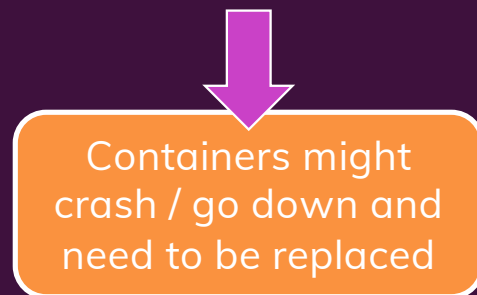


We (Maybe) Have A Problem

e.g., manually run docker containers on EC2 instances

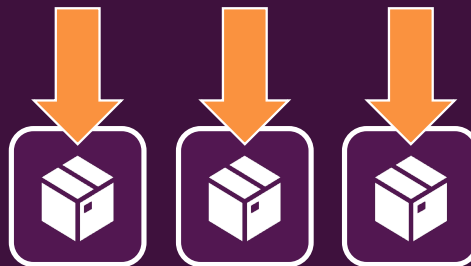
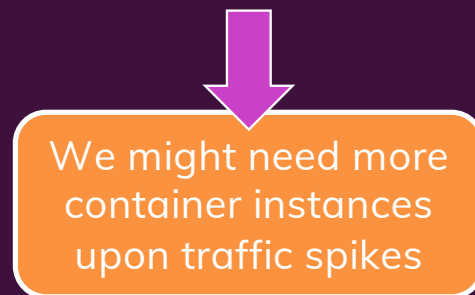
Manual deployment of Containers is hard to maintain, error-prone and annoying

(even beyond security and configuration concerns!)

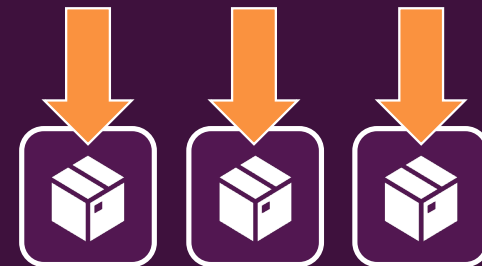
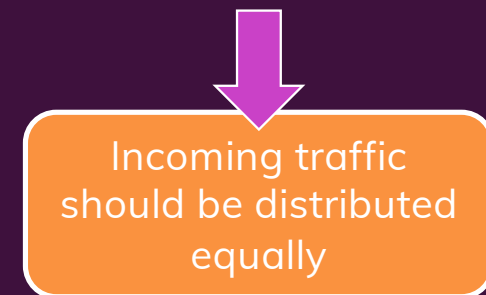


something might fail in the containerized application

might need to replace/restart the container.



scale up the number of containers. If got less traffic, remove some containers.



evenly distributed across running containers to ensure that not one container is doing all the work.

