New !

New and upcoming features in Apache Tomcat ™

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Contents

New Features

TLS 1.3 support

TLS 1.3 support on OpenSSL 1.1.1+, including PHA

TLS 1.3 support on Java 11+, without PHA

APR connector support for JSSE configuration

Allows using JSSE keystores and truststores

Aims at making connector independent of the TLS configuration used

TLS session cache size and timeout configuration

Asynchronous IO API for NIO and APR

Previously NIO 2 only, now with NIO and APR support in Tomcat 9.0.21+

Same behavior and API as for NIO 2

Verified and tested using HTTP/2 and Websockets

APR disabled by default due to lower performance

HTTP/2 enhancements

ALPN ready with Java 9+ JSSE

Reliability and security improvements

NIOx improvements using asynchronous IO:

- Gather semi blocking frame writes
- Scatter async frame reads
- Memory mapping with gather writes for static files

Reactive IO

Allows suspending and resuming Servlet 3.1 input IO events

Suspend / resume included for WebSockets

Taken advantage of by frameworks like Spring

Possible inclusion in Servlet.next specification

See Reactive IO in Tomcat presentation from Apache EU Roadshow 2018

Reactive IO WebSockets support

Suspend / resume methods on WsSession

WsSession.suspend()

WsFrame now filters out the Servlet 3.1 onDataAvailable events

Until WsSession.resume()

Cluster traffic encryption

Simple cluster traffic encryption

Use the org.apache.catalina.tribes.group.interceptors.EncryptInterceptor interceptor

Set a shared encryptionKey across the cluster

Static cluster membership

Single membership provider replaces complex setup

Use org.apache.catalina.tribes.membership.StaticMembershipService

Cloud membership provider

Multicast needed for cluster member discovery

Static membership is not flexible

Need something ready to use

Need to support as many cloud providers as possible

Kubernetes support

Uses Kubernetes API, now supported by most major providers

JSON list of members

Processed using a special implementation of the cluster membership service

Integrated in Tomcat 9.0.13+

See Tomcat: From a cluster to the cloud from ApacheCon EU 19 presentation for more details

Tomcat configuration source

Allows abstracting access to Tomcat configuration files

Default Catalina implementation now standardizes locations for all files:

- File system access based on CATALINA_BASE
- Classloader based on the resource name
- URL resolution based on the resource name
- server.xml also gets resolved as the legacy server-embed.xml using the classloader

Easier Tomcat embedded

The startup.Tomcat class used for embedding can now set a configuration source

Use Tomcat.init(ConfigurationSource mySource)

Allows using a regular server.xml for easier configuration before calling startup.Tomcat

Cloud functionality

Improved CDI 2 integration using Apache OpenWebBeans

Better user experience using optional server listeners

User friendly CDI 2 and JAX-RS (using Apache CXF) packaging

Partial Eclipse Microprofile support

Build them from modules/owb and modules/cxf from Tomcat git

Improved Tomcat containers

Maven based build, produces a fat Tomcat JAR

Add your custom Tomcat components sources, web applications and tomcat-native binaries

Container build file provided and tested, simple and lightweight

Monitoring included (Jolokia and Prometheus)

Configured using the usual server.xml, web.xml, context.xml, etc

Graal support

Graal is a special, polyglot JVM with Java 8 support, developed by Oracle

Ability to generate native images for Tomcat standalone or embedded

Tomcat now handles Graal as a specific JVM

Can use the Maven based build which produces a fat Tomcat JAR

On demand Tomcat services are doable: very fast startup and minimal base memory use

Tomcat fixes for Graal

Disable JMX

Simpler implementation of JSP runtime library

Simpler JNDI reference resolution

Some listeners from default config are incompatible

Provide base json descriptors for native image generation

Graal descriptors and scripts

Needed for any dynamic classloading or reflection

Descriptors for Tomcat reflection use and resource bundles are now provided

Start Graal substrate VM with a specific agent to generate descriptors for your webapp

Scripts allow building a native image that includes your webapps

See Apache Tomcat, your Webapp and the Graal at ApacheCon EU 19 for the full process

Jakarta EE TCKs

Verify compatibility with EE TCKs, investigate issues, fix Tomcat bugs and report TCK problems

- Servlets 4.0
- JSP 2.3
- EL 3.0
- WebSocket 1.1

Refactored background threads

Scheduled executor available on the Server for any utility tasks

Background thread count reduction in all Tomcat components

Background processing reliability improvements

i18n overhaul

POEditor project for Apache Tomcat, feel free to join and help !

Fix all non internationalized strings in Tomcat components

Full French, Korean and Japanese i18n

Many other WIP languages, but slower progress

Migration to Git and Github

https://github.com/apache/tomcat and https://gitbox.apache.org/repos/asf?p=tomcat.git

More modern infrastructure and capabilities

Three branches: master (9.0.x), 8.5.x, 7.0.x

Tomcat SVN repository is now archived

More new features

Automatic reload of tomcat-users.xml after updates

Multithreaded JSP precompilation Ant task support

NIO2 connector thread count reduction by removing acceptor thread

NIO2 asynchronous IO API now available in Tomcat 8.5.39+

More flexible optional Server listeners

Even more new features

Allow disabling JMX for embedded

Directory listing sorting

Better HTTP/2 defaults

Decouple socket from its wrapper after close to improve security

Yet more new features

Same-site cookie attribute

Property source implementation for environment variables

Plans for Tomcat 9.x and .next

(yes, you can contribute)

Long term support for EE 8 APIs

Long term support for javax.* package in Tomcat

Servlets, JSP, EL and WebSockets

Allows unchanged webapps that run on current Tomcat 9

Jakarta EE.next support

Jakarta EE at Eclipse and Apache Tomcat in 2019

Move to jakarta.* API packages in Tomcat.next

- Servlets .next
- WebSocket .next
- Reactive streams API
- More ?

[9.x] HTTP/2 improvements

Resource use improvements

Profiling and performance study

DoS resilience study and better defaults

Improve core HTTP/2 implementation using existing tests (prioritization and caching)

HTTP/2 extensions

Coyote cleanups and improvements

APR connector removal

AJP removal

Native improvements

Removal of APR dependency if APR connector removal

Support of OpenSSL clones

Modernization of native code

Possible use of project Panama ?

HTTP/3 in Tomcat

QUIC support (UDP framing protocol)

QPACK support

DTLS using OpenSSL

HTTP/3 implementation

Configuration improvements

Attributes cleanup (SSL is the most obvious)

System properties removal

Additional JMX beans as needed

Minor changes with risk or dependencies

Encoding defaults to UTF-8 for more items

Various parsing changes

ExtensionValidator removal with Java 9+

Wrapping up