KUBERNETES

INTRODUCTION TO DEVOPS

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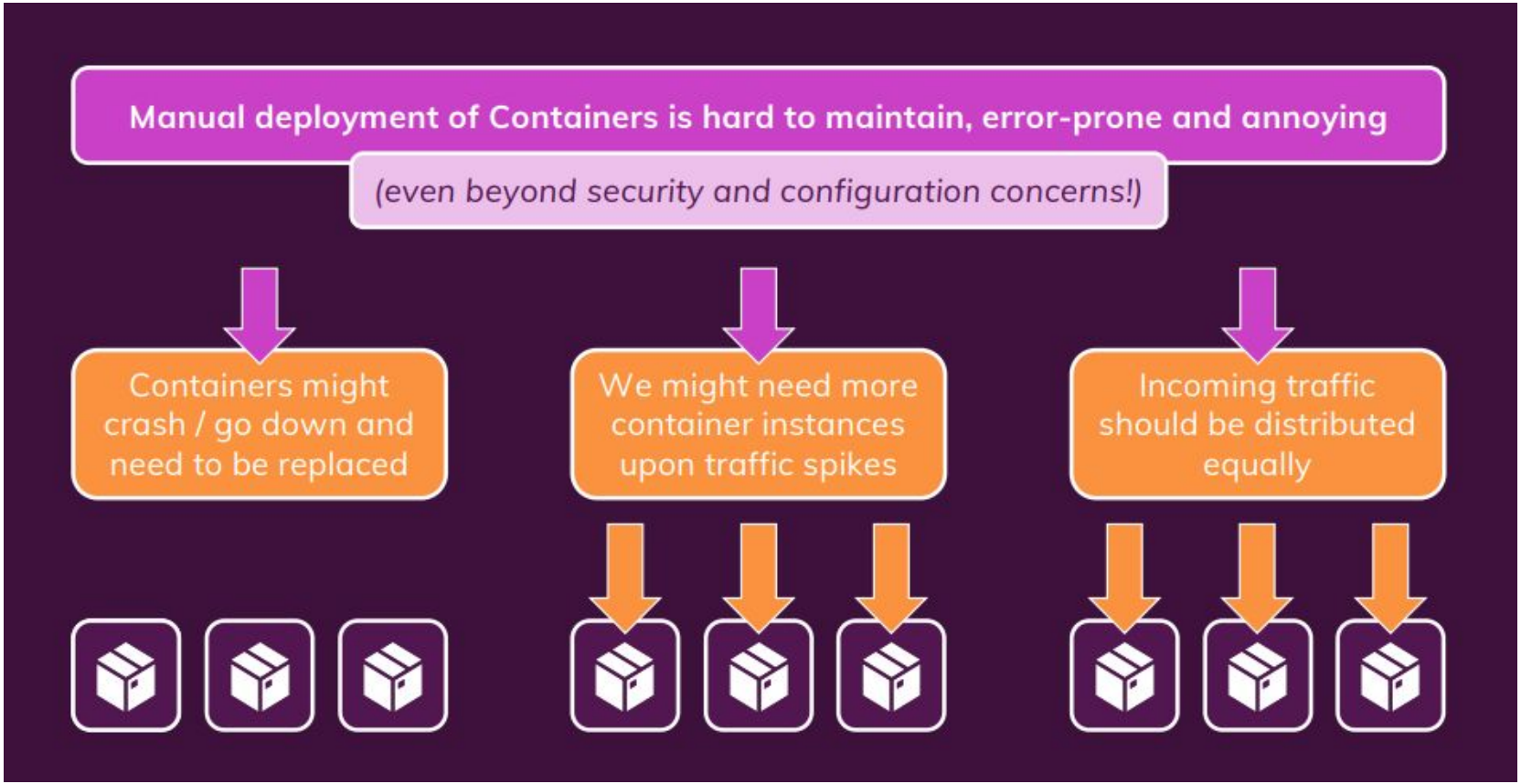
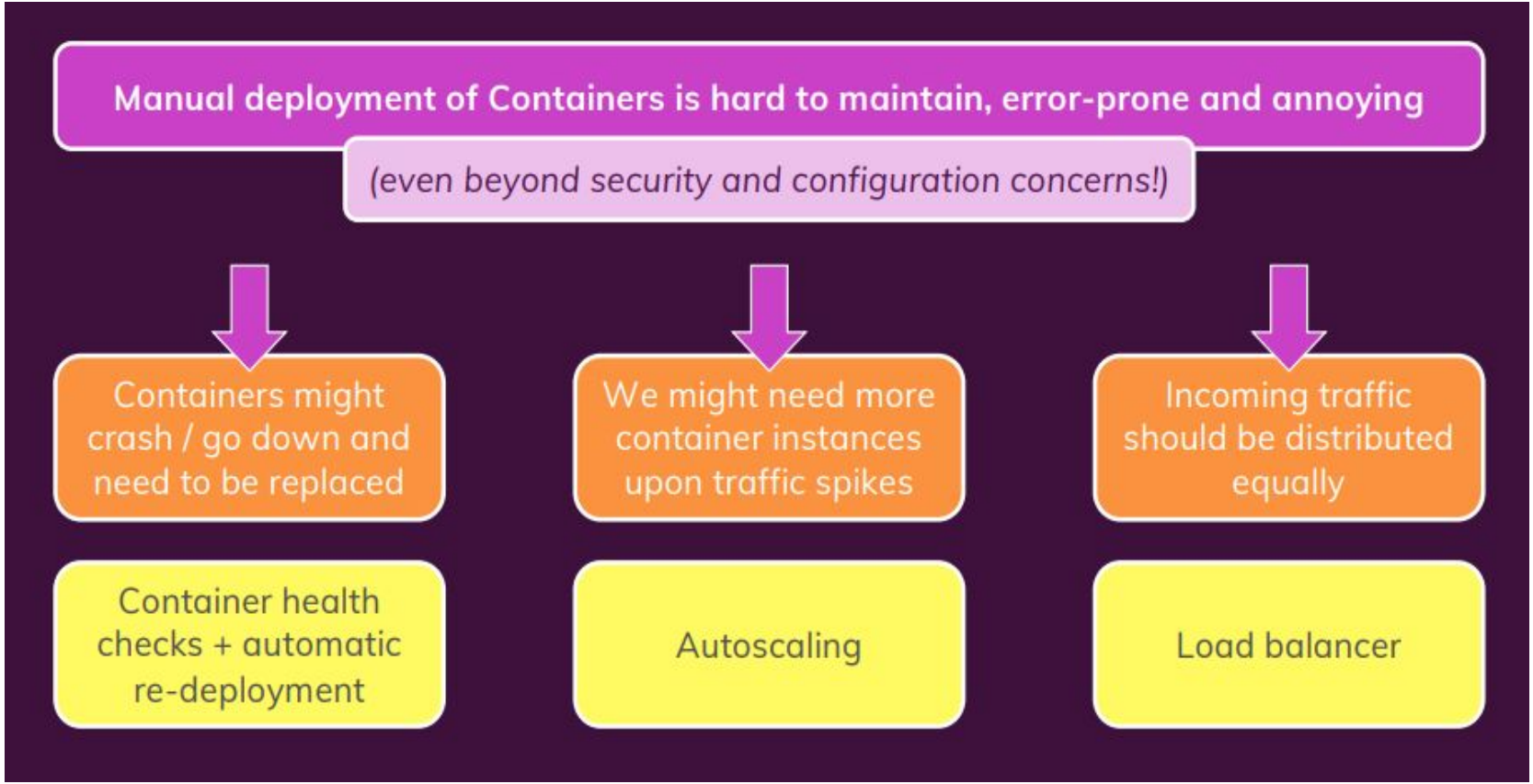
INTRODUCTION

- Kubernetes is an open source container orchestration engine for automating deployment, scaling, and management of containerized applications.
- It groups containers that make up an application into logical units for easy management and discovery.

