**Discovering Liberty on IBM Cloud**

Contents

[Lab 1 Discover Liberty on IBM Cloud 3](#_Toc495398125)

[1.1 Introduction to IBM Cloud 3](#_Toc495398126)

[1.2 What is Liberty, and what is Liberty on IBM Cloud 4](#_Toc495398127)

[1.3 Prerequisites 4](#_Toc495398128)

[1.4 Working with your application 7](#_Toc495398129)

[1.5 Clean up 15](#_Toc495398130)

[1.6 Glossary 16](#_Toc495398131)

[1.7 Summary 16](#_Toc495398132)

[Appendix A. Notices 17](#_Toc495398133)

[Appendix B. Trademarks and copyrights 19](#_Toc495398134)

# Discover Liberty on IBM Cloud

In this lab, you will learn how to run, modify and deploy a simple web app to the cloud using the Java language and the IBM Cloud® Tools for Eclipse. Once you deploy the app to IBM Cloud, IBM's cloud development platform, anyone on the Internet can access it.

Please refer to the following table for file and resource location references on different operating systems.

|  |  |  |
| --- | --- | --- |
| Location Ref. | OS | Absolute Path |
| *{LAB\_HOME}* | Windows | C:\WLP\_<version> |
| Linux | ~/WLP\_<version>  Or your choice |
| Mac OSX | ~/WLP\_<version>  Or your choice |

## Introduction to IBM Cloud

IBM Cloud allows developers to deploy applications directly to the cloud without needing to configure the underlying system or service dependencies. This allows developers to stay focused on the fun stuff, without the hassle of backend and system configuration. IBM Cloud supports both web and mobile workloads, and provides boilerplates and runtimes for many common scenarios, which allows developers to get up-and-running quickly.

IBM Eclipse Tools for IBM Cloud grants you the ability to develop and deploy applications to your local workspace to IBM Cloud, directly from inside the Eclipse IDE. During this lab, we demonstrate how to install the tools and to quickly bootstrap your Eclipse environment to deploy to IBM Cloud using an existing IBM Cloud account. The tools integrate directly into your existing Eclipse environment (as a set of installed plug-ins). IBM Eclipse Tools for IBM Cloud is available from the Eclipse Marketplace, from WASdev and from ibmcloud.net, and is based on the open source Cloud Foundry Eclipse Integration project, while including additional support for IBM Cloud-specific functionality.

IBM Eclipse Tools for IBM Cloud provides a fully integrated IBM Cloud development environment for developing and deploying both Java and JavaScript applications. Developers may use IBM Cloud Eclipse Tools tooling to easily create new applications, or migrate/deploy existing applications.

## What is Liberty, and what is Liberty on IBM Cloud

WebSphere Liberty is a highly composable, fast-to-start, dynamic application server runtime environment. It is available as part of IBM WebSphere Application Server v8.5.5, and it supports popular frameworks like Spring and includes the IBM JRE. WebSphere Liberty enables rapid application development that is well suited to the cloud.

Liberty for Java applications on IBM® Cloud are powered by the IBM WebSphere® Liberty Buildpack. Buildpacks are the underlying infrastructure that your applications run on. Different buildpacks power different types of applications, for example, Java EE applications are powered by the Liberty buildpack, while Javascript applications are powered by Node.js buildpack. The Liberty buildpack provides a complete runtime environment for running Java EE 7 and OSGi applications on top of Liberty profile.

In addition to the above, IBM Cloud offers a wide variety of buildpacks, such as buildpacks for Ruby, GO, Python, PHP, ASP.NET and more. To see the full list of all available buildpacks, you can use the cf buildpacks once you have are logged in:

(What is CLI?: https://www.ng.IBM Cloud.net/docs/starters/install\_cli.html)

## Prerequisites

The following preparation must be completed prior to beginning this lab:

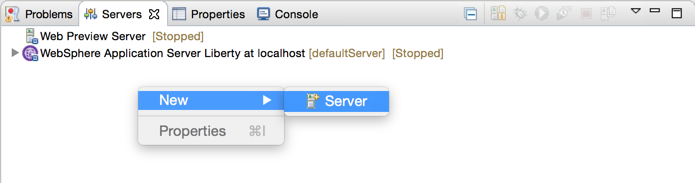
### Setup up Access to IBM Cloud

1. Complete the sections marked “Labs Accessing IBM Cloud” in ${LAB\_HOME}/labs/getttingStarted/0\_setup\_<timestamp>/setup.pdf

