

Phase 9 - Testing and evaluation

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1 Project cost evaluation

To make this evaluation, the GCP Cost calculator was used.

1.1 Compute Engine

Instâncias da VM		
<div><div>Instâncias da VM</div><div><div>CRIAR INSTÂNCIA</div><div>IMPORTAR VM</div><div>ATUAL</div></div></div>		
<div><div>INSTÂNCIAS</div><div>OBSERVABILIDADE</div><div>PROGRAMAÇÕES DE INSTÂNCIAS</div></div>		
Instâncias da VM		
<div><div>Filtro</div><div>Insira o nome ou o valor da propriedade</div></div>		
<input type="checkbox"/>	Status	Nome ↑
<input type="checkbox"/>	Nome	Zona
<input type="checkbox"/>	Nome	Zona
<input type="checkbox"/>	Nome	Zona
<input type="checkbox"/>	Nome	Zona

Figure 1: VM Instances

In this project 3 VM Instances were used and the machine type was the E2 series, specifically the e2-medium instance. This instance provides:

- Number of vCPUs: 1 vCPU

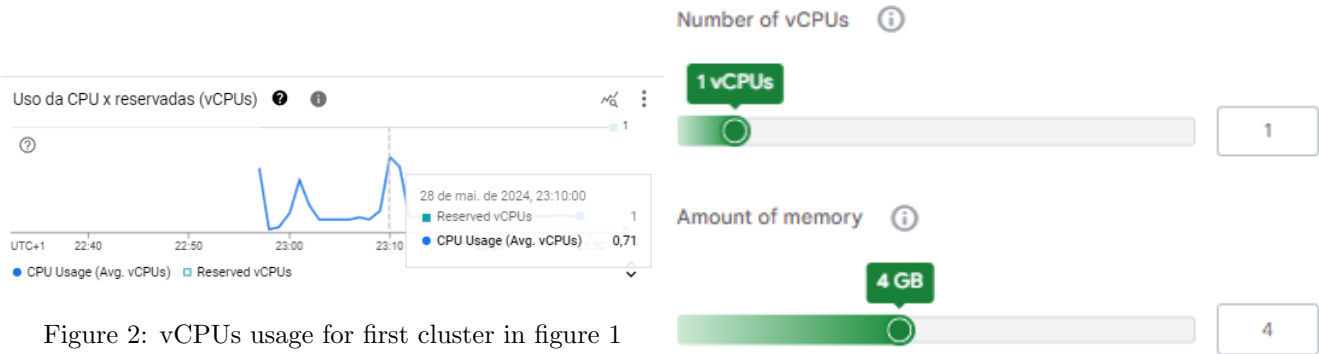


Figure 2: vCPUs usage for first cluster in figure 1

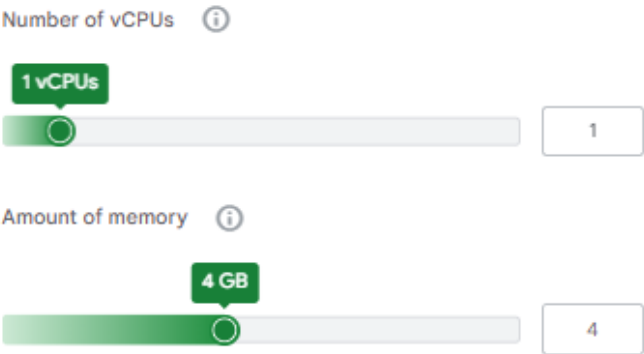


Figure 3: vcpu usage Graph for first cluster in figure 1

- Amount of memory: 4 GB
- Region: europe-west4

1.2 Kubernetes Engine

```
NAME: cluster-amazon-data
LOCATION: europe-west4-a
MASTER_VERSION: 1.29.4-gke.1043001
MASTER_IP: 35.204.187.51
MACHINE_TYPE: e2-medium
NODE_VERSION: 1.29.4-gke.1043001
NUM_NODES: 3
STATUS: RUNNING
```

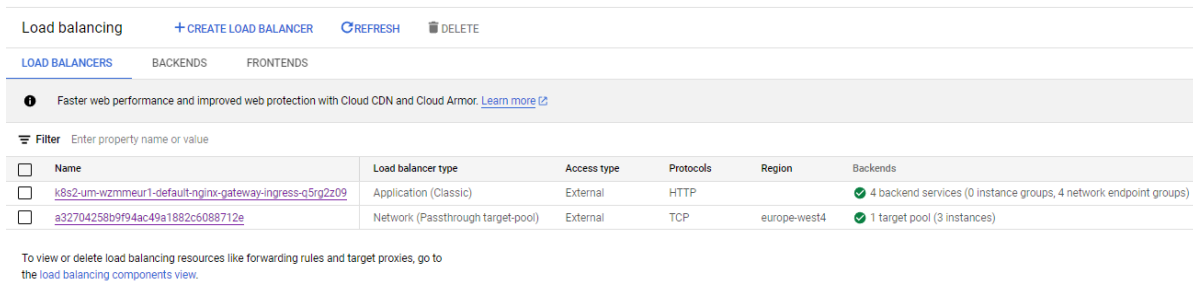
Figure 4: GKE Cluster specifications obtained with cmd `gcloud container clusters list`

For the Kubernetes Engine (GKE), the configurations were obtained using the `gcloud container clusters list` command, which provided detailed specifications for the GKE clusters in use. These specifications were then input into the GCP Cost calculator to estimate the total cost of running the Kubernetes clusters.

