Cloud Computing Journal

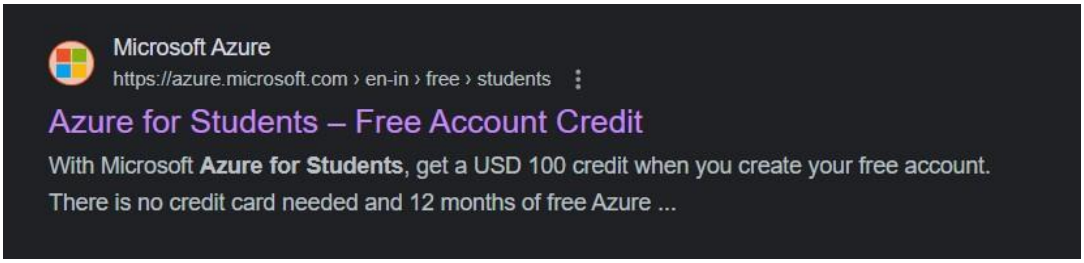
Name	**Tauseem Chaudhary**
Seat No.	**31010921006**
Course	**BSc-IT**
Year/Sem	**TY VI**
College	**S K Somaiya College, SVU**
Faculty	**Hemalata Mam**

Index

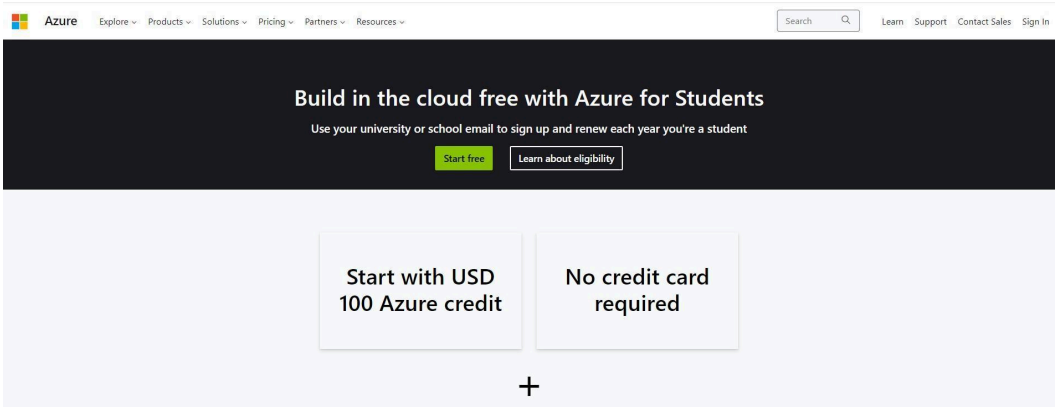
Practical 1:Setting up of Azure account and Creating a virtual machine in Azure with Linux OS.

A. Setting up of Azure account

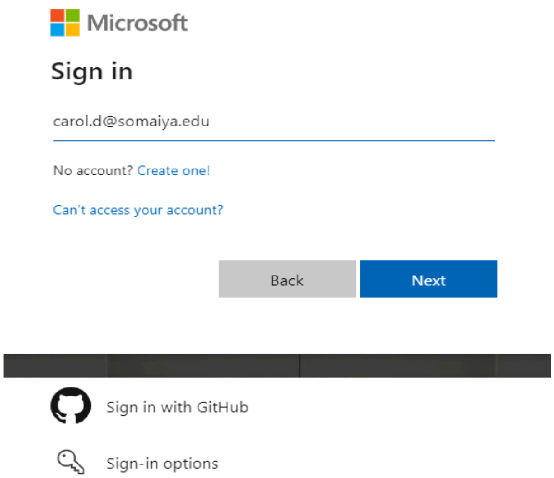
1. Search for “Microsoft Azure for Students” on Google and click on the link.



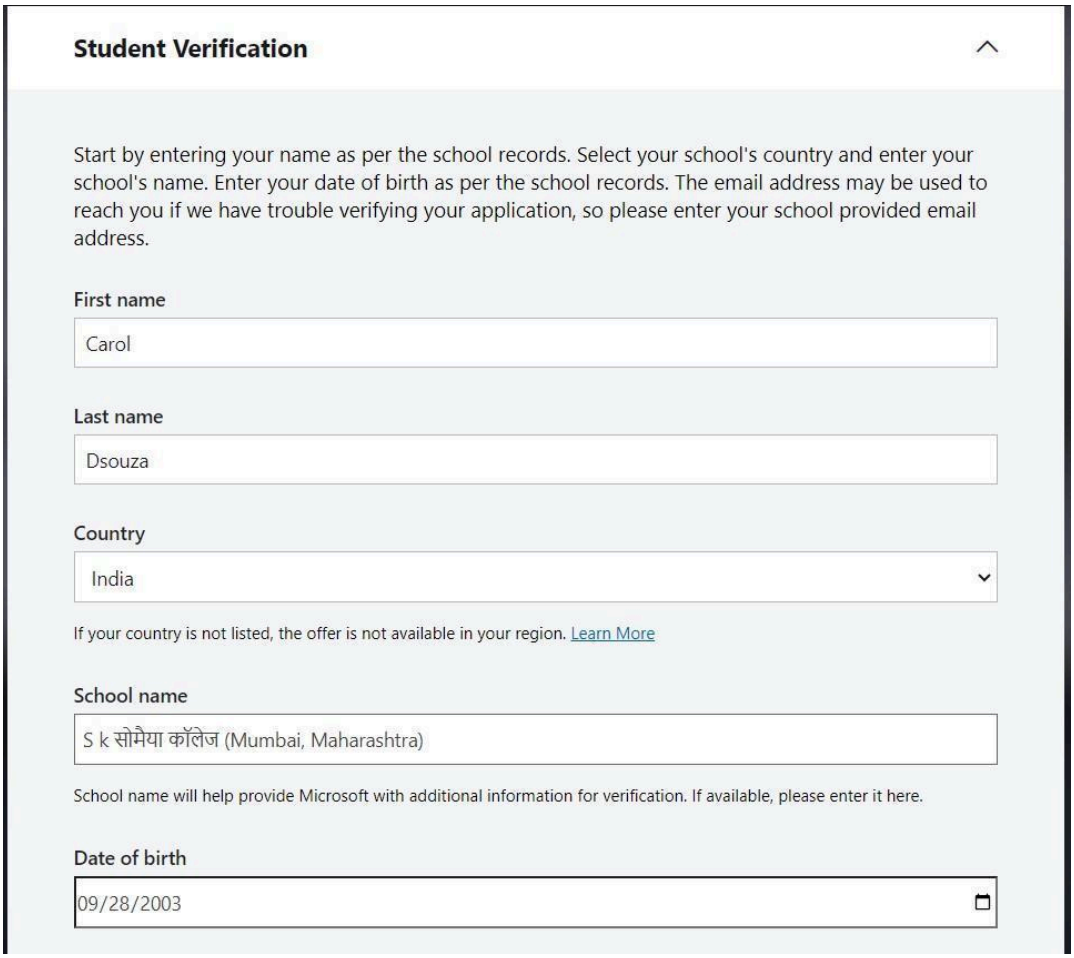
2. Click on “Start Free”



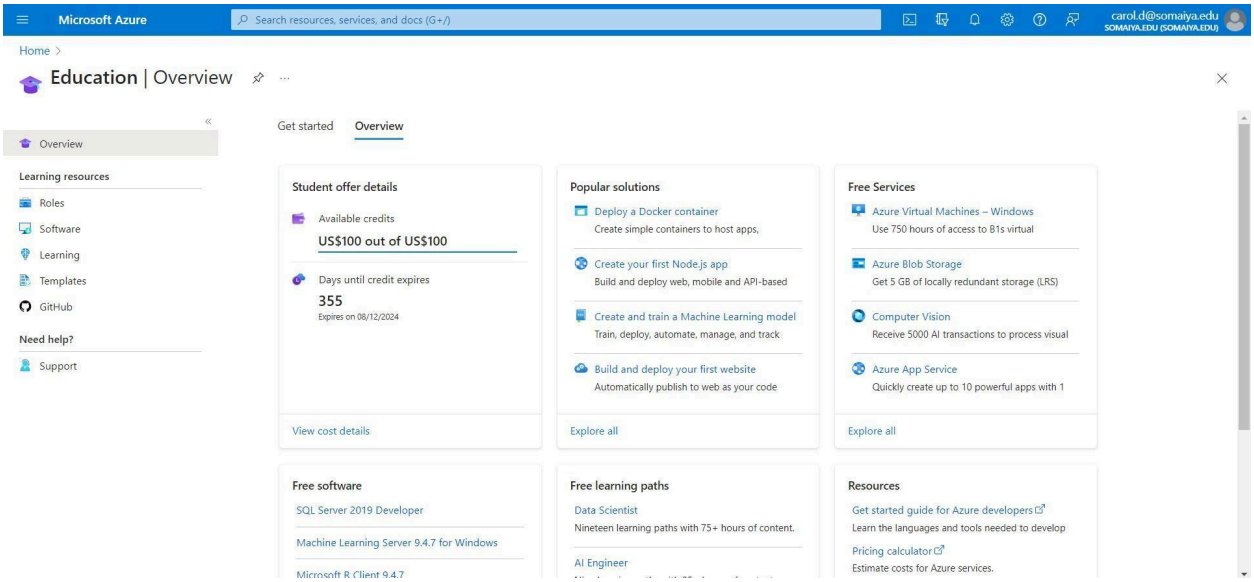
3. Sign in to Microsoft using the email address and password.



4. Fill in the details mentioned and verify the academic status.

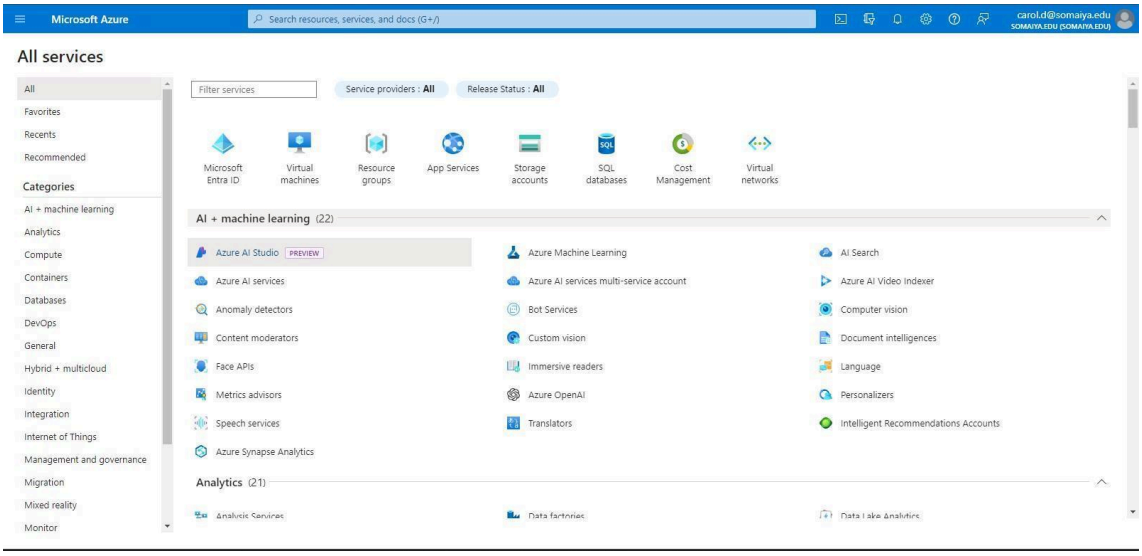


5. The student version of Azure has $100 credits free for students

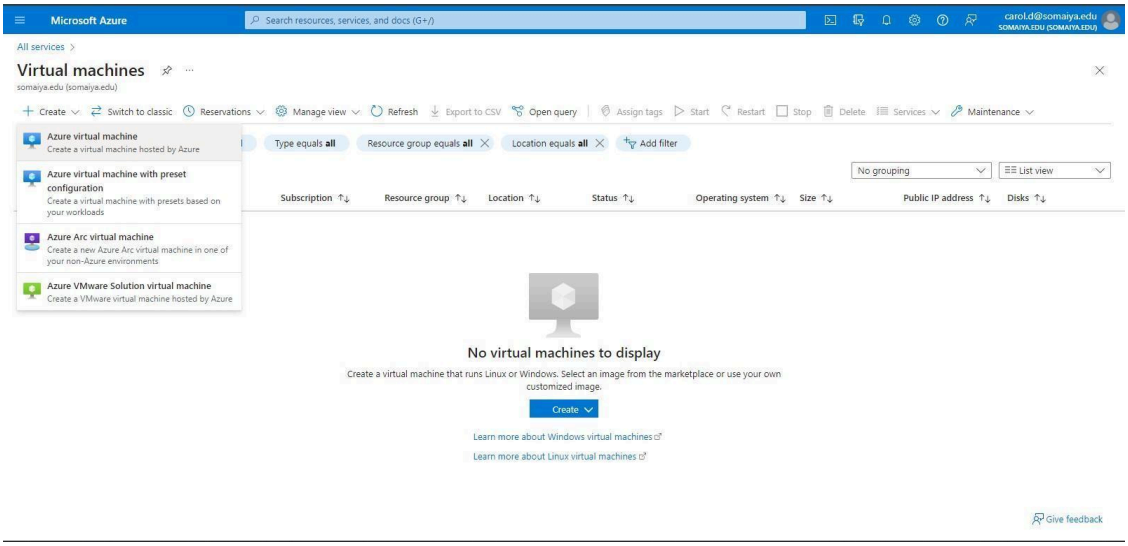


B. Creation of Virtual Machine

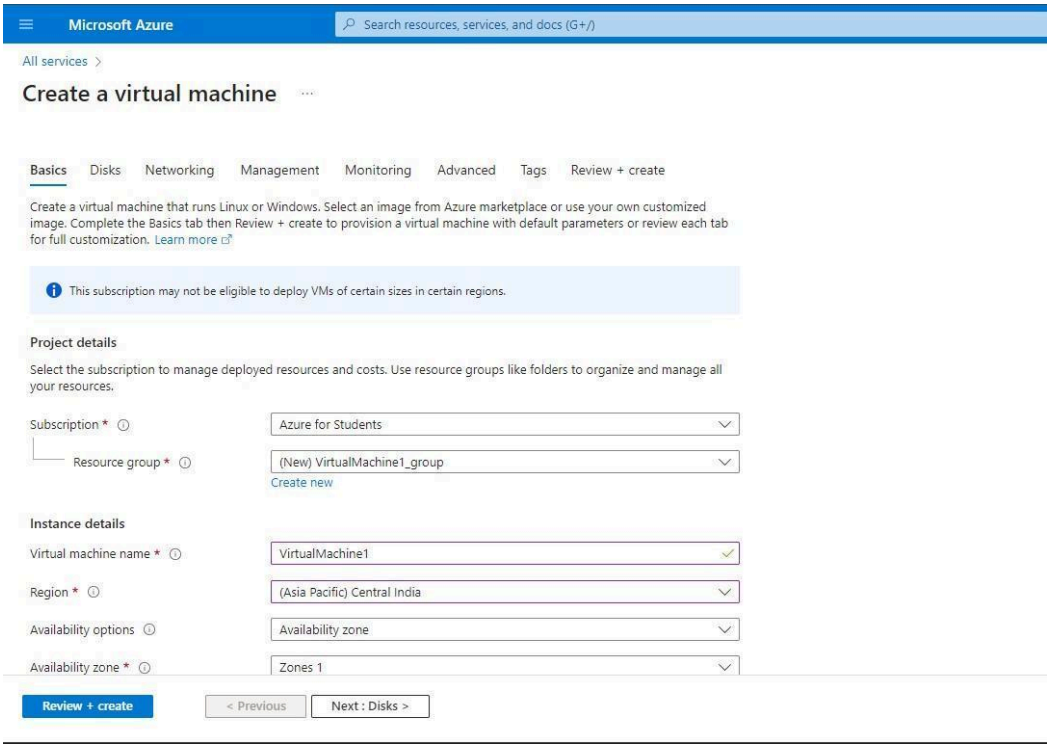
1. Go to Home on Azure and click on “Virtual machines”

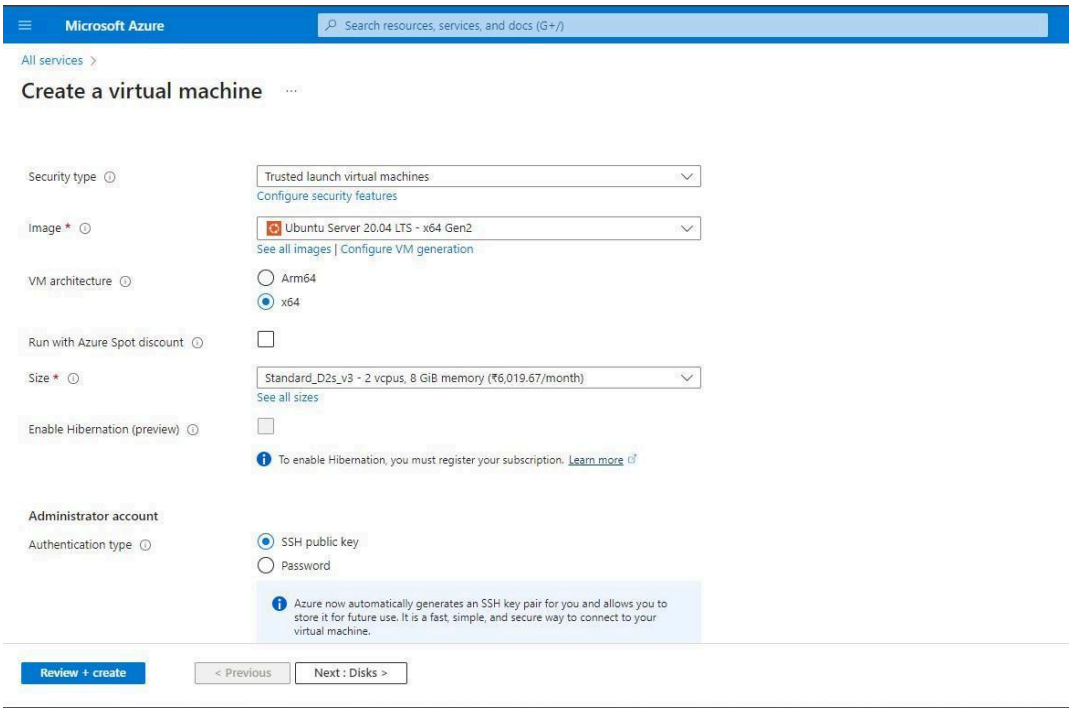


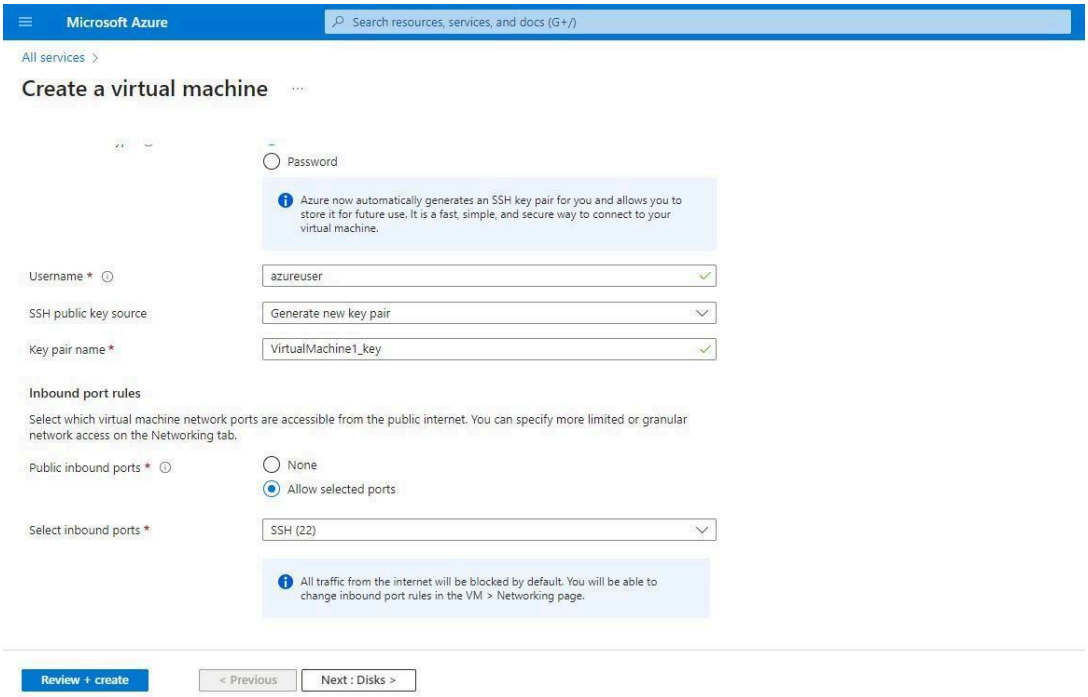
2. Click on “Create” and select “Azure virtual machine - Create a virtual machine hosted by Azure”



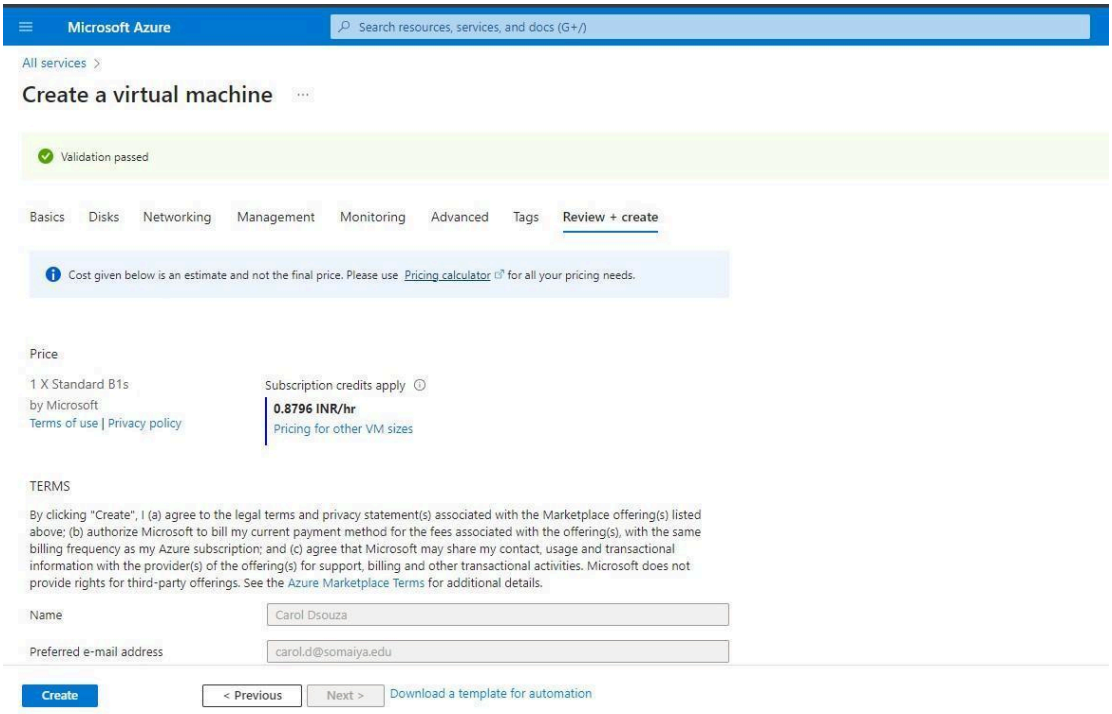
3. Enter the name of the virtual machine as well as change the region to India.


