**CMIT 495 Current Trends and Projects in Computer Networks and Security**

*Week 2 – Cloud Computing*

1. **Log in to your newly created AWS account and take a screenshot of the AWS Management Console (Dashboard) and paste it below question 1. The screenshot should include the username you created during the setup phase.**

**Graphical user interface, application

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1. **Launch a Windows Virtual Machine (VM). Provide a detailed overview of the steps required to install the Microsoft Windows operating system (OS) on the VM. The steps may be listed in the form of bullet points or a summary with complete sentences. Use as much space as required. Finally, take a screenshot of the desktop and paste it with your response below this question.**

* In the top right corner of the AWS dashboard, select **Services**.
* In Services, select Compute and from the subsequent pallet, select **EC2**
* From the EC2 dashboard, select **Launch Instance**
* From the EC2 instance tab, type in the name you would like to give your server.
* For this project, I will name this **Windows\_VM**
* In the **Application and OS Images** section, select Windows but ensure it is the free tier Microsoft Windows Server 2022 Base.
* Leave the Instance Type pane to default free t2 micro selection.
* Create Key pair. This will be important for remoting into the AWS console while using the Window or Linux machine. For this assignment, I will utilize the **Virtualization.pem** key pair.
* In the Network Setting tab, select a Security group. For this assignment, I will utilize the security group I created for an earlier assignment.
* Select Launch Instance.
* To view the new EC2 instance created, select **View all Instances.**

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* Select the Instance you would like to remotely connect to. On the Instance dashboard, in the top right, select **Connect**.
* In the next prompt, select “RDP Client” and “**Get Windows password**.”
* Select “**Upload private key file**” and browse to your downloaded .pem file
* Select “**Decrypt Password**.”

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* After decrypting the password, copy the result and save it on your computer.
* Download the remote desktop file from the AWS pane.

Graphical user interface, application, Teams

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* In your computer downloads, double click on the Window Instance rdp file and wait for it to load.
* In the prompt, type in or paste in the password that was downloaded earlier.
* In the security prompt, select “**Don’t ask this question when logging into this computer**” and select “**Yes**.”

Graphical user interface

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A screenshot of a computer

Description automatically generated with medium confidence

1. **Using what you learned from Project 1, provision and launch a new AWS EC2 Ubuntu Linux Server and connect to it via the SSH protocol. Note any challenges or opportunities associated with this provisioning.**

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For this assignment, I did not face any challenges since I had already gone through these steps for assignment one. I already had a key pair on my computer, and I knew the command for connecting to my Ubuntu server.

1. **Using AWS, *create a network file system* with Amazon Elastic File Systems (EFS) and attach it to the running Ubuntu Server instance. You may use the** [**AWS**](https://docs.aws.amazon.com/efs/latest/ug/how-it-works.html) ***web page* for step-by-step instructions and understand how the EFS works. Take a screenshot of the result and embed it below. Specifically, take a screenshot to verify *that your file system has been successfully mounted*, along with the results from *creating a test file in your new file system. This will be done by running a simple dd command to generate a 1GiB file in your new directory.* Finally, describe the value of a network file system.**

* Services
* Storage
* Create file system. Ensure that the file system is in the same security group as the Ubuntu server.

Graphical user interface, application

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* In the file system window, select **Attach**
* In the attach window, copy the NFS client command and paste it in notepad.
* In your Ubuntu server command line pallet, create a new directory. I created the **newdir1** directory.
* Copy the NFS client command you copied earlier and paste it in the command line
* Verify that the new directory has been mounted by using the ls or df khP command.

Text

Description automatically generated

* Create a file in the newly mounted file system.
* Utilize the dd command to generate a 1 GiB file in the new folder.

A picture containing text

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Text

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A network file system (NFS) allows data to be stored and retrieved from multiple disks and directories across a shared network. It also allows local users to access remote data and files in the same way that they do local data and files. This type of file systems is typically used in computing environments where centralized data and resource management is critical. It is the most used in IP-based networks due to its ability to deliver data via both TCP and UDP protocols.

1. **Using the AWS platform, create an S3 bucket and upload any file to the S3 bucket. Take a screenshot showing the file was uploaded to the S3 bucket and paste it below. If necessary, use the AWS webpage above for step-by-step instructions.**

* In Services, select Storage/S3 bucket.
* In the next window, choose a bucket name. Ensure there are no caps letters in the bucket name.
* Select Create bucket.
* Open the newly created bucket. In the top right, select “Upload” to upload a file.
* In the Upload window, you can choose to drag and drop, or utils the Add files tab to import new file.
* Browse the folders you would like to upload and select the orange “Upload” button.

