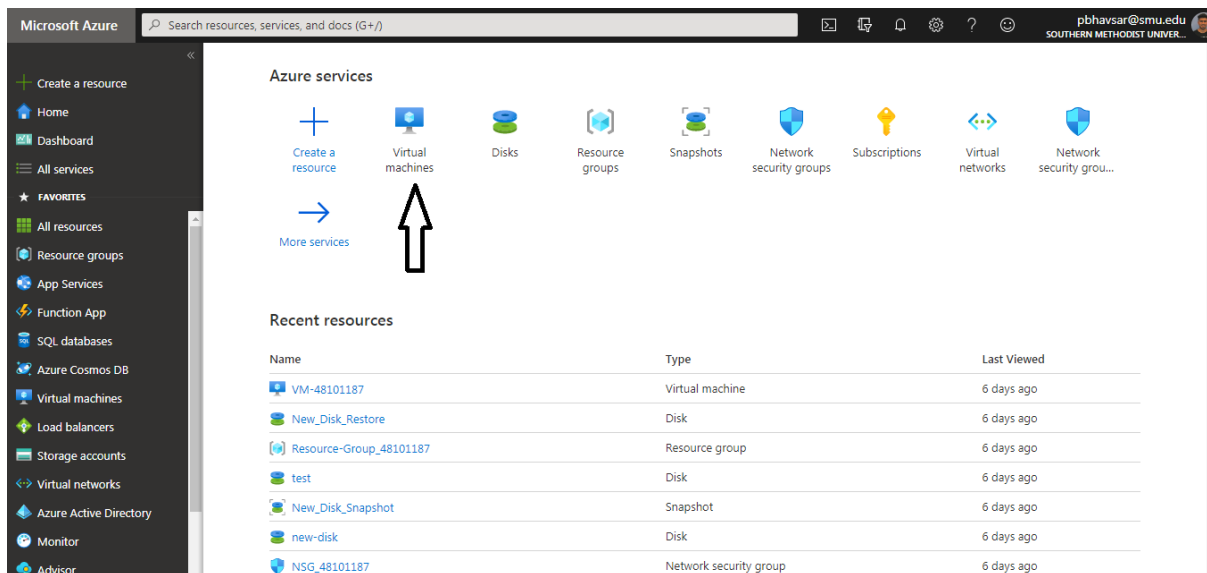


**LAB: Introduction to Azure Virtual Machines Service**

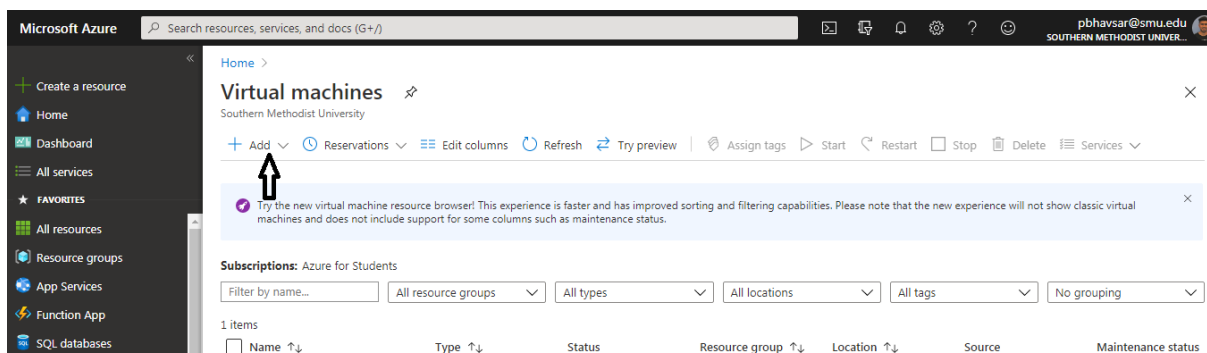
In this Lab, we are going to look at the Azure Virtual Machine (VM) Service. This Service is identical to the “Elastic Compute Cloud (EC2) Service in Amazon Web Services (AWS).

**Task 1: Launch Your Amazon EC2 Instance**

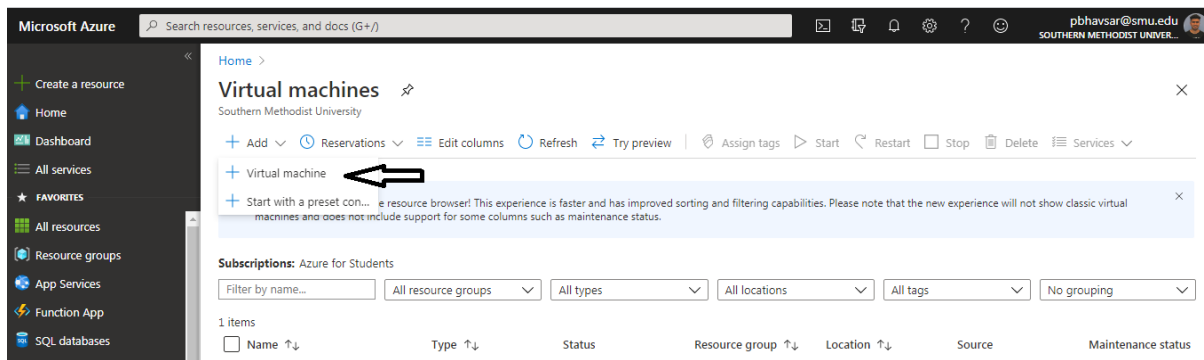
Navigate to Microsoft Azure Portal and under the Search bar, search for the “Virtual Machines” Service.



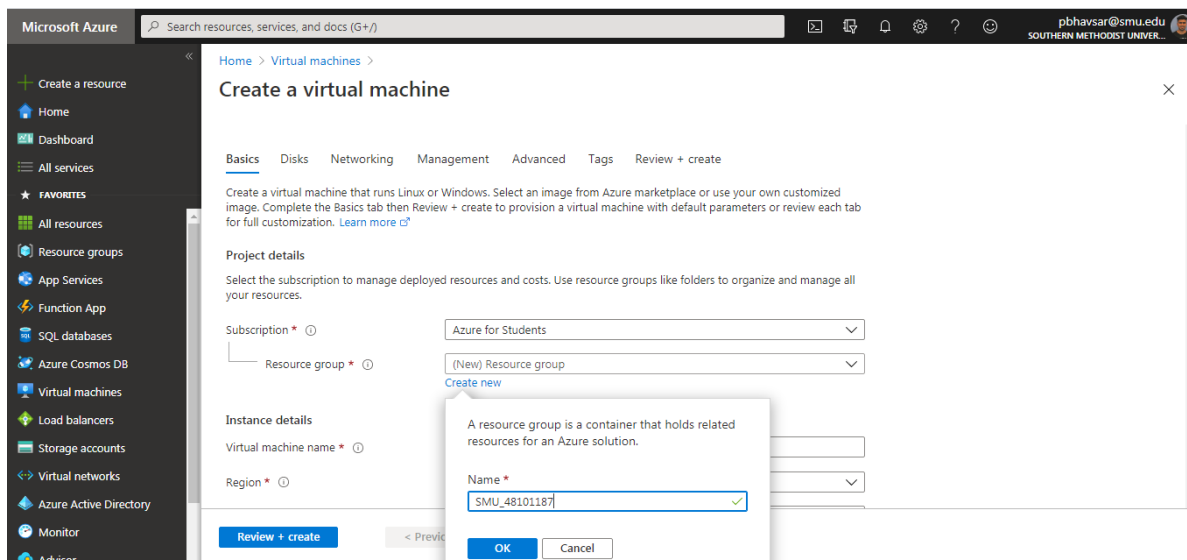
Click on “+ Add” to create a new Azure Virtual Machine (VM).