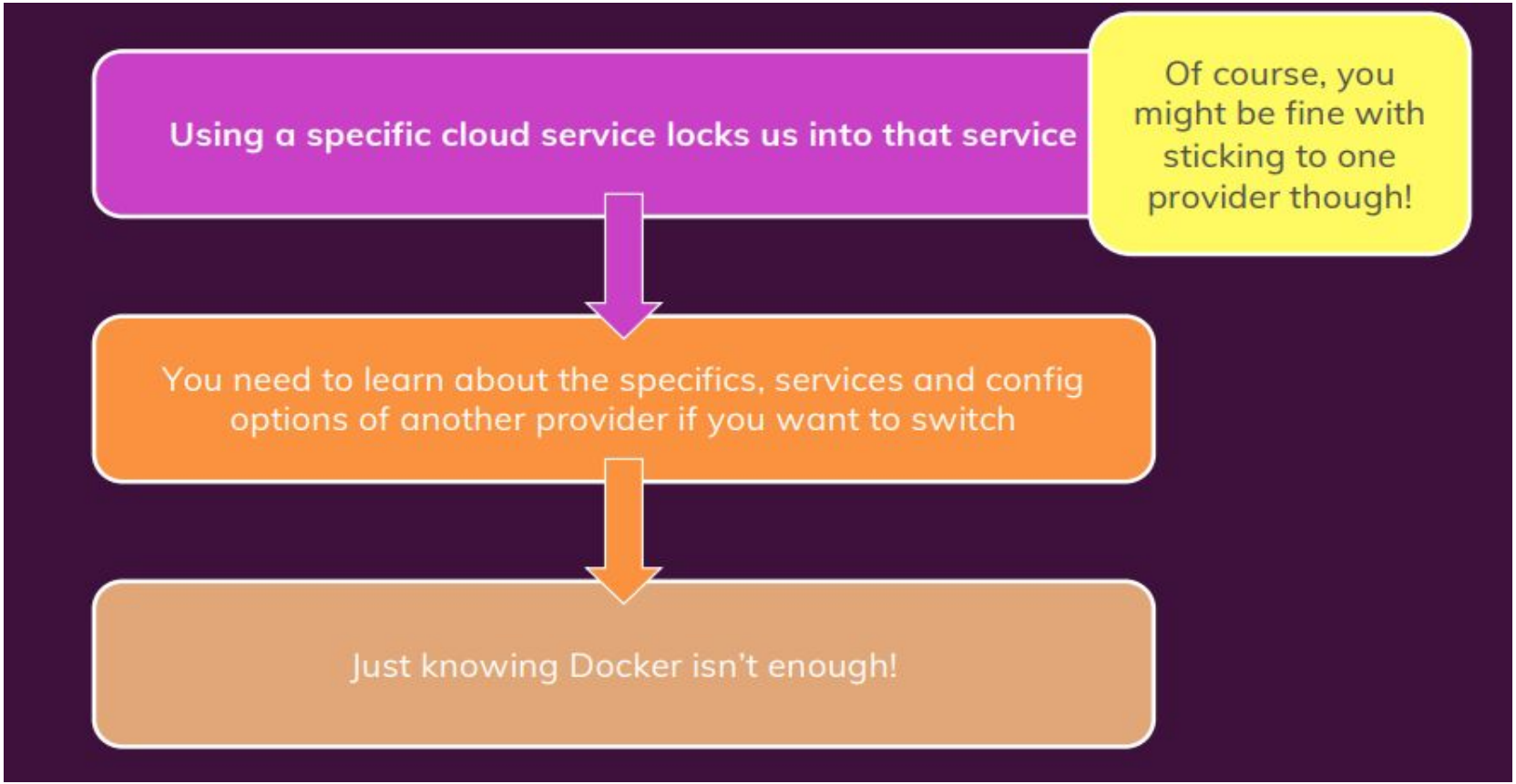
Problems with manual deployment



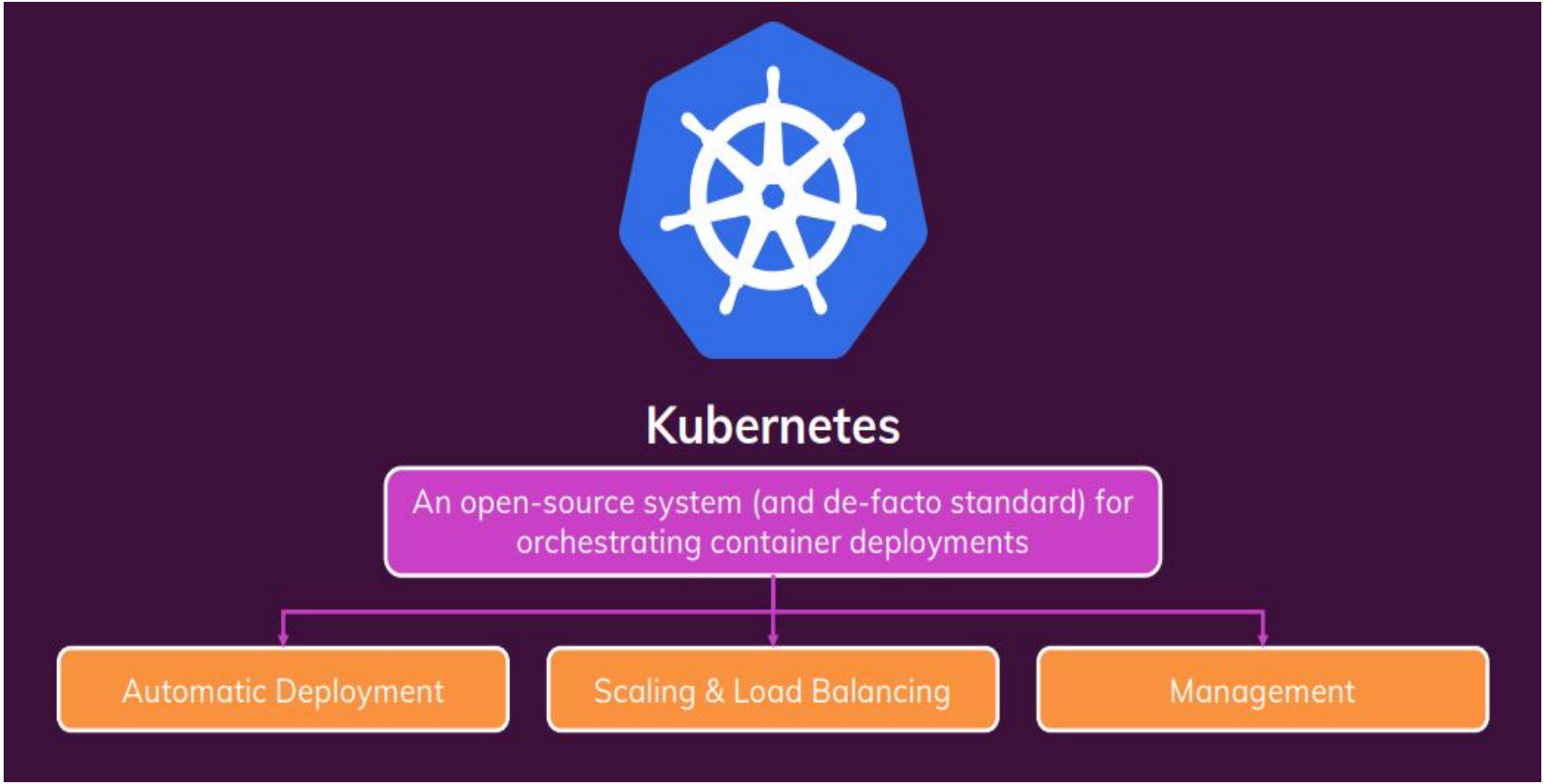
Services Like AWS ECS Can Help!



