kubernetes

CS777 Big Data Analytics

Aditya Maheshwari

BOSTON UNIVERSITY

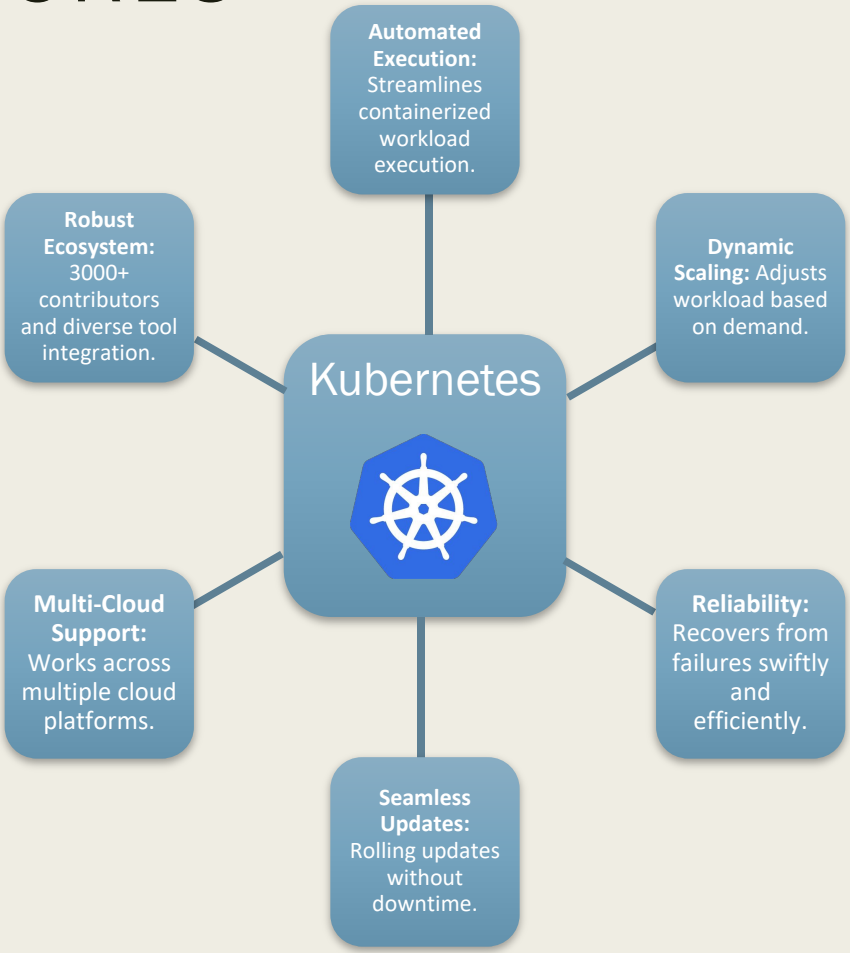
Fall 2023

WHAT & WHY?

- **Kubernetes (K8s):** Open-source container management by Google in 2014.
- **Function:** Manages containerized apps efficiently.
- **CNCF Donation:** Google donated it to CNCF in 2015.
- **Cloud Usage:** Compatible with AWS, Google Cloud, and private clouds.
- **Containerization Advantages:** Efficient, consistent, and portable.
- **Complexity Challenge:** Containerization complexity addressed by Kubernetes.
- **Facilitating Features:** Streamlines management and deployment.

