[2] Virtual Machine Deployment in Google Cloud Platform

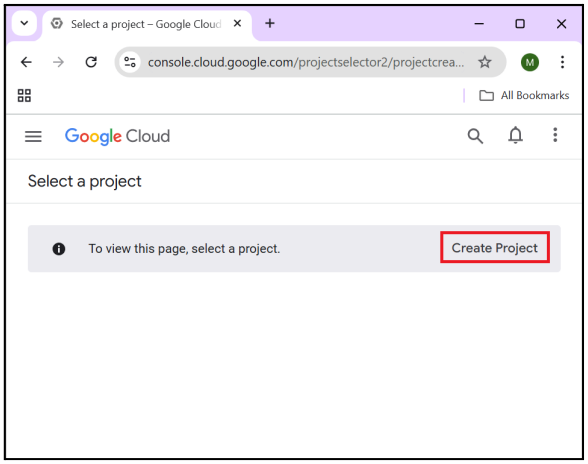
Step 1: Access the GCP Console

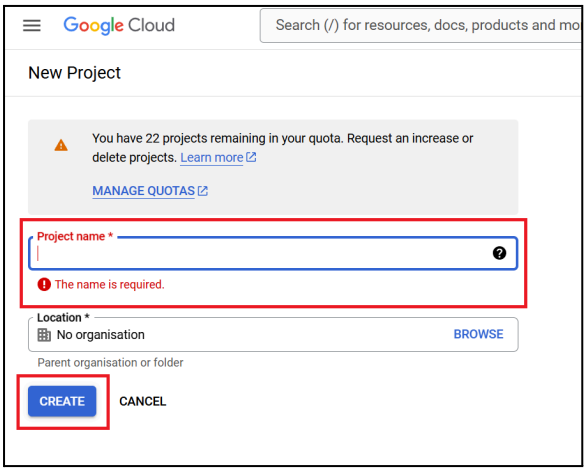
1. Navigate to https://console.cloud.google.com/.
2. Log in to your Google account and ensure your billing account is active.

   Note: You are required to set up a billing account before using the Google Cloud Platform service (https://cloud.google.com/billing/docs/how-to/manage-billing-account)

Step 2: Create a Project

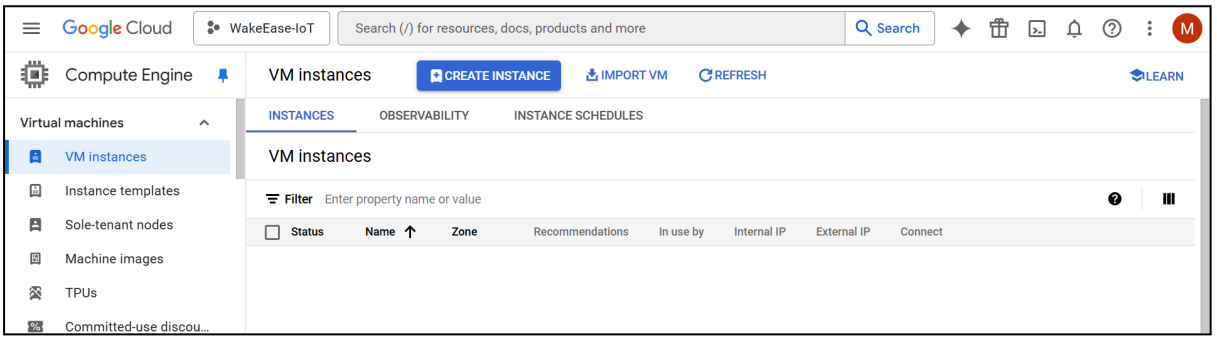
1. In the GCP console, click the ***Create Project*** > set the project name > click ***CREATE***.