- Number Of Nodes: 3
- Number Of Zonal Clusters : 1
- Machine Type: e2-medium
- Number of vCPUs: 1 vCPU
- Amount of memory: 4 GB
- Region: europe-west4

1.3 Networks

1.3.1 Cloud Load balancing



Load balancing					
+ CREATE LOAD BALANCER REFRESH DELETE					
LOAD BALANCERS BACKENDS FRONTENDS					
i Faster web performance and improved web protection with Cloud CDN and Cloud Armor. Learn more					
Filter Enter property name or value					
<input type="checkbox"/> Name	Load balancer type	Access type	Protocols	Region	Backends
<input type="checkbox"/> k8s2-um-wzmmeur1-default-nginx-gateway-ingress-q5rg2z09	Application (Classic)	External	HTTP		4 backend services (0 Instance groups, 4 network endpoint groups)
<input type="checkbox"/> a32704258b9f94ac49a1882c6088712e	Network (Passthrough target-pool)	External	TCP	europe-west4	1 target pool (3 instances)
To view or delete load balancing resources like forwarding rules and target proxies, go to the load balancing components view .					

Figure 5: load balancers used in the app

In the Cost calculator about 2 different estimates were added (figure 5), one for the Network Cloud Balancer and the other for the Application Load balancer concerning the ingress, for this one in the estimate was also considered the use a Target Proxy that was also a specific configuration of this service. For both, these metrics were the same:

- Number of forwarding rules: 1
- Amount of inbound data: 100 GiB
- Amount of outbound data: 100 GiB

1.4 Artifact Registry

Artifact Registry		Repositories		+ CREATE REPOSITORY	EDIT REPOSITORY	DELETE
Repositories		<input type="text" value="Filter"/> Enter property name or value				
<input type="checkbox"/>	Name ↑	Format	Type	Location		
<input type="checkbox"/>	eu.gcr.io	Docker	Standard	europe (multiple regions in European Union)		
<input type="checkbox"/>	gcr.io	Docker	Standard	us (multiple regions in United States)		

Figure 6: Repositories used in the project

As there was no Artifact Registry or Container Registry service available in the cost calculator, based on the current pricing established by GCP in this site [1], the estimate for this service is according to the rules:

- Storage Costs: \$0.10 per GB per month for artifact storage.
- Network Egress Costs: Within the same region: Free.
- Cross-region egress: \$0.12 per GB.
- Internet egress: Based on standard internet egress pricing (e.g., \$0.12 per GB).

For example for our project a reasonable estimation would be :

- Storage Cost:
 - Storage Used: 100 GB
 - Cost: $100 \text{ GB} * \$0.10/\text{GB} = \10.00 per month
- Network Egress Cost:
 - Cross-region Egress:
 - Data Transferred: 20 GB
 - Cost: $20 \text{ GB} * \$0.12/\text{GB} = \2.40 per month
- Internet Egress:
 - Data Transferred: 10 GB
 - Cost: $10 \text{ GB} * \$0.12/\text{GB} = \1.20 per month
- Total Estimated Monthly Cost:
 - Storage Cost: \$10.00
 - Cross-region Egress Cost: \$2.40
 - Internet Egress Cost: \$1.20
 - Total: \$13.60 per month = 12.53 euros

1.5 Total

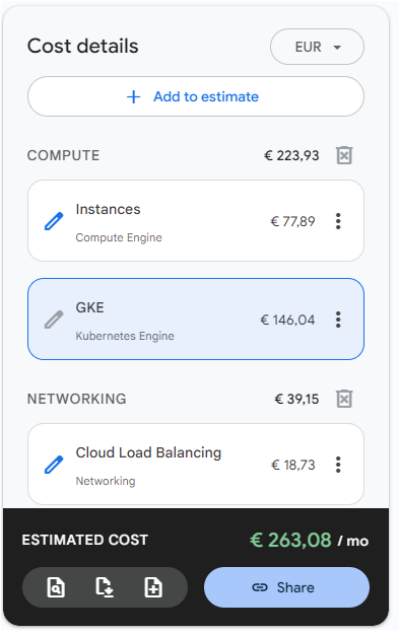


Figure 7: Cost Calculator Result

$263,08 + 12,53 = 275,61$ euros/month to run this application

References

[1] Google Cloud, “Artifact registry pricing,” 2024, accessed: 2024-05-29. [Online]. Available: <https://cloud.google.com/artifact-registry/pricing>