

Cloud Computing Fundamentals & Platforms

Autoscaling and NLB in a cloud-based environment

Continuous Assessment 2

Programme: Bachelor of Science in Computing and Information Technology

Lecturer: Mr. Michael Weiss

Student: Leisly Alitzel Pino Duran

Number Student: 2020303

AUTOSCALING, STRESS TESTING, MONITORING AND NETWORK LOAD BALANCING FOR A TEST WEBSITE

1. Web page modified on the index.html with PHP code and its updates saved using the name index.php:

```
<div id="Digitech">
<h1 style="text-align: center">Welcome to Digitech!</h1>
<h3 style="text-align: center">Bringing Digital Technologies to an Analog world</h3>
<h3 style="text-align: center">Student name: Leisly Pino -</h3>
<h3 style="text-align: center">Student Number: 2020303</h3>
<p style="text-align: center"></p>
</div>
<div id="Construction">
<p style="text-align: center">
<?php
$name = "WEBMASTER";
$studentNum = "2020303";
echo $name . "<br>";
echo $studentNum . "<br>";
echo gethostname();
?>
</body>
</html>
```

2. Digitech web content uploaded in the storage bucket with the index.php:

Buckets	>	practice-123	>	digi-web	
UPLOAD FILES UPLOAD FOLDER CREATE					
Filter by name prefix only ▼ Filter Filter					
<input type="checkbox"/>	Name				
<input type="checkbox"/>		.bashrc			
<input type="checkbox"/>		construction.jpg			
<input type="checkbox"/>		construction2.jpg			
<input type="checkbox"/>		desktop.ini			
<input type="checkbox"/>		digitech.jpg			
<input type="checkbox"/>		digitech_create.jpg			
<input type="checkbox"/>		images/			
<input type="checkbox"/>		index.php			

3. Start-up script:

```
#!/bin/bash
apt-get update -y
apt-get install apache2 -y
apt-get install php -y
mv /var/www/html/index.html /var/www/html/index.php
gsutil cp -r gs://practice-123/digi-web/* . /var/www/html
```

4. Start-up script displays the web page using the Public IP address of linux-web303:

To create a VM instance, select one of the options:

- New VM instance**
Create a single VM instance from scratch
- New VM instance from template**
Create a single VM instance from an existing template

Automation

Startup script

```
#!/bin/bash
apt-get update -y
apt-get install apache2 -y
apt-get install php -y
mv /var/www/html/index.html /var/www/html/index.php
gsutil cp -r gs://practice-123/digi-web/* . /var/www/html
```

Name	Zone	Recommendations	In use by	Internal IP	External IP
linux-web303	europe-west2-c			10.154.0.14 (nic0)	35.230.148.4

VM instances – Compute Engine x Digitech


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5. Instance template digitech-global-template with the start-up script:

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Create an instance template

Automation

Startup script

```
#!/bin/bash
apt-get update -y
apt-get install apache2 -y
apt-get install php -y
mv /var/www/html/index.html /var/www/html/index.php
gsutil cp -r gs://practice-123/digi-web/* . /var/www/html
```

Name ↑	Machine type	Image	Disk type	Placement policy ?	In use by
digitech-global-template	e2-medium	debian-10-buster-v20211105	Balanced persistent disk	No policy	digitech-europe-group, digitech-usa-group

6. Instance group digitech-europe-group and digitech-usa-group:

Name ↑	Instances	Template	Auto-scaling	Zone
digitech-europe-group	1	digitech-global-template	On: Target CPU utilisation 60%	eu-west-2 (3/3)
digitech-usa-group	1	digitech-global-template	On: Target CPU utilisation 60%	us-central-1 (3/4)

7. VM instance digitech-europe-group and digitech-usa-group:

Status ↑	Name	Zone	Recommendations	In use by	Internal IP	External IP
✓	digitech-europe-group-27nj	eu-west-2-a		digitech-europe-group	10.154.0.15 (nic0)	34.142.48.215
✓	digitech-usa-group-5q78	us-central-1-c		digitech-usa-group	10.128.0.13 (nic0)	35.202.42.143

VM instances – Compute Engine

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Digitech

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VM instances – Compute Engine

