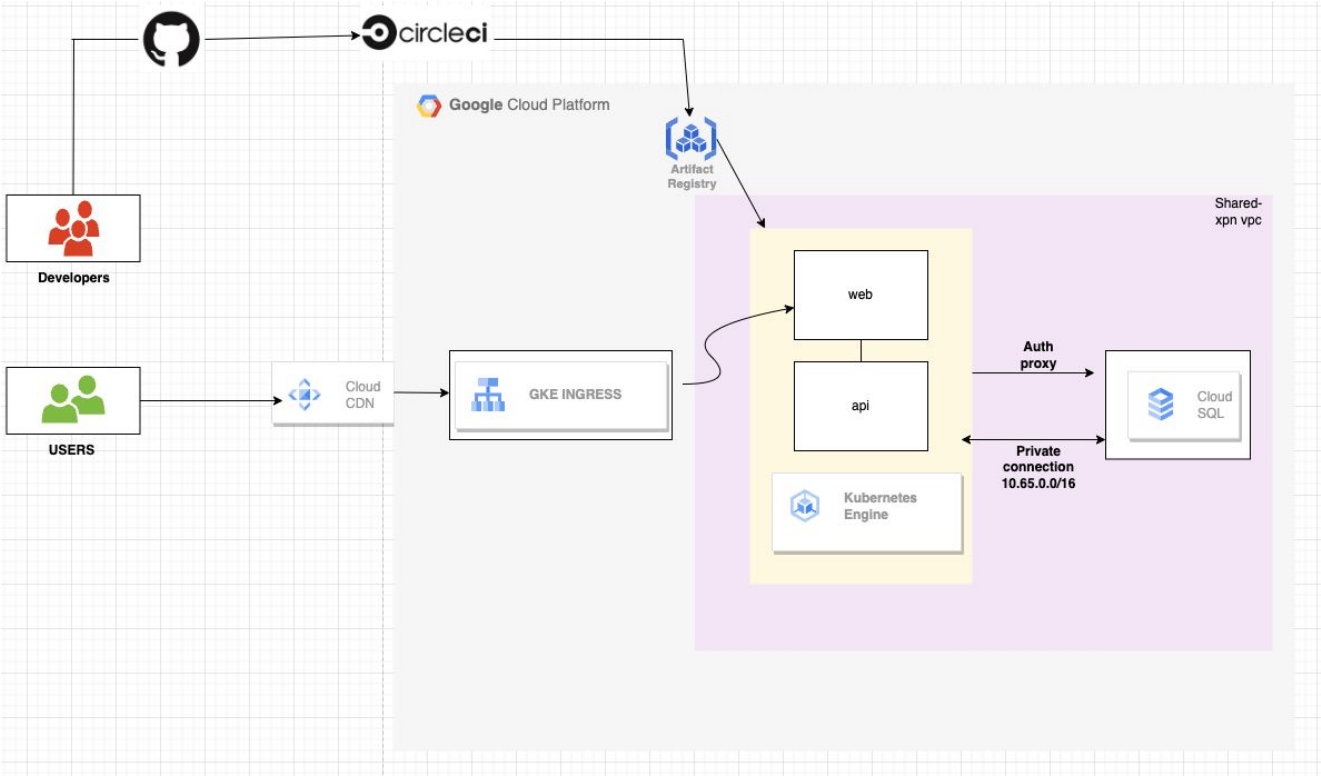
Technical Screening

Infrastructure

- **How**
  - All infrastructure is deployed using Terraform
  - Cloud Platform used is GCP
  - All authentication to GCP is done via Service Account using following command:
    - gcloud auth activate-service-account --key-file=~/path/to/key/file
- **Why**
  - Eliminates the need for manual intervention
  - Handy in case of Disaster and Recovery
  - Allows teams to collaborate seamlessly on infrastructure management

High Level Diagram



GKE Autopilot

- A private GKE Autopilot Cluster is used where api and web tier of application is deployed.
- Only master authorized network ranges can access Cluster's control plane
- Outbound connections from GKE cluster are handled through Cloud NAT
- **Why**?
  - You don't need to manage underlying infra, master nodes or etcd cluster.
  - Automated scaling and Resource Management, Improved Security and Compliance
  - Benefits of GKE Autopilot Clusters in terms of handling server failures:
    - Automated Node Repair and Replacement
    - Node Pools with Multiple Zones
    - Improved Node Maintenance

Cloud SQL

- Type of Google Cloud SQL Postgres instance that is designed to provide a more secure and isolated environment for your database.
- Private Services Access is enabled for Cloud SQL
- Instance name:
  - Private-instance-7124d943
- Database name:
  - Nodejs-db

SUBNETS | STATIC INTERNAL IP ADDRESSES | FIREWALLS | ROUTES | VPC NETWORK PEERING | PRIVATE SERVICE CONNECTION

ALLOCATED IP RANGES FOR SERVICES | PRIVATE CONNECTIONS TO SERVICES

Internal IP address ranges that are allocated for services private connection Learn more

ALLOCATE IP RANGE | RELEASE

Name	Internal IP range	Service producer	Connection name
private-ip-address	10.2.0.0/16	Google Cloud Platform	servicenetworking-googleapis-com

