

ASPIRE RETAILERS CLOUD MANAGEMENT WITH AZURE

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Submission date: 24-Jul-2023 12:41AM (UTC+0100)

Submission ID: 210584683

File name:

30086_Valentin_Blazhev_ASPIRE_RETAILERS_CLOUD_MANAGEMENT_WITH_AZURE_507874_1417345272.docx
(3.18M)

Word count: 5503

Character count: 32579

Programme: BSc (Hons) Cloud Computing
Module: Cloud Computing Administration
(ACCA6025_BIRM)
!StudentID:2026380!

ASPIRE RETAILERS CLOUD MANAGEMENT WITH AZURE

1 Guide the Aspire Retailers by discussing how the Cloud solution support Aspire Retailers in providing solution to their needs of computing services immediately. Describe the features of load balancing (approx.: 700 words).

The volume of traffic at our retail store has been rapidly increasing over the last several days, which has left us responding to client inquiries quite slowly. We have built load balancers and employed load-balancing approaches to solve this problem. However, the number of visits is increasing, and our present system is having trouble keeping up. Take action right away to avoid delays and client discontent. We'd need a lot of time and resources to upgrade our equipment. Because we can use distant servers, storage, databases, and other resources provided by cloud service providers, moving our setup to the cloud is a more effective choice. With this strategy, there is no need for on-premises management, and we may use online resources whenever we need them.

Different business demands are catered for by the variety of services and deployment models provided by cloud solutions:

- 17** 1. Infrastructure as a Service (IaaS): Offers resources for virtualized computing, including networks, storage, and virtual machines.
- 17** 2. Platform as a Service (PaaS): A platform for creating, evaluating, and deploying applications.
- 37** 3. Software as a Service (SaaS): Provides full-featured software programmes online.

The easiest way for Aspire Retailers to meet their immediate requirement for computing services is to go to the cloud through:

On-Demand Provisioning: The time-consuming process of purchasing and configuring hardware and software is eliminated when computing resources are made available on demand. Through a self-service interface, Aspire Retailers may instantaneously supply servers, storage, databases, and other resources. This enables quicker application development and deployment to quickly fulfil consumer and market expectations.

Scalability: The elastic scaling will allow Aspire Retailers to modify their resource allocation in response to demand. In contrast to conventional on-premises configurations, scaling hardware in the cloud is simple and affordable. By ensuring maximum performance during times of high traffic and minimising revenue loss, auto-scaling improves customer satisfaction.

8

Load Balancing: Load balancing is a fundamental component of cloud computing that aids in distributing incoming network traffic among several servers or resources in order to improve availability, optimise performance, and prevent overtaxing certain components. There are many ways to achieve load balancing, including:

- a. **Traffic Distribution:** A load balancer, which sits between users and several servers, automatically distributes incoming traffic across those servers in accordance with specified rules. This guarantees equitable resource use, avoids bottlenecks, and speeds up response times.
- b. **High Availability:** Load balancers build up redundant setups so that many instances can function simultaneously and effortlessly take over if one fails, ensuring continuous service availability.
- c. **Health Monitoring:** Backend server health is always being checked by load balancers. The load balancer can automatically redirect traffic to other healthy servers if a server stops responding or malfunctions, preventing service interruptions.
- d. **Session Persistence:** A few apps need to keep track of user session information over the course of a session. By sending successive requests from the same user to the same server, maintaining continuity, and keeping application data, load balancers can guarantee session persistence.
- e. **SSL Termination:** By offloading SSL/TLS encryption and decryption operations, load balancers can reduce the computational strain on backend servers and boost performance. (Firestone et al., 2018)

Cost Optimization: Pay-as-you-go pricing options in cloud computing provide benefits for cost optimisation. Overprovisioning is unnecessary because Aspire Retailers may dynamically change resource allocation based on actual usage. By guaranteeing effective resource use, load balancing is essential in this context. Load balancers help Aspire Retailers achieve improved resource utilisation and lower infrastructure expenses by dispersing traffic over different servers (Azure, 2016).

Global Availability: Aspire Retailers can deploy apps closer to their target markets by using the worldwide data centres that cloud providers have, which lowers latency. By routing traffic to the nearby, effective server, load balancers improve performance (Azure, 2016).

Redundancy and Disaster Recovery: Built-in redundancy and disaster recovery features are available with cloud systems. When load balancing is used in conjunction with multi-region deployments, high availability and fault tolerance can be achieved. Load balancers improve business continuity by spreading traffic among servers

located in several locations and reducing the impact of infrastructure failures or outages (Copeland et al., 2015)

As a result, implementing cloud computing enables Aspire Retailers to access computing capabilities instantly, hastening the development and deployment of applications. As a crucial component of cloud solutions, load balancing promotes availability, improves performance, and allows for effective resource utilisation. These advantages allow Aspire Retailers to quickly meet their computing requirements, quickly offer apps to customers, and quickly capture new business opportunities in the competitive retail industry.

1

B) Take any three Cloud Providers and analyse their services.

The three main participants in the cloud computing sector, Azure, AWS, and Google Cloud, provide a variety of services and products. Let's examine the main services each cloud provider offers:

Azure by Microsoft:

Azure provides a full range of cloud services in many categories:

Computing: Scalable and customised virtual machine instances are provided by Azure Virtual Machines (VMs). The deployment and maintenance of containerized applications are made possible by Azure Kubernetes Service (AKS). Serverless computing for event-driven applications is possible with Azure Functions.

34

Storage: Scalable object storage for unstructured data is provided via Azure Blob Storage. For usage on-premises or in the cloud, Azure Files offers fully managed file sharing. For VMs, Azure Disc Storage provides high-performance, persistent block storage.

Networking: Creating isolated virtual networks with control over IP addresses, subnets, and routing is possible with Azure Virtual Network. The VM instances that receive inbound traffic are split up by Azure Load Balancer. Web application firewall (WAF) and layer 7 load balancing services are offered by Azure Application Gateway.

Databases: Managed and scalable relational database services are provided by Azure SQL Database. Globally distributed and multi-model NoSQL database capabilities are offered by Azure Cosmos DB. Managed database services are available for these open-source platforms through Azure Database for MySQL and Azure Database for PostgreSQL.

Analytics: A unified analytics platform that integrates big data and data warehousing features is called Azure Synapse Analytics. For large data analytics, Azure Data Lake Storage offers scalable and secure data lakes. Managed versions of Spark, Hadoop, and other big data frameworks are available through Azure HDInsight.

2

AI and Machine Learning: Building, honing, and deploying machine learning models is made easy with the help of Azure Machine Learning's tools and services. Pre-built AI capabilities are available for voice, language, vision, and other areas through Azure Cognitive Services. The development of sophisticated chatbots is made possible by Azure Bot Service (Mukunthu, Shah and Tok, 2019)

AWS (Amazon Web Services):

AWS provides a wide range of cloud services to meet different purposes, including:

Computing: The cloud-based resizable computing capacity offered by Amazon EC2 enables the development of virtual servers. Serverless computing, or the execution of code in response to events, is made possible via AWS Lambda. Solutions for container orchestration are provided by Amazon Elastic Container Service (ECS) and Amazon Elastic Kubernetes Service (EKS).

Storage: For every part of data, Amazon S3 offers scalable and reliable object storage. For EC2 instances, Amazon EBS provides persistent block-level storage volumes. For Linux-based applications, Amazon EFS offers fully controlled shared file storage.

Networking: With control over IP addresses, subnets, and routing, Amazon VPC enables the construction of secluded virtual networks. Multiple EC2 instances get inbound traffic thanks to elastic load balancing. A worldwide content delivery network (CDN) called Amazon CloudFront is available for delivering material quickly.

Databases: Managed relational databases with support for MySQL, PostgreSQL, and Oracle are offered by Amazon RDS. A completely managed NoSQL database service is provided by Amazon DynamoDB. Analytics data warehousing features are offered by Amazon Redshift.

Analytics: Standard SQL statements may be used to query data in S3 using Amazon Athena. Amazon EMR offers managed large data processing using frameworks like Spark, Apache Hadoop, and others. Business information and visualisation features are available with Amazon QuickSight.

AI and Machine Learning: Amazon SageMaker offers a comprehensive platform for creating, honing, and deploying machine learning models at scale. Amazon SageMaker is used in AI and machine learning. Images and videos may be analysed with Amazon Rekognition. The creation of conversational interfaces is made possible by Amazon Lex (Elger and Shanaghy, 2020).

Google Cloud

Google Cloud provides a wide range of services in several industries, including:

Computing: Google Compute Engine offers scalability options for virtual machine instances. For containerized applications, Google Kubernetes Engine (GKE) delivers managed Kubernetes. Serverless execution of code is made possible via Cloud Functions.

Storage: For every kind of data, Google Cloud Storage offers scalable object storage. Applications that use a conventional file system interface can store their files on managed servers like Cloud Filestore. Block storage is available for VM instances from Persistent Disc.

Networking: Creating isolated virtual networks with control over IP addresses, subnets, and routing is possible with the Virtual Private Cloud (VPC). Traffic is distributed among VM instances using load balancing. A worldwide content delivery network is provided by cloud CDN.

Databases: Managed relational databases with support for MySQL, PostgreSQL, and SQL Server are offered by Cloud SQL. A relational database service with worldwide distribution is available from Cloud Spanner. A NoSQL document storage is called Cloud Firestore.

Analytics: For analytics, BigQuery offers a fully managed, serverless data warehouse. Dataflow provides batch/streaming functionality as well as serverless data processing. Event ingestion and real-time communications are made possible using Google Cloud Pub/Sub.

²³
AI and Machine Learning: Google Cloud AI Platform offers tools for creating, honing, and deploying machine learning models. Pre-trained AI is available through the Google Cloud Vision, Translation, and Natural Language APIs. The development of conversational bots is possible with Dialogflow (Wakchaure et al., 2022).

All three cloud service providers also provide extra services including serverless computing, monitoring and logging, identity and access management, DevOps tools, and others. In addition, they offer substantial documentation, SDKs, and developer tools to facilitate the creation and deployment of applications.

Azure stands out in several areas that make it a strong competitor and, in some cases, a preferred choice over AWS and GCP in terms of hybrid cloud approach, enterprise integration and familiarity, AI and ML services, enterprise support and SLAs, integration with Microsoft ecosystem, extensive compliance and security capabilities. All three cloud platforms have their strengths and are preferred by different organisations based on specific requirements.

¹
C) Estimate how much it would cost Aspire Retailers to manage their cloud spending based on the above computing configurations. Support your claim with appropriate screen shots of your TCO calculation and attach the report from Azure (approx.: 700 words).

A attractive choice for businesses looking for affordable IT solutions is cloud computing, with a particular focus ²⁵ the services offered by Microsoft Azure. Azure cloud services are an intriguing option for organisations of all sizes and sectors because they provide a number of benefits over conventional on-premises infrastructure, particularly in terms of cost reductions.

The notion of economies of scale is one of the main factors influencing how affordable Azure cloud services are. According to Williams (2012), cloud service providers like Azure are able to spread out the expense of infrastructure and upkeep over a broad client base. By doing this, numerous users share in the costs associated with running and maintaining data centres, servers, and networking hardware. Because of the lower per-customer costs that arise from this, businesses may use

advanced IT resources without having to fully cover the cost of purchasing and maintaining hardware.

Cost effectiveness is further improved by Azure's pay-as-you-go pricing mechanism (Copeland et al., 2015), in addition to economies of scale. In contrast to on-premises infrastructure, which frequently requires enterprises to make substantial upfront purchases of hardware and software licences, Azure enables them to just pay for the resources they actually use. With this "pay-as-you-go" strategy, expensive capital investments are unnecessary, and the financial risks linked to underutilised resources are decreased. It gives companies the flexibility to adjust their computer resources according to demand, bringing IT costs into line with real utilisation and eventually fostering cost optimisation.

Another important element that boosts the affordability of Azure cloud services is scalability. Falatah and Batarfi (2014) emphasise how organisations with varying workloads might benefit especially from the flexibility to swiftly modify computer resources based on demand. With on-premises infrastructure, businesses frequently have to set aside and maintain hardware for periods of high demand, resulting in ineffective resource use during those times. Businesses can avoid over-provisioning and only pay for the resources they really use thanks to Azure's dynamic scalability, which results in significant cost savings.

Utilising Microsoft Azure cloud services also results in cost savings because hardware maintenance and related human costs are no longer necessary. The upkeep and modernization of servers, storage, and networking hardware are the responsibility of the cloud provider under Microsoft Azure's infrastructure management (Copeland et al., 2015). Businesses are able to do this by reducing the size of their internal IT teams, which lowers labour costs and frees up resources for other important duties.

This idea is supported by Sahandi et al. (2013), who emphasise how cloud adoption lowers operating expenses for enterprises considerably by streamlining IT operations and streamlining management. Organisations may focus on innovation and core business operations by shifting the burden of hardware maintenance to Microsoft Azure, which will eventually result in more cost-effectiveness and market competitiveness.