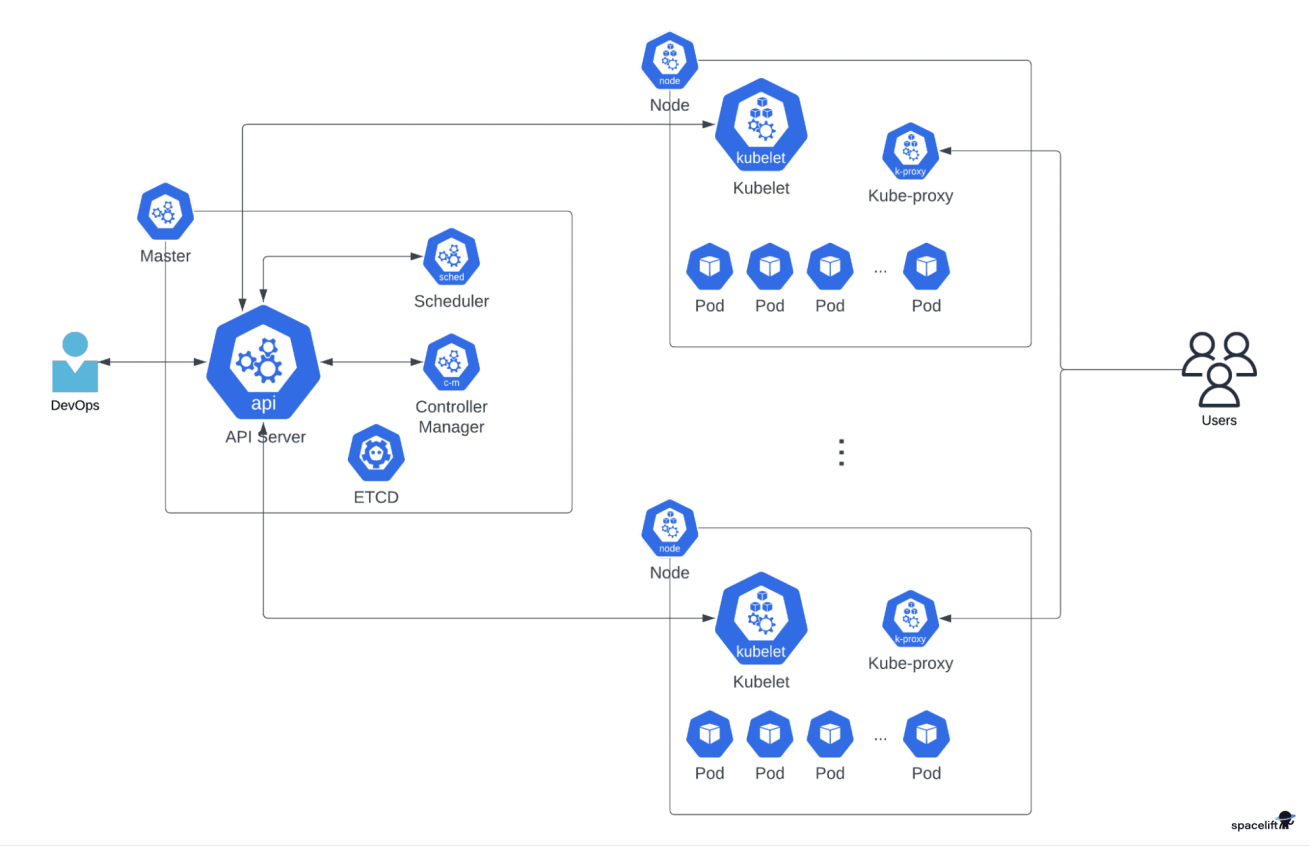
kubernetes

KEY FEATURES

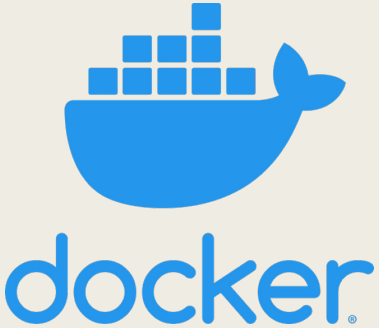


kubernetes

ARCHITECTURE



SOFTWARES & INSTALLATIONS



Install Docker
https://docs.docker.com

>> brew install kubectl
>> kubectl version --client

>> brew install minikube
>> minikube start

kubernetes

CREATION OF KUBERNETES CLUSTER

```
Terminal commands to create a minikube cluster

minikube status
minikube start --driver=docker
miniube ip
minikube ssh
docker ps
kubectl cluster-info
kubectl get nodes
kubectl get pods
kubectl get namespaces
kubectl get pods --namespace = kube-system
kubectl run nginx --image = nginx
kubectl describe pod nginx
minikube ssh
kubectl get pods -0 wide
alias k='kubectl'
k create deployments
