Task 10.1

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Containerising and Deploying a Node.js Application using Kubernetes and Google Cloud

1. Overview of the Task

The primary objective of this task was to containerise a Node.js application, deploy it using Kubernetes, and manage it through the Google Cloud Platform. The task involved several key steps:

- Building a Docker image for the Node.js application.
- Pushing the image to Google Artifact Registry.
- Creating and managing Kubernetes deployments to orchestrate the application on a cloud environment.

2. Steps Taken

Throughout this task, I completed the following steps:

- Dockerization of Node.js App: Developed a Dockerfile to build an image of the Node.js application, ensuring all dependencies were correctly packaged.
- Image Repository Management: The created Docker image was pushed to the Google Artifact Registry, confirming its availability in the cloud.
- Kubernetes Deployment Configuration: Configured a deployment.yaml file for Kubernetes, specifying the necessary parameters to deploy the containerised application.

3. Challenges and Troubleshooting Efforts

During deployment, I encountered a persistent issue that prevented the Kubernetes pods from successfully pulling the Docker image, resulting in an ImagePullBackOff error. My troubleshooting efforts included:

```
PS C:\projects\task10> kubectl get pods
>>
NAME                                    READY   STATUS             RESTARTS        AGE
mongodb-deployment-d77d478c7-pbkq9      1/1     Running            1 (3h51m ago)   3d22h
my-mongodb-6975cd5d7c-n5m9n             1/1     Running            1 (3h51m ago)   4d1h
mynodeapp-deployment-549567d94c-4l4vd   0/1     ImagePullBackOff   0               143m
mynodeapp-deployment-549567d94c-8rqrj   0/1     ImagePullBackOff   0               143m
mynodeapp-deployment-f894bffbd-qbzn4    0/1     ImagePullBackOff   0               5m54s
node-web-app-deployment-58ccc599fb-8jc5z   1/1     Running         2 (3h51m ago)   24d
node-web-app-deployment-58ccc599fb-sxcgr   1/1     Running         2 (3h51m ago)   24d
```

- **Verifying Image Path:** Ensured that the image path in the Kubernetes deployment matched the one in the Artifact Registry.
- **Checking Image Pull Secrets:** Validated that the Kubernetes secret for pulling the Docker image was set up correctly and contained the appropriate credentials.
- **Reviewing Permissions:** Checked and rechecked the permissions associated with the Google Cloud IAM roles to ensure they were correctly configured to allow image pulling from the registry.

Despite extensive efforts (over 8 hours ..) to resolve these issues, including reconfiguring and restarting deployments, the problem persisted, suggesting a deeper configuration or compatibility issue, possibly outside the task setup's immediate scope.