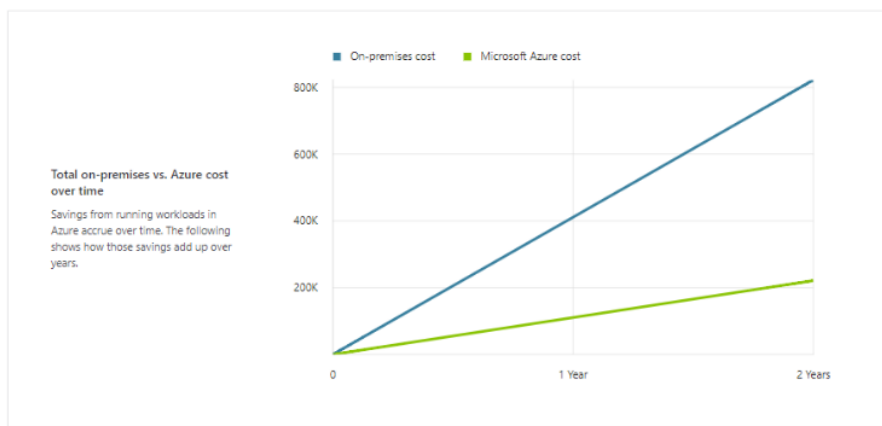
Additionally, Azure's cloud data centres are built with energy efficiency in mind, which means that operating them costs less than running power-hungry on-premises data centres. The environmental benefits of cloud data centres were highlighted by Patil and Patil (2019), and Azure continues this trend by utilising cutting-edge cooling and power management techniques. This energy-efficient strategy not only lowers operating expenses but also demonstrates resource management in accordance with sustainable practises.

Because of several characteristics including economies of scale, pay-as-you-go pricing, scalability, little hardware maintenance, and energy efficiency, Microsoft Azure cloud services provide an affordable alternative to on-premises infrastructure. These crucial cost-saving advantages provided by Azure cloud services should be considered by businesses thinking about switching to cloud-based solutions when doing a thorough cost analysis suited to their unique needs. Azure continues to be at

the forefront of cloud computing's evolution, giving businesses a dependable and affordable platform to address their evolving IT requirements and spur corporate expansion in the digital era.

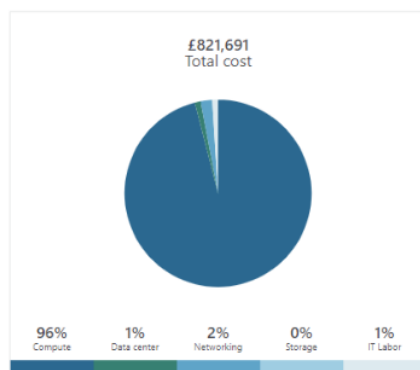
Even though multiple researchers have found that Microsoft Azure cloud services are more affordable than on-premises solutions, we nevertheless conducted a cost comparison before switching to Azure cloud solutions. Let's look at the projected cost.

Microsoft Azure is predicted to cost £221,106.93 in total to suit our needs, compared to £821,690.52 for an on-premises arrangement. Thus, switching to Azure services will result in a two-year savings of £600,584. Let's look at the graph comparing the costs of an on-premises solution versus an Azure solution.



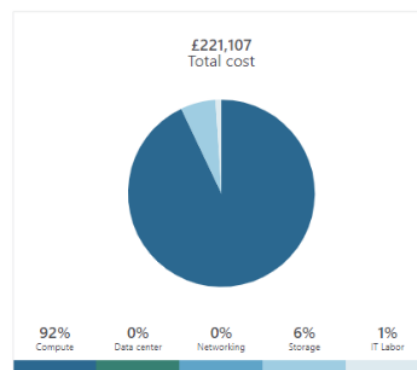
Total on-premises over 2 year(s)

TCD of on-premises environments tends to be driven by compute and data center costs.



Total Azure cost over 2 year(s)

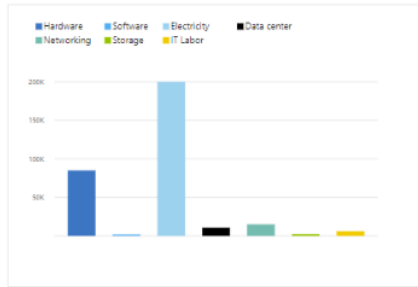
In Azure, certain cost categories decrease or go away completely.



For more clear understanding, please have a look at cost breakdown.

Total on-premises cost breakdown

In Azure, several of the cost categories from the on-premises environment are consolidated and decrease with the efficiency that comes with the cloud.

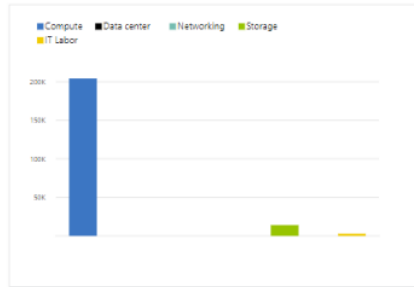


£821,691

Cost over 2 year(s)

Total Azure cost breakdown

In Azure, several of the cost categories from the on-premises environment are consolidated and decrease with the efficiency that comes with the cloud.



£221,107

Cost over 2 year(s)

Cost breakdown Summary of both solutions.

On-premises cost breakdown summary		Azure cost breakdown summary	
Category	Cost	Category	Cost
Compute	£787,583.59	Compute	£204,217.04
Hardware	£85,005.08	Data Center	£0.00
Software	£1,879.90	Networking	£0.00
Electricity	£200,023.53	Storage	£13,923.47
Virtualization	£4,926.90	IT Labor	£2,966.7502
Database	£495,748.20		
Data Center	£10,761.11		
Networking	£14,990.51		
Storage	£2,421.72		
IT Labor	£5,933.85		
Total	£821,690.52	Total	£221,106.93

Cost Estimations of both solutions.

Estimated on-premises cost (2 year(s))	Estimated Azure cost (2 year(s))
☒ Compute cost	Azure compute cost
☒ Data center cost	Azure data center cost
☒ Networking cost	Azure networking cost
☒ Storage cost	Azure storage cost
☒ IT labor cost	Azure IT labor cost
Total on-premises cost over two year(s) £821,690.52 Total Azure cost over two year(s) £221,106.93	
A total savings of £600,583.59 with Microsoft Azure	

1 **D) Explain the uses of Azure Active Directory (Azure AD) to configure different user accounts and how to set roles of Global users and normal users. Show your**

¹ understanding of Azure AD by creating at least two users and assign their role as Global user as well as normal user with appropriate screen shots from your lab activity.

¹ A cloud-based identity and access management solution provided by Microsoft Azure is called Azure Active Directory (Azure AD). Organisations like Aspire Retailers are able to safely and effectively control user access to their cloud-based resources and apps because to the extensive range of management tools it offers for user accounts, groups, and applications. Single sign-on (SSO) and seamless user experiences across several cloud-based apps and services are made possible thanks in large part to Azure AD.

In this article, I'll go through the functions of Azure Active Directory and how to set up various user accounts while establishing roles for both global users and regular users. In addition, I'll make two sample users to show how their roles as a global user and a regular user are assigned.

Uses of Azure Active Directory (Azure AD):

Centralized Identity Management: Azure AD acts as a single identity repository for organisations, allowing them to establish and manage user accounts and passwords. It makes user identification and authorisation simpler, which makes IT administrators' jobs easier.

²⁶ **Single Sign-On (SSO):** Azure AD supports SSO, allowing users to sign in once and access a variety of programmes and services. Because they don't have to remember numerous login information for various programmes, this increases user productivity.

²⁹ **Multi-Factor Authentication (MFA):** Azure AD offers multi-factor authentication (MFA), adding an extra layer of protection to thwart unauthorised access. Users must provide multiple forms of authentication (MFA), such as a password and an SMS-delivered one-time verification code.

Conditional Access Policies: With the help of Azure AD, businesses can enact conditional access policies that let them restrict access to resources depending on factors like user location, device type, and risk level. Users may now securely access resources from recognised devices and locations thanks to this.

¹⁴ **Role-Based Access Control (RBAC):** The RBAC feature of Azure AD enables administrators to specify precise access privileges for users and groups. It aids in successfully managing permissions, making sure users have access to just the resources they require to complete their duties.

Integration with SaaS Applications: Azure AD enables smooth user provisioning and deprovisioning for a wide range of Software-as-a-Service (SaaS) applications.

Setting Roles and Configuring User Accounts in Azure AD:

User Account Creation: The IT administrator must use the Azure AD interface in order to establish a user account in Azure AD. They may then choose the "Users" option and click "New User." After receiving the user's name, email address, and other necessary details, the administrator will provide the user a username and temporary password.

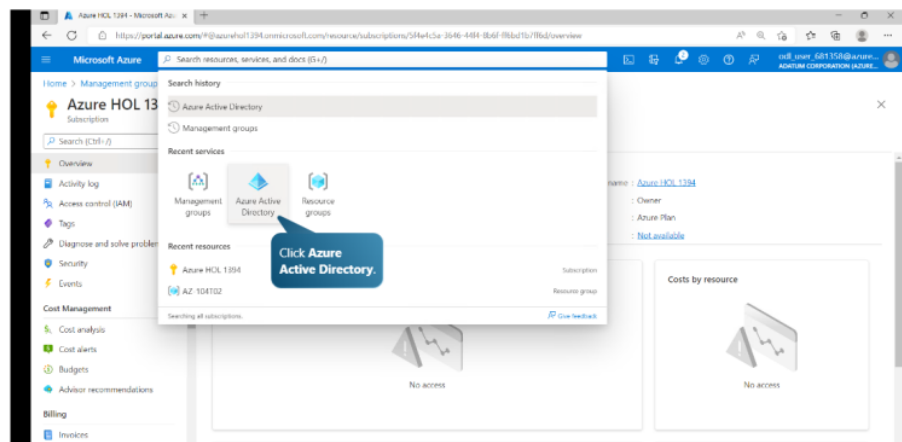
Assigning Roles to Global Users: Global users in Azure AD are granted administrative rights, allowing them to control all facets of the service, including as user accounts, apps, and access policies. Usually, the Global Administrator job is given to the first user established during the Azure AD setup. The administrator must first choose the user from the list of users, then click "Directory role" beneath the user's profile to grant them the Global Administrator position. They can then choose "Global administrator" as the allocated role from that point on.

Assigning Roles to Regular Users: In Azure AD, regular users do not have global administrative rights and only have a few administrative capabilities. Based on the RBAC settings, they could have access to particular apps or resources. The administrator must first choose the user from the list of users before selecting "Directory role" to give the user a role. The administrator can select roles like "User administrator," "Application administrator," or any other unique roles suited for the user's tasks based on the needs of the organisation.

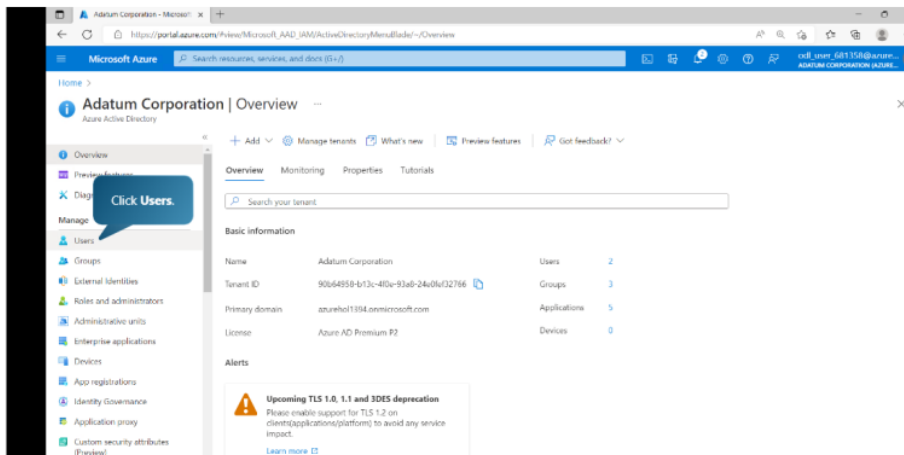
Global User Configurations:

To configure Global Administrator, we will follow the following steps:

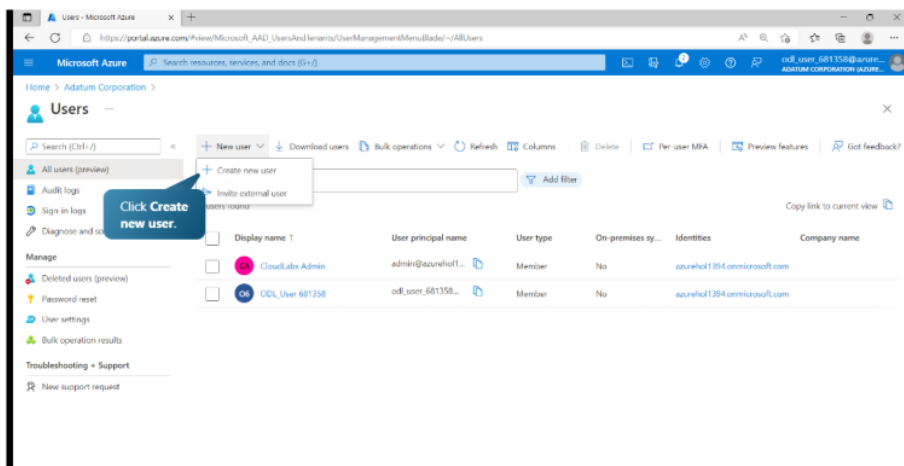
Search Azure AD in Azure portal.



