Google Cloud Workshop

Ryan Matsumoto - Developer Advocate at Google

Cathy Bareiss - Computer Science Professor at Bethel University

CCSC:MW 2019

Google Cloud

About Me

- Ryan Matsumoto
- Developer Advocate at Google
- Office Location: San Francisco, CA
- Focused on Cloud for Education - Students & Faculty
- Stanford Class of 2016 (Computer Science & Economics)
- Hobbies & Interests: Elections, all of the Bachelor TV shows, Family Tree Research, Hackathons

Agenda

1. Intro to Google Cloud
2. Education Grants Program and Learning Resources
3. Compute - Compute Engine, Cloud Functions, and App Engine
4. Machine Learning - Natural Language API
5. Storage and Databases - Cloud Storage, Cloud SQL, and Cloud Firestore

Dictionary

cloud

cloud

/klaʊd/

noun

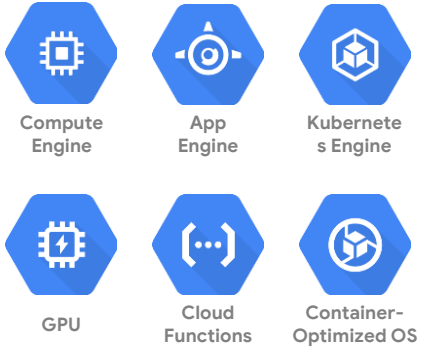
1. **Getting things done using someone else's computers**, especially where someone else worries about maintenance, provisioning, system administration, security, networking, failure recover, etc.

What is Google Cloud Platform?

Google Cloud Platform lets you build and host applications and websites, store data, and analyze data, all on Google's highly scalable and reliable computing infrastructure.

Google Cloud Platform Products

Compute

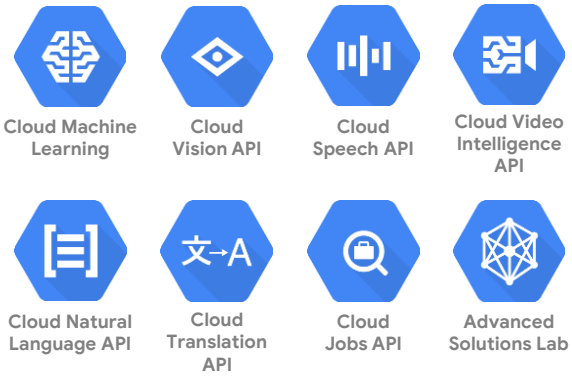


Big Data

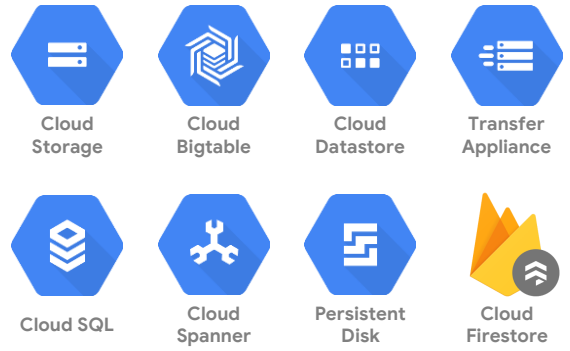
Identity & Security

Internet of Things

Machine Learning



Storage & Databases



Google Cloud

Google Cloud Platform Products (tl;dr)

