Deploying and Maintaining Applications with DaemonSets and Jobs

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Course Overview

Using Controllers to Deploy Applications and Deployment Basics

Maintaining Applications with Deployments

Deploying and Maintaining Applications with DaemonSets and Jobs

Overview

Working with Controllers in Kubernetes

- DaemonSets
- Jobs and CronJobs
- StatefulSets

Controllers in Kubernetes

DaemonSet

Jobs

CronJobs

StatefulSets

Introducing DaemonSet

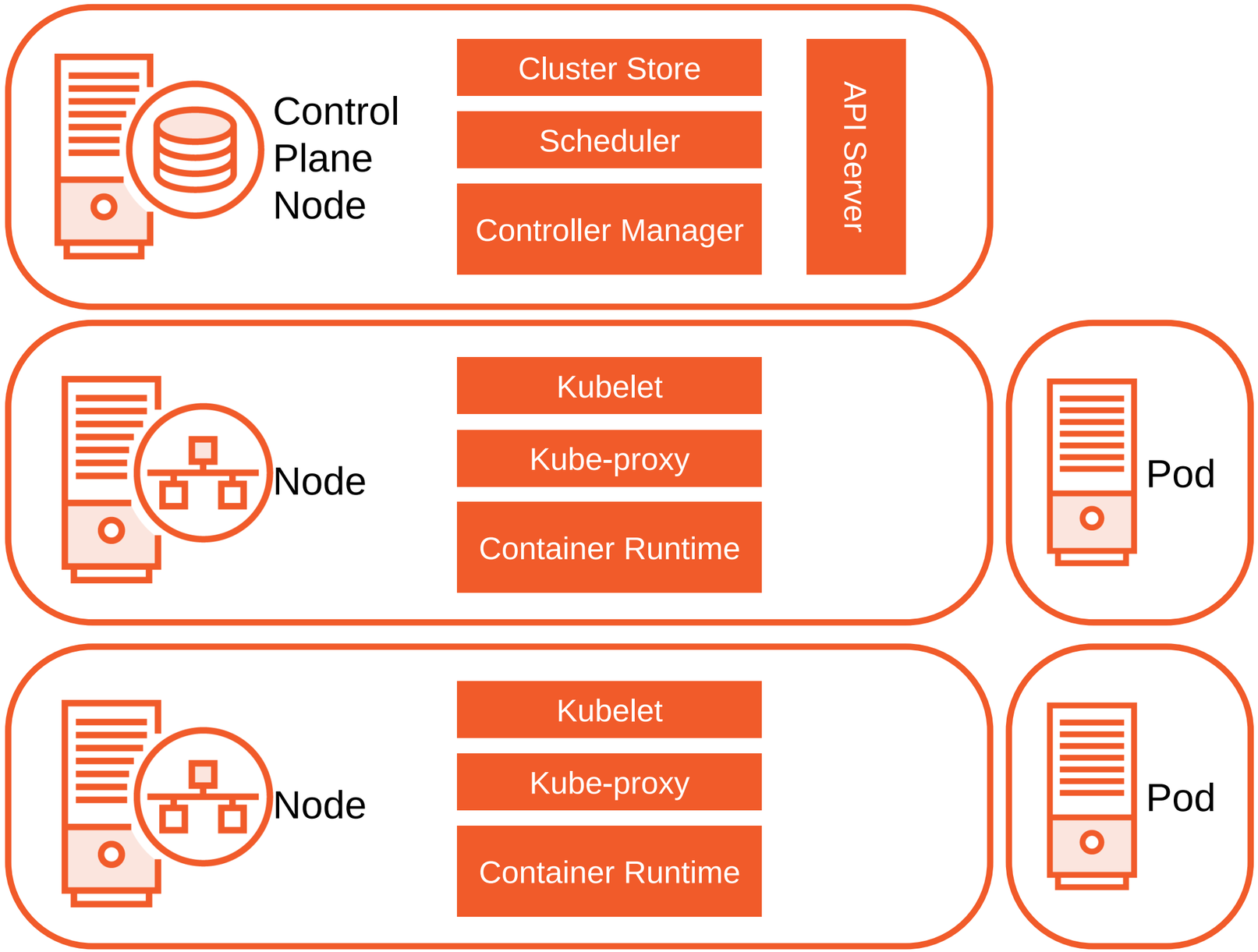
Ensures that all or some Nodes run a Pod

Effectively an init daemon inside your cluster

Example workloads

- `kube-proxy` for network services
- Log collectors
- Metric servers
- Resource monitoring agents
- Storage daemons

Controller Operations - DaemonSets



DaemonSet Pod Scheduling

One Pod will be scheduled to each worker Node in a cluster by the default-scheduler

