ORACLE

FUSION MIDDLEWARE

WEBLOGIC SERVER

An Oracle White Paper
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Oracle WebLogic Server 12c on Microsoft Windows Azure

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Introduction

Oracle is committed to enabling you to embrace cloud computing by providing greater choice and flexibility in how you deploy Oracle software. In support of that commitment, Oracle has created virtual machine images hosted in the Windows Azure Virtual Machine Gallery that include pre-installed Oracle software. You can use these images to easily create virtual machines in your Azure environment and run your applications on Oracle software.

This document describes how to use the Oracle WebLogic Server 12c image hosted on Windows Azure. You can find the image in the Gallery of virtual machine images with the following title: *Oracle WebLogic Server 12.1.2 on Oracle Linux 6.4.0.0.0*.

This image includes the following Oracle products pre-installed:

- Oracle WebLogic Server 12.1.2.0.0
- Oracle JDK 1.7.0u25
- Oracle Linux 6.4.0.0.0

When you create a virtual machine based on the WebLogic Server 12c image, you use it as you would use it on an on-premise virtual or physical machine: all of the configuration and management tooling is available; you must configure a WebLogic domain and then configure servers within that domain to run your applications.

Note that you must have an appropriate license to run Oracle software. See the following links for more information:

- Oracle Fusion Middleware Licensing:
  http://docs.oracle.com/middleware/1212/core/FMWLC/index.html

- End User License Agreement for Oracle Products on Azure:
  http://www.oracle.com/technetwork/licenses/oracle-license-2016066.html

Also, refer to any agreement that you may have with Oracle for details on software that you are licensed to use.

Getting Started: Creating a Single Virtual Machine

For testing and development purposes, you may want to create a stand-alone virtual machine that is not part of a virtual network.

To create a WebLogic Server domain that contains only a single virtual machine that is not part of a virtual network, you must complete the following tasks:

- Create a virtual machine on Windows Azure using the *Oracle WebLogic Server 12.1.2 on Oracle Linux 6.4.0.0.0* virtual machine image.

- Create a WebLogic Domain. The domain can contain an Administration Server and, if needed, Managed Servers, all of which will reside on the single virtual machine.

Before You Begin

Prior to creating the virtual machine, collect the following information:

- Name to use for the virtual machine. The URL for accessing the virtual machine via a web browser will be virtual_machine_name.cloudapp.net.

- Listen port numbers to use for the WebLogic Server Administration Server. If you enable SSL, you will need two port numbers (typically 7001 and 7002). You must configure these ports as endpoints on the virtual machine.

- If you plan to create Managed Servers on this virtual machine, you also need listen port numbers for each Managed Server. If you enable SSL, you will need two port numbers for each Managed Server. You must configure these ports as endpoints on the virtual machine.

- The user name and password that you want to use to log in to the virtual machine via an SSH connection.

- If applicable, the SSH key certificate file, available on your local client or network, to upload for SSH authentication.

Creating a Virtual Machine on Windows Azure

This section describes how to create a standalone virtual machine for running WebLogic Server.

To create a single virtual machine that is not part of a virtual network:

1. Log into the Windows Azure Management Portal at https://manage.windowsazure.com/.

2. From the Windows Azure Management Portal, click **New** on the lower left. The **New** configuration menu is displayed.

