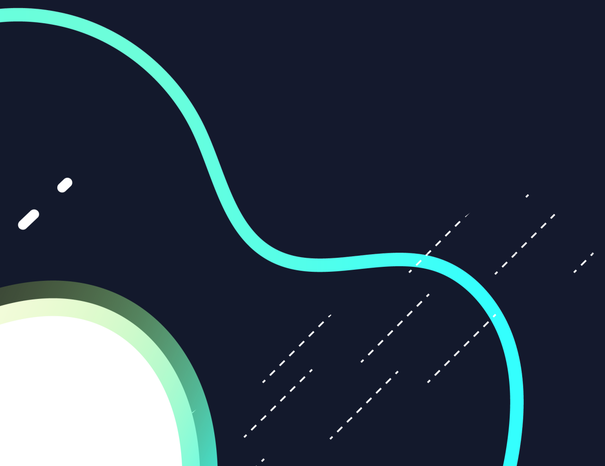
KUBERNETES UNDER THE HOOD

Richard Szabo
Duelbox
Co-Founder, Software Engineer

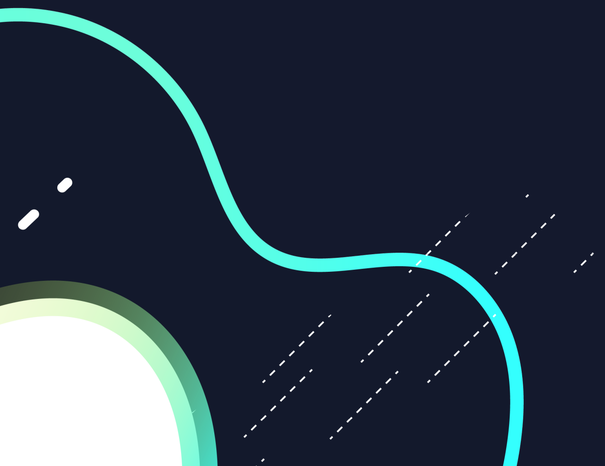
WHY BOTHER?



DUELBOX

WHY BOTHER?

Understand the basics of the infrastructure



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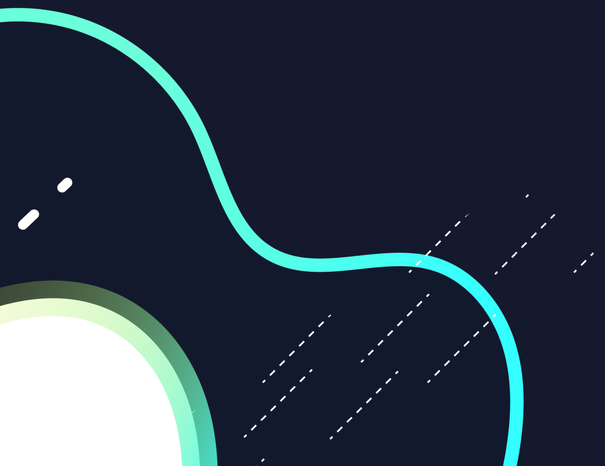
Understand the basics of the infrastructure

Debugging / fixing issues



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Helpful in design decisions

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Learn from patterns of a complex distributed system

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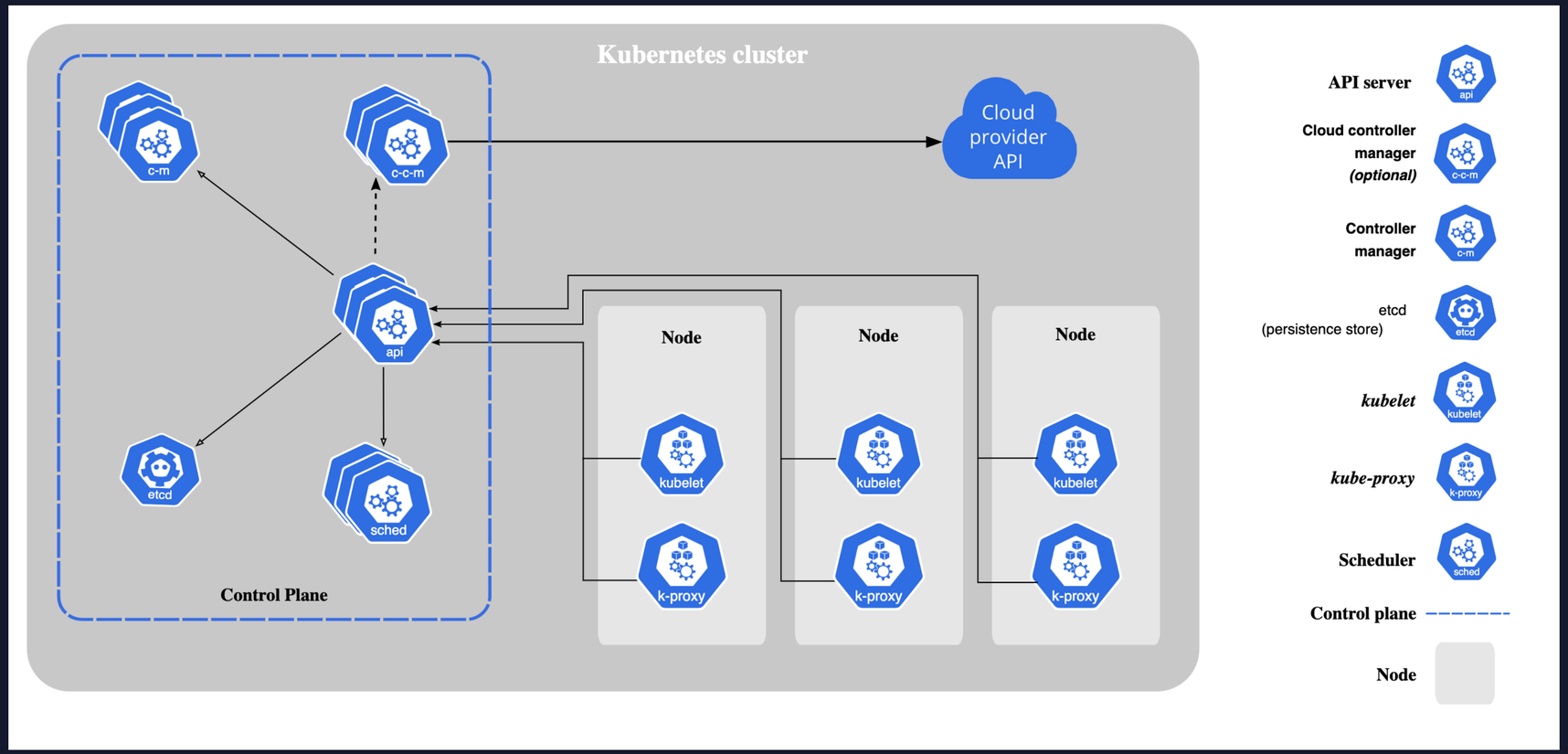
Learn from patterns of a complex distributed system

Extensions, CRD

KUBERNETES ARCHITECTURE



https://kubernetes.io/docs/concepts/overview/components/

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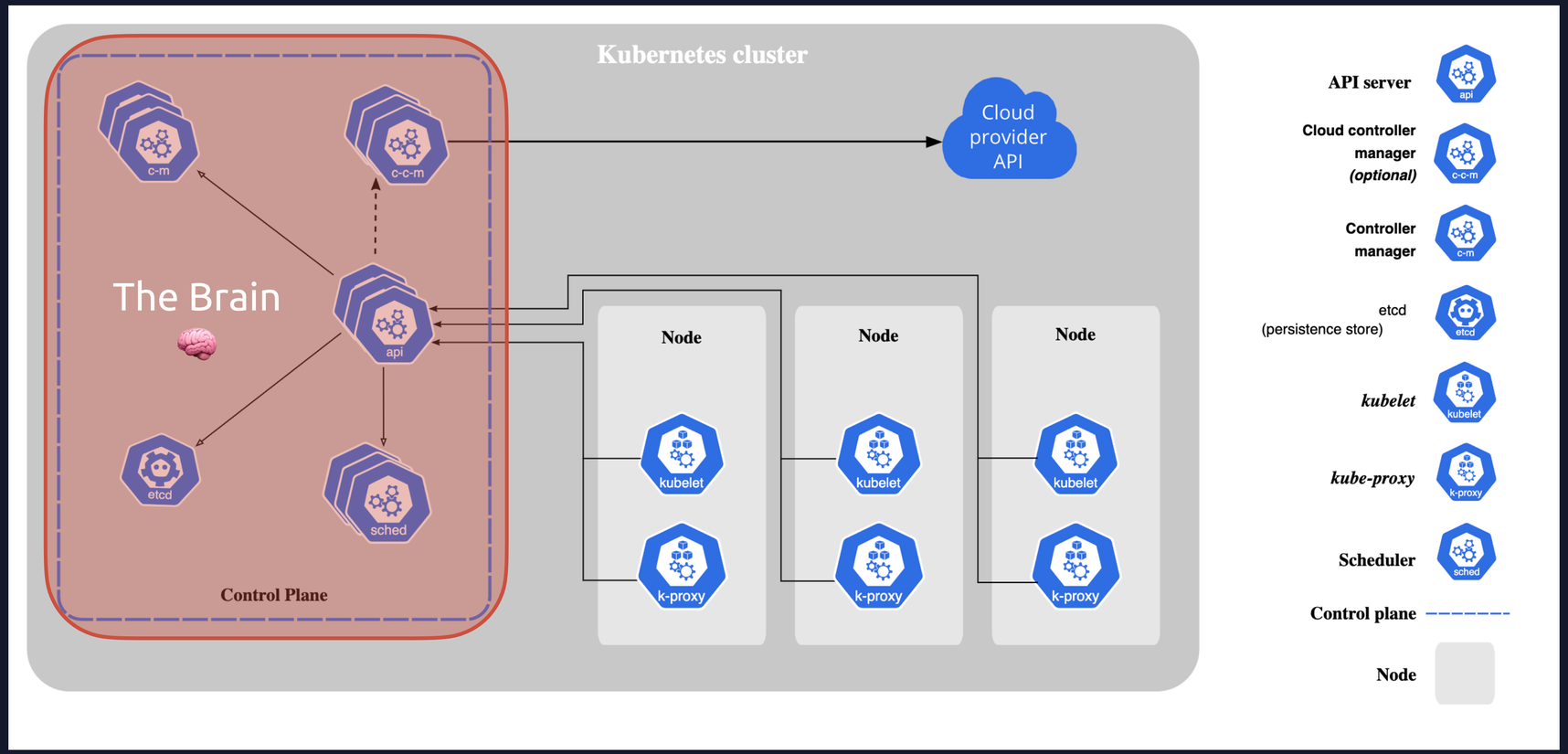

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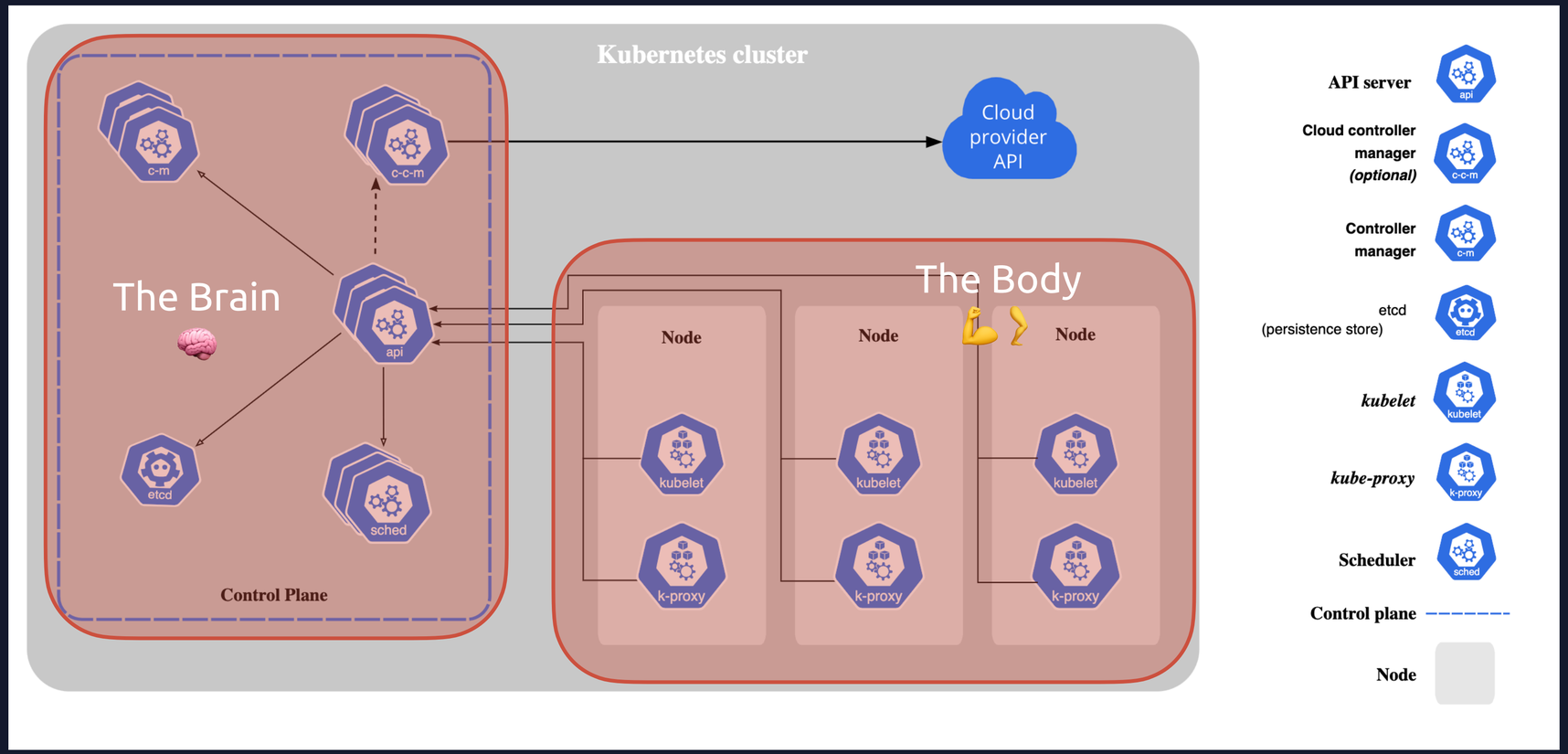

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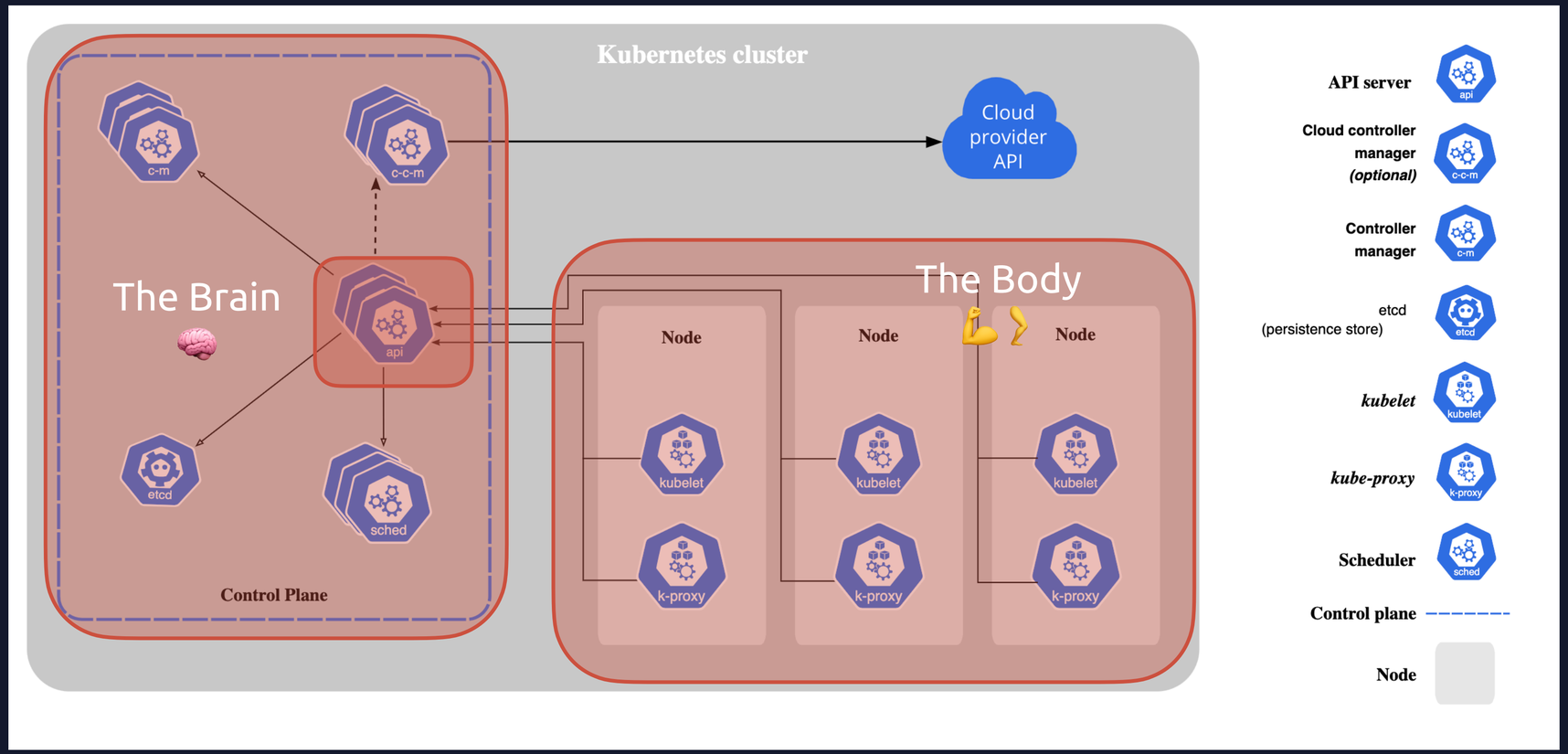

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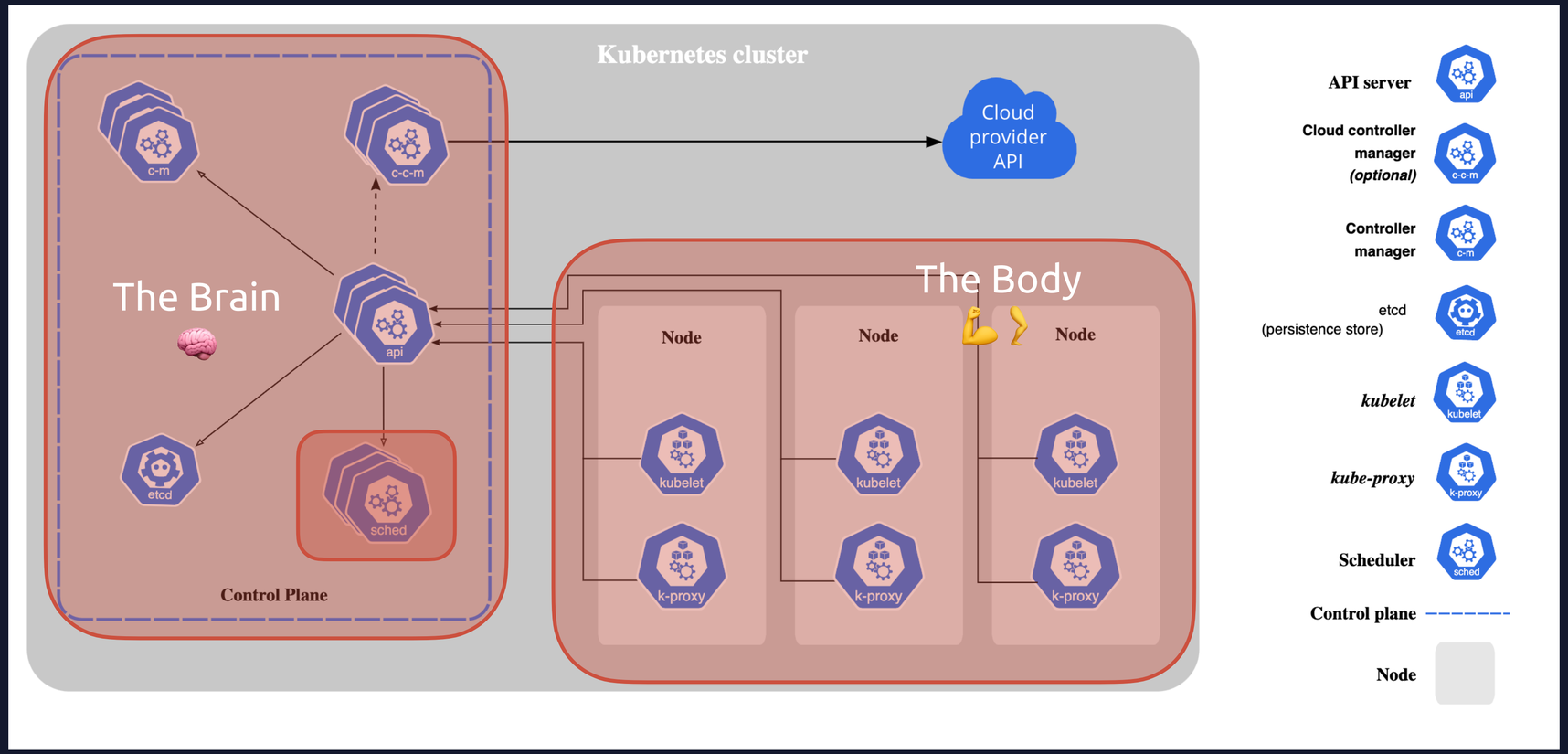

