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We (Maybe) Have A Problem

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

(even beyond security and configuration concerns!)

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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	We might need more container instances upon traffic spikes	Incoming traffic should be distributed equally
Container health checks + automatic re-deployment	Autoscaling	Load balancer

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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!

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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**

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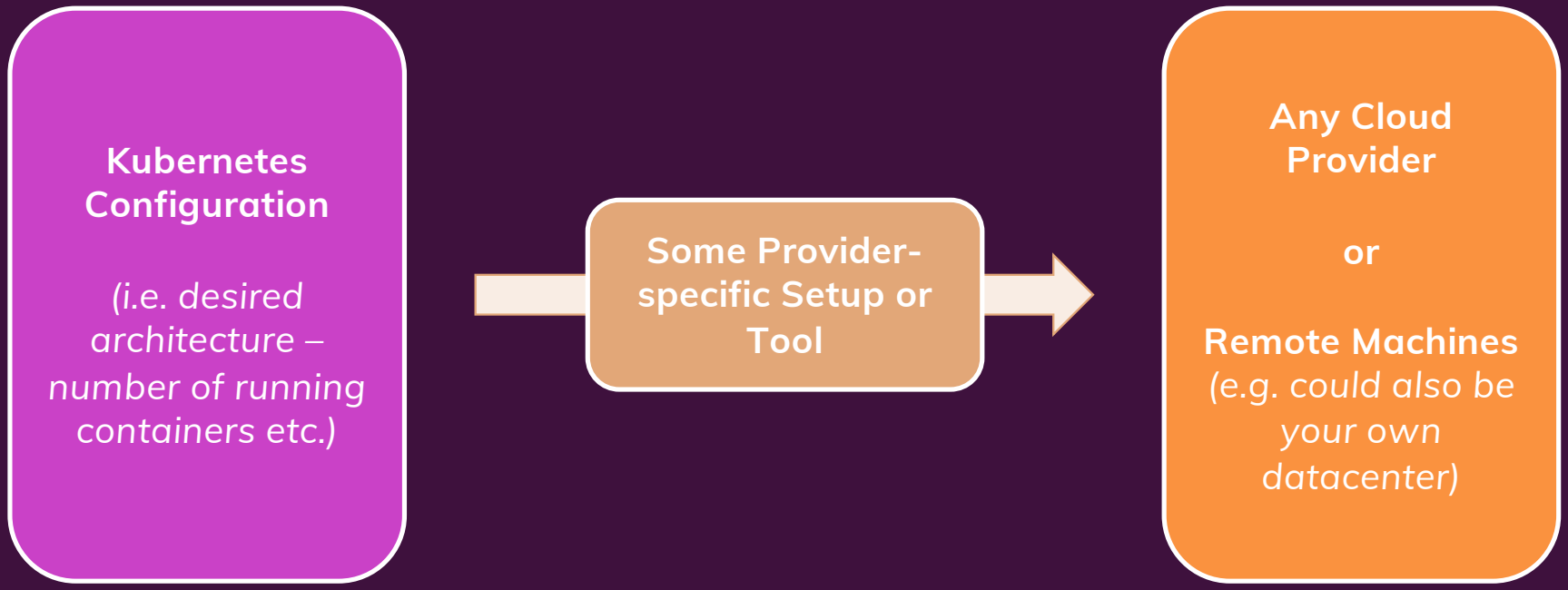
Why Kubernetes?



