MMBase Installation HOWTO

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minor corrections

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This document describes the installation of the MMBase content management system on a Red Hat Linux distribution, using the Tomcat application server, and integrating it with MySQL and Apache.

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1. Introduction

>From the MMBase website (www.mmbase.org):

> "MMBase is a Web Content Management System with strong multimedia features. MMBase has a large installed base in The Netherlands, and is used by major Dutch broadcasters, publishers, educational institutes, national and local governments. MMBase is written in Java, it is Open Source Software (MPL) and all standards used are as 'open' as possible. The system can be used with all major operating systems, application servers and databases."

Unfortunately, the installation of MMBase is not well documented. Furthermore, when searching the internet looking for installation clues and trying out tips, it turns out that the details of the installation have changed frequently.

This document describes the installation of the MMBase content management system on a Red Hat Linux distribution, using the Tomcat application server, and the integration with MySQL and Apache.

It is based on our own experience and compiled to the benefit of the community.

These are the ingredients we used to cook up this recipe ourselves:

- Red Hat 8.0 distribution running a 2.4.20 kernel, with Alan Cox 2 and EA/ACL extensions.
- Java 2 Software Developers Kit (SDK) and Java 2 Run−time Engine (J2RE) from Sun's Java 2 Platform Standard Edition 5.0 (J2SE) (version 1.5.0−01),
- Apache Jakarta Tomcat 5.5.4,
- ImageMagick 6.1.3−7,
- MMBase 1.7.3 with various modules,
- MySQL Connector/J 3.0.16−ga,
- Jikes 1.22.

And before:

- Red Hat 8.0 distribution running a 2.4.20 kernel, with Alan Cox 2 and EA/ACL extensions.
- Java 2 Software Developers Kit (SDK) and Java 2 Run−time Engine (J2RE) from the Blackdown Java 2 JDK version v1.4.1−01,
- Apache Jakarta Tomcat 4.1.27,
- ImageMagick 5.4.7−5,
- MMBase 1.6.5 for JDK 1.4,
- MySQL Connector/J 3.0.8,
- Jikes 1.18.

2. Installation

Although we installed MMBase on a kernel with the Alan Cox and EA/ACL extensions, these features are no prerequisites.

We assume that you have already installed and configured Apache and MySQL on your server.

3. Installing Java

Download the latest versions of the Java 2 Development Kit (JDK) or Run−time Engine (JRE), and the accompanying documentation from:

```
http://java.sun.com
```

Installation instructions and release notes for the JDK and JRE are available at the download page.

Make the binary distribution of the JDK executable and extract in a new directory:

```
chmod +x jdk-xxx.bin
cd /usr/local/
.../jdk-xxx.bin
```

Install the JDK documentation by unzipping it in the JDK directory:

```
cd /usr/local/jdk-xxx/
unzip .../jdk-xxx-doc.zip
```

Change the ownership of the JDK directory and make it available as `/usr/local/j2sdk/`:

```
chown -R root:root /usr/local/jdk-xxx/
ln -s /usr/local/jdk-xxx /usr/local/j2sdk
```

If you need only the JRE, the installation would be like this:

```
chmod +x jre-xxx.bin
cd /usr/local/
.../jre-xxx.bin
chown -R root:root /usr/local/jre-xxx/
ln -s /usr/local/jre-xxx /usr/local/j2re
```

Using JDK version 1.5.0 caused our Tomcat server to crash every now and then:

```
#
# An unexpected error has been detected by HotSpot Virtual Machine:
#
#  SIGSEGV (0xb) at pc=0x4042db3f, pid=11991, tid=16386
#
# Java VM: Java HotSpot(TM) Server VM (1.5.0-b64 mixed mode)
# Problematic frame:
# V  [libjvm.so+0x3abb3f]
#
```

Upgrading to version 1.5.0−01 seemed to solve these problems.

For the (previously used) BlackDown Java for Linux distribution:

Find yourself a mirror for the BlackDown Java Development Kit at:

```
http://www.blackdown.org/java-linux/mirrors.html
```

There you can download the latest versions of the J2 Software Development Kit (SDK) and Run−time Engine (RE).

Make sure you pick out the right version for the gcc library installed on your system. You can find out the version currently installed by typing:

```
rpm -q libgcc
```

Installation instructions for the Java Development Kit are available as `INSTALL-j2sdk` and `INSTALL-j2re`.

Make the binary distribution of the SDK executable and extract in a new directory:

```
chmod +x j2sdk-xxx.bin
cd /usr/local/
.../j2sdk-xxx.bin
```

Change the ownership of the J2SDK directory and make it available as `/usr/local/j2sdk/`:

```
chown -R root:root /usr/local/j2sdk-xxx/
ln -s /usr/local/j2sdk-xxx /usr/local/j2sdk
```

Do the same for the RE:

```
chmod +x j2re-xxx.bin
cd /usr/local/
.../j2re-xxx.bin
chown -R root:root /usr/local/j2re-xxx/
ln -s /usr/local/j2re-xxx /usr/local/j2re
```

Since we didn't install the JDK and JRE in our path, we have to add the `bin/` directories to our `$PATH` environment variable. To make sure the Java distributions and classes can be found, we set the `$JAVA_HOME` and `$CLASSPATH` variables as well.

For the Bourne shells, create a file /etc/profile.d/java.sh:

```
if ! echo ${PATH} | grep -q /usr/local/j2sdk/bin ; then
  export PATH=/usr/local/j2sdk/bin:${PATH}
  fi
if ! echo ${PATH} | grep -q /usr/local/j2re/bin ; then
  export PATH=/usr/local/j2re/bin:${PATH}
  fi
export JAVA_HOME=/usr/local/j2sdk
export CLASSPATH=.:/usr/local/j2sdk/lib/tools.jar:/usr/local/j2re/lib/rt.jar
```

Set its ownership and access rights:

```
chown root:root /etc/profile.d/java.sh
chmod 755 /etc/profile.d/java.sh
```

Do the same for C shells, by creating the file /etc/profile.d/java.csh:

```
if ( "${path}" !~ */usr/local/j2sdk/bin* ) then
  set path = ( /usr/local/j2sdk/bin $path )
  endif
if ( "${path}" !~ */usr/local/j2re/bin* ) then
  set path = ( /usr/local/j2re/bin $path )
  endif
setenv JAVA_HOME /usr/local/j2sdk
setenv CLASSPATH .:/usr/local/j2sdk/lib/tools.jar:/usr/local/j2re/lib/rt.jar
```

and setting its ownership and access rights:

```
chown root:root /etc/profile.d/java.csh
chmod 755 /etc/profile.d/java.csh
```

Now the JDK should be available to everyone on your system.

