# Practice M2: Infrastructure #2 (Core Services)

For this module we will need a PC running recent version of **Windows**, **Linux**, or **macOS**. It can be either physical or virtual machine

All resource related tasks can be executed either in the locally installed tools or in the **Azure Cloud Shell**

**Any type of subscription** will be suitable for doing the exercises

## Part 1: Core Services

#### Portal: Two VMs + Cloud Init + LB + SG

Navigate to <https://portal.azure.com>

Enter your credentials

##### Resource group

Go to **Resource groups**

Create new resource group **RG-Demo-P1-1** in the **West Europe** region

##### Virtual network

Enter the resource group and click on the **+ Add** button to add new resources

In the search field enter **Virtual Network** and hit **Enter**

Then click on the **Create** button

For name enter **p11vnet**

Leave the **address space** as it is

The default values of the **subscription**, **resource group** and **location** should be okay, leave them as they are

Click on the **Create** button

##### Network security group

Return to the resource group and click on the **+ Add** button to add new resources

In the search field enter **Network security group** and hit **Enter**

Then click on the **Create** button

For **name** enter **p11sg**, accept the proposed values for all other parameters

Click on the **Review + create** button and then on **Create**

Once the deployment is done click on the **Go to resource**

In the **Settings** section click on **Subnets** to associate the group with a network

Click on the **+ Associate** button

In **Virtual network** drop-down select **p11vnet** and then in the **Subnet** drop-down select **default**

Click on **OK**

In the **Settings** section click on the **Inbound security rules** to add two rules

##### Security rules

Click on the **+ Add** button

Change **Destination port ranges** to **22**

Change **Protocol** to **TCP**

In the **Name** field enter **Port\_22**

Click on the **Add** button

Repeat the procedure once again but change **22** to **80**

##### Virtual machines

Return to the resource group and click on the **+ Add** button to add new resources

Select **Ubuntu Server 18.04 LTS** from the list of popular resources

Leave **Subscription** and **Resource group** as they are

In the **Virtual machine name** enter **p11vm1**

For **Availability options** set **Availability set**

Click on the **Create new** under the **Availability set**

For **Name** set **p11as**

Click **OK**

Change the **Size** to **Standard B1S**

Select **Password** as **Authentication type**

Enter **demouser** as **Username**

For **Password** set for example **DemoPassword-2019**

In the **Public inbound ports** section select **None**

Click on the **Next: Disks** button

Accept all default values and click on the **Next: Networking** button

Do not change proposed values in the **Virtual network**, **subnet**, and **Public IP** fields

In the **NIC network security group** select **Advanced**

Select **p11sg** from the **Configure network security group** drop-down

Click on the **Next: Management** button and then on the **Next: Advanced** button

In the **Cloud init** section paste (be sure the keep the formatting incl. empty spaces):

**#cloud-config**

**package\_upgrade: true**

**packages:**

**- apache2**

**- php**

**write\_files:**

**- path: /var/www/html/index.php**

**content: |**

**Hello from <b><?php echo gethostname(); ?></b>**

**runcmd:**

**- systemctl restart apache2**

Click on the **Review + create** button

Click on the **Create** button

Once the deployment is done, repeat the procedure but enter **p11vm2** for VM name

##### Load balancer

Now, if we test with the public IP address of either machine, we must see a simple web site

Let’s add a load balancer in from of the VMs

Return to the resource group and click on the **+ Add** button to add new resources

In the search field enter **Load Balancer** and hit **Enter**

Then click on the **Create** button  
In the **Name** field enter **p11lb**

Select the **Basic** option in the **SKU** section

In the **Public IP address name** enter **p11lb-ip**

Click on **Review + Create** and then on **Create**

Once the deployment is done click on the **Go to resource** button

In the **Settings** section click on the **Backend pools**

Then click on the **+ Add** button

For **Name** enter **p11lb-back-pool** and click **OK**

Change **Associated to** to **Availability set**

In the **Availability set** drop-down select **p11as**

Click on the **+ Add a target network IP configuration** button

Select the first VM then select its IP configuration

Repeat the procedure for the second VM

Finally, click **OK**

Next, go to **Health probes**

Click on the **+ Add** button

For **Name** enter **p11lb-health** and click on **OK**

Next, go to the **Load balancing rules** section in the menu

Click on the **+ Add** button

In the **Name** field enter **p11lb-rule**

Accept all other values and click on **OK**

Now, return to the **Overview** of the load balancer

Copy the **Public IP address** and paste in a browser

Refresh several times

#### Portal: VMSS

Navigate to <https://portal.azure.com>

Enter your credentials

##### Resource group

Go to **Resource groups**

Create new resource group **RG-Demo-P1-2** in the **West Europe** region

##### Virtual machines scale set

Enter the resource group and click on the **+ Add** button to add new resources

In the search field enter **Virtual machine scale set** and press **Enter**

Then click on the **Create** button

For the **Virtual machine scale set name** enter **vss**

From the list of **Operating system disk images** choose **Ubuntu Server 18.04 LTS**

