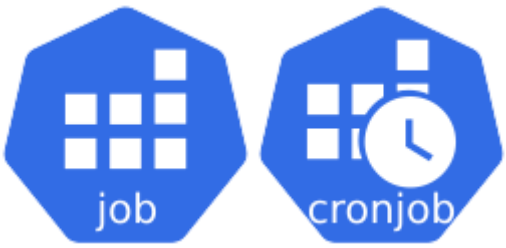
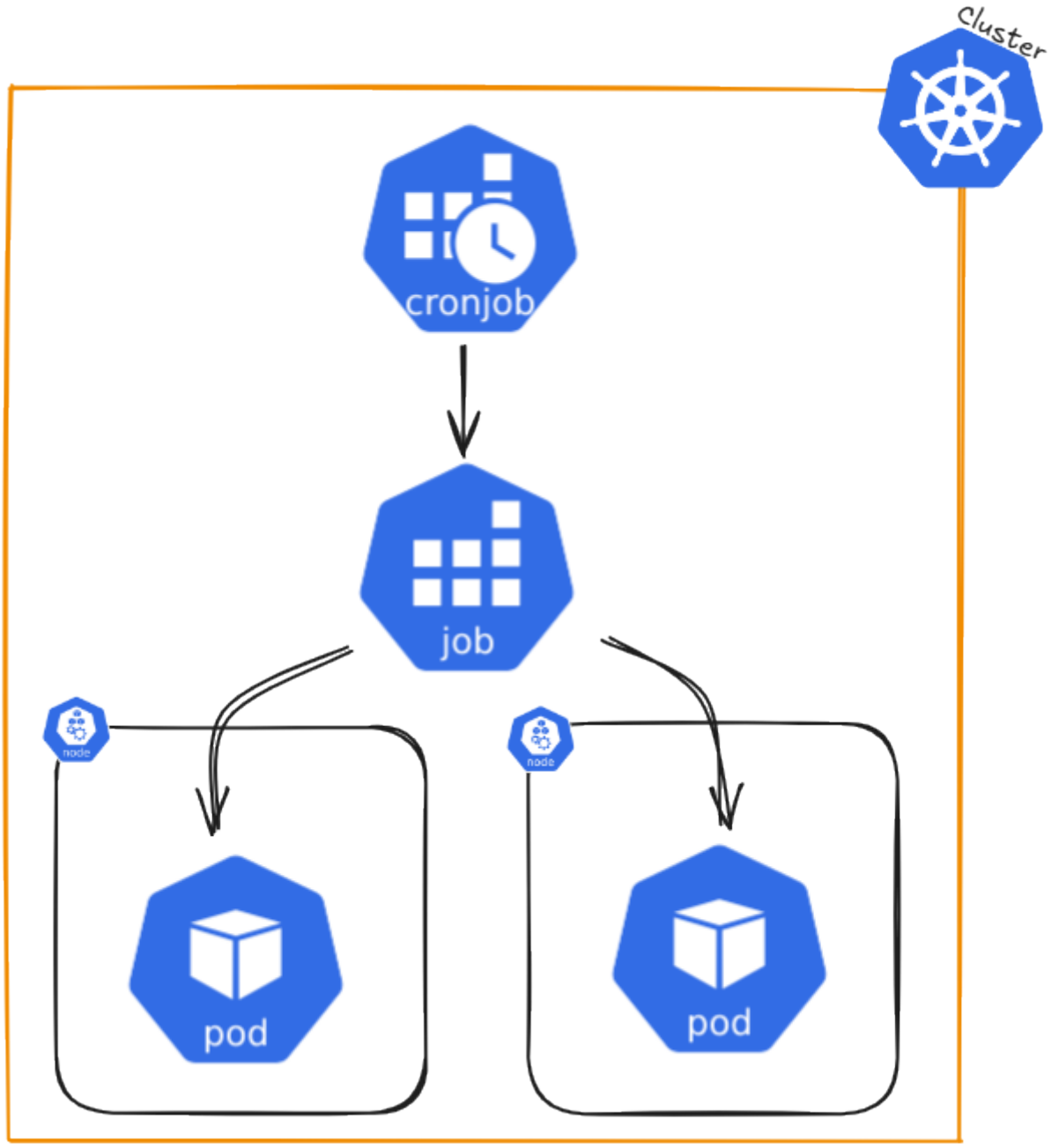
Job / Cronjob



Useful Links

- Kubernetes Official Documentation

Architecture



Detailed Description

A Job creates one or more Pods and keeps retrying them until a specified number successfully finish. Once the desired number of successful completions is reached, the Job is complete. Deleting a Job also deletes the Pods it created, while suspending it will stop active Pods until the Job is resumed.

