

Case Study

Requirements

- A low cost solution based on demand of dynamic business conditions.
- As the business expands across EastUS and EA, they would like to have their DataCenter virtualised using cloud computing.
- Critical Data should be made available in case of disaster

Business Requirements

East Asia

- 2 web servers with 99.95% high availability
- These web services has to be utilised with proper balance with client affinity with Public IP
- Selected web servers should be reachable via RDP from internet
- A jump port should accessible from internet to upload contents to web servers.
- Protect web server traffic restricted to allowed based on ip addresses which will be updated as warranted
- Enable backup for WebServers
- Have alert generated in case of 80% above cpu usage

East US

- EastUS server (Server11) should be accessible from internet via public IP
- Establish secure Connection to SEA-EUS Azure sites
- All servers should be reachable with internal ip addresses

Storage Requirements

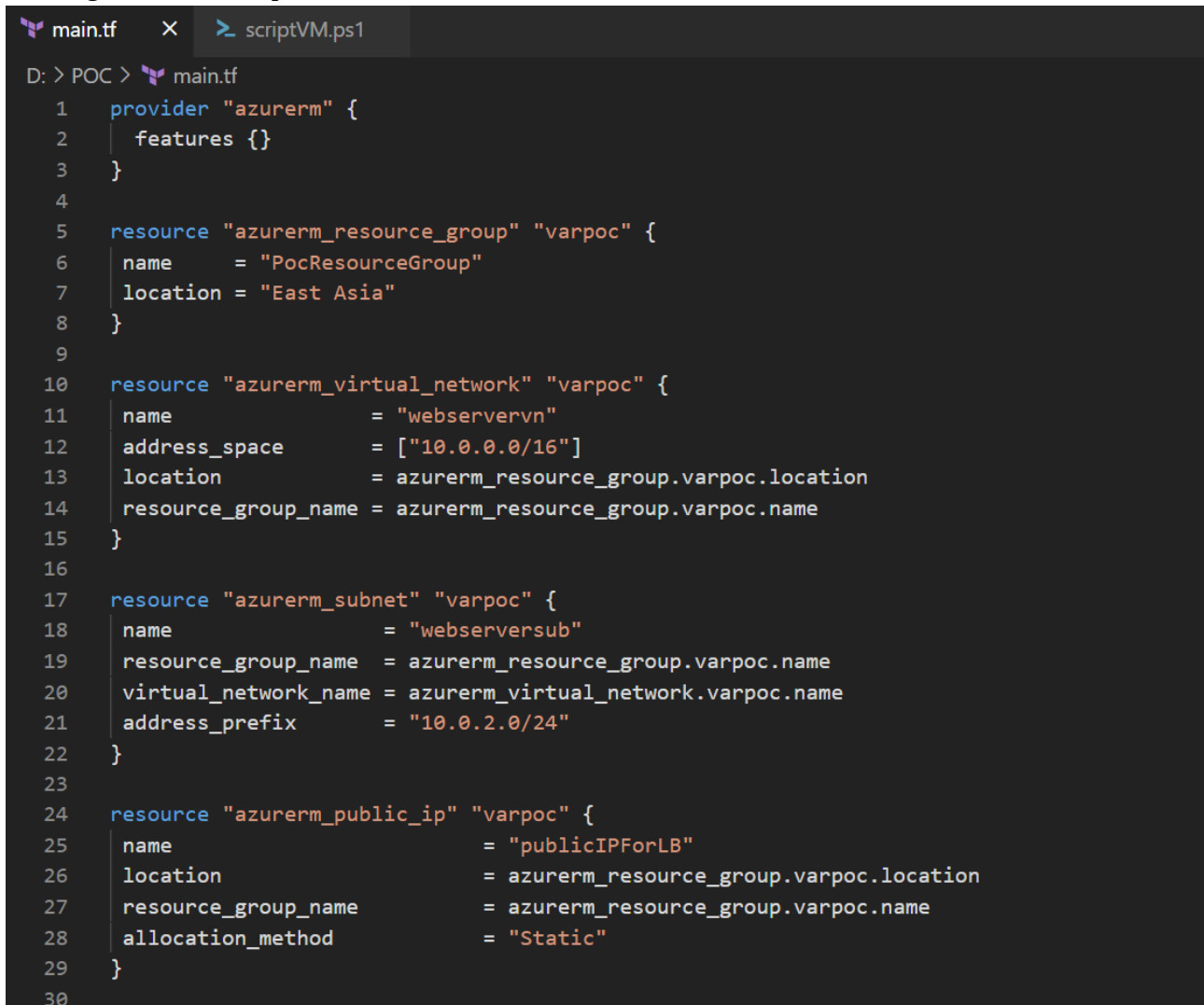
- EUS based resources should provide data resiliency in case of azure datacentre failure.
- The storage should be accessible by applications with secure access. provide access urls and keys.
- Sales manager should access his resource from windows explorer.
- SEA data resources must provide high resiliency in case of even multiple azure data center failures