Microsoft Azure
Search resources, services, and docs (G+/)
All services
Create a virtual machine
Basics
Disks
Networking
Management
Monitoring
Advanced
Tags
Review + create
Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. Learn more
This subscription may not be eligible to deploy VMs of certain sizes in certain regions.
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 *
(New) VirtualMachine1_group
Create new
Instance details
Virtual machine name *
VirtualMachine1
Region *
(Asia Pacific) Central India
Availability options
Availability zone
Availability zone *
Zones 1
Review + create
< Previous
Next : Disks >

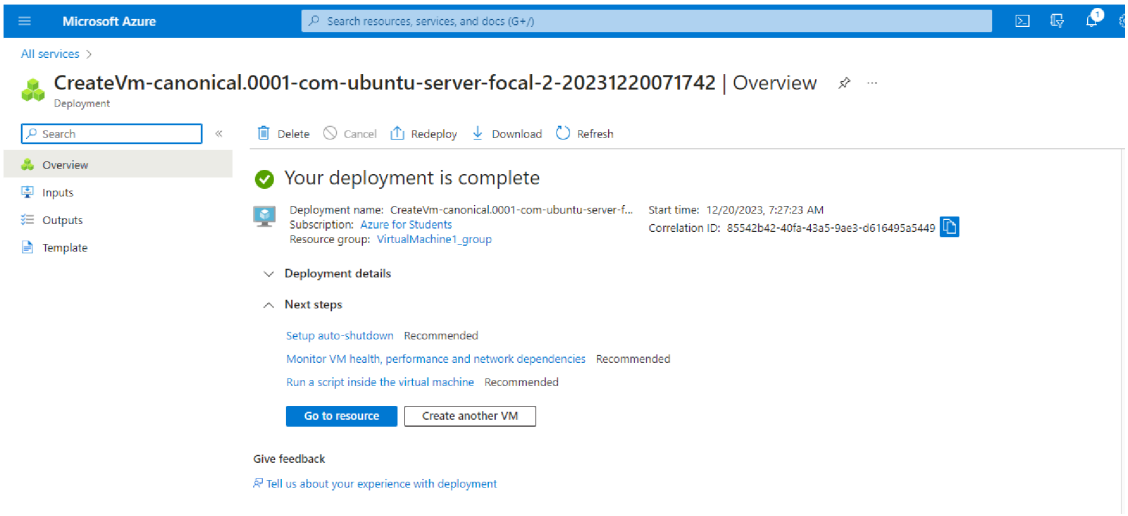

Microsoft Azure
Search resources, services, and docs (G+/)
All services
Create a virtual machine
Security type
Trusted launch virtual machines
Configure security features
Image *
Ubuntu Server 20.04 LTS - x64 Gen2
See all images | Configure VM generation
VM architecture
Arm64
x64
Run with Azure Spot discount
Size *
Standard_D2s_v3 - 2 vcpus, 8 GiB memory (₹6,019.67/month)
See all sizes
Enable Hibernation (preview)
To enable Hibernation, you must register your subscription. Learn more
Administrator account
Authentication type
SSH public key
Password
Azure now automatically generates an SSH key pair for you and allows you to store it for future use. It is a fast, simple, and secure way to connect to your virtual machine.
Review + create
< Previous
Next : Disks >



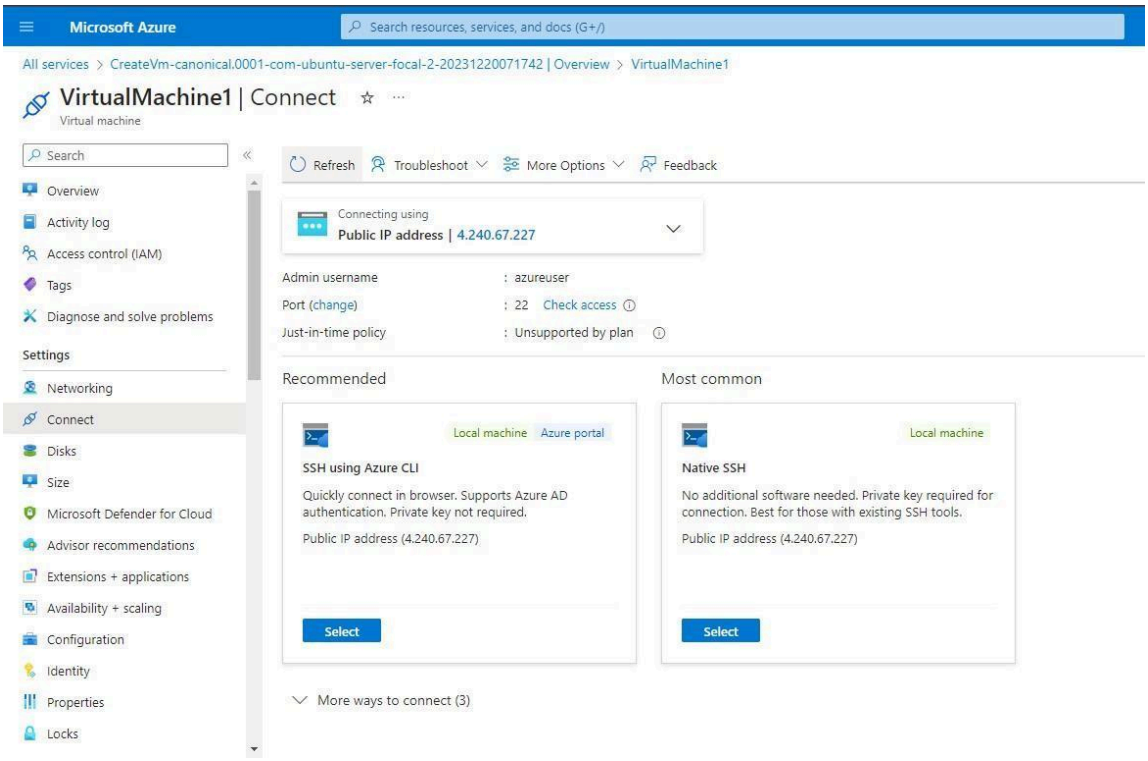
4. Then click on “Review + create”. Once the validation is complete, click on “Create”



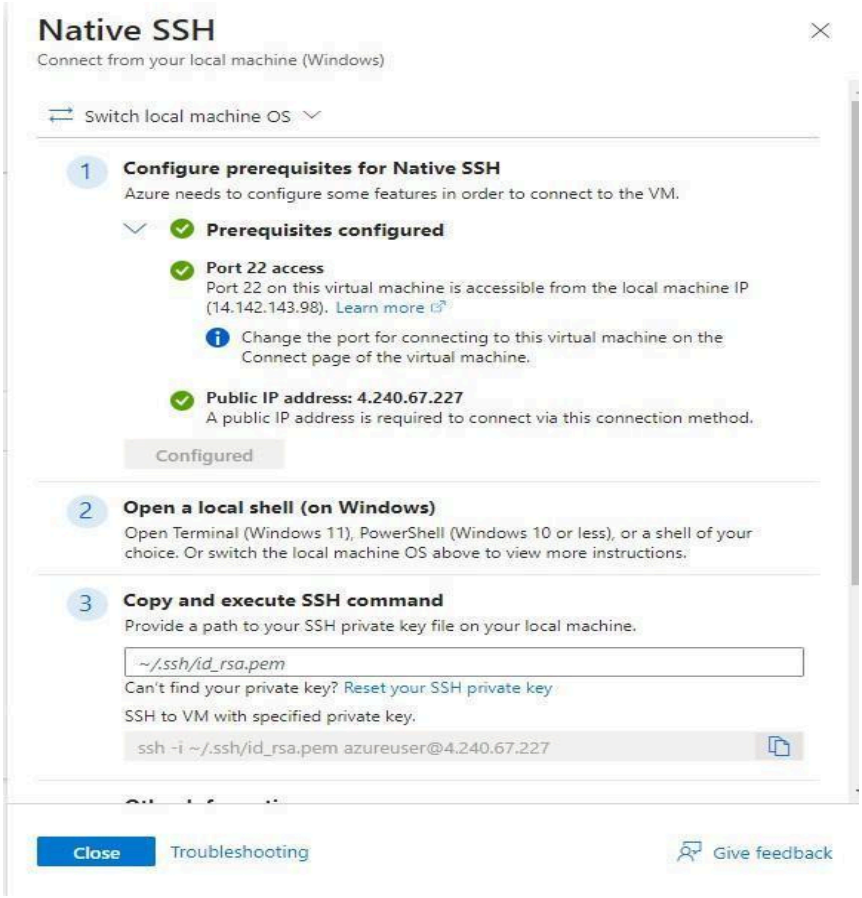
5. The machine will be created along with the SSH keys. Download the private key pair present as a “PEM file” and save it. Click on “Go to resource”



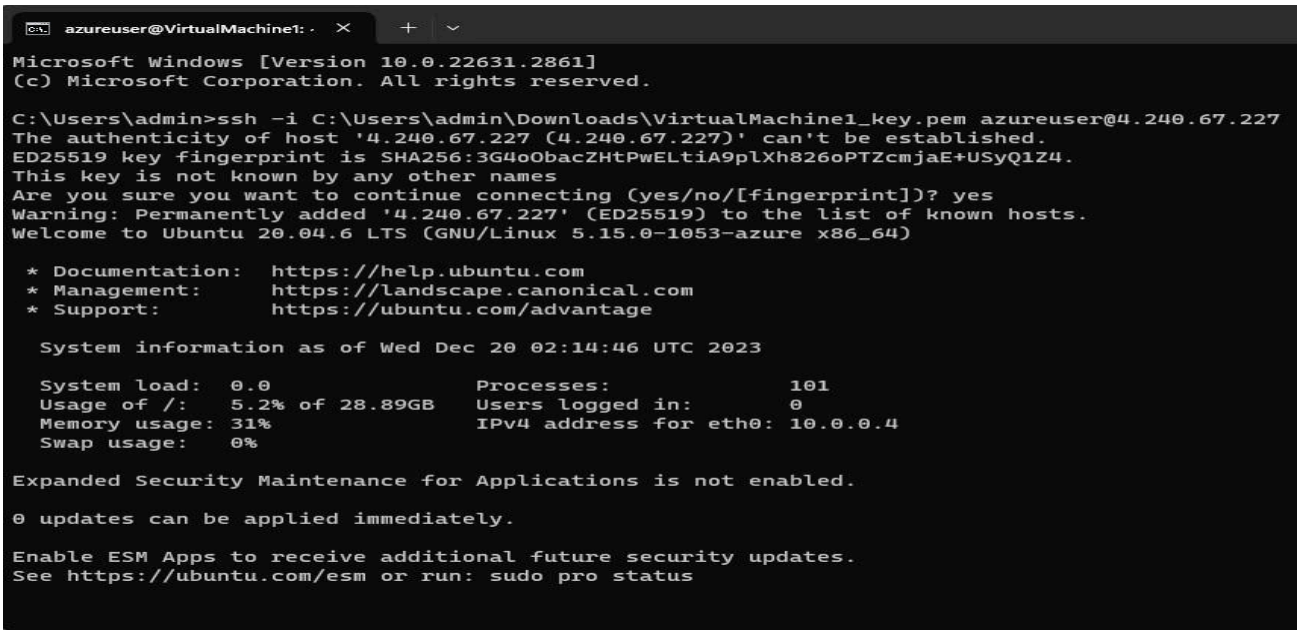
6. Under “Connect” in Settings, select the “Native SSH”.



7. Follow the instructions given to connect the local machine i.e. copy the path of the private key (PEM File) and paste it. Then, open the local shell (Command Prompt) on the PC and execute the command.

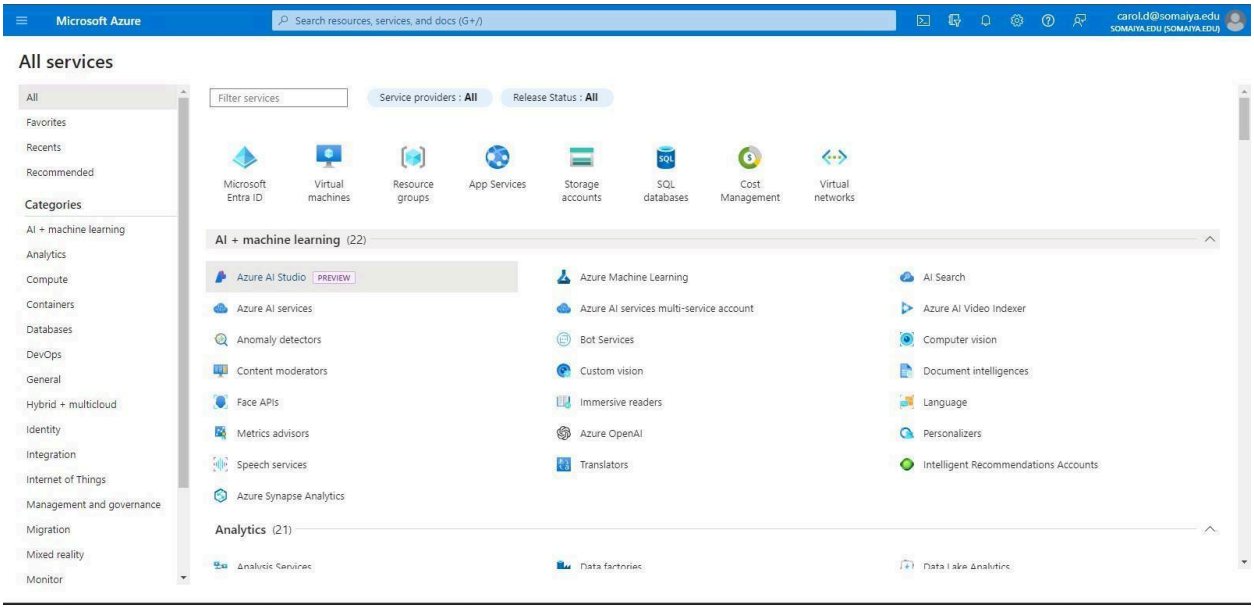


8. The command is executed as shown below in the Command Prompt or terminal and the local machine is now connected to the virtual machine.

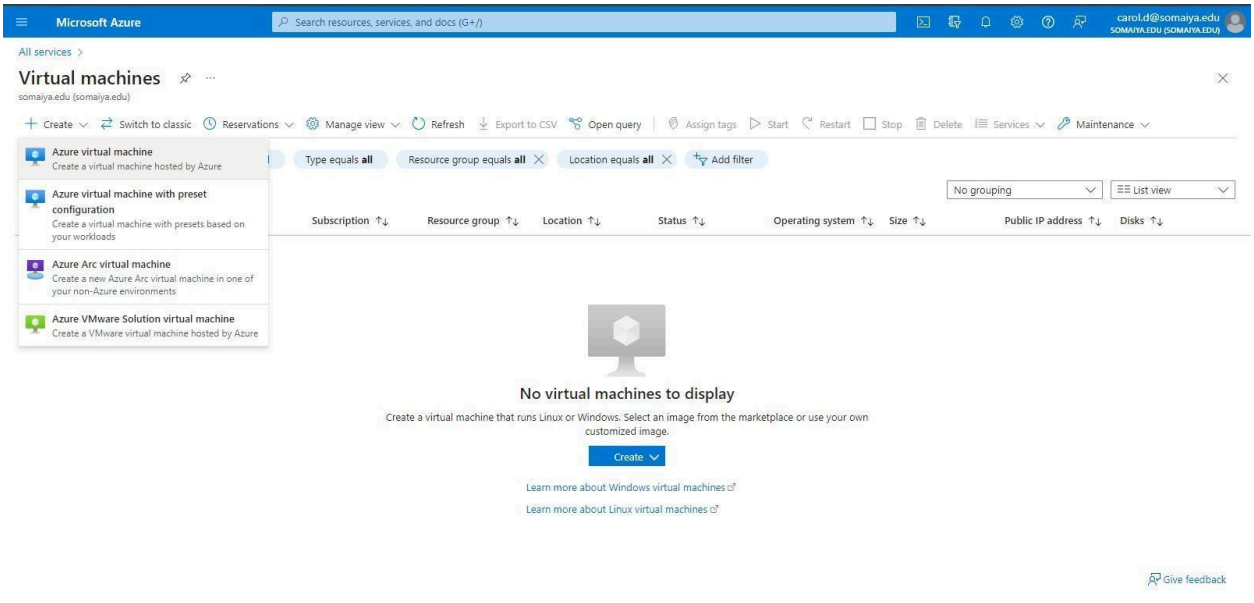


Practical 2: Creating Excel Blob using Storage Account in Azure

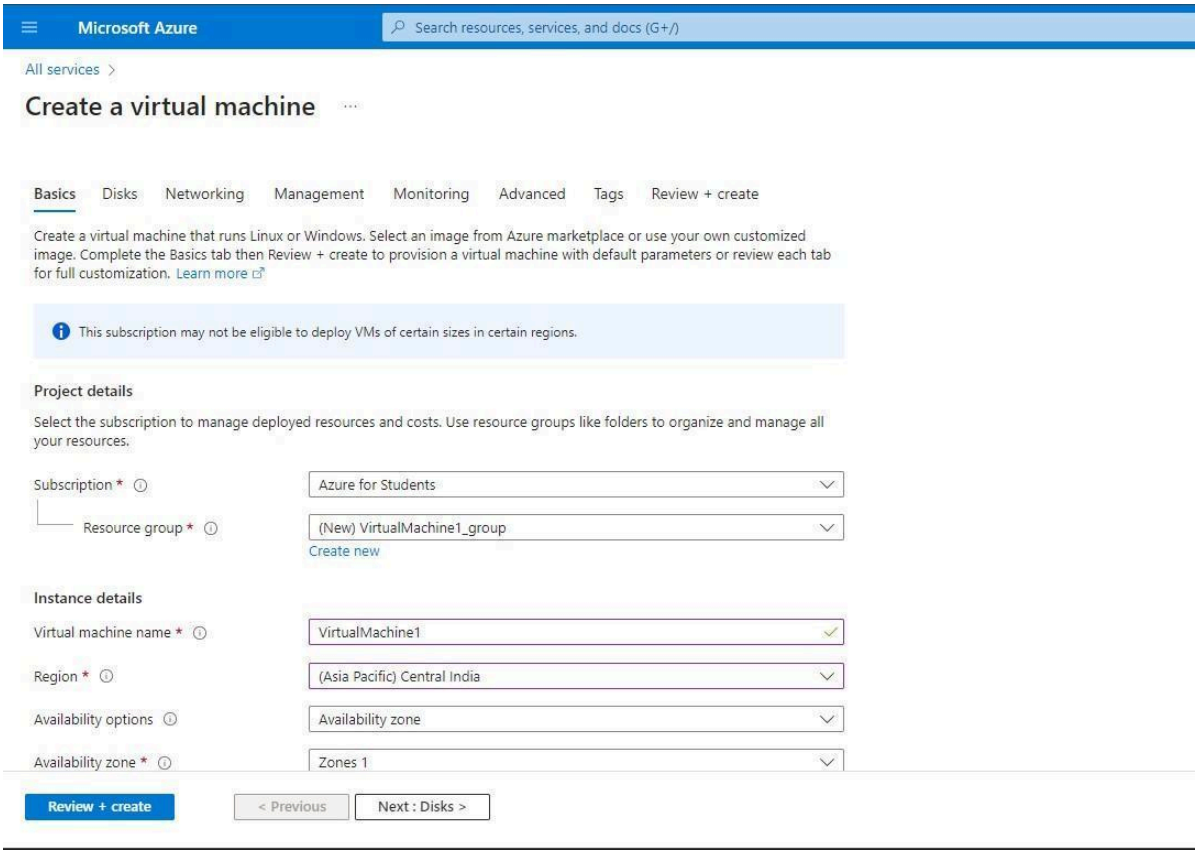
1. Go to Home on Azure and click on “Virtual machines”



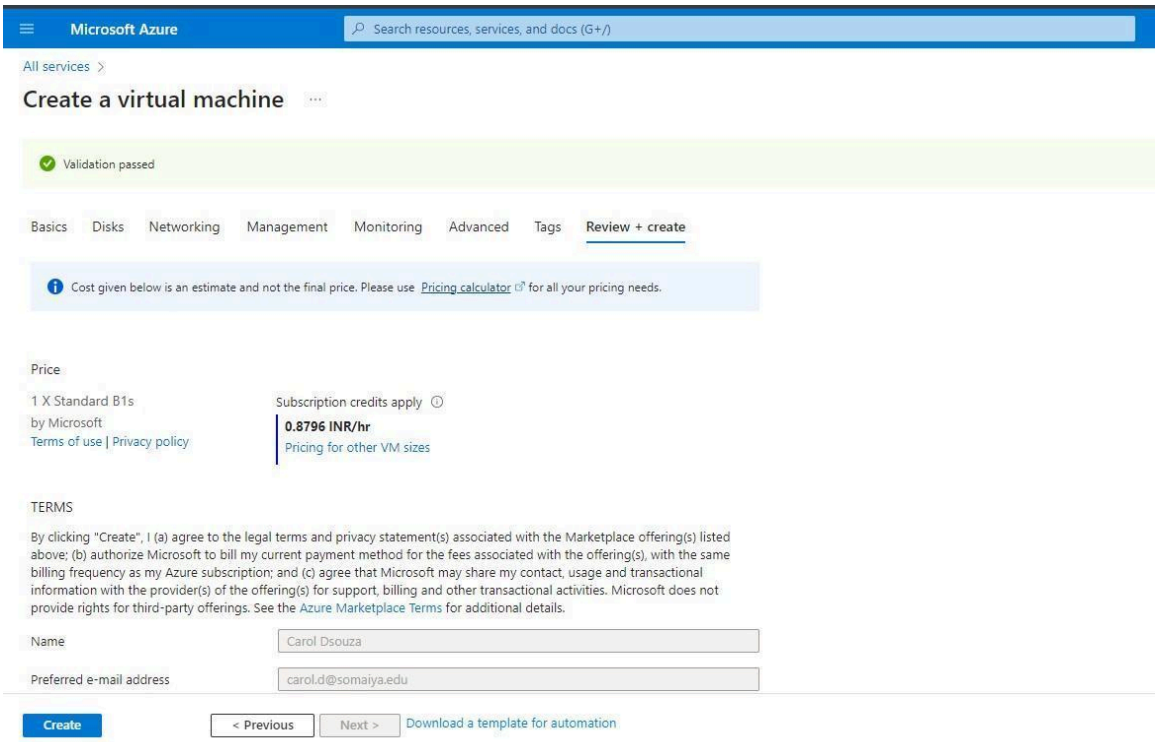
2. Click on “Create” and select “Azure virtual machine - Create a virtual machine hosted by Azure”



3. Enter the name of the virtual machine as well as change the region to India.

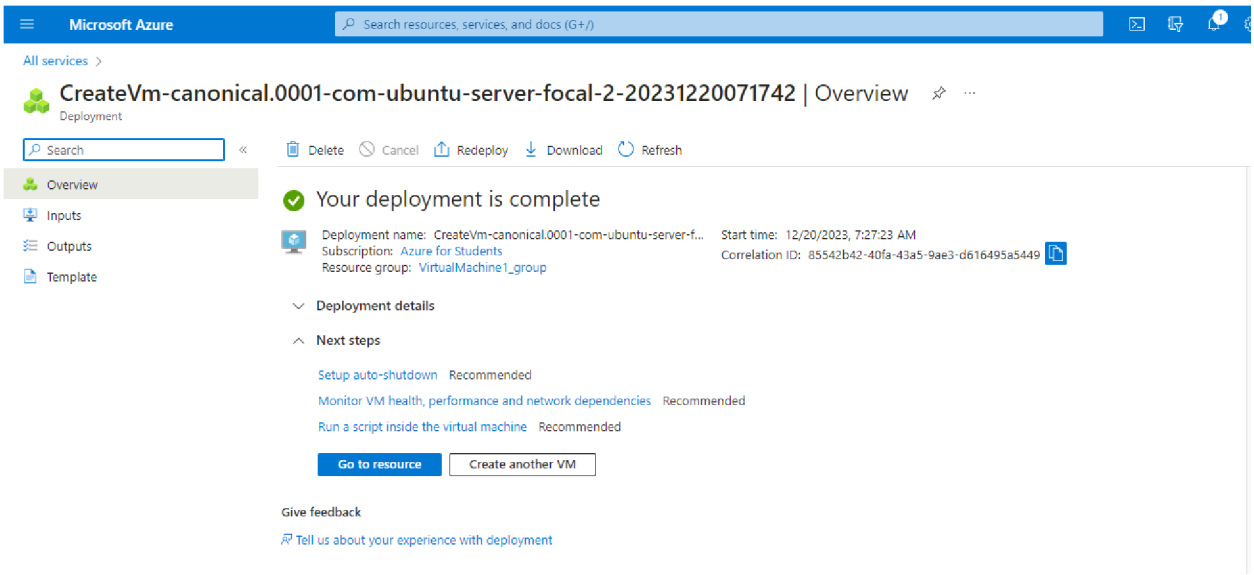


4. Then click on “Review + create”. Once the validation is complete, click on “Create”

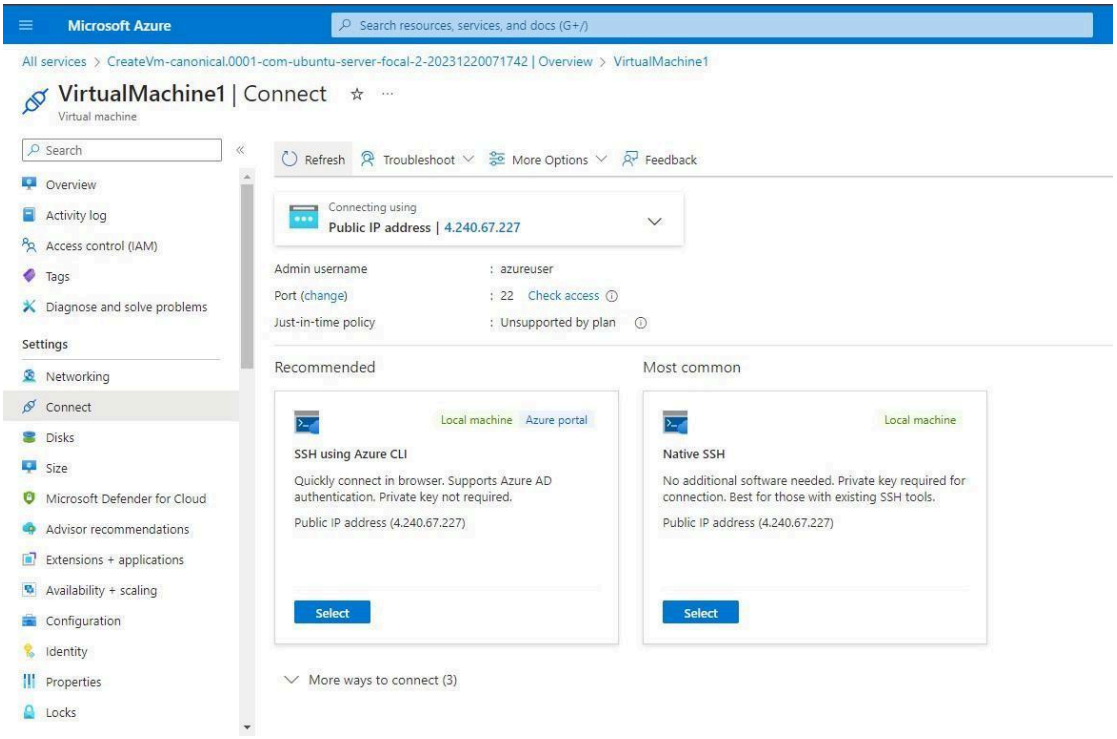


5. The machine will be created along with the SSH keys. Download the private key pair present as a “PEM file” and save it.

