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1.4 animal-sniffer-annotations 1.14

1.5 antisamy 1.5.8

1.6 apache-el 8.5.40

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1.7 apache-httpclient 4.5.9

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1.8 archaius-core 0.7.6

1.9 asm 7.0

1.10 asm 7.1

1.11 asm 5.0.4

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1.12 asm-analysis 7.1

1.13 asm-commons 7.1

1.14 asm-tree 7.1

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1.16 aspectj 1.9.4

1.17 batik-constants 1.11

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1.23 bcprov-ext-jdk15on 1.62

1.24 Beanshell 2.0b6

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1.26 bouncycastle 1.56

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The following organisations and people have contributed to the Bouncy Castle Cryptography Package.
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Germano Rizzo <germano.rizzo&#064gmail.com> - initial implementation of CMac, EAX, HC-128, and HC-256, optimisations for Salsa20.
Núria Marí <numaa&#064hotmail.com> - patch for alternate data type recoginition in CMSSignedDataParser.
Janis Schuller <js&#064tzi.de> - addition of NotationData packets for OpenPGP.
Michael Samblanet <mike&#064samblanet.com> - patches towards improved Sun/default provider support in

CMS.
Mike StJohns <mstjohns&#064comcast.net> - patches for supporting empty subject in X.509 certificate generation, noneWithECDSA.
Ramon Keller <ramon.keller&#064gmx.ch> - patch to deal with null revocations return from other CRL in X509V2CRLGenerator.
Mark Nelson <mark&#064nbr.com> - correction to excluded DN in name constraints processing for PKIX processing.
Eugene Golushkov <eugene_gff&#064ukr.net> - mask fix to single byte read in TlsInputStream.
Julien Pasquier <julienpasquier&#064free.fr> - additional classes for supporting signature policy and signer certificates in the ASN.1 esf and ess libraries.
Peter Knopp <pknopp&#064mtg.de> - fix for named curve recognition in ECGOST key generation.
Jakub Gwozdz <gwozdziu&#064rpg.pl> - addition of getTsa() to TimeStampTokenInfo.
Bartosz Malkowski <bmalkow&#064tigase.org> - initial implementation of VMPC cipher, VMPCRandomGenerator, VMPCMac.
Tal Yacobi <tal.yacobi&#064octavian-tech.com> - fix for issue in OpenPGP examples [#BJA-55].
Massimiliano Ziccardi <massimiliano.ziccardi&#064gmail.comt> - support for counter signature reading in CMS API, update for multiple counter signature attributes.
Andrey Pavlenko <andrey.a.pavlenko&#064gmail.com> - security manager patch for PKCS1Encoding property check.
Mike StJohns <mstjohns&#064comcast.net> - updates to KeyPurposeId
J Ross Nicoll <jrn&#064jrn.me.uk> - improved exception handling for getInstance() in ASN.1 library.
Matthew Stevenson <mavricknz&#064yahoo.com> - patch to construtor for CRMF CertSequence.
Gabriele Contini <gcontini&#064hotpop.com> - identified a bug in ASN.1 library with handling of unterminated NDEF's.
Roelof Naude <roelof.naude&#064epiuse.com> - patch for TLS client to send empty client certs in response to HP_CERTIFICATE_REQUEST.
Patrick Peck <peck&#064signaturen.at> - identified problem with DERApplicationSpecific and high tag numbers in ASN.1 library.
Michael LeMay <lemaymd&#064lemaymd.com> - identified problem with EAX [#BJA-93].
Alex Dupre <ale&#064FreeBSD.org> - fix to use of Signature rather than SignatureSpi in provider [#BJA-90]. Addition of null provider use to SignedPublicKeyAndChallenge and PKCS10CertificationRequest [#BJA-102]
Michael Schoene <michael&#064sigrid-und-michael.de> - fix of improper handling of null in ExtendedPKIXParameters.setTrustedACIssuers(), check for V2 signingCertificate attribute in TimeStampResponse.validate().
Ion Larrañaga <ilarra&#064s21sec.com> fix to default partial packet generation in BCPGOutputStream.
Bob Kerns <bob.kerns&#064positscience.com> fix to hashCode for X509CertificateObject.
Stefan Meyer <stefan.meyer&#064ewe.de> backport for PKIXCertPathValidotor and SMIMESignedMailReviewer.
Robert J. Moore <Robert.J.Moore&#064allanbank.com> speedups for OpenPGPCFB mode, clean room JCE patches.
Rui Hodai <rui&#064po.ntts.co.jp> speed ups for Camellia implementation, CamelliaLightEngine.
Emir Bucalovic <emir.bucalovic&#064mail.com> initial implementation of Grain-v1 and Grain-128.
Torbjorn Svensson <tobbe79&#064gmail.com> initial implementation of Grain-v1 and Grain-128.
Paul FitzPatrick <bouncycastle_pfitz&#064fitzpatrick.cc> error message fix to X509LDAPCertStoreSpi, comparison fix to BCStrictStyle.
Henrik Andersson <k.henrik.andersson&#064gmail.com> addition of UniqueIssuerID to certificate generation.

Cagdas Cirit <cagdascirit&#064gmail.com> subjectAlternativeName fix for x509CertStoreSelector.
Harakiri <harakiri_23&#064yahoo.com> datahandler patch for attached parts in SMIME signatures.
Pedro Henriques <pmahenriques&#064gmail.com> explicit bounds checking for DESKeyGenerator, code simplification for OAEPEncoding.
Lothar Kimmeringer <job&#064kimmeringer.de> verbose mode for ASN1Dump, support for DERExternal.
Richard Farr <rfarr.se&#064gmail.com> initial SRP-6a implementation.
Thomas Castiglione <castiglione&#064au.ibm.com> patch to encoding for CRMF OptionalValidity.
Elisabetta Romani <eromani&#064sogei.it> patch for recognising multiple counter signatures.
Robin Lundgren <r737lundgren&#064gmail.com> CMPCertificate constructor from X509CertificateStructure fix.
Petr Kadlec <mormegil&#064centrum.cz> fix to sign extension key and IV problem in HC-128, HC-256.
Andreas Antener <antener_a&#064gmx.ch> fix to buffer reset in AsymmetricBufferedBlockCipher.
Harendra Rawat <hsrawat&#064yahoo.com> fix for BERConstructedOctetString.
Rolf Lindemann <lindemann&#064trustcenter.de> patch for PKCS12 key store to support more flexible attribute specifications [#BMA-42].
Alex Artamonov <alexart.home&#064gmail.com> name look up patch for GOST-2001 parameters.
Mike Lyons <mlyons&#064layer7tech.com> work arounds for EC JDK bug 6738532 and JSSE EC naming conventions.
Chris Cole <chris_h_cole&#064yahoo.com> identified a problem handling null passwords when loading a BKS keystore.
Tomas Krivanek <tom&#064atack.cz> added checking of Sender header to SignedMailValidator.
Michael <emfau&#064t-online.de> correction of field error in getResponse method in CertRepMessage.
Trevor Perrin <trevor&#064cryptography.com> addition of constant time equals to avoid possible timing attacks.
Markus Kilås <markus&#064primekey.se> several enhancements to TimeStampResponseGenerator.
Dario Novakovic <darionis&#064yahoo.com> fix for NPE when checking revocation reason on CRL without extensions.
Michael Smith <msmith&#064cbnco.com> bug fixes and enhancements to the CMP and CRMF classes, initial Master List classes.
Andrea Zilio <andrea.zilio&#064gmail.com> fix for PEM password encryption of private keys.
Alex Birkett <alex&#064birkett.co.uk> added support for EC cipher suites in TLS client (RFC 4492) [#BJA-291].
Wayne Grant <waynedgrant&#064gmail.com> additional OIDs for PCKS10 and certificate generation support.
Frank Cornelis <info&#064frankcornelis.be> additional support classes for CAdES, enhancements to OCSP classes.
Jan Dittberner <jan&#064dittberner.info> addHeader patch for SMIME generator.
Bob McGowan <boab.mcgoo&#064btinternet.com> patch to support different content and mgf digests in PSS signing.
Ivo Matheis <i.matheis&#064seeburger.de> fix to padding verification in ISO-9796-1.
Marco Sandrini <nessche&#064gmail.com> patch to add IV to ISO9797Alg3Mac.
Alf Malf <alfilmalf&#064hotmail.com> removal of unnecessary limit in CMSContentInfoParser.
Alfonso Massa <alfonso.massa&#064insiel.it> contributions to CMS time stamp classes.
Giacomo Boccardo <gboccardo&#064unimaticaspa.it> initial work on CMSTimeStampedDataParser.
Arnis Tartu <arnis&#064ut.ee> patches for dealing with OIDs with specific key sizes associated in CMS.
Janusz Sikociski <J.Sikocinski&#064gdzie.pl> addition of Features subpacket support to OpenPGP API.
Juri Hudolejev <jhudolejev&#064gmail.com> JavaDoc fix to CMSSignedDataParser.

Liane Velten <liane.velten&#064hjp-consulting.com> fine tuning of code for DHParameters validation.
Shawn Willden <swillden&#064google.com> additional functionality to PGPKeyRing.
Atanas Krachev <akrachev&#064gmail.com> added support for revocation signatures in OpenPGP.
Mickael Laiking <mickael.laiking&#064keynectis.com> initial cut of EAC classes.
Tim Buktu <tbuktu&#064hotmail.com> Initial implementation of NTRU signing and encryption.
Bernd <rbernd&#064gmail.com> Fix for open of PGP literal data stream with UTF-8 naming.
Steing Inge Morisbak <stein.inge.morisbak&#064BEKK.no> Test code for lower case Hex data in PEM headers.
Andreas Schmid <andreas.schmid&#064tngtech.com> Additional expiry time check in PGPPublicKeys.
Phil Steitz <phil.steitz&#064gmail.com> Final patch eliminating JCE dependencies in the OpenPGP BC classes.
Ignat Korchagin <ignat.korchagin&#064gmail.com> Initial implementation of DSTU-4145-2002, long hash fix for DSTU-4145-2002.
Petar Petrov <p.petrov&#064bers-soft.com> Testing and debugging of UTF-8 OpenPGP passwords.
Daniel Fitzpatrick <daniel.f.nwr&#064gmail.com> Initial implementation of ephemeral key support for IES, initial implementions of RSA-KEM and ECIES-KEM, initial implementation of homogeneous projective coordinates for EC.
Andy Neilson <Andy.Neilson&#064quest.com>a further patches to deal with multiple providers and PEMReader.
Ted Shaw <xiao.xj&#064gmail.com> patch to MiscPEMGenerator for handling new PKCS10CeritficationRequests.
Eleriseth <Eleriseth&#064WPECGLtYbVi8Rl6Y7Vzl2Lvd2EUVW99v3yNV3IWROG8.fms> speed up for SIC/CTR mode. Provider compatibilty generalisations for EC operations.
Kenny Root <kenny&#064the-b.org> patch for issuerAltName, subjectAltName support in X509CertificateObject, BaseBlockCipher.getIV() patch for AEAD.
Maarten Bodewes <maarten.bodewes&#064gmail.com> initial implementation of HKDF and NIST SP 800-108 MAC based KDF functions.
Philip Clay <pilf_b&#064gyahoo.com> Initial implementation of J-PAKE.
Brian Carlstrom <bdc&#064carlstrom.com> compliance patches for some JCA/JCE keystore and cipher classes, miscellaneous code quality improvements, intial provider PBKDF2WithHmacSHA1 SecretKeyFactory.
Samuel Lidén Borell <samuel&#064primekey.se> patch to add DSTU-4145 to DefaultSignatureAlgorithmFinder
Sergio Demian Lerner <sergiolerner&#064certimix.com> pointing out isInfinity issue in ECDSASigner signature verification.
Tim Whittington <Tim.Whittington&#064orionhealth.com> patch to remove extra init call in CMac, additional of Memoable interface for Digest classes, initial implementation of GMAC, further correctness tests for IV and reset processing in OCB, CCM, and block cipher reset. Initial implementation of Skein, XSalsa20, ChaCha, reduced round Salsa20, Threefish, and the Poly1305 MAC. Documentation updates. Added OCB support to Noekeon and CAST6 in the provider, exception testing for CTS, optimisations for CCM, provider support for AAD cipher methods, safe CipherInput/OutputStream implementations for use with AAD and subsequent bug fixes, cleanup after IDEA patent expiry, work on JCE SipHash support, optimisations for AESFastEngine, further work on EncodableDigest for SHA-2 digests, contributions to BCrypt/OpenBSDBCrypt, PGP API documentation and code quality work.
Marcus Lundblad <marcus.lundblad&#064primekey.se> patch for working arnound JDK jarsigner TSP bug, optional setting of IssuerSerial in TimeStampTokenGenerator, additional extensions enhancement for time stamp token generation.
Andrey Zhozhin <zhozhin&#064xrm.ru> patch for override of TSP SignerInfo attributes.
Sergey Tiunov <t5555d&#064gmail.com> initial cut of DVCS classes.

Damian Kolasa <fatfredyy&#064gmail.com> ASN1Sequence patch for class cast issue in X9Curve.
Ash Hughes <ashley.hughes&#064blueyonder.co.uk> patches for supporting PGPSecretKeyRing/PGPSecretKeys encodings with empty private keys, initial code for PGPSignatureSubpacketVector.getEmbeddedSignatures().
Daniel Hirscher <dev&#064daniel-hirscher.de> patch to support parsing of explicit EC parameters in PEM files.
Daniele Ricci <daniele.athome&#064gmail.com> initial implementation of EC keys for OpenpPGP and RFC6637 support.
Matti Aarnio <matti.aarnio&#064methics.fi> tweaks to any build to remove dependence on shell scripts. Initial SM3 digest implementation, some EC related code cleanups, JavaDoc improvements for ASN.1 classes.
Babak Najafi <bnajafi&#064akamai.com> fixes to OpenPGP NotationData to prevent truncation problems.
Eric Müller <eric.mueller&#064sage.de> additional standard algorithm name lookups in JcaPEMKeyConverter.
Mathias Herberts <Mathias.Herberts&#064gmail.com> fix to inOff usage in RFC3394WrapEngine.
Daniil Ivanov <daniil.ivanov&#064gmail.com> addition of provider support for GOST HMAC SecretKeyFactory.
Daniele Grasso <daniele.grasso86&#064gmail.com> contributions to final Key calculation code for SRP6.
Andrey Utkin <cindrhc&#064gmail.com> patch to reconstruction of ECGOST keys from PrivateKeyInfo objects in provider classes.
Arnis Tartu <arnis&#064ut.ee> checker for generated key vs OID in JceCMSContentEncryptorBuilder.
AxelVDB <axel-vdb&#064riseup.net> initial implementation of Shacal2.
Roberto Tyley <> further work on completing gradle build.
Waldemar Dick <wdick&#064devmue.de> code improvement in x500 ASN.1 package.
Sid Steward <sid.steward&#064pdflabs.com> code improvements to ASN1Boolean.
Alex Klyubin <klyubin&#064google.com> AlgorithmParameters check for EC key agreement.
Jonathan Gillett <gsoc.student&#064gmail.com> Initial support for block cipher IVs in IESEngine, IES MAC length check bug fix.
Andreas Reiter <andreas.reiter&#064iaik.tugraz.at> Reported incomplete status of CertificateVerify processing in (D)TLS server, and provided fix.
Kieran Miller <kieran.miller&#064gmail.com> initial implementation for RFC 5649 key wrap with padding.
Oliver Ehli<ehli&#064arago.de> Additional support for BSI plain ECDSA in the provider.
Daniel Heldt<Daniel.Heldt&#064cryptovision.com> Initial support for encodable state message digests
Robert Bushman <bouncycastle&#064traxel.com> Clean up of DirectKeySignature example.
Maurice Aarts<aarts&#064riscure.com> updated to KDF generator to follow NIST SP 800-108.
Franziskus Kiefer<https://github.com/franziskuskiefer> initial implementation of Cramer-Shoup.
KB Sriram<mail_kb&#064yahoo.com> testing for odd encodings for PGP User Attribute Subpackets.
Marco Schulze<marco&#064nightlabs.de> Reported verification bug in GenericSigner.
Martin Schaef<https://github.com/martinschaef> contributed a code-cleanup patch.
Lijun Liao<&jun.liao&#064gmail.comgt; addition of getSignatureAlgorithmID to BasicOCSPResp.
dstutz<https://github.com/dstutz> added iteration count setters to PKCS#12 PBE mac/key generator builders.
Tobias Wich<tobias.wich&#064ecsec.de> Provided patch for TLS to work around servers sending Supported Elliptic Curves extension unexpectedly.
Hauke Mehrtens<hauke&#064hauke-m.de> TLS patch to add ECDHE_ECDSA CCM ciphersuites from RFC 7251.
Daniel Zimmerman<dmz&#064galois.com> Further key quality improvements to RSAKeyPairGenerator.
Jens Kapitza&ltj.kapitza&#064schwarze-allianz.de> Iterable support in OpenPGP API, code cleanup in

OpenPGP API.
Johan Eklund<johan&#064primekey.se> update to RFC 6960 for OCSPObjectIdentifiers.
nikosn<https://github.com/nikosn> Fix to encoding of EC private keys to ensure encoding matches order length.
Axel von dem Bruch <axel-vdb&#064riseup.net> Contributions to BCrypt/OpenBSDBCrypt, original version of Blake2bDigest.
Derek Atkins <derek&#064ihtfp.com> Documentation fixes to X9ObjectIdentifiers.
Peter Jr Halicky <peto&#064halicky.sk> Correction to notification/error message handling in SignedMailValidator.
lartiguePierre<https://github.com/lartiguePierre> Fix for counter signature SID in CMSSignedData.
Thomas Belot<thomas.belot+BC&#064gmail.com> initial CertPathLoopTest for demonstrating stack overflow issue.
Rich DiCroce<https://github.com/rdicroce> Initial implementation of server-side TLS-SRP support. TLS API extension to support non-blocking usage.
Björn Kautler<https://github.com/Vampire> Refinements to cert path validation (authority key addition, certificate order preservation).
Dominik Schürmann<https://github.com/dschuermann> method for returning signatures/verifications without user IDs on PGPPublicKey, method for exposing S2K in PGPSecretKey, constants for GNU protection modes in S2K classes, optional version header for armored output.
Michael <MSKnete&#064web.de> initial fix for bitStrength issue for OpenPGP EC keys.
Tobias Wagner <tobias.wagner&#064n-design.de> Fix SecureRandom handling in BcAsymmetricKeyWrapper [#BJA-536].
Sergio Giro <sgiro&#064google.com> Fixed adding of additional stores from CRL distribution point [#BJA-537]. Fixed missing null check for CRL certificate issuer [#BJA-538], removal of risky zeroisation code in PBE.java, check for salt in PBEKeys that require it.
bschuette<https://github.com/bschuette> Fixed typo in DefaultSignatureAlgorithmIdentifierFinder, additional methods on CMSSignedDataParser.
Leonard Dallot<https://github.com/dallotTazTag> Fix to S2K usage of none on changing passwords on keys without passwords originally.
Jan Willem Janssen <j.w.janssen+bouncycastle&#064lxtreme.nl> Support for DSAParameters in lightweight SubjectPublicKeyInfoFactory, initial content signer verifier for BC lightweight EC.
Sebastian Oerding <sebastian.oerding@robotron.de> Fixes to toString() in x509.CertificatePolicies.
Kai Kramer <kai.kramer&#064gmail.com> Code to deal with orphaned chain certificates in the PKCS#12 KeyStore.
Benoit Charles <benoit.charles&#064opentrust.com> Fix for IES data length check on decryption.
Niko <nfink95&#064gmail.com> fix to cast issue in getOutputSize() for ECIES.
akwizgran<https://github.com/akwizgran> Fixed clone of key in Blake2bDgest copy constructor, blake2b reset issue for varient keys.
Matthias Edelhoff <Matthias.Edelhoff&#064cryptovision.com> BasicConstraintsValidation pathlen fix in PKIX certpath classes.
Lukasz Deputat <lukasz.deputat&#064gmail.com> Fixed bugs in TlsUtils read methods [#BJA-592].
Justin Ludwig <https://github.com/justinludwig> Iterator fix for PGPObjectFactory to handle stream packets at start of iterated data.
André Berenguel <https://github.com/aberenguel> Fix to include ECNamedCurveSpec in EC AlgorithmParameterSpi
Slawomir Jaranowski<https://github.com/slawekjaranowski> Patch to make cipher/hash/signature name methods in PGP internal API public.
Andrey Vasilyev<https://github.com/andrey-vasilyev> Initial implementation of GOST R 34.11-2012.

William Glanton <wglanton77&#064gmail.com> Fixed bug in Poly1305 [#BJA-620].
jdvorak001<https://github.com/jdvorak001> Speed improvements for ASN.1 ObjectIdentifier cache.
Joseph Naegele <jnaegele@grierforensics.com> Patch for handling multiple certificates in a DANE SMIMEA entry.
Andrew Bonventre<https://github.com/andybons> NullPointer patch for WNafUtil.
The Google Security Team (Project Wycheproof) <https://github.com/google/wycheproof> defect analysis and additional test cases for the provider.
The Intel Security Team <> analysis detecting the issue with AESFastEngine (CVE-2016-1000339), additional suggestions for improvement to hardening of AESEngine.

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1.27 bouncycastle 1.62

1.28 brave 5.6.5

1.29 brave-context-log4j2 5.6.5

1.30 brave-instrumentation-http 5.6.5

1.31 brave-instrumentation-httpasyncclient 5.6.5

1.32 brave-instrumentation-httpclient 5.6.5

1.33 brave-instrumentation-jms 5.6.5

1.34 brave-instrumentation-kafka-clients 5.6.5

1.35 brave-instrumentation-servlet 5.6.5

1.36 brave-instrumentation-spring-rabbit 5.6.5

1.37 brave-instrumentation-spring-web 5.6.5

1.38 brave-instrumentation-spring-webmvc 5.6.5

1.39 builder-annotations 0.18.0

1.40 byte-buddy 1.9.16

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1.42 byte-buddy-dep 1.9.16

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1.43 cassandra-driver-core 3.6.0

1.44 cassandra-lucene-index-builder 3.10.0 :3.10.0

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1.45 cglib 3.2.10

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1.46 checker-qual 2.0.0

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Java ClassMate library was originally written by Tatu Saloranta (tatu.saloranta@iki.fi)

Other developers who have contributed code are:

* Brian Langel

1.48 client-java 5.0.0

1.49 client-java-api 5.0.0

1.50 client-java-proto 5.0.0

1.51 commons-beanutils 1.9.4

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1.52 commons-beanutils-core 1.8.3

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*/
package org.apache.commons.compress.archivers;

import java.util.Date;

/**
* Represents an entry of an archive.
*/
public interface ArchiveEntry {

  /**
   * Gets the name of the entry in this archive. May refer to a file or directory or other item.
   *
   * <p>This method returns the raw name as it is stored inside of the archive.</p>
   *
   * @return The name of this entry in the archive.
   */
  String getName();

  /**
   * Gets the uncompressed size of this entry. May be -1 (SIZE_UNKNOWN) if the size is unknown
   *
   * @return the uncompressed size of this entry.
   */
  long getSize();

  /** Special value indicating that the size is unknown */
  long SIZE_UNKNOWN = -1;

  /**
   * Returns true if this entry refers to a directory.
   *
   * @return true if this entry refers to a directory.
   */
  boolean isDirectory();

  /**
   * Gets the last modified date of this entry.
   *
   * @return the last modified date of this entry.
   * @since 1.1
   */
  Date getLastModifiedDate();
```

}
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http://snowball.tartarus.org/

The KStem stemmer in
analysis/common/src/org/apache/lucene/analysis/en
was developed by Bob Krovetz and Sergio Guzman-Lara (CIIR-UMass Amherst)
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The Arabic,Persian,Romanian,Bulgarian, Hindi and Bengali analyzers (common) come with a default
stopword list that is BSD-licensed created by Jacques Savoy. These files reside in:
analysis/common/src/resources/org/apache/lucene/analysis/ar/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/fa/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/ro/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers
(common) are based on BSD-licensed reference implementations created by Jacques Savoy and
Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/hu/HungarianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/it/ItalianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/pt/PortugueseLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/ru/RussianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

The Stempel analyzer (stempel) includes BSD-licensed software developed
by the Egothor project http://egothor.sf.net/, created by Leo Galambos, Martin Kvapil,
and Edmond Nolan.

The Polish analyzer (stempel) comes with a default
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in stempel/src/resources/org/apache/lucene/analysis/pl/stopwords.txt.
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The SmartChineseAnalyzer source code (smartcn) was
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Kuromoji Japanese Morphological Analyzer - Apache Lucene Integration
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// Transitive dependencies of this project determined from the
// maven pom organized by organization.
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Apache Extras for Apache log4j.

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- geronimo-jms_1.1_spec org.apache.geronimo.specs:geronimo-jms_1.1_spec:jar:1.0

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The code for the t-digest was originally authored by Ted Dunning

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[role="xpack"]
[[license-settings]]
=== {xpack} License Settings
++++
<titleabbrev>License Settings</titleabbrev>
++++

You can configure this licensing setting in the `elasticsearch.yml` file. For more information, see {xpack-ref}/license-management.html[{xpack} License Management].

`xpack.license.self_generated.type`::
Set to `basic` (default) to enable basic {xpack} features. +
+
--
If set to `trial`, the self-generated license gives access only to all the features of a x-pack for 30 days. You can later downgrade the cluster to a basic license if needed.
--
[role="xpack"]
[testenv="basic"]
[[update-license]]
=== Update License API

This API enables you to update your license.

[float]
==== Request

`PUT _xpack/license`

[float]
==== Description

You can update your license at runtime without shutting down your nodes.
License updates take effect immediately. If the license you are installing does
not support all of the features that were available with your previous license,
however, you are notified in the response. You must then re-submit the API
request with the `acknowledge` parameter set to `true`.

For more information about the different types of licenses, see
https://www.elastic.co/subscriptions.

[float]
==== Query Parameters

`acknowledge`::
 (boolean) Specifies whether you acknowledge the license changes. The default
 value is `false`.

[float]
==== Request Body

`licenses`::
 (array) A sequence of one or more JSON documents containing the license
 information.

[float]
==== Authorization

If {security} is enabled, you need `manage` cluster privileges to install the
license.

If {security} is enabled and you are installing a gold or platinum license, you
must enable TLS on the transport networking layer before you install the license.
See <<configuring-tls>>.

[float]
==== Examples

The following example updates to a basic license:

[source,js]

POST _xpack/license
{
 "licenses": [
   {

```
    "uid":"893361dc-9749-4997-93cb-802e3d7fa4xx",
    "type":"basic",
    "issue_date_in_millis":1411948800000,
    "expiry_date_in_millis":1914278399999,
    "max_nodes":1,
    "issued_to":"issuedTo",
    "issuer":"issuer",
    "signature":"xx"
  }
  ]
}
---------------------------------------------------------------
// CONSOLE
// TEST[skip:license testing issues]
```

NOTE: These values are invalid; you must substitute the appropriate content
from your license file.

You can alternatively use a `curl` command, for example:

```
[source,js]
[source,shell]
---------------------------------------------------------------
curl -XPUT -u <user> 'http://<host>:<port>/_xpack/license' -H "Content-Type: application/json" -d @license.json
---------------------------------------------------------------
// NOTCONSOLE
```

On Windows machine, use the following command:

```
[source,shell]
---------------------------------------------------------------
gc .\license.json |  Invoke-WebRequest -uri http://<host>:<port>/_xpack/license -Credential elastic -Method Put -
ContentType "application/json"
---------------------------------------------------------------
```

In these examples,

* `<user>` is a user ID with the appropriate authority.
* `<host>` is the hostname of the {es} node (`localhost` if executing
 locally)
* `<port>` is the http port (defaults to `9200`)
* `license.json` is the license JSON file

NOTE: If your {es} node has SSL enabled on the HTTP interface, you must
 start your URL with `https://`

If you previously had a license with more features than the basic license, you
receive the following response:

[source,js]

{
 "acknowledged": false,
 "license_status": "valid",
 "acknowledge": {
   "message": """This license update requires acknowledgement. To acknowledge the license, please read the following messages and update the license again, this time with the "acknowledge=true" parameter:""",
   "watcher": [
     "Watcher will be disabled"
   ],
   "logstash": [
     "Logstash will no longer poll for centrally-managed pipelines"
   ],
   "security": [
     "The following X-Pack security functionality will be disabled: ..."]
   }
}

// NOTCONSOLE

To complete the update, you must re-submit the API request and set the
`acknowledge` parameter to `true`. For example:

[source,js]

POST _xpack/license?acknowledge=true
{
 "licenses": [
   {
     "uid":"893361dc-9749-4997-93cb-802e3d7fa4xx",
     "type":"basic",
     "issue_date_in_millis":1411948800000,
     "expiry_date_in_millis":1914278399999,
     "max_nodes":1,
     "issued_to":"issuedTo",
     "issuer":"issuer",
     "signature":"xx"
   }
   ]
}

// CONSOLE
// TEST[skip:license testing issues]

Alternatively:

[source,sh]
----
curl -XPUT -u elastic 'http://<host>:<port>/_xpack/license?acknowledge=true' -H "Content-Type: application/json"
-d @license.json

// NOTCONSOLE

For more information about the features that are disabled when you downgrade
your license, see {xpack-ref}/license-expiration.html[License Expiration].
[role="xpack"]
[testenv="basic"]
[[delete-license]]
=== Delete License API

This API enables you to delete licensing information.

[float]
==== Request

`DELETE /_xpack/license`

[float]
==== Description

When your license expires, {xpack} operates in a degraded mode. For more
information, see {xpack-ref}/license-expiration.html[License Expiration].

[float]
==== Authorization

You must have `manage` cluster privileges to use this API.
For more information, see
{xpack-ref}/security-privileges.html[Security Privileges].

[float]
==== Examples

The following example queries the info API:

[source,js]

DELETE _xpack/license

// CONSOLE
// TEST[skip:license testing issues]

When the license is successfully deleted, the API returns the following response:
[source,js]

```
--------------------------------------------------------------------
{
 "acknowledged": true
}
--------------------------------------------------------------------
// NOTCONSOLE
[role="xpack"]
[testenv="basic"]
[[get-license]]
=== Get License API

This API enables you to retrieve licensing information.

[float]
==== Request

`GET /_xpack/license`

[float]
==== Description

This API returns information about the type of license, when it was issued, and
when it expires, for example.

For more information about the different types of licenses, see
https://www.elastic.co/subscriptions.


[float]
==== Query Parameters

`local`::
 (boolean) Specifies whether to retrieve local information. The default value
 is `false`, which means the information is retrieved from the master node.


[float]
==== Authorization

You must have `monitor` cluster privileges to use this API.
For more information, see
{xpack-ref}/security-privileges.html[Security Privileges].


[float]
==== Examples

The following example provides information about a trial license:
```

[source,js]

GET _xpack/license

// CONSOLE

[source,js]

{
 "license" : {
   "status" : "active",
   "uid" : "cbff45e7-c553-41f7-ae4f-9205eabd80xx",
   "type" : "trial",
   "issue_date" : "2018-10-20T22:05:12.332Z",
   "issue_date_in_millis" : 1540073112332,
   "expiry_date" : "2018-11-19T22:05:12.332Z",
   "expiry_date_in_millis" : 1542665112332,
   "max_nodes" : 1000,
   "issued_to" : "test",
   "issuer" : "elasticsearch",
   "start_date_in_millis" : -1
 }
}

// TESTRESPONSE[s/"cbff45e7-c553-41f7-ae4f-9205eabd80xx"/$body.license.uid/]
// TESTRESPONSE[s/"basic"/$body.license.type/]
// TESTRESPONSE[s/"2018-10-20T22:05:12.332Z"/$body.license.issue_date/]
// TESTRESPONSE[s/1540073112332/$body.license.issue_date_in_millis/]
// TESTRESPONSE[s/"2018-11-19T22:05:12.332Z"/$body.license.expiry_date/]
// TESTRESPONSE[s/1542665112332/$body.license.expiry_date_in_millis/]
// TESTRESPONSE[s/1000/$body.license.max_nodes/]
// TESTRESPONSE[s/"test"/$body.license.issued_to/]
// TESTRESPONSE[s/"elasticsearch"/$body.license.issuer/]
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[[java-rest-high-delete-license]]
=== Delete License

[[java-rest-high-delete-license-execution]]
==== Execution

The license can be deleted using the `deleteLicense()` method:

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[delete-license-execute]

[[java-rest-high-delete-license-response]]
==== Response

The returned `DeleteLicenseResponse` contains the `acknowledged` flag, which
returns true if the request was processed by all nodes.

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[delete-license-response]

<1> Check the acknowledge flag. It should be true if license deletion is acknowledged.

[[java-rest-high-delete-license-async]]
==== Asynchronous Execution

This request can be executed asynchronously:

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[delete-license-execute-async]

<1> The `DeleteLicenseRequest` to execute and the `ActionListener` to use when
the execution completes

The asynchronous method does not block and returns immediately. Once it is
completed the `ActionListener` is called back using the `onResponse` method
if the execution successfully completed or using the `onFailure` method if
it failed.

A typical listener for `DeleteLicenseResponse` looks like:

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[delete-license-execute-listener]

```
--------------------------------------------------
<1> Called when the execution is successfully completed. The response is
provided as an argument
<2> Called in case of failure. The raised exception is provided as an argument
[[java-rest-high-put-license]]
=== Update License

[[java-rest-high-put-license-execution]]
==== Execution

The license can be added or updated using the `putLicense()` method:

["source","java",subs="attributes,callouts,macros"]
--------------------------------------------------
include-tagged::{doc-tests}/LicensingDocumentationIT.java[put-license-execute]
--------------------------------------------------
<1> Set the categories of information to retrieve. The default is to
return no information which is useful for checking if {xpack} is installed
but not much else.
<2> A JSON document containing the license information.

[[java-rest-high-put-license-response]]
==== Response

The returned `PutLicenseResponse` contains the `LicensesStatus`,
`acknowledged` flag and possible acknowledge messages. The acknowledge messages
are present if you previously had a license with more features than one you
are trying to update and you didn't set the `acknowledge` flag to `true`. In this case
you need to display the messages to the end user and if they agree, resubmit the
license with the `acknowledge` flag set to `true`. Please note that the request will
still return a 200 return code even if requires an acknowledgement. So, it is
necessary to check the `acknowledged` flag.

["source","java",subs="attributes,callouts,macros"]
--------------------------------------------------
include-tagged::{doc-tests}/LicensingDocumentationIT.java[put-license-response]
--------------------------------------------------
<1> The status of the license
<2> Make sure that the license is valid.
<3> Check the acknowledge flag. It should be true if license is acknowledged.
<4> Otherwise we can see the acknowledge messages in `acknowledgeHeader()`
<5> and check component-specific messages in `acknowledgeMessages()`.

[[java-rest-high-put-license-async]]
==== Asynchronous Execution

This request can be executed asynchronously:
```

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[put-license-execute-async]

<1> The `PutLicenseRequest` to execute and the `ActionListener` to use when
the execution completes

The asynchronous method does not block and returns immediately. Once it is
completed the `ActionListener` is called back using the `onResponse` method
if the execution successfully completed or using the `onFailure` method if
it failed.

A typical listener for `PutLicenseResponse` looks like:

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[put-license-execute-listener]

<1> Called when the execution is successfully completed. The response is
provided as an argument
<2> Called in case of failure. The raised exception is provided as an argument
[[java-rest-high-get-license]]
=== Get License

[[java-rest-high-get-license-execution]]
==== Execution

The license can be added or updated using the `getLicense()` method:

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[get-license-execute]

[[java-rest-high-get-license-response]]
==== Response

The returned `GetLicenseResponse` contains the license in the JSON format.

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[get-license-response]

<1> The text of the license.

[[java-rest-high-get-license-async]]
==== Asynchronous Execution

This request can be executed asynchronously:

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[get-license-execute-async]

<1> The `GetLicenseRequest` to execute and the `ActionListener` to use when
the execution completes

The asynchronous method does not block and returns immediately. Once it is
completed the `ActionListener` is called back using the `onResponse` method
if the execution successfully completed or using the `onFailure` method if
it failed.

A typical listener for `GetLicenseResponse` looks like:

["source","java",subs="attributes,callouts,macros"]
----
include-tagged::{doc-tests}/LicensingDocumentationIT.java[get-license-execute-listener]

<1> Called when the execution is successfully completed. The response is
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<2> Called in case of failure. The raised exception is provided as an argument
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Posted Date: April 20, 2018

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Jackson JSON processor

Jackson is a high-performance, Free/Open Source JSON processing library.
It was originally written by Tatu Saloranta (tatu.saloranta@iki.fi), and has
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It is currently developed by a community of developers, as well as supported
commercially by FasterXML.com.

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The art of simplicity is a puzzle of complexity.

Overview
[YAML](http://yaml.org) is a data serialization format designed for human readability and interaction with scripting languages.

SnakeYAML is a YAML processor for the Java Virtual Machine.

SnakeYAML features

* a **complete** [YAML 1.1 processor](http://yaml.org/spec/1.1/current.html). In particular, SnakeYAML can parse all examples from the specification.
* Unicode support including UTF-8/UTF-16 input/output.
* high-level API for serializing and deserializing native Java objects.

* support for all types from the [YAML types repository](http://yaml.org/type/index.html).
* relatively sensible error messages.

Info
* [Changes](https://bitbucket.org/asomov/snakeyaml/wiki/Changes)
* [Documentation](https://bitbucket.org/asomov/snakeyaml/wiki/Documentation)

Contribute
* Mercurial DVCS is used to dance with the [source code](https://bitbucket.org/asomov/snakeyaml/src).
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src/test/org/apache/commons/codec/language/DoubleMetaphoneTest.java
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==========

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*/
package org.elasticsearch.client.license;

import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.client.common.ProtocolUtils;
import org.elasticsearch.test.ESTestCase;

import java.io.IOException;
import java.util.Collections;
import java.util.HashMap;
import java.util.Map;

import static org.hamcrest.CoreMatchers.equalTo;

public class StartBasicResponseTests extends ESTestCase {

  public void testFromXContent() throws Exception {
     StartBasicResponse.Status status = randomFrom(StartBasicResponse.Status.values());

     boolean acknowledged = status != StartBasicResponse.Status.NEED_ACKNOWLEDGEMENT;
     String acknowledgeMessage = null;
     Map<String, String[]> ackMessages = Collections.emptyMap();
     if (status != StartBasicResponse.Status.GENERATED_BASIC) {
        acknowledgeMessage = randomAlphaOfLength(10);
        ackMessages = randomAckMessages();
     }

     final StartBasicResponse startBasicResponse = new StartBasicResponse(status, ackMessages,
acknowledgeMessage);

     XContentType xContentType = randomFrom(XContentType.values());
     XContentBuilder builder = XContentFactory.contentBuilder(xContentType);

     toXContent(startBasicResponse, builder);

     final StartBasicResponse response = StartBasicResponse.fromXContent(createParser(builder));
     assertThat(response.isAcknowledged(), equalTo(acknowledged));
     assertThat(response.isBasicStarted(), equalTo(status.isBasicStarted()));
     assertThat(response.getAcknowledgeMessage(), equalTo(acknowledgeMessage));
```

```
        assertThat(ProtocolUtils.equals(response.getAcknowledgeMessages(), ackMessages), equalTo(true));
    }

    private static void toXContent(StartBasicResponse response, XContentBuilder builder) throws IOException {
        builder.startObject();
        builder.field("acknowledged", response.isAcknowledged());
        if (response.isBasicStarted()) {
            builder.field("basic_was_started", true);
        } else {
            builder.field("basic_was_started", false);
            builder.field("error_message", response.getErrorMessage());
        }
        if (response.getAcknowledgeMessages().isEmpty() == false) {
            builder.startObject("acknowledge");
            builder.field("message", response.getAcknowledgeMessage());
            for (Map.Entry<String, String[]> entry : response.getAcknowledgeMessages().entrySet()) {
                builder.startArray(entry.getKey());
                for (String message : entry.getValue()) {
                    builder.value(message);
                }
                builder.endArray();
            }
            builder.endObject();
        }
        builder.endObject();
    }

    private static Map<String, String[]> randomAckMessages() {
        int nFeatures = randomIntBetween(1, 5);

        Map<String, String[]> ackMessages = new HashMap<>();

        for (int i = 0; i < nFeatures; i++) {
            String feature = randomAlphaOfLengthBetween(9, 15);
            int nMessages = randomIntBetween(1, 5);
            String[] messages = new String[nMessages];
            for (int j = 0; j < nMessages; j++) {
                messages[j] = randomAlphaOfLengthBetween(10, 30);
            }
            ackMessages.put(feature, messages);
        }

        return ackMessages;
    }

}
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*/
package org.elasticsearch.client.license;

import org.elasticsearch.client.Validatable;


public class GetLicenseRequest implements Validatable {

  protected boolean local = false;

  public GetLicenseRequest() {
  }

  public boolean isLocal() {
     return local;
  }

  public void setLocal(boolean local) {
     this.local = local;
  }
}
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*/

package org.elasticsearch.client.license;

import org.elasticsearch.client.Validatable;
import org.elasticsearch.common.Nullable;

public class StartTrialRequest implements Validatable {

  private final boolean acknowledge;
  private final String licenseType;

  public StartTrialRequest() {
     this(false);
  }

  public StartTrialRequest(boolean acknowledge) {
     this(acknowledge, null);
  }

  public StartTrialRequest(boolean acknowledge, @Nullable String licenseType) {
     this.acknowledge = acknowledge;
     this.licenseType = licenseType;
  }

  public boolean isAcknowledge() {
     return acknowledge;
  }

  public String getLicenseType() {
     return licenseType;
  }
}
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/**
* Request and Response objects for the default distribution's License
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*/
package org.elasticsearch.client.license;

import org.elasticsearch.client.TimedRequest;

public class StartBasicRequest extends TimedRequest {
  private final boolean acknowledge;

  public StartBasicRequest() {
     this(false);
  }

  public StartBasicRequest(boolean acknowledge) {
     this.acknowledge = acknowledge;
  }

  public boolean isAcknowledge() {
```

```
    return acknowledge;
  }
}
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*/

package org.elasticsearch.client.license;

import org.elasticsearch.client.TimedRequest;

public class PutLicenseRequest extends TimedRequest {

  private String licenseDefinition;
  private boolean acknowledge = false;

  public PutLicenseRequest() {
  }

  public void setLicenseDefinition(String licenseDefinition) {
    this.licenseDefinition = licenseDefinition;
  }

  public String getLicenseDefinition() {
    return licenseDefinition;
  }

  public void setAcknowledge(boolean acknowledge) {
    this.acknowledge = acknowledge;
  }

  public boolean isAcknowledge() {
    return acknowledge;
```

```
  }
}
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*/
package org.elasticsearch.client.license;

import org.elasticsearch.common.ParseField;
import org.elasticsearch.common.collect.Tuple;
import org.elasticsearch.common.xcontent.ConstructingObjectParser;
import org.elasticsearch.common.xcontent.XContentParseException;
import org.elasticsearch.common.xcontent.XContentParser;
import org.elasticsearch.rest.RestStatus;

import java.io.IOException;
import java.util.ArrayList;
import java.util.Collections;
import java.util.HashMap;
import java.util.List;
import java.util.Map;
import java.util.Objects;

import static org.elasticsearch.common.xcontent.ConstructingObjectParser.constructorArg;
import static org.elasticsearch.common.xcontent.ConstructingObjectParser.optionalConstructorArg;
import static org.elasticsearch.common.xcontent.XContentParserUtils.ensureExpectedToken;

public class StartBasicResponse {

  private static final ConstructingObjectParser<StartBasicResponse, Void> PARSER = new
ConstructingObjectParser<>(
      "start_basic_response", true, (a, v) -> {
      boolean basicWasStarted = (Boolean) a[0];
      String errorMessage = (String) a[1];
```

```
        if (basicWasStarted) {
            return new StartBasicResponse(StartBasicResponse.Status.GENERATED_BASIC);
        }
        StartBasicResponse.Status status = StartBasicResponse.Status.fromErrorMessage(errorMessage);
        @SuppressWarnings("unchecked") Tuple<String, Map<String, String[]>> acknowledgements = (Tuple<String,
Map<String, String[]>>) a[2];
        return new StartBasicResponse(status, acknowledgements.v2(), acknowledgements.v1());
    });

    static {
        PARSER.declareBoolean(constructorArg(), new ParseField("basic_was_started"));
        PARSER.declareString(optionalConstructorArg(), new ParseField("error_message"));
        PARSER.declareObject(optionalConstructorArg(), (parser, v) -> {
            Map<String, String[]> acknowledgeMessages = new HashMap<>();
            String message = null;
            XContentParser.Token token;
            String currentFieldName = null;
            while ((token = parser.nextToken()) != XContentParser.Token.END_OBJECT) {
                if (token == XContentParser.Token.FIELD_NAME) {
                    currentFieldName = parser.currentName();
                } else {
                    if (currentFieldName == null) {
                        throw new XContentParseException(parser.getTokenLocation(), "expected message header or
acknowledgement");
                    }
                    if (new ParseField("message").getPreferredName().equals(currentFieldName)) {
                        ensureExpectedToken(XContentParser.Token.VALUE_STRING, token,
parser::getTokenLocation);
                        message = parser.text();
                    } else {
                        if (token != XContentParser.Token.START_ARRAY) {
                            throw new XContentParseException(parser.getTokenLocation(), "unexpected acknowledgement
type");
                        }
                        List<String> acknowledgeMessagesList = new ArrayList<>();
                        while ((token = parser.nextToken()) != XContentParser.Token.END_ARRAY) {
                            ensureExpectedToken(XContentParser.Token.VALUE_STRING, token,
parser::getTokenLocation);
                            acknowledgeMessagesList.add(parser.text());
                        }
                        acknowledgeMessages.put(currentFieldName, acknowledgeMessagesList.toArray(new String[0]));
                    }
                }
            }
            return new Tuple<>(message, acknowledgeMessages);
        },
        new ParseField("acknowledge"));
```

```
}

private Map<String, String[]> acknowledgeMessages;
private String acknowledgeMessage;

enum Status {
   GENERATED_BASIC(true, null, RestStatus.OK),
   ALREADY_USING_BASIC(false, "Operation failed: Current license is basic.", RestStatus.FORBIDDEN),
   NEED_ACKNOWLEDGEMENT(false, "Operation failed: Needs acknowledgement.", RestStatus.OK);

   private final boolean isBasicStarted;
   private final String errorMessage;
   private final RestStatus restStatus;

   Status(boolean isBasicStarted, String errorMessage, RestStatus restStatus) {
      this.isBasicStarted = isBasicStarted;
      this.errorMessage = errorMessage;
      this.restStatus = restStatus;
   }

   String getErrorMessage() {
      return errorMessage;
   }

   boolean isBasicStarted() {
      return isBasicStarted;
   }

   static StartBasicResponse.Status fromErrorMessage(final String errorMessage) {
      final StartBasicResponse.Status[] values = StartBasicResponse.Status.values();
      for (StartBasicResponse.Status status : values) {
         if (Objects.equals(status.errorMessage, errorMessage)) {
            return status;
         }
      }
      throw new IllegalArgumentException("No status for error message ['" + errorMessage + "']");
   }
}

private StartBasicResponse.Status status;

public StartBasicResponse() {
}

StartBasicResponse(StartBasicResponse.Status status) {
   this(status, Collections.emptyMap(), null);
}
```

```
    StartBasicResponse(StartBasicResponse.Status status,
                       Map<String, String[]> acknowledgeMessages, String acknowledgeMessage) {
        this.status = status;
        this.acknowledgeMessages = acknowledgeMessages;
        this.acknowledgeMessage = acknowledgeMessage;
    }

    public boolean isAcknowledged() {
        return status != StartBasicResponse.Status.NEED_ACKNOWLEDGEMENT;
    }

    public boolean isBasicStarted() {
        return status.isBasicStarted;
    }

    public String getErrorMessage() {
        return status.errorMessage;
    }

    public String getAcknowledgeMessage() {
        return acknowledgeMessage;
    }

    public Map<String, String[]> getAcknowledgeMessages() {
        return acknowledgeMessages;
    }

    public static StartBasicResponse fromXContent(XContentParser parser) throws IOException {
        return PARSER.parse(parser, null);
    }

}
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*/

package org.elasticsearch.client.license;

import org.elasticsearch.common.ParseField;
import org.elasticsearch.common.collect.Tuple;
import org.elasticsearch.common.xcontent.ConstructingObjectParser;
import org.elasticsearch.common.xcontent.XContentParseException;
import org.elasticsearch.common.xcontent.XContentParser;
import org.elasticsearch.client.common.ProtocolUtils;

import java.io.IOException;
import java.util.ArrayList;
import java.util.Collections;
import java.util.HashMap;
import java.util.List;
import java.util.Map;
import java.util.Objects;

import static org.elasticsearch.common.xcontent.ConstructingObjectParser.constructorArg;
import static org.elasticsearch.common.xcontent.ConstructingObjectParser.optionalConstructorArg;

public final class PutLicenseResponse {

  private static final ConstructingObjectParser<PutLicenseResponse, Void> PARSER = new
ConstructingObjectParser<>(
     "put_license_response", true, (a, v) -> {
     boolean acknowledged = (Boolean) a[0];
     LicensesStatus licensesStatus = LicensesStatus.fromString((String) a[1]);
     @SuppressWarnings("unchecked") Tuple<String, Map<String, String[]>> acknowledgements = (Tuple<String,
Map<String, String[]>>) a[2];
     if (acknowledgements == null) {
        return new PutLicenseResponse(acknowledged, licensesStatus);
     } else {
        return new PutLicenseResponse(acknowledged, licensesStatus, acknowledgements.v1(),
acknowledgements.v2());
     }

  });

  static {
     PARSER.declareBoolean(constructorArg(), new ParseField("acknowledged"));
     PARSER.declareString(constructorArg(), new ParseField("license_status"));
     PARSER.declareObject(optionalConstructorArg(), (parser, v) -> {
          Map<String, String[]> acknowledgeMessages = new HashMap<>();
          String message = null;
          XContentParser.Token token;
```

```
            String currentFieldName = null;
            while ((token = parser.nextToken()) != XContentParser.Token.END_OBJECT) {
               if (token == XContentParser.Token.FIELD_NAME) {
                  currentFieldName = parser.currentName();
               } else {
                  if (currentFieldName == null) {
                     throw new XContentParseException(parser.getTokenLocation(), "expected message header or
acknowledgement");
                  }
                  if ("message".equals(currentFieldName)) {
                     if (token != XContentParser.Token.VALUE_STRING) {
                        throw new XContentParseException(parser.getTokenLocation(), "unexpected message header
type");
                     }
                     message = parser.text();
                  } else {
                     if (token != XContentParser.Token.START_ARRAY) {
                        throw new XContentParseException(parser.getTokenLocation(), "unexpected acknowledgement
type");
                     }
                     List<String> acknowledgeMessagesList = new ArrayList<>();
                     while ((token = parser.nextToken()) != XContentParser.Token.END_ARRAY) {
                        if (token != XContentParser.Token.VALUE_STRING) {
                           throw new XContentParseException(parser.getTokenLocation(), "unexpected
acknowledgement text");
                        }
                        acknowledgeMessagesList.add(parser.text());
                     }
                     acknowledgeMessages.put(currentFieldName, acknowledgeMessagesList.toArray(new String[0]));
                  }
               }
            }
            return new Tuple<>(message, acknowledgeMessages);
         },
         new ParseField("acknowledge"));
   }

   private boolean acknowledged;
   private LicensesStatus status;
   private Map<String, String[]> acknowledgeMessages;
   private String acknowledgeHeader;

   public PutLicenseResponse() {
   }

   public PutLicenseResponse(boolean acknowledged, LicensesStatus status) {
      this(acknowledged, status, null, Collections.<String, String[]>emptyMap());
   }
```

```
  public PutLicenseResponse(boolean acknowledged, LicensesStatus status, String acknowledgeHeader,
                            Map<String, String[]> acknowledgeMessages) {
    this.acknowledged = acknowledged;
    this.status = status;
    this.acknowledgeHeader = acknowledgeHeader;
    this.acknowledgeMessages = acknowledgeMessages;
  }

  public boolean isAcknowledged() {
    return acknowledged;
  }

  public LicensesStatus status() {
    return status;
  }

  public Map<String, String[]> acknowledgeMessages() {
    return acknowledgeMessages;
  }

  public String acknowledgeHeader() {
    return acknowledgeHeader;
  }

  public static PutLicenseResponse fromXContent(XContentParser parser) throws IOException {
    return PARSER.parse(parser, null);
  }

  @Override
  public boolean equals(Object o) {
    if (this == o) return true;
    if (o == null || getClass() != o.getClass()) return false;
    if (!super.equals(o)) return false;
    PutLicenseResponse that = (PutLicenseResponse) o;

    return status == that.status &&
      ProtocolUtils.equals(acknowledgeMessages, that.acknowledgeMessages) &&
      Objects.equals(acknowledgeHeader, that.acknowledgeHeader);
  }

  @Override
  public int hashCode() {
    return Objects.hash(super.hashCode(), status, ProtocolUtils.hashCode(acknowledgeMessages),
acknowledgeHeader);
  }

}
```

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*/
package org.elasticsearch.client.license;

public class GetLicenseResponse {

  private String license;

  GetLicenseResponse() {
  }

  public GetLicenseResponse(String license) {
     this.license = license;
  }

  public String getLicenseDefinition() {
     return license;
  }

}
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*/
package org.elasticsearch.client.license;

/**
* Status of an X-Pack license.
*/
public enum LicenseStatus {

  ACTIVE("active"),
  INVALID("invalid"),
  EXPIRED("expired");

  private final String label;

  LicenseStatus(String label) {
    this.label = label;
  }

  public String label() {
    return label;
  }

  public static LicenseStatus fromString(String value) {
    switch (value) {
      case "active":
        return ACTIVE;
      case "invalid":
        return INVALID;
      case "expired":
        return EXPIRED;
      default:
        throw new IllegalArgumentException("unknown license status [" + value + "]");
    }
  }
}
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*/
package org.elasticsearch.client.license;

import org.elasticsearch.client.TimedRequest;

public class DeleteLicenseRequest extends TimedRequest {

}
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*/

package org.elasticsearch.client.license;

import org.elasticsearch.common.ParseField;
import org.elasticsearch.common.collect.Tuple;
import org.elasticsearch.common.xcontent.ConstructingObjectParser;
import org.elasticsearch.common.xcontent.XContentParseException;
import org.elasticsearch.common.xcontent.XContentParser;

import java.io.IOException;
import java.util.ArrayList;
import java.util.HashMap;
import java.util.List;
```

```
import java.util.Map;

import static org.elasticsearch.common.xcontent.ConstructingObjectParser.constructorArg;
import static org.elasticsearch.common.xcontent.ConstructingObjectParser.optionalConstructorArg;

public class StartTrialResponse {

  private static final ConstructingObjectParser<StartTrialResponse, Void> PARSER = new
ConstructingObjectParser<>(
      "start_trial_response",
      true,
      (Object[] arguments, Void aVoid) -> {
         final boolean acknowledged = (boolean) arguments[0];
         final boolean trialWasStarted = (boolean) arguments[1];
         final String licenseType = (String) arguments[2];
         final String errorMessage = (String) arguments[3];

         @SuppressWarnings("unchecked")
         final Tuple<String, Map<String, String[]>> acknowledgeDetails = (Tuple<String, Map<String, String[]>>)
arguments[4];
         final String acknowledgeHeader;
         final Map<String, String[]> acknowledgeMessages;

         if (acknowledgeDetails != null) {
            acknowledgeHeader = acknowledgeDetails.v1();
            acknowledgeMessages = acknowledgeDetails.v2();
         } else {
            acknowledgeHeader = null;
            acknowledgeMessages = null;
         }

         return new StartTrialResponse(acknowledged, trialWasStarted, licenseType, errorMessage,
acknowledgeHeader,
            acknowledgeMessages);
      }
  );

  static {
      PARSER.declareBoolean(constructorArg(), new ParseField("acknowledged"));
      PARSER.declareBoolean(constructorArg(), new ParseField("trial_was_started"));
      PARSER.declareString(optionalConstructorArg(), new ParseField("type"));
      PARSER.declareString(optionalConstructorArg(), new ParseField("error_message"));
      // todo consolidate this parsing with the parsing in PutLicenseResponse
      PARSER.declareObject(optionalConstructorArg(), (parser, aVoid) -> {
         final Map<String, String[]> acknowledgeMessages = new HashMap<>();
         String message = null;

         final Map<String, Object> parsedMap = parser.map();
```

```
        for (Map.Entry<String, Object> entry : parsedMap.entrySet()) {
            if (entry.getKey().equals("message")) {
                if (entry.getValue() instanceof String) {
                    message = (String) entry.getValue();
                } else {
                    throw new XContentParseException(parser.getTokenLocation(), "unexpected acknowledgement
header type");
                }
            } else {
                if (entry.getValue() instanceof List) {
                    final List<String> messageStrings = new ArrayList<>();
                    @SuppressWarnings("unchecked")
                    final List<Object> messageObjects = (List<Object>) entry.getValue();
                    for (Object messageObject : messageObjects) {
                        if (messageObject instanceof String) {
                            messageStrings.add((String) messageObject);
                        } else {
                            throw new XContentParseException(parser.getTokenLocation(), "expected text in
acknowledgement message");
                        }
                    }

                    acknowledgeMessages.put(entry.getKey(), messageStrings.toArray(new
String[messageStrings.size()]));
                } else {
                    throw new XContentParseException(parser.getTokenLocation(), "unexpected acknowledgement
message type");
                }
            }
        }

        if (message == null) {
            throw new XContentParseException(parser.getTokenLocation(), "expected acknowledgement header");
        }

        return new Tuple<>(message, acknowledgeMessages);

    }, new ParseField("acknowledge"));
  }

  public static StartTrialResponse fromXContent(XContentParser parser) throws IOException {
    return PARSER.apply(parser, null);
  }

  private final boolean acknowledged;
  private final boolean trialWasStarted;
  private final String licenseType;
  private final String errorMessage;
```

```
  private final String acknowledgeHeader;
  private final Map<String, String[]> acknowledgeMessages;

  public StartTrialResponse(boolean acknowledged,
                            boolean trialWasStarted,
                            String licenseType,
                            String errorMessage,
                            String acknowledgeHeader,
                            Map<String, String[]> acknowledgeMessages) {

    this.acknowledged = acknowledged;
    this.trialWasStarted = trialWasStarted;
    this.licenseType = licenseType;
    this.errorMessage = errorMessage;
    this.acknowledgeHeader = acknowledgeHeader;
    this.acknowledgeMessages = acknowledgeMessages;
  }

  /**
   * Returns true if the request that corresponds to this response acknowledged license changes that would occur as a result of starting
   * a trial license
   */
  public boolean isAcknowledged() {
    return acknowledged;
  }

  /**
   * Returns true if a trial license was started as a result of the request corresponding to this response. Returns false if the cluster
   * did not start a trial, or a trial had already been started before the corresponding request was made
   */
  public boolean isTrialWasStarted() {
    return trialWasStarted;
  }

  /**
   * If a trial license was started as a result of the request corresponding to this response (see {@link #isTrialWasStarted()}) then
   * returns the type of license that was started on the cluster. Returns null otherwise
   */
  public String getLicenseType() {
    return licenseType;
  }

  /**
   * If a trial license was not started as a result of the request corresponding to this response (see {@link #isTrialWasStarted()} then
```

```
     * returns a brief message explaining why the trial could not be started. Returns false otherwise
     */
    public String getErrorMessage() {
        return errorMessage;
    }

    /**
     * If the request corresponding to this response did not acknowledge licensing changes that would result from starting a trial license
     * (see {@link #isAcknowledged()}), returns a message describing how the user must acknowledge licensing changes as a result of
     * such a request. Returns null otherwise
     */
    public String getAcknowledgeHeader() {
        return acknowledgeHeader;
    }

    /**
     * If the request corresponding to this response did not acknowledge licensing changes that would result from starting a trial license
     * (see {@link #isAcknowledged()}, returns a map. The map's keys are names of commercial Elasticsearch features, and their values are
     * messages about how those features will be affected by licensing changes as a result of starting a trial license
     */
    public Map<String, String[]> getAcknowledgeMessages() {
        return acknowledgeMessages;
    }
}
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*/
package org.elasticsearch.client.license;
```

```
import java.util.Locale;

public enum LicensesStatus {
  VALID((byte) 0),
  INVALID((byte) 1),
  EXPIRED((byte) 2);

  private final byte id;

  LicensesStatus(byte id) {
    this.id = id;
  }

  public int id() {
    return id;
  }

  public static LicensesStatus fromId(int id) {
    if (id == 0) {
      return VALID;
    } else if (id == 1) {
      return INVALID;
    } else if (id == 2) {
      return EXPIRED;
    } else {
      throw new IllegalStateException("no valid LicensesStatus for id=" + id);
    }
  }


  @Override
  public String toString() {
    return this.name().toLowerCase(Locale.ROOT);
  }

  public static LicensesStatus fromString(String value) {
    switch (value) {
      case "valid":
        return VALID;
      case "invalid":
        return INVALID;
      case "expired":
        return EXPIRED;
      default:
        throw new IllegalArgumentException("unknown licenses status [" + value + "]");
    }
  }
}
```

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*/
package org.elasticsearch.license.licensor.tools;

import org.elasticsearch.cli.Command;
import org.elasticsearch.cli.CommandTestCase;
import org.elasticsearch.cli.ExitCodes;
import org.elasticsearch.cli.UserException;
import org.elasticsearch.common.bytes.BytesArray;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.license.License;
import org.elasticsearch.license.licensor.TestUtils;
import org.junit.Before;

import java.nio.charset.StandardCharsets;
import java.nio.file.Files;
import java.nio.file.Path;

public class LicenseGenerationToolTests extends CommandTestCase {

  protected Path pubKeyPath = null;
  protected Path priKeyPath = null;

  @Before
  public void setup() throws Exception {
     pubKeyPath = getDataPath(TestUtils.PUBLIC_KEY_RESOURCE);
     priKeyPath = getDataPath(TestUtils.PRIVATE_KEY_RESOURCE);
  }

  @Override
  protected Command newCommand() {
     return new LicenseGeneratorTool();
```

```
}

public void testMissingKeyPaths() throws Exception {
    Path pub = createTempDir().resolve("pub");
    Path pri = createTempDir().resolve("pri");
    UserException e = expectThrows(
            UserException.class,
            () -> execute(
                    "--publicKeyPath",
                    pub.toString(),
                    "--privateKeyPath",
                    pri.toString()));
    assertTrue(e.getMessage(), e.getMessage().contains("pri does not exist"));
    assertEquals(ExitCodes.USAGE, e.exitCode);

    Files.createFile(pri);
    e = expectThrows(
            UserException.class,
            () -> execute(
                    "--publicKeyPath",
                    pub.toString(),
                    "--privateKeyPath",
                    pri.toString()));
    assertTrue(e.getMessage(), e.getMessage().contains("pub does not exist"));
    assertEquals(ExitCodes.USAGE, e.exitCode);
}

public void testMissingLicenseSpec() throws Exception {
    UserException e = expectThrows(
            UserException.class,
            () -> execute(
                    "--publicKeyPath",
                    pubKeyPath.toString(),
                    "--privateKeyPath",
                    priKeyPath.toString()));
    assertTrue(
            e.getMessage(),
            e.getMessage().contains("Must specify either --license or --licenseFile"));
    assertEquals(ExitCodes.USAGE, e.exitCode);
}

public void testLicenseSpecString() throws Exception {
    TestUtils.LicenseSpec inputLicenseSpec =
            TestUtils.generateRandomLicenseSpec(License.VERSION_CURRENT);
    String licenseSpecString = TestUtils.generateLicenseSpecString(inputLicenseSpec);
    String output = execute(
            "--publicKeyPath",
            pubKeyPath.toString(),
```

```
            "--privateKeyPath",
            priKeyPath.toString(),
            "--license",
            licenseSpecString);
        final BytesArray bytes = new BytesArray(output.getBytes(StandardCharsets.UTF_8));
        License outputLicense = License.fromSource(bytes, XContentType.JSON);
        TestUtils.assertLicenseSpec(inputLicenseSpec, outputLicense);
    }

    public void testLicenseSpecFile() throws Exception {
        TestUtils.LicenseSpec inputLicenseSpec =
            TestUtils.generateRandomLicenseSpec(License.VERSION_CURRENT);
        String licenseSpecString = TestUtils.generateLicenseSpecString(inputLicenseSpec);
        Path licenseSpecFile = createTempFile();
        Files.write(licenseSpecFile, licenseSpecString.getBytes(StandardCharsets.UTF_8));
        String output = execute(
            "--publicKeyPath",
            pubKeyPath.toString(),
            "--privateKeyPath",
            priKeyPath.toString(),
            "--licenseFile",
            licenseSpecFile.toString());
        final BytesArray bytes = new BytesArray(output.getBytes(StandardCharsets.UTF_8));
        License outputLicense = License.fromSource(bytes, XContentType.JSON);
        TestUtils.assertLicenseSpec(inputLicenseSpec, outputLicense);
    }

}
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*/
package org.elasticsearch.license.licensor.tools;

import org.elasticsearch.cli.Command;
import org.elasticsearch.cli.CommandTestCase;
import org.elasticsearch.cli.ExitCodes;
import org.elasticsearch.cli.UserException;

import java.nio.file.Files;
import java.nio.file.Path;

import static org.hamcrest.CoreMatchers.containsString;

public class KeyPairGenerationToolTests extends CommandTestCase {

    @Override
```

```
  protected Command newCommand() {
    return new KeyPairGeneratorTool();
  }

  public void testMissingKeyPaths() throws Exception {
    Path exists = createTempFile("", "existing");
    Path dne = createTempDir().resolve("dne");
    UserException e = expectThrows(
        UserException.class,
        () -> execute(
            "--publicKeyPath",
            exists.toString(),
            "--privateKeyPath",
            dne.toString()));
    assertThat(e.getMessage(), containsString("existing"));
    assertEquals(ExitCodes.USAGE, e.exitCode);
    e = expectThrows(
        UserException.class,
        () -> execute(
            "--publicKeyPath",
            dne.toString(),
            "--privateKeyPath",
            exists.toString()));
    assertThat(e.getMessage(), containsString("existing"));
    assertEquals(ExitCodes.USAGE, e.exitCode);
  }

  public void testTool() throws Exception {
    Path keysDir = createTempDir();
    Path publicKeyFilePath = keysDir.resolve("public");
    Path privateKeyFilePath = keysDir.resolve("private");

    execute(
        "--publicKeyPath",
        publicKeyFilePath.toString(),
        "--privateKeyPath",
        privateKeyFilePath.toString());
    assertTrue(publicKeyFilePath.toString(), Files.exists(publicKeyFilePath));
    assertTrue(privateKeyFilePath.toString(), Files.exists(privateKeyFilePath));
  }

}
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package org.elasticsearch.license.licensor.tools;
```

```
import org.elasticsearch.cli.Command;
import org.elasticsearch.cli.CommandTestCase;
import org.elasticsearch.cli.ExitCodes;
import org.elasticsearch.cli.UserException;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.license.License;
import org.elasticsearch.license.licensor.TestUtils;
import org.junit.Before;

import java.nio.charset.StandardCharsets;
import java.nio.file.Files;
import java.nio.file.Path;

public class LicenseVerificationToolTests extends CommandTestCase {
  protected Path pubKeyPath = null;
  protected Path priKeyPath = null;

  @Before
  public void setup() throws Exception {
     logger.error("project.basedir [{}]", System.getProperty("project.basedir"));
     pubKeyPath = getDataPath(TestUtils.PUBLIC_KEY_RESOURCE);
     priKeyPath = getDataPath(TestUtils.PRIVATE_KEY_RESOURCE);
  }

  @Override
  protected Command newCommand() {
     return new LicenseVerificationTool();
  }

  public void testMissingKeyPath() throws Exception {
     Path pub = createTempDir().resolve("pub");
     UserException e = expectThrows(
           UserException.class,
           () -> execute("--publicKeyPath", pub.toString()));
     assertTrue(e.getMessage(), e.getMessage().contains("pub does not exist"));
     assertEquals(ExitCodes.USAGE, e.exitCode);
  }

  public void testMissingLicenseSpec() throws Exception {
     UserException e = expectThrows(UserException.class, () -> {
        execute("--publicKeyPath", pubKeyPath.toString());
     });
     assertTrue(
           e.getMessage(),
           e.getMessage().contains("Must specify either --license or --licenseFile"));
     assertEquals(ExitCodes.USAGE, e.exitCode);
  }
```

```
  public void testBrokenLicense() throws Exception {
    final TimeValue oneHour = TimeValue.timeValueHours(1);
    License signedLicense = TestUtils.generateSignedLicense(oneHour, pubKeyPath, priKeyPath);
    License tamperedLicense = License.builder()
       .fromLicenseSpec(signedLicense, signedLicense.signature())
       .expiryDate(signedLicense.expiryDate() + randomIntBetween(1, 1000)).build();
    UserException e = expectThrows(
          UserException.class,
          () -> execute(
                "--publicKeyPath",
                pubKeyPath.toString(),
                "--license",
                TestUtils.dumpLicense(tamperedLicense)));
    assertEquals("Invalid License!", e.getMessage());
    assertEquals(ExitCodes.DATA_ERROR, e.exitCode);
  }

  public void testLicenseSpecString() throws Exception {
    final TimeValue oneHour = TimeValue.timeValueHours(1);
    License signedLicense = TestUtils.generateSignedLicense(oneHour, pubKeyPath, priKeyPath);
    String output = execute(
          "--publicKeyPath",
          pubKeyPath.toString(),
          "--license",
          TestUtils.dumpLicense(signedLicense));
    assertFalse(output, output.isEmpty());
  }

  public void testLicenseSpecFile() throws Exception {
    final TimeValue oneHour = TimeValue.timeValueHours(1);
    License signedLicense = TestUtils.generateSignedLicense(oneHour, pubKeyPath, priKeyPath);
    Path licenseSpecFile = createTempFile();
    Files.write(
          licenseSpecFile,
          TestUtils.dumpLicense(signedLicense).getBytes(StandardCharsets.UTF_8));
    String output = execute(
          "--publicKeyPath",
          pubKeyPath.toString(),
          "--licenseFile",
          licenseSpecFile.toString());
    assertFalse(output, output.isEmpty());
  }

}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
```

```
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license.licensor;

import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.license.DateUtils;
import org.elasticsearch.license.License;
import org.elasticsearch.license.LicenseVerifier;
import org.elasticsearch.test.ESTestCase;
import org.junit.After;
import org.junit.Before;

import java.nio.file.Files;
import java.nio.file.Path;

public class LicenseVerificationTests extends ESTestCase {

  protected Path pubKeyPath = null;
  protected Path priKeyPath = null;

  @Before
  public void setup() throws Exception {
     pubKeyPath = getDataPath("/public.key");
     priKeyPath = getDataPath("/private.key");
  }

  @After
  public void cleanUp() {
     pubKeyPath = null;
     priKeyPath = null;
  }

  public void testGeneratedLicenses() throws Exception {
     final TimeValue fortyEightHours = TimeValue.timeValueHours(2 * 24);
     final License license =
           TestUtils.generateSignedLicense(fortyEightHours, pubKeyPath, priKeyPath);
     assertTrue(LicenseVerifier.verifyLicense(license, Files.readAllBytes(pubKeyPath)));
  }

  public void testLicenseTampering() throws Exception {
     final TimeValue twoHours = TimeValue.timeValueHours(2);
     License license = TestUtils.generateSignedLicense(twoHours, pubKeyPath, priKeyPath);

     final License tamperedLicense = License.builder()
           .fromLicenseSpec(license, license.signature())
           .expiryDate(license.expiryDate() + 10 * 24 * 60 * 60 * 1000L)
           .validate()
           .build();
```

```
        assertFalse(LicenseVerifier.verifyLicense(tamperedLicense, Files.readAllBytes(pubKeyPath)));
    }

    public void testRandomLicenseVerification() throws Exception {
        TestUtils.LicenseSpec licenseSpec = TestUtils.generateRandomLicenseSpec(
                randomIntBetween(License.VERSION_START, License.VERSION_CURRENT));
        License generatedLicense = generateSignedLicense(licenseSpec, pubKeyPath, priKeyPath);
        assertTrue(LicenseVerifier.verifyLicense(generatedLicense, Files.readAllBytes(pubKeyPath)));
    }

    private static License generateSignedLicense(
            TestUtils.LicenseSpec spec, Path pubKeyPath, Path priKeyPath) throws Exception {
        LicenseSigner signer = new LicenseSigner(priKeyPath, pubKeyPath);
        License.Builder builder = License.builder()
                .uid(spec.uid)
                .feature(spec.feature)
                .type(spec.type)
                .subscriptionType(spec.subscriptionType)
                .issuedTo(spec.issuedTo)
                .issuer(spec.issuer)
                .maxNodes(spec.maxNodes);

        if (spec.expiryDate != null) {
            builder.expiryDate(DateUtils.endOfTheDay(spec.expiryDate));
        } else {
            builder.expiryDate(spec.expiryDateInMillis);
        }
        if (spec.issueDate != null) {
            builder.issueDate(DateUtils.beginningOfTheDay(spec.issueDate));
        } else {
            builder.issueDate(spec.issueDateInMillis);
        }
        builder.version(spec.version);
        return signer.sign(builder.build());
    }

}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license.licensor;

import org.elasticsearch.common.Strings;
import org.elasticsearch.common.joda.FormatDateTimeFormatter;
import org.elasticsearch.common.joda.Joda;
```

```
import org.elasticsearch.common.time.DateMathParser;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.license.DateUtils;
import org.elasticsearch.license.License;
import org.elasticsearch.test.ESTestCase;
import org.hamcrest.MatcherAssert;
import org.joda.time.format.DateTimeFormatter;

import java.io.IOException;
import java.nio.file.Path;
import java.util.UUID;

import static com.carrotsearch.randomizedtesting.RandomizedTest.randomBoolean;
import static com.carrotsearch.randomizedtesting.RandomizedTest.randomInt;
import static com.carrotsearch.randomizedtesting.RandomizedTest.randomIntBetween;
import static org.elasticsearch.common.xcontent.XContentFactory.jsonBuilder;
import static org.elasticsearch.test.ESTestCase.randomFrom;
import static org.hamcrest.core.IsEqual.equalTo;

public class TestUtils {

  public static final String PUBLIC_KEY_RESOURCE = "/public.key";
  public static final String PRIVATE_KEY_RESOURCE = "/private.key";

  private static final FormatDateTimeFormatter formatDateTimeFormatter =
        Joda.forPattern("yyyy-MM-dd");
  private static final DateMathParser dateMathParser = formatDateTimeFormatter.toDateMathParser();
  private static final DateTimeFormatter dateTimeFormatter = formatDateTimeFormatter.printer();

  public static String dumpLicense(License license) throws Exception {
     XContentBuilder builder = XContentFactory.contentBuilder(XContentType.JSON);
     builder.startObject();
     builder.startObject("license");
     license.toInnerXContent(builder, ToXContent.EMPTY_PARAMS);
     builder.endObject();
     builder.endObject();
     return Strings.toString(builder);
  }

  public static String dateMathString(String time, final long now) {
     return dateTimeFormatter.print(dateMathParser.parse(time, () -> now));
  }

  public static long dateMath(String time, final long now) {
```

```
    return dateMathParser.parse(time, () -> now);
}

public static LicenseSpec generateRandomLicenseSpec(int version) {
    boolean datesInMillis = randomBoolean();
    long now = System.currentTimeMillis();
    String uid = UUID.randomUUID().toString();
    String issuer = "issuer__"  + randomInt();
    String issuedTo = "issuedTo__" + randomInt();
    String type = version < License.VERSION_NO_FEATURE_TYPE ?
            randomFrom("subscription", "internal", "development") :
            randomFrom("basic", "silver", "dev", "gold", "platinum");
    final String subscriptionType;
    final String feature;
    if (version < License.VERSION_NO_FEATURE_TYPE) {
        subscriptionType = randomFrom("gold", "silver", "platinum");
        feature = "feature__" + randomInt();
    } else {
        subscriptionType = null;
        feature = null;
    }
    int maxNodes = randomIntBetween(5, 100);
    if (datesInMillis) {
        long issueDateInMillis = dateMath("now", now);
        long expiryDateInMillis = dateMath("now+10d/d", now);
        return new LicenseSpec(
                version,
                uid,
                feature,
                issueDateInMillis,
                expiryDateInMillis,
                type,
                subscriptionType,
                issuedTo,
                issuer,
                maxNodes);
    } else {
        String issueDate = dateMathString("now", now);
        String expiryDate = dateMathString("now+10d/d", now);
        return new LicenseSpec(
                version,
                uid,
                feature,
                issueDate,
                expiryDate, type,
                subscriptionType,
                issuedTo,
                issuer,
```

```
                maxNodes);
        }
    }

    public static String generateLicenseSpecString(LicenseSpec licenseSpec) throws IOException {
        XContentBuilder licenses = jsonBuilder();
        licenses.startObject();
        licenses.startObject("license")
                .field("uid", licenseSpec.uid)
                .field("type", licenseSpec.type)
                .field("subscription_type", licenseSpec.subscriptionType)
                .field("issued_to", licenseSpec.issuedTo)
                .field("issuer", licenseSpec.issuer)
                .field("feature", licenseSpec.feature)
                .field("max_nodes", licenseSpec.maxNodes);

        if (licenseSpec.issueDate != null) {
            licenses.field("issue_date", licenseSpec.issueDate);
        } else {
            licenses.field("issue_date_in_millis", licenseSpec.issueDateInMillis);
        }
        if (licenseSpec.expiryDate != null) {
            licenses.field("expiry_date", licenseSpec.expiryDate);
        } else {
            licenses.field("expiry_date_in_millis", licenseSpec.expiryDateInMillis);
        }
        licenses.field("version", licenseSpec.version);
        licenses.endObject();
        licenses.endObject();
        return Strings.toString(licenses);
    }

    public static void assertLicenseSpec(LicenseSpec spec, License license) {
        MatcherAssert.assertThat(license.uid(), equalTo(spec.uid));
        MatcherAssert.assertThat(license.issuedTo(), equalTo(spec.issuedTo));
        MatcherAssert.assertThat(license.issuer(), equalTo(spec.issuer));
        MatcherAssert.assertThat(license.type(), equalTo(spec.type));
        MatcherAssert.assertThat(license.maxNodes(), equalTo(spec.maxNodes));
        if (spec.issueDate != null) {
            MatcherAssert.assertThat(
                    license.issueDate(),
                    equalTo(DateUtils.beginningOfTheDay(spec.issueDate)));
        } else {
            MatcherAssert.assertThat(license.issueDate(), equalTo(spec.issueDateInMillis));
        }
        if (spec.expiryDate != null) {
            MatcherAssert.assertThat(
                    license.expiryDate(),
```

```
            equalTo(DateUtils.endOfTheDay(spec.expiryDate)));
    } else {
        MatcherAssert.assertThat(license.expiryDate(), equalTo(spec.expiryDateInMillis));
    }
}

public static License generateSignedLicense(
        TimeValue expiryDuration, Path pubKeyPath, Path priKeyPath) throws Exception {
    long issue = System.currentTimeMillis();
    int version = ESTestCase.randomIntBetween(License.VERSION_START, License.VERSION_CURRENT);
    String type = version < License.VERSION_NO_FEATURE_TYPE ?
            randomFrom("subscription", "internal", "development") :
            randomFrom("trial", "basic", "silver", "dev", "gold", "platinum");
    final License.Builder builder = License.builder()
            .uid(UUID.randomUUID().toString())
            .expiryDate(issue + expiryDuration.getMillis())
            .issueDate(issue)
            .version(version)
            .type(type)
            .issuedTo("customer")
            .issuer("elasticsearch")
            .maxNodes(5);
    if (version == License.VERSION_START) {
        builder.subscriptionType(randomFrom("dev", "gold", "platinum", "silver"));
        builder.feature(ESTestCase.randomAlphaOfLength(10));
    }
    LicenseSigner signer = new LicenseSigner(priKeyPath, pubKeyPath);
    return signer.sign(builder.build());
}

public static class LicenseSpec {
    public final int version;
    public final String feature;
    public final String issueDate;
    public final long issueDateInMillis;
    public final String expiryDate;
    public final long expiryDateInMillis;
    public final String uid;
    public final String type;
    public final String subscriptionType;
    public final String issuedTo;
    public final String issuer;
    public final int maxNodes;

    public LicenseSpec(
            int version,
            String uid,
            String feature,
```

```
            long issueDateInMillis,
            long expiryDateInMillis,
            String type,
            String subscriptionType,
            String issuedTo,
            String issuer,
            int maxNodes) {
        this.version = version;
        this.feature = feature;
        this.issueDateInMillis = issueDateInMillis;
        this.issueDate = null;
        this.expiryDateInMillis = expiryDateInMillis;
        this.expiryDate = null;
        this.uid = uid;
        this.type = type;
        this.subscriptionType = subscriptionType;
        this.issuedTo = issuedTo;
        this.issuer = issuer;
        this.maxNodes = maxNodes;
    }

    public LicenseSpec(
            int version,
            String uid,
            String feature,
            String issueDate,
            String expiryDate,
            String type,
            String subscriptionType,
            String issuedTo,
            String issuer,
            int maxNodes) {
        this.version = version;
        this.feature = feature;
        this.issueDate = issueDate;
        this.issueDateInMillis = -1;
        this.expiryDate = expiryDate;
        this.expiryDateInMillis = -1;
        this.uid = uid;
        this.type = type;
        this.subscriptionType = subscriptionType;
        this.issuedTo = issuedTo;
        this.issuer = issuer;
        this.maxNodes = maxNodes;
    }
  }

}
```