Azure Resource management

- Create Vmadmin user who can manage all VM in the subscription
- Create Backup_admin user who can manage backup only in EUS servers in EURG

Implementation Flow

- Created 2 web servers along with resource group, vnet, subnet, load balancer, back end pool using terraform script in East Asia

A screenshot of a code editor with a dark theme. The editor has two tabs at the top: 'main.tf' and 'scriptVM.ps1'. The 'main.tf' tab is active, showing a Terraform script. The script is written in HCL and defines several Azure resources. It starts with a provider block for 'azurerm' with features enabled. Then, it defines an 'azurerm_resource_group' named 'varpoc' in the 'East Asia' location. Next, it defines an 'azurerm_virtual_network' named 'varpoc' with an address space of '10.0.0.0/16' in the same location and resource group. Then, it defines an 'azurerm_subnet' named 'varpoc' with an address prefix of '10.0.2.0/24' in the same location and resource group. Finally, it defines an 'azurerm_public_ip' named 'varpoc' with a static allocation method in the same location and resource group. The script is numbered from 1 to 30.

```
1 provider "azurerm" {
2   features {}
3 }
4
5 resource "azurerm_resource_group" "varpoc" {
6   name     = "PocResourceGroup"
7   location = "East Asia"
8 }
9
10 resource "azurerm_virtual_network" "varpoc" {
11   name                = "webservervn"
12   address_space       = ["10.0.0.0/16"]
13   location             = azurerm_resource_group.varpoc.location
14   resource_group_name = azurerm_resource_group.varpoc.name
15 }
16
17 resource "azurerm_subnet" "varpoc" {
18   name                = "webserversub"
19   resource_group_name = azurerm_resource_group.varpoc.name
20   virtual_network_name = azurerm_virtual_network.varpoc.name
21   address_prefix       = "10.0.2.0/24"
22 }
23
24 resource "azurerm_public_ip" "varpoc" {
25   name                = "publicIPForLB"
26   location             = azurerm_resource_group.varpoc.location
27   resource_group_name = azurerm_resource_group.varpoc.name
28   allocation_method   = "Static"
29 }
30
```

*Complete script is uploaded on GitHub

- Configured load balancer

The screenshot shows the Microsoft Azure portal interface for a load balancer resource. The left sidebar contains navigation options: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings, Frontend IP configuration, Backend pools, Health probes, Load balancing rules, Inbound NAT rules, Properties, and Locks. The main content area displays the 'loadBalancer' resource overview. It includes a search bar, action buttons (Move, Delete, Refresh, Give feedback), and a link to learn about upgrading to Standard SKU. The 'Essentials' section lists key properties: Resource group (PocResourceGroup), Location (East Asia), Subscription ID (5cb9ef1a-ac15-4c29-be1d-bc557cd5e780), SKU (Basic), and Tags. The 'Backend pool' section shows the BackEndAddressPool (2 virtual machines), Load balancing rule (port80 (Tcp/80)), Health probe (webServer (Tcp:80)), NAT rules (2 inbound), and Public IP address (137.116.164.124 (publicIPForLB)). A watermark for 'Activate Windows' is visible in the bottom right corner.

