

Using RBAC and Priority in Kueue

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RBAC...

Role-based access control (RBAC) is a method of regulating access to computer or network resources based on the roles of individual users within your organization.

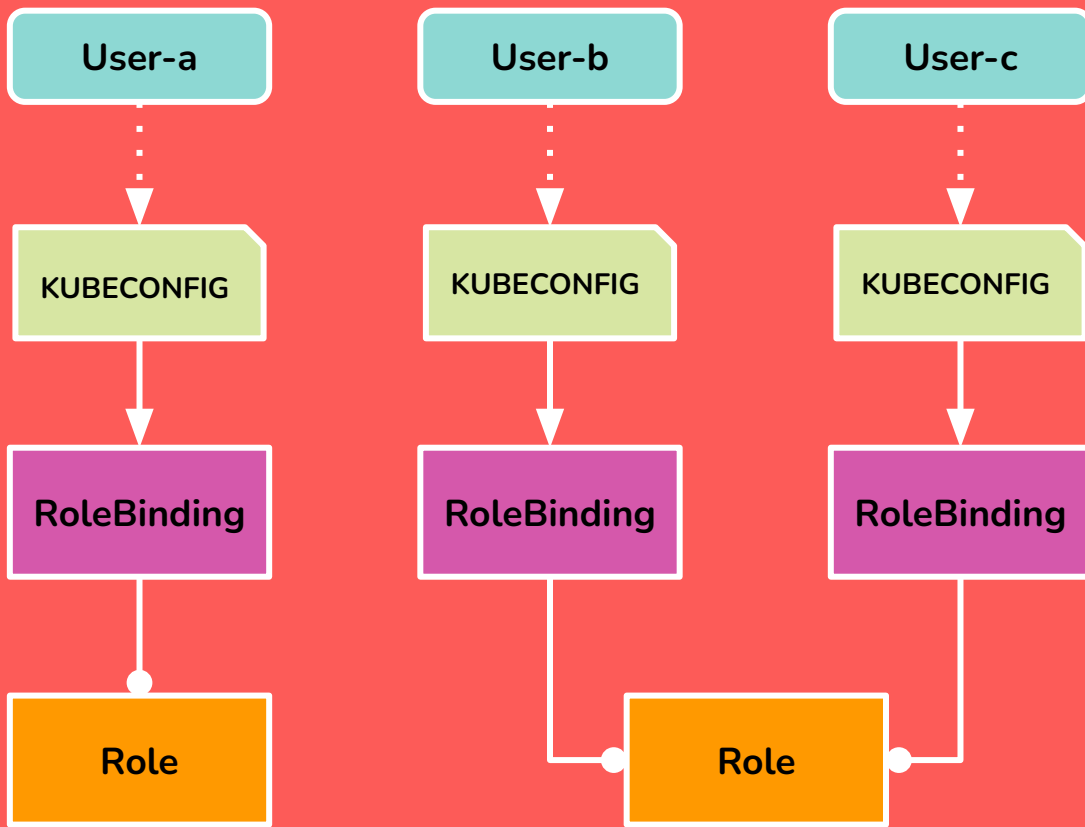
The RBAC API declares four kinds of Kubernetes object: Role, ClusterRole, RoleBinding and ClusterRoleBinding. You can describe or amend the RBAC objects using tools such as kubectl, just like any other Kubernetes object.

...and Workload Priority Class

A WorkloadPriorityClass allows you to control the Workload's priority without affecting the pod's priority. This feature is useful for these cases:

- want to prioritize workloads that remain inactive for a specific duration
- want to set a lower priority for development workloads and higher priority for production workloads

Overview



Each user connects from their own host with their own configuration file.