You can test the Java engine by typing:

```
java -version
```

or create a file `Test.java`:

```
public class Test {
  public static void main(String[] args) {
    System.out.println("Hello world");
    }
  }
```

and test the compiler:

```
javac Test.java
java Test
```

4. Installing Tomcat

Download a binary distribution of Tomcat from the Apache Jakarta website:

```
http://jakarta.apache.org/tomcat/
```

If you don't want to run the Tomcat daemon as root, create a new user/group tomcat (first make sure that the UID and GID you use are still available by checking the files `/etc/passwd` and `/etc/group`):

```
groupadd -g 220 tomcat
useradd -u 220 -g tomcat -c "Tomcat" -r -d /usr/local/tomcat -s "/sbin/nologin" tomcat
```

You really should not use the root account to run the Tomcat daemon; (using Tomcat version 4.1.27) we found out that this allows the MMBase admin user to write backup dumps of his sites anywhere on the system.

<TODO: better solution available?>

Extract the Tomcat distribution in a new directory:

```
cd /usr/local/
tar -zxvf .../jakarta-tomcat-xxx.tar.gz
```

Version 4.1.27 came with a hot−fix:

```
cd /usr/local/jakarta-tomcat-xxx/
tar -zxvf .../xxx-hotfix-xxx.tar.gz
```

Change the ownership of the Tomcat directory and make it available as `/usr/local/tomcat/`:

```
chown -R tomcat:tomcat /usr/local/jakarta-tomcat-xxx
ln -s /usr/local/jakarta-tomcat-xxx /usr/local/tomcat
```

Open up the firewall for web access to the Tomcat server by adding to the file `/etc/sysconfig/iptables`:

```
-A RH-Lokkit-0-50-INPUT -p tcp -m tcp --dport 8080 --syn -j ACCEPT
```

You need to reboot your system to make this rule effective or restart the iptables firewall:

```
service iptables restart
```

Since (for some odd reason) some network managers allow outgoing web connections only to TCP port 80, there might be people around that cannot access your Tomcat (and MMBase) server through port 8080. Further below we will explain how to install a JK 2 mapping or a reverse proxy in Apache, so

> Tomcat and MMBase can be accessed through the Apache web server at port 80. Apart from the port issue, this has the advantage that you can use Apache to manage you SSL connections and use your existing Apache logs and statistics facilities for Tomcat and MMBase as well.
>
> If you decide to use Apache as a front–end to your Tomcat and MMBase server, there's no need to open up port 8080 in your firewall.

To run Tomcat, set the `$CATALINA_HOME` environment variable:

```
CATALINA_HOME=/usr/local/tomcat
```

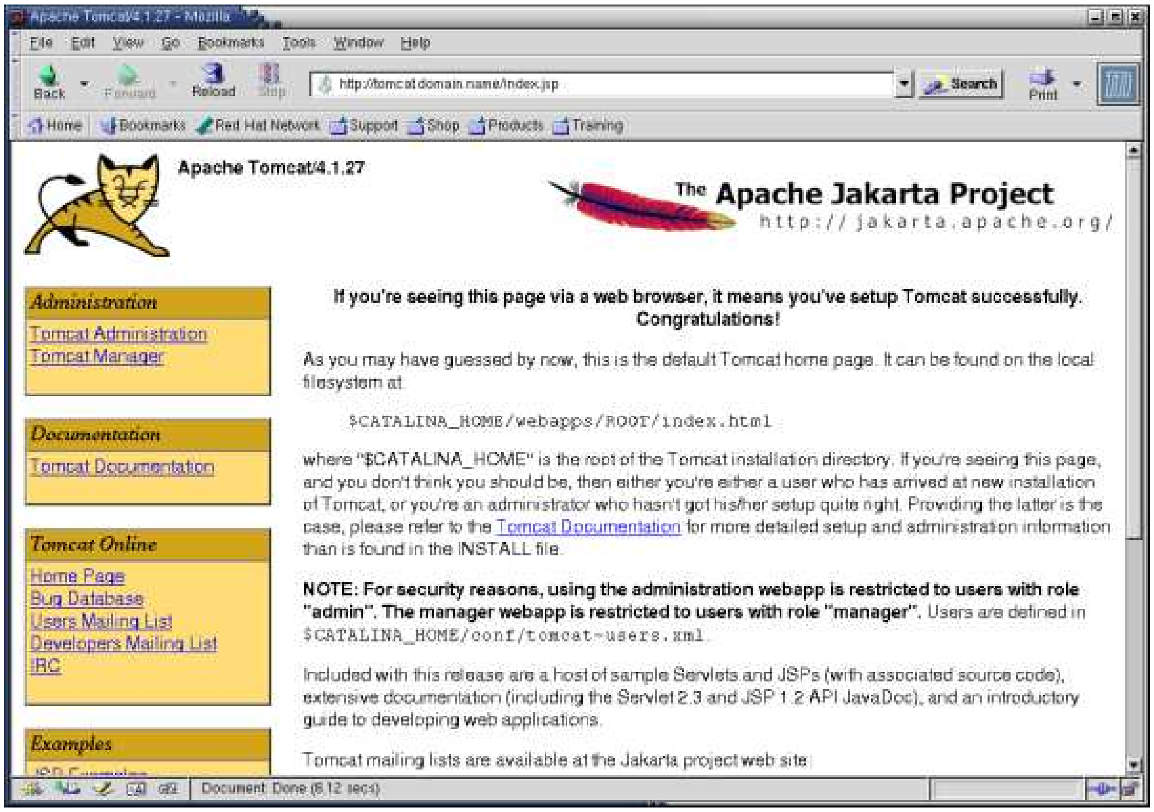
and fire it up:

```
/usr/local/tomcat/bin/startup.sh
```

Now you can access Tomcat's home page through (replace *<hostname>* with your hostname):

```
http://<hostname>:8080/
```

which should give you the Tomcat welcome screen.



