

## We (Maybe) Have A Problem

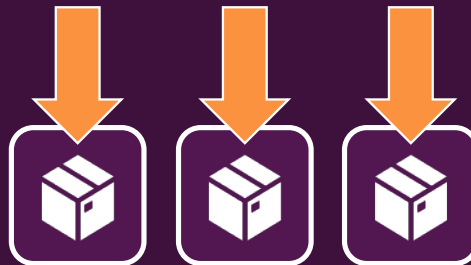
Manual deployment of Containers is hard to maintain, error-prone and annoying

*(even beyond security and configuration concerns!)*

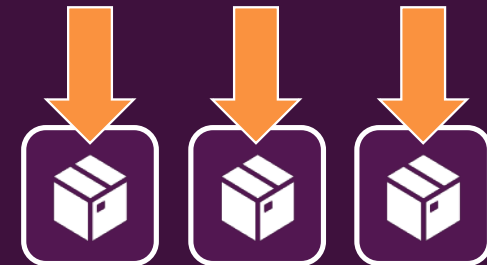
Containers might crash / go down and need to be replaced



We might need more container instances upon traffic spikes



Incoming traffic should be distributed equally



## Services Like AWS ECS Can Help!

Manual deployment of Containers is hard to maintain, error-prone and annoying

*(even beyond security and configuration concerns!)*

Containers might  
crash / go down and  
need to be replaced

Container health  
checks + automatic  
re-deployment

We might need more  
container instances  
upon traffic spikes

Autoscaling

Incoming traffic  
should be distributed  
equally

Load balancer

## But That Locks Us In!

Using a specific cloud service locks us into that service

Of course, you might be fine with sticking to one provider though!

You need to learn about the specifics, services and config options of another provider if you want to switch

Just knowing Docker isn't enough!

# Kubernetes To The Rescue



## Kubernetes

An open-source system (and de-facto standard) for orchestrating container deployments

Automatic Deployment

Scaling & Load Balancing

Management

Kubernetes is like  
Docker-Compose  
for multiple machines

## Why Kubernetes?

### Kubernetes Configuration

(i.e. desired architecture – number of running containers etc.)

Some Provider-specific Setup or Tool

Any Cloud Provider

or

Remote Machines  
(e.g. could also be your own datacenter)