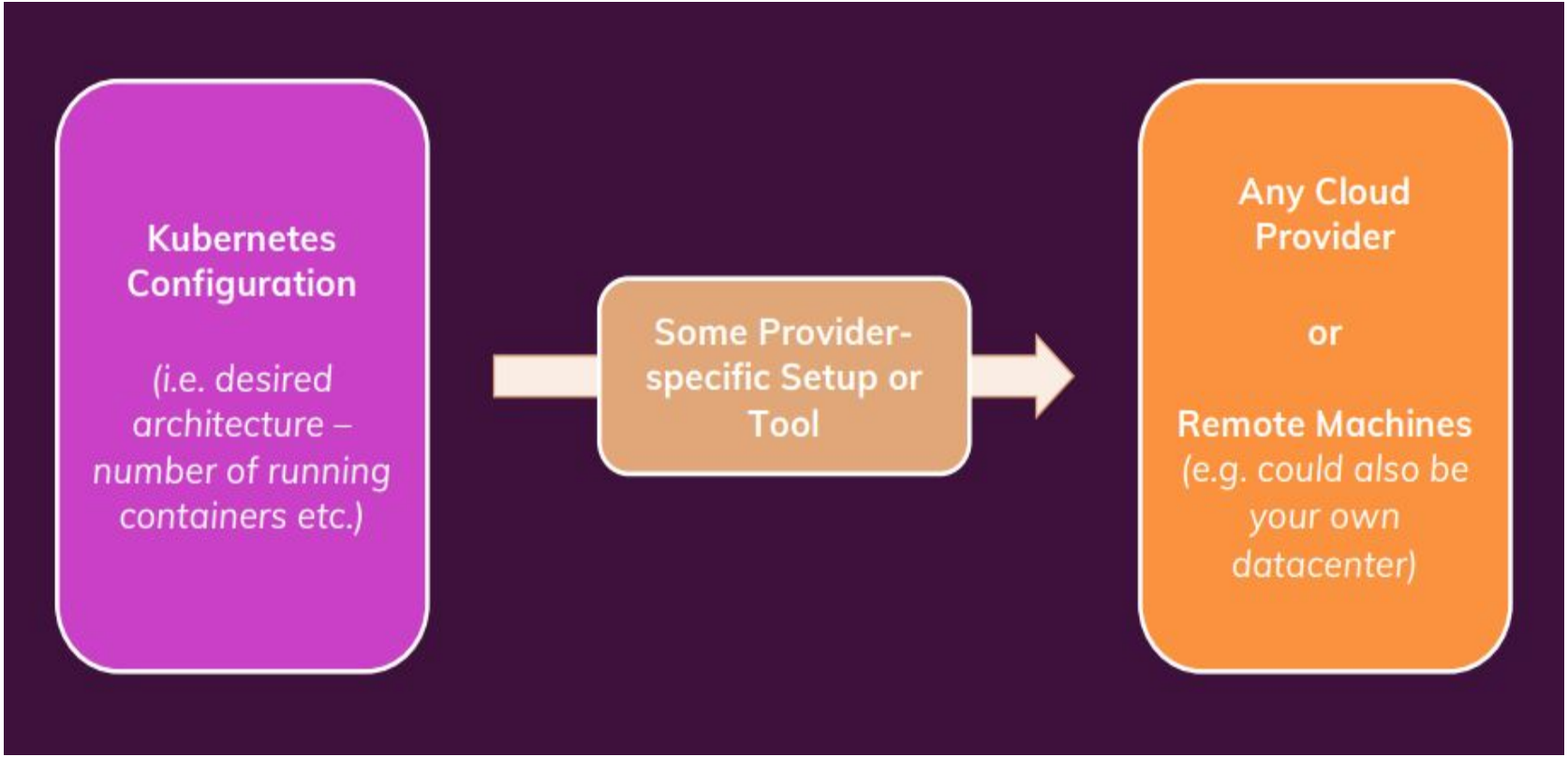
But That Locks Us In!



Kubernetes To The Rescue



Why Kubernetes?



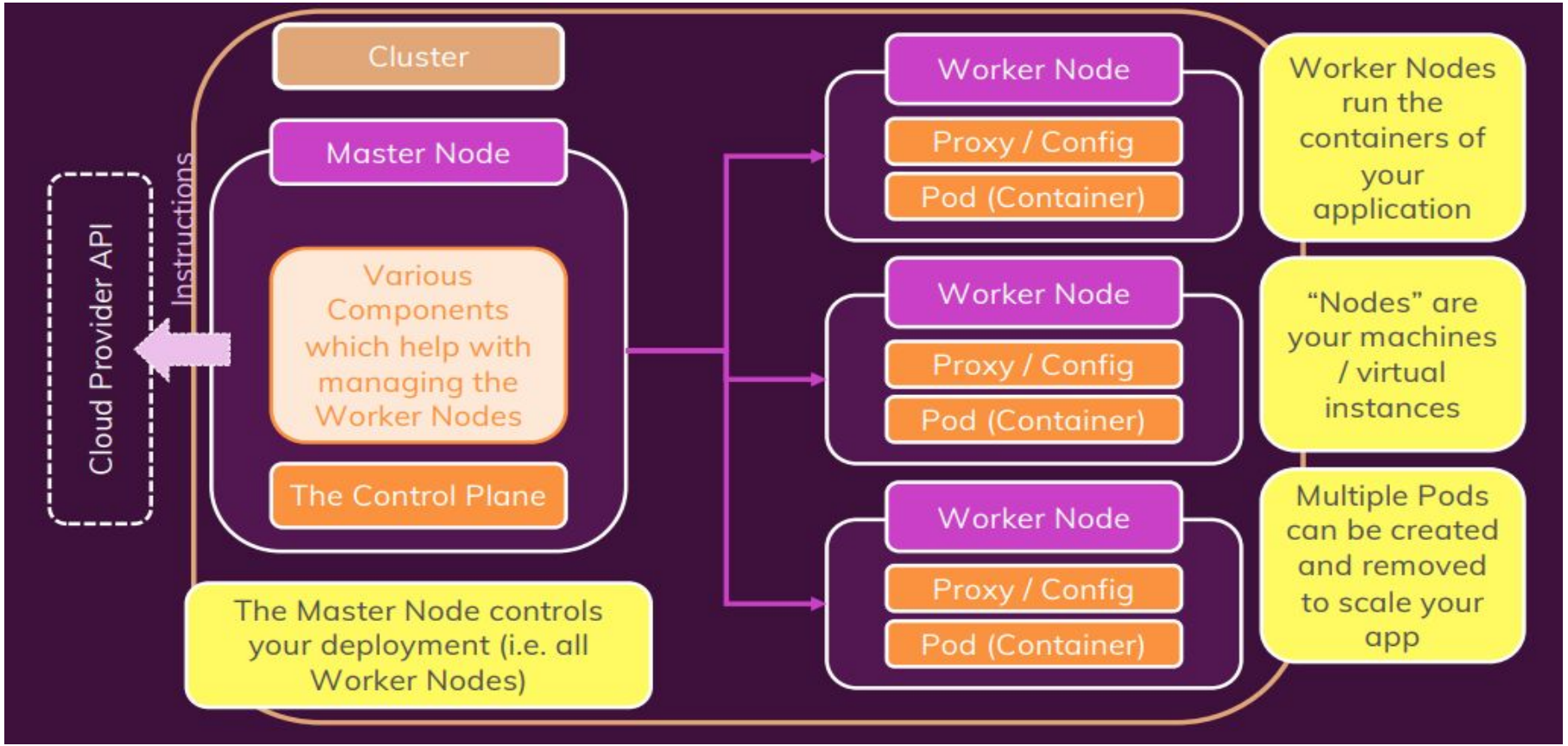
Extensible, Yet Standardized Configuration

```
apiVersion: v1
kind: Service
metadata:
  name: auth-service
  annotations:
    service.beta.kubernetes.io/aws-load-balancer-access-log-enabled: "true"
spec:
  selector:
    app: auth-app
ports:
  - protocol: TCP
    port: 80
    targetPort: 8080
type: LoadBalancer
...
```