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

auto restart containers
when they crash



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

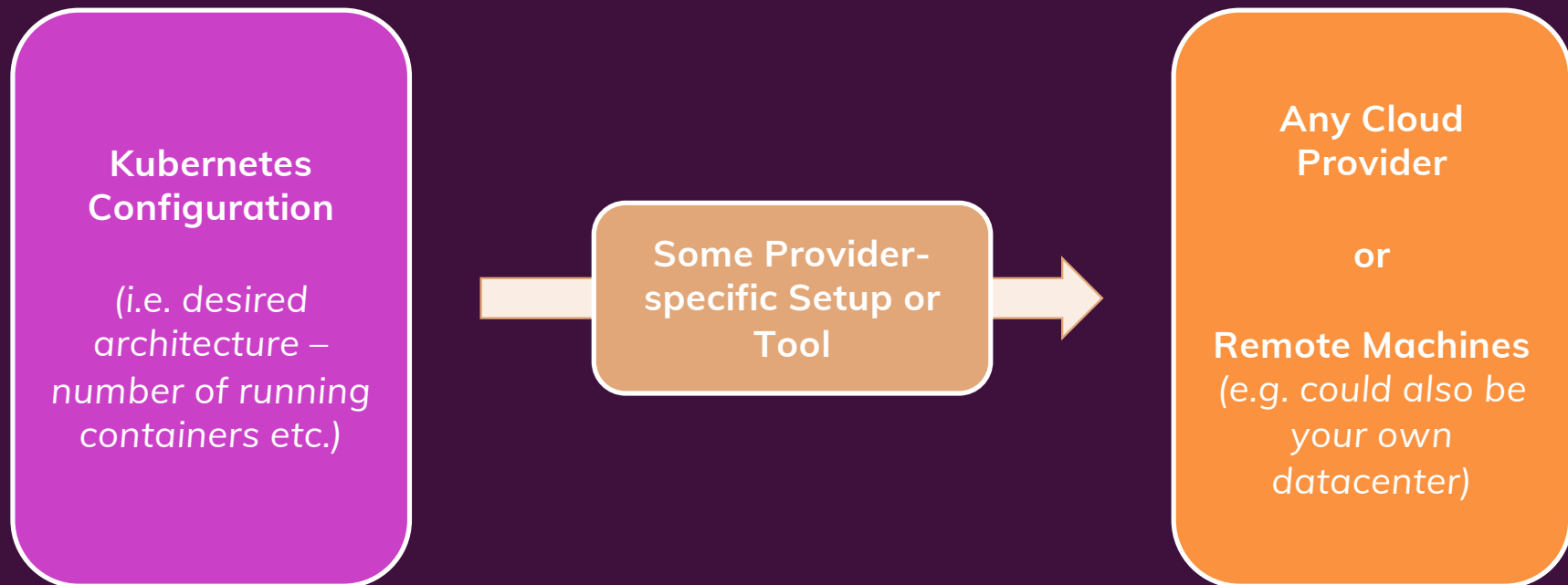
Automatic Deployment

Scaling & Load Balancing

Management

Kubernetes is like
Docker-Compose
for multiple machines

Why Kubernetes?