- Created NAT rule to access server via RDP

The screenshot shows the Microsoft Azure portal interface for the 'loadBalancer | Inbound NAT rules' configuration. The left sidebar is the same as the previous screenshot, with 'Inbound NAT rules' selected. The main content area displays a table of NAT rules. The table has columns for Name, Frontend IP, Frontend Port, Target, and Service. Two rules are listed: 'rdpConnectWebServer0' and 'rdpConnectWebServer1'. A watermark for 'Activate Windows' is visible in the bottom right corner.

Name	Frontend IP	Frontend Port	Target	Service
rdpConnectWebServer0	137.116.164.124	55000	webservervm0	RDP (TCP/3389)
rdpConnectWebServer1	137.116.164.124	55001	webservervm1	RDP (TCP/3389)

- Private ip connection testing

```
Administrator: Command Prompt
C:\Users\azuser>hostname
ServerEUS

C:\Users\azuser>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix  . : ynlih4bleboebop0yciois5knf.bx.internal.cloudapp.net
    Link-local IPv6 Address . . . . . : fe80::882e:308d:d603:6459%3
    IPv4 Address. . . . . : 192.168.1.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

C:\Users\azuser>ping 10.0.2.4

Pinging 10.0.2.4 with 32 bytes of data:
Reply from 10.0.2.4: bytes=32 time=200ms TTL=128
Reply from 10.0.2.4: bytes=32 time=198ms TTL=128
Reply from 10.0.2.4: bytes=32 time=199ms TTL=128
Reply from 10.0.2.4: bytes=32 time=199ms TTL=128

Ping statistics for 10.0.2.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 198ms, Maximum = 200ms, Average = 199ms

C:\Users\azuser>
```

- Created alert in case of CPU usages are above 80%

Alert rules - Microsoft Azure

Document.docx - Microsoft Word

portal.azure.com/#blade/Microsoft_Azure_Monitoring/AlertsManagementSummaryBlade

Microsoft Azure

Upgrade

Search resources, services, and docs (G+)

kudatarkar4@DEF

Home > Alerts >

Alert rules

New alert rule

Edit columns

Manage actions

View classic alerts

Refresh

Enable

Disable

Delete

Subscription : Free Trial

Resource group : All

Resource type : All

Resource : All

Signal type : All signal types

Status : Enabled

Displaying 1 - 1 rules out of total 1 rules

Search alert rules based on rule name and condition...

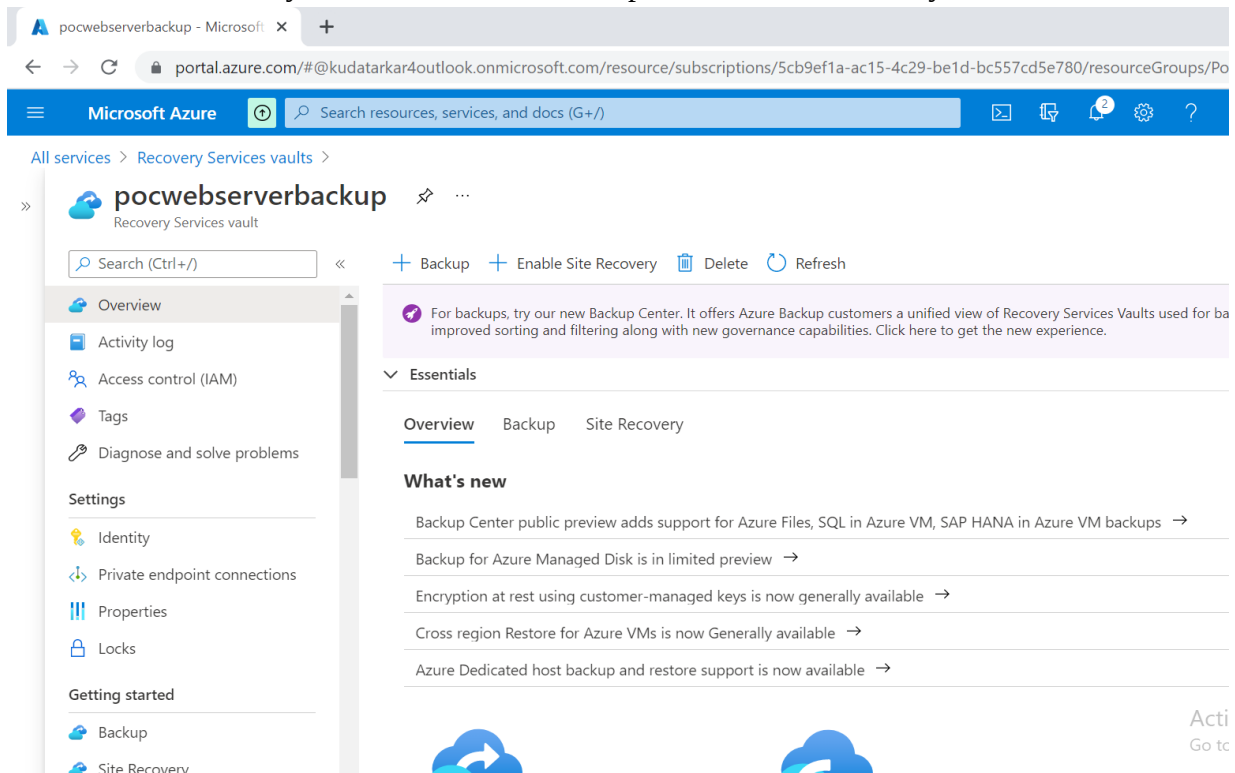
Name	Condition	Status	Target resource	Target resource type	Signal type
<input type="checkbox"/> cpuAbove80	Whenever the average percenta...	Enabled	webservervm1, webservervm0	Virtual machines	Metrics