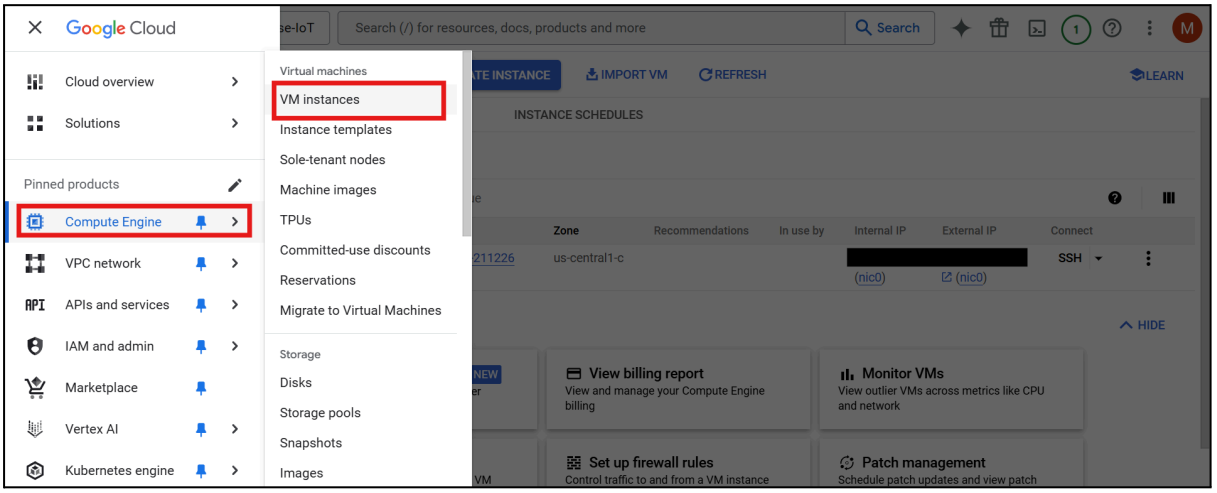
2. Click the ***ENABLE*** button to enable the Compute Engine API for the project.

3. If the API is enabled, you will be redirected to the ***VM Instances*** page

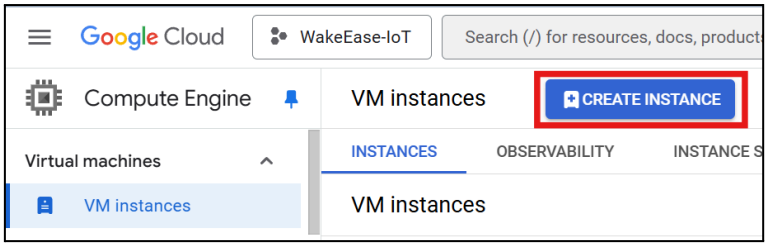


Step 3: Create a Virtual Machine (VM) Instance

1. If you are not redirected to the VM Instances page after enabling the API, manually navigate to it by selecting ***Compute Engine > Virtual Machines > VM Instances*** from the navigation menu.