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digitech-usa-group-5q78

8. Construction of the AutoScaler and the stress applied:

<input type="checkbox"/>	Status ↑	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>	✓	digitech-europe-group-27nj	europe-west2-a		digitech-europe-...	10.154.0.15 (nic0)	34.142.48.215	SSH
<input type="checkbox"/>	✓	digitech-europe-group-2vfj	europe-west2-b		digitech-europe-...	10.154.0.24 (nic0)	35.234.146.245	SSH
<input type="checkbox"/>	✓	digitech-europe-group-5frs	europe-west2-c		digitech-europe-...	10.154.0.30 (nic0)	34.89.53.167	SSH
<input type="checkbox"/>	✓	digitech-europe-group-b4w4	europe-west2-c		digitech-europe-...	10.154.0.28 (nic0)	34.105.129.0	SSH
<input type="checkbox"/>	✓	digitech-europe-group-dv1s	europe-west2-a		digitech-europe-...	10.154.0.29 (nic0)	35.197.244.210	SSH
<input type="checkbox"/>	✓	digitech-europe-group-h5m9	europe-west2-a		digitech-europe-...	10.154.0.27 (nic0)	35.189.84.1	SSH
<input type="checkbox"/>	✓	digitech-europe-group-p0kq	europe-west2-c		digitech-europe-...	10.154.0.25 (nic0)	35.230.148.4	SSH
<input type="checkbox"/>	✓	digitech-europe-group-v253	europe-west2-b		digitech-europe-...	10.154.0.26 (nic0)	34.105.211.139	SSH
<input type="checkbox"/>	✓	digitech-usa-group-4qpw	us-central1-c		digitech-usa-group	10.128.0.22 (nic0)	34.135.40.161	SSH
<input type="checkbox"/>	✓	digitech-usa-group-jh0n	us-central1-c		digitech-usa-group	10.128.0.18 (nic0)	34.66.66.4	SSH
<input type="checkbox"/>	✓	digitech-usa-group-ns1x	us-central1-f		digitech-usa-group	10.128.0.23 (nic0)	34.66.171.185	SSH
<input type="checkbox"/>	✓	digitech-usa-group-tkdp	us-central1-b		digitech-usa-group	10.128.0.21 (nic0)	35.225.10.68	SSH