To shutdown again:

```
/usr/local/tomcat/bin/shutdown.sh
```

Since we want to automate the starting up and shutting down of the Tomcat server, we create a file `/etc/rc.d/init.d/tomcat` to do this for us:

```
#!/bin/sh
#
# Startup script for the Jakarta Tomcat Java Servlets and JSP server
#
# chkconfig: - 85 15
# description: Jakarta Tomcat Java Servlets and JSP server
# processname: tomcat
# pidfile: /var/run/tomcat.pid
# config:

# Source function library.
. /etc/rc.d/init.d/functions

# Source networking configuration.
. /etc/sysconfig/network

# Check that networking is up.
[ ${NETWORKING} = "no" ] && exit 0

# Set Tomcat environment.
export JAVA_HOME=/usr/local/j2sdk
export CLASSPATH=.:/usr/local/j2sdk/lib/tools.jar:/usr/local/j2re/lib/rt.jar
export CATALINA_HOME=/usr/local/tomcat
export CATALINA_OPTS="-server -Xms64m -Xmx512m -Dbuild.compiler.emacs=true"
export PATH=/usr/local/j2sdk/bin:/usr/local/j2re/bin:$PATH

[ -f /usr/local/tomcat/bin/startup.sh ] || exit 0
[ -f /usr/local/tomcat/bin/shutdown.sh ] || exit 0

export PATH=$PATH:/usr/bin:/usr/local/bin

# See how we were called.
case "$1" in
  start)
        # Start daemon.
        echo -n "Starting Tomcat: "
        /usr/local/tomcat/bin/startup.sh
        RETVAL=$?
        echo
        [ $RETVAL = 0 ] && touch /var/lock/subsys/tomcat
        ;;
  stop)
        # Stop daemons.
        echo -n "Shutting down Tomcat: "
        /usr/local/tomcat/bin/shutdown.sh
        RETVAL=$?
        echo
        [ $RETVAL = 0 ] && rm -f /var/lock/subsys/tomcat
        ;;
  restart)
        $0 stop
        $0 start
        ;;
  condrestart)
       [ -e /var/lock/subsys/tomcat ] && $0 restart
       ;;
  status)
        status tomcat
```

```
        ;;
  *)
        echo "Usage: $0 {start|stop|restart|status}"
        exit 1
esac

exit 0
```

Set its ownership and access rights:

```
chown root:root /etc/rc.d/init.d/tomcat
chmod 755 /etc/rc.d/init.d/tomcat
```

And add this init script to chkconfig:

```
chkconfig --add tomcat
chkconfig tomcat on
```

Instead of creating your own init script, you can use the script that comes with the Tomcat package: `/usr/local/tomcat/bin/catalina.sh`. Make sure you set the Tomcat environment at the start of this script. Or create a short init script that calls the original Tomcat init script.

See How can I start Tomcat as a daemon in Linux?.

To install two (or even more) versions of Tomcat server on the same system, increase the port numbers of the second server (e.g. by 10), by editing the configuration file `/usr/local/tomcat55/conf/server.xml`:

```
<Server port="8015" shutdown="SHUTDOWN">
...
<!-- Define a non-SSL HTTP/1.1 Connector on port 8080 -->
<Connector port="8090"
    maxThreads="150" minSpareThreads="25" maxSpareThreads="75"
    enableLookups="false" redirectPort="8453" acceptCount="100"
    connectionTimeout="20000" disableUploadTimeout="true" />
...
<!-- Define a SSL HTTP/1.1 Connector on port 8443 -->
<!--
<Connector port="8453"
    maxThreads="150" minSpareThreads="25" maxSpareThreads="75"
    enableLookups="false" disableUploadTimeout="true"
    acceptCount="100" scheme="https" secure="true"
    clientAuth="false" sslProtocol="TLS" />
-->
...
<!-- Define an AJP 1.3 Connector on port 8009 -->
<Connector port="8019"
    enableLookups="false" redirectPort="8453" protocol="AJP/1.3" />
...
<!-- Define a Proxied HTTP/1.1 Connector on port 8082 -->
<!-- See proxy documentation for more information about using this. -->
<!--
<Connector port="8082"
```

```
    maxThreads="150" minSpareThreads="25" maxSpareThreads="75"
    enableLookups="false" acceptCount="100" connectionTimeout="20000"
    proxyPort="80" disableUploadTimeout="true" />
-->
```

Complete this second Tomcat server installation as above for the first server, using adjusted directory and file names.

5. Replacing Tomcat's default JSP compiler Jasper with IBM's Jikes compiler

Since IBM's Java compiler Jikes is performing better than Tomcat's own JSP compiler Jasper, it's recommended to install Jikes instead.

Download the sources of Jikes from IBM's Research website:

```
http://jikes.sourceforge.net/
```

Extract and compile Jikes:

```
./configure --prefix=/usr/local/jikes
make
make check
make install
```

Check support for the `-encoding` option:

```
/usr/local/jikes/bin/jikes -help
```

To have Jikes output its error messages in a Jasper compatible way, add this `$CATALINA_OPTS` environment variable to `/etc/rc.d/init.d/tomcat`:

```
export CATALINA_OPTS="-Dbuild.compiler.emacs=true"
```

If you get an error message saying Jikes can not use UTF8 encoding, add the following option as well:

```
-DjavaEncoding=ISO-8859-1
```

Make Jikes your JSP compiler for Tomcat by adding to `/usr/local/tomcat/conf/web.xml`:

```
<init-param>
    <param-name>compiler</param-name>
    <param-value>jikes</param-value>
</init-param>
```

Since entering the full path to Jikes in `/usr/local/tomcat/conf/web.xml` doesn't seem to work (version 4.1.27), make the **jikes** program available in your path:

```
ln -s /usr/local/jikes/bin/jikes /usr/local/bin/jikes
```

6. Installing ImageMagick

MMBase uses ImageMagick's **convert** tool to build and convert its images.

ImageMagick is already part of the Red Hat distribution. Check its availability using:

```
rpm -q ImageMagick
```

If ImageMagick is not available on your system, install it using up2date:

```
up2date
```

or download it from the Red Hat Network:

```
https://rhn.redhat.com/
```

and install it by hand:

```
rpm -ihv ImageMagick-xxx.rpm
```

7. Installing MMBase

Download the binary distribution of MMBase, and the additional applications you need (i.e. CloudContext Security, Media, Email) (see the next section), from:

```
http://www.mmbase.org/ --> Download --> Releases
```

MMBase version 1.7.2 contained a nasty bug, resulting in problems with the editwizards. The 1.7.3 release includes a bugfix for this problem.