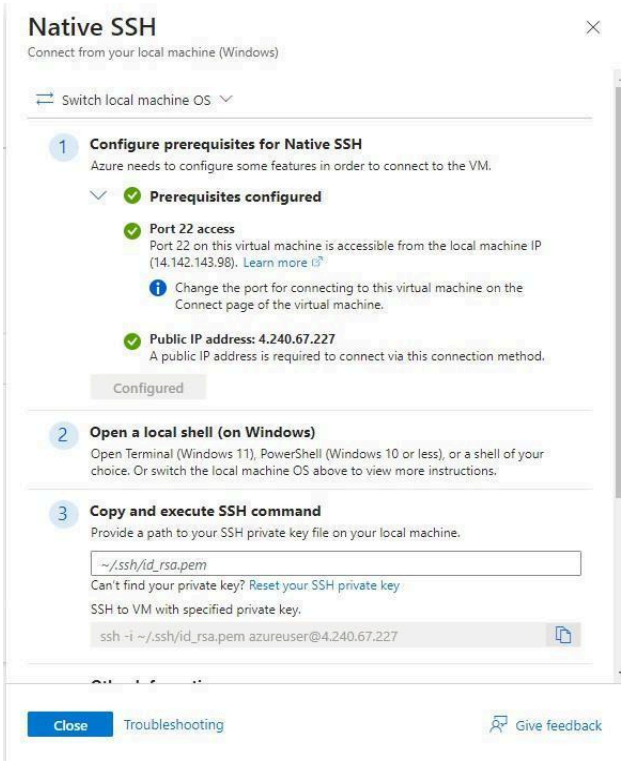
6. Click on “Go to resource”



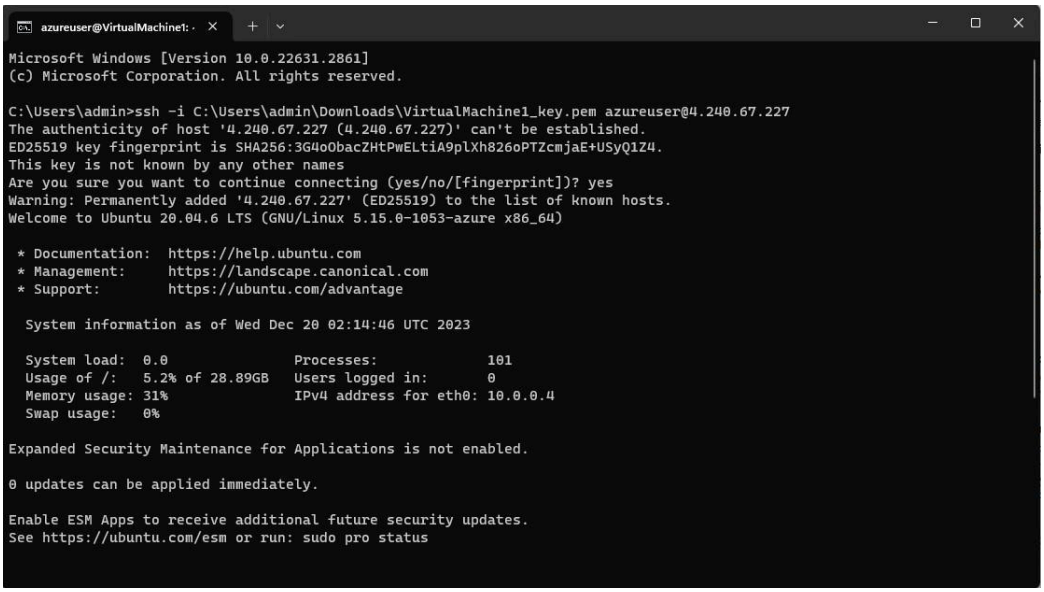
7. Under “Connect” in Settings, select the “Native SSH”.



8. Follow the instructions given to connect the local machine i.e copy the path of the private key (PEM File) and paste it. Then, open the Command Prompt and execute the command.

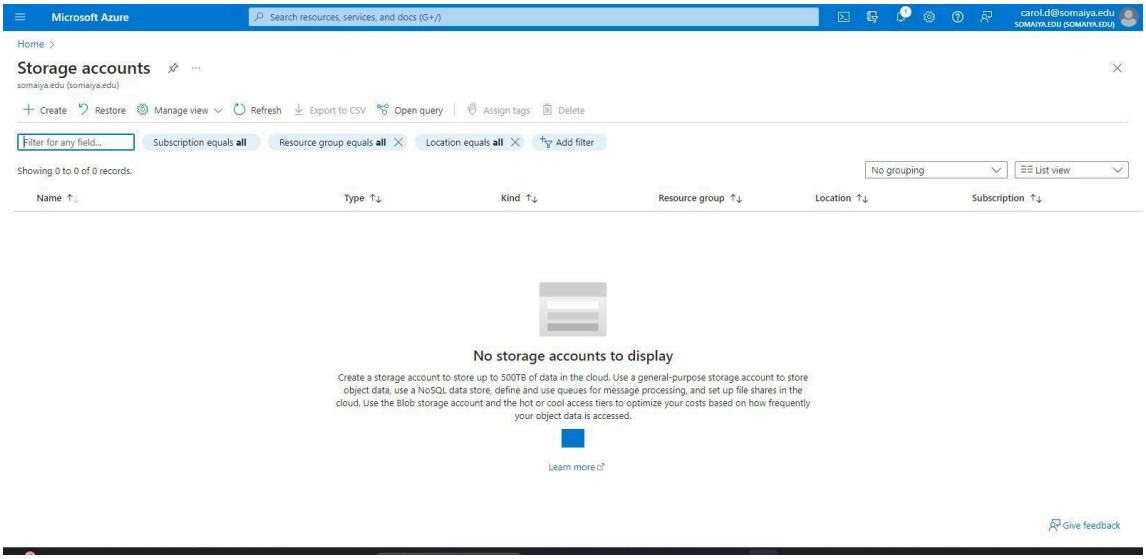


8. The command is executed as shown below in the Command Prompt and the local machine is now connected to the virtual machine.

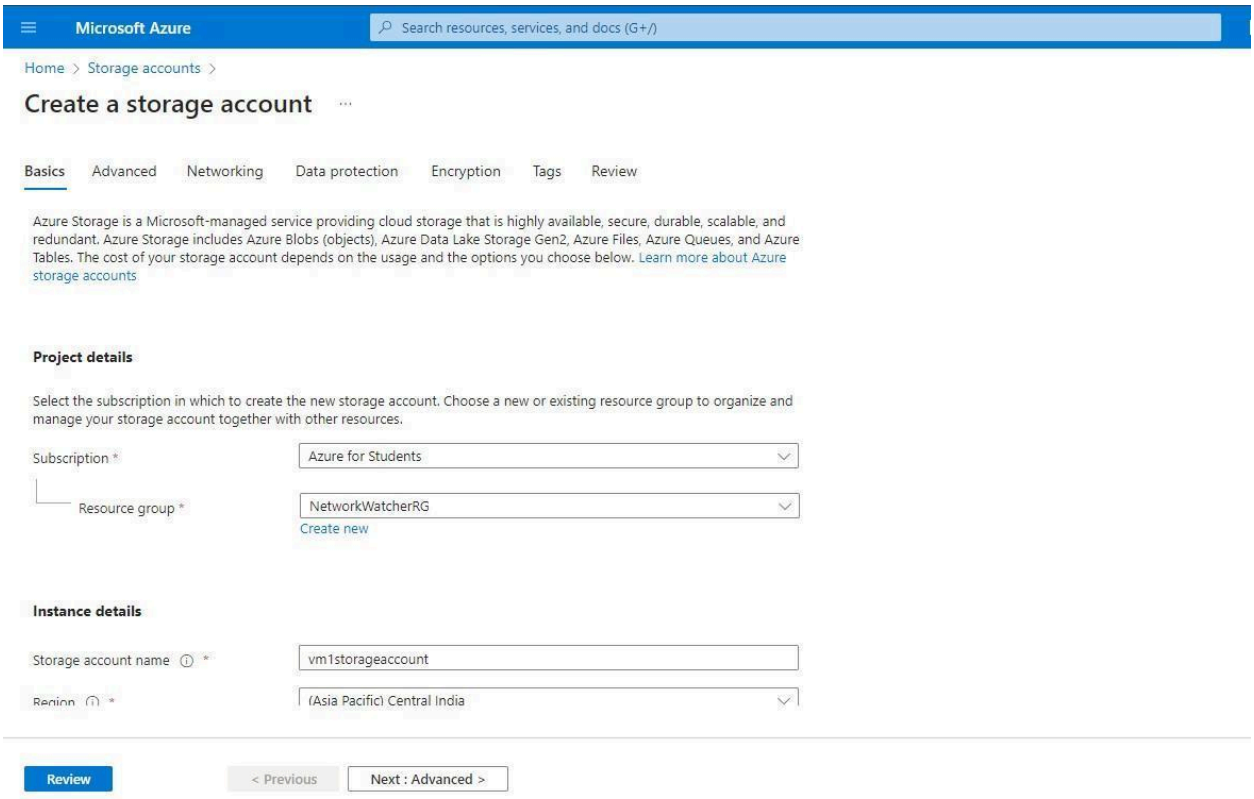


9. Go to Home and click on “Storage Accounts”.

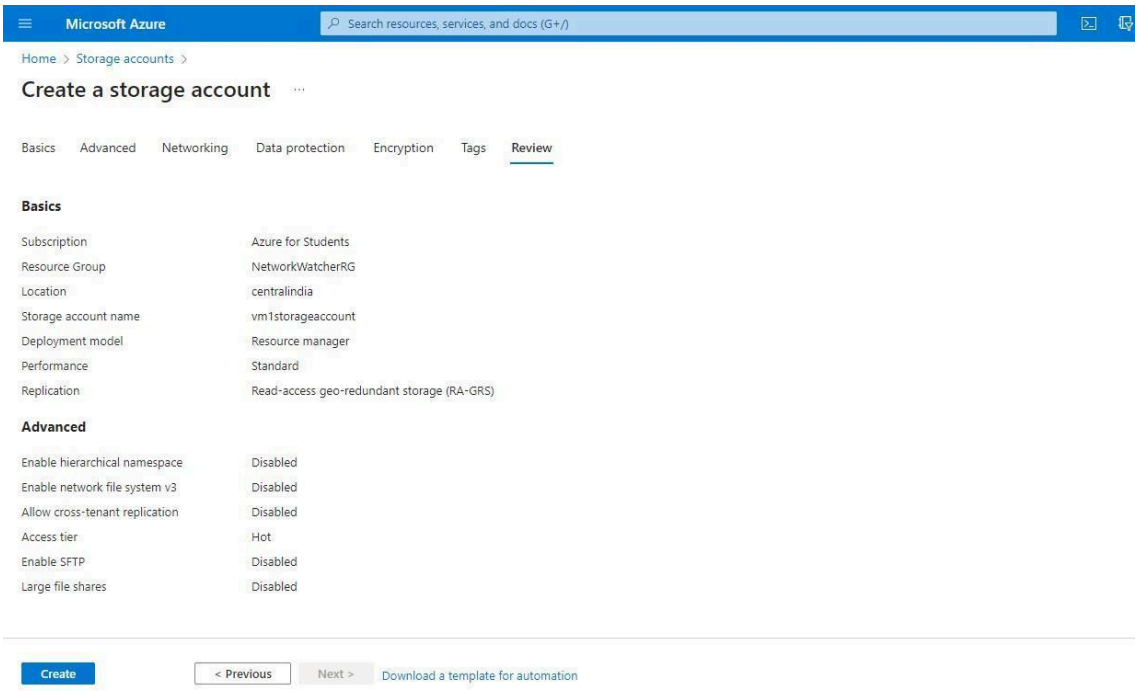
10. Click on “Create”



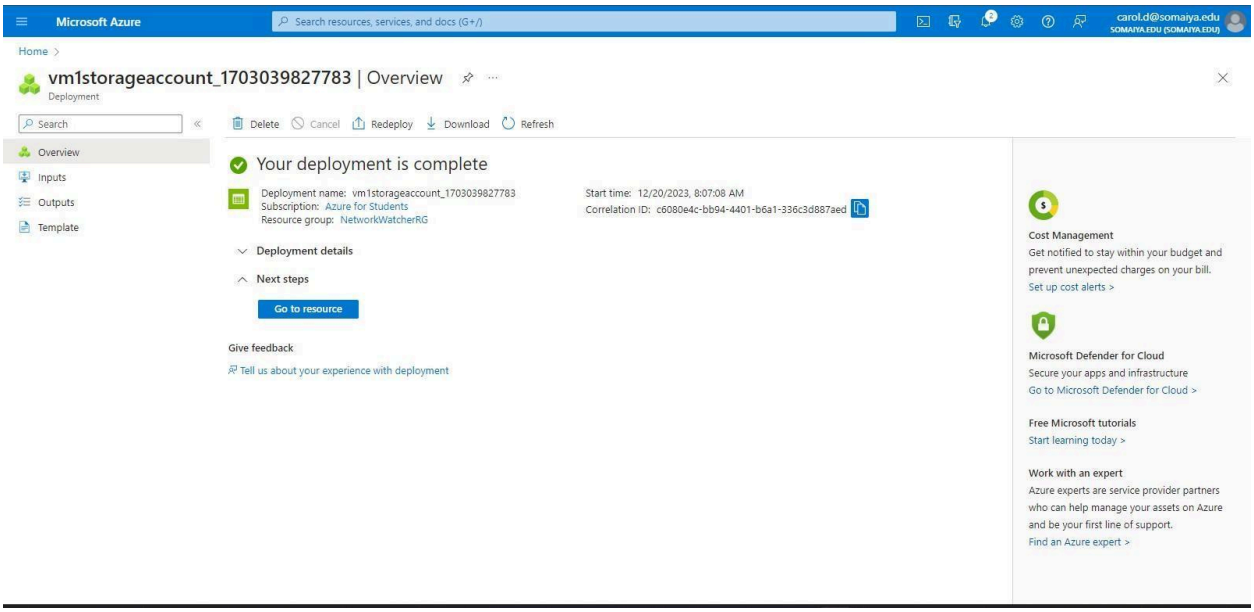
11. Enter the name of the storage account and fill in the required information. Click on “Review”



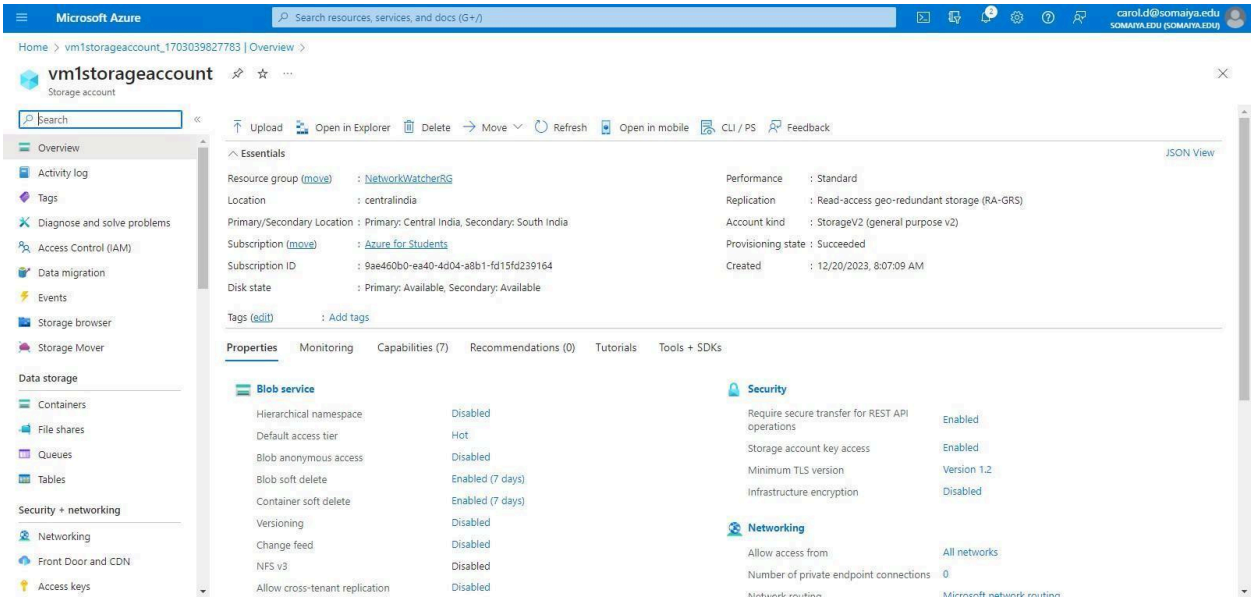
12. Then, click on “Create”.



13. Here, the storage account has been created and deployment is completed. Click on “Go to resource”



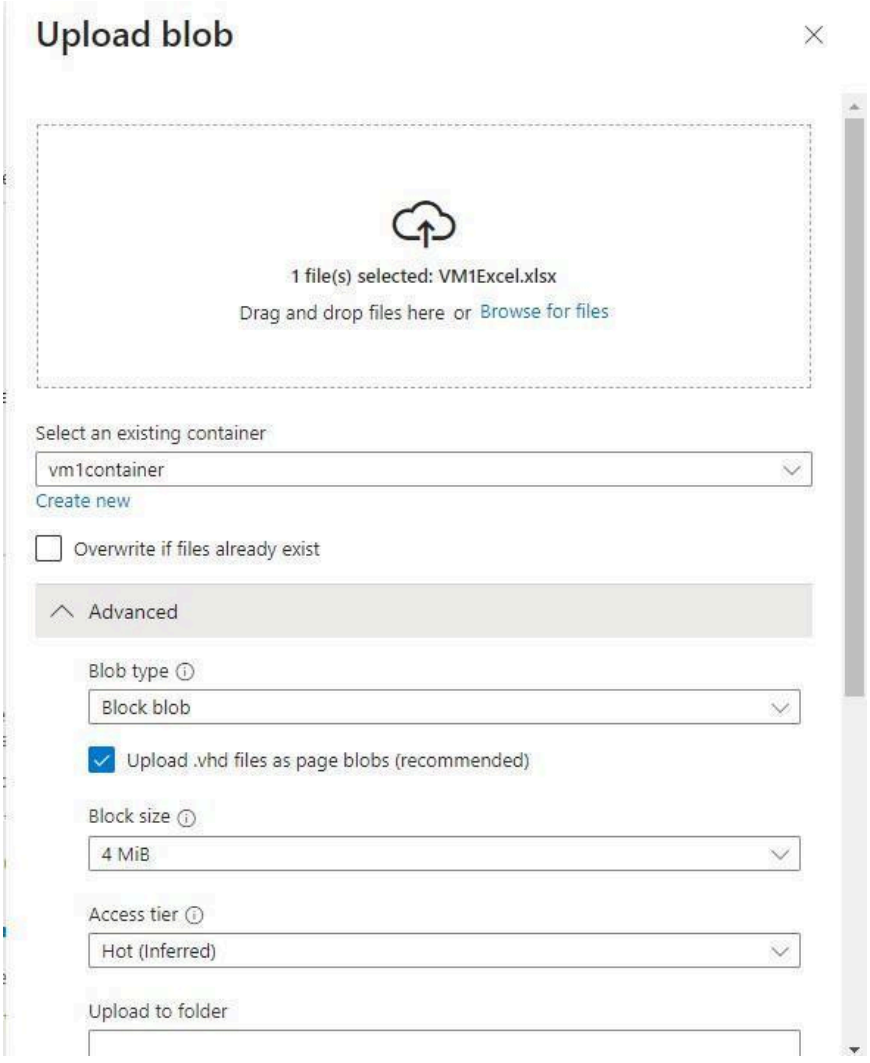
14. Click on “Upload”.



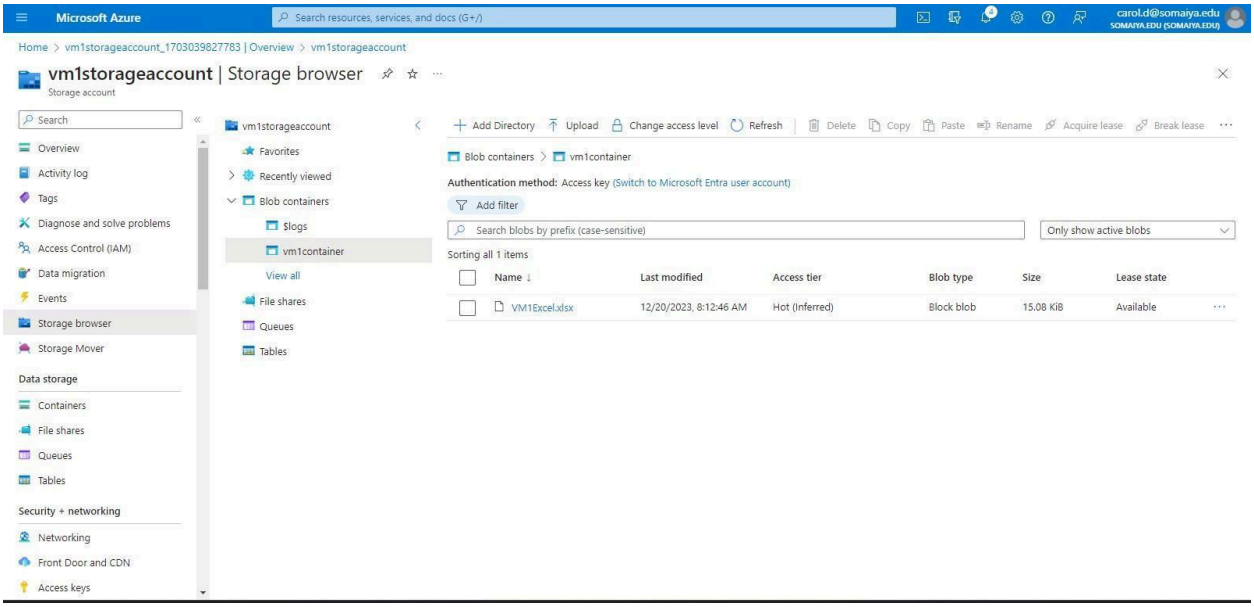
15. Create an Excel file as below and save it.