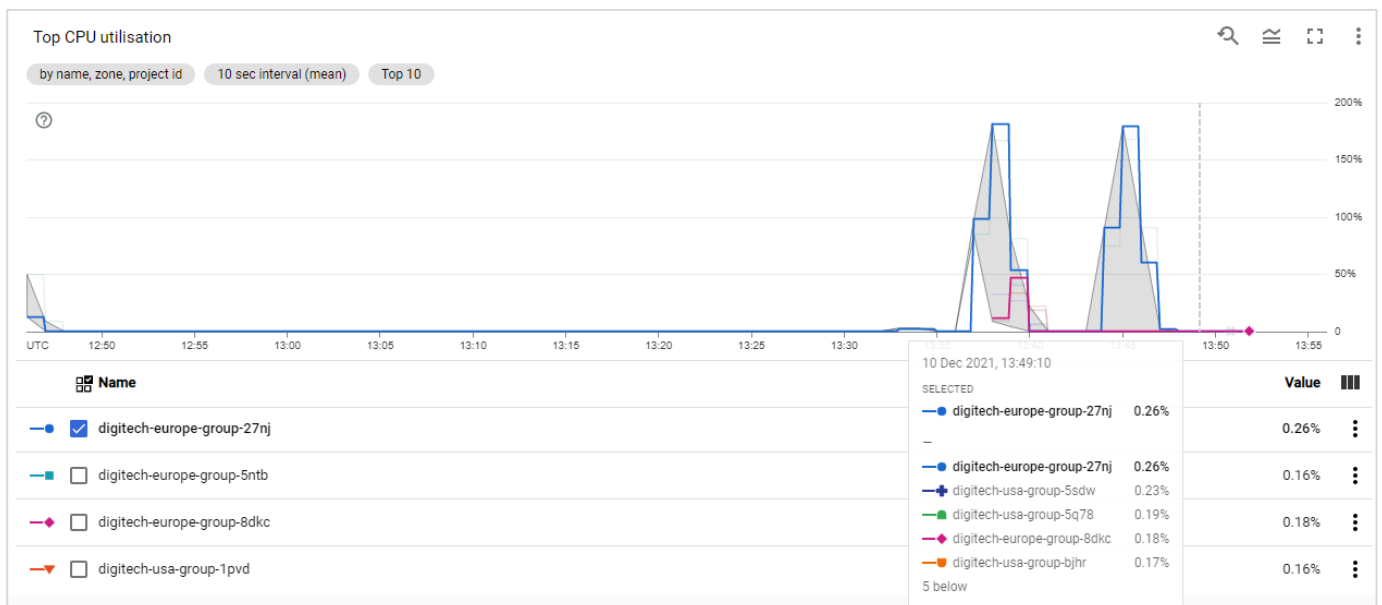
```

20201030digitech-europe-group-27nj:~$ sudo apt install stress
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  stress
0 upgraded, 1 newly installed, 0 to remove and 5 not upgraded.
Need to get 21.8 kB of archives.
After this operation, 55.3 kB of additional disk space will be used.
Get:1 http://deb.debian.org/debian buster/main amd64 stress amd64 1.0.4-4 [21.8 kB]
Fetched 21.8 kB in 0s (1347 kB/s)
Selecting previously unselected package stress.
(Reading database ... 49106 files and directories currently installed.)
Preparing to unpack .../stress-1.0.4-4_amd64.deb ...
Unpacking stress (1.0.4-4) ...
Setting up stress (1.0.4-4) ...
Processing triggers for man-db (2.8.5-2) ...
20201030digitech-europe-group-27nj:~$ sudo stress --cpu 12 --timeout 100
stress: info: [9243] dispatching hogs: 12 cpu, 0 io, 0 vm, 0 hdd
stress: info: [9243] successful run completed in 100s
20201030digitech-europe-group-27nj:~$ sudo stress --cpu 12 --timeout 100
stress: info: [9316] dispatching hogs: 12 cpu, 0 io, 0 vm, 0 hdd
stress: info: [9316] successful run completed in 100s
20201030digitech-europe-group-27nj:~$

20201030digitech-usa-group-5q78:~$ sudo apt install stress
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  stress
0 upgraded, 1 newly installed, 0 to remove and 5 not upgraded.
Need to get 21.8 kB of archives.
After this operation, 55.3 kB of additional disk space will be used.
Get:1 http://deb.debian.org/debian buster/main amd64 stress amd64 1.0.4-4 [21.8 kB]
Fetched 21.8 kB in 0s (737 kB/s)
Selecting previously unselected package stress.
(Reading database ... 49106 files and directories currently installed.)
Preparing to unpack .../stress-1.0.4-4_amd64.deb ...
Unpacking stress (1.0.4-4) ...
Setting up stress (1.0.4-4) ...
Processing triggers for man-db (2.8.5-2) ...
20201030digitech-usa-group-5q78:~$ sudo stress --cpu 12 --timeout 100
stress: info: [9258] dispatching hogs: 12 cpu, 0 io, 0 vm, 0 hdd
stress: info: [9258] successful run completed in 100s
20201030digitech-usa-group-5q78:~$ sudo stress --cpu 12 --timeout 100
stress: info: [9328] dispatching hogs: 12 cpu, 0 io, 0 vm, 0 hdd
stress: info: [9328] successful run completed in 100s
20201030digitech-usa-group-5q78:~$

```

9. Monitoring the stress in the CPU utilization:



10.Static IP address used for the Network Load Balancing and the differrents VMs appeared with the static IP address:

Name	Load balancer type ↑	Protocols	Region	Backends
global-digitech	HTTP(S)	HTTP		✓ 1 backend service (2 instance groups, 0 network endpoint groups)

Name	External address	Region	Type ↓	Version	In use by	Network tier ?
digitech-static-ip-address	34.98.78.142		Static	IPv4	Forwarding rule global	Premium

