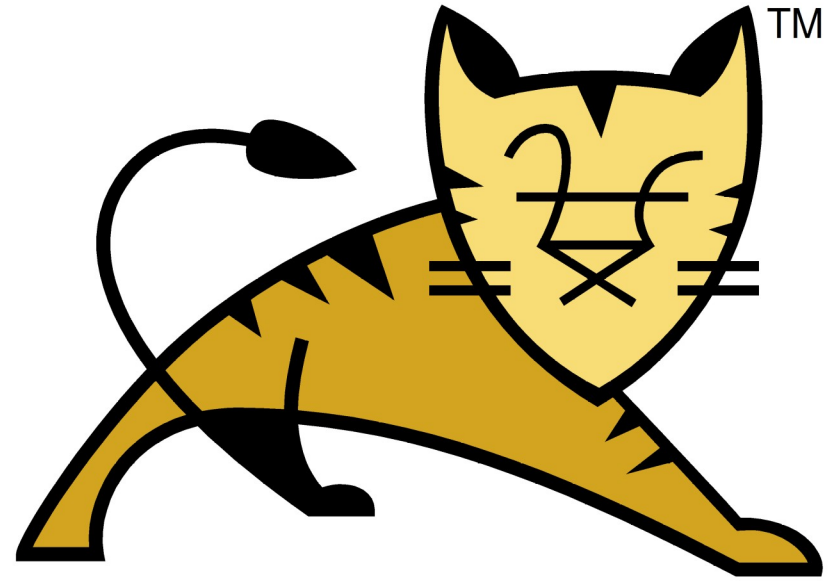


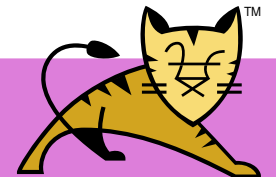
LOST IN THE DOCS

Felix Schumacher
Tomcat & JMeter
fschumacher@apache.org



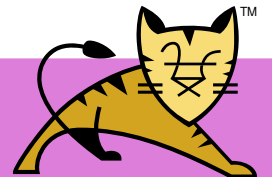
AGENDA

- Where to find documentation
- Interesting bits found in the deep labyrinth of documentation



CONVENTIONS USED ON THE SLIDES

- Shorten long package names from `org.apache.tomcat` to `o.a.t` (or `c` for `catalina`)



LOST IN THE DOCS

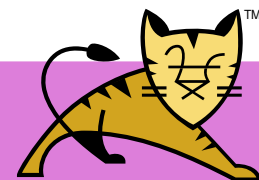
- Possible reasons
 - Not reading the docs
 - Too much docs
 - Too many features
 - Source-Documented



HOW TO READ THE DOCS

Four main sources for documentation

- User Guide
- Reference
- Wiki
- Source

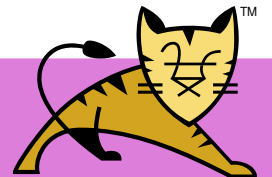


DOCS: TOMCAT USER GUIDE

Common use cases with sample code

<https://tomcat.apache.org/tomcat-9.0-doc>

When in doubt **Start here**



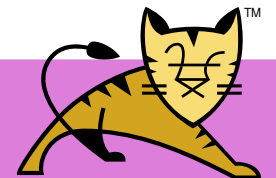
DOCS: REFERENCE

List of all configurable elements

Grouped by function

<https://tomcat.apache.org/tomcat-9.0-doc/config/index.html>

Good when you **know what to look for**

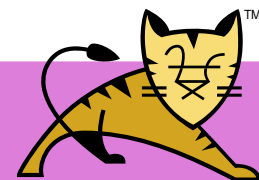


DOCS: WIKI

Community generated content

<https://cwiki.apache.org/confluence/display/TOMCAT>

Helpful when you are looking for broader
information about general usage



DOCS: SOURCE

Who needs documentation anyway

<https://github.com/apache/tomcat/>

Right place when you think documentation is **wrong or missing**



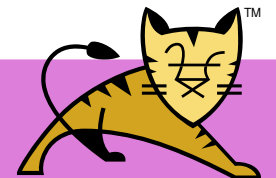
DOCS: OTHER SOURCES

Have a look around on the internet

E.g. by searching “`site:tomcat.apache.org stuck thread`” or use the mailing list