Compute


Compute Engine


App Engine

Kubernetes Engine


Cloud Functions

GPU

Container-Optimized OS

Big Data

BigQuery

Cloud Dataflow

Cloud Dataproc

Cloud Dataprep

Cloud Datalab

Cloud Pub/Sub

Genomics

Data Studio

Identity & Security

Cloud IAM

Cloud Resource Manager

Cloud Security Scanner

Key Management Service

BeyondCorp

Data Loss Prevention API

Identity-Aware Proxy

Security Key Enforcement

Internet of Things

Cloud IoT Core

Machine Learning

Cloud Machine Learning

Cloud Vision API

Cloud Speech API

Cloud Video Intelligence API


Cloud Natural Language API

Cloud Translation API

Cloud Jobs API

Advanced Solutions Lab

Storage & Databases


Cloud Storage

Cloud Bigtable

Cloud Datastore

Transfer Appliance


Cloud SQL

Cloud Spanner

Persistent Disk


Cloud Firestore

Google Cloud

Education Grants Program

- Teaching Grants (per-course basis)
  - $50USD for students & $100USD for Faculty & TAs
  - Must exceed “Always Free” daily/monthly quota to incur billing
  - Students will barely use it (average utilization: <25%)
  - KEY: **not** giving Google your personal credit card
- Research Grants
  - Larger amounts: consider it as seed funding
  - Over a longer period of time
- Apply at cloud.google.com/edu
  - Turnaround time: “within a few business days”
  - Redeem at console.cloud.google.com/edu

Learning Resources

- Official Google Cloud documentation (i/e cloud.google.com/appengine/docs)
  - **Recommended:** Quickstart tutorials
- Google Cloud Platform YouTube Channel
  - https://www.youtube.com/googlecloudplatform
  - **Recommended:** Cloud Minute shorts and Cloud NEXT videos
  - **Coming Soon:** Google Cloud for Student Developers Playlist & EDU Video Case Study Videos
- Codelabs
  - Self-paced, hands-on tutorials
  - Require a Google account
  - Use free credits from the Education Grants Program
  - https://codelabs.developers.google.com/cloud/

Qwiklabs

- **Qwiklabs** codelabs: don't need a Gmail account; typically not free
  - google.qwiklabs.com
- Codelabs == self-paced, hands-on tutorials
- "Quests" == group of codelabs arranged in a "learning path"
- No Google account (provisioned on-the-fly)
- Apply for QwikLabs coupons at cloud.google.com/edu
  - Individual grant 200 tokens ... OR
  - Request 5000 tokens for use in courses

Activating Your Google Cloud Credits

- Make sure you have one of our flyers with $50 Google Cloud Credits
- Visit console.cloud.google.com/edu
- Make sure you are logged in with a Google account of your choice
- Enter the 16 digit coupon code from the flyer

The Google Cloud Console

- console.cloud.google.com
- Web portal where you can manage your Cloud resources
- Do things like set up databases, SSH into virtual machines, and manage Billing

Google Cloud Projects

- All your resources reside inside a project
- Create a Google Cloud “project” for each “project” you’re working on in real life
- Way to stay organized
- Can share projects with teammates for collaboration

Activity: Share Your Project with a Friend

- See your students' work or collaborate with teammates
- We will use IAM (Identity and Access Management)
- Many roles, but "Project Owner" and "Project Editor" are most useful

Compute Engine

- Access to virtual machines
- Running in Google's innovative data centers and worldwide fiber network
- Predefined and Custom machine types
- Persistent Disks
- Per-second billing

