

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.

Azure for Students
Subscription

Search (Ctrl+/) << Upgrade Cancel subscription Rename Change directory Transfer billing ownership Feedback

To check your remaining credit, visit <https://www.microsoftazuresponsorships.com> →

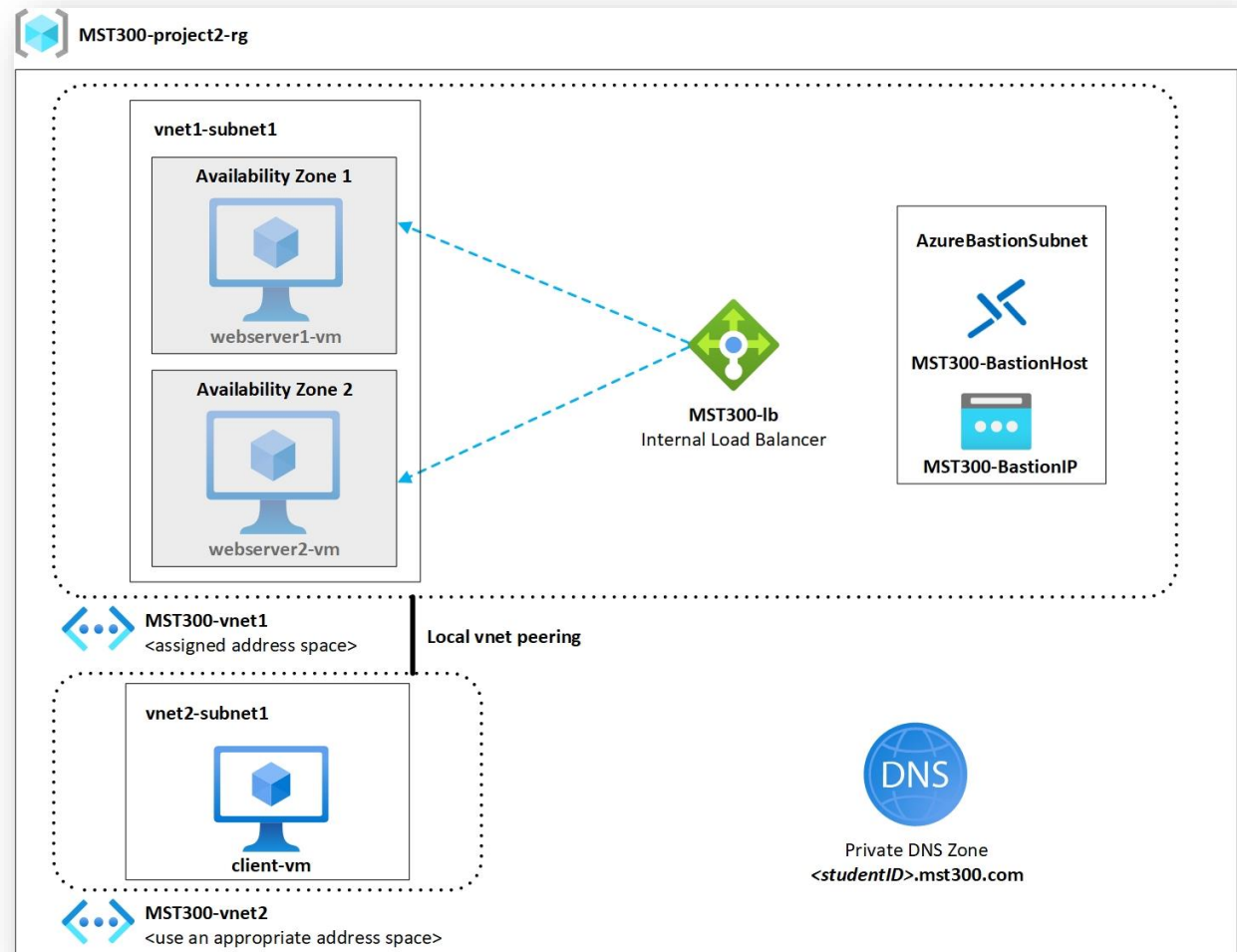
Essentials

Subscription ID		Subscription name	: Azure for Students
Directory	: Seneca (seneca.onmicrosoft.com)	Current billing period	: 9/13/2021-10/12/2021
My role	: Account admin	Currency	: CAD
Offer	: Azure for Students	Status	: Active
Offer ID	: MS-AZR-0170P	Secure score	: Not available

