Fundamental aspects of google's core infrastructure -

1. Security(Base)
2. Compute
3. Storage
4. Networking
5. Big Data and ML Products(Top Layer)

**Google's pre-trained AI building blocks -**

1. Sight
   1. Cloud Vision
   2. Cloud Videos Intelligence
   3. AutoML Vision
2. Language
   1. Cloud Translation
   2. Cloud Natural Language
   3. AutoML Translation
   4. AutoML Natural Language
3. Conversation
   1. Dialogflow Enterprise Edition
   2. Cloud Text-to-Speech
   3. Cloud Speech-to-Text

*FACT* - google cloud deals with 60 petabytes of data every hour only from youtube, and 13 petabyte data every day from google photos.

* Google developed an ASIC which is TPU(Tensor Processing Unit) to deal with the bottleneck created by computing power for machine learning. eBay uses TPU's to achieve 10x faster speedup
* Google used machine learning to reduce power consumption in cooling by 40% at their data centres.

***gsutil***: google storage utility function. one can use this command to copy files to cloud storage buckets from either VM or local machine(using cloud SDK). ex - gsutil cp filename.extension gs://path

**Types of storage classes used in google storage -**

1. *Multi-Regional(high-frequency access)*: optimized for geo-redundancy and end-user latency.
2. ***Regional****(high-frequency access)*: used when your project requires higher performance local access to computing resources. ex - High-frequency analytic workload.
3. *Nearline(low-frequency access): fast, highly durable storage for data accessed less than once a month.*
4. *Coldline(lowest-frequency access): fast, highly durable storage for data accessed less than once a year.*

* **Regional** cloud storage bucket is used for big data analytics workloads.

**what's a project?**

A project is a base-level organizing entity for creating and using resources and services for managing billing APIs and permissions. Zones and regions, physically organize the GCP resources you use. Whereas projects logically organize them. Projects can be created, managed, deleted, even recovered from accidental deletions.

**Folders** are another logical grouping, you can have for collections of projects. Having an organization is required to use folders.

**what's an organization?**

The organization is a root node of the entire GCP hierarchy. While it's not required, an organization is quite useful, because it allows you to set policies that apply throughout your enterprise to all the projects and all the folders that are created in your enterprise.

**Cloud Identity and Access Management (IAM)**: IAM, lets you fine-tune access control to all the GCP resources you use. You define IAM policies that control user access to resources.

* Google has 1 petabit/sec of total bisection bandwidth.
* this network speed allows separating compute and storage.
* Edge point of presence: google network interconnects with public internet at more than 90 internet exchanges.
* Google provides encryption to BigQuery by providing data encryption keys, and further key-encryption keys and this is called envelope encryption.

***BigQuery***: A serverless, highly scalable, and cost-effective cloud data warehouse

**Services Offered by Google Cloud Platform:**

1. **Compute**
   1. **compute engine(IaaS):** lets you run VM on-demand in the cloud. provides maximum flexibility to people who like to manage instances themselves.
   2. **Google Kubernetes Engine:** Clusters of machines running containers. Containers have code packaged along with its dependencies.
   3. **App Engine(PaaS):** way to run code in the cloud without having to worry about infrastructure. used for long-lived web applications which can scale up to handle billions of users.
   4. **Cloud Functions(Faas):** Serverless execution environment, code is executed in response to events, used for code that's triggered by an event.
2. **Storage**
   1. **Cloud BigTable:**
   2. **Cloud Storage:**
   3. **Cloud SQL:**
   4. **Cloud Spanner:**
   5. **Cloud DataStore:**
3. **Big Data :**
   1. **BigQuery:**
   2. **Cloud Pub/Sub:**
   3. **Cloud DataFlow:**
   4. **Cloud DataProc:**
   5. **Cloud DataLab:**
4. **Cloud AI:**
   1. **Cloud machine learning engine:**
   2. **Cloud Vision API:**
   3. **Cloud speech to text:**
   4. **Cloud video intelligence API:**
   5. **Cloud auto ML:**
   6. **Cloud TPU:**
   7. **Cloud Natural Language API:**
   8. **Cloud Translation API:**
   9. **Cloud Jobs API:**
   10. **Advanced Solutions Lab:**
   11. **Cloud Text-to-Speech:**
   12. **DialogFlow Enterprise edition:**