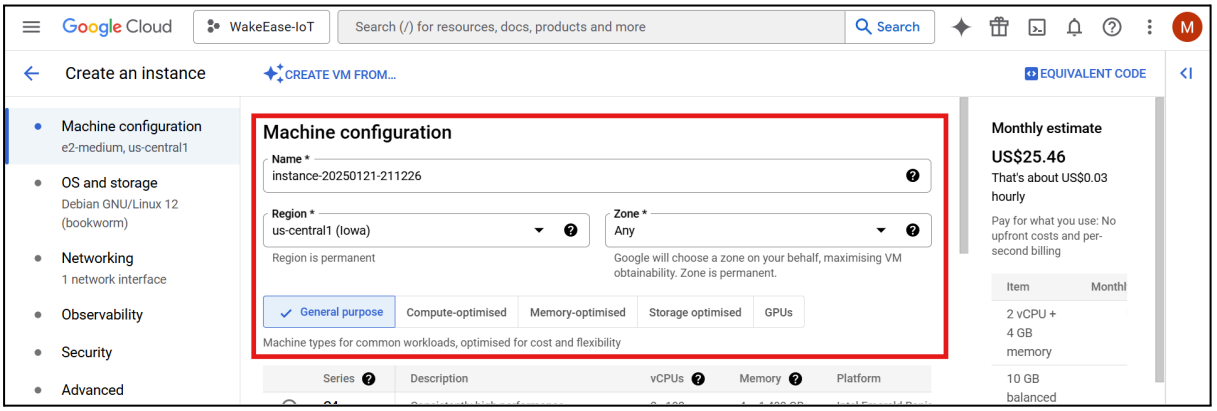


2. Click the ***Create Instance*** button to start configuring a new VM.

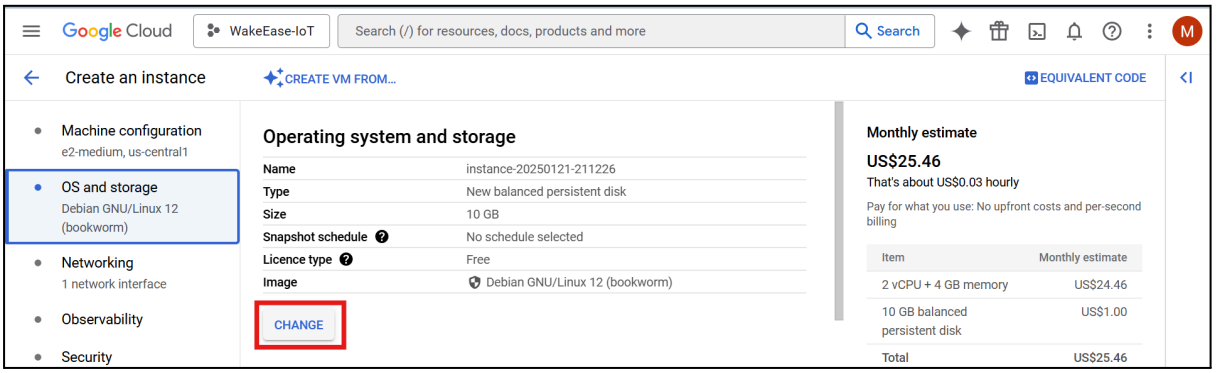


Step 4: Configure the Virtual Machine

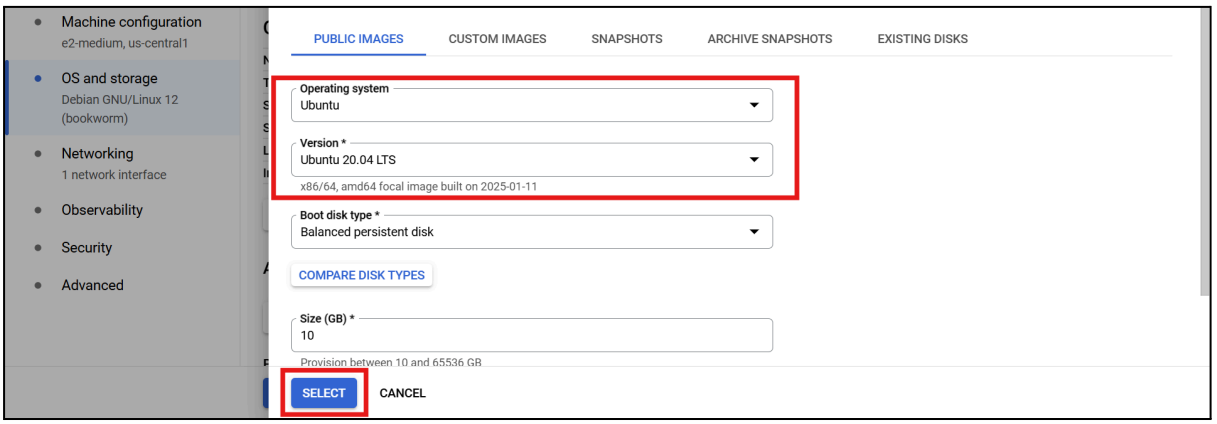
1. At **Machine Configuration** tab:
   - Set the ***Region*** and ***Zone*** *(You may use the default settings for all details here)*