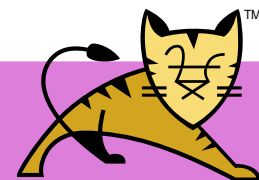
<http://tomcat.apache.org/lists.html>

For hard problems **mailing list is really helpful**



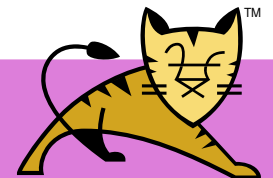
LOST IN THE DOCS

- Randomly picked interesting topics
- Subjective choice



PARALLEL DEPLOYMENT

- Enables deploying of new versions of your software without interruption
- Routes sessions to the correct version of your app
- Removes old versions when they are not used anymore (`undeployOldVersions`)

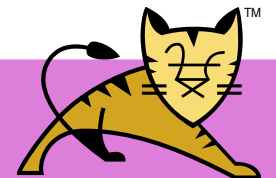


PARALLEL DEPLOYMENT MORE DOCS

Mentioned in Tomcat Reference and User Guide:

<https://tomcat.apache.org/tomcat-9.0-doc/config/context.html>

<https://tomcat.apache.org/tomcat-9.0-doc/manager-howto.html>

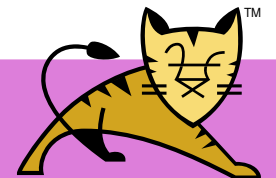


PARALLEL DEPLOYMENT USAGE

Deploy a new WAR with a name ending on
##VERSION_STRING

Example: R00T##001.war

Look out for warnings in the logs. You may hold on to your objects too tightly.



LOST IN SYSTEM PROPS

Tomcat can be fine tuned using quite a few system properties

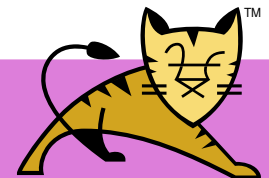
They are listed at the reference section

<http://tomcat.apache.org/tomcat-9.0-doc/config/systemprops.html>



LOST IN TOO MANY SYSTEM PROPS

- System props can be defined in `conf/catalina.properties`
- `CATALINA_OPTS` is used on startup only
- System props are set for the whole JVM
- Location of `catalina.properties` can be specified by `catalina.config` property



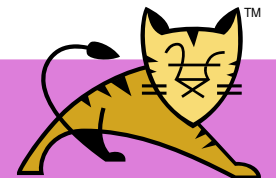
PROPERTY_SOURCE

Inserts values into Tomcat's configuration files (`context.xml`, `server.xml`, `web.xml`)

New PropertySource that reads values from environment variables

Mentioned in Tomcat Reference:

<https://tomcat.apache.org/tomcat-9.0-doc/config/systemprops.html>



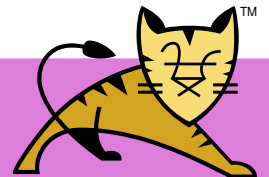
PROPERTY_SOURCE USAGE

In config file reference a value

```
<Context>  
  <Resource name="jdbc/database"  
    port="${db.port:-5432}" ... />  
</Context>
```

that is set by Java system property

```
CATALINA_OPTS="-Ddb.port=4223"
```



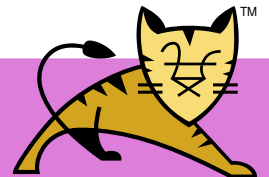
PROPERTY_SOURCE ADVANCED

`o.a.t.util.digester.`

`PROPERTY_SOURCE=my.PropertySource`

Create **my.PropertySource** that
implements

`o.a.t.util.IntrospectionUtils.PropertySource`
and place it in `${CATALINA_BASE}/lib`

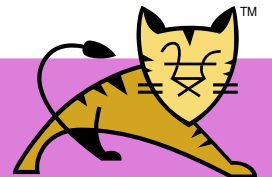


RECYCLE_FACADES

Tomcat is re-using request/response objects

If you are **holding** onto those objects, you will get in **trouble**

This option gives you a new one every time

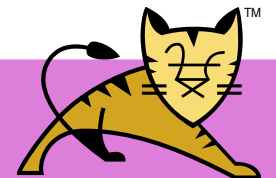


RECYCLE_FACADES

Set `o.a.c.connector.RECYCLE_FACADES` to **true**

Mentioned in Tomcat Reference

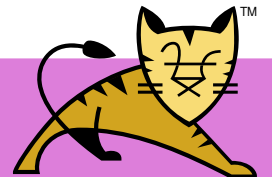
<https://tomcat.apache.org/tomcat-9.0-doc/config/systemprops.html>



DEFAULTS FOR VIRTUAL HOSTS

Tomcat can set defaults for web.xml and context.xml based on virtual hosts

Useful to customize webapps for different parties on the same instance



DEFAULTS FOR VIRTUAL HOST PREPS

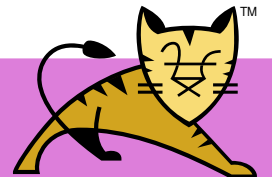
Add a virtual host to `server.xml` inside `Engine` tag

```
<Host name="customerone"  
      appBase="portal-webapps"  
      unpackWars="true"  
      autoDeploy="true" />
```

