Agenda

- Commands
- Resources Limits
- NameSpaces
- Taint & Tolerations
- Node Selectors
- Node Affinity

COMMANDS & ARGUMENTS

```
docker run ubuntu [COMMAND]
```

```
docker run ubuntu sleep 5
```

```
FROM Ubuntu

CMD sleep 5
```

CMD command param1

CMD [“command”, “param1”]

CMD sleep 5

CMD [“sleep”, “5”] ✓

CMD [“sleep 5”] ✗

```
docker build -t ubuntu-sleeper .
```

```
docker run ubuntu-sleeper
```

```
FROM Ubuntu

CMD sleep 5
```

```
docker run ubuntu-sleeper sleep 10
```

Command at Startup: sleep 10

```
FROM Ubuntu

ENTRYPOINT ["sleep"]
```

```
docker run ubuntu-sleeper 10
```

Command at Startup: sleep 10

```
docker run ubuntu-sleeper
sleep: missing operand
Try 'sleep --help' for more information.
```

Command at Startup: sleep

```
FROM Ubuntu

ENTRYPOINT ["sleep"]

CMD ["5"]
```

```
docker run ubuntu-sleeper
sleep: missing operand
Try 'sleep --help' for more information.
```

Command at Startup: sleep 5

```
docker run ubuntu-sleeper 10
```

Command at Startup: sleep 10

```
docker run --entrypoint sleep2.0 ubuntu-sleeper 10
```

Command at Startup: sleep2.0 10

```
FROM Ubuntu

ENTRYPOINT ["sleep"]

CMD ["5"]
```

pod-definition.yml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: ubuntu-sleeper-pod
spec:
  containers:
    - name: ubuntu-sleeper
      image: ubuntu-sleeper
      args: ["10"]
```

```
kubectl create -f pod-definition.yml
```

```
FROM Ubuntu

ENTRYPOINT ["sleep"]

CMD ["5"]
```

```
docker run --name ubuntu-sleeper \
    --entrypoint sleep2.0
    ubuntu-sleeper 10
```

pod-definition.yml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: ubuntu-sleeper-pod
spec:
  containers:
    - name: ubuntu-sleeper
      image: ubuntu-sleeper
      command: ["sleep2.0"]

      args: ["10"]
```

```
kubectl create -f pod-definition.yml
```

FROM Ubuntu

ENTRYPOINT [“sleep”]

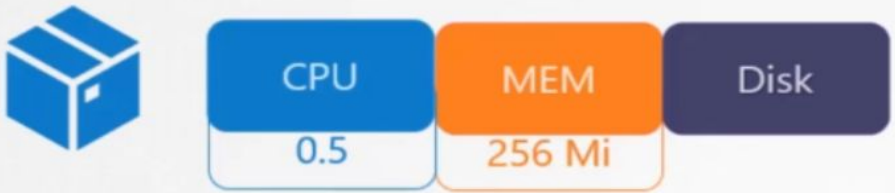
CMD [“5”]

pod-definition.yml

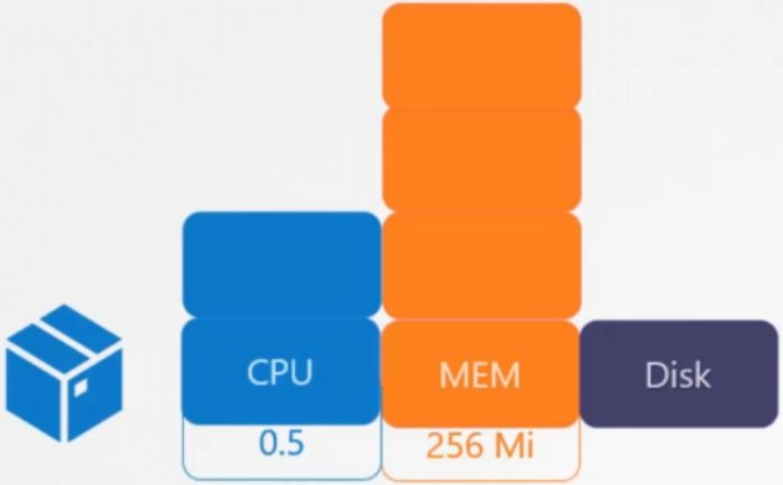
```
apiVersion: v1
kind: Pod
metadata:
  name: ubuntu-sleeper-pod
spec:
  containers:
    - name: ubuntu-sleeper
      image: ubuntu-sleeper
      command:[“sleep2.0”]
      args: [“10”]
```

RESOURCE LIMITS

Resource Requests



Resource Requests



pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
  labels:
    name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080
    resources:
      requests:
        memory: "1Gi"
        cpu: 1
```

Resource - CPU

CPU

0.1

CPU

100m

Resource - Memory

1 G (Gigabyte) = 1,000,000,000 bytes

1 M (Megabyte) = 1,000,000 bytes

1 K (Kilobyte) = 1,000 bytes

1 Gi (Gibibyte) = 1,073,741,824 bytes

1 Mi (Mebibyte) = 1,048,576 bytes

1 Ki (Kibibyte) = 1,024 bytes

Resource Limits

Resource Limits

pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
  labels:
    name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080
    resources:
      requests:
        memory: "1Gi"
        cpu: 1
      limits:
        memory: "2Gi"
        cpu: 2
```

Exceed Limits

Demo: Specify a memory request and a memory limit

```
apiVersion: v1
kind: Pod
metadata:
  name: memory-demo
  namespace: mem-example
spec:
  containers:
  - name: memory-demo-ctr
    image: polinux/stress
    resources:
      limits:
        memory: "200Mi"
      requests:
        memory: "100Mi"
    command: ["stress"]
    args: ["--vm", "1", "--vm-bytes", "150M", "--vm-hang", "1"]
```

Demo: Exceed a Container's memory limit

```
apiVersion: v1
kind: Pod
metadata:
  name: memory-demo-2
  namespace: mem-example
spec:
  containers:
  - name: memory-demo-2-ctr
    image: polinux/stress
    resources:
      requests:
        memory: "50Mi"
      limits:
        memory: "100Mi"
    command: ["stress"]
    args: ["--vm", "1", "--vm-bytes", "250M", "--vm-hang", "1"]
```

Demo: Specify a memory request that is too big for your Nodes

```
apiVersion: v1
kind: Pod
metadata:
  name: memory-demo-3
  namespace: mem-example
spec:
  containers:
  - name: memory-demo-3-ctr
    image: polinux/stress
    resources:
      limits:
        memory: "1000Gi"
      requests:
        memory: "1000Gi"
    command: ["stress"]
    args: ["--vm", "1", "--vm-bytes", "150M", "--vm-hang", "1"]
```

If you do not specify a memory limit

If you do not specify a memory limit for a Container, one of the following situations applies:

- The Container has no upper bound on the amount of memory it uses. The Container could use all of the memory available on the Node where it is running which in turn could invoke the OOM Killer. Further, in case of an OOM Kill, a container with no resource limits will have a greater chance of being killed.
- The Container is running in a namespace that has a default memory limit, and the Container is automatically assigned the default limit. Cluster administrators can use a LimitRange to specify a default value for the memory limit.

