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Course: Cloud Data Centres

Content: Lab 2 – notes and screenshots from creating a Nebula network

Nebula zero-trust network

A Certificate Authority

Certificate Authority can be set in any device with Nebula software installed. This software is necessary to create digital signatures used in an authentication process within Nebula mesh network.

Step by step guide

Follow quick start tutorial available here [1].

Instance in Google Cloud Platform

Creating an instance.

In order to avail a Free Tier in Google Cloud Platform it is necessary to select machine with following parameters[2]:

Machine type: e2-micro VM instance

Geographic regions: Oregon: us-west1, Iowa: us-central1, South Carolina: us-east1

Disk size: 30 GB-months standard persistent disk.

Network traffic: 1 GB of outbound data transfer from North America to all region destinations (excluding China and Australia) per month.

Note: A free usage of e2-micro instances is based on total hours used across all instances.

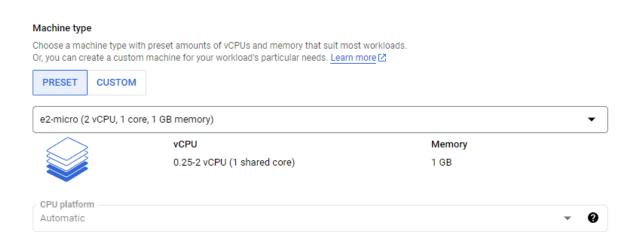


Fig. 1. Step 1 - select machine type.

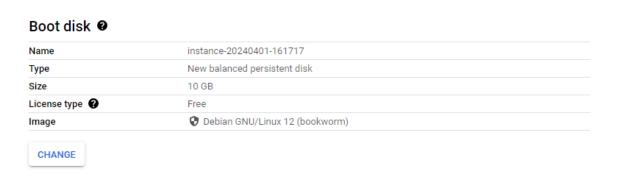


Fig. 2. Step 2 - select boot disk.

Boot disk

Select an image or snapshot to create a boot disk; or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in Marketplace 🖸

PUBLIC IMAGES	CUSTOM IMAGES	SNAPSHOTS	ARCHIVE SNAPSHOTS	EXISTING DISKS
Operating system ——				
Ubuntu			•	
Version *				
Ubuntu 22.04 LTS			•	
x86/64, amd64 jammy in	nage built on 2024-03-19			
Boot disk type *				
Balanced persistent dis	sk		•	
COMPARE DISK TYPES				
10				
Provision between 10 an	d 3072 GB			
eletion rule				
Vhen deleting instance				
Keep boot disk				
Delete boot disk				

Fig. 3. Step 3 - select boot disk type.

Data is encrypted automatically. Select an encryption key management solution. Google-managed encryption key No configuration required Customer-managed encryption key (CMEK) Manage via Google Cloud Key Management Service O Customer-supplied encryption key (CSEK) Manage outside of Google Cloud Snapshot schedule Use snapshot schedules to automate disk backups. Learn more 🔀 Select a snapshot schedule Device name @ Used to reference the device for mounting or resizing. Use a custom device name Nebula_lighthouse_instance Custom ▲ HIDE ADVANCED CONFIGURATION SELECT CANCEL

Encryption

Fig. 4. Step 4 - change of device (instance) name.

Identity and API access @ Service accounts 2 Service account Compute Engine default service account Requires the Service Account User role (roles/iam.serviceAccountUser) to be set for users who want to access VMs with this service account. Learn more 🗷 Access scopes ? Allow default access Allow full access to all Cloud APIs O Set access for each API Firewall @ Add tags and firewall rules to allow specific network traffic from the Internet Allow HTTP traffic Allow HTTPS traffic Allow Load Balancer Health Checks Observability - Ops Agent @ Monitor your system through collection of logs and key metrics. Install Ops Agent for Monitoring and Logging Fig. 5. Step 5 - select firewall and API related options. VM instances IMPORT VM C REFRESH OBSERVABILITY INSTANCE SCHEDULES INSTANCES VM instances Filter Enter property name or value instance-20240401-161717 us-central1-a 10.128.0.2 (nic0) 34.28.64.175 12 (nic0)

Fig. 6. New instance displayed on Google Cloud Compute Engine control panel.

Nebula lighthouse on Google Cloud Platform instance.