3. Select **Compute > Virtual Machine > From Gallery**. The Virtual Machine Image Selection screen is displayed.
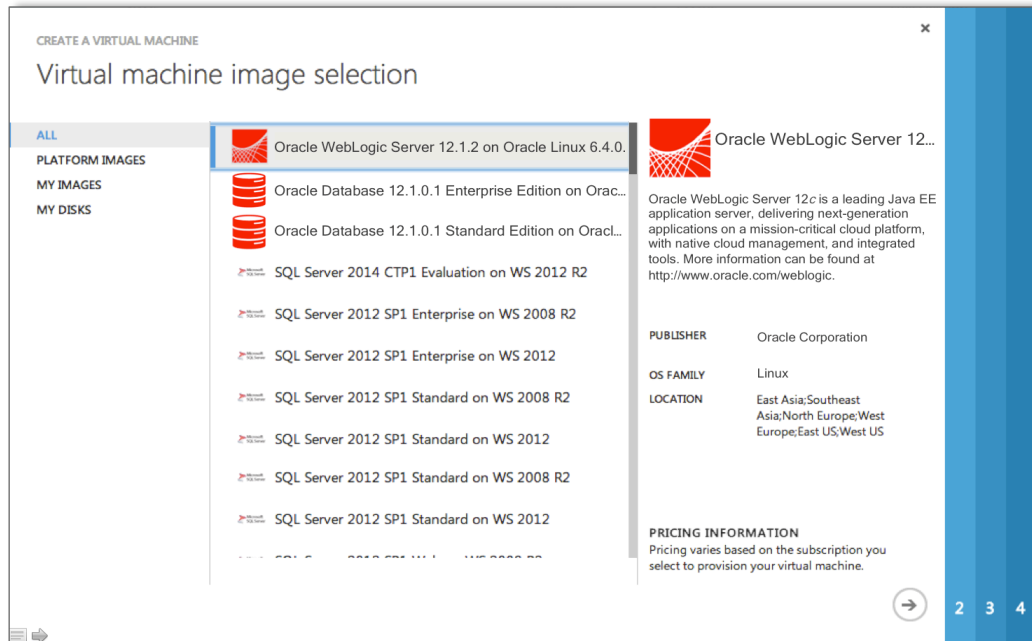
Sample Windows Azure Virtual Machine Image Gallery

4. Select the **Oracle WebLogic Server 12.1.2 on Oracle Linux 6.4.0.0.0** image, and then click the arrow on the lower right to display the Virtual Machine Configuration screen.

5. Enter the following information:

    ◦ For **VIRTUAL MACHINE NAME**, enter a unique name for the virtual machine, such as **myvm01**.

    ◦ For **SIZE**, select the number of cores needed for the virtual machine. For production, Oracle recommends selecting a minimum of 2 cores.

    ◦ For **NEW USER NAME**, enter the user name that you want to use to log into and manage the virtual machine.

Note: After creating the VM, you must change ownership of the files and directories under the Oracle home directory to the user you specify here.

    ◦ To upload an SSH key to use for authentication when logging in to the virtual machine via SSH, select the **AUTHENTICATION** check box, and then use the **CERTIFICATE** field to locate the key file on your local client or network. For more information about user names and authentication, see "Authentication: User Names, Passwords, and SSH Keys" in the Windows Azure online documentation at: https://www.windowsazure.com/en-us/manage/linux/tutorials/intro-to-linux/#authentication

    ◦ Select the **PROVIDE A PASSWORD** check box, enter a strong password, and then confirm the password.

6. Click the arrow on the lower right to access the next Virtual Machine Configuration screen.

7. Enter or select the following information on this screen:

    ◦ For **CLOUD SERVICE**, select **Create a new cloud service**.

    ◦ For **CLOUD SERVICE DNS NAME**, enter a unique name for the cloud service for this virtual machine. Typically, you should accept the default, which is the same name that you used for the virtual machine.

    ◦ For **REGION/AFFINITY GROUP/VIRTUAL NETWORK**, select the region in which you want the virtual machine to be located. Note that for standalone VMs, there is no associated Affinity Group or Virtual Network. Therefore, if any Affinity Groups or Virtual Networks that are associated with your Azure account are listed here, do not select one for this virtual machine.

    ◦ Leave **AVAILABILITY SETS** set to None.

8. Click the arrow on the lower right to continue to the next Virtual Machine Configuration screen.

9. Use the Virtual Machine Configuration screen to create the virtual private network endpoints (listen address ports and other ports) for the virtual machine. In addition to the default SSH port 22, you can also create the following endpoints for the virtual machine at this time, or you can create these endpoints later after the virtual machine is in a **Running** state.

   For each endpoint, use the same value for both the public and private ports. The following table shows recommended port values.

   Note: You must create all endpoints that you will need for the domain prior to starting the domain's Administration Server.

