

APPLICATION MIGRATION

IN PUBLIC CLOUD



OBJECTIVE

The primary objective of this project is to successfully migrate the organization's applications, databases, and associated resources from Microsoft Azure to Google Cloud Platform (GCP) to achieve better alignment with the organization's evolving technical and business needs.

Specific objectives include:

- **Cost Efficiency:** This migration aims to reduce operational costs in the current Azure environment. GCP's competitive pricing, sustained use discounts, and resource optimization opportunities are expected to deliver significant cost savings.
- **Enhanced Performance:** The goal is to boost application performance by leveraging GCP's scalable infrastructure. Services like Google Compute Engine and Kubernetes Engine will enhance speed, reliability, and scalability, supporting the organization's digital transformation.
- **Access to Advanced Tools:** The project seeks to empower the organization with GCP's advanced data analytics, machine learning, and AI tools, such as BigQuery and TensorFlow, to drive innovation and enable smarter, data-driven applications.
- **Security and Compliance:** Maintaining or improving security and compliance is crucial. The migration will utilize GCP's robust security features and compliance certifications to uphold the organization's security standards.
- **Minimal Disruption:** The migration will focus on minimizing downtime and disruption to business operations, ensuring a smooth transition that maintains continuity and safeguards data integrity.

INTRODUCTION

Cloud migration is the process of transferring applications, data, and other business elements from an on-premises data centre or one cloud environment to another, such as a public, private, or hybrid cloud. The primary goal of this migration is to take advantage of the benefits that cloud platforms offer, including scalability, cost efficiency, and enhanced flexibility. Businesses may choose to migrate to the cloud in different ways, depending on their specific needs and goals.

This project focuses on migrating an organization's applications and resources from Microsoft Azure to Google Cloud Platform (GCP). The decision to migrate is driven by challenges such as rising costs, suboptimal performance, and limited access to advanced tools in the current Azure environment, which no longer fully aligns with the organization's evolving technical needs and business goals. In contrast, GCP offers a suite of services that better address these challenges, particularly in data analytics, machine learning, and cost management. The scope of this migration project includes a comprehensive transfer of the organization's applications, databases, and resources from Azure to GCP. This process involves thoroughly assessing the existing environment, inventorying resources, mapping dependencies, and identifying potential risks. The chosen migration strategy—whether lift-and-shift, re-platforming, or refactoring—will ensure a smooth transition and optimization of applications for the new GCP environment.

MICROSOFT AZURE



The Azure cloud platform is more than 200 products and cloud services designed to help you bring new solutions to life to solve today's challenges and create the future. Build, run, and manage applications across multiple clouds, on-premises, and at the edge, with the tools and frameworks of your choice. The Azure platform aims to help businesses manage challenges and meet their organizational goals. It offers tools that support all industries -- including e-commerce, finance and a variety of Fortune 500 companies -- and is compatible with open-source technologies. This gives users the flexibility to use their preferred tools and technologies. In addition, Azure offers four different forms of cloud computing: infrastructure as a service (IaaS), platform as a service (PaaS), software as a service (SaaS) and serverless functions.

Some of the services provided by Azure are-

Azure Virtual Machines (VMs)	Azure Active Directory (AD)	Azure DevOps	Azure Virtual Network (VNet)
Azure Key Vault	Azure Site Recovery	Azure Blob Storage	Load Balancers

Some advantages of Azure are-

- **Broad Integration:** Seamless integration with Microsoft products like Office 365 and Dynamics 365.
- **Enterprise Support:** Strong support for large-scale enterprise needs and hybrid environments.
- **Comprehensive Security:** Advanced security features and compliance with numerous standards.
- **Hybrid Capabilities:** Robust hybrid cloud options with Azure Arc and Azure Stack
- **Developer Ecosystem:** Rich set of tools for developers, including Visual Studio integration and Azure DevOps.

GOOGLE CLOUD PLATFORM



Google Cloud Platform is a set of cloud computing services that Google offers, which runs on the same infrastructure that Google uses for its end-user products, such as YouTube, Gmail, and more. Google Cloud Platform offers a variety of services, including Compute, Network, Machine learning and AI, Big data processing. Google Cloud Platform (GCP) provides cloud services through a global network of data centres. It offers scalable infrastructure resources, such as virtual machines and storage, with Compute Engine and Cloud Storage. For application development, GCP includes platforms like App Engine and Kubernetes Engine, which handle deployment and management. Serverless options like Cloud Functions enable code execution in response to events without server management.

Some of the services provided by Google Cloud Platform (GCP) are-

Compute Engine	Cloud SQL	App Engine	Cloud AI Platform
Kubernetes Engine	Cloud Storage	Cloud Pub/Sub	Cloud Run

Some advantages of (GCP) are-

- **Advanced Data Analytics:** High-performance tools like BigQuery for real-time and large-scale data analysis.
- **Strong AI and Machine Learning:** Integrated AI and ML tools, including TensorFlow and AutoML, for building intelligent applications.
- **Global Network Infrastructure:** Extensive global network providing low latency and high-speed connectivity.
- **Customizable VM's:** Ability to create custom virtual machine types tailored to specific needs.
- **Open-Source Support:** Strong support for open-source technologies, including Kubernetes and other container tools.



REASONS TO MIGRATE FROM AZURE TO GOOGLE CLOUD PLATFORM (GCP)



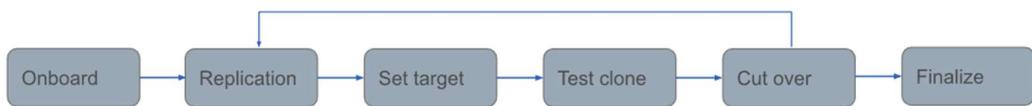
- ❖ **Cost Savings:** GCP's competitive pricing models, sustained use discounts, and cost management tools can lead to significant savings compared to Azure.
- ❖ **Superior Data Analytics:** GCP's BigQuery offers faster and more efficient data analytics capabilities, ideal for handling large-scale and real-time data processing.
- ❖ **Advanced AI and Machine Learning:** GCP provides cutting-edge AI and machine learning tools, such as TensorFlow and AutoML, which may offer enhanced features and ease of use compared to Azure's offerings.
- ❖ **Global Network Performance:** GCP leverages Google's extensive global network infrastructure, providing low-latency and high-speed connectivity that can improve performance.
- ❖ **Custom VM Options:** GCP allows for highly customizable virtual machine types, giving more precise control over resource allocation and cost.
- ❖ **Integrated Tools:** GCP offers a suite of integrated tools for data processing, machine learning, and application development, which can simplify workflows and improve efficiency.
- ❖ **Innovative Technology:** GCP often leads in deploying innovative technologies and advancements, providing early access to the latest cloud computing trends and solutions.
- ❖ **Multiple outages reported recently in Ms azure public cloud that impacted a lot of customers across multiple geographies:** as a direct impact business hosting their mission critical apps and workloads in Ms azure got impacted and suffered financially.

MIGRATION PROCESS

Migrate to Virtual Machines provides a simple path for you to migrate your VMs to Compute Engine. The migration process occurs in the following distinct phases:

- ❖ **Onboard:** Select a source VM that you want to migrate.
- ❖ **Replication:** Replicate data from the source VM to Google Cloud. Data replication is a continuous process that takes place in the background until the final cut-over or you delete the migration.
- ❖ **Set VM target details:** Configure Compute Engine settings for the migrated VM, such as the project, instance type, memory, network, and more.
- ❖ **Test-clone:** Optionally create a Compute Engine clone of the source VM from the replication data and test it on Google Cloud.
- ❖ **Cut-over:** Migrate the source VM to Compute Engine. This process includes stopping the source VM, completing a final replication, and creating the production Compute Engine instance from the source VM.
- ❖ **Finalize:** Perform any final cleanup after a successful migration.

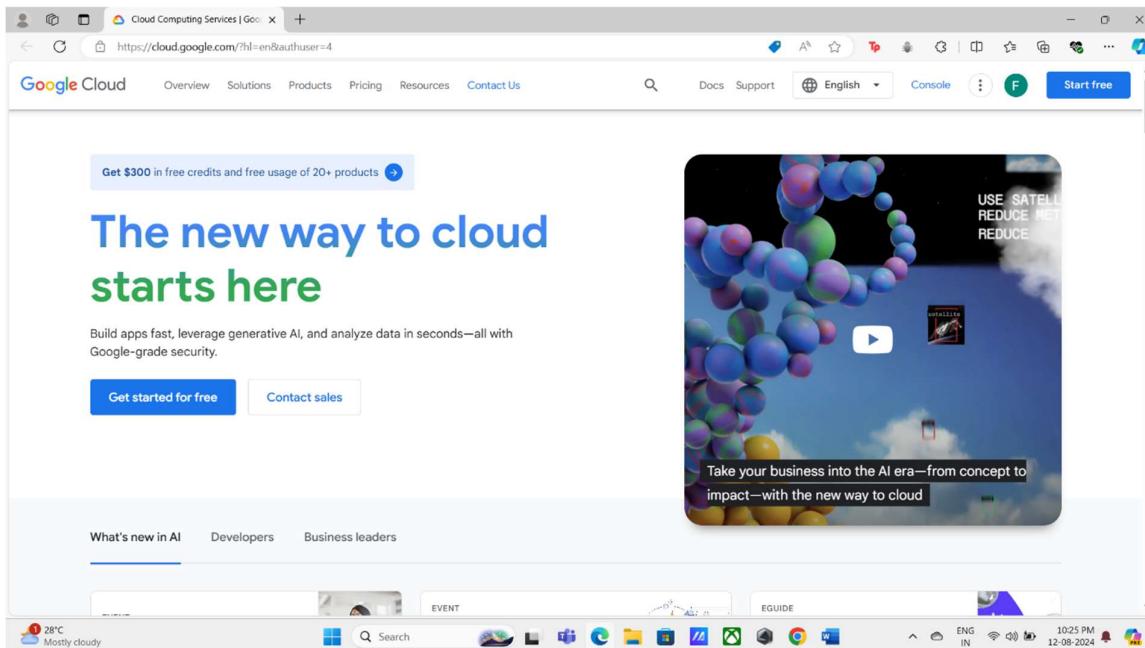
❖ The following image shows these phases:



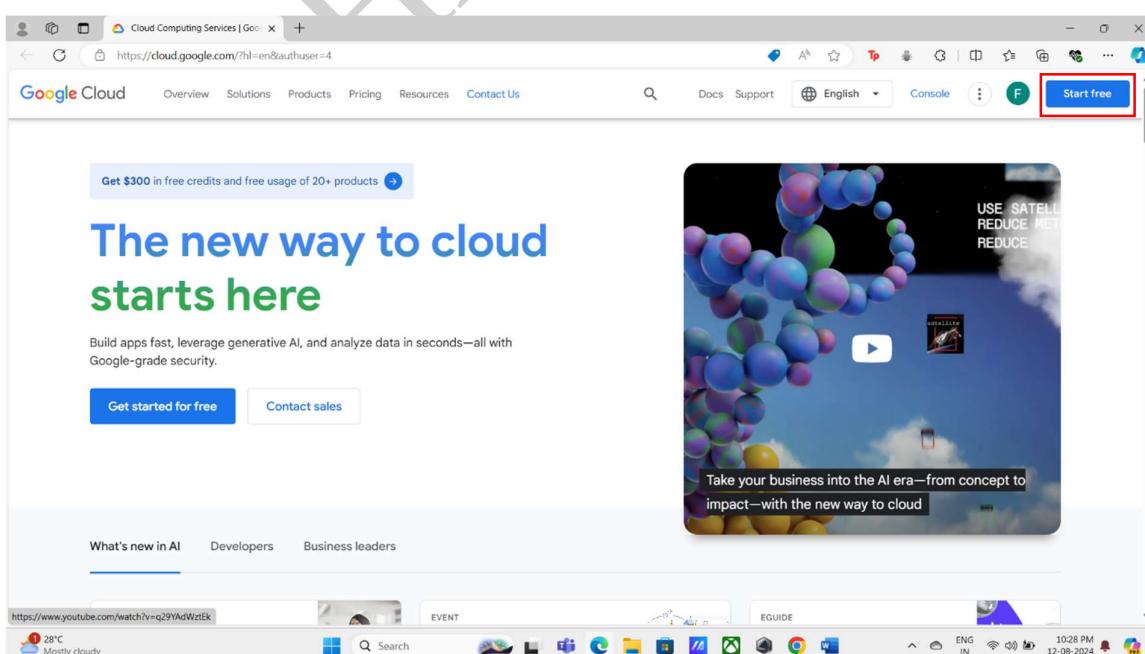
KEY STEPS IN THE MIGRATION PROCESS

1. LET'S SET UP THE GOOGLE CLOUD PLATFORM FREE TRIAL ACCOUNT.

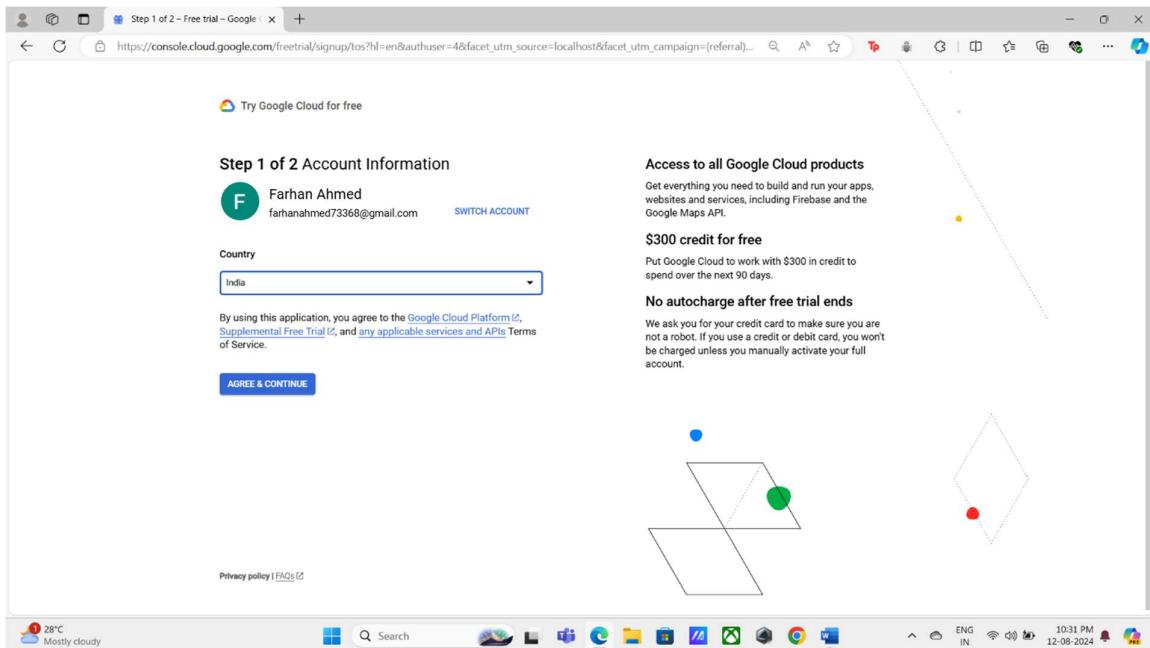
1.1- Type [google.cloud.com](https://cloud.google.com) in the browser.



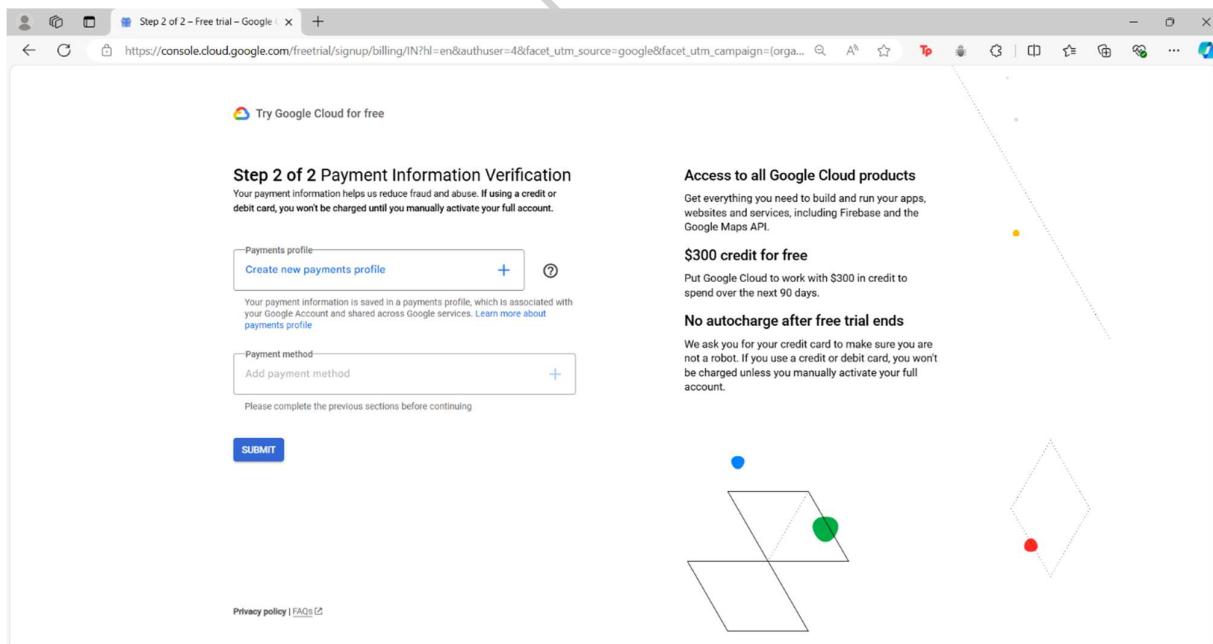
❖ Click on start free.



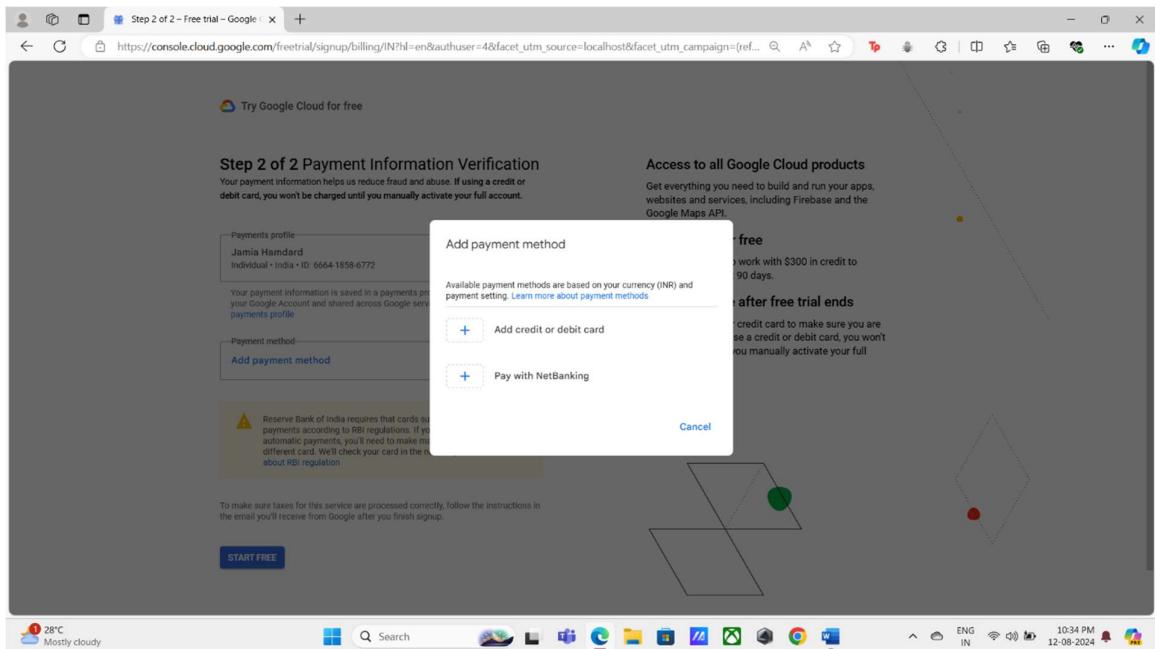
❖ Choose your country and click on agree and continue.



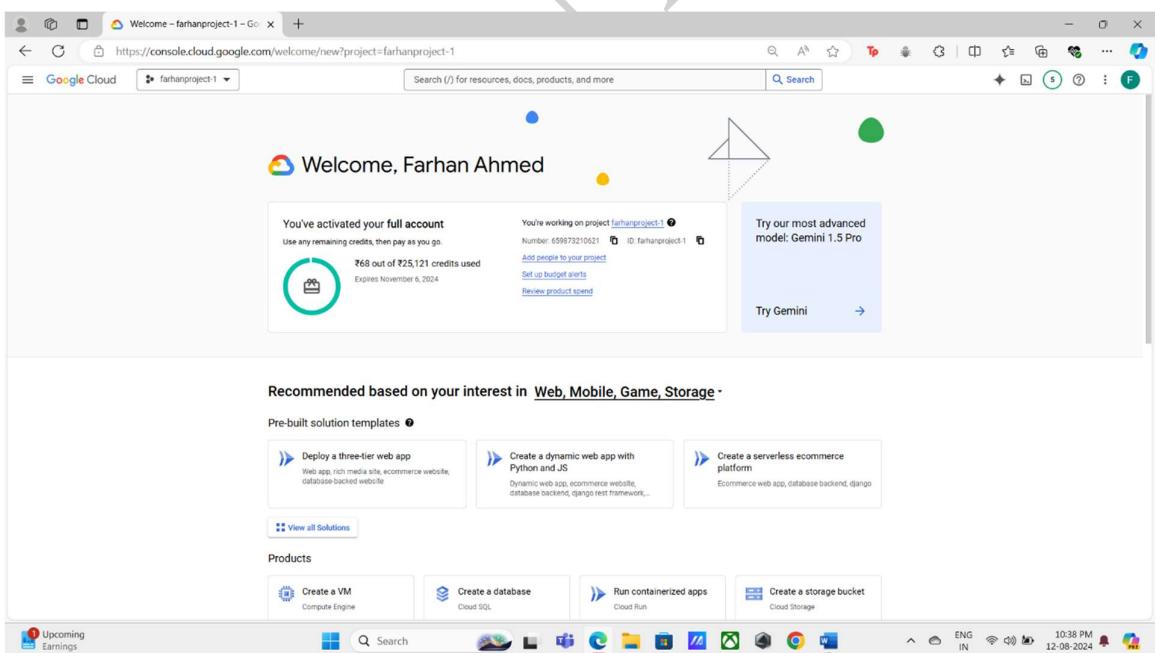
❖ Create your payment profile and provide all the necessary information.



- ❖ Add a payment method and click on Start free.



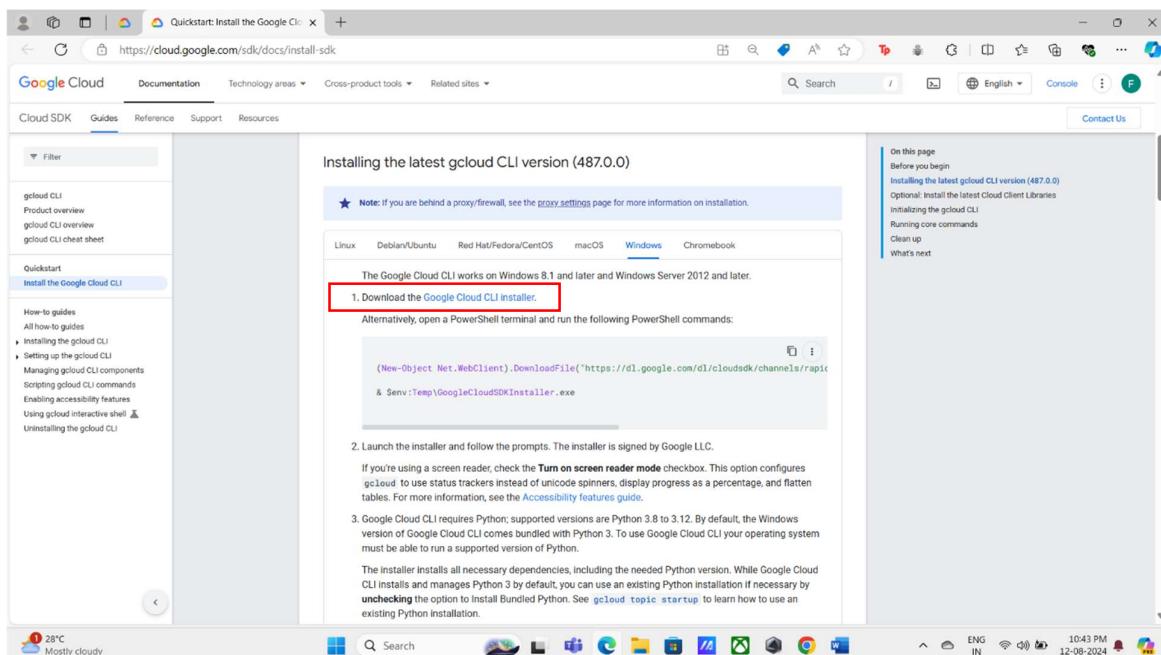
(After clicking on start free ₹2 will be deducted from your account for the confirmation process.)



