Google Cloud

Community Day 2023

Discover the Ideal Approach to Harness Google Cloud Build for your upcoming CI/CD Pipeline

Speakers

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Agenda

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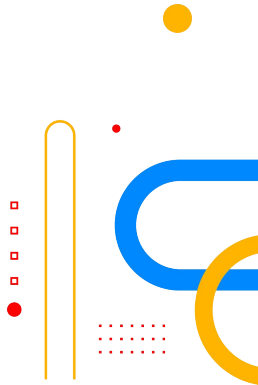
- Why CI/CD?
- Essential Features of CI/CD
- Legacy vs Cloud CI/CD
- Google Cloud Build Features
- FormHouse.Pro CI/CD
- CI/CD Pipeline Optimization
- Time vs Cost Comparison with different setup



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Why CI/CD?

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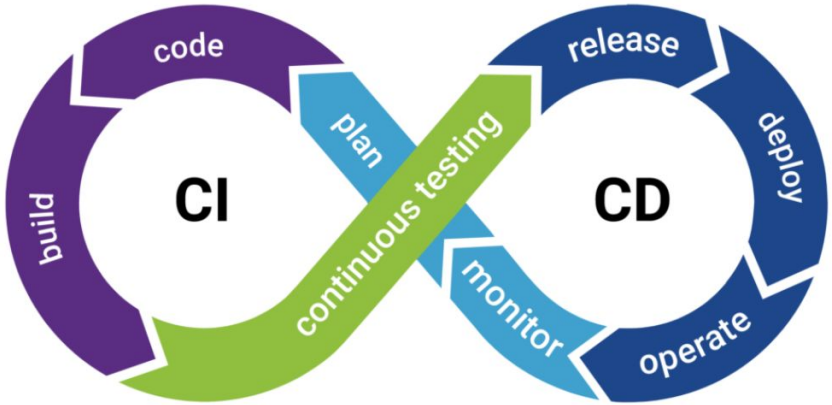
- Faster Delivery
- Higher quality
- Improved collaboration
- Faster feedback
- Continuous Improvements
- Cost Savings



"Secret development sauce for enterprises to be fast, responsive and ready to take on incumbents and would-be digital disruptors"

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Essential features of CI/CD

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- Automation
- Version control Integration
- Scalability
- Flexibility
- Security

- Monitoring & Logging
- Integration options
- Ease of use
- Multiplatform Support

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Legacy vs Cloud CI/CD

- Infrastructure
- Maintenance
- Scalability
- Security
- Cost
- Integration

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Google Cloud Build Features

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- Serverless
- **Docker Support**
- Built-in git support
- Parallel Builds
- Pay-as-you-go
- Free 120 minutes / day

- Customizable build steps
- Integration with legacy tools (Jenkins)
- Private Pool
- Multiple build environments (Linux, Windows and Custom)

Cloud Build named a leader for Cloud-Native Continuous Integration in The Forrester Wave™.

