Grand Valley State University
www.gvsu.edu

Cloud Computing Operations and Deployments

CIS437
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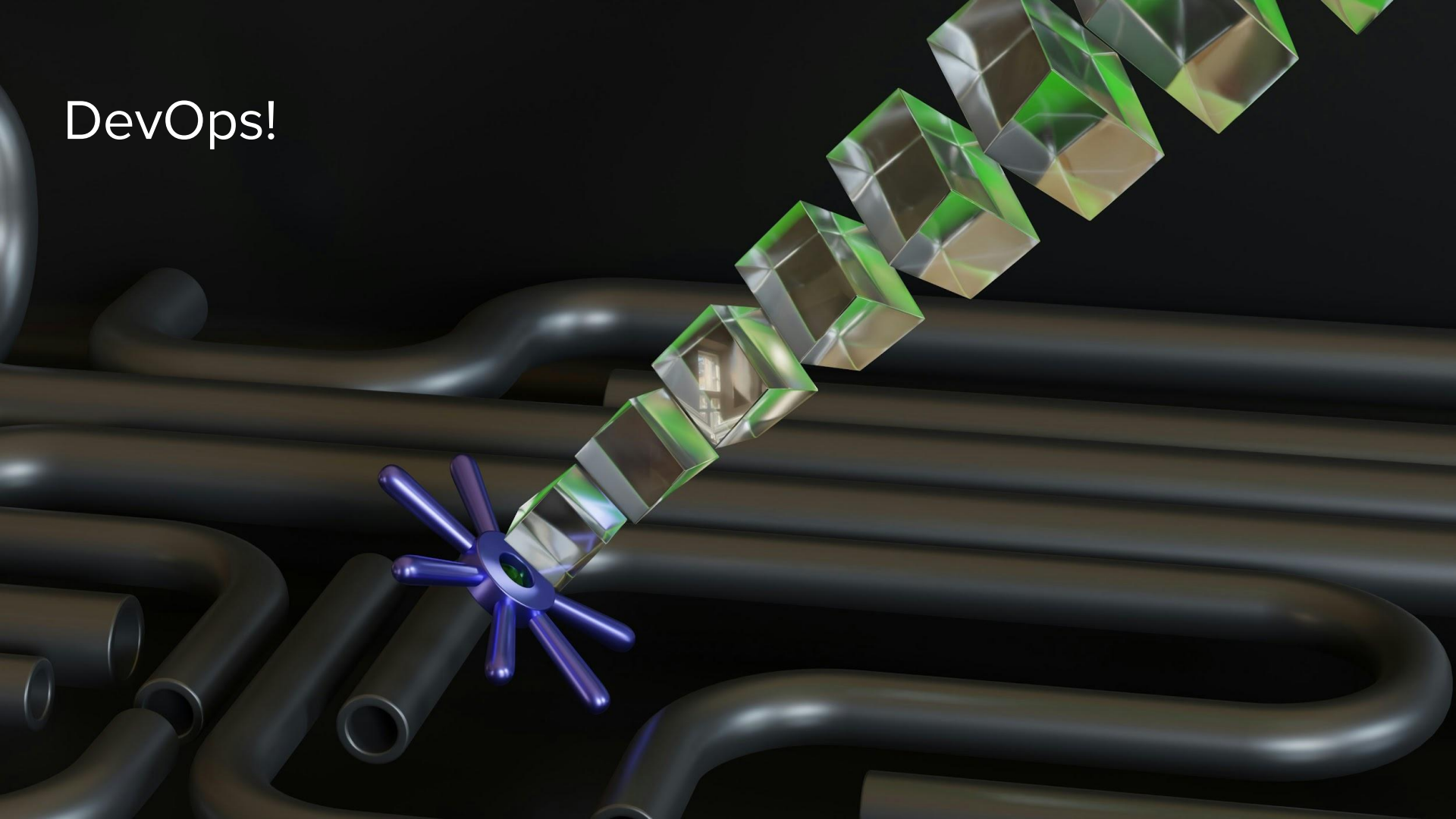
Adapted from Google Cloud Computing Foundations, Overview of Cloud Computing (Wufka & Canonico)

DevOps!



