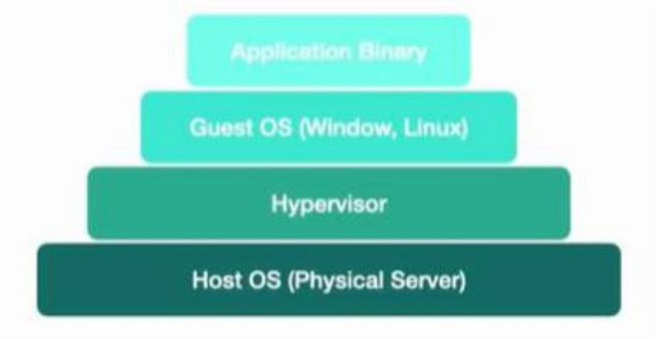
SECTION 3: AZURE VIRTUAL MACHINE

In this section, we are going to look into one of the most used compute services from Azure called Virtual Machine. When talking about virtual machine in Azure, it is important for us to understand the architecture of Azure virtual machine.



On the above diagram, you can see that we have a four layers virtual machine. These four layers are the basic building blocks for running a virtual machine on our Azure cloud. This is how the Microsoft Azure is going to manage our virtual machines.

The first layer in this architecture is the **Host OS or layer**. The host layer is like a physical server which is sitting in the Azure cloud Data center managed by Microsoft Azure. This server has a really high configuration in terms of CPU, memory and disk storage because the virtual machine is provisioned here.

Now, how the virtual machine is provisioned? This is where the **Hypervisor** comes in. So, on top of our physical host machine which is managed by Azure, then comes the **Hypervisor** which manages our virtual machine.

Then comes the **Guest OS**, that is our virtual machine. This is where our virtual machine comes into play. And here we can provision different types of virtual machines such as Windows or Linux. In the Linux, we also have different flavors of virtual machines such as Ubuntu. You can choose what kind of virtual machine you want to provision.

So, the **Hypervisor** that is sitting between the Host OS and the Guest OS acts like a bridge between the Guest OS and the Host OS, so that our virtual machine can run on the Data center premises.

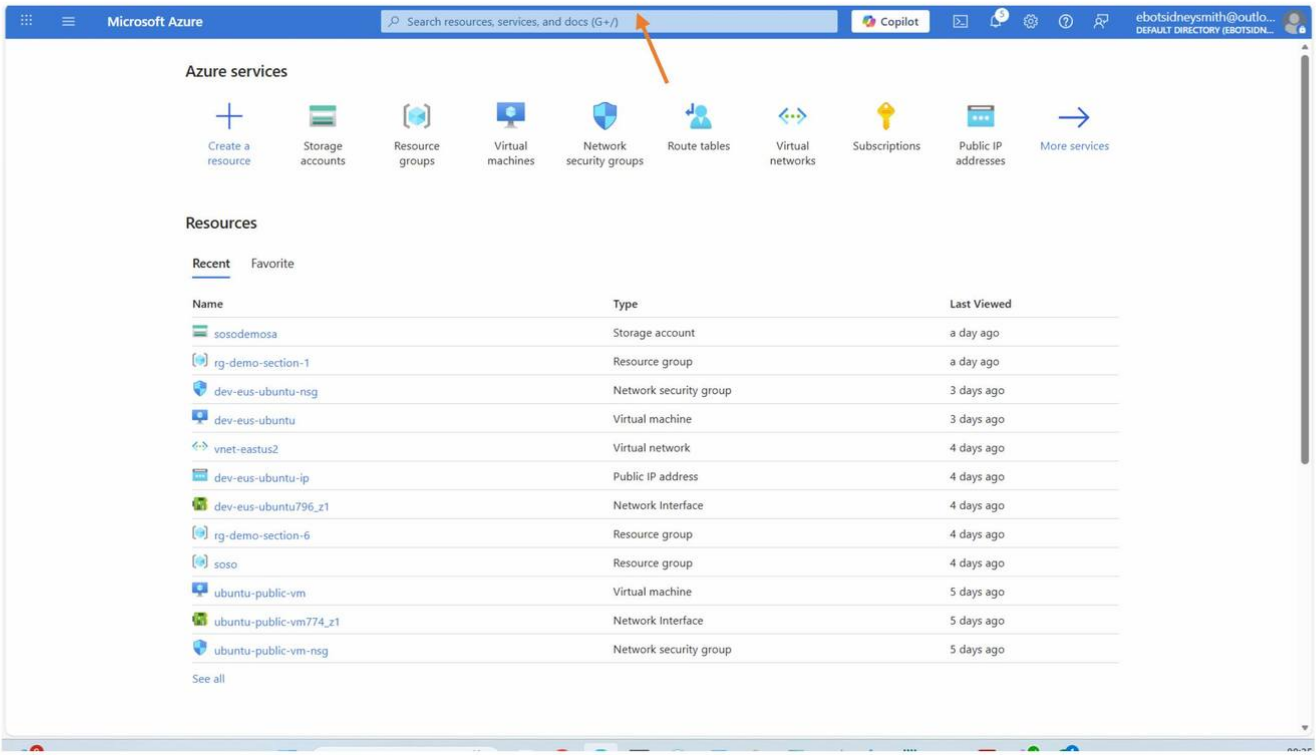
And at last, there comes the **Application Binary**, which is sitting on the Guest OS. This Application Binary is the binary we want to deploy or run inside our Guest OS.

The **Guest OS** and the Application Binary are managed by us and Azure cloud does not interfere with them. The only responsibility of Azure cloud is to manage the Hypervisor and the Host OS.

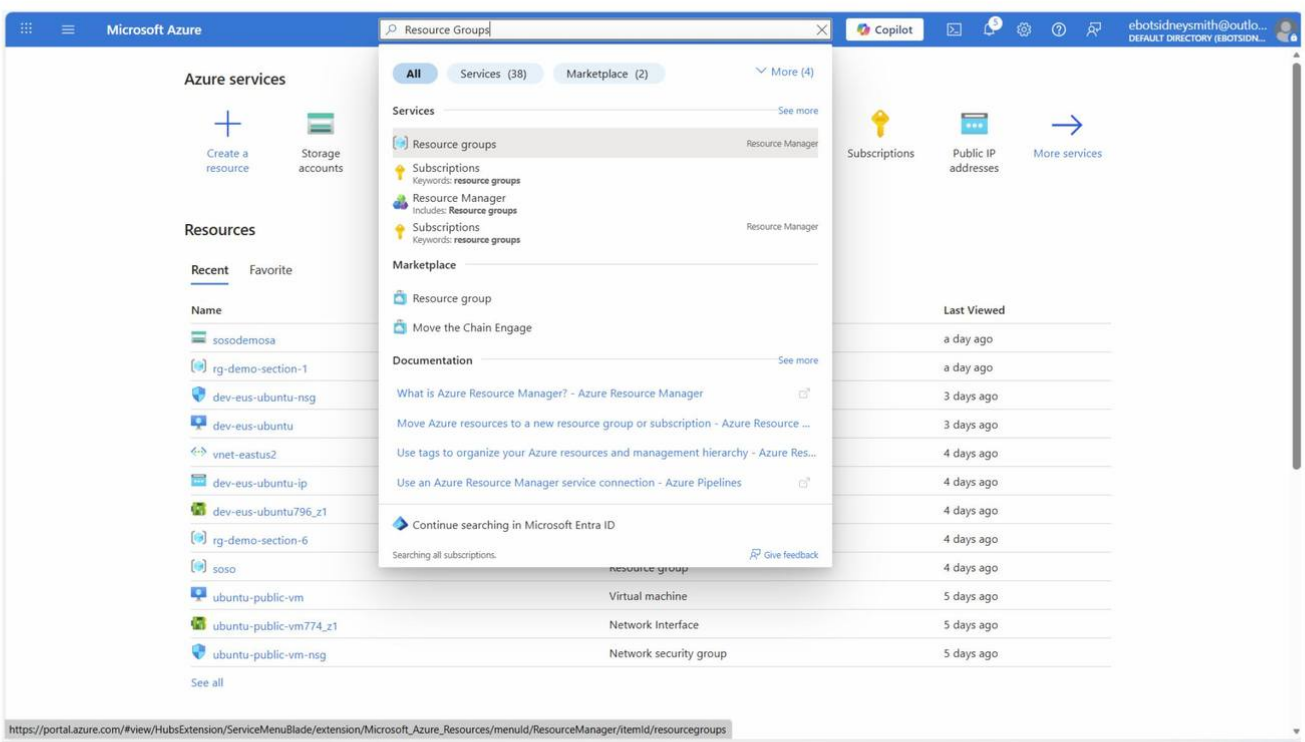
So, if something goes wrong in our Application Binary or Guest OS, then it is our responsibility to go and fix it. When we will do the demo, we will play around with these two layers. First, we are going to provision our Guest OS. After provisioning our Guest OS, we will try to access our virtual machine. And then in that virtual machine, we are going to install some of the binaries so that we can see how we can play around with the virtual machine.

Part 1: Set up Linux Virtual Machine

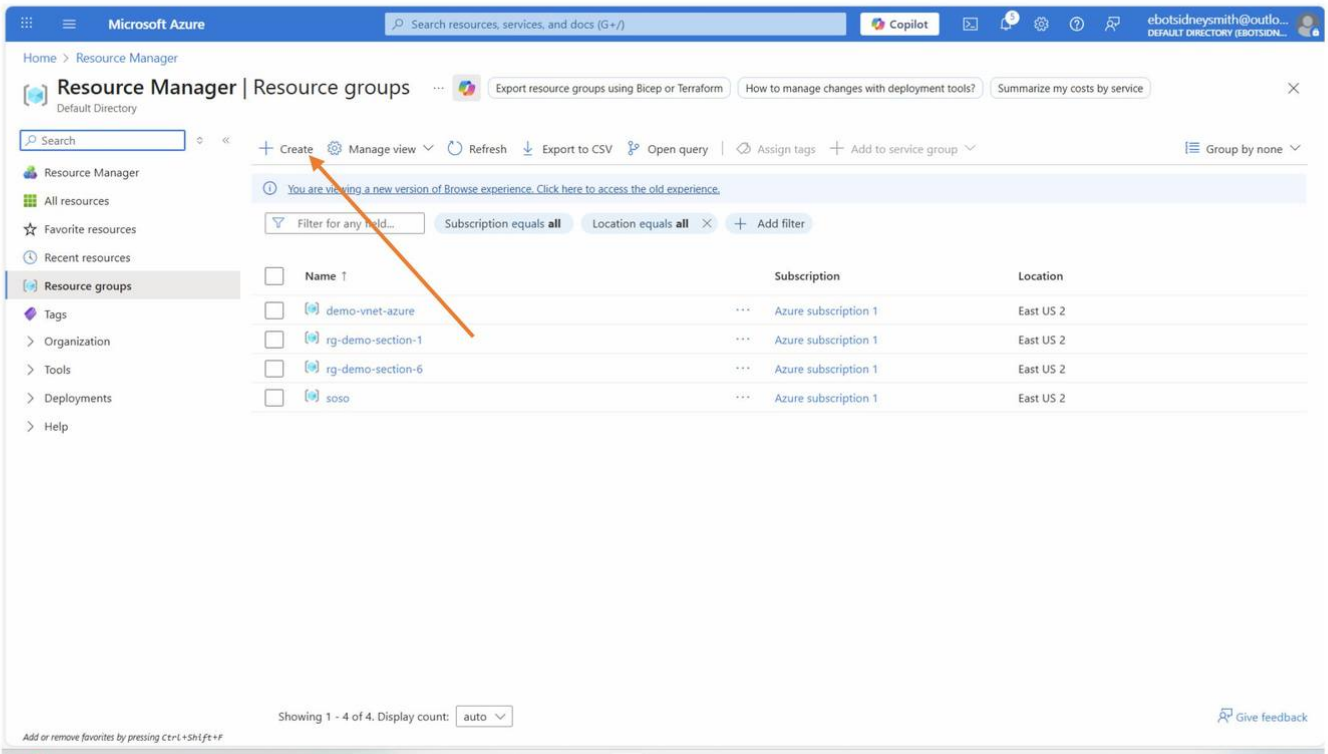
In this part we will do a demo on how to set up a Linux virtual machine. To start with the demo, go to Azure portal.



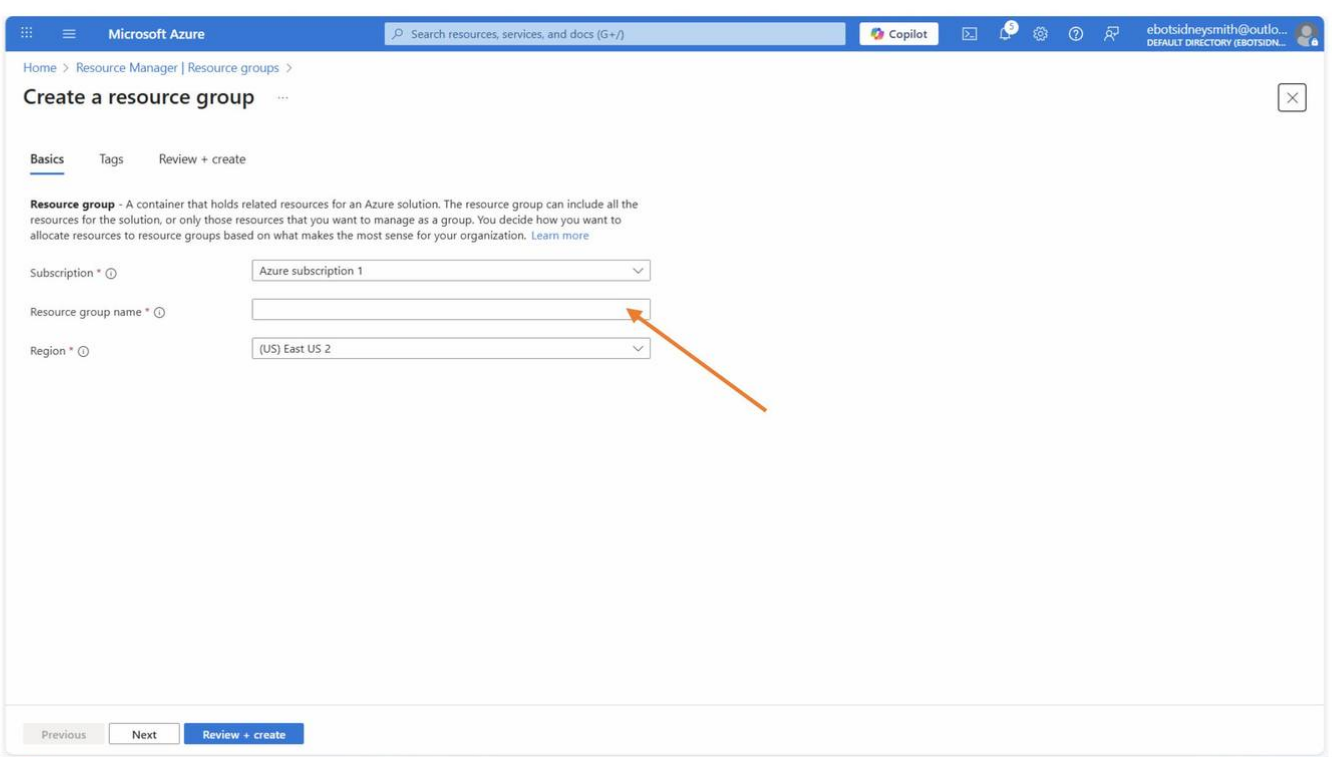
We will start by creating a new “Resource Group” for this virtual machine demo. Search for “**Resource Groups**”



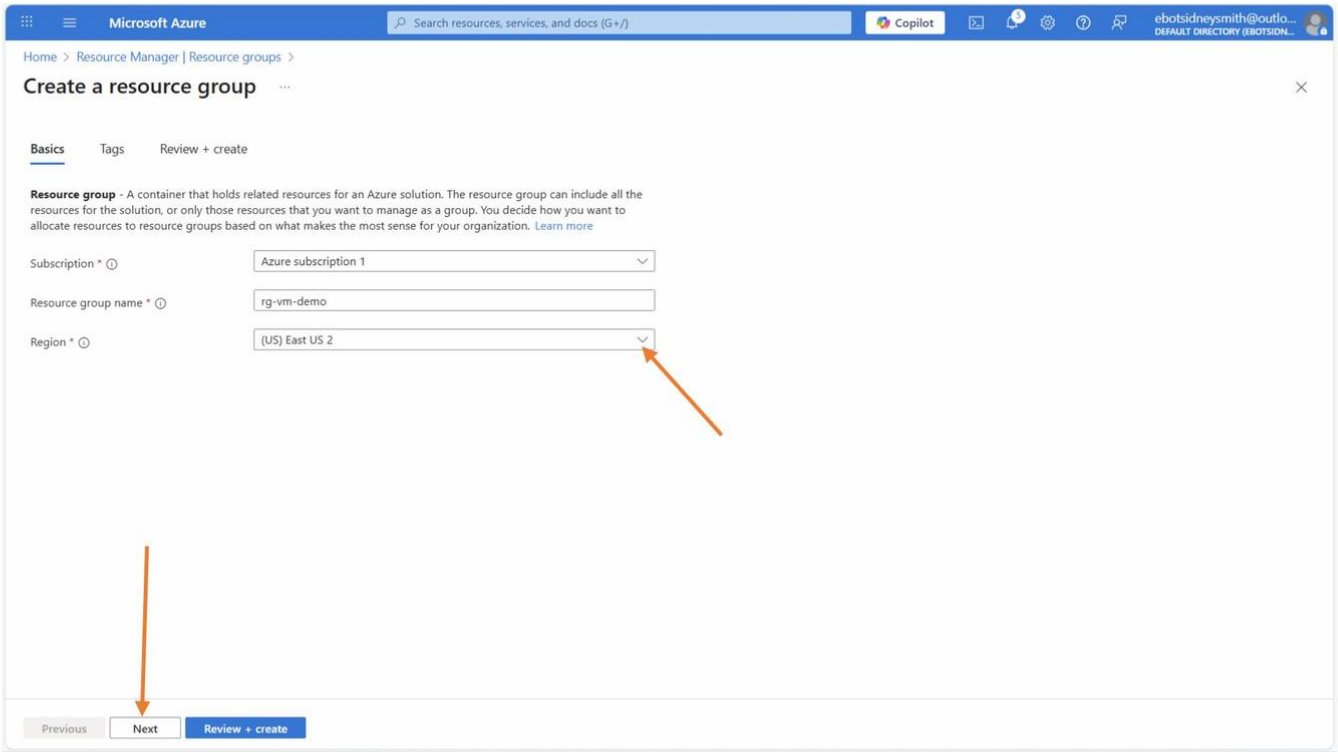
Select "**Resource Groups**" under "**Services**"



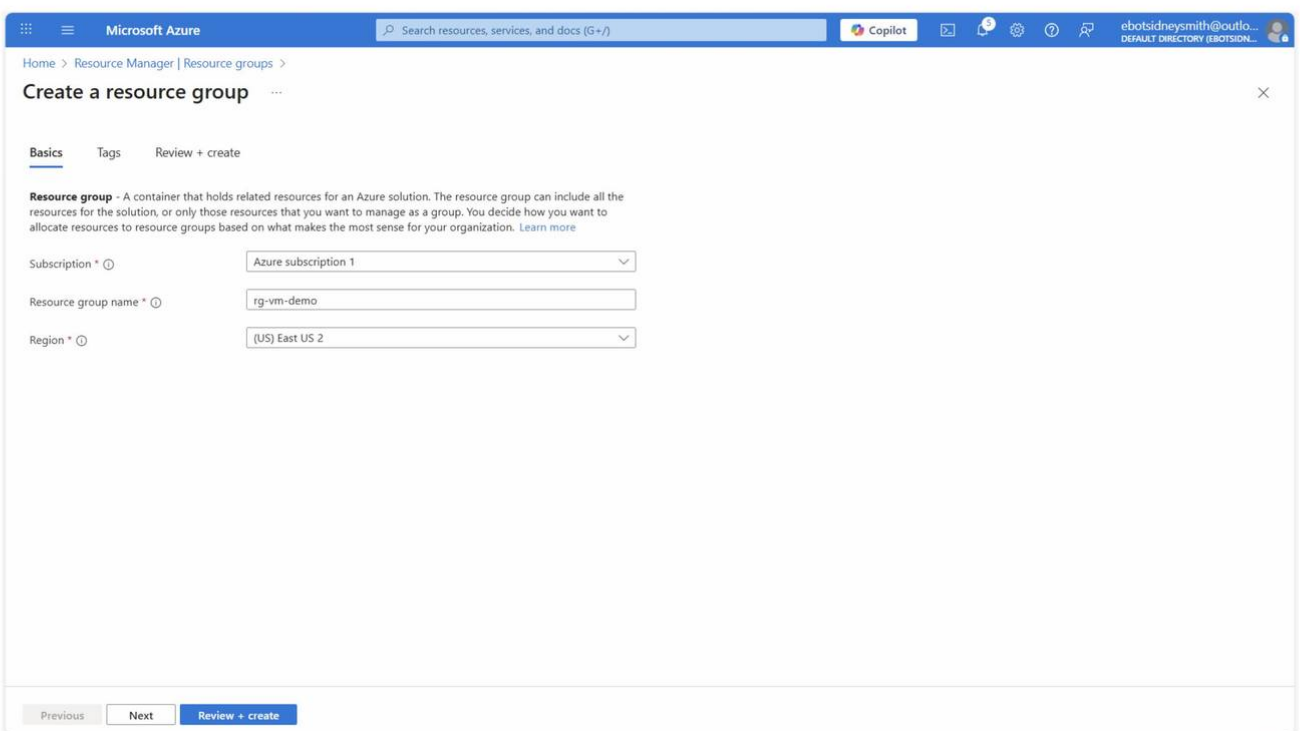
Click on "Create"



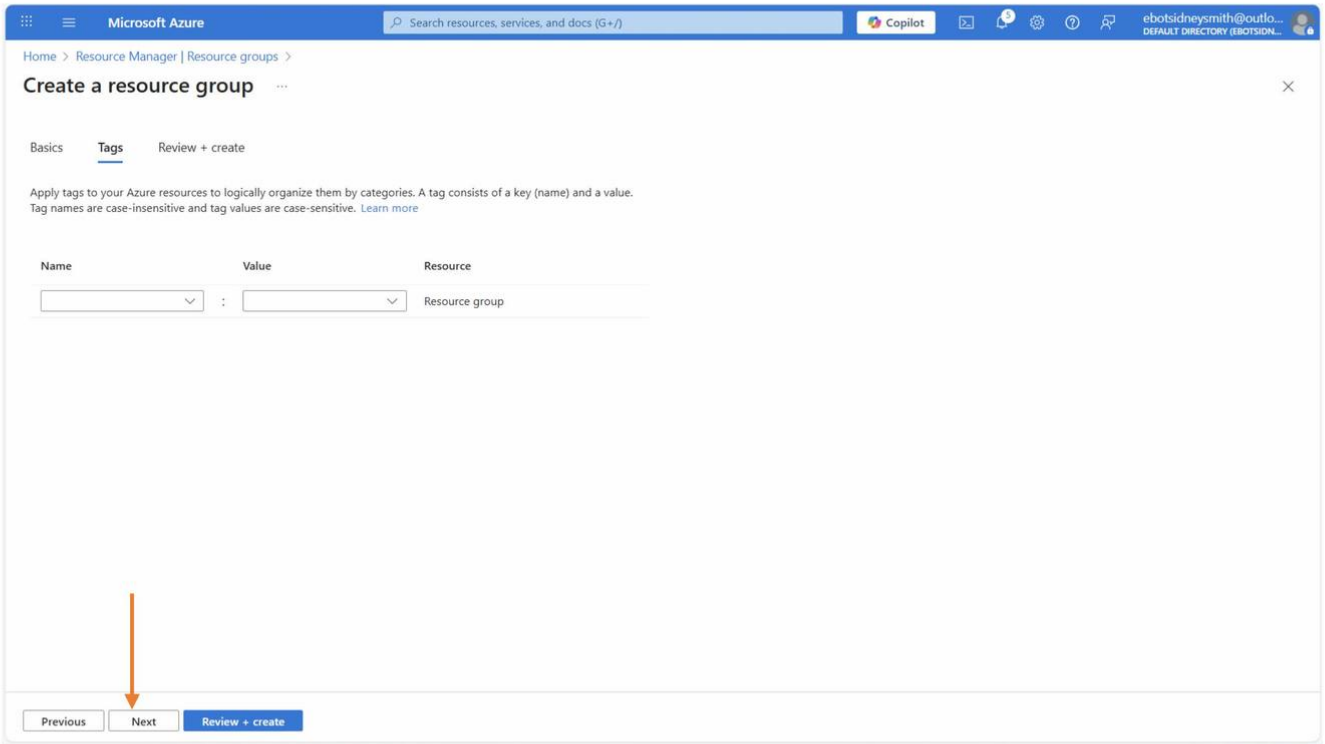
The "**Subscription**" has already been selected. Let us give the "**Resource Group**" a name. So, on "**Resource Group**", give it the name "**rg-vm-demo**"



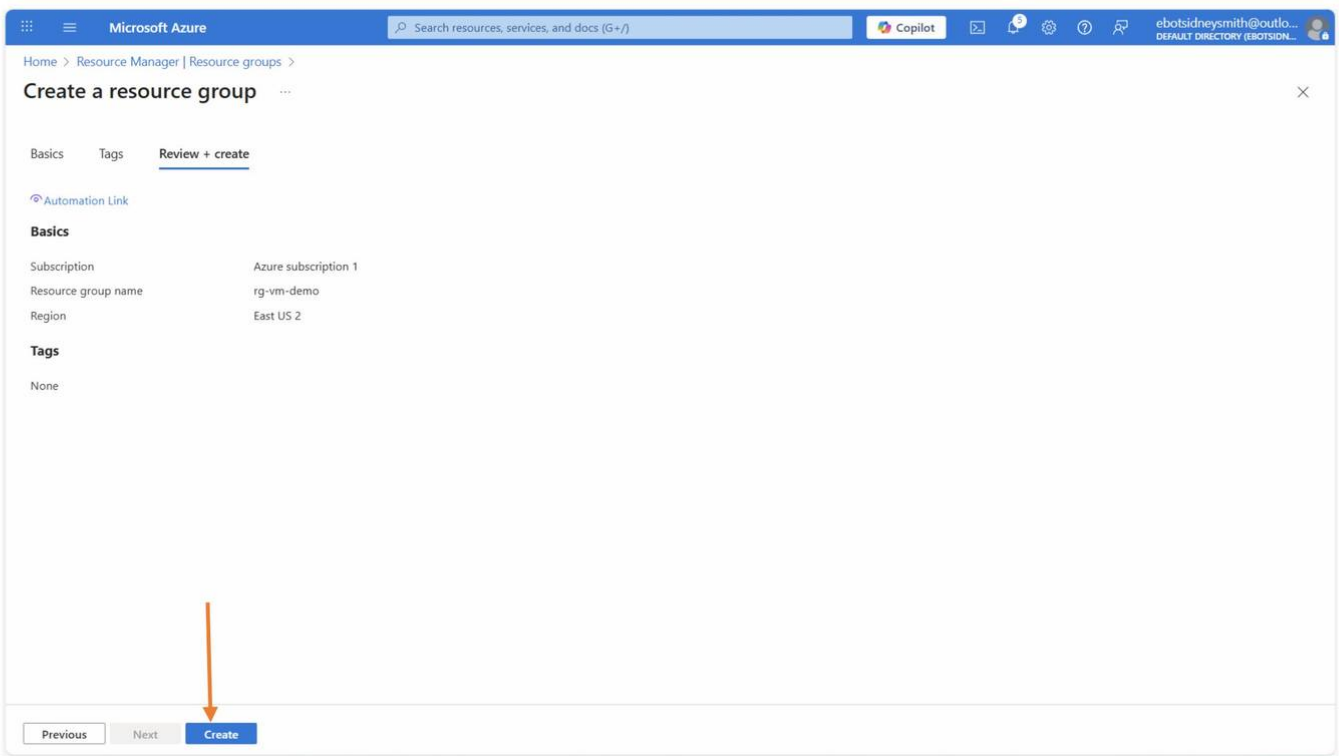
Then for "**Region**", we will leave it as "**East US 2**"



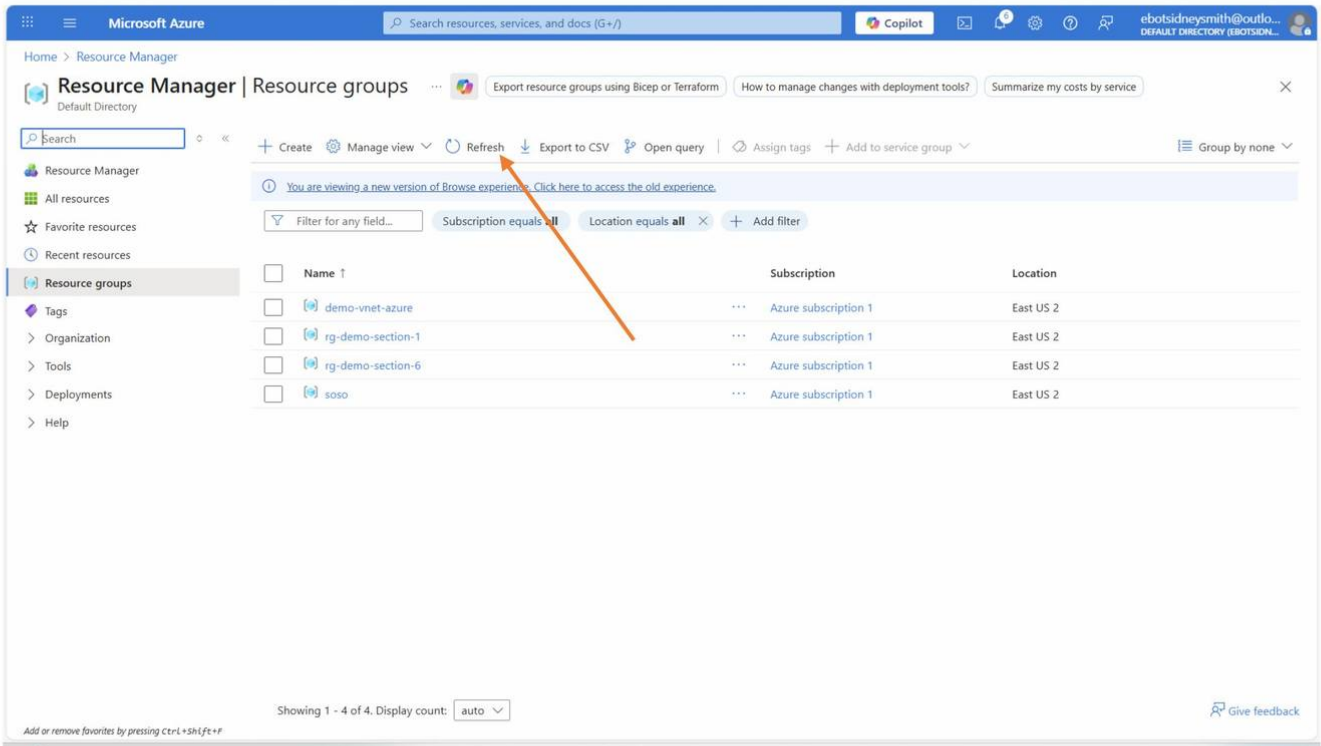
Click on "**Next**"



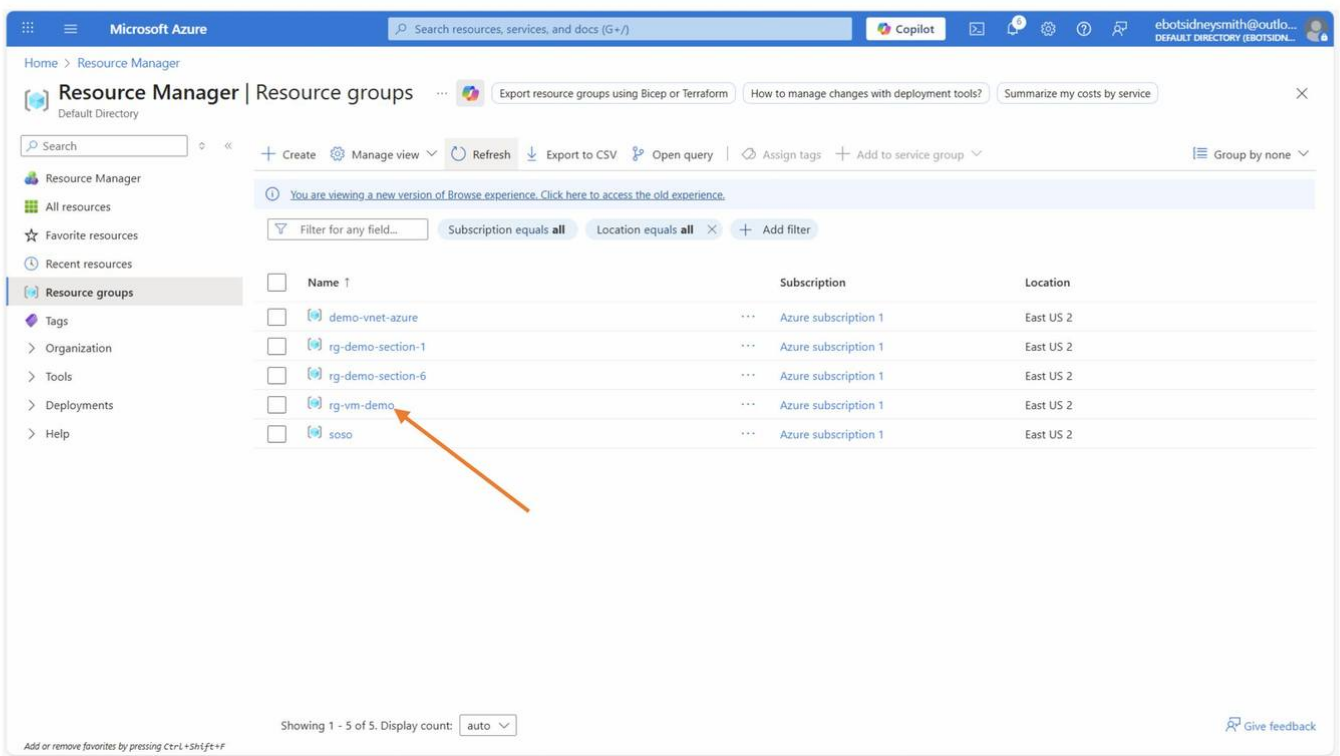
Here is "**Tags**", we will just leave it blank for this demo. Click on "**Next**"



Click on "**Create**" and this is going to create our resource group.

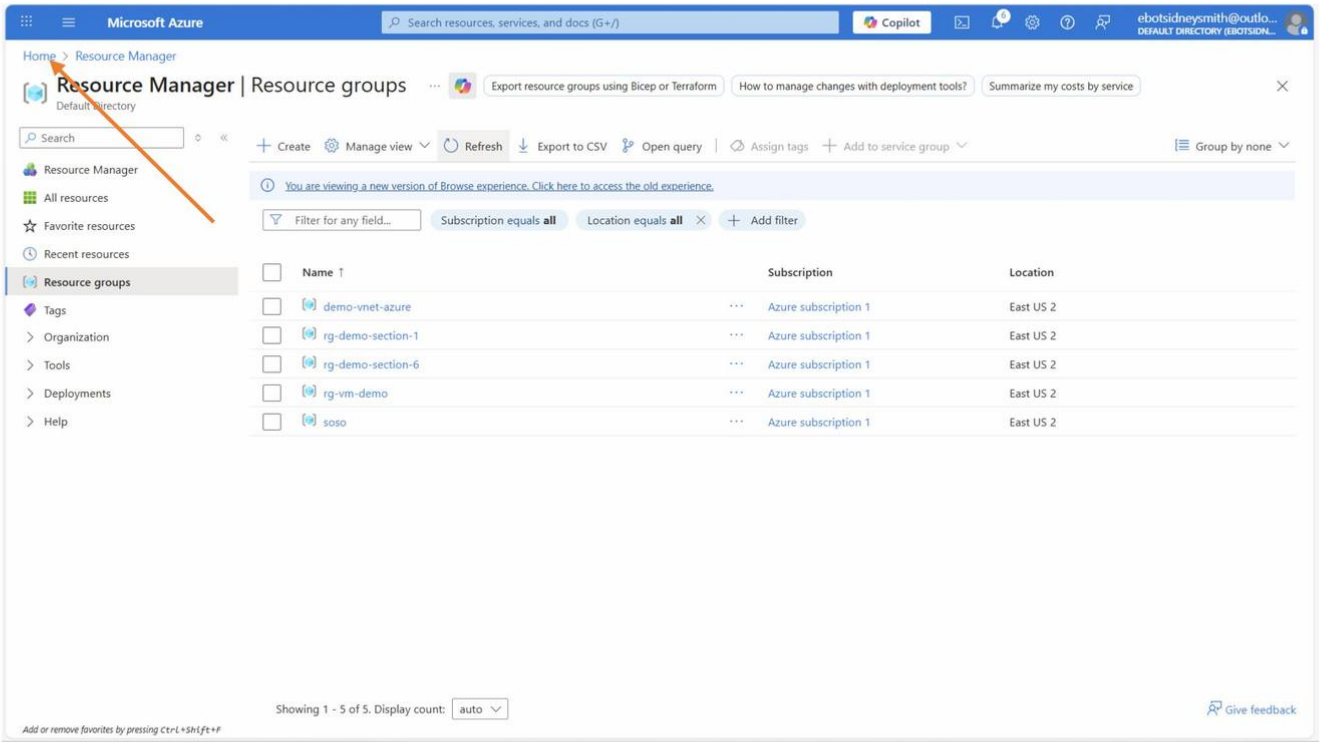


The resource group has been created. Refresh the page by clicking on “Refresh”

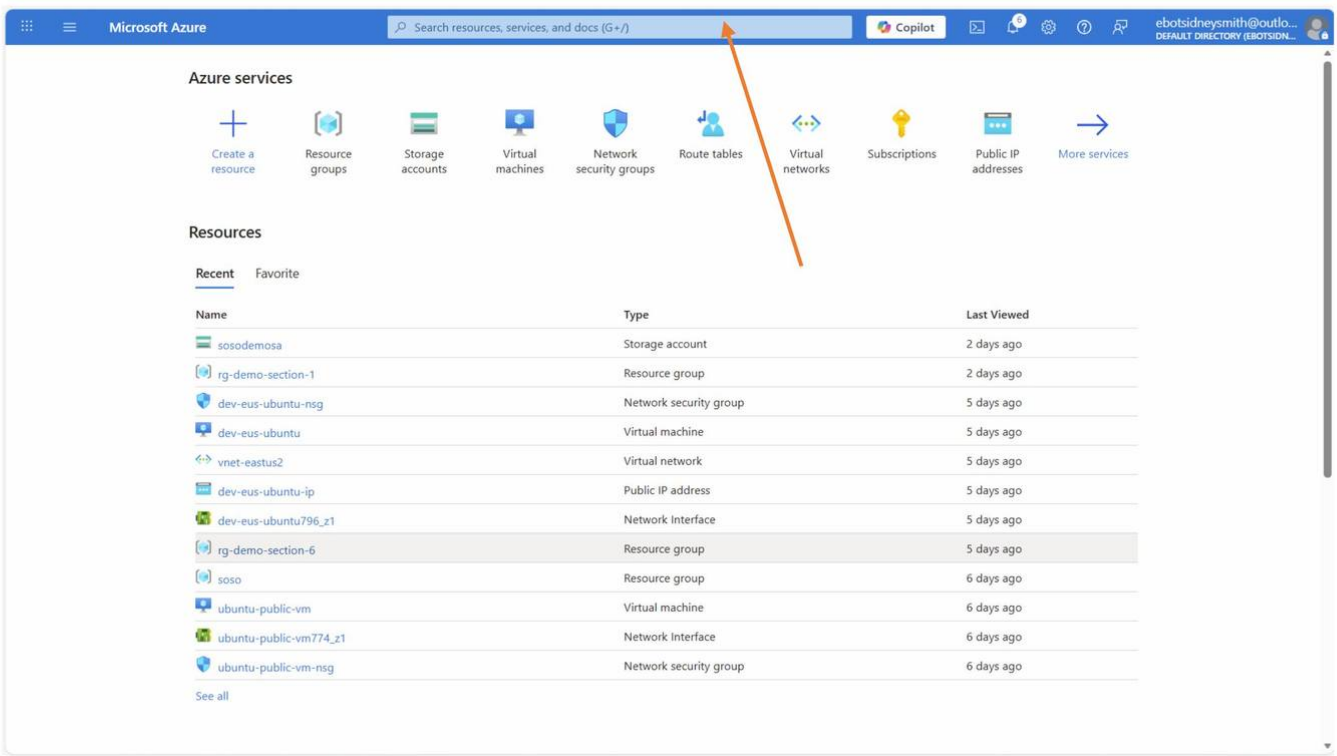


You can see the resource group we just created.