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FormHouse.Pro CI/CD

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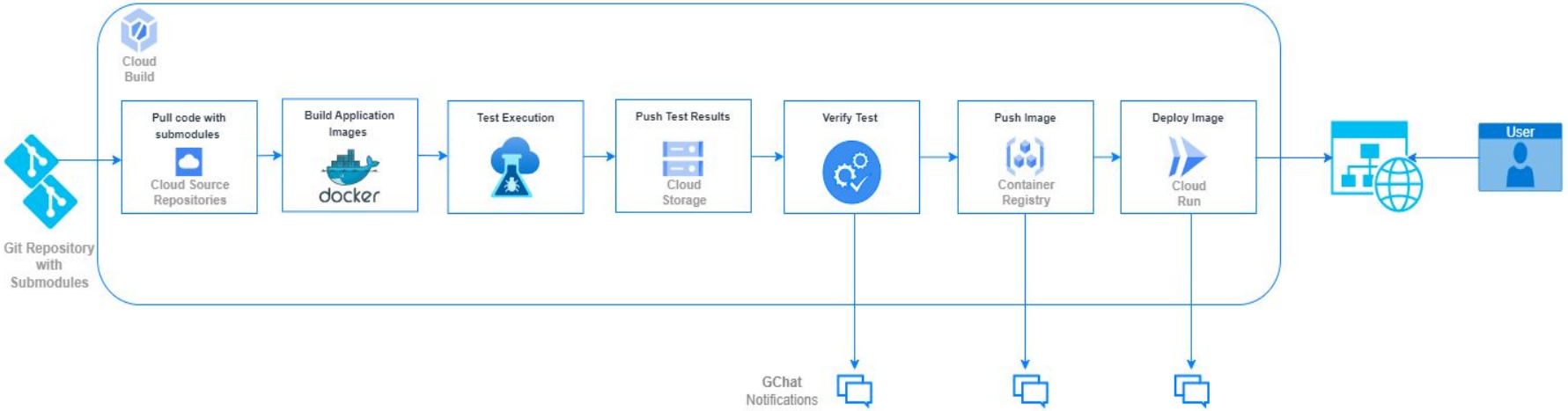

[GitHub Gist](#) - *cloudbuild.yaml & docker-compose.yaml files*

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Build Trigger Setup

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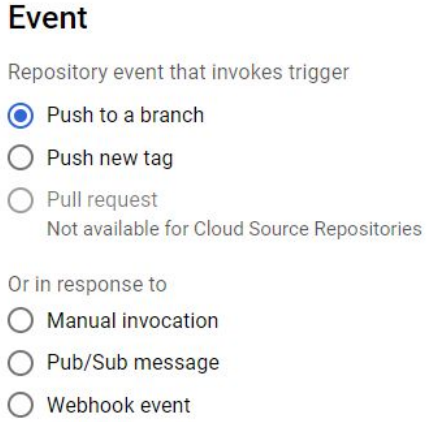
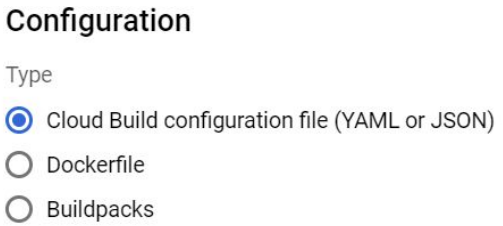
- **Event** - Execute Build automatically based on a event
- **Source** - From Cloud Source Repositories
- **Configuration**
- **Substitution variables**
  - *_GCS_BUCKET*
  - *_SUITE_NAME*
- **Private Pool**
- **Build Approval**
- **Service Account**





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Configuration - *cloudbuild.yaml*

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- Define the tasks to perform in each step
- Execute task using **Cloud Builders**

Build Steps	Cloud Builder
0 Remove last run test results step failure allowed	gcr.io/cloud-builders/gsutil
1 Pull app code with submodules (test code)	gcr.io/cloud-builders/git
2 Docker-compose up -d	docker/compose:1.19.0
3 Install test dependencies on host machine	node:18
4 Execute test on host machine Test execution status notified via GChat webhook step failure allowed	node:18
5 Copy test results to cloud storage bucket	gcr.io/cloud-builders/gsutill
6 Check gate 1 (Check for test exit code file)	ubuntu
7 Check gate 2 (Read test exit code from file) Test exit code fails the build & stops the pipeline	ubuntu
8 Push app docker image	gcr.io/cloud-builders/docker
9 Notify status via GChat webhook using curl	curlimages/curl
10 Deploy app docker image	gcr.io/google.com/cloudsdktool/cloud-sdk
11 Notify status via GChat webhook using curl	curlimages/curl