- Created 1 VM in East US along with all networking components using PowerShell script

```
main.tf scriptVM.ps1 X
D: > POC > > scriptVM.ps1 > ...
1 # Variables
2 $resourceGroup = "PocResourceGroup"
3 $location = "East US"
4 $vmName = "ServerEUS"
5
6 # user
7 $cred = Get-Credential -Message " username and password "
8
9 # Create a subnet
10 $subnetConfig = New-AzVirtualNetworkSubnetConfig -Name subnet1 -AddressPrefix 192.168.1.0/24
11
12 # Create a vn
13 $vnet = New-AzVirtualNetwork -ResourceGroupName $resourceGroup -Location $location `
14   -Name vnetus -AddressPrefix 192.168.0.0/16 -Subnet $subnetConfig
15
16 # Create a dns
17 $pip = New-AzPublicIpAddress -ResourceGroupName $resourceGroup -Location $location `
18   -Name "publicdns$(Get-Random)" -AllocationMethod Static -IdleTimeoutInMinutes 4
19
20 # rdp
21 $nsgRuleRDP = New-AzNetworkSecurityRuleConfig -Name RuleRDP -Protocol Tcp `
22   -Direction Inbound -Priority 1000 -SourceAddressPrefix * -SourcePortRange * -DestinationAddressPrefix * `
23   -DestinationPortRange 3389 -Access Allow
24
25 # Create nsg
26 $nsg = New-AzNetworkSecurityGroup -ResourceGroupName $resourceGroup -Location $location `
27   -Name nsgUS -SecurityRules $nsgRuleRDP
28
29 # Create nic
30 $nic = New-AzNetworkInterface -Name nicUS -ResourceGroupName $resourceGroup -Location $location `
```

*Complete script is uploaded on GitHub

- Created Recovery Services vault for backups and disaster recovery



- Created backup jobs for 2 webserver backups

The screenshot shows the Azure portal interface for a Recovery Services vault. The left sidebar contains a navigation menu with options like Alerts, Diagnostic settings, Logs, Backup Jobs, Site Recovery jobs, Backup Alerts, Site Recovery events, Tasks (preview), and Export template. The main content area displays the 'Backup Jobs' page, which includes a search bar, a filter bar, and a table of backup jobs. The table has columns for Workload name, Operation, Status, Type, and Start time. The jobs listed are for 'webservervm1' and 'webservervm0', with operations including 'Backup' and 'Configure backup'. The status of the jobs is 'In progress' or 'Completed'.