## 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

## What Kubernetes IS and IS NOT

It's not a cloud service provider

It's an open-source project

It's not a service by a cloud service provider

It can be used with any provider

It's not restricted to any specific (cloud) service provider

It can be used with any provider

It's not just a software you run on some machine

It's a collection of concepts and tools

It's not an alternative to Docker

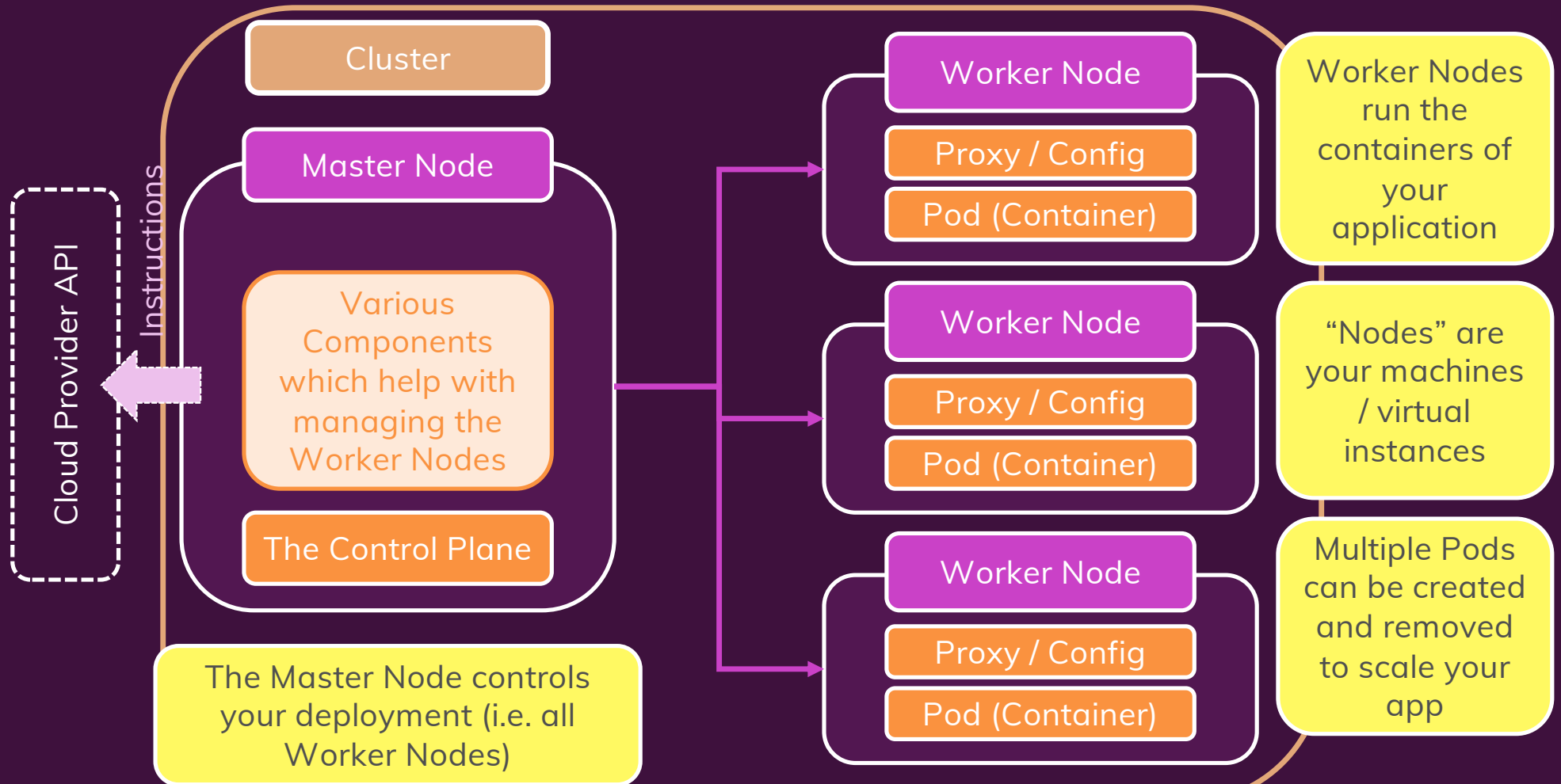
It works with (Docker) containers

It's not a paid service

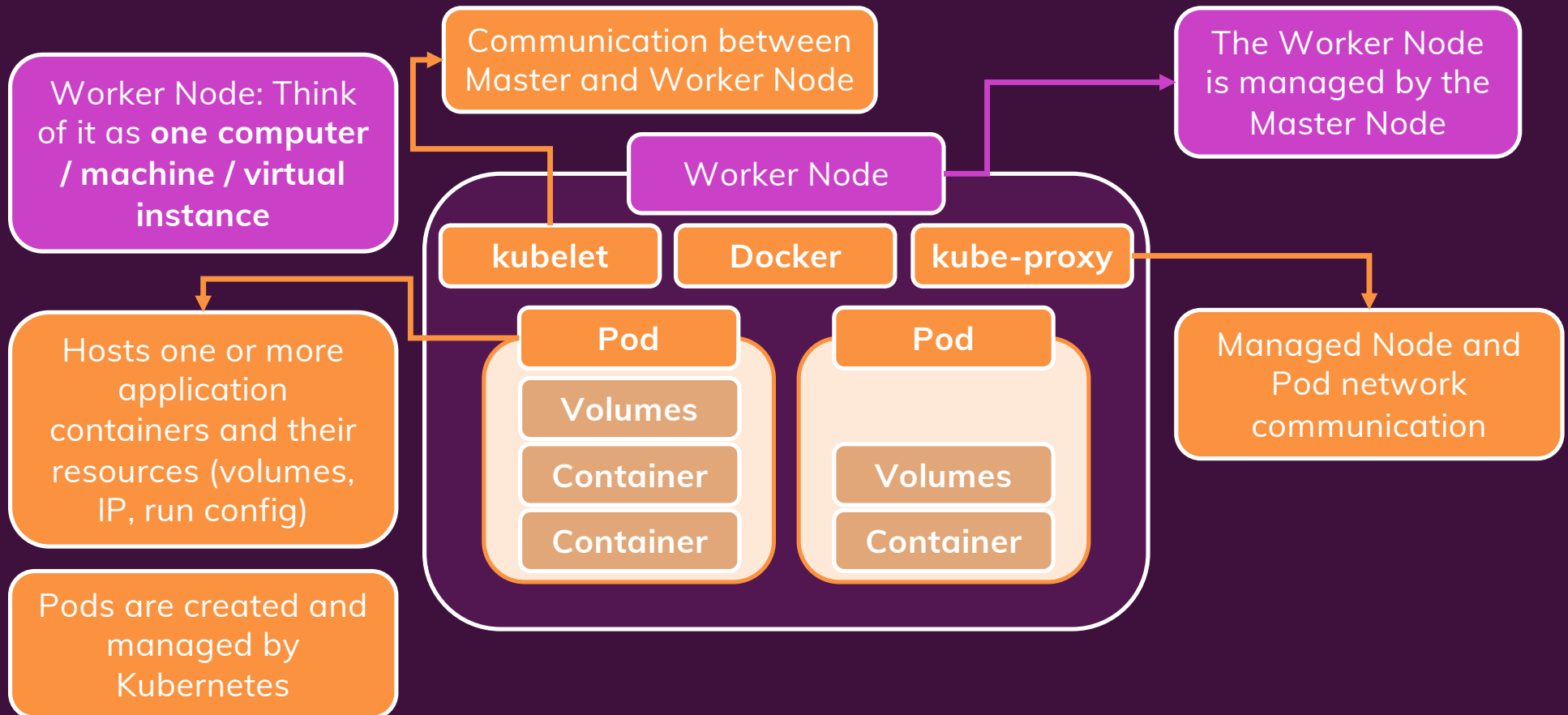
It's a free open-source project



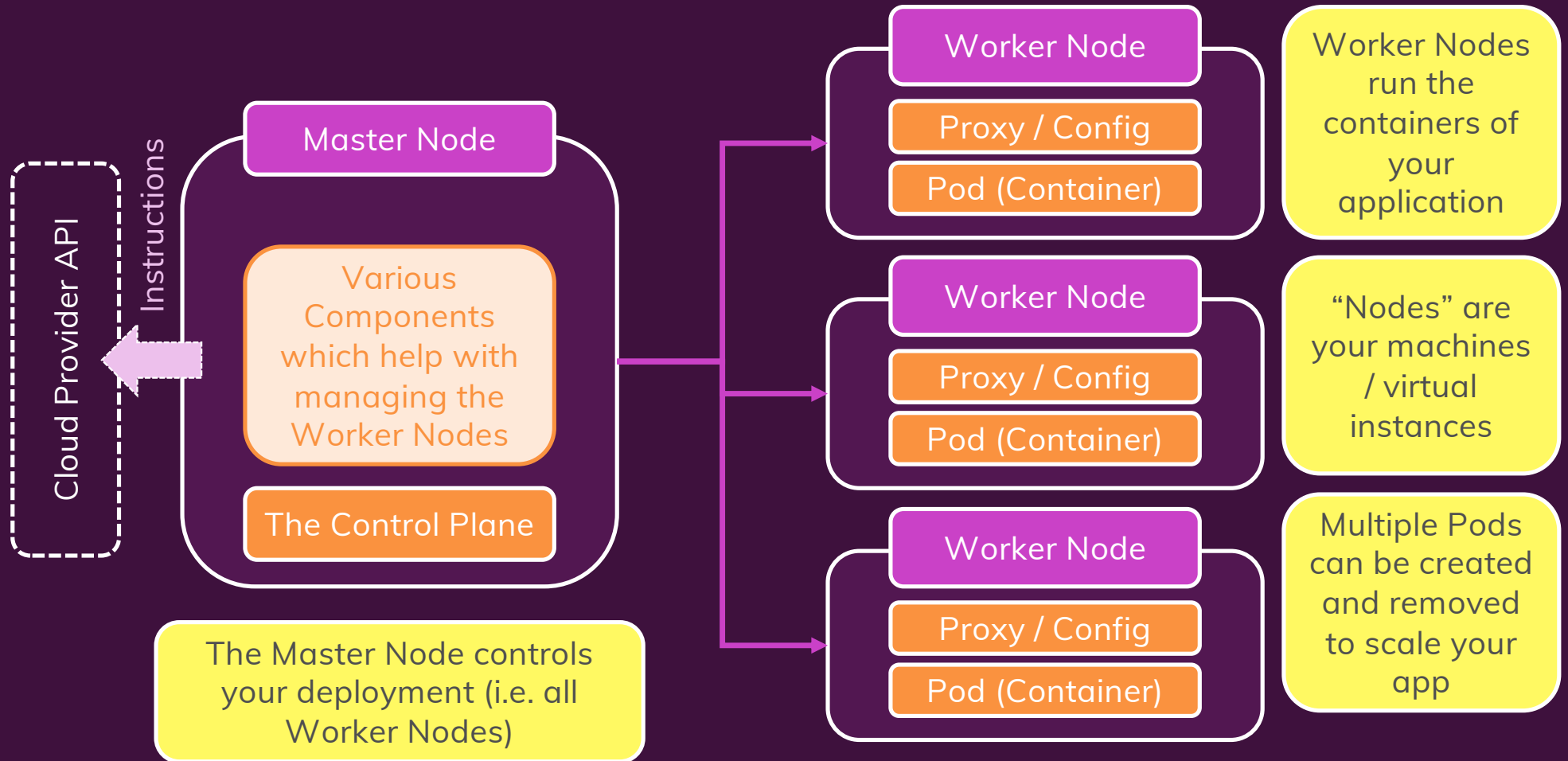
# Core Kubernetes Concepts & Architecture



