



EIS GROUP™

**Installation Guide
OpenL Tablets BRMS
Release 5.16**

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1 Preface

OpenL Tablets is a Business Rules Management System (BRMS) based on tables presented in Excel documents. Using unique concepts, OpenL Tablets facilitates treating business documents containing business logic specifications as an executable source code.

OpenL Tablets provides a set of tools addressing BRMS related capabilities including *OpenL Tablets WebStudio* that can be used for creating, testing, and managing business rules and business rule projects, and *OpenL Tablets Web Services* designed for integration of business rules into customer applications.

The OpenL Tablets Installation Guide provides instructions for installing and customizing OpenL Tablets software. The document describes how to install OpenL Tablets under Apache Tomcat, deploy, and set up OpenL Tablets Web Services.

This section includes the following topics:

- [How This Guide Is Organized](#)
- [Audience](#)
- [Related Information](#)
- [Typographic Conventions](#)

1.1 How This Guide Is Organized

Information on how to use this guide	
Section	Description
Before You Begin	Lists system requirements for installing and using OpenL Tablets software.
Install OpenL Tablets WebStudio under Apache Tomcat	Explains how to install OpenL Tablets WebStudio under Apache Tomcat.
Install OpenL Tablets WebStudio on WebSphere Application Server	Explains how to install OpenL Tablets WebStudio on WebSphere Application Server.
Deploy OpenL Tablets Web Services	Describes how to deploy OpenL Tablets Web Services. This section is designed for developers.
OpenL Tablets WebStudio and OpenL Tablets Web Services Integration	Explains how to set up OpenL Tablets WebStudio and OpenL Tablets Web Services as an integrated environment.
<ul style="list-style-type: none">• Troubleshooting Notes• Frequently Asked Questions	Provides useful information related to OpenL Tablets installation.

1.2 Audience

This guide is mainly targeted at business users and rule experts who define, view, and manage their business rules and rule projects via OpenL Tablets WebStudio. Developers can also use this document to learn how to install and set up OpenL Tablets Web Services.

Basic knowledge of Java and Apache Tomcat is required to use this guide effectively.

1.3 Related Information

The following table lists sources of information related to contents of this guide:

Related information	
Title	Description
[OpenL Tablets WebStudio User Guide]	Describes OpenL Tablets WebStudio, a web application for managing OpenL Tablets projects through web browser.
[OpenL Tablets Reference Guide]	Provides overview of OpenL Tablets technology, as well as its basic concepts and principles.
http://openl-tablets.org/	OpenL Tablets open source project website.

1.4 Typographic Conventions

The following styles and conventions are used in this guide:

Typographic styles and conventions	
Convention	Description
Bold	<ul style="list-style-type: none"> Represents user interface items such as check boxes, command buttons, dialog boxes, drop-down list values, field names, menu commands, menus, option buttons, perspectives, tabs, tooltip labels, tree elements, views, and windows. Represents keys, such as F9 or CTRL+A. Represents a term the first time it is defined.
<code>Courier</code>	Represents file and directory names, code, system messages, and command-line commands.
Courier Bold	Represents emphasized text in code.
Select File > Save As	Represents a command to perform, such as opening the File menu and selecting Save As.
<i>Italic</i>	<ul style="list-style-type: none"> Represents any information to be entered in a field. Represents documentation titles.
< >	Represents placeholder values to be substituted with user specific values.
Hyperlink	Represents a hyperlink. Clicking a hyperlink displays the information topic or external source.
[name of guide]	Reference to another guide that contains additional information on a specific feature.

2 Before You Begin

The following table covers system requirements for installing and running OpenL Tablets software:

Software requirements	
Software	Requirements description
Operating systems	<p>One of the following:</p> <ul style="list-style-type: none">• Microsoft Windows 7 x86/64• Ubuntu 12.x• Linux 3.x <p>Note: OpenL Tablets software can potentially run on any operating system that supports Java Virtual Machine, e.g. Mac OS. This table lists operating systems on which the OpenL Tablets software is tested and supported.</p>
Browsers	<p>One of the following:</p> <ul style="list-style-type: none">• Microsoft Internet Explorer 9/10.x• Firefox 27.x or later• Chrome 31.x or later
Other software	<ul style="list-style-type: none">• Java v6/7 x86/64 - JDK 1.7.0_x• Apache Tomcat 7.0.x
Hardware requirements	
	<ul style="list-style-type: none">• RAM 4 GB minimum. 6 GB is recommended.• 1 GHz or faster 32-bit (x86) or 64-bit (x64) processor.
User rights requirements	
	Administrative permissions are required to install the software under Microsoft Windows or UNIX system.

Note: It is highly recommended to avoid using spaces and special characters in paths.

3 Install OpenL Tablets WebStudio under Apache Tomcat

This section describes how to set up the environment for working with OpenL Tablets software and deploy OpenL Tablets WebStudio under Apache Tomcat, and provides information about settings required for proper functioning of the application.

Perform the following steps:

1. [Step 1: Installing JDK](#)
2. [Step 2: Installing Apache Tomcat](#)
3. [Step 3: Deploying OpenL Tablets WebStudio](#)
4. [Step 4: Configuring External User Database](#)
5. [Step 5: Setting Up OpenL Tablets WebStudio with Installation Wizard](#)
6. [Step 6: Configuring Settings for Microsoft Excel Application](#)
7. [OpenL Tablets WebStudio Customization](#)

3.1 Step 1: Installing JDK

To install JDK, perform the following steps:

1. Download JDK 1.7.0_x or later from <http://www.oracle.com/technetwork/java/javase/downloads/index.html> to the target directory.

Further in the document, this catalog is referred to as `<JAVA_HOME>`.

Note: It is highly recommended to avoid installing Java in the default Program Files directory because it can cause problems due to space characters in the path to the folder.

For more information on the installation, see <http://www.oracle.com/technetwork/java/javase/index-137561.html>.

2. Install JDK according to the instructions.

Now the environment variable `JAVA_HOME` must be set to the pathname of the directory where JDK is installed.

3. For MS Windows, set the environment variable `JAVA_HOME` as follows:

1. To open the **System Properties** window, press **<Windows> + <Pause>** or right click the **My Computer** icon and in the pop-up menu, select **Properties**.
2. In the **Advanced** tab, click **Environment Variables**.
3. In the **System variables** area, click **New**.
4. In the **Variable** name field, enter `JAVA_HOME`.
5. In the **Variable** value field, enter the path to the directory where JDK is installed, for example, `C:\Java\jdk1.7.0_20`.
6. Click **OK** to complete.

4. For Unix/Linux environments, assuming the target directory is `/usr/lib/jvm/java-6-sun`, to set up the environment variable `JAVA_HOME` for a single user, proceed as follows:

1. Log in to the account and open `.bash_profile:nano ~/.bash_profile`.

2. Add the following line:
`export JAVA_HOME=/usr/lib/jvm/java-6-sun.`
3. Add or correct the system PATH as follows:
`export PATH=$PATH:$JAVA_HOME/bin`
4. To save, press **CTRL+O** and then press **CTRL+X** to exit.
5. For Unix/Linux environments, assuming the target directory is `/usr/lib/jvm/java-6-sun`, to set up the environment variable `JAVA_HOME` for all users, proceed as follows:
 1. Log in as root and open the `nano /etc/profile` profile.
 2. Add the following line:
`export JAVA_HOME=/usr/lib/jvm/java-6-sun`
 3. Add or correct the system PATH as follows:
`export PATH=$PATH:$JAVA_HOME/bin`

3.2 Step 2: Installing Apache Tomcat

Apache Tomcat can be installed from a ZIP file or using Windows Service Installer. The following topics are included in this section:

- [Installing Apache Tomcat on Windows](#)
- [Installing Apache Tomcat on UNIX / Linux Machine](#)

Installing Apache Tomcat on Windows

This section describes how to install Apache Tomcat on Windows and includes the following topics:

- [Installing Apache Tomcat from Zip File](#)
- [Installing Apache Tomcat Using Windows Service Installer](#)

Installing Apache Tomcat from Zip File

To install Apache Tomcat 7.0.x or later, proceed as follows:

1. Open Apache Tomcat home page at <http://tomcat.apache.org/index.html>.
2. In the left-hand **Download** menu, click the latest available Tomcat version.
3. Locate the **Binary Distributions** area and in the **Core** list, click on the ZIP file corresponding to the required Windows version.
4. Save the ZIP file in a temporary directory.
5. Extract the downloaded ZIP file into the target folder on the computer.

This folder is referred to as `<TOMCAT_HOME>` further in this document.

