Azure Virtual Networking

Practical Tutorial On VNets & Load Balancing

Lab 11 – December 21, 2017

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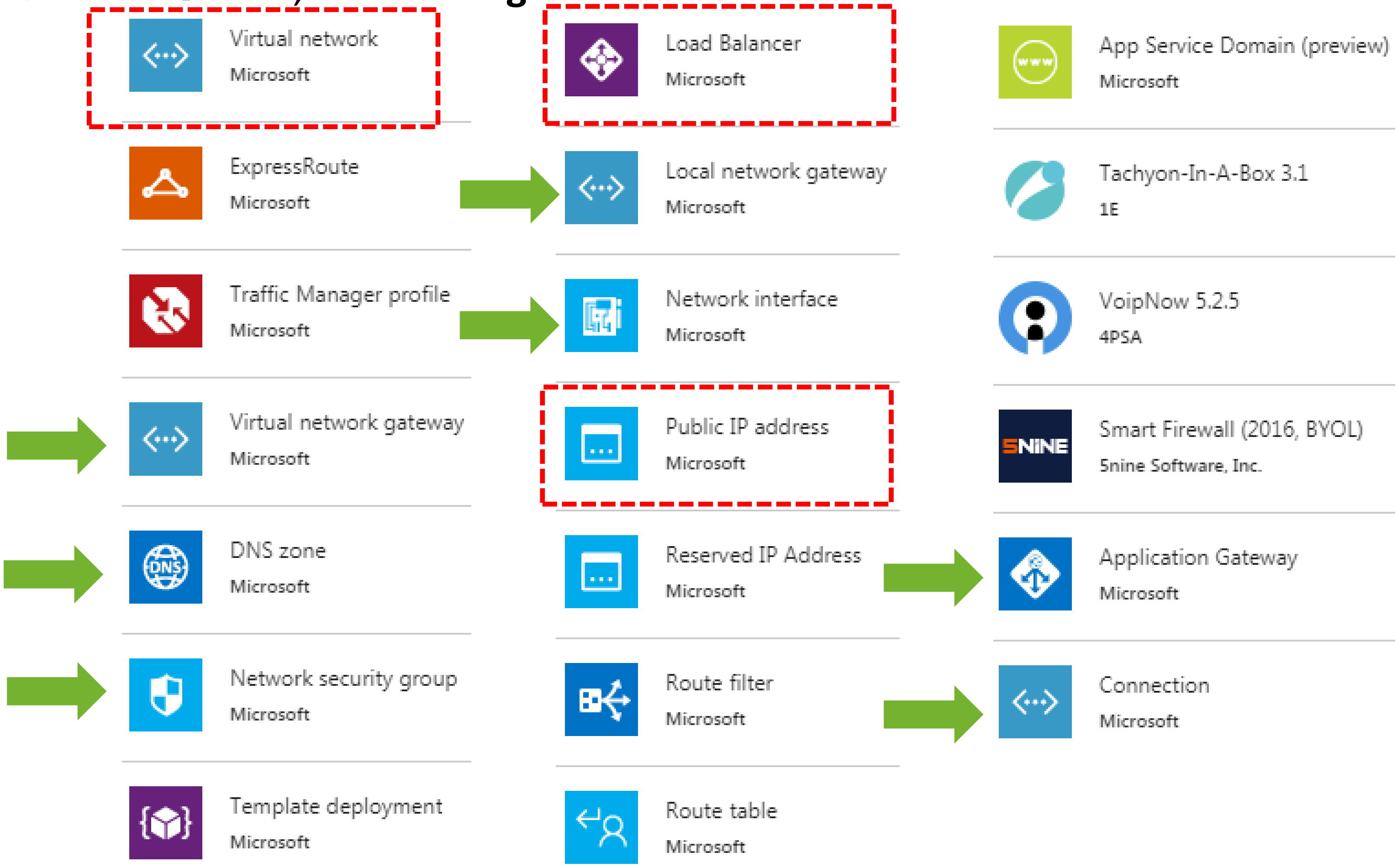
Deep Azure @McKesson

Azure Virtual Network

VNets In Azure Portal →New, Networking



Virtual network
Microsoft

ExpressRoute
Microsoft

Traffic Manager profile
Microsoft

Virtual network gateway
Microsoft

DNS zone
Microsoft

Network security group
Microsoft

Template deployment
Microsoft

Load Balancer
Microsoft

Local network gateway
Microsoft

Network interface
Microsoft

Public IP address
Microsoft

Reserved IP Address
Microsoft

Route filter
Microsoft

Route table
Microsoft

App Service Domain (preview)
Microsoft

Tachyon-In-A-Box 3.1
1E

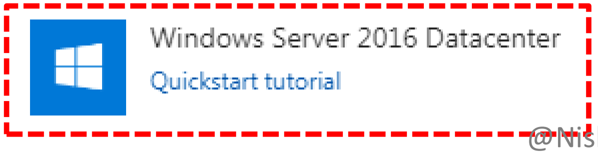
VoipNow 5.2.5
4PSA

Smart Firewall (2016, BYOL)
5nine Software, Inc.

Application Gateway
Microsoft

Connection
Microsoft

VMs In Azure Portal →New, Compute



Windows Server 2016 Datacenter
Quickstart tutorial

Many more Azure Services …

Goal of Lab 11

Objectives:

Understand Azure Virtual Networks (VNet), Step-By-Step Guide (videos)
Explore VNets, Implement Load balancing, Deploy pool of VMs in Vnet
- IP Subnets, FrontEnd / BackEnd Resources, VM Availability Sets
- Vnets in context of IP Address Space, Traffic Rules, DNS, Service Endpoints

Demo1: Virtual Networks Reference – See Lecture 11 Slides 33 -50

Demo2: Virtual Networks Reference – See Lecture 11 Slides Below

Layer 4 and Layer 7 Load Balancing – Slides 15, 16
Compare to Azure Load Balancer and Application Gateway – Slide 60

IP Address of Load Balancers, VPN /App Gateways – Slides 55-60
Load balancing VMs for Highly Available Application- Slides 66 -77

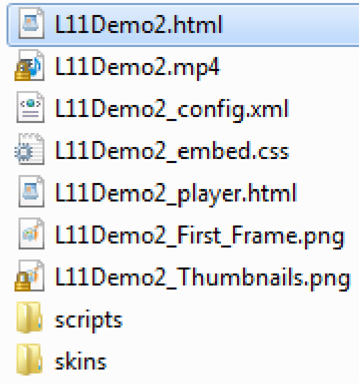
Azure network security groups (NSGs) , Rules for TCP (port 80 etc.)
NIC Vnet/Subnet, Border gateway protocol (BGP) routing

Implement & deploy Azure networking resources via tools:

Azure portal, Azure PowerShell,
Azure command-line interface (CLI),
Azure Resource Manager templates, programmatically / scripts

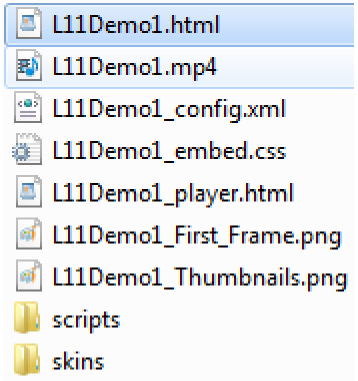
Instructions Lab 11 Demos

Lab11Demo2.zip:



L11Demo2.html
L11Demo2.mp4
L11Demo2_config.xml
L11Demo2_embed.css
L11Demo2_player.html
L11Demo2_First_Frame.png
L11Demo2_Thumbnails.png
scripts
skins

Lab11Demo1.zip:

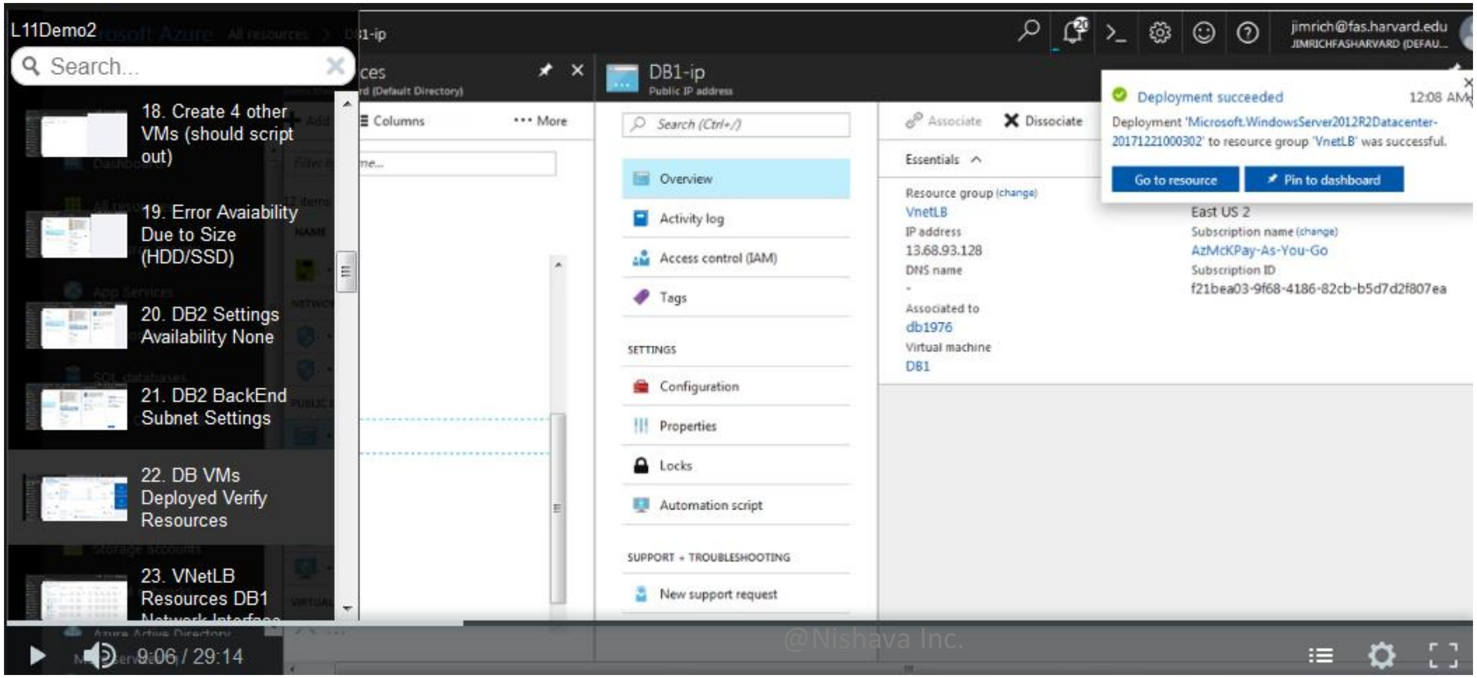


L11Demo1.html
L11Demo1.mp4
L11Demo1_config.xml
L11Demo1_embed.css
L11Demo1_player.html
L11Demo1_First_Frame.png
L11Demo1_Thumbnails.png
scripts
skins

1. Download zip files
2. Extract Folders
3. Open *Demo*.html in Browser
4. Scroll through Index Left Side
5. Jump to Identified Topics / Steps

http://deepazure.s3.amazonaws.com/Recording_lab_week11/Lab11Demo2.zip

http://deepazure.s3.amazonaws.com/Recording_lab_week11/Lab11Demo1.zip



L11Demo2

18. Create 4 other VMs (should script out)
19. Error Avaiability Due to Size (HDD/SSD)
20. DB2 Settings Availability None
21. DB2 BackEnd Subnet Settings
22. DB VMs Deployed Verify Resources
23. VNetLB Resources DB1 Network Interface

DB1-ip
Public IP address

Deployment succeeded 12:08 AM
Deployment 'Microsoft.WindowsServer2012R2Datacenter-20171221000302' to resource group 'VnetLB' was successful.

Resource group (change): VnetLB
IP address: 13.68.93.128
DNS name: -
Associated to: db1976
Virtual machine: DB1
East US 2
Subscription name (change): AzMcKPay-As-You-Go
Subscription ID: f21bea03-9f68-4186-82cb-b5d7d2f807ea

DEMOS

Demo1:   Create Virtual Networks (VNet)
Demo2:   Deploy VNets & Load Balancer

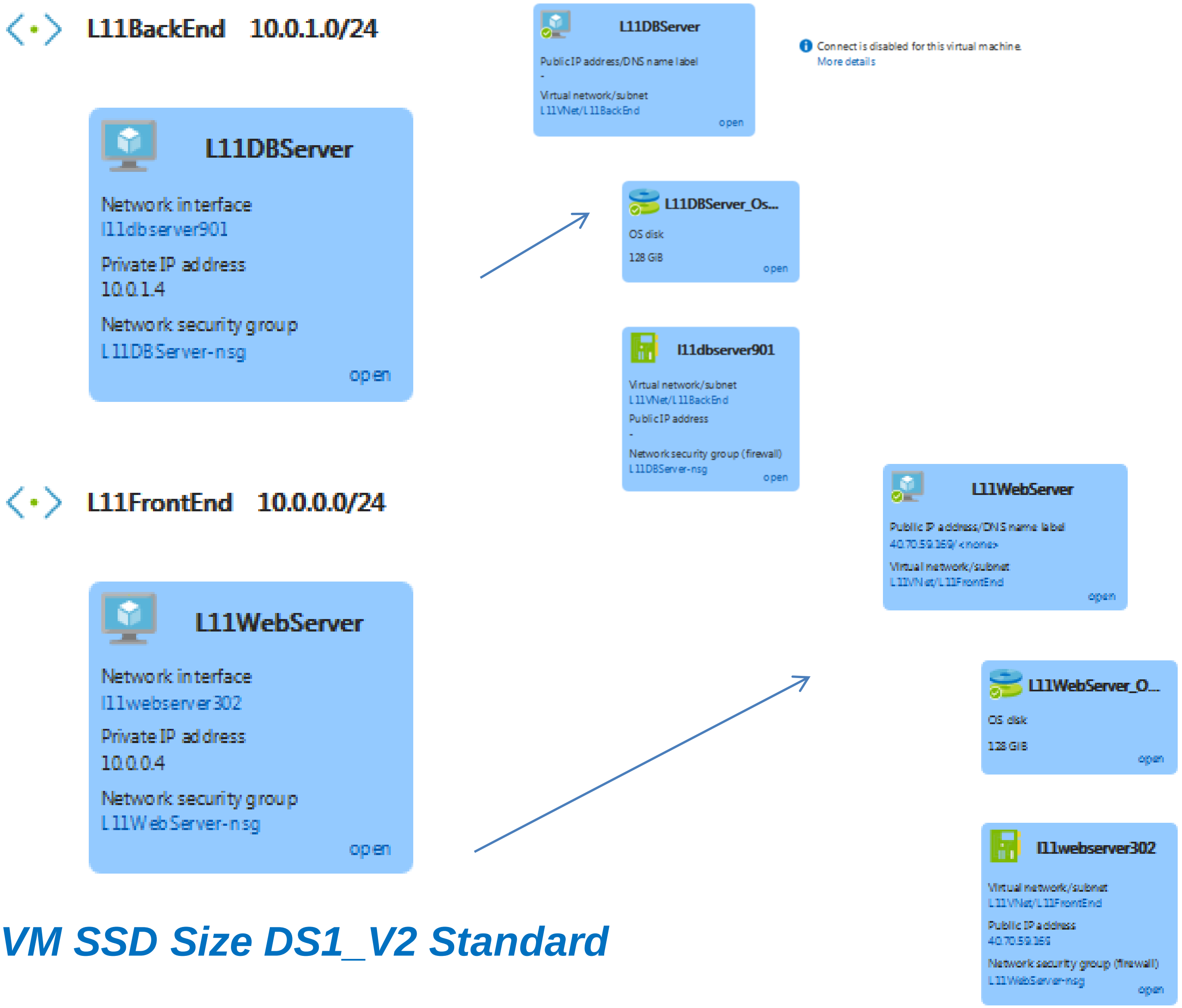
Demo1: Create Virtual Networks (VNets)

- An Azure virtual network (VNet) is a representation of your own network in the cloud. You can control your Azure network settings and define DHCP address blocks, DNS settings, security policies, and routing.
- Subnets are typically used to control traffic flow

  - Azure Portal +New → Networking → Virtual Network
    - View Resources
      - Service overview
      - Documentation
      - Pricing
    - → Create a VNet with two subnets
  - Azure Portal +New → Compute → Windows Server 2016 Datacenter
    - → Create two VMs, Web Server & DB Server
    - Connect each VM to Frontend & Backend Subnets
  - Review Resources, RDP to Vnet, examine NSGs, Delete Lab11RG

http://deepazure.s3.amazonaws.com/Recording_lab_week11/Lab11Demo2.zip
https://canvas.instructure.com/courses/1227361/pages/week-11
*Lecture 11 – **Summary Slides 33 -50***

Demo1: Diagram for VNet Named L11VNet



L11BackEnd 10.0.1.0/24

L11DBServer

Network interface
l11dbserver901

Private IP address
10.0.1.4

Network security group
L11DBServer-nsg

open

L11DBServer

Public IP address/DNS name label
-

Virtual network/subnet
L11VNet/L11BackEnd

open

Connect is disabled for this virtual machine.
More details

L11DBServer_Os...