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

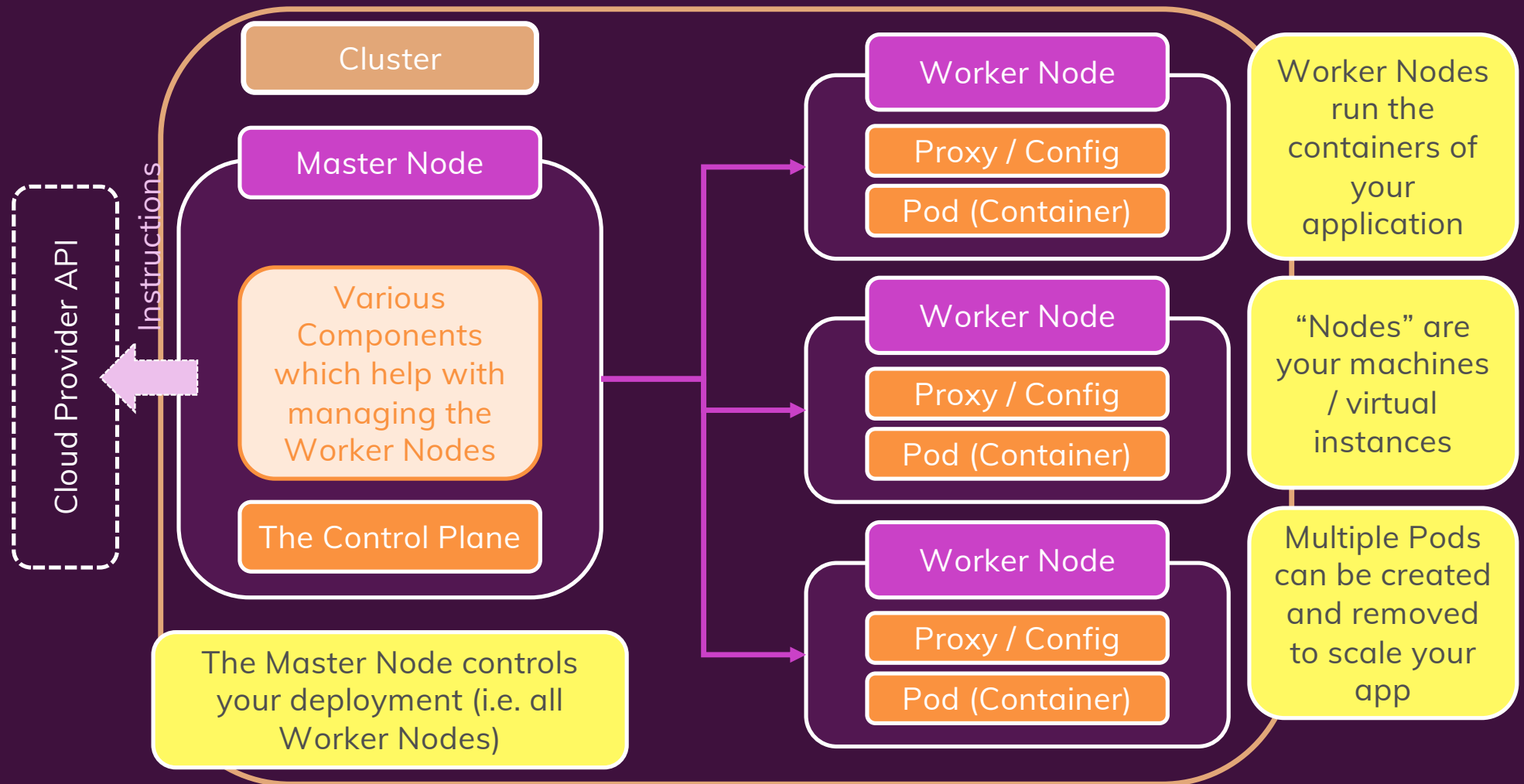
It's not an alternative to Docker

It works with (Docker) containers

