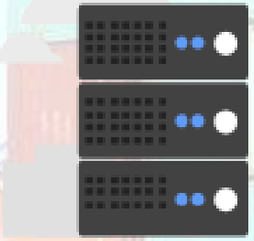
Start Cloud Now

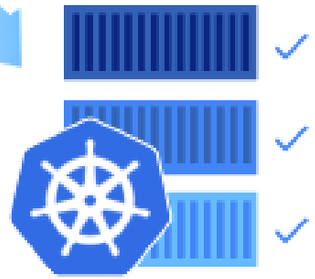
Google Cloud Professional DevOps Engineer Exam

Prep Notes by

Ammett

Class SRE implements DevOps





Google Cloud Professional Cloud DevOps Engineer Exam

Exam prep sheet by Ammett v.1.1

06-2021

SRE

SRE

What it is

In general, an SRE team is responsible for the **availability, latency, performance, efficiency, change management, monitoring, emergency response, and capacity planning** of their service(s)

What you should know

1- What it is and how it aligns with DevOps

Key Points

1- Understand the mind-set of the SRE principles (important)

SLO

What it is

This is a target value or range of values for a service level that is measured by an SLI.

What you should know

1- Actions to take when SLO's are being met or not being met

Key Points

1- Options, adjusts SLO & SLI, stop deployment until stable,

SLI

What it is

This is a carefully defined quantitative measure of some aspect of the level of service that is provided.

What you should know

1- How to set metrics
2- Freshness
3- Formulas

Key Points

1- Understand the "math" what is being measured

SLA

What it is

This is an explicit or implicit contract with your users that includes consequences of meeting (or missing) the SLOs they contain

What you should know

1- These have penalties
2- Should be less strict than SLO's

Key Points

1- Compare SLA to SLO targets point

Error budget

What it is

Provides a clear, objective metric that determines how unreliable the service is allowed to be within a single quarter.

What you should know

1- How is this determined
2- What happen when this is exceeded or in danger

Key Points

1- How are these established and who is responsible.

Toil

What it is

Toil is the kind of work tied to running a production service that tends to be **manual, repetitive, automatable, tactical, devoid of enduring value, and that scales linearly** as a service grows

What you should know

1- What is toil
2- How to handle toil over time
3- What type of task are worth automating

Key Points

1- What should be the aim of engineering task vs toil. Automate this year's toil away

Review documents

SRE Book

Video

SRE playlist

My experience

Various element of the SRE topics combine to make some interesting questions. Spend some time on each area and learn to appreciate your SLI metrics. Generally, a good area to pick up some points and not too hard if you understand them well.

Toil Budgets

What it is

Google aims to ensure that at least 50% of each SRE's time is spent doing engineering projects

What you should know

1- Understand the general point of this toil budgets.

DevOps

What it is

Organizational and cultural movement that aims to increase software delivery velocity, service reliability, and shared ownership among stakeholders.

What you should know

1- Map SRE principles to DevOps

Key Points

1- No Silos, Accidents are normal, Gradual change, Tooling, measurement is crucial.

Alerting

What it is

While there may be many alerts ultimately, your goal is to be notified for a significant event: an event that consumes a large fraction of the error budget.

What you should know

1- Precision, Recall, Detection time, reset time

Key Points

1-. Target Error rate, Increased alert window, incrementing duration, Burn rate, multiple burn rate, multiwindow, multi-burn-rate alerts

Monitoring

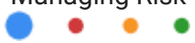
What it is

Collecting, processing, aggregating, and displaying real-time quantitative data about a system, such as query counts and types, error counts etc.

What you should know

1- Analyse long term trends.
2- Comparing over time

Managing Risk



What it is

Item or risk that may cause you to not meet the SLO

What you should know

1- Target risk that will bring you in the error budget
2. Quantify data

Key Points

1- Controlling and identify risk helps you manage your SLO

Post-mortems

What it is

A rolling update is an update that is gradually applied to all instances in an instance group until all instances have been updated

What you should know

1- Writing post-mortems based on SRE principles.

Key Points

1- No blame, root causes, action items

Review documents

SRE Workbook

Video

Improving reliability

My experience

These topics make up the core of the SRE practice. Combined they will be featured and you can pick up a few points if you are prepared enough.

SRE

Handling Incidents

What it is
Things break so it is important to understand how and what to do when that happens.

What you should know
1- What options do you employ

Key Points
1- Roll back, Connection draining, stop testing, A/B, scaling

API lifecycle

What it is
What is the process for your new deployment and life cycle of your API.

What you should know
1 - Stages to replace an API

Key Points
1 - The order of the process
2 - Is it chicken or egg

IRM Dashboard

What it is
Incident Response and Management (IRM) is a product within Stackdriver for managing and responding to incidents.

What you should know
1 – Contains 2 list (Alerts details and Incidents detail)
2- IRM relies on Workspaces to provide access to stackdriver.

Response Structure

What it is
Communication and structure is a key part of handling incident.

What you should know
1- Who handle what role
2- Delegation
3- Communication

Key Points
1- Operation lead, Communication lead, Incident commander

Tracing

What it is
Going deeper toward the source of the problem in the system

What you should know
1- Have a digital representation of where time is spent on your queries

Key Points
1- This can be done in stackdriver

Communication

What it is
Keeping stack holder in the loops. Communication is “KEY” the better it is the better for your incident management

What you should know
1- Who handles communication in what circumstances
2-Internal and external communication