Compute Engine Quickstart

Quickstart Tutorial

Google Cloud

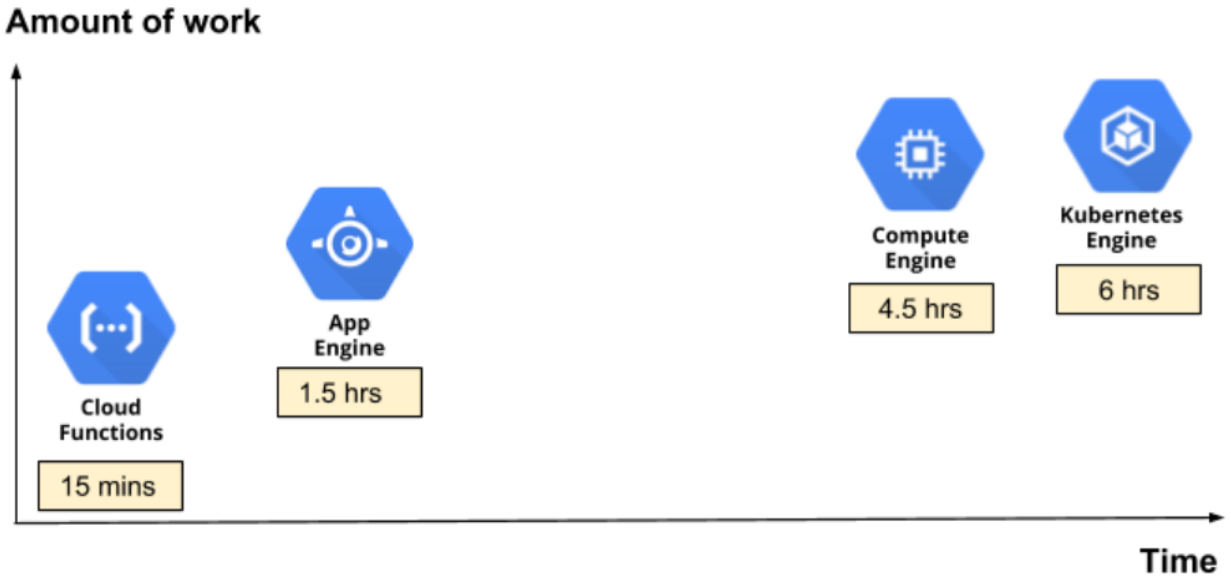
From a Recent Blog Post:

Do you want to build applications on Google Cloud Platform (GCP) but have no idea where to start? That was me, just a few months ago, before I joined the Google Cloud compute team.

...

And since there is no better way to learn than by doing, I also decided to build a “Hello, World” web application on each of GCP’s compute offerings—Google Compute Engine (VMs), Google Kubernetes Engine (containers), Google App Engine (PaaS), and Google Cloud Functions (FaaS).

Time to “Hello World” on Compute Platforms



Google Cloud

The Problem

- You want to write code
- You want it to run on the web
- You DON’T want to worry about handling virtual machines, scaling your app, or paying for unused resources

The Solution: Serverless Computing

- You write code and it runs in the Cloud - a Cloud provider manages computing infrastructure to let you focus on your code
- Misnomer: yes, there is a server
- But you don’t need to worry as much about it
- Google Cloud Serverless Products:
  - App Engine
  - Cloud Functions

Cloud Functions

- **Event-driven serverless computing**
- Write code at the individual function level
- Simplest way to run code in the Cloud
- Pay only when code is run
- Triggered by HTTP or other Cloud products

Cloud Functions Quickstart

[Quickstart Tutorial]

Google Cloud

App Engine

- **Deploy web apps** and mobile backends to the Cloud
- “Platform as a service” product
- Managed application platform that lets you focus on your code
- Autoscaling, load balancing, traffic splitting for A/B testing, error reporting, and more!

App Engine Quickstart

[Quickstart Tutorial]

Google Cloud

Machine Learning on Google Cloud

Google Cloud

Puppy or Muffin?

