

# Kubernetes Basic

## Course Outline

- Introduction to Kubernetes
  - What is Kubernetes
  - Advantages of Kubernetes
  - Kubernetes features / concepts
  - Kubernetes cluster components
    - Nodes - Masters, workers
    - Master Node
      - Etcd, Api Server, Controller Manager, Scheduler
    - Worker Node
      - Kubelet, Kube Proxy
  - Kubernetes Resources Overview
    - Workload
    - Networking
    - Configuration management
    - Storage
    - RBAC
  - 12 Factor apps and Kubernetes
- Lokal Kubernetes environment
  - Introduction to Minikube and local Kubernetes
  - Setup of local cluster using Minikube
- Working with Kubernetes
  - Working with Kubernetes CLI
  - Basic kubectl commands
  - Work with Kubernetes YAML files
    - Basic structure of Kubernetes YAML files
    - Kubernetes metadata
  - kubectl proxy
  - Kubernetes Dashboard
    - Working with dashboard in Minikube
    - Setup & work with Kubernetes dashboard in production environment
    - Setup dashboard for dev environment outside Minikube (Azure, AWS, ...)
- Pod
  - What is pod?
  - Pod lifecycle
  - Pod YAML
  - Components of Pods
    - Containers
    - InitContainers

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- Resource (Requests, Limits)
- Configuration
  - Environment Variables
  - Config Files
- Volumes
  - Local Storage
  - Persistent Volumes
- topologySpreadConstraints
- Generated Names
- Workload Controllers
  - Why we want to use workload controllers
  - CRUD
  - ReplicaSets
  - Deployment
  - StatefulSets
  - DaemonSets
  - Jobs
  - CronJobs
- Rollbacks & Deployment history
- Rollout Strategies
  - Rolling Update
  - Recreate
  - Blue Green
  - Canary Deployments
- kubectl run
- Services
  - Concept of services
  - ClusterIP
  - Headless Services
  - NodePort
  - LoadBalancer
  - ExternalService
- Ingress
  - Concept of Ingress
  - Ingress Controllers
    - Nginx Ingress Controller
  - Ingress on Minikube & in cloud
  - Kubernetes Ingress Resource
  - Cert-manager & HTTPS
- Namespaces
  - Concept of Namespaces
  - Namespaced & Cluster wide resources
  - CRUD
  - Limit resources in namespace (ResourceQuotas)
- Storage
  - emptyDir
  - Persistent Storage concept
  - Storage Classes

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- PersistentVolumeClaims
- NFS Storage
- Longhorn Storage
- Reclaim policy
- Configuration
  - Concept of ConfigMaps & Secrets
  - Secrets
    - Types
  - ConfigMaps
  - Configuration in Pods
    - Configuration files
    - Environment variables
    - Expansion of ENV variables in config files
- Kubectl config file
  - Manage multiple clusters in one config
- Role Base Access Control
  - Concept of RBAC
  - Impersonation
  - Testing permission using kubectl can-i
  - ServiceAccounts
  - Roles / ClusterRoles & bindings
    - Custom roles
- CURL access to Kubernetes API
- Probes
  - Concept of probes
  - Probe methods (http, exec, tcp)
  - Startup probes
  - Liveness probes
  - Readiness probes
- Auto Scaling
  - Introduction to metrics server
  - Metrics using kubectl top
  - Introduction to autoscaling
  - Horizontal Pod Autoscaler
  - Load generation using AB (Apache Benchmark)
- Helm
  - Introduction to Helm
  - Basic helm commands
  - Helm repositories
  - Install public Helm packages
  - Artifact Hub
  - Create own helm package
  - Publish helm package to helm repository