Lab 7: Securing Applications in Liberty Profile

What this Lab Exercise is about

In this lab, you are going to secure access to applications deployed onto Liberty Profile. It maintains security in a default install by ensuring that it only listens to requests from the localhost and only HTTP protocol is supported.

In this exercise you learn how to configure the server to listen for HTTPS requests, configure a basic user registry, and protect access so only authorized users can execute a servlet.

Assumptions

It is assumed that you are using the WebSphere Version to Version Migration Workshop VMWare image that has been pre-installed with the necessary binaries.

In this exercise, you will:

- Configure the Liberty server for HTTPS support
- Setup a basic user registry in Liberty Profile
- Securing application resources
- Testing user access to secure resources in the blog application

Configure the Liberty server for HTTPS support

The configuration of the server to enable HTTPS support is a two-step process.

- Create self-signed SSL certificates
- Configuring the server to use these certificates for SSL

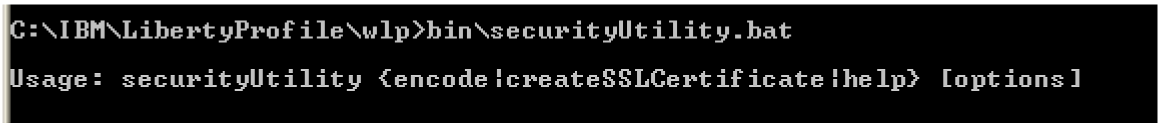
1) Create a self-signed certificate

__a. The **securityUtility** command line tool needs to be used to create the SSL certificates.

__b. Open the command prompt

__c. Navigate to the directory Liberty Profile was installed to, e.g. **C:\IBM\LibertyProfile\wlp\**

__d. The command to create SSL certificates for the server is **bin/securityUtility.bat**. Execute it to learn about its options.



```
C:\IBM\LibertyProfile\wlp>bin\securityUtility.bat
Usage: securityUtility {encode|createSSLCertificate|help} [options]
```

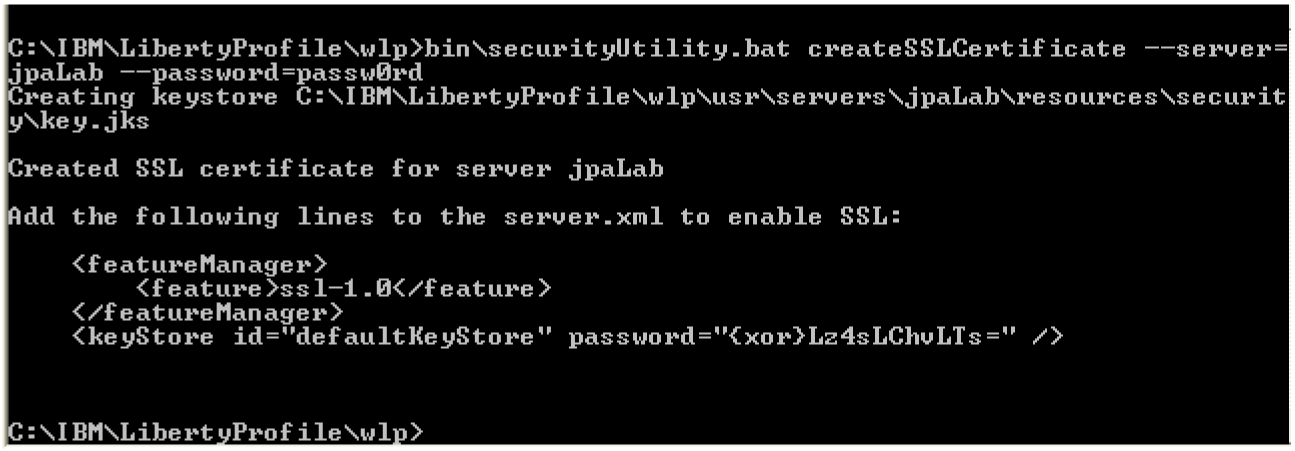
__e. To create the certificate in the command prompt, type the following text as a single line:

```
bin/securityUtility createSSLCertificate --server=jpaLab --password=passw0rd
```

It assumes that the **jpaLab** server has already been created which was done in the previous lab.

This generates the keystore and places it in the server configuration directory.

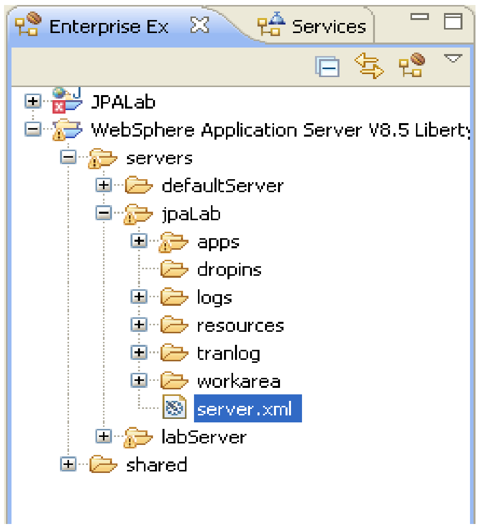
The utility also produces output of the XML snippet that can be copied into the server.xml to use the keyStore.



```
C:\IBM\LibertyProfile\wlp>bin\securityUtility.bat createSSLCertificate --server=
jpaLab --password=passw0rd
Creating keystore C:\IBM\LibertyProfile\wlp\usr\servers\jpaLab\resources\securit
y\key.jks

Created SSL certificate for server jpaLab

Add the following lines to the server.xml to enable SSL:

    <featureManager>
        <feature>ssl-1.0</feature>
    </featureManager>
    <keyStore id="defaultKeyStore" password="{xor}Lz4sLChvLTs=" />


C:\IBM\LibertyProfile\wlp>
```