As Nodes are added to the cluster, they will get a Pod

You can control which Nodes get Pods

- Node Selector
- Labeling the Nodes

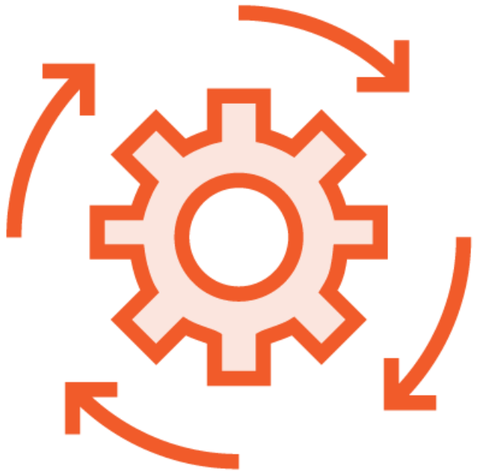
Defining a DaemonSet

```
apiVersion: apps/v1
kind: DaemonSet
metadata:
  name: hello-world-ds
spec:
  selector:
    matchLabels:
      app: hello-world-app
  template:
    metadata:
      labels:
        app: hello-world-app
    spec:
      containers:
        - name: hello-world
          image: gcr.io/google-samples/hello-app:1.0
```

Defining a DaemonSet with a nodeSelector

```
apiVersion: apps/v1
kind: DaemonSet
metadata:
  name: hello-world-ds
spec:
  selector:
    matchLabels:
      app: hello-world-app
  template:
    metadata:
      labels:
        app: hello-world-app
    spec:
      nodeSelector:
        node: hello-world-ns
      containers:
        - name: hello-world
          image: gcr.io/google-samples/hello-app:1.0
```

DaemonSet Update Strategy



RollingUpdate

OnDelete

Demo

Creating a DaemonSet

- All Nodes
- Subset of Nodes

Updating a DaemonSet

Controllers so far introduced, start up and run Pods continuously…

but what if you wanted to run a single task?

Introducing Jobs

Jobs create one or more Pods

Runs a program in a container to completion

Ensure that the specified number of Pods complete successfully

Workload examples

- Ad-hoc
- Batch
- Data oriented tasks

Ensuring Jobs Run to Completion

Interrupted Execution

Non-zero Exit Code

Rescheduled

`restartPolicy`

Jobs Lifecycle

Jobs are tasks that we need to ensure run to completion

When a Job completes successfully

- Its status is set to ‘Completed’
- The Job object remains
- The Pods are not deleted
- This way we can keep them around for their logs and other output

It is up to the user to delete the Job when finished, this will delete the Pods

Defining a Job

```
apiVersion: batch/v1
kind: Job
metadata:
  name: hello-world
spec:
  template:
    spec:
      containers:
      - name: ubuntu
        image: ubuntu
        command:
         - "/bin/bash"
         - "-c"
         - "/bin/echo Hello from Pod $(hostname) at $(date)"
      restartPolicy: Never
```

Controlling Job Execution

`backoffLimit` - number of Job retries before it's marked failed

`activeDeadlineSeconds` - max execution time for the Job

`parallelism` - max number of running Pods in a Job at a point in time

`completions` - number of Pods that need to finish successfully

Introducing CronJobs

`CronJob` will run a `Job` on a given time based schedule

- Conceptually similar to UNIX/Linux cron job
- Uses the standard cron format

Example Workloads

- Periodic workloads and scheduled tasks

`CronJob` resource is created when the object is submitted to the API Server

When it's time, a `Job` is created via the `Job` template from the `CronJob` Object

Controlling CronJobs Execution

`schedule` - a cron formatted schedule

suspend - suspends the `CronJob`

`startingDeadlineSeconds` - the `Job` hasn't started in this amount of time mark it as Failed

`concurrencyPolicy` - handles concurrent executions of a `Job`. Allow, Forbid or Replace

Defining a CronJob

```
apiVersion: batch/v1beta1
kind: CronJob
metadata:
  name: hello-world-cron
spec:
  schedule: "*/1 * * * *"
  jobTemplate:
    spec:
      template:
        spec:
          containers:
          - name: ubuntu
            ...
```

Demo

Executing tasks with `Jobs`

Failed `Jobs` and `restartPolicy`

Defining a Parallel `Job`

Scheduling tasks with `CronJobs`

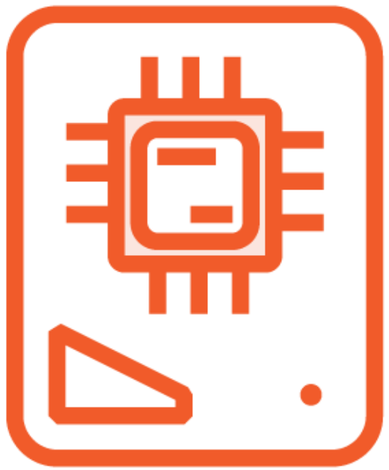
StatefulSets

Enables stateful applications to be managed by a controller

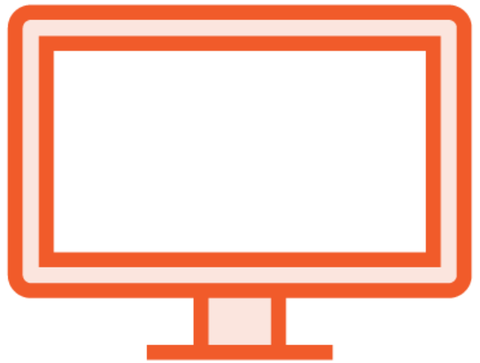
- Database workloads
- Caching servers
- Application state for web farms

StatefulSet Capabilities

Naming



Storage



Headless Service

Review

Working with Controllers in Kubernetes

- DaemonSets
- Jobs and CronJobs
- StatefulSets

Thank You!

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