6. Configure JVM options for Tomcat web server as follows:

1. Create `TOMCAT_HOME/bin/setenv.bat` file and add the following line:

```
set JAVA_OPTS=%JAVA_OPTS% -Xms512m -Xmx2000m -XX:+UseParNewGC -XX:PermSize=128m -
XX:MaxPermSize=512m
```

2. Open the `TOMCAT_HOME/conf/server.xml` file and add the `URIEncoding="UTF-8"` attribute for all `<Connector>` elements.

For example:

```
<Connector port="8080" protocol="HTTP/1.1" connectionTimeout="20000"
redirectPort="8443" URIEncoding="UTF-8"/>
```


Installing Apache Tomcat Using Windows Service Installer


This section describes how to install Apache Tomcat using Windows Service Installer.

Note: It is not recommended to select this type of installation if planning to edit rule tables in Excel files from OpenL Tablets WebStudio as described in [\[OpenL Tablets WebStudio User Guide\]](#), the **Modifying Tables** section. This type of installation requires additional setup. To solve this issue, contact your OpenL Tablets administrator.

Note: For OpenL Tablets administrator: to enable editing rule tables in Excel files from OpenL Tablets WebStudio, enable the **Allow** service to interact with desktop Tomcat service option using MMC or from the command line.

Proceed as follows:

1. Navigate to the Apache Tomcat site at <http://tomcat.apache.org/index.html> and in the left-hand **Download** menu, click the latest available Tomcat version.
2. Locate the **Binary Distributions** area and in the **Core** list, click the [32-bit/64-bit Windows Service Installer](#) link.
Save the apache-tomcat exe file in a temporary folder.
3. Run the exe file and follow the instructions of the installation wizard.
4. Click **Next**.
5. In the **License Agreement** window, click **I Agree**.
6. In the **Choose Components** dialog, leave the default **Normal** type of installation.
Experienced Tomcat users can select another installation type in the drop-down list.
7. In the **Configuration** dialog, proceed with default values.
8. In the next window, review the folder where Tomcat will be installed, the **Destination Folder**.
This folder is referred to as <TOMCAT_HOME> further in this document.
9. Click **Install** to start the installation.
10. Click **Finish** to complete.

As a result, Apache Tomcat is installed and started on the user's computer. In the **Notification Area** located next to the clock, the  icon appears. Tomcat is managed by using this icon or from the **Start** menu.

11. To configure JVM options for Tomcat, in the **Notification** area, right click the **Apache Tomcat** icon and select **Configure**; or click **Start > All Programs > Apache Tomcat 7.0 > Configure Tomcat**.
The Apache Tomcat Properties dialog appears.

12. Click the **Java** tab and in the **Java Options** text box, add the following lines:

```
-Xms512m
-Xmx2000m
-XX: +UseConcMarkSweepGC
-XX:PermSize=128m
-XX:MaxPermSize=512m
```

Note that every option must be manually entered in a separate row.

13. Click **Apply** and then click **OK**.
14. To restart Tomcat, in **Notification Area**, right click the Tomcat icon and select **Stop service**.

The Tomcat icon changes to .

15. Select **Start Service**.

Alternatively, Tomcat can be restarted from the **General** tab in the **Apache Tomcat Properties** window which appears after selecting **Start > All Programs > Apache Tomcat 7.0 > Configure Tomcat**.

From this point, OpenL Tablets WebStudio can be run as described in [Step 3: Deploying OpenL Tablets WebStudio](#).

Installing Apache Tomcat on UNIX / Linux Machine

This section describes how to install Apache Tomcat on the UNIX or Linux machine and includes the following topics:

- [Installing Apache Tomcat from Repository](#)
- [Installing Apache Tomcat from ZIP File](#)
- [Configuring JVM Options for Tomcat on UNIX / Linux Machine](#)

Installing Apache Tomcat from Repository

This section describes how to install Apache Tomcat from repository as a service on Ubuntu 12.x.

Note: All commands must be entered into a terminal window using an account with `sudo` privileges.

Proceed as follows:

1. Open a terminal window and enter the following:

```
sudo apt-get install tomcat7
```
2. Start Tomcat with the next command:

```
sudo /etc/init.d/tomcat7 start
```

All necessary folders must be located in `/var/lib/tomcat7`.
3. To ensure that Tomcat works properly, open the browser and enter `http://localhost:8080`.
If all is correct, Apache Tomcat displays the welcome page with a message similar to the following:
If you're seeing this, you've successfully installed Tomcat. Congratulations!
 - If the 404 error appears, try to restart Tomcat as follows:

```
sudo /etc/init.d/tomcat7 restart
```
 - Alternatively, stop Tomcat by entering the following command and then start it as described previously:

```
sudo /etc/init.d/tomcat7 stop
```

Installing Apache Tomcat from ZIP File

This section describes how to install Apache Tomcat on Ubuntu 12.04 and Centos 6.3. The instructions are valid for other Linux distributions with small changes.

Proceed as follows:

1. Download the appropriate Tomcat archive file, ZIP or `tar.gz` archive, from its official website <http://tomcat.apache.org/download-70.cgi> to the required user folder.
In this example, Tomcat 7.0.39 is downloaded to the `/home/myuser` folder.
2. Open a terminal window and change directory to the folder containing the Tomcat archive.
3. Extract the archive by entering the following command in the terminal, modifying the Tomcat version as required:

```
tar -zxvf apache-tomcat-7.0.39.tar.gz
```

The `apache-tomcat-7.0.39` folder appears. For example:
`/home/myuser/apache-tomcat-7.0.39`
4. Change directory to the `tomcat/bin`:

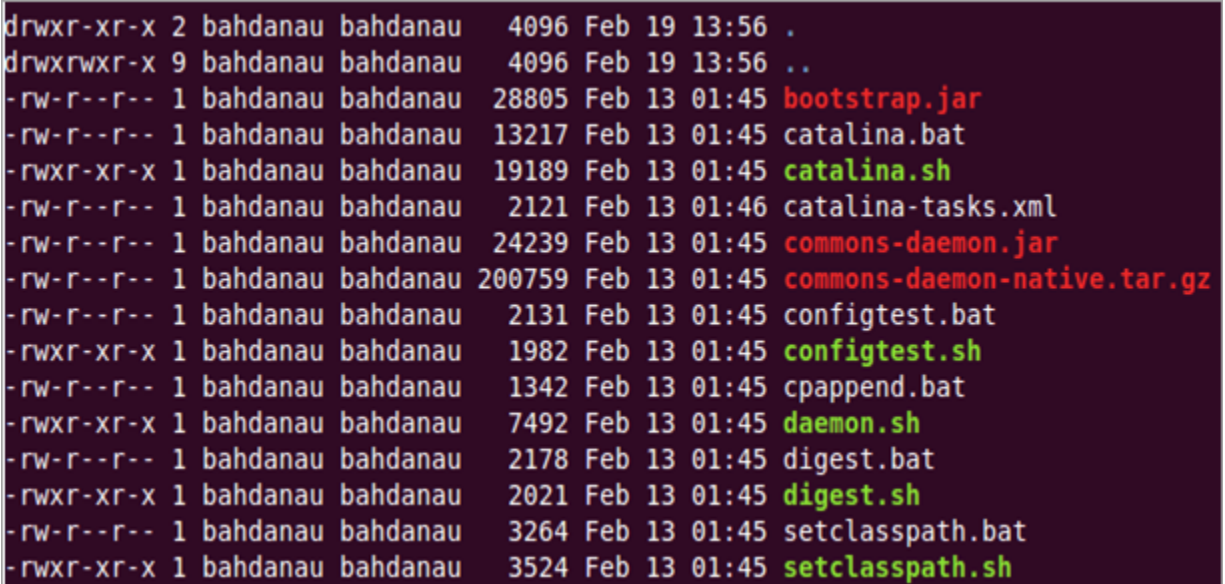
```
cd apache-tomcat-7.0.39/bin
```

- Make sure all *.sh files are executable, that is, they have `x` in all positions to the left of the file name, for example, `-rwxr-xr-x`.

