

AWS and Google Cloud Services

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Infrastructure

- ▶ AWS: 46 Availability Zones within 17 geographic Regions around the world
- ▶ Google cloud: 13 regions, 39 zones
- ▶ Services:

Amazon Web Services	Google Cloud
Amazon Elastic Compute Cloud	Google Compute Engine
AWS Lambda	Google Cloud Functions
Elastic Load Balancer	Google Cloud Load Balancing
Amazon Route 53	Google Cloud DNS
Amazon Simple Storage Service(S3)	Google Cloud Storage
Amazon Relational Database Service	Google Cloud SQL
Google Cloud SQL	Google Cloud Pub/Sub
AWS CloudFormation	Google Cloud Deployment Manager

CDN Edge solution for AWS

- ▶ Edge locations are Aws sites deployed in major cities and highly populated areas around the globe which are lot more than availability zones available
- ▶ It is not used to deploy main infrastructure(EC2, RDS, VPC) etc
- ▶ They are used for AWS services such as AWS Cloudfront and AWSLambda to cache data and reduce latency for end user access
- ▶ These locations act as Content Delivery Network(CDN)

Amazon EC2 & Google Compute Engine

- ▶ AWS has wide selection of instance types optimized to fit different use cases
- ▶ Google cloud has more flexible instance configuration offering
- ▶ Google: 96vCPUs, 624GB RAM, AWS: 128vCPU, 3904GB RAM
- ▶ Type of hypervisors: KVM(Kernel VM): GCP, Xen: AWS
- ▶ Instance Migration in AWS has to be manual or using snapshots
- ▶ There is no downtime for instance migration in google cloud
- ▶ Pricing models:
 - ▶ EC2: spot instances, on-demand instances, reserved instances
 - ▶ GCE: on-demand, sustained pricing models, preemptible instances

Amazon S3

- ▶ Amazon provides lowest latency
- ▶ AWS excels for smaller file
- ▶ Maximum object size limit 5TB
- ▶ The largest object that can be uploaded in a single PUT is 5 gigabytes.
- ▶ For objects larger than 100 megabytes, customers should consider using the Multipart Upload capability.

Google Object storage

- ▶ Google provides highest throughput for both upload and downloads
- ▶ Can handle larger files very well
- ▶ Maximum object size limit 5TB
- ▶ Objects are immutable, which means that an uploaded object cannot change throughout its storage lifetime.
- ▶ However, it is possible to overwrite objects that are stored in Cloud Storage
- ▶ Google's unique multi-region buckets keep costs down when working with data from multiple datacenters in the same region (e.g. continent).
- ▶ Object storage scales automatically to provide high aggregate throughput.

AWS RDS & Google SQL

- ▶ Google Cloud SQL exhibits lower latency than RDS for MySQL

	Google SQL	Amazon RDS
Databases	MySQL, PostgreSQL	MySQL, PostgreSQL, Oracle, SQL Server, Aurora
Storage	10Tb	16Tb
Read replicas	Supported	Supported
Backups	Automated backups	Automated backups
Pricing	\$0.0150 - \$8.0480 per hour	\$0.175 - \$7.68

Dynamodb Features:

- ▶ Pricing depends on requests/s (can always be provisioned to scale)
- ▶ Storage is on SSDs
- ▶ cross-availability zone replication
- ▶ synchronized replication
- ▶ Unlimited storage
- ▶ Java, Python ,PHP, Ruby and more supported

Bigtable features:

- ▶ It's one of the core internal product of google which now they have introduced on cloud platform
- ▶ Popular Data Analysis tool
- ▶ Very low latency
- ▶ Integration with Apache API makes it even easier
- ▶ No provisioning required
- ▶ Discounts proportional to usage
- ▶ Integration with BigQuery
- ▶ 1 TB of data analysis and 10 GB data storage is free per month
- ▶ Option of HDD and SSD storage
- ▶ Ingress are free

SQS

- ▶ SQS uses queue where as Pub/Sub uses topics as data source for messaging
- ▶ SQS has either queue or subscriber as the message endpoint
- ▶ Supports pull based messaged delivery
- ▶ Message retention is up to 14 days
- ▶ Standard queue , FIFO queue