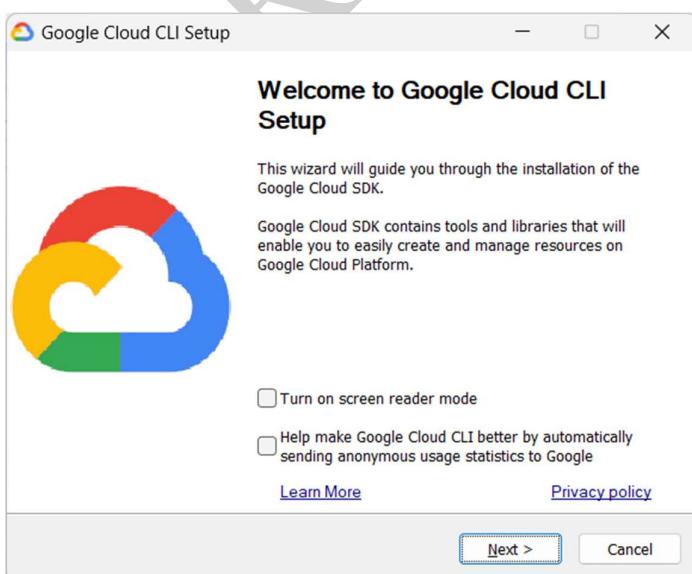
- ❖ You are now set to go, having been given \$300 USD to use on the platform for 90 days and free access to all required Google Cloud services.

1.2- Install the google cloud CLI.

- ❖ Install the gcloud CLI- <https://cloud.google.com/sdk/docs/install-sdk>.
- ❖ Select the Architecture of your machines (Linux, Debian/Ubuntu, Red Hat/Fedora/CentOS, macOS, Windows, Chromebook).
- ❖ Click on download the Google Cloud CLI installer.

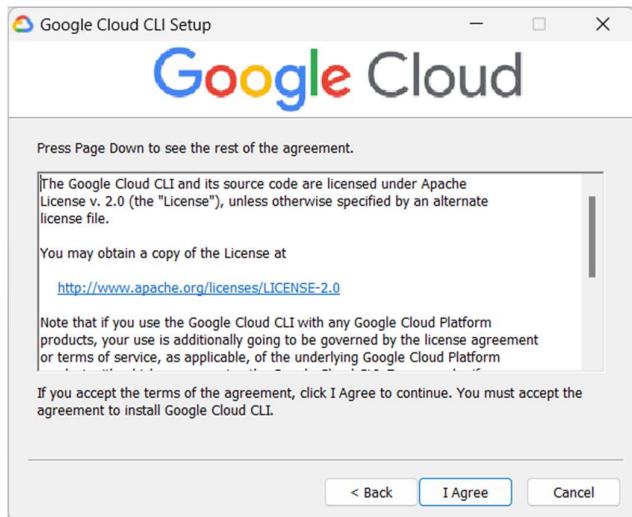


1.3- Set up the Google cloud CLI.



❖ Click on next.

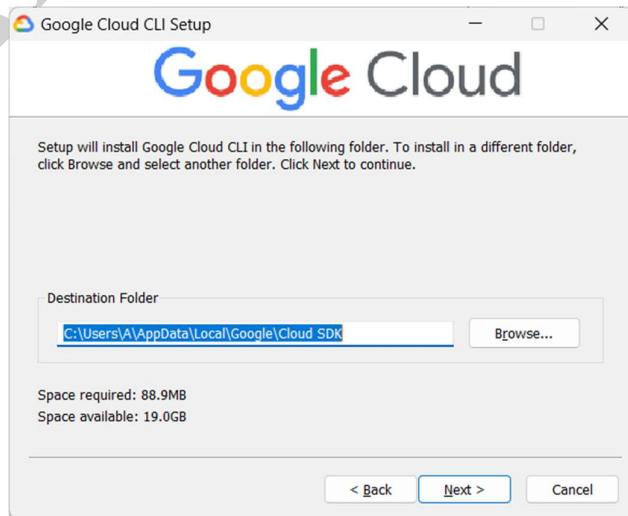
- ❖ Click on I Agree after reading the agreement.



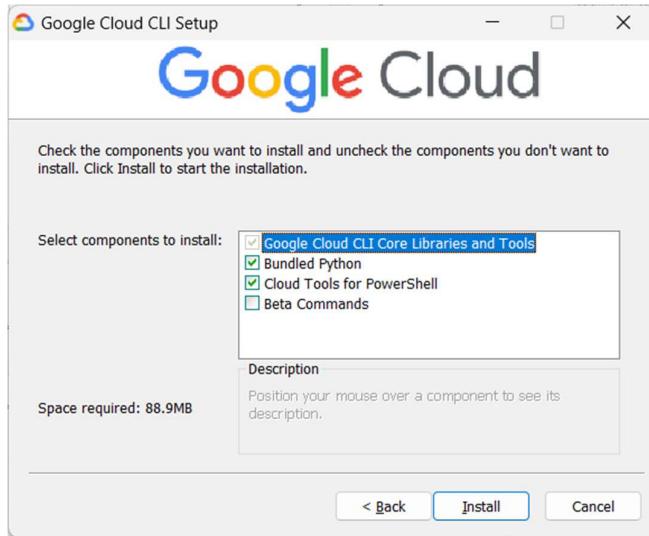
- ❖ Select the install type and click on Next.



- ❖ Select the Destination folder and click on Next.



- ❖ Check the components you want to install and Click on Install to start the installation.



(The gcloud CLI will now function after the installation is finished.)

1.4- Open command prompt(cmd).

- ❖ Write `gcloud init`.

The screenshot shows a Microsoft Windows Command Prompt window titled 'Command Prompt - gcloud init'. The window displays the output of the `gcloud init` command. It starts with the Windows copyright notice and then asks for configuration settings. It then prompts the user to pick a configuration to use, with options [1] or [2]. The user chooses option 1. It then asks if the user wants to skip diagnostics, and the user responds with 'skip'. It performs network diagnostic checks and finds them passed. Finally, it asks the user to select an account, listing three options: [1] the user's existing account, [2] sign in with a new account, or [3] skip this step. The user selects option 1. The command prompt then ends with a standard Windows taskbar at the bottom.

```

Microsoft Windows [Version 10.0.22631.3958]
(c) Microsoft Corporation. All rights reserved.

C:\Users\A>gcloud init
Welcome! This command will take you through the configuration of gcloud.

Settings from your current configuration [default] are:
accessibility:
  screen_reader: 'False'
core:
  account: farhanahmed73368@gmail.com
  disable_usage_reporting: 'True'

Pick configuration to use:
[1] Re-initialize this configuration [default] with new settings
[2] Create a new configuration
Please enter your numeric choice: 1

Your current configuration has been set to: [default]

You can skip diagnostics next time by using the following flag:
gcloud init --skip-diagnostics

Network diagnostic detects and fixes local network connection issues.
Checking network connection...done.
Reachability Check passed.
Network diagnostic passed (1/1 checks passed).

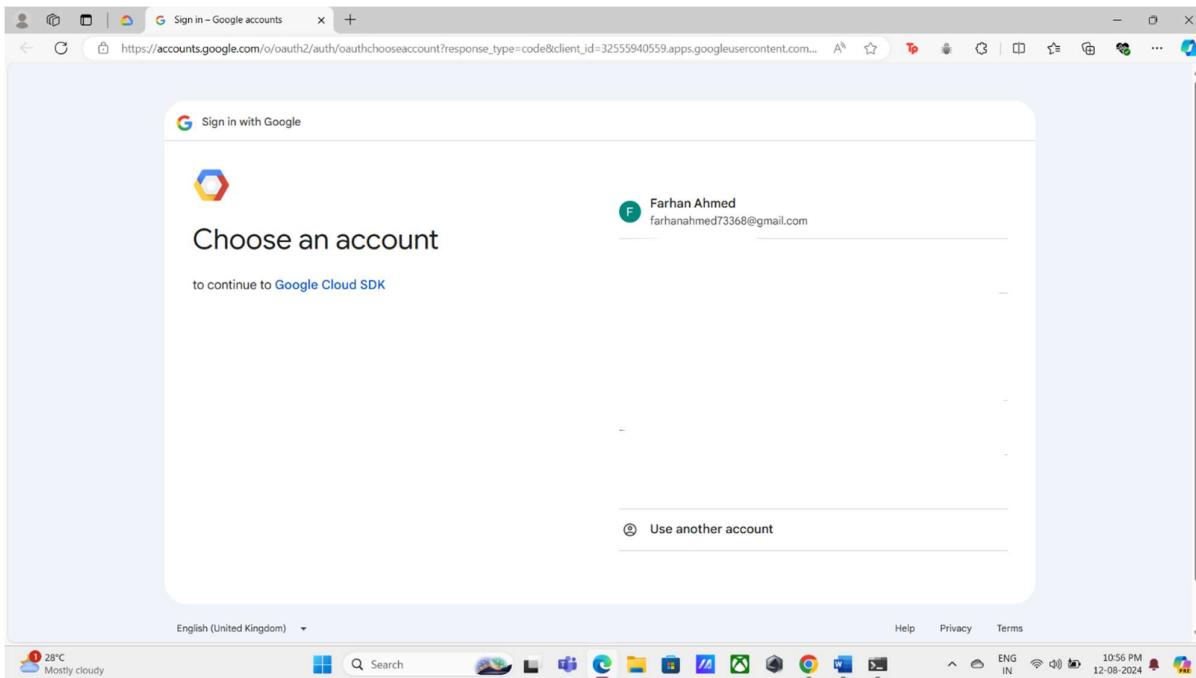
Choose the account you want to use for this configuration.
To use a federated user account, exit this command and sign in to the gcloud CLI with your login configuration file, then run this command again.

Select an account:
[1] farhanahmed73368@gmail.com
[2] Sign in with a new Google Account
[3] Skip this step
Please enter your numeric choice:

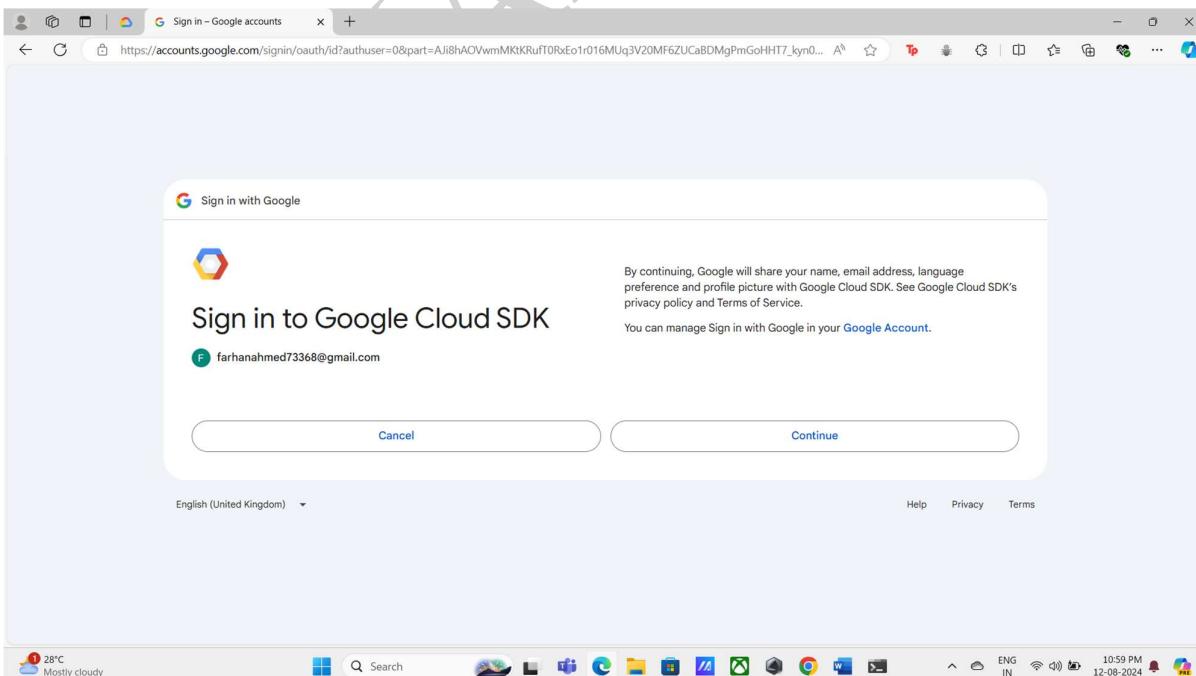
```

(In order to access Google Cloud SDK, you will be prompted to sign in.)