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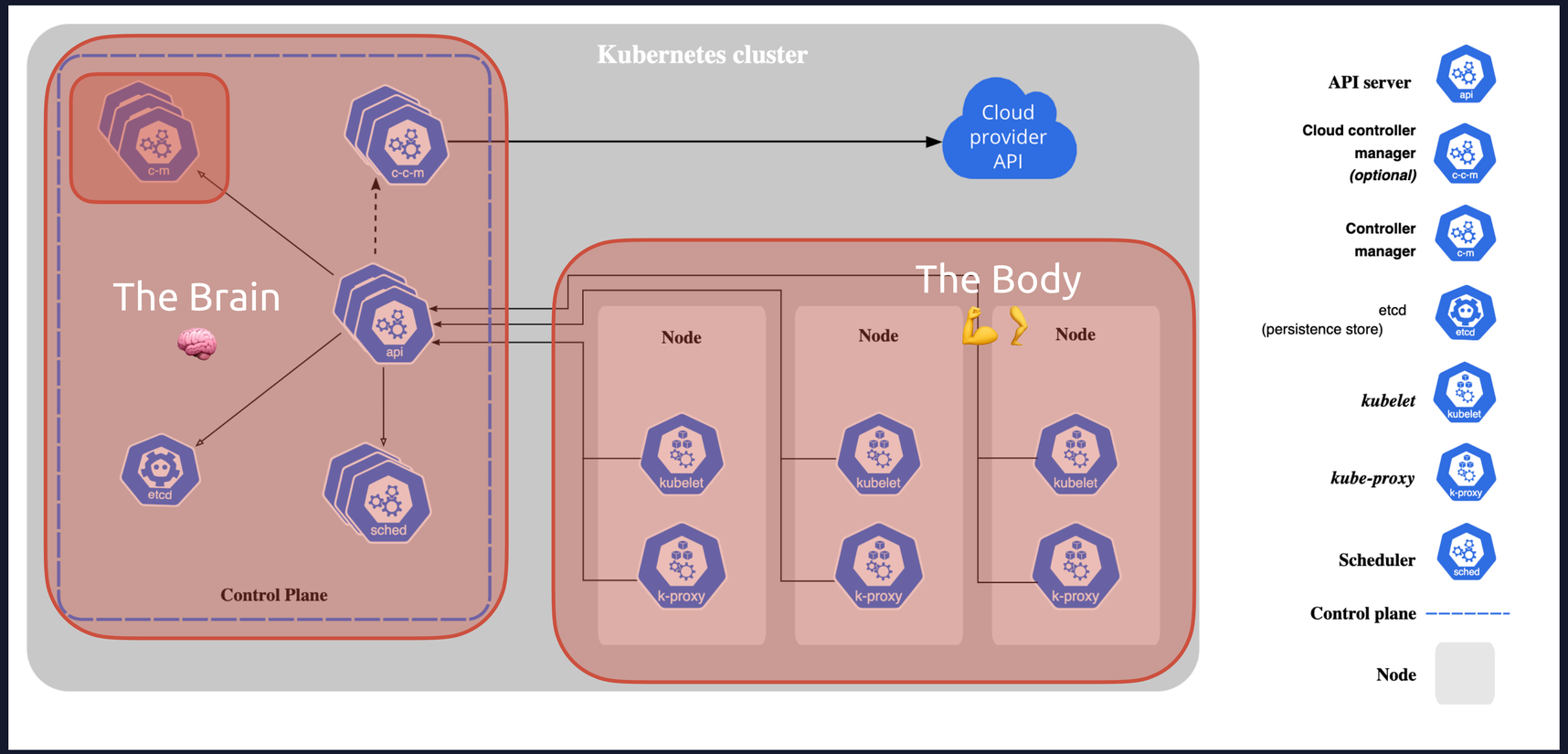

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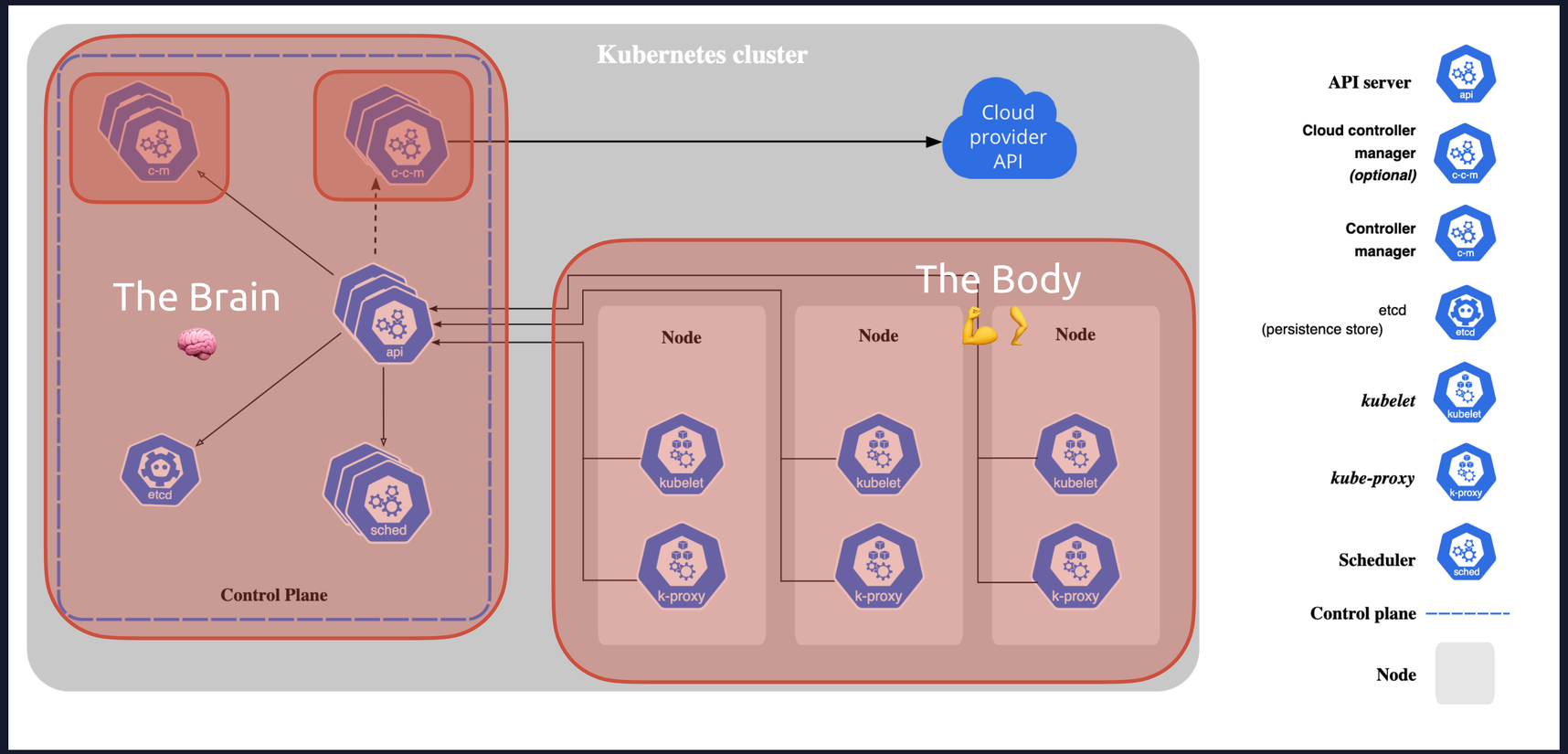

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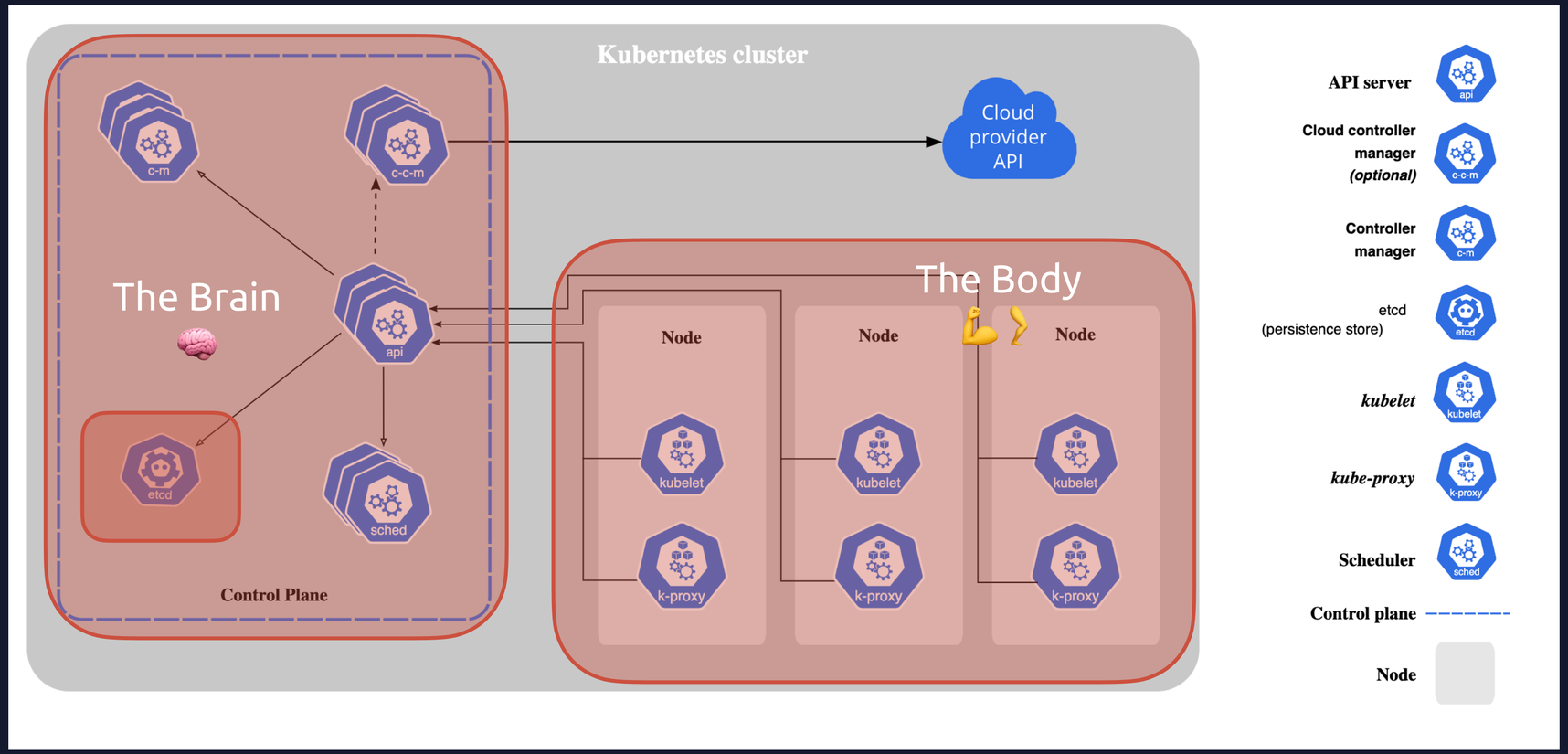

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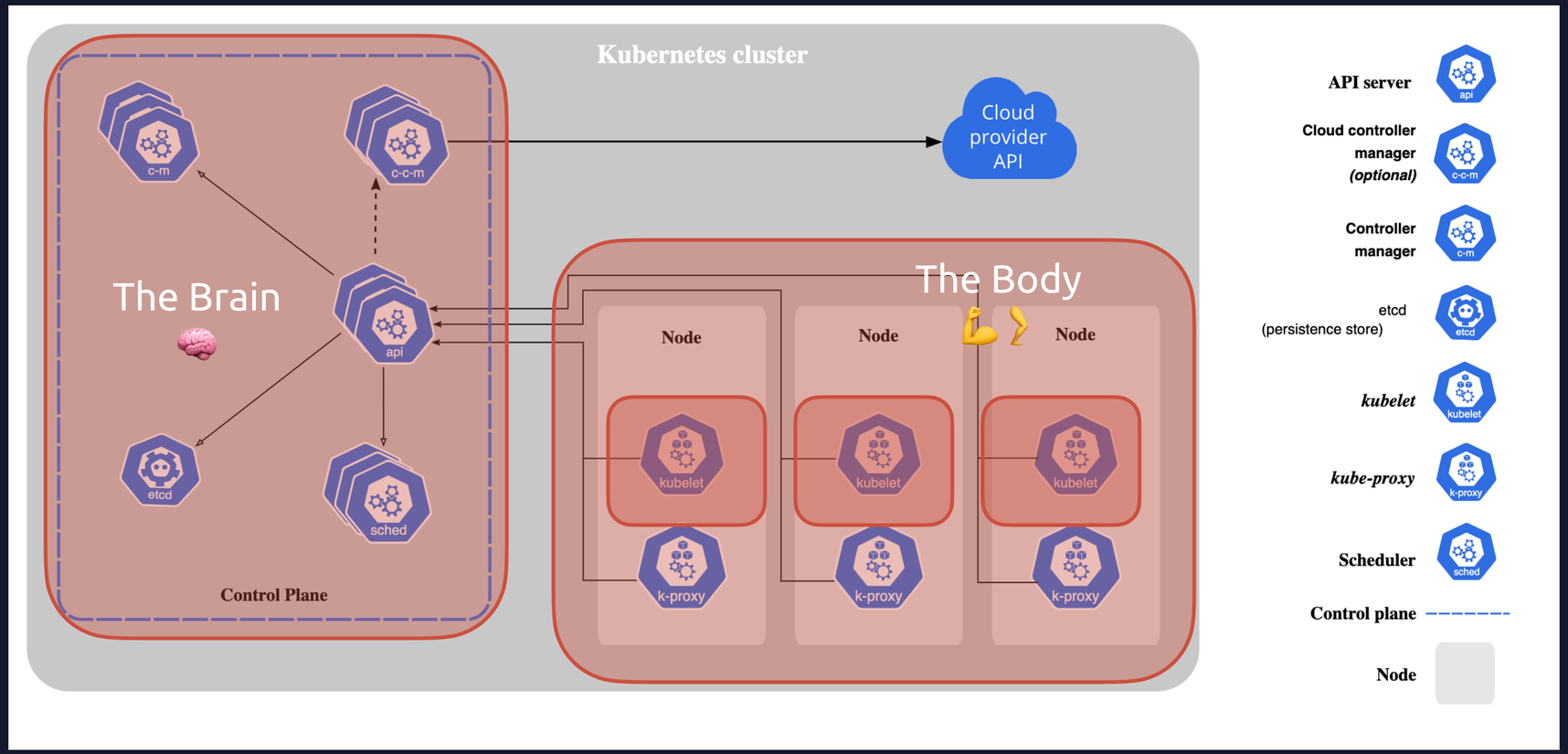

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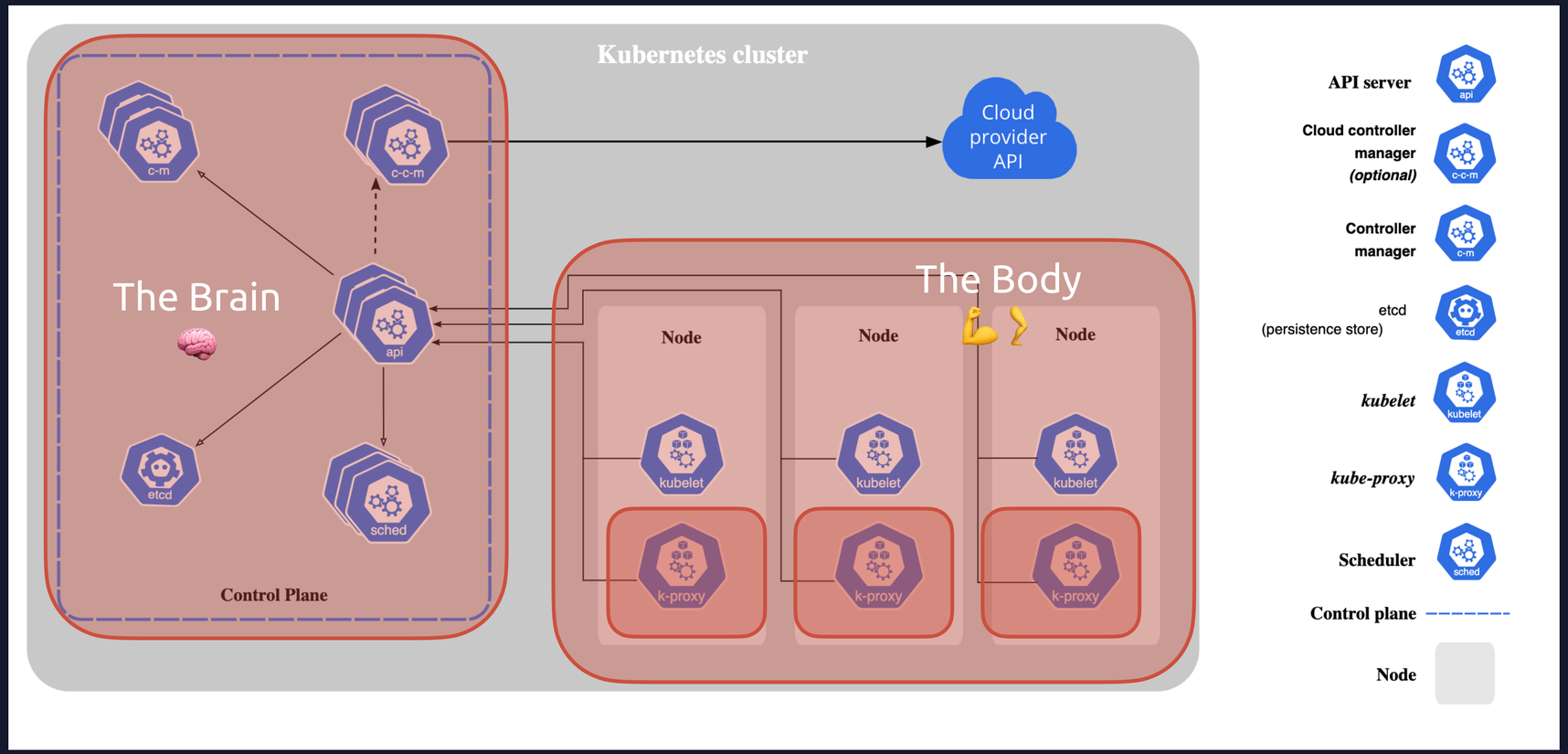