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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

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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

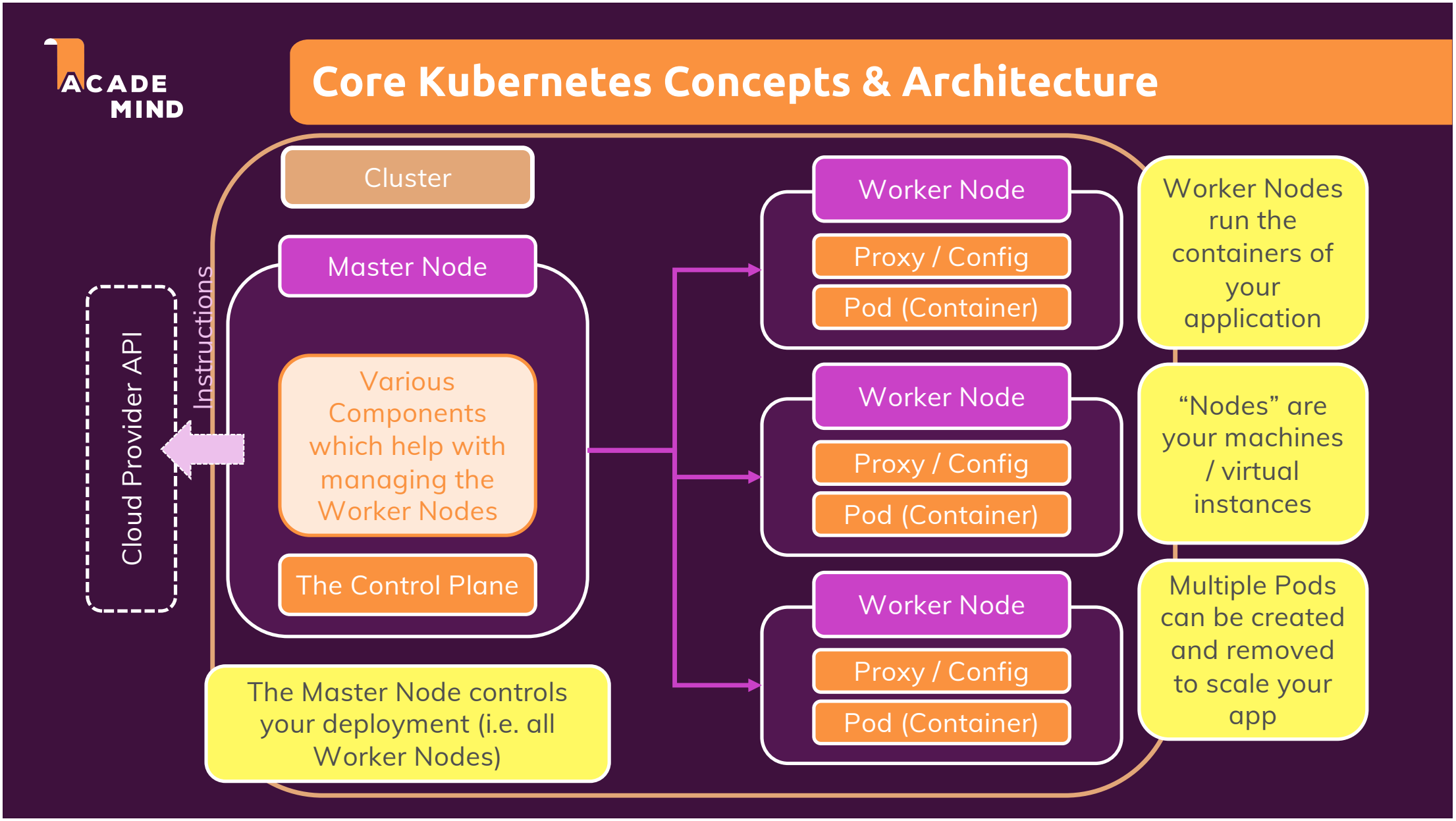
It's a collection of concepts and tools

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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Core Kubernetes Concepts & Architecture
Cluster
Master Node
Various Components which help with managing the Worker Nodes
The Control Plane
Cloud Provider API
Instructions
The Master Node controls your deployment (i.e. all Worker Nodes)
Worker Node
Proxy / Config
Pod (Container)
Worker Node
Proxy / Config
Pod (Container)
Worker Node
Proxy / Config
Pod (Container)
Worker Nodes run the containers of your application
"Nodes" are your machines / virtual instances
Multiple Pods can be created and removed to scale your app

