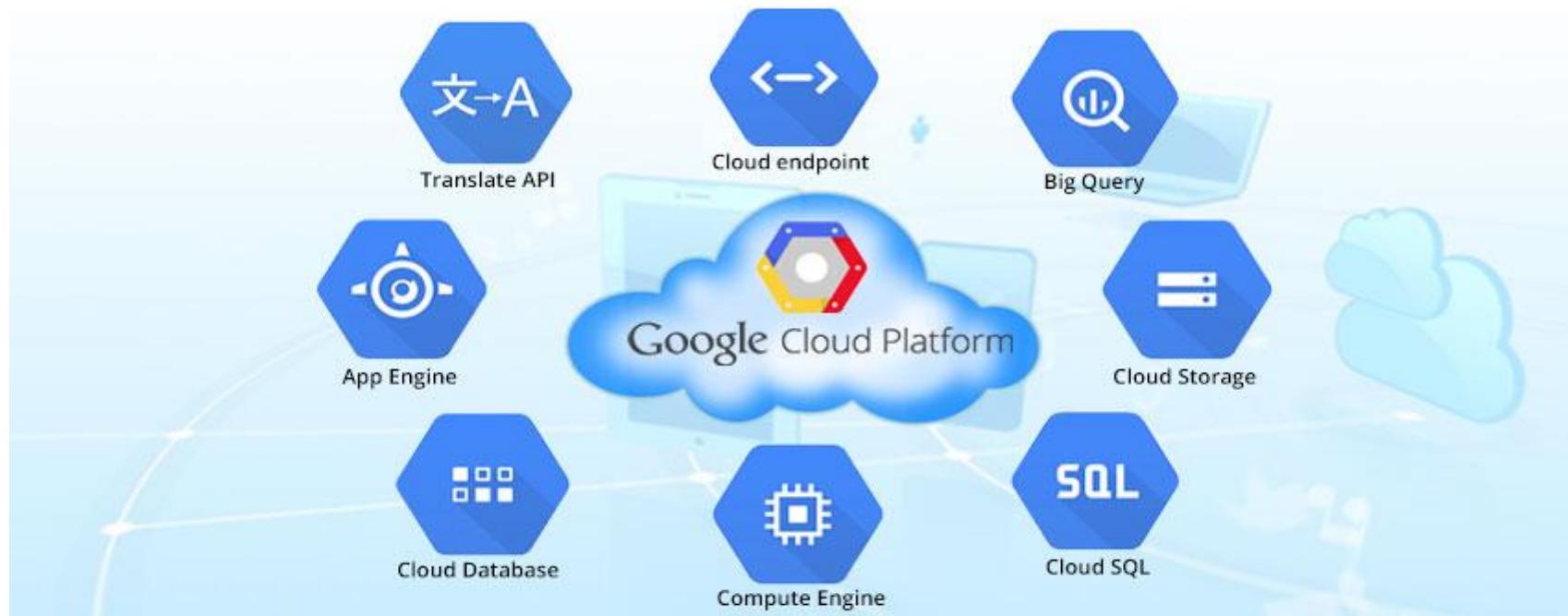


GOOGLE CLOUD PLATFORM GUIDE



Why Google Cloud Platform?

Version 0.0.7



Damian Ndunda

MUGUMOINI - NAIROBI

GOOGLE CLOUD PLATFORM GUIDE

Copyright © 2020 BICT Solutions.

Visit <https://businessict.weebly.com/cloud-computing.html>

Trademarks used belong Alphabet Inc. Icons used are reproduced from Google Cloud Platform Web. Trademark information about all of the companies and products mentioned herein are provided accordingly but cannot guarantee the accuracy of all information as information changes with time.