DevOps

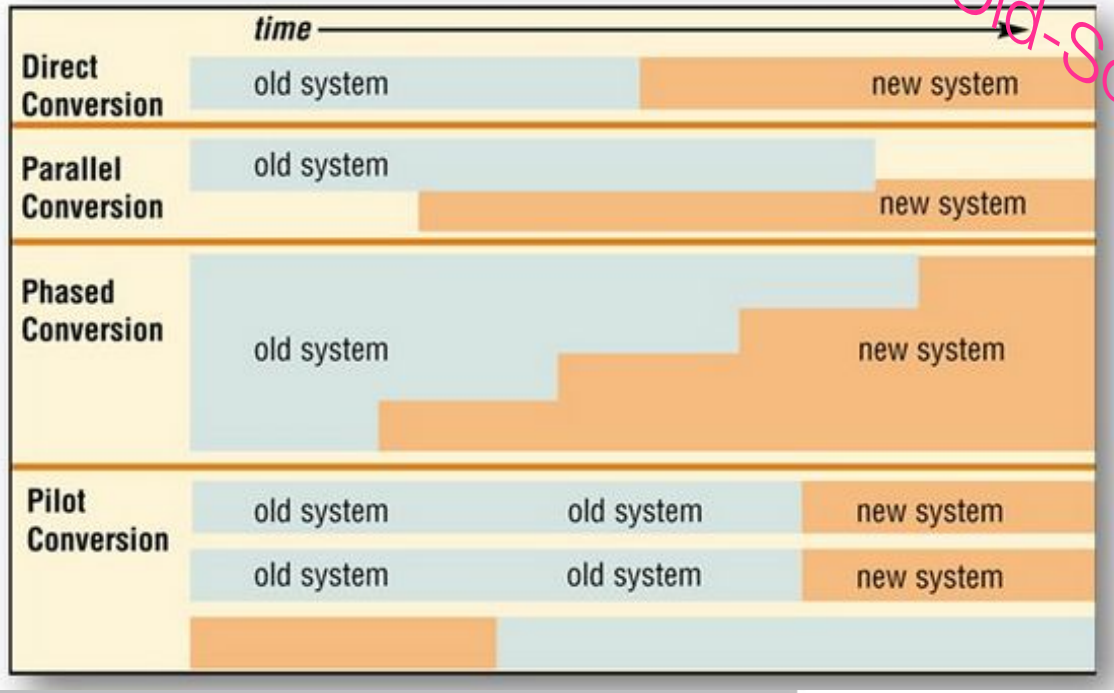
Development + operations

Previously multiple teams in silos
- With cloud, infrastructure supports fast deployment

Already saw the GCP + GitHub demo!
- Idea is a one-push deployment, complete with test reports
-

(A few 641 slides)

Application Deployment



This is Old-School!!!

	Conversion Style		Conversion Location			Conversion Modules	
Characteristic	Direct Conversion	Parallel Conversion	Pilot Conversion	Phased Conversion	Simultaneous Conversion	Whole-System Conversion	Modular Conversion
Risk	High	Low	Low	Medium	High	High	Medium
Cost	Low	High	Medium	Medium	High	Medium	High
Time	Short	Long	Medium	Long	Short	Short	Long

Application deployment

Guidelines

- Simple - minimal
- Consistent
- Organized
- Secure
- Plan B
- Be Agile
- Checklist
- Continuous
- Automate
- Top Tools

BUILD

DEPLOY

MANAGE

Why Automate?

- Easier to repeat
- More time for dev
- No need for dedicated team
- Higher frequency

