



Running a Subversion or Git Server natively on IBM i

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If your shop has no Windows or Linux server to host the Subversion or Git repositories or you just don't want to host the Subversion or Git repositories on this platforms you can also use your IBM i server. There is one open source Subversion and Git server available written in Java. It's SCM-Manager of TRIOLOGY GmbH. They are also from Germany like us. SCM-Manager comes as WAR file which means that you can run SCM-Manager in an application server like Websphere or Tomcat. Since Tomcat is also a java application Tomcat runs also on IBM i. In this tutorial we will guide you step by to install Tomcat and SCM-Manager.

This tutorial has been tested with Tomcat 7.0.42 using Java 6 32 Bit runtime environment on IBM i with release V6R1 with Java Group PTF SF99562 level 24.

First we have to check, if Java 6 32 Bit has installed on the machine. In a 5250 Session type GO MENU(LICPGM) and then type option 10. You must see product 5761JV1 with option 11. If you don't see this product with this option you have to install it first.

```

Display Installed Licensed Programs
System: TFSVR2

Licensed Program  Product Option  Description
5761JV1           8        J2SE 5.0 32 bit
5761JV1           9        J2SE 5.0 64 bit
5761JV1           11       Java SE 6 32 bit
5761JV1           12       Java SE 6 64 bit
5733OAR          *BASE    IBM Rational Open Access: RPG Edition
5761QU1          *BASE    IBM Query for i5/OS
5733QU2          *BASE    IBM DB2 Web Query for i Option Base
5761ST1          *BASE    DB2 Query Mgr and SQL DevKit
5761TC1          *BASE    IBM TCP/IP Connectivity Utilities for i5/OS
5761TS1          *BASE    IBM Transform Services for i5/OS
5761TS1           1        Transforms - AFP to PDF Transform
5770UME          *BASE    5770UME 00
5761WDS          *BASE    Websphere Development studio
5761WDS           21       Application Development Toolset

More...

Press Enter to continue.

F3=Exit  F11=Display status  F12=Cancel  F19=Display trademarks

```

It's also good practice to install the current Java Group PTF. In a 5250 Session type GO MENU(PTF) and then type option 12. On a machine with V6R1 you should see PTF-Group SF99562. On V7R1 you should see SF99572. We recommend to check if the installed level is equal to the current available level at <https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/IBM%20i%20Technology%20Updates/page/Java%20on%20IBM%20i%20security%20updates>.

```

Work with PTF Groups
System: TFSVR2

Type options, press Enter.
1=Order  4=Delete  5=Display  6=Print  8=Display special handling PTFs
9=Display related PTF groups

Opt  PTF Group  Level  Status
|----|-----|-----|-----|
|  | SF99636  | 2     | Installed
|  | SF99626  | 5     | Installed
|  | SF99616  | 10    | Installed
|  | SF99610  | 11102 | Not installed
|  | SF99609  | 89    | Installed
|  | SF99608  | 21    | Installed
|  | SF99601  | 19    | Installed
|  | SF99562  | 15    | Installed
|  | SF99562  | 24    | Installed
|  | SF99356  | 21    | Not installed
|  | SF99354  | 11    | Installed
|  | SF99115  | 18    | Installed

Bottom

F3=Exit  F6=Print  F11=Display descriptions  F12=Cancel
F22=Display entire field

```


Next to 32bit type option 5 again.

You see this.

```
work with object Links
Directory . . . . : /QOpenSys/QIBM/ProdData/JavaVM/jdk626/32bit
Type options, press Enter.
 2=Edit  3=Copy  4=Remove  5=Display  7=Rename  8=Display attributes
11=Change current directory ...

Opt  object link      Type      Attribute  Text
---  ---
 1  bin                DIR
 2  copyright          STMF
 3  include            DIR
 4  jre                DIR
 5  lib                DIR
 6  license_en.txt     STMF
 7  notices.txt        STMF
 8  src.zip            STMF
 9  IBMmisc.jar        STMF

Parameters or command
===>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F12=Cancel  F17=Position to
F22=Display entire field  F23=More options

Bottom
```

Copy the value in the header in field "Directory" to the clipboard. In our case /QOpenSys/QIBM/ProdData/JavaVM/jdk626/32bit. We will need this value later several times.

Now we have to download and install Tomcat.

Go to <http://tomcat.apache.org/>.

