Seneca

Project 2: Load Balancing Websites

At the end of each session, any resources you created in your account will be preserved. Some Azure resources, such as VM instances, may be automatically shut down, while other resources, such as storage services will be left running. Keep in mind that some Azure features cannot be stopped and can still incur charges (i.e. Azure Bastion). To minimize your costs, delete all resources and recreate them as needed to test your work during a session.

Lab Objectives

In this project, we will investigate and construct an architecture using the following Azure services:

- Azure Bastion
- Azure Virtual Machines
- Azure Virtual Networks
- Azure Virtual Network peering
- Azure Load Balancer
- Azure Private DNS
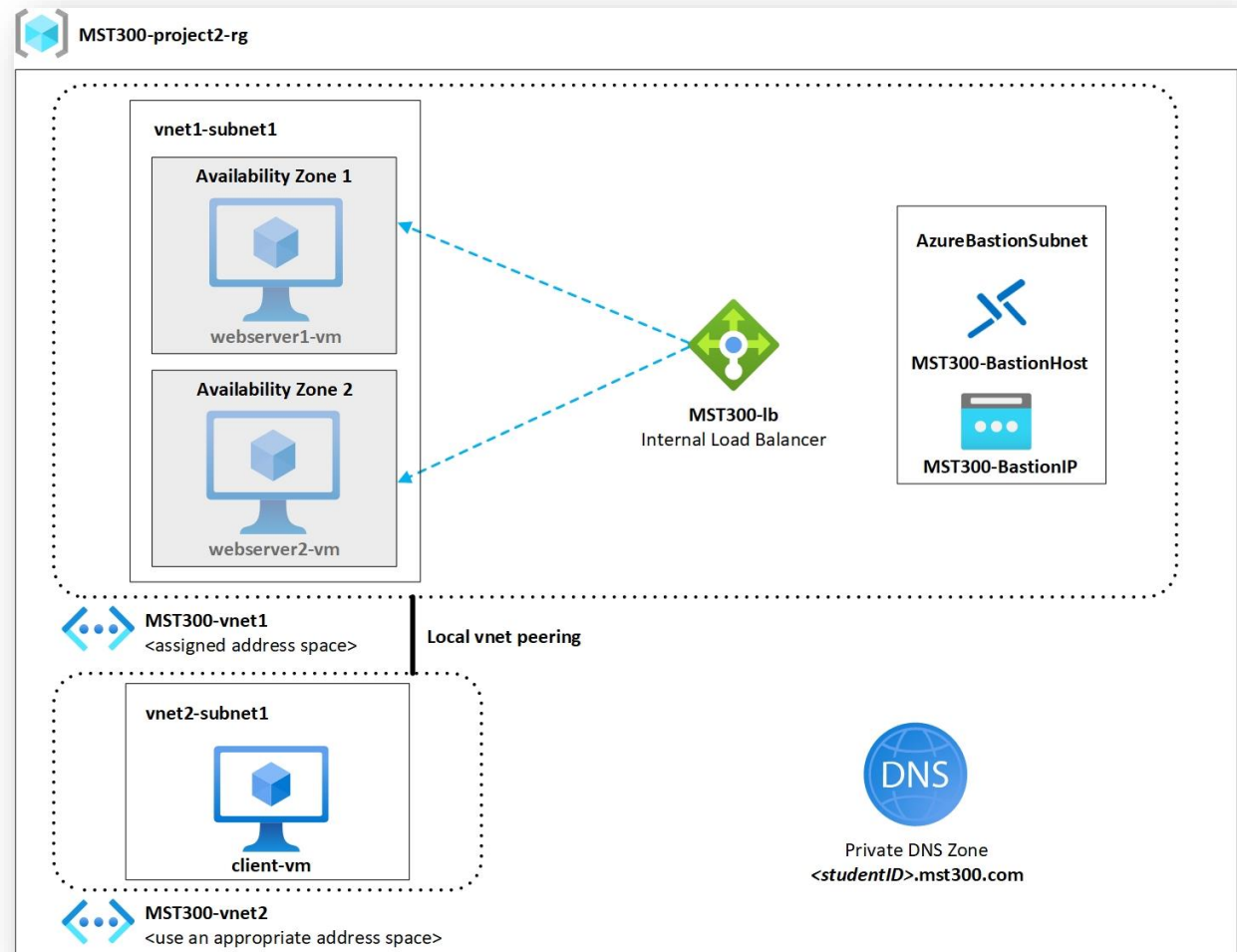
Lab Materials