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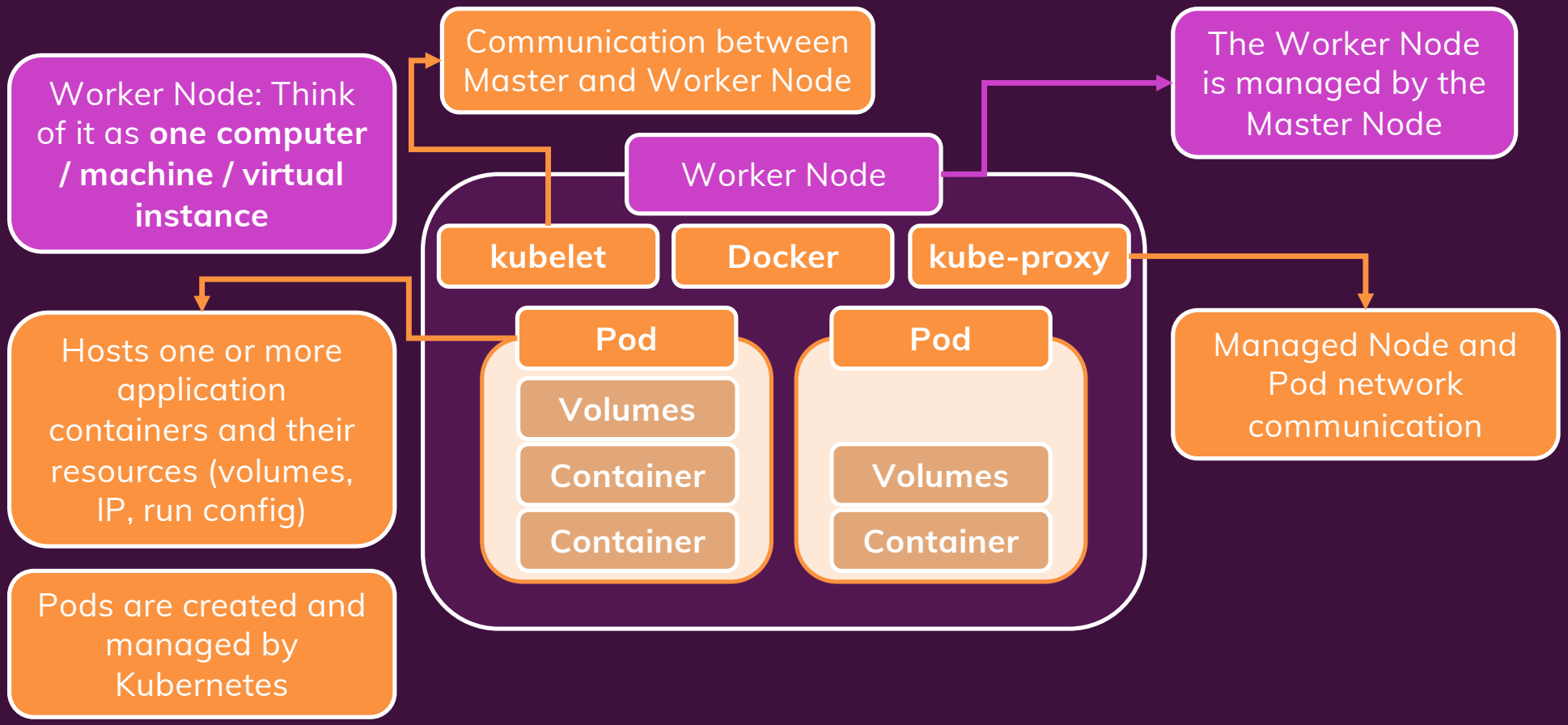
A Closer Look At The Worker Nodes