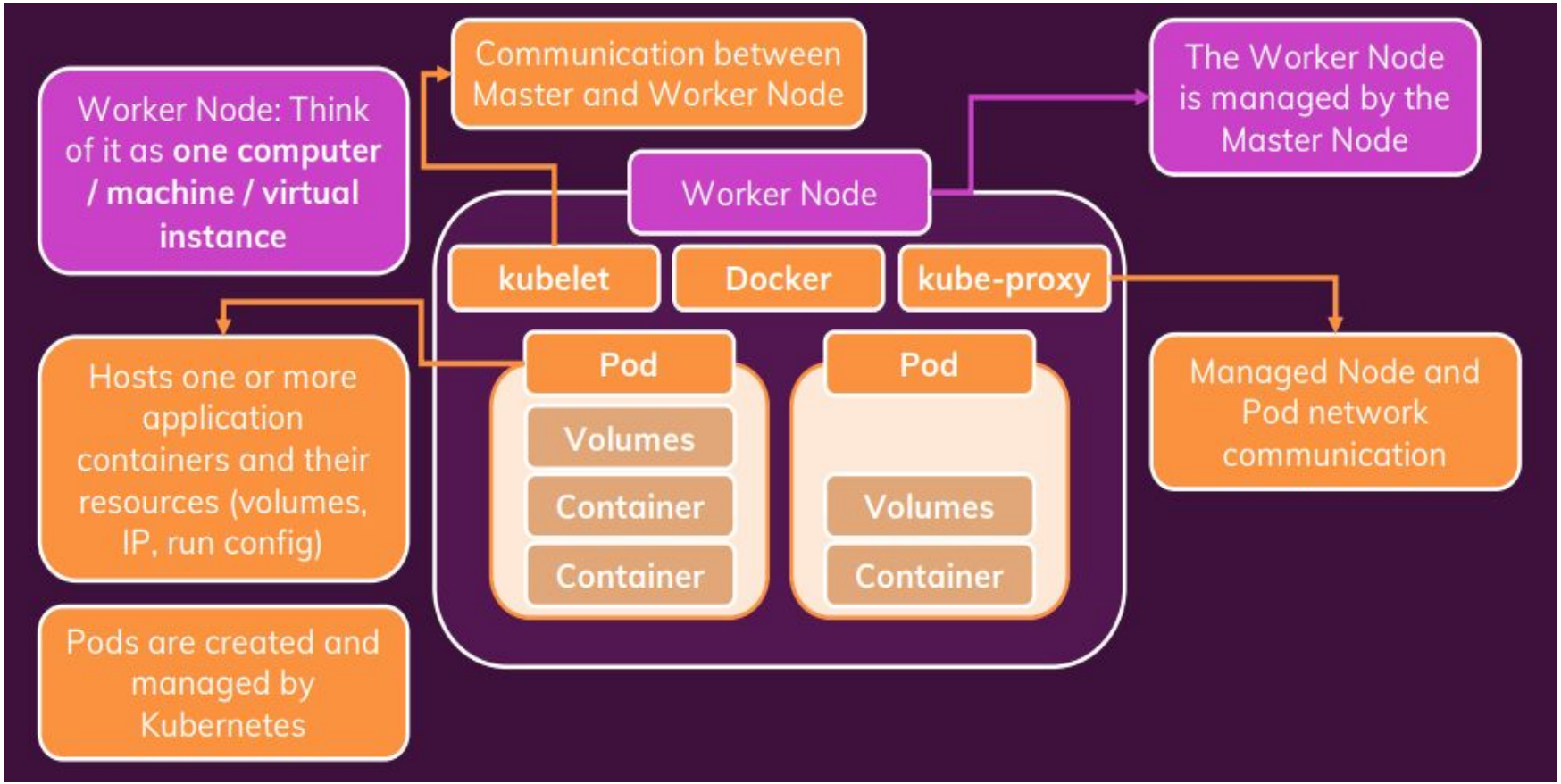
Standardized way of describing the to-be-created and to-be-managed resources of the Kubernetes Cluster

