**Raziana(Rozi) Beidi**

**Cloud Computing**

**Section 031- SP 2022**

**Professor Bell**

**Azure Project**



**Architecture Diagram**



Icon

Description automatically generated with medium confidence A blue container with white text

Description automatically generated with low confidence

Icon

Description automatically generatedfront pool ip A picture containing text, clipart

Description automatically generated Icon

Description automatically generated Backend pool

Icon

Description automatically generated with medium confidence A blue container with white text

Description automatically generated with low confidence

Icon

Description automatically generated  

.

Tier 2 • Any Monitor, Costing, or Alarm services

Tier 1 Typical - these are ones that most of you will use • Virtual machines • Databases • Storage • Identity

**Introduction:**

Azure is Microsoft’s cloud services platform with a wide range of resources building and running solutions in Azure. The best thing of cloud computing or Azure I don’t have the hardware to ship, install, configure. With the software version I can install while I am writing the code. Most of advantage of azure pay as you use and cost effective. Before I begin this project I was frighten and do not know where to begin and end. Because I haven’t much experience of cloud service and IT. After a lot thinking I came up with my idea and dream to open small tradition food restaurant. Since I am good on cooking of Ethiopian, Eritrean and some middle east food. I also enjoy cooking. A lot of my friend, my husband and my kids suggest me to open restaurant because they like my food most of the time. I also have some security background with previous courses I took in UML. I would like to concern on security of environments because with development technology there are a lot company lose their business with attack of cybersecurity. Security is a big and hot issue worldwide on network infrastructure that affect the business and customer trust.

**Overview:**

My main concern on this project to open restaurant and name my little restaurant called Habesha Restaurant. The restaurant is small business it might be doing everything by itself could be expensive, not flexible and competitive. I came up with idea to use some of Azure service and focus myself on application and customer. To use the azure service I will create a Resource Group, Virtual Machine, Network resource, storage, availability set, redundancy. I will use azure portal web browser for creating and managing resource because I am more comfortable with it. I am trying to use the reasonable performance and cost effective service since it is a new business. May be in the future if my business grows and expand, I will use best performance.

**1.Creating Resource Group:**

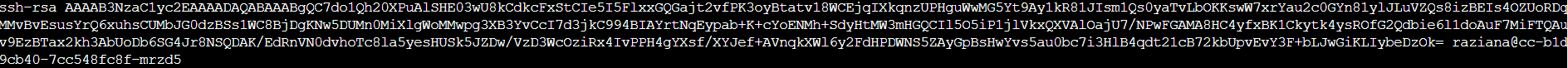
I will create resource group to organize and mange my Azure portal resource as I go forward. I named my resource group HabeshaRestaurant. The VM resource group different with the network resource group since the role are separated and managed by different expert.

**2.Creating an SSH key pair for authentication:**

For my Ubuntu Linux VMI and VM2will create SSH key pair for authentication from CLI. I will use SSH protocol that I can used to communicate securely with remote computers and to log in to Linux VMs. Also, it is more secure than password. I will open Azure portal with link <https://portal.azure.com>. Or <https://shell.azure.com>. to open Cloud Shell and create the ssh key. The public key below I will use that public key to create a VM later. Below is snapshoot of ssh key and public key.

Text

Description automatically generated



**3.Networking Resource:**

The network is central to how everything communicates. VM needs network connectivity if I want my customer to reach my applications. Azure Networking is one of the core services in azure application. Azure has powerful network features to secure and route my traffic on truly global scale. For my restaurant I build my network with Azure I will not worry about the route and IP address. I will focus on my application and customer. My restaurants and online order and payment transaction will securely transmit the customer data and process payment transactions. Before I created my VM, now I will create network resource like Virtual networks and subnets, Virtual network interface cards, public IP addresses, DNS name and Load Balancer and Network security groups and rules.

If I do not have IP address and DNS name and associate them no one can’t access my resource. So I created public ip address and DNS name for my Habesha restaurant. Then I will assign them with network interface. Below are snapshoot of vnet, Nic 1 and Nic2 that I created for my Habesha restaurant.

**3.1 Virtual networks and subnets:**

Text

Description automatically generated with medium confidence

**3.2 Virtual network interface cards:**

Now I did create two interface cards as we see below screenshot.