For that, in terminal, enter the following:

```
ls -la
```

The following information is displayed:



```
drwxr-xr-x 2 bahdanau bahdanau 4096 Feb 19 13:56 .
drwxrwxr-x 9 bahdanau bahdanau 4096 Feb 19 13:56 ..
-rw-r--r-- 1 bahdanau bahdanau 28805 Feb 13 01:45 bootstrap.jar
-rw-r--r-- 1 bahdanau bahdanau 13217 Feb 13 01:45 catalina.bat
-rwxr-xr-x 1 bahdanau bahdanau 19189 Feb 13 01:45 catalina.sh
-rw-r--r-- 1 bahdanau bahdanau 2121 Feb 13 01:46 catalina-tasks.xml
-rw-r--r-- 1 bahdanau bahdanau 24239 Feb 13 01:45 commons-daemon.jar
-rw-r--r-- 1 bahdanau bahdanau 200759 Feb 13 01:45 commons-daemon-native.tar.gz
-rw-r--r-- 1 bahdanau bahdanau 2131 Feb 13 01:45 configtest.bat
-rwxr-xr-x 1 bahdanau bahdanau 1982 Feb 13 01:45 configtest.sh
-rw-r--r-- 1 bahdanau bahdanau 1342 Feb 13 01:45 cpappend.bat
-rwxr-xr-x 1 bahdanau bahdanau 7492 Feb 13 01:45 daemon.sh
-rw-r--r-- 1 bahdanau bahdanau 2178 Feb 13 01:45 digest.bat
-rwxr-xr-x 1 bahdanau bahdanau 2021 Feb 13 01:45 digest.sh
-rw-r--r-- 1 bahdanau bahdanau 3264 Feb 13 01:45 setclasspath.bat
-rwxr-xr-x 1 bahdanau bahdanau 3524 Feb 13 01:45 setclasspath.sh
```

Figure 1: OpenL Tablets package is added

- If some sh files are not executable, enter the following command:

```
chmod +x ./*.sh
```

- Run the `sturtup.sh` file as follows:

```
sh ./startup.sh
```

- In the browser, enter the following URL:

<http://localhost:8080>

If the installation is completed successfully, the Apache Tomcat welcome screen appears. The next thing to be done is to configure JVM options for Tomcat.

Configuring JVM Options for Tomcat on UNIX / Linux Machine

To configure JVM options for Tomcat on a UNIX / Linux machine, proceed as follows:

- For UNIX, create `TOMCAT_HOME/bin/setenv.sh` file and type the following:

```
export JAVA_OPTS="$JAVA_OPTS -Xms512m -Xmx2000m -XX:+UseConcMarkSweepGC -XX:PermSize=128m -XX:MaxPermSize=512m"
```

- Locate the `TOMCAT_HOME/conf/server.xml` file and add the `URIEncoding="UTF-8"` attribute for all `<Connector>` elements.

For example:

```
<Connector port="8080" protocol="HTTP/1.1" connectionTimeout="20000" redirectPort="8443"
URIEncoding="UTF-8"/>
```

- From this point, deploy OpenL Tablets WebStudio as described in [Step 3: Deploying OpenL Tablets WebStudio](#).

3.3 Step 3: Deploying OpenL Tablets WebStudio

This section describes how to deploy and run OpenL Tablets WebStudio under Tomcat.

The following topics are included:

- [Deploying OpenL Tablets WebStudio on a Windows Machine](#)
- [Deploying OpenL Tablets WebStudio on a Linux Machine](#)

Deploying OpenL Tablets WebStudio on a Windows Machine

This section describes how to deploy and run OpenL Tablets WebStudio under Tomcat on a Windows machine.

Proceed as follows:

1. Go to the <http://openl-tablets.org/downloads> page.
2. Click the appropriate OpenL Tablets WebStudio WAR link.
3. Save the file in a temporary folder and then copy the OpenL Tablets WebStudio WAR file.
For example, `openl-tablets-webstudio-X.X.X.war` to the `<TOMCAT_HOME>\webapps` folder.
4. Run Tomcat as follows:
 - If Tomcat is installed from the ZIP file, in `TOMCAT_HOME\bin`, click the `startup.bat` file.
 - If Tomcat is installed using Windows Service Installer, restart Tomcat as described in [Step 3: Deploying OpenL Tablets WebStudio on WebSphere Application Server](#).

Tomcat unpacks the WAR file into the `<TOMCAT_HOME>\webapps\<war file name>` folder. For example, for 5.9.4 version the target folder can be `<TOMCAT_HOME>\webapps\openl-tablets-webstudio-5.9.4`. For convenience, the folder can be renamed as needed but remember that this name is used to launch OpenL Tablets WebStudio under Tomcat.

From this point on, run OpenL Tablets WebStudio with default settings or make additional customizations by changing the user mode and configuring an external user database as described in [\[OpenL Tablets Web Services Usage and Customization Guide\]](#).

5. To run OpenL Tablets WebStudio, in the browser, enter the following URL:

`http://localhost:8080/<WAR file name>`

That is, for this example, the URL is `http://localhost:8080/openl-tablets-webstudio-5.9.4`.

OpenL Tablets WebStudio is opened in the browser on the **Welcome to Installation Wizard** page. The wizard will guide through the setup process as described in [Step 5: Setting Up OpenL Tablets WebStudio with Installation Wizard](#). When setup is complete, use OpenL Tablets WebStudio to create new projects or download existing ones.

6. After a new release of the OpenL Tablets WebStudio is installed, click **CTRL+F5** or clear cookies and cash manually to reload the page in the browser.

Deploying OpenL Tablets WebStudio on a Linux Machine

To install OpenL Tablets WebStudio under Linux, perform the following steps:

1. Create the `<OPENL_HOME>` folder where the application will be deployed as follows:
`sudo mkdir /<OPENL_HOME>`
2. Change access rights for this folder:
`sudo chmod 775 -R /<OPENL_HOME>`
3. Change the owner for this folder:

```
sudo chown tomcat7:tomcat7 /<OPENL_HOME>
```

4. Download OpenL Tablets WebStudio WAR file from <https://github.com/openl-tablets/openl-tablets/releases/> to a temporary folder.
5. Copy the downloaded WAR file to the Tomcat webapps folder:

```
cp /home/myuser/Downloads/<openl-tablets-webstudio-xxxx.war>/home/myuser/<TOMCAT_HOME>/webapps/webstudio.war
```
6. To stop Tomcat, run the following command from /home/myuser/<TOMCAT_HOME>/bin :

```
sh shutdown.sh
```
7. Start Tomcat from the same folder as follows:

```
sh startup.sh
```
8. In the browser, enter <http://localhost:8080/webstudio>.
 If deployment is completed without errors, the OpenL Tablets WebStudio Installation Wizard described in the next step is opened in the browser.
 If encountering any problems, for more information, see the following log files:

```
home/myuser/<TOMCAT_HOME>/logs/catalina.out and  
home/myuser//<TOMCAT_HOME>/logs/webstudio.log
```

3.4 Step 4: Configuring External User Database

This step is only required if a user is planning to work in **Production application mode**. For more information, see [Step 5: Setting Up OpenL Tablets WebStudio with Installation Wizard](#) and use an external database such as MySQL for managing users in OpenL Tablets WebStudio.

By default, OpenL Tablets WebStudio can run using an internal user database based on the HSQLDB database engine. It is a good idea to use the internal user database for demonstration purposes because it is provided by default and requires no additional setup. But in this case, all user management changes will be lost after server restart.

In a production environment, it is strongly recommended to use an external database.

Note: For more information on supported platforms, see <http://openl-tablets.org/>.

The following topics are included:

- [Configuring MySQL Database as External User Storage](#)
- [Configuring Oracle Database as External User Storage](#)

Configuring MySQL Database as External User Storage

This section explains how to set up a MySQL database. Proceed as follows:

1. Go to <http://dev.mysql.com/downloads/mysql/>.
2. Select the appropriate MSI Installer for system configuration and click **Download**.
 For example, **Windows (x86, 32-bit), MSI Installer** may be needed. It is recommended to use **ZIP Archive** version since it is intended for advanced users.
3. In the next window, register or log in to the MySQL site.
 This step can be skipped and users can proceed to **No thanks, just start my download!** link.
4. In the next window, select **Save File** and save the .msi file in a target folder.
5. Navigate to the folder containing the .msi file and double click the file to start the installation process.
 The **MYSQL Server Setup Wizard Welcome** window appears.

6. Follow the wizard steps leaving the default values and clicking **Next** to proceed.
7. Click **Finish** to close the wizard when installation is complete.

Note: It is recommended to configure the database server to use the UTF-8 character set.

When MySQL is successfully installed on the user's computer, an empty database for OpenL Tablets WebStudio in MySQL must be created and permissions to modify this database granted to the user from which the OpenL Tablets WebStudio will work with this database.

8. To open MySQL Command Line Client, select **Start > All Programs > MySQL > MySQL Server 5.5 > MySQL Command Line Client** and enter the following commands:

```
CREATE USER openl_user IDENTIFIED BY 'openl_password';
CREATE DATABASE openl CHARACTER SET utf8;
GRANT ALL PRIVILEGES ON openl.* TO openl_user;
```

Configuring Oracle Database as External User Storage

This section explains how to set up an Oracle database. Proceed as follows:

1. Go to <http://www.oracle.com/technetwork/database/enterprise-edition/downloads/index.html>.
2. After registration, select the appropriate version and system configuration, and click **Download**.
3. Unzip 2 archives in one folder and click the `exe` file.
4. Configure the database and define a username and password.
These values will be used further for configuration.
5. To improve work with database, download Oracle SQL Developer at <http://www.oracle.com/technetwork/developer-tools/sql-developer/overview/index.html>.
In this section, as an example, Oracle SQL Developer 3.2.2 is used.
6. Start Oracle Workbench and create a connection or select an existing database connection.

