



Kubernetes (K8s) is an open-source container orchestration platform that automates the deployment, scaling, and management of containerized applications.

Key Features of Kubernetes

- **Automated Deployment & Scaling** – Ensures applications scale based on demand.
- **Self-Healing** – Automatically restarts failed containers.
- **Load Balancing** – Distributes network traffic across multiple instances.
- **Storage Management** – Supports persistent storage for applications.
- **Service Discovery** – Manages internal and external application access.

Core Components

- **Pods** – The smallest deployable unit, containing one or more containers.
- **Nodes** – Machines (physical or virtual) that run Kubernetes workloads.
- **Cluster** – A group of nodes managed by Kubernetes.
- **Deployments** – Define application rollout and update strategies.
- **Services** – Provide networking and access to applications.

Why Use Kubernetes

- Ensures consistent application deployment across environments.
- Automates infrastructure management and failure recovery.
- Handles networking and persistent storage efficiently.
- Works with Docker and other container runtimes.

To work with kubernetes

```
#!/bin/bash
```

```
# Kubernetes Installation Script for WSL Ubuntu
```

```
# This script installs Docker, kubectl, Minikube, and Helm on WSL Ubuntu
```

```
set -e
```

```
echo "==== Kubernetes Installation Script for WSL Ubuntu ====="
```

```
echo "This script will install Docker, kubectl, Minikube, and Helm"
```

```
echo "Starting installation..."
```

```
# Update and install required packages
```

```
echo "[1/8] Updating system and installing dependencies..."
```

```
sudo apt-get update
```

```
sudo apt-get install -y apt-transport-https ca-certificates curl software-properties-common gnupg2 contrack
```

```
# Install Docker
```

```
echo "[2/8] Installing Docker..."
```

```

# Remove any old versions
sudo apt-get remove -y docker docker-engine docker.io containerd runc || true
# Add Docker repository
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
# Install Docker CE
sudo apt-get update
sudo apt-get install -y docker-ce docker-ce-cli containerd.io
# Add current user to docker group
sudo usermod -aG docker $USER
# Test Docker installation
echo "Testing Docker installation..."
sudo docker run hello-world

# Install kubectl
echo "[3/8] Installing kubectl..."
curl -LO "https://dl.k8s.io/release/\$\(curl -L -s https://dl.k8s.io/release/stable.txt\)/bin/linux/amd64/kubectl"
sudo install -o root -g root -m 0755 kubectl /usr/local/bin/kubectl
rm kubectl
# Test kubectl installation
echo "Testing kubectl installation..."
kubectl version --client

# Install Minikube
echo "[4/8] Installing Minikube..."
curl -LO https://storage.googleapis.com/minikube/releases/latest/minikube-linux-amd64
sudo install minikube-linux-amd64 /usr/local/bin/minikube
rm minikube-linux-amd64

# Install Helm
echo "[5/8] Installing Helm..."
curl https://raw.githubusercontent.com/helm/helm/main/scripts/get-helm-3 | bash

# Configure Docker to start on WSL startup
echo "[6/8] Configuring Docker to start on WSL startup..."
echo '# Start Docker daemon automatically when WSL starts'
if [ -z "$(ps -ef | grep dockerd | grep -v grep)" ]; then
    sudo service docker start
fi' >> ~/.bashrc

# Create directory for Kubernetes config
echo "[7/8] Creating Kubernetes config directory..."
mkdir -p ~/.kube

# Final setup and verification
echo "[8/8] Performing final setup and verification..."
echo '# Kubernetes aliases'
alias k="kubectl"
alias kgp="kubectl get pods"
alias kgs="kubectl get services"
alias kgd="kubectl get deployments"
alias kgn="kubectl get nodes"
alias kga="kubectl get all" >> ~/.bashrc

# Print installation summary
echo ""
echo "==== Installation Complete! ====="
echo "Docker version:"
docker --version
echo "kubectl version:"
kubectl version --client
echo "Minikube version:"
minikube version
echo "Helm version:"
helm version

echo ""
echo "Important Notes:"
echo "1. You may need to log out and log back in for the Docker group changes to take effect."
echo "2. To start Minikube, run: 'minikube start --driver=docker'"

```

```
echo "3. WSL has some limitations with Kubernetes. For production use, consider native Linux."
echo ""
echo "To start using Kubernetes, run:"
echo "minikube start --driver=docker"
echo ""
echo "===== Happy Kubernetes! ====="
```