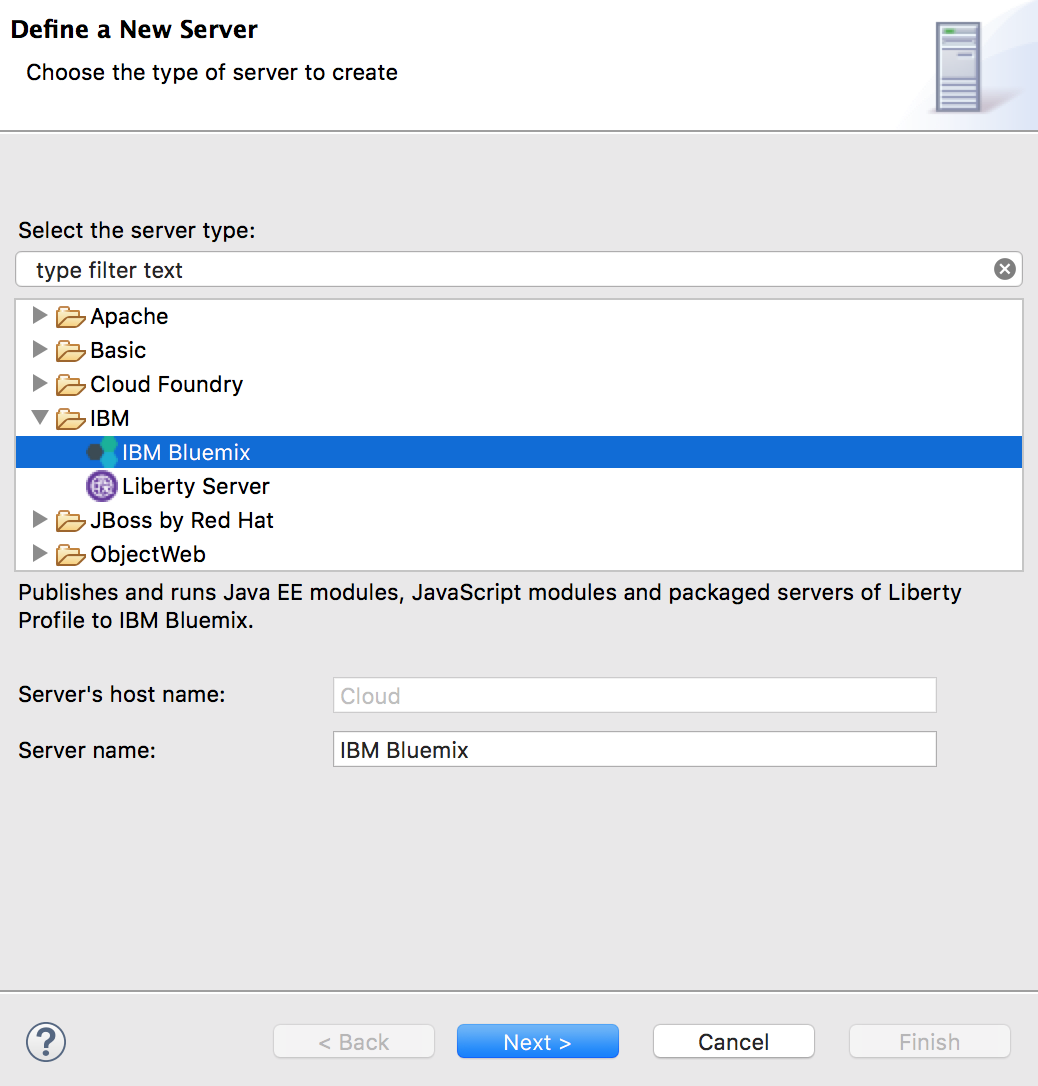
### Optional – Create the IBM Cloud Server configuration in WDT