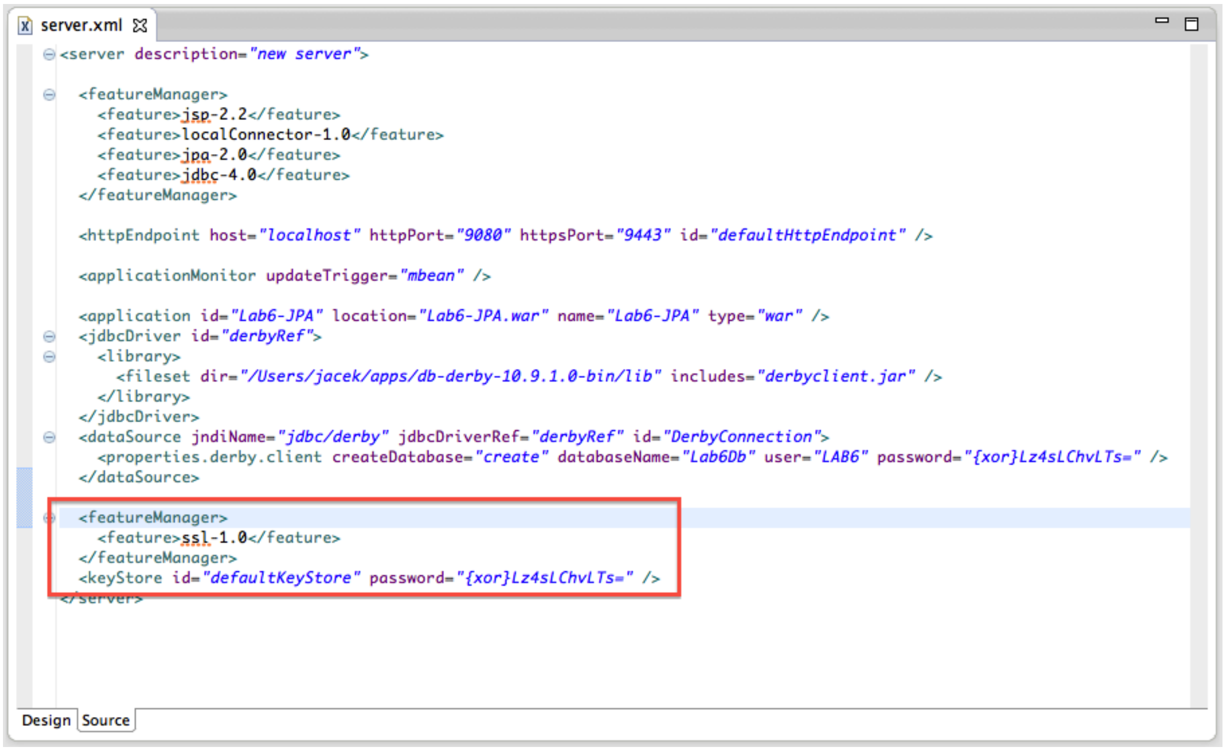
2) Update the server configuration with the **ssl** feature and keystore

__a. Open the **server.xml** file in Eclipse IDE. In Project Explorer go to WebSphere Application Server V8.5 Liberty Profile → servers → jpaLab → server.xml



__b. Copy the output generated by the **securityUtility** command. And, then paste it into the **server.xml** Source tab in Eclipse.

This configures the **ssl-1.0** feature and tells the runtime the password to use when accessing the default key store.



```
<server description="new server">

  <featureManager>
    <feature>jsp-2.2</feature>
    <feature>localConnector-1.0</feature>
    <feature>jpa-2.0</feature>
    <feature>jdbc-4.0</feature>
  </featureManager>

  <httpEndpoint host="localhost" httpPort="9080" httpsPort="9443" id="defaultHttpEndpoint" />

  <applicationMonitor updateTrigger="mbean" />

  <application id="Lab6-JPA" location="Lab6-JPA.war" name="Lab6-JPA" type="war" />
  <jdbcDriver id="derbyRef">
    <library>
      <fileset dir="/Users/jacek/apps/db-derby-10.9.1.0-bin/lib" includes="derbyclient.jar" />
    </library>
  </jdbcDriver>
  <dataSource jndiName="jdbc/derby" jdbcDriverRef="derbyRef" id="DerbyConnection">
    <properties.derby.client createDatabase="create" databaseName="Lab6Db" user="LAB6" password="{xor}Lz4sLChvLTs=" />
  </dataSource>

  <featureManager>
    <feature>ssl-1.0</feature>
  </featureManager>
  <keyStore id="defaultKeyStore" password="{xor}Lz4sLChvLTs=" />
</server>
```

__c. Save the configuration.

__d. If the server's started at the time of the change you should be able to see the **ssl-1.0** feature has been installed.

It displays this message:

```
[AUDIT   ] CWWKG0016I: Starting server configuration update.
[AUDIT   ] CWWKG0017I: The server configuration was successfully updated in
4.766 seconds.
[AUDIT   ] CWWKF0012I: The server installed the following features: [ssl-
1.0].
[AUDIT   ] CWWKF0008I: Feature update completed in 1.062 seconds.
```

__e. Unless it's already started, **start** the server.

__f. Open the browser and go to **https://localhost:9447/JPALab**. Note you use HTTPS to access the application.

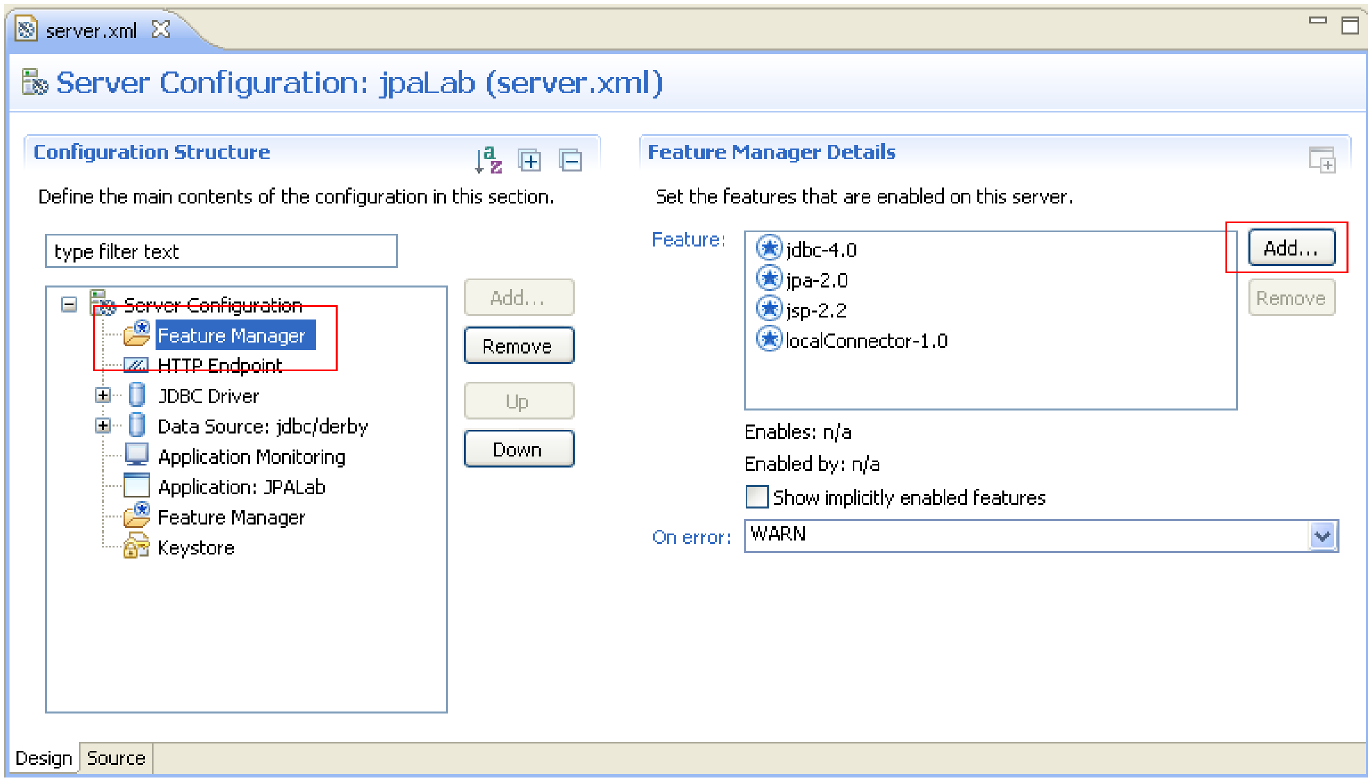
Since Liberty Profile uses a self-generated certificate a browser usually displays a warning to tell a user about a potential security breach. In the case of the example, you can safely access the page.