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 *H
0
+5Bj:h$Tfsr&avDgpi]2oR<Cizzz E(yhZ}TCjh~!P|499cq5b!Y{VX=,Vd ;g9hD`Xv8n|i) 34aYfsWBkuOo@
u@175/YmI4~
d&^w t<q^XQ^KG#|X?tV}f;5ENHgXyk9Mh/WM*D;D^]H`"
}W"o"'YY@9x"|`hNb>a3>8ZOSd}R4HxQU99dQ\nTxL?>*}QMB7fhIE952^hn=-m2-
pF8T_I^yT1=)dc=t*Ge^^f71cb~_^|5yZl&9LSdxR8XNUC1%^R;CiVIN~O}c%\'h|&UX;j{_#9/^/1H@_Wr$l,})v[#?
;m;`O'ZiB <Pu
OkH4jbr
WvF\w'#`)~Vx/|?{zDa
\| hGEi?#r~N
zm`nL|~1~'?/'>k?~gyk,b' _.41K??3d2kgb$7~QjlqN]j,Lr-9Vl34uNe+'4dpP.V}uvq4D}08LrTeg5Z+n@&+(P=-M"
[rw8baSjJaam+ +?b!u&2tW!IYi.fj@/ G#uZv_sgj2UXk.I`dbq7kT%h5'Nv5[D4!l@1
5}*`"DK[%N^(Af9l] 0X`M:c01uAm\jB/.;f
es.logger.level=INFO
log4j.rootLogger=${es.logger.level}, out

log4j.logger.org.apache.http=INFO, out
log4j.additivity.org.apache.http=false

log4j.logger.org.elasticsearch.license=TRACE

log4j.appender.out=org.apache.log4j.ConsoleAppender
log4j.appender.out.layout=org.apache.log4j.PatternLayout
log4j.appender.out.layout.conversionPattern=[%d{ISO8601}][%-5p][%-25c] %m%n
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license.licensor;

import org.apache.lucene.util.BytesRef;
import org.apache.lucene.util.BytesRefIterator;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.hash.MessageDigests;
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.license.CryptUtils;
import org.elasticsearch.license.License;

import java.io.IOException;
import java.nio.ByteBuffer;
import java.nio.file.Files;
import java.nio.file.Path;

```
import java.security.InvalidKeyException;
import java.security.MessageDigest;
import java.security.NoSuchAlgorithmException;
import java.security.PrivateKey;
import java.security.PublicKey;
import java.security.SecureRandom;
import java.security.Signature;
import java.security.SignatureException;
import java.util.Base64;
import java.util.Collections;
import java.util.Map;

/**
* Responsible for generating a license signature according to the signature spec and sign it with
* the provided encrypted private key
*/
public class LicenseSigner {

  private static final int MAGIC_LENGTH = 13;
  private final Path publicKeyPath;
  private final Path privateKeyPath;

  public LicenseSigner(final Path privateKeyPath, final Path publicKeyPath) {
     this.publicKeyPath = publicKeyPath;
     this.privateKeyPath = privateKeyPath;
  }

  /**
   * Generates a signature for the {@code licenseSpec}. Signature structure:
   * <code>
   * | VERSION | MAGIC | PUB_KEY_DIGEST | SIGNED_LICENSE_CONTENT |
   * </code>
   *
   * @return a signed License
   */
  public License sign(License licenseSpec) throws IOException {
     XContentBuilder contentBuilder = XContentFactory.contentBuilder(XContentType.JSON);
     final Map<String, String> licenseSpecViewMode =
           Collections.singletonMap(License.LICENSE_SPEC_VIEW_MODE, "true");
     licenseSpec.toXContent(contentBuilder, new ToXContent.MapParams(licenseSpecViewMode));
     final byte[] signedContent;
     final boolean preV4 = licenseSpec.version() < License.VERSION_CRYPTO_ALGORITHMS;
     try {
        final Signature rsa = Signature.getInstance("SHA512withRSA");
        PrivateKey decryptedPrivateKey =
CryptUtils.readEncryptedPrivateKey(Files.readAllBytes(privateKeyPath));
        rsa.initSign(decryptedPrivateKey);
        final BytesRefIterator iterator = BytesReference.bytes(contentBuilder).iterator();
```

```
            BytesRef ref;
            while((ref = iterator.next()) != null) {
               rsa.update(ref.bytes, ref.offset, ref.length);
            }
            signedContent = rsa.sign();
         } catch (InvalidKeyException
               | IOException
               | NoSuchAlgorithmException
               | SignatureException e) {
            throw new IllegalStateException(e);
         }
         final byte[] magic = new byte[MAGIC_LENGTH];
         SecureRandom random = new SecureRandom();
         random.nextBytes(magic);
         final byte[] publicKeyBytes = Files.readAllBytes(publicKeyPath);
         PublicKey publicKey = CryptUtils.readPublicKey(publicKeyBytes);
         final byte[] pubKeyFingerprint = preV4 ?
Base64.getEncoder().encode(CryptUtils.writeEncryptedPublicKey(publicKey)) :
               getPublicKeyFingerprint(publicKeyBytes);
         byte[] bytes = new byte[4 + 4 + MAGIC_LENGTH + 4 + pubKeyFingerprint.length + 4 +
signedContent.length];
         ByteBuffer byteBuffer = ByteBuffer.wrap(bytes);
         byteBuffer.putInt(licenseSpec.version())
               .putInt(magic.length)
               .put(magic)
               .putInt(pubKeyFingerprint.length)
               .put(pubKeyFingerprint)
               .putInt(signedContent.length)
               .put(signedContent);

         return License.builder()
               .fromLicenseSpec(licenseSpec, Base64.getEncoder().encodeToString(bytes))
               .build();
      }

      private byte[] getPublicKeyFingerprint(byte[] keyBytes) {
         MessageDigest sha256 = MessageDigests.sha256();
         sha256.update(keyBytes);
         return sha256.digest();
      }
   }
   apply plugin: 'elasticsearch.build'

   dependencies {
    compile "org.elasticsearch.plugin:x-pack-core:${version}"
    compile "org.elasticsearch:elasticsearch:${version}"
    testCompile "org.elasticsearch.test:framework:${version}"
   }
```

```
project.forbiddenPatterns {
 exclude '**/*.key'
}

dependencyLicenses.enabled = false

task buildZip(type: Zip, dependsOn: jar) {
 String parentDir = "license-tools-${version}"
 into(parentDir + '/lib') {
   from jar
   from configurations.runtime
 }
 into(parentDir + '/bin') {
   from 'bin'
 }
}

assemble.dependsOn buildZip
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack;

import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.license.LicenseService;
import org.elasticsearch.license.XPackLicenseState;
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;
import org.elasticsearch.xpack.core.ssl.SSLService;
import org.elasticsearch.xpack.deprecation.Deprecation;
import org.elasticsearch.xpack.graph.Graph;
import org.elasticsearch.xpack.logstash.Logstash;
import org.elasticsearch.xpack.ml.MachineLearning;
import org.elasticsearch.xpack.monitoring.Monitoring;
import org.elasticsearch.xpack.security.Security;
import org.elasticsearch.xpack.watcher.Watcher;

import java.nio.file.Path;

public class CompositeTestingXPackPlugin extends LocalStateCompositeXPackPlugin {

  public CompositeTestingXPackPlugin(final Settings settings, final Path configPath) throws Exception {
     super(settings, configPath);
     CompositeTestingXPackPlugin thisVar = this;
     plugins.add(new Deprecation());
     plugins.add(new Graph(settings));
```

```
        plugins.add(new Logstash(settings));
        plugins.add(new MachineLearning(settings, configPath) {
            @Override
            protected XPackLicenseState getLicenseState() {
                return super.getLicenseState();
            }
        });
        plugins.add(new Monitoring(settings) {
            @Override
            protected SSLService getSslService() {
                return thisVar.getSslService();
            }

            @Override
            protected LicenseService getLicenseService() {
                return thisVar.getLicenseService();
            }

            @Override
            protected XPackLicenseState getLicenseState() {
                return thisVar.getLicenseState();
            }
        });
        plugins.add(new Watcher(settings) {
            @Override
            protected SSLService getSslService() {
                return thisVar.getSslService();
            }

            @Override
            protected XPackLicenseState getLicenseState() {
                return thisVar.getLicenseState();
            }
        });
        plugins.add(new Security(settings, configPath) {
            @Override
            protected SSLService getSslService() { return thisVar.getSslService(); }

            @Override
            protected XPackLicenseState getLicenseState() { return thisVar.getLicenseState(); }
        });
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
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*/
```

```
package org.elasticsearch.xpack.monitoring;

import org.elasticsearch.action.admin.cluster.node.info.NodeInfo;
import org.elasticsearch.action.admin.cluster.node.info.NodesInfoResponse;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.env.Environment;
import org.elasticsearch.node.MockNode;
import org.elasticsearch.node.Node;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.plugins.PluginInfo;
import org.elasticsearch.test.ESIntegTestCase.ClusterScope;
import org.elasticsearch.test.discovery.TestZenDiscovery;
import org.elasticsearch.tribe.TribePlugin;
import org.elasticsearch.xpack.core.XPackSettings;
import org.elasticsearch.xpack.monitoring.test.MonitoringIntegTestCase;

import java.nio.file.Path;
import java.util.ArrayList;
import java.util.Collection;
import java.util.function.Function;

import static org.elasticsearch.test.ESIntegTestCase.Scope.TEST;
import static org.hamcrest.Matchers.equalTo;

@ClusterScope(scope = TEST, transportClientRatio = 0, numClientNodes = 0, numDataNodes = 0)
public class MonitoringPluginTests extends MonitoringIntegTestCase {

  public MonitoringPluginTests() throws Exception {
     super();
  }

  @Override
  protected void startMonitoringService() {
     // do nothing as monitoring is sometime unbound
  }

  @Override
  protected void stopMonitoringService() {
     // do nothing as monitoring is sometime unbound
  }

  @Override
  protected boolean addTestZenDiscovery() {
     return false;
  }

  public static class TribeAwareTestZenDiscoveryPlugin extends TestZenDiscovery.TestPlugin {
```

```
    public TribeAwareTestZenDiscoveryPlugin(Settings settings) {
        super(settings);
    }

    @Override
    public Settings additionalSettings() {
        if (settings.getGroups("tribe", true).isEmpty()) {
            return super.additionalSettings();
        } else {
            return Settings.EMPTY;
        }
    }
}

public static class MockTribePlugin extends TribePlugin {

    public MockTribePlugin(Settings settings) {
        super(settings);
    }

    protected Function<Settings, Node> nodeBuilder(Path configPath) {
        return settings -> new MockNode(new Environment(settings, configPath), internalCluster().getPlugins());
    }

}

@Override
protected Collection<Class<? extends Plugin>> nodePlugins() {
    ArrayList<Class<? extends Plugin>> plugins = new ArrayList<>(super.nodePlugins());
    plugins.add(MockTribePlugin.class);
    plugins.add(TribeAwareTestZenDiscoveryPlugin.class);
    return plugins;
}

@Override
protected Settings nodeSettings(int nodeOrdinal) {
    return Settings.builder()
            .put(super.nodeSettings(nodeOrdinal))
            .put(MonitoringService.INTERVAL.getKey(), "-1")
            .put(XPackSettings.SECURITY_ENABLED.getKey(), false)
            .put(XPackSettings.WATCHER_ENABLED.getKey(), false)
            .build();
}

@Override
protected Settings transportClientSettings() {
    return Settings.builder()
            .put(super.transportClientSettings())
```

```
            .put(XPackSettings.SECURITY_ENABLED.getKey(), false)
            .build();
    }

    public void testMonitoringEnabled() {
        internalCluster().startNode(Settings.builder()
                .put(XPackSettings.MONITORING_ENABLED.getKey(), true)
                .build());
        assertPluginIsLoaded();
        assertServiceIsBound(MonitoringService.class);
    }

    public void testMonitoringDisabled() {
        internalCluster().startNode(Settings.builder()
                .put(XPackSettings.MONITORING_ENABLED.getKey(), false)
                .build());
        assertPluginIsLoaded();
        assertServiceIsNotBound(MonitoringService.class);
    }

    public void testMonitoringEnabledOnTribeNode() {
        internalCluster().startNode(Settings.builder()
                .put(XPackSettings.MONITORING_ENABLED.getKey(), true)
                .put("tribe.name", "t1")
                .build());
        assertPluginIsLoaded();
        assertServiceIsBound(MonitoringService.class);
    }

    public void testMonitoringDisabledOnTribeNode() {
        internalCluster().startNode(Settings.builder().put("tribe.name", "t1").build());
        assertPluginIsLoaded();
        assertServiceIsNotBound(MonitoringService.class);
    }

    private void assertPluginIsLoaded() {
        NodesInfoResponse response = client().admin().cluster().prepareNodesInfo().setPlugins(true).get();
        for (NodeInfo nodeInfo : response.getNodes()) {
            assertNotNull(nodeInfo.getPlugins());

            boolean found = false;
            for (PluginInfo plugin : nodeInfo.getPlugins().getPluginInfos()) {
                assertNotNull(plugin);

                if (LocalStateMonitoring.class.getName().equals(plugin.getName())) {
                    found = true;
                    break;
                }
```

```
            }
            assertThat("xpack plugin not found", found, equalTo(true));
        }
    }

    private void assertServiceIsBound(Class<?> klass) {
        try {
            Object binding = internalCluster().getDataNodeInstance(klass);
            assertNotNull(binding);
            assertTrue(klass.isInstance(binding));
        } catch (Exception e) {
            fail("no service bound for class " + klass.getSimpleName());
        }
    }

    private void assertServiceIsNotBound(Class<?> klass) {
        try {
            // it should be bound, but directly as null
            assertNull(internalCluster().getDataNodeInstance(klass));
        } catch (Exception ce) {
            assertThat("message contains error about missing implementation: " + ce.getMessage(),
                    ce.getMessage().contains("Could not find a suitable constructor"), equalTo(true));
        }
    }
}
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*/
package org.elasticsearch.xpack.monitoring;

import org.elasticsearch.client.Client;
import org.elasticsearch.license.TribeTransportTestCase;
import org.elasticsearch.xpack.core.XPackField;
import org.elasticsearch.xpack.core.monitoring.action.MonitoringBulkAction;
import org.elasticsearch.xpack.core.monitoring.action.MonitoringBulkRequest;

import java.util.Collections;
import java.util.List;

public class MonitoringTribeTests extends TribeTransportTestCase {

    @Override
    protected List<String> enabledFeatures() {
        return Collections.singletonList(XPackField.MONITORING);
    }
```

```
    @Override
    protected void verifyActionOnClientNode(Client client) throws Exception {
        assertMonitoringTransportActionsWorks(client);
    }

    @Override
    protected void verifyActionOnMasterNode(Client masterClient) throws Exception {
        assertMonitoringTransportActionsWorks(masterClient);
    }

    @Override
    protected void verifyActionOnDataNode(Client dataNodeClient) throws Exception {
        assertMonitoringTransportActionsWorks(dataNodeClient);
    }

    private static void assertMonitoringTransportActionsWorks(Client client) throws Exception {
        client.execute(MonitoringBulkAction.INSTANCE, new MonitoringBulkRequest());
    }

    @Override
    protected void verifyActionOnTribeNode(Client tribeClient) {
        failAction(tribeClient, MonitoringBulkAction.INSTANCE);
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
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*/
package org.elasticsearch.test;

import org.elasticsearch.Build;
import org.elasticsearch.common.bytes.BytesArray;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.transport.TransportAddress;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.license.GetLicenseResponse;
import org.elasticsearch.license.License;
import org.elasticsearch.license.LicensingClient;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.protocol.xpack.license.LicensesStatus;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;
import org.elasticsearch.xpack.core.XPackPlugin;
import org.elasticsearch.xpack.core.XPackSettings;
import org.junit.AfterClass;

import java.io.IOException;
```

```
import java.net.InetAddress;
import java.net.InetSocketAddress;
import java.net.URL;
import java.nio.charset.StandardCharsets;
import java.util.Collection;
import java.util.Collections;

import static org.hamcrest.CoreMatchers.equalTo;

public class LicensingTribeIT extends ESIntegTestCase {
  private static TestCluster cluster2;
  private static TestCluster tribeNode;

  @Override
  protected Collection<Class<? extends Plugin>> nodePlugins() {
     return Collections.singletonList(XPackPlugin.class);
  }

  @Override
  protected Collection<Class<? extends Plugin>> transportClientPlugins() {
     return Collections.singletonList(LocalStateCompositeXPackPlugin.class);
  }

  @Override
  public void setUp() throws Exception {
     super.setUp();
     if (cluster2 == null) {
        cluster2 = buildExternalCluster(System.getProperty("tests.cluster2"));
     }
     if (tribeNode == null) {
        tribeNode = buildExternalCluster(System.getProperty("tests.tribe"));
     }
  }

  @Override
  protected Settings nodeSettings(int nodeOrdinal) {
     Settings.Builder builder = Settings.builder();
     builder.put(super.nodeSettings(nodeOrdinal));
     return builder.build();
  }

  @AfterClass
  public static void tearDownExternalClusters() throws IOException {
     if (cluster2 != null) {
        try {
           cluster2.close();
        } finally {
           cluster2 = null;
```

```
            }
        }
        if (tribeNode != null) {
            try {
                tribeNode.close();
            } finally {
                tribeNode = null;
            }
        }
    }

    @Override
    protected Settings externalClusterClientSettings() {
        Settings.Builder builder = Settings.builder();
        builder.put(XPackSettings.SECURITY_ENABLED.getKey(), false);
        builder.put(XPackSettings.MONITORING_ENABLED.getKey(), false);
        builder.put(XPackSettings.WATCHER_ENABLED.getKey(), false);
        builder.put(XPackSettings.GRAPH_ENABLED.getKey(), false);
        builder.put(XPackSettings.MACHINE_LEARNING_ENABLED.getKey(), false);
        return builder.build();
    }

    private ExternalTestCluster buildExternalCluster(String clusterAddresses) throws IOException {
        String[] stringAddresses = clusterAddresses.split(",");
        TransportAddress[] transportAddresses = new TransportAddress[stringAddresses.length];
        int i = 0;
        for (String stringAddress : stringAddresses) {
            URL url = new URL("http://" + stringAddress);
            InetAddress inetAddress = InetAddress.getByName(url.getHost());
            transportAddresses[i++] = new TransportAddress(new InetSocketAddress(inetAddress, url.getPort()));
        }
        return new ExternalTestCluster(createTempDir(), externalClusterClientSettings(), transportClientPlugins(),
transportAddresses);
    }

    public void testLicensePropagateToTribeNode() throws Exception {
        assumeTrue("License is only valid when tested against snapshot/test keys", Build.CURRENT.isSnapshot());
        // test that auto-generated basic license propagates to tribe
        assertBusy(() -> {
            GetLicenseResponse getLicenseResponse = new
LicensingClient(tribeNode.client()).prepareGetLicense().get();
            assertNotNull(getLicenseResponse.license());
            assertThat(getLicenseResponse.license().operationMode(), equalTo(License.OperationMode.BASIC));
        });

        // test that signed license with higher operation mode takes precedence
        LicensingClient cluster2Client = new LicensingClient(cluster2.client());
        PutLicenseResponse licenseResponse = cluster2Client
```

```
            .preparePutLicense(License.fromSource(new
BytesArray(PLATINUM_LICENSE.getBytes(StandardCharsets.UTF_8)), XContentType.JSON))
            .setAcknowledge(true).get();
        assertThat(licenseResponse.isAcknowledged(), equalTo(true));
        assertThat(licenseResponse.status(), equalTo(LicensesStatus.VALID));
        assertBusy(() -> {
            GetLicenseResponse getLicenseResponse = new
LicensingClient(tribeNode.client()).prepareGetLicense().get();
            assertNotNull(getLicenseResponse.license());
            assertThat(getLicenseResponse.license().operationMode(), equalTo(License.OperationMode.PLATINUM));
        });

        // test removing signed license falls back works
        assertTrue(cluster2Client.prepareDeleteLicense().get().isAcknowledged());
        assertBusy(() -> {
            GetLicenseResponse getLicenseResponse = new
LicensingClient(tribeNode.client()).prepareGetLicense().get();
            assertNotNull(getLicenseResponse.license());
            assertThat(getLicenseResponse.license().operationMode(), equalTo(License.OperationMode.BASIC));
        });
    }

    public void testDummy() throws Exception {
        // this test is here so that testLicensePropagateToTribeNode's assumption
        // doesn't result in this test suite to have no tests run and trigger a build failure
    }

    private static final String PLATINUM_LICENSE = "{\"license\":{\"uid\":\"1\",\"type\":\"platinum\"," +
            "\"issue_date_in_millis\":1411948800000,\"expiry_date_in_millis\":1914278399999,\"max_nodes\":1," +
            "\"issued_to\":\"issuedTo\",\"issuer\":\"issuer\"," +
"\"signature\":\"AAAAAwAAAA2hWlkvKcxQIpdVWdCtAAABmC9ZN0hjZDBGYnVyRXpCOW5Bb3FjZDAxO
WpSbTVoMVZwUzRxVk1" +
"PSmkxakxZdW5IMlhlTHNoN1N2MXMvRFk4d3JTZEx3R3RRZ0pzU3lobWJKZnQvSEFva0ppTHBkWkprZWZ
SQi9iNmRQNkw1SlpLN0l" +
"DalZCS095MXRGN1lIZlpYcVVTTnFrcTE2dzhJZmZrdFQrN3JQeGwxb0U0MXZ0dDJHSERiZTVLOHNzSDBy
WnpoZEphZHBEZjUrTVB" +
"xRENNSXNsWWJjZllaODdzVmEzUjNiWktNWGM5TUhQV2plaUo4Q1JOUml4MXNuL0pSOEhQaVB2azhmU
k9QVzhFeTFoM1Q0RnJXSG5" +
"3MWk2K055c28zSmRnVkF1b2JSQkFLV2VXUmVHNDZ2R3o2VE1qbVNQS2lxOHN5bUErZlNIWkZSVmZI
WEtaSU9wTTJENDVvT1NCYkla" +
"cUYyK2FwRW9xa0t6dldMbmMzSGtQc3FWOTgzZ3ZUcXMvQkt2RUZwMFJnZzlvL2d2bDRWUzh6UG5pdEN
GWFRreXNKNkE9PQAAAQBWg" +
"u3yZp0KOBG//92X4YVmau3P5asvx0FAPDX2Ze734Tap/nc30X6Rt4yEEm+6bCQr/ibBOqWboJKRbbTZLBQfY
FmL1ZqvAY3bJJ1/Xs" +
"8NyDfxKGztlUt/IIOzHPzxs0f8Bv4OJeK48vjovWaDc1Vmo4n1SGyyL0JcEbOWC6A3U3mBsWn7wLUe+hW9+
akVAYOO5TIcm60ub7k" +
"H/LIZNOhvGglSVDbl3p8EBkNMy0CV7urQ0wdG1nLCnvf8/BiT15lC5nLrM9Dt5w3pzciPlASzw4iksW/CzvYy5
tjOoWKEnxi2EZOB" +
```

```
        "9dKyT4mTdvyBOrTHLdgr4lmHd3qYAEgcTCaQ\",\"start_date_in_millis\":-1}}";
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.client.Client;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.protocol.xpack.license.DeleteLicenseRequest;
import org.elasticsearch.protocol.xpack.license.GetLicenseRequest;

import static org.elasticsearch.license.TestUtils.generateSignedLicense;

public class LicenseTribeTests extends TribeTransportTestCase {

  @Override
  protected void verifyActionOnClientNode(Client client) throws Exception {
     assertLicenseTransportActionsWorks(client);
  }

  @Override
  protected void verifyActionOnMasterNode(Client masterClient) throws Exception {
     assertLicenseTransportActionsWorks(masterClient);
  }

  @Override
  protected void verifyActionOnDataNode(Client dataNodeClient) throws Exception {
     assertLicenseTransportActionsWorks(dataNodeClient);
  }

  private static void assertLicenseTransportActionsWorks(Client client) throws Exception {
     client.execute(GetLicenseAction.INSTANCE, new GetLicenseRequest()).get();
     client.execute(PutLicenseAction.INSTANCE, new PutLicenseRequest()
           .license(generateSignedLicense(TimeValue.timeValueHours(1))));
     client.execute(DeleteLicenseAction.INSTANCE, new DeleteLicenseRequest());
  }

  @Override
  protected void verifyActionOnTribeNode(Client tribeClient) throws Exception {
     // The get licence action should work, but everything else should fail
     tribeClient.execute(GetLicenseAction.INSTANCE, new GetLicenseRequest()).get();
     failAction(tribeClient, PutLicenseAction.INSTANCE);
     failAction(tribeClient, DeleteLicenseAction.INSTANCE);
  }
}
```

```
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.Action;
import org.elasticsearch.action.admin.cluster.health.ClusterHealthResponse;
import org.elasticsearch.action.admin.cluster.node.info.NodeInfo;
import org.elasticsearch.action.admin.cluster.node.info.NodesInfoResponse;
import org.elasticsearch.analysis.common.CommonAnalysisPlugin;
import org.elasticsearch.client.Client;
import org.elasticsearch.client.Requests;
import org.elasticsearch.cluster.health.ClusterHealthStatus;
import org.elasticsearch.cluster.node.DiscoveryNode;
import org.elasticsearch.cluster.node.DiscoveryNodes;
import org.elasticsearch.common.Priority;
import org.elasticsearch.common.UUIDs;
import org.elasticsearch.common.network.NetworkModule;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.transport.TransportAddress;
import org.elasticsearch.discovery.zen.SettingsBasedHostsProvider;
import org.elasticsearch.env.Environment;
import org.elasticsearch.node.MockNode;
import org.elasticsearch.node.Node;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.test.ESIntegTestCase;
import org.elasticsearch.test.ESIntegTestCase.ClusterScope;
import org.elasticsearch.test.ESIntegTestCase.Scope;
import org.elasticsearch.test.InternalTestCluster;
import org.elasticsearch.test.NodeConfigurationSource;
import org.elasticsearch.test.TestCluster;
import org.elasticsearch.test.discovery.TestZenDiscovery;
import org.elasticsearch.tribe.TribePlugin;
import org.elasticsearch.xpack.CompositeTestingXPackPlugin;
import org.elasticsearch.xpack.core.XPackClientPlugin;
import org.elasticsearch.xpack.core.XPackPlugin;
import org.elasticsearch.xpack.core.XPackSettings;
import org.elasticsearch.xpack.core.XPackField;
import org.elasticsearch.xpack.deprecation.Deprecation;
import org.elasticsearch.xpack.graph.Graph;
import org.elasticsearch.xpack.logstash.Logstash;
import org.elasticsearch.xpack.ml.MachineLearning;
import org.elasticsearch.xpack.core.ml.MachineLearningField;
import org.elasticsearch.xpack.monitoring.Monitoring;
import org.elasticsearch.xpack.security.Security;
import org.elasticsearch.xpack.upgrade.Upgrade;
```

```
import org.elasticsearch.xpack.watcher.Watcher;

import java.nio.file.Path;
import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collection;
import java.util.Collections;
import java.util.List;
import java.util.function.Function;

import static org.elasticsearch.test.hamcrest.ElasticsearchAssertions.assertAcked;
import static org.hamcrest.Matchers.anyOf;
import static org.hamcrest.Matchers.containsString;
import static org.hamcrest.Matchers.equalTo;

@ClusterScope(scope = Scope.TEST, transportClientRatio = 0, numClientNodes = 1, numDataNodes = 2)
public abstract class TribeTransportTestCase extends ESIntegTestCase {

  protected List<String> enabledFeatures() {
     return Collections.emptyList();
  }

  @Override
  protected final Settings nodeSettings(int nodeOrdinal) {
     final Settings.Builder builder = Settings.builder()
           .put(NetworkModule.HTTP_ENABLED.getKey(), false)
           .put("transport.type", getTestTransportType());
     List<String> enabledFeatures = enabledFeatures();
     builder.put(XPackSettings.SECURITY_ENABLED.getKey(),
enabledFeatures.contains(XPackField.SECURITY));
     builder.put(XPackSettings.MONITORING_ENABLED.getKey(),
enabledFeatures.contains(XPackField.MONITORING));
     builder.put(XPackSettings.WATCHER_ENABLED.getKey(),
enabledFeatures.contains(XPackField.WATCHER));
     builder.put(XPackSettings.GRAPH_ENABLED.getKey(), enabledFeatures.contains(XPackField.GRAPH));
     builder.put(XPackSettings.MACHINE_LEARNING_ENABLED.getKey(),
enabledFeatures.contains(XPackField.MACHINE_LEARNING));
     builder.put(MachineLearningField.AUTODETECT_PROCESS.getKey(), false);
     return builder.build();
  }

  @Override
  protected boolean ignoreExternalCluster() {
     return true;
  }

  @Override
  protected boolean addTestZenDiscovery() {
```

```
    return false;
}

public static class TribeAwareTestZenDiscoveryPlugin extends TestZenDiscovery.TestPlugin {

    public TribeAwareTestZenDiscoveryPlugin(Settings settings) {
        super(settings);
    }

    @Override
    public Settings additionalSettings() {
        if (settings.getGroups("tribe", true).isEmpty()) {
            return super.additionalSettings();
        } else {
            return Settings.EMPTY;
        }
    }
}

public static class MockTribePlugin extends TribePlugin {

    public MockTribePlugin(Settings settings) {
        super(settings);
    }

    protected Function<Settings, Node> nodeBuilder(Path configPath) {
        return settings -> new MockNode(new Environment(settings, configPath), internalCluster().getPlugins());
    }

}

@Override
protected Collection<Class<? extends Plugin>> nodePlugins() {
    ArrayList<Class<? extends Plugin>> plugins = new ArrayList<>();
    plugins.add(MockTribePlugin.class);
    plugins.add(TribeAwareTestZenDiscoveryPlugin.class);
    plugins.add(CompositeTestingXPackPlugin.class);
    plugins.add(CommonAnalysisPlugin.class);
    return plugins;
}

@Override
protected final Collection<Class<? extends Plugin>> transportClientPlugins() {
    ArrayList<Class<? extends Plugin>> plugins = new ArrayList<>();
    plugins.add(MockTribePlugin.class);
    plugins.add(TribeAwareTestZenDiscoveryPlugin.class);
    plugins.add(XPackClientPlugin.class);
    plugins.add(CommonAnalysisPlugin.class);
```

```
        return plugins;
    }
    public void testTribeSetup() throws Exception {
        NodeConfigurationSource nodeConfigurationSource = new NodeConfigurationSource() {
            @Override
            public Settings nodeSettings(int nodeOrdinal) {
                return TribeTransportTestCase.this.nodeSettings(nodeOrdinal);
            }

            @Override
            public Path nodeConfigPath(int nodeOrdinal) {
                return null;
            }

            @Override
            public Collection<Class<? extends Plugin>> nodePlugins() {
                return TribeTransportTestCase.this.nodePlugins();
            }

            @Override
            public Settings transportClientSettings() {
                return TribeTransportTestCase.this.transportClientSettings();
            }

            @Override
            public Collection<Class<? extends Plugin>> transportClientPlugins() {
                return TribeTransportTestCase.this.transportClientPlugins();
            }
        };
        final InternalTestCluster cluster2 = new InternalTestCluster(
                randomLong(), createTempDir(), true, true, 2, 2,
                UUIDs.randomBase64UUID(random()), nodeConfigurationSource, 1, false, "tribe_node2",
                getMockPlugins(), getClientWrapper());

        cluster2.beforeTest(random(), 0.0);

        logger.info("create 2 indices, test1 on t1, and test2 on t2");
        assertAcked(internalCluster().client().admin().indices().prepareCreate("test1").get());
        assertAcked(cluster2.client().admin().indices().prepareCreate("test2").get());
        ensureYellow(internalCluster());
        ensureYellow(cluster2);
    //      Map<String,String> asMap = internalCluster().getDefaultSettings().getAsMap();
        Settings.Builder tribe1Defaults = Settings.builder();
        Settings.Builder tribe2Defaults = Settings.builder();
        internalCluster().getDefaultSettings().keySet().forEach(k -> {
            if (k.startsWith("path.") == false) {
                tribe1Defaults.copy(k, internalCluster().getDefaultSettings());
                tribe2Defaults.copy(k, internalCluster().getDefaultSettings());
```

```
            }
        });
        tribe1Defaults.normalizePrefix("tribe.t1.");
        tribe2Defaults.normalizePrefix("tribe.t2.");
        // give each tribe it's unicast hosts to connect to
        tribe1Defaults.putList("tribe.t1." +
SettingsBasedHostsProvider.DISCOVERY_ZEN_PING_UNICAST_HOSTS_SETTING.getKey(),
                getUnicastHosts(internalCluster().client()));
        tribe1Defaults.putList("tribe.t2." +
SettingsBasedHostsProvider.DISCOVERY_ZEN_PING_UNICAST_HOSTS_SETTING.getKey(),
                getUnicastHosts(cluster2.client()));

        Settings merged = Settings.builder()
                .put("tribe.t1.cluster.name", internalCluster().getClusterName())
                .put("tribe.t2.cluster.name", cluster2.getClusterName())
                .put("tribe.t1.transport.tcp.port", 0)
                .put("tribe.t2.transport.tcp.port", 0)
                .put("tribe.t1.transport.type", getTestTransportType())
                .put("tribe.t2.transport.type", getTestTransportType())
                .put("tribe.blocks.write", false)
                .put(tribe1Defaults.build())
                .put(tribe2Defaults.build())
                .put(NetworkModule.HTTP_ENABLED.getKey(), false)
                .put(internalCluster().getDefaultSettings())
                .put(XPackSettings.SECURITY_ENABLED.getKey(), false) // otherwise it conflicts with mock transport
                .put(XPackSettings.MACHINE_LEARNING_ENABLED.getKey(), false)
                .put(MachineLearningField.AUTODETECT_PROCESS.getKey(), false)
                .put("tribe.t1." + XPackSettings.SECURITY_ENABLED.getKey(), false)
                .put("tribe.t2." + XPackSettings.SECURITY_ENABLED.getKey(), false)
                .put("tribe.t1." + XPackSettings.WATCHER_ENABLED.getKey(), false)
                .put("tribe.t2." + XPackSettings.WATCHER_ENABLED.getKey(), false)
                .put("tribe.t1." + XPackSettings.MACHINE_LEARNING_ENABLED.getKey(), false)
                .put("tribe.t2." + XPackSettings.MACHINE_LEARNING_ENABLED.getKey(), false)
                .put("tribe.t1." + MachineLearningField.AUTODETECT_PROCESS.getKey(), false)
                .put("tribe.t2." + MachineLearningField.AUTODETECT_PROCESS.getKey(), false)
                .put("node.name", "tribe_node") // make sure we can identify threads from this node
                .put("transport.type", getTestTransportType())
                .build();

        final List<Class<? extends Plugin>> mockPlugins = Arrays.asList(MockTribePlugin.class,
TribeAwareTestZenDiscoveryPlugin.class,
                getTestTransportPlugin(), Deprecation.class, Graph.class, Logstash.class, MachineLearning.class,
Monitoring.class,
                Security.class, Upgrade.class, Watcher.class, XPackPlugin.class);
        final Node tribeNode = new MockNode(merged, mockPlugins).start();
        Client tribeClient = tribeNode.client();

        logger.info("wait till tribe has the same nodes as the 2 clusters");
```

```
    assertBusy(() -> {
        DiscoveryNodes tribeNodes = tribeNode.client().admin().cluster().prepareState().get().getState().getNodes();
        assertThat(countDataNodesForTribe("t1", tribeNodes),
                equalTo(internalCluster().client().admin().cluster().prepareState().get().getState()
                        .getNodes().getDataNodes().size()));
        assertThat(countDataNodesForTribe("t2", tribeNodes),
                equalTo(cluster2.client().admin().cluster().prepareState().get().getState()
                        .getNodes().getDataNodes().size()));
    });
    logger.info(" --> verify transport actions for tribe node");
    verifyActionOnTribeNode(tribeClient);
    logger.info(" --> verify transport actions for data node");
    verifyActionOnDataNode((randomBoolean() ? internalCluster() : cluster2).dataNodeClient());
    logger.info(" --> verify transport actions for master node");
    verifyActionOnMasterNode((randomBoolean() ? internalCluster() : cluster2).masterClient());
    logger.info(" --> verify transport actions for client node");
    verifyActionOnClientNode((randomBoolean() ? internalCluster() : cluster2).coordOnlyNodeClient());
    try {
        cluster2.wipe(Collections.<String>emptySet());
    } finally {
        cluster2.afterTest();
    }
    tribeNode.close();
    cluster2.close();
}

/**
 * Verify transport action behaviour on client node
 */
protected abstract void verifyActionOnClientNode(Client client) throws Exception;

/**
 * Verify transport action behaviour on master node
 */
protected abstract void verifyActionOnMasterNode(Client masterClient) throws Exception;

/**
 * Verify transport action behaviour on data node
 */
protected abstract void verifyActionOnDataNode(Client dataNodeClient) throws Exception;

/**
 * Verify transport action behaviour on tribe node
 */
protected abstract void verifyActionOnTribeNode(Client tribeClient) throws Exception;

protected void failAction(Client client, Action action) {
    try {
```

```
            client.execute(action, action.newRequestBuilder(client).request());
            fail("expected [" + action.name() + "] to fail");
        } catch (IllegalStateException e) {
            assertThat(e.getMessage(), containsString("failed to find action"));
        }
    }

    private void ensureYellow(TestCluster testCluster) {
        ClusterHealthResponse actionGet = testCluster.client().admin().cluster()
                .health(Requests.clusterHealthRequest().waitForYellowStatus()
                        .waitForEvents(Priority.LANGUID).waitForNoRelocatingShards(true)).actionGet();
        if (actionGet.isTimedOut()) {
            logger.info("ensureGreen timed out, cluster state:\n{}\n{}", testCluster.client().admin().cluster()
                    .prepareState().get().getState(),
                    testCluster.client().admin().cluster().preparePendingClusterTasks().get());
            assertThat("timed out waiting for yellow state", actionGet.isTimedOut(), equalTo(false));
        }
        assertThat(actionGet.getStatus(), anyOf(equalTo(ClusterHealthStatus.YELLOW),
equalTo(ClusterHealthStatus.GREEN)));
    }

    private int countDataNodesForTribe(String tribeName, DiscoveryNodes nodes) {
        int count = 0;
        for (DiscoveryNode node : nodes) {
            if (!node.isDataNode()) {
                continue;
            }
            if (tribeName.equals(node.getAttributes().get("tribe.name"))) {
                count++;
            }
        }
        return count;
    }

    private static String[] getUnicastHosts(Client client) {
        ArrayList<String> unicastHosts = new ArrayList<>();
        NodesInfoResponse nodeInfos = client.admin().cluster().prepareNodesInfo().clear().setTransport(true).get();
        for (NodeInfo info : nodeInfos.getNodes()) {
            TransportAddress address = info.getTransport().getAddress().publishAddress();
            unicastHosts.add(address.getAddress() + ":" + address.getPort());
        }
        return unicastHosts.toArray(new String[unicastHosts.size()]);
    }

}
import org.elasticsearch.gradle.test.ClusterConfiguration
import org.elasticsearch.gradle.test.ClusterFormationTasks
import org.elasticsearch.gradle.test.NodeInfo
```

```
apply plugin: 'elasticsearch.standalone-test'
apply plugin: 'elasticsearch.standalone-rest-test'
apply plugin: 'elasticsearch.rest-test'

dependencies {
  testCompile project(path: ':modules:tribe', configuration: 'runtime')
  testCompile project(path: xpackProject('plugin').path, configuration: 'testArtifacts')

  // TODO: remove all these test deps, this is completely bogus, guava is being force upgraded
  testCompile project(path: xpackModule('deprecation'), configuration: 'runtime')
  testCompile project(path: xpackModule('graph'), configuration: 'runtime')
  testCompile project(path: xpackModule('logstash'), configuration: 'runtime')
  testCompile project(path: xpackModule('ml'), configuration: 'runtime')
  testCompile project(path: xpackModule('monitoring'), configuration: 'runtime')
  testCompile project(path: xpackModule('security'), configuration: 'runtime')
  testCompile project(path: xpackModule('upgrade'), configuration: 'runtime')
  testCompile project(path: xpackModule('watcher'), configuration: 'runtime')
  testCompile project(path: xpackModule('core'), configuration: 'testArtifacts')
  testCompile project(path: xpackModule('monitoring'), configuration: 'testArtifacts')
}

compileTestJava.options.compilerArgs << "-Xlint:-rawtypes,-unchecked"
namingConventions.skipIntegTestInDisguise = true

test {
 /*
  * We have to disable setting the number of available processors as tests in the same JVM randomize processors and
will step on each
  * other if we allow them to set the number of available processors as it's set-once in Netty.
  */
 systemProperty 'es.set.netty.runtime.available.processors', 'false'
 include '**/*Tests.class'
}

String licensePath = xpackProject('license-tools').projectDir.toPath().resolve('src/test/resources').toString()
sourceSets {
 test {
   resources {
     srcDirs += [licensePath]
   }
 }
}

project.forbiddenPatterns {
 exclude '**/*.key'
}
```

```
task setupClusterOne {}
ClusterConfiguration cluster1Config = new ClusterConfiguration(project)
cluster1Config.clusterName = 'cluster1'
cluster1Config.setting('node.name', 'cluster1-node1')
// x-pack
cluster1Config.setting('xpack.monitoring.enabled', false)
cluster1Config.setting('xpack.security.enabled', false)
cluster1Config.setting('xpack.watcher.enabled', false)
cluster1Config.setting('xpack.graph.enabled', false)
cluster1Config.setting('xpack.ml.enabled', false)

List<NodeInfo> cluster1Nodes = ClusterFormationTasks.setup(project, 'clusterOne', setupClusterOne,
cluster1Config)

task setupClusterTwo {}
ClusterConfiguration cluster2Config = new ClusterConfiguration(project)
cluster2Config.clusterName = 'cluster2'
cluster2Config.setting('node.name', 'cluster2-node1')
// x-pack
cluster2Config.setting('xpack.monitoring.enabled', false)
cluster2Config.setting('xpack.monitoring.enabled', false)
cluster2Config.setting('xpack.security.enabled', false)
cluster2Config.setting('xpack.watcher.enabled', false)
cluster2Config.setting('xpack.graph.enabled', false)
cluster2Config.setting('xpack.ml.enabled', false)

List<NodeInfo> cluster2Nodes = ClusterFormationTasks.setup(project, 'clusterTwo', setupClusterTwo,
cluster2Config)

integTestCluster {
 dependsOn setupClusterOne, setupClusterTwo
 setting 'node.name', 'tribe-node'
 setting 'tribe.on_conflict', 'prefer_cluster1'
 setting 'tribe.cluster1.cluster.name', 'cluster1'
 setting 'tribe.cluster1.discovery.zen.ping.unicast.hosts', '"${-> cluster1Nodes.get(0).transportUri()}"'
 setting 'tribe.cluster1.http.enabled', 'true'
 setting 'tribe.cluster1.http.port', '0'
 setting 'tribe.cluster1.transport.tcp.port', '0'
 setting 'tribe.cluster1.xpack.monitoring.enabled', false
 setting 'tribe.cluster1.xpack.monitoring.enabled', false
 setting 'tribe.cluster1.xpack.security.enabled', false
 setting 'tribe.cluster1.xpack.watcher.enabled', false
 setting 'tribe.cluster1.xpack.graph.enabled', false
 setting 'tribe.cluster1.xpack.ml.enabled', false
 setting 'tribe.cluster1.xpack.license.self_generated.type', 'trial'
 setting 'tribe.cluster2.cluster.name', 'cluster2'
 setting 'tribe.cluster2.discovery.zen.ping.unicast.hosts', '"${-> cluster2Nodes.get(0).transportUri()}"'
 setting 'tribe.cluster2.http.enabled', 'true'
```

```
 setting 'tribe.cluster1.http.port', '0'
 setting 'tribe.cluster1.transport.tcp.port', '0'
 setting 'tribe.cluster2.xpack.monitoring.enabled', false
 setting 'tribe.cluster2.xpack.monitoring.enabled', false
 setting 'tribe.cluster2.xpack.security.enabled', false
 setting 'tribe.cluster2.xpack.watcher.enabled', false
 setting 'tribe.cluster2.xpack.graph.enabled', false
 setting 'tribe.cluster2.xpack.ml.enabled', false
 setting 'tribe.cluster2.xpack.license.self_generated.type', 'trial'
 // x-pack
 setting 'xpack.monitoring.enabled', false
 setting 'xpack.monitoring.enabled', false
 setting 'xpack.security.enabled', false
 setting 'xpack.watcher.enabled', false
 setting 'xpack.graph.enabled', false
 setting 'xpack.ml.enabled', false
 setting 'xpack.license.self_generated.type', 'trial'
 waitCondition = { node, ant ->
   File tmpFile = new File(node.cwd, 'wait.success')
   // 5 nodes: tribe + clusterOne (1 node + tribe internal node) + clusterTwo (1 node + tribe internal node)
   ant.get(src: "http://${node.httpUri()}/_cluster/health?wait_for_nodes=>=5&wait_for_status=yellow",
           dest: tmpFile.toString(),
           ignoreerrors: true,
           retries: 10)
   return tmpFile.exists()
 }
}

integTestRunner {
 /*
  * We have to disable setting the number of available processors as tests in the same JVM randomize processors and
will step on each
  * other if we allow them to set the number of available processors as it's set-once in Netty.
  */
 systemProperty 'es.set.netty.runtime.available.processors', 'false'
 systemProperty 'tests.cluster', "${-> cluster1Nodes.get(0).transportUri()}"
 systemProperty 'tests.cluster2', "${-> cluster2Nodes.get(0).transportUri()}"
 systemProperty 'tests.tribe', "${-> integTest.nodes.get(0).transportUri()}"
 finalizedBy 'clusterOne#stop'
 finalizedBy 'clusterTwo#stop'
}
---
teardown:
 - do:
     xpack.license.post:
       acknowledge: true
       body: |
         {"licenses":[{"uid":"3aa62ffe-36e1-4fad-bfdc-
```

9dff8301eb22","type":"trial","issue_date_in_millis":1523456691721,"expiry_date_in_millis":1838816691721,"max_nodes":5,"issued_to":"customer","issuer":"elasticsearch","signature":"AAAABAAAAA2kWNcuc+DT0lrlmYZKAAAAIAo5/x6hrsGh1GqqrJmy4qgmEC7gK0U4zQ6q5ZEMhm4jAAABAEn6fG9y2VxKBu2T3D5hffh56kzOQODCOdhr0y2d17ZSIJMZRqO7ZywPCWNS1aR33GhfIHkTER0ysML0xMH/gXavhyRvMBndJj0UBKzuwpTawSlnxYtcqN8mSBIvJC7Ki+uJ1SpAILC2ZP9fnkRlqwXqBlTwfYn7xnZgu9DKrOWru/ipTPObo7jcePl8VTK6nWFen7/hCFDQTUFZ0jQvd+nq7A1PAcHGNxGfdbMVmAXCXgGWkRfT3clo9/vadgo+isNyh1sPq9mN7gwsvBAKtA1FrpH2EXYYbfOsSpBvUmhYMgErLg1k3/CbS0pCWLKOaX1xTMayosdZOjagU3auZXY=","start_date_in_millis":-1}]}

"Installing and getting license works":

```
## current license version
- do:
    xpack.license.post:
      acknowledge: true
      body: |
        {"licenses":[{"uid":"894371dc-9t49-4997-93cb-
```

8o2e3r7fa6a8","type":"trial","issue_date_in_millis":1411948800000,"expiry_date_in_millis":1916956799999,"max_nodes":1,"issued_to":"issuedTo","issuer":"issuer","signature":"AAAAAgAAAA0FWh0T9njItjQ2qammAAABmC9ZN0hjZDBGYnVyRXpCOW5Bb3FjZDAxOWpSbTVoMVZwUzRxVk1PSmkxakxZdW5IMlhlTHNoN1N2MXMvRFk4d3JTZEx3R3RRZ0pzU3lobWJKZnQvSEFva0ppTHBkWkprZWZSQi9iNmRQNkw1SlpLN0lDalZCS095MXRGN1lIZlpYcVVTTnFrcTE2dzhJZmZrdFQrN3JQeGwxb0U0MXZ0dDJHSERiZTVLOHNzSDByWnpoZEphZHBEZjUrTVBxRENNSXNsWWJjZllaODdzVmEzUjNiWktNWGM5TUhQV2plaUo4Q1JOUml4MXNuL0pSOEhQaVB2azhmUk9QVzhFeTFoM1Q0RnJXSG53MWk2K055c28zSmRnVkF1b2JSQkFLV2VXUmVHNDZ2R3o2VE1qbVNQS2lxOHN5bUErZlNIWkZSVmZIWEtaSU9wTTJENDVvT1NCYklacUYyK2FwRW9xa0t6ldldMbmMzSGtQc3FWOTgzZ3ZUcXMvQkt2RUZwMFJnZzlvL2d2bDRWUzh6UG5pdENGWFRreXNKNkE9PQAAAQBZhvozA0trrxhUZ1QbaTsKTna9C5KVQ6pv8yg1pnsBpZXCl8kX1SrgoFn1bXq61IvJwfw5qnmYNiH3hRhTO9EyaCBqaLk8NXZQ6TrRkQSpEnnBwAYUkZeKXsIuBoOk4B4mzwC/r8aMAkzrTiEBtBbog+57cSaU9y37Gkdd+1jXCQrxP+jOEUf7gnXWZvE6oeRroLvCt1fYn09k0CF8kKTbrPTSjC6igZR3uvTHyee74XQ9PRavvHax73T4UOEdQZX/P1ibSQIWKbBRD5YQ1POYVjTayoltTnWLMxfEcAkkATJZLhpBEHST7kZWjrTS6J1dCReJc7a8Vsj/78HXvOIy"}]}

```
- match: { license_status:  "valid" }

- do:
    xpack.license.get: {}

## a license object has 11 attributes
- length: { license: 11 }

## bwc for licenses format
- do:
    xpack.license.post:
      acknowledge: true
      body: |
        {"licenses":[{"uid":"893361dc-9749-4997-93cb-
```

802e3d7fa4a8","type":"gold","issue_date_in_millis":1411948800000,"expiry_date_in_millis":1914278399999,"max_nodes":1,"issued_to":"issued_to","issuer":"issuer","signature":"AAAAAwAAAA2T3vqdBBetKQaBgxipAAABmC9ZN0hjZDBGYnVyRXpCOW5Bb3FjZDAxOWpSbTVoMVZwUzRxVk1PSmkxakxZdW5IMlhlTHNoN1N2M

XMvRFk4d3JTZEx3R3RRZ0pzU3lobWJKZnQvSEFva0ppTHBkWkprZWZSQi9iNmRQNkw1SlpLN0lDalZCS095MXRGN1lIZlpYcVVTTnFrcTE2dzhJZmZrdFQrN3JQeGwxb0U0MXZ0dDJHSERiZTVLOHNzSDByWnpoZEphZHBEZjUrTVBxRENNSXNsWWJjZllaODdzVmEzUjNiWktNWGM5TUhQV2plaUo4Q1JOUml4MXNuL0pSOEhqaVB2azhmUk9QVzhFeTFoM1Q0RnJXSG53MWk2K055c28zSmRnVkF1b2JSQkFLV2VXUmVHNDZ2R3o2VE1qbVNQS2lxOHN5bUErZlNIWkZSVmZIWEtaSU9wTTJENDVvT1NCYklacUYyK2FwRW9xa0t6dldMbmMzSGtQc3FWOTgzZ3ZUcXMvQkt2RUZwMFJnZzlvL2d2bDRWUzh6UG5pdENGWFRreXNKNkE9PQAAAQB7pGFYgawfLm9zzT80LvcLHjy1t/v2uSzCQWKdXXhrwSy4WrAH2uK/+PEiQ7aEpW5erLsyJ5KLA6OEZJDaP7r+mjOPuLt0++l5j4DMn7ybMzOPHXWBc6LETE3+pp0GZPyOmwsDkZSRUegTtciR2R6z+mdnGrhOYM80y08KVWwhdU/DHw41MK7ePo6tq73Nz49y9lDgt9fxA0t4ggEBPbnTDDBVQ25AjauY8sa0M5eg9rDDRayw1KamYWrara8PIGX+2YjhtUeQhmlCPdlxc9wECJ7/knPss5bI3ZoXQR3fyXhjcXNnHEIsblqLrMCal3pLxs7lI+KPYMa2ZYL/am4P"}]}

- match: { license_status: "valid" }

- do:
    xpack.license.get: {}

- length: { license: 11 }

license version: 1.x
- do:
    xpack.license.post:
      acknowledge: true
      body: |
        {"licenses":[{"uid":"893361dc-9749-4997-93cb-802e3d7fa4a8","type":"subscription","subscription_type":"gold","issue_date_in_millis":1411948800000,"feature":"shield","expiry_date_in_millis":1914278399999,"max_nodes":1,"issued_to":"issuedTo","issuer":"issuer","signature":"AAAAAQAAAA0LVAywwpSH94cyXr4zAAABmC9ZN0hjZDBGYnVyRXpCOW5Bb3FjZDAxOWpSbTVoMVZwUzRxVk1PSmkxakxZdW5IMlhlTHNoN1N2MXMvRFk4d3JTZEx3R3RRZ0pzU3lobWJKZnQvSEFva0ppTHBkWkprZWZSQi9iNmRQNkw1SlpLN0lDalZCS095MXRGN1lIZlpYcVVTTnFrcTE2dzhJZmZrdFQrN3JQeGwxb0U0MXZ0dDJHSERiZTVLOHNzSDByWnpoZEphZHBEZjUrTVBxRENNSXNsWWJjZllaODdzVmEzUjNiWktNWGM5TUhQV2plaUo4Q1JOUml4MXNuL0pSOEhqaVB2azhmUk9QVzhFeTFoM1Q0RnJXSG53MWk2K055c28zSmRnVkF1b2JSQkFLV2VXUmVHNDZ2R3o2VE1qbVNQS2lxOHN5bUErZlNIWkZSVmZIWEtaSU9wTTJENDVvT1NCYklacUYyK2FwRW9xa0t6dldMbmMzSGtQc3FWOTgzZ3ZUcXMvQkt2RUZwMFJnZzlvL2d2bDRWUzh6UG5pdENGWFRreXNKNkE9PQAAAQA4qscc/URRZVdFoLwgy9dqybYEQLW8YLkiAyPV5XHHHdtk+dtZIepiNEDkUXhSX2waVJlsNRF8/4kqplDfwNoD2TUM8fTgiIfiSiZYGDTGST+yW/5eAveEU5J5v1liBN27bwkqL+V4YAa0Tcm7NKKwjScWKAHiTU3vF8chPkGfCHE0kQgVwPC9RE82pTw0s6/uR4PfLGNFfqPM0uiE5nucfVrtj89JQiO/KA/7ZyFbo7VTNXxZQt7T7rZWBCP9KIjptXzcWuk08Q5S+rSoJNYbFo3HGKtrCVsRz/55rceNtdwKKXu1IwnSeir4I1/KLduQTtFLy0+1th87VS8T88UT"}]}

- match: { license_status: "valid" }

- do:
    xpack.license.get: {}

- length: { license: 11 }

multiple licenses version: 1.x

```
- do:
    xpack.license.post:
      acknowledge: true
      body: |
        {"licenses":[{"uid":"893361dc-9749-4997-93cb-
802e3d7fa4a8","type":"internal","subscription_type":"none","issue_date_in_millis":1411948800000,"feature":"shiel
d","expiry_date_in_millis":1440892799999,"max_nodes":1,"issued_to":"issuedTo","issuer":"issuer","signature":"A
AAAAQAAAA04Q4ky3rFyyWLFkytEAAABmC9ZN0hjZDBGYnVyRXpCOW5Bb3FjZDAxOWpSbTVoMVZw
UzRxVk1PSmkxakxZdW5IMlhlTHNoN1N2MXMvRFk4d3JTZEx3R3RRZ0pzU3lobWJKZnQvSEFva0ppTHBkW
kprZWZSQi9iNmRQNkw1SlpLN0lDalZCS095MXRGN1lIZlpYcVVTTnFrcTE2dzhJZmZrdFQrN3JQeGwxb0U0
MXZ0dDJHSERiZTVLOHNzSDByWnpoZEphZHBEZjUrTVBxRENNSXNsWWJjZllaODdzVmEzUjNiWktNW
GM5TUhQV2plaUo4Q1JOUml4MXNuL0pSOEhQaVB2azhmUk9QVzhFeTFoM1Q0RnJXSG53MWk2K055c28z
SmRnVkF1b2JSQkFLV2VXUmVHNDZ2R3o2VE1qbVNQS2lxOHN5bUErZlNIWkZSVmZIWEtaSU9wTTJEND
VvT1NCYklacUYyK2FwRW9xa0t6dldMbmMzSGtQc3FWOTgzZ3ZUcXMvQkt2RUZwMFJnZzlvL2d2bDRWUz
h6UG5pdENGWFRreXNKNkE9PQAAAQBxMvUMn4h2E4R4TQMijahTxQj4LPQO4f1M79UxX/XkDlGcH+J5p
RHx08OtTRPsFL1lED+h+PIXx307Vo+PNDsOxrWvoYZeYBkOLAO3ny9vhQga+52jYhMxIuFrT9xbcSCSNpMh
GojgOIPU2WgiopVdVcimo1+Gk8VtklPB1wPwFzfOjOnPgp/Icx3WYpfkeAUUOyWUYiFIBAe4bnz84iF+xwLKb
gYk6aHF25ECBtdb/Uruhcm9+jEFpoIEUtCouvvk9C+NJZ4OickV4xpRgaRG2x9PONH8ZN0QGhGYhJGbisoCxu
DmlLsyVxqxfMu3n/r7/jdsEJScjAlSrsLDOu6H"},{"uid":"893361dc-9749-4997-93cb-
802e3dofh7aa","type":"internal","subscription_type":"none","issue_date_in_millis":1443484800000,"feature":"watc
her","expiry_date_in_millis":1914278399999,"max_nodes":1,"issued_to":"issuedTo","issuer":"issuer","signature":"
AAAAAQAAAA0Sc90guRIaQEmgLvMnAAABmC9ZN0hjZDBGYnVyRXpCOW5Bb3FjZDAxOWpSbTVoMV
ZwUzRxVk1PSmkxakxZdW5IMlhlTHNoN1N2MXMvRFk4d3JTZEx3R3RRZ0pzU3lobWJKZnQvSEFva0ppTHB
kWkprZWZSQi9iNmRQNkw1SlpLN0lDalZCS095MXRGN1lIZlpYcVVTTnFrcTE2dzhJZmZrdFQrN3JQeGwxb0
U0MXZ0dDJHSERiZTVLOHNzSDByWnpoZEphZHBEZjUrTVBxRENNSXNsWWJjZllaODdzVmEzUjNiWktN
WGM5TUhQV2plaUo4Q1JOUml4MXNuL0pSOEhQaVB2azhmUk9QVzhFeTFoM1Q0RnJXSG53MWk2K055c2
8zSmRnVkF1b2JSQkFLV2VXUmVHNDZ2R3o2VE1qbVNQS2lxOHN5bUErZlNIWkZSVmZIWEtaSU9wTTJEN
DVvT1NCYklacUYyK2FwRW9xa0t6dldMbmMzSGtQc3FWOTgzZ3ZUcXMvQkt2RUZwMFJnZzlvL2d2bDRW
Uzh6UG5pdENGWFRreXNKNkE9PQAAAQCQ94dju0pnDZR3Uuypi0ic3aQJ+nvVqe+U8u79Dga5n1qIjcHDh7H
vIBJEkF+tnVPlo/PXV/x7BZSwVY1PVErit+6rYix1yuHEgqwxmx/VdRICjCaZM6tk0Ob4dZCPv6Ebn2Mmk89KH
C/PwiLPqF6QfwV/Pkpa8k2A3ORJmvYSDvXhe6tCs8dqc4ebrsFxqrZjwWh5CZSpzqqZBFXlngDv2N0hHhpGlueR
szD0JJ5dfEL5ZA1DDOrgO9OJVejSHyRqe1L5QRUNdXPVfS+EAG0Dd1cNdJ/sMpYCPnVjbw6iq2/YgM3cuztsX
VBY7ij4WnoP3ce7Zjs9TwHn+IqzftC6"}]}

- match: { license_status:  "valid" }

- do:
    xpack.license.get: {}

- length: { license: 11 }
- match: { license.uid: "893361dc-9749-4997-93cb-802e3dofh7aa" }
---
"Should throw 404 after license deletion":
- do:
    xpack.license.delete: {}

- match: { acknowledged: true }
```

```
- do:
    xpack.license.get: {}
    catch: missing

---
"Should install a feature type license":

  # VERSION_NO_FEATURE_TYPE license version
- do:
    xpack.license.post:
      acknowledge: true
      body: |
        {"license": {"uid":"893361dc-9749-4997-93cb-
802e3d7fa4a8","type":"gold","issue_date_in_millis":1411948800000,"expiry_date_in_millis":1914278399999,"ma
x_nodes":1,"issued_to":"issued_to","issuer":"issuer","signature":"AAAAAgAAAA3U8+YmnvwC+CWsV/mRAA
ABmC9ZN0hjZDBGYnVyRXpCOW5Bb3FjZDAxOWpSbTVoMVZwUzRxVk1PSmkxakxZdW5IMlhlTHNoN1N
2MXMvRFk4d3JTZEx3R3RRZ0pzU3lobWJKZnQvSEFva0ppTHBkWkprZWZSQi9iNmRQNkw1SlpLN0lDalZC
S095MXRGN1lIZlpYcVVTTnFrcTE2dzhJZmZrdFQrN3JQeGwxb0U0MXZ0dDJHSERiZTVLOHNzSDByWnpoZ
EphZHBEZjUrTVBxRENNSXNsWWJjZllaODdzVmEzUjNiWktNWGM5TUhQV2plaUo4Q1JOUml4MXNuL0pS
OEhQaVB2azhmUk9QVzhFeTFoM1Q0RnJXSG53MWk2K055c28zSmRnVkF1b2JSQkFLV2VXUmVHNDZ2R3
o2VE1qbVNQS2lxOHN5bUErZlNIWkZSVmZIWEtaSU9wTTJENDVvT1NCYklacUYyK2FwRW9xa0t6dldMbm
MzSGtQc3FWOTgzZ3ZUcXMvQkt2RUZwMFJnZzlvL2d2bDRWUzh6UG5pdENGWFRreXNKNkE9PQAAAQB
e8GfzDm6T537Iuuvjetb3xK5dvg0K5NQapv+rczWcQFxgCuzbF8plkgetP1aAGZP4uRESDQPMlOCsx4d0UqqAm
9f7GbBQ3l93P+PogInPFeEH9NvOmaAQovmxVM9SE6DsDqlX4cXSO+bgWpXPTd2LmpoQc1fXd6BZ8GeuyYp
VHVKp9hVU0tAYjw6HzYOE7+zuO1oJYOxElqy66AnIfkvHrvni+flym3tE7tDTgsDRaz7W3iBhaqiSntEqabEkvH
dPHQdSR99XGaEvnHO1paK01/35iZF6OXHsF7CCj+558GRXiVxzueOe7TsGSSt8g7YjZwV9bRCyU7oB4B/nidg
I"}}

- match: { license_status:  "valid" }

- do:
    xpack.license.get: {}

- length: { license: 11 }
---
"Cannot start basic":

- do:
    catch: bad_request
    xpack.license.post:
      acknowledge: true
      body: |
        {"license":{"uid":"893361dc-9749-4997-93cb-
802e3d7fa4a8","type":"basic","issue_date_in_millis":1411948800000,"expiry_date_in_millis":1914278399999,"ma
x_nodes":1,"issued_to":"issuedTo","issuer":"issuer","signature":"AAAAAgAAAA0lKPZ0a7aZquUltho/AAABmC
9ZN0hjZDBGYnVyRXpCOW5Bb3FjZDAxOWpSbTVoMVZwUzRxVk1PSmkxakxZdW5IMlhlTHNoN1N2MXM
vRFk4d3JTZEx3R3RRZ0pzU3lobWJKZnQvSEFva0ppTHBkWkprZWZSQi9iNmRQNkw1SlpLN0lDalZCS095M
XRGN1lIZlpYcVVTTnFrcTE2dzhJZmZrdFQrN3JQeGwxb0U0MXZ0dDJHSERiZTVLOHNzSDByWnpoZEphZH
```

BEZjUrTVBxRENNSXNsWWJjZllaODdzVmEzUjNiWktNWGM5TUhQV2plaUo4Q1JOUml4MXNuL0pSOEhQa
VB2azhmUk9QVzhFeTFoM1Q0RnJXSG53MWk2K055c28zSmRnVkF1b2JSQkFLV2VXUmVHNDZ2R3o2VE1q
bVNQS2lxOHN5bUErZlNIWkZSVmZIWEtaSU9wTTJENDVvT1NCYklacUYyK2FwRW9xa0t6dldMbmMzSGtQ
c3FWOTgzZ3ZUcXMvQkt2RUZwMFJnZzlvL2d2bDRWUzh6UG5pdENGWFRreXNKNkE9PQAAAQAALuQ44
S3IG6SzolcXVJ6Z4CIXORDrYQ+wdLCeey0XdujTslAOj+k+vNgo6wauc7Uswi01esHu4lb5IgpvKy7RRCbh5bj/z2
ubu2qMJqopp9BQyD7VQjVfqmG6seUMJwJ1a5Avvm9r41YPSPcrii3bKK2e1l6jK6N8ibCvnTyY/XkYGCJrBWT
SJePDbg6ErbyodrZ37x1StLbPWcNAkmweyHjDJnvYnbeZZO7A3NmubXZjW7Ttf8/YwQyE00PqMcl7fVPY3hk
KpAeHf8aaJbqkKYbqZuER3EWJX7ZvLVb1dNdNg8aXRn7YrkQcYwWgptYQpfV+D7yEJ4j5muAEoler"}}

- match: { error.root_cause.0.reason: 'Installing basic licenses is no longer allowed. Use the POST /_xpack/license/start_basic API to install a basic license that does not expire.' }

"Should fail gracefully when body content is not provided":

- do:
    catch: bad_request
    xpack.license.post:
      acknowledge: true

- match: { error.root_cause.0.reason: 'The license must be provided in the request body' }

"Current license is trial means not eligle to start trial":

- do:
    xpack.license.get_trial_status: {}

- match: { eligible_to_start_trial: false }

- do:
    xpack.license.post_start_basic:
      acknowledge: true

- match: { basic_was_started: true }

- do:
    xpack.license.get_trial_status: {}

- match: { eligible_to_start_trial: false }

- do:
    catch: forbidden
    xpack.license.post_start_trial:
      acknowledge: true

- match: { trial_was_started: false }
- match: { error_message: "Operation failed: Trial was already activated." }

"Trial license cannot be basic":

```
 - do:
     catch: bad_request
     xpack.license.post_start_trial:
       type: "basic"
       acknowledge: true
---
"Can start basic license if do not already have basic":
 - do:
     xpack.license.get_basic_status: {}

 - match: { eligible_to_start_basic: true }

 - do:
     xpack.license.post_start_basic:
       acknowledge: true

 - match: { basic_was_started: true }
 - match: { acknowledged: true }

 - do:
       xpack.license.get_basic_status: {}

 - match: { eligible_to_start_basic: false }

 - do:
     catch: forbidden
     xpack.license.post_start_basic: {}

 - match: { basic_was_started: false }
 - match: { acknowledged: true }
 - match: { error_message: "Operation failed: Current license is basic." }
---
"Must acknowledge to start basic":
 - do:
     xpack.license.post_start_basic: {}

 - match: { basic_was_started: false }
 - match: { acknowledged: false }
 - match: { error_message: "Operation failed: Needs acknowledgement." }
{
 "xpack.license.post_start_trial": {
   "documentation": "https://www.elastic.co/guide/en/x-pack/current/license-management.html",
   "methods": ["POST"],
   "url": {
     "path": "/_xpack/license/start_trial",
     "paths": ["/_xpack/license/start_trial"],
     "parts" : {
     },
```

```
    "params": {
      "type": {
        "type" : "string",
        "description" : "The type of trial license to generate (default: \"trial\")"
      },
      "acknowledge": {
        "type" : "boolean",
        "description" : "whether the user has acknowledged acknowledge messages (default: false)"
      }
    }
  },
  "body": null
 }
}
{
 "xpack.license.get": {
  "documentation": "https://www.elastic.co/guide/en/x-pack/current/license-management.html",
  "methods": ["GET"],
  "url": {
    "path": "/_xpack/license",
    "paths": ["/_xpack/license"],
    "parts" : {
    },
    "params": {
      "local": {
        "type" : "boolean",
        "description" : "Return local information, do not retrieve the state from master node (default: false)"
      }
    }
  },
  "body": null
 }
}
{
 "xpack.license.delete": {
  "documentation": "https://www.elastic.co/guide/en/x-pack/current/license-management.html",
  "methods": ["DELETE"],
  "url": {
    "path": "/_xpack/license",
    "paths": ["/_xpack/license"],
    "parts" : {}
  },
  "body": null
 }
}
{
 "xpack.license.get_basic_status": {
  "documentation": "https://www.elastic.co/guide/en/x-pack/current/license-management.html",
```

```
  "methods": ["GET"],
  "url": {
    "path": "/_xpack/license/basic_status",
    "paths": ["/_xpack/license/basic_status"],
    "parts" : {
    },
    "params": {
    }
  },
  "body": null
 }
}
{
 "xpack.license.post": {
  "documentation": "https://www.elastic.co/guide/en/x-pack/current/license-management.html",
  "methods": ["PUT", "POST"],
  "url": {
    "path": "/_xpack/license",
    "paths": ["/_xpack/license"],
    "parts" : {
    },
    "params": {
      "acknowledge": {
        "type" : "boolean",
        "description" : "whether the user has acknowledged acknowledge messages (default: false)"
      }
    }
  },
  "body": {
    "description" : "licenses to be installed"
  }
 }
}
{
 "xpack.license.post_start_basic": {
  "documentation": "https://www.elastic.co/guide/en/x-pack/current/license-management.html",
  "methods": ["POST"],
  "url": {
    "path": "/_xpack/license/start_basic",
    "paths": ["/_xpack/license/start_basic"],
    "parts" : {
    },
    "params": {
      "acknowledge": {
        "type" : "boolean",
        "description" : "whether the user has acknowledged acknowledge messages (default: false)"
      }
    }
```

```
  },
  "body": null
 }
}
{
 "xpack.license.get_trial_status": {
  "documentation": "https://www.elastic.co/guide/en/x-pack/current/license-management.html",
  "methods": ["GET"],
  "url": {
   "path": "/_xpack/license/trial_status",
   "paths": ["/_xpack/license/trial_status"],
   "parts" : {
   },
   "params": {
   }
  },
  "body": null
 }
}
```

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from your version.

```
{
 "metadata": {
  "name": "X-Pack Monitoring: License Expiration",
  "xpack": {
    "link": "license",
    "expires_days": [ 60, 30, 14, 7 ],
    "severity": 0,
    "alert_index": ".monitoring-alerts-6",
    "cluster_uuid": "${monitoring.watch.cluster_uuid}",
    "type": "monitoring",
    "version_created": 6040099,
    "watch": "${monitoring.watch.id}"
  }
 },
 "trigger": {
  "schedule": {
    "interval": "1m"
  }
 },
 "input": {
  "chain": {
    "inputs": [
      {
        "check": {
          "search": {
            "request": {
              "indices": [
                ".monitoring-es-*"
              ],
              "body": {
                "size": 1,
                "sort": [
                  {
                    "timestamp": {
                      "order": "desc"
                    }
                  }
                ],
                "_source": [
                  "license.*"
                ],
                "query": {
                  "bool": {
                    "filter": [
                      {
```

```
            "term": {
              "cluster_uuid": "{{ctx.metadata.xpack.cluster_uuid}}"
            }
          },
          {
            "term": {
              "type": "cluster_stats"
            }
          },
          {
            "range": {
              "timestamp": {
                "gte": "now-2m"
              }
            }
          }
        ]
      }
    }
  }
 }
},
{
 "alert": {
  "search": {
   "request": {
    "indices": [
     ".monitoring-alerts-6"
    ],
    "body": {
     "size": 1,
     "terminate_after": 1,
     "query": {
      "bool": {
       "filter": {
        "term": {
         "_id": "{{ctx.watch_id}}"
        }
       }
      }
     },
     "sort": [
      { "timestamp": { "order": "desc" } }
     ]
    }
   }
```

```
        }
       }
      },
      {
       "kibana_settings": {
        "search": {
         "request": {
          "indices": [
           ".monitoring-kibana-6-*"
          ],
          "body": {
           "size": 1,
           "query": {
            "bool": {
             "filter": {
              "term": {
               "type": "kibana_settings"
              }
             }
            }
           },
           "sort": [
            {
             "timestamp": {
              "order": "desc"
             }
            }
           ]
          }
         }
        }
       }
      }
     ]
    }
   },
   "condition": {
    "script": {
     "source": "if (ctx.payload.check.hits.total == 0) {return false;}def license =
ctx.payload.check.hits.hits[0]._source.license;if (license == null) {return false;}ctx.vars.fails_check = false;Instant
expiry = Instant.ofEpochMilli(license.expiry_date_in_millis);ctx.vars.expiry = expiry;if (license.status != 'active')
{ctx.vars.expired = true;ctx.vars.fails_check = true;ctx.metadata.xpack.severity = 2001;} else {Instant now =
Instant.ofEpochMilli(new Date().getTime());ctx.vars.now = now;for (int i = ctx.metadata.xpack.expires_days.length
- 1;i > -1;--i) {if (license.type == 'trial' && i < 2) {break;}Instant fromNow =
now.plusSeconds(ctx.metadata.xpack.expires_days[i] * 24 * 60 * 60);if (fromNow.isAfter(expiry))
{ctx.vars.fails_check = true;ctx.metadata.xpack.severity = i * 1000;break;}}}ctx.vars.not_resolved =
(ctx.payload.alert.hits.total == 1 && ctx.payload.alert.hits.hits[0]._source.resolved_timestamp ==
null);ctx.vars.update = ctx.vars.fails_check || ctx.vars.not_resolved;"
```

```
  }
 },
 "transform": {
  "script": {
    "source": "ctx.vars.email_recipient = (ctx.payload.kibana_settings.hits.total > 0 &&
ctx.payload.kibana_settings.hits.hits[0]._source.kibana_settings.xpack != null) ?
ctx.payload.kibana_settings.hits.hits[0]._source.kibana_settings.xpack.default_admin_email : null;ctx.vars.is_new =
ctx.vars.fails_check && !ctx.vars.not_resolved;ctx.vars.is_resolved = !ctx.vars.fails_check &&
ctx.vars.not_resolved;def alertMessage = null;if (ctx.vars.fails_check) { alertMessage = 'Update your license.';} if
(ctx.vars.not_resolved) { ctx.payload = ctx.payload.alert.hits.hits[0]._source;ctx.payload.metadata =
ctx.metadata.xpack;if (ctx.vars.fails_check == false) { ctx.payload.resolved_timestamp = ctx.execution_time;} }
else { ctx.payload = [ 'timestamp': ctx.execution_time, 'prefix': 'This cluster\\'s license is going to expire in
{{#relativeTime}}metadata.time{{/relativeTime}} at {{#absoluteTime}}metadata.time{{/absoluteTime}}.',
'message': alertMessage, 'metadata': ctx.metadata.xpack ];} if (ctx.vars.fails_check) { ctx.payload.metadata.time =
ctx.vars.expiry.toString();} ctx.payload.update_timestamp = ctx.execution_time;return ctx.payload;"
  }
 },
 "actions": {
  "add_to_alerts_index": {
    "index": {
      "index": ".monitoring-alerts-6",
      "doc_type": "doc",
      "doc_id": "${monitoring.watch.unique_id}"
    }
  },
  "send_email_to_admin": {
    "condition": {
      "script": "return ctx.vars.email_recipient != null && (ctx.vars.is_new || ctx.vars.is_resolved)"
    },
    "email": {
      "to": "X-Pack Admin <{{ctx.vars.email_recipient}}>",
      "from": "X-Pack Admin <{{ctx.vars.email_recipient}}>",
      "subject":
"[{{#ctx.vars.is_new}}NEW{{/ctx.vars.is_new}}{{#ctx.vars.is_resolved}}RESOLVED{{/ctx.vars.is_resolved}}]
{{ctx.metadata.name}}",
      "body": {
        "text": "{{#ctx.vars.is_resolved}}This cluster alert has been resolved: {{/ctx.vars.is_resolved}} This cluster's
license {{#ctx.vars.is_new}}is going to expire on
{{ctx.payload.metadata.time}}{{/ctx.vars.is_new}}{{#ctx.vars.is_resolved}}was going to
expire{{ctx.payload.metadata.time}}{{/ctx.vars.is_resolved}}.
{{#ctx.vars.is_new}}{{ctx.payload.message}}{{/ctx.vars.is_new}}"
      }
    }
  }
 }
}
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
```

```
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchSecurityException;
import org.elasticsearch.action.support.PlainActionFuture;
import org.elasticsearch.action.support.master.AcknowledgedResponse;
import org.elasticsearch.client.transport.TransportClient;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.license.License.OperationMode;
import org.elasticsearch.persistent.PersistentTasksCustomMetaData;
import org.elasticsearch.rest.RestStatus;
import org.elasticsearch.test.junit.annotations.TestLogging;
import org.elasticsearch.transport.Transport;
import org.elasticsearch.xpack.core.TestXPackTransportClient;
import org.elasticsearch.xpack.core.XPackField;
import org.elasticsearch.xpack.core.ml.action.CloseJobAction;
import org.elasticsearch.xpack.core.ml.action.DeleteDatafeedAction;
import org.elasticsearch.xpack.core.ml.action.DeleteJobAction;
import org.elasticsearch.xpack.core.ml.action.GetDatafeedsStatsAction;
import org.elasticsearch.xpack.core.ml.action.GetJobsStatsAction;
import org.elasticsearch.xpack.core.ml.action.OpenJobAction;
import org.elasticsearch.xpack.core.ml.action.PutDatafeedAction;
import org.elasticsearch.xpack.core.ml.action.PutJobAction;
import org.elasticsearch.xpack.core.ml.action.StartDatafeedAction;
import org.elasticsearch.xpack.core.ml.action.StopDatafeedAction;
import org.elasticsearch.xpack.core.ml.client.MachineLearningClient;
import org.elasticsearch.xpack.core.ml.datafeed.DatafeedState;
import org.elasticsearch.xpack.core.ml.job.config.JobState;
import org.elasticsearch.xpack.ml.LocalStateMachineLearning;
import org.elasticsearch.xpack.ml.support.BaseMlIntegTestCase;
import org.junit.Before;

import java.util.Collections;

import static org.hamcrest.Matchers.containsString;
import static org.hamcrest.Matchers.hasItem;
import static org.hamcrest.Matchers.is;

@TestLogging("org.elasticsearch.xpack.ml.action:DEBUG")
public class MachineLearningLicensingTests extends BaseMlIntegTestCase {

  @Before
  public void resetLicensing() {
```

```
        enableLicensing();

        ensureStableCluster(1);
        ensureYellow();
    }

    public void testMachineLearningPutJobActionRestricted() throws Exception {
        String jobId = "testmachinelearningputjobactionrestricted";
        // Pick a license that does not allow machine learning
        License.OperationMode mode = randomInvalidLicenseType();
        enableLicensing(mode);
        assertMLAllowed(false);
        // test that license restricted apis do not work
        Settings settings = internalCluster().transportClient().settings();
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<PutJobAction.Response> listener = PlainActionFuture. newFuture();
            new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), listener);
            listener.actionGet();
            fail("put job action should not be enabled!");
        } catch (ElasticsearchSecurityException e) {
            assertThat(e.status(), is(RestStatus.FORBIDDEN));
            assertThat(e.getMessage(), containsString("non-compliant"));
            assertThat(e.getMetadata(LicenseUtils.EXPIRED_FEATURE_METADATA),
hasItem(XPackField.MACHINE_LEARNING));
        }

        // Pick a license that does allow machine learning
        mode = randomValidLicenseType();
        enableLicensing(mode);
        assertMLAllowed(true);
        // test that license restricted apis do now work
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<PutJobAction.Response> listener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), listener);
            PutJobAction.Response response = listener.actionGet();
            assertNotNull(response);
        }
    }

    public void testMachineLearningOpenJobActionRestricted() throws Exception {
        String jobId = "testmachinelearningopenjobactionrestricted";
        assertMLAllowed(true);
        // test that license restricted apis do now work
        Settings settings = internalCluster().transportClient().settings();
```

```
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<PutJobAction.Response> putJobListener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), putJobListener);
            PutJobAction.Response response = putJobListener.actionGet();
            assertNotNull(response);
        }

        // Pick a license that does not allow machine learning
        License.OperationMode mode = randomInvalidLicenseType();
        enableLicensing(mode);
        assertMLAllowed(false);
        // test that license restricted apis do not work
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<AcknowledgedResponse> listener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).openJob(new OpenJobAction.Request(jobId), listener);
            listener.actionGet();
            fail("open job action should not be enabled!");
        } catch (ElasticsearchSecurityException e) {
            assertThat(e.status(), is(RestStatus.FORBIDDEN));
            assertThat(e.getMessage(), containsString("non-compliant"));
            assertThat(e.getMetadata(LicenseUtils.EXPIRED_FEATURE_METADATA),
hasItem(XPackField.MACHINE_LEARNING));
        }

        // Pick a license that does allow machine learning
        mode = randomValidLicenseType();
        enableLicensing(mode);
        assertMLAllowed(true);

        // now that the license is invalid, the job should get closed:
        assertBusy(() -> {
            JobState jobState = getJobStats(jobId).getState();
            assertEquals(JobState.CLOSED, jobState);
        });

        // test that license restricted apis do now work
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<AcknowledgedResponse> listener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).openJob(new OpenJobAction.Request(jobId), listener);
            AcknowledgedResponse response = listener.actionGet();
            assertNotNull(response);
        }
```

```
  }

  public void testMachineLearningPutDatafeedActionRestricted() throws Exception {
    String jobId = "testmachinelearningputdatafeedactionrestricted";
    String datafeedId = jobId + "-datafeed";
    assertMLAllowed(true);
    // test that license restricted apis do now work
    Settings settings = internalCluster().transportClient().settings();
    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
      PlainActionFuture<PutJobAction.Response> putJobListener = PlainActionFuture.newFuture();
      new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), putJobListener);
      PutJobAction.Response putJobResponse = putJobListener.actionGet();
      assertNotNull(putJobResponse);
    }

    // Pick a license that does not allow machine learning
    License.OperationMode mode = randomInvalidLicenseType();
    enableLicensing(mode);
    assertMLAllowed(false);
    // test that license restricted apis do not work
    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
      PlainActionFuture<PutDatafeedAction.Response> listener = PlainActionFuture.newFuture();
      new MachineLearningClient(client).putDatafeed(
          new PutDatafeedAction.Request(createDatafeed(datafeedId, jobId, Collections.singletonList(jobId))),
listener);
      listener.actionGet();
      fail("put datafeed action should not be enabled!");
    } catch (ElasticsearchSecurityException e) {
      assertThat(e.status(), is(RestStatus.FORBIDDEN));
      assertThat(e.getMessage(), containsString("non-compliant"));
      assertThat(e.getMetadata(LicenseUtils.EXPIRED_FEATURE_METADATA),
hasItem(XPackField.MACHINE_LEARNING));
    }

    // Pick a license that does allow machine learning
    mode = randomValidLicenseType();
    enableLicensing(mode);
    assertMLAllowed(true);
    // test that license restricted apis do now work
    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
      PlainActionFuture<PutDatafeedAction.Response> listener = PlainActionFuture.newFuture();
      new MachineLearningClient(client).putDatafeed(
```

```
            new PutDatafeedAction.Request(createDatafeed(datafeedId, jobId, Collections.singletonList(jobId))),
listener);
        PutDatafeedAction.Response response = listener.actionGet();
        assertNotNull(response);
      }
    }

    public void testAutoCloseJobWithDatafeed() throws Exception {
      String jobId = "testautoclosejobwithdatafeed";
      String datafeedId = jobId + "-datafeed";
      assertMLAllowed(true);
      String datafeedIndex = jobId + "-data";
      prepareCreate(datafeedIndex).addMapping("type", "{\"type\":{\"properties\":{\"time\":{\"type\":\"date\"}}}}",
        XContentType.JSON).get();
      Settings settings = internalCluster().transportClient().settings();
      try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
        // put job
        PlainActionFuture<PutJobAction.Response> putJobListener = PlainActionFuture.newFuture();
        new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), putJobListener);
        PutJobAction.Response putJobResponse = putJobListener.actionGet();
        assertNotNull(putJobResponse);
        // put datafeed
        PlainActionFuture<PutDatafeedAction.Response> putDatafeedListener = PlainActionFuture.newFuture();
        new MachineLearningClient(client).putDatafeed(
            new PutDatafeedAction.Request(createDatafeed(datafeedId, jobId,
                Collections.singletonList(datafeedIndex))), putDatafeedListener);
        PutDatafeedAction.Response putDatafeedResponse = putDatafeedListener.actionGet();
        assertNotNull(putDatafeedResponse);
        // open job
        PlainActionFuture<AcknowledgedResponse> openJobListener = PlainActionFuture.newFuture();
        new MachineLearningClient(client).openJob(new OpenJobAction.Request(jobId), openJobListener);
        AcknowledgedResponse openJobResponse = openJobListener.actionGet();
        assertNotNull(openJobResponse);
        // start datafeed
        PlainActionFuture<AcknowledgedResponse> listener = PlainActionFuture.newFuture();
        new MachineLearningClient(client).startDatafeed(new StartDatafeedAction.Request(datafeedId, 0L),
listener);
        listener.actionGet();
      }

      if (randomBoolean()) {
        enableLicensing(randomInvalidLicenseType());
      } else {
        disableLicensing();
      }
      assertMLAllowed(false);
```

```
        // now that the license is invalid, the job should be closed and datafeed stopped:
        assertBusy(() -> {
            JobState jobState = getJobStats(jobId).getState();
            assertEquals(JobState.CLOSED, jobState);

            DatafeedState datafeedState = getDatafeedStats(datafeedId).getDatafeedState();
            assertEquals(DatafeedState.STOPPED, datafeedState);

            ClusterState state = client().admin().cluster().prepareState().get().getState();
            PersistentTasksCustomMetaData tasks = state.metaData().custom(PersistentTasksCustomMetaData.TYPE);
            assertEquals(0, tasks.taskMap().size());
        });

        enableLicensing(randomValidLicenseType());
        assertMLAllowed(true);

        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            // open job
            PlainActionFuture<AcknowledgedResponse> openJobListener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).openJob(new OpenJobAction.Request(jobId), openJobListener);
            AcknowledgedResponse openJobResponse = openJobListener.actionGet();
            assertNotNull(openJobResponse);
            // start datafeed
            PlainActionFuture<AcknowledgedResponse> listener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).startDatafeed(new StartDatafeedAction.Request(datafeedId, 0L),
listener);
            listener.actionGet();
        }

        assertBusy(() -> {
            JobState jobState = getJobStats(jobId).getState();
            assertEquals(JobState.OPENED, jobState);

            DatafeedState datafeedState = getDatafeedStats(datafeedId).getDatafeedState();
            assertEquals(DatafeedState.STARTED, datafeedState);

            ClusterState state = client().admin().cluster().prepareState().get().getState();
            PersistentTasksCustomMetaData tasks = state.metaData().custom(PersistentTasksCustomMetaData.TYPE);
            assertEquals(2, tasks.taskMap().size());
        });

        if (randomBoolean()) {
            enableLicensing(randomInvalidLicenseType());
        } else {
            disableLicensing();
```

```
        }
        assertMLAllowed(false);

        // now that the license is invalid, the job should be closed and datafeed stopped:
        assertBusy(() -> {
            JobState jobState = getJobStats(jobId).getState();
            assertEquals(JobState.CLOSED, jobState);

            DatafeedState datafeedState = getDatafeedStats(datafeedId).getDatafeedState();
            assertEquals(DatafeedState.STOPPED, datafeedState);

            ClusterState state = client().admin().cluster().prepareState().get().getState();
            PersistentTasksCustomMetaData tasks = state.metaData().custom(PersistentTasksCustomMetaData.TYPE);
            assertEquals(0, tasks.taskMap().size());
        });
    }

    public void testMachineLearningStartDatafeedActionRestricted() throws Exception {
        String jobId = "testmachinelearningstartdatafeedactionrestricted";
        String datafeedId = jobId + "-datafeed";
        assertMLAllowed(true);
        String datafeedIndex = jobId + "-data";
        prepareCreate(datafeedIndex).addMapping("type", "{\"type\":{\"properties\":{\"time\":{\"type\":\"date\"}}}}",
            XContentType.JSON).get();
        // test that license restricted apis do now work
        Settings settings = internalCluster().transportClient().settings();
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<PutJobAction.Response> putJobListener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), putJobListener);
            PutJobAction.Response putJobResponse = putJobListener.actionGet();
            assertNotNull(putJobResponse);
            PlainActionFuture<PutDatafeedAction.Response> putDatafeedListener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).putDatafeed(
                    new PutDatafeedAction.Request(createDatafeed(datafeedId, jobId,
                            Collections.singletonList(datafeedIndex))), putDatafeedListener);
            PutDatafeedAction.Response putDatafeedResponse = putDatafeedListener.actionGet();
            assertNotNull(putDatafeedResponse);
            PlainActionFuture<AcknowledgedResponse> openJobListener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).openJob(new OpenJobAction.Request(jobId), openJobListener);
            AcknowledgedResponse openJobResponse = openJobListener.actionGet();
            assertNotNull(openJobResponse);
        }

        // Pick a license that does not allow machine learning
        License.OperationMode mode = randomInvalidLicenseType();
        enableLicensing(mode);
```

```
        assertMLAllowed(false);

        // now that the license is invalid, the job should get closed:
        assertBusy(() -> {
            JobState jobState = getJobStats(jobId).getState();
            assertEquals(JobState.CLOSED, jobState);
            ClusterState state = client().admin().cluster().prepareState().get().getState();
            PersistentTasksCustomMetaData tasks = state.metaData().custom(PersistentTasksCustomMetaData.TYPE);
            assertEquals(0, tasks.taskMap().size());
        });

        // test that license restricted apis do not work
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<AcknowledgedResponse> listener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).startDatafeed(new StartDatafeedAction.Request(datafeedId, 0L),
listener);
            listener.actionGet();
            fail("start datafeed action should not be enabled!");
        } catch (ElasticsearchSecurityException e) {
            assertThat(e.status(), is(RestStatus.FORBIDDEN));
            assertThat(e.getMessage(), containsString("non-compliant"));
            assertThat(e.getMetadata(LicenseUtils.EXPIRED_FEATURE_METADATA),
hasItem(XPackField.MACHINE_LEARNING));
        }

        // Pick a license that does allow machine learning
        mode = randomValidLicenseType();
        enableLicensing(mode);
        assertMLAllowed(true);
        // test that license restricted apis do now work
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            // re-open job now that the license is valid again
            PlainActionFuture<AcknowledgedResponse> openJobListener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).openJob(new OpenJobAction.Request(jobId), openJobListener);
            AcknowledgedResponse openJobResponse = openJobListener.actionGet();
            assertNotNull(openJobResponse);

            PlainActionFuture<AcknowledgedResponse> listener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).startDatafeed(new StartDatafeedAction.Request(datafeedId, 0L),
listener);
            AcknowledgedResponse response = listener.actionGet();
            assertNotNull(response);
        }
    }
```

```
  public void testMachineLearningStopDatafeedActionNotRestricted() throws Exception {
    String jobId = "testmachinelearningstopdatafeedactionnotrestricted";
    String datafeedId = jobId + "-datafeed";
    assertMLAllowed(true);
    String datafeedIndex = jobId + "-data";
    prepareCreate(datafeedIndex).addMapping("type", "{\"type\":{\"properties\":{\"time\":{\"type\":\"date\"}}}}",
       XContentType.JSON).get();
    // test that license restricted apis do now work
    Settings settings = internalCluster().transportClient().settings();
    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
      PlainActionFuture<PutJobAction.Response> putJobListener = PlainActionFuture.newFuture();
      new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), putJobListener);
      PutJobAction.Response putJobResponse = putJobListener.actionGet();
      assertNotNull(putJobResponse);
      PlainActionFuture<PutDatafeedAction.Response> putDatafeedListener = PlainActionFuture.newFuture();
      new MachineLearningClient(client).putDatafeed(
          new PutDatafeedAction.Request(createDatafeed(datafeedId, jobId,
              Collections.singletonList(datafeedIndex))), putDatafeedListener);
      PutDatafeedAction.Response putDatafeedResponse = putDatafeedListener.actionGet();
      assertNotNull(putDatafeedResponse);
      PlainActionFuture<AcknowledgedResponse> openJobListener = PlainActionFuture.newFuture();
      new MachineLearningClient(client).openJob(new OpenJobAction.Request(jobId), openJobListener);
      AcknowledgedResponse openJobResponse = openJobListener.actionGet();
      assertNotNull(openJobResponse);
      PlainActionFuture<AcknowledgedResponse> startDatafeedListener = PlainActionFuture.newFuture();
      new MachineLearningClient(client).startDatafeed(
        new StartDatafeedAction.Request(datafeedId, 0L), startDatafeedListener);
      AcknowledgedResponse startDatafeedResponse = startDatafeedListener.actionGet();
      assertNotNull(startDatafeedResponse);
    }

    boolean invalidLicense = randomBoolean();
    if (invalidLicense) {
      enableLicensing(randomInvalidLicenseType());
    } else {
      enableLicensing(randomValidLicenseType());
    }

    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
      PlainActionFuture<StopDatafeedAction.Response> listener = PlainActionFuture.newFuture();
      new MachineLearningClient(client).stopDatafeed(new StopDatafeedAction.Request(datafeedId), listener);
      if (invalidLicense) {
        // the stop datafeed due to invalid license happens async, so check if the datafeed turns into stopped state:
```

```
            assertBusy(() -> {
                GetDatafeedsStatsAction.Response response =
                        new MachineLearningClient(client)
                                .getDatafeedsStats(new GetDatafeedsStatsAction.Request(datafeedId)).actionGet();
                assertEquals(DatafeedState.STOPPED, response.getResponse().results().get(0).getDatafeedState());
            });
        } else {
            listener.actionGet();
        }

        if (invalidLicense) {
            // the close due to invalid license happens async, so check if the job turns into closed state:
            assertBusy(() -> {
                GetJobsStatsAction.Response response =
                        new MachineLearningClient(client).getJobsStats(new
GetJobsStatsAction.Request(jobId)).actionGet();
                assertEquals(JobState.CLOSED, response.getResponse().results().get(0).getState());
            });
        }
    }
  }

  public void testMachineLearningCloseJobActionNotRestricted() throws Exception {
    String jobId = "testmachinelearningclosejobactionnotrestricted";
    assertMLAllowed(true);
    // test that license restricted apis do now work
    Settings settings = internalCluster().transportClient().settings();
    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
        PlainActionFuture<PutJobAction.Response> putJobListener = PlainActionFuture.newFuture();
        new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), putJobListener);
        PutJobAction.Response putJobResponse = putJobListener.actionGet();
        assertNotNull(putJobResponse);
        PlainActionFuture<AcknowledgedResponse> openJobListener = PlainActionFuture.newFuture();
        new MachineLearningClient(client).openJob(new OpenJobAction.Request(jobId), openJobListener);
        AcknowledgedResponse openJobResponse = openJobListener.actionGet();
        assertNotNull(openJobResponse);
    }

    boolean invalidLicense = randomBoolean();
    if (invalidLicense) {
        enableLicensing(randomInvalidLicenseType());
    } else {
        enableLicensing(randomValidLicenseType());
    }

    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
```

```
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
        PlainActionFuture<CloseJobAction.Response> listener = PlainActionFuture.newFuture();
        CloseJobAction.Request request = new CloseJobAction.Request(jobId);
        request.setCloseTimeout(TimeValue.timeValueSeconds(20));
        if (invalidLicense) {
            // the close due to invalid license happens async, so check if the job turns into closed state:
            assertBusy(() -> {
                GetJobsStatsAction.Response response =
                        new MachineLearningClient(client).getJobsStats(new
GetJobsStatsAction.Request(jobId)).actionGet();
                assertEquals(JobState.CLOSED, response.getResponse().results().get(0).getState());
            });
        } else {
            new MachineLearningClient(client).closeJob(request, listener);
            listener.actionGet();
        }
    }
  }

  public void testMachineLearningDeleteJobActionNotRestricted() throws Exception {
    String jobId = "testmachinelearningclosejobactionnotrestricted";
    assertMLAllowed(true);
    // test that license restricted apis do now work
    Settings settings = internalCluster().transportClient().settings();
    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
        PlainActionFuture<PutJobAction.Response> putJobListener = PlainActionFuture.newFuture();
        new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), putJobListener);
        PutJobAction.Response putJobResponse = putJobListener.actionGet();
        assertNotNull(putJobResponse);
    }

    // Pick a random license
    License.OperationMode mode = randomLicenseType();
    enableLicensing(mode);

    try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
        PlainActionFuture<AcknowledgedResponse> listener = PlainActionFuture.newFuture();
        new MachineLearningClient(client).deleteJob(new DeleteJobAction.Request(jobId), listener);
        listener.actionGet();
    }
  }

  public void testMachineLearningDeleteDatafeedActionNotRestricted() throws Exception {
```

```
        String jobId = "testmachinelearningdeletedatafeedactionnotrestricted";
        String datafeedId = jobId + "-datafeed";
        assertMLAllowed(true);
        // test that license restricted apis do now work
        Settings settings = internalCluster().transportClient().settings();
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<PutJobAction.Response> putJobListener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).putJob(new PutJobAction.Request(createJob(jobId)), putJobListener);
            PutJobAction.Response putJobResponse = putJobListener.actionGet();
            assertNotNull(putJobResponse);
            PlainActionFuture<PutDatafeedAction.Response> putDatafeedListener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).putDatafeed(
                    new PutDatafeedAction.Request(createDatafeed(datafeedId, jobId,
                            Collections.singletonList(jobId))), putDatafeedListener);
            PutDatafeedAction.Response putDatafeedResponse = putDatafeedListener.actionGet();
            assertNotNull(putDatafeedResponse);
        }

        // Pick a random license
        License.OperationMode mode = randomLicenseType();
        enableLicensing(mode);

        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateMachineLearning.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PlainActionFuture<AcknowledgedResponse> listener = PlainActionFuture.newFuture();
            new MachineLearningClient(client).deleteDatafeed(new DeleteDatafeedAction.Request(datafeedId),
listener);
            listener.actionGet();
        }
    }

    private static OperationMode randomInvalidLicenseType() {
        return randomFrom(License.OperationMode.GOLD, License.OperationMode.STANDARD,
License.OperationMode.BASIC);
    }

    private static OperationMode randomValidLicenseType() {
        return randomFrom(License.OperationMode.TRIAL, License.OperationMode.PLATINUM);
    }

    private static OperationMode randomLicenseType() {
        return randomFrom(License.OperationMode.values());
    }

    private static void assertMLAllowed(boolean expected) {
```

```
        for (XPackLicenseState licenseState : internalCluster().getInstances(XPackLicenseState.class)) {
            assertEquals(licenseState.isMachineLearningAllowed(), expected);
        }
    }

    public static void disableLicensing() {
        disableLicensing(randomValidLicenseType());
    }

    public static void disableLicensing(License.OperationMode operationMode) {
        for (XPackLicenseState licenseState : internalCluster().getInstances(XPackLicenseState.class)) {
            licenseState.update(operationMode, false, null);
        }
    }

    public static void enableLicensing() {
        enableLicensing(randomValidLicenseType());
    }

    public static void enableLicensing(License.OperationMode operationMode) {
        for (XPackLicenseState licenseState : internalCluster().getInstances(XPackLicenseState.class)) {
            licenseState.update(operationMode, true, null);
        }
    }
}
```

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package org.elasticsearch.xpack.security.authz.permission;

import org.elasticsearch.ElasticsearchParseException;
import org.elasticsearch.common.bytes.BytesArray;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.xpack.core.security.authz.RoleDescriptor;
import org.elasticsearch.xpack.core.security.authz.permission.FieldPermissions;
import org.elasticsearch.xpack.core.security.authz.permission.FieldPermissionsDefinition;

import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collections;
import java.util.List;
import java.util.concurrent.CountDownLatch;
import java.util.concurrent.atomic.AtomicReferenceArray;

import static org.hamcrest.Matchers.containsString;
```

```
public class FieldPermissionsTests extends ESTestCase {

  public void testParseFieldPermissions() throws Exception {
    String q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
          "\"field_security\": {" +
          "\"grant\": [\"f1\", \"f2\", \"f3\", \"f4\"]," +
          "\"except\": [\"f3\",\"f4\"]" +
          "}}]}";
    RoleDescriptor rd =
          RoleDescriptor.parse("test", new BytesArray(q), false, XContentType.JSON);
    assertArrayEquals(rd.getIndicesPrivileges()[0].getGrantedFields(),
          new String[] { "f1", "f2", "f3", "f4" });
    assertArrayEquals(rd.getIndicesPrivileges()[0].getDeniedFields(),
          new String[] { "f3", "f4" });

    q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
          "\"field_security\": {" +
          "\"except\": [\"f3\",\"f4\"]," +
          "\"grant\": [\"f1\", \"f2\", \"f3\", \"f4\"]" +
          "}}]}";
    rd = RoleDescriptor.parse("test", new BytesArray(q), false, XContentType.JSON);
    assertArrayEquals(rd.getIndicesPrivileges()[0].getGrantedFields(),
          new String[] { "f1", "f2", "f3", "f4" });
    assertArrayEquals(rd.getIndicesPrivileges()[0].getDeniedFields(),
          new String[] { "f3", "f4" });

    q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
          "\"field_security\": {" +
          "\"grant\": [\"f1\", \"f2\"]" +
          "}}]}";
    rd = RoleDescriptor.parse("test", new BytesArray(q), false, XContentType.JSON);
    assertArrayEquals(rd.getIndicesPrivileges()[0].getGrantedFields(),
          new String[] { "f1", "f2" });
    assertNull(rd.getIndicesPrivileges()[0].getDeniedFields());

    q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
          "\"field_security\": {" +
          "\"grant\": []" +
          "}}]}";
    rd = RoleDescriptor.parse("test", new BytesArray(q), false, XContentType.JSON);
    assertArrayEquals(rd.getIndicesPrivileges()[0].getGrantedFields(), new String[] {});
    assertNull(rd.getIndicesPrivileges()[0].getDeniedFields());

    q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
          "\"field_security\": {" +
          "\"except\": []," +
          "\"grant\": []" +
          "}}]}";
```