Demo: Specify a CPU request and a CPU limit

```
apiVersion: v1
kind: Pod
metadata:
  name: cpu-demo
  namespace: cpu-example
spec:
  containers:
  - name: cpu-demo-ctr
    image: vish/stress
    resources:
      limits:
        cpu: "1"
      requests:
        cpu: "0.5"
    args:
    - -cpus
    - "2"
```

If you do not specify a CPU limit

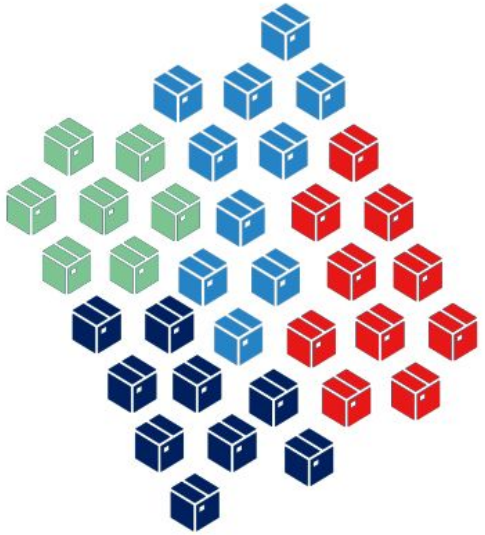
If you do not specify a CPU limit for a Container, then one of these situations applies:

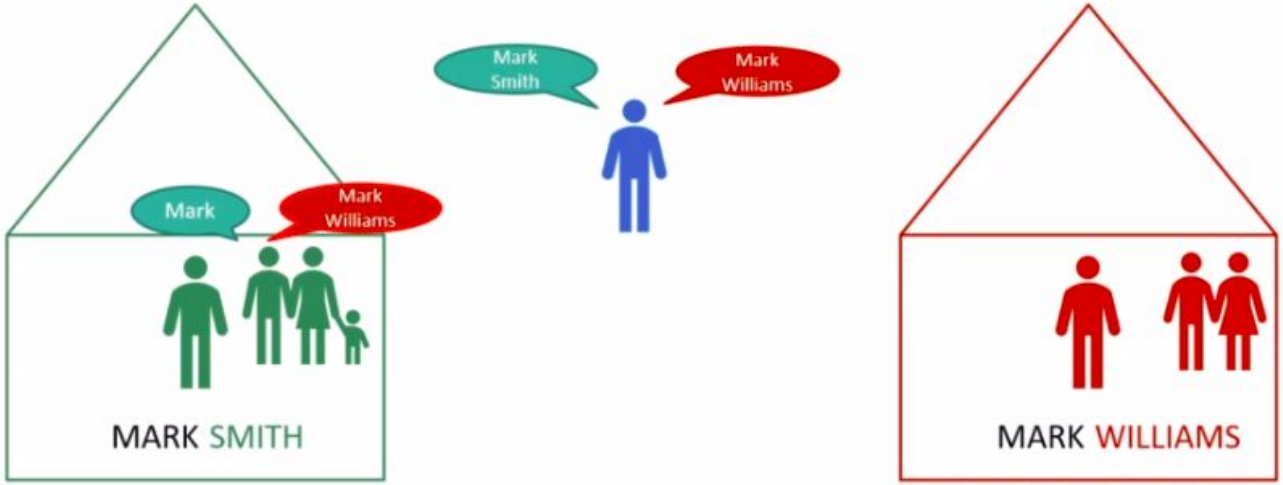
- The Container has no upper bound on the CPU resources it can use. The Container could use all of the CPU resources available on the Node where it is running.
- The Container is running in a namespace that has a default CPU limit, and the Container is automatically assigned the default limit. Cluster administrators can use a LimitRange to specify a default value for the CPU limit.

If you specify a CPU limit but do not specify a CPU request

If you specify a CPU limit for a Container but do not specify a CPU request, Kubernetes automatically assigns a CPU request that matches the limit. Similarly, if a Container specifies its own memory limit, but does not specify a memory request, Kubernetes automatically assigns a memory request that matches the limit.

Namespace




Mark
Mark Williams
MARK SMITH
Mark Smith
Mark Williams
MARK WILLIAMS

View Namespaces

```
> kubectl get namespaces
NAME          STATUS   AGE
default       Active   20m
kube-system   Active   20m
```

View Resources in a Namespace

```
> kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
myapp-pod     1/1     Running   0          20s
```

```
> kubectl get pods --namespace=kube-system
NAME                                    READY   STATUS    RESTARTS   AGE
etcd-kubemaster                         1/1     Running   2          14d
kube-apiserver-kubemaster               1/1     Running   4          14d
kube-controller-manager-kubemaster      1/1     Running   4          14d
kube-dns-86f4d74b45-zgh8p               3/3     Running   10         14d
kube-flannel-ds-gmg5r                   1/1     Running   4          14d
kube-flannel-ds-kt74d                   1/1     Running   4          14d
kube-flannel-ds-qtlg8                   1/1     Running   4          14d
kube-proxy-4nkb6                        1/1     Running   3          14d
kube-proxy-b6wnm                        1/1     Running   3          14d
kube-proxy-rph7b                        1/1     Running   2          14d
kube-scheduler-kubemaster               1/1     Running   3          14d
metrics-server-6fbfb84cdd-jt5q9         1/1     Running   0          3d
```

Create Namespace

namespace-definition.yml

```yaml
apiVersion: v1
kind: Namespace
metadata:
  name: team1

spec:
```

