IBM WebSphere Application Server V8.5 lab
Advanced Liberty profile administration using the job manager

Scenario

You are a system administrator responsible for managing web application server installations. An application developer has asked you to deploy two Liberty profile servers to two different hosts in a first-level test environment. You decide to use the WebSphere Application Server Network Deployment V8.5 job manager to remotely deploy and administer the Liberty profile installations.

Goals

During this lab, you will learn to use the job manager to remotely deploy and manage a Liberty profile environment that uses a shared SDK (JRE), a shared Liberty profile runtime, and isolated Liberty profile servers.

For more information, see the WebSphere Application Server V8.5 information center topic Submitting jobs to manage Liberty profile installations.

This lab is provided **AS-IS**, with no formal IBM support.

Prerequisites

Hosts

The lab instructions assume the use of three hosts; a job manager host and two server hosts; however, a single host can take on both roles. For example, you can place the job manager on one host, and use the same host as a server host.

- Job manager host
  - Host name: host-1
  - Operating System: Windows, UNIX, or Linux
  - WebSphere Application Server Network Deployment V8.5
    - Job manager node
  - A utility for creating and managing compressed (.zip) files
- Server hosts
  - Host names
    - host-2
    - host-3
  - Operating system: Windows, UNIX, or Linux

Materials

This lab requires these materials, all of which must be available on host-1:

- The lab materials file, `WASv85Labs_AdvLibJM.zip`. To download this file, visit the WebSphere Application Server V8.5 area of the IBM Education Assistant site.
- The installation image for (or a clean copy of) a suitable version of the Java 6 JRE. The minimum supported level for the JRE from Oracle is Java 6 update 26. For the Java JRE from IBM, the minimum supported level is 6.0 (J9 2.6) SR 1. Java 7 is supported; however, there are several significant restrictions. For more information, see the WebSphere Application Server V8.5 information center topic Liberty profile: Runtime environment known restrictions.
- A clean copy of the WebSphere Application Server V8.5 Liberty profile. For more information, see the WebSphere Application Server V8.5 information center topic Installing the Liberty profile.

Procedure

Overview

Assume that an application developer has asked you to deploy two Liberty profile servers to two different hosts in a first-level test environment. The developer provided you a .zip file that includes a Liberty profile user (usr) directory that contains the two servers. Each server includes one embedded application. The basic structure of the .zip file is outlined below.

- usr
  - servers
    - SecuritySample-01.00-01
      - apps
        - SecuritySample-01.00.war
    - ServletSample-01.00-01
      - apps
        - ServletSample-01.00.war

You decide that it will be best to utilize the following topology on each server host in order to simplify maintenance and to conserve disk space as additional servers are deployed in the future:

- Shared server resources
  - SDK (JRE)
  - Liberty profile runtime
- Working server resources
  - Project
    - Liberty profile server 1
      - Application binary 1
    - Liberty profile server 2
      - Application binary 2

With this topology, each server host contains a shared SDK (JRE), a shared Liberty profile runtime, and two isolated (working) servers. Each isolated server must be configured to function properly outside of the runtime, and to use a specific SDK (as opposed the default or system SDK). In the future, additional isolated servers can use the same shared SDK and shared Liberty profile runtime.

Note: A variation of this topology places the SDK (JRE) and the Liberty profile runtime on a SAN (as opposed to each server host), further reducing maintenance overhead and disk space usage.

Deployment to server hosts

- You will deploy the SDK (JRE) and the Liberty profile runtime to the shared resources directory on each server host, for example,

  Windows: `C:\liberty\shared`

  UNIX/Linux: `/liberty/shared`

- You will deploy the servers and their embedded applications to project directory `isolated` in the working resources directory on each server host, for example,

  Windows: `C:\liberty\working\isolated`

  UNIX/Linux: `/liberty/working/isolated`

  Each server host will ultimately include the following directories and files.

```
[-] liberty
      [-] shared
            [-] jre-60
                  [+] bin
                  [+] lib
            [-] wlp-85
                  [+] bin
                  [ ] clients
                  [+] dev
                  [ ] lafiles
                  [+] lib
                  [+] templates
      [-] working
            [-] isolated
                  [-] servers
                        [-] SecuritySample-01.00-01
                              o bootstrap.properties
                              o server.env
                              o server.xml
                             [ ] apps
                                   o SecuritySample-01.00.war
                        [-] ServletSample-01.00-01
                              o bootstrap.properties
                              o server.env
                              o server.xml
                             [ ] apps
                                   o ServletSample-01.00.war
```