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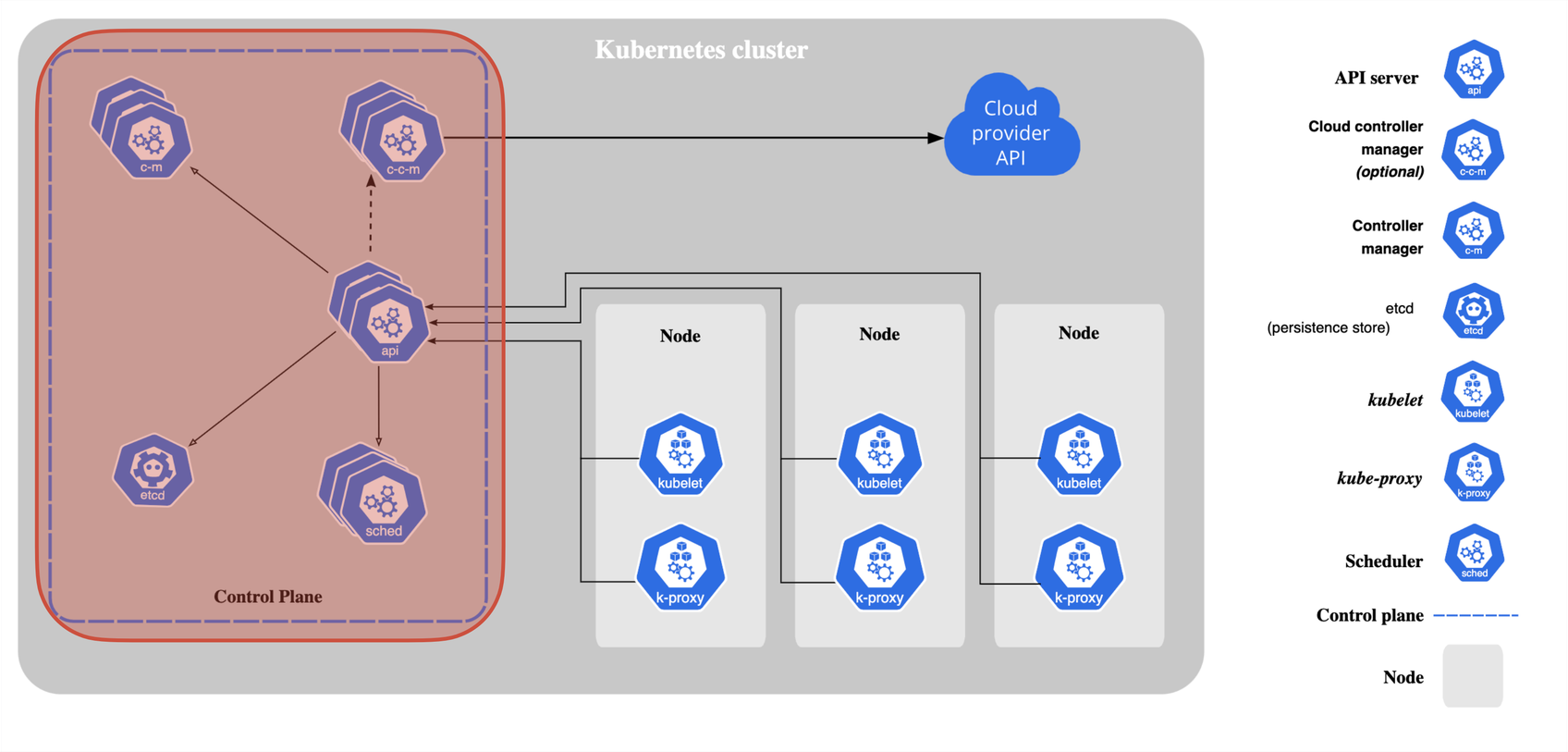
DUELBOX

CONTROL PLANE



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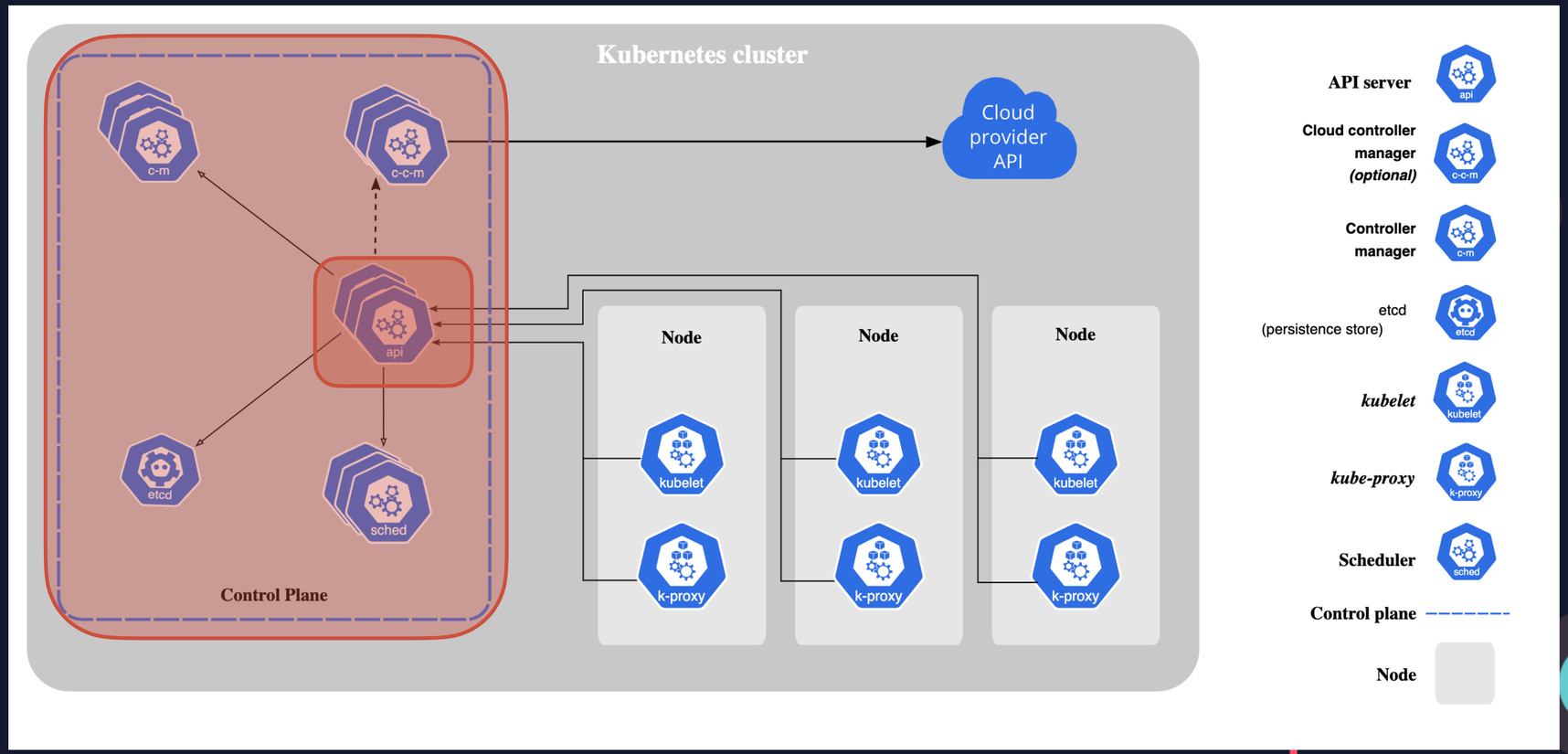
API SERVER

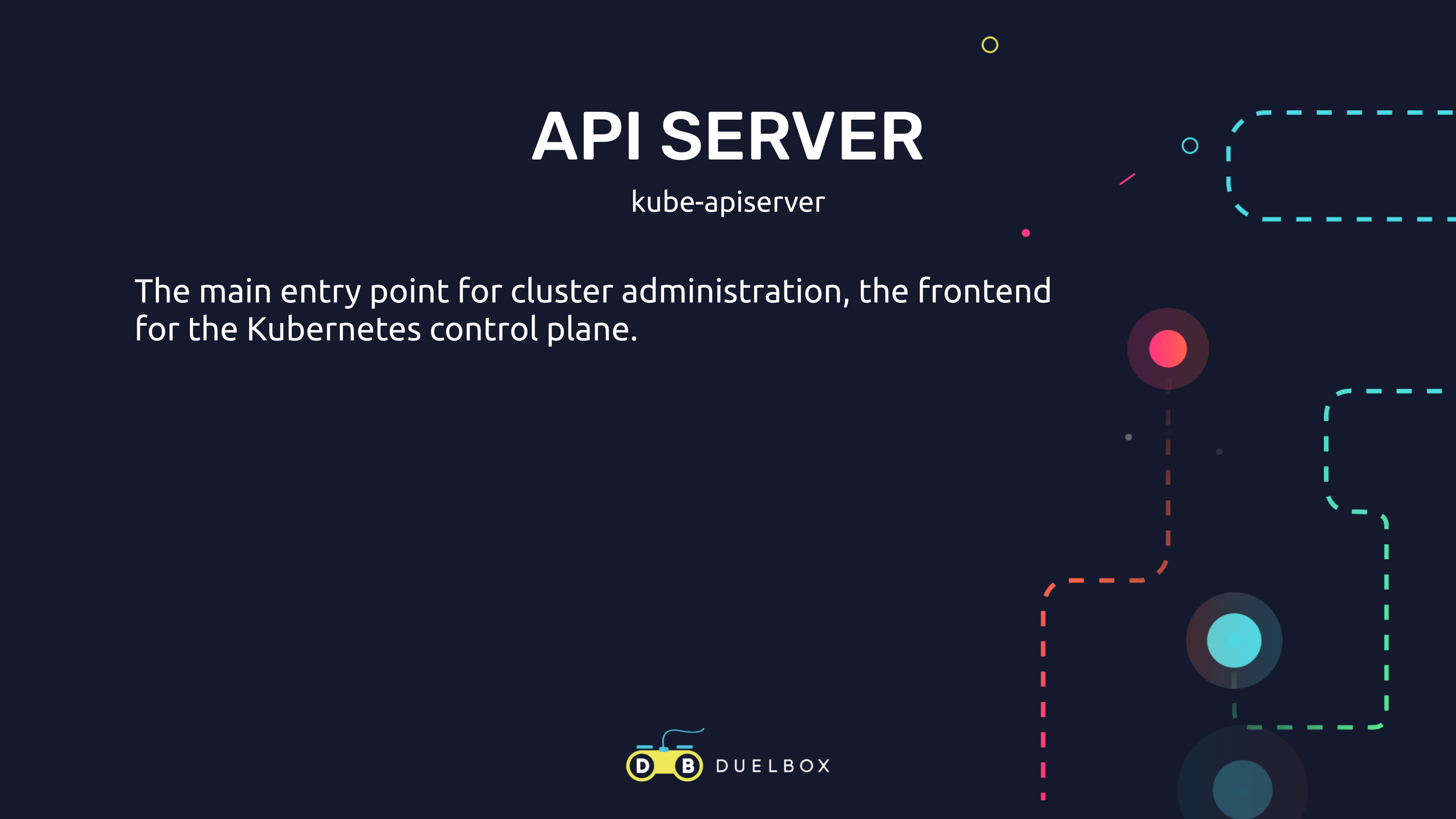


DUELBOX

API SERVER

kube-apiserver

The main entry point for cluster administration, the frontend for the Kubernetes control plane.



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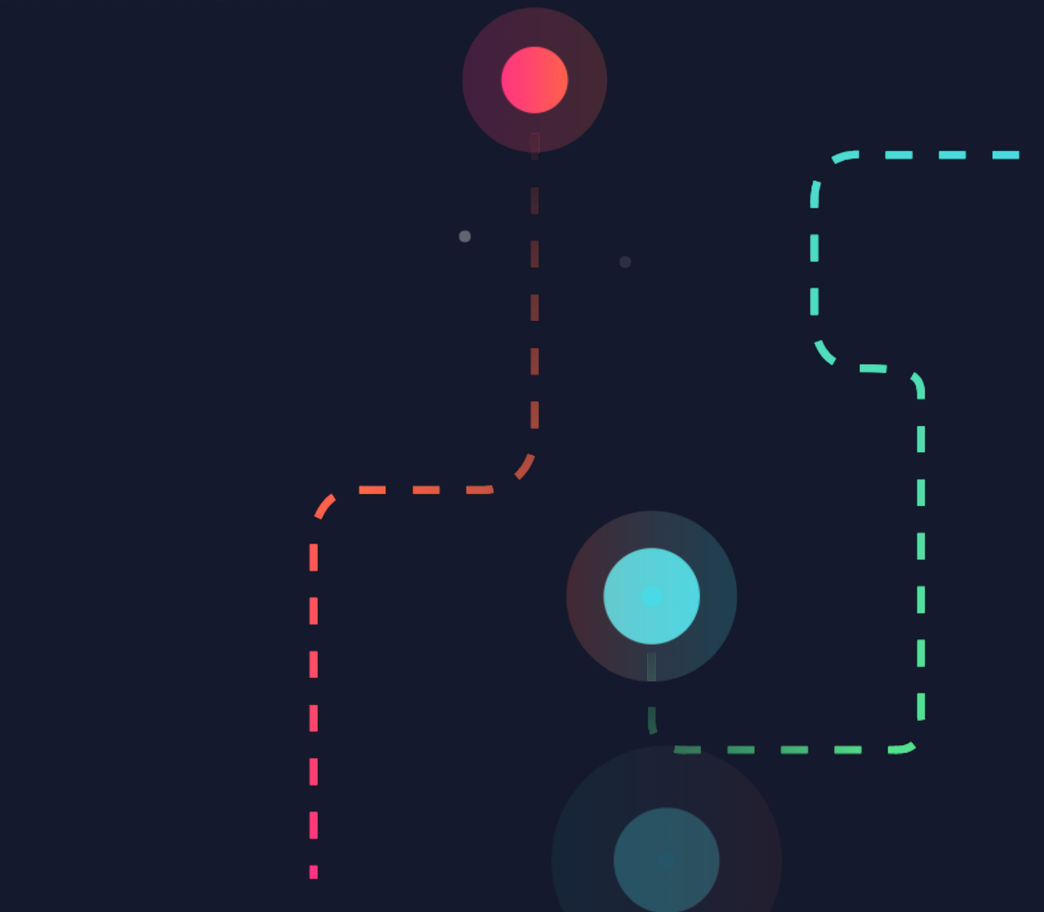

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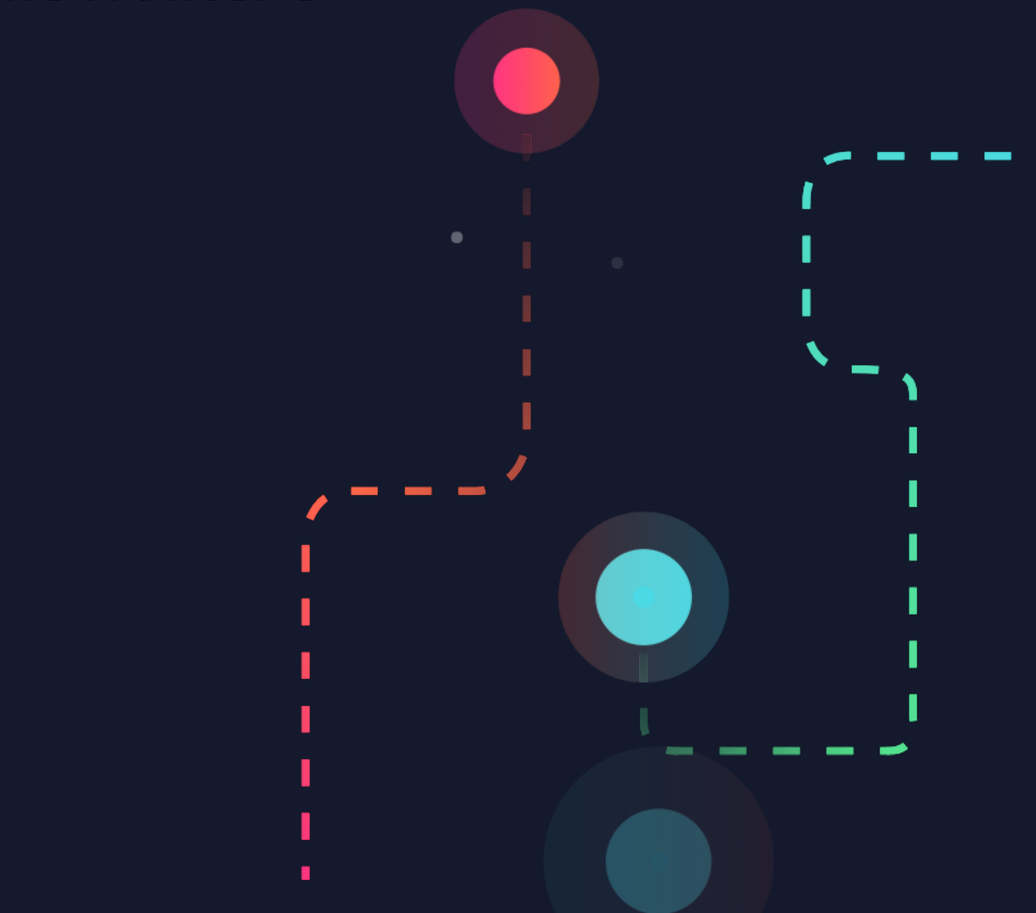

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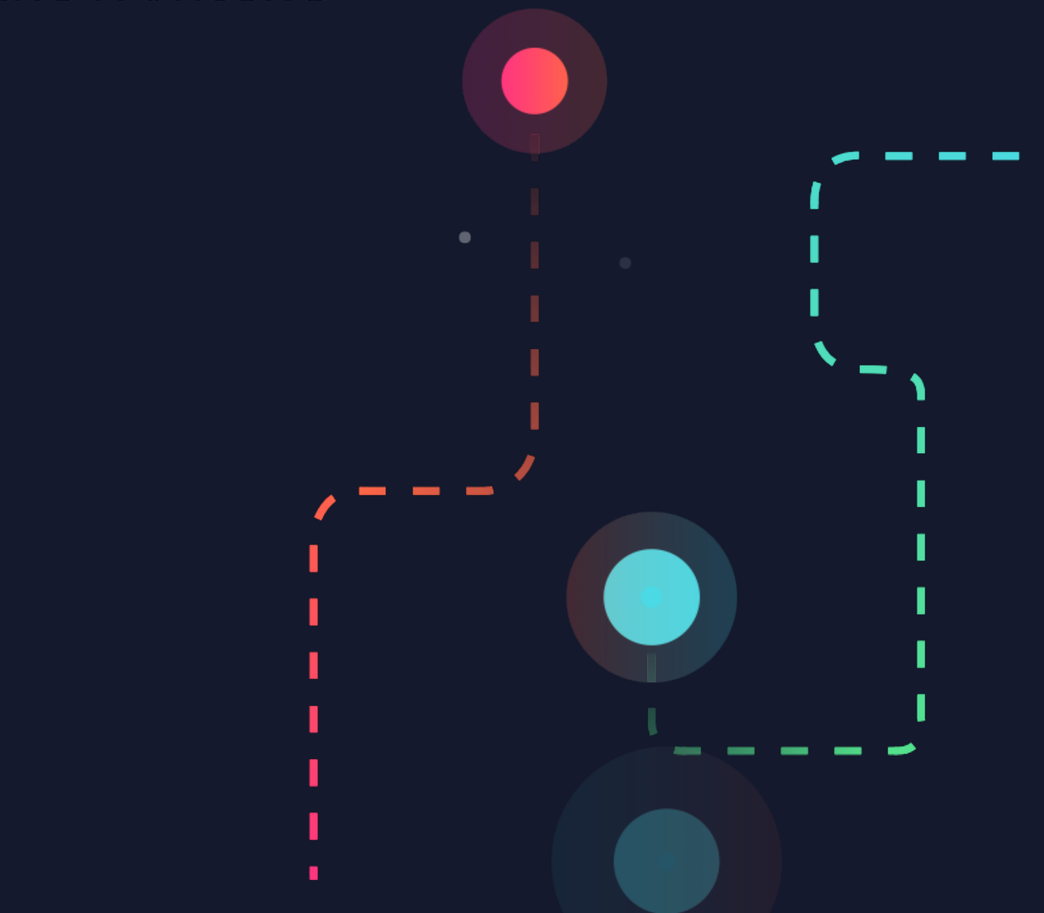