Google Cloud

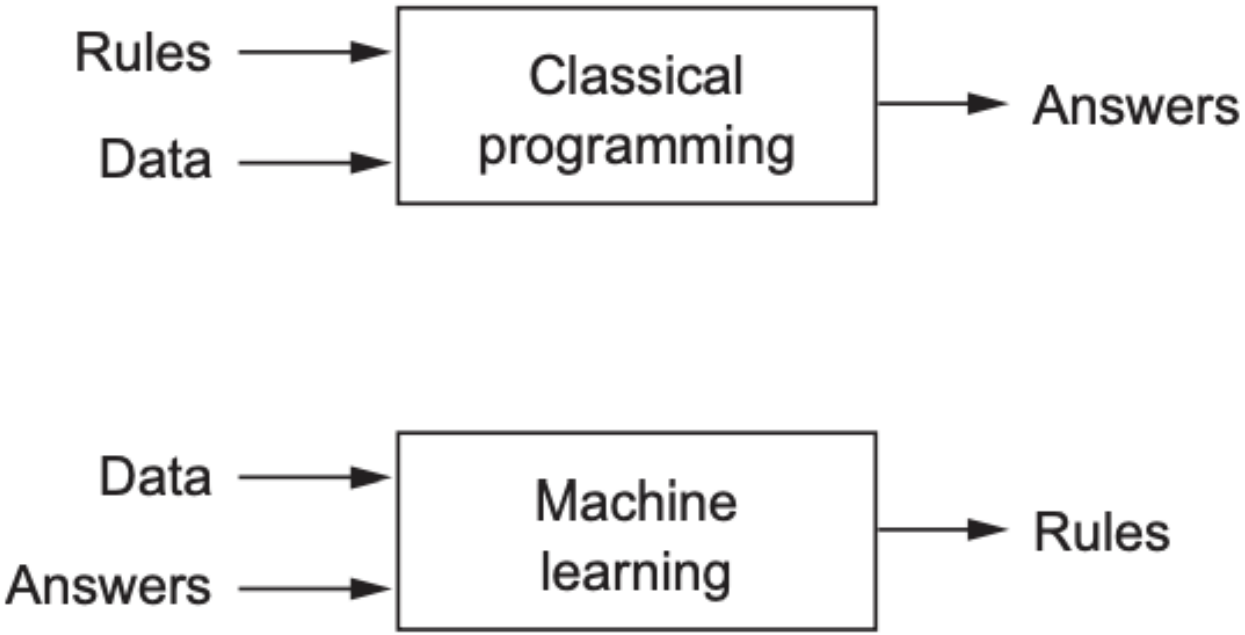
“The brown quick fox jumps over the lazy dog.”

Google Cloud

Syntax rules for adjective order in English:

- Quantity or number
- Quality or opinion
- Size
- Age
- Shape
- Colour
- Proper adjective (often nationality, place of origin, or material)
- Purpose or qualifier

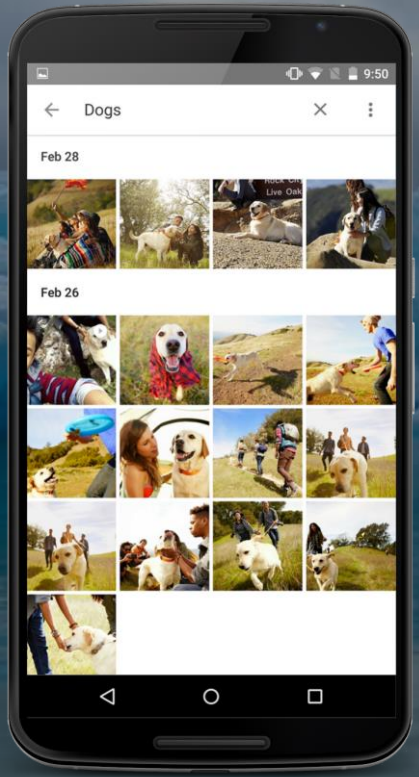
Machine learning is learning from rules plus experience.


Rules
Data
Classical programming
Answers
Data
Answers
Machine learning
Rules

What is Machine Learning?

- “Machine Learning is the study of computer algorithms that improve automatically through experience.” ~IEEE
- “Machine Learning is using data to answer questions.” ~Yufeng Guo, Developer Advocate at Google
- Data -> Model -> Prediction