OS disk

128 GiB

open

l11dbserver901

Virtual network/subnet
L11VNet/L11BackEnd

Public IP address
-

Network security group (firewall)
L11DBServer-nsg

open

L11FrontEnd 10.0.0.0/24

L11WebServer

Network interface
l11webserver302

Private IP address
10.0.0.4

Network security group
L11WebServer-nsg

open

L11WebServer

Public IP address/DNS name label
40.70.59.169/ <none>

Virtual network/subnet
L11VNet/L11FrontEnd

open

L11WebServer_O...

OS disk

128 GiB

open

l11webserver302

Virtual network/subnet
L11VNet/L11FrontEnd

Public IP address
40.70.59.169

Network security group (firewall)
L11WebServer-nsg

open

VM SSD Size DS1_V2 Standard

Demo1: Create VNet Summary

1. Create Virtual Network – In Azure Portal →New, Networking, then Virtual Network

Name *L11VNet* The name must be unique within the resource group.
Address space *10.0.0.0/16* You can specify any address space you like in CIDR notation.
Subscription *[Your subscription]* Select a subscription to create the VNet (single subscription ex **AzMcKPay-As-Yo**
Resource group *Lab11RG* Create New, resource group name must be unique within subscription.
Location *East US2* Typically the location that is closest to your physical locale
Subnet name *L11FrontEnd* The subnet name must be unique within the virtual network.
Subnet address range *10.0.0.0/24* range specified must exist in VNet address space (default service endpoints)

Q: How many hosts can occupy a single subnet in the following VNet?
Address space: 10.0.0.0/16
Subnet: 10.0.0.0/24
A: the "/24" means the first 3 octets fill in from the most significant bit and mask off the first 3 bytes. That leaves one byte (or 8 bits) of subnet space– or 256 hosts. But 5 addresses have to be subtracted which leaves 251 hosts.

2. Create Second Subnet for VNet – In *Lab11VNet* blade, settings/subnet click +Subnet

Name *L11BackEnd,* The name must be unique within the virtual network.
Address range *10.0.1.0/24,* The range you specify must exist within address space defined for VNet
Network security group and **Route table** *None* … all other settings are **Default**, Network security groups (NSG) … DEMO1 create s NSG for ea. subnet

3. Create Two VMs – In Azure Portal →New, Compute, then Windows Server 2016 Datacenter

BASICS blade, Name *L11WebServer* Do this step again for *L11DBServer* Two VMs web server connects frontend Internet resources & DB backend
VM disk type *SSD* *Choose* SSD solid-state disks rather than regular hard disks
User name *lab11* **Password** *lab11PASSWORD123*
Subscription The subscription must be the same as above. The VNet you connect VMs to, must exist in the same subscription.
Resource group Use existing: Select *Lab11RG* VNet resources don't have to exist in the same resource group.
Location *East US2* The location must be the same location specified in create a virtual network with two subnets step
https://docs.microsoft.com/en-us/azure/search/search-sku-tier#sku-descriptions

4. Choose a Size for 2 VMs (based on SKU / SLAs), click *DS1_V2 Standard $91.50* OK, In Settings blade …

Storage: **Yes , Use managed disks**
Virtual network Select *L11VNet* You can select any VNet that exists in the same location as VM
Subnet Select *L11FrontEnd* for WebServer *L11BackEnd* for DBserver by clicking **Subnet** box, then **Choose Subnet** blade (select any subnet in Vnet)
Public IP address- Accept default **for webserver, for dbserver** click *None.* Without a public IP, you can't connect to it directly from Internet.
Network security group (firewall) *Accept the default* , You can add additional inbound rule for TCP/80 (HTTP), TCP/443 (HTTPS) (web server), TCP/1433 (MS SQL) for a database server. *All other values Accept defaults* By default, all inbound traffic to the VM is denied. There is no rule for outbound traffic because by default, all outbound traffic is allowed. You can add/remove rules to control traffic per your policies.

5. Review Resources & Connect– In Azure Portal ARM→ Connect to *L11WebServer* VM from the Internet , Overview, click Connect

(download the *MyWebServer.rdp* file & open, verify IE *whatsmyipaddress*, … again for *L11DBServer … see NSG's* ***Delete all resources***

Demo2: VNets & Load Balancers

Load balance incoming traffic across your virtual machines.

Forward traffic to and from a specific virtual machine using NAT rules.

Load balancers can be internet-facing via public IP addresses or internal to VNet

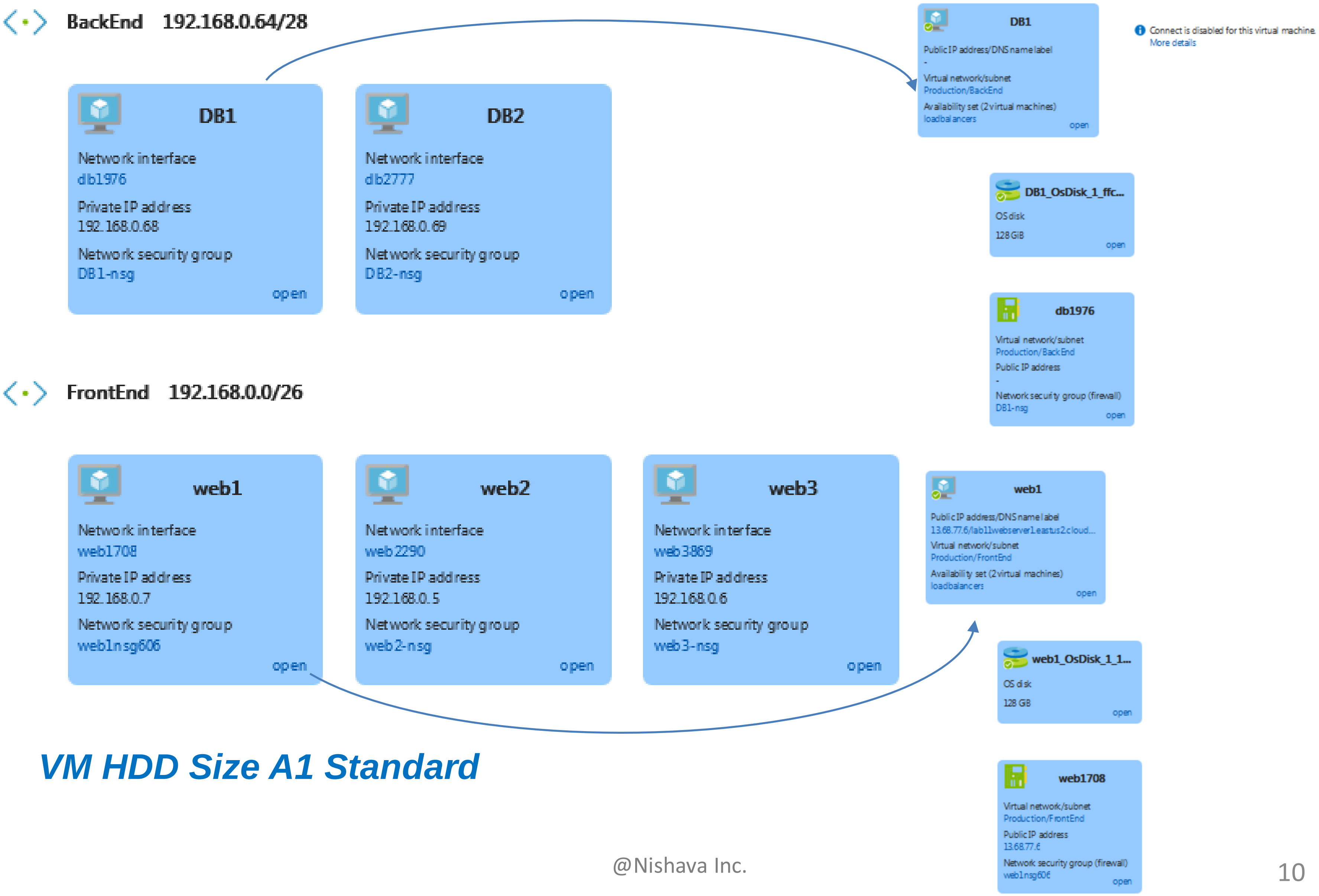
- Azure Portal +New → Networking → Virtual Network
  - → Create a VNet with two subnets
- Azure Portal +New → Compute → Windows Server 2016/2012 Datacenter
  - → Create 5 VMs, 3 Web Servers & 2DB Servers
  - Connect each VM to Frontend & Backend Subnets
- Azure Portal +New → Load Balancer
  - View Resources
    - Service overview
    - Documentation
  - Configure / Assign Resources, Availability, IP Address, Subnets
  - Examine RDP, DNS, NSG, Inbound NAT Rules, Traffic
  - Health Probes & Idle Timeout
- Review Resources, Connecting RDP to Vnets, Delete VNetLB Resources
- LBs use a 5-tuple (source IP, source port, destination IP, destination port, protocol type) hash to map traffic to available servers.