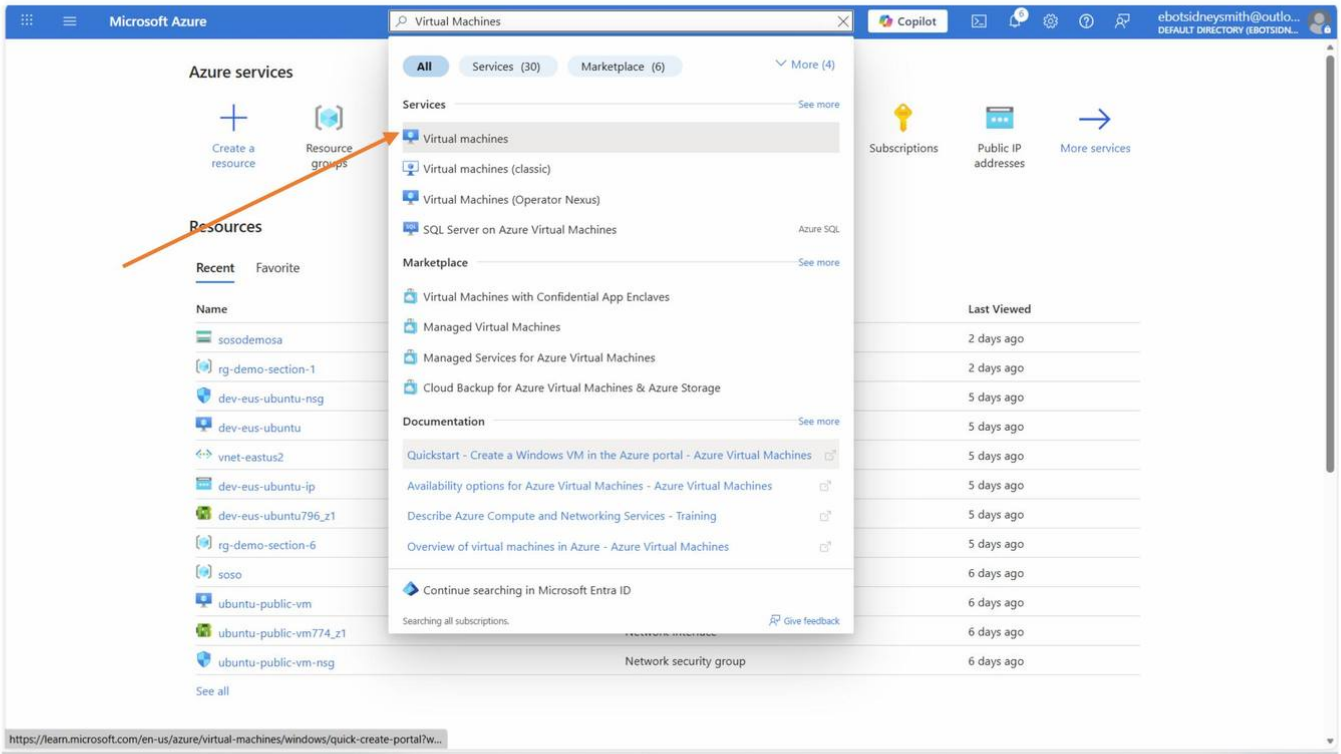
Now, let us continue to create our Virtual machine.



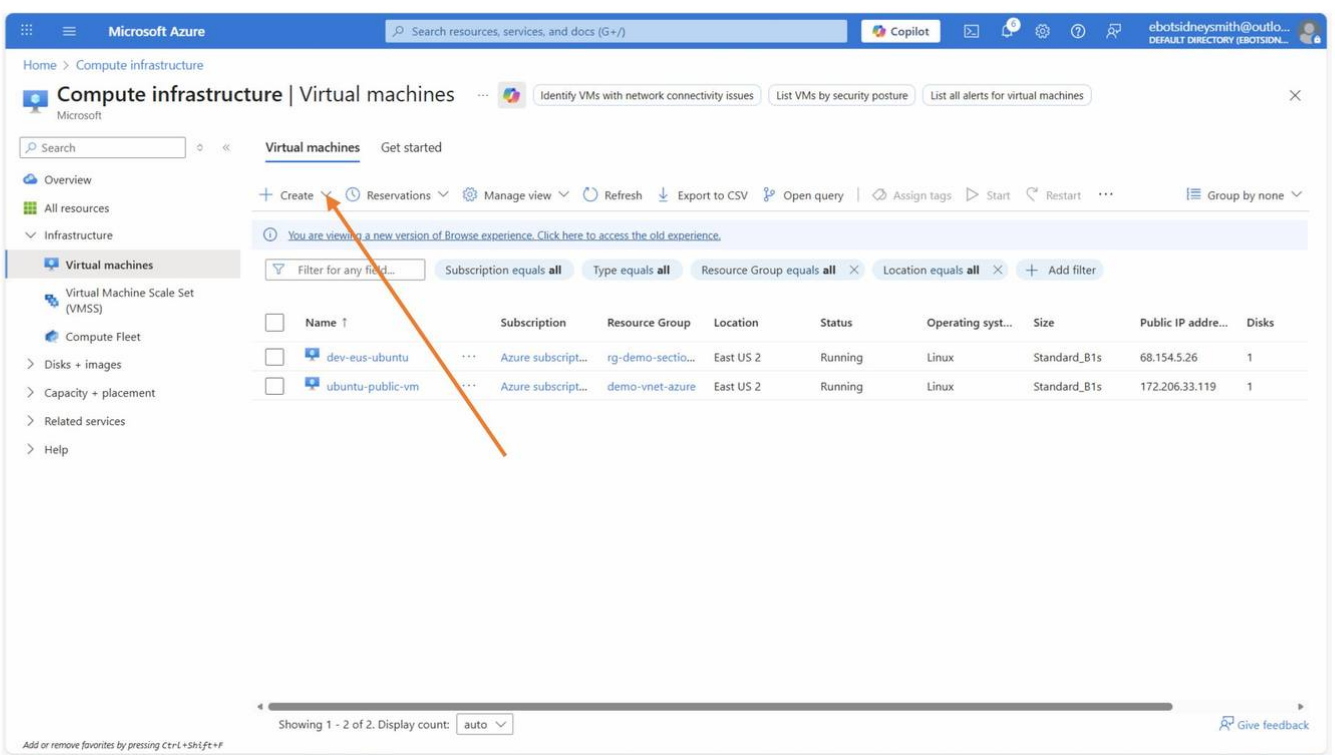
Click on "**Home**"



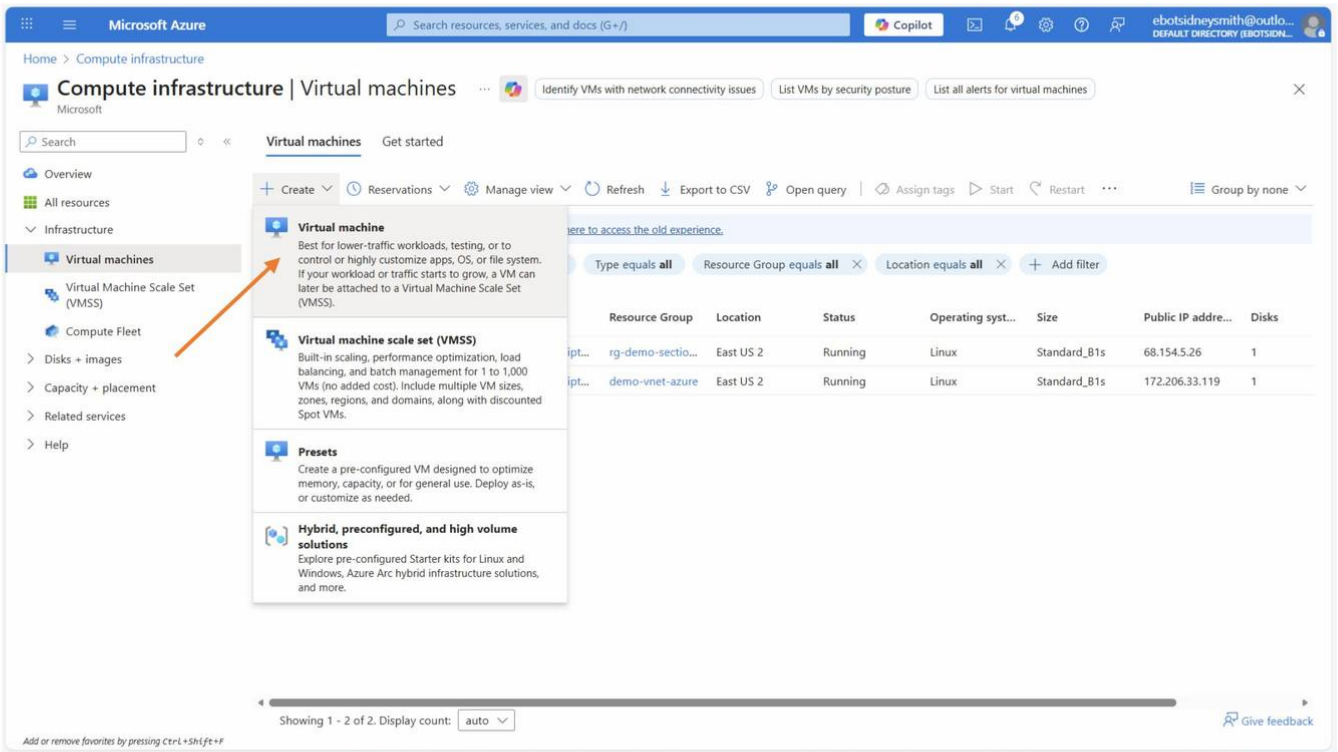
Search for "**Virtual Machines**"



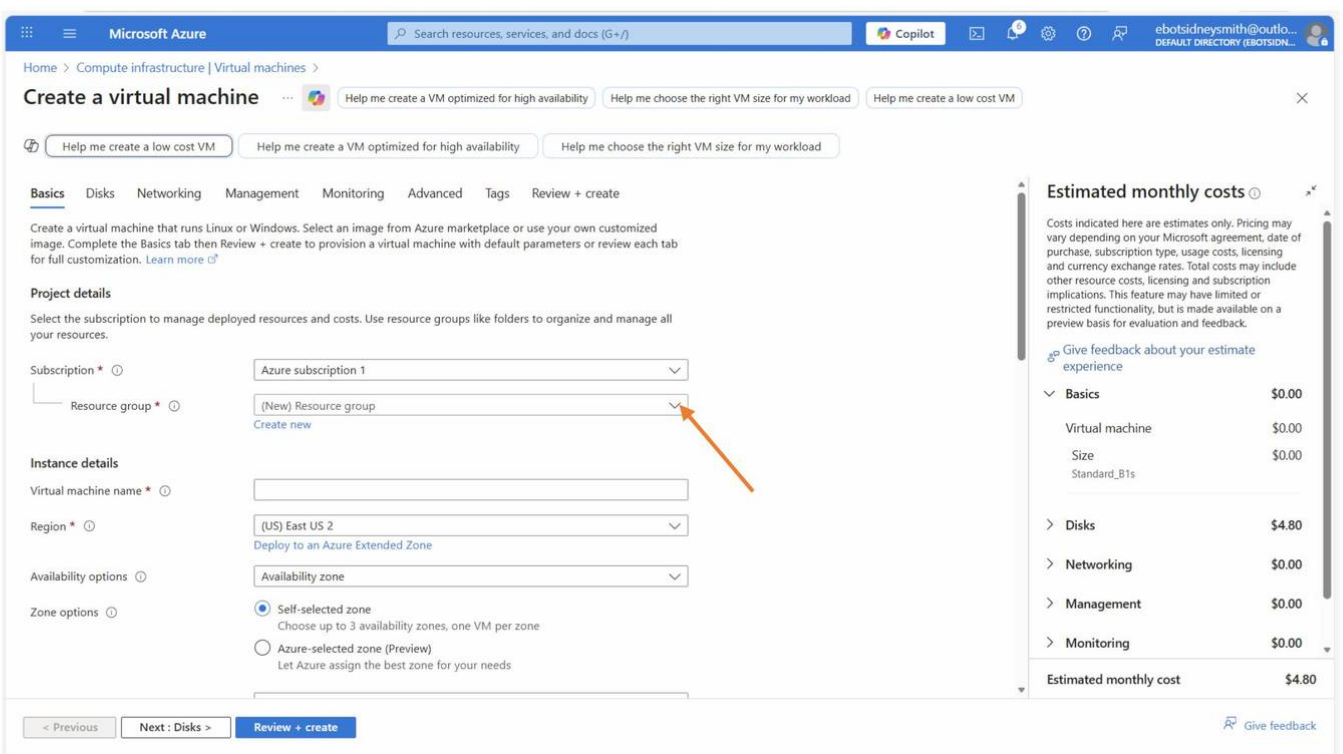
Click on "**Virtual Machines**"



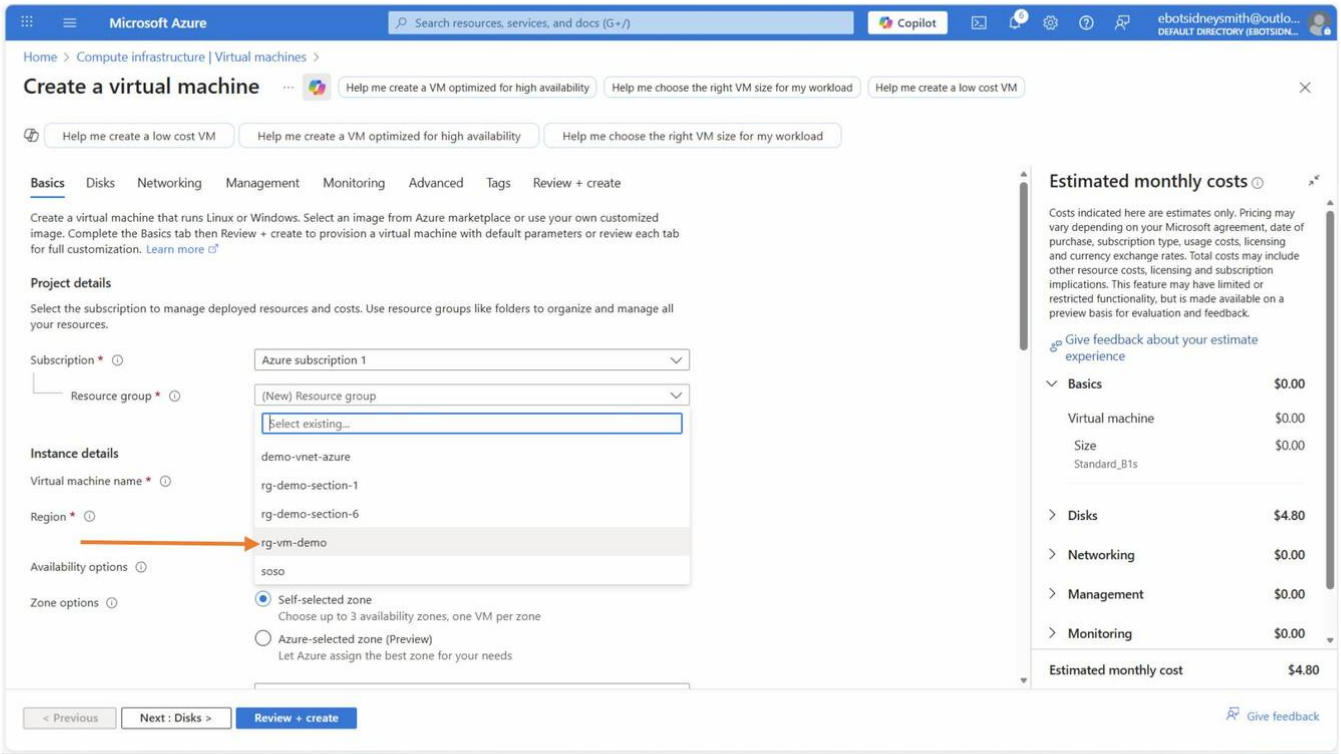
Click on the drop down on "**Create**"



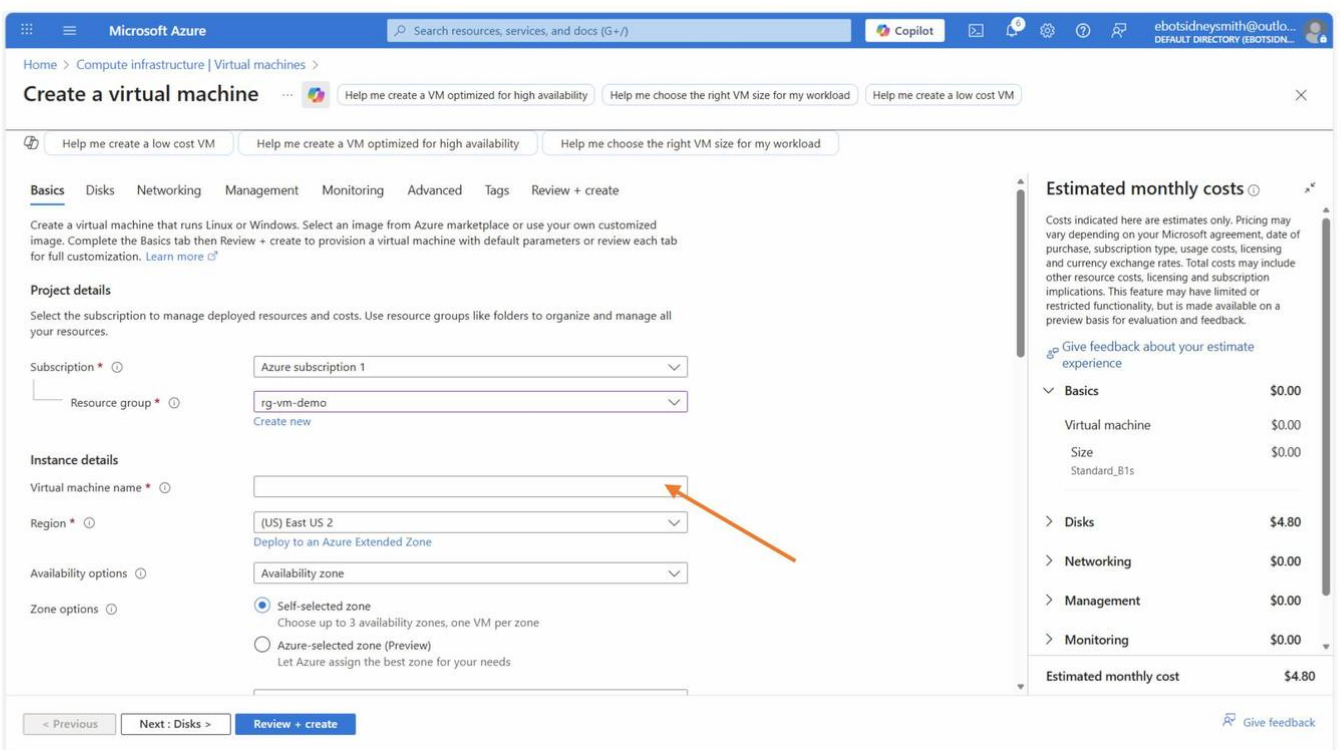
Select "**Virtual Machine**"



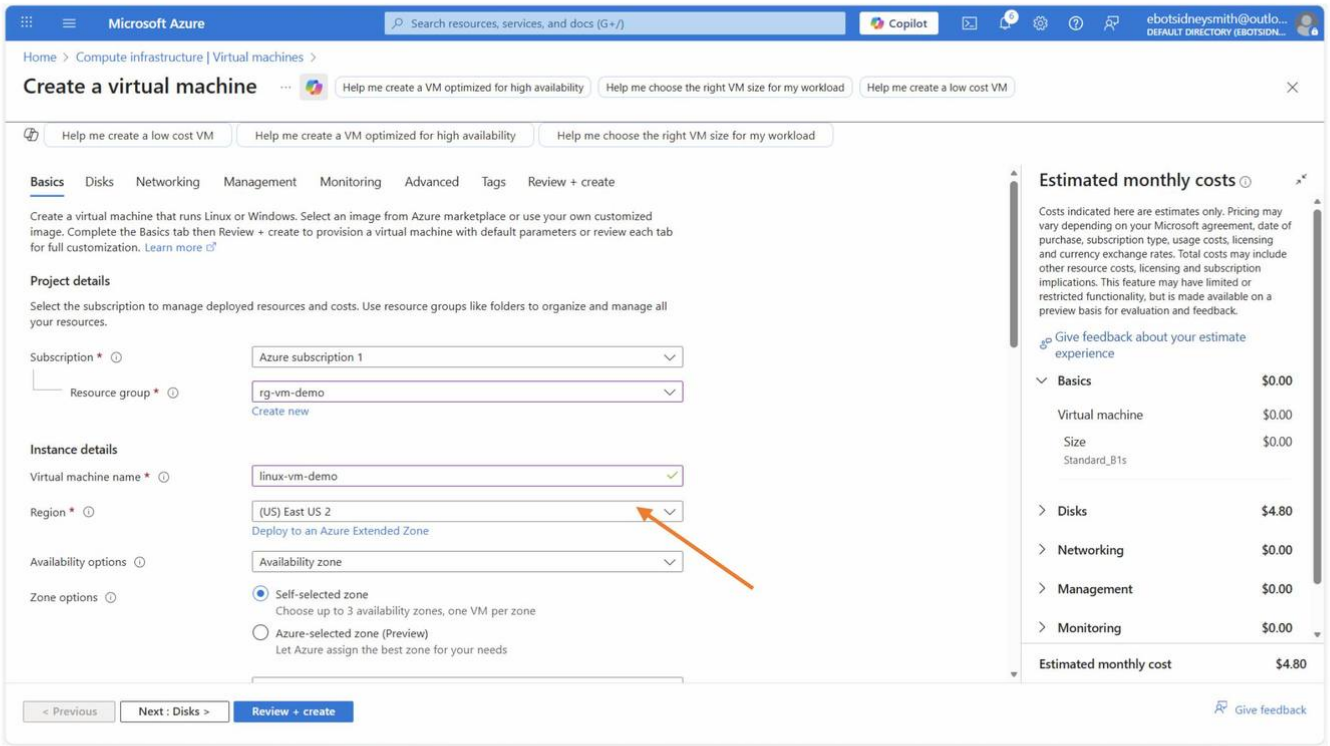
You can see that our "**Subscription**" has bee selected. Let us select the "**Resource Group**". Click on the drop down on "**Resource Group**"



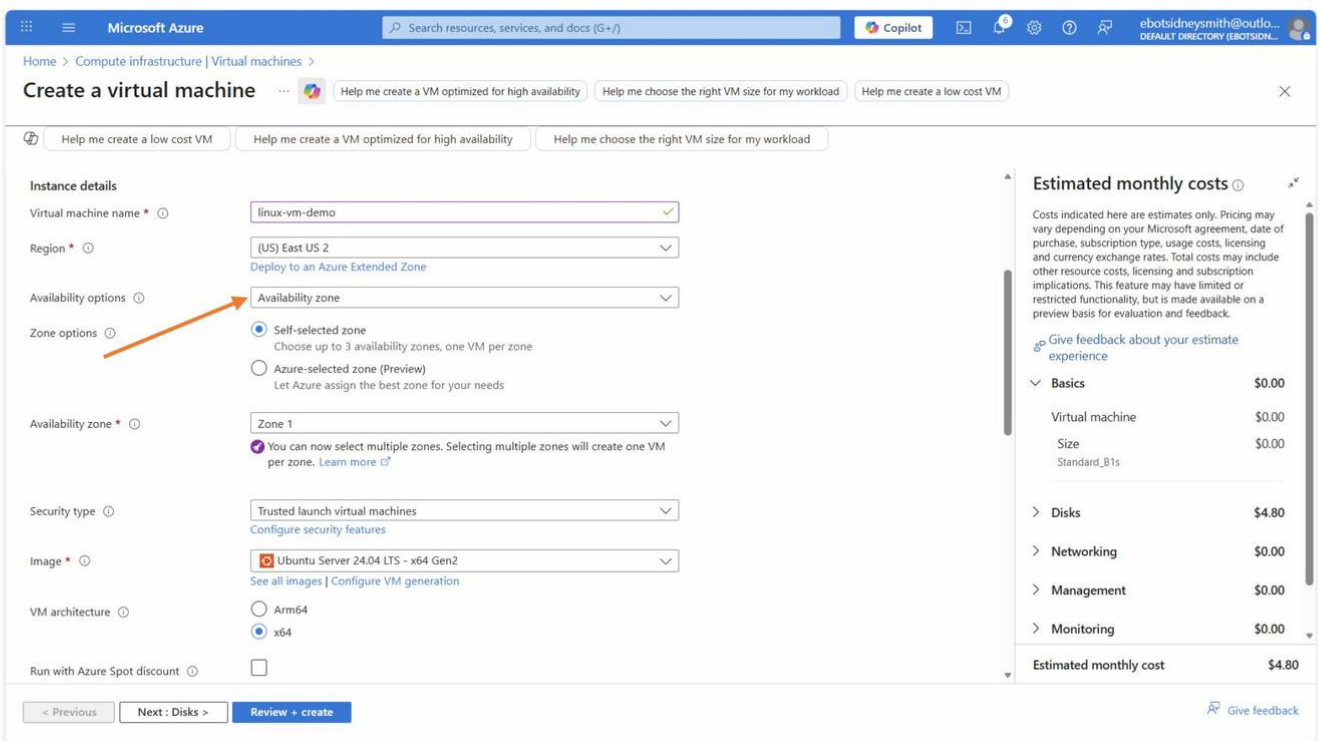
Select the "**Resource Group**" we created, that is "**rg-vm-demo**"



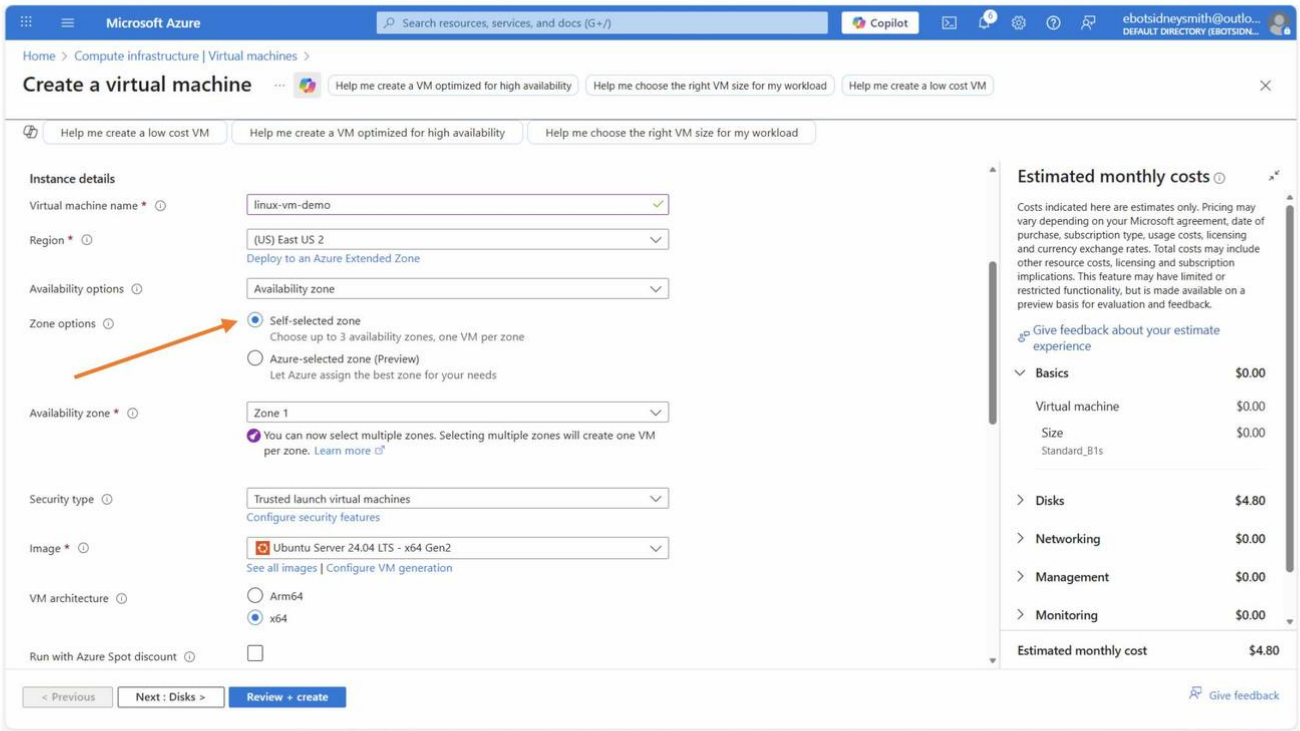
Here, we will give the "**Virtual Machine**" a name. In this demo, we are creating a Linux machine. I will call it "**linux-vm-demo**".



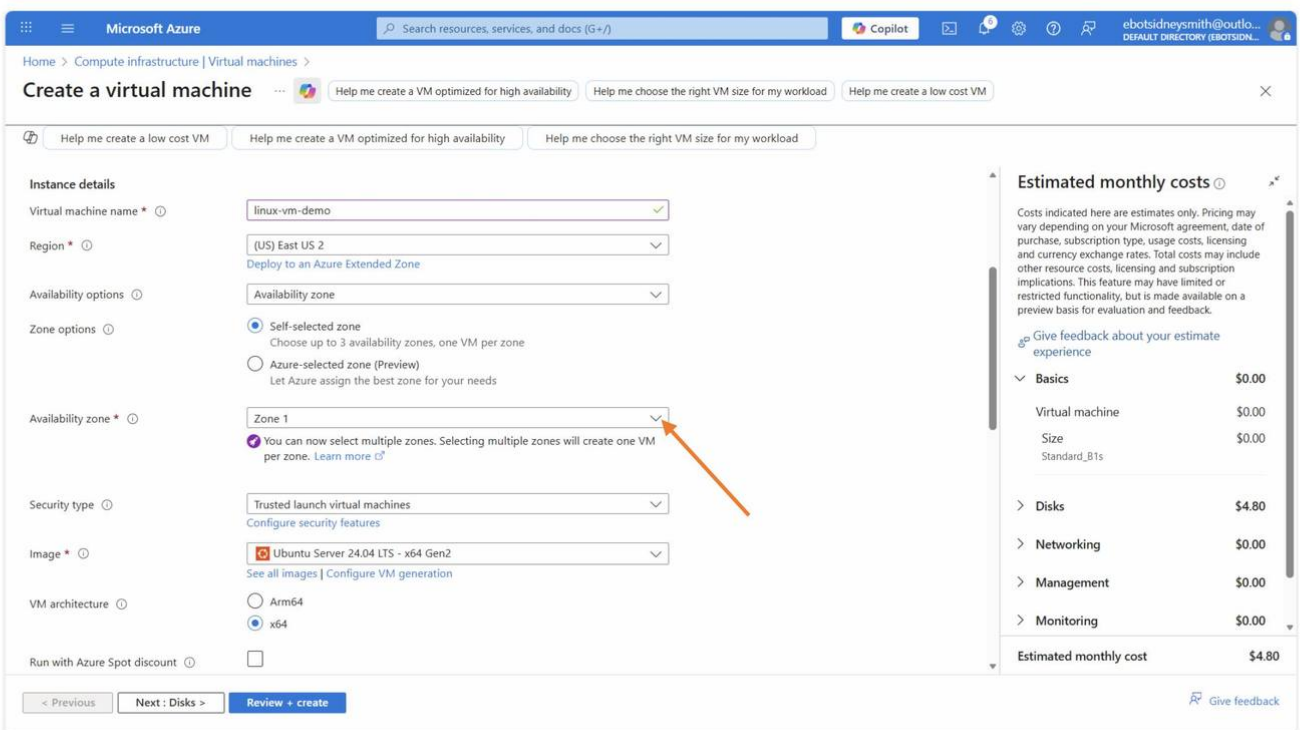
Here, on "**Region**", we will use "**East US 2**". So, we will leave it as it is.



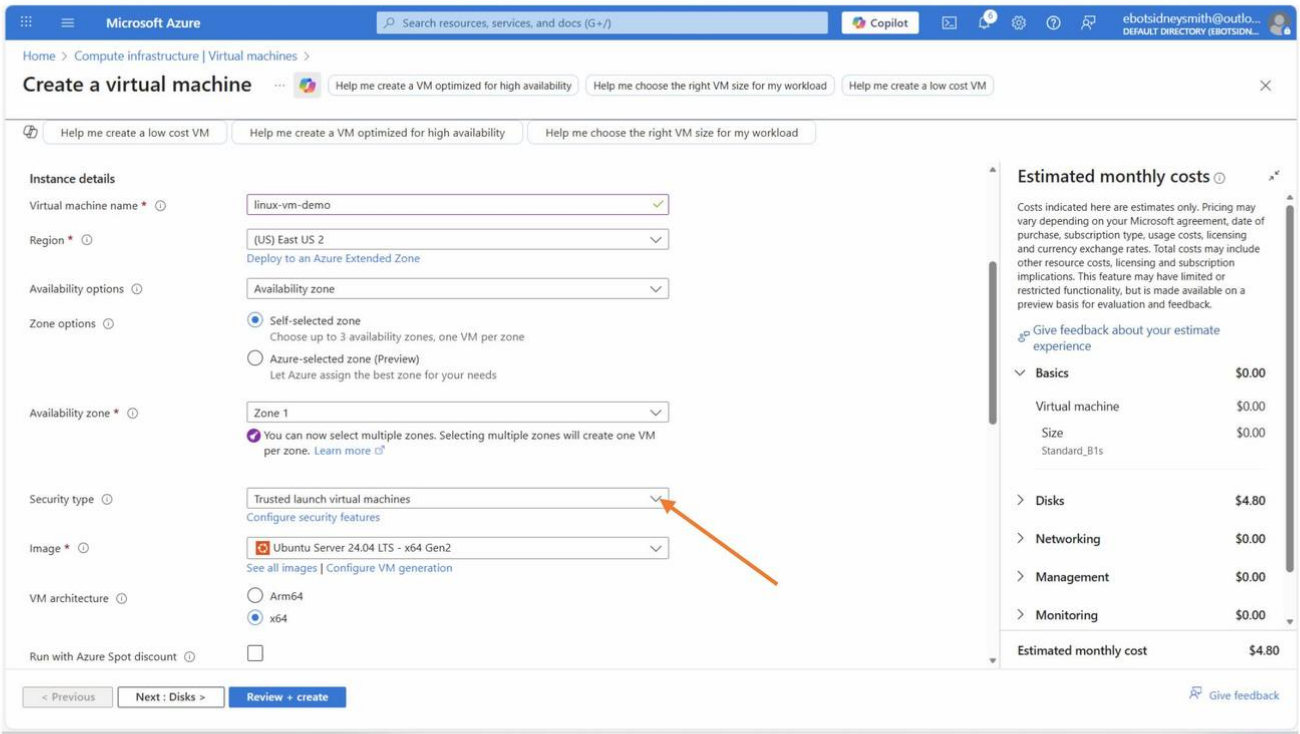
Then, on "**Availability Option**", we will select "**Availability zone**"



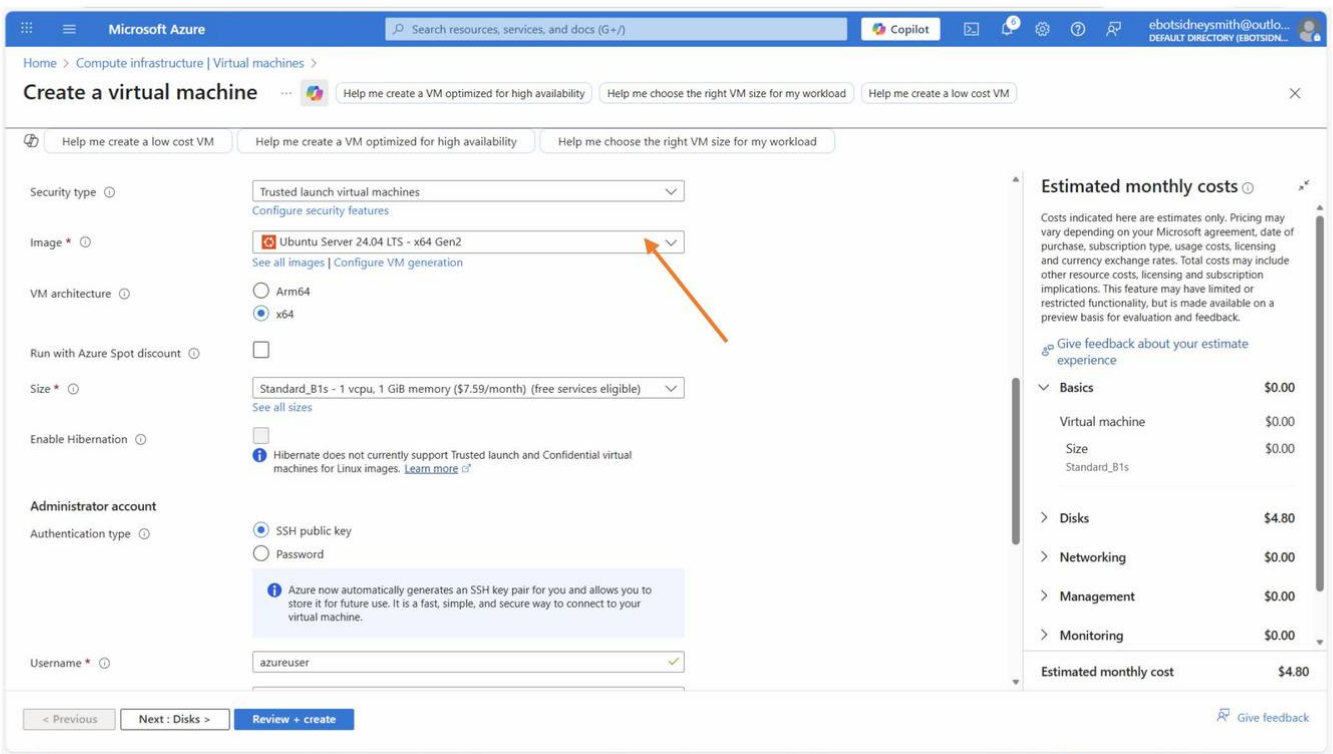
Then, on the "**Zone Options**", select "**Self-selected Zone**"



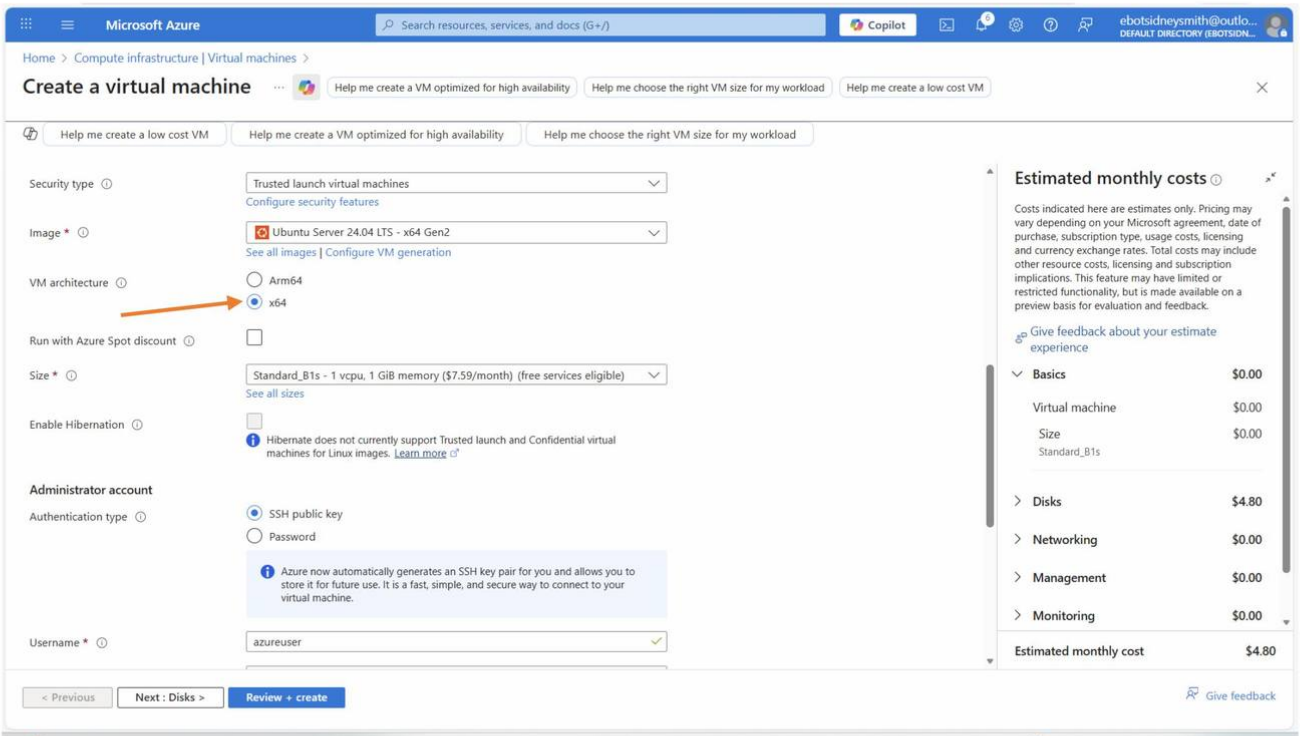
For Zone, select "**Zone 1**". But is you want to have maximum availability for your machine, you can select more zones.