- Azure Bastion
  - [What is Azure Bastion?](#)
  - [Azure Bastion Tutorial](#)
- Azure Virtual Networks
  - [What is Azure Virtual Network?](#)
  - [Azure Virtual Network Tutorial](#)
- Azure Virtual Network Peering
  - [What is Azure Virtual Network Peering?](#)
  - [Azure Virtual Network Peering Tutorial](#)
- Azure Load Balancer
  - [What is Azure Load Balancer?](#)
  - [Create Internal Load Balancer Tutorial](#)
- Azure Private DNS
  - [What is Azure Private DNS?](#)
  - [Create a Private Zone Tutorial](#)
- Project Topology
  - [Download Topology](#)
- Network address space from Seneca Blackboard
  - Use the assigned network address space as indicated in the project

Project Instructions

We will be creating an internal load balancer which randomly selects which webserver will be serving our private website. A client VM will be accessing this website from another virtual network outside of our webservers' virtual network. We will demonstrate on the client VM that both webservers can service our private website. The project topology outlines the different components and requirements for our project.

Project components:

1 – Resource Group
2 – Webservers
1 – Client VM
1 – Azure Load Balancer
2 – Virtual Networks
3 – Subnets in total
1 – Azure Bastion Host
1 – Private DNS Zone
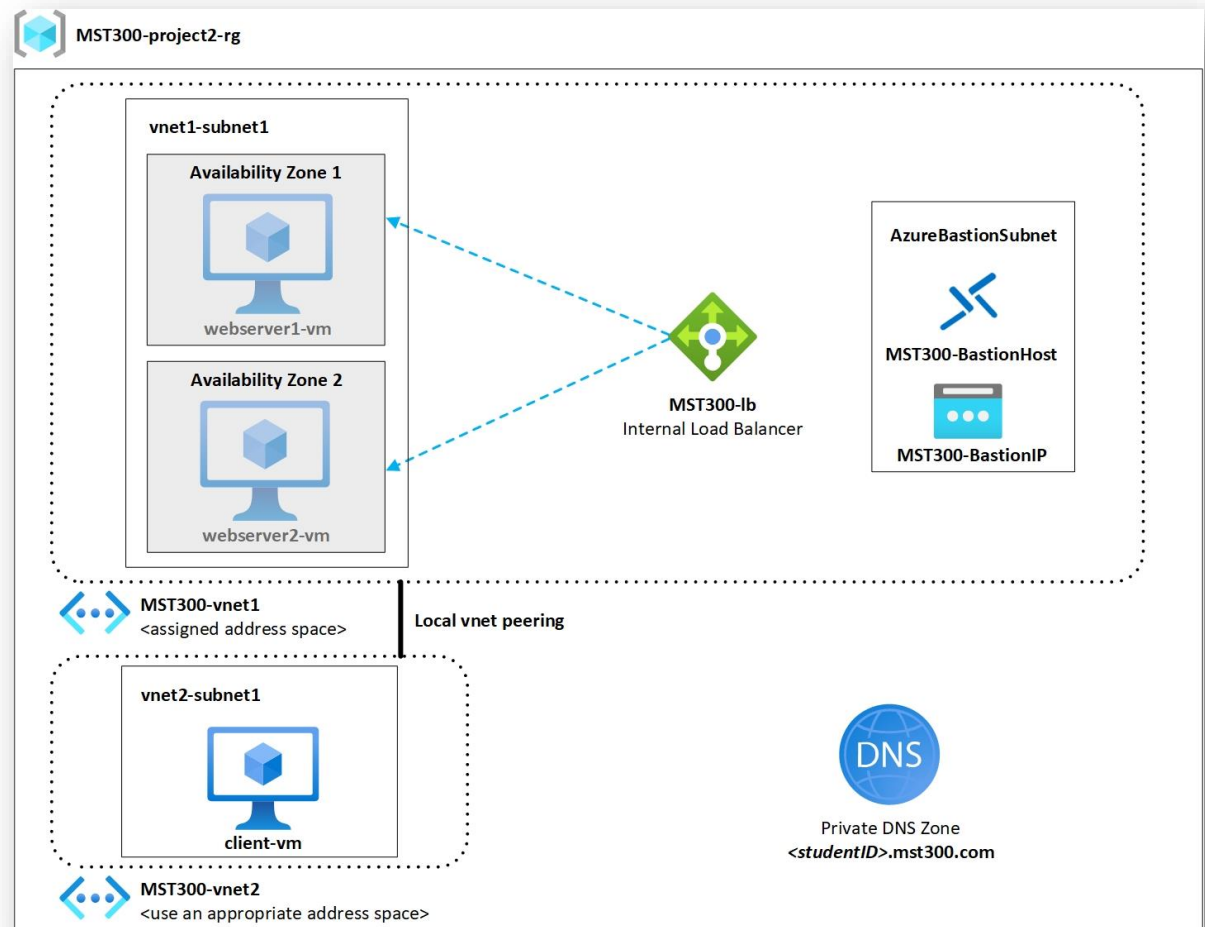
Resource Group Requirements

