Migrate a WebLogic Server cluster to Azure with Azure Application Gateway as a load balancer

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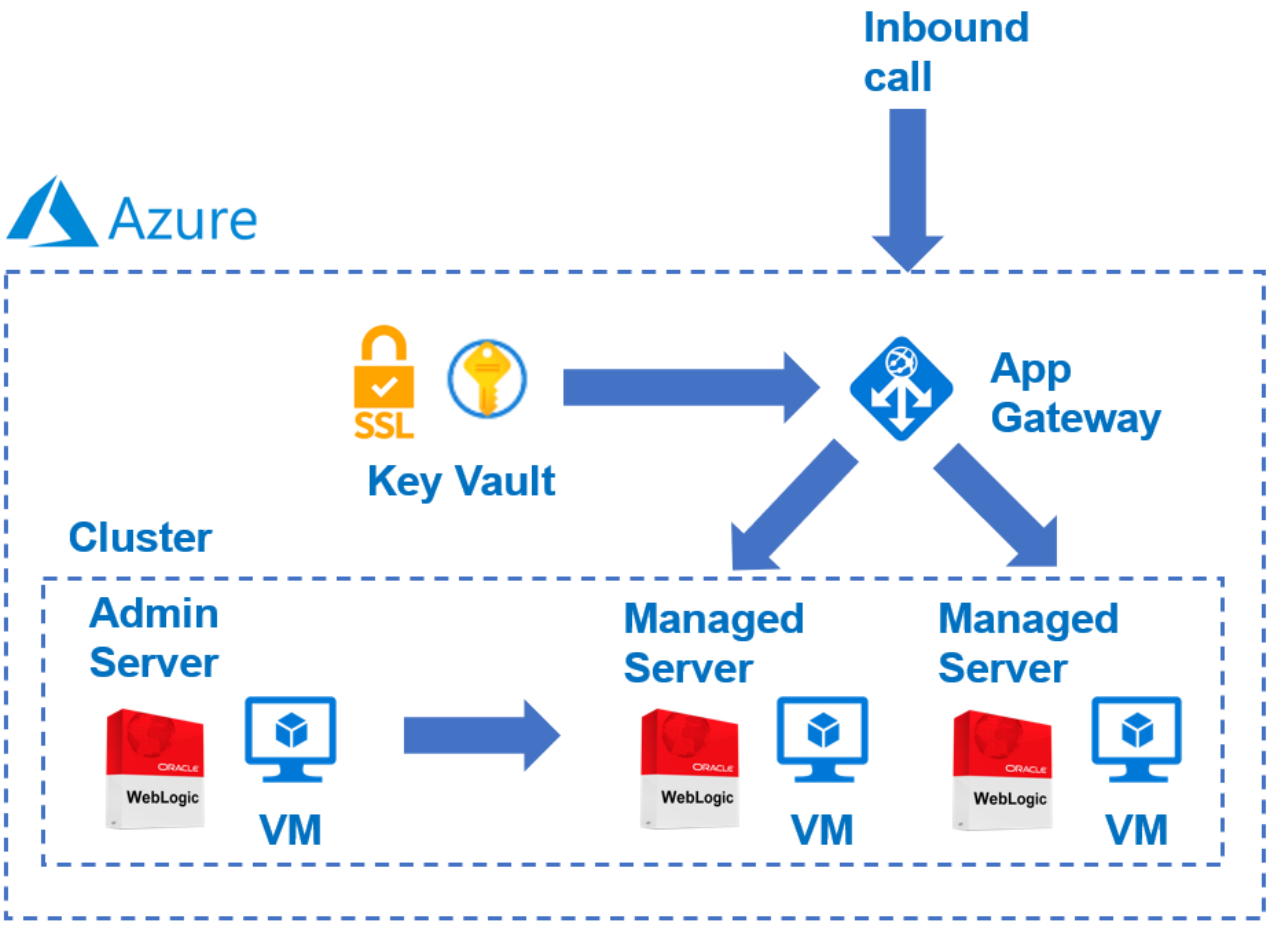
In this article

This tutorial walks you through the process of deploying WebLogic Server (WLS) with Azure Application Gateway. It covers the specific steps for creating a Key Vault, storing an SSL certificate in the Key Vault, and using that certificate for SSL termination. While all of these elements are well documented in their own right, this tutorial shows the specific way all of these elements come together to create a simple, yet powerful load-balancing solution for WLS on Azure.