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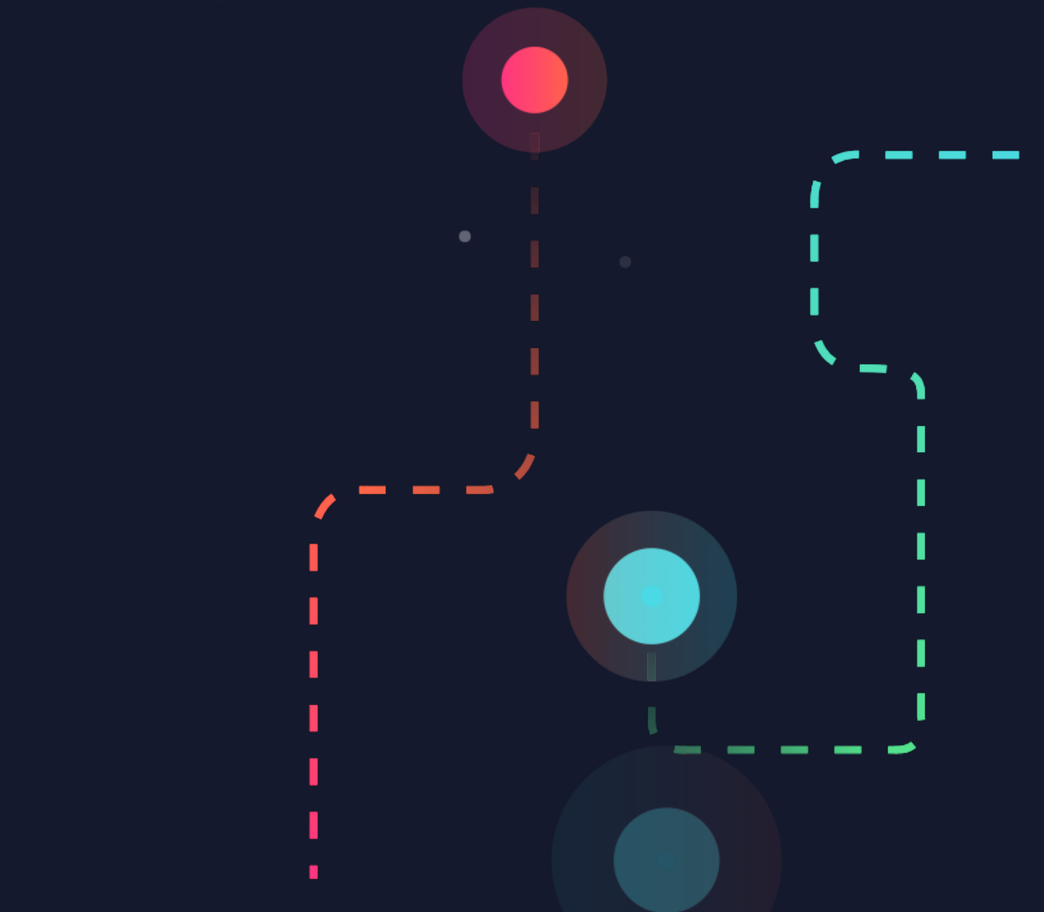

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kubectl

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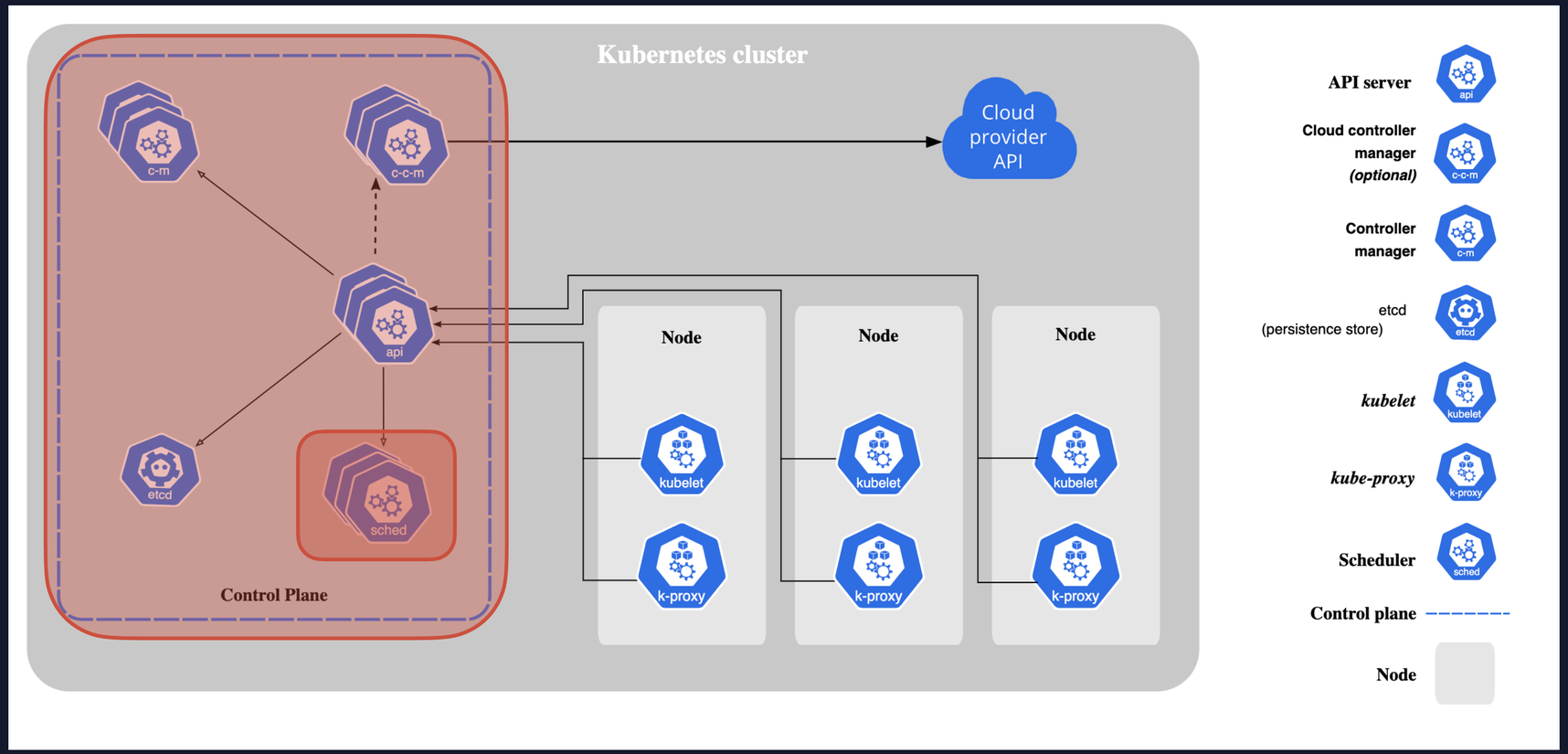

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SCHEDULER

kube-scheduler

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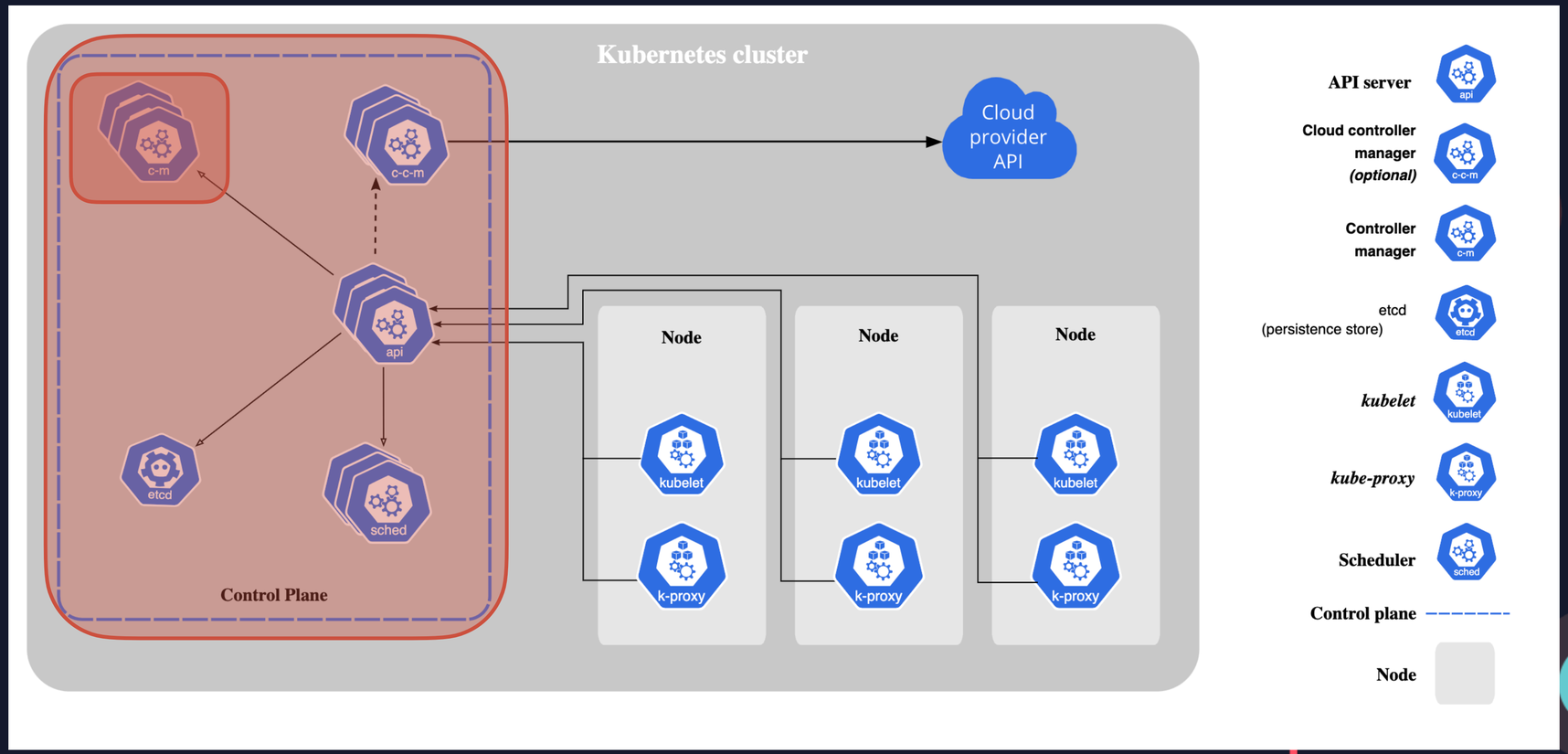
nodeSelector / affinity / taints

CONTROLLER MANAGER

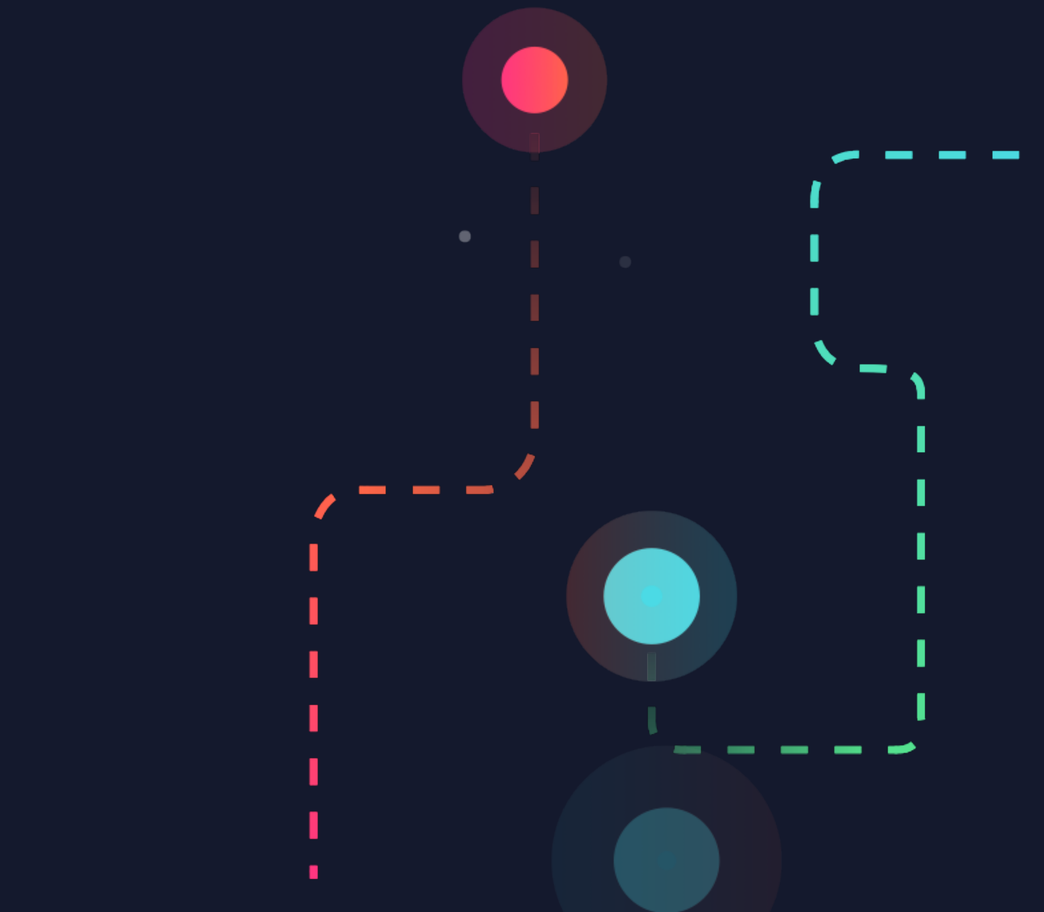


DUELBOX

CONTROLLER MANAGER

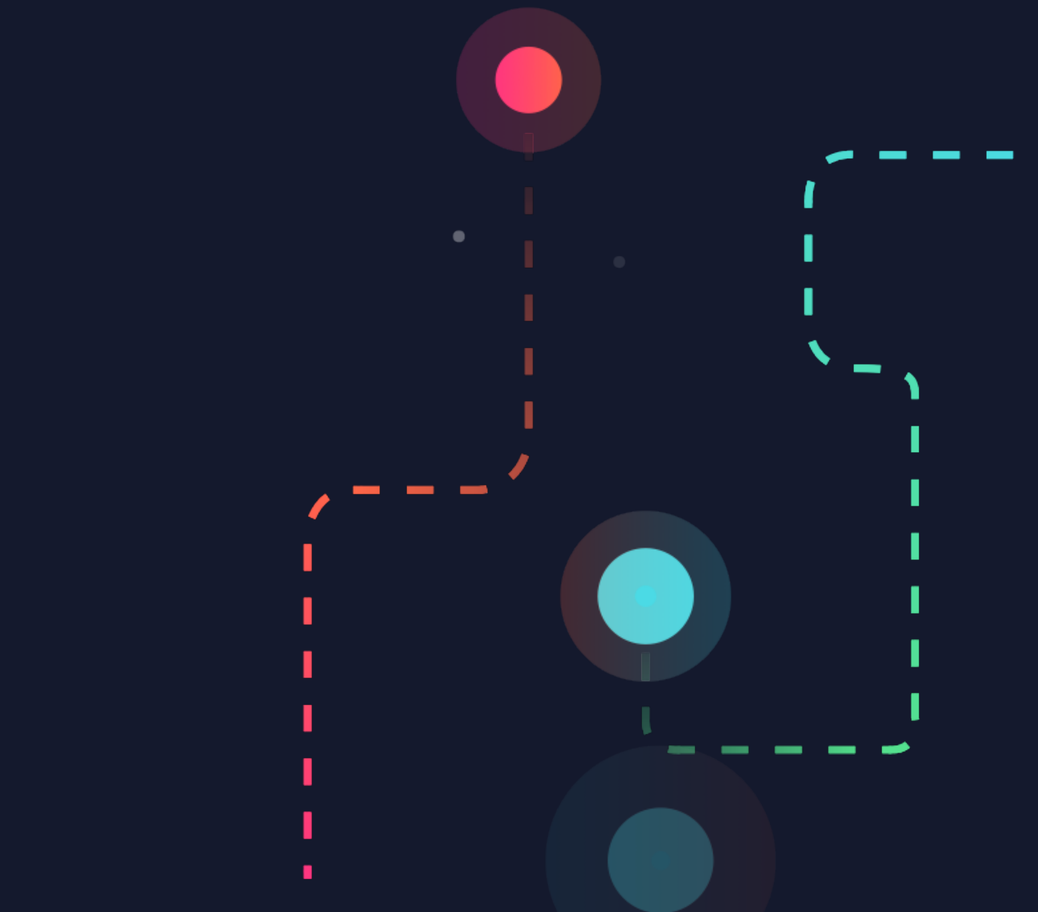
kube-controller-manager

Manages various controllers.



DUELBOX

WHAT IS A CONTROLLER?



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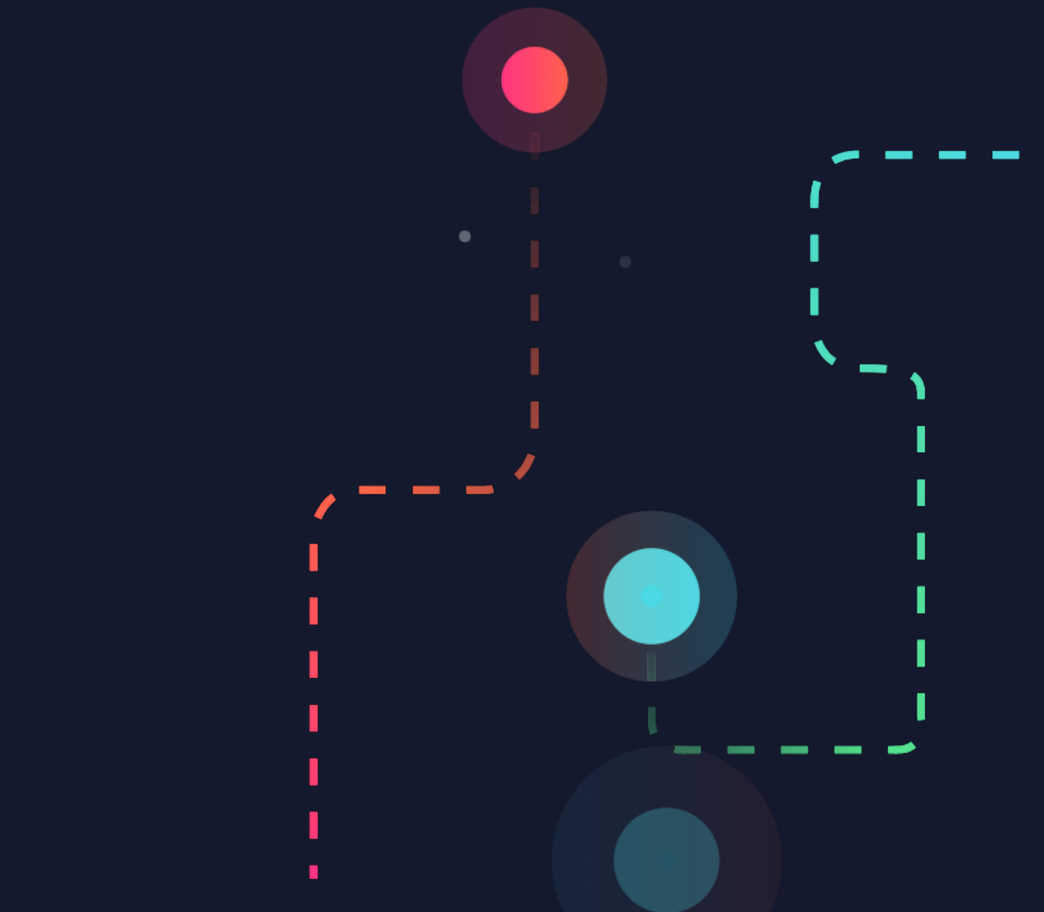
WHAT IS A CONTROLLER?

