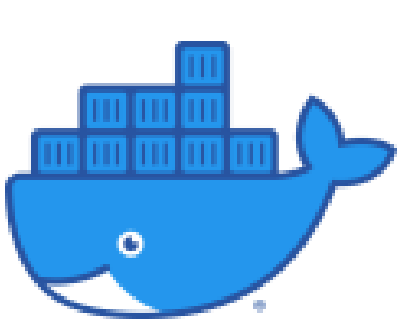
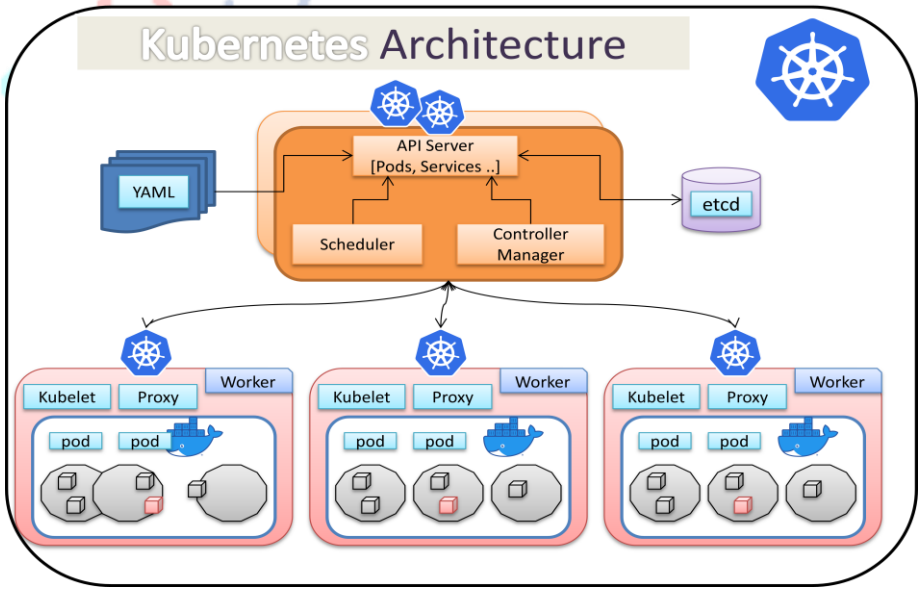
KUBERNETES COURSE CONTENT



Docker & Kubernetes

Course Summary

Kubernetes is a wonderful open source platform for container-orchestration, basically container is providing compute power while controlling the micro services and every container has its own storage network and processing unit and generally container orchestration tools are managing and scheduling containers when the time of node failure.



Kubernetes is one of the best market leaders for container- orchestration. In this course we are going to learn set of kubernetes features, benefits, deployments and monitoring alerts.

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Let Start “Course Content“

Docker:

- Why Docker ? Why Now?
- Docker Architecture and Terminology.
- Microservices Vs Monolithic Apps
- Why Microservices Apps ?
- Docker Installation On Linux / Windows

Docker Containers:

- What is Container ?
- What is Docker daemon?
- Container Vs VM
- Multiple Containers Management
- Container basic commands
- Docker Container Lifecycle Management

Building Docker Image

- Image Creation
- Deploying and configuring Private Registry
- Automating Build using Dockerfile Instructions
    - ✓ FROM Instruction
    - ✓ Environmental Vars
    - ✓ RUN ,CMD
    - ✓ ADD, Copy
    - ✓ EXPOSE, ENTRYPOINT
    - ✓ Etc..

- Image Tagging
- Commit Changes
- Push/Pull Images With Docker Registry
- Docker Image Creation with Real world Use cases.

Docker Networking/ Storage

- Overview Of Docker Networking
- Docker Networking Drivers and Usage
- User Defined Network Creation and Management.
- DNS? How to enable Name Resolution between the Containers
- Overview Of Docker Storage Drivers
- Docker Volume Vs VM Volume
- Docker Volume Management and Storage Plugins
- Storage Types and real time Use Cases.

