

# SPECjEnterprise2010 – Installing and Running the Benchmark on Linux



## Applies to:

SPECjEnterprise2010 v1.00, NetWeaver 7.11 CE, MaxDB 7.8 and Linux. For more information, visit the [Performance homepage](#).

## Summary

SPECjEnterprise2010 is a tool for benchmarking Java EE 5 servers and the supporting infrastructure such as JVM, database, CPU, disk and servers. This article gives a description on how to install SPECjEnterprise2010 on SAP NetWeaver 7.11 CE, running on a Linux environment, and how to run the benchmark.

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## Author Bio

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## SPECjEnterprise2010 Installation

### Step 1: Using the SPECjEnterprise2010 CD

Put the CD into your CD tray and go to the CD root directory. Open a shell on this directory and execute the following command:

```
java -jar setup.jar
```

A window like the one below should show up:



**Image 1: SPECjEnterprise2010 Setup**

Now follow the instructions given to you.

**Note:** Please make sure GUI (graphical user interface) is available. Otherwise you will not be able to continue the installation.

### Step 2: Extracting Ant

In your shell, go the SPECjEnterprise2010 home directory and execute the following command:

```
./extractant.sh
```

If the extractant.sh script does not work (e.g. because of the missing “z” option, which is needed because this archive is compressed using gzip), type in

```
tar -C ant -xvzf ant/apache-ant-1.7.1-bin.tar.gz
```

or see the man pages of tar (e.g. use the command `man tar`).

**Note:** The extractant.sh script utilizes tar; if you do not have tar available, you can manually unpack the file into the ant directory with another appropriate utility.

### Step 3: Adjusting Environment Variables

Please make sure that the following environment variables are set, otherwise the next installation steps will not work:

Name of the Environment Variable	Path(s) of the Environment Variable
ANT_HOME	<installation directory of SPECjEnterprise2010-1.00>/ant/apache-ant-1.7.1  (or use any version of Ant, but at least version 1.7)
JAVA_HOME	<installation directory of SAP System>/<System ID>/<Instance ID>/exe/sapjvm_5  (You can use any JVM of version 1.5. If you use a higher version, the version of the class files will differ from the server. Therefore you will get errors later on. You should not use a lower version because the benchmark is designed for version 1.5. In both cases you will not be able to run a benchmark.)
PATH	<path of JAVA_HOME>/bin:<path of ANT_HOME>/bin:<whatever was in there before>

**Note:** ANT\_HOME and JAVA\_HOME should be placed at the beginning of the path. This makes sure that they are called first (instead of other Ant or JVM versions).

If you would like to find out whether your environment variables are set correctly, you can display them by typing into your shell  
`echo $<environment variable>`

For example, in a bash shell you can set environment variables by executing the command:  
`export <environment variable>=<content of variable>`

The following command adds the JAVA\_HOME path to the PATH variable:  
`export PATH=<JAVA_HOME path>:$PATH`

The export command mentioned above sets the environment variables only for the shell you are using at this moment. This means, if you close the shell and open another one, you environment variable settings will be reset. If you would like to permanently set you environment variables, you can do this by editing the .bashrc file which is located in your home directory.

### Step 4: Post Installation of SPECjEnterprise2010

You can now continue with post installation. Therefore, go to the SPECjEnterprise2010 home directory and type into your shell:

```
ant install
```

## Deploying the SPECjEnterprise2010 Benchmark Application

### Step 1: Extracting SPECjEnterprise2010\_v1.0\_netweaver711.zip

At first, you have to extract the file which you can download [here](#).

It is called “SPECjEnterprise2010\_v1.0\_netweaver711.zip”. Now, you can save the file in the directory <SPECjEnterprise2010 home directory>\appservers. To extract the file, you have to open a shell, go to the directory mentioned above and type in:

```
jar -xvf SPECjEnterprise2010_v1.0_netweaver711.zip
```

This will extract to the directory where the command is executed in.

### Step 2: Configuring the build.properties File

The next step is to configure the “build.properties” file which is located in the SPECjEnterprise2010 home directory. Open the file (e.g. with vi), set the following values and save the file:

```
appserver=netweaver711
benchmark.txrate=10
```

**Note:** The injection rate (txrate) is the load level put onto the system. It is increasing linearly. This means, a txrate of 20 will lead to a load level which is as double as high as the load level caused by a txrate of 10. The lowest value of txrate is 1; typically a value between 10 and 200 ensures successful runs.