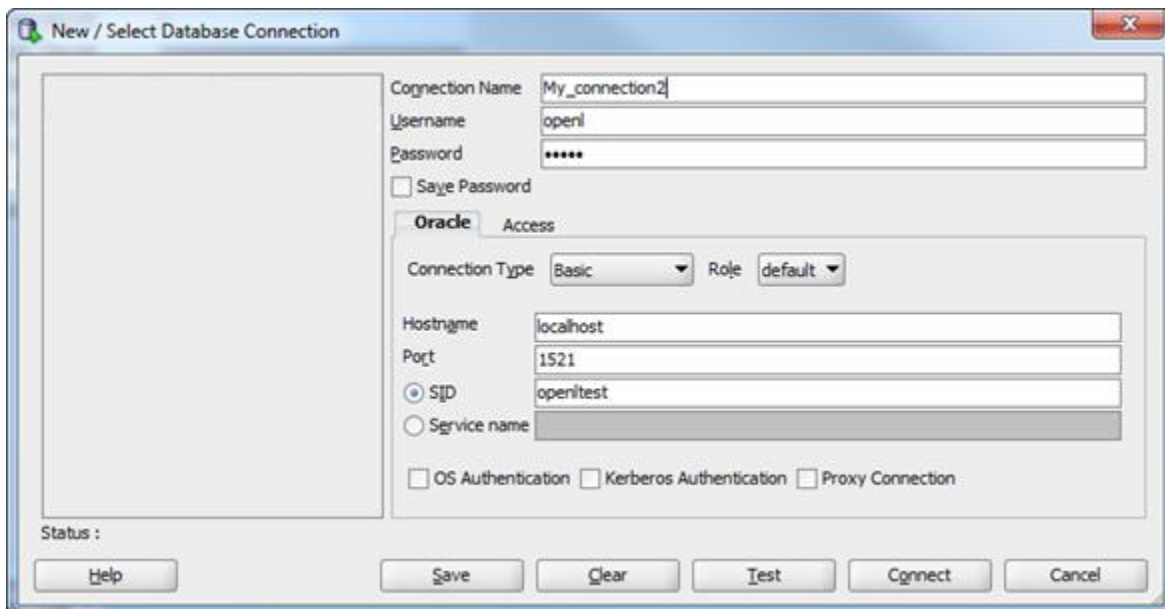


Figure 2: Creating a connection to the Oracle database

7. Enter username and password values defined when installing the database.

8. Start OpenL Tablets WebStudio and in the third step, select a **multi-user** mode and **production application** mode.
9. Select the Oracle database type and define database URL, username, and password.



Configure database:

Set up a database to be used for managing users in OpenL Tablets WebStudio. Please contact your System Administrator for this information if necessary.

Database type: Oracle 11g Release 2 ▼

Database URL: localhost:1521/openitest

Username: openl

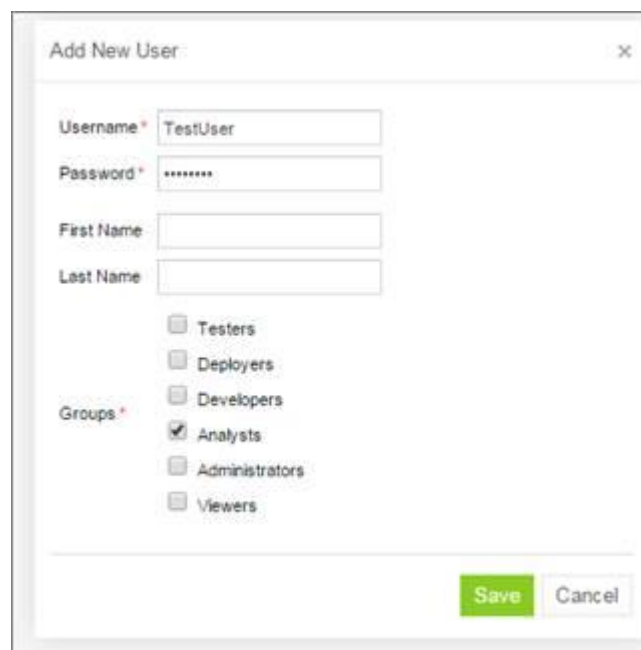
Password: *****

Prev **Finish** Click "Finish" to complete the installation process

Figure 3: Creating a connection to the Oracle database in the installation wizard

10. Click **Finish**.
11. Log in as user **a1** with password **a1**.

Note that even after configuring the database as user storage all default users are available for login. The user **a1** with administrative rights can manage user settings in OpenL Tablets WebStudio, for example, create a user or add privileges to a user. All user management activities can be performed via OpenL Tablets WebStudio UI, in the **Admin > User Management** section.



Add New User [X]

Username *: TestUser

Password *: *****

First Name:

Last Name:

Groups *: ☐ Testers ☐ Deployers ☐ Developers ☒ Analysts ☐ Administrators ☐ Viewers

Save **Cancel**

Figure 4: Managing users in the User Management section of OpenL Tablets WebStudio

Right after applying changes in OpenL Tablets WebStudio, the updates are applied to the database. A user can log in and work under a newly created account in OpenL Tablets WebStudio.

Note: During installation, several tables are created in the database. If the same tables exist in the database from the previous usage, a conflict occurs. To avoid this situation, the following tables must be removed:

- ACCESSCONTROLENTY
- GROUP2GROUP
- OPENLUSER
- schema_version
- USER2GROUP
- USERGROUP
- HIBERNATE_SEQUENCE table that has SEQUENCE_OWNER=OPENL

The previous steps describes configuration in case user starts OpenL Tablets WebStudio for the first time. Otherwise, in the `openl\user-workspace` folder, do the following changes:

1. In the `system-settings` folder, locate the `db.properties` configuration file and edit it as follows:

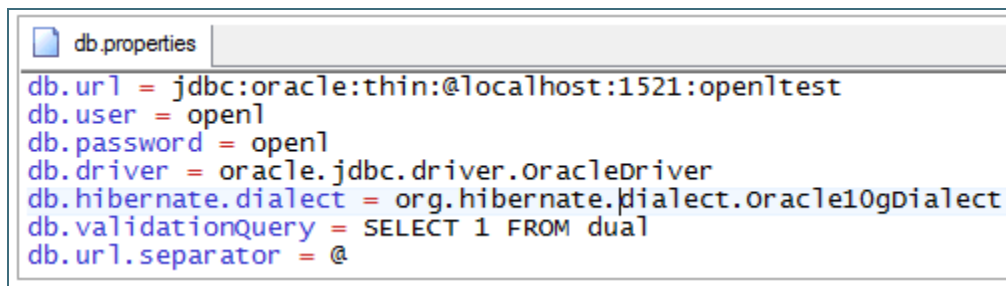


Figure 5: Configuration file with database settings

2. In the `system.properties` file, set variable `user.mode = multi`.

3.5 Step 5: Setting Up OpenL Tablets WebStudio with Installation Wizard

This topic describes the steps that must be taken after the first run of OpenL Tablets WebStudio under Tomcat or WebSphere Application Server. For more information, see [Install OpenL Tablets WebStudio on WebSphere Application Server](#). Accept the default options provided by the wizard by clicking **Next** to move to the next step or change the options as required and click **Next** to proceed.

Proceed as follows:

1. In the **Welcome to OpenL Tablets WebStudio Installation Wizard** window, click **Start**.
2. In the next window, specify a working directory for OpenL Tablets.
By default, the following directory is displayed:
`c:\Users\username\.openl\`
This folder is referred to as `<OPENL_HOME>` in the documentation. It is highly recommended not to use the system drive for that.
3. Click **Next** to proceed.
4. Specify production and design repositories:

Connection types for setting up design and production repositories

Type	Description
Local	The repository is located on the local machine as a folder. This folder must be specified in the Repository Directory field.
Remote - RMI	The repository is located on a remote server and can be accessed by the RMI protocol. The Repository URL field displays URL for remote access to the repository.
Remote - WebDav	The repository is located on a remote server and can be accessed via WebDav protocol. The Repository URL field displays URL for remote access to the repository.
Database	The repository is located in a database installed either local or remote. Available only for production repository . The Repository URL field displays URL for access to the database.

For more information on repository security, see [\[OpenL Tablets WebStudio User Guide\]](#), the **Repository Settings** section.

5. Select a user mode:

User modes

Mode	Description
Single-user	Only the user currently logged on to the computer can work with the OpenL Tablets WebStudio. For more information on the single user mode, see [OpenL Tablets WebStudio User Guide] .
Multi-user (recommended)	Multiple users can run OpenL Tablets WebStudio with their unique names.