Once logged in, RoleBinding assigns to each user a Role

Roles define read/write permissions within the cluster. **Kueue uses predefined Roles.**

Kueue Role

kueue-batch-admin-role

kueue-clusterqueue-editor-role

kueue-job-editor-role

kueue-jobset-editor-role

kueue-localqueue-editor-role

kueue-manager-role

kueue-mpijob-editor-role

kueue-proxy-role

kueue-rayjob-viewer-role

kueue-resourceflavor-editor-role

kueue-workload-editor-role

kueue-batch-user-role

kueue-clusterqueue-viewer-role

kueue-job-viewer-role

kueue-jobset-viewer-role

kueue-localqueue-viewer-role

kueue-metrics-reader

kueue-mpijob-viewer-role

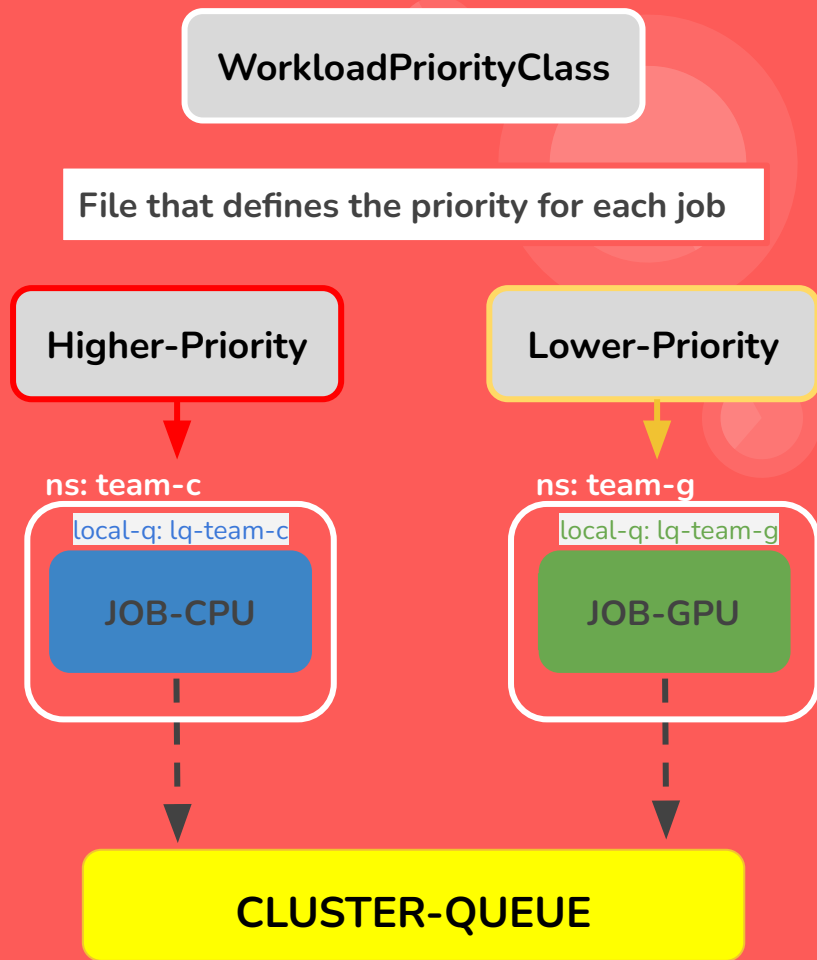
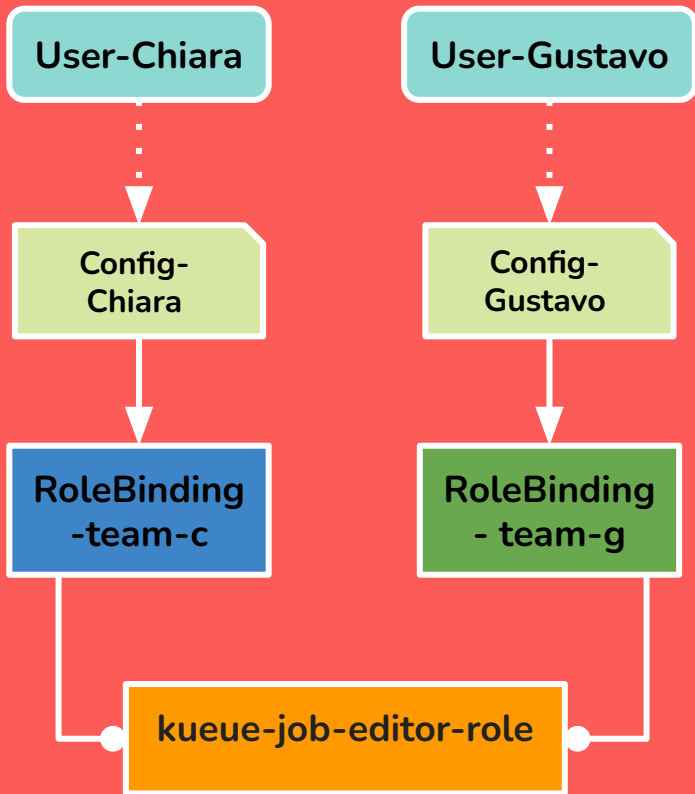
kueue-rayjob-editor-role