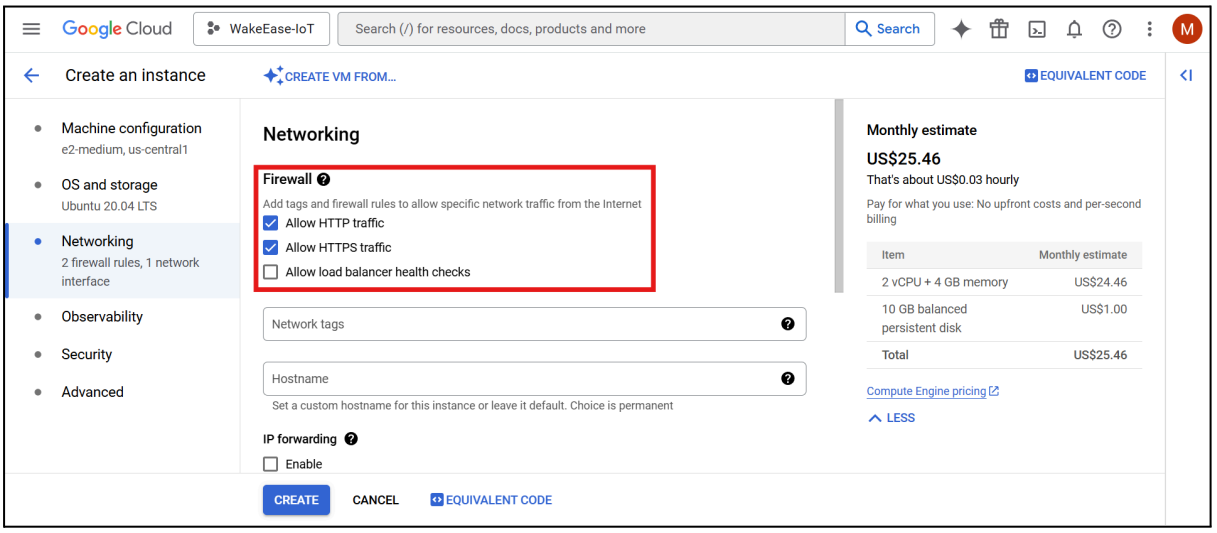
2. At **OS and Storage** tab:
   - Click the ***CHANGE*** button.



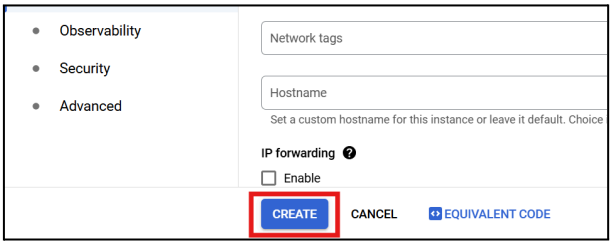
   - Set ***Operating system*** to **Ubuntu**, ***version*** to **Ubuntu 20.04 LTS** then click ***SELECT***.