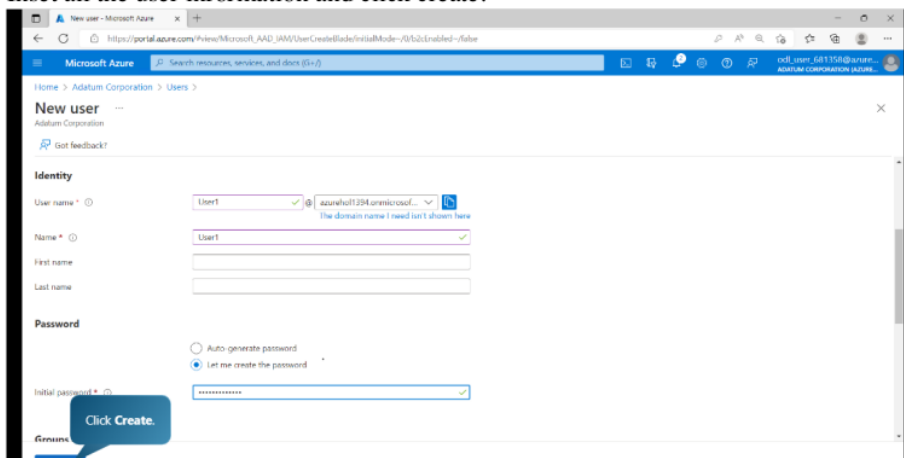
Click Users



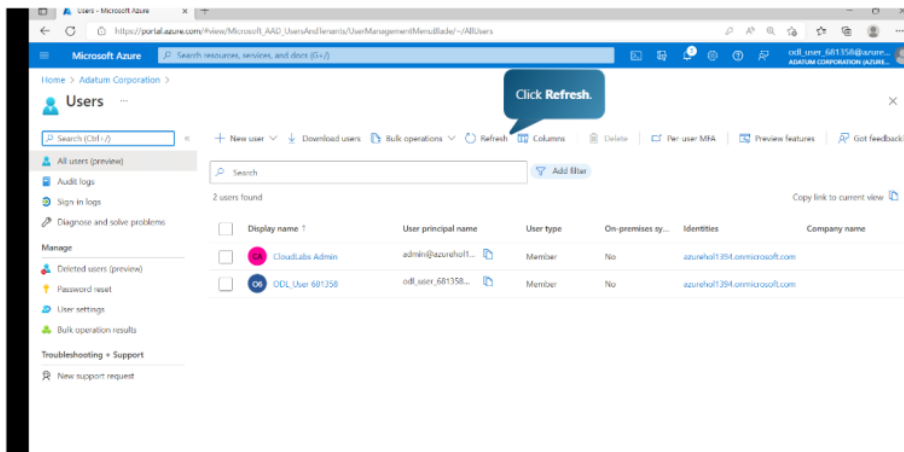
Now create New User



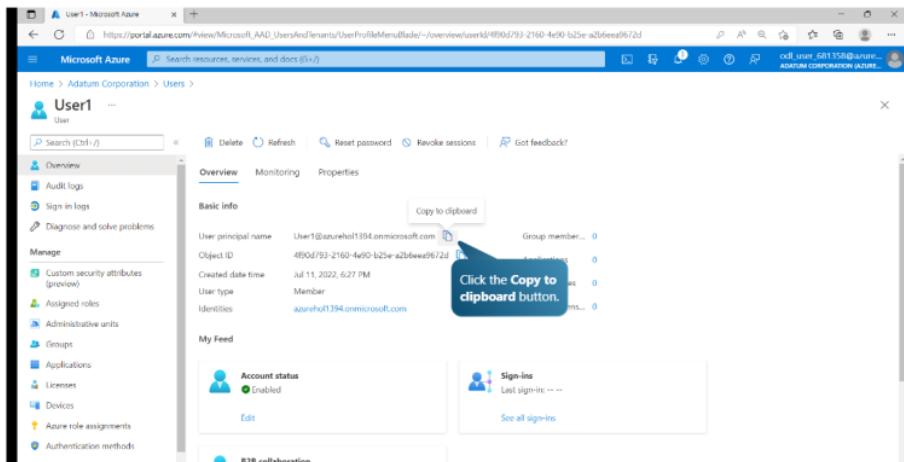
Inset all the user information and click create.



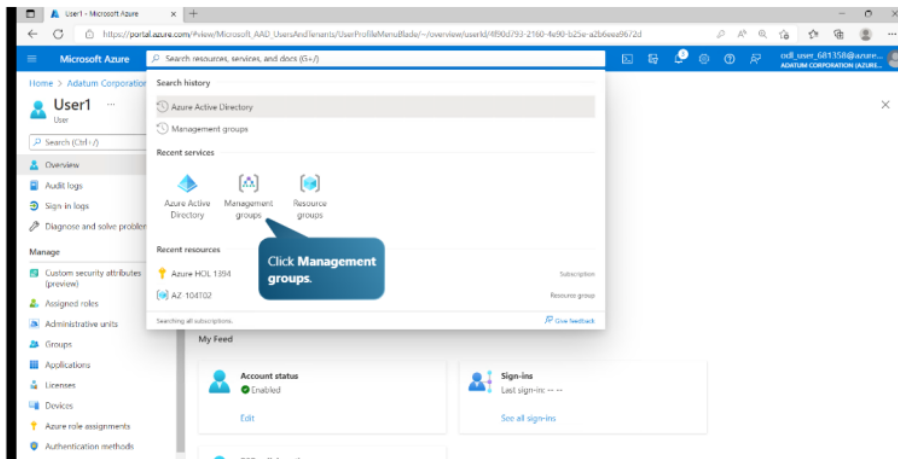
New User is created.



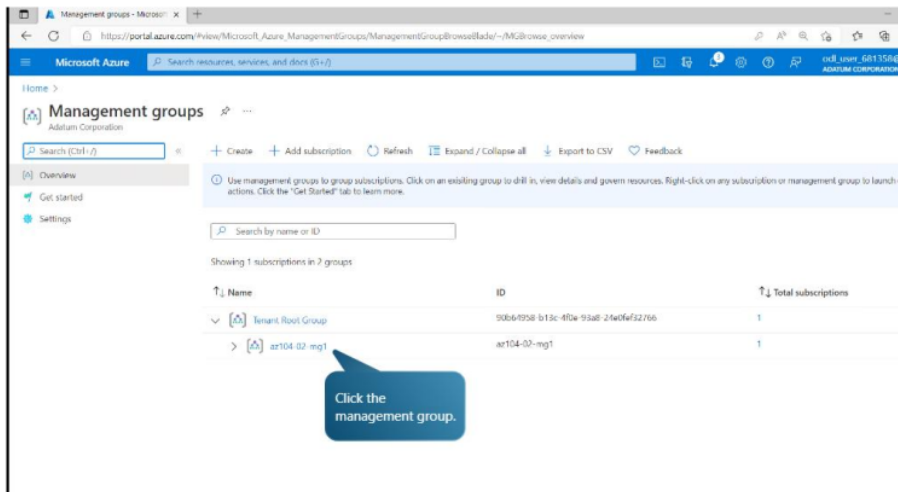
Now open new user and copy the user principle name.



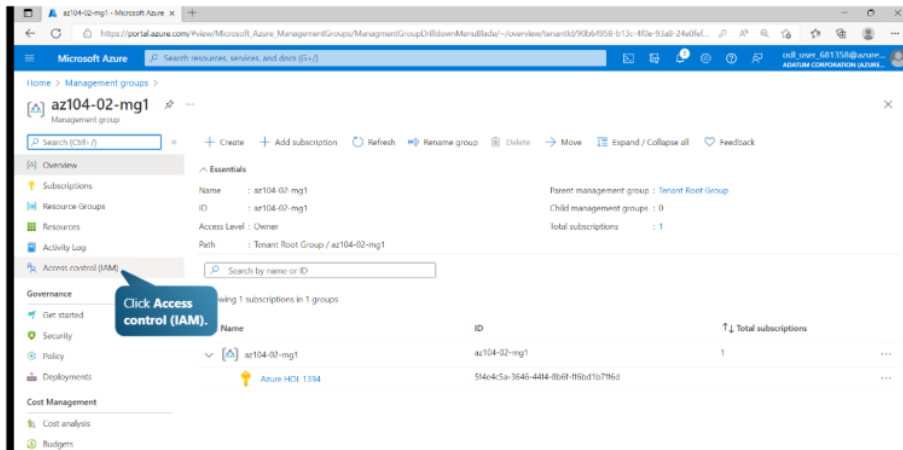
Now navigate to management groups.



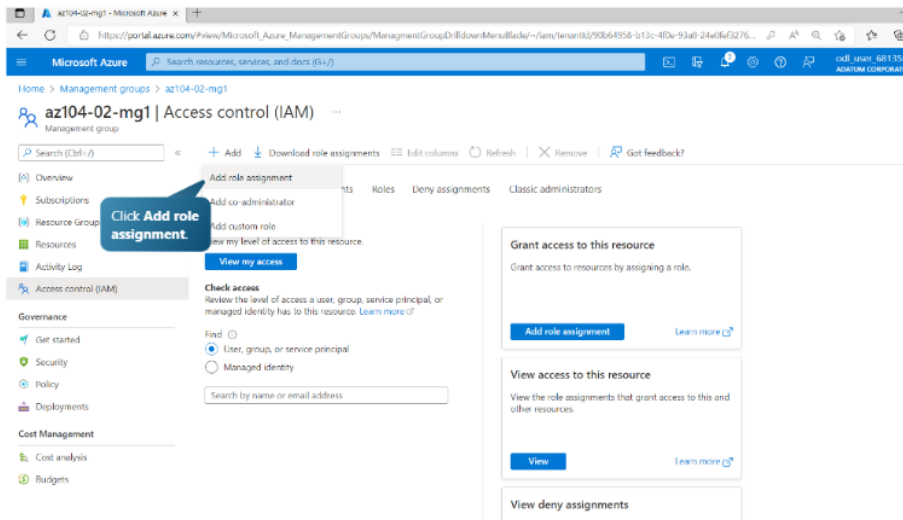
Click the management group created earlier.



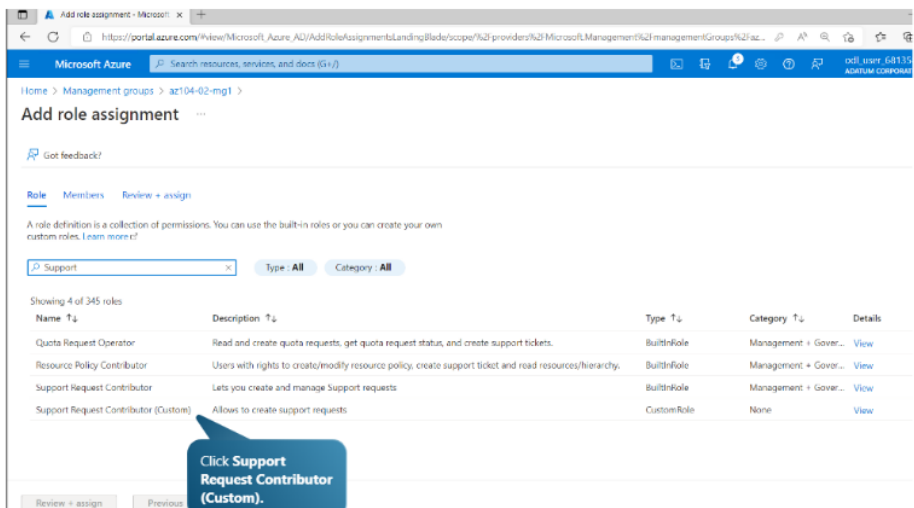
21 Select access control IAM.



