

Embedding Tomcat

Mark Thomas
SpringSource



Agenda

- Introduction
- Background
- A new way to embed
- Single servlet
- Web application
- Differences
- Other features



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INTRODUCTION

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Introduction

- markt@apache.org
- Tomcat committer & PMC member
- Tomcat 7 release manager
- Member of ASF security team
- Member of ASF infra team
- Staff Engineer at SpringSource



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BACKGROUND

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Background

- Tomcat has always been embeddable
- Hasn't always been easy



Background

- * @see [org.apache.catalina.startup.Bootstrap#main](#) For a complete example
- * of how Tomcat is set up and launched as an Embedded application.

```
/**
 * Main method, used for testing only.
 * @param args Command line arguments to be processed
 */
public static void main(String args[]) {
    if (daemon == null) {
        // Don't set daemon until init() has completed
        Bootstrap bootstrap = new Bootstrap();
        try {
            bootstrap.init();
        } catch (Throwable t) {
            handleThrowable(t);
            t.printStackTrace();
            return;
        }
        ...
    }
}
```



Background

- That 'example' doesn't help very much
- Leaves a lot of questions unanswered
 - Which JARs?
 - File system layout?
 - Is all of that code necessary?



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A NEW WAY TO EMBED



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A new way to embed

- Costin has been working on 'Tomcat-Lite'
- Costin wrote a new wrapper:
`org.apache.catalina.startup.Tomcat`
- Much simpler to use
- Added this wrapper to Tomcat 7
- Use it in many of the unit tests



A new way to embed

- Added to build targets to generate JARs suitable for embedding
- Next 7.0.x release will include the embedded JARs
 - Need to modify the build script
- For now:

```
svn co https://svn.apache.org/repos/asf/tomcat/trunk
ant embed-release
cd output/embed
```



A new way to embed

- tomcat-embed-core.jar
 - required
- tomcat-embed-logging-juli.jar
 - required
- tomcat-dbcpc.jar
 - optional, provides connection pooling



A new way to embed

- tomcat-jasper.jar
 - optional, provides JSP support
- ecj-3.6.jar
 - optional, provides JSP support



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SINGLE SERVLET

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Single servlet

- JARs on classpath
 - tomcat-embed-core.jar
 - tomcat-embed-logging-juli.jar
- Single class
 - org.apache.markt>HelloWorld



Single servlet

```
// Create a Tomcat instance  
Tomcat tomcat = new Tomcat();  
  
// Set the port  
tomcat.setPort(8080);
```



Single servlet

```
// Create a context
```

```
File docBase = new File(  
    System.getProperty(  
        "java.io.tmpdir"));
```

```
Context ctxt = tomcat.addContext("",  
    docBase.getAbsolutePath());
```



Single servlet

```
// Add a Servlet
```

```
Tomcat.addServlet(ctxt, "HelloWorld",  
    new HelloWorldServlet());
```

```
ctxt.addServletMapping("/*",  
    "HelloWorld");
```



Single servlet

```
// Start the instance  
tomcat.start();  
  
// Loop to serve requests  
while(true) {  
    Thread.sleep(5000);  
}
```



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SINGLE SERVLET DEMO



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WEB APPLICATION



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Web application

- JARs on classpath
 - tomcat-embed-core.jar
 - tomcat-embed-logging-juli.jar
 - tomcat-embed-jasper.jar
 - ecj-3.6.jar
- Single class
 - org.apache.markt.WebApp



Web application

```
// Create a Tomcat instance
```

```
Tomcat tomcat = new Tomcat();
```

```
// Set the port
```

```
tomcat.setPort(8080);
```



Web application

```
// Create a context
```

```
File docBase = new File(  
    "/Users/mthomas/repos/asf-public/" +  
    "tomcat/trunk/output/build/" +  
    "webapps/examples");
```

```
tomcat.addWebapp(null, "",  
    docBase.getAbsolutePath());
```



Web application

```
// Start the instance  
tomcat.start();  
  
// Loop to serve requests  
while(true) {  
    Thread.sleep(5000);  
}
```



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WEB APPLICATION DEMO



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DIFFERENCES

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Differences

- Tomcat.addContext(...)
 - Completely programmatic
 - You must do everything
 - No default servlet
 - No JSP servlet
 - No welcome files
 - No web.xml parsing
- If you don't code it, it doesn't happen



Differences

- Tomcat.addWebapp(...)
 - Emulates
\$CATALINA_BASE/conf/web.xml
 - Default servlet present
 - JSP servlet present
 - Welcome files configured
 - MIME mappings configured
 - WEB-INF/web.xml parsed



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OTHER FEATURES



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Realms

```
MapRealm realm = new MapRealm();  
  
realm.addUser("tomcat", "tomcat");  
realm.addUserRole("tomcat", "tomcat");  
  
ctx.setRealm(realm);
```



Login configuration

```
LoginConfig config = new  
    LoginConfig();  
config.setAuthMethod("BASIC");  
ctx.setLoginConfig(config);  
ctx.getPipeline().addValve(  
    new BasicAuthenticator());
```



Connector properties

```
Tomcat tomcat = getTomcatInstance();  
  
tomcat.getConnector().setProperty(  
    "maxKeepAliveRequests", "5");  
tomcat.getConnector().setProperty(  
    "soTimeout", "20000");  
tomcat.getConnector().setProperty(  
    "keepAliveTimeout", "50000");
```



Servlet configuration

```
Bug49567Servlet servlet =  
    new Bug49567Servlet();
```

```
Wrapper wrapper = Tomcat.addServlet(  
    ctx, "servlet", servlet);
```

```
wrapper.setAsyncSupported(true);
```

```
ctx.addServletMapping("/", "servlet");
```



Further examples

- Tomcat source code
- Unit tests
- All previous examples taken from here
- Lots of other examples
- CI means they will always be working examples



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QUESTIONS

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