ACADEMIND

Your Work / Kubernetes' Work

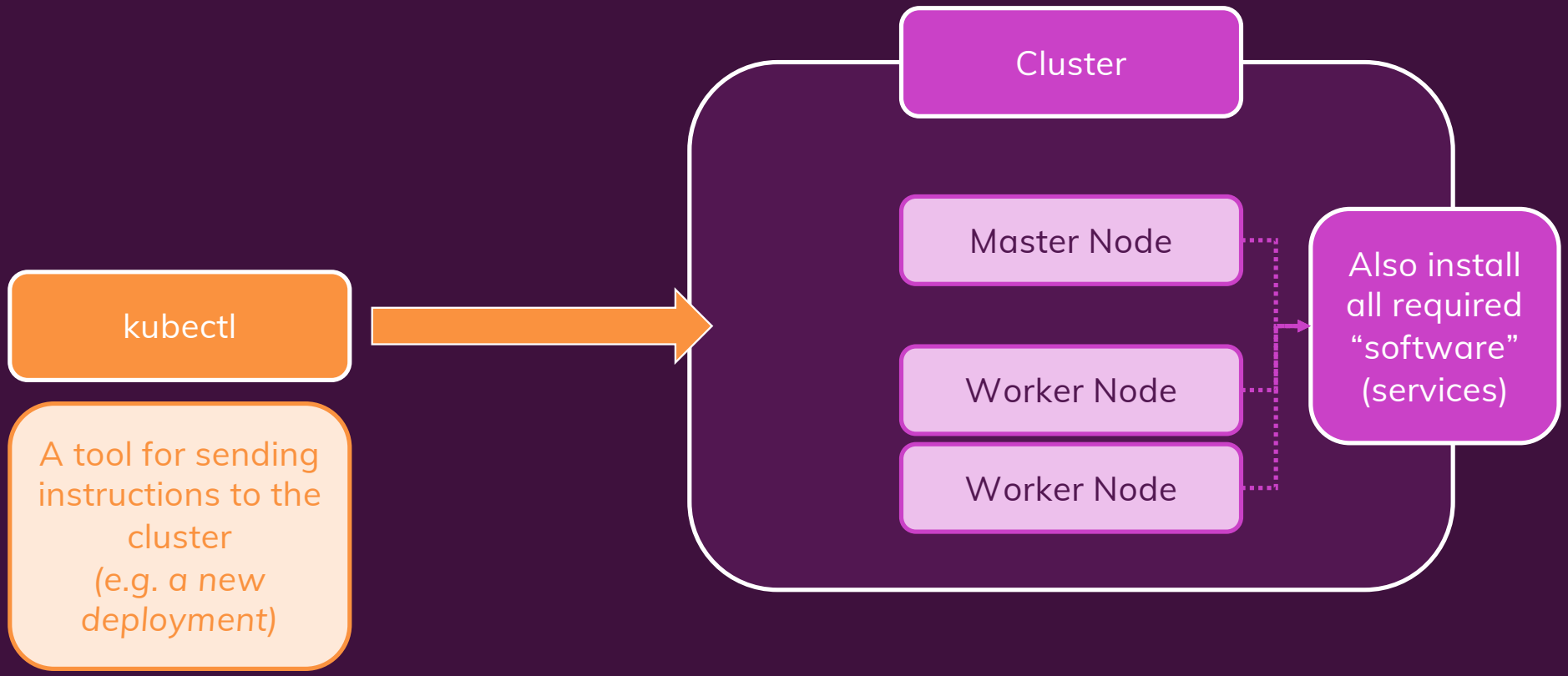
What Kubernetes Will Do

- Create your objects (e.g. Pods) and manage them
- Monitor Pods and re-create them, scale Pods etc.
- Kubernetes utilizes the provided (cloud) resources to apply your configuration / goals