TABLE 2 ENDPOINTS TO CREATE ON THE VIRTUAL MACHINE

RECOMMENDED NAME	PROTOCOL	PUBLIC PORT/PRIVATE PORT
Admin	TCP	7001 This is the default Administration Server listen port. After creating and starting the domain, this is the listen port you will use to access the Administration Console from a Web browser.
AdminSSL	TCP	7002 Required if SSL is enabled on the Administration Server.
Managed	TCP	Start with 7003 for the first Managed Server, increment by 2 for each additional Managed Server in the domain.
ManagedSSL	TCP	Required if SSL is enabled on the Managed Servers. Start with 7004 for the first Managed Server, increment by 2 for each additional Managed Server in the domain.
NodeManager	TCP	5556 This is the default Node Manager listen port.

10. After specifying the endpoints, click the check mark on the lower right to start the virtual machine creation process. Once the process completes, the virtual machine will be in a **Running** state.

11. To set file ownership and allow file access to the user you specified when creating the virtual machine, perform the following steps:

  ◦ Open a terminal window and use SSH to log in to the virtual machine as the VM user.

  ◦ Enter `sudo su` and enter the VM user password.

  ◦ Enter the following command to change ownership of the installed WebLogic Server directories to the VM user:
  ```
  chown -R vm_username /opt/oracle
  ```

To continue, see "Creating and Configuring a WebLogic Domain" later in this document.

Creating a Multi-Machine Virtual Network for WebLogic Server

If you want to take advantage of the scalability, elasticity, and availability of WebLogic Server Enterprise Edition, you need to create a virtual network in Windows Azure to host clustered WebLogic Server Managed Servers. In general, the instructions below expect you to configure one WebLogic Managed Server or Administration Server per virtual machine.

To create a virtual network that contains multiple virtual machines, you must complete the following tasks:

• Create a virtual network on Windows Azure

• Optionally create a storage account

• Create one virtual machine for each WebLogic Server node in the configuration

• Create a WebLogic domain on the Administration Server node

• Copy the WebLogic domain to the Managed Servers on remote nodes

Before You Begin

Prior to creating the virtual network and virtual machines, collect the following information:

• Name to use for the virtual network.

• Name to use for each virtual machine you plan to create. The URL for accessing each virtual machine via a web browser will be virtual_machine_name.cloudapp.net.

- Listen port numbers to use for the WebLogic Server Administration Server. If you enable SSL, you will need two port numbers (typically 7001 and 7002).

- Listen port numbers for each Managed Server that will be added to each virtual machine. If you enable SSL, you will need two port numbers for each Managed Server. The listen ports must be unique for each Managed Server on a given virtual machine.

- The user name and password that you want to use to log in to each virtual machine via an SSH connection. You can use the same user name and password for each VM.

- If applicable, the SSH key certificate file, available on your local client or network, to upload for SSH authentication.

Creating a Virtual Network for WebLogic Server

To create a production, development, or testing domain that contains multiple virtual machines, you must first create a virtual network for the virtual machines in your Windows Azure environment.

To create your virtual network for WebLogic Server on Microsoft Azure, refer to the following topics in the Microsoft Azure online documentation:

- "Windows Azure Virtual Network Overview"
  http://msdn.microsoft.com/en-us/library/windowsazure/jj156007.aspx

- "About Configuring a Virtual Network in the Management Portal"
  http://msdn.microsoft.com/en-us/library/windowsazure/jj156074.aspx

- "Create a Virtual Network in Windows Azure" (tutorial)
  http://www.windowsazure.com/en-us/manage/services/networking/create-a-virtual-network/

Note: When creating the virtual network, **do not** define a DNS server. Leave the DNS Server fields blank. This will create a default DNS server for you in Microsoft Azure.

After creating the virtual network, you can create the storage account for the network and create the virtual machines for each node in the configuration.

Optional: Creating a Storage Account

Prior to creating the first virtual machine, you may want to create a storage account. For information on storage accounts and how to create one, refer to "How to Create a Storage Account" in the Microsoft Azure online documentation at http://www.windowsazure.com/en-us/manage/services/storage/how-to-create-a-storage-account/.