Connection between Cloud SQL and GKE Autopilot

- We use Cloud SQL Auth proxy (with private IP) to access Cloud SQL instance from application running in GKE
- GKE is connecting to Cloud SQL using GKE's Workload Identity feature.
  - This basically binds K.S.A to Google Service account
- We run cloud-sql-proxy in a sidecar pattern

```
~/toptal/Anurag-Sharma  git main
❯ kubectl get serviceaccount
NAME                 SECRETS   AGE
default              0         9d
terraform-sa-ksa     0         4d7h
```

Artifact Registry

Filter Enter property name or value

Name	Format	Type	Location	Description	Labels	Version policy	Encryption	Encryption key	Created	Updated	Size
gcp-node-test	Docker	Standard	us-central1 (Iowa)	Repo for storing nodejs images			Google-managed key	—	5 days ago	1 day ago	438.8 MB

us-central1-docker.pkg.dev > peak-apparatus-379619 > gcp-node-test

Repository Details

Format	Docker
Type	Standard

Filter Enter property name or value

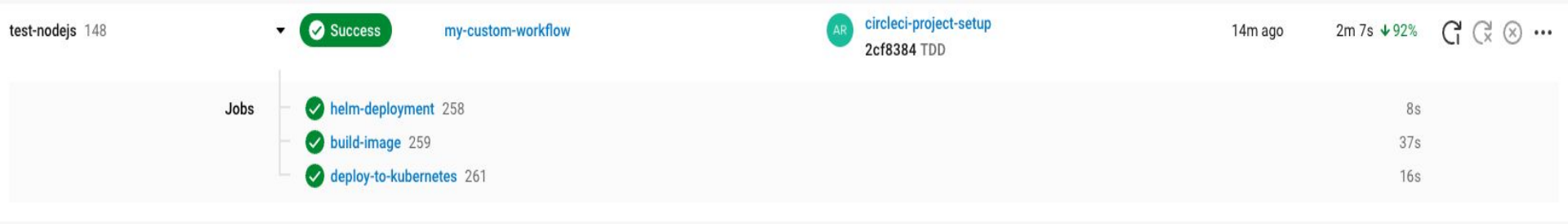
Name	Created	Updated
api-nodejs-image	2 days ago	1 day ago
web-nodejs-image	2 days ago	1 day ago

CircleCI

- CircleCI pipeline has 3 jobs basically:
  - Helm-deployment
  - Build-image
  - Deploy-to-kubernetes
- CircleCI is authenticating to Google Cloud Platform using Service Account which has been added as Environment variable
- Here is what each of the job does:
  - **Helm-deployment**: Deploys a Helm chart to a Kubernetes cluster on Google Kubernetes Engine (GKE). It initializes the Google Cloud CLI, installs Helm, and updates the version of a Helm chart based on the VERSION_PREFIX and the CircleCI build number. Then it commits the changes to the chart and pushes it to the GitHub repository.

CircleCI (contd.)

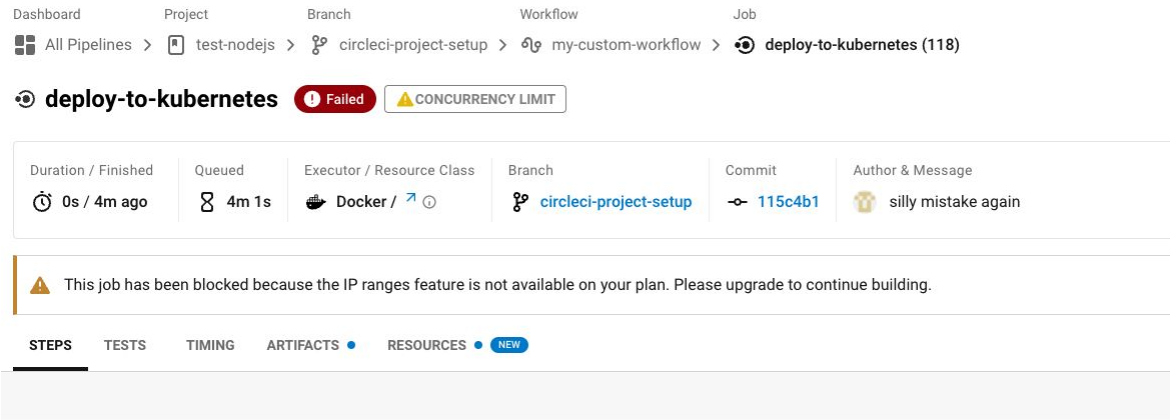
- Build-image:
  - Build and push the Docker container image to the Google Artifact Registry.
- Deploy to kubernetes:
  - Deploys Helm chart to a GKE Cluster.
  - Runs a series of steps to authenticate with GCP, install/upgrade helm deployment.



CircleCI (Free version caveat)

- As we discussed earlier, access to Private GKE cluster is secure and is controlled via Master Authorized Network.
- There is a feature in CircleCI where we can whitelist CircleCI IPs on a private GKE cluster by using circleci_ip_range: true
  - However, it is not allowed in Free Tier of CircleCI

```
deploy-to-kubernetes:
  circleci_ip_ranges: true
  environment:
    DOCKER_REPO: gcp-node-test
    IMAGE_NAME: web-nodejs-image
    HELM_RELEASE_NAME: nodejs
    CHART_NAME: circle-nodejs-chart
    VERSION_PREFIX: 0.1
    GCP_PROJECT: peak-apparatus-379619
    GKE_CLUSTER: gke-test-us-central1
    GKE_REGION: us-central1
  executor: my-custom-executor
```



Thank You!!!