Load balancing is an essential part of migrating your Oracle WebLogic Server cluster to Azure. The easiest solution is to use the built-in support for Azure Application Gateway. App Gateway is included as part of the WebLogic Cluster support on Azure. For an overview of WebLogic Cluster support on Azure, see What is Oracle WebLogic Server on Azure?.

In this tutorial, you learn how to:

- ✓ Choose how to provide the SSL certificate to the App Gateway
- ✓ Deploy WebLogic Server with Azure Application Gateway to Azure
- ✓ Validate successful deployment of WLS and App Gateway

Prerequisites

- OpenSSL on a computer running a UNIX-like command-line environment.

  While there could be other tools available for certificate management, this tutorial uses OpenSSL. You can find OpenSSL bundled with many GNU/Linux distributions, such as Ubuntu.

- An active Azure subscription.

- If you don't have an Azure subscription, create a free account .

- The ability to deploy one of the WLS Azure Applications listed at Oracle WebLogic Server Azure Applications.

Migration context

Here are some things to consider about migrating on-premise WLS installations and Azure Application Gateway. While the steps of this tutorial are the easiest way to stand up a load-balancer in front of your WebLogic Server Cluster on Azure, there are many other ways to do it. This list shows some other things to consider.

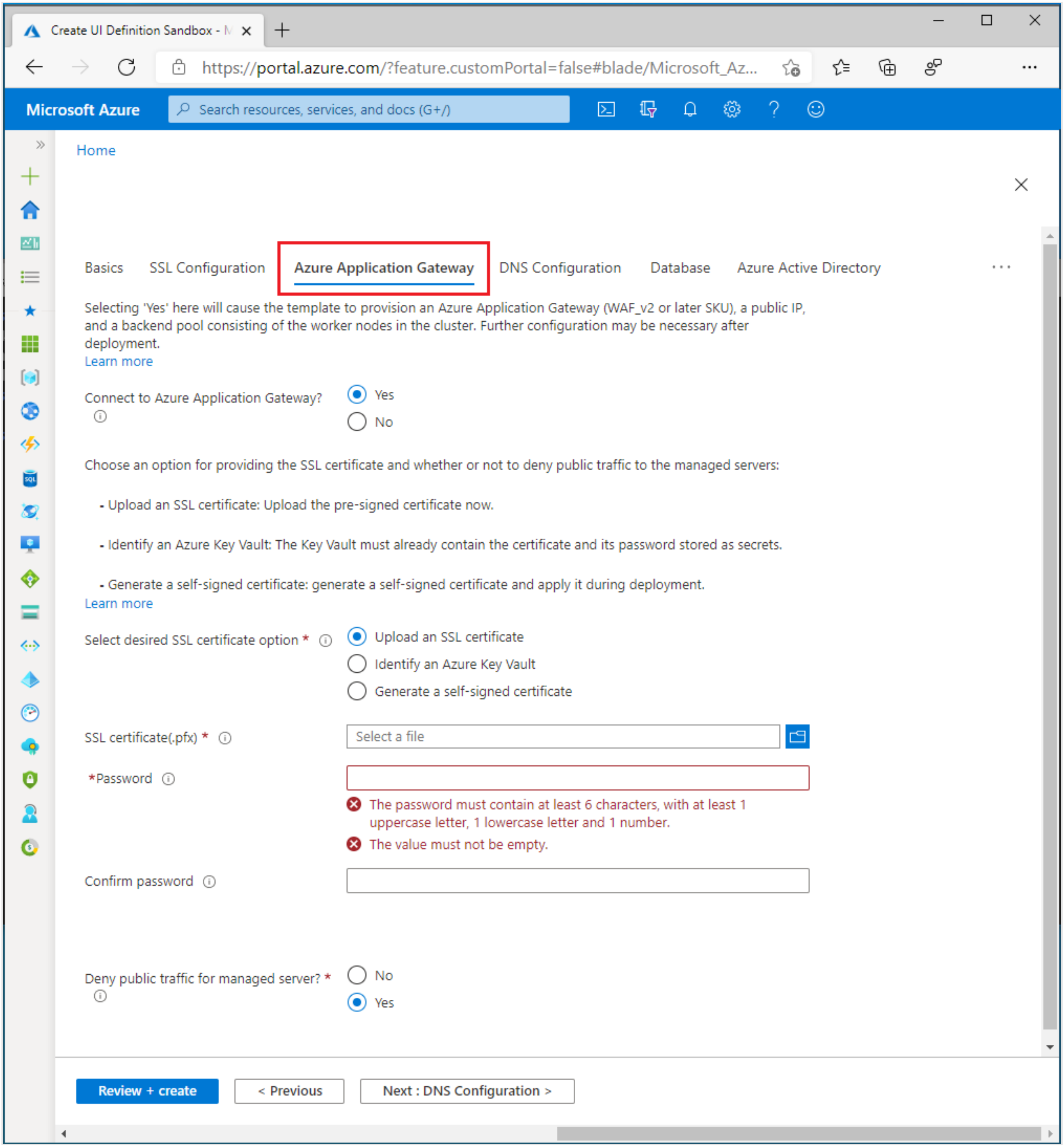
- If you have an existing load-balancing solution, ensure that its capabilities are met or exceeded by Azure Application Gateway. For a summary of the capabilities of Azure Application Gateway compared to other Azure load-balancing solutions, see Overview of load-balancing options in Azure.
- If your existing load-balancing solution provides security protection from common exploits and vulnerabilities, the Application Gateway has you covered. Application Gateway's built-in Web Application Firewall (WAF) implements the OWASP (Open Web Application Security Project) core rule sets . For more information on WAF support in Application Gateway, see Application Gateway Features.