3) Configure the Liberty Server to run the security related features. The **appSecurity-1.0** feature is used to secure web resources.

__a. Select the **Design** tab on the server.xml configuration editor.

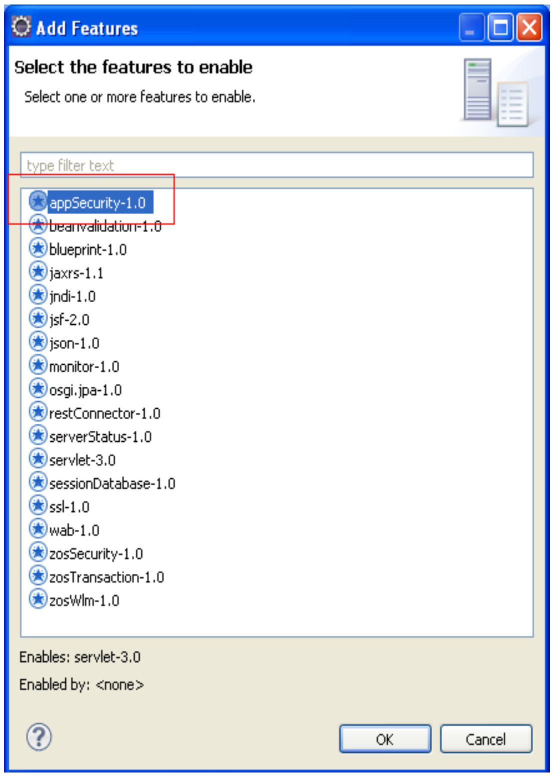
__b. Click the **Feature Manager** option from the **Configuration Structure** section.

__c. In Feature Manager Details section on the right, click the **Add...** button to add a new feature into the list.


server.xml

Server Configuration: jpaLab (server.xml)

__d. Select **appSecurity-1.0**.


Add Features
Select the features to enable
Select one or more features to enable.
type filter text
OK
Cancel

appSecurity-1.0
beanvalidation-1.0
blueprint-1.0
jaxrs-1.1
jndi-1.0
jsf-2.0
json-1.0
monitor-1.0
osgi.jpa-1.0
restConnector-1.0
serverStatus-1.0
servlet-3.0
sessionDatabase-1.0
ssl-1.0
wab-1.0
zosSecurity-1.0
zosTransaction-1.0
zosWlm-1.0

Enables: servlet-3.0
Enabled by: <none>

__e. Save the changes.

The Liberty Profile Server is now configured to support HTTPS channel on port **9447** and can host applications with restricted (secured) resources.

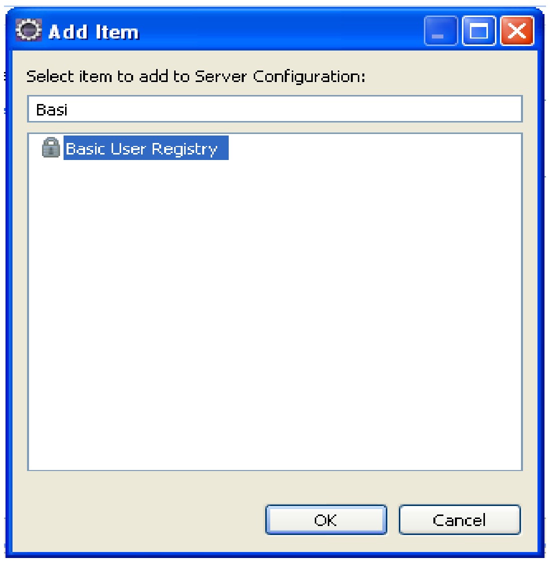
In the next section, you will setup a basic user registry that is included with the Liberty Profile. You will then configure the JPALab application to restrict access to its web resources.

Setup a basic user registry in Liberty Profile

__1. Configure a user registry.

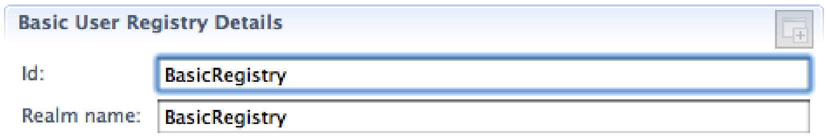
__a. In the **Design** tab of the server.xml configuration editor, click **Server Configuration**. Click **Add...** button.

