



# **KUBECTL OVERVIEW AND MINIKUBE INSTALLATION WITH ROLLING UPDATES**

## Training Material

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## Chapter 1: Kubernetes kubectl Overview and Key Commands

### *1.1 Introduction to kubectl*

The kubectl command-line tool enables direct interaction with Kubernetes clusters. It supports resource management, application deployment, and logs access, allowing users to control various aspects of Kubernetes environments.

### *1.2 Basic kubectl Commands for Cluster Management*

- **Get cluster information:** `kubectl cluster-info`
- **List all resources:** `kubectl get all`
- **Get nodes in the cluster:** `kubectl get nodes`
- **Describe a node:** `kubectl describe node <node-name>`

### *1.3 Managing Pods and Deployments with kubectl*

- **Create a pod:** `kubectl run <pod-name> --image=<image-name>`
- **Delete a pod:** `kubectl delete pod <pod-name>`
- **Create a deployment:** `kubectl create deployment <deployment-name> --image=<image-name>`
- **Scale a deployment:** `kubectl scale deployment <deployment-name> --replicas=<number>`

### *1.4 Service Management and Networking Commands*

- **Expose a deployment as a service:** `kubectl expose deployment <deployment-name> --type=<service-type> --port=<port>`
- **View service details:** `kubectl get service <service-name>`
- **Access an external service URL:** `kubectl port-forward service/<service-name> <local-port>:<container-port>`

### *1.5 Namespace Management with kubectl*

- **Create a namespace:** `kubectl create namespace <namespace-name>`
- **View all namespaces:** `kubectl get namespaces`
- **Delete a namespace:** `kubectl delete namespace <namespace-name>`

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## Chapter 2: Installing kubectl and Minikube on Local Environments

### 2.1 Installing kubectl on Windows

- **Windows:**  
Download the binary and add it to your PATH.

### 2.2 Verifying kubectl Installation

Run the following command to verify installation:

```
kubectl version --client
```

### 2.3 Installing Minikube on Windows

- **Windows:**  
Download the executable from Minikube releases.

### 2.4 Verifying Minikube Installation

Check installation with:

```
minikube version
```

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## Chapter 3: Starting and Configuring Minikube Cluster

### 3.1 Initializing a Minikube Cluster

To start Minikube with a specific driver:

```
minikube start --driver=<driver-name>
```

Common drivers include docker and virtualbox.

### 3.2 Starting, Stopping, and Deleting a Minikube Cluster

- **Start Minikube:** minikube start
- **Stop Minikube:** minikube stop
- **Delete Cluster:** minikube delete

### 3.3 Accessing the Kubernetes Dashboard with Minikube

To open the Minikube dashboard:

minikube dashboard

### 3.4 Advanced Minikube Cluster Configuration

- **Specify Kubernetes version:** minikube start --kubernetes-version=<version>
- **Enable Ingress:**

*minikube addons enable ingress*

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## Chapter 4: Essential Minikube Commands and Usage

### 4.1 Rolling Updates and Rollback Concepts

Rolling updates are the default deployment strategy in Kubernetes, offering an easy way to minimize downtime.

- **Rolling Updates:**
  - Kubernetes handles this by controlling the number of Pods updated at a time using parameters like maxSurge and maxUnavailable.
  - maxSurge: Specifies the maximum number of Pods created above the desired amount during the update.
  - maxUnavailable: Determines the maximum number of Pods that can be unavailable during the update.
- **Rollbacks:**
  - In case of a failure, you can rollback to the previous stable version.
  - Kubernetes maintains a history of deployments, enabling you to revert to a previous state if the update fails.

### 4.2 Managing Services in Minikube

Access services using:

minikube service <service-name>

Minikube opens a local URL for the specified service.

### *4.3 Enabling and Managing Add-ons in Minikube*

Enable add-ons such as metrics-server or dashboard with:

`minikube addons enable <addon-name>`

### *4.4 Accessing and Viewing Minikube Logs*

To view Minikube logs for debugging:

`minikube logs`

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