# GCP Assignment 3

1. **What distinguishes the Google Cloud Machine Learning Engine from others?**

   - In 2016, Google gave businesses the ability to build machine learning models using its cloud platform.

   - The Google Cloud ML Engine is a hosted platform to run machine learning training jobs and predictions at scale. The service treats these two processes (training and predictions) independently. It is possible to use Google Cloud ML Engine just to train a complex model by leveraging the GPU and TPU infrastructure. The outcome from this step — a fully-trained machine learning model — can be hosted in other environments including on-prem infrastructure and public cloud. The service can also be used to deploy a model that is trained in external environments. Cloud ML Engine automates all resource provisioning and monitoring for running the jobs. It can also manage the lifecycle of deployed models and their versions.

   - Apart from training and hosting, Cloud ML Engine can also perform hyperparameter tuning that influences the accuracy of predictions. Without automated hyperparameter tuning, data scientists will have to experiment with multiple values while evaluating the accuracy of the results.
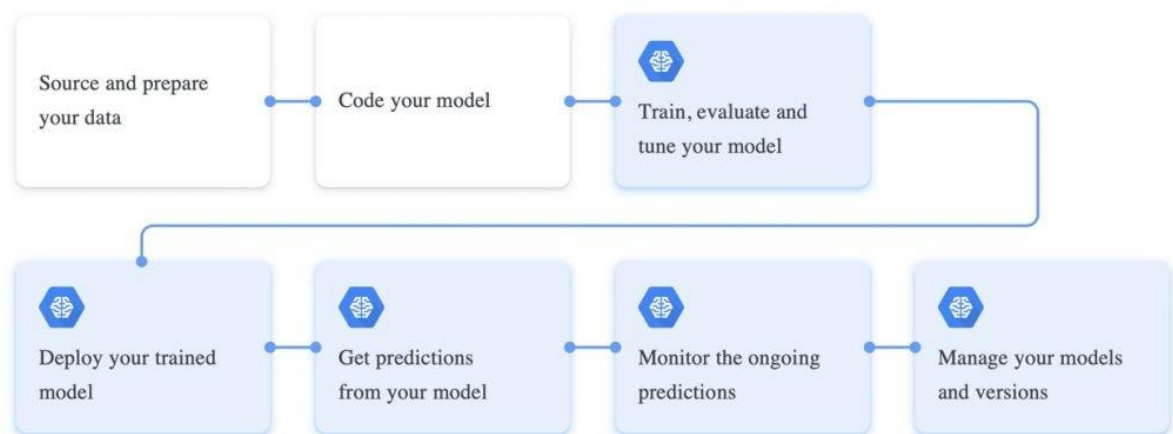
Benefits:

- The cloud's pay-per-use model is good for bursty AI or machine learning workloads.
- The cloud makes it easy for enterprises to experiment with machine learning capabilities and scale up as projects go into production and demand increases.
- The cloud makes intelligent capabilities accessible without requiring advanced skills in artificial intelligence or data science.
- Google Cloud Platform offer many machine learning options that don't require deep knowledge of AI, machine learning theory, or a team of data scientists.

2. **What are GCP's cloud storage libraries and tools?**

- **Google Cloud Platform Console**, which performs fundamental tasks on objects and buckets
- **Cloud Storage Client Libraries**, which give programming backing to different languages including Java, Ruby, and Python
- **GustilCommand-line Tool**, which gives a command-line interface to the cloud storage.
- There are numerous external libraries and tools, for example, **Boto Library**.

3. **Define the Google Cloud pricing model.**
- Google Cloud offers several pricing models, including pay-as-you-go, long-term reservations, and a free tier option. Your organization will need to decide which model is the most suitable, according to your budget and computing needs.
- Google Cloud costs are affected by additional components, including compute, storage, network, SQL, and serverless

pricing. These factors should be explored when selecting a pricing structure for your organization.

Google Cloud Platform provides the pricing models seen here:

- **Pay-as-you-go pricing model**

  Google Cloud provides a pay-as-you-go on-demand pricing model. This is most suited to individuals who expect to use the cloud intermittently, as it gives you the flexibility to remove or add services as you wish. However, this degree of flexibility incurs a cost, meaning that the pay-as-you-go model is the most expensive option per hour.

- **Long-term plan**

  If you are planning to use the cloud for a long period, and are willing to make an extended-period upfront commitment to your cloud deployment, you can achieve greater savings than you would with the pay-as-you-go model. Google provides long-term pricing terms with upfront obligations of one year or three years. This plan is called Committed Use, and it provides significant savings when compared to an on-demand pricing model—as much as 70% on Compute Engine.

- **Free tier option**

  If you are not at a stage where you are ready to move to a cloud service, Google Cloud provides the free tier option over a wide variety of products. This gives you a predefined resource amount over a specific period, suitable for those looking to try out a service.

4. **The Google Compute Engine API has a variety of authentication mechanisms.**

- Google Cloud APIs use the OAuth 2.0 protocol for authenticating both user accounts and service accounts. The OAuth 2.0 authentication process determines both the principal and the application.

- Most Google Cloud APIs also support anonymous access to public data using API keys. However, API keys only identify the application, not the principal. When using API keys, the principal must be authenticated by other means.

- Google Cloud APIs support multiple authentication flows for different runtime environments. For the best developer experience, we recommend using Google Cloud Client Libraries with Google Cloud APIs. They use Google-provided authentication libraries that support a variety of authentication flows and runtime environments.

5. **Create Google Cloud service accounts and explain how to use them.**

   A service account is a special type of Google account intended to represent a nonhuman user that needs to authenticate and be authorized to access data in Google APIs. Typically, service accounts are used in scenarios such as: Running workloads on virtual machines (VMs).

   1. Sign in to the Google API Console.

   2. Open the Credentials page. If prompted, select the project that has the Android Management API enabled.

   3. Click Create credentials > Service account key.

   4. From the dropdown menu, select New service account. Enter a name for your service account.

   5. Select your preferred key type and click Create. Your new public/private key pair is generated and downloaded to your machine and is the only copy of this key. You are responsible for storing it securely.

   6. Open the IAM page. If prompted, select the project that has the Android Management API enabled.

7. Click Add.

8. Add the service account you've just created as member and select the role Android Management User.

9. Click Save.

10. (Optional, but highly recommended) Add additional project owners by granting the Owner role to existing project members.

6. How to make a Google Cloud Storage project?
Steps:

1. Select Browser in the left hand menu.
2. Click CREATE BUCKET.
3. Enter a unique bucket name. Names must start and end with a letter or number.
4. Pick a storage class. Storage class affects performance, cost, and location.
5. Pick a location to store your data.
6. Click Create.