Create the `webapps` and `conf` folder

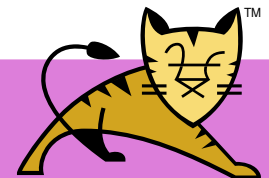
```
$ mkdir -p conf/Catalina/customerone
```

```
$ mkdir portal-webapps
```



DEFAULTS FOR VIRTUAL HOSTS USAGE

- Put **web.xml.default** and/or **context.xml.default** files in `conf/Catalina/customerone`
- Possible content is same as `web.xml` and `context.xml`
- Order of element lookup in the files is
 - 1) Files deployed with the webapp
 - 2) Files found in the virtual host config dir
 - 3) Files found in the default host
(which is called `localhost` in default setup)



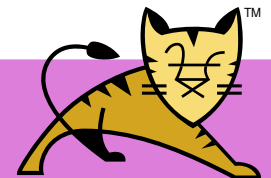
DEFAULTS FOR VIRTUAL HOSTS

Mentioned in Tomcat Reference

<https://tomcat.apache.org/tomcat-9.0-doc/config/context.html>

Mentioned in Tomcat User Guide

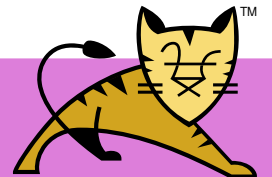
<https://tomcat.apache.org/tomcat-9.0-doc/virtual-hosting-howto.html>



SOURCE CODE DOCS

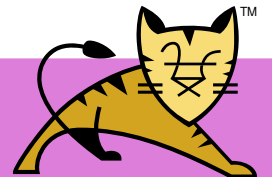
A new way of Tomcat's cluster setup using Kubernetes is documented in the source only

OK, it can be found in the wiki, too



CLUSTER SETUP FOR KUBERNETES

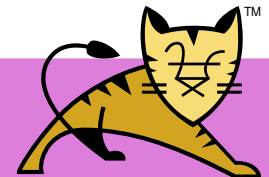
- Tomcat's builtin session replication uses multicast to find cluster nodes
- Kubernetes doesn't like multicast
- Configure Membership Provider for Kubernetes
- Configure your application on Kubernetes



CLUSTER SETUP FOR KUBERNETES (TOMCAT SIDE)

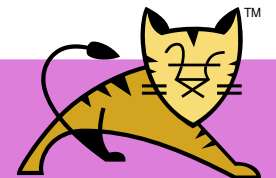
Add a cluster definition in server.xml to your Engine or Host tag

```
<Cluster className="org.apache.catalina.ha.tcp.SimpleTcpCluster">  
  <Channel  
    className="org.apache.catalina.tribes.group.GroupChannel">  
    <Membership  
      className="o.a.c.t.membership.cloud.CloudMembershipService" />  
    </Membership>  
  </Channel>  
</Cluster>
```



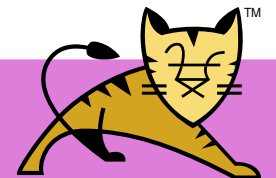
CLUSTER SETUP DOCS

- <https://www.slideshare.net/jfclere/from-a-cluster-to-the-cloud>
- <https://github.com/jfclere/tomcat-kubernetes>
- <https://cwiki.apache.org/confluence/display/tomcat/ClusteringCloud>



VALVES

- A small selection of built-in valves
 - StuckThreadDetectionValve
 - SemaphoreValve
 - RewriteValve



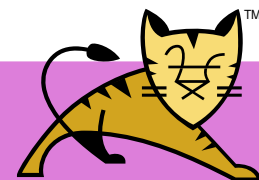
VALVES EXAMPLE 1

- **StuckThreadDetectionValve** detects requests that take too long
- Information about those requests is available through JMX and will be logged
- Optionally interrupts stuck threads



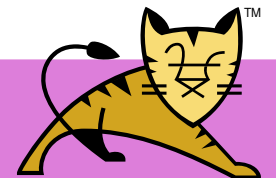
VALVES EXAMPLE 2

- **SemaphoreValve** guards a resource from too much concurrency
- Most useful for synchronous servlets
- Guards all or nothing :(
- Subclasses can control concurrency by overwriting `SemaphoreValve#controlConcurrency(request, response)`



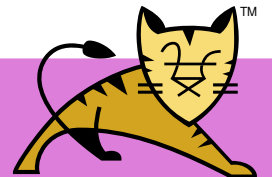
VALVES EXAMPLE 3

- **RewriteValve** mimics Apache httpd rewrite module
- Use it for simple rewrite rules that are read from a file named **rewrite.config**



