Kubernetes Full Tutorial (English + Kannada)

1. What is Kubernetes?

English: Kubernetes (K8s) is a container orchestration tool. It manages containerized applications automatically — scaling, self-healing, and networking.

Kannada: Kubernetes (K8s) ■■■■■ container orchestration tool. ■■■ container apps-■■■■■ ■■■■■ manage ■■■■■■■■■ – scale ■■■■■■■, ■■■■■■■■■ heal ■■■■■■■■, network ■■■ control ■■■■■■■■■.

2. Kubernetes Architecture

English:

- Master Node (Control Plane) → API Server, Scheduler, Controller Manager, ETCD.

- Worker Nodes → kubelet, kube-proxy, container runtime (Docker/CRI-O).

Kannada:

- Master Node → control ■■■■■ node.

- Worker Node → application run ■■■ node.

3. Kubernetes Important Objects

Pod:

English: Smallest unit → runs 1 or more containers.

Kannada: ■■■■ ■■■ → ■■■■ ■■■■ ■■■■■■ container run ■■■■■■■■■.

ReplicaSet:

English: Ensures fixed number of pods run.

Kannada: ■■■■■■■ fixed pod count ■■■■■ ■■■■■■■■■■.

Deployment:

English: Manages ReplicaSets, supports rolling updates/rollback.

Kannada: ReplicaSet-■■■■■ manage ■■■■■■■■, update/rollback ■■■■■■■■.

Service:

English: Provides stable networking for pods.

Kannada: Pod IP ■■■■■■■■■ stable access ■■■■■■■■.

ConfigMap & Secret:

English: Store configs (ConfigMap) and sensitive data (Secret).

Kannada: Settings store ■■■■■■ (ConfigMap), passwords store ■■■■■■ (Secret).

Namespace:

English: Virtual cluster inside Kubernetes.

Kannada: Cluster-■■■■■ project/team ■■■■■ ■■■■ divide ■■■■■■.

Ingress:

English: External HTTP/HTTPS access to services.

Kannada: Service-■■ ■■■■■■■ users HTTP/HTTPS ■■■■ access ■■■■■■.

Volumes:

English: emptyDir, hostPath, PV, PVC for storage.

Kannada: temporary ■■■■■ permanent storage options.

DaemonSet:

English: One pod per node (logging/monitoring).

Kannada: ■■■■■ node ■■■■ ■■■■ pod run ■■■■■■■■.

StatefulSet:

English: For stateful apps like DB.

Kannada: Database/stateful apps-■■ ■■■■■.

Job & CronJob:

English: Job → one-time task. CronJob → scheduled tasks.

Kannada: Job → ■■■■ ■■■■. CronJob → ■■■■■■■ ■■■■■■■.

Horizontal Pod Autoscaler (HPA):

English: Auto scales pods.

Kannada: Pod load ■■■■■■■■■ auto scale.

NetworkPolicy:

English: Firewall rules between pods.

Kannada: Firewall/network rules ■■■■■■.

4. Real-time Example

MySQL + App → StatefulSet + PVC + Deployment + Service + Ingress.

5. Debugging

kubectl get pods → check status

kubectl logs pod → check logs

kubectl describe pod → check events

kubectl exec -it pod -- bash → go inside

6. Handling Pod Failure Without Downtime

English: Use multiple replicas + RollingUpdate.

Kannada: Replicas ■■■■■■■■ downtime ■■■■■.

7. Production Checklist

- Use Deployment, not single Pod

- Replicas > 2

- HPA for scaling

- Service/Ingress for load balancing

- readinessProbe/livenessProbe for healing

- ConfigMap/Secret for configs

- PV/PVC for storage

- Monitoring with Prometheus/Grafana

8. Interview Questions

Q1: Difference between Deployment & StatefulSet?

Q2: Use of Service?

Q3: How to store sensitive data?

Q4: How to debug CrashLoopBackOff?

Q5: Difference between ConfigMap & Secret?

Summary:

Kubernetes in Production = Self-healing + Scaling + Load balancing + Zero downtime