- If your existing load-balancing solution requires end-to-end SSL encryption, you'll need to do additional configuration after following the steps in this guide. See Overview of TLS termination and end to end TLS with Application Gateway and the Oracle documentation on Configuring SSL in Oracle Fusion Middleware .
- If you're optimizing for the cloud, this guide shows you how to start from scratch with Azure App Gateway and WLS.
- For a comprehensive survey of migrating WebLogic Server to Azure Virtual Machines, see Migrate WebLogic Server applications to Azure Virtual Machines.

Deploy WebLogic Server with Application Gateway to Azure

This section will show you how to provision a WLS cluster with Azure Application Gateway automatically created as the load balancer for the cluster nodes. The Application Gateway will use the provided SSL certificate for SSL termination. For advanced details on SSL termination with Application Gateway, see Overview of TLS termination and end to end TLS with Application Gateway.

To create the WLS cluster and Application Gateway, use the following steps.

First, begin the process of deploying a WebLogic Server configured or dynamic cluster as described in the Oracle documentation , but come back to this page when you reach **Azure Application Gateway**, as shown here.


Create UI Definition Sandbox - M
https://portal.azure.com/?feature.customPortal=false#blade/Microsoft_Az...
Microsoft Azure
Search resources, services, and docs (G+/)
Home
Basics
SSL Configuration
Azure Application Gateway
DNS Configuration
Database
Azure Active Directory

Selecting 'Yes' here will cause the template to provision an Azure Application Gateway (WAF_v2 or later SKU), a public IP, and a backend pool consisting of the worker nodes in the cluster. Further configuration may be necessary after deployment.
Learn more

Connect to Azure Application Gateway? ● Yes ○ No

Choose an option for providing the SSL certificate and whether or not to deny public traffic to the managed servers:

- Upload an SSL certificate: Upload the pre-signed certificate now.
- Identify an Azure Key Vault: The Key Vault must already contain the certificate and its password stored as secrets.
- Generate a self-signed certificate: generate a self-signed certificate and apply it during deployment.