For a simple task, you can create a Job to run a single Pod, which will restart if it fails or is deleted (e.g., due to a node failure). Jobs can also run multiple Pods at the same time.

the job name `.metadata.name` should follow rules for DNS subdomain (ideally stricter rules but cannot be longer 63 chars)

- Non-parallel Jobs:
  - The Job creates only one Pod
  - The Job is complete when the Pod successfully finishes
- Parallel Jobs with a fixed completion count:
  - Set `.spec.completions` to a number greater than 0. (e.g. completions: 5)
  - The Job is complete when the specified number of Pods have finished successfully.
  - Optionally, set `.spec.completionMode` to "Indexed" if each Pod has a specific role or task
- Parallel Jobs with a work queue:
  - Leave .spec.completions unset
  - Set `.spec.parallelism` to the number of Pods that can run simultaneously (e.g. parallelism: 3 - default: 1 - parallelism: 0 will pause the job)
  - The Pods coordinate with each other or an external service to divide the work
  - Once any Pod finishes successfully, no new Pods are started, and the Job is complete when all Pods stop
- Restart policy
  - In `.spec.template.spec.restartPolicy`, you must set an appropriate restart policy: (`Never` or `OnFailure`)
- For Jobs with `.spec.completions`, you can set `.spec.completionMode`:
  - `NonIndexed` (default): All Pods are identical, and the Job completes when the specified number of successful Pods (`.spec.completions`) is reached.
  - `Indexed`: Each Pod gets a unique index (from 0 to .spec.completions - 1), which is available via:
    - Pod annotation: batch.kubernetes.io/job-completion-index.
    - Pod label (from Kubernetes v1.28 onwards): batch.kubernetes.io/job-completion-index.
    - Environment variable: JOB_COMPLETION_INDEX.
    - Pod hostname: Follows the pattern $(job-name)-$(index).

Example: Non-parallel Job (Single Pod):

```
apiVersion: batch/v1
kind: Job
metadata:
name: single-task-job
spec:
template:
  spec:
```

```
    containers:
    - name: worker
      image: busybox
      command: ["echo", "Hello World"]
    restartPolicy: Never
```

Parallel Job with Fixed Completions:

```
apiVersion: batch/v1
kind: Job
metadata:
name: fixed-task-job
spec:
completions: 5
parallelism: 2
template:
  spec:
    containers:
    - name: worker
      image: busybox
      command: ["echo", "Processing task"]
    restartPolicy: OnFailure
```

Parallel Job with Work Queue:

```
apiVersion: batch/v1
kind: Job
metadata:
name: work-queue-job
spec:
parallelism: 3
template:
  spec:
    containers:
    - name: worker
      image: busybox
```

```
      command: ["fetch-and-process-task"]
    restartPolicy: Never
```

Indexed CompletionMode:

```
apiVersion: batch/v1
kind: Job
metadata:
name: indexed-job
spec:
completions: 3         # Job completes when all 3 indexed Pods have succeeded
parallelism: 2         # At most 2 Pods run simultaneously
completionMode: Indexed
template:
  spec:
    containers:
    - name: worker
      image: busybox
      command:
      - /bin/sh
      - -c
      - |
        echo "Processing task for index $JOB_COMPLETION_INDEX"
    restartPolicy: Never
```

If you want to run a Job on a schedule, use a CronJob.

Command Reference Guide

> Remeber to use dry-run and tee to check the configuration of each command first.
> `--dry-run=client -o yaml | tee nginx-deployment.yaml`

Create a Namespace using a YAML file (declarative method)

```
apiVersion: v1
kind: Namespace
metadata:
  name: dev
  labels:
    name: dev
---
apiVersion: v1
kind: Namespace
metadata:
  name: prod
  labels:
    name: prod
```

```
# Create namespaces
kubectl create -f namespace.yaml

# Get namespaces
kubectl get namespaces --show-labels

# Add context spaces (First get user and clustername)
kubectl config view
CLUSTER_NAME=$(kubectl config view --raw -o jsonpath='{.clusters[0].name}')
USER_NAME=$(kubectl config view --raw -o jsonpath='{.users[0].name}')
kubectl config set-context dev --namespace=dev --cluster=$CLUSTER_NAME --user=$USER_NAME
kubectl config set-context prod --namespace=prod --cluster=$CLUSTER_NAME --user=$USER_NAME
# We added  two new request contexts (dev and prod)
kubectl config view

# Switch context
kubectl config use-context dev

# Check current context
kubectl config current-context

# Create deployment in context dev and check pods
kubectl create deployment nginx-deployment --image=nginxdemos/hello --port=80
kubectl get pods
```

```
# Switch context and check pods
kubectl config use-context prod
kubectl get pods

# Delete context
kubectl config use-context default
kubectl config delete-context dev
kubectl config delete-context prod
```

Revision #10
Created 24 November 2024 18:55:26 by Admin
Updated 26 November 2024 13:21:53 by Admin