	A	B
1	Name	Country
2	ABC	India
3	DEF	Thailand
4	GHI	Korea

16. Upload the file by clicking on “Browse for files”. Create a new container and name it.



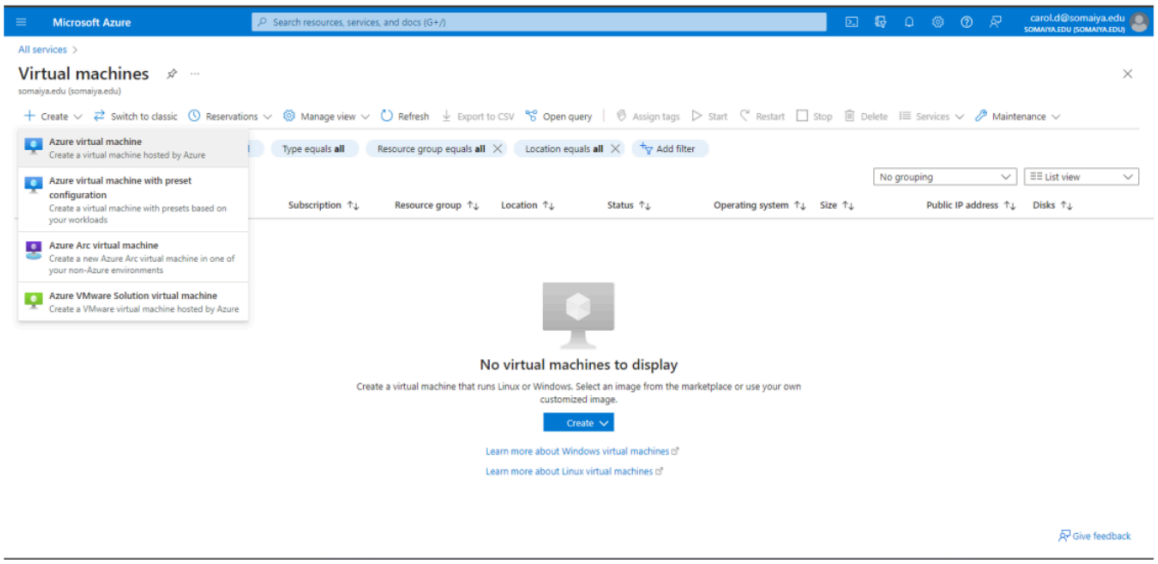
17. Navigate to “Storage Browser” and enter the blob container to see if the Excel file has been uploaded.


Microsoft Azure
Search resources, services, and docs (G+/)
carol.d@somaiya.edu
SOMAIYA.EDU (SOMAIYA.EDU)
Home > vm1storageaccount_1703039827783 | Overview > vm1storageaccount
vm1storageaccount | Storage browser
Storage account
Search
Overview
Activity log
Tags
Diagnose and solve problems
Access Control (IAM)
Data migration
Events
Storage browser
Storage Mover
Data storage
Containers
File shares
Queues
Tables
Security + networking
Networking
Front Door and CDN
Access keys
vm1storageaccount
Favorites
Recently viewed
Blob containers
$logs
vm1container
View all
File shares
Queues
Tables
Add Directory
Upload
Change access level
Refresh
Delete
Copy
Paste
Rename
Acquire lease
Break lease
Blob containers > vm1container
Authentication method: Access key (Switch to Microsoft Entra user account)
Add filter
Search blobs by prefix (case-sensitive)
Only show active blobs
Sorting all 1 items
Name
Last modified
Access tier
Blob type
Size
Lease state
VM1Excel.xlsx
12/20/2023, 8:12:46 AM
Hot (Inferred)
Block blob
15.08 KiB
Available

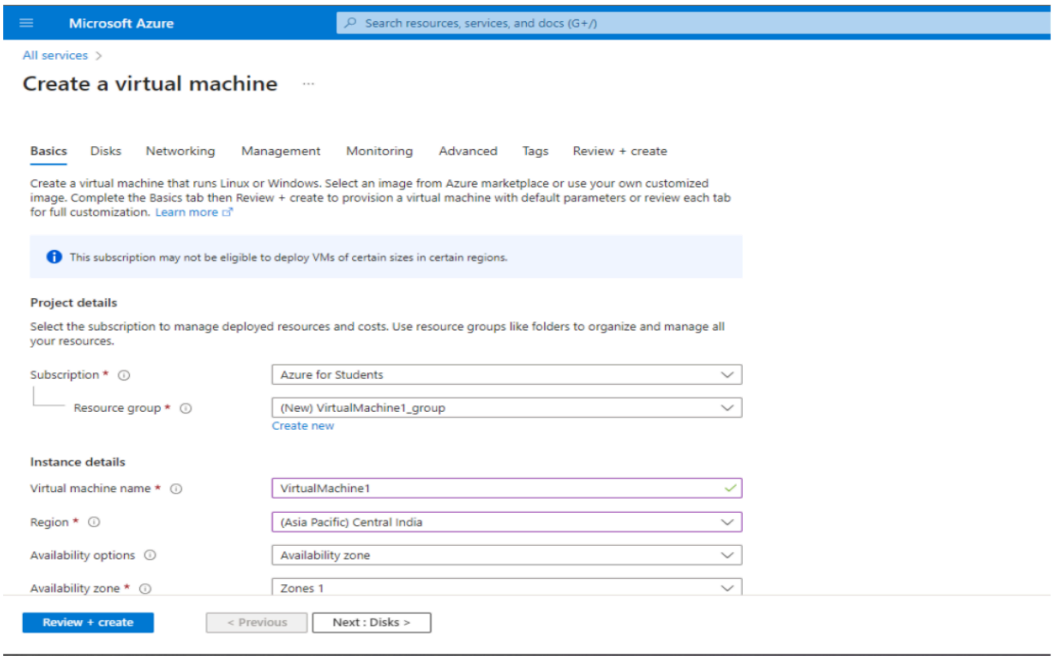
Practical 3: Creating Image Blob using Storage Account in Azure

1. Go to Home on Azure and click on “Virtual machines”

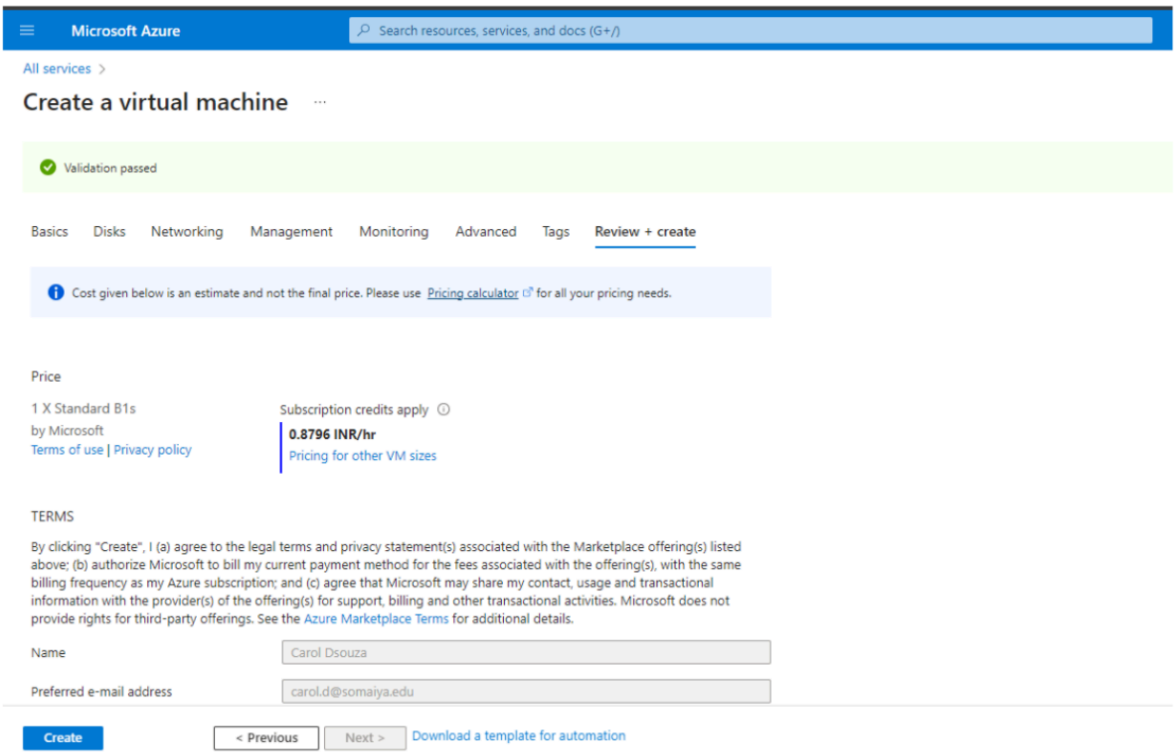
2. Click on “Create” and select “Azure virtual machine - Create a virtual machine hosted by Azure”



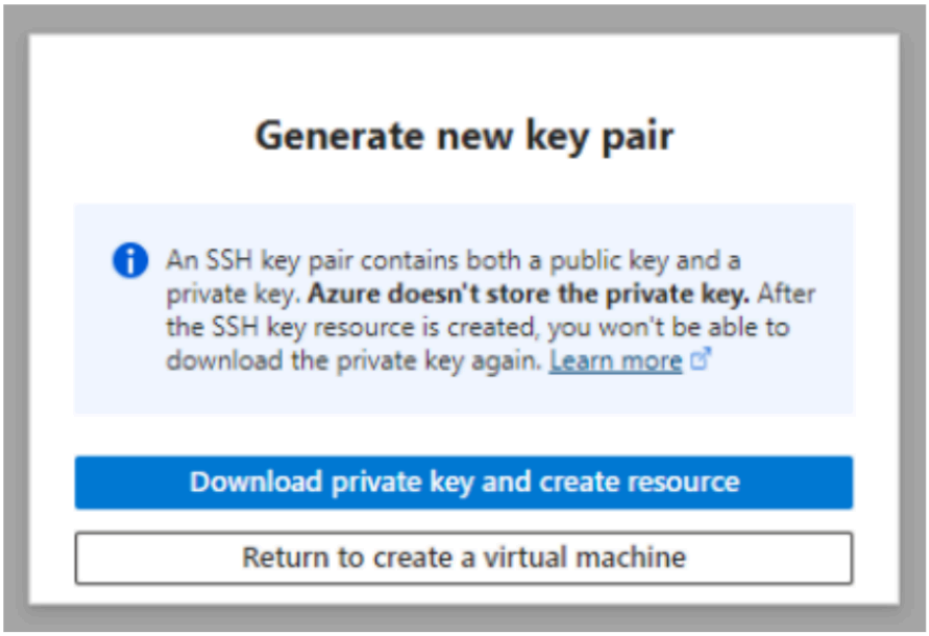
3. Enter the name of the virtual machine as well as change the region to India.



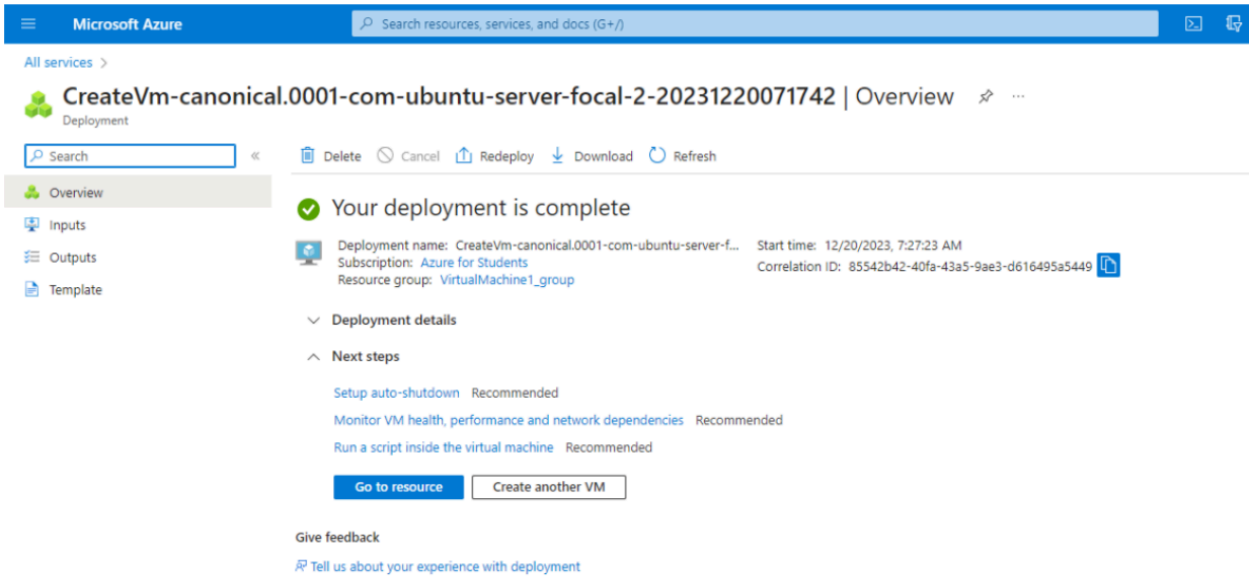
4. Then click on “Review + create”. Once the validation is complete, click on “Create”



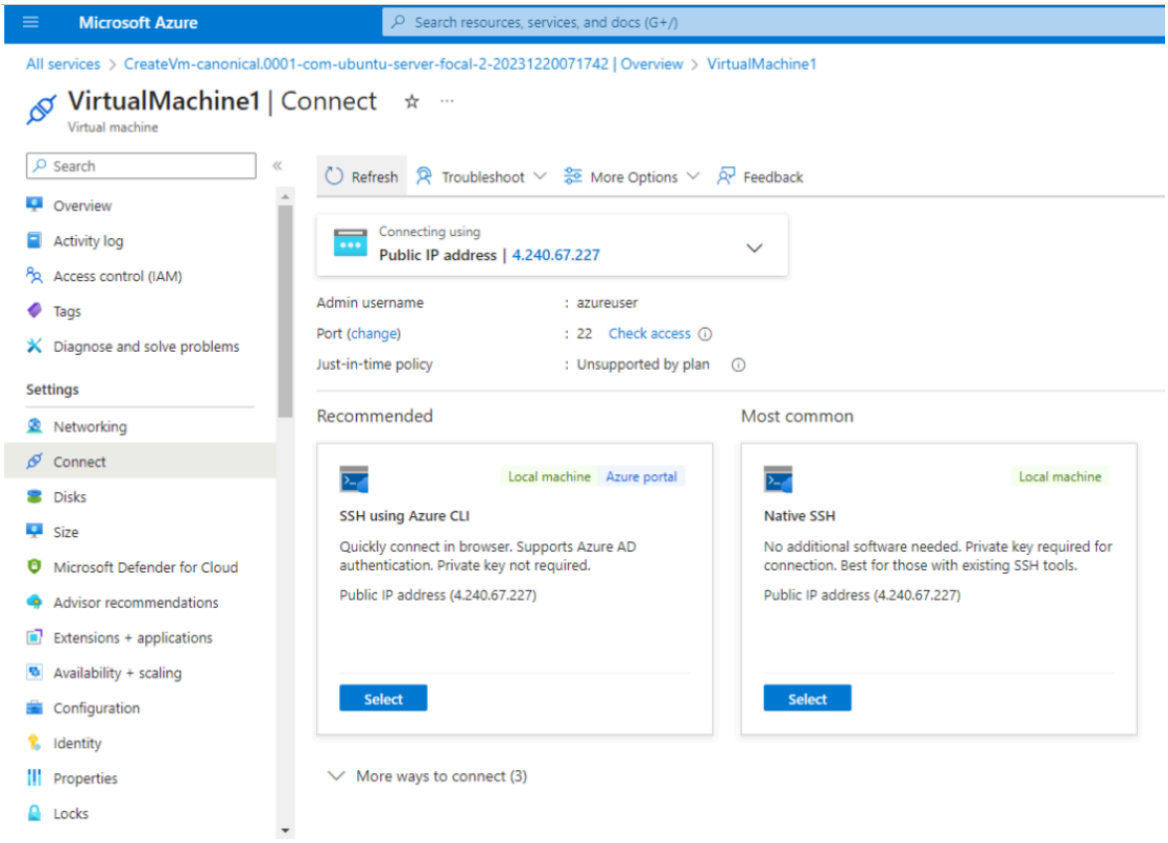
5. The machine will be created along with the SSH keys. Download the private key pair present as a “PEM file” and save it.



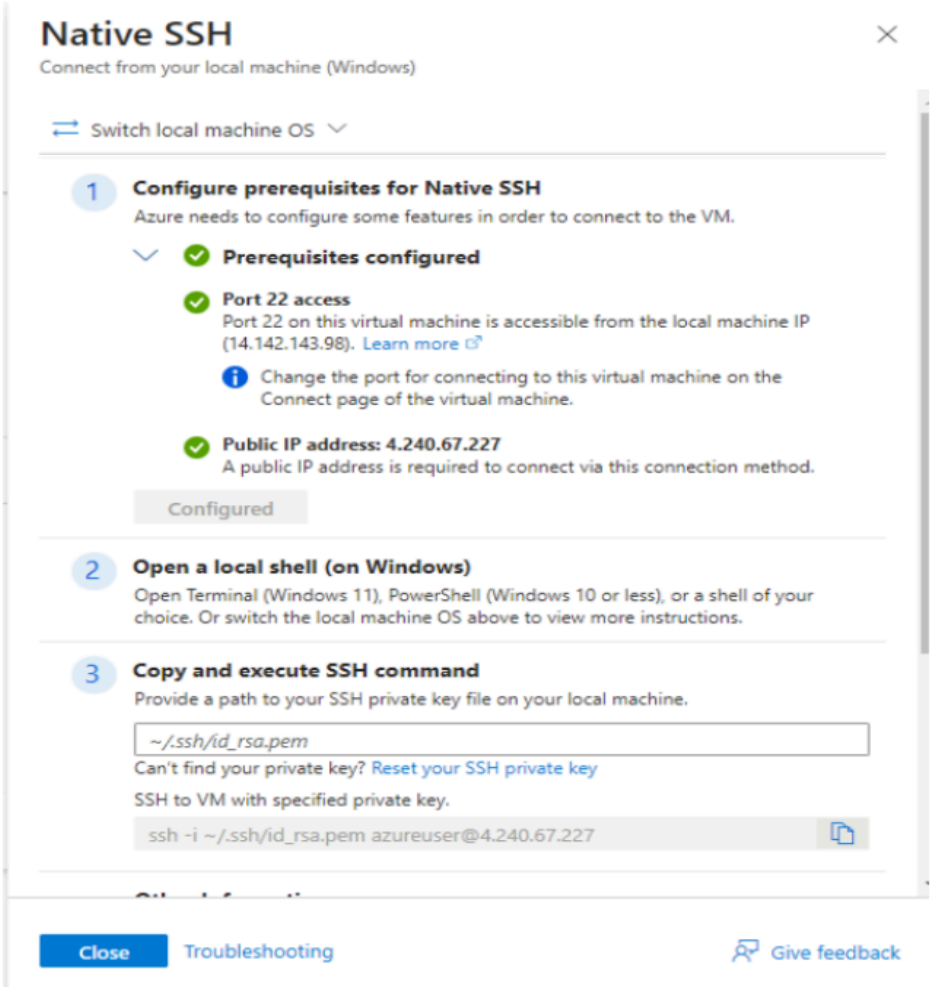
6. Click on “Go to resource”



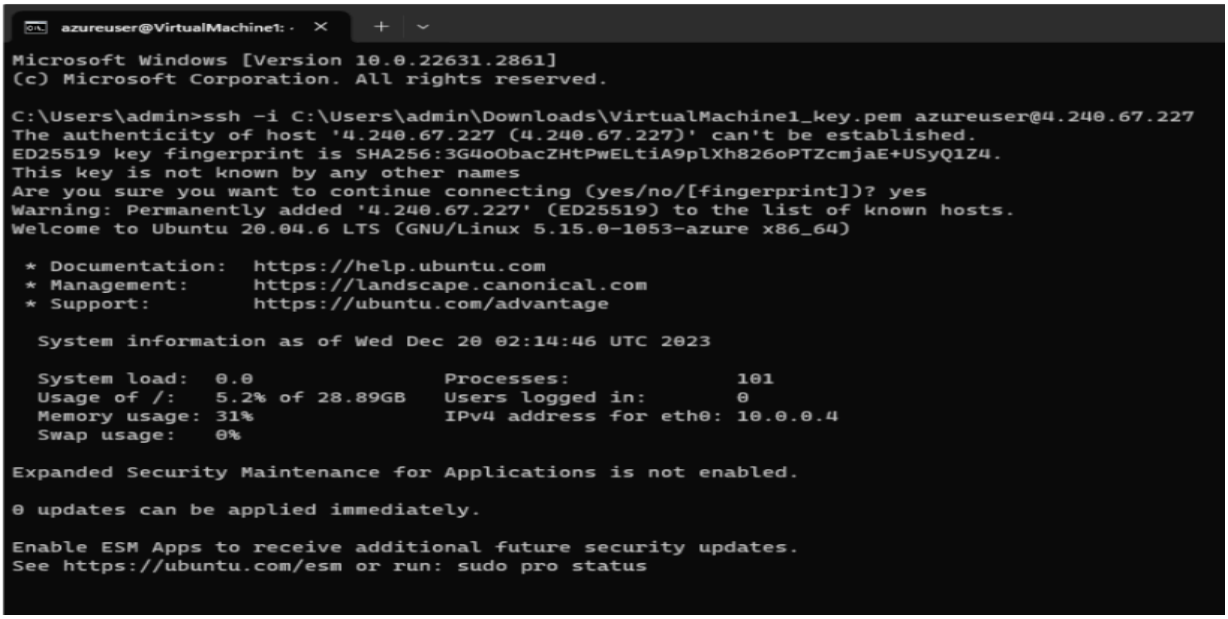
7. Under “Connect” in Settings, select the “Native SSH”.



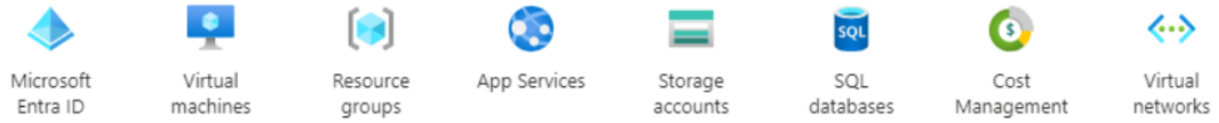
8. Follow the instructions given to connect the local machine i.e copy the path of the private key (PEM File) and paste it. Then, open the Command Prompt and execute the command.



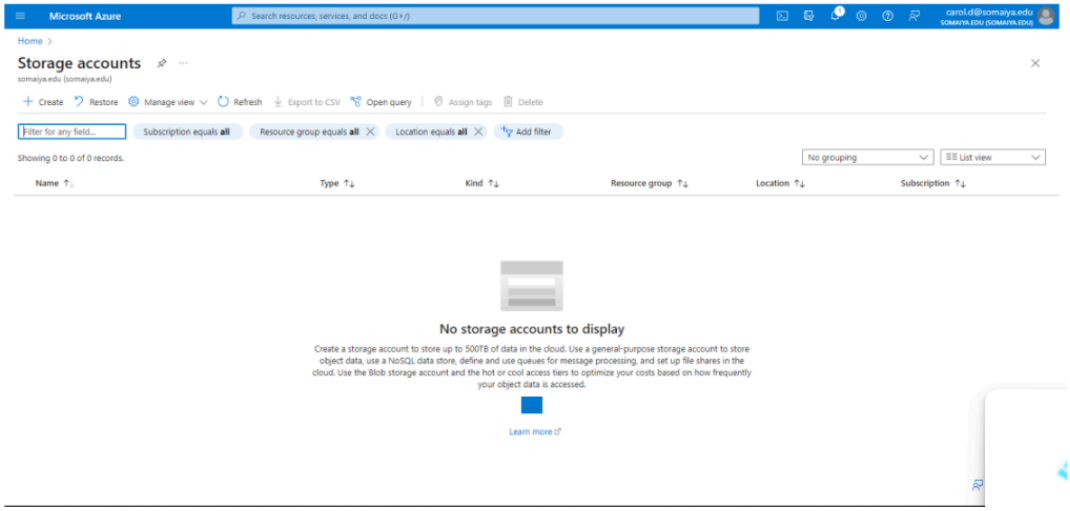
8. The command is executed as shown below in the Command Prompt and the local machine is now connected to the virtual machine.