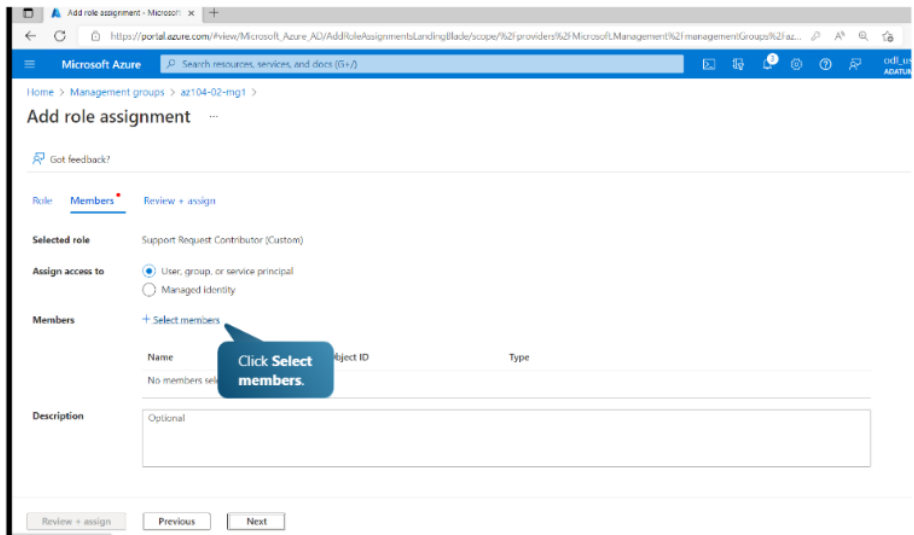
Add role assignment.



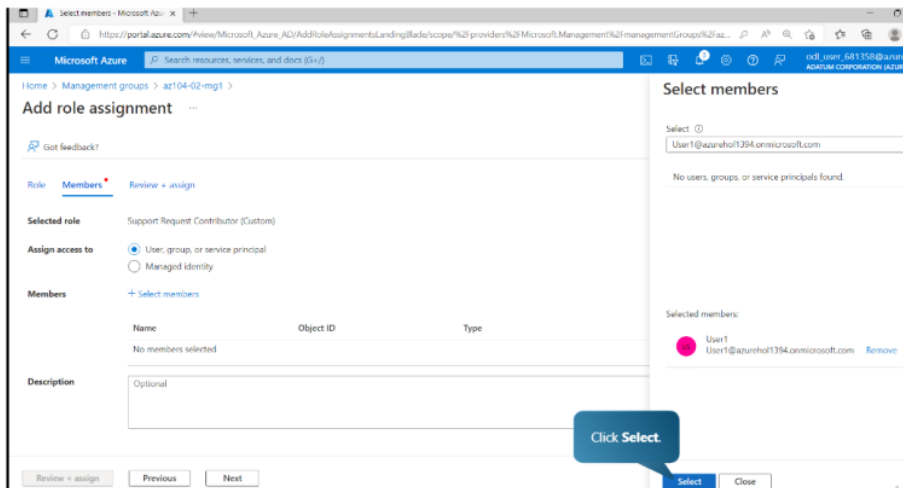
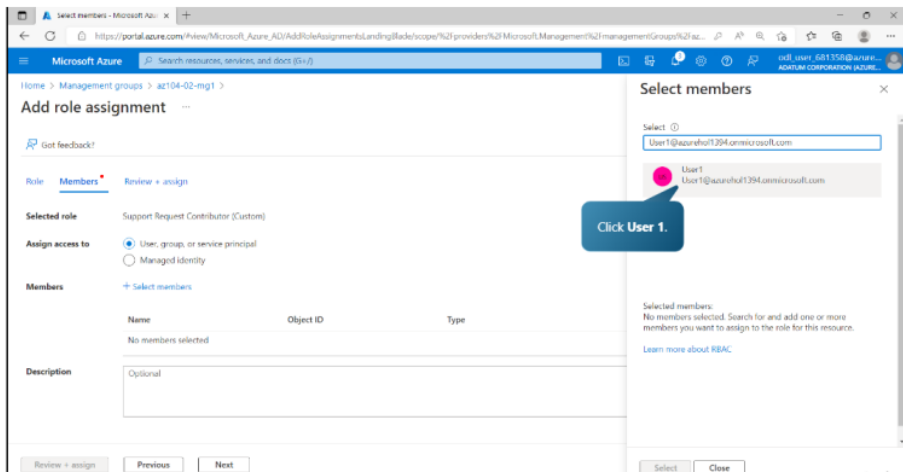
Select Support Request Contributor (Custom Role)



Click Select Members



Select the member created



Microsoft Azure

Home > Management groups > az104-02-mg1 >

Add role assignment

Got feedback?

Role: **Members** Review + assign

Selected role Support Request Contributor (Custom)

Assign access to ☒ User, group, or service principal ☐ Managed identity

Members + Select members

Name	Object ID	Type
User1	4f90d793-2160-4e90-b25e-a2b6ee967...	User

Description Optional

Click Next.

Review + assign Previous Next

Review the configuration and then assign role.

Microsoft Azure

Home > Management groups > az104-02-mg1 >

Add role assignment

Got feedback?

Role: **Members** Review + assign

Role Support Request Contributor (Custom)

Scope /providers/Microsoft.Management/managementGroups/az104-02-mg1

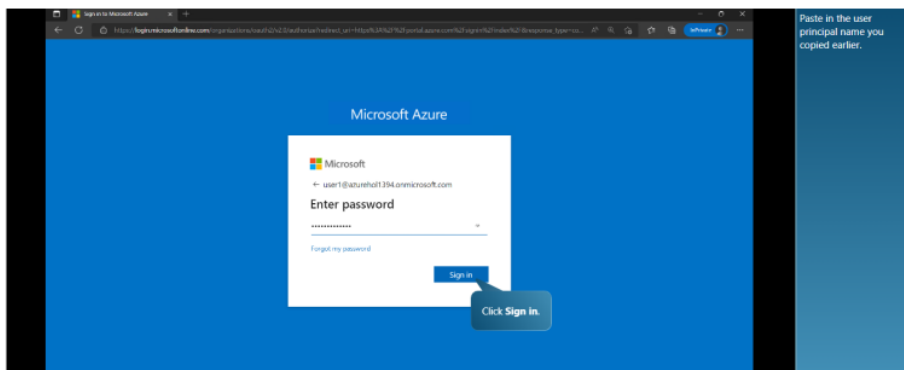
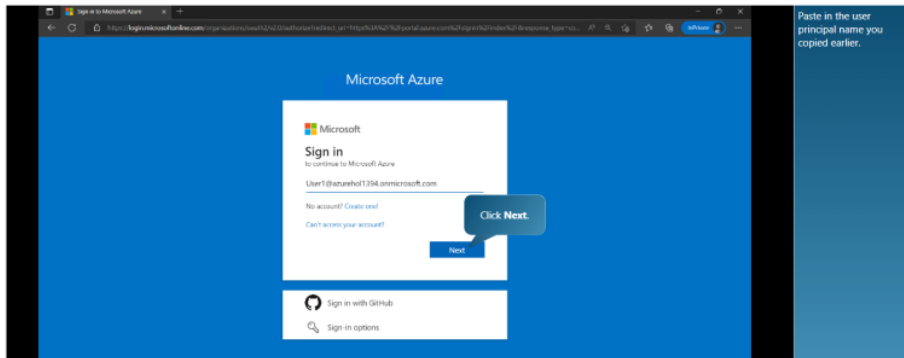
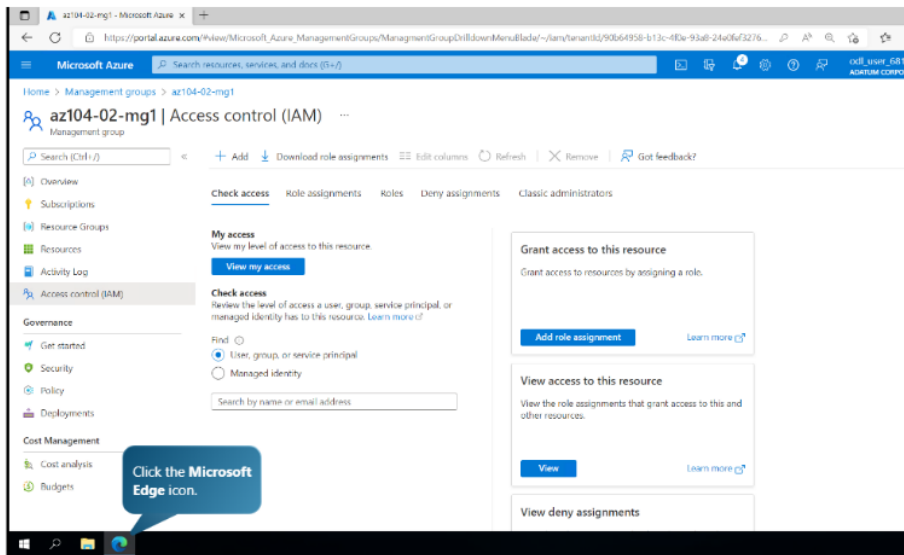
Members

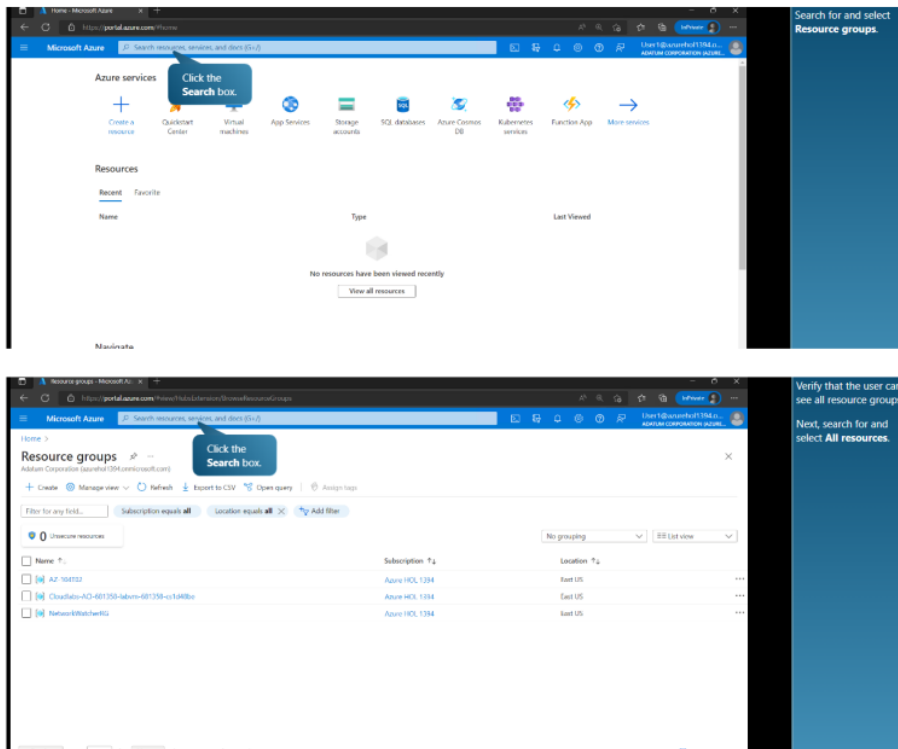
Name	Object ID	Type
User1	4f90d793-2160-4e90-b25e-a2b6ee9672d	User

Description No description

Click Review + assign.