Graphical user interface, text, application, email

Description automatically generated

**Graphical user interface, text, application

Description automatically generated**

I open the public address then click associate icon then from drop down menu I choose the network interface car and choose the NIC that I want to associated. Below snapshoot that it shows associated public address with NIC

**3.3 Network Security Group:**

If my VM connect with internet without of security rule or firewall that led me to be attack by cyberattacks. In Azure, firewall and traffic rules are provided by network security groups.MY customer to allow access my web server over the internet, I need to create a rule in the network security group that allows web traffic. The rules define what traffic can flow in and out of my VM. To protect my VM, network security group have to associate with subnet. For my Habesha restaurant I created NSG named VM2nsg and added which traffic to allow which traffic to deny.

Graphical user interface, application

Description automatically generated

**Load balancer Components:**

Load balancer is examining and distributes traffic across all my VMs. I use azure portal service with standard load balancer that provides low latency and high availability by default. Load balancers have components that work together like frontend IP pool that attached with public ip address and backend ip pool that attaches with the VMs. For my restaurant first I create public ip and then I create load balancer with frontend and backend.

Screenshoot of public-ip

Text

Description automatically generated

Text

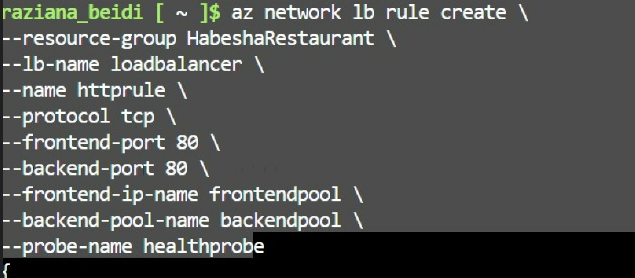
Description automatically generated

The frontend allow access from internet and attached to public address. Backend is attached with VMs that run my application. Below Screenshot of frontend-ip and backend pool assigned public address for my restaurant.

****

**Health prope**

load balancer health prob monitors the status of the VMs that have issue. since my restaurant is small restaurant I don’t have expert keep coming and checking my website that is accessed by customer. So I need to use the service of Azure for my business continuity or check my website accessed or not. below is screenshot of health prope I created.

****

I also create virtual network resources before I can connect a VM for the backend load balncer.i create first virtual network and subnet.

**4.Creating a Virtual Machines:**

Virtualization is logically dividing physical resources in a server into virtual resources that can be securely accessed by individual workloads. It contains virtual CPU, memory (RAM), storage ( DISK) and network connectivity (NIC). Before I deploy my application in Azure, I have to consider close region of datacenter to my customer and the size of VM. I create virtual machine for my little Habesha Restaurant. I create tow Ubuntu Linux VM from azure portal. I named them VM1 and VM2. I connect ubuntu Linux with SSH that is created earlier. I choose to connect the basic two NIC for Linux VMs . automatically generated standard public id address for the first VM and left empty the second one. I left most of it default and update for further. Please see below snapshoot of the two Linux VM created.

Availability set:

An [availability set](https://learn.microsoft.com/en-us/azure/virtual-machines/availability-set-overview) is a logical grouping of VMs that allows Azure to understand how my application is built to provide for redundancy and availability. I set VM1 and VM2 on availability set.

Graphical user interface, text, application, email

Description automatically generated

Graphical user interface, text, application, email

Description automatically generated

Below snapshoot indicated the Network interface card attached with my vm1

The second VM2 also attached with network interface card as you see below snapshoot

The first vm has public ip address but the second VM2 I go to networking and ip configuration and associate by giving new public ip address. Below is snapshoot of my VM2 with public ip address.

**I**

**Auto-shutdown:**

When VMs running it incur the cost. So, when I created the VMs I add the auto shutdown on my VM because I will not be using the business after 9:00pm.

**Install a web server,**

The Habesha restaurant provide service in the restaurant, accept order, and deliver the order to its customers. For expanding my operation to online order, I need website. Once the VM running I begin to install and configure the web server. I will create web browser, created VM that will be login and install my website and open the port and then customers can access my website. For login in for my Linux VM, the Connect button SSH connection and I will insert earlier created the public IP address of my VM and select port. With a Linux VMs, I will past SSH command in cloud shell that includes my name and public IP address. For my restaurant once created VM and connect SSH, I install LAMP web stack on VM2. I insert below command on Cloud Shell. But when I try with my second VM called VM1 refuse the ip address.



