Show Submission Credentials

P0. Google Cloud Platform Intro GCP

Primer

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Google Cloud Platform Intro

Google Cloud Platform Intro

Danger

Grading Penalties

The following table outlines the violations of the project rules and their corresponding grade penalties for the first week of the course. The cost limits include both Project `getting-started-with-cloud-computing` and the Primers.

These rules apply for the week when Project `getting-started-with-cloud-computing` is active.

Violation	Penalty of the project grade

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Using more than $5 of GCP resources (on Project `getting-started-with-cloud-computing` and Primer combined)	Warning email
Using more than $10	Possible penalty on future projects
Not tagging any of your resources	Warning email
Using any project tags apart from `project` : `getting-started-with-cloud-computing`	Warning email

Google Cloud Platform (GCP) is one of the largest cloud service providers world and is constantly releasing new features. GCP is rapidly growing to compete with AWS and Azure for being the go-to infrastructure and platform services provider for corporations, start-ups, and the individual developer.

GCP offers hosting on the same supporting infrastructure that Google uses internally for end-user products like Google Search and YouTube, and provides developer products to build a range of programs from simple static websites to complex, global-scale, machine-learning applications.

For the projects in this course we will be working with various offerings of the Compute, Storage, and Monitoring services, such as Compute Engine, Container Engine, Cloud Storage, etc.

You can find a comparison to AWS and Azure services (https://cloud.google.com/free/docs/aws-azure-gcp-service-comparison) in the GCP documentation. Some of these include:

- Google Compute Engine provides an infrastructure service providing virtual machines similar to Amazon EC2.
- Google Cloud Storage provides storage services similar to Amazon S3, Glacier, and Elastic File System (EFS).
- BigQuery is an enterprise data warehouse for analytics service.
- DataProc provides a service to run Hadoop MapReduce and Spark jobs.
- Google Cloud Functions is a Functions-as-a-Service (FaaS) provider which allows functions to be triggered by events without developer resource management similar to Amazon Lambda or IBM OpenWhisk.

In this primer we will be making use of the `gcloud` utility to explore GCP's services. Please install the Cloud SDK (https://cloud.google.com/sdk/downloads) on your local machine.

To verify that you have successfully installed Google Cloud SDK, ensure that running `gcloud --version` returns a similar output:

```
$ gcloud --version
Google Cloud SDK a.b.c
...
```

GCP References

1. GCP Website (https://cloud.google.com) - General information about GCP.
2. Product Listing (https://cloud.google.com/products/) - Documentation of specific GCP services.
3. Google Cloud Platform (https://github.com/googlecloudplatform) - Language specific client libraries, code samples, and more.
4. GCP Console (https://console.cloud.google.com)

GCP Compute Engine

GCP Compute Engine

Google Compute Engine lets you create and run virtual machines on Google infrastructure. Compute Engine offers scale, performance, and value that allows you to easily launch large compute clusters on Google's infrastructure.

There are no upfront capital investments, and you can run thousands of virtual CPUs on a system that has been designed to be fast with stable performance using a pay-as-you-go model.

For full documentation on GCP Compute, please refer to the official docs (https://cloud.google.com/compute/docs/).

For your first run of Compute Engine, we'd like you to complete this 5-minute exercise (https://cloud.google.com/compute/docs/quickstart-linux).

Additionally, there are plenty of extra quickstart guides (https://cloud.google.com/compute/docs/quickstarts), tutorials (https://cloud.google.com/compute/docs/tutorials), and how-to's (https://cloud.google.com/compute/docs/how-to) in place to explore so you can familiarize yourself with more features of GCP compute.

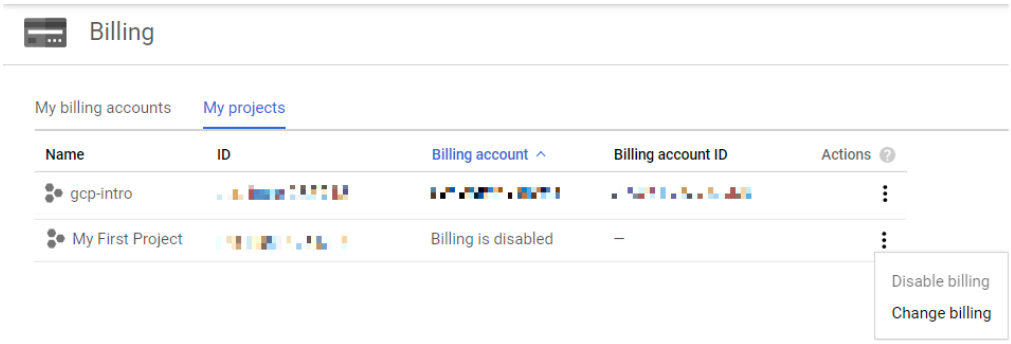
Exercise

In this exercise, we will be utilizing the Cloud SDK to leverage GCP compute services to host a simple service.

1. Navigate to https://console.cloud.google.com (https://console.cloud.google.com) and activate cloud shell.
2. Create a project named ***gcp-intro***. Google Cloud projects are isolated logical and managerial containers that form the basis for creating, enabling, and using all Google Cloud services including managing APIs, **enabling billing**, adding and removing collaborators, and managing permissions for Google Cloud resources.