http://deepazure.s3.amazonaws.com/Recording_lab_week11/Lab11Demo2.zip

https://canvas.instructure.com/courses/1227361/pages/week-11

*Lecture 11 – **Summary Slides 33 -50***

Demo2: Diagram for VNet Named Production



BackEnd 192.168.0.64/28

DB1

Network interface
db1976

Private IP address
192.168.0.68

Network security group
DB1-nsg

open

DB2

Network interface
db2777

Private IP address
192.168.0.69

Network security group
DB2-nsg

open

FrontEnd 192.168.0.0/26

web1

Network interface
web1708

Private IP address
192.168.0.7

Network security group
web1nsg606

open

web2

Network interface
web2290

Private IP address
192.168.0.5

Network security group
web2-nsg

open

web3

Network interface
web3869

Private IP address
192.168.0.6

Network security group
web3-nsg

open

DB1

Public IP address/DNS name label
-

Virtual network/subnet
Production/BackEnd

Availability set (2 virtual machines)
loadbalancers

open

Connect is disabled for this virtual machine.
More details

DB1_OsDisk_1_ffc...

OS disk

128 GiB

open

db1976

Virtual network/subnet
Production/BackEnd

Public IP address
-

Network security group (firewall)
DB1-nsg

open

web1

Public IP address/DNS name label
13.68.77.6/lab11webserver1.eastus2.cloud...

Virtual network/subnet
Production/FrontEnd

Availability set (2 virtual machines)
loadbalancers

open

web1_OsDisk_1_1...

OS disk

128 GB

open

web1708

Virtual network/subnet
Production/FrontEnd

Public IP address
13.68.77.6

Network security group (firewall)
web1nsg606

open

VM HDD Size A1 Standard

Demo2: VNets & Load Balancer Summary

1. Create Virtual Network – In Azure Portal →New, Networking, then Virtual Network

Name *Production* The name must be unique within the resource group.
Address space *192.168.0.0/24 .. /26* You can specify any address space you like in CIDR notation (provides 256 addresses minus 5)
Subscription *[Your subscription]* A VNet exists within a single subscription (example: AzMcKPay-As-You-Go)
Resource group *VnetLB* Create New resource group. The name must be unique within the subscription you selected.
Location *East US2* Typically the location that is closest to your physical locale
Subnet name *FrontEnd* The subnet name must be unique within the virtual network.
Subnet address range *192.168.0.0/29* The range you specify must exist within the address space you defined for the Vnet (provides 8 addresses)

2. Create Second Subnet for VNet – In *Production* blade, settings/subnet click +Subnet

Name *BackEnd,* The name must be unique within the virtual network.
Address range *192.168.0.0/28,* The range you specify must exist within address space defined for Vnet
Network security group and **Route table** *None* … all other settings are Default, Network security groups (NSG) … DEMO2 create s NSG for ea. subnet

3. Create Internet Load Balancer – In Azure Portal →New, Load Balancer Name *ILBpublic,* Type *Public*

4. Create VMs – In Azure Portal →New, Compute, then Windows Server 2012 R2 Datacenter

BASICS blade, Name *DB1* connect to backend, don't want public IP (Create ***DB2 with defaults,*** web server connects frontend Internet resources)
VM disk type *HDD* *Choose* regular hard disks rather than SSD solid-state disks
User name *lab11* **Password** *lab11PASSWORD123*
Subscription The subscription must be the same as above. The VNet you connect VMs to, must exist in the same subscription.
Resource group Use existing: Select *VnetLB* VNet resources don't have to exist in the same resource group.
Location *East US2* The location must be the same location specified in create a virtual network with two subnets step

5. Choose a Size for 5 VMs (based on SKU / SLAs), click *A1 Standard* *$66.96* (one NIC)

Storage: default (new) vinetlbsdisk…
Virtual network *Production* You can select any VNet that exists in the same location as VM
Subnet Select Accept default *FrontEnd (192.168.0.0/26)*
Public IP address- Accept default (new) DB1-ip Without a public IP, you can't connect to it directly from Internet.
Network security group (firewall) *Accept the default* (new) DB1-nsg
Extensions No extensions, **High Availability** …*All other values Accept defaults* By default, all inbound traffic to the VM is denied. There is no rule for outbound traffic because by default, all outbound traffic is allowed. You can add/remove rules to control traffic per your policies.

6. Review Resources & Connect– In Azure Portal ARM→ Connect to *L11WebServer* VM from the Internet , Overview, click Connect

(download the *MyWebServer.rdp* file & open) ***Delete all resources***

Demo2: VNets & Load Balancer Steps

1. Create Virtual Network – In Azure Portal →New, Networking, then Virtual Network

- **Name** *Production* The name must be unique within the resource group.
- **Address space** *192.168.0.0/24* You can specify any address space you like in CIDR notation. Subnet must be contained in address space or error (192.168.0.0 - 192.168.0.255 (256 addresses)) From 10.0.0.0/24 (10.0.0.0 - 10.0.0.255 (256 addresses))
- **Subscription** *[Your subscription]* A VNet exists within a single subscription (example: **AzMcKPay-As-You-Go**)
- **Resource group** *VnetLB* Use existing resource group name must be unique within the subscription you selected.
- **Location** *East US2* Typically the location that is closest to your physical locale
- **Subnet name** *FrontEnd* The subnet name must be unique within the virtual network. Need enough addresses??!!
- **Subnet address range** *192.168.0.0/29* The range must exist within the address space (provides 8 addresses, Azure loses 5)

2. Create Second Subnet for VNet – In *Production* blade, settings/subnet click +Subnet

- **Subnet name** *BackEnd,* The name must be unique within the virtual network.
- **Address range** *192.168.0.0/28,* The range you specify must exist within address space defined for VNet
- **Network security group** and **Route table** *None* … all other settings are **Default**
- Verify Subnets All resources → filter ***VnetLB ..*** RG, click ***Production*** → Settings → Subnets
- Change **Subnet name** *FrontEnd* **address range** *192.168.0.0/26 SAVE to add more errors out, delete* **Subnet** *BackEnd,* then adjust Front
- Recreate **Subnet name** *BackEnd,* **Address range** *192.168.0.0/28*
- *Can do via Administrator Windows Powershell ISE … script out when creating a lot of Vnets*

3. Create VMs – In Azure Portal →New, Compute, Windows Server 2012/2016 R2 Datacenter (3 web + 2DB)

- **BASICS blade, Name** *DB1* web server connects frontend Internet resources & DB1 backend, don't want public IP
- **VM disk type** *HDD Choose* regular hard disks ***A1 Standard*** size and/or *SSD* solid-state disks ***DS1_V2 Standard*** size
- **User name** *lab11* **Password** *lab11PASSWORD123*
- **Subscription** The subscription must be the same as above. The VNet you connect VMs to, must exist in the same subscription.
- **Resource group Use existing:** Select *VnetLB* VNet resources don't have to exist in the same resource group.
- **Location** *East US2* The location must be the same location specified in create a virtual network with two subnets step
- https://docs.microsoft.com/en-us/azure/search/search-sku-tier#sku-descriptions

Demo2: Azure Load Balancer Summary

4. Choose a Size for 5 VMs (based on SKU / SLAs), click *A1 Standard $66.96* (one NIC) ~7min's create

- **Storage:** default (new) vnetlbdisks664 …
- **Virtual network** *Production* You can select any VNet that exists in the same location as VM
- **Subnet** Select *BackEnd (192.168.0.0/28)* … since DB1 is a Database / Domain Controller (DC)
- **Public IP address** Create new, dynamic *DB1-ip* Without a public IP, you can't connect to it directly from Internet.
- **Network security group (firewall)** Create new, *test* or *DB1-nsg*, Inbound Rules *Any RDP(TCP/3389),* , Inbound Rules *default NoResults*
- **Extensions** No extensions, **High Availability?** *Loadbalancing* **Monitoring** …*All other values Accept defaults* By default, all inbound traffic to the VM is denied. There is no rule for outbound traffic because by default, all outbound traffic is allowed. You can add/remove rules to control traffic per your policies.