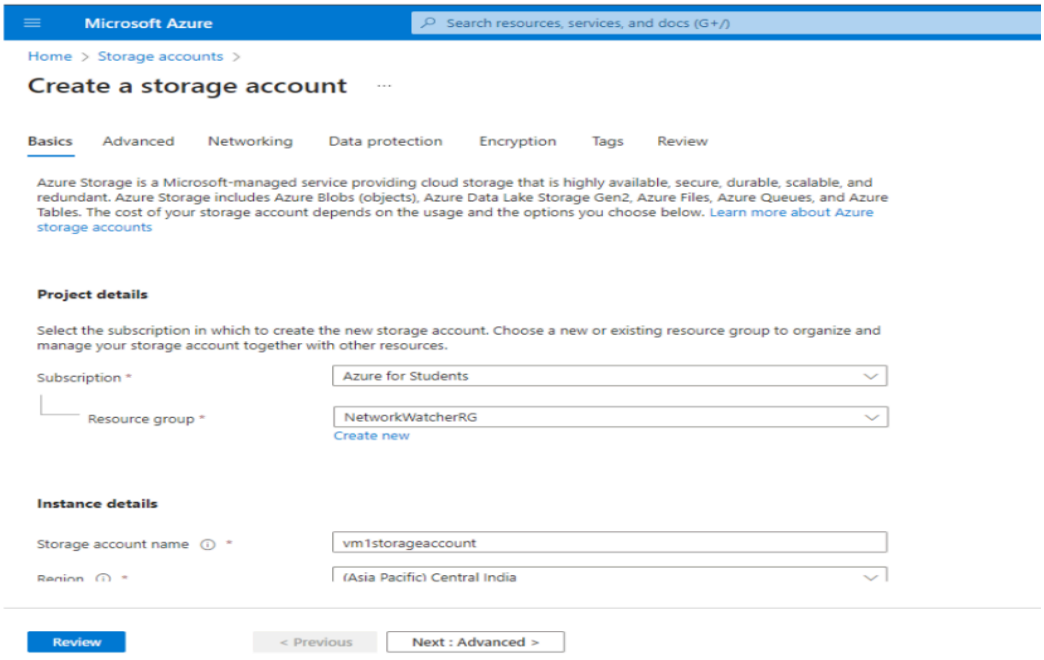
9. Go to Home and click on “Storage Accounts”.



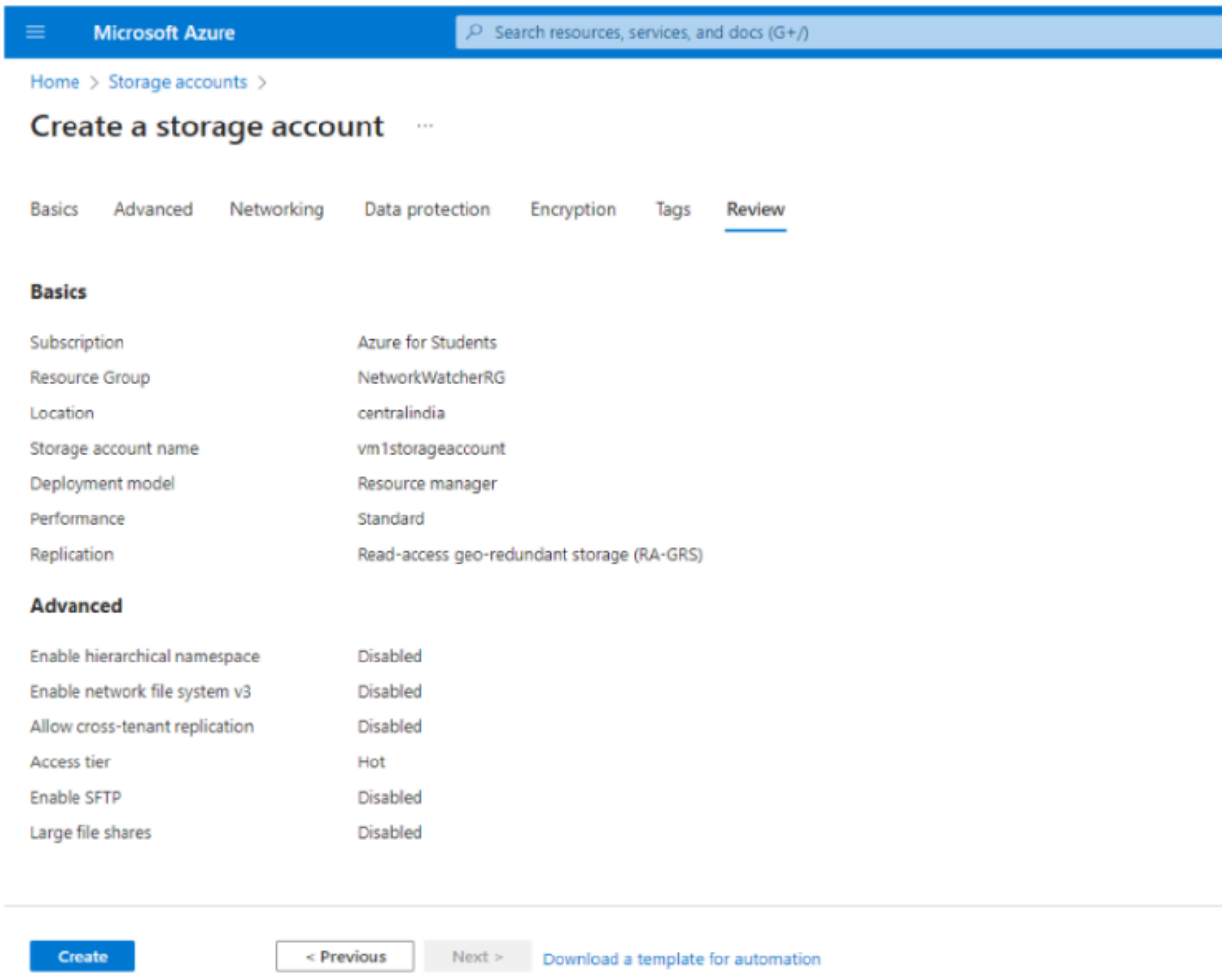
10. Click on “Create”



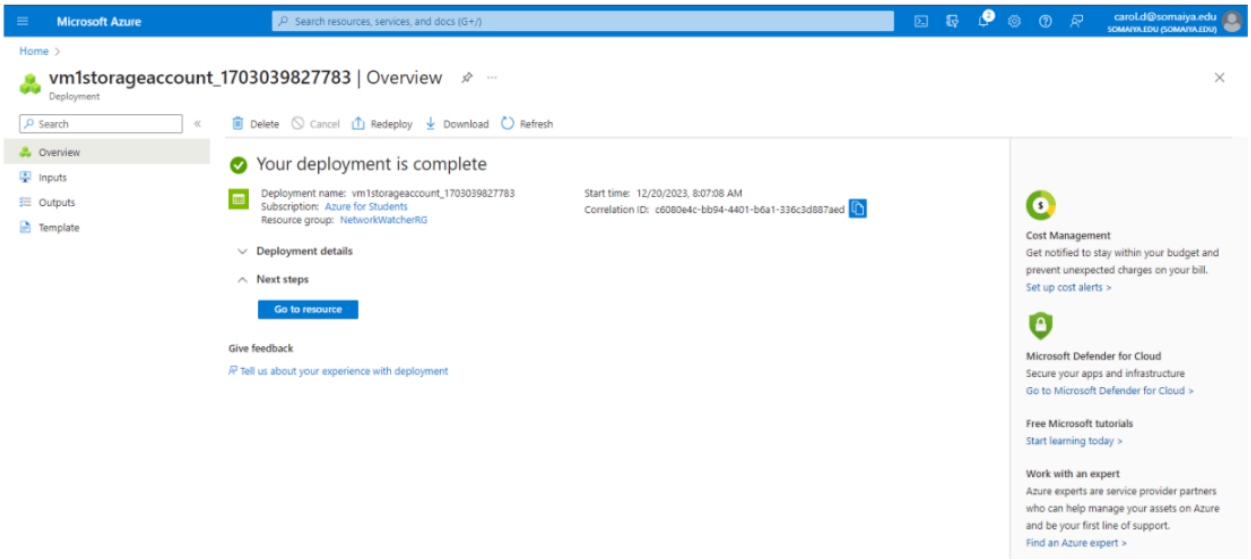
11. Enter the name of the storage account and fill in the required information. Click on “Review”



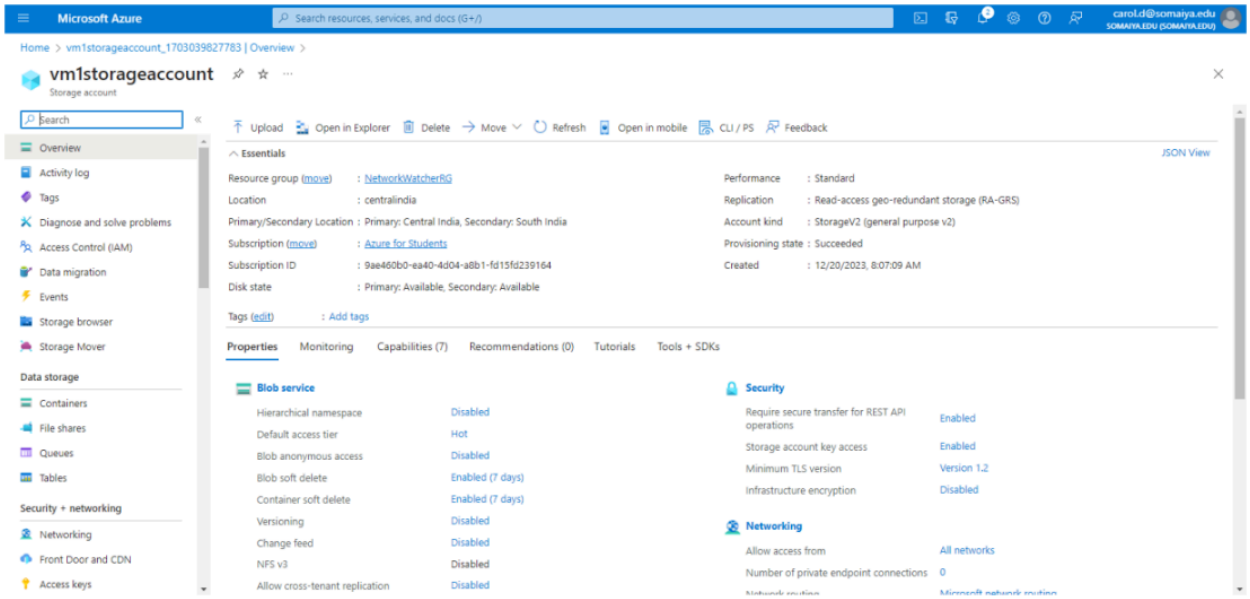
12. Then, click on “Create”.



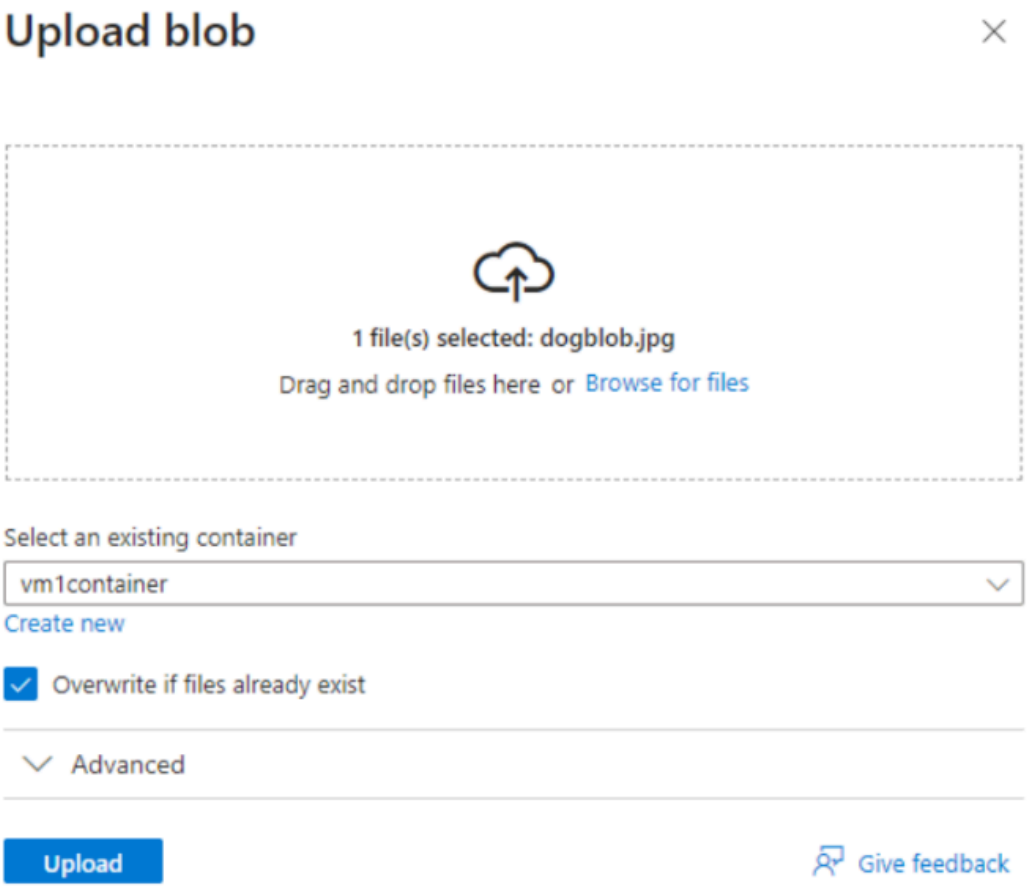
13. Here, the storage account has been created and deployment is completed. Click on “Go to resource”



14. Click on “Upload”.

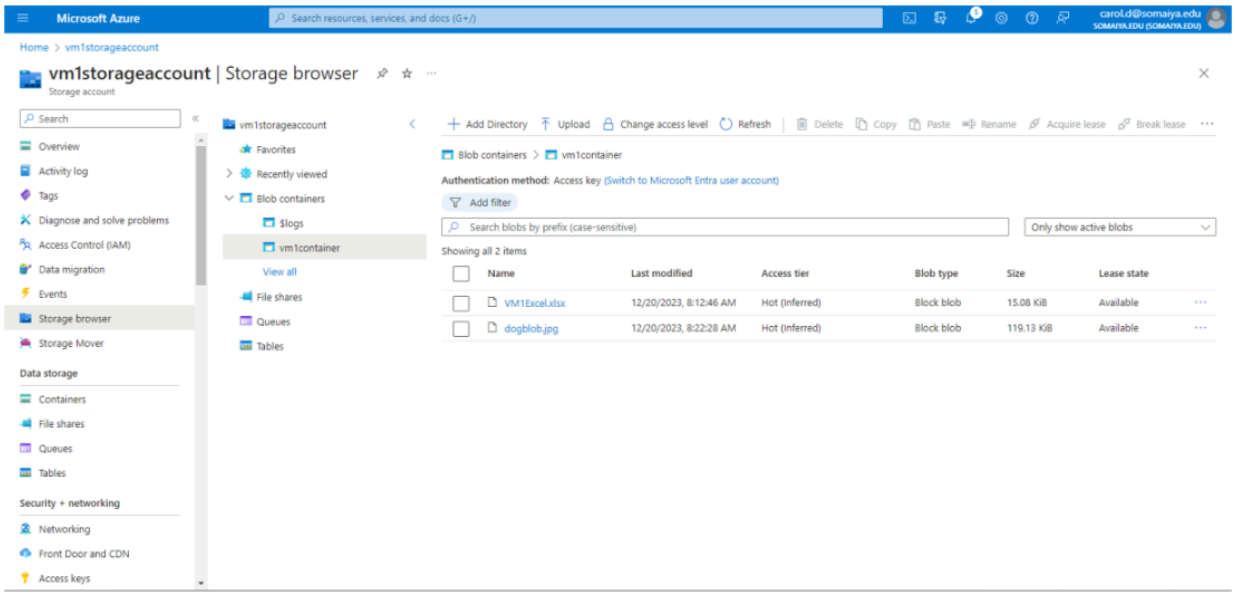


15. Download an image and save it. Upload the file by clicking on “Browse for files”. Create a new container and name it.



16. Navigate to “Storage Browser” and enter the blob container to see if the image file

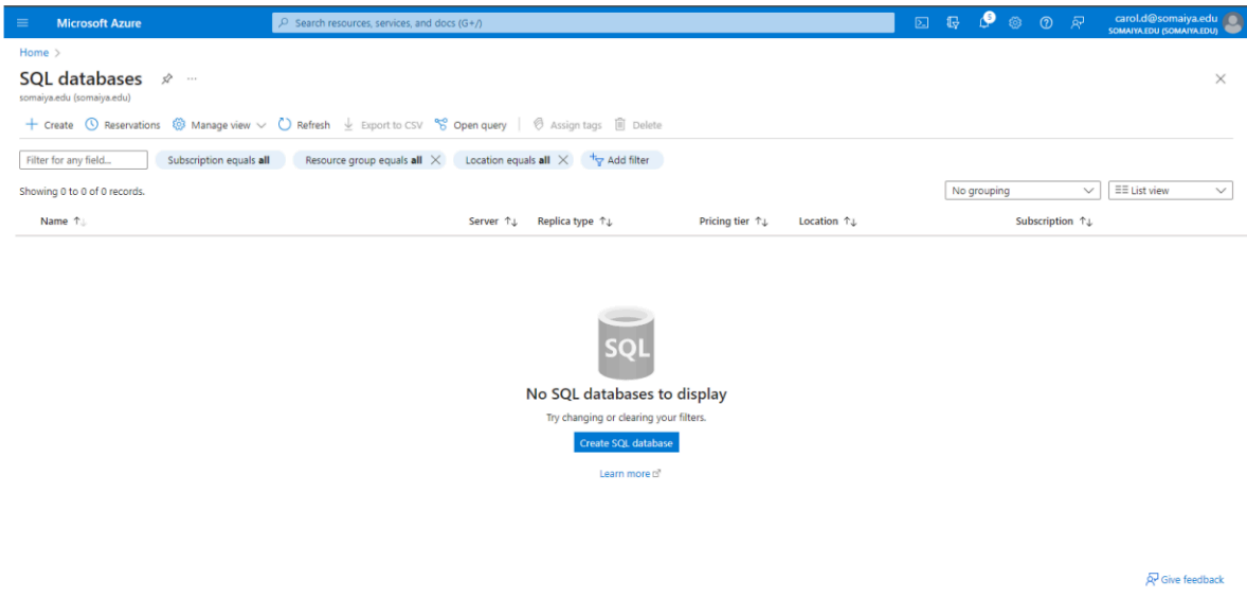
has been uploaded.



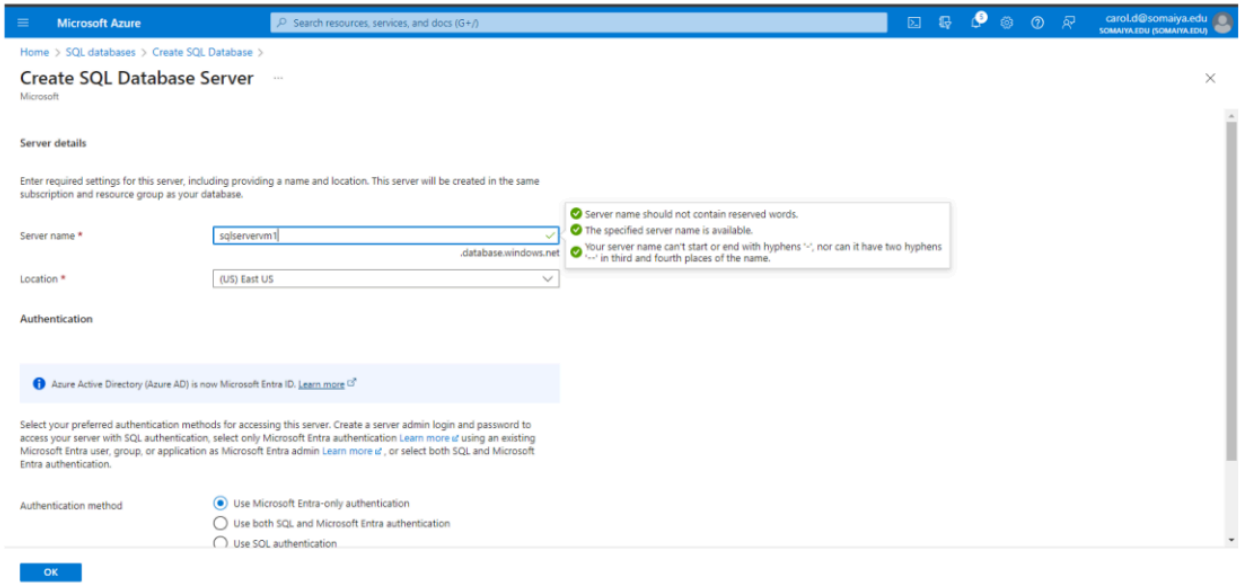
Practical 4: Creating SQL database in Azure.

1. Go to Home and click on “SQL databases”

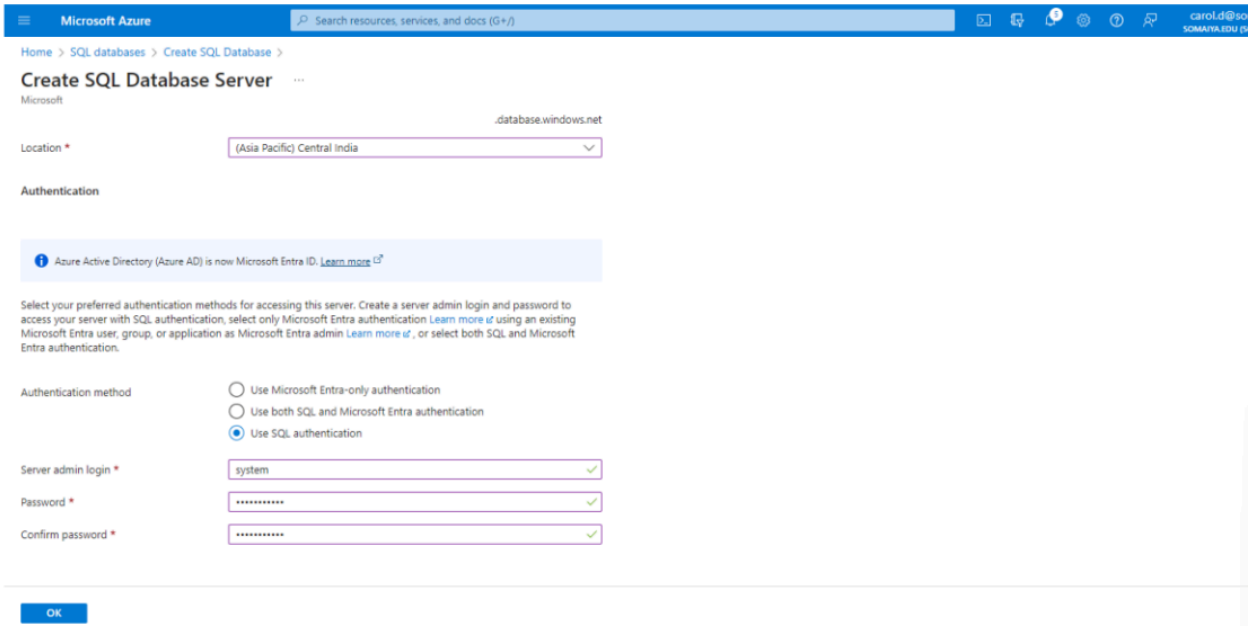
2. Click on “Create SQL database” to create a new database.



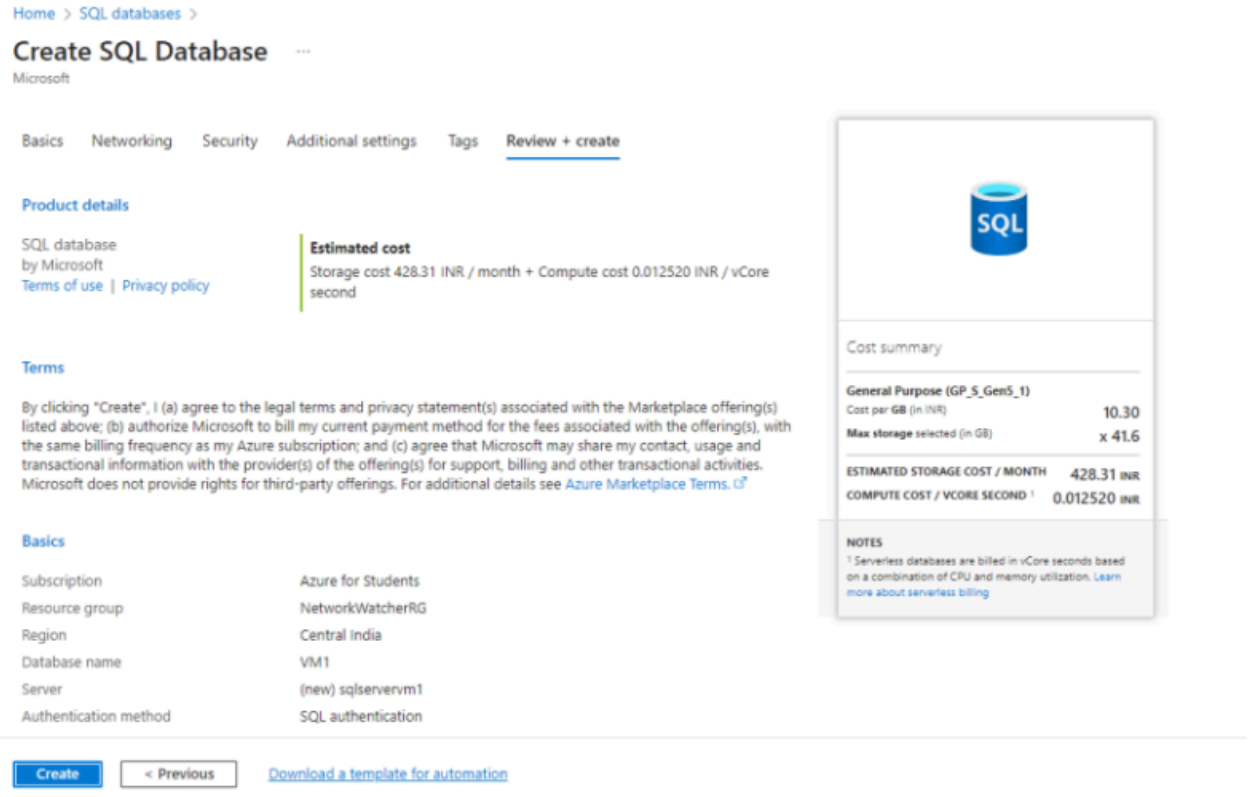
3. Enter the details for the SQL Database Server such as name and location.