Key Points
1- Communication loops

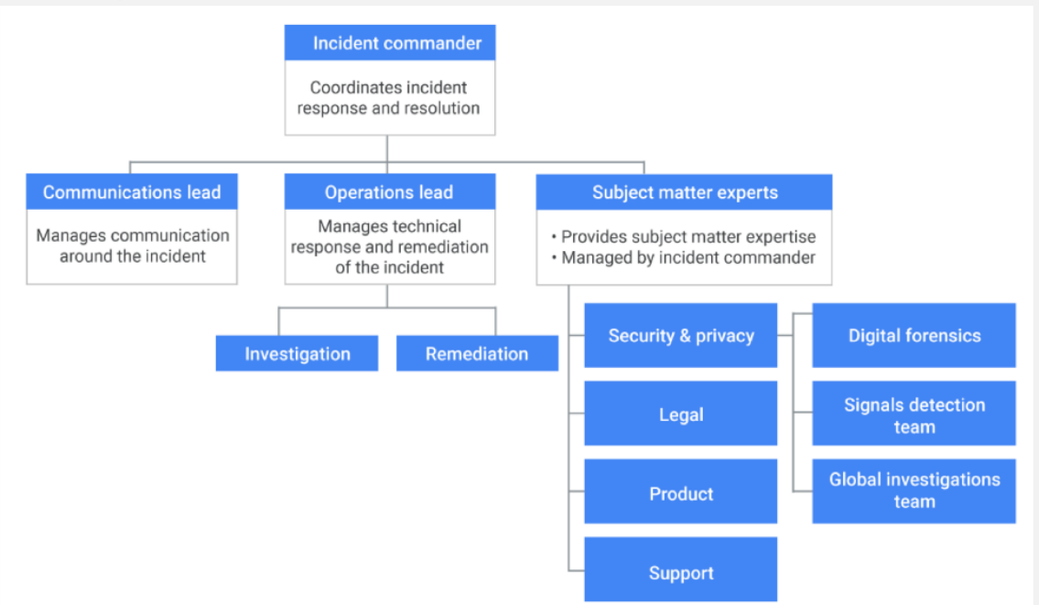
Review documents

Data incident response
API lifecycle
IRM concept

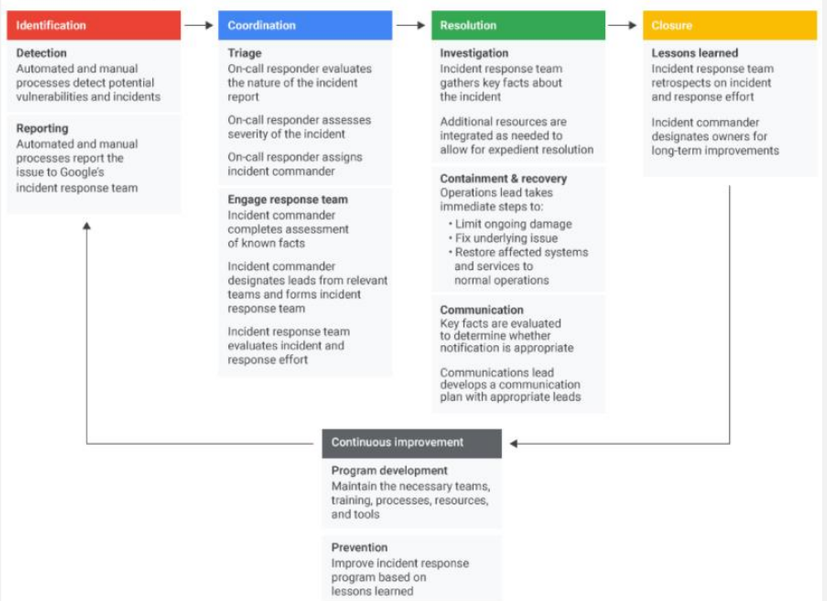
Video
SRE playlist

My experience
Handling incident is important. There are steps, roles, activities involved. Do not forget communication also.

