Installing a Tomcat Server

HowTo for Installing an

JSP/Servlet Server

Based on IBM OS/2 Warp 4.5 (MCP),

SUN/Innotek Java 1.4.2 SDK, Apache Tomcat 5.5

and optionally Apache 2.2, MySQL 5.0, PHP 5

(c) 2006 Thorolf.Godawa@GodaCon.de05.11.2006, Version 0.4

Installing a Tomcat Server Preface

I would like to thank InnoTek and all others who worked on the InnoTek GCC for OS/2 project that enabled the OS/2 community to get a lot of great OpenSource Software running on OS/2 using their port of the GCC compiler.

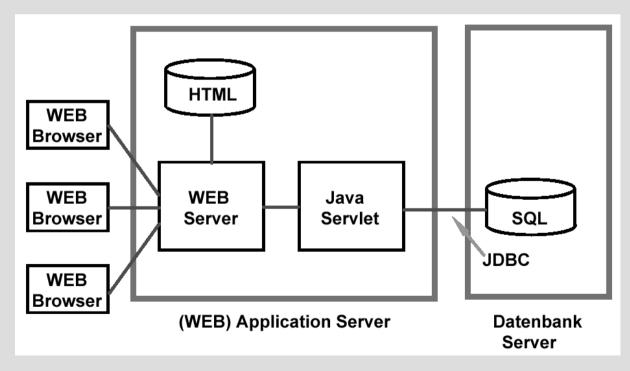
And I would like to especially thank Paul Smedley who is investing a lot time into doing these ports that enabled me to install a web server based on mostly current OpenSource Software!

Installing a Tomcat Server Introduction

- Tomcat is a JSP/servlet container that can serve static HTML code and Java-based dynamic content to web clients. In conjunction with a database server you can create very complex web applications like web portals, online shops or communication platforms.
- A big advantage of using Java is the platform independence and that the web application itself theoretically will run without modification on all J2EEcompatible application servers and other JSP/servlet containers.

Installing a Tomcat Server Introduction

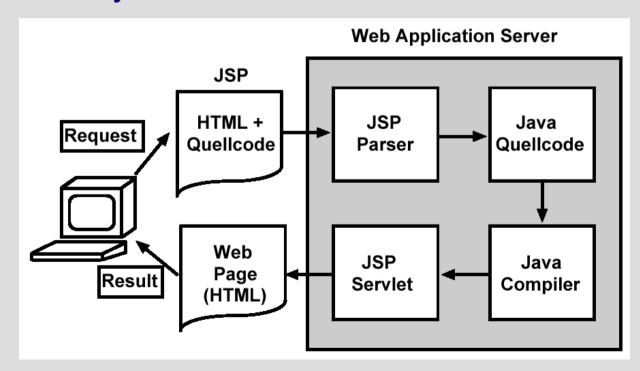
 Servlets are Java programs that are running on the web server like conventional CGIs, for example to get content from HTML forms, analyze it and send back the result.



Java Servlet Engine, source: Spruth 2004

Installing a Tomcat Server Introduction

 Java Server Pages (JSP) are an enhancement of servlets.
 The Java code is embedded in the HTML pages, will be interpreted by the JSP server and send back to the client.



Java Server Pages, source: Spruth 2004

- Prerequisites:
 - IBM OS/2 Warp 4.5 (MCP) with working TCP/IP
 - Copy GCC/LIBC DLLs from libc-0.6.1-csd1 to LIBPATH (e.g., D:\OS2\DLL):
 - gcc335.dll
 - libc06.dll
 - libc061.dll

- Used software:
 - Download SUN/Innotek Java 1.4.2-09 SDK from:
 - http://download.innotek.de/javaos2/142_09/install_sdk.exe
 - Download the following packages from http://tomcat.apache.org/:
 - apache-tomcat-5.5.20.zip
 - apache-tomcat-5.5.20-compat.zip
 - apache-tomcat-5.5.20-admin.zip