Workload name	Operation	Status	Type	Start time
webservervm1	Backup	In progress	Azure Virtual machine	7/15/2021
webservervm0	Backup	In progress	Azure Virtual machine	7/15/2021
webservervm1	Configure backup	Completed	Azure Virtual machine	7/15/2021
webservervm0	Configure backup	Completed	Azure Virtual machine	7/15/2021

- Created Disaster recovery service in West US region for East US server and East Asia to SEA

The screenshot shows the Azure portal interface for a disaster recovery service named 'ServerEUS'. The left sidebar contains a navigation menu with options like Overview, Properties, Compute and Network, and Disks. The main content area displays the 'Overview' page, which includes a search bar, a filter bar, and a table of disaster recovery services. The table has columns for Health and status, Failover readiness, and Errors. The services listed are for 'ServerEUS' and 'ServerEUS-SEA', with health status 'Healthy' and failover readiness 'Never performed successfully'.

Health and status	Failover readiness	Errors
Replication Health ✔ Healthy Status Protected RPO 3 mins [As on 7/15/2021, 9:19:36 PM]	Last successful Test Failover ⚠ Never performed successfully Configuration issues ✔ No issues Agent version ✔ 9.42.5980.1 Agent status ✔ Healthy	Errors(0) No errors

- Created peering secure Connection to EA-EUS so that All servers will be reachable with internal ip addresses

Microsoft Azure portal interface showing the 'vneteus | Peerings' page. The left sidebar displays 'Virtual networks' with a list of networks: vneteus, vneteus-asr, and webservervn. The main area shows the 'Peerings' tab for the 'vneteus' virtual network. A table lists the peering connection to 'asiatouslink' with a status of 'Connected' and a peer of 'webservervn'.

Name	Peering status	Peer	Gateway transit
asiatouslink	Connected	webservervn	Disabled

- Created storage account for storage requirements

Microsoft Azure portal interface showing the 'pocstorageaccountus' storage account overview page. The left sidebar shows the 'Overview' tab selected. The main area displays the account details, including Resource group (PocResourceGroup), Location (East US), and Subscription ID (5cb9ef1a-ac15-4c29-be1d-bc557cd5e780). A 'Blob service' section shows 'Hierarchical namespace' is disabled.

Property	Value
Resource group	PocResourceGroup
Location	East US
Primary/Secondary Location	Primary: East US, Secondary: West US
Subscription	Free Trial
Subscription ID	5cb9ef1a-ac15-4c29-be1d-bc557cd5e780
Disk state	Primary: Available, Secondary: Available
Performance/Access tier	Standard/Hot
Replication	Read-access geo-redundant storage (F)
Account kind	StorageV2 (general purpose v2)
Provisioning state	Succeeded
Created	15/07/2021, 02:59:19

Blob service

Property	Value
Hierarchical namespace	Disabled

- Created File shares to access resources from windows explorer and can be used to store/share data across virtual server or physical machine

The screenshot shows the Microsoft Azure portal interface for a file share named 'pocfileshare'. The breadcrumb navigation is 'All services > Storage accounts > pocstorageaccountus > pocfileshare'. The left sidebar contains sections for Overview, Diagnose and solve problems, Access Control (IAM), Settings (Properties), Operations (Snapshots, Backup), and a search bar. The main content area has a top bar with actions: Connect, Upload, Add directory, Refresh, Delete share, Change tier, and Edit quota. Below this is a search bar 'Search files by prefix' and a table with columns Name, Type, and Size. The table contains one entry: 'test' of type 'Directory'.

Name	Type	Size
test	Directory	

Activate V
Go to Setting

- Below are access key and connection string which will be used by applications

The screenshot shows the Microsoft Azure portal interface for the 'pocstorageaccountus' storage account, specifically the 'Access keys' page. The breadcrumb navigation is 'All services > Storage accounts > pocstorageaccountus'. The left sidebar contains sections for Events, Storage Explorer (preview), Data storage (Containers, File shares, Queues, Tables), Security + networking (Networking, Azure CDN, Access keys, Shared access signature, Encryption), and a search bar. The main content area shows two keys, 'key1' and 'key2', each with a 'Rotate key' button. For each key, the 'Last rotated' time is '15/07/2021 (0 days ago)'. The 'Key' field is displayed with a copy icon. The 'Connection string' field is also displayed with a copy icon. The connection string format is 'DefaultEndpointsProtocol=https;AccountName=pocstorageaccountus;AccountKey=...'.