In the **Username** field enter **demouser**

For password use **DemoPassword-2019**

Leave **Instance count** to **2**

Set **Instance size** to **Standard B1s**

Leave **Autoscale** to **Disabled**

Select **Load balancer** in the **Choose Load balancing options**

Enter **vss-ip** in the **Public IP address name** field

Enter something unique, for example **vssaze**, in the **Domain name label** section

Click **Create new** in the **Configure virtual network** section

In the **Name** field enter **vss-net**

Put a check mark for the **Address space** and **Subnet name** to accept the proposed values and click on the **OK** button

If you want, you can turn **On** the option **Public IP address per instance**

Select **Allow selected ports** and select port **HTTP (80)** and **SSH (22)**

In the **Cloud init** field paste:

**#cloud-config**

**package\_upgrade: true**

**packages:**

**- apache2**

**- php**

**write\_files:**

**- path: /var/www/html/index.php**

**content: |**

**Hello from <b><?php echo gethostname(); ?></b>**

**runcmd:**

**- systemctl restart apache2**

Click the **Create** button

Once the deployment is done, click on the **Go to resource** button

Get the public IP address and paste it into a browser window, a web site should be seen

#### Portal: BLOB + Files

Navigate to <https://portal.azure.com>

Enter your credentials

##### Resource group

Go to **Resource groups**

Create new resource group **RG-Demo-P1-3** in the **West Europe** region

Enter the resource group and click on the **+ Add** button to add new resources

In the search field enter **Storage account** and hit **Enter**

Then click on the **Create** button

For name enter something unique, for example **sadvzaze**

Leave all other values as they are and click on the **Review + create** button

Then click on the **Create** button

##### BLOB

Enter the account

Click on the **Containers** section

Click on the **+ Container** button to create new one

For **Name** enter **blobs** and click on **OK**

Click on the newly created container

Now, we can upload one or more files to it. Click on the **Upload** button

Click on the **Browse** button and select one or more files, then click on **Open**

Finally, click on **Upload**

##### Files

Return to the storage account

Click on the **File shares** option

Click on the **+ File share** button to create one

For **Name** enter **share**

For **Quota** enter for example **2**

Click on **Create**

Upload a file

##### Storage Explorer

Download the **Storage Explorer** application from <https://azure.microsoft.com/en-us/features/storage-explorer/>

Install it and run it

Connect it to your subscription

Navigate to the storage account and explore its contents

## Part 2: Users. Roles. Policies

Login to the Azure portal if you are not

#### Users

Enter **Users** in the search field, then hit the **Enter** key

Click on the **+ New user** button

In the **User name** field enter something, for example **azeuser**

For **Name** enter **AzE User**

Select the **Let me create the password** option

Then for **Initial password** enter something (up to 16 symbols), for example **Password-2019**

Click on **Create**

Now, the new account which will be **azeuser@<domain>.onmicrosoft.com** can be used for login

Open new browser window in private mode and navigate to **portal.azure.com**

Enter the account name

Next you will be asked to change the password

Once you are in the portal, you will notice that the new user is not assigned to a subscription

#### RBAC

Return to the session with your main user

In the search field enter **Subscription** and hit **Enter**

Now, we will grant certain privileges to our new user on a subscription level

Go to **Access control (IAM)**

Switch to **Role assignments**

Click on the **+ Add** button

Select **Add role assignments**

In the **Role** field select **Virtual Machine Contributor**

Select the user from the users list

Click on **Save**

Now, if we return to the private session and refresh, the user must be able to create virtual machines

In a similar way, we can make him an owner of a resource group, for example

#### Policies

Go to **Home** view

In the search bar enter **Policy** and hit **Enter**

Let’s go to **Definitions**

Filter the **Category** to **Compute** only

Click on the **Allowed virtual machine SKUs**

Explore its contents

Click on the **Assign** button

In scope choose both **subscription** and **resource group**. For example, the one we created earlier