You see this.



Apache Tomcat



Search the Site...

Apache Tomcat

Home
Taglibs
Maven Plugin

Download

Which version?
Tomcat 8.0
Tomcat 7.0
Tomcat 6.0
Tomcat Connectors
Tomcat Native
Archives

<http://www.apache.org/licenses>

Apache Tomcat

Apache Tomcat is an open source software implementation of the Java Servlet and JavaServer Pages technologies. The Java Servlet and JavaServer Pages specifications are developed under the [Java Community Process](#).

Apache Tomcat is developed in an open and participatory environment and released under the [Apache License version 2](#). Apache Tomcat is intended to be a collaboration of the best-of-breed developers from around the world. We invite you to participate in this open development project. To learn more about getting involved, [click here](#).

Apache Tomcat powers numerous large-scale, mission-critical web

On the left side of the navigation bar click "Tomcat 7.0".

You see this.

IRC

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Legal
Sponsorship
Thanks

7.0.42

Please see the [README](#) file for packaging information. It explains what every distribution contains.

Binary Distributions

- Core:
 - **zip** ([pgp](#), [md5](#))
 - [tar.gz](#) ([pgp](#), [md5](#))
 - [32-bit Windows zip](#) ([pgp](#), [md5](#))
 - [64-bit Windows zip](#) ([pgp](#), [md5](#))
 - [64-bit Itanium Windows zip](#) ([pgp](#), [md5](#))
 - [32-bit/64-bit Windows Service Installer](#) ([pgp](#), [md5](#))
- Full documentation:
 - [tar.gz](#) ([pgp](#), [md5](#))
- Deployer:
 - [zip](#) ([pgp](#), [md5](#))
 - [tar.gz](#) ([pgp](#), [md5](#))
- Extras:
 - [JMX Remote jar](#) ([pgp](#), [md5](#))

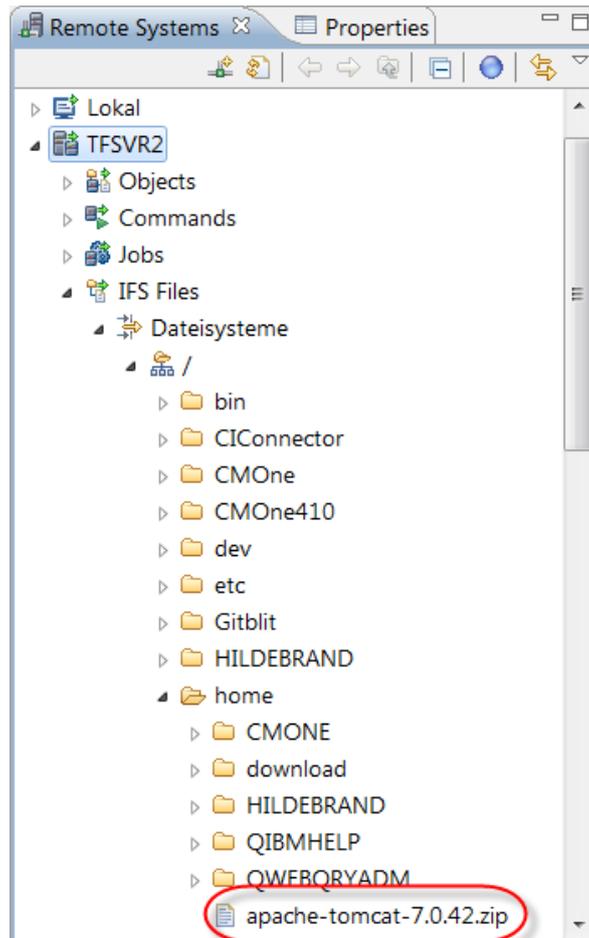
<http://mirror.serversupportforum.de/apache/tomcat/tomcat-7/v7.0.42/bin/>

Click on Core – Zip. Tomcat will be downloaded now.

Now we have to put the downloaded file "apache-tomcat-7.0.42.zip" to the IFS of the IBM i server in directory "/home". There are several ways to do this. I do this now via RDi.

Start RDi and open in Remote Systems Explorer the following path. "MySystem/IFS Files/File Systems/"//"/home". On Windows open the Windows Explorer and go to the directory where you have stored the downloaded file. Right click the file and select "Copy". In RDi right click the directory "/home" and select "Paste".

