



# Getting Started with the NetBeans IDE and the Sun GlassFish Web Stack in OpenSolaris 2009.06

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## 1. Document Convention

Convention used in this document are list below:

- OpenSolaris OS** – OpenSolaris 2009.06 OS.
- Web Stack** – Sun GlassFish Web Stack 1.5.
- AMP** – Apache, MySQL, and PHP runtime libraries (Web Stack).
- Web Stack UI** – Web Stack Configuration Tool.
- NetBeans IDE** – NetBeans IDE 6.5.1

## 2. NetBeans IDE And Web Stack

OpenSolaris OS offers complete support for developing and deploying applications for the web. Starting from OpenSolaris 2008.05 OS, a collection of some of the most commonly used open source applications and frameworks are bundled with the OS. These applications comprise the Web Stack and include several packages that are optimized for the OpenSolaris OS and aid in web based development in that platform.

Along with OpenSolaris OS, you can try out the NetBeans IDE, a free open-source IDE for creating professional desktop, enterprise, web, and mobile applications.

This document shows you how you can use NetBeans IDE to build web applications on OpenSolaris OS using the Web Stack components. Before we dive into the details of these components, let us enumerate the stages involved in developing an end to end enterprise grade web application.

What do you expect from an IDE if you are planning to use the IDE for web development?

- Server support** – Your IDE should support managing the Server lifecycle through an intuitive and easy to use interface.
- Languages Support** – You will expect the IDE to support working with the programming language or web application framework your web application will be eventually built on.
- Database support** – What good is an enterprise application without a database? You want your IDE to be well integrated with your development, testing, and production database.

Typically, your development environment should enable you to build web applications with minimal effort offering you an extensive support for stack level configuration through property editors, wizards, and widgets. Server support, languages support, and database support are the three prime facets that any IDE can offer for web development.

NetBeans IDE on OpenSolaris OS takes care of all these factors with an elegant interface making web development just easy. You can build your web applications in PHP or use Rails framework and work with DBs like MySQL DB or PostgreSQL DB in NetBeans.

### 3. Getting Started

In OpenSolaris OS, for building and testing web applications, get the following software:

- NetBeans IDE
- Web Stack
- The Java SE Development Kit (JDK) 5.0 or higher

Web Stack is fully integrated with OpenSolaris 2008.11 and can be easily installed by using the Package Manager GUI or `pfexec pkg install` commands.

Component	Package Name	Command to Install
Apache 2.2 core only	<code>SUNWapch22, SUNWapch22d</code>	<code>pfexec pkg install SUNWapch22 SUNWapch22d</code>
Apache 2.2 modules	<code>SUNWapch22m-security, SUNWapch22m-jk, SUNWapch22m-fcgid, SUNWapch22m-dtrace</code>	<code>pfexec pkg install SUNWapch22m-security SUNWapch22m-jk SUNWapch22m-fcgid SUNWapch22m-dtrace</code>
PHP5	<code>SUNWphp52, SUNWphp52d, SUNWphp52-mysql, SUNWphp52-pgsql, SUNWapch22m-php52</code>	<code>pfexec pkg install SUNWphp52 SUNWphp52d SUNWphp52-mysql SUNWphp52- pgsql SUNWapch22m-php52</code>
MySQL	<code>SUNWmysql5</code>	<code>pfexec pkg install SUNWmysql5</code>
Web Stack user interface	<code>webstackui</code>	<code>pfexec pkg install webstackui</code>

**Note** - For executing the `pkg install` command, you should be a root user. You can also invoke the `pkg install` command adding a `pfexec` prefix to the command as a non-root user. For instance, as a non-root user, execute `pfexec pkg install amp-dev`.

Alternatively, if you are an AMP developer, you can download the entire AMP package by executing the following command:

```
$ pkg install amp-dev
```

The `amp-dev` package is the set of all the web stack packages. The approximate size of this package is 650 mega bytes (MB). You need to download and install this package for AMP development. If you are unable to download this package, you can download individual packages as shown in the following sections.

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If you already have installed NetBeans IDE version 6.5.1 or higher, then you can download just the AMP components without any IDE as shown below:

```
$ pkg install amp
```

## Web Stack IPS Repository

Web Stack IPS repository is an experimental repository hosting applications and tools pertaining to Web Stack. For example, you can find applications like Drupal or PHPMyAdmin in the Web Stack repository, which you can download and install instead of downloading the applications directly from the respective sites. The applications that are available in the Web Stack repository are pre-configured to work with other components in the Web Stack.