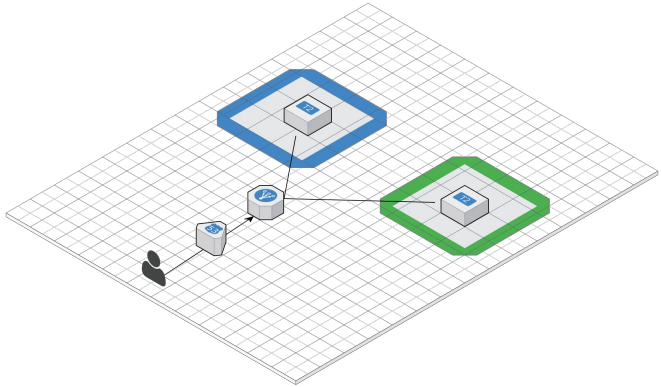
Modern deployment schemes

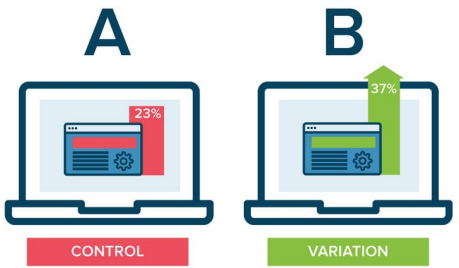
Recreate
- Switch off old, start new

Ramped
- Slowly replace instances of old with new

Blue-Green

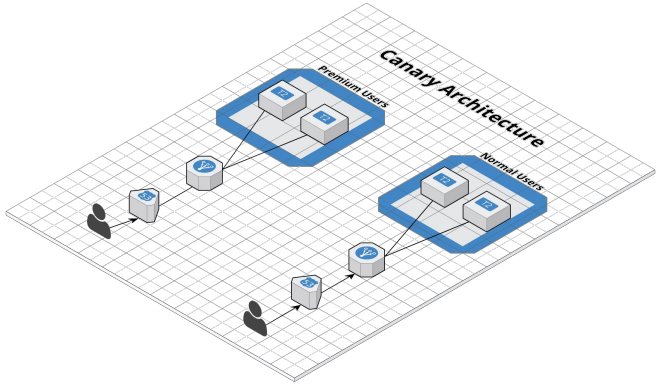
A/B Testing



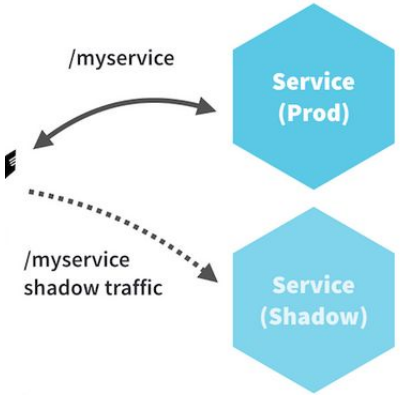


Modern deployment schemes

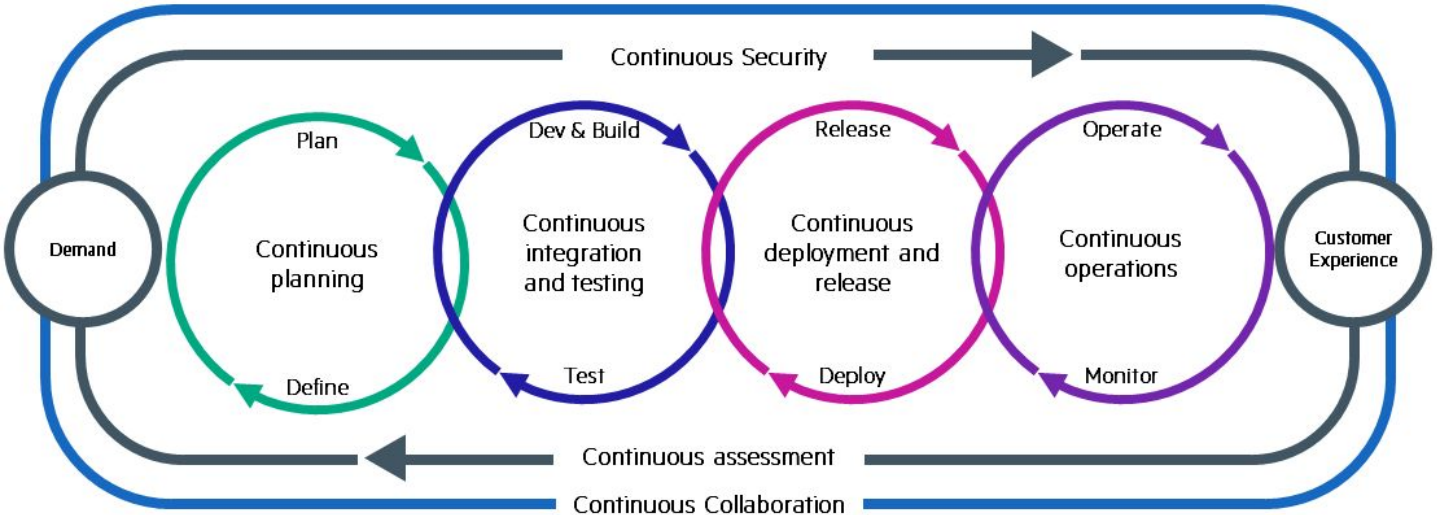
Canary



Shadow



DevOps



https://software.microfocus.com/en-us/solutions/devops-solutions

...

