**🧱 What Is Kubernetes + Docker?**

* **Docker**: Tool for **containerizing** applications (packaging app + dependencies into a single unit).
* **Kubernetes**: **Orchestrator** that manages multiple containers (scheduling, scaling, healing, networking, etc).

**🔧 Architecture Overview**

Here's a simplified architecture of Kubernetes with Docker:

**🔹 Kubernetes Master Node Components**

| **Component** | **Description** |
| --- | --- |
| **API Server** | Entry point to Kubernetes (talks to kubectl & other components) |
| **Controller Manager** | Ensures desired state (e.g., replicating pods) |
| **Scheduler** | Decides which node runs which pod |
| **etcd** | Key-value store for all cluster data (config/state) |

**🔹 Worker Node Components**

| **Component** | **Description** |
| --- | --- |
| **Kubelet** | Talks to master, runs containers via Docker |
| **Container Runtime** | Docker (or containerd, etc.) runs the containers |
| **Kube Proxy** | Handles networking between pods/services |

**🔹 Other Key Concepts**

| **Concept** | **Description** |
| --- | --- |
| **Pod** | Smallest unit, holds one or more containers |
| **Service** | Stable network endpoint to a set of pods |
| **Deployment** | Manages replica sets and rolling updates |
| **Namespace** | Virtual clusters for organizing resources |

**📦 Docker’s Role in Kubernetes**

* Docker builds container images
* Kubernetes pulls and runs these images inside pods

**📊 Diagram of Kubernetes + Docker Architecture**

Here's a basic visual representation:

Credit: Kubernetes Docs

**✅ Why Use Kubernetes + Docker?**

| **Benefit** | **Explanation** |
| --- | --- |
| **Scalability** | Easily scale up/down your apps |
| **High Availability** | Self-healing containers, auto-restart, replication |
| **Portability** | Docker containers run anywhere |
| **DevOps Friendly** | CI/CD integrations, declarative configs |
| **Load Balancing** | Built-in service discovery and traffic routing |
| **Resource Management** | Limits, quotas, auto-scheduling |