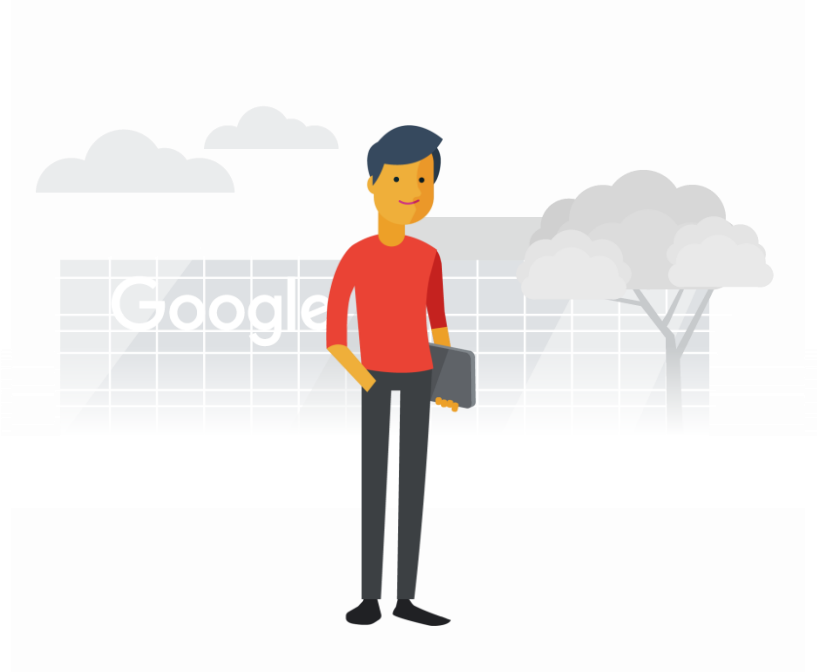
Google Photos



Google Translate

Google Cloud Machine Learning APIs

- **Gain insights from data** using Google Cloud's pre-trained machine learning models
- Leverage same technology as Google Photos and Google Assistant
- Require ZERO prior knowledge of ML



Google Cloud Machine Learning APIs

Vision

Video Intelligence

Speech

Natural Language

Translation

Video Case Study: Nagish

- Student team at hackathon created a system to help people who are deaf or hard of hearing make phone calls
- Used Speech-to-Text, Text-to-Speech, App Engine, and Firebase Realtime Database
- YouTube Video Link

Natural Language API Quickstart

Quickstart Tutorial

Google Cloud

Google Cloud SQL

- Managed version of classic relational databases - MySQL and PostgreSQL
- Data stored in table format - every database row follows a predefined “schema” of which fields to include

Cloud SQL Quickstart

Quickstart Tutorial

Google Cloud

Google Cloud Storage

- Store file objects in the Cloud
- Designed for unstructured data (i/e images, text files, audio files, video files)
- Accessible through Google Cloud Console, gsutil command line tool, and programmatically with client libraries

Cloud Storage Quickstart

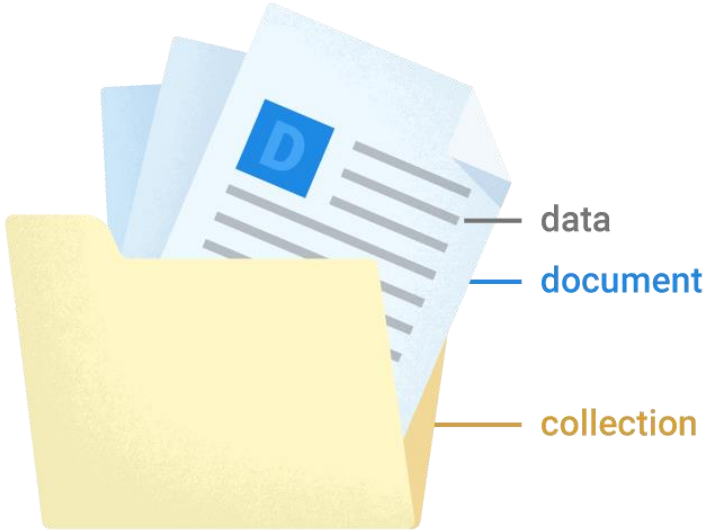
Quickstart Tutorial

Google Cloud

Cloud Firestore

- **Powerful NoSQL realtime database**
- **Ordinary database -** query database for new updates
- **Realtime database -** automatically *receive* updates when the database is updated
  - Set up a listener object on the client