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

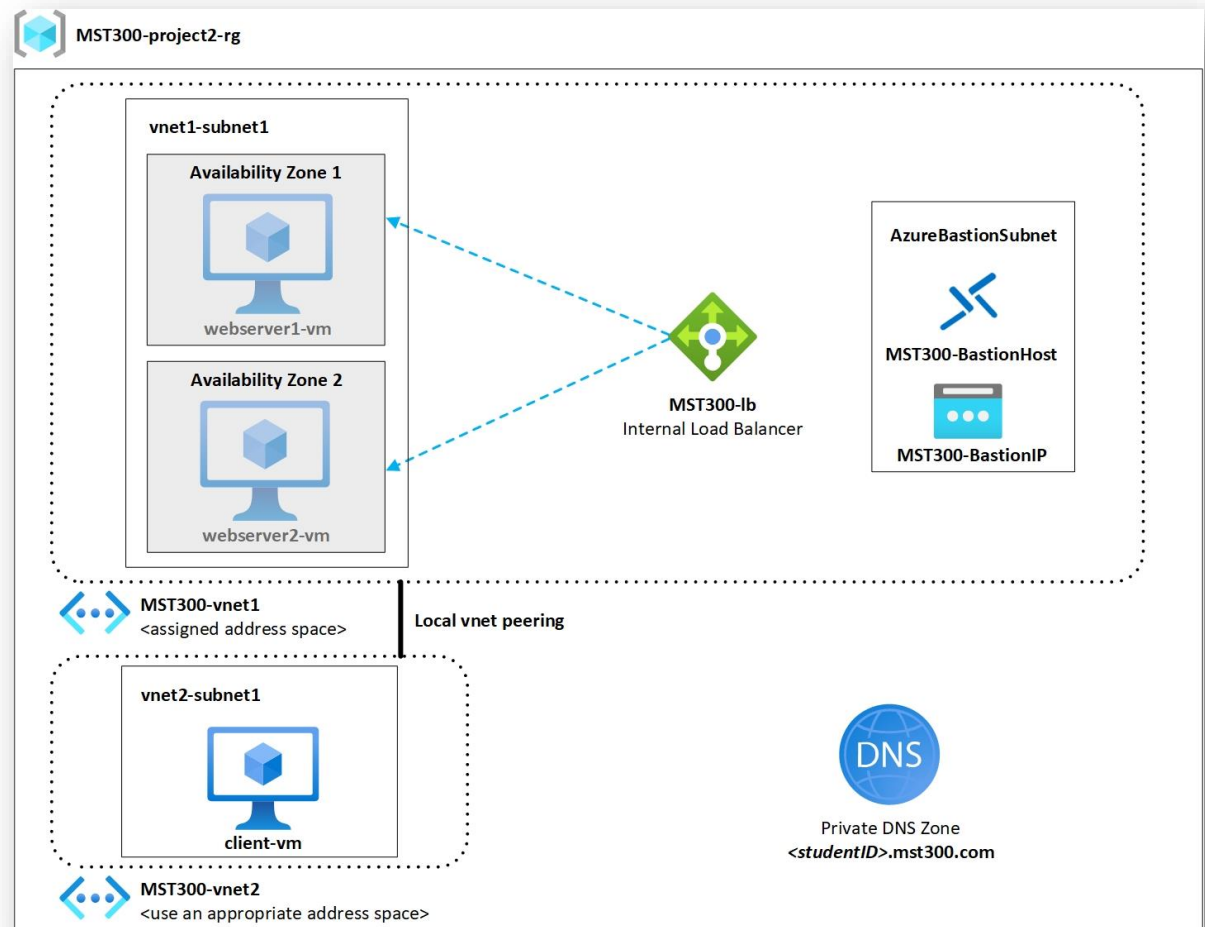
- Azure Bastion
 - [What is Azure Bastion?](#)
 - [Azure Bastion Tutorial](#)
- Azure Virtual Networks
 - [What is Azure Virtual Network?](#)
 - [Azure Virtual Network Tutorial](#)
- Azure Virtual Network Peering
 - [What is Azure Virtual Network Peering?](#)
 - [Azure Virtual Network Peering Tutorial](#)
- 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 webserver's virtual network. We will demonstrate on the client VM that both webserver 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**