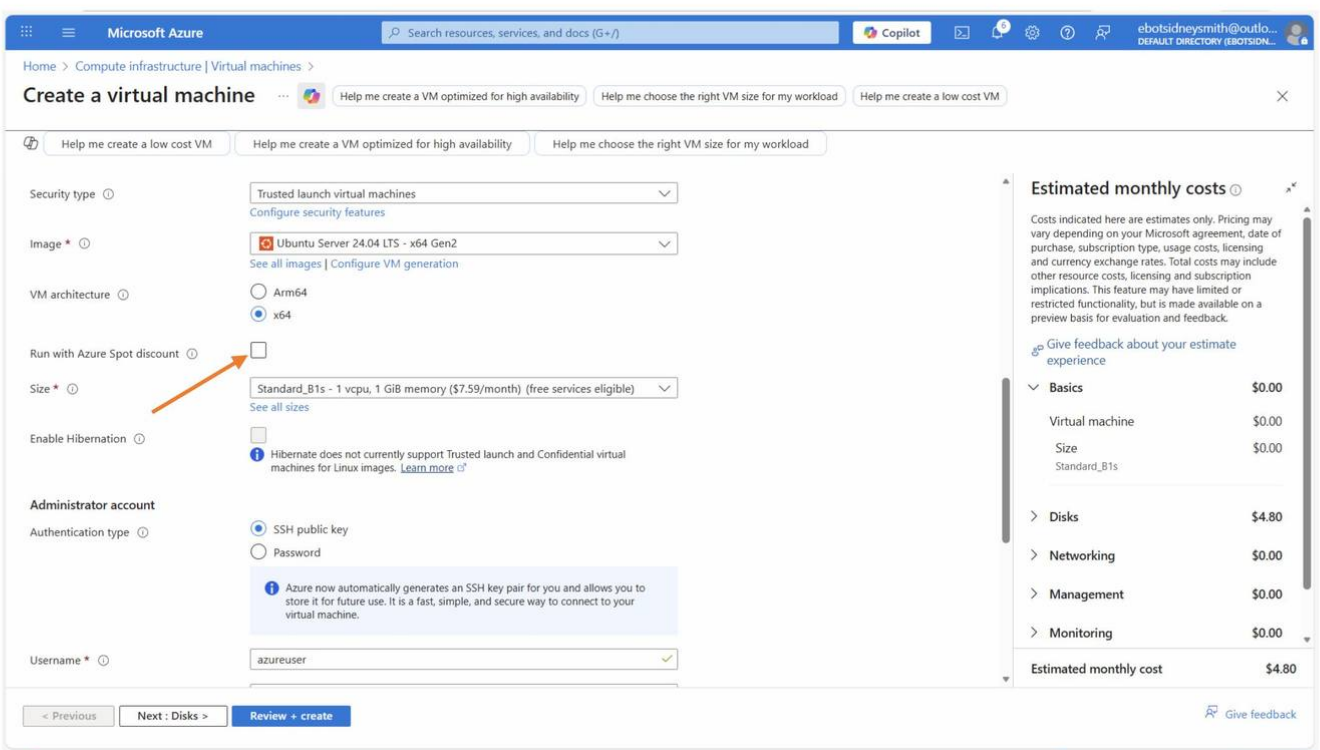
For "**Security Type**", select "**Trusted Launch virtual Machines**"



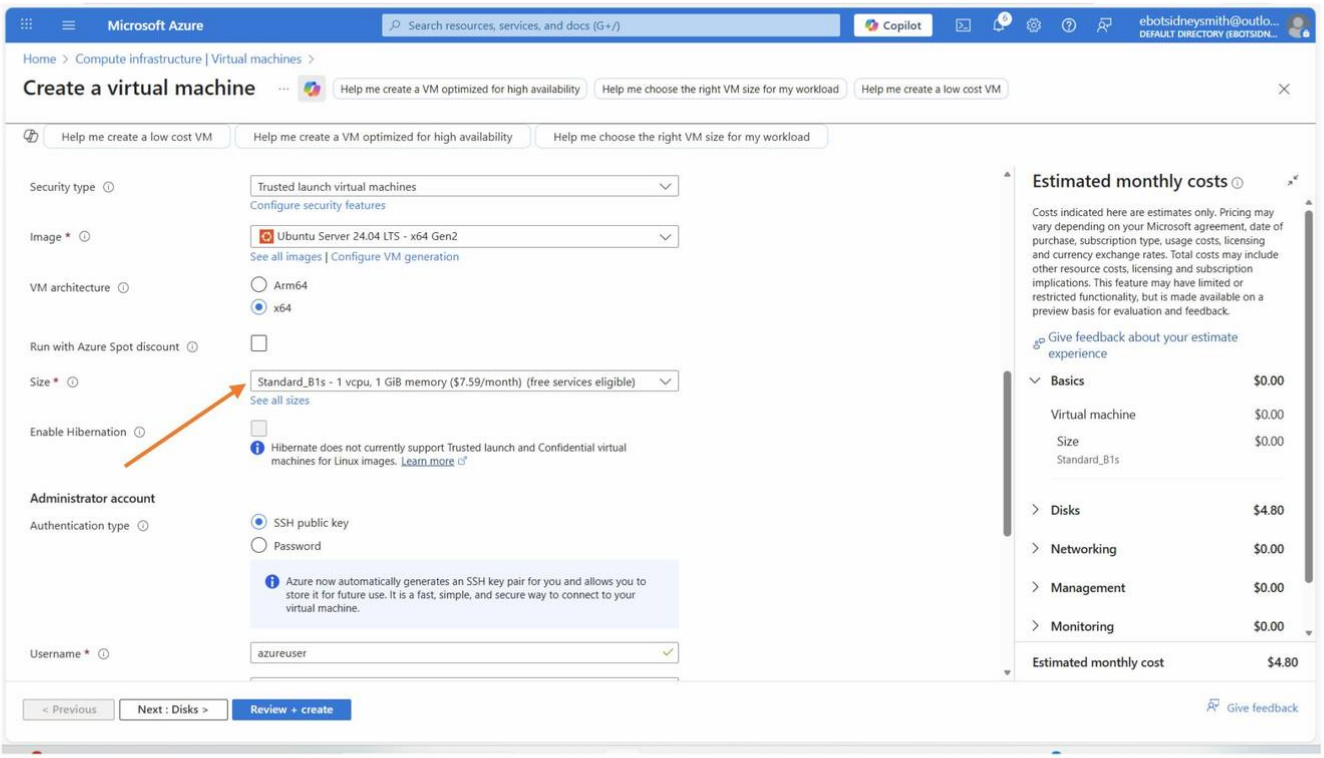
For the "**Image**", you can select any of the Linux flavour. We will select "**Ubuntu Server**".



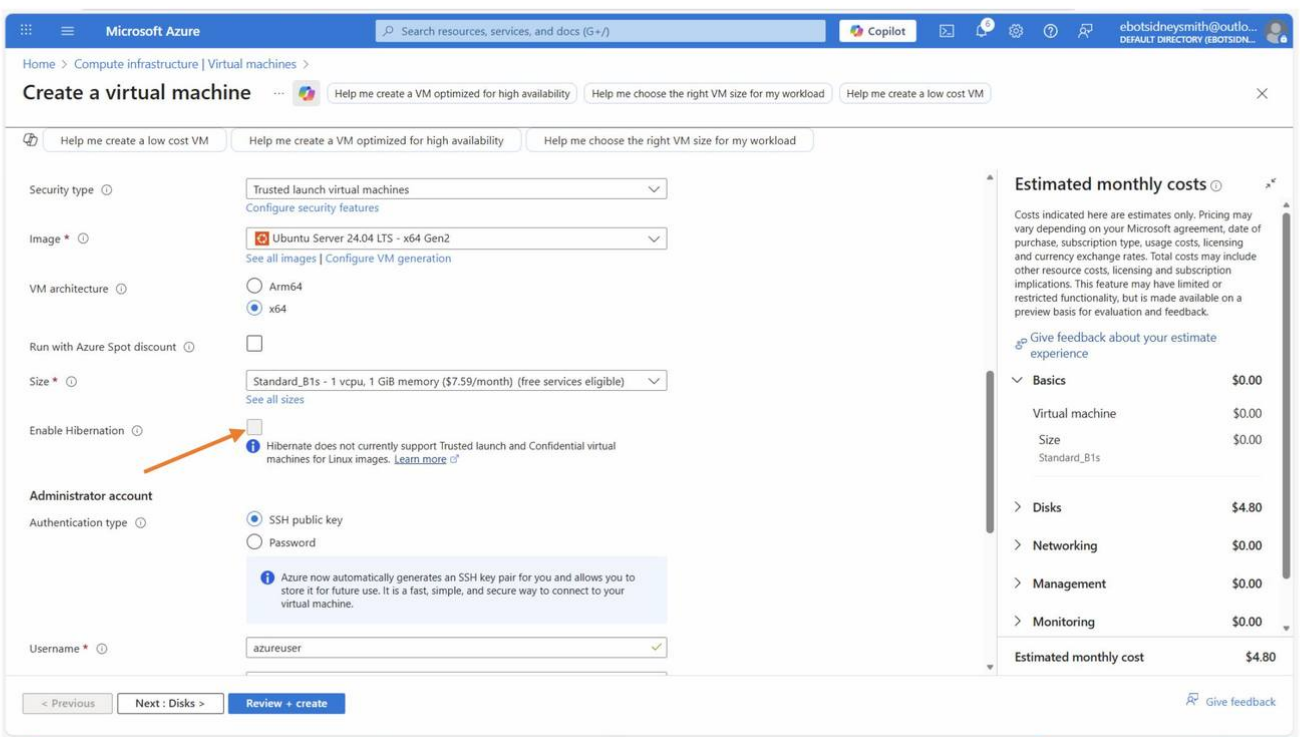
On "**VM Architecture**", select "**x64**"



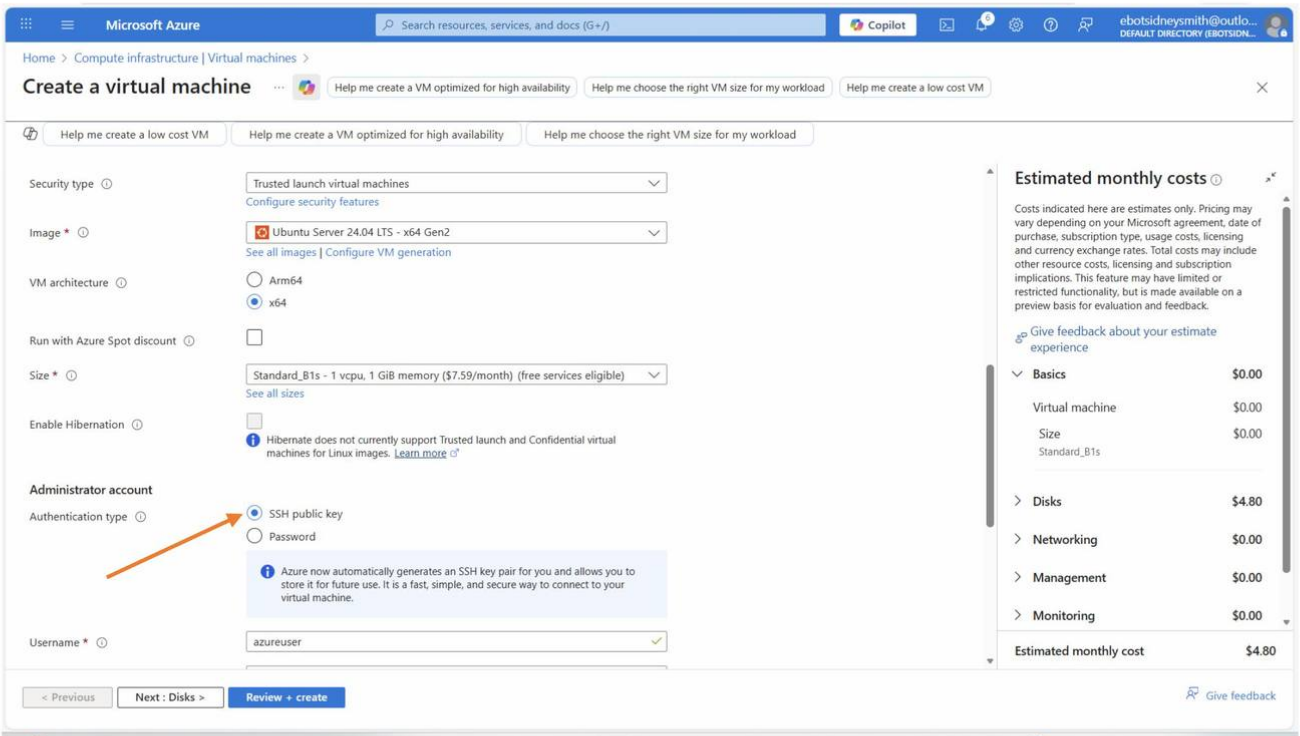
Here on "**Run with Azure Spot Discount**", leave the box "**Unchecked**"



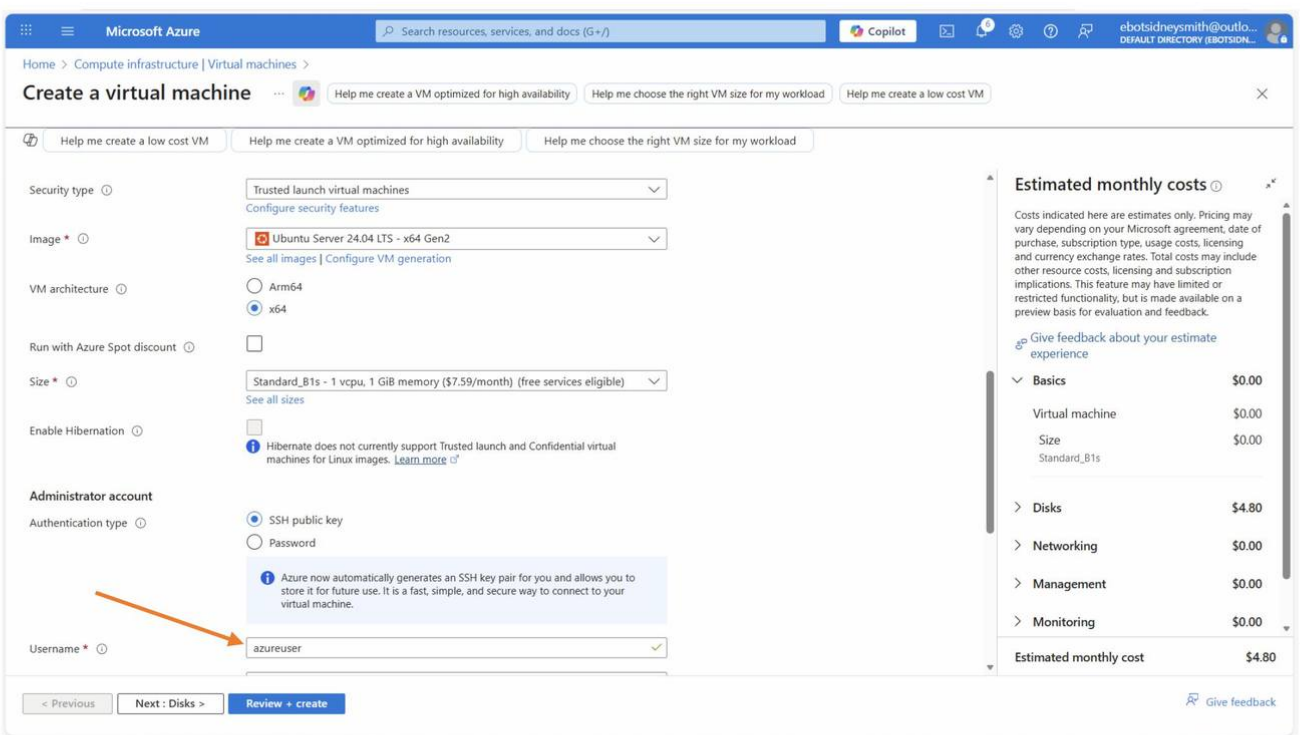
For "**Size**", select "**Standard_B1s-1 vcpu .....**" to keep the cost low.



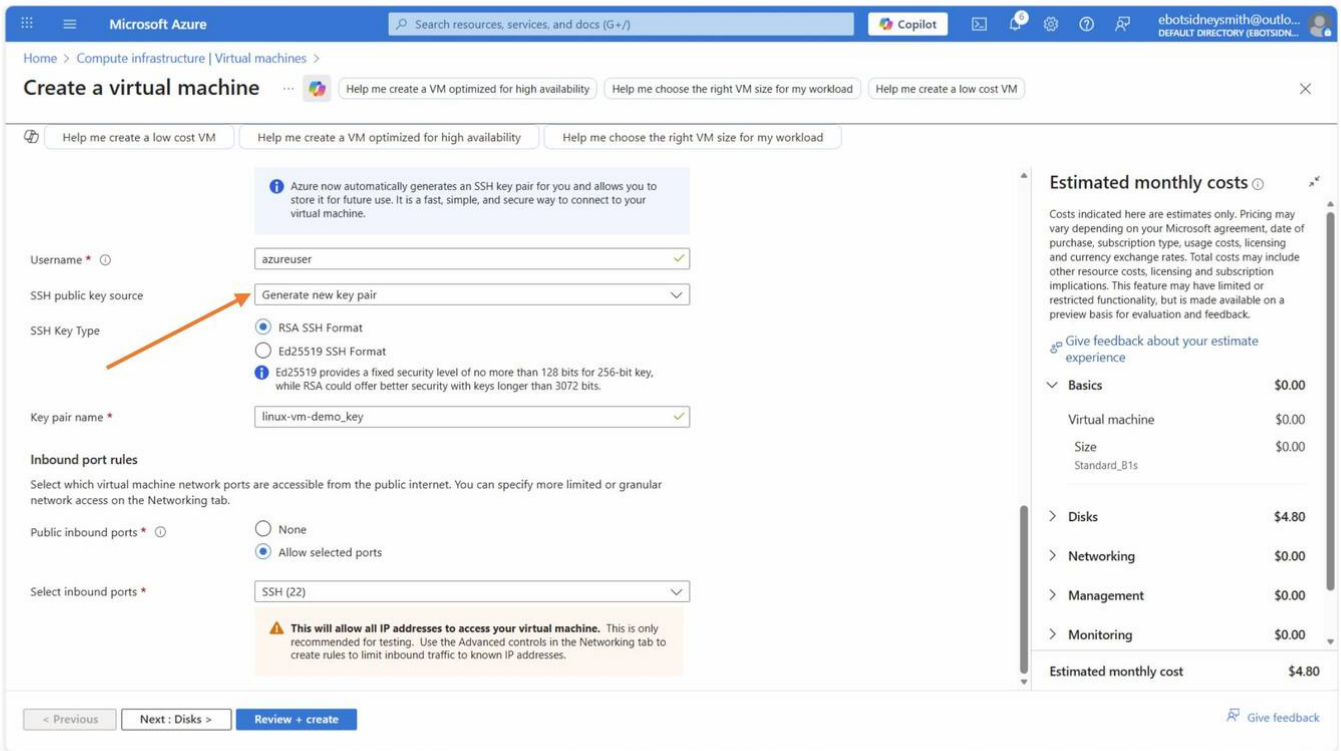
On "**Enable Hibernation**", leave the box "**Unchecked**"



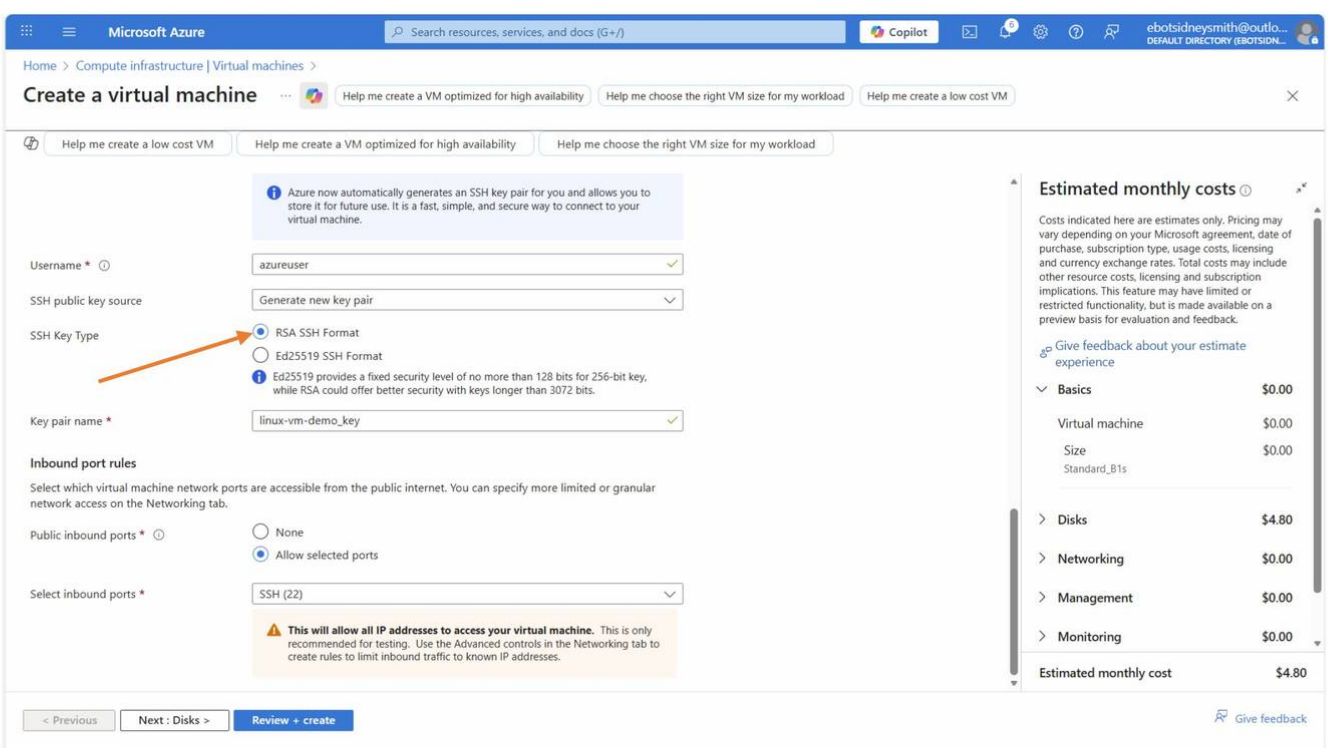
The next thing is how we are going to access our application or virtual machine. There two ways you can access the virtual machine. There is a username and password. And the other one is "SSH Public Key". Username and password is quite simple, but it is recommended to always use "**SSH Public Key**" which is assumed to be the most secured ways of securing the login to your virtual machine. Select the "**SSH Public Key**".



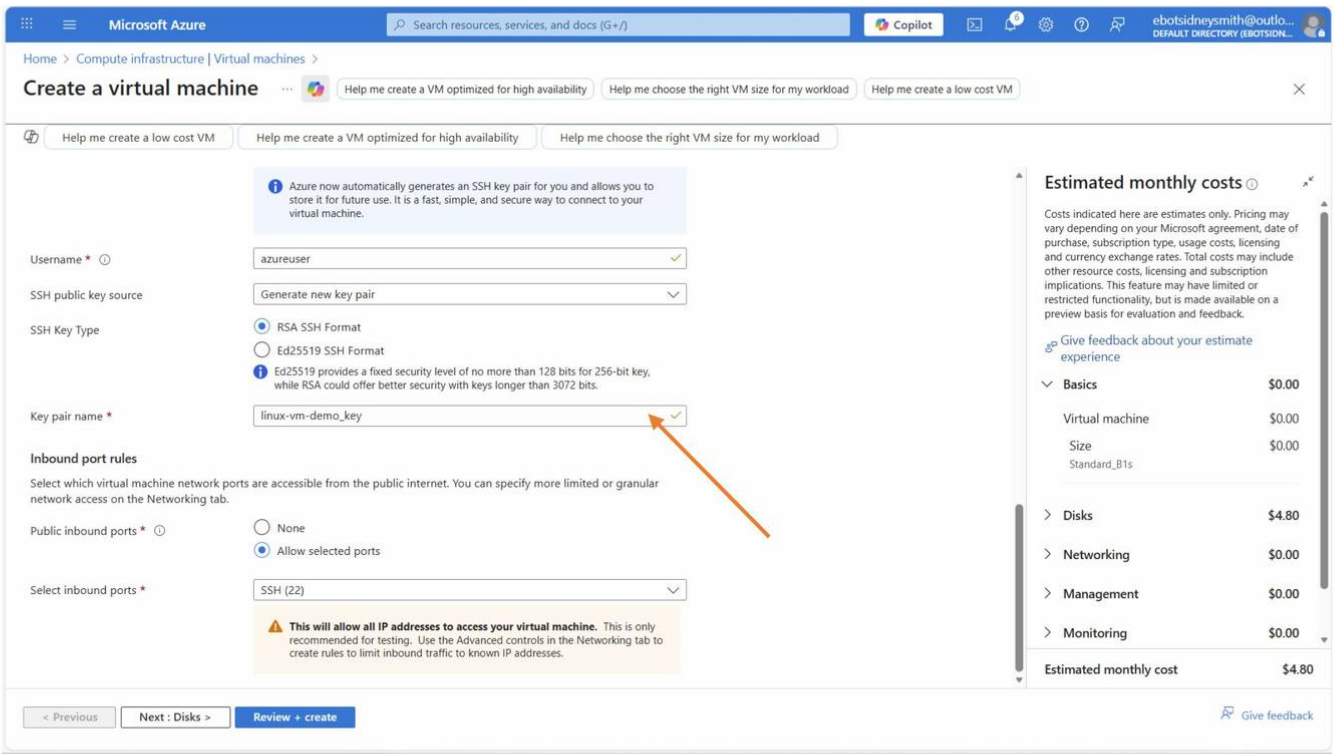
Then on "**Username**", leave it as "**azureuser**"



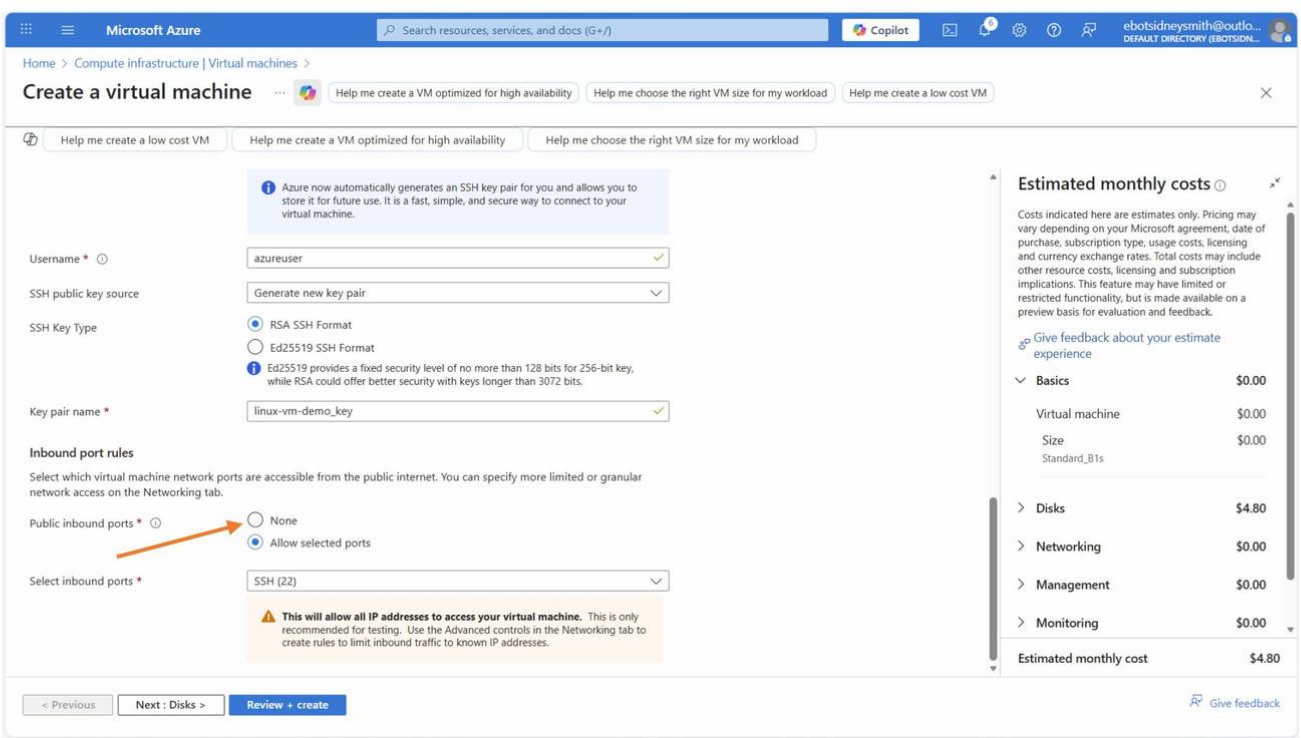
Then, on "**SSH Public Key Source**", select "**Generate new key pair**"



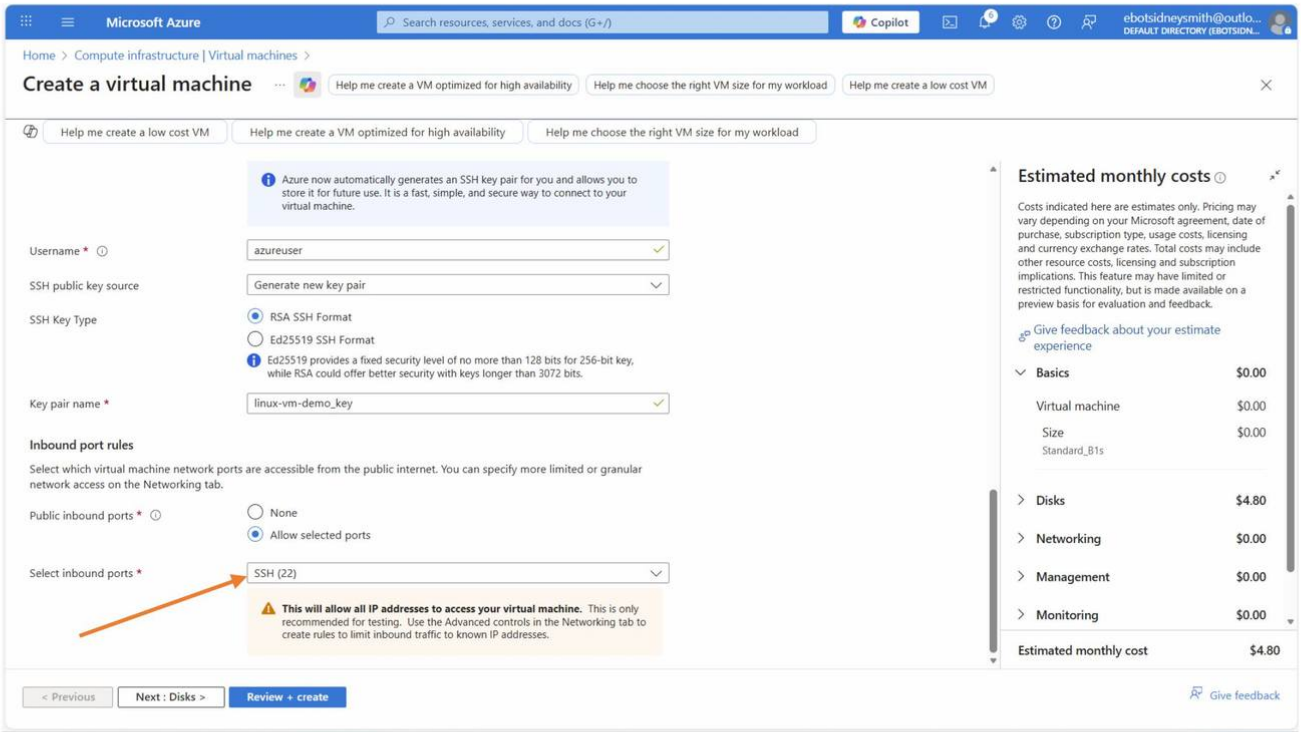
Then on "**SSH Key Type**", select "**RSA SSH Format**"



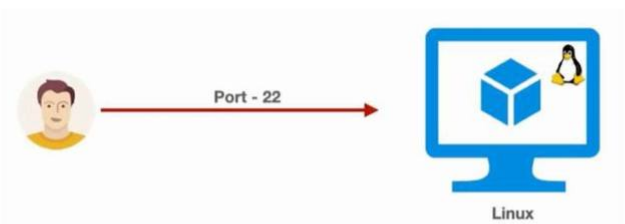
For the "**Key Pair Name**", we will just leave it as "**linux-vm-demo-key**". This key will be downloaded once the virtual machine is provisioned. The key will contain the public and private key.



On "**Public Inbound ports**", we will select "**Allow selected ports**"

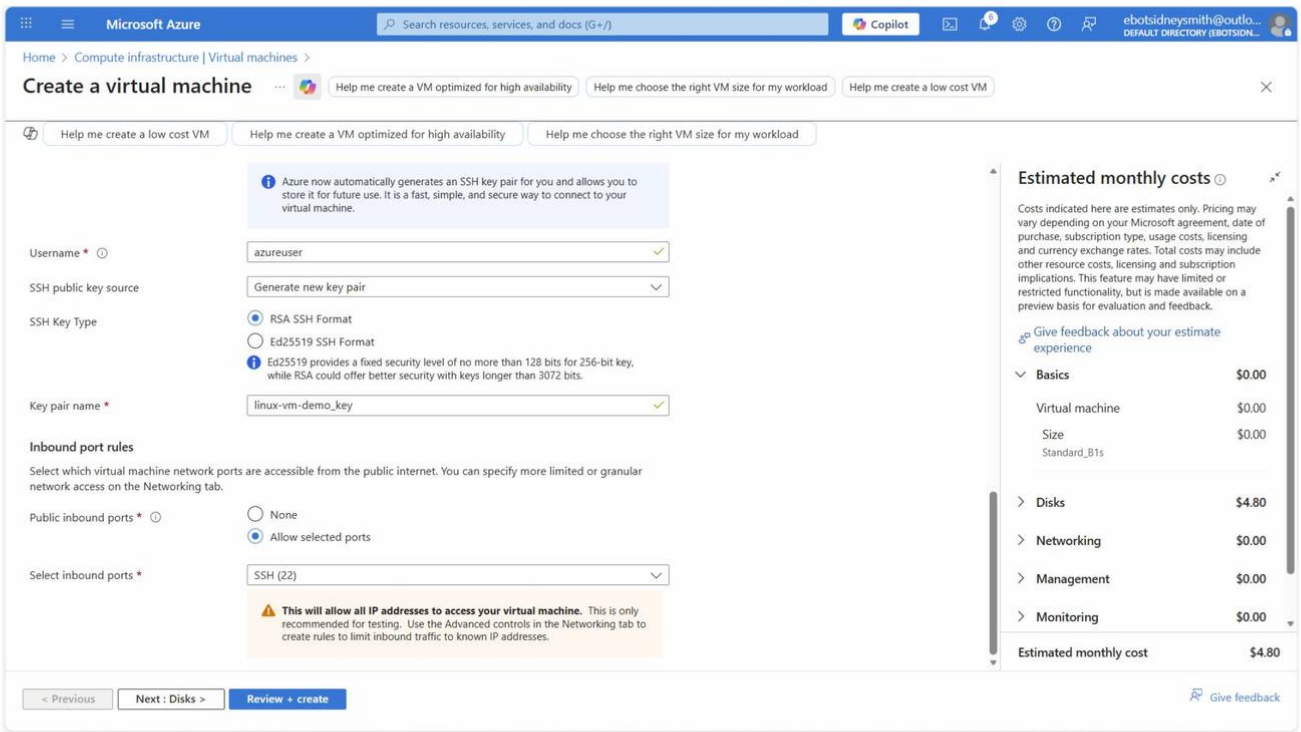


Then, the next thing is "**Select Inbound ports**". You need to understand some concepts here.

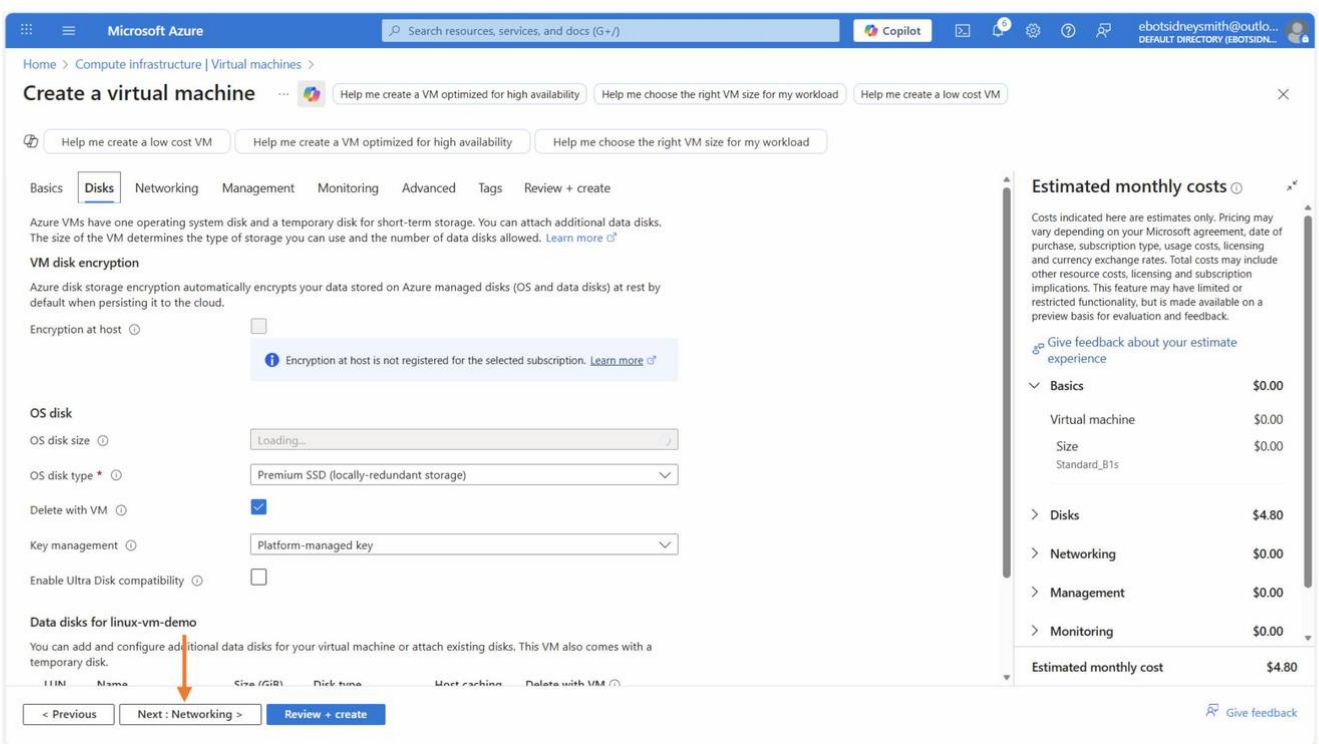


Here is a basic flow of how you can access a virtual machine. If a user wants to access the Linux virtual machine, then there should be a port which needs to be opened, and that port for Linux machines is 22. So, port 22 needed to be enabled and open for that virtual machine otherwise that user will not be able to access or login into the virtual machine using the public IP. We are going to learn about Public IP later.