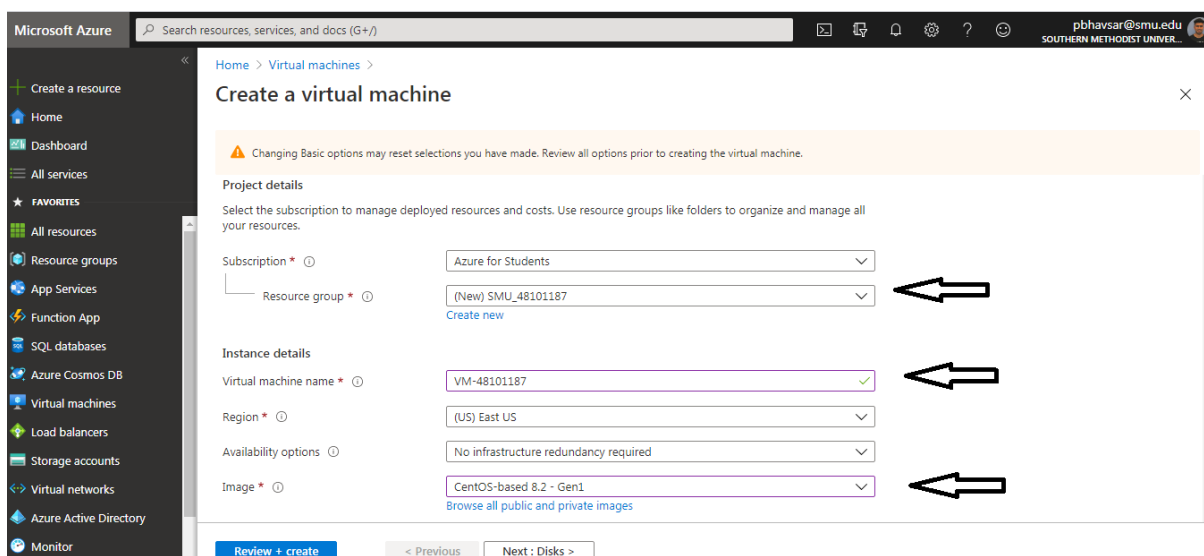
Click on “+ Virtual Machine”.



Under Resource Group, click on “Create New” and give Resource Group name as “SMU\_SMUID”. We’ll discuss more about designing a Resource Group in the upcoming Labs.



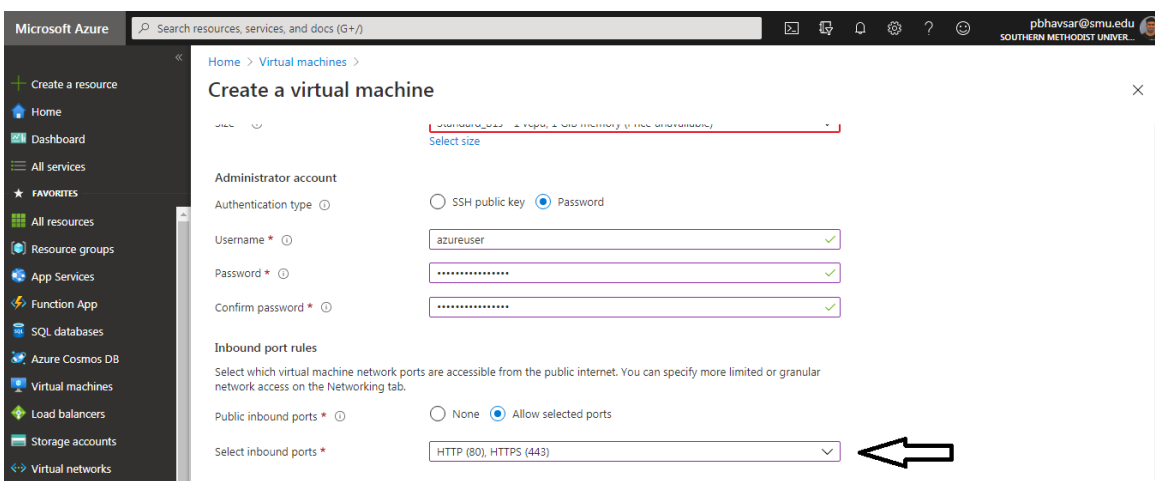
Specify the Virtual Machine Name, Region and Image as follow. We are deploying a CentOS-8 VM on Microsoft Azure.



Specify the Username as “azureuser” and Password of your choice.

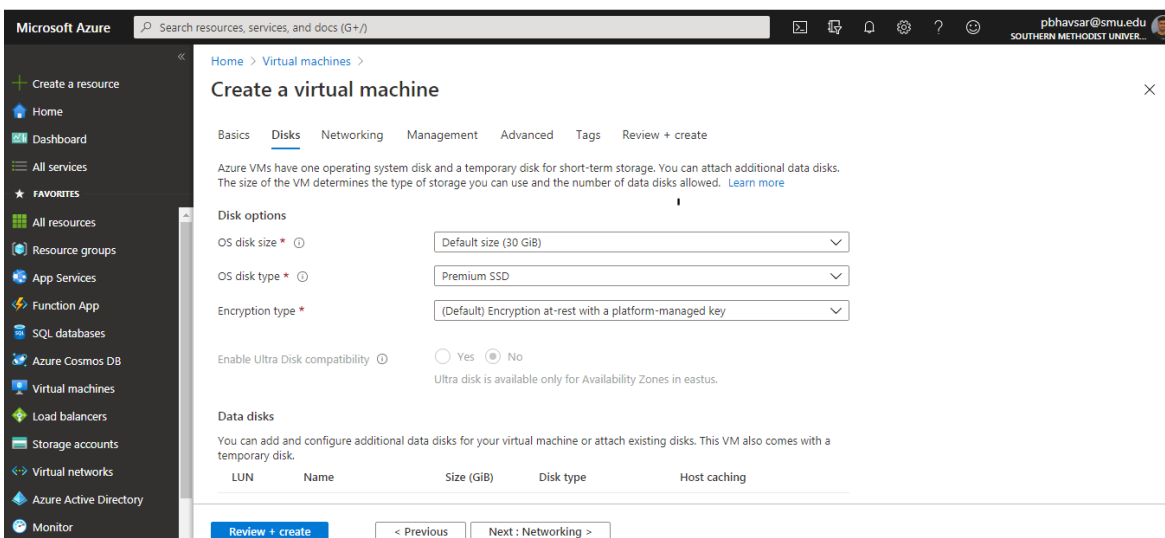


Since we'll be hosting a sample Web Application on this CentOS VM, allow the Inbound Ports 80 and 443. This will create a Network Security Group (NSG) for this VM but it can be used for Azure VMnet-Subnets level as well.



Select the default settings for the Virtual Machine's Disk.

If you notice, the default settings include SSD Disk for the OS Disk.



Keep the default settings for the Networking. We will configure a custom Virtual Network, custom Subnets in the upcoming Labs.

The screenshot shows the 'Create a virtual machine' page in the Microsoft Azure portal, specifically the 'Networking' tab. The page is titled 'Create a virtual machine' and has a sub-header 'Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution. [Learn more](#)'. The 'Network interface' section states: 'When creating a virtual machine, a network interface will be created for you.' The configuration fields are as follows: 'Virtual network' is set to '(new) SMU\_48101187-vnet' with a 'Create new' link; 'Subnet' is set to '(new) default (10.1.0.0/24)' with a 'Create new' link; 'Public IP' is set to '(new) VM-48101187-ip' with a 'Create new' link; 'NIC network security group' has radio buttons for 'None', 'Basic' (selected), and 'Advanced'; 'Public inbound ports' has radio buttons for 'None' and 'Allow selected ports' (selected); and 'Select inbound ports' is set to 'HTTP (80), HTTPS (443)'. At the bottom, there are buttons for 'Review + create', '< Previous', and 'Next : Management >'.

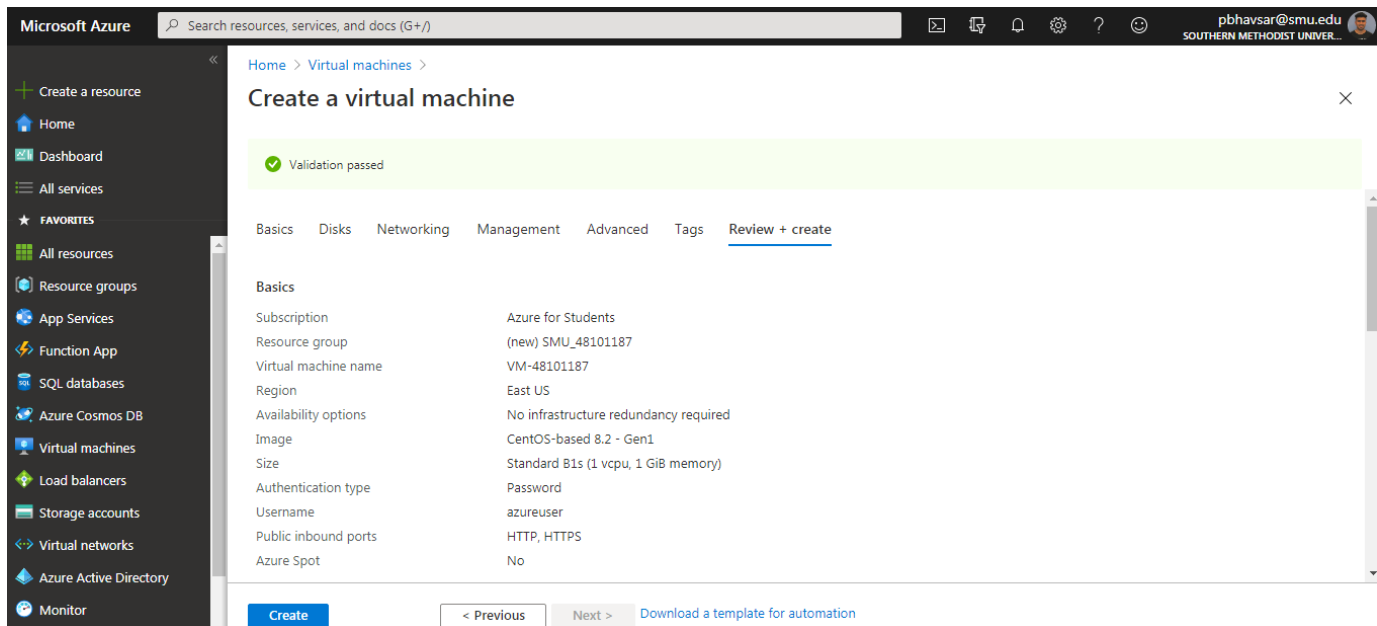
Now in the Advanced Tab, under “Custom Data”, write a bash script which would configure the Web Server for you during the Virtual Machine Boot Up process. This is exactly same as the “User Data” field in the AWS-EC2 Service.