5. Create Internet Load Balancer – In Azure Portal →New, Load Balancer

- **Name** *ILBpublic*
- **Type** *public* **Assignment** *dynamic*
- **Subscription** AzMcKPay-As-You-Go
- **Resource group** *VnetLB* VNet resources don't have to exist in the same resource group.
- **Location** *East US2* The location must be the same location specified in create a virtual network with two subnets step
- Go to → *ILBpublic …* **click add** *ILB* **click add virtualmachine, assign VM availability sets (none, Frontend, Backend)**
- **In SETTINGS Add 3 web VMs / FrontEnd to choose Virtual Machines availability group**
- **Add availability sets which has multiple VMs / FrontEnd & BackEnd**
- **Create health probes** *ILBprobe … 15 min*
- **Add Load Balancing Rules** *ILBrules*
- **Configure Inbound NAT Rules, Add Name** *RDP* **FrontEnd IP Address** *LoadBalancerfrontEnd* **Service** *RDP,* **Protocol** *TCP* **Target** *Web3*

6. Configure Load Balancer, VMs Availability Sets, Health Probes, Idle Time, DB & Web VM IP & NAT rules

- Create web1, web2 (static IP) VMs … Consider scripting this!!!
- Modify IPs of *DB1* (don't want it available on internet)
- Review RG→ VNetILB→ DB1→ Settings→ Network Interfaces
- Go to Settings→ IP Configurations modify ipconfig1, click disable, click static IP leave default, Save
- Close blade, public IP is removed from Interface, private IP is now static
- Overview … "Connect" is grayed out … No Internet access to BackEnd DB resources, cannot RDP into VNet resource directly
- Modify IPs of *web1 web2* (want it available Static IP on internet, **VMs by default have public dynamic IP address**
- RG→ VnetLB→ web2-ip then Settings → Configuration to **Assignment** *Static*, **Idle Timeout(min)** *default is 4,* **Health Probe etc.**
- **DNS Name Label** *lab11webserver*
- **LOOK at Web2 Network Interface … connect, ensure static, associate via IP configurations (don't go into VM do it in portal or PowerShell)**
- RG→ VnetLB→ Scroll down to Web2-ip Network Interfaces … Click Web2, then Settings → Configuration, click Primary
- Public Ip hasn't come up yet, **Public IP address** *Enable* **(click web2-ip, SAVE) Assignment** *Dynamic*

APPENDIX

Misc. VNet Topics

IP Address Space

Generally use 10.x.x.x if you're running a large network and 192.168.x.x for a smaller network. It doesn’t matter how large or small the subnet is, any range of available addresses are automatically reduced by 5 (because of the 5 reserved addresses mentioned above). So for example a 16-bit subnet (which gives a total of 65536 host addresses) is reduced to 65531. An 8 bit subnet has a maximum of 251 addresses (256-5).

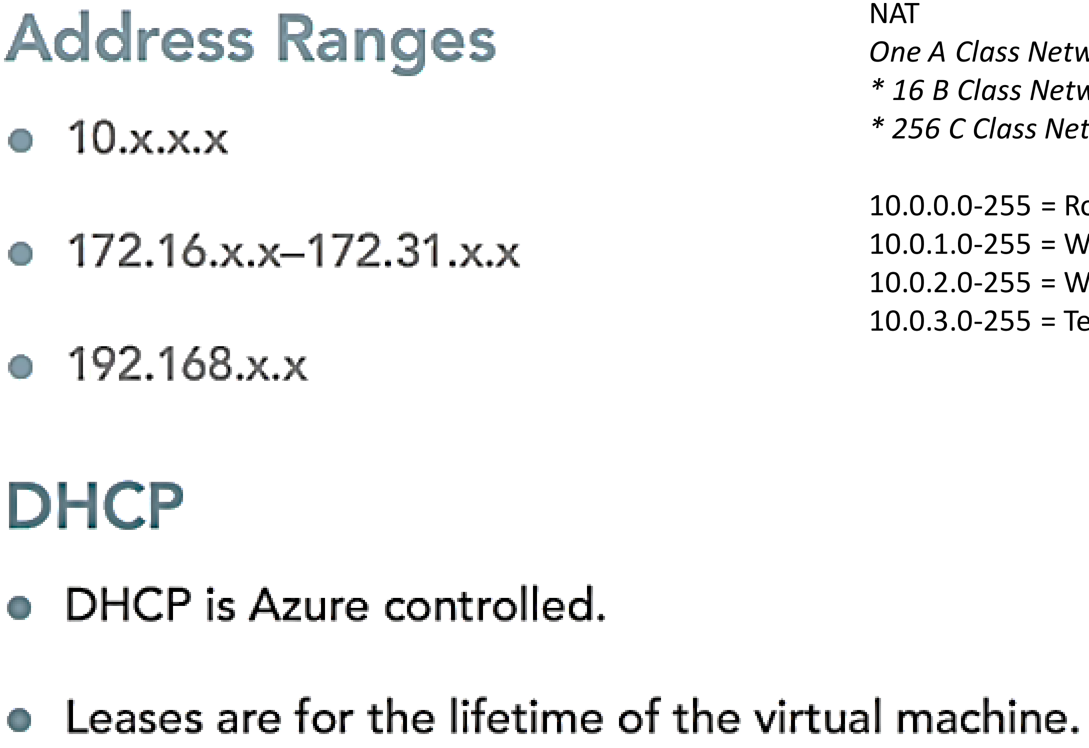
When you have a network you lose two IP addresses one for broadcast and one for the network. The first IP is reserved to refer to the network while the last ip of the range is reserved for the broadcast address. IETF / RFC1878

```
/8  = 255.0.0.0
/16 = 255.255.0.0
/24 = 255.255.255.0
/32 = 255.255.255.255
192.168.1.0/24 = 192.168.1.0-192.168.1.255
192.168.1.5/24 is still in the same network as above
we would have to go to 192.168.2.0 to be on a
different network.
192.168.1.1/16 = 192.168.0.0-192.168.255.255
```

10.0.0.0 /24 instead of /16 mask means that the first 3 octets of the ip address are used to specify the network versus the first 2 octets

/8 is using only the first octet to specify the network portion, which is what a 10. network explicitly meant back in the pre-CIDR days, and that's why you still see it more often with a /8 than with a 24

IP Addresses



Address Ranges

- 10.x.x.x
- 172.16.x.x–172.31.x.x
- 192.168.x.x

DHCP

- DHCP is Azure controlled.
- Leases are for the lifetime of the virtual machine.