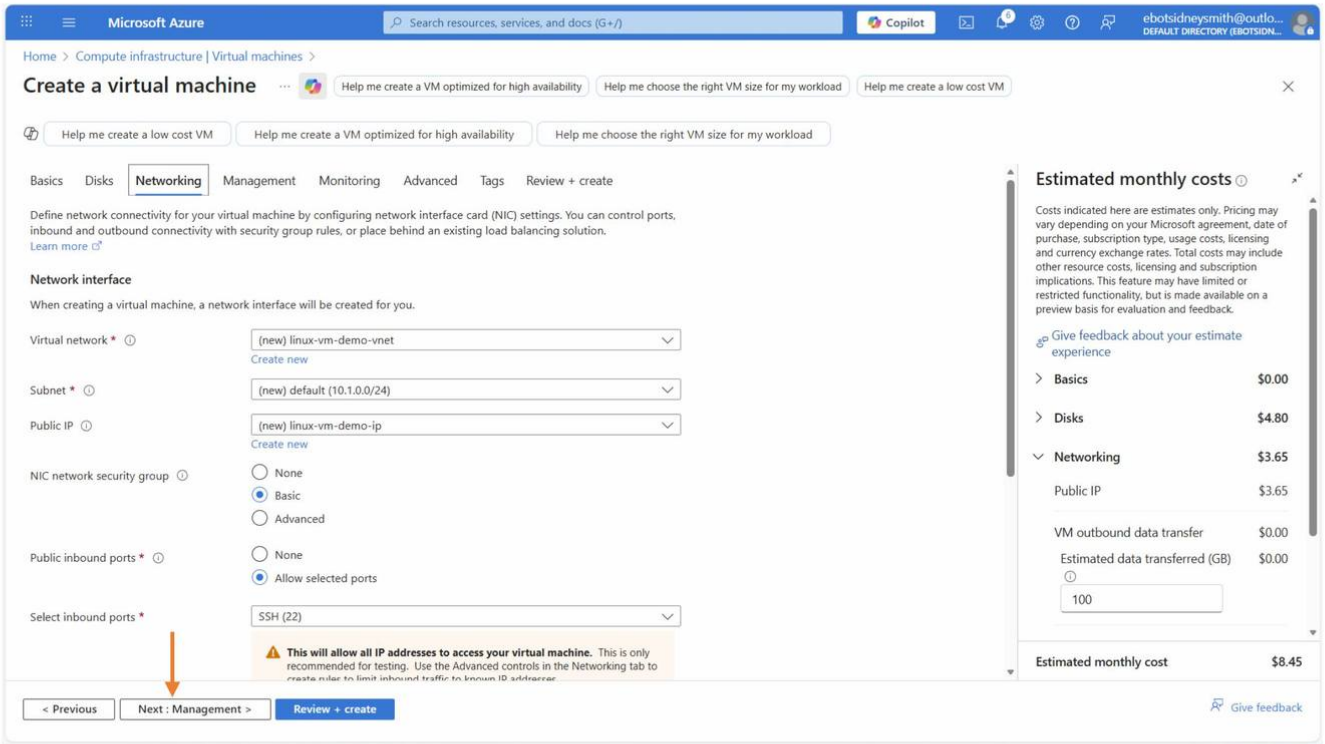
So, "**Select Inbound ports**", we will select "**SSH (22)**"



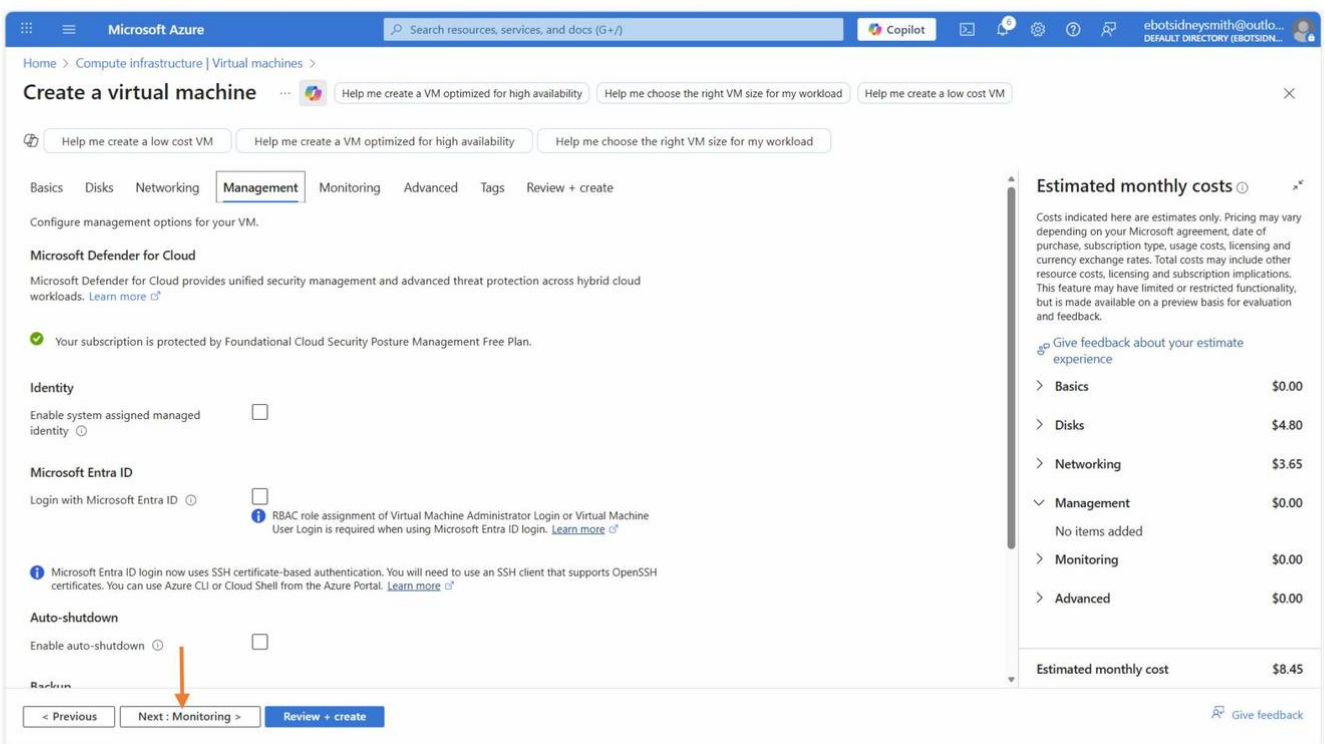
Then click on "**Next: Disks**"



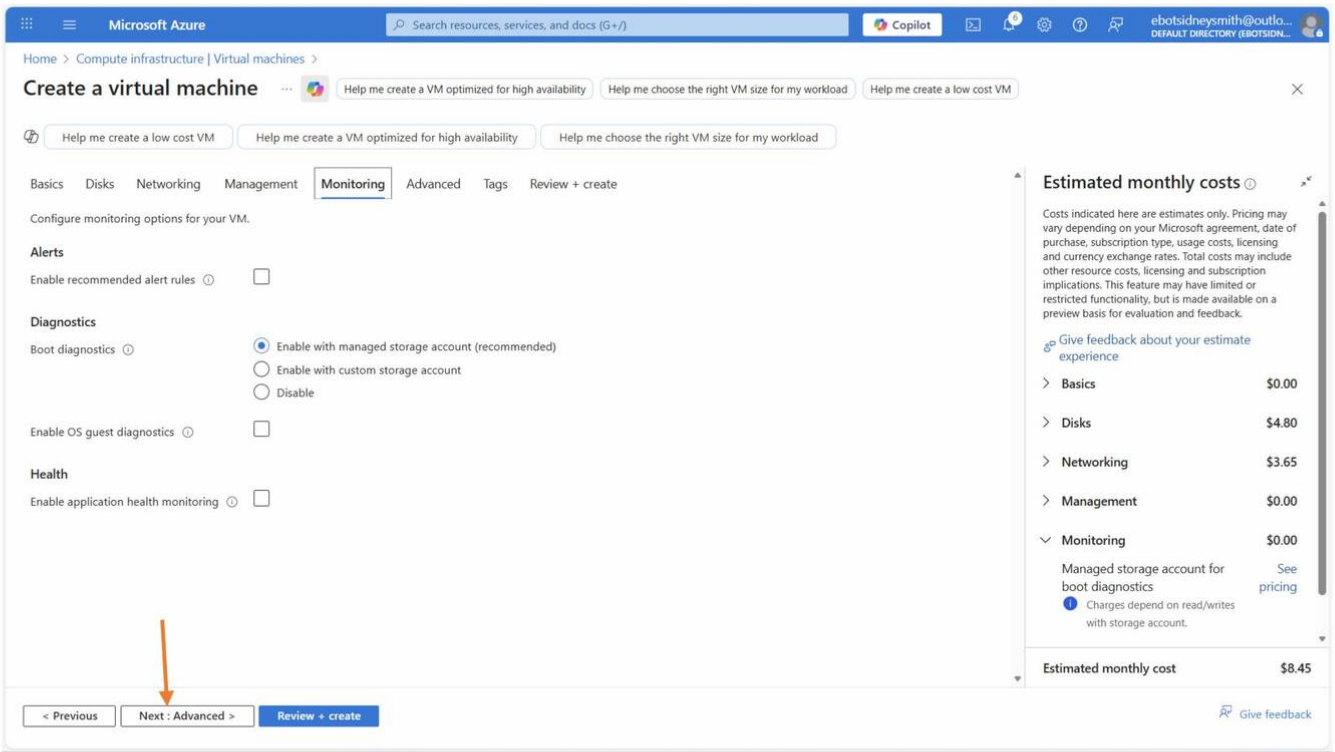
Here we are going to use the default values. We will leave every thing as default and click on "**Next: Networking**".



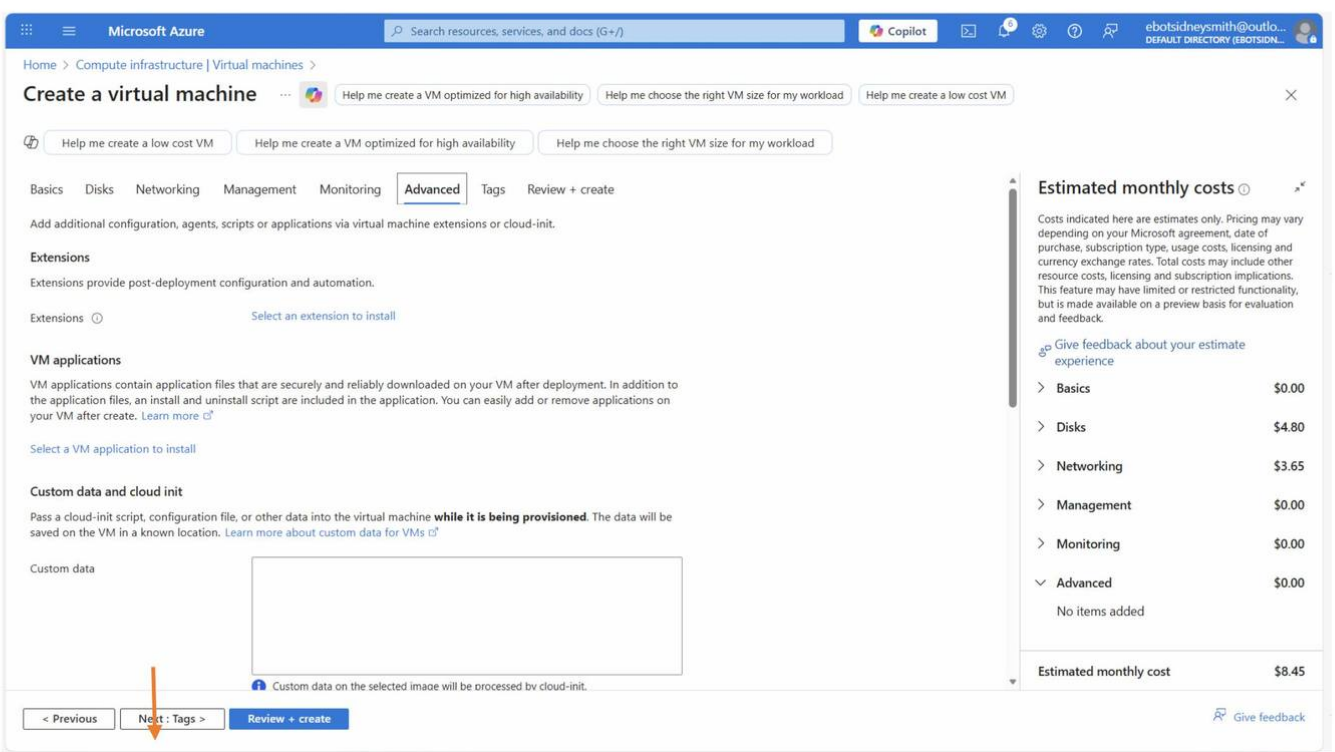
Here we will keep all the default selections and click on "**Next: Management**"



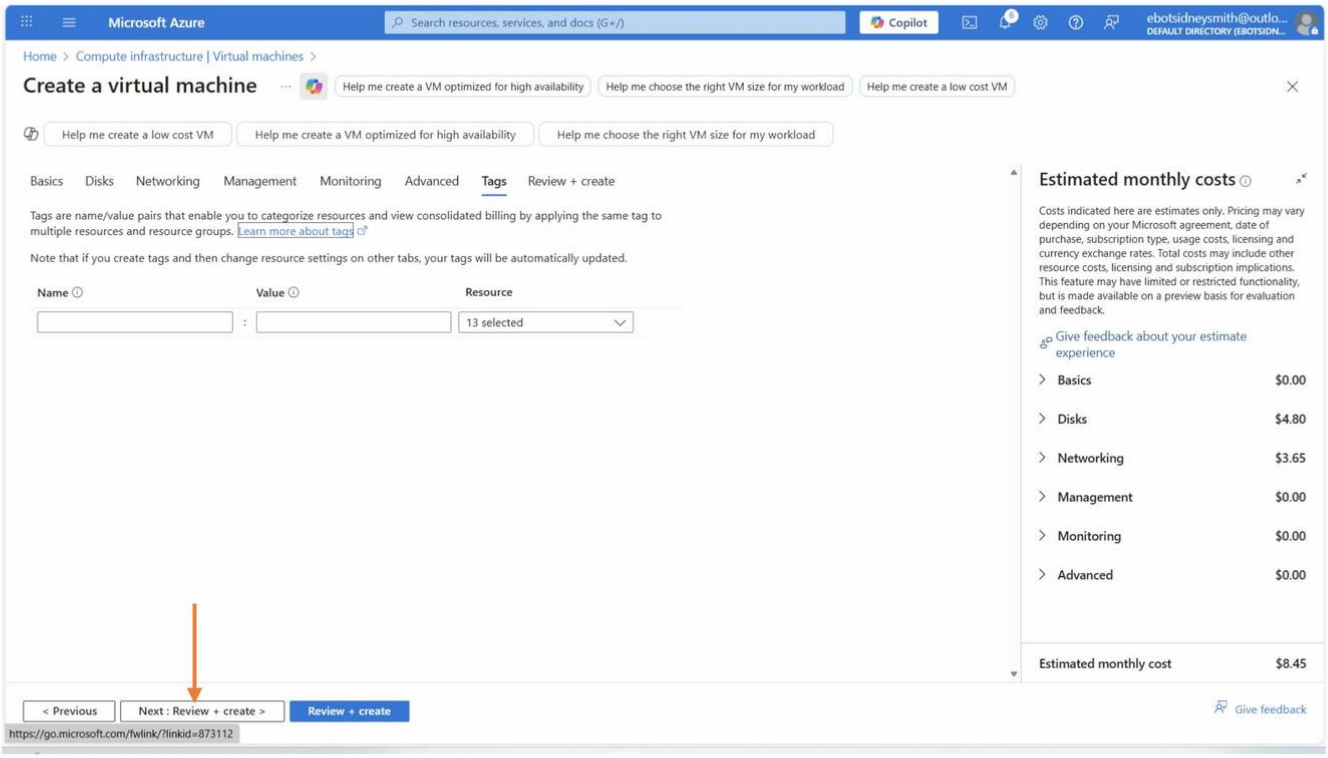
Here we will leave everything as default and click on "**Next: Monitoring**"



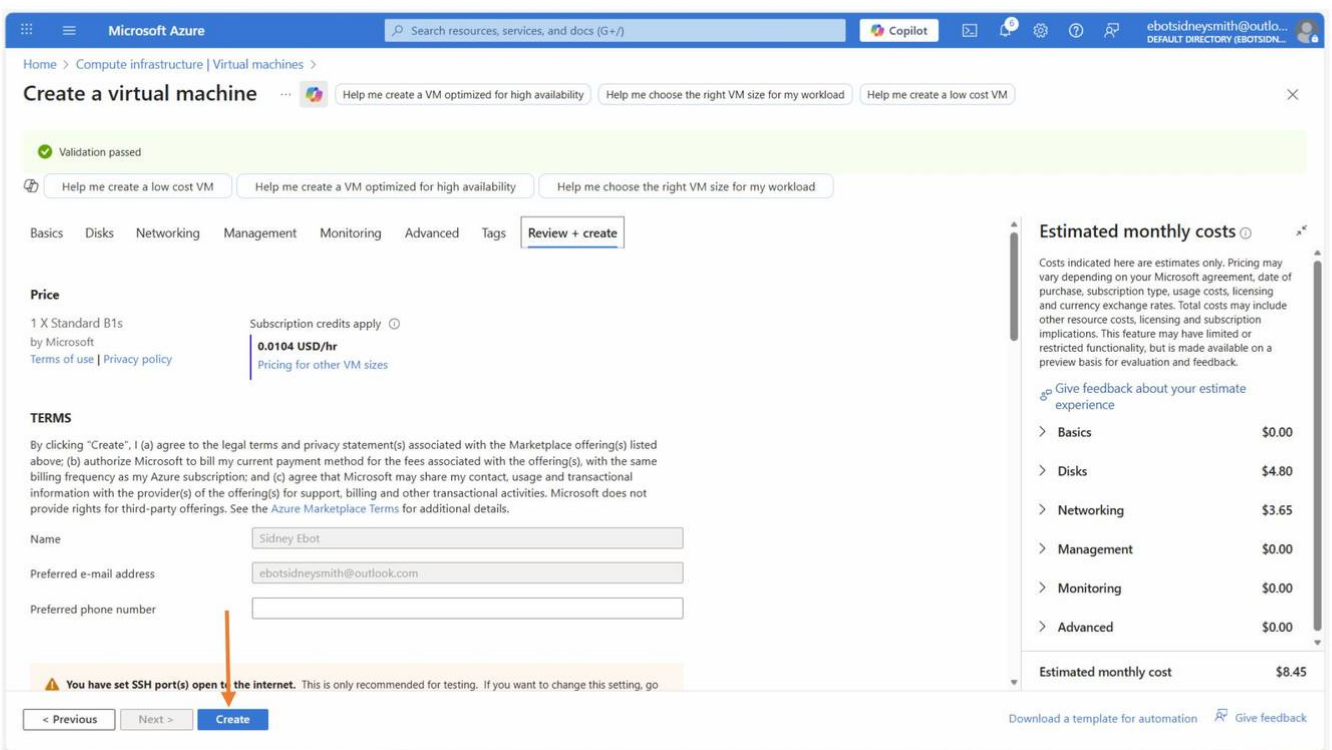
Here, we are also going to leave everything as default. Click on "**Next: Advanced**"



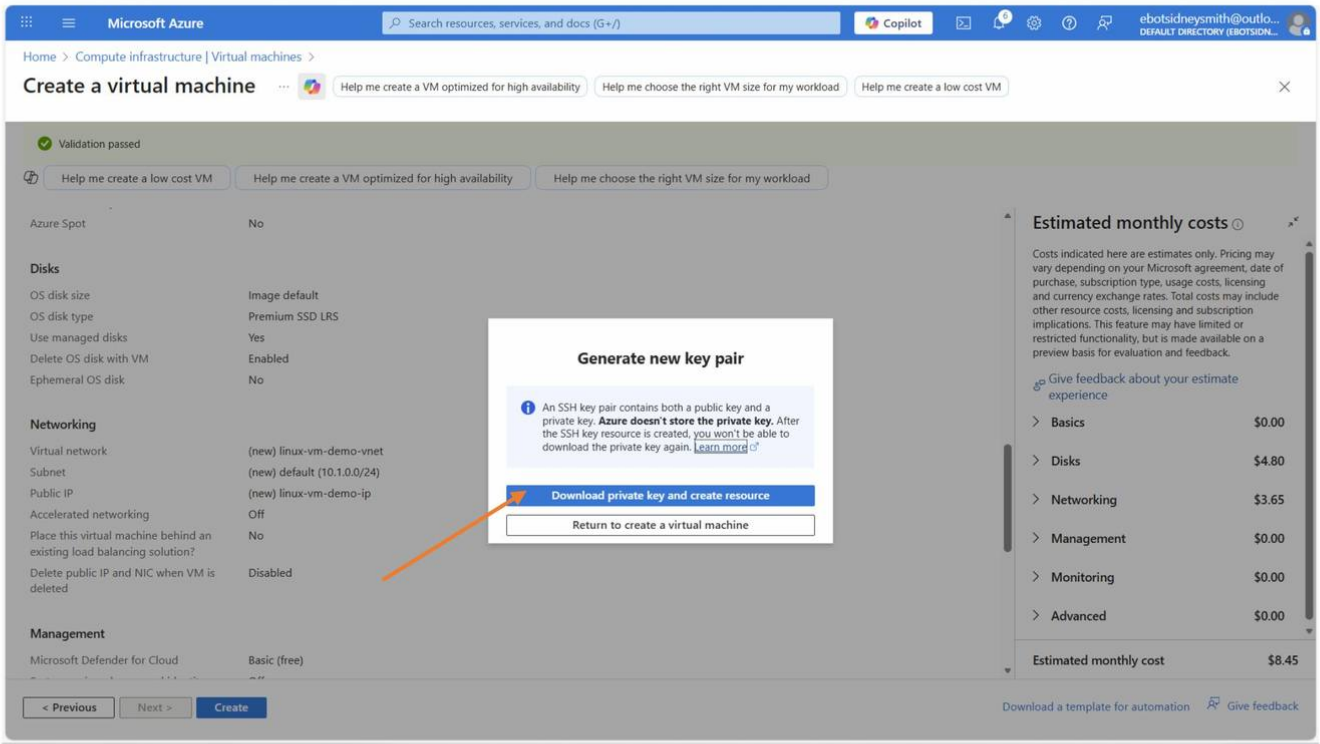
Here, we will leave everything as default and click on "**Next: Tags**"



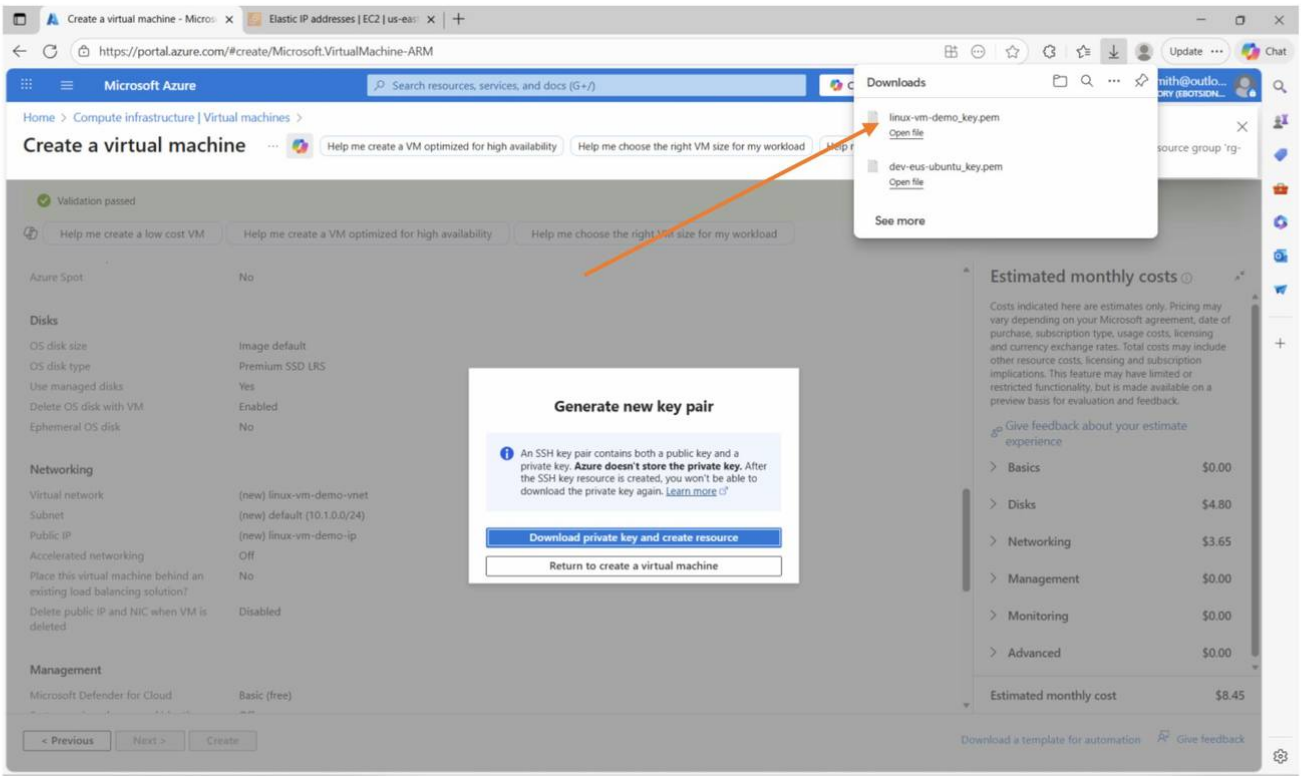
We are not going to add any “Tags”, we will leave it as default. Click on “**Next: Review + Create**”



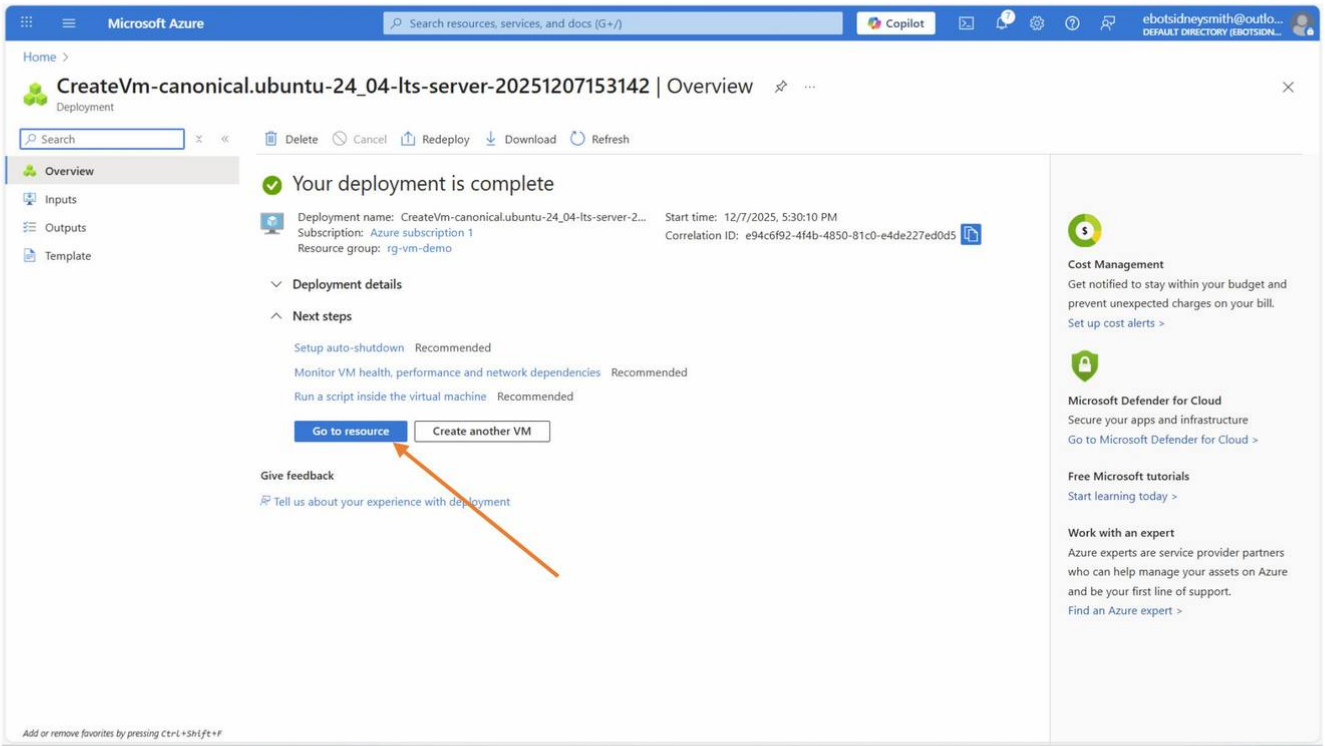
Review and click on “**Create**”



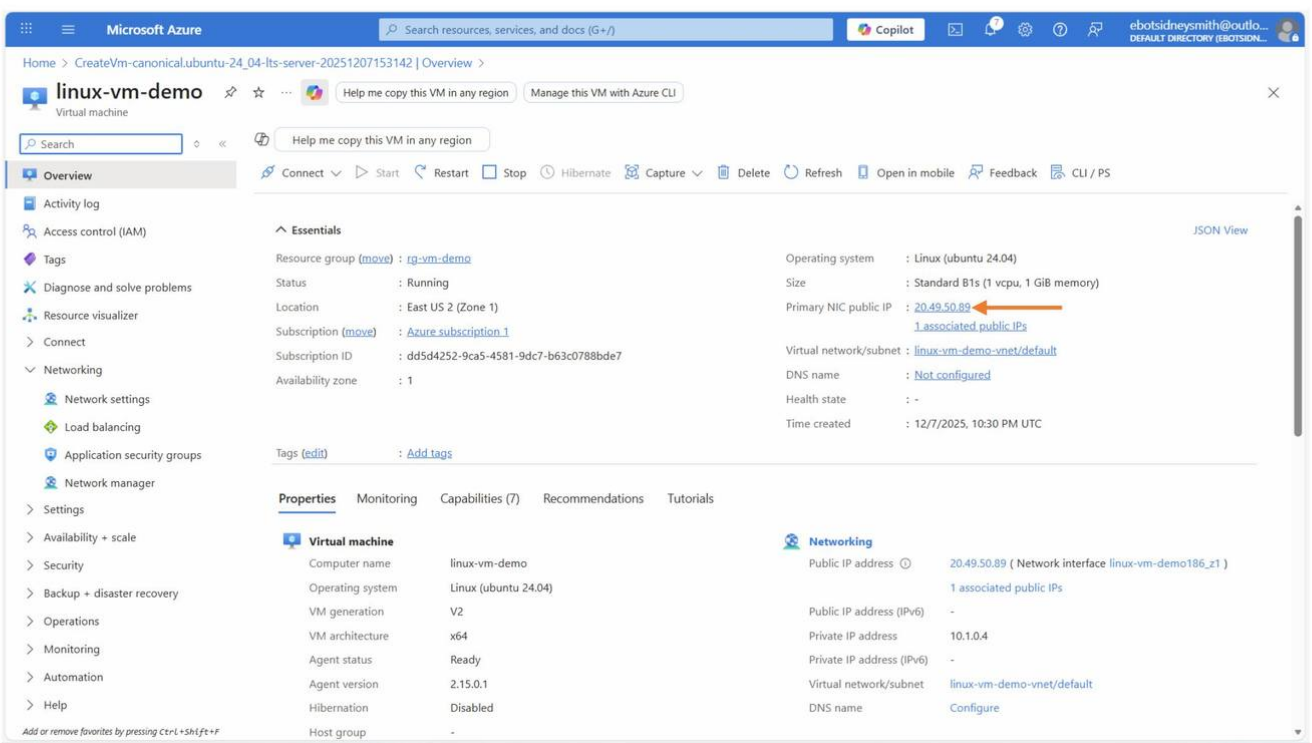
Then, click on "**Download private key and create resource**"



You can see that the key pair has been downloaded.

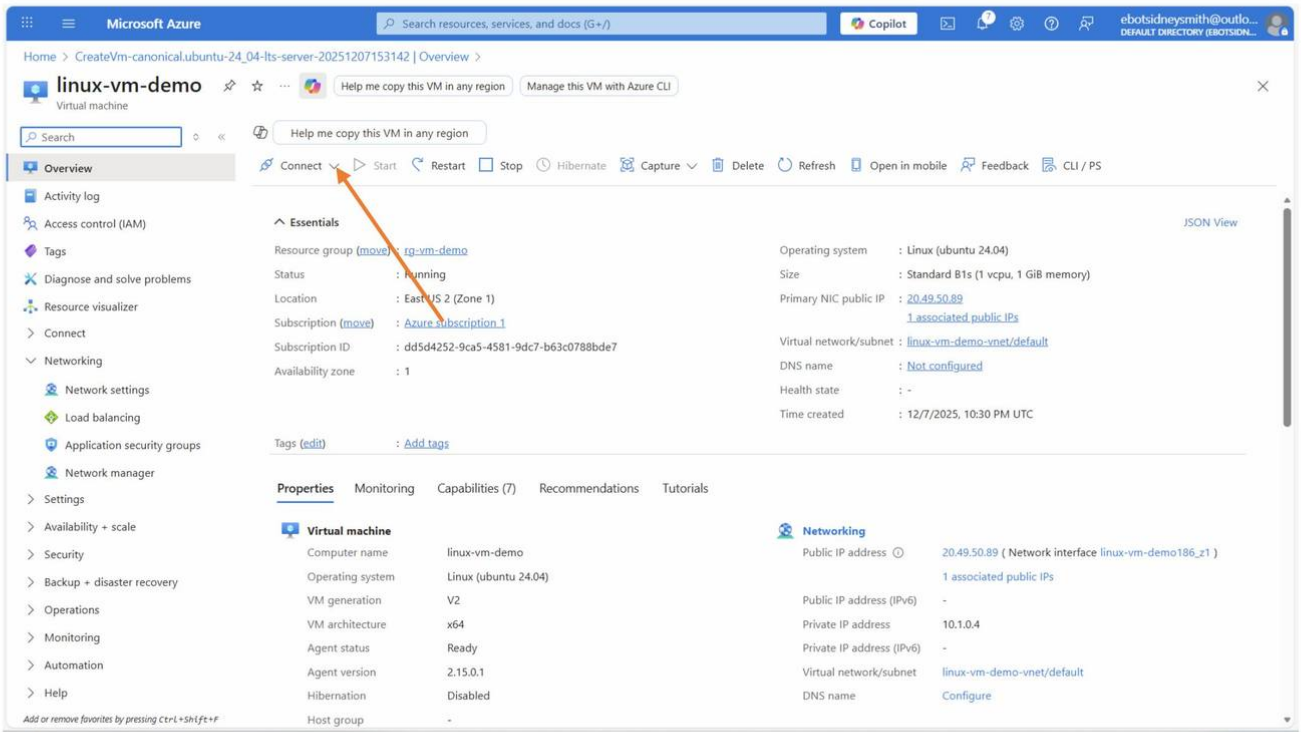


The deployment is complete. Click on "**Go to resource**"

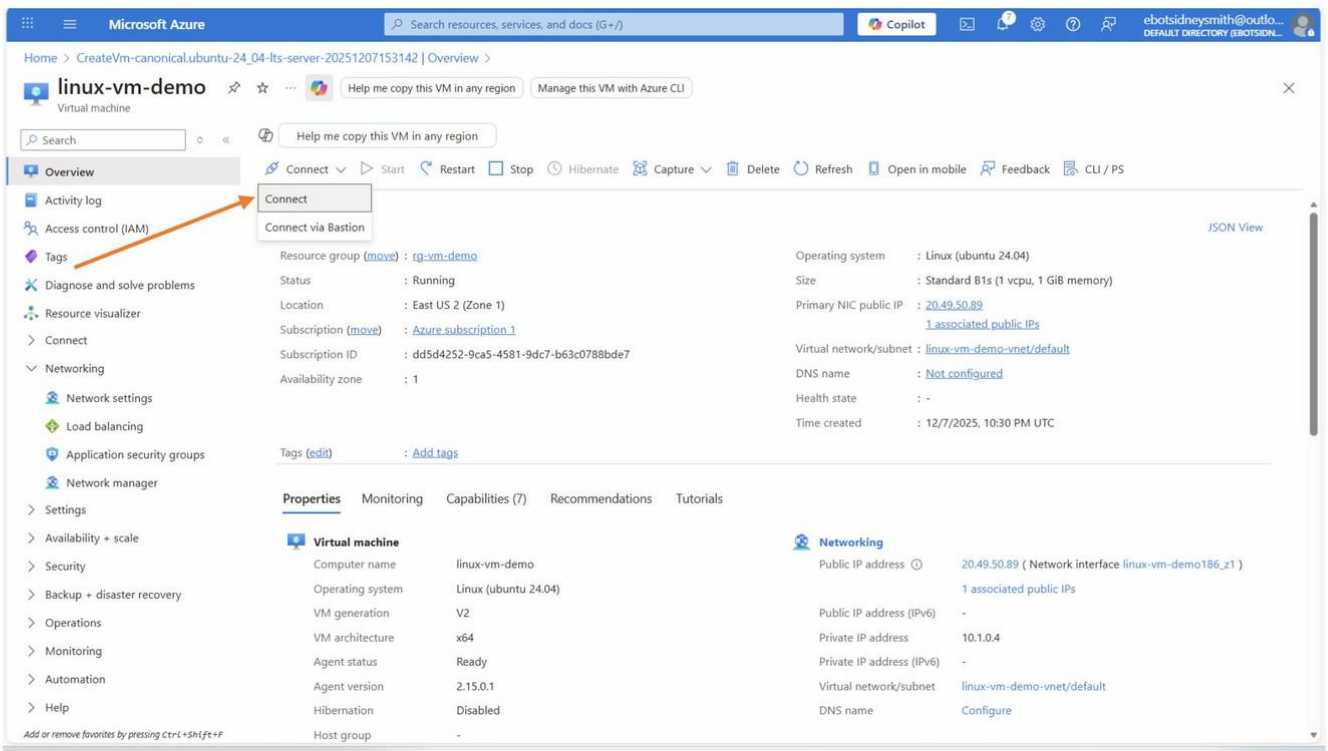


This is our virtual machine. You can see the Public IP. We will use this public IP to access our virtual machine.

