# Memory Limit

1. Enable metrics-server addon in your minikube if needed.
2. Run the following pods:
   * pods/resource/memory-fine.yaml
   * pods/resource/memory-greedy.yaml
   * pods/resource/memory-over.yaml
3. What status of each pod? What is detailed information in kubectl describe?
4. Clean up the running pods.

## Solution

Enable metrics-server addon:

$ minikube addons enable metrics-server  
 ▪ Using image k8s.gcr.io/metrics-server/metrics-server:v0.4.2  
🌟 The 'metrics-server' addon is enabled

Run Pods:

$ kubectl create -f pods/resource/memory-fine.yaml  
pod/memory-fine created  
  
$ kubectl create -f pods/resource/memory-greedy.yaml  
pod/memory-greedy created  
  
$ kubectl create -f pods/resource/memory-over.yaml  
pod/memory-over created

Get status of pods:

$ kubectl get pods  
NAME READY STATUS RESTARTS AGE  
memory-fine 1/1 Running 0 49s  
memory-greedy 0/1 CrashLoopBackOff 2 37s  
memory-over 0/1 Pending 0 28s

Pod memory-fine is working normally:

$ kubectl describe pod memory-fine  
Name: memory-fine  
Namespace: msuslov  
Priority: 0  
Node: minikube/192.168.49.2  
Start Time: Fri, 11 Jun 2021 15:37:03 +0300  
Labels: <none>  
Annotations: <none>  
Status: Running  
IP: 172.17.0.5  
IPs:  
 IP: 172.17.0.5  
Containers:  
 ctr:  
 Container ID: docker://4abb55588e9ce27edd361c94eb42cc7c74f7ab09f4d997199fb04be0ae4a1229  
 Image: polinux/stress  
 Image ID: docker-pullable://polinux/stress@sha256:b6144f84f9c15dac80deb48d3a646b55c7043ab1d83ea0a697c09097aaad21aa  
 Port: <none>  
 Host Port: <none>  
 Command:  
 stress  
 Args:  
 --vm  
 1  
 --vm-bytes  
 150M  
 --vm-hang  
 1  
 State: Running  
 Started: Fri, 11 Jun 2021 15:37:09 +0300  
 Ready: True  
 Restart Count: 0  
 Limits:  
 memory: 200Mi  
 Requests:  
 memory: 100Mi  
 Environment: <none>  
 Mounts:  
 /var/run/secrets/kubernetes.io/serviceaccount from default-token-gnw4f (ro)  
Conditions:  
 Type Status  
 Initialized True  
 Ready True  
 ContainersReady True  
 PodScheduled True  
Volumes:  
 default-token-gnw4f:  
 Type: Secret (a volume populated by a Secret)  
 SecretName: default-token-gnw4f  
 Optional: false  
QoS Class: Burstable  
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 3m1s default-scheduler Successfully assigned msuslov/memory-fine to minikube  
 Normal Pulling 3m1s kubelet Pulling image "polinux/stress"  
 Normal Pulled 2m56s kubelet Successfully pulled image "polinux/stress" in 4.8251877s  
 Normal Created 2m56s kubelet Created container ctr  
 Normal Started 2m56s kubelet Started container ctr

Pod memory-greedy has invoked OOMKiller:

$ kubectl describe pod memory-greedy  
Name: memory-greedy  
Namespace: msuslov  
Priority: 0  
Node: minikube/192.168.49.2  
Start Time: Fri, 11 Jun 2021 15:37:15 +0300  
Labels: <none>  
Annotations: <none>  
Status: Running  
IP: 172.17.0.6  
IPs:  
 IP: 172.17.0.6  
Containers:  
 ctr:  
 Container ID: docker://132fc90577660d4a9ea63ab524848dfada1d23d8dcbb8a6aa91bdb16666143a3  
 Image: polinux/stress  
 Image ID: docker-pullable://polinux/stress@sha256:b6144f84f9c15dac80deb48d3a646b55c7043ab1d83ea0a697c09097aaad21aa  
 Port: <none>  
 Host Port: <none>  
 Command:  
 stress  
 Args:  
 --vm  
 1  
 --vm-bytes  
 1250M  
 --vm-hang  
 1  
 State: Waiting  
 Reason: CrashLoopBackOff  
 Last State: Terminated  
 Reason: OOMKilled  
 Exit Code: 1  
 Started: Fri, 11 Jun 2021 15:40:14 +0300  
 Finished: Fri, 11 Jun 2021 15:40:14 +0300  
 Ready: False  
 Restart Count: 5  
 Limits:  
 memory: 100Mi  
 Requests:  
 memory: 50Mi  
 Environment: <none>  
 Mounts:  
 /var/run/secrets/kubernetes.io/serviceaccount from default-token-gnw4f (ro)  
Conditions:  
 Type Status  
 Initialized True  
 Ready False  
 ContainersReady False  
 PodScheduled True  
Volumes:  
 default-token-gnw4f:  
 Type: Secret (a volume populated by a Secret)  
 SecretName: default-token-gnw4f  
 Optional: false  
QoS Class: Burstable  
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 3m27s default-scheduler Successfully assigned msuslov/memory-greedy to minikube  
 Normal Pulled 115s (x5 over 3m27s) kubelet Container image "polinux/stress" already present on machine  
 Normal Created 115s (x5 over 3m27s) kubelet Created container ctr  
 Normal Started 115s (x5 over 3m27s) kubelet Started container ctr  
 Warning BackOff 103s (x10 over 3m26s) kubelet Back-off restarting failed container

Pod memory-over is pending and waiting for node with sufficient memory:

$ kubectl describe pod memory-over  
Name: memory-over  
Namespace: msuslov  
Priority: 0  
Node: <none>  
Labels: <none>  
Annotations: <none>  
Status: Pending  
IP:  
IPs: <none>  
Containers:  
 ctr:  
 Image: polinux/stress  
 Port: <none>  
 Host Port: <none>  
 Command:  
 stress  
 Args:  
 --vm  
 1  
 --vm-bytes  
 150M  
 --vm-hang  
 1  
 Limits:  
 memory: 1000Gi  
 Requests:  
 memory: 1000Gi  
 Environment: <none>  
 Mounts:  
 /var/run/secrets/kubernetes.io/serviceaccount from default-token-gnw4f (ro)  
Conditions:  
 Type Status  
 PodScheduled False  
Volumes:  
 default-token-gnw4f:  
 Type: Secret (a volume populated by a Secret)  
 SecretName: default-token-gnw4f  
 Optional: false  
QoS Class: Burstable  
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  
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 Warning FailedScheduling 3m37s default-scheduler 0/1 nodes are available: 1 Insufficient memory.  
 Warning FailedScheduling 3m37s default-scheduler 0/1 nodes are available: 1 Insufficient memory.

Clean up:

$ kubectl delete -f pods/resource/memory-fine.yaml  
pod "memory-fine" deleted  
  
$ kubectl delete -f pods/resource/memory-greedy.yaml  
pod "memory-greedy" deleted  
  
$ kubectl delete -f pods/resource/memory-over.yaml  
pod "memory-over" deleted