6. For the **Multi-user** mode, in the **Select application mode** area, specify the database for users management:

User management databases

Database	Description
Demo	Default database which contains a predefined list of users and does not require additional setup.
Production	External MySQL database with a customizable list of users.

7. If the **Production** mode is selected, in the **Configure database** area that appears, modify the database parameters as follows:

Database parameters

Parameter	Description
Database URL	By default, <code>localhost:3306/openl</code> must be used.
Username / Password	Username and password specified for the MySQL database user as defined in Step 4: Configuring External User Database .

8. Click **Finish** to complete setup.

As a result, for the **Multi-user** mode, the logging screen appears for entering user's credentials to start working with OpenL Tablets WebStudio.

The list of users predefined in the Demo application mode can be found in [\[OpenL Tablets WebStudio User Guide\]](#), *User Management > Manage Users*.

3.6 Step 6: Configuring Settings for Microsoft Excel Application

The **Open in Excel** functionality does not work under the default settings if Apache Tomcat is installed on Windows using Windows Service Installer as described in [Installing Apache Tomcat Using Windows Service Installer](#). This case requires a user to make several configuration changes.

To change DCOMConfig settings for Excel, proceed as follows:

1. Run the `dcomconfig.exe` utility using administrator credentials:
Start > dcomcnfg.exe
The **Component Services** window appears.
2. In **Console Root**, select **Component Services > Computers > My Computer > DCOM Config**.
3. Navigate to the **Microsoft Excel Application** at the right.
If Microsoft Excel Application is not available under DCOMConfig settings, on 64 bit system with 32 bit Office, select **Start > Run mmc -32 > File > Add/Remove Snap-in... > Component Services > Add > OK > Console Root > Component Services > Computers > My Computer > DCOM Config > Microsoft Excel Application**.
4. Right click **Microsoft Excel Application** and in the drop-down menu, select **Properties**.
5. In the **Microsoft Excel Application** window, click the **Identity** tab.
6. Select **This user**.
7. Click **OK** to complete.

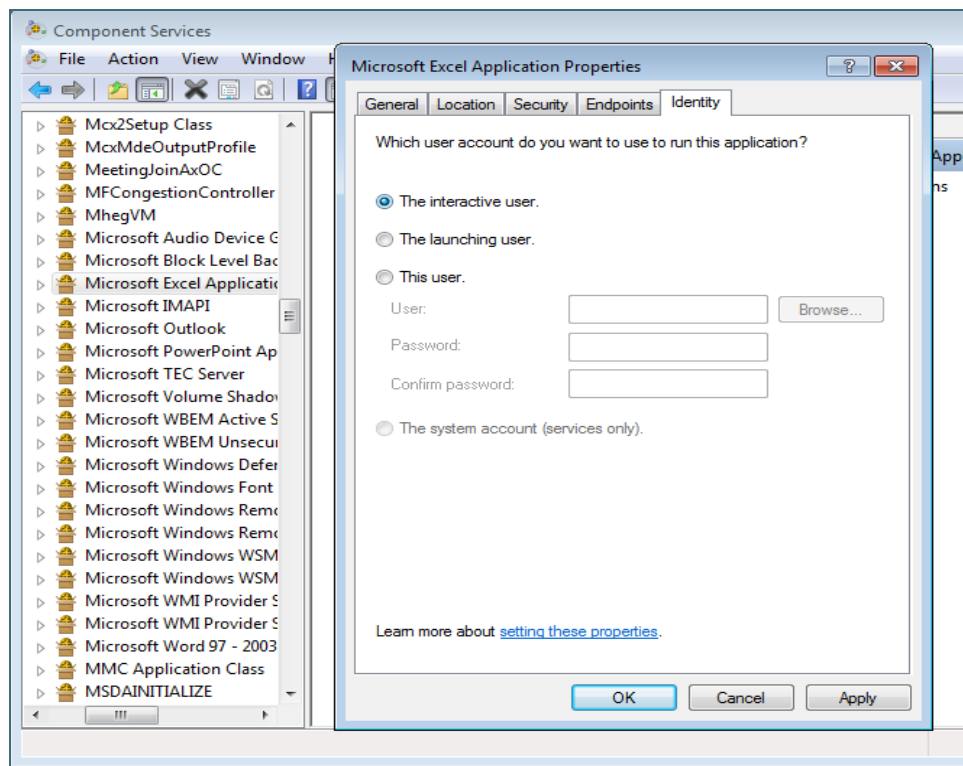


Figure 6: Microsoft Excel Application Properties

3.7 OpenL Tablets WebStudio Customization

This section describes additional configuration for OpenL Tablets WebStudio and includes the following topics:

- [Updating User Database Configuration](#)
- [Configuring User Mode](#)
- [Configuring Google Analytics](#)
- [Configuring Private Key for Repository Security](#)

Updating User Database Configuration

User database settings, such as connection, login, and password data, are modified using the `<OPENL_HOME>/system-settings/db.properties` file.

An example of the configuration that can be used for the user database is as follows:

```
db.hibernate.dialect = org.hibernate.dialect.MySQLDialect
db.driver = com.mysql.jdbc.Driver
db.url = jdbc:mysql://localhost:3306/openl
db.user = openl_user
db.password = openl_password
```

Configuring User Mode

Normally, user mode in OpenL Tablets WebStudio is set to **multi-user** by using OpenL Tablets WebStudio Installation Wizard as described in [Step 5: Setting Up OpenL Tablets WebStudio with Installation Wizard](#).

User mode can also be changed as a JVM option for Tomcat. For that, open the **Apache Tomcat Properties** dialog as described in [Installing Apache Tomcat Using Windows Service Installer](#), and in the **Java Options** text box, add the following line:

```
-Duser.mode=multi
```

Note: User mode set as a Java option takes precedence over the corresponding value specified in the OpenL Tablets WebStudio Installation Wizard. So if both are defined, the Java option value is used.

Configuring Google Analytics

Google Analytics is a service offered by Google that generates detailed statistics about website traffic and traffic sources. To configure Google Analytics for OpenL, open the **Apache Tomcat Properties** dialog as described in [Installing Apache Tomcat Using Windows Service Installer](#) and in the **Java Options** text box, add the following lines:

```
-Dwebstudio.analytics=number
```

Alternatively, configure Google Analytics for OpenL in the `config.properties` file located in `\WEB-INF\conf\` as follows:

```
webstudio.analytics=number
```

`number` is a number provided by Google during registration.

Configuring Private Key for Repository Security

OpenL Tablets WebStudio allows connecting to secured repositories. In this case, passwords are stored in OpenL Tablets WebStudio workspace. To improve passwords protection, a private key can be used.

Private key is a special secure sentence for coding and encoding repository passwords. By default, the private key is empty. It can be set up as a JVM option for Tomcat by adding and specifying the value of the following parameter:

```
repository.encode.decode.key.
```

The private key must be specified without spaces.

Note: The private key must be configured prior to creating any secured connections. Otherwise, all stored passwords become invalid.

4 Install OpenL Tablets WebStudio on WebSphere Application Server

This section explains how to install OpenL Tablets WebStudio on WebSphere Application Server. The following topics are included:

- [Prerequisites](#)
- [Step 1: Setting Up JVM Options for WebSphere Application Server](#)
- [Step 2: Preparing OpenL Tablets WAR Files](#)
- [Step 3: Deploying OpenL Tablets WebStudio on WebSphere Application Server](#)
- [Step 4: Configuring Settings for Microsoft Excel Application](#)

4.1 Prerequisites

Before deploying OpenL Tablets WebStudio on WebSphere Application Server, IBM WebSphere Application Server v. 8.5 or later must be installed on the user's local machine, or users must be granted access to a WebSphere Application Server instance with logon that has appropriate permissions to configure JVM options.

For more information on how to install IBM WebSphere Application Server, see Oracle online documentation, section *Installing and Configuring WebSphere 8.5* at

http://docs.oracle.com/cd/E24902_01/doc.91/e23435/inst_config_was85_win.htm

IMPORTANT! When defining the Shared Resource Directory during the installation process, the path to the directory must be specified without spaces. Otherwise, OpenL Tablets WebStudio fails.

4.2 Step 1: Setting Up JVM Options for WebSphere Application Server

To set up JVM options for WebSphere Application Server, proceed as follows:

1. In WebSphere Application Server Console, navigate to **Servers/ServerTypes/WebSphere Application Servers**.
The server appears in the right pane.
2. In the right pane, click the server name.
The default value is **server1**.
3. Locate the **Server Infrastructure** area and expand the **Java Process Management** node.
4. Click **Process Definition**.
5. In the upper right part of the window, click the **Java Virtual Machine** link.
6. In the **Initial heap size** text box, enter **256**.
7. In the **Maximum heap size** text box, enter **1024**.
8. In the **Generic JVM Arguments**, add the following line:
`-XX:+UseParallelOldGC -XX:PermSize=128m -XX:MaxPermSize=384M -Dclient.encoding.override=UTF-8`
9. Click **OK**.

