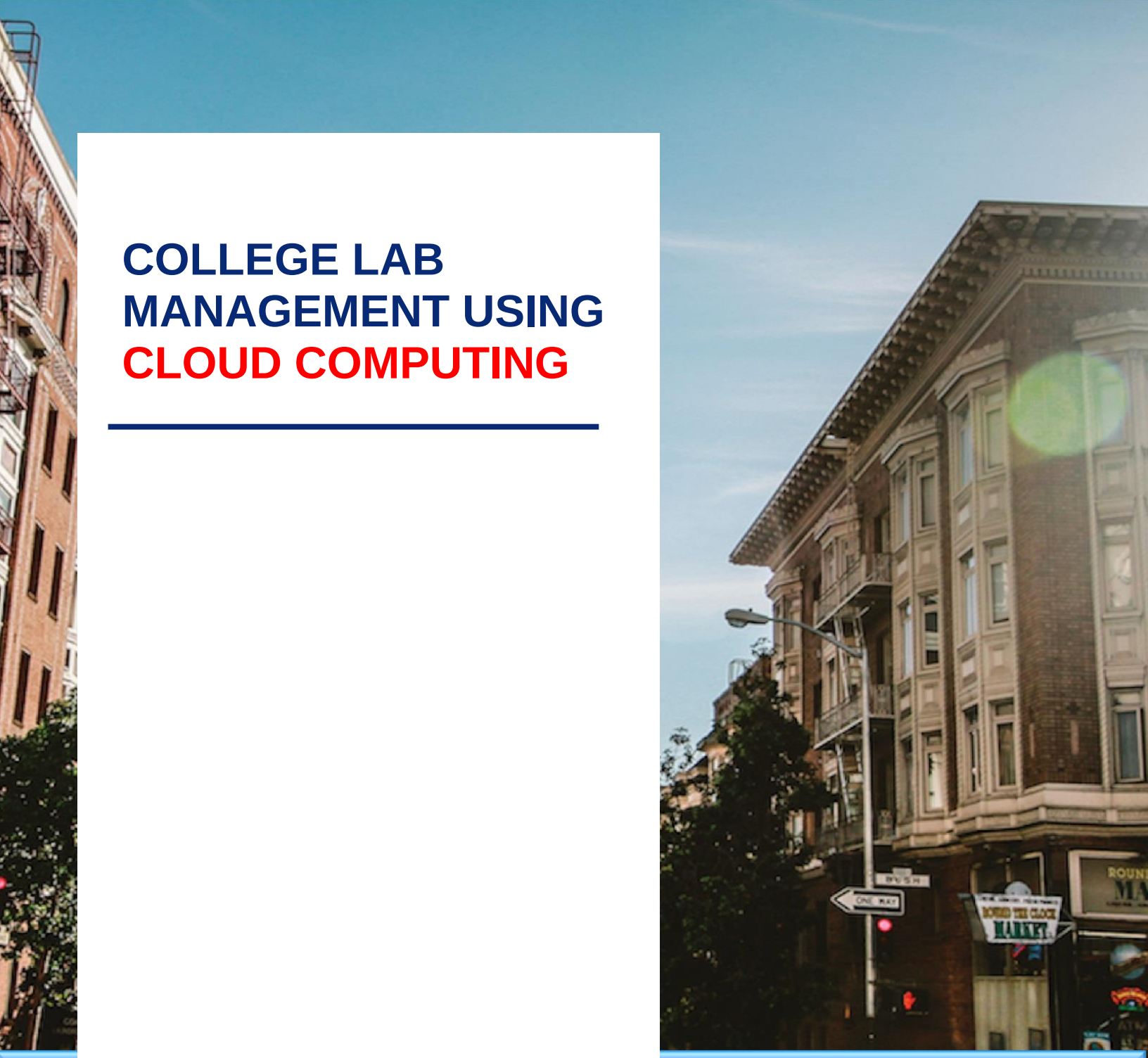

COLLEGE LAB MANAGEMENT USING CLOUD COMPUTING

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By : Vaishnavi Shrikant Bidaye