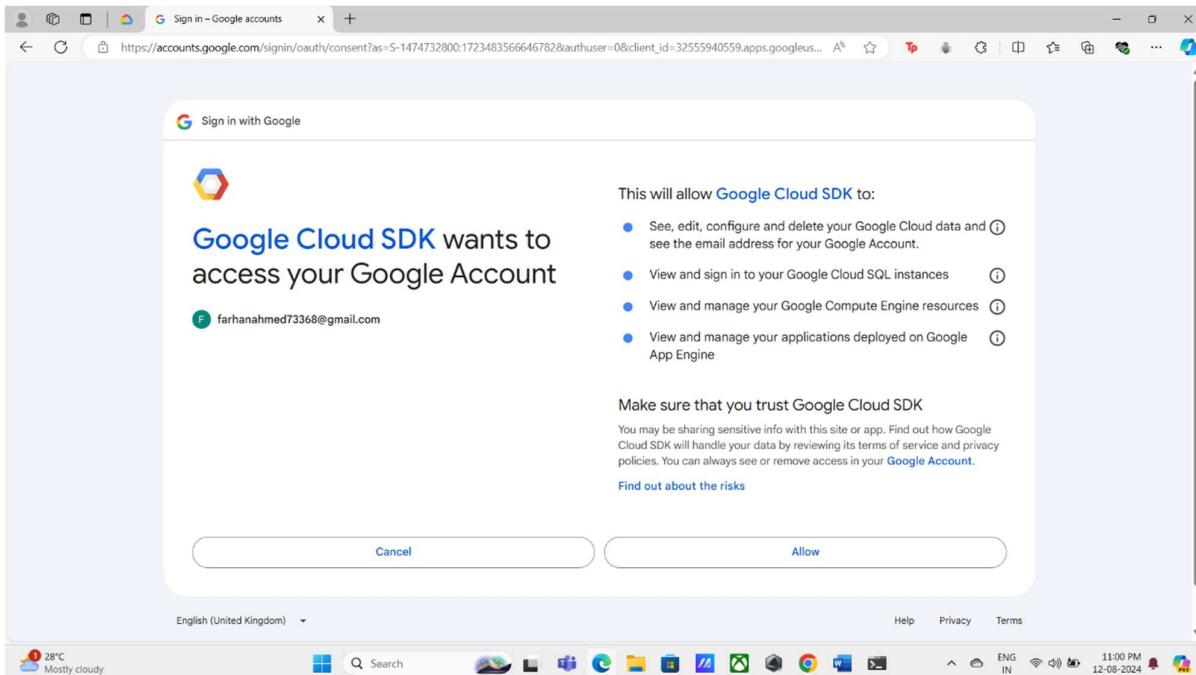
❖ Select the account you wish to use to log in.



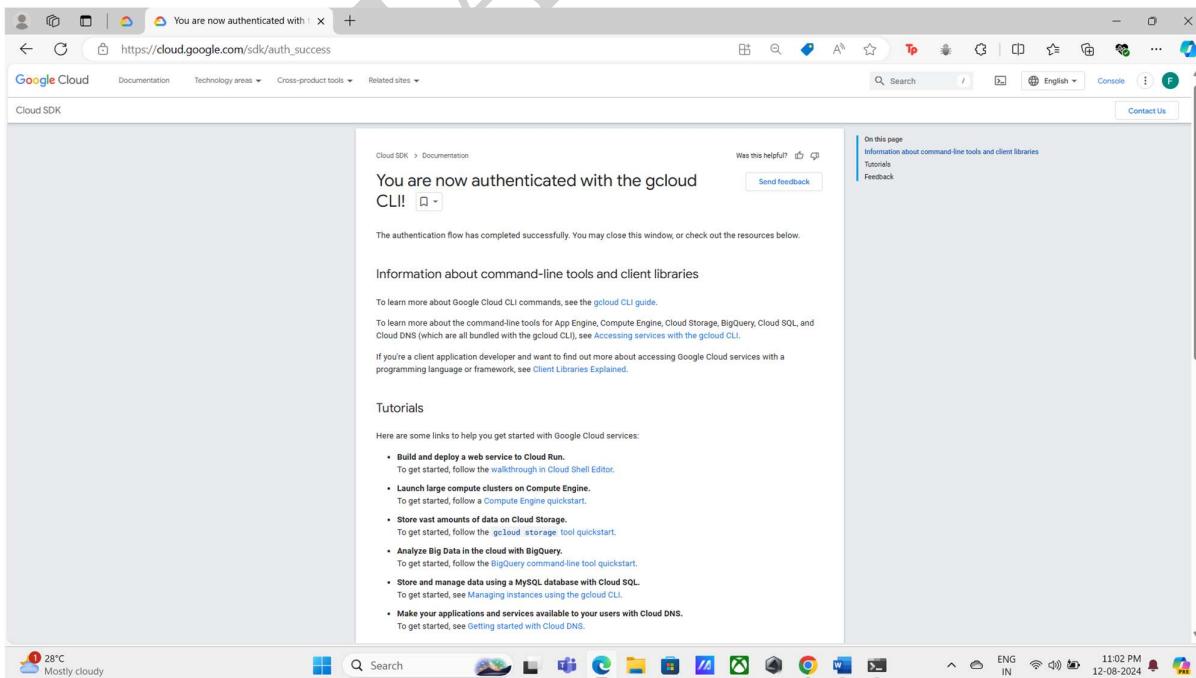
❖ Click on Continue.



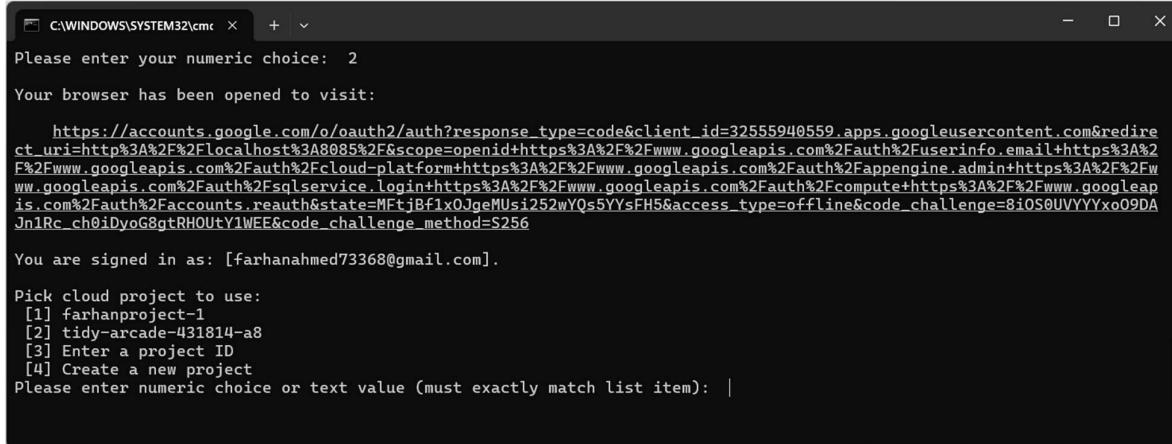
❖ Click on allow.



❖ Your gcloud CLI authentication will be successfully completed.

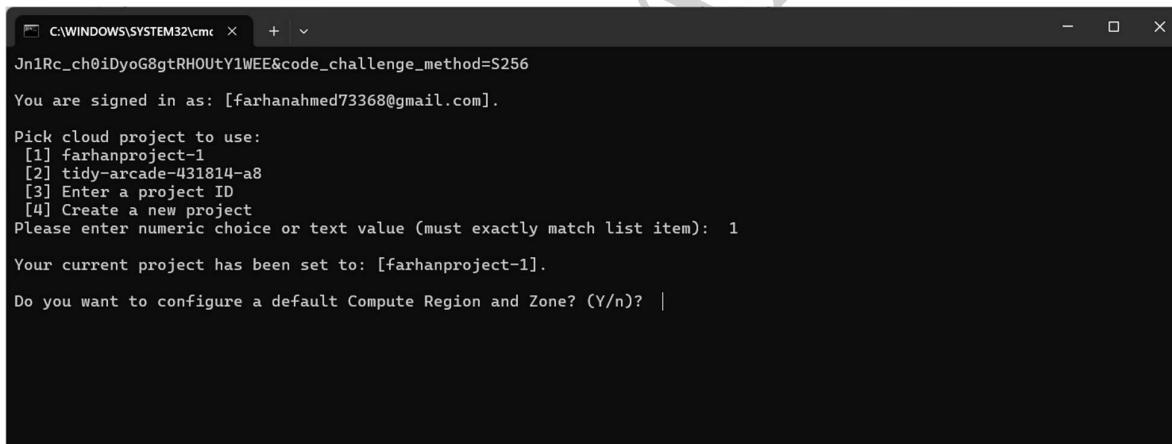


- ❖ After indicating that you are logged in with the selected ID, the command prompt will ask you to select an existing project or create a new one.