Below are to open the port for specific vm1



Below Is snapshoot of my VMs.

**Azure Web Apps:**

One of the main use of Azure VM is to run our application. With azure I can upload my web application and other management task can be taken care of by Azure. I can focus on my web application improvement and focus on customer.to build my web apps I can use different programming languages and version .For my little Habesha restaurant since it is start up business or on development environment I choose SKU standard that add daily backup, automatic scale of web app instance, allow my route user with traffic manager and deployment slots. When my restaurant demand increase, I may change to premium one. First, I create the basic web app and see the default site in my browser. Then, I use a sample web page from GitHub and push that to Azure. I created from Azure portal Habesha restaurant web in the region of East US with SKU standard that is free and save some money and window operating system as you see below screenshot of Habesha web app.

Graphical user interface, text, application, email

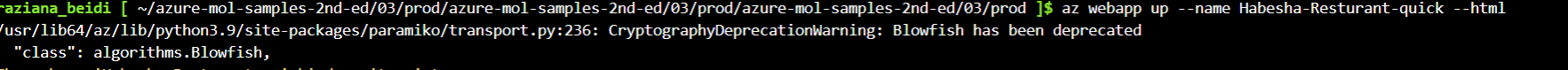
Description automatically generated

After I created web app if I select and above habeshafood URL of my web app and past it in new browser window gave me default web app page load. GitHub is a cloud-based service that lets me share and contribute code with the rest of the world.

So, I need HTML sample site from GitHub. I use cloud shell in azure portal to get copy sample HTML page from GitHub and push it to my web app. From Git hub code I copy and paste this <https://github.com/YaninaTrekhleb/restaurant-website> to cloud shell. local copy of the static HTML sample site and then push the files to Azure web app. Since the above HTML site already there, the code is deployed and created web app in azure. Let us assume that we are already the folder deploy we haven’t deploy any resource yet let us deploy azure webapp with different name. I did insert below command on cloud shell:

Az webapp up –name Habesha-Resturant-quick –html

Immidatly the az webapp doesn’t recognize name habesha resturant doesn’t exist and try to create resource group for it and app service plan for it.it upload the ziploge on it as created below screenshot



Background pattern

Description automatically generated with low confidence

Graphical user interface, text, application, email

Description automatically generated

Azure storage

Azure storage is storing multiple copy of data in case of outage, disaster and hardware failure. Storage support highly availability and redundancy service. How well the application is design and written without support of infrastructure of storage and network will be useless. Before I choose storage, I have to know Habesha restaurant what type of storage require for my business. For example, if my business is production, I might select premium SSD disks. Before I choose my storage, I should consider low cost and high availability storage disk. Since my Habesha restaurant start up business, I have to choose cost effect storage. for development and consistence performance I selected standard storage. For my little restaurant I also choose azure blob service because it is unstructured data such as media files, documents and applications can store data in blob storage, such as images. My app should show the availability of food, variety, price and my website needs attractive images to show customers what type of food I am offering that is why I need blob service. And also the storage store customers views and good and bad comments. For my storage availability and redundancy, I also include Local redundancy storage LRs that will duplicate my data three times in a data center incase of one hardware failure the other still continue performing.

Graphical user interface, text, application, email

Description automatically generated

Backup Service:

In case of disaste I need to back up my data so I creat back up with my workload run on Azure and to do with virtual machine. I choose standard backa up and set drefult policy then click enable backup VMs

And to connect the VM install the web-server components, open SSH on port 22.

. I will chose Standard SSD disks storage as a start up business I may upgrade to premium SSD when as business need. the I configure my VM across region to prevent hardware failure and maintenance update. Below is snapshoot of VMs.

To get started with the basics needed for this chapter, a virtual network in Azure is made up of the same core features as a regular physical network:

¡ An address space and a subnet mask, such as 10.0.0.0/16 ¡

One or more subnets, which you can use to divide external, database, or application traffic, for example ¡

Virtual network interface cards (NICs) that connect VMs to a given subnet ¡

Virtual IP addresses that are assigned to resources such as a virtual NIC or load balance

Creating a Load Balancer:

Creating a Virtual Network:

IP address: a public IP address. This public IP address is assigned to the virtual NIC and allows external traffic to reach your VM. Then you can control the flow of traffic to your VM with NSGs (network security groups).