Cloud-provider-specific settings can be added

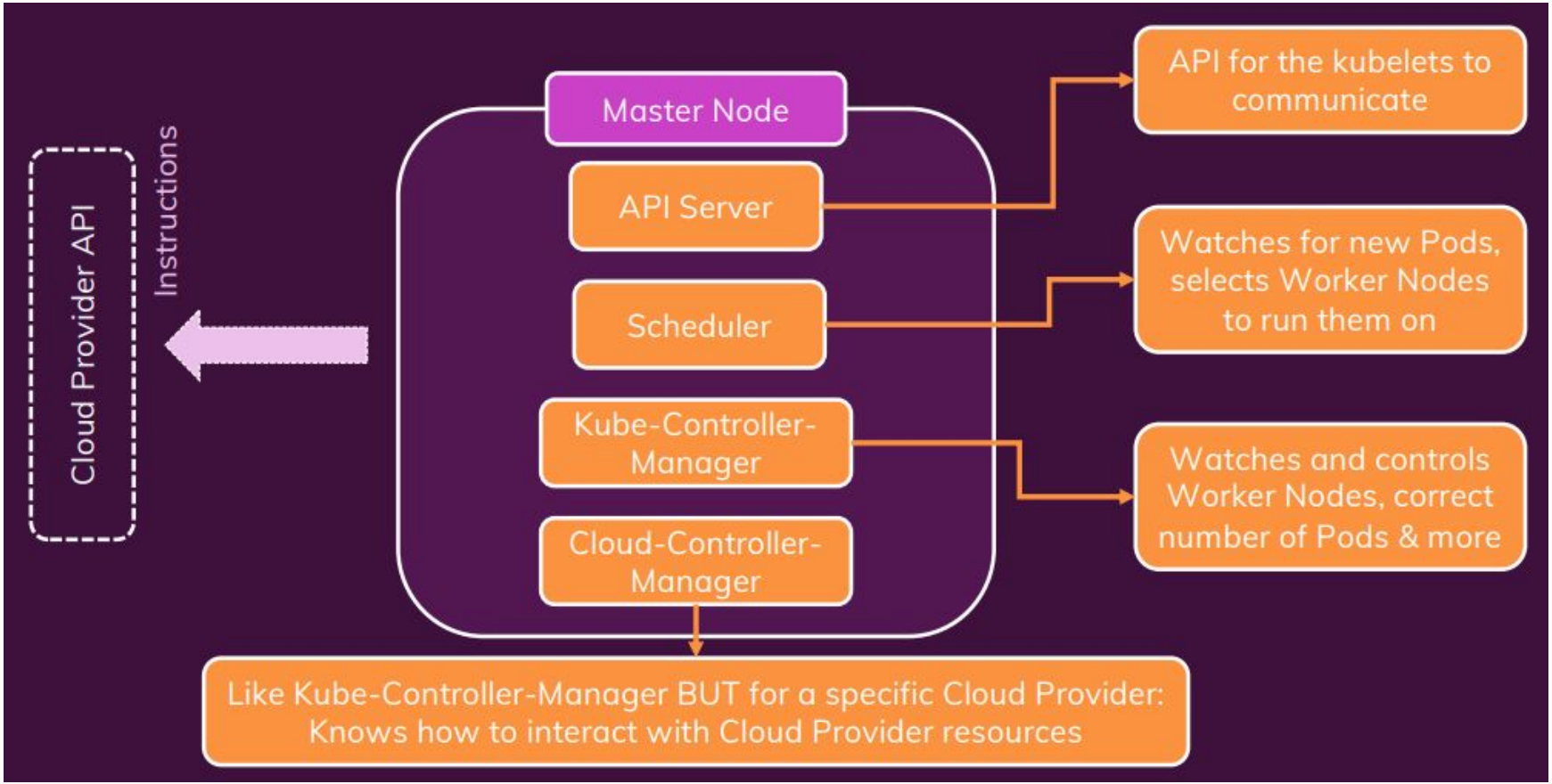
Kubernetes Architecture



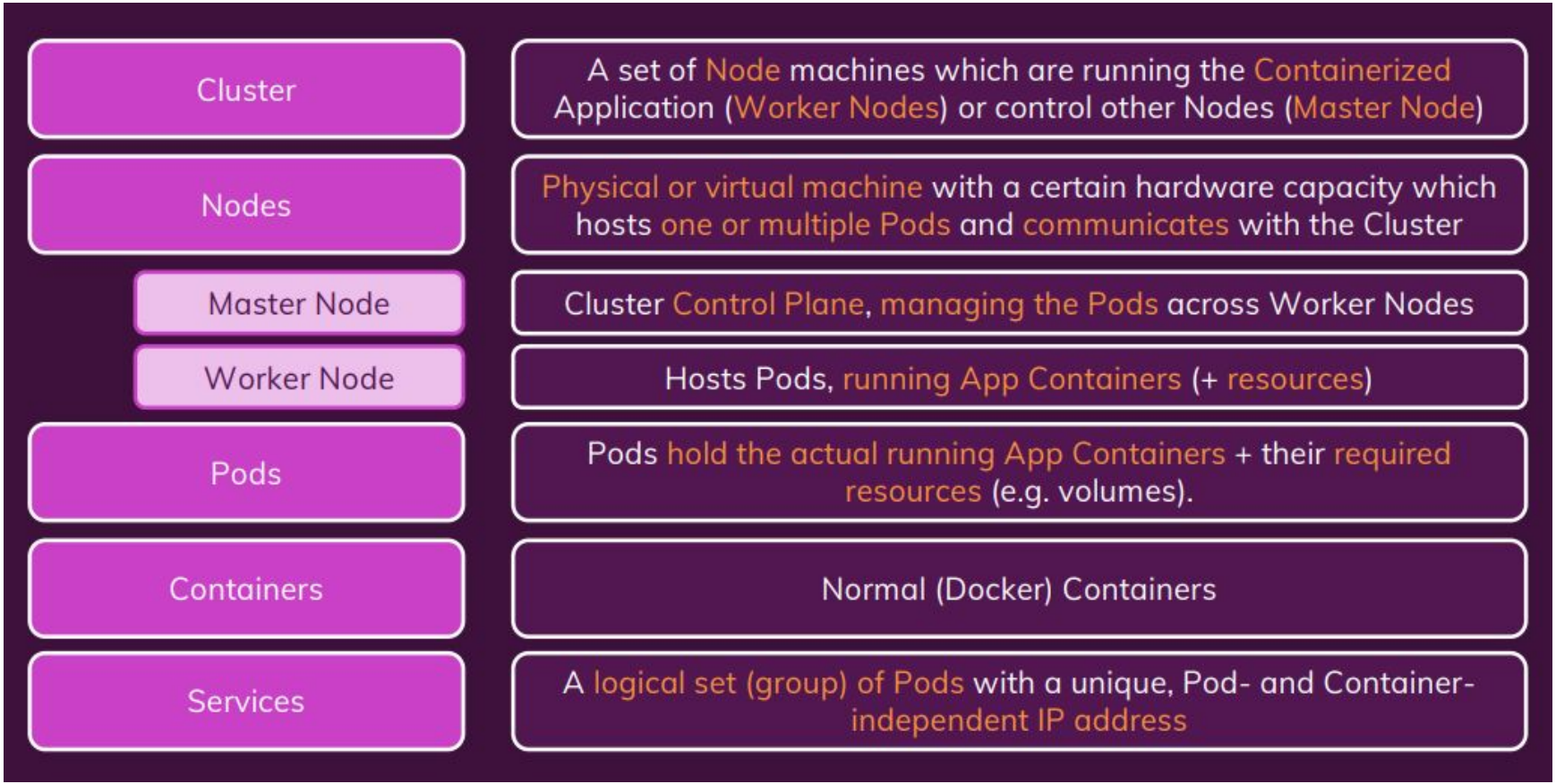
A Closer Look At The Worker Nodes



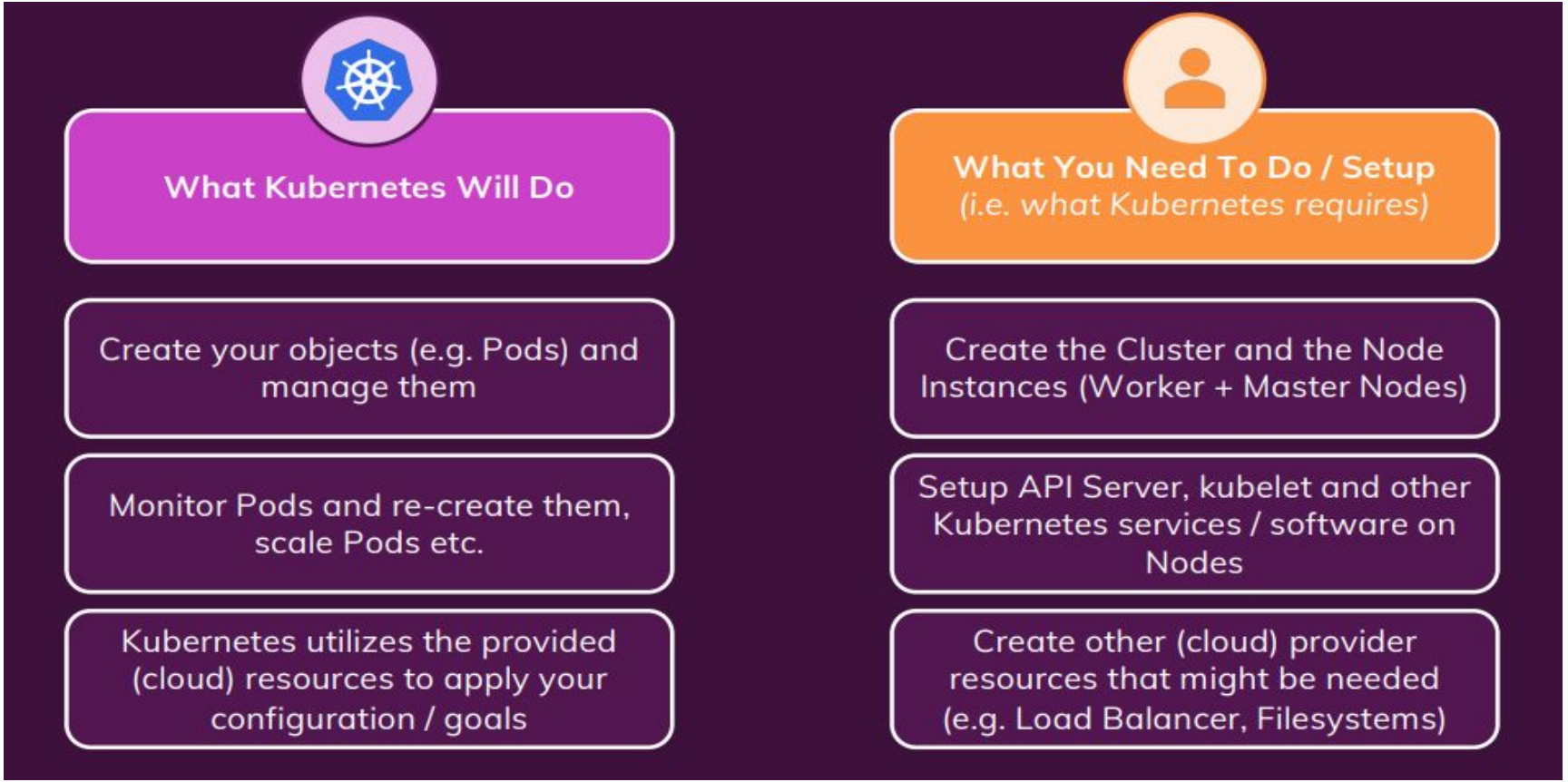
A Closer Look At The Master Node



Core Components



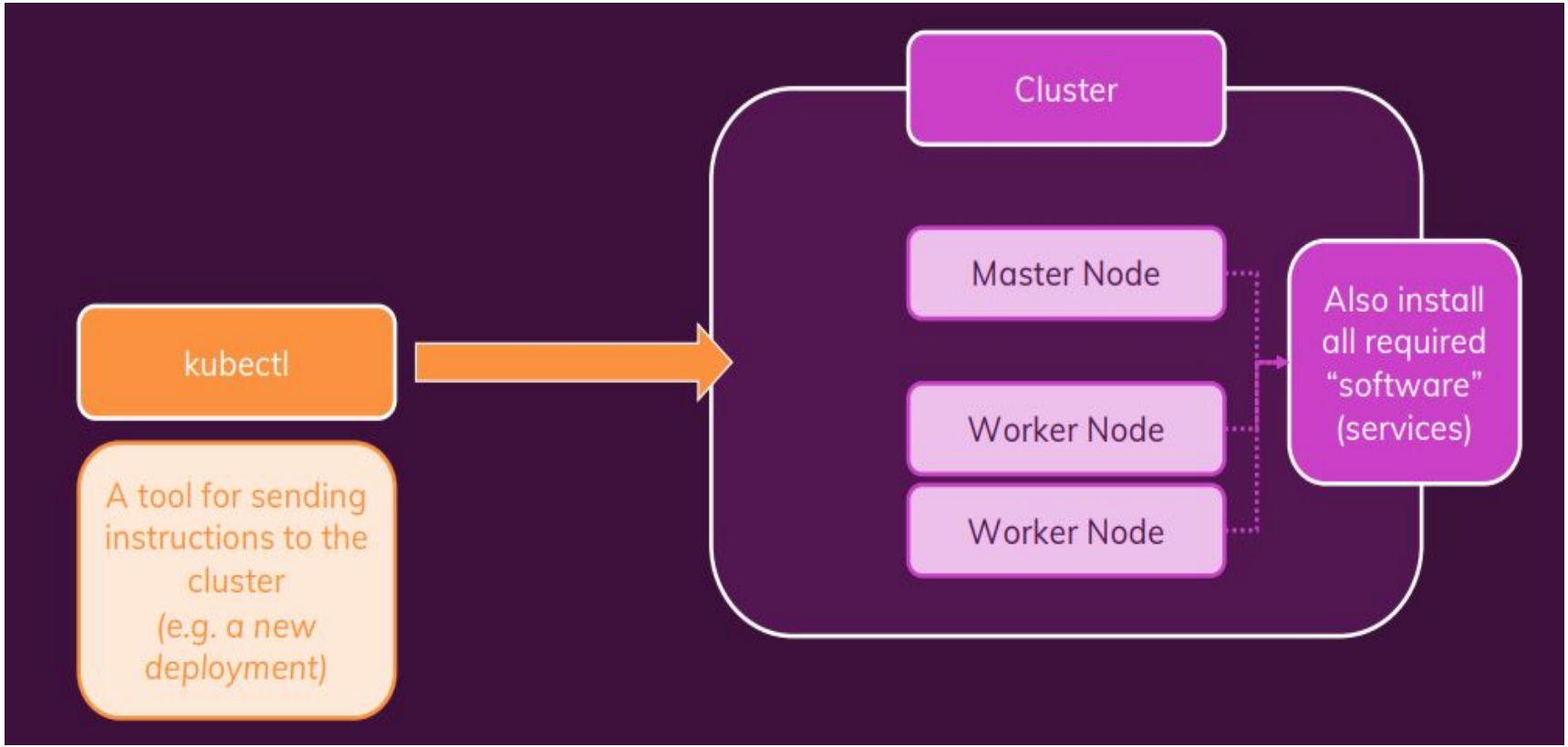
Your Work / Kubernetes' Work



Setting up the Infrastructure

- EKS (Amazon)
- AKS (Microsoft)
- Kubermatic

kubectl


Cluster
Master Node
Worker Node
Worker Node
Also install all required "software" (services)
kubectl
A tool for sending instructions to the cluster (e.g. a new deployment)

kubectl Installation

- choco install kubernetes-cli

```
C:\Windows\system32>choco install kubernetes-cli
Chocolatey v1.1.0
Installing the following packages:
kubernetes-cli
By installing, you accept licenses for the packages.
Progress: Downloading kubernetes-cli 1.25.3... 100%

kubernetes-cli v1.25.3 [Approved]
kubernetes-cli package files install completed. Performing other installation steps.
The package kubernetes-cli wants to run 'chocolateyInstall.ps1'.