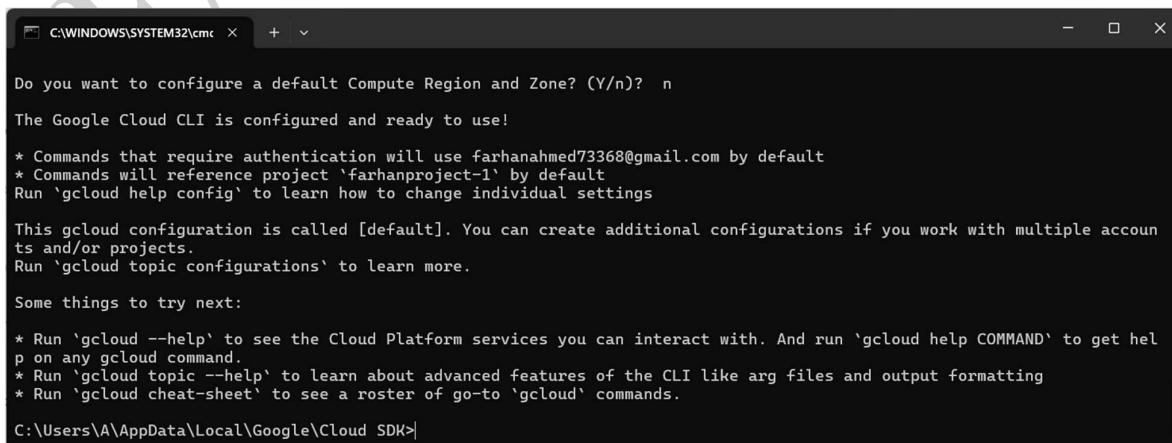
```
C:\WINDOWS\SYSTEM32\cmd > Please enter your numeric choice: 2
Your browser has been opened to visit:
https://accounts.google.com/o/oauth2/auth?response_type=code&client_id=32555940559.apps.googleusercontent.com&redirect_uri=http%3A%2Flocalhost%3A8085%2F&scope=openid+https%3A%2Fwww.googleapis.com%2Fauth%2Fuserinfo.email+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcloud-platform+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fappengine.admin+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fsqlservice.login+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcompute+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Faccounts.reauth&state=MftjBf1x0JgehUsi252wYQs5YYsFH5&access_type=offline&code_challenge=8i0S0UVYYYx09DAJn1Rc_ch0iDyoG8gtRHOutY1WEE&code_challenge_method=S256
You are signed in as: [farhanahmed73368@gmail.com].
Pick cloud project to use:
[1] farhanproject-1
[2] tidy-arcade-431814-a8
[3] Enter a project ID
[4] Create a new project
Please enter numeric choice or text value (must exactly match list item): |
```

- ❖ You will be prompted to configure a default compute region and zone after selecting the cloud project. You can choose to respond with a yes or no.



```
C:\WINDOWS\SYSTEM32\cmd > Jn1Rc_ch0iDyoG8gtRHOutY1WEE&code_challenge_method=S256
You are signed in as: [farhanahmed73368@gmail.com].
Pick cloud project to use:
[1] farhanproject-1
[2] tidy-arcade-431814-a8
[3] Enter a project ID
[4] Create a new project
Please enter numeric choice or text value (must exactly match list item): 1
Your current project has been set to: [farhanproject-1].
Do you want to configure a default Compute Region and Zone? (Y/n)? |
```

- ❖ The gcloud CLI has been configured and is now operational.



```
C:\WINDOWS\SYSTEM32\cmd > Do you want to configure a default Compute Region and Zone? (Y/n)? n
The Google Cloud CLI is configured and ready to use!
* Commands that require authentication will use farhanahmed73368@gmail.com by default
* Commands will reference project 'farhanproject-1' by default
Run 'gcloud help config' to learn how to change individual settings

This gcloud configuration is called [default]. You can create additional configurations if you work with multiple accounts and/or projects.
Run 'gcloud topic configurations' to learn more.

Some things to try next:
* Run 'gcloud --help' to see the Cloud Platform services you can interact with. And run 'gcloud help COMMAND' to get help on any gcloud command.
* Run 'gcloud topic --help' to learn about advanced features of the CLI like arg files and output formatting
* Run 'gcloud cheat-sheet' to see a roster of go-to 'gcloud' commands.

C:\Users\A\AppData\Local\Google\Cloud SDK>
```

2. CREATING AN AZURE SOURCE.



2.1- In Azure, we will first register an app in App Registration.

The screenshot shows the Microsoft Azure portal homepage. A large blue 'A' watermark is overlaid on the page. At the top, there's a search bar with 'app reg' typed into it. Below the search bar, there are several service categories: 'Azure services' (Create a resource, App registrations, Subscriptions), 'Resources' (Recent: Farhan-vm1, Farhan-vm2, Farhan-RG1, Farhan-vm1-nsg, farhan-vm1128_z1, Farhan-vnet2, az900, Test-VM_OsDisk_1_52965c41f4c4482a9db6; Favorite: See all), 'Marketplace' (Function App, Web App, App Service Plan, WordPress on App Service), 'Documentation' (Configure continuous deployment - Azure App Service, Create an App Service app using a Terraform template - Azure App Service, Security - Azure App Service, Authenticate access and connections with managed identities - Azure Logic Apps), 'Microsoft Entra ID' (Continue searching in Microsoft Entra ID), and 'Last Viewed' items (8 minutes ago, 9 minutes ago, a week ago, a week ago, a week ago, 3 weeks ago, 3 weeks ago). The 'App registrations' link is highlighted with a red box.

❖ Click on New Registrations.

The screenshot shows the 'App registrations' blade in the Microsoft Azure portal. A large blue 'A' watermark is overlaid. At the top, there's a navigation bar with 'Home > App registrations'. Below it is a toolbar with buttons for '+ New registration' (highlighted with a red box), 'Endpoints', 'Troubleshoot', 'Refresh', 'Download', 'Preview features', and 'Got feedback?'. A message box at the top states: 'Starting June 30th, 2020 we will no longer add any new features to Azure Active Directory Authentication Library (ADAL) and Azure Active Directory Graph. We will continue to provide technical support and security updates but we will no longer provide feature updates. Applications will need to be upgraded to Microsoft Authentication Library (MSAL) and Microsoft Graph. Learn more.' Below the toolbar, there are tabs for 'All applications' (selected), 'Owned applications', and 'Deleted applications'. A search bar says 'Start typing a display name or application (client) ID to filter these r...'. A 'View all applications in the directory' button is at the bottom.

- ❖ Enter the app's name and the supported account types, and finally click Register.

Name: TestingForMGTGCP

Supported account types:

- Accounts in this organizational directory only (Default Directory only - Single tenant)
- Accounts in any organizational directory (Any Microsoft Entra ID tenant - Multitenant)
- Accounts in any organizational directory (Any Microsoft Entra ID tenant - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)
- Personal Microsoft accounts only

Help me choose...

Redirect URI (optional):

By proceeding, you agree to the Microsoft Platform Policies [\[?\]](#)

Register

- ❖ Your app will be successfully registered.

Overview

Display name : TestingForMGTGCP

Client credentials : 0_certificate_1_secret

Application (client) ID : e7503eae-56aa-473c-8fdc-6057009e1036

Redirect URIs : Add a Redirect URI

Object ID : edbf1369-8e39-4682-9acd-29f824512685

Application ID URI : Add an Application ID URI

Directory (tenant) ID : 077351a6-4671-460b-a140-5c3bace15f58

Managed application in L... : TestingForMGTGCP

Supported account types : My organization only

Starting June 30th, 2020 we will no longer add any new features to Azure Active Directory Authentication Library (ADAL) and Azure Active Directory Graph. We will continue to provide technical support and security updates but we will no longer provide feature updates. Applications will need to be upgraded to Microsoft Authentication Library (MSAL) and Microsoft Graph. [Learn more](#)

Get Started Documentation

Build your application with the Microsoft identity platform

The Microsoft identity platform is an authentication service, open-source libraries, and application management tools. You can create modern, standards-based authentication solutions, access and protect APIs, and add sign-in for your users and customers. [Learn more](#)

Call APIs Sign in users in 5 minutes Configure for your organization

Call more powerful APIs with rich user and... Use our SDKs to sign in users and call APIs in a few... Action users and groups, enable conditional access...

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2.2- Click the "Certificates & secrets" option.

The screenshot shows the Azure portal interface for an app registration named 'TestingForMGTGCP'. The left sidebar has a 'Certificates & secrets' option highlighted with a red box. The main content area displays various application details like display name, object ID, and client credentials.

❖ Click on New client secret.

The screenshot shows the 'Certificates & secrets' page for the same app registration. The 'Client secrets' tab is selected. A red box highlights the '+ New client secret' button.

❖ Add a client secret by providing a description and choosing the expiration time and click on Add.

The screenshot shows the 'Add a client secret' dialog box. The 'Description' field contains 'TestingGCPMGT' and the 'Expires' dropdown is set to '90 days (3 months)'. The 'Certificates & secrets' option in the sidebar is also highlighted with a red box.

- ❖ Make a copy of the "value" credential because it is only available once and disappears as soon as we switch to a different service because it is equivalent to a password.

The screenshot shows the Microsoft Azure portal interface. The user is in the 'Certificates & secrets' section of an app registration. A red box highlights the 'Value' field for a client secret, which contains a long string of characters.

- 2.3- We will now move to the subscriptions tab in order to give the Google Cloud Migration Service on your source environment the minimal set of privileges.

The screenshot shows the Microsoft Azure portal interface with the 'Subscriptions' blade open. It lists a single subscription named 'Azure for Students'.

❖ Choose your subscription name.

The screenshot shows the Microsoft Azure portal interface with the 'Overview' page for the 'Azure for Students' subscription. It displays basic subscription information:

Subscription name	Current cost	Secure Score	Parent management group	Status
Azure for Students	Not available	-	Tenant Root Group	Active

- ❖ Click on access control (IAM) now, and create a custom role for migration.

Azure for Students | Access control (IAM)

Add custom role

Subscription

Overview

Activity log

Access control (IAM) **Activity log**

Tags

Diagnose and solve problems

Security

Events

Billing

Invoices

Partner information

Settings

Help

Search

Add role assignment

Add co-administrator

Add custom role

Download role assignments

Edit columns

Refresh

Delete

Feedback

My access

Check access

Role assignments

Roles

Deny assignments

Classic administrators

View my access

Check access

Grant access to this resource

View access to this resource

View deny assignments

Create a custom role

Learn more

Learn more

Learn more

Learn more

Learn more

New! Permissions Management

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- ❖ Give all the required details and select the baseline permissions starting from JSON and add the JSON file.

Create a custom role

Basics Permissions Assignable scopes JSON Review + create

To create a custom role for Azure resources, fill out some basic information. [Learn more](#)

Custom role name *

Description

Baseline permissions Clone a role Start from scratch Start from JSON

File *

Review + create Previous Next

Feedback

29°C Mostly cloudy

Search

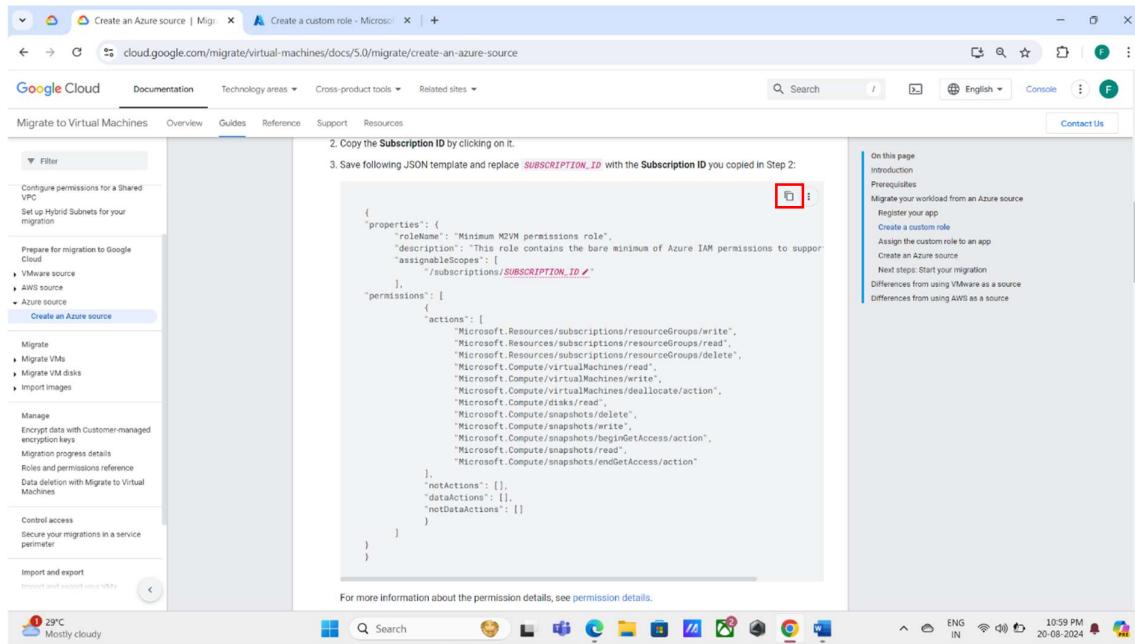
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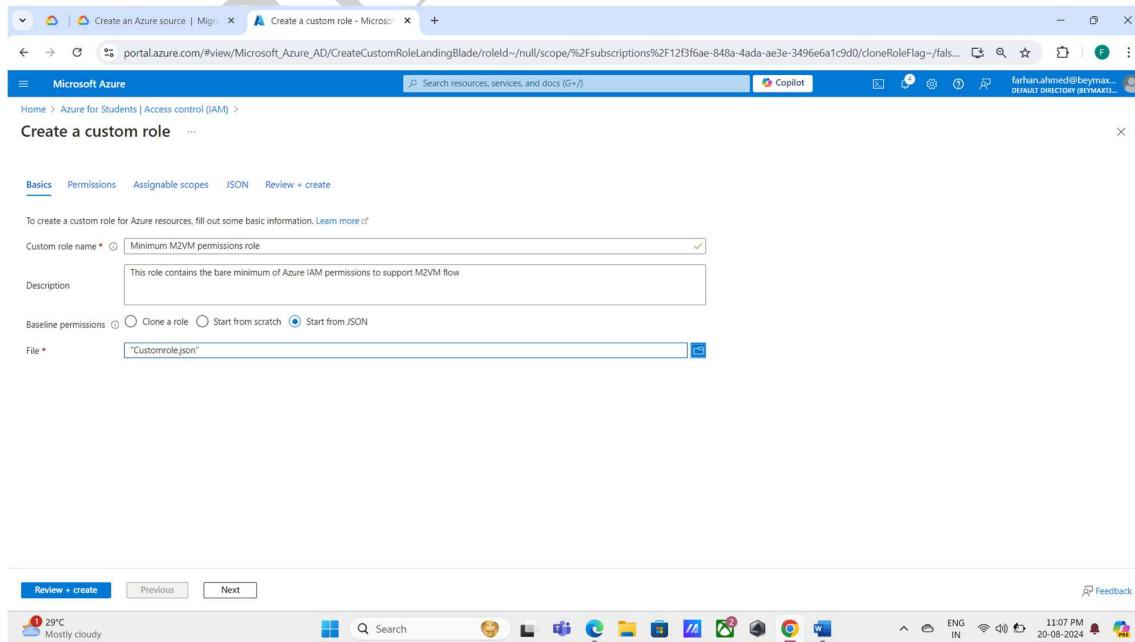
❖ For saving the JSON file-