CONTENTS AT A GLANCE

GOOGLE CLOUD PLATFORM GUIDE.....	1
CONTENTS AT A GLANCE.....	3
TABLE OF CONTENTS.....	4
FOREWORD	18
CHAPTER - CLOUD.....	50
CHAPTER - CLOUD SQL: MANAGED RELATIONAL STORAGE.....	71
COMPUTING ON GOOGLE COMPUTE ENGINE	109
CHAPTER: NETWORKING IN GCP	224
CHAPTER: SECURITY ON THE GCP	243
CHAPTER: EFFECTIVE USE OF GCP	252
CHAPTER: GOOGLE CLOUD CERTIFICATION.....	261
INDEX	264
REFERENCES.....	265

TABLE OF CONTENTS

GOOGLE CLOUD PLATFORM GUIDE.....	1
CONTENTS AT A GLANCE.....	3
TABLE OF CONTENTS.....	4
FOREWORD	18
WHY GOOGLE WEB LINKS	18
GOOGLE CLOUD PRODUCTS	19
Featured products	20
Compute Engine	20
Cloud Run	20
Anthos	21
Vision AI	21
Cloud Storage	21
Cloud SQL.....	21
BigQuery	21
Security key enforcement.....	21
AI and Machine Learning	21
AI building blocks.....	21
AutoML.....	21
Vision AI	21
Video AI.....	22
Cloud Natural Language API.....	22
Cloud Translation	22
Text-to-Speech	22
Speech-to-Text	22
Dialogflow	22

AutoML Tables (beta)	22
Cloud Inference API (alpha)	22
AI Platform and accelerators	23
AI Platform	23
AI Platform Deep Learning VM Images	23
AI Platform Notebooks (beta)	23
AI Platform Deep Learning Containers (beta)	23
AI Platform Pipelines (beta)	23
AI Hub (beta)	23
Cloud GPUs.....	23
Cloud TPU.....	23
TensorFlow Enterprise	23
API Management	24
Apigee API Platform.....	24
Cloud Endpoints.....	24
Developer Portal.....	25
Apigee Sense	25
API Analytics	25
API Monetization.....	25
Apigee Hybrid	25
Cloud Healthcare API.....	25
Compute	27
Compute Engine	27
App Engine.....	27
Bare Metal Solution.....	27
Cloud GPUs	27
Migrate for Compute Engine	27
Preemptible VMs.....	27
Shielded VMs	27
Sole-tenant nodes	27
Containers.....	28
Google Kubernetes Engine (GKE)	28
Artifact Registry (beta)	28

Container Registry	28
Kubernetes applications on Google Cloud Marketplace	28
Cloud Build.....	28
AI Platform Deep Learning Containers	28
Batch on GKE (beta).....	28
Data Analytics	28
BigQuery	28
Cloud Composer	29
Dataflow	29
Cloud Data Fusion.....	29
Dataprep by Trifacta	29
Dataproc	29
Google Data Studio.....	29
Pub/Sub	29
Data Catalog	29
Cloud Life Sciences (beta).....	29
Databases.....	30
Cloud Bigtable.....	30
Firestore	30
Memorystore.....	30
Cloud Spanner	30
Cloud SQL.....	30
Firebase Realtime Database	30
Developer Tools	30
Artifact Registry (beta)	30
Cloud SDK	30
Container Registry	31
Cloud Code	31
Cloud Source Repositories.....	31
Cloud Scheduler.....	31
Cloud Tasks.....	31
Cloud Code for IntelliJ.....	31
Tools for PowerShell.....	31

Tools for Visual Studio	31
Tools for Eclipse.....	32
Gradle App Engine Plugin	32
Maven App Engine Plugin.....	32
Firebase Test Lab	32
Firebase Crashlytics	32
Tekton.....	32
Workflows	32
Healthcare and Life Sciences	32
Cloud Healthcare API.....	32
Cloud Life Sciences (beta).....	33
Hybrid and Multi-cloud.....	33
Anthos	33
Anthos deployed on VMware.....	33
Anthos GKE	33
Anthos Config Management.....	33
Cloud Run for Anthos	33
Apigee API Management	33
Google Cloud Marketplace for Anthos	33
Migrate for Anthos	34
Operations.....	34
Cloud Build.....	34
Traffic Director.....	34
Internet of Things (IoT)	34
IoT Core	34
Edge TPU.....	34
Cloud IoT Edge.....	34
Management Tools	35
Private Catalog	35
Cloud Deployment Manager	35
Cloud Console.....	35
Cloud Shell	35
Cost management	35