The screenshot shows the 'Create a virtual machine' page in the Microsoft Azure portal, specifically the 'Advanced' tab. The page is titled 'Create a virtual machine' and has a sub-header 'Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.' The 'Extensions' section states: 'Extensions provide post-deployment configuration and automation.' There is a link 'Select an extension to install'. The 'Custom data' section states: 'Pass a script, configuration file, or other data into the virtual machine while it is being provisioned. The data will be saved on the VM in a known location. [Learn more about custom data for VMs](#)'. The 'Custom data' field contains a bash script: 

```
#!/bin/bash
sudo su -
yum install -y httpd
systemctl start httpd.service
systemctl enable httpd.service
echo "Hello Mustangs!" > /var/www/html/index.html
```

 A large black arrow points to this field. At the bottom, there are buttons for 'Review + create', '< Previous', and 'Next : Tags >'.

Review the configurations which you've specified and click on "Create".



Microsoft Azure

Search resources, services, and docs (G+)

Home > Virtual machines >

### Create a virtual machine

Validation passed

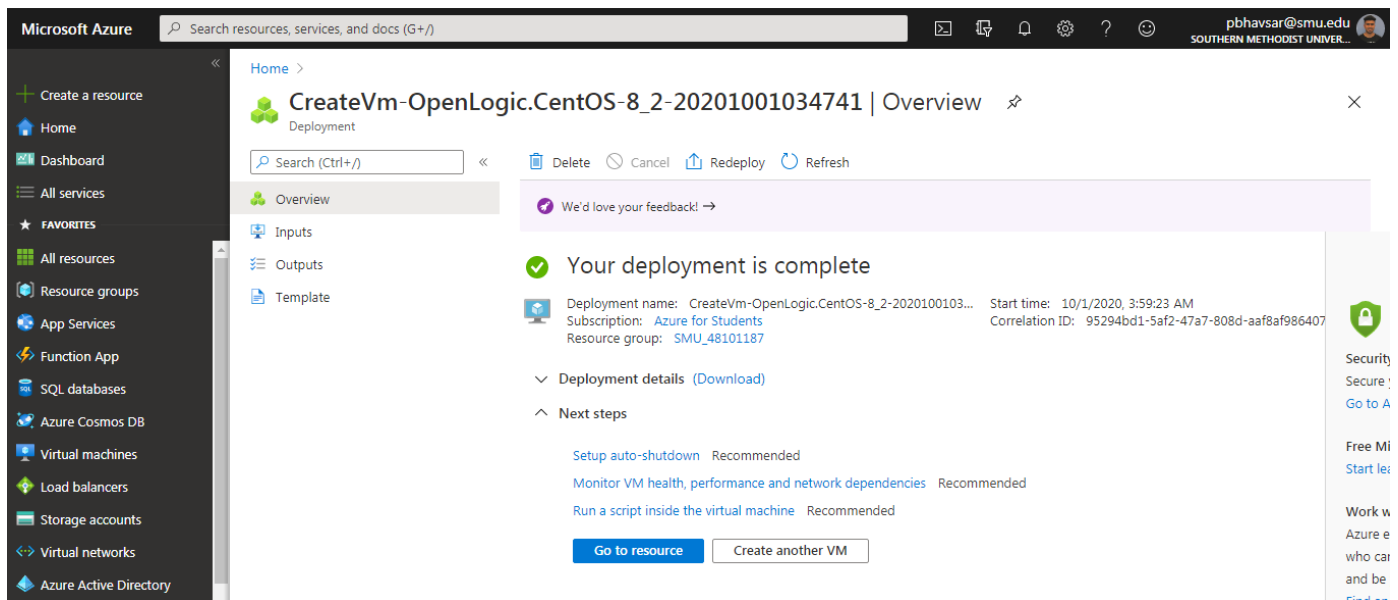
Basics Disks Networking Management Advanced Tags Review + create

**Basics**

Subscription	Azure for Students
Resource group	(new) SMU_48101187
Virtual machine name	VM-48101187
Region	East US
Availability options	No infrastructure redundancy required
Image	CentOS-based 8.2 - Gen1
Size	Standard B1s (1 vcpu, 1 GiB memory)
Authentication type	Password
Username	azureuser
Public inbound ports	HTTP, HTTPS
Azure Spot	No

Create < Previous Next > Download a template for automation

Your Azure Virtual Machine (VM) deployment is finally completed.



Microsoft Azure

Search resources, services, and docs (G+)

Home >

### CreateVm-OpenLogic.CentOS-8\_2-20201001034741 | Overview

Deployment

Search (Ctrl+ /) Delete Cancel Redeploy Refresh

We'd love your feedback! →

**✓ Your deployment is complete**

Deployment name: CreateVm-OpenLogic.CentOS-8\_2-2020100103... Start time: 10/1/2020, 3:59:23 AM  
Subscription: Azure for Students Correlation ID: 95294bd1-5af2-47a7-808d-aaf8af986407  
Resource group: SMU\_48101187

Deployment details (Download)

Next steps

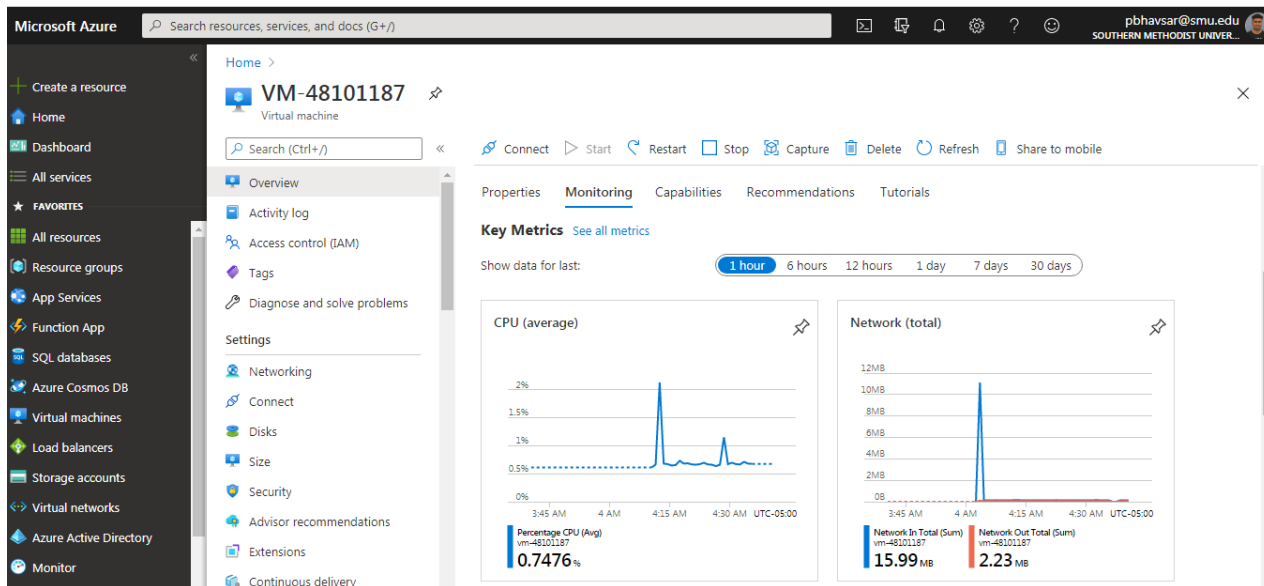
- Setup auto-shutdown Recommended
- Monitor VM health, performance and network dependencies Recommended
- Run a script inside the virtual machine Recommended

Go to resource Create another VM

Security Secure : Go to A  
Free Mi Start le  
Work w Azure e who car and be Find an

## Task 2: Monitor Your Instance

Click on your Virtual Machine and on the left-hand side, click on “Overview”. Click on Monitoring, it will display the current resource utilizations of the Virtual Machine (VM). You can also integrate these metrics with the Azure Monitor service for implementing Monitoring and Alerting system in your environment.