DevOps is not...

A product ➜ philosophy, approach, method

An interchangeable buzzword ("Agile", "Cloud", "Automation")

A separate team ➜ no new silos!!

A staff **consolidation** technique

New ➜ a new term but collaboration has existed for a long time

Only about dev and ops ➜ it is a culture

- A set of processes and practices that optimize service delivery

DevOps requires...

A set of processes and practices that optimize service delivery

- Culture
- Automation
- Measurement
- Sharing

https://www.youtube.com/watch?v=aFWi8ToAjpU (2 minutes)
https://www.youtube.com/watch?v=_I94-tJIovg (7 minutes → watch if you want)

DevOps pipeline

Build

Unit Test

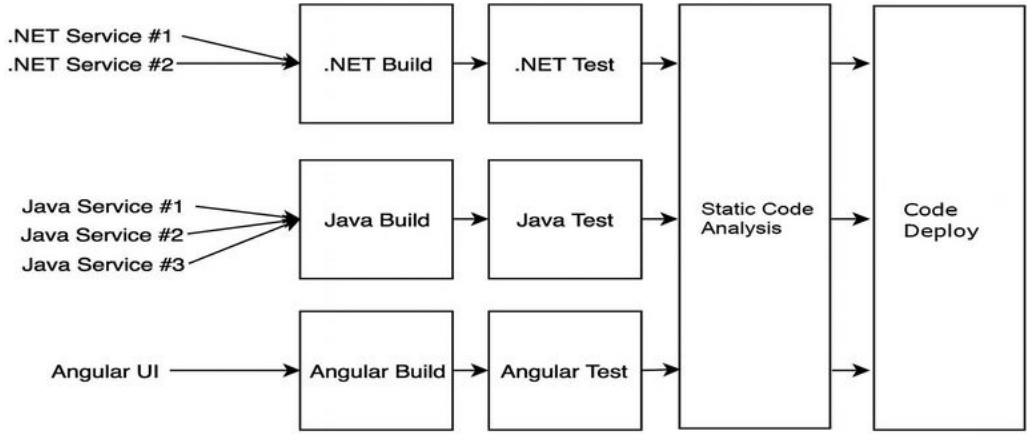
Static Code Scan/Security Scan

Packaging Publishing of Artifacts

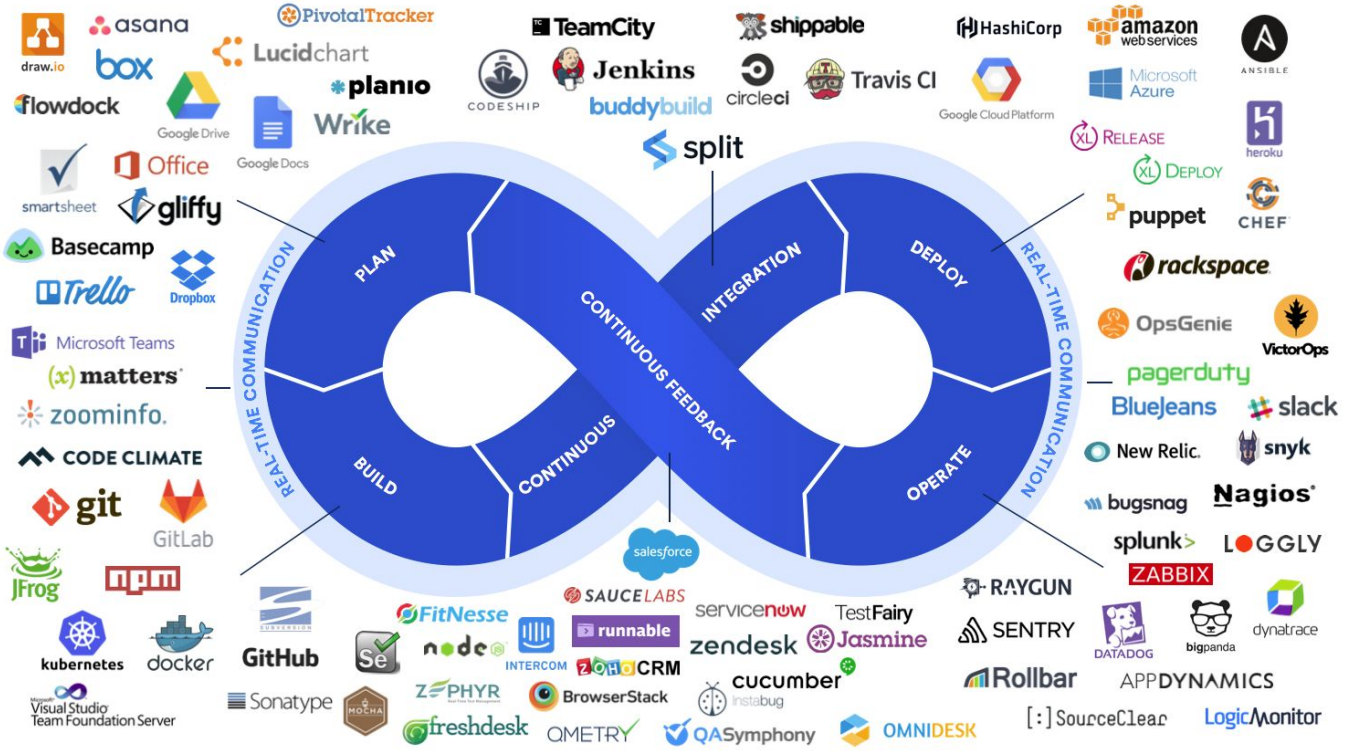
Deploying

End to End Tests

Performance Tests



https://www.youtube.com/watch?v=Me3ea4nUt0U
(10 minutes in)


PLAN
CODE
BUILD
CONTINUOUS
INTEGRATION
DEPLOY
OPERATE
CONTINUOUS FEEDBACK
REAL-TIME COMMUNICATION
REAL-TIME COMMUNICATION
draw.io
asana
box
Flowdock
Google Drive
PivotalTracker
Lucidchart
planio
Google Docs
Wrike
smartsheet
Office
gliffy
Basecamp
Trello
Dropbox
Microsoft Teams
(x) matters
zoominfo.
CODE CLIMATE
git
GitLab
JFrog
npm