Learn more

Select desired SSL certificate option * ● Upload an SSL certificate ○ Identify an Azure Key Vault ○ Generate a self-signed certificate

SSL certificate(.pfx) * Select a file

*Password

The password must contain at least 6 characters, with at least 1 uppercase letter, 1 lowercase letter and 1 number.

The value must not be empty.

Confirm password

Deny public traffic for managed server? * ○ No ● Yes

Choose how to provide the SSL certificate to the App Gateway

You have several options to provide the SSL certificate to the application gateway, but can only choose one. This section explains each option so you can choose the best one for your deployment.

Option one: Upload an SSL certificate

This option is suitable for production workloads where the App Gateway faces the public Internet, or for intranet workloads that require SSL. By choosing this option, an Azure Key Vault is automatically provisioned to contain the SSL certificate used by the App Gateway.

To upload an existing, signed, SSL certificate, use the following steps:

1. Follow the steps from your certificate issuer to create a password protected SSL certificate and specify the DNS name for the certificate. How to choose wildcard vs. single-name certificate is beyond the scope of this document. Either one will work here.
2. Export the certificate from your issuer using the PFX file format and download it to your local machine. If your issuer doesn't support exporting as PFX, tools exist to convert many certificate formats to PFX format.
3. Select the **Azure Application Gateway** section.
4. Next to **Connect to Azure Application Gateway**, select **Yes**.
5. Select **Upload an SSL certificate**.
6. Select the file browser icon for the field **SSL certificate**. Navigate to the downloaded PFX format certificate and select **Open**.
7. Enter the password for the certificate in the **Password** and **Confirm password** boxes.
8. Choose whether or not to deny public traffic directly to the nodes of the managed servers. Selecting **Yes** will make it so the managed servers are only accessible through the App Gateway.

Select DNS Configuration

SSL certificates are associated with a DNS domain name at the time they're issued by the certificate issuer. Follow the steps in this section to configure the deployment with the DNS name for the certificate. You can use a DNS Zone you already have created or allow the deployment to create one for you. Select the **DNS Configuration** section to continue.

Use an existing Azure DNS Zone

To use an existing Azure DNS Zone with the App Gateway, use the following steps:

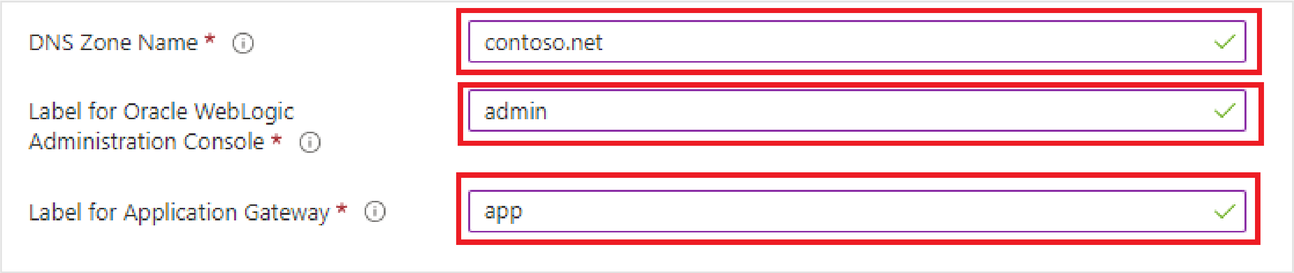
1. Next to **Configure Custom DNS Alias**, select **Yes**.
2. Next to **Use an existing Azure DNS Zone** select **Yes**.
3. Enter the name of the Azure DNS Zone next to **DNS Zone Name**.
4. Enter the resource group that contains the Azure DNS Zone from the preceding step.

Allow the deployment to create a new Azure DNS Zone

To create an Azure DNS Zone to use with the App Gateway, use the following steps:

1. Next to **Configure Custom DNS Alias**, select **Yes**.
2. Next to **Use an existing Azure DNS Zone** select **No**.
3. Enter the name of the Azure DNS Zone next to **DNS Zone Name**. A new DNS Zone will be created in the same resource group as WLS.