Below the “Overview”, click on “Export Template”.

Template in JSON format is already populated for you. You can use this template to deploy an identical Virtual Machine on Azure platform using Azure ARM Service.

The screenshot shows the 'Export template' dialog for VM-48101187. The dialog includes a 'Download' button, a 'Deploy' button, and a 'Template' tab showing the ARM template JSON code. The 'Include parameters' checkbox is checked. The 'Template' tab shows the following JSON code:

```
1 {
2   "$schema": "https://schema.management.azure.com/schemas/
3     2015-01-01/deploymentTemplate.json#",
4   "contentVersion": "1.0.0.0",
5   "parameters": {
6     "virtualMachines_VM_48101187_name": {
7       "defaultValue": "VM-48101187",
8       "type": "String"
9     },
10    "disks_VM_48101187_OsDisk_1_7b6b15e0fd45496d93651b25b87e8875_exte
11      rnalid": {
12        "defaultValue": "/subscriptions/
13          0b428db0-cfb4-4abf-9f5e-43ed6a5732fc/resourceGroups/SMU_48101187/
14          providers/Microsoft.Compute/disks/
15          VM-48101187_OsDisk_1_7b6b15e0fd45496d93651b25b87e8875",
16        "type": "String"
17      }
18    }
19  }
```

Click on “Auto-Shutdown”. You can enable the Auto-Shutdown feature to shutdown your Azure VM for a particular time and configure to send notifications to the Webhooks or Email IDs before auto-shutdown.

The screenshot shows the Microsoft Azure portal interface. On the left sidebar, the 'Auto-shutdown' option is highlighted with a black arrow. The main panel displays the 'Auto-shutdown' settings for the virtual machine 'VM-48101187'. The settings include:

- Enabled:** A toggle switch set to 'On'.
- Scheduled shutdown:** A text input field containing '12:00:00 AM'.
- Time zone:** A dropdown menu set to '(UTC-06:00) Central Time (US & Canada)'.
- Send notification before auto-shutdown?:** Radio buttons for 'Yes' and 'No', with 'No' selected.
- Webhook URL:** A text input field.
- Email address:** A text input field.

Finally, under “Search Resources” option, search for the “Resource Group” which you created during VM configurations.

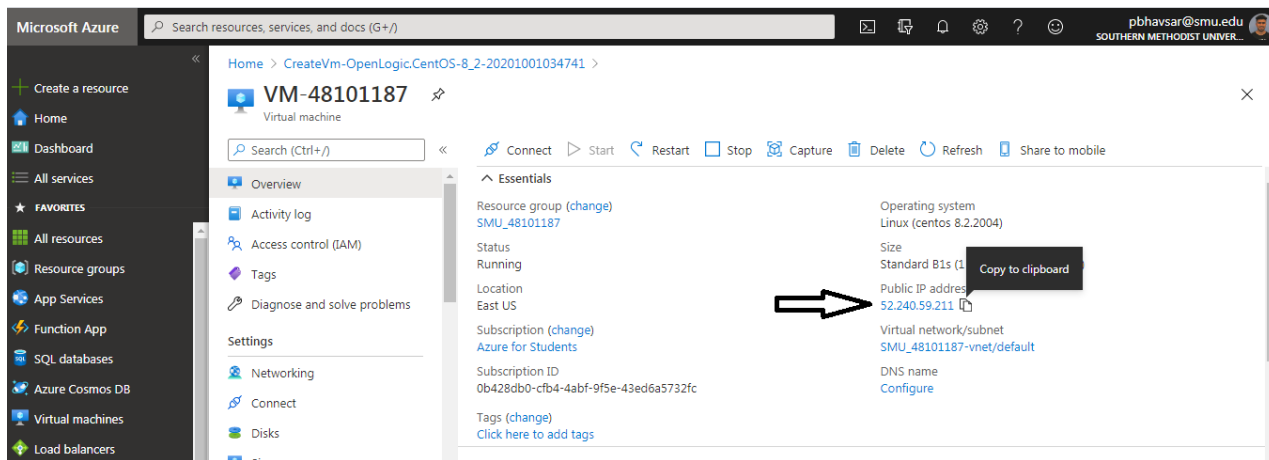
Under Resource Group, you’ll see all the specified VM Configurations are available such as Virtual Machine, Public IP Address, Network Security Group, Network Interface, Virtual Machine Disk etc.

The screenshot shows the Microsoft Azure portal interface. On the left sidebar, the 'Resource groups' option is highlighted. The main panel displays the 'Resource groups' page for the resource group 'SMU\_48101187'. The page shows a list of resources within the resource group, including a virtual network, virtual machine, public IP address, network security group, network interface, and disk. The list is filtered by name and location.

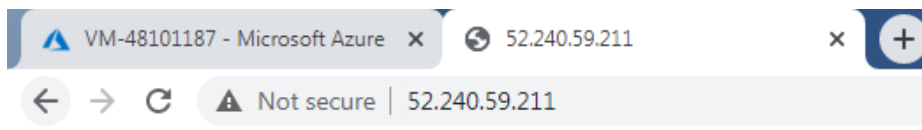
Name	Type	Location
SMU_48101187-vnet	Virtual network	East US
VM-48101187	Virtual machine	East US
VM-48101187-ip	Public IP address	East US
VM-48101187-nsg	Network security group	East US
vm-48101187314	Network interface	East US
VM-48101187_OsDisk_1_7b6b15e0fd45496d93651b25b87e88...	Disk	East US

### Task 3: Access the Web Server and Update Your Security Group.

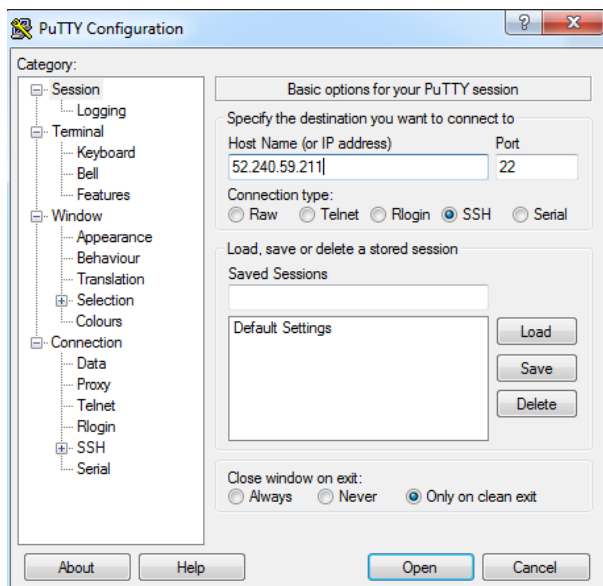
Under the Virtual Machine (VM), click on Overview and copy the Public IP Address.



Put the Public IP in Browser, it would open the sample webpage which we configured earlier.



But if you try to take PuTTY session of this Virtual Machine, it would be failed as we've only specified the Inbound traffic for HTTP (Port 80) and HTTPS (Port 443).

