Head Start Application

1. Migrate Legacy Java App (XWiki)
(User Guide Documentation)

February 2023

Content

Glossary

GCP	Google Cloud Platform
GCE	Google Compute Engine
DATADOG API KEY	DataDog web page navigate to Organization settings -> API Keys -> Create or select a key
DATADOG APP KEY	DataDog web page navigate to Organization settings -> Application Keys -> Create or select a key

1. Overview

Head Start application - Migrate Legacy Java App aims to reduce the entry barrier for Google Cloud Platform developers in migrating a local Java application infrastructure to a cloud Java application infrastructure on Google Cloud Platform.

This project uses XWiki (ver. 14.10.4) as a sample application, in which XWiki WAR files and dependencies are built and deployed on Google Compute Engine, with as few end-user steps as possible with a Terraform designed application.

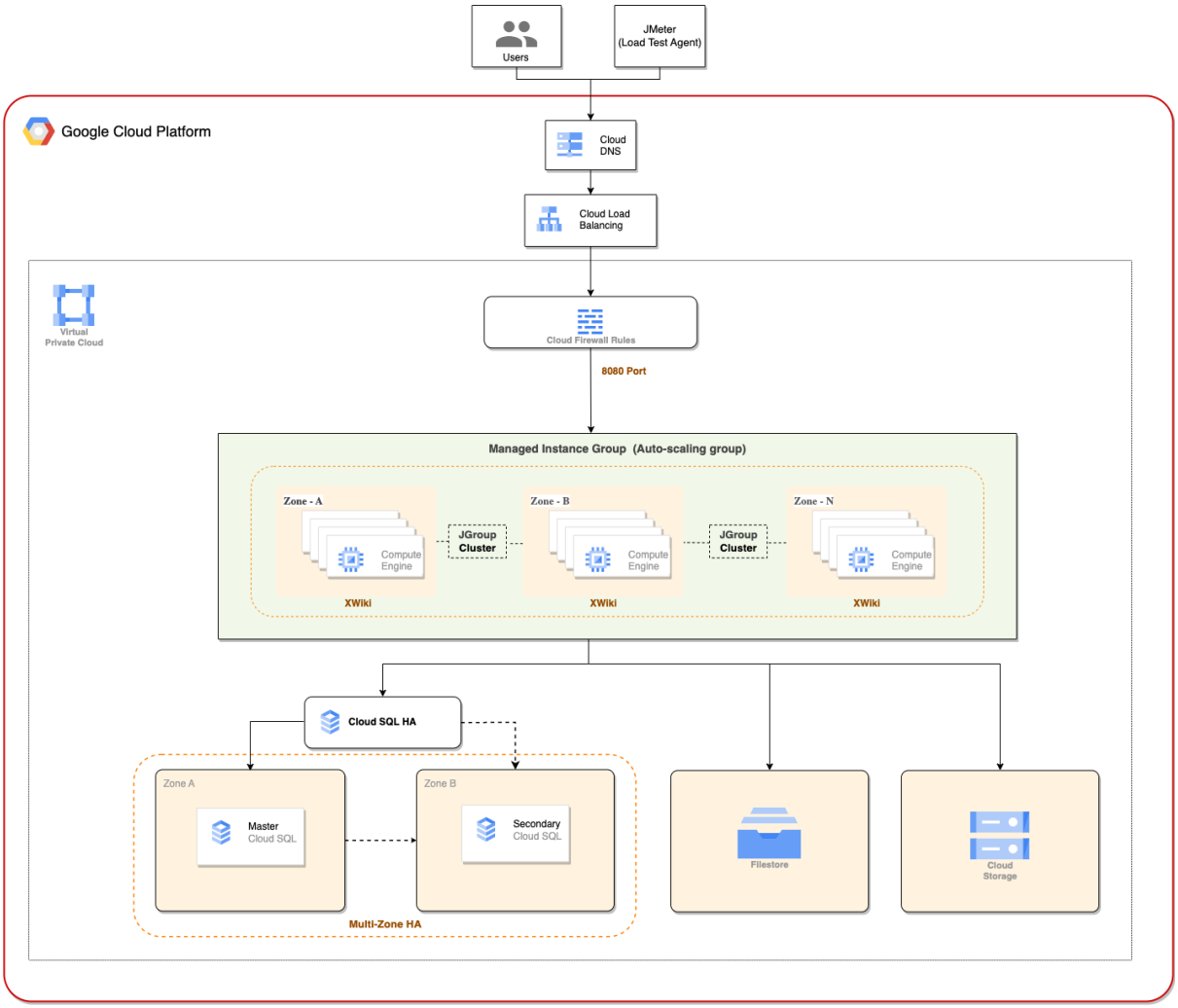


Figure above depicts XWiki-GCE architecture and GCP resources used within the application.

2. GCP Microservices and API

API Enabled

- Cloud Auto-scaling API
- Cloud Build API
- Cloud Filestore API
- Cloud Pub/Sub API
- Cloud Source Repositories API
- Cloud SQL API
- Cloud Storage API
- Container File System API
- Google Cloud APIs
- Google Cloud Storage JSON API
- IAM Service Account Credentials API
- Identity and Access Management (IAM) API
- Compute Engine API
- Secret Manager API
- Service Management API
- Service Networking API
- Service Usage API

GCP Microservices/ Products

- Google Cloud Build
- Google Cloud Storage