__b. Start typing **“Basic User Registry”** until it's highlighted in the **Add Item** popup window.



__c. Click **OK**.

__d. In the **Basic User Registry Details** on the right, provide a value for the **Id** by entering **BasicRegistry**.

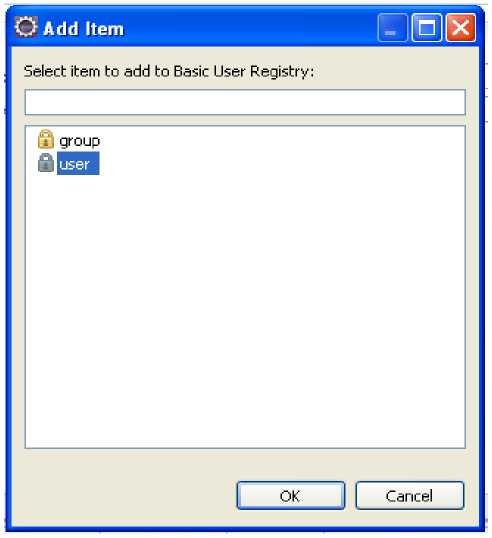

Basic User Registry Details

Id:	BasicRegistry
Realm name:	BasicRegistry

__e. Save the changes.

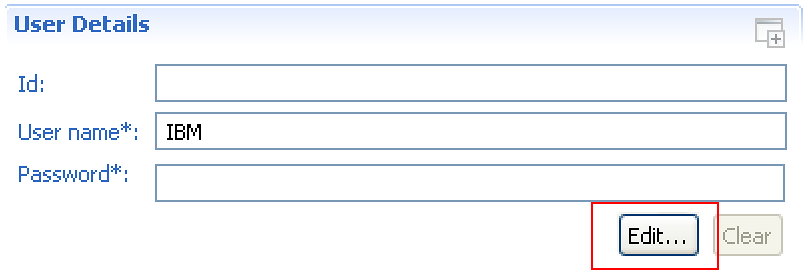
__f. With **Basic user Registry** selected in **Configuration Structure** section of the editor, click **Add...** button.

__g. Select user to add a new user to the registry.

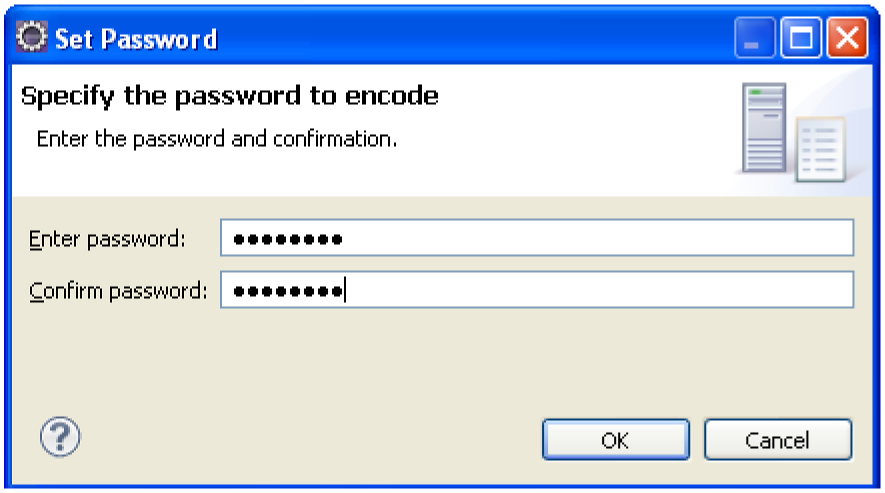


__h. In the **User Details** section, enter **IBM** as the user name. And **passw0rd** as the password

__i.Click **Edit...** button next to the **Password** field.



__j.Enter and confirm a password and click **OK**.


Set Password
Specify the password to encode
Enter the password and confirmation.
Enter password:
Confirm password:
OK
Cancel

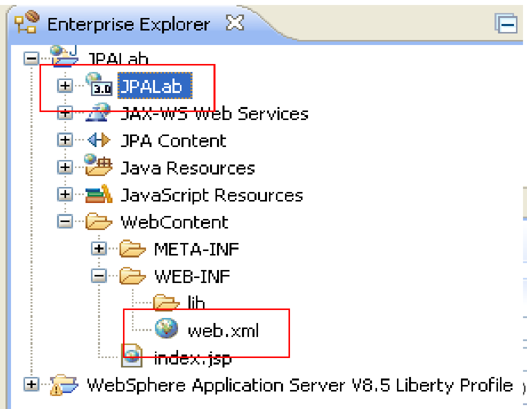
__k. Save the server configuration.

Congratulations! The basic user registry now exists in the server and contains one user named **IBM**.

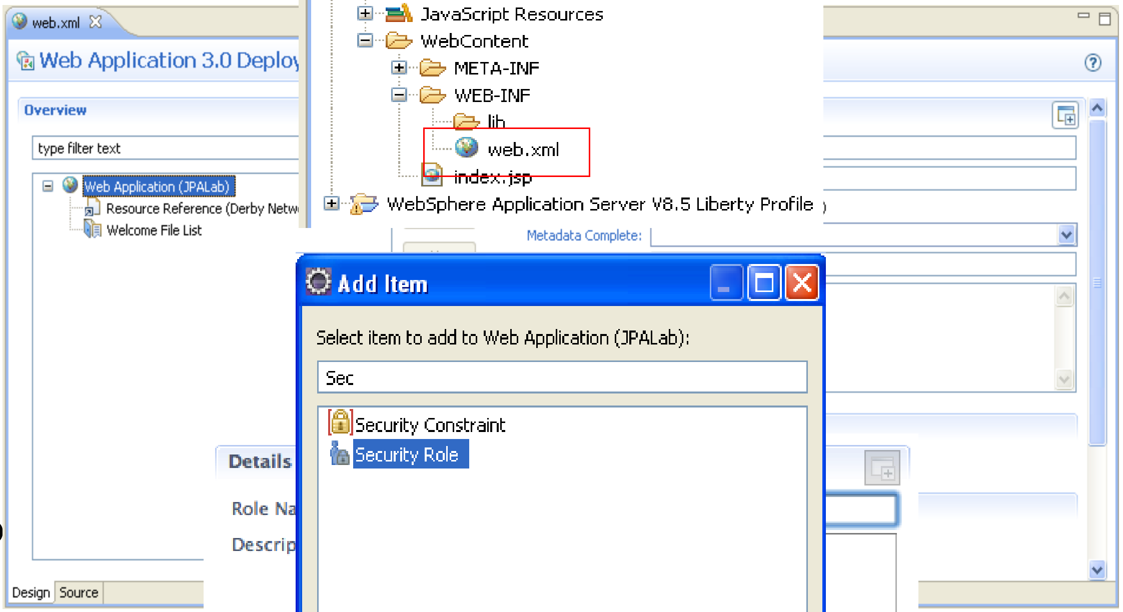
Securing application resources

The next step is to configure security for the **JPALab** application. This requires a web deployment descriptor – **web.xml**.