- Open the Google Cloud Portal, navigate to the Migration to Virtual Machines section, and click on [Create an Azure source](#).
- Copy the JSON template and replace **SUBSCRIPTION_ID** with your Azure Subscription ID.



(Save the JSON template after entering your Azure subscription ID.)

❖ Select the file.



❖ Click on Create and the custom role will be added.

The screenshot shows the 'Create a custom role' page in the Microsoft Azure portal. The 'Review + create' tab is selected. Under the 'Basics' section, the role name is 'Minimum M2VM permissions role' and the role description is 'This role contains the bare minimum of Azure IAM permissions to support M2VM flow'. Under the 'Permissions' section, there is a list of actions: Microsoft.Resources/subscriptions/resourceGroups/write, Microsoft.Resources/subscriptions/resourceGroups/read, Microsoft.Resources/subscriptions/resourceGroups/delete, Microsoft.Compute/virtualMachines/read, Microsoft.Compute/virtualMachines/write, Microsoft.Compute/virtualMachines/deallocate/action, Microsoft.Compute/disks/read, Microsoft.Compute/snapshots/delete, Microsoft.Compute/snapshots/write, Microsoft.Compute/snapshots/beginGetAccess/action, and Microsoft.Compute/snapshots/read. At the bottom, there are 'Create' and 'Previous' buttons.

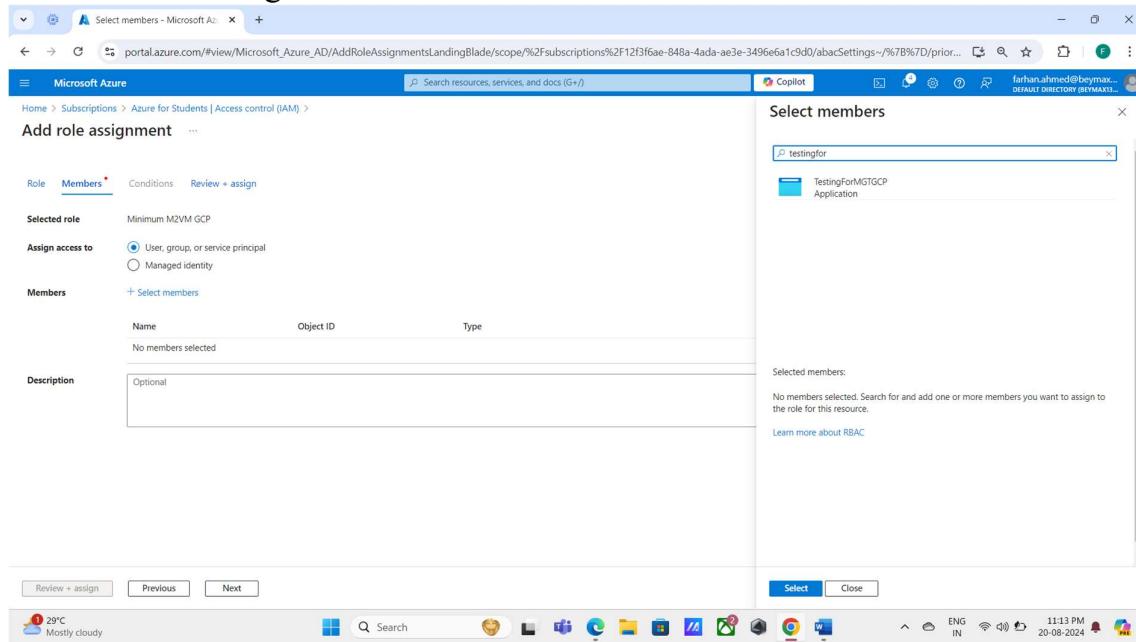
❖ We will grant access to that custom role.

The screenshot shows the 'Azure for Students | Access control (IAM)' page in the Microsoft Azure portal. The 'Add role assignment' button is highlighted with a red box. The page also shows other options like 'Add co-administrator', 'Add role assignment', and 'Add custom role'. There are tabs for 'Check access', 'Role assignments', 'Roles', 'Deny assignments', and 'Classic administrators'. A message at the top right says: 'August 31, 2024. After August 31, 2024, all classic administrators risk losing access to the subscription. Delete Classic Admins who no longer need access or assign an Azure RBAC role for fine-grained access.' Below the tabs, it says 'My access' and 'View my access'.

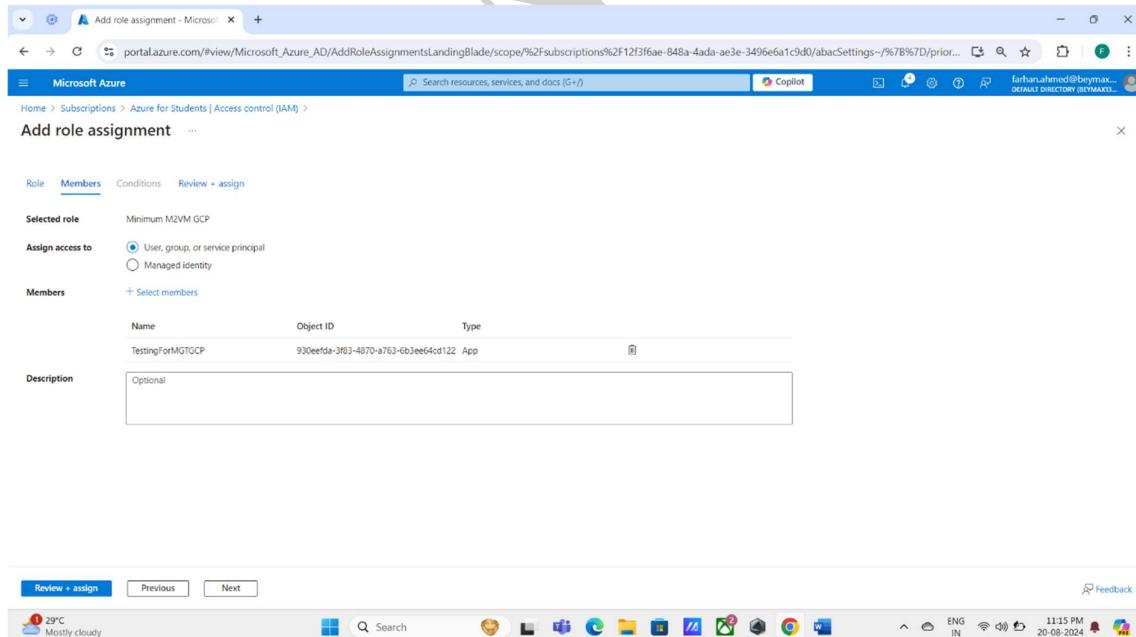
❖ Select the job function roles you created and click on next.

The screenshot shows the 'Add role assignment' page in the Microsoft Azure portal. The 'Job function roles' section is selected, showing 'Privileged administrator roles'. It says 'Grant access to Azure resources based on job function, such as the ability to create virtual machines.' A search bar at the top has 'minimum' typed into it. A table below lists three roles: 'Minimum M2VM GCP' (selected), 'Minimum M2VM permissions', and 'Minimum M2VM permissions role'. All three are categorized as 'CustomRole' and have 'None' under 'Category'. The 'Details' column shows 'View' for all. At the bottom, there are 'Review + assign', 'Previous', and 'Next' buttons.

- ❖ Click "Select members" now and select the application that you registered and click on Select.



- ❖ Click on Review + assign.



 Now that we have finished our work on Azure for the application migration, we can move on to working with Google Cloud Console.

3. WORKING ON GOOGLE CLOUD CONSOLE.

- 3.1- Navigate to Virtual Machines on Compute Engine and select Migrate to Virtual Machines.



A screenshot of the Google Cloud Console dashboard. On the left, there's a sidebar with various services like Cloud overview, Solutions, API & Services, Billing, IAM & Admin, Marketplace, Vertex AI, Compute Engine, Kubernetes Engine, Cloud Storage, BigQuery, VPC Network, Cloud Run, and SQL. The 'Compute Engine' item is highlighted with a red box. The main area shows a user profile for 'Farhan Ahmed' and a section titled 'Migrate to Virtual Machines'. A callout arrow points from the 'Compute Engine' menu item to the 'Migrate to Virtual Machines' section.

❖ Click on MANAGE SOURCES to add a source.

A screenshot of the 'Migrate to Virtual Machines' dashboard. The sidebar shows 'Virtual machines' with options like VM instances, Instance templates, Sole-tenant nodes, Machine images, TPUs, Committed-use discounts, Reservations, and 'Migrate to Virtual Machines'. The main area has tabs for DASHBOARD, SOURCES, VM MIGRATIONS, DISK MIGRATIONS, IMAGE IMPORTS, GROUPS, and TARGETS. Under the SOURCES tab, there's a 'Welcome to Migrate to Virtual Machines' section with buttons for 'Add a source', 'Add targets', 'Add migrations', and 'Create a group'. A callout arrow points from the 'MANAGE SOURCES' button in the sidebar to the 'Add a source' button in the main area.

- 3.2- Click on ADD SOURCE and select Add Azure source.

A screenshot of the 'Sources' page under the 'Compute Engine' section. The sidebar shows 'Virtual machines' with options like VM instances, Instance templates, Sole-tenant nodes, Machine images, and TPUs. The main area has tabs for DASHBOARD, SOURCES, VM MIGRATIONS, DISK MIGRATIONS, IMAGE IMPORTS, GROUPS, and TARGETS. Under the SOURCES tab, it says 'No sources available'. There's a 'VIEW REPORTS' and 'SOURCE DETAILS' button. Below that, there's an 'ADD SOURCE' button with a dropdown menu showing '+ Add VMware source', '+ Add AWS source', and '+ Add Azure source'. A callout arrow points from the '+ Add Azure source' option in the dropdown menu to the '+ Add Azure source' option in the main area.

- ❖ Provide all the information that is required and that comes from the source cloud (Azure).

The screenshot shows the Google Cloud Compute Engine interface for migrating VMs. On the left, there's a sidebar with 'Virtual machines', 'Storage', and 'Migrate to Virtual Machines'. The main area is titled 'Migrate to Virtual Machines' with tabs for 'DASHBOARD', 'SOURCES', 'VM MIGRATIONS', 'DISK MIGRATIONS', and 'IMAGE IMPORTS'. Under 'SOURCES', it says 'Source is the cloud environment or the on-prem VMware data center hosting the VMs that you want to migrate.' Below this, there's a table for 'Source VM list' with columns for Computer name, Resource group, CPUs, Memory (GB), and Number of disks. Two VMs are listed: 'farhan-vm1' and 'farhan-vm2', both in 'farhan-rg1' resource group. To the right, a modal window titled 'Create Azure source' is open, prompting for 'Required details' such as Name, GCP region (set to 'asia-east1'), Azure location ('canadacentral'), Subscription ID, Client ID, Tenant ID, and Client secret value. It also has an 'Encryption' section with options for Google-managed or Cloud KMS keys.