- Google Compute Engine
- Google Cloud Source Repositories
- Google Filestore
- CloudSQL

3. Setup

This section contains step by step instructions to setup XWiki through GCP **Cloud Shell Editor**.

3.1 Prerequisites

These requirements are needed to run the XWiki-GCE Terraform build:

- Google Cloud Platform account.

- Create a New Google Cloud project.

- DataDog account [Optional]
  - DataDog API Key
  - DataDog APP Key

- Access to Migrate-Legacy-Java repo:
  - For Migrate-Legacy-Java-App-GCE (Choose one)
    - Cloud Source Repositories (requires access to **hsa-testing** project): https://source.cloud.google.com/hsa-testing/github_hsa-integration_migrate-legacy-java-app-gce/+/main:

    - GitHub Repo (requires collaborator access): https://github.com/HSA-Integration/Migrate-Legacy-Java-App-GCE

- XWiki VM Image:

  Please note that the location of the customized public XWiki VM Image is currently hard-coded in the project

  This image is currently publicly accessible from CIeNet's GCP project, but will be provided in Google's testing project (e.g. **hsa-testing**) in the future.

  Url to fetch the image:
  https://www.googleapis.com/compute/beta/projects/$%7Bvar.xwiki_img_info.image_project%7D/global/images/$%7Bvar.xwiki_img_info.image_name%7D

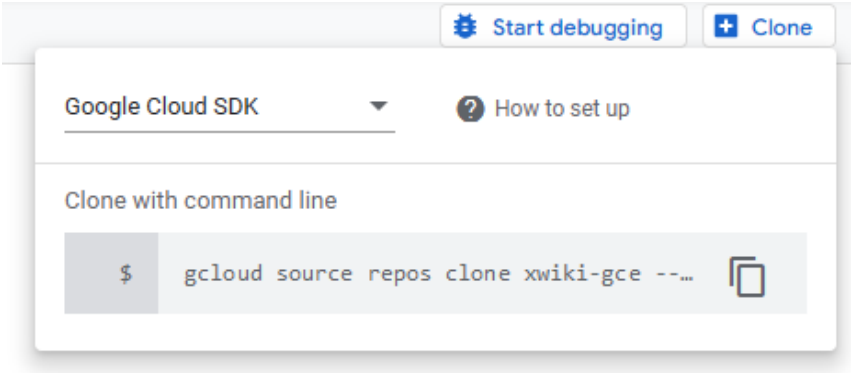
  In *tools/prepare_tfvars.sh*, the *image_project* and *image_name* variables are used to detect which image should be retrieved and used in the application. Currently these variables are hardcoded in our implementation.