LOST IN TOO MANY FEATURES

You may be wondering why Tomcat provides **two** different pool implementations for JDBC



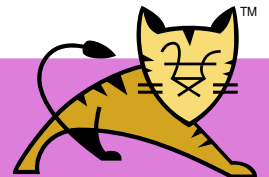
WHICH JDBC POOL

- **jdbc-pool**

fixed problems found in old dbcp based pool
capable of advanced stuff
development has stalled

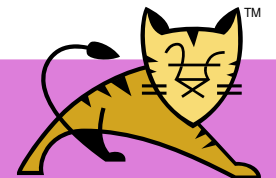
- **tomcat-dbcp**

dbcp2 based pool (fixed the problems with old
dbcp based pool)
is actively maintained



LOST ON THE RUN

An often overlooked gem is the file **RUNNING.txt** in the root directory of a fresh Tomcat installation

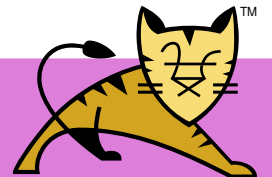


BIN/SETENV.SH

Customize environment settings

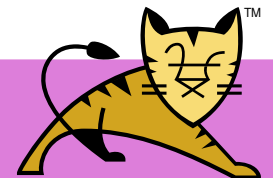
Don't edit catalina.sh or startup.sh

- You don't need to
- Makes updates easier



MULTI-INSTANCE SETUP

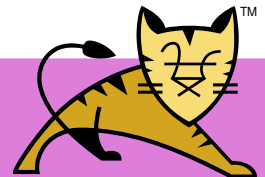
- easy updates and lightweight instances
- CATALINA_HOME
 - points to the extracted binaries downloaded from Tomcat homepage, can be read only
- CATALINA_BASE
 - points to a stripped down installation that gets laid over CATALINA_HOME



MULTI-INSTANCE SETUP

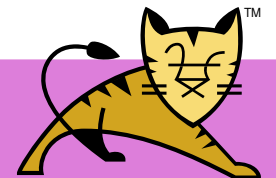
USAGE

```
$ TCV=apache-tomcat-9.0.38
$ mkdir -p /srv/tomcat && cd /srv/tomcat
$ tar xf "/tmp/${TCV}.tar.gz"
$ mkdir -p
tc-instance/{bin,logs,webapps,temp,work}
$ cp -r "${TCV}/conf" tc-instance
$ export CATALINA_HOME="$PWD/${TCV}"
$ export CATALINA_BASE="$PWD/tc-instance"
$ "${CATALINA_HOME}/bin/startup.sh"
```



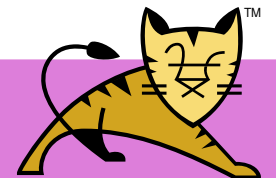
RESOURCE FRAMEWORK

- Every “file” – classes, jars, static resources – in Tomcat is read through the resource framework. (Tomcat 8.5 and up)
- Replaces VirtualDirContext and VirtualWebappClassLoader from Tomcat 7.0 and below



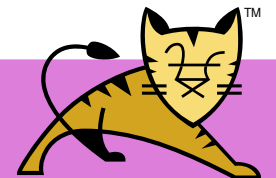
RESOURCES EXAMPLE

```
<Context>  
  <Resources>  
    <PreResources  
      base=  
        "${catalina.base}/special-config.jar"  
      className=  
        "o.a.c.webresources.JarResourceSet"  
      webAppMount=  
        "/WEB-INF/classes" />  
    </Resources>  
</Context>
```



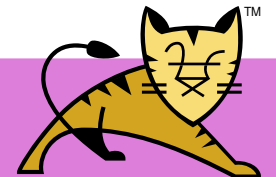
RESOURCES TYPES

- WebResourceSet (Interface)
- DirResourceSet (files as files)
- FileResourceSet (one file as a file)
- JarResourceSet (files inside jar as files)



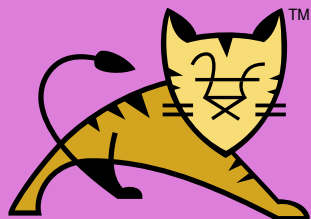
RESOURCES ORDERING

- PreResources
- MainResources
- ClassResources
- JarResources
- PostResources



LOST IN THE DOCS

- Thanks for listening
- Questions?



APACHECON @Home
Sept 29th – Oct 1st 2020

LOST IN THE DOCS

- Thanks for listening
- Find missing docs and add them