Controllers are responsible for ensuring the components of the cluster are in the *desired* state.



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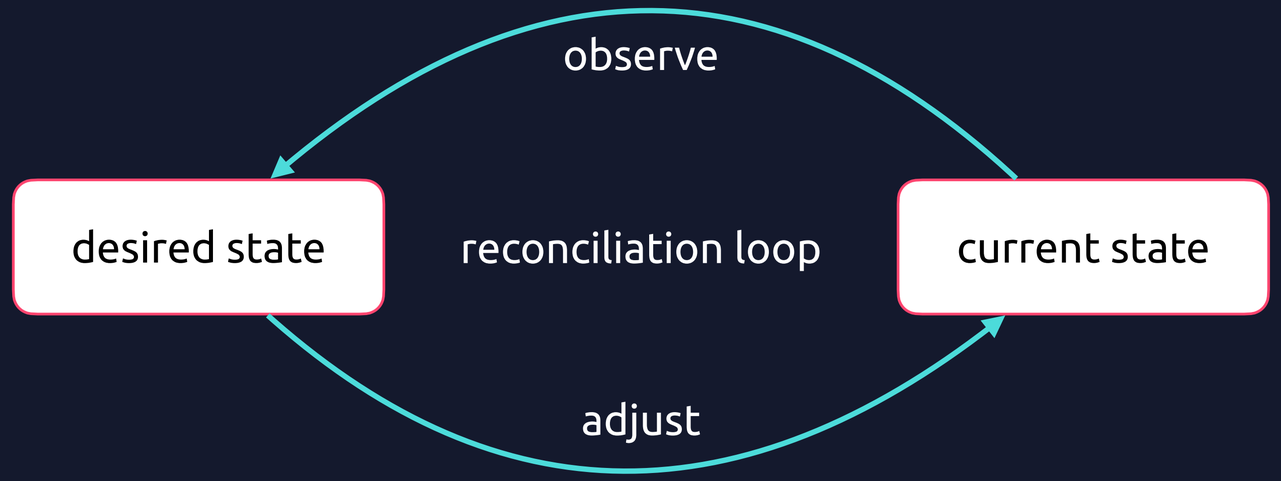
Reconciliation / control loop:



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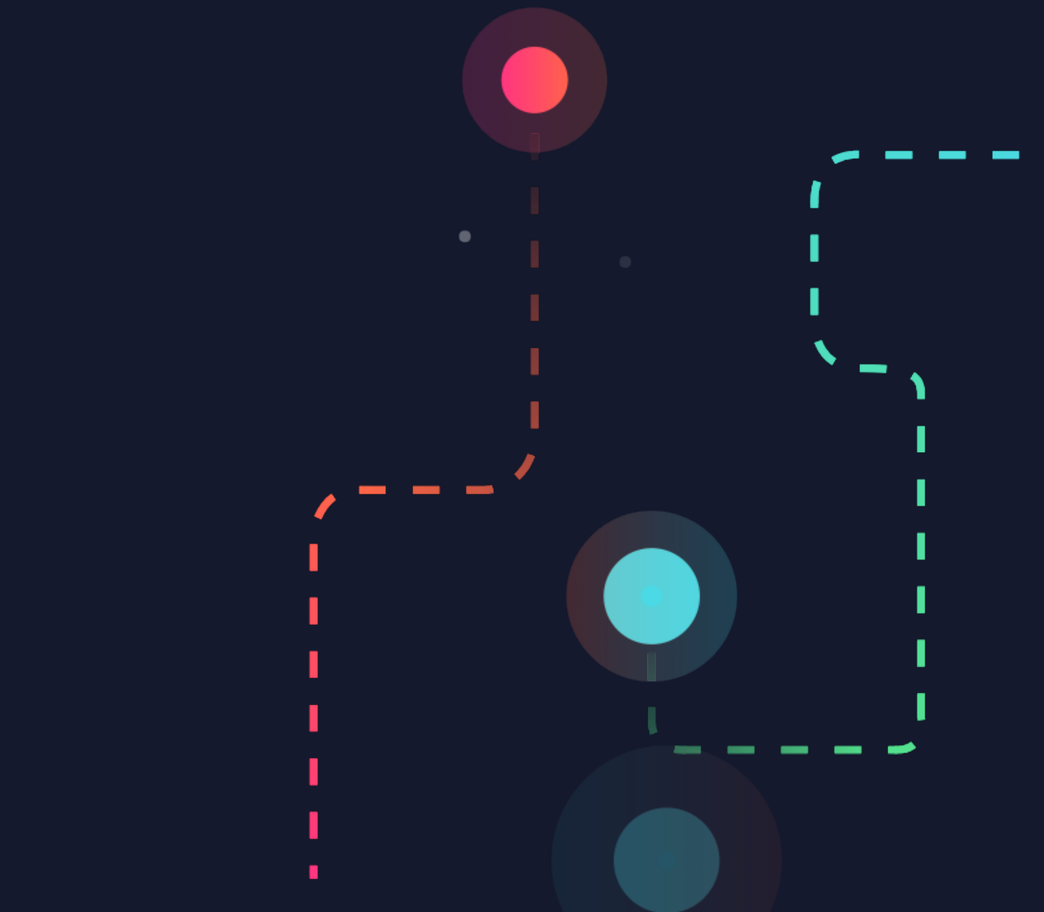

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CONTROLLER MANAGER

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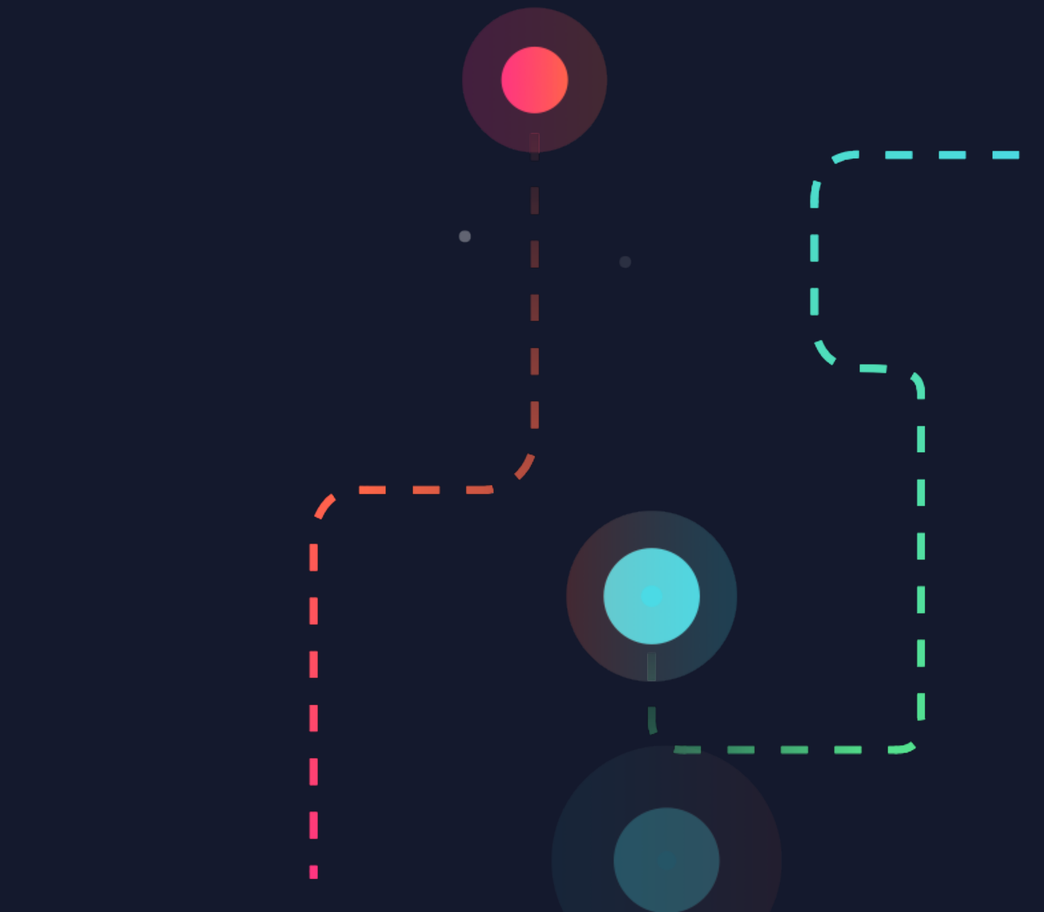
ReplicaSet / Deployment controller



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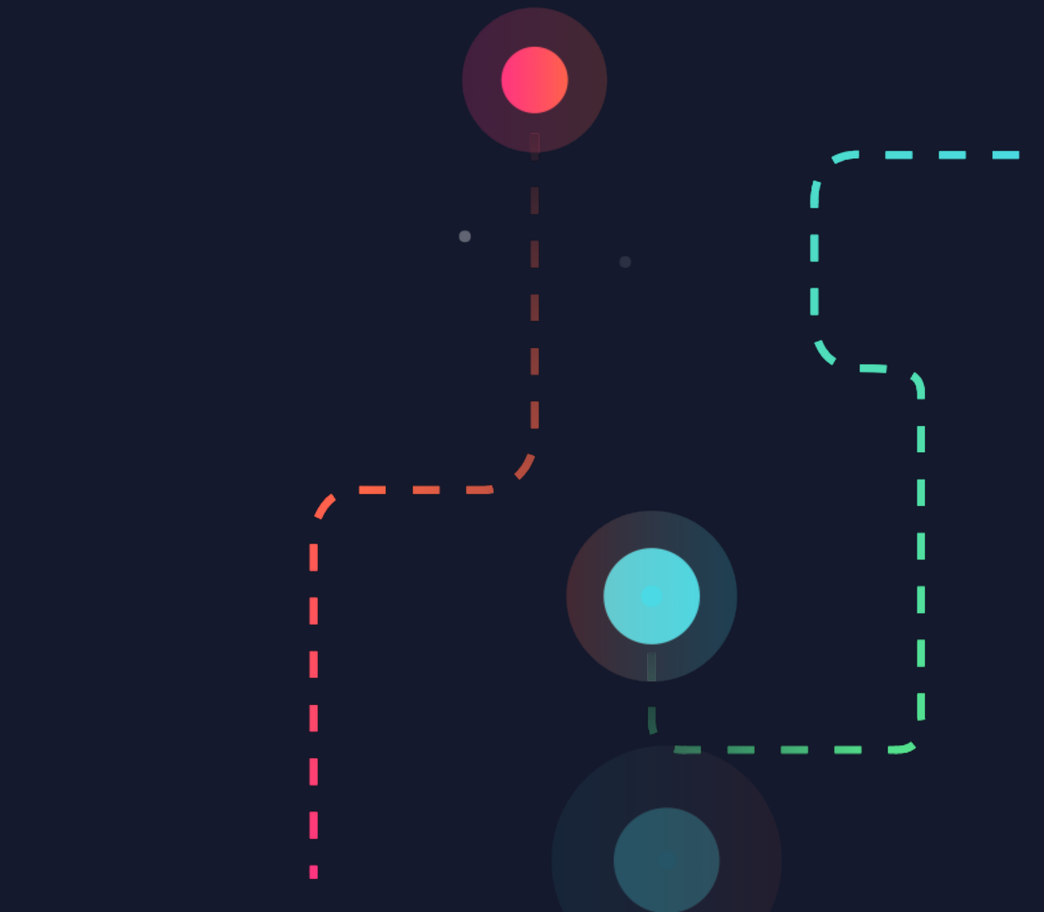
Node controller



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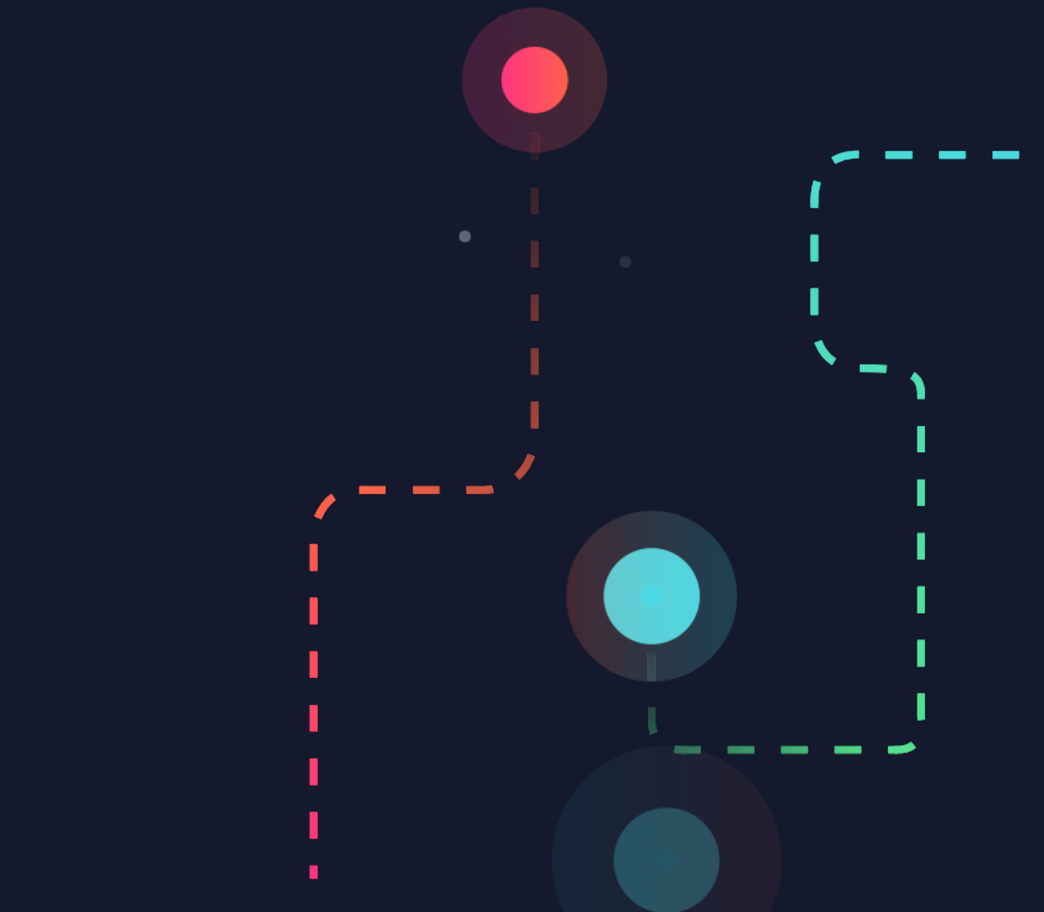

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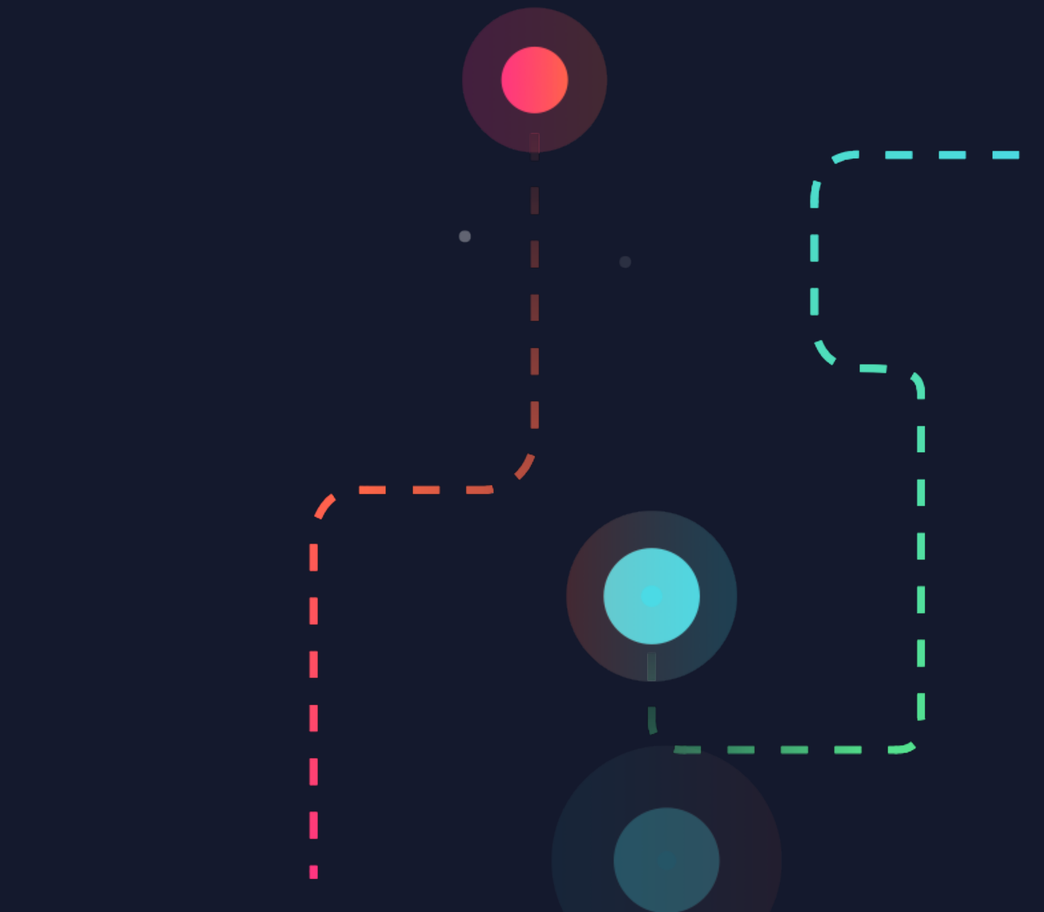
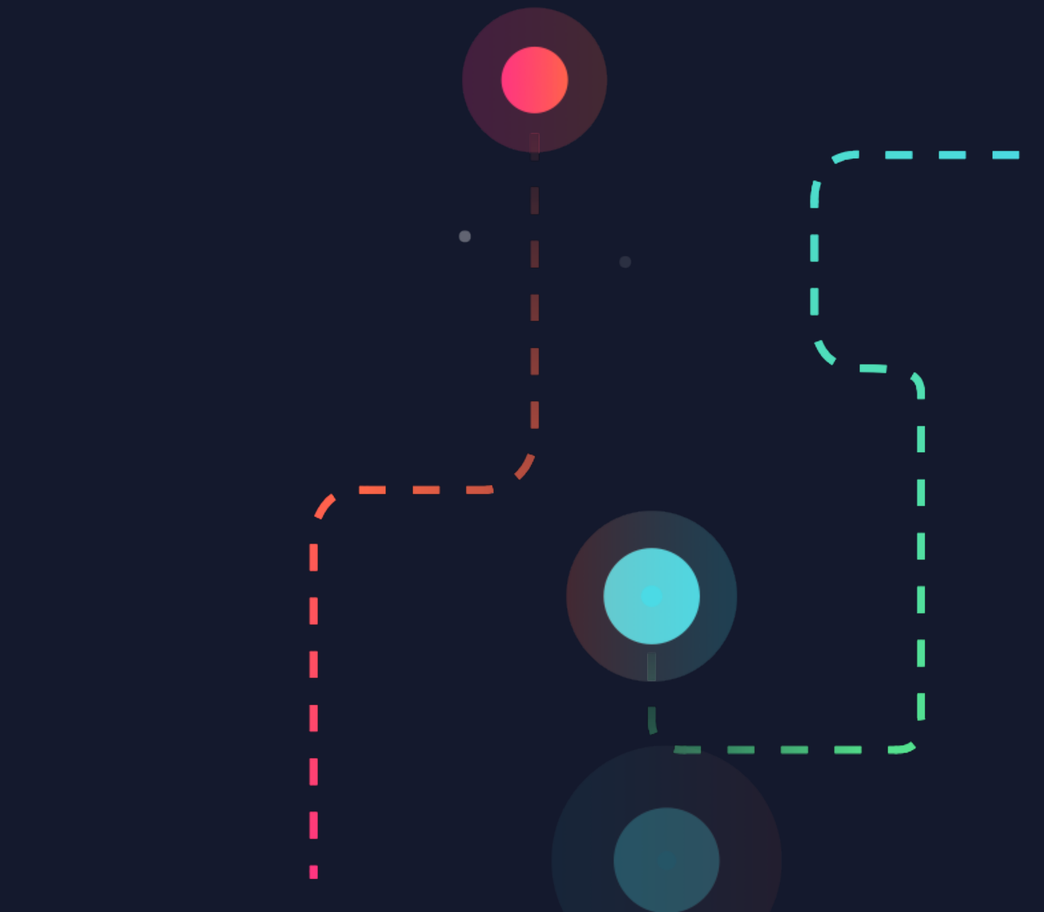
CRD controller