It should look like this now.



Now we have to do some work in a 5250 session.

```
Start QSH
QSH
```

```
Change the current directory
cd /home
```

```
Extract the zip archive
jar -xvf apache-tomcat-7.0.42.zip
```

```
Create an empty stream file
touch -C 819 /home/apache-tomcat-7.0.42/bin/setenv.sh
```



End QSH
Press F3=Exit

Move and rename the extracted directory
MOV OBJ('/home/apache-tomcat-7.0.42') TOOBJ('/SCM-Manager')

We must edit the file setenv.sh to tell Tomcat which Java Runtime to use.
Enter the following command.
EDTF STMF('/SCM-Manager/bin/setenv.sh')
Add the following line
export JAVA_HOME="/PathToMyJDK"

Replace /PathToMyJDK with the value you have copied to clipboard on several steps above. In our example it was
/QOpenSys/QIBM/ProdData/JavaVM/jdk626/32bit

Press F2=Save and F3=Exit.

By default Tomcat uses the ports 8005, 8009 and 8080. We must check, if this ports are free or occupied. Enter the following command.
NETSTAT OPTION(*CNN)

If you see that one of the ports are used or if you in general want to change the ports Tomcat is listening enter the following command.
EDTF STMF('/SCM-Manager/conf/server.xml')

Change the default ports to free ports. To do this enter in field "Control" the following commands and press F16.

```
find port="8005"  
find port="8009"  
find port="8080"
```

Replace the default ports by the ports you have chosen.

Press F2=Save and F3=Exit.

Now we have to configure a user and a password needed to sign on to Tomcat. Enter the following command.
EDTF STMF('/SCM-Manager/conf/tomcat-users.xml')

Go to the bottom of this file and remove the marked lines as described in the hardcopy below.

```

Edit File: /SCM-Manager/conf/tomcat-users.xml
Record : 29 of 36 by 10      Column : 1 64 by 126
Control : |

CMD .....1.....2.....3.....4.....5.....6.....7.....8.....9.....0.....1.....2.....

<!-- Remove this line
<role rolename="tomcat"/>
<role rolename="role1"/>
<user username="tomcat" password="tomcat" roles="tomcat"/>
<user username="both" password="tomcat" roles="tomcat,role1"/>
<user username="role1" password="tomcat" roles="role1"/>
--> Remove this line
</tomcat-users>
*****End of Data*****

F2=Save F3=Save/Exit F12=Exit F15=Services F16=Repeat find F17=Repeat change F19=Left F20=Right

```

Add

<role rolename= "manager-gui"/>
after all existing rolename elements.

Add

<user username="MyUser" password="MyPassword" roles="manager-gui"/>
after all existing username elements and replace MyUser with a user of
your choice like admin and MyPassword with a password of your choice.

The file should now look like this.

```

Edit File: /SCM-Manager/conf/tomcat-users.xml
Record : 29 of 38 by 10      Column : 1 69 by 126
Control :
CMD .....1.....2.....3.....4.....5.....6.....7.....8.....9.....0.....1.....2.....
<role rolename="tomcat"/>
<role rolename="role1"/>
<role rolename="manager-gui"/>
<user username="tomcat" password="tomcat" roles="tomcat"/>
<user username="both" password="tomcat" roles="tomcat,role1"/>
<user username="role1" password="tomcat" roles="role1"/>
<user username="MyUser" password="MyPassword" roles="manager-gui"/>
</tomcat-users>
*****End of Data*****
F2=Save F3=Save/Exit F12=Exit F15=Services F16=Repeat find F17=Repeat change F19=Left F20=Right

```

Press F2=Save and F3=Exit.

If we have done everything right then we can start Tomcat. Enter the following command.

```
SBMJOB          CMD(QSH          CMD('/SCM-Manager/bin/startup.sh'))
JOB(SCMMANAGER) JOBQ(QINTER)
```

Now we have to check if the job is running. Enter the following command.

```
WRKACTJOB SBS(QINTER)
```

You must see job QP0ZSPWT and job SCMMANAGER. If not, then there are some problems and you should check the previous steps.

The last step with Tomcat is to check if we can start the Tomcat Management Console. Open a browser and enter the following URL. Replace myServer with you server name and myPort with the port you have chosen above for port 8080.

