KIP-653: Upgrade log4j to log4j2

Status

Current state: Accepted

Discussion thread: thread

JIRA: KAFKA-9366

Please keep the discussion on the mailing list rather than commenting on the wiki (wiki discussions get unwieldy fast).

Motivation

In May 2012, the log4j dev team released log4j 1.2.17 and stopped their support to 1.x releases. And from then on, Apache Kafka is still using it in its core and the other subprojects.

The problem caused by the obsolete log4j version is not limited to security problems like CVE-2019-17571. Most users are now familiar with log4j2 (2.x) syntax, not 1.x. For this reason, when they are trying to customize the logging of Apache Kafka or Kafka Connect, they have to work with outdated, dismissed old configuration format.

This KIP proposes to upgrade the log4j 1.x dependencies into log4j2 from the Server-side of Kafka. (For the exact definition of 'server-side', please refer to the 'Which modules will be influenced?' subsection.)

Public Interfaces

This KIP proposes the following:

1. Replace server-side dependency from log4j into log4j2, along with their slf4j bindings.
2. User-interfacing configurations (like broker logging config), provide additional log4j2-equivalent configuration with backward compatibility.
3. For non-user interfacing configurations (like test config), all of them will be migrated into log4j2.

Proposed Changes

0. Which modules will be influenced?

The following modules will be updated:

- clients: core, metadata, raft, server-common, and storage modules are directly dependent on clients module. So, We should include it.
- connect
- core
- metadata
- raft
- storage
- streams: this module directly depends on clients.
- embedded zookeeper

The following modules are not the scope of this proposal with some reasons:

- log4j-appender: This module should not be touched for the users, and its log4j2 equivalent should be provided independently. However, it is above the scope of this proposal.
- tools: VerifiableLog4jAppender depends on log4j-appender. So, we can't migrate them until log4j2-appender is ready.

- trogdor: As of this KIP was passed, trogdor was a part of tools. So, it was excluded.

1. clients

slf4j, log4j dependencies (org.slf4j:slf4j-log4j12, log4j:log4j) will be upgraded into log4j2 (org.apache.logging.log4j:log4j-slf4j-impl, org.apache.logging.log4j). The test logging configuration (src/test/resources/log4j.properties) will be migrated into log4j2. (In this case, we don't care about the backward-compatibility.)

2. connect

slf4j, log4j 1.x dependencies will be upgraded into log4j2 and additional log4j2 configuration file will be provided.

For backward compatibility, Kafka broker will use the log4j configuration file (connect-log4j2.properties) by default. But for informational purpose, the following message will be shown when user launches connect-standalone.sh, connect-mirror-maker.sh, and connect-distributed.sh:

```
DEPRECATED: using log4j 1.x configuration. To use log4j 2.x configuration, run with: 'export KAFKA_LOG4J_OPTS=\"
-Dlog4j.configurationFile=file:$base_dir/../config/connect-log4j2.properties\"'
```

As the message above states, the user can run Kafka broker with log4j2 config file by setting `export KAFKA_LOG4J_OPTS="-Dlog4j.configurationFile={log4j2-config-file-path}"`. Thanks to log4j12-api, a compatibility bridge between log4j and log4j2, Kafka broker can be run without any changes. Since a log4j2 equivalent for traditional built-in log4j config (log4j2.properties) will be provided, the user can make use of it if they want.

The test logging configuration (src/test/resources/log4j.properties) will be updated into log4j2.

3. core

Like connect, slf4j, log4j 1.x dependencies will be upgraded into log4j2 and additional log4j2 configuration file will be provided.

For backward compatibility, Kafka broker will use the log4j configuration file (log4j2.properties) by default. But for informational purpose, the following message will be shown when user launches kafka-server-start.sh:

```
DEPRECATED: using log4j 1.x configuration. To use log4j 2.x configuration, run with: 'export KAFKA_LOG4J_OPTS="-
Dlog4j.configurationFile=file:$base_dir/../config/log4j2.properties"'
```

The test logging configuration (src/test/resources/log4j.properties) will be migrated into log4j2, also.

4. metadata

slf4j, log4j 1.x dependencies will be upgraded into log4j2 and the he test logging configuration (src/test/resources/log4j.properties) will be migrated into log4j2.

5. raft

Similar to connect and core. If the user launches test-kraft-server-start.sh, the following message will be shown:

```
DEPRECATED: using log4j 1.x configuration. To use log4j 2.x configuration, run with: 'export KAFKA_LOG4J_OPTS="-
Dlog4j.configurationFile=file:$base_dir/../config/kraft-log4j2.properties"'
```

6. storage

slf4j, log4j 1.x dependencies will be upgraded into log4j2 and the he test logging configuration (src/test/resources/log4j.properties) will be migrated into log4j2.

7. streams

slf4j, log4j 1.x dependencies will be upgraded into log4j2 and the he test logging configuration (src/test/resources/log4j.properties) will be migrated into log4j2.

Archetype log4j configuration will be updated into log4j2 equivalent (log4j2.properties).

8. embedded zookeeper

Kafka provides an embedded zookeeper functionality with `zookeeper-server-start.[sh|bat]`. Since zookeeper's dynamic log level change feature depends on log4j 1.x (especially, Log4j MBean registration feature. see 'Run a JMX console' section here.), we will not support this functionality anymore. If the user runs `zookeeper-server-start.[sh|bat]`, the following message will be displayed:

```
Running with log4j 2.x - Log4j MBean registration is not supported.
```

Compatibility, Deprecation, and Migration Plan

At some time or other,the default logging configuration format will be switched into log4j2. In that point, the informational message launcher scripts of core, connect, and raft will be also changed into like the following:

```
Using log4j 2.x configuration. To use log4j 1.x configuration, run with: 'export KAFKA_LOG4J_OPTS="-Dlog4j.
configuration=file:$base_dir/../config/log4j.properties"'
```

Rejected Alternatives

None.