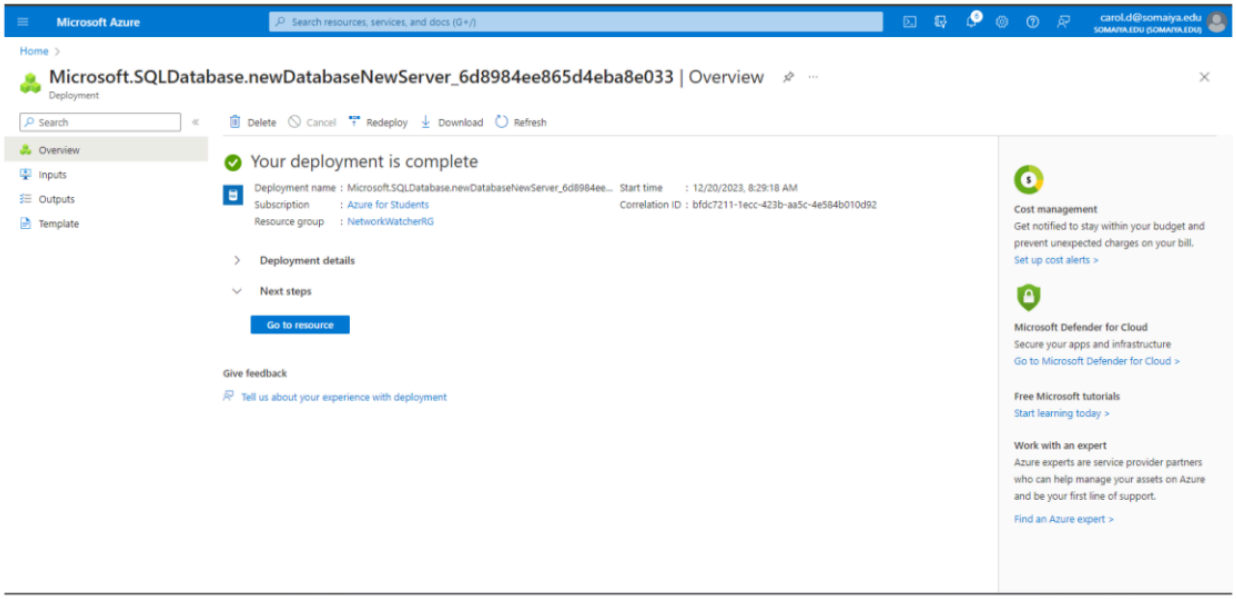
4. Select the “Authentication method” as “Use SQL authentication”. Enter the admin login and password (Remember the login and password). Then click “Ok”



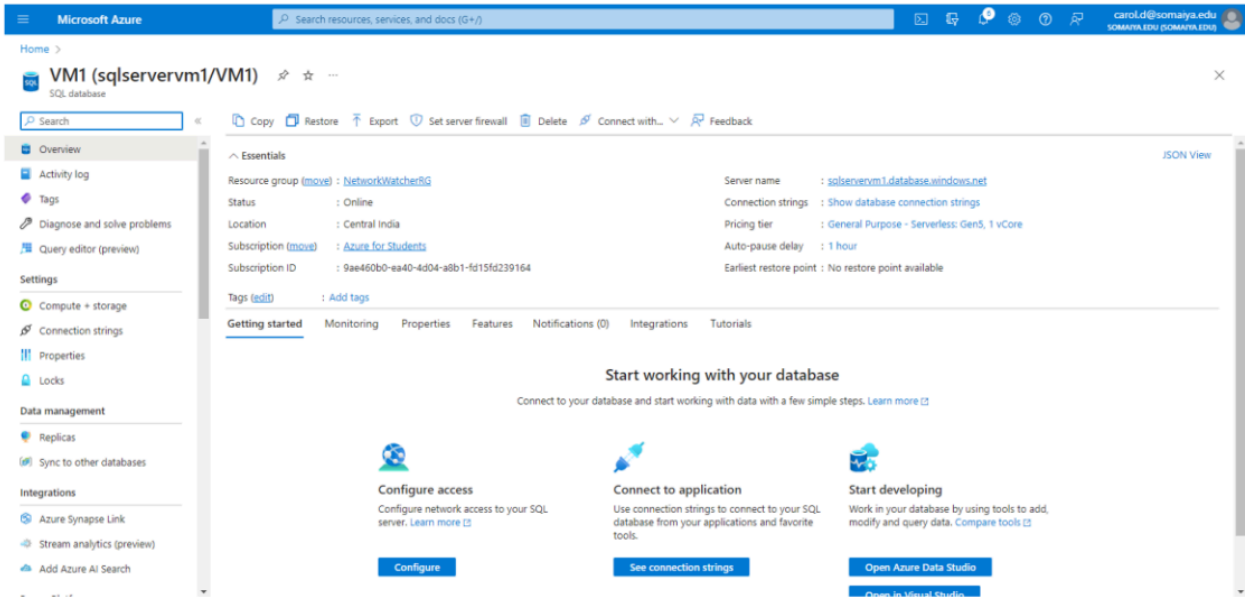
5. Under the “Review + create” tab, click on “Create”.



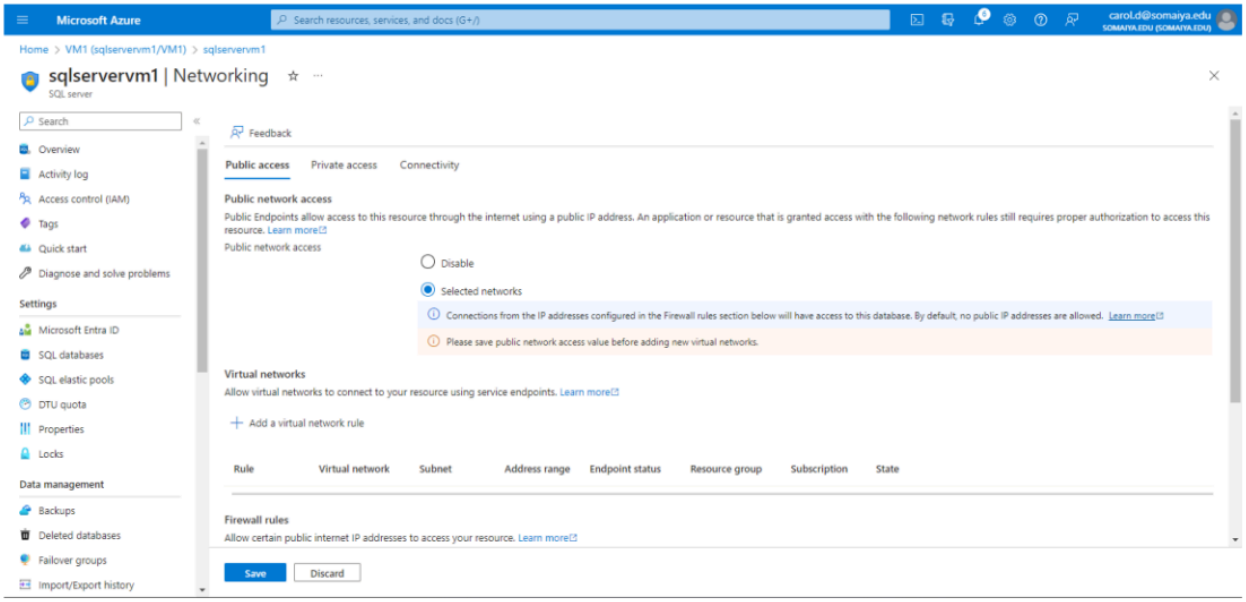
6. After deployment has been completed, click on “Go to resource”



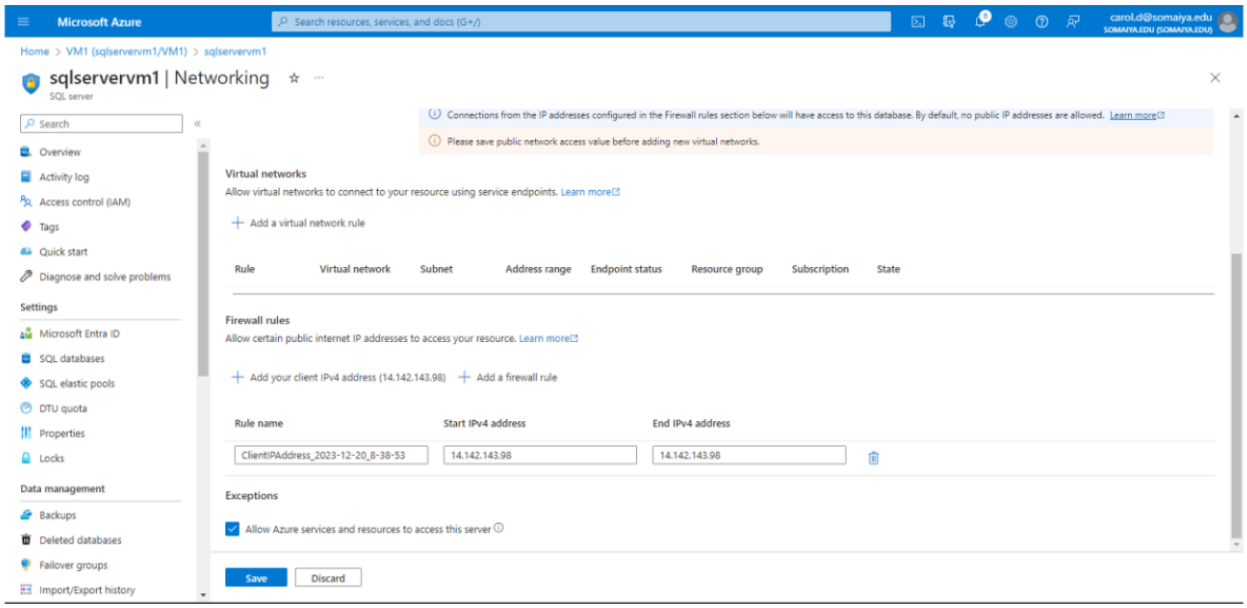
7. Click on “Properties”.



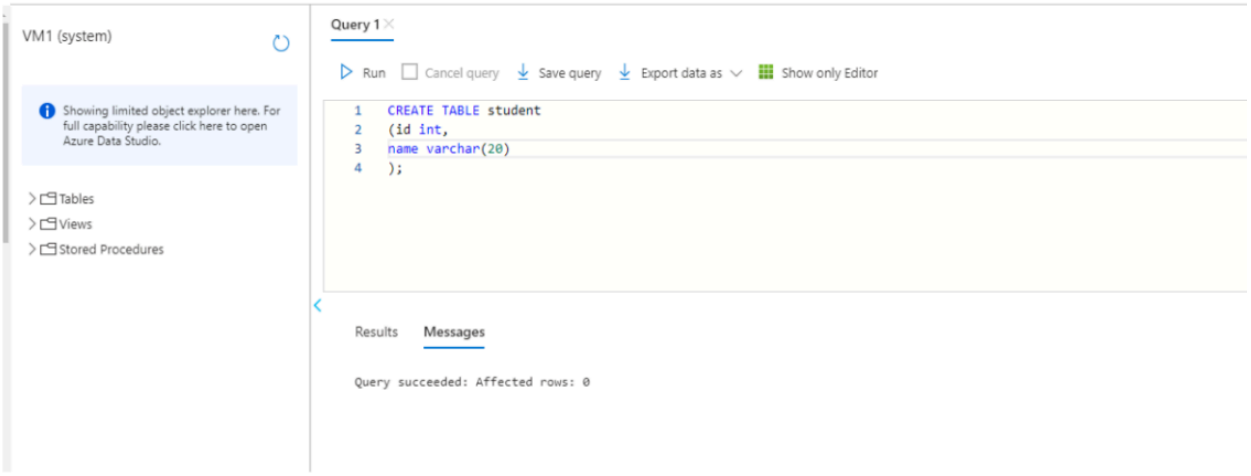
8. Click on “Networking” and then select “Selected Networks” under Public access.



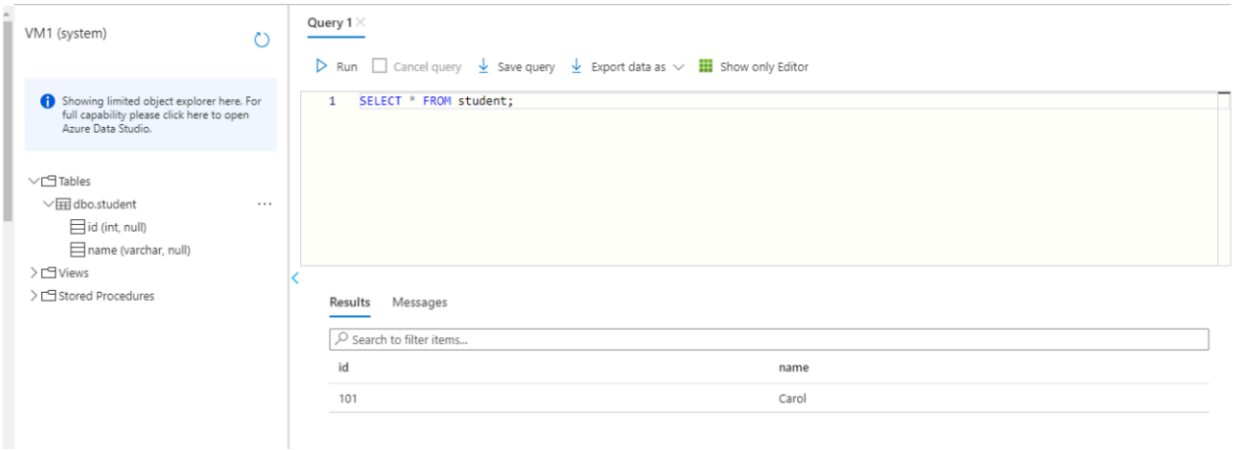
9. Click on “Add your client IPv4 address” and select the “Allow Azure services and resources to access this server” checkbox”. Then click “Save”



10. Navigate to the “Query editor” tab. Create a table using SQL queries and insert values into the table.

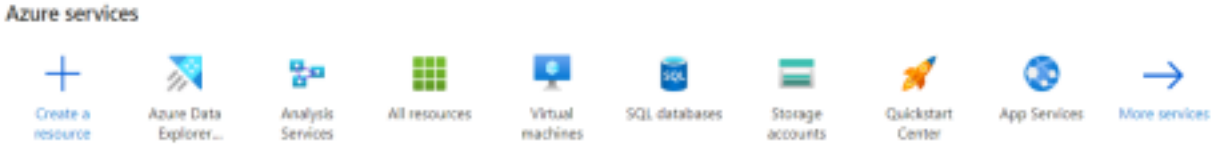


11. Display the columns present in the table using the “SELECT” statement.

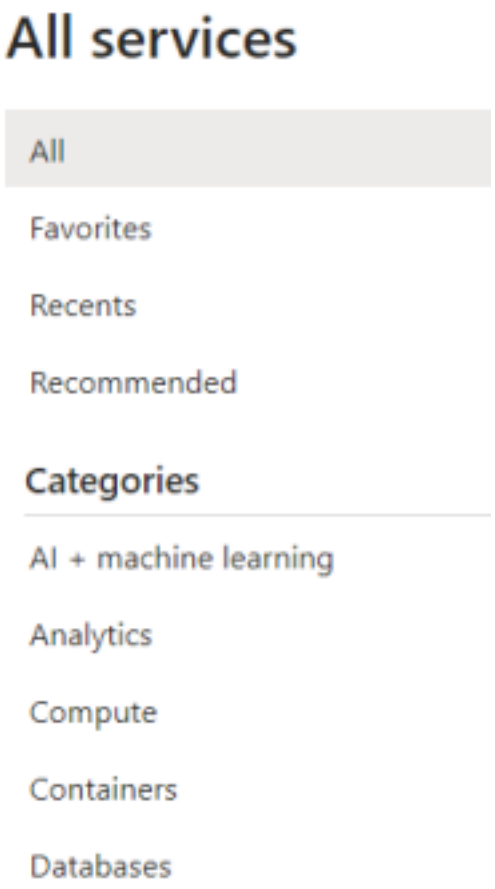


Practical 5:Performing power BI in Azure.

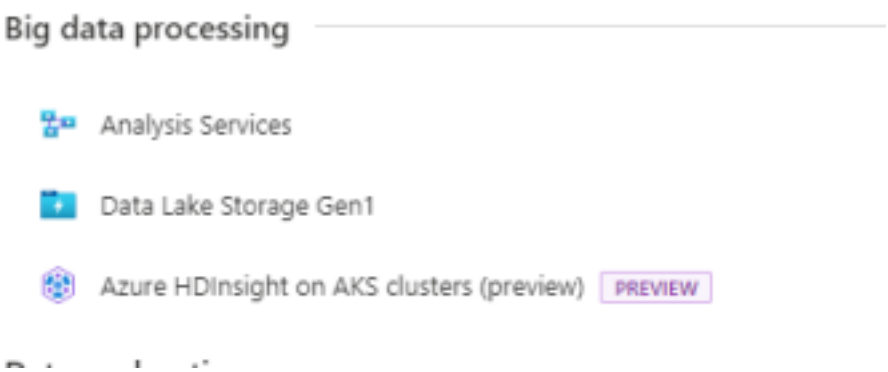
1. Login into Azure and click on “More Services”



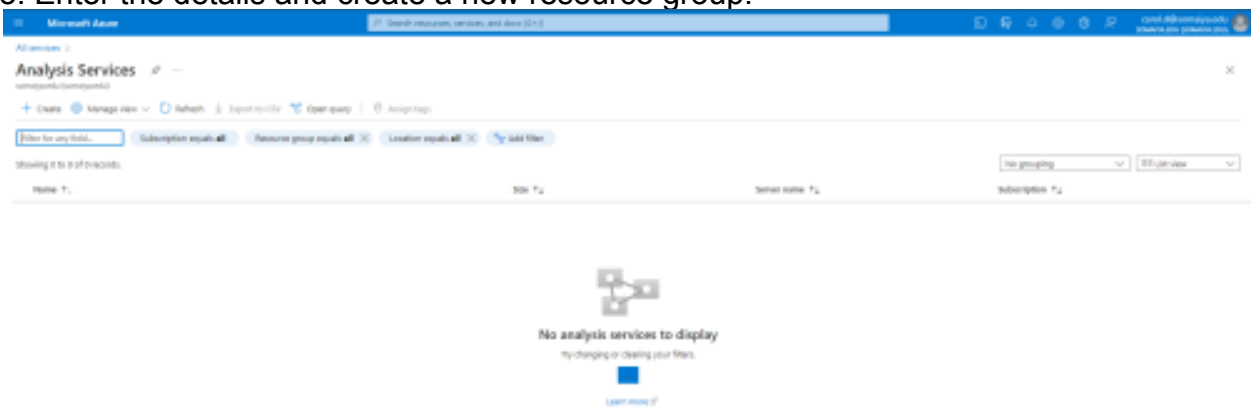
2. Under “All services”, click “Analytics”



3. Click on “Analysis Services”



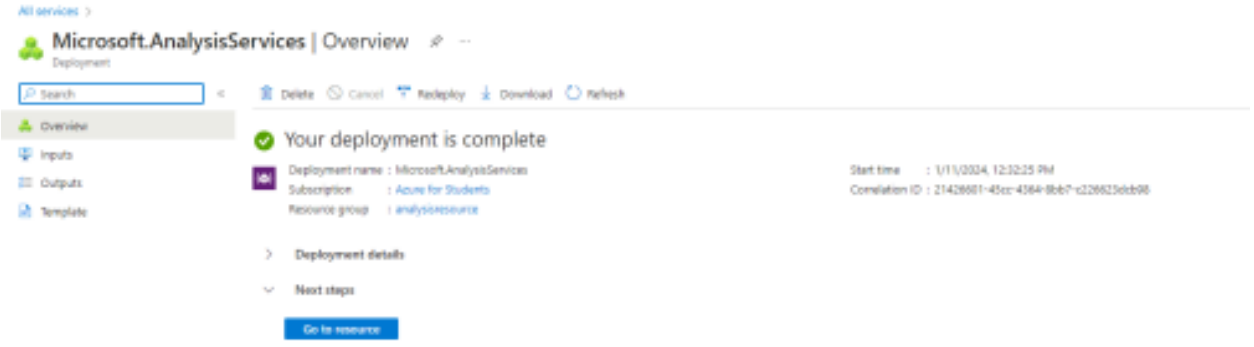
4. Click on “Create” in Analysis Services
5. Enter the details and create a new resource group.