Note: If you don't run this script, the installation will fail.
Note: To confirm automatically next time, use '-y' or consider:
choco feature enable -n allowGlobalConfirmation
Do you want to run the script?([Y]es/[A]ll - yes to all/[N]o/[P]rint): y
```

- kubectl version --client

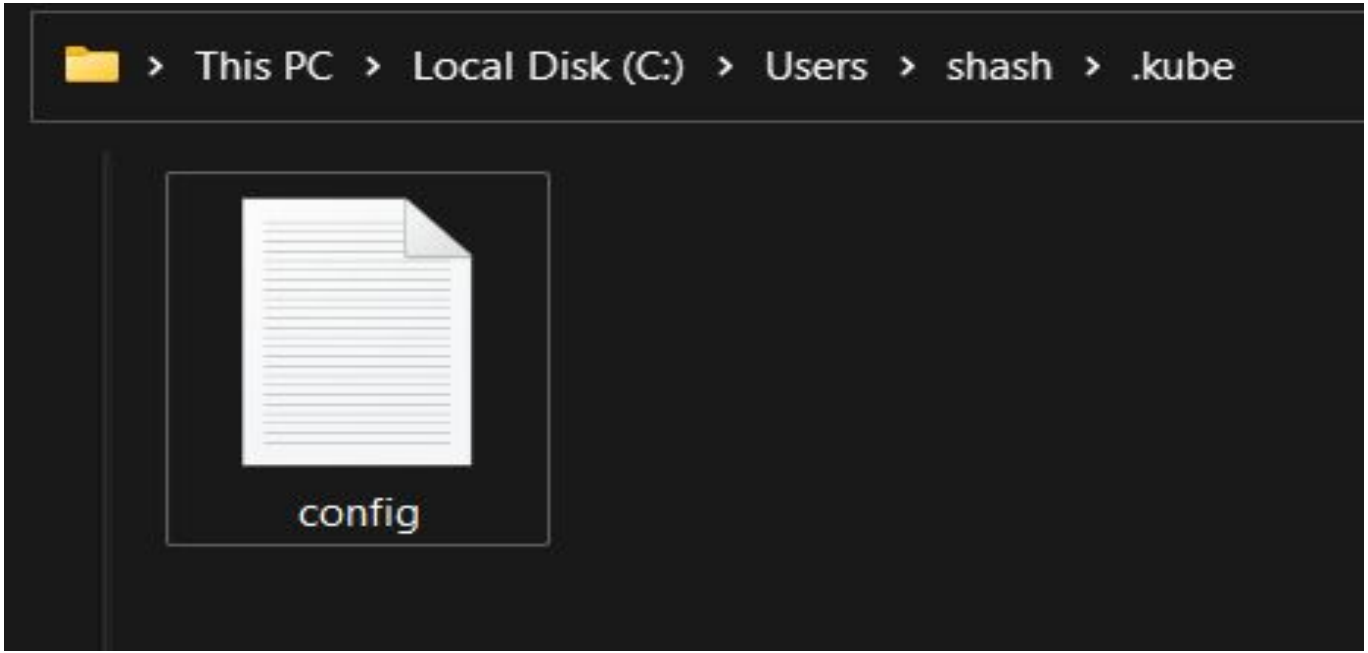
```
C:\Windows\system32>kubectl version --client
WARNING: This version information is deprecated and will be replaced with the output from kube
ctl version --short.  Use --output=yaml|json to get the full version.
Client Version: version.Info{Major:"1", Minor:"25", GitVersion:"v1.25.3", GitCommit:"434bfd828
14af038ad94d62ebe59b133fcb50506", GitTreeState:"clean", BuildDate:"2022-10-12T10:57:26Z", GoVe
rsion:"go1.19.2", Compiler:"gc", Platform:"windows/amd64"}
Kustomize Version: v4.5.7
```

- Navigate to your home directory and create a ".kube" folder

```
C:\Windows\system32>cd %USERPROFILE%

C:\Users\shash>mkdir .kube
```

- Create a config file inside this folder. (This file will later tell the kubectl command to which Cluster it should connect. It’ll be populated automatically.)