Make sure you pick out the right version for the Java 2 JDK installed on your system. You can find out the version currently installed by typing:

```
java -version
```

Extract the binary distribution of MMBase, copy it into the Tomcat directory, and change the ownership of the MMBase directory:

```
unzip mmbase-xxx.zip
cd /usr/local/tomcat/webapps/
mkdir mmbase-webapp/
cp -R .../mmbase-x.x.x/mmbase-webapp/* ./mmbase-webapp/
chown -R tomcat:tomcat ./mmbase-webapp/
```

Installing MMBase version 1.7 on Tomcat version 5 resulted in version incompatibilities:

```
FATAL org.mmbase.servlet.MMBaseStartThread -
    Could not find the MMBase module!Class
    javax/servlet/http/HttpServletResponse violates loader constraints
```

We had to disable the RMMCI library to get this installation up and running:

```
mv /usr/local/tomcat/webapps/web-app/WEB-INF/lib/mmbase-rmmci.jar \
    /usr/local/tomcat/webapps/web-app/WEB-INF/lib/mmbase-rmmci.jar.org
```

For MMBase version 1.7 running on Tomcat version 5, enable the Xerces libraries:

```
mv /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xalan.renametojar \
    /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xalan.jar
mv /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xerces.renametojar \
    /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xerces.jar
mv /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xml-apis.renametojar \
    /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xml-apis.jar
```

Or you will have fatal errors like:

```
FATAL org.mmbase.servlet.MMBaseStartThread -
    Could not find the MMBase module!org/apache/xpath/XPathAPI
```

For MMBase version 1.6 running on Tomcat version 4, replace the Tomcat Xerces libraries by those coming with MMBase:

```
mv -i /usr/local/tomcat/common/endorsed/xercesImpl.jar ~/
mv -i /usr/local/tomcat/common/endorsed/xmlParserAPIs.jar ~/
cp /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xalan.jar \
    /usr/local/tomcat/common/endorsed/
chown tomcat:tomcat /usr/local/tomcat/common/endorsed/xalan.jar
chmod 644 /usr/local/tomcat/common/endorsed/xalan.jar
cp /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xerces.jar \
    /usr/local/tomcat/common/endorsed/
chown tomcat:tomcat /usr/local/tomcat/common/endorsed/xerces.jar
chmod 644 /usr/local/tomcat/common/endorsed/xerces.jar
cp /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/xml-apis.jar \
    /usr/local/tomcat/common/endorsed/
chown tomcat:tomcat /usr/local/tomcat/common/endorsed/xml-apis.jar
chmod 644 /usr/local/tomcat/common/endorsed/xml-apis.jar
```

If you will not be using an Apache JK 2 mapping or reverse proxy (see further below) as a front−end to your MMBase server, you can add to the file `/usr/local/tomcat/conf/server.xml`:

```
<Context path="/mmbase" docBase="/usr/local/tomcat/webapps/mmbase-webapp" debug="0">
<!-- if you want symlinks to work: -->
<Resources className="org.apache.naming.resources.FileDirContext" allowLinking="true" />
</Context>
```

This will allow you to access your MMBase server using (replace *<hostname>* with your hostname):

```
http://<hostname>:8080/mmbase
```

instead of:

```
http://<hostname>:8080/mmbase-webapp
```

Check if the ImageMagick **convert** tool is in your path:

```
which convert
```

If not, add it to `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/applications/Resources/builders/images.xml`. For example:

```
<property name="ImageConvert.ConverterCommand">/usr/bin/X11/convert</property>
```

Make sure that the directory `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/builders/applications` is writable by the servlet engine user (for auto−installing builders):

```
chown tomcat:tomcat /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/builders/applications
chmod 775 /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/builders/applications
```

8. Connecting MMBase to MySQL using MySQL Connector/J

We can connect MMBase to our MySQL database server using MySQL Connector/J. This JDBC driver for MySQL can be downloaded from:

```
http://www.mysql.com/downloads/api-jdbc.html
```

Copy the JDBC driver to the MMBase `lib/` directory:

```
cp mysql-connector-java-xxx-bin.jar /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/
chown tomcat:tomcat /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/mysql-connector-java-xxx-bin.jar
chmod 664 /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/mysql-connector-java-xxx-bin.jar
```

Make this your JDBC driver for MMBase by editing `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/modules/jdbc.xml`. Substitute the database name (*`mmbase`*), user (*`mmuser`*) and password (*`mmpass`*) with the database settings you'd like MMBase to use.

```
<property name="url">jdbc:mysql://$HOST:$PORT/$DBM</property>
<property name="user">mmuser</property>
<property name="password">mmpass</property>
<property name="supportclass">org.mmbase.module.database.DatabaseSupportShim</property>
<property name="database">mmbase</property>
<property name="connections">20</property>
<property name="host">localhost</property>
<property name="driver">com.mysql.jdbc.Driver</property>
<property name="port">3306</property>
<property name="querys">256</property>
<property name="probetime">30</property>
```

Set the ownership and access rights of this configuration file. Since it contains your database name, user name and password, make sure other users can not read this file.

```
chown tomcat:tomcat /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/modules/jdbc.xml
chmod 640 /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/modules/jdbc.xml
```

Now create the MySQL database you've just defined for MMBase:

```
mysql -u root -p
```

```
CREATE DATABASE <mmbase>;
USE <mmbase>;
GRANT SELECT,INSERT,UPDATE,DELETE,CREATE,DROP ON <mmbase>.* TO
    <mmuser>@'%' IDENTIFIED BY '<password>';
GRANT SELECT,INSERT,UPDATE,DELETE,CREATE,DROP ON <mmbase>.* TO
    <mmuser>@localhost IDENTIFIED BY '<password>';
GRANT SELECT,INSERT,UPDATE,DELETE,CREATE,DROP ON <mmbase>.* TO
    <mmuser>@localhost.<domainname> IDENTIFIED BY '<password>';
  # RH bug fix
```

```
GRANT SELECT,INSERT,UPDATE,DELETE,CREATE,DROP ON <mmbase>.* TO
    <mmuser>@<hostname> IDENTIFIED BY '<password>';
flush privileges;
exit;
```

Substitute the hostname (*<hostname>*) and domain name (*<domainname>*) with your own hostname and domain name, and the database name (*<mmbase>*), user (*<mmuser>*) and password (*<password>*) with the values you just entered in the JDBC driver configuration file.