- ❖ Click on Create after providing all the details.

This screenshot shows the same 'Create Azure source' dialog as the previous one, but with more detailed information filled in. The 'Name' field contains 'm2vm-farhan', 'GCP region' is set to 'asia-east1', 'Azure location' is 'canadacentral', 'Subscription ID' is '12f5ffaa-848a-4d9a-ae3e-3495eda1c9d0', 'Client ID' is 'e7503eae-56aa-473c-8fdc-6057009e1036', 'Tenant ID' is '077351a6-467f-450b-a140-5c3bace15f58', and 'Client secret value' is a redacted string. The 'Encryption' section remains the same. At the bottom right of the dialog, the 'CREATE' button is visible.

 (Azure location, Subscription ID, Client ID, Tenant ID and Client secret value details can be gathered from Azure.)

- ❖ In 10 to 15 minutes, the source virtual machines will be added, and their status will show activated.

The screenshot shows the 'Sources' tab of the 'Migrate to Virtual Machines' interface. The 'Source status' dropdown is highlighted with a red box and shows 'Pending'. The 'Source VM list' table has one row: 'm2vm-farhan', 'Azure location: canadacentral', 'Target region: asia-east1', 'Migrating VMs: 0', and 'Total VMs: 0'. A note says 'Source is the cloud environment or the on-prem VMware data center hosting the VMs that you want to migrate.'

- ❖ The source status is active, and the migrated VMs are now accessible in the list of source VMs.

The screenshot shows the 'Sources' tab of the 'Migrate to Virtual Machines' interface. The 'Source status' dropdown is highlighted with a red box and shows 'Active'. The 'Source VM list' table now shows two rows: 'farhan-vm1' and 'farhan-vm2', both under 'Computer name'. Other columns include Resource group (farhan-rg1), CPUs (1), Memory (GB) (3.5), Number of disks (1), OS description (windows), VM size (standard_d1_v2), and Tags (owner:Farhan ahmed). A note says 'Source is the cloud environment or the on-prem VMware data center hosting the VMs that you want to migrate.'

3.3- Select the VM's and click on ADD MIGRATIONS.

➤ Choose any one-

- ❖ VM migration- used to migrate the entire VM.
- ❖ Disk migration-used to migrate the disks only.

The screenshot shows the 'Sources' tab of the 'Migrate to Virtual Machines' interface. The 'ADD MIGRATION' button is highlighted with a red box. A dropdown menu is open, showing 'VM migration' and 'Disk migration'. The 'Source VM list (selected)' table shows two rows: 'farhan-vm1' and 'farhan-vm2'. The 'ADD MIGRATION' dropdown also lists 'Add migrations of selected VMs' and 'Disk migration'.

- ❖ The two chosen virtual machines are now accessible within the VM MIGRATIONS segment.

Total migrating VMs	Ready	First sync	Active	Paused	Cut-over	Finalised
2	2	0	0	0	0	0

- ❖ To start the replication process after choosing the virtual machines, select MIGRATIONS and then click "Start replication."

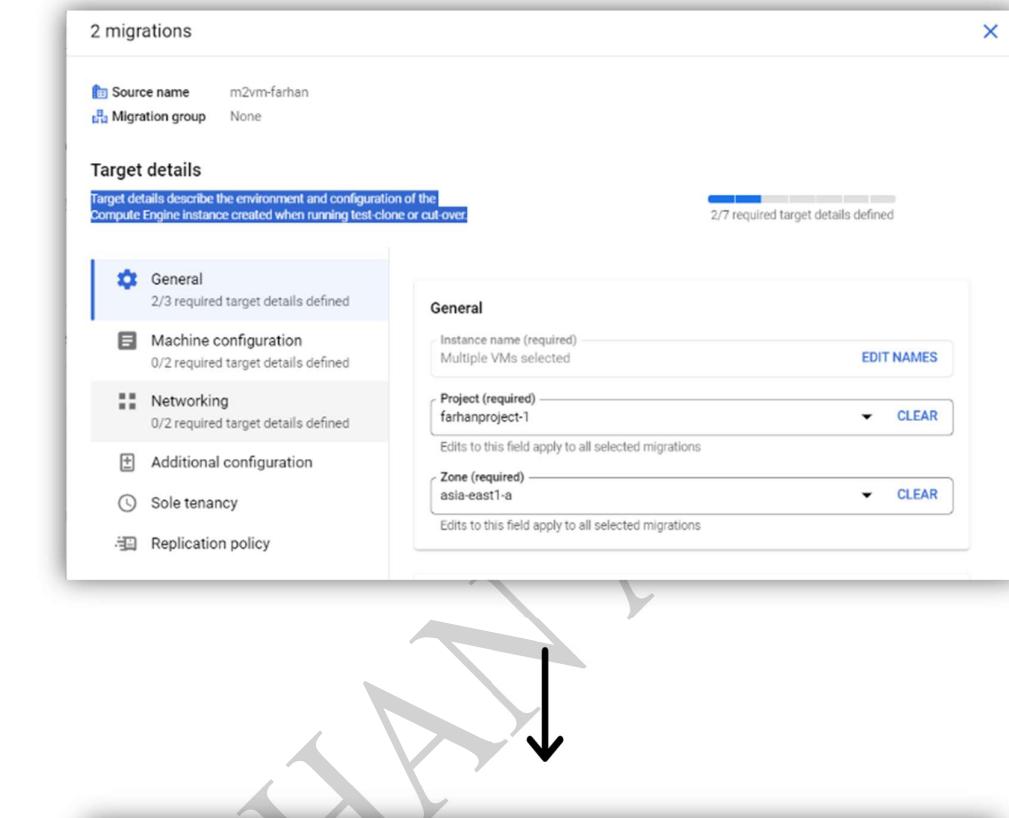
❖ Replication started.

Source asset name	Source asset ID	Resource Group	Source status	Region	Replication status	Estimated cut-over time	Test-clone/Cut-over status
farhan-vm1	farhan-vm1	farhan-rg1	Active	asia-east1	Ready	N/A	
farhan-vm2	farhan-vm2	farhan-rg1	Active	asia-east1	Ready	N/A	

- ❖ (Replication time for the VM will depend on the data that is available at the source VM's)

3.4- We will Select the VM's and click on EDIT TARGET DETAILS so that we can perform TEST-CLONE or CUT-OVER.

- ❖ Select all the necessary Target details as it describes the environment and configuration of the Compute Engine instance created when running test-clone or cut-over.



2 migrations

Source name: m2vm-farhan
Migration group: None

Target details

Target details describe the environment and configuration of the Compute Engine instance created when running test-clone or cut-over.

2/7 required target details defined

General (selected)
2/3 required target details defined

Machine configuration
0/2 required target details defined

Networking
0/2 required target details defined

Additional configuration

Sole tenancy

Replication policy

General

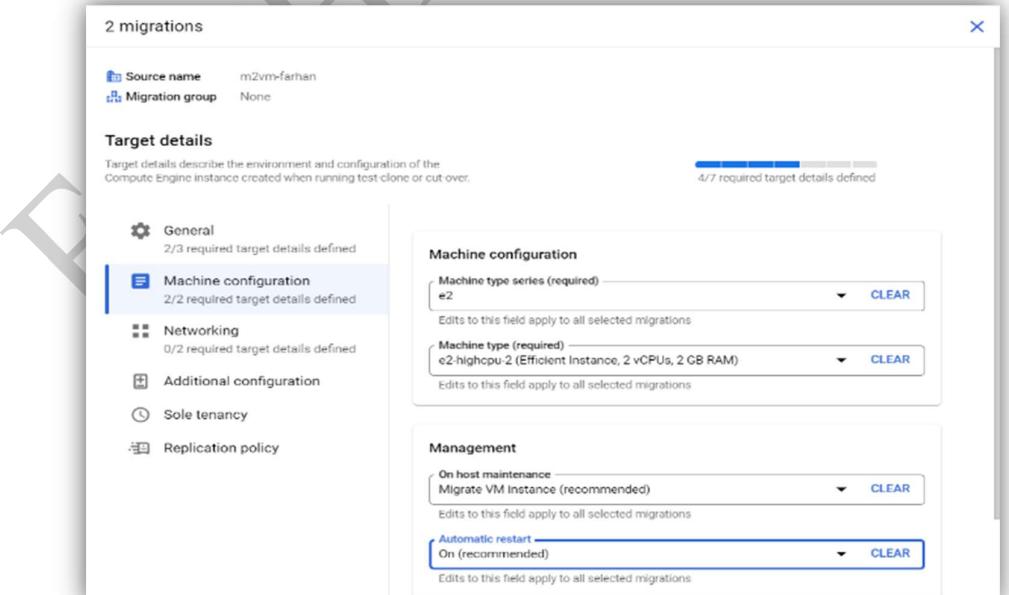
Instance name (required)
Multiple VMs selected **EDIT NAMES**

Project (required)
farhanproject-1 **CLEAR**

Edits to this field apply to all selected migrations

Zone (required)
asia-east1-a **CLEAR**

Edits to this field apply to all selected migrations



2 migrations

Source name: m2vm-farhan
Migration group: None

Target details

Target details describe the environment and configuration of the Compute Engine instance created when running test-clone or cut over.

4/7 required target details defined

General (selected)
2/3 required target details defined

Machine configuration (selected)
2/2 required target details defined

Networking
0/2 required target details defined

Additional configuration

Sole tenancy

Replication policy

Machine configuration

Machine type series (required)
e2 **CLEAR**

Edits to this field apply to all selected migrations

Machine type (required)
e2-highcpu-2 (Efficient Instance, 2 vCPUs, 2 GB RAM) **CLEAR**

Edits to this field apply to all selected migrations

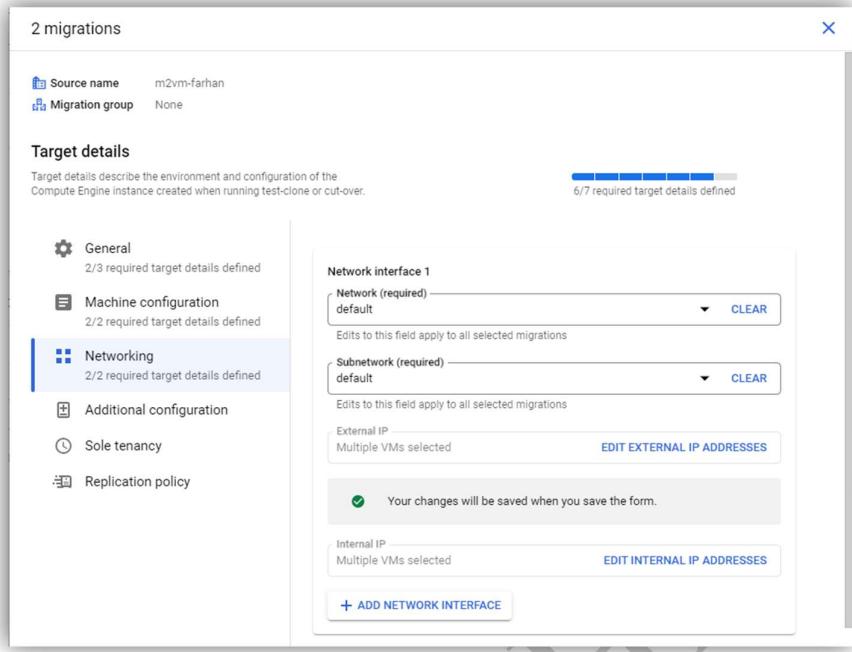
Management

On host maintenance
Migrate VM Instance (recommended) **CLEAR**

Edits to this field apply to all selected migrations

Automatic restart
On (recommended) **CLEAR**

Edits to this field apply to all selected migrations



❖ Now click on save.