```
rd = RoleDescriptor.parse("test", new BytesArray(q), false, XContentType.JSON);
assertArrayEquals(rd.getIndicesPrivileges()[0].getGrantedFields(), new String[] {});
assertArrayEquals(rd.getIndicesPrivileges()[0].getDeniedFields(), new String[] {});

final String exceptWithoutGrant = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\":" +
        " [\"p3\"], \"field_security\": {" +
        "\"except\": [\"f1\"]" +
        "}}]}";
ElasticsearchParseException e = expectThrows(ElasticsearchParseException.class,
        () -> RoleDescriptor.parse("test", new BytesArray(exceptWithoutGrant), false,
                XContentType.JSON));
assertThat(e.getDetailedMessage(),
        containsString("failed to parse indices privileges for role [test]. field_security"
                + " requires grant if except is given"));

final String grantNull = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"]," +
        " \"field_security\": {" +
        "\"grant\": null" +
        "}}]}";
e = expectThrows(ElasticsearchParseException.class,
        () -> RoleDescriptor.parse("test", new BytesArray(grantNull), false,
                XContentType.JSON));
assertThat(e.getDetailedMessage(), containsString("failed to parse indices privileges for" +
        " role [test]. grant must not be null."));

final String exceptNull = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": " +
        "[\"p3\"], \"field_security\": {" +
        "\"grant\": [\"*\"]," +
        "\"except\": null" +
        "}}]}";
e = expectThrows(ElasticsearchParseException.class,
        () -> RoleDescriptor.parse("test", new BytesArray(exceptNull), false,
                XContentType.JSON));
assertThat(e.getDetailedMessage(),
        containsString("failed to parse indices privileges for role [test]. except must" +
                " not be null."));

final String exceptGrantNull = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": " +
        "[\"p3\"], \"field_security\": {" +
        "\"grant\": null," +
        "\"except\": null" +
        "}}]}";
e = expectThrows(ElasticsearchParseException.class,
        () -> RoleDescriptor.parse("test", new BytesArray(exceptGrantNull), false,
                XContentType.JSON));
assertThat(e.getDetailedMessage(), containsString("failed to parse indices privileges " +
        "for role [test]. grant must not be null."));
```

```
    final String bothFieldsMissing = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": " +
            "[\"p3\"], \"field_security\": {" +
            "}}]}";
    e = expectThrows(ElasticsearchParseException.class,
            () -> RoleDescriptor.parse("test", new BytesArray(bothFieldsMissing), false,
                    XContentType.JSON));
    assertThat(e.getDetailedMessage(), containsString("failed to parse indices privileges " +
            "for role [test]. \"field_security\" must not be empty."));

    // try with two indices and mix order a little
    q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
            "\"field_security\": {" +
            "\"grant\": []" +
            "}}," +
            "{\"names\": \"idx3\",\n" +
            " \"field_security\": {\n" +
            " \"grant\": [\"*\"], \n" +
            " \"except\": [\"f2\"]}," +
            "\"privileges\": [\"p3\"]}]}";
    rd = RoleDescriptor.parse("test", new BytesArray(q), false, XContentType.JSON);
    assertArrayEquals(rd.getIndicesPrivileges()[0].getGrantedFields(), new String[] {});
    assertNull(rd.getIndicesPrivileges()[0].getDeniedFields());
    assertArrayEquals(rd.getIndicesPrivileges()[1].getGrantedFields(), new String[] {"*"});
    assertArrayEquals(rd.getIndicesPrivileges()[1].getDeniedFields(), new String[] {"f2"});
}

// test old syntax for field permissions
public void testBWCFieldPermissions() throws Exception {
    String q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
            "\"fields\": [\"f1\", \"f2\"]" +
            "}]}";
    RoleDescriptor rd = RoleDescriptor.parse("test", new BytesArray(q), true,
            XContentType.JSON);
    assertArrayEquals(rd.getIndicesPrivileges()[0].getGrantedFields(),
            new String[]{"f1", "f2"});
    assertNull(rd.getIndicesPrivileges()[0].getDeniedFields());

    final String failingQuery = q;
    ElasticsearchParseException e = expectThrows(ElasticsearchParseException.class,
            () -> RoleDescriptor.parse("test", new BytesArray(failingQuery), false,
                    XContentType.JSON));
    assertThat(e.getDetailedMessage(), containsString("[\"fields\": [...]] format has " +
            "changed for field permissions in role [test]" +
            ", use [\"field_security\": {\"grant\":[...],\"except\":[...]}] instead"));

    q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
            "\"fields\": []" +
            "}]}";
```

```
        rd = RoleDescriptor.parse("test", new BytesArray(q), true, XContentType.JSON);
        assertArrayEquals(rd.getIndicesPrivileges()[0].getGrantedFields(), new String[]{});
        assertNull(rd.getIndicesPrivileges()[0].getDeniedFields());
        final String failingQuery2 = q;
        e = expectThrows(ElasticsearchParseException.class,
                () -> RoleDescriptor.parse("test", new BytesArray(failingQuery2), false,
                        XContentType.JSON));
        assertThat(e.getDetailedMessage(), containsString("[\"fields\": [...]] format has " +
                "changed for field permissions in role [test]" +
                ", use [\"field_security\": {\"grant\":[...],\"except\":[...]}] instead"));

        q = "{\"indices\": [ {\"names\": \"idx2\", \"privileges\": [\"p3\"], " +
                "\"fields\": null" +
                "}]}";
        rd = RoleDescriptor.parse("test", new BytesArray(q), true, XContentType.JSON);
        assertNull(rd.getIndicesPrivileges()[0].getGrantedFields());
        assertNull(rd.getIndicesPrivileges()[0].getDeniedFields());
        final String failingQuery3 = q;
        e = expectThrows(ElasticsearchParseException.class,
                () -> RoleDescriptor.parse("test", new BytesArray(failingQuery3), false,
                        XContentType.JSON));
        assertThat(e.getDetailedMessage(), containsString("[\"fields\": [...]] format has " +
                "changed for field permissions in role [test]" +
                ", use [\"field_security\": {\"grant\":[...],\"except\":[...]}] instead"));
    }

    public void testFieldPermissionsHashCodeThreadSafe() throws Exception {
        final int numThreads = scaledRandomIntBetween(4, 16);
        final FieldPermissions fieldPermissions =new FieldPermissions(
                new FieldPermissionsDefinition(new String[] { "*" }, new String[] { "foo" }));
        final CountDownLatch latch = new CountDownLatch(numThreads + 1);
        final AtomicReferenceArray<Integer> hashCodes = new AtomicReferenceArray<>(numThreads);
        List<Thread> threads = new ArrayList<>(numThreads);
        for (int i = 0; i < numThreads; i++) {
            final int threadNum = i;
            threads.add(new Thread(() -> {
                latch.countDown();
                try {
                    latch.await();
                } catch (InterruptedException e) {
                    Thread.currentThread().interrupt();
                }
                final int hashCode = fieldPermissions.hashCode();
                hashCodes.set(threadNum, hashCode);
            }));
        }

        for (Thread thread : threads) {
```

```
            thread.start();
        }
        latch.countDown();
        for (Thread thread : threads) {
            thread.join();
        }

        final int hashCode = fieldPermissions.hashCode();
        for (int i = 0; i < numThreads; i++) {
            assertEquals((Integer) hashCode, hashCodes.get(i));
        }
    }

    public void testAllFieldIsAutomaticallyExcludedIfNotExplicitlyGranted() throws Exception {
        final FieldPermissions fieldPermissions = new FieldPermissions(
                new FieldPermissionsDefinition(new String[] { "_a*" }, new String[0]));
        assertTrue(fieldPermissions.grantsAccessTo("_animal"));
        assertFalse(fieldPermissions.grantsAccessTo("_all"));
    }

    public void testAllFieldIsNotExcludedIfExplicitlyGranted() throws Exception {
        final String[] grant = { "foo", "bar", "baz", "_all" };
        Collections.shuffle(Arrays.asList(grant), random());

        final FieldPermissions fieldPermissions = new FieldPermissions(
                new FieldPermissionsDefinition(grant, new String[0]));

        assertTrue(fieldPermissions.grantsAccessTo("_all"));
        assertTrue(fieldPermissions.grantsAccessTo("foo"));
        assertTrue(fieldPermissions.grantsAccessTo("bar"));
        assertTrue(fieldPermissions.grantsAccessTo("baz"));
        assertFalse(fieldPermissions.grantsAccessTo(randomAlphaOfLengthBetween(5, 8)));
    }
}
/*
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*/
package org.elasticsearch.xpack.security.authz.permission;

import org.elasticsearch.action.get.GetAction;
import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.xpack.core.security.authz.permission.Role;
import org.elasticsearch.xpack.core.security.authz.privilege.Privilege;
import org.junit.Before;

import java.util.function.Predicate;
```

```
import static org.elasticsearch.xpack.core.security.authz.privilege.IndexPrivilege.MONITOR;
import static org.elasticsearch.xpack.core.security.authz.privilege.IndexPrivilege.READ;
import static org.hamcrest.Matchers.is;
import static org.hamcrest.Matchers.notNullValue;

public class PermissionTests extends ESTestCase {
  private Role permission;

  @Before
  public void init() {
    Role.Builder builder = Role.builder("test");
    builder.add(MONITOR, "test_*", "/foo.*/");
    builder.add(READ, "baz_*foo", "/fool.*bar/");
    builder.add(MONITOR, "/bar.*/");
    permission = builder.build();
  }

  public void testAllowedIndicesMatcherAction() throws Exception {
    testAllowedIndicesMatcher(permission.indices().allowedIndicesMatcher(GetAction.NAME));
  }

  public void testAllowedIndicesMatcherActionCaching() throws Exception {
    Predicate<String> matcher1 = permission.indices().allowedIndicesMatcher(GetAction.NAME);
    Predicate<String> matcher2 = permission.indices().allowedIndicesMatcher(GetAction.NAME);
    assertThat(matcher1, is(matcher2));
  }

  public void testBuildEmptyRole() {
    Role.Builder permission = Role.builder(new String[] { "some_role" });
    Role role = permission.build();
    assertThat(role, notNullValue());
    assertThat(role.cluster(), notNullValue());
    assertThat(role.indices(), notNullValue());
    assertThat(role.runAs(), notNullValue());
  }

  public void testRunAs() {
    Role permission = Role.builder("some_role")
        .runAs(new Privilege("name", "user1", "run*"))
        .build();
    assertThat(permission.runAs().check("user1"), is(true));
    assertThat(permission.runAs().check("user"), is(false));
    assertThat(permission.runAs().check("run" + randomAlphaOfLengthBetween(1, 10)), is(true));
  }

  // "baz_*foo", "/fool.*bar/"
  private void testAllowedIndicesMatcher(Predicate<String> indicesMatcher) {
```

```
        assertThat(indicesMatcher.test("foobar"), is(false));
        assertThat(indicesMatcher.test("fool"), is(false));
        assertThat(indicesMatcher.test("fool2bar"), is(true));
        assertThat(indicesMatcher.test("baz_foo"), is(true));
        assertThat(indicesMatcher.test("barbapapa"), is(false));
    }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchSecurityException;
import org.elasticsearch.action.DocWriteResponse;
import org.elasticsearch.action.admin.cluster.health.ClusterHealthResponse;
import org.elasticsearch.action.admin.cluster.node.info.NodesInfoRequest;
import org.elasticsearch.action.admin.cluster.node.stats.NodesStatsResponse;
import org.elasticsearch.action.admin.cluster.stats.ClusterStatsIndices;
import org.elasticsearch.action.admin.cluster.stats.ClusterStatsResponse;
import org.elasticsearch.action.admin.indices.stats.IndicesStatsResponse;
import org.elasticsearch.action.index.IndexResponse;
import org.elasticsearch.client.Client;
import org.elasticsearch.client.Request;
import org.elasticsearch.client.RequestOptions;
import org.elasticsearch.client.Response;
import org.elasticsearch.client.ResponseException;
import org.elasticsearch.client.transport.NoNodeAvailableException;
import org.elasticsearch.client.transport.TransportClient;
import org.elasticsearch.cluster.routing.ShardRoutingState;
import org.elasticsearch.common.network.NetworkModule;
import org.elasticsearch.common.settings.SecureString;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.util.concurrent.ThreadContext;
import org.elasticsearch.discovery.DiscoveryModule;
import org.elasticsearch.node.MockNode;
import org.elasticsearch.node.Node;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.rest.RestStatus;
import org.elasticsearch.test.SecurityIntegTestCase;
import org.elasticsearch.test.SecuritySettingsSource;
import org.elasticsearch.test.SecuritySettingsSourceField;
import org.elasticsearch.test.discovery.TestZenDiscovery;
import org.elasticsearch.test.junit.annotations.TestLogging;
import org.elasticsearch.transport.Netty4Plugin;
import org.elasticsearch.transport.Transport;
import org.elasticsearch.xpack.core.TestXPackTransportClient;
```

```
import org.elasticsearch.xpack.core.XPackField;
import org.elasticsearch.xpack.core.security.SecurityField;
import org.elasticsearch.xpack.core.security.action.user.PutUserResponse;
import org.elasticsearch.xpack.core.security.authc.support.Hasher;
import org.elasticsearch.xpack.core.security.authc.support.UsernamePasswordToken;
import org.elasticsearch.xpack.core.security.client.SecurityClient;
import org.elasticsearch.xpack.security.LocalStateSecurity;
import org.junit.After;
import org.junit.Before;

import java.nio.file.Files;
import java.nio.file.Path;
import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collection;
import java.util.List;
import java.util.stream.Collectors;

import static org.elasticsearch.common.xcontent.XContentFactory.jsonBuilder;
import static
org.elasticsearch.discovery.zen.SettingsBasedHostsProvider.DISCOVERY_ZEN_PING_UNICAST_HOSTS_SETT
ING;
import static org.elasticsearch.test.hamcrest.ElasticsearchAssertions.assertNoFailures;
import static org.hamcrest.Matchers.containsString;
import static org.hamcrest.Matchers.greaterThanOrEqualTo;
import static org.hamcrest.Matchers.hasItem;
import static org.hamcrest.Matchers.is;
import static org.hamcrest.Matchers.notNullValue;

@TestLogging("org.elasticsearch.cluster.service:TRACE,org.elasticsearch.discovery.zen:TRACE,org.elasticsearch.
action.search:TRACE," +
  "org.elasticsearch.search:TRACE")
public class LicensingTests extends SecurityIntegTestCase {
  public static final String ROLES =
      SecuritySettingsSource.TEST_ROLE + ":\n" +
          "  cluster: [ all ]\n" +
          "  indices:\n" +
          "    - names: '*'\n" +
          "      privileges: [manage]\n" +
          "    - names: '/.*/'\n" +
          "      privileges: [write]\n" +
          "    - names: 'test'\n" +
          "      privileges: [read]\n" +
          "    - names: 'test1'\n" +
          "      privileges: [read]\n" +
          "\n" +
          "role_a:\n" +
          "  indices:\n" +
```

```
            "    - names: 'a'\n" +
            "      privileges: [all]\n" +
            "\n" +
            "role_b:\n" +
            "  indices:\n" +
            "    - names: 'b'\n" +
            "      privileges: [all]\n";

public static final String USERS_ROLES =
      SecuritySettingsSource.CONFIG_STANDARD_USER_ROLES +
            "role_a:user_a,user_b\n" +
            "role_b:user_b\n";

@Override
protected String configRoles() {
   return ROLES;
}

@Override
protected String configUsers() {
   return SecuritySettingsSource.CONFIG_STANDARD_USER +
      "user_a:{plain}passwd\n" +
      "user_b:{plain}passwd\n";
}

@Override
protected String configUsersRoles() {
   return USERS_ROLES;
}

@Override
public Settings nodeSettings(int nodeOrdinal) {
   return Settings.builder().put(super.nodeSettings(nodeOrdinal))
         .put(NetworkModule.HTTP_ENABLED.getKey(), true)
      .put(TestZenDiscovery.USE_MOCK_PINGS.getKey(), false)
         .build();
}

@Override
protected Collection<Class<? extends Plugin>> nodePlugins() {
   ArrayList<Class<? extends Plugin>> plugins = new ArrayList<>(super.nodePlugins());
   plugins.add(Netty4Plugin.class); // for http
   return plugins;
}

@Override
protected int maxNumberOfNodes() {
   return super.maxNumberOfNodes() + 1;
```

```
    }

    @Before
    public void resetLicensing() {
        enableLicensing();
    }

    @After
    public void cleanupSecurityIndex() {
        deleteSecurityIndex();
    }

    public void testEnableDisableBehaviour() throws Exception {
        IndexResponse indexResponse = index("test", "type", jsonBuilder()
                .startObject()
                .field("name", "value")
                .endObject());
        assertEquals(DocWriteResponse.Result.CREATED, indexResponse.getResult());


        indexResponse = index("test1", "type", jsonBuilder()
                .startObject()
                .field("name", "value1")
                .endObject());
        assertEquals(DocWriteResponse.Result.CREATED, indexResponse.getResult());

        refresh();
        // wait for all replicas to be started (to make sure that there are no more cluster state updates when we disable
licensing)
        assertBusy(() -> assertTrue(client().admin().cluster().prepareState().get().getState().routingTable()
                .shardsWithState(ShardRoutingState.INITIALIZING).isEmpty()));

        Client client = internalCluster().transportClient();

        disableLicensing();

        assertElasticsearchSecurityException(() -> client.admin().indices().prepareStats().get());
        assertElasticsearchSecurityException(() -> client.admin().cluster().prepareClusterStats().get());
        assertElasticsearchSecurityException(() -> client.admin().cluster().prepareHealth().get());
        assertElasticsearchSecurityException(() -> client.admin().cluster().prepareNodesStats().get());

        enableLicensing(randomFrom(License.OperationMode.values()));

        IndicesStatsResponse indicesStatsResponse = client.admin().indices().prepareStats().get();
        assertNoFailures(indicesStatsResponse);

        ClusterStatsResponse clusterStatsNodeResponse = client.admin().cluster().prepareClusterStats().get();
        assertThat(clusterStatsNodeResponse, notNullValue());
```

```
        ClusterStatsIndices indices = clusterStatsNodeResponse.getIndicesStats();
        assertThat(indices, notNullValue());
        assertThat(indices.getIndexCount(), greaterThanOrEqualTo(2));

        ClusterHealthResponse clusterIndexHealth = client.admin().cluster().prepareHealth().get();
        assertThat(clusterIndexHealth, notNullValue());

        NodesStatsResponse nodeStats = client.admin().cluster().prepareNodesStats().get();
        assertThat(nodeStats, notNullValue());
    }

    public void testRestAuthenticationByLicenseType() throws Exception {
        Response unauthorizedRootResponse = getRestClient().performRequest(new Request("GET", "/"));
        // the default of the licensing tests is basic
        assertThat(unauthorizedRootResponse.getStatusLine().getStatusCode(), is(200));
        ResponseException e = expectThrows(ResponseException.class,
                () -> getRestClient().performRequest(new Request("GET", "/_xpack/security/_authenticate")));
        assertThat(e.getResponse().getStatusLine().getStatusCode(), is(403));

        // generate a new license with a mode that enables auth
        License.OperationMode mode = randomFrom(License.OperationMode.GOLD,
License.OperationMode.TRIAL,
                License.OperationMode.PLATINUM, License.OperationMode.STANDARD);
        enableLicensing(mode);
        e = expectThrows(ResponseException.class, () -> getRestClient().performRequest(new Request("GET", "/")));
        assertThat(e.getResponse().getStatusLine().getStatusCode(), is(401));
        e = expectThrows(ResponseException.class,
           () -> getRestClient().performRequest(new Request("GET", "/_xpack/security/_authenticate")));
        assertThat(e.getResponse().getStatusLine().getStatusCode(), is(401));

        RequestOptions.Builder optionsBuilder = RequestOptions.DEFAULT.toBuilder();
        optionsBuilder.addHeader("Authorization",
UsernamePasswordToken.basicAuthHeaderValue(SecuritySettingsSource.TEST_USER_NAME,
                new SecureString(SecuritySettingsSourceField.TEST_PASSWORD.toCharArray())));
        RequestOptions options = optionsBuilder.build();

        Request rootRequest = new Request("GET", "/");
        rootRequest.setOptions(options);
        Response authorizedRootResponse = getRestClient().performRequest(rootRequest);
        assertThat(authorizedRootResponse.getStatusLine().getStatusCode(), is(200));
        Request authenticateRequest = new Request("GET", "/_xpack/security/_authenticate");
        authenticateRequest.setOptions(options);
        Response authorizedAuthenticateResponse = getRestClient().performRequest(authenticateRequest);
        assertThat(authorizedAuthenticateResponse.getStatusLine().getStatusCode(), is(200));
    }

    public void testSecurityActionsByLicenseType() throws Exception {
        // security actions should not work!
```

```
        Settings settings = internalCluster().transportClient().settings();
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateSecurity.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            new SecurityClient(client).preparePutUser("john", "password".toCharArray(), Hasher.BCRYPT).get();
            fail("security actions should not be enabled!");
        } catch (ElasticsearchSecurityException e) {
            assertThat(e.status(), is(RestStatus.FORBIDDEN));
            assertThat(e.getMessage(), containsString("non-compliant"));
        }

        // enable a license that enables security
        License.OperationMode mode = randomFrom(License.OperationMode.GOLD,
License.OperationMode.TRIAL,
                License.OperationMode.PLATINUM, License.OperationMode.STANDARD);
        enableLicensing(mode);
        // security actions should work!
        try (TransportClient client = new TestXPackTransportClient(settings, LocalStateSecurity.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            PutUserResponse response = new SecurityClient(client).preparePutUser("john", "password".toCharArray(),
Hasher.BCRYPT).get();
            assertNotNull(response);
        }
    }

    public void testTransportClientAuthenticationByLicenseType() throws Exception {
        Settings.Builder builder = Settings.builder()
                .put(internalCluster().transportClient().settings());
        // remove user info
        builder.remove(SecurityField.USER_SETTING.getKey());
        builder.remove(ThreadContext.PREFIX + "." + UsernamePasswordToken.BASIC_AUTH_HEADER);

        // basic has no auth
        try (TransportClient client = new TestXPackTransportClient(builder.build(), LocalStateSecurity.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
());
            assertGreenClusterState(client);
        }

        // enable a license that enables security
        License.OperationMode mode = randomFrom(License.OperationMode.GOLD,
License.OperationMode.TRIAL,
                License.OperationMode.PLATINUM, License.OperationMode.STANDARD);
        enableLicensing(mode);

        try (TransportClient client = new TestXPackTransportClient(builder.build(), LocalStateSecurity.class)) {
client.addTransportAddress(internalCluster().getDataNodeInstance(Transport.class).boundAddress().publishAddress
```

```
());
            client.admin().cluster().prepareHealth().get();
            fail("should not have been able to connect to a node!");
        } catch (NoNodeAvailableException e) {
            // expected
        }
    }

    public void testNodeJoinWithoutSecurityExplicitlyEnabled() throws Exception {
        License.OperationMode mode = randomFrom(License.OperationMode.GOLD,
License.OperationMode.PLATINUM, License.OperationMode.STANDARD);
        enableLicensing(mode);
        ensureGreen();

        final List<String> unicastHostsList = internalCluster().masterClient().admin().cluster().nodesInfo(new
NodesInfoRequest()).get()
            .getNodes().stream().map(n -> n.getTransport().getAddress().publishAddress().toString()).distinct()
            .collect(Collectors.toList());

        Path home = createTempDir();
        Path conf = home.resolve("config");
        Files.createDirectories(conf);
        Settings nodeSettings = Settings.builder()
            .put(nodeSettings(maxNumberOfNodes() - 1).filter(s -> "xpack.security.enabled".equals(s) == false))
            .put("node.name", "my-test-node")
            .put("network.host", "localhost")
            .put("cluster.name", internalCluster().getClusterName())
            .put("discovery.zen.minimum_master_nodes",
                internalCluster().getInstance(Settings.class).get("discovery.zen.minimum_master_nodes"))
            .put("path.home", home)
            .put(TestZenDiscovery.USE_MOCK_PINGS.getKey(), false)
            .put(DiscoveryModule.DISCOVERY_TYPE_SETTING.getKey(), "test-zen")
            .putList(DiscoveryModule.DISCOVERY_HOSTS_PROVIDER_SETTING.getKey())
            .putList(DISCOVERY_ZEN_PING_UNICAST_HOSTS_SETTING.getKey(), unicastHostsList)
            .build();
        Collection<Class<? extends Plugin>> mockPlugins = Arrays.asList(LocalStateSecurity.class,
TestZenDiscovery.TestPlugin.class);
        try (Node node = new MockNode(nodeSettings, mockPlugins)) {
            node.start();
            ensureStableCluster(cluster().size() + 1);
        }
    }

    private static void assertElasticsearchSecurityException(ThrowingRunnable runnable) {
        ElasticsearchSecurityException ee = expectThrows(ElasticsearchSecurityException.class, runnable);
        assertThat(ee.getMetadata(LicenseUtils.EXPIRED_FEATURE_METADATA),
hasItem(XPackField.SECURITY));
        assertThat(ee.status(), is(RestStatus.FORBIDDEN));
```

```
  }

  public static void disableLicensing() {
    disableLicensing(License.OperationMode.BASIC);
  }

  public static void disableLicensing(License.OperationMode operationMode) {
    for (XPackLicenseState licenseState : internalCluster().getInstances(XPackLicenseState.class)) {
      licenseState.update(operationMode, false, null);
    }
  }

  public static void enableLicensing() {
    enableLicensing(License.OperationMode.BASIC);
  }

  public static void enableLicensing(License.OperationMode operationMode) {
    for (XPackLicenseState licenseState : internalCluster().getInstances(XPackLicenseState.class)) {
      licenseState.update(operationMode, true, null);
    }
  }
}
```

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<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<link rel="dns-prefetch" href="https://assets-cdn.github.com">
<link rel="dns-prefetch" href="https://avatars0.githubusercontent.com">
<link rel="dns-prefetch" href="https://avatars1.githubusercontent.com">
<link rel="dns-prefetch" href="https://avatars2.githubusercontent.com">
<link rel="dns-prefetch" href="https://avatars3.githubusercontent.com">
<link rel="dns-prefetch" href="https://github-cloud.s3.amazonaws.com">
<link rel="dns-prefetch" href="https://user-images.githubusercontent.com/">

<link crossorigin="anonymous" href="https://assets-cdn.github.com/assets/frameworks-2d2d4c150f7000385741c6b992b302689ecd172246c6428904e0813be9bceca6.css" media="all" rel="stylesheet" />
<link crossorigin="anonymous" href="https://assets-cdn.github.com/assets/github-0522ae8d3b3bdc841d2f91f90efd5f1fd9040d910905674cd134ced43a6dfea6.css" media="all" rel="stylesheet" />

<link crossorigin="anonymous" href="https://assets-cdn.github.com/assets/site-

cfab053e93f0e27f4c63d4ff6b7957bd25f711667fe678e747f8a4d88c47b38d.css" media="all" rel="stylesheet" />

<meta name="viewport" content="width=device-width">

<title>cryptacular/NOTICE at master vt-middleware/cryptacular GitHub</title>
<link rel="search" type="application/opensearchdescription+xml" href="/opensearch.xml" title="GitHub">
<link rel="fluid-icon" href="https://github.com/fluidicon.png" title="GitHub">
<meta property="fb:app_id" content="1401488693436528">

<meta content="https://avatars7.githubusercontent.com/u/6122907?v=4&s=400" property="og:image" /><meta content="GitHub" property="og:site_name" /><meta content="object" property="og:type" /><meta content="vt-middleware/cryptacular" property="og:title" /><meta content="https://github.com/vt-middleware/cryptacular" property="og:url" /><meta content="cryptacular - The friendly complement to the BouncyCastle crypto API for Java." property="og:description" />

<link rel="assets" href="https://assets-cdn.github.com/">

<meta name="pjax-timeout" content="1000">

<meta name="request-id" content="E0E4:26F16:12A5AE6:1D11801:596C7978" data-pjax-transient>

<meta name="selected-link" value="repo_source" data-pjax-transient>

<meta name="google-site-verification" content="KT5gs8h0wvaagLKAVWq8bbeNwnZZK1r1XQysX3xurLU">
<meta name="google-site-verification" content="ZzhVyEFwb7w3e0-uOTltm8Jsck2F5StVihD0exw2fsA">
<meta name="google-analytics" content="UA-3769691-2">

<meta content="collector.githubapp.com" name="octolytics-host" /><meta content="github" name="octolytics-app-id" /><meta content="https://collector.githubapp.com/github-external/browser_event" name="octolytics-event-url" /><meta content="E0E4:26F16:12A5AE6:1D11801:596C7978" name="octolytics-dimension-request_id" /><meta content="sea" name="octolytics-dimension-region_edge" /><meta content="iad" name="octolytics-dimension-region_render" />
<meta content="/<user-name>/<repo-name>/blob/show" data-pjax-transient="true" name="analytics-location" />

<meta class="js-ga-set" name="dimension1" content="Logged Out">

<meta name="hostname" content="github.com">
<meta name="user-login" content="">

<meta name="expected-hostname" content="github.com">
<meta name="js-proxy-site-detection-payload" content="N2ZhMjk0NTA4MjI1NmZhYTVlNzM5NzVjZmFkOWY2NGFkNmMxYzcyMGViNzAzZGQxMGMzZmJhZDQ3YWZiZTI0OHx7InJlbW90ZV9hZGRyZXNzIjoiMTEwLjIwLjIyMC4xMzUiLCJyZXF1ZXN0X2lkIjoiRTBFNDoyNkYxNjoxMkE1QUU2OjFEMTE4MDE6NTk2Qzc5NzgiLCJ0aW1lc3RhbXAiOjE1MDAyODEyMDgsImhvc3QiOiJnaXRodWIuY29tIn0=">

<meta name="html-safe-nonce" content="5aa226b80a18dc40894e1d405e4eb31cfca7d616">

<meta http-equiv="x-pjax-version" content="f682644ce1bb9629b9d9d9bedf64801b">

<link href="https://github.com/vt-middleware/cryptacular/commits/master.atom" rel="alternate" title="Recent Commits to cryptacular:master" type="application/atom+xml">

<meta name="description" content="cryptacular - The friendly complement to the BouncyCastle crypto API for Java.">
<meta name="go-import" content="github.com/vt-middleware/cryptacular git https://github.com/vt-middleware/cryptacular.git">

<meta content="6122907" name="octolytics-dimension-user_id" /><meta content="vt-middleware" name="octolytics-dimension-user_login" /><meta content="15714989" name="octolytics-dimension-repository_id" /><meta content="vt-middleware/cryptacular" name="octolytics-dimension-repository_nwo" /><meta content="true" name="octolytics-dimension-repository_public" /><meta content="false" name="octolytics-dimension-repository_is_fork" /><meta content="15714989" name="octolytics-dimension-repository_network_root_id" /><meta content="vt-middleware/cryptacular" name="octolytics-dimension-repository_network_root_nwo" /><meta content="false" name="octolytics-dimension-repository_explore_github_marketplace_ci_cta_shown" />

<link rel="canonical" href="https://github.com/vt-middleware/cryptacular/blob/master/NOTICE" data-pjax-transient>

<meta name="browser-stats-url" content="https://api.github.com/_private/browser/stats">

<meta name="browser-errors-url" content="https://api.github.com/_private/browser/errors">

<link rel="mask-icon" href="https://assets-cdn.github.com/pinned-octocat.svg" color="#000000">
<link rel="icon" type="image/x-icon" href="https://assets-cdn.github.com/favicon.ico">

<meta name="theme-color" content="#1e2327">

</head>

<body class="logged-out env-production page-blob">

Skip to content

<header class="site-header js-details-container Details" role="banner">

<svg aria-hidden="true" class="octicon octicon-mark-github" height="32" version="1.1" viewBox="0 0 16 16" width="32"><path fill-rule="evenodd" d="M8 0C3.58 0 0 3.58 0 8c0 3.54 2.29 6.53 5.47 7.59.4.07.55-.17.55-.38 0-.19-.01-.82-.01-1.49-2.01.37-2.53-.49-2.69-.94-.09-.23-.48-.94-.82-1.13-.28-.15-.68-.52-.01-.53.63-.01 1.08.58 1.23.82.72 1.21 1.87.87 2.33.66.07-.52.28-.87.51-1.07-1.78-.2-3.64-.89-3.64-3.95 0-.87.31-1.59.82-2.15-.08-.2-.36-1.02.08-2.12 0 0 .67-.21 2.2.82.64-.18 1.32-.27 2-.27.68 0 1.36.09 2 .27 1.53-1.04 2.2-.82 2.2-.82.44 1.1.16 1.92.08 2.12.51.56.82 1.27.82 2.15 0 3.07-1.87 3.75-3.65 3.95.29.25.54.73.54 1.48 0 1.07-.01 1.93-.01 2.2 0 .21.15.46.55.38A8.013 8.013 0 0 0 16 8c0-4.42-3.58-8-8-8z"/></svg>

<button class="btn-link float-right site-header-toggle js-details-target" type="button" aria-label="Toggle navigation" aria-expanded="false">
<svg aria-hidden="true" class="octicon octicon-three-bars" height="24" version="1.1" viewBox="0 0 12 16" width="18"><path fill-rule="evenodd" d="M11.41 9H.59C0 9 0 8.59 0 8c0-.59 0-1 .59-1H11.4c.59 0 .59.41.59 1 0 .59 0 1-.59 1h.01zm0-4H.59C0 5 0 4.59 0 4c0-.59 0-1 .59-1H11.4c.59 0 .59.41.59 1 0 .59 0 1-.59 1h.01zM.59 11H11.4c.59 0 .59.41.59 1 0 .59 0 1-.59 1H.59C0 13 0 12.59 0 12c0-.59 0-1 .59-1z"/></svg>
</button>

<nav class="site-header-nav">

Features

Business
 <a href="/explore" class="js-selected-navigation-item nav-item" data-ga-click="Header, click, Nav menu - item:explore" data-selected-links="/explore /trending /trending/developers /stars /integrations /integrations/feature/code /integrations/feature/collaborate /integrations/feature/ship showcases showcases_search

showcases_landing /explore">
Explore

Marketplace

Pricing
 </nav>

<!-- "'` --><!-- </textarea></xmp> --></option></form><form accept-charset="UTF-8" action="/vt-middleware/cryptacular/search" class="js-site-search-form" data-scoped-search-url="/vt-middleware/cryptacular/search" data-unscoped-search-url="/search" method="get"> <input name="utf8" type="hidden" value="✓" />
<label class="form-control header-search-wrapper js-chromeless-input-container">
This repository
<input type="text"
class="form-control header-search-input js-site-search-focus js-site-search-field is-clearable"
data-hotkey="s"
name="q"
value=""
placeholder="Search"
aria-label="Search this repository"
data-unscoped-placeholder="Search GitHub"
data-scoped-placeholder="Search"
autocapitalize="off">
<input type="hidden" class="js-site-search-type-field" name="type" >
</label>
</form>

Sign in
or
Sign up

</header>

<div itemscope itemtype="http://schema.org/SoftwareSourceCode">
<div id="js-repo-pjax-container" data-pjax-container>

<ul class="pagehead-actions">

<a href="/login?return_to=%2Fvt-middleware%2Fcryptacular"
class="btn btn-sm btn-with-count tooltipped tooltipped-n"
aria-label="You must be signed in to watch a repository" rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-eye" height="16" version="1.1" viewBox="0 0 16 16"
width="16"><path fill-rule="evenodd" d="M8.06 2C3 2 0 8 0 8s3 6 8.06 6C13 14 16 8 16 8s-3-6-7.94-6zM8 12c-
2.2 0-4-1.78-4-4 0-2.2 1.8-4 4-4 2.22 0 4 1.8 4 4 0 2.22-1.78 4-4 4zm2-4c0 1.11-.89 2-2 2-1.11 0-2-.89-2-2 0-
1.11.89-2 2-2 1.11 0 2 .89 2 2z"/></svg>
Watch

<a class="social-count" href="/vt-middleware/cryptacular/watchers"
aria-label="9 users are watching this repository">
9

<a href="/login?return_to=%2Fvt-middleware%2Fcryptacular"
class="btn btn-sm btn-with-count tooltipped tooltipped-n"
aria-label="You must be signed in to star a repository" rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-star" height="16" version="1.1" viewBox="0 0 14 16"
width="14"><path fill-rule="evenodd" d="M14 6l-4.9-.64L7 1 4.9 5.36 0 6l3.6 3.26L2.67 14 7 11.67 11.33 14l-.93-
4.74z"/></svg>
Star


```
  <a class="social-count js-social-count" href="/vt-middleware/cryptacular/stargazers"
    aria-label="15 users starred this repository">
    15
  </a>

 </li>

 <li>
    <a href="/login?return_to=%2Fvt-middleware%2Fcryptacular"
      class="btn btn-sm btn-with-count tooltipped tooltipped-n"
      aria-label="You must be signed in to fork a repository" rel="nofollow">
      <svg aria-hidden="true" class="octicon octicon-repo-forked" height="16" version="1.1" viewBox="0 0 10 16"
width="10"><path fill-rule="evenodd" d="M8 1a1.993 1.993 0 0 0-1 3.72V6L5 8 3 6V4.72A1.993 1.993 0 0 0 2
1a1.993 1.993 0 0 0-1 3.72V6.5l3 3v1.78A1.993 1.993 0 0 0 5 15a1.993 1.993 0 0 0 1-3.72V9.5l3-3V4.72A1.993
1.993 0 0 0 8 1zM2 4.2C1.34 4.2.8 3.65.8 3c0-.65.55-1.2 1.2-1.2.65 0 1.2.55 1.2 1.2 0 .65-.55 1.2-1.2 1.2zm3 10c-
.66 0-1.2-.55-1.2-1.2 0-.65.55-1.2 1.2-1.2.65 0 1.2.55 1.2 1.2 0 .65-.55 1.2-1.2 1.2zm3-10c-.66 0-1.2-.55-1.2-1.2 0-
.65.55-1.2 1.2-1.2.65 0 1.2.55 1.2 1.2 0 .65-.55 1.2-1.2 1.2z"/></svg>
      Fork
    </a>

  <a href="/vt-middleware/cryptacular/network" class="social-count"
    aria-label="1 user forked this repository">
    1
  </a>
 </li>
</ul>

      <h1 class="public ">
 <svg aria-hidden="true" class="octicon octicon-repo" height="16" version="1.1" viewBox="0 0 12 16"
width="12"><path fill-rule="evenodd" d="M4 9H3V8h1v1zm0-3H3v1h1V6zm0-2H3v1h1V4zm0-
2H3v1h1V2zm8-1v12c0 .55-.45 1-1 1H6v2l-1.5-1.5L3 16v-2H1c-.55 0-1-.45-1-1V1c0-.55.45-1 1-1h10c.55 0 1 .45
1 1zm-1 10H1v2h2v-1h3v1h5v-2zm0-10H2v9h9V1z"/></svg>
 <span class="author" itemprop="author"><a href="/vt-middleware" class="url fn" rel="author">vt-
middleware</a></span><!--
--><span class="path-divider">/</span><!--
--><strong itemprop="name"><a href="/vt-middleware/cryptacular" data-pjax="#js-repo-pjax-
container">cryptacular</a></strong>

</h1>

    </div>
    <div class="container">

<nav class="reponav js-repo-nav js-sidenav-container-pjax"
   itemscope
   itemtype="http://schema.org/BreadcrumbList"
   role="navigation"
```

```
   data-pjax="#js-repo-pjax-container">

 <span itemscope itemtype="http://schema.org/ListItem" itemprop="itemListElement">
   <a href="/vt-middleware/cryptacular" class="js-selected-navigation-item selected reponav-item" data-hotkey="g
c" data-selected-links="repo_source repo_downloads repo_commits repo_releases repo_tags repo_branches /vt-
middleware/cryptacular" itemprop="url">
     <svg aria-hidden="true" class="octicon octicon-code" height="16" version="1.1" viewBox="0 0 14 16"
width="14"><path fill-rule="evenodd" d="M9.5 3L8 4.5 11.5 8 8 11.5 9.5 13 14 8 9.5 3zm-5 0L0 8l4.5 5L6 11.5
2.5 8 6 4.5 4.5 3z"/></svg>
     <span itemprop="name">Code</span>
     <meta itemprop="position" content="1">
</a>  </span>

   <span itemscope itemtype="http://schema.org/ListItem" itemprop="itemListElement">
     <a href="/vt-middleware/cryptacular/issues" class="js-selected-navigation-item reponav-item" data-hotkey="g i"
data-selected-links="repo_issues repo_labels repo_milestones /vt-middleware/cryptacular/issues" itemprop="url">
       <svg aria-hidden="true" class="octicon octicon-issue-opened" height="16" version="1.1" viewBox="0 0 14 16"
width="14"><path fill-rule="evenodd" d="M7 2.3c3.14 0 5.7 2.56 5.7 5.7s-2.56 5.7-5.7 5.7A5.71 5.71 0 0 1 1.3
8c0-3.14 2.56-5.7 5.7-5.7zM7 1C3.14 1 0 4.14 0 8s3.14 7 7 7 7-3.14 7-7-3.14-7-7-7zm1 3H6v5h2V4zm0
6H6v2h2v-2z"/></svg>
       <span itemprop="name">Issues</span>
       <span class="Counter">4</span>
       <meta itemprop="position" content="2">
</a>    </span>

 <span itemscope itemtype="http://schema.org/ListItem" itemprop="itemListElement">
   <a href="/vt-middleware/cryptacular/pulls" class="js-selected-navigation-item reponav-item" data-hotkey="g p"
data-selected-links="repo_pulls /vt-middleware/cryptacular/pulls" itemprop="url">
     <svg aria-hidden="true" class="octicon octicon-git-pull-request" height="16" version="1.1" viewBox="0 0 12
16" width="12"><path fill-rule="evenodd" d="M11 11.28V5c-.03-.78-.34-1.47-.94-2.06C9.46 2.35 8.78 2.03 8
2H7V0L4 3l3 3V4h1c.27.02.48.11.69.31.21.2.3.42.31.69v6.28A1.993 1.993 0 0 0 10 15a1.993 1.993 0 0 0 1-
3.72zm-1 2.92c-.66 0-1.2-.55-1.2-1.2 0-.65.55-1.2 1.2-1.2.65 0 1.2.55 1.2 1.2 0 .65-.55 1.2-1.2 1.2zM4 3c0-1.11-
.89-2-2-2a1.993 1.993 0 0 0-1 3.72v6.56A1.993 1.993 0 0 0 2 15a1.993 1.993 0 0 0 1-3.72V4.72c.59-.34 1-.98 1-
1.72zm-.8 10c0 .66-.55 1.2-1.2 1.2-.65 0-1.2-.55-1.2-1.2 0-.65.55-1.2 1.2-1.2.65 0 1.2.55 1.2 1.2zM2 4.2C1.34 4.2 8
3.65.8 3c0-.65.55-1.2 1.2-1.2.65 0 1.2.55 1.2 1.2 0 .65-.55 1.2-1.2 1.2z"/></svg>
     <span itemprop="name">Pull requests</span>
     <span class="Counter">1</span>
     <meta itemprop="position" content="3">
</a>  </span>

   <a href="/vt-middleware/cryptacular/projects" class="js-selected-navigation-item reponav-item" data-selected-
links="repo_projects new_repo_project repo_project /vt-middleware/cryptacular/projects">
     <svg aria-hidden="true" class="octicon octicon-project" height="16" version="1.1" viewBox="0 0 15 16"
width="15"><path fill-rule="evenodd" d="M10 12h3V2h-3v10zm-4-2h3V2H6v8zm-4 4h3V2H2v12zm-1
1h13V1H1v14zM14 0H1a1 1 0 0 0-1 1v14a1 1 0 0 0 1 1h13a1 1 0 0 0 1-1V1a1 1 0 0 0-1-1z"/></svg>
     Projects
     <span class="Counter" >0</span>
</a>
```

```
  <div class="reponav-dropdown js-menu-container">
    <button type="button" class="btn-link reponav-item reponav-dropdown js-menu-target " data-no-toggle aria-expanded="false" aria-haspopup="true">
      Insights
      <svg aria-hidden="true" class="octicon octicon-triangle-down v-align-middle text-gray" height="11" version="1.1" viewBox="0 0 12 16" width="8"><path fill-rule="evenodd" d="M0 5l6 6 6-6z"/></svg>
    </button>
    <div class="dropdown-menu-content js-menu-content">
      <div class="dropdown-menu dropdown-menu-sw">
        <a class="dropdown-item" href="/vt-middleware/cryptacular/pulse" data-skip-pjax>
          <svg aria-hidden="true" class="octicon octicon-pulse" height="16" version="1.1" viewBox="0 0 14 16" width="14"><path fill-rule="evenodd" d="M11.5 8L8.8 5.4 6.6 8.5 5.5 1.6 2.38 8H0v2h3.6l.9-1.8.9 5.4L9 8.5l1.6 1.5H14V8z"/></svg>
          Pulse
        </a>
        <a class="dropdown-item" href="/vt-middleware/cryptacular/graphs" data-skip-pjax>
          <svg aria-hidden="true" class="octicon octicon-graph" height="16" version="1.1" viewBox="0 0 16 16" width="16"><path fill-rule="evenodd" d="M16 14v1H0V0h1v14h15zM5 13H3V8h2v5zm4 0H7V3h2v10zm4 0h-2V6h2v7z"/></svg>
          Graphs
        </a>
      </div>
    </div>
  </div>
</nav>

    </div>
  </div>

<div class="container new-discussion-timeline experiment-repo-nav">
 <div class="repository-content">


 <a href="/vt-middleware/cryptacular/blob/c26911e3cd28497ce9daa3ce682e09cb2d1d8688/NOTICE" class="d-none js-permalink-shortcut" data-hotkey="y">Permalink</a>

 <!-- blob contrib key: blob_contributors:v21:f5054b9e46039e0ad937c69e6151b7d4 -->

 <div class="file-navigation js-zeroclipboard-container">

<div class="select-menu branch-select-menu js-menu-container js-select-menu float-left">
 <button class=" btn btn-sm select-menu-button js-menu-target css-truncate" data-hotkey="w"

   type="button" aria-label="Switch branches or tags" aria-expanded="false" aria-haspopup="true">
    <i>Branch:</i>
    <span class="js-select-button css-truncate-target">master</span>
```

</button>

<div class="select-menu-modal-holder js-menu-content js-navigation-container" data-pjax>

<svg aria-label="Close" class="octicon octicon-x js-menu-close" height="16" role="img" version="1.1" viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M7.48 8l3.75 3.75-1.48 1.48L6 9.48l-3.75 3.75-1.48-1.48L4.52 8 .77 4.25l1.48-1.48L6 6.52l3.75-3.75 1.48 1.48z"/></svg>
Switch branches/tags

<input type="text" aria-label="Filter branches/tags" id="context-commitish-filter-field" class="form-control js-filterable-field js-navigation-enable" placeholder="Filter branches/tags">

<li class="select-menu-tab">
Branches

<li class="select-menu-tab">
Tags

<a class="select-menu-item js-navigation-item js-navigation-open "
href="/vt-middleware/cryptacular/blob/ISSUE-31+32/NOTICE"
data-name="ISSUE-31+32"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1" viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

ISSUE-31+32

<a class="select-menu-item js-navigation-item js-navigation-open "
href="/vt-middleware/cryptacular/blob/gh-pages/NOTICE"
data-name="gh-pages"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1" viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

gh-pages

<a class="select-menu-item js-navigation-item js-navigation-open selected"
href="/vt-middleware/cryptacular/blob/master/NOTICE"
data-name="master"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1" viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

master

<a class="select-menu-item js-navigation-item js-navigation-open "
href="/vt-middleware/cryptacular/blob/v1.1/NOTICE"
data-name="v1.1"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1" viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

v1.1

Nothing to show

<a class="select-menu-item js-navigation-item js-navigation-open "
href="/vt-middleware/cryptacular/tree/v1.2.1/NOTICE"
data-name="v1.2.1"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"

viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

v1.2.1

<a class="select-menu-item js-navigation-item js-navigation-open "
href="/vt-middleware/cryptacular/tree/v1.2.0/NOTICE"
data-name="v1.2.0"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

v1.2.0

<a class="select-menu-item js-navigation-item js-navigation-open "
href="/vt-middleware/cryptacular/tree/v1.1.2/NOTICE"
data-name="v1.1.2"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

v1.1.2

<a class="select-menu-item js-navigation-item js-navigation-open "
href="/vt-middleware/cryptacular/tree/v1.1.1/NOTICE"
data-name="v1.1.1"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

v1.1.1

<a class="select-menu-item js-navigation-item js-navigation-open "
href="/vt-middleware/cryptacular/tree/v1.1.0/NOTICE"
data-name="v1.1.0"
data-skip-pjax="true"
rel="nofollow">
<svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>

v1.1.0

```
        </a>
        <a class="select-menu-item js-navigation-item js-navigation-open "
         href="/vt-middleware/cryptacular/tree/v1.0/NOTICE"
         data-name="v1.0"
         data-skip-pjax="true"
         rel="nofollow">
         <svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>
         <span class="select-menu-item-text css-truncate-target" title="v1.0">
          v1.0
         </span>
        </a>
        <a class="select-menu-item js-navigation-item js-navigation-open "
         href="/vt-middleware/cryptacular/tree/v1.0-RC6/NOTICE"
         data-name="v1.0-RC6"
         data-skip-pjax="true"
         rel="nofollow">
         <svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>
         <span class="select-menu-item-text css-truncate-target" title="v1.0-RC6">
          v1.0-RC6
         </span>
        </a>
        <a class="select-menu-item js-navigation-item js-navigation-open "
         href="/vt-middleware/cryptacular/tree/v1.0-RC4/NOTICE"
         data-name="v1.0-RC4"
         data-skip-pjax="true"
         rel="nofollow">
         <svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>
         <span class="select-menu-item-text css-truncate-target" title="v1.0-RC4">
          v1.0-RC4
         </span>
        </a>
        <a class="select-menu-item js-navigation-item js-navigation-open "
         href="/vt-middleware/cryptacular/tree/v1.0-RC3/NOTICE"
         data-name="v1.0-RC3"
         data-skip-pjax="true"
         rel="nofollow">
         <svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>
         <span class="select-menu-item-text css-truncate-target" title="v1.0-RC3">
          v1.0-RC3
         </span>
        </a>
        <a class="select-menu-item js-navigation-item js-navigation-open "
         href="/vt-middleware/cryptacular/tree/v1.0-RC2/NOTICE"
         data-name="v1.0-RC2"
```

```
          data-skip-pjax="true"
          rel="nofollow">
          <svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>
          <span class="select-menu-item-text css-truncate-target" title="v1.0-RC2">
            v1.0-RC2
          </span>
        </a>
        <a class="select-menu-item js-navigation-item js-navigation-open "
          href="/vt-middleware/cryptacular/tree/v1.0-RC1/NOTICE"
          data-name="v1.0-RC1"
          data-skip-pjax="true"
          rel="nofollow">
          <svg aria-hidden="true" class="octicon octicon-check select-menu-item-icon" height="16" version="1.1"
viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M12 5l-8 8-4-4 1.5-1.5L4 10l6.5-6.5z"/></svg>
          <span class="select-menu-item-text css-truncate-target" title="v1.0-RC1">
            v1.0-RC1
          </span>
        </a>
      </div>

      <div class="select-menu-no-results">Nothing to show</div>
    </div>

  </div>
 </div>
</div>

  <div class="BtnGroup float-right">
    <a href="/vt-middleware/cryptacular/find/master"
        class="js-pjax-capture-input btn btn-sm BtnGroup-item"
        data-pjax
        data-hotkey="t">
      Find file
    </a>
    <button aria-label="Copy file path to clipboard" class="js-zeroclipboard btn btn-sm BtnGroup-item tooltipped
tooltipped-s" data-copied-hint="Copied!" type="button">Copy path</button>
  </div>
  <div class="breadcrumb js-zeroclipboard-target">
    <span class="repo-root js-repo-root"><span class="js-path-segment"><a href="/vt-
middleware/cryptacular"><span>cryptacular</span></a></span></span><span class="separator">/</span><strong
class="final-path">NOTICE</strong>
  </div>
 </div>



 <div class="commit-tease">
```

```
    <span class="float-right">
      <a class="commit-tease-sha" href="/vt-
middleware/cryptacular/commit/6dd6f199ac3ecc3b4c5aef9e04be3bbe265a30a1" data-pjax>
        6dd6f19
      </a>
      <relative-time datetime="2017-07-06T22:28:36Z">Jul 7, 2017</relative-time>
    </span>
    <div>
      <img alt="@dfish3r" class="avatar" height="20"
src="https://avatars6.githubusercontent.com/u/1051499?v=4&s=40" width="20" />
      <a href="/dfish3r" class="user-mention" rel="contributor">dfish3r</a>
        <a href="/vt-middleware/cryptacular/commit/6dd6f199ac3ecc3b4c5aef9e04be3bbe265a30a1"
class="message" data-pjax="true" title="Update year in notice.">Update year in notice.</a>
    </div>

  <div class="commit-tease-contributors">
    <button type="button" class="btn-link muted-link contributors-toggle" data-facebox="#blob_contributors_box">
      <strong>1</strong>
       contributor
    </button>

  </div>

  <div id="blob_contributors_box" style="display:none">
    <h2 class="facebox-header" data-facebox-id="facebox-header">Users who have contributed to this file</h2>
    <ul class="facebox-user-list" data-facebox-id="facebox-description">
       <li class="facebox-user-list-item">
         <img alt="@dfish3r" height="24" src="https://avatars4.githubusercontent.com/u/1051499?v=4&s=48"
width="24" />
         <a href="/dfish3r">dfish3r</a>
       </li>
    </ul>
  </div>
 </div>

 <div class="file">
  <div class="file-header">
 <div class="file-actions">

  <div class="BtnGroup">
    <a href="/vt-middleware/cryptacular/raw/master/NOTICE" class="btn btn-sm BtnGroup-item" id="raw-
url">Raw</a>
      <a href="/vt-middleware/cryptacular/blame/master/NOTICE" class="btn btn-sm js-update-url-with-hash
BtnGroup-item" data-hotkey="b">Blame</a>
    <a href="/vt-middleware/cryptacular/commits/master/NOTICE" class="btn btn-sm BtnGroup-item"
rel="nofollow">History</a>
  </div>
```

```
      <button type="button" class="btn-octicon disabled tooltipped tooltipped-nw"
        aria-label="You must be signed in to make or propose changes">
        <svg aria-hidden="true" class="octicon octicon-pencil" height="16" version="1.1" viewBox="0 0 14 16"
width="14"><path fill-rule="evenodd" d="M0 12v3h3l8-8-3-3-8 8zm3 2H1v-2h1v1h1v1zm10.3-9.3L12 6 9 3l1.3-
1.3a.996.996 0 0 1 1.41 0l1.59 1.59c.39.39.39 1.02 0 1.41z"/></svg>
      </button>
      <button type="button" class="btn-octicon btn-octicon-danger disabled tooltipped tooltipped-nw"
        aria-label="You must be signed in to make or propose changes">
        <svg aria-hidden="true" class="octicon octicon-trashcan" height="16" version="1.1" viewBox="0 0 12 16"
width="12"><path fill-rule="evenodd" d="M11 2H9c0-.55-.45-1-1-1H5c-.55 0-1 .45-1 1H2c-.55 0-1 .45-1 1v1c0
.55.45 1 1 1v9c0 .55.45 1 1 1h7c.55 0 1-.45 1-1V5c.55 0 1-.45 1-1V3c0-.55-.45-1-1-1zm-1
12H3V5h1v8h1V5h1v8h1V5h1v8h1V5h1v9zm1-10H2V3h9v1z"/></svg>
      </button>
 </div>

 <div class="file-info">
    7 lines (5 sloc)
    <span class="file-info-divider"></span>
  165 Bytes
 </div>
</div>



 <div itemprop="text" class="blob-wrapper data type-text">
    <table class="highlight tab-size js-file-line-container" data-tab-size="8">
    <tr>
      <td id="L1" class="blob-num js-line-number" data-line-number="1"></td>
      <td id="LC1" class="blob-code blob-code-inner js-file-line">Cryptacular Java Library</td>
    </tr>
    <tr>
      <td id="L2" class="blob-num js-line-number" data-line-number="2"></td>
      <td id="LC2" class="blob-code blob-code-inner js-file-line">Copyright (C) 2003-2017 Virginia Tech.</td>
    </tr>
    <tr>
      <td id="L3" class="blob-num js-line-number" data-line-number="3"></td>
      <td id="LC3" class="blob-code blob-code-inner js-file-line">All rights reserved.</td>
    </tr>
    <tr>
      <td id="L4" class="blob-num js-line-number" data-line-number="4"></td>
      <td id="LC4" class="blob-code blob-code-inner js-file-line">
</td>
    </tr>
    <tr>
      <td id="L5" class="blob-num js-line-number" data-line-number="5"></td>
      <td id="LC5" class="blob-code blob-code-inner js-file-line">This product includes software developed at</td>
    </tr>
```

<tr>
<td id="L6" class="blob-num js-line-number" data-line-number="6"></td>
<td id="LC6" class="blob-code blob-code-inner js-file-line">Virginia Tech (http://www.vt.edu).</td>
</tr>
</table>

<button type="button" data-facebox="#jump-to-line" data-facebox-class="linejump" data-hotkey="l" class="d-none">Jump to Line</button>

<!-- "` --><!-- </textarea></xmp> --></option></form><form accept-charset="UTF-8" action="" class="js-jump-to-line-form" method="get"> <input name="utf8" type="hidden" value="✓" />
<input class="form-control linejump-input js-jump-to-line-field" type="text" placeholder="Jump to line…" aria-label="Jump to line" autofocus>
<button type="submit" class="btn">Go</button>
</form>

<ul class="site-footer-links float-right">
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<svg aria-hidden="true" class="octicon octicon-mark-github" height="24" version="1.1" viewBox="0 0 16 16" width="24"><path fill-rule="evenodd" d="M8 0C3.58 0 0 3.58 0 8c0 3.54 2.29 6.53 5.47 7.59.4.07.55-.17.55-.38 0-

.19-.01-.82-.01-1.49-2.01.37-2.53-.49-2.69-.94-.09-.23-.48-.94-.82-1.13-.28-.15-.68-.52-.01-.53.63-.01 1.08.58 1.23.82.72 1.21 1.87.87 2.33.66.07-.52.28-.87.51-1.07-1.78-.2-3.64-.89-3.64-3.95 0-.87.31-1.59.82-2.15-.08-.2-.36-1.02.08-2.12 0 0 .67-.21 2.2.82.64-.18 1.32-.27 2-.27.68 0 1.36.09 2 .27 1.53-1.04 2.2-.82 2.2-.82.44 1.1.16 1.92.08 2.12.51.56.82 1.27.82 2.15 0 3.07-1.87 3.75-3.65 3.95.29.25.54.73.54 1.48 0 1.07-.01 1.93-.01 2.2 0 .21.15.46.55.38A8.013 8.013 0 0 0 16 8c0-4.42-3.58-8-8-8z"/></svg>

<ul class="site-footer-links">
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<svg aria-hidden="true" class="octicon octicon-alert" height="16" version="1.1" viewBox="0 0 16 16" width="16"><path fill-rule="evenodd" d="M8.865 1.52c-.18-.31-.51-.5-.87-.5s-.69.19-.87.5L.275 13.5c-.18.31-.18.69 0 1 .19.31.52.5.87.5h13.7c.36 0 .69-.19.86-.5.17-.31.18-.69.01-1L8.865 1.52zM8.995 13h-2v-2h2v2zm0-3h-2V6h2v4z"/></svg>
<button type="button" class="flash-close js-flash-close js-ajax-error-dismiss" aria-label="Dismiss error">
<svg aria-hidden="true" class="octicon octicon-x" height="16" version="1.1" viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M7.48 8l3.75 3.75-1.48 1.48L6 9.48l-3.75 3.75-1.48-1.48L4.52 8 .77 4.25l1.48-1.48L6 6.52l3.75-3.75 1.48 1.48z"/></svg>
</button>
You can't perform that action at this time.

<script crossorigin="anonymous" src="https://assets-cdn.github.com/assets/compat-91f98c37fc84eac24836eec2567e9912742094369a04c4eba6e3cd1fa18902d9.js"></script>
<script crossorigin="anonymous" src="https://assets-cdn.github.com/assets/frameworks-f84bb87b149685d1e6c6f057ee324f2cd496e677f5a359a8b5db853313bb83e6.js"></script>

<script async="async" crossorigin="anonymous" src="https://assets-cdn.github.com/assets/github-13fa3aa50ac8f9fa9a7d198f0cd13b0905775d39446ad076d17d8f74a998438a.js"></script>

<svg aria-hidden="true" class="octicon octicon-alert" height="16" version="1.1" viewBox="0 0 16 16"

width="16"><path fill-rule="evenodd" d="M8.865 1.52c-.18-.31-.51-.5-.87-.5s-.69.19-.87.5L.275 13.5c-.18.31-.18.69 0 1 .19.31.52.5.87.5h13.7c.36 0 .69-.19.86-.5.17-.31.18-.69.01-1L8.865 1.52zM8.995 13h-2v-2h2v2zm0-3h-2V6h2v4z"/></svg>
You signed in with another tab or window. Reload to refresh your session.
You signed out in another tab or window. Reload to refresh your session.

<button type="button" class="facebox-close js-facebox-close" aria-label="Close modal">
<svg aria-hidden="true" class="octicon octicon-x" height="16" version="1.1" viewBox="0 0 12 16" width="12"><path fill-rule="evenodd" d="M7.48 8l3.75 3.75-1.48 1.48L6 9.48l-3.75 3.75-1.48-1.48L4.52 8 .77 4.25l1.48-1.48L6 6.52l3.75-3.75 1.48 1.48z"/></svg>
</button>

</body>
</html>

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*/

```
package org.elasticsearch.xpack.ccr;

import org.elasticsearch.client.Request;
import org.elasticsearch.client.ResponseException;

import java.util.Locale;

import static org.hamcrest.Matchers.containsString;
import static org.hamcrest.Matchers.hasToString;

public class CcrMultiClusterLicenseIT extends ESCCRRestTestCase {

  public void testFollow() {
    if ("follow".equals(targetCluster)) {
      final Request request = new Request("PUT", "/follower/_ccr/follow");
      request.setJsonEntity("{\"remote_cluster\": \"leader_cluster\", \"leader_index\": \"leader\"}");
      assertNonCompliantLicense(request);
    }
  }
```

```
  public void testAutoFollow() throws Exception {
    if ("follow".equals(targetCluster)) {
      final Request request = new Request("PUT", "/_ccr/auto_follow/test_pattern");
      request.setJsonEntity("{\"leader_index_patterns\":[\"*\"], \"remote_cluster\": \"leader_cluster\"}");
      final ResponseException e = expectThrows(ResponseException.class, () ->
client().performRequest(request));
      final String expected = String.format(
        Locale.ROOT,
        "can not fetch remote cluster state as the remote cluster [%s] is not licensed for [ccr]; " +
          "the license mode [BASIC] on cluster [%s] does not enable [ccr]",
        "leader_cluster",
        "leader_cluster");
      assertThat(e, hasToString(containsString(expected)));
    }
  }

  private static void assertNonCompliantLicense(final Request request) {
    final ResponseException e = expectThrows(ResponseException.class, () -> client().performRequest(request));
    final String expected = String.format(
        Locale.ROOT,
        "can not fetch remote index [%s] metadata as the remote cluster [%s] is not licensed for [ccr]; " +
            "the license mode [BASIC] on cluster [%s] does not enable [ccr]",
        "leader_cluster:leader",
        "leader_cluster",
        "leader_cluster");
    assertThat(e, hasToString(containsString(expected)));
  }

}
import org.elasticsearch.gradle.test.RestIntegTestTask

apply plugin: 'elasticsearch.standalone-test'

dependencies {
  testCompile project(path: xpackModule('core'), configuration: 'testArtifacts')
  testCompile project(path: xpackModule('ccr'), configuration: 'runtime')
  testCompile project(':x-pack:plugin:ccr:qa:')
}

task leaderClusterTest(type: RestIntegTestTask) {
  mustRunAfter(precommit)
}

leaderClusterTestCluster {
  numNodes = 1
  clusterName = 'leader-cluster'
}
```

```
leaderClusterTestRunner {
  systemProperty 'tests.target_cluster', 'leader'
}

task followClusterTest(type: RestIntegTestTask) {}

followClusterTestCluster {
  dependsOn leaderClusterTestRunner
  numNodes = 1
  clusterName = 'follow-cluster'
  setting 'xpack.license.self_generated.type', 'trial'
  setting 'cluster.remote.leader_cluster.seeds', "\"${-> leaderClusterTest.nodes.get(0).transportUri()}\""
}

followClusterTestRunner {
  systemProperty 'tests.target_cluster', 'follow'
  systemProperty 'tests.leader_host', "${-> leaderClusterTest.nodes.get(0).httpUri()}"
  finalizedBy 'leaderClusterTestCluster#stop'
}

check.dependsOn followClusterTest
test.enabled = false
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.ccr;

import org.apache.lucene.util.Constants;
import org.elasticsearch.client.Request;
import org.elasticsearch.client.ResponseException;
import org.elasticsearch.client.RestClient;
import org.elasticsearch.common.Strings;
import org.elasticsearch.common.io.PathUtils;
import org.elasticsearch.common.settings.Settings;

import java.io.IOException;
import java.nio.file.Files;
import java.util.Iterator;
import java.util.List;
import java.util.Map;

import static org.elasticsearch.xpack.core.watcher.support.xcontent.ObjectPath.eval;
import static org.hamcrest.Matchers.containsString;
import static org.hamcrest.Matchers.equalTo;
import static org.hamcrest.Matchers.greaterThanOrEqualTo;
import static org.hamcrest.core.Is.is;
```

```
public class FollowIndexIT extends ESCCRRestTestCase {

  public void testDowngradeRemoteClusterToBasic() throws Exception {
    if ("follow".equals(targetCluster) == false) {
      return;
    }

    {
      Request request = new Request("PUT", "/_ccr/auto_follow/test_pattern");
      request.setJsonEntity("{\"leader_index_patterns\": [\"logs-*\"], \"remote_cluster\": \"leader_cluster\"}");
      assertOK(client().performRequest(request));
    }

    String index1 = "logs-20190101";
    try (RestClient leaderClient = buildLeaderClient()) {
      createNewIndexAndIndexDocs(leaderClient, index1);
    }

    assertBusy(() -> {
      ensureYellow(index1);
      verifyDocuments(index1, 5, "filtered_field:true");
    });

    String index2 = "logs-20190102";
    try (RestClient leaderClient = buildLeaderClient()) {
      Request request = new Request("POST", "/_xpack/license/start_basic");
      request.addParameter("acknowledge", "true");
      Map<?, ?> response = toMap(leaderClient.performRequest(request));
      assertThat(response.get("basic_was_started"), is(true));
      assertThat(response.get("acknowledged"), is(true));

      createNewIndexAndIndexDocs(leaderClient, index2);
      index(leaderClient, index1, "5", "field", 5, "filtered_field", "true");
    }

    assertBusy(() -> {
      Request statsRequest = new Request("GET", "/_ccr/stats");
      Map<?, ?> response = toMap(client().performRequest(statsRequest));
      assertThat(eval("auto_follow_stats.number_of_successful_follow_indices", response), equalTo(1));
      assertThat(eval("auto_follow_stats.number_of_failed_remote_cluster_state_requests", response),
greaterThanOrEqualTo(1));
      assertThat(eval("auto_follow_stats.recent_auto_follow_errors.0.auto_follow_exception.reason", response),
          containsString("the license mode [BASIC] on cluster [leader_cluster] does not enable [ccr]"));

      // Follow indices actively following leader indices before the downgrade to basic license remain to follow
      // the leader index after the downgrade, so document with id 5 should be replicated to follower index:
      verifyDocuments(index1, 6, "filtered_field:true");
```

```
        // Index2 was created in leader cluster after the downgrade and therefor the auto follow coordinator in
        // follow cluster should not pick that index up:
        assertThat(indexExists(index2), is(false));

        // parse the logs and ensure that the auto-coordinator skipped coordination on the leader cluster
        // (does not work on windows...)
        if (Constants.WINDOWS == false) {
          assertBusy(() -> {
            final List<String> lines = Files.readAllLines(PathUtils.get(System.getProperty("log")));
            final Iterator<String> it = lines.iterator();
            boolean warn = false;
            while (it.hasNext()) {
              final String line = it.next();
              if (line.matches(".*\\[WARN\\s*\\]\\[o\\.e\\.x\\.c\\.a\\.AutoFollowCoordinator\\s*\\] \\[node-0\\] " +
                "failure occurred while fetching cluster state for auto follow pattern \\[test_pattern\\]")) {
                warn = true;
                break;
              }
            }
            assertTrue(warn);
            assertTrue(it.hasNext());
            final String lineAfterWarn = it.next();
            assertThat(
              lineAfterWarn,
              equalTo("org.elasticsearch.ElasticsearchStatusException: " +
                "can not fetch remote cluster state as the remote cluster [leader_cluster] is not licensed for [ccr]; " +
                "the license mode [BASIC] on cluster [leader_cluster] does not enable [ccr]"));
          });
        }
      });

      // Manually following index2 also does not work after the downgrade:
      Exception e = expectThrows(ResponseException.class, () -> followIndex("leader_cluster", index2));
      assertThat(e.getMessage(), containsString("the license mode [BASIC] on cluster [leader_cluster] does not
enable [ccr]"));
    }

    private void createNewIndexAndIndexDocs(RestClient client, String index) throws IOException {
      Settings settings = Settings.builder()
          .put("index.soft_deletes.enabled", true)
          .build();
      Request request = new Request("PUT", "/" + index);
      request.setJsonEntity("{\"settings\": " + Strings.toString(settings) +
          ", \"mappings\": {\"_doc\": {\"properties\": {\"field\": {\"type\": \"keyword\"}}}} }");
      assertOK(client.performRequest(request));

      for (int i = 0; i < 5; i++) {
```

```
        String id = Integer.toString(i);
        index(client, index, id, "field", i, "filtered_field", "true");
      }
    }

}
import org.elasticsearch.gradle.test.RestIntegTestTask

apply plugin: 'elasticsearch.standalone-test'

dependencies {
  testCompile project(path: xpackModule('core'), configuration: 'testArtifacts')
  testCompile project(path: xpackModule('ccr'), configuration: 'runtime')
  testCompile project(':x-pack:plugin:ccr:qa')
}

task leaderClusterTest(type: RestIntegTestTask) {
  mustRunAfter(precommit)
}

leaderClusterTestCluster {
  numNodes = 1
  clusterName = 'leader-cluster'
  setting 'xpack.license.self_generated.type', 'trial'
}

leaderClusterTestRunner {
  systemProperty 'tests.target_cluster', 'leader'
}

task writeJavaPolicy {
  doLast {
     final File tmp = file("${buildDir}/tmp")
     if (tmp.exists() == false && tmp.mkdirs() == false) {
        throw new GradleException("failed to create temporary directory [${tmp}]")
     }
     final File javaPolicy = file("${tmp}/java.policy")
     javaPolicy.write(
           [
                 "grant {",
                 "  permission java.io.FilePermission \"${-> followClusterTest.getNodes().get(0).homeDir}/logs/${->
followClusterTest.getNodes().get(0).clusterName}.log\", \"read\";",
                 "};"
           ].join("\n"))
  }
}

task followClusterTest(type: RestIntegTestTask) {}
```

```
followClusterTest.dependsOn writeJavaPolicy

followClusterTestCluster {
  dependsOn leaderClusterTestRunner
  numNodes = 1
  clusterName = 'follow-cluster'
  setting 'xpack.monitoring.collection.enabled', 'true'
  setting 'xpack.license.self_generated.type', 'trial'
  setting 'cluster.remote.leader_cluster.seeds', "\"${-> leaderClusterTest.nodes.get(0).transportUri()}\""
}

followClusterTestRunner {
  systemProperty 'java.security.policy', "file://${buildDir}/tmp/java.policy"
  systemProperty 'tests.target_cluster', 'follow'
  systemProperty 'tests.leader_host', "${-> leaderClusterTest.nodes.get(0).httpUri()}"
  systemProperty 'log', "${-> followClusterTest.getNodes().get(0).homeDir}/logs/${->
followClusterTest.getNodes().get(0).clusterName}.log"
  finalizedBy 'leaderClusterTestCluster#stop'
}

check.dependsOn followClusterTest
test.enabled = false // no unit tests for multi-cluster-search, only the rest integration test
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.elasticsearch.common.collect.Tuple;
import org.elasticsearch.common.util.set.Sets;
import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.xpack.core.security.authz.privilege.ApplicationPrivilege;
import org.elasticsearch.xpack.core.security.authz.privilege.ApplicationPrivilegeDescriptor;

import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collections;
import java.util.List;
import java.util.Set;
import java.util.stream.Collectors;
import java.util.stream.Stream;

import static java.util.Collections.singletonList;
import static org.hamcrest.Matchers.containsInAnyOrder;
import static org.hamcrest.Matchers.equalTo;

public class ApplicationPermissionTests extends ESTestCase {
```

```
  private List<ApplicationPrivilegeDescriptor> store = new ArrayList<>();

  private ApplicationPrivilege app1All = storePrivilege("app1", "all", "*");
  private ApplicationPrivilege app1Empty = storePrivilege("app1", "empty");
  private ApplicationPrivilege app1Read = storePrivilege("app1", "read", "read/*");
  private ApplicationPrivilege app1Write = storePrivilege("app1", "write", "write/*");
  private ApplicationPrivilege app1Delete = storePrivilege("app1", "delete", "write/delete");
  private ApplicationPrivilege app1Create = storePrivilege("app1", "create", "write/create");
  private ApplicationPrivilege app2Read = storePrivilege("app2", "read", "read/*");

  private ApplicationPrivilege storePrivilege(String app, String name, String... patterns) {
    store.add(new ApplicationPrivilegeDescriptor(app, name, Sets.newHashSet(patterns),
Collections.emptyMap()));
    return new ApplicationPrivilege(app, name, patterns);
  }

  public void testCheckSimplePermission() {
    final ApplicationPermission hasPermission = buildPermission(app1Write, "*");
    assertThat(hasPermission.grants(app1Write, "*"), equalTo(true));
    assertThat(hasPermission.grants(app1Write, "foo"), equalTo(true));
    assertThat(hasPermission.grants(app1Delete, "*"), equalTo(true));
    assertThat(hasPermission.grants(app1Create, "foo"), equalTo(true));

    assertThat(hasPermission.grants(app1Read, "*"), equalTo(false));
    assertThat(hasPermission.grants(app1Read, "foo"), equalTo(false));
    assertThat(hasPermission.grants(app1All, "*"), equalTo(false));
    assertThat(hasPermission.grants(app1All, "foo"), equalTo(false));
  }

  public void testNonePermission() {
    final ApplicationPermission hasPermission = buildPermission(ApplicationPrivilege.NONE.apply("app1"), "*");
    for (ApplicationPrivilege privilege : Arrays.asList(app1All, app1Empty, app1Create, app1Delete, app1Read,
app1Write, app2Read)) {
      assertThat("Privilege " + privilege + " on *", hasPermission.grants(privilege, "*"), equalTo(false));
      final String resource = randomAlphaOfLengthBetween(1, 6);
      assertThat("Privilege " + privilege + " on " + resource, hasPermission.grants(privilege, resource),
equalTo(false));
    }
  }

  public void testResourceMatching() {
    final ApplicationPermission hasPermission = buildPermission(app1All, "dashboard/*", "audit/*",
"user/12345");

    assertThat(hasPermission.grants(app1Write, "*"), equalTo(false));
    assertThat(hasPermission.grants(app1Write, "dashboard"), equalTo(false));
    assertThat(hasPermission.grants(app1Write, "dashboard/999"), equalTo(true));
```

```
    assertThat(hasPermission.grants(app1Create, "audit/2018-02-21"), equalTo(true));
    assertThat(hasPermission.grants(app1Create, "report/2018-02-21"), equalTo(false));

    assertThat(hasPermission.grants(app1Read, "user/12345"), equalTo(true));
    assertThat(hasPermission.grants(app1Read, "user/67890"), equalTo(false));

    assertThat(hasPermission.grants(app1All, "dashboard/999"), equalTo(true));
    assertThat(hasPermission.grants(app1All, "audit/2018-02-21"), equalTo(true));
    assertThat(hasPermission.grants(app1All, "user/12345"), equalTo(true));
}

public void testActionMatching() {
    final ApplicationPermission hasPermission = buildPermission(app1Write, "allow/*");

    final ApplicationPrivilege update = actionPrivilege("app1", "write/update");
    assertThat(hasPermission.grants(update, "allow/1"), equalTo(true));
    assertThat(hasPermission.grants(update, "deny/1"), equalTo(false));

    final ApplicationPrivilege updateCreate = actionPrivilege("app1", "write/update", "write/create");
    assertThat(hasPermission.grants(updateCreate, "allow/1"), equalTo(true));
    assertThat(hasPermission.grants(updateCreate, "deny/1"), equalTo(false));

    final ApplicationPrivilege manage = actionPrivilege("app1", "admin/manage");
    assertThat(hasPermission.grants(manage, "allow/1"), equalTo(false));
    assertThat(hasPermission.grants(manage, "deny/1"), equalTo(false));
}

public void testDoesNotMatchAcrossApplications() {
    assertThat(buildPermission(app1Read, "*").grants(app1Read, "123"), equalTo(true));
    assertThat(buildPermission(app1All, "*").grants(app1Read, "123"), equalTo(true));

    assertThat(buildPermission(app1Read, "*").grants(app2Read, "123"), equalTo(false));
    assertThat(buildPermission(app1All, "*").grants(app2Read, "123"), equalTo(false));
}

public void testMergedPermissionChecking() {
    final ApplicationPrivilege app1ReadWrite = compositePrivilege("app1", app1Read, app1Write);
    final ApplicationPermission hasPermission = buildPermission(app1ReadWrite, "allow/*");

    assertThat(hasPermission.grants(app1Read, "allow/1"), equalTo(true));
    assertThat(hasPermission.grants(app1Write, "allow/1"), equalTo(true));

    assertThat(hasPermission.grants(app1Read, "deny/1"), equalTo(false));
    assertThat(hasPermission.grants(app1Write, "deny/1"), equalTo(false));

    assertThat(hasPermission.grants(app1All, "allow/1"), equalTo(false));
    assertThat(hasPermission.grants(app2Read, "allow/1"), equalTo(false));
```

```
  }

  public void testInspectPermissionContents() {
    final ApplicationPrivilege app1ReadWrite = compositePrivilege("app1", app1Read, app1Write);
    ApplicationPermission perm = new ApplicationPermission(Arrays.asList(
      new Tuple<>(app1Read, Sets.newHashSet("obj/1", "obj/2")),
      new Tuple<>(app1Write, Sets.newHashSet("obj/3", "obj/4")),
      new Tuple<>(app1ReadWrite, Sets.newHashSet("obj/5")),
      new Tuple<>(app1All, Sets.newHashSet("obj/6", "obj/7")),
      new Tuple<>(app2Read, Sets.newHashSet("obj/1", "obj/8"))
    ));
    assertThat(perm.getApplicationNames(), containsInAnyOrder("app1", "app2"));
    assertThat(perm.getPrivileges("app1"), containsInAnyOrder(app1Read, app1Write, app1ReadWrite, app1All));
    assertThat(perm.getPrivileges("app2"), containsInAnyOrder(app2Read));
    assertThat(perm.getResourcePatterns(app1Read), containsInAnyOrder("obj/1", "obj/2", "obj/5", "obj/6",
"obj/7"));
    assertThat(perm.getResourcePatterns(app1Write), containsInAnyOrder("obj/3", "obj/4", "obj/5", "obj/6",
"obj/7"));
    assertThat(perm.getResourcePatterns(app1ReadWrite), containsInAnyOrder("obj/5", "obj/6", "obj/7"));
    assertThat(perm.getResourcePatterns(app1All), containsInAnyOrder("obj/6", "obj/7"));
    assertThat(perm.getResourcePatterns(app2Read), containsInAnyOrder("obj/1", "obj/8"));
  }

  private ApplicationPrivilege actionPrivilege(String appName, String... actions) {
    return ApplicationPrivilege.get(appName, Sets.newHashSet(actions), Collections.emptyList());
  }

  private ApplicationPrivilege compositePrivilege(String application, ApplicationPrivilege... children) {
    Set<String> names =
Stream.of(children).map(ApplicationPrivilege::name).flatMap(Set::stream).collect(Collectors.toSet());
    return ApplicationPrivilege.get(application, names, store);
  }


  private ApplicationPermission buildPermission(ApplicationPrivilege privilege, String... resources) {
    return new ApplicationPermission(singletonList(new Tuple<>(privilege, Sets.newHashSet(resources))));
  }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.test.ESTestCase;
```

```
import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collections;
import java.util.List;

public class FieldPermissionsCacheTests extends ESTestCase {

  public void testFieldPermissionsCaching() {
    FieldPermissionsCache fieldPermissionsCache = new FieldPermissionsCache(Settings.EMPTY);
    String[] allowed = new String[]{randomAlphaOfLength(5) + "*", randomAlphaOfLength(5) + "*",
randomAlphaOfLength(5) + "*"};
    String[] denied = new String[]{allowed[0] + randomAlphaOfLength(5), allowed[1] +
randomAlphaOfLength(5),
        allowed[2] + randomAlphaOfLength(5)};
    FieldPermissions fieldPermissions = fieldPermissionsCache.getFieldPermissions(allowed, denied);
    assertNotNull(fieldPermissions);
    final String[] allowed2 = randomBoolean() ? allowed : Arrays.copyOf(allowed, allowed.length);
    final String[] denied2 = randomBoolean() ? denied : Arrays.copyOf(denied, denied.length);
    assertSame(fieldPermissions, fieldPermissionsCache.getFieldPermissions(allowed2, denied2));
  }

  public void testMergeFieldPermissions() {
    FieldPermissionsCache fieldPermissionsCache = new FieldPermissionsCache(Settings.EMPTY);
    String allowedPrefix1 = randomAlphaOfLength(5);
    String allowedPrefix2 = randomAlphaOfLength(5);
    String[] allowed1 = new String[]{allowedPrefix1 + "*"};
    String[] allowed2 = new String[]{allowedPrefix2 + "*"};
    String[] denied1 = new String[]{allowedPrefix1 + "a"};
    String[] denied2 = new String[]{allowedPrefix2 + "a"};
    FieldPermissions fieldPermissions1 = randomBoolean() ?
fieldPermissionsCache.getFieldPermissions(allowed1, denied1) :
        new FieldPermissions(fieldPermissionDef(allowed1, denied1));
    FieldPermissions fieldPermissions2 = randomBoolean() ?
fieldPermissionsCache.getFieldPermissions(allowed2, denied2) :
        new FieldPermissions(fieldPermissionDef(allowed2, denied2));
    FieldPermissions mergedFieldPermissions =
        fieldPermissionsCache.getFieldPermissions(Arrays.asList(fieldPermissions1, fieldPermissions2));
    assertTrue(mergedFieldPermissions.grantsAccessTo(allowedPrefix1 + "b"));
    assertTrue(mergedFieldPermissions.grantsAccessTo(allowedPrefix2 + "b"));
    assertFalse(mergedFieldPermissions.grantsAccessTo(denied1[0]));
    assertFalse(mergedFieldPermissions.grantsAccessTo(denied2[0]));

    allowed1 = new String[]{randomAlphaOfLength(5) + "*", randomAlphaOfLength(5) + "*"};
    allowed2 = null;
    denied1 = new String[]{allowed1[0] + "a", allowed1[1] + "a"};
    denied2 = null;
    fieldPermissions1 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed1, denied1) :
        new FieldPermissions(fieldPermissionDef(allowed1, denied1));
```

```
fieldPermissions2 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed2, denied2) :
      new FieldPermissions(fieldPermissionDef(allowed2, denied2));
mergedFieldPermissions =
      fieldPermissionsCache.getFieldPermissions(Arrays.asList(fieldPermissions1, fieldPermissions2));
assertFalse(mergedFieldPermissions.hasFieldLevelSecurity());

allowed1 = new String[]{};
allowed2 = new String[]{randomAlphaOfLength(5) + "*", randomAlphaOfLength(5) + "*"};
denied1 = new String[]{};
denied2 = new String[]{allowed2[0] + "a", allowed2[1] + "a"};
fieldPermissions1 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed1, denied1) :
      new FieldPermissions(fieldPermissionDef(allowed1, denied1));
fieldPermissions2 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed2, denied2) :
      new FieldPermissions(fieldPermissionDef(allowed2, denied2));
mergedFieldPermissions =
      fieldPermissionsCache.getFieldPermissions(Arrays.asList(fieldPermissions1, fieldPermissions2));
for (String field : allowed2) {
   assertTrue(mergedFieldPermissions.grantsAccessTo(field));
}
for (String field : denied2) {
   assertFalse(mergedFieldPermissions.grantsAccessTo(field));
}

allowed1 = randomBoolean() ? null : new String[]{"*"};
allowed2 = randomBoolean() ? null : new String[]{"*"};
denied1 = new String[]{"a"};
denied2 = new String[]{"b"};
fieldPermissions1 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed1, denied1) :
      new FieldPermissions(fieldPermissionDef(allowed1, denied1));
fieldPermissions2 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed2, denied2) :
      new FieldPermissions(fieldPermissionDef(allowed2, denied2));
mergedFieldPermissions =
      fieldPermissionsCache.getFieldPermissions(Arrays.asList(fieldPermissions1, fieldPermissions2));
assertTrue(mergedFieldPermissions.grantsAccessTo("a"));
assertTrue(mergedFieldPermissions.grantsAccessTo("b"));

// test merge does not remove _all
allowed1 = new String[]{"_all"};
allowed2 = new String[]{};
denied1 = null;
denied2 = null;
fieldPermissions1 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed1, denied1) :
      new FieldPermissions(fieldPermissionDef(allowed1, denied1));
fieldPermissions2 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed2, denied2) :
      new FieldPermissions(fieldPermissionDef(allowed2, denied2));
mergedFieldPermissions =
      fieldPermissionsCache.getFieldPermissions(Arrays.asList(fieldPermissions1, fieldPermissions2));
assertTrue(fieldPermissions1.grantsAccessTo("_all"));
```

```
        assertFalse(fieldPermissions2.grantsAccessTo("_all"));
        assertTrue(mergedFieldPermissions.grantsAccessTo("_all"));

        allowed1 = new String[] { "a*" };
        allowed2 = new String[] { "b*" };
        denied1 = new String[] { "aa*" };
        denied2 = null;
        fieldPermissions1 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed1, denied1) :
                new FieldPermissions(fieldPermissionDef(allowed1, denied1));
        fieldPermissions2 = randomBoolean() ? fieldPermissionsCache.getFieldPermissions(allowed2, denied2) :
                new FieldPermissions(fieldPermissionDef(allowed2, denied2));
        mergedFieldPermissions =
                fieldPermissionsCache.getFieldPermissions(Arrays.asList(fieldPermissions1, fieldPermissions2));
        assertTrue(mergedFieldPermissions.grantsAccessTo("a"));
        assertTrue(mergedFieldPermissions.grantsAccessTo("b"));
        assertFalse(mergedFieldPermissions.grantsAccessTo("aa"));
        assertFalse(mergedFieldPermissions.grantsAccessTo("aa1"));
        assertTrue(mergedFieldPermissions.grantsAccessTo("a1"));
    }

    public void testNonFlsAndFlsMerging() {
        List<FieldPermissions> permissionsList = new ArrayList<>();
        permissionsList.add(new FieldPermissions(fieldPermissionDef(new String[] {"field1"}, null)));
        permissionsList.add(new FieldPermissions(fieldPermissionDef(new String[] {"field2", "query*"}, null)));
        permissionsList.add(new FieldPermissions(fieldPermissionDef(new String[] {"field1", "field2"}, null)));
        permissionsList.add(new FieldPermissions(fieldPermissionDef(new String[] {}, null)));
        permissionsList.add(new FieldPermissions(fieldPermissionDef(null, null)));

        FieldPermissionsCache cache = new FieldPermissionsCache(Settings.EMPTY);
        for (int i = 0; i < scaledRandomIntBetween(1, 12); i++) {
            Collections.shuffle(permissionsList, random());
            FieldPermissions result = cache.getFieldPermissions(permissionsList);
            assertFalse(result.hasFieldLevelSecurity());
        }
    }

    private static FieldPermissionsDefinition fieldPermissionDef(String[] granted, String[] denied) {
        return new FieldPermissionsDefinition(granted, denied);
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.protocol.xpack.license;

import java.io.IOException;
```

```
import org.elasticsearch.test.ESTestCase;

public class LicenseStatusTests extends ESTestCase {
  public void testSerialization() throws IOException {
    LicenseStatus status = randomFrom(LicenseStatus.values());
    assertSame(status, copyWriteable(status, writableRegistry(), LicenseStatus::readFrom));
  }
}
/*
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*/
package org.elasticsearch.protocol.xpack.license;

import org.elasticsearch.common.xcontent.XContentParser;
import org.elasticsearch.test.AbstractStreamableXContentTestCase;

import java.io.IOException;
import java.util.Collections;
import java.util.HashMap;
import java.util.Map;
import java.util.function.Function;
import java.util.function.Predicate;

public class PutLicenseResponseTests extends AbstractStreamableXContentTestCase<PutLicenseResponse> {

  @Override
  protected boolean supportsUnknownFields() {
    return true;
  }

  @Override
  protected Predicate<String> getRandomFieldsExcludeFilter() {
    // The structure of the response is such that unknown fields inside acknowledge cannot be supported since they
    // are treated as messages from new services
    return p -> p.startsWith("acknowledge");
  }

  @Override
  protected PutLicenseResponse createTestInstance() {
    boolean acknowledged = randomBoolean();
    LicensesStatus status = randomFrom(LicensesStatus.VALID, LicensesStatus.INVALID,
LicensesStatus.EXPIRED);
    String messageHeader;
    Map<String, String[]> ackMessages;
    if (randomBoolean()) {
```

```
            messageHeader = randomAlphaOfLength(10);
            ackMessages = randomAckMessages();
        } else {
            messageHeader = null;
            ackMessages = Collections.emptyMap();
        }

        return new PutLicenseResponse(acknowledged, status, messageHeader, ackMessages);
    }

    private static Map<String, String[]> randomAckMessages() {
        int nFeatures = randomIntBetween(1, 5);

        Map<String, String[]> ackMessages = new HashMap<>();

        for (int i = 0; i < nFeatures; i++) {
            String feature = randomAlphaOfLengthBetween(9, 15);
            int nMessages = randomIntBetween(1, 5);
            String[] messages = new String[nMessages];
            for (int j = 0; j < nMessages; j++) {
                messages[j] = randomAlphaOfLengthBetween(10, 30);
            }
            ackMessages.put(feature, messages);
        }

        return ackMessages;
    }

    @Override
    protected PutLicenseResponse doParseInstance(XContentParser parser) throws IOException {
        return PutLicenseResponse.fromXContent(parser);
    }

    @Override
    protected PutLicenseResponse createBlankInstance() {
        return new PutLicenseResponse();
    }

    @Override
    protected PutLicenseResponse mutateInstance(PutLicenseResponse response) {
        @SuppressWarnings("unchecked")
        Function<PutLicenseResponse, PutLicenseResponse> mutator = randomFrom(
            r -> new PutLicenseResponse(
                r.isAcknowledged() == false,
                r.status(),
                r.acknowledgeHeader(),
                r.acknowledgeMessages()),
            r -> new PutLicenseResponse(
```

```
            r.isAcknowledged(),
            mutateStatus(r.status()),
            r.acknowledgeHeader(),
            r.acknowledgeMessages()),
        r -> {
            if (r.acknowledgeMessages().isEmpty()) {
                return new PutLicenseResponse(
                    r.isAcknowledged(),
                    r.status(),
                    randomAlphaOfLength(10),
                    randomAckMessages()
                );
            } else {
                return new PutLicenseResponse(r.isAcknowledged(), r.status());
            }
        }

    );
    return mutator.apply(response);
  }

  private LicensesStatus mutateStatus(LicensesStatus status) {
    return randomValueOtherThan(status, () -> randomFrom(LicensesStatus.values()));
  }

}
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* or more contributor license agreements. Licensed under the Elastic License;
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*/
package org.elasticsearch.license;

import org.elasticsearch.Version;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.license.License.OperationMode;
import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.test.VersionUtils;
import org.elasticsearch.xpack.core.XPackField;
import org.elasticsearch.xpack.core.XPackSettings;

import java.util.Arrays;
import java.util.function.Predicate;
import java.util.stream.Collectors;

import static org.elasticsearch.license.License.OperationMode.BASIC;
import static org.elasticsearch.license.License.OperationMode.GOLD;
import static org.elasticsearch.license.License.OperationMode.MISSING;
```

```
import static org.elasticsearch.license.License.OperationMode.PLATINUM;
import static org.elasticsearch.license.License.OperationMode.STANDARD;
import static org.elasticsearch.license.License.OperationMode.TRIAL;
import static org.hamcrest.Matchers.is;

/**
* Unit tests for the {@link XPackLicenseState}
*/
public class XPackLicenseStateTests extends ESTestCase {

  /** Creates a license state with the given license type and active state, and checks the given method returns
expected. */
  void assertAllowed(OperationMode mode, boolean active, Predicate<XPackLicenseState> predicate, boolean
expected) {
      XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
      licenseState.update(mode, active, null);
      assertEquals(expected, predicate.test(licenseState));
  }