- Optional software:
 - Download the MySQL Java database connector from http://www.mysql.org/downloads/connector/j/3.1.html:
 - mysql-connector-java-3.1.14.zip
 - Download the following packages from http://smedley.info/os2ports/:
 - httpd-2.2.3-os2-b3.zip
 - mysql-5.0.27-os2-b1.zip

- Recommended directory structure on a JFS drive:
 - For the Java-SDK:
 - E:\java142sdk
 - For the binaries:
 - E:\server\tomcat55
 - E:\server\apache22
 - E:\server\mysql5
 - For the data:
 - E:\data\htdocs
 - E:\data\mysql

Installing a Tomcat Server Installation of Java 1.4.2 SDK

- Execute the installation archive:
 - install_sdk.exe

As target, select your desired Java-SDK directory

(e.g., E:\java142sdk).

• There is no further configuration necessary!

Installing a Tomcat Server Testing the Java 1.4.2 SDK

 Open an OS/2 window, go to the jre-bin directory of your Java-SDK directory (e.g., E:\java142sdk\jre\bin) and check the Java version with 'java -version'. You get:

OS/2-Fenster					
OS/2 Strg+Esc = Fensterliste HELP = Hilfe					
[E:\Java142SDK\jre\bin]java -version					
java version "1.4.2_09"					
Java(TM) 2 Runtime Environment, Standard Edition (build 1.4.2_09-b05)					
Java HotSpot(TM) Client VM (build 1.4.2_09-b05, mixed mode)					

If not, you probably downloaded/installed the wrong version or you selected the wrong directory and you have a different Java installation in your PATH/LIBPATH.

Installing a Tomcat Server Installation of Tomcat 5.5

- Unzip the Tomcat zip archives with (skip existing files): unzip apache-tomcat-5.5.20.zip -d . unzip apache-tomcat-5.5.20-compat.zip -d . unzip apache-tomcat-5.5.20-admin.zip -d .
- Move 'apache-tomcat-5.5.20' to your desired Tomcat55bin directory (e.g., E:\server\tomcat55).

The compat package is needed to make Tomcat 5.5 compatible with JDK 1.4.2, basically Tomcat 5.5 is designed for JDK 1.5 which does not exists for OS/2.

The admin package is for administration of the installed web applications (Web-Apps).

Installing a Tomcat Server Installation of Tomcat 5.5

- Create/get modified cmd scripts for OS/2 and place them in the Tomcat55-bin directory (e.g., E:\server\tomcat55\bin), as template use the batch scripts from the Windows installation.
- Rename the 'shutdown.cmd' to some thing else (e.g., 'shutdowntc.cmd'), otherwise you will shutdown your whole system if you try to end Tomcat while you are in a wrong directory!
- Adjust paths in setenvos2.cmd.

Installing a Tomcat Server Configuration of Tomcat 5.5

- Adjust xml files in Tomcat55-conf directory (e.g., E:\server\tomcat55\conf), first the server configuration in %CATALINA_HOME%\conf\server.xml:
 - Server port (standard):

<Connector port="8080"

maxHttpHeaderSize="8192".../>

 Activate SSL-connection of the server (optional): Comment out normal connection, activate the SSL port: <Connector port="8443" maxHttpHeaderSize="8192".../>

Installing a Tomcat Server Configuration of Tomcat 5.5

- Create Tomcat users in %CATALINA_HOME%\conf\tomcat-users.xml:
 - Create the user for Manager Application access:
 <role rolename="manager"/>
 <user username="tcmgr" password="secretpwd"
 roles="standard,manager" />
 - Create the user for Admin access:

<role rolename="admin"/>
<user username="tcadmin" password="otherpwd"
roles="standard,admin" />

• Open an OS/2 window, go to the Tomcat55-bin directory, and check the Tomcat version with 'catalina.cmd

version'. You should get:

🞯 OS/2-Fenster		
OS/2 Str	rg+Esc = Fensterliste HELP = Hilfe	
[E:\server\tomca	at55\bin]catalina version	
Using CATALINA_E	BASE: E:\server\tomcat55	
Using CATALINA_H	IOME: E:\server\tomcat55	
Using CATALINA_T	MPDIR: E:\server\tomcat55\temp	
Using JRE_HOME:	E:\java142sdk	
Server version:	Apache Tomcat/5.5.20	
Server built:	Sep 12 2006 10:09:20	
Server number:	5.5.20.0	
OS Name:	0S/2	
OS Version:	20.45	
Architecture:	x86	
JVM Version:	1.4.2_09-b05	
JVM Vendor:	Sun Microsystems Inc.	