Cloud APIs.....	35
Orbitera White-Label Marketplace.....	35
Media and Gaming.....	35
Game Servers.....	35
OpenCue	36
Zync Render	36
Anvato	36
Migration	36
BigQuery Data Transfer Service.....	36
Migrate for Compute Engine	36
Cloud Storage Transfer Service.....	36
Migrate for Anthos	36
Transfer Appliance.....	36
Networking	37
Cloud Armor	37
Cloud CDN.....	37
Cloud DNS	37
Cloud Interconnect.....	37
Cloud Load Balancing.....	37
Cloud NAT	37
Cloud Router.....	37
Cloud VPN.....	37
Network Intelligence Center.....	37
Network Service Tiers.....	38
Network Telemetry.....	38
Traffic Director.....	38
Virtual Private Cloud (VPC)	38
Security and Identity	38
Security	38
Access Transparency	38
Binary Authorization	38
Cloud Asset Inventory	38
Cloud Audit Logs.....	38

Cloud Data Loss Prevention	39
Cloud HSM.....	39
Cloud Key Management Service	39
Security Command Center	39
Shielded VMs.....	39
VPC Service Controls	39
Incident Response and Management (alpha)	39
Identity and Access.....	39
IAM.....	39
Cloud Identity.....	40
Identity-Aware Proxy	40
Context-Aware Access.....	40
Identity Platform	40
Managed Service for Microsoft Active Directory (beta).....	40
Resource Manager	40
Security key enforcement	40
Titan Security Keys	40
User Protection Services.....	41
Phishing Protection	41
reCAPTCHA Enterprise	41
Web Risk.....	41
Serverless Computing	41
Cloud Run	41
App Engine.....	41
Cloud Functions.....	41
Knative.....	41
Workflows	41
Storage.....	42
Cloud Storage	42
Persistent Disk.....	42
Filestore	42
Cloud Storage for Firebase	42
Operations	42

Operations Suite	42
Cloud Logging	42
Cloud Monitoring.....	42
Cloud Trace	43
Cloud Debugger	43
Cloud Profiler.....	43
Error Reporting.....	43
Service Level Monitoring	43
Other Google Cloud Products	43
Google Maps Platform.....	43
Firebase	43
Firebase Authentication	43
Cloud Functions for Firebase	44
G Suite	44
Chrome Enterprise.....	44
Cloud Storage for Firebase	44
Firebase Test Lab	44
GCP CLOUD PLATFORM URLs TABLE.....	45
PRODUCTS PRICING.....	46
GCP NETWORK	48
GCP REGIONS	49
CHAPTER - CLOUD.....	50
1 What is Google Cloud Platform?	50
2 Why cloud?.....	50
2.1 Why not cloud?	50
3 What to expect from cloud services.....	51
3.1 Computing.....	51
3.2 Storage	51
3.3 Analytics (aka, Big Data).....	52
3.4 Networking	52
3.5 Pricing	53
4 Building an application for the cloud	53

