1.1 健康检查

1.1.1 使用存活探针

步骤 1　创建文件夹，用于存放健康检查实验相关文件。

```
[root@k8s-master djfile]# mkdir /labfile/probefile
[root@k8s-master djfile]# cd /labfile/probefile/
```

步骤 2　创建使用 execaction 模式的存活探针 pod 的 yaml 文件。

```
[root@k8s-master probefile]# vim liveness-exec.yaml
```

```
apiVersion: v1
kind: Pod
metadata:
  labels:
    test: liveness
  name: liveness-exec
spec:
  containers:
  - name: liveness
    args:
    - /bin/sh
    - -c
    - touch /tmp/healthy; sleep 30; rm -rf /tmp/healthy; sleep 600
    image: busybox
    livenessProbe:
      exec:
        command:
        - cat
        - /tmp/healthy
      initialDelaySeconds: 5
      periodSeconds: 5
```

步骤 3　创建该 Pod。

```
[root@k8s-master probefile]# kubectl apply -f liveness-exec.yaml
```

步骤 4　使用 kubectl get pod -w 命令持续监控 pod 状态。可以看到 Pod 反复重启。

```
[root@k8s-master probefile]# kubectl get pod -w
```

```
NAME                READY   STATUS      RESTARTS   AGE
liveness-exec       1/1     Running     0          23s
```

执行 Ctrl + C 退出监控

步骤 5　使用 describe 命令查看详细 pod 信息

```
[root@k8s-master probefile]# kubectl describe pod liveness-exec
```

检查其中 events 项，确认探针工作流程。

步骤 6　创建使用 http 存活探针的 pod 的 yaml 文件。

```
[root@k8s-master probefile]# vim liveness-http.yaml
```

```
apiVersion: v1
kind: Pod
metadata:
  labels:
    test: liveness
  name: liveness-http
spec:
  containers:
  - name: liveness
    image: mirrorgooglecontainers/liveness
    args:
    - /server
    livenessProbe:
      httpGet:
        path: /healthz
        port: 8080
        httpHeaders:
        - name: X-Custom-Header
          value: Awesome
      initialDelaySeconds: 3
      periodSeconds: 3
```

步骤 7　创建该 pod

```
[root@k8s-master probefile]# kubectl apply -f liveness-http.yaml
pod/liveness-http created
```

步骤 8　使用 get 命令观察 pod 状态变化。

```
[root@k8s-master probefile]# kubectl get pod -w
NAME            READY   STATUS             RESTARTS   AGE
liveness-http   1/1     Running            3          70s
liveness-http   0/1     CrashLoopBackOff   3          72s
```

步骤 9　使用 describe 命令查看 pod 的 events

```
[root@k8s-master probefile]# kubectl describe pod liveness-http
Events:
```

```
  Type     Reason     Age                From               Message
  ----     ------     ----               ----               -------
  Normal   Scheduled  2m39s               default-scheduler   Successfully
assigned default/liveness-http to k8s-master
  Normal   Pulled     2m2s (x3 over 2m37s)  kubelet, k8s-master  Successfully
pulled image "mirrorgooglecontainers/liveness"
  Normal   Created    2m2s (x3 over 2m37s)  kubelet, k8s-master  Created
container liveness
  Normal   Started    2m2s (x3 over 2m37s)  kubelet, k8s-master  Started
container liveness
  Normal   Pulling    105s (x4 over 2m38s)  kubelet, k8s-master  Pulling image
"mirrorgooglecontainers/liveness"
  Warning  Unhealthy  105s (x9 over 2m27s)  kubelet, k8s-master  Liveness probe
failed: HTTP probe failed with statuscode: 500
  Normal   Killing    105s (x3 over 2m21s)  kubelet, k8s-master  Container
liveness failed liveness probe, will be restarted
```

步骤 10　创建使用 tcp 存活探针的 pod 的 yaml，模板采用 httpd 容器镜像。

```
[root@k8s-master probefile]# vim liveness-tcp.yaml
```

```
apiVersion: v1
kind: Pod
metadata:
  name: liveness-tcp
  labels:
    app: httpd
spec:
  containers:
  - name: httpd
    image: httpd
    livenessProbe:
      tcpSocket:
        port: 80
      initialDelaySeconds: 10
      periodSeconds: 10
```

步骤 11　创建 pod，并且稍等两分钟，待内部所有任务完成。

```
[root@k8s-master probefile]# kubectl apply -f liveness-tcp.yaml
[root@k8s-master probefile]# kubectl get pod
```

步骤 12　进入容器，使用如下命令修改提供服务的端口，从默认的 80 端口修改为 8080 端口，并重启容器内 httpd 服务以应用端口变更。

```
[root@k8s-master probefile]# kubectl exec -it liveness-tcp /bin/bash
# /etc/init.d/openbsd-inetd stop
```

```
[root@k8s-master probefile]# kubectl exec -it liveness-tcp /bin/bash
```

```
root@liveness-tcp:/usr/local/apache2/conf# sed -i "52c listen 8080"
/usr/local/apache2/conf/httpd.conf
root@liveness-tcp:/usr/local/apache2/conf# sed -i "241c ServerName
localhost:8080" /usr/local/apache2/conf/httpd.conf
root@liveness-tcp:/usr/local/apache2/conf# httpd -k restart
```