DUELBOX

+ CLOUD CONTROLLER MANAGER

Cloud-specific control logic:



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+ CLOUD CONTROLLER MANAGER

Cloud-specific control logic:

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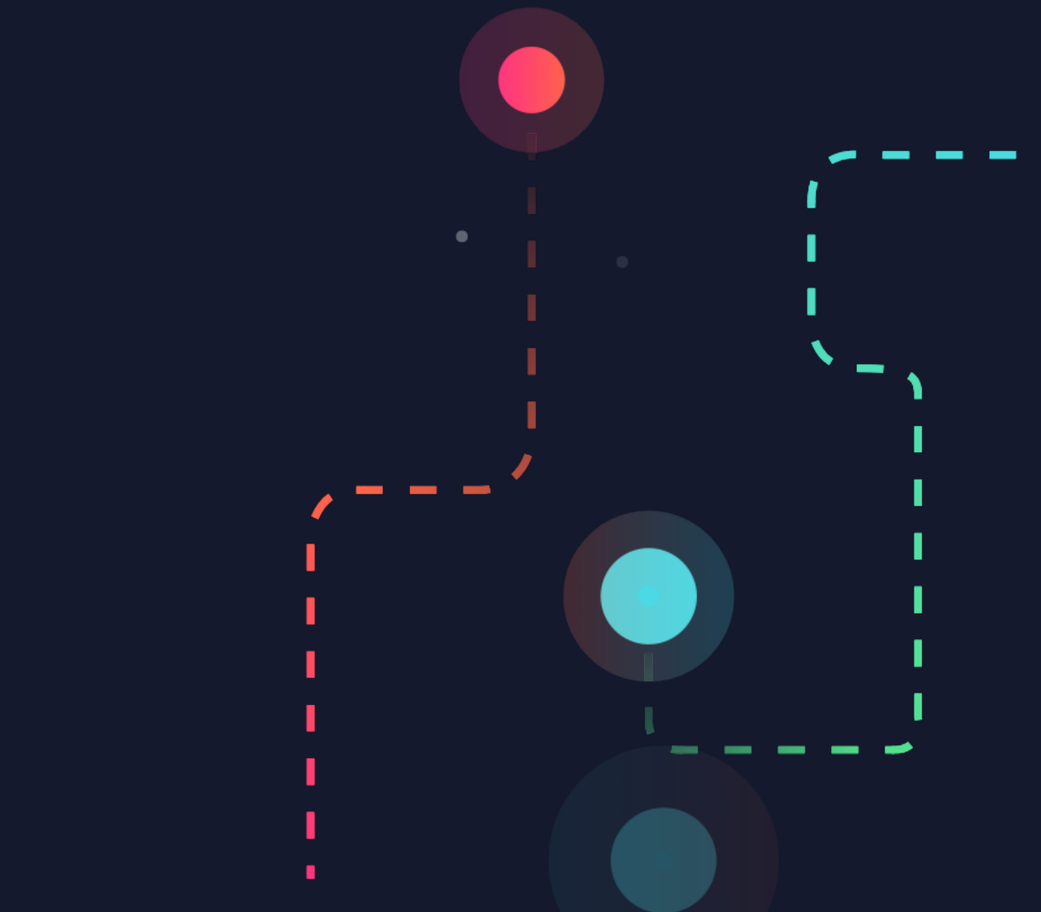

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Cloud-specific control logic:

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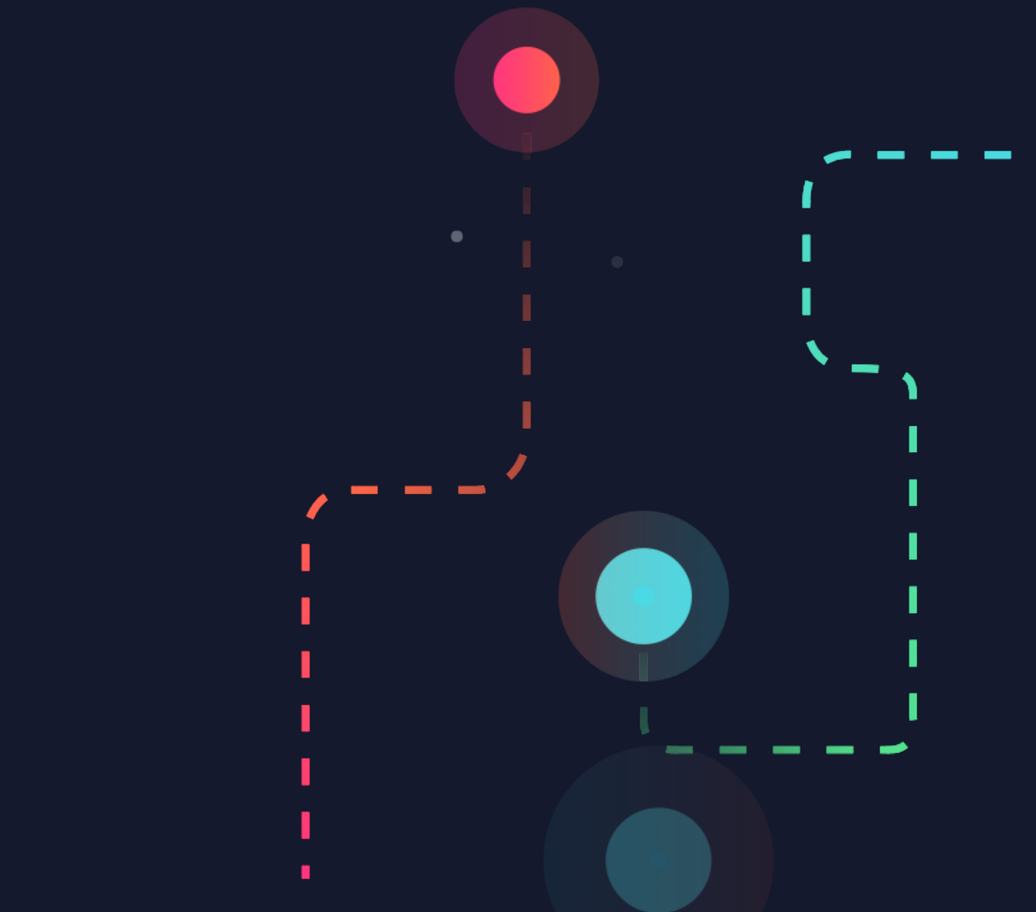

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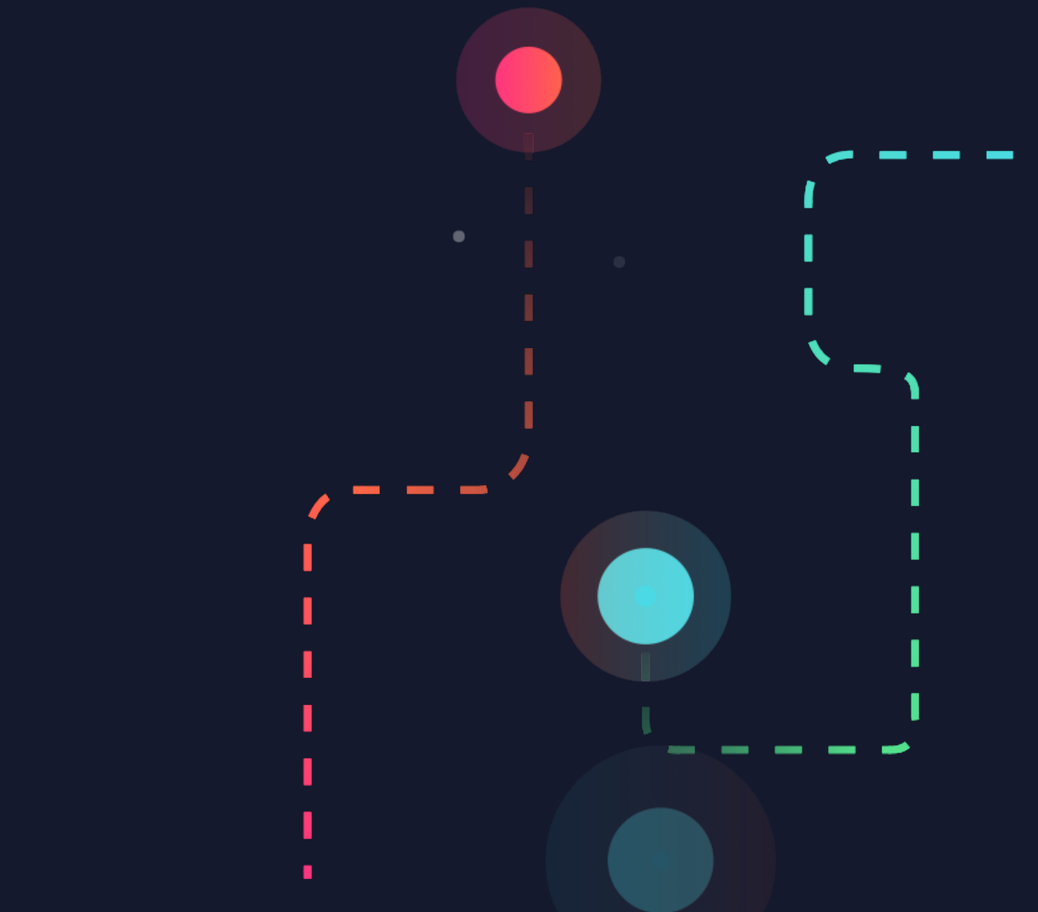
Cloud-specific control logic:

Node-related information

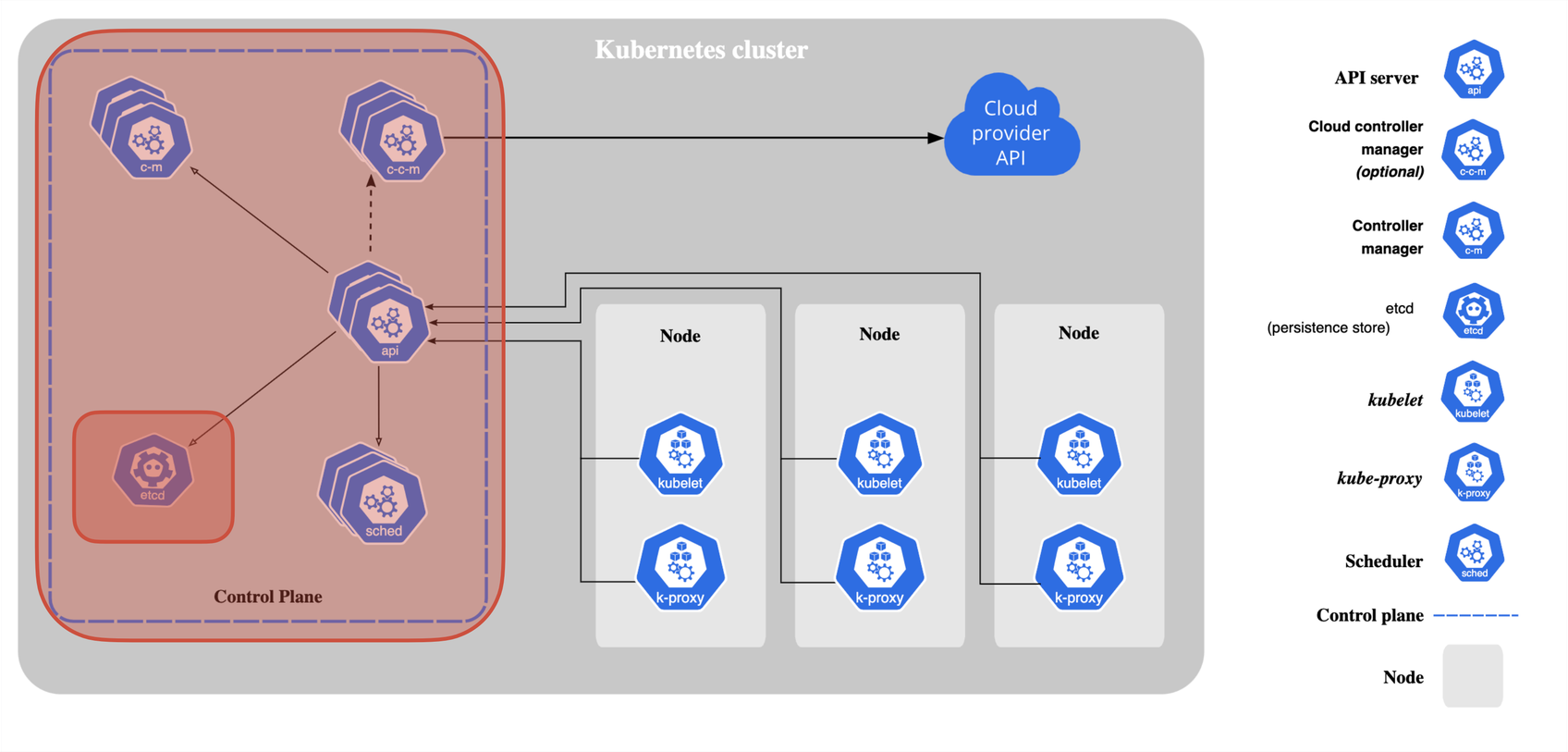
Storage

Services, Networking



DUELBOX

ETCD



DUELBOX

ETCD

The single source of truth – the database for storing all cluster data.

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HA, distributed, key-value storage

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Kubernetes API objects: Pods, Services, Nodes, etc.

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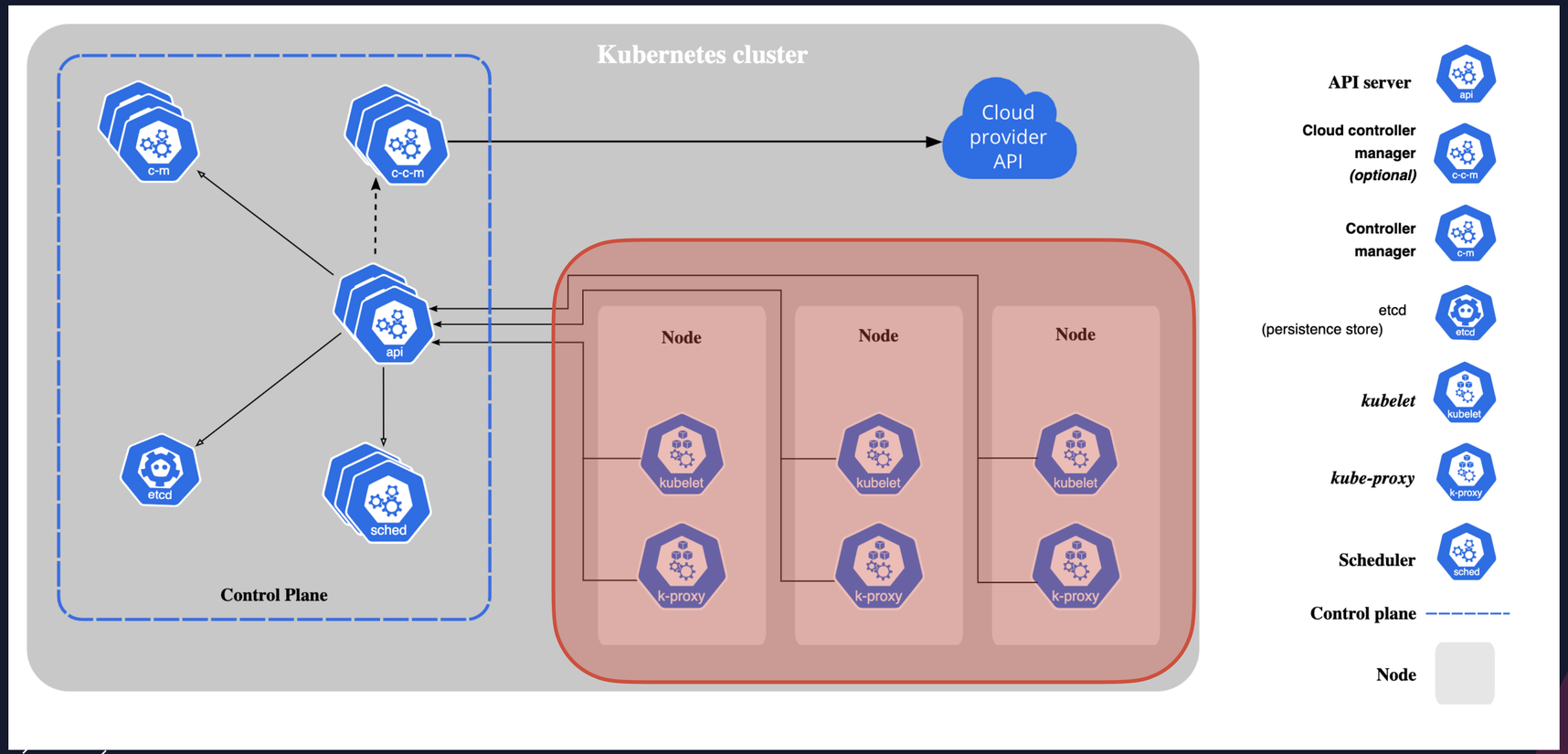
Kubernetes API objects: Pods, Services, Nodes, etc.

(Might be replaced with other storage engine: e.g. SQLite)

WORKER NODES



DUELBOX

KUBELET

The Kubernetes agent that runs on each node of the cluster.

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Registers node with the API server.

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Takes PodSpecs from the API server and ensures that containers of Pods are running and healthy.

Reports the status of the node itself.