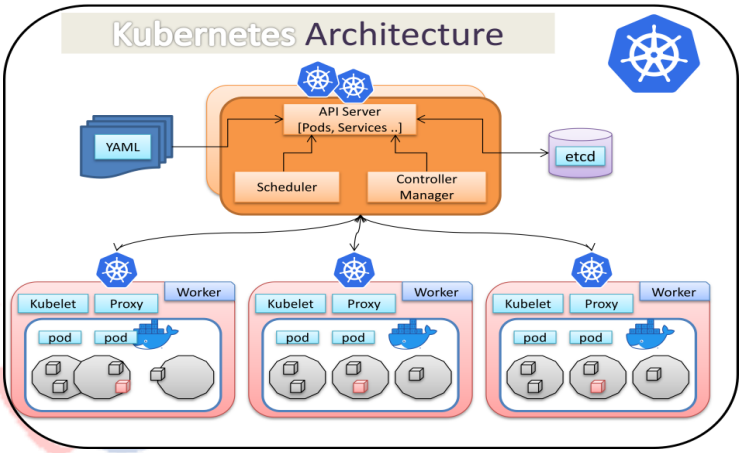
Container Orchestration

- Orchestration key features.
- Why Organizations are looking for Container Orchestration.
- Most familiar Container Orchestration Tools and working.

Kubernetes

- Kubernetes History
- Why it became more famous in Container Orchestration world.
- Where did Kubernetes come from

Kubernetes Architecture



- Kubernetes Overview
- Kubernetes Terminology
  - ❖ Node
    - ✓ Master Node Basic components
      - Kube-API Server
      - Kube-Scheduler
      - Kube- Controller Manager
      - Etcd
    - ✓ Worker Node Basic components
      - Kubelet
      - Kube Proxy
      - Pod
      - Pod Network

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- Etc..

✓ Master Node – Worker Node Communication

- Configure a kubernetes cluster using Kubeadm
- Bootstrap a kubernetes cluster on premise data center and cloud

Kubernetes Certifications Demand

Certified Kubernetes Administrator (CKA)

Certified Kubernetes Application Developer (CKAD)

Certified Kubernetes Security Specialist (CKS)

Kubernetes Fundamenatls

Module 1: YAML Basics

- Introduction to Kubernetes Declarative Approach
- YAML Basics
- Create Pod with Yaml syntax
- kubernetes manifest file implementation with Yaml

Module 2: Running Kubernetes Cluster

- On Premises Cluster Creation
- Custom Cloud Solution
- AWS EKS Cluster
- Azure AKS Cluster
- GKE Cluster
- Minikube Cluster
- KOPS (Kubernetes Operations) Cluster
- Rancher Cluster

Module 3: Pods

- Overview on Pod's
- Differences BW Container and Pod
- Pod Components
- Pod's Creation through Imperative and Declarative Approach
- Managing Pod and Pod's Metadata
- Deploying Pod using kubectl and Manifests
- Pod Networking and volume management
- kubernetes sidecar container
- Exposing Pods Over Exec and Port forwarding
- Hands on with Pod working

Module 4: Deployments

- Introduction to Deployments
- Deployment strategies in Kubernetes
- Defects of Pods and introduction to Deployments.
- Scaling Applications with Deployments and replication controller, replica set.

- Difference between replication controller and replica set.
- Deep drive on Kubernetes Deployments
- Real-Time Use Cases on Deployments.

Module 5: Services

- Introduction to Kubernetes Services and it's working.
- Deep drive into Kubernetes services.
- Namespaces and DNS

    - ✓ Services - Cluster IP Service
    - ✓ Services - External Name Service
    - ✓ Services - Load Balancers
    - ✓ Services - Ingress Service
    - ✓ Services - Ingress SSL & SSL Redirect
    - ✓ Services - Ingress & External DNS

- Kubernetes - Liveness & Readiness Probes
- Creating ingress controllers and services.
- Constructing ClusterIP, NodePort, Loadbalancer and ingress services.
- Kubernetes - Namespaces, Limit Range and Resource Quota

Module 6: Namespaces

- Introduction to Kubernetes Namespaces
- Deep drive into Kubernetes Namespaces.

    - ✓ Namespaces - Imperative
    - ✓ Namespaces - Limit Range
    - ✓ Namespaces - Resource Quota

- Creating Namespaces
- NamespaceDefaultLabelName.