10. In the **Message** window which appears in the top of the form, click **Save directly to the master configuration** to save changes.
11. Restart WebSphere Application Server.

4.3 Step 2: Preparing OpenL Tablets WAR Files

This section describes how to configure OpenL Tablets WebStudio WAR file. Proceed as follows:

1. Locate <http://openl-tablets.org/downloads>.
2. Click the appropriate OpenL Tablets WebStudio WAR link.
3. Save the file in a temporary folder.
4. Open the downloaded WAR file as a ZIP archive.
5. In the `\WEB-INF\lib\` folder, remove the following JAR files:
`jboss-transaction-api_1.1_spec-1.0.0.Final.jar`
`jboss-transaction-api_1.2_spec-1.0.0.Final.jar`
`jta-1.1.jar`
6. Save the WAR file.

4.4 Step 3: Deploying OpenL Tablets WebStudio on WebSphere Application Server

To deploy OpenL Tablets WebStudio on WebSphere Application Server, proceed as follows:

1. In a browser, enter the following URL:
`https://localhost:9043/ibm/console`
This is a default port for local installation. The **WebSphere Application Server Console** window appears.
2. Navigate to **Applications / Application Types / WebSphere enterprise applications**.
3. In the top line tool bar, click the **Install** button.
4. In the **Path to the new application** area, select the modified OpenL Tablets WebStudio WAR file.
The **Local file system** option is selected by default.
5. Click **Next**.
6. In the **Step 2: Map modules to servers** page, select the check box on the left to the file name and click **Next**.
7. In the **Step 3: Map virtual hosts for Web modules** page, select the check box on the left to the file name and click **Next**.
8. In the **Step 4: Map context roots for Web modules** page, in the **Context Root** text field, enter `/webstudio` and click **Next**.
9. Click **Finish** to complete.
10. When the installation process is complete, click the **Manage Applications** link.
11. In the next window, in the list of applications, click the OpenL Tablets WebStudio WAR file link.
12. In the next window, locate the **Default Properties** area and click the **Class loading and update detection** link.
13. In the next window, select the following radio buttons:
 - Classes loaded with local class loader first (parent last)
 - Single class loader for application

14. Click **OK** to finish.
15. In the next window, click the **Save directly to the master configuration** link.
Now the OpenL Tablets WebStudio application is installed and started. If not, start the application.
16. Run OpenL Tablets WebStudio by entering `http://localhost:9080/webstudio/` in a browser.
The **Welcome to OpenL Tablets WebStudio Installation Wizard** window appears allowing to set up the application as needed. For more information on the application setup, see [Step 4: Configuring External User Database](#), [Step 5: Setting Up OpenL Tablets WebStudio with Installation Wizard](#) and [OpenL Tablets WebStudio Customization](#).

4.5 Step 4: Configuring Settings for Microsoft Excel Application

The **Open in Excel** functionality does not work if WebSphere Application Server 8.5 is used under the default settings. Execute configuration changes described in [Step 6: Configuring Settings for Microsoft Excel Application](#).

5 Deploy OpenL Tablets Web Services

This chapter is designed for rule developers who need to use business rules as separate web services.

Note: A particular case will be considered when users use a file system as a data source for their projects. In such case, all OpenL Tablets projects must be placed into a local folder; this folder represents a single deployment containing all the projects. In its turn, each project must also be represented as a separate folder.

For more information on how to configure OpenL Tablets Web Services, see [[OpenL Tablets Web Services Usage and Customization Guide](#)].

Make sure the following tasks have been performed:

- The `JAVA_HOME` environment variable is set to the pathname of the directory where JDK is installed.
- JVM options are set up as described in [Step 2: Installing Apache Tomcat](#).

The folder where Tomcat is installed is referred to as `<TOMCAT_HOME>`.

To deploy OpenL Tablets Web Services, proceed as follows:

1. To download the preconfigured OpenL Tablets Web Services application in a WAR file, proceed as follows:
 1. Locate <http://openl-tablets.org/downloads>.
 2. Click the appropriate OpenL Tablets Web Services WAR link.
 3. Save the WAR file to the `<TOMCAT_HOME>\webapps` directory.
2. Configure a local file system as a data source as follows:
 1. Navigate to the `<TOMCAT_HOME>\webapps` folder and extract the OpenL Tablets Web Services WAR file. For example, right click the OpenL Tablets Web Services WAR file name and select **7-zip > Open archive**.
 2. Navigate to the `WEB-INF\classes` folder, open the `openl-ruleservice.properties` file, and for the `ruleservice.datasource.dir` setting, define the address to the folder with projects. For example:

```
ruleservice.datasource.dir = d:/datasource/
```
 3. Check if the property is defined as `ruleservice.datasource.type = local`.
 4. Save the rule project in the appropriate `datasource` folder. Every rule project must be represented as a separate folder. As an example, use OpenL Tablets Tutorial available at <http://openl-tablets.org/documentation/tutorials>.
 5. To run Tomcat, in `<TOMCAT_HOME>\bin`, click the `startup.bat` file.
3. To ensure the deployment is successful, try loading the appropriate CXF page with web services. An example is <http://localhost:8080/openl-tablets-ws-X.X.X>.
4. To deploy several projects which use the same java classes, in `openl-ruleservice.properties`, set the `ruleservice.datasource.filesystem.supportDeployments` property to `true`.
5. To enable saving different versions of the same project, in `openl-ruleservice.properties`, set the `ruleservice.datasource.filesystem.supportVersion` property to `true`. Storing project versions becomes available if `ruleservice.datasource.filesystem.supportDeployments` is set to `true`. Each project must be stored in a separate folder with name ending resembling `_v2`, or `_v0.0.2`.

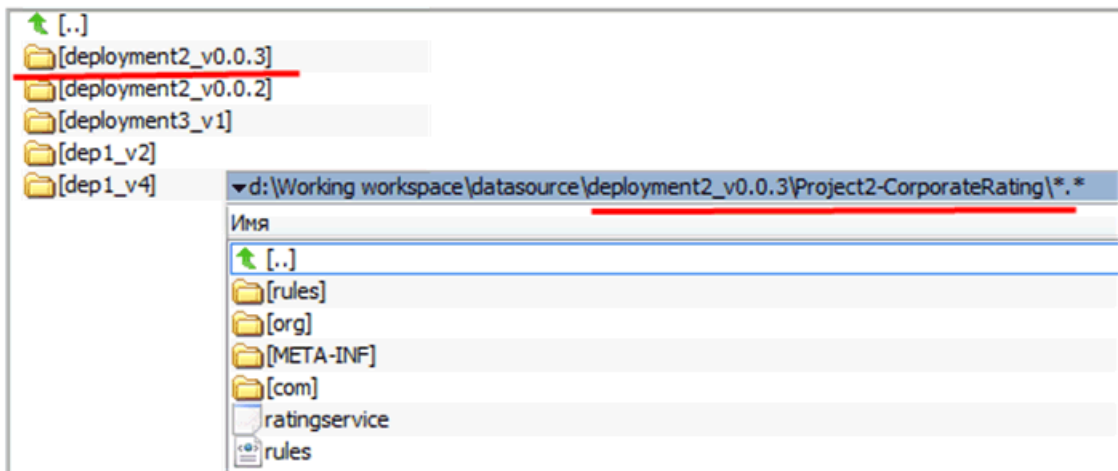


Figure 7: Example of defining different versions of a project

For more information on project versions, see [\[OpenL Tablets Web Services Usage and Customization Guide\]](#), the **Step 3 - File System Data Source** section.

Note: In the Tomcat log file, users can find the URL that must be used to run the Web Service. For file system data source, the URL must resemble `http://localhost:8080/<ws war file name>/<datasource folder>/<rule project name>?wsdl`, where `<datasource folder>/<rule project name>` can be taken from the Tomcat log file.

6 OpenL Tablets WebStudio and OpenL Tablets Web Services Integration

This section describes how to set up OpenL Tablets WebStudio and OpenL Tablets Web Services integration and enable backward compatibility and includes the following topics:

- [OpenL Tablets WebStudio and Web Services Integration via Jackrabbit Repository](#)
- [OpenL Tablets WebStudio and Web Services Integration via Database Repository](#)
- [Enabling Backward Compatibility of OpenL Tablets WebStudio with Previous Versions of OpenL Tablets Web Services](#)

6.1 OpenL Tablets WebStudio and Web Services Integration via Jackrabbit Repository

This section describes how to set up an integrated environment that enables work with business rules from OpenL Tablets WebStudio and launch these rules as OpenL Tablets Web Services. This section describes how to set up OpenL Tablets WebStudio and OpenL Tablets Web Services integration via RMI.