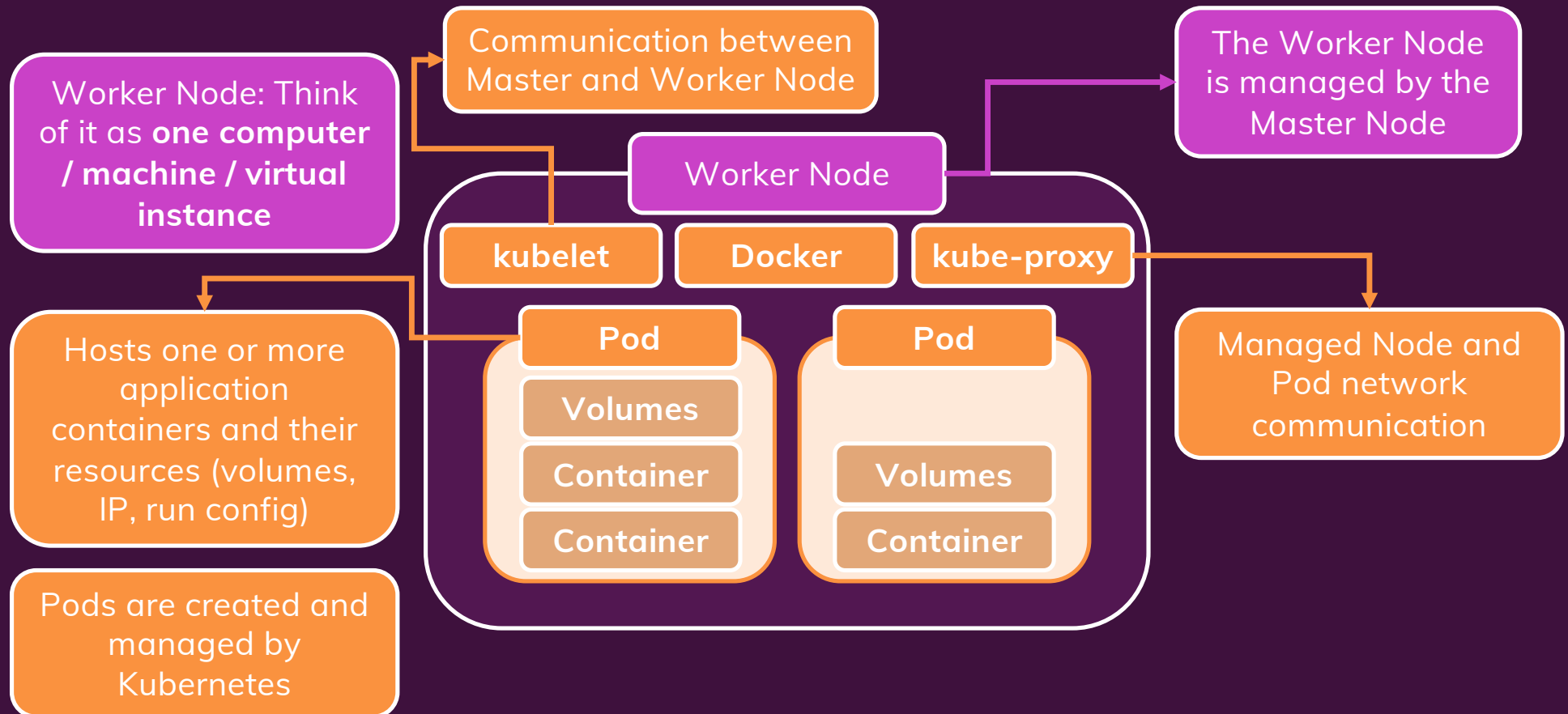
It's not a paid service

It's a free open-source project

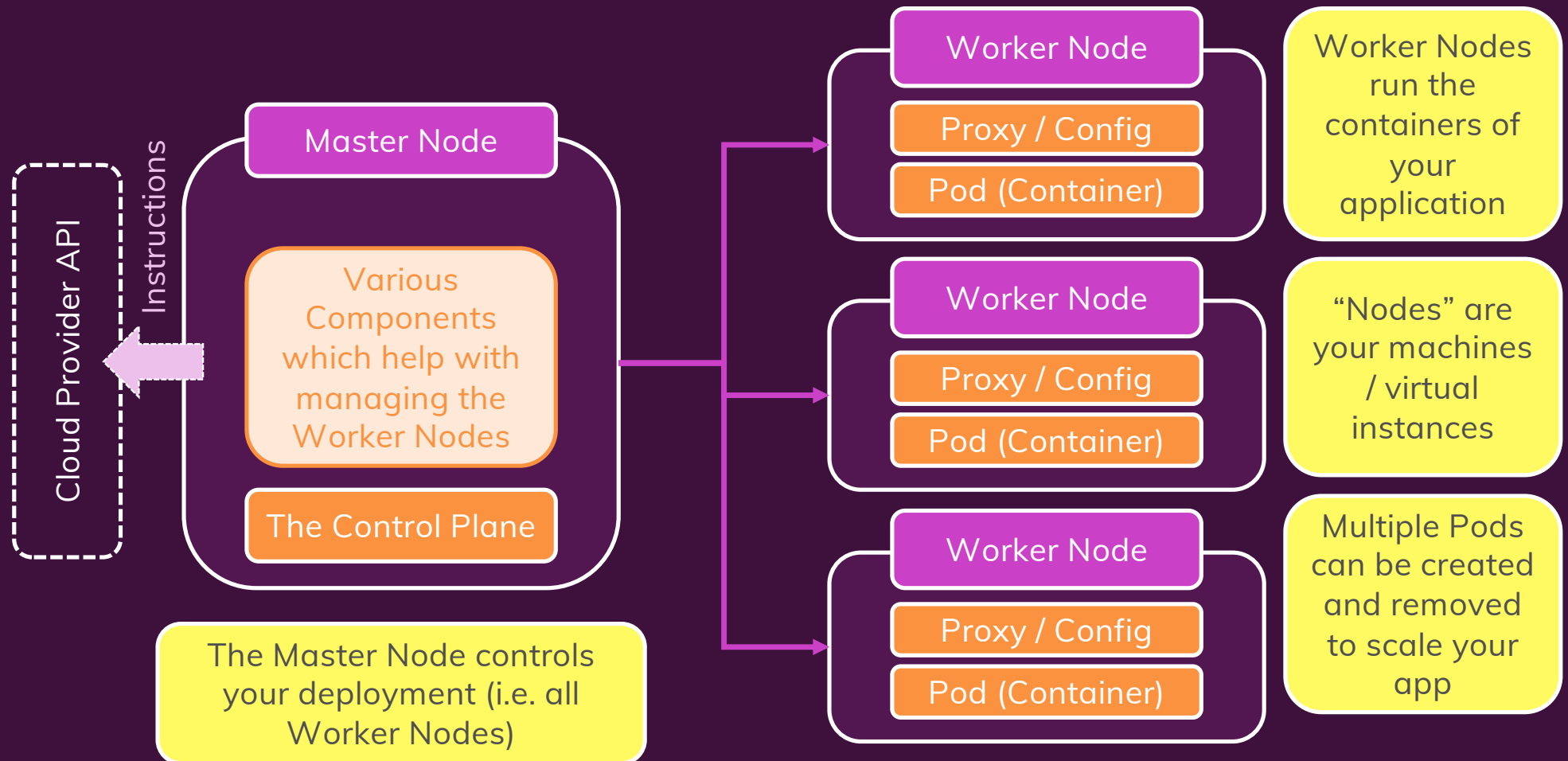