"You can include up to 300 build steps in your config file"

```yaml
steps:
  # Docker Build
  - name: 'gcr.io/cloud-builders/docker'
    args: ['build', '-t',
           'us-central1-docker.pkg.dev/${PROJECT_ID}/my-docker-repo/myimage',
           '.']
```

```yaml
steps:
- name: string
  args: [string, string, ...]
  env: [string, string, ...]
  allowFailure: boolean
  allowExitCodes: [string (int64 format), string (int64 format), ...]
  dir: string
  id: string
  waitFor: [string, string, ...]
  entrypoint: string
  secretEnv: string
  volumes: object(Volume)
  timeout: string (Duration format)
  script: string
```

[GitHub Gist](#) - *cloudbuild.yaml file*

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Monitor your CI/CD Pipeline Duration !

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- ➔ Initial few runs - 10 to 15 mins
- ➔ In a month - 15 to 20 mins
- ➔ Then - 20 to 30 mins
- ➔ Later - 30 to 40, 40 to 50 mins …

It's almost an hour ⚠

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Why my Build Pipeline is taking so long?

- Cloud Build - Default machine-type
  - *e2-medium (1 vCPU 4GB Memory)*
- Docker Image - *Each run building all layers of image even without any change*
- Sequential Execution
  - Functional/e2e - Tests
  - Cloud Build Steps

CI/CD Optimization

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- **machine-type**: e2-medium (1 vCPU 4GB Memory) to **e2-highcpu-8** (8 vCPU 8GB Memory)
- Added **Kaniko cache** with docker build

💡 *To get the most out of cache, modify your Dockerfile in such a way that frequently changing layers are kept at last.*

```
steps:
- name: 'gcr.io/kaniko-project/executor:latest'
  args:
  - --destination=${_LOCATION}-docker.pkg.dev/$PROJECT_ID/${_REPOSITORY}/${_IMAGE}
  - --cache=true
  - --cache-ttl=XXh
```

- **Parallel Test Execution**

💡 *To get the best execution time, have many individual test suites/files with minimal number of tests.*

- **Parallel Cloud Build Step Execution**

`waitFor`: [“stepId”]

```
steps:
# Download the binary and the data in parallel.
- name: 'gcr.io/cloud-builders/wget'
  args: ['https://example.com/binary']
- name: 'gcr.io/cloud-builders/gsutil'
  args: ['cp', 'gs://$PROJECT_ID-data/rawdata.tgz', '.']
  waitFor: ['-']  # The '-' indicates that this step begins immediately.
```