- Now start the Tomcat JSP/servlet server with
 - 'catalina.cmd start'or 'startuptc.cmd'.

You should get:

🗑 OS/2-Fenster 🛛 🗆 🗉				
OS/2 Strg+Es	sc = Fensterliste	HELP = Hilfe		
[E:\server\tomcat55	<pre>\bin]catalina start</pre>			
Using CATALINA_BASE	: E:\server\tomca	t55		
Using CATALINA_HOME	: E:\server\tomca	t55		
Using CATALINA_TMPD	[R: E:\server\tomca	t55\temp		
Using JRE_HOME:	E:\java142sdk	-		

• A second window should open and show the start up of

the Tomcat JSP/servlet server:

Tomcat 5.5 running on OS/2 02.11.2006 21:57:49 org.apache.coyote.http11.Http11BaseProtocol init INFO: Initializing Coyote HTTP/1.1 on http-8080 02.11.2006 21:57:49 org.apache.catalina.startup.Catalina load INFO: Initialization processed in 2440 ms 02.11.2006 21:57:50 org.apache.catalina.core.StandardService start INFO: Starting service Catalina 02.11.2006 21:57:50 org.apache.catalina.core.StandardEngine start INFO: Starting Servlet Engine: Apache Tomcat/5.5.20 02.11.2006 21:57:50 org.apache.catalina.core.StandardHost start INFO: XML validation disabled 02.11.2006 21:57:53 org.apache.coyote.http11.Http11BaseProtocol start INFO: Starting Coyote HTTP/1.1 on http-8080 02.11.2006 21:57:54 org.apache.jk.common.ChannelSocket init INFO: JK: ajp13 listening on /0.0.0.0:8009 02.11.2006 21:57:54 org.apache.jk.server.JkMain start INFO: Jk running ID=0 time=0/80 config=null 02.11.2006 21:57:54 org.apache.catalina.storeconfig.StoreLoader load INFO: Find registry server-registry.xml at classpath resource 02.11.2006 21:57:54 org.apache.catalina.startup.Catalina start INFO: Server startup in 4590 ms

- Using Tomcat:
 - 'catalina.cmd start' or 'startuptc.cmd'
 - 'catalina.cmd stop' or 'shutdowntc.cmd'
 - 'catalina.cmd version'

Other commands are not implemented/tested on OS/2!

The basic Tomcat JSP/servlet server is running now. Terminate it with 'shutdowntc.cmd' for further configuration.

Installing a Tomcat Server

Configuration of Tomcat 5.5 for Apache 2.2

- Using Tomcat together with Apache enables the usage of all Apache features for the static content, while Tomcat only generates the dynamic one. It also enables loadbalancing so Tomcat and Apache can be installed on different servers.
- Adjust the server configuration in %CATALINA_HOME%\conf\server.xml that Tomcat 5.5 accepts Apache 2.2 acting as reverse proxy:
 - Define a Proxied HTTP Connector on port 8082 (opt.): <Connector port="8082"</pre>
 - proxyPort="80" disableUploadTimeout="true" />

Installing a Tomcat Server Configuration of Apache 2.2

- For installation and basic configuration of Apache 2.2, PHP 5 and/or MySQL 5 see the "OAMP" documentation!
- Configure Apache 2.2 as reverse-proxy (mod_proxy) for Tomcat 5.5, adjust the httpd.conf:

LoadModule proxy_module modules/proxy.dll

LoadModule proxy_ajp_module modules/proxy_aj.dl

LoadModule proxy_connect_module modules/proxy co.dll

LoadModule proxy_ftp_module modules/proxy_ft.dl LoadModule proxy http module

modules/proxy_ht.dll

Installing a Tomcat Server Configuration of Apache 2.2

• Adjust the httpd.conf (continued):

```
#
# Limits access of the forward proxy to the
# local network with the given IP address
#
<Proxy *>
Order Deny,Allow
Deny from all
Allow from 192.168.0 127.0.0.1
</Proxy>
```

Installing a Tomcat Server Configuration of Apache 2.2

• Adjust the httpd.conf (continued):

<VirtualHost *:80> DocumentRoot /data/htdocs ServerName www.example.com:80 ServerAlias example.com ErrorLog logs / example.com-error log CustomLog logs/example.com-access log common ProxyPass /jsp-examples http://example.com:8082/jsp-examples ProxyPassReverse /jsp-examples http://example.com:8082/jsp-examples ProxyPass /svl-examples http://example.com:8082/svl-examples ProxyPassReverse /svl-examples http://example.com:8082/svl-examples </VirtualHost>

Installing a Tomcat Server Installation of JDBC for MySQL

• Unzip the MySQL-JDBC zip archive with:

unzip mysql-connector-java-3.1.14.zip -d mysql-connector-java-3.1.14

 If nonexistent create a 'classes' and a 'lib' directory in the Tomcat55-common directory

(e.g., E:\server\tomcat55\common).

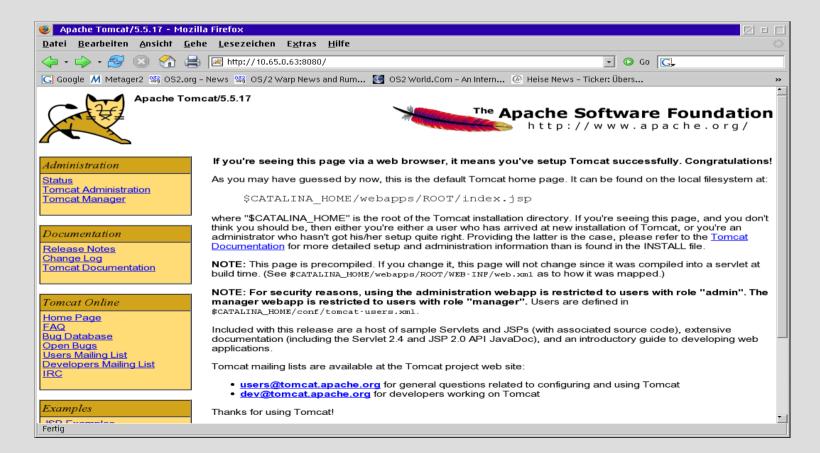
• Copy mysql-connector-java-3.1.14-bin.jar to the lib directory.

Installing a Tomcat Server

Starting Apache 2.2, MySQL 5.0 and Tomcat 5.5

- I assume that the "AMP" part of the installation is running correctly. Please read the "OAMP" documentation for further informations and testing procedures!
- Start the Apache web server with 'startup.cmd', the MySQL database server with 'mysqld.exe --console' and the Tomcat JSP/servlet server with 'startuptc.cmd'.
- The installation of PHP5 and phpMyAdmin is optional but sometimes useful if you want to administrate the database via a web interface.

 Open your web browser, enter the IP address of your local machine with port 8080. In your browser you get:



Click on 'Administration - Status', enter the Tomcat manager
 ID (e.g. tcmgr) and password. In your browser you get:

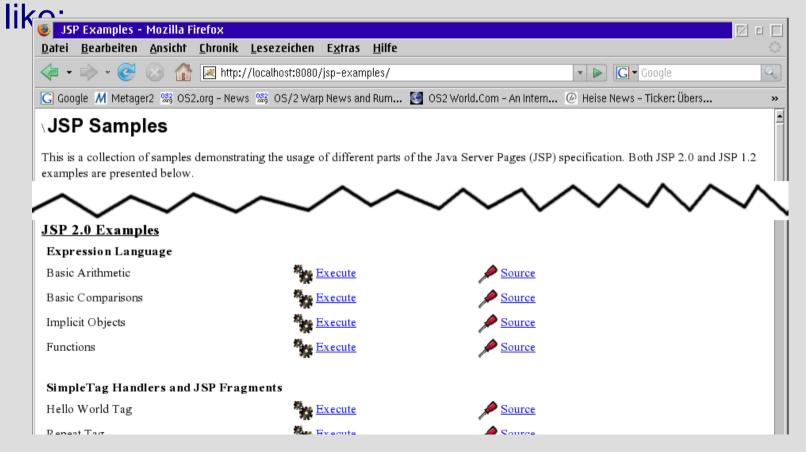
🕘 /manager - Mozilla	Firefox						
<u>D</u> atei <u>B</u> earbeiten <u>A</u> n	sicht <u>G</u> ehe	<u>L</u> esezeichen E <u>x</u> tras <u>H</u> ilfe					
🖕 • 🖕 - 🛃 🛞	승 🖶 [🛃 http://10.65.0.63:8080/manager/html				🖸 💽 Go 🚺	<u> </u>
		lews 👷 OS/2 Warp News and Rum 💽 OS2	world.Com - An In	tern @ Heise N	ews – Ticker:	Übers	
The Apache Software Foundation http://www.apache.org/ Tomcat Webanwendungs-Manager							
Nachricht: OK							
Anwendungen auflist	en	Hilfeseite HTML Manager (englis	sch)	Hilfeseite Ma	anager (en	glisch)	Server Status
Anwendungen							
Kontext Pfad	Anzeigena	me	Verfügbar	Sitzungen	Kommandos		andos
1	Welcome to	Tomcat	true	<u>0</u>	Start <u>Sto</u>	<u>Neu laden</u>	<u>Entfernen</u>
<u>/admin</u>	Tomcat Adm	ninistration Application	true	<u>0</u>	Start <u>Sto</u>	<u>Neu laden</u>	Entfernen
/balancer	Tomcat Sim	ple Load Balancer Example App	true	<u>0</u>	Start <u>Sto</u>	<u>Neu laden</u>	Entfernen
/host-manager	Tomcat Man	ager Application	true	<u>0</u>	Start <u>Sto</u>	<u>Neu laden</u>	<u>Entfernen</u>
/jsp-examples	JSP 2.0 Examples true 0 Start		Start <u>Sto</u>	<u>Neu laden</u>	Entfernen		
/manager	Tomcat Man	omcat Manager Application true <u>0</u> Start Stop Neu laden Entfernen		Entfernen			
/servlets-examples	Servlet 2.4 Examples true 0 Start Stop Neu laden Entferm		<u>Entfernen</u>				
/tomcat-docs	Tomcat Documentation true <u>0</u> Start <u>Stop Neu laden</u> <u>Entfernen</u>		Entfernen				
/webdav	Webdav Con	tent Management	true	<u>0</u>	Start <u>Sto</u>	<u>Neu laden</u>	Entfernen
Fertig							

 Go back to the Tomcat start page, click on 'Administration -Tomcat Administration', enter the Tomcat admin ID (e.g. tcadm) and password then click on login. You get:

Tomcat Server Administration - Mozi	lla Firefox			
<u>D</u> atei <u>B</u> earbeiten <u>A</u> nsicht <u>G</u> ehe <u>L</u> e	sezeichen E <u>x</u> tras <u>H</u> ilfe			
🗣 • 🧼 - 🔗 🛞 😪 🚍 🖂 r	🚡 🚔 🔀 http://10.65.0.63:8080/admin/frameset.jsp 💿 💿 💿			0 C,
G Google M Metager2 🞇 OS2.org - News	🞇 OS/2 Warp News and Rum	🧐 OS2 World.Com - An Intern	@ Heise News - Ticker: Übers	»
TOMCAT WEB SERVER Administration Tool			Commit Changes	Log Out
ବ 🏁 Tomcat Server	Service (Catalina)		Service Actions —	-Available Actions—
 ♥ ■Resources ■ Data Sources 	Service Properties			Save Reset
Mail Sessions	Property	Value		
🔿 User Databases	Name:	Catalina		
♥ ☐User Definition ♠ Users	Engine Properties			
- ^余 党 Groups -	Property	Value		
A Roles	Name:	Catalina		
	Default Hostname:	localhost 💌		
Fertig	•			Save Reset

- If all tests run correctly, the basic Tomcat installation and the administration and management interface are working.
 Now click on <Log Out> to leave the Tomcat administration.
- Next step will be testing if Tomcat handles the example JSP and servlets correctly.