Activate V
Go to Setting

- Shared access keys can be used for limited access

The screenshot shows the 'Shared access signature' page in the Azure portal. The left sidebar contains navigation links: Diagnose and solve problems, Data storage (File shares), Security + networking (Shared access signature), Settings (Resource sharing (CORS)), Automation (Export template), and Support + troubleshooting (New support request). The main content area displays a 'Generate SAS and connection string' button and several SAS URLs for different services: Blob service SAS URL, File service SAS URL, Queue service SAS URL, and Table service SAS URL. Each URL is accompanied by a 'SAS token' and a 'Connection string'.

- Created Vmadmin user who can manage all VM in the subscription

The screenshot shows the 'Access control (IAM)' page in the Azure portal. The left sidebar contains navigation links: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Security, Events, Cost Management (Cost analysis, Cost alerts, Budgets, Advisor recommendations). The main content area displays a table of role assignments. The table has columns: Name, Type, Role, Scope, and Condition. There are 4 items listed: 1 Group and 3 Service Principals. The first three items are 'Contributor' roles assigned to 'pocwebser-g3v-asr', 'site-reco-irz-asr-aut', and 'site-reco-ttf-asr-aut'. The fourth item is a 'Virtual Machine Contributor' role assigned to the 'vmadmin' group.

Name	Type	Role	Scope	Condition
<input type="checkbox"/> pocwebser-g3v-asr	App	Contributor	This resource	None
<input type="checkbox"/> site-reco-irz-asr-aut	App	Contributor	This resource	None
<input type="checkbox"/> site-reco-ttf-asr-aut	App	Contributor	This resource	None
<input type="checkbox"/> VM vmadmin	Group	Virtual Machine Contributor	This resource	None

- Created backup admin to manage backups

Free Trial - Microsoft Azure

portal.azure.com/#@kudatarkar4outlook.onmicrosoft.com/resource/subscriptions/5cb9ef1a-ac15-4c29-be1d-bc557cd5e780/users

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

Home > Subscriptions > Free Trial

Free Trial | Access control (IAM)

Subscription

Search (Ctrl+/)

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Security

Events

Cost Management

Cost analysis

Cost alerts

Check access

Role assignments

Roles

Roles (Classic)

Deny assignments

Classic administrators

Number of role assignments for this subscription

8 2000

Search by name or email

Type: All

Role: All

Scope: All scopes

Group by: Role

5 items (2 Groups, 3 Service Principals)

Name	Type	Role	Scope	Condition
Backup Contributor				
BA backup_admin	Group	Backup Contributor	This resource	None

Contributor

Other information

- All virtual machines

Virtual machines

Default Directory

Create

Switch to classic

Reservations

Manage view

Refresh

Export to CSV

Open query

Assign tags

Start

Restart

Stop

Filter for any field...

Subscription == all

Resource group == all

Location == all

Add filter

Showing 1 to 3 of 3 records.