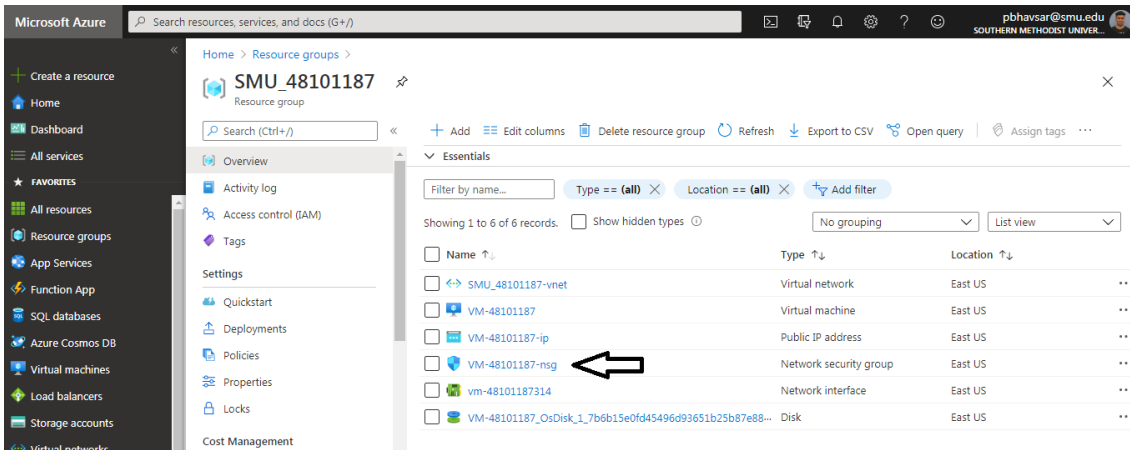




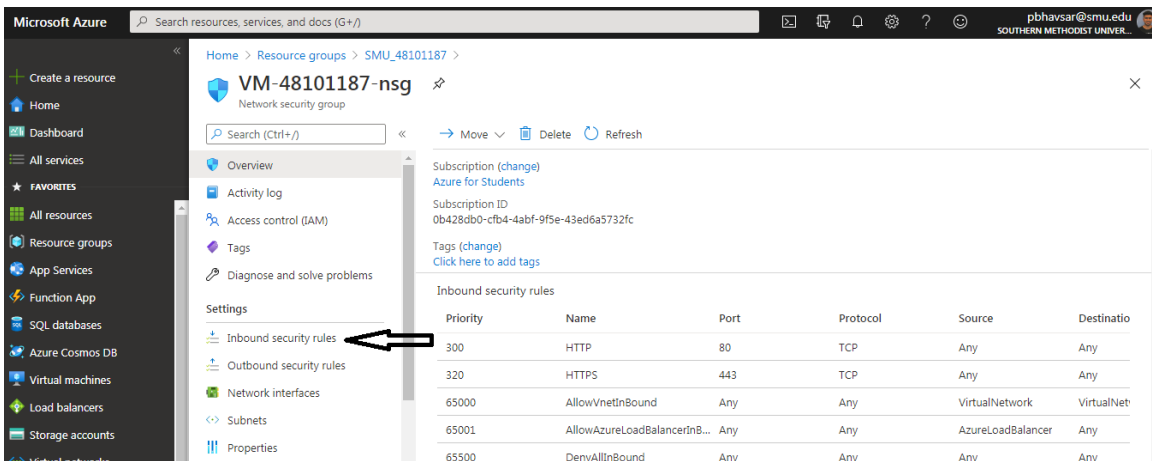


Let's now add the new Inbound Rule for the SSH (Port: 22).

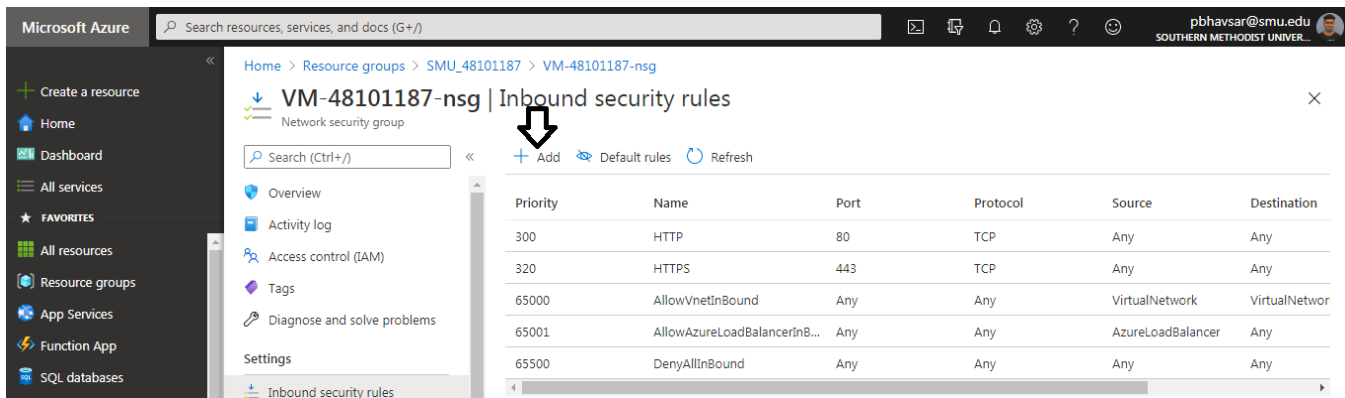
Navigate to "Resource Group" again and click on the "Network Security Group".



Under Network Security Group (NSG), click on "Inbound Rules".



Click on + Add to add a new Inbound Rule.

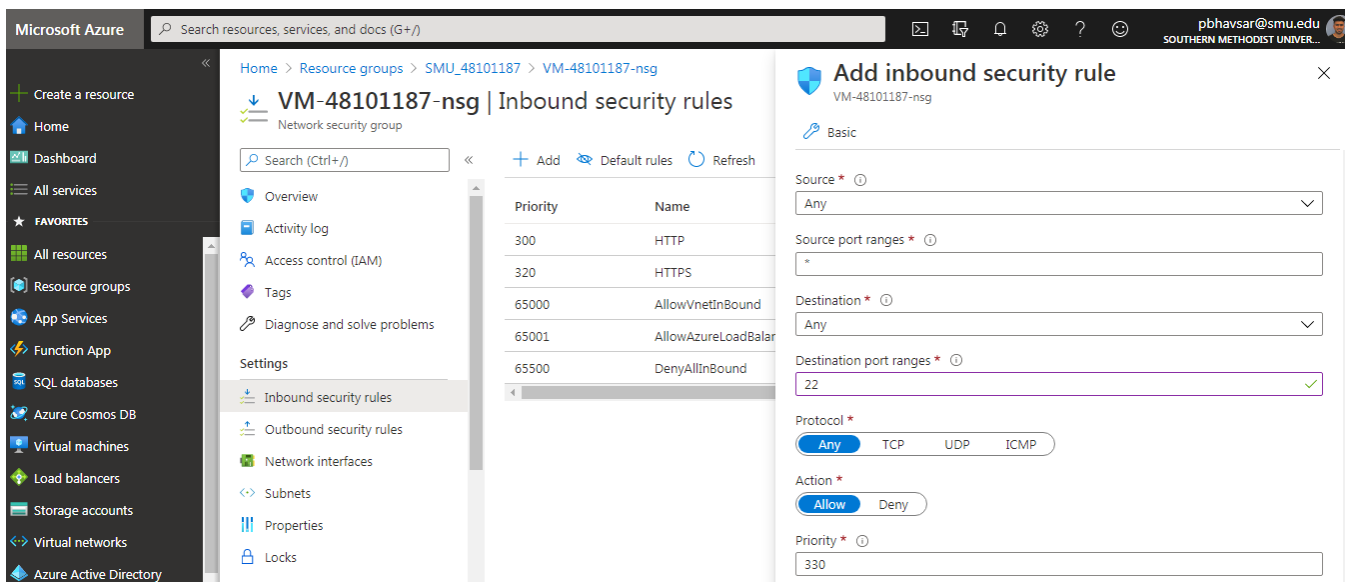


The screenshot shows the Azure portal interface for the 'VM-48101187-nsg' network security group. The left sidebar contains navigation links like 'Create a resource', 'Home', 'Dashboard', 'All services', 'FAVORITES', 'All resources', 'Resource groups', 'App Services', 'Function App', and 'SQL databases'. The main pane displays the 'Inbound security rules' table with columns: Priority, Name, Port, Protocol, Source, and Destination. The table lists several rules, including HTTP (Priority 300), HTTPS (Priority 320), and various system-defined rules. A black arrow points to the '+ Add' button located above the table.

Priority	Name	Port	Protocol	Source	Destination
300	HTTP	80	TCP	Any	Any
320	HTTPS	443	TCP	Any	Any
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork
65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any
65500	DenyAllInBound	Any	Any	Any	Any

Add an Inbound Rule as follow.