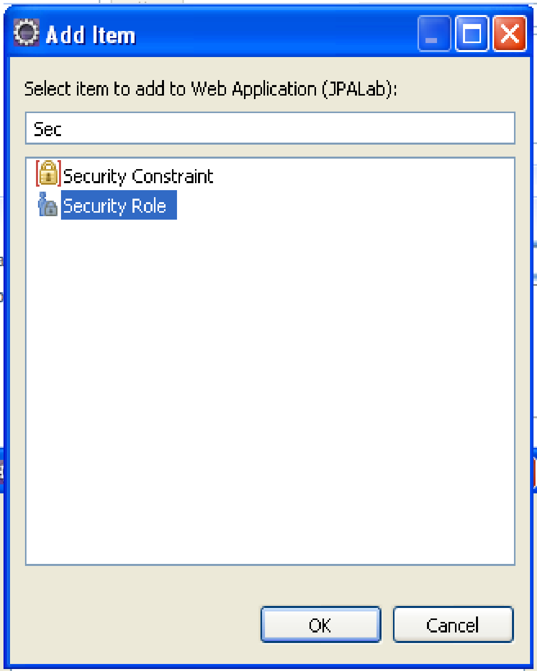
1) Open the web descriptor file located at **JPALab\WebContent\WEB-INF\web.xml.** Alternatively you can double click on the deployment descriptor in the project.

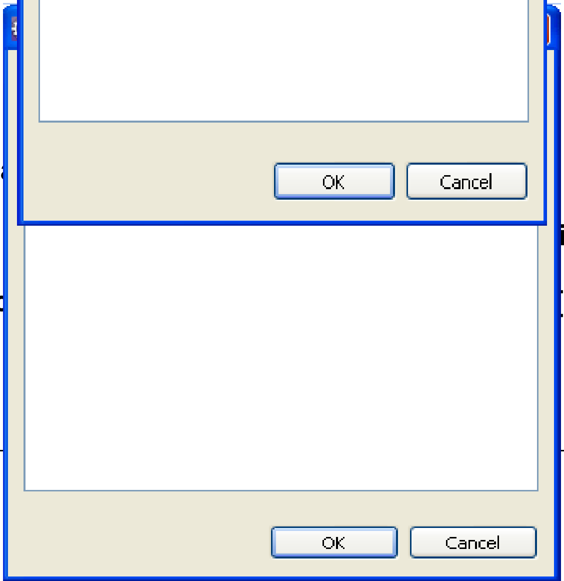


2) The Web Application 3.0



3) D





__b. Start typ

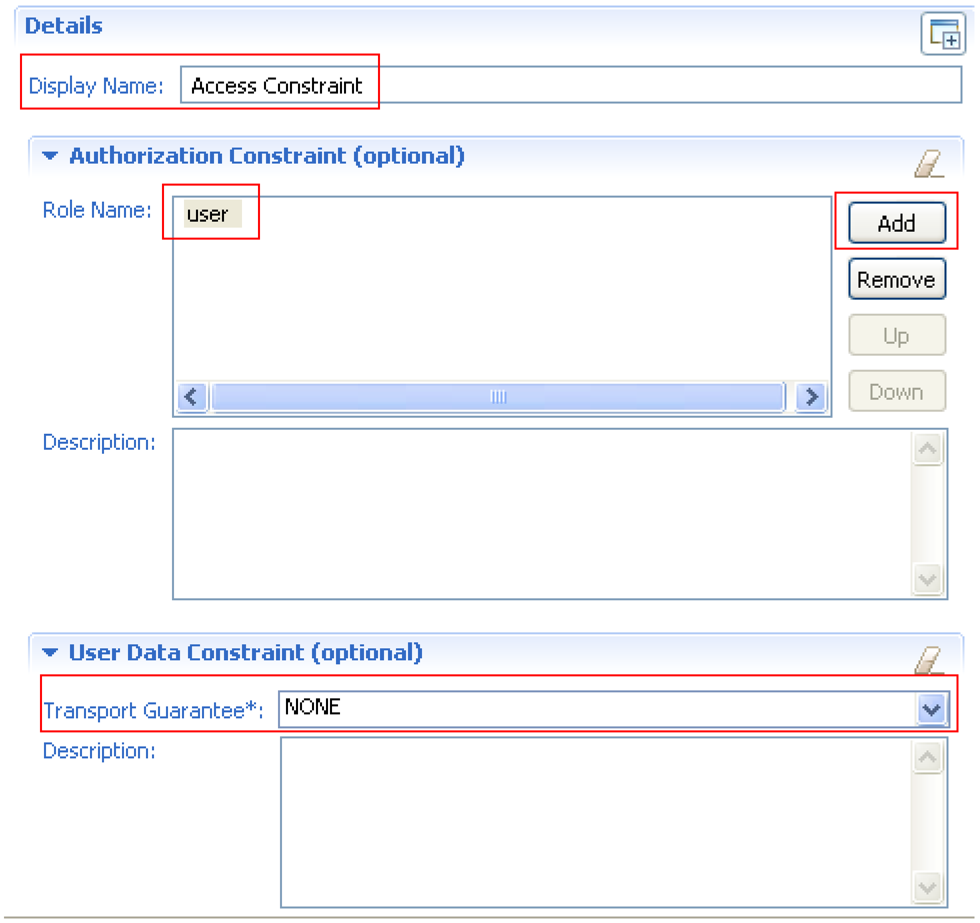
__c. Click **OK**.

Ignore any errors that are displ steps.

__d. In the **Details** **isplay Name** field.

__e. Next to the **Ro** **[New Item]** with **user**.

__f. In **Transport Guarantee** select **NONE** from the drop-down menu.


Details
Authorization Constraint (optional)
Add
Remove
Up
Down
User Data Constraint (optional)

Display Name: Access Constraint

Role Name: user

Description:

Transport Guarantee*: NONE

Description:

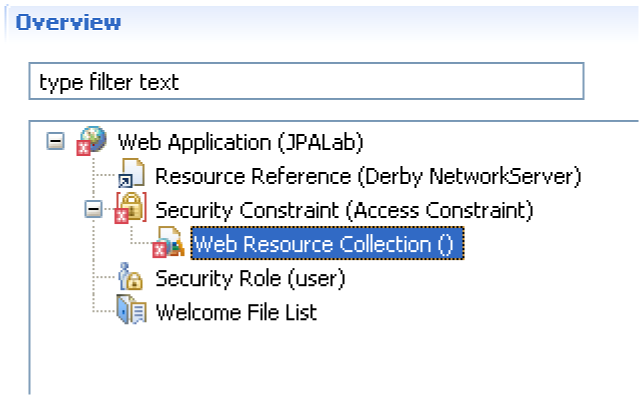
__g.