  /**
   * Checks the ack message going from the  {@code from} license type to {@code to} license type.
   * TODO: check the actual messages, not just the number of them! This was copied from previous license tests...
   */
  void assertAckMesssages(String feature, OperationMode from, OperationMode to, int expectedMessages) {
      String[] gotMessages = XPackLicenseState.ACKNOWLEDGMENT_MESSAGES.get(feature).apply(from, to);
      assertEquals(expectedMessages, gotMessages.length);
  }

  static <T> T randomFrom(T[] values, Predicate<T> filter) {
      return randomFrom(Arrays.stream(values).filter(filter).collect(Collectors.toList()));
  }

  static OperationMode randomMode() {
      return randomFrom(OperationMode.values());
  }

  public static OperationMode randomTrialStandardGoldOrPlatinumMode() {
      return randomFrom(TRIAL, STANDARD, GOLD, PLATINUM);
  }

  public static OperationMode randomTrialOrPlatinumMode() {
      return randomFrom(TRIAL, PLATINUM);
  }

  public static OperationMode randomTrialBasicStandardGoldOrPlatinumMode() {
      return randomFrom(TRIAL, BASIC, STANDARD, GOLD, PLATINUM);
  }
```

```
  public static OperationMode randomBasicStandardOrGold() {
    return randomFrom(BASIC, STANDARD, GOLD);
  }

  public void testSecurityDefaults() {
    XPackLicenseState licenseState =
        new XPackLicenseState(Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(),
true).build());
    assertThat(licenseState.isAuthAllowed(), is(true));
    assertThat(licenseState.isIpFilteringAllowed(), is(true));
    assertThat(licenseState.isAuditingAllowed(), is(true));
    assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
    assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(true));
    assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.ALL));
    assertThat(licenseState.isCustomRoleProvidersAllowed(), is(true));

    licenseState =
      new XPackLicenseState(Settings.builder().put(XPackSettings.TRANSPORT_SSL_ENABLED.getKey(),
true).build());
    assertThat(licenseState.isAuthAllowed(), is(true));
    assertThat(licenseState.isIpFilteringAllowed(), is(true));
    assertThat(licenseState.isAuditingAllowed(), is(true));
    assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
    assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(true));
    assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.ALL));
    assertThat(licenseState.isCustomRoleProvidersAllowed(), is(true));

    licenseState = new XPackLicenseState(Settings.EMPTY);
    assertThat(licenseState.isAuthAllowed(), is(false));
    assertThat(licenseState.isIpFilteringAllowed(), is(false));
    assertThat(licenseState.isAuditingAllowed(), is(false));
    assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
    assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(false));
    assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.NONE));
    assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
  }

  public void testSecurityBasic() {
    XPackLicenseState licenseState = new XPackLicenseState(randomFrom(Settings.EMPTY,
        Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), true).build()));
    licenseState.update(BASIC, true, null);

    assertThat(licenseState.isAuthAllowed(), is(false));
    assertThat(licenseState.isIpFilteringAllowed(), is(false));
    assertThat(licenseState.isAuditingAllowed(), is(false));
    assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
    assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(false));
    assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.NONE));
```

```
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
    }

    public void testSecurityBasicExpired() {
        XPackLicenseState licenseState = new XPackLicenseState(randomFrom(Settings.EMPTY,
                Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), true).build()));
        licenseState.update(BASIC, false, null);

        assertThat(licenseState.isAuthAllowed(), is(false));
        assertThat(licenseState.isIpFilteringAllowed(), is(false));
        assertThat(licenseState.isAuditingAllowed(), is(false));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(false));
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(false));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.NONE));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
    }

    public void testSecurityStandard() {
        XPackLicenseState licenseState = new XPackLicenseState(randomFrom(Settings.EMPTY,
                Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), true).build()));
        licenseState.update(STANDARD, true, null);

        assertThat(licenseState.isAuthAllowed(), is(true));
        assertThat(licenseState.isIpFilteringAllowed(), is(false));
        assertThat(licenseState.isAuditingAllowed(), is(false));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(false));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.NATIVE));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
    }

    public void testSecurityStandardExpired() {
        XPackLicenseState licenseState = new XPackLicenseState(randomFrom(Settings.EMPTY,
                Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), true).build()));
        licenseState.update(STANDARD, false, null);

        assertThat(licenseState.isAuthAllowed(), is(true));
        assertThat(licenseState.isIpFilteringAllowed(), is(false));
        assertThat(licenseState.isAuditingAllowed(), is(false));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(false));
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(false));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.NATIVE));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
    }

    public void testSecurityGold() {
        XPackLicenseState licenseState = new XPackLicenseState(randomFrom(Settings.EMPTY,
                Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), true).build()));
```

```
        licenseState.update(GOLD, true, null);

        assertThat(licenseState.isAuthAllowed(), is(true));
        assertThat(licenseState.isIpFilteringAllowed(), is(true));
        assertThat(licenseState.isAuditingAllowed(), is(true));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(false));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.DEFAULT));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
    }

    public void testSecurityGoldExpired() {
        XPackLicenseState licenseState = new XPackLicenseState(randomFrom(Settings.EMPTY,
                Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), true).build()));
        licenseState.update(GOLD, false, null);

        assertThat(licenseState.isAuthAllowed(), is(true));
        assertThat(licenseState.isIpFilteringAllowed(), is(true));
        assertThat(licenseState.isAuditingAllowed(), is(true));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(false));
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(false));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.DEFAULT));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
    }

    public void testSecurityPlatinum() {
        XPackLicenseState licenseState = new XPackLicenseState(randomFrom(Settings.EMPTY,
                Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), true).build()));
        licenseState.update(PLATINUM, true, null);

        assertThat(licenseState.isAuthAllowed(), is(true));
        assertThat(licenseState.isIpFilteringAllowed(), is(true));
        assertThat(licenseState.isAuditingAllowed(), is(true));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(true));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.ALL));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(true));
    }

    public void testSecurityPlatinumExpired() {
        XPackLicenseState licenseState = new XPackLicenseState(randomFrom(Settings.EMPTY,
                Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), true).build()));
        licenseState.update(PLATINUM, false, null);

        assertThat(licenseState.isAuthAllowed(), is(true));
        assertThat(licenseState.isIpFilteringAllowed(), is(true));
        assertThat(licenseState.isAuditingAllowed(), is(true));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(false));
```

```
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(true));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.ALL));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
    }

    public void testNewTrialDefaultsSecurityOff() {
        XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
        licenseState.update(TRIAL, true, VersionUtils.randomVersionBetween(random(), Version.V_6_3_0,
Version.CURRENT));

        assertThat(licenseState.isSecurityDisabledByTrialLicense(), is(true));
        assertThat(licenseState.isAuthAllowed(), is(false));
        assertThat(licenseState.isIpFilteringAllowed(), is(false));
        assertThat(licenseState.isAuditingAllowed(), is(false));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(false));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.NONE));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(false));
    }

    public void testOldTrialDefaultsSecurityOn() {
        XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
        licenseState.update(TRIAL, true, rarely() ? null : VersionUtils.randomVersionBetween(random(),
Version.V_5_6_0, Version.V_6_2_4));

        assertThat(licenseState.isSecurityDisabledByTrialLicense(), is(false));
        assertThat(licenseState.isAuthAllowed(), is(true));
        assertThat(licenseState.isIpFilteringAllowed(), is(true));
        assertThat(licenseState.isAuditingAllowed(), is(true));
        assertThat(licenseState.isStatsAndHealthAllowed(), is(true));
        assertThat(licenseState.isDocumentAndFieldLevelSecurityAllowed(), is(true));
        assertThat(licenseState.allowedRealmType(), is(XPackLicenseState.AllowedRealmType.ALL));
        assertThat(licenseState.isCustomRoleProvidersAllowed(), is(true));
    }

    public void testSecurityAckBasicToNotGoldOrStandard() {
        OperationMode toMode = randomFrom(OperationMode.values(), mode -> mode != GOLD && mode !=
STANDARD);
        assertAckMesssages(XPackField.SECURITY, BASIC, toMode, 0);
    }

    public void testSecurityAckAnyToTrialOrPlatinum() {
        assertAckMesssages(XPackField.SECURITY, randomMode(), randomTrialOrPlatinumMode(), 0);
    }

    public void testSecurityAckTrialStandardGoldOrPlatinumToBasic() {
        assertAckMesssages(XPackField.SECURITY, randomTrialStandardGoldOrPlatinumMode(), BASIC, 3);
    }
```

```
  public void testSecurityAckAnyToStandard() {
    OperationMode from = randomFrom(BASIC, GOLD, PLATINUM, TRIAL);
    assertAckMesssages(XPackField.SECURITY, from, STANDARD, 4);
  }

  public void testSecurityAckBasicStandardTrialOrPlatinumToGold() {
    OperationMode from = randomFrom(BASIC, PLATINUM, TRIAL, STANDARD);
    assertAckMesssages(XPackField.SECURITY, from, GOLD, 2);
  }

  public void testMonitoringAckBasicToAny() {
    assertAckMesssages(XPackField.MONITORING, BASIC, randomMode(), 0);
  }

  public void testMonitoringAckAnyToTrialGoldOrPlatinum() {
    assertAckMesssages(XPackField.MONITORING, randomMode(),
randomTrialStandardGoldOrPlatinumMode(), 0);
  }

  public void testMonitoringAckNotBasicToBasic() {
    OperationMode from = randomFrom(STANDARD, GOLD, PLATINUM, TRIAL);
    assertAckMesssages(XPackField.MONITORING, from, BASIC, 2);
  }

  public void testMonitoringAllowed() {
    assertAllowed(randomMode(), true, XPackLicenseState::isMonitoringAllowed, true);
    assertAllowed(randomMode(), false, XPackLicenseState::isMonitoringAllowed, false);
  }

  public void testMonitoringUpdateRetention() {
    assertAllowed(STANDARD, true, XPackLicenseState::isUpdateRetentionAllowed, true);
    assertAllowed(GOLD, true, XPackLicenseState::isUpdateRetentionAllowed, true);
    assertAllowed(PLATINUM, true, XPackLicenseState::isUpdateRetentionAllowed, true);
    assertAllowed(TRIAL, true, XPackLicenseState::isUpdateRetentionAllowed, true);
    assertAllowed(BASIC, true, XPackLicenseState::isUpdateRetentionAllowed, false);
    assertAllowed(MISSING, false, XPackLicenseState::isUpdateRetentionAllowed, false);
  }

  public void testWatcherPlatinumGoldTrialStandard() throws Exception {
    assertAllowed(TRIAL, true, XPackLicenseState::isWatcherAllowed, true);
    assertAllowed(GOLD, true, XPackLicenseState::isWatcherAllowed, true);
    assertAllowed(PLATINUM, true, XPackLicenseState::isWatcherAllowed, true);
    assertAllowed(STANDARD, true, XPackLicenseState::isWatcherAllowed, true);
  }

  public void testWatcherBasicLicense() throws Exception {
    assertAllowed(BASIC, true, XPackLicenseState::isWatcherAllowed, false);
```

```
}

public void testWatcherInactive() {
   assertAllowed(BASIC, false, XPackLicenseState::isWatcherAllowed, false);
}

public void testWatcherInactivePlatinumGoldTrial() throws Exception {
   assertAllowed(TRIAL, false, XPackLicenseState::isWatcherAllowed, false);
   assertAllowed(GOLD, false, XPackLicenseState::isWatcherAllowed, false);
   assertAllowed(PLATINUM, false, XPackLicenseState::isWatcherAllowed, false);
   assertAllowed(STANDARD, false, XPackLicenseState::isWatcherAllowed, false);
}

public void testGraphPlatinumTrial() throws Exception {
   assertAllowed(TRIAL, true, XPackLicenseState::isGraphAllowed, true);
   assertAllowed(PLATINUM, true, XPackLicenseState::isGraphAllowed, true);
}

public void testGraphBasic() throws Exception {
   assertAllowed(BASIC, true, XPackLicenseState::isGraphAllowed, false);
}

public void testGraphStandard() throws Exception {
   assertAllowed(STANDARD, true, XPackLicenseState::isGraphAllowed, false);
}

public void testGraphInactiveBasic() {
   assertAllowed(BASIC, false, XPackLicenseState::isGraphAllowed, false);
}

public void testGraphInactivePlatinumTrial() throws Exception {
   assertAllowed(TRIAL, false, XPackLicenseState::isMachineLearningAllowed, false);
   assertAllowed(PLATINUM, false, XPackLicenseState::isMachineLearningAllowed, false);
}

public void testMachineLearningPlatinumTrial() throws Exception {
   assertAllowed(TRIAL, true, XPackLicenseState::isMachineLearningAllowed, true);
   assertAllowed(PLATINUM, true, XPackLicenseState::isMachineLearningAllowed, true);
}

public void testMachineLearningBasic() throws Exception {
   assertAllowed(BASIC, true, XPackLicenseState::isMachineLearningAllowed, false);
}

public void testMachineLearningStandard() throws Exception {
   assertAllowed(STANDARD, true, XPackLicenseState::isMachineLearningAllowed, false);
}
```

```
public void testMachineLearningInactiveBasic() {
    assertAllowed(BASIC, false, XPackLicenseState::isMachineLearningAllowed, false);
}

public void testMachineLearningInactivePlatinumTrial() throws Exception {
    assertAllowed(TRIAL, false, XPackLicenseState::isMachineLearningAllowed, false);
    assertAllowed(PLATINUM, false, XPackLicenseState::isMachineLearningAllowed, false);
}

public void testLogstashPlatinumGoldTrialStandard() throws Exception {
    assertAllowed(TRIAL, true, XPackLicenseState::isLogstashAllowed, true);
    assertAllowed(GOLD, true, XPackLicenseState::isLogstashAllowed, true);
    assertAllowed(PLATINUM, true, XPackLicenseState::isLogstashAllowed, true);
    assertAllowed(STANDARD, true, XPackLicenseState::isLogstashAllowed, true);
}

public void testLogstashBasicLicense() throws Exception {
    assertAllowed(BASIC, true, XPackLicenseState::isLogstashAllowed, false);
}

public void testLogstashInactive() {
    assertAllowed(BASIC, false, XPackLicenseState::isLogstashAllowed, false);
    assertAllowed(TRIAL, false, XPackLicenseState::isLogstashAllowed, false);
    assertAllowed(GOLD, false, XPackLicenseState::isLogstashAllowed, false);
    assertAllowed(PLATINUM, false, XPackLicenseState::isLogstashAllowed, false);
    assertAllowed(STANDARD, false, XPackLicenseState::isLogstashAllowed, false);
}

public void testSqlDefaults() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    assertThat(licenseState.isSqlAllowed(), is(true));
    assertThat(licenseState.isJdbcAllowed(), is(true));
}

public void testSqlBasic() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    licenseState.update(BASIC, true, null);

    assertThat(licenseState.isSqlAllowed(), is(true));
    assertThat(licenseState.isJdbcAllowed(), is(false));
}

public void testSqlBasicExpired() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    licenseState.update(BASIC, false, null);

    assertThat(licenseState.isSqlAllowed(), is(false));
    assertThat(licenseState.isJdbcAllowed(), is(false));
```

```
}

public void testSqlStandard() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    licenseState.update(STANDARD, true, null);

    assertThat(licenseState.isSqlAllowed(), is(true));
    assertThat(licenseState.isJdbcAllowed(), is(false));
}

public void testSqlStandardExpired() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    licenseState.update(STANDARD, false, null);

    assertThat(licenseState.isSqlAllowed(), is(false));
    assertThat(licenseState.isJdbcAllowed(), is(false));
}

public void testSqlGold() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    licenseState.update(GOLD, true, null);

    assertThat(licenseState.isSqlAllowed(), is(true));
    assertThat(licenseState.isJdbcAllowed(), is(false));
}

public void testSqlGoldExpired() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    licenseState.update(GOLD, false, null);

    assertThat(licenseState.isSqlAllowed(), is(false));
    assertThat(licenseState.isJdbcAllowed(), is(false));
}

public void testSqlPlatinum() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    licenseState.update(PLATINUM, true, null);

    assertThat(licenseState.isSqlAllowed(), is(true));
    assertThat(licenseState.isJdbcAllowed(), is(true));
}

public void testSqlPlatinumExpired() {
    XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
    licenseState.update(PLATINUM, false, null);

    assertThat(licenseState.isSqlAllowed(), is(false));
    assertThat(licenseState.isJdbcAllowed(), is(false));
```

```
  }

  public void testSqlAckAnyToTrialOrPlatinum() {
    assertAckMesssages(XPackField.SQL, randomMode(), randomTrialOrPlatinumMode(), 0);
  }

  public void testSqlAckTrialOrPlatinumToNotTrialOrPlatinum() {
    assertAckMesssages(XPackField.SQL, randomTrialOrPlatinumMode(), randomBasicStandardOrGold(), 1);
  }

}
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.xpack.core.scheduler.SchedulerEngine;
import org.junit.Before;

import static org.hamcrest.Matchers.equalTo;

public class LicenseScheduleTests extends ESTestCase {

  private License license;
  private SchedulerEngine.Schedule schedule;

  @Before
  public void setuo() throws Exception {
    license = TestUtils.generateSignedLicense(TimeValue.timeValueHours(12));
    schedule = LicenseService.nextLicenseCheck(license);
  }

  public void testEnabledLicenseSchedule() throws Exception {
    int expiryDuration = (int) (license.expiryDate() - license.issueDate());
    long triggeredTime = license.issueDate() + between(0, expiryDuration);
    assertThat(schedule.nextScheduledTimeAfter(license.issueDate(), triggeredTime),
equalTo(license.expiryDate()));
  }

  public void testGraceLicenseSchedule() throws Exception {
    long triggeredTime = license.expiryDate() + between(1,
        ((int) LicenseService.GRACE_PERIOD_DURATION.getMillis()));
    assertThat(schedule.nextScheduledTimeAfter(license.issueDate(), triggeredTime),
        equalTo(license.expiryDate() + LicenseService.GRACE_PERIOD_DURATION.getMillis()));
```

```
    }

    public void testExpiredLicenseSchedule() throws Exception {
        long triggeredTime = license.expiryDate() + LicenseService.GRACE_PERIOD_DURATION.getMillis() +
                randomIntBetween(1, 1000);
        assertThat(schedule.nextScheduledTimeAfter(license.issueDate(), triggeredTime),
                equalTo(-1L));
    }

    public void testInvalidLicenseSchedule() throws Exception {
        long triggeredTime = license.issueDate() - randomIntBetween(1, 1000);
        assertThat(schedule.nextScheduledTimeAfter(triggeredTime, triggeredTime),
                equalTo(license.issueDate()));
    }
}
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.analysis.common.CommonAnalysisPlugin;
import org.elasticsearch.common.network.NetworkModule;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.test.ESIntegTestCase;
import org.elasticsearch.transport.Netty4Plugin;
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;

import java.util.Arrays;
import java.util.Collection;

import static org.elasticsearch.test.ESIntegTestCase.Scope.TEST;

@ESIntegTestCase.ClusterScope(scope = TEST, numDataNodes = 0, numClientNodes = 0, maxNumDataNodes =
0, transportClientRatio = 0,
        autoMinMasterNodes = false)
public class LicenseServiceClusterNotRecoveredTests extends AbstractLicensesIntegrationTestCase {

    @Override
    protected Settings nodeSettings(int nodeOrdinal) {
        return nodeSettingsBuilder(nodeOrdinal).build();
    }

    private Settings.Builder nodeSettingsBuilder(int nodeOrdinal) {
        return Settings.builder()
                .put(super.nodeSettings(nodeOrdinal))
```

```
            .put("node.data", true)
            .put("resource.reload.interval.high", "500ms") // for license mode file watcher
            .put(NetworkModule.HTTP_ENABLED.getKey(), true);
    }

    @Override
    protected Collection<Class<? extends Plugin>> nodePlugins() {
        return Arrays.asList(LocalStateCompositeXPackPlugin.class, CommonAnalysisPlugin.class,
Netty4Plugin.class);
    }

    @Override
    protected Collection<Class<? extends Plugin>> transportClientPlugins() {
        return nodePlugins();
    }

    public void testClusterNotRecovered() throws Exception {
        logger.info("--> start one master out of two [recovery state]");
        internalCluster().startNode(nodeSettingsBuilder(0).put("discovery.zen.minimum_master_nodes",
2).put("node.master", true));
        logger.info("--> start second master out of two [recovered state]");
        internalCluster().startNode(nodeSettingsBuilder(1).put("discovery.zen.minimum_master_nodes",
2).put("node.master", true));
        assertLicenseActive(true);
    }
}
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/

package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchException;
import org.elasticsearch.action.ActionListener;
import org.elasticsearch.client.Client;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.util.concurrent.ThreadContext;
import org.elasticsearch.protocol.xpack.XPackInfoResponse;
import org.elasticsearch.protocol.xpack.license.LicenseStatus;
import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.threadpool.TestThreadPool;
import org.elasticsearch.threadpool.ThreadPool;
import org.elasticsearch.xpack.core.action.XPackInfoAction;

import java.util.ArrayList;
import java.util.Arrays;
```

```
import java.util.Collections;
import java.util.List;
import java.util.concurrent.atomic.AtomicBoolean;
import java.util.concurrent.atomic.AtomicInteger;
import java.util.concurrent.atomic.AtomicReference;
import java.util.function.Consumer;

import static org.hamcrest.Matchers.contains;
import static org.hamcrest.Matchers.containsInAnyOrder;
import static org.hamcrest.Matchers.containsString;
import static org.hamcrest.Matchers.empty;
import static org.hamcrest.Matchers.equalTo;
import static org.hamcrest.Matchers.hasToString;
import static org.hamcrest.Matchers.instanceOf;
import static org.hamcrest.Matchers.is;
import static org.hamcrest.Matchers.not;
import static org.mockito.Matchers.any;
import static org.mockito.Matchers.anyString;
import static org.mockito.Matchers.argThat;
import static org.mockito.Matchers.same;
import static org.mockito.Mockito.doAnswer;
import static org.mockito.Mockito.mock;
import static org.mockito.Mockito.times;
import static org.mockito.Mockito.verify;
import static org.mockito.Mockito.when;

public final class RemoteClusterLicenseCheckerTests extends ESTestCase {

  public void testIsNotRemoteIndex() {
     assertFalse(RemoteClusterLicenseChecker.isRemoteIndex("local-index"));
  }

  public void testIsRemoteIndex() {
     assertTrue(RemoteClusterLicenseChecker.isRemoteIndex("remote-cluster:remote-index"));
  }

  public void testNoRemoteIndex() {
     final List<String> indices = Arrays.asList("local-index1", "local-index2");
     assertFalse(RemoteClusterLicenseChecker.containsRemoteIndex(indices));
  }

  public void testRemoteIndex() {
     final List<String> indices = Arrays.asList("local-index", "remote-cluster:remote-index");
     assertTrue(RemoteClusterLicenseChecker.containsRemoteIndex(indices));
  }

  public void testNoRemoteIndices() {
     final List<String> indices = Collections.singletonList("local-index");
```

```
        assertThat(RemoteClusterLicenseChecker.remoteIndices(indices), is(empty()));
    }

    public void testRemoteIndices() {
        final List<String> indices = Arrays.asList("local-index1", "remote-cluster1:index1", "local-index2", "remote-
cluster2:index1");
        assertThat(
                RemoteClusterLicenseChecker.remoteIndices(indices),
                containsInAnyOrder("remote-cluster1:index1", "remote-cluster2:index1"));
    }

    public void testNoRemoteClusterAliases() {
        final List<String> indices = Arrays.asList("local-index1", "local-index2");
        assertThat(RemoteClusterLicenseChecker.remoteClusterAliases(indices), empty());
    }

    public void testOneRemoteClusterAlias() {
        final List<String> indices = Arrays.asList("local-index1", "remote-cluster1:remote-index1");
        assertThat(RemoteClusterLicenseChecker.remoteClusterAliases(indices), contains("remote-cluster1"));
    }

    public void testMoreThanOneRemoteClusterAlias() {
        final List<String> indices = Arrays.asList("remote-cluster1:remote-index1", "local-index1", "remote-
cluster2:remote-index1");
        assertThat(RemoteClusterLicenseChecker.remoteClusterAliases(indices), contains("remote-cluster1", "remote-
cluster2"));
    }

    public void testDuplicateRemoteClusterAlias() {
        final List<String> indices = Arrays.asList(
                "remote-cluster1:remote-index1", "local-index1", "remote-cluster2:index1", "remote-cluster2:remote-
index2");
        assertThat(RemoteClusterLicenseChecker.remoteClusterAliases(indices), contains("remote-cluster1", "remote-
cluster2"));
    }

    public void testCheckRemoteClusterLicensesGivenCompatibleLicenses() {
        final AtomicInteger index = new AtomicInteger();
        final List<XPackInfoResponse> responses = new ArrayList<>();

        final ThreadPool threadPool = createMockThreadPool();
        final Client client = createMockClient(threadPool);
        doAnswer(invocationMock -> {
            @SuppressWarnings("unchecked") ActionListener<XPackInfoResponse> listener =
                    (ActionListener<XPackInfoResponse>) invocationMock.getArguments()[2];
            listener.onResponse(responses.get(index.getAndIncrement()));
            return null;
        }).when(client).execute(same(XPackInfoAction.INSTANCE), any(), any());
```

```
        final List<String> remoteClusterAliases = Arrays.asList("valid1", "valid2", "valid3");
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));

        final RemoteClusterLicenseChecker licenseChecker =
            new RemoteClusterLicenseChecker(client, XPackLicenseState::isPlatinumOrTrialOperationMode);
        final AtomicReference<RemoteClusterLicenseChecker.LicenseCheck> licenseCheck = new
AtomicReference<>();

        licenseChecker.checkRemoteClusterLicenses(
            remoteClusterAliases,
            doubleInvocationProtectingListener(new ActionListener<RemoteClusterLicenseChecker.LicenseCheck>()
{

                @Override
                public void onResponse(final RemoteClusterLicenseChecker.LicenseCheck response) {
                    licenseCheck.set(response);
                }

                @Override
                public void onFailure(final Exception e) {
                    fail(e.getMessage());
                }

            }));

        verify(client, times(3)).execute(same(XPackInfoAction.INSTANCE), any(), any());
        assertNotNull(licenseCheck.get());
        assertTrue(licenseCheck.get().isSuccess());
    }

    public void testCheckRemoteClusterLicensesGivenIncompatibleLicense() {
        final AtomicInteger index = new AtomicInteger();
        final List<String> remoteClusterAliases = Arrays.asList("good", "cluster-with-basic-license", "good2");
        final List<XPackInfoResponse> responses = new ArrayList<>();
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));
        responses.add(new XPackInfoResponse(null, createBasicLicenseResponse(), null));
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));

        final ThreadPool threadPool = createMockThreadPool();
        final Client client = createMockClient(threadPool);
        doAnswer(invocationMock -> {
            @SuppressWarnings("unchecked") ActionListener<XPackInfoResponse> listener =
                (ActionListener<XPackInfoResponse>) invocationMock.getArguments()[2];
            listener.onResponse(responses.get(index.getAndIncrement()));
            return null;
```

```
        }).when(client).execute(same(XPackInfoAction.INSTANCE), any(), any());

        final RemoteClusterLicenseChecker licenseChecker =
            new RemoteClusterLicenseChecker(client, XPackLicenseState::isPlatinumOrTrialOperationMode);
        final AtomicReference<RemoteClusterLicenseChecker.LicenseCheck> licenseCheck = new
AtomicReference<>();

        licenseChecker.checkRemoteClusterLicenses(
            remoteClusterAliases,
            doubleInvocationProtectingListener(new ActionListener<RemoteClusterLicenseChecker.LicenseCheck>()
{

                @Override
                public void onResponse(final RemoteClusterLicenseChecker.LicenseCheck response) {
                    licenseCheck.set(response);
                }

                @Override
                public void onFailure(final Exception e) {
                    fail(e.getMessage());
                }

            }));

        verify(client, times(2)).execute(same(XPackInfoAction.INSTANCE), any(), any());
        assertNotNull(licenseCheck.get());
        assertFalse(licenseCheck.get().isSuccess());
        assertThat(licenseCheck.get().remoteClusterLicenseInfo().clusterAlias(), equalTo("cluster-with-basic-
license"));
        assertThat(licenseCheck.get().remoteClusterLicenseInfo().licenseInfo().getType(), equalTo("BASIC"));
    }

    public void testCheckRemoteClusterLicencesGivenNonExistentCluster() {
        final AtomicInteger index = new AtomicInteger();
        final List<XPackInfoResponse> responses = new ArrayList<>();

        final List<String> remoteClusterAliases = Arrays.asList("valid1", "valid2", "valid3");
        final String failingClusterAlias = randomFrom(remoteClusterAliases);
        final ThreadPool threadPool = createMockThreadPool();
        final Client client = createMockClientThatThrowsOnGetRemoteClusterClient(threadPool, failingClusterAlias);
        doAnswer(invocationMock -> {
            @SuppressWarnings("unchecked") ActionListener<XPackInfoResponse> listener =
                (ActionListener<XPackInfoResponse>) invocationMock.getArguments()[2];
            listener.onResponse(responses.get(index.getAndIncrement()));
            return null;
        }).when(client).execute(same(XPackInfoAction.INSTANCE), any(), any());

        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));
```

```
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));

        final RemoteClusterLicenseChecker licenseChecker =
            new RemoteClusterLicenseChecker(client, XPackLicenseState::isPlatinumOrTrialOperationMode);
        final AtomicReference<Exception> exception = new AtomicReference<>();

        licenseChecker.checkRemoteClusterLicenses(
            remoteClusterAliases,
            doubleInvocationProtectingListener(new ActionListener<RemoteClusterLicenseChecker.LicenseCheck>()
{

                @Override
                public void onResponse(final RemoteClusterLicenseChecker.LicenseCheck response) {
                    fail();
                }

                @Override
                public void onFailure(final Exception e) {
                    exception.set(e);
                }

            }));

        assertNotNull(exception.get());
        assertThat(exception.get(), instanceOf(ElasticsearchException.class));
        assertThat(exception.get().getMessage(), equalTo("could not determine the license type for cluster [" +
failingClusterAlias + "]"));
        assertNotNull(exception.get().getCause());
        assertThat(exception.get().getCause(), instanceOf(IllegalArgumentException.class));
    }

    public void testRemoteClusterLicenseCallUsesSystemContext() throws InterruptedException {
        final ThreadPool threadPool = new TestThreadPool(getTestName());

        try {
            final Client client = createMockClient(threadPool);
            doAnswer(invocationMock -> {
                assertTrue(threadPool.getThreadContext().isSystemContext());
                @SuppressWarnings("unchecked") ActionListener<XPackInfoResponse> listener =
                    (ActionListener<XPackInfoResponse>) invocationMock.getArguments()[2];
                listener.onResponse(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));
                return null;
            }).when(client).execute(same(XPackInfoAction.INSTANCE), any(), any());

            final RemoteClusterLicenseChecker licenseChecker =
                new RemoteClusterLicenseChecker(client, XPackLicenseState::isPlatinumOrTrialOperationMode);
```

```
        final List<String> remoteClusterAliases = Collections.singletonList("valid");
        licenseChecker.checkRemoteClusterLicenses(
            remoteClusterAliases, doubleInvocationProtectingListener(ActionListener.wrap(() -> {})));

        verify(client, times(1)).execute(same(XPackInfoAction.INSTANCE), any(), any());
      } finally {
        terminate(threadPool);
      }
    }

    public void testListenerIsExecutedWithCallingContext() throws InterruptedException {
      final AtomicInteger index = new AtomicInteger();
      final List<XPackInfoResponse> responses = new ArrayList<>();

      final ThreadPool threadPool = new TestThreadPool(getTestName());

      try {
        final List<String> remoteClusterAliases = Arrays.asList("valid1", "valid2", "valid3");
        final Client client;
        final boolean failure = randomBoolean();
        if (failure) {
          client = createMockClientThatThrowsOnGetRemoteClusterClient(threadPool,
randomFrom(remoteClusterAliases));
        } else {
          client = createMockClient(threadPool);
        }
        doAnswer(invocationMock -> {
          @SuppressWarnings("unchecked") ActionListener<XPackInfoResponse> listener =
              (ActionListener<XPackInfoResponse>) invocationMock.getArguments()[2];
          listener.onResponse(responses.get(index.getAndIncrement()));
          return null;
        }).when(client).execute(same(XPackInfoAction.INSTANCE), any(), any());

        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));
        responses.add(new XPackInfoResponse(null, createPlatinumLicenseResponse(), null));

        final RemoteClusterLicenseChecker licenseChecker =
            new RemoteClusterLicenseChecker(client, XPackLicenseState::isPlatinumOrTrialOperationMode);

        final AtomicBoolean listenerInvoked = new AtomicBoolean();
        threadPool.getThreadContext().putHeader("key", "value");
        licenseChecker.checkRemoteClusterLicenses(
            remoteClusterAliases,
            doubleInvocationProtectingListener(new
ActionListener<RemoteClusterLicenseChecker.LicenseCheck>() {

              @Override
```

```
                public void onResponse(final RemoteClusterLicenseChecker.LicenseCheck response) {
                    if (failure) {
                        fail();
                    }
                    assertThat(threadPool.getThreadContext().getHeader("key"), equalTo("value"));
                    assertFalse(threadPool.getThreadContext().isSystemContext());
                    listenerInvoked.set(true);
                }

                @Override
                public void onFailure(final Exception e) {
                    if (failure == false) {
                        fail();
                    }
                    assertThat(threadPool.getThreadContext().getHeader("key"), equalTo("value"));
                    assertFalse(threadPool.getThreadContext().isSystemContext());
                    listenerInvoked.set(true);
                }

            }));

        assertTrue(listenerInvoked.get());
    } finally {
        terminate(threadPool);
    }
  }

  public void testBuildErrorMessageForActiveCompatibleLicense() {
    final XPackInfoResponse.LicenseInfo platinumLicence = createPlatinumLicenseResponse();
    final RemoteClusterLicenseChecker.RemoteClusterLicenseInfo info =
            new RemoteClusterLicenseChecker.RemoteClusterLicenseInfo("platinum-cluster", platinumLicence);
    final AssertionError e = expectThrows(
            AssertionError.class,
            () -> RemoteClusterLicenseChecker.buildErrorMessage("", info,
RemoteClusterLicenseChecker::isLicensePlatinumOrTrial));
    assertThat(e, hasToString(containsString("license must be incompatible to build error message")));
  }

  public void testBuildErrorMessageForIncompatibleLicense() {
    final XPackInfoResponse.LicenseInfo basicLicense = createBasicLicenseResponse();
    final RemoteClusterLicenseChecker.RemoteClusterLicenseInfo info =
            new RemoteClusterLicenseChecker.RemoteClusterLicenseInfo("basic-cluster", basicLicense);
    assertThat(
            RemoteClusterLicenseChecker.buildErrorMessage("Feature", info,
RemoteClusterLicenseChecker::isLicensePlatinumOrTrial),
            equalTo("the license mode [BASIC] on cluster [basic-cluster] does not enable [Feature]"));
  }
```

```
  public void testBuildErrorMessageForInactiveLicense() {
     final XPackInfoResponse.LicenseInfo expiredLicense = createExpiredLicenseResponse();
     final RemoteClusterLicenseChecker.RemoteClusterLicenseInfo info =
           new RemoteClusterLicenseChecker.RemoteClusterLicenseInfo("expired-cluster", expiredLicense);
     assertThat(
           RemoteClusterLicenseChecker.buildErrorMessage("Feature", info,
RemoteClusterLicenseChecker::isLicensePlatinumOrTrial),
           equalTo("the license on cluster [expired-cluster] is not active"));
  }

  private ActionListener<RemoteClusterLicenseChecker.LicenseCheck> doubleInvocationProtectingListener(
        final ActionListener<RemoteClusterLicenseChecker.LicenseCheck> listener) {
     final AtomicBoolean listenerInvoked = new AtomicBoolean();
     return new ActionListener<RemoteClusterLicenseChecker.LicenseCheck>() {

        @Override
        public void onResponse(final RemoteClusterLicenseChecker.LicenseCheck response) {
           if (listenerInvoked.compareAndSet(false, true) == false) {
              fail("listener invoked twice");
           }
           listener.onResponse(response);
        }

        @Override
        public void onFailure(final Exception e) {
           if (listenerInvoked.compareAndSet(false, true) == false) {
              fail("listener invoked twice");
           }
           listener.onFailure(e);
        }

     };
  }

  private ThreadPool createMockThreadPool() {
     final ThreadPool threadPool = mock(ThreadPool.class);
     when(threadPool.getThreadContext()).thenReturn(new ThreadContext(Settings.EMPTY));
     return threadPool;
  }

  private Client createMockClient(final ThreadPool threadPool) {
     return createMockClient(threadPool, client ->
when(client.getRemoteClusterClient(anyString())).thenReturn(client));
  }

  private Client createMockClientThatThrowsOnGetRemoteClusterClient(final ThreadPool threadPool, final String
clusterAlias) {
     return createMockClient(
```

```
            threadPool,
            client -> {
                when(client.getRemoteClusterClient(clusterAlias)).thenThrow(new IllegalArgumentException());
                when(client.getRemoteClusterClient(argThat(not(clusterAlias)))).thenReturn(client);
            });
    }

    private Client createMockClient(final ThreadPool threadPool, final Consumer<Client> finish) {
        final Client client = mock(Client.class);
        when(client.threadPool()).thenReturn(threadPool);
        finish.accept(client);
        return client;
    }

    private XPackInfoResponse.LicenseInfo createPlatinumLicenseResponse() {
        return new XPackInfoResponse.LicenseInfo("uid", "PLATINUM", "PLATINUM", LicenseStatus.ACTIVE,
randomNonNegativeLong());
    }

    private XPackInfoResponse.LicenseInfo createBasicLicenseResponse() {
        return new XPackInfoResponse.LicenseInfo("uid", "BASIC", "BASIC", LicenseStatus.ACTIVE,
randomNonNegativeLong());
    }

    private XPackInfoResponse.LicenseInfo createExpiredLicenseResponse() {
        return new XPackInfoResponse.LicenseInfo("uid", "PLATINUM", "PLATINUM", LicenseStatus.EXPIRED,
randomNonNegativeLong());
    }

}
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionFuture;
import org.elasticsearch.action.support.master.AcknowledgedResponse;
import org.elasticsearch.common.bytes.BytesArray;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.node.Node;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.protocol.xpack.license.LicensesStatus;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;
import org.elasticsearch.test.ESSingleNodeTestCase;
```

```
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;
import org.elasticsearch.xpack.core.XPackSettings;

import java.nio.charset.StandardCharsets;
import java.util.Collection;
import java.util.Collections;
import java.util.UUID;

import static org.elasticsearch.license.TestUtils.dateMath;
import static org.elasticsearch.license.TestUtils.generateExpiredNonBasicLicense;
import static org.elasticsearch.license.TestUtils.generateSignedLicense;
import static org.hamcrest.CoreMatchers.equalTo;
import static org.hamcrest.CoreMatchers.not;

public class LicensesTransportTests extends ESSingleNodeTestCase {

  @Override
  protected boolean resetNodeAfterTest() {
    return true;
  }

  @Override
  protected Collection<Class<? extends Plugin>> getPlugins() {
    return Collections.singletonList(LocalStateCompositeXPackPlugin.class);
  }

  @Override
  protected Settings nodeSettings() {
    Settings.Builder newSettings = Settings.builder();
    newSettings.put(super.nodeSettings());
    newSettings.put(XPackSettings.SECURITY_ENABLED.getKey(), false);
//      newSettings.put(XPackSettings.MONITORING_ENABLED.getKey(), false);
//      newSettings.put(XPackSettings.WATCHER_ENABLED.getKey(), false);
    newSettings.put(Node.NODE_DATA_SETTING.getKey(), true);
    return newSettings.build();
  }

  public void testEmptyGetLicense() throws Exception {
    // basic license is added async, we should wait for it
    assertBusy(() -> {
      try {
        final ActionFuture<GetLicenseResponse> getLicenseFuture =
            new GetLicenseRequestBuilder(client().admin().cluster(), GetLicenseAction.INSTANCE).execute();
        final GetLicenseResponse getLicenseResponse;
        getLicenseResponse = getLicenseFuture.get();
        assertNotNull(getLicenseResponse.license());
        assertThat(getLicenseResponse.license().operationMode(), equalTo(License.OperationMode.BASIC));
      } catch (Exception e) {
```

```
                throw new RuntimeException("unexpected exception", e);
            }
        });
    }

    public void testPutLicense() throws Exception {
        License signedLicense = generateSignedLicense(TimeValue.timeValueMinutes(2));

        // put license
        PutLicenseRequestBuilder putLicenseRequestBuilder =
                new PutLicenseRequestBuilder(client().admin().cluster(),
PutLicenseAction.INSTANCE).setLicense(signedLicense)
                        .setAcknowledge(true);
        PutLicenseResponse putLicenseResponse = putLicenseRequestBuilder.get();
        assertThat(putLicenseResponse.isAcknowledged(), equalTo(true));
        assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.VALID));

        // get and check license
        GetLicenseResponse getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
        assertThat(getLicenseResponse.license(), equalTo(signedLicense));
    }

    public void testPutLicenseFromString() throws Exception {
        License signedLicense = generateSignedLicense(TimeValue.timeValueMinutes(2));
        String licenseString = TestUtils.dumpLicense(signedLicense);

        // put license source
        PutLicenseRequestBuilder putLicenseRequestBuilder =
                new PutLicenseRequestBuilder(client().admin().cluster(), PutLicenseAction.INSTANCE)
                        .setLicense(new BytesArray(licenseString.getBytes(StandardCharsets.UTF_8)),
XContentType.JSON)
                        .setAcknowledge(true);
        PutLicenseResponse putLicenseResponse = putLicenseRequestBuilder.get();
        assertThat(putLicenseResponse.isAcknowledged(), equalTo(true));
        assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.VALID));

        // get and check license
        GetLicenseResponse getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
        assertThat(getLicenseResponse.license(), equalTo(signedLicense));
    }

    public void testPutInvalidLicense() throws Exception {
        License signedLicense = generateSignedLicense(TimeValue.timeValueMinutes(2));

        // modify content of signed license
        License tamperedLicense = License.builder()
```

```
            .fromLicenseSpec(signedLicense, signedLicense.signature())
            .expiryDate(signedLicense.expiryDate() + 10 * 24 * 60 * 60 * 1000L)
            .validate()
            .build();

        PutLicenseRequestBuilder builder = new PutLicenseRequestBuilder(client().admin().cluster(),
PutLicenseAction.INSTANCE);
        builder.setLicense(tamperedLicense);

        // try to put license (should be invalid)
        final PutLicenseResponse putLicenseResponse = builder.get();
        assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.INVALID));

        // try to get invalid license
        GetLicenseResponse getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
        assertThat(getLicenseResponse.license(), not(tamperedLicense));
    }

    public void testPutBasicLicenseIsInvalid() throws Exception {
        License signedLicense = generateSignedLicense("basic", License.VERSION_CURRENT, -1,
TimeValue.timeValueMinutes(2));

        PutLicenseRequestBuilder builder = new PutLicenseRequestBuilder(client().admin().cluster(),
PutLicenseAction.INSTANCE);
        builder.setLicense(signedLicense);

        // try to put license (should be invalid)
        IllegalArgumentException iae = expectThrows(IllegalArgumentException.class, builder::get);
        assertEquals(iae.getMessage(), "Registering basic licenses is not allowed.");

        // try to get invalid license
        GetLicenseResponse getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
        assertThat(getLicenseResponse.license(), not(signedLicense));
    }

    public void testPutExpiredLicense() throws Exception {
        License expiredLicense = generateExpiredNonBasicLicense();
        PutLicenseRequestBuilder builder = new PutLicenseRequestBuilder(client().admin().cluster(),
PutLicenseAction.INSTANCE);
        builder.setLicense(expiredLicense);
        PutLicenseResponse putLicenseResponse = builder.get();
        assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.EXPIRED));
        // get license should not return the expired license
        GetLicenseResponse getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
        assertThat(getLicenseResponse.license(), not(expiredLicense));
```

```
  }

  public void testPutLicensesSimple() throws Exception {
    License goldSignedLicense = generateSignedLicense("gold", TimeValue.timeValueMinutes(5));
    PutLicenseRequestBuilder putLicenseRequestBuilder =
        new PutLicenseRequestBuilder(client().admin().cluster(),
PutLicenseAction.INSTANCE).setLicense(goldSignedLicense)
            .setAcknowledge(true);
    PutLicenseResponse putLicenseResponse = putLicenseRequestBuilder.get();
    assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.VALID));
    GetLicenseResponse getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
    assertThat(getLicenseResponse.license(), equalTo(goldSignedLicense));

    License platinumSignedLicense = generateSignedLicense("platinum", TimeValue.timeValueMinutes(2));
    putLicenseRequestBuilder.setLicense(platinumSignedLicense);
    putLicenseResponse = putLicenseRequestBuilder.get();
    assertThat(putLicenseResponse.isAcknowledged(), equalTo(true));
    assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.VALID));
    getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
    assertThat(getLicenseResponse.license(), equalTo(platinumSignedLicense));
  }

  public void testRemoveLicensesSimple() throws Exception {
    License goldLicense = generateSignedLicense("gold", TimeValue.timeValueMinutes(5));
    PutLicenseRequestBuilder putLicenseRequestBuilder =
        new PutLicenseRequestBuilder(client().admin().cluster(),
PutLicenseAction.INSTANCE).setLicense(goldLicense)
            .setAcknowledge(true);
    PutLicenseResponse putLicenseResponse = putLicenseRequestBuilder.get();
    assertThat(putLicenseResponse.isAcknowledged(), equalTo(true));
    assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.VALID));
    GetLicenseResponse getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
    assertThat(getLicenseResponse.license(), equalTo(goldLicense));
    // delete all licenses
    DeleteLicenseRequestBuilder deleteLicenseRequestBuilder =
        new DeleteLicenseRequestBuilder(client().admin().cluster(), DeleteLicenseAction.INSTANCE);
    AcknowledgedResponse deleteLicenseResponse = deleteLicenseRequestBuilder.get();
    assertThat(deleteLicenseResponse.isAcknowledged(), equalTo(true));
    // get licenses (expected no licenses)
    getLicenseResponse = new GetLicenseRequestBuilder(client().admin().cluster(),
GetLicenseAction.INSTANCE).get();
    assertNull(getLicenseResponse.license());
  }

  public void testLicenseIsRejectWhenStartDateLaterThanNow() throws Exception {
```

```
        long now = System.currentTimeMillis();
        final License.Builder builder = License.builder()
                .uid(UUID.randomUUID().toString())
                .version(License.VERSION_CURRENT)
                .expiryDate(dateMath("now+2h", now))
                .startDate(dateMath("now+1h", now))
                .issueDate(now)
                .type(License.OperationMode.TRIAL.toString())
                .issuedTo("customer")
                .issuer("elasticsearch")
                .maxNodes(5);
        License license = TestUtils.generateSignedLicense(builder);

        PutLicenseRequestBuilder putLicenseRequestBuilder =
                new PutLicenseRequestBuilder(client().admin().cluster(),
PutLicenseAction.INSTANCE).setLicense(license)
                        .setAcknowledge(true);
        PutLicenseResponse putLicenseResponse = putLicenseRequestBuilder.get();
        assertThat(putLicenseResponse.isAcknowledged(), equalTo(true));
        assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.INVALID));
    }

    public void testLicenseIsAcceptedWhenStartDateBeforeThanNow() throws Exception {
        long now = System.currentTimeMillis();
        final License.Builder builder = License.builder()
                .uid(UUID.randomUUID().toString())
                .version(License.VERSION_CURRENT)
                .expiryDate(dateMath("now+2h", now))
                .startDate(now)
                .issueDate(now)
                .type(License.OperationMode.TRIAL.toString())
                .issuedTo("customer")
                .issuer("elasticsearch")
                .maxNodes(5);
        License license = TestUtils.generateSignedLicense(builder);

        PutLicenseRequestBuilder putLicenseRequestBuilder =
                new PutLicenseRequestBuilder(client().admin().cluster(),
PutLicenseAction.INSTANCE).setLicense(license)
                        .setAcknowledge(true);
        PutLicenseResponse putLicenseResponse = putLicenseRequestBuilder.get();
        assertThat(putLicenseResponse.isAcknowledged(), equalTo(true));
        assertThat(putLicenseResponse.status(), equalTo(LicensesStatus.VALID));
    }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
```

```
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.Version;
import org.elasticsearch.action.support.PlainActionFuture;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.cluster.node.DiscoveryNode;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.transport.TransportAddress;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;

import java.net.InetAddress;

import static java.util.Collections.emptyMap;
import static java.util.Collections.emptySet;
import static org.hamcrest.Matchers.containsString;
import static org.mockito.Matchers.any;
import static org.mockito.Mockito.times;
import static org.mockito.Mockito.verify;

public class LicenseTLSTests extends AbstractLicenseServiceTestCase {

  private InetAddress inetAddress;

  public void testApplyLicenseInDevMode() throws Exception {
     License newLicense = TestUtils.generateSignedLicense(randomFrom("gold", "platinum"),
TimeValue.timeValueHours(24L));
     PutLicenseRequest request = new PutLicenseRequest();
     request.acknowledge(true);
     request.license(newLicense);
     Settings settings = Settings.builder().put("xpack.security.enabled", true).build();
     XPackLicenseState licenseState = new XPackLicenseState(settings);
     inetAddress = InetAddress.getLoopbackAddress();

     setInitialState(null, licenseState, settings);
     licenseService.start();
     PlainActionFuture<PutLicenseResponse> responseFuture = new PlainActionFuture<>();
     licenseService.registerLicense(request, responseFuture);
     verify(clusterService).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));

     inetAddress = TransportAddress.META_ADDRESS;
     settings = Settings.builder()
           .put("xpack.security.enabled", true)
           .put("discovery.type", "single-node")
           .build();
     licenseService.stop();
```

```
        licenseState = new XPackLicenseState(settings);
        setInitialState(null, licenseState, settings);
        licenseService.start();
        licenseService.registerLicense(request, responseFuture);
        verify(clusterService, times(2)).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));
    }

    public void testApplyLicenseInProdMode() throws Exception {
        final String licenseType = randomFrom("GOLD", "PLATINUM");
        License newLicense = TestUtils.generateSignedLicense(licenseType, TimeValue.timeValueHours(24L));
        PutLicenseRequest request = new PutLicenseRequest();
        request.acknowledge(true);
        request.license(newLicense);
        Settings settings = Settings.builder().put("xpack.security.enabled", true).build();
        XPackLicenseState licenseState = new XPackLicenseState(settings);
        inetAddress = TransportAddress.META_ADDRESS;

        setInitialState(null, licenseState, settings);
        licenseService.start();
        PlainActionFuture<PutLicenseResponse> responseFuture = new PlainActionFuture<>();
        IllegalStateException e = expectThrows(IllegalStateException.class, () ->
licenseService.registerLicense(request, responseFuture));
        assertThat(e.getMessage(),
                containsString("Cannot install a [" + licenseType + "] license unless TLS is configured or security is
disabled"));

        settings = Settings.builder().put("xpack.security.enabled", false).build();
        licenseService.stop();
        licenseState = new XPackLicenseState(settings);
        setInitialState(null, licenseState, settings);
        licenseService.start();
        licenseService.registerLicense(request, responseFuture);
        verify(clusterService).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));

        settings = Settings.builder()
                .put("xpack.security.enabled", true)
                .put("xpack.security.transport.ssl.enabled", true)
                .build();
        licenseService.stop();
        licenseState = new XPackLicenseState(settings);
        setInitialState(null, licenseState, settings);
        licenseService.start();
        licenseService.registerLicense(request, responseFuture);
        verify(clusterService, times(2)).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));
    }

    @Override
    protected DiscoveryNode getLocalNode() {
```

```
        return new DiscoveryNode("localnode", new TransportAddress(inetAddress, randomIntBetween(9300, 9399)),
                emptyMap(), emptySet(), Version.CURRENT);
    }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.Version;
import org.elasticsearch.cluster.ClusterName;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.block.ClusterBlocks;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.cluster.node.DiscoveryNode;
import org.elasticsearch.cluster.node.DiscoveryNodes;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.component.Lifecycle;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.env.Environment;
import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.watcher.ResourceWatcherService;
import org.elasticsearch.xpack.core.XPackPlugin;
import org.elasticsearch.xpack.core.watcher.watch.ClockMock;
import org.junit.After;
import org.junit.Before;

import java.nio.file.Path;
import java.util.Arrays;

import static java.util.Collections.emptySet;
import static java.util.Collections.singletonMap;
import static org.mockito.Mockito.mock;
import static org.mockito.Mockito.when;

public abstract class AbstractLicenseServiceTestCase extends ESTestCase {

    protected LicenseService licenseService;
    protected ClusterService clusterService;
    protected ResourceWatcherService resourceWatcherService;
    protected ClockMock clock;
    protected DiscoveryNodes discoveryNodes;
    protected Environment environment;
    protected String licenseType;

    @Before
```

```
  public void init() throws Exception {
     clusterService = mock(ClusterService.class);
     clock = ClockMock.frozen();
     discoveryNodes = mock(DiscoveryNodes.class);
     resourceWatcherService = mock(ResourceWatcherService.class);
     environment = mock(Environment.class);
  }

  protected void setInitialState(License license, XPackLicenseState licenseState, Settings settings) {
     setInitialState(license, licenseState, settings, randomBoolean() ? "trial" : "basic");
  }

  protected void setInitialState(License license, XPackLicenseState licenseState, Settings settings, String
selfGeneratedType) {
     Path tempDir = createTempDir();
     when(environment.configFile()).thenReturn(tempDir);
     licenseType = selfGeneratedType;
     settings =
Settings.builder().put(settings).put(LicenseService.SELF_GENERATED_LICENSE_TYPE.getKey(),
licenseType).build();
     licenseService = new LicenseService(settings, clusterService, clock, environment, resourceWatcherService,
licenseState);
     ClusterState state = mock(ClusterState.class);
     final ClusterBlocks noBlock = ClusterBlocks.builder().build();
     when(state.blocks()).thenReturn(noBlock);
     MetaData metaData = mock(MetaData.class);
     when(metaData.custom(LicensesMetaData.TYPE)).thenReturn(new LicensesMetaData(license, null));
     when(state.metaData()).thenReturn(metaData);
     final DiscoveryNode mockNode = getLocalNode();
     when(discoveryNodes.getMasterNode()).thenReturn(mockNode);
     when(discoveryNodes.spliterator()).thenReturn(Arrays.asList(mockNode).spliterator());
     when(discoveryNodes.isLocalNodeElectedMaster()).thenReturn(false);
     when(state.nodes()).thenReturn(discoveryNodes);
     when(state.getNodes()).thenReturn(discoveryNodes); // it is really ridiculous we have nodes() and getNodes()...
     when(clusterService.state()).thenReturn(state);
     when(clusterService.lifecycleState()).thenReturn(Lifecycle.State.STARTED);
     when(clusterService.getClusterName()).thenReturn(new ClusterName("a"));
     when(clusterService.localNode()).thenReturn(mockNode);
  }

  protected DiscoveryNode getLocalNode() {
     return new DiscoveryNode("b", buildNewFakeTransportAddress(),
singletonMap(XPackPlugin.XPACK_INSTALLED_NODE_ATTR, "true"),
        emptySet(), Version.CURRENT);
  }

  @After
  public void tearDown() throws Exception {
```

```
        super.tearDown();
        licenseService.stop();
    }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.test.ESTestCase;

import java.io.IOException;
import java.nio.ByteBuffer;
import java.util.Base64;
import java.util.Collections;
import java.util.UUID;

import static org.elasticsearch.license.CryptUtils.encryptV3Format;
import static org.hamcrest.Matchers.equalTo;


public class SelfGeneratedLicenseTests extends ESTestCase {

    public void testBasic() throws Exception {
        long issueDate = System.currentTimeMillis();
        License.Builder specBuilder = License.builder()
                .uid(UUID.randomUUID().toString())
                .issuedTo("customer")
                .maxNodes(5)
                .type(randomBoolean() ? "trial" : "basic")
                .issueDate(issueDate)
                .expiryDate(issueDate + TimeValue.timeValueHours(2).getMillis());
        License trialLicense = SelfGeneratedLicense.create(specBuilder, License.VERSION_CURRENT);
        assertThat(SelfGeneratedLicense.verify(trialLicense), equalTo(true));
    }

    public void testTampered() throws Exception {
        long issueDate = System.currentTimeMillis();
        License.Builder specBuilder = License.builder()
                .uid(UUID.randomUUID().toString())
```

```
                .issuedTo("customer")
                .type(randomBoolean() ? "trial" : "basic")
                .maxNodes(5)
                .issueDate(issueDate)
                .expiryDate(issueDate + TimeValue.timeValueHours(2).getMillis());
        License trialLicense = SelfGeneratedLicense.create(specBuilder, License.VERSION_CURRENT);
        final String originalSignature = trialLicense.signature();
        License tamperedLicense = License.builder().fromLicenseSpec(trialLicense, originalSignature)
                .expiryDate(System.currentTimeMillis() + TimeValue.timeValueHours(5).getMillis())
                .build();
        assertThat(SelfGeneratedLicense.verify(trialLicense), equalTo(true));
        assertThat(SelfGeneratedLicense.verify(tamperedLicense), equalTo(false));
    }

    public void testFrom1x() throws Exception {
        long issueDate = System.currentTimeMillis();
        License.Builder specBuilder = License.builder()
                .uid(UUID.randomUUID().toString())
                .issuedTo("customer")
                .type("subscription")
                .subscriptionType("trial")
                .issuer("elasticsearch")
                .feature("")
                .version(License.VERSION_START)
                .maxNodes(5)
                .issueDate(issueDate)
                .expiryDate(issueDate + TimeValue.timeValueHours(2).getMillis());
        License pre20TrialLicense = specBuilder.build();
        License license =
SelfGeneratedLicense.create(License.builder().fromPre20LicenseSpec(pre20TrialLicense).type("trial"),
            License.VERSION_CURRENT);
        assertThat(SelfGeneratedLicense.verify(license), equalTo(true));
    }

    public void testTrialLicenseVerifyWithOlderVersion() throws Exception {
        assumeFalse("Can't run in a FIPS JVM. We can't generate old licenses since PBEWithSHA1AndDESede is not
available", inFipsJvm());
        long issueDate = System.currentTimeMillis();
        License.Builder specBuilder = License.builder()
                .issuedTo("customer")
                .maxNodes(5)
                .issueDate(issueDate)
                .expiryDate(issueDate + TimeValue.timeValueHours(2).getMillis())
                .feature("")
                .subscriptionType("trial")
                .version(1);
        License trialLicenseV1 = createTrialLicense(specBuilder);
        assertThat(SelfGeneratedLicense.verify(trialLicenseV1), equalTo(true));
```

```
  }

  private static License createTrialLicense(License.Builder specBuilder) {
    License spec = specBuilder
          .type(randomBoolean() ? "trial" : "basic")
          .issuer("elasticsearch")
          .uid(UUID.randomUUID().toString())
          .build();
    final String signature;
    try {
      XContentBuilder contentBuilder = XContentFactory.contentBuilder(XContentType.JSON);
      spec.toXContent(contentBuilder, new
ToXContent.MapParams(Collections.singletonMap(License.LICENSE_SPEC_VIEW_MODE, "true")));
      byte[] encrypt = encryptV3Format(BytesReference.toBytes(BytesReference.bytes(contentBuilder)));
      byte[] bytes = new byte[4 + 4 + encrypt.length];
      ByteBuffer byteBuffer = ByteBuffer.wrap(bytes);
      byteBuffer.putInt(-spec.version())
            .putInt(encrypt.length)
            .put(encrypt);
      signature = Base64.getEncoder().encodeToString(bytes);
    } catch (IOException e) {
      throw new IllegalStateException(e);
    }
    return License.builder().fromLicenseSpec(spec, signature).build();
  }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
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*/
package org.elasticsearch.license;

import org.elasticsearch.cluster.ClusterName;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.common.settings.Settings;
import org.mockito.ArgumentCaptor;
import org.mockito.Mockito;

import java.util.UUID;

import static org.elasticsearch.license.TestUtils.dateMath;
import static org.mockito.Matchers.any;
import static org.mockito.Mockito.verify;
import static org.mockito.Mockito.when;
```

```
public class LicenseRegistrationTests extends AbstractLicenseServiceTestCase {

  public void testSelfGeneratedTrialLicense() throws Exception {
     XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
     setInitialState(null, licenseState, Settings.EMPTY, "trial");
     when(discoveryNodes.isLocalNodeElectedMaster()).thenReturn(true);
     licenseService.start();

     ClusterState state = ClusterState.builder(new ClusterName("a")).build();
     ArgumentCaptor<ClusterStateUpdateTask> stateUpdater =
ArgumentCaptor.forClass(ClusterStateUpdateTask.class);
     verify(clusterService, Mockito.times(1)).submitStateUpdateTask(any(), stateUpdater.capture());
     ClusterState stateWithLicense = stateUpdater.getValue().execute(state);
     LicensesMetaData licenseMetaData = stateWithLicense.metaData().custom(LicensesMetaData.TYPE);
     assertNotNull(licenseMetaData);
     assertNotNull(licenseMetaData.getLicense());
     assertFalse(licenseMetaData.isEligibleForTrial());
     assertEquals("trial", licenseMetaData.getLicense().type());
     assertEquals(clock.millis() +
LicenseService.NON_BASIC_SELF_GENERATED_LICENSE_DURATION.millis(),
          licenseMetaData.getLicense().expiryDate());
  }

  public void testSelfGeneratedBasicLicense() throws Exception {
     XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
     setInitialState(null, licenseState, Settings.EMPTY, "basic");
     when(discoveryNodes.isLocalNodeElectedMaster()).thenReturn(true);
     licenseService.start();

     ClusterState state = ClusterState.builder(new ClusterName("a")).build();
     ArgumentCaptor<ClusterStateUpdateTask> stateUpdater =
ArgumentCaptor.forClass(ClusterStateUpdateTask.class);
     verify(clusterService, Mockito.times(1)).submitStateUpdateTask(any(), stateUpdater.capture());
     ClusterState stateWithLicense = stateUpdater.getValue().execute(state);
     LicensesMetaData licenseMetaData = stateWithLicense.metaData().custom(LicensesMetaData.TYPE);
     assertNotNull(licenseMetaData);
     assertNotNull(licenseMetaData.getLicense());
     assertTrue(licenseMetaData.isEligibleForTrial());
     assertEquals("basic", licenseMetaData.getLicense().type());
     assertEquals(LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS,
licenseMetaData.getLicense().expiryDate());
  }

  public void testNonSelfGeneratedBasicLicenseIsReplaced() throws Exception {
     long now = System.currentTimeMillis();
     String uid = UUID.randomUUID().toString();
     final License.Builder builder = License.builder()
          .uid(uid)
```

```
                .version(License.VERSION_CURRENT)
                .expiryDate(dateMath("now+2h", now))
                .startDate(now)
                .issueDate(now)
                .type("basic")
                .issuedTo("customer")
                .issuer("elasticsearch")
                .maxNodes(5);
        License license = TestUtils.generateSignedLicense(builder);

        XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
        setInitialState(license, licenseState, Settings.EMPTY);
        when(discoveryNodes.isLocalNodeElectedMaster()).thenReturn(true);
        licenseService.start();

        MetaData.Builder mdBuilder = MetaData.builder();
        mdBuilder.putCustom(LicensesMetaData.TYPE, new LicensesMetaData(license, null));
        ClusterState state = ClusterState.builder(new ClusterName("a")).metaData(mdBuilder.build()).build();
        ArgumentCaptor<ClusterStateUpdateTask> stateUpdater =
ArgumentCaptor.forClass(ClusterStateUpdateTask.class);
        verify(clusterService, Mockito.times(1)).submitStateUpdateTask(any(), stateUpdater.capture());
        ClusterState stateWithLicense = stateUpdater.getValue().execute(state);
        LicensesMetaData licenseMetaData = stateWithLicense.metaData().custom(LicensesMetaData.TYPE);
        assertNotNull(licenseMetaData);
        assertNotNull(licenseMetaData.getLicense());
        assertTrue(licenseMetaData.isEligibleForTrial());
        assertEquals("basic", licenseMetaData.getLicense().type());
        assertEquals(LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS,
licenseMetaData.getLicense().expiryDate());
        assertEquals(uid, licenseMetaData.getLicense().uid());
    }

    public void testExpiredSelfGeneratedBasicLicenseIsExtended() throws Exception {
        long now = System.currentTimeMillis();
        String uid = UUID.randomUUID().toString();
        License.Builder builder = License.builder()
                .uid(uid)
                .issuedTo("name")
                .maxNodes(1000)
                .issueDate(dateMath("now-10h", now))
                .type("basic")
                .expiryDate(dateMath("now-2h", now));
        License license = SelfGeneratedLicense.create(builder, License.VERSION_CURRENT);

        XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
        setInitialState(license, licenseState, Settings.EMPTY);
        when(discoveryNodes.isLocalNodeElectedMaster()).thenReturn(true);
        licenseService.start();
```

```
        MetaData.Builder mdBuilder = MetaData.builder();
        mdBuilder.putCustom(LicensesMetaData.TYPE, new LicensesMetaData(license, null));
        ClusterState state = ClusterState.builder(new ClusterName("a")).metaData(mdBuilder.build()).build();
        ArgumentCaptor<ClusterStateUpdateTask> stateUpdater =
    ArgumentCaptor.forClass(ClusterStateUpdateTask.class);
        verify(clusterService, Mockito.times(1)).submitStateUpdateTask(any(), stateUpdater.capture());
        ClusterState stateWithLicense = stateUpdater.getValue().execute(state);
        LicensesMetaData licenseMetaData = stateWithLicense.metaData().custom(LicensesMetaData.TYPE);
        assertNotNull(licenseMetaData);
        assertNotNull(licenseMetaData.getLicense());
        assertTrue(licenseMetaData.isEligibleForTrial());
        assertEquals("basic", licenseMetaData.getLicense().type());
        assertEquals(LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS,
    licenseMetaData.getLicense().expiryDate());
        assertEquals(uid, licenseMetaData.getLicense().uid());
      }
    }
    /*
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    * or more contributor license agreements. Licensed under the Elastic License;
    * you may not use this file except in compliance with the Elastic License.
    */
    package org.elasticsearch.license;

    import com.carrotsearch.randomizedtesting.RandomizedTest;
    import org.elasticsearch.Version;
    import org.elasticsearch.action.ActionListener;
    import org.elasticsearch.cluster.metadata.MetaData;
    import org.elasticsearch.common.Strings;
    import org.elasticsearch.common.joda.FormatDateTimeFormatter;
    import org.elasticsearch.common.joda.Joda;
    import org.elasticsearch.common.settings.Settings;
    import org.elasticsearch.common.time.DateMathParser;
    import org.elasticsearch.common.unit.TimeValue;
    import org.elasticsearch.common.xcontent.ToXContent;
    import org.elasticsearch.common.xcontent.XContentBuilder;
    import org.elasticsearch.common.xcontent.XContentFactory;
    import org.elasticsearch.common.xcontent.XContentType;
    import org.elasticsearch.license.licensor.LicenseSigner;
    import org.elasticsearch.protocol.xpack.license.LicensesStatus;
    import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;
    import org.hamcrest.MatcherAssert;
    import org.joda.time.format.DateTimeFormatter;
    import org.junit.Assert;

    import java.io.IOException;
    import java.io.InputStream;
```

```
import java.nio.file.Files;
import java.nio.file.Path;
import java.nio.file.StandardCopyOption;
import java.util.ArrayList;
import java.util.List;
import java.util.UUID;
import java.util.concurrent.CountDownLatch;
import java.util.concurrent.atomic.AtomicReference;

import static com.carrotsearch.randomizedtesting.RandomizedTest.randomBoolean;
import static com.carrotsearch.randomizedtesting.RandomizedTest.randomInt;
import static org.apache.lucene.util.LuceneTestCase.createTempFile;
import static org.elasticsearch.common.xcontent.XContentFactory.jsonBuilder;
import static org.elasticsearch.test.ESTestCase.randomAlphaOfLength;
import static org.elasticsearch.test.ESTestCase.randomFrom;
import static org.elasticsearch.test.ESTestCase.randomIntBetween;
import static org.hamcrest.core.IsEqual.equalTo;
import static org.junit.Assert.assertThat;

public class TestUtils {

  private static final FormatDateTimeFormatter formatDateTimeFormatter = Joda.forPattern("yyyy-MM-dd");
  private static final DateMathParser dateMathParser = formatDateTimeFormatter.toDateMathParser();
  private static final DateTimeFormatter dateTimeFormatter = formatDateTimeFormatter.printer();

  public static String dateMathString(String time, final long now) {
     return dateTimeFormatter.print(dateMathParser.parse(time, () -> now));
  }

  public static long dateMath(String time, final long now) {
     return dateMathParser.parse(time, () -> now);
  }

  public static LicenseSpec generateRandomLicenseSpec(int version) {
     boolean datesInMillis = randomBoolean();
     long now = System.currentTimeMillis();
     String uid = UUID.randomUUID().toString();
     String feature = "feature__" + randomInt();
     String issuer = "issuer__"  + randomInt();
     String issuedTo = "issuedTo__" + randomInt();
     final String type;
     final String subscriptionType;
     if (version < License.VERSION_NO_FEATURE_TYPE) {
        subscriptionType = randomFrom("gold", "silver", "platinum");
        type = "subscription";//randomFrom("subscription", "internal", "development");
     } else {
        subscriptionType = null;
        type = randomFrom("basic", "dev", "gold", "silver", "platinum");
```

```
        }
        int maxNodes = RandomizedTest.randomIntBetween(5, 100);
        if (datesInMillis) {
            long issueDateInMillis = dateMath("now", now);
            long expiryDateInMillis = dateMath("now+10d/d", now);
            return new LicenseSpec(version, uid, feature, issueDateInMillis, expiryDateInMillis, type, subscriptionType,
issuedTo, issuer,
                maxNodes);
        } else {
            String issueDate = dateMathString("now", now);
            String expiryDate = dateMathString("now+10d/d", now);
            return new LicenseSpec(version, uid, feature, issueDate, expiryDate, type, subscriptionType, issuedTo,
issuer, maxNodes);
        }
    }

    public static String generateLicenseSpecString(LicenseSpec licenseSpec) throws IOException {
        XContentBuilder licenses = jsonBuilder();
        licenses.startObject();
        licenses.startArray("licenses");
        licenses.startObject()
            .field("uid", licenseSpec.uid)
            .field("type", licenseSpec.type)
            .field("subscription_type", licenseSpec.subscriptionType)
            .field("issued_to", licenseSpec.issuedTo)
            .field("issuer", licenseSpec.issuer)
            .field("feature", licenseSpec.feature)
            .field("max_nodes", licenseSpec.maxNodes);

        if (licenseSpec.issueDate != null) {
            licenses.field("issue_date", licenseSpec.issueDate);
        } else {
            licenses.field("issue_date_in_millis", licenseSpec.issueDateInMillis);
        }
        if (licenseSpec.expiryDate != null) {
            licenses.field("expiry_date", licenseSpec.expiryDate);
        } else {
            licenses.field("expiry_date_in_millis", licenseSpec.expiryDateInMillis);
        }
        licenses.field("version", licenseSpec.version);
        licenses.endObject();
        licenses.endArray();
        licenses.endObject();
        return Strings.toString(licenses);
    }

    public static License generateLicenses(LicenseSpec spec) {
        License.Builder builder = License.builder()
```

```
        .uid(spec.uid)
        .feature(spec.feature)
        .type(spec.type)
        .subscriptionType(spec.subscriptionType)
        .issuedTo(spec.issuedTo)
        .issuer(spec.issuer)
        .maxNodes(spec.maxNodes);

    if (spec.expiryDate != null) {
        builder.expiryDate(DateUtils.endOfTheDay(spec.expiryDate));
    } else {
        builder.expiryDate(spec.expiryDateInMillis);
    }
    if (spec.issueDate != null) {
        builder.issueDate(DateUtils.beginningOfTheDay(spec.issueDate));
    } else {
        builder.issueDate(spec.issueDateInMillis);
    }
    return builder.build();
}

public static void assertLicenseSpec(LicenseSpec spec, License license) {
    MatcherAssert.assertThat(license.uid(), equalTo(spec.uid));
    MatcherAssert.assertThat(license.issuedTo(), equalTo(spec.issuedTo));
    MatcherAssert.assertThat(license.issuer(), equalTo(spec.issuer));
    MatcherAssert.assertThat(license.type(), equalTo(spec.type));
    MatcherAssert.assertThat(license.maxNodes(), equalTo(spec.maxNodes));
    if (spec.issueDate != null) {
        MatcherAssert.assertThat(license.issueDate(), equalTo(DateUtils.beginningOfTheDay(spec.issueDate)));
    } else {
        MatcherAssert.assertThat(license.issueDate(), equalTo(spec.issueDateInMillis));
    }
    if (spec.expiryDate != null) {
        MatcherAssert.assertThat(license.expiryDate(), equalTo(DateUtils.endOfTheDay(spec.expiryDate)));
    } else {
        MatcherAssert.assertThat(license.expiryDate(), equalTo(spec.expiryDateInMillis));
    }
}

public static class LicenseSpec {
    public final int version;
    public final String feature;
    public final String issueDate;
    public final long issueDateInMillis;
    public final String expiryDate;
    public final long expiryDateInMillis;
    public final String uid;
    public final String type;
```

```
        public final String subscriptionType;
        public final String issuedTo;
        public final String issuer;
        public final int maxNodes;

        public LicenseSpec(String issueDate, String expiryDate) {
            this(License.VERSION_CURRENT, UUID.randomUUID().toString(), "feature", issueDate, expiryDate,
"trial", "none", "customer",
                "elasticsearch", 5);
        }

        public LicenseSpec(int version, String uid, String feature, long issueDateInMillis, long expiryDateInMillis,
String type,
                           String subscriptionType, String issuedTo, String issuer, int maxNodes) {
            this.version = version;
            this.feature = feature;
            this.issueDateInMillis = issueDateInMillis;
            this.issueDate = null;
            this.expiryDateInMillis = expiryDateInMillis;
            this.expiryDate = null;
            this.uid = uid;
            this.type = type;
            this.subscriptionType = subscriptionType;
            this.issuedTo = issuedTo;
            this.issuer = issuer;
            this.maxNodes = maxNodes;
        }

        public LicenseSpec(int version, String uid, String feature, String issueDate, String expiryDate, String type,
                           String subscriptionType, String issuedTo, String issuer, int maxNodes) {
            this.version = version;
            this.feature = feature;
            this.issueDate = issueDate;
            this.issueDateInMillis = -1;
            this.expiryDate = expiryDate;
            this.expiryDateInMillis = -1;
            this.uid = uid;
            this.type = type;
            this.subscriptionType = subscriptionType;
            this.issuedTo = issuedTo;
            this.issuer = issuer;
            this.maxNodes = maxNodes;
        }
    }
    private static Path getTestPriKeyPath() throws Exception {
        return getResourcePath("/private.key");
    }
```

```
  private static Path getTestPubKeyPath() throws Exception {
    return getResourcePath("/public.key");
  }

  public static String dumpLicense(License license) throws Exception {
    XContentBuilder builder = XContentFactory.contentBuilder(XContentType.JSON);
    builder.startObject();
    builder.startObject("license");
    license.toInnerXContent(builder, ToXContent.EMPTY_PARAMS);
    builder.endObject();
    builder.endObject();
    return Strings.toString(builder);
  }

  public static License generateSignedLicense(TimeValue expiryDuration) throws Exception {
    return generateSignedLicense(null, -1, expiryDuration);
  }

  public static License generateSignedLicense(String type, TimeValue expiryDuration) throws Exception {
    return generateSignedLicense(type, -1, expiryDuration);
  }

  public static License generateSignedLicense(long issueDate, TimeValue expiryDuration) throws Exception {
    return generateSignedLicense(null, issueDate, expiryDuration);
  }

  public static License generateSignedLicense(String type, long issueDate, TimeValue expiryDuration) throws
Exception {
    return generateSignedLicense(type, randomIntBetween(License.VERSION_START,
License.VERSION_CURRENT), issueDate, expiryDuration);
  }

  public static License generateSignedLicenseOldSignature() {
    long issueDate = System.currentTimeMillis();
    License.Builder specBuilder = License.builder()
        .uid(UUID.randomUUID().toString())
        .version(License.VERSION_START_DATE)
        .issuedTo("customer")
        .maxNodes(5)
        .type("trial")
        .issueDate(issueDate)
        .expiryDate(issueDate + TimeValue.timeValueHours(24).getMillis());
    return SelfGeneratedLicense.create(specBuilder, License.VERSION_START_DATE);
  }

  /**
   * This method which chooses the license type randomly if the type is null. However, it will not randomly
   * choose trial or basic types as those types can only be self-generated.
```

```
     */
    public static License generateSignedLicense(String type, int version, long issueDate, TimeValue expiryDuration)
throws Exception {
        long issue = (issueDate != -1L) ? issueDate : System.currentTimeMillis() -
TimeValue.timeValueHours(2).getMillis();
        final String licenseType;
        if (version < License.VERSION_NO_FEATURE_TYPE) {
            licenseType = randomFrom("subscription", "internal", "development");
        } else {
            licenseType = (type != null) ? type : randomFrom("silver", "dev", "gold", "platinum");
        }
        final License.Builder builder = License.builder()
                .uid(UUID.randomUUID().toString())
                .version(version)
                .expiryDate(System.currentTimeMillis() + expiryDuration.getMillis())
                .issueDate(issue)
                .type(licenseType)
                .issuedTo("customer")
                .issuer("elasticsearch")
                .maxNodes(5);
        if (version == License.VERSION_START) {
            builder.subscriptionType((type != null) ? type : randomFrom("dev", "gold", "platinum", "silver"));
            builder.feature(randomAlphaOfLength(10));
        }
        final LicenseSigner signer = new LicenseSigner(getTestPriKeyPath(), getTestPubKeyPath());
        return signer.sign(builder.build());
    }

    public static License generateSignedLicense(License.Builder builder) throws Exception {
        LicenseSigner signer = new LicenseSigner(getTestPriKeyPath(), getTestPubKeyPath());
        return signer.sign(builder.build());
    }

    public static License generateExpiredNonBasicLicense(long expiryDate) throws Exception {
        return generateExpiredNonBasicLicense(randomFrom("silver", "dev", "gold", "platinum"), expiryDate);
    }

    public static License generateExpiredNonBasicLicense() throws Exception {
        return generateExpiredNonBasicLicense(randomFrom("silver", "dev", "gold", "platinum"));
    }

    public static License generateExpiredNonBasicLicense(String type) throws Exception {
        return generateExpiredNonBasicLicense(type,
                System.currentTimeMillis() - TimeValue.timeValueHours(randomIntBetween(1, 10)).getMillis());
    }

    public static License generateExpiredNonBasicLicense(String type, long expiryDate) throws Exception {
        final License.Builder builder = License.builder()
```

```
            .uid(UUID.randomUUID().toString())
            .version(License.VERSION_CURRENT)
            .expiryDate(expiryDate)
            .issueDate(expiryDate - TimeValue.timeValueMinutes(10).getMillis())
            .type(type)
            .issuedTo("customer")
            .issuer("elasticsearch")
            .maxNodes(5);
    LicenseSigner signer = new LicenseSigner(getTestPriKeyPath(), getTestPubKeyPath());
    return signer.sign(builder.build());
}

private static Path getResourcePath(String resource) throws Exception {
    Path resourceFile = createTempFile();
    try (InputStream resourceInput = TestUtils.class.getResourceAsStream(resource)) {
        Files.copy(resourceInput, resourceFile, StandardCopyOption.REPLACE_EXISTING);
    }
    return resourceFile;
}

public static void registerAndAckSignedLicenses(final LicenseService licenseService, License license,
                                                final LicensesStatus expectedStatus) {
    PutLicenseRequest putLicenseRequest = new PutLicenseRequest().license(license).acknowledge(true);
    final CountDownLatch latch = new CountDownLatch(1);
    final AtomicReference<LicensesStatus> status = new AtomicReference<>();
    licenseService.registerLicense(putLicenseRequest, new ActionListener<PutLicenseResponse>() {
        @Override
        public void onResponse(PutLicenseResponse licensesUpdateResponse) {
            status.set(licensesUpdateResponse.status());
            latch.countDown();
        }

        @Override
        public void onFailure(Exception e) {
            latch.countDown();
        }
    });
    try {
        latch.await();
    } catch (InterruptedException e) {
        Assert.fail(e.getMessage());
    }
    assertThat(status.get(), equalTo(expectedStatus));
}

public static class AssertingLicenseState extends XPackLicenseState {
    public final List<License.OperationMode> modeUpdates = new ArrayList<>();
    public final List<Boolean> activeUpdates = new ArrayList<>();
```

```
        public final List<Version> trialVersionUpdates = new ArrayList<>();

        public AssertingLicenseState() {
            super(Settings.EMPTY);
        }

        @Override
        void update(License.OperationMode mode, boolean active, Version mostRecentTrialVersion) {
            modeUpdates.add(mode);
            activeUpdates.add(active);
            trialVersionUpdates.add(mostRecentTrialVersion);
        }
    }

    /**
     * A license state that makes the {@link #update(License.OperationMode, boolean, Version)}
     * method public for use in tests.
     */
    public static class UpdatableLicenseState extends XPackLicenseState {
        public UpdatableLicenseState() {
            this(Settings.EMPTY);
        }

        public UpdatableLicenseState(Settings settings) {
            super(settings);
        }

        @Override
        public void update(License.OperationMode mode, boolean active, Version mostRecentTrialVersion) {
            super.update(mode, active, mostRecentTrialVersion);
        }
    }

    public static void putLicense(MetaData.Builder builder, License license) {
        builder.putCustom(LicensesMetaData.TYPE, new LicensesMetaData(license, null));
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionListener;
import org.elasticsearch.cluster.ack.ClusterStateUpdateResponse;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.settings.Settings;
```

```
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.protocol.xpack.license.DeleteLicenseRequest;
import org.elasticsearch.protocol.xpack.license.LicensesStatus;
import org.elasticsearch.test.ESSingleNodeTestCase;
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;
import org.elasticsearch.xpack.core.XPackSettings;
import org.junit.Before;

import java.util.Collection;
import java.util.Collections;
import java.util.concurrent.CountDownLatch;
import java.util.concurrent.atomic.AtomicBoolean;

import static org.hamcrest.Matchers.equalTo;
import static org.hamcrest.Matchers.not;

public class LicensesManagerServiceTests extends ESSingleNodeTestCase {

  @Override
  protected Collection<Class<? extends Plugin>> getPlugins() {
     return Collections.singletonList(LocalStateCompositeXPackPlugin.class);
  }

  @Override
  protected Settings nodeSettings() {
     return Settings.builder()
        .put(super.nodeSettings())
        .put(XPackSettings.SECURITY_ENABLED.getKey(), false)
        .put(XPackSettings.MONITORING_ENABLED.getKey(), false)
        .put(XPackSettings.WATCHER_ENABLED.getKey(), false)
        .put(XPackSettings.GRAPH_ENABLED.getKey(), false)
        .put(XPackSettings.MACHINE_LEARNING_ENABLED.getKey(), false)
        .build();
  }

  @Override
  protected boolean resetNodeAfterTest() {
     return true;
  }

  @Before
  public void waitForTrialLicenseToBeGenerated() throws Exception {
     assertBusy(() ->
assertNotNull(getInstanceFromNode(ClusterService.class).state().metaData().custom(LicensesMetaData.TYPE)));
  }

  public void testStoreAndGetLicenses() throws Exception {
```

```
    LicenseService licenseService = getInstanceFromNode(LicenseService.class);
    ClusterService clusterService = getInstanceFromNode(ClusterService.class);
    License goldLicense = TestUtils.generateSignedLicense("gold", TimeValue.timeValueHours(1));
    TestUtils.registerAndAckSignedLicenses(licenseService, goldLicense, LicensesStatus.VALID);
    License silverLicense = TestUtils.generateSignedLicense("silver", TimeValue.timeValueHours(2));
    TestUtils.registerAndAckSignedLicenses(licenseService, silverLicense, LicensesStatus.VALID);
    License platinumLicense = TestUtils.generateSignedLicense("platinum", TimeValue.timeValueHours(1));
    TestUtils.registerAndAckSignedLicenses(licenseService, platinumLicense, LicensesStatus.VALID);
    LicensesMetaData licensesMetaData = clusterService.state().metaData().custom(LicensesMetaData.TYPE);
    assertThat(licensesMetaData.getLicense(), equalTo(platinumLicense));
    final License getLicenses = licenseService.getLicense();
    assertThat(getLicenses, equalTo(platinumLicense));
}

// TODO: Add test/feature blocking the registration of basic license

public void testEffectiveLicenses() throws Exception {
    final LicenseService licenseService = getInstanceFromNode(LicenseService.class);
    final ClusterService clusterService = getInstanceFromNode(ClusterService.class);
    License goldLicense = TestUtils.generateSignedLicense("gold", TimeValue.timeValueSeconds(5));
    // put gold license
    TestUtils.registerAndAckSignedLicenses(licenseService, goldLicense, LicensesStatus.VALID);
    LicensesMetaData licensesMetaData = clusterService.state().metaData().custom(LicensesMetaData.TYPE);
    assertThat(LicenseService.getLicense(licensesMetaData), equalTo(goldLicense));

    License platinumLicense = TestUtils.generateSignedLicense("platinum", TimeValue.timeValueSeconds(3));
    // put platinum license
    TestUtils.registerAndAckSignedLicenses(licenseService, platinumLicense, LicensesStatus.VALID);
    licensesMetaData = clusterService.state().metaData().custom(LicensesMetaData.TYPE);
    assertThat(LicenseService.getLicense(licensesMetaData), equalTo(platinumLicense));
}

public void testInvalidLicenseStorage() throws Exception {
    LicenseService licenseService = getInstanceFromNode(LicenseService.class);
    ClusterService clusterService = getInstanceFromNode(ClusterService.class);
    License signedLicense = TestUtils.generateSignedLicense(TimeValue.timeValueMinutes(2));

    // modify content of signed license
    License tamperedLicense = License.builder()
            .fromLicenseSpec(signedLicense, signedLicense.signature())
            .expiryDate(signedLicense.expiryDate() + 10 * 24 * 60 * 60 * 1000L)
            .validate()
            .build();

    TestUtils.registerAndAckSignedLicenses(licenseService, tamperedLicense, LicensesStatus.INVALID);

    // ensure that the invalid license never made it to cluster state
    LicensesMetaData licensesMetaData = clusterService.state().metaData().custom(LicensesMetaData.TYPE);
```

```
        assertThat(licensesMetaData.getLicense(), not(equalTo(tamperedLicense)));
    }

    public void testRemoveLicenses() throws Exception {
        LicenseService licenseService = getInstanceFromNode(LicenseService.class);
        ClusterService clusterService = getInstanceFromNode(ClusterService.class);

        // generate signed licenses
        License license = TestUtils.generateSignedLicense(TimeValue.timeValueHours(1));
        TestUtils.registerAndAckSignedLicenses(licenseService, license, LicensesStatus.VALID);
        LicensesMetaData licensesMetaData = clusterService.state().metaData().custom(LicensesMetaData.TYPE);
        assertThat(licensesMetaData.getLicense(), not(LicensesMetaData.LICENSE_TOMBSTONE));

        // remove signed licenses
        removeAndAckSignedLicenses(licenseService);
        licensesMetaData = clusterService.state().metaData().custom(LicensesMetaData.TYPE);
        assertThat(licensesMetaData.getLicense(), equalTo(LicensesMetaData.LICENSE_TOMBSTONE));
    }

    private void removeAndAckSignedLicenses(final LicenseService licenseService) {
        final CountDownLatch latch = new CountDownLatch(1);
        final AtomicBoolean success = new AtomicBoolean(false);
        licenseService.removeLicense(new DeleteLicenseRequest(), new
ActionListener<ClusterStateUpdateResponse>() {
            @Override
            public void onResponse(ClusterStateUpdateResponse clusterStateUpdateResponse) {
                if (clusterStateUpdateResponse.isAcknowledged()) {
                    success.set(true);
                }
                latch.countDown();
            }