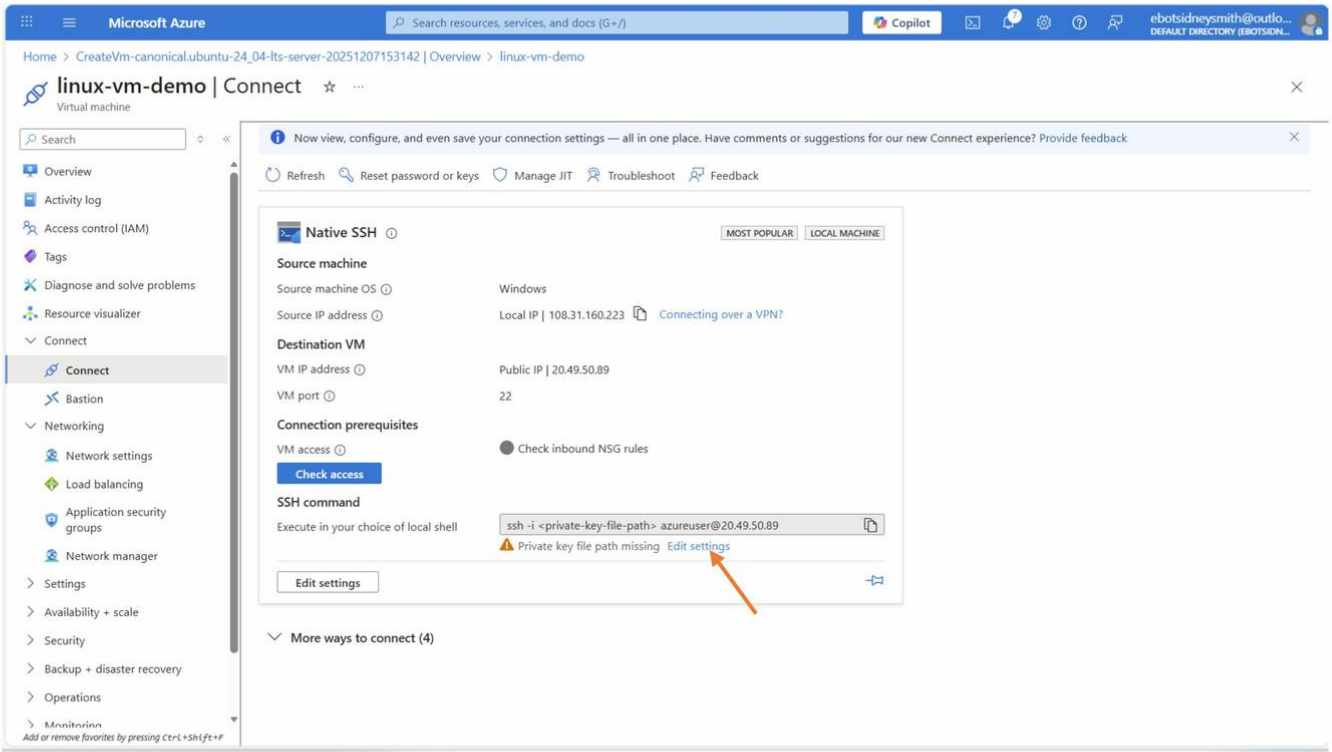
SSH into the Virtual Machine



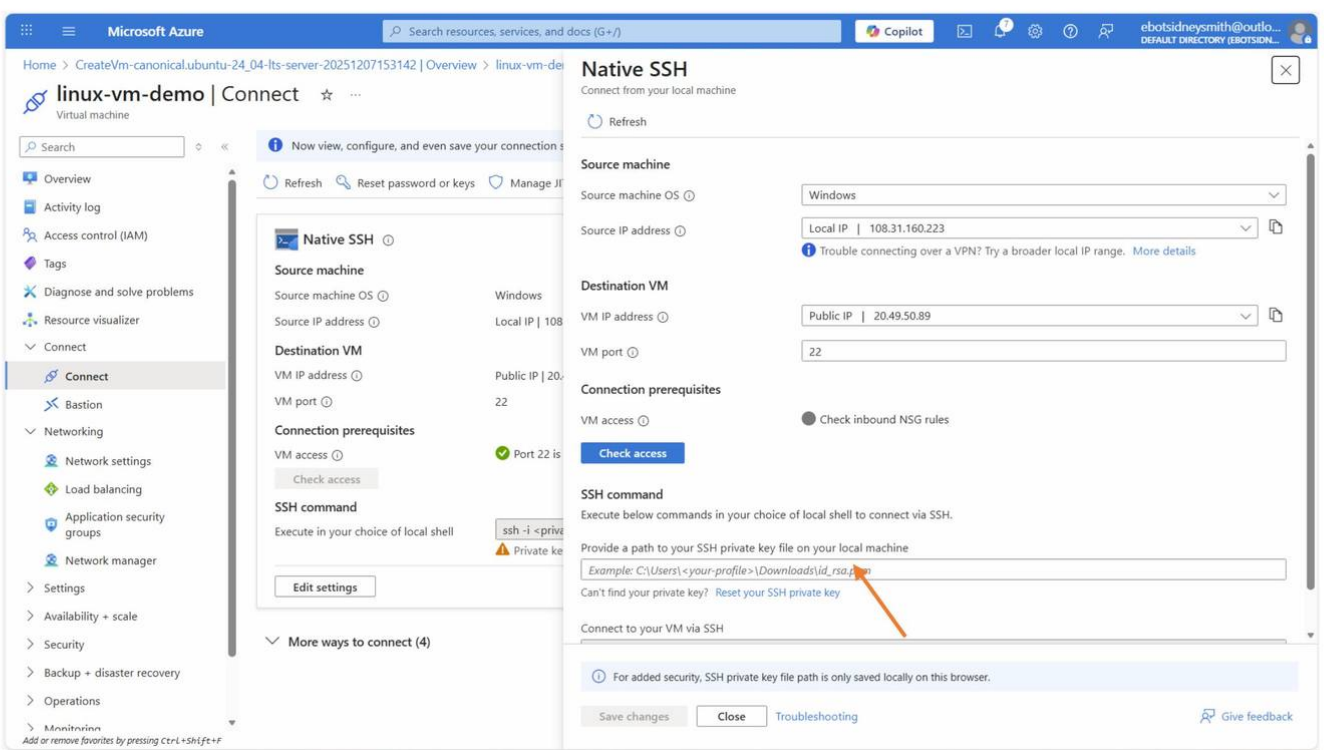
To connect to this virtual machine, click on the drop down on "**Connect**"



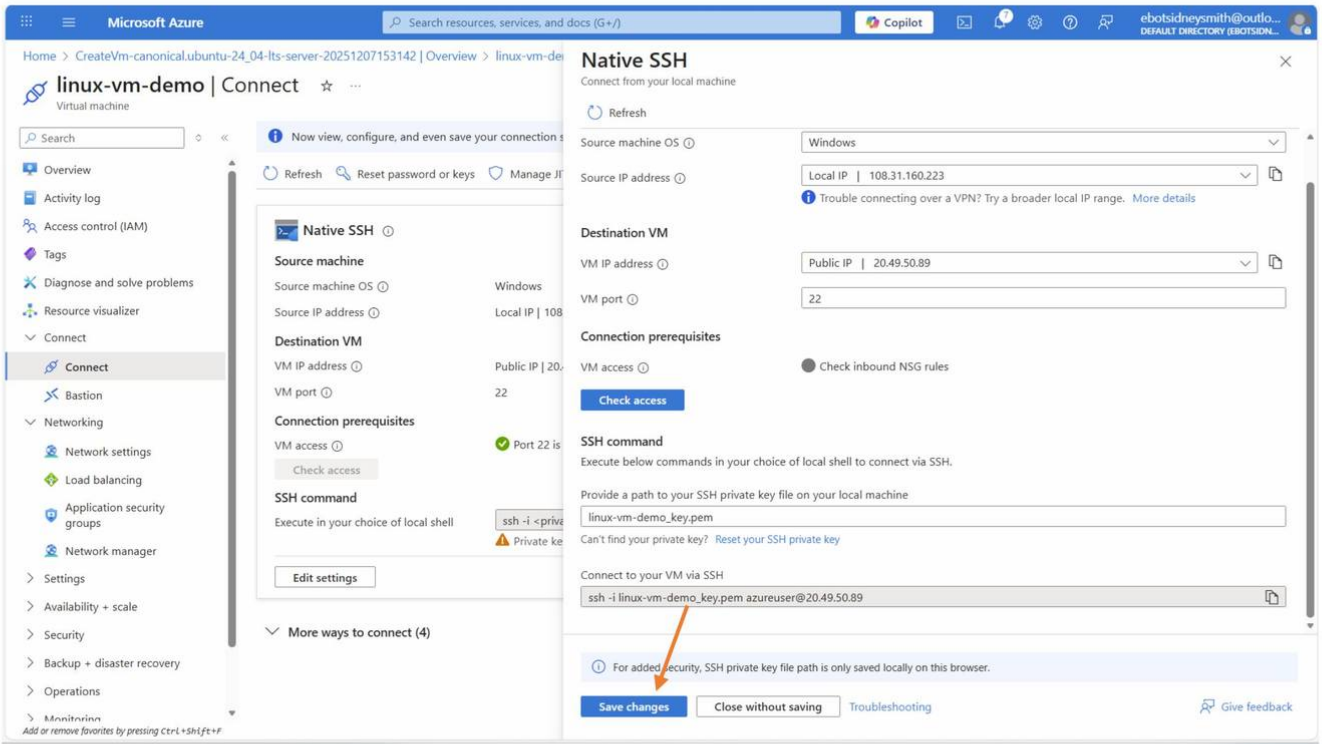
Select "**Connect**"



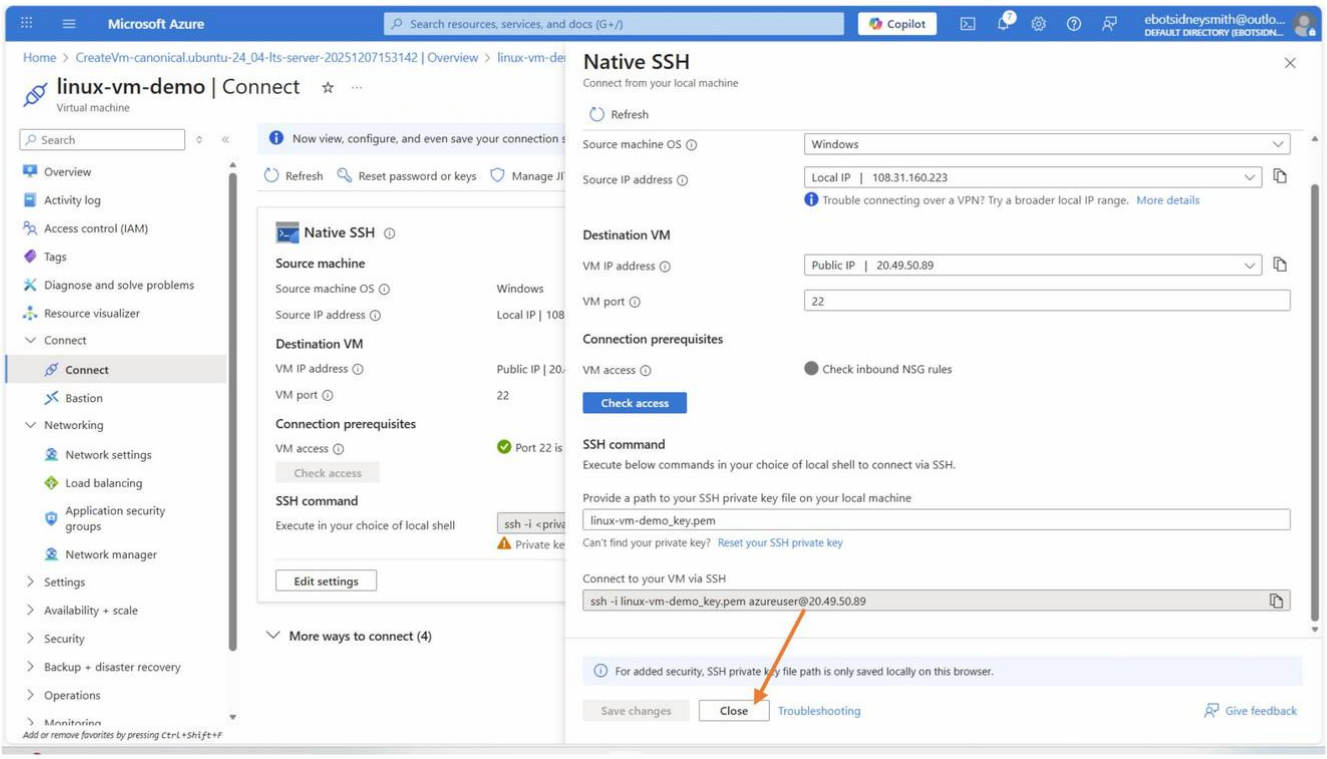
There are different methods to connect, but we will use the "**Native SSH**". Click on "**Edit Settings**"



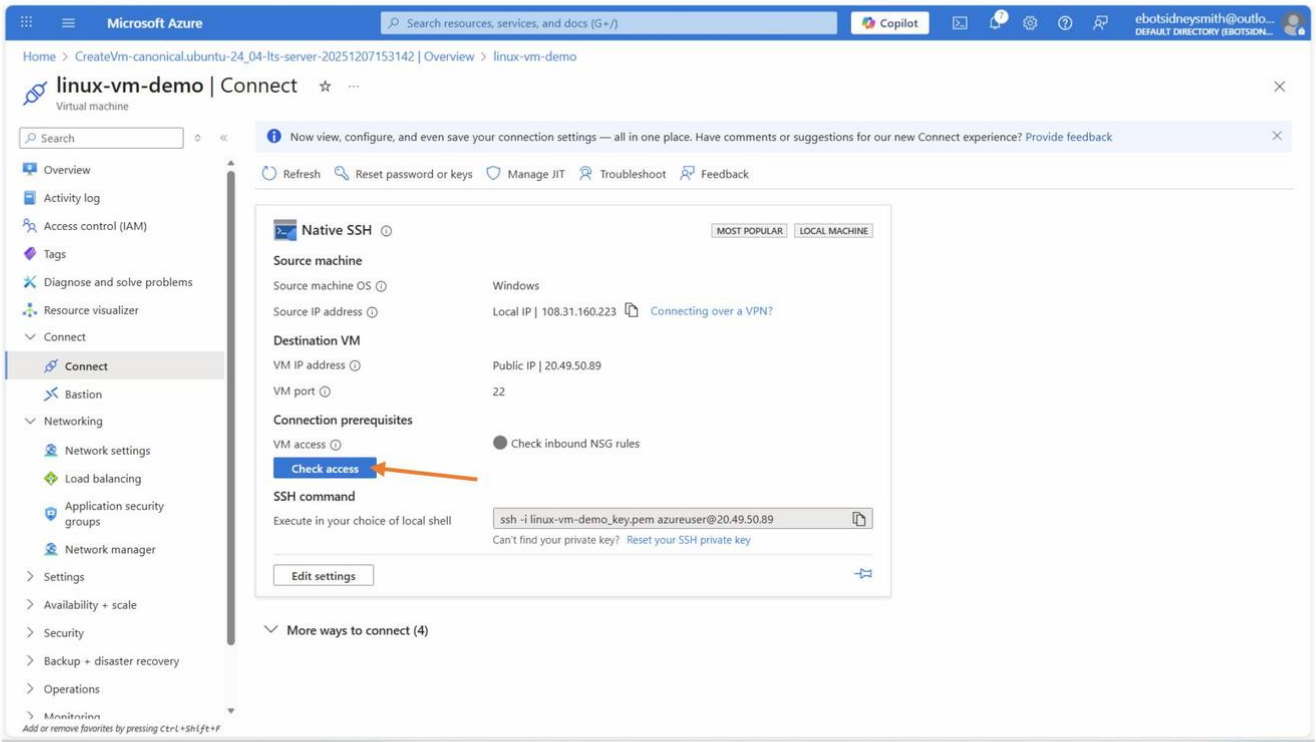
Enter the name of the key pair, that is "**linux-vm-demo_key.pem**"



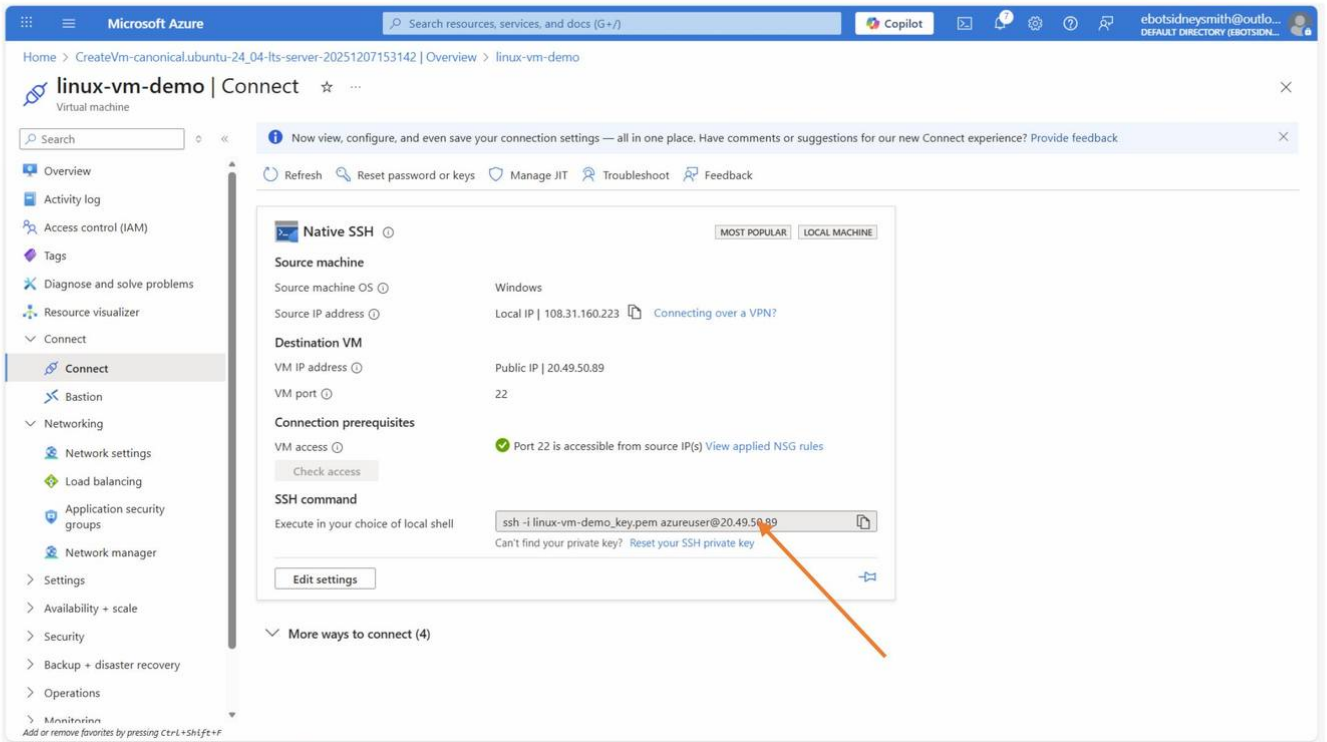
Click on "**Save Changes**"



Click on "**Close**"



Click on "**Check Access**"



Copy this command:

```
ssh -i linux-vm-demo_key.pem azureuser@20.49.50.89
```

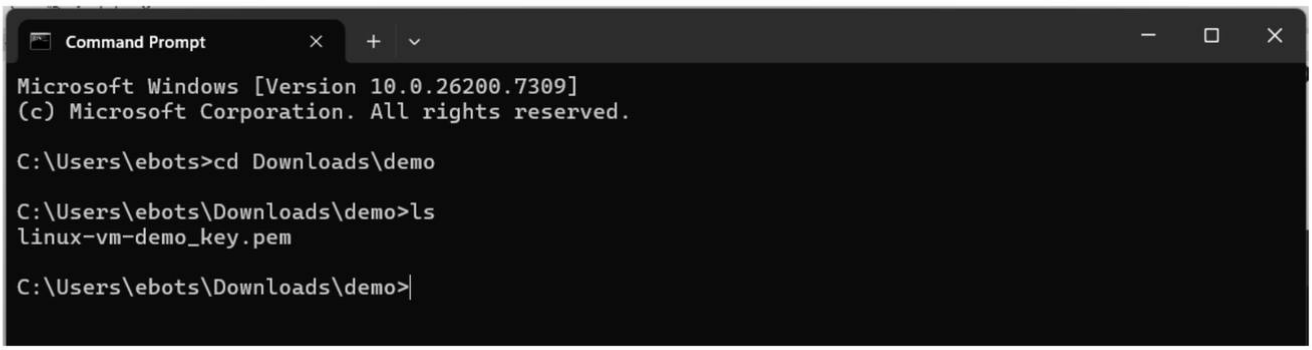
Open Command prompt terminal

Navigate to where the key pair file is saved. It is saved in this path "**C:\Users\ebots\Downloads\demo**". So, run the command:

```
cd Downloads\demo
```

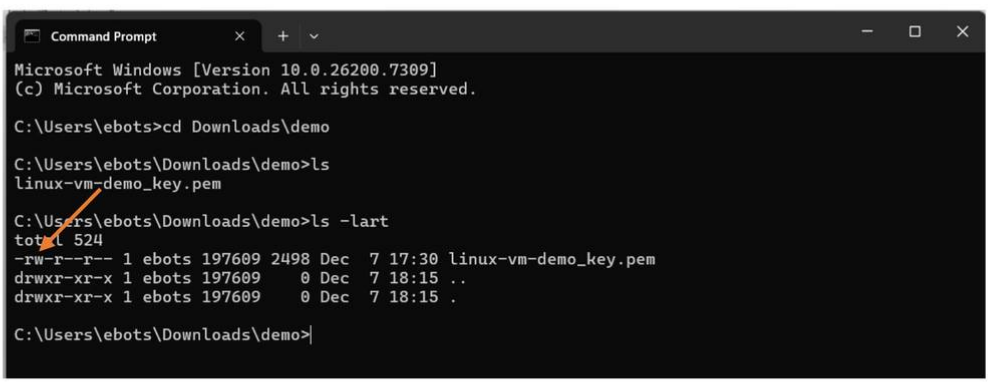
Let us check the content of the folder by using the command:

```
ls
```



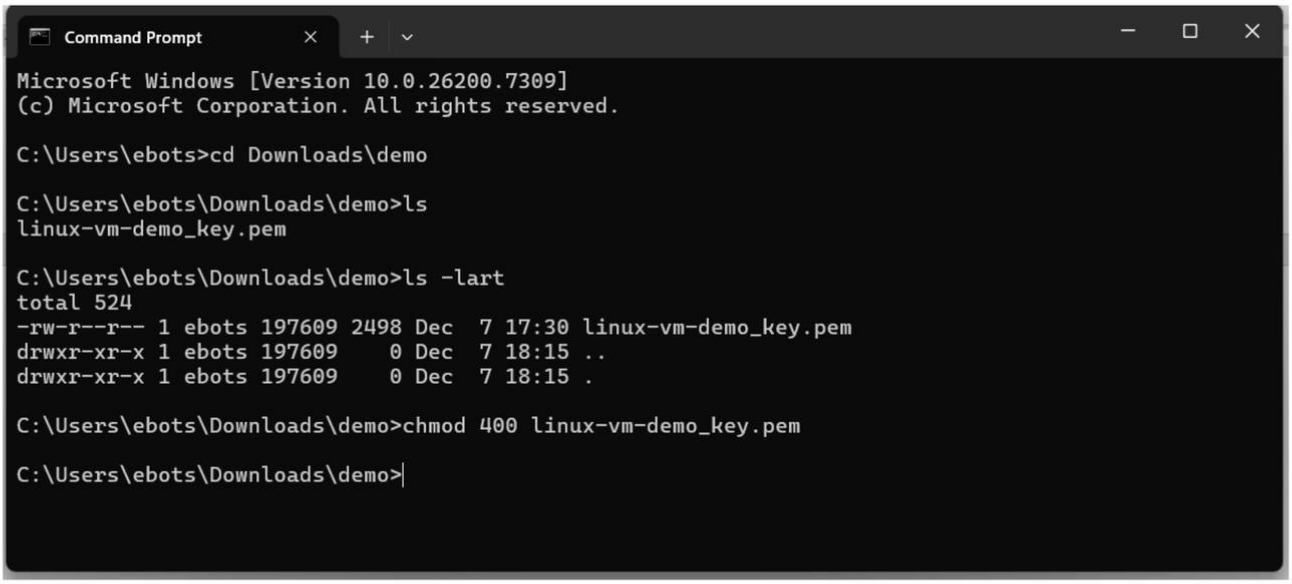
You can see that the key pair file is present, this is the private key. The next thing is to check the permission of our key pair. We will do this using the command"

```
ls -lart
```



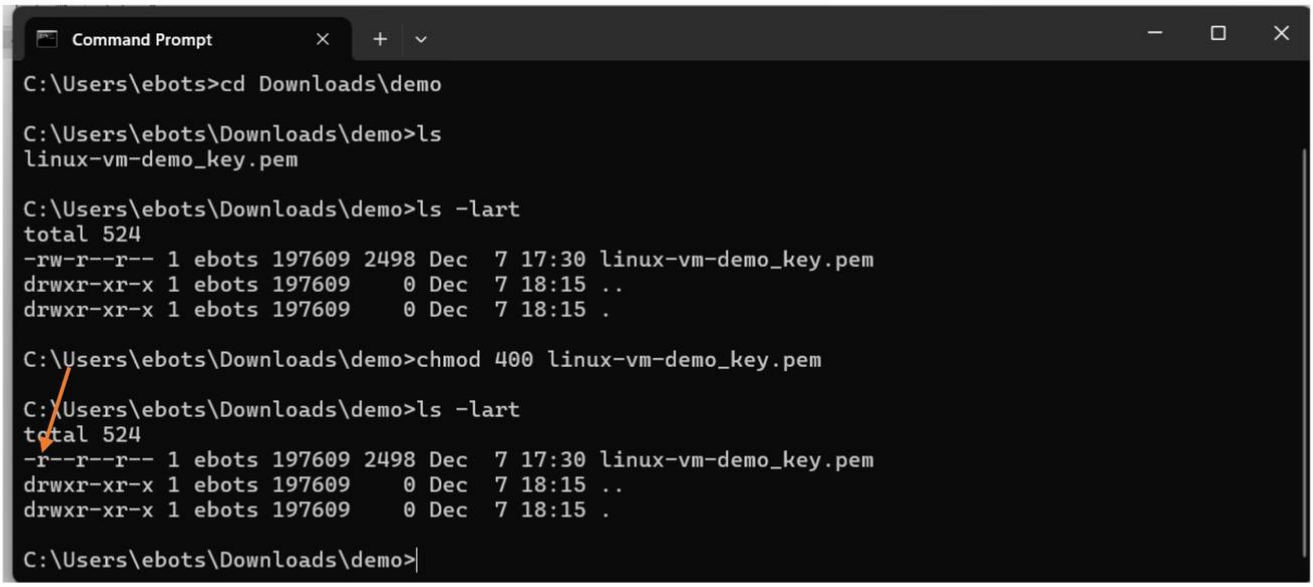
You can see that the private key has both read and write permission. But the private key needs to have just the read permission. So, we change the permission by running the command:

```
chmod 400 linux-vm-demo_key.pem
```



Let us check the permission again by running the command:

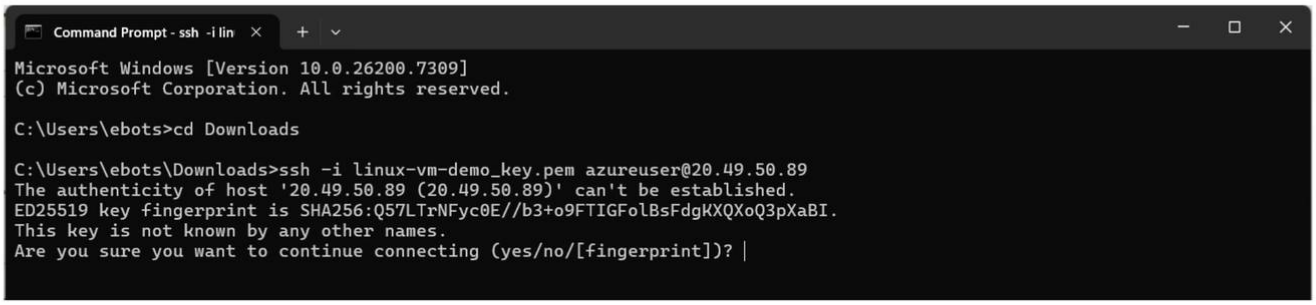
```
ls -lart
```



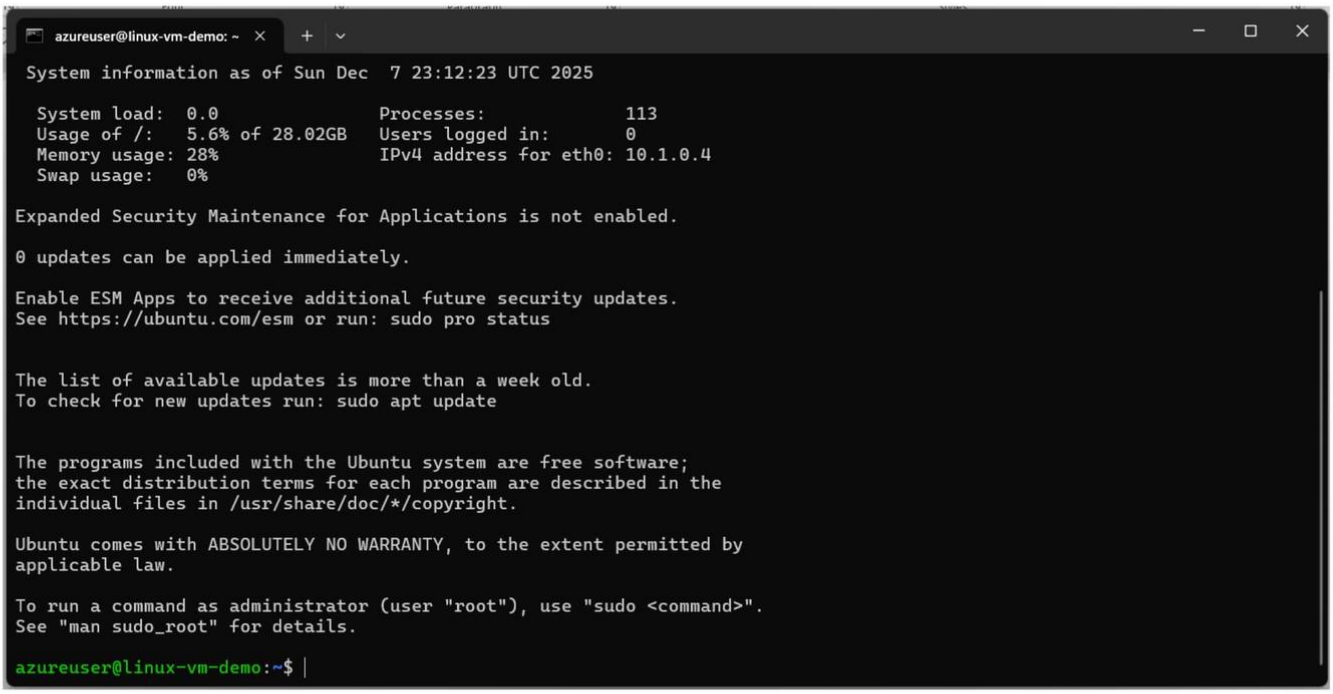
You can see that we have just read only permission.

Now, Run the copied command here

```
ssh -i linux-vm-demo_key.pem azureuser@20.49.50.89
```



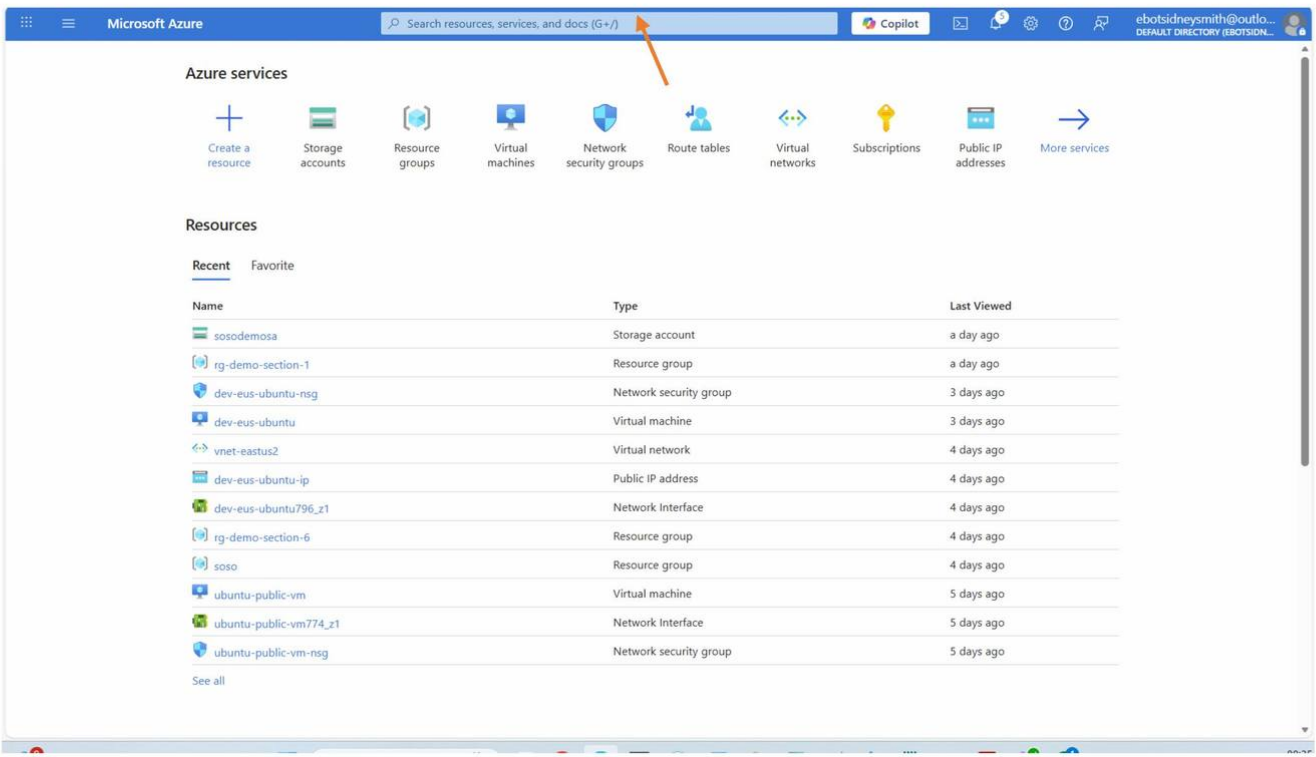
Type "**yes**" and press "**Enter**"



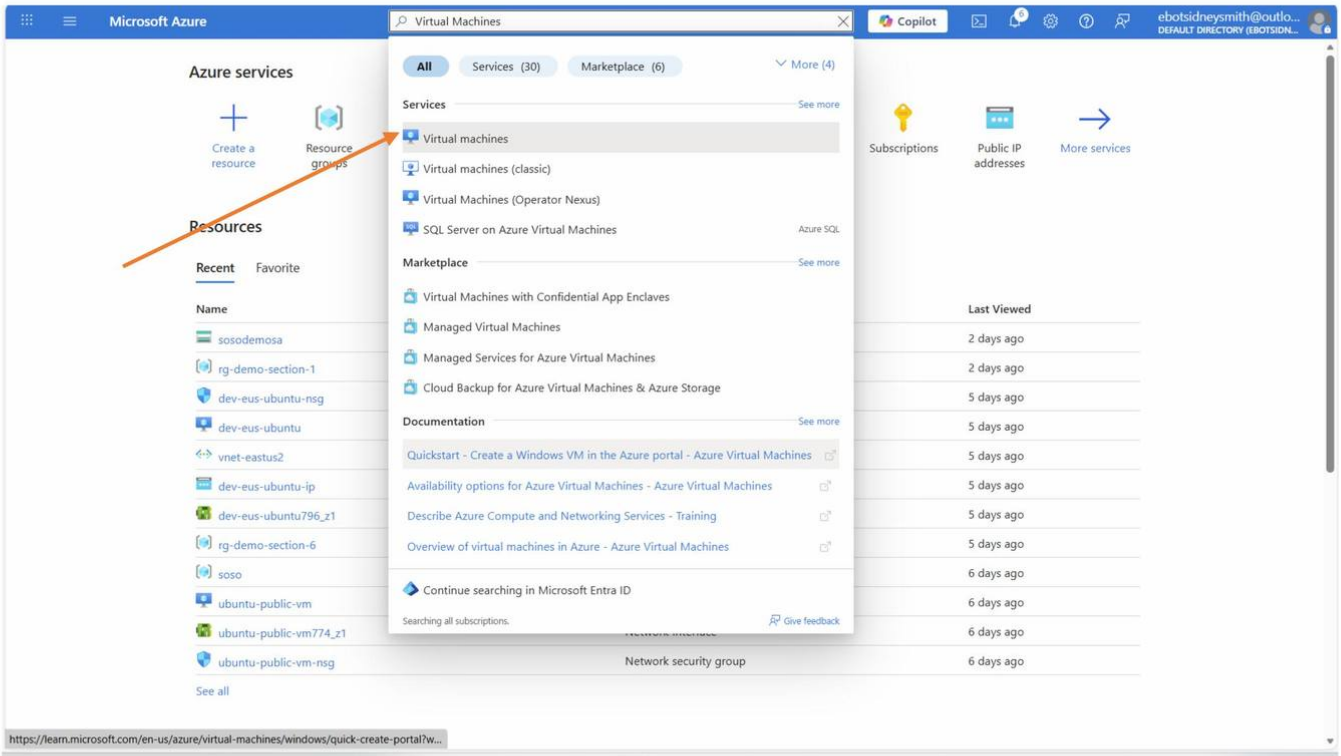
We are now connected to the virtual machine. So, we have successfully provisioned the virtual machine on our Azure Cloud.

Part 2: Set up Windows Virtual Machine

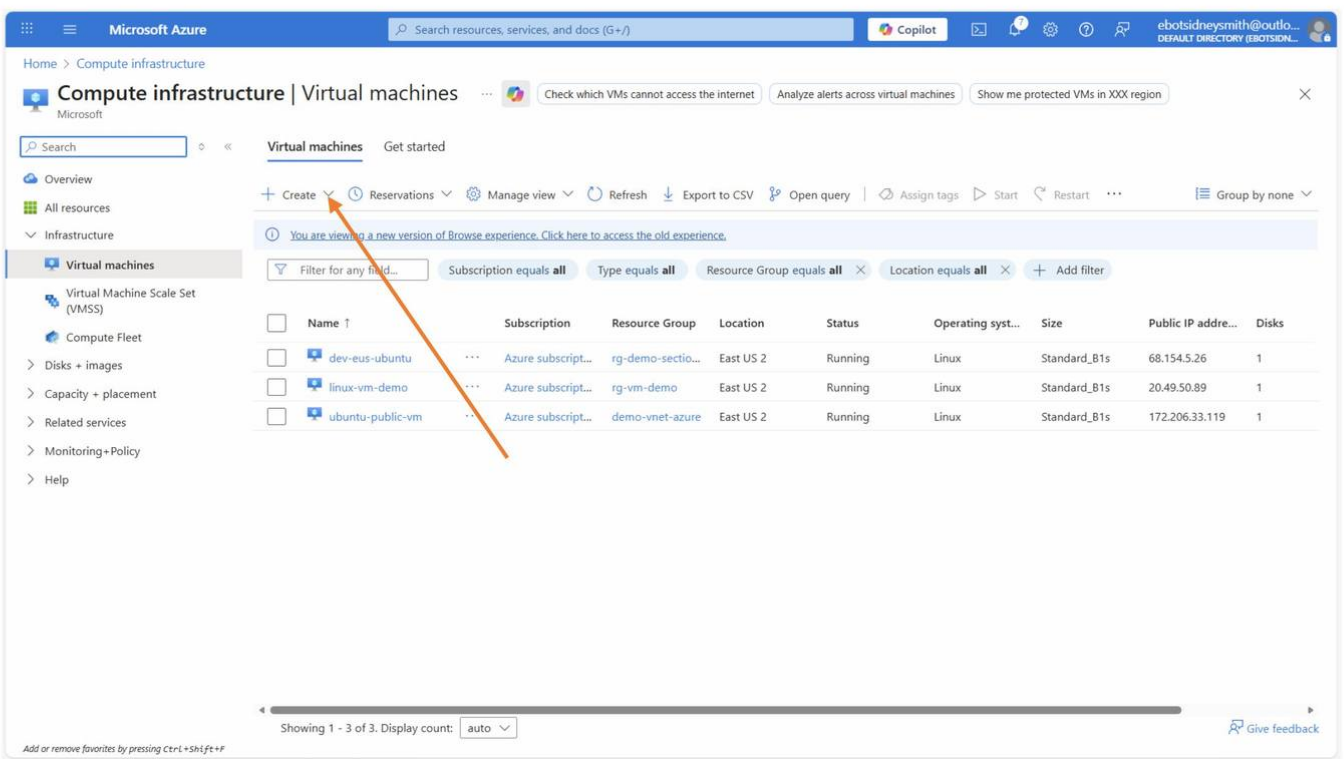
In this part we will do a demo on how to set up a Windows virtual machine. To start with the demo, go to Azure portal.