### Step 3: Configuring the Application Server Properties

Open the appserver.properties file, which is located in appservers/netweaver711. Adjust all values to fit your system. You have to change at least the following values:

```
appserver.localinst.sid=<system ID>
appserver.localinst.instance.nr=<instance number>
```

**Note:** If you do not use MaxDB, you have to change "database.driver=com.sap.dbtech.jdbc.DriverSapDB".

### Step 4: Building the Project

This will build the EJB Jar, Web Application aRchive (WAR) and Enterprise ARchive (EAR) files with the vendor-specific configurations (appserver, database, driver) given in the file “build.properties”.

You need a shell. Go to the SPECjEnterprise2010 home directory. Now you can type into you shell

```
ant
```

Which will build specj.ear and emulator.ear in the target/jar directory.

### Step 5: Configuring the Application Server and the Database

Again, you need a shell in the home directory of SPECjEnterprise2010. If you would like to use the default configuration, execute the following command:

```
ant appserver.deploy.template.sda
```

**Note:** You might need to change some configurations (like heap size ...). The template (“template.xml”) is located in the directory “appservers\netweaver711\Deploy\template.sda”. The file extension \*.SDA is similar to \*.JAR. You can manipulate SDA files just like JAR files.

## Step 6: Deploying the SPECjEnterprise2010 Application

The process of deployment also includes all database tables, resources and the emulator. You need a shell in the home directory of SPECjEnterprise2010, where you execute the following command:

```
ant appserver.deploy
```

The three targets, called while executing the target `appserver.deploy`, can be called individually:

```
appserver.deploy.DDIC.sda  
appserver.deploy.specj.ear  
appserver.deploy.emulator.ear
```

**Note:** Sometimes deploying the `specj.ear` fails due to a timeout. Please check that it has been deployed successfully before deploying the emulator.  
If you have trouble deploying SPECj and/or the emulator, please see “

Problem: The Deployment of SPECj and/or the Emulator does not work” at the end of the article.

### Step 7: Loading the Database

This will load all tables of all domains for each database instance.

Again, you need a shell in the home directory of SPECjEnterprise2010, where you execute the command:

```
ant load.database
```

### Step 8: Restarting the SPECjEnterprise2010 Application

The reason why you need to restart is that there is data cached in the engine, e.g. JPA table generator values. They will be reused in the next run. This will lead to duplicate key errors on the database. Another reason is that the txrate, which is stored in a static member variable, will not be reinitialized.

You can restart the application by using different methods. I will describe the method using telnet. You have to open a shell and type in

```
telnet localhost 5<instance number>08
```

Now you are in the telnet console where you can stop and start SPECjEnterprise2010 by executing the following commands:

```
stop_app JavaEE/specj  
start_app JavaEE/specj
```

After stopping the application you might want to check if it really stopped. You can do this by typing

```
list_app
```

which will show you all applications. Right behind the application you can see whether it is started or stopped. Instead you can type

```
list_app | grep specj
```

which will show you all applications having “specj” in their name.

## Step 9: Checking the Functionality of the Benchmark Application

At last, you can check whether SPECjEnterprise has successfully been deployed by opening your browser and opening the page

`http://localhost:5<instance_number>00/specj`

If there is a page of SPECjEnterprise2010 is coming up, you have successfully installed the benchmark application.



**Image 2: SPECjEnterprise Application Homepage**

## Running the Benchmark Driver Using Faban Harness

### Step 1: Configuration

At first, you have to adjust the file “run.xml.template” (in the directory “<SPECj home directory>/faban”), so it matches your system configuration. Important values are

- rampUp – time in seconds used for ramp up
- steadyState – time in seconds used for steady state
- rampDown – time in seconds used for ramp down
- stopIfAuditFailed – tells whether the benchmark will stop if audit fails

Auditing means, the driver does a number of tests before starting the benchmark. If you would like to submit your result to SPEC, the system has to pass auditing. Sometimes it makes sense to set the value of stopIfAuditFailed to “false”, for example if you would like to see whether the benchmark will run at all.

Please also double check the value of benchmark.txrate the file “build.properties” which is in the SPECj home directory.

### Step 2: Loading the Database and Restarting SPECjEnterprise2010 Application

See “Step 7: Loading the Database” and “Step 8: Restarting the SPECjEnterprise2010 Application” above. Each time you want to run a new benchmark, you should do those two steps in order to get a valid run.