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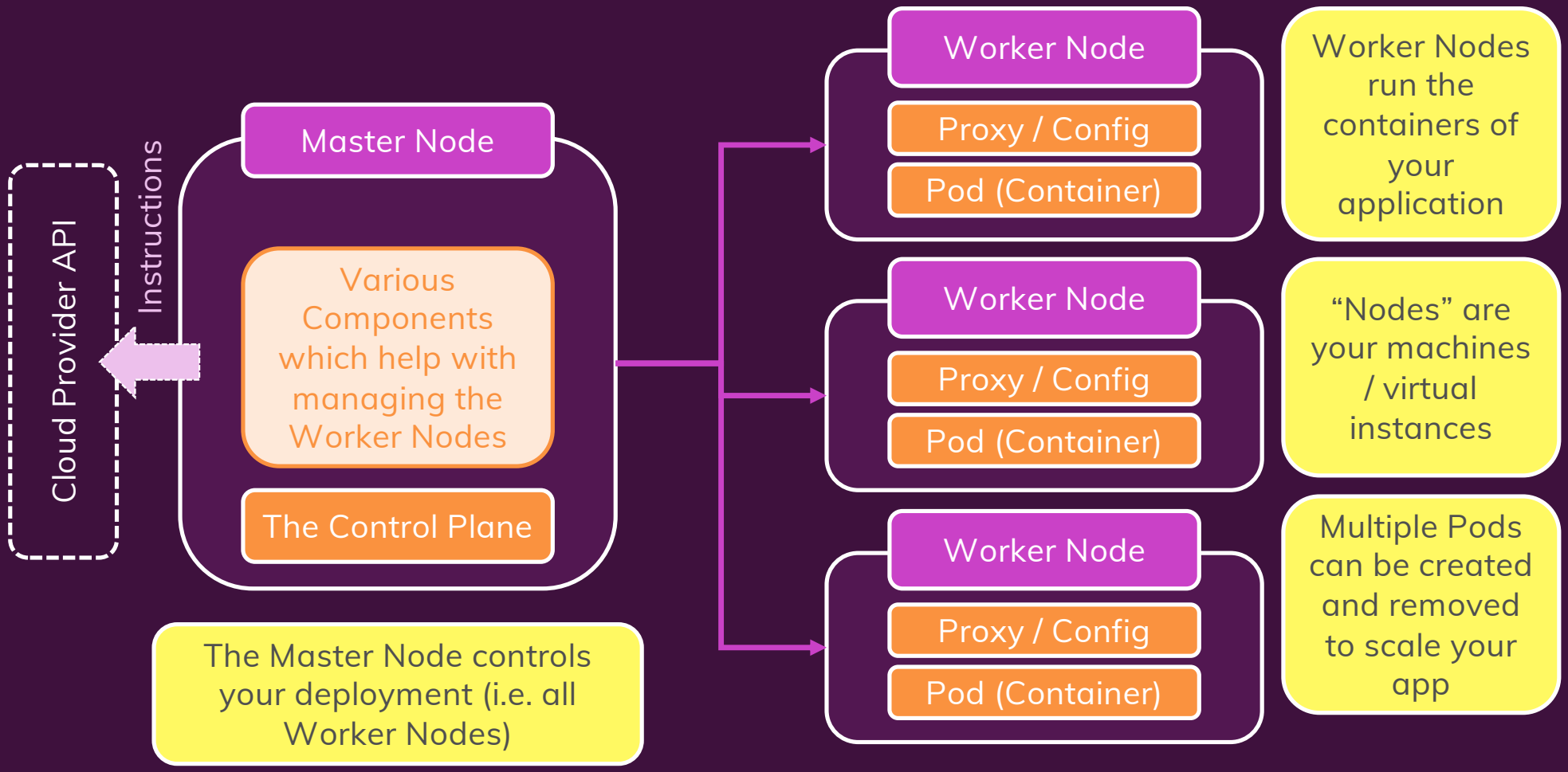
Core Kubernetes Concepts & Architecture