            @Override
            public void onFailure(Exception throwable) {
                latch.countDown();
            }
        });
        try {
            latch.await();
        } catch (InterruptedException e) {
            fail(e.getMessage());
        }
        assertThat("remove license(s) failed", success.get(), equalTo(true));
    }
}
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```

```
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*/
package org.elasticsearch.license;

import org.elasticsearch.analysis.common.CommonAnalysisPlugin;
import org.elasticsearch.common.network.NetworkModule;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.env.Environment;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.test.ESIntegTestCase.ClusterScope;
import org.elasticsearch.transport.Netty4Plugin;
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;
import org.elasticsearch.xpack.core.XPackPlugin;

import java.nio.charset.StandardCharsets;
import java.nio.file.Files;
import java.nio.file.Path;
import java.util.Arrays;
import java.util.Collection;

import static org.elasticsearch.test.ESIntegTestCase.Scope.TEST;
import static org.hamcrest.CoreMatchers.equalTo;
import static org.hamcrest.CoreMatchers.nullValue;

@ClusterScope(scope = TEST, numDataNodes = 0, numClientNodes = 0, maxNumDataNodes = 0,
transportClientRatio = 0)
public class LicenseServiceClusterTests extends AbstractLicensesIntegrationTestCase {

  @Override
  protected Settings nodeSettings(int nodeOrdinal) {
     return nodeSettingsBuilder(nodeOrdinal).build();
  }

  private Settings.Builder nodeSettingsBuilder(int nodeOrdinal) {
     return Settings.builder()
           .put(super.nodeSettings(nodeOrdinal))
           .put("node.data", true)
           .put("resource.reload.interval.high", "500ms") // for license mode file watcher
           .put(NetworkModule.HTTP_ENABLED.getKey(), true);
  }

  @Override
  protected Collection<Class<? extends Plugin>> nodePlugins() {
     return Arrays.asList(LocalStateCompositeXPackPlugin.class, CommonAnalysisPlugin.class,
Netty4Plugin.class);
  }
```

```
@Override
protected Collection<Class<? extends Plugin>> transportClientPlugins() {
    return nodePlugins();
}

public void testClusterRestartWithLicense() throws Exception {
    wipeAllLicenses();

    int numNodes = randomIntBetween(1, 5);
    logger.info("--> starting {} node(s)", numNodes);
    internalCluster().startNodes(numNodes);
    ensureGreen();

    logger.info("--> put signed license");
    LicensingClient licensingClient = new LicensingClient(client());
    License license = TestUtils.generateSignedLicense(TimeValue.timeValueMinutes(1));
    putLicense(license);
    assertThat(licensingClient.prepareGetLicense().get().license(), equalTo(license));
    assertOperationMode(license.operationMode());

    logger.info("--> restart all nodes");
    internalCluster().fullRestart();
    ensureYellow();
    licensingClient = new LicensingClient(client());
    logger.info("--> get and check signed license");
    assertThat(licensingClient.prepareGetLicense().get().license(), equalTo(license));
    logger.info("--> remove licenses");
    licensingClient.prepareDeleteLicense().get();
    assertOperationMode(License.OperationMode.MISSING);

    logger.info("--> restart all nodes");
    internalCluster().fullRestart();
    licensingClient = new LicensingClient(client());
    ensureYellow();
    assertThat(licensingClient.prepareGetLicense().get().license(), nullValue());
    assertOperationMode(License.OperationMode.MISSING);


    wipeAllLicenses();
}

public void testCloudInternalLicense() throws Exception {
    wipeAllLicenses();

    int numNodes = randomIntBetween(1, 5);
    logger.info("--> starting {} node(s)", numNodes);
    internalCluster().startNodes(numNodes);
    ensureGreen();
```

```
        logger.info("--> put signed license");
        LicensingClient licensingClient = new LicensingClient(client());
        License license = TestUtils.generateSignedLicense("cloud_internal", License.VERSION_CURRENT,
    System.currentTimeMillis(),
                TimeValue.timeValueMinutes(1));
        putLicense(license);
        assertThat(licensingClient.prepareGetLicense().get().license(), equalTo(license));
        assertOperationMode(License.OperationMode.PLATINUM);
        writeCloudInternalMode("gold");
        assertOperationMode(License.OperationMode.GOLD);
        writeCloudInternalMode("basic");
        assertOperationMode(License.OperationMode.BASIC);
    }

    public void testClusterRestartWhileEnabled() throws Exception {
        wipeAllLicenses();
        internalCluster().startNode();
        ensureGreen();
        assertLicenseActive(true);
        logger.info("--> restart node");
        internalCluster().fullRestart();
        ensureYellow();
        logger.info("--> await node for enabled");
        assertLicenseActive(true);
    }

    public void testClusterRestartWhileGrace() throws Exception {
        wipeAllLicenses();
        internalCluster().startNode();
        assertLicenseActive(true);
        putLicense(TestUtils.generateSignedLicense(TimeValue.timeValueMillis(0)));
        ensureGreen();
        assertLicenseActive(true);
        logger.info("--> restart node");
        internalCluster().fullRestart();
        ensureYellow();
        logger.info("--> await node for grace_period");
        assertLicenseActive(true);
    }

    public void testClusterRestartWhileExpired() throws Exception {
        wipeAllLicenses();
        internalCluster().startNode();
        ensureGreen();
        assertLicenseActive(true);
        putLicense(TestUtils.generateExpiredNonBasicLicense(System.currentTimeMillis() -
    LicenseService.GRACE_PERIOD_DURATION.getMillis()));
```

```
        assertLicenseActive(false);
        logger.info("--> restart node");
        internalCluster().fullRestart();
        ensureYellow();
        logger.info("--> await node for disabled");
        assertLicenseActive(false);
    }

    public void testClusterRestartWithOldSignature() throws Exception {
        assumeFalse("Can't run in a FIPS JVM. We can't generate old licenses since PBEWithSHA1AndDESede is not
available", inFipsJvm());
        wipeAllLicenses();
        internalCluster().startNode();
        ensureGreen();
        assertLicenseActive(true);
        putLicense(TestUtils.generateSignedLicenseOldSignature());
        LicensingClient licensingClient = new LicensingClient(client());
        assertThat(licensingClient.prepareGetLicense().get().license().version(),
equalTo(License.VERSION_START_DATE));
        logger.info("--> restart node");
        internalCluster().fullRestart(); // restart so that license is updated
        ensureYellow();
        logger.info("--> await node for enabled");
        assertLicenseActive(true);
        licensingClient = new LicensingClient(client());
        assertThat(licensingClient.prepareGetLicense().get().license().version(),
equalTo(License.VERSION_CURRENT)); //license updated
        internalCluster().fullRestart(); // restart once more and verify updated license is active
        ensureYellow();
        logger.info("--> await node for enabled");
        assertLicenseActive(true);
    }

    private void assertOperationMode(License.OperationMode operationMode) throws InterruptedException {
        boolean success = awaitBusy(() -> {
            for (XPackLicenseState licenseState : internalCluster().getDataNodeInstances(XPackLicenseState.class)) {
                if (licenseState.getOperationMode() == operationMode) {
                    return true;
                }
            }
            return false;
        });
        assertTrue(success);
    }

    private void writeCloudInternalMode(String mode) throws Exception {
        for (Environment environment : internalCluster().getDataOrMasterNodeInstances(Environment.class)) {
            Path licenseModePath = XPackPlugin.resolveConfigFile(environment, "license_mode");
```

```
            Files.createDirectories(licenseModePath.getParent());
            Files.write(licenseModePath, mode.getBytes(StandardCharsets.UTF_8));
        }
    }

}
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* or more contributor license agreements. Licensed under the Elastic License;
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*/
package org.elasticsearch.license;

import org.elasticsearch.test.ESTestCase;

import java.util.Locale;

import static org.elasticsearch.license.License.OperationMode;
import static org.hamcrest.Matchers.equalTo;

/**
* Tests {@link License.OperationMode} for correctness.
* <p>
* If you change the behavior of these tests, then it means that licensing changes across the products!
*/
public class LicenseOperationModeTests extends ESTestCase {
    public void testResolveTrial() {
        // assert 1.x BWC
        assertResolve(OperationMode.TRIAL, "nONE", "DEv", "deveLopment");
        // assert expected (2.x+) variant
        assertResolve(OperationMode.TRIAL, "tRiAl", "trial");
    }

    public void testResolveBasic() {
        // assert expected (2.x+) variant (note: no 1.x variant of BASIC)
        assertResolve(OperationMode.BASIC, "bAsIc", "basic");
    }

    public void testResolveStandard() {
        // assert expected (2.x+) variant (note: no 1.x variant of STANDARD)
        assertResolve(OperationMode.STANDARD, "StAnDARd", "standard");
    }

    public void testResolveGold() {
        // assert expected (2.x+) variant (note: no different 1.x variant of GOLD)
        assertResolve(OperationMode.GOLD, "SiLvEr", "gOlD", "silver", "gold");
    }
```

```
  public void testResolvePlatinum() {
    // assert 1.x BWC
    assertResolve(OperationMode.PLATINUM, "iNtErNaL");
    // assert expected (2.x+) variant
    assertResolve(OperationMode.PLATINUM, "PlAtINum", "platinum");
  }

  public void testResolveUnknown() {
    // 'enterprise' is a type that exists in cloud but should be rejected under normal operation
    // See https://github.com/elastic/x-plugins/issues/3371
    String[] types = { "unknown", "fake", "enterprise" };

    for (String type : types) {
      try {
        OperationMode.resolve(type);

        fail(String.format(Locale.ROOT, "[%s] should not be recognized as an operation mode", type));
      }
      catch (IllegalArgumentException e) {
        assertThat(e.getMessage(), equalTo("unknown type [" + type + "]"));
      }
    }
  }

  private static void assertResolve(OperationMode expected, String... types) {
    for (String type : types) {
      assertThat(OperationMode.resolve(type), equalTo(expected));
    }
  }
}
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* you may not use this file except in compliance with the Elastic License.
*/

package org.elasticsearch.license;

import org.elasticsearch.action.support.PlainActionFuture;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;

import static org.hamcrest.Matchers.containsString;
import static org.mockito.Matchers.any;
import static org.mockito.Mockito.verify;
```

```
public class LicenseFIPSTests extends AbstractLicenseServiceTestCase {

  public void testFIPSCheckWithAllowedLicense() throws Exception {
    License newLicense = TestUtils.generateSignedLicense(randomFrom("trial", "platinum"),
TimeValue.timeValueHours(24L));
    PutLicenseRequest request = new PutLicenseRequest();
    request.acknowledge(true);
    request.license(newLicense);
    Settings settings = Settings.builder()
      .put("xpack.security.enabled", true)
      .put("xpack.security.transport.ssl.enabled", true)
      .put("xpack.security.fips_mode.enabled", randomBoolean())
      .build();
    XPackLicenseState licenseState = new XPackLicenseState(settings);

    setInitialState(null, licenseState, settings);
    licenseService.start();
    PlainActionFuture<PutLicenseResponse> responseFuture = new PlainActionFuture<>();
    licenseService.registerLicense(request, responseFuture);
    verify(clusterService).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));
  }

  public void testFIPSCheckWithoutAllowedLicense() throws Exception {
    License newLicense = TestUtils.generateSignedLicense(randomFrom("gold", "standard"),
TimeValue.timeValueHours(24L));
    PutLicenseRequest request = new PutLicenseRequest();
    request.acknowledge(true);
    request.license(newLicense);
    Settings settings = Settings.builder()
      .put("xpack.security.enabled", true)
      .put("xpack.security.transport.ssl.enabled", true)
      .put("xpack.security.fips_mode.enabled", true)
      .build();
    XPackLicenseState licenseState = new XPackLicenseState(settings);

    setInitialState(null, licenseState, settings);
    licenseService.start();
    PlainActionFuture<PutLicenseResponse> responseFuture = new PlainActionFuture<>();
    IllegalStateException e = expectThrows(IllegalStateException.class, () ->
licenseService.registerLicense(request, responseFuture));
    assertThat(e.getMessage(),
      containsString("Cannot install a [" + newLicense.operationMode() + "] license unless FIPS mode is
disabled"));
    licenseService.stop();

    settings = Settings.builder()
      .put("xpack.security.enabled", true)
      .put("xpack.security.transport.ssl.enabled", true)
```

```
            .put("xpack.security.fips_mode.enabled", false)
            .build();
        licenseState = new XPackLicenseState(settings);

        setInitialState(null, licenseState, settings);
        licenseService.start();
        licenseService.registerLicense(request, responseFuture);
        verify(clusterService).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));
    }
}
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* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.Version;
import org.elasticsearch.cluster.ClusterModule;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.cluster.metadata.RepositoriesMetaData;
import org.elasticsearch.cluster.metadata.RepositoryMetaData;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.common.xcontent.NamedXContentRegistry;
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.ToXContent.Params;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentParser;
import org.elasticsearch.test.ESTestCase;

import java.util.Collections;
import java.util.UUID;
import java.util.stream.Collectors;
import java.util.stream.Stream;

import static org.hamcrest.Matchers.equalTo;
import static org.hamcrest.Matchers.notNullValue;
import static org.hamcrest.Matchers.nullValue;

public class LicensesMetaDataSerializationTests extends ESTestCase {

    public void testXContentSerializationOneSignedLicense() throws Exception {
        License license = TestUtils.generateSignedLicense(TimeValue.timeValueHours(2));
        LicensesMetaData licensesMetaData = new LicensesMetaData(license, null);
        XContentBuilder builder = XContentFactory.jsonBuilder();
        builder.startObject();
```

```
        builder.startObject("licenses");
        licensesMetaData.toXContent(builder, ToXContent.EMPTY_PARAMS);
        builder.endObject();
        builder.endObject();
        LicensesMetaData licensesMetaDataFromXContent =
getLicensesMetaDataFromXContent(createParser(builder));
        assertThat(licensesMetaDataFromXContent.getLicense(), equalTo(license));
        assertNull(licensesMetaDataFromXContent.getMostRecentTrialVersion());
    }

    public void testXContentSerializationOneSignedLicenseWithUsedTrial() throws Exception {
        License license = TestUtils.generateSignedLicense(TimeValue.timeValueHours(2));
        LicensesMetaData licensesMetaData = new LicensesMetaData(license, Version.CURRENT);
        XContentBuilder builder = XContentFactory.jsonBuilder();
        builder.startObject();
        builder.startObject("licenses");
        licensesMetaData.toXContent(builder, ToXContent.EMPTY_PARAMS);
        builder.endObject();
        builder.endObject();
        LicensesMetaData licensesMetaDataFromXContent =
getLicensesMetaDataFromXContent(createParser(builder));
        assertThat(licensesMetaDataFromXContent.getLicense(), equalTo(license));
        assertEquals(licensesMetaDataFromXContent.getMostRecentTrialVersion(), Version.CURRENT);
    }

    public void testLicenseMetadataParsingDoesNotSwallowOtherMetaData() throws Exception {
        new Licensing(Settings.EMPTY); // makes sure LicensePlugin is registered in Custom MetaData
        License license = TestUtils.generateSignedLicense(TimeValue.timeValueHours(2));
        LicensesMetaData licensesMetaData = new LicensesMetaData(license, Version.CURRENT);
        RepositoryMetaData repositoryMetaData = new RepositoryMetaData("repo", "fs", Settings.EMPTY);
        RepositoriesMetaData repositoriesMetaData = new
RepositoriesMetaData(Collections.singletonList(repositoryMetaData));
        final MetaData.Builder metaDataBuilder = MetaData.builder();
        if (randomBoolean()) { // random order of insertion
            metaDataBuilder.putCustom(licensesMetaData.getWriteableName(), licensesMetaData);
            metaDataBuilder.putCustom(repositoriesMetaData.getWriteableName(), repositoriesMetaData);
        } else {
            metaDataBuilder.putCustom(repositoriesMetaData.getWriteableName(), repositoriesMetaData);
            metaDataBuilder.putCustom(licensesMetaData.getWriteableName(), licensesMetaData);
        }
        // serialize metadata
        XContentBuilder builder = XContentFactory.jsonBuilder();
        Params params = new
ToXContent.MapParams(Collections.singletonMap(MetaData.CONTEXT_MODE_PARAM,
MetaData.CONTEXT_MODE_GATEWAY));
        builder.startObject();
        builder = metaDataBuilder.build().toXContent(builder, params);
        builder.endObject();
```

```
        // deserialize metadata again
        MetaData metaData = MetaData.Builder.fromXContent(createParser(builder));
        // check that custom metadata still present
        assertThat(metaData.custom(licensesMetaData.getWriteableName()), notNullValue());
        assertThat(metaData.custom(repositoriesMetaData.getWriteableName()), notNullValue());
    }

    public void testXContentSerializationOneTrial() throws Exception {
        long issueDate = System.currentTimeMillis();
        License.Builder specBuilder = License.builder()
                .uid(UUID.randomUUID().toString())
                .issuedTo("customer")
                .maxNodes(5)
                .issueDate(issueDate)
                .type(randomBoolean() ? "trial" : "basic")
                .expiryDate(issueDate + TimeValue.timeValueHours(2).getMillis());
        final License trialLicense = SelfGeneratedLicense.create(specBuilder, License.VERSION_CURRENT);
        LicensesMetaData licensesMetaData = new LicensesMetaData(trialLicense, Version.CURRENT);
        XContentBuilder builder = XContentFactory.jsonBuilder();
        builder.startObject();
        builder.startObject("licenses");
        licensesMetaData.toXContent(builder, ToXContent.EMPTY_PARAMS);
        builder.endObject();
        builder.endObject();
        LicensesMetaData licensesMetaDataFromXContent =
getLicensesMetaDataFromXContent(createParser(builder));
        assertThat(licensesMetaDataFromXContent.getLicense(), equalTo(trialLicense));
        assertEquals(licensesMetaDataFromXContent.getMostRecentTrialVersion(), Version.CURRENT);
    }

    public void testLicenseTombstoneFromXContext() throws Exception {
        final XContentBuilder builder = XContentFactory.jsonBuilder();
        builder.startObject();
        builder.startObject("licenses");
        builder.nullField("license");
        builder.endObject();
        builder.endObject();
        LicensesMetaData metaDataFromXContent = getLicensesMetaDataFromXContent(createParser(builder));
        assertThat(metaDataFromXContent.getLicense(), equalTo(LicensesMetaData.LICENSE_TOMBSTONE));
    }

    public void testLicenseTombstoneWithUsedTrialFromXContext() throws Exception {
        final XContentBuilder builder = XContentFactory.jsonBuilder();
        builder.startObject();
        builder.startObject("licenses");
        builder.nullField("license");
        builder.field("trial_license", Version.CURRENT.toString());
        builder.endObject();
```

```
        builder.endObject();
        LicensesMetaData metaDataFromXContent = getLicensesMetaDataFromXContent(createParser(builder));
        assertThat(metaDataFromXContent.getLicense(), equalTo(LicensesMetaData.LICENSE_TOMBSTONE));
        assertEquals(metaDataFromXContent.getMostRecentTrialVersion(), Version.CURRENT);
    }

    private static LicensesMetaData getLicensesMetaDataFromXContent(XContentParser parser) throws Exception {
        parser.nextToken(); // consume null
        parser.nextToken(); // consume "licenses"
        LicensesMetaData licensesMetaDataFromXContent = LicensesMetaData.fromXContent(parser);
        parser.nextToken(); // consume endObject
        assertThat(parser.nextToken(), nullValue());
        return licensesMetaDataFromXContent;
    }

    @Override
    protected NamedXContentRegistry xContentRegistry() {
        return new NamedXContentRegistry(Stream.concat(
                new Licensing(Settings.EMPTY).getNamedXContent().stream(),
                ClusterModule.getNamedXWriteables().stream()
        ).collect(Collectors.toList()));
    }
}
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* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionListener;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.protocol.xpack.license.LicensesStatus;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;

import static org.elasticsearch.common.unit.TimeValue.timeValueHours;
import static org.hamcrest.Matchers.equalTo;
import static org.hamcrest.Matchers.not;
import static org.mockito.Matchers.any;
import static org.mockito.Mockito.times;
import static org.mockito.Mockito.verify;

public class LicensesAcknowledgementTests extends AbstractLicenseServiceTestCase {

    public void testAcknowledgment() throws Exception {
        XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
```

```
        setInitialState(TestUtils.generateSignedLicense("gold", timeValueHours(2)), licenseState, Settings.EMPTY);
        licenseService.start();
        // try installing a signed license
        long issueDate = System.currentTimeMillis() - TimeValue.timeValueHours(24 * 2).getMillis();
        License signedLicense = TestUtils.generateSignedLicense("trial", License.VERSION_CURRENT, issueDate,
timeValueHours(10));
        PutLicenseRequest putLicenseRequest = new PutLicenseRequest().license(signedLicense);
        // ensure acknowledgement message was part of the response
        licenseService.registerLicense(putLicenseRequest, new AssertingLicensesUpdateResponse(false,
LicensesStatus.VALID, true));
        assertThat(licenseService.getLicense(), not(signedLicense));
        verify(clusterService, times(0)).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));

        // try installing a signed license with acknowledgement
        putLicenseRequest = new PutLicenseRequest().license(signedLicense).acknowledge(true);
        // ensure license was installed and no acknowledgment message was returned
        licenseService.registerLicense(putLicenseRequest, new AssertingLicensesUpdateResponse(true,
LicensesStatus.VALID, false));
        verify(clusterService, times(1)).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));
    }

    public void testRejectUpgradeToProductionWithoutTLS() throws Exception {
        XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
        setInitialState(TestUtils.generateSignedLicense("trial", timeValueHours(2)), licenseState, Settings.EMPTY);
        licenseService.start();
        // try installing a signed license
        License signedLicense = TestUtils.generateSignedLicense("platinum", timeValueHours(10));
        PutLicenseRequest putLicenseRequest = new PutLicenseRequest().license(signedLicense);
        // ensure acknowledgement message was part of the response
        IllegalStateException ise = expectThrows(IllegalStateException.class, () ->
                licenseService.registerLicense(putLicenseRequest, new AssertingLicensesUpdateResponse(false,
LicensesStatus.VALID, true)));
        assertEquals("Cannot install a [PLATINUM] license unless TLS is configured or security is disabled",
ise.getMessage());
    }

    public void testUpgradeToProductionWithoutTLSAndSecurityDisabled() throws Exception {
        XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
        setInitialState(TestUtils.generateSignedLicense("trial", timeValueHours(2)), licenseState, Settings.builder()
                .put("xpack.security.enabled", false).build());
        licenseService.start();
        // try installing a signed license
        License signedLicense = TestUtils.generateSignedLicense("platinum", timeValueHours(10));
        PutLicenseRequest putLicenseRequest = new PutLicenseRequest().license(signedLicense);
        licenseService.registerLicense(putLicenseRequest, new AssertingLicensesUpdateResponse(false,
LicensesStatus.VALID, true));
        assertThat(licenseService.getLicense(), not(signedLicense));
        verify(clusterService, times(1)).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));
```

```
        // try installing a signed license with acknowledgement
        putLicenseRequest = new PutLicenseRequest().license(signedLicense).acknowledge(true);
        // ensure license was installed and no acknowledgment message was returned
        licenseService.registerLicense(putLicenseRequest, new AssertingLicensesUpdateResponse(true,
    LicensesStatus.VALID, false));
        verify(clusterService, times(2)).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));
      }

      public void testUpgradeToProductionWithTLSAndSecurity() throws Exception {
        XPackLicenseState licenseState = new XPackLicenseState(Settings.EMPTY);
        setInitialState(TestUtils.generateSignedLicense("trial", timeValueHours(2)), licenseState, Settings.builder()
                .put("xpack.security.enabled", true)
                .put("xpack.security.transport.ssl.enabled", true).build());
        licenseService.start();
        // try installing a signed license
        License signedLicense = TestUtils.generateSignedLicense("platinum", timeValueHours(10));
        PutLicenseRequest putLicenseRequest = new PutLicenseRequest().license(signedLicense);
        licenseService.registerLicense(putLicenseRequest, new AssertingLicensesUpdateResponse(false,
    LicensesStatus.VALID, true));
        assertThat(licenseService.getLicense(), not(signedLicense));
        verify(clusterService, times(1)).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));

        // try installing a signed license with acknowledgement
        putLicenseRequest = new PutLicenseRequest().license(signedLicense).acknowledge(true);
        // ensure license was installed and no acknowledgment message was returned
        licenseService.registerLicense(putLicenseRequest, new AssertingLicensesUpdateResponse(true,
    LicensesStatus.VALID, false));
        verify(clusterService, times(2)).submitStateUpdateTask(any(String.class), any(ClusterStateUpdateTask.class));
      }

      private static class AssertingLicensesUpdateResponse implements ActionListener<PutLicenseResponse> {
        private final boolean expectedAcknowledgement;
        private final LicensesStatus expectedStatus;
        private final boolean expectAckMessages;

        AssertingLicensesUpdateResponse(boolean expectedAcknowledgement, LicensesStatus expectedStatus,
                                        boolean expectAckMessages) {
          this.expectedAcknowledgement = expectedAcknowledgement;
          this.expectedStatus = expectedStatus;
          this.expectAckMessages = expectAckMessages;
        }

        @Override
        public void onResponse(PutLicenseResponse licensesUpdateResponse) {
          assertThat(licensesUpdateResponse.isAcknowledged(), equalTo(expectedAcknowledgement));
          assertThat(licensesUpdateResponse.status(), equalTo(expectedStatus));
          assertEquals(licensesUpdateResponse.acknowledgeMessages().isEmpty(), expectAckMessages == false);
```

```
        }

        @Override
        public void onFailure(Exception throwable) {
            throw new RuntimeException(throwable);
        }
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.test.ESTestCase;

import static org.elasticsearch.common.unit.TimeValue.timeValueMillis;
import static org.hamcrest.Matchers.equalTo;
import static org.hamcrest.Matchers.nullValue;

public class ExpirationCallbackTests extends ESTestCase {

    public void testPostExpirationDelay() throws Exception {
        TimeValue expiryDuration = TimeValue.timeValueSeconds(randomIntBetween(5, 10));
        TimeValue min = TimeValue.timeValueSeconds(1);
        TimeValue max = TimeValue.timeValueSeconds(4);
        TimeValue frequency = TimeValue.timeValueSeconds(1);
        NoopPostExpirationCallback post = new NoopPostExpirationCallback(min, max, frequency);
        long now = System.currentTimeMillis();
        long expiryDate = now + expiryDuration.getMillis();
        assertThat(post.delay(expiryDate, now),
                equalTo(TimeValue.timeValueMillis(expiryDuration.getMillis() + min.getMillis()))); // before license
expiry
        assertThat(post.delay(expiryDate, expiryDate), equalTo(min)); // on license expiry
        int latestValidTriggerDelay = (int) (expiryDuration.getMillis() + max.getMillis());
        int earliestValidTriggerDelay = (int) (expiryDuration.getMillis() + min.getMillis());
        assertExpirationCallbackDelay(post, expiryDuration.millis(), latestValidTriggerDelay,
earliestValidTriggerDelay);
    }

    public void testPreExpirationDelay() throws Exception {
        TimeValue expiryDuration = TimeValue.timeValueSeconds(randomIntBetween(5, 10));
        TimeValue min = TimeValue.timeValueSeconds(1);
        TimeValue max = TimeValue.timeValueSeconds(4);
        TimeValue frequency = TimeValue.timeValueSeconds(1);
        NoopPreExpirationCallback pre = new NoopPreExpirationCallback(min, max, frequency);
```

```
        long now = System.currentTimeMillis();
        long expiryDate = now + expiryDuration.getMillis();
        assertThat(pre.delay(expiryDate, expiryDate), nullValue()); // on license expiry
        int latestValidTriggerDelay = (int) (expiryDuration.getMillis() - min.getMillis());
        int earliestValidTriggerDelay = (int) (expiryDuration.getMillis() - max.getMillis());
        assertExpirationCallbackDelay(pre, expiryDuration.millis(), latestValidTriggerDelay,
earliestValidTriggerDelay);
    }

    public void testPostExpirationWithNullMax() throws Exception {
        int postExpirySeconds = randomIntBetween(5, 10);
        TimeValue postExpiryDuration = TimeValue.timeValueSeconds(postExpirySeconds);
        TimeValue min = TimeValue.timeValueSeconds(postExpirySeconds - randomIntBetween(1, 3));

        final ExpirationCallback.Post post = new NoopPostExpirationCallback(min, null, timeValueMillis(10));
        long now = System.currentTimeMillis();
        assertThat(post.delay(now - postExpiryDuration.millis(), now), equalTo(TimeValue.timeValueMillis(0)));
    }

    public void testPreExpirationWithNullMin() throws Exception {
        int expirySeconds = randomIntBetween(5, 10);
        TimeValue expiryDuration = TimeValue.timeValueSeconds(expirySeconds);
        TimeValue max = TimeValue.timeValueSeconds(expirySeconds + randomIntBetween(1, 10));

        final ExpirationCallback.Pre pre = new NoopPreExpirationCallback(null, max, timeValueMillis(10));
        long now = System.currentTimeMillis();
        assertThat(pre.delay(expiryDuration.millis() + now, now), equalTo(TimeValue.timeValueMillis(0)));
    }

    public void testPreExpirationScheduleTime() throws Exception {
        TimeValue expiryDuration = TimeValue.timeValueSeconds(randomIntBetween(5, 10));
        TimeValue min = TimeValue.timeValueSeconds(1);
        TimeValue max = TimeValue.timeValueSeconds(4);
        TimeValue frequency = TimeValue.timeValueSeconds(1);
        NoopPreExpirationCallback pre = new NoopPreExpirationCallback(min, max, frequency);
        int latestValidTriggerDelay = (int) (expiryDuration.getMillis() - min.getMillis());
        int earliestValidTriggerDelay = (int) (expiryDuration.getMillis() - max.getMillis());
        assertExpirationCallbackScheduleTime(pre, expiryDuration.millis(), latestValidTriggerDelay,
earliestValidTriggerDelay);
    }

    public void testPostExpirationScheduleTime() throws Exception {
        TimeValue expiryDuration = TimeValue.timeValueSeconds(randomIntBetween(5, 10));
        TimeValue min = TimeValue.timeValueSeconds(1);
        TimeValue max = TimeValue.timeValueSeconds(4);
        TimeValue frequency = TimeValue.timeValueSeconds(1);
        NoopPostExpirationCallback pre = new NoopPostExpirationCallback(min, max, frequency);
        int latestValidTriggerDelay = (int) (expiryDuration.getMillis() + max.getMillis());
```

```
    int earliestValidTriggerDelay = (int) (expiryDuration.getMillis() + min.getMillis());
    assertExpirationCallbackScheduleTime(pre, expiryDuration.millis(), latestValidTriggerDelay,
earliestValidTriggerDelay);
  }

  private void assertExpirationCallbackDelay(ExpirationCallback expirationCallback, long expiryDuration,
                                             int latestValidTriggerDelay, int earliestValidTriggerDelay) {
    long now = System.currentTimeMillis();
    long expiryDate = now + expiryDuration;
    // bounds
    assertThat(expirationCallback.delay(expiryDate, now + earliestValidTriggerDelay),
equalTo(TimeValue.timeValueMillis(0)));
    assertThat(expirationCallback.delay(expiryDate, now + latestValidTriggerDelay),
equalTo(TimeValue.timeValueMillis(0)));
    // in match
    assertThat(expirationCallback.delay(expiryDate,
        now + randomIntBetween(earliestValidTriggerDelay, latestValidTriggerDelay)),
        equalTo(TimeValue.timeValueMillis(0)));
    // out of bounds
    int deltaBeforeEarliestMatch = between(1, earliestValidTriggerDelay);
    assertThat(expirationCallback.delay(expiryDate, now + deltaBeforeEarliestMatch),
        equalTo(TimeValue.timeValueMillis(earliestValidTriggerDelay - deltaBeforeEarliestMatch)));
    int deltaAfterLatestMatch = between(latestValidTriggerDelay + 1, Integer.MAX_VALUE); // after expiry and
after max
    assertThat(expirationCallback.delay(expiryDate, expiryDate + deltaAfterLatestMatch), nullValue());
  }

  public void assertExpirationCallbackScheduleTime(ExpirationCallback expirationCallback, long expiryDuration,
                                                   int latestValidTriggerDelay, int earliestValidTriggerDelay) {
    long now = System.currentTimeMillis();
    long expiryDate = now + expiryDuration;
    int validTriggerInterval = between(earliestValidTriggerDelay, latestValidTriggerDelay);
    assertThat(expirationCallback.nextScheduledTimeForExpiry(expiryDate,
        now + validTriggerInterval, now + validTriggerInterval),
        equalTo(now + validTriggerInterval));
    assertThat(expirationCallback.nextScheduledTimeForExpiry(expiryDate, now, now + validTriggerInterval),
        equalTo(now + validTriggerInterval + expirationCallback.getFrequency()));

    int deltaBeforeEarliestMatch = between(1, earliestValidTriggerDelay - 1);
    assertThat(expirationCallback.nextScheduledTimeForExpiry(expiryDate, now, now +
deltaBeforeEarliestMatch),
        equalTo(now + deltaBeforeEarliestMatch +
            expirationCallback.delay(expiryDate, now + deltaBeforeEarliestMatch).getMillis()));
    assertThat(expirationCallback.nextScheduledTimeForExpiry(expiryDate,
        now + deltaBeforeEarliestMatch, now + deltaBeforeEarliestMatch),
        equalTo(now + deltaBeforeEarliestMatch +
            expirationCallback.delay(expiryDate, now + deltaBeforeEarliestMatch).getMillis()));
```

```
        int deltaAfterLatestMatch = between(latestValidTriggerDelay + 1, Integer.MAX_VALUE); // after expiry and
after max
        assertThat(expirationCallback.nextScheduledTimeForExpiry(expiryDate, now, now + deltaAfterLatestMatch),
equalTo(-1L));
        assertThat(expirationCallback.nextScheduledTimeForExpiry(expiryDate,
                now + deltaAfterLatestMatch, now + deltaAfterLatestMatch),
                equalTo(-1L));
    }

    private static class NoopPostExpirationCallback extends ExpirationCallback.Post {

        NoopPostExpirationCallback(TimeValue min, TimeValue max, TimeValue frequency) {
            super(min, max, frequency);
        }

        @Override
        public void on(License license) {}
    }

    private static class NoopPreExpirationCallback extends ExpirationCallback.Pre {

        NoopPreExpirationCallback(TimeValue min, TimeValue max, TimeValue frequency) {
            super(min, max, frequency);
        }

        @Override
        public void on(License license) {}
    }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.threadpool.TestThreadPool;
import org.elasticsearch.watcher.ResourceWatcherService;
import org.junit.After;
import org.junit.Before;

import java.io.IOException;
import java.nio.charset.StandardCharsets;
import java.nio.file.Files;
import java.nio.file.Path;
import java.nio.file.StandardOpenOption;
```

```
import java.util.concurrent.CountDownLatch;
import java.util.concurrent.TimeUnit;
import java.util.concurrent.atomic.AtomicReference;

import static org.hamcrest.Matchers.equalTo;

public class OperationModeFileWatcherTests extends ESTestCase {
  private ResourceWatcherService watcherService;
  private TestThreadPool threadPool;
  private Path licenseModePath;
  private OperationModeFileWatcher operationModeFileWatcher;
  private AtomicReference<CountDownLatch> onChangeCounter;

  @Before
  public void setup() throws Exception {
    threadPool = new TestThreadPool("license mode file watcher tests");
    Settings settings = Settings.builder()
        .put("resource.reload.interval.high", "10ms")
        .build();
    watcherService = new ResourceWatcherService(settings,
        threadPool);
    watcherService.start();
    licenseModePath = createTempFile();
    onChangeCounter = new AtomicReference<>(new CountDownLatch(1));
    operationModeFileWatcher = new OperationModeFileWatcher(watcherService, licenseModePath, logger,
        () -> onChangeCounter.get().countDown());
  }

  @After
  public void shutdown() throws InterruptedException {
    terminate(threadPool);
    watcherService.stop();
  }

  public void testInit() throws Exception {
    onChangeCounter.set(new CountDownLatch(2));
    writeMode("gold");
    assertThat(operationModeFileWatcher.getCurrentOperationMode(),
equalTo(License.OperationMode.PLATINUM));
    operationModeFileWatcher.init();
    assertTrue(onChangeCounter.get().await(5, TimeUnit.SECONDS));
    assertThat(operationModeFileWatcher.getCurrentOperationMode(), equalTo(License.OperationMode.GOLD));
  }

  public void testUpdateModeFromFile() throws Exception {
    Files.delete(licenseModePath);
    operationModeFileWatcher.init();
    assertThat(operationModeFileWatcher.getCurrentOperationMode(),
```

```
equalTo(License.OperationMode.PLATINUM));
        writeMode("gold");
        assertTrue(onChangeCounter.get().await(5, TimeUnit.SECONDS));
        assertThat(operationModeFileWatcher.getCurrentOperationMode(), equalTo(License.OperationMode.GOLD));
        onChangeCounter.set(new CountDownLatch(1));
        writeMode("basic");
        assertTrue(onChangeCounter.get().await(5, TimeUnit.SECONDS));
        assertThat(operationModeFileWatcher.getCurrentOperationMode(), equalTo(License.OperationMode.BASIC));
    }

    public void testDeleteModeFromFile() throws Exception {
        Files.delete(licenseModePath);
        operationModeFileWatcher.init();
        writeMode("gold");
        assertTrue(onChangeCounter.get().await(5, TimeUnit.SECONDS));
        assertThat(operationModeFileWatcher.getCurrentOperationMode(), equalTo(License.OperationMode.GOLD));
        onChangeCounter.set(new CountDownLatch(1));

        Files.delete(licenseModePath);
        assertTrue(onChangeCounter.get().await(5, TimeUnit.SECONDS));
        assertThat(operationModeFileWatcher.getCurrentOperationMode(),
equalTo(License.OperationMode.PLATINUM));
    }

    public void testInvalidModeFromFile() throws Exception {
        writeMode("invalid");
        operationModeFileWatcher.init();
        assertThat(operationModeFileWatcher.getCurrentOperationMode(),
equalTo(License.OperationMode.PLATINUM));
        operationModeFileWatcher.onFileChanged(licenseModePath);
        assertThat(operationModeFileWatcher.getCurrentOperationMode(),
equalTo(License.OperationMode.PLATINUM));
    }

    public void testLicenseModeFileIsDirectory() throws Exception {
        licenseModePath = createTempDir();
        operationModeFileWatcher.init();
        assertThat(operationModeFileWatcher.getCurrentOperationMode(),
equalTo(License.OperationMode.PLATINUM));
        operationModeFileWatcher.onFileChanged(licenseModePath);
        assertThat(operationModeFileWatcher.getCurrentOperationMode(),
equalTo(License.OperationMode.PLATINUM));
    }

    public void testLicenseModeFileCreatedAfterInit() throws Exception {
        Files.delete(licenseModePath);
        operationModeFileWatcher.init();
        assertThat(operationModeFileWatcher.getCurrentOperationMode(),
```

```
equalTo(License.OperationMode.PLATINUM));
        onChangeCounter.set(new CountDownLatch(1));
        Path tempFile = createTempFile();
        writeMode("gold", tempFile);
        licenseModePath = tempFile;
        assertTrue(onChangeCounter.get().await(5, TimeUnit.SECONDS));
        assertThat(operationModeFileWatcher.getCurrentOperationMode(), equalTo(License.OperationMode.GOLD));
    }

    private void writeMode(String mode) throws IOException {
        writeMode(mode, licenseModePath);
    }

    static void writeMode(String mode, Path file) throws IOException {
        Files.write(file, mode.getBytes(StandardCharsets.UTF_8), StandardOpenOption.CREATE);
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.test.ESTestCase;
import org.elasticsearch.watcher.FileWatcher;
import org.elasticsearch.watcher.ResourceWatcherService;
import org.junit.Before;

import java.nio.file.Path;

import static org.hamcrest.Matchers.equalTo;
import static org.mockito.Matchers.any;
import static org.mockito.Matchers.eq;
import static org.mockito.Mockito.mock;
import static org.mockito.Mockito.times;
import static org.mockito.Mockito.verify;
import static org.mockito.Mockito.verifyZeroInteractions;

public class LicenseOperationModeUpdateTests extends ESTestCase {

    private OperationModeFileWatcher operationModeFileWatcher;
    private Path licenseModeFile;
    private ResourceWatcherService resourceWatcherService;

    @Before
    public void init() throws Exception {
        licenseModeFile = createTempFile();
```

```
        resourceWatcherService = mock(ResourceWatcherService.class);
        operationModeFileWatcher = new OperationModeFileWatcher(resourceWatcherService, licenseModeFile,
logger, () -> {});
    }

    public void testLicenseOperationModeUpdate() throws Exception {
        String type = randomFrom("trial", "basic", "standard", "gold", "platinum");
        License license = License.builder()
                .uid("id")
                .expiryDate(0)
                .issueDate(0)
                .issuedTo("elasticsearch")
                .issuer("issuer")
                .type(type)
                .maxNodes(1)
                .build();

        assertThat(license.operationMode(), equalTo(License.OperationMode.resolve(type)));
        OperationModeFileWatcherTests.writeMode("gold", licenseModeFile);
        license.setOperationModeFileWatcher(operationModeFileWatcher);
        verifyZeroInteractions(resourceWatcherService);
        assertThat(license.operationMode(), equalTo(License.OperationMode.resolve(type)));
    }

    public void testCloudInternalLicenseOperationModeUpdate() throws Exception {
        License license = License.builder()
                .uid("id")
                .expiryDate(0)
                .issueDate(0)
                .issuedTo("elasticsearch")
                .issuer("issuer")
                .type("cloud_internal")
                .maxNodes(1)
                .build();

        assertThat(license.operationMode(), equalTo(License.OperationMode.PLATINUM));
        OperationModeFileWatcherTests.writeMode("gold", licenseModeFile);
        license.setOperationModeFileWatcher(operationModeFileWatcher);
        verify(resourceWatcherService, times(1)).add(any(FileWatcher.class),
eq(ResourceWatcherService.Frequency.HIGH));
        assertThat(license.operationMode(), equalTo(License.OperationMode.GOLD));
    }
}
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*/
```

```
package org.elasticsearch.license;

import org.elasticsearch.common.bytes.BytesArray;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentHelper;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.test.ESTestCase;

import java.nio.charset.StandardCharsets;
import java.util.Collections;
import java.util.Map;
import java.util.UUID;

import static org.hamcrest.core.IsEqual.equalTo;
import static org.hamcrest.core.IsNull.notNullValue;
import static org.hamcrest.core.IsNull.nullValue;

public class LicenseSerializationTests extends ESTestCase {
  public void testSimpleIssueExpiryDate() throws Exception {
    long now = System.currentTimeMillis();
    String issueDate = TestUtils.dateMathString("now", now);
    String expiryDate = TestUtils.dateMathString("now+10d/d", now);
    String licenseSpecs = TestUtils.generateLicenseSpecString(new TestUtils.LicenseSpec(issueDate, expiryDate));
    License generatedLicense = License.fromSource(new
BytesArray(licenseSpecs.getBytes(StandardCharsets.UTF_8)), XContentType.JSON);
    assertThat(generatedLicense.issueDate(), equalTo(DateUtils.beginningOfTheDay(issueDate)));
    assertThat(generatedLicense.expiryDate(), equalTo(DateUtils.endOfTheDay(expiryDate)));
  }

  public void testLicensesFields() throws Exception {
    TestUtils.LicenseSpec randomLicenseSpec =
TestUtils.generateRandomLicenseSpec(License.VERSION_START);
    String licenseSpecsSource = TestUtils.generateLicenseSpecString(randomLicenseSpec);
    final License fromSource =
        License.fromSource(new BytesArray(licenseSpecsSource.getBytes(StandardCharsets.UTF_8)),
XContentType.JSON);
    TestUtils.assertLicenseSpec(randomLicenseSpec, fromSource);
  }

  public void testLicenseRestView() throws Exception {
    long now = System.currentTimeMillis();
    String expiredLicenseExpiryDate = TestUtils.dateMathString("now-1d/d", now);
    String validLicenseIssueDate = TestUtils.dateMathString("now-10d/d", now);
    String invalidLicenseIssueDate = TestUtils.dateMathString("now+1d/d", now);
    String validLicenseExpiryDate = TestUtils.dateMathString("now+2d/d", now);
```

```
        License license = TestUtils.generateLicenses(new TestUtils.LicenseSpec(validLicenseIssueDate,
expiredLicenseExpiryDate));
        XContentBuilder builder = XContentFactory.contentBuilder(XContentType.JSON);
        license.toXContent(builder, new
ToXContent.MapParams(Collections.singletonMap(License.REST_VIEW_MODE, "true")));
        builder.flush();
        Map<String, Object> map = XContentHelper.convertToMap(BytesReference.bytes(builder), false,
builder.contentType()).v2();

        // should have an extra status field, human readable issue_data and expiry_date
        assertThat(map.get("status"), notNullValue());
        assertThat(map.get("issue_date"), notNullValue());
        assertThat(map.get("expiry_date"), notNullValue());
        assertThat(map.get("status"), equalTo("expired"));
        builder = XContentFactory.contentBuilder(XContentType.JSON);
        license.toXContent(builder, ToXContent.EMPTY_PARAMS);
        builder.flush();
        map = XContentHelper.convertToMap(BytesReference.bytes(builder), false, builder.contentType()).v2();
        assertThat(map.get("status"), nullValue());

        license = TestUtils.generateLicenses(new TestUtils.LicenseSpec(validLicenseIssueDate,
validLicenseExpiryDate));
        builder = XContentFactory.contentBuilder(XContentType.JSON);
        license.toXContent(builder, new
ToXContent.MapParams(Collections.singletonMap(License.REST_VIEW_MODE, "true")));
        builder.flush();
        map = XContentHelper.convertToMap(BytesReference.bytes(builder), false, builder.contentType()).v2();

        // should have an extra status field, human readable issue_data and expiry_date
        assertThat(map.get("status"), notNullValue());
        assertThat(map.get("issue_date"), notNullValue());
        assertThat(map.get("expiry_date"), notNullValue());
        assertThat(map.get("status"), equalTo("active"));
        builder = XContentFactory.contentBuilder(XContentType.JSON);
        license.toXContent(builder, ToXContent.EMPTY_PARAMS);
        builder.flush();
        map = XContentHelper.convertToMap(BytesReference.bytes(builder), false, builder.contentType()).v2();
        assertThat(map.get("status"), nullValue());

        license = TestUtils.generateLicenses(new TestUtils.LicenseSpec(invalidLicenseIssueDate,
validLicenseExpiryDate));
        builder = XContentFactory.contentBuilder(XContentType.JSON);
        license.toXContent(builder, new
ToXContent.MapParams(Collections.singletonMap(License.REST_VIEW_MODE, "true")));
        builder.flush();
        map = XContentHelper.convertToMap(BytesReference.bytes(builder), false, builder.contentType()).v2();
```

```
        // should have an extra status field, human readable issue_data and expiry_date
        assertThat(map.get("status"), notNullValue());
        assertThat(map.get("issue_date"), notNullValue());
        assertThat(map.get("expiry_date"), notNullValue());
        assertThat(map.get("status"), equalTo("invalid"));
        builder = XContentFactory.contentBuilder(XContentType.JSON);
        license.toXContent(builder, ToXContent.EMPTY_PARAMS);
        builder.flush();
        map = XContentHelper.convertToMap(BytesReference.bytes(builder), false, builder.contentType()).v2();
        assertThat(map.get("status"), nullValue());
    }

    public void testLicenseRestViewNonExpiringBasic() throws Exception {
        long now = System.currentTimeMillis();

        License.Builder specBuilder = License.builder()
                .uid(UUID.randomUUID().toString())
                .issuedTo("test")
                .maxNodes(1000)
                .issueDate(now)
                .type("basic")
                .expiryDate(LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS);
        License license = SelfGeneratedLicense.create(specBuilder, License.VERSION_CURRENT);
        XContentBuilder builder = XContentFactory.contentBuilder(XContentType.JSON);
        license.toXContent(builder, new
ToXContent.MapParams(Collections.singletonMap(License.REST_VIEW_MODE, "true")));
        builder.flush();
        Map<String, Object> map = XContentHelper.convertToMap(BytesReference.bytes(builder), false,
builder.contentType()).v2();

        // should have an extra status field, human readable issue_data and no expiry_date
        assertThat(map.get("status"), notNullValue());
        assertThat(map.get("type"), equalTo("basic"));
        assertThat(map.get("issue_date"), notNullValue());
        assertThat(map.get("expiry_date"), nullValue());
        assertThat(map.get("expiry_date_in_millis"), nullValue());
        assertThat(map.get("status"), equalTo("active"));
        builder = XContentFactory.contentBuilder(XContentType.JSON);
        license.toXContent(builder, ToXContent.EMPTY_PARAMS);
        builder.flush();
        map = XContentHelper.convertToMap(BytesReference.bytes(builder), false, builder.contentType()).v2();
        assertThat(map.get("status"), nullValue());
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
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```

```
*/
package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchSecurityException;
import org.elasticsearch.test.ESTestCase;

import java.util.Arrays;

import static org.hamcrest.Matchers.contains;
import static org.hamcrest.Matchers.equalTo;
import static org.hamcrest.Matchers.hasSize;

public class LicenseUtilsTests extends ESTestCase {

  public void testNewExpirationException() {
    for (String feature : Arrays.asList("feature", randomAlphaOfLength(5), null, "")) {
      ElasticsearchSecurityException exception = LicenseUtils.newComplianceException(feature);
      assertNotNull(exception);
      assertThat(exception.getMetadataKeys(), contains(LicenseUtils.EXPIRED_FEATURE_METADATA));
      assertThat(exception.getMetadata(LicenseUtils.EXPIRED_FEATURE_METADATA), hasSize(1));
      assertThat(exception.getMetadata(LicenseUtils.EXPIRED_FEATURE_METADATA).iterator().next(),
equalTo(feature));
    }
  }

  public void testIsLicenseExpiredException() {
    ElasticsearchSecurityException exception = LicenseUtils.newComplianceException("feature");
    assertTrue(LicenseUtils.isLicenseExpiredException(exception));

    exception = new ElasticsearchSecurityException("msg");
    assertFalse(LicenseUtils.isLicenseExpiredException(exception));
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.analysis.common.CommonAnalysisPlugin;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.Nullable;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.plugins.Plugin;
```

```
import org.elasticsearch.test.ESIntegTestCase;
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;
import org.elasticsearch.xpack.core.XPackClientPlugin;
import org.elasticsearch.xpack.core.XPackSettings;

import java.util.Arrays;
import java.util.Collection;
import java.util.concurrent.CountDownLatch;

public abstract class AbstractLicensesIntegrationTestCase extends ESIntegTestCase {

  @Override
  protected Settings nodeSettings(int nodeOrdinal) {
    return Settings.builder().put(XPackSettings.SECURITY_ENABLED.getKey(), false).build();
  }

  @Override
  protected Collection<Class<? extends Plugin>> nodePlugins() {
    return Arrays.asList(LocalStateCompositeXPackPlugin.class, CommonAnalysisPlugin.class);
  }

  @Override
  protected Collection<Class<? extends Plugin>> transportClientPlugins() {
    return Arrays.asList(XPackClientPlugin.class, CommonAnalysisPlugin.class);
  }

  @Override
  protected Settings transportClientSettings() {
    // Plugin should be loaded on the transport client as well
    return nodeSettings(0);
  }

  protected void putLicense(final License license) throws InterruptedException {
    final CountDownLatch latch = new CountDownLatch(1);
    ClusterService clusterService = internalCluster().getInstance(ClusterService.class,
internalCluster().getMasterName());
    clusterService.submitStateUpdateTask("putting license", new ClusterStateUpdateTask() {
      @Override
      public void clusterStateProcessed(String source, ClusterState oldState, ClusterState newState) {
        latch.countDown();
      }

      @Override
      public ClusterState execute(ClusterState currentState) throws Exception {
        MetaData.Builder mdBuilder = MetaData.builder(currentState.metaData());
        mdBuilder.putCustom(LicensesMetaData.TYPE, new LicensesMetaData(license, null));
        return ClusterState.builder(currentState).metaData(mdBuilder).build();
      }
```

```
            @Override
            public void onFailure(String source, @Nullable Exception e) {
                logger.error("error on metaData cleanup after test", e);
            }
        });
        latch.await();
    }

    protected void putLicenseTombstone() throws InterruptedException {
        putLicense(LicensesMetaData.LICENSE_TOMBSTONE);
    }

    protected void wipeAllLicenses() throws InterruptedException {
        final CountDownLatch latch = new CountDownLatch(1);
        ClusterService clusterService = internalCluster().getInstance(ClusterService.class,
internalCluster().getMasterName());
        clusterService.submitStateUpdateTask("delete licensing metadata", new ClusterStateUpdateTask() {
            @Override
            public void clusterStateProcessed(String source, ClusterState oldState, ClusterState newState) {
                latch.countDown();
            }

            @Override
            public ClusterState execute(ClusterState currentState) throws Exception {
                MetaData.Builder mdBuilder = MetaData.builder(currentState.metaData());
                mdBuilder.removeCustom(LicensesMetaData.TYPE);
                return ClusterState.builder(currentState).metaData(mdBuilder).build();
            }

            @Override
            public void onFailure(String source, @Nullable Exception e) {
                logger.error("error on metaData cleanup after test", e);
            }
        });
        latch.await();
    }

    protected void assertLicenseActive(boolean active) throws InterruptedException {
        boolean success = awaitBusy(() -> {
            for (XPackLicenseState licenseState : internalCluster().getDataNodeInstances(XPackLicenseState.class)) {
                if (licenseState.isActive() == active) {
                    return true;
                }
            }
            return false;
        });
        assertTrue(success);
```

```
  }

}
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*/
package org.elasticsearch.license;

import org.elasticsearch.client.Request;
import org.elasticsearch.client.Response;
import org.elasticsearch.client.ResponseException;
import org.elasticsearch.client.RestClient;
import org.elasticsearch.common.io.Streams;
import org.elasticsearch.common.network.NetworkModule;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.test.ESIntegTestCase;
import org.elasticsearch.transport.Netty4Plugin;
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;
import org.elasticsearch.xpack.core.XPackClientPlugin;

import java.io.InputStreamReader;
import java.nio.charset.StandardCharsets;
import java.util.Arrays;
import java.util.Collection;

import static org.elasticsearch.test.ESIntegTestCase.Scope.SUITE;

@ESIntegTestCase.ClusterScope(scope = SUITE)
public class StartBasicLicenseTests extends AbstractLicensesIntegrationTestCase {

  @Override
  protected Settings nodeSettings(int nodeOrdinal) {
     return Settings.builder()
           .put(super.nodeSettings(nodeOrdinal))
           .put("node.data", true)
           .put(LicenseService.SELF_GENERATED_LICENSE_TYPE.getKey(), "basic")
           .put(NetworkModule.HTTP_ENABLED.getKey(), true).build();
  }

  @Override
  protected Collection<Class<? extends Plugin>> nodePlugins() {
     return Arrays.asList(LocalStateCompositeXPackPlugin.class, Netty4Plugin.class);
  }
```

```
  @Override
  protected Collection<Class<? extends Plugin>> transportClientPlugins() {
    return Arrays.asList(XPackClientPlugin.class, Netty4Plugin.class);
  }

  public void testStartBasicLicense() throws Exception {
    LicensingClient licensingClient = new LicensingClient(client());
    License license = TestUtils.generateSignedLicense("trial",  License.VERSION_CURRENT, -1,
TimeValue.timeValueHours(24));
    licensingClient.preparePutLicense(license).get();

    assertBusy(() -> {
      GetLicenseResponse getLicenseResponse = licensingClient.prepareGetLicense().get();
      assertEquals("trial", getLicenseResponse.license().type());
    });

    // Testing that you can start a basic license when you have no license
    if (randomBoolean()) {
      licensingClient.prepareDeleteLicense().get();
      assertNull(licensingClient.prepareGetLicense().get().license());
    }

    RestClient restClient = getRestClient();
    Response response = restClient.performRequest(new Request("GET", "/_xpack/license/basic_status"));
    String body = Streams.copyToString(new InputStreamReader(response.getEntity().getContent(),
StandardCharsets.UTF_8));
    assertEquals(200, response.getStatusLine().getStatusCode());
    assertEquals("{\"eligible_to_start_basic\":true}", body);

    Request ackRequest = new Request("POST", "/_xpack/license/start_basic");
    ackRequest.addParameter("acknowledge", "true");
    Response response2 = restClient.performRequest(ackRequest);
    String body2 = Streams.copyToString(new InputStreamReader(response2.getEntity().getContent(),
StandardCharsets.UTF_8));
    assertEquals(200, response2.getStatusLine().getStatusCode());
    assertTrue(body2.contains("\"acknowledged\":true"));
    assertTrue(body2.contains("\"basic_was_started\":true"));

    assertBusy(() -> {
      GetLicenseResponse currentLicense = licensingClient.prepareGetLicense().get();
      assertEquals("basic", currentLicense.license().type());
    });

    long expirationMillis = licensingClient.prepareGetLicense().get().license().expiryDate();
    assertEquals(LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS,
expirationMillis);

    Response response3 = restClient.performRequest(new Request("GET", "/_xpack/license"));
```

```
        String body3 = Streams.copyToString(new InputStreamReader(response3.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertTrue(body3.contains("\"type\" : \"basic\""));
        assertFalse(body3.contains("expiry_date"));
        assertFalse(body3.contains("expiry_date_in_millis"));

        Response response4 = restClient.performRequest(new Request("GET", "/_xpack/license/basic_status"));
        String body4 = Streams.copyToString(new InputStreamReader(response4.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(200, response3.getStatusLine().getStatusCode());
        assertEquals("{\"eligible_to_start_basic\":false}", body4);

        ResponseException ex = expectThrows(ResponseException.class,
            () -> restClient.performRequest(new Request("POST", "/_xpack/license/start_basic")));
        Response response5 = ex.getResponse();
        String body5 = Streams.copyToString(new InputStreamReader(response5.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(403, response5.getStatusLine().getStatusCode());
        assertTrue(body5.contains("\"basic_was_started\":false"));
        assertTrue(body5.contains("\"acknowledged\":true"));
        assertTrue(body5.contains("\"error_message\":\"Operation failed: Current license is basic.\""));
    }

    public void testUnacknowledgedStartBasicLicense() throws Exception {
        LicensingClient licensingClient = new LicensingClient(client());
        License license = TestUtils.generateSignedLicense("trial",  License.VERSION_CURRENT, -1,
TimeValue.timeValueHours(24));
        licensingClient.preparePutLicense(license).get();

        assertBusy(() -> {
            GetLicenseResponse getLicenseResponse = licensingClient.prepareGetLicense().get();
            assertEquals("trial", getLicenseResponse.license().type());
        });

        Response response2 = getRestClient().performRequest(new Request("POST", "/_xpack/license/start_basic"));
        String body2 = Streams.copyToString(new InputStreamReader(response2.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(200, response2.getStatusLine().getStatusCode());
        assertTrue(body2.contains("\"acknowledged\":false"));
        assertTrue(body2.contains("\"basic_was_started\":false"));
        assertTrue(body2.contains("\"error_message\":\"Operation failed: Needs acknowledgement.\""));
        assertTrue(body2.contains("\"message\":\"This license update requires acknowledgement. To acknowledge the
license, " +
                "please read the following messages and call /start_basic again, this time with the
\\\"acknowledge=true\\\""));
    }
}
```

```
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*/
package org.elasticsearch.license;

import org.elasticsearch.Version;
import org.elasticsearch.cluster.ClusterChangedEvent;
import org.elasticsearch.cluster.ClusterName;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.cluster.node.DiscoveryNode;
import org.elasticsearch.cluster.node.DiscoveryNodes;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.junit.After;
import org.junit.Before;
import org.mockito.ArgumentCaptor;

import static java.util.Collections.emptyMap;
import static java.util.Collections.emptySet;
import static org.hamcrest.Matchers.equalTo;
import static org.mockito.Matchers.any;
import static org.mockito.Mockito.times;
import static org.mockito.Mockito.verify;
import static org.mockito.Mockito.when;

public class LicenseClusterChangeTests extends AbstractLicenseServiceTestCase {

  private TestUtils.AssertingLicenseState licenseState;

  @Before
  public void setup() {
     licenseState = new TestUtils.AssertingLicenseState();
     setInitialState(null, licenseState, Settings.EMPTY);
     licenseService.start();
  }

  @After
  public void teardown() {
     licenseService.stop();
  }


  public void testNotificationOnNewLicense() throws Exception {
     ClusterState oldState = ClusterState.builder(new ClusterName("a")).build();
```

```
        final License license = TestUtils.generateSignedLicense(TimeValue.timeValueHours(24));
        MetaData metaData = MetaData.builder().putCustom(LicensesMetaData.TYPE, new
LicensesMetaData(license, null)).build();
        ClusterState newState = ClusterState.builder(new ClusterName("a")).metaData(metaData).build();
        licenseService.clusterChanged(new ClusterChangedEvent("simulated", newState, oldState));
        assertThat(licenseState.activeUpdates.size(), equalTo(1));
        assertTrue(licenseState.activeUpdates.get(0));
    }

    public void testNoNotificationOnExistingLicense() throws Exception {
        final License license = TestUtils.generateSignedLicense(TimeValue.timeValueHours(24));
        MetaData metaData = MetaData.builder().putCustom(LicensesMetaData.TYPE, new
LicensesMetaData(license, null)).build();
        ClusterState newState = ClusterState.builder(new ClusterName("a")).metaData(metaData).build();
        ClusterState oldState = ClusterState.builder(newState).build();
        licenseService.clusterChanged(new ClusterChangedEvent("simulated", newState, oldState));
        assertThat(licenseState.activeUpdates.size(), equalTo(0));
    }

    public void testSelfGeneratedLicenseGeneration() throws Exception {
        DiscoveryNode master = new DiscoveryNode("b", buildNewFakeTransportAddress(), emptyMap(), emptySet(),
Version.CURRENT);
        ClusterState oldState = ClusterState.builder(new ClusterName("a"))
                .nodes(DiscoveryNodes.builder().masterNodeId(master.getId()).add(master)).build();
        when(discoveryNodes.isLocalNodeElectedMaster()).thenReturn(true);
        ClusterState newState = ClusterState.builder(oldState).nodes(discoveryNodes).build();

        licenseService.clusterChanged(new ClusterChangedEvent("simulated", newState, oldState));
        ArgumentCaptor<ClusterStateUpdateTask> stateUpdater =
ArgumentCaptor.forClass(ClusterStateUpdateTask.class);
        verify(clusterService, times(1)).submitStateUpdateTask(any(), stateUpdater.capture());
        ClusterState stateWithLicense = stateUpdater.getValue().execute(newState);
        LicensesMetaData licenseMetaData = stateWithLicense.metaData().custom(LicensesMetaData.TYPE);
        assertNotNull(licenseMetaData);
        assertNotNull(licenseMetaData.getLicense());
        assertEquals(licenseType, licenseMetaData.getLicense().type());
        long expiration;
        if (licenseType.equals("basic")) {
            expiration = LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS;
        } else {
            expiration = LicenseService.NON_BASIC_SELF_GENERATED_LICENSE_DURATION.millis() +
clock.millis();
        }
        assertEquals(expiration, licenseMetaData.getLicense().expiryDate());
    }
}
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```

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*/
package org.elasticsearch.license;

import org.elasticsearch.client.Request;
import org.elasticsearch.client.Response;
import org.elasticsearch.client.ResponseException;
import org.elasticsearch.client.RestClient;
import org.elasticsearch.common.io.Streams;
import org.elasticsearch.common.network.NetworkModule;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.plugins.Plugin;
import org.elasticsearch.test.ESIntegTestCase;
import org.elasticsearch.transport.Netty4Plugin;
import org.elasticsearch.xpack.core.LocalStateCompositeXPackPlugin;
import org.elasticsearch.xpack.core.XPackClientPlugin;

import java.io.InputStreamReader;
import java.nio.charset.StandardCharsets;
import java.util.Arrays;
import java.util.Collection;

import static org.elasticsearch.test.ESIntegTestCase.Scope.SUITE;

@ESIntegTestCase.ClusterScope(scope = SUITE)
public class StartTrialLicenseTests extends AbstractLicensesIntegrationTestCase {

  @Override
  protected Settings nodeSettings(int nodeOrdinal) {
     return Settings.builder()
           .put(super.nodeSettings(nodeOrdinal))
           .put("node.data", true)
           .put(LicenseService.SELF_GENERATED_LICENSE_TYPE.getKey(), "basic")
           .put(NetworkModule.HTTP_ENABLED.getKey(), true).build();
  }

  @Override
  protected Collection<Class<? extends Plugin>> nodePlugins() {
     return Arrays.asList(LocalStateCompositeXPackPlugin.class, Netty4Plugin.class);
  }

  @Override
  protected Collection<Class<? extends Plugin>> transportClientPlugins() {
     return Arrays.asList(XPackClientPlugin.class, Netty4Plugin.class);
  }

  public void testStartTrial() throws Exception {
```

```
        LicensingClient licensingClient = new LicensingClient(client());
        ensureStartingWithBasic();

        RestClient restClient = getRestClient();
        Response response = restClient.performRequest(new Request("GET", "/_xpack/license/trial_status"));
        String body = Streams.copyToString(new InputStreamReader(response.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(200, response.getStatusLine().getStatusCode());
        assertEquals("{\"eligible_to_start_trial\":true}", body);

        // Test that starting will fail without acknowledgement
        Response response2 = restClient.performRequest(new Request("POST", "/_xpack/license/start_trial"));
        String body2 = Streams.copyToString(new InputStreamReader(response2.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(200, response2.getStatusLine().getStatusCode());
        assertTrue(body2.contains("\"trial_was_started\":false"));
        assertTrue(body2.contains("\"error_message\":\"Operation failed: Needs acknowledgement.\""));
        assertTrue(body2.contains("\"acknowledged\":false"));

        assertBusy(() -> {
            GetLicenseResponse getLicenseResponse = licensingClient.prepareGetLicense().get();
            assertEquals("basic", getLicenseResponse.license().type());
        });

        String type = randomFrom(LicenseService.VALID_TRIAL_TYPES);

        Request ackRequest = new Request("POST", "/_xpack/license/start_trial");
        ackRequest.addParameter("acknowledge", "true");
        ackRequest.addParameter("type", type);
        Response response3 = restClient.performRequest(ackRequest);
        String body3 = Streams.copyToString(new InputStreamReader(response3.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(200, response3.getStatusLine().getStatusCode());
        assertTrue(body3.contains("\"trial_was_started\":true"));
        assertTrue(body3.contains("\"type\":\"" + type + "\""));
        assertTrue(body3.contains("\"acknowledged\":true"));

        assertBusy(() -> {
            GetLicenseResponse postTrialLicenseResponse = licensingClient.prepareGetLicense().get();
            assertEquals(type, postTrialLicenseResponse.license().type());
        });

        Response response4 = restClient.performRequest(new Request("GET", "/_xpack/license/trial_status"));
        String body4 = Streams.copyToString(new InputStreamReader(response4.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(200, response4.getStatusLine().getStatusCode());
        assertEquals("{\"eligible_to_start_trial\":false}", body4);
```

```
        String secondAttemptType = randomFrom(LicenseService.VALID_TRIAL_TYPES);

        Request startTrialWhenStartedRequest = new Request("POST", "/_xpack/license/start_trial");
        startTrialWhenStartedRequest.addParameter("acknowledge", "true");
        startTrialWhenStartedRequest.addParameter("type", secondAttemptType);
        ResponseException ex = expectThrows(ResponseException.class, () ->
restClient.performRequest(startTrialWhenStartedRequest));
        Response response5 = ex.getResponse();
        String body5 = Streams.copyToString(new InputStreamReader(response5.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(403, response5.getStatusLine().getStatusCode());
        assertTrue(body5.contains("\"trial_was_started\":false"));
        assertTrue(body5.contains("\"error_message\":\"Operation failed: Trial was already activated.\""));
    }

    public void testInvalidType() throws Exception {
        ensureStartingWithBasic();

        Request request = new Request("POST", "/_xpack/license/start_trial");
        request.addParameter("type", "basic");
        ResponseException ex = expectThrows(ResponseException.class, () ->
getRestClient().performRequest(request));
        Response response = ex.getResponse();
        String body = Streams.copyToString(new InputStreamReader(response.getEntity().getContent(),
StandardCharsets.UTF_8));
        assertEquals(400, response.getStatusLine().getStatusCode());
        assertTrue(body.contains("\"type\":\"illegal_argument_exception\""));
        assertTrue(body.contains("\"reason\":\"Cannot start trial of type [basic]. Valid trial types are ["));
    }

    private void ensureStartingWithBasic() throws Exception {
        LicensingClient licensingClient = new LicensingClient(client());
        GetLicenseResponse getLicenseResponse = licensingClient.prepareGetLicense().get();

        if ("basic".equals(getLicenseResponse.license().type()) == false) {
            licensingClient.preparePostStartBasic().setAcknowledge(true).get();
        }

        assertBusy(() -> {
            GetLicenseResponse postTrialLicenseResponse = licensingClient.prepareGetLicense().get();
            assertEquals("basic", postTrialLicenseResponse.license().type());
        });
    }
}
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```

```
*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.apache.lucene.index.DirectoryReader;
import org.apache.lucene.util.Accountable;
import org.apache.lucene.util.RamUsageEstimator;
import org.apache.lucene.util.automaton.Automata;
import org.apache.lucene.util.automaton.Automaton;
import org.apache.lucene.util.automaton.CharacterRunAutomaton;
import org.apache.lucene.util.automaton.MinimizationOperations;
import org.apache.lucene.util.automaton.Operations;
import org.elasticsearch.ElasticsearchSecurityException;
import org.elasticsearch.common.Strings;
import org.elasticsearch.common.regex.Regex;
import org.elasticsearch.index.mapper.AllFieldMapper;
import org.elasticsearch.xpack.core.security.authz.accesscontrol.FieldSubsetReader;
import org.elasticsearch.xpack.core.security.authz.permission.FieldPermissionsDefinition.FieldGrantExcludeGroup;
import org.elasticsearch.xpack.core.security.support.Automatons;

import java.io.IOException;
import java.util.Arrays;
import java.util.HashMap;
import java.util.HashSet;
import java.util.List;
import java.util.Set;
import java.util.stream.Collectors;

import static org.apache.lucene.util.automaton.Operations.subsetOf;

/**
* Stores patterns to fields which access is granted or denied to and maintains an automaton that can be used to check
if permission is
* allowed for a specific field.
* Field permissions are configured via a list of strings that are patterns a field has to match. Two lists determine
whether or
* not a field is granted access to:
* 1. It has to match the patterns in grantedFieldsArray
* 2. it must not match the patterns in deniedFieldsArray
*/
public final class FieldPermissions implements Accountable {

  public static final FieldPermissions DEFAULT = new FieldPermissions();

  private static final long BASE_FIELD_PERM_DEF_BYTES = RamUsageEstimator.shallowSizeOf(new
FieldPermissionsDefinition(null, null));
  private static final long BASE_FIELD_GROUP_BYTES = RamUsageEstimator.shallowSizeOf(new
FieldGrantExcludeGroup(null, null));
  private static final long BASE_HASHSET_SIZE = RamUsageEstimator.shallowSizeOfInstance(HashSet.class);
```

```
  private static final long BASE_HASHSET_ENTRY_SIZE;
  static {
    HashMap<String, Object> map = new HashMap<>();
    map.put(FieldPermissions.class.getName(), new Object());
    long mapEntryShallowSize = RamUsageEstimator.shallowSizeOf(map.entrySet().iterator().next());
    // assume a load factor of 50%
    // for each entry, we need two object refs, one for the entry itself
    // and one for the free space that is due to the fact hash tables can
    // not be fully loaded
    BASE_HASHSET_ENTRY_SIZE = mapEntryShallowSize + 2 *
RamUsageEstimator.NUM_BYTES_OBJECT_REF;
  }

  private final FieldPermissionsDefinition fieldPermissionsDefinition;
  // an automaton that represents a union of one more sets of permitted and denied fields
  private final CharacterRunAutomaton permittedFieldsAutomaton;
  private final boolean permittedFieldsAutomatonIsTotal;
  private final Automaton originalAutomaton;

  private final long ramBytesUsed;

  /** Constructor that does not enable field-level security: all fields are accepted. */
  public FieldPermissions() {
    this(new FieldPermissionsDefinition(null, null), Automatons.MATCH_ALL);
  }

  /** Constructor that enables field-level security based on include/exclude rules. Exclude rules
   *  have precedence over include rules. */
  public FieldPermissions(FieldPermissionsDefinition fieldPermissionsDefinition) {
    this(fieldPermissionsDefinition, initializePermittedFieldsAutomaton(fieldPermissionsDefinition));
  }

  /** Constructor that enables field-level security based on include/exclude rules. Exclude rules
   *  have precedence over include rules. */
  FieldPermissions(FieldPermissionsDefinition fieldPermissionsDefinition, Automaton permittedFieldsAutomaton)
{
    if (permittedFieldsAutomaton.isDeterministic() == false && permittedFieldsAutomaton.getNumStates() > 1) {
      // we only accept deterministic automata so that the CharacterRunAutomaton constructor
      // directly wraps the provided automaton
      throw new IllegalArgumentException("Only accepts deterministic automata");
    }
    this.fieldPermissionsDefinition = fieldPermissionsDefinition;
    this.originalAutomaton = permittedFieldsAutomaton;
    this.permittedFieldsAutomaton = new CharacterRunAutomaton(permittedFieldsAutomaton);
    // we cache the result of isTotal since this might be a costly operation
    this.permittedFieldsAutomatonIsTotal = Operations.isTotal(permittedFieldsAutomaton);

    long ramBytesUsed = BASE_FIELD_PERM_DEF_BYTES;
```

```
    for (FieldGrantExcludeGroup group : fieldPermissionsDefinition.getFieldGrantExcludeGroups()) {
      ramBytesUsed += BASE_FIELD_GROUP_BYTES + BASE_HASHSET_ENTRY_SIZE;
      if (group.getGrantedFields() != null) {
        ramBytesUsed += RamUsageEstimator.shallowSizeOf(group.getGrantedFields());
      }
      if (group.getExcludedFields() != null) {
        ramBytesUsed += RamUsageEstimator.shallowSizeOf(group.getExcludedFields());
      }
    }
    ramBytesUsed += permittedFieldsAutomaton.ramBytesUsed();
    ramBytesUsed += runAutomatonRamBytesUsed(permittedFieldsAutomaton);
    this.ramBytesUsed = ramBytesUsed;
  }

  /**
   * Return an estimation of the ram bytes used by a {@link CharacterRunAutomaton}
   * that wraps the given automaton.
   */
  private static long runAutomatonRamBytesUsed(Automaton a) {
    return a.getNumStates() * 5; // wild guess, better than 0
  }

  public static Automaton initializePermittedFieldsAutomaton(FieldPermissionsDefinition
fieldPermissionsDefinition) {
    Set<FieldGrantExcludeGroup> groups = fieldPermissionsDefinition.getFieldGrantExcludeGroups();
    assert groups.size() > 0 : "there must always be a single group for field inclusion/exclusion";
    List<Automaton> automatonList =
        groups.stream()
            .map(g -> FieldPermissions.initializePermittedFieldsAutomaton(g.getGrantedFields(),
g.getExcludedFields()))
            .collect(Collectors.toList());
    return Automatons.unionAndMinimize(automatonList);
  }

  private static Automaton initializePermittedFieldsAutomaton(final String[] grantedFields, final String[]
deniedFields) {
    Automaton grantedFieldsAutomaton;
    if (grantedFields == null || Arrays.stream(grantedFields).anyMatch(Regex::isMatchAllPattern)) {
      grantedFieldsAutomaton = Automatons.MATCH_ALL;
    } else {
      // an automaton that includes metadata fields, including join fields created by the _parent field such
      // as _parent#type
      Automaton metaFieldsAutomaton = Operations.concatenate(Automata.makeChar('_'),
Automata.makeAnyString());
      grantedFieldsAutomaton = Operations.union(Automatons.patterns(grantedFields), metaFieldsAutomaton);
    }
```

```
        Automaton deniedFieldsAutomaton;
        if (deniedFields == null || deniedFields.length == 0) {
            deniedFieldsAutomaton = Automatons.EMPTY;
        } else {
            deniedFieldsAutomaton = Automatons.patterns(deniedFields);
        }

        grantedFieldsAutomaton = MinimizationOperations.minimize(grantedFieldsAutomaton,
Operations.DEFAULT_MAX_DETERMINIZED_STATES);
        deniedFieldsAutomaton = MinimizationOperations.minimize(deniedFieldsAutomaton,
Operations.DEFAULT_MAX_DETERMINIZED_STATES);

        if (subsetOf(deniedFieldsAutomaton, grantedFieldsAutomaton) == false) {
            throw new ElasticsearchSecurityException("Exceptions for field permissions must be a subset of the " +
                    "granted fields but " + Strings.arrayToCommaDelimitedString(deniedFields) + " is not a subset of " +
                    Strings.arrayToCommaDelimitedString(grantedFields));
        }

        if (!containsAllField(grantedFields) && !containsAllField(deniedFields)) {
            // It is not explicitly stated whether _all should be allowed/denied
            // In that case we automatically disable _all, unless all fields would match
            if (Operations.isTotal(grantedFieldsAutomaton) && Operations.isEmpty(deniedFieldsAutomaton)) {
                // all fields are accepted, so using _all is fine
            } else {
                deniedFieldsAutomaton = Operations.union(deniedFieldsAutomaton,
Automata.makeString(AllFieldMapper.NAME));
            }
        }

        grantedFieldsAutomaton = Automatons.minusAndMinimize(grantedFieldsAutomaton,
deniedFieldsAutomaton);
        return grantedFieldsAutomaton;
    }

    private static boolean containsAllField(String[] fields) {
        return fields != null && Arrays.stream(fields).anyMatch(AllFieldMapper.NAME::equals);
    }

    /**
     * Returns true if this field permission policy allows access to the field and false if not.
     * fieldName can be a wildcard.
     */
    public boolean grantsAccessTo(String fieldName) {
        return permittedFieldsAutomatonIsTotal || permittedFieldsAutomaton.run(fieldName);
    }

    public FieldPermissionsDefinition getFieldPermissionsDefinition() {
        return fieldPermissionsDefinition;
```

```
  }

  /** Return whether field-level security is enabled, ie. whether any field might be filtered out. */
  public boolean hasFieldLevelSecurity() {
    return permittedFieldsAutomatonIsTotal == false;
  }

  /** Return a wrapped reader that only exposes allowed fields. */
  public DirectoryReader filter(DirectoryReader reader) throws IOException {
    if (hasFieldLevelSecurity() == false) {
      return reader;
    }
    return FieldSubsetReader.wrap(reader, permittedFieldsAutomaton);
  }

  // for testing only
  Automaton getIncludeAutomaton() {
    return originalAutomaton;
  }

  @Override
  public boolean equals(Object o) {
    if (this == o) return true;
    if (o == null || getClass() != o.getClass()) return false;

    FieldPermissions that = (FieldPermissions) o;

    if (permittedFieldsAutomatonIsTotal != that.permittedFieldsAutomatonIsTotal) return false;
    return fieldPermissionsDefinition != null ?
        fieldPermissionsDefinition.equals(that.fieldPermissionsDefinition) : that.fieldPermissionsDefinition ==
null;
  }

  @Override
  public int hashCode() {
    int result = fieldPermissionsDefinition != null ? fieldPermissionsDefinition.hashCode() : 0;
    result = 31 * result + (permittedFieldsAutomatonIsTotal ? 1 : 0);
    return result;
  }

  @Override
  public long ramBytesUsed() {
    return ramBytesUsed;
  }
}
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```

```
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*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.elasticsearch.xpack.core.security.authz.privilege.Privilege;

import java.util.function.Predicate;

/**
* A permissions that is based on a general privilege that contains patterns of users that this
* user can execute a request as
*/
public final class RunAsPermission {

  public static final RunAsPermission NONE = new RunAsPermission(Privilege.NONE);

  private final Privilege privilege;
  private final Predicate<String> predicate;

  RunAsPermission(Privilege privilege) {
     this.privilege = privilege;
     this.predicate = privilege.predicate();
  }

  public Privilege getPrivilege() {
     return privilege;
  }

  /**
   * Checks if this permission grants run as to the specified user
   */
  public boolean check(String username) {
     return predicate.test(username);
  }
}
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* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.apache.lucene.util.automaton.Automaton;
import org.elasticsearch.ElasticsearchException;
import org.elasticsearch.common.cache.Cache;
import org.elasticsearch.common.cache.CacheBuilder;
import org.elasticsearch.common.settings.Setting;
import org.elasticsearch.common.settings.Setting.Property;
```

```
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.xpack.core.security.authz.permission.FieldPermissionsDefinition.FieldGrantExcludeGroup;
import org.elasticsearch.xpack.core.security.support.Automatons;

import java.util.Collection;
import java.util.List;
import java.util.Optional;
import java.util.Set;
import java.util.concurrent.ExecutionException;
import java.util.function.Predicate;
import java.util.stream.Collectors;

import static org.elasticsearch.xpack.core.security.SecurityField.setting;

/**
* A service for managing the caching of {@link FieldPermissions} as these may often need to be combined or
created and internally they
* use an {@link org.apache.lucene.util.automaton.Automaton}, which can be costly to create once you account for
minimization
*/
public final class FieldPermissionsCache {

  public static final Setting<Long> CACHE_SIZE_SETTING = Setting.longSetting(
        setting("authz.store.roles.field_permissions.cache.max_size_in_bytes"), 100 * 1024 * 1024, -1L,
Property.NodeScope);
  private final Cache<FieldPermissionsDefinition, FieldPermissions> cache;

  public FieldPermissionsCache(Settings settings) {
    this.cache = CacheBuilder.<FieldPermissionsDefinition, FieldPermissions>builder()
          .setMaximumWeight(CACHE_SIZE_SETTING.get(settings))
          .weigher((key, fieldPermissions) -> fieldPermissions.ramBytesUsed())
          .build();
  }

  /**
   * Gets a {@link FieldPermissions} instance that corresponds to the granted and denied parameters. The instance
may come from the cache
   * or if it gets created, the instance will be cached
   */
  FieldPermissions getFieldPermissions(String[] granted, String[] denied) {
    return getFieldPermissions(new FieldPermissionsDefinition(granted, denied));
  }

  /**
   * Gets a {@link FieldPermissions} instance that corresponds to the granted and denied parameters. The instance
may come from the cache
   * or if it gets created, the instance will be cached
   */
```

```
  public FieldPermissions getFieldPermissions(FieldPermissionsDefinition fieldPermissionsDefinition) {
    try {
      return cache.computeIfAbsent(fieldPermissionsDefinition,
          (key) -> new FieldPermissions(key, FieldPermissions.initializePermittedFieldsAutomaton(key)));
    } catch (ExecutionException e) {
      throw new ElasticsearchException("unable to compute field permissions", e);
    }
  }

  /**
   * Returns a field permissions object that corresponds to the merging of the given field permissions and caches the
instance if one was
   * not found in the cache.
   */
  FieldPermissions getFieldPermissions(Collection<FieldPermissions> fieldPermissionsCollection) {
    Optional<FieldPermissions> allowAllFieldPermissions = fieldPermissionsCollection.stream()
        .filter(((Predicate<FieldPermissions>) (FieldPermissions::hasFieldLevelSecurity)).negate())
        .findFirst();
    return allowAllFieldPermissions.orElseGet(() -> {
      final Set<FieldGrantExcludeGroup> fieldGrantExcludeGroups = fieldPermissionsCollection.stream()
          .flatMap(fieldPermission ->
fieldPermission.getFieldPermissionsDefinition().getFieldGrantExcludeGroups().stream())
          .collect(Collectors.toSet());
      final FieldPermissionsDefinition combined = new FieldPermissionsDefinition(fieldGrantExcludeGroups);
      try {
        return cache.computeIfAbsent(combined, (key) -> {
          List<Automaton> automatonList = fieldPermissionsCollection.stream()
                  .map(FieldPermissions::getIncludeAutomaton)
                  .collect(Collectors.toList());
          return new FieldPermissions(key, Automatons.unionAndMinimize(automatonList));
        });
      } catch (ExecutionException e) {
        throw new ElasticsearchException("unable to compute field permissions", e);
      }
    });
  }
}
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* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.elasticsearch.common.collect.Tuple;
import org.elasticsearch.transport.TransportRequest;
import org.elasticsearch.xpack.core.security.authz.privilege.ClusterPrivilege;
import org.elasticsearch.xpack.core.security.authz.privilege.ConditionalClusterPrivilege;
```

```
import java.util.Collection;
import java.util.Collections;
import java.util.List;
import java.util.Set;
import java.util.function.Predicate;
import java.util.stream.Collectors;

/**
* A permission that is based on privileges for cluster wide actions, with the optional ability to inspect the request object
*/
public abstract class ClusterPermission {
  private final ClusterPrivilege privilege;

  ClusterPermission(ClusterPrivilege privilege) {
     this.privilege = privilege;
  }

  public ClusterPrivilege privilege() {
     return privilege;
  }

  public abstract boolean check(String action, TransportRequest request);

  public abstract List<Tuple<ClusterPrivilege, ConditionalClusterPrivilege>> privileges();

  /**
   * A permission that is based solely on cluster privileges and does not consider request state
   */
  public static class SimpleClusterPermission extends ClusterPermission {

     public static final SimpleClusterPermission NONE = new SimpleClusterPermission(ClusterPrivilege.NONE);

     private final Predicate<String> predicate;

     SimpleClusterPermission(ClusterPrivilege privilege) {
        super(privilege);
        this.predicate = privilege.predicate();
     }

     @Override
     public boolean check(String action, TransportRequest request) {
        return predicate.test(action);
     }

     @Override
     public List<Tuple<ClusterPrivilege, ConditionalClusterPrivilege>> privileges() {
```

```
            return Collections.singletonList(new Tuple<>(super.privilege, null));
        }
    }

    /**
     * A permission that makes use of both cluster privileges and request inspection
     */
    public static class ConditionalClusterPermission extends ClusterPermission {
        private final ConditionalClusterPrivilege conditionalPrivilege;

        public ConditionalClusterPermission(ConditionalClusterPrivilege conditionalPrivilege) {
            super(conditionalPrivilege.getPrivilege());
            this.conditionalPrivilege = conditionalPrivilege;
        }

        @Override
        public boolean check(String action, TransportRequest request) {
            return super.privilege.predicate().test(action) && conditionalPrivilege.getRequestPredicate().test(request);
        }

        @Override
        public List<Tuple<ClusterPrivilege, ConditionalClusterPrivilege>> privileges() {
            return Collections.singletonList(new Tuple<>(super.privilege, conditionalPrivilege));
        }
    }

    /**
     * A permission that composes a number of other cluster permissions
     */
    public static class CompositeClusterPermission extends ClusterPermission {
        private final Collection<ClusterPermission> children;

        public CompositeClusterPermission(Collection<ClusterPermission> children) {
            super(buildPrivilege(children));
            this.children = children;
        }

        private static ClusterPrivilege buildPrivilege(Collection<ClusterPermission> children) {
            final Set<String> names = children.stream()
                .map(ClusterPermission::privilege)
                .map(ClusterPrivilege::name)
                .flatMap(Set::stream)
                .collect(Collectors.toSet());
            return ClusterPrivilege.get(names);
        }

        @Override
        public List<Tuple<ClusterPrivilege, ConditionalClusterPrivilege>> privileges() {
```

```
            return children.stream().map(ClusterPermission::privileges).flatMap(List::stream).collect(Collectors.toList());
        }

        @Override
        public boolean check(String action, TransportRequest request) {
            return children.stream().anyMatch(p -> p.check(action, request));
        }
    }
}
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* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.elasticsearch.common.Strings;

import java.util.Arrays;
import java.util.Collections;
import java.util.Set;

/**
* Represents the definition of a {@link FieldPermissions}. Field permissions are defined as a
* collections of grant and exclude definitions where the exclude definition must be a subset of
* the grant definition.
*/
public final class FieldPermissionsDefinition {

    private final Set<FieldGrantExcludeGroup> fieldGrantExcludeGroups;

    public FieldPermissionsDefinition(String[] grant, String[] exclude) {
        this(Collections.singleton(new FieldGrantExcludeGroup(grant, exclude)));
    }

    public FieldPermissionsDefinition(Set<FieldGrantExcludeGroup> fieldGrantExcludeGroups) {
        this.fieldGrantExcludeGroups = Collections.unmodifiableSet(fieldGrantExcludeGroups);
    }

    public Set<FieldGrantExcludeGroup> getFieldGrantExcludeGroups() {
        return fieldGrantExcludeGroups;
    }

    @Override
    public boolean equals(Object o) {
        if (this == o) return true;
        if (o == null || getClass() != o.getClass()) return false;
```

```
    FieldPermissionsDefinition that = (FieldPermissionsDefinition) o;

    return fieldGrantExcludeGroups != null ?
            fieldGrantExcludeGroups.equals(that.fieldGrantExcludeGroups) :
            that.fieldGrantExcludeGroups == null;
}

@Override
public int hashCode() {
    return fieldGrantExcludeGroups != null ? fieldGrantExcludeGroups.hashCode() : 0;
}

public static final class FieldGrantExcludeGroup {
    private final String[] grantedFields;
    private final String[] excludedFields;

    public FieldGrantExcludeGroup(String[] grantedFields, String[] excludedFields) {
        this.grantedFields = grantedFields;
        this.excludedFields = excludedFields;
    }

    public String[] getGrantedFields() {
        return grantedFields;
    }

    public String[] getExcludedFields() {
        return excludedFields;
    }

    @Override
    public boolean equals(Object o) {
        if (this == o) return true;
        if (o == null || getClass() != o.getClass()) return false;

        FieldGrantExcludeGroup that = (FieldGrantExcludeGroup) o;

        if (!Arrays.equals(grantedFields, that.grantedFields)) return false;
        return Arrays.equals(excludedFields, that.excludedFields);
    }

    @Override
    public int hashCode() {
        int result = Arrays.hashCode(grantedFields);
        result = 31 * result + Arrays.hashCode(excludedFields);
        return result;
    }

    @Override
```

```
        public String toString() {
            return getClass().getSimpleName()
                + "[grant=" + Strings.arrayToCommaDelimitedString(grantedFields)
                + "; exclude=" + Strings.arrayToCommaDelimitedString(excludedFields)
                + "]";
        }
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.common.Nullable;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.collect.Tuple;
import org.elasticsearch.common.util.set.Sets;
import org.elasticsearch.xpack.core.security.authz.RoleDescriptor;
import org.elasticsearch.xpack.core.security.authz.accesscontrol.IndicesAccessControl;
import org.elasticsearch.xpack.core.security.authz.privilege.ApplicationPrivilege;
import org.elasticsearch.xpack.core.security.authz.privilege.ClusterPrivilege;
import org.elasticsearch.xpack.core.security.authz.privilege.ConditionalClusterPrivilege;
import org.elasticsearch.xpack.core.security.authz.privilege.IndexPrivilege;
import org.elasticsearch.xpack.core.security.authz.privilege.Privilege;

import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collections;
import java.util.List;
import java.util.Map;
import java.util.Objects;
import java.util.Set;

public final class Role {

  public static final Role EMPTY = Role.builder("__empty").build();

  private final String[] names;
  private final ClusterPermission cluster;
  private final IndicesPermission indices;
  private final ApplicationPermission application;
  private final RunAsPermission runAs;

  Role(String[] names, ClusterPermission cluster, IndicesPermission indices, ApplicationPermission application,
RunAsPermission runAs) {
```

```
        this.names = names;
        this.cluster = Objects.requireNonNull(cluster);
        this.indices = Objects.requireNonNull(indices);
        this.application = Objects.requireNonNull(application);
        this.runAs = Objects.requireNonNull(runAs);
    }

    public String[] names() {
        return names;
    }

    public ClusterPermission cluster() {
        return cluster;
    }

    public IndicesPermission indices() {
        return indices;
    }

    public ApplicationPermission application() {
        return application;
    }

    public RunAsPermission runAs() {
        return runAs;
    }

    public static Builder builder(String... names) {
        return new Builder(names, null);
    }

    public static Builder builder(String[] names, FieldPermissionsCache fieldPermissionsCache) {
        return new Builder(names, fieldPermissionsCache);
    }

    public static Builder builder(RoleDescriptor rd, FieldPermissionsCache fieldPermissionsCache) {
        return new Builder(rd, fieldPermissionsCache);
    }

    /**
     * Returns whether at least one group encapsulated by this indices permissions is authorized to execute the
     * specified action with the requested indices/aliases. At the same time if field and/or document level security
     * is configured for any group also the allowed fields and role queries are resolved.
     */
    public IndicesAccessControl authorize(String action, Set<String> requestedIndicesOrAliases, MetaData
metaData,
                                          FieldPermissionsCache fieldPermissionsCache) {
        Map<String, IndicesAccessControl.IndexAccessControl> indexPermissions = indices.authorize(
```

```
            action, requestedIndicesOrAliases, metaData, fieldPermissionsCache
        );

        // At least one role / indices permission set need to match with all the requested indices/aliases:
        boolean granted = true;
        for (Map.Entry<String, IndicesAccessControl.IndexAccessControl> entry : indexPermissions.entrySet()) {
            if (!entry.getValue().isGranted()) {
                granted = false;
                break;
            }
        }
        return new IndicesAccessControl(granted, indexPermissions);
    }

    public static class Builder {

        private final String[] names;
        private ClusterPermission cluster = ClusterPermission.SimpleClusterPermission.NONE;
        private RunAsPermission runAs = RunAsPermission.NONE;
        private List<IndicesPermission.Group> groups = new ArrayList<>();
        private FieldPermissionsCache fieldPermissionsCache = null;
        private List<Tuple<ApplicationPrivilege, Set<String>>> applicationPrivs = new ArrayList<>();

        private Builder(String[] names, FieldPermissionsCache fieldPermissionsCache) {
            this.names = names;
            this.fieldPermissionsCache = fieldPermissionsCache;
        }

        private Builder(RoleDescriptor rd, @Nullable FieldPermissionsCache fieldPermissionsCache) {
            this.names = new String[] { rd.getName() };
            this.fieldPermissionsCache = fieldPermissionsCache;
            cluster(Sets.newHashSet(rd.getClusterPrivileges()), Arrays.asList(rd.getConditionalClusterPrivileges()));
            groups.addAll(convertFromIndicesPrivileges(rd.getIndicesPrivileges(), fieldPermissionsCache));

            final RoleDescriptor.ApplicationResourcePrivileges[] applicationPrivileges = rd.getApplicationPrivileges();
            for (int i = 0; i < applicationPrivileges.length; i++) {
                applicationPrivs.add(convertApplicationPrivilege(rd.getName(), i, applicationPrivileges[i]));
            }

            String[] rdRunAs = rd.getRunAs();
            if (rdRunAs != null && rdRunAs.length > 0) {
                this.runAs(new Privilege(Sets.newHashSet(rdRunAs), rdRunAs));
            }
        }

        public Builder cluster(Set<String> privilegeNames, Iterable<ConditionalClusterPrivilege>
    conditionalClusterPrivileges) {
            List<ClusterPermission> clusterPermissions = new ArrayList<>();
```

```
            if (privilegeNames.isEmpty() == false) {
                clusterPermissions.add(new
ClusterPermission.SimpleClusterPermission(ClusterPrivilege.get(privilegeNames)));
            }
            for (ConditionalClusterPrivilege ccp : conditionalClusterPrivileges) {
                clusterPermissions.add(new ClusterPermission.ConditionalClusterPermission(ccp));
            }
            if (clusterPermissions.isEmpty()) {
                this.cluster = ClusterPermission.SimpleClusterPermission.NONE;
            } else if (clusterPermissions.size() == 1) {
                this.cluster = clusterPermissions.get(0);
            } else {
                this.cluster = new ClusterPermission.CompositeClusterPermission(clusterPermissions);
            }
            return this;
        }

        /**
         * @deprecated Use {@link #cluster(Set, Iterable)}
         */
        @Deprecated
        public Builder cluster(ClusterPrivilege privilege) {
            cluster = new ClusterPermission.SimpleClusterPermission(privilege);
            return this;
        }

        public Builder runAs(Privilege privilege) {
            runAs = new RunAsPermission(privilege);
            return this;
        }

        public Builder add(IndexPrivilege privilege, String... indices) {
            groups.add(new IndicesPermission.Group(privilege, FieldPermissions.DEFAULT, null, indices));
            return this;
        }

        public Builder add(FieldPermissions fieldPermissions, Set<BytesReference> query, IndexPrivilege privilege,
String... indices) {
            groups.add(new IndicesPermission.Group(privilege, fieldPermissions, query, indices));
            return this;
        }

        public Builder addApplicationPrivilege(ApplicationPrivilege privilege, Set<String> resources) {
            applicationPrivs.add(new Tuple<>(privilege, resources));
            return this;
        }

        public Role build() {
```

```
        IndicesPermission indices = groups.isEmpty() ? IndicesPermission.NONE :
            new IndicesPermission(groups.toArray(new IndicesPermission.Group[groups.size()]));
        final ApplicationPermission applicationPermission
            = applicationPrivs.isEmpty() ? ApplicationPermission.NONE : new
ApplicationPermission(applicationPrivs);
        return new Role(names, cluster, indices, applicationPermission, runAs);
    }

    static List<IndicesPermission.Group> convertFromIndicesPrivileges(RoleDescriptor.IndicesPrivileges[]
indicesPrivileges,
                                                      @Nullable FieldPermissionsCache fieldPermissionsCache) {
        List<IndicesPermission.Group> list = new ArrayList<>(indicesPrivileges.length);
        for (RoleDescriptor.IndicesPrivileges privilege : indicesPrivileges) {
            final FieldPermissions fieldPermissions;
            if (fieldPermissionsCache != null) {
                fieldPermissions = fieldPermissionsCache.getFieldPermissions(privilege.getGrantedFields(),
privilege.getDeniedFields());
            } else {
                fieldPermissions = new FieldPermissions(
                    new FieldPermissionsDefinition(privilege.getGrantedFields(), privilege.getDeniedFields()));
            }
            final Set<BytesReference> query = privilege.getQuery() == null ? null :
Collections.singleton(privilege.getQuery());
            list.add(new IndicesPermission.Group(IndexPrivilege.get(Sets.newHashSet(privilege.getPrivileges())),
                fieldPermissions,
                query,
                privilege.getIndices()));