Part A – Initial setup and packaging

Tasks

1. Working on host-1, extract lab materials file `WASv85Labs_AdvLibJM.zip` into a suitable directory. You can extract this file and any other WebSphere Application Server V8.5 lab materials files into the root directory. For example, on Windows, extracting the file into the `C:\` directory will create lab materials directory `C:\WASv85Labs\AdvLibJM`, and so on. You can also use the same basic approach on UNIX/Linux.

2. Install or copy a completely clean instance of the Java 6 JRE into directory `WASv85Labs/AdvLibJM/jre-60`. The minimum supported level for the JRE from Oracle is Java 6 update 26. For the Java JRE from IBM, the minimum supported level is 6.0 (J9 2.6) SR 1. For more information, see the WebSphere Application Server V8.5 information center topic Liberty profile: Runtime environment known restrictions.

3. Install or copy a completely clean instance of the V8.5 Liberty profile into directory `WASv85Labs/AdvLibJM/wlp-85`. For more information, see the WebSphere Application Server V8.5 information center topic Installing the Liberty profile.

4. Create project directory `isolated` by renaming directory `WASv85Labs/AdvLibJM/InitialServers/usr` to `WASv85Labs/AdvLibJM/InitialServers/isolated`

5. Delete directory `WASv85Labs/AdvLibJM/wlp-85/usr` (since the server instances will be isolated from the Liberty profile runtime).

   The final directory structure is illustrated below.

```
[-] WASv85Labs
     [-] AdvLibJM
          [-] InitialServers
               [-] isolated
                    [-] servers
                         [-] SecuritySample-01.00-01
                              [ ] apps
                         [-] ServletSample-01.00-01
                              [ ] apps
          [-] jre-60
               [+] bin
               [+] lib
          [ ] SecuritySampleUpdate
          [-] wlp-85
               [+] bin
               [ ] clients
               [+] dev
               [ ] lafiles
               [+] lib
               [+] templates
```

6. Configure and package the Liberty profile resources for deployment to the server hosts.
    a. Within each of the server directories (`SecuritySample-01.00-01` and `ServletSample-01.00-01`), create a text file named `server.env` that contains the following lines, the first defining the location of the Liberty profile runtime, and the second defining the location of the JRE, for example,

       Windows

       ```
       WLP_RUNTIME_DIR=${WLP_SHARED_DIR}\wlp-85
       JAVA_HOME=${WLP_SHARED_DIR}\jre-60
       ```

       UNIX/Linux

       ```
       WLP_RUNTIME_DIR=${WLP_SHARED_DIR}/wlp-85
       JAVA_HOME=${WLP_SHARED_DIR}/jre-60
       ```

    b. Create a compressed (.zip) file that includes directory `isolated` (and its full contents). Then open the compressed file and verify that `isolated` is the top-level directory. (This structure will instruct the job manager to install the isolated servers to a project directory named `isolated`.)
    c. Create a second compressed (.zip) file that includes the directories `jre-60` and `wlp-85` (and their full contents). Then open the compressed file and verify that that `jre-60` and `wlp-85` are the top-level directories.

Part B – Deployment and basic use

You will use the job manager on host-1 to deploy the Liberty profile components to host-2 and host-3. You will then start, test, and stop the servers.

Tasks

1. On host-1, use the operating system shell to start the job manager server.

2. Use the operating system shell to launch the administrative console for the job manager. If administrative security is enabled, be sure to log in as a WebSphere user possessing the Administrator role.