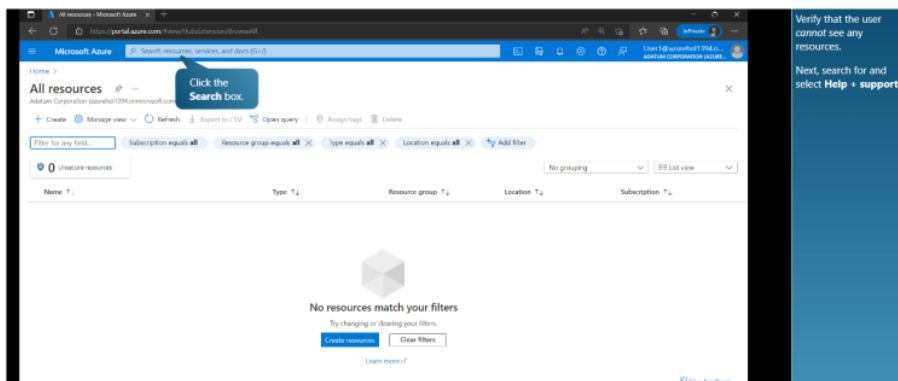
Review + assign Previous

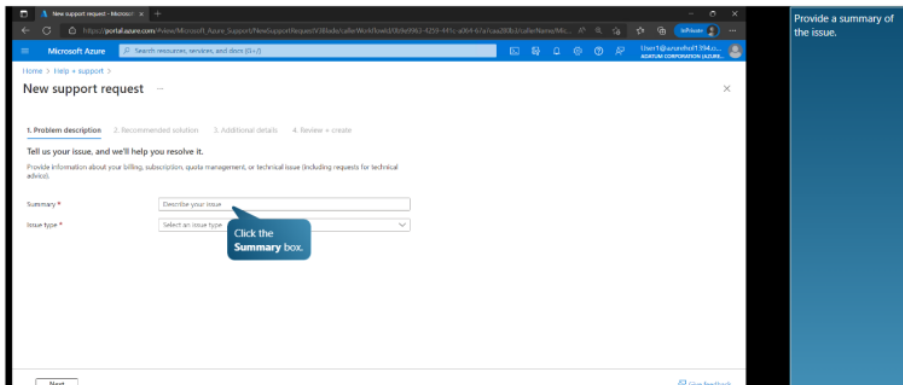
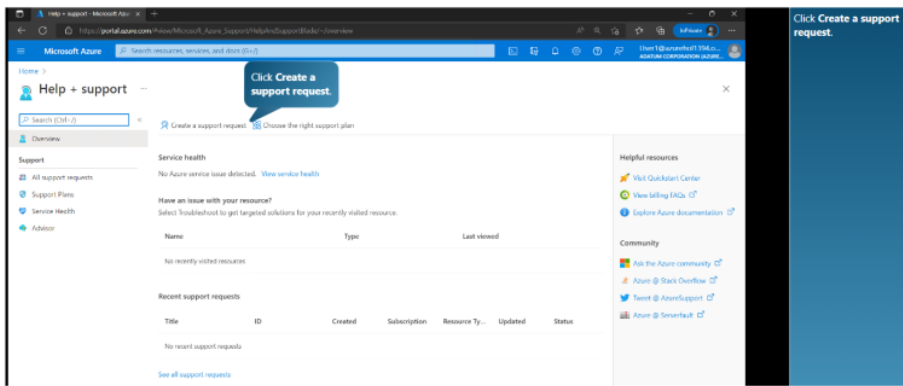
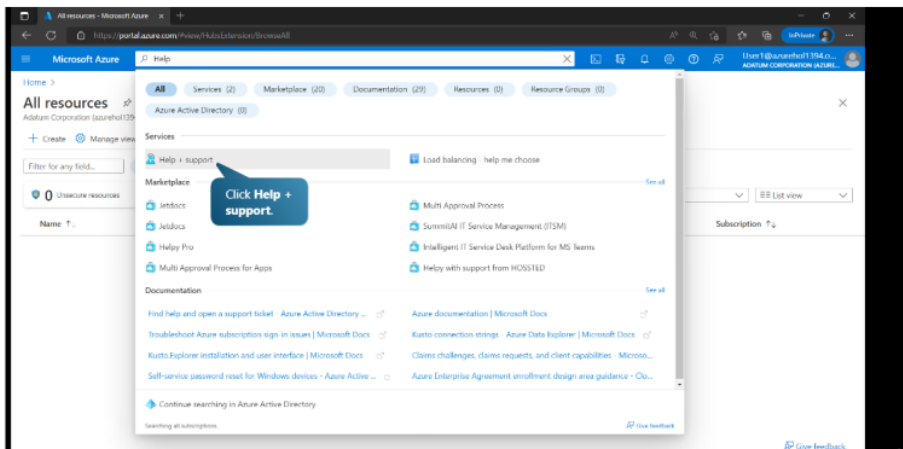




Regular User Configurations:

To configure a normal user with specific application management privileges, we will follow the same steps as of Global user except the following two:





Next, specify the issue type and quota type.

Click the issue type dropdown arrow.

The subscription you are using appears in the Subscription dropdown list, indicating that your account has the permissions required to create the subscription-specific support request.

The IT staff ¹⁴ Aspire Retailers can effectively manage user accounts, assign roles, and securely manage access to resources and apps thanks to Azure AD. The features of Azure AD will continue to offer a strong identity and access management solution as the business grows and incorporates additional SaaS apps, enabling a seamless and secure user experience across the organization's cloud-based resources.

E)

- 1
- What cloud governance strategy is and analyse how Microsoft Azure can help Aspire Retailer to secure access of cloud resources?
- Suggest at least one policy to assist the Aspire Retailers
- Attach appropriate screen shots from your lab activity to support your discussion.

Using Microsoft Azure to secure access to cloud resources and implement a cloud governance strategy:

In order to provide efficient and safe administration of cloud resources inside an organisation, a cloud governance plan is a collection of rules, practises, and processes. While utilising cloud services, it aids in maintaining control, compliance, and cost optimisation. Aspire Retailers may profit from Azure's strong capabilities to improve

the security of cloud resources and establish a thorough governance approach as it moves towards adopting Microsoft Azure for cloud computing.

1. Using Microsoft Azure to secure access to cloud resources:

With an emphasis on identity and access management, Azure offers a variety of security features and tools to safeguard access to cloud resources. An essential element that is essential to manage user identities and access restrictions is Azure Active Directory (Azure AD). Aspire Retailers may implement robust security protocols like Multi-Factor security (MFA) using Azure AD, lowering the risk of unapproved access. Azure AD also offers Single Sign-On (SSO), which streamlines the authentication process and improves user experience by allowing users to access different cloud services with a single set of credentials.

Another essential security element of Azure is role-based access control (RBAC), which enables businesses to specify precise access privileges for individuals and groups. Users can be given the proper roles by Aspire Retailers, limiting them access to resources to those need for performing their respective job duties. This reduces the chance of privilege misuse and unauthorised access to private information.

Utilising Azure Conditional Access, adaptive access controls may be implemented depending on factors like user location, device health, and risk level. In order to provide an extra layer of security against possible risks, Aspire Retailers may implement policies that demand additional authentication procedures from users trying to access cloud services from untrusted places or devices.

2. Suggested Policy for Aspire Retailers:

"Minimum Privilege Access" is a critical policy that Aspire Retailers should put into place. This policy upholds the idea that users should only be given the privileges necessary to carry out their responsibilities. By utilising Azure RBAC and adhering to the "granting the least privilege" approach, this may be accomplished in Azure.

Steps for Implementation:

- a) **Define Roles:** Aspire Retailers should establish the numerous positions within their organisation and the particular responsibilities assigned to each role. This covers positions such as administrators, developers, marketers, etc.
- b) **Specify role-based access controls:** For each role, specify the minimal set of rights necessary to carry out their duties. Even for administrative users, refrain from giving them unduly liberal responsibilities.
- c) **Assign Roles to Users and Groups:** Using Azure RBAC, assign users and groups the proper roles based on those roles' responsibilities. Make certain that positions are frequently evaluated and modified as necessary to reflect changes in the organization's structure.
- d) **Implement Just-In-Time (JIT) Access:** JIT access, which gives users temporary elevated rights for a specific time frame, is something to think about doing for

extremely sensitive operations. This lessens the danger of unauthorised access to vital resources.

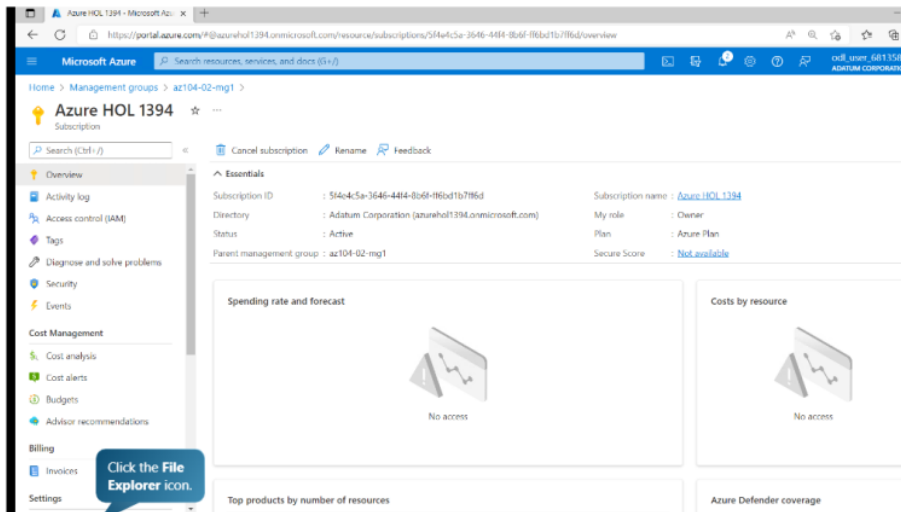
- e) **Audit and Monitor Access:** To spot any strange or suspicious behaviour, regularly check access records and keep an eye on user activity. To help with this process, Azure offers powerful monitoring and logging tools.

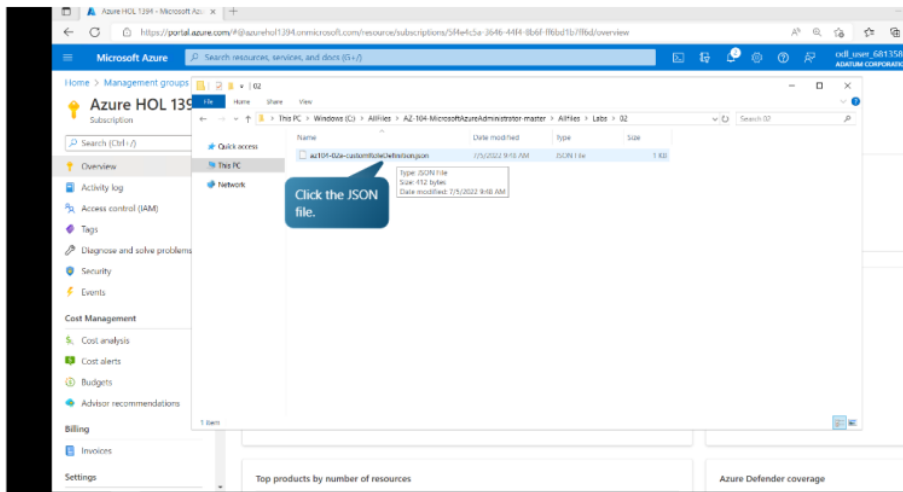
Aspire Retailers may decrease the attack surface, lessen the possible effect of security breaches, and maintain better control over their cloud environment by putting the Minimum Privilege Access policy into practise.

3. Screen Shots from Lab Activity:

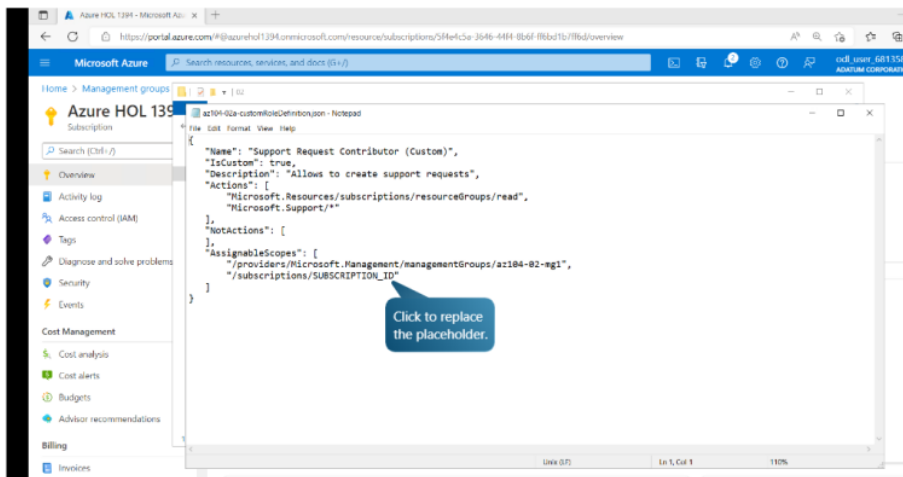
Look at the following example of creating a custom Azure RBAC role and assigning it to a user or group using Azure Portal or Azure PowerShell:

- a) Create a custom role in the Azure Portal by selecting "Azure Active Directory," then "Roles and administrators." Select "New custom role," give the role a name, a brief description, and any permissions that are necessary.