   ```
   $ gcloud projects create --name gcp-intro --enable-cloud-apis
   ```

3. For any new GCP project, you must first link a billing account in order to provision resources. Visit https://console.cloud.google.com/billing/ (https://console.cloud.google.com/billing/), click the `MY PROJECTS` tab, and select your project, click Actions and change billing.



4. Return to GCP cloud shell, look up the project ID you created and set the project as the default project to work with:

```
$ gcloud projects list
PROJECT_ID        NAME           PROJECT_NUMBER
<PROJECT_ID>     gcp-intro      <PROJECT_NUMBER>

$ gcloud config set project <PROJECT_ID>
```

5. List available regions and zones, and set the region and zone where the cloud resources will reside.

```
$ gcloud compute regions list
$ gcloud config set compute/region us-east1
$ gcloud compute zones list
$ gcloud config set compute/zone us-east1-b
```

6. Next, create a GCP instance named `example-instance-1` using the command with one label with the key as `project` and the value as `getting-started-with-cloud-computing`.

```
$ gcloud compute instances create example-instance-1 --labels project=get
ting-started-with-cloud-computing
```

7. About the detailed usage of `gcloud compute`, you can refer to the gcloud compute documentation (https://cloud.google.com/sdk/gcloud/reference/compute/) and/or `gcloud compute instances --help`. Also, note that GCP GUI and CLI are at parity, i.e., you are able to provision a VM with the same configuration with either the GCP console or gcloud. If you visit the GCP console (https://console.cloud.google.com/compute) and create a VM from the GUI, after you enter all the configuration, there's a `Equivalent REST or command line` link at the bottom of the VM creation form and GCP will translate the configuration into the equivalent gcloud command to create a VM per the VM configuration you specified in the GUI.

8. *It may take a minutes for the VM to become available.* Once the instance is in the *running* state in the Console, we can connect to the machine:

```
$ gcloud compute ssh example-instance-1
```

If you are unable to connect to the instance using `gcloud`, check that your configuration has the correct `zone` and `project`:

```
$ gcloud config list
...

$ gcloud config get-value compute/zone
Your active configuration is: [default]

us-east1-b

$ gcloud config get-value project
Your active configuration is: [default]

<PROJECT_ID>
```

9. Create a firewall rule to allow external HTTP traffic and add the firewall rule to the instance. Note that the target tags instead of the firewall rule names are used as the identifiers when associating firewall rules with instances.

```
 $ gcloud compute firewall-rules create allow-http --direction=INGRESS --p
riority=1000 --network=default --action=ALLOW --rules=tcp:80 --source-rang
es=0.0.0.0/0 --target-tags=allow-http-target-tag

 $ gcloud compute instances add-tags example-instance-1 --tags allow-http-
target-tag
```

GCP Labels v.s. Tags

Please note the difference between GCP labels and GCP network tags.

GCP labels are key-value pairs that can be used on Google Cloud to group related or associated resources.

"Tags" in GCP are used in the context of network configuration, which enable you to associate firewall rules and routes to specific VM instances by tags.

The tagging requirement in this course applies to any cloud services provider you are working with. You will use GCP labels to tag the GCP resources.

GCP Storage Solutions

GCP Storage Solutions

Each instance on the Google Compute Engine has a single root persistent disk that contains the operating system. When your application requires additional storage space, you can add one or more storage options to your instance.

GCP offers four kinds of Storage options to connect directly to computing resources:

- Persistent Disks
- Local SSDs
- RAM disks
- Google Cloud Storage buckets

Information

(Optional Reading)

Persistent Disks

Persistent disks are durable storage devices that function similarly to the physical disks in a desktop or a server. Compute Engine manages the hardware behind these devices to ensure data redundancy and optimize performance for you.

Persistent disks are managed independently from your virtual machine instances, so you can detach or move persistent disks to keep your data even after you delete your instances.

Persistent disk performance scales automatically with size, so you can resize your existing persistent disks or add more persistent disks to an instance to meet your performance and storage space requirements.

Local SSDs

Local SSDs are physically attached to the server that hosts your virtual machine instance. Local SSDs have higher throughput and lower latency than standard persistent disks or SSD persistent disks. The data that you store on a local SSD persists only until you stop or delete the instance.

RAM disks

RAM disks use the `tmpfs` tool to turn instance memory into storage space. RAM disks can be faster than local SSDs or persistent disks with much lower latency and much higher throughput. However, RAM disks are highly volatile and erase their data when you stop or restart your instance.

Google Cloud Storage Buckets

Google Cloud Storage Buckets are the most flexible, scalable, and durable storage option for your virtual machine instances. If your applications do not require the lower latency of persistent disks and local SSDs, you can store your data in a Cloud Storage bucket. Google Cloud Storage bucket makes it easy to share data easily between multiple instances or across multiple zones.

Writing data to Google Cloud Storage buckets

1. After creating a compute instance, connect to it through ssh.
2. Use the `gsutil` tool to create buckets and write data to those buckets (https://cloud.google.com/storage/docs/getting-started-gsutil#create).

All the buckets created can be seen in Storage section in this URL (https://console.cloud.google.com/storage/browser). For more actions on Google Storage Buckets, check this link (https://cloud.google.com/storage/docs/quickstart-gsutil) and review `gsutil help` and the gsutil docs (https://cloud.google.com/storage/docs/gsutil) for more on working with GCP Storage.

GCP Intro Clean-Up

GCP Intro Clean-Up

After you've completed this primer, please destroy the GCP project you created in this primer to terminate the resources and avoid any unwanted costs to your account.