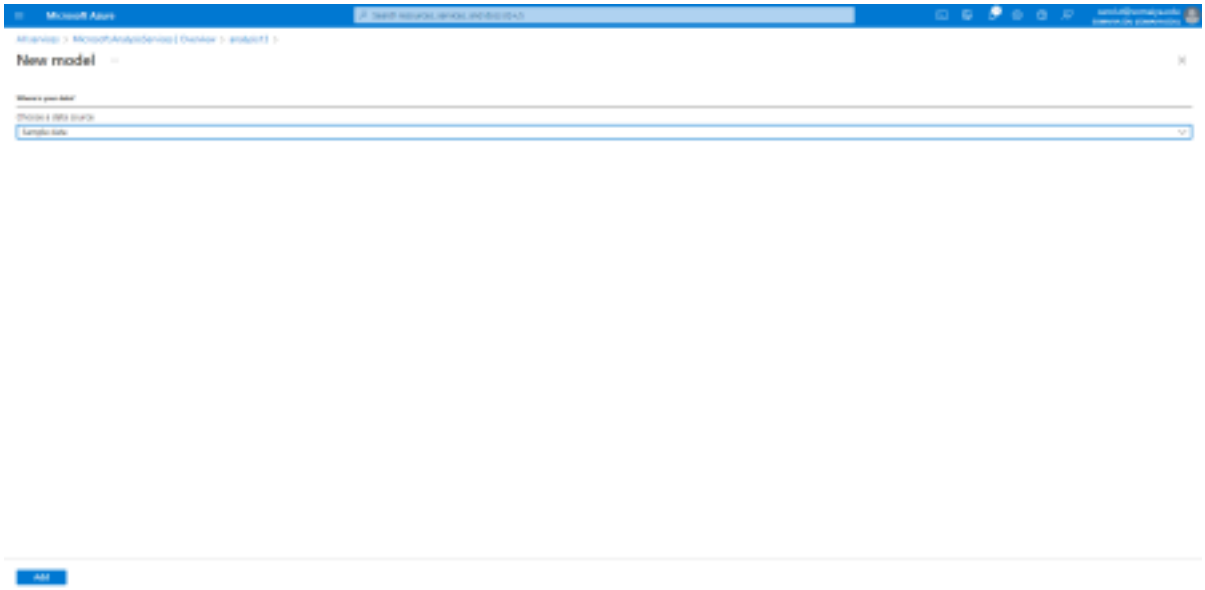
Select “B2 (80 Query Processing Units)” as the Pricing tier

6. After deployment is complete, click on “Go to resource”

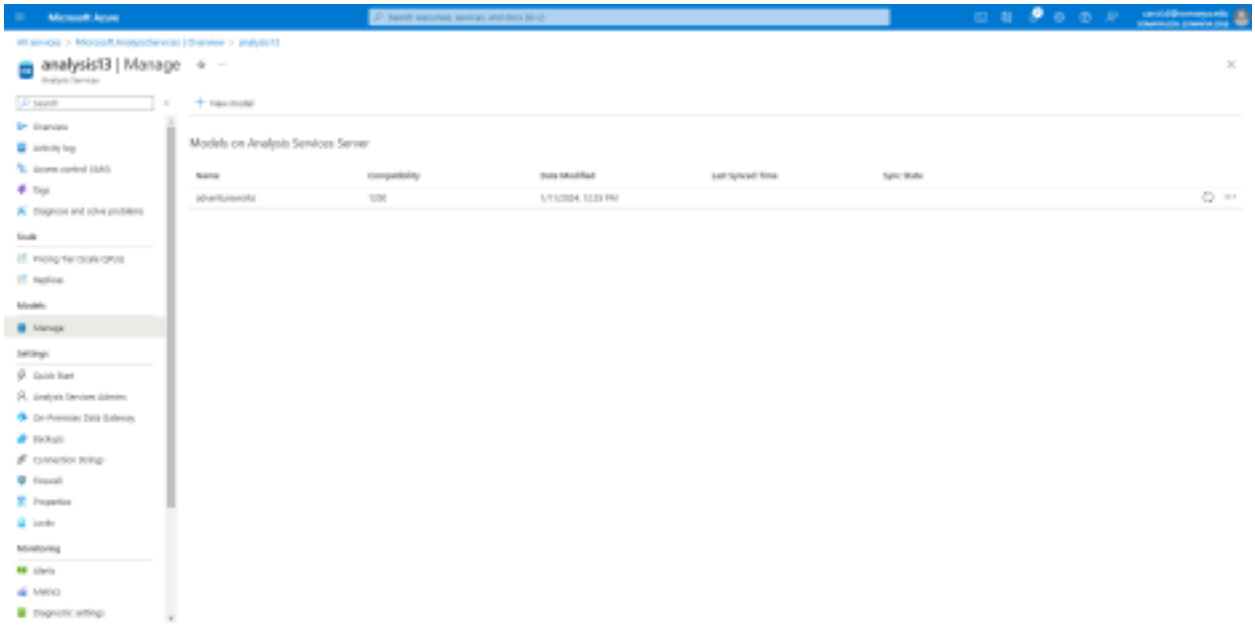
7. Select “New model”



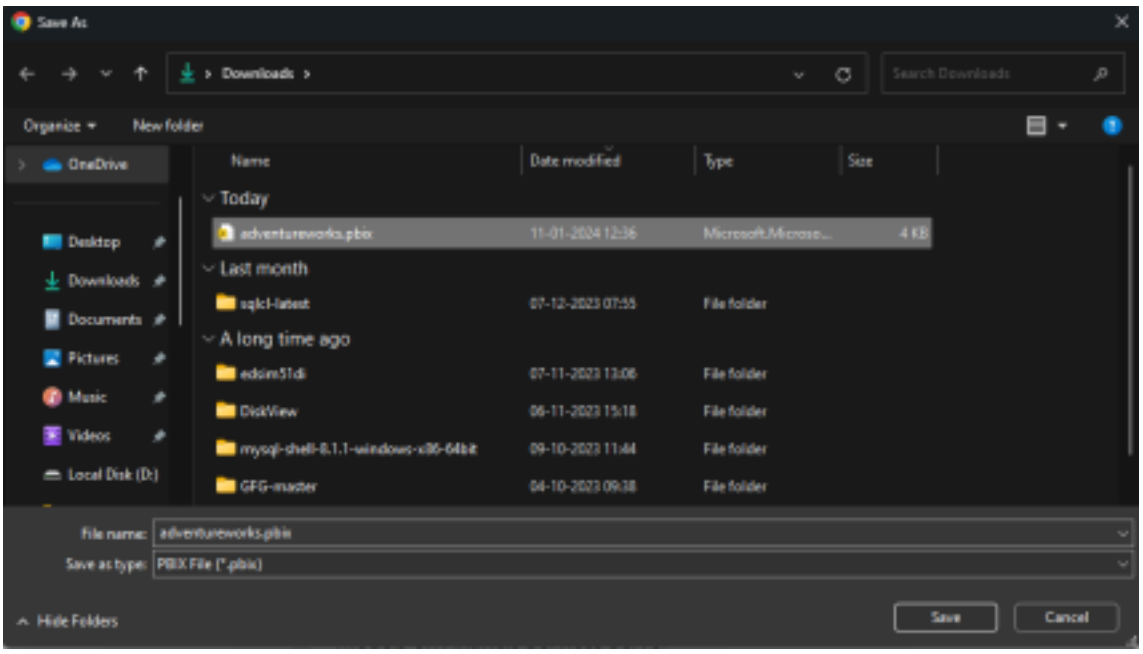
8. Choose the data source as “Sample data” and then click on “Add”



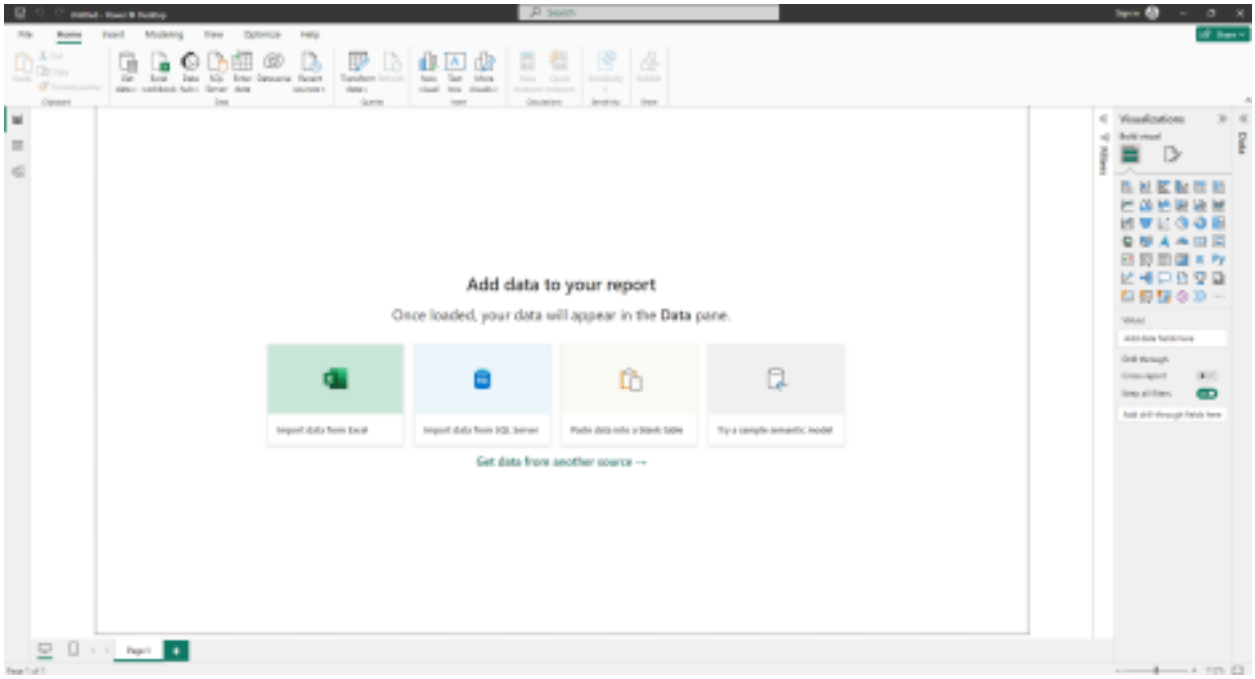
Navigate to the “Manage” tab and the sample data will be visible there.



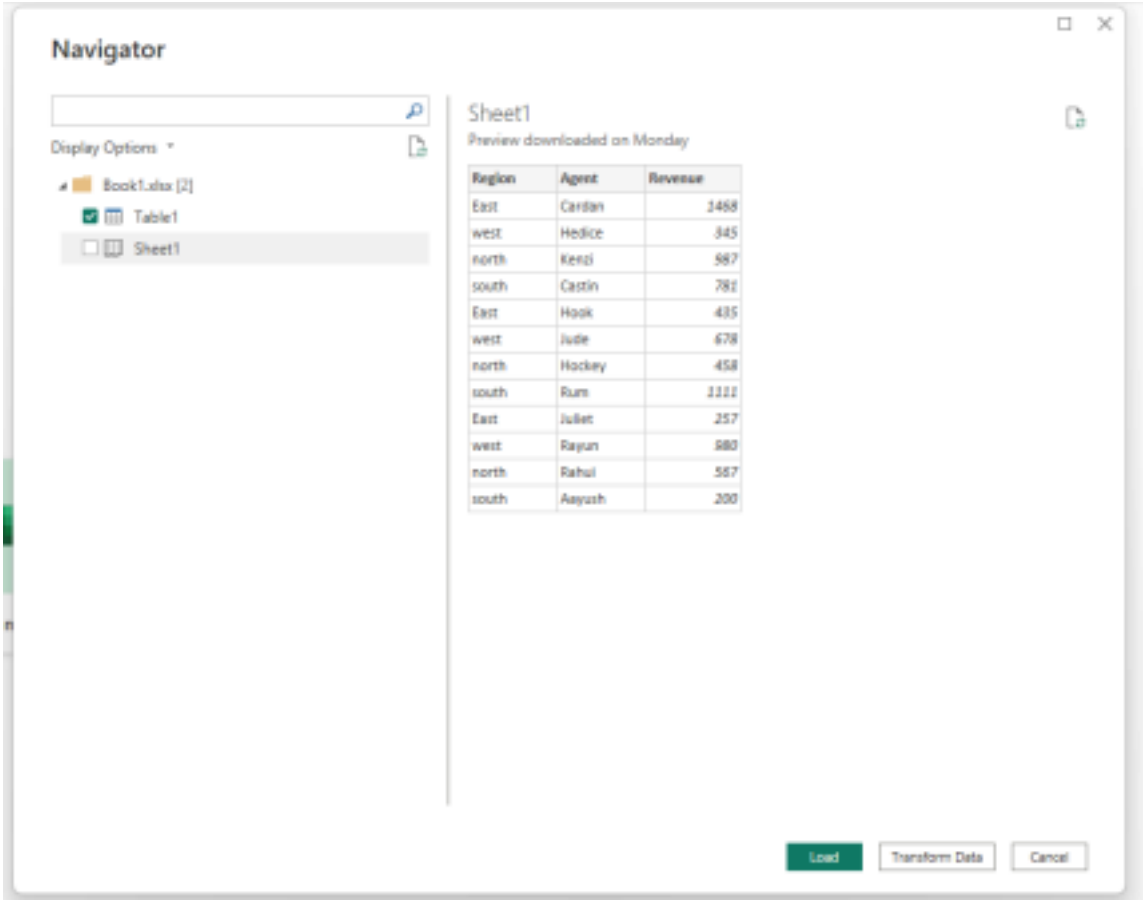
9. Right click on the sample data and select “Open in Power BI Desktop” Save the file



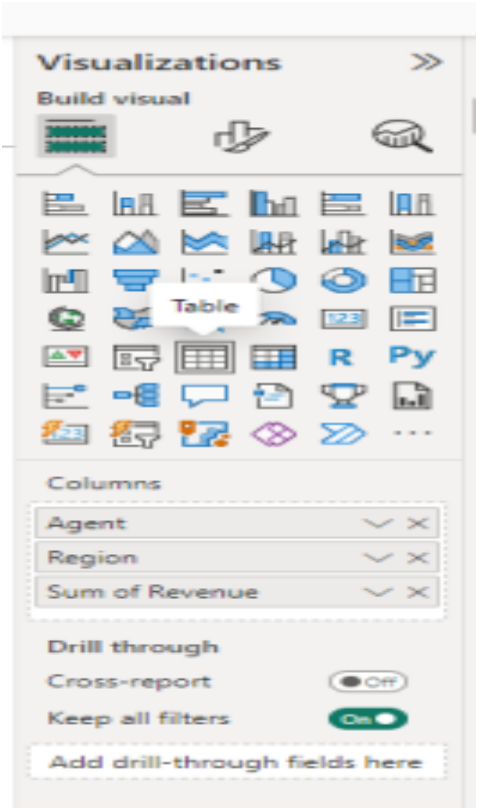
10. Once Power BI is opened, click on “Import data from Excel”

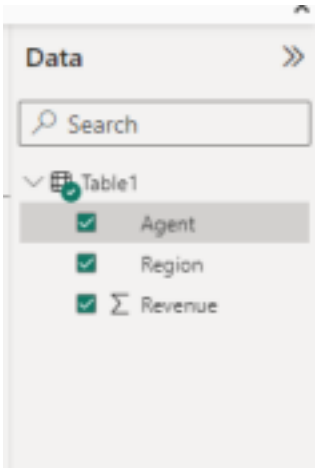


11. Add an excel sheet into Power BI and click on “Load”

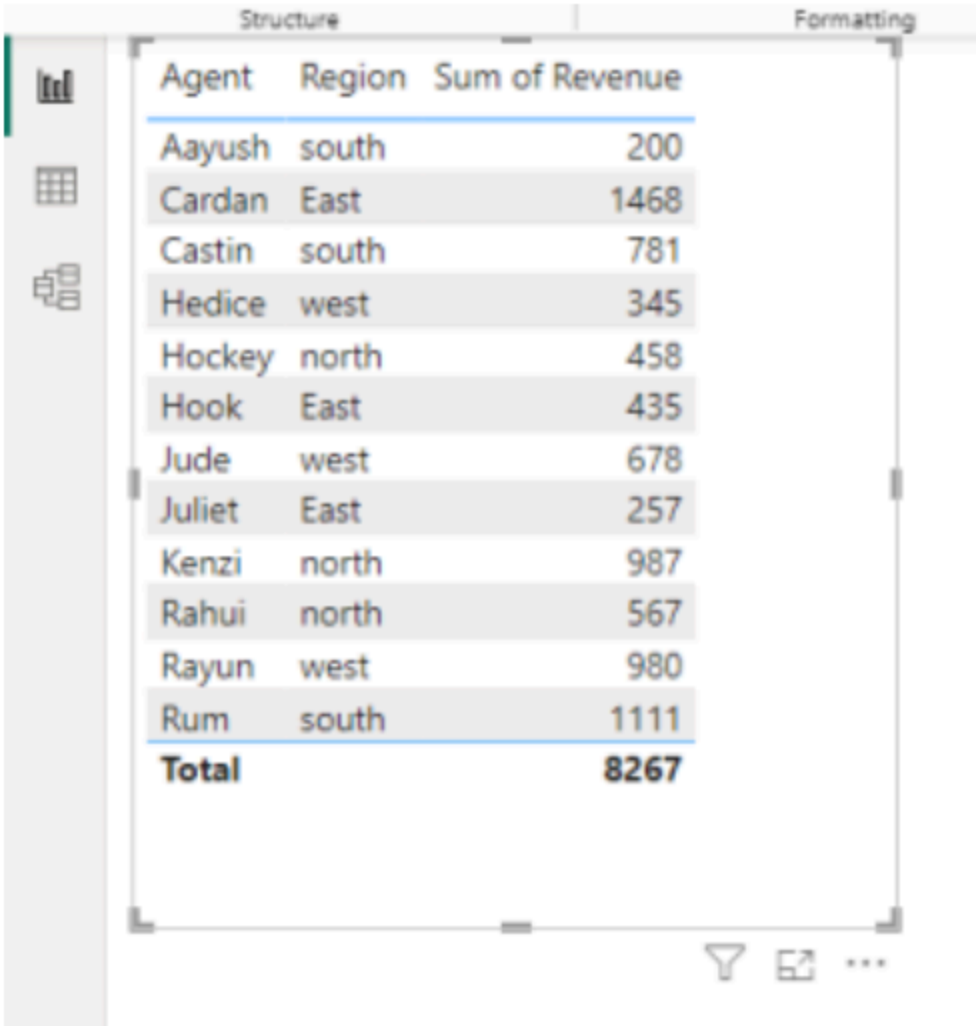


12. We use Power BI in order to visualize the data stored.
On the right hand side of the screen, select the visualizations you want (In this case, it is table) and select the various columns you want to visualize.



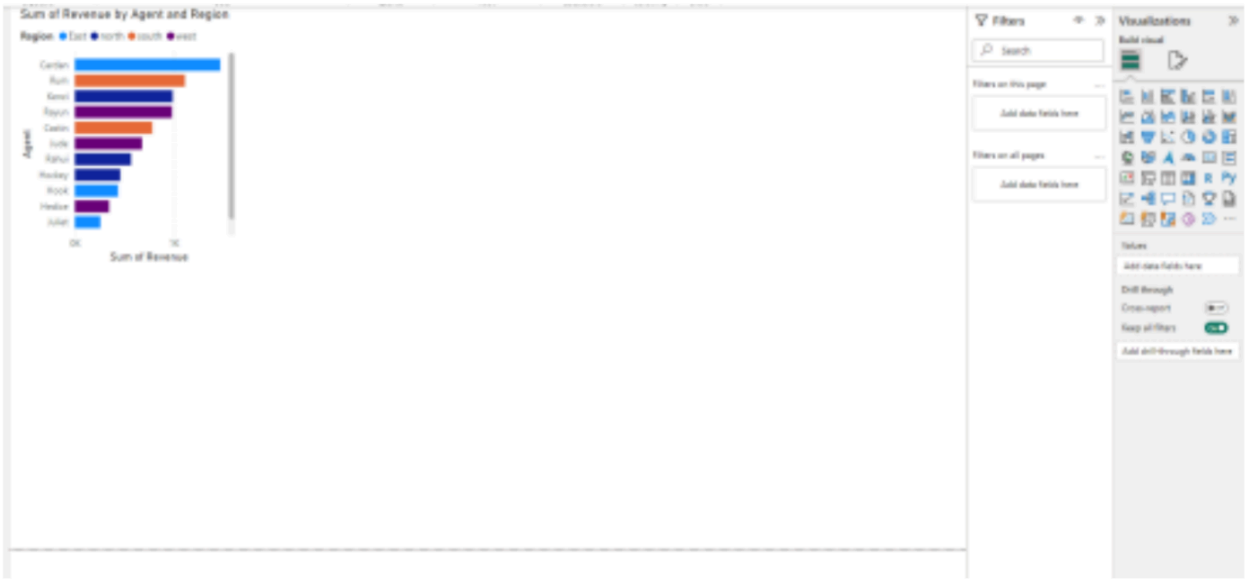


The output of the visualization is as shown below



Agent	Region	Sum of Revenue
Aayush	south	200
Cardan	East	1468
Castin	south	781
Hedice	west	345
Hockey	north	458
Hook	East	435
Jude	west	678
Juliet	East	257
Kenzi	north	987
Rahui	north	567
Rayun	west	980
Rum	south	1111
Total		**8267**

13.Similarly, we can use other visualizations in order to visualize the the data



Practical 6: Case study- Microsoft Azure.

Cloud Computing Case Study on Microsoft Azure
Tauseem Chaudhary,
Somaiya Vidyavihar University
Date: April 2024

Abstract—Cloud computing is an emerging paradigm that provides a promise to revolutionize the way the software development industry operates. In this paper, we perform a thorough case study of Microsoft Azure a popular cloud computing platform. We thoroughly study various key concepts and features provided by this platform. This study will provide researchers and in-depth understanding of various aspects of Microsoft Azure.

I. INTRODUCTION

A rapid growth in networking technologies and newly enabled features has resulted in a tremendous growth in user data and computation capability requirement for application design [1]–[8]. Cloud computing is a promising new paradigm that provides agility, scalability, and efficiency to the software design methodologies of the information technology (IT) industry. Further, its use can enable the design and development of various new applications for wireless communication use cases [9]–[13].

Microsoft Azure is a cloud computing platform and infrastructure created by Microsoft for building, deploying, and managing applications and services through a global network of Microsoft-managed data centers. It provides both PaaS and IaaS services and supports many different programming languages, tools, and frameworks, including both Microsoft-specific and third-party software and systems.

Azure Storage is massively scalable, so a user can store and process hundreds of terabytes of data to support the big data scenarios required by scientific, financial analysis, and media applications. Further, the user can store the small amounts of data required for a small business website. Such capabilities are also required for development of new analytic features [14]–[16]. Wherever the user needs fall, the users pay only for the data they store.

Azure Storage currently stores tens of trillions of unique customer objects, and handles millions of requests per second on average.

II. BENEFITS OF AZURE STORAGE

Azure Storage supports clients using a diverse set of operating systems (including Windows and Linux) and a variety of programming languages (including .NET, Java, and C++) for convenient development. Azure Storage also exposes data resources via simple REST APIs, which are available to any client capable of sending and receiving data via HTTP/HTTPS.

III. DETAILS OF MICROSOFT AZURE WEBSITES

Microsoft Azure Web Sites is implemented as websites that are dynamically created on-demand on servers running Windows Server 2012 and IIS 8.0. When a client posts a request to a web site, Microsoft Azure Web Sites dynamically provisions the site on one of the Azure virtual machines pointing it at content stored in Azure Storage containers. The Azure Virtual Machines are deployed in groups called "Stamps," which may contain hundreds of such machines. Microsoft deploys these stamps in its Azure centers across the world and adds more stamps as demand grows.

IV. SERVICES PROVIDED BY MICROSOFT AZURE

Microsoft lists over 50 Azure services including: Azure Active Directory B2C, Azure Active Directory, Azure Active Directory Domain Services, API Management, Application Gateway, Visual Studio Application Insights, App Service, Automation, Backup, Batch, BizTalk Services, CDN, Cloud Services, Azure Container Service, Data Catalog, Data Factory, Data Lake Analytics, Data Lake Store, Azure DevTest Labs, AzureDNS, DocumentDB, Event Hubs, ExpressRoute, HDInsight, Azure IoT Hub, Key Vault, Load Balancer, Machine Learning, Managed Cache Service, Media Services, Mobile Engagement, Mobile Services, Multi-Factor Authentication, Notification Hubs, Operational Insights, Redis Cache, RemoteApp, Scheduler, Search, Security Center, Service Bus, Service Fabric, SiteRecovery, SQL Database, SQL Data Warehouse, SQL Server Stretch Database, Storage, StorSimple, Stream Analytics, Traffic Manager, Virtual Machines, Virtual Network, Visual Studio Team Services, VPN Gateway.

V. KEY FEATURES PROVIDED BY MICROSOFT AZURE

The key features of Microsoft Azure are covered below:

A. Compute

These services provide virtual machines, containers, batch processing, and remote application access.

- App services, platform as a service (PaaS) environment letting developers easily publish and manage websites.
- Websites, high density hosting of websites allows developers to build sites using ASP.NET, PHP, Node.js, or Python and can be deployed using FTP, Git, Mercurial, or Team Foundation Server. This feature was announced in preview form in June 2012 at the Meet Microsoft Azure event. Customers can create websites in PHP, ASP.NET, Node.js, or Python, or select from several open source applications from a gallery to deploy. This comprises one aspect of the platform as a service (PaaS) offerings for the Microsoft Azure Platform. It was renamed to Web Apps in April 2015.
- WebJobs, applications which can be deployed to a Web App to implement background processing. That can be invoked on a schedule, on demand or can run continuously. The Blob, Table, and Queue services can be used to communicate between Web Apps and Web Jobs and to provide state.

Refer to fig. 1 to view various services covered under Compute feature of Microsoft Azure.

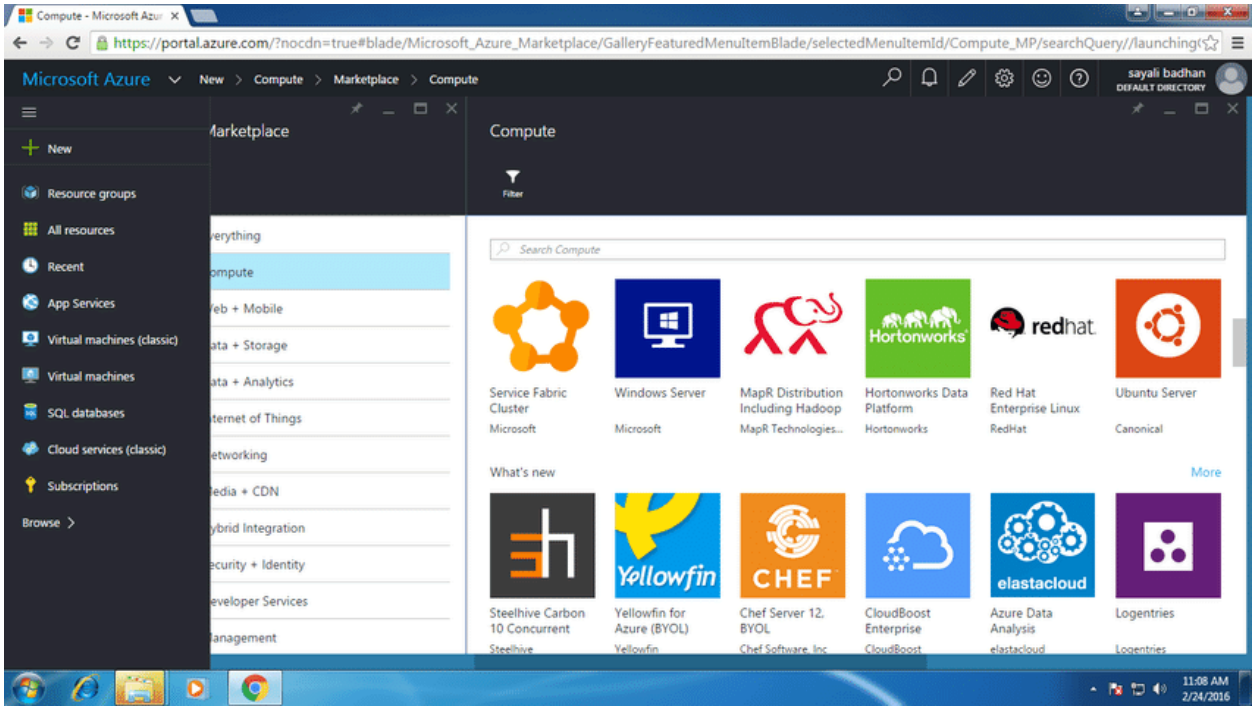


Fig. 1: Services under Compute feature

B. Networking

This group includes virtual networks, dedicated connections and gateways, as well as services for traffic management, load balancing and domain name system (DNS) hosting.