Setting the **Transport Guarantee** to **NONE** means that SSL is not required to invoke the application. However, as we have already demonstrated, the JPALab application is available from the HTTP and HTTPS transports. In both cases, you will be prompted for user credentials to access the protected web resources in the application.

__h. Save the changes.

4) Define the Web resources to protect

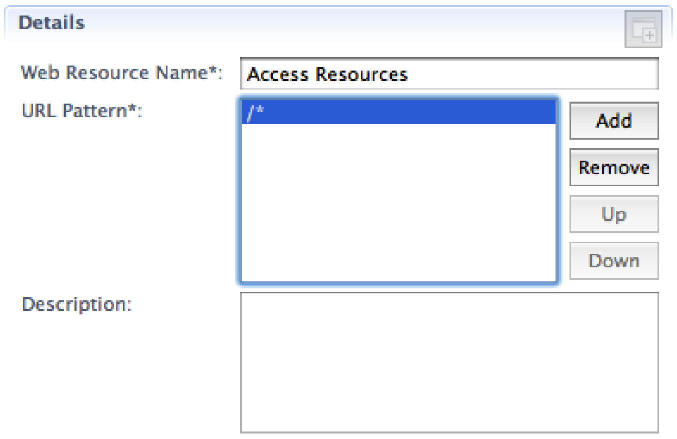
__a. In the **Overview** section, select **Web Application (JPALab) >> Security Constraint (Access Constraint) >> Web Resource Collection ()**


Overview
type filter text
Web Application (JPALab)
Resource Reference (Derby NetworkServer)
Security Constraint (Access Constraint)
Web Resource Collection ()
Security Role (user)
Welcome File List

__b. Enter **Access Resources** in the **Web Resource Name** field.

__c. Next to **URL Pattern** field, click the **Add** button and replace **New Item** with **/*** (the forward slash and the asterisk).

This ensures that requests to any resources in the web application are authenticated using BASIC HTTP authentication.


Details

Web Resource Name*: Access Resources

URL Pattern*: /*

__d. Save the Web Deployment Descriptor.

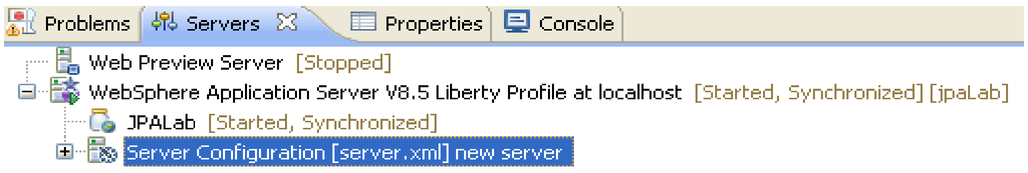
The errors in the Web Deployment Descriptor should now be resolved.

The application is now configured to be secure, but the roles to user/group mappings have not yet been defined. Remember that roles are used to logically restrict access to web resources and before users can access them, these roles should be mapped to their user/groups equivalents managed by the Liberty Profile server.

5) Define User/Group mappings

__a. Go to the **Servers** view in eclipse.

__b. Double click on the **Server Configuration** under **WebSphere Application Server V8.5 Liberty Profile at localhost [jpaLab]** to open the Server Configuration editor.

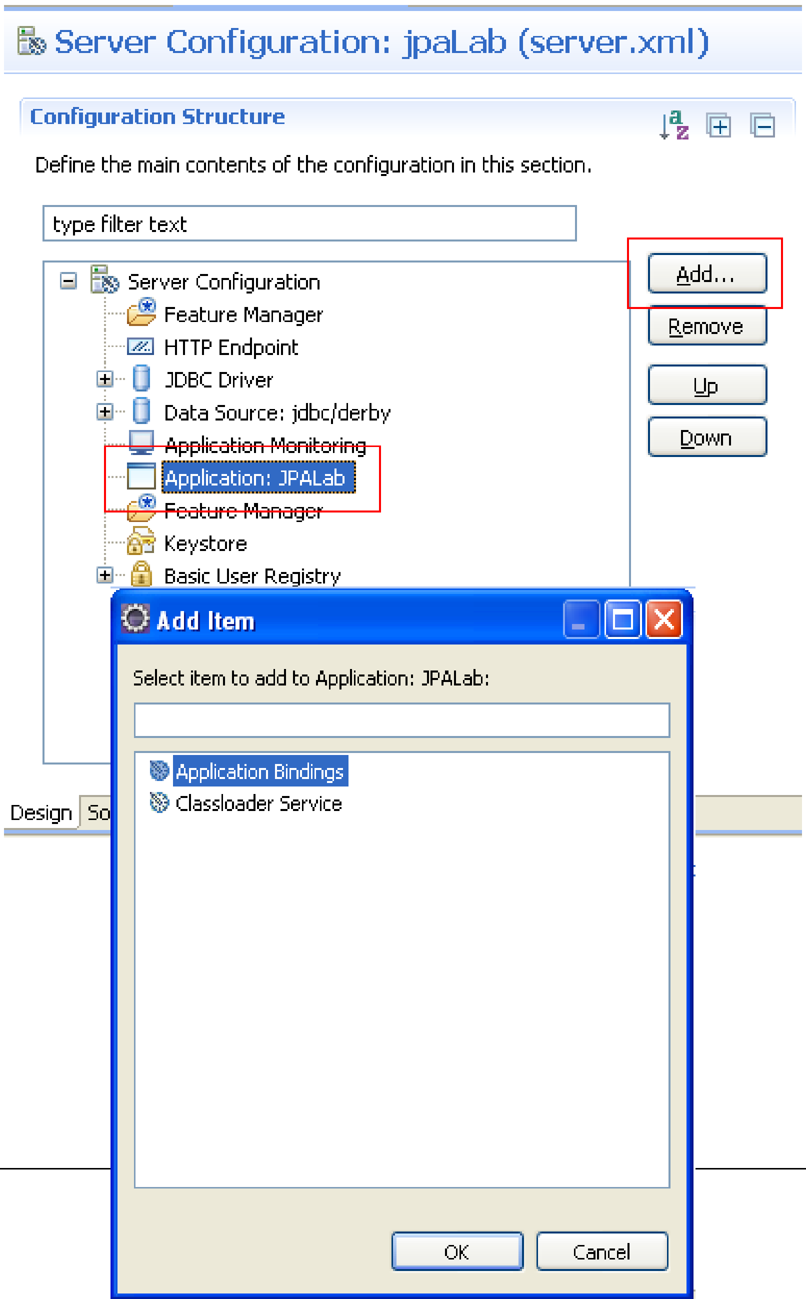


Web Preview Server [Stopped]
WebSphere Application Server V8.5 Liberty Profile at localhost [Started, Synchronized] [jpaLab]
JPALab [Started, Synchronized]
Server Configuration [server.xml] new server