Incident response team



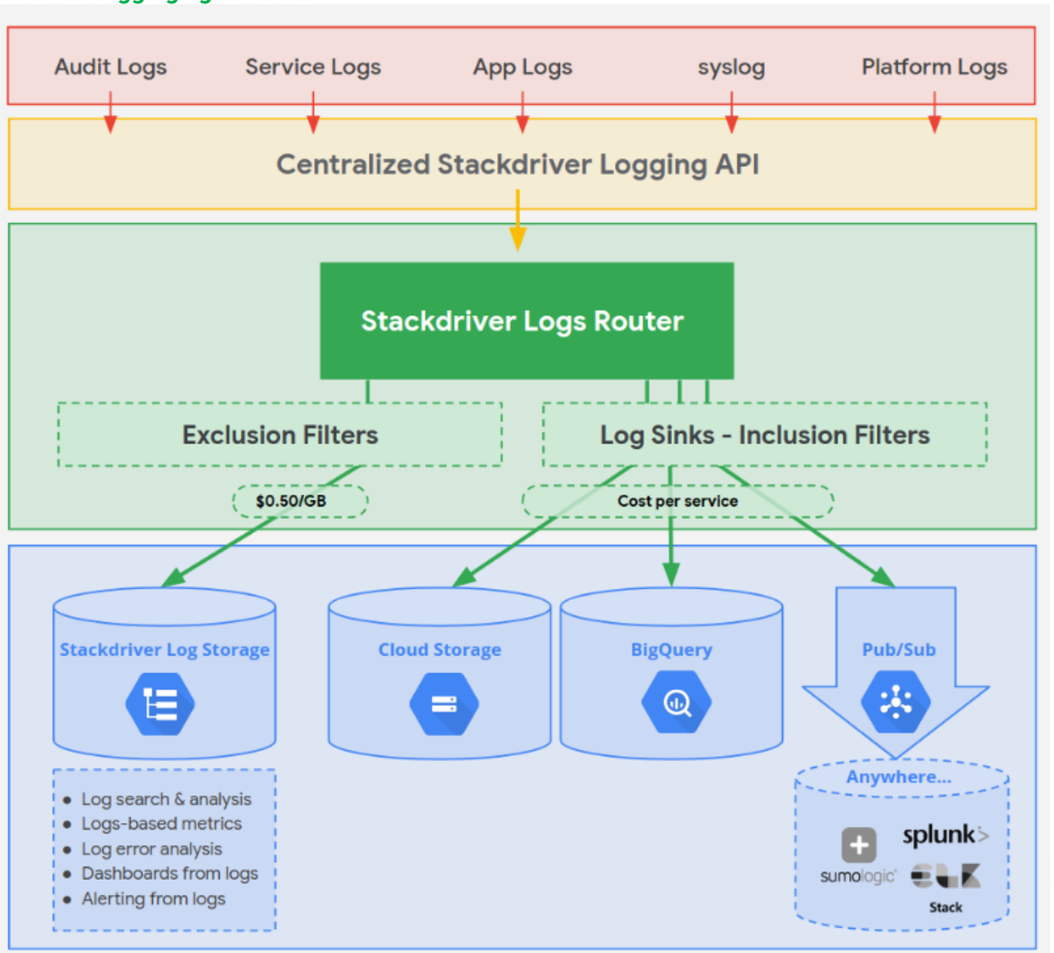
Incident response workflow



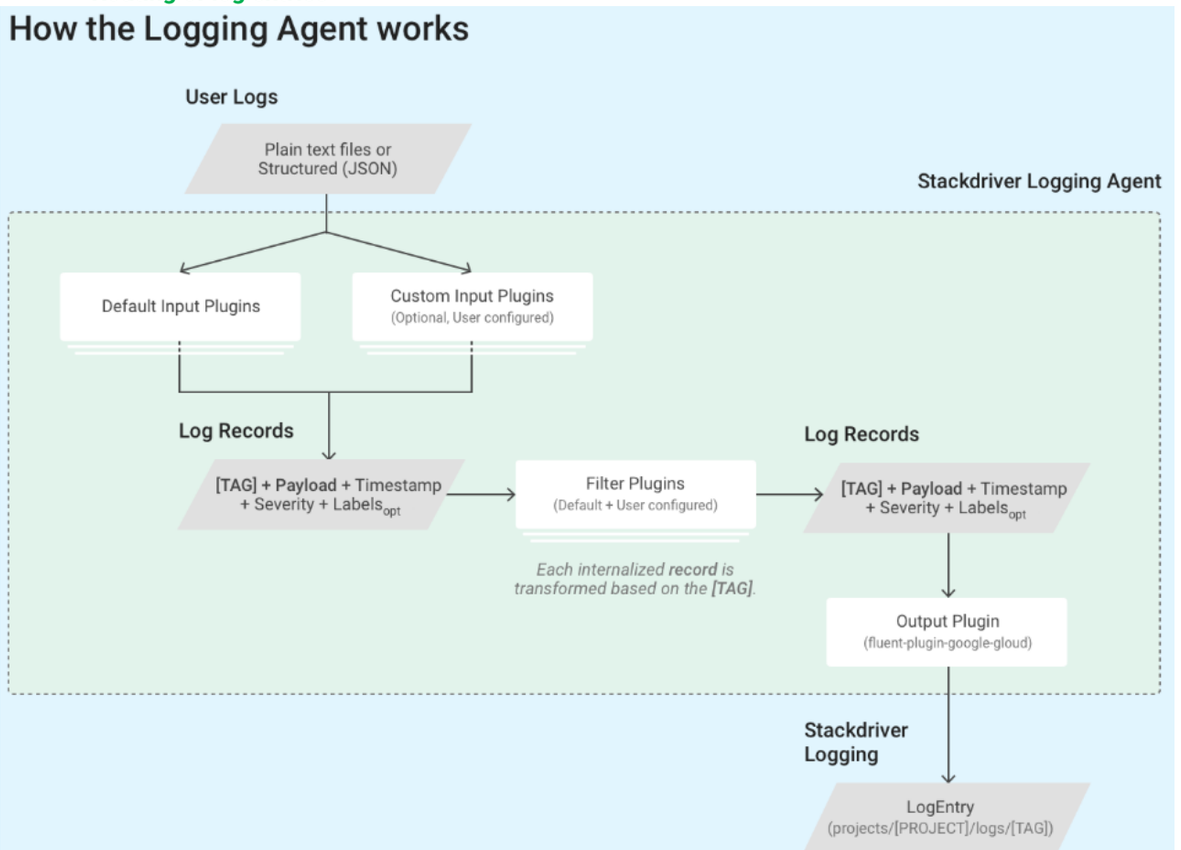
BY AMMETT

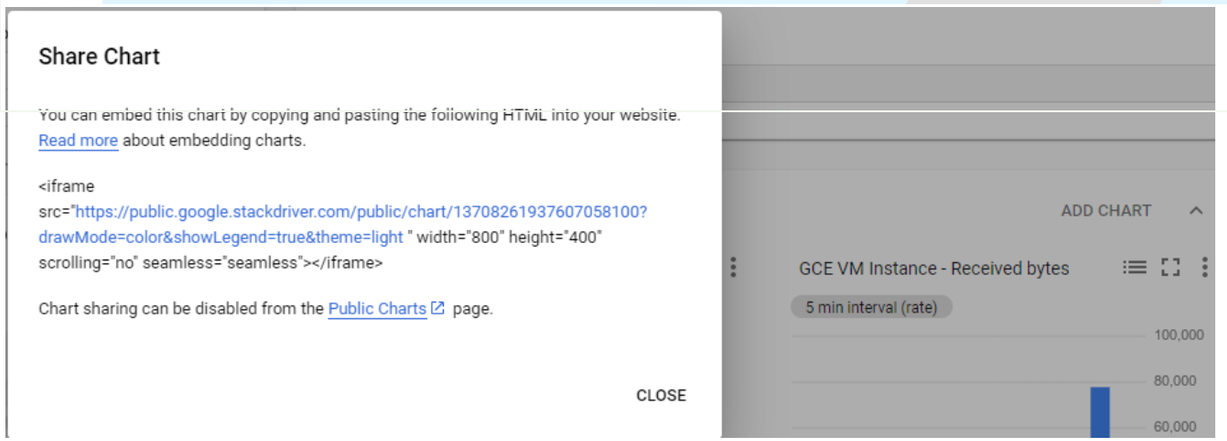
Stack driver						
Cloud Monitoring 	**What it is** Cloud Monitoring (formerly Stackdriver) discovers and monitors your cloud resources automatically, whether you are running on Google Cloud Platform or AWS	**Key points** 1- Metrics 2- Custom metrics 3- Alerting policies 4- Monitoring	**What you should know** 1- Everything in depth about stackdriver	**Review documents** Monitoring docs	**Video** Intro to stackdriver Stackdriver monitoring	**My experience** Ok if you don't know cloud operations (**stackdriver)** deeply don't do the exam. This means you should focus a lot of time testing an experimenting with all the features.
Sharing charts 	**What it is** If you want, you can share a chart with others by sending them a parameterized URL.	**Key points** 1- Sharing various chars is possible 2- Understand how to customise the parameter 3- Know the tag used	**What you should know** 1- iframe 2- query parameters 3- keeping view updated 4- Static screen shot	**Review documents** Managing dashboard widgets Sharing charts		**My experience** This is something you may bypass but can pick you up a point.
Workspaces 	**What it is** A Workspace is a tool for monitoring resources contained in one or more Google Cloud projects	**Key points** 1- What it is 2- How to design 3- Every Workspace has a *host project* 4- Add existing account to workspace	**What you should know** 1- Required roles, project owner, monitoring editor, monitoring Admin, stackdriver account editor	**Review documents** Stackdriver workspaces Multiple projects Roles		**My experience** This was a shocker but not anymore right
Python 	**What it is** You can write logs to Logging from Python applications by using the Python logging handler included with the Logging client library	**Key points** 1- How to use with App engine, GKE, compute engine, locally 2- IAM permission required	**What you should know** 1- Logging library for python	**Review documents** Stackdriver logging for python Google Cloud Client Libraries for Python		**My experience** This was a shocker but it's DevOps so how about that. What about the others languages?
Stackdriver agent / Fluentd 	**What it is** The Logging agent, an application based on Fluentd that runs on your virtual machine (VM) instances.	**Key points** 1- Stream log from VM and 3rd party software packages to stack drive logging 2- Install agent	**What you should know** 1 - Based on Fluentd 2 - Get syslog files 3 - Get third party logs	**Review documents** About the agent Configuring the agent Syslog		**My experience** **Ok if you don't know** cloud operations **(stackdriver) don't do the exam.** Please be warned in case you missed it earlier.
Protect sensitive Data 	**What it is** Fluentd filter plugin mutates/transforms incoming event streams in a versatile manner	**Key points** 1- Remove sensitive or unwanted data 2- Add new fields 3- Update field in log entries 4- Delete fields in log entries	**What you should know** 1- filter record transformer	**Review documents** Logging agent modifying records Agent config Fluentd		**My experience** Protecting data is important. This can pick you up a point or two.

How the logging agent works



Routing of log entries





Stack driver – Trace – Debugger - profiler						
Stackdriver logging 	**What it is** Stackdriver Logging allows you to store, search, analyze, monitor, and alert on log data and events from Google Cloud Platform and (AWS).	**Key points** 1- Routing of logged entries 2- Log sinks 3- Storing logs 4- Third party SIEM	**What you should know** 1- As much as possible ☺	**Review documents** Log router	**Video** Stackdriver doctor Centralized logging	**My experience** Ok if you don't know stackdriver deeply don't do the exam. Repeating in cased you miss it earlier.
Trace 	**What it is** Trace is a distributed tracing system that collects latency data from your applications and displays it in the Google Cloud Platform Console.	**Key points** 1- What type of problems you would use trace for.	**What you should know** 1- Latency 2- Permission errors 3- How & when to create custom roles 4- Service account permissions	**Review documents** Trace	**Video** Stackdriver Trace	**My experience** Think latency and finding it's cause.
Debugger 	**What it is** Stackdriver Debugger is a feature of Google Cloud Platform that lets you inspect the state of a running application in real time, without stopping or slowing it down	**Key points** 1- View app state without adding logging 2- Use with test, development and production	**What you should know** 1- Less that 10ms of latency added	**Review documents** Debugger	**Video** Debugging in production	**My experience** Get info without affecting the app.
Profiler 	**What it is** Profiler continuously analyzes the performance of CPU or memory-intensive functions executed across an application.	**Key points** 1- Capture characteristics of the code *as it runs* 2- Finds bugs 3- It does not require pervasive changes	**What you should know** 1- Show what happing within each service 2- Take random sample profiles	**Review documents** Profiler	**Video** Stackdriver profiler	**My experience** Know what your code is doing in real time, get analytics with profiler.
Alerting 	**What it is** You must configure most notification channels before you use them in alerting policies.	**Key points** 1- Different channels and how to use them for alerts	**What you should know** 1- Email, mobile apps, pagerduty, SMS, Slack, Webhooks	**Review documents** Notification Options	**Video** Error reporting Alerting	**My experience** Alerts can be sent using multiple channels. Understand the integrations.
Cloud IAM 	**What it is** With the logging data in a Google Cloud project, you must be a member and have an Cloud IAM role that grants you permission to use Logging	**Key points** 1- What are the various roles and the permissions they have to do various functions	**What you should know** 1- Permissions level necessary to export logs 2- (Logging.configWriter, logging.admin owner)	**Review documents** Role etc Export logs		**My experience** Nice easy point right. Well IAM permissions are necessary to run most services. You may as well get familiar with them.