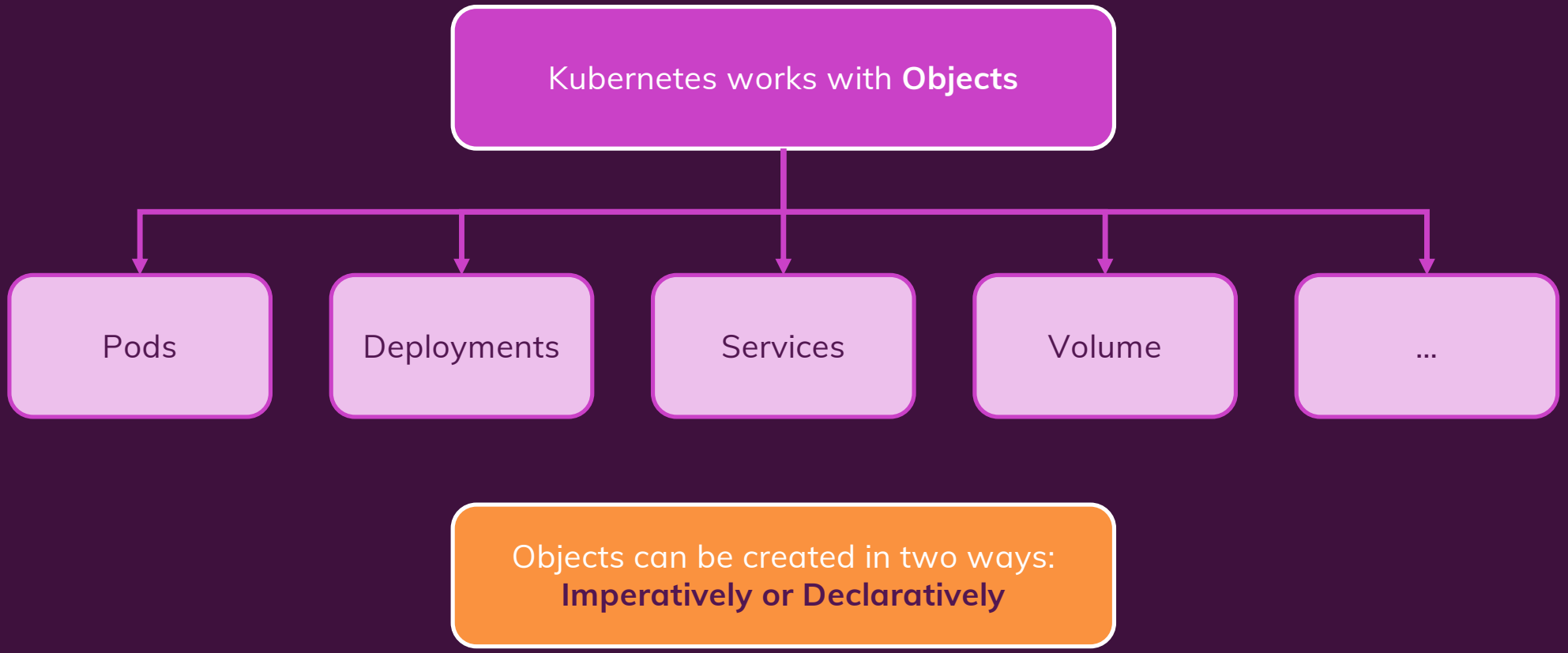
What You Need To Do / Setup
(i.e. what Kubernetes requires)

- Create the Cluster and the Node Instances (Worker + Master Nodes)
- Setup API Server, kubelet and other Kubernetes services / software on Nodes
- Create other (cloud) provider resources that might be needed (e.g. Load Balancer, Filesystems)

Installation



Understanding Kubernetes Objects



ACADEMIND

The "Pod" Object

The smallest "unit" Kubernetes interacts with

- Contains and runs one or multiple containers
- Pods contain shared resources (e.g. volumes) for all Pod containers
- Has a cluster-internal IP by default

- The most common use-case is "one container per Pod"
- Containers inside a Pod can communicate via localhost

Pods are designed to be **ephemeral**: Kubernetes will start, stop and replace them as needed.

For Pods to be managed for you, you need a "**Controller**" (e.g. a "Deployment")

ACADEMIND

The "Deployment" Object

Controls (multiple) Pods

You set a desired state, Kubernetes then changes the actual state

Deployments can be paused, deleted and rolled back

Deployments can be scaled dynamically (and automatically)

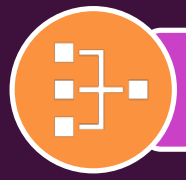
Define which Pods and containers to run and the number of instances

You can change the number of desired Pods as needed

Deployments manage a Pod for you, you can also create multiple Deployments

You therefore typically don't directly control Pods, instead you use Deployments to set up the desired end state