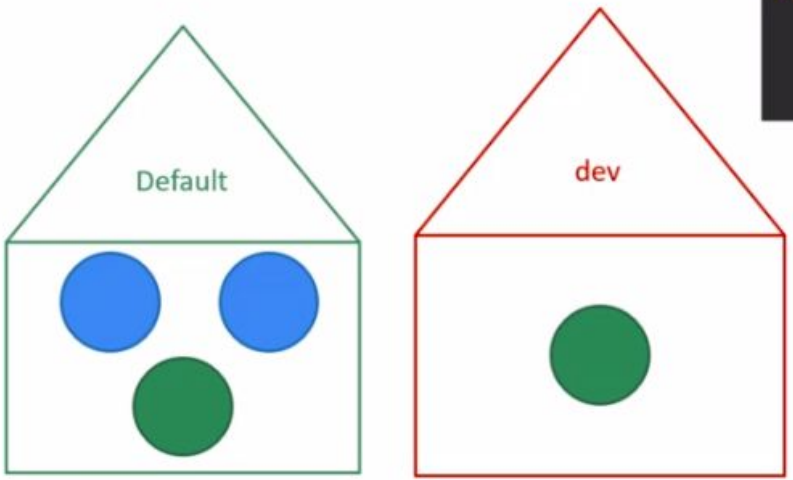
```
kubectl create -f namespace-definition.yml
namespace “team1” created
```

```
> kubectl create -f pod-definition.yml
pod/myapp-pod created
```

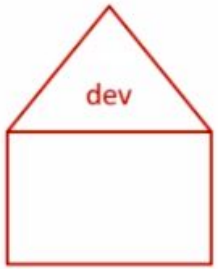
```
> kubectl create -f pod-definition.yml
pod/myapp-pod created
```

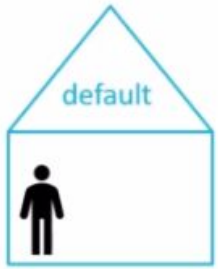
pod-definition.yml

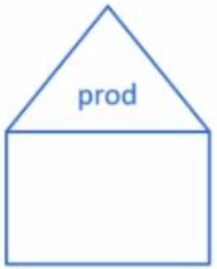
```yaml
apiVersion: v1
kind: Pod

metadata:
 name: myapp-pod
 namespace: dev

 labels:
    app: myapp
    type: front-end
spec:
  containers:
  - name: nginx-container
    image: nginx
```



Switch





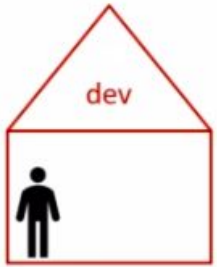


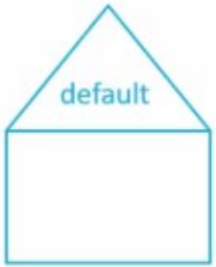

```
> kubectl get pods --namespace=dev
```

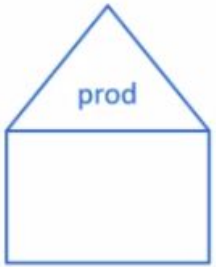
```
> kubectl get pods
```

```
> kubectl get pods --namespace=prod
```

Switch








```
> kubectl get pods --namespace=dev
```

```
> kubectl get pods
```

```
> kubectl get pods --namespace=prod
```

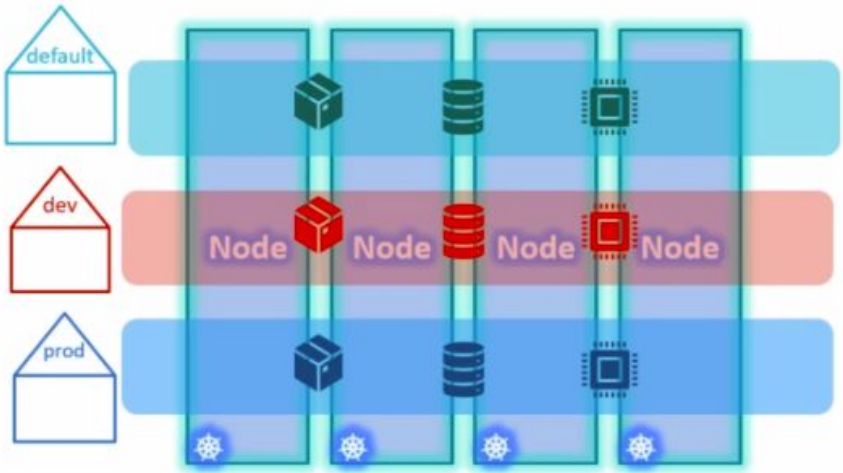
```
> kubectl config set-context $(kubectl config current-context) --namespace=dev
```

```
> kubectl get pods
```

```
> kubectl get pods --namespace=default
```

```
> kubectl get pods --namespace=prod
```

Resource Quota



Note: you could also limit the total number of other kinds of object. For example, you might decide to limit how many Deployments that can live in a single namespace.

Compute-quota.yaml

```yaml
apiVersion: v1
kind: ResourceQuota
metadata:
    name: compute-quota
    namespace: dev

spec:
  hard:
    pods: "10"
    requests.cpu: "4"
    requests.memory: 5Gi
    limits.cpu: "10"
    limits.memory: 10Gi
```

```
> kubectl create -f compute-quota.yaml
```

Configure Memory and CPU Quotas for a Namespace

```
kubectl create namespace quota-mem-cpu-example
```

```
apiVersion: v1
kind: ResourceQuota
metadata:
  name: mem-cpu-demo
spec:
  hard:
    requests.cpu: "1"
    requests.memory: 1Gi
    limits.cpu: "2"
    limits.memory: 2Gi
```

```
kubectl apply -f quota-mem-cpu.yaml --namespace=quota-mem-cpu-example
```

```
kubectl get resourcequota mem-cpu-demo --namespace=quota-mem-cpu-example --output=yaml
```

The ResourceQuota places these requirements on the quota-mem-cpu-example namespace:

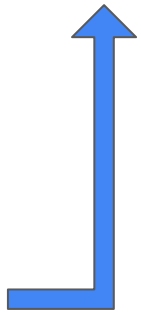
- For every Pod in the namespace, each container must have a memory request, memory limit, cpu request, and cpu limit.
- The memory request total for all Pods in that namespace must not exceed 1 GiB.
- The memory limit total for all Pods in that namespace must not exceed 2 GiB.
- The CPU request total for all Pods in that namespace must not exceed 1 cpu.
- The CPU limit total for all Pods in that namespace must not exceed 2 cpu.