        }
        return list;
    }

    static Tuple<ApplicationPrivilege, Set<String>> convertApplicationPrivilege(String role, int index,
                                                         RoleDescriptor.ApplicationResourcePrivileges arp) {
        return new Tuple<>(new ApplicationPrivilege(arp.getApplication(),
            Sets.newHashSet(arp.getPrivileges()),
            arp.getPrivileges()
        ), Sets.newHashSet(arp.getResources()));
    }
  }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.core.security.authz.permission;
```

```
import org.apache.lucene.util.automaton.Automaton;
import org.apache.lucene.util.automaton.TooComplexToDeterminizeException;
import org.elasticsearch.ElasticsearchSecurityException;
import org.elasticsearch.cluster.metadata.AliasOrIndex;
import org.elasticsearch.cluster.metadata.IndexMetaData;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.common.Nullable;
import org.elasticsearch.common.Strings;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.logging.Loggers;
import org.elasticsearch.xpack.core.security.authz.accesscontrol.IndicesAccessControl;
import org.elasticsearch.xpack.core.security.authz.privilege.IndexPrivilege;
import org.elasticsearch.xpack.core.security.support.Automatons;

import java.util.ArrayList;
import java.util.Arrays;
import java.util.HashMap;
import java.util.HashSet;
import java.util.Iterator;
import java.util.List;
import java.util.Map;
import java.util.Objects;
import java.util.Set;
import java.util.SortedMap;
import java.util.concurrent.ConcurrentHashMap;
import java.util.function.Function;
import java.util.function.Predicate;

import static java.util.Collections.unmodifiableMap;
import static java.util.Collections.unmodifiableSet;

/**
* A permission that is based on privileges for index related actions executed
* on specific indices
*/
public final class IndicesPermission implements Iterable<IndicesPermission.Group> {

  public static final IndicesPermission NONE = new IndicesPermission();

  private final Function<String, Predicate<String>> loadingFunction;

  private final ConcurrentHashMap<String, Predicate<String>> allowedIndicesMatchersForAction = new
ConcurrentHashMap<>();

  private final Group[] groups;

  public IndicesPermission(Group... groups) {
     this.groups = groups;
```

```
        loadingFunction = (action) -> {
            List<String> indices = new ArrayList<>();
            for (Group group : groups) {
                if (group.actionMatcher.test(action)) {
                    indices.addAll(Arrays.asList(group.indices));
                }
            }
            return indexMatcher(indices);
        };
    }

    static Predicate<String> indexMatcher(List<String> indices) {
        try {
            return Automatons.predicate(indices);
        } catch (TooComplexToDeterminizeException e) {
            Loggers.getLogger(IndicesPermission.class).debug("Index pattern automaton [{}] is too complex", indices);
            String description = Strings.collectionToCommaDelimitedString(indices);
            if (description.length() > 80) {
                description = Strings.cleanTruncate(description, 80) + "...";
            }
            throw new ElasticsearchSecurityException("The set of permitted index patterns [{}] is too complex to
evaluate", e, description);
        }
    }

    @Override
    public Iterator<Group> iterator() {
        return Arrays.asList(groups).iterator();
    }

    public Group[] groups() {
        return groups;
    }

    /**
     * @return A predicate that will match all the indices that this permission
     * has the privilege for executing the given action on.
     */
    public Predicate<String> allowedIndicesMatcher(String action) {
        return allowedIndicesMatchersForAction.computeIfAbsent(action, loadingFunction);
    }

    /**
     * Checks if the permission matches the provided action, without looking at indices.
     * To be used in very specific cases where indices actions need to be authorized regardless of their indices.
     * The usecase for this is composite actions that are initially only authorized based on the action name (indices are
not
     * checked on the coordinating node), and properly authorized later at the shard level checking their indices as
```

```
well.
     */
    public boolean check(String action) {
        for (Group group : groups) {
            if (group.check(action)) {
                return true;
            }
        }
        return false;
    }

    public Automaton allowedActionsMatcher(String index) {
        List<Automaton> automatonList = new ArrayList<>();
        for (Group group : groups) {
            if (group.indexNameMatcher.test(index)) {
                automatonList.add(group.privilege.getAutomaton());
            }
        }
        return automatonList.isEmpty() ? Automatons.EMPTY : Automatons.unionAndMinimize(automatonList);
    }

    /**
     * Authorizes the provided action against the provided indices, given the current cluster metadata
     */
    public Map<String, IndicesAccessControl.IndexAccessControl> authorize(String action, Set<String>
requestedIndicesOrAliases,
                                                                           MetaData metaData, FieldPermissionsCache fieldPermissionsCache) {
        // now... every index that is associated with the request, must be granted
        // by at least one indices permission group

        SortedMap<String, AliasOrIndex> allAliasesAndIndices = metaData.getAliasAndIndexLookup();
        Map<String, Set<FieldPermissions>> fieldPermissionsByIndex = new HashMap<>();
        Map<String, DocumentLevelPermissions> roleQueriesByIndex = new HashMap<>();
        Map<String, Boolean> grantedBuilder = new HashMap<>();

        for (String indexOrAlias : requestedIndicesOrAliases) {
            boolean granted = false;
            Set<String> concreteIndices = new HashSet<>();
            AliasOrIndex aliasOrIndex = allAliasesAndIndices.get(indexOrAlias);
            if (aliasOrIndex != null) {
                for (IndexMetaData indexMetaData : aliasOrIndex.getIndices()) {
                    concreteIndices.add(indexMetaData.getIndex().getName());
                }
            }

            for (Group group : groups) {
                if (group.check(action, indexOrAlias)) {
                    granted = true;
```

```
            for (String index : concreteIndices) {
                Set<FieldPermissions> fieldPermissions = fieldPermissionsByIndex.computeIfAbsent(index, (k) ->
new HashSet<>());
                fieldPermissionsByIndex.put(indexOrAlias, fieldPermissions);
                fieldPermissions.add(group.getFieldPermissions());
                DocumentLevelPermissions permissions =
                    roleQueriesByIndex.computeIfAbsent(index, (k) -> new DocumentLevelPermissions());
                roleQueriesByIndex.putIfAbsent(indexOrAlias, permissions);
                if (group.hasQuery()) {
                  permissions.addAll(group.getQuery());
                } else {
                  // if more than one permission matches for a concrete index here and if
                  // a single permission doesn't have a role query then DLS will not be
                  // applied even when other permissions do have a role query
                  permissions.setAllowAll(true);
                }
              }
            }
          }

          if (concreteIndices.isEmpty()) {
            grantedBuilder.put(indexOrAlias, granted);
          } else {
            grantedBuilder.put(indexOrAlias, granted);
            for (String concreteIndex : concreteIndices) {
              grantedBuilder.put(concreteIndex, granted);
            }
          }
        }

        Map<String, IndicesAccessControl.IndexAccessControl> indexPermissions = new HashMap<>();
        for (Map.Entry<String, Boolean> entry : grantedBuilder.entrySet()) {
          String index = entry.getKey();
          DocumentLevelPermissions permissions = roleQueriesByIndex.get(index);
          final Set<BytesReference> roleQueries;
          if (permissions != null && permissions.isAllowAll() == false) {
            roleQueries = unmodifiableSet(permissions.queries);
          } else {
            roleQueries = null;
          }

          final FieldPermissions fieldPermissions;
          final Set<FieldPermissions> indexFieldPermissions = fieldPermissionsByIndex.get(index);
          if (indexFieldPermissions != null && indexFieldPermissions.isEmpty() == false) {
            fieldPermissions = indexFieldPermissions.size() == 1 ? indexFieldPermissions.iterator().next() :
                fieldPermissionsCache.getFieldPermissions(indexFieldPermissions);
          } else {
            fieldPermissions = FieldPermissions.DEFAULT;
```

```
            }
            indexPermissions.put(index, new IndicesAccessControl.IndexAccessControl(entry.getValue(),
fieldPermissions, roleQueries));
        }
        return unmodifiableMap(indexPermissions);
    }

    public static class Group {
        private final IndexPrivilege privilege;
        private final Predicate<String> actionMatcher;
        private final String[] indices;
        private final Predicate<String> indexNameMatcher;

        public FieldPermissions getFieldPermissions() {
            return fieldPermissions;
        }

        private final FieldPermissions fieldPermissions;
        private final Set<BytesReference> query;

        public Group(IndexPrivilege privilege, FieldPermissions fieldPermissions, @Nullable Set<BytesReference>
query, String... indices) {
            assert indices.length != 0;
            this.privilege = privilege;
            this.actionMatcher = privilege.predicate();
            this.indices = indices;
            this.indexNameMatcher = indexMatcher(Arrays.asList(indices));
            this.fieldPermissions = Objects.requireNonNull(fieldPermissions);
            this.query = query;
        }

        public IndexPrivilege privilege() {
            return privilege;
        }

        public String[] indices() {
            return indices;
        }

        @Nullable
        public Set<BytesReference> getQuery() {
            return query;
        }

        private boolean check(String action) {
            return actionMatcher.test(action);
        }
```

```
        private boolean check(String action, String index) {
            assert index != null;
            return check(action) && indexNameMatcher.test(index);
        }

        boolean hasQuery() {
            return query != null;
        }
    }

    private static class DocumentLevelPermissions {

        private Set<BytesReference> queries = null;
        private boolean allowAll = false;

        private void addAll(Set<BytesReference> query) {
            if (allowAll == false) {
                if (queries == null) {
                    queries = new HashSet<>();
                }
                queries.addAll(query);
            }
        }

        private boolean isAllowAll() {
            return allowAll;
        }

        private void setAllowAll(boolean allowAll) {
            this.allowAll = allowAll;
        }
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.xpack.core.security.authz.permission;

import org.apache.logging.log4j.LogManager;
import org.apache.logging.log4j.Logger;
import org.apache.lucene.util.automaton.Automaton;
import org.apache.lucene.util.automaton.Operations;
import org.elasticsearch.common.collect.Tuple;
import org.elasticsearch.common.util.set.Sets;
import org.elasticsearch.xpack.core.security.authz.privilege.ApplicationPrivilege;
import org.elasticsearch.xpack.core.security.support.Automatons;
```

```
import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collections;
import java.util.HashMap;
import java.util.List;
import java.util.Map;
import java.util.Set;
import java.util.function.Predicate;
import java.util.stream.Collectors;

/**
* A permission that is based on privileges for application (non elasticsearch) capabilities
*/
public final class ApplicationPermission {

  public static final ApplicationPermission NONE = new ApplicationPermission(Collections.emptyList());

  private final Logger logger;
  private final List<PermissionEntry> permissions;

  /**
   * @param privilegesAndResources A list of (privilege, resources). Each element in the {@link List} is a {@link
Tuple} containing
   *                               a single {@link ApplicationPrivilege} and the {@link Set} of resources to which that
privilege is
   *                               applied. The resources are treated as a wildcard {@link Automatons#pattern}.
   */
  ApplicationPermission(List<Tuple<ApplicationPrivilege, Set<String>>> privilegesAndResources) {
    this.logger = LogManager.getLogger(getClass());
    Map<ApplicationPrivilege, PermissionEntry> permissionsByPrivilege = new HashMap<>();
    privilegesAndResources.forEach(tup -> permissionsByPrivilege.compute(tup.v1(), (appPriv, existing) -> {
      final Set<String> resourceNames = tup.v2();
      final Automaton patterns = Automatons.patterns(resourceNames);
      if (existing == null) {
        return new PermissionEntry(appPriv, resourceNames, patterns);
      } else {
        return new PermissionEntry(appPriv, Sets.union(existing.resourceNames, resourceNames),
          Automatons.unionAndMinimize(Arrays.asList(existing.resourceAutomaton, patterns)));
      }
    }));
    this.permissions = Collections.unmodifiableList(new ArrayList<>(permissionsByPrivilege.values()));
  }

  /**
   * Determines whether this permission grants the specified privilege on the given resource.
   * <p>
   * An {@link ApplicationPermission} consists of a sequence of permission entries, where each entry contains a
```

```
single
   * {@link ApplicationPrivilege} and one or more resource patterns.
   * </p>
   * <p>
   * This method returns {@code true} if, one or more of those entries meet the following criteria
   * </p>
   * <ul>
   * <li>The entry's application, when interpreted as an {@link Automaton} {@link Automatons#pattern(String)
pattern} matches the
   * application given in the argument (interpreted as a raw string)
   * </li>
   * <li>The {@link ApplicationPrivilege#getAutomaton automaton that defines the entry's actions} entirely covers
the
   * automaton given in the argument (that is, the argument is a subset of the entry's automaton)
   * </li>
   * <li>The entry's resources, when interpreted as an {@link Automaton} {@link Automatons#patterns(String...)}
set of patterns} entirely
   * covers the resource given in the argument (also interpreted as an {@link Automaton} {@link
Automatons#pattern(String) pattern}.
   * </li>
   * </ul>
   */
  public boolean grants(ApplicationPrivilege other, String resource) {
     Automaton resourceAutomaton = Automatons.patterns(resource);
     final boolean matched = permissions.stream().anyMatch(e -> e.grants(other, resourceAutomaton));
     logger.trace("Permission [{}] {} grant [{} , {}]", this, matched ? "does" : "does not", other, resource);
     return matched;
  }

  @Override
  public String toString() {
     return getClass().getSimpleName() + "{privileges=" + permissions + "}";
  }

  public Set<String> getApplicationNames() {
     return permissions.stream()
        .map(e -> e.privilege.getApplication())
        .collect(Collectors.toSet());
  }

  public Set<ApplicationPrivilege> getPrivileges(String application) {
     return permissions.stream()
        .filter(e -> application.equals(e.privilege.getApplication()))
        .map(e -> e.privilege)
        .collect(Collectors.toSet());
  }

  /**
```

```
   * Returns a set of resource patterns that are permitted for the provided privilege.
   * The returned set may include patterns that overlap (e.g. "object/*" and "object/1") and may
   * also include patterns that are defined again a more permissive privilege.
   * e.g. If a permission grants
   * <ul>
   *     <li>"my-app", "read", [ "user/*" ]</li>
   *     <li>"my-app", "all", [ "user/kimchy", "config/*" ]</li>
   * </ul>
   * Then <code>getResourcePatterns( myAppRead )</code> would return <code>"user/*", "user/kimchy",
"config/*"</code>.
   */
  public Set<String> getResourcePatterns(ApplicationPrivilege privilege) {
     return permissions.stream()
        .filter(e -> e.matchesPrivilege(privilege))
        .map(e -> e.resourceNames)
        .flatMap(Set::stream)
        .collect(Collectors.toSet());
  }

  private static class PermissionEntry {
     private final ApplicationPrivilege privilege;
     private final Predicate<String> application;
     private final Set<String> resourceNames;
     private final Automaton resourceAutomaton;

     private PermissionEntry(ApplicationPrivilege privilege, Set<String> resourceNames, Automaton
resourceAutomaton) {
        this.privilege = privilege;
        this.application = Automatons.predicate(privilege.getApplication());
        this.resourceNames = resourceNames;
        this.resourceAutomaton = resourceAutomaton;
     }

     private boolean grants(ApplicationPrivilege other, Automaton resource) {
        return matchesPrivilege(other) && Operations.subsetOf(resource, this.resourceAutomaton);
     }

     private boolean matchesPrivilege(ApplicationPrivilege other) {
        if (this.privilege.equals(other)) {
           return true;
        }
        if (this.application.test(other.getApplication()) == false) {
           return false;
        }
        if (Operations.isTotal(privilege.getAutomaton())) {
           return true;
        }
        return Operations.isEmpty(privilege.getAutomaton()) == false
```

```
            && Operations.isEmpty(other.getAutomaton()) == false
            && Operations.subsetOf(other.getAutomaton(), privilege.getAutomaton());
      }

      @Override
      public String toString() {
         return privilege.toString() + ":" + resourceNames;
      }
   }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.protocol.xpack.license;

import org.elasticsearch.action.ActionRequestValidationException;
import org.elasticsearch.action.support.master.MasterNodeReadRequest;


public class GetLicenseRequest extends MasterNodeReadRequest<GetLicenseRequest> {

   public GetLicenseRequest() {
   }

   @Override
   public ActionRequestValidationException validate() {
      return null;
   }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/

/**
* Request and Response objects for the default distribution's License
* APIs.
*/
package org.elasticsearch.protocol.xpack.license;
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.protocol.xpack.license;
```

```
import org.elasticsearch.action.ActionRequestValidationException;
import org.elasticsearch.action.support.master.AcknowledgedRequest;

public class PutLicenseRequest extends AcknowledgedRequest<PutLicenseRequest> {

  private String licenseDefinition;
  private boolean acknowledge = false;

  public PutLicenseRequest() {

  }

  @Override
  public ActionRequestValidationException validate() {
     return null;
  }

  public void setLicenseDefinition(String licenseDefinition) {
     this.licenseDefinition = licenseDefinition;
  }

  public String getLicenseDefinition() {
     return licenseDefinition;
  }

  public void setAcknowledge(boolean acknowledge) {
     this.acknowledge = acknowledge;
  }

  public boolean isAcknowledge() {
     return acknowledge;
  }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.protocol.xpack.license;

import org.elasticsearch.action.support.master.AcknowledgedResponse;
import org.elasticsearch.common.ParseField;
import org.elasticsearch.common.Strings;
import org.elasticsearch.common.collect.Tuple;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;
import org.elasticsearch.common.xcontent.ConstructingObjectParser;
```

```
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentParseException;
import org.elasticsearch.common.xcontent.XContentParser;
import org.elasticsearch.protocol.xpack.common.ProtocolUtils;

import java.io.IOException;
import java.util.ArrayList;
import java.util.Collections;
import java.util.HashMap;
import java.util.List;
import java.util.Map;
import java.util.Objects;

import static org.elasticsearch.common.xcontent.ConstructingObjectParser.constructorArg;
import static org.elasticsearch.common.xcontent.ConstructingObjectParser.optionalConstructorArg;

public class PutLicenseResponse extends AcknowledgedResponse {

  private static final ConstructingObjectParser<PutLicenseResponse, Void> PARSER = new
ConstructingObjectParser<>(
     "put_license_response", true, (a, v) -> {
     boolean acknowledged = (Boolean) a[0];
     LicensesStatus licensesStatus = LicensesStatus.fromString((String) a[1]);
     @SuppressWarnings("unchecked") Tuple<String, Map<String, String[]>> acknowledgements = (Tuple<String,
Map<String, String[]>>) a[2];
     if (acknowledgements == null) {
        return new PutLicenseResponse(acknowledged, licensesStatus);
     } else {
        return new PutLicenseResponse(acknowledged, licensesStatus, acknowledgements.v1(),
acknowledgements.v2());
     }

  });

  static {
     PARSER.declareBoolean(constructorArg(), new ParseField("acknowledged"));
     PARSER.declareString(constructorArg(), new ParseField("license_status"));
     PARSER.declareObject(optionalConstructorArg(), (parser, v) -> {
          Map<String, String[]> acknowledgeMessages = new HashMap<>();
          String message = null;
          XContentParser.Token token;
          String currentFieldName = null;
          while ((token = parser.nextToken()) != XContentParser.Token.END_OBJECT) {
             if (token == XContentParser.Token.FIELD_NAME) {
                currentFieldName = parser.currentName();
             } else {
                if (currentFieldName == null) {
                   throw new XContentParseException(parser.getTokenLocation(), "expected message header or
```

```
acknowledgement");
                }
                if ("message".equals(currentFieldName)) {
                    if (token != XContentParser.Token.VALUE_STRING) {
                        throw new XContentParseException(parser.getTokenLocation(), "unexpected message header
type");
                    }
                    message = parser.text();
                } else {
                    if (token != XContentParser.Token.START_ARRAY) {
                        throw new XContentParseException(parser.getTokenLocation(), "unexpected acknowledgement
type");
                    }
                    List<String> acknowledgeMessagesList = new ArrayList<>();
                    while ((token = parser.nextToken()) != XContentParser.Token.END_ARRAY) {
                        if (token != XContentParser.Token.VALUE_STRING) {
                            throw new XContentParseException(parser.getTokenLocation(), "unexpected
acknowledgement text");
                        }
                        acknowledgeMessagesList.add(parser.text());
                    }
                    acknowledgeMessages.put(currentFieldName, acknowledgeMessagesList.toArray(new String[0]));
                }
            }
        }
        return new Tuple<>(message, acknowledgeMessages);
    },
    new ParseField("acknowledge"));
  }

  private LicensesStatus status;
  private Map<String, String[]> acknowledgeMessages;
  private String acknowledgeHeader;

  public PutLicenseResponse() {
  }

  public PutLicenseResponse(boolean acknowledged, LicensesStatus status) {
    this(acknowledged, status, null, Collections.<String, String[]>emptyMap());
  }

  public PutLicenseResponse(boolean acknowledged, LicensesStatus status, String acknowledgeHeader,
                    Map<String, String[]> acknowledgeMessages) {
    super(acknowledged);
    this.status = status;
    this.acknowledgeHeader = acknowledgeHeader;
    this.acknowledgeMessages = acknowledgeMessages;
  }
```

```
public LicensesStatus status() {
   return status;
}

public Map<String, String[]> acknowledgeMessages() {
   return acknowledgeMessages;
}

public String acknowledgeHeader() {
   return acknowledgeHeader;
}

@Override
public void readFrom(StreamInput in) throws IOException {
   super.readFrom(in);
   status = LicensesStatus.fromId(in.readVInt());
   acknowledgeHeader = in.readOptionalString();
   int size = in.readVInt();
   Map<String, String[]> acknowledgeMessages = new HashMap<>(size);
   for (int i = 0; i < size; i++) {
      String feature = in.readString();
      int nMessages = in.readVInt();
      String[] messages = new String[nMessages];
      for (int j = 0; j < nMessages; j++) {
         messages[j] = in.readString();
      }
      acknowledgeMessages.put(feature, messages);
   }
   this.acknowledgeMessages = acknowledgeMessages;
}

@Override
public void writeTo(StreamOutput out) throws IOException {
   super.writeTo(out);
   out.writeVInt(status.id());
   out.writeOptionalString(acknowledgeHeader);
   out.writeVInt(acknowledgeMessages.size());
   for (Map.Entry<String, String[]> entry : acknowledgeMessages.entrySet()) {
      out.writeString(entry.getKey());
      out.writeVInt(entry.getValue().length);
      for (String message : entry.getValue()) {
         out.writeString(message);
      }
   }
}

@Override
```

```
  protected void addCustomFields(XContentBuilder builder, Params params) throws IOException {
    builder.field("license_status", status.toString());
    if (!acknowledgeMessages.isEmpty()) {
      builder.startObject("acknowledge");
      builder.field("message", acknowledgeHeader);
      for (Map.Entry<String, String[]> entry : acknowledgeMessages.entrySet()) {
        builder.startArray(entry.getKey());
        for (String message : entry.getValue()) {
          builder.value(message);
        }
        builder.endArray();
      }
      builder.endObject();
    }
  }

  @Override
  public String toString() {
    return Strings.toString(this, true, true);
  }

  public static PutLicenseResponse fromXContent(XContentParser parser) throws IOException {
    return PARSER.parse(parser, null);
  }

  @Override
  public boolean equals(Object o) {
    if (this == o) return true;
    if (o == null || getClass() != o.getClass()) return false;
    if (!super.equals(o)) return false;
    PutLicenseResponse that = (PutLicenseResponse) o;

    return status == that.status &&
      ProtocolUtils.equals(acknowledgeMessages, that.acknowledgeMessages) &&
      Objects.equals(acknowledgeHeader, that.acknowledgeHeader);
  }

  @Override
  public int hashCode() {
    return Objects.hash(super.hashCode(), status, ProtocolUtils.hashCode(acknowledgeMessages),
acknowledgeHeader);
  }


}
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```

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*/
package org.elasticsearch.protocol.xpack.license;

import org.elasticsearch.action.ActionResponse;

public class GetLicenseResponse extends ActionResponse {

  private String license;

  GetLicenseResponse() {
  }

  public GetLicenseResponse(String license) {
     this.license = license;
  }

  public String getLicenseDefinition() {
     return license;
  }

}
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*/
package org.elasticsearch.protocol.xpack.license;

import java.io.IOException;

import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;
import org.elasticsearch.common.io.stream.Writeable;

/**
* Status of an X-Pack license.
*/
public enum LicenseStatus implements Writeable {

  ACTIVE("active"),
  INVALID("invalid"),
  EXPIRED("expired");

  private final String label;

  LicenseStatus(String label) {
     this.label = label;
```

```
    }

    public String label() {
        return label;
    }

    @Override
    public void writeTo(StreamOutput out) throws IOException {
        out.writeString(label);
    }

    public static LicenseStatus readFrom(StreamInput in) throws IOException {
        return fromString(in.readString());
    }

    public static LicenseStatus fromString(String value) {
        switch (value) {
            case "active":
                return ACTIVE;
            case "invalid":
                return INVALID;
            case "expired":
                return EXPIRED;
            default:
                throw new IllegalArgumentException("unknown license status [" + value + "]");
        }
    }
}
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*/
package org.elasticsearch.protocol.xpack.license;

import org.elasticsearch.action.ActionRequestValidationException;
import org.elasticsearch.action.support.master.AcknowledgedRequest;


public class DeleteLicenseRequest extends AcknowledgedRequest<DeleteLicenseRequest> {

    @Override
    public ActionRequestValidationException validate() {
        return null;
    }
}
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```

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*/
package org.elasticsearch.protocol.xpack.license;

import java.util.Locale;

public enum LicensesStatus {
  VALID((byte) 0),
  INVALID((byte) 1),
  EXPIRED((byte) 2);

  private final byte id;

  LicensesStatus(byte id) {
    this.id = id;
  }

  public int id() {
    return id;
  }

  public static LicensesStatus fromId(int id) {
    if (id == 0) {
      return VALID;
    } else if (id == 1) {
      return INVALID;
    } else if (id == 2) {
      return EXPIRED;
    } else {
      throw new IllegalStateException("no valid LicensesStatus for id=" + id);
    }
  }


  @Override
  public String toString() {
    return this.name().toLowerCase(Locale.ROOT);
  }

  public static LicensesStatus fromString(String value) {
    switch (value) {
      case "valid":
        return VALID;
      case "invalid":
        return INVALID;
      case "expired":
        return EXPIRED;
```

```
            default:
                throw new IllegalArgumentException("unknown licenses status [" + value + "]");
        }
    }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.support.master.AcknowledgedRequestBuilder;
import org.elasticsearch.action.support.master.AcknowledgedResponse;
import org.elasticsearch.client.ElasticsearchClient;
import org.elasticsearch.protocol.xpack.license.DeleteLicenseRequest;

public class DeleteLicenseRequestBuilder extends AcknowledgedRequestBuilder<DeleteLicenseRequest,
AcknowledgedResponse,
    DeleteLicenseRequestBuilder> {

  public DeleteLicenseRequestBuilder(ElasticsearchClient client) {
    this(client, DeleteLicenseAction.INSTANCE);
  }

  /**
   * Creates new get licenses request builder
   *
   * @param client elasticsearch client
   */
  public DeleteLicenseRequestBuilder(ElasticsearchClient client, DeleteLicenseAction action) {
    super(client, action, new DeleteLicenseRequest());
  }
}
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*/
package org.elasticsearch.license;


import org.apache.logging.log4j.Logger;
import org.apache.logging.log4j.message.ParameterizedMessage;
import org.apache.logging.log4j.util.Supplier;
import org.apache.lucene.util.BytesRef;
import org.elasticsearch.license.License.OperationMode;
import org.elasticsearch.watcher.FileChangesListener;
```

```
import org.elasticsearch.watcher.FileWatcher;
import org.elasticsearch.watcher.ResourceWatcherService;

import java.io.IOException;
import java.nio.file.Files;
import java.nio.file.Path;
import java.util.concurrent.atomic.AtomicBoolean;

/**
* File based watcher for license {@link OperationMode}
* Watches for changes in <code>licenseModePath</code>, use
* {@link #getCurrentOperationMode()} to access the latest mode
*
* In case of failure to read a valid operation mode from <code>licenseModePath</code>,
* the operation mode will default to PLATINUM
*/
public final class OperationModeFileWatcher implements FileChangesListener {
  private final ResourceWatcherService resourceWatcherService;
  private final Path licenseModePath;
  private final AtomicBoolean initialized = new AtomicBoolean();
  private final OperationMode defaultOperationMode = OperationMode.PLATINUM;
  private volatile OperationMode currentOperationMode = defaultOperationMode;
  private final Logger logger;
  private final Runnable onChange;

  public OperationModeFileWatcher(ResourceWatcherService resourceWatcherService, Path licenseModePath,
                                  Logger logger, Runnable onChange) {
    this.resourceWatcherService = resourceWatcherService;
    this.licenseModePath = licenseModePath;
    this.logger = logger;
    this.onChange = onChange;
  }

  public void init() {
    if (initialized.compareAndSet(false, true)) {
      final FileWatcher watcher = new FileWatcher(licenseModePath);
      watcher.addListener(this);
      try {
        resourceWatcherService.add(watcher, ResourceWatcherService.Frequency.HIGH);
        if (Files.exists(licenseModePath)) {
          onChange(licenseModePath);
        }
      } catch (IOException e) {
        logger.error("couldn't initialize watching license mode file", e);
      }
    }
  }
```

```
/**
 * Returns the current operation mode based on license mode file.
 * Defaults to {@link OperationMode#PLATINUM}
 */
public OperationMode getCurrentOperationMode() {
   return currentOperationMode;
}

@Override
public void onFileInit(Path file) {
   onChange(file);
}

@Override
public void onFileCreated(Path file) {
   onChange(file);
}

@Override
public void onFileDeleted(Path file) {
   onChange(file);
}

@Override
public void onFileChanged(Path file) {
   onChange(file);
}

private synchronized void onChange(Path file) {
   if (file.equals(licenseModePath)) {
      OperationMode newOperationMode = defaultOperationMode;
      try {
         if (Files.exists(licenseModePath)
               && Files.isReadable(licenseModePath)) {
            final byte[] content;
            try {
               content = Files.readAllBytes(licenseModePath);
            } catch (IOException e) {
               logger.error(
                     (Supplier<?>) () -> new ParameterizedMessage(
                           "couldn't read operation mode from [{}]", licenseModePath.toAbsolutePath()), e);
               return;
            }
            // this UTF-8 conversion is much pickier than java String
            final String operationMode = new BytesRef(content).utf8ToString();
            try {
               newOperationMode = OperationMode.resolve(operationMode);
            } catch (IllegalArgumentException e) {
```

```
                    logger.error(
                        (Supplier<?>) () -> new ParameterizedMessage(
                            "invalid operation mode in [{}]", licenseModePath.toAbsolutePath()), e);
                    return;
                }
            }
        } finally {
            // set this after the fact to prevent that we are jumping back and forth first setting to defautl and then
reading the
            // actual op mode resetting it.
            this.currentOperationMode = newOperationMode;
        }
        onChange.run();
    }
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionRequest;
import org.elasticsearch.action.ActionResponse;
import org.elasticsearch.cluster.NamedDiff;
import org.elasticsearch.cluster.metadata.IndexNameExpressionResolver;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.cluster.node.DiscoveryNodes;
import org.elasticsearch.common.ParseField;
import org.elasticsearch.common.io.stream.NamedWriteableRegistry;
import org.elasticsearch.common.settings.ClusterSettings;
import org.elasticsearch.common.settings.IndexScopedSettings;
import org.elasticsearch.common.settings.Setting;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.settings.SettingsFilter;
import org.elasticsearch.common.xcontent.NamedXContentRegistry;
import org.elasticsearch.plugins.ActionPlugin;
import org.elasticsearch.rest.RestController;
import org.elasticsearch.rest.RestHandler;

import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collections;
import java.util.List;
import java.util.function.Supplier;

import static org.elasticsearch.xpack.core.XPackClientActionPlugin.isTribeNode;
```

```
import static org.elasticsearch.xpack.core.XPackPlugin.transportClientMode;

public class Licensing implements ActionPlugin {

  public static final String NAME = "license";
  protected final Settings settings;
  private final boolean isTransportClient;
  private final boolean isTribeNode;

  // Until this is moved out to its own plugin (its currently in XPackPlugin.java, we need to make sure that any edits
to this file
  // are also carried out in XPackClientPlugin.java
  public List<NamedWriteableRegistry.Entry> getNamedWriteables() {
     List<NamedWriteableRegistry.Entry> entries = new ArrayList<>();
     entries.add(new NamedWriteableRegistry.Entry(MetaData.Custom.class, LicensesMetaData.TYPE,
LicensesMetaData::new));
     entries.add(new NamedWriteableRegistry.Entry(NamedDiff.class, LicensesMetaData.TYPE,
LicensesMetaData::readDiffFrom));
     return entries;
  }

  // Until this is moved out to its own plugin (its currently in XPackPlugin.java, we need to make sure that any edits
to this file
  // are also carried out in XPackClientPlugin.java
  public List<NamedXContentRegistry.Entry> getNamedXContent() {
     List<NamedXContentRegistry.Entry> entries = new ArrayList<>();
     // Metadata
     entries.add(new NamedXContentRegistry.Entry(MetaData.Custom.class, new
ParseField(LicensesMetaData.TYPE),
           LicensesMetaData::fromXContent));
     return entries;
  }

  public Licensing(Settings settings) {
     this.settings = settings;
     isTransportClient = transportClientMode(settings);
     isTribeNode = isTribeNode(settings);
  }

  @Override
  public List<ActionHandler<? extends ActionRequest, ? extends ActionResponse>> getActions() {
     if (isTribeNode) {
        return Collections.singletonList(new ActionHandler<>(GetLicenseAction.INSTANCE,
TransportGetLicenseAction.class));
     }
     return Arrays.asList(new ActionHandler<>(PutLicenseAction.INSTANCE, TransportPutLicenseAction.class),
           new ActionHandler<>(GetLicenseAction.INSTANCE, TransportGetLicenseAction.class),
           new ActionHandler<>(DeleteLicenseAction.INSTANCE, TransportDeleteLicenseAction.class),
```

```
            new ActionHandler<>(PostStartTrialAction.INSTANCE, TransportPostStartTrialAction.class),
            new ActionHandler<>(GetTrialStatusAction.INSTANCE, TransportGetTrialStatusAction.class),
            new ActionHandler<>(PostStartBasicAction.INSTANCE, TransportPostStartBasicAction.class),
            new ActionHandler<>(GetBasicStatusAction.INSTANCE, TransportGetBasicStatusAction.class));
    }

    @Override
    public List<RestHandler> getRestHandlers(Settings settings, RestController restController, ClusterSettings
clusterSettings,
            IndexScopedSettings indexScopedSettings, SettingsFilter settingsFilter, IndexNameExpressionResolver
indexNameExpressionResolver,
            Supplier<DiscoveryNodes> nodesInCluster) {
        List<RestHandler> handlers = new ArrayList<>();
        handlers.add(new RestGetLicenseAction(settings, restController));
        if (false == isTribeNode) {
            handlers.add(new RestPutLicenseAction(settings, restController));
            handlers.add(new RestDeleteLicenseAction(settings, restController));
            handlers.add(new RestGetTrialStatus(settings, restController));
            handlers.add(new RestGetBasicStatus(settings, restController));
            handlers.add(new RestPostStartTrialLicense(settings, restController));
            handlers.add(new RestPostStartBasicLicense(settings, restController));
        }
        return handlers;
    }

    // Until this is moved out to its own plugin (its currently in XPackPlugin.java, we need to make sure that any edits
to this file
    // are also carried out in XPackClientPlugin.java
    public List<Setting<?>> getSettings() {
        // TODO convert this wildcard to a real setting
        return Collections.singletonList(Setting.groupSetting("license.", Setting.Property.NodeScope));
    }

}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionRequestBuilder;
import org.elasticsearch.client.ElasticsearchClient;

class PostStartBasicRequestBuilder extends ActionRequestBuilder<PostStartBasicRequest,
        PostStartBasicResponse, PostStartBasicRequestBuilder> {

    PostStartBasicRequestBuilder(ElasticsearchClient client, PostStartBasicAction action) {
```

```
        super(client, action, new PostStartBasicRequest());
    }

    public PostStartBasicRequestBuilder setAcknowledge(boolean acknowledge) {
        request.acknowledge(acknowledge);
        return this;
    }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.cluster.node.DiscoveryNodes;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.xcontent.LoggingDeprecationHandler;
import org.elasticsearch.common.xcontent.NamedXContentRegistry;
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentParser;
import org.elasticsearch.common.xcontent.XContentType;

import java.io.IOException;
import java.nio.ByteBuffer;
import java.util.Base64;
import java.util.Collections;

import static org.elasticsearch.license.CryptUtils.encryptV3Format;
import static org.elasticsearch.license.CryptUtils.encrypt;
import static org.elasticsearch.license.CryptUtils.decryptV3Format;
import static org.elasticsearch.license.CryptUtils.decrypt;

class SelfGeneratedLicense {

    public static License create(License.Builder specBuilder, DiscoveryNodes currentNodes) {
        return create(specBuilder, LicenseUtils.compatibleLicenseVersion(currentNodes));
    }

    public static License create(License.Builder specBuilder, int version) {
        License spec = specBuilder
                .issuer("elasticsearch")
                .version(version)
                .build();
        final String signature;
        try {
```

```
        XContentBuilder contentBuilder = XContentFactory.contentBuilder(XContentType.JSON);
        spec.toXContent(contentBuilder, new
ToXContent.MapParams(Collections.singletonMap(License.LICENSE_SPEC_VIEW_MODE, "true")));
        byte[] encrypt;
        if (version < License.VERSION_CRYPTO_ALGORITHMS) {
           encrypt = encryptV3Format(BytesReference.toBytes(BytesReference.bytes(contentBuilder)));
        } else {
           encrypt = encrypt(BytesReference.toBytes(BytesReference.bytes(contentBuilder)));
        }
        byte[] bytes = new byte[4 + 4 + encrypt.length];
        ByteBuffer byteBuffer = ByteBuffer.wrap(bytes);
        // Set -version in signature
        byteBuffer.putInt(-version)
              .putInt(encrypt.length)
              .put(encrypt);
        signature = Base64.getEncoder().encodeToString(bytes);
     } catch (IOException e) {
        throw new IllegalStateException(e);
     }
     return License.builder().fromLicenseSpec(spec, signature).build();
  }

  public static boolean verify(final License license) {
     try {
        byte[] signatureBytes = Base64.getDecoder().decode(license.signature());
        ByteBuffer byteBuffer = ByteBuffer.wrap(signatureBytes);
        int version = byteBuffer.getInt();
        int contentLen = byteBuffer.getInt();
        byte[] content = new byte[contentLen];
        byteBuffer.get(content);
        final License expectedLicense;
        // Version in signature is -version, so check for -(-version) < 4
        byte[] decryptedContent = (-version < License.VERSION_CRYPTO_ALGORITHMS) ?
decryptV3Format(content) : decrypt(content);
        // EMPTY is safe here because we don't call namedObject
        try (XContentParser parser = XContentFactory.xContent(XContentType.JSON)
              .createParser(NamedXContentRegistry.EMPTY, LoggingDeprecationHandler.INSTANCE,
decryptedContent)) {
           parser.nextToken();
           expectedLicense = License.builder().fromLicenseSpec(License.fromXContent(parser),
                 license.signature()).version(-version).build();
        }
        return license.equals(expectedLicense);
     } catch (IOException e) {
        throw new IllegalStateException(e);
     }
  }
```

```
  public static boolean validSelfGeneratedType(String type) {
     return "basic".equals(type) || "trial".equals(type);
  }
}
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*/
package org.elasticsearch.license;


import javax.crypto.BadPaddingException;
import javax.crypto.Cipher;
import javax.crypto.IllegalBlockSizeException;
import javax.crypto.NoSuchPaddingException;
import javax.crypto.SecretKey;
import javax.crypto.SecretKeyFactory;
import javax.crypto.spec.PBEKeySpec;
import javax.crypto.spec.SecretKeySpec;
import java.nio.charset.StandardCharsets;
import java.security.GeneralSecurityException;
import java.security.KeyFactory;
import java.security.MessageDigest;
import java.security.PrivateKey;
import java.security.PublicKey;
import java.security.SecureRandom;
import java.security.NoSuchAlgorithmException;
import java.security.InvalidKeyException;
import java.security.spec.InvalidKeySpecException;
import java.security.spec.PKCS8EncodedKeySpec;
import java.security.spec.X509EncodedKeySpec;
import java.util.Base64;

public class CryptUtils {
  // SALT must be at least 128bits for FIPS 140-2 compliance
  private static final byte[] SALT = {
        (byte) 0x74, (byte) 0x68, (byte) 0x69, (byte) 0x73,
        (byte) 0x69, (byte) 0x73, (byte) 0x74, (byte) 0x68,
        (byte) 0x65, (byte) 0x73, (byte) 0x61, (byte) 0x6C,
        (byte) 0x74, (byte) 0x77, (byte) 0x65, (byte) 0x75
  };
  private static final String KEY_ALGORITHM = "RSA";
  private static final char[] DEFAULT_PASS_PHRASE = "elasticsearch-license".toCharArray();
  private static final String KDF_ALGORITHM = "PBKDF2WithHmacSHA512";
  private static final int KDF_ITERATION_COUNT = 10000;
  private static final String CIPHER_ALGORITHM = "AES";
  // This can be changed to 256 once Java 9 is the minimum version
```

```
// http://www.oracle.com/technetwork/java/javase/terms/readme/jdk9-readme-3852447.html#jce
private static final int ENCRYPTION_KEY_LENGTH = 128;
private static final SecureRandom RANDOM = new SecureRandom();

/**
 * Read encrypted private key file content with default pass phrase
 */
public static PrivateKey readEncryptedPrivateKey(byte[] fileContents) {
   return readEncryptedPrivateKey(fileContents, DEFAULT_PASS_PHRASE, false);
}

/**
 * Returns encrypted private key file content with default pass phrase
 */
public static byte[] writeEncryptedPrivateKey(PrivateKey privateKey) {
   return writeEncryptedPrivateKey(privateKey, DEFAULT_PASS_PHRASE);
}

/**
 * Read encrypted private key file content with provided <code>passPhrase</code>
 */
public static PrivateKey readEncryptedPrivateKey(byte[] fileContents, char[] passPhrase, boolean preV4) {
   byte[] keyBytes = preV4 ? decryptV3Format(fileContents) : decrypt(fileContents, passPhrase);
   PKCS8EncodedKeySpec privateKeySpec = new PKCS8EncodedKeySpec(keyBytes);
   try {
      return KeyFactory.getInstance(KEY_ALGORITHM).generatePrivate(privateKeySpec);
   } catch (NoSuchAlgorithmException | InvalidKeySpecException e) {
      throw new IllegalStateException(e);
   }
}

/**
 * Read public key file content
 */
public static PublicKey readPublicKey(byte[] fileContents) {
   X509EncodedKeySpec publicKeySpec = new X509EncodedKeySpec(fileContents);
   try {
      return KeyFactory.getInstance(CryptUtils.KEY_ALGORITHM).generatePublic(publicKeySpec);
   } catch (NoSuchAlgorithmException | InvalidKeySpecException e) {
      throw new IllegalStateException(e);
   }
}

/**
 * Returns encrypted public key file content with provided <code>passPhrase</code>
 */
public static byte[] writeEncryptedPublicKey(PublicKey publicKey) {
   X509EncodedKeySpec encodedKeySpec = new X509EncodedKeySpec(publicKey.getEncoded());
```

```
    return encrypt(encodedKeySpec.getEncoded(), DEFAULT_PASS_PHRASE);
}

/**
 * Returns encrypted private key file content with provided <code>passPhrase</code>
 */
public static byte[] writeEncryptedPrivateKey(PrivateKey privateKey, char[] passPhrase) {
    PKCS8EncodedKeySpec encodedKeySpec = new PKCS8EncodedKeySpec(privateKey.getEncoded());
    return encrypt(encodedKeySpec.getEncoded(), passPhrase);
}

/**
 * Encrypts provided <code>data</code> with <code>DEFAULT_PASS_PHRASE</code>
 */
static byte[] encrypt(byte[] data) {
    return encrypt(data, DEFAULT_PASS_PHRASE);
}

/**
 * Decrypts provided <code>encryptedData</code> with <code>DEFAULT_PASS_PHRASE</code>
 */
static byte[] decrypt(byte[] encryptedData) {
    return decrypt(encryptedData, DEFAULT_PASS_PHRASE);
}

/**
 * Encrypts provided <code>data</code> with <code>passPhrase</code>
 */
private static byte[] encrypt(byte[] data, char[] passPhrase) {
    try {
        final Cipher encryptionCipher = getEncryptionCipher(deriveSecretKey(passPhrase));
        return encryptionCipher.doFinal(data);
    } catch (IllegalBlockSizeException | BadPaddingException e) {
        throw new IllegalStateException(e);
    }
}

/**
 * Decrypts provided <code>encryptedData</code> with <code>passPhrase</code>
 */
private static byte[] decrypt(byte[] encryptedData, char[] passPhrase) {
    try {
        final Cipher cipher = getDecryptionCipher(deriveSecretKey(passPhrase));
        return cipher.doFinal(encryptedData);
    } catch (IllegalBlockSizeException | BadPaddingException e) {
        throw new IllegalStateException(e);
    }
}
```

```
  static byte[] encryptV3Format(byte[] data) {
     try {
        SecretKey encryptionKey = getV3Key();
        final Cipher encryptionCipher = getEncryptionCipher(encryptionKey);
        return encryptionCipher.doFinal(pad(data, 20));
     } catch (GeneralSecurityException e) {
        throw new IllegalStateException(e);
     }
  }

  static byte[] decryptV3Format(byte[] data) {
     try {
        SecretKey decryptionKey = getV3Key();
        final Cipher decryptionCipher = getDecryptionCipher(decryptionKey);
        return unPad(decryptionCipher.doFinal(data));
     } catch (GeneralSecurityException e) {
        throw new IllegalStateException(e);
     }
  }

  private static SecretKey getV3Key() throws NoSuchAlgorithmException, InvalidKeySpecException {
     final byte[] salt = {
           (byte) 0xA9, (byte) 0xA2, (byte) 0xB5, (byte) 0xDE,
           (byte) 0x2A, (byte) 0x8A, (byte) 0x9A, (byte) 0xE6
     };
     final byte[] passBytes = "elasticsearch-license".getBytes(StandardCharsets.UTF_8);
     final byte[] digest = MessageDigest.getInstance("SHA-512").digest(passBytes);
     final char[] hashedPassphrase = Base64.getEncoder().encodeToString(digest).toCharArray();
     PBEKeySpec keySpec = new PBEKeySpec(hashedPassphrase, salt, 1024, 128);
     byte[] shortKey = SecretKeyFactory.getInstance("PBEWithSHA1AndDESede").
           generateSecret(keySpec).getEncoded();
     byte[] intermediaryKey = new byte[16];
     for (int i = 0, j = 0; i < 16; i++) {
        intermediaryKey[i] = shortKey[j];
        if (++j == shortKey.length)
           j = 0;
     }
     return new SecretKeySpec(intermediaryKey, "AES");
  }

  private static SecretKey deriveSecretKey(char[] passPhrase) {
     try {
        PBEKeySpec keySpec = new PBEKeySpec(passPhrase, SALT, KDF_ITERATION_COUNT,
ENCRYPTION_KEY_LENGTH);

        SecretKey secretKey = SecretKeyFactory.getInstance(KDF_ALGORITHM).
              generateSecret(keySpec);
```

```
            return new SecretKeySpec(secretKey.getEncoded(), CIPHER_ALGORITHM);
        } catch (NoSuchAlgorithmException | InvalidKeySpecException e) {
            throw new IllegalStateException(e);
        }
    }

    private static Cipher getEncryptionCipher(SecretKey secretKey) {
        return getCipher(Cipher.ENCRYPT_MODE, secretKey);
    }

    private static Cipher getDecryptionCipher(SecretKey secretKey) {
        return getCipher(Cipher.DECRYPT_MODE, secretKey);
    }

    private static Cipher getCipher(int mode, SecretKey secretKey) {
        try {
            Cipher cipher = Cipher.getInstance(CIPHER_ALGORITHM);
            cipher.init(mode, secretKey, RANDOM);
            return cipher;
        } catch (NoSuchAlgorithmException | InvalidKeyException | NoSuchPaddingException e) {
            throw new IllegalStateException(e);
        }
    }

    private static byte[] pad(byte[] bytes, int length) {
        if (bytes.length >= length) {
            byte[] out = new byte[bytes.length + 1];
            System.arraycopy(bytes, 0, out, 0, bytes.length);
            out[bytes.length] = (byte) 1;
            return out;
        }

        byte[] out = new byte[length + 1];

        int i = 0;
        for (; i < bytes.length; i++)
            out[i] = bytes[i];

        int padded = length - i;

        // fill the rest with random bytes
        byte[] fill = new byte[padded - 1];
        RANDOM.nextBytes(fill);
        System.arraycopy(fill, 0, out, i, padded - 1);

        out[length] = (byte) (padded + 1);

        return out;
```

```
  }

  private static byte[] unPad(byte[] bytes) {
    int padded = (int) bytes[bytes.length - 1];
    int targetLength = bytes.length - padded;

    byte[] out = new byte[targetLength];

    System.arraycopy(bytes, 0, out, 0, targetLength);

    return out;
  }
}
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.rest.BytesRestResponse;
import org.elasticsearch.rest.RestController;
import org.elasticsearch.rest.RestRequest;
import org.elasticsearch.rest.RestResponse;
import org.elasticsearch.rest.action.RestBuilderListener;
import org.elasticsearch.xpack.core.XPackClient;
import org.elasticsearch.xpack.core.rest.XPackRestHandler;

import java.io.IOException;
import java.util.Map;

import static org.elasticsearch.rest.RestRequest.Method.POST;

public class RestPostStartTrialLicense extends XPackRestHandler {

  RestPostStartTrialLicense(Settings settings, RestController controller) {
    super(settings);
    controller.registerHandler(POST, URI_BASE + "/license/start_trial", this);
  }

  @Override
  protected RestChannelConsumer doPrepareRequest(RestRequest request, XPackClient client) throws IOException
{
    PostStartTrialRequest startTrialRequest = new PostStartTrialRequest();
    startTrialRequest.setType(request.param("type", "trial"));
    startTrialRequest.acknowledge(request.paramAsBoolean("acknowledge", false));
```

```
        return channel -> client.licensing().postStartTrial(startTrialRequest,
                new RestBuilderListener<PostStartTrialResponse>(channel) {
                    @Override
                    public RestResponse buildResponse(PostStartTrialResponse response, XContentBuilder builder) throws
    Exception {
                        PostStartTrialResponse.Status status = response.getStatus();
                        builder.startObject();
                        builder.field("acknowledged", startTrialRequest.isAcknowledged());
                        if (status.isTrialStarted()) {
                            builder.field("trial_was_started", true);
                            builder.field("type", startTrialRequest.getType());
                        } else {
                            builder.field("trial_was_started", false);
                            builder.field("error_message", status.getErrorMessage());
                        }

                        Map<String, String[]> acknowledgementMessages = response.getAcknowledgementMessages();
                        if (acknowledgementMessages.isEmpty() == false) {
                            builder.startObject("acknowledge");
                            builder.field("message", response.getAcknowledgementMessage());
                            for (Map.Entry<String, String[]> entry : acknowledgementMessages.entrySet()) {
                                builder.startArray(entry.getKey());
                                for (String message : entry.getValue()) {
                                    builder.value(message);
                                }
                                builder.endArray();
                            }
                            builder.endObject();
                        }
                        builder.endObject();
                        return new BytesRestResponse(status.getRestStatus(), builder);
                    }
                });
      }

      @Override
      public String getName() {
        return "xpack_upgrade_to_trial_action";
      }
    }
    /*
    * Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
    * or more contributor license agreements. Licensed under the Elastic License;
    * you may not use this file except in compliance with the Elastic License.
    */
    package org.elasticsearch.license;

    import org.apache.logging.log4j.Logger;
```

```
import org.apache.logging.log4j.LogManager;
import org.apache.logging.log4j.message.ParameterizedMessage;
import org.apache.logging.log4j.util.Supplier;
import org.elasticsearch.Version;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.Nullable;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.xpack.core.XPackPlugin;

import java.time.Clock;
import java.util.UUID;

public class StartupSelfGeneratedLicenseTask extends ClusterStateUpdateTask {
  private static final Logger logger = LogManager.getLogger(StartupSelfGeneratedLicenseTask.class);

  /**
   * Max number of nodes licensed by generated trial license
   */
  private int selfGeneratedLicenseMaxNodes = 1000;

  private final Settings settings;
  private final Clock clock;
  private final ClusterService clusterService;

  public StartupSelfGeneratedLicenseTask(Settings settings, Clock clock, ClusterService clusterService) {
     this.settings = settings;
     this.clock = clock;
     this.clusterService = clusterService;
  }

  @Override
  public void clusterStateProcessed(String source, ClusterState oldState, ClusterState newState) {
     LicensesMetaData licensesMetaData = newState.metaData().custom(LicensesMetaData.TYPE);
     if (logger.isDebugEnabled()) {
        logger.debug("registered self generated license: {}", licensesMetaData);
     }
  }

  @Override
  public ClusterState execute(ClusterState currentState) throws Exception {
     XPackPlugin.checkReadyForXPackCustomMetadata(currentState);
     final MetaData metaData = currentState.metaData();
     final LicensesMetaData currentLicensesMetaData = metaData.custom(LicensesMetaData.TYPE);
     // do not generate a license if any license is present
     if (currentLicensesMetaData == null) {
```

```
            String type = LicenseService.SELF_GENERATED_LICENSE_TYPE.get(settings);
            if (SelfGeneratedLicense.validSelfGeneratedType(type) == false) {
                throw new IllegalArgumentException("Illegal self generated license type [" + type +
                        "]. Must be trial or basic.");
            }
            return updateWithLicense(currentState, type);
        } else if (LicenseUtils.signatureNeedsUpdate(currentLicensesMetaData.getLicense(), currentState.nodes())) {
            return updateLicenseSignature(currentState, currentLicensesMetaData);
        } else if (LicenseUtils.licenseNeedsExtended(currentLicensesMetaData.getLicense())) {
            return extendBasic(currentState, currentLicensesMetaData);
        } else {
            return currentState;
        }
    }

    private ClusterState updateLicenseSignature(ClusterState currentState, LicensesMetaData
currentLicenseMetaData) {
        License license = currentLicenseMetaData.getLicense();
        MetaData.Builder mdBuilder = MetaData.builder(currentState.metaData());
        String type = license.type();
        long issueDate = license.issueDate();
        long expiryDate = license.expiryDate();
        // extend the basic license expiration date if needed since extendBasic will not be called now
        if ("basic".equals(type) &&  expiryDate !=
LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS) {
            expiryDate = LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS;
        }
        License.Builder specBuilder = License.builder()
                .uid(license.uid())
                .issuedTo(license.issuedTo())
                .maxNodes(selfGeneratedLicenseMaxNodes)
                .issueDate(issueDate)
                .type(type)
                .expiryDate(expiryDate);
        License selfGeneratedLicense = SelfGeneratedLicense.create(specBuilder, currentState.nodes());
        Version trialVersion = currentLicenseMetaData.getMostRecentTrialVersion();
        LicensesMetaData newLicenseMetadata = new LicensesMetaData(selfGeneratedLicense, trialVersion);
        mdBuilder.putCustom(LicensesMetaData.TYPE, newLicenseMetadata);
        logger.info("Updating existing license to the new version.\n\nOld license:\n {}\n\n New license:\n{}",
            license, newLicenseMetadata.getLicense());
        return ClusterState.builder(currentState).metaData(mdBuilder).build();
    }

    @Override
    public void onFailure(String source, @Nullable Exception e) {
        logger.error((Supplier<?>) () -> new ParameterizedMessage("unexpected failure during [{}]", source), e);
    }
```

```
  private ClusterState extendBasic(ClusterState currentState, LicensesMetaData currentLicenseMetadata) {
     License license = currentLicenseMetadata.getLicense();
     MetaData.Builder mdBuilder = MetaData.builder(currentState.metaData());
     LicensesMetaData newLicenseMetadata = createBasicLicenseFromExistingLicense(currentLicenseMetadata);
     mdBuilder.putCustom(LicensesMetaData.TYPE, newLicenseMetadata);
     logger.info("Existing basic license has an expiration. Basic licenses no longer expire." +
           "Regenerating license.\n\nOld license:\n {}\n\n New license:\n{}", license,
newLicenseMetadata.getLicense());
     return ClusterState.builder(currentState).metaData(mdBuilder).build();
  }

  private LicensesMetaData createBasicLicenseFromExistingLicense(LicensesMetaData currentLicenseMetadata) {
     License currentLicense = currentLicenseMetadata.getLicense();
     License.Builder specBuilder = License.builder()
           .uid(currentLicense.uid())
           .issuedTo(currentLicense.issuedTo())
           .maxNodes(selfGeneratedLicenseMaxNodes)
           .issueDate(currentLicense.issueDate())
           .type("basic")
           .expiryDate(LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS);
     License selfGeneratedLicense = SelfGeneratedLicense.create(specBuilder, currentLicense.version());
     Version trialVersion = currentLicenseMetadata.getMostRecentTrialVersion();
     return new LicensesMetaData(selfGeneratedLicense, trialVersion);
  }

  private ClusterState updateWithLicense(ClusterState currentState, String type) {
     long issueDate = clock.millis();
     MetaData.Builder mdBuilder = MetaData.builder(currentState.metaData());
     long expiryDate;
     if ("basic".equals(type)) {
        expiryDate = LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS;
     } else {
        expiryDate = issueDate +
LicenseService.NON_BASIC_SELF_GENERATED_LICENSE_DURATION.getMillis();
     }
     License.Builder specBuilder = License.builder()
           .uid(UUID.randomUUID().toString())
           .issuedTo(clusterService.getClusterName().value())
           .maxNodes(selfGeneratedLicenseMaxNodes)
           .issueDate(issueDate)
           .type(type)
           .expiryDate(expiryDate);
     License selfGeneratedLicense = SelfGeneratedLicense.create(specBuilder, currentState.nodes());
     LicensesMetaData licensesMetaData;
     if ("trial".equals(type)) {
        licensesMetaData = new LicensesMetaData(selfGeneratedLicense, Version.CURRENT);
     } else {
        licensesMetaData = new LicensesMetaData(selfGeneratedLicense, null);
```

```
      }
      mdBuilder.putCustom(LicensesMetaData.TYPE, licensesMetaData);
      return ClusterState.builder(currentState).metaData(mdBuilder).build();
    }
  }
  /*
  * Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
  * or more contributor license agreements. Licensed under the Elastic License;
  * you may not use this file except in compliance with the Elastic License.
  */
  package org.elasticsearch.license;

  import org.elasticsearch.Version;
  import org.elasticsearch.cluster.AbstractNamedDiffable;
  import org.elasticsearch.cluster.MergableCustomMetaData;
  import org.elasticsearch.cluster.NamedDiff;
  import org.elasticsearch.cluster.metadata.MetaData;
  import org.elasticsearch.common.Nullable;
  import org.elasticsearch.common.io.stream.StreamInput;
  import org.elasticsearch.common.io.stream.StreamOutput;
  import org.elasticsearch.common.xcontent.XContentBuilder;
  import org.elasticsearch.common.xcontent.XContentParser;
  import org.elasticsearch.license.License.OperationMode;
  import org.elasticsearch.xpack.core.XPackPlugin;

  import java.io.IOException;
  import java.util.EnumSet;

  /**
  * Contains metadata about registered licenses
  */
  public class LicensesMetaData extends AbstractNamedDiffable<MetaData.Custom> implements
  XPackPlugin.XPackMetaDataCustom,
      MergableCustomMetaData<LicensesMetaData> {

    public static final String TYPE = "licenses";

    /**
     * When license is explicitly removed by a user, LICENSE_TOMBSTONE
     * is used as a placeholder in the license metadata. This enables
     * us to distinguish between the scenario when a cluster never
     * had a license (null) and when a license was removed explicitly
     * (LICENSE_TOMBSTONE).
     * We rely on this to decide whether to generate a unsigned trial
     * license or not. we should only generate a license if no license
     * ever existed in the cluster state
     */
    public static final License LICENSE_TOMBSTONE = License.builder()
```

```
        .type("trial")
        .issuer("elasticsearch")
        .uid("TOMBSTONE")
        .issuedTo("")
        .maxNodes(0)
        .issueDate(0)
        .expiryDate(0)
        .build();

private License license;

// This field describes the version of x-pack for which this cluster has exercised a trial. If the field
// is null, then no trial has been exercised. We keep the version to leave open the possibility that we
// may eventually allow a cluster to exercise a trial every time they upgrade to a new major version.
@Nullable
private Version trialVersion;

LicensesMetaData(License license, Version trialVersion) {
   this.license = license;
   this.trialVersion = trialVersion;
}

public License getLicense() {
   return license;
}

boolean isEligibleForTrial() {
   if (trialVersion == null) {
      return true;
   }
   return Version.CURRENT.major > trialVersion.major;
}

Version getMostRecentTrialVersion() {
   return trialVersion;
}

@Override
public String toString() {
   return "LicensesMetaData{" +
         "license=" + license +
         ", trialVersion=" + trialVersion +
         '}';
}

@Override
public boolean equals(Object o) {
   if (this == o) return true;
```

```
    if (o == null || getClass() != o.getClass()) return false;

    LicensesMetaData that = (LicensesMetaData) o;

    if (license != null ? !license.equals(that.license) : that.license != null) return false;
    return trialVersion != null ? trialVersion.equals(that.trialVersion) : that.trialVersion == null;
}

@Override
public int hashCode() {
    int result = license != null ? license.hashCode() : 0;
    result = 31 * result + (trialVersion != null ? trialVersion.hashCode() : 0);
    return result;
}

@Override
public String getWriteableName() {
    return TYPE;
}

@Override
public Version getMinimalSupportedVersion() {
    return Version.CURRENT.minimumCompatibilityVersion();
}

@Override
public EnumSet<MetaData.XContentContext> context() {
    return EnumSet.of(MetaData.XContentContext.GATEWAY);
}

public static LicensesMetaData fromXContent(XContentParser parser) throws IOException {
    License license = LICENSE_TOMBSTONE;
    Version trialLicense = null;
    XContentParser.Token token;
    while ((token = parser.nextToken()) != XContentParser.Token.END_OBJECT) {
        if (token == XContentParser.Token.FIELD_NAME) {
            String fieldName = parser.currentName();
            if (fieldName != null) {
                if (fieldName.equals(Fields.LICENSE)) {
                    token = parser.nextToken();
                    if (token == XContentParser.Token.START_OBJECT) {
                        license = License.fromXContent(parser);
                    } else if (token == XContentParser.Token.VALUE_NULL) {
                        license = LICENSE_TOMBSTONE;
                    }
                } else if (fieldName.equals(Fields.TRIAL_LICENSE)) {
                    parser.nextToken();
                    trialLicense = Version.fromString(parser.text());
```

```
            }
          }
        }
    }
    return new LicensesMetaData(license, trialLicense);
}

@Override
public XContentBuilder toXContent(XContentBuilder builder, Params params) throws IOException {
    if (license == LICENSE_TOMBSTONE) {
        builder.nullField(Fields.LICENSE);
    } else {
        builder.startObject(Fields.LICENSE);
        license.toInnerXContent(builder, params);
        builder.endObject();
    }
    if (trialVersion != null) {
        builder.field(Fields.TRIAL_LICENSE, trialVersion.toString());
    }
    return builder;
}

@Override
public void writeTo(StreamOutput streamOutput) throws IOException {
    if (license == LICENSE_TOMBSTONE) {
        streamOutput.writeBoolean(false); // no license
    } else {
        streamOutput.writeBoolean(true); // has a license
        license.writeTo(streamOutput);
    }
    if (streamOutput.getVersion().onOrAfter(Version.V_6_1_0)) {
        if (trialVersion == null) {
            streamOutput.writeBoolean(false);
        } else {
            streamOutput.writeBoolean(true);
            Version.writeVersion(trialVersion, streamOutput);
        }
    }
}

public LicensesMetaData(StreamInput streamInput) throws IOException {
    if (streamInput.readBoolean()) {
        license = License.readLicense(streamInput);
    } else {
        license = LICENSE_TOMBSTONE;
    }
    if (streamInput.getVersion().onOrAfter(Version.V_6_1_0)) {
        boolean hasExercisedTrial = streamInput.readBoolean();
```

```
            if (hasExercisedTrial) {
                this.trialVersion = Version.readVersion(streamInput);
            }
        }
    }

    public static NamedDiff<MetaData.Custom> readDiffFrom(StreamInput streamInput) throws IOException {
        return readDiffFrom(MetaData.Custom.class, TYPE, streamInput);
    }

    public static License extractLicense(LicensesMetaData licensesMetaData) {
        if (licensesMetaData != null) {
            License license = licensesMetaData.getLicense();
            if (license == LicensesMetaData.LICENSE_TOMBSTONE) {
                return null;
            } else {
                return license;
            }
        }
        return null;
    }

    @Override
    public LicensesMetaData merge(LicensesMetaData other) {
        if (other.license == null) {
            return this;
        } else if (license == null
                || OperationMode.compare(other.license.operationMode(), license.operationMode()) > 0) {
            return other;
        }
        return this;
    }

    private static final class Fields {
        private static final String LICENSE = "license";
        private static final String TRIAL_LICENSE = "trial_license";
    }
}
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.inject.Inject;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.xcontent.ToXContent;
```

```
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.protocol.xpack.license.GetLicenseRequest;
import org.elasticsearch.rest.BytesRestResponse;
import org.elasticsearch.rest.RestController;
import org.elasticsearch.rest.RestRequest;
import org.elasticsearch.rest.RestResponse;
import org.elasticsearch.rest.action.RestBuilderListener;
import org.elasticsearch.xpack.core.XPackClient;
import org.elasticsearch.xpack.core.rest.XPackRestHandler;

import java.io.IOException;
import java.util.HashMap;
import java.util.Map;

import static org.elasticsearch.rest.RestRequest.Method.GET;
import static org.elasticsearch.rest.RestStatus.NOT_FOUND;
import static org.elasticsearch.rest.RestStatus.OK;

public class RestGetLicenseAction extends XPackRestHandler {

  @Inject
  public RestGetLicenseAction(Settings settings, RestController controller) {
     super(settings);
     // @deprecated Remove deprecations in 6.0
     controller.registerWithDeprecatedHandler(GET,  URI_BASE + "/license", this,
                                      GET, "/_license", deprecationLogger);

     // Remove _licenses support entirely in 6.0
     controller.registerAsDeprecatedHandler(GET, "/_licenses", this,
                                     "[GET /_licenses] is deprecated! Use " +
                                     "[GET /_xpack/license] instead.",
                                     deprecationLogger);
  }

  @Override
  public String getName() {
     return "xpack_get_license_action";
  }

  /**
   * There will be only one license displayed per feature, the selected license will have the latest expiry_date
   * out of all other licenses for the feature.
   * <p>
   * The licenses are sorted by latest issue_date
   */
  @Override
  public RestChannelConsumer doPrepareRequest(final RestRequest request, final XPackClient client) throws
IOException {
```

```
        final Map<String, String> overrideParams = new HashMap<>(2);
        overrideParams.put(License.REST_VIEW_MODE, "true");
        overrideParams.put(License.LICENSE_VERSION_MODE, String.valueOf(License.VERSION_CURRENT));
        final ToXContent.Params params = new ToXContent.DelegatingMapParams(overrideParams, request);
        GetLicenseRequest getLicenseRequest = new GetLicenseRequest();
        getLicenseRequest.local(request.paramAsBoolean("local", getLicenseRequest.local()));
        return channel -> client.es().admin().cluster().execute(GetLicenseAction.INSTANCE, getLicenseRequest,
                new RestBuilderListener<GetLicenseResponse>(channel) {
                    @Override
                    public RestResponse buildResponse(GetLicenseResponse response, XContentBuilder builder) throws
    Exception {
                        // Default to pretty printing, but allow ?pretty=false to disable
                        if (!request.hasParam("pretty")) {
                            builder.prettyPrint().lfAtEnd();
                        }
                        boolean hasLicense = response.license() != null;
                        builder.startObject();
                        if (hasLicense) {
                            builder.startObject("license");
                            response.license().toInnerXContent(builder, params);
                            builder.endObject();
                        }
                        builder.endObject();
                        return new BytesRestResponse(hasLicense ? OK : NOT_FOUND, builder);
                    }
                });
      }

    }
    /*
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    * or more contributor license agreements. Licensed under the Elastic License;
    * you may not use this file except in compliance with the Elastic License.
    */

    /**
    * Licensing for xpack.
    *
    * A {@link org.elasticsearch.license.License} is a signed set of json properties that determine what features
    * are available in a running cluster. Licenses are registered through a
    * {@link org.elasticsearch.license.PutLicenseRequest}. This action is handled by the master node, which places
    * the signed license into the cluster state. Each node listens for cluster state updates via the
    * {@link org.elasticsearch.license.LicenseService}, and updates its local copy of the license when it detects
    * changes in the cluster state.
    *
    * The logic for which features are available given the current license is handled by
    * {@link org.elasticsearch.license.XPackLicenseState}, which is updated by the
    * {@link org.elasticsearch.license.LicenseService} when the license changes.
```

```
*/
package org.elasticsearch.license;
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.action.support.master.AcknowledgedResponse;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.rest.RestStatus;

import java.io.IOException;
import java.util.Collections;
import java.util.HashMap;
import java.util.Map;

import static org.elasticsearch.license.PostStartBasicResponse.Status.NEED_ACKNOWLEDGEMENT;

class PostStartBasicResponse extends AcknowledgedResponse {

  private Map<String, String[]> acknowledgeMessages;
  private String acknowledgeMessage;

  enum Status {
     GENERATED_BASIC(true, null, RestStatus.OK),
     ALREADY_USING_BASIC(false, "Operation failed: Current license is basic.", RestStatus.FORBIDDEN),
     NEED_ACKNOWLEDGEMENT(false, "Operation failed: Needs acknowledgement.", RestStatus.OK);

     private final boolean isBasicStarted;
     private final String errorMessage;
     private final RestStatus restStatus;

     Status(boolean isBasicStarted, String errorMessage, RestStatus restStatus) {
        this.isBasicStarted = isBasicStarted;
        this.errorMessage = errorMessage;
        this.restStatus = restStatus;
     }

     boolean isBasicStarted() {
        return isBasicStarted;
     }

     String getErrorMessage() {
        return errorMessage;
```

```
    }

    RestStatus getRestStatus() {
      return restStatus;
    }
  }

  private Status status;

  PostStartBasicResponse() {
  }

  PostStartBasicResponse(Status status) {
    this(status, Collections.emptyMap(), null);
  }

  PostStartBasicResponse(Status status, Map<String, String[]> acknowledgeMessages, String
acknowledgeMessage) {
    super(status != NEED_ACKNOWLEDGEMENT);
    this.status = status;
    this.acknowledgeMessages = acknowledgeMessages;
    this.acknowledgeMessage = acknowledgeMessage;
  }

  public Status getStatus() {
    return status;
  }

  @Override
  public void readFrom(StreamInput in) throws IOException {
    super.readFrom(in);
    status = in.readEnum(Status.class);
    acknowledgeMessage = in.readOptionalString();
    int size = in.readVInt();
    Map<String, String[]> acknowledgeMessages = new HashMap<>(size);
    for (int i = 0; i < size; i++) {
      String feature = in.readString();
      int nMessages = in.readVInt();
      String[] messages = new String[nMessages];
      for (int j = 0; j < nMessages; j++) {
        messages[j] = in.readString();
      }
      acknowledgeMessages.put(feature, messages);
    }
    this.acknowledgeMessages = acknowledgeMessages;
  }

  @Override
```

```
    public void writeTo(StreamOutput out) throws IOException {
        super.writeTo(out);
        out.writeEnum(status);
        out.writeOptionalString(acknowledgeMessage);
        out.writeVInt(acknowledgeMessages.size());
        for (Map.Entry<String, String[]> entry : acknowledgeMessages.entrySet()) {
            out.writeString(entry.getKey());
            out.writeVInt(entry.getValue().length);
            for (String message : entry.getValue()) {
                out.writeString(message);
            }
        }
    }

    @Override
    protected void addCustomFields(XContentBuilder builder, Params params) throws IOException {
        if (status.isBasicStarted()) {
            builder.field("basic_was_started", true);
        } else {
            builder.field("basic_was_started", false);
            builder.field("error_message", status.getErrorMessage());
        }
        if (acknowledgeMessages.isEmpty() == false) {
            builder.startObject("acknowledge");
            builder.field("message", acknowledgeMessage);
            for (Map.Entry<String, String[]> entry : acknowledgeMessages.entrySet()) {
                builder.startArray(entry.getKey());
                for (String message : entry.getValue()) {
                    builder.value(message);
                }
                builder.endArray();
            }
            builder.endObject();
        }
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.ActionFilters;
import org.elasticsearch.action.support.master.TransportMasterNodeAction;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.block.ClusterBlockException;
```

```
import org.elasticsearch.cluster.block.ClusterBlockLevel;
import org.elasticsearch.cluster.metadata.IndexNameExpressionResolver;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.inject.Inject;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.threadpool.ThreadPool;
import org.elasticsearch.transport.TransportService;

public class TransportPostStartBasicAction extends TransportMasterNodeAction<PostStartBasicRequest,
PostStartBasicResponse> {

  private final LicenseService licenseService;

  @Inject
  public TransportPostStartBasicAction(Settings settings, TransportService transportService, ClusterService
clusterService,
                                       LicenseService licenseService, ThreadPool threadPool, ActionFilters actionFilters,
                                       IndexNameExpressionResolver indexNameExpressionResolver) {
    super(settings, PostStartBasicAction.NAME, transportService, clusterService, threadPool, actionFilters,
        indexNameExpressionResolver, PostStartBasicRequest::new);
    this.licenseService = licenseService;
  }

  @Override
  protected String executor() {
    return ThreadPool.Names.SAME;
  }

  @Override
  protected PostStartBasicResponse newResponse() {
    return new PostStartBasicResponse();
  }

  @Override
  protected void masterOperation(PostStartBasicRequest request, ClusterState state,
                                 ActionListener<PostStartBasicResponse> listener) throws Exception {
    licenseService.startBasicLicense(request, listener);
  }