3.2 Configuration

Sets up the required services and APIs that are needed to build the application on GCE.

1. Clone XWiki repository

   Run the following command in GCP Cloud Shell terminal to clone the provided XWiki repository to your own private repository:



   For GCE:

   - *$ gcloud source repos clone github_newfel-cloud_migrate-legacy-java-app-gce --project=hsa-testing*

   You can navigate to **Cloud Shell Editor** and confirm the repository has successfully been cloned to your own private repo.

2. Enable Service API:

   Enable the service API through **APIs & Services -> Enable APIs and Services**

   - Cloud Build API **-> Enable**
     - Once enabled, go to **IAM & Admin** -> locate principal xxxxx@cloudbuild.gserviceaccount.com -> Edit -> Add Another Role -> Basic -> Owner -> Save.
   - Secret Manager API **-> Enable**

3.3 Build XWiki

Utilizing **Cloud Shell Editor** terminal, you can build the application with Cloud Build by running the following command inside your XWiki directory:

```
$ gcloud builds submit . --substitutions
_ZONE1=${ZONE1},_ZONE2=${ZONE2},_XWIKI_SQL_USER_PASSWORD=${SQL_PWD}
--region=${REGION}
```

If DataDog is enabled:

```
$ gcloud builds submit . --substitutions
_ZONE1=${ZONE1},_ZONE2=${ZONE2},_DATADOG_API_KEY=${DATADOG_API_KEY},_DATADOG
_APP_KEY=${DATADOG_APP_KEY},_XWIKI_SQL_USER_PASSWORD=${SQL_PWD}
--region=${REGION}
```

- Replace ${REGION} with a region of your choice e.g. *us-west1* or *us-central1*

  Replace ${ZONE1} and ${ZONE2) with the fully-qualified names of the selected zones. E.g. if the fully-qualified names of the selected zones are *us-west1-b* and *us-west1-c*. ${ZONE1} and ${ZONE2) values will be **us-west1-b** and **us-west1-c** respectively.

  GCP offers a variety of locations to host your server e.g. us-west1-b, please refer to Available regions and zones.

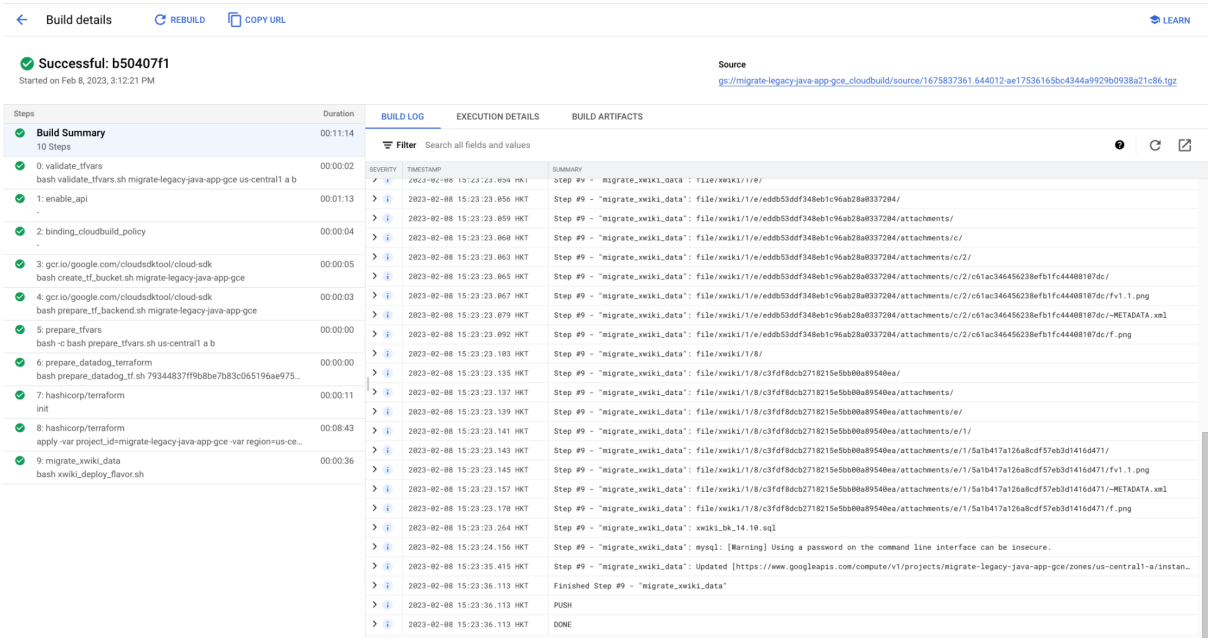
- [If DataDog is enabled] ${DATADOG_API_KEY} and ${DATADOG_APP_KEY} can be found under your DataDog -> Organization settings.