Create a resource group

BasicsTagsReview + create

Resource group - A container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. [Learn more](#)

Project details

Subscription * ⓘAzure for Students ✓

Resource group * ⓘMST300-project2-rg ✓

Resource details

Region * ⓘ(US) East US ✓

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**

The screenshot shows the 'Project details' page for creating a new Load Balancer in the Azure portal. The page is divided into several sections with configuration options:

- Project details:**
 - Subscription ***: Azure for Students (dropdown)
 - Resource group ***: MST300-rg (dropdown) with a [Create new](#) link below it.
- Instance details:**
 - Name ***: MST300-lb (text input, green checkmark)
 - Region ***: (US) East US (dropdown)
 - Type ***: ☒ Internal, ☐ Public
 - SKU ***: ☒ Standard, ☐ Basic. Below this is a blue information box: "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 (dropdown)
 - Subnet ***: vnet1-subnet1 (10.0.0.0/24) (dropdown) with a [Manage subnet configuration](#) link below it.
 - IP address assignment ***: ☐ Static, ☒ Dynamic
 - Availability zone ***: Zone-redundant (dropdown)

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**

The screenshot displays the Azure Bastion creation wizard interface. It is organized into several sections: 'Project details', 'Instance details', 'Configure virtual networks', and 'Public IP address'. In the 'Project details' section, the 'Subscription' is set to 'Azure for Students' and the 'Resource group' is 'MST300-rg'. The 'Instance details' section shows the 'Name' as 'MST300-BastionHost' and the 'Region' as 'East US'. Under 'Configure virtual networks', the 'Virtual network' is 'MST300-vnet1' and the 'Subnet' is 'AzureBastionSubnet (10.0.1.0/24)'. The 'Public IP address' section has 'Create new' selected, with the 'Public IP address name' set to 'MST300-BastionIP', 'Public IP address SKU' as 'Standard', and 'Assignment' as 'Static'.

Project details	
Subscription *	Azure for Students
Resource group *	MST300-rg

Instance details	
Name *	MST300-BastionHost
Region *	East US

Configure virtual networks	
Virtual network * ⓘ	MST300-vnet1
Subnet *	AzureBastionSubnet (10.0.1.0/24)

Public IP address	
Public IP address * ⓘ	<input checked="" type="radio"/> Create new <input type="radio"/> Use existing
Public IP address name *	MST300-BastionIP
Public IP address SKU	Standard
Assignment	<input type="radio"/> Dynamic <input checked="" type="radio"/> 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