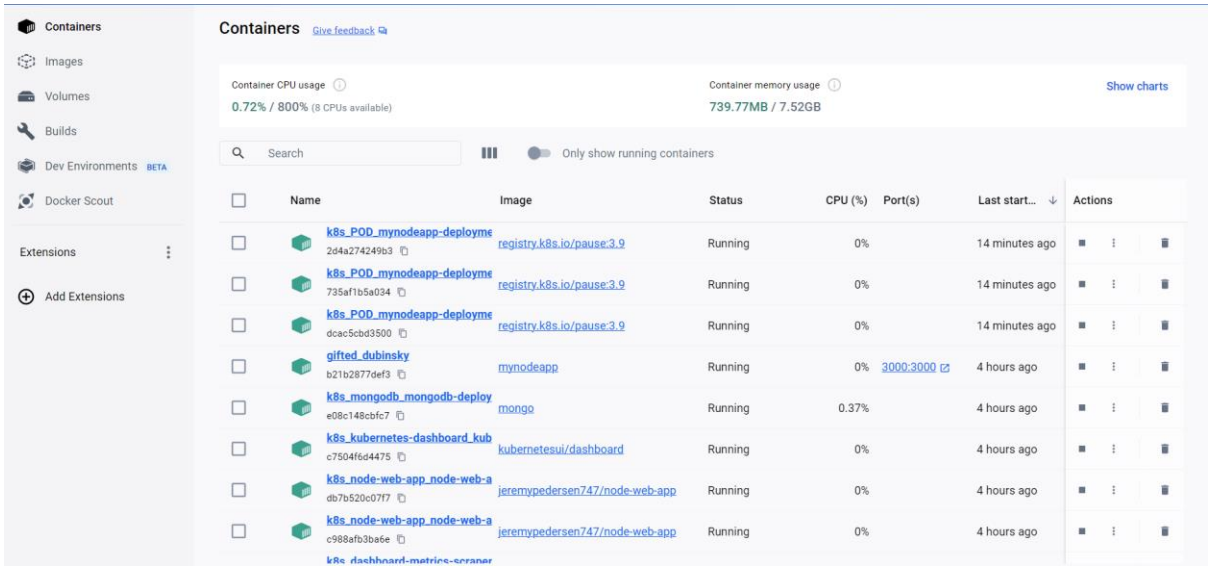
4. Logs and Outputs

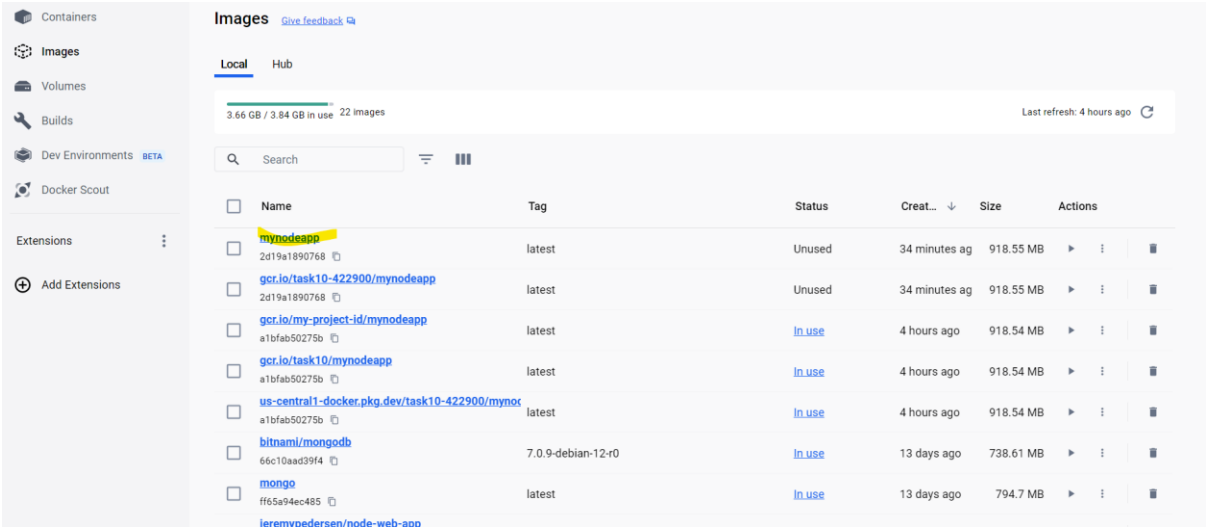
The relevant command outputs and logs, documenting both the successful configurations and the errors encountered, are attached. These include screenshots from the Google Cloud Console, Kubernetes pod description logs, and deployment commands' terminal outputs.