4.1 What is a cloud application?	53
4.2 Example projects.....	53
TO-DO LIST.....	53
INSTASNAP.....	53
E*EXCHANGE	54
5 Getting started with Google Cloud Platform.....	54
5.1 Signing up for GCP.....	54
5.2 Exploring the console	57
5.3 Understanding projects	58
5.4 Installing the SDK	58
6 Interacting with GCP	60
6.1 In the browser: the Cloud Console	60
TESTING OUT YOUR INSTANCE.....	64
6.2 On the command line: gcloud.....	65
CONNECTING TO YOUR INSTANCE	65
6.3 In your own code: google-cloud-*	67
7 SUMMARY	70
CHAPTER - CLOUD SQL: MANAGED RELATIONAL STORAGE.....	71
1 WHAT'S CLOUD SQL?	71
2 INTERACTING WITH CLOUD SQL	71
3 CONFIGURING CLOUD SQL FOR PRODUCTION	79
3.1 Access control	79
3.2 Connecting over SSL.....	80
3.3 Maintenance windows.....	86
3.4 Extra MySQL options.....	88
4 SCALING UP (AND DOWN).....	88
4.1 Computing power	88
4.2 Storage	89
5 REPLICATION	90
6 BACKUP AND RESTORE.....	96
6.1 Automated daily backups	96
6.2 Manual data export to Cloud Storage.....	97

7 UNDERSTANDING PRICING.....	103
8 WHEN SHOULD I USE CLOUD SQL?	104
8.1 Structure	105
8.2 Query complexity.....	106
8.3 Durability.....	106
8.4 Speed (latency)	106
8.5 Throughput	106
9 COST	106
9.1 Overall.....	107
10 WEIGHING CLOUD SQL AGAINST A VM RUNNING MYSQL.....	107
11 SUMMARY	108
 COMPUTING ON GOOGLE COMPUTE ENGINE	109
CHAPTER: COMPUTE ENGINE: VIRTUAL MACHINES	110
1 LAUNCHING YOUR FIRST (OR SECOND) VM.....	111
2 BLOCK STORAGE WITH PERSISTENT DISKS.....	113
2.1 Disks as resources.....	114
2.2 Attaching and detaching disks	115
2.3 Using your disks	119
2.4 Resizing disks	122
2.5 Snapshots	124
2.6 Images	132
2.7 Performance	132
2.8 Encryption.....	134
3 INSTANCE GROUPS AND DYNAMIC RESOURCES.....	139
3.1 Changing the size of an instance group	144
3.2 Rolling updates	146
3.3 Autoscaling	149
4 Ephemeral computing with preemptible VMs.....	152
4.1 Why use preemptible machines?	153
4.2 Turning on preemptible VMs.....	153
4.3 Handling terminations	154
4.4 Preemption selection	155

5 LOAD BALANCING	155
5.1 Backend configuration.....	157
CREATING A HEALTH CHECK	157
5.2 Host and path rules	159
5.3 Frontend configuration.....	159
5.4 Reviewing the configuration.....	161
6 CLOUD CDN	165
6.1 Enabling Cloud CDN	166
6.2 Cache control.....	170
7 UNDERSTANDING PRICING	171
7.1 Computing capacity	171
7.2 Sustained use discounts	172
7.3 Pre-emptible prices	176
7.4 Storage.....	177
7.5 Network traffic	178
8 WHEN SHOULD I USE GCE?.....	179
8.1 Flexibility.....	179
8.2 Complexity.....	180
8.3 Performance	180
8.4 Cost	180
9 SUMMARY.....	181
CHAPTER: KUBERNETES ENGINE: MANAGED KUBERNETES CLUSTERS	182
1 WHAT ARE CONTAINERS?	182
1.1 Configuration.....	183
1.2 Standardization.....	183
1.3 Isolation	183
2 WHAT IS DOCKER?	184
3 WHAT IS KUBERNETES?.....	185
What is an orchestrator	186
What is a containerised app.....	186
What is a cloud-native app.....	186
What is a microservices app.....	187
Where did Kubernetes come from.....	187