<http://myServer:myPort/manager>

Next the browser must ask you for the user and password you have specified above. Type in the user and the password.

Do you see now the Tomcat Management Console? Congratulations. Tomcat has installed on your server and is running.

So leave now the browser and let`s stop Tomcat by entering the following command.



```
SBMJOB          CMD(QSH          CMD('/SCM-Manager/bin/shutdown.sh'))
JOB(SCMDOWN) JOBQ(QINTER)
```

Now we have to check if the job has finished. Enter the following command.

```
WRKACTJOB SBS(QINTER)
```

The jobs QP0ZSPWT and SCMMANAGER should be disappeared.

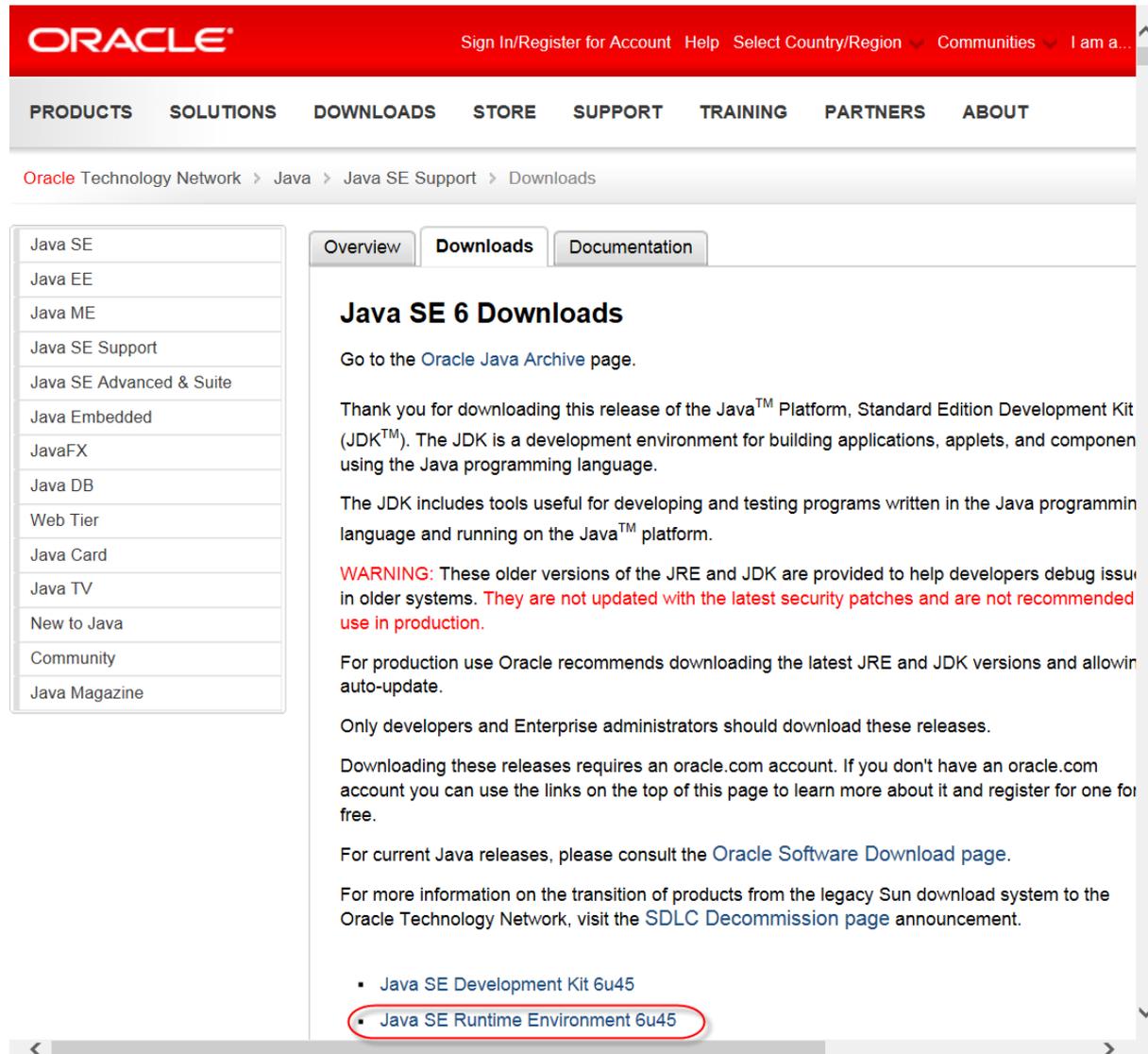
Next is to prepare the system for the installation of SCM-Manager. SCM-Manager needs some encryption algorithms which are provided by the Oracle Java Virtual Machine but not by the IBM Java Virtual Machine which is installed on IBM i. This is a problem of the JCE provider. These encryption algorithms will be provided by the jar `sunjce_provider.jar` of the Oracle JVM. What we have to do now is to take the jar `sunjce_provider.jar` from Oracle JVM and put it to the IBM JVM on IBM i. This may sound very strange but I have asked IBM if they see any problems in doing this. The answer of IBM was that there are no problems.