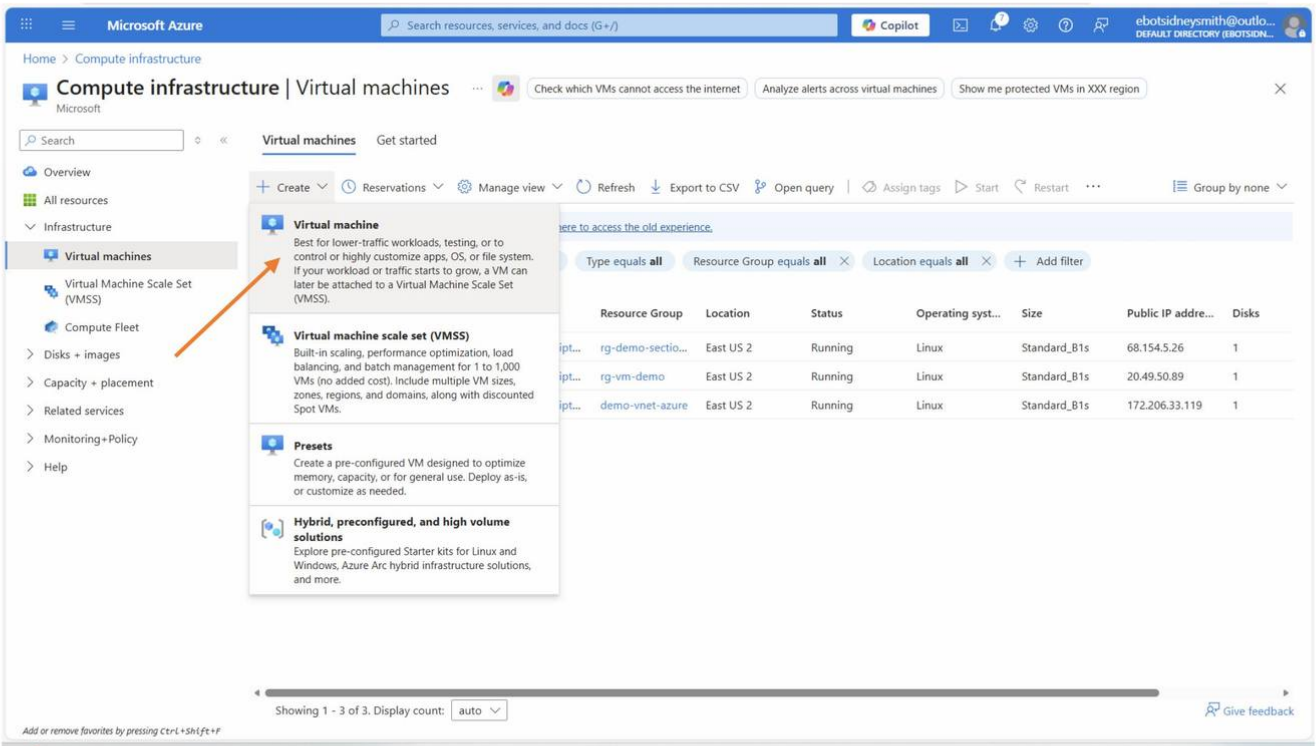
We will use the “Resource Group” we created for the Linux machine demo. Now, let us continue to create our Virtual machine. Search for “**Virtual Machines**”



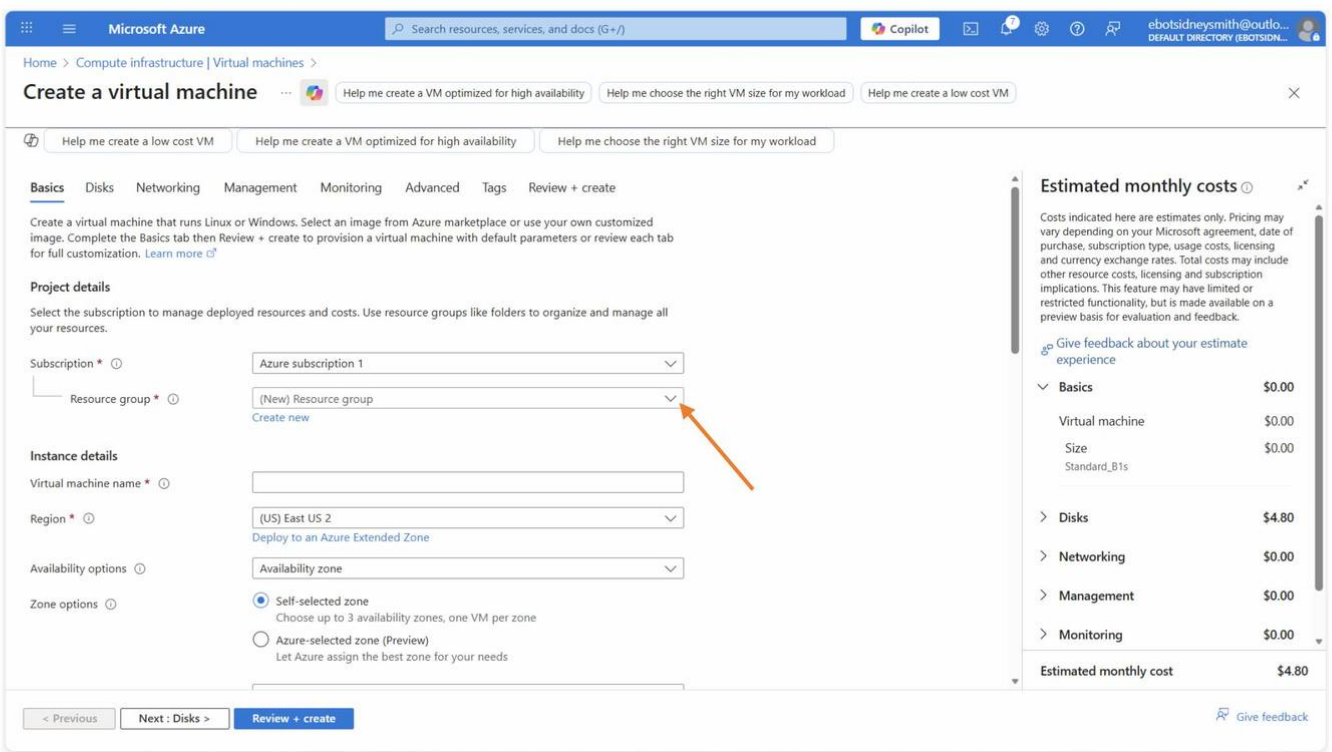
Click on “**Virtual Machines**”



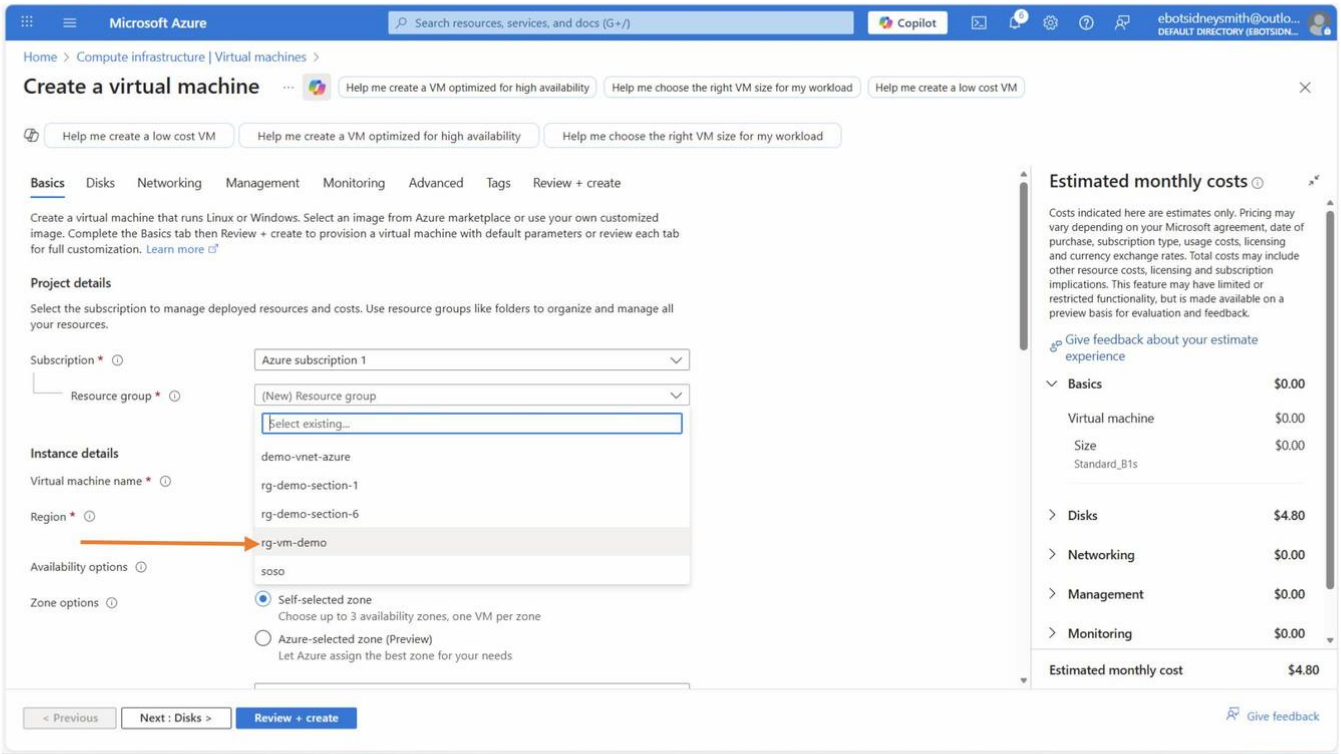
Click on the drop down on “**Create**”



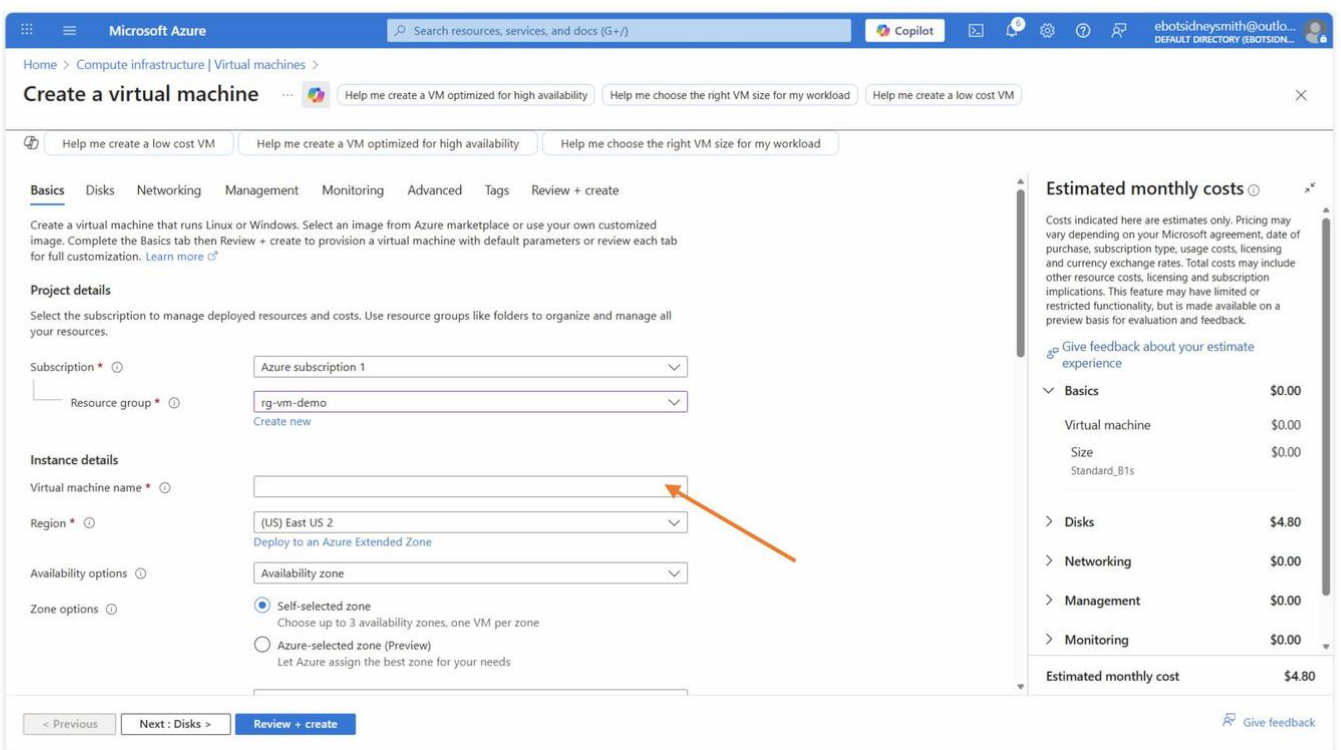
Select "**Virtual Machine**"



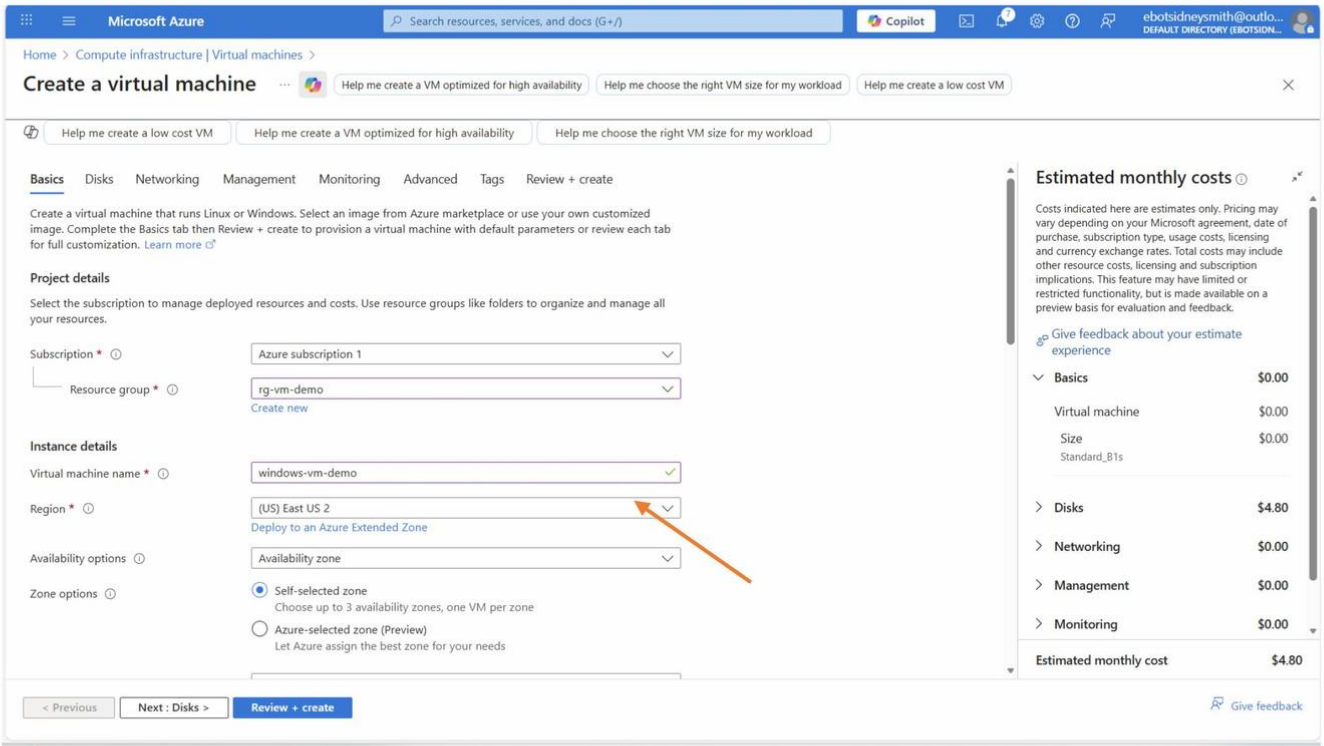
You can see that our "**Subscription**" has been selected. Let us select the "**Resource Group**". Click on the drop down on "**Resource Group**"



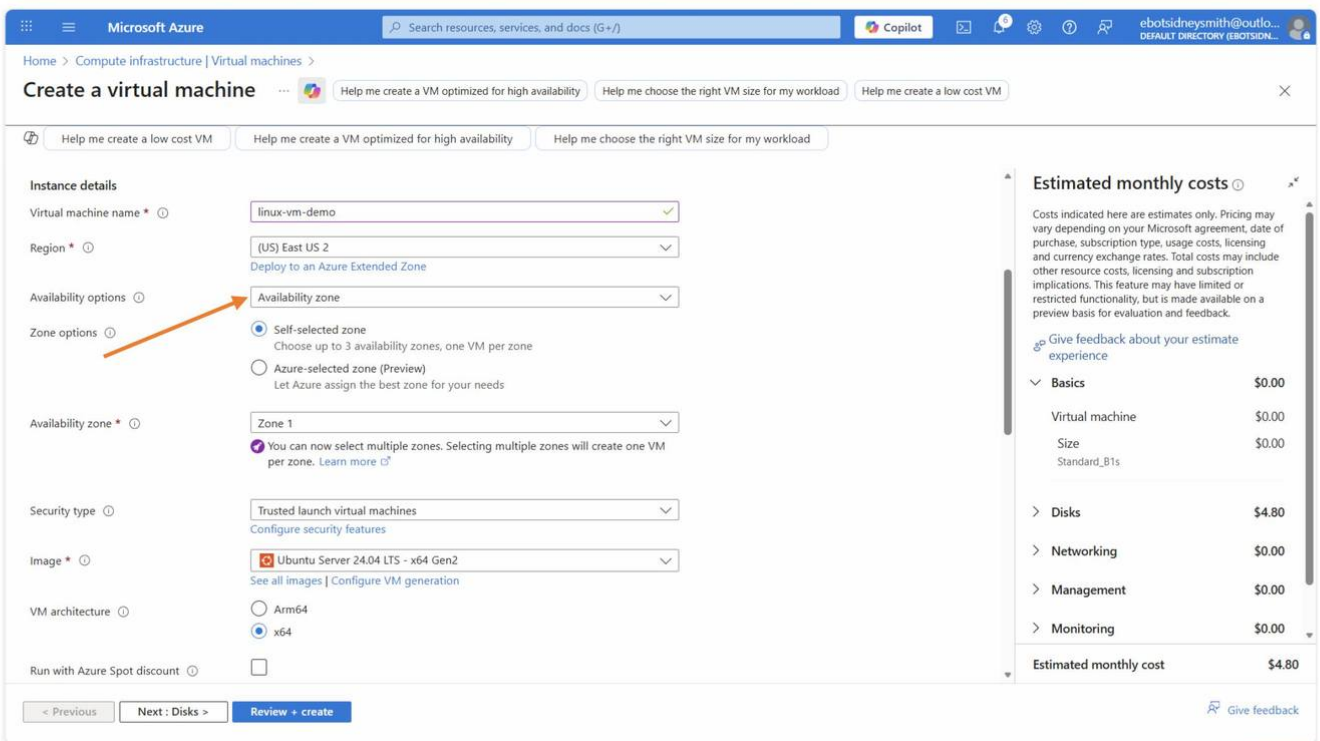
Select the "**Resource Group**" we created, that is "**rg-vm-demo**"



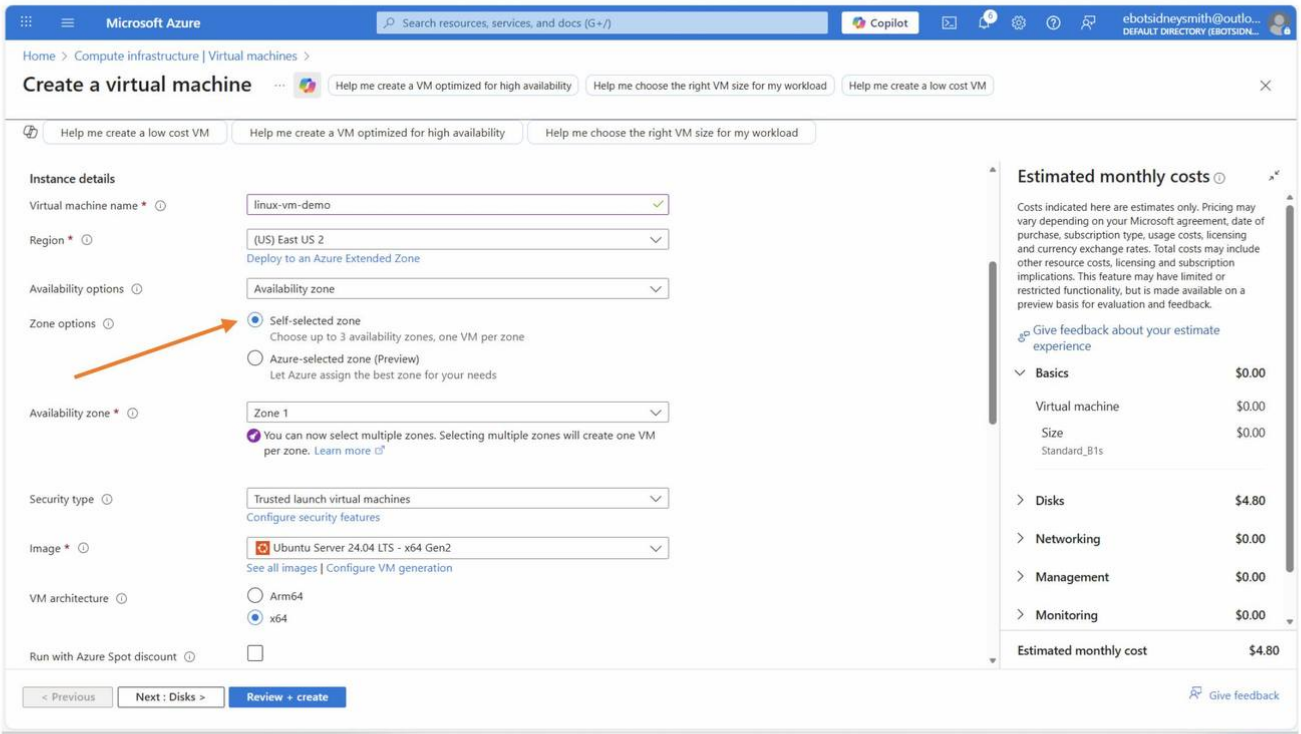
Here, we will give the "**Virtual Machine**" a name. In this demo, we are creating a Linux machine. I will call it "**windows-vm-demo**".



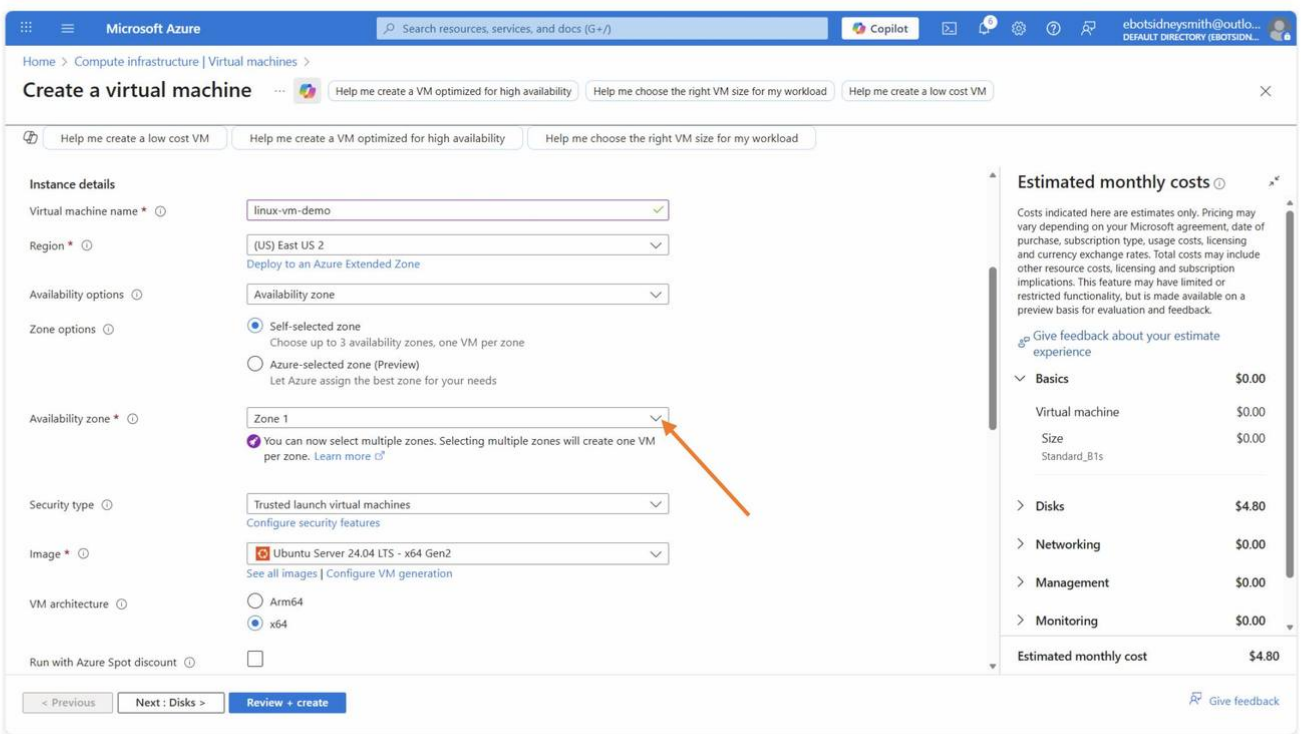
Here, on "**Region**", we will use "**East US 2**". So, we will leave it as it is.



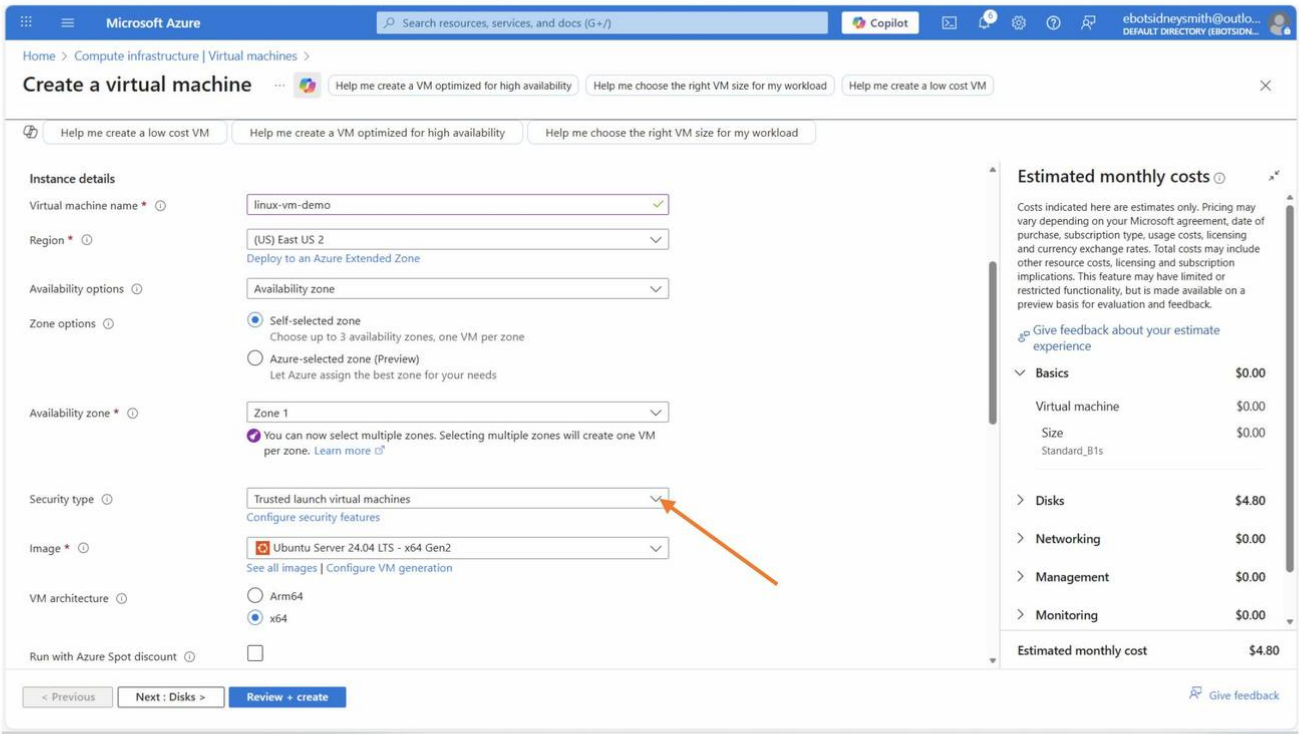
Then, on "**Availability Option**", we will select "**Availability zone**"



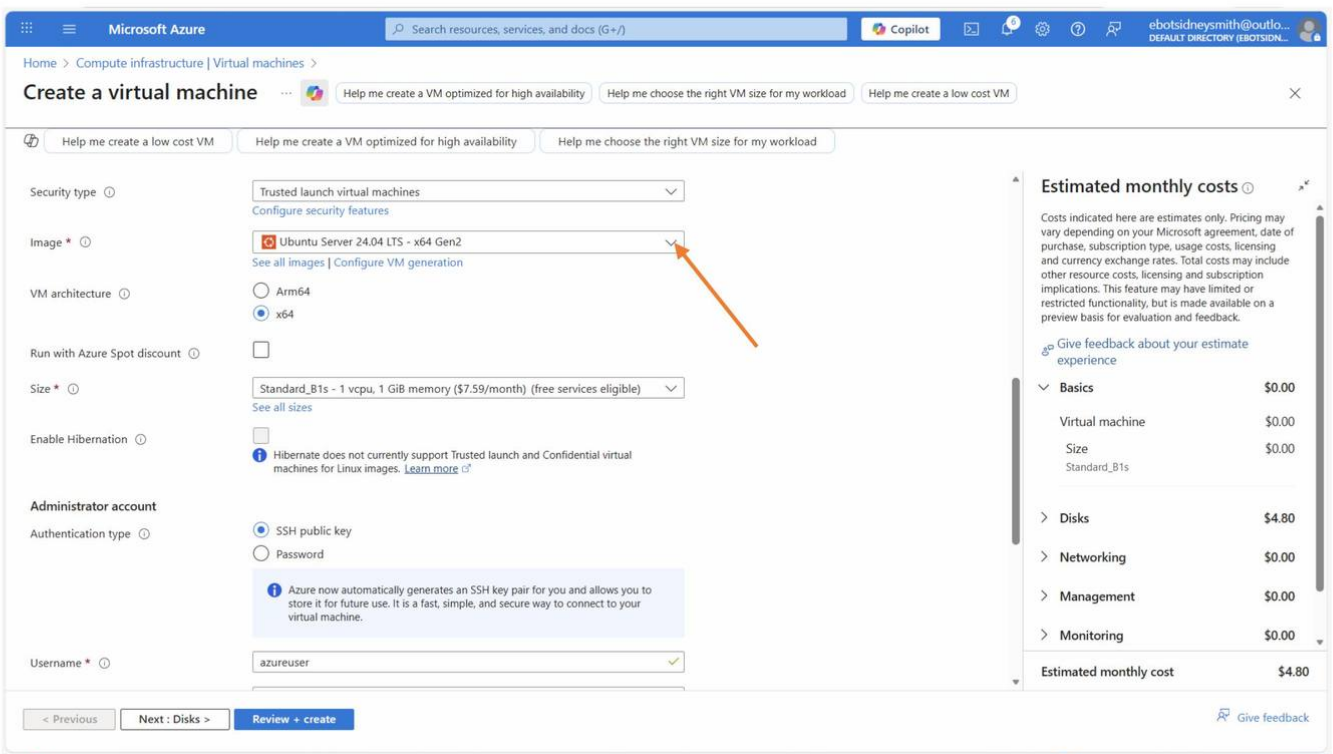
Then, on the "**Zone Options**", select "**Self-selected Zone**"



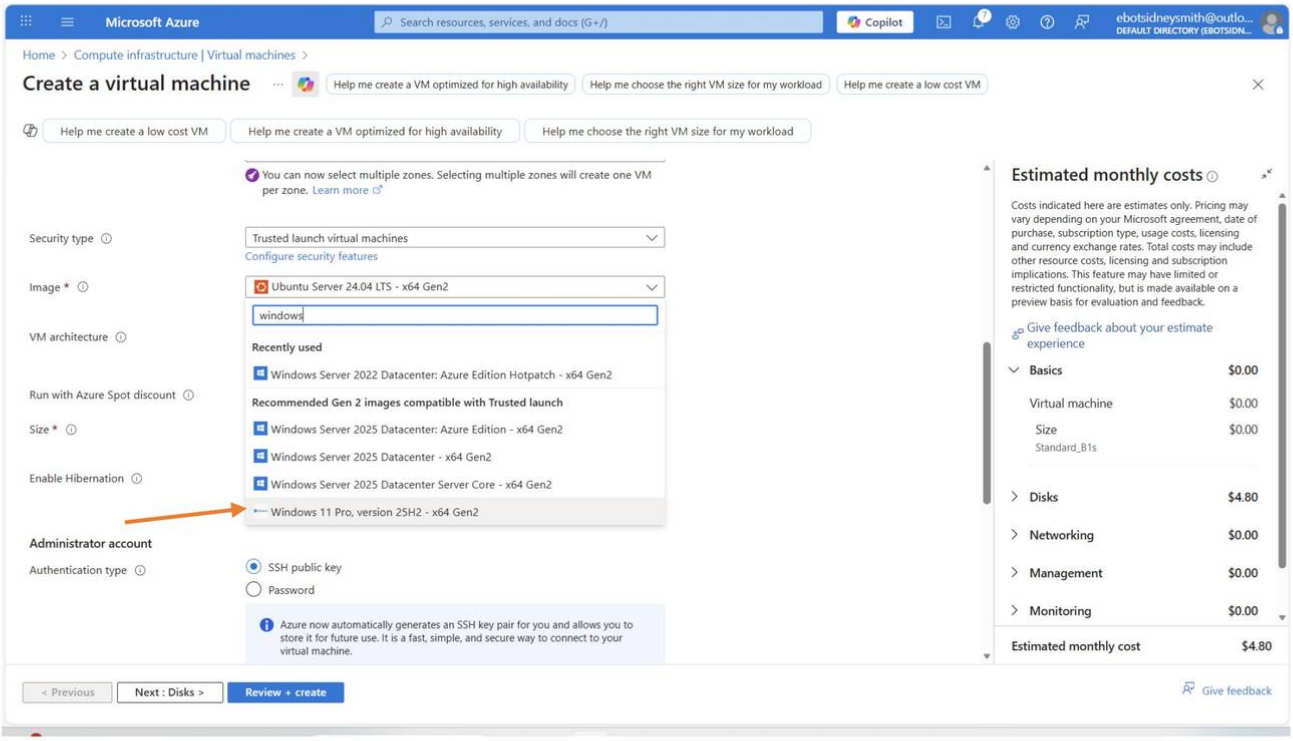
For Zone, select "**Zone 1**". But if you want to have maximum availability for your machine, you can select more zones.



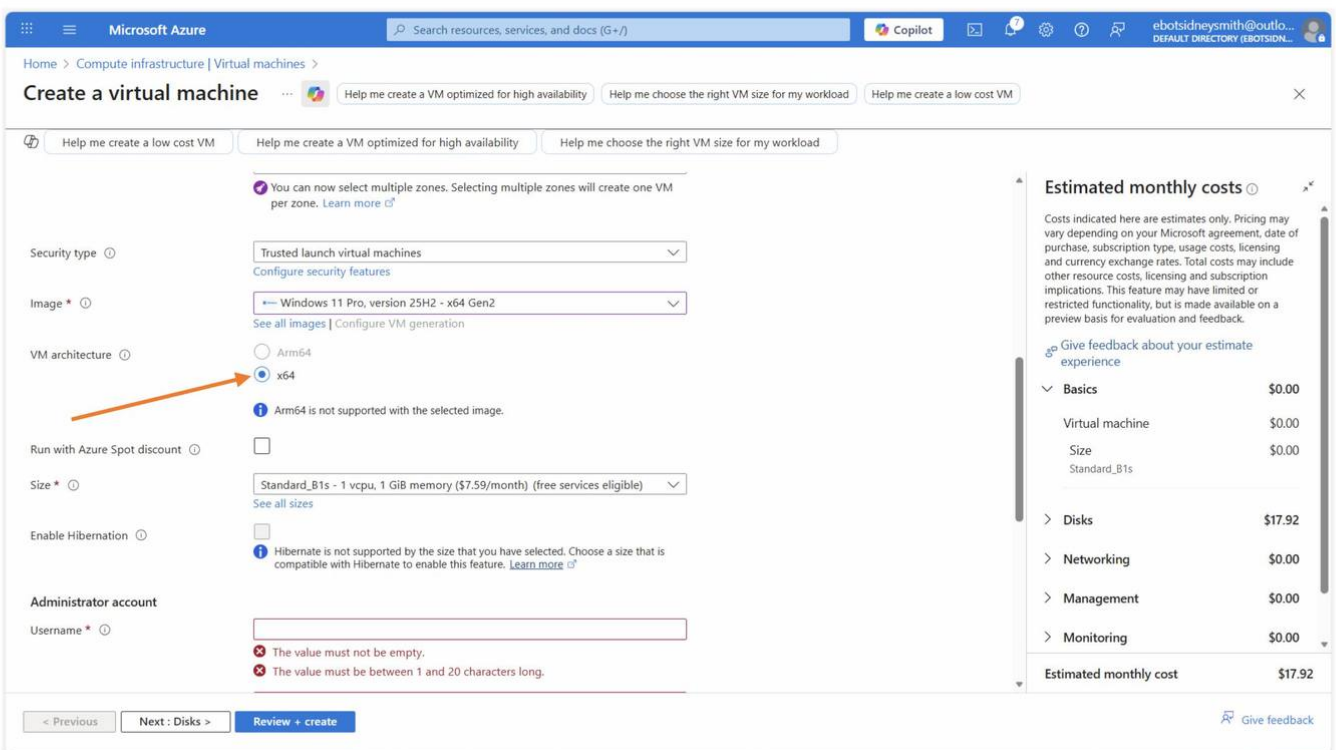
For "**Security Type**", select "**Trusted Launch virtual Machines**"



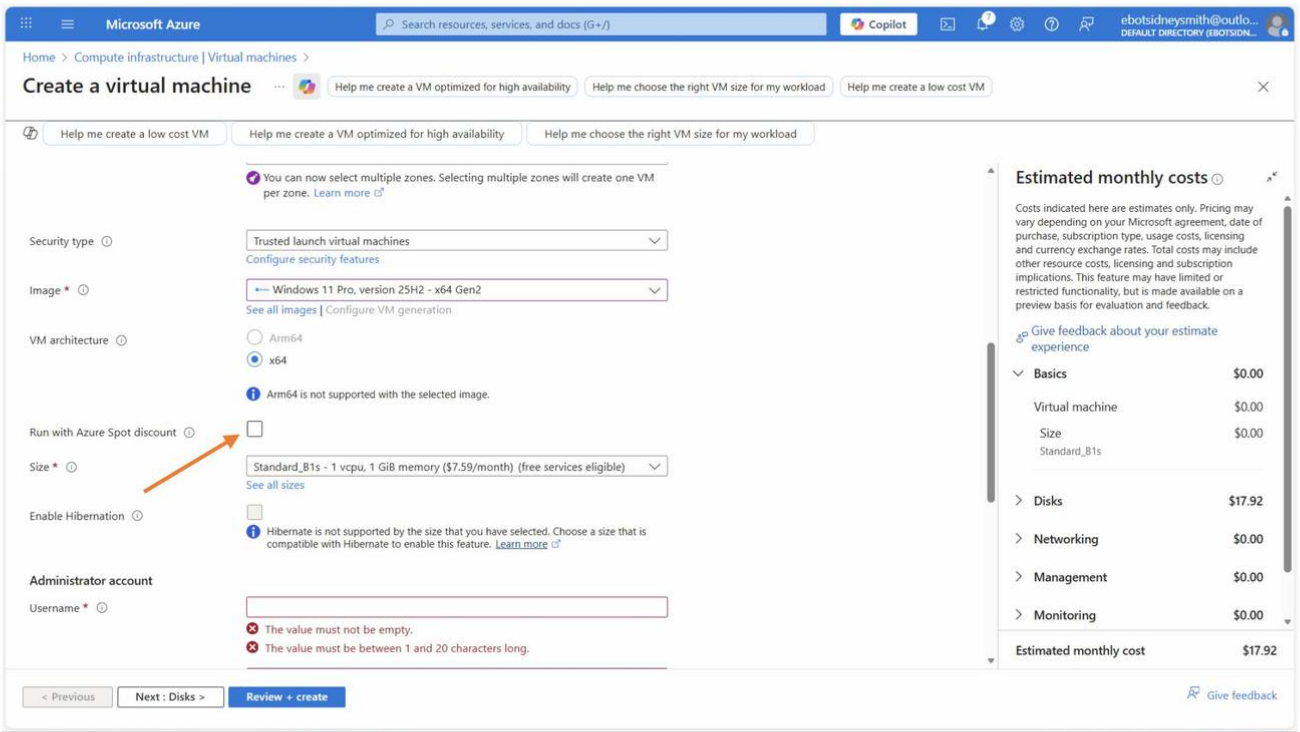
For the "**Image**", click on the drop down on "Image". On the search type "Windows"



