

CS542600 Distributed System

Lab: Kubernetes Report

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screenshot of kubectl get nodes

```
● student@ds-student18:~/NTHU-K8S$ kubectl get nodes
NAME                STATUS    ROLES    AGE   VERSION
kind-control-plane  Ready    control-plane   15d   v1.29.2
kind-worker         Ready    <none>        15d   v1.29.2
kind-worker2        Ready    <none>        15d   v1.29.2
```

1. screenshot of passing all the unit tests

```
?      my-scheduler-plugins/cmd/scheduler      [no test files]
=== RUN    TestCustomScheduler_Prefilter
=== RUN    TestCustomScheduler_Prefilter/pod_is_accepted
finish adding2024/06/15 14:11:38 Pod  is in Prefilter phase.
=== RUN    TestCustomScheduler_Prefilter/pod_is_just_accepted
finish adding2024/06/15 14:11:38 Pod  is in Prefilter phase.
=== RUN    TestCustomScheduler_Prefilter/pod_is_rejected
finish adding2024/06/15 14:11:38 Pod  is in Prefilter phase.
--- PASS: TestCustomScheduler_Prefilter (0.11s)
    --- PASS: TestCustomScheduler_Prefilter/pod_is_accepted (0.11s)
    --- 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
2024/06/15 14:11:38 Custom scheduler runs with the mode: Least.
2024/06/15 14:11:38 Pod  is in Score phase. Calculate the score of Node m1.
2024/06/15 14:11:38 Pod  is in Score phase. Calculate the score of Node m2.
=== RUN    TestCustomScheduler_Score/most_mode
2024/06/15 14:11:38 Custom scheduler runs with the mode: Least.
2024/06/15 14:11:38 Pod  is in Score phase. Calculate the score of Node m1.
2024/06/15 14:11:38 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      0.297s
```

3.

- Prefilter:

Pod 0, 1, 2 的 group 為 A, pod 3, 4 為 B

將 Pod 0, 1, 2 的 minAvailable 設為 3，因此只有 pod 2 能通過 prefilter phase

Pod 的 minAvailable 設定為 2，因此只有 pod4 為 running, pod3 為 pending

```
student@ds-student18:~/NTHU-Scheduler-Plugin$ kubectl get po -o wide
```

NAME	READY	STATUS	RESTARTS	AGE	IP	NODE	NOMINATED NODE	READINESS GATES
existing-pod-0	0/1	Pending	0	20s	<none>	<none>	<none>	<none>
existing-pod-1	0/1	Pending	0	19s	<none>	<none>	<none>	<none>
existing-pod-2	1/1	Running	0	19s	10.244.2.75	kind-worker	<none>	<none>
existing-pod-3	0/1	Pending	0	19s	<none>	<none>	<none>	<none>
existing-pod-4	1/1	Running	0	19s	10.244.2.76	kind-worker	<none>	<none>
my-scheduler-69cfc986c7-4crlf	1/1	Running	0	39s	10.244.2.74	kind-worker	<none>	<none>

- Most mode:

從 log 可以看到在初始狀態，kind-worker 2 剩餘的記憶體大於 kind-worker 剩餘的記憶體，因此 pod 0 分配給 kind-worker 2。

接著，kind-worker 2 剩餘的記憶體減少了 pod 0 的用量 200MB，此時 kind-worker 擁有更多記憶體，所以將 pod 1 分配給 kind-worker。