__c. Ensure you are in the Design mode by selecting the **Design** tab on the Server Configuration editor.

__d. Select the **Application: JPALab** element for the application.

__e. With the **Application: JPALab** element selected, click the **Add...** button.



Define the main contents of the configuration in this section.

Server Configuration
Feature Manager
HTTP Endpoint
JDBC Driver
Data Source: jdbc/derby
Application Monitoring
Application: JPALab
Feature Manager
Keystore
Basic User Registry

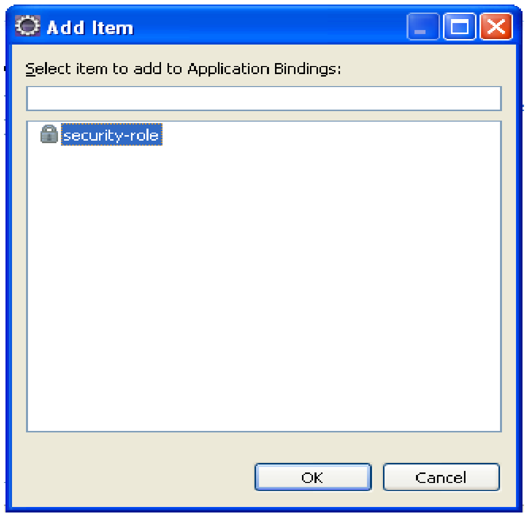
Select item to add to Application: JPALab:

Application Bindings
Classloader Service

__g. When highlighted, click the **OK** button.

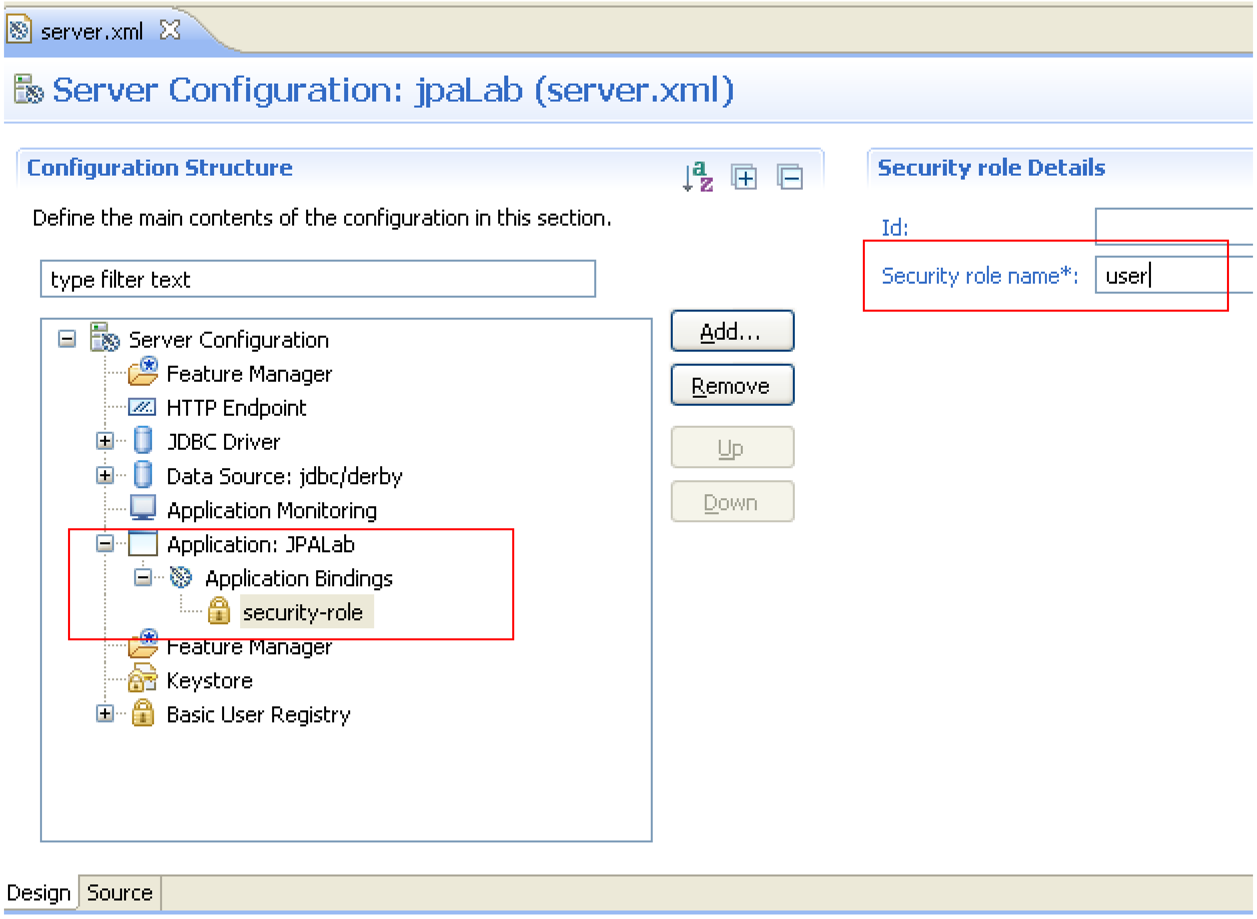
__h. With **Application Bindings** selected, click the **Add...** button.