Cummins College Of Engineering Women, Pune

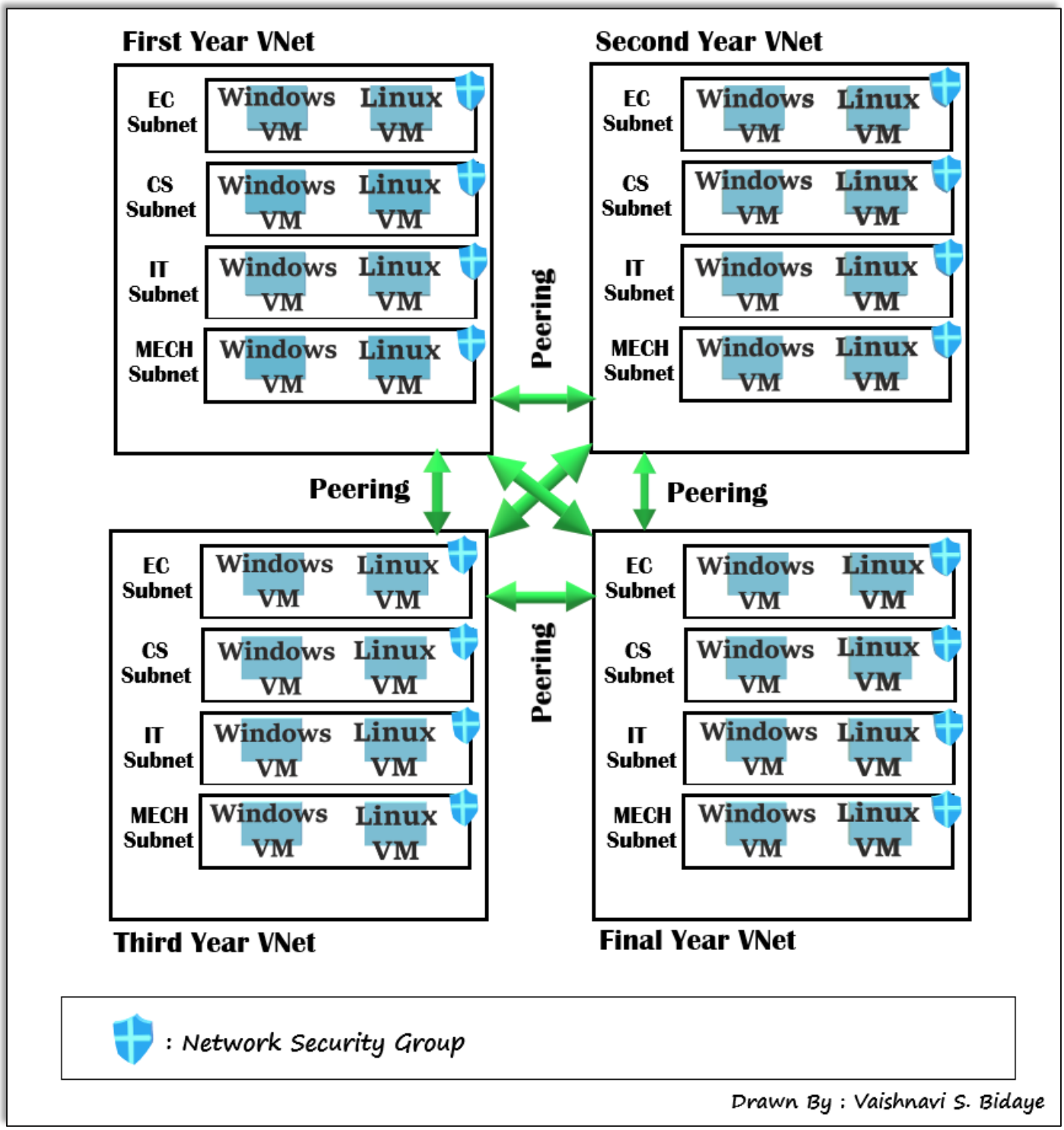
College Lab Management System

Using Cloud Computing

In this Mini Project, I create setup for the Cummins Engineering College For Pune computer lab in Azure Cloud using Infrastructure as code (IaaC) in PowerShell. It includes following components:

- The Computer Lab for first year, second year, third year and fourth year and in each year a separate lab for Electrical (EC), Computer (CS), Information Technology (IT) and Mechanical (Mech).
- Each Lab should have 2 computers (One Linux and one Windows).
- Create the connectivity between all the virtual networks so that each computers can access the computer from others networks.
- Create 4 network security group and apply it on each subnets of that year.
- Allow inbound and outbound traffic only on port 3389 and 22.
- Create a standard storage account and enable boot diagnostics in all the computers using same storage account.

Design Module



Resources Required To Create System

1. Resource Group (RG) –

"Resource Group" is a container to store all the resources. Here, Resources are available for management purpose.

- **Syntax** –
```
New-AzResourceGroup -Name "Name_of_RG" -Location "Location_of_RG"
```
- **Example** –
```
New-AzResourceGroup -Name "RG" -Location "westus"
```

2. Network Security Group (NSG) –

Restrict inbound and outbound traffic from and to a subnet is called "Network Security Group". It is applied on subnetworks as well as network interface cards.

- **Syntax –**
```
New-AzNetworkSecurityGroup -Name "Name_of_NSG" -ResourceGroupName "RG_Name" -Location "RG_Location" -SecurityRules "Security_Rules"
```
- **Example –**
```
New-AzNetworkSecurityGroup -Name "First_Year_NSG" -ResourceGroupName "RG" -Location "westus" -SecurityRules "Rule"
```

3. Subnets –

Networks within network known as “Subnetwork”. Portion of virtual network address space is allocated to each subnet.

- **Syntax** –

```
New-AzVirtualNetworkSubnetConfig -Name "Subnet_Name" -AddressPrefix "Address_Range" -NetworkSecurityGroup “nsg_Name”
```

- **Example** –

```
New-AzVirtualNetworkSubnetConfig -Name "Subnet1" -AddressPrefix "10.0.0.0/27" -NetworkSecurityGroup “nsg”
```

4. Virtual Network (VNet) –

Representation of a network in cloud known as “Virtual Network”. VM’s within virtual network can communicate directly and securely with each other.

- **Syntax** –

```
New-AzVirtualNetwork -Name "VNet_Name" -ResourceGroupName “RG_Name” -Location “RG_Location” -AddressPrefix "Address_Range" -Subnet “subnetworks”
```

- **Example** –

```
New-AzVirtualNetwork -Name "VNet" -ResourceGroupName “RG” -Location “westus” -AddressPrefix "10.0.0.0/25" -Subnet “Subnet1”
```

5. Peering –

To communicate between two VM's within two different vnets in the same region and across region, "Peering is used".

- **Syntax** –

```
Add-AzVirtualNetworkPeering -Name
"Peering_Name" -VirtualNetwork
"Peer_From" -RemoteVirtualNetworkId
"Peer_To"
```

- **Example** –

```
Add-AzVirtualNetworkPeering -Name
"Peering_FY_to_SY" -VirtualNetwork
"vnet_FY" -RemoteVirtualNetworkId
"vnet_SY"
```

6. Public IP Address (PIP) –

To communicate with a virtual machine from outside of the Virtual Network, "Public IP Address" is used.

- **Syntax** –

```
New-AzPublicIpAddress -Name "Pip_Name"
-ResourceGroupName "RG_Name" -Location
"RG_Location" -AllocationMethod Dynamic
```

- **Example** –

```
New-AzPublicIpAddress -Name "Pip_FY"
-ResourceGroupName "RG" -Location
"westus" -AllocationMethod Dynamic
```

7. Network Interface Card (NIC) –

Enables an Azure VM to communicate with Internet, ”Network Interface Card” is used.