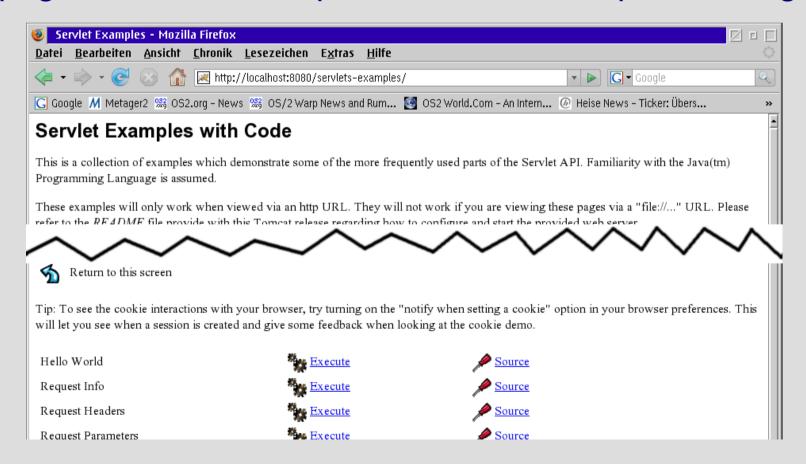
• Enter the IP address of your local machine with port 8080, in your browser you get the Tomcat start page again. Now click on 'Examples - JSP Examples' you should get s.th.



 Now select any of the <Execute> links and you always should get a reasonable result. For example the 'Hello World Tag' shows:



• For testing Tomcats servlet processing go back to the start page, click on 'Examples - Servlet Examples'. You get:



 Now select any of the <Execute> links and you always should get a reasonable result. For example 'Hello World' shows:

🕘 Hello World! - Mozilla Firefox	
<u>D</u> atei <u>B</u> earbeiten <u>A</u> nsicht <u>C</u> hronik <u>L</u> esezeichen E <u>x</u> tras <u>H</u> ilfe	0
🔄 🗣 👻 🚱 🏠 🗷 http://localhost:8080/servlets-examples/servlet/HelloWorldExample 🔹 🕨 💽 Google	Q
🜀 Google 👭 Metager2 🗱 OS2.org - News 🗱 OS/2 Warp News and Rum 🦉 OS2 World.Com - An Intern @ Heise News - Ticker: Übers	»
Hello World!	% ∕∕

Installing a Tomcat Server

Testing of Tomcat 5.5 with Apache 2.2 as Proxy

- For testing if Tomcat with Apache as reverse proxy works, first check if the Apache server works itself.
- Open your web browser and enter the IP address of your local machine (without any port), in your browser you should get the Apache start page:

🧶 Mozilla Firefox	
<u>D</u> atei <u>B</u> earbeiten <u>A</u> nsicht <u>C</u> hronik <u>L</u> esezeichen E <u>x</u> tras <u>H</u> ilfe	() ()
	Q
G Google 세 Metager2 🧱 OS2.org - News 🗱 OS/2 Warp News and Rum 🦉 OS2 World.Com - An Intern @ Heise News - Ticker: Ük	iers »
It works!	