**Note:** If you already have a IBM Cloud Server defined in WDT, you can skip this step.

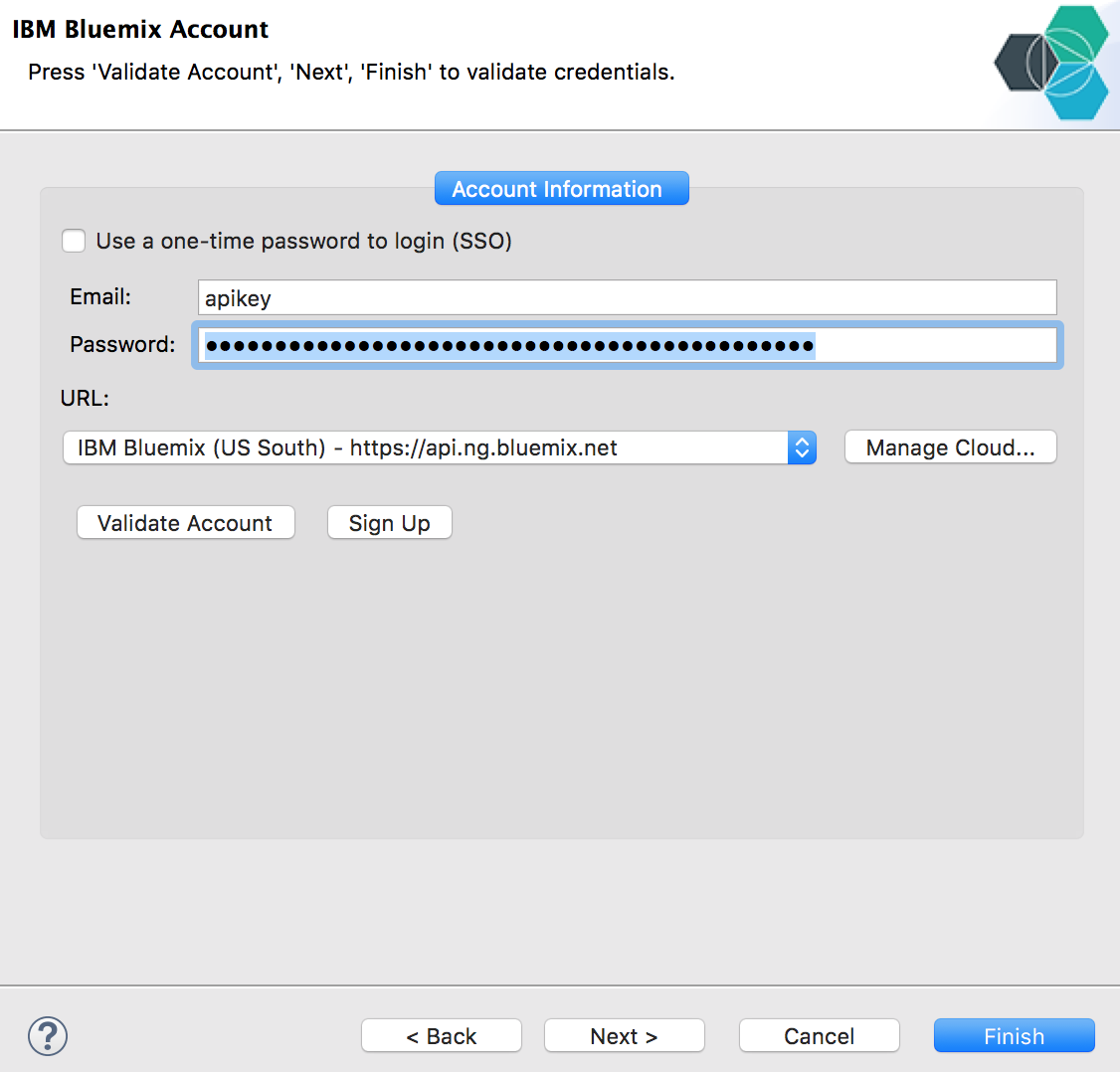
1. At the bottom of the workbench, open the Servers view by clicking the Servers tab. Right-click within the windows of the Servers view and select **New > Server**:



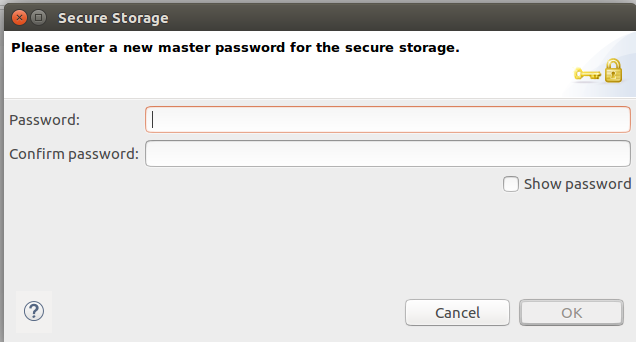
1. Under the **server type** list, expand IBM and select **IBM Cloud**. Use the default eclipse server name (IBM Cloud) supplied. Click **Next**.