- ${SQL_PWD} will be the password set for the SQL database used by XWiki. If the parameter is not initialized in the command, The default password for the SQL database will be **vuYTCazG0IcEc**.

An example of what the command would look like:

```
$ gcloud builds submit . --substitutions
_ZONE1=us-west1-a,_ZONE2=us-west1-b,_DATADOG_API_KEY=b8be7b83c065196ae9753ds
3
,_DATADOG_APP_KEY=c6528cf345bc3ef94a203ea0c,_XWIKI_SQL_USER_PASSWORD=Xw!kipW
d44123 --region= us-west1
```

Once the command is executed and running, navigate to ***Cloud Build -> History*** to view the build log. There should be 10 total build steps executed for a successful build.



Once the build is successfully completed, all necessary server, database and application is built and is ready to be launched.

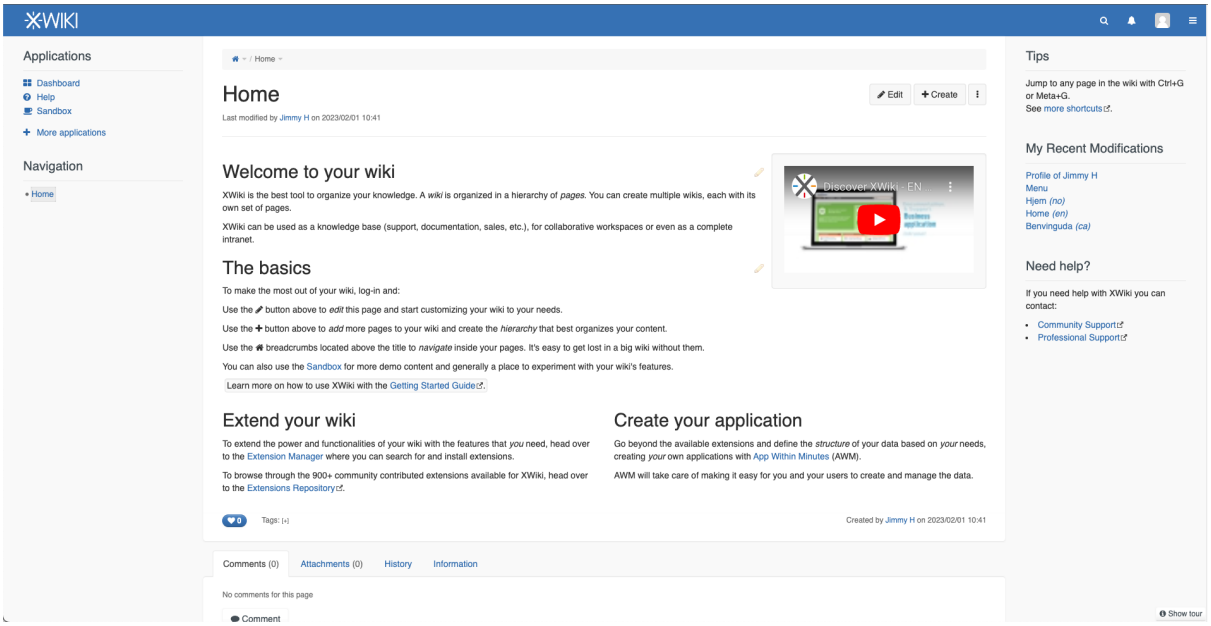
3.4 XWiki

Navigate to http://{LOAD_BALANCER_FRONTENDS_IP}:8080/xwiki , XWiki should have Flavor UI installed and can be used by end-users instantly.