Finally, specify the names for the child DNS zones. The deployment will create two child DNS zones for use with WLS: one for the admin console, and one for the App Gateway. For example, if your DNS Zone Name was 'contoso.net', you could enter *admin* and *app* as the values. The admin console would be available at 'admin.contoso.net' and the app gateway would be available at 'app.contoso.net'. Don't forget set up DNS delegation as described in Delegation of DNS zones with Azure DNS.



DNS Zone Name * ⓘ contoso.net ✓

Label for Oracle WebLogic Administration Console * ⓘ admin ✓

Label for Application Gateway * ⓘ app ✓

The other options for providing an SSL certificate to the App Gateway are detailed in the following sections. If you're satisfied with your chosen option, you can skip to the section Continue with deployment.

Option two: Identify an Azure Key Vault

This option is suitable for production or non-production workloads, depending on the SSL certificate provided. If you don't want the deployment to create an Azure Key Vault, you can identify an existing one or create one yourself. This option requires you to store the certificate and its password in the Azure Key Vault before continuing. If you have an existing Key Vault you want to use, skip to the section Create an SSL certificate. Otherwise, continue to the next section.

Create an Azure Key Vault

This section shows how to use the Azure portal to create an Azure Key Vault.

1. From the Azure portal menu, or from the **Home** page, select **Create a resource**.
2. In the Search box, enter **Key Vault**.
3. From the results list, choose **Key Vault**.
4. On the Key Vault section, choose **Create**.
5. On the **Create key vault** section provide the following information:

   - **Subscription**: Choose a subscription.
   - Under **Resource group**, choose **Create new** and enter a resource group name. Take note of the key vault name. *You'll need it later when deploying WLS.*
   - **Key Vault Name**: A unique name is required. Take note of the key vault name. *You'll need it later when deploying WLS.*

   > ⓘ Note
   >
   > You may use the same name for both **Resource group** and **Key vault name**.

   - In the **Location** pull-down menu, choose a location.
   - Leave the other options to their defaults.

6. Select **Next: Access Policy**.
7. Under **Enable Access to**, select **Azure Resource Manager for template deployment**.
8. Select **Review + Create**.
9. Select **Create**.

Key vault creation is fairly lightweight, typically completing in less than two minutes. When deployment completes, select **Go to resource** and continue to the next section.

Create an SSL certificate

This section shows how to create a self-signed SSL certificate in a format suitable for use by Application Gateway deployed with WebLogic on Azure. The certificate must have a non-empty password. If you already have a valid, non-empty password SSL certificate in *.pfx* format, you can skip this section and move on to the next. If your existing, valid, non-empty password SSL certificate is not in the *.pfx* format, first convert it to a *.pfx* file before skipping to the next section. Otherwise, open a command shell and enter the following commands.

> ⓘ **Note**
>
> This section shows how to base 64 encode the certificate before storing it as a secret in the Key Vault. This is required by the underlying Azure deployment that creates the WebLogic Server and Application Gateway.

Follow these steps to create and base 64 encode the certificate:

1. Create an `RSA PRIVATE KEY`

   ```Bash
   openssl genrsa 2048 > private.pem
   ```

2. Create a corresponding public key.

   ```Bash
   openssl req -x509 -new -key private.pem -out public.pem
   ```

   You'll have to answer several questions when prompted by the OpenSSL tool. These values will be included in the certificate. This tutorial uses a self-signed certificate, therefore the values are irrelevant. The following literal values are fine.
   a. For **Country Name**, enter a two letter code.
   b. For **State or Province Name**, enter WA.
   c. For **Organization Name**, enter Contoso. For Organizational Unit Name enter billing.
   d. For **Common Name**, enter Contoso.
   e. For **Email Address**, enter billing@contoso.com.