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: quota-mem-cpu-demo
spec:
  containers:
  - name: quota-mem-cpu-demo-ctr
    image: nginx
    resources:
      limits:
        memory: "800Mi"
        cpu: "800m"
      requests:
        memory: "600Mi"
        cpu: "400m"
```

```yaml
status:
  hard:
    limits.cpu: "2"
    limits.memory: 2Gi
    requests.cpu: "1"
    requests.memory: 1Gi
  used:
    limits.cpu: 800m
    limits.memory: 800Mi
    requests.cpu: 400m
    requests.memory: 600Mi
```

```
kubectl apply -f quota-mem-cpu-pod.yaml --namespace=quota-mem-cpu-example
```

```
kubectl get resourcequota mem-cpu-demo --namespace=quota-mem-cpu-example --output=yaml
```



Attempt to create a second Pod

```
apiVersion: v1
kind: Pod
metadata:
  name: quota-mem-cpu-demo-2
spec:
  containers:
  - name: quota-mem-cpu-demo-2-ctr
    image: redis
    resources:
      limits:
        memory: "1Gi"
        cpu: "800m"
      requests:
        memory: "700Mi"
        cpu: "400m"
```

```
kubectl apply -f quota-mem-cpu-pod-2.yaml --namespace=quota-mem-cpu-example
```

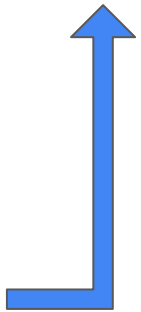
```
Error from server (Forbidden): error when creating "quota-mem-cpu-pod-2.yaml":
pods "quota-mem-cpu-demo-2" is forbidden: exceeded quota: mem-cpu-demo,
requested: requests.memory=700Mi,used: requests.memory=600Mi, limited:
requests.memory=1Gi
```

Configure a Pod Quota for a Namespace

```
kubectl create namespace quota-pod-example
```

```
apiVersion: v1
kind: ResourceQuota
metadata:
  name: pod-demo
spec:
  hard:
    pods: "2"
```

```
status:
  hard:
    pods: "2"
  used:
    pods: "0"
```



```
kubectl apply -f quota-pod.yaml --namespace=quota-pod-example
```

```
kubectl get resourcequota pod-demo --namespace=quota-pod-example --output=yaml
```

Create a deployment

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: pod-quota-demo
spec:
  selector:
    matchLabels:
      purpose: quota-demo
  replicas: 3
  template:
    metadata:
      labels:
        purpose: quota-demo
    spec:
      containers:
      - name: pod-quota-demo
        image: nginx
```

```
kubectl apply -f quota-pod-deployment.yaml
--namespace=quota-pod-example
```

```
kubectl get deployment pod-quota-demo
--namespace=quota-pod-example --output=yaml
```

```
spec:
  ...
  replicas: 3
...
status:
  availableReplicas: 2
...
lastUpdateTime: 2021-04-02T20:57:05Z
    message: 'unable to create pods: pods
"pod-quota-demo-1650323038-" is forbidden:
      exceeded quota: pod-demo, requested: pods=1,
used: pods=2, limited: pods=2'
```

Limit Range (Memory):

Provides constraints to limit resource consumption per Containers or Pods in a namespace.

```
kubectl create namespace default-mem-example
```

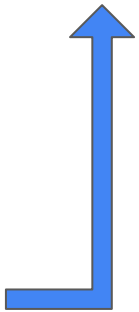
```
apiVersion: v1
kind: LimitRange
metadata:
  name: mem-limit-range
spec:
  limits:
  - default:
      memory: 512Mi
    defaultRequest:
      memory: 256Mi
    type: Container
```

```
kubectl apply -f memory-defaults.yaml --namespace=default-mem-example
```

Now if you create a Pod in the default-mem-example namespace, and any container within that Pod does not specify its own values for memory request and memory limit, then the control plane applies default values: a memory request of 256MiB and a memory limit of 512MiB.

```
apiVersion: v1
kind: Pod
metadata:
  name: default-mem-demo
spec:
  containers:
  - name: default-mem-demo-ctr
    image: nginx
```

```
containers:
- image: nginx
  imagePullPolicy: Always
  name: default-mem-demo-ctr
  resources:
    limits:
      memory: 512Mi
    requests:
      memory: 256Mi
```



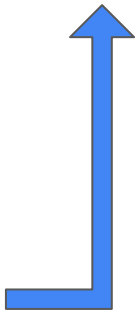
```
kubectl apply -f memory-defaults-pod.yaml --namespace=default-mem-example
```

```
kubectl get pod default-mem-demo --output=yaml --namespace=default-mem-example
```

What if you specify a container's limit, but not its request?

```
apiVersion: v1
kind: Pod
metadata:
  name: default-mem-demo-2
spec:
  containers:
  - name: default-mem-demo-2-ctr
    image: nginx
    resources:
      limits:
        memory: "1Gi"
```

```
resources:
  limits:
    memory: 1Gi
  requests:
    memory: 1Gi
```



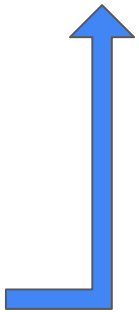
```
kubectl apply -f memory-defaults-pod-2.yaml --namespace=default-mem-example
```

```
kubectl get pod default-mem-demo-2 --output=yaml --namespace=default-mem-example
```

What if you specify a container's request, but not its limit?

```
apiVersion: v1
kind: Pod
metadata:
  name: default-mem-demo-3
spec:
  containers:
  - name: default-mem-demo-3-ctr
    image: nginx
    resources:
      requests:
        memory: "128Mi"
```

```
resources:
  limits:
    memory: 512Mi
  requests:
    memory: 128Mi
```



```
kubectl apply -f memory-defaults-pod-3.yaml --namespace=default-mem-example
```

```
kubectl get pod default-mem-demo-3 --output=yaml --namespace=default-mem-example
```

Limit Range (CPU):

```
kubectl create namespace default-cpu-example
```

```
apiVersion: v1
kind: LimitRange
metadata:
  name: cpu-limit-range
spec:
  limits:
  - default:
      cpu: 1
    defaultRequest:
      cpu: 0.5
    type: Container
```

```
kubectl apply -f cpu-defaults.yaml --namespace=default-cpu-example
```

Now if you create a Pod in the default-cpu-example namespace, and any container in that Pod does not specify its own values for CPU request and CPU limit, then the control plane applies default values: a CPU request of 0.5 and a default CPU limit of 1.

```
apiVersion: v1
kind: Pod
metadata:
  name: default-cpu-demo
spec:
  containers:
  - name: default-cpu-demo-ctr
    image: nginx
```

```
containers:
- image: nginx
  imagePullPolicy: Always
  name: default-cpu-demo-ctr
  resources:
    limits:
      cpu: "1"
    requests:
      cpu: 500m
```

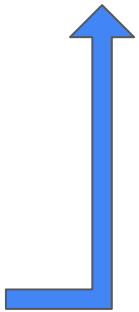
```
kubectl apply -f cpu-defaults-pod.yaml --namespace=default-cpu-example
```

```
kubectl get pod default-cpu-demo --output=yaml --namespace=default-cpu-example
```