Create a resource group that will be the logical container that holds all our resources for this project.

Resource group name: **MST300-project2-rg**

Virtual Network Requirements

Create 2 virtual networks which will be used to connect our resources. A total of 3 subnets will be created [2 subnets in vnet1 and 1 subnet in vnet2].

Virtual Network 1

- Use your network address space assigned in Blackboard
- Name: **MST300-vnet1**
- Create 2 subnets within this Virtual Network
  - Subnet Name: **vnet1-subnet1**
  - Subnet Name: **AzureBastionSubnet**
- Assign an appropriate address using your network address

Virtual Network 2

- Name: **MST300-vnet2**
- Create 1 subnet within this Virtual Network
  - Subnet Name: **vnet2-subnet1**
- Assign an appropriate address for this virtual network
- *Note: Do not use overlapping network address spaces*

Configure Virtual Network Peering between virtual networks.

Basics	IP Addresses	Security	Tags	**Review + create**

Basics

Subscription	Microsoft Azure Sponsorship 2
Resource group	MST300-rg
Name	MST300-vnet1
Region	East US

IP addresses

Address space	10.0.0.0/16
Subnet	vnet1-subnet1 (10.0.0.0/24),AzureBastionSubnet (10.0.1.0/24)

Tags

None

Security

BastionHost	Disabled
DDoS protection plan	Basic
Firewall	Disabled

Load Balancer Requirements

Create a load balancer within virtual network 1 in vnet1-subnet1.

- Name: **MST300-lb**
- Type: **Internal**
- Virtual network: **MST300-vnet1**
- Subnet: **vnet1-subnet1**

Load Balancer – Backend Pool

- Name: **MST300-BackendPool**

Load Balancer – Health Probe

- Name: **MST300-HealthProbe**
- Protocol: **HTTP**
- Port: **80**
- Interval: **15**
- Unhealthy threshold: **3**

Project details

Subscription *	Azure for Students
Resource group *	MST300-rg

Create new

Instance details

Name *	MST300-lb
Region *	(US) East US
Type * ⓘ	● Internal ○ Public
SKU * ⓘ	● Standard ○ Basic

ⓘ Microsoft recommends Standard SKU load balancer for production workloads.
Learn more about pricing differences between Standard and Basic SKU ⧉

Tier	● Regional ○ Global

Configure virtual network.

Virtual network * ⓘ	MST300-vnet1
Subnet *	vnet1-subnet1 (10.0.0.0/24)

Manage subnet configuration

IP address assignment *	○ Static ● Dynamic
Availability zone * ⓘ	Zone-redundant

Load Balancer – Load Balancer Rule

- Name: **MST300-HTTPRule**
- Protocol: **TCP**
- Port: **80**
- Idle timeout (minutes): **15**
- TCP reset: **Enabled**

Name *
MST300-HTTPRule

IP Version *
◉ IPv4 ○ IPv6

Frontend IP address * ⓘ
10.0.0.4 (LoadBalancerFrontEnd)

☐ HA Ports ⓘ

Protocol
◉ TCP ○ UDP

Port *
80

Backend port * ⓘ
80

Backend pool ⓘ
MST300-BackendPool

Health probe ⓘ
MST300-HealthProbe (HTTP:80)

Session persistence ⓘ
None

Idle timeout (minutes) * ⓘ
15

TCP reset
○ Disabled ◉ Enabled

Floating IP ⓘ
Disabled | Enabled

Azure Bastion Requirements

To access our virtual machines, we will use the Azure Bastion PaaS service. This service allows us to connect to our virtual machines through SSL. By using this service, we do not need a public IP address for our virtual machines.