3. Export the certificate as a *.pfx* file

   ```Bash
   openssl pkcs12 -export -in public.pem -inkey private.pem -out
   mycert.pfx
   ```

   Enter the password twice. Take note of the password. *You'll need it later when deploying WLS.*

4. Base 64 encode the *mycert.pfx* file

```bash
base64 mycert.pfx > mycert.txt
```

Now that you have a Key Vault and a valid SSL certificate with a non-empty password, you can store the certificate in the Key Vault.

Store the SSL certificate in the Key Vault

This section shows how to store the certificate and its password in the Key Vault created in the preceding sections.

To store the certificate, follow these steps:

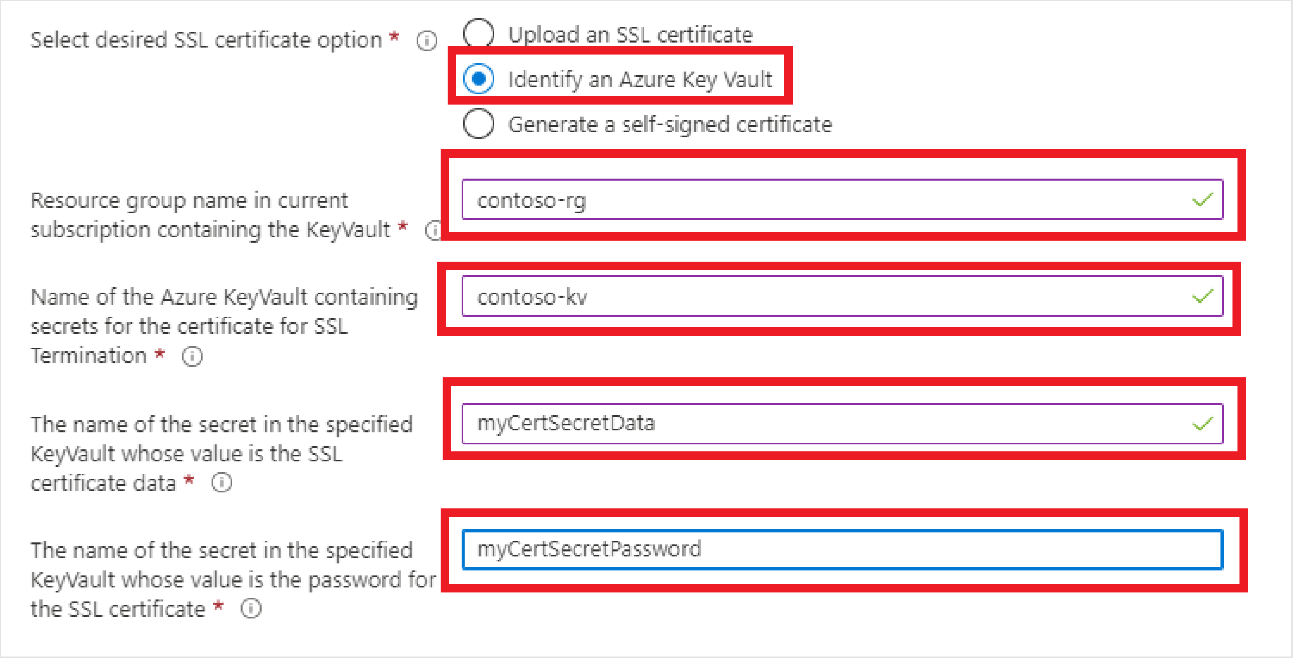
1. From the Azure portal, put the cursor in the search bar at the top of the page and type the name of the Key Vault you created earlier in the tutorial.
2. Your Key Vault should appear under the **Resources** heading. Select it.
3. In the **Settings** section, select **Secrets**.
4. Select **Generate/Import**.
5. Under **Upload options**, leave the default value.
6. Under **Name**, enter `myCertSecretData`, or whatever name you like.
7. Under **Value**, enter the content of the *mycert.txt* file. The length of the value, and the presence of newlines, aren't a problem for the text field.
8. Leave the remaining values at their defaults and select **Create**.