Virtual machines - Microsoft A: | +

console.cloud.google.com/compute/mfce/migrations?project=farhanproject-1

Google Cloud

Compute Engine

Migrate to Virtual Machines

DASHBOARD SOURCES VM MIGRATIONS DISK MIGRATIONS IMAGE IMPORTS

VM migrations are all of your VMs that are currently in the migration process. [Read more](#)

Total migrating VMs: 2 Ready: 0 First sync: 0

Migrations (2 selected)

Filter	Source asset name	Source asset ID	Resource Group	Source status	Region
<input checked="" type="checkbox"/>	farhan-vm1	farhan-vm1	farhan-rg1	Active	asia-east1
<input checked="" type="checkbox"/>	farhan-vm2	farhan-vm2	farhan-rg1	Active	asia-east1

Target details

Target details describe the environment and configuration of the Compute Engine instance created when running test-clone or cut-over.

6/7 required target details defined

- General: 2/3 required target details defined
- Machine configuration: 2/2 required target details defined
- Networking:** 2/2 required target details defined
- Additional configuration
- Sole tenancy
- Replication policy

Scheduling

Replication idle time between cycles: 1000 seconds

Actions: SAVE, CANCEL

- 3.5- Select the VM's and click on TEST-CLONE or CUT- OVER to perform the failover.

- TEST CLONE- The VM from the source platform, then moves the clone to Compute Engine for testing.
- CUT-OVER-This process includes stopping the source VM, completing a final replication, and creating the production Compute Engine instance from the source VM.

Virtual machines - Microsoft Azure

Google Cloud farhanproject-1

Migrate to Virtual Machines

VM MIGRATIONS

Total migrating VMs	Ready	First sync	Active	Paused	Cut-over	Finalised
2	0	0	2	0	0	0

Migrations (2 selected) EDIT TARGET DETAILS MIGRATION CUT-OVER AND TEST-CLONE GROUP ASSIGNMENT DELETE

Filter migrations ID: Test-clone

Source asset name	Source asset ID	Resource Group	Source status	Replication status	Estimated cut-over time	Test-clone/Cut-over status	Last sync snapshot time
farhan-vm1	farhan-vm1	farhan-rg1	Active	Active (Post-processing)	N/A	1 hour ago	
farhan-vm2	farhan-vm2	farhan-rg1	Active	Active (Post-processing)	N/A	1 hour ago	

❖ TEST-CLONE has been started.

Home - Microsoft Azure

Google Cloud farhanproject-1

Migrate to Virtual Machines

VM MIGRATIONS

Total migrating VMs	Ready	First sync	Active	Paused	Cut-over	Finalised
2	0	0	2	0	0	0

Migrations (2 selected) EDIT TARGET DETAILS MIGRATION CUT-OVER AND TEST-CLONE GROUP ASSIGNMENT DELETE

Filter migrations

Source asset name	Source asset ID	Resource Group	Source status	Region	Replication status	Estimated cut-over time	Test-clone/Cut-over status
farhan-vm1	farhan-vm1	farhan-rg1	Active	asia-east1	Active (Post-processing)	44 min	Test-clone/Cut-over status Cloning (Preparing VM disks)
farhan-vm2	farhan-vm2	farhan-rg1	Active	asia-east1	Active (Post-processing)	42 min	Cloning (Preparing VM disks)

❖ TEST-CLONE is now completed.

Home - Microsoft Azure

Google Cloud farhanproject-1

Migrate to Virtual Machines

VM MIGRATIONS

Total migrating VMs	Ready	First sync	Active	Paused	Cut-over	Finalised
2	0	0	2	0	0	0

Migrations (2 selected) EDIT TARGET DETAILS MIGRATION CUT-OVER AND TEST-CLONE GROUP ASSIGNMENT DELETE

Filter migrations

Source asset name	Source asset ID	Resource Group	Source status	Region	Replication status	Estimated cut-over time	Test-clone/Cut-over status
farhan-vm1	farhan-vm1	farhan-rg1	Active	asia-east1	Active (Post-processing)	44 min	Clone completed 2 minutes ago
farhan-vm2	farhan-vm2	farhan-rg1	Active	asia-east1	Active (Idle)	43 min	Clone completed 2 minutes ago

3.6- Click on VM instances.

Total migrating VMs	Ready	First sync	Active	Paused	Cut-over	Finalised
2	0	0	2	0	0	0

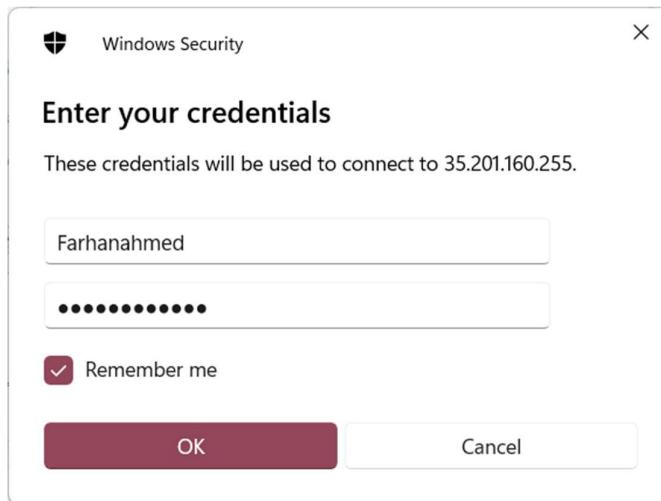
- ❖ Both of our virtual machines are now accessible within the virtual instances.

3.7- Now that we have moved our machines from the source cloud, we will connect to them via Remote Desktop Connection (RDC) by copying their external IP address.

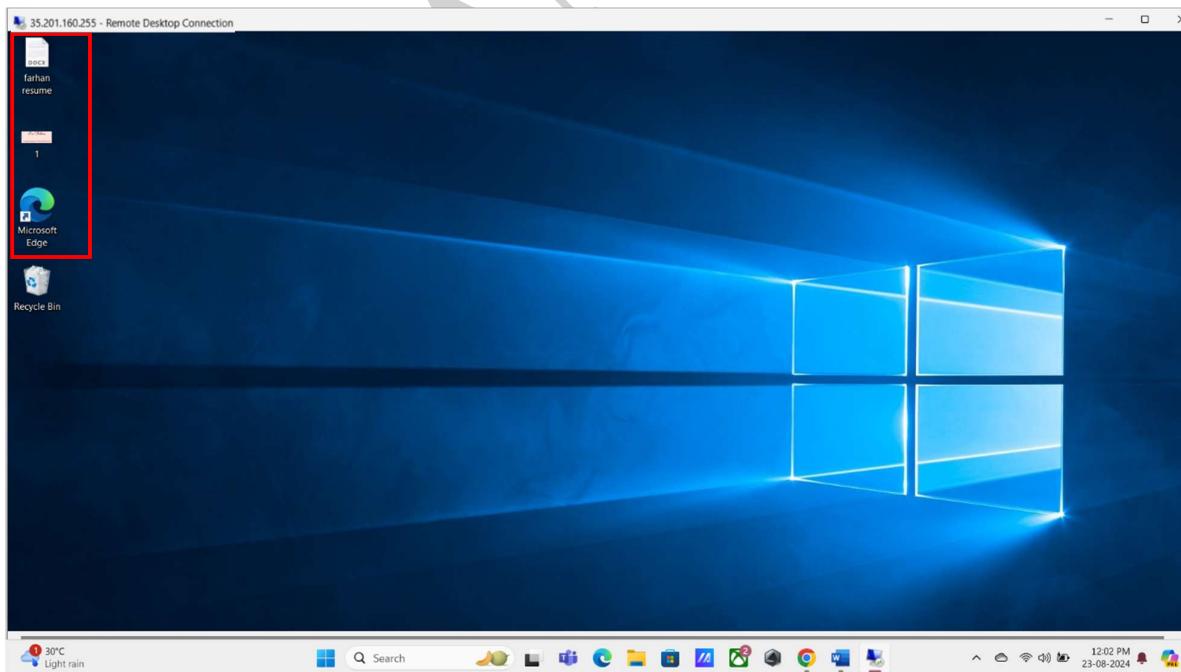
- ❖ Click on Connect.



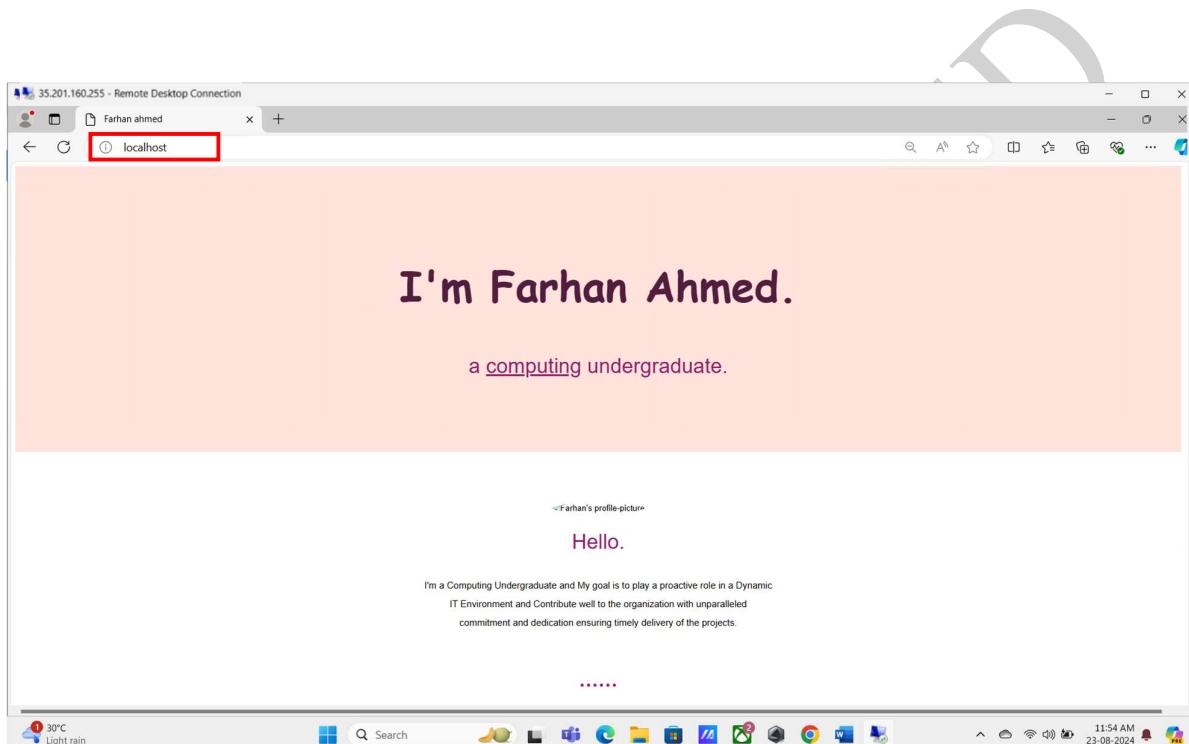
- ❖ Enter your credentials for login. (the same as your source clouds virtual machine).



- ❖ Now that we are connected to the migrated VM-1, all of the data from the source virtual machine (VM) is accessible here and intact.



- ❖ As all of our data was accessible in the migrated VM in GCP, we published a website in source VM to further confirm it. To access the published website, connect to the VM via Remote Desktop Connection (RDC) and type **localhost** in any local browser.



⊕ We can therefore conclude that the application's migration from Azure to Google Cloud Platform was successful.

CONCLUSION

In conclusion, the successful migration of our application from Microsoft Azure to Google Cloud Platform (GCP) marks a significant milestone in our journey toward optimizing our cloud infrastructure. This transition has enabled us to leverage the advanced capabilities of GCP, including enhanced data analytics, cost efficiency, and cutting-edge AI tools. By addressing the limitations of our previous environment and aligning with our long-term strategic goals, we have not only improved the performance and scalability of our applications but also positioned our organization to better capitalize on future opportunities in the rapidly evolving digital landscape. The seamless migration process, with minimal disruption to operations, underscores the effectiveness of our planning and execution, paving the way for continued innovation and growth in our cloud strategy.