  @Override
  protected ClusterBlockException checkBlock(PostStartBasicRequest request, ClusterState state) {
    return state.blocks().globalBlockedException(ClusterBlockLevel.METADATA_WRITE);
  }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
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```

```
*/
package org.elasticsearch.license;

import org.elasticsearch.action.Action;
import org.elasticsearch.client.ElasticsearchClient;
import org.elasticsearch.protocol.xpack.license.GetLicenseRequest;

public class GetLicenseAction extends Action<GetLicenseRequest, GetLicenseResponse,
GetLicenseRequestBuilder> {

  public static final GetLicenseAction INSTANCE = new GetLicenseAction();
  public static final String NAME = "cluster:monitor/xpack/license/get";

  private GetLicenseAction() {
     super(NAME);
  }

  @Override
  public GetLicenseResponse newResponse() {
     return new GetLicenseResponse();
  }

  @Override
  public GetLicenseRequestBuilder newRequestBuilder(ElasticsearchClient client) {
     return new GetLicenseRequestBuilder(client, this);
  }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.action.Action;
import org.elasticsearch.client.ElasticsearchClient;
import org.elasticsearch.protocol.xpack.license.DeleteLicenseRequest;
import org.elasticsearch.action.support.master.AcknowledgedResponse;

public class DeleteLicenseAction extends Action<DeleteLicenseRequest, AcknowledgedResponse,
DeleteLicenseRequestBuilder> {

  public static final DeleteLicenseAction INSTANCE = new DeleteLicenseAction();
  public static final String NAME = "cluster:admin/xpack/license/delete";

  private DeleteLicenseAction() {
     super(NAME);
  }
```

```
  @Override
  public AcknowledgedResponse newResponse() {
    return new AcknowledgedResponse();
  }

  @Override
  public DeleteLicenseRequestBuilder newRequestBuilder(ElasticsearchClient client) {
    return new DeleteLicenseRequestBuilder(client, this);
  }
}
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* or more contributor license agreements. Licensed under the Elastic License;
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*/
package org.elasticsearch.license;

import org.elasticsearch.Version;
import org.elasticsearch.action.ActionRequestValidationException;
import org.elasticsearch.action.support.master.MasterNodeRequest;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;

import java.io.IOException;

public class PostStartTrialRequest extends MasterNodeRequest<PostStartTrialRequest> {

  private boolean acknowledge = false;
  private String type;

  @Override
  public ActionRequestValidationException validate() {
    return null;
  }

  public PostStartTrialRequest setType(String type) {
    this.type = type;
    return this;
  }

  public String getType() {
    return type;
  }

  public PostStartTrialRequest acknowledge(boolean acknowledge) {
    this.acknowledge = acknowledge;
    return this;
```

```
    }

    public boolean isAcknowledged() {
        return acknowledge;
    }

    @Override
    public void readFrom(StreamInput in) throws IOException {
        super.readFrom(in);
        if (in.getVersion().onOrAfter(Version.V_6_3_0)) {
            type = in.readString();
            acknowledge = in.readBoolean();
        } else {
            type = "trial";
            acknowledge = true;
        }
    }

    @Override
    public void writeTo(StreamOutput out) throws IOException {
        Version version = Version.V_6_3_0;
        if (out.getVersion().onOrAfter(version)) {
            super.writeTo(out);
            out.writeString(type);
            out.writeBoolean(acknowledge);
        } else {
            if ("trial".equals(type) == false) {
                throw new IllegalArgumentException("All nodes in cluster must be version [" + version
                        + "] or newer to start trial with a different type than 'trial'. Attempting to write to " +
                        "a node with version [" + out.getVersion() + "] with trial type [" + type + "].");
            } else if (acknowledge == false) {
                throw new IllegalArgumentException("Request must be acknowledged to send to a node with a version " +
                        "prior to [" + version + "]. Attempting to send request to node with version [" + out.getVersion() + "] "
+
                        "without acknowledgement.");
            } else {
                super.writeTo(out);
            }
        }
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;
```

```
import java.io.IOException;
import java.io.InputStream;
import java.nio.ByteBuffer;
import java.util.ArrayList;
import java.util.Base64;
import java.util.Comparator;
import java.util.List;
import java.util.Locale;

import org.apache.lucene.util.CollectionUtil;
import org.elasticsearch.ElasticsearchException;
import org.elasticsearch.ElasticsearchParseException;
import org.elasticsearch.common.Strings;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;
import org.elasticsearch.common.xcontent.LoggingDeprecationHandler;
import org.elasticsearch.common.xcontent.NamedXContentRegistry;
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.ToXContentObject;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentParser;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.protocol.xpack.license.LicenseStatus;

/**
* Data structure for license. Use {@link Builder} to build a license.
* Provides serialization/deserialization & validation methods for license object
*/
public class License implements ToXContentObject {
  public static final int VERSION_START = 1;
  public static final int VERSION_NO_FEATURE_TYPE = 2;
  public static final int VERSION_START_DATE = 3;
  public static final int VERSION_CRYPTO_ALGORITHMS = 4;
  public static final int VERSION_CURRENT = VERSION_CRYPTO_ALGORITHMS;

  /**
   * XContent param name to deserialize license(s) with
   * an additional <code>status</code> field, indicating whether a
   * particular license is 'active' or 'expired' and no signature
   * and in a human readable format
   */
  public static final String REST_VIEW_MODE = "rest_view";
  /**
   * XContent param name to deserialize license(s) with
   * no signature
   */
```

```
  public static final String LICENSE_SPEC_VIEW_MODE = "license_spec_view";
  /**
   * XContent param name to deserialize licenses according
   * to a specific license version
   */
  public static final String LICENSE_VERSION_MODE = "license_version";

  public static final Comparator<License> LATEST_ISSUE_DATE_FIRST =
Comparator.comparing(License::issueDate).reversed();

  private final int version;
  private final String uid;
  private final String issuer;
  private final String issuedTo;
  private final long issueDate;
  private final String type;
  private final String subscriptionType;
  private final String feature;
  private final String signature;
  private final long expiryDate;
  private final long startDate;
  private final int maxNodes;
  private final OperationMode operationMode;

  /**
   * Decouples operation mode of a license from the license type value.
   * <p>
   * Note: The mode indicates features that should be made available, but it does not indicate whether the license is
active!
   *
   * The id byte is used for ordering operation modes (used for merging license md in tribe node)
   */
  public enum OperationMode {
     MISSING((byte) 0),
     TRIAL((byte) 1),
     BASIC((byte) 2),
     STANDARD((byte) 3),
     GOLD((byte) 4),
     PLATINUM((byte) 5);

     private final byte id;

     OperationMode(byte id) {
        this.id = id;
     }

     /** Returns non-zero positive number when <code>opMode1</code> is greater than <code>opMode2</code>
*/
```

```
        public static int compare(OperationMode opMode1, OperationMode opMode2) {
            return Integer.compare(opMode1.id, opMode2.id);
        }

        public static OperationMode resolve(String type) {
            switch (type.toLowerCase(Locale.ROOT)) {
                case "missing":
                    return MISSING;
                case "trial":
                case "none": // bwc for 1.x subscription_type field
                case "dev": // bwc for 1.x subscription_type field
                case "development": // bwc for 1.x subscription_type field
                    return TRIAL;
                case "basic":
                    return BASIC;
                case "standard":
                    return STANDARD;
                case "silver":
                case "gold":
                    return GOLD;
                case "platinum":
                case "cloud_internal":
                case "internal": // bwc for 1.x subscription_type field
                    return PLATINUM;
                default:
                    throw new IllegalArgumentException("unknown type [" + type + "]");
            }
        }
    }

    private License(int version, String uid, String issuer, String issuedTo, long issueDate, String type,
                    String subscriptionType, String feature, String signature, long expiryDate, int maxNodes, long startDate)
{
        this.version = version;
        this.uid = uid;
        this.issuer = issuer;
        this.issuedTo = issuedTo;
        this.issueDate = issueDate;
        this.type = type;
        this.subscriptionType = subscriptionType;
        this.feature = feature;
        this.signature = signature;
        // We will validate that only a basic license can have the
BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS
        // in the validate() method.
        if (expiryDate == -1) {
            this.expiryDate = LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS;
        } else {
```

```
        this.expiryDate = expiryDate;
    }
    this.maxNodes = maxNodes;
    this.startDate = startDate;
    if (version == VERSION_START) {
        // in 1.x: the acceptable values for 'subscription_type': none | dev | silver | gold | platinum
        this.operationMode = OperationMode.resolve(subscriptionType);
    } else {
        // in 2.x: the acceptable values for 'type': trial | basic | silver | dev | gold | platinum
        this.operationMode = OperationMode.resolve(type);
    }
    validate();
}

/**
 * @return version of the license
 */
public int version() {
    return version;
}

/**
 * @return a unique identifier for a license
 */
public String uid() {
    return uid;
}

/**
 * @return type of the license [trial, subscription, internal]
 */
public String type() {
    return type;
}

/**
 * @return the issueDate in milliseconds
 */
public long issueDate() {
    return issueDate;
}

/**
 * @return the startDate in milliseconds
 */
public long startDate() {
    return startDate;
}
```

```
/**
 * @return the expiry date in milliseconds
 */
public long expiryDate() {
   return expiryDate;
}

/**
 * @return the maximum number of nodes this license has been issued for
 */
public int maxNodes() {
   return maxNodes;
}

/**
 * @return a string representing the entity this licenses has been issued to
 */
public String issuedTo() {
   return issuedTo;
}

/**
 * @return a string representing the entity responsible for issuing this license (internal)
 */
public String issuer() {
   return issuer;
}

/**
 * @return a string representing the signature of the license used for license verification
 */
public String signature() {
   return signature;
}

/**
 * @return the operation mode of the license as computed from the license type or from
 * the license mode file
 */
public OperationMode operationMode() {
   synchronized (this) {
      if (canReadOperationModeFromFile() && operationModeFileWatcher != null) {
         return operationModeFileWatcher.getCurrentOperationMode();
      }
   }
   return operationMode;
}
```

```
  private boolean canReadOperationModeFromFile() {
    return type.equals("cloud_internal");
  }

  private volatile OperationModeFileWatcher operationModeFileWatcher;

  /**
   * Sets the operation mode file watcher for the license and initializes the
   * file watcher when the license type allows to override operation mode from file
   */
  public synchronized void setOperationModeFileWatcher(final OperationModeFileWatcher
operationModeFileWatcher) {
    this.operationModeFileWatcher = operationModeFileWatcher;
    if (canReadOperationModeFromFile()) {
      this.operationModeFileWatcher.init();
    }
  }

  /**
   * Removes operation mode file watcher, so unused license objects can be gc'ed
   */
  public synchronized void removeOperationModeFileWatcher() {
    this.operationModeFileWatcher = null;
  }

  /**
   * @return the current license's status
   */
  public LicenseStatus status() {
    long now = System.currentTimeMillis();
    if (issueDate > now) {
      return LicenseStatus.INVALID;
    } else if (expiryDate < now) {
      return LicenseStatus.EXPIRED;
    }
    return LicenseStatus.ACTIVE;
  }

  private void validate() {
    if (issuer == null) {
      throw new IllegalStateException("issuer can not be null");
    } else if (issuedTo == null) {
      throw new IllegalStateException("issuedTo can not be null");
    } else if (issueDate == -1) {
      throw new IllegalStateException("issueDate has to be set");
    } else if (type == null) {
      throw new IllegalStateException("type can not be null");
```

```
        } else if (subscriptionType == null && version == VERSION_START) {
            throw new IllegalStateException("subscriptionType can not be null");
        } else if (uid == null) {
            throw new IllegalStateException("uid can not be null");
        } else if (feature == null && version == VERSION_START) {
            throw new IllegalStateException("feature can not be null");
        } else if (maxNodes == -1) {
            throw new IllegalStateException("maxNodes has to be set");
        } else if (expiryDate == -1) {
            throw new IllegalStateException("expiryDate has to be set");
        } else if (expiryDate == LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS
&& "basic".equals(type) == false) {
            throw new IllegalStateException("only basic licenses are allowed to have no expiration");
        }
    }

    public static License readLicense(StreamInput in) throws IOException {
        int version = in.readVInt(); // Version for future extensibility
        if (version > VERSION_CURRENT) {
            throw new ElasticsearchException("Unknown license version found, please upgrade all nodes to the latest
elasticsearch-license" +
                    " plugin");
        }
        Builder builder = builder();
        builder.version(version);
        builder.uid(in.readString());
        builder.type(in.readString());
        if (version == VERSION_START) {
            builder.subscriptionType(in.readString());
        }
        builder.issueDate(in.readLong());
        if (version == VERSION_START) {
            builder.feature(in.readString());
        }
        builder.expiryDate(in.readLong());
        builder.maxNodes(in.readInt());
        builder.issuedTo(in.readString());
        builder.issuer(in.readString());
        builder.signature(in.readOptionalString());
        if (version >= VERSION_START_DATE) {
            builder.startDate(in.readLong());
        }
        return builder.build();
    }

    public void writeTo(StreamOutput out) throws IOException {
        out.writeVInt(version);
        out.writeString(uid);
```

```
        out.writeString(type);
        if (version == VERSION_START) {
            out.writeString(subscriptionType);
        }
        out.writeLong(issueDate);
        if (version == VERSION_START) {
            out.writeString(feature);
        }
        out.writeLong(expiryDate);
        out.writeInt(maxNodes);
        out.writeString(issuedTo);
        out.writeString(issuer);
        out.writeOptionalString(signature);
        if (version >= VERSION_START_DATE) {
            out.writeLong(startDate);
        }
    }

    @Override
    public String toString() {
        try {
            final XContentBuilder builder = XContentFactory.jsonBuilder();
            toXContent(builder, ToXContent.EMPTY_PARAMS);
            return Strings.toString(builder);
        } catch (IOException e) {
            return "";
        }
    }

    @Override
    public XContentBuilder toXContent(XContentBuilder builder, Params params) throws IOException {
        builder.startObject();
        toInnerXContent(builder, params);
        builder.endObject();
        return builder;
    }

    public XContentBuilder toInnerXContent(XContentBuilder builder, Params params) throws IOException {
        boolean licenseSpecMode = params.paramAsBoolean(LICENSE_SPEC_VIEW_MODE, false);
        boolean restViewMode = params.paramAsBoolean(REST_VIEW_MODE, false);
        boolean previouslyHumanReadable = builder.humanReadable();
        if (licenseSpecMode && restViewMode) {
            throw new IllegalArgumentException("can have either " + REST_VIEW_MODE + " or " +
LICENSE_SPEC_VIEW_MODE);
        } else if (restViewMode) {
            if (!previouslyHumanReadable) {
                builder.humanReadable(true);
            }
```

```
    }
    final int version;
    if (params.param(LICENSE_VERSION_MODE) != null && restViewMode) {
        version = Integer.parseInt(params.param(LICENSE_VERSION_MODE));
    } else {
        version = this.version;
    }
    if (restViewMode) {
        builder.field(Fields.STATUS, status().label());
    }
    builder.field(Fields.UID, uid);
    builder.field(Fields.TYPE, type);
    if (version == VERSION_START) {
        builder.field(Fields.SUBSCRIPTION_TYPE, subscriptionType);
    }
    builder.timeField(Fields.ISSUE_DATE_IN_MILLIS, Fields.ISSUE_DATE, issueDate);
    if (version == VERSION_START) {
        builder.field(Fields.FEATURE, feature);
    }

    if (expiryDate != LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS) {
        builder.timeField(Fields.EXPIRY_DATE_IN_MILLIS, Fields.EXPIRY_DATE, expiryDate);
    }
    builder.field(Fields.MAX_NODES, maxNodes);
    builder.field(Fields.ISSUED_TO, issuedTo);
    builder.field(Fields.ISSUER, issuer);
    if (!licenseSpecMode && !restViewMode && signature != null) {
        builder.field(Fields.SIGNATURE, signature);
    }
    if (restViewMode) {
        builder.humanReadable(previouslyHumanReadable);
    }
    if (version >= VERSION_START_DATE) {
        builder.timeField(Fields.START_DATE_IN_MILLIS, Fields.START_DATE, startDate);
    }
    return builder;
}

public static License fromXContent(XContentParser parser) throws IOException {
    Builder builder = new Builder();
    XContentParser.Token token;
    while ((token = parser.nextToken()) != XContentParser.Token.END_OBJECT) {
        if (token == XContentParser.Token.FIELD_NAME) {
            String currentFieldName = parser.currentName();
            token = parser.nextToken();
            if (token.isValue()) {
                if (Fields.UID.equals(currentFieldName)) {
                    builder.uid(parser.text());
```

```
            } else if (Fields.TYPE.equals(currentFieldName)) {
                builder.type(parser.text());
            } else if (Fields.SUBSCRIPTION_TYPE.equals(currentFieldName)) {
                builder.subscriptionType(parser.text());
            } else if (Fields.ISSUE_DATE.equals(currentFieldName)) {
                builder.issueDate(parseDate(parser, "issue", false));
            } else if (Fields.ISSUE_DATE_IN_MILLIS.equals(currentFieldName)) {
                builder.issueDate(parser.longValue());
            } else if (Fields.FEATURE.equals(currentFieldName)) {
                builder.feature(parser.text());
            } else if (Fields.EXPIRY_DATE.equals(currentFieldName)) {
                builder.expiryDate(parseDate(parser, "expiration", true));
            } else if (Fields.EXPIRY_DATE_IN_MILLIS.equals(currentFieldName)) {
                builder.expiryDate(parser.longValue());
            } else if (Fields.START_DATE.equals(currentFieldName)) {
                builder.startDate(parseDate(parser, "start", false));
            } else if (Fields.START_DATE_IN_MILLIS.equals(currentFieldName)) {
                builder.startDate(parser.longValue());
            } else if (Fields.MAX_NODES.equals(currentFieldName)) {
                builder.maxNodes(parser.intValue());
            } else if (Fields.ISSUED_TO.equals(currentFieldName)) {
                builder.issuedTo(parser.text());
            } else if (Fields.ISSUER.equals(currentFieldName)) {
                builder.issuer(parser.text());
            } else if (Fields.SIGNATURE.equals(currentFieldName)) {
                builder.signature(parser.text());
            } else if (Fields.VERSION.equals(currentFieldName)) {
                builder.version(parser.intValue());
            }
            // Ignore unknown elements - might be new version of license
        } else if (token == XContentParser.Token.START_ARRAY) {
            // It was probably created by newer version - ignoring
            parser.skipChildren();
        } else if (token == XContentParser.Token.START_OBJECT) {
            // It was probably created by newer version - ignoring
            parser.skipChildren();
        }
    }
}
// not a license spec
if (builder.signature != null) {
    byte[] signatureBytes = Base64.getDecoder().decode(builder.signature);
    ByteBuffer byteBuffer = ByteBuffer.wrap(signatureBytes);
    int version = byteBuffer.getInt();
    // we take the absolute version, because negative versions
    // mean that the license was generated by the cluster (see TrialLicense)
    // and positive version means that the license was signed
    if (version < 0) {
```

```
            version *= -1;
        }
        if (version == 0) {
            throw new ElasticsearchException("malformed signature for license [" + builder.uid + "]");
        } else if (version > VERSION_CURRENT) {
            throw new ElasticsearchException("Unknown license version found, please upgrade all nodes to the latest
" +
                    "elasticsearch-license plugin");
        }
        // signature version is the source of truth
        builder.version(version);
    }
    return builder.build();
}

/**
 * Returns true if the license was auto-generated (by license plugin),
 * false otherwise
 */
public static boolean isAutoGeneratedLicense(String signature) {
    try {
        byte[] signatureBytes = Base64.getDecoder().decode(signature);
        ByteBuffer byteBuffer = ByteBuffer.wrap(signatureBytes);
        return byteBuffer.getInt() < 0;
    } catch (IllegalArgumentException e) {
        throw new IllegalStateException(e);
    }
}

public static License fromSource(BytesReference bytes, XContentType xContentType) throws IOException {
    if (bytes == null || bytes.length() == 0) {
        throw new ElasticsearchParseException("failed to parse license - no content provided");
    }
    if (xContentType == null) {
        throw new ElasticsearchParseException("failed to parse license - no content-type provided");
    }
    // EMPTY is safe here because we don't call namedObject
    try (InputStream byteStream = bytes.streamInput();
         XContentParser parser = xContentType.xContent()
            .createParser(NamedXContentRegistry.EMPTY, LoggingDeprecationHandler.INSTANCE, byteStream))
    {
        License license = null;
        if (parser.nextToken() == XContentParser.Token.START_OBJECT) {
            if (parser.nextToken() == XContentParser.Token.FIELD_NAME) {
                String currentFieldName = parser.currentName();
                if (Fields.LICENSES.equals(currentFieldName)) {
                    final List<License> pre20Licenses = new ArrayList<>();
                    if (parser.nextToken() == XContentParser.Token.START_ARRAY) {
```

```
                    while (parser.nextToken() != XContentParser.Token.END_ARRAY) {
                        pre20Licenses.add(License.fromXContent(parser));
                    }
                    // take the latest issued unexpired license
                    CollectionUtil.timSort(pre20Licenses, LATEST_ISSUE_DATE_FIRST);
                    long now = System.currentTimeMillis();
                    for (License oldLicense : pre20Licenses) {
                        if (oldLicense.expiryDate() > now) {
                            license = oldLicense;
                            break;
                        }
                    }
                    if (license == null && !pre20Licenses.isEmpty()) {
                        license = pre20Licenses.get(0);
                    }
                } else {
                    throw new ElasticsearchParseException("failed to parse licenses expected an array of licenses");
                }
            } else if (Fields.LICENSE.equals(currentFieldName)) {
                license = License.fromXContent(parser);
            }
            // Ignore all other fields - might be created with new version
        } else {
            throw new ElasticsearchParseException("failed to parse licenses expected field");
        }
    } else {
        throw new ElasticsearchParseException("failed to parse licenses expected start object");
    }
    return license;
  }
}

@Override
public boolean equals(Object o) {
    if (this == o) return true;
    if (o == null || getClass() != o.getClass()) return false;

    License license = (License) o;

    if (issueDate != license.issueDate) return false;
    if (expiryDate != license.expiryDate) return false;
    if (startDate!= license.startDate) return false;
    if (maxNodes != license.maxNodes) return false;
    if (version != license.version) return false;
    if (uid != null ? !uid.equals(license.uid) : license.uid != null) return false;
    if (issuer != null ? !issuer.equals(license.issuer) : license.issuer != null) return false;
    if (issuedTo != null ? !issuedTo.equals(license.issuedTo) : license.issuedTo != null) return false;
    if (type != null ? !type.equals(license.type) : license.type != null) return false;
```

```
    if (subscriptionType != null ? !subscriptionType.equals(license.subscriptionType) : license.subscriptionType !=
null)
        return false;
    if (feature != null ? !feature.equals(license.feature) : license.feature != null) return false;
    return !(signature != null ? !signature.equals(license.signature) : license.signature != null);

  }

  @Override
  public int hashCode() {
    int result = uid != null ? uid.hashCode() : 0;
    result = 31 * result + (issuer != null ? issuer.hashCode() : 0);
    result = 31 * result + (issuedTo != null ? issuedTo.hashCode() : 0);
    result = 31 * result + (int) (issueDate ^ (issueDate >>> 32));
    result = 31 * result + (type != null ? type.hashCode() : 0);
    result = 31 * result + (subscriptionType != null ? subscriptionType.hashCode() : 0);
    result = 31 * result + (feature != null ? feature.hashCode() : 0);
    result = 31 * result + (signature != null ? signature.hashCode() : 0);
    result = 31 * result + (int) (expiryDate ^ (expiryDate >>> 32));
    result = 31 * result + (int) (startDate ^ (startDate>>> 32));
    result = 31 * result + maxNodes;
    result = 31 * result + version;
    return result;
  }

  public static final class Fields {
    public static final String STATUS = "status";
    public static final String UID = "uid";
    public static final String TYPE = "type";
    public static final String SUBSCRIPTION_TYPE = "subscription_type";
    public static final String ISSUE_DATE_IN_MILLIS = "issue_date_in_millis";
    public static final String ISSUE_DATE = "issue_date";
    public static final String FEATURE = "feature";
    public static final String EXPIRY_DATE_IN_MILLIS = "expiry_date_in_millis";
    public static final String EXPIRY_DATE = "expiry_date";
    public static final String START_DATE_IN_MILLIS = "start_date_in_millis";
    public static final String START_DATE = "start_date";
    public static final String MAX_NODES = "max_nodes";
    public static final String ISSUED_TO = "issued_to";
    public static final String ISSUER = "issuer";
    public static final String VERSION = "version";
    public static final String SIGNATURE = "signature";

    public static final String LICENSES = "licenses";
    public static final String LICENSE = "license";

  }
```

```
  private static long parseDate(XContentParser parser, String description, boolean endOfTheDay) throws
IOException {
    if (parser.currentToken() == XContentParser.Token.VALUE_NUMBER) {
      return parser.longValue();
    } else {
      try {
        if (endOfTheDay) {
          return DateUtils.endOfTheDay(parser.text());
        } else {
          return DateUtils.beginningOfTheDay(parser.text());
        }
      } catch (IllegalArgumentException ex) {
        throw new ElasticsearchParseException("invalid " + description + " date format " + parser.text());
      }
    }
  }

  public static Builder builder() {
    return new Builder();
  }

  public static class Builder {
    private int version = License.VERSION_CURRENT;
    private String uid;
    private String issuer;
    private String issuedTo;
    private long issueDate = -1;
    private String type;
    private String subscriptionType;
    private String feature;
    private String signature;
    private long expiryDate = -1;
    private long startDate = -1;
    private int maxNodes = -1;

    public Builder uid(String uid) {
      this.uid = uid;
      return this;
    }

    public Builder version(int version) {
      this.version = version;
      return this;
    }

    public Builder issuer(String issuer) {
      this.issuer = issuer;
      return this;
```

```
}

public Builder issuedTo(String issuedTo) {
   this.issuedTo = issuedTo;
   return this;
}

public Builder issueDate(long issueDate) {
   this.issueDate = issueDate;
   return this;
}

public Builder type(String type) {
   this.type = type;
   return this;
}

public Builder subscriptionType(String subscriptionType) {
   this.subscriptionType = subscriptionType;
   return this;
}

public Builder feature(String feature) {
   this.feature = feature;
   return this;
}

public Builder expiryDate(long expiryDate) {
   this.expiryDate = expiryDate;
   return this;
}

public Builder maxNodes(int maxNodes) {
   this.maxNodes = maxNodes;
   return this;
}

public Builder signature(String signature) {
   if (signature != null) {
      this.signature = signature;
   }
   return this;
}

public Builder startDate(long startDate) {
   this.startDate = startDate;
   return this;
}
```

```
public Builder fromLicenseSpec(License license, String signature) {
   return uid(license.uid())
         .version(license.version())
         .issuedTo(license.issuedTo())
         .issueDate(license.issueDate())
         .startDate(license.startDate())
         .type(license.type())
         .subscriptionType(license.subscriptionType)
         .feature(license.feature)
         .maxNodes(license.maxNodes())
         .expiryDate(license.expiryDate())
         .issuer(license.issuer())
         .signature(signature);
}

/**
 * Returns a builder that converts pre 2.0 licenses
 * to the new license format
 */
public Builder fromPre20LicenseSpec(License pre20License) {
   return uid(pre20License.uid())
         .issuedTo(pre20License.issuedTo())
         .issueDate(pre20License.issueDate())
         .maxNodes(pre20License.maxNodes())
         .expiryDate(pre20License.expiryDate());
}

public License build() {
   return new License(version, uid, issuer, issuedTo, issueDate, type,
         subscriptionType, feature, signature, expiryDate, maxNodes, startDate);
}

public Builder validate() {
   if (issuer == null) {
      throw new IllegalStateException("issuer can not be null");
   } else if (issuedTo == null) {
      throw new IllegalStateException("issuedTo can not be null");
   } else if (issueDate == -1) {
      throw new IllegalStateException("issueDate has to be set");
   } else if (type == null) {
      throw new IllegalStateException("type can not be null");
   } else if (uid == null) {
      throw new IllegalStateException("uid can not be null");
   } else if (signature == null) {
      throw new IllegalStateException("signature can not be null");
   } else if (maxNodes == -1) {
      throw new IllegalStateException("maxNodes has to be set");
```

```
        } else if (expiryDate == -1) {
            throw new IllegalStateException("expiryDate has to be set");
        }
        return this;
    }
  }

  /**
   * Returns <code>true</code> iff the license is a production licnese
   */
  public boolean isProductionLicense() {
     switch (operationMode()) {
        case MISSING:
        case TRIAL:
        case BASIC:
           return false;
        case STANDARD:
        case GOLD:
        case PLATINUM:
           return true;
        default:
           throw new AssertionError("unknown operation mode: " + operationMode());

     }
  }
}
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.Version;
import org.elasticsearch.common.Nullable;
import org.elasticsearch.common.Strings;
import org.elasticsearch.common.logging.LoggerMessageFormat;
import org.elasticsearch.common.logging.Loggers;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.license.License.OperationMode;
import org.elasticsearch.xpack.core.XPackField;
import org.elasticsearch.xpack.core.XPackSettings;
import org.elasticsearch.xpack.core.monitoring.MonitoringField;

import java.util.Collections;
import java.util.LinkedHashMap;
import java.util.List;
import java.util.Map;
```

```
import java.util.Objects;
import java.util.concurrent.CopyOnWriteArrayList;
import java.util.function.BiFunction;

/**
* A holder for the current state of the license for all xpack features.
*/
public class XPackLicenseState {

  /** Messages for each feature which are printed when the license expires. */
  static final Map<String, String[]> EXPIRATION_MESSAGES;
  static {
    Map<String, String[]> messages = new LinkedHashMap<>();
    messages.put(XPackField.SECURITY, new String[] {
      "Cluster health, cluster stats and indices stats operations are blocked",
      "All data operations (read and write) continue to work"
    });
    messages.put(XPackField.WATCHER, new String[] {
      "PUT / GET watch APIs are disabled, DELETE watch API continues to work",
      "Watches execute and write to the history",
      "The actions of the watches don't execute"
    });
    messages.put(XPackField.MONITORING, new String[] {
      "The agent will stop collecting cluster and indices metrics",
      "The agent will stop automatically cleaning indices older than [xpack.monitoring.history.duration]"
    });
    messages.put(XPackField.GRAPH, new String[] {
      "Graph explore APIs are disabled"
    });
    messages.put(XPackField.MACHINE_LEARNING, new String[] {
      "Machine learning APIs are disabled"
    });
    messages.put(XPackField.LOGSTASH, new String[] {
      "Logstash will continue to poll centrally-managed pipelines"
    });
    messages.put(XPackField.BEATS, new String[] {
      "Beats will continue to poll centrally-managed configuration"
    });
    messages.put(XPackField.DEPRECATION, new String[] {
      "Deprecation APIs are disabled"
    });
    messages.put(XPackField.UPGRADE, new String[] {
      "Upgrade API is disabled"
    });
    messages.put(XPackField.SQL, new String[] {
      "SQL support is disabled"
    });
    messages.put(XPackField.ROLLUP, new String[] {
```

```
            "Creating and Starting rollup jobs will no longer be allowed.",
            "Stopping/Deleting existing jobs, RollupCaps API and RollupSearch continue to function."
        });
        EXPIRATION_MESSAGES = Collections.unmodifiableMap(messages);
    }

    /**
     * Messages for each feature which are printed when the license type changes.
     * The value is a function taking the old and new license type, and returns the messages for that feature.
     */
    static final Map<String, BiFunction<OperationMode, OperationMode, String[]>>
ACKNOWLEDGMENT_MESSAGES;
    static {
        Map<String, BiFunction<OperationMode, OperationMode, String[]>> messages = new LinkedHashMap<>();
        messages.put(XPackField.SECURITY, XPackLicenseState::securityAcknowledgementMessages);
        messages.put(XPackField.WATCHER, XPackLicenseState::watcherAcknowledgementMessages);
        messages.put(XPackField.MONITORING, XPackLicenseState::monitoringAcknowledgementMessages);
        messages.put(XPackField.GRAPH, XPackLicenseState::graphAcknowledgementMessages);
        messages.put(XPackField.MACHINE_LEARNING,
XPackLicenseState::machineLearningAcknowledgementMessages);
        messages.put(XPackField.LOGSTASH, XPackLicenseState::logstashAcknowledgementMessages);
        messages.put(XPackField.BEATS, XPackLicenseState::beatsAcknowledgementMessages);
        messages.put(XPackField.SQL, XPackLicenseState::sqlAcknowledgementMessages);
        ACKNOWLEDGMENT_MESSAGES = Collections.unmodifiableMap(messages);
    }

    private static String[] securityAcknowledgementMessages(OperationMode currentMode, OperationMode
newMode) {
        switch (newMode) {
            case BASIC:
                switch (currentMode) {
                    case TRIAL:
                    case STANDARD:
                    case GOLD:
                    case PLATINUM:
                        return new String[] {
                            "The following X-Pack security functionality will be disabled: authentication, authorization, " +
                                "ip filtering, and auditing. Please restart your node after applying the license.",
                            "Field and document level access control will be disabled.",
                            "Custom realms will be ignored."
                        };
                }
                break;
            case GOLD:
                switch (currentMode) {
                    case BASIC:
                    case STANDARD:
                        // ^^ though technically it was already disabled, it's not bad to remind them
```

```
                case TRIAL:
                case PLATINUM:
                    return new String[] {
                        "Field and document level access control will be disabled.",
                        "Custom realms will be ignored."
                    };
                }
                break;
            case STANDARD:
                switch (currentMode) {
                case BASIC:
                    // ^^ though technically it was already disabled, it's not bad to remind them
                case GOLD:
                case PLATINUM:
                case TRIAL:
                    return new String[] {
                        "Authentication will be limited to the native realms.",
                        "IP filtering and auditing will be disabled.",
                        "Field and document level access control will be disabled.",
                        "Custom realms will be ignored."
                    };
                }
            }
            return Strings.EMPTY_ARRAY;
        }

        private static String[] watcherAcknowledgementMessages(OperationMode currentMode, OperationMode
newMode) {
            switch (newMode) {
                case BASIC:
                    switch (currentMode) {
                        case TRIAL:
                        case STANDARD:
                        case GOLD:
                        case PLATINUM:
                            return new String[] { "Watcher will be disabled" };
                    }
                    break;
            }
            return Strings.EMPTY_ARRAY;
        }

        private static String[] monitoringAcknowledgementMessages(OperationMode currentMode, OperationMode
newMode) {
            switch (newMode) {
                case BASIC:
                    switch (currentMode) {
                        case TRIAL:
```

```
                case STANDARD:
                case GOLD:
                case PLATINUM:
                    return new String[] {
                        LoggerMessageFormat.format(
                            "Multi-cluster support is disabled for clusters with [{}] license. If you are\n" +
                                "running multiple clusters, users won't be able to access the clusters with\n" +
                                "[{}] licenses from within a single X-Pack Kibana instance. You will have to deploy a\n" +
                                "separate and dedicated X-pack Kibana instance for each [{}] cluster you wish to monitor.",
                            newMode, newMode, newMode),
                        LoggerMessageFormat.format(
                            "Automatic index cleanup is locked to {} days for clusters with [{}] license.",
                            MonitoringField.HISTORY_DURATION.getDefault(Settings.EMPTY).days(), newMode)
                    };
            }
            break;
        }
        return Strings.EMPTY_ARRAY;
    }

    private static String[] graphAcknowledgementMessages(OperationMode currentMode, OperationMode newMode)
{
        switch (newMode) {
            case BASIC:
            case STANDARD:
            case GOLD:
                switch (currentMode) {
                    case TRIAL:
                    case PLATINUM:
                        return new String[] { "Graph will be disabled" };
                }
                break;
        }
        return Strings.EMPTY_ARRAY;
    }

    private static String[] machineLearningAcknowledgementMessages(OperationMode currentMode,
OperationMode newMode) {
        switch (newMode) {
            case BASIC:
            case STANDARD:
            case GOLD:
                switch (currentMode) {
                    case TRIAL:
                    case PLATINUM:
                        return new String[] { "Machine learning will be disabled" };
                }
                break;
```

```
        }
        return Strings.EMPTY_ARRAY;
    }

    private static String[] logstashAcknowledgementMessages(OperationMode currentMode, OperationMode
newMode) {
        switch (newMode) {
            case BASIC:
                if (isBasic(currentMode) == false) {
                    return new String[] { "Logstash will no longer poll for centrally-managed pipelines" };
                }
                break;
        }
        return Strings.EMPTY_ARRAY;
    }

    private static String[] beatsAcknowledgementMessages(OperationMode currentMode, OperationMode newMode)
{
        switch (newMode) {
            case BASIC:
                if (isBasic(currentMode) == false) {
                    return new String[] { "Beats will no longer be able to use centrally-managed configuration" };
                }
                break;
        }
        return Strings.EMPTY_ARRAY;
    }

    private static String[] sqlAcknowledgementMessages(OperationMode currentMode, OperationMode newMode) {
        switch (newMode) {
            case BASIC:
            case STANDARD:
            case GOLD:
                switch (currentMode) {
                    case TRIAL:
                    case PLATINUM:
                        return new String[] {
                                "JDBC and ODBC support will be disabled, but you can continue to use SQL CLI and REST
endpoint" };
                }
                break;
        }
        return Strings.EMPTY_ARRAY;
    }

    private static boolean isBasic(OperationMode mode) {
        return mode == OperationMode.BASIC;
    }
```

```
  /** A wrapper for the license mode and state, to allow atomically swapping. */
  private static class Status {

    /** The current "mode" of the license (ie license type). */
    final OperationMode mode;

    /** True if the license is active, or false if it is expired. */
    final boolean active;

    Status(OperationMode mode, boolean active) {
      this.mode = mode;
      this.active = active;
    }
  }

  private final List<LicenseStateListener> listeners;
  private final boolean isSecurityEnabled;
  private final boolean isSecurityExplicitlyEnabled;

  private Status status = new Status(OperationMode.TRIAL, true);
  private boolean isSecurityEnabledByTrialVersion;

  public XPackLicenseState(Settings settings) {
    this.listeners = new CopyOnWriteArrayList<>();
    this.isSecurityEnabled = XPackSettings.SECURITY_ENABLED.get(settings);
    // 6.0+ requires TLS for production licenses, so if TLS is enabled and security is enabled
    // we can interpret this as an explicit enabling of security if the security enabled
    // setting is not explicitly set
    this.isSecurityExplicitlyEnabled = isSecurityEnabled &&
      (settings.hasValue(XPackSettings.SECURITY_ENABLED.getKey()) ||
XPackSettings.TRANSPORT_SSL_ENABLED.get(settings));
    this.isSecurityEnabledByTrialVersion = false;
  }

  private XPackLicenseState(XPackLicenseState xPackLicenseState) {
    this.listeners = xPackLicenseState.listeners;
    this.isSecurityEnabled = xPackLicenseState.isSecurityEnabled;
    this.isSecurityExplicitlyEnabled = xPackLicenseState.isSecurityExplicitlyEnabled;
    this.status = xPackLicenseState.status;
    this.isSecurityEnabledByTrialVersion = xPackLicenseState.isSecurityEnabledByTrialVersion;
  }

  /**
   * Updates the current state of the license, which will change what features are available.
   *
   * @param mode   The mode (type) of the current license.
   * @param active True if the current license exists and is within its allowed usage period; false if it is expired or
```

```
missing.
   * @param mostRecentTrialVersion If this cluster has, at some point commenced a trial, the most recent version
on which they did that.
   *                               May be {@code null} if they have never generated a trial license on this cluster, or the most
recent
   *                               trial was prior to this metadata being tracked (6.1)
   */
  void update(OperationMode mode, boolean active, @Nullable Version mostRecentTrialVersion) {
     synchronized (this) {
        status = new Status(mode, active);
        if (isSecurityEnabled == true && isSecurityExplicitlyEnabled == false && mode == OperationMode.TRIAL
           && isSecurityEnabledByTrialVersion == false) {
           // Before 6.3, Trial licenses would default having security enabled.
           // If this license was generated before that version, then treat it as if security is explicitly enabled
           if (mostRecentTrialVersion == null || mostRecentTrialVersion.before(Version.V_6_3_0)) {
              Loggers.getLogger(getClass()).info("Automatically enabling security for older trial license ({})",
                 mostRecentTrialVersion == null ? "[pre 6.1.0]" : mostRecentTrialVersion.toString());
              isSecurityEnabledByTrialVersion = true;
           }
        }
     }
     listeners.forEach(LicenseStateListener::licenseStateChanged);
  }

  /** Add a listener to be notified on license change */
  public void addListener(final LicenseStateListener listener) {
     listeners.add(Objects.requireNonNull(listener));
  }

  /** Remove a listener */
  public void removeListener(final LicenseStateListener listener) {
     listeners.remove(Objects.requireNonNull(listener));
  }

  /** Return the current license type. */
  public synchronized OperationMode getOperationMode() {
     return status.mode;
  }

  /** Return true if the license is currently within its time boundaries, false otherwise. */
  public synchronized boolean isActive() {
     return status.active;
  }

  /**
   * @return true if authentication and authorization should be enabled. this does not indicate what realms are
available
   * @see #allowedRealmType() for the enabled realms
```

```
     */
    public synchronized boolean isAuthAllowed() {
        OperationMode mode = status.mode;
        final boolean isSecurityCurrentlyEnabled =
            isSecurityEnabled(mode, isSecurityExplicitlyEnabled, isSecurityEnabledByTrialVersion, isSecurityEnabled);
        return isSecurityCurrentlyEnabled && (mode == OperationMode.STANDARD || mode ==
OperationMode.GOLD
            || mode == OperationMode.PLATINUM || mode == OperationMode.TRIAL);
    }

    /**
     * @return true if IP filtering should be enabled
     */
    public synchronized boolean isIpFilteringAllowed() {
        OperationMode mode = status.mode;
        final boolean isSecurityCurrentlyEnabled =
            isSecurityEnabled(mode, isSecurityExplicitlyEnabled, isSecurityEnabledByTrialVersion, isSecurityEnabled);
        return isSecurityCurrentlyEnabled && (mode == OperationMode.GOLD || mode ==
OperationMode.PLATINUM || mode == OperationMode.TRIAL);
    }

    /**
     * @return true if auditing should be enabled
     */
    public synchronized boolean isAuditingAllowed() {
        OperationMode mode = status.mode;
        final boolean isSecurityCurrentlyEnabled =
            isSecurityEnabled(mode, isSecurityExplicitlyEnabled, isSecurityEnabledByTrialVersion, isSecurityEnabled);
        return isSecurityCurrentlyEnabled && (mode == OperationMode.GOLD || mode ==
OperationMode.PLATINUM || mode == OperationMode.TRIAL);
    }

    /**
     * Indicates whether the stats and health API calls should be allowed. If a license is expired and past the grace
     * period then we deny these calls.
     *
     * @return true if the license allows for the stats and health APIs to be used.
     */
    public synchronized boolean isStatsAndHealthAllowed() {
        return status.active;
    }

    /**
     * Determine if Document Level Security (DLS) and Field Level Security (FLS) should be enabled.
     * <p>
     * DLS and FLS are only disabled when the mode is not:
     * <ul>
     * <li>{@link OperationMode#PLATINUM}</li>
```

```
   * <li>{@link OperationMode#TRIAL}</li>
   * </ul>
   * Note: This does not consider the <em>state</em> of the license so that Security does not suddenly leak
information!
   *
   * @return {@code true} to enable DLS and FLS. Otherwise {@code false}.
   */
  public synchronized boolean isDocumentAndFieldLevelSecurityAllowed() {
     OperationMode mode = status.mode;
     final boolean isSecurityCurrentlyEnabled =
        isSecurityEnabled(mode, isSecurityExplicitlyEnabled, isSecurityEnabledByTrialVersion, isSecurityEnabled);
     return isSecurityCurrentlyEnabled && (mode == OperationMode.TRIAL || mode ==
OperationMode.PLATINUM);
  }

  /** Classes of realms that may be available based on the license type. */
  public enum AllowedRealmType {
     NONE,
     NATIVE,
     DEFAULT,
     ALL
  }

  /**
   * @return the type of realms that are enabled based on the license {@link OperationMode}
   */
  public synchronized AllowedRealmType allowedRealmType() {
     final boolean isSecurityCurrentlyEnabled =
        isSecurityEnabled(status.mode, isSecurityExplicitlyEnabled, isSecurityEnabledByTrialVersion,
isSecurityEnabled);
     if (isSecurityCurrentlyEnabled) {
        switch (status.mode) {
           case PLATINUM:
           case TRIAL:
              return AllowedRealmType.ALL;
           case GOLD:
              return AllowedRealmType.DEFAULT;
           case STANDARD:
              return AllowedRealmType.NATIVE;
           default:
              return AllowedRealmType.NONE;
        }
     } else {
        return AllowedRealmType.NONE;
     }
  }

  /**
```

```
     * @return whether custom role providers are allowed based on the license {@link OperationMode}
     */
    public synchronized boolean isCustomRoleProvidersAllowed() {
        final boolean isSecurityCurrentlyEnabled =
            isSecurityEnabled(status.mode, isSecurityExplicitlyEnabled, isSecurityEnabledByTrialVersion,
isSecurityEnabled);
        return isSecurityCurrentlyEnabled && (status.mode == OperationMode.PLATINUM || status.mode ==
OperationMode.TRIAL)
                && status.active;
    }

    /**
     * @return whether "authorization_realms" are allowed based on the license {@link OperationMode}
     * @see org.elasticsearch.xpack.core.security.authc.support.DelegatedAuthorizationSettings
     */
    public boolean isAuthorizationRealmAllowed() {
        final Status localStatus = status;
        return (localStatus.mode == OperationMode.PLATINUM || localStatus.mode == OperationMode.TRIAL)
            && localStatus.active;
    }

    /**
     * Determine if Watcher is available based on the current license.
     * <p>
     * Watcher is available if the license is active (hasn't expired) and of one of the following types:
     * <ul>
     * <li>{@link OperationMode#STANDARD}</li>
     * <li>{@link OperationMode#PLATINUM}</li>
     * <li>{@link OperationMode#GOLD}</li>
     * <li>{@link OperationMode#TRIAL}</li>
     * </ul>
     *
     * @return {@code true} as long as the license is valid. Otherwise {@code false}.
     */
    public synchronized boolean isWatcherAllowed() {
        Status localStatus = status;

        if (localStatus.active == false) {
            return false;
        }

        switch (localStatus.mode) {
            case TRIAL:
            case GOLD:
            case PLATINUM:
            case STANDARD:
                return true;
            default:
```

```
            return false;
        }
    }

    /**
     * Monitoring is always available as long as there is a valid license
     *
     * @return true if the license is active
     */
    public synchronized boolean isMonitoringAllowed() {
        return status.active;
    }

    /**
     * Monitoring Cluster Alerts requires the equivalent license to use Watcher.
     *
     * @return {@link #isWatcherAllowed()}
     * @see #isWatcherAllowed()
     */
    public synchronized boolean isMonitoringClusterAlertsAllowed() {
        return isWatcherAllowed();
    }

    /**
     * Determine if the current license allows the retention of indices to be modified.
     * <p>
     * Only users with a non-{@link OperationMode#BASIC} license can update the retention period.
     * <p>
     * Note: This does not consider the <em>state</em> of the license so that any change is remembered for when
they fix their license.
     *
     * @return {@code true} if the user is allowed to modify the retention. Otherwise {@code false}.
     */
    public synchronized boolean isUpdateRetentionAllowed() {
        final OperationMode mode = status.mode;
        return mode != OperationMode.BASIC && mode != OperationMode.MISSING;
    }

    /**
     * Determine if Graph Exploration should be enabled.
     * <p>
     * Exploration is only disabled when the license has expired or if the mode is not:
     * <ul>
     * <li>{@link OperationMode#PLATINUM}</li>
     * <li>{@link OperationMode#TRIAL}</li>
     * </ul>
     *
     * @return {@code true} as long as the license is valid. Otherwise {@code false}.
```

```
     */
    public synchronized boolean isGraphAllowed() {
        Status localStatus = status;
        OperationMode operationMode = localStatus.mode;

        boolean licensed = operationMode == OperationMode.TRIAL || operationMode ==
OperationMode.PLATINUM;

        return licensed && localStatus.active;
    }

    /**
     * Determine if Machine Learning should be enabled.
     * <p>
     * Machine Learning is only disabled when the license has expired or if the
     * mode is not:
     * <ul>
     * <li>{@link OperationMode#PLATINUM}</li>
     * <li>{@link OperationMode#TRIAL}</li>
     * </ul>
     *
     * @return {@code true} as long as the license is valid. Otherwise
     *         {@code false}.
     */
    public synchronized boolean isMachineLearningAllowed() {
        final Status currentStatus = status;
        return currentStatus.active && isMachineLearningAllowedForOperationMode(currentStatus.mode);
    }

    public static boolean isMachineLearningAllowedForOperationMode(final OperationMode operationMode) {
        return isPlatinumOrTrialOperationMode(operationMode);
    }

    /**
     * Rollup is always available as long as there is a valid license
     *
     * @return true if the license is active
     */
    public synchronized boolean isRollupAllowed() {
        return status.active;
    }

    /**
     * Logstash is allowed as long as there is an active license of type TRIAL, STANDARD, GOLD or PLATINUM
     * @return {@code true} as long as there is a valid license
     */
    public synchronized boolean isLogstashAllowed() {
        Status localStatus = status;
```

```
    return localStatus.active && (isBasic(localStatus.mode) == false);
  }

  /**
   * Beats is allowed as long as there is an active license of type TRIAL, STANDARD, GOLD or PLATINUM
   * @return {@code true} as long as there is a valid license
   */
  public boolean isBeatsAllowed() {
    Status localStatus = status;
    return localStatus.active && (isBasic(localStatus.mode) == false);

  }

  /**
   * Deprecation APIs are always allowed as long as there is an active license
   * @return {@code true} as long as there is a valid license
   */
  public synchronized boolean isDeprecationAllowed() {
    return status.active;
  }

  /**
   * Determine if Upgrade API should be enabled.
   * <p>
   *  Upgrade API is not available in for all license types except {@link OperationMode#MISSING}
   *
   * @return {@code true} as long as the license is valid. Otherwise
   *         {@code false}.
   */
  public synchronized boolean isUpgradeAllowed() {
    // Should work on all active licenses
    return status.active;
  }

  /**
   * Determine if SQL support should be enabled.
   * <p>
   *  SQL is available for all license types except {@link OperationMode#MISSING}
   */
  public synchronized boolean isSqlAllowed() {
    return status.active;
  }

  /**
   * Determine if JDBC support should be enabled.
   * <p>
   *  JDBC is available only in for {@link OperationMode#PLATINUM} and {@link OperationMode#TRIAL}
licences
```

```
     */
    public synchronized boolean isJdbcAllowed() {
        Status localStatus = status;
        OperationMode operationMode = localStatus.mode;

        boolean licensed = operationMode == OperationMode.TRIAL || operationMode ==
OperationMode.PLATINUM;

        return licensed && localStatus.active;
    }

    /**
     * Determine if ODBC support should be enabled.
     * <p>
     * ODBC is available only in for {@link OperationMode#PLATINUM} and {@link OperationMode#TRIAL}
licences
     */
    public synchronized boolean isOdbcAllowed() {
        Status localStatus = status;
        OperationMode operationMode = localStatus.mode;

        boolean licensed = operationMode == OperationMode.TRIAL || operationMode ==
OperationMode.PLATINUM;

        return licensed && localStatus.active;
    }

    public synchronized boolean isTrialLicense() {
        return status.mode == OperationMode.TRIAL;
    }

    /**
     * @return true if security is available to be used with the current license type
     */
    public synchronized boolean isSecurityAvailable() {
        OperationMode mode = status.mode;
        return mode == OperationMode.GOLD || mode == OperationMode.PLATINUM || mode ==
OperationMode.STANDARD ||
                mode == OperationMode.TRIAL;
    }

    /**
     * @return true if security has been disabled by a trial license which is the case of the
     *         default distribution post 6.3.0. The conditions necessary for this are:
     *         <ul>
     *             <li>A trial license generated in 6.3.0+</li>
     *             <li>xpack.security.enabled not specified as a setting</li>
     *         </ul>
```

```
     */
    public synchronized boolean isSecurityDisabledByTrialLicense() {
        return status.mode == OperationMode.TRIAL && isSecurityEnabled
            && isSecurityExplicitlyEnabled == false
            && isSecurityEnabledByTrialVersion == false;
    }

    private static boolean isSecurityEnabled(final OperationMode mode, final boolean isSecurityExplicitlyEnabled,
                                             final boolean isSecurityEnabledByTrialVersion, final boolean isSecurityEnabled) {
        return mode == OperationMode.TRIAL ? (isSecurityExplicitlyEnabled || isSecurityEnabledByTrialVersion) :
isSecurityEnabled;
    }

    /**
     * Determine if cross-cluster replication should be enabled.
     * <p>
     * Cross-cluster replication is only disabled when the license has expired or if the mode is not:
     * <ul>
     * <li>{@link OperationMode#PLATINUM}</li>
     * <li>{@link OperationMode#TRIAL}</li>
     * </ul>
     *
     * @return true is the license is compatible, otherwise false
     */
    public synchronized boolean isCcrAllowed() {
        final Status currentStatus = status;
        return currentStatus.active && isCcrAllowedForOperationMode(currentStatus.mode);
    }

    public static boolean isCcrAllowedForOperationMode(final OperationMode operationMode) {
        return isPlatinumOrTrialOperationMode(operationMode);
    }

    public static boolean isPlatinumOrTrialOperationMode(final OperationMode operationMode) {
        return operationMode == OperationMode.PLATINUM || operationMode == OperationMode.TRIAL;
    }

    /**
     * Creates a copy of this object based on the state at the time the method was called. The
     * returned object will not be modified by a license update/expiration so it can be used to
     * make multiple method calls on the license state safely. This object should not be long
     * lived but instead used within a method when a consistent view of the license state
     * is needed for multiple interactions with the license state.
     */
    public synchronized XPackLicenseState copyCurrentLicenseState() {
        return new XPackLicenseState(this);
    }
}
```

```
/*
* Copyright Elasticsearch B.V. and/or licensed to Elasticsearch B.V. under one
* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionRequestValidationException;
import org.elasticsearch.action.ValidateActions;
import org.elasticsearch.action.support.master.AcknowledgedRequest;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;
import org.elasticsearch.common.xcontent.XContentType;

import java.io.IOException;


public class PutLicenseRequest extends AcknowledgedRequest<PutLicenseRequest> {

  private License license;
  private boolean acknowledge = false;

  public PutLicenseRequest() {
  }

  @Override
  public ActionRequestValidationException validate() {
     return (license == null) ? ValidateActions.addValidationError("license is missing", null) : null;
  }

  /**
   * Parses license from json format to an instance of {@link License}
   *
   * @param licenseDefinition licenses definition
   * @param xContentType the content type of the license
   */
  public PutLicenseRequest license(BytesReference licenseDefinition, XContentType xContentType) {
     try {
        return license(License.fromSource(licenseDefinition, xContentType));
     } catch (IOException e) {
        throw new IllegalArgumentException("failed to parse license source", e);
     }
  }

  public PutLicenseRequest license(License license) {
     this.license = license;
     return this;
```

```
    }

    public License license() {
        return license;
    }

    public PutLicenseRequest acknowledge(boolean acknowledge) {
        this.acknowledge = acknowledge;
        return this;
    }

    public boolean acknowledged() {
        return acknowledge;
    }

    @Override
    public void readFrom(StreamInput in) throws IOException {
        super.readFrom(in);
        license = License.readLicense(in);
        acknowledge = in.readBoolean();
    }

    @Override
    public void writeTo(StreamOutput out) throws IOException {
        super.writeTo(out);
        license.writeTo(out);
        out.writeBoolean(acknowledge);
    }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.action.support.master.AcknowledgedRequestBuilder;
import org.elasticsearch.client.ElasticsearchClient;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;

/**
* Register license request builder
*/
public class PutLicenseRequestBuilder extends AcknowledgedRequestBuilder<PutLicenseRequest,
PutLicenseResponse, PutLicenseRequestBuilder> {
```

```
  public PutLicenseRequestBuilder(ElasticsearchClient client) {
    this(client, PutLicenseAction.INSTANCE);
  }

  /**
   * Constructs register license request
   *
   * @param client elasticsearch client
   */
  public PutLicenseRequestBuilder(ElasticsearchClient client, PutLicenseAction action) {
    super(client, action, new PutLicenseRequest());
  }

  /**
   * Sets the license
   *
   * @param license license
   * @return this builder
   */
  public PutLicenseRequestBuilder setLicense(License license) {
    request.license(license);
    return this;
  }

  public PutLicenseRequestBuilder setLicense(BytesReference licenseSource, XContentType xContentType) {
    request.license(licenseSource, xContentType);
    return this;
  }

  public PutLicenseRequestBuilder setAcknowledge(boolean acknowledge) {
    request.acknowledge(acknowledge);
    return this;
  }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchSecurityException;
import org.elasticsearch.Version;
import org.elasticsearch.cluster.node.DiscoveryNodes;
import org.elasticsearch.rest.RestStatus;

import java.util.stream.StreamSupport;
```

```
public class LicenseUtils {

  public static final String EXPIRED_FEATURE_METADATA = "es.license.expired.feature";

  /**
   * Exception to be thrown when a feature action requires a valid license, but license
   * has expired
   *
   * <code>feature</code> accessible through {@link #EXPIRED_FEATURE_METADATA} in the
   * exception's rest header
   */
  public static ElasticsearchSecurityException newComplianceException(String feature) {
     ElasticsearchSecurityException e = new ElasticsearchSecurityException("current license is non-compliant for
[{}]",
           RestStatus.FORBIDDEN, feature);
     e.addMetadata(EXPIRED_FEATURE_METADATA, feature);
     return e;
  }

  /**
   * Checks if a given {@link ElasticsearchSecurityException} refers to a feature that
   * requires a valid license, but the license has expired.
   */
  public static boolean isLicenseExpiredException(ElasticsearchSecurityException exception) {
     return (exception != null) && (exception.getMetadata(EXPIRED_FEATURE_METADATA) != null);
  }

  public static boolean licenseNeedsExtended(License license) {
     return "basic".equals(license.type()) && license.expiryDate() !=
LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS;
  }

  /**
   * Checks if the signature of a self generated license with older version needs to be
   * recreated with the new key
   */
  public static boolean signatureNeedsUpdate(License license, DiscoveryNodes currentNodes) {
     assert License.VERSION_CRYPTO_ALGORITHMS == License.VERSION_CURRENT : "update this method
when adding a new version";

     return ("basic".equals(license.type()) || "trial".equals(license.type())) &&
           // only upgrade signature when all nodes are ready to deserialize the new signature
           (license.version() < License.VERSION_CRYPTO_ALGORITHMS &&
              compatibleLicenseVersion(currentNodes) == License.VERSION_CRYPTO_ALGORITHMS
           );
  }

  public static int compatibleLicenseVersion(DiscoveryNodes currentNodes) {
```

```
        assert License.VERSION_CRYPTO_ALGORITHMS == License.VERSION_CURRENT : "update this method
when adding a new version";

        if (StreamSupport.stream(currentNodes.spliterator(), false)
            .allMatch(node -> node.getVersion().onOrAfter(Version.V_6_4_0))) {
            // License.VERSION_CRYPTO_ALGORITHMS was introduced in 6.4.0
            return License.VERSION_CRYPTO_ALGORITHMS;
        } else {
            return License.VERSION_START_DATE;
        }
    }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.rest.BytesRestResponse;
import org.elasticsearch.rest.RestController;
import org.elasticsearch.rest.RestRequest;
import org.elasticsearch.rest.RestResponse;
import org.elasticsearch.rest.RestStatus;
import org.elasticsearch.rest.action.RestBuilderListener;
import org.elasticsearch.xpack.core.XPackClient;
import org.elasticsearch.xpack.core.rest.XPackRestHandler;

import java.io.IOException;

import static org.elasticsearch.rest.RestRequest.Method.GET;

public class RestGetBasicStatus extends XPackRestHandler {

    RestGetBasicStatus(Settings settings, RestController controller) {
        super(settings);
        controller.registerHandler(GET, URI_BASE + "/license/basic_status", this);
    }

    @Override
    protected RestChannelConsumer doPrepareRequest(RestRequest request, XPackClient client) throws IOException
{
        return channel -> client.licensing().prepareGetStartBasic().execute(
                new RestBuilderListener<GetBasicStatusResponse>(channel) {
                    @Override
                    public RestResponse buildResponse(GetBasicStatusResponse response, XContentBuilder builder)
```

```
throws Exception {
                builder.startObject();
                builder.field("eligible_to_start_basic", response.isEligibleToStartBasic());
                builder.endObject();
                return new BytesRestResponse(RestStatus.OK, builder);
            }
        });
  }

  @Override
  public String getName() {
    return "xpack_basic_status_action";
  }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.protocol.xpack.license.DeleteLicenseRequest;
import org.elasticsearch.rest.RestController;
import org.elasticsearch.rest.RestRequest;
import org.elasticsearch.rest.action.RestToXContentListener;
import org.elasticsearch.xpack.core.XPackClient;
import org.elasticsearch.xpack.core.rest.XPackRestHandler;

import java.io.IOException;

import static org.elasticsearch.rest.RestRequest.Method.DELETE;

public class RestDeleteLicenseAction extends XPackRestHandler {
  public RestDeleteLicenseAction(Settings settings, RestController controller) {
    super(settings);
    // @deprecated Remove deprecations in 6.0
    controller.registerWithDeprecatedHandler(DELETE, URI_BASE + "/license", this,
                                             DELETE, "/_license", deprecationLogger);

    // Remove _licenses support entirely in 6.0
    controller.registerAsDeprecatedHandler(DELETE, "/_licenses", this,
                                           "[DELETE /_licenses] is deprecated! Use " +
                                           "[DELETE /_xpack/license] instead.",
                                           deprecationLogger);
  }

  @Override
```

```
  public String getName() {
    return "xpack_delete_license_action";
  }

  @Override
  public RestChannelConsumer doPrepareRequest(final RestRequest request, final XPackClient client) throws
IOException {
    DeleteLicenseRequest deleteLicenseRequest = new DeleteLicenseRequest();
    deleteLicenseRequest.timeout(request.paramAsTime("timeout", deleteLicenseRequest.timeout()));
    deleteLicenseRequest.masterNodeTimeout(request.paramAsTime("master_timeout",
deleteLicenseRequest.masterNodeTimeout()));

    return channel -> client.es().admin().cluster().execute(DeleteLicenseAction.INSTANCE, deleteLicenseRequest,
        new RestToXContentListener<>(channel));
  }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.rest.BytesRestResponse;
import org.elasticsearch.rest.RestController;
import org.elasticsearch.rest.RestRequest;
import org.elasticsearch.rest.RestResponse;
import org.elasticsearch.rest.RestStatus;
import org.elasticsearch.rest.action.RestBuilderListener;
import org.elasticsearch.xpack.core.XPackClient;
import org.elasticsearch.xpack.core.rest.XPackRestHandler;

import java.io.IOException;

import static org.elasticsearch.rest.RestRequest.Method.GET;

public class RestGetTrialStatus extends XPackRestHandler {

  RestGetTrialStatus(Settings settings, RestController controller) {
    super(settings);
    controller.registerHandler(GET, URI_BASE + "/license/trial_status", this);
  }

  @Override
  protected RestChannelConsumer doPrepareRequest(RestRequest request, XPackClient client) throws IOException
{
```

```
        return channel -> client.licensing().prepareGetStartTrial().execute(
                new RestBuilderListener<GetTrialStatusResponse>(channel) {
                    @Override
                    public RestResponse buildResponse(GetTrialStatusResponse response, XContentBuilder builder) throws
Exception {
                        builder.startObject();
                        builder.field("eligible_to_start_trial", response.isEligibleToStartTrial());
                        builder.endObject();
                        return new BytesRestResponse(RestStatus.OK, builder);
                    }
                });
    }

    @Override
    public String getName() {
        return "xpack_trial_status_action";
    }
}
/*
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.common.logging.LoggerMessageFormat;
import org.elasticsearch.common.unit.TimeValue;

import java.util.UUID;

abstract class ExpirationCallback {

    static final String EXPIRATION_JOB_PREFIX = ".license_expiration_job_";

    public enum Orientation {PRE, POST}

    /**
     * Callback that is triggered every <code>frequency</code> when
     * current time is between <code>max</code> and <code>min</code>
     * before license expiry.
     */
    public abstract static class Pre extends ExpirationCallback {

        /**
         * Callback schedule prior to license expiry
         *
         * @param min       latest relative time to execute before license expiry
         * @param max       earliest relative time to execute before license expiry
```

```
     * @param frequency interval between execution
     */
    Pre(TimeValue min, TimeValue max, TimeValue frequency) {
      super(Orientation.PRE, min, max, frequency);
    }
}

/**
 * Callback that is triggered every <code>frequency</code> when
 * current time is between <code>min</code> and <code>max</code>
 * after license expiry.
 */
public abstract static class Post extends ExpirationCallback {

    /**
     * Callback schedule after license expiry
     *
     * @param min       earliest relative time to execute after license expiry
     * @param max       latest relative time to execute after license expiry
     * @param frequency interval between execution
     */
    Post(TimeValue min, TimeValue max, TimeValue frequency) {
      super(Orientation.POST, min, max, frequency);
    }
}

private final String id;
private final Orientation orientation;
private final long min;
private final long max;
private final long frequency;

private ExpirationCallback(Orientation orientation, TimeValue min, TimeValue max, TimeValue frequency) {
    this.orientation = orientation;
    this.min = (min == null) ? 0 : min.getMillis();
    this.max = (max == null) ? Long.MAX_VALUE : max.getMillis();
    this.frequency = frequency.getMillis();
    this.id = String.join("", EXPIRATION_JOB_PREFIX, UUID.randomUUID().toString());
}

public final String getId() {
    return id;
}

public final long getFrequency() {
    return frequency;
}
```

```
/**
 * Calculates the delay for the next trigger time. When <code>now</code> is in a
 * valid time bracket with respect to <code>expirationDate</code>, the delay is 0.
 * When <code>now</code> is before the time bracket, than delay to the start of the
 * time bracket and when <code>now</code> is passed the valid time bracket, the delay
 * is <code>null</code>
 * @param expirationDate license expiry date in milliseconds
 * @param now current time in milliseconds
 * @return time delay
 */
final TimeValue delay(long expirationDate, long now) {
   final TimeValue delay;
   switch (orientation) {
      case PRE:
         if (expirationDate >= now) {
            // license not yet expired
            long preExpiryDuration = expirationDate - now;
            if (preExpiryDuration > max) {
               // license duration is longer than maximum duration, delay it to the first match time
               delay = TimeValue.timeValueMillis(preExpiryDuration - max);
            } else if (preExpiryDuration <= max && preExpiryDuration >= min) {
               // no delay in valid time bracket
               delay = TimeValue.timeValueMillis(0);
            } else {
               // passed last match time
               delay = null;
            }
         } else {
            // invalid after license expiry
            delay = null;
         }
         break;
      case POST:
         if (expirationDate >= now) {
            // license not yet expired, delay it to the first match time
            delay = TimeValue.timeValueMillis(expirationDate - now + min);
         } else {
            // license has expired
            long expiredDuration = now - expirationDate;
            if (expiredDuration < min) {
               // license expiry duration is shorter than minimum duration, delay it to the first match time
               delay = TimeValue.timeValueMillis(min - expiredDuration);
            } else if (expiredDuration >= min && expiredDuration <= max) {
               // no delay in valid time bracket
               delay = TimeValue.timeValueMillis(0);
            } else {
               // passed last match time
               delay = null;
```

```
                }
            }
            break;
        default:
            throw new IllegalStateException("orientation [" + orientation + "] unknown");
    }
    return delay;
  }

  /**
   * {@link org.elasticsearch.xpack.core.scheduler.SchedulerEngine.Schedule#nextScheduledTimeAfter(long,
long)}
   * with respect to license expiry date
   */
  public final long nextScheduledTimeForExpiry(long expiryDate, long startTime, long time) {
    TimeValue delay = delay(expiryDate, time);
    if (delay != null) {
      long delayInMillis = delay.getMillis();
      if (delayInMillis == 0L) {
        if (startTime == time) {
          // initial trigger and in time bracket, schedule immediately
          return time;
        } else {
          // in time bracket, add frequency
          return time + frequency;
        }
      } else {
        // not in time bracket
        return time + delayInMillis;
      }
    }
    return -1;
  }

  /**
   * Code to execute when the expiry callback is triggered in a valid
   * time bracket
   * @param license license to operate on
   */
  public abstract void on(License license);

  public final String toString() {
    return LoggerMessageFormat.format(null, "ExpirationCallback:(orientation [{}],  min [{}], max [{}], freq
[{}])",
        orientation.name(), TimeValue.timeValueMillis(min), TimeValue.timeValueMillis(max),
        TimeValue.timeValueMillis(frequency));
  }
}
```

```
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*/
package org.elasticsearch.license;

import org.elasticsearch.common.joda.FormatDateTimeFormatter;
import org.elasticsearch.common.joda.Joda;
import org.joda.time.MutableDateTime;
import org.joda.time.format.DateTimeFormatter;
import org.joda.time.format.ISODateTimeFormat;

public class DateUtils {

  private static final FormatDateTimeFormatter formatDateOnlyFormatter = Joda.forPattern("yyyy-MM-dd");

  private static final DateTimeFormatter dateOnlyFormatter = formatDateOnlyFormatter.parser().withZoneUTC();

  private static final DateTimeFormatter dateTimeFormatter = ISODateTimeFormat.dateTime().withZoneUTC();

  public static long endOfTheDay(String date) {
     try {
        // Try parsing using complete date/time format
        return dateTimeFormatter.parseDateTime(date).getMillis();
     } catch (IllegalArgumentException ex) {
        // Fall back to the date only format
        MutableDateTime dateTime = dateOnlyFormatter.parseMutableDateTime(date);
        dateTime.millisOfDay().set(dateTime.millisOfDay().getMaximumValue());
        return dateTime.getMillis();
     }
  }

  public static long beginningOfTheDay(String date) {
     try {
        // Try parsing using complete date/time format
        return dateTimeFormatter.parseDateTime(date).getMillis();
     } catch (IllegalArgumentException ex) {
        // Fall back to the date only format
        return dateOnlyFormatter.parseDateTime(date).getMillis();
     }

  }
}
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```

```
*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.ActionFilters;
import org.elasticsearch.action.support.master.TransportMasterNodeAction;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.block.ClusterBlockException;
import org.elasticsearch.cluster.block.ClusterBlockLevel;
import org.elasticsearch.cluster.metadata.IndexNameExpressionResolver;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.inject.Inject;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.threadpool.ThreadPool;
import org.elasticsearch.transport.TransportService;

public class TransportPostStartTrialAction extends TransportMasterNodeAction<PostStartTrialRequest,
PostStartTrialResponse> {

  private final LicenseService licenseService;

  @Inject
  public TransportPostStartTrialAction(Settings settings, TransportService transportService, ClusterService
clusterService,
                                       LicenseService licenseService, ThreadPool threadPool, ActionFilters actionFilters,
                                       IndexNameExpressionResolver indexNameExpressionResolver) {
    super(settings, PostStartTrialAction.NAME, transportService, clusterService, threadPool, actionFilters,
        indexNameExpressionResolver, PostStartTrialRequest::new);
    this.licenseService = licenseService;
  }

  @Override
  protected String executor() {
    return ThreadPool.Names.SAME;
  }

  @Override
  protected PostStartTrialResponse newResponse() {
    return new PostStartTrialResponse();
  }

  @Override
  protected void masterOperation(PostStartTrialRequest request, ClusterState state,
                                 ActionListener<PostStartTrialResponse> listener) throws Exception {
    licenseService.startTrialLicense(request, listener);
  }

  @Override
```

```
  protected ClusterBlockException checkBlock(PostStartTrialRequest request, ClusterState state) {
    return state.blocks().globalBlockedException(ClusterBlockLevel.METADATA_WRITE);
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionResponse;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;

import java.io.IOException;

public class GetLicenseResponse extends ActionResponse {

  private License license;

  GetLicenseResponse() {
  }

  GetLicenseResponse(License license) {
    this.license = license;
  }

  public License license() {
    return license;
  }

  @Override
  public void readFrom(StreamInput in) throws IOException {
    super.readFrom(in);
    if (in.readBoolean()) {
      license = License.readLicense(in);
    }
  }

  @Override
  public void writeTo(StreamOutput out) throws IOException {
    super.writeTo(out);
    if (license == null) {
      out.writeBoolean(false);
    } else {
      out.writeBoolean(true);
      license.writeTo(out);
```

```
    }
  }

}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionResponse;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;

import java.io.IOException;

class GetBasicStatusResponse extends ActionResponse {

  private boolean eligibleToStartBasic;

  GetBasicStatusResponse() {
  }

  GetBasicStatusResponse(boolean eligibleToStartBasic) {
    this.eligibleToStartBasic = eligibleToStartBasic;
  }

  boolean isEligibleToStartBasic() {
    return eligibleToStartBasic;
  }

  @Override
  public void readFrom(StreamInput in) throws IOException {
    eligibleToStartBasic = in.readBoolean();
  }

  @Override
  public void writeTo(StreamOutput out) throws IOException {
    out.writeBoolean(eligibleToStartBasic);
  }
}
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*/
package org.elasticsearch.license;
```

```
import org.elasticsearch.action.ActionRequestBuilder;
import org.elasticsearch.client.ElasticsearchClient;

class GetTrialStatusRequestBuilder extends ActionRequestBuilder<GetTrialStatusRequest,
      GetTrialStatusResponse, GetTrialStatusRequestBuilder> {

  GetTrialStatusRequestBuilder(ElasticsearchClient client, GetTrialStatusAction action) {
     super(client, action, new GetTrialStatusRequest());
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionResponse;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;

import java.io.IOException;

class GetTrialStatusResponse extends ActionResponse {

  private boolean eligibleToStartTrial;

  GetTrialStatusResponse() {
  }

  GetTrialStatusResponse(boolean eligibleToStartTrial) {
     this.eligibleToStartTrial = eligibleToStartTrial;
  }

  boolean isEligibleToStartTrial() {
     return eligibleToStartTrial;
  }

  @Override
  public void readFrom(StreamInput in) throws IOException {
     eligibleToStartTrial = in.readBoolean();
  }

  @Override
  public void writeTo(StreamOutput out) throws IOException {
     out.writeBoolean(eligibleToStartTrial);
  }
```

```
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.ActionFilters;
import org.elasticsearch.action.support.master.TransportMasterNodeReadAction;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.block.ClusterBlockException;
import org.elasticsearch.cluster.block.ClusterBlockLevel;
import org.elasticsearch.cluster.metadata.IndexNameExpressionResolver;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.inject.Inject;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.threadpool.ThreadPool;
import org.elasticsearch.transport.TransportService;

public class TransportGetBasicStatusAction extends TransportMasterNodeReadAction<GetBasicStatusRequest,
GetBasicStatusResponse> {

  @Inject
  public TransportGetBasicStatusAction(Settings settings, TransportService transportService, ClusterService
clusterService,
                                       ThreadPool threadPool, ActionFilters actionFilters,
                                       IndexNameExpressionResolver indexNameExpressionResolver) {
    super(settings, GetBasicStatusAction.NAME, transportService, clusterService, threadPool, actionFilters,
          indexNameExpressionResolver, GetBasicStatusRequest::new);
  }

  @Override
  protected String executor() {
    return ThreadPool.Names.SAME;
  }

  @Override
  protected GetBasicStatusResponse newResponse() {
    return new GetBasicStatusResponse();
  }

  @Override
  protected void masterOperation(GetBasicStatusRequest request, ClusterState state,
                                 ActionListener<GetBasicStatusResponse> listener) throws Exception {
    LicensesMetaData licensesMetaData = state.metaData().custom(LicensesMetaData.TYPE);
    if (licensesMetaData == null) {
```

```
            listener.onResponse(new GetBasicStatusResponse(true));
        } else {
            License license = licensesMetaData.getLicense();
            listener.onResponse(new GetBasicStatusResponse(license == null || license.type().equals("basic") == false));
        }

    }

    @Override
    protected ClusterBlockException checkBlock(GetBasicStatusRequest request, ClusterState state) {
        return state.blocks().globalBlockedException(ClusterBlockLevel.METADATA_READ);
    }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.Action;
import org.elasticsearch.client.ElasticsearchClient;

public class GetTrialStatusAction extends Action<GetTrialStatusRequest, GetTrialStatusResponse,
GetTrialStatusRequestBuilder> {

    public static final GetTrialStatusAction INSTANCE = new GetTrialStatusAction();
    public static final String NAME = "cluster:admin/xpack/license/trial_status";

    private GetTrialStatusAction() {
        super(NAME);
    }

    @Override
    public GetTrialStatusRequestBuilder newRequestBuilder(ElasticsearchClient client) {
        return new GetTrialStatusRequestBuilder(client, this);
    }

    @Override
    public GetTrialStatusResponse newResponse() {
        return new GetTrialStatusResponse();
    }
}
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*/
```

```
package org.elasticsearch.license;

import org.elasticsearch.action.support.master.MasterNodeReadOperationRequestBuilder;
import org.elasticsearch.client.ElasticsearchClient;
import org.elasticsearch.protocol.xpack.license.GetLicenseRequest;

public class GetLicenseRequestBuilder extends MasterNodeReadOperationRequestBuilder<GetLicenseRequest,
GetLicenseResponse,
      GetLicenseRequestBuilder> {

  public GetLicenseRequestBuilder(ElasticsearchClient client) {
     this(client, GetLicenseAction.INSTANCE);
  }

  /**
   * Creates new get licenses request builder
   *
   * @param client elasticsearch client
   */
  public GetLicenseRequestBuilder(ElasticsearchClient client, GetLicenseAction action) {
     super(client, action, new GetLicenseRequest());
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionRequestBuilder;
import org.elasticsearch.client.ElasticsearchClient;

class GetBasicStatusRequestBuilder extends ActionRequestBuilder<GetBasicStatusRequest,
GetBasicStatusResponse,
      GetBasicStatusRequestBuilder> {

  GetBasicStatusRequestBuilder(ElasticsearchClient client, GetBasicStatusAction action) {
     super(client, action, new GetBasicStatusRequest());
  }
}
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*/
package org.elasticsearch.license;
```

```
import org.elasticsearch.action.ActionRequestValidationException;
import org.elasticsearch.action.support.master.AcknowledgedRequest;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;

import java.io.IOException;

public class PostStartBasicRequest extends AcknowledgedRequest<PostStartBasicRequest> {

  private boolean acknowledge = false;

  @Override
  public ActionRequestValidationException validate() {
     return null;
  }

  public PostStartBasicRequest acknowledge(boolean acknowledge) {
     this.acknowledge = acknowledge;
     return this;
  }

  public boolean isAcknowledged() {
     return acknowledge;
  }

  @Override
  public void readFrom(StreamInput in) throws IOException {
     super.readFrom(in);
     acknowledge = in.readBoolean();
  }

  @Override
  public void writeTo(StreamOutput out) throws IOException {
     super.writeTo(out);
     out.writeBoolean(acknowledge);
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.Action;
import org.elasticsearch.client.ElasticsearchClient;

public class GetBasicStatusAction extends Action<GetBasicStatusRequest, GetBasicStatusResponse,
```

```
GetBasicStatusRequestBuilder> {

  public static final GetBasicStatusAction INSTANCE = new GetBasicStatusAction();
  public static final String NAME = "cluster:admin/xpack/license/basic_status";

  private GetBasicStatusAction() {
     super(NAME);
  }

  @Override
  public GetBasicStatusRequestBuilder newRequestBuilder(ElasticsearchClient client) {
     return new GetBasicStatusRequestBuilder(client, this);
  }

  @Override
  public GetBasicStatusResponse newResponse() {
     return new GetBasicStatusResponse();
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchException;
import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.ActionFilters;
import org.elasticsearch.action.support.master.TransportMasterNodeAction;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.block.ClusterBlockException;
import org.elasticsearch.cluster.block.ClusterBlockLevel;
import org.elasticsearch.cluster.metadata.IndexNameExpressionResolver;
import org.elasticsearch.common.inject.Inject;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;
import org.elasticsearch.threadpool.ThreadPool;
import org.elasticsearch.transport.TransportService;

public class TransportPutLicenseAction extends TransportMasterNodeAction<PutLicenseRequest,
PutLicenseResponse> {

  private final LicenseService licenseService;

  @Inject
  public TransportPutLicenseAction(Settings settings, TransportService transportService, ClusterService
```

```
clusterService,
                        LicenseService licenseService, ThreadPool threadPool, ActionFilters actionFilters,
                        IndexNameExpressionResolver indexNameExpressionResolver) {
    super(settings, PutLicenseAction.NAME, transportService, clusterService, threadPool, actionFilters,
indexNameExpressionResolver,
            PutLicenseRequest::new);
    this.licenseService = licenseService;
  }

  @Override
  protected String executor() {
    return ThreadPool.Names.MANAGEMENT;
  }

  @Override
  protected PutLicenseResponse newResponse() {
    return new PutLicenseResponse();
  }

  @Override
  protected ClusterBlockException checkBlock(PutLicenseRequest request, ClusterState state) {
    return state.blocks().globalBlockedException(ClusterBlockLevel.METADATA_WRITE);
  }

  @Override
  protected void masterOperation(final PutLicenseRequest request, ClusterState state, final
ActionListener<PutLicenseResponse>
          listener) throws ElasticsearchException {
    licenseService.registerLicense(request, listener);
  }

}
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*/
package org.elasticsearch.license;

import org.elasticsearch.Version;
import org.elasticsearch.action.ActionResponse;
import org.elasticsearch.common.io.stream.StreamInput;
import org.elasticsearch.common.io.stream.StreamOutput;
import org.elasticsearch.rest.RestStatus;

import java.io.IOException;
import java.util.Collections;
import java.util.HashMap;
```

```
import java.util.Map;

class PostStartTrialResponse extends ActionResponse {

  // Nodes Prior to 6.3 did not have NEED_ACKNOWLEDGEMENT as part of status
  enum Pre63Status {
     UPGRADED_TO_TRIAL,
     TRIAL_ALREADY_ACTIVATED;
  }
  enum Status {
     UPGRADED_TO_TRIAL(true, null, RestStatus.OK),
     TRIAL_ALREADY_ACTIVATED(false, "Operation failed: Trial was already activated.",
RestStatus.FORBIDDEN),
     NEED_ACKNOWLEDGEMENT(false,"Operation failed: Needs acknowledgement.", RestStatus.OK);

     private final boolean isTrialStarted;

     private final String errorMessage;
     private final RestStatus restStatus;
     Status(boolean isTrialStarted, String errorMessage, RestStatus restStatus) {
        this.isTrialStarted = isTrialStarted;
        this.errorMessage = errorMessage;
        this.restStatus = restStatus;
     }

     boolean isTrialStarted() {
        return isTrialStarted;
     }

     String getErrorMessage() {
        return errorMessage;
     }

     RestStatus getRestStatus() {
        return restStatus;
     }

  }

  private Status status;
  private Map<String, String[]> acknowledgeMessages;
  private String acknowledgeMessage;

  PostStartTrialResponse() {
  }

  PostStartTrialResponse(Status status) {
     this(status, Collections.emptyMap(), null);
```

```
    }

    PostStartTrialResponse(Status status, Map<String, String[]> acknowledgeMessages, String acknowledgeMessage)
{
        this.status = status;
        this.acknowledgeMessages = acknowledgeMessages;
        this.acknowledgeMessage = acknowledgeMessage;
    }

    public Status getStatus() {
        return status;
    }

    @Override
    public void readFrom(StreamInput in) throws IOException {
        status = in.readEnum(Status.class);
        if (in.getVersion().onOrAfter(Version.V_6_3_0)) {
            acknowledgeMessage = in.readOptionalString();
            int size = in.readVInt();
            Map<String, String[]> acknowledgeMessages = new HashMap<>(size);
            for (int i = 0; i < size; i++) {
                String feature = in.readString();
                int nMessages = in.readVInt();
                String[] messages = new String[nMessages];
                for (int j = 0; j < nMessages; j++) {
                    messages[j] = in.readString();
                }
                acknowledgeMessages.put(feature, messages);
            }
            this.acknowledgeMessages = acknowledgeMessages;
        } else {
            this.acknowledgeMessages = Collections.emptyMap();
        }
    }

    @Override
    public void writeTo(StreamOutput out) throws IOException {
        Version version = Version.V_6_3_0;
        if (out.getVersion().onOrAfter(version)) {
            out.writeEnum(status);
            out.writeOptionalString(acknowledgeMessage);
            out.writeVInt(acknowledgeMessages.size());
            for (Map.Entry<String, String[]> entry : acknowledgeMessages.entrySet()) {
                out.writeString(entry.getKey());
                out.writeVInt(entry.getValue().length);
                for (String message : entry.getValue()) {
                    out.writeString(message);
                }
```

```
            }
        } else {
            if (status == Status.UPGRADED_TO_TRIAL) {
                out.writeEnum(Pre63Status.UPGRADED_TO_TRIAL);
            } else if (status == Status.TRIAL_ALREADY_ACTIVATED) {
                out.writeEnum(Pre63Status.TRIAL_ALREADY_ACTIVATED);
            } else {
                throw new IllegalArgumentException("Starting trial on node with version [" + Version.CURRENT + "]
requires " +
                        "acknowledgement parameter.");
            }
        }
    }

    Map<String, String[]> getAcknowledgementMessages() {
        return acknowledgeMessages;
    }

    String getAcknowledgementMessage() {
        return acknowledgeMessage;
    }
}
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*/
package org.elasticsearch.license;

import org.apache.lucene.util.BytesRef;
import org.apache.lucene.util.BytesRefIterator;
import org.elasticsearch.common.bytes.BytesReference;
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.common.xcontent.XContentFactory;
import org.elasticsearch.common.xcontent.XContentType;
import org.elasticsearch.core.internal.io.Streams;

import java.io.ByteArrayOutputStream;
import java.io.IOException;
import java.io.InputStream;
import java.nio.ByteBuffer;
import java.security.InvalidKeyException;
import java.security.NoSuchAlgorithmException;
import java.security.Signature;
import java.security.SignatureException;
import java.util.Arrays;
import java.util.Base64;
```

```
import java.util.Collections;

/**
* Responsible for verifying signed licenses
*/
public class LicenseVerifier {

  /**
   * verifies the license content with the signature using the packaged
   * public key
   * @param license to verify
   * @return true if valid, false otherwise
   */
  public static boolean verifyLicense(final License license, byte[] publicKeyData) {
      byte[] signedContent = null;
      byte[] publicKeyFingerprint = null;
      try {
          byte[] signatureBytes = Base64.getDecoder().decode(license.signature());
          ByteBuffer byteBuffer = ByteBuffer.wrap(signatureBytes);
          int version = byteBuffer.getInt();
          int magicLen = byteBuffer.getInt();
          byte[] magic = new byte[magicLen];
          byteBuffer.get(magic);
          int hashLen = byteBuffer.getInt();
          publicKeyFingerprint = new byte[hashLen];
          byteBuffer.get(publicKeyFingerprint);
          int signedContentLen = byteBuffer.getInt();
          signedContent = new byte[signedContentLen];
          byteBuffer.get(signedContent);
          XContentBuilder contentBuilder = XContentFactory.contentBuilder(XContentType.JSON);
          license.toXContent(contentBuilder, new
ToXContent.MapParams(Collections.singletonMap(License.LICENSE_SPEC_VIEW_MODE, "true")));
          Signature rsa = Signature.getInstance("SHA512withRSA");
          rsa.initVerify(CryptUtils.readPublicKey(publicKeyData));
          BytesRefIterator iterator = BytesReference.bytes(contentBuilder).iterator();
          BytesRef ref;
          while((ref = iterator.next()) != null) {
              rsa.update(ref.bytes, ref.offset, ref.length);
          }
          return rsa.verify(signedContent);
      } catch (IOException | NoSuchAlgorithmException | SignatureException | InvalidKeyException e) {
          throw new IllegalStateException(e);
      } finally {
          if (signedContent != null) {
              Arrays.fill(signedContent, (byte) 0);
          }
      }
  }
```

```
  public static boolean verifyLicense(final License license) {
    final byte[] publicKeyBytes;
    try (InputStream is = LicenseVerifier.class.getResourceAsStream("/public.key")) {
      ByteArrayOutputStream out = new ByteArrayOutputStream();
      Streams.copy(is, out);
      publicKeyBytes = out.toByteArray();
    } catch (IOException ex) {
      throw new IllegalStateException(ex);
    }
    return verifyLicense(license, publicKeyBytes);
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionRequestValidationException;
import org.elasticsearch.action.support.master.MasterNodeReadRequest;

public class GetTrialStatusRequest extends MasterNodeReadRequest<GetTrialStatusRequest> {

  public GetTrialStatusRequest() {
  }

  @Override
  public ActionRequestValidationException validate() {
    return null;
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.rest.RestController;
import org.elasticsearch.rest.RestRequest;
import org.elasticsearch.rest.action.RestToXContentListener;
import org.elasticsearch.xpack.core.XPackClient;
import org.elasticsearch.xpack.core.rest.XPackRestHandler;

import java.io.IOException;
```

```
import static org.elasticsearch.rest.RestRequest.Method.POST;
import static org.elasticsearch.rest.RestRequest.Method.PUT;

public class RestPutLicenseAction extends XPackRestHandler {
  public RestPutLicenseAction(Settings settings, RestController controller) {
    super(settings);
    // @deprecated Remove deprecations in 6.0
    controller.registerWithDeprecatedHandler(POST, URI_BASE + "/license", this,
                                  POST, "/_license", deprecationLogger);
    controller.registerWithDeprecatedHandler(PUT, URI_BASE + "/license", this,
                                  PUT, "/_license", deprecationLogger);

    // Remove _licenses support entirely in 6.0
    controller.registerAsDeprecatedHandler(POST, "/_licenses", this,
                                "[POST /_licenses] is deprecated! Use " +
                                "[POST /_xpack/license] instead.",
                                deprecationLogger);
    controller.registerAsDeprecatedHandler(PUT, "/_licenses", this,
                                "[PUT /_licenses] is deprecated! Use " +
                                "[PUT /_xpack/license] instead.",
                                deprecationLogger);
  }

  @Override
  public String getName() {
    return "xpack_put_license_action";
  }

  @Override
  public RestChannelConsumer doPrepareRequest(final RestRequest request, final XPackClient client) throws
IOException {
    if (request.hasContent() == false) {
      throw new IllegalArgumentException("The license must be provided in the request body");
    }
    PutLicenseRequest putLicenseRequest = new PutLicenseRequest();
    putLicenseRequest.license(request.content(), request.getXContentType());
    putLicenseRequest.acknowledge(request.paramAsBoolean("acknowledge", false));
    putLicenseRequest.timeout(request.paramAsTime("timeout", putLicenseRequest.timeout()));
    putLicenseRequest.masterNodeTimeout(request.paramAsTime("master_timeout",
putLicenseRequest.masterNodeTimeout()));

    if ("basic".equals(putLicenseRequest.license().type())) {
      throw new IllegalArgumentException("Installing basic licenses is no longer allowed. Use the POST " +
          "/_xpack/license/start_basic API to install a basic license that does not expire.");
    }

    return channel -> client.es().admin().cluster().execute(PutLicenseAction.INSTANCE, putLicenseRequest,
```

```
            new RestToXContentListener<>(channel));
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionRequestValidationException;
import org.elasticsearch.action.support.master.MasterNodeReadRequest;

public class GetBasicStatusRequest extends MasterNodeReadRequest<GetBasicStatusRequest> {

  public GetBasicStatusRequest() {
  }

  @Override
  public ActionRequestValidationException validate() {
     return null;
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.master.AcknowledgedResponse;
import org.elasticsearch.client.ElasticsearchClient;
import org.elasticsearch.protocol.xpack.license.DeleteLicenseRequest;
import org.elasticsearch.protocol.xpack.license.GetLicenseRequest;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;

public class LicensingClient {

  private final ElasticsearchClient client;

  public LicensingClient(ElasticsearchClient client) {
     this.client = client;
  }

  public PutLicenseRequestBuilder preparePutLicense(License license) {
     return new PutLicenseRequestBuilder(client).setLicense(license);
  }
```

```
    public void putLicense(PutLicenseRequest request, ActionListener<PutLicenseResponse> listener) {
        client.execute(PutLicenseAction.INSTANCE, request, listener);
    }

    public GetLicenseRequestBuilder prepareGetLicense() {
        return new GetLicenseRequestBuilder(client);
    }

    public void getLicense(GetLicenseRequest request, ActionListener<GetLicenseResponse> listener) {
        client.execute(GetLicenseAction.INSTANCE, request, listener);
    }

    public DeleteLicenseRequestBuilder prepareDeleteLicense() {
        return new DeleteLicenseRequestBuilder(client);
    }

    public void deleteLicense(DeleteLicenseRequest request, ActionListener<AcknowledgedResponse> listener) {
        client.execute(DeleteLicenseAction.INSTANCE, request, listener);
    }

    public PostStartTrialRequestBuilder preparePostStartTrial() {
        return new PostStartTrialRequestBuilder(client, PostStartTrialAction.INSTANCE);
    }

    public GetTrialStatusRequestBuilder prepareGetStartTrial() {
        return new GetTrialStatusRequestBuilder(client, GetTrialStatusAction.INSTANCE);
    }

    public void postStartTrial(PostStartTrialRequest request, ActionListener<PostStartTrialResponse> listener) {
        client.execute(PostStartTrialAction.INSTANCE, request, listener);
    }

    public void postStartBasic(PostStartBasicRequest request, ActionListener<PostStartBasicResponse> listener) {
        client.execute(PostStartBasicAction.INSTANCE, request, listener);
    }

    public PostStartBasicRequestBuilder preparePostStartBasic() {
        return new PostStartBasicRequestBuilder(client, PostStartBasicAction.INSTANCE);
    }

    public GetBasicStatusRequestBuilder prepareGetStartBasic() {
        return new GetBasicStatusRequestBuilder(client, GetBasicStatusAction.INSTANCE);
    }
}
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```

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*/

package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchException;
import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.ContextPreservingActionListener;
import org.elasticsearch.client.Client;
import org.elasticsearch.common.util.concurrent.ThreadContext;
import org.elasticsearch.protocol.xpack.XPackInfoRequest;
import org.elasticsearch.protocol.xpack.XPackInfoResponse;
import org.elasticsearch.protocol.xpack.license.LicenseStatus;
import org.elasticsearch.transport.RemoteClusterAware;
import org.elasticsearch.xpack.core.action.XPackInfoAction;

import java.util.EnumSet;
import java.util.Iterator;
import java.util.List;
import java.util.Locale;
import java.util.concurrent.atomic.AtomicReference;
import java.util.function.Predicate;
import java.util.stream.Collectors;

/**
* Checks remote clusters for license compatibility with a specified license predicate.
*/
public final class RemoteClusterLicenseChecker {

  /**
   * Encapsulates the license info of a remote cluster.
   */
  public static final class RemoteClusterLicenseInfo {

      private final String clusterAlias;

      /**
       * The alias of the remote cluster.
       *
       * @return the cluster alias
       */
      public String clusterAlias() {
          return clusterAlias;
      }

      private final XPackInfoResponse.LicenseInfo licenseInfo;

      /**
```

```
     * The license info of the remote cluster.
     *
     * @return the license info
     */
    public XPackInfoResponse.LicenseInfo licenseInfo() {
        return licenseInfo;
    }

    RemoteClusterLicenseInfo(final String clusterAlias, final XPackInfoResponse.LicenseInfo licenseInfo) {
        this.clusterAlias = clusterAlias;
        this.licenseInfo = licenseInfo;
    }

}

/**
 * Encapsulates a remote cluster license check. The check is either successful if the license of the remote cluster is compatible with
 * the predicate used to check license compatibility, or the check is a failure.
 */
public static final class LicenseCheck {

    private final RemoteClusterLicenseInfo remoteClusterLicenseInfo;

    /**
     * The remote cluster license info. This method should only be invoked if this instance represents a failing license check.
     *
     * @return the remote cluster license info
     */
    public RemoteClusterLicenseInfo remoteClusterLicenseInfo() {
        assert isSuccess() == false;
        return remoteClusterLicenseInfo;
    }

    private static final LicenseCheck SUCCESS = new LicenseCheck(null);

    /**
     * A successful license check.
     *
     * @return a successful license check instance
     */
    public static LicenseCheck success() {
        return SUCCESS;
    }

    /**
     * Test if this instance represents a successful license check.
```

```
         *
         * @return true if this instance represents a successful license check, otherwise false
         */
        public boolean isSuccess() {
            return this == SUCCESS;
        }

        /**
         * Creates a failing license check encapsulating the specified remote cluster license info.
         *
         * @param remoteClusterLicenseInfo the remote cluster license info
         * @return a failing license check
         */
        public static LicenseCheck failure(final RemoteClusterLicenseInfo remoteClusterLicenseInfo) {
            return new LicenseCheck(remoteClusterLicenseInfo);
        }

        private LicenseCheck(final RemoteClusterLicenseInfo remoteClusterLicenseInfo) {
            this.remoteClusterLicenseInfo = remoteClusterLicenseInfo;
        }

    }

    private final Client client;
    private final Predicate<License.OperationMode> predicate;

    /**
     * Constructs a remote cluster license checker with the specified license predicate for checking license
compatibility. The predicate
     * does not need to check for the active license state as this is handled by the remote cluster license checker.
     *
     * @param client    the client
     * @param predicate the license predicate
     */
    public RemoteClusterLicenseChecker(final Client client, final Predicate<License.OperationMode> predicate) {
        this.client = client;
        this.predicate = predicate;
    }

    public static boolean isLicensePlatinumOrTrial(final XPackInfoResponse.LicenseInfo licenseInfo) {
        final License.OperationMode mode = License.OperationMode.resolve(licenseInfo.getMode());
        return mode == License.OperationMode.PLATINUM || mode == License.OperationMode.TRIAL;
    }

    /**
     * Checks the specified clusters for license compatibility. The specified callback will be invoked once if all
clusters are
     * license-compatible, otherwise the specified callback will be invoked once on the first cluster that is not license-
```

```
compatible.
   *
   * @param clusterAliases the cluster aliases to check
   * @param listener       a callback
   */
  public void checkRemoteClusterLicenses(final List<String> clusterAliases, final ActionListener<LicenseCheck>
listener) {
      final Iterator<String> clusterAliasesIterator = clusterAliases.iterator();
      if (clusterAliasesIterator.hasNext() == false) {
         listener.onResponse(LicenseCheck.success());
         return;
      }

      final AtomicReference<String> clusterAlias = new AtomicReference<>();

      final ActionListener<XPackInfoResponse> infoListener = new ActionListener<XPackInfoResponse>() {

         @Override
         public void onResponse(final XPackInfoResponse xPackInfoResponse) {
            final XPackInfoResponse.LicenseInfo licenseInfo = xPackInfoResponse.getLicenseInfo();
            if ((licenseInfo.getStatus() == LicenseStatus.ACTIVE) == false
                  || predicate.test(License.OperationMode.resolve(licenseInfo.getMode())) == false) {
               listener.onResponse(LicenseCheck.failure(new RemoteClusterLicenseInfo(clusterAlias.get(),
licenseInfo)));
               return;
            }

            if (clusterAliasesIterator.hasNext()) {
               clusterAlias.set(clusterAliasesIterator.next());
               // recurse to the next cluster
               remoteClusterLicense(clusterAlias.get(), this);
            } else {
               listener.onResponse(LicenseCheck.success());
            }
         }

         @Override
         public void onFailure(final Exception e) {
            final String message = "could not determine the license type for cluster [" + clusterAlias.get() + "]";
            listener.onFailure(new ElasticsearchException(message, e));
         }

      };

      // check the license on the first cluster, and then we recursively check licenses on the remaining clusters
      clusterAlias.set(clusterAliasesIterator.next());
      remoteClusterLicense(clusterAlias.get(), infoListener);
   }
```

```
  private void remoteClusterLicense(final String clusterAlias, final ActionListener<XPackInfoResponse> listener) {
     final ThreadContext threadContext = client.threadPool().getThreadContext();
     final ContextPreservingActionListener<XPackInfoResponse> contextPreservingActionListener =
           new ContextPreservingActionListener<>(threadContext.newRestorableContext(false), listener);
     try (ThreadContext.StoredContext ignore = threadContext.stashContext()) {
        // we stash any context here since this is an internal execution and should not leak any existing context
information
        threadContext.markAsSystemContext();

        final XPackInfoRequest request = new XPackInfoRequest();
        request.setCategories(EnumSet.of(XPackInfoRequest.Category.LICENSE));
        try {
           client.getRemoteClusterClient(clusterAlias).execute(XPackInfoAction.INSTANCE, request,
contextPreservingActionListener);
        } catch (final Exception e) {
           contextPreservingActionListener.onFailure(e);
        }
     }
  }

  /**
   * Predicate to test if the index name represents the name of a remote index.
   *
   * @param index the index name
   * @return true if the collection of indices contains a remote index, otherwise false
   */
  public static boolean isRemoteIndex(final String index) {
     return index.indexOf(RemoteClusterAware.REMOTE_CLUSTER_INDEX_SEPARATOR) != -1;
  }

  /**
   * Predicate to test if the collection of index names contains any that represent the name of a remote index.
   *
   * @param indices the collection of index names
   * @return true if the collection of index names contains a name that represents a remote index, otherwise false
   */
  public static boolean containsRemoteIndex(final List<String> indices) {
     return indices.stream().anyMatch(RemoteClusterLicenseChecker::isRemoteIndex);
  }

  /**
   * Filters the collection of index names for names that represent a remote index. Remote index names are of the
form
   * {@code cluster_name:index_name}.
   *
   * @param indices the collection of index names
   * @return list of index names that represent remote index names
```

```
     */
    public static List<String> remoteIndices(final List<String> indices) {
        return indices.stream().filter(RemoteClusterLicenseChecker::isRemoteIndex).collect(Collectors.toList());
    }

    /**
     * Extract the list of remote cluster aliases from the list of index names. Remote index names are of the form
     * {@code cluster_alias:index_name} and the cluster_alias is extracted for each index name that represents a
remote index.
     *
     * @param indices the collection of index names
     * @return the remote cluster names
     */
    public static List<String> remoteClusterAliases(final List<String> indices) {
        return indices.stream()
                .filter(RemoteClusterLicenseChecker::isRemoteIndex)
                .map(index -> index.substring(0,
index.indexOf(RemoteClusterAware.REMOTE_CLUSTER_INDEX_SEPARATOR)))
                .distinct()
                .collect(Collectors.toList());
    }

    /**
     * Constructs an error message for license incompatibility.
     *
     * @param feature                 the name of the feature that initiated the remote cluster license check.
     * @param remoteClusterLicenseInfo the remote cluster license info of the cluster that failed the license check
     * @return an error message representing license incompatibility
     */
    public static String buildErrorMessage(
            final String feature,
            final RemoteClusterLicenseInfo remoteClusterLicenseInfo,
            final Predicate<XPackInfoResponse.LicenseInfo> predicate) {
        final StringBuilder error = new StringBuilder();
        if (remoteClusterLicenseInfo.licenseInfo().getStatus() != LicenseStatus.ACTIVE) {
            error.append(String.format(Locale.ROOT, "the license on cluster [%s] is not active",
remoteClusterLicenseInfo.clusterAlias()));
        } else {
            assert predicate.test(remoteClusterLicenseInfo.licenseInfo()) == false : "license must be incompatible to build
error message";
            final String message = String.format(
                    Locale.ROOT,
                    "the license mode [%s] on cluster [%s] does not enable [%s]",
                    License.OperationMode.resolve(remoteClusterLicenseInfo.licenseInfo().getMode()),
                    remoteClusterLicenseInfo.clusterAlias(),
                    feature);
            error.append(message);
        }
```

```
        return error.toString();
    }

}
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*/

package org.elasticsearch.license;

import org.elasticsearch.Version;

/**
* Marker interface for callbacks that are invoked when the license state changes.
*/
@FunctionalInterface
public interface LicenseStateListener {

    /**
     * Callback when the license state changes. See {@link XPackLicenseState#update(License.OperationMode,
boolean, Version)}.
     */
    void licenseStateChanged();

}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.Action;
import org.elasticsearch.client.ElasticsearchClient;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;

public class PutLicenseAction extends Action<PutLicenseRequest, PutLicenseResponse,
PutLicenseRequestBuilder> {

    public static final PutLicenseAction INSTANCE = new PutLicenseAction();
    public static final String NAME = "cluster:admin/xpack/license/put";

    private PutLicenseAction() {
        super(NAME);
    }
```

```
  @Override
  public PutLicenseResponse newResponse() {
    return new PutLicenseResponse();
  }

  @Override
  public PutLicenseRequestBuilder newRequestBuilder(ElasticsearchClient client) {
    return new PutLicenseRequestBuilder(client, this);
  }
}
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*/
package org.elasticsearch.license;

import org.apache.logging.log4j.Logger;
import org.apache.logging.log4j.message.ParameterizedMessage;
import org.elasticsearch.Version;
import org.elasticsearch.action.ActionListener;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.common.Nullable;
import org.elasticsearch.xpack.core.XPackPlugin;

import java.time.Clock;
import java.util.Collections;
import java.util.Map;
import java.util.UUID;

public class StartTrialClusterTask extends ClusterStateUpdateTask {

  private static final String ACKNOWLEDGEMENT_HEADER = "This API initiates a free 30-day trial for all
platinum features. " +
      "By starting this trial, you agree that it is subject to the terms and conditions at" +
      " https://www.elastic.co/legal/trial_license/. To begin your free trial, call /start_trial again and specify " +
      "the \"acknowledge=true\" parameter.";

  private static final Map<String, String[]> ACK_MESSAGES = Collections.singletonMap("security",
      new String[] {"With a trial license, X-Pack security features are available, but are not enabled by default."});

  private final Logger logger;
  private final String clusterName;
  private final PostStartTrialRequest request;
  private final ActionListener<PostStartTrialResponse> listener;
```

```
  private final Clock clock;

  StartTrialClusterTask(Logger logger, String clusterName, Clock clock, PostStartTrialRequest request,
                        ActionListener<PostStartTrialResponse> listener) {
    this.logger = logger;
    this.clusterName = clusterName;
    this.request = request;
    this.listener = listener;
    this.clock = clock;
  }

  @Override
  public void clusterStateProcessed(String source, ClusterState oldState, ClusterState newState) {
    LicensesMetaData oldLicensesMetaData = oldState.metaData().custom(LicensesMetaData.TYPE);
    logger.debug("started self generated trial license: {}", oldLicensesMetaData);

    if (request.isAcknowledged() == false) {
      listener.onResponse(new
PostStartTrialResponse(PostStartTrialResponse.Status.NEED_ACKNOWLEDGEMENT,
          ACK_MESSAGES, ACKNOWLEDGEMENT_HEADER));
    } else if (oldLicensesMetaData == null || oldLicensesMetaData.isEligibleForTrial()) {
      listener.onResponse(new PostStartTrialResponse(PostStartTrialResponse.Status.UPGRADED_TO_TRIAL));
    } else {
      listener.onResponse(new
PostStartTrialResponse(PostStartTrialResponse.Status.TRIAL_ALREADY_ACTIVATED));
    }
  }

  @Override
  public ClusterState execute(ClusterState currentState) throws Exception {
    XPackPlugin.checkReadyForXPackCustomMetadata(currentState);
    LicensesMetaData currentLicensesMetaData = currentState.metaData().custom(LicensesMetaData.TYPE);

    if (request.isAcknowledged() == false) {
      return currentState;
    } else if (currentLicensesMetaData == null || currentLicensesMetaData.isEligibleForTrial()) {
      long issueDate = clock.millis();
      MetaData.Builder mdBuilder = MetaData.builder(currentState.metaData());
      long expiryDate = issueDate +
LicenseService.NON_BASIC_SELF_GENERATED_LICENSE_DURATION.getMillis();

      License.Builder specBuilder = License.builder()
          .uid(UUID.randomUUID().toString())
          .issuedTo(clusterName)
          .maxNodes(LicenseService.SELF_GENERATED_LICENSE_MAX_NODES)
          .issueDate(issueDate)
          .type(request.getType())
          .expiryDate(expiryDate);
```

```
            License selfGeneratedLicense = SelfGeneratedLicense.create(specBuilder, currentState.nodes());
            LicensesMetaData newLicensesMetaData = new LicensesMetaData(selfGeneratedLicense,
Version.CURRENT);
            mdBuilder.putCustom(LicensesMetaData.TYPE, newLicensesMetaData);
            return ClusterState.builder(currentState).metaData(mdBuilder).build();
        } else {
            return currentState;
        }
    }

    @Override
    public void onFailure(String source, @Nullable Exception e) {
        logger.error(new ParameterizedMessage("unexpected failure during [{}]", source), e);
        listener.onFailure(e);
    }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionRequestBuilder;
import org.elasticsearch.client.ElasticsearchClient;

class PostStartTrialRequestBuilder extends ActionRequestBuilder<PostStartTrialRequest,
        PostStartTrialResponse, PostStartTrialRequestBuilder> {

    PostStartTrialRequestBuilder(ElasticsearchClient client, PostStartTrialAction action) {
        super(client, action, new PostStartTrialRequest());
    }

    public PostStartTrialRequestBuilder setAcknowledge(boolean acknowledge) {
        request.acknowledge(acknowledge);
        return this;
    }
}
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* or more contributor license agreements. Licensed under the Elastic License;
* you may not use this file except in compliance with the Elastic License.
*/
package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchException;
import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.ActionFilters;
```

```
import org.elasticsearch.action.support.master.TransportMasterNodeReadAction;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.block.ClusterBlockException;
import org.elasticsearch.cluster.block.ClusterBlockLevel;
import org.elasticsearch.cluster.metadata.IndexNameExpressionResolver;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.inject.Inject;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.protocol.xpack.license.GetLicenseRequest;
import org.elasticsearch.threadpool.ThreadPool;
import org.elasticsearch.transport.TransportService;

public class TransportGetLicenseAction extends TransportMasterNodeReadAction<GetLicenseRequest,
GetLicenseResponse> {

  private final LicenseService licenseService;