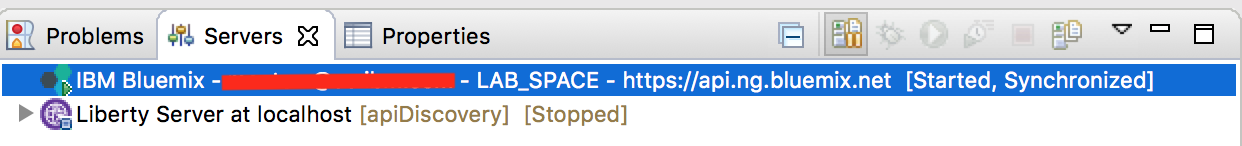
1. On the **IBM Cloud Account** page,
   1. Enter your IBM Cloud login credentials. (These were created in the labs/gettingStarted/0\_setup\_<timestamp>/setup.pdf section 0.5)
      1. email address: **apikey**
      2. password: (Value in ***{LAB\_HOME}/*Liberty-APIKey.json** file **apiKey**)
   2. Select the URL from the drop-down list for the IBM Cloud Region you belong.
   3. Click the **Validate Account** button. An error will be displayed if there are validation errors with the credentials entered.
   4. If you have multiple ORGs or Spaces defined in your IBM Cloud account, select the desired ORG and Space where you will deploy your application. Click **Finish**.



* 1. A prompt may appear for a new master password. Use what you remember, but l**abPassword** is as good as any.



* 1. The IBM Cloud server will appear in the Servers view. You can expand the server and view any applications that are already deployed to your IBM Cloud server.



## Working with your application

### Deploy the WAR file to IBM Cloud

You can deploy the Simple1.war file directly to Java EE-compatible servers such as a Liberty profile server running either on your own computer or in the IBM Cloud cloud. You'll deploy it now to IBM Cloud:

1. To get started, first make sure that your command window is in the working directory where the application war file is located at: {LAB\_HOME}\labs\cloud\1\_LibertyOnIBM Cloud\_<datestamp>\Sample1.war
2. If you're not already logged in to IBM Cloud, run these Cloud Foundry commands from your OS command prompt to log in:

bx api <https://api.ng.bluemix.net/>

For other regions of the world:

bx api https://api.eu-gb.bluemix.net/

bx api <https://api.eu-de.bluemix.net/>

bx api <https://api.au-syd.bluemix.net/>

bx login –u <Your IBM Cloud username> --apikey @{LAB\_HOME}/Liberty-APIKey.json

API endpoint: **https://api.ng.bluemix.net**

Authenticating...

**OK**

Targeted account **<your account> Account (eeee7d19b6701916e21bf02f116813a9)**

Targeted org **<Your org (email if non subscribed account)>**

Targeted space **LAB\_SPACE**

**API endpoint:**   **https://api.ng.IBM Cloud.net** (API version: **2.75.0**)

**Region:**         **us-south**

**User:**           **<your user email>**

**Account:**        **<your account> Account (eeee7d19b6701916e21bf02f116813a9)**

**Org:**            **<Your org (email if non subscribed account)>**

**Space:**          **LAB\_SPACE**

1. Deploy <war name> to IBM Cloud by running this command:

bx cf push <*your app name>* -p <war name>

The name you choose for your application must be unique on IBM Cloud — not used by any other IBM Cloud user. You'll get an error if the name (called a *route*) is taken.

The command that you just ran:

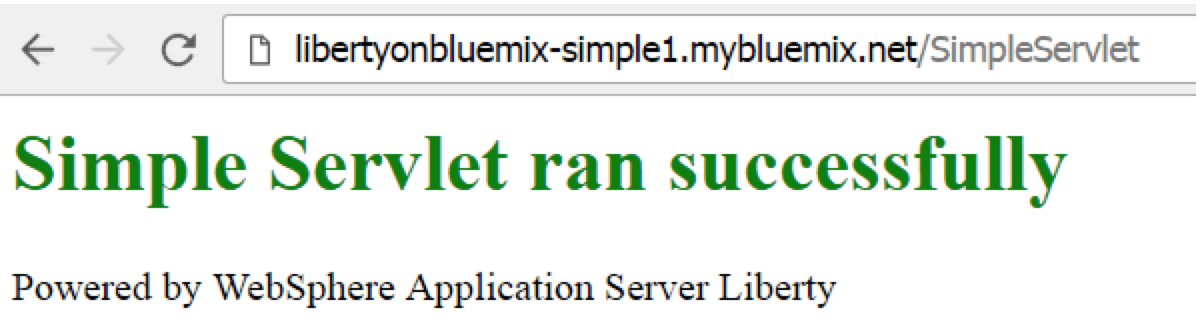
1. Uploads the WAR file to IBM Cloud
2. Runs the Liberty profile buildpack in IBM Cloud
3. Starts your Liberty profile server instance in IBM Cloud
4. Deploys the app in your Liberty Profile server instance
5. Maps a route to your running app, enabling the app to be accessed over the Internet at the URL https://<your app name>.mybluemix.net/
6. Open https://<your app name>.mybluemix.net/SimpleServlet in your browser to try out the app the simple web application call Sample1. The image below is an example of what the result looks like. The ‘sub-domain’ url will be the value of <your app name>.mybluemix.net.