In the example above we have chosen to use Java 6 32 Bit runtime environment. Therefore we now have to download the Java 6 32 Bit runtime environment from Oracle.

Go to the following site.

<http://www.oracle.com/technetwork/java/javasebusiness/downloads/java-archive-downloads-javase6-419409.html#jre-6u45-oth-JPR>

You see this.



The screenshot shows the Oracle Java SE 6 Downloads page. The Oracle logo is at the top left, and navigation links like 'Sign In/Register for Account', 'Help', 'Select Country/Region', 'Communities', and 'I am a...' are at the top right. Below the logo is a navigation menu with 'PRODUCTS', 'SOLUTIONS', 'DOWNLOADS', 'STORE', 'SUPPORT', 'TRAINING', 'PARTNERS', and 'ABOUT'. The breadcrumb trail reads 'Oracle Technology Network > Java > Java SE Support > Downloads'. On the left is a sidebar menu with items like 'Java SE', 'Java EE', 'Java ME', 'Java SE Support', 'Java SE Advanced & Suite', 'Java Embedded', 'JavaFX', 'Java DB', 'Web Tier', 'Java Card', 'Java TV', 'New to Java', 'Community', and 'Java Magazine'. The main content area has tabs for 'Overview', 'Downloads', and 'Documentation'. The 'Downloads' tab is active, showing the title 'Java SE 6 Downloads'. The text includes a link to the 'Oracle Java Archive page', a thank you message for downloading the Java™ Platform, Standard Edition Development Kit (JDK™), and a warning that these older versions are not updated with the latest security patches and are not recommended for production use. It also mentions that for production use, the latest JRE and JDK versions should be downloaded and allowed to auto-update. A list of releases is shown at the bottom, with 'Java SE Runtime Environment 6u45' circled in red.

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Java DB
Web Tier
Java Card
Java TV
New to Java
Community
Java Magazine

Overview Downloads Documentation

Java SE 6 Downloads

Go to the [Oracle Java Archive page](#).

Thank you for downloading this release of the Java™ Platform, Standard Edition Development Kit (JDK™). The JDK is a development environment for building applications, applets, and componen using the Java programming language.

The JDK includes tools useful for developing and testing programs written in the Java programmin language and running on the Java™ platform.

WARNING: These older versions of the JRE and JDK are provided to help developers debug issu in older systems. **They are not updated with the latest security patches and are not recommended use in production.**

For production use Oracle recommends downloading the latest JRE and JDK versions and allowin auto-update.

Only developers and Enterprise administrators should download these releases.

Downloading these releases requires an oracle.com account. If you don't have an oracle.com account you can use the links on the top of this page to learn more about it and register for one for free.

For current Java releases, please consult the [Oracle Software Download page](#).

For more information on the transition of products from the legacy Sun download system to the Oracle Technology Network, visit the [SDLC Decommission page](#) announcement.

- [Java SE Development Kit 6u45](#)
- [Java SE Runtime Environment 6u45](#)

Click "Java SE Runtime Environment 6u45"

You see this.

Java SE Runtime Environment 6u45

You must accept the [Oracle Binary Code License Agreement for Java SE](#) to download this software.