The "Service" Object



Exposes Pods to the Cluster or Externally

Pods have an internal IP by default – it changes when a Pod is replaced

Finding Pods is hard if the IP changes all the time

Services group Pods with a shared IP

Services can allow external access to Pods

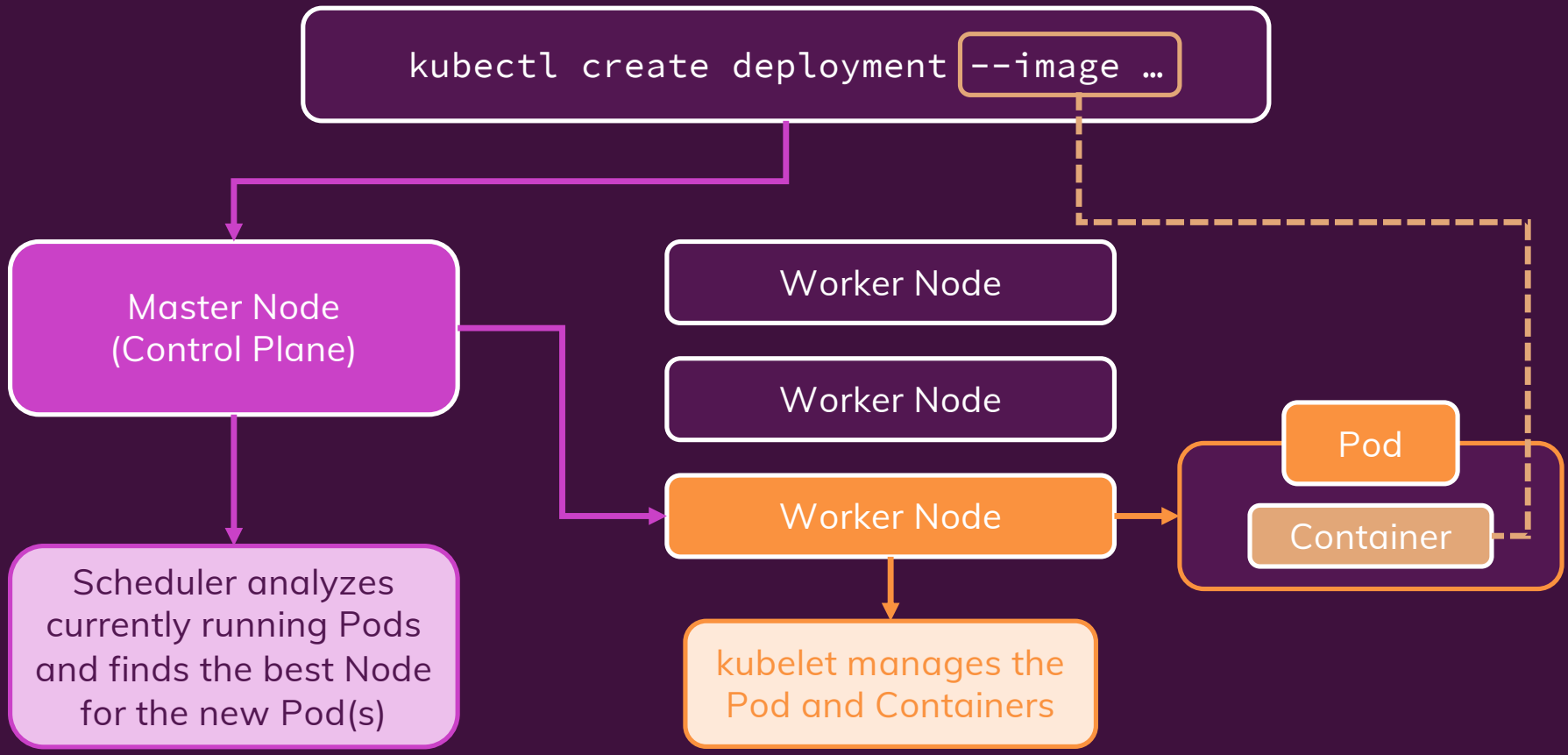
The default (internal only) can be overwritten

Without Services, Pods are very hard to reach and communication is difficult

Reaching a Pod from outside the Cluster is not possible at all without Services

ACADEMIND

Behind The Scenes



ACADEMIND

Imperative vs Declarative Kubernetes Usage

Imperative	Declarative
`kubectl create deployment …`	`kubectl apply -f config.yaml`
Individual commands are executed to trigger certain Kubernetes actions	A config file is defined and applied to change the desired state
Comparable to using **`docker run`** only	Comparable to using **Docker Compose** with compose files

ACADEMIND

A Resource Definition

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: second-app
spec:
  selector:
    matchLabels:
      app: second-dummy
  replicas: 1
  template:
    metadata:
      labels:
        app: second-dummy
    spec:
      containers:
      - name: second-node
        image: "academind/kub-first-app"
```