

# K8S Scheduler Report

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## 1. kubectl get nodes

```
04:32:34 student@ds-student5 NTHU-DS-Scheduler-Plugin ±|main x|→ kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
kind-control-plane	Ready	control-plane	33d	v1.29.2
kind-worker	Ready	<none>	33d	v1.29.2
kind-worker2	Ready	<none>	33d	v1.29.2

## 2. Unit tests

```
? my-scheduler-plugins/cmd/scheduler [no test files]
=== RUN TestCustomScheduler_PreFilter
=== RUN TestCustomScheduler_PreFilter/pod_is_accepted
finish adding2024/06/04 16:39:01 Pod is in Prefilter phase.
=== RUN TestCustomScheduler_PreFilter/pod_is_just_accepted
finish adding2024/06/04 16:39:01 Pod is in Prefilter phase.
=== RUN TestCustomScheduler_PreFilter/pod_is_rejected
finish adding2024/06/04 16:39:01 Pod is in Prefilter phase.
--- PASS: TestCustomScheduler_PreFilter (0.00s)
    --- PASS: TestCustomScheduler_PreFilter/pod_is_accepted (0.00s)
    --- PASS: TestCustomScheduler_PreFilter/pod_is_just_accepted (0.00s)
    --- PASS: TestCustomScheduler_PreFilter/pod_is_rejected (0.00s)
=== RUN TestCustomScheduler_Score
=== RUN TestCustomScheduler_Score/least_mode
2024/06/04 16:39:01 Custom scheduler runs with the mode: Least.
2024/06/04 16:39:01 Pod is in Score phase. Calculate the score of Node m1.
2024/06/04 16:39:01 Pod is in Score phase. Calculate the score of Node m2.
=== RUN TestCustomScheduler_Score/most_mode
2024/06/04 16:39:01 Custom scheduler runs with the mode: Least.
2024/06/04 16:39:01 Pod is in Score phase. Calculate the score of Node m1.
2024/06/04 16:39:01 Pod is in Score phase. Calculate the score of Node m2.
--- PASS: TestCustomScheduler_Score (0.00s)
    --- PASS: TestCustomScheduler_Score/least_mode (0.00s)
    --- PASS: TestCustomScheduler_Score/most_mode (0.00s)
=== RUN TestCustomScheduler_NormalizeScore
=== RUN TestCustomScheduler_NormalizeScore/scores_in_range
=== RUN TestCustomScheduler_NormalizeScore/scores_out_of_range
=== RUN TestCustomScheduler_NormalizeScore/negative_score
--- PASS: TestCustomScheduler_NormalizeScore (0.00s)
    --- PASS: TestCustomScheduler_NormalizeScore/scores_in_range (0.00s)
    --- PASS: TestCustomScheduler_NormalizeScore/scores_out_of_range (0.00s)
    --- PASS: TestCustomScheduler_NormalizeScore/negative_score (0.00s)
PASS
ok my-scheduler-plugins/pkg/plugins 0.033s
```

## 3. Scenarios

### Configurations

```
pluginConfig:
- name: CustomScheduler
  args:
    mode: Least
labels:
  podGroup: "A"
  minAvailable: "3"
```

#### 3-1. Pods within same group is less than minimum available: Pods become pending.

```
I0605 14:08:52.55623    1 log.go:194] Pod nginx1 is in Prefilter phase.
I0605 14:08:52.568262   1 schedule_one.go:867] "Unable to schedule pod; no fit; waiting" pod="default/nginx1" err="0/3 nodes are available: preemption: 0/3 nodes are available: 3 No preemption victims found for incoming pod..."
I0605 14:08:55.135814   1 log.go:194] Pod nginx2 is in Prefilter phase.
I0605 14:08:55.16621    1 schedule_one.go:867] "Unable to schedule pod; no fit; waiting" pod="default/nginx2" err="0/3 nodes are available: preemption: 0/3 nodes are available: 3 No preemption victims found for incoming pod..."
```

#### 3-2. Already two pods within same group are pending: Pods scheduled.