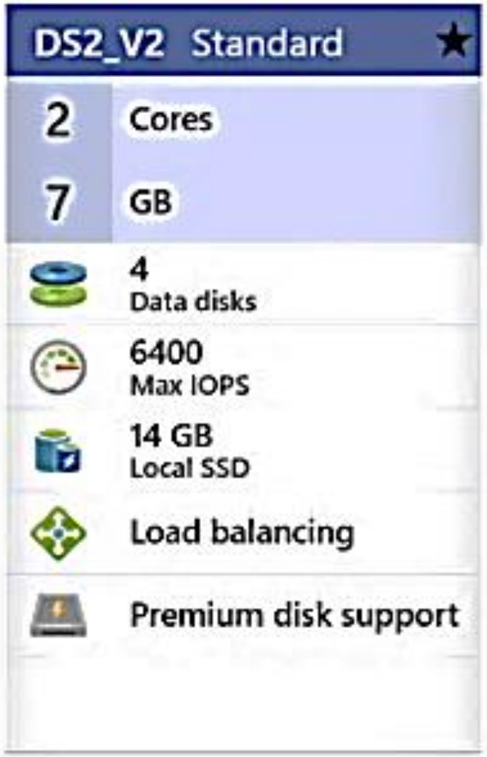
NAT
One A Class Network 10.0.0.0
** 16 B Class Networks 172.16.0.0 - 172.31.0.0*
** 256 C Class Networks 192.168.0.0 - 192.168.255.0*

10.0.0.0-255 = Routers/Server - Kinda, sorta DMZ
10.0.1.0-255 = Wired Workstations
10.0.2.0-255 = Wireless Workstations
10.0.3.0-255 = Test stuffage

https://blogs.msdn.microsoft.com/plankytronixx/2015/05/05/azure-exam-prep-virtual-networks/

Azure VNet Sizes

General Purpose



DS2_V2 Standard ★

2 Cores

7 GB

4 Data disks

6400 Max IOPS

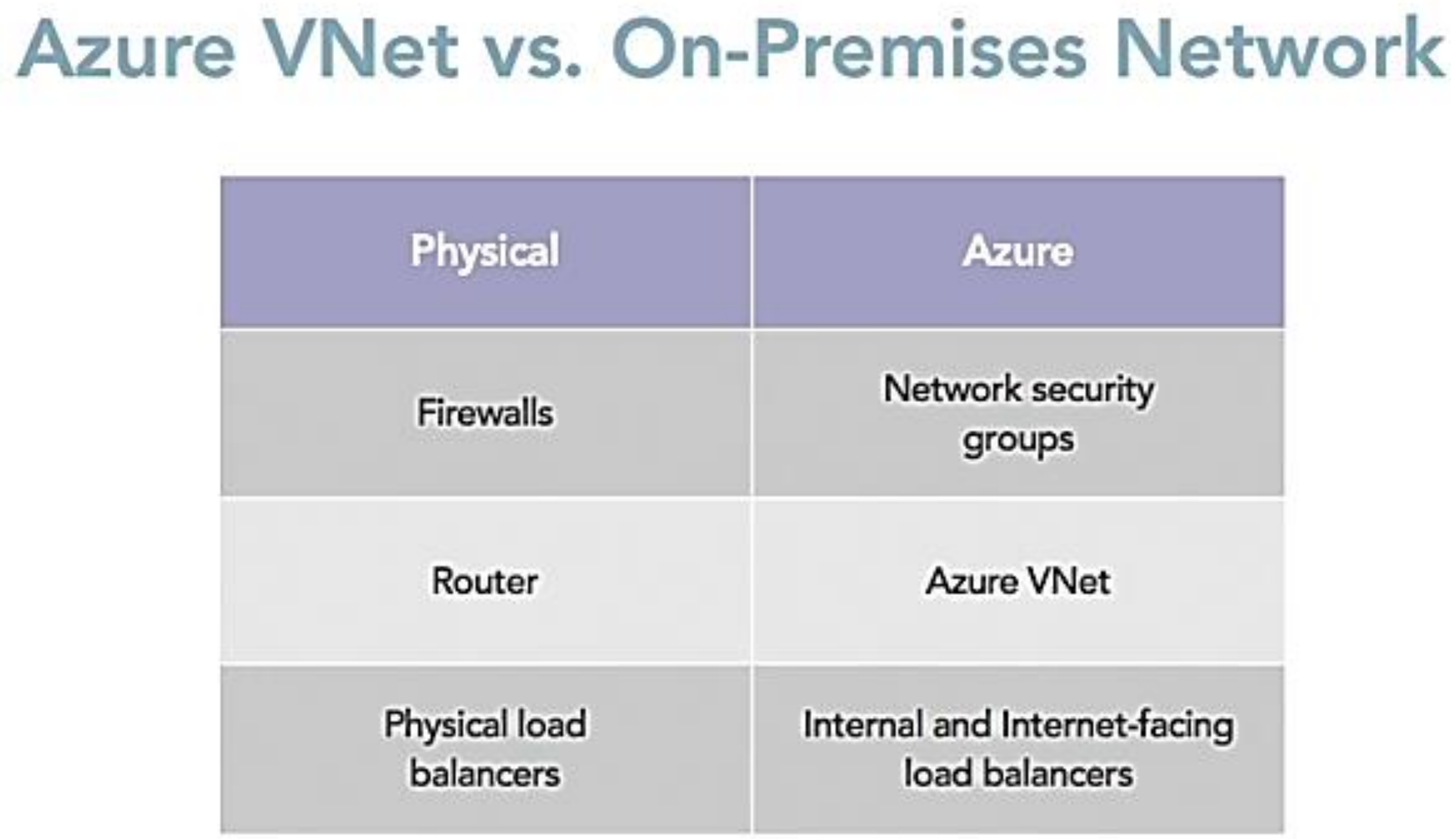
14 GB Local SSD

Load balancing

Premium disk support

- Test and dev
- Small-to-medium databases
- Low-to-medium-traffic web servers
- Balanced CPU to memory ratio
- DSv2, Dv2, DS, D, Av2, and A0-7 SKUs

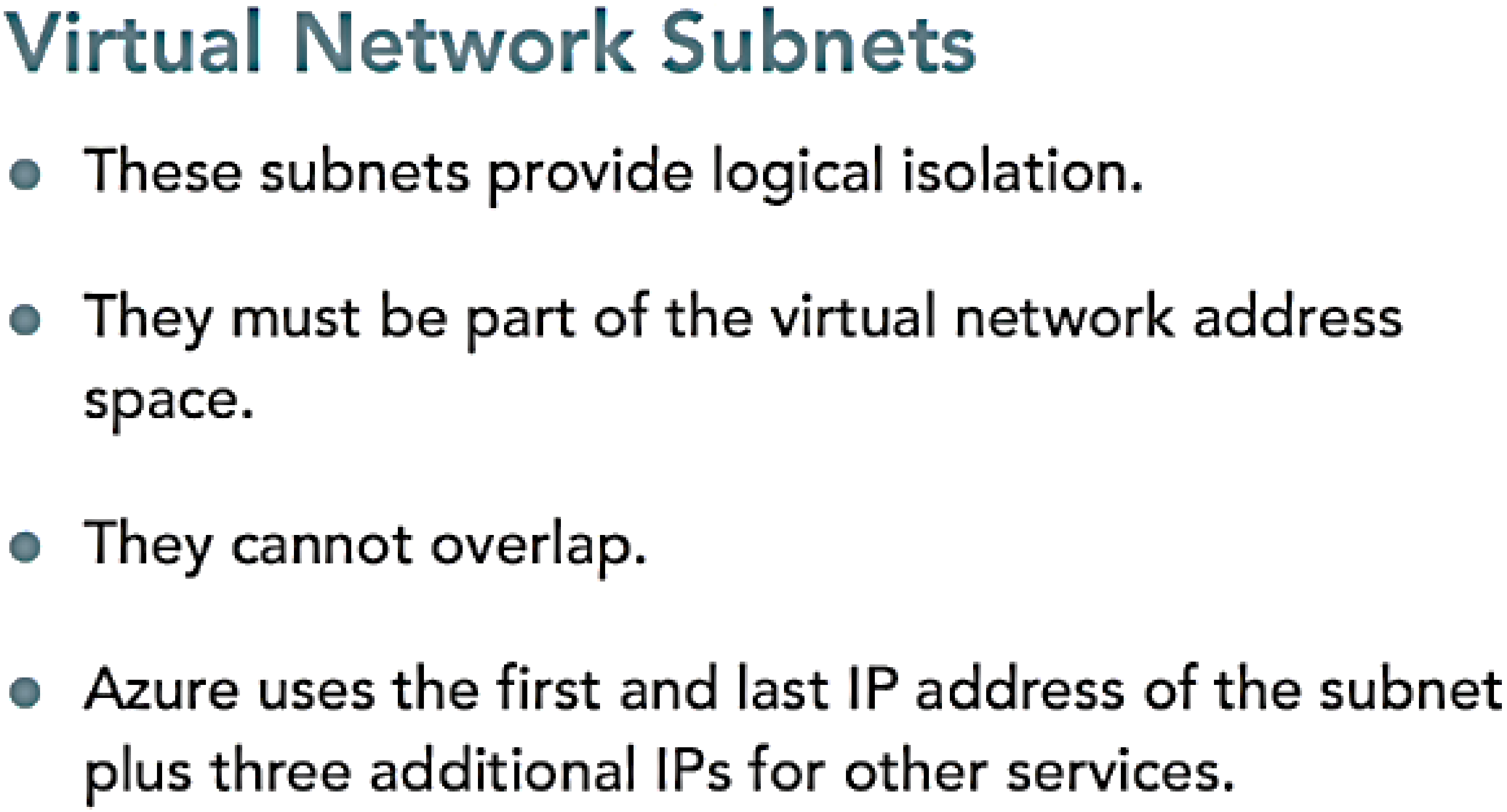
Azure Virtual Network Overview



Azure VNet vs. On-Premises Network

Physical	Azure
Firewalls	Network security groups
Router	Azure VNet
Physical load balancers	Internal and Internet-facing load balancers