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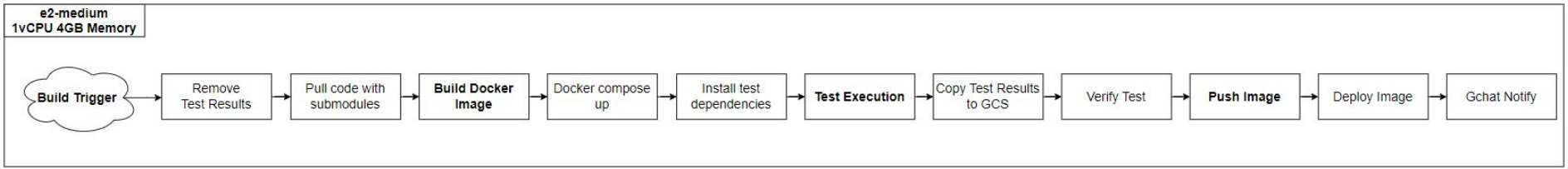
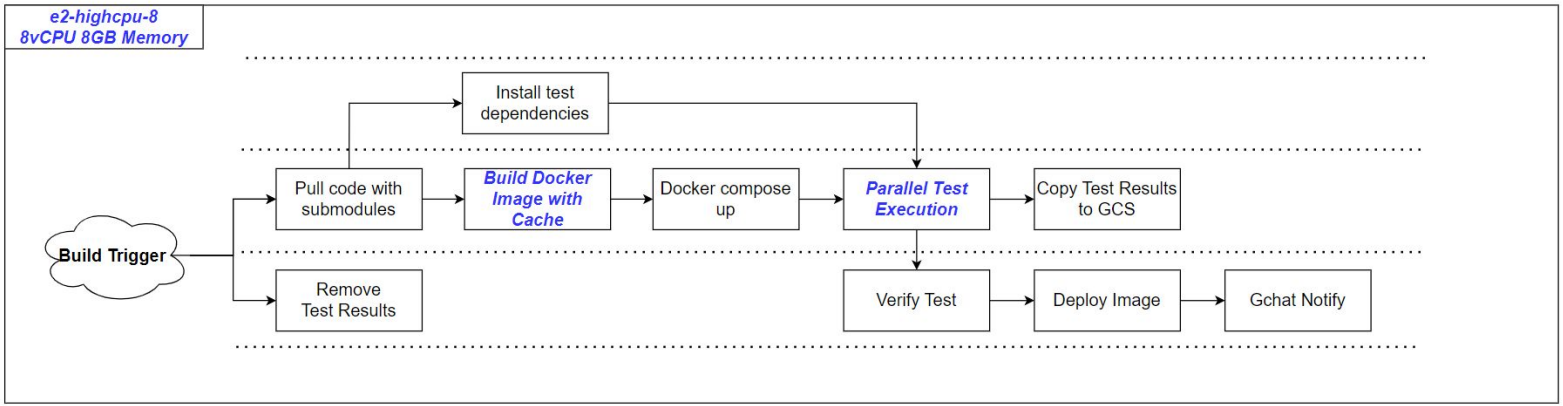
CI/CD Optimized





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Time vs Cost Comparison - *8 cents more ($0.08) saved us 40 mins of our build time !*

Cloud Setup	**Machine Type -** e2-medium (1 vCPU 4GB Memory) **Kaniko Cache -** N **Sequential Tests** **Sequential Cloud Build steps**	**Machine Type -** e2-highcpu-8 (8 vCPU 8GB Memory) **Kaniko Cache -** N **Sequential Tests** **Sequential Cloud Build steps**	**Machine Type -** e2-highcpu-8 (8 vCPU 8GB Memory) **Kaniko Cache -** Y **Sequential Tests** **Sequential Cloud Build steps**	**Machine Type -** e2-highcpu-8 (8 vCPU 8GB Memory) **Kaniko Cache -** Y **Parallel Tests** with 8 instances **Sequential Cloud Build steps**	**Machine Type -** e2-highcpu-8 (8 vCPU 8GB Memory) **Kaniko Cache -** Y **Parallel Tests** with 8 instances **Parallel Cloud Build steps**
Pricing	$0.003 / build-minute. **First 120 builds-minutes per day are free Quick Start - Starts instantly	$0.016 / build-minute Startup time ~ 1min	$0.016 / build-minute Startup time ~ 1min	$0.016 / build-minute Startup time ~ 1min	$0.016 / build-minute Startup time ~ 1min
Build Steps	**Duration (hh:mm:ss)**				
0 - Remove allure results**	00:00:44	00:00:07	00:00:07	00:00:53	00:01:03
1 - Pull code with submodules	00:00:07	00:00:07	00:00:07	00:00:07	00:00:09 ***Parallel with step 0
2 - Build Image with kaniko cache	-	-	**00:02:00**	**00:01:57**	**00:02:26**
3 - Docker compose up	**00:12:18**	**00:05:18**	**00:02:44**	**00:02:46**	**00:02:51**
4 - Install test dependencies	00:01:23	00:00:14	00:00:14	00:00:15	00:00:35 ***Parallel with step 2
5 - Test execution**	**00:26:00**	**00:23:00**	**00:23:00**	**00:05:48**	**00:05:38**
6 - Copy allure results to GCS**	00:03:30	00:01:45	00:01:45	00:01:38	00:01:44 ***Parallel with step 10
7 - Verify Test	00:00:01	00:00:01	00:00:01	00:00:01	00:00:01
8 - Push Image	00:02:44	-	-	-	-
9 - Gchat - Notify image pushed	00:00:02	-	-	-	-
10 - Deploy Image	00:05:55	00:03:43	00:03:43	00:03:18	00:03:37 ***Parallel with step 6
11 -Gchat - Notify image deployed	00:00:01	00:00:02	00:00:02	00:00:02	00:00:02
Summary	**Duration (hh:mm:ss)**				
Stage Time	00:22:31	00:09:25	00:08:51	00:08:26	00:05:20
Stage Time**	00:30:14	00:24:52	00:24:52	00:08:19	00:06:41
Total Time	**00:52:45**	**00:34:17**	**00:33:43**	**00:16:45**	**00:14:55** ***Parallel
Cost per build ($)	**$0.16**	**$0.54**	**$0.54**	**$0.27**	**$0.24**
** steps duration will vary based on the test suite executed / ***With parallel cloud build steps we should not consider total time that sums up to18mins, need to consider overall build time as above					