- Name: **MST300-BastionHost**
- Region: **Use the same region as your vnets**
- Virtual network: **MST300-vnet1**
- Subnet: **AzureBastionSubnet**
- Public IP address name: **MST300-BastionIP**

Project details

Subscription *	Azure for Students
Resource group *	MST300-rg
	Create new

Instance details

Name *	MST300-BastionHost ✓
Region *	East US

Configure virtual networks

Virtual network * ⓘ	MST300-vnet1
	Create new
Subnet *	AzureBastionSubnet (10.0.1.0/24)
	Manage subnet configuration

Public IP address

Public IP address * ⓘ	◉ Create new ○ Use existing
Public IP address name *	MST300-BastionIP ✓
Public IP address SKU	**Standard**
Assignment	○ Dynamic ◉ Static

Webserver Requirements

Create 2 virtual machines which will be running IIS roles on both servers. Each server will be hosted on different availability zones. The default pages will be modified to include the name of the servers.

Webserver 1

- Name: **webserver1-vm**
- Availability zone: **1**
- Image: **Windows Server 2019 Datacenter – Gen1**
- Size: **Standard_B1s**
- Virtual network: **MST300-vnet1**
- Subnet: **vnet1-subnet1**
- Public IP: **None**
- Place this webserver in the load balancer created earlier

Webserver 2

- Name: **webserver2-vm**
- Availability zone: **2**
- Image: **Windows Server 2019 Datacenter – Gen1**
- Size: **Standard_B1s**
- Virtual network: **MST300-vnet1**
- Subnet: **vnet1-subnet1**
- Public IP: **None**
- Place this webserver in the load balancer created earlier

Basics

Subscription	Azure for Students
Resource group	MST300-rg
Virtual machine name	webserver1-vm
Region	East US
Availability options	Availability zone
Availability zone	1
Image	Windows Server 2019 Datacenter - Gen1
Size	Standard B1s (1 vcpu, 1 GiB memory)
Username	azureuser
Public inbound ports	RDP
Already have a Windows license?	No
Azure Spot	No

Disks

OS disk type	Premium SSD LRS
Use managed disks	Yes
Use ephemeral OS disk	No

Networking

|	
Virtual network	(new) MST300-vnet1
Subnet	(new) vnet1-subnet1 (10.0.0.0/24)
Public IP	None
Accelerated networking	Off
Place this virtual machine behind an existing load balancing solution?	No