For other regions in IBM Cloud:

US: Open https://<your app name>.mybluemix.net/SimpleServlet

Other: Open https://<your app name>.<your-region>.myblulemix.net/SimpleServlet

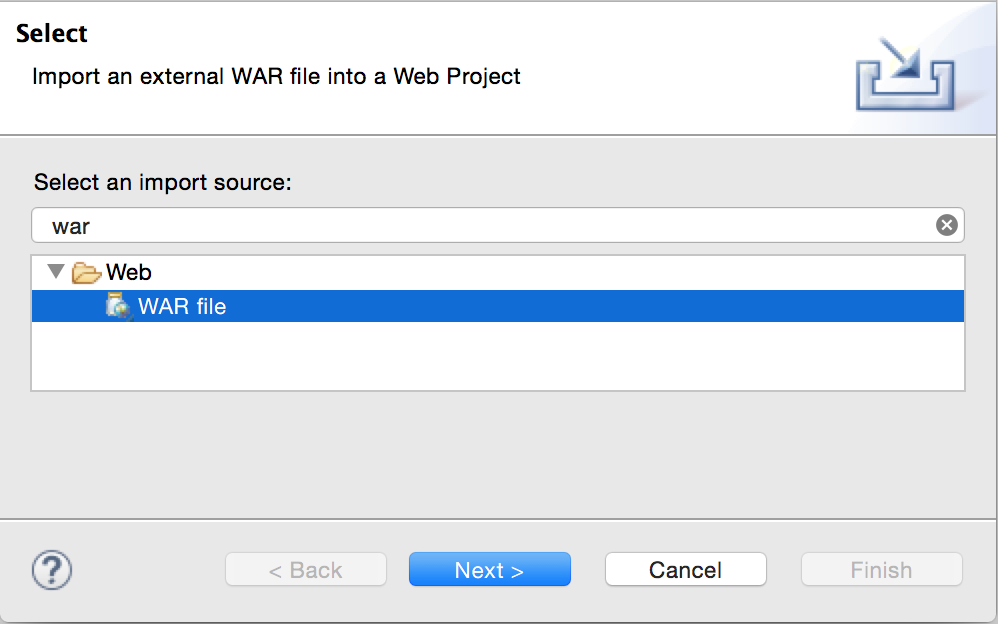
For example: https://<your app name>.eu-gb.mybluemix.net/SimpleServlet