```
I0605 14:09:01.352999   1 log.go:194] Pod nginx3 is in Prefilter phase.
I0605 14:09:01.353718   1 log.go:194] Pod nginx3 is in Score phase. Calculate the score of Node kind-worker.
I0605 14:09:01.353736   1 log.go:194] Pod nginx3 is in Score phase. Calculate the score of Node kind-worker2.
I0605 14:09:01.358933   1 schedule_one.go:252] "Successfully bound pod to node" pod="default/nginx3" node="kind-worker" evaluatedNodes=3 feasibleNodes=2
I0605 14:09:37.355129   1 log.go:194] Pod nginx4 is in Prefilter phase.
I0605 14:09:37.356145   1 log.go:194] Pod nginx4 is in Score phase. Calculate the score of Node kind-worker2.
I0605 14:09:37.356219   1 log.go:194] Pod nginx4 is in Score phase. Calculate the score of Node kind-worker.
I0605 14:09:37.362991   1 schedule_one.go:252] "Successfully bound pod to node" pod="default/nginx4" node="kind-worker" evaluatedNodes=3 feasibleNodes=2
```

3-3. After a while, pod 1 and pod 2 will be evaluated again: Pods scheduled.

```
I0605 14:14:09.039334      1 log.go:194] Pod nginx1 is in Prefilter phase.
I0605 14:14:09.040207      1 log.go:194] Pod nginx1 is in Score phase. Calculate the score of Node kind-worker2.
I0605 14:14:09.040289      1 log.go:194] Pod nginx1 is in Score phase. Calculate the score of Node kind-worker.
I0605 14:14:09.040695      1 log.go:194] Pod nginx2 is in Prefilter phase.
I0605 14:14:09.040891      1 log.go:194] Pod nginx2 is in Score phase. Calculate the score of Node kind-worker.
I0605 14:14:09.040911      1 log.go:194] Pod nginx2 is in Score phase. Calculate the score of Node kind-worker2.
I0605 14:14:09.047153      1 schedule_one.go:252] "Successfully bound pod to node" pod="default/nginx1" node="kind-worker" evaluatedNodes=3 feasibleNodes=2
I0605 14:14:09.049105      1 schedule_one.go:252] "Successfully bound pod to node" pod="default/nginx2" node="kind-worker" evaluatedNodes=3 feasibleNodes=2
```

3-4. With least mode, pods are scheduled to kind-worker, which has the least allocatable memory

We can examine the allocatable memory with command `k describe nodes`

Addresses:	Addresses:
InternalIP: 172.19.0.3	InternalIP: 172.19.0.2
Hostname: kind-worker	Hostname: kind-worker2
Capacity:	Capacity:
cpu: 6	cpu: 6
ephemeral-storage: 50620216Ki	ephemeral-storage: 50620216Ki
hugepages-2Mi: 0	hugepages-2Mi: 0
memory: 6063048Ki	memory: 6063048Ki
pods: 110	pods: 110
Allocatable:	Allocatable:
cpu: 6	cpu: 6
ephemeral-storage: 50620216Ki	ephemeral-storage: 50620216Ki
hugepages-2Mi: 0	hugepages-2Mi: 0
memory: 1344456Ki	memory: 1868744Ki
pods: 110	pods: 110

3-5. With most mode, nginx3 was scheduled to kind-worker2

NAME	READY	STATUS	RESTARTS	AGE	IP	NODE	NOMINATED NODE	READINESS GATES
my-scheduler-69cfc986c7-mn965	1/1	Running	0	11m	10.244.1.4	kind-worker2	<none>	<none>
nginx1	0/1	Pending	0	46s	<none>	<none>	<none>	<none>
nginx2	0/1	Pending	0	44s	<none>	<none>	<none>	<none>
nginx3	1/1	Running	0	42s	10.244.1.5	kind-worker2	<none>	<none>

Addresses:	Addresses:
InternalIP: 172.19.0.3	InternalIP: 172.19.0.4
Hostname: kind-worker	Hostname: kind-worker2
Capacity:	Capacity:
cpu: 6	cpu: 6
ephemeral-storage: 50620216Ki	ephemeral-storage: 50620216Ki
hugepages-2Mi: 0	hugepages-2Mi: 0
memory: 6063024Ki	memory: 6063024Ki
pods: 110	pods: 110
Allocatable:	Allocatable:
cpu: 6	cpu: 6
ephemeral-storage: 50620216Ki	ephemeral-storage: 50620216Ki
hugepages-2Mi: 0	hugepages-2Mi: 0
memory: 1344432Ki	memory: 1868720Ki
pods: 110	pods: 110