When creating the storage account, select the **Affinity Group** that you created for your virtual network.

Creating a WebLogic Server Virtual Machine on a Virtual Network

This section describes how to create a virtual machine for each WebLogic Server node in your virtual network. These steps are specific to a virtual machine that was created using the available *Oracle WebLogic Server 12.1.2 on Oracle Linux 6.4.0.0.0* disk image.

Once you have created a storage account, you can create the virtual machines. For more details on creating virtual machines, refer to the following topics in the Microsoft Azure online documentation:

- "How to Create a Custom Virtual Machine" http://www.windowsazure.com/en-us/manage/windows/how-to-guides/custom-create-a-vm/

- "Add a Virtual Machine to a Virtual Network" (tutorial) http://www.windowsazure.com/en-us/manage/services/networking/add-a-vm-to-a-virtual-network/

To create a WebLogic Server virtual machine:

1. Log into the Windows Azure Management Portal at https://manage.windowsazure.com/.

2. From the Windows Azure Management Portal, click **New** on the lower left. The **New** configuration menu is displayed.

3. Select **Compute > Virtual Machine > From Gallery**. The Virtual Machine Image Selection screen is displayed.

4. Select the **Oracle WebLogic Server 12.1.2** image, and then click the arrow on the lower right to display the Virtual Machine Configuration screen.

5. Enter the following information:

   ◦ For **VIRTUAL MACHINE NAME**, enter a unique name for the virtual machine, such as **MyVM-1**.

   ◦ For **SIZE**, select the number of cores needed for the virtual machine. For production, Oracle recommends selecting a minimum of 2 cores.

   ◦ For **NEW USER NAME**, enter the user name that you want to use to log into and manage the virtual machine.

   Note: Pre-installed Oracle software was installed using the `oracle` username, and appropriate file permissions were applied. After creating the VM, you must change ownership of the files and directories under the Oracle home directory to the user you specify here.

   ◦ To upload an SSH key to use for authentication when logging in to the virtual machine via SSH, select the **AUTHENTICATION** check box, and then use the **CERTIFICATE** field to locate the key file on your local client or network. For more information about user names and authentication, see "Authentication: User Names, Passwords, and SSH Keys" in the Microsoft Azure online documentation at https://www.windowsazure.com/en-us/manage/linux/tutorials/intro-to-linux/#authentication.

- ◦ Select the **PROVIDE A PASSWORD** check box and then enter and confirm the password.

6. Click the arrow on the lower right to access the next Virtual Machine Configuration screen.

7. Enter or select the following information on this screen:

   - ◦ For **CLOUD SERVICE**, select **Create a new cloud service**.

   - ◦ For **CLOUD SERVICE DNS NAME**, enter a unique name for this virtual machine. Each virtual machine in the virtual network must have a unique cloud service DNS name. The default is vm_name.cloudapp.net.

   - ◦ For **REGION/AFFINITY GROUP/VIRTUAL NETWORK**, select the virtual network to which you want to assign the virtual machine .

   - ◦ For **VIRTUAL NETWORK SUBNETS**, select one of the subnets that you created for this virtual network. The specified subnet will be used as the front-end subnet.

   - ◦ Leave **AVAILABILITY SETS** set to (None).

8. Click the arrow on the lower right to continue to the next Virtual Machine Configuration screen.

9. In addition to the default SSH port 22, you can also create the following endpoints for the virtual machine at this time, or you can create these endpoints later after the virtual machine is in a **Running** state. The assigned ports are used as the WebLogic Server listen ports on each machine in the network. Assign the same port names and values to the endpoints on each virtual machine in the network. For each endpoint, use the same value for both the public and private ports. The following table shows recommended port values.

Note: You must create all endpoints that you will need for the domain prior to starting the domain's Administration Server.