+ CONTAINER RUNTIME

Docker

containerd

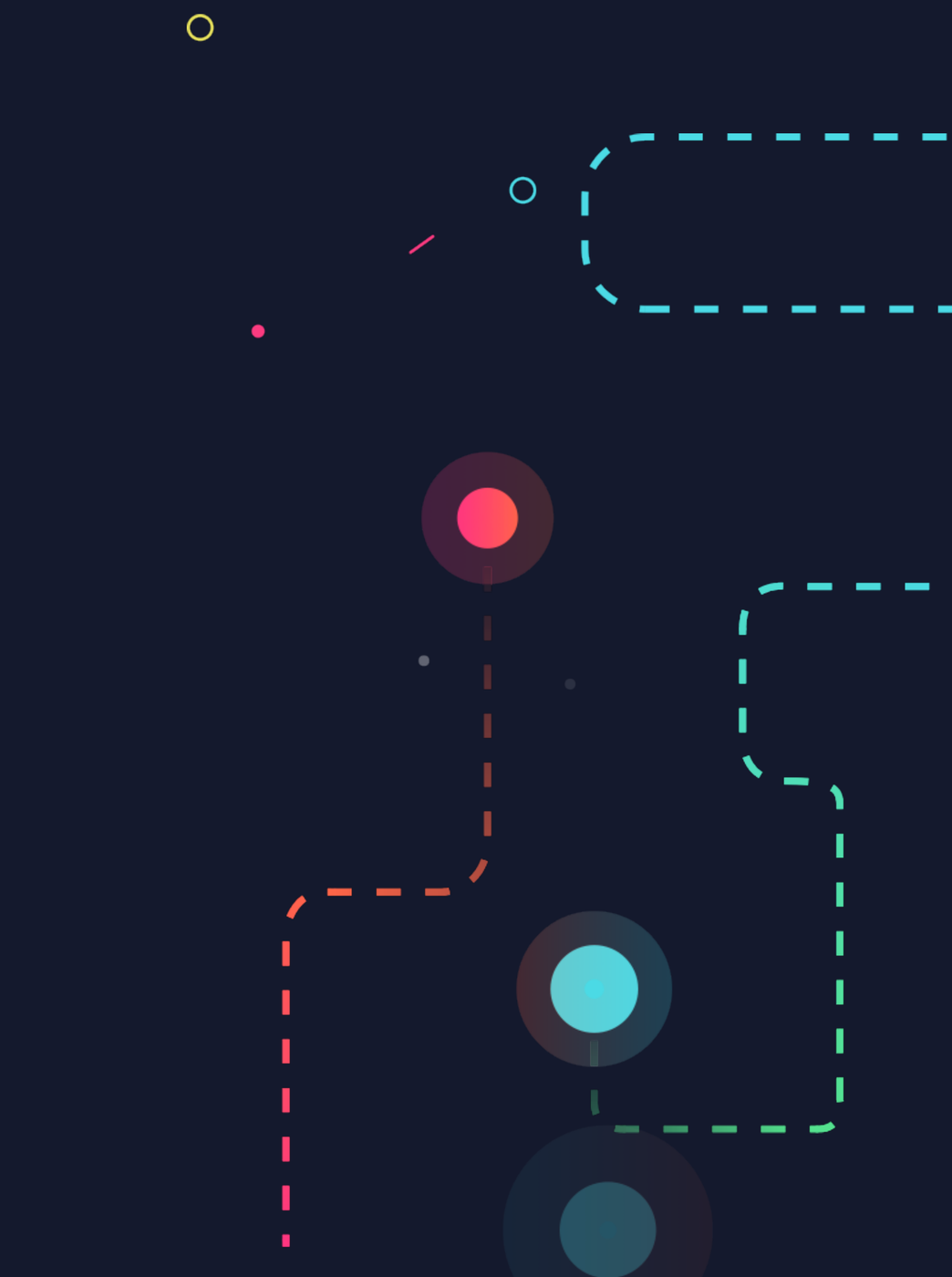
CRI-O

DUELBOX

PROXY

kube-proxy

A network proxy running on each node.



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Maintains network rules to allow network communication to Pods from inside or outside of the cluster.

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Key component for Services.

+ OTHER

DNS

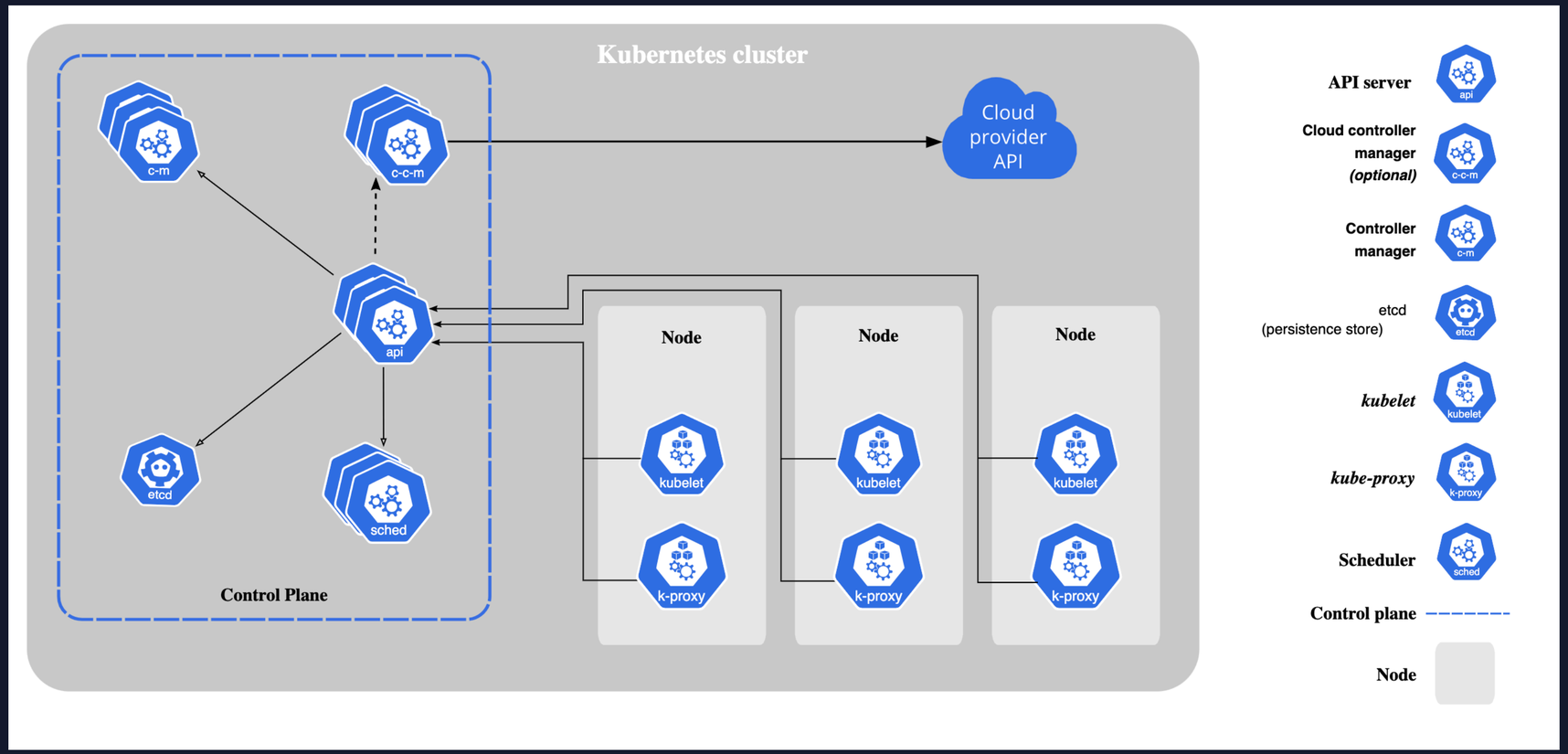
Web UI (Dashboard)

Cluster-level logging

RECAP

DUELBOX

KUBERNETES ARCHITECTURE



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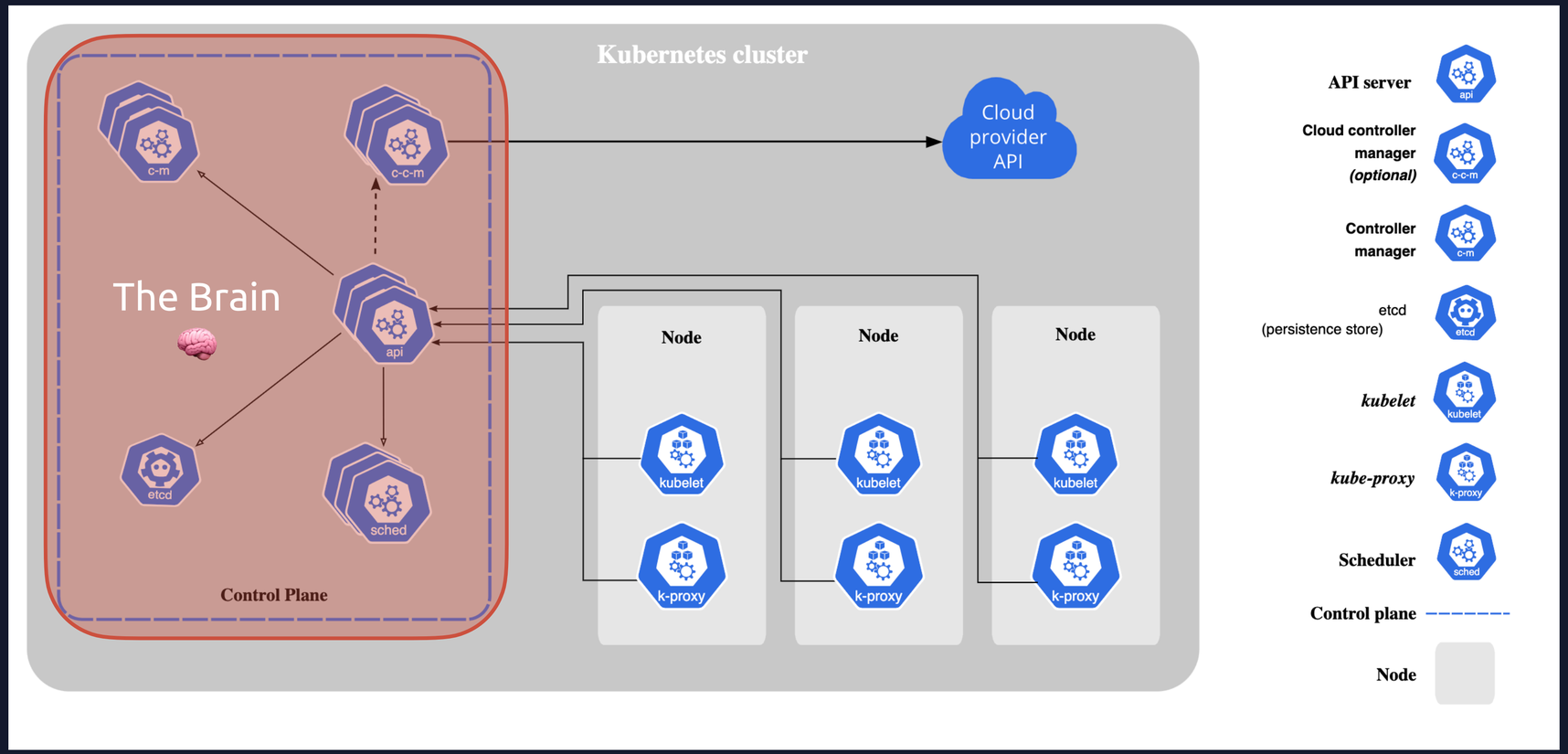

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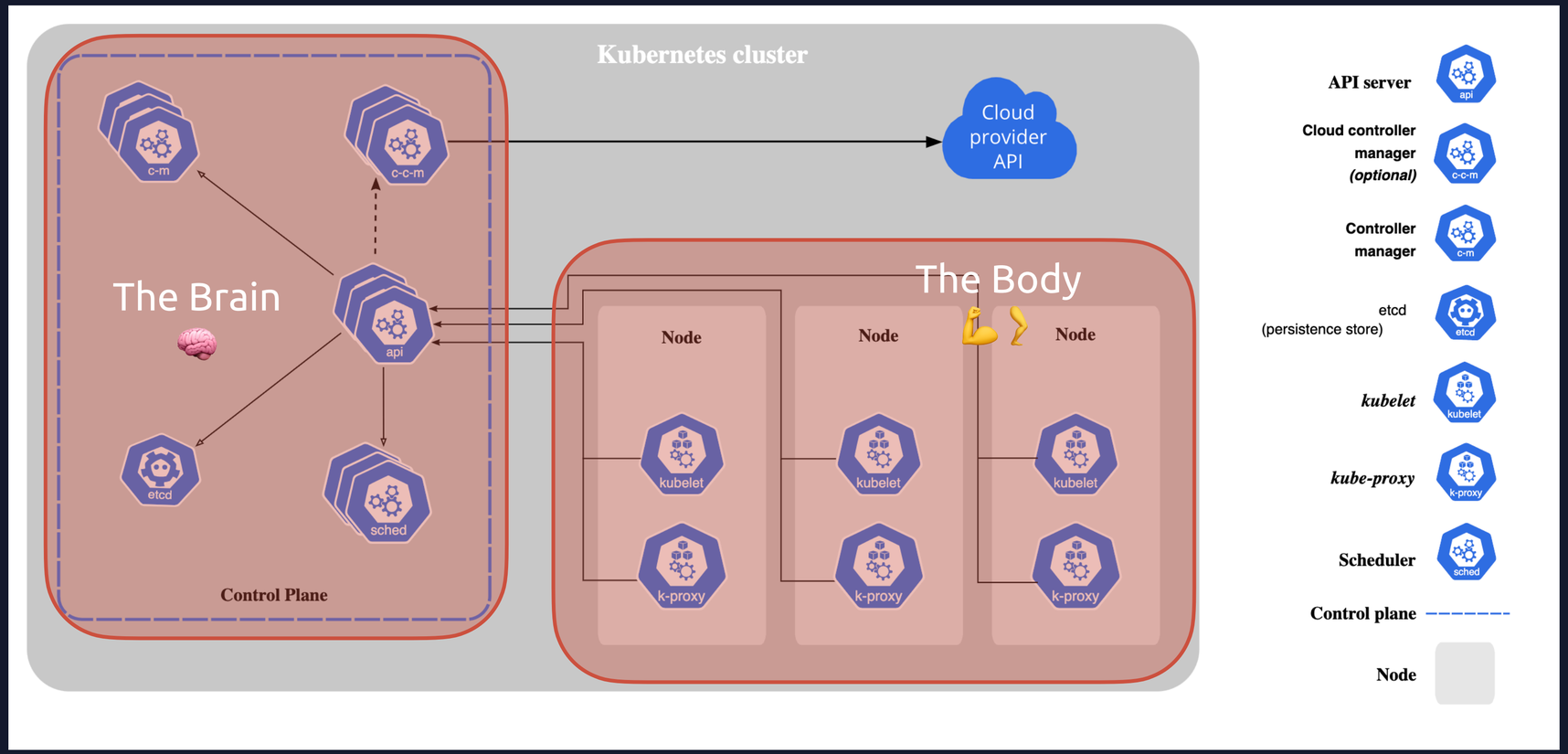

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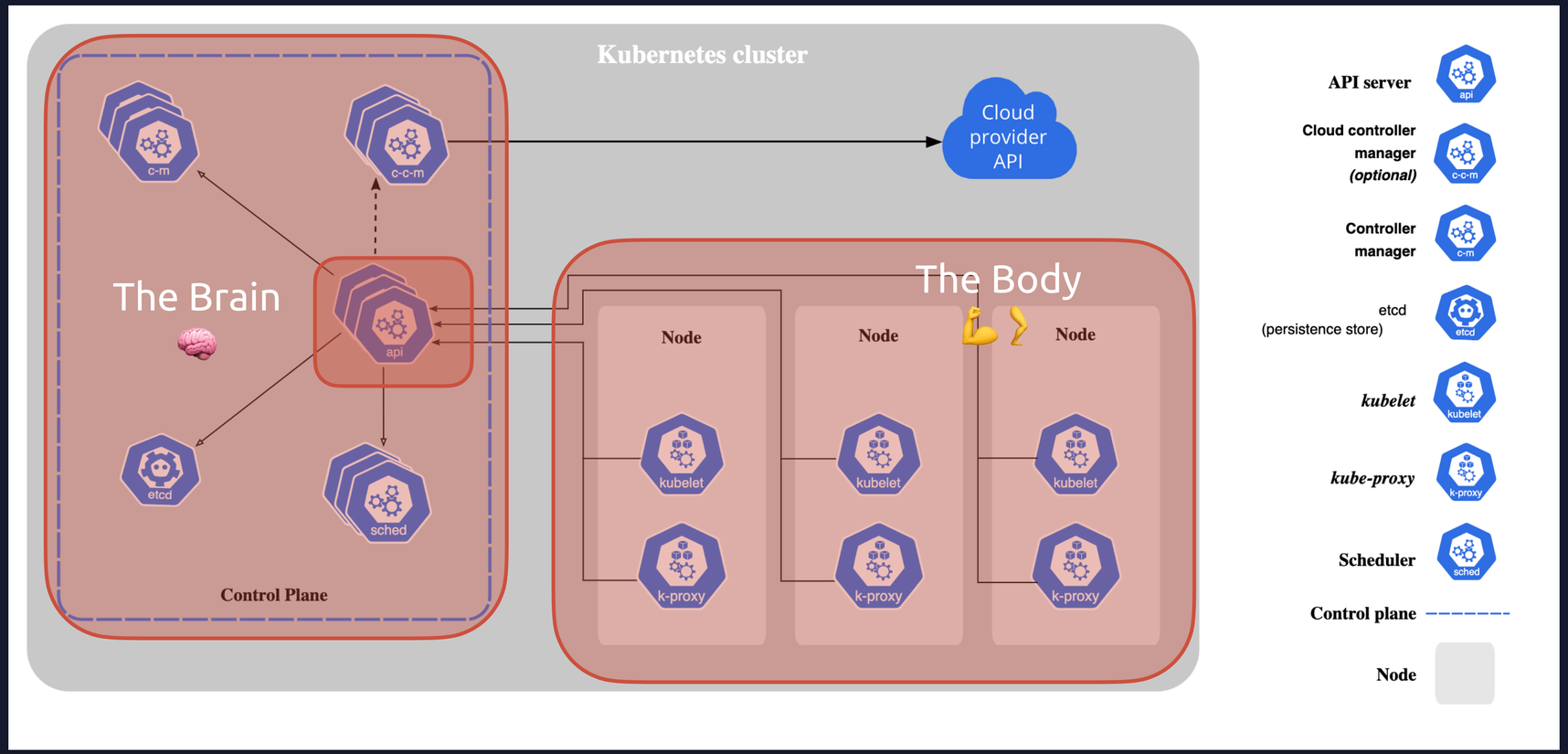

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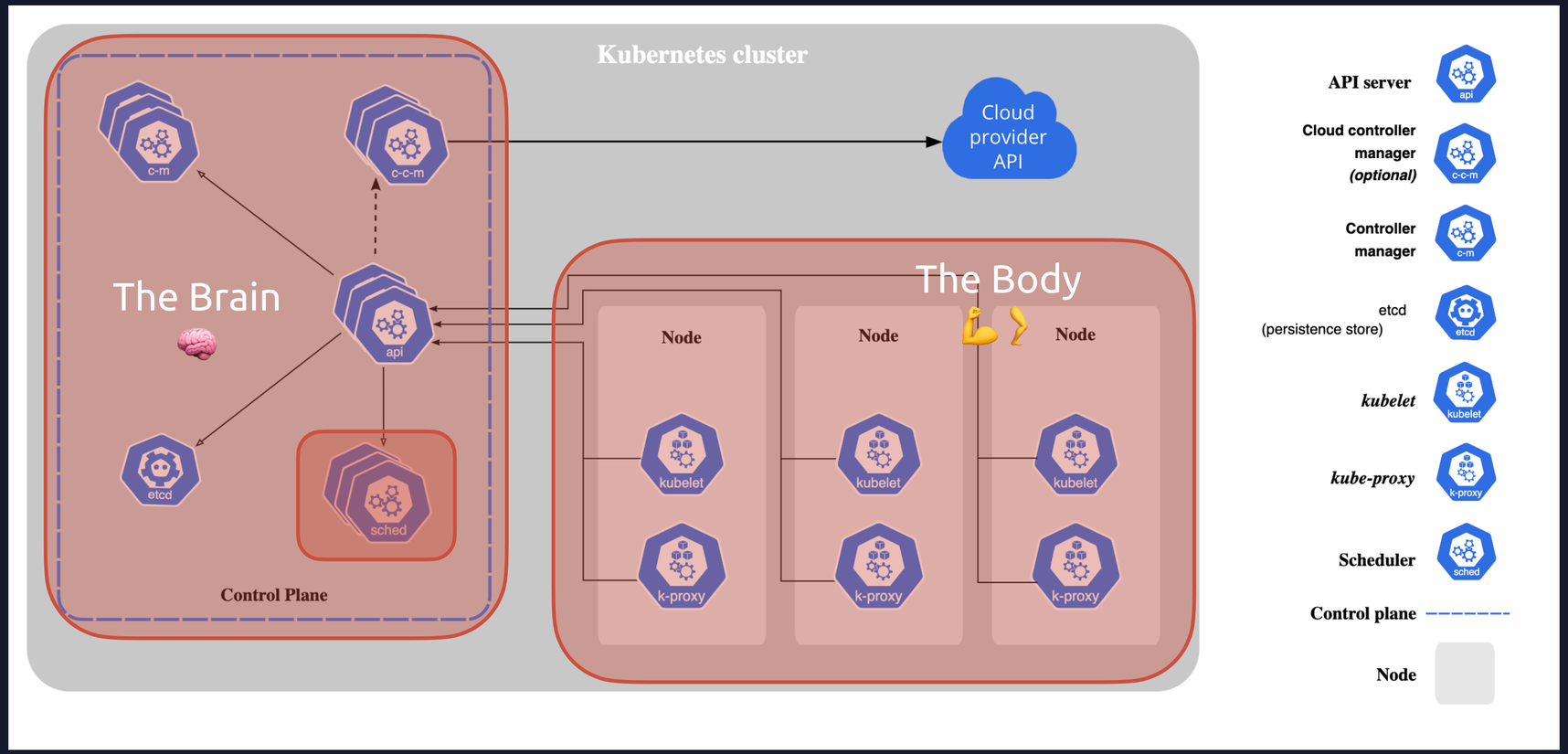