To quickly empty your MySQL database, i.e. after you've updated your MMBase configuration or application (replace the database name *<mmbase>* with your own):

```
mysqladmin -u root -p drop <mmbase>
mysqladmin -u root -p create <mmbase>
```

If you are already using quite some MySQL connections (for example for authentication by and as a back−end to your mail daemons and Apache servers), the MySQL server might run out of connections (its maximum number defaults to 100). Then Tomcat could simply refuse to start or give an error message when initiating the MySQL connection pool, or your IMAP or POP servers will have problems authenticating their clients.

You can increase the maximum number of connections to MySQL by adding to the configuration file `/etc/my.cnf`:

```
[mysqld]
set-variable = max_connections=200
```

9. Installing MMBase additional applications

With the release of version 1.7 MMBase was reworked into a more modular structure. The developers decided to take several modules (i.e. CloudContext Security, Media, Email) from the MMBase tree, and make these available as separate entities. However, at this moment MMBase doesn't have a module interface at all. So, to use these additional applications, the library and other files need to be placed into the installation tree and the configuration needs to be added into the existing configuration files by hand.

9.1. Installing the CloudContext Security module

>From the MMBase website (www.mmbase.org):

> "Cloud security uses the object mmbaseuser to store information used for authorisation and authentication of users. The two main advantages of this security implementation are that the user administration can be carried out by using a webbrowser (instead of editing a file on the filesystem) and that the users of your MMBase installation are available as objects in the cloud. For instance, it is possible to create groups of users, which are allowed to carry out certain tasks."
>
> "A context exists of a set of rights which describe what you can do within this context with an object of MMBase. For example you define read access to a the context which is used by anonymous visitors of your site and you can define a context with edit rights for registered users of your site. "

Move the library and other files of the CloudContext Security module into the MMBase installation tree:

```
mv -i web-app/WEB-INF/lib/* \
    /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/
mv -i web-app/WEB-INF/config/applications/* \
    /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/applications/
mv -i web-app/WEB-INF/config/builders/* \
    /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/builders/
```

Save the documentation files for later reference:

```
mv -i web-app/README.txt web-app/README-PACKAGE.txt web-app/documentation web-app/src \
    /usr/local/tomcat/webapps/mmbase-webapp/mmdocs/security/
```

Make sure all these new files are owned by your tomcat user as well:

```
chown -R tomcat:tomcat /usr/local/tomcat/webapps/mmbase-webapp
```

Disable the existing configuration in the security configuration file `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/security/security.xml`:

```
<!--
<authentication class="org.mmbase.security.implementation.context.ContextAuthentication" url="context/config.xml" />
-->
...
```

```
<!--
<authorization class="org.mmbase.security.implementation.context.ContextAuthorization" url="context/config.xml" />
-->
```

And add (from `web-app/WEB-INF/config/security/security.xml`):

```
<!--
Example security.xml to switch on Cloud Context Security.
No other configuration needed
(Cloud Context Security is configured in the cloud)
@version $Id: security.xml,v 1.1 2003/06/17 16:44:01 michiel Exp $
-->
<authentication class="org.mmbase.security.implementation.cloudcontext.Authenticate" url="" />
<authorization  class="org.mmbase.security.implementation.cloudcontext.Verify"       url="" />
```

Make sure to include the configuration above before the `<sharedsecret>` statement, or you will get an error like this:

```
ERROR org.mmbase.util.XMLErrorHandler - security.xml line:71 column:12:
    The content of element type "security" must match "(authentication,authorization,sharedsecret)".
```

9.2. Installing the Media module

<TODO>

9.3. Installing the Email module

The Email module makes it possible to send email with MMBase, using either SendMail or JMSendMail.

Move the library and other files of the Email module into the MMBase installation tree:

```
mv -i web-app/WEB-INF/lib/* \
    /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/lib/
mv -i web-app/WEB-INF/config/builders/* \
    /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/builders/
mkdir /usr/local/tomcat/webapps/mmbase-webapp/email-examples/
cp -iR web-app/examples/* \
    /usr/local/tomcat/webapps/mmbase-webapp/email-examples/
```

Save the documentation files for later reference:

```
mkdir /usr/local/tomcat/webapps/mmbase-webapp/mmdocs/email/
mv -i web-app/README.txt web-app/README-PACKAGE.txt web-app/documentation web-app/src \
    /usr/local/tomcat/webapps/mmbase-webapp/mmdocs/email/
```

Make sure all these new files are owned by your tomcat user as well:

```
chown -R tomcat:tomcat /usr/local/tomcat/webapps/mmbase-webapp
```

Edit the email configuration file
`/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/modules/sendmail.xml`
(from `web-app/WEB-INF/config/modules/sendmail.xml`):

```
...
<status>active</status>
...
<classfile>org.mmbase.applications.email.SendMail</classfile>
...
```

Add to Tomcat's root `Context` (in /usr/local/tomcat/conf/context.xml for Tomcat version 5, in /usr/local/tomcat/conf/server.xml for Tomcat version 4) (replace <smtp.domain.tld> with the adres of your SMTP server):

```
Resource name="mail/Session" auth="Container"
         type="javax.mail.Session"/>
  <ResourceParams name="mail/Session">
    <parameter>
      <name>mail.smtp.host</name>
      <value>smtp.domain.tld</value>
    </parameter>
  </ResourceParams>
  <ResourceLink name="linkToGlobalResource"
                global="simpleValue"
                type="java.lang.Integer"/>
```

Failing to do this, results in a fatal error:

```
FATAL org.mmbase.module.JMSendMail -
    JMSendMail failure: Name mail is not bound in this Context
```

Installing the Email module in MMBase version 1.7 running on Tomcat version 5 resulted in a fatal error:

```
FATAL org.mmbase.servlet.MMBaseStartThread -
Could not find the MMBase module!javax/mail/Session
```

10. Configuring initial MMBase settings

Here are some initial configuration settings for MMBase.

Change the default password admin2k for the administrator admin by editing `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/security/context/config.xml`:

```
<user name="admin" context="admin">
    <identify type="name/password" rank="administrator">admin2k</identify>
</user>
```

Also, outcomment or remove the user foo/bar.