To store the password for the certificate, follow these steps:

1. You'll be returned to the **Secrets** page. Select **Generate/Import**.
2. Under **Upload options**, leave the default value.
3. Under **Name**, enter `myCertSecretPassword`, or whatever name you like.
4. Under **Value**, enter the password for the certificate.
5. Leave the remaining values at their defaults and select **Create**.
6. you'll be returned to the **Secrets** page.

Identify the Key Vault

Now that you have a Key Vault with a signed SSL certificate and its password stored as secrets, return to the **Azure Application Gateway** section to identify the Key Vault for the deployment.



Select desired SSL certificate option * ⓘ
○ Upload an SSL certificate
● Identify an Azure Key Vault
○ Generate a self-signed certificate

Resource group name in current subscription containing the KeyVault * ⓘ: contoso-rg ✓

Name of the Azure KeyVault containing secrets for the certificate for SSL Termination * ⓘ: contoso-kv ✓

The name of the secret in the specified KeyVault whose value is the SSL certificate data * ⓘ: myCertSecretData ✓

The name of the secret in the specified KeyVault whose value is the password for the SSL certificate * ⓘ: myCertSecretPassword

1. Under **Resource group name in current subscription containing the KeyVault**, enter the name of the resource group containing the Key Vault you created earlier.
2. Under **Name of the Azure KeyVault containing secrets for the Certificate for SSL Termination**, enter the name of the Key Vault.
3. Under **The name of the secret in the specified KeyVault whose value is the SSL Certificate Data**, enter `myCertSecretData`, or whatever name you entered previously.
4. Under **The name of the secret in the specified KeyVault whose value is the password for the SSL Certificate**, enter `myCertSecretData`, or whatever name you entered previously.
5. Select **Review + Create**.
6. Select **Create**. This will do a validation the certificate can be obtained from the Key Vault, and that its password matches the value you stored in for the password in the Key Vault. If this validation step fails, review the properties of the Key Vault, ensure the certificate was entered correctly, and ensure the password was entered correctly.
7. Once you see **Validation passed**, select **Create**.

This will start the process of creating the WLS cluster and its front-end Application Gateway, which may take about 15 minutes. When the deployment completes, select **Go to resource group**. From the list of resources in the resource group, select **myAppGateway**.

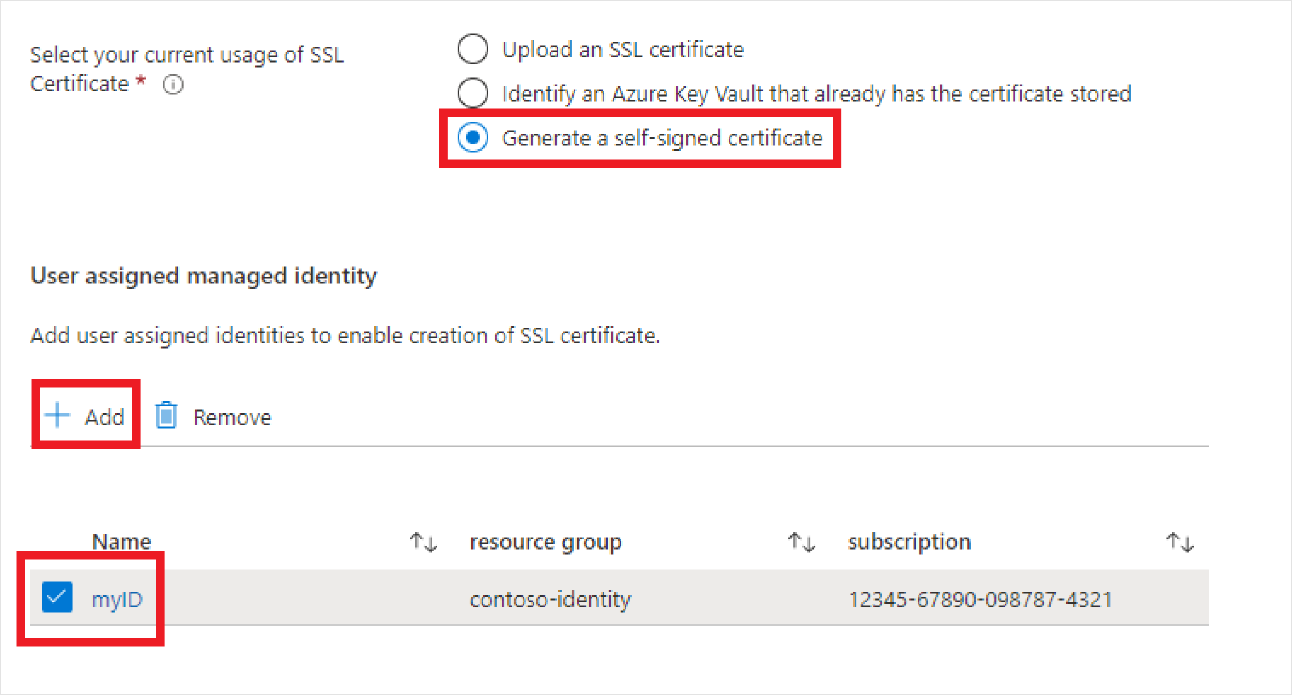
The final option for providing an SSL certificate to the App Gateway is detailed in the next section. If you're satisfied with your chosen option, you can skip to the section Continue with deployment.