Google Cloud Platform x Digitech



No es seguro 34.98.78.142

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RESEARCH TOPICS: ATTACHING CLOUD STORAGE TO A WEB SERVER

11. Upload the DigiTech website to Linux using FileZilla:

rsa-key-20211211	ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEAhU+fUMIR5SmkXnCpV1ov9OPkWxdswvU6lihoAfmJqCxtnK9TbJUUpz7B7xGKGTKDfe3cFjyWHl CGkyS1pW4ecZnL5IG7p+NutROPhPQHatMX7lrZv+JuIS4txho1/Ai6TdyKBJuldJOyDrUmeHFmrCJL3S4ddcHPMTFPGF0xGkuwMFufq WAwz/mJue2/mHMNI7mG0t2rTQmzd1SlmYQfEius4uDsWZHpIOBnOFn+MgFChNBckcK66GkvAQIOirPNA9dU1iOivVwsOyi43CHR Qs7U9FYs0gWV1aCHXymV+Twl+12054FA+ALq+VmNRocUJZ1hnPCu0S37mQtJ3skpw== rsa-key-20211211
------------------	---

Name	Zone	External IP
digi-zilla	europa-west2-c	35.189.84.1 ↗

Servidor: Nombre de usuario: Contraseña: Puerto:

Estado: Transferencia correcta, transferidos 1,249 bytes en 1 segundo

Estado: Recuperando el listado del directorio "/var/www/html"...

Estado: Listing directory /var/www/html

Estado: Directorio "/var/www/html" listado correctamente

Estado: Desconectado del servidor

Estado: Desconectado del servidor

Sitio local:

Sitio remoto:

Nombre de archivo	Tamaño de...	Tipo de arch
..		
images		Carpeta de a
.bashrc	3,526	Archivo de c
construction.jpg	11,281	Archivo JPG
construction2.jpg	15,350	Archivo JPG
desktop.ini	218	Opciones de

Nombre de archivo	Tamaño d...	Tipo de arc...
construction2.jpg	15,350	Archivo JPG
desktop.ini	218	Opciones ...
digitech.jpg	14,982	Archivo JPG
digitech_create.jpg	4,326	Archivo JPG
index.php	1,249	Archivo de...

7 archivos seleccionados. Tamaño total: 50,932 bytes

1 archivo seleccionado. Tamaño total: 1,249 bytes

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UNDER CONSTRUCTION

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12. Attached cloud storage to a web server:

To carry out this task an research of the following commands was started:

- **gcloud init**: Used for initial setup of gcloud and to create new configurations, in this part we need take the first option of the menu to start the configuration on our account. Next we need put the ID of the project, in this case my project have this ID: **studious-parity-328114**.

- Add the gcsfuse distribution URL as package source and imort this public key:

```
export GCSFUSE_REPO=gcsfuse-`lsb_release -c -s`  
echo "deb http://packages.cloud.google.com/apt $GCSFUSE_REPO main" | sudo tee  
/etc/apt/sources.list.d/gcsfuse.list  
curl https://packages.cloud.google.com/apt/doc/apt-key.gpg | sudo apt-key add -
```

- Update the list of packages available and install gcsfuse:

```
sudo apt-get update
```

```
sudo apt-get install gcsfuse
```

- Create a directory where you can mount the bucket:

```
sudo mkdir /mnt/gcs-bucket
```

```
sudo chmod a+w /mnt/gcs-bucket
```

- Specify a bucket location, in this case the name of my bucket is **practice-123**:

```
gcsfuse practice-123 /mnt/gcs-bucket
```

```
g2020303@linux-vm-with-storage:~$ cd /mnt  
g2020303@linux-vm-with-storage:/mnt$ ls  
gcs-bucket  gcs-bucket  
g2020303@linux-vm-with-storage:/mnt$ cd gcs-bucket  
g2020303@linux-vm-with-storage:/mnt/gcs-bucket$ ls -al  
total 8  
drwxrwxrwx 2 root root 4096 Dec 11 23:12   
drwxr-xr-x 4 root root 4096 Dec 11 23:26 ..
```


REFERENCES

- Google Cloud, 2021. Connecting to Cloud Storage buckets [online]. *Google Cloud*. [Accessed December 10, 2021]. Available at: <https://cloud.google.com/compute/docs/disks/gcs-buckets#api>
- Manu Presannakumar, 2017. Connecting to Google Cloud Storage Bucket from VM Instance [online]. *YouTube*. [Accessed December 10, 2021]. Available at: <https://www.youtube.com/watch?v=fkeoYOXnnCQ>