Enter a unique DNS name. This name forms the fully qualified domain name (FQDN) for your resource that’s based on the Azure region you create it in. If you create a DNS name called azuremol in the East US region, for example, the FQDN becomes azuremol.eastus.cloudapp.azure.com.

For production use, you’ll ideally run your application on multiple VMs with a load balancer in front of them. In that scenario, the public IP address is assigned to the load balancer and typically creates a static assignment at that point.

built-in software firewall, and every (competent) on-premises network I’ve seen has a network firewall between the internet and the internal network. In Azure, firewall and traffic rules are provided by network security groups

Backups and Recovery

**Cleaning up resources:**

In Azure whatever resources I had created will be charged. The billigng will be chargerd for the running VMs . Whenever we done or not anymore use the resource I have to delete or Deallocate the resource.

Tier 2 • Any Monitor, Costing, or Alarm services

**Monitoring and Alerts**

On business one of the most concern is monitoring the business and alerts. In Azure environment we need to be conscious the billing that incurred and set alert. At the beginning may be difficult to estimate the budget but for further by setting billing alert and notification can help us our budget and accommodate.

Billing Alerts:

The main idea of billing alarm I want to aware of my little Habesha restaurant spending. Billing alarm is to know the budget or monthly payment in azure at the beginning may be difficult to know the budget, but I can estimate. I set the budget of $100 once I consumed 80% of that budget I will received the billing alarm notification. In the Azure portal I select “Cost Management + Billing”, then “Cost Alerts”. I select “Budget”, then “Add ” then I update the name, I set the amount of credit is $100, resets monthly and year. Then on alert icon I update the amount of alert and email where to receive the notification then press create.it shows as below screenshot. Graphical user interface, text, application, email

Description automatically generated

Graphical user interface, text, application, email

Description automatically generated

Monitoring:

In azure have many future to monitoring and troubleshooting for diagnostic for VM, monitor performance metrics and troubleshooting connectivity issues. In azure to check if VM is running well azure provide future to create VM with enable boot diagnostics. Boot diagnostic that VM status are displayed the health and boot status. If errors are display, I should be able to troubleshoot and diagnose the root cause. The setup of troubleshooting performance For Habesha restaurant I will review that how much memory is available, how much CPU is consumed and how much disk activity is there.I will check the logon and create alert.

virtual machine Alerts :

monitoring Virtual Machine health and diagnostic are the main part of Azure service future. I create alerts for Performance condition for my resource and threshold to set for the CPU usage and memory.

As we see below snapshoot I set monitor and alert for VM1. I create the rule of resource of monitoring and alert for CPU and memory.

Graphical user interface, application

Description automatically generated

Graphical user interface, text, application, email

Description automatically generated

Monitoring Log:

Azure services have a future to assess whether a resource is healthy such as virtual machines, web application and databased. If the resource is unhealthy, health analyzer gather the information to identify the source of problem and report the problem. I did create monitoring log resource for VM1. I went to monitoring log and run my VM1 there is no result found from last 24 hours. Also, I can create new alert rule on the right of the portal and update the template. Please see below screenshot of monitoring log for my VM1.

Graphical user interface, application

Description automatically generated

Lesson learn or conclusion

I learn variety of Azure resource and future of them. It is interesting and little challenge doing the lab. I have learned a lot through the challenges. Azure offer from creating variety of resource from virtual network resource until virtual machine. And it offer service of installing and configuring server, deploying storage, backup, billing alarm, monitoring and troubleshooting future. Each of the resource and future depend on the business used and important. The most interesting things I will know and notifed the budget of my business spending. I have to choose some of resources based on my budget and cost effective resources for business. Once in development stage I can constratin my budget. when my business grow I can expand and increase the resource. Azure is cost effective, flexible and scalable cloud computing for my restaurant.

Reference:

<https://learn.microsoft.com/en-us/azure/virtual-network/ip-services/associate-public-ip-address-vm>

<https://learn.microsoft.com/en-us/azure/backup/backup-create-recovery-services-vault#modifying-default-settings>

<https://www.youtube.com/watch?v=0QO2jdinCoQ>

<https://www.youtube.com/watch?v=UCeYq6nMuiE>

can I talk to you at the end privately?