Replace **${LOAD_BALANCER_FRONTENDS_IP}** with the frontend IP address of the load balancer, the IP address can be retrieved using one of the following methods:

- **From GCP console:**
  GCE:
  `Network services -> Load balancing -> Frontends -> Copy the IP address shown in the console.`

- **Run the gcloud command in Cloud Shell Editor terminal:**
  `gcloud compute forwarding-rules list --format="value(IP_ADDRESS)"`



3.5 Remove XWiki

To remove the entire application and GCP products/services created, run the following command under XWiki-GCE directory in the Cloud Shell terminal:

```
$ gcloud builds submit . --substitutions _ZONE1=${ZONE1},_ZONE2=${ZONE2}
--region=${REGION} --config=cloudbuild_destroy.yaml
```

If DataDog was enabled, include the Datadog api and app key you had input in the build command:

```
$ gcloud builds submit . --substitutions
_ZONE1=${ZONE_CODE1},_ZONE2=${ZONE_CODE2},_DATADOG_API_KEY=${DATADOG_API_KE
Y},_DATADOG_APP_KEY=${DATADOG_APP_KEY} --region=${REGION}
--config=cloudbuild_destroy.yaml
```

Replace ${REGION}, ${ZONE1} and ${ZONE2} with the region and zone code you had selected to build XWiki in.

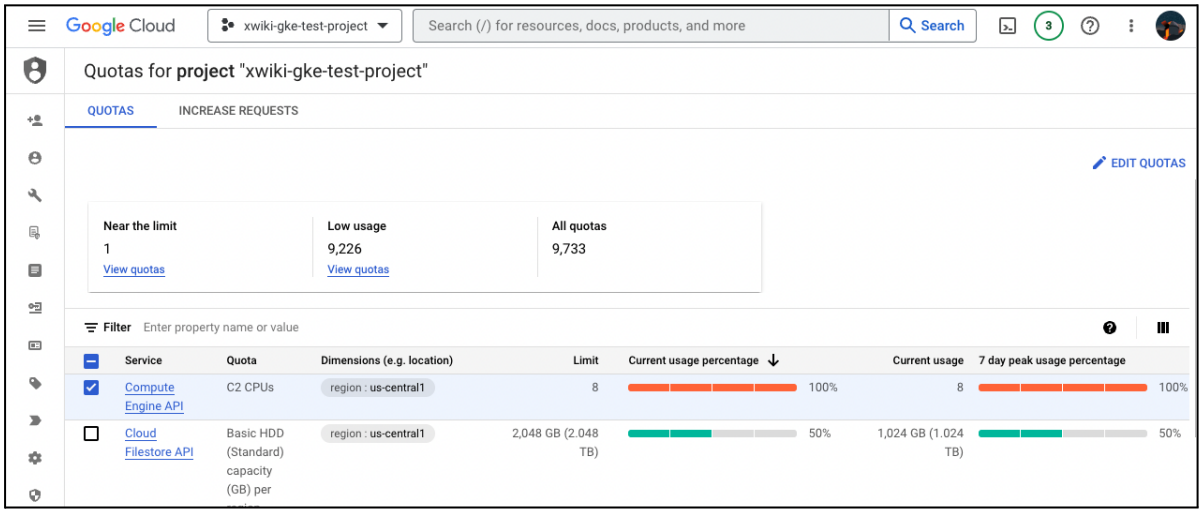
All services and products built in **3.3** should all be removed from your GCP project.