  @Inject
  public TransportGetLicenseAction(Settings settings, TransportService transportService, ClusterService
clusterService,
                                   LicenseService licenseService, ThreadPool threadPool, ActionFilters actionFilters,
                                   IndexNameExpressionResolver indexNameExpressionResolver) {
    super(settings, GetLicenseAction.NAME, transportService, clusterService, threadPool, actionFilters,
indexNameExpressionResolver,
        GetLicenseRequest::new);
    this.licenseService = licenseService;
  }

  @Override
  protected String executor() {
    return ThreadPool.Names.MANAGEMENT;
  }

  @Override
  protected GetLicenseResponse newResponse() {
    return new GetLicenseResponse();
  }

  @Override
  protected ClusterBlockException checkBlock(GetLicenseRequest request, ClusterState state) {
    return state.blocks().globalBlockedException(ClusterBlockLevel.METADATA_READ);
  }

  @Override
  protected void masterOperation(final GetLicenseRequest request, ClusterState state,
                                 final ActionListener<GetLicenseResponse> listener) throws ElasticsearchException {
    listener.onResponse(new GetLicenseResponse(licenseService.getLicense()));
  }
```

```
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.Action;
import org.elasticsearch.client.ElasticsearchClient;

public class PostStartTrialAction extends Action<PostStartTrialRequest, PostStartTrialResponse,
PostStartTrialRequestBuilder> {

  public static final PostStartTrialAction INSTANCE = new PostStartTrialAction();
  public static final String NAME = "cluster:admin/xpack/license/start_trial";

  private PostStartTrialAction() {
     super(NAME);
  }

  @Override
  public PostStartTrialRequestBuilder newRequestBuilder(ElasticsearchClient client) {
     return new PostStartTrialRequestBuilder(client, this);
  }

  @Override
  public PostStartTrialResponse newResponse() {
     return new PostStartTrialResponse();
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.Action;
import org.elasticsearch.client.ElasticsearchClient;

public class PostStartBasicAction extends Action<PostStartBasicRequest, PostStartBasicResponse,
PostStartBasicRequestBuilder> {

  public static final PostStartBasicAction INSTANCE = new PostStartBasicAction();
  public static final String NAME = "cluster:admin/xpack/license/start_basic";

  private PostStartBasicAction() {
```

```
        super(NAME);
    }

    @Override
    public PostStartBasicRequestBuilder newRequestBuilder(ElasticsearchClient client) {
        return new PostStartBasicRequestBuilder(client, this);
    }

    @Override
    public PostStartBasicResponse newResponse() {
        return new PostStartBasicResponse();
    }
}
/*
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*/
package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchException;
import org.elasticsearch.Version;
import org.elasticsearch.action.ActionListener;
import org.elasticsearch.cluster.AckedClusterStateUpdateTask;
import org.elasticsearch.cluster.ClusterChangedEvent;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.ClusterStateListener;
import org.elasticsearch.cluster.ack.ClusterStateUpdateResponse;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.cluster.node.DiscoveryNode;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.component.AbstractLifecycleComponent;
import org.elasticsearch.common.component.Lifecycle;
import org.elasticsearch.common.joda.FormatDateTimeFormatter;
import org.elasticsearch.common.joda.Joda;
import org.elasticsearch.common.logging.LoggerMessageFormat;
import org.elasticsearch.common.settings.Setting;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.common.unit.TimeValue;
import org.elasticsearch.discovery.DiscoveryModule;
import org.elasticsearch.env.Environment;
import org.elasticsearch.gateway.GatewayService;
import org.elasticsearch.protocol.xpack.XPackInfoResponse;
import org.elasticsearch.protocol.xpack.license.DeleteLicenseRequest;
import org.elasticsearch.protocol.xpack.license.LicensesStatus;
import org.elasticsearch.protocol.xpack.license.PutLicenseResponse;
import org.elasticsearch.watcher.ResourceWatcherService;
import org.elasticsearch.xpack.core.XPackPlugin;
```

```
import org.elasticsearch.xpack.core.XPackSettings;
import org.elasticsearch.xpack.core.scheduler.SchedulerEngine;

import java.time.Clock;
import java.util.ArrayList;
import java.util.Arrays;
import java.util.Collections;
import java.util.HashMap;
import java.util.HashSet;
import java.util.List;
import java.util.Locale;
import java.util.Map;
import java.util.Set;
import java.util.concurrent.atomic.AtomicReference;

/**
* Service responsible for managing {@link LicensesMetaData}.
* <p>
* On the master node, the service handles updating the cluster state when a new license is registered.
* It also listens on all nodes for cluster state updates, and updates {@link XPackLicenseState} when
* the license changes are detected in the cluster state.
*/
public class LicenseService extends AbstractLifecycleComponent implements ClusterStateListener,
SchedulerEngine.Listener {

  public static final Setting<String> SELF_GENERATED_LICENSE_TYPE = new
Setting<>("xpack.license.self_generated.type",
        (s) -> "basic", (s) -> {
      if (SelfGeneratedLicense.validSelfGeneratedType(s)) {
        return s;
      } else {
        throw new IllegalArgumentException("Illegal self generated license type [" + s + "]. Must be trial or basic.");
      }
  }, Setting.Property.NodeScope);

  // pkg private for tests
  static final TimeValue NON_BASIC_SELF_GENERATED_LICENSE_DURATION =
TimeValue.timeValueHours(30 * 24);

  static final Set<String> VALID_TRIAL_TYPES = new HashSet<>(Arrays.asList("trial", "platinum", "gold"));

  /**
   * Duration of grace period after a license has expired
   */
  static final TimeValue GRACE_PERIOD_DURATION = days(7);

  public static final long BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS =
        XPackInfoResponse.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS;
```

```
  private final ClusterService clusterService;

  /**
   * The xpack feature state to update when license changes are made.
   */
  private final XPackLicenseState licenseState;

  /**
   * Currently active license
   */
  private final AtomicReference<License> currentLicense = new AtomicReference<>();
  private SchedulerEngine scheduler;
  private final Clock clock;

  /**
   * File watcher for operation mode changes
   */
  private final OperationModeFileWatcher operationModeFileWatcher;

  /**
   * Callbacks to notify relative to license expiry
   */
  private List<ExpirationCallback> expirationCallbacks = new ArrayList<>();

  /**
   * Max number of nodes licensed by generated trial license
   */
  static final int SELF_GENERATED_LICENSE_MAX_NODES = 1000;

  public static final String LICENSE_JOB = "licenseJob";

  private static final FormatDateTimeFormatter DATE_FORMATTER = Joda.forPattern("EEEE, MMMMM dd,
yyyy", Locale.ROOT);

  private static final String ACKNOWLEDGEMENT_HEADER = "This license update requires acknowledgement.
To acknowledge the license, " +
        "please read the following messages and update the license again, this time with the \"acknowledge=true\"
parameter:";

  public LicenseService(Settings settings, ClusterService clusterService, Clock clock, Environment env,
                        ResourceWatcherService resourceWatcherService, XPackLicenseState licenseState) {
    super(settings);
    this.clusterService = clusterService;
    this.clock = clock;
    this.scheduler = new SchedulerEngine(settings, clock);
    this.licenseState = licenseState;
    this.operationModeFileWatcher = new OperationModeFileWatcher(resourceWatcherService,
```

```
            XPackPlugin.resolveConfigFile(env, "license_mode"), logger,
            () -> updateLicenseState(getLicensesMetaData()));
        this.scheduler.register(this);
        populateExpirationCallbacks();
    }

    private void logExpirationWarning(long expirationMillis, boolean expired) {
        String expiredMsg = expired ? "expired" : "will expire";
        String general = LoggerMessageFormat.format(null, "License [{}] on [{}].\n" +
                "# If you have a new license, please update it. Otherwise, please reach out to\n" +
                "# your support contact.\n" +
                "# ", expiredMsg, DATE_FORMATTER.printer().print(expirationMillis));
        if (expired) {
            general = general.toUpperCase(Locale.ROOT);
        }
        StringBuilder builder = new StringBuilder(general);
        builder.append(System.lineSeparator());
        if (expired) {
            builder.append("# COMMERCIAL PLUGINS OPERATING WITH REDUCED FUNCTIONALITY");
        } else {
            builder.append("# Commercial plugins operate with reduced functionality on license expiration:");
        }
        XPackLicenseState.EXPIRATION_MESSAGES.forEach((feature, messages) -> {
            if (messages.length > 0) {
                builder.append(System.lineSeparator());
                builder.append("# - ");
                builder.append(feature);
                for (String message : messages) {
                    builder.append(System.lineSeparator());
                    builder.append("#  - ");
                    builder.append(message);
                }
            }
        });
        logger.warn("{}", builder);
    }

    private void populateExpirationCallbacks() {
        expirationCallbacks.add(new ExpirationCallback.Pre(days(7), days(25), days(1)) {
            @Override
            public void on(License license) {
                logExpirationWarning(license.expiryDate(), false);
            }
        });
        expirationCallbacks.add(new ExpirationCallback.Pre(days(0), days(7), TimeValue.timeValueMinutes(10)) {
            @Override
            public void on(License license) {
                logExpirationWarning(license.expiryDate(), false);
```

```
            }
        });
        expirationCallbacks.add(new ExpirationCallback.Post(days(0), null, TimeValue.timeValueMinutes(10)) {
            @Override
            public void on(License license) {
                // logged when grace period begins
                logExpirationWarning(license.expiryDate(), true);
            }
        });
    }

    /**
     * Registers new license in the cluster
     * Master only operation. Installs a new license on the master provided it is VALID
     */
    public void registerLicense(final PutLicenseRequest request, final ActionListener<PutLicenseResponse> listener)
{
        final License newLicense = request.license();
        final long now = clock.millis();
        if (!LicenseVerifier.verifyLicense(newLicense) || newLicense.issueDate() > now || newLicense.startDate() >
now) {
            listener.onResponse(new PutLicenseResponse(true, LicensesStatus.INVALID));
        } else if (newLicense.type().equals("basic")) {
            listener.onFailure(new IllegalArgumentException("Registering basic licenses is not allowed."));
        } else if (newLicense.expiryDate() < now) {
            listener.onResponse(new PutLicenseResponse(true, LicensesStatus.EXPIRED));
        } else {
            if (!request.acknowledged()) {
                // TODO: ack messages should be generated on the master, since another node's cluster state may be
behind...
                final License currentLicense = getLicense();
                if (currentLicense != null) {
                    Map<String, String[]> acknowledgeMessages = getAckMessages(newLicense, currentLicense);
                    if (acknowledgeMessages.isEmpty() == false) {
                        // needs acknowledgement
                        listener.onResponse(new PutLicenseResponse(false, LicensesStatus.VALID,
ACKNOWLEDGEMENT_HEADER,
                                acknowledgeMessages));
                        return;
                    }
                }
            }

            if (XPackSettings.SECURITY_ENABLED.get(settings)) {
                // TODO we should really validate that all nodes have xpack installed and are consistently configured but
this
                // should happen on a different level and not in this code
                if (newLicense.isProductionLicense()
```

```
                && XPackSettings.TRANSPORT_SSL_ENABLED.get(settings) == false
                && isProductionMode(settings, clusterService.localNode())) {
                // security is on but TLS is not configured we gonna fail the entire request and throw an exception
                throw new IllegalStateException("Cannot install a [" + newLicense.operationMode() +
                   "] license unless TLS is configured or security is disabled");
            } else if (XPackSettings.FIPS_MODE_ENABLED.get(settings)
                && newLicense.operationMode() != License.OperationMode.PLATINUM
                && newLicense.operationMode() != License.OperationMode.TRIAL) {
                throw new IllegalStateException("Cannot install a [" + newLicense.operationMode() +
                   "] license unless FIPS mode is disabled");
            }
        }

        clusterService.submitStateUpdateTask("register license [" + newLicense.uid() + "]", new
                AckedClusterStateUpdateTask<PutLicenseResponse>(request, listener) {
                   @Override
                   protected PutLicenseResponse newResponse(boolean acknowledged) {
                      return new PutLicenseResponse(acknowledged, LicensesStatus.VALID);
                   }

                   @Override
                   public ClusterState execute(ClusterState currentState) throws Exception {
                      XPackPlugin.checkReadyForXPackCustomMetadata(currentState);
                      MetaData currentMetadata = currentState.metaData();
                      LicensesMetaData licensesMetaData = currentMetadata.custom(LicensesMetaData.TYPE);
                      Version trialVersion = null;
                      if (licensesMetaData != null) {
                         trialVersion = licensesMetaData.getMostRecentTrialVersion();
                      }
                      MetaData.Builder mdBuilder = MetaData.builder(currentMetadata);
                      mdBuilder.putCustom(LicensesMetaData.TYPE, new LicensesMetaData(newLicense,
trialVersion));
                      return ClusterState.builder(currentState).metaData(mdBuilder).build();
                   }
                });
    }
  }

  public static Map<String, String[]> getAckMessages(License newLicense, License currentLicense) {
    Map<String, String[]> acknowledgeMessages = new HashMap<>();
    if (!License.isAutoGeneratedLicense(currentLicense.signature()) // current license is not auto-generated
          && currentLicense.issueDate() > newLicense.issueDate()) { // and has a later issue date
       acknowledgeMessages.put("license", new String[]{
             "The new license is older than the currently installed license. " +
                "Are you sure you want to override the current license?"});
    }
    XPackLicenseState.ACKNOWLEDGMENT_MESSAGES.forEach((feature, ackMessages) -> {
       String[] messages = ackMessages.apply(currentLicense.operationMode(), newLicense.operationMode());
```

```
            if (messages.length > 0) {
                acknowledgeMessages.put(feature, messages);
            }
        });
        return acknowledgeMessages;
    }


    private static TimeValue days(int days) {
        return TimeValue.timeValueHours(days * 24);
    }

    @Override
    public void triggered(SchedulerEngine.Event event) {
        final LicensesMetaData licensesMetaData = getLicensesMetaData();
        if (licensesMetaData != null) {
            final License license = licensesMetaData.getLicense();
            if (event.getJobName().equals(LICENSE_JOB)) {
                updateLicenseState(license, licensesMetaData.getMostRecentTrialVersion());
            } else if (event.getJobName().startsWith(ExpirationCallback.EXPIRATION_JOB_PREFIX)) {
                expirationCallbacks.stream()
                        .filter(expirationCallback -> expirationCallback.getId().equals(event.getJobName()))
                        .forEach(expirationCallback -> expirationCallback.on(license));
            }
        }
    }

    /**
     * Remove license from the cluster state metadata
     */
    public void removeLicense(final DeleteLicenseRequest request, final
ActionListener<ClusterStateUpdateResponse> listener) {
        clusterService.submitStateUpdateTask("delete license",
                new AckedClusterStateUpdateTask<ClusterStateUpdateResponse>(request, listener) {
                    @Override
                    protected ClusterStateUpdateResponse newResponse(boolean acknowledged) {
                        return new ClusterStateUpdateResponse(acknowledged);
                    }

                    @Override
                    public ClusterState execute(ClusterState currentState) throws Exception {
                        MetaData metaData = currentState.metaData();
                        final LicensesMetaData currentLicenses = metaData.custom(LicensesMetaData.TYPE);
                        if (currentLicenses.getLicense() != LicensesMetaData.LICENSE_TOMBSTONE) {
                            MetaData.Builder mdBuilder = MetaData.builder(currentState.metaData());
                            LicensesMetaData newMetadata = new
LicensesMetaData(LicensesMetaData.LICENSE_TOMBSTONE,
                                    currentLicenses.getMostRecentTrialVersion());
```

```
                    mdBuilder.putCustom(LicensesMetaData.TYPE, newMetadata);
                    return ClusterState.builder(currentState).metaData(mdBuilder).build();
                } else {
                    return currentState;
                }
            }
        });
    }

    public License getLicense() {
        final License license = getLicense(clusterService.state().metaData());
        return license == LicensesMetaData.LICENSE_TOMBSTONE ? null : license;
    }

    private LicensesMetaData getLicensesMetaData() {
        return this.clusterService.state().metaData().custom(LicensesMetaData.TYPE);
    }

    void startTrialLicense(PostStartTrialRequest request, final ActionListener<PostStartTrialResponse> listener) {
        if (VALID_TRIAL_TYPES.contains(request.getType()) == false) {
            throw new IllegalArgumentException("Cannot start trial of type [" + request.getType() + "]. Valid trial types
are "
                    + VALID_TRIAL_TYPES + ".");
        }
        StartTrialClusterTask task = new StartTrialClusterTask(logger, clusterService.getClusterName().value(), clock,
request, listener);
        clusterService.submitStateUpdateTask("started trial license", task);
    }

    void startBasicLicense(PostStartBasicRequest request, final ActionListener<PostStartBasicResponse> listener) {
        StartBasicClusterTask task = new StartBasicClusterTask(logger, clusterService.getClusterName().value(),
clock, request, listener);
        clusterService.submitStateUpdateTask("start basic license", task);
    }

    /**
     * Master-only operation to generate a one-time global self generated license.
     * The self generated license is only generated and stored if the current cluster state metadata
     * has no existing license. If the cluster currently has a basic license that has an expiration date,
     * a new basic license with no expiration date is generated.
     */
    private void registerOrUpdateSelfGeneratedLicense() {
        clusterService.submitStateUpdateTask("maybe generate license for cluster",
                new StartupSelfGeneratedLicenseTask(settings, clock, clusterService));
    }

    @Override
    protected void doStart() throws ElasticsearchException {
```

```
        clusterService.addListener(this);
        scheduler.start(Collections.emptyList());
        logger.debug("initializing license state");
        if (clusterService.lifecycleState() == Lifecycle.State.STARTED) {
            final ClusterState clusterState = clusterService.state();
            if (clusterState.blocks().hasGlobalBlock(GatewayService.STATE_NOT_RECOVERED_BLOCK) == false
&&
                    clusterState.nodes().getMasterNode() != null &&
XPackPlugin.isReadyForXPackCustomMetadata(clusterState)) {
                final LicensesMetaData currentMetaData = clusterState.metaData().custom(LicensesMetaData.TYPE);
                boolean noLicense = currentMetaData == null || currentMetaData.getLicense() == null;
                if (clusterState.getNodes().isLocalNodeElectedMaster() &&
                        (noLicense || LicenseUtils.licenseNeedsExtended(currentMetaData.getLicense()))) {
                    // triggers a cluster changed event eventually notifying the current licensee
                    registerOrUpdateSelfGeneratedLicense();
                }
            }
        }
    }

    @Override
    protected void doStop() throws ElasticsearchException {
        clusterService.removeListener(this);
        scheduler.stop();
        // clear current license
        currentLicense.set(null);
    }

    @Override
    protected void doClose() throws ElasticsearchException {
    }

    /**
     * When there is no global block on {@link
org.elasticsearch.gateway.GatewayService#STATE_NOT_RECOVERED_BLOCK}
     * notify licensees and issue auto-generated license if no license has been installed/issued yet.
     */
    @Override
    public void clusterChanged(ClusterChangedEvent event) {
        final ClusterState previousClusterState = event.previousState();
        final ClusterState currentClusterState = event.state();
        if (!currentClusterState.blocks().hasGlobalBlock(GatewayService.STATE_NOT_RECOVERED_BLOCK)) {
            if (XPackPlugin.isReadyForXPackCustomMetadata(currentClusterState) == false) {
                logger.debug("cannot add license to cluster as the following nodes might not understand the license
metadata: {}",
                        () -> XPackPlugin.nodesNotReadyForXPackCustomMetadata(currentClusterState));
                return;
            }
```

```
        final LicensesMetaData prevLicensesMetaData =
previousClusterState.getMetaData().custom(LicensesMetaData.TYPE);
        final LicensesMetaData currentLicensesMetaData =
currentClusterState.getMetaData().custom(LicensesMetaData.TYPE);
        if (logger.isDebugEnabled()) {
            logger.debug("previous [{}]", prevLicensesMetaData);
            logger.debug("current [{}]", currentLicensesMetaData);
        }
        // notify all interested plugins
        if (previousClusterState.blocks().hasGlobalBlock(GatewayService.STATE_NOT_RECOVERED_BLOCK)
                || prevLicensesMetaData == null) {
            if (currentLicensesMetaData != null) {
                onUpdate(currentLicensesMetaData);
            }
        } else if (!prevLicensesMetaData.equals(currentLicensesMetaData)) {
            onUpdate(currentLicensesMetaData);
        }

        License currentLicense = null;
        boolean noLicenseInPrevMetadata = prevLicensesMetaData == null || prevLicensesMetaData.getLicense()
== null;
        if (noLicenseInPrevMetadata == false) {
            currentLicense = prevLicensesMetaData.getLicense();
        }
        boolean noLicenseInCurrentMetadata = (currentLicensesMetaData == null ||
currentLicensesMetaData.getLicense() == null);
        if (noLicenseInCurrentMetadata == false) {
            currentLicense = currentLicensesMetaData.getLicense();
        }

        boolean noLicense = noLicenseInPrevMetadata && noLicenseInCurrentMetadata;
        // auto-generate license if no licenses ever existed or if the current license is basic and
        // needs extended or if the license signature needs to be updated. this will trigger a subsequent cluster changed
event
        if (currentClusterState.getNodes().isLocalNodeElectedMaster() &&
                (noLicense || LicenseUtils.licenseNeedsExtended(currentLicense) ||
                    LicenseUtils.signatureNeedsUpdate(currentLicense, currentClusterState.nodes()))) {
            registerOrUpdateSelfGeneratedLicense();
        }
    } else if (logger.isDebugEnabled()) {
        logger.debug("skipped license notifications reason: [{}]",
GatewayService.STATE_NOT_RECOVERED_BLOCK);
    }
  }

  private void updateLicenseState(LicensesMetaData licensesMetaData) {
    if (licensesMetaData != null) {
```

```
            updateLicenseState(getLicense(licensesMetaData), licensesMetaData.getMostRecentTrialVersion());
        }
    }

    protected void updateLicenseState(final License license, Version mostRecentTrialVersion) {
        if (license == LicensesMetaData.LICENSE_TOMBSTONE) {
            // implies license has been explicitly deleted
            licenseState.update(License.OperationMode.MISSING, false, mostRecentTrialVersion);
            return;
        }
        if (license != null) {
            long time = clock.millis();
            boolean active;
            if (license.expiryDate() == BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS) {
                active = true;
            } else {
                // We subtract the grace period from the current time to avoid overflowing on an expiration
                // date that is near Long.MAX_VALUE
                active = time >= license.issueDate() && time - GRACE_PERIOD_DURATION.getMillis() <
license.expiryDate();
            }
            licenseState.update(license.operationMode(), active, mostRecentTrialVersion);

            if (active) {
                if (time < license.expiryDate()) {
                    logger.debug("license [{}] - valid", license.uid());
                } else {
                    logger.warn("license [{}] - grace", license.uid());
                }
            } else {
                logger.warn("license [{}] - expired", license.uid());
            }
        }
    }

    /**
     * Notifies registered licensees of license state change and/or new active license
     * based on the license in <code>currentLicensesMetaData</code>.
     * Additionally schedules license expiry notifications and event callbacks
     * relative to the current license's expiry
     */
    private void onUpdate(final LicensesMetaData currentLicensesMetaData) {
        final License license = getLicense(currentLicensesMetaData);
        // license can be null if the trial license is yet to be auto-generated
        // in this case, it is a no-op
        if (license != null) {
            final License previousLicense = currentLicense.get();
            if (license.equals(previousLicense) == false) {
```

```
            currentLicense.set(license);
            license.setOperationModeFileWatcher(operationModeFileWatcher);
            scheduler.add(new SchedulerEngine.Job(LICENSE_JOB, nextLicenseCheck(license)));
            for (ExpirationCallback expirationCallback : expirationCallbacks) {
                scheduler.add(new SchedulerEngine.Job(expirationCallback.getId(),
                        (startTime, now) ->
                                expirationCallback.nextScheduledTimeForExpiry(license.expiryDate(), startTime, now)));
            }
            if (previousLicense != null) {
                // remove operationModeFileWatcher to gc the old license object
                previousLicense.removeOperationModeFileWatcher();
            }
            logger.info("license [{}] mode [{}] - valid", license.uid(),
                    license.operationMode().name().toLowerCase(Locale.ROOT));
        }
        updateLicenseState(license, currentLicensesMetaData.getMostRecentTrialVersion());
    }
}

// pkg private for tests
static SchedulerEngine.Schedule nextLicenseCheck(License license) {
    return (startTime, time) -> {
        if (time < license.issueDate()) {
            // when we encounter a license with a future issue date
            // which can happen with autogenerated license,
            // we want to schedule a notification on the license issue date
            // so the license is notificed once it is valid
            // see https://github.com/elastic/x-plugins/issues/983
            return license.issueDate();
        } else if (time < license.expiryDate()) {
            return license.expiryDate();
        } else if (time < license.expiryDate() + GRACE_PERIOD_DURATION.getMillis()) {
            return license.expiryDate() + GRACE_PERIOD_DURATION.getMillis();
        }
        return -1; // license is expired, no need to check again
    };
}

public static License getLicense(final MetaData metaData) {
    final LicensesMetaData licensesMetaData = metaData.custom(LicensesMetaData.TYPE);
    return getLicense(licensesMetaData);
}

static License getLicense(final LicensesMetaData metaData) {
    if (metaData != null) {
        License license = metaData.getLicense();
        if (license == LicensesMetaData.LICENSE_TOMBSTONE) {
            return license;
```

```
        } else if (license != null) {
            boolean autoGeneratedLicense = License.isAutoGeneratedLicense(license.signature());
            if ((autoGeneratedLicense && SelfGeneratedLicense.verify(license))
                    || (!autoGeneratedLicense && LicenseVerifier.verifyLicense(license))) {
                return license;
            }
        }
    }
    return null;
  }

  private static boolean isProductionMode(Settings settings, DiscoveryNode localNode) {
    final boolean singleNodeDisco = "single-
node".equals(DiscoveryModule.DISCOVERY_TYPE_SETTING.get(settings));
    return singleNodeDisco == false && isBoundToLoopback(localNode) == false;
  }

  private static boolean isBoundToLoopback(DiscoveryNode localNode) {
    return localNode.getAddress().address().getAddress().isLoopbackAddress();
  }
}
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*/
package org.elasticsearch.license;

import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.ActionFilters;
import org.elasticsearch.action.support.master.TransportMasterNodeReadAction;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.block.ClusterBlockException;
import org.elasticsearch.cluster.block.ClusterBlockLevel;
import org.elasticsearch.cluster.metadata.IndexNameExpressionResolver;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.inject.Inject;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.threadpool.ThreadPool;
import org.elasticsearch.transport.TransportService;

public class TransportGetTrialStatusAction extends TransportMasterNodeReadAction<GetTrialStatusRequest,
GetTrialStatusResponse> {

  @Inject
  public TransportGetTrialStatusAction(Settings settings, TransportService transportService, ClusterService
clusterService,
                                       ThreadPool threadPool, ActionFilters actionFilters,
```

```
                                IndexNameExpressionResolver indexNameExpressionResolver) {
        super(settings, GetTrialStatusAction.NAME, transportService, clusterService, threadPool, actionFilters,
                indexNameExpressionResolver, GetTrialStatusRequest::new);
    }

    @Override
    protected String executor() {
        return ThreadPool.Names.SAME;
    }

    @Override
    protected GetTrialStatusResponse newResponse() {
        return new GetTrialStatusResponse();
    }

    @Override
    protected void masterOperation(GetTrialStatusRequest request, ClusterState state,
                                   ActionListener<GetTrialStatusResponse> listener) throws Exception {
        LicensesMetaData licensesMetaData = state.metaData().custom(LicensesMetaData.TYPE);
        listener.onResponse(new GetTrialStatusResponse(licensesMetaData == null ||
licensesMetaData.isEligibleForTrial()));

    }

    @Override
    protected ClusterBlockException checkBlock(GetTrialStatusRequest request, ClusterState state) {
        return state.blocks().globalBlockedException(ClusterBlockLevel.METADATA_READ);
    }
}
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*/
package org.elasticsearch.license;

import org.apache.logging.log4j.Logger;
import org.apache.logging.log4j.message.ParameterizedMessage;
import org.elasticsearch.Version;
import org.elasticsearch.action.ActionListener;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.ClusterStateUpdateTask;
import org.elasticsearch.cluster.metadata.MetaData;
import org.elasticsearch.common.Nullable;
import org.elasticsearch.xpack.core.XPackPlugin;

import java.time.Clock;
import java.util.Collections;
```

```
import java.util.Map;
import java.util.UUID;
import java.util.concurrent.atomic.AtomicReference;

public class StartBasicClusterTask extends ClusterStateUpdateTask {

  private static final String ACKNOWLEDGEMENT_HEADER = "This license update requires acknowledgement.
To acknowledge the license, " +
        "please read the following messages and call /start_basic again, this time with the \"acknowledge=true\"
parameter:";

  private final Logger logger;
  private final String clusterName;
  private final PostStartBasicRequest request;
  private final ActionListener<PostStartBasicResponse> listener;
  private final Clock clock;
  private AtomicReference<Map<String, String[]>> ackMessages = new
AtomicReference<>(Collections.emptyMap());

  StartBasicClusterTask(Logger logger, String clusterName, Clock clock, PostStartBasicRequest request,
                ActionListener<PostStartBasicResponse> listener) {
    this.logger = logger;
    this.clusterName = clusterName;
    this.request = request;
    this.listener = listener;
    this.clock = clock;
  }

  @Override
  public void clusterStateProcessed(String source, ClusterState oldState, ClusterState newState) {
    LicensesMetaData oldLicensesMetaData = oldState.metaData().custom(LicensesMetaData.TYPE);
    logger.debug("license prior to starting basic license: {}", oldLicensesMetaData);
    License oldLicense = LicensesMetaData.extractLicense(oldLicensesMetaData);
    Map<String, String[]> acknowledgeMessages = ackMessages.get();
    if (acknowledgeMessages.isEmpty() == false) {
      listener.onResponse(new
PostStartBasicResponse(PostStartBasicResponse.Status.NEED_ACKNOWLEDGEMENT, acknowledgeMessages,
          ACKNOWLEDGEMENT_HEADER));
    } else if (oldLicense != null && oldLicense.type().equals("basic")) {
      listener.onResponse(new
PostStartBasicResponse(PostStartBasicResponse.Status.ALREADY_USING_BASIC));
    } else {
      listener.onResponse(new PostStartBasicResponse(PostStartBasicResponse.Status.GENERATED_BASIC));
    }
  }

  @Override
  public ClusterState execute(ClusterState currentState) throws Exception {
```

```
        XPackPlugin.checkReadyForXPackCustomMetadata(currentState);
        LicensesMetaData licensesMetaData = currentState.metaData().custom(LicensesMetaData.TYPE);
        License currentLicense = LicensesMetaData.extractLicense(licensesMetaData);
        if (currentLicense == null || currentLicense.type().equals("basic") == false) {
            long issueDate = clock.millis();
            MetaData.Builder mdBuilder = MetaData.builder(currentState.metaData());
            License.Builder specBuilder = License.builder()
                    .uid(UUID.randomUUID().toString())
                    .issuedTo(clusterName)
                    .maxNodes(LicenseService.SELF_GENERATED_LICENSE_MAX_NODES)
                    .issueDate(issueDate)
                    .type("basic")
                    .expiryDate(LicenseService.BASIC_SELF_GENERATED_LICENSE_EXPIRATION_MILLIS);
            License selfGeneratedLicense = SelfGeneratedLicense.create(specBuilder, currentState.nodes());
            if (request.isAcknowledged() == false && currentLicense != null) {
                Map<String, String[]> ackMessages = LicenseService.getAckMessages(selfGeneratedLicense,
currentLicense);
                if (ackMessages.isEmpty() == false) {
                    this.ackMessages.set(ackMessages);
                    return currentState;
                }
            }
            Version trialVersion = null;
            if (licensesMetaData != null) {
                trialVersion = licensesMetaData.getMostRecentTrialVersion();
            }
            LicensesMetaData newLicensesMetaData = new LicensesMetaData(selfGeneratedLicense, trialVersion);
            mdBuilder.putCustom(LicensesMetaData.TYPE, newLicensesMetaData);
            return ClusterState.builder(currentState).metaData(mdBuilder).build();
        } else {
            return currentState;
        }
    }

    @Override
    public void onFailure(String source, @Nullable Exception e) {
        logger.error(new ParameterizedMessage("unexpected failure during [{}]", source), e);
        listener.onFailure(e);
    }
}
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package org.elasticsearch.license;

import org.elasticsearch.common.settings.Settings;
```

```
import org.elasticsearch.common.xcontent.ToXContent;
import org.elasticsearch.common.xcontent.XContentBuilder;
import org.elasticsearch.rest.BytesRestResponse;
import org.elasticsearch.rest.RestController;
import org.elasticsearch.rest.RestRequest;
import org.elasticsearch.rest.RestResponse;
import org.elasticsearch.rest.action.RestBuilderListener;
import org.elasticsearch.xpack.core.XPackClient;
import org.elasticsearch.xpack.core.rest.XPackRestHandler;

import java.io.IOException;

import static org.elasticsearch.rest.RestRequest.Method.POST;

public class RestPostStartBasicLicense extends XPackRestHandler {

  RestPostStartBasicLicense(Settings settings, RestController controller) {
    super(settings);
    controller.registerHandler(POST, URI_BASE + "/license/start_basic", this);
  }

  @Override
  protected RestChannelConsumer doPrepareRequest(RestRequest request, XPackClient client) throws IOException
{
    PostStartBasicRequest startBasicRequest = new PostStartBasicRequest();
    startBasicRequest.acknowledge(request.paramAsBoolean("acknowledge", false));
    startBasicRequest.timeout(request.paramAsTime("timeout", startBasicRequest.timeout()));
    startBasicRequest.masterNodeTimeout(request.paramAsTime("master_timeout",
startBasicRequest.masterNodeTimeout()));
    return channel -> client.licensing().postStartBasic(startBasicRequest, new
RestBuilderListener<PostStartBasicResponse>(channel) {
      @Override
      public RestResponse buildResponse(PostStartBasicResponse response, XContentBuilder builder) throws
Exception {
        PostStartBasicResponse.Status status = response.getStatus();
        response.toXContent(builder, ToXContent.EMPTY_PARAMS);
        return new BytesRestResponse(status.getRestStatus(), builder);
      }
    });
  }

  @Override
  public String getName() {
    return "xpack_start_basic_action";
  }
}
/*
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```

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*/
package org.elasticsearch.license;

import org.elasticsearch.ElasticsearchException;
import org.elasticsearch.action.ActionListener;
import org.elasticsearch.action.support.ActionFilters;
import org.elasticsearch.action.support.master.AcknowledgedResponse;
import org.elasticsearch.action.support.master.TransportMasterNodeAction;
import org.elasticsearch.cluster.ClusterState;
import org.elasticsearch.cluster.ack.ClusterStateUpdateResponse;
import org.elasticsearch.cluster.block.ClusterBlockException;
import org.elasticsearch.cluster.block.ClusterBlockLevel;
import org.elasticsearch.cluster.metadata.IndexNameExpressionResolver;
import org.elasticsearch.cluster.service.ClusterService;
import org.elasticsearch.common.inject.Inject;
import org.elasticsearch.common.settings.Settings;
import org.elasticsearch.protocol.xpack.license.DeleteLicenseRequest;
import org.elasticsearch.threadpool.ThreadPool;
import org.elasticsearch.transport.TransportService;

public class TransportDeleteLicenseAction extends TransportMasterNodeAction<DeleteLicenseRequest,
AcknowledgedResponse> {

  private final LicenseService licenseService;

  @Inject
  public TransportDeleteLicenseAction(Settings settings, TransportService transportService, ClusterService
clusterService,
                                      LicenseService licenseService, ThreadPool threadPool, ActionFilters actionFilters,
                                      IndexNameExpressionResolver indexNameExpressionResolver) {
    super(settings, DeleteLicenseAction.NAME, transportService, clusterService, threadPool, actionFilters,
        indexNameExpressionResolver, DeleteLicenseRequest::new);
    this.licenseService = licenseService;
  }

  @Override
  protected String executor() {
    return ThreadPool.Names.MANAGEMENT;
  }

  @Override
  protected AcknowledgedResponse newResponse() {
    return new AcknowledgedResponse();
  }

  @Override
```

```
  protected ClusterBlockException checkBlock(DeleteLicenseRequest request, ClusterState state) {
    return state.blocks().globalBlockedException(ClusterBlockLevel.METADATA_WRITE);
  }

  @Override
  protected void masterOperation(final DeleteLicenseRequest request, ClusterState state, final
ActionListener<AcknowledgedResponse>
      listener) throws ElasticsearchException {
    licenseService.removeLicense(request, new ActionListener<ClusterStateUpdateResponse>() {
      @Override
      public void onResponse(ClusterStateUpdateResponse clusterStateUpdateResponse) {
        listener.onResponse(new AcknowledgedResponse(clusterStateUpdateResponse.isAcknowledged()));
      }

      @Override
      public void onFailure(Exception e) {
        listener.onFailure(e);
      }
    });
  }
}
```

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Alan Beale <biljir@pobox.com> also deserves special credit as he has,
in addition to providing the 12Dicts package and being a major
contributor to the ENABLE word list, given me an incredible amount of
feedback and created a number of special lists (those found in the

Supplement) in order to help improve the overall quality of SCOWL.

The 10 level includes the 1000 most common English words (according to the Moby (TM) Words II [MWords] package), a subset of the 1000 most common words on the Internet (again, according to Moby Words II), and frequently class 16 from Brian Kelk's "UK English Wordlist with Frequency Classification".

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> Date: Sat, 08 Jul 2000 20:27:21 +0100
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>
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>
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> Date: Tue, 11 Jul 2000 19:31:34 +0100
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The 50 level includes Brian's frequency class 1, words words appearing in at least 5 of 12 of the dictionaries as indicated in the 12Dicts package, and uppercase words in at least 4 of the previous 12 dictionaries. A decent number of proper names is also included: The top 1000 male, female, and Last names from the 1990 Census report; a list of names sent to me by Alan Beale; and a few names that I added myself. Finally a small list of abbreviations not commonly found in other word lists is included.

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The 80 level includes the ENABLE word list, all the lists in the ENABLE supplement package (except for ABLE), the "UK Advanced Cryptics Dictionary" (UKACD), the list of signature words in from YAWL package, and the 10,196 places list from the MWords package.

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1.85 error_prone_annotations 2.1.3

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1.92 feign-slf4j 10.2.3

1.93 freemarker 2.3.28

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src/manual/en_US/docgen-originals/figures/overview.odg
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src/manual/en_US/docgen-originals/figures/tree_with_alpha.png
src/manual/en_US/favicon.png
src/manual/en_US/figures/model2sketch.png
src/manual/en_US/figures/overview.png
src/manual/en_US/figures/tree.png
src/manual/en_US/logo.png
src/manual/zh_CN/favicon.png
src/manual/zh_CN/figures/model2sketch.png
src/manual/zh_CN/figures/overview.png
src/manual/zh_CN/figures/tree.png
src/manual/zh_CN/logo.png

1.94 ganymed-ssh2 262

1.94.1 Available under license :

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1.95 google-protobuf 3.4.0

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  * Fix compiler to not make output executable.
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  * gzip/zlib I/O support.
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  * Fixed warnings about generated constructors not explicitly initializing
    all fields (only present with certain compiler settings).
  * Added generation of field number constants.
Wink Saville <wink@google.com>
  * Fixed initialization ordering problem in logging code.
Will Pierce <willp@nuclei.com>
  * Small patch improving performance of in Python serialization.
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  * Emacs mode for Protocol Buffers (editors/protobuf-mode.el).
Scott Stafford <scott.stafford@gmail.com>
  * Added Swap(), SwapElements(), and RemoveLast() to Reflection interface.
Alexander Melnikov <alm@sibmail.ru>
  * HPUX support.
Oliver Jowett <oliver.jowett@gmail.com>
  * Detect whether zlib is new enough in configure script.
  * Fixes for Solaris 10 32/64-bit confusion.
Evan Jones <evanj@mit.edu>
  * Optimize Java serialization code when writing a small message to a stream.
  * Optimize Java serialization of strings so that UTF-8 encoding happens only
    once per string per serialization call.
  * Clean up some Java warnings.
  * Fix bug with permanent callbacks that delete themselves when run.
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Kacper Kowalik <xarthisius.kk@gmail.com>
  * Fixed m4/acx_pthread.m4 problem for some Linux distributions.
William Orr <will@worrbase.com>
  * Fixed detection of sched_yield on Solaris.
  * Added atomicops for Solaris
Andrew Paprocki <andrew@ishiboo.com>
  * Fixed minor IBM xlC compiler build issues
  * Added atomicops for AIX (POWER)

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1.96 gson 2.8.5

1.97 guava 25.1

1.98 HdrHistogram 2.1.9

1.98.1 Available under license :

```
<!DOCTYPE html>
<html lang="en">
<head>
 <meta charset="utf-8">
 <meta http-equiv="X-UA-Compatible" content="IE=edge">
 <meta name="viewport" content="width=device-width, initial-scale=1">
 <meta name="description" content="Home page of The Apache Software Foundation">

 <link rel="apple-touch-icon" sizes="57x57" href="/favicons/apple-touch-icon-57x57.png">
 <link rel="apple-touch-icon" sizes="60x60" href="/favicons/apple-touch-icon-60x60.png">
 <link rel="apple-touch-icon" sizes="72x72" href="/favicons/apple-touch-icon-72x72.png">
 <link rel="apple-touch-icon" sizes="76x76" href="/favicons/apple-touch-icon-76x76.png">
 <link rel="apple-touch-icon" sizes="114x114" href="/favicons/apple-touch-icon-114x114.png">
 <link rel="apple-touch-icon" sizes="120x120" href="/favicons/apple-touch-icon-120x120.png">
 <link rel="apple-touch-icon" sizes="144x144" href="/favicons/apple-touch-icon-144x144.png">
 <link rel="apple-touch-icon" sizes="152x152" href="/favicons/apple-touch-icon-152x152.png">
 <link rel="apple-touch-icon" sizes="180x180" href="/favicons/apple-touch-icon-180x180.png">
 <link rel="icon" type="image/png" href="/favicons/favicon-32x32.png" sizes="32x32">
 <link rel="icon" type="image/png" href="/favicons/favicon-194x194.png" sizes="194x194">
 <link rel="icon" type="image/png" href="/favicons/favicon-96x96.png" sizes="96x96">
 <link rel="icon" type="image/png" href="/favicons/android-chrome-192x192.png" sizes="192x192">
 <link rel="icon" type="image/png" href="/favicons/favicon-16x16.png" sizes="16x16">
 <link rel="manifest" href="/favicons/manifest.json">
 <link rel="shortcut icon" href="/favicons/favicon.ico">
 <meta name="msapplication-TileColor" content="#603cba">
 <meta name="msapplication-TileImage" content="/favicons/mstile-144x144.png">
 <meta name="msapplication-config" content="/favicons/browserconfig.xml">
 <meta name="theme-color" content="#303284">

 <title>Apache License, Version 2.0</title>
 <link href='https://fonts.googleapis.com/css?family=Source+Sans+Pro:400,700%7cDroid+Serif:400,700'
rel='stylesheet' type='text/css'>
 <link href="/css/min.bootstrap.css" rel="stylesheet">
 <link href="/css/styles.css" rel="stylesheet">


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</head>

<body>
<!-- Navigation -->
<header>
 <nav class="navbar navbar-default navbar-fixed-top">

    <button class="navbar-toggle" type="button" data-toggle="collapse" data-target="#mainnav-collapse">
     Toggle navigation

    </button>

    Home &raquo Licenses
    <ul class="nav navbar-nav navbar-right">
     <li class="dropdown">
      About
      <ul class="dropdown-menu" role="menu">
     Overview
     Members
     Process
     Sponsorship
     Glossary
     FAQ
     Contact

  Projects
   <li class="dropdown">
      People
      <ul class="dropdown-menu" role="menu">
    Overview
    Committers
    Meritocracy
    Roles
    Planet Apache


```
        </li>
        <li class="dropdown">
          <a href="#" class="dropdown-toggle" data-toggle="dropdown">Get Involved <span
class="caret"></span></a>
          <ul class="dropdown-menu" role="menu">
            <li><a href="/foundation/getinvolved.html">Overview</a></li>
        <li><a href="http://community.apache.org/">Community Development</a></li>
              <li><a href="http://helpwanted.apache.org/">Help Wanted</a></li>
        <li><a href="http://www.apachecon.com/">ApacheCon</a></li>
          </ul>
      </li>
        <li><a href="/dyn/closer.cgi">Download</a></li>
        <li class="dropdown">
         <a href="#" class="dropdown-toggle" data-toggle="dropdown">Support Apache <span
class="caret"></span></a>
          <ul class="dropdown-menu" role="menu">
        <li><a href="/foundation/sponsorship.html">Sponsorship</a></li>
        <li><a href="/foundation/contributing.html">Donations</a></li>
        <li><a href="/foundation/buy_stuff.html">Buy Stuff</a></li>
        <li><a href="/foundation/thanks.html">Thanks</a></li>
         </ul>
        </li>
       </ul>
      </div>
    </div>
  </nav>
</header>
<!-- / Navigation -->
<div class="container">
 <div class="row">
       <div class="col-md-6 col-sm-5 col-xs-12">
     <img src="/img/asf_logo.png" alt="Apache Logo" style="max-width: 100%;">
   </div>
   <div class="col-md-3 col-sm-3 col-xs-6">
   <a href="http://apache.org/foundation/contributing.html" title="Support Apache">
     <img src="/images/SupportApache-small.png" style="height: 150px; width: 150px; margin-top: 5px; margin-
bottom: 5px;">
   </a>
   </div>
   <div class="col-md-3 col-sm-4 col-xs-6">
     <div class="input-group" style="margin-bottom: 5px;">
    <script>
 (function() {
   var cx = '005703438322411770421:5mgshgrgx2u';
   var gcse = document.createElement('script');
   gcse.type = 'text/javascript';
   gcse.async = true;
   gcse.src = (document.location.protocol == 'https:' ? 'https:' : 'http:') +
```

```
      '//cse.google.com/cse.js?cx=' + cx;
   var s = document.getElementsByTagName('script')[0];
   s.parentNode.insertBefore(gcse, s);
 })();
</script>
    <gcse:searchbox-only></gcse:searchbox-only>
   </div>
   <a role="button" class="btn btn-block btn-default btn-xs" href="/foundation/governance/">The Apache Way</a>
   <a role="button" class="btn btn-block btn-default btn-xs"
href="https://community.apache.org/contributors/">Contribute</a>
   <a role="button" class="btn btn-block btn-default btn-xs" href="/foundation/thanks.html">ASF Sponsors</a>
   </div>
 </div>
</div>
<div class="container"><style type="text/css">
/* The following code is added by mdx_elementid.py
  It was originally lifted from http://subversion.apache.org/style/site.css */
/*
* Hide class="elementid-permalink", except when an enclosing heading
* has the :hover property.
*/
.headerlink, .elementid-permalink {
 visibility: hidden;
}
h2:hover > .headerlink, h3:hover > .headerlink, h1:hover > .headerlink, h6:hover > .headerlink, h4:hover >
.headerlink, h5:hover > .headerlink, dt:hover > .elementid-permalink { visibility: visible }</style>
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<footer class="bg-primary">

        <h5 class="white">Community</h5>
        <ul class="list-unstyled white" role="menu">
    Overview
    Conferences
    Summer of Code
    Getting Started
    The Apache Way
    Travel Assistance
    Get Involved
    Community FAQ
    Memorials

    <h5 class="white">Innovation</h5>
        <ul class="list-unstyled white" role="menu">
    Incubator
    Labs
    Licensing
    Licensing FAQ
    Trademark Policy
    Contacts


```
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   <h5 class="white">Tech Operations</h5>
       <ul class="list-unstyled white" role="menu">
    <li><a href="/dev/">Developer Information</a></li>
    <li><a href="/dev/infrastructure.html">Infrastructure</a></li>
    <li><a href="/security/">Security</a></li>
    <li><a href="http://status.apache.org">Status</a></li>
    <li><a href="/foundation/contact.html">Contacts</a></li>
       </ul>
  </div>

  <div class="col-sm-2">
   <h5 class="white">Press</h5>
     <ul class="list-unstyled white" role="menu">
    <li><a href="/press/">Overview</a></li>
    <li><a href="https://blogs.apache.org/">ASF News</a></li>
    <li><a href="https://blogs.apache.org/foundation/">Announcements</a></li>
    <li><a href="https://twitter.com/TheASF">Twitter Feed</a></li>
    <li><a href="/press/#contact">Contacts</a></li>
     </ul>
  </div>

  <div class="col-sm-2">
   <h5 class="white">Legal</h5>
     <ul class="list-unstyled white" role="menu">
    <li><a href="/legal/">Legal Affairs</a></li>
    <li><a href="/licenses/">Licenses</a></li>
    <li><a href="/foundation/marks/">Trademark Policy</a></li>
    <li><a href="/foundation/records/">Public Records</a></li>
        <li><a href="/foundation/policies/privacy.html">Privacy Policy</a></li>
    <li><a href="/licenses/exports/">Export Information</a></li>
    <li><a href="/foundation/license-faq.html">License/Distribution FAQ</a></li>
    <li><a href="/foundation/contact.html">Contacts</a></li>
     </ul>
  </div>

  <div class="col-sm-1">
  </div>

 </div>
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  <div class="col-lg-12">
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  </div>
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  </div>
 </div>

</footer>

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<script src="/js/jquery-2.1.1.min.js"></script>
<script src="/js/bootstrap.js"></script>
</body>
</html>
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1.99 hibernate-validator 6.0.17

1.100 hppc 0.7.1

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1.122 javaparser-core 2.4.0

1.123 javax-websocket-client-impl 9.4.19.v20190610

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* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

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* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

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org.ow2.asm:asm-commons
org.ow2.asm:asm

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org.apache.taglibs:taglibs-standard-impl

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 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

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1.124 javax-websocket-server-impl 9.4.19.v20190610

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org.apache.tomcat:tomcat-jasper-el
org.apache.tomcat:tomcat-api
org.apache.tomcat:tomcat-util-scan
org.apache.tomcat:tomcat-util

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1.126 javax.inject 1

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 <meta http-equiv="content-type" content="text/html; charset=UTF-8">
 <style type="text/css">
  li {display: block;}
 </style>
</head>

<body leftmargin="0" topmargin="0" marginheight="0" marginwidth="0" bgcolor="#ffffff">

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1.130 jaxen 1.1.6

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1.131 jboss-logging 3.3.2

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1.135 jersey-client 1.19.1

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* java.sun.security.ssl

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 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
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org.eclipse.jetty.toolchain:jetty-schemas

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* org.eclipse.jetty.orbit:org.eclipse.jdt.core

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* org.eclipse.jetty.orbit:javax.security.auth.message

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* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

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https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
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module is selected.

* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications
are hosted at github and both modified and original are under GPL v2 with
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http://openjdk.java.net/legal/gplv2+ce.html

OW2

The following artifacts are licensed by the OW2 Foundation according to the
terms of http://asm.ow2.org/license.html

org.ow2.asm:asm-commons
org.ow2.asm:asm

Apache

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org.apache.taglibs:taglibs-standard-spec
org.apache.taglibs:taglibs-standard-impl

MortBay

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following Apache Tomcat jars, all ASL2 licensed.

org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

org.mortbay.jasper:apache-el
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-el-api

Mortbay

The following artifacts are CDDL + GPLv2 with classpath exception.

https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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The following artifacts are EPL and ASL2.
* org.eclipse.jetty.orbit:javax.security.auth.message

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* org.eclipse.jetty.orbit:javax.mail.glassfish

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* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
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* java.sun.security.ssl

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http://openjdk.java.net/legal/gplv2+ce.html

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org.ow2.asm:asm

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org.apache.taglibs:taglibs-standard-impl

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 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

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 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
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* org.eclipse.jetty.orbit:org.eclipse.jdt.core

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* org.eclipse.jetty.orbit:javax.security.auth.message

The following artifacts are EPL and CDDL 1.0.
* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

The following artifacts are CDDL + GPLv2 with classpath exception.
https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
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module is selected.

* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications
are hosted at github and both modified and original are under GPL v2 with
classpath exceptions.
http://openjdk.java.net/legal/gplv2+ce.html

OW2

The following artifacts are licensed by the OW2 Foundation according to the
terms of http://asm.ow2.org/license.html

org.ow2.asm:asm-commons
org.ow2.asm:asm

Apache

The following artifacts are ASL2 licensed.

org.apache.taglibs:taglibs-standard-spec
org.apache.taglibs:taglibs-standard-impl

MortBay

The following artifacts are ASL2 licensed. Based on selected classes from
following Apache Tomcat jars, all ASL2 licensed.

org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

org.mortbay.jasper:apache-el
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-el-api

Mortbay

The following artifacts are CDDL + GPLv2 with classpath exception.

https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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* org.eclipse.jetty.orbit:javax.security.auth.message

The following artifacts are EPL and CDDL 1.0.
* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

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https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
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module is selected.

* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications
are hosted at github and both modified and original are under GPL v2 with
classpath exceptions.
http://openjdk.java.net/legal/gplv2+ce.html

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org.ow2.asm:asm-commons
org.ow2.asm:asm

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org.apache.taglibs:taglibs-standard-spec

org.apache.taglibs:taglibs-standard-impl

MortBay

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org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

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 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-el-api

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https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

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* org.eclipse.jetty.orbit:org.eclipse.jdt.core

The following artifacts are EPL and ASL2.
* org.eclipse.jetty.orbit:javax.security.auth.message

The following artifacts are EPL and CDDL 1.0.
* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

The following artifacts are CDDL + GPLv2 with classpath exception.
https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
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module is selected.

* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications
are hosted at github and both modified and original are under GPL v2 with
classpath exceptions.
http://openjdk.java.net/legal/gplv2+ce.html

OW2

The following artifacts are licensed by the OW2 Foundation according to the
terms of http://asm.ow2.org/license.html

org.ow2.asm:asm-commons
org.ow2.asm:asm

Apache

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org.apache.taglibs:taglibs-standard-spec
org.apache.taglibs:taglibs-standard-impl

MortBay

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org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

org.mortbay.jasper:apache-el
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-el-api

Mortbay

The following artifacts are CDDL + GPLv2 with classpath exception.

https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

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http://openjdk.java.net/legal/gplv2+ce.html

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org.ow2.asm:asm-commons
org.ow2.asm:asm

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org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

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org.eclipse.jetty.toolchain:jetty-schemas

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 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

org.mortbay.jasper:apache-el
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-el-api

Mortbay

The following artifacts are CDDL + GPLv2 with classpath exception.

https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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* org.eclipse.jetty.orbit:org.eclipse.jdt.core

The following artifacts are EPL and ASL2.
* org.eclipse.jetty.orbit:javax.security.auth.message

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* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

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* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

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* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications
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http://openjdk.java.net/legal/gplv2+ce.html

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terms of http://asm.ow2.org/license.html

org.ow2.asm:asm-commons
org.ow2.asm:asm

Apache

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org.apache.taglibs:taglibs-standard-spec

org.apache.taglibs:taglibs-standard-impl

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 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
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 org.apache.tomcat:tomcat-util-scan
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* org.eclipse.jetty.orbit:org.eclipse.jdt.core

The following artifacts are EPL and ASL2.
* org.eclipse.jetty.orbit:javax.security.auth.message

The following artifacts are EPL and CDDL 1.0.
* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

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https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
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module is selected.

* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications
are hosted at github and both modified and original are under GPL v2 with
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http://openjdk.java.net/legal/gplv2+ce.html

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org.ow2.asm:asm-commons
org.ow2.asm:asm

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org.apache.taglibs:taglibs-standard-spec
org.apache.taglibs:taglibs-standard-impl

MortBay

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org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

org.mortbay.jasper:apache-el
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-el-api

Mortbay

The following artifacts are CDDL + GPLv2 with classpath exception.

https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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* org.eclipse.jetty.orbit:org.eclipse.jdt.core

The following artifacts are EPL and ASL2.
* org.eclipse.jetty.orbit:javax.security.auth.message

The following artifacts are EPL and CDDL 1.0.
* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

The following artifacts are CDDL + GPLv2 with classpath exception.
https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
artifacts may be included in the distribution or downloaded when ALPN
module is selected.

* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications

are hosted at github and both modified and original are under GPL v2 with
classpath exceptions.
http://openjdk.java.net/legal/gplv2+ce.html

OW2

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org.ow2.asm:asm-commons
org.ow2.asm:asm

Apache

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org.apache.taglibs:taglibs-standard-spec
org.apache.taglibs:taglibs-standard-impl

MortBay

The following artifacts are ASL2 licensed. Based on selected classes from
following Apache Tomcat jars, all ASL2 licensed.

org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

org.mortbay.jasper:apache-el
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-el-api

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org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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1.149 jffi 1.2.16

1.150 jna 4.5.1

1.151 jnc 1.0

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1.152 jnr-constants 0.9.9

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1.153 jnr-ffi 2.1.7

1.154 jnr-posix 3.0.44

1.155 jnr-x86asm 1.0.2

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1.156 joda-convert 1.2

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1.157 joda-time 2.10.3

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1.159 jsch 0.1.54

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1.160 json-java 20140107

1.161 json-path 2.4.0

1.162 json-smart 2.3

1.163 jsr-305 3.0.2

1.164 jsr305 3.0.2

1.165 jsr311-api 1.1.1

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1.175 libffi 3.2.1-6

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1.176 log4j-api 2.11.2

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1.178 logback 1.2.3

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 </head>
 <body>
  <script type="text/javascript">prefix='';</script>
```

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1.179 logging-interceptor 2.7.5

1.180 lombok 1.18.8

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analysis/common/src/resources/org/apache/lucene/analysis/fa/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/ro/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers
(common) are based on BSD-licensed reference implementations created by Jacques Savoy and

Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
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analysis/common/src/resources/org/apache/lucene/analysis/fa/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/ro/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers (common) are based on BSD-licensed reference implementations created by Jacques Savoy and Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
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analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers
(common) are based on BSD-licensed reference implementations created by Jacques Savoy and
Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchMinimalStemmer.java
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analysis/common/src/resources/org/apache/lucene/analysis/fa/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/ro/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers
(common) are based on BSD-licensed reference implementations created by Jacques Savoy and
Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
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analysis/common/src/resources/org/apache/lucene/analysis/ro/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers

(common) are based on BSD-licensed reference implementations created by Jacques Savoy and
Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/hu/HungarianLightStemmer.java
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analysis/common/src/resources/org/apache/lucene/analysis/ro/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers (common) are based on BSD-licensed reference implementations created by Jacques Savoy and Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
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analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
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See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers
(common) are based on BSD-licensed reference implementations created by Jacques Savoy and
Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/hu/HungarianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/it/ItalianLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

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analysis/common/src/resources/org/apache/lucene/analysis/bg/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers
(common) are based on BSD-licensed reference implementations created by Jacques Savoy and
Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

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analysis/common/src/resources/org/apache/lucene/analysis/hi/stopwords.txt,
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See http://members.unine.ch/jacques.savoy/clef/index.html.

The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers

(common) are based on BSD-licensed reference implementations created by Jacques Savoy and
Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

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analysis/common/src/resources/org/apache/lucene/analysis/bn/stopwords.txt
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The German,Spanish,Finnish,French,Hungarian,Italian,Portuguese,Russian and Swedish light stemmers (common) are based on BSD-licensed reference implementations created by Jacques Savoy and Ljiljana Dolamic. These files reside in:
analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/ru/RussianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

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analysis/common/src/java/org/apache/lucene/analysis/de/GermanLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/de/GermanMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/hu/HungarianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/it/ItalianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/pt/PortugueseLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/ru/RussianLightStemmer.java

analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

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analysis/common/src/java/org/apache/lucene/analysis/es/SpanishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/hu/HungarianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/it/ItalianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/pt/PortugueseLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/ru/RussianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

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analysis/common/src/java/org/apache/lucene/analysis/fi/FinnishLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/fr/FrenchMinimalStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/hu/HungarianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/it/ItalianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/pt/PortugueseLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/ru/RussianLightStemmer.java
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analysis/common/src/java/org/apache/lucene/analysis/hu/HungarianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/it/ItalianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/pt/PortugueseLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/ru/RussianLightStemmer.java
analysis/common/src/java/org/apache/lucene/analysis/sv/SwedishLightStemmer.java

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1.197 mapstruct 1.2.0

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1.198 metrics 4.0.5

1.199 micrometer-core 1.1.5

1.200 minlog 1.3.0

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    if($(this).scrollTop() != 0) {

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   $("#toTop").fadeIn();
  } else {
   $("#toTop").fadeOut();
  }
 });

 $("#toTop").click(function() {
  $("body,html").animate({scrollTop:0},800);
 });

 });
//--><!]]>
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license.php":true},"superfish":{"1":{"id":"1","sf":{"animation":{"opacity":"show","height":"show"},"speed":"\u002
7fast\u0027","autoArrows":false,"dropShadows":true,"disableHI":false},"plugins":{"touchscreen":{"mode":"windo
w_width"},"smallscreen":{"mode":"window_width","addSelected":false,"menuClasses":false,"hyperlinkClasses":fa
lse,"title":"Navigation"},"supposition":true,"bgiframe":false,"supersubs":{"minWidth":"12","maxWidth":"27","extr
aWidth":1}}}}});
//--><!]]>
</script>
</head>
<body class="html not-front not-logged-in no-sidebars page-node page-node- page-node-45 node-type-page" >
 <div id="skip-link">
  <a href="#main-content" class="element-invisible element-focusable">Skip to main content</a>
 </div>
```

```
  <div id="toTop"><span class="glyphicon glyphicon-chevron-up"></span></div>



<!-- #header-top -->
<div id="header-top" class="clearfix">
  <div class="container">

    <!-- #header-top-inside -->
    <div id="header-top-inside" class="clearfix">
      <div class="row">

            <div class="col-md-8">
        <!-- #header-top-left -->
        <div id="header-top-left" class="clearfix">
            <div class="region region-header-top-left">
  <div id="block-menu-secondary-menu" class="block block-menu clearfix">


 <div class="content">
  <ul class="menu"><li class="first leaf"><a href="/" title="">Home</a></li>
<li class="leaf"><a href="/blog" title="">From the Board</a></li>
<li class="leaf"><a href="/contact" title="">Contact</a></li>
<li class="last leaf"><a href="/civicrm/contribute/transact?reset=1&amp;id=2" title="">Donate</a></li>
</ul>  </div>
</div>
 </div>
        </div>
        <!-- EOF:#header-top-left -->
      </div>

            <div class="col-md-4">
        <!-- #header-top-right -->
        <div id="header-top-right" class="clearfix">
            <div class="region region-header-top-right">
  <div id="block-search-form" class="block block-search clearfix">


 <div class="content">
  <form action="/licenses/bsd-license.php" method="post" id="search-block-form" accept-charset="UTF-
8"><div><div class="container-inline">
    <h2 class="element-invisible">Search form</h2>
  <div class="form-item form-type-textfield form-item-search-block-form">
<input onblur="if (this.value == &#039;&#039;) {this.value = &#039;Search this website...&#039;;}" onfocus="if
(this.value == &#039;Search this website...&#039;) {this.value = &#039;&#039;;}" type="text" id="edit-search-
block-form--2" name="search_block_form" value="Search this website..." size="15" maxlength="128"
class="form-text" />
</div>
```

```
<div class="form-actions form-wrapper" id="edit-actions"><input value="" type="submit" id="edit-submit"
name="op" class="form-submit" /></div><input type="hidden" name="form_build_id" value="form-
6xmGQUbpVd1U0SKdWfuJe4IuZO3jmemfJvi1vG55FT0" />
<input type="hidden" name="form_id" value="search_block_form" />
</div>
</div></form>  </div>
</div>
 </div>
            </div>
            <!-- EOF:#header-top-right -->
          </div>

          </div>
      </div>
      <!-- EOF: #header-top-inside -->

  </div>
</div>
<!-- EOF: #header-top -->

<!-- header -->
<header id="header" role="banner" class="clearfix">
  <div class="container">

      <!-- #header-inside -->
      <div id="header-inside" class="clearfix">
        <div class="row">
          <div class="col-md-8">

                    <div id="logo">
          <a href="/" title="Home" rel="home"> <img
src="https://opensource.org/files/osi_keyhole_300X300_90ppi_0.png" alt="Home" /> </a>
          </div>

                    <div id="site-name">
          <a href="/" title="Home">Open Source Initiative</a>
          </div>


          </div>

          <div class="col-md-4">


          </div>
        </div>
      </div>
      <!-- EOF: #header-inside -->
```

```
  </div>
</header>
<!-- EOF: #header -->

<!-- #main-navigation -->
<div id="main-navigation" class="clearfix">
  <div class="container">

    <!-- #main-navigation-inside -->
    <div id="main-navigation-inside" class="clearfix">
      <div class="row">
        <div class="col-md-12">
          <nav role="navigation">
                                <div class="region region-navigation">
  <div id="block-superfish-1" class="block block-superfish clearfix">


 <div class="content">
  <ul id="superfish-1" class="menu sf-menu sf-navigation sf-horizontal sf-style-none sf-total-items-6 sf-parent-items-6 sf-single-items-0"><li id="menu-37-1" class="first odd sf-item-1 sf-depth-1 sf-total-children-4 sf-parent-children-2 sf-single-children-2 menuparent"><a href="/about" title="About the Open Source Initiative" class="sf-depth-1 menuparent">About</a><ul><li id="menu-75-1" class="first odd sf-item-1 sf-depth-2 sf-no-children"><a href="/history" title="History of the OSI" class="sf-depth-2">History</a></li><li id="menu-82-1" class="middle even sf-item-2 sf-depth-2 sf-total-children-7 sf-parent-children-0 sf-single-children-7 menuparent"><a href="/board" title="Board of Directors" class="sf-depth-2 menuparent">Board</a><ul><li id="menu-83-1" class="first odd sf-item-1 sf-depth-3 sf-no-children"><a href="/docs/board-annotated" title="OSI Board -- With Annotations" class="sf-depth-3">Board - Annotated</a></li><li id="menu-96-1" class="middle even sf-item-2 sf-depth-3 sf-no-children"><a href="/minutes" title="Public Minutes of Board Meetings" class="sf-depth-3">Minutes</a></li><li id="menu-185-1" class="middle odd sf-item-3 sf-depth-3 sf-no-children"><a href="/organization" title="These portfolios represent the activities of the current OSI board." class="sf-depth-3">Organization &amp;amp; Operations</a></li><li id="menu-95-1" class="middle even sf-item-4 sf-depth-3 sf-no-children"><a href="/articles-of-incorporation" title="OSI incorporation record" class="sf-depth-3">Articles of Incorporation</a></li><li id="menu-1475-1" class="middle odd sf-item-5 sf-depth-3 sf-no-children"><a href="/elections" class="sf-depth-3">Board Elections</a></li><li id="menu-84-1" class="middle even sf-item-6 sf-depth-3 sf-no-children"><a href="/bylaws" title="Bylaws of the Open Source Initiative" class="sf-depth-3">Bylaws</a></li><li id="menu-1317-1" class="last odd sf-item-7 sf-depth-3 sf-no-children"><a href="/conflict_of_interest_policy" title="" class="sf-depth-3">Conflict of Interest</a></li></ul></li><li id="menu-1843-1" class="middle odd sf-item-3 sf-depth-2 sf-total-children-2 sf-parent-children-0 sf-single-children-2 menuparent"><a href="/trademark" title="" class="sf-depth-2 menuparent">Trademark &amp;amp; Logo</a><ul><li id="menu-184-1" class="first odd sf-item-1 sf-depth-3 sf-no-children"><a href="/trademark-guidelines" title="OSI&amp;#039;s Trademark Policy" class="sf-depth-3">Trademark Guidelines</a></li><li id="menu-183-1" class="last even sf-item-2 sf-depth-3 sf-no-children"><a href="/logo-usage-guidelines" title="Guidelines for appearance and usage of OSI Logo" class="sf-depth-3">Logo Guidelines</a></li></ul></li><li id="menu-126-1" class="last even sf-item-4 sf-depth-2 sf-no-children"><a href="/ToS" title="Rules for posting content on this site" class="sf-depth-2">Terms of Service</a></li></ul></li><li id="menu-65-1" class="middle even sf-item-2 sf-depth-1 sf-total-children-5 sf-parent-children-3 sf-single-children-2 menuparent"><a href="/licenses" class="sf-depth-1 menuparent">Licenses</a><ul><li id="menu-61-1" class="first odd sf-item-1 sf-depth-2 sf-total-children-1 sf-
```

parent-children-0 sf-single-children-1 menuparent">Open Source Definition
<li id="menu-62-1" class="firstandlast odd sf-item-1 sf-depth-3 sf-no-children">OSD - Annotated
<li id="menu-77-1" class="middle even sf-item-2 sf-depth-2 sf-no-children">Licenses by Category
<li id="menu-72-1" class="middle odd sf-item-3 sf-depth-2 sf-no-children">Licenses by Name
<li id="menu-66-1" class="middle even sf-item-4 sf-depth-2 sf-total-children-2 sf-parent-children-0 sf-single-children-2 menuparent">License Review Process
<li id="menu-67-1" class="first odd sf-item-1 sf-depth-3 sf-no-children">Licence Proliferation
<li id="menu-69-1" class="last even sf-item-2 sf-depth-3 sf-no-children">LP report to the Board
<li id="menu-99-1" class="last odd sf-item-5 sf-depth-2 sf-total-children-4 sf-parent-children-0 sf-single-children-4 menuparent">Open Standards
<li id="menu-101-1" class="first odd sf-item-1 sf-depth-3 sf-no-children">The Open Standards Requirement
<li id="menu-102-1" class="middle even sf-item-2 sf-depth-3 sf-no-children">Open Standards Requirement Compliance
<li id="menu-100-1" class="middle odd sf-item-3 sf-depth-3 sf-no-children">Open Standards Requirement Rationale
<li id="menu-103-1" class="last even sf-item-4 sf-depth-3 sf-no-children">OSR Frequently Asked Questions
<li id="menu-1842-1" class="middle odd sf-item-3 sf-depth-1 sf-total-children-3 sf-parent-children-2 sf-single-children-1 menuparent">Membership
<li id="menu-914-1" class="first odd sf-item-1 sf-depth-2 sf-total-children-1 sf-parent-children-0 sf-single-children-1 menuparent">Individuals
<li id="menu-897-1" class="firstandlast odd sf-item-1 sf-depth-3 sf-no-children">Join
<li id="menu-675-1" class="middle even sf-item-2 sf-depth-2 sf-total-children-3 sf-parent-children-0 sf-single-children-3 menuparent">Affiliates
<li id="menu-676-1" class="first odd sf-item-1 sf-depth-3 sf-no-children">Become an Affiliate
<li id="menu-677-1" class="middle even sf-item-2 sf-depth-3 sf-no-children">List of Affiliates
<li id="menu-2071-1" class="last odd sf-item-3 sf-depth-3 sf-no-children">Affiliate Criteria
<li id="menu-1436-1" class="last odd sf-item-3 sf-depth-2 sf-no-children">Sponsors & Support
<li id="menu-1841-1" class="middle even sf-item-4 sf-depth-1 sf-total-children-4 sf-parent-children-1 sf-single-children-3 menuparent">Community
<li id="menu-63-1" class="first odd sf-item-1 sf-depth-2 sf-total-children-4 sf-parent-children-0 sf-single-children-4 menuparent">Mailing lists
<li id="menu-78-1" class="first odd sf-item-1 sf-depth-3 sf-no-children">General Code of Conduct
<li id="menu-1072-1" class="middle even sf-item-2 sf-depth-3 sf-no-children">Licensing Code of Conduct
<li id="menu-2111-1" class="middle odd sf-item-3 sf-depth-3 sf-no-children"><a

href="/public_forums_disclaimer" class="sf-depth-3">Disclaimer for OSI Public Forums
<li id="menu-2110-1" class="last even sf-item-4 sf-depth-3 sf-no-children">Policy on Public Communications and Archives
<li id="menu-2032-1" class="middle even sf-item-2 sf-depth-2 sf-no-children">Volunteers
<li id="menu-1846-1" class="middle odd sf-item-3 sf-depth-2 sf-no-children">Wiki
<li id="menu-1524-1" class="last even sf-item-4 sf-depth-2 sf-no-children">OSI Store
<li id="menu-1840-1" class="middle odd sf-item-5 sf-depth-1 sf-total-children-5 sf-parent-children-1 sf-single-children-4 menuparent">Resources
<li id="menu-342-1" class="first odd sf-item-1 sf-depth-2 sf-no-children">FAQ
<li id="menu-38-1" class="middle even sf-item-2 sf-depth-2 sf-no-children">OSI Board Blog
<li id="menu-45-1" class="middle odd sf-item-3 sf-depth-2 sf-total-children-2 sf-parent-children-0 sf-single-children-2 menuparent">Getting Help
<li id="menu-76-1" class="first odd sf-item-1 sf-depth-3 sf-no-children">Bibliography
<li id="menu-125-1" class="last even sf-item-2 sf-depth-3 sf-no-children">Open Source Case for Business
<li id="menu-1514-1" class="middle even sf-item-4 sf-depth-2 sf-no-children">Working Groups
<li id="menu-12-1" class="last odd sf-item-5 sf-depth-2 sf-no-children">Open Source Education
<li id="menu-1844-1" class="last even sf-item-6 sf-depth-1 sf-total-children-2 sf-parent-children-0 sf-single-children-2 menuparent">News & Events
<li id="menu-1845-1" class="first odd sf-item-1 sf-depth-2 sf-no-children">Newsletters
<li id="menu-1999-1" class="last even sf-item-2 sf-depth-2 sf-no-children">Events

                                </nav>

      <!-- EOF: #main-navigation-inside -->

<!-- EOF: #main-navigation -->

<!-- #page -->

  <!-- #main-content -->

<!-- #messages-console -->
<!-- EOF: #messages-console -->

<section class="col-md-12">

<!-- #main -->

<!-- EOF:#content-wrapper -->

<h1 class="page-title">The 2-Clause BSD License</h1>

<!-- #tabs -->

<!-- EOF: #tabs -->

<!-- #action links -->
<!-- EOF: #action links -->

<article id="node-45" class="node node-page clearfix">

SPDX short identifier: BSD-2-Clause

<button onclick="myFunction()">Further resources on the 2-clause BSD license</button>

<script>
<!--//--><![CDATA[// ><!--

function myFunction() {
  var x;
  if (confirm("Disclaimer: While the OSI acknowledges these as potentially helpful resources for the community, it does not endorse any content, contributors or license interpretations from these websites. Any links to these resources across opensource.org are solely for navigational purposes. The OSI does not promote or exclusively favor any of the mentioned resources, but instead provides them as separate third-party resource to help inform your opinion. Any content from or links to these resources are separate from the OSI, exist for purely informational purposes and creates no attorney-client relationship between you, the OSI or the resources. If you have questions about how licenses apply to you or your organization, you should seek legal advice. ") == true) {
      x = "
 The following are other community resources that may be helpful:

<a href=https://tldrlegal.com/license/bsd-2-clause-license-%28freebsd%29 style='font-weight: bold;'>The BSD 2-Clause License on TLDRLegal
<a href=http://www.gnu.org/licenses/license-list.en.html>GNU License List
<a href=https://en.wikipedia.org/wiki/Comparison_of_free_and_open-source_software_licenses>Wikipedia License List
<a href=http://oss-watch.ac.uk/apps/licdiff/>OSSWatch License Diff
<a href=choosealicense.com>Choosealicense";
  } else {
     x = " ";
  }
  document.getElementById("demo").innerHTML = x;
}

//--><!]]>
</script>

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</article>

<!-- EOF:#content-wrapper -->

<!-- EOF:#main -->

</section>

<!-- EOF:#main-content -->

<!-- EOF:#page -->

<footer id="subfooter" class="clearfix">

<!-- #subfooter-inside -->

<!-- #subfooter-left -->

<script id="fbwiuwz">
<!--//--><![CDATA[// ><!--
(function(i){var
f,s=document.getElementById(i);f=document.createElement('iframe');f.src='//api.flattr.com/button/view/?uid=osi&url=http%3A%2F%2Fopensource.org';f.title='Flattr';f.height=70;f.width=70;f.style.borderWidth=0;s.parentNode.insertBefore(f,s);})('fbwiuwz');
//--><!]]>
</script>

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Terms of Service

<script src="https://www.google-analytics.com/urchin.js" type="text/javascript">
<!--//--><![CDATA[// ><!--

//--><!]]>
</script><script type="text/javascript">
<!--//--><![CDATA[// ><!--

_uacct = "UA-3916956-1";
urchinTracker();

//--><!]]>
</script>

<!-- EOF: #subfooter-left -->

<!-- EOF: #subfooter-inside -->

</footer>
<!-- EOF:#subfooter -->
</body>
</html>

1.201 modelmapper 2.3.0

1.201.1 Available under license :

2corg/modelmapper/internal/bytebuddy/asm/Advice$ArgumentHandler$ForInstrumentedMethod$Default$Copying[org/modelmapper/internal/bytebuddy/asm/Advice$ArgumentHandler$ForInstrumentedMethod$DefaultAdvice.javaJLorg/modelmapper/internal/bytebuddy/build/HashCodeAndEqualsPlugin$Enhance;=org/modelmapper/internal/bytebuddy/asm/Advice$ArgumentHandler-org/modelmapper/internal/bytebuddy/asm/Advice ArgumentHandlerSorg/modelmapper/internal/bytebuddy/asm/Advice$ArgumentHandler$ForInstrumentedMethodForInstrumentedMethodDefaultHorg/modelmapper/internal/bytebuddy/build/HashCodeAndEqualsPlugin$Enhance@org/modelmapper/internal/bytebuddy/build/HashCodeAndEqualsPluginEnhanceKorg/modelmapper/internal/bytebuddy/description/type/TypeDescription$GenericCorg/modelmapper/internal/bytebuddy/description/type/TypeDescriptionGenericCopying<init>(Lorg/modelmapper/internal/bytebuddy/description/method/MethodDescription;Lorg/modelmapper/internal/bytebuddy/description/type/TypeDefinition;Ljava/util/NavigableMap;Lorg/modelmapper/internal/bytebuddy/description/type/TypeDefinition;)V

thiseLorg/modelmapper/internal/bytebuddy/asm/Advice$ArgumentHandler$ForInstrumentedMethod$Default$Copying;instrumentedMethodILorg/modelmapper/internal/bytebuddy/description/method/MethodDescription;exitTypeDLorg/modelmapper/internal/bytebuddy/description/type/TypeDefinition;
namedTypespLjava/util/NavigableMap<Ljava/lang/String;Lorg/modelmapper/internal/bytebuddy/description/type/TypeDefinition;>;Ljava/util/NavigableMap; enterTypeargument(I)I!"
+Gorg/modelmapper/internal/bytebuddy/description/method/MethodDescription-getStackSize()I/0.1#$
3Borg/modelmapper/internal/bytebuddy/description/type/TypeDefinition5H()Lorg/modelmapper/internal/bytebuddy/implementation/bytecode/StackSize;/768Dorg/modelmapper/internal/bytebuddy/implementation/bytecode/StackSize:getSize<0
;=%' ?java/util/NavigableMapAvalues()Ljava/util/Collection;CDBEof(Ljava/util/Collection;)IGH
;I($ KoffsetIvariableisStatic()ZPQ.R
getParametersG()Lorg/modelmapper/internal/bytebuddy/description/method/ParameterList;TU.VCorg/modelmapper/internal/bytebuddy/description/method/ParameterListXsizeZ0Y[java/lang/Void]TYPELjava/lang/Class;_` ^a
represents(Ljava/lang/reflect/Type;)Zcd6eB[indexisCopyingArgumentsprepare/(Lorg/modelmapper/internal/asm/MethodVisitor;)I*org/modelmapper/internal/asm/MethodVisitorlvisitVarInsn(II)Vno
mpSINGLEFLorg/modelmapper/internal/bytebuddy/implementation/bytecode/StackSize;rs ;tZEROvs
;witerator()Ljava/util/Iterator;yzY{java/util/Iterator}hasNextQ~next()Ljava/lang/Object;~Jorg/modelmapper/internal/bytebuddy/description/method/ParameterDescriptiongetTypeO()Lorg/modelmapper/internal/bytebuddy/description/type/TypeDescription$Generic;
asErasureG()Lorg/modelmapper/internal/bytebuddy/description/type/TypeDescription;
getDescriptor()Ljava/lang/String;!org/modelmapper/internal/asm/Type7(Ljava/lang/String;)Lorg/modelmapper/internal/asm/Type;
getOpcode*
getOffset08maximum(Lorg/modelmapper/internal/bytebuddy/implementation/bytecode/StackSize;)Lorg/modelmapper/internal/bytebuddy/implementation/bytecode/StackSize;
;
stackSizetype#Lorg/modelmapper/internal/asm/Type;parameterDescriptionLLorg/modelmapper/internal/bytebuddy/description/method/ParameterDescription;
methodVisitor,Lorg/modelmapper/internal/asm/MethodVisitor;equals(Ljava/lang/Object;)Zjava/lang/ObjectgetClass()Ljava/lang/Class;
hashCodeCodeLocalVariableTableLocalVariableTypeTableLineNumberTable
SignatureD(Lorg/modelmapper/internal/bytebuddy/description/method/MethodDescription;Lorg/modelmapper/internal/bytebuddy/description/type/TypeDefinition;Ljava/util/NavigableMap<Ljava/lang/String;Lorg/modelmapper/internal/bytebuddy/description/type/TypeDefinition;>;Lorg/modelmapper/internal/bytebuddy/description/type/TypeDefinition;)V
StackMapTable
SourceFileInnerClassesRuntimeVisibleAnnotations!r
*+,-4

!"
#$
%'
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%&
6 7)*w3*,2*49>`*@FJ`*L9>``3 3MN;
<='>2;O*W*,S*,W\`*4bf`*@g`*Lbf``W WhNDE'F9GFHVD#@a]iQ,
Njk*,SG+q+:*,2*49>`*@FJ`*L9>`quMxM*,W|N--::+q+6*,2*49>`*@FJ`*L9>``q,Mp,>>Msfw|
TsVTUV#W0X=YFVIZP\T^w_`abcdeafghP;~3*++*+02

&

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1.219 opencsv 3.9

1.220 opensaml-java 2.6.1

1.221 opensaml-java 2.6.6

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1.223 org.objectweb.asm 7.1

1.224 parent-join-client 6.5.4

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1.234 regexp 2.7.2

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1.245 rxnetty-contexts 0.4.9

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1.281 spring-data-keyvalue 2.1.10

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1.282 spring-data-redis 2.1.10

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1.286 spring-integration-core 5.1.7

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1.287 spring-integration-jmx 5.1.7

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1.288 spring-integration-kafka 3.1.0

1.289 spring-integration-tuple 1.0.0

1.290 spring-jcl 5.1.9

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1.295 spring-plugin-metadata 1.2.0

1.296 spring-retry 1.2.4

1.297 spring-security-config 5.1.6

1.298 spring-security-core 5.1.6

1.299 spring-security-crypto 5.1.6

1.300 spring-security-jwt 1.0.10

1.301 spring-security-jwt 1.0.8

1.302 spring-security-oauth2 2.3.6

1.303 spring-security-rsa 1.0.7

1.304 spring-security-saml2 1.0.9

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1.305 spring-security-web 5.1.6

1.306 spring-session-core 2.1.8

1.307 spring-session-data-redis 2.1.8

1.308 spring-tuple 1.0.0

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1.309 spring-tx 5.1.9

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1.310 spring-vault-core 2.1.2

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```
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*/

package org.springframework.test.context.junit4.orm.domain;

/**
* DriversLicense POJO.
*
* @author Sam Brannen
* @since 3.0
*/
public class DriversLicense {

 private Long id;

 private Long number;


 public DriversLicense() {
 }

 public DriversLicense(Long number) {
  this(null, number);
 }

 public DriversLicense(Long id, Long number) {
  this.id = id;
  this.number = number;
 }

 public Long getId() {
  return this.id;
 }

 protected void setId(Long id) {
  this.id = id;
 }

 public Long getNumber() {
  return this.number;
 }

 public void setNumber(Long number) {
  this.number = number;
 }

}
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hibernate-mapping PUBLIC "-//Hibernate/Hibernate Mapping DTD//EN"
  "https://hibernate.org/dtd/hibernate-mapping-3.0.dtd">

<hibernate-mapping auto-import="true" default-lazy="false">

 <class name="org.springframework.test.context.junit4.orm.domain.DriversLicense" table="drivers_license">
  <id name="id" column="id">
   <generator class="identity" />
  </id>
  <property name="number" column="license_number" />
 </class>

</hibernate-mapping>
/*
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*/

package org.springframework.orm.jpa.domain;

import javax.persistence.Entity;
import javax.persistence.Id;
import javax.persistence.Table;

@Entity
@Table(name="DRIVERS_LICENSE")
public class DriversLicense {

 @Id
 private int id;

 private String serial_number;


 protected DriversLicense() {
 }
```

```
public DriversLicense(String serialNumber) {
 this.serial_number = serialNumber;
}

public String getSerialNumber() {
 return serial_number;
}

}
```

1.315 springfox-core 2.9.2

1.316 springfox-schema 2.9.2

1.317 springfox-spi 2.9.2

1.318 springfox-spring-web 2.9.2

1.319 springfox-swagger-common 2.9.2

1.320 springfox-swagger2 2.9.2

1.320.1 Available under license :

2
SourceFileLicenseMapper.javaRuntimeVisibleAnnotationsLjava/lang/annotation/Target;value"Ljava/lang/annotation/ElementType;METHOD
Ljava/lang/annotation/Retention;&Ljava/lang/annotation/RetentionPolicy;SOURCERuntimeInvisibleAnnotationsLorg/mapstruct/Qualifier;>springfox/documentation/swagger2/mappers/LicenseMapper$LicenseLicenseInnerClassesjava/lang/Objectjava/lang/annotation/Annotation6springfox/documentation/swagger2/mappers/LicenseMapper&[e
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1.321 stax-ex 1.8

1.322 sundr-codegen 0.18.0

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1.323 sundr-core 0.18.0

1.324 swagger 1.5.20

1.325 swagger 1.5.10

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```
package io.swagger.models;

import com.fasterxml.jackson.annotation.JsonAnyGetter;
import com.fasterxml.jackson.annotation.JsonAnySetter;

import java.util.HashMap;
import java.util.Map;

public class License {
  private final Map<String, Object> vendorExtensions = new HashMap<String, Object>();
  private String name;
  private String url;

  public License name(String name) {
    setName(name);
    return this;
  }

  public License url(String url) {
    setUrl(url);
    return this;
  }

  public String getName() {
    return name;
  }

  public void setName(String name) {
    this.name = name;
  }

  public String getUrl() {
    return url;
  }

  public void setUrl(String url) {
    this.url = url;
  }

  @JsonAnyGetter
  public Map<String, Object> getVendorExtensions() {
    return vendorExtensions;
  }

  @JsonAnySetter
  public void setVendorExtension(String name, Object value) {
```

```
        if (name.startsWith("x-")) {
            vendorExtensions.put(name, value);
        }
    }

    @Override
    public int hashCode() {
        final int prime = 31;
        int result = 1;
        result = prime * result + ((name == null) ? 0 : name.hashCode());
        result = prime * result + ((url == null) ? 0 : url.hashCode());
        return result;
    }

    @Override
    public boolean equals(Object obj) {
        if (this == obj) {
            return true;
        }
        if (obj == null) {
            return false;
        }
        if (getClass() != obj.getClass()) {
            return false;
        }
        License other = (License) obj;
        if (name == null) {
            if (other.name != null) {
                return false;
            }
        } else if (!name.equals(other.name)) {
            return false;
        }
        if (url == null) {
            if (other.url != null) {
                return false;
            }
        } else if (!url.equals(other.url)) {
            return false;
        }
        return true;
    }
}
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```

```
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*/

package io.swagger.annotations;

import java.lang.annotation.ElementType;
import java.lang.annotation.Retention;
import java.lang.annotation.RetentionPolicy;
import java.lang.annotation.Target;

/**
* License metadata available within the info section of a Swagger definition, see
* https://github.com/OAI/OpenAPI-Specification/blob/master/versions/2.0.md#licenseObject
*
* @since 1.5.0
*/

@Target(ElementType.ANNOTATION_TYPE)
@Retention(RetentionPolicy.RUNTIME)
public @interface License {

  /**
   * The name of the license.
   *
   * @return the name of the license
   */
  String name();

  /**
   * An optional URL for the license.
   *
   * @return an optional URL for the license.
   */
  String url() default "";
}
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1.326 swagger-annotations 1.5.22

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1.327 t-digest 3.2

1.328 tomcat-embed-el 9.0.22

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1.329 transport 6.5.4

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1.331 txw2 2.3.1

1.332 TypeTools 0.5.0

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OW2

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org.ow2.asm:asm-commons
org.ow2.asm:asm

Apache

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org.apache.taglibs:taglibs-standard-spec
org.apache.taglibs:taglibs-standard-impl

MortBay

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following Apache Tomcat jars, all ASL2 licensed.

org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api

org.apache.tomcat:tomcat-el-api
org.apache.tomcat:tomcat-jasper-el
org.apache.tomcat:tomcat-api
org.apache.tomcat:tomcat-util-scan
org.apache.tomcat:tomcat-util

org.mortbay.jasper:apache-el
org.apache.tomcat:tomcat-jasper-el
org.apache.tomcat:tomcat-el-api

Mortbay

The following artifacts are CDDL + GPLv2 with classpath exception.

https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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* org.eclipse.jetty.orbit:javax.security.auth.message

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* org.eclipse.jetty.orbit:javax.mail.glassfish

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* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

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* java.sun.security.ssl

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* org.eclipse.jetty.orbit:javax.security.auth.message

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* org.eclipse.jetty.orbit:javax.mail.glassfish

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https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
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module is selected.

* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications
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http://openjdk.java.net/legal/gplv2+ce.html

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org.ow2.asm:asm-commons
org.ow2.asm:asm

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org.apache.taglibs:taglibs-standard-spec
org.apache.taglibs:taglibs-standard-impl

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org.mortbay.jasper:apache-jsp
 org.apache.tomcat:tomcat-jasper
 org.apache.tomcat:tomcat-juli
 org.apache.tomcat:tomcat-jsp-api
 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

org.mortbay.jasper:apache-el
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-el-api

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The following artifacts are CDDL + GPLv2 with classpath exception.

https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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* org.eclipse.jetty.orbit:org.eclipse.jdt.core

The following artifacts are EPL and ASL2.
* org.eclipse.jetty.orbit:javax.security.auth.message

The following artifacts are EPL and CDDL 1.0.
* org.eclipse.jetty.orbit:javax.mail.glassfish

Oracle

The following artifacts are CDDL + GPLv2 with classpath exception.
https://glassfish.dev.java.net/nonav/public/CDDL+GPL.html

* javax.servlet:javax.servlet-api
* javax.annotation:javax.annotation-api
* javax.transaction:javax.transaction-api
* javax.websocket:javax.websocket-api

Oracle OpenJDK

If ALPN is used to negotiate HTTP/2 connections, then the following
artifacts may be included in the distribution or downloaded when ALPN
module is selected.

* java.sun.security.ssl

These artifacts replace/modify OpenJDK classes. The modifications
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http://openjdk.java.net/legal/gplv2+ce.html

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org.ow2.asm:asm-commons
org.ow2.asm:asm

Apache

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org.apache.taglibs:taglibs-standard-spec
org.apache.taglibs:taglibs-standard-impl

MortBay

The following artifacts are ASL2 licensed. Based on selected classes from following Apache Tomcat jars, all ASL2 licensed.

org.mortbay.jasper:apache-jsp
org.apache.tomcat:tomcat-jasper
org.apache.tomcat:tomcat-juli
org.apache.tomcat:tomcat-jsp-api
org.apache.tomcat:tomcat-el-api
org.apache.tomcat:tomcat-jasper-el
org.apache.tomcat:tomcat-api
org.apache.tomcat:tomcat-util-scan
org.apache.tomcat:tomcat-util

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org.eclipse.jetty.toolchain:jetty-schemas

Assorted

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 org.apache.tomcat:tomcat-el-api
 org.apache.tomcat:tomcat-jasper-el
 org.apache.tomcat:tomcat-api
 org.apache.tomcat:tomcat-util-scan
 org.apache.tomcat:tomcat-util

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Source: http://ant.apache.org/
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Source: http://jakarta.apache.org/regexp
Used By: BCEL.jar which is used by XSLTC component of xml-xalan/java

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Used By: XSLTC component of xml-xalan/java

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Integrated with Xalan-Java 2 and Xerces 2.
Source: http://svn.apache.org/viewvc/xml/stylebook/
Used by: Xalan-Java 2, Xalan-C++

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1.343 xerces-j 2.12.0

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1.344 xml-apis-ext 1.3.04

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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