The Web Stack repository is available at <http://pkg.opensolaris.org/webstack>.

You can set additional repositories in Open Solaris using `pkg set-repository` command.

## Web Stack UI

Before you can use Web Stack for web development, you need to initialize the environment for your login. Every new user logged into the system must initialize their own environment.

To download and install the Web Stack UI, execute the following command:

```
$ pkg install webstackui
```

Note - If you have already installed `amp-dev` package, `webstackui` package is also installed. You need to install `webstackui` only when you are installing the AMP packages separately.

Since `webstackui` package depends on other Apache packages, if you have not already installed the Apache Web Server, it will be automatically downloaded when you install the `webstackui` package. As mentioned earlier, Web Stack UI is just the GUI option to control the AMP components. You still need to download and configure AMP packages if you have not installed the `amp-dev` package.

After downloading and installing the `amp-dev` package, initialize the Web Stack environment as follows:

- Click **Applications > Developer Tools > Web Stack Initialize**
- Enter the user password

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After installing Web Stack, Click **Applications > Developer Tools > Web Stack Getting Started Guide** for more information on setting up AMP on OpenSolaris OS.

After installing the Web Stack UI, you can create and run the bundled sample applications from the menu item. Go to **Applications > Developer Tools > Web Stack Admin > Sample App** to find these menu items.

## 4. Server Support

NetBeans IDE on OpenSolaris OS supports various Java EE servers and other web servers for application deployment. You can have multiple servers configured in the NetBeans IDE irrespective of the server that will be used in your projects. Thus you can have Apache Web Server configured for deploying PHP files, Apache Tomcat container configured for deploying Java based web applications or a WEBrick server for deploying Rails applications.

### Apache2 Web Server

The Web Stack bundle comes with the Apache 2 Web Server. The NetBeans IDE lets you add the Apache web server in the servers list so that the applications you build including any PHP based web applications can be deployed to the Apache web server. This section shows you how you can set up the Apache Web Server in the NetBeans IDE.

You do not need to download Apache Web Server or PHP engine separately if you have installed the Web Stack software.

To start/stop the Apache Web Server, perform the following task:

Click **Applications > Developer Tools > Web Stack Admin > Start Apache2/MySQL Servers**

### Testing the Apache Web Server from the NetBeans IDE

You do not need to explicitly add the Apache Web Server in the NetBeans IDE's Server's entry. Earlier versions of the NetBeans IDE (< 6.0) allowed you to add the Apache Web Server in your Server's entry by letting you provide details including the path to the `htdocs` directory.

The main advantage of using the NetBeans IDE 6.5.1 or higher is that you can set individual server configuration for each PHP project. The NetBeans PHP project itself contains information on which `htdocs` directory the PHP files need to be copied to test the project.

To test if the NetBeans IDE and Apache Web Server combination is working for you, perform the following tasks:

Start the Apache Web Server. Click **Applications > Developer Tools > Web Stack Admin**

### > Start Apache2/MySQL Servers.

- In the NetBeans IDE, click File > New Project > PHP > PHP Application.
- Enter **TestPHP** as the name of the PHP Project.
- Enter **/var/apache2/2.2/htdocs/HelloPHP** as the Sources Folder path. NetBeans IDE assumes that you need to store the source files on the local web server. The NetBeans wizard detects the Apache installation type and provides the path to the default location of the htdocs folder for the current installation type.
- Select the default encoding as UTF-8.
- If you need to store the NetBeans project files outside the htdocs folder, select the **Put NetBeans metadata into a separate directory** option and provide the path. Click Next.
- Select **Local Web Site (running on local web server)** for the Run As option.
- Leave the Project URL field un-modified if you have not made any changes to the Apache Web Server startup port. (<http://localhost/HelloPHP/>).
- You do not need to provide an alternative path to the htdocs directory as specified in the wizard page if you are using the Apache Web Server through the Web Stack bundle.
- Click Finish.