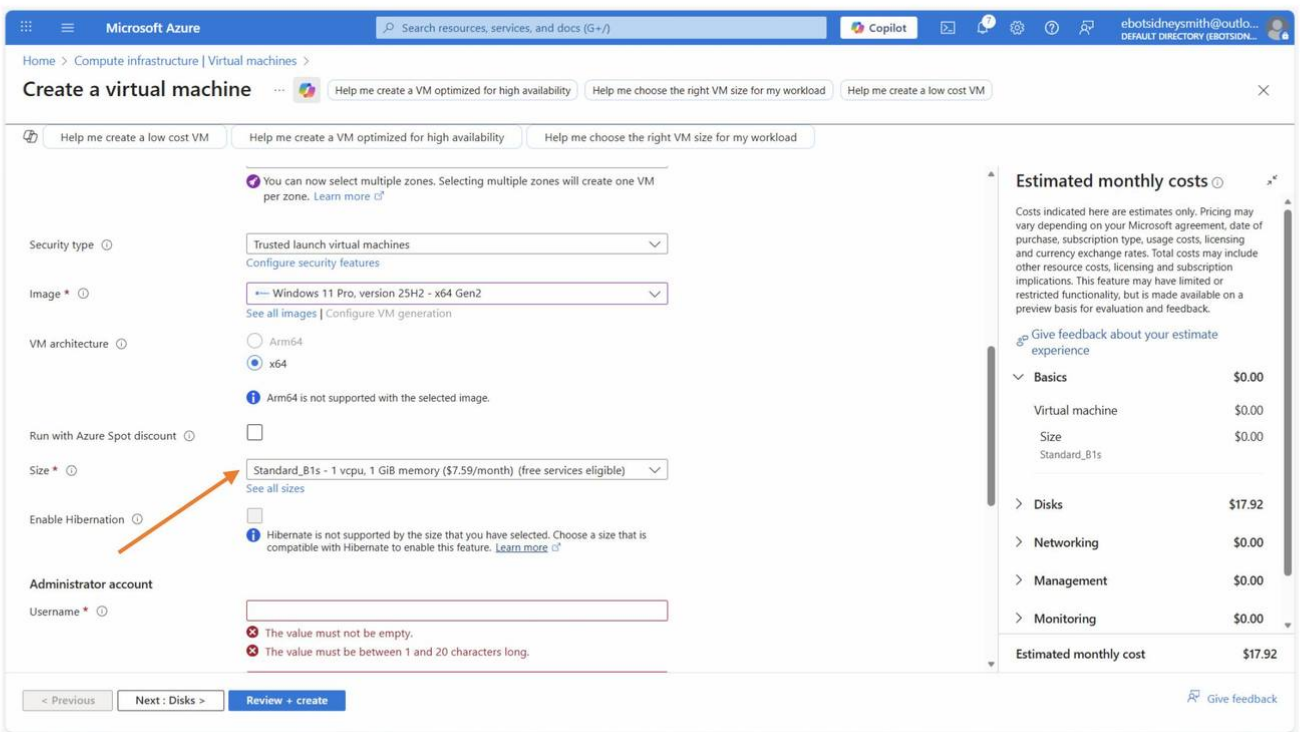
Select "**Windows 11 Pro, version 25H2 – x64 Gen2**"



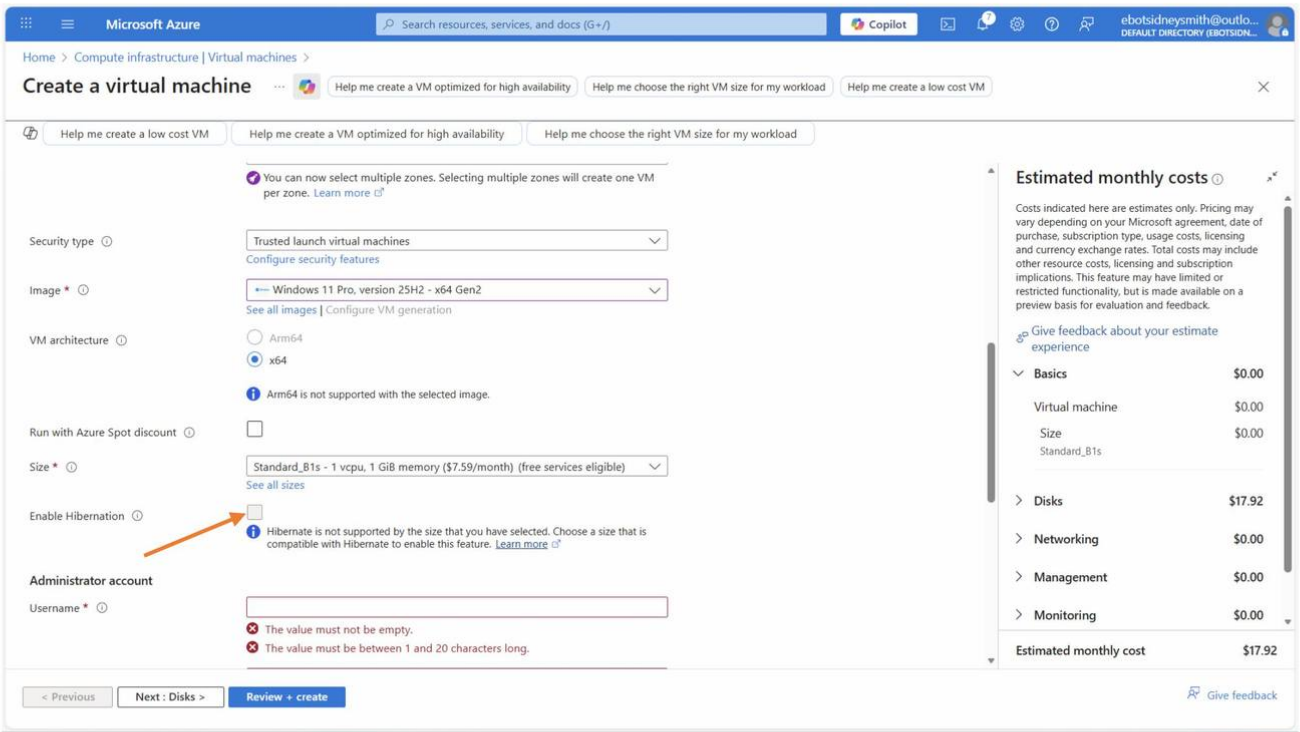
On "**VM Architecture**", select "**x64**"



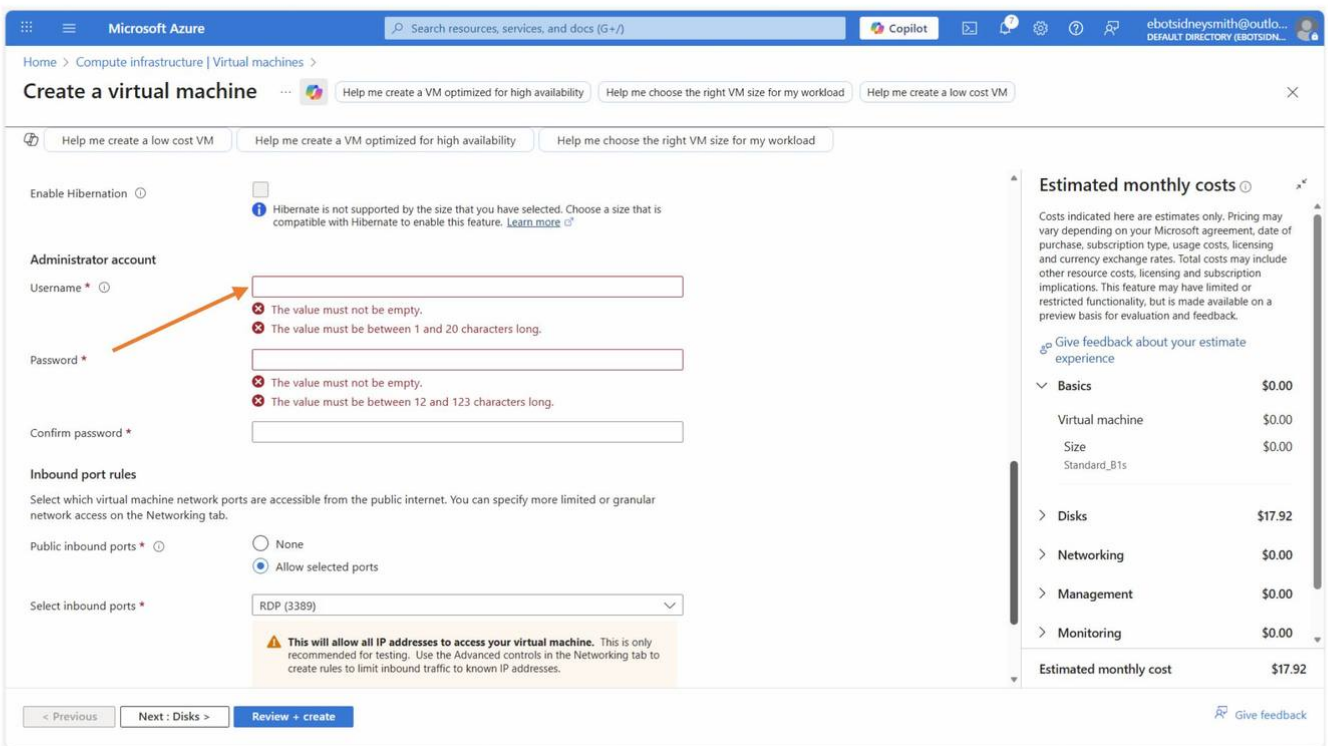
Here on "**Run with Azure Spot Discount**", leave the box "**Unchecked**"



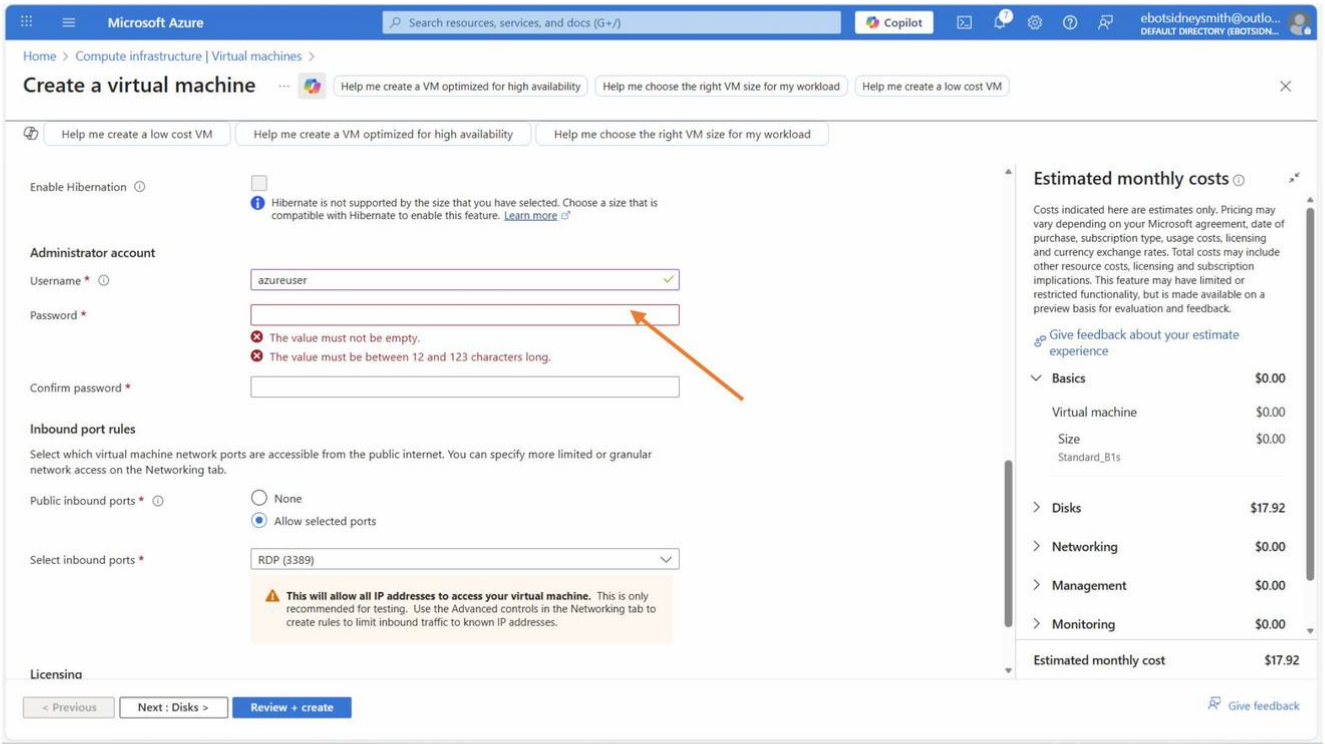
For "**Size**", select "**Standard_B1s-1 vcpu …….**" to keep the cost low.



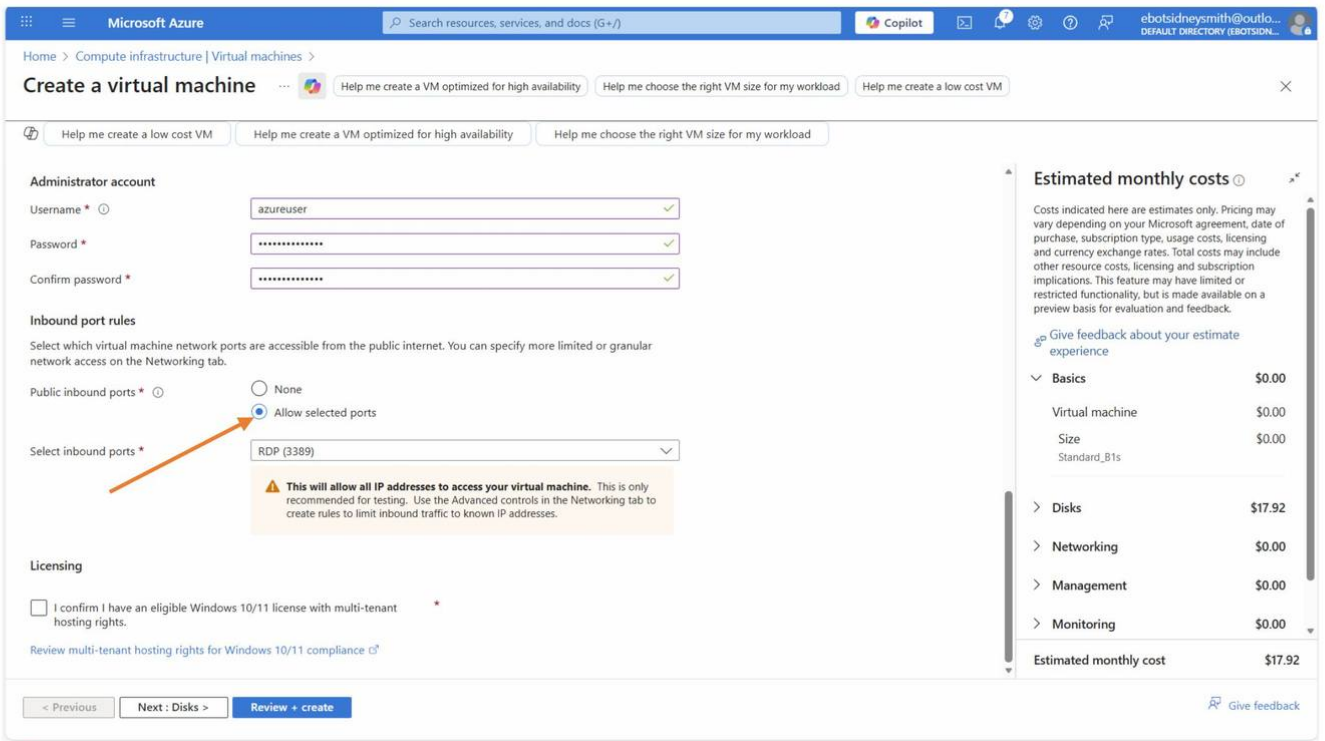
On "**Enable Hibernation**", leave the box "**Unchecked**"



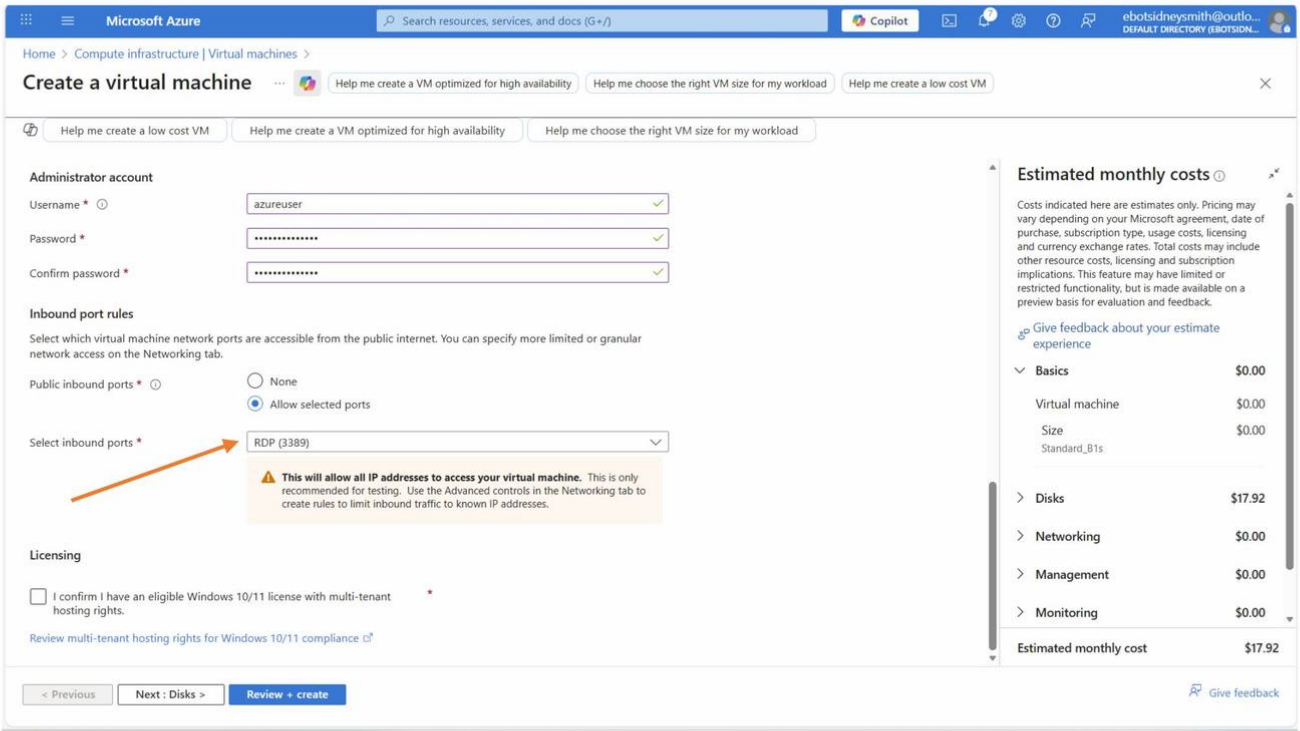
The next thing is to enter the "**Username**", I will use "**azureuser**".



Then on "**password**", enter the password. We will use "**WindowsAdmin77**" and then confirm it.



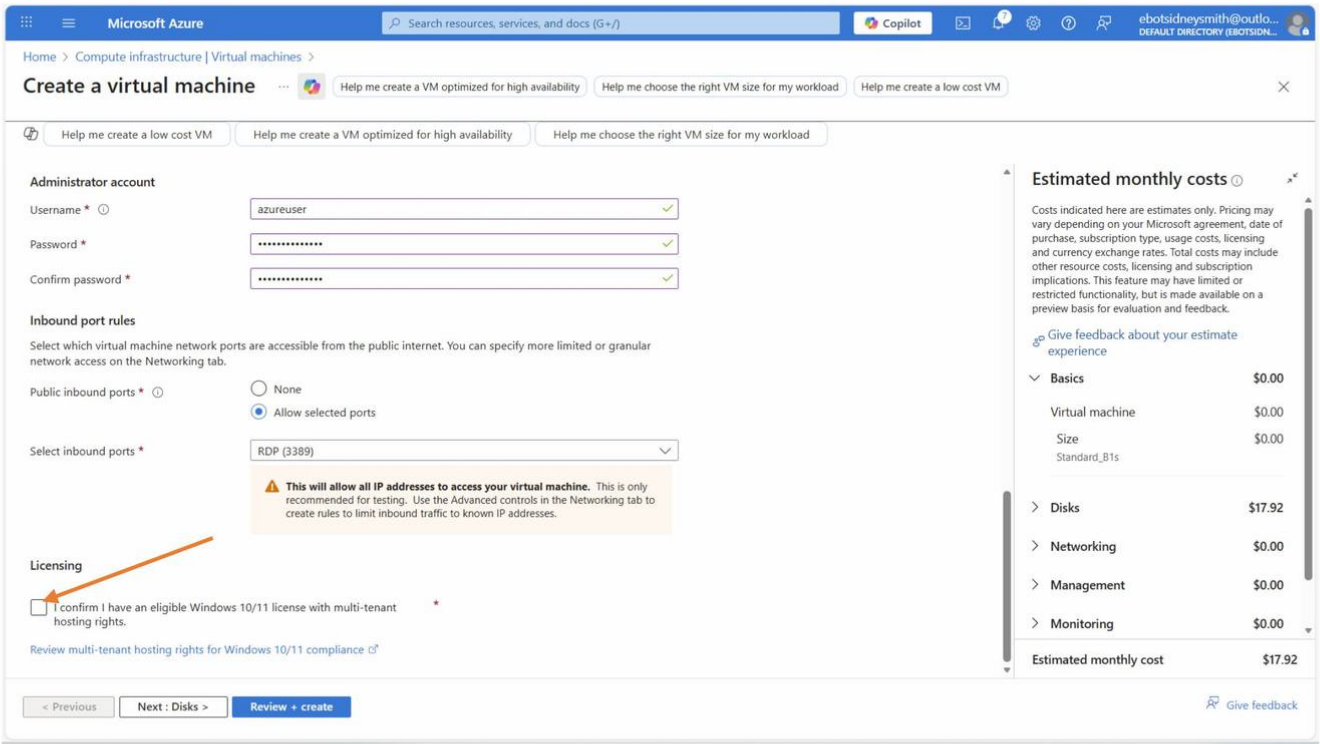
On "**Public Inbound ports**", we will select "**Allow selected ports**"



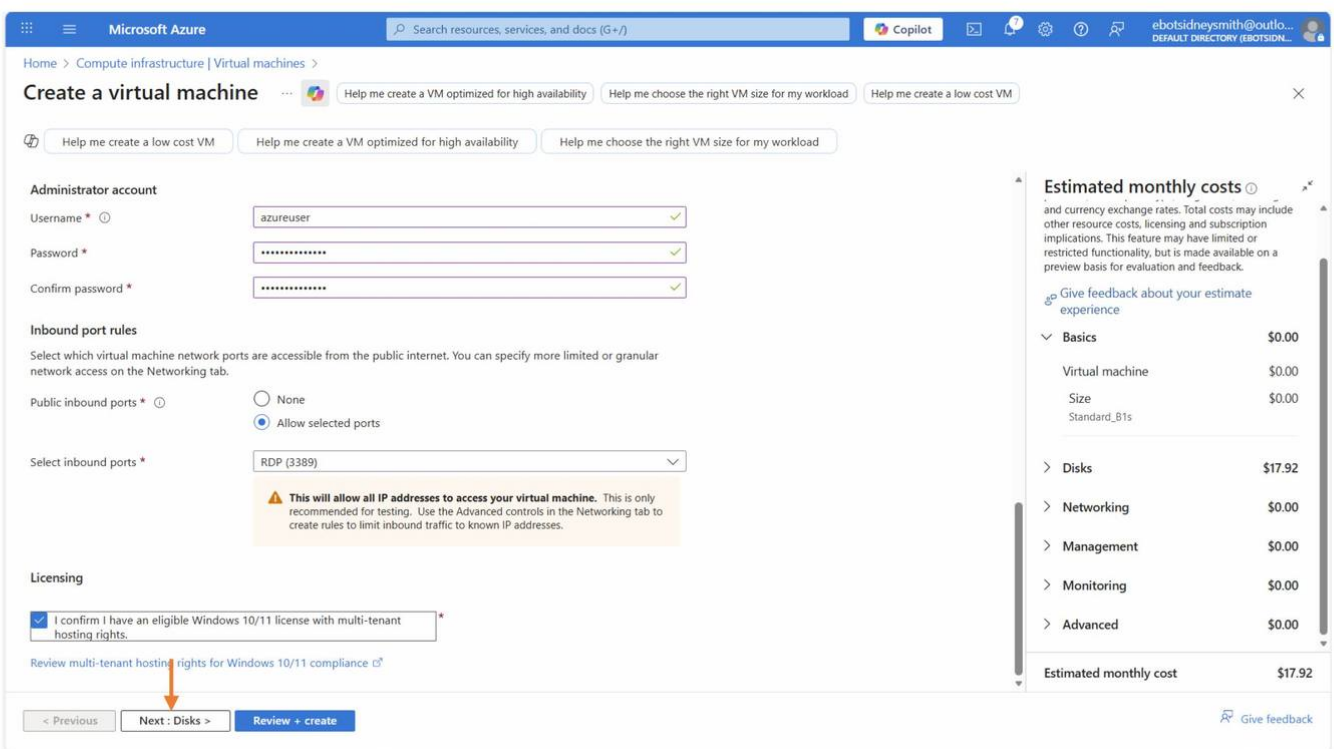
Then, the next thing is "**Select Inbound ports**". You need to understand some concepts here.

Here is a basic flow of how you can access a virtual machine. If a user wants to access the Windows virtual machine, then there should be a port which needs to be opened, and that port for Windows machines is 3389. So, port 3389 needed to be enabled and open for that virtual machine otherwise that user will not be able to access or login into the virtual machine using the public IP. We are going to learn about Public IP later.

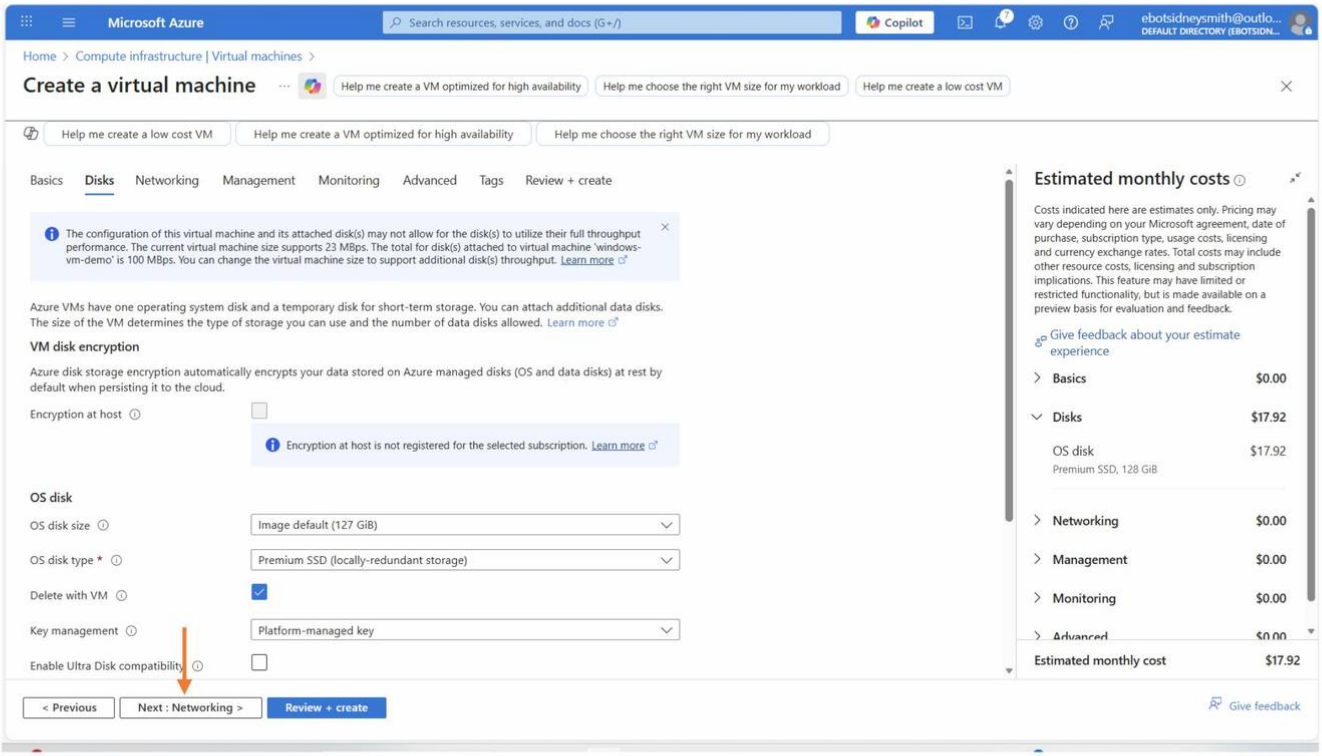
So, "**Select Inbound ports**", we will select "**RDP (3389)**"



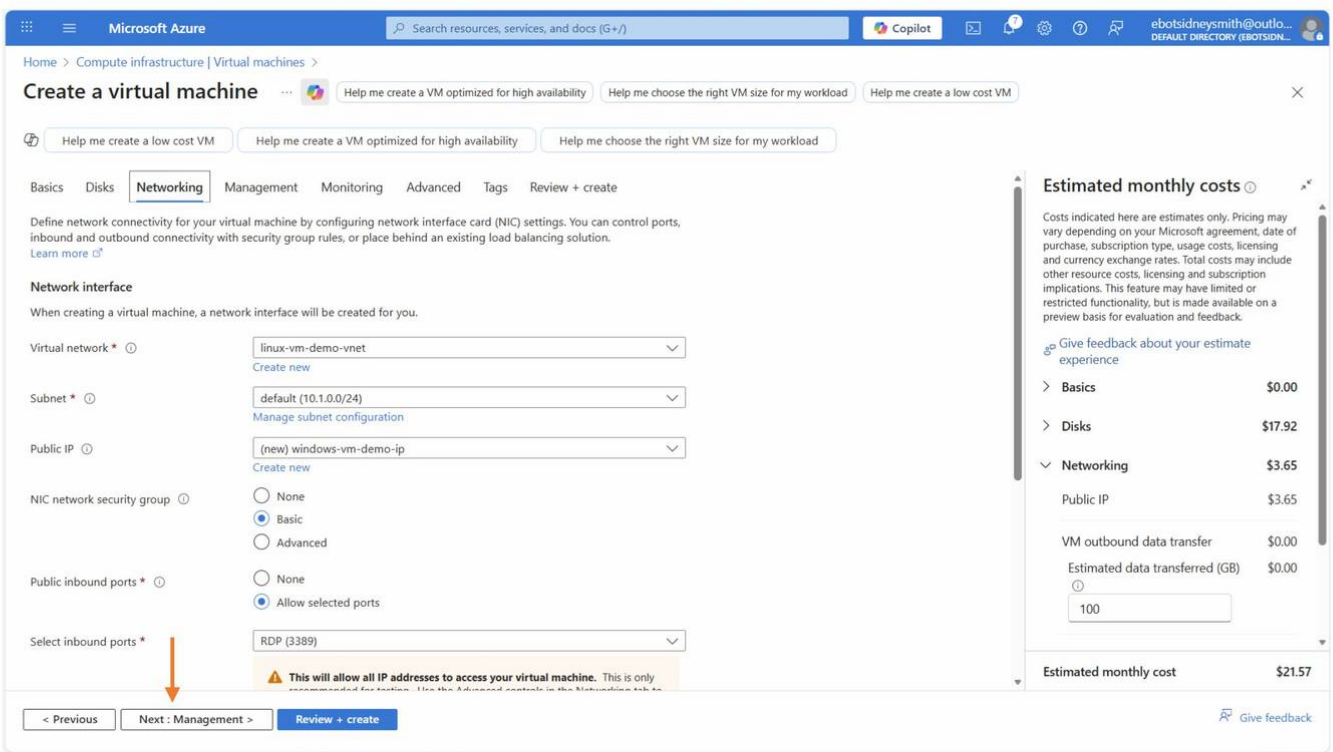
Then check the box "**I confirm I have an eligible Windows 10/11 license with multi-tenant**"



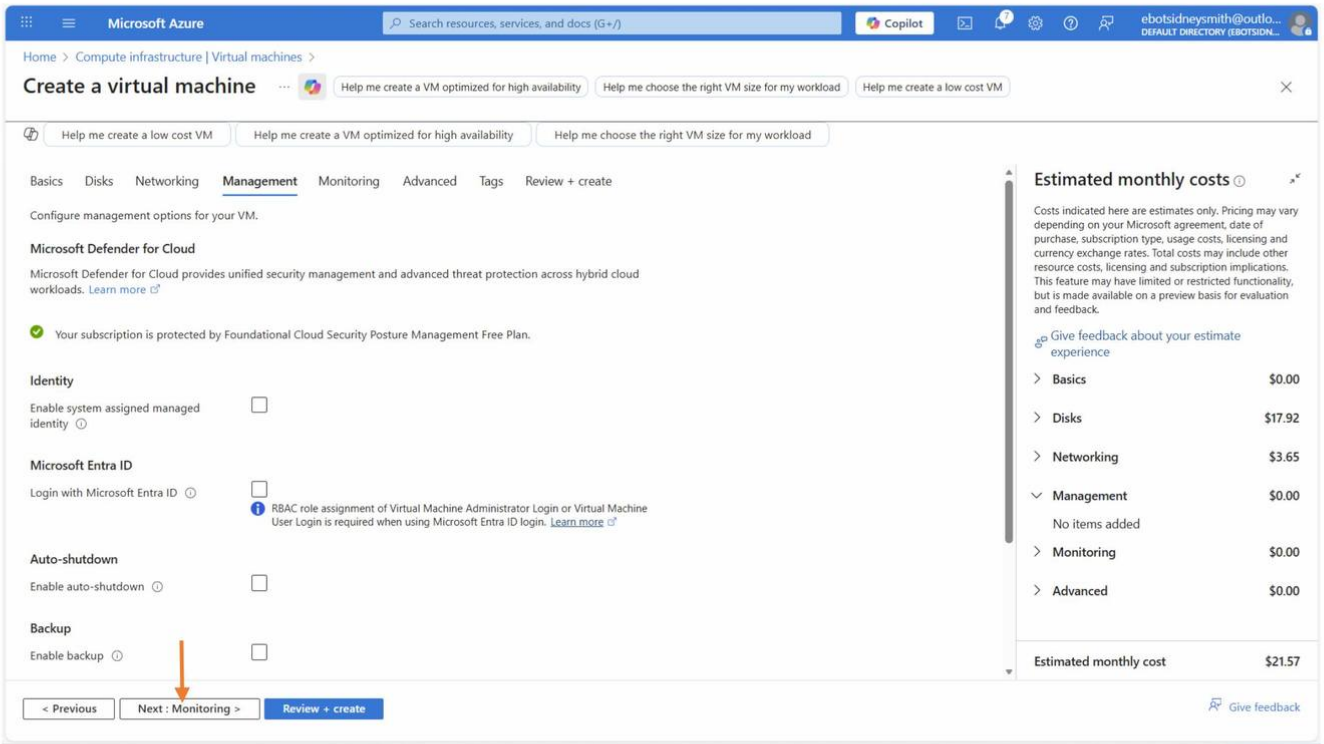
Then click on "**Next: Disks**"



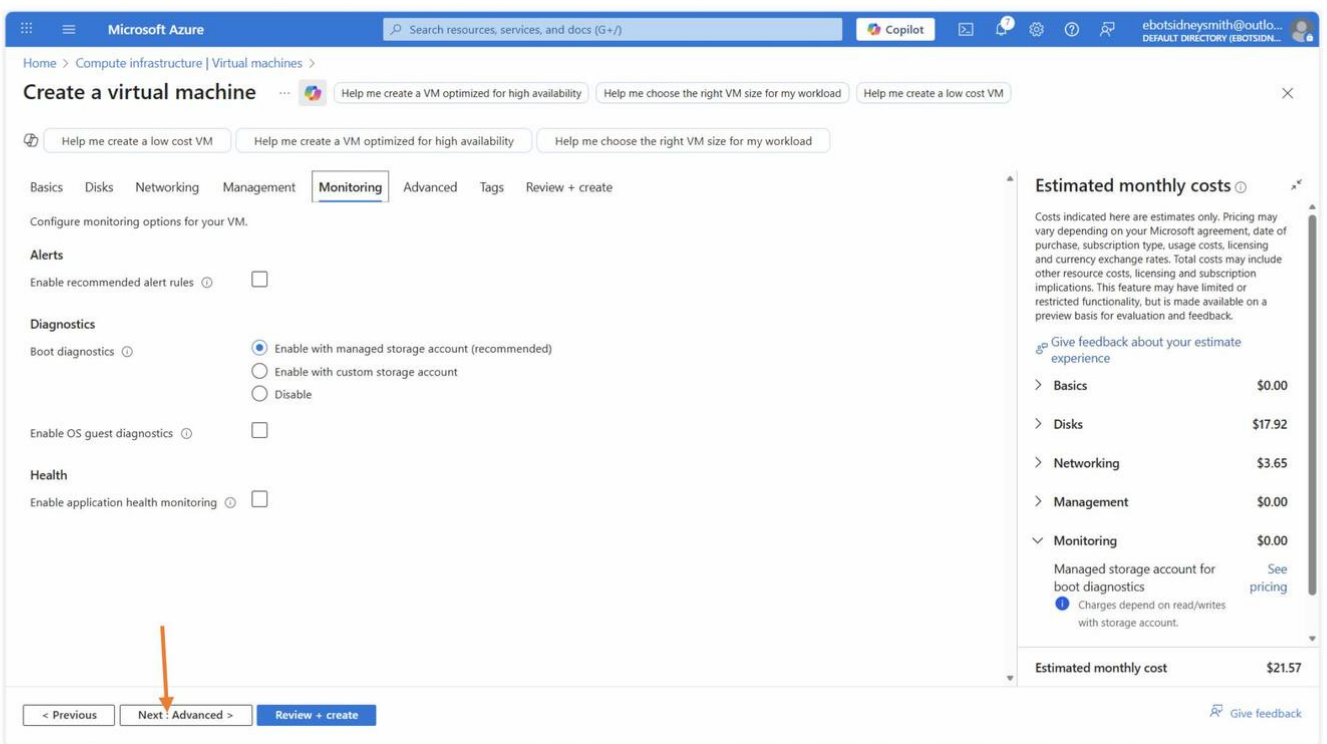
Here we are going to use the default values. We will leave everything as default and click on "**Next: Networking**".