Data

BigQuery

What it is

BigQuery is a serverless, highly scalable, and cost-effective cloud enterprise data warehouse that enables super-fast SQL queries using the processing power of Google's infrastructure.

What you should know

1- How it works with Cloud operations (Stackdriver) etc.

Key Points

1- Sinks, viewing logs, exporting logs, ingesting logs

Data Studio

What it is

Google Data Studio allows you to create branded reports with **data** visualizations to share with your clients.

What you should know

1- Integrating Google services with Data Studio

Key Points

What google service it integrates with

Cloud Storage

What it is

Used for a range of scenarios including serving website content, storing data for archival and disaster recovery, or distributing large data objects to users via direct download.

What you should know

1- What it does, classes
2- Integrations
3- Uses for DevOps

Pub/Sub

What it is

Cloud Pub/Sub is a *publish/subscribe* (*Pub/Sub*) *service*: a messaging service where the senders of messages are decoupled from the receivers of messages

What you should know

1- Multiple uses and integration of PubSub

Key Points

1- Be aware of the services that can use it as a trigger

Grafana

What it is

Grafana is an open source metric analytics and visualization suite for visualizing time series data that supports various types of data sources

What you should know

1- How does this work with Cloud operations (Stackdriver)

Key Points

1- Integration

Datadog

What it is

Datadog pulls **metrics** from Google Stackdriver Logging to:
1- Visualize the performance of your Stackdriver logs
2- Correlate the performance of your logs with your applications

What you should know

1- What it is used for
2- How it integrate with Cloud operations

Key Points

1- Intergration

Review documents

Pub/Sub
Grafana
BigQuery
Cloud storage
Datadog

Video

BigQuery

My experience

Viewing data using different tools (integrations). Storage of logs, exporting logs permissions, pub/sub, triggers and more. Any combo may appear but is it correct?

Networking / Compute

Computer engine

What it is

Compute Engine delivers configurable virtual machines running in Google's data centres with access to high-performance networking infrastructure and block storage.

What you should know

1- Monitor these with stack driver
2- Monitor application

Managed Instance groups

What it is

A managed instance group (MIG) contains identical instances that are based on an instance template.

What you should know

1- What it does (autoheal, load balancing, autoscaling an auto-updating.

Key Points

1- Keep scenarios in mind where you would use these for deployments

Flow logs

What it is

VPC Flow Logs record a sample of network flows sent from and received by VM instances, including instances used as GKE nodes

What you should know

1- Log entry sampling (default 0.50 (50%)) max is 1
2- TCP/UDP traffic
3- Health checks

Key Points

1-What you can monitor with it
2- Used for seeing what's happening in the network

Network service Tier

What it is

Allows customers to optimize their cloud network for performance or price optimisation.

What you should know

1- When to use.
2- What is the difference and trade-off

Key Points

1- Managing cost (know the trade-offs also)

Preemptible VM's

What it is

Best for short-lived compute instances suitable for batch jobs and fault-tolerant workloads.

What you should know

1- How, when to use these to save cost or help processing

Committed use

What it is

Committed use discounts are ideal for workloads with predictable resources needs.

What you should know

1- Predictable work needs
2- Term 1-3 years
3- Billed weather used or not monthly

Key Points

1- Requirements and recommendation for use.