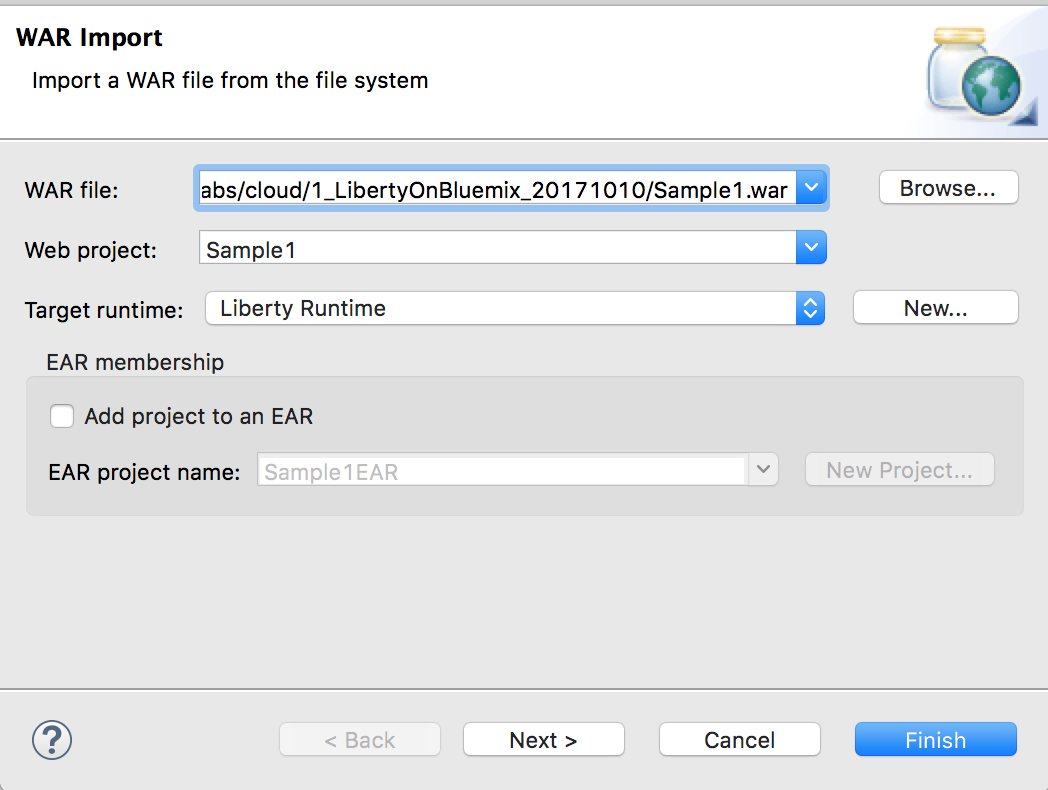
1. Stop and reflect. You just finished deploying a working web application to the cloud! The bx command-line tool and a IBM Cloud account were all you needed.

### Import the app into your Eclipse workspace

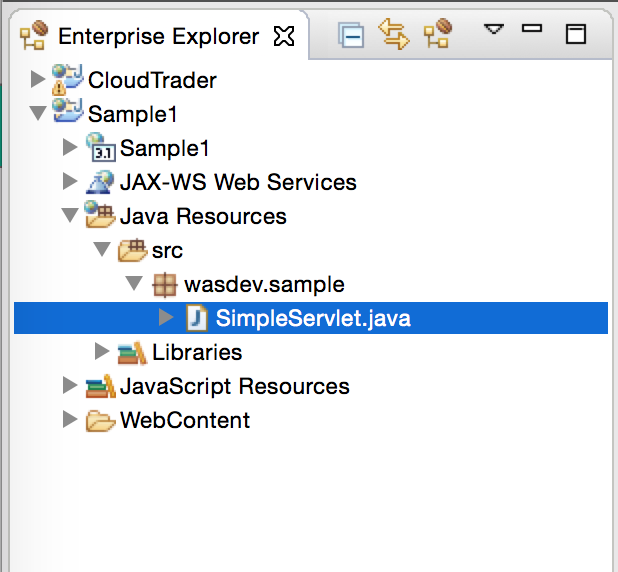
1. Start your Eclipse IDE by running ***{LAB\_HOME}*\wdt\eclipse.exe** and select the workspace at *{LAB\_HOME}*\workspace . Select **File > Import**. The select **Web > WAR file**



1. Browse your file system to locate the war file. Make sure to uncheck the **Add project to an EAR** box, then click the **Finish** button.