3. Use the job manager administrative console to configure the job manager so that it is possible to deploy Liberty profile resources to the server hosts.
    a. Define WebSphere variables WLP_WORKING_DIR, the base directory for the isolated Liberty profile servers, and WLP_SHARED_DIR, the base directory for the shared JRE and shared Liberty profile runtime.
        i. Click **Environment > WebSphere variables**.
        ii. Set the scope to the level of the cell.
        iii. Define the variables, for example,

             Windows

             `WLP_WORKING_DIR` with value `C:\liberty\working`

             `WLP_SHARED_DIR` with value `C:\liberty\shared`

             UNIX/Linux

             `WLP_WORKING_DIR` with value `/liberty/working`

             `WLP_SHARED_DIR` with value `/liberty/shared`
        iv. Click **Save** to save the changes to the master configuration.

b. Add host-2 and host-3 to the list of job manager targets.
    i. Click **Jobs > Targets**.
    ii. Add host-2 to the list of targets.
        - Host name: host-2
        - Operating system: Operating system of target host
        - Administrative user with installation authority: Operating system user
        - Password authentication: Selected
        - Password: Password of operating system user
        - Confirm password: Password of operating system user
        - Save security information: Checked
    iii. Repeat step ii for host host-3.
c. Create a new target group containing host-2 and host-3.
    i. Click **Jobs > Target groups**.
    ii. Create a new target group with name Server Hosts and members host-2 and host-3.

4. Use the job manager to install the appropriate packages on each server host.
    a. Within the job manager console, click **Jobs > Submit** and do the following:
        i. Select the job type **Install Liberty profile resources** and click **Next**.
        ii. Select the target group **Server Hosts**. (Since you saved the authentication information for each host in the target group, you do not need to provide any in this step.) Then click **Next**.
        iii. Specify the job parameters.
            - Select or enter the path to the compressed (.zip) file containing the shared SDK (JRE) and Liberty profile runtime.
            - Do not specify any authentication information, as it is only required when specifying a URL path that is secured.
            - Select **Install to shared location**.

            Click **Next**.
        iv. Accept the default job scheduling settings and click **Next**.
        v. Click **Finish** to submit the job.
    b. In the Job Status window, click the install job to see the status of the job on each target host. Periodically click the refresh icon in the Status column header. The status should move through these stages over the course of several minutes: Not submitted, In progress, and Succeeded.
    c. Repeat steps a and b for the isolated (working) servers; however, when defining the job parameters, do not select **Install to shared location**, given that you need to install the servers into the working directory.

5. Use the job manager to verify that the required components are present on each server host.

   Within the job manager console, click **Jobs > Target resources**. You should see a project named *isolated*, an SDK named *jre-60*, a runtime named *wlp-85*, Liberty servers named *SecuritySample-01.00-01* and *ServletSample-01.00-01*, and application binaries named *SecuritySample-01.00.war* and *ServletSample-01.00.war*.

6. Use the job manager to start the servers on each server host.
    a. Within the job manager console, click **Jobs > Submit** and do the following:
        i. Select the job type **Start Liberty profile server** and click **Next**.
        ii. Select the target group **Server Hosts** and click **Next**.
        iii. Select the server to be started (on each target host).
        Click **Find**. In the Find Target Resources window, click **Find**. Then select server **SecuritySample-01.00-01** and click **OK**.
        Click **Next**.
        iv. Accept the default job scheduling settings and click **Next**.
        v. Click **Finish** to submit the job. Then monitor the job until it is complete.
    b. Repeat step a for server **ServletSample-01.00-01**.

7. Use the job manager to display the status of the servers on each server host.
    Within the job manager console, click **Jobs > Target resources**. Then click each server to view its status on each target host.

8. Working on host-1, use a web browser to verify that it is possible to access each application running on each server on host-2 and host-3, for example,
    `http://host-2:9080/ServletSample`
    `http://host-2:9081/SecuritySample` (Specify user name `gkelly` and password `gkelly1`)

Part C – Application and server configuration update

You will use the job manager to deploy, to each server host, a new instance of the SecuritySample server that includes a new version of the SecuritySample application and updated server configuration files.

Notes

- The updated application and server configuration files are located in the `SecuritySampleUpdate` directory of the lab materials.
- The updated server configuration file includes the following:
    - Two new users (lhess and bchi) in the basic user registry.
    - Unique HTTP and HTTPS ports to enable both versions of the SecuritySample application to be used at the same time.