Review documents

Committed use
Managed instances
Preemptible VM
Network Service Tier
Flow logs

Video

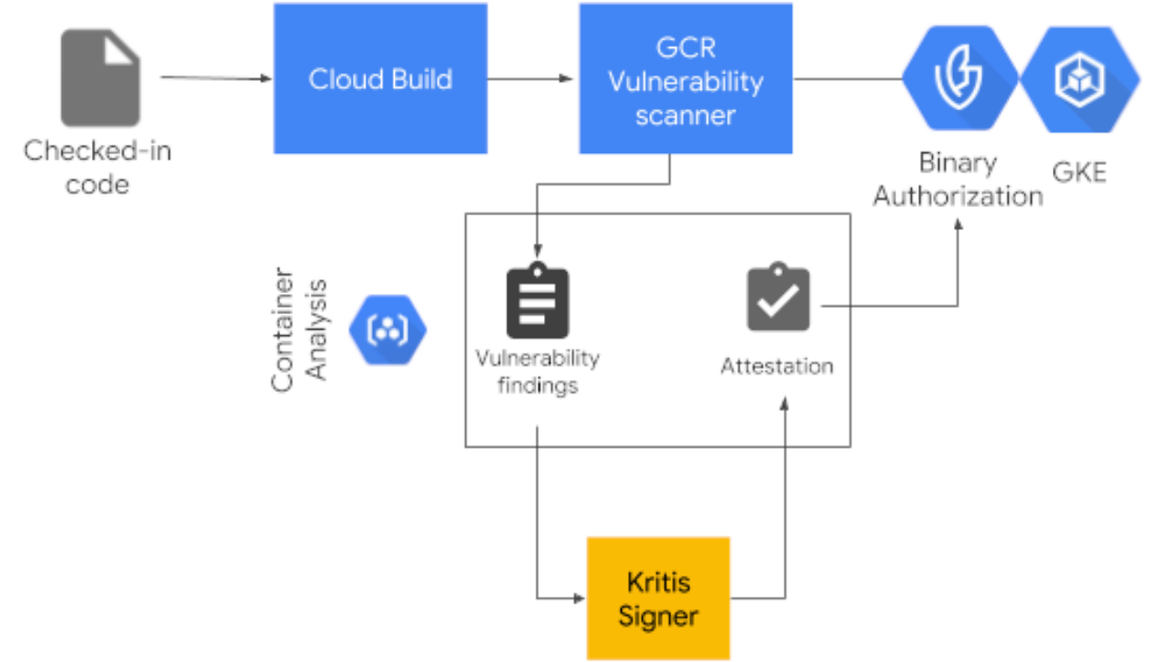
Highly available deployments

My experience

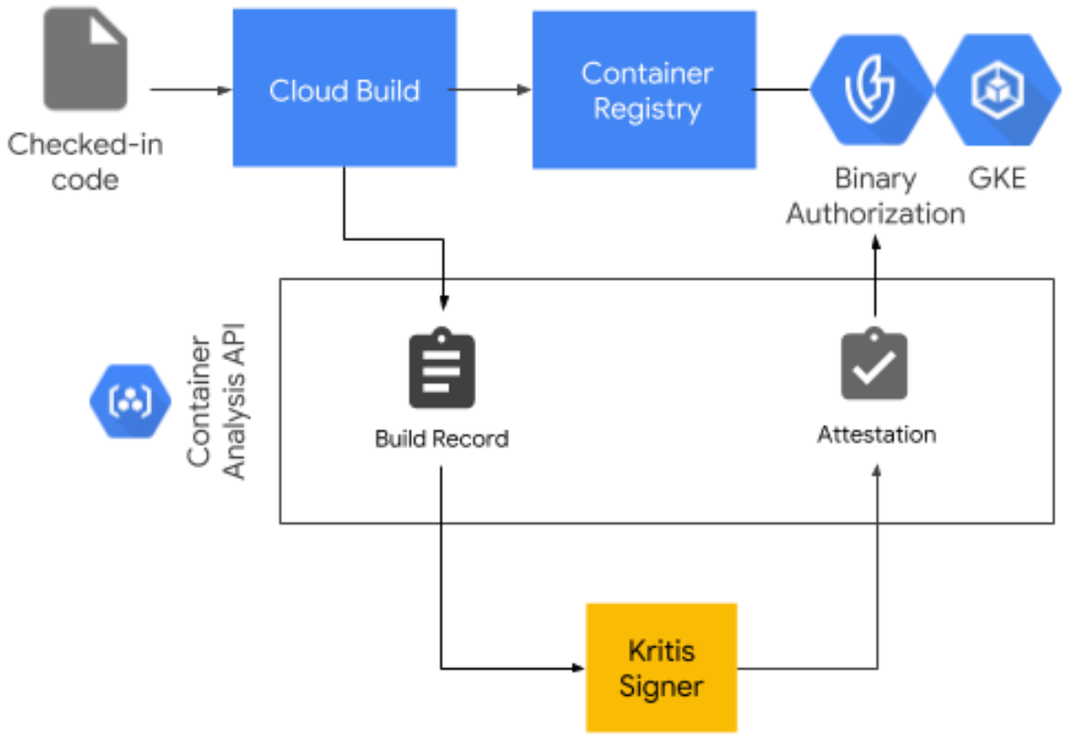
The networking once again is a key point in any cloud infrastructure same applies in DevOps. Get familiar with these and pick up a point or 3

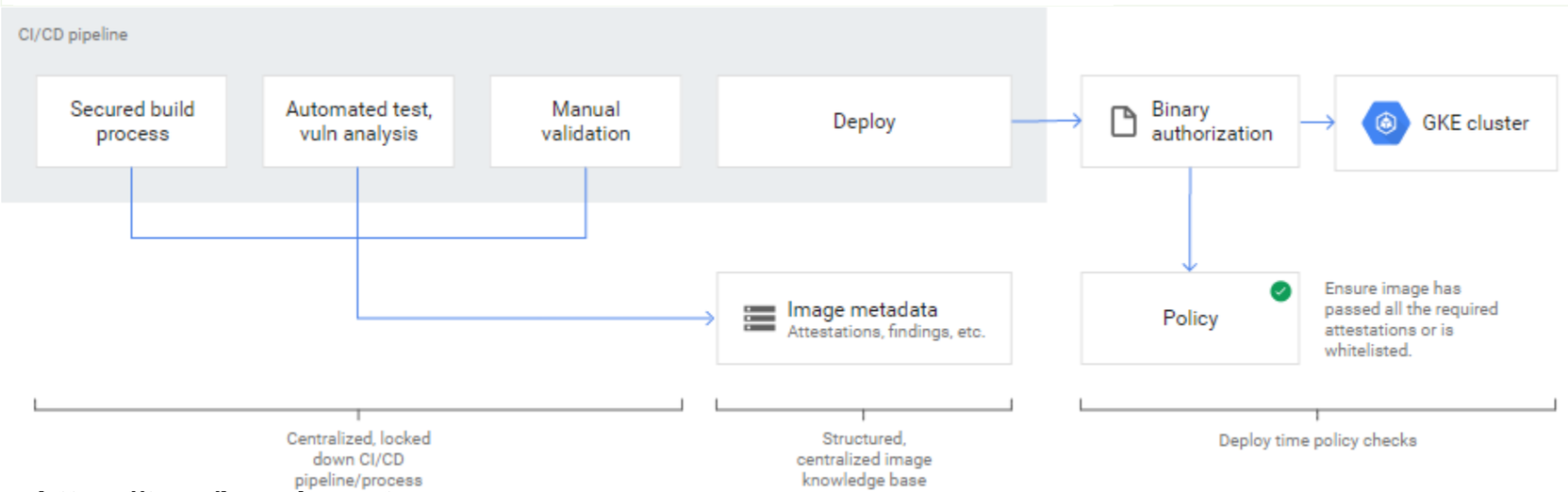
Security						
Service accounts 	**What it is** IAM lets you manage who has access to what in you GCP environment.	**Key points** 1- All the services need some level of permissions to run. 2- User service account or not	**What you should know** 1- Modify permission on service accounts.	**Review documents** IAM roles	**Video** Best practices for identity	**My experience** IAM is now like a staple on GCP exams just like kubernetes. Ok that's all you need to know.
KMS 	**What it is** Cloud KMS is a cloud-hosted key management service that lets you manage encryption for your cloud services the same way you do on-premises. .	**Key points** 1- You can generate, use, rotate, and destroy cryptographic keys	**What you should know** 1- Using cloud KMS with other GCP services (especially developer based)	**Review documents** Using cloud KMS with other products	**Video** Securing Kubernetes secrets	**My experience** KMS helps you in many ways. Figure out which ways you need to be helped.
Secret Manager 	**What it is** Secret Manager provides a secure and convenient tool for storing API keys, passwords, certificates, and other sensitive data.	**Key points** 1- Encrypt, store and audit (infrastructure and apps secrets) 2- You can address individual version of a secret 3- Rotation	**What you should know** 1-Applications often require access to small pieces of sensitive data at build or run time. These pieces of data are often referred to as *secrets*.	**Review documents** Secrets Manager Secrets	**Video** Cloud Run secrets securely with secret manager Cloud code	**My experience** Secrets will pop up somewhere, so now it's no longer a secret.
Cloud SCC 	**What it is** Security Command Center gives enterprises consolidated visibility into their Google Cloud assets across their organization.	**Key points** 1- What it does.	**What you should know** 1- What may be relevant for your pipeline.	**Review documents** Security Command Center	**Video** Cloud security cc	**My experience** Get familiar with this.
Binary Authorisation 	**What it is** Binary Authorization is a service on Google Cloud Platform (GCP) that provides software supply-chain security for applications that run in the Cloud.	**Key points** 1- Allows or blocks deployment of images to GKE based on policy 2- Attestation 3- Enforcement functionality 4 Authorization	**What you should know** 1-Know the flow of binary authorisation **(Très important)**	**Review documents** Secure software chains Codelab Binary authorization	**Video** Binary Authorisation Demo	**My experience** This is a bit confusing so study the flow and the stages (important to figure out the answers for this type of question)
Images 	**What it is** Container Analysis provides vulnerability information and other types of metadata for the container images in Container Registry.	**Key points** 1- Allow vulnerability scanning and metadata storage for software artifacts	**What you should know** 1- Performs scans on images in container registry and monitor vulnerability info to keep up to date. -Incremental scans -Continuous analysis	**Review documents** Get image vulnerabilities	**Video** Building small containers End-To-End Security and Compliance for Your Kubernetes Software Supply Chain	**My experience** Think secured images and secure deployments
Security scanner 	**What it is** Automatically scan your App Engine, Compute Engine, and GKE apps for common vulnerabilities.	**Key points** 1- Detect 4 common OWASP top 10 vulnerabilities (XSS, Flash injection, mixed content, outdated/insecure libraries)				**My experience** This may pop up but then again who knows??