Since this file contains your administrators password, make sure other users can not read it:

```
chmod 640 /usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/security/context/config.xml
```

To use the MMBase builder mmbaseuser (using the mmbaseuser table in your MySQL database) for user authentication, set the `authentication` class in the configuration file `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/security/security.xml` to:

```
<authentication class="org.mmbase.security.implementation.cloud.Authenticate" url="" />
```

and set the `authorization` class to:

```
<authorization class="org.mmbase.security.implementation.cloud.Verify" url="" />
```

In the same file change the shared secret used to communicate with remote builders (on other MMBase servers):

```
<sharedsecret>yoursharedsecret</sharedsecret>
```

You can set the language for MMBase by editing `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/modules/mmbaseroot.xml`:

```
<property name="language">en</property>
```

You can set the SMTP gateway by editing `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/modules/sendmail.xml`:

```
<property name="mailhost">localhost</property>
```

11. Running MMBase

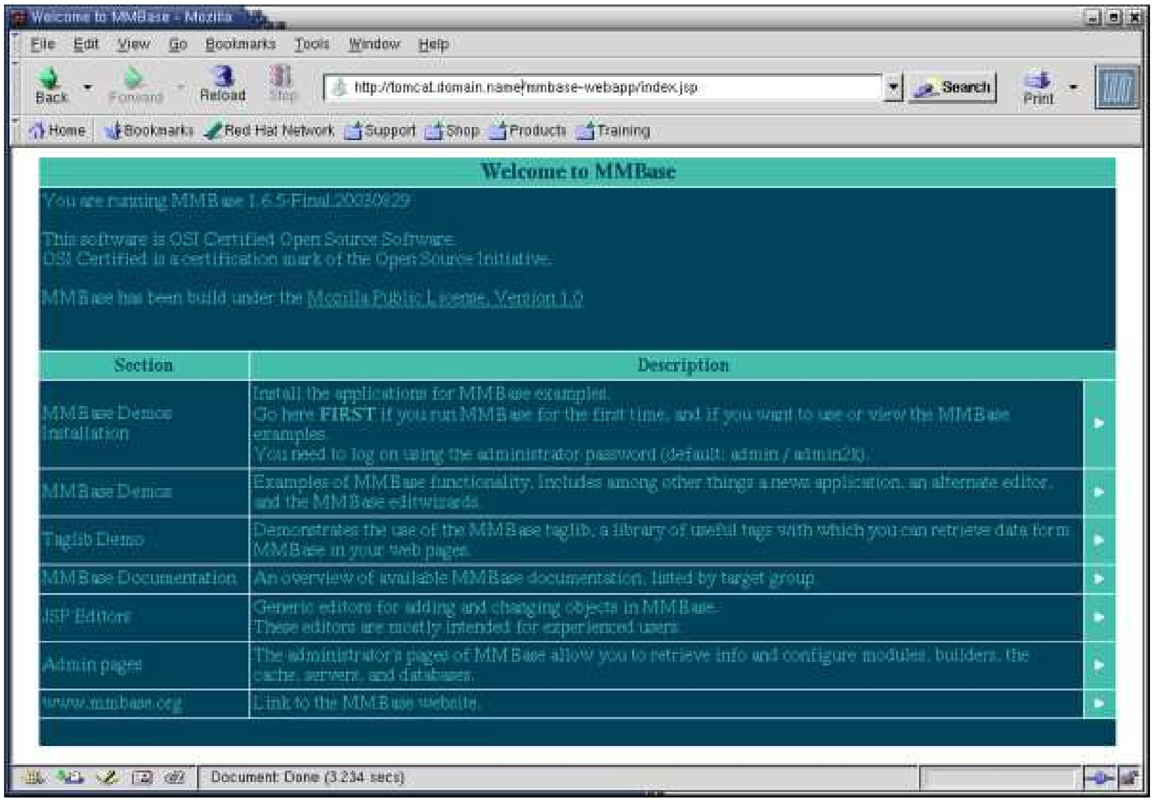
Now you are ready to start Tomcat:

```
service tomcat start
```

and access your new MMBase server through (replace *<hostname>* with your hostname):

```
http://<hostname>:8080/mmbase-webapp/
```

If everything you just did worked out, you should get the MMBase welcome screen where you can change the settings, look at the demos, and install the samples.



When asked for a login use the name admin and the password you just set in the security configuration file `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/security/context/config.xml`.

MMBase users (i.e. front−end developers) will typically add their web files to the `/usr/local/tomcat/webapps/mmbase-webapp/` directory. Applications (defining the content) will be placed in the `/usr/local/tomcat/webapps/mmbase-webapp/WEB-INF/config/applications/` directory.

Tomcat consumes far more CPU and memory resources than Apache. Make sure the dimensions of your Tomcat/MMBase server system meet these requirements.

Shutting down (or restarting) the Tomcat server (version 1.6) in our case always left a last process running. If you experience this same problem, kill the process by hand before starting it up again:

```
[root@hostname root]# service tomcat stop
[root@hostname root]# ps -ax |grep j2
24535 ?        S      4:12 /usr/local/j2sdk/bin/java -server -Xms64m -Xmx512m-Dbuild.compiler.emacs=true ...
[root@hostname root]# kill 24535
[root@hostname root]# service tomcat start
[root@hostname root]#
```

You can save the original `index.jsp` file by renaming it to `mmbase.jsp`:

```
mv -i /usr/local/tomcat/webapps/mmbase-webapp/index.jsp \
    /usr/local/tomcat/webapps/mmbase-webapp/mmbase.jsp
```

This will allow you to always access the original MMBase home page through (replace *<hostname>* with your hostname):

```
http://<hostname>:8080/mmbase-webapp/mmbase.jsp
```

In case of any problems, check the Tomcat and MMBase log files in the directory `/usr/local/tomcat/logs/` for hints.

>From here, we refer to the documentation on the MMbase website to complete your configuration and start using MMBase:

```
http://www.mmbase.org/docs/
```

12. Connecting Apache and Tomcat using mod_jk2

Since (for some odd reason) some network managers allow outgoing web connections only to TCP port 80, there might be people around that cannot access your Tomcat (and MMBase) server through port 8080. You can install a JK 2 mapping or a reverse proxy in Apache, so Tomcat and MMBase can be accessed through the Apache web server at port 80. Apart from the port issue, this has the advantage that you can use Apache to manage you SSL connections and use your existing Apache logs and statistics facilities for Tomcat and MMBase as well.

Here we describe the installation and configuration of the JK 2 Connector connecting Apache and Tomcat. In this way, Tomcat paths can be mapped into Apache.