IIS on Webserver 1

- Webpage Title: **studentID's Windows Server**
- Body Text: **This webspage is hosted on webserver1-vm**
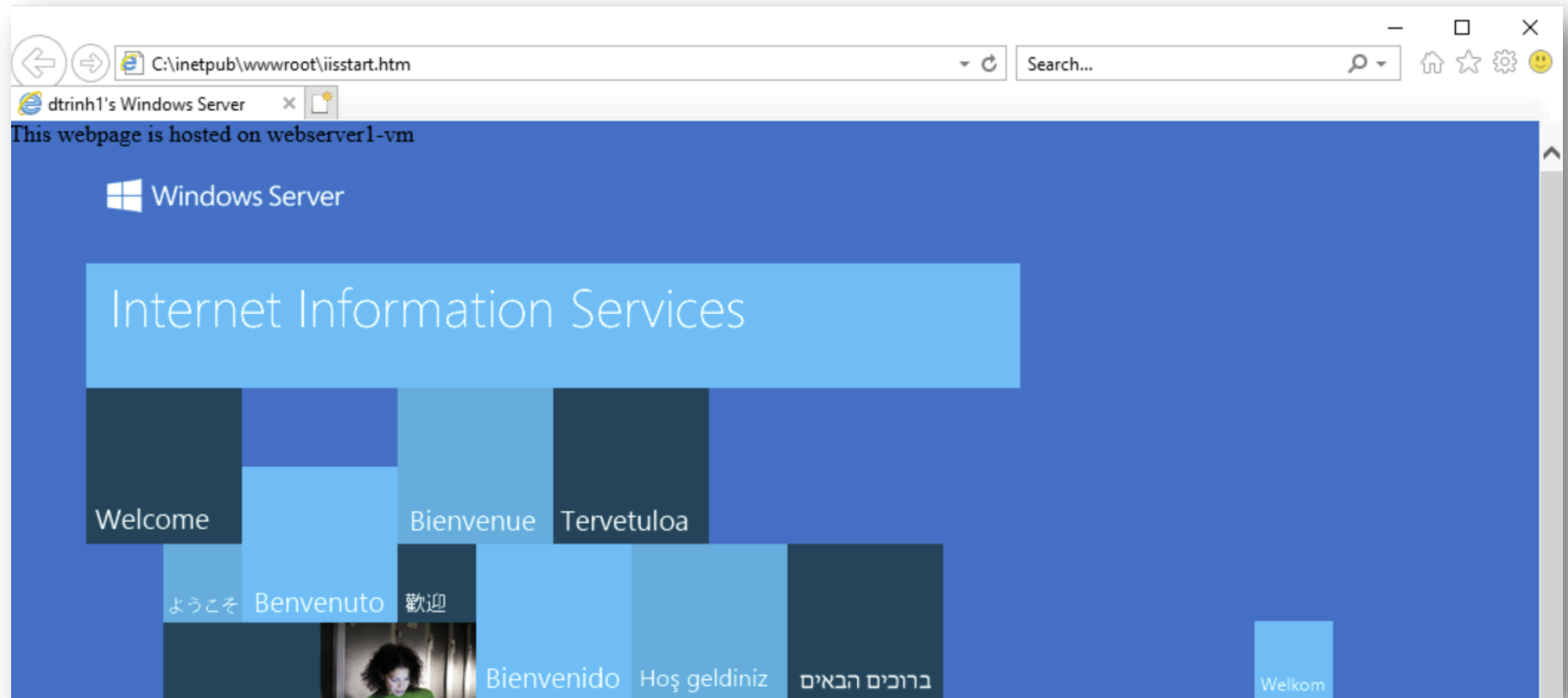
IIS on Webserver 2

- Webpage Title: **studentID's WebPage**
- Body Text: **This webspage is hosted on webserver2-vm**
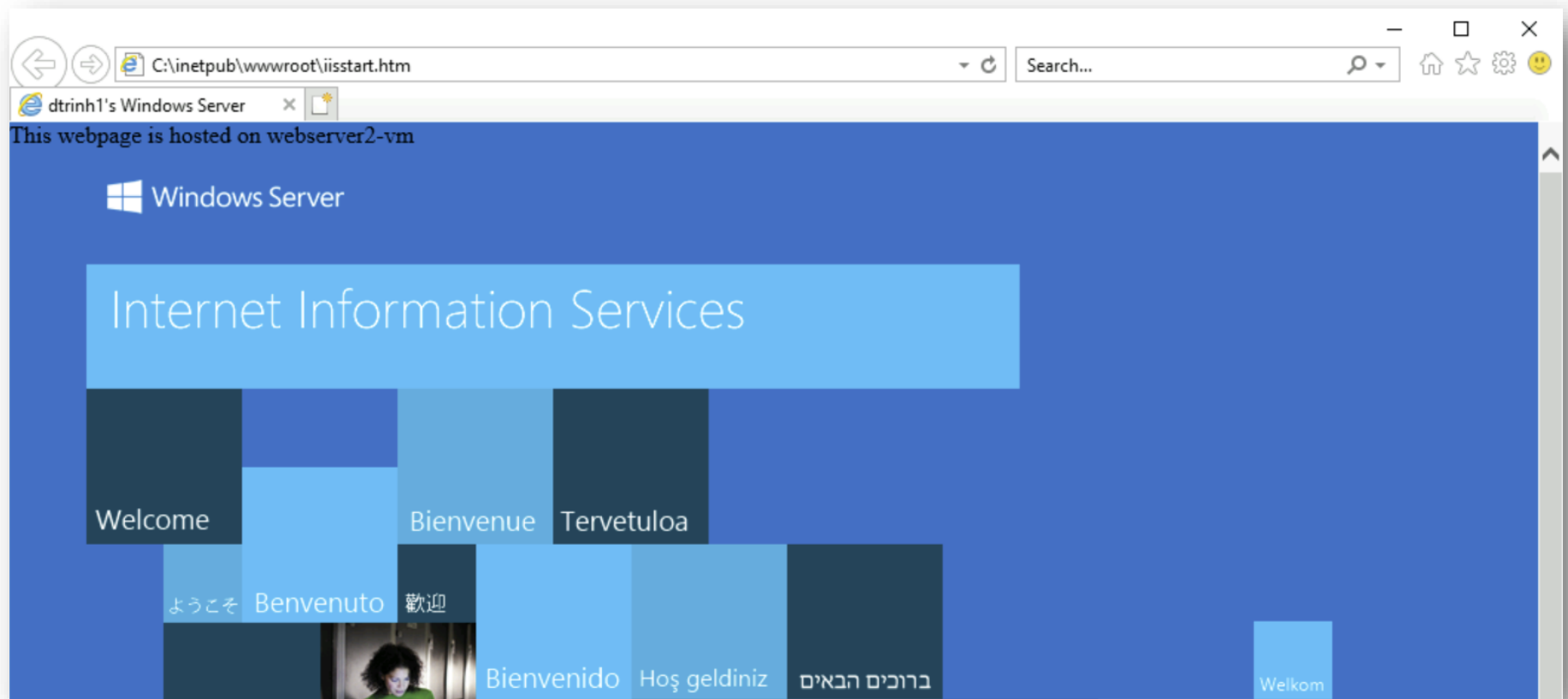
Client VM Requirements