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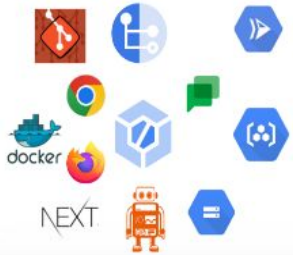
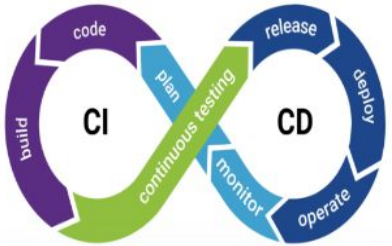
Configuring Cloud Native CI/CD (Cloud Build) Pipeline ...



Cloud Native CI/CD Pipeline with Notifications in GCP



Google Cloud Build CI/CD pipeline performance ...

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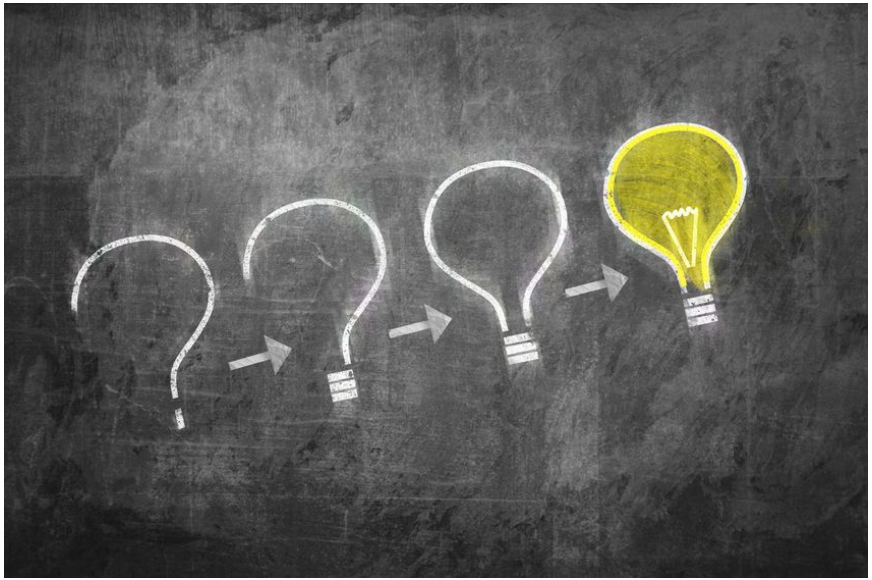