由於 pod 1 占去了 300MB 的記憶體，此時 kind-worker 2 剩餘記憶體又大於 kind-worker，因此將 pod2 分配給 kind-worker 2

```
I0616 09:11:53.070903 1 log.go:194] Pod existing-pod-0 is in Prefilter phase.
W0616 09:11:53.070956 1 lists.go:63] can not retrieve list of objects using index : Index with name namespace does not exist
I0616 09:11:53.071512 1 log.go:194] Pod existing-pod-0 is in Score phase. Calculate the score of Node kind-worker2.
I0616 09:11:53.071537 1 log.go:194] Node kind-worker2's remaining memory: 1305540KB, score: 1336872960
I0616 09:11:53.071546 1 log.go:194] Pod existing-pod-0 is in Score phase. Calculate the score of Node kind-worker.
I0616 09:11:53.071551 1 log.go:194] Node kind-worker's remaining memory: 1293252KB, score: 1324290048
I0616 09:11:53.117767 1 schedule_one.go:252] "Successfully bound pod to node" pod="default/existing-pod-0" node="kind-worker2" evaluatedNodes=3 feasibleNodes=2
I0616 09:11:53.145122 1 log.go:194] Pod existing-pod-1 is in Prefilter phase.
W0616 09:11:53.145154 1 lists.go:63] can not retrieve list of objects using index : Index with name namespace does not exist
I0616 09:11:53.145555 1 log.go:194] Pod existing-pod-1 is in Score phase. Calculate the score of Node kind-worker2.
I0616 09:11:53.145582 1 log.go:194] Node kind-worker2's remaining memory: 1100740KB, score: 1127157760
I0616 09:11:53.145607 1 log.go:194] Pod existing-pod-1 is in Score phase. Calculate the score of Node kind-worker.
I0616 09:11:53.145636 1 log.go:194] Node kind-worker's remaining memory: 1293252KB, score: 1324290048
I0616 09:11:53.162568 1 schedule_one.go:252] "Successfully bound pod to node" pod="default/existing-pod-1" node="kind-worker" evaluatedNodes=3 feasibleNodes=2
I0616 09:11:53.280691 1 log.go:194] Pod existing-pod-2 is in Prefilter phase.
W0616 09:11:53.280766 1 lists.go:63] can not retrieve list of objects using index : Index with name namespace does not exist
I0616 09:11:53.280999 1 log.go:194] Pod existing-pod-2 is in Score phase. Calculate the score of Node kind-worker.
I0616 09:11:53.281011 1 log.go:194] Pod existing-pod-2 is in Score phase. Calculate the score of Node kind-worker2.
I0616 09:11:53.281020 1 log.go:194] Node kind-worker2's remaining memory: 1100740KB, score: 1127157760
I0616 09:11:53.281077 1 log.go:194] Node kind-worker's remaining memory: 986052KB, score: 1009717248
I0616 09:11:53.320845 1 schedule_one.go:252] "Successfully bound pod to node" pod="default/existing-pod-2" node="kind-worker2" evaluatedNodes=3 feasibleNodes=2
```

- Lease mode:

從 log 可以看到在初始狀態，kind-worker 剩餘的記憶體小於 kind-worker2 剩餘的記憶體，因此 kind-worker 擁有較高的分數，將 pod 0 分配給 kind-worker。

在 pod 0 用去 1000MB 後，kind-worker 還是比 kind-worker2 擁有較少的記憶體，因此分數較高，將 pod 1 分配給 kind-worker。

在 pod 0 和 pod 1 分配完後，kind-worker 剩餘的記憶體容量不足以容納 pod 2 的 300MB 記憶體用量，因此分配給 kind-worker2。

```
I0616 09:00:22.942142 1 log.go:194] Pod existing-pod-0 is in Prefilter phase.
W0616 09:00:22.942200 1 lists.go:63] can not retrieve list of objects using index : Index with name namespace does not exist
I0616 09:00:22.942825 1 log.go:194] Pod existing-pod-0 is in Score phase. Calculate the score of Node kind-worker.
I0616 09:00:22.942852 1 log.go:194] Node kind-worker's remaining memory: 1293252KB, score: -1324290048
I0616 09:00:22.942872 1 log.go:194] Pod existing-pod-0 is in Score phase. Calculate the score of Node kind-worker2.
I0616 09:00:22.942878 1 log.go:194] Node kind-worker2's remaining memory: 1305540KB, score: -1336872960
I0616 09:00:22.994147 1 schedule_one.go:252] "Successfully bound pod to node" pod="default/existing-pod-0" node="kind-worker" evaluatedNodes=3 feasibleNodes=2
I0616 09:00:23.009235 1 log.go:194] Pod existing-pod-1 is in Prefilter phase.
W0616 09:00:23.009271 1 lists.go:63] can not retrieve list of objects using index : Index with name namespace does not exist
I0616 09:00:23.009518 1 log.go:194] Pod existing-pod-1 is in Score phase. Calculate the score of Node kind-worker.
I0616 09:00:23.009546 1 log.go:194] Node kind-worker's remaining memory: 269252KB, score: -275714048
I0616 09:00:23.009559 1 log.go:194] Pod existing-pod-1 is in Score phase. Calculate the score of Node kind-worker2.
I0616 09:00:23.009566 1 log.go:194] Node kind-worker2's remaining memory: 1305540KB, score: -1336872960
I0616 09:00:23.073957 1 schedule_one.go:252] "Successfully bound pod to node" pod="default/existing-pod-1" node="kind-worker" evaluatedNodes=3 feasibleNodes=2
I0616 09:00:23.098529 1 log.go:194] Pod existing-pod-2 is in Prefilter phase.
W0616 09:00:23.098560 1 lists.go:63] can not retrieve list of objects using index : Index with name namespace does not exist
I0616 09:00:23.134983 1 schedule_one.go:252] "Successfully bound pod to node" pod="default/existing-pod-2" node="kind-worker2" evaluatedNodes=3 feasibleNodes=1
```