Apache Cassandra : What's New

New Features

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New Features in Apache Cassandra 5.0

This section covers the new features in Apache Cassandra 5.0.

- Storage Attached Indexes: **Docs**, CEP-7, JIRA ticket
- Trie memtables: CEP-19, JIRA ticket
- Trie SSTables: CEP-25, JIRA ticket
- JDK 17: **Docs**, JIRA ticket
- More guardrails: NEWS.txt
- TTL and writetime on collections and UDTs: **Docs**, JIRA ticket
- New vector data type: **Docs**, CEP-30, JIRA ticket
- New vector similarity functions: **Docs**, CEP-30, JIRA ticket
- Unified Compaction Strategy: **Docs**, CEP-26, JIRA ticket
- New Mathematical CQL functions: abs, exp, log, log10 and round: **Docs**, JIRA ticket
- Dynamic Data Masking: **Docs**, CEP-20, JIRA ticket
- New CIDR authorizer: CEP-33, JIRA ticket
- Extend maximum expiration date (TTL): NEWS.txt, JIRA ticket
- New CQL native scalar functions for collections: JIRA ticket
- New sstablepartitions offline tool to find large partitions: JIRA ticket
- New snitch for Microsoft Azure: JIRA ticket
- Pluggable crypto provider: JIRA ticket
- New virtual table to view system logs: JIRA ticket

Support for Java

Support for Java

The support matrix for the Java versions for compiling and running **Apache Cassandra** is detailed in Table 1. The build version is along the vertical axis and the run version is along the horizontal axis.

Table 1. Support Matrix for Java

	Java 11 (Run)	Java 17 (Run)
Java 11 (Build)	Supported	Experimental Support
Java 17(Build)	Not Supported	Experimental in CI

Apache 5.0 source code built with Java 17 cannot be run with Java 11. All binary releases are built with Java 11.

Using Java 11 to Build

To start with, install Java 11. As an example, for installing Java 11 on RedHat Linux the command is as follows:

```
$ sudo yum install java-11-openjdk
```

Set the environment variables JAVA_HOME and PATH.

```
$ export JAVA_HOME=/usr/lib/jvm/java-11-openjdk
$ export PATH=$PATH:$JAVA_HOME/bin:$JRE_HOME/bin
```

Download and install Apache Cassandra 5.0 source code from the Git along with the dependencies.

```
$ git clone https://github.com/apache/cassandra.git
```

If Cassandra is already running stop Cassandra with the following command.

```
$ ./nodetool stopdaemon
```

Build the source code from the cassandra directory, which has the build.xml build script. The Apache Ant uses the Java version set in the JAVA_HOME environment variable.

```
$ cd ~/cassandra
$ ant
```

Apache Cassandra 5.0 gets built with Java 11. Set the environment variable for CASSANDRA_HOME in the bash script. Also add the CASSANDRA_HOME/bin to the PATH variable.

```
$ export CASSANDRA_HOME=~/cassandra
$ export PATH=$PATH:$JAVA_HOME/bin:$JRE_HOME/bin:$CASSANDRA_HOME/bin
```

To run Apache Cassandra 5.0 with either of Java 11 or Java 17 run the Cassandra application in the CASSANDRA_HOME/bin directory, which is in the PATH env variable.

```
$ cassandra
```

The Java version used to run Cassandra gets output as Cassandra is getting started. As an example if Java 11 is used, the run output should include similar to the following output snippet:

```
INFO  [main] 2019-07-31 21:18:16,862 CassandraDaemon.java:480 - Hostname: ip-172-30-3-
146.ec2.internal:7000:7001
INFO  [main] 2019-07-31 21:18:16,862 CassandraDaemon.java:487 - JVM vendor/version:
OpenJDK
64-Bit Server VM/11.0.3
INFO  [main] 2019-07-31 21:18:16,863 CassandraDaemon.java:488 - Heap size:
1004.000MiB/1004.000MiB
```

The following output indicates a single node Cassandra 5.0 cluster has started.

```
INFO  [main] 2019-07-31 21:18:19,687 InboundConnectionInitiator.java:130 - Listening on
address: (127.0.0.1:7000), nic: lo, encryption: enabled (openssl)
...
...
INFO  [main] 2019-07-31 21:18:19,850 StorageService.java:512 - Unable to gossip with any
peers but continuing anyway since node is in its own seed list
INFO  [main] 2019-07-31 21:18:19,864 StorageService.java:695 - Loading persisted ring
state
INFO  [main] 2019-07-31 21:18:19,865 StorageService.java:814 - Starting up server gossip
INFO  [main] 2019-07-31 21:18:20,088 BufferPool.java:216 - Global buffer pool is enabled,
when pool is exhausted (max is 251.000MiB) it will allocate on heap
INFO  [main] 2019-07-31 21:18:20,110 StorageService.java:875 - This node will not auto
bootstrap because it is configured to be a seed node.
...
...
```

```
INFO  [main] 2019-07-31 21:18:20,809 StorageService.java:1507 - JOINING: Finish joining
ring
INFO  [main] 2019-07-31 21:18:20,921 StorageService.java:2508 - Node 127.0.0.1:7000 state
jump to NORMAL
```

Using Java 17 to Build

If Java 17 is used to build Apache Cassandra 5.0, first Java 17 must be installed and the environment variables set. As an example, to download and install Java 17 on RedHat Linux run the following command.

```
$ yum install java-17-openjdk
```

Set the environment variables JAVA_HOME and PATH.

```
$ export JAVA_HOME=/usr/lib/jvm/java-17-openjdk
$ export PATH=$PATH:$JAVA_HOME/bin:$JRE_HOME/bin
```

The build output should now include the following.

```
[echo] Non default JDK version used: 17
...
...
_build_java:
    [echo] Compiling for Java 17
...
...
build:

_main-jar:
         [copy] Copying 1 file to /home/ec2-user/cassandra/build/classes/main/META-INF
      [jar] Building jar: /home/ec2-user/cassandra/build/apache-cassandra-5.0-SNAPSHOT.jar
...
...
_build-test:
   [javac] Compiling 739 source files to /home/ec2-user/cassandra/build/test/classes
    [copy] Copying 25 files to /home/ec2-user/cassandra/build/test/classes
...
...
jar:
   [mkdir] Created dir: /home/ec2-user/cassandra/build/classes/stress/META-INF
   [mkdir] Created dir: /home/ec2-user/cassandra/build/tools/lib
     [jar] Building jar: /home/ec2-user/cassandra/build/tools/lib/stress.jar
```

```
     [mkdir] Created dir: /home/ec2-user/cassandra/build/classes/fqltool/META-INF
       [jar] Building jar: /home/ec2-user/cassandra/build/tools/lib/fqltool.jar

BUILD SUCCESSFUL
Total time: 1 minute 3 seconds
```

Common Issues

The Java 17 built Apache Cassandra 5.0 source code may be run with Java 17 only. If a Java 17 built code is run with Java 11 the following error message gets output.

```
$ echo $JAVA_HOME
/usr/lib/jvm/java-11-openjdk
$ cassandra
...
...
Error: LinkageError occurred while loading main class
org.apache.cassandra.service.CassandraDaemon
    java.lang.UnsupportedClassVersionError: org/apache/cassandra/service/CassandraDaemon
has been compiled by a more
recent version of the Java Runtime (class file version 61.0), this version of the Java
Runtime only recognizes class file
versions up to 55.0
...
```