Binary Authorization/vulnerability



Binary Authorization/Cloud Build





DevOps and tools

Git

What it is
Git is a version control app which handle everything from small to large projects with speed an efficiency.

What you should know
1- What it is and how it aligns with DevOps

Code process

What it is
Stages involved in DevOps.

What you should know
1- Put code into SCM, Build, Test, Stage, deploy, test code, Run

Key Points
1- Know the steps

Jenkins

What it is
Jenkins is an open source automation server that enables developers around the world to reliably build, test, and deploy their software.

What you should know
1- What it does, flow, stages, uses with GCP

Key Points
Jenkins

Spinnaker

What it is
Spinnaker on GCP is a tool for easily installing a production-ready instance of Spinnaker, and for managing that instance over time.

What you should know
1- Stages it does, flow, stages, uses with GCP

Key Points
1- Triggers for Spinnaker (Important)

Terraform

What it is
Terraform is a tool for building, changing, and versioning infrastructure safely and efficiently developed by HashiCorp

What you should know
1- Using terraform to manage code in a team (Central repository, peer review, one final source)

Key Points
Core terraform workflow

Webhooks

What it is
A Webhook target is an open and public URL. Most services provide a token or a secret to ensure that the incoming requests are from authorized services

What you should know
1- What is it
2- Where and what services it's used with
3- How to set up

Review documents

Codelabs Spinnaker on GCP
Jenkins
Webhooks
Terraform

Video

Jenkins
CI/CD across multiple
Terraform
Spinnaker

My experience

These tools and terms have a high probability of being used and the flows are very important. I suggest that for external tools like Spinnaker and Terraform you do some hands-on practice to keep it fresh in your mind.

CI

What it is
CI follows the principle of frequent automatic integration of code. It is easier to make small frequent changes.

What you should know
1- Helps find bugs faster
2- Automatically test all new and modified code with the master code.

Key Points
1- Continuous Integration

CD

What it is
Extension of **Continuous Integration**

What you should know
1- Ensures that the code is always ready to be deployed
2- Manual approval is required to actually deploy the software to production

Key Points
1- Continuous delivery

Triggers

What it is
A **trigger** automatically starts a build whenever you make any changes to your source code.

What you should know
1- Types of triggers, how to create triggers. (important)

Artifacts

What it is
If your build produces artifacts such as container images, binaries, or tarballs, you can store them in Container Registry, Cloud Storage, or any private third-party repositories.

What you should know
1- Where / How to store (Container registry or Cloud Storage)

JSON

What it is
JSON stands for JavaScript Object Notation. JSON is a lightweight format for storing and transporting data

What you should know
1- General Syntax

YAML

What it is
YAML is a human-readable data-serialization language.

What you should know
1- General Syntax

Review documents

CI/CD suite Interactive Grande Tour

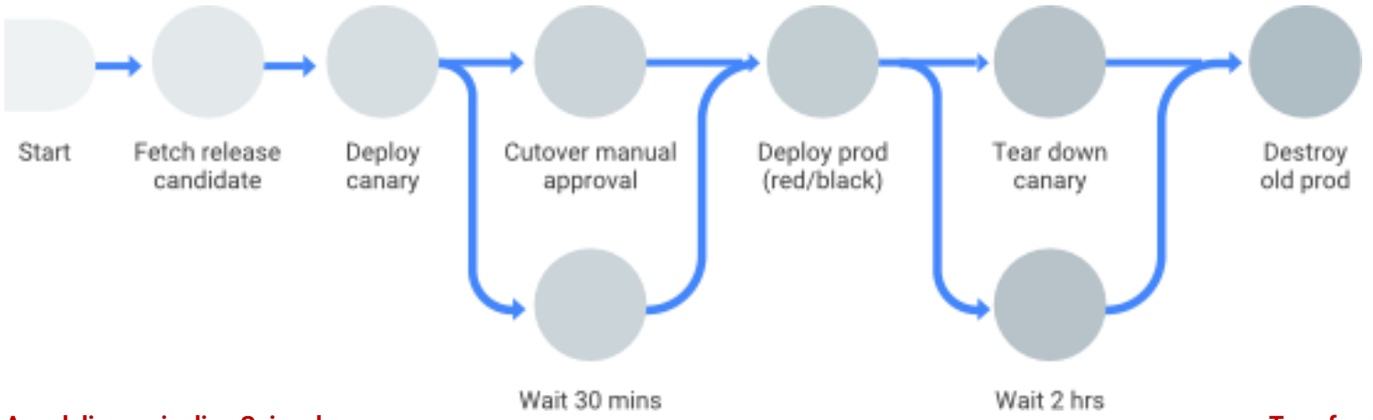
Triggers

Artifacts

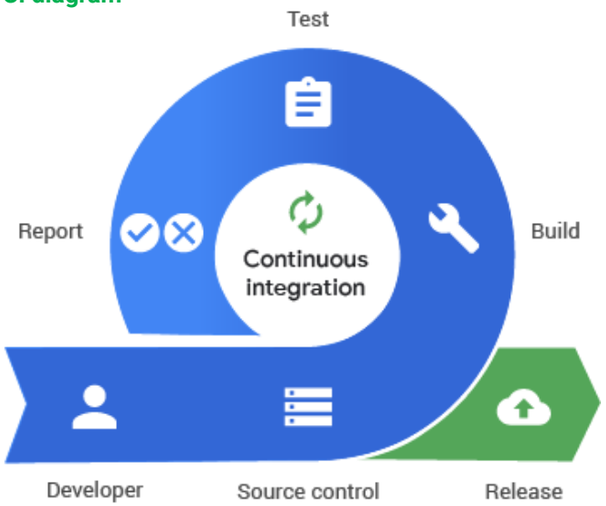
My experience

Understanding what these terms are will help you understand the point of view of the question. These are core terms in the DevOps process

