Kubernetes Init Containers

A Pod can have multiple containers running apps within it, but it can also have one or more init containers, which are run before the app containers are started.

Init containers are exactly like regular containers, except:

- Init containers always run to completion.
- Each init container must complete successfully before the next one starts.
- If a Pod's init container fails, the kubelet repeatedly restarts that init container until it succeeds. However, if the Pod has a restartPolicy of Never, and an init container fails during startup of that Pod, Kubernetes treats the overall Pod as failed.
- Kubelet initializes the application containers for the pod after all init container are completed
- Init containers can contain utilities or setup scripts not present in an app image.
- Run in sequence

Ex: init container yaml

```
apiVersion: v1
kind: Pod
metadata:
  name: myapp-pod
  labels:
    app: myapp
spec:
  containers:
  - name: myapp-container
    image: busybox:1.28
    command: ['sh', '-c', 'echo The app is running! && sleep 3600']
  initContainers:
  - name: init-myservice
    image: busybox:1.28
    command: ['sh', '-
c', "until nslookup myservice.$(cat /var/run/secrets/kubernetes.io/serviceaccount
/namespace).svc.cluster.local; do echo waiting for myservice; sleep 2; done"]
  - name: init-mydb
    image: busybox:1.28
    command: ['sh', '-
c', "until nslookup mydb.$(cat /var/run/secrets/kubernetes.io/serviceaccount/name
space).svc.cluster.local; do echo waiting for mydb; sleep 2; done"]
```

Simulation:

```
ubuntu@master:~$ kubectl apply -f init.yml
pod/myapp-pod created
ubuntu@master:~$ kubectl get po
NAME                          READY   STATUS     RESTARTS   AGE
my-jenkins-65757db454-v6krj   1/1     Running    1          44h
my-jenkins-65757db454-wfcb2   1/1     Running    1          44h
my-nginx-749f56d864-h7q6t     1/1     Running    1          44h
myapp-pod                     0/1     Init:0/2   0          7s
ubuntu@master:~$
```

```
ubuntu@master:~$ kubectl describe -f myapp.yaml
error: the path "myapp.yaml" does not exist
ubuntu@master:~$ kubectl describe po myapp-pod
Name:         myapp-pod
Namespace:    default
Priority:     0
Node:         worker/172.31.1.3
Start Time:   Fri, 17 Dec 2021 14:07:47 +0000
Labels:       app=myapp
Annotations:  <none>
Status:       Pending
IP:           10.44.0.7
IPs:
  IP:  10.44.0.7
Init Containers:
  init-myservice:
    Container ID:  containerd://aa43d03a32dbd9da0a14d165dfec77f414cda0b19aef52937f90b2cc8cad801f
    Image:         busybox:1.28
    Image ID:      docker.io/library/busybox@sha256:141c253bc4c3fd0a201d32dc1f493bcf3fff003b6df416dea4f41046e0f37d47
    Port:          <none>
    Host Port:     <none>
    Command:
      sh
      -c
      until nslookup myservice.$(cat /var/run/secrets/kubernetes.io/serviceaccount/namespace).svc.cluster.local; do echo waiting for myservice; sleep 2; done
    State:          Running
      Started:      Fri, 17 Dec 2021 14:07:53 +0000
    Ready:          False
    Restart Count:  0
    Environment:    <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-f55rr (ro)
```

```
    /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-f55rr (ro)
 init-mydb:
   Container ID:
   Image:         busybox:1.28
   Image ID:
   Port:          <none>
   Host Port:     <none>
   Command:
     sh
     -c
     until nslookup mydb.$(cat /var/run/secrets/kubernetes.io/serviceaccount/namespace).svc.cluster.local; do echo waiting for mydb; sleep 2; done
   State:          Waiting
     Reason:       PodInitializing
   Ready:          False
   Restart Count:  0
   Environment:    <none>
   Mounts:
     /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-f55rr (ro)
ontainers:
 myapp-container:
   Container ID:
   Image:         busybox:1.28
   Image ID:
   Port:          <none>
   Host Port:     <none>
   Command:
     sh
     -c
     echo The app is running! && sleep 3600
   State:          Waiting
     Reason:       PodInitializing
   Ready:          False
   Restart Count:  0
   Environment:    <none>
   Mounts:
     /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-f55rr (ro)
onditions:
```

```
  ContainersReady   False
  PodScheduled      True
Volumes:
  kube-api-access-f55rr:
    Type:                    Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds:  3607
    ConfigMapName:           kube-root-ca.crt
    ConfigMapOptional:       <nil>
    DownwardAPI:             true
QoS Class:                   BestEffort
Node-Selectors:              <none>
Tolerations:                 node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                             node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type    Reason     Age   From               Message
  ----    ------     ----  ----               -------
  Normal  Scheduled  76s   default-scheduler  Successfully assigned default/myapp-pod to worker
  Normal  Pulling    76s   kubelet            Pulling image "busybox:1.28"
  Normal  Pulled     71s   kubelet            Successfully pulled image "busybox:1.28" in 5.123386909s
  Normal  Created    71s   kubelet            Created container init-myservice
  Normal  Started    71s   kubelet            Started container init-myservice
ubuntu@master:~$
```

```
myapp-pod                       0/1     Init:0/2   0          5m35s
ubuntu@master:~$ kubectl get po
NAME                            READY   STATUS     RESTARTS   AGE
my-jenkins-65757db454-v6krj     1/1     Running    1          44h
my-jenkins-65757db454-wfcb2     1/1     Running    1          44h
my-nginx-749f56d864-h7q6t       1/1     Running    1          44h
myapp-pod                       0/1     Init:1/2   0          5m35s
ubuntu@master:~$ kubectl describe po myapp-pod
```

```
                    node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type    Reason     Age    From               Message
  ----    ------     ----   ----               -------
  Normal  Scheduled  6m1s   default-scheduler  Successfully assigned default/myapp-pod to worker
  Normal  Pulling    6m     kubelet            Pulling image "busybox:1.28"
  Normal  Pulled     5m55s  kubelet            Successfully pulled image "busybox:1.28" in 5.123386909s
  Normal  Created    5m55s  kubelet            Created container init-myservice
  Normal  Started    5m55s  kubelet            Started container init-myservice
  Normal  Pulled     26s    kubelet            Container image "busybox:1.28" already present on machine
  Normal  Created    26s    kubelet            Created container init-mydb
  Normal  Started    26s    kubelet            Started container init-mydb
  Normal  Pulled     25s    kubelet            Container image "busybox:1.28" already present on machine
  Normal  Created    25s    kubelet            Created container myapp-container
  Normal  Started    25s    kubelet            Started container myapp-container
ubuntu@master:~$ kubectl get po
NAME                            READY   STATUS    RESTARTS   AGE
my-jenkins-65757db454-v6krj     1/1     Running   1          44h
my-jenkins-65757db454-wfcb2     1/1     Running   1          44h
my-nginx-749f56d864-h7q6t       1/1     Running   1          44h
myapp-pod                       1/1     Running   0          6m2s
ubuntu@master:~$ kubectl get po
```