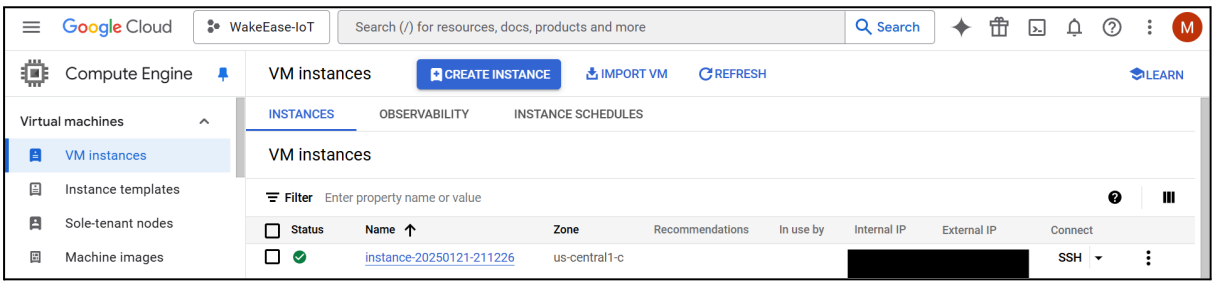
3. At **Networking** tab:
   - Under **Firewall**, check the boxes for:
     - **Allow HTTP traffic**
     - **Allow HTTPS traffic**



4. Lastly, click the ***CREATE*** button to complete the VM creation.



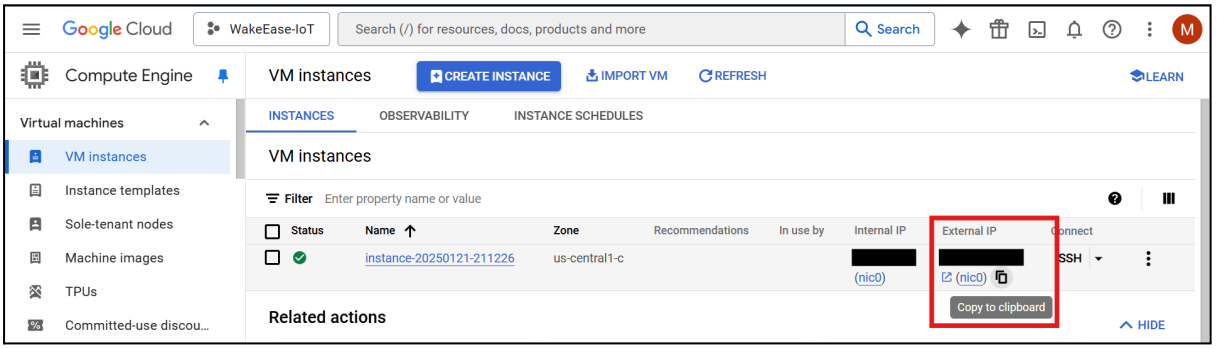
5. Once completed, you will see the newly created instance in the list.



Step 5: Note the External IP Address

1. At the VM instance list, locate the **External IP Address** of your VM.

   Note: The external IP address changes whenever the VM instance is restarted.



2. Copy the external IP address and update it in the following files:

   - WakeEase.ino (line 11)

WakeEase.ino

```
1   #include <PubSubClient.h>
2   #include <WiFi.h>
3   #include <time.h>
4   #include <ESP32Servo.h>
5
6   // Wi-Fi Credentials
7   const char* ssid = "yourwifi";  // Replace with your Wi-Fi SSID
8   const char* password = "yourwifipassword";    // Replace with your Wi-Fi password
9
10  // MQTT Credentials
11  const char* MQTT_SERVER = "yourExternalIP"; // Replace with your VM External IP
12  const int MQTT_PORT = 1883;                 // Non-TLS communication port
13  WiFiClient espClient;
14  PubSubClient client(espClient);
```