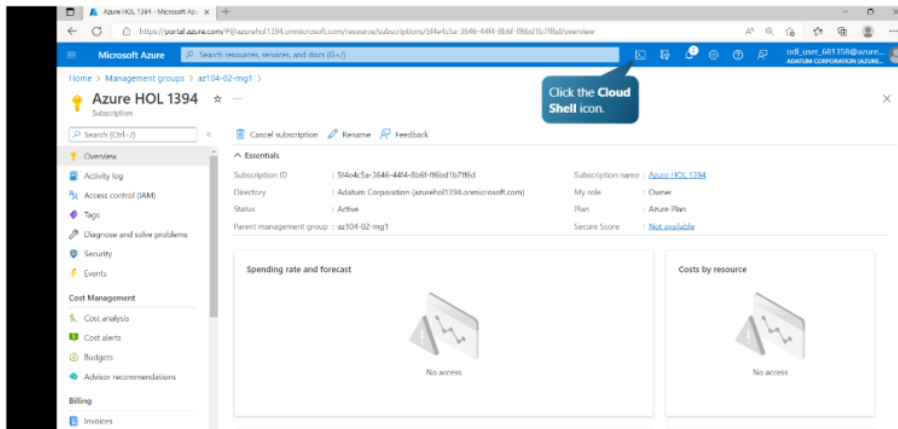




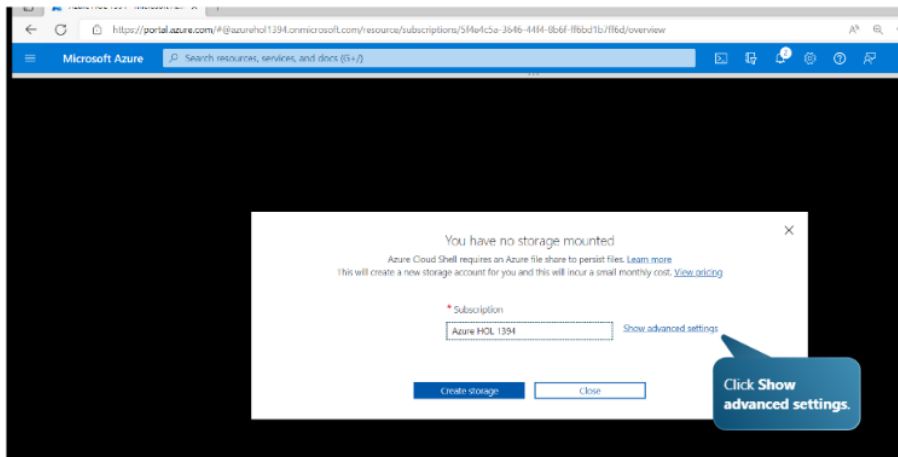
This json file contains custom role definitions. Open that file in notepad through right click. Then replace SUBSCRIPTION_ID placeholder with the subscription id copied earlier and save change.



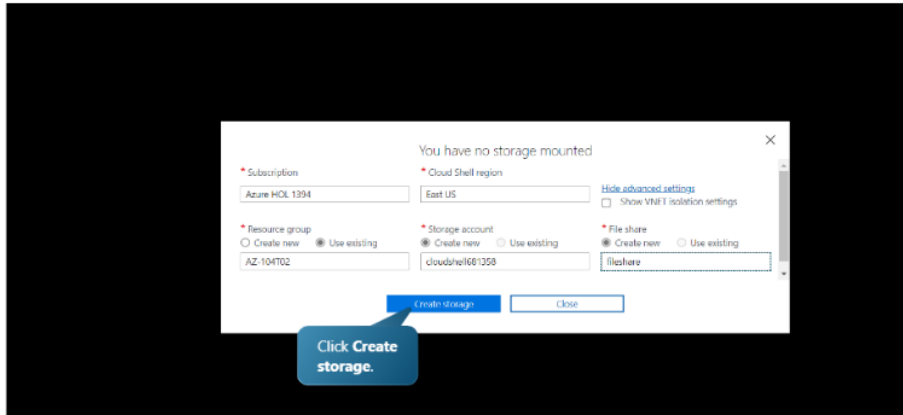
Open Azure cloud shell and select powershell option.



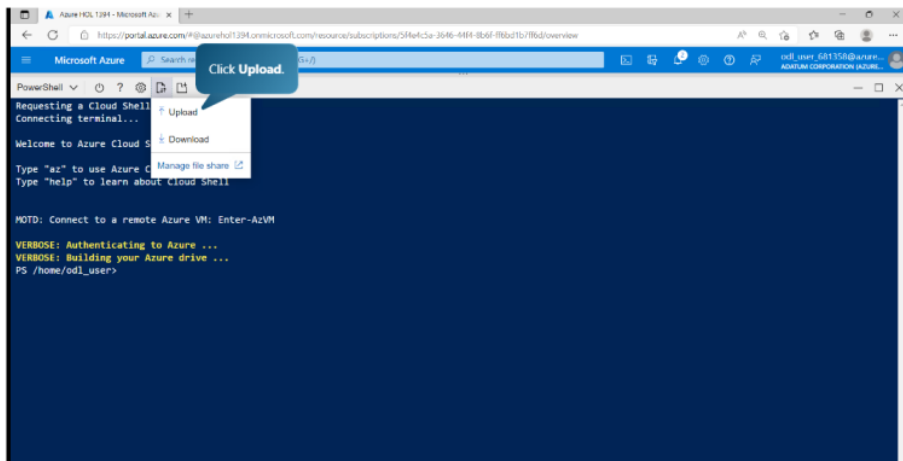
Click advance setting if this prompt appears.



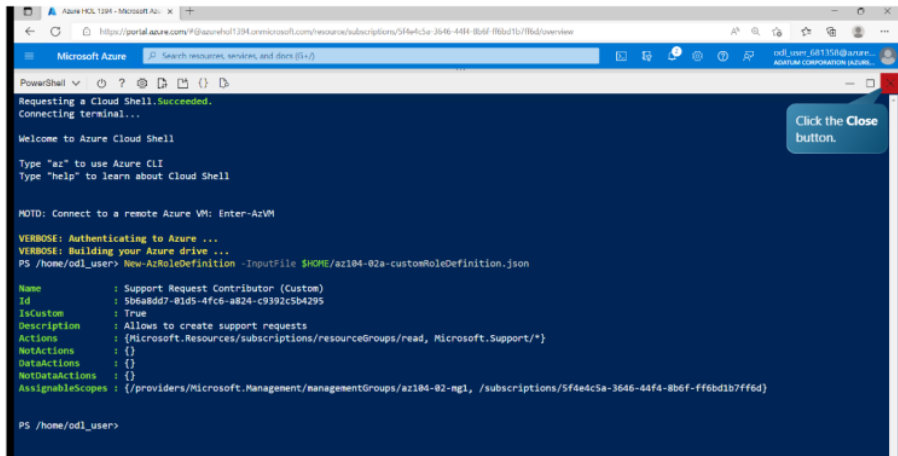
Create storage by providing required information.



Upload json file having custom role definition into the Cloud shell home directory



Run the following command to create the custom role definition.



```
PowerShell
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

MOTD: Connect to a remote Azure VM: Enter-AzVM

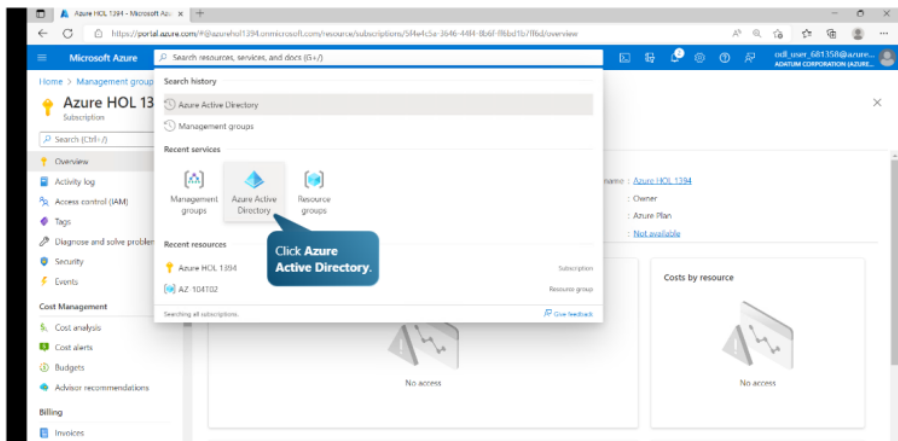
VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/od_user> New-AzRoleDefinition -InputFile $HOME/az104-02a-customRoleDefinition.json

Name       : Support Request Contributor (Custom)
Id         : 5b6a8d67-81d5-4fc6-a824-c9392c5b4295
IsCustom   : True
Description : Allows to create support requests
Actions    : (Microsoft.Resources/subscriptions/resourceGroups/read, Microsoft.Support/*)
NotActions : {}
DataActions : {}
NotDataActions : {}
AssignableScopes : [/providers/Microsoft.Management/managementGroups/az104-02-mg1, /subscriptions/5f4e4c5a-3646-44f4-8b6f-ff6bd1b7ffed]

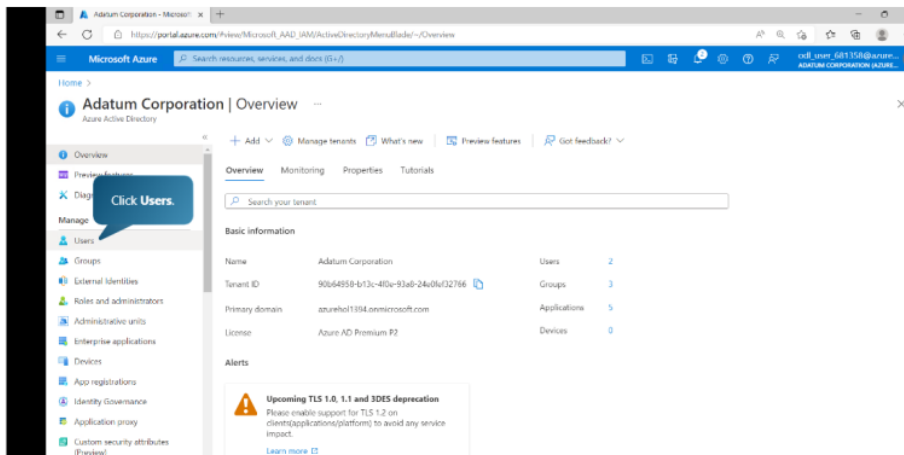
PS /home/od_user>
```

b) After the custom role has been established, assign it by going to "Azure Active Directory," then "Users and groups." You may assign a custom role to a user or group by selecting it, selecting "Directory role," and then "Add assignments." From the list, choose the custom role, then click "Save."

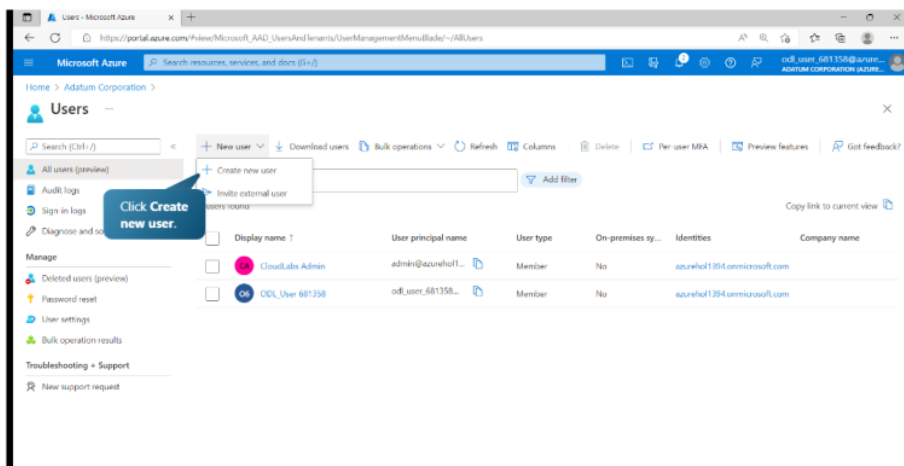
Search Azure AD in Azure portal.