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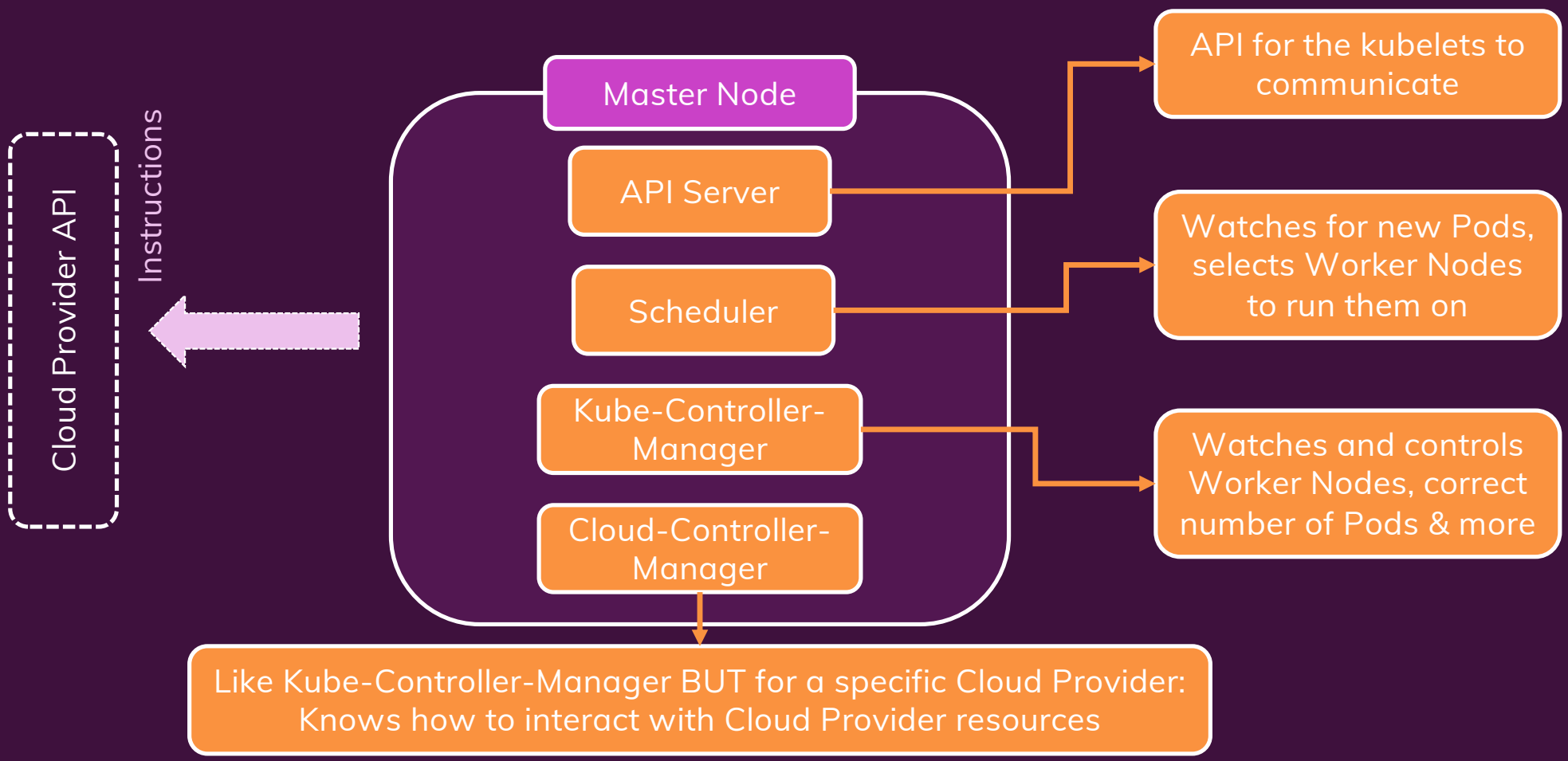
Core Kubernetes Concepts & Architecture



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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)

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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