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Product / File Description	File Size	Download
Linux x86	20.24 MB	jre-6u45-linux-i586-rpm.bin
Linux x86	20.76 MB	jre-6u45-linux-i586.bin
Linux x64	19.82 MB	jre-6u45-linux-x64-rpm.bin
Linux x64	20.39 MB	jre-6u45-linux-x64.bin
Solaris x86	20.4 MB	jre-6u45-solaris-i586.sh
Solaris x64	7.54 MB	jre-6u45-solaris-x64.sh
Solaris SPARC	25.19 MB	jre-6u45-solaris-sparc.sh
Solaris SPARC 64-bit	11.21 MB	jre-6u45-solaris-sparcv9.sh
Windows x86 Online	0.87 MB	jre-6u45-windows-i586-iftw.exe
Windows x86 Offline	16.3 MB	jre-6u45-windows-i586.exe
Windows x64	11 MB	jre-6u45-windows-x64.exe
Linux Intel Itanium	19.36 MB	jre-6u45-linux-ia64-rpm.bin
Linux Intel Itanium	21.9 MB	jre-6u45-linux-ia64.bin
Windows Intel Itanium	18.99 MB	jre-6u45-windows-ia64.exe

[Back to top](#)

Click "Accept License Agreement".

Download `jre-6u45-linux-i586-rpm.bin`. Don't worry about Linux. That's right.

Open the downloaded file with 7-Zip and go to the following path.
`..\jre-6u45-linux-i586-rpm.bin\jre-6u45-linux-i586.rpm\jre-6u45-linux-i586.cpio\usr\java\jre1.6.0_45\lib\ext\`

Here you should see the jar `sunjce_provider.jar`. Extract only this file.

Enter the following command.
`WRKLNK OBJ('/PathToMyJDK')`

Replace `/PathToMyJDK` with the value you have copied to clipboard on several steps above. In our example it was
`/QOpenSys/QIBM/ProdData/JavaVM/jdk626/32bit`

Next to "32bit" type "5=Display".
 Next to "jre" type "5=Display".
 Next to "lib" type "5=Display".
 Next to "ext" type "5=Display".

In our example I am now located at the following path
`/QOpenSys/QIBM/ProdData/JavaVM/jdk626/32bit/jre/lib/ext`

This is the directory I have to copy the jar `sunjce_provider.jar` to. As I described above there are several ways to do this. I do this with RDi again.

Enter the following command.
 WRKLNK OBJ('/PathToMyJDK ')

Replace /PathToMyJDK with the value you have copied to clipboard on several steps above. In our example it was /QOpenSys/QIBM/ProdData/JavaVM/jdk626/32bit

Next to "32bit" type "5=Display".
 Next to "jre" type "5=Display".
 Next to "lib" type "5=Display".
 Next to "security" type "5=Display".
 Next to file "java.security" type "2=Edit".

In field "Control" type "security.provider" and press F16.

Add the following Oracle providers to the list of providers

```
security.provider.10=com.sun.crypto.provider.SunJCE
security.provider.11=sun.security.provider.Sun
security.provider.12=sun.security.rsa.SunRsaSign
security.provider.13=sun.security.jgss.SunProvider
```

Change each number of the Oracle providers you add to sequentially follow the existing providers in the list.

It should now look like this.

```

Browse : < IBM/ProdData/JavaVM/jdk626/32bit/jre/lib/security/java.security
Record : 48 of 297 by 18 Column : 1 71 by 131
Control :

....+....1...+....2...+....3...+....4...+....5...+....6...+....7...+....8...+....9...+....0...+....1...+....2...+....3.
#
# List of providers and their preference orders (see above):
#
security.provider.1=com.ibm.jsse2.IBMJSSEProvider2
security.provider.2=com.ibm.crypto.provider.IBMJCE
security.provider.3=com.ibm.security.jgss.IBMJGSSProvider
security.provider.4=com.ibm.security.cert.IBMCertPath
security.provider.5=com.ibm.security.sasl.IBMSASL
security.provider.6=com.ibm.xml.crypto.IBMXMLCryptoProvider
security.provider.7=com.ibm.xml.enc.IBMXMLEncProvider
security.provider.8=org.apache.harmony.security.provider.PolicyProvider
security.provider.9=com.ibm.security.jgss.mech.spnego.IBMSPNego
security.provider.10=com.ibm.i5os.jsse.JSSEProvider
security.provider.11=com.sun.crypto.provider.SunJCE
security.provider.12=sun.security.provider.Sun
security.provider.13=sun.security.rsa.SunRsaSign
security.provider.14=sun.security.jgss.SunProvider
#
F3=Exit F10=Display Hex F12=Cancel F15=Services F16=Repeat find F19=Left F20=Right

```

Press F2=Save and F3=Exit.