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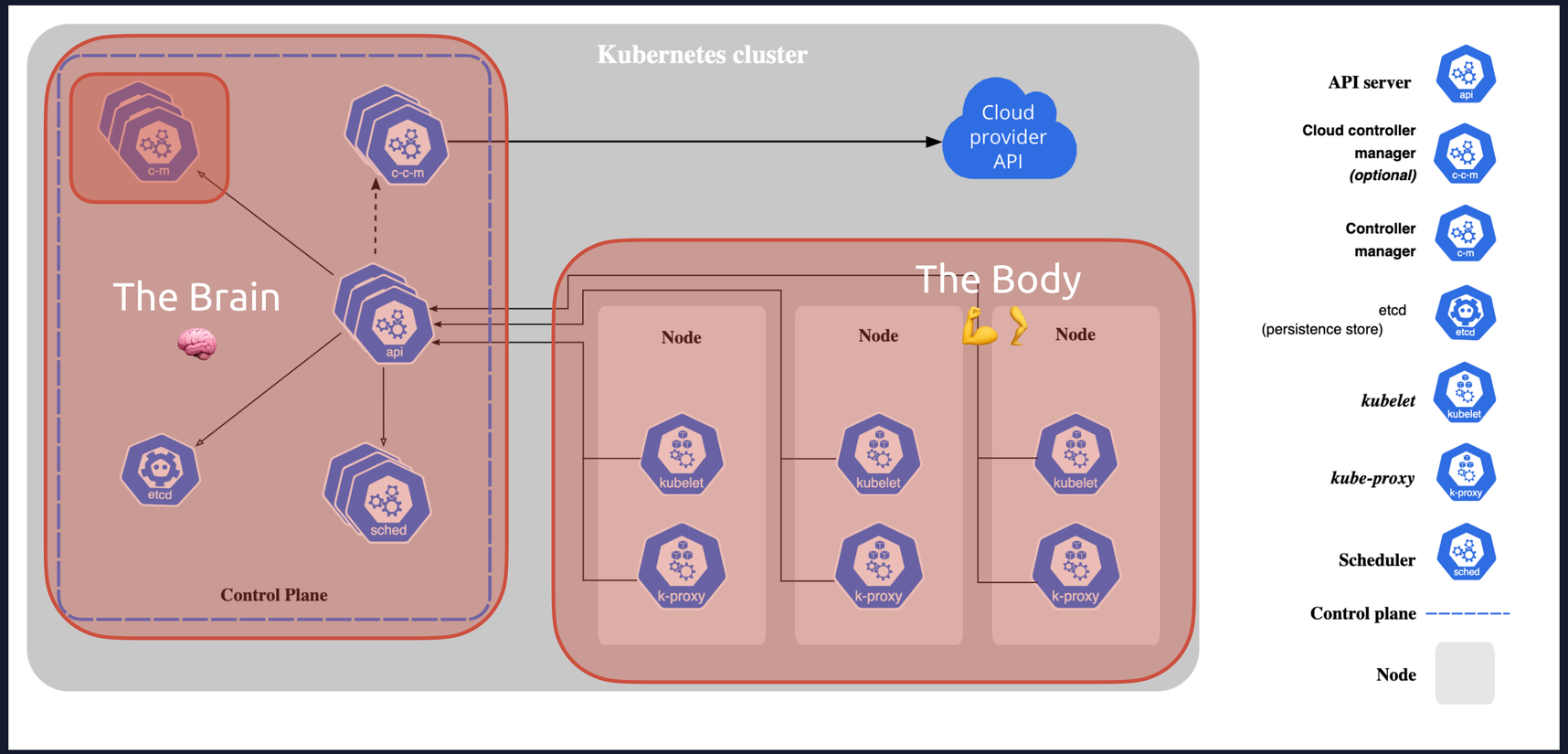

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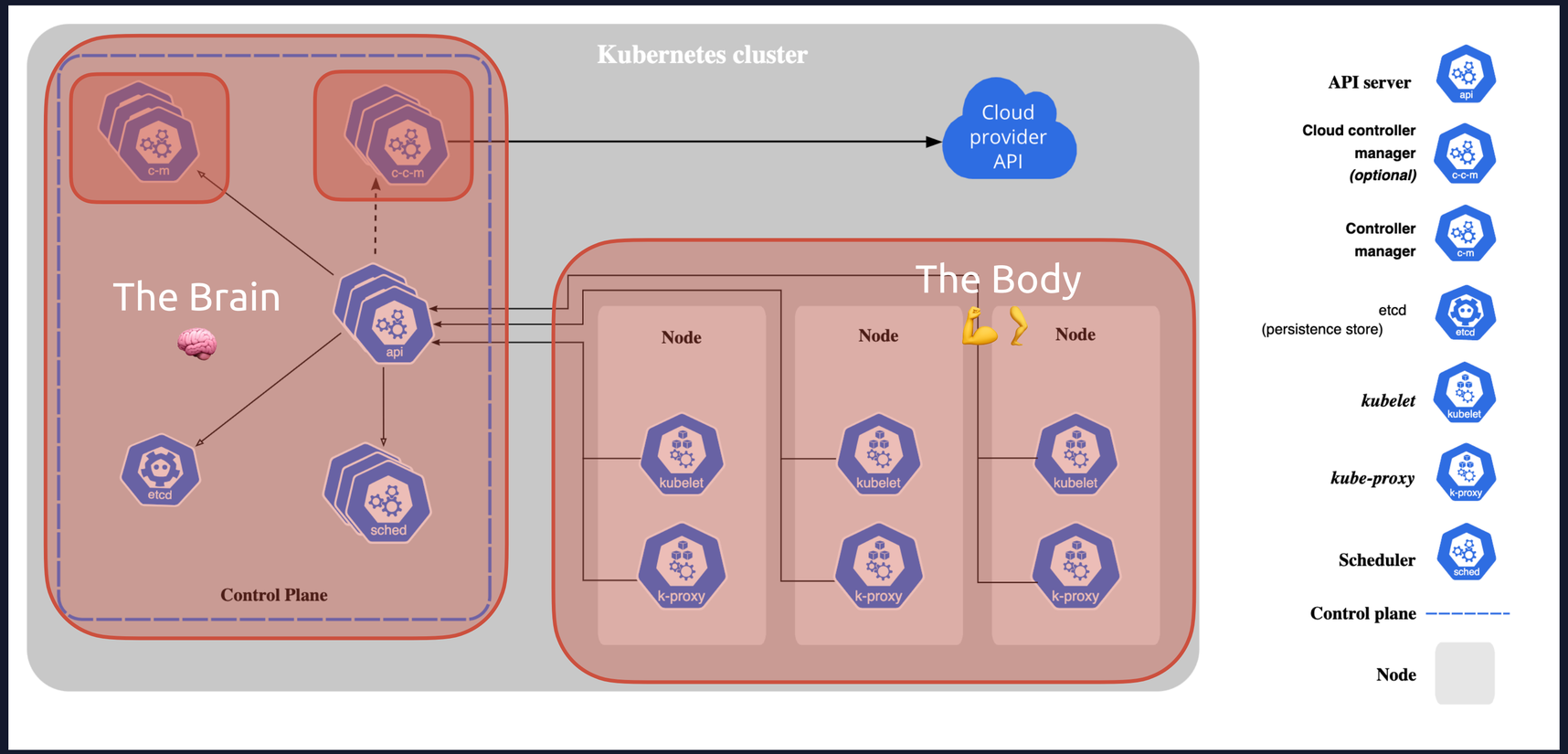

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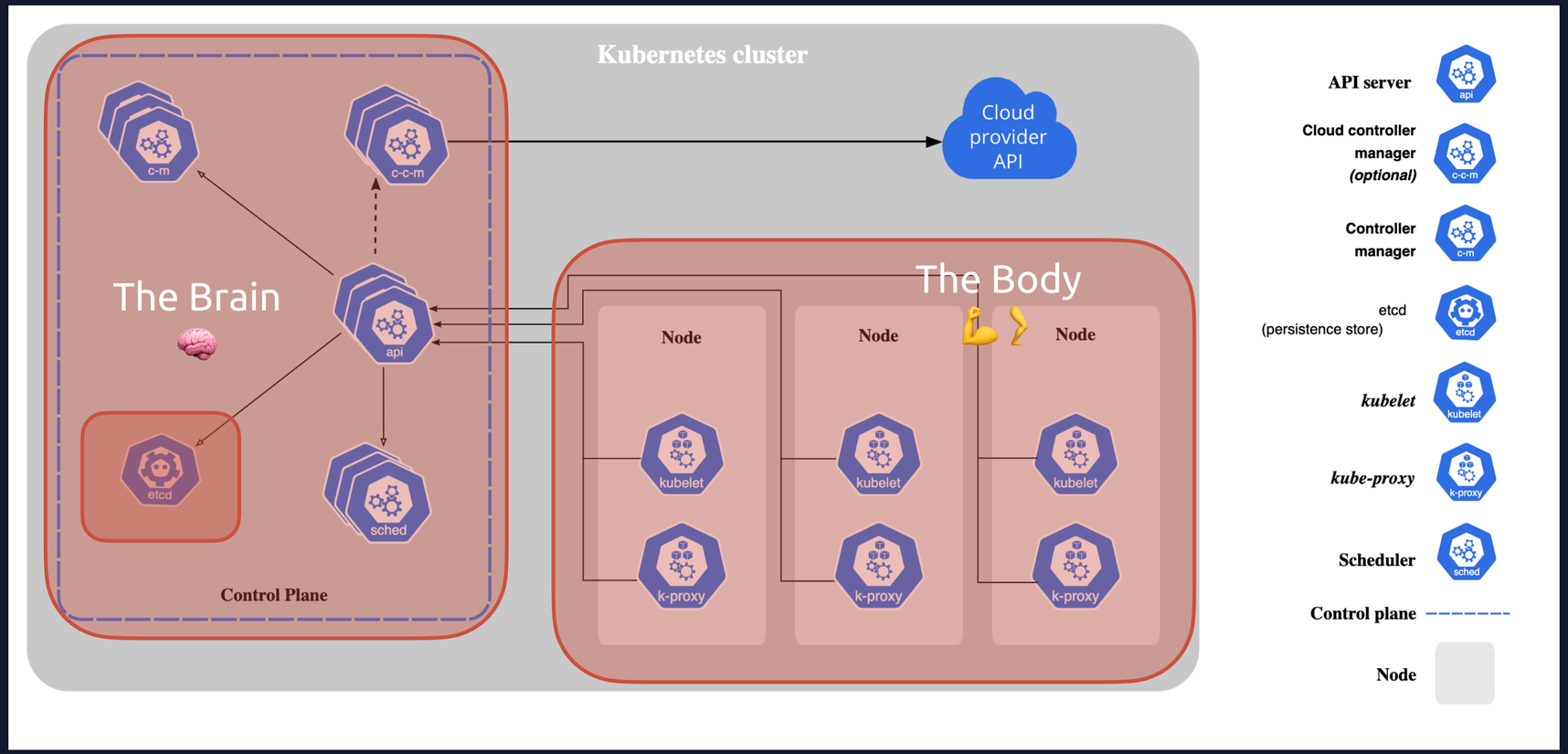
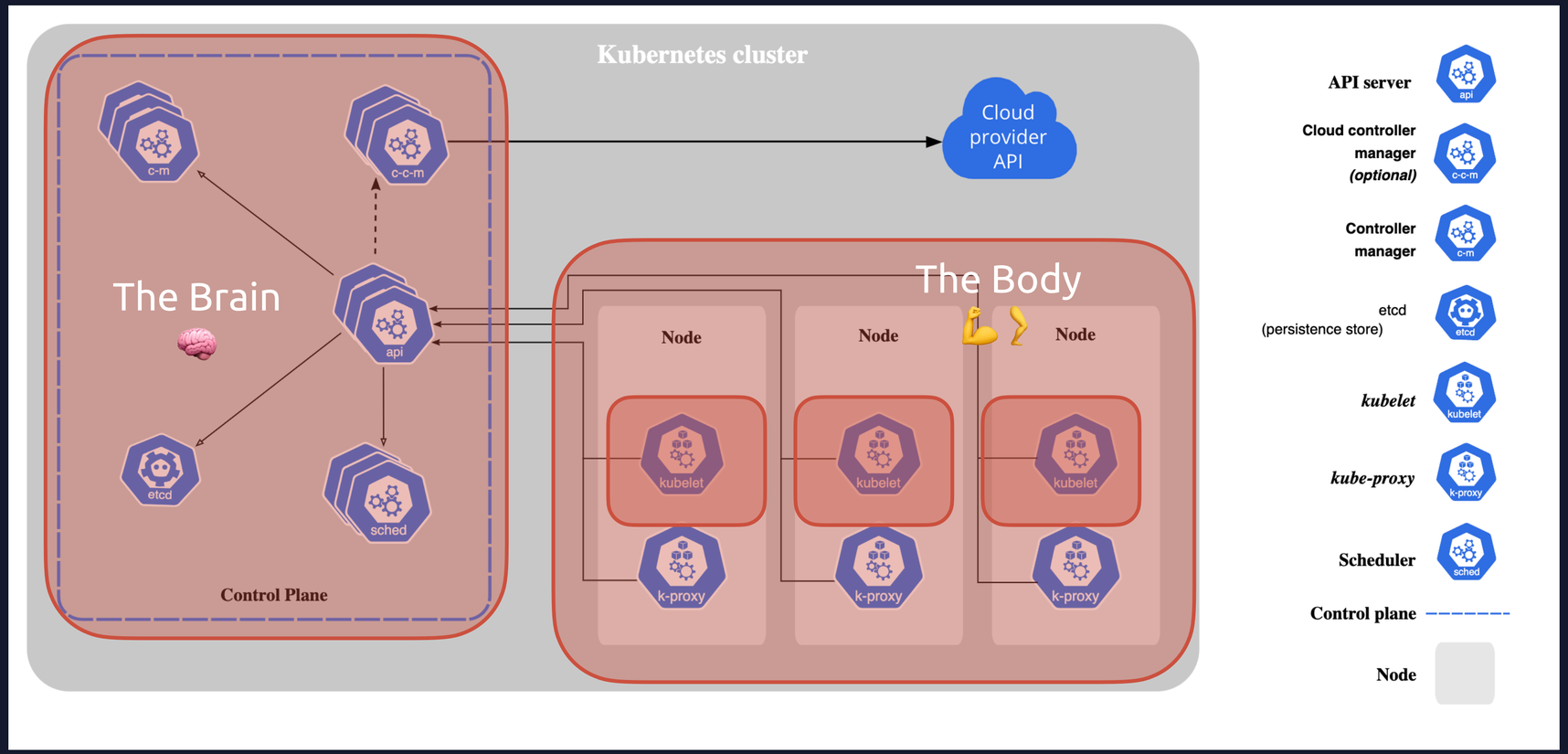


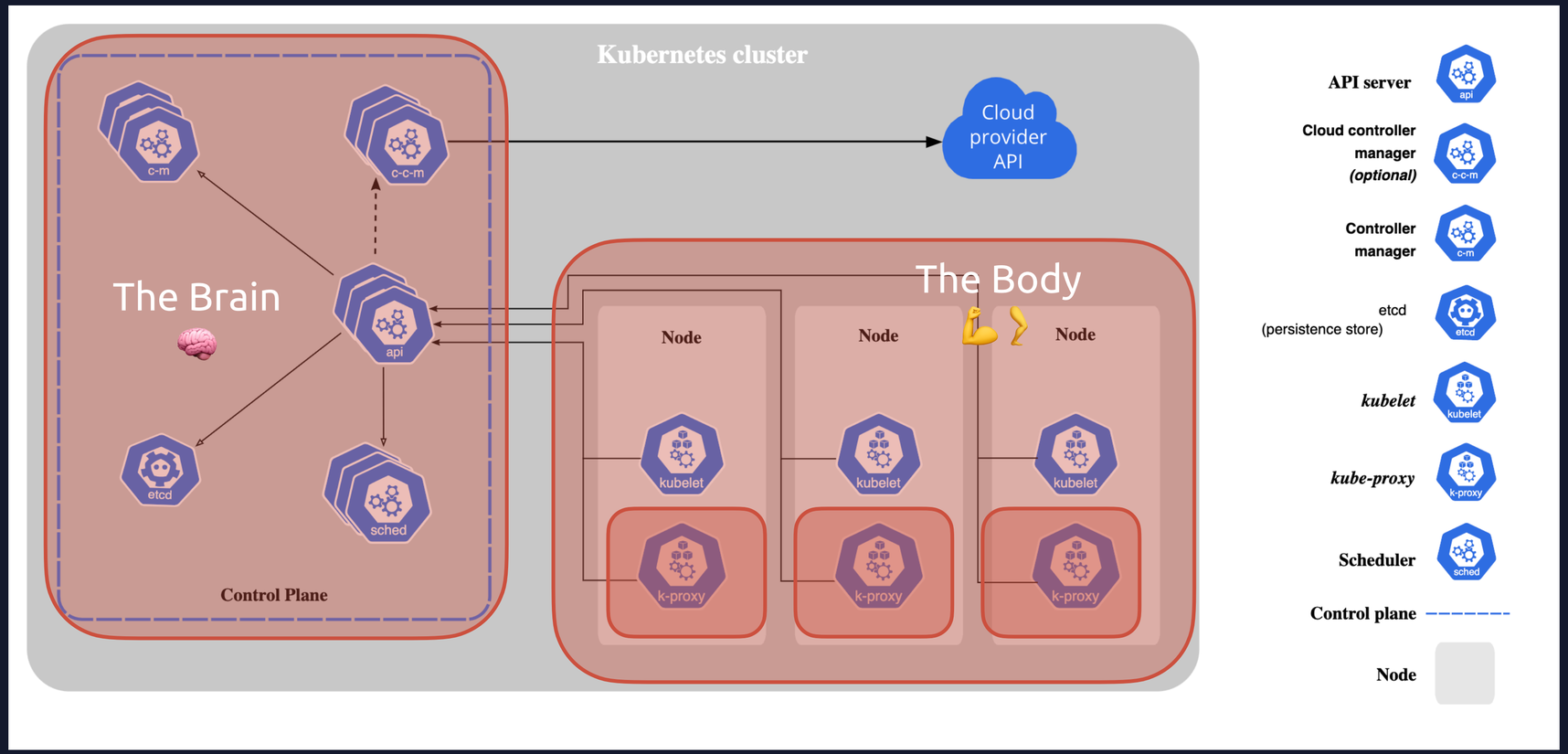
DUELBOX

KUBERNETES ARCHITECTURE



DUELBOX

KUBERNETES ARCHITECTURE



DUELBOX

THANK YOU!

DUELBOX