k get pods
k describe deployment nginx-deployment
k scale deployment nginx-deploymet --replicas=5
k get deloyments
k expose deployment nginx-deployment --port = 8080 --target-port = 80
k get services
k describe service nginx-deployment
```

Creating a cluster using terminal commands (manually)

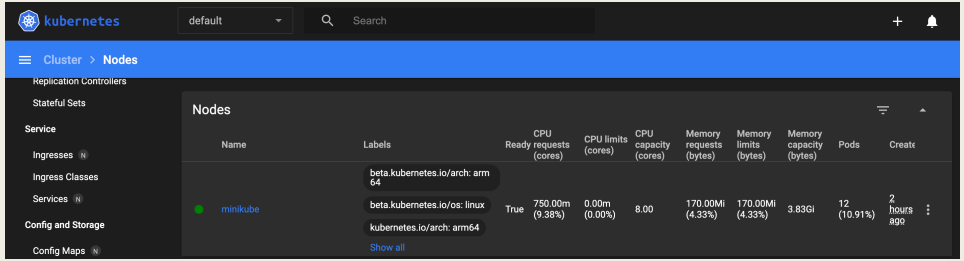
kubernetes-dashboard.yaml

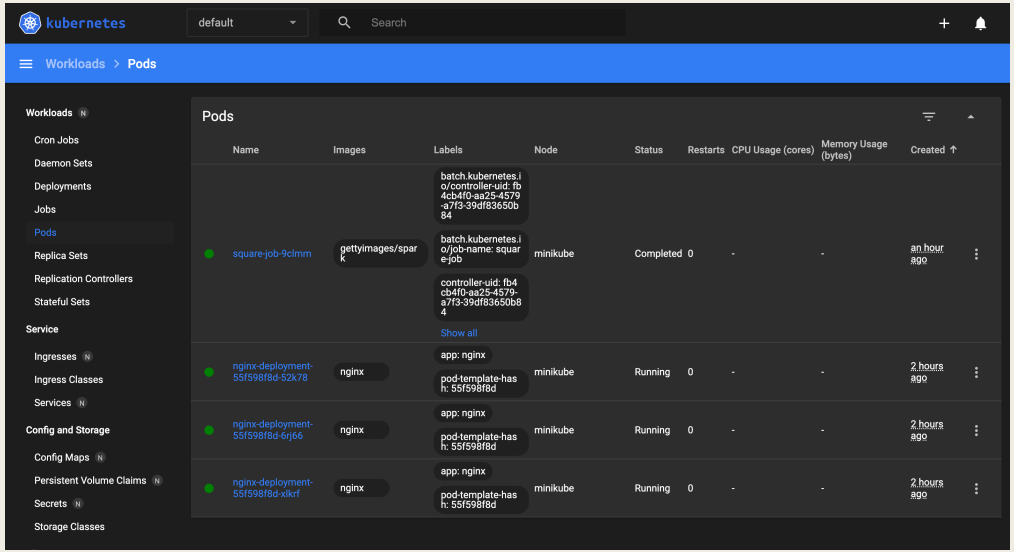
```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
      - name: nginx
        image: nginx
        ports:
        - containerPort: 80
---
apiVersion: v1
kind: Service
metadata:
  name: nginx-service
spec:
  selector:
    app: nginx
  ports:
    - protocol: TCP
      port: 8080
      targetPort: 80
  type: NodePort
```