Now you have created and configured a PHP project. Modify the file, index.php to read as follows:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
    <title></title>
  </head>
  <body>
    <?php
      echo "Hello Web Stack";
    ?>
  </body>
</html>
```

After saving the project, right click the project and click **Run**. A web browser window opens invoking the URL – <http://localhost/HelloPHP/index.php>.

You will see the Hello Web Stack page on the browser. If you get any error, check the Apache Web Server log file by clicking **Applications > Developer Tools > Web Stack Admin > Logs > Apache 2 Log** for more information.

Since the Apache Web Server is already configured to support PHP files, you do not need to perform any other configuration apart from getting and installing the Web Stack bundle.

## Tomcat Web Server

The Web Stack software comes with the Tomcat 6.0 Servlet container for deploying your JSP based web applications. Some of the examples shown later in this document highlights the usage of the Tomcat Server in the NetBeans IDE. The NetBeans IDE for the OpenSolaris OS may not come bundled with the Tomcat server as it is already available in the OpenSolaris OS through the

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Web Stack bundle. But still you need to let the NetBeans IDE know where your Tomcat Server installation directory is to allow NetBeans manage Tomcat's lifecycle.

**Important** - NetBeans IDE version 6.5.1 or lesser does not recognize the Apache Tomcat Server installed through the Web Stack bundle. This issue is tracker at [http://www.netbeans.org/issues/show\\_bug.cgi?id=156913](http://www.netbeans.org/issues/show_bug.cgi?id=156913). Hence you need to use NetBeans IDE 6.7 or higher to add the Apache Tomcat Server in the Server's list.

To configure the Apache Tomcat Server in the NetBeans IDE, perform the following tasks:

- Download and install the NetBeans IDE 6.7 from the IPS repository (If available) or download the NetBeans IDE from the product site at <http://www.netbeans.org>.
- Go to **Services** tab.
- Right click **Servers** and click **Add Servers...**
- From the Servers list, select **Tomcat 6.0** and click Next.
- For Server Location, enter, `/usr/tomcat6`.
- Select **Use Private Configuration Folder (Catalina Base)** and provide the Catalina Base path as `/var/tomcat6`.
- Enter the username and password for Tomcat's manager role.

If you have not already created a user with the manager role, edit the file `/var/tomcat6/conf/tomcat-users.xml` as shown below:

```
<tomcat-users>
...
  <role rolename="manager"/>
<role rolename="admin"/>
...
  <user username="admin" password="admin" roles="tomcat,manager,admin"/>
</tomcat-users>
```

You need to edit the `tomcat-users.xml` file as a privileged user. Hint – Use `pfexec` command.

When the Tomcat Server is successfully configured in the NetBeans IDE, the Servers node under the Services tab shows the Tomcat 6.0 entry.

### Testing the Apache Tomcat Server from the NetBeans IDE

When you have successfully added the Tomcat Server to the NetBeans's Servers list, test the setup by running some sample web applications as shown below:

#### Start the Tomcat Server

In OpenSolaris OS, you can start the Tomcat Server by executing the following command:

```
pfexec svcadm enable tomcat6
```

**Important** – Do not manually start the Tomcat Server, by running any other startup script including

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the `startup.sh` script bundled with the Tomcat Server. Always use the `svcadm enable/disable` command to start/stop the Tomcat Server.

To test if the server is running invoke the URL - <http://localhost:8080/> from a browser window. You will see the Tomcat welcome page.

Now, from the NetBeans IDE, perform the following tasks:

- Click **File > New Project**
- From the Categories, select **Java Web > Web Application**. Click Next.
- Enter TestJSP as the project name. Click Next.
- Do not select any entry for **Add to Enterprise Application** option as our project is a simple one.
- In the Server list, select **Tomcat 6.0**.
- Do not modify the Java EE version (Java EE 5) and the Context Path `/TestJSP`. Click Next.
- Do not apply any framework on your application. Click Finish.

Modify the `index.jsp` file in the project to read as follows;

```
<%@page contentType="text/html" pageEncoding="UTF-8"%>
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
    "http://www.w3.org/TR/html4/loose.dtd">

<html>
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
    <title>JSP Page</title>
  </head>
  <body>
    <h1>Hello Web Stack</h1>
  </body>
</html>
```

- Right click the TestJSP project node and select **Build**.
- Right click the TestJSP project node and select **Run**.

If you get any build error, check the Tomcat log file available at `/var/tomcat6/logs/catalina.out`. Your error message may look like:

```
java.io.FileNotFoundException:
/var/tomcat6/conf/Catalina/localhost/TestJSP.xml (No such file or directory)
```

This is a known issue. You need to deploy the `..TestJSP/dist/TestJSP.war` file manually from the Tomcat's manager interface available at <http://localhost:8080/manager>.

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## WEBrick Server

The NetBeans IDE 6.5.1 comes bundled with a WEBrick Server, the most widely used Ruby web server. WEBrick is started automatically on Rails project creation. There is a WEBrick console window that shows the output of the web server. No other manual configuration is required for the WEBrick server. For using Mongrel or any other server, update your gems by invoking **Tools > Ruby gems**.

For using the native Ruby platform (available from the IPS repository) instead of the built-in Ruby platform, perform the following tasks:

- Click **Tools > Ruby Platforms**.
- Click **Add Platform...**
- Select the path to the native ruby interpreter (`/usr/ruby/1.8/bin/ruby`)

## 5. Languages And Applications Support

NetBeans IDE supports working with non-Java scripting languages like PHP, Ruby, and other such scripting languages. If you are using the NetBeans IDE in Open Solaris OS, you can work with any of these scripting languages supported by the Web Stack. This document shows you how you can use the NetBeans IDE with the language interpreters that comes with the OpenSolaris OS.

**Note** – Visit <http://scripting.netbeans.org> for more information on scripting support in NetBeans IDE 6.0.

## PHP Support

PHP is an interpreted, dynamic, web page scripting language. NetBeans IDE has support for PHP editing and debugging through an add-on component called PHP plug-in. The plug-in supports PHP5 and some of the features include:

- Formatting, folding, and bracket completion of the PHP code
- Syntax highlighting
- Combination of HTML and PHP blocks
- Code completion
- Debugging
- Command-line mode
- Automatic detection of configured servers (for Solaris OS)

**Supported Version** – Web Stack supports PHP 5.2.9

If you have the PHP configuration setup showed in the previous sections, you should be able to create new PHP projects. However to run and debug your PHP projects, you will need:

- Apache 2** - Available through Web Stack. You can use a local server or a remote server

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with FTP access. Typically a local web server is utilized for development and debugging, while the production environment is located on a remote web server.

- PHP engine** - Available through Web Stack.
- PHP debugger** - Available through a Web Stack PHP Extension (`xdebug.ini`). The NetBeans IDE allows you to use XDebug, but using a debugger is optional.

For using PHP and Apache2 through Web Stack, you do not need any additional configuration.

**Note** - PHP language interpreter is integrated into the Apache Web Server. PHP module with MySQL and PostgreSQL database support is provided for the Apache Web Server. If you need to configure PHP with Apache 2.2 worker MPM, then you need to use Apache 2.2 Web Server + PHP FastCGI.

Some PHP modules are packaged with OpenSolaris OS as extensions. Each of the modules has a respective INI file under `/etc/php5/conf.d` directory. Some PHP extensions are enabled by default. You can edit the PHP extension specific INI file for any specific configuration changes.

For enabling debugging support in PHP, perform the following steps:

- Click **Applications > Developer Tools > Web Stack Admin > Options**.
- Go to **PHP tab** and click **enable** option for the **PHP Debugger** check box. In the PHP tab, click **Advanced Configuration** to open the INI file for editing.

NetBeans PHP IDE is a pre-configured NetBeans setup that only exposes the PHP support. You do not need to download any additional PHP modules. NetBeans PHP IDE startup time is lesser than the normal NetBeans IDE. For downloading the IDE just for PHP editing, go to <http://www.netbeans.org/downloads/index.html> and download the PHP IDE.

### Bundled PHP Extensions

Some PHP extensions are available in OpenSolaris OS through the Web Stack software. Each of these extensions has a respective INI file under `/etc/php5/conf.d` directory. The list of PHP extensions available through the Web Stack software are :