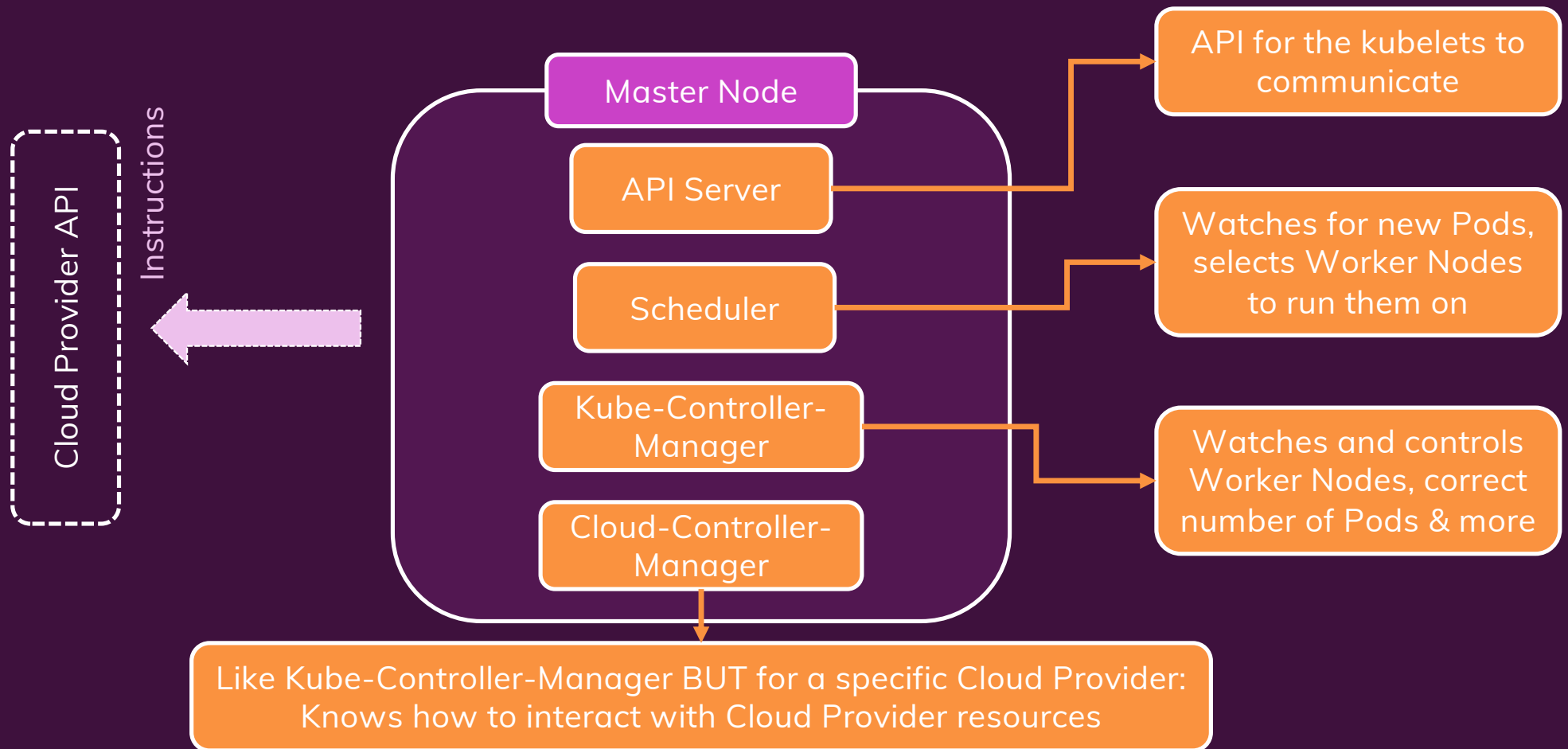
# A Closer Look At The Worker Nodes



# Core Kubernetes Concepts & Architecture



# Core Kubernetes Concepts & Architecture



## 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)

## Core Components

Cluster

A set of **Node** machines which are running the **Containerized Application (Worker Nodes)** or control other Nodes (**Master Node**)

Nodes

**Physical or virtual machine** with a certain hardware capacity which hosts **one or multiple Pods** and **communicates** with the Cluster

Master Node

Cluster **Control Plane**, managing the **Pods** across Worker Nodes

Worker Node

Hosts **Pods**, running **App Containers (+ resources)**

Pods

Pods **hold the actual running App Containers + their required resources** (e.g. volumes).

Containers

Normal (Docker) Containers

Services

A **logical set (group)** of **Pods** with a unique, Pod- and Container-independent **IP address**