No grouping

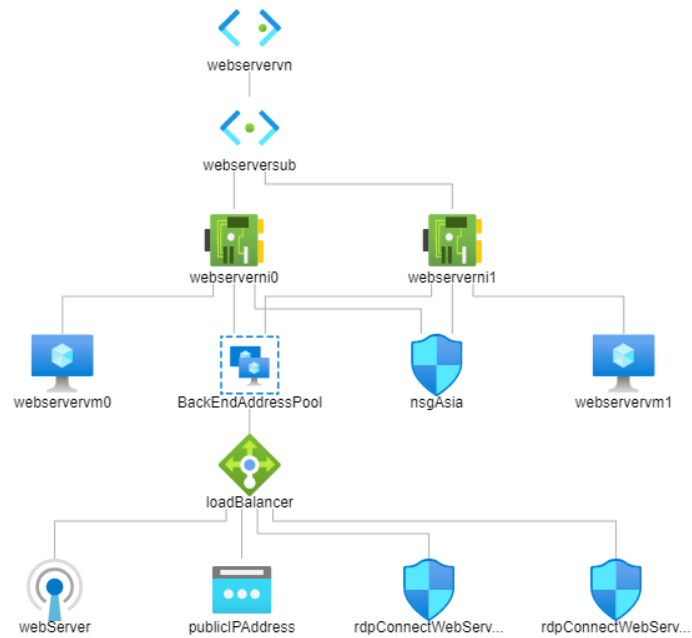
List view

Name	Subscription	Resource group	Location	Status	Operating system	Size	Public IP address
ServerEUS	Free Trial	PocResourceGroup	East US	Running	Windows	Standard_DS1_v2	52.152.151.3
webservervm0	Free Trial	POCRESOURCEGROUP	East Asia	Running	Windows	Standard_DS1_v2	137.116.164.124
webservervm1	Free Trial	POCRESOURCEGROUP	East Asia	Running	Windows	Standard_DS1_v2	137.116.164.124

- Vnet Diagram for web servers East Asia

[Download topology](#)

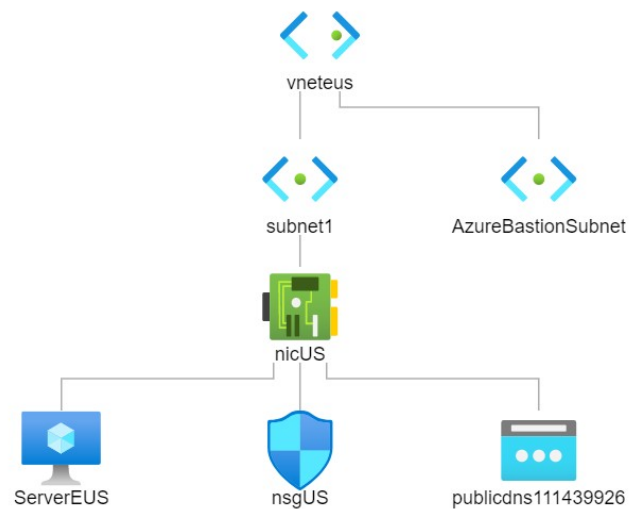
Subscription ⓘ	Resource Group ⓘ	Virtual Network ⓘ
Free Trial	PocResourceGroup	webservervn



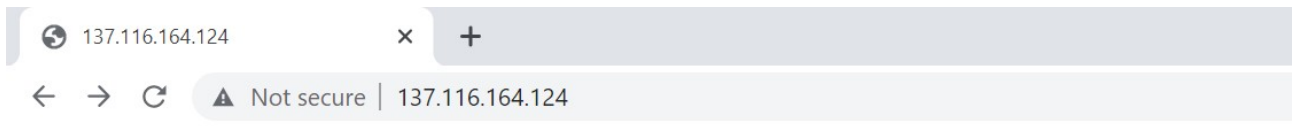
- Vnet Diagram for East US server

[Download topology](#)

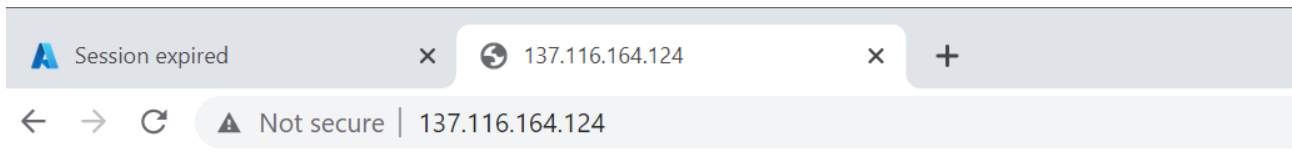
Subscription ⓘ	Resource Group ⓘ	Virtual Network ⓘ
Free Trial	PocResourceGroup	vneteus



- Web servers



This is web server 1



This is web server 0 zero