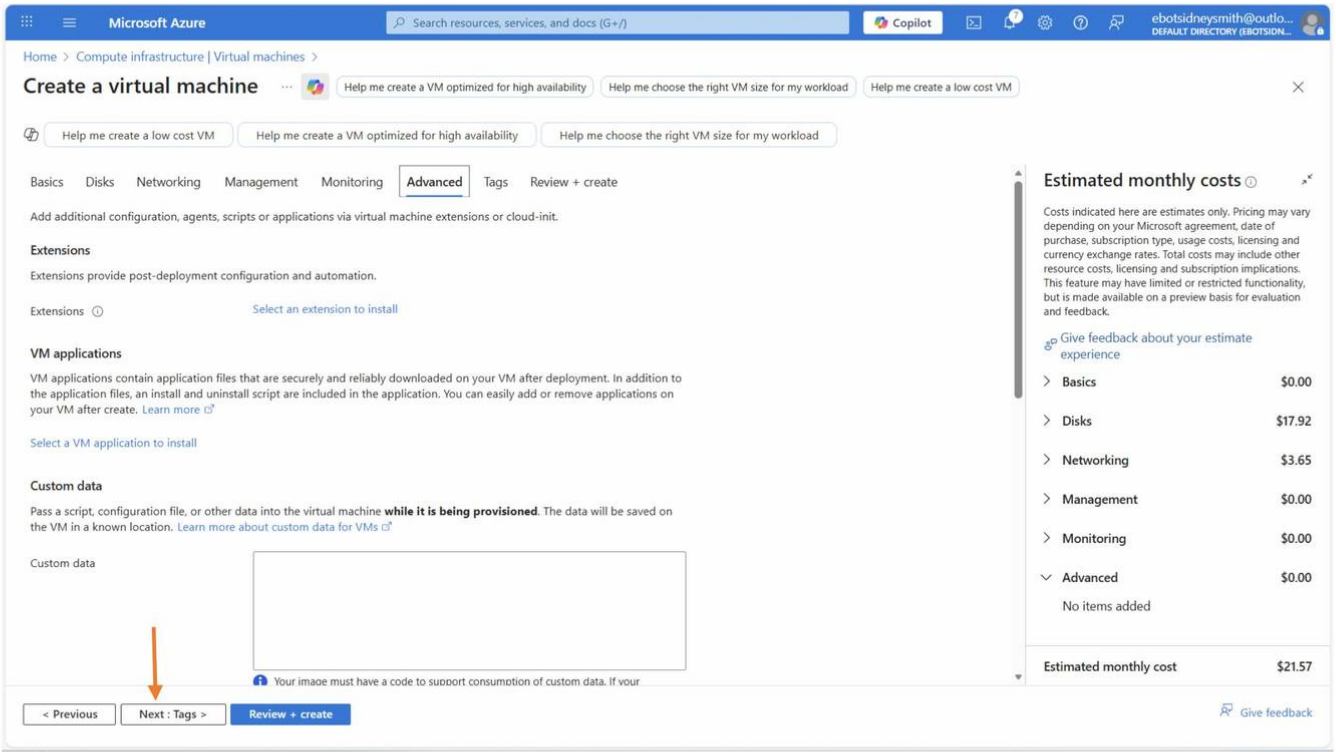
Here we will keep all the default selections and click on "**Next: Management**"



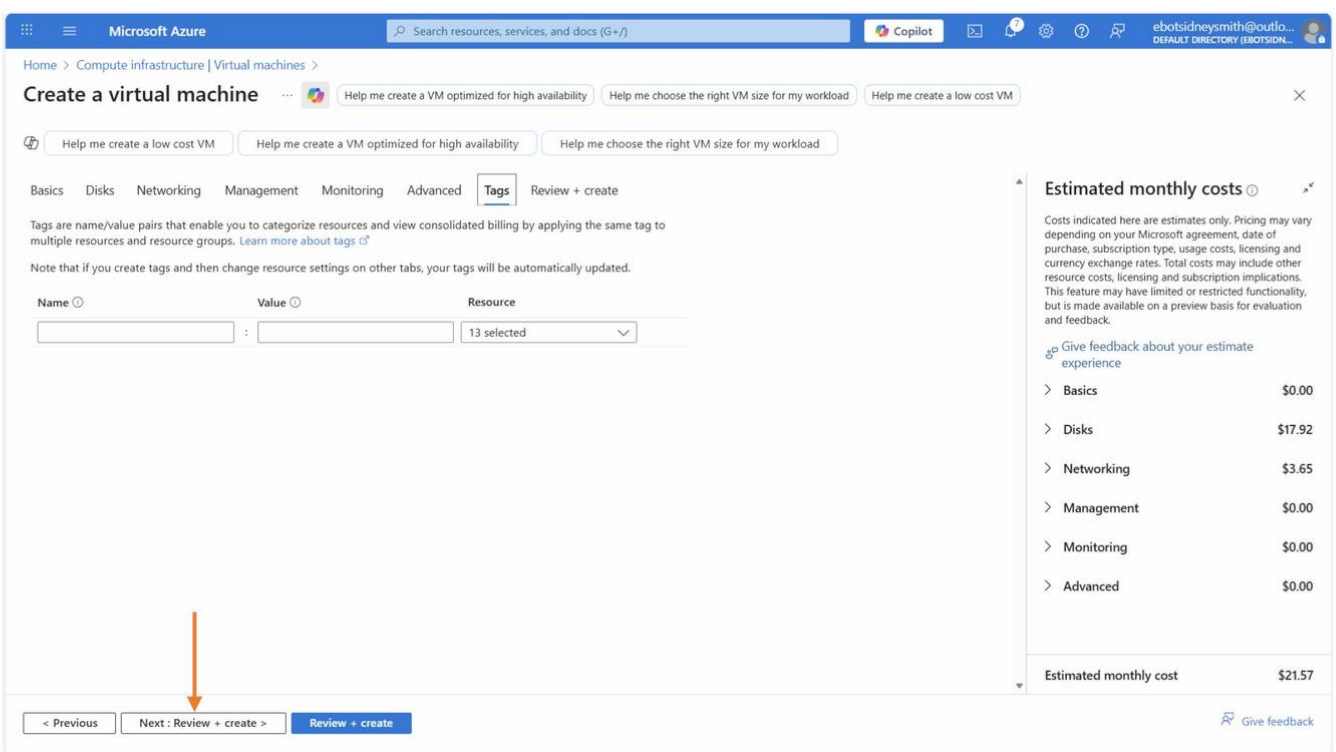
Here we will leave everything as default and click on "**Next: Monitoring**"



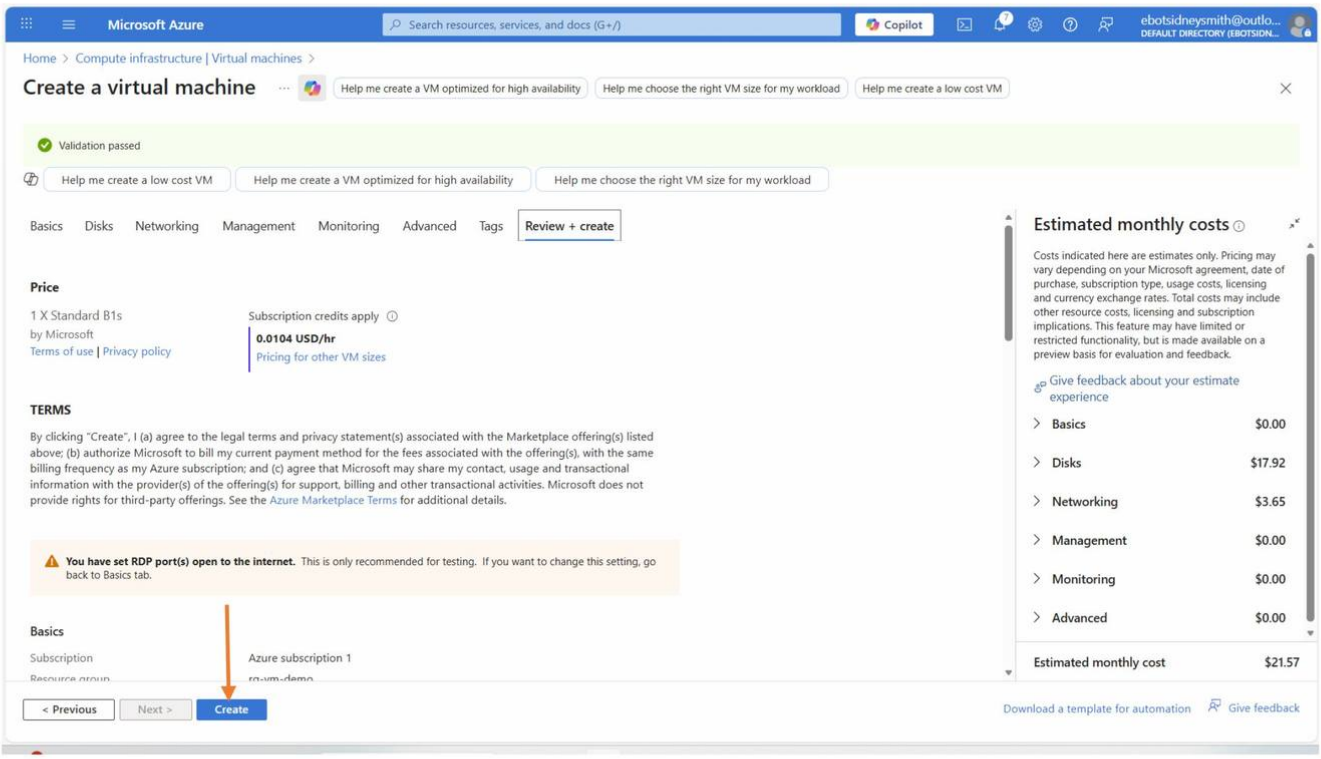
Here, we are also going to leave everything as default. Click on "**Next: Advanced**"



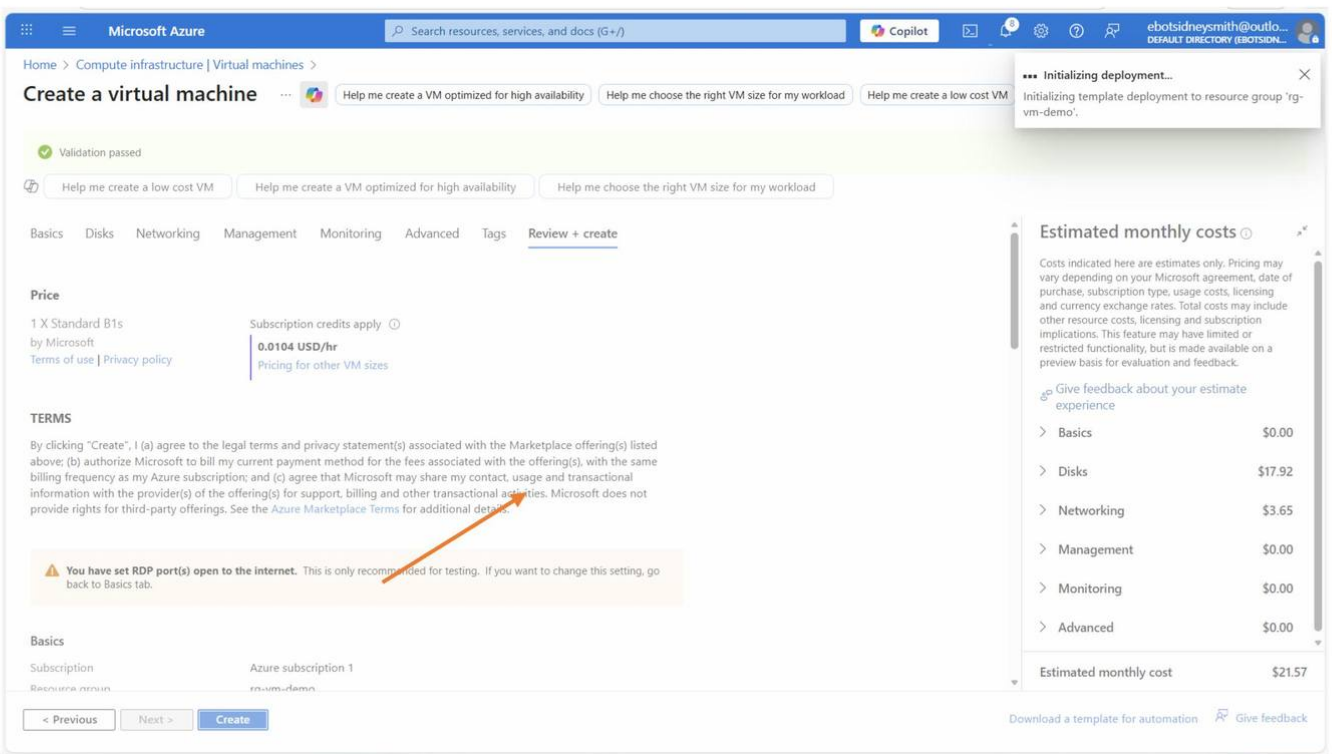
Here, we will leave everything as default and click on "**Next: Tags**"



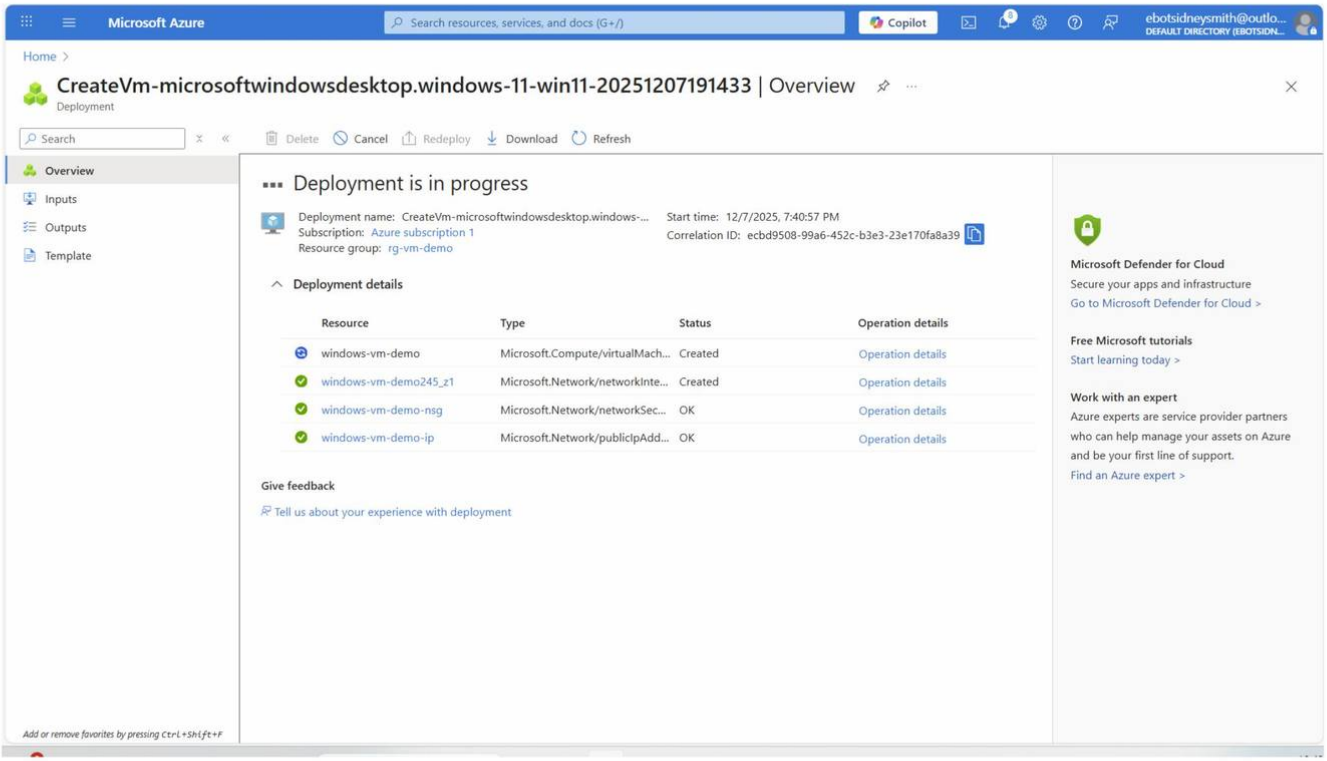
We are not going to add any "**Tags**", we will leave it as default. Click on "**Next: Review + Create**"



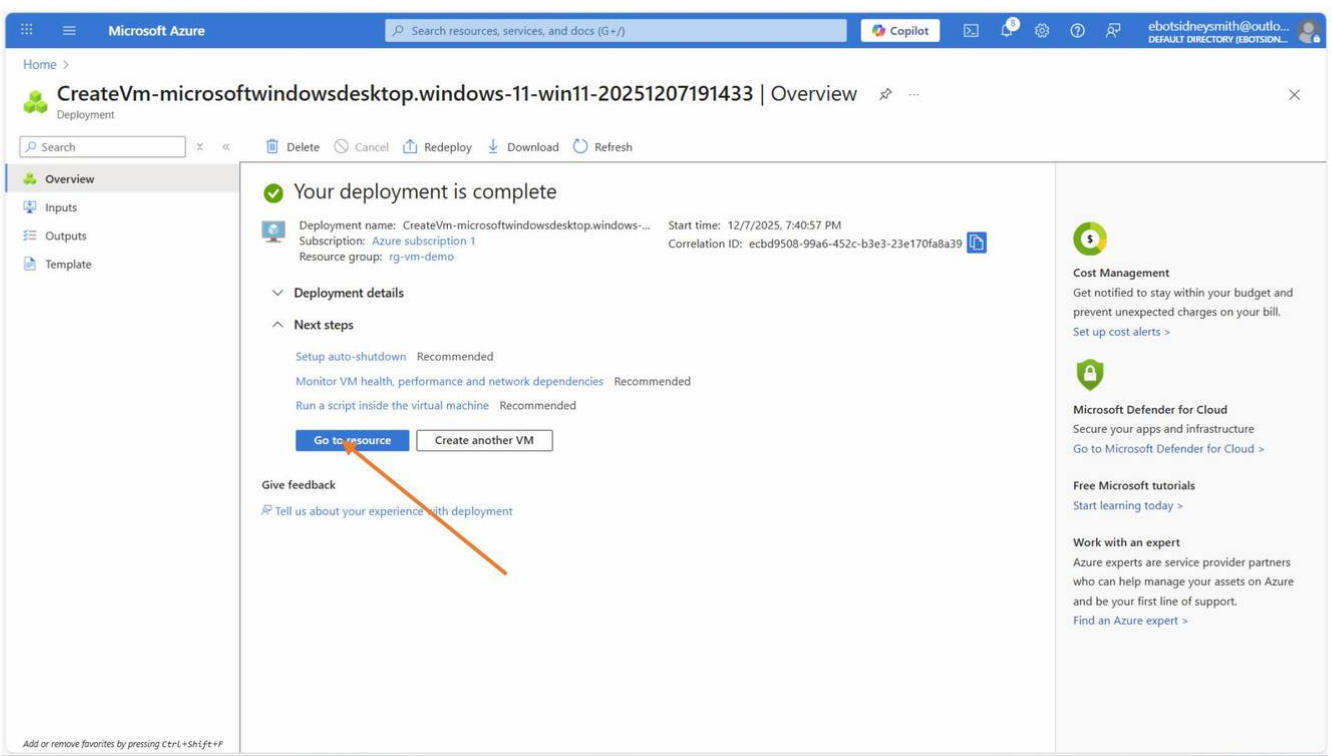
Review and click on "**Create**"



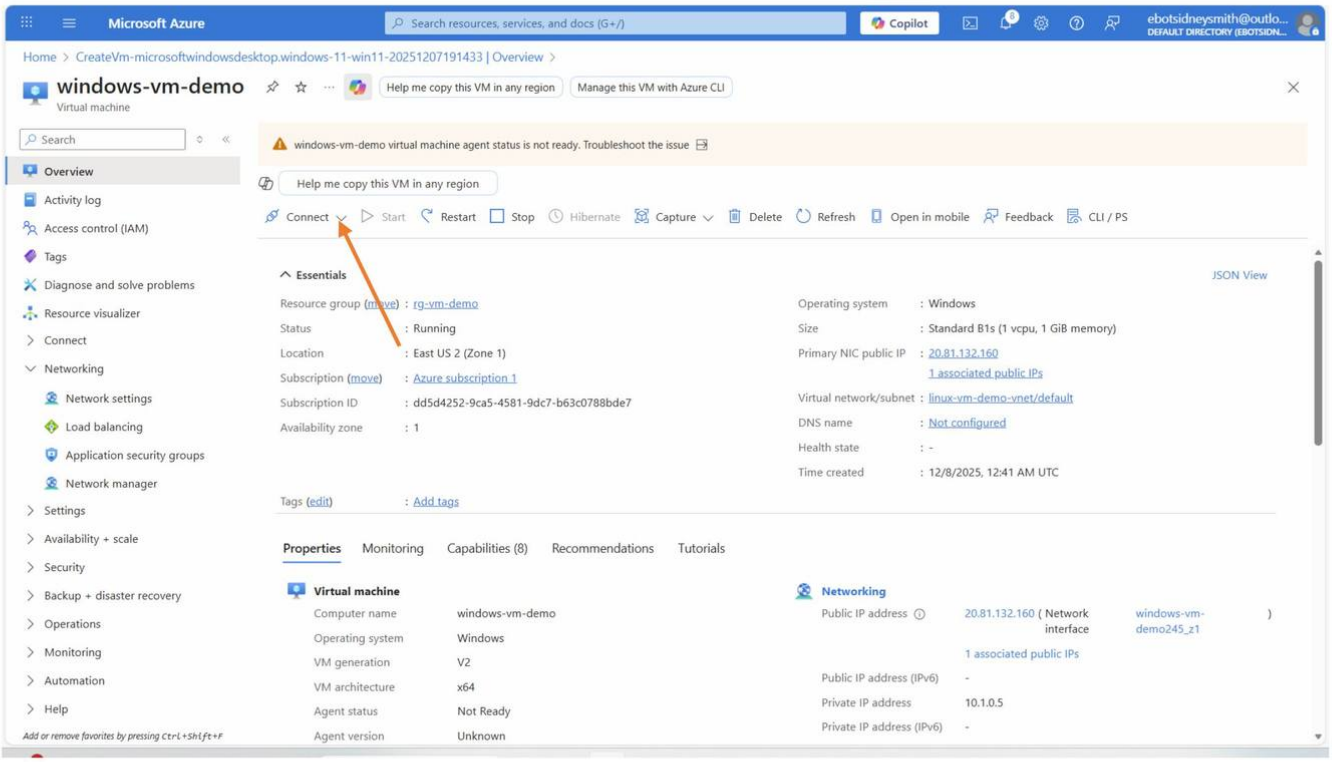
The deployment is initializing



The deployment is in progress

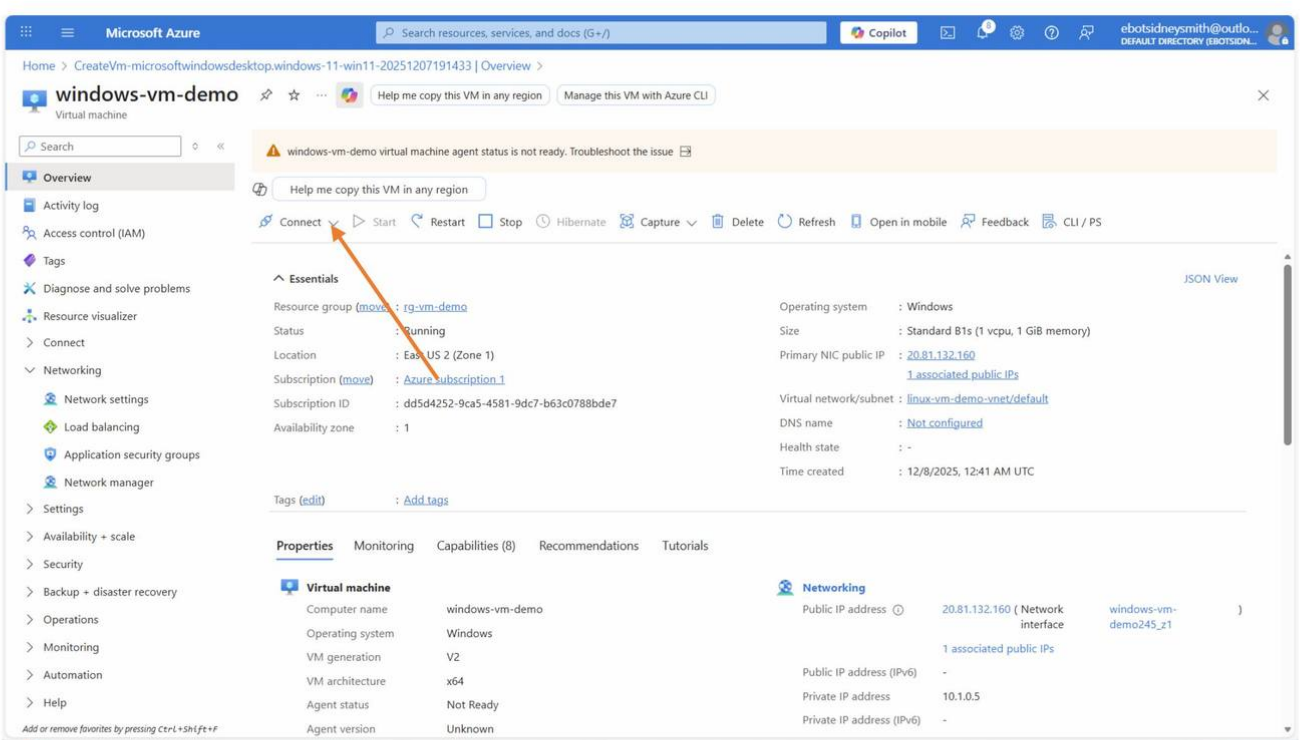


The deployment is complete. Click on "**Go to resource**"

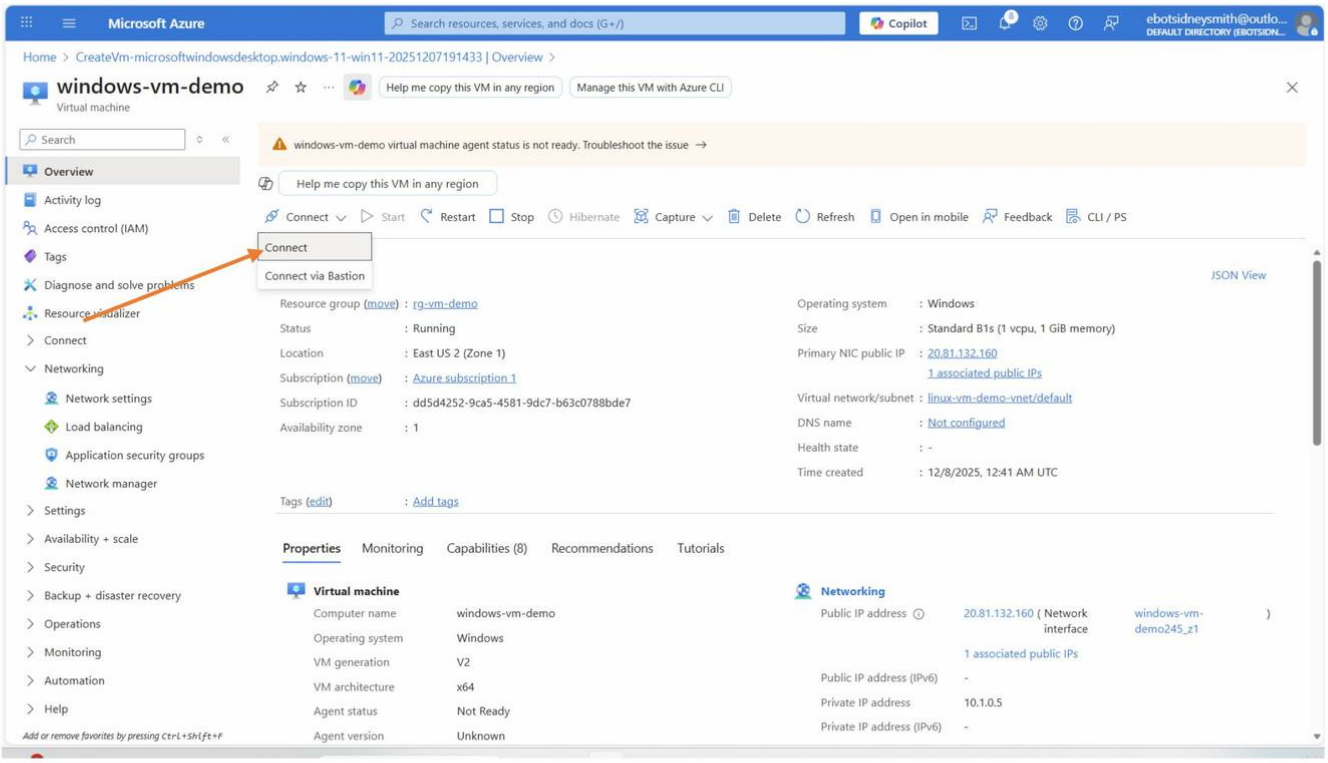


This is our virtual machine.

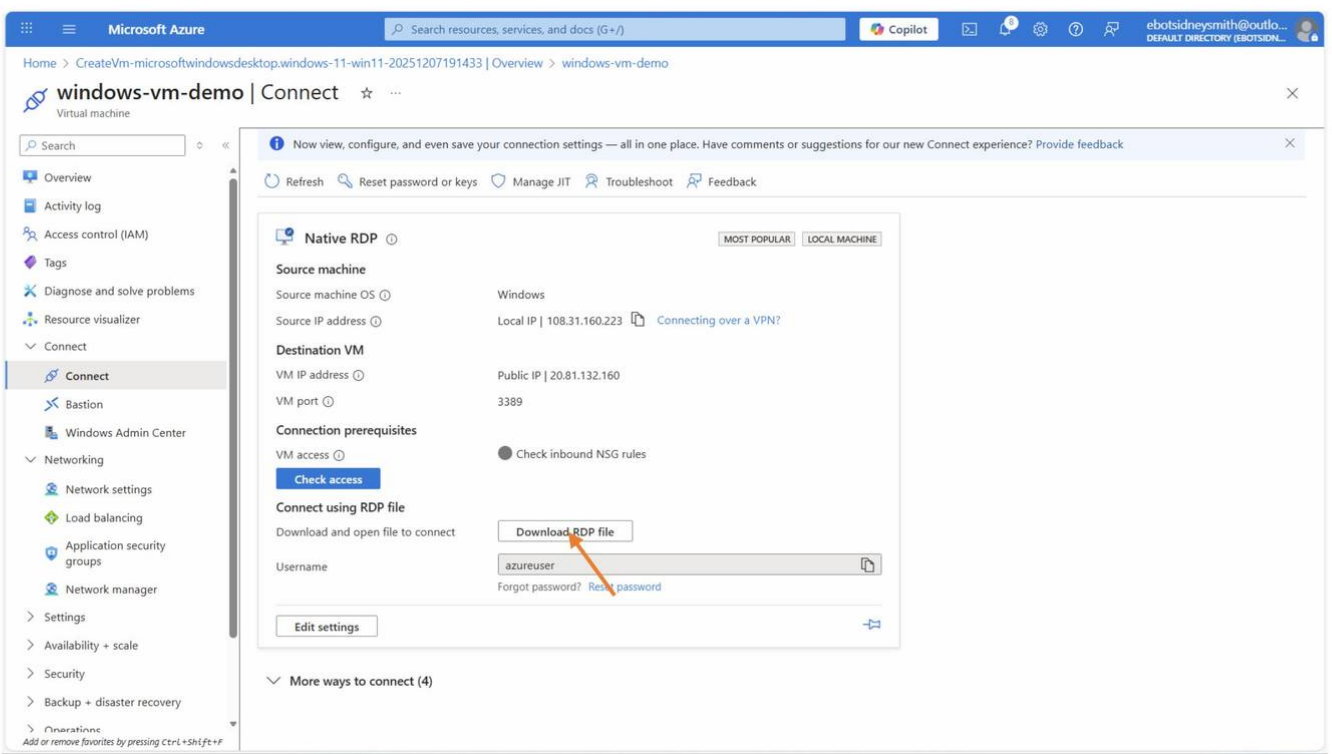
Connect to the Virtual Machine



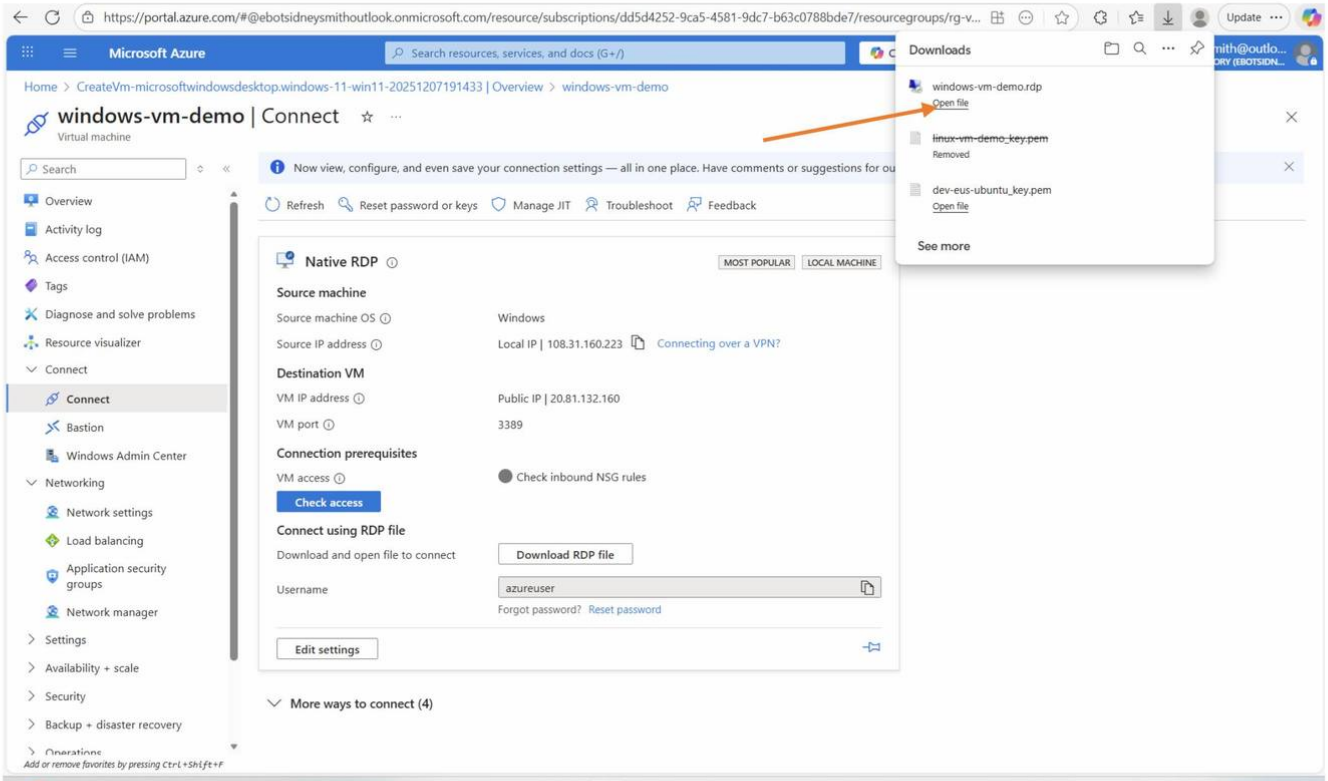
To connect to this virtual machine, click on the drop down on "**Connect**"



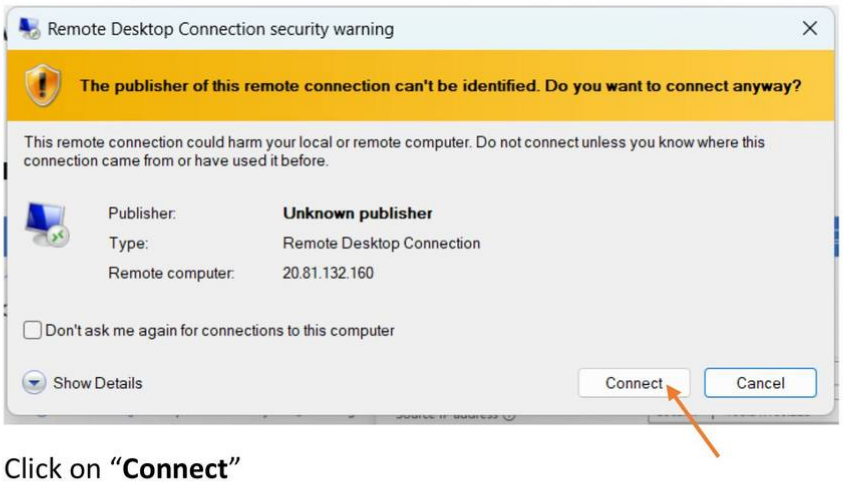
Select "**Connect**"



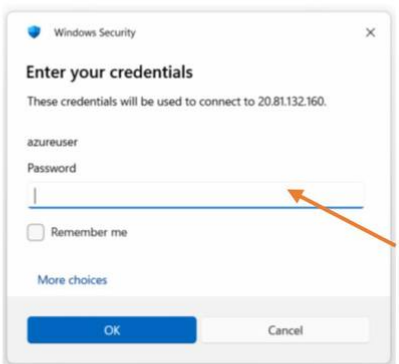
Click on "**Download RDP File**"



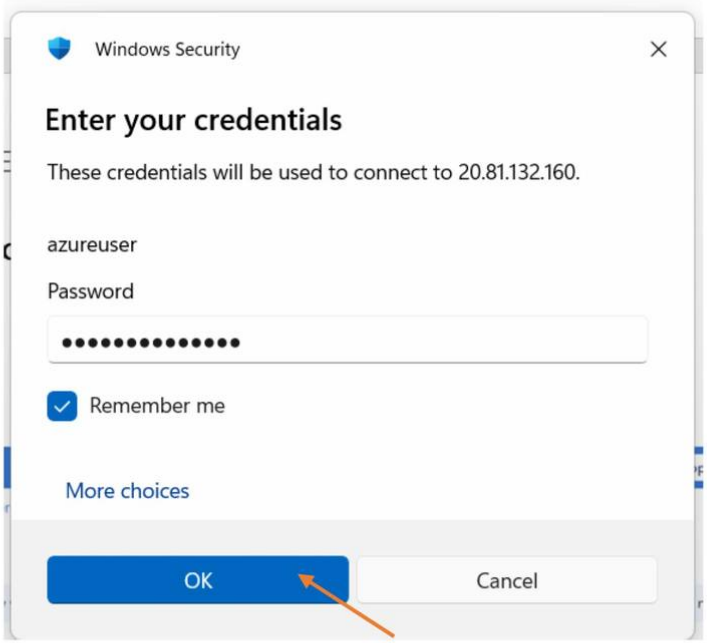
The file has been downloaded. Open the file by clicking on it.



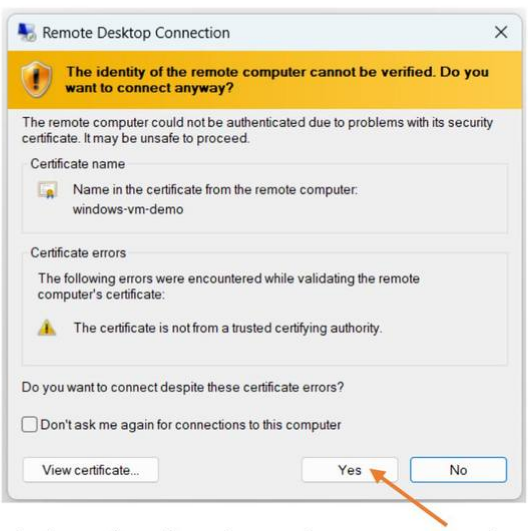
Click on "**Connect**"



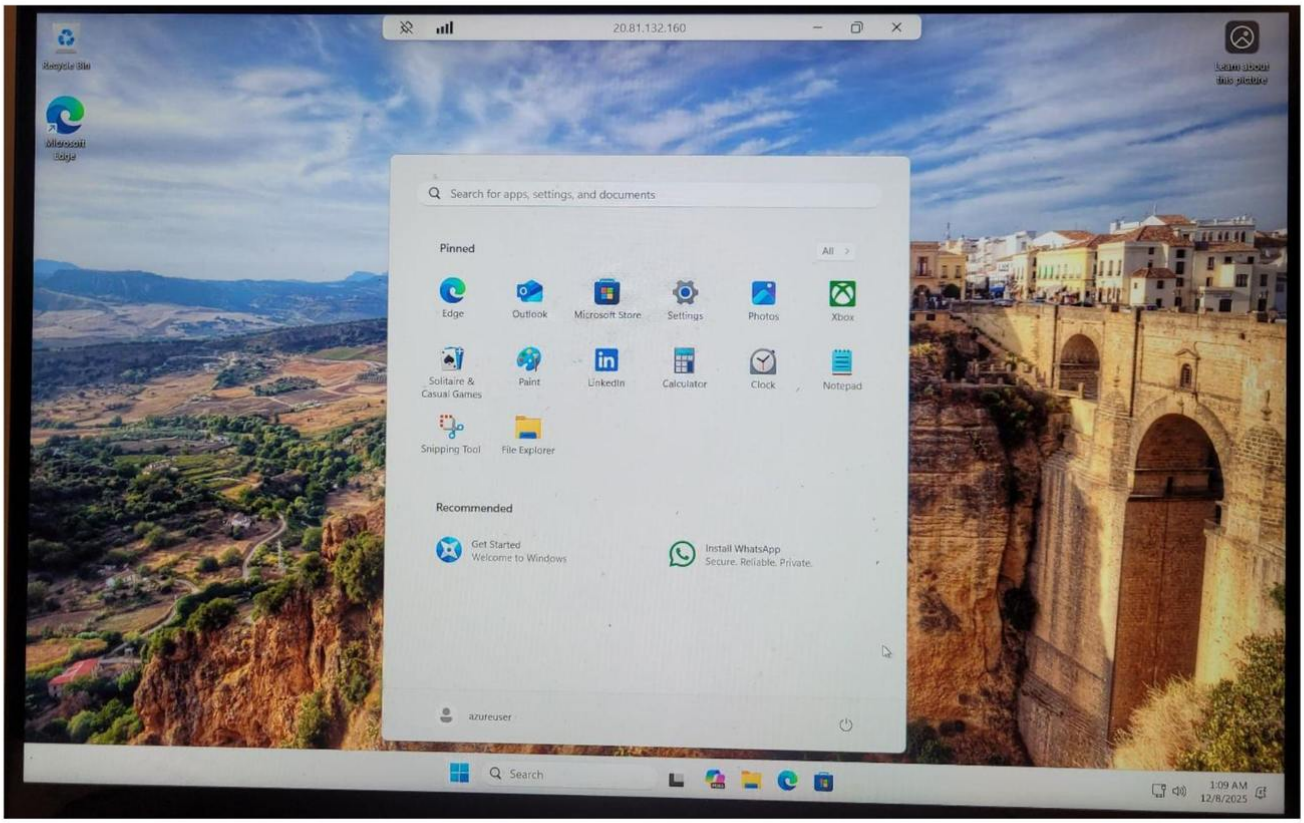
Enter the password



Click on "**OK**"



Click on "**Yes**" and wait for some time for it to connect to Windows



We are connected to the Windows virtual machine