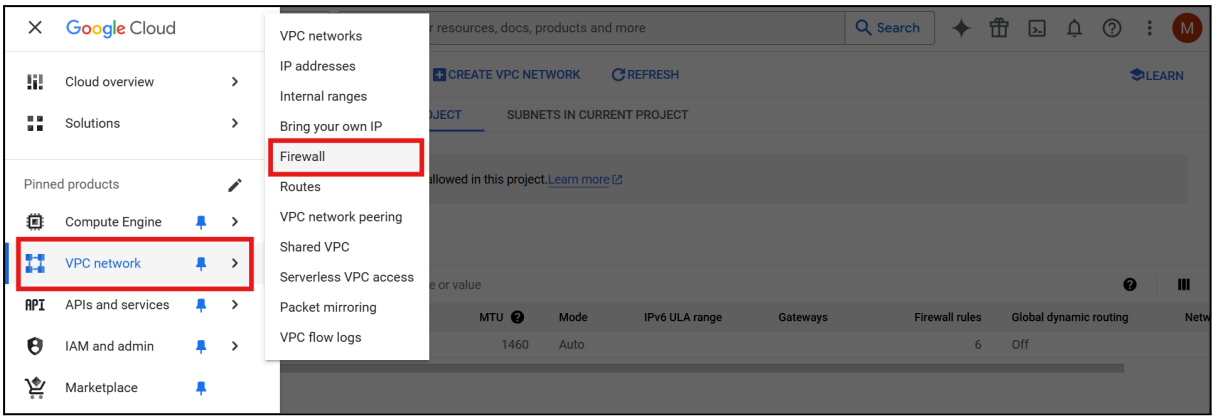
   - WakeEase_script.py (line 11)

wakeEase_script.py > mqtt_broker_address

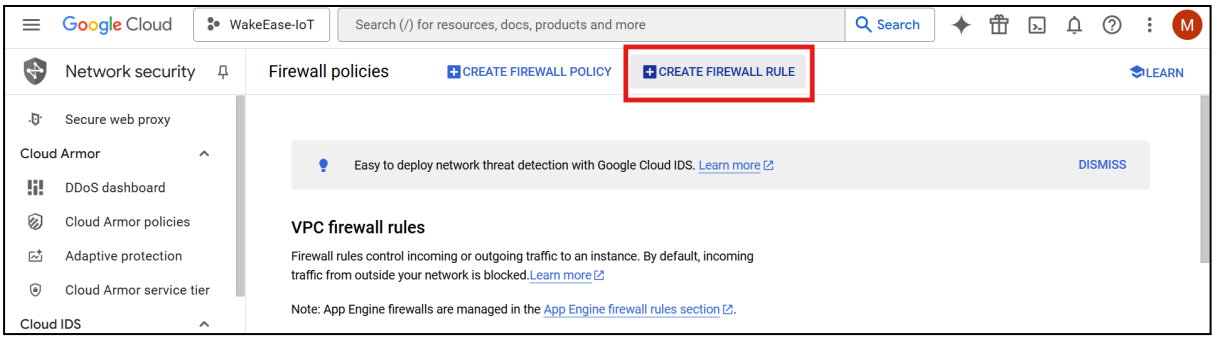
```
1   import pymongo
2   import paho.mqtt.client as mqtt
3   from datetime import datetime
4   import pytz  # To handle timezone conversions
5
6   # MongoDB configuration
7   mongo_client = pymongo.MongoClient("mongodb://localhost:27017/")
8   db = mongo_client["WakeEase"]
9
10  # MQTT configuration
11  mqtt_broker_address = "yourExternalIP" # Replace with your VM instance external IP address
12  mqtt_topics = [("notification", 0), ("duration", 0), ("response_time", 0)]  # List of topics
```

