**❓ 2. What are Static Pods?**

**🧠 Simple Definition:**

**Static Pods** are special pods that are **directly created by the node itself**, not by the Kubernetes control plane (like the scheduler or controller manager).

They are managed by a part of Kubernetes running on the node called the **kubelet**.

**🛠️ Use Case 1: Control Plane Components**

When you install Kubernetes manually (e.g., using kubeadm), important system services like:

* kube-apiserver
* kube-scheduler
* kube-controller-manager

…are often created as **static pods** on the master node.

Why? Because the control plane isn't fully up yet — and we need to run these pods **before** the scheduler or controller even exists! So kubelet takes care of them.

**🛠️ Use Case 2: Node-Specific Applications**

Sometimes you want to run something **only on one specific node**, like:

* A custom monitoring tool on one powerful node.
* A security scanner on a node with access to sensitive resources.
* A local file-processing script for one node.

Instead of going through Kubernetes API, you just drop a pod YAML file into a **special folder** on that node, and kubelet runs it for you.

**📁 How Do They Work?**

You place a YAML file inside a special folder on a node, like:

/etc/kubernetes/manifests/

Kubelet watches this folder and **automatically starts any pod described in a file there.**

If you delete the file — kubelet deletes the pod.  
If you update the file — kubelet restarts the pod with the new config.

⚠️ Important: Static pods do **not** show up in kubectl get deploy or kubectl get rs — because they are **not managed by the control plane**. You’ll only see them using:

kubectl get pods --all-namespaces

**✅ Advantages of Static Pods**

| **Feature** | **Benefit** |
| --- | --- |
| 🧠 Simple | Just drop a file in a folder to run a pod — no need for YAML + kubectl apply. |
| 🛠️ Works without full control plane | Used for running the control plane components themselves! |
| 📌 Node-local | Useful when you want a pod **only on one specific node**. |
| 🔁 Self-healing | If a static pod crashes, kubelet restarts it automatically. |

**🤔 Static Pod vs DaemonSet (Very Simple Difference):**

| **Feature** | **Static Pod** | **DaemonSet** |
| --- | --- | --- |
| Who manages it? | kubelet on node | Kubernetes control plane |
| Runs on all nodes? | ❌ No (only on the node with the YAML) | ✅ Yes (on all or selected nodes) |
| How created? | YAML in a folder | YAML sent to Kubernetes via kubectl apply |
| Control plane needed? | ❌ No | ✅ Yes |

**🧒 Kid-Level Summary:**

"Static Pods are like lunch boxes you place **manually** in your school locker. The school (Kubernetes) doesn't give them to you — **you bring them yourself** and put them in your locker (node). They're useful if you need lunch even before the cafeteria opens."