- **Syntax** –

```
New-AzNetworkInterface -Name "Nic_Name"
-ResourceGroupName “RG_Name” -Location
“RG_Location” -Subnet “Subnet”
-PublicIpAddress “Pip_Name”
-PrivateIpAddress "Private_IP"
```

- **Example** –

```
New-AzNetworkInterface -Name "Nic_FY"
-ResourceGroupName “RG” -Location
“westus” -Subnet “Subnet1”
-PublicIpAddress “”Pip_FY
-PrivateIpAddress "10.0.0.4"
```

8. Data Disk –

The disk is used to store all type of data, known as “Data Disk”.

- **Syntax –**
  - `$disk1 = New-AzDiskConfig -Location “Disk_Location” -DiskSizeGB “Size”`
  - `New-AzDisk -DiskName "DataDisk_Name" -ResourceGroupName “RG_Name” -Disk $disk1`
- **Example –**
  - `$disk1 = New-AzDiskConfig -Location “westus” -DiskSizeGB 80`
  - `New-AzDisk -DiskName "DataDisk_01" -ResourceGroupName “RG” -Disk $disk1`

9. Storage Account –

The container which stores various types of data like blobs, files, queues, tables, disks, etc. known as “Storage Account”.

- **Syntax –**

```
New-AzStorageAccount -Name "SA_Name" -ResourceGroupName “RG_Name” -Location “RG_Location” -SkuName “SA_Replication” -Kind “SA_Type”
```

- **Example –**

```
New-AzStorageAccount -Name "cumminspune" -ResourceGroupName “RG” -Location “westus” -SkuName Standard_GRS -Kind StorageV2
```

10. Virtual Machine (VM) –

Create a machine virtually on top of your physical machine known as “Virtual Machine”. VM’s are classified based on Memory, Storage and Compute types.

- **Syntax –**
  -
```
$vm_config = New-AzVMConfig -VMName "VM_Name" -VMSize "VM_Size" | Set-AzVMOperatingSystem -Windows -ComputerName "Comp_Name"-Credential “credentials” | Set-AzVMSourceImage -PublisherName "Publisher_Name" -Offer “Server_Name" -Skus "Server_type" -Version latest | Set-AzVMBootDiagnostic -Enable -Resource GroupName “RG_Name” -StorageAccount
```

```
Name "SA_Name" | Add-AzVMNetwork
Interface -Id “”Nic_Id”.Id | Add-
AzVMDataDisk -Name "DataDisk_Name"
-CreateOption Attach -ManagedDiskId
“Disk_Id”.Id -Lun 1
```

- `New-AzVM -ResourceGroupName “RG_Name” -Location “RG_Location” -VM “VM_Config_Name”`

- **Example –**
  - `$vm_config = New-AzVMConfig -VMName "VM" -VMSize "Standard_B2ms" | Set-AzVMOperating System -Windows -ComputerName "VM-FY" -Credential $credentials | Set-AzVMSourceImage -PublisherName "MicrosoftWindowsServer" -Offer "WindowsServer" -Skus "2016-DataCenter" -Version latest | Set-AzVMBootDiagnostic -Enable -ResourceGroupName “RG” -StorageAccountName "cumminspune" | Add-AzVMNetworkInterface -Id $nic.Id | Add-AzVMDataDisk -Name "DataDisk" -CreateOption Attach -ManagedDiskId $datadisk.Id -Lun 1`
  - `New-AzVM -ResourceGroupName “RG” -Location “westus” -VM $vm_config`

Conclusion

Cloud computing is an on-demand availability of computer system resources, data storage and computing power, without direct active management by the user. By using this technology, I create “College Lab Management System” using Infrastructure as a code in PowerShell.