Note: In this example, OpenL Tablets WebStudio must be run under Tomcat.

All sources related to JCR repository can be downloaded from the <http://openl-tablets.org/downloads> page,

Repository (ZIP file) link. Repository package is a ZIP file containing repository server, configuration files and an empty JCR repository.

Proceed as follows:

1. Copy the `openl-tablets-remote-repository-server-X.X.X.war` file from the repository package into `\<TOMCAT_HOME>\webapps`.
2. Copy the `repository` folder into the `<OPENL_HOME>` folder.
By default, the repository folder name is `repository`. It is recommended to rename it to `production-repository` in case of setting up a remote production repository. Settings described further use this name.
3. Copy the content of the `jackrabbit` folder, the `bootstrap.properties` and `jackrabbit-repository.xml` files, into `\webapps\<openl-tablets-remote-repository-server-X.X.X.war>\WEB-INF\`.
4. In `\<openl-tablets-remote-repository-server-X.X.X.war>\WEB-INF\bootstrap.properties`, set up repository settings as follows:

```

repository.config=/WEB-INF/jackrabbit-repository.xml
repository.home=<OPENL_HOME>/production-repository
repository.name=production-repository
# RMI Settings
rmi.enabled=true
rmi.port=1099
rmi.host=localhost

```
5. Open the `\<openl-tablets-remote-repository-server-X.X.X.war>\WEB-INF\web.xml` file and in the **Repository Startup Servlet** and **Repository Servlet** sections, inside the `<init-param>` tag, modify `<param-value>` as follows:

```

<param-value>/WEB-INF/bootstrap.properties</param-value>

```
6. Set up OpenL Tablets Web Services as follows:

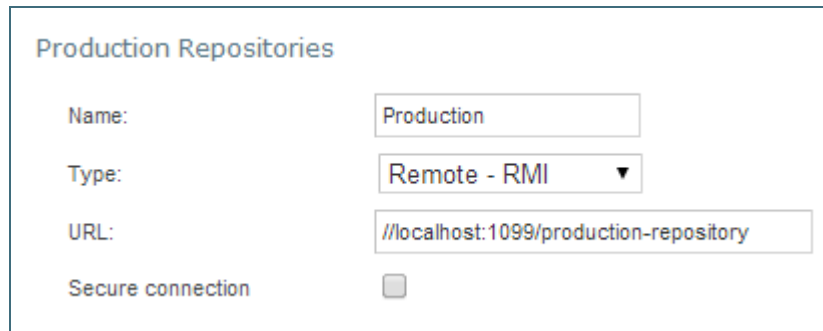
1. Open the `\<TOMCAT_HOME>\webapps\<ws project name>\WEB-INF\classes\rules-production.properties` file.
2. Update the `rules-production.properties` file.
3. Comment the following lines:

```
# production-repository.factory =
org.openl.rules.repository.factories.LocalJackrabbitProductionRepositoryFactory
# production-repository.local.home=/openl/production-repository
```
4. Remove the comment mark from the following lines:

```
production-repository.factory =
org.openl.rules.repository.factories.RmiJackrabbitProductionRepositoryFactory

production-repository.remote.rmi.url = //localhost:1099/production-repository
```
5. Open the `\<TOMCAT_HOME>\webapps\<ws project name>\WEB-INF\classes\openl-ruleservice.properties` file.
6. In the `openl-ruleservice.properties` file, define `ruleservice.datasource.type = jcr`.
7. To run OpenL Tablets WebStudio, in a browser, enter `http://localhost:8080/<webstudio war file name>`.
8. Set up the appropriate **design and production repositories** settings in OpenL Tablets WebStudio administration.

In this case, production repository settings must be as follows:



Production Repositories

Name:

Type:

URL:

Secure connection ☐

Figure 8: Production repository settings

From this point, any changes can be made in user's rule in OpenL Tablets WebStudio, and then the project must be saved and redeployed. These changes will immediately affect the rule represented as web service.

The following diagram illustrates the OpenL Tablets WebStudio and OpenL Tablets Web Services integration:

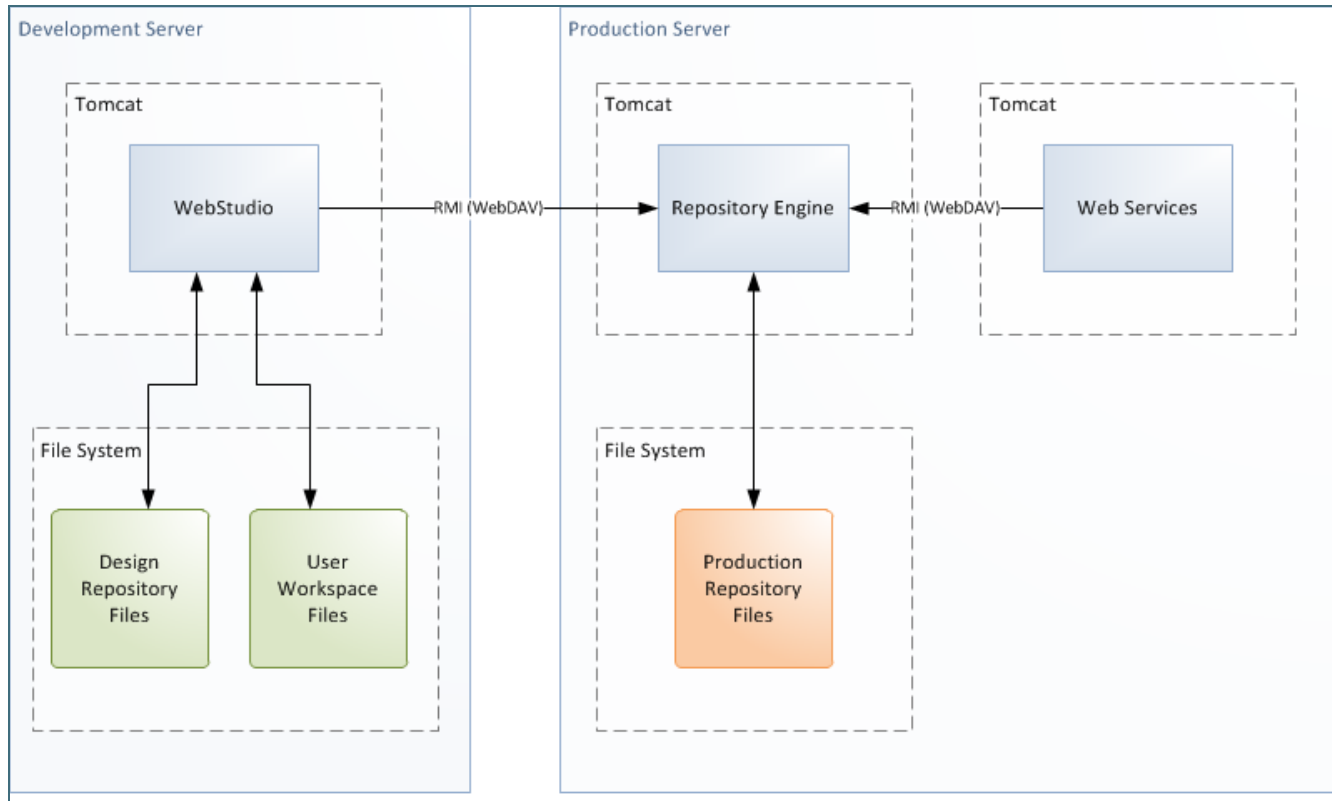


Figure 9: OpenL Tablets WebStudio and OpenL Tablets Web Services deployment

During development, rules are stored in the file system of the development server.

When development is finished, rules can be deployed to the production server as follows:

1. OpenL Tablets WebStudio sends the rules project to Repository Engine, that is, Jackrabbit web application, using the RMI or WebDAV protocol.
2. The rules are saved on the production server.
3. OpenL Tablets Web Services detects a new version of the deployed rules and starts using it.

6.2 OpenL Tablets WebStudio and Web Services Integration via Database Repository

This section describes another way how to set up an integrated environment that enables work with business rules from OpenL Tablets WebStudio and launch these rules as OpenL Tablets Web Services. This section describes how to set up OpenL Tablets WebStudio and OpenL Tablets Web Services integration using database as storage for production repository. For that, proceed as follows:

1. Add the appropriate driver library for a database to `webstudio-5.X.X.war\WEB-INF\lib\`.
For example, for MySQL 5.6, it is the `mysql-connector-java-5.1.31.jar` library and it is already located in the OpenL Tablets WebStudio war file.
2. Install the database, defining login and password and creating a new schema or service for Oracle database.
For more information on supported databases and versions, see <http://openl-tablets.org/>.
3. Start the database.