__i.Select the only available **security-role** from the list.



__j.Click the **OK** button to confirm the selection.

__k. In the **Security role Details** section, provide the **Security role name** as **user**.


server.xml

Server Configuration: jpaLab (server.xml)

Configuration Structure

Define the main contents of the configuration in this section.

type filter text

- Server Configuration
  - Feature Manager
  - HTTP Endpoint
  - JDBC Driver
  - Data Source: jdbc/derby
  - Application Monitoring
  - Application: JPALab
    - Application Bindings
      - security-role
  - Feature Manager
  - Keystore
  - Basic User Registry

Security role Details

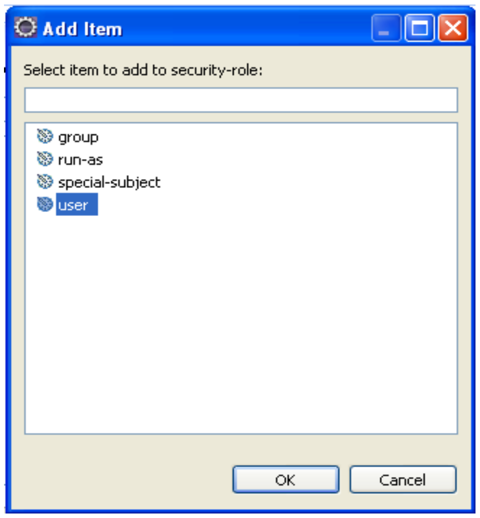
Id:

Security role name*: user

This ties up with the role name in the web.xml defined earlier in the lab.

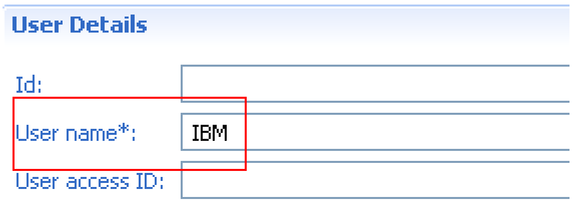
__l.Select the **security-role** in the **Configuration Structure** section. Click the **Add...** button.

__m. Select **user** from the list.



__n. When highlighted, click the **OK** button.

__o. In the **User name** field, enter the user name you defined earlier. In the example this was **IBM**.



IBM

The common best practice is to use groups for role mappings rather than users. Defining groups is performed basically the same as defining users.

__p. Save the configuration.

__q. Restart the server so the security settings takes effect.

__r. The application is now ready to run with security enabled.

Testing user access to secure resources in the blog application

Now that the security features of the Liberty Profile server are configured, you can test the JPALab application to ensure that the resources are indeed protected using SSL and role based access control to protected resources.

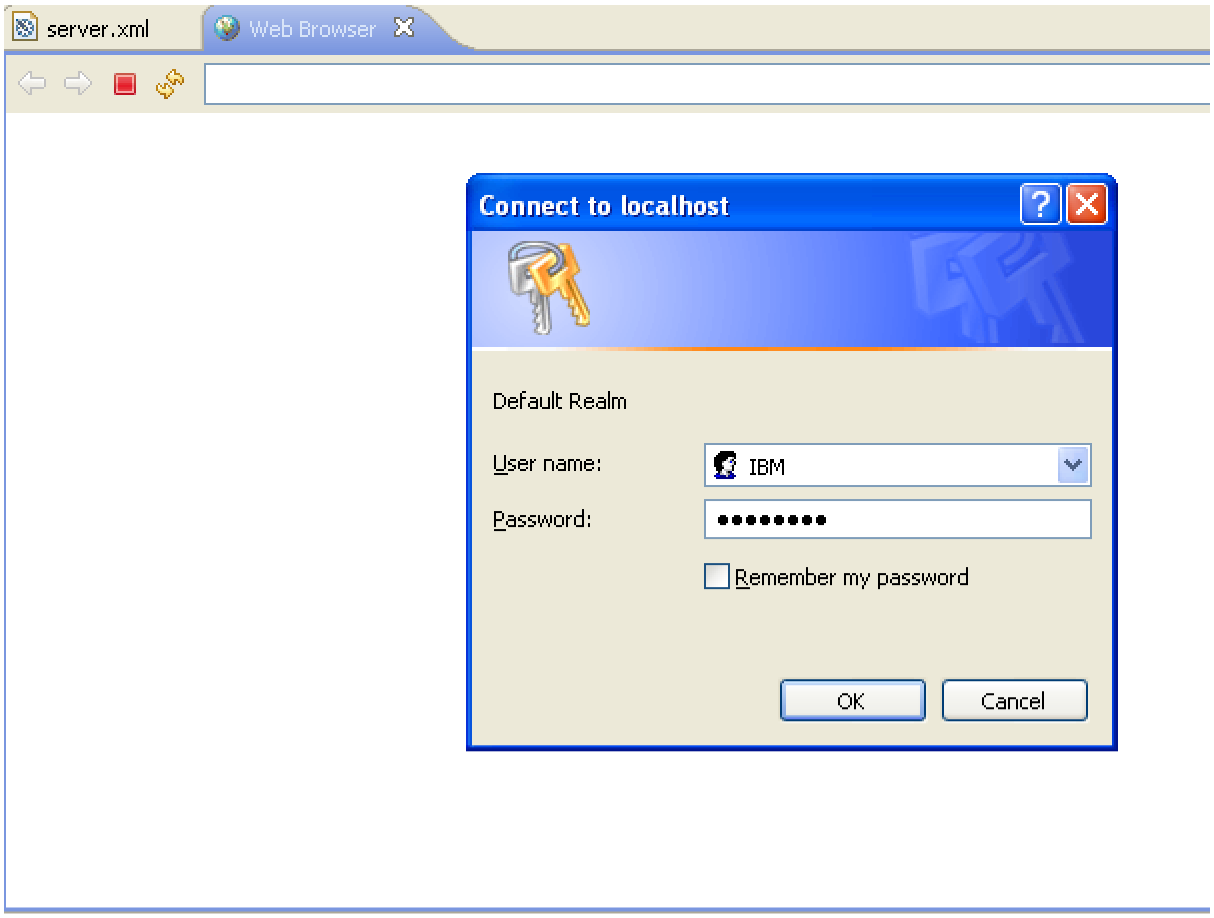
1) Close any Web browser windows in Eclipse that have the JPALab application loaded.

2) Right-click the JPALab application in the Project Explorer and select **Run As >> Run on Server** to launch it.

3) The web browser comes up. You should be prompted for a user name and password.

4) Enter the credentials as defined in the lab:

Name: **IBM**
Password: **passw0rd**



Default Realm

User name: IBM

Password: ●●●●●●●●●

Remember my password

5) Click **OK**.

6) You can now securely use the application. Congratulations! You've done the lab.