### Step 3: Deploying the Benchmark Driver on Harness

Again, you need a shell in the home directory of SPECjEnterprise2010, where you execute the command:

```
ant deploy-on-harness
```

### Step 4: Starting the Benchmark Driver

If you want to start a run using the command line interface (CLI), you need a shell in the home directory of SPECjEnterprise2010, where you execute the command:

```
ant faban.cli.run
```

Another way to start the benchmark driver is to use the web interface. You can go to the web interface by opening the following website in your browser:

```
http://localhost:9980/
```



Related Content”).

**Problem: The Deployment of SPECj and/or the Emulator does not work**

In some cases, the deployment of SPECj and the emulator will not work. You can also deploy those manually. Please follow the steps below:

1. Open a shell and change to the directory “/usr/sap/<SID>/<instance>/j2ee/deployment/scripts”
2. Type in  

```
make_SDA.sh <SPECjEnterprise home directory>/target/jar/specj.ear
```
3. Open telnet  

```
telnet localhost 5<instance number>08
```
4. Then type into the telnet console  

```
deploy /usr/sap/<SID>/<instance>/j2ee/deployment/scripts/specj.ear
version_rule=all
```
5. To see whether the deployment was successful, type in  

```
list_app | grep specj
```

You can do the same steps for the emulator, using “emulator” instead of “specj”.

**Problem: Faban Web Interface Does Not Work**

This might happen if Faban is not started. Usually, Faban is started when the benchmark driver is deployed on harness. In order to start Faban, open a shell and change to the SPECjEnterprise2010 home directory. Now, you can execute the command

```
ant faban.harness.start
```

This will start Faban. You can stop Faban in a similar way:

```
ant faban.harness.stop
```

**Problem: “Warning: Initial Order Audit failed, database initial state validation failed but ignored”**

Please look at the exception message. Does it say something similar to the following message?

```
org.spec.jent.common.AuditValidationException: Invalid initial state for the
CUSTINVENTORY table expected: 56250, actual: 35, relative difference: 1606.14,
allowed variation: 0.05
```

If yes, you can do the following steps:

1. Open a shell and change the directory to the SPECjEnterprise2010 home directory. Now, execute the following command:  

```
ant load.database
```
2. Now, restart your application server.

This problem appears if you schedule a new benchmark run after another one is finished without loading the database again.

### Problem: Duplicate Key Error on the Database

This problem can happen if you start a new run after reloading the database but forgot to restart the application. So, there are entries in the database which were changed during the last run and cached by the application. Therefore, the application will use the cached information again. This brings up duplicate keys in the database. To solve this problem, please try the following steps:

1. Open a shell and change the directory to the SPECjEnterprise2010 home directory. Now, execute the following command:

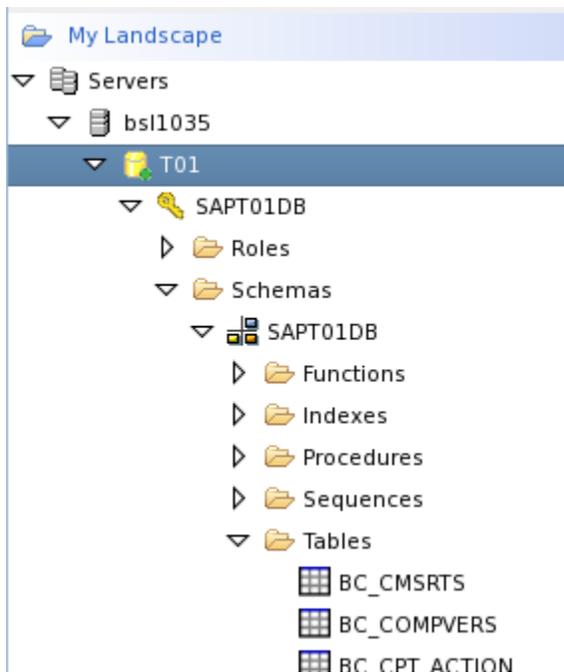
```
ant load.database
```

2. Now, restart the application.

### Problem: AUDIT TEST #4 (PurchaseOrderLines without deliveries) Fails

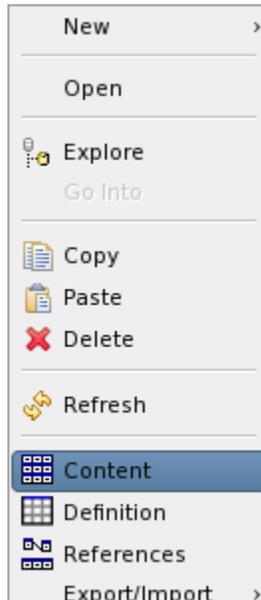
In order to solve this problem, you can try the following steps:

1. Open the MaxDB Database Studio
2. Open the table BC\_JMSQUEUE



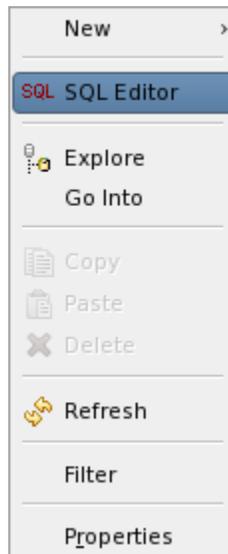
**Image 4: MaxDB Database Studio - Tables**

Do a right mouse click on the table BC\_JMSQUEUE and select "Content"



**Image 5: MaxDB Database Studio - Show Content of a Table**

3. Open the SQL editor by clicking on “Tables” and select “SQL Editor”.



**Image 6: MaxDB Database Studio - Open SQL Editor**

Now execute SQL command

```
truncate table bc_jmsqueue
```

4. Exit MaxDB Database Studio
5. Open a shell and change the directory to the SPECjEnterprise2010 home directory. Now, execute the following command:

```
ant load.database
```

6. Now, restart your application server.

### **Problem: Audit Fails due to Failing Phantom Delete Test**

Tests fail due to phantom deletes. In order to fix this, you have to set the database parameter `UseMultiVersionReadSupport=yes`. You can find more information on that issue in SAP Note 1384780. If you use MaxDB 7.7, you first have to upgrade to MaxDB 7.8. For further information on the upgrade of MaxDB 7.7 to MaxDB 7.8, please see SAP Note 1298972.

You can find the links of the SAP Notes in the “

Related Content” section.

## Glossary

Ant	is a tool to automatically build software out of source code. It is similar to make, but it is implemented in Java.
audit	is the examination of the system to check whether it complies with the run rules of SPECjEnterprise. In order to submit your results, you have to make sure that your system passes audit.
CLI	Command Line Interface  is the opposite of a GUI. It means that you control a program via a shell or other kind of command line.
Emulator	In SPECjEnterprise2010, the Emulator simulates suppliers for the car manufacturing which is simulated.
environment variables	a set of dynamic variables (used by your shell) which might affect the way processes running on your computer  For example, JAVA_HOME is an environment variable used to store the directory where the files needed to execute java class files or JARs are stored. You can set the path to different java versions depending on what you want to do. However, if the version is not the one with which the java files were compiled, you will probably get errors.
Faban	is a facility for developing and running benchmarks. It consists of the driver and the harness.
Faban Driver	is a framework and component-based model to help developing a new benchmark. It also controls the lifecycle of the benchmark run and is responsible for the simulation of the users.
Faban Harness	is a tool to automatically run benchmarks. It allows you to deploy new benchmarks as well as it provides a web interface to access old runs and schedule new ones.
GUI	Graphical User Interface  is a way to communicate with the user by the help of windows, buttons and other graphics. The alternative is the command line interface, which is the shell.
gzip	GNU ZIP  a program for compressing files or archives
jar	Java ARchive  is a zip archive with additional meta data. JARs are used to distribute Java class libraries. In order to execute a jar from a shell, you have to execute the command  <code>java -jar</code>

If you would like to extract a jar file, you have to use the command

```
jar -xvf
```

where the x stands for extracting, v means verbose (show all error messages on the shell) and f tells you that there is the file name following, which is meant to be extracted.

man

Manual

used in front of a command you do not know, e.g.

```
man tar
```

will open the manual for the command tar.

tar

Tape ARchive

is a file archive format.

Tar archiving is often used with the gzip compression method. Those archives have the file ending \*.tar.gz. In order to extracting the files, you have to type the command

```
tar -xvzf <filename>.tar.gz
```

in your shell. The option x means extracting, v means verbose (list all files processed on the shell), z shows that is an archive compressed with gzip and f means that there is a file name following.

txrate

is the load level put onto the system. In is increasing linearly.

vi

is a text based editor which is present in each Linux system.

## Related Content

More information about SPEC, SPECjEnterprise2010 and Faban is provided below:

[SPEC](#)

[SPECjEnterprise2010](#)

[SPECjEnterprise2010 User Guide](#)

[SAP Note 1298972](#)

[SAP Note 1384780](#)

[Faban](#)

For more information, visit the [Performance homepage](#).

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