Graphical user interface, text, application, email

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1. **The CTO will be reviewing this document. You have shown how easy it is to provision a Microsoft OS using the AWS platform. The CTO chose AWS because it offered a free account. She will now expect a recommendation from you on what cloud service to use for the organization’s PaaS (e.g., the infrastructure, OS, runtime, etc.) needs. There is no need for a private cloud, so the public option will work just fine. Describe the difference between the Google Cloud platform, Amazon AWS platform, and Microsoft Azure platform. Provide a recommendation for the CTO as to which service provider you would recommend and why. Be explicit and detailed in your recommendation.**

There are several attributes every company should look at before deciding which cloud service provider should be awarded a contract to provide them with virtualization services. Such attributes availability, overhead cost, service cost, client support services among others. With 77 availability zones available in 24 geographical regions, Amazon Web Services is a cloud market according to (allcode, 2023). The perks of choosing AWS include but not limited to; 24/7 hour support, a 12 month training for employees on how to utilize and optimize AWS services, ability to support large enterprises in the areas of data, applications among others.

Microsoft Azure on the other hand is a cloud computing service from Microsoft. While it is new compared to AWS, it offers over 200 cloud computing applications and solutions in the areas of healthcare, financial services, retail, manufacturing, and government offices (Microsoft, n.d). Some of the advantages of using Azure is that since most enterprises use Microsoft word, data, and email tools, using Azure makes software and tool integration easy.

Closely behind AWS and Azure is the Google Cloud Platform (GCP). The cloud computing services offered are like the first two but the major different is that GCP provides services at a faster rate than both AWS offering bandwidth speeds of up 32Gbps compared to AWS’ and Azure’s 25Gbps and 8Gbps respectively.

In summary, I would recommend to the CTO that AWS is in a great position to provide the organization with the best Platform-as-a-service solutions due to its tiered services and the ability to save by pulling resources if organizations working in the same industry. Furthermore, AWS provides its clients with a several disaster recovery of IT infrastructure options to companies that face destruction of data and premises (AWS, 2023). The options range from offering a low-cost low complexity to high cost high complexity involving storage of data in several regions. These are great attributes for a company to consider when choosing a cloud service provider because this means that business is resilient to disaster and cyber-attacks.

**References**

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The Stack. (2021, January 18). AWS vs Azure vs GCP: How hyperscaler performance stacks up across 1000 benchmark tests. Retrieved March 28, 2023, from <https://thestack.technology/aws-vs-azure-vs-gcp/#:~:text=Cockroach%20Labs%20notes%3A%20%E2%80%9C%5BThese,(up%20to%208%20Gbps)>.

1. **The CTO approved your comparative analysis between the cloud service providers (i.e. Amazon, Google, and Microsoft). She has decided to proceed with an** [**Amazon Virtual Private Cloud (Amazon VPC)**](https://docs.aws.amazon.com/vpc/latest/userguide/what-is-amazon-vpc.html)**. The Amazon VPC en**a**bles one to launch AWS resources into a virtual network, which is like a traditional network that can be operated in an on-premises data center. Keep in mind that networking, storage, and security associated with a VPC are as important as the overall scalable infrastructure of AWS.**
   1. **To begin, the CEO would like you to provide the network settings needed to provision two (2) subnets for the VPC as shown in the table below:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subnet** | **End-User** | **CIDR** | **Network** | **Broadcast** | **Mask** |
| **A** | **Developers** | **146.38.70.105/20** | ***146.38.64.0*** | ***146.38.79.255*** | ***255.255.240.0*** |
| **B** | **Marketing** | **172.31.0.0 /16** | ***172.31.0.1*** | ***172.31.255.255*** | ***255.255.0.0*** |

* 1. **Based on your understanding, list the network address, broadcast address, and subnet mask for subnet A and subnet B in the table above. Perform the necessary calculations and explain how you arrived at your answer.**

**To better help you understand IP addressing, IP subnetting, and IP address summarization, review the following AWS documentation prior to answering the questions in this section:**

* [**VPCs and subnets**](https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Subnets.html)
* [**CIDR and Peering for VPC and AWS Control Tower**](https://docs.aws.amazon.com/controltower/latest/userguide/vpc-ct-cidr.html)
* [**Subnet CIDR reservations**](https://docs.aws.amazon.com/vpc/latest/userguide/subnet-cidr-reservation.html)

**Note:**

**The key benefit of an Amazon VPC (or a virtual private network) is that the internal network devices are not openly accessible via the Internet and can only be accessed from within a secure network. Thus, it keeps the proprietary applications and data protected.**

**Classless Internet Domain Routing (CIDR) notation: CIDR was introduced to primarily improve address space utilization as a result of the rapid growth of the Internet and growth of the IP routing tables held in the Internet routers. Represented by an IP prefix, CIDR moves away from the traditional IP classes (e.g., Class A, Class B, Class C, etc.). Subnetting a network address space using CCIDR leads to an effective IP address space only for the number of hosts needed without wasting IP addresses.**

1. **Please note the following carefully. Confirm that you have stopped and terminated your Microsoft Windows virtual machine, deleted your file system from the Amazon EFS console, deleted the contents of your Amazon S3 bucket, and deleted your Amazon S3 bucket. To confirm, simply type your name below.**

***Abdu Kiyaga***