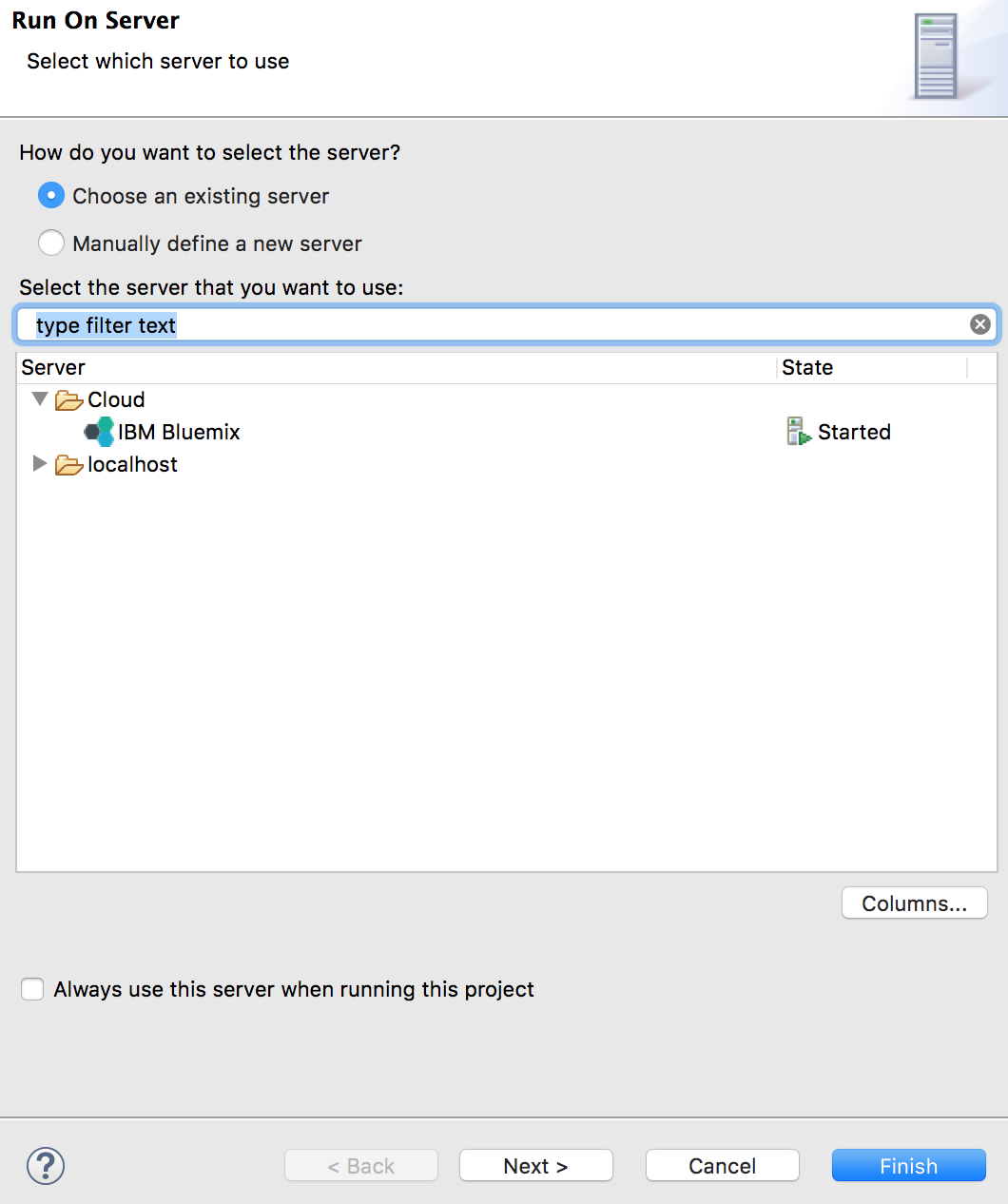
1. Examine the simple code structure in the Enterprise Explorer pane on the left.



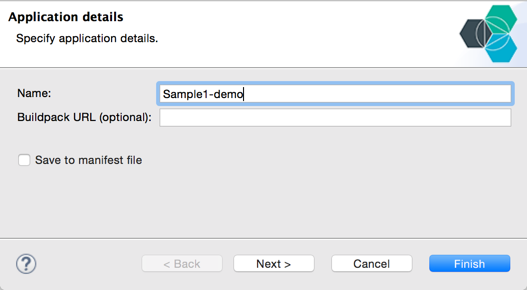
### Deploy application using IBM Cloud Tools for Eclipse

There are several ways to deploy this application to IBM Cloud. The earlier deployment was done using the Command Line Interface (CLI), in this part of the exercise you will use the IBM Cloud Tools for Eclipse to update and deploy the application to IBM Cloud.

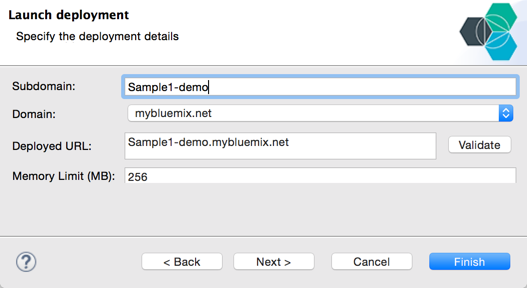
1. In the Enterprise Explorer, expand the **Java Resources > src > wasdev.sample**. Right click on the **SimpleServlet.java** file and choose **Run As > Run On Server**.
2. In the menu that opens, select **IBM Cloud** under the Cloud folder then click on the **Finish** button.