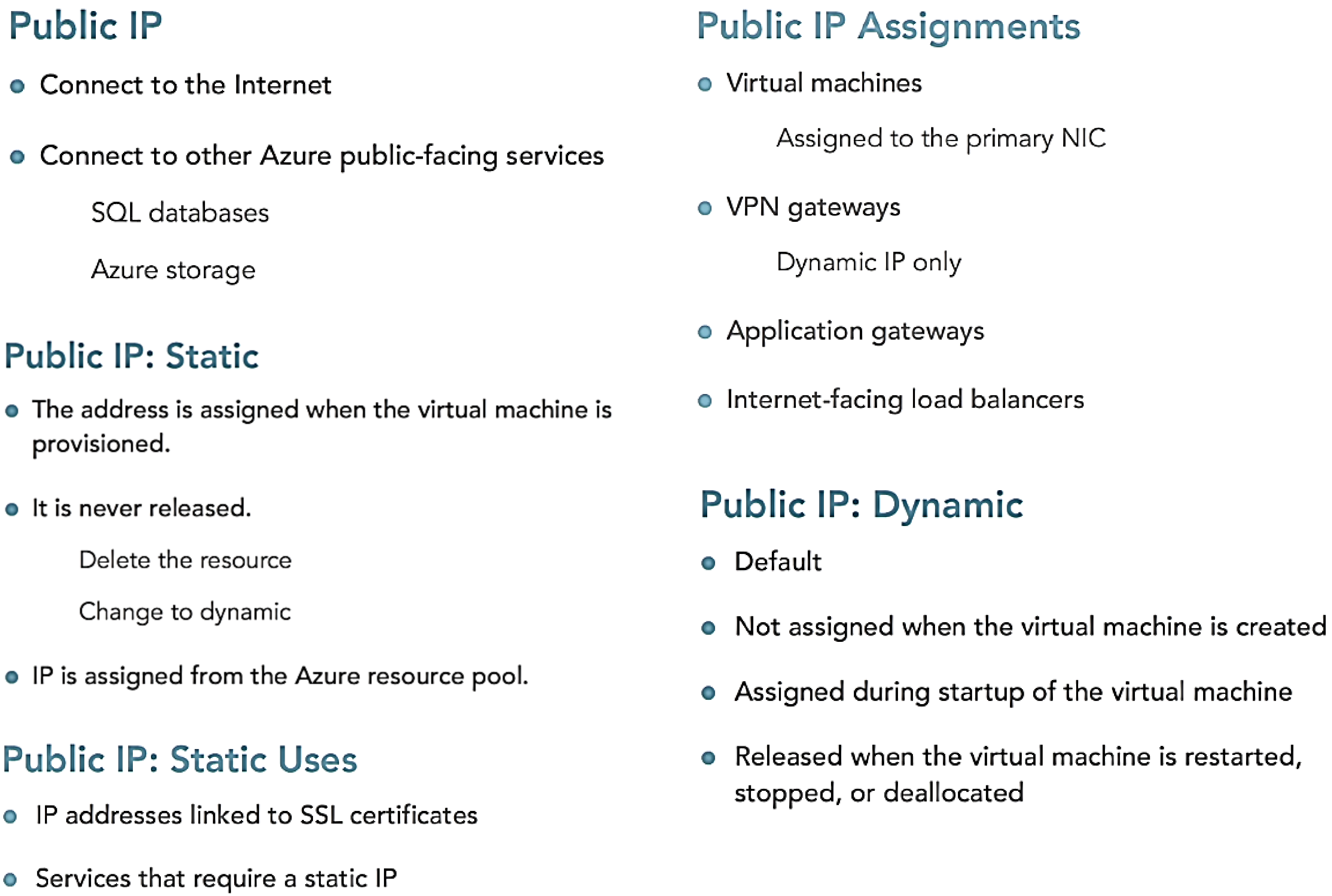
Azure Virtual Network Overview



Virtual Network Subnets

- These subnets provide logical isolation.
- They must be part of the virtual network address space.
- They cannot overlap.
- Azure uses the first and last IP address of the subnet plus three additional IPs for other services.

Public IP Addresses



Public IP

- Connect to the Internet
- Connect to other Azure public-facing services
  - SQL databases
  - Azure storage

Public IP: Static

- The address is assigned when the virtual machine is provisioned.
- It is never released.
  - Delete the resource
  - Change to dynamic
- IP is assigned from the Azure resource pool.

Public IP: Static Uses

- IP addresses linked to SSL certificates
- Services that require a static IP

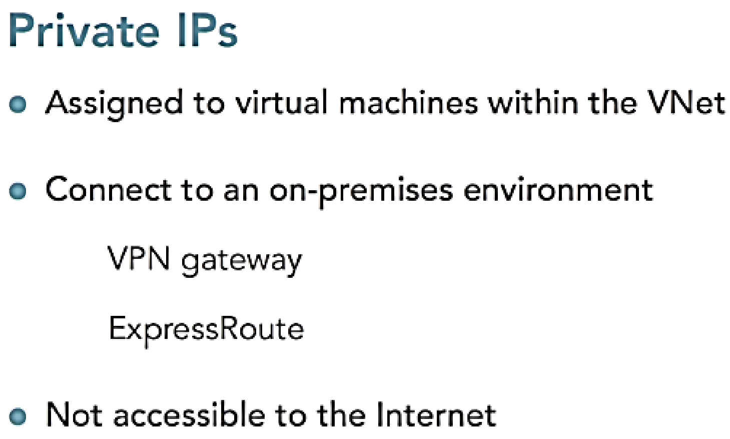
Public IP Assignments

- Virtual machines
  - Assigned to the primary NIC
- VPN gateways
  - Dynamic IP only
- Application gateways
- Internet-facing load balancers

Public IP: Dynamic

- Default
- Not assigned when the virtual machine is created
- Assigned during startup of the virtual machine
- Released when the virtual machine is restarted, stopped, or deallocated

Private IP Addresses

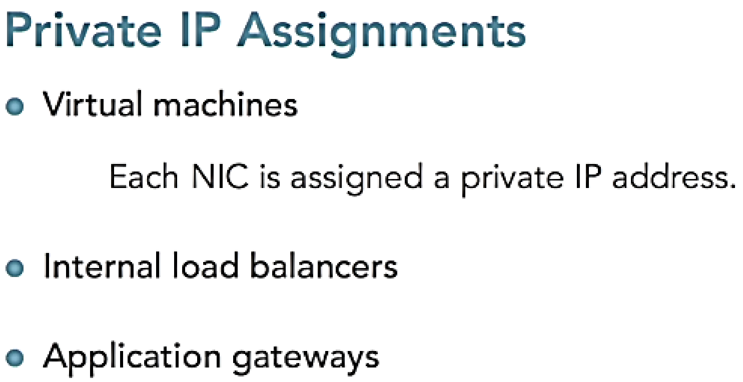


Private IPs

- Assigned to virtual machines within the VNet
- Connect to an on-premises environment