What if you specify a container's limit, but not its request?

```
apiVersion: v1
kind: Pod
metadata:
  name: default-cpu-demo-2
spec:
  containers:
  - name: default-cpu-demo-2-ctr
    image: nginx
    resources:
      limits:
        cpu: "1"
```

```
resources:
  limits:
    cpu: "1"
  requests:
    cpu: "1"
```



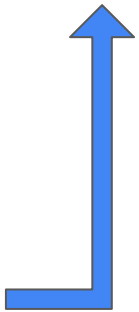
```
kubectl apply -f cpu-defaults-pod-2.yaml --namespace=default-cpu-example
```

```
kubectl get pod default-cpu-demo-2 --output=yaml --namespace=default-cpu-example
```

What if you specify a container's request, but not its limit?

```
apiVersion: v1
kind: Pod
metadata:
  name: default-cpu-demo-3
spec:
  containers:
  - name: default-cpu-demo-3-ctr
    image: nginx
    resources:
      requests:
        cpu: "0.75"
```

```
resources:
  limits:
    cpu: "1"
  requests:
    cpu: 750m
```



```
kubectl apply -f cpu-defaults-pod-3.yaml --namespace=default-cpu-example
```

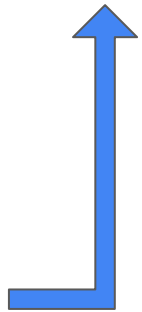
```
kubectl get pod default-cpu-demo-3 --output=yaml --namespace=default-cpu-example
```

Configure Minimum and Maximum Memory Constraints for a Namespace

```
kubectl create namespace constraints-mem-example
```

```
apiVersion: v1
kind: LimitRange
metadata:
  name: mem-min-max-demo-lr
spec:
  limits:
  - max:
      memory: 1Gi
    min:
      memory: 500Mi
    type: Container
```

```
limits:
  - default:
      memory: 1Gi
    defaultRequest:
      memory: 1Gi
    max:
      memory: 1Gi
    min:
      memory: 500Mi
    type: Container
```

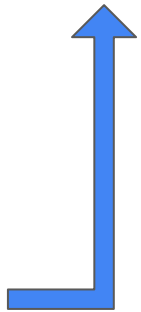


```
kubectl apply -f memory-constraints.yaml --namespace=constraints-mem-example
```

```
kubectl get limitrange mem-min-max-demo-lr --namespace=constraints-mem-example --output=yaml
```

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: constraints-mem-demo
spec:
  containers:
  - name: constraints-mem-demo-ctr
    image: nginx
    resources:
      limits:
        memory: "800Mi"
      requests:
        memory: "600Mi"
```

```yaml
resources:
  limits:
     memory: 800Mi
  requests:
    memory: 600Mi
```



```
kubectl apply -f memory-constraints-pod.yaml --namespace=constraints-mem-example
```

```
kubectl get pod constraints-mem-demo --output=yaml --namespace=constraints-mem-example
```

Attempt to create a Pod that exceeds the maximum memory constraint

```
apiVersion: v1
kind: Pod
metadata:
  name: constraints-mem-demo-2
spec:
  containers:
  - name:
constraints-mem-demo-2-ctr
    image: nginx
    resources:
      limits:
        memory: "1.5Gi"
      requests:
        memory: "800Mi”
```

```
kubectl apply -f memory-constraints-pod-2.yaml --namespace=constraints-mem-example
```

```
Error from server (Forbidden): error when creating "memory-constraints-pod-2.yaml":
pods "constraints-mem-demo-2" is forbidden: maximum memory usage per Container is 1Gi, but limit is
1536Mi.
```

Attempt to create a Pod that does not meet the minimum memory request

```
apiVersion: v1
kind: Pod
metadata:
  name: constraints-mem-demo-3
spec:
  containers:
  - name:
constraints-mem-demo-3-ctr
    image: nginx
    resources:
      limits:
        memory: "800Mi"
      requests:
        memory: "100Mi"
```

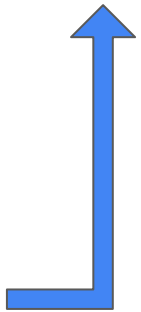
```
kubectl apply -f memory-constraints-pod-3.yaml --namespace=constraints-mem-example
```

```
Error from server (Forbidden): error when creating "memory-constraints-pod-3.yaml":
pods "constraints-mem-demo-3" is forbidden: minimum memory usage per Container is 500Mi, but request
is 100Mi.
```

Create a Pod that does not specify any memory request or limit

```
apiVersion: v1
kind: Pod
metadata:
  name: constraints-mem-demo-4
spec:
  containers:
  - name: constraints-mem-demo-4-ctr
    image: nginx
```

```
resources:
  limits:
    memory: 1Gi
  requests:
    memory: 1Gi
```



```
kubectl apply -f memory-constraints-pod-4.yaml --namespace=constraints-mem-example
```

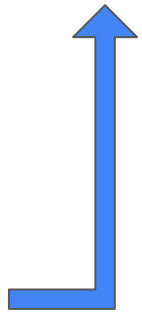
```
kubectl get pod constraints-mem-demo-4 --namespace=constraints-mem-example --output=yaml
```

Configure Minimum and Maximum CPU Constraints for a Namespace

```
kubectl create namespace constraints-cpu-example
```

```
apiVersion: v1
kind: LimitRange
metadata:
  name: cpu-min-max-demo-lr
spec:
  limits:
  - max:
      cpu: "800m"
    min:
      cpu: "200m"
    type: Container
```

```
limits:
- default:
    cpu: 800m
  defaultRequest:
    cpu: 800m
  max:
    cpu: 800m
  min:
    cpu: 200m
  type: Container
```

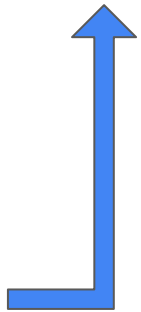


```
kubectl apply -f cpu-constraints.yaml --namespace=constraints-cpu-example
```

```
kubectl get limitrange cpu-min-max-demo-lr --output=yaml --namespace=constraints-cpu-example
```

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: constraints-cpu-demo
spec:
  containers:
  - name: constraints-cpu-demo-ctr
    image: nginx
    resources:
      limits:
        cpu: "800m"
      requests:
        cpu: "500m"
```

```yaml
resources:
  limits:
    cpu: 800m
  requests:
    cpu: 500m
```



```
kubectl apply -f cpu-constraints-pod.yaml --namespace=constraints-cpu-example
```

```
kubectl get pod constraints-cpu-demo --output=yaml --namespace=constraints-cpu-example
```