kubernetes
docker
Visual Studio Team Foundation Server
GitHub
Sonatype
CODESHIP
TeamCity
Jenkins
buddybuild
shippable
circleci
Travis CI
split
salesforce
SAUCELABS
FitNesse
runnable
node
INTERCOM
ZOHO CRM
ZEPHYR
BrowserStack
freshdesk
QMETRY
servicenow
TestFairy
zendesk
Jasmine
cucumber
Instabug
QASymphony
OMNIDESK
HashiCorp
Google Cloud Platform
amazon web services
Microsoft Azure
RELEASE
DEPLOY
ANSIBLE
heroku
puppet
CHEF
rackspace
OpsGenie
VictorOps
pagerduty
BlueJeans
slack
New Relic.
snyk
bugsnag
Nagios
splunk>
LOGGLY
ZABBIX
RAYGUN
SENTRY
DATADOG
bigpanda
dynatrace
Rollbar
APPDYNAMICS
[:] SourceClear
LogicMonitor

SHARE

BUSINESS | JOURNAL REPORTS: TECHNOLOGY

It's Time to Get Rid of the IT Department

It made sense in a bygone era, when technology was separate from the business. Now it just hurts both.

No man is an island. And the IT department shouldn't be one, either.

Despite their mission, which often talks about driving corporatewide innovation and digital transformation, chief information officers, as heads of these departments, are frequently reduced to running a metaphorical island. Just look at any organization's structure, and you are very likely to see a rectangular box labeled IT, with its own management hierarchy and budget.