TABLE 3 ENDPOINTS TO CREATE ON EACH VIRTUAL MACHINE

RECOMMENDED NAME	PROTOCOL	PUBLIC PORT/PRIVATE PORT
Admin	TCP	7001 This is the default Administration Server listen port. After creating and starting the domain, this is the listen port you will use to access the Administration Console from a Web browser. You need to configure this port only on the virtual machine on which the Administration Server will run.
AdminSSL	TCP	7002 Required if SSL is enabled on the Administration Server. You need to configure this port only on the virtual machine on which the Administration Server will run.
Managed	TCP	These are the listen ports for each Managed Server, which must be unique for each Managed Server on a given virtual machine. Start with 7003 for the first Managed Server on a given virtual machine, increment by 2 for each additional Managed Server in the domain.

ManagedSSL		Required if SSL is enabled on each Managed Server. These must be unique for each Managed Server on a given virtual machine. Start with 7004 for the first Managed Server on a given virtual machine, increment by 2 for each additional Managed Server in the domain.
NodeManager	TCP	5556 This is the default Node Manager listen port on all VMs in the network. You must configure this port on all virtual machines in the network.
	TCP	7999

10. After specifying the endpoints, click the check mark on the lower right to start the virtual machine creation process. Once the process completes, the virtual machine will be in a **Running** state.

11. To set file ownership and allow file access to the user you specified when creating the virtual machines, perform the following steps on each VM:

    ◦ Open a terminal window and use SSH to log in to the virtual machine as the VM user.

    ◦ Enter `sudo su` and enter the VM user password.

    ◦ Enter the following command to change ownership of the installed WebLogic Server directories to the VM user:

    ```
    chown -R vm_username /opt/oracle
    ```

12. Repeat Steps 2 through 10 to configure additional virtual machines. Keep the following points in mind:

    ◦ You must select the same platform image for each virtual machine.

    ◦ Enter the same user name for each virtual machine.

    ◦ Create a new cloud service for each machine. Oracle recommends that you accept the default, which is based on the virtual machine name.

Creating and Configuring a WebLogic Domain

This section describes how to create a domain on the Administration Server VM, deploy your applications, and (if you created a virtual network with multiple VMs) move the domain to each of your Managed Server VMs.

Creating the Domain on the Administration Server VM

Prior to creating your domain on the Administration Server VM, Oracle recommends that you configure all of the listen port endpoints on each VM, as shown in Table 3.

To create the domain on the Administration Server VM, you can use a WLST script or you can use the Configuration Wizard.

Note: When specifying the **ListenAddress** for servers and machines in a WLST script, the Configuration Wizard, or the Administration Console, you must use the **internal** IP address for the node instead of the public IP address.

Creating a Domain with a WLST Script

To use a WLST script to create and configure a domain, you can use a detailed script to completely configure the domain, Managed Servers, and other resources in the domain, or you can create a simple domain and configure the Managed Servers and other resources later via the WebLogic Server Administration Console. If using a script:

1. Use a secure copy client or scp command to copy the script from your local client to an appropriate location on the Administration Server VM, such as /tmp.

2. Use SSH to log in to the virtual machine on which the Administration Server will reside: ssh *vm_username@vmname*.cloudapp.net

3. Change to the /opt/oracle/products/Middleware/oracle_common/common/bin directory.

4. Enter the following command to run WLST: ./wlst.sh

5. Enter the following WLST command to run the script, where script_path is the full path and filename for the WLST script: execfile('*script_path*')

For more information on using WLST to create a domain, see "Creating WebLogic Domains Using WLST Offline" in *Understanding the WebLogic Scripting Tool*. For a list of available sample WLST scripts, see "WLST Sample Scripts" in Understanding the WebLogic Scripting Tool.

Creating a Domain with the Configuration Wizard

To use the Configuration Wizard to create the domain, use the following steps:

1. Use SSH to log in to the virtual machine on which the Administration Server will reside. You must include the -X parameter to enable graphical mode on the virtual machine. ssh - X *vm_username@vmname*.cloudapp.net

2. Change to the /opt/oracle/products/Middleware/oracle_common/common/bin directory.

3. Enter the following command to run the Configuration Wizard: ./config.sh

For information on using the Configuration Wizard to create a domain, see "Creating a WebLogic Domain" in *Creating WebLogic Domains Using the Configuration Wizard*. You can create the Managed

Servers, clusters, and machines for the domain during the wizard session, or you can create them later via the Administration Console.