Kubernetes and Docker	188
What about Kubernetes vs Docker Swarm	189
Kubernetes and Borg: Resistance is futile!.....	189
Kubernetes – what's in the name	189
3.1 Clusters	192
3.2 Nodes.....	192
3.3 Pods	192
Pods and containers.....	193
Pod anatomy	193
Pods as the unit of scaling	194
Pods - atomic operations	194
Pod lifecycle	194
3.4 Services.....	197
4 WHAT IS KUBERNETES ENGINE?	197
5 INTERACTING WITH KUBERNETES ENGINE	198
5.1 Defining your application	198
5.2 Running your container locally	200
5.3 Deploying to your container registry.....	203
5.4 Setting up your Kubernetes Engine cluster	205
5.5 Deploying your application.....	206
5.6 Replicating your application	208
.7 Using the Kubernetes UI.....	210
6 MAINTAINING YOUR CLUSTER	212
6.1 Upgrading the Kubernetes master node	213
6.2 Upgrading cluster nodes.....	215
6.3 Resizing your cluster.....	217
7 UNDERSTANDING PRICING	218
8 WHEN SHOULD I USE KUBERNETES ENGINE?	218
8.1 Flexibility.....	219
8.2 Complexity.....	219
8.3 Performance	219
8.4 Cost	219
8.5 Overall	220

8.6 To-Do List	220
8.7 E*Exchange	220
8.8 InstaSnap	221
9 SUMMARY	222
TABLE: SIMILARITY TO SERVICES BY OTHER CLOUD SERVICE PROVIDERS	223
CHAPTER: NETWORKING IN GCP	224
1 WHY GCP'S NETWORKING MODEL IS UNIQUE	225
2 VPC NETWORKS AND SUBNETS	227
3 THE DEFAULT VPC	229
4 INTERNAL AND EXTERNAL IP ADDRESSES	230
Advantages Of Communication On Internal IP Addresses:.....	231
Cost:.....	231
Security:.....	231
Latency:	231
2 Features To Consider	231
I. VPC peering:	231
II. Shared VPC:	232
5 VPN AND CLOUD ROUTER	232
6 WORKING WITH VPCS	233
7 WORKING WITH CUSTOM SUBNETS	236
8 WORKING WITH FIREWALL RULES	238
How To Create And Manage Custom Firewall Rules:.....	239
Steps For Creating A Firewall Rule Using A Web Console.....	240
CHAPTER: SECURITY ON THE GCP	243
1 SECURITY FEATURES AT GOOGLE AND ON THE GCP	244
Data center physical security	244
Custom hardware and trusted booting	244
Data disposal.....	245
Data encryption	245
Secure service deployment.....	247
This secure service deployment is based on three attributes:.....	247

I. Identity:.....	247
II. Integrity:.....	247
III. Isolation:.....	247
Secure interservice communication	247
Using Google Front End	248
In-built DDoS protections.....	248
Insider risk and intrusion detection	249
2 GOOGLE-PROVIDED TOOLS AND OPTIONS FOR SECURITY.....	249
Data encryption options	249
Customer-managed encryption keys (CMEK) using Cloud KMS	249
Customer-supplied encryption keys (CSEK)	249
Cloud security scanner	250
3 SOME SECURITY BEST PRACTICES	250
4 BEYONDcorp – IDENTITY-AWARE PROXY	251
CHAPTER: EFFECTIVE USE OF GCP	252
1 Eat the Kubernetes frog	252
2 Careful that you don't get nickel-and-dimed	253
3 Pay for what you allocate not what you use	254
4 Make friends with the gsuite admins	254
5 Try to find reasons to use network peering	255
6 Understand how sustained use discounts work.....	255
7 Read the fine print on GCS pricing	255
Keep In Mind:.....	256
Access charges on nearline and coldline buckets:.....	256
Class A and Class B operations:	256
8 Use BigQuery unless you have a specific reason not to	256
9 Use pre-emptible instances in your Dataproc clusters	257
10 Keep your Dataproc clusters stateless	257
11 Understand the unified architecture for batch and stream.....	258
12 Understand the main choices for ML applications.....	259
13 Understand the differences between snapshots and images.....	260
14 Don't be Milton!.....	260

CHAPTER: GOOGLE CLOUD CERTIFICATION	261
WHY GET GOOGLE CLOUD CERTIFIED	261
WHICH GOOGLE CLOUD CERTIFICATION IS RIGHT FOR YOU?	261
Associate certification.....	262
Professional certification	262
User certification	262
INDEX	264
REFERENCES.....	265