TO READ THE FULL STORY

SUBSCRIBE

SIGN IN

Let's all have a kneejerk reaction from the headline!

Thoughts on removing the IT department?

Thoughts on having each dept. have their own IT dept.?

Back to 437 slides

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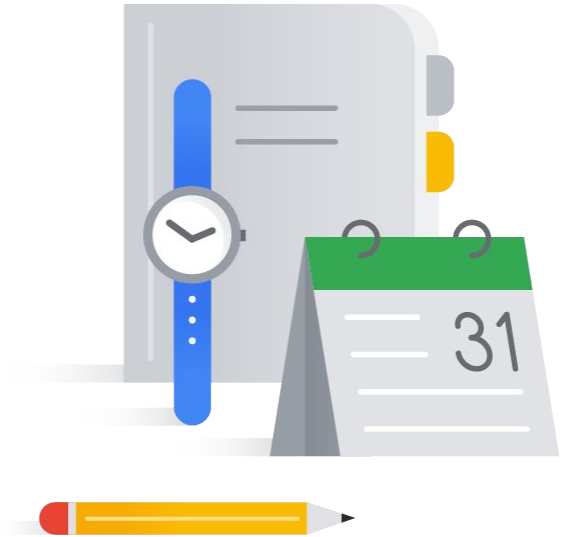
Agenda

Introduction to Infrastructure as Code (IaC)

Cloud Deployment Manager

Monitoring and Managing Your Services, Applications, and Infrastructure

Google Cloud's operations suite



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Your can define your required infrastructure as code

- Infrastructure requirements are defined as code in a template that's human-readable and machine consumable.
- Use templates to automate building, modifying, and deleting infrastructure.
- Templates can be stored, versioned, and shared.
- Templates can be used to rebuild an infrastructure after a crash.

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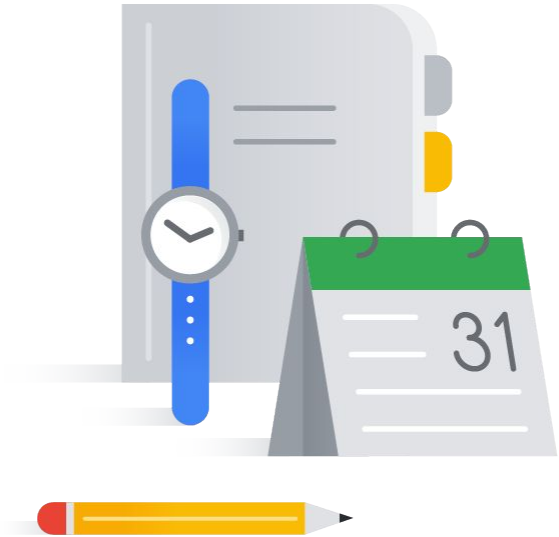

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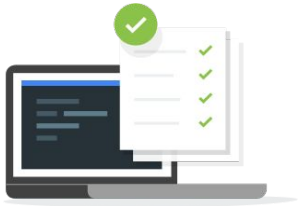
Deployment Manager is an IaC tool to manage Google Cloud systems



Repeatable deployment process

Achieve consistent results.

Deploy many resources at once, in parallel.

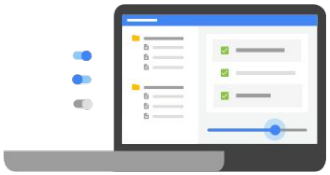
One reference definition can reference another.

Easy to update.

Declarative language

The system figures out the steps to take.

Specify the resources needed using YAML.



Template-driven

Create sets of resources that are typically deployed together.

Use Python and Jinja2 templates to programmatically control what gets deployed.

Pass variables and get output values back.

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Google Cloud support is also available for third-party, open source IaC tools

Deployment Manager

HashiCorp Terraform

puppet

ANSIBLE

HashiCorp Packer

CHEF™

Simple Terraform Example

https://cloud.google.com/docs/terraform/deploy-flask-web-server

Scheduler / Tasks

https://cloud.google.com/scheduler/docs
https://cloud.google.com/tasks/docs

Scheduler

Managed `cron` service

cron: https://opensource.com/article/17/11/how-use-cron-linux

What kinds of things should happen regularly from a cloud perspective?