>From the JK 2 Connector website (http://jakarta.apache.org/tomcat/tomcat−4.1−doc/config/jk2.html):

> " The JK 2 Connector element represents a `Connector` component that communicates with a web connector via the AJP protocol. This is used for cases where you wish to invisibly integrate Tomcat 4 into an existing (or new) Apache installation, and you want Apache to handle the static content contained in the web application, and/or utilize Apache's SSL processing. In many application environments, this will result in better overall performance than running your applications under Tomcat stand−alone using the HTTP/1.1 Connector. However, the only way to know for sure whether it will provide better performance for your application is to try it both ways. "

If you will only be needing a simple configuration−− typically a single Tomcat server sitting on the same system as your Apache server−− Apache reverse proxies might be an easier solution for you. Although these are simpler in terms of the interconnection features, reverse proxies provide more flexibility in fiddling with your paths and other options. The configuration of Apache reverse proxies is described in the next section.

However, if you plan to build or grow to a farm of several Tomcat servers behind an Apache front−end or build a high−performance system, deploying the JK 2 Connector is the way to go.

Download the sources of the JK 2 Connector from the Apache Jakarta website:

```
http://jakarta.apache.org/site/sourceindex.cgi
```

Extract and compile the JK 2 Connector:

```
 tar −zxvf jakarta−tomcat−connectors−jk2−src−xxx.tar.gz
 cd jakarta−tomcat−connectors−jk2−src/jk/native2/
 ./configure \
   −−with−apxs2=/usr/local/apache/bin/apxs
 make
```

Make sure your `$JAVA_HOME` environment variable is set and the Java binaries are in your `$PATH` or add this option to your **./configure** command:

```
−−with−java−home=/usr/local/j2sdk
```

Copy the module files `mod_jk2.so` and `jkjni.so` to the `modules/` directory of Apache:

```
cp -i ../build/jk2/apache2/*.so /usr/local/apache/modules/
chmod 755 /usr/local/apache/modules/mod_jk2.so
chown root:root /usr/local/apache/modules/mod_jk2.so
chmod 755 /usr/local/apache/modules/jkjni.so
chown root:root /usr/local/apache/modules/jkjni.so
libtool --finish /usr/local/apache/modules
```

Copy the sample configuration file `workers2.properties` to the configuration directory of Apache:

```
cp -i ../../jk/conf/workers2.properties /usr/local/apache/conf/
chown root:root /usr/local/apache/conf/workers2.properties
chmod 644 /usr/local/apache/conf/workers2.properties
```

and adjust it to your own needs.

Here is a simple configuration that should get you up and running:

```
[logger]
# outcomment this in production use
level=DEBUG

[config:]
file=${serverRoot}/conf/workers2.properties
debug=0
debugEnv=0

[uriMap:]
info=Maps the requests. Options: debug
debug=1

[shm:]
info=Scoreboard. Required for reconfiguration and status with multiprocess servers
file=${serverRoot}/logs/jk2.shm
size=1000000
debug=0
disabled=0

[workerEnv:]
info=Global server options
timing=1
debug=0

[status:]
info=Status worker, displays runtime informations

[uri:<hostname>/jkstatus/*]
info=Display status information and checks the config file for changes.
group=status:

[channel.socket:localhost:8009]
info=Ajp13 forwarding over socket

# Define the worker
[ajp13:localhost:8009]
channel=channel.socket:localhost:8009

[uri:<hostname>/mmbase-webapp/*]
```

```
info=MMBase
```

Most of this configuration is pretty standard. The last `uri` declaration (replace *`<hostname>`* with your hostname) is what this is all about; it maps all client requests starting with `/mmbase-webapp/` from Apache to your Tomcat server.

When we made a virtual host mapping, somehow the general mappings no longer worked for this virtual host (other virtual hosts on the same IP address had no problem at all). We had to explicitly add the general mappings for this virtual host to make these work again. A bug? Or a consequence of the way Apache implements name based virtual hosts?

So now, the same application you accessed through Tomcat as (replace *`<hostname>`* with your hostname):

```
http://<hostname>:8080/mmbase-webapp/
```

will be available through Apache as:

```
http://<hostname>/mmbase-webapp/
```

Only name based virtual hosts are supported this way. Make sure you add the virtual host name (pointing to this very same (web) server) to the `/etc/hosts` file (replace *`<hostname>`* with your hostname):

```
192.168.3.17 <hostname>
```

or things will not work (running DNS is not sufficient here!).

If your Apache installation is serving only a single website, you can leave out the hostname:

```
[uri:/mmbase-webapp/*]
info=MMBase
```

which will serve the mapped `/mmbase-webapp/` directory on every address and site of your Apache installation.

Using JK Connector version 2, all configuration settings will be in the `workers2.properties` file. Even though Tomcat comes with its own JK 2 configuration file `/usr/local/tomcat/conf/jk2.properties`, there's no need to edit this as long as you stick with the standard port 8009.

If you do have to edit this file (for example when changing the port), make sure that you do it when your Tomcat server is not running; the file is auto–edited by Tomcat itself.

After adding the mod_jk2 module to your Apache configuration (in the file `/etc/httpd/conf/httpd.conf` or in a new file `jk2.conf` in the Apache configuration directory `/etc/httpd/conf.d`):

```
# Load mod_jk2 module
LoadModule jk2_module modules/mod_jk2.so
```

```
chown root:root /etc/httpd/conf.d/jk2.conf
chmod 644 /etc/httpd/conf.d/jk2.conf
```

you can now restart Apache and give your new entrance a try: (replace *<hostname>* with your hostname):

```
http://<hostname>/mmbase-webapp/
```

To check the status of the JK 2 Connector (replace *<hostname>* with your hostname):

```
http://<hostname>/jkstatus/
```

You can reread the configuration in `/usr/local/apache/conf/workers2.properties` by (re)loading the JK Status page. This allows you to add new mappings without restarting Apache or having it reload its configuration. However, existing mappings can not be removed this way and require Apache to reconfigure.

Although it's also possible to place the JK 2 configurations (in a slightly different form) in your Apache configuration file, this is a good reason to stick with the `workers2.properties` setup.

To protect access to the JK Status page, add an authentication declaration to the Apache configuration. For example:

```
<Location /jkstatus/>
AuthType Basic
AuthName "JK 2 Connector Status"
AuthUserFile /etc/httpd/conf/users
AuthGroupFile /etc/httpd/conf/groups
Require group admin
</Location>
```

This will prompt for a login from a user from the admin group.

In case of any problems, check the JK 2 Connector log messages that will be written to your Apache `error_log`.

In case the JK 2 Connector has difficulties connecting to Tomcat, check whether Tomcat is indeed available on port 8009:

```
netstat -tln
```

Access requests mapping to Tomcat will be logged in the `access_log`'s and `error_log`'s of Apache.