Attempt to create a Pod that exceeds the maximum CPU constraint

```
apiVersion: v1
kind: Pod
metadata:
  name: constraints-cpu-demo-2
spec:
  containers:
  - name:
constraints-cpu-demo-2-ctr
    image: nginx
    resources:
      limits:
        cpu: "1.5"
      requests:
        cpu: "500m"
```

```
kubectl apply -f cpu-constraints-pod-2.yaml --namespace=constraints-cpu-example
```

```
Error from server (Forbidden): error when creating "cpu-constraints-pod-2.yaml":
pods "constraints-cpu-demo-2" is forbidden: maximum cpu usage per Container is 800m, but limit is
1500m.
```

Attempt to create a Pod that does not meet the minimum CPU request

```
apiVersion: v1
kind: Pod
metadata:
  name: constraints-cpu-demo-3
spec:
  containers:
  - name:
constraints-cpu-demo-3-ctr
    image: nginx
    resources:
      limits:
        cpu: "800m"
      requests:
        cpu: "100m"
```

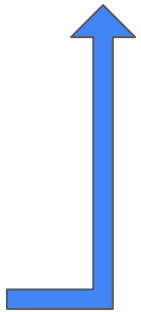
```
kubectl apply -f cpu-constraints-pod-3.yaml --namespace=constraints-cpu-example
```

```
Error from server (Forbidden): error when creating "cpu-constraints-pod-3.yaml":
pods "constraints-cpu-demo-3" is forbidden: minimum cpu usage per Container is 200m, but request is
100m.
```

Create a Pod that does not specify any CPU request or limit

```
apiVersion: v1
kind: Pod
metadata:
  name: constraints-cpu-demo-4
spec:
  containers:
  - name: constraints-cpu-demo-4-ctr
    image: vish/stress
```

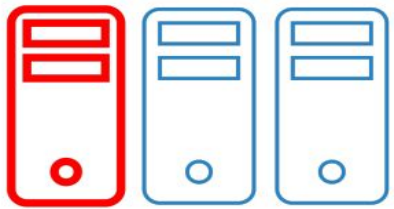
```
resources:
  limits:
    cpu: 800m
  requests:
    cpu: 800m
```

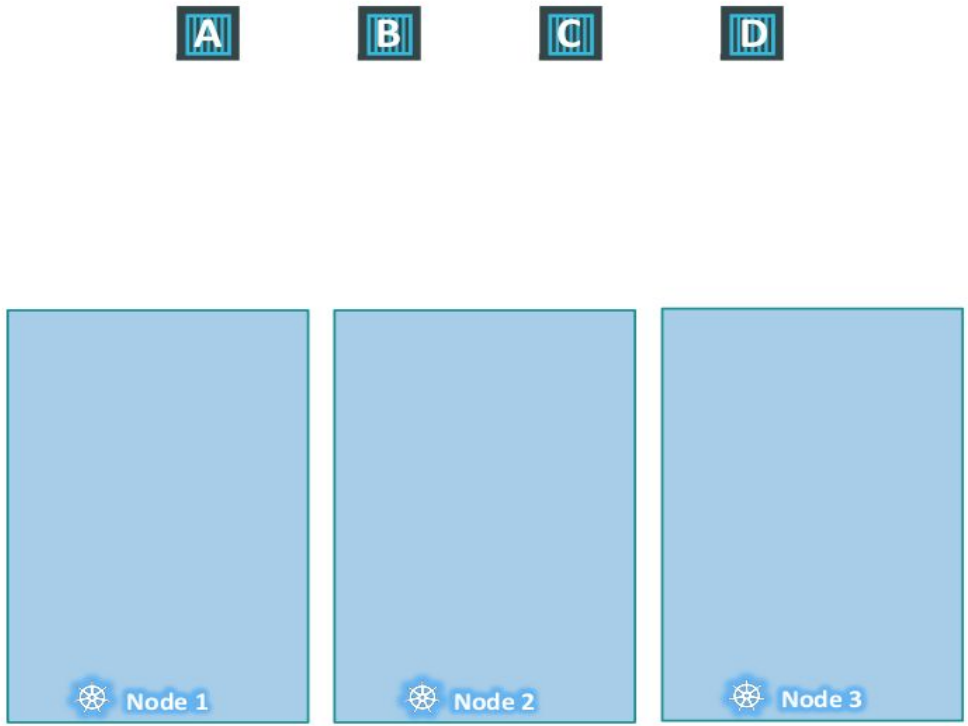


```
kubectl apply -f cpu-constraints-pod-4.yaml --namespace=constraints-cpu-example
```

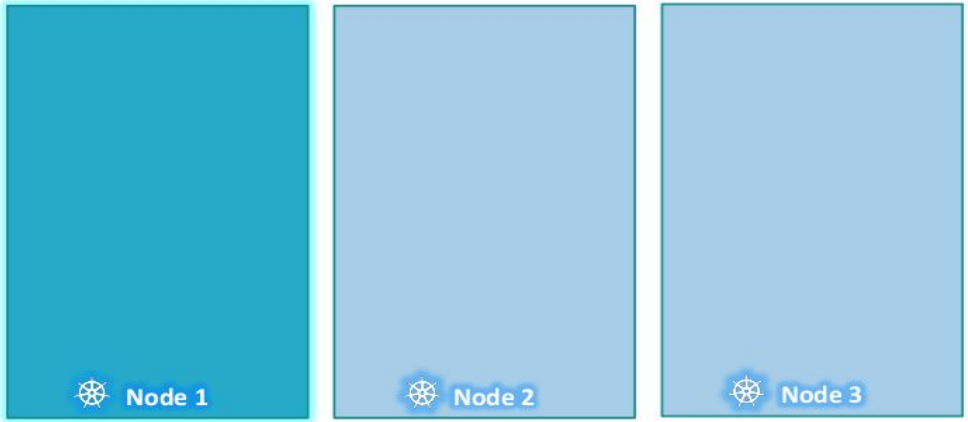
```
kubectl get pod constraints-cpu-demo-4 --namespace=constraints-cpu-example --output=yaml
```