Core Kubernetes Concepts & Architecture



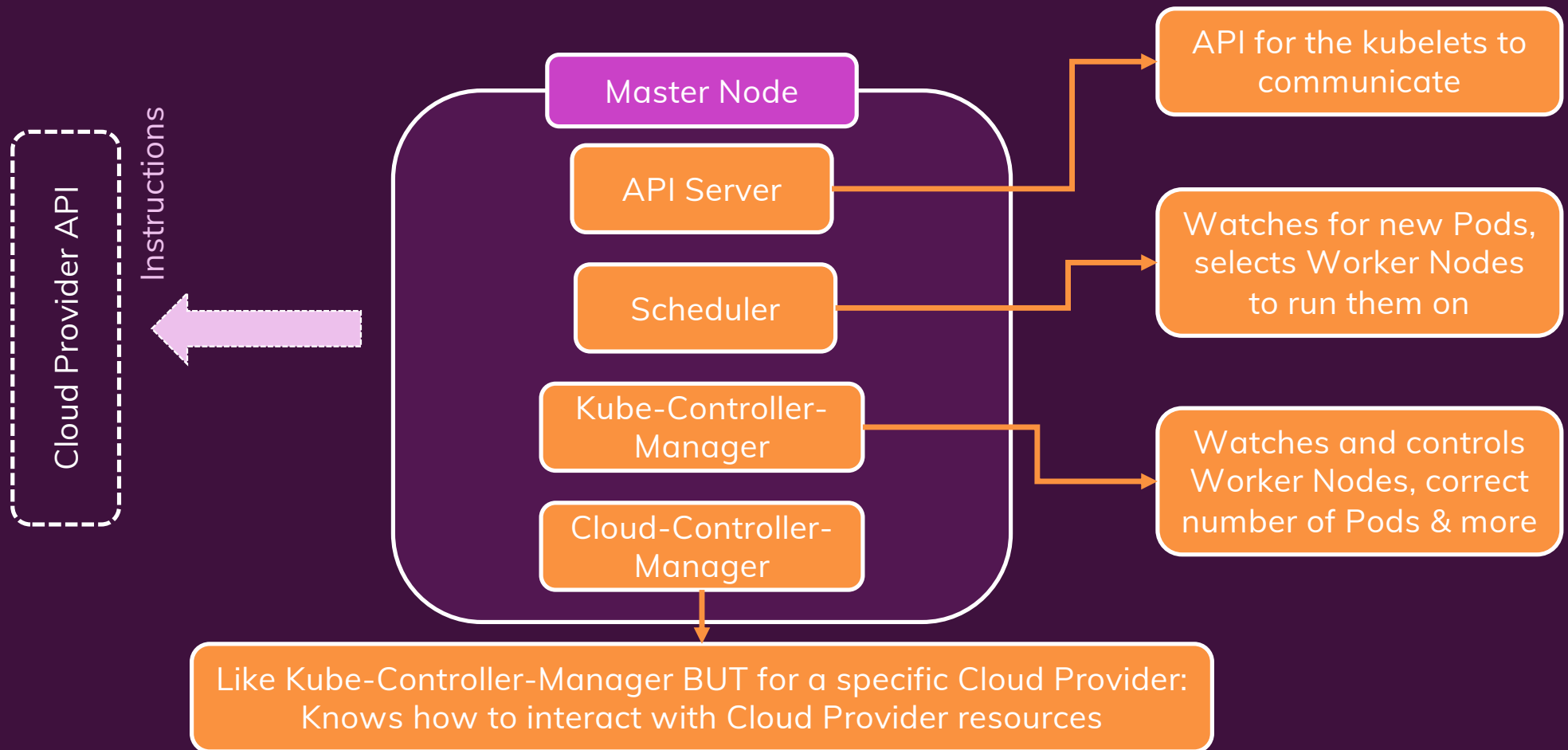
A Closer Look At The Worker Nodes



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**