Now we have installed the Oracle JCE Provider.

Next we have to create a directory where to store the contents of the repositories which will be created by SCM-Manager.

Enter the following command.

```
md '/SCM-Manager/userdata'
```

We must edit the file setenv.sh to tell SCM-Manager the directory we have created before.

Enter the following command.

```
EDTF STMF('/SCM-Manager/bin/setenv.sh')
```

Add the following line

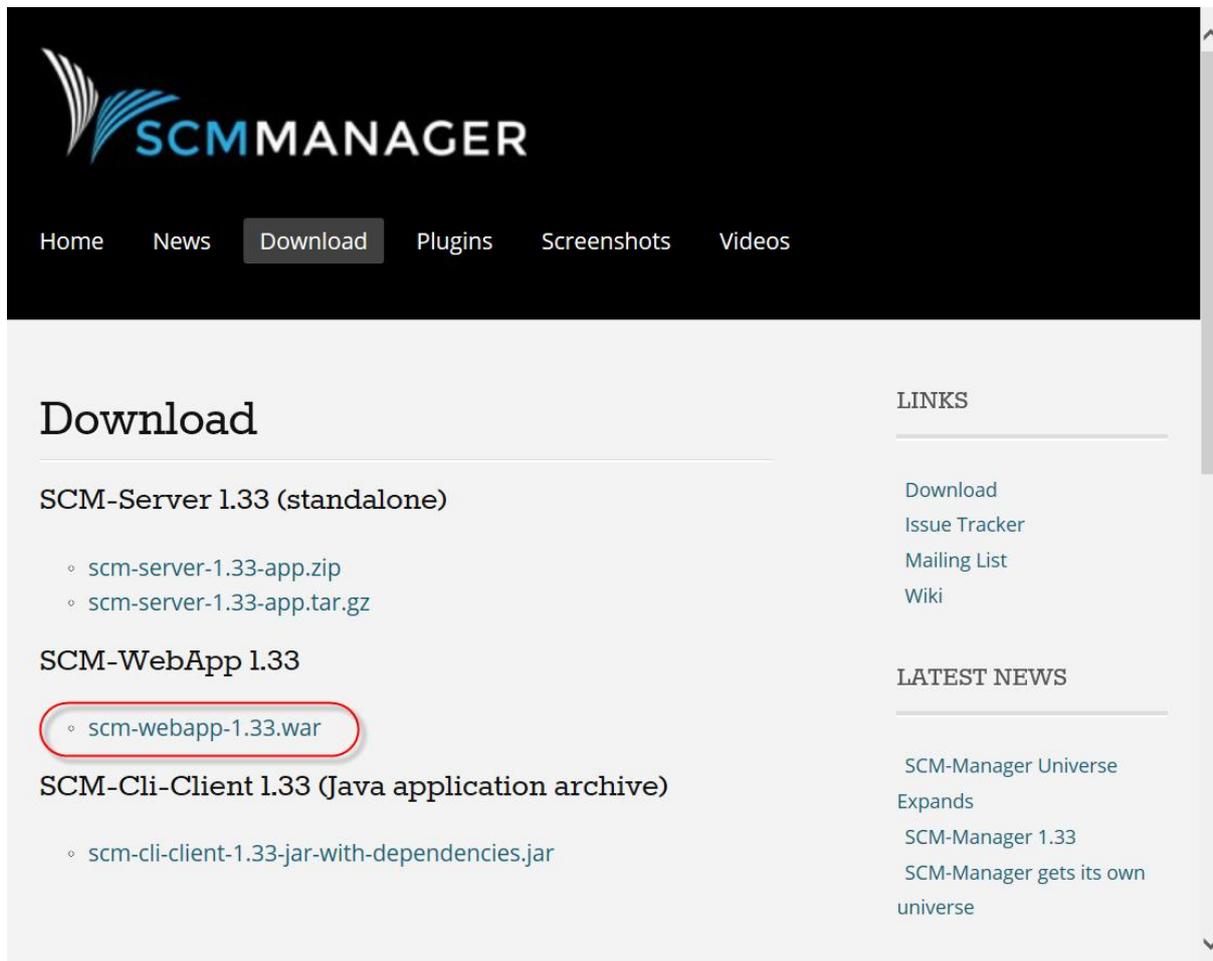
```
export SCM_HOME="/SCM-Manager/userdata"
```

Press F2=Save and F3=Exit.