- Virtual Network, a hosted Virtual private network.
- Azure DNS, a DNS domain hosting service. It provides domain name resolution services using the cloud infrastructure of Microsoft Azure. The Azure DNS services are integrated with other Azure services in terms of APIs, billing, credentials. The Azure DNS service is built upon the highly scalable cloud infrastructure provided by Microsoft Azure. The deployment is Anycast based and the service has a high global footprint to provide faster network resolution. Azure DNS is currently open for public preview.
- ExpressRoute allows creation of private connections between Azure datacenters and infrastructure that's on your premises or in a colocation environment. ExpressRoute connections don't go over the public Internet (sometimes called "dark fiber") and offer more reliability, faster speeds (it's like a leased line), lower latencies (one hop to Azure), and may offer higher security than typical Internet connections. In some cases, using ExpressRoute connections to transfer data between on-premises systems and Azure can also yield significant cost benefits.

Refer to fig. 2 to view various services covered under Networking feature of Microsoft Azure.

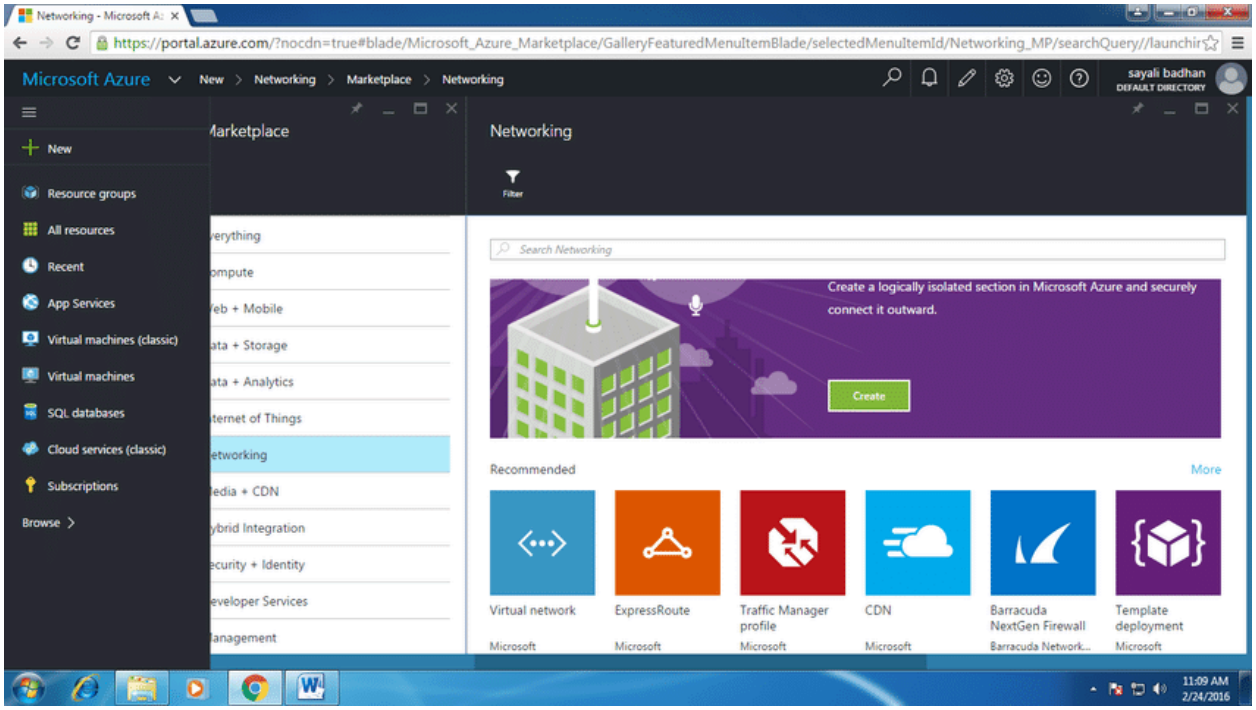


Fig. 2: Services under Networking feature

C. Data+Storage

This category includes Database offerings for SQL and NoSQL, as well as unstructured and cached cloud storage. Azure Storage provides the flexibility and hyper-scale needed to store and retrieve large amounts of data. Use Azure Blob Storage (Object Storage) to store unstructured data, such as documents and media files. Use Azure Table Storage for structured NoSQL data. Use Azure Queue Storage to reliably store messages. And use SMB-based Azure File Storage for existing or new applications—no code changes are required.

- SQL Database, formerly known as SQL Azure Database, works to create, scale, and extend applications into the cloud using Microsoft SQL Server technology. It also integrates with Active Directory and Microsoft System Center and Hadoop.
- Azure Search provides text search and a subset of [OData]'s structured filters using REST or SDK APIs.
- DocumentDB is a NoSQL database service that implements a subset of the [SQL] SELECT statement on [JSON] documents.
- Redis Cache is a managed implementation of Redis.
- StorSimple manages storage tasks between on-premises devices and cloud storage.

Refer to fig. 3 to view various services covered under Data+Storage feature of Microsoft Azure.

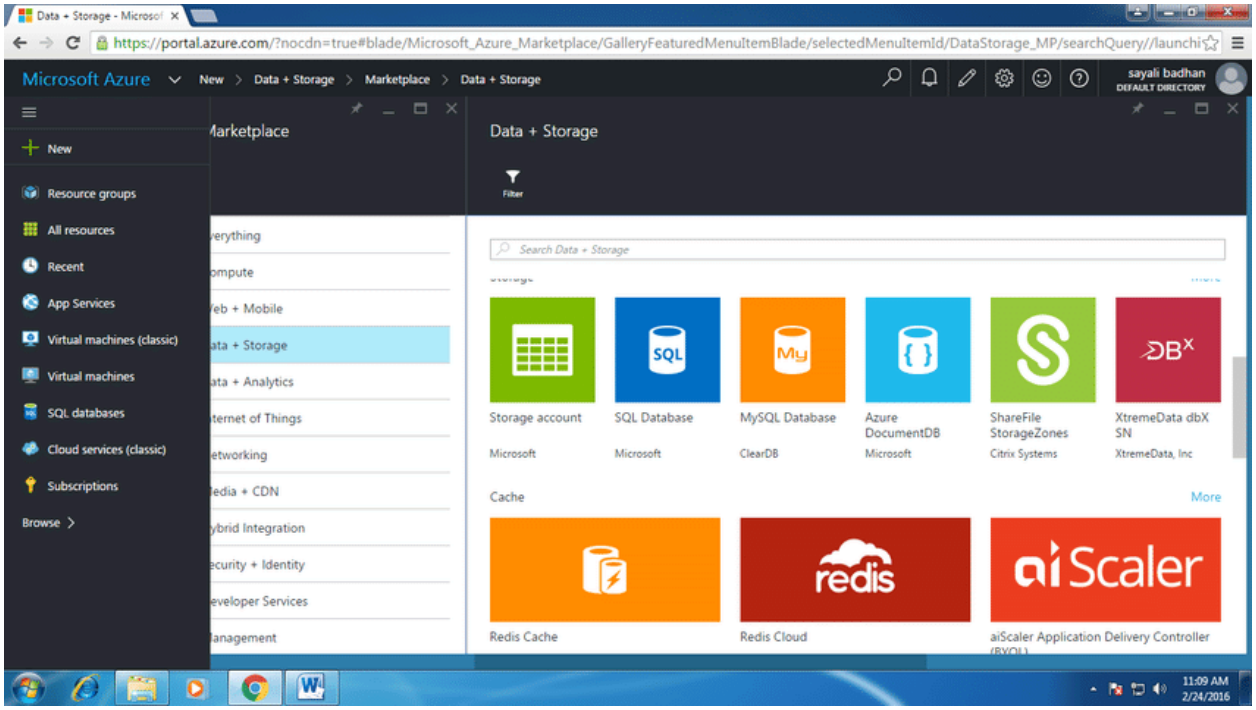


Fig. 3: Services under the Data+Storage feature

VI. CONCLUSION

In this paper, we study about one cloud computing platform: Microsoft Azure. First, we study what is Microsoft Azure. Following this, we go through its benefits and various services provided by Microsoft Azure. Finally, we explore different features provided by Microsoft Azure like compute, data+storage, Networking in detail.

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Practical 7: Case study- Amazon EC2

A CASE STUDY OF AMAZON WEB SERVICES: AMAZON EC2

Tauseem Chaudhary,
Somaiya Vidyavihar University
Date: April 2024

Abstract-A tremendous growth in user data has led to design and development of a number of analytic tools. To support such tools, efficient cloud computing services have become the need of the hour. This paper studies Amazon Web Services, a popular cloud computing platform. The paper provides an overview of features of the platform such as AWS security and identity, computation, storage, content delivery, etc.

I. INTRODUCTION

A rapid growth of network usage has led to an increasing transmission of user data over it [1]–[8]. User data not only exposes what users want but also provides an insight into how users think and behave. Consequently, a number of analytic tools [9]–[16] have been developed to process such user data to generate interesting trends from them. However, to support such features, efficient cloud computing platforms are extremely important.

Amazon Web Services (AWS) is a collection of cloud computing services, also called services that make up a cloud-computing platform offered by Amazon.com. These services operate from 12 geographical regions across the world. The most central and well-known of these services arguably include Amazon Elastic Compute Cloud, also known as ”EC2”, and Amazon Simple Storage Service, also known as ”S3”. Amazon markets AWS as a service to provide large computing capacity more quickly and more cheaply than a client company building an actual physical server farm.

II. LOCATIONS OF SERVICE

AWS is located in 12 geographical ”regions”:
- US East (Northern Virginia), where the majority of AWS servers are based
- US West (northern California)
- US West (Oregon)
- Brazil (Sao Paulo)
- Europe (Ireland and Germany)
- Southeast Asia (Singapore)
- East Asia (Tokyo, Seoul, Beijing)

- Australia (Sydney)

There is also a ”GovCloud”, based in the Northwestern United States, provided for U.S. government customers, complementing existing government agencies already using the US East Region. Each Region is wholly contained within a single country, and all of its data and services stay within the designated Region.

III. AWS SECURITY AND IDENTITY

#A. AWS Identity and Access Management (IAM)

AWS Identity and Access Management (IAM) is a web service that helps you securely control access to AWS resources for your users. You use IAM to control who can use your AWS resources (authentication) and what resources they can use and in what ways (authorization).

#B. Features

- Shared access to your AWS account
- Granular permissions
- Secure access to AWS resources for applications that run on Amazon EC2
- Multi-factor authentication (MFA)
- Identity federation
- Identity information for assurance
- PCI DSS Compliance
- Integrated with many AWS services
- Eventually Consistent
- Free to use
- AWS SDKs

#C. AWS Certificate Manager (ACM)

AWS Certificate Manager (ACM) handles the complexity of provisioning, deploying, and managing certificates provided by ACM (ACM Certificates) for your AWS-based websites and applications.

IV. COMPUTE FEATURE OF AWS: AMAZON EC2

Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud. Using Amazon EC2 eliminates your need to invest in hardware upfront, so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.

#A. Features of Amazon EC2
- Virtual computing environments, known as instances
- Preconfigured templates for your instances, known as Amazon Machine Images (AMIs)
- Various configurations of CPU, memory, storage, and networking capacity for your instances, known as instance types
- Secure login information for your instances using key pairs
- Storage volumes for temporary data that's deleted when you stop or terminate your instance, known as instance store volumes
- Persistent storage volumes for your data using Amazon Elastic Block Store (Amazon EBS), known as Amazon EBS volumes
- Multiple physical locations for your resources, such as instances and Amazon EBS volumes, known as regions and Availability Zones

#B. How to Get Started with Amazon EC2
The first thing you need to do is get set up to use Amazon EC2. After you are set up, you are ready to complete the Getting Started tutorial for Amazon EC2. Whenever you need more information about a feature of Amazon EC2, you can read the technical documentation.

V. STORAGE & CONTENT DELIVERY: CLOUDFRONT

Amazon CloudFront is a content delivery web service. It integrates with other Amazon Web Services products to give developers and businesses an easy way to distribute content to end users with low latency, high data transfer speeds, and no minimum usage commitments. Amazon CloudFront can be used to deliver your entire website, including dynamic, static, streaming, and interactive content using a global network of edge locations. Requests for your content are automatically routed to the nearest edge location, so content is delivered with the best possible performance. Amazon CloudFront is optimized to work with other Amazon Web Services, like Amazon Simple Storage Service (Amazon S3), Amazon Elastic Compute Cloud (Amazon EC2), Amazon Elastic Load Balancing, and Amazon Route 53. Amazon CloudFront also works seamlessly with any non-AWS origin server, which stores the original, definitive versions of your files.

VI. DATABASE: RDS

Amazon Relational Database Service (Amazon RDS) is a web service that makes it easier to set up, operate, and scale a relational database in the cloud. It provides cost-efficient, resizable capacity for an industry-standard relational database and manages common database administration tasks. Amazon RDS manages backups, software patching, automatic failure detection, and recovery. In order to deliver a managed service experience, Amazon RDS does

not provide shell access to DB instances, and it restricts access to certain system procedures and tables that require advanced privileges. You can have automated backups performed when you need them, or create your own backup snapshot. These backups can be used to restore a database, and the Amazon RDS restore process works reliably and efficiently.

VII. CONCLUSION

We studied various Amazon Web Services (AWS) which is a

collection of cloud computing services that make up a cloud-computing platform offered by Amazon.com. Also studied about Amazon EC2 in detail.

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This format presents a structured and detailed overview of the Amazon EC2 case study, following the guidelines provided in the previous example. You can use this as a reference or modify it as per your requirements.

Practical 8: Case study- Oracle cloud.

A CASE STUDY OF ORACLE CLOUD

Tauseem Chaudhary,
Somaiya Vidyavihar University
Date: April 2024

Abstract
The demand for scalable, secure, and reliable cloud computing services has led to the rise of various cloud platforms. This paper delves into Oracle Cloud, a comprehensive cloud computing platform offered by Oracle Corporation. It provides an overview of key features such as compute, storage, networking, security, and database services, highlighting its benefits and advantages.

I. INTRODUCTION

With the exponential growth of data and the need for advanced computing capabilities, cloud computing has become an integral part of modern business operations. Oracle Cloud is a cloud computing service offered by Oracle Corporation, providing a wide range of services to support various business needs. This paper aims to explore the features and benefits of Oracle Cloud, focusing on its compute, storage, networking, security, and database offerings.

II. ORACLE CLOUD REGIONS

Oracle Cloud operates in multiple geographic regions across the globe, allowing users to deploy resources closer to their end-users for improved performance and compliance. Some of the key regions include:
- North America (US)
- Europe (UK, Germany, Switzerland, Netherlands)
- Asia Pacific (Japan, India, Australia)
- Middle East (UAE, Saudi Arabia)
- South America (Brazil)

Each region is designed to comply with local data privacy and sovereignty laws, ensuring data residency and regulatory compliance.

III. COMPUTE SERVICES: ORACLE COMPUTE

Oracle Compute is a core service within Oracle Cloud, offering scalable and flexible compute resources for various workloads. Key features include:
- Virtual Machine Instances: Create and manage virtual machines (VMs) with customizable CPU, memory, and storage configurations.
- Bare Metal Instances: Provision dedicated physical servers for high-performance and security-sensitive applications.
- Container Engine: Run and manage Docker containers at scale with Oracle's Kubernetes-based container service.
- Functions: Serverless computing platform for running code without provisioning or managing servers.

Oracle Compute enables users to deploy, scale, and manage applications with ease, supporting diverse workload requirements.

IV. STORAGE SERVICES: ORACLE STORAGE

Oracle Storage provides reliable and scalable storage solutions for data management and backup. Key offerings include:
- Object Storage: Store and retrieve large amounts of unstructured data such as images, videos, and documents.
- Block Volumes: High-performance block storage for VMs and bare metal instances, with options for encryption and replication.
- File Storage: Fully managed file storage service for shared file systems, suitable for enterprise applications and databases.
- Archive Storage: Cost-effective long-term storage for data archival and compliance needs.

With Oracle Storage, users can securely store, manage, and access their data while benefiting from scalability and durability.

V. NETWORKING SERVICES: ORACLE NETWORKING

Oracle Networking services provide the foundation for connecting and managing cloud resources. Key features include:
- Virtual Cloud Networks (VCNs): Software-defined networks for isolating and segmenting cloud resources.
- Load Balancing: Distribute incoming traffic across multiple compute instances for improved performance and availability.
- VPN Connect: Securely connect on-premises data centers to Oracle Cloud using encrypted VPN tunnels.
- FastConnect: Dedicated private connections between on-premises infrastructure and Oracle Cloud data centers for low-latency, high-bandwidth networking.

Oracle Networking empowers users to build secure, scalable, and high-performance networks for their cloud environments.

VI. SECURITY SERVICES: ORACLE SECURITY

Security is a top priority for Oracle Cloud, with a range of built-in security services and controls. Key security features include:
- Identity and Access Management (IAM): Manage user identities, roles, and access policies to control resource permissions.
- Security Zones: Isolate and protect critical workloads by defining security boundaries within Oracle Cloud.
- Encryption: Secure data at rest and in transit with encryption capabilities for storage volumes, databases, and network traffic.
- Security Monitoring: Real-time monitoring and alerting for potential security threats and vulnerabilities.
- Compliance Reporting: Generate compliance reports and audits to meet regulatory requirements.

Oracle Cloud's robust security framework ensures data protection, compliance, and threat detection for users' cloud environments.

VII. DATABASE SERVICES: ORACLE DATABASE

Oracle Database services offer a range of database options tailored to different business needs. Key offerings include:
- Autonomous Database: Self-driving, self-securing, and self-repairing database service for high-performance, automated data management.
- Exadata Cloud Service: Fully managed Oracle Exadata infrastructure for mission-critical database workloads with high availability and performance.
- Database Backup: Automated and scalable backup solutions for Oracle databases, ensuring data protection and disaster recovery.
- Database Migration: Tools and services for migrating on-premises databases to Oracle Cloud with minimal downtime and effort.

Oracle Database services empower organizations to leverage powerful database technologies with the simplicity and scalability of the cloud.

VIII. CONCLUSION

In conclusion, Oracle Cloud offers a comprehensive suite of cloud computing services designed to meet the diverse needs of modern businesses. From compute and storage to networking, security, and databases, Oracle Cloud provides a scalable, secure, and reliable platform for running mission-critical workloads and applications. By leveraging Oracle Cloud's capabilities, organizations can accelerate innovation, reduce costs, and drive business growth in the digital era.

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6. "Oracle Database Services: A Comprehensive Guide" by Oracle Corporation.

This case study provides a detailed overview of Oracle Cloud, focusing on its key services, features, and benefits. It can serve as a reference for understanding the capabilities and advantages of Oracle's cloud computing platform.

Practical 9: Case study- Google cloud.

A CASE STUDY OF GOOGLE CLOUD

Tauseem Chaudhary,
Somaiya Vidyavihar University
Date: April 2024

Abstract
In the rapidly evolving landscape of cloud computing, Google Cloud has emerged as a prominent player, offering a wide array of services for businesses of all sizes. This case study delves into the key features and benefits of Google Cloud, exploring its compute, storage, networking, security, and machine learning capabilities.

I. INTRODUCTION

Cloud computing has become a cornerstone of modern IT infrastructure, enabling businesses to scale, innovate, and stay competitive. Google Cloud, the cloud computing platform by Google, provides a suite of services designed to meet the demands of today's digital landscape. This case study aims to explore the diverse offerings of Google Cloud, highlighting its versatility and advantages.

II. GOOGLE CLOUD REGIONS

Google Cloud operates in a global network of regions and zones, allowing users to deploy resources closer to their end-users for improved performance. Some key regions include:
- North America (US)
- Europe (UK, Germany, Netherlands)
- Asia Pacific (Singapore, Japan, India)
- South America (Brazil)
- Australia

Each region is designed to provide low-latency, high-availability environments with robust data residency options for compliance.

III. COMPUTE ENGINE: GOOGLE COMPUTE

Google Compute Engine is a core component of Google Cloud, offering flexible and scalable virtual machine (VM) instances. Key features include:
- Custom Machine Types: Create VMs with customized CPU, memory, and storage configurations to meet specific workload requirements.
- Predefined Machine Types: Choose from a range of predefined machine types optimized for general-purpose, memory-intensive, or compute-intensive workloads.
- Managed Instance Groups: Automatically manage and scale groups of VM instances based on demand, ensuring high availability and reliability.
- Google Kubernetes Engine (GKE): Managed Kubernetes service for deploying, managing, and scaling containerized applications.

Google Compute Engine provides users with the agility and flexibility to run various workloads efficiently in the cloud environment.

IV. STORAGE SERVICES: GOOGLE STORAGE

Google Cloud Storage offers scalable, durable, and cost-effective storage solutions for businesses of all sizes. Key offerings include:
- Cloud Storage Standard: Highly available and durable object storage for storing unstructured data such as images, videos, and backups.
- Cloud Storage Nearline: Cost-effective storage for data that is accessed less frequently but requires quick access when needed.
- Cloud Storage Coldline: Low-cost archival storage for data that is accessed infrequently and stored for long-term retention.
- Cloud Filestore: Managed file storage for enterprise applications, providing high performance and compatibility with NFS protocols.

With Google Cloud Storage, users can securely store, access, and manage their data with ease, ensuring high availability and durability.

V. NETWORKING SERVICES: GOOGLE NETWORKING

Google Cloud Networking offers a robust and scalable network infrastructure to connect and optimize cloud resources. Key features include:
- Virtual Private Cloud (VPC): Securely isolate and control network traffic within Google Cloud environments using customizable VPC networks.

- Cloud Load Balancing: Distribute incoming traffic across multiple instances or regions for improved availability and performance.
- Cloud Interconnect: Establish private, high-bandwidth connections between on-premises networks and Google Cloud using dedicated interconnects or VPNs.
- Network Intelligence Center: Gain visibility and control over network performance and security with real-time monitoring, diagnostics, and insights.

Google Networking services enable users to build secure, reliable, and performant networks tailored to their specific needs.

VI. SECURITY SERVICES: GOOGLE SECURITY

Security is a top priority for Google Cloud, with a comprehensive set of tools and services to protect cloud environments. Key security features include:
- Identity and Access Management (IAM): Manage user identities and control access to resources with fine-grained permissions and policies.
- Cloud Identity-Aware Proxy (IAP): Enforce access controls based on user identity and context, securing applications running on Google Cloud.
- Cloud Security Scanner: Detect and fix security vulnerabilities in web applications hosted on Google Cloud.
- Google Cloud Armor: Protect applications and services from Distributed Denial of Service (DDoS) attacks with built-in defenses and WAF capabilities.
- Encryption: Encrypt data at rest and in transit using Google-managed encryption keys or customer-supplied keys for enhanced data protection.

Google Cloud's robust security framework ensures compliance, data integrity, and threat prevention for users' cloud environments.

VII. MACHINE LEARNING SERVICES: GOOGLE ML

Google Cloud offers a suite of machine learning (ML) and artificial intelligence (AI) tools to enable businesses to derive insights and make informed decisions. Key ML services include:
- Cloud AI Platform: Managed platform for building, training, and deploying ML models at scale with TensorFlow and scikit-learn.
- AutoML: Automated machine learning service for building custom ML models without extensive expertise in ML algorithms.
- Vision AI: Pre-trained models for image recognition, object detection, and optical character recognition (OCR).
- Natural Language AI: APIs for sentiment analysis, entity recognition, and language translation for text-based data.

- Recommendations AI: Personalized recommendation engines for enhancing customer experiences and increasing engagement.

With Google Cloud's ML services, businesses can harness the power of AI to unlock insights, automate tasks, and drive innovation.

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