Option three: Generate a self-signed certificate

This option is suitable for test and development deployments only. With this option, both an Azure Key Vault and a self-signed certificate are automatically created, and the certificate is provided to App Gateway.

To request the deployment to perform these actions, use the following steps:

1. In the **Azure Application Gateway** section, select **Generate a self-signed certificate**.
2. Select a user-assigned managed identity. This is necessary to allow the deployment to create the Azure Key Vault and certificate.
3. If you don't already have a user-assigned managed identity, select **Add** to begin the process of creating one.
4. To create a user-assigned managed identity, follow the steps in Create a user-assigned managed identity. Once you've selected the user-assigned managed identity, make sure the checkbox next to the user-assigned managed identity is checked.



Select your current usage of SSL Certificate *

○ Upload an SSL certificate
○ Identify an Azure Key Vault that already has the certificate stored
● Generate a self-signed certificate

User assigned managed identity

Add user assigned identities to enable creation of SSL certificate.

	Name	resource group	subscription
☑	myID	contoso-identity	12345-67890-098787-4321

Continue with deployment

You can now continue with the other aspects of the WLS deployment as described in the Oracle documentation .

Validate successful deployment of WLS and App Gateway

This section shows a technique to quickly validate the successful deployment of the WLS cluster and Application Gateway.

If you had selected **Go to resource group** and then **myAppGateway** at the end of the preceding section, you'll be looking at overview page for the Application Gateway. If not, you can find this page by typing `myAppGateway` in the text box at the top of the Azure portal, and then selecting the correct one that appears. Be sure to select the one within the resource group you created for the WLS cluster. Then, complete the following steps.

1. In the left pane of the overview page for **myAppGateway**, scroll down to the **Monitoring** section and select **Backend health**.
2. After the **loading** message disappears, you should see a table in the middle of the screen showing the nodes of your cluster configured as nodes in the backend pool.
3. Verify that the status shows **Healthy** for each node.

Clean up resources

If you're not going to continue to use the WLS cluster, delete the Key Vault and the WLS Cluster with the following steps:

1. Visit the overview page for **myAppGateway** as shown in the preceding section.
2. At the top of the page, under the text **Resource group**, select the resource group.
3. Select **Delete resource group**.
4. The input focus will be set to the field labeled **TYPE THE RESOURCE GROUP NAME**. Type the resource group name as requested.
5. This will cause the **Delete** button to become enabled. Select the **Delete** button. This operation will take some time, but you can continue to the next step while the deletion is processing.
6. Locate the Key Vault by following the first step of the section Store the SSL certificate in the Key Vault.
7. Select **Delete**.
8. Select **Delete** in the pane that appears.

Next steps

Continue to explore options to run WLS on Azure.

Learn more about Oracle WebLogic on Azure

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👍 Yes 👎 No

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