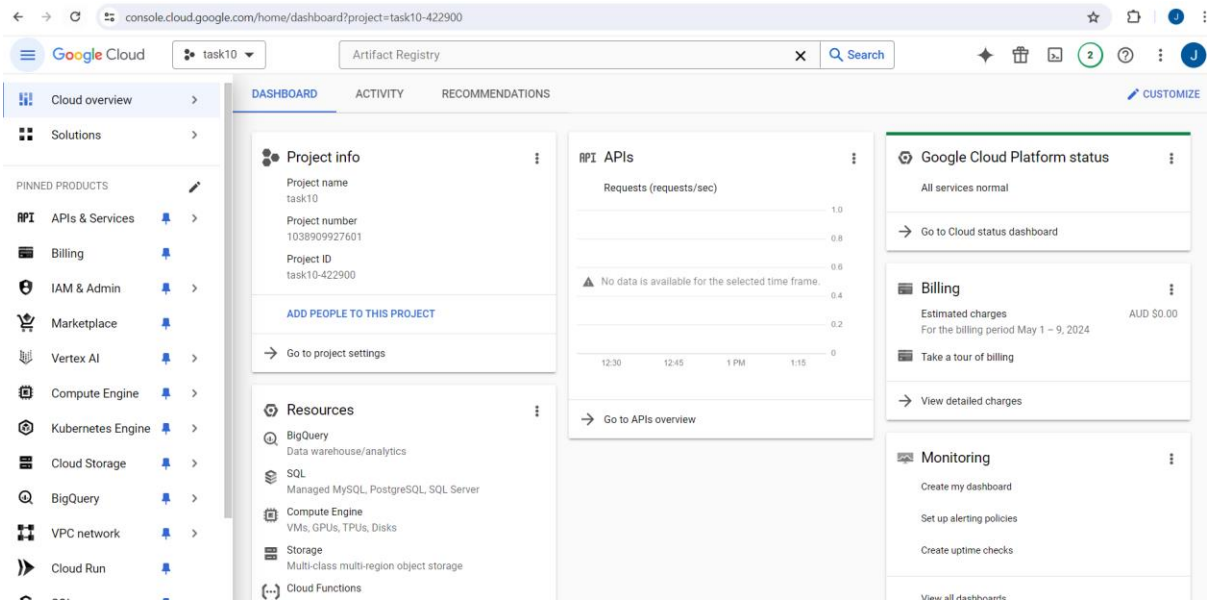
5. Reflections and Learning Outcomes

This project provided profound insights into the complexities of deploying applications in a cloud-native environment using Kubernetes. It highlighted the importance of precise configuration and the challenges associated with managing cloud resources and security:

- Technical Learning: Gained a better understanding of Docker and Kubernetes, especially in cloud integrations and containerised application deployment.
- Problem-Solving Skills: Developed a systematic approach to troubleshooting deployment issues in a cloud environment.




Containers
Images
Volumes
Builds
Dev Environments BETA
Docker Scout
Extensions
Add Extensions
Images Give feedback
Local Hub
3.66 GB / 3.84 GB in use 22 images
Last refresh: 4 hours ago
Search
Name Tag Status Creat... Size Actions
mynodeapp 2d19a1890768 latest Unused 34 minutes ag 918.55 MB
gcr.io/task10-422900/mynodeapp 2d19a1890768 latest Unused 34 minutes ag 918.55 MB
gcr.io/my-project-id/mynodeapp a1bfab50275b latest In use 4 hours ago 918.54 MB
gcr.io/task10/mynodeapp a1bfab50275b latest In use 4 hours ago 918.54 MB
us-central1-docker.pkg.dev/task10-422900/mynoc a1bfab50275b latest In use 4 hours ago 918.54 MB
bitnami/mongodb 66c10aad39f4 7.0.9-debian-12-r0 In use 13 days ago 738.61 MB
mongo ff65a94ec485 latest In use 13 days ago 794.7 MB
jeremypedersen/node-web-app


console.cloud.google.com/home/dashboard?project=task10-422900
Google Cloud task10 Artifact Registry Search
Cloud overview
Solutions
PINNED PRODUCTS
APIs & Services
Billing
IAM & Admin
Marketplace
Vertex AI
Compute Engine
Kubernetes Engine
Cloud Storage
BigQuery
VPC network
Cloud Run
DASHBOARD ACTIVITY RECOMMENDATIONS CUSTOMIZE
Project info
Project name task10
Project number 1038909927601
Project ID task10-422900
ADD PEOPLE TO THIS PROJECT
Go to project settings
Resources
BigQuery Data warehouse/analytics
SQL Managed MySQL, PostgreSQL, SQL Server
Compute Engine VMs, GPUs, TPUs, Disks
Storage Multi-class multi-region object storage
Cloud Functions
APIs
Requests (requests/sec)
No data is available for the selected time frame.
Go to APIs overview
Google Cloud Platform status
All services normal
Go to Cloud status dashboard
Billing
Estimated charges AUD $0.00
For the billing period May 1 – 9, 2024
Take a tour of billing
View detailed charges
Monitoring
Create my dashboard
Set up alerting policies
Create uptime checks