How do you run a POD on Minikube? What steps will you follow?

Minikube: Short & Simple

- **Minikube** is a tool that runs a single-node **Kubernetes cluster** locally.
- Ideal for **learning, testing, and development** on Kubernetes.
- Supports **Linux, macOS, and Windows**.
- Runs Kubernetes inside a **virtual machine (VM) or container**.
- Can deploy and manage **pods, services, and deployments**.
- Provides built-in support for **load balancers, Ingress, and storage**.
- Simple to start: `minikube start` and easy to stop: `minikube stop`.

Pod: The smallest deployable unit in Kubernetes, encapsulating one or more containers.

- **Multi-Container Support**: Can run multiple containers sharing storage & network.
- **Shared Resources**: Containers in a pod share the same IP, hostname, and volumes.
- **Ephemeral**: Designed to be created, destroyed, and replaced dynamically.
- **Managed by Controllers**: Like Deployments, StatefulSets, and DaemonSets for scaling and stability.

A **Node in Kubernetes** is a **worker machine** that runs **containerized applications**. It can be a physical or virtual machine and contains essential components like Kubelet, Kube Proxy, and Container Runtime (e.g., Docker, containerd) to manage and execute Pods.

Step 1: Install Minikube

Minikube allows you to run Kubernetes locally. Install it based on your OS:

For Linux:

```
curl -LO https://storage.googleapis.com/minikube/releases/latest/minikube-linux-
amd64
sudo install minikube-linux-amd64 /usr/local/bin/minikube
```

For Mac (Apple Silicon & Intel):

```
sh
--------
brew install minikube
```

For Windows (Using Chocolatey)

```
sh
--------
choco install minikube
```

Step 2: Install kubectl

You need `kubectl` to interact with the cluster.

```
sh
--------
curl -LO "https://dl.k8s.io/release/$(curl -L -s
https://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl"
chmod +x kubectl
sudo mv kubectl /usr/local/bin/
```

OR (Mac)

```
sh
--------
brew install kubectl
```

OR (Windows)

```
sh
--------
choco install kubernetes-cli
```

Step 3: Start Minikube

```
sh
--------
minikube start
```

This will start a single-node Kubernetes cluster.

Step 4: Verify Installation

Check Minikube status:

```
sh
--------
minikube status
```

Check if `kubectl` can connect:

```sh
kubectl get nodes
```

It should show a single node in the **Ready** state.

Step 5: Create a Simple Pod

Create a YAML file (`pod.yaml`) with a simple **Nginx** pod:

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: my-nginx
spec:
  containers:
  - name: nginx
    image: nginx
    ports:
    - containerPort: 80
```

Apply the pod configuration:

```sh
kubectl apply -f pod.yaml
```

Step 6: Verify the Pod is Running

```sh
kubectl get pods
```

You should see:

```perl
NAME        READY   STATUS    RESTARTS   AGE
my-nginx    1/1     Running   0          Xs
```

Step 7: Access the Pod

Expose the pod using a service:

```sh
kubectl expose pod my-nginx --type=NodePort --port=80
```

Find the Minikube service URL:

```sh
```

```
--------
minikube service my-nginx --url
```

Open the displayed URL in your browser to verify that Nginx is running.

Step 8: Cleanup

To delete the pod:

```sh
--------
kubectl delete pod my-nginx
```

To stop Minikube:

```sh
--------
minikube stop
```

To delete the Minikube cluster:

```sh
--------
minikube delete
```

1. What is the first step to run a pod on Minikube?

A) Create a YAML file
B) Install Minikube and kubectl
C) Start Minikube
D) Run `kubectl get pods`

B) Install Minikube and kubectl ✅

2. How do you start Minikube?

A) `kubectl start minikube`
B) `minikube init`
C) `minikube start`
D) `kubectl create cluster`

C) `minikube start` ✅

3. What command is used to check if Minikube is running?

A) `kubectl get pods`
B) `minikube status`
C) `kubectl status`
D) `minikube check`

B) `minikube status` ✅