  VPN gateway

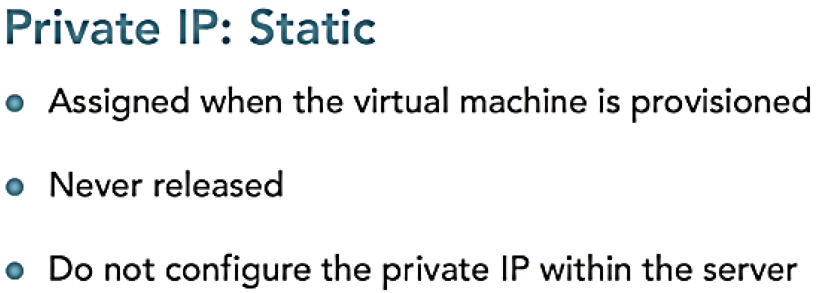
  ExpressRoute
- Not accessible to the Internet



Private IP Assignments

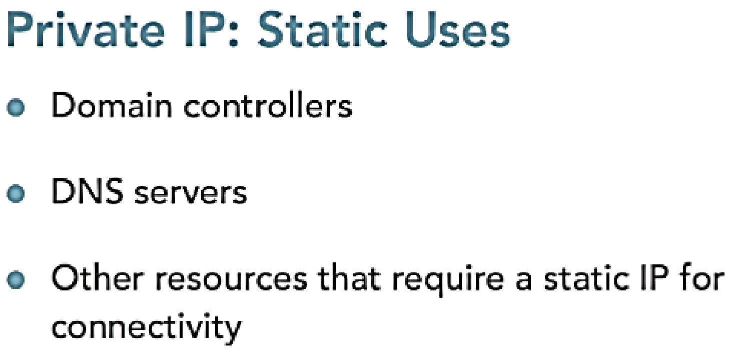
- Virtual machines

  Each NIC is assigned a private IP address.
- Internal load balancers
- Application gateways



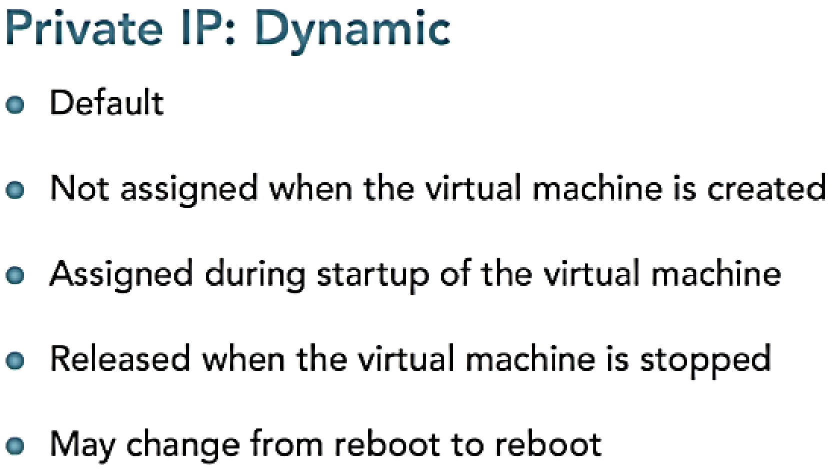
Private IP: Static

- Assigned when the virtual machine is provisioned
- Never released
- Do not configure the private IP within the server



Private IP: Static Uses

- Domain controllers
- DNS servers
- Other resources that require a static IP for connectivity

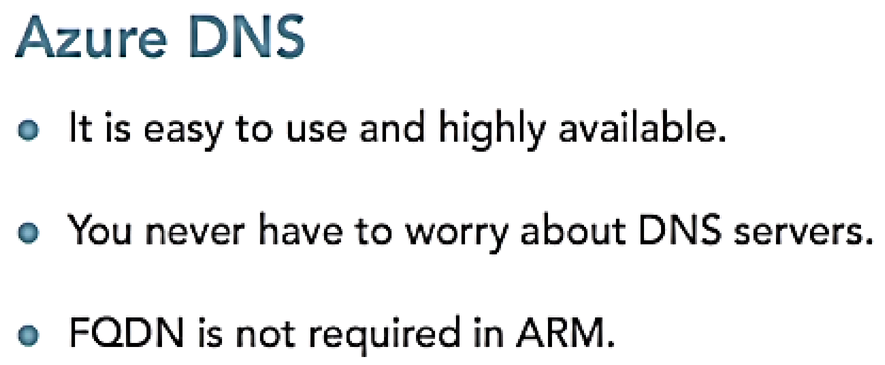


Private IP: Dynamic

- Default
- Not assigned when the virtual machine is created
- Assigned during startup of the virtual machine
- Released when the virtual machine is stopped
- May change from reboot to reboot

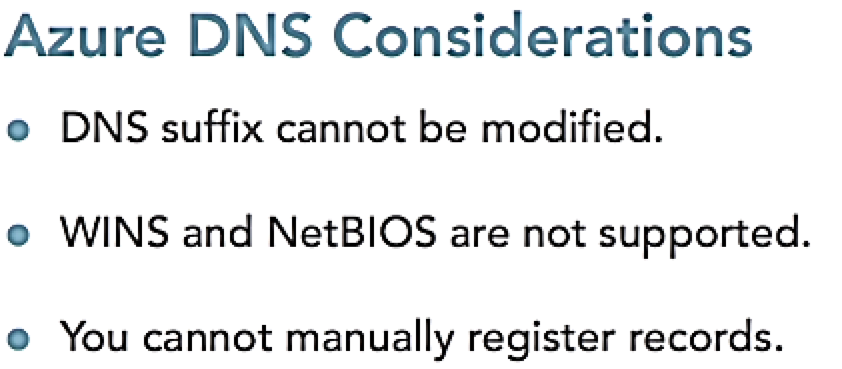
Azure DNS

DNS is telephone book of Internet, good for Test, DEV, POC



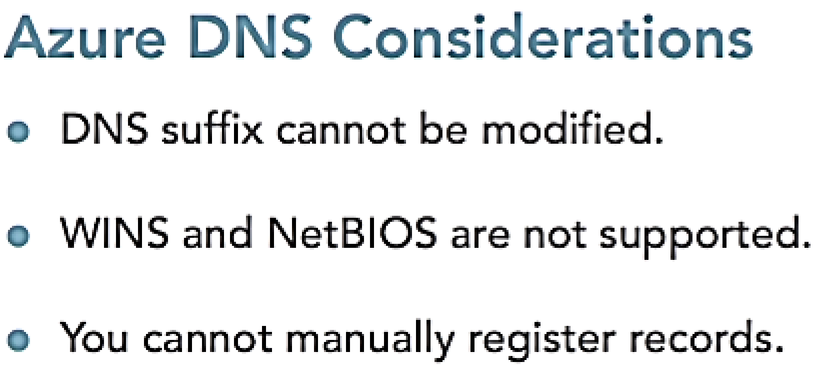
Azure DNS

- It is easy to use and highly available.
- You never have to worry about DNS servers.
- FQDN is not required in ARM.



Azure DNS Considerations

- DNS suffix cannot be modified.
- WINS and NetBIOS are not supported.
- You cannot manually register records.



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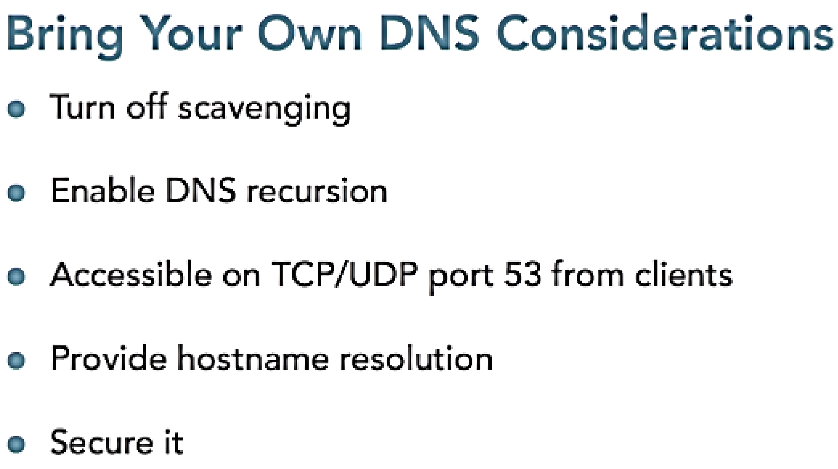

Bring Your Own DNS Considerations

- Turn off scavenging
- Enable DNS recursion
- Accessible on TCP/UDP port 53 from clients
- Provide hostname resolution
- Secure it

Happy Holidays & Best Wishes For A Successful New Year!

Cloud Santa Beams Season Greetings To All!