```
apc, gd, ldap, openssl, pgsql, xdebug.ini , bz2, gettext, mcrypt, pdo
sqlite, zlib, curl, iconv, memcache, pdo_mysql, suhosin, dtrace, idn,
mysqli, pdo_pgsql, tcpwrap, ftp, imap, mysql, pdo_sqlite, tidy
```

### PHP Configuration through the Web Stack UI

You can use the Web Stack UI to modify PHP settings as supported by the Apache Web Server. For invoking the GUI tool, click **Applications > Developer Tools > WebStack Admin > Options**.

PHP Debugger is not enabled by default. You need to click PHP Debugger check box to enable this option. NetBeans IDE supports the use of XDebug for debugging PHP projects.

## ☑ Ruby Support

The NetBeans IDE features support for an integrated development environment for building, running, testing, and debugging Ruby and Ruby on Rails (RoR) applications. NetBeans supports Ruby project types including Ruby files, RSpec specification files, and YAML files. You can configure the NetBeans tIDE to use the native ruby available through the Web Stack software. The IDE also supports Rake build tool integration and gives you access to the Interactive Ruby Shell.

### Supported Version – Ruby 1.8

**Note** – If you need to use the Gem Manager, you must have **gem** installed, and the IDE must have write permission to your Ruby installation directory.

Amp-dev package does not contain the Ruby interpreter. For getting the Ruby interpreter in OpenSolaris OS, execute the following command:

```
$ pfexec pkg install ruby-dev
```

You do not need to download and install a third-party Ruby interpreter if you are using the OpenSolaris OS with the Web Stack software. The following list describes the file structure for Ruby:

- ☑ `/var/ruby/1.8/gem_home` contains the Ruby gems repository. Configure the **GEM\_HOME** environment variable to point to `/var/ruby/1.8/gem_home`.
- ☑ `/usr/ruby/1.8/bin` contains the Ruby executable as well as other utility programs, and Ruby gems programs. These programs are linked from `/usr/bin`. For example, `/usr/ruby/1.8/bin/ruby` is linked from `/usr/bin/ruby1.8`, and may be linked from `/usr/bin/ruby` if 1.8 is the latest version of Ruby installed on this system.

Before proceeding to use NetBeans for Ruby, set the environmental variable **GEM\_HOME**.

```
For sh -> export GEM_HOME=/var/ruby/1.8/gem_home  
For csh -> setenv GEM_HOME /var/ruby/1.8/gem_home
```

To use **gem**, make sure you have direct access to the Internet. If your system is behind a firewall or if it uses a proxy server, set the **HTTP\_PROXY** variable.

If you do not set the **GEM\_HOME** environmental variable, the NetBeans IDE will not work because the available gems cannot be enumerated if you are using a native Ruby environment. For this reason you need to set **GEM\_HOME** in order for the gem repository to be accessible from the NetBeans IDE. Also the directory referenced by **GEM\_HOME** should be writable. So make sure you execute the following command:

```
$ chmod -R a+w <GEM_HOME_PATH>
```

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## Ruby on Rails

Rails is a full-stack framework for developing database-backed web applications. Rails provide a pure-Ruby development environment. Ruby Gems is the standard Ruby package manager. You can install Rails and its dependencies executing the following command:

```
$ pfexec gem install rails --include-dependencies
```

You can also install Rails directly from the NetBeans IDE rather than invoking the gem command through command line. The Ruby on Rails environment is now set up successfully. You can now use the NetBeans IDE to create a Ruby on Rails project. When you create a project, the IDE creates the same folders and files that a rails command would create.

**Note** - Depending on the version of the Web Stack software, Rails may not be available automatically. If Rails is not available, you need to install that using the gem command as shown earlier in this section.

## Getting Additional Ruby Gems

Ruby Gems is a system for managing Ruby software libraries. Ruby code packaged in this manner is called a gem. Gems allow downloading, installing, and managing your Ruby libraries. The Web Stack bundle in Solaris does not include a lot of bundled gems as you can use Ruby Gems to download and install additional gems. You can use the NetBeans interface for managing Gems.

You can manage Ruby gems directly from the NetBeans IDE as shown below:

- Click **Tools > Ruby Gems**.
- Go to **New Gems** tab.
- Click **Reload Gems**.
- Select the Ruby Gem and click **Install**.

## Ruby Projects

Ruby and Rails support has been well documented in NetBeans site. If you are going to use your NetBeans IDE just for Ruby development, you have the option to download the IDE with only Ruby support. Go to the NetBeans download site and download the NetBeans Ruby IDE.

For creating a Rails application perform the following steps:

- Click **File > New Project**.
- Under Ruby category, select **Ruby on Rails Application**. Click **Next**.
- At this point you will be prompted to select a Ruby interpreter for your project. You can select the optimized native Ruby interpreter if you have added the native Ruby interpreter as a platform as shown in the previous sections.

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## 6. MySQL DB Support

MySQL DB is a popular Open Source relational database management system (RDBMS) commonly used in web applications due to its speed, flexibility, and reliability. MySQL Server 5.0 is available through the Web Stack software.

This section demonstrates how to obtain the DB and set up a connection to a MySQL database from the NetBeans IDE. Once connected, you can begin working with MySQL in the IDE's Database Explorer by creating new databases and tables, populating tables with data, and running SQL queries on database structures and content.

When you download and install the `amp-dev` package you are also installing the MySQL database. If you have not downloaded the `amp-dev` package, you can download only the MySQL package as shown below:

```
$ pkg install SUNWmysql5
```

You may still need to configure the MySQL Server in order for it to function properly. If you have installed the Web Stack UI package, you can start/stop the MySQL Server from the menu.

To start the MySQL Server on OpenSolaris OS, click **Applications > Developer Tools > Web Stack Admin > Start Apache2/MySQL Servers**.

The following examples shows you how you can start the MySQL Server in different modes:

### 1. To list the SMF properties

```
$ svccfg -s mysql:version_50 listprop mysql/*
```

### 2. To run the MySQL 5.0 server in the 32-bit mode (default)

```
$ svccfg -s mysql:version_50 setprop mysql/enable_64bit=false
$ svcadm refresh mysql:version_50
$ svcadm disable mysql:version_50
$ svcadm enable mysql:version_50
```

### 3. To run the MySQL 5.0 server in the 64-bit mode

```
$ svccfg -s mysql:version_50 setprop mysql/enable_64bit=true
$ svcadm refresh mysql:version_50
$ svcadm disable mysql:version_50
$ svcadm enable mysql:version_50
```

### 4. To change the location of MySQL data directory (default is `/var/mysql/5.0/data`)

```
$ svccfg -s mysql:version_50 setprop mysql/data=/zpool/data
$ svcadm refresh mysql:version_50
$ svcadm disable mysql:version_50
```

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```
$ svcadm enable mysql:version_50
```

Perform the following steps as a root user to start the MySQL Server:

```
svccfg import /var/svc/manifest/application/database/mysql.xml
svcadm enable application/database/mysql:version_50
```

The first command shows how you can import the MySQL Server manifest file. You need to execute this only once. To stop the server, execute the following command:

```
svcadm disable application/database/mysql:version_50
```

**Note** - The default password for the MySQL Server root user is a blank string (no password). Change the default MySQL Server root password before deploying it in a production environment. After starting the MySQL Server using the command provided in the previous section, you can connect to the MySQL Server using the command `/usr/mysql/bin/mysql -u root`

## Registering the Server with the NetBeans IDE

You can register the MySQL Server with the NetBeans IDE so that you can manage the lifecycle of the server directly from the IDE. You need to perform the following tasks:

- Go to the **Services** Tab.
- Right click **Databases** and select **Register MySQL Server...**
- Enter Server Host Name as **localhost**, Server Port Number as **3306**, Administrator Username as **root**. Do not type any value for the Administrator Password if you have not changed the root password.
- Click OK. You will see the sample tables of the registered MySQL Server.

That is all you need to work with the MySQL Server from the NetBeans IDE. You can perform many operations like creating databases and tables directly from the NetBeans IDE.

For more information, see <http://db.netbeans.org/>

## 7. Getting Help

Getting help is always easier for NetBeans IDE and OpenSolaris OS. If you have a particular problem that you are facing with Web Stack, you can get help from the community mailing lists at <http://forums.sun.com/forum.jspa?forumID=980&start=0>.

When you have a particular issue with the NetBeans IDE, you can write to the NetBeans mailing list. To subscribe, unsubscribe, browse archives, or for more info on individual lists, please follow the appropriate links given in the NetBeans mailing list site at <http://www.netbeans.org/community/lists/>

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## Documentation

Web Stack documentation is available at <http://wikis.sun.com/display/WebStack/Browse+Documentation>. For information on OpenSolaris OS for web development, read the Web Stack Getting Started Guide available at <http://wikis.sun.com/download/attachments/48125322/WSGSG-OS.pdf>. For any other issues pertaining to Web Stack documentation, send a mail to [webstack-discuss@opensolaris.org](mailto:webstack-discuss@opensolaris.org).

## More Information

- NetBeans Documentation Site - <http://www.netbeans.org/kb/60/>
- OpenSolaris Web Stack Project Page - <http://opensolaris.org/os/project/webstack/>