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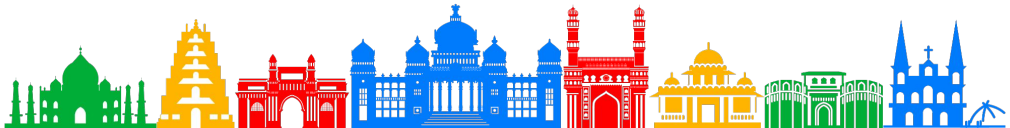
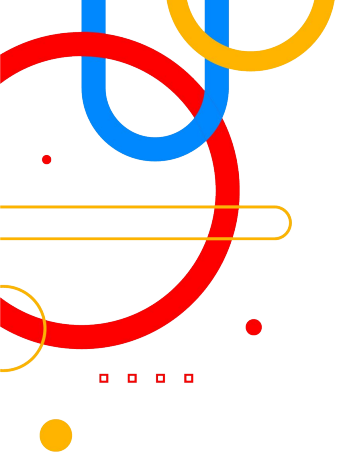
Thank you !





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Appendix

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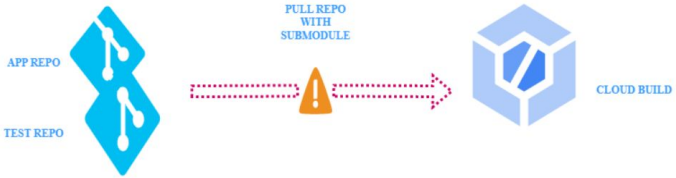
Build Hurdles - How we overcome!

- CloudBuild with git submodules project, is not pulling the submodule code



- Import submodule repository to ***Cloud Source Repository*** *<cloud repo url>*
  - *Replace* `cloud` *to* `developers`
- Replace the git url value in `.gitmodules` file with *<cloud repo url>*
- Add a separate step in `cloudbuild.yaml` file with git commands to pull the test code submodule along with the application code

CloudBuild with Submodules project

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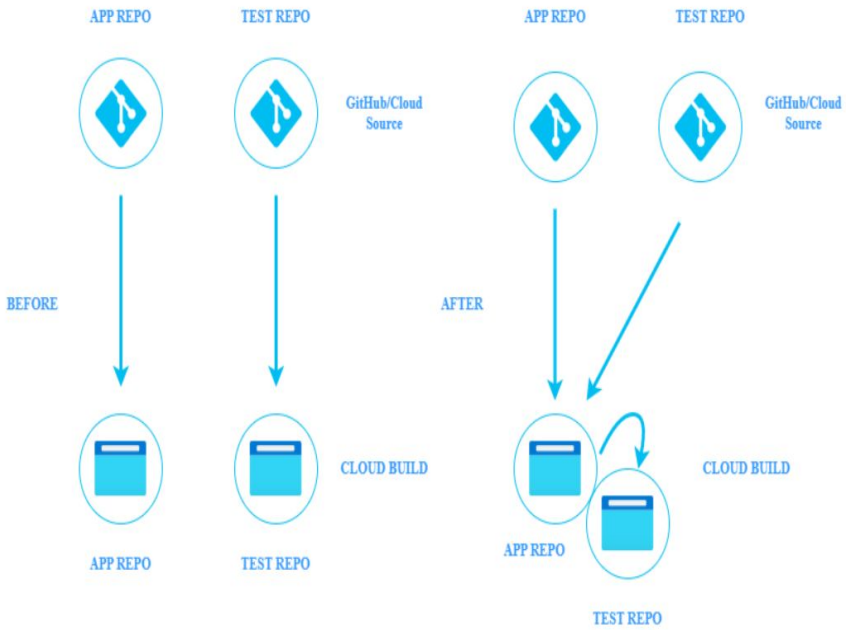

Git commands used:

git init
git clean -d -f . #clean current working directory
git remote add origin (host/app repo cloud url)
git fetch origin $BRANCH_NAME
git checkout $COMMIT_SHA #checkout at current commit
git config -f .gitmodules submodule.[test-repo].url (test repo cloud url)
git submodule update –init

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