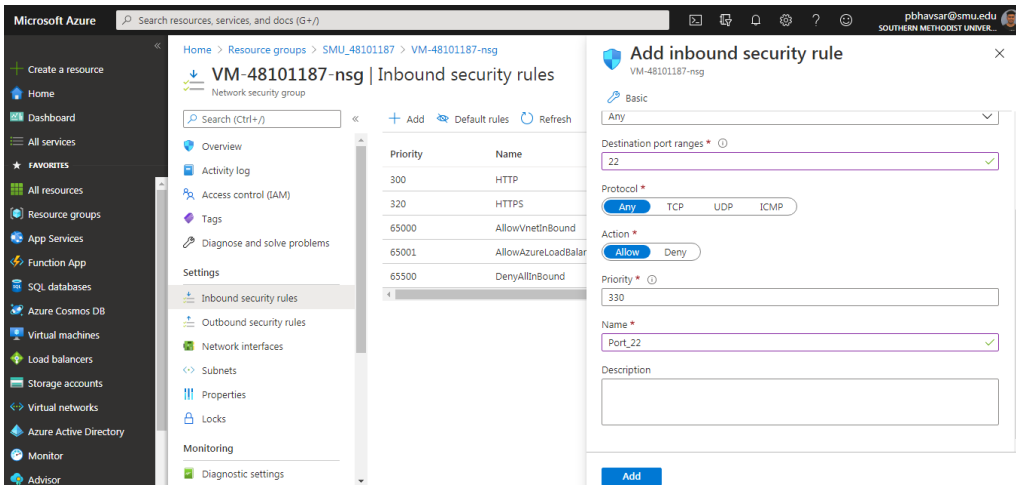
- Source: Any
- Source Port Ranges: \*
- Destination: Any
- Destination Port Ranges: 22



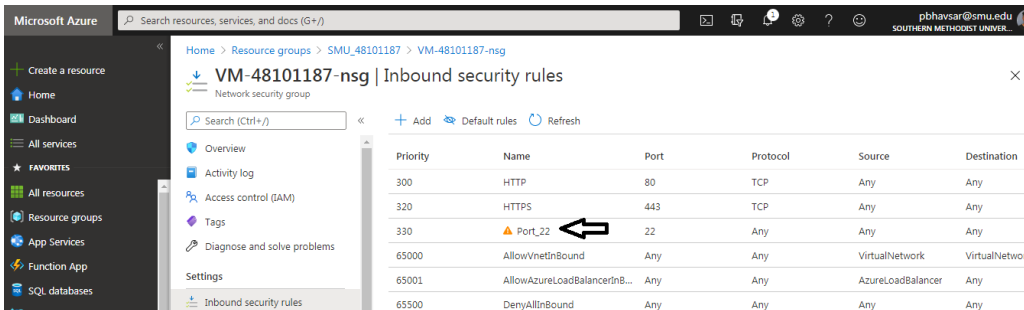
The screenshot shows the 'Add inbound security rule' configuration window in the Azure portal. The rule is being added to the 'VM-48101187-nsg' network security group. The configuration is as follows:

- Source: Any
- Source port ranges: \*
- Destination: Any
- Destination port ranges: 22
- Protocol: Any
- Action: Allow
- Priority: 330

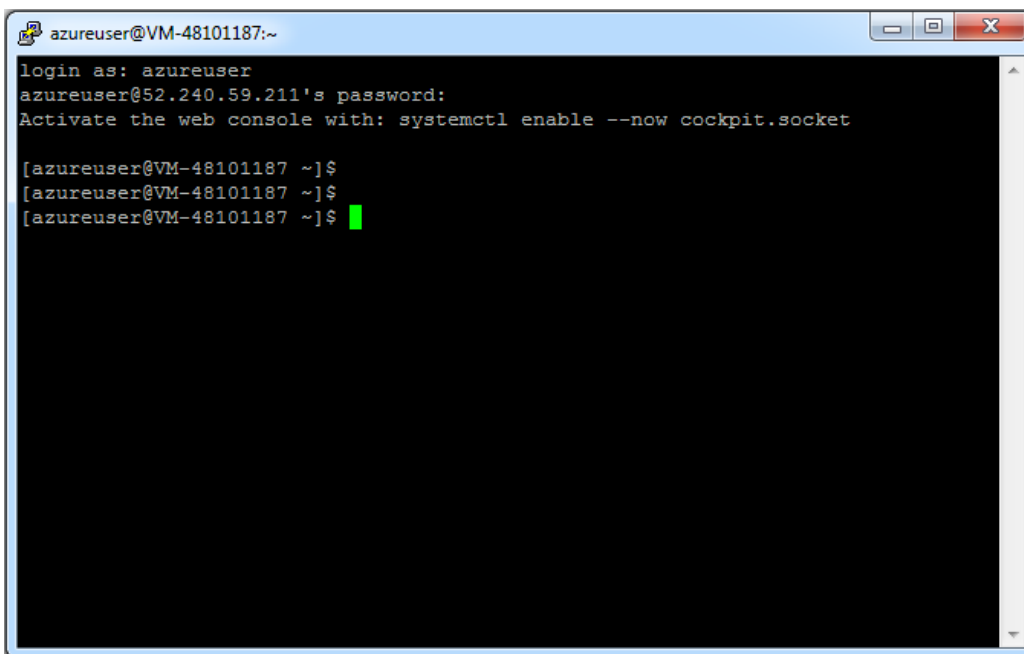
Specify the Inbound Rule Name as “Port\_22” and click on Add.



You've now added a new Inbound Rule for SSH (Port: 22).



Now try to access your Virtual Machine using PuTTY, it should work now.



## Task 4: Resize Your Instance: Instance Type and Disk Volume

Navigate to Virtual Machine Service and click on your Virtual Machine. Click on Size.

Microsoft Azure | Search resources, services, and docs (G+)

Home > Virtual machines > VM-48101187

Virtual machine

Search (Ctrl+/)

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

Disks

Size

Security

Advisor recommendations

Extensions

Continuous delivery

Availability + scaling

VM Size

Family

vCPUs

RAM (GiB)

Data disks

Max IOPS

Most used sizes by Azure users

VM Size	Family	vCPUs	RAM (GiB)	Data disks	Max IOPS
D51_v2	General purpose	1	3.5	4	3200
D2s_v3	General purpose	2	8	4	3200
B2s	General purpose	2	4	4	1280
B1s	General purpose	1	1	2	320

Resize

You can select the Instance Type as per your requirement and click on “Resize”.

Microsoft Azure | Search resources, services, and docs (G+)

Home > Virtual machines > VM-48101187

Virtual machine

Search (Ctrl+/)

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

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Size

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Advisor recommendations

Extensions

Continuous delivery

Availability + scaling

VM Size

Family

vCPUs

RAM (GiB)

Data disks

Max IOPS

Most used sizes by Azure users

VM Size	Family	vCPUs	RAM (GiB)	Data disks	Max IOPS
D51_v2	General purpose	1	3.5	4	3200
D2s_v3	General purpose	2	8	4	3200
B2s	General purpose	2	4	4	1280
B1s	General purpose	1	1	2	320

Resize

Microsoft Azure | Search resources, services, and docs (G+)

Home > Virtual machines > VM-48101187

Virtual machine

Search (Ctrl+/)

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

Disks

Size

Security

Advisor recommendations

Extensions

Continuous delivery

Availability + scaling

VM Size

Family

vCPUs

RAM (GiB)

Data disks

Max IOPS

Most used sizes by Azure users

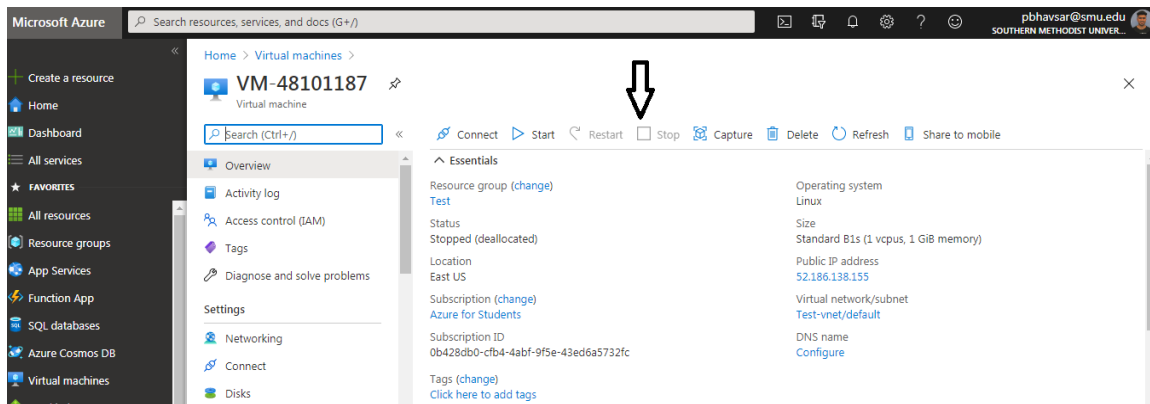
VM Size	Family	vCPUs	RAM (GiB)	Data disks	Max IOPS
D51_v2	General purpose	1	3.5	4	3200
D2s_v3	General purpose	2	8	4	3200
B2s	General purpose	2	4	4	1280
B1s	General purpose	1	1	2	320