Tasks

1. Working on host-1, package a new server for deployment.
   a. Extend the `SecuritySampleUpdate` directory of the lab materials to include the path `isolated/servers/SecuritySample-01.01-01/apps` as illustrated below.

```
[-] WASv85Labs
      [-] AdvLibJM
            [+] InitialServers
            [+] jre-60
            [-] SecuritySampleUpdate
                  [-] isolated
                        [-] servers
                              [-] SecuritySample-01.01-01
                                    [ ] apps
            [+] wlp-85
```

   b. Move the updated `bootstrap.properties` and `server.xml` files from lab materials directory `SecuritySampleUpdate` to lab materials directory `SecuritySampleUpdate/isolated/servers/SecuritySample-01.01-01`
   c. Move `SecuritySample-01.01.war` from lab materials directory `SecuritySampleUpdate` to lab materials directory `SecuritySampleUpdate/isolated/servers/SecuritySample-01.01-01/apps`
   d. Copy the `server.env` file from lab materials directory `InitialServers/isolated/servers/SecuritySample-01.00-01` to lab materials directory `SecuritySampleUpdate/isolated/servers/SecuritySample-01.01-01`

   The final directory structure is illustrated below.

```
[-] WASv85Labs
      [-] AdvLibJM
            [+] InitialServers
            [+] jre-60
            [-] SecuritySampleUpdate
                  [-] isolated
                        [-] servers
                              [-] SecuritySample-01.01-01
                                    o bootstrap.properties
                                    o server.env
                                    o server.xml
                                    [ ] apps
                                          o SecuritySample-01.01.war
            [+] wlp-85
```

2. Create a compressed (.zip) file that includes the `isolated` directory (and its full contents) for the update to the SecuritySample application. Then open the compressed file and verify that `isolated` is the top-level directory.

3. Use the job manager to install the update package on each server host.
   Within the job manager console, click **Jobs > Submit** and do the following:
   a. Select the job type **Install Liberty profile resources** and click **Next**.
   b. Select the target group **Server Hosts** and click **Next**.
   c. Specify the path to the Liberty profile resources compressed (.zip) file that you created previously. (Do not specify any authentication information, as it is only required when specifying a URL path that is secured.) Then click **Next**.
   d. Accept the default job scheduling settings and click **Next**.
   e. Click **Finish** to submit the job. Then monitor the job until it is complete.

4. Use the job manager to start the updated (new) server on each server host.
   Within the job manager console, click **Jobs > Submit** and do the following:
   a. Select the job type **Start Liberty profile server** and click **Next**.
   b. Select the target group Server Hosts and click **Next**.
   c. Select the server to be started (on each target host).
      Click **Find**. In the Find Target Resources window, click **Find**. Then select server **SecuritySample-01.01-01** and click **OK**.
      Click **Next**.
   d. Accept the default job scheduling settings and click **Next**.
   e. Click **Finish** to submit the job. Then monitor the job until it is complete.

5. Working on host-1, use a web browser to verify that it is possible to access each instance of the SecuritySample application running on each server on host-2 and host-3, for example,
   `http://host-2:9081/SecuritySample` (Specify user name `gkelly` and password `gkelly1`)
   `http://host-2:9082/SecuritySample` (Specify user name `lhess` and password `lhess1`)

6. Use the job manager to stop all servers running on each server host.
   a. Within the job manager console, click **Jobs > Submit** and do the following:
      i. Select the job type **Stop Liberty profile server** and click **Next**.
      ii. Select the target group **Server Hosts** and click **Next**.
      iii. Select the server to be stopped (on each target host).
         Click **Find**. In the Find Target Resources window, click **Find**. Then select server **SecuritySample-01.00-01** and click **OK**.
         Click **Next**.
      iv. Accept the default job scheduling settings and click **Next**.
      v. Click **Finish** to submit the job. Then monitor the job until it is complete.
   b. Repeat step a for server SecuritySample-01.01-01.
   c. Repeat step a for server ServletSample-01.00-01.

7. Log out of the job manager console.

8. Use the operating system shell to stop the job manager server. If you are prompted to authenticate, specify the user name and password of a WebSphere user possessing the Administrator role and click **OK**.