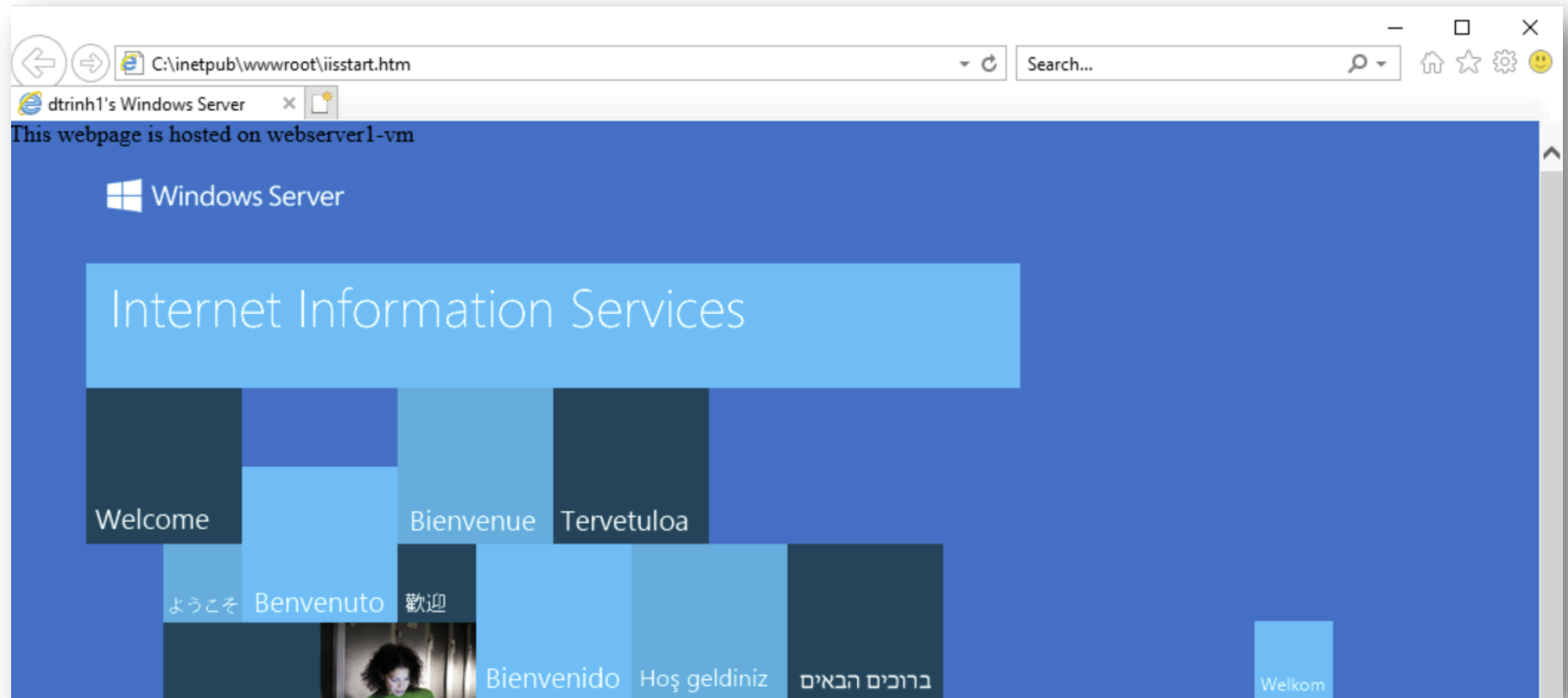
Webserver 2

- 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

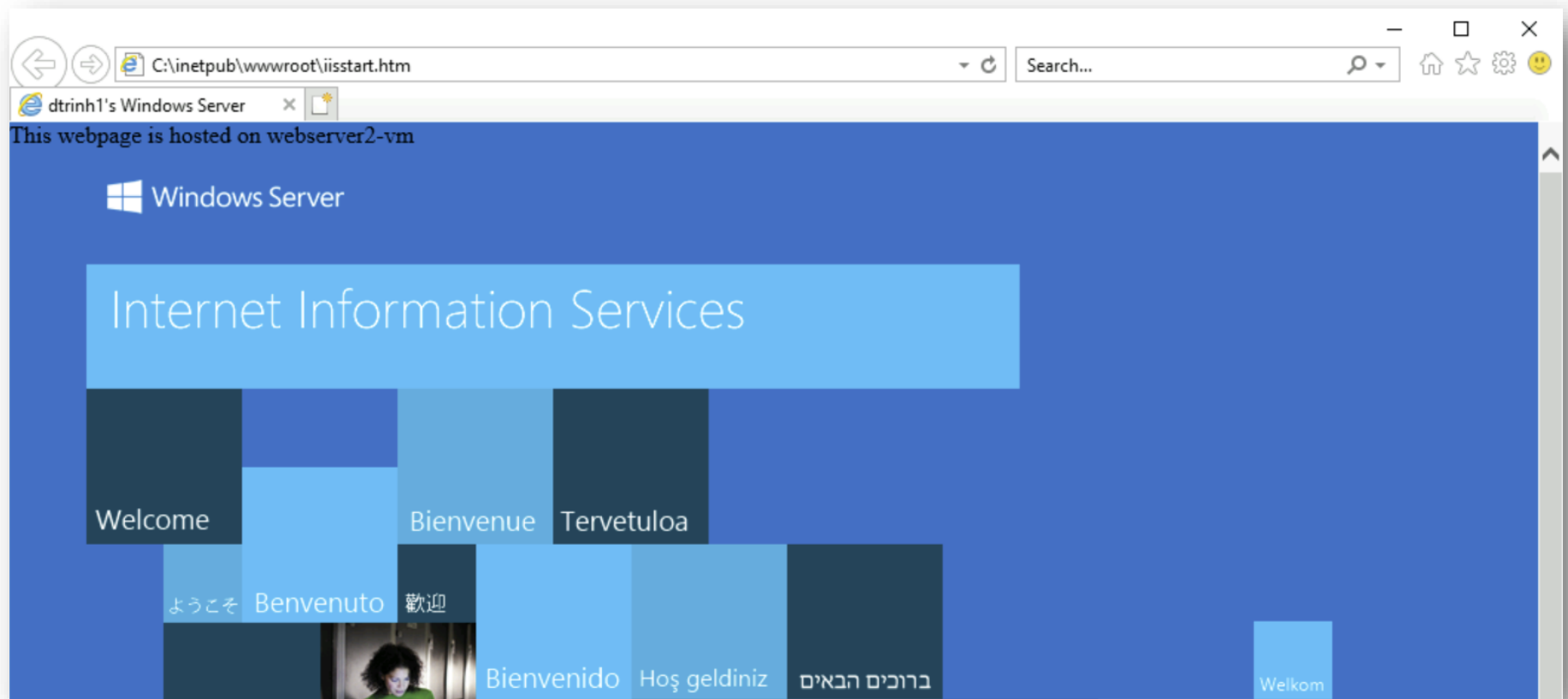
IIS on Webserver 1

- Webpage Title: **studentID's Windows Server**
- Body Text: **This webpage is hosted on webserver1-vm**



IIS on Webserver 2

- Webpage Title: **studentID's WebPage**
- Body Text: **This webpage 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 webserver. 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.

Basics Tags Review + create

A Private DNS zone provides name resolution services within virtual networks. A Private DNS zone is accessible only from the virtual networks that it is linked to and can't be accessed over internet. For example you can create a Private DNS zone named contoso.com and then create DNS records like www.contoso.com in this zone. You can then link the zone to a one or more virtual networks. [Learn more.](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

Azure for Students

Resource group *

MST300-rg

[Create new](#)

Instance details

Name * ⓘ

studentID.mst300.com

Resource group location ⓘ

East US

Project Rubric

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

1. Azure Bastion [Yes / No]

- Demonstrate connectivity to client-vm using Azure Bastion Host

2. Azure Load Balancer [Yes / No]

- Demonstrate load balancer configurations
- Demonstrate the client-vm's browser launching the load balancer
- Forced refresh of browser shows switching between webserver

3. Webserver with modified default pages [Yes / No]

- Default webpages modified
- Title modified to show studentID
- Body of default webpage displays name of webserver

4. Virtual Network Peering [Yes / No]

- Demonstrate the client-vm resides in a different vnet than the webserver
- Successful access of website from client-vm

5. Azure Private DNS Zone [Yes / No]

- 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](#)