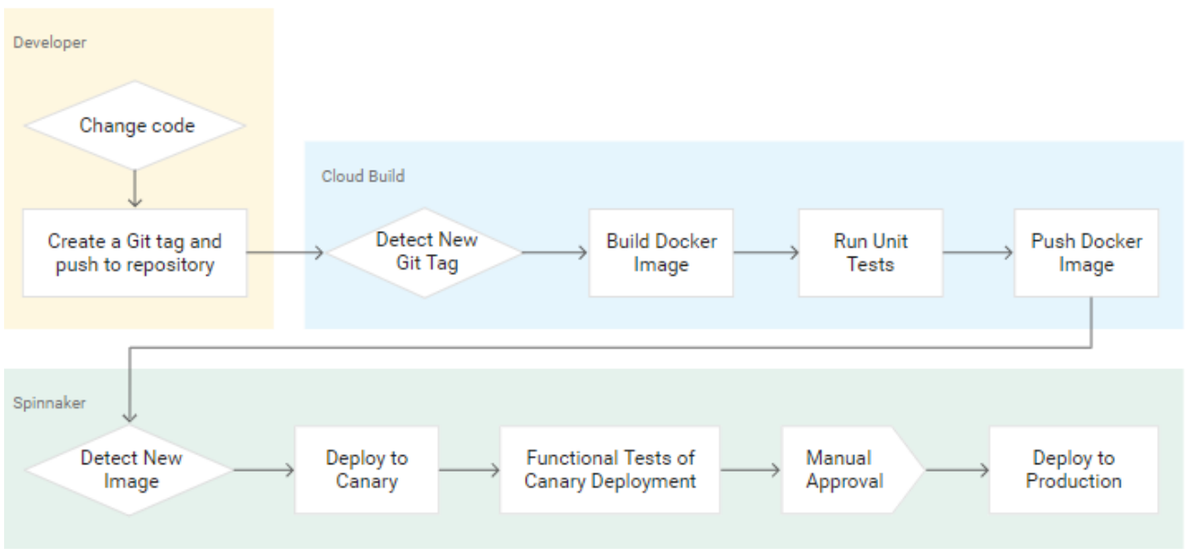
CD diagram



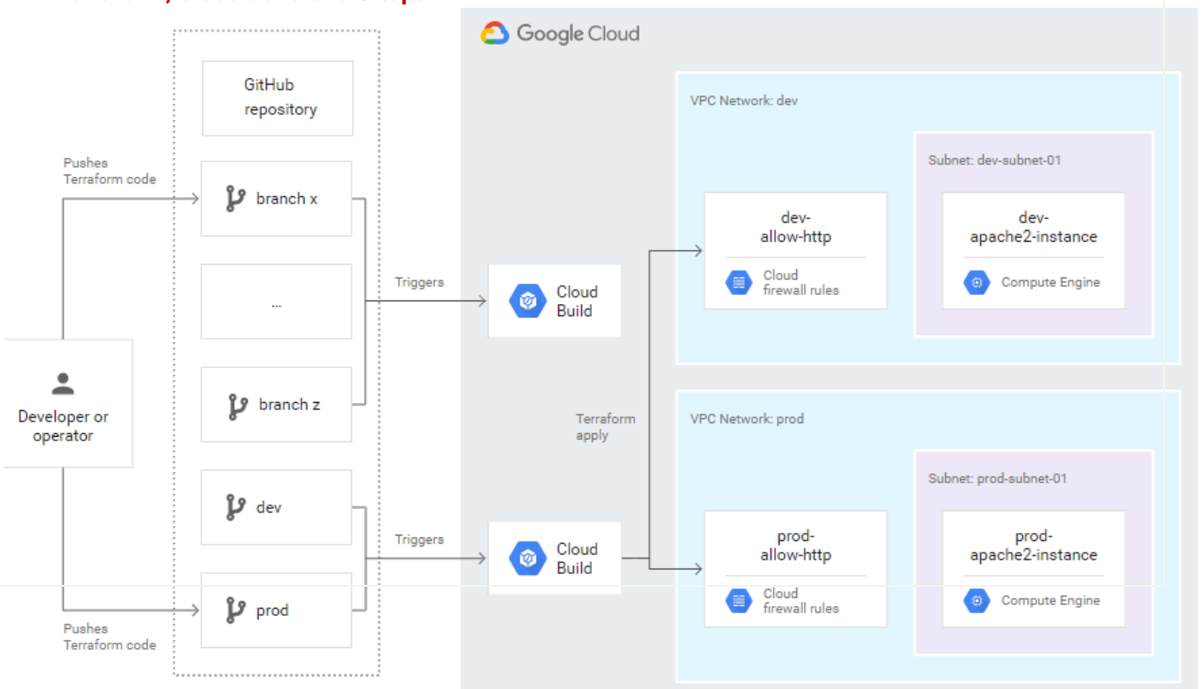
CI diagram



App delivery pipeline Spinnaker



Terraform, Cloud Build and Gitops



Kubernetes - DevOps on Google

GKE

What it is

GKE provides a managed environment for deploying, managing, and scaling your containerized applications using Google infrastructure.

What you should know

1- This is standard understand deployment, scaling, load balancing, rollbacks) important

Blue/Green Red/Black

What it is

Blue/green deployment maintains two instances of a system: one that is serving traffic (green), and another that is ready to serve traffic (blue).

What you should know

1- Difference from canary and how it's deployed (general knowledge)

Canary

What it is

A way of comparing a candidate version again a baseline to check deviations in behaviour

What you should know

1- When to use, how it works
2- Uses for DevOps (important)

Key Points

1- What you are comparing again (current production version)

Deployments

What it is

A Deployment runs multiple replicas of your application and automatically replaces any instances that fail or become unresponsive.

What you should know

1- What is a deployment
2- How to use a deployment for rollout and testing

Key Points

1- Difference between deployment and replica set

ReplicaSets

What it is

ReplicaSet's purpose is to maintain a stable set of replica Pods running at any given time

What you should know

1- What it is
2- Difference from a deployment

Load balancer

What it is

This can be exposed as a service type LoadBalancer in kubernetes to create a Network Load Balancer to distributes traffic among virtual machine (VM)

What you should know

Getting metric, scaling, placement, have a good general appreciation of this

Review documents

GKE
Anthos
Canary
Deployments
Replicasets
Loadbalancer

Video

Deployments Canary

My experience

GKE is standard and you should spend some time on it. All the topics mention here can be combined and referenced in term of **uses and DevOps so don't ignore them.**

DevOps on Google – key services

Ingress

What it is

An Ingress object defines rules for routing external HTTP(S) traffic to applications running in a cluster

What you should know

1- The purpose and setup of ingress

Cloud Source Repositories

What it is

Cloud Source Repositories are fully featured, private Git repositories hosted on Google Cloud.

What you should know

1- Integration with other GCP tools.

Cloud Build

What it is

Cloud Build executes your build as a series of *build steps*, where each build step is run in a Docker container.

What you should know

1- Import source code from Cloud storage, Github, Bitbucket etc
2- Produces artifacts (docker or java)

Proper understanding of cloud build capabilities is important

Container Registry

What it is

Container Registry is a private container image registry that runs on Google Cloud.

What you should know

1- How it works

App Engine

What it is

App Engine is a fully managed, serverless platform for developing and hosting web applications at scale

What you should know

1- Understand it's functions
2- Get current open connections

Deployment Manager

What it is

Deployment Manager is an infrastructure deployment service that automates the creation and management of Google Cloud resources

What you should know

1- When to use.
2- Different templates.

