

# Service

A Service in Kubernetes provides a stable network endpoint to access one or more Pods. It allows communication between different components (e.g., frontend → backend) or access from outside the cluster.

## Why Do You Need a Service?

the problem is

In Kubernetes:

- You deploy your app (say nginx) using a Deployment.
- It creates multiple Pods (like small containers running your app).
- Each Pod gets its own IP address.
- But those IPs can change if the Pod restarts or gets rescheduled.

So, let's say:

```
Pod-1 IP: 10.0.0.2
Pod-2 IP: 10.0.0.5
Pod-3 IP: 10.0.0.9
```

Tomorrow, they might be:

```
Pod-1 IP: 10.0.0.12
Pod-2 IP: 10.0.0.14
```

## Why We Need a Service

A Service gives your app:

- A fixed name (e.g., nginx-service)
- A fixed IP inside the cluster (like 10.0.0.50)
- Automatically connects to whichever Pods are alive

So instead of calling:

```
http://10.0.0.2
http://10.0.0.5

#just call
http://nginx-service
```

Without Service	With Service
IPs change when Pods restart	Fixed IP and name

Without Service	With Service
No easy way to reach your app	Easy and stable access
No load balancing	Load balances between multiple Pods
Hard to expose app outside cluster	Can expose to internet using NodePort / LoadBalancer