4. Set up configuration settings for OpenL Tablets Web Services as follows:

1. Open the `rules-production.properties` file located in the `ws-5.X.X.war\WEB-INF\classes\` directory for editing.
2. Comment the setting `production-repository.factory = org.openl.rules.repository.factories.LocalJackrabbitProductionRepositoryFactory.`
3. Define `production-repository.factory = org.openl.rules.repository.factories.DBProductionRepositoryFactory.`
4. Set the URL value for `production-repository.db.url` according to the appropriate database.

URL value according to the database type	
Database	URL value
MySQL	<code>jdbc:mysql://[host][:port]/[schema]</code>
Oracle	<code>jdbc:oracle:thin:@//[HOST][:PORT]/SERVICE</code>
MS SQL	<code>jdbc:sqlserver://[serverName\[instanceName][:portNumber]][:property=value[:property=value]]</code>

5. Set the login `production-repository.login` and password `production-repository.password` for connection to the database defined while installing the database.

Note: The password must be encoded via Base64 encoding schema when `repository.encode.decode.key` is also defined.

```
rules-production.properties *
#JCR.default.path = /PRODUCTION

# Which class should we instantiate in RepositoryFactory?
#JCR.type = org.openl.rules.repository.factories.RmiJackrabbitProductionRepositoryFactory
#JCR.name=Production Local
#JCR.local.home=../production-repository
#JCR.rmi.url = //localhost:1099/jackrabbit.repository
#JCR.nodetype.file=/org/openl/rules/repository/production_nodetypes.xml
#JCR.nodetype.file=/org/openl/rules/repository/design_production_nodetypes.xml

# File with NodeType definitions.
# It can be used to initialize JCR at first start.
# Note, that some implementations of JCR require manual steps to do that.
production-repository.jcr.nodetypes=/org/openl/rules/repository/design_production_nodetypes.xml

# Which class should we instantiate in RepositoryFactory?
#production-repository.factory = org.openl.rules.repository.factories.LocalJackrabbitProductionRepositoryFactory
#production-repository.factory = org.openl.rules.repository.factories.RmiJackrabbitProductionRepositoryFactory
production-repository.factory = org.openl.rules.repository.factories.DBProductionRepositoryFactory

# In case of RMI this property defines how to access it
# default is '//localhost:1099/jackrabbit.repository'
#production-repository.remote.rmi.url = //localhost:1099/production-repository
#production-repository.local.home= ${ruleservice.openl.home}/production-repository
production-repository.db.url=jdbc:oracle:thin:@localhost:production-repository

#Login and password for remote repository
production-repository.login= root
production-repository.password= admin

# Secret key for password code/decode
repository.encode.decode.key =
```

Figure 10: Connections settings defined in `rules-production.properties`

For more information on database connection setup, see [\[OpenL Tablets - Web Services Usage and Customization Guide\]](#).

6. To set up OpenL Tablets WebStudio, configure the following production repository settings in the installation wizard.

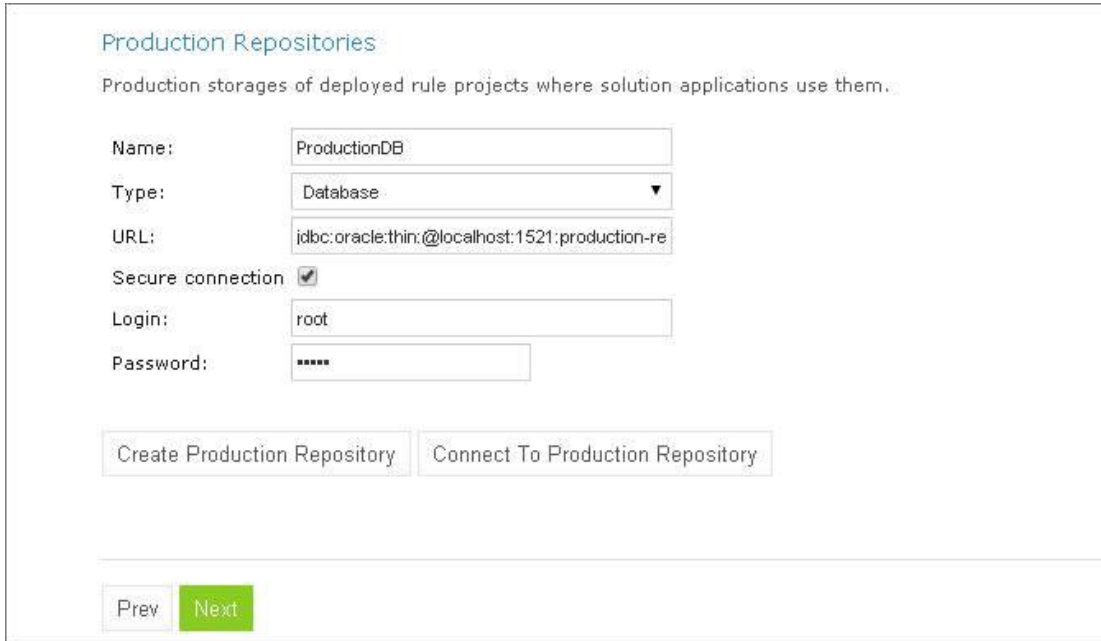


Figure 11: Setting for connection production to Database during WebStudio installation

From this point, any changes can be made in user's rule in OpenL Tablets WebStudio, and then the project must be saved and redeployed. These changes will immediately affect the rule represented as web service.

During development, rules are stored in the file system of the development server.

When development is finished, rules can be deployed to the production server as follows:

1. OpenL Tablets WebStudio sends the rules project to the database repository using the JDBC driver for connection.
2. The rules are saved on the production server.
3. OpenL Tablets Web Services detects a new version of the deployed rules and starts using it.

6.3 Enabling Backward Compatibility of OpenL Tablets WebStudio with Previous Versions of OpenL Tablets Web Services

To configure the compatibility of OpenL Tablets WebStudio deployment configuration with the previous versions of OpenL Tablets Web Services, such as version 5.9.3 and earlier, switch the `deployment.format.old` parameter in the `system.properties` file to **true**. If the parameter does not exist, it must be created.

7 Troubleshooting Notes

If OpenL Tablets WebStudio is deployed under Tomcat in the Unix/Linux environment, consider the following troubleshooting recommendations:

1. Before starting Tomcat under Linux, make sure that no Java processes are running:

```
sudo ps -A | grep j
```

If found, the process name and number are displayed.
2. If any Java process is running, stop it as follows:

```
kill -9 <process number>
```
3. Make sure that port 8080 is available as follows:

```
sudo netstat -an | grep 8080
```
4. Run Tomcat under Linux as follows:

```
<TOMCAT_HOME>/bin/startup.sh
```
5. If the **command not found** error appears, mark the `.sh` file as an executable script as follows:

```
chmod +x startup.sh
```
6. If the **Permission denied** or **The BASEDIR environment variable is not defined correctly** error is displayed, make all `.sh` files in the `bin` folder executable as follows:

```
chmod 777 *.sh
```
7. Verify that all `.sh` files in the `bin` folder are executable as follows:

```
ls -la
```
8. Run Tomcat as follows:

```
<TOMCAT_HOME>/bin/startup.sh
```

8 Frequently Asked Questions

This section provides the most common questions and answers related to the OpenL Tablets installation procedure. For more information on working with Java, Tomcat, and other third party software, see the corresponding sites of the software manufacturers.

Frequently Asked Questions		
#	Question	Answer
1	How can I check if Java is installed on my PC?	<p>Proceed as follows:</p> <ol style="list-style-type: none"> 1. Open Start > Control Panel. 2. Perform either of the following: <ul style="list-style-type: none"> • For Windows XP, double click Add or Remove Programs. • For Windows 7/Vista, click Programs > Programs and Features. 3. Look through the list for Java(TM)... or Java(TM) Update... items. If any is present, Java is installed on your PC.
2	During Java installation, the page for Java registration appears. Do I have to register Java?	No, it is optional. You can close the registration page.
3	How can I check which version of Java is installed on my PC?	<p>Open the Verify Java Version page and click the Verify Java Version button.</p> <p>In a few seconds a new page appears where you will find the message similar to the following one: Your Java version: Version 6 Update 26.</p>
4	How can I see the error message in the Tomcat console that appears when I start Tomcat? The error screen disappears too quickly.	<p>Proceed as follows:</p> <ol style="list-style-type: none"> 1. Click Start > Run. 2. Locate the <code><TOMCAT_HOME>\bin</code> folder. 3. Select <code>catalina.bat</code> and enter <i>run</i> in the command line.