- Log rotation
- Bucket rotation
- Emailing reports
- Pentesting
- ...

Scheduler

No Cloud Scheduler jobs to display

Jobs you create will appear here.

SCHEDULE A JOB START TUTORIAL

```
# ┌──────────── min (0 - 59)
# │ ┌────────── hour (0 - 23)
# │ │ ┌──────── day of month (1 - 31)
# │ │ │ ┌────── month (1 - 12)
# │ │ │ │ ┌──── day of week (0 - 6) (0 to 6 are Sunday to
# │ │ │ │ │                Saturday, or use names; 7 is also Sunday)
# │ │ │ │ │
# │ │ │ │ │
# * * * * *  command to execute
```

Name	Status of last execution	Region	State	Description	Frequency	Target	Last run	Next run	Last updated	Actions
demo	Has not run yet	us-central1	Enabled		* * * * * (America/ Detroit)	URL : https://us-central1-cloud-apps-demos-w24.cloudfunctions.net/dadjoke-demo-log			Nov 25, 2024, 10:49:47 AM	

^-- this is the "broken" Cloud Function from a few modules ago

https://cloud.google.com/scheduler/docs/schedule-run-cron-job

[ALERT - Critical] 437 CF ERRRRRROR for Cloud Run Revision with {configuration_name=dadjoke-demo-log, location=us-central1, project_id=cloud-apps-demos-w24, revision_name=dadjoke-demo-log-00004-gik, service_name=dadjoke-demo-log} Inbox ×

Google Cloud Alerting <alerting-noreply@google.com> 10:50 AM (0 minutes ago)
to me

Google Cloud VIEW INCIDENT

Log alert fired | Critical

Cloud Run Revision with a log matching the query has appeared

Start time
Nov 25, 2024 at 3:50PM UTC (less than 1 sec ago)

Policy
437 CF ERRRRRROR

Project
cloud-apps-demos-w24

Condition
Log match condition

configuration_name : dadjoke-demo-log
location : us-central1
project_id : cloud-apps-demos-w24
revision_name : dadjoke-demo-log-00004-gik
service_name : dadjoke-demo-log

Policy documentation

YOU DONE BROKE YOUR CLOUD FUNCTION YOU IDIOT :) ;)

VIEW INCIDENT

Tasks

One-off asynchronous execution of tasks in queues

- Not scheduled to repeat
- A thing to be done at some point in the future

When to use

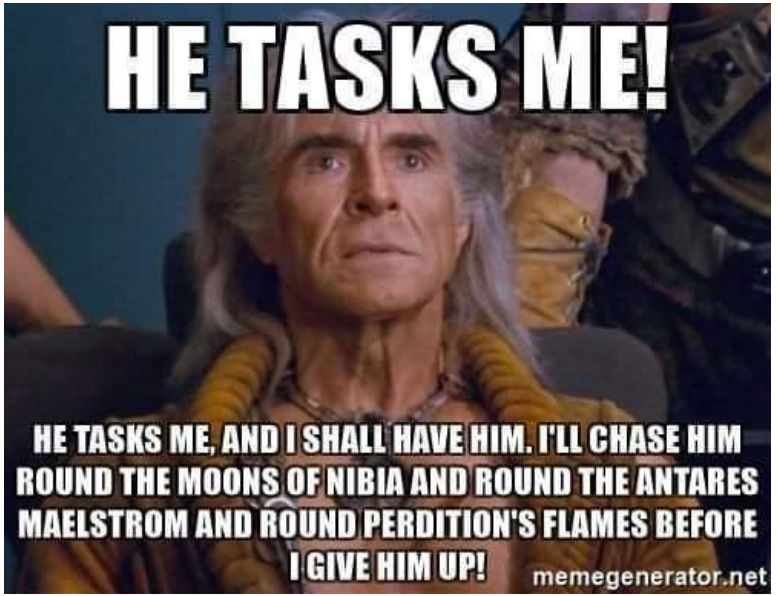
- When you have some **asynchronous** job to be done

Async?

- Not dependent on the main tasks
  - Image processing at some point
  - Log analysis
  - Etc.

Tasks

https://cloud.google.com/tasks/docs/add-task-queue



Fun