Creating a cluster using .yaml file

kubernetes

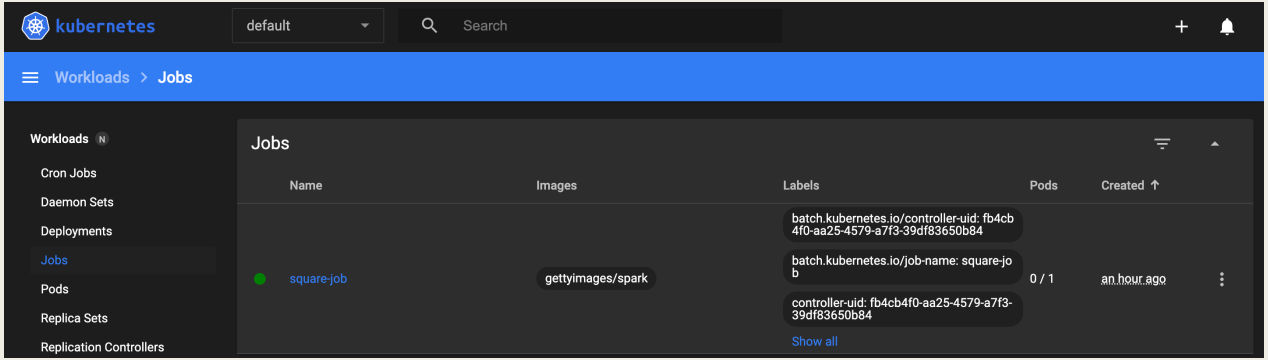
KUBERNETES DASHBOARD

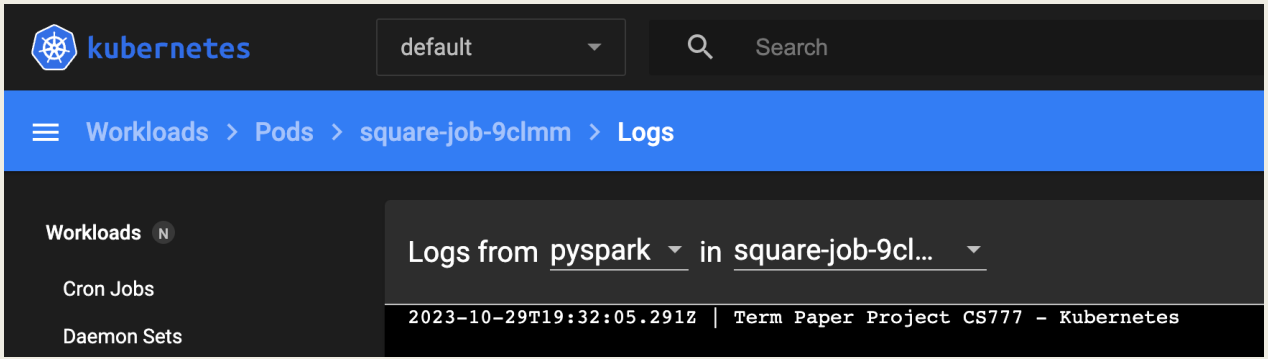




kubernetes

KUBERNETES JOB OUTPUT





USE CASES

1. **Distributed Processing:** Manages Hadoop and Spark frameworks.

2. **Data Storage Management:** Efficient handling of data storage systems.

3. **Distributed Systems Management:** Deploys MongoDB, Kafka, and more.

ADVANTAGES	DISADVANTAGES
Scalability	Complex configuration and integration
Portability	Steep learning curve
Stability	

kubernetes

CONCLUSION

- **Kubernetes for Big Data:** Empowers efficient Big Data management.
- **Feature-Rich Support:** Scalability, stability, and portability for Big Data.
- **Ongoing Advancements:** Continuous improvement via contributions.
- **Learning Curve:** Demands familiarity but offers substantial benefits.

kubernetes

THANK YOU