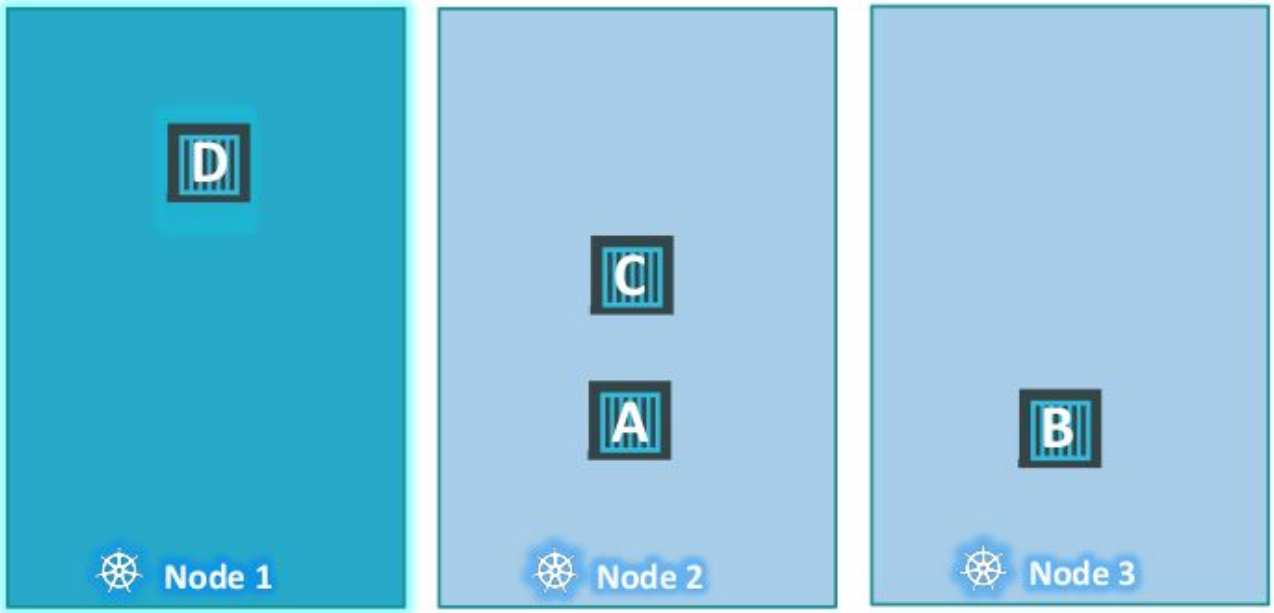
Taints And Tolerations



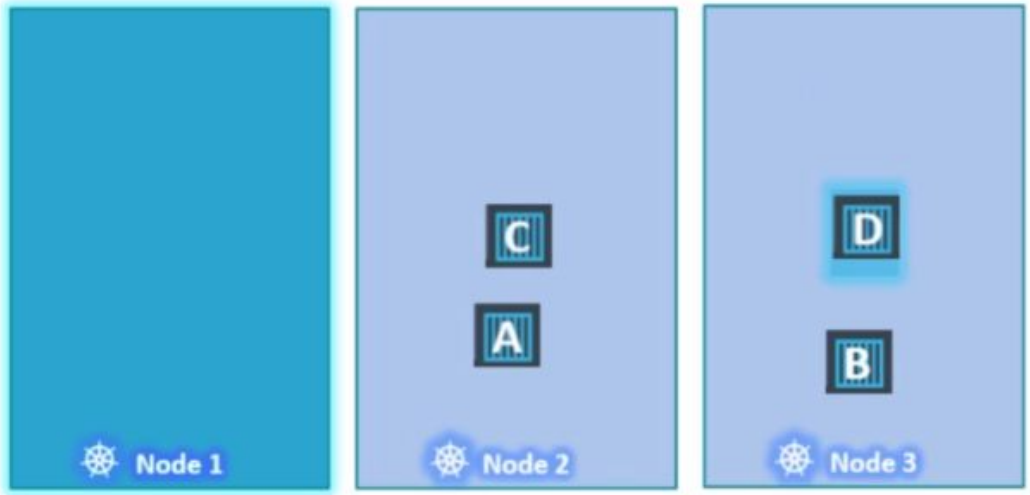

A
B
C
D
Node 1
Node 2
Node 3

Taint=blue




D
C
A
B
Node 1
Node 2
Node 3

Taint=blue



Taints - Node

```
kubectl taint nodes node-name key=value:taint-effect
```

NoSchedule | PreferNoSchedule | NoExecute

What happens to PODs that do not tolerate this taint?

```
kubectl taint nodes node1 app=myapp:NoSchedule
```

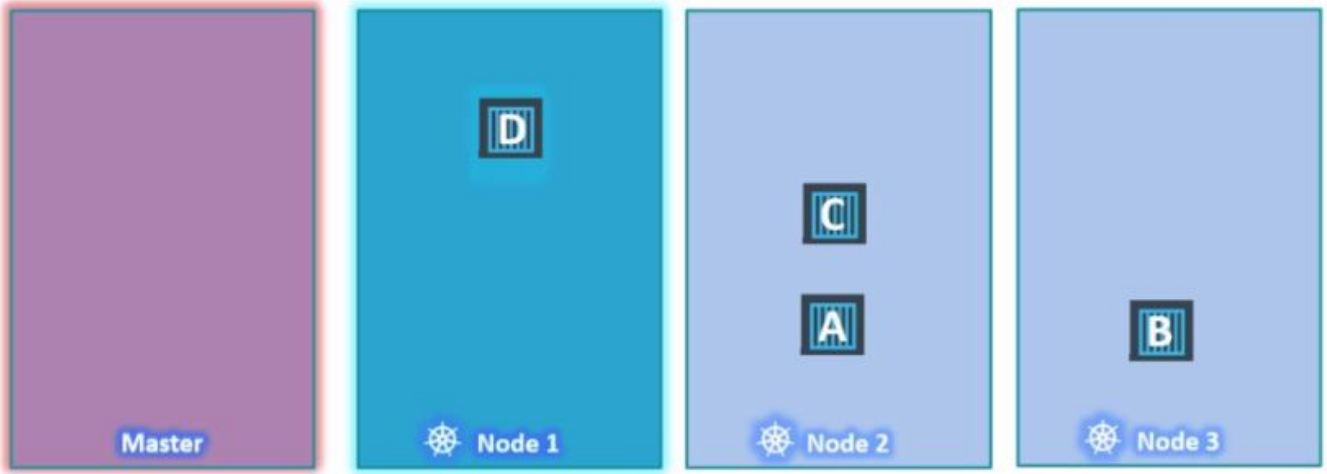
Tolerations - PODs

```
kubectl taint nodes node1 app= blue :NoSchedule
```

pod-definition.yml

```yaml
apiVersion:
kind: Pod
metadata:
 name: myapp-pod
spec:
  containers:
  - name: nginx-container
    image: nginx

  tolerations:
  - key:"app"
    operator:"Equal"
    value:" blue"
    effect:" NoSchedule"
```

```
kubectl describe node kubemaster | grep Taint
Taints:             node-role.kubernetes.io/master:NoSchedule
```