Resize

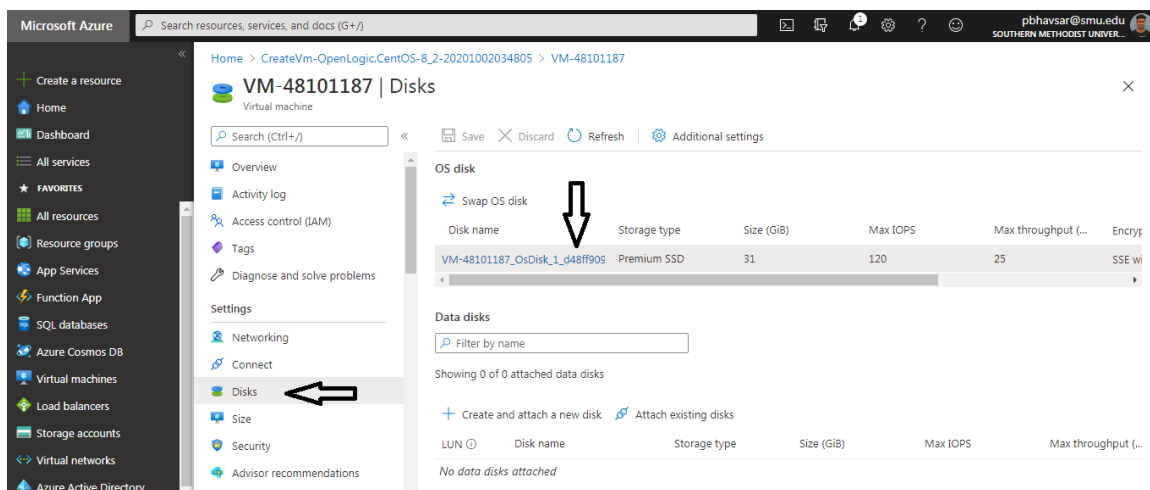
Resized virtual machine

Successfully resized virtual machine 'VM-48101187' to size 'Standard D2s\_v3'.

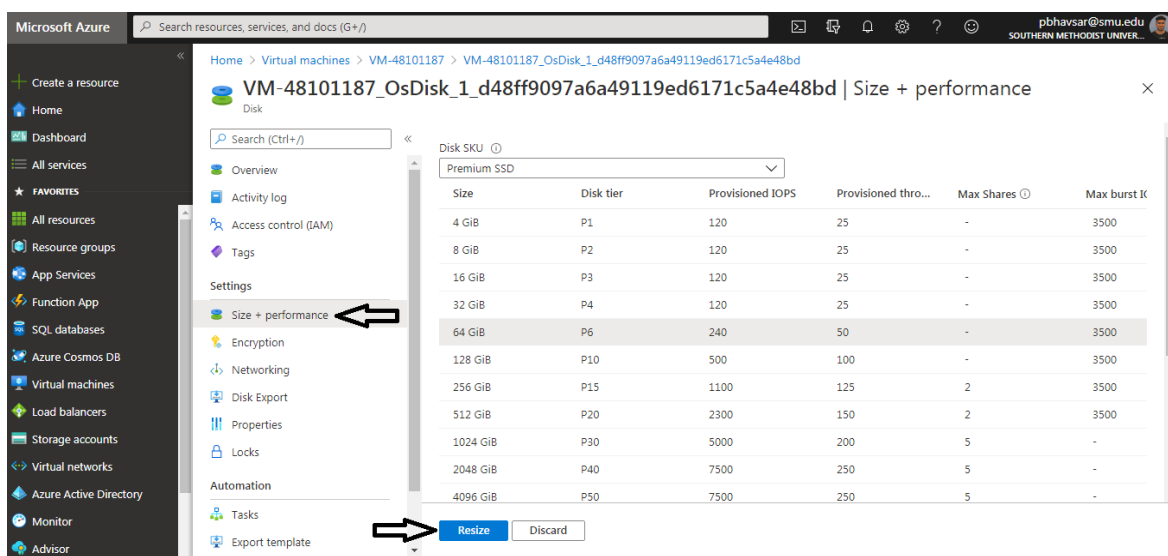
Now in order to Resize the Disk Volume, first STOP the Virtual Machine.



Now click on “Disks” and click on the OS Disk.



Under the OS Disk, click on “Disk+Performance”. Select the Disk Size as per your requirements and click on “Resize”.



Microsoft Azure

Home > Virtual machines > VM-48101187 > VM-48101187\_OsDisk\_1\_d48ff9097a6a49119ed617

VM-48101187\_OsDisk\_1\_d48ff9097a6a49119ed617

Disk

Search (Ctrl+/)

Overview

Activity log

Access control (IAM)

Tags

Settings

Disk SKU

Premium SSD

Size

4 GiB

8 GiB

16 GiB

32 GiB

Disk tier

P1

P2

P3

P4

Pro

120

120

120

120

Notifications

More events in the activity log →

Dismiss all

Successfully updated disk

Successfully updated disk 'VM-48101187\_OsDisk\_1\_d48ff9097a6a49119ed617c5a4e48bd'.

a few seconds ago

Successfully stopped virtual machine

Successfully stopped the virtual machine 'VM-48101187'.

6 minutes ago

Start your Virtual Machine. Under Disk, you'll notice that the Disk Size has been changed to 64 GB.

Microsoft Azure

Home > Virtual machines > VM-48101187

VM-48101187

Virtual machine

Search (Ctrl+/)

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

Disks

Essentials

Resource group (change)

Test

Status

Running

Location

East US

Subscription (change)

Azure for Students

Subscription ID

0b428db0-cfb4-4abf-9f5e-43ed6a5732fc

Tags (change)

Click here to add tags

Operating system

Linux

Size

Standard B1s (1 vcpu, 1 GiB memory)

Public IP address

52.186.138.155

Virtual network/subnet

Test-vnet/default

DNS name

Configure

Started virtual machine

Successfully started virtual machine 'VM-48101187'.

4:09 AM

Microsoft Azure

Home > Virtual machines > VM-48101187

VM-48101187 | Disks

Virtual machine

Search (Ctrl+/)

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

Disks

Size

Security

Advisor recommendations

Save

Discard

Refresh

Additional settings

OS disk

Swap OS disk

Disk name

Storage type

Size (GiB)

Max IOPS

Max throughput (...)

Encrypt

VM-48101187\_OsDisk\_1\_d48ff909

Premium SSD

64

240

50

SSE wi

Data disks

Filter by name

Showing 0 of 0 attached data disks

Create and attach a new disk

Attach existing disks

LUN

Disk name

Storage type

Size (GiB)

Max IOPS

Max throughput (...)

No data disks attached

## Task 6: Test Azure Locks

In Microsoft Azure, we make use of LOCKS to avoid accidentally deletion of the Azure Resources.

Navigate to Virtual Machine Service and click on your CentOS Virtual Machine.

On the left-hand side click on Locks.

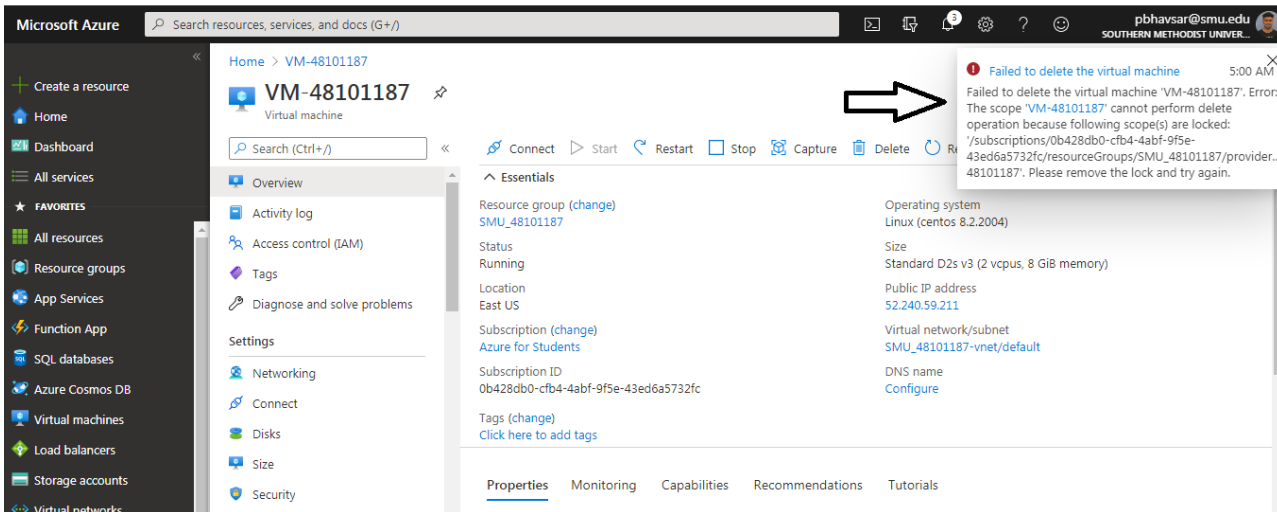
The screenshot shows the Microsoft Azure portal interface. On the left-hand side, the navigation menu is visible, and the 'Locks' option is highlighted with a black arrow. The main content area displays the details for the virtual machine 'VM-48101187'. The 'Essentials' section shows the resource group 'SMU\_48101187', status 'Running', location 'East US', subscription 'Azure for Students', and subscription ID '0b428db0-cfb4-4abf-9f5e-43ed6a5732fc'. The 'Properties' section shows the computer name 'VM-48101187', operating system 'Linux (centos 8.2.2004)', and SKU '8\_2'. The 'Networking' section shows the public IP address '52.240.59.211' and private IP address '10.1.0.4'.