For more information on the `workers2.properties` configuration, check the documentation at:

```
http://jakarta.apache.org/tomcat/tomcat-4.1-doc/jk2/jk2/configwebcom.html
```

There you will read about setting up more (remote) Tomcat workers, grouping these together in load–balancing pools, setting up RPC channels, using Unix sockets, using the Java Native Interface (JNI) to interconnect with Tomcat directly (in–process), setting up alternative loggers, and optimizing your time–outs.

Apache is far more efficient than Tomcat in serving ordinary content files. You could have both the Apache and Tomcat document directories point to the same directory on your filesystem and only forward requests for JSP pages and Java Servlets. For example (in `workers2.conf`):

```
#[uri:/examples/servlet/*]
#info=Prefix mapping

#[uri:/examples/*.jsp]
#info=Extension mapping
```

However, now you need to protect Tomcat's `WEB-INF/` directories (and other directories and files you don't want visitors to have access to) from being served by Apache. For example (in Apache's `httpd.conf`):

```
<Location "/examples/WEB-INF/">
AllowOverride None
deny from all
<Location>
```

Also, realize that a setup like this bypasses any security constraints you may have configured in the file `/usr/local/tomcat/webapps/examples/WEB-INF/web.xml`.

You can find more general information about the JK 2 Connector at:

```
http://jakarta.apache.org/tomcat/tomcat-4.1-doc/jk2/
```

13. Installing an Apache reverse proxy as a front−end to your MMBase server

Installing an Apache reverse proxy is an easy alternative to the JK 2 Connector to use Apache as a front−end to your Tomcat server.

Add to your Apache (virtual) server configuration (replace *<hostname>* with your hostname):

```
ProxyPass /tomcat/ http://<hostname>:8080/
ProxyPassReverse /tomcat/ http://<hostname>:8080/
ProxyPass /mmbase/ http://<hostname>:8080/mmbase-webapp/
ProxyPassReverse /mmbase/ http://<hostname>:8080/mmbase-webapp/
```

This allows you to access your Tomcat server as (replace *<hostname>* with your hostname):

```
http://<hostname>/tomcat/
```

and your MMBase server as (replace *<hostname>* with your hostname):

```
http://<hostname>/mmbase/
```

Our MMBase version 1.7 installation used absolute directory paths in the web pages it generated. In order to get the reverse proxies to work properly, the Apache proxy paths had to be the same (replace *<hostname>* with your hostname):

```
ProxyPass /mmbase-webapp/ http://<hostname>:8080/mmbase-webapp/
ProxyPassReverse /mmbase-webapp/ http://<hostname>:8080/mmbase-webapp/
```

14. Installing more MMBase servers on a single Tomcat server

If you want to support more instances of MMBase, for example if you would like to make MMBase available to more or all of your users, you can create several MMBase installations and have these all run on the same Tomcat server.

Install MMBase in the home directory of the user *<user>* performing all steps before:

- create a directory `mmbase/` in the users home directory,
- copy all MMBase files into the directory `/home/`*<user>*`/mmbase/`,
- build the directory structure and configuration files in the very same way we did before,
- for MMBase version 1.7 running on Tomcat version 5, enable the Xerces libraries,
- for MMBase version 1.6 running on Tomcat version 4, remove the Xerces libraries in MMBase (after you have copied these from MMBase to Tomcat the first time),
- install the MySQL JDBC driver and create a new MySQL database for this user.

Make sure both the user and the Tomcat server have access to the MMBase installation:

```
chown -R <user>:tomcat /home/<user>/mmbase/
```

Make sure that the directory `/home/`*<user>*`/mmbase/WEB-INF/config/builders/applications` is writable and accessible by the servlet engine user (for auto–installing builders):

```
chmod 770 /home/<user>/mmbase/WEB-INF/config/builders/applications
chmod 750 /home/<user>/mmbase/WEB-INF/config/builders/
chmod 750 /home/<user>/mmbase/WEB-INF/config/
chmod 750 /home/<user>/mmbase/WEB-INF/
chmod 750 /home/<user>/mmbase/
```

Now the home directory of this user has to be accessible to the Tomcat server as well. You can change the group owner of the users home directory to the tomcat user group:

```
chown -g tomcat /home/<user>/
```

Or, if you don't want this, use the Access Control Lists (ACL's) to accomplish the same:

```
setfacl -m u:tomcat:r-x /home/<user>/
```

Finally, link the new MMBase installation to the Tomcat server:

```
ln -s /home/<user>/mmbase /usr/local/tomcat/webapps/mmbase-<user>
```

and restart Tomcat:

```
service tomcat restart
```

which will make this users MMBase installation available through:

```
http://<hostname>:8080/mmbase-<user>/
```

Again, you can set up a JK 2 mapping or a reverse proxy in Apache like we did before.

In order to run several instances of MMBase on a single Tomcat server, make sure you increase the available memory resources, i.e. by adding to the `$CATALINA_OPTS` environment variable in `/etc/rc.d/init.d/tomcat`:

```
-Xms64m -Xmx512m
```

15. Acknowledgements

This document is a follow−up on the "MMBase Mini−HOWTO: Installation on Debian Woody", by Casper Joost Eyckelhof, University of Twente, The Netherlands.

16. Contributers

- Felipe Caballero Gil,
- André van Elst, Finalist, The Netherlands.

17. Revision history

- Version 0.3.5, June 25, 2006: Tomcat init script,
- Version 0.3.4, September 19, 2005: minor corrections,
- version 0.3.2, January 25, 2005: MMBase 1.7.3, Java 1.5.0−01,
- version 0.3.1, December 26, 2004: Email module,
- version 0.3.0, December 25, 2004: MMBase 1.7.2, Tomcat 5.5.4, Java 1.5.0, MySQL Connector/J 3.0.16−ga, Jikes 1.22,
- version 0.2.6, July 27, 2004: minor additions,
- version 0.2.5, February 28, 2004: Creative Commons copyright license adjusted,
- version 0.2.4, January 22, 2004: Creative Commons copyright license; minor additions and corrections,
- version 0.2.3, December 26, 2003: minor additions and corrections,
- version 0.2.2, December 20, 2003: copyright adjusted,
- version 0.2.1, December 18, 2003: minor corrections,
- version 0.2, December 15, 2003: JK 2 Connector setup added,
- version 0.1, December 10, 2003: initial draft.

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