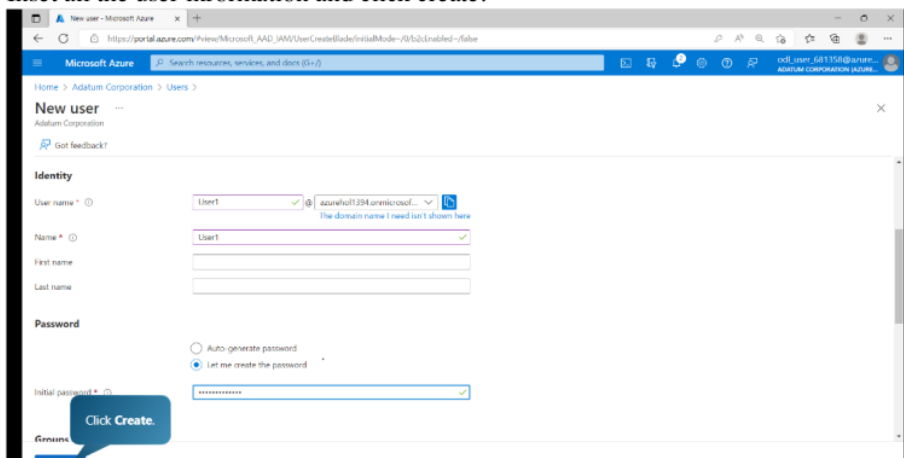
Click Users



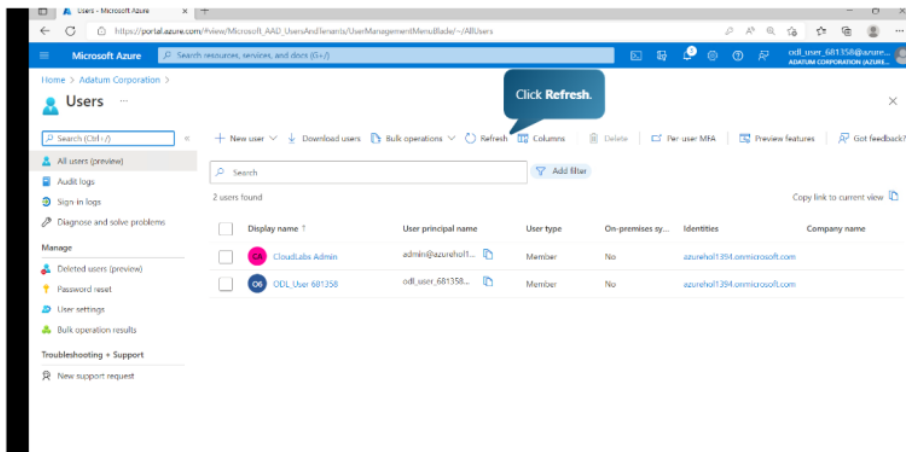
Now create New User



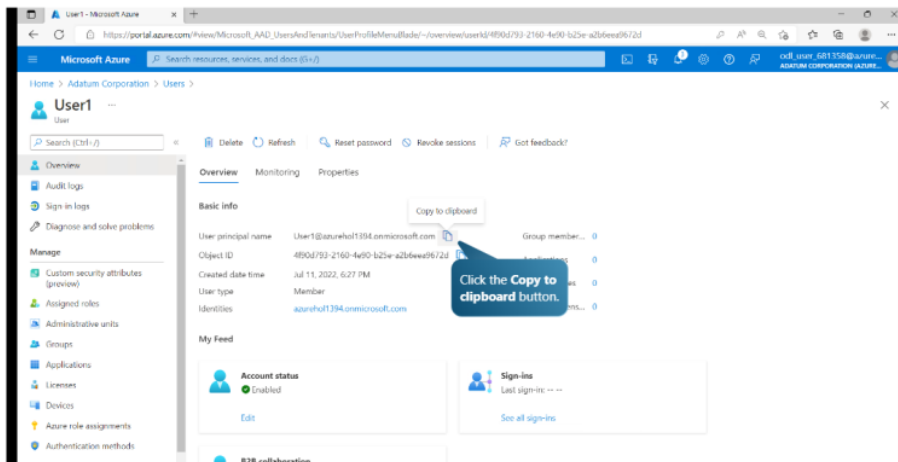
Inset all the user information and click create.



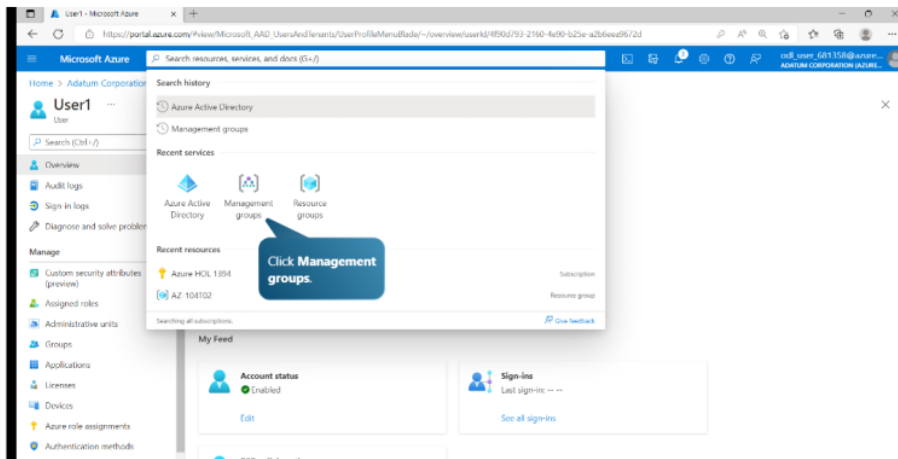
New User is created.



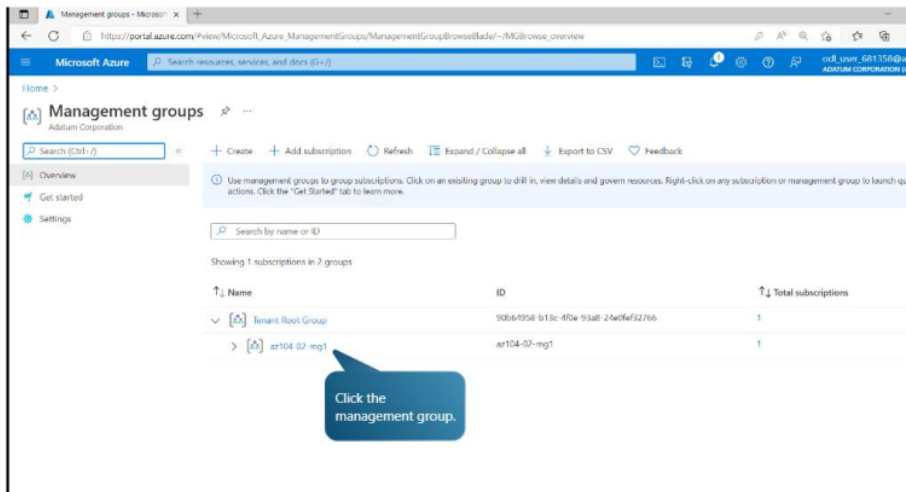
Now open new user and copy the user principle name.



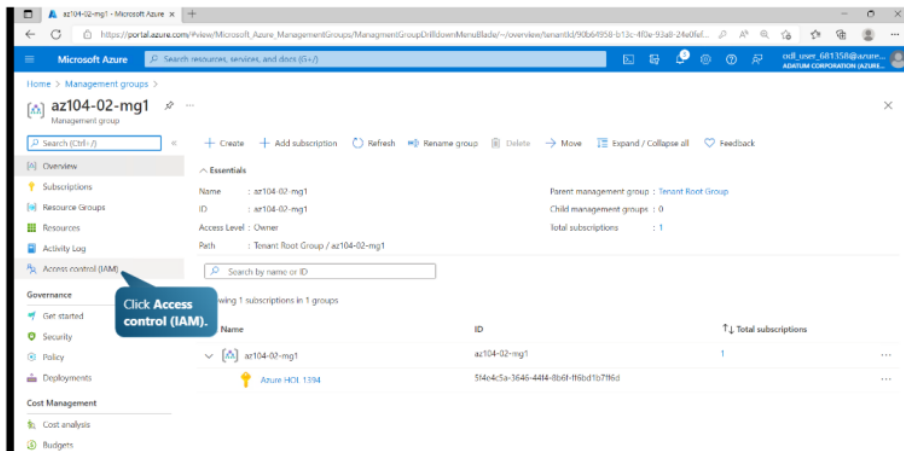
Now navigate to management groups.



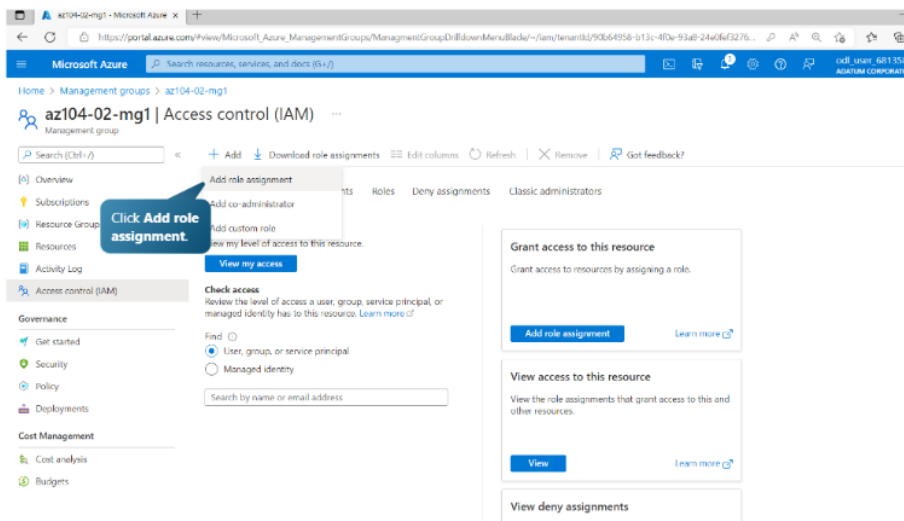
Click the management group created earlier.



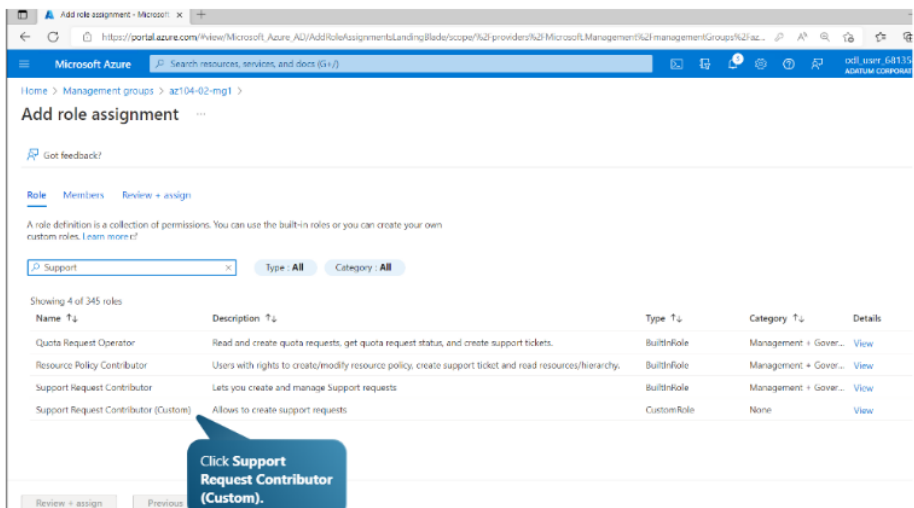
21 Select access control IAM.



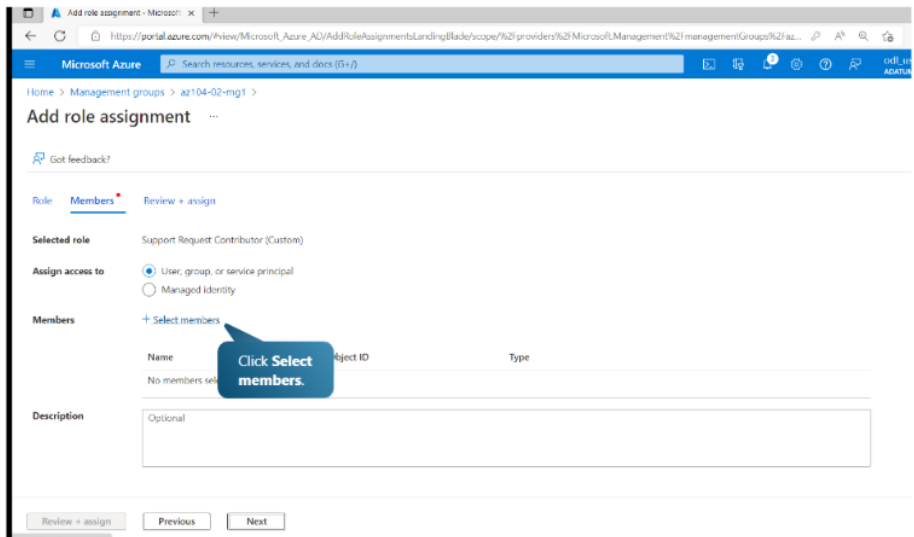
Add role assignment.