4. Load Test with JMeter

Perform a load test on the built XWiki server simulated through Apache JMeter, expecting the server to autoscale and handle the load balance. To run the load test,navigate to your XWiki-GCE folder that is in your Cloud Shell Environment and perform the following steps:

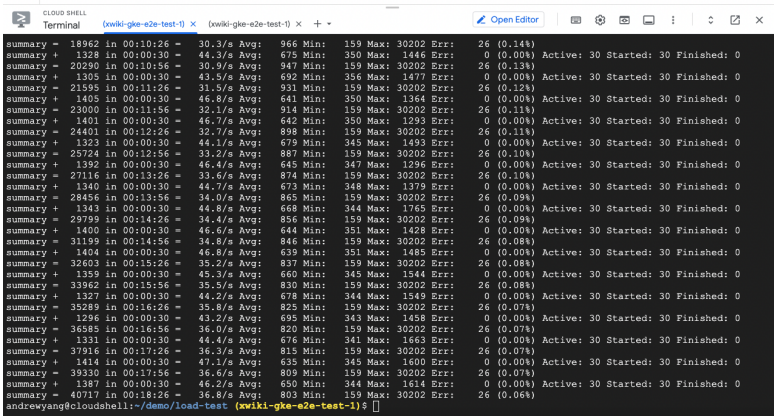
(Optional step for Load Test) Increase C2 CPU quota for autoscaling:

- Navigate to IAM & Admin -> Quotas
  https://console.cloud.google.com/iam-admin/quotas?project={PROJECT_ID}
- Increase the C2 CPUs in your selected region to at least **30** if needed.



*Note: Project quota restrictions may affect the performance of XWiki load balancing.

1. Open Cloud Shell terminal.
2. Create a folder "*load-test*" (or any custom name your prefer) and change current directory to *load-test* folder
   - `$ mkdir load-test`
   - `$ cd load-test`
3. Copy the JMeter load test script to the above folder
   - `$ cp {PATH_TO_XWIKI_REPO}/tools/start_load_test_gce.sh`
4. Run **start_load_test.sh** script to start the load test
   `$ sh -x start_load_test_gce.sh`
   - The script will get GCE to expose the load balancer ip and download:
     - Apache-jmeter-5.5.zip: JMeter software zip file
     - xwiki_load_test_30.jmx: JMeter plan file
   - The load test should be running after a few seconds.



5. Press Ctrl-C to terminate load test process

6. Load test process are record in log files which can be viewed by tail command:
   - `$ tail jmeter_YYYY-MM-DD.log`

```
summary +     61 in 00:00:27 =    2.2/s Avg:  5007 Min:  5003 Max:  5072 Err:    61 (100.00%) Active: 28 Started: 28 Finished: 0
summary +    177 in 00:00:30 =    5.9/s Avg:  5005 Min:  5001 Max:  5015 Err:   177 (100.00%) Active: 30 Started: 30 Finished: 0
summary =    238 in 00:00:57 =    4.2/s Avg:  5006 Min:  5001 Max:  5072 Err:   238 (100.00%)
summary +    197 in 00:00:30 =    6.6/s Avg:  2845 Min:   489 Max: 24643 Err:    28 (14.21%) Active: 30 Started: 30 Finished: 0
summary =    435 in 00:01:27 =    5.0/s Avg:  4027 Min:   489 Max: 24643 Err:   266 (61.15%)
summary +    466 in 00:00:30 =   15.6/s Avg:  2710 Min:   484 Max: 33262 Err:    13 (2.79%) Active: 30 Started: 30 Finished: 0
summary =    901 in 00:01:57 =    7.7/s Avg:  3346 Min:   484 Max: 33262 Err:   279 (30.97%)
```

5. View Metrics on DataDog

Navigate to DataDog console to view the Load Test performance metrics

Frequently used metrics:

GCE:

- Instance CPU Utilization: gcp.gce.instance.cpu.utilization
- HTTP request count: gcp.loadbalancing.https.request_count

MySQL:

- CloudSQL CPU utilization: gcp.cloudsql.database.cpu.utilization
- CloudSQL DB connections: gcp.cloudsql.database.network.connections

These metrics can also be filtered using project_id for more fine-grained information.