Step 1: Download Nebula

wget https://github.com/slackhq/nebula/releases/download/v1.8.2/nebula-linux-amd64.tar.gz

Step 2: Extract the Archive

tar-xzvf nebula-linux-amd64.tar.gz

Step 3: Move Nebula Binaries to '/usr/local/bin'

sudo mv nebula /usr/local/bin/

sudo mv nebula-cert /usr/local/bin/

Step 4: Configuration

```
! lighthouse_configyaml X

D.>IT Carlow > Y4_2023_2024 > OneDrive - South East Technological University > Y4_2023_2024 > Cloud Data Centers > labs > Lab2 > ! lighthouse_configyaml

# This is the nebula example configuration file. You must edit, at a minimum, the static_host map, lighthouse, and firewall sections

# Some options in this file are HUPable, including the pole section. (A HUP will relate or election and its rice are stating tunnels)

# PKI defines the location of credentials for this node. Each of these can also be inlined by using the yaml ": |" syntax.

pki:

# The CAs that are accepted by this node. Must contain one or more certificates created by 'nebula-cert ca'

car: /home/peter_artman/lighthouse.crt

key: /home/peter_artman/lighthouse.key

# blocklist is a list of certificate fingerprints that we will refuse to talk to

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## disconnect_invalid is a toggle to force a client to be disconnected if the certificate is expired or invalid.

# # disconnect_invalid is a toggle to force a client to be disconnected if the certificate is expired or invalid.

# The static host map defines a set of hosts with fixed IP addresses on the internet (or any network).

# A host can have multiple fixed IP addresses defined here, and nebula will try each when establishing a tunnel.

# The syntax is:

# The syntax is:
```

Certificates used inside Nebula network.

```
nebula nebula-cert nebula-linux-amd64.tar.gz
     -(peter&LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
./nebula-cert ca -name "Piotr Artman, Y4, Cloud Data Centres"
     -(peter®LAPTOP-I062M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
L<sub>$</sub> is
ca.crt ca.key nebula nebula-cert nebula-linux-amd64.tar.gz
     -(peter@LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
./nebula-cert sign -name "lighthouse" -ip "192.168.100.1/24"
     -(peter: LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
| color | colo
     -(peter: LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
./nebula-cert sign -name "laptop_SurfacePro6" -ip "192.168.100.5/24" -groups "laptop,ssh"
     -(peter&LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
ca.crt
                                laptop_P50.key
                                                                                  lighthouse.crt nebula-cert
ca.key laptop_SurfacePro6.crt lighthouse.key nebula-linux-amd64.tar.gz laptop_P50.crt laptop_SurfacePro6.key nebula
      -(peter&LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
$ rm laptop_P50.key lighthouse.crt laptop_SurfacePro6.crt lighthouse.key laptop_P50.crt lapto
p_SurfacePro6.key
     -(peter&LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
ca.crt ca.key nebula nebula-cert nebula-linux-amd64.tar.gz
(peter@ LAPTOP-I062M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
$ ./nebula-cert sign -name "lighthouse" -ip "192.168.100.1/24"
    -(peter@LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
./nebula-cert sign -name "laptop_SurfacePro6" -ip "192.168.100.5/24"
    —(peter® LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
(peter LAPTOP-I062M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
    ./nebula-cert sign -name "mobile_SamsungS21" -ip "192.168.100.7/24"
    -(peter&LAPTOP-IO62M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
□$ ls
ca.crt
                                laptop_SurfacePro6.crt mobile_SamsungS21.crt nebula-linux-amd64.tar.gz
                                laptop_SurfacePro6.key mobile_SamsungS21.key
ca.key
laptop_P50.crt lighthouse.crt laptop_P50.key lighthouse.key
                                                                                nebula
                                                                                 nebula-cert
(peter LAPTOP-I062M5BI)-[/mnt/c/Users/peter/Desktop/nebula]
```

Settings on client machine

REFERENCES:

- [1] "Quick Start Nebula Docs." Accessed: Apr. 02, 2024. [Online]. Available: https://nebula.defined.net/docs/guides/quick-start/
- [2] "Free cloud features and trial offer Google Cloud Free Program." Accessed: Apr. 01, 2024. [Online]. Available: https://cloud.google.com/free/docs/free-cloud-features#compute