Moving the Domain to Managed Server VMs

If your domain contains multiple VMs, after completing the domain configuration, use the pack and unpack commands to move the domain to each VM that is hosting Managed Servers. Prior to moving the domain to the Managed Server VMs, you should have already created the Managed Servers, clusters, and machines for the domain.

1. On the Administration Server VM, change to the
   `/opt/oracle/products/Middleware/oracle_common/common/bin` directory.

2. Enter the following command to pack the domain, where domain_path is the full path to the domain directory, template_file is the path and file name for the template file you are creating, and name is any name you want to give to the template:
   ```
   ./pack.sh -domain=domain_path -template=template_file -
   managed=true -template_name="name"
   ```

    For example:
   ```
   ./pack.sh -domain=/opt/oracle/products/domains/mydomain -
   template=/opt/oracle/products/Middleware/domains/mydomain.jar -
   managed=true -templateName="mydomain"
   ```


3. Move the template JAR to a preferred location on each Managed Server VM.

4. On the Managed Server VM, change to the
   `/opt/oracle/products/Middleware/oracle_common/common/bin` directory.

5. Enter the following command to unpack the domain, where template_file is the path and file name for the template JAR you are using to create the domain, domain_path is the full path to the directory in which you want to create the domain, and application_path is the full path to the applications directory for the domain. Note that appdir applies only if the domain JAR defines applications for the domain.
   ```
   ./unpack.sh -template=template_file -domain=domain_path -
   appdir=application_path
   ```

   For example:
   ```
   ./unpack.sh -template=/opt/oracle/products/domains/mydomain.jar
   -domain=/opt/oracle/products/Middleware/domains/mydomain -
   appdir=/opt/oracle/products/Middleware/applications/mydomain
   ```

 For more information on the pack and unpack commands, see [Creating Domains Using the pack and unpack Commands.](#)

Deploying Applications in the Domain

To deploy applications in the domain, use scp or a secure copy client to copy the application EAR or WAR files to the appropriate directory on the Administration Server and optionally to each Managed Server. After doing so, deploy the applications as you normally would in WebLogic Server. For more information, see [Deploying Applications to Oracle WebLogic Server](#).

Adding an Oracle Database to Your Virtual Network

If you want to use an Oracle Database with your WebLogic Server domain, create the virtual machine for the database in the same Virtual Network to make it easy to connect to the database. There are several virtual machine images available with the Oracle Database software pre-installed. Make sure that you create an endpoint for port 1521 on the database virtual machine.

Integrating the Oracle Database With WebLogic Server

Integrating your WebLogic Server domain on Azure with an Oracle database is the same as it is when running WebLogic Server on premise: use a datasource configured to connect to the database and pool those database connections. See "WebLogic Server Data Sources" at http://docs.oracle.com/middleware/1212/wls/INTRO/jdbc.htm.

Conclusion

You have the choice of where you want to run Oracle software products and your applications. By providing virtual machine images with Oracle WebLogic Server pre-installed, Oracle is making it easier for you to choose public cloud platforms, including Microsoft Windows Azure, as the environment on which you can run WebLogic Server and your applications.

Reference

WebLogic Server Virtual Machine Directory Structure

The following table shows the Oracle-specific directory structure for each virtual machine that is created using the Oracle WebLogic Server 12.1.2 image. When referring to Oracle WebLogic Server documentation, substitute these paths for the directory variables in the documentation.

TABLE 1 WEBLOGIC SERVER VIRTUAL MACHINE DIRECTORIES

DIRECTORY VARIABLE	PURPOSE	DIRECTORY PATH
ORACLE_HOME	Oracle home directory	/opt/oracle/products/Middleware
WL_HOME	WebLogic Server home directory	/opt/oracle/products/Middleware/wlserver
JAVA_HOME	Java home directory	/opt/oracle/products/jdk1.7.0_25

Related Documentation

For related documentation, access the following URLs:

- Windows Azure online documentation:
  http://msdn.microsoft.com/en-us/library/windowsazure

- WebLogic Server 12.1.2 online documentation library:
  http://docs.oracle.com/middleware/1212/wls/index.html

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