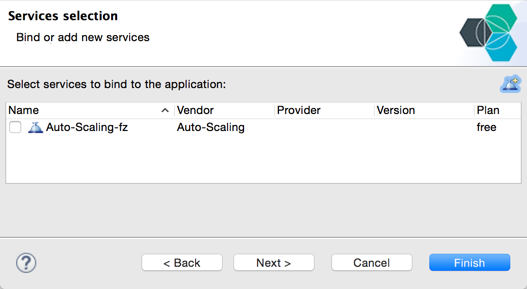
1. In the application details dialog window, enter a unique name for the application that will be deployed to IBM Cloud. The wizard will attempt to provide a unique name based on the Project. You can use provided name or enter a unique value of your liking. Suggest using **“<your name>-Sample1-demo**” Click the **Next** button. **Note:** A non-unique name can cause and error when deploying to IBM Cloud. Namespace is based on unique names.



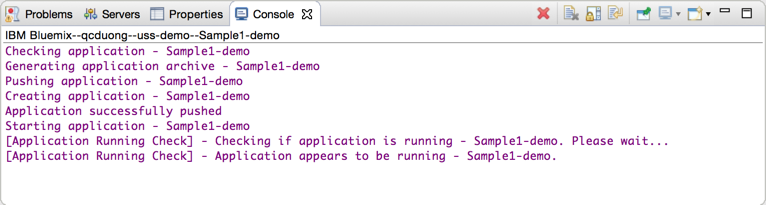
1. The Launch deployment dialogue allows for modifying the deployment details for the application. You can customize the Subdomain and Domain value, then validate if that route is available. You can also update the amount of memory allocated to the deployed instance.
   1. Set the Memory Limit (MB) to **256**
   2. Click the **Next** button to continue.



1. The Services selection window allows you to optionally select and bind services that you have already provisioned, if any, in the IBM Cloud organization and space that you are you targeting. The service shown here is an example. Click on the **Finish** button.



1. Follow the status of the deploying process using the **Console** view window.



1. After a period of time, a web browser should open to the SimpleServlet as shown below. If this does not happen, open a browser and enter address as shown in the Deployed URL.

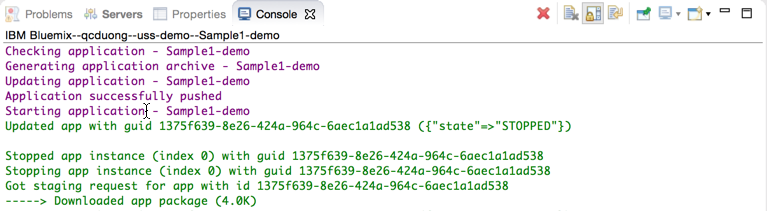


### Update the application on IBM Cloud

1. Open the SimpleServlet.java file to reveal the implementation class in the editor.



1. Change the print method to <font color=purple>**…** then save the file.
2. Select the SimpleServlet.java file and **Run As > On Server**. Choose the **IBM Cloud** server then click the **Finish** button.
3. Look for updating application messages in the **Console** view.



1. After a short time, you can see that the application is updated and results in the new font color.



1. Congratulations! You deployed a web application on IBM Cloud.

## Clean up

In the interest of not running up subscription costs on IBM Cloud, please stop all instances that you created from the dashboard. This will let you stay in the free tier while you are learning the product.

Dashboard URLS are:

<https://console.ng.bluemix.net/dashboard/>

<https://console.eu-gb.bluemix.net/dashboard>

<https://console.eu-de.bluemix.net/dashboard>

<https://console.au-syd.bluemix.net/dashboard>

## Glossary

Familiarize yourself with the following important terms, which you'll often see in documentation and status messages when you work with IBM Cloud.

**Droplet**— A bundle ready to run in the cloud, including everything needed (for instance, a bundle with JVM, Liberty profile server, and your app) except an operating system.

**Buildpack**— An executable that takes the code or packaged server that you push, and bundles it up into a droplet.

**Manifest**— An optional file, named ***manifest.yml***, that you can add to your project. The manifest file configures various parameters that affect the deployed server — including memory size, buildpack to use during deployment, services that are required, the disk space consumed, and so on. For simple Java web apps, you don't need a manifest; the system automatically detects and uses the Liberty profile buildpack and applies a default configuration.

**Staging**— The process handled by the buildpack, bundling what you uploaded with system components and dependencies into a valid droplet

**Droplet Execution Agent (DEA)**— The system piece that's responsible for reconstituting the droplet and running your app in the cloud

**Warden**— A mechanism to ensure that your app is isolated and secured from other running apps

## Summary

In this exercise, you have experience various ways to deploy and run your application to WebSphere Liberty on IBM Cloud. Using the command line interface as well as Eclipse based tooling.

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