Go to the following site.

<http://www.scm-manager.org/download/>

You see this.



Click "scm-webapp-1.33.war"

The downloaded WAR file has to be placed to directory /SCM-Manager/webapps. Again there are several ways to do this. I do it with RDi.

Now we want to rename the name of the WAR file because this name will be part of the URL when we trying to access SCM-Manager. Enter the following command.

```
RNM          OBJ('/SCM-Manager/webapps/scm-webapp-1.33.war')
NEWOBJ('scm-manager.war')
```

Now we have to start Tomcat again. Enter the following command.

```
SBMJOB      CMD(QSH          CMD('/SCM-Manager/bin/startup.sh'))
JOB(SCMMANAGER) JOBQ(QINTER)
```

Type in WRKACTJOB SBS(QINTER). Wait until you see that the jobs QP0ZSPWT and SCMMANAGER don` t consume further CPU time.

Now we want to start the Tomcat Management Console again. Open a browser and enter the following URL by replacing myServer and myPort with the values you have chosen for your configuration.

<http://myServer:myPort/manager>

You should see something like this.

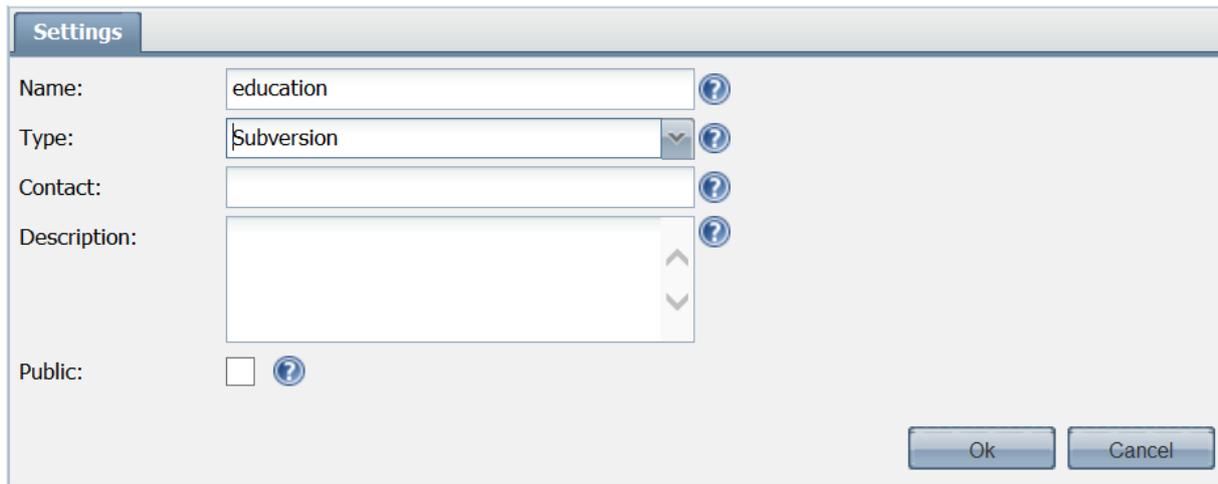
<u>/scm-manager</u>	None specified		<u>true</u>	<u>0</u>	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
---------------------	----------------	--	-------------	----------	----------------------------------------------------------------------------

Now we want to start SCM-Manager. Open the following URL in a browser.

<http://myServer:myPort/scm-manager>

If everything works fine SCM-Manager requests you now for a user and a password. Enter user "scmadmin" and password "scmadmin".

If you want you can now create your first repository. Click on tab "Repositories" and then click on "Add". Enter the name of the repository. On type select Subversion or Git and click "OK".



The screenshot shows a 'Settings' dialog box with the following fields and options:

- Name:** A text input field containing 'education'.
- Type:** A dropdown menu set to 'Subversion'.
- Contact:** An empty text input field.
- Description:** A large empty text area with scrollbars.
- Public:** A checkbox that is currently unchecked.

Each field has a small blue question mark icon to its right. At the bottom right of the dialog are 'Ok' and 'Cancel' buttons.

Now we are finished. Everything has installed and configured. I hope this tutorial was useful for you and SCM-Manager on IBM i will give you some benefits.

Have a great day.

Frank Hildebrandt