Create 1 virtual machine which will be running Windows 10 operating system. This virtual machine will reside in a different virtual network than the webservers. We will need to configure virtual network peering in order for us to log into the virtual machine using our Bastion Host.

- Name: **client-vm**
- Image: **Windows 10 Pro, Version 20H2 – Gen1**
- Size: **Select an appropriate size based on the OS**
- Virtual network: **MST300-vnet2**
- Subnet: **vnet2-subnet1**
- Public IP: **None**

Remember to configure Virtual Network Peering between vnet1 and vnet2. This step is required for us to connect to the client VM using our Bastion Host.

Basics

Subscription	Azure for Students
Resource group	MST300-rg
Virtual machine name	client-vm
Region	East US
Availability options	No infrastructure redundancy required
Image	Windows 10 Pro, Version 20H2 - Gen1
Size	Standard B1ls (1 vcpu, 0.5 GiB memory)
Username	azureuser
Public inbound ports	RDP
Already have a Windows license?	Yes
License type	Windows Client
Azure Spot	No

Disks

OS disk type	Premium SSD LRS
Use managed disks	Yes
Use ephemeral OS disk	No

Networking

Virtual network	(new) MST300-vnet2
Subnet	(new) vnet2-subnet1 (10.1.0.0/24)
Public IP	None
Accelerated networking	Off
Place this virtual machine behind an existing load balancing solution?	No

Private DNS Zones Requirements

Create a private DNS zone which will be used when we access our website from our client VM. Configure the private DNS zone so that the client VM can connect to the webserver using its FQDN. Remember you may need to create an A record for the load balancer.

Project Rubric

The project will be graded on successful functionality of each of the following components:

1. **Azure Bastion [Yes / No]**
   - o Demonstrate connectivity to client-vm using Azure Bastion Host
2. **Azure Load Balancer [Yes / No]**
   - o Demonstrate load balancer configurations
   - o Demonstrate the client-vm's browser launching the load balancer
   - o Forced refresh of browser shows switching between webservers
3. **Webservers with modified default pages [Yes / No]**
   - o Default webpages modified
   - o Title modified to show studentID
   - o Body of default webpage displays name of webserver
4. **Virtual Network Peering [Yes / No]**
   - o Demonstrate the client-vm resides in a different vnet than the webservers
   - o Successful access of website from client-vm
5. **Azure Private DNS Zone [Yes / No]**
   - o Accessing website using FQDN on client-vm browser

Project Submission

1. The project submission will be in a video format uploaded to Microsoft Stream.
2. Use a screen capturing software to demonstrate the different project components as outlined in the project rubric.
3. Submit a link to your video demonstration in Blackboard.

Resources:

- Microsoft Stream: https://www.microsoft.com/en-us/microsoft-365/microsoft-stream
- Microsoft Stream screen capture: Create a screen recording from your desktop
- Video link: Obtain direct link to video
- Submission Example: Project Demonstration Sample