Click **Select**

In the **Assignment name** append **only B1S**

Click on **Next**

In the **Allowed SKUs** select **Standard\_B1s**

Click **Review + create**

Finally, click on **Create**

Return to **Assignments** in the **Policies.** Our new policy assignment should be there

Now, let’s test it

Go to the resource group and try to create a VM of different size

The process should stop on the **review + create** phase

#### Locks

Locks are an effective prevention mechanism against deleting resources by a mistake

Let’s navigate to a resource, for example one of the machines, created during the first part – **p11vm1**

In the **Overview** mode, scroll down to the **Settings** section

There is the **Locks** command. Click on it

Click on the **+ Add** button

For **Lock name** enter **vm-lock**

Set the **Lock type** to **Delete**

In the **Notes** field enter **Do not delete this VM**

Click on the **OK** button

Now, let’s try to delete the VM. We won’t succeed, even though we created the lock

In order to delete the resource, first we must delete the lock

## Part 3: Monitoring and Costs

Login to the Azure portal if you are not

#### Cost Management

Go to the **Home** view

From the menu on your left choose **Cost Management + Billing**

It opens in **Overview** mode

Here we can see information about the past few periods and our currently accumulated amount

Click on the **Cost Management**

Then on **Cost analysis**

Here, interactively we can see what led to our current bill and an estimation

By clicking on **Accumulated costs** we can switch between different built-in views

We can change the time frame or add a filter

We can change the **Group by** clause as well

There are options to save and export our cost analysis

From this tool we can set budgets as well

Or ask the **Advisor** for recommendations

Return to **Cost Management + Billing**

Click on **Subscriptions** and select your subscription

Here we can see at a glance all **resource groups** and **resources**

#### Limits

Being in the **Cost Management + Billing**

Another interesting option is the **Usage + quotas**. Let’s go there

Select **Microsoft.Compute** from the **All providers** drop-down

Now, we can see what our consumption is and how much room we have

Should we need bigger limits, we can hit the **Request Increase** button

#### Calculators

We can estimate how much will cost if we deploy a solution in Azure with:

<https://azure.microsoft.com/en-us/pricing/calculator/>

In a similar way, we can calculate what will be the savings if we migrate to Azure with:

<https://azure.microsoft.com/en-us/pricing/tco/calculator/>

#### Tags

As we saw earlier, we can break costs by different criteria

Tags, provide us with a way to break them further

We can add tags for example to resource groups and resources

Tags applied to a resource group are not inherited by its resources

We can add a few tags on the artifacts we created so far

#### Azure Resource Manager Templates

##### Obtain a template

We can download a template from an existing resource

Go to the resource, for example a VM

Click on the **Export template**

From here, we can add the template to our library, or download it on our PC

We can copy the template code and paste it into the ARMVIZ application in order to visualize it

By using this template, we may omit some related resources. A better option would be to use extract the template from a resource group

##### Quickstart templates

We can go one step further. There is a publicly available library with sample templates:

<https://github.com/Azure/azure-quickstart-templates>

##### Deploy a template from the Portal

Go to the **Home** view

In the search bar enter **Deploy a custom template** and hit **Enter**

Here we can:

* Use our own template
* Use one of the proposed
* Use a quickstart template

Let’s go with the quickstart one

Type **wordpress** in the **Select a template (disclaimer)** drop-down

Select the **wordpress-single-vm-ubuntu** item

Click on the **Select template** button

Here, we can edit either the template or its parameters

Let’s fill-in the required fields:

* Click on **Create new** under the **Resource group** and for **Name** enter **RG-Template**
* Set **Vm Dns Name** to **azewp**
* In **Admin Username** enter **demouser**
* For **My Sql Password** set **DemoPassword-2019**
* Enter **Standard\_B1s** for **Vm Size**
* Set **Authentication Type** to **password**
* Enter **DemoPassword-2019** in the **Admin Password Or Key** field

Check the **I agree to the terms and conditions stated above**

Click on **Purchase** button

Sit back and watch the deployment

After the deployment finishes, click on the **Go to resource group** button

Navigate to the virtual machine and copy either the **Public IP address**, or the **DNS name**

If all went according to the plan, we should see the welcome page of Apache

If we modify the URL to <http://azewp.westeurope.cloudapp.azure.com/wordpress>, we will see the welcome page of WordPress

## REMINDER

Don’t forget to delete resources that you do not need

Also remember to stop VMs that you are not going to use in the coming hours or days

There Is an **Auto-shutdown** option in the **Operations** section of every VM

You can enable the automatic shutdown, for example at 19:00. This will definitely save you some money