Step 6: Configure a VPC Firewall Rule

1. Navigate to ***VPC Network > Firewall*** in the navigation menu.

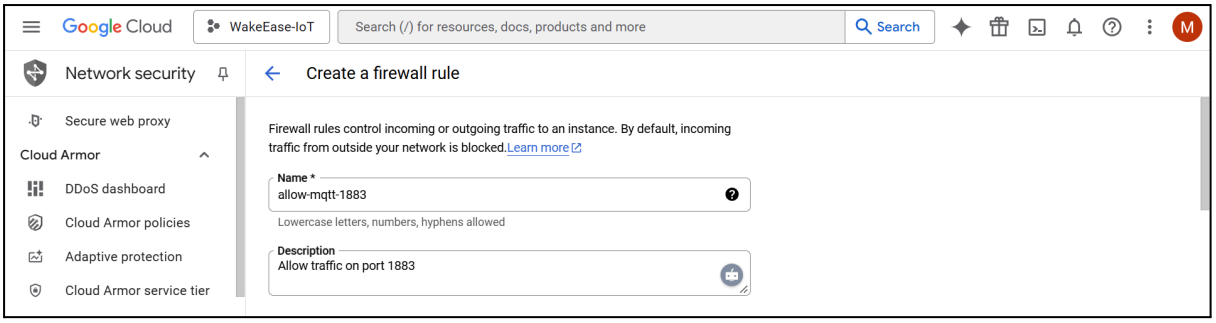


2. Click the ***CREATE FIREWALL RULE*** button at the top.



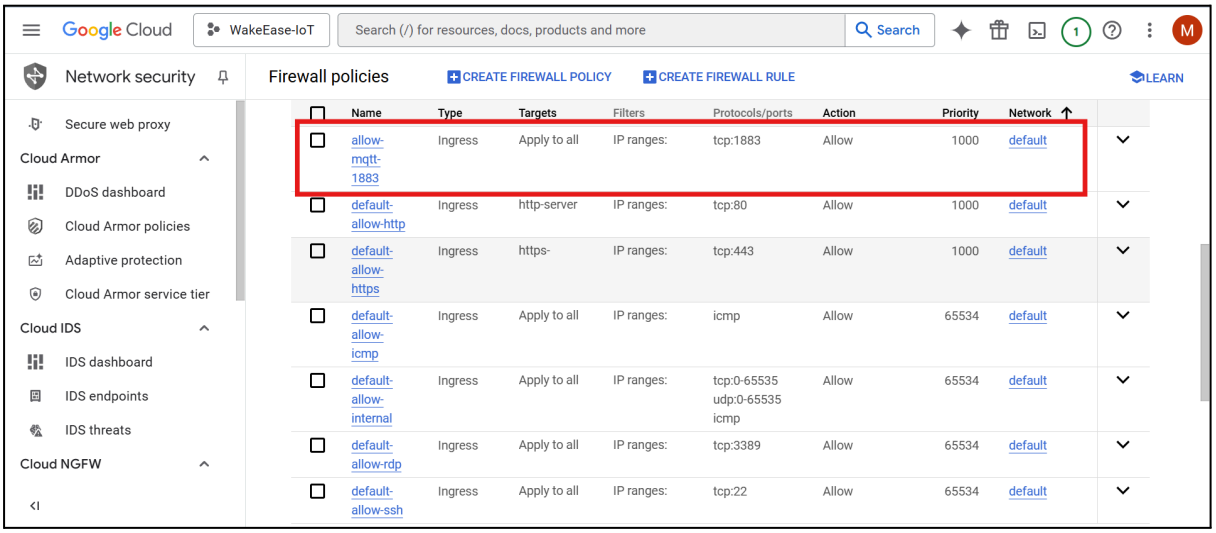
3. Configure the firewall rule as follows:

- **Name**: allow-mqtt-1883
- **Description**: Allow traffic on port 1883.
- **Logs**: Off.
- **Network**: default.
- **Priority**: 1000.
- **Direction of Traffic**: Ingress.
- **Action on Match**: Allow.
- **Targets**: All instances in the network.
- **Source Filter**: IPv4 ranges.
- **Source IPv4 Ranges**: 0.0.0.0/0.
- **Second Source Filter**: None.
- **Destination Filter**: None.
- **Protocols and Ports**: TCP port 1883.



4. Click the ***CREATE*** button to save the firewall rule.

5. Ensure the new VPC firewall rule appears in the list.



6. Your VM instance is now fully configured and ready for the next steps.

   ***Note**: Setting the source IP range to 0.0.0.0/0 allows access from anywhere and is not recommended for production environments.*

Step 7: Access the VM via SSH

1. Click the ***SSH*** button next to your VM instance to launch the SSH-in-browser.