# CPU Limit

1. Enable metrics-server addon in your minikube if needed.
2. Run the following pods:
   * pods/resource/cpu-fine.yaml
   * pods/resource/cpu-greedy.yaml
   * pods/resource/cpu-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/cpu-fine.yaml  
pod/cpu-fine created  
  
$ kubectl create -f pods/resource/cpu-greedy.yaml  
pod/cpu-greedy created  
  
$ kubectl create -f pods/resource/cpu-over.yaml  
pod/cpu-over created

Get status of pods:

$ kubectl get pods  
NAME READY STATUS RESTARTS AGE  
cpu-fine 1/1 Running 0 16s  
cpu-greedy 1/1 Running 0 11s  
cpu-over 0/1 Pending 0 7s  
  
kubectl top pod --use-protocol-buffers  
NAME CPU(cores) MEMORY(bytes)  
command-continuous 1m 2Mi  
cpu-fine 999m 1Mi  
cpu-greedy 749m 2Mi

Pod cpu-fine is working normally:

$ kubectl describe pod cpu-fine  
Name: cpu-fine  
Namespace: msuslov  
Priority: 0  
Node: minikube/192.168.49.2  
Start Time: Fri, 11 Jun 2021 15:58:13 +0300  
Labels: <none>  
Annotations: <none>  
Status: Running  
IP: 172.17.0.5  
IPs:  
 IP: 172.17.0.5  
Containers:  
 ctr:  
 Container ID: docker://fa60e4fe977aeac5a3a9dd1e29b4b432b4ba669013630c08fe4b63ce968ac89b  
 Image: vish/stress  
 Image ID: docker-pullable://vish/stress@sha256:b6456a3df6db5e063e1783153627947484a3db387be99e49708c70a9a15e7177  
 Port: <none>  
 Host Port: <none>  
 Args:  
 -cpus  
 2  
 State: Running  
 Started: Fri, 11 Jun 2021 15:58:14 +0300  
 Ready: True  
 Restart Count: 0  
 Limits:  
 cpu: 2100m  
 Requests:  
 cpu: 1500m  
 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 2m6s default-scheduler Successfully assigned msuslov/cpu-fine to minikube  
 Normal Pulled 2m6s kubelet Container image "vish/stress" already present on machine  
 Normal Created 2m6s kubelet Created container ctr  
 Normal Started 2m6s kubelet Started container ctr

Pod cpu-greedy is working normally and it is throttled (see kubectl top pod output above):

$ kubectl describe pod cpu-greedy  
Name: cpu-greedy  
Namespace: msuslov  
Priority: 0  
Node: minikube/192.168.49.2  
Start Time: Fri, 11 Jun 2021 15:51:37 +0300  
Labels: <none>  
Annotations: <none>  
Status: Running  
IP: 172.17.0.6  
IPs:  
 IP: 172.17.0.6  
Containers:  
 ctr:  
 Container ID: docker://49e40f846bf608153797b37165dfd222f2305805b15745775d30c82a05b128ff  
 Image: vish/stress  
 Image ID: docker-pullable://vish/stress@sha256:b6456a3df6db5e063e1783153627947484a3db387be99e49708c70a9a15e7177  
 Port: <none>  
 Host Port: <none>  
 Args:  
 -cpus  
 2  
 State: Running  
 Started: Fri, 11 Jun 2021 15:51:41 +0300  
 Ready: True  
 Restart Count: 0  
 Limits:  
 cpu: 750m  
 Requests:  
 cpu: 500m  
 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 10m default-scheduler Successfully assigned msuslov/cpu-greedy to minikube  
 Normal Pulling 10m kubelet Pulling image "vish/stress"  
 Normal Pulled 10m kubelet Successfully pulled image "vish/stress" in 3.3228801s  
 Normal Created 10m kubelet Created container ctr  
 Normal Started 10m kubelet Started container ctr

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

$ kubectl describe pod cpu-over  
Name: cpu-over  
Namespace: msuslov  
Priority: 0  
Node: <none>  
Labels: <none>  
Annotations: <none>  
Status: Pending  
IP:  
IPs: <none>  
Containers:  
 ctr:  
 Image: vish/stress  
 Port: <none>  
 Host Port: <none>  
 Args:  
 -cpus  
 2  
 Limits:  
 cpu: 100  
 Requests:  
 cpu: 100  
 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  
 ---- ------ ---- ---- -------  
 Warning FailedScheduling 12m default-scheduler 0/1 nodes are available: 1 Insufficient cpu.  
 Warning FailedScheduling 12m default-scheduler 0/1 nodes are available: 1 Insufficient cpu.

Clean up:

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