Minikube Installation

- Choco install minikube

```
C:\Windows\system32>choco install minikube
Chocolatey v1.1.0
Installing the following packages:
minikube
By installing, you accept licenses for the packages.
Progress: Downloading Minikube 1.28.0... 100%

Minikube v1.28.0 [Approved]
minikube package files install completed. Performing other installation steps.
 ShimGen has successfully created a shim for minikube.exe
 The install of minikube was successful.
  Software installed to 'C:\ProgramData\chocolatey\lib\Minikube'

Chocolatey installed 1/1 packages.
 See the log for details (C:\ProgramData\chocolatey\logs\chocolatey.log).
```

- minikube start --driver=docker

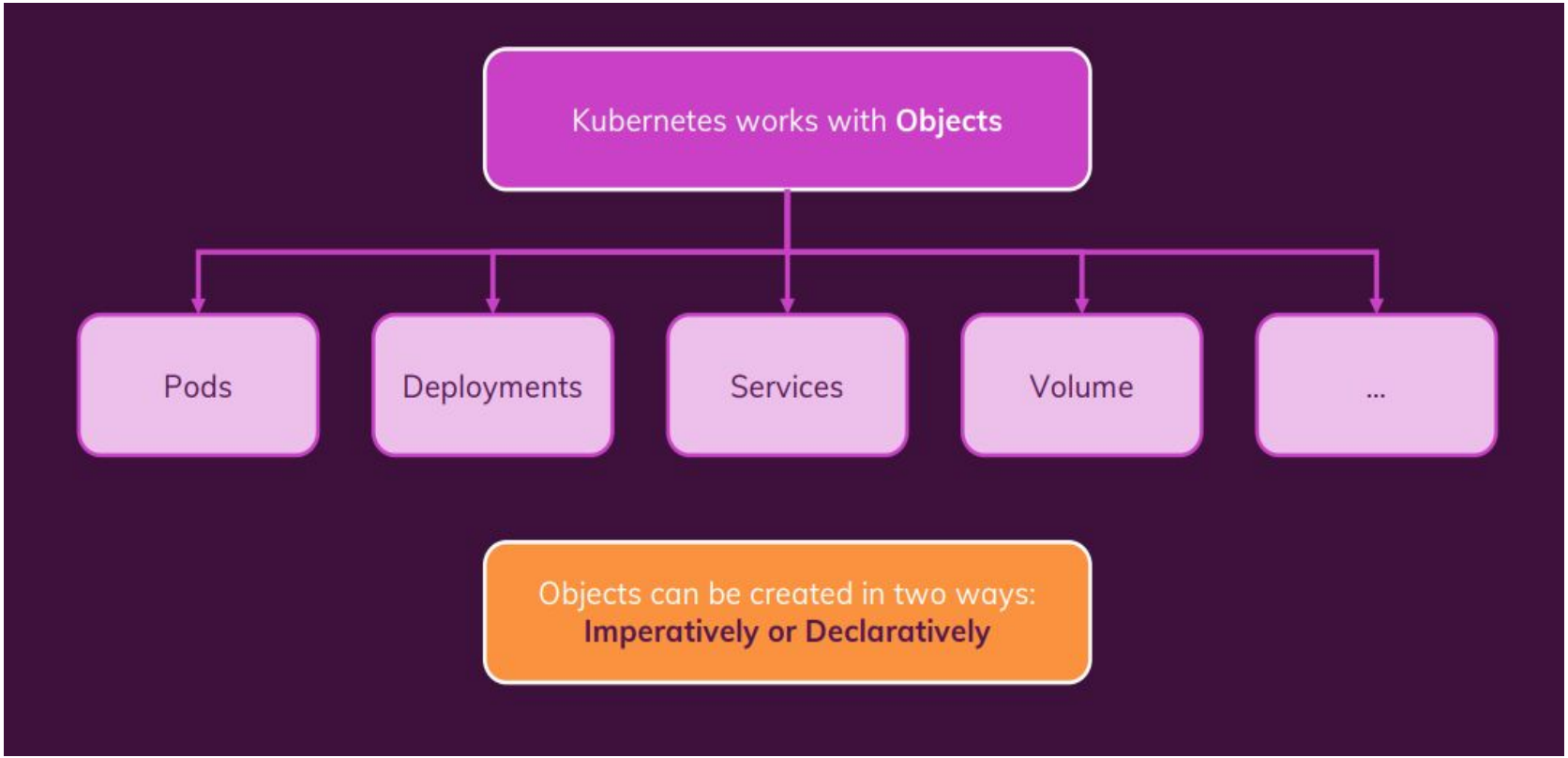
```
C:\Windows\system32>minikube start --driver=docker
* minikube v1.28.0 on Microsoft Windows 11 Home Single Language 10.0.22000 Build 22000
* Using the docker driver based on existing profile
* Starting control plane node minikube in cluster minikube
* Pulling base image ...
    > gcr.io/k8s-minikube/kicbase:  0 B [_____________________________] ?% ? p    > gcr.io/
```

```
* docker "minikube" container is missing, will recreate.
* Creating docker container (CPUs=2, Memory=2200MB) ...
* Preparing Kubernetes v1.25.3 on Docker 20.10.20 ...
* Verifying Kubernetes components...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Enabled addons: storage-provisioner, default-storageclass
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
```

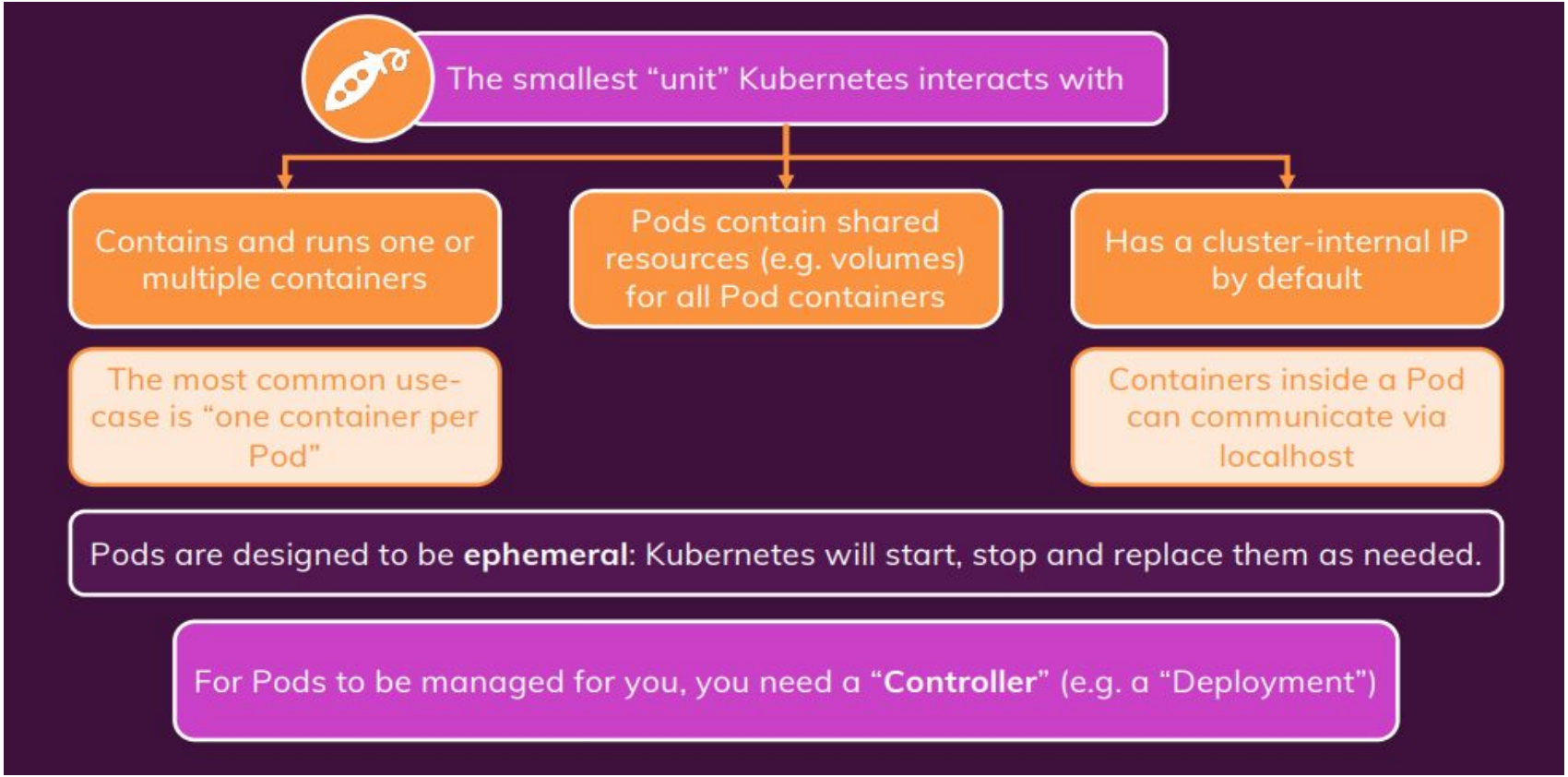
- minikube status

```
C:\Users\shash>minikube status
minikube
type: Control Plane
host: Running
kubelet: Running
apiserver: Running
kubeconfig: Configured
```