Click on “+Add” and specify the Lock Name and Lock Type as Delete.

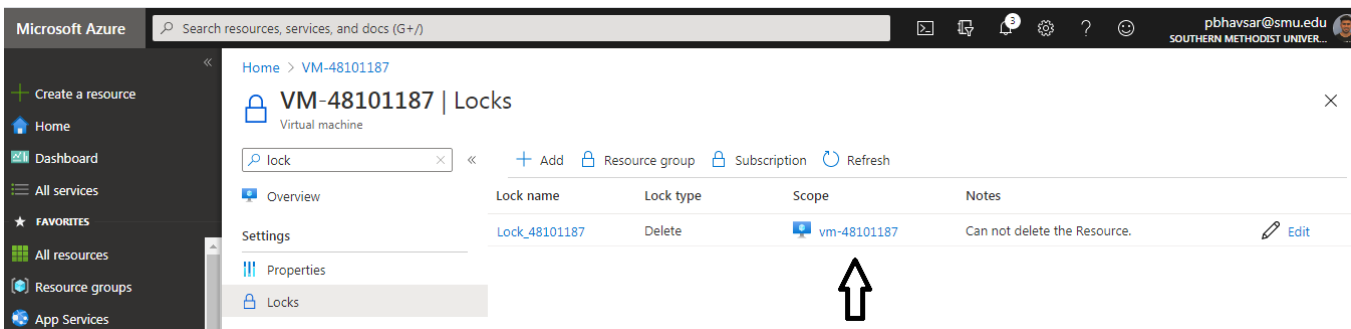
Specify the Notes as per your requirements.

The screenshot shows the 'Add lock' dialog box in the Microsoft Azure portal. The dialog box has three main sections: 'Lock name', 'Lock type', and 'Notes'. The 'Lock name' field contains 'Lock\_48101187' and has a green checkmark. The 'Lock type' dropdown menu is set to 'Delete'. The 'Notes' field contains the text 'Can not delete the Resource'. There are 'OK' and 'Cancel' buttons at the bottom of the dialog box.

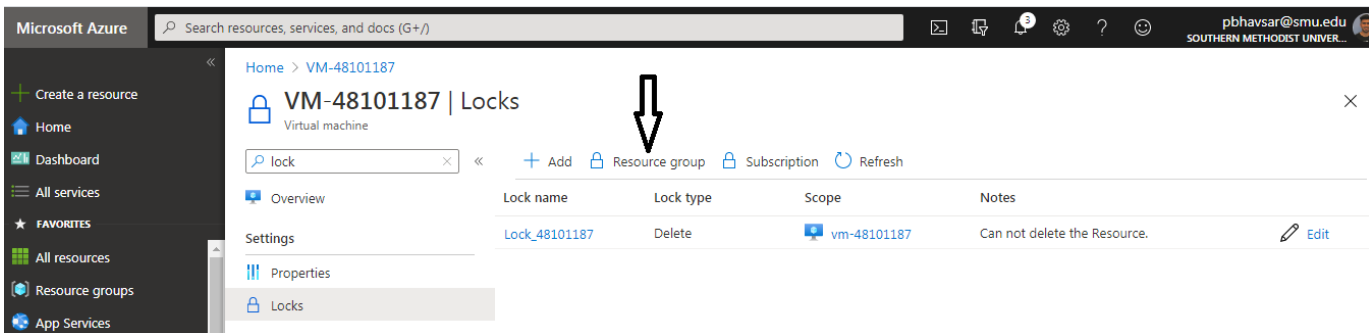
Now try to delete the Virtual Machine, it would FAIL as we've LOCK enabled on the Azure Virtual Machine.



Now click on your Virtual Machine again.

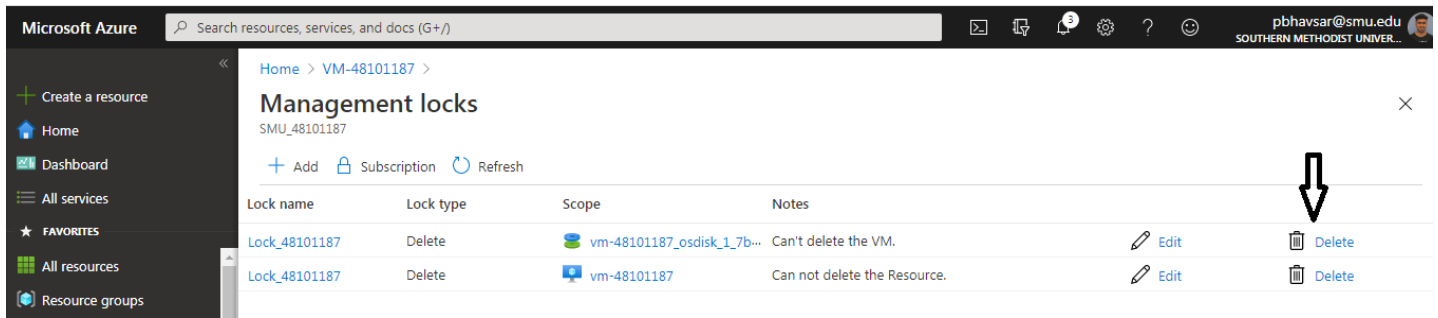


Click on LOCKS and click on Resource Group.





Select the LOCK which you've configured for the Virtual Machine and click on Delete.



Microsoft Azure

Home > VM-48101187 >

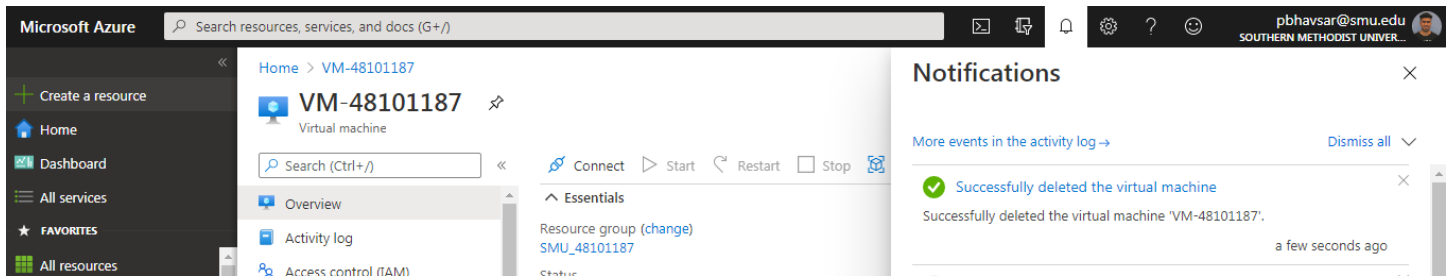
### Management locks

SMU\_48101187

+ Add   Subscription   Refresh

Lock name	Lock type	Scope	Notes		
Lock_48101187	Delete	vm-48101187_osdisk_1_7b...	Can't delete the VM.	Edit	Delete
Lock_48101187	Delete	vm-48101187	Can not delete the Resource.	Edit	Delete

Now try to delete the CentOS Virtual Machine again. It would get deleted without any errors.



Microsoft Azure

Home > VM-48101187

### VM-48101187

Virtual machine

Search (Ctrl+J)

Connect   Start   Restart   Stop

Overview   Activity log   Access control (IAM)

#### Notifications

More events in the activity log →   Dismiss all

✓ Successfully deleted the virtual machine

Successfully deleted the virtual machine 'VM-48101187'.

a few seconds ago

-----END OF LAB-----

For questions, contact on below information.

Email: pbhavsar@smu.edu