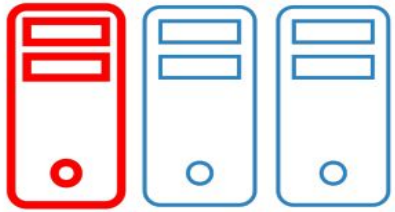


Manual Scheduling

pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: nginx
  labels:
    name: nginx
spec:
  containers:
  - name: nginx
    image: nginx
    ports:
      - containerPort: 8080

  nodeName: node02
```

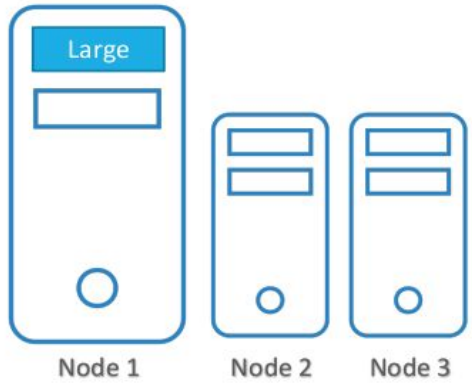
Node Selectors



Node Selectors

pod-definition.yml

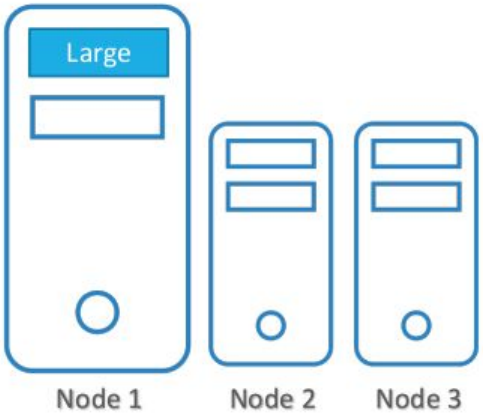
```
apiVersion:
kind: Pod
metadata:
 name: myapp-pod
spec:
  containers:
  - name: data-processor
    image: data-processor

  nodeSelector:
    size: Large
```



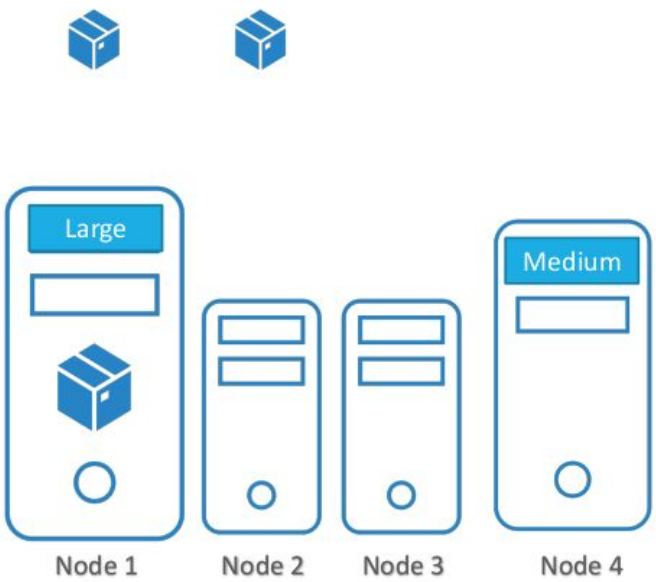
Label Nodes

```
kubectl label nodes <node-name> <label-key>=<label-value>
```

```
kubectl label nodes node-1 size=Large
```

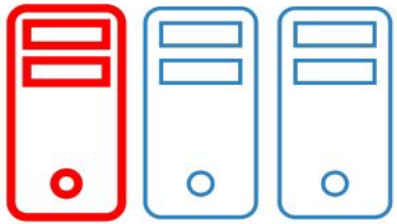


Node Selector - Limitations



- Large OR Medium?
- NOT Small

Node Affinity



Node Affinity

pod-definition.yml

```
apiVersion:
kind: Pod

metadata:
 name: myapp-pod
spec:

  containers:
  - name: data-processor
    image: data-processor

  nodeSelector:
    size: Large
```

pod-definition.yml

```
apiVersion:
kind:

metadata:
 name: myapp-pod
spec:

 containers:
  - name: data-processor
    image: data-processor

 affinity:
  nodeAffinity:
    requiredDuringSchedulingIgnoredDuringExecution:
      nodeSelectorTerms:
      - matchExpressions:
        - key: size
          operator: In
          values:
          - Large
```

Node Affinity Types

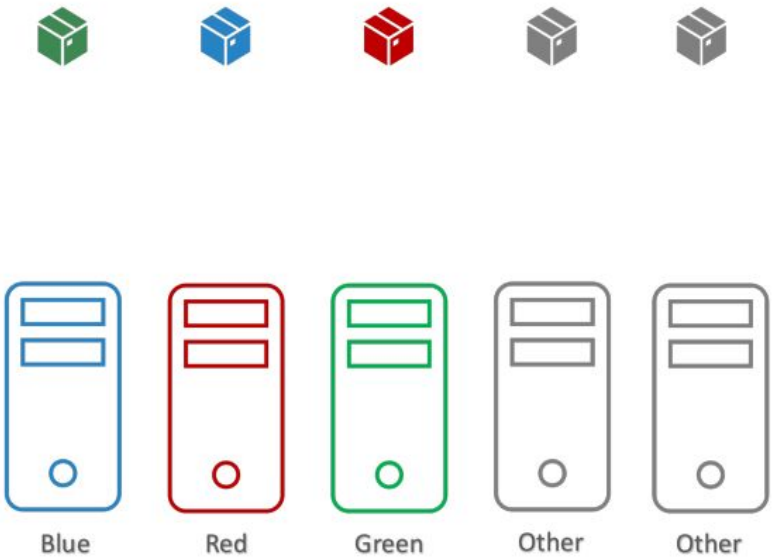
Available:

`requiredDuringSchedulingIgnoredDuringExecution`

`preferredDuringSchedulingIgnoredDuringExecution`

Planned:

`requiredDuringSchedulingRequiredDuringExecution`


Blue
Red
Green
Other
Other

References:

- https://www.udemy.com/course/certified-kubernetes-administrator-with-practice-tests
- https://www.udemy.com/course/certified-kubernetes-application-developer
- https://kubernetes.io/docs