PubSub

- ▶ Pubsub uses topics as data source
- ▶ Supports both pull and push based messaged delivery
- ▶ Messages sent are to destination queue
- ▶ Message retention is up to 7 days

Load Balancers

- ▶ AWS load balancing is linear
- ▶ New instances on AWS takes some time to configure (1-8 min)
- ▶ Whereas in Google cloud has no wait time for increase in traffic
- ▶ You can warm up your instance for incoming spike in traffic in AWS but there is no need to do so in google cloud

Lambda & Google cloud Function

	Amazon	Google
Alpha Release	2015	2016
Automatic Scaling	Supported	Supported
Number of functions	Unlimited	1000 functions/project
Max execution time	300s(5 min)	540s(9min)
Supported Languages	JS, Java, C#, Python	JS
Concurrent Executions	1000	400

Simple Email Services

- ▶ You can use our SMTP interface or one of the AWS SDKs to integrate Amazon SES directly into your existing applications.
- ▶ Google Compute Engine does not allow outbound connections on ports 25, 465, and 587
- ▶ By default, these outbound SMTP ports are blocked because of the large amount of abuse these ports are susceptible to
- ▶ Compute Engine partners: SendGrid, Mailgun, and Mailjet offer a free tier for Compute Engine customers to set up and send email through their servers.
- ▶ Features Provided: click tracking, analytics, APIs etc
- ▶ G-suite limits: 2000 messages per day, 2000 recipient per message


Firewall & Security Group

- ▶ Both are stateful: if you send a request from your instance, the response traffic for that request is allowed to flow in regardless of inbound security group rules
- ▶ Google cloud has both allow and deny rules whereas amazon has only allow rule for inbound and outbound traffic
- ▶ Google cloud platform uses priority between 1 to 65535; 1 being highest for the inbound and outbound traffic rules

Analyzing Cost:

- ▶ AWS and Google cloud charges almost same for all resources but, the closer look at pricing reveal following:
 - ▶ AWS:
 1. In AWS, longer you commit , more discount you get
 2. You can commit for 1 to 3 years
 3. More you upfront, larger discount you get
 - ▶ Google cloud:
 1. Uses Sustained Usage Discount(SUD)
 2. Applied automatically, Required no upfront commitment
 3. Instances running 100 percent of the time during the month will earn a maximum 30% discount.

Amazon EC2 Service (US-East)		\$ 47.79
Compute:	\$ 25.50	
Intra-Region Data Transfer:	\$ 0.10	
Elastic IPs:	\$ 3.66	
Elastic LBs:	\$ 18.30	
Data Processed by Elastic LBs:	\$ 0.08	
VPC Peering Data Transfer:	\$ 0.05	
Inter-Region Data Transfer Out	\$ 0.10	
Amazon S3 Service (US-East)		\$ 73.40
Standard Storage:	\$ 23.00	
Standard Put/List Requests:	\$ 50.00	
Standard Other Requests:	\$ 0.40	
Amazon Route 53 Service		\$ 102.20
Hosted Zones:	\$ 0.50	
Traffic Flow:	\$ 100.00	
Standard Queries:	\$ 0.40	
Latency Based Routing Queries:	\$ 0.60	
Geo DNS Queries:	\$ 0.70	
Amazon RDS Service (US-East)		\$ 111.06
DB instances:	\$ 99.56	
Storage:	\$ 11.50	
Amazon DvnamoDB Service (US-East)		\$ 7.48
Indexed Data Storage:	\$ 7.48	
DynamoDB Streams:	\$ 0.00	
Amazon CloudWatch Service (US-East)		\$ 0.00
Amazon SES Service (US-East)		\$ 0.12
Email Messages:	\$ 0.00	
Data Transfer (Attachments):	\$ 0.12	
Amazon SNS Service (US-East)		\$ 0.00
Requests:	\$ 0.00	
Notifications:	\$ 0.00	
AWS Data Transfer In		\$ 0.00
US-East / US Standard (Virginia) Region:	\$ 0.00	
AWS Data Transfer Out		\$ 90.14
US-East / US Standard (Virginia) Region:	\$ 90.14	
AWS Support (Basic)		\$ 0.00
Support for all AWS services:	\$ 0.00	
Free Tier Discount:		\$ -30.78
Total Monthly Payment:		\$ 401.41