Installing a Tomcat Server

Testing of Tomcat 5.5 with Apache 2.2 as Proxy

- Now append 'jsp-examples' or 'servlets-examples' to the URL and execute any of the examples again, they all still have to work as expected!
- The 'Hello World Tag' for example shows:



- The final test is to check if the Java database connector (JDBC) works correctly with MySQL.
- Create the following 'testjdbc.jsp' and place it to the Tomcat55-webapps-jsp-examples directory (e.g., E:\server\tomcat55\webapps\jsp-examples):

```
<html>
<head>
  <title>Test JDBC with JSP</title>
</head>
<body>
 <%@ page import="java.util.*" %>
 <%@ page import="java.sql.*" %>
 < %
 out.println("<h1>Test JDBC with JSP</h1><br>");
 try {
   Class.forName("com.mysql.jdbc.Driver");
   Connection conn = DriverManager.getConnection("jdbc:
                mysql://localhost/mysql", "root", "psw");
    out.println("Connection successfull!<br>");
    out.println("<br>");
    Statement stmt = conn.createStatement();
    String query = "SELECT * ";
    query += "FROM `user` ";
    query += "LIMIT 0 , 30";
   ResultSet rs = stmt.executeQuery(query);
```

```
out.println("Output of 'user'-table:<br>");
out.println("");
while (rs.next()) {
 String m Host = rs.getString("Host");
 String m User = rs.getString("User");
 String m Password = rs.getString("Password");
 out.println(" " +
            " " + m Host + "" +
            " " + m User + "" +
            " " + m Password + "" +
            " 
out.println("");
rs.close();
stmt.close();
conn.close();
```

}

```
catch(ClassNotFoundException err) {
   out.println("DB-driver not found ");
   out.println("(" + err + ") !");
   catch(SQLException err) {
    out.println("Connetion not successful ");
    out.println("(" + err + ") !");
   }
   %>
</body>
</html>
```

Installing a Tomcat Server

Testing of Tomcat 5.5 with Apache 2.2 as Proxy

 Open your web browser and enter the IP address of your local machine (with or without port 8080). Append 'jspexamples/testjdbc.jsp', in your browser you get:



Now you have a working Tomcat as JSP/servlet server for dynamic content with an Apache http server as rev. proxy for the static content and MySQL as database back-end!

Installing a Tomcat Server Conclusion

- The server is running on OS/2 now, some advantages are:
 - You don't need other systems than OS/2 on your servers just because you need a web server environment.
 - You can use your laptop running OS/2 for the development of web applications.
 - It's more secure by obscurity because nobody knows
 OS/2 and has the ability to hack the base OS!

Installing a Tomcat Server Conclusion

- There are disadvantages too:
 - An important part of the server is based on an outdated, no longer supported Java engine, which can result in stability, performance and security problems!
 - Stability and performance is not tested on higher loads, so the server probably is only for small environments!
 - We have very few development and porting resources for the OS/2 versions, so the ports generally don't support OS/2-specific things and the OS/2 versions often are not on the same level as the Linux versions.

Installing a Tomcat Server Links

• Web sites:

http://tomcat.apache.org/ http://tomcat.apache.org/tomcat-5.5-doc/index.html http://tomcat.apache.org/connectors-doc/faq.html http://tomcat.apache.org/connectors-doc/proxy.html http://httpd.apache.org/ http://httpd.apache.org/docs/2.2/ http://httpd.apache.org/docs/2.2/mod/mod proxy ajp.html http://httpd.apache.org/docs/2.2/mod/mod proxy.html#acces http://www.cymulacrum.net/writings/tomcat5/c875.html

Installing a Tomcat Server Links

Web sites (continued): http://smedley.info/os2ports/ http://www.innotek.de/products.html ftp://ftp.netlabs.org/pub/gcc/ http://mww.ampos2.de/ http://os4you.org/servletengines.html http://www.mysql.org/

Installing a Tomcat Server Links

- Mailing lists/Newsgroups: http://tech.dir.groups.yahoo.com/group/mysql-os2/
- My documentation, prepared OS2TC and OAMP package: http://www.godacon.de/download/OS2TC-Pres_V04.zip http://www.godacon.de/download/OS2TC-Conf_V04.zip http://www.godacon.de/download/OAMP-Pres_V07.zip http://www.godacon.de/download/OAMP-Pack_V07.zip

...and much other OS/2 and Linux-related stuff!

Installing a Tomcat Server

Thanks

for your attention!

(c) 2006 Thorolf.Godawa@GodaCon.de