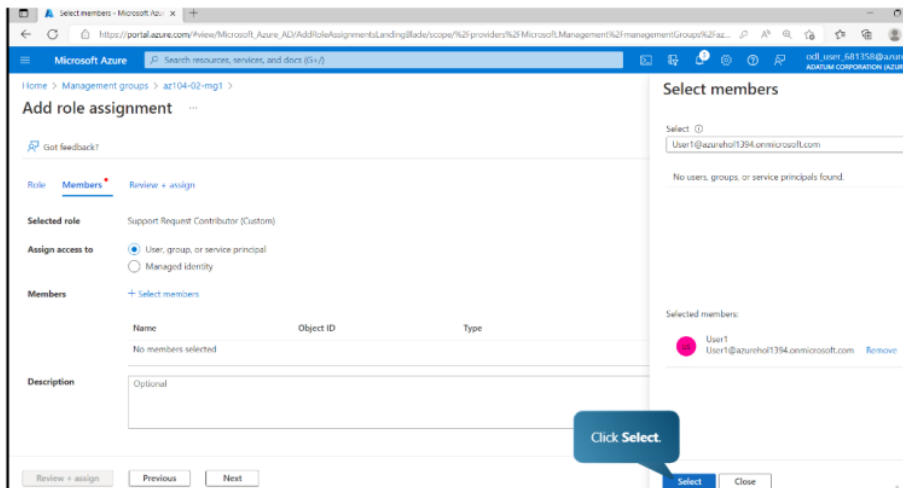
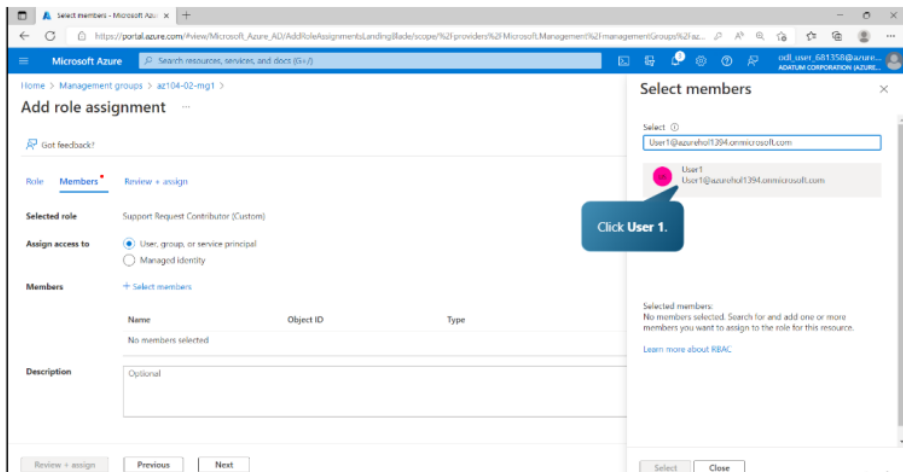
Support Request Contributor (Custom Role)



Click Select Members



Select the member created



Microsoft Azure

Home > Management groups > az104-02-mg1 >

Add role assignment

Got feedback?

Role: **Members** Review + assign

Selected role Support Request Contributor (Custom)

Assign access to ☒ User, group, or service principal ☐ Managed identity

Members + Select members

Name	Object ID	Type
User1	4f90d793-2160-4e90-b25e-a2b6ee967...	User

Description Optional

Click Next.

Review + assign Previous Next

Review the configuration and then assign role.

Microsoft Azure

Home > Management groups > az104-02-mg1 >

Add role assignment

Got feedback?

Role: **Members** Review + assign

Role Support Request Contributor (Custom)

Scope /providers/Microsoft.Management/managementGroups/az104-02-mg1

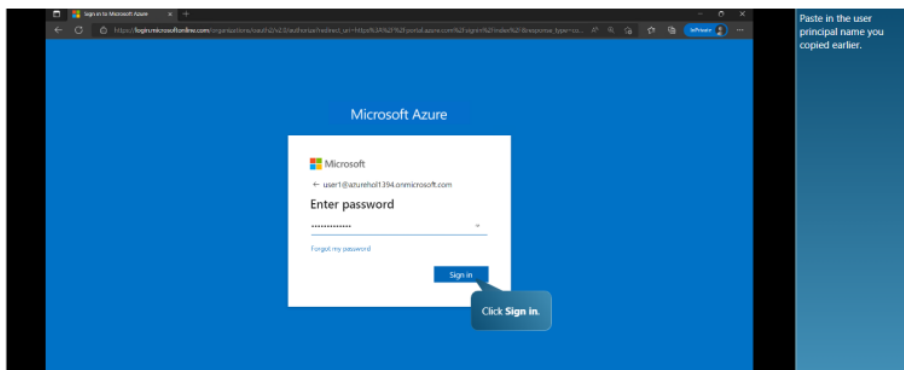
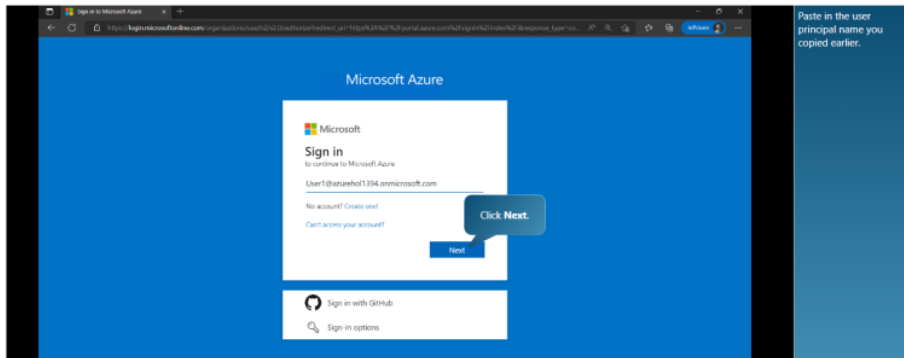
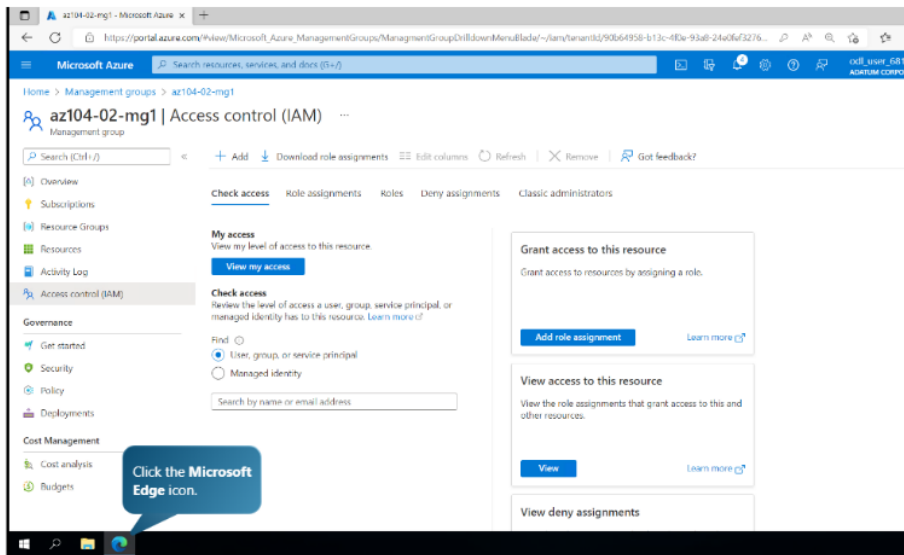
Members

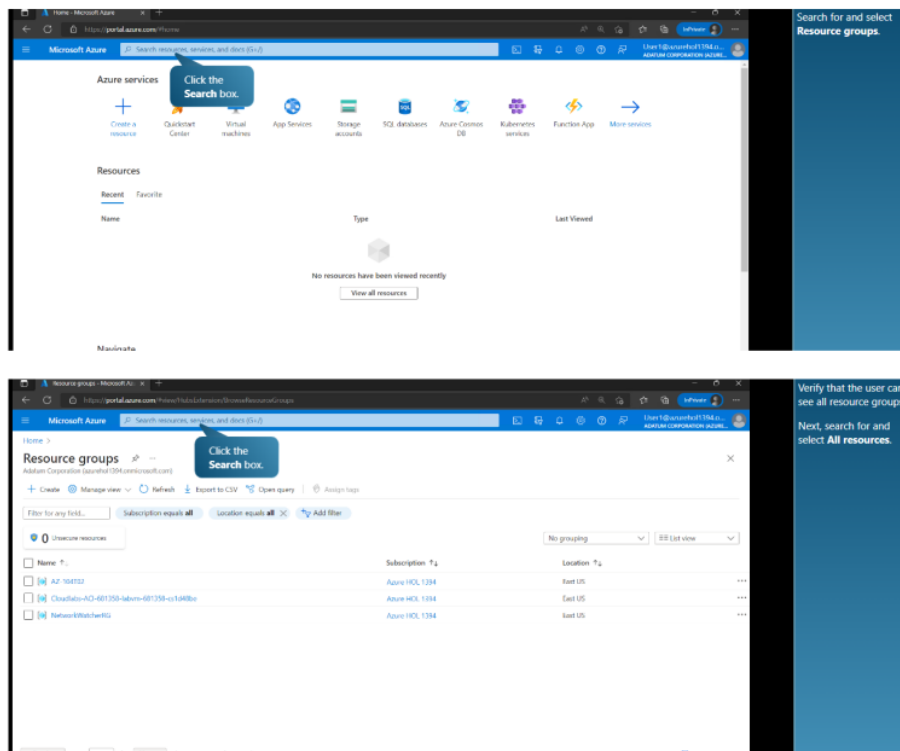
Name	Object ID	Type
User1	4f90d793-2160-4e90-b25e-a2b6ee9672d	User

Description No description

Click Review + assign.

Review + assign Previous





Using this process, Aspire Retailers may create fine-grained roles that are tailored to their specific needs and ensure that users only have access to the resources they require.

With the use of a clear cloud governance strategy and the effective use of Microsoft Azure's security features, Aspire Retailers can maintain control, security, and compliance while taking advantage of cloud computing's benefits. By implementing the Minimum Privilege Access policy and utilising Azure RBAC, Aspire Retailers can create a strong security foundation, safeguard their cloud resources, and confidently take advantage of the opportunities presented by the cloud in the rapidly changing world of remote work, BYOD, mobile applications, and cloud applications.

1 **F) The Aspire Retailers would like to have a proper disaster recovery plan to support their data and application on Cloud. Suggest appropriate disaster recovery plan to the Aspire Retailers**

Aspire Retailers must implement a suitable disaster recovery (DR) plan in order to guarantee the continuity and resilience of their cloud-based data and applications. The organisation will be able to recover from unforeseen occurrences, such as natural disasters, hardware failures, cyber-attacks, or human errors, with the least amount of downtime and data loss if its disaster recovery plan is well-designed. The following are some crucial actions and factors to take into account while creating a suitable disaster recovery strategy for cloud-based Aspire Retailers:

1. Define Recovery Objectives: Aspire Retailers should begin by identifying their recovery goals, which include their recovery time and point objectives (RTO and RPO). While RTO describes the maximum permitted downtime before the services must be restored, RPO establishes the acceptable level of data loss in the event of a catastrophe. These goals will act as important yardsticks to direct the DR planning procedure (Antonopoulos et al., 2019)

2. Data Replication and Backup Strategy: To provide data resilience, Aspire Retailers should establish data replication and backup procedures. Data replication is made easier by a number of Azure services, including Azure Backup and Azure Site Recovery (ASR). Azure Backup offers a point-in-time recovery solution by enabling automatic backups of virtual machines, databases, and files to Azure. In the case of a regional outage, ASR enables replication of virtual machines and workloads to a backup Azure region, guaranteeing business continuity. (Perumal et al., 2022)

3. Multi-Region Deployment: Aspire Retailers should think about distributing their key apps across various Azure regions to better improve availability and disaster recovery capabilities. This strategy guarantees that services may failover to another area if one region becomes unavailable, minimising downtime and preserving service availability. (Soh et al., 2020)

4. Load Balancing and Traffic Manager: Aspire Retailers may divide incoming network traffic among several healthy instances of their apps by using Azure Load Balancer and Traffic Manager. This not only boosts speed but also gives the architecture more redundancy, enabling applications to switch to healthy instances in the event of outages in certain areas. (Sheela et al., 2021)

5. Azure Virtual Network and Network Security Groups: Azure Virtual Networks' Network Security Groups (NSGs) may be used to manage inbound and outgoing traffic to isolate and secure resources. NSGs can aid in limiting the lateral movement of attackers inside the network in the case of a cyberattack and safeguard crucial resources. (Ots and Ots, 2021)

6. Disaster Recovery Testing and Drills: The catastrophe recovery strategy must be regularly tested and validated to remain successful. To find any holes in the plan or other problems, Aspire Retailers should do simulated disaster recovery drills and adjust the procedures as necessary. Different situations, including data loss, application failures, and regional outages, should be covered throughout testing. (Chakraborty et al., 2020)

7. Monitoring and Alerting: Implement reliable monitoring and warning systems to quickly identify abnormalities and possible problems. Azure offers tools like Azure Monitor and Azure Log Analytics that provide continuous resource and application monitoring and enable pro-active reactions to any important occurrences. (Sahay and Sahay, 2020)

8. Documentation and Communication: Completely describe the duties and responsibilities of each team member during an incident in the disaster recovery plan's documentation. Make sure that everyone who needs to know about the strategy is

aware of it and their responsibilities. As the cloud environment changes, the documentation should be updated often.

9. Regular Review and Update: Business needs and IT infrastructure for Aspire Retailers are probably going to change over time. The disaster recovery plan must be continuously reviewed and updated to reflect any adjustments to the organization's cloud resources or compliance needs.

By implementing these recommendations, Aspire Retailers may create a solid disaster recovery policy to safeguard their cloud-based data and apps. The proactive approach used by the organisation will lower risks, minimise downtime, and ensure business continuity, by guaranteeing its cloud-based services are highly accessible and disaster-resistant.

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