Pub/Sub	Operations	8.09765625 GB	0
3 x	f1-microSustained Usage Discount Monthly Breakdown: •1st ¼ - 547.5 hrs @ 0.0% off: \$4.16 •2nd ¼ - 547.5 hrs @ 20.0% off: \$3.33 (\$0.83 saved) •3rd ¼ - 547.5 hrs @ 40.0% off: \$2.50 (\$1.66 saved) •4th ¼ - 547.5 hrs @ 60.0% off: \$1.66 (\$2.50 saved) 	2190 total hours per month	\$7.66
Cloud Storage	Multi-Regional storage	1000 GB	\$26.00
Cloud Functions		1000	0
Managed Zones	Managed Zones	1 zones	\$0.20
Queries	Cloud dns queries	1000	\$0.00
db-pg-g1-small	1000 GB	730 total hours per month	\$195.55
Datastore Storage	Datastore Storage	10 GB	0

Total Estimated Monthly Cost

\$229.41

AWS Tools

► Developer Tools:

1. AWS CodeCommit: Hosts private Git repositories in the AWS cloud
2. AWS CodePipeline: Builds, tests, and deploys your code every time there is a code change, based on the release process models you define
3. AWS CodeBuild: Fully managed build service that compiles source code, runs tests, and produces software packages that are ready to deploy
4. AWS CodeDeploy: Fully automates code deployments

► Management Tools:

1. AWS CloudFormation: AWS CloudFormation allows you to model your entire infrastructure in a text file
2. Amazon CloudWatch: Cloud monitoring services for customers of AWS resources
3. AWS Config: Assess, audit and evaluate the configurations of cloud resources
4. AWS CloudTrail: Log, continuously monitor, and retain account activity related to actions across your AWS infrastructure

GCP Tools

▶ Developer Tools:

1. Cloud SDK: Set of tools for Cloud Platform
2. Cloud Shell
3. Cloud Tools for Android Studio
4. Cloud Deployment Manager

▶ Management Tools:

1. Stackdriver: Provides powerful monitoring, logging, error reporting and diagnostics
2. Cloud Deployment Manager: Allows you to specify all the resources needed for your application in a declarative format using yaml
3. Cloud Billing API: You can use to programmatically manage billing for your projects in the Google Cloud Platform

AWS Cloudformation & GCP Deployment Manager

	AWS	Google
Deployed Collection of resources	Stack	Deployment
Deployment files	Template	Configuration file, template file, schema file
Syntax	Json, Yml	Yml, Jinja, Python
Default maximum number of stack/ deployments	200	1000

Hybrid Solution on AWS

- ▶ Data Integration:
 - ▶ large scale data storage
 - ▶ move data closer to clients
 - ▶ backup and archive solutions, eliminate maintenance at the same time keep the confidential data secure
- ▶ AWS Storage Getway:
 - ▶ This enables hybrid between on-premises and AWS cloud
 - ▶ Amazon RDS: Has MySQL, MariaDB, PostgreSQL, Oracle which are quite popular and easy to migrate to or rather won't need migration
 - ▶ Amazon S3: Provides variety of storages

Conclusion

- ▶ Google cloud offers better user interface than Amazon along with better debugging tools.(like preview feature for Deployment manger, Cloud shell for SDK commands)
- ▶ Google's Cloud is always preferred over AWS when it comes to compute and storage costs and also Google offers better offers for AWS on free trials
- ▶ GCP offers a “multi-regional” cloud storage option, where the data is automatically replicated across several regions for very little added cost
- ▶ Though Amazon AWS is old player in cloud services, google cloud has managed to take fair share in market. And with continuous improvements to Google Cloud, it surely looks like better way to go for cloud-infrastructure related needs

Thank You!