Cloud Firestore - Data Model



users

alovelace
first : "Ada"
last : "Lovelace"
born : 1815

sride
first : "Sally"
last : "Ride"
born : 1951

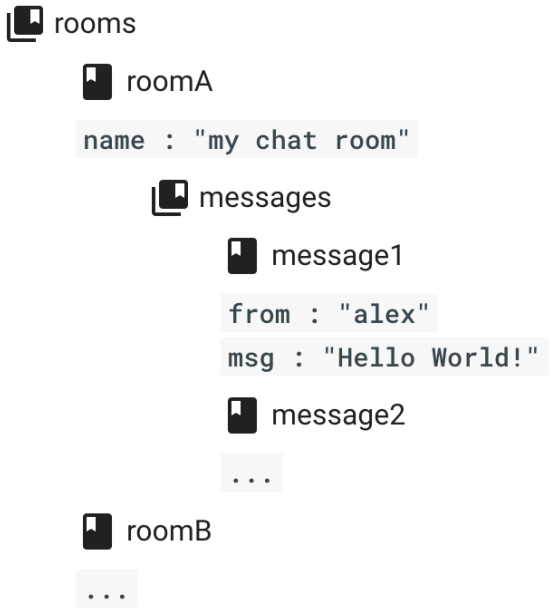
Google Cloud

Cloud Firestore Demo

bit.ly/firestore-game

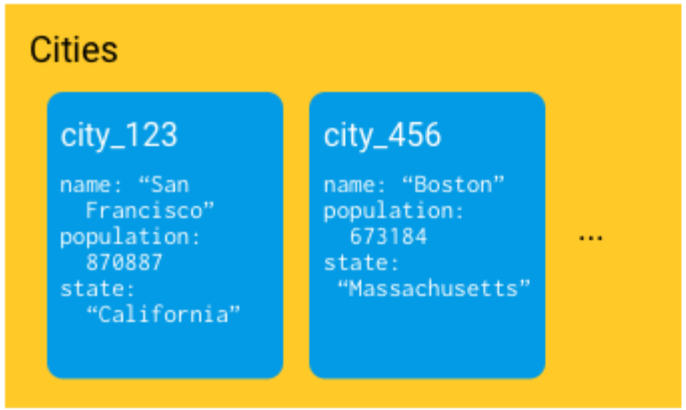
Google Cloud

Cloud Firestore - Subcollections



Google Cloud

Cloud Firestore - Easy Querying




```
citiesRef
.where("state", "==", "California“)
.where("population", “>”, 500000)
```

Google Cloud

Cloud Firestore - Key Advantages

- Highly scalable database
- Multi-regional data replication
- Strong consistency
- Robust client libraries (iOS, Android, front-end Javascript, Node.js, Python, Ruby, Java, PHP, Go, and .NET)

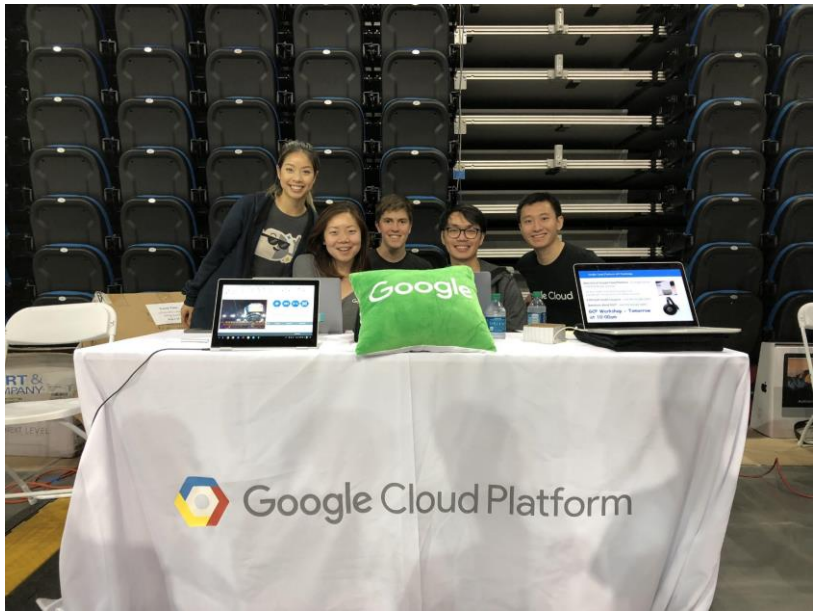
Cloud Firestore Quickstart

Quickstart Tutorial

Google Cloud

Google Cloud

Thank you!



Google Cloud