Module 7: Labels and Selectors

- Introduction to Labels and Annotations
- Syntax and character set
- Label Selectors
- Set-based requirements
- Equality-based requirement
- Overview of annotations to attach metadata to Kubernetes objects.
- Configuring Node and Pod Affinity.

Module 8: Volumes

- Introduction to Persistence and Non-Persistent Storage
- Deep drive into Kubernetes Volumes.
  - ✓ Storage Classes
  - ✓ Persistent Volumes
  - ✓ Persistent Volume Claims
- Importance of Kubernetes storage classes and working
- Static Provisioning
- Dynamic Provisioning
- HostPath configuration and volumes management

Module 9: Networking

- Networking Problems
- Docker Networking
- Kubernetes Networking

- Networking Implementations
- Overlay Network
- Network Policy
- Flannel

Module 10: Network Policies

- Introduction to Kubernetes Network policies
- Network Default policies and usage.
- Targeting a range of Ports.
- Targeting a Namespace by its name.
- Create ingress and egress policies
- Allow egress traffic to IP addresses or CIDR range

Module 11: Istio and Service Mesh

- Introduction to Istio Service Mesh
- What is Istio ?
- Istio Traffic Management
- Managing microservices with the Istio service mesh
- Deploying Istio on Kubernetes Cluster

Module 12: Variables

- Introduction to Environments Variables.
- Define an environment variable for a container
- Using environment variables inside of your config
- Using Secrets as environment variables

Module 13: Authentication

- Kubernetes Authentication strategies
  - ✓ Bootstrap Tokens
  - ✓ Static Token File
  - ✓ Service Account Tokens
- Service Account creation and working
- Kubernetes authentication methods
- Using RBAC Authorization
- RBAC Role and ClusterRole

Module 14: CronJob

- Introduction Kubernetes CronJob
- Kubenetes CronJob Limitations
- Scheduling CronJob on Kubernetes Cluster
- Real-time use cases for Kubernetes CronJob

Module 15: AWS EKS

- Introduction to AWS EKS - Elastic Kubernetes Service
- AWS EBS - Elastic Block Store
- EKS Cluster Creation
- Application Deployment On EKS Cluster

Module 16: Azure AKS

- Introduction to AWS AKS - Azure Kubernetes Service
- AKS Cluster Creation
- Create an Azure Container Registry (ACR)
- Application Deployment on AKS

Module 16: Rancher

- Introduction Kubernetes Rancher Cluster
- Rancher Installation and pre-requisites
- Deploy a cluster workload in Rancher
- Deploying Rancher Container
- Real-Time Use cases On Rancher

Module 17: Google GKE

- Introduction to Google GKE - Google Kubernetes Engine
- Google Kubernetes Cluster Creation
- Application Deployment on GKE
- GKE autopilot and Use cases.

Module 18: Jenkins CI/CD

- Introduction to Jenkins
- Jenkins Job Creation and Integration with CI/CD
- CI/CD Pipeline Integration with Kubernetes Cluster
- Important Jenkins Plugins
- Real-Time Use cases on Jenkins Integration with K8S
- Google Kubernetes Cluster Creation

Module 19: Helm Chart

- Overview of Helm charts
- When and why to use Helm and Helm Charts in Kubernetes Deployment.
- Describing a Helm chart Yaml files
  - ✓ .helmignore
  - ✓ chart.yaml

- ✓ values.yaml
- ✓ templates

- Installing and Configuration of Helm Charts
- Helm Stable repository and deployment Apps

Module 19: Monitoring and Kubernetes observability

- Pod and Cluster Monitoring
- Overview on Heapster and ELK Stack
- Configuration of Prometheus monitoring
- Grafana dashboard with parameters control
- log analysis using kibana
- Kubernetes Dashboard

Module 20: Troubleshooting and Working keywords

- Container version Upgradation
- Cluster Upgradation
- Challenges with Cluster Failure
- Backup and Restore
- Common Kubernetes troubleshooting tasks

Kubernetes Certification (CKA , CKAD , CKS) and practice Questions.

Kubernetes Interview Preparation Tips & Tricks

Kubernetes Day to Day activities and CV Preparation.

Kubernetes Organizational Best Practices and use cases.

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