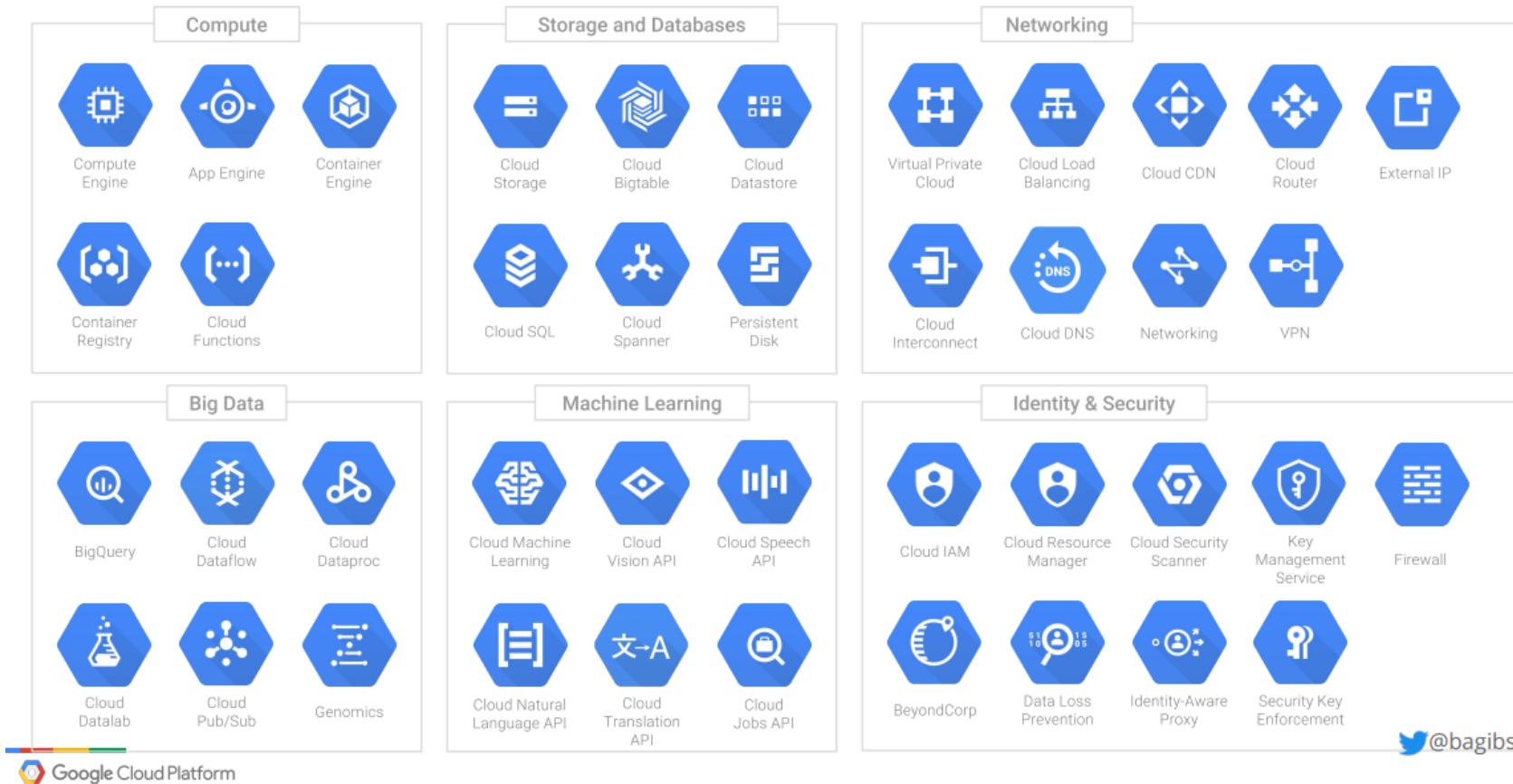
FOREWORD

WHY GOOGLE WEB LINKS

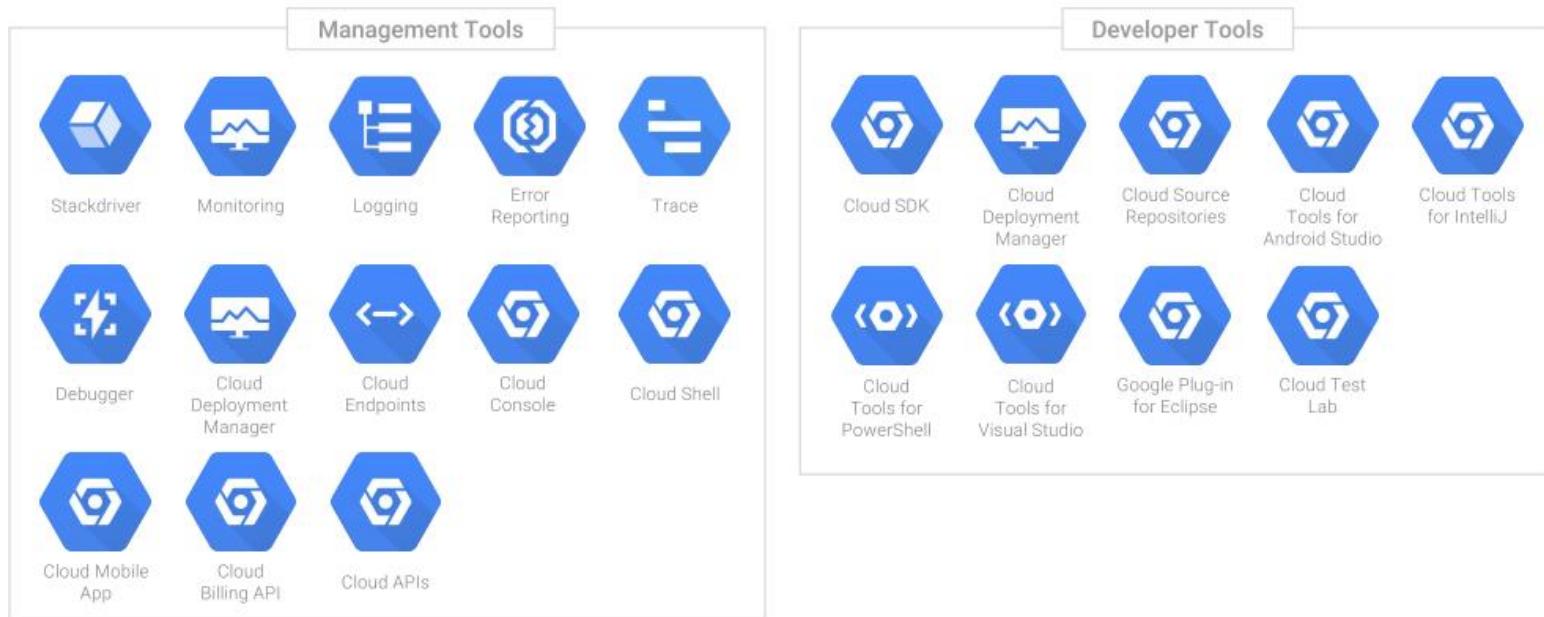
- ✓ [Choosing Google Cloud](#)
- ✓ [Trust and security](#)
- ✓ [Open cloud](#)
- ✓ [Global infrastructure](#)
- ✓ [Customers and case studies](#)
- ✓ [Analyst reports](#)
- ✓ [Whitepapers](#)

GOOGLE CLOUD PRODUCTS

More than 60 Google Cloud Platform services



More than 60 Google Cloud Platform services



Saxby R. Salama K. Gibson B. Deep Learning with Google Cloud

Featured products

[Compute Engine](#)

Create and deploy scalable, high-performance VMs.

[Cloud Run](#)

Run stateless containers on a fully managed environment or on Anthos.