Key Points

1- Config written in YAML must contain Name, Type, Properties
2- Templates written in python or jinja2

Review documents

Ingress
Rolling Updates
Local development server
Deployment Manager
Modify IAM permission CB

Video

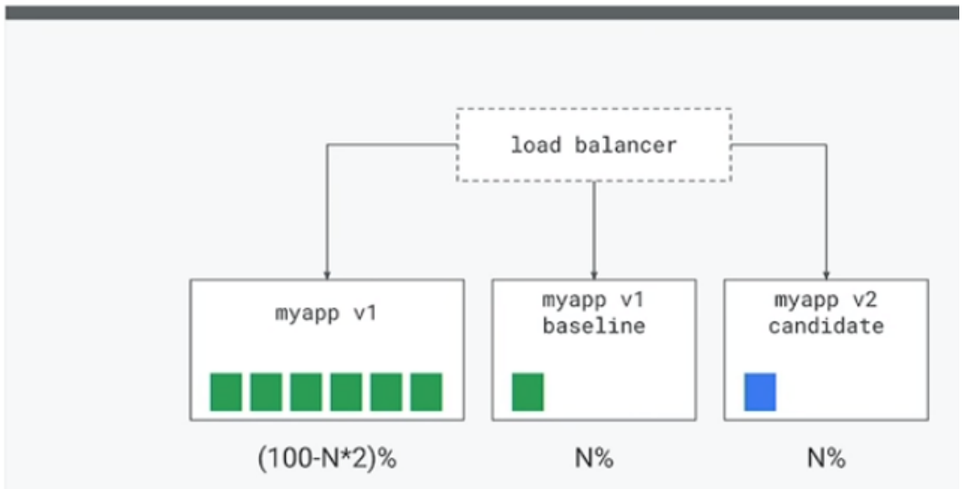
CI testing with cloud build

My experience

These tools **(Cloudbuild, Container registry, AppEngine, Source Repositories)** will appear in various ways in the exam. If you don't understand them don't do the exam.

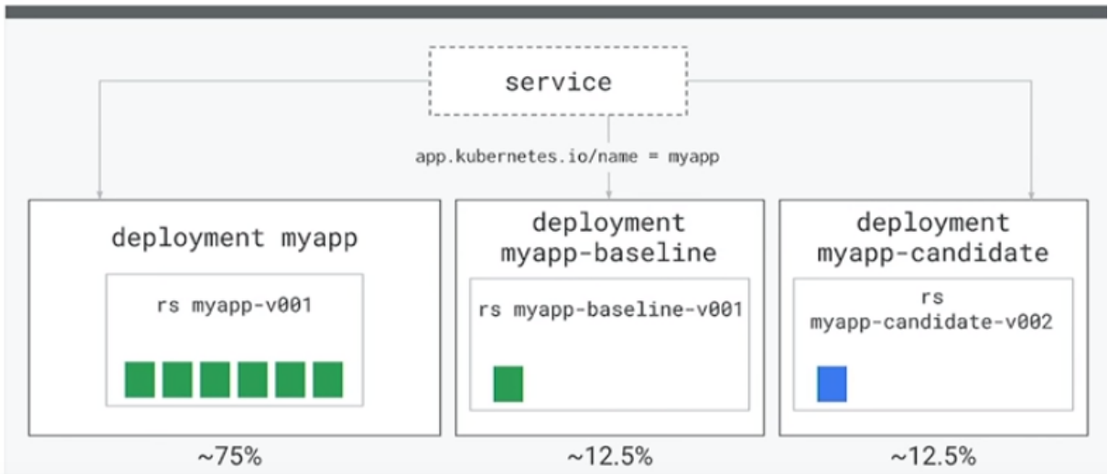
Canary Rollout

Canary rollout

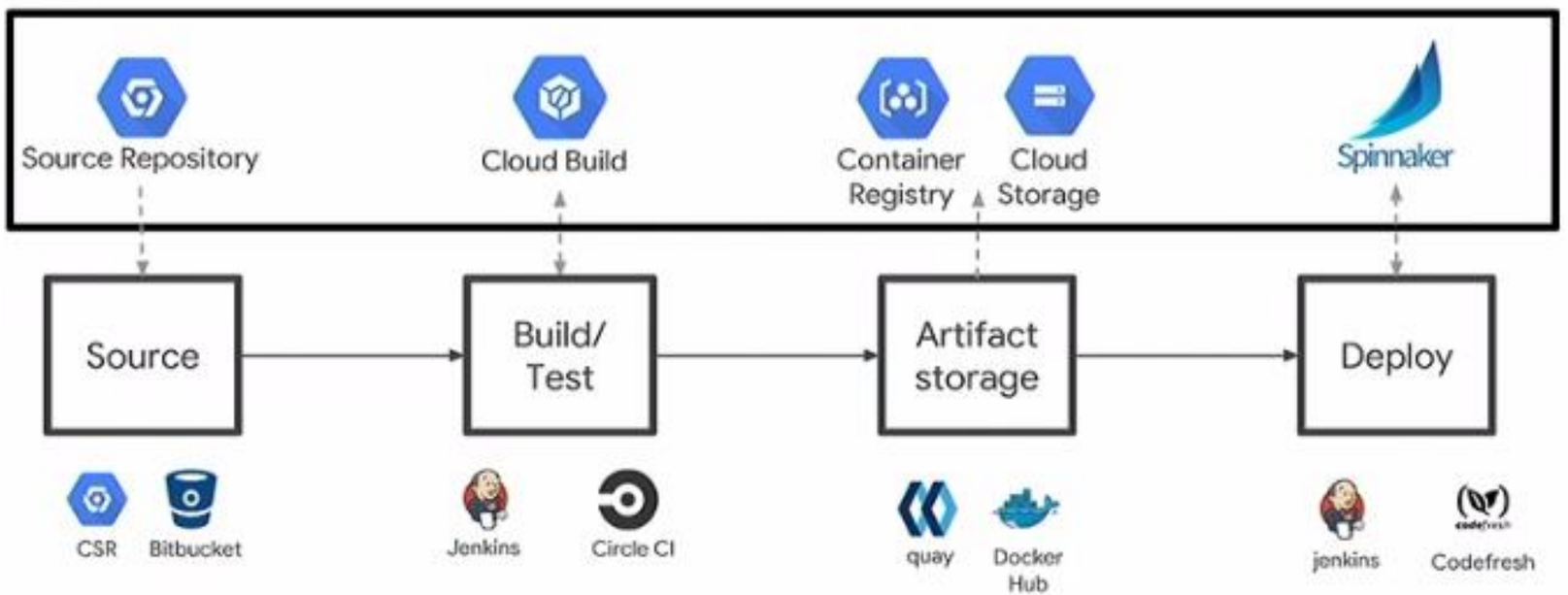


Canary using service label; selector

Canary using Service label selector



CI \ CD on Google Cloud



Performance						
Speeding up builds 	AutoScaling Deployments GKE 	MTTR 	Structure of metric types 	Troubleshooting agents 	Prometheus 	**My experience** Now these are super helpful. That's all I am going to say
What it is Quick ways to improve deployment speed	**What it is** This is a target value or range of values for a service level that is measured by an SLI.	**What it is** MTTR, MTTD, MTBF etc	**What it is** Take some time to understand observability stackdriver metric types	**What it is** Things break and can give problem check out these troubleshooting tips for your stackdrive agents	**What it is** Prometheus is an open-source systems monitoring and alerting toolkit	
Review Documents Speeding up builds	**Review Documents** AutoScaling deployments	**Review Documents** MTTR	**Review Documents** Metric Types	**Review Documents** Troubleshooting Agents	**Review Documents** Prometheus	

Thanks for reviewing

Please visit the official certification outline HERE

ps. These are my notes and deep dive resources for the Cloud DevOps exam. This is a tough exam. Every area on the document represents a topic that has a strong probability of appearing. Google may change the exam requirements at any time so always review the outline.

The knowledge is free it just cost me a good bit of time to put together. Please share with your network who may be interested in the GCP Cloud DevOps Exam or just need a quick refresher on these topics.

You can also check my all my **prep notes** for other **Google Cloud Certs** exams **HERE**

If these help you give me a shout on Linkedin.

Bonne Journée

Start Cloud Now

BY AMMETT