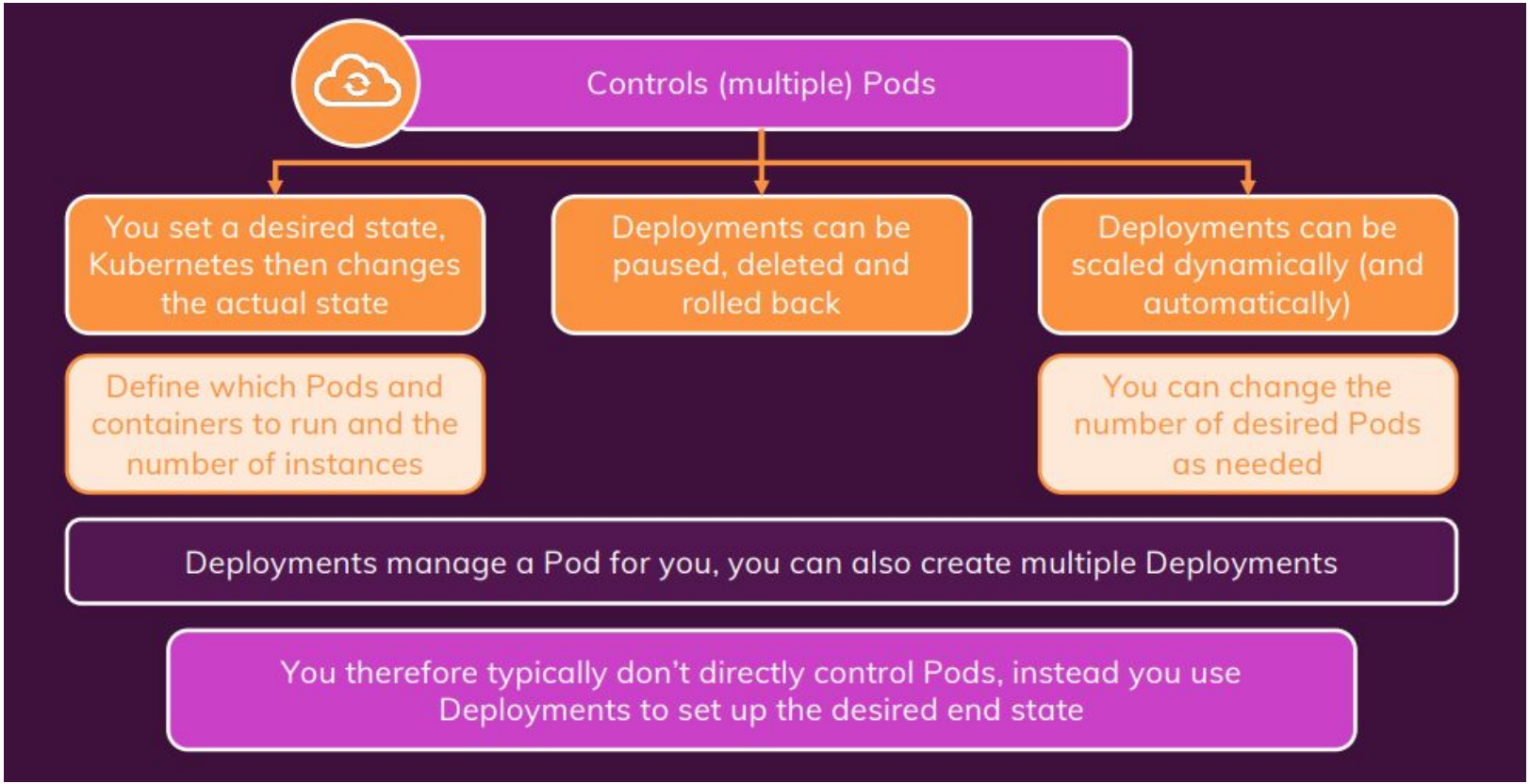
Kubernetes Objects



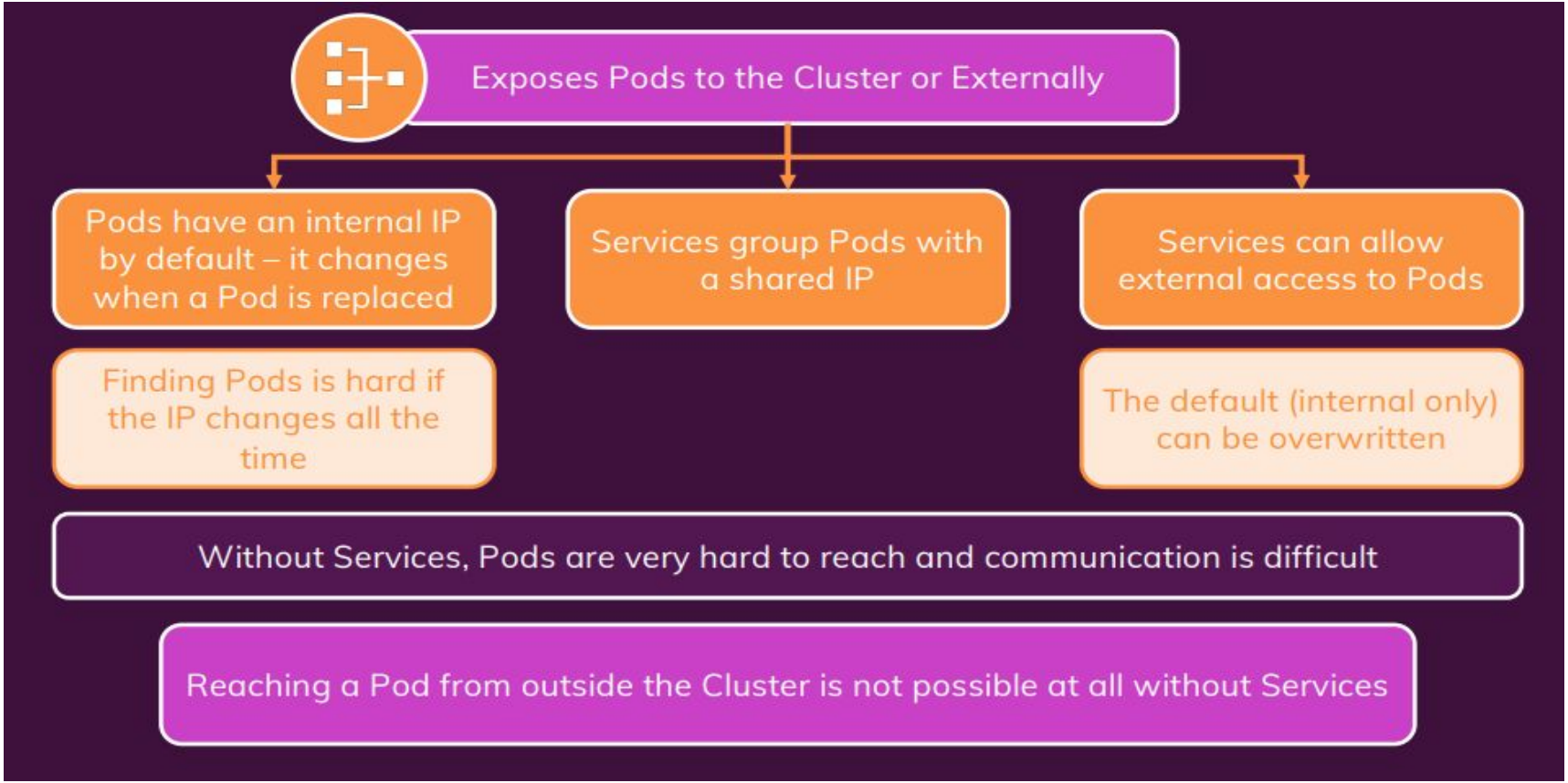
The “Pod” Object



The “Deployment” Object



The “Service” Object



Let’s see a demo now

ADVANTAGES

- Simplified DevOps
- Adaptive Nature
- Universal Support
- Replicated Applications
- No Vendor Lock-Ins

DISADVANTAGES

- Steep Learning Curve
- Diverse Knowledge Needed
- Initial Configuration Difficult
- Migrating Existing Applications to Kubernetes Can Be a Pain
- Reduces Productivity