注意提示符，以上命令有些由于过长分行了，在输入过程中不要分行。

```
# exit 退出
```

步骤 13 等待一段时间后，可以看到 pod 的 restarts 次数变成了 1，由于未通过存活探针检测，pod 进行了重启，因此业务又恢复正常了，并且端口也恢复到了默认的 80 端口。

```
[root@k8s-master probefile]# kubectl get pod
NAME           READY   STATUS             RESTARTS   AGE
liveness-exec  0/1     CrashLoopBackOff   23         76m
liveness-tcp   1/1     Running            1          18m
```

步骤 14 使用 describe 命令可以看到 pod 之前未通过 liveness 的记录。

```
[root@k8s-master probefile]# kubectl describe pod
Events:
  Type     Reason     Age                  From               Message
  ----     ------     ----                 ----               -------
  Normal   Scheduled  13m                  default-scheduler  Successfully
assigned default/liveness-tcp to k8s-master
  Normal   Pulling    6m51s (x2 over 13m)  kubelet, k8s-master  Pulling
image "httpd"
  Warning  Unhealthy  6m51s (x3 over 7m11s)  kubelet, k8s-master  Liveness
probe failed: dial tcp 10.244.0.14:80: connect: connection refused
  Normal   Killing    6m51s                kubelet, k8s-master  Container httpd
failed liveness probe, will be restarted
  Normal   Pulled     6m50s (x2 over 13m)  kubelet, k8s-master  Successfully
pulled image "httpd"
  Normal   Created    6m50s (x2 over 13m)  kubelet, k8s-master  Created
container httpd
  Normal   Started    6m50s (x2 over 13m)  kubelet, k8s-master  Started
container httpd
```

1.1.2 使用 readiness 探针

步骤 1 创建 http 的 deployment 的 yaml 文件，其中配置 readiness 探针。

```
[root@k8s-master probefile]# vim httpd-deployment.yaml
```

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: httpd-deployment
```

```
spec:
  replicas: 3
  selector:
    matchLabels:
      app: httpd
  template:
    metadata:
      labels:
        app: httpd
    spec:
      containers:
      - name: httpd
        image: httpd
        ports:
        - containerPort: 80
        readinessProbe:
          exec:
            command:
            - cat
            - /usr/local/apache2/htdocs/index.html
          initialDelaySeconds: 5
          periodSeconds: 5
```

步骤 2　创建 deployment

```
[root@k8s-master probefile]# kubectl apply -f httpd-deployment.yaml
deployment.apps/httpd-deployment created
```

步骤 3　创建 http 服务的 yaml 文件。

```
[root@k8s-master probefile]# vim httpd-svc.yaml
```

```
apiVersion: v1
kind: Service
metadata:
  name: httpd-svc
spec:
  selector:
    app: httpd
  ports:
  - protocol: TCP
    port: 8080
    targetPort: 80
```

步骤 4　创建 service

```
[root@k8s-master probefile]# kubectl apply -f httpd-svc.yaml
```

步骤 5　使用 describe 命令查看 http 服务的 endpoint

```
[root@k8s-master probefile]# kubectl describe service httpd-svc
Endpoints:        10.244.0.18:80,10.244.1.84:80,10.244.2.104:80
```

步骤 6　进入一个 httpd 容器，删除/usr/local/apache2/htdocs/index.html 文件。

```
[root@k8s-master probefile]# kubectl exec -it httpd-deployment-859778b7b6-57m8b
/bin/sh
# rm /usr/local/apache2/htdocs/index.html
```

exit 退出

步骤 7　使用 describe 命令查看 endpoint，可以看到该 pod 的地址已经从 endpoint 中移除。

```
[root@k8s-master probefile]# kubectl describe service httpd-svc
Endpoints:        10.244.0.18:80,10.244.2.104:80
```

步骤 8　查看 pod 的详细信息，可以看到 pod 未通过探针检测。

```
[root@k8s-master probefile]# kubectl describe pod httpd-deployment-859778b7b6-
57m8b
Events:
  Type     Reason     Age                From               Message
  ----     ------     ----               ----               -------
  Normal   Scheduled  40m                default-scheduler  Successfully
assigned default/httpd-deployment-859778b7b6-57m8b to k8s-node2
  Normal   Pulling    40m                kubelet, k8s-node2  Pulling image
"httpd"
  Normal   Pulled     40m                kubelet, k8s-node2  Successfully pulled
image "httpd"
  Normal   Created    40m                kubelet, k8s-node2  Created container
httpd
  Normal   Started    40m                kubelet, k8s-node2  Started container
httpd
  Warning  Unhealthy  6s (x25 over 2m6s)  kubelet, k8s-node2  Readiness probe
failed: cat: /usr/local/apache2/htdocs/index.html: No such file or directory
```

步骤 9　查看 pod 信息，可以看到 pod 处于 notready 状态

```
[root@k8s-master probefile]# kubectl get pod
NAME                                READY   STATUS    RESTARTS   AGE
httpd-deployment-859778b7b6-57m8b   0/1     Running   0          41m
httpd-deployment-859778b7b6-9b6p2   1/1     Running   0          41m
httpd-deployment-859778b7b6-qrkc5   1/1     Running   0          41m
```