kueue-reader

kueue-resourceflavor-viewer-role

kueue-workload-viewer-role

RBAC & Priority Kueue



Users ' configuration files

```
1  apiVersion: v1
2  clusters:
3  - cluster:
4    |   certificate-authority-data: LS0tLS1CRUdJTiBDRVJUS
5    |   server: https://192.168.1.163:6443
6    |   name: kubernetes
7  contexts:
8  - context:
9    |   cluster: kubernetes
10   |   user: chiara
11   |   name: chiara
12  current-context: chiara
13  kind: Config
14  preferences: {}
15  users:
16  - name: chiara
17    |   user:
18    |   client-certificate-data: LS0tLS1CRUdJTiBDRVJUSUZJ
19    |   client-key-data: LS0tLS1CRUdJTiBSU0EgUFJJVkFURSBL
20
```

```
1  apiVersion: v1
2  clusters:
3  - cluster:
4    |   certificate-authority-data: LS0tLS1CRUdJTiBDRVJUS
5    |   server: https://192.168.1.163:6443
6    |   name: kubernetes
7  contexts:
8  - context:
9    |   cluster: kubernetes
10   |   user: gustavo
11   |   name: gustavo
12  current-context: gustavo
13  kind: Config
14  preferences: {}
15  users:
16  - name: gustavo
17    |   user:
18    |   client-certificate-data: LS0tLS1CRUdJTiBDRVJUSUZJ
19    |   client-key-data: LS0tLS1CRUdJTiBSU0EgUFJJVkFURSBL
20
```

Users ' Role Binding

```
1  apiVersion: rbac.authorization.k8s.io/v1
2  kind: RoleBinding
3  metadata:
4    name: edit-jobs
5    namespace: team-c
6  subjects:
7  - kind: User
8    name: chiara
9    apiGroup: rbac.authorization.k8s.io
10 roleRef:
11   kind: ClusterRole
12   name: kueue-job-editor-role
13   apiGroup: rbac.authorization.k8s.io
```

```
1  apiVersion: rbac.authorization.k8s.io/v1
2  kind: RoleBinding
3  metadata:
4    name: edit-jobs
5    namespace: team-g
6  subjects:
7  - kind: User
8    name: gustavo
9    apiGroup: rbac.authorization.k8s.io
10 roleRef:
11   kind: ClusterRole
12   name: kueue-job-editor-role
13   apiGroup: rbac.authorization.k8s.io
```

WorkloadPriorityClass

```
apiVersion: kueue.x-k8s.io/v1beta1
kind: WorkloadPriorityClass
metadata:
  name: lower-priority
value: 100
description: "Lower priority"
```

```
1  apiVersion: kueue.x-k8s.io/v1beta1
2  kind: WorkloadPriorityClass
3  metadata:
4    name: higher-priority
5  value: 100000
6  description: "Higher priority"
```

NOTE: Workload Priority Class is independent from pod's priority.

JOB CPU & GPU

```
apiVersion: batch/v1
kind: Job
metadata:
  namespace: team-c # Job under team-c namespace
  generateName: priority-job-cpu-
  labels:
    kueue.x-k8s.io/queue-name: lq-team-c # Point to the LocalQueue
    kueue.x-k8s.io/priority-class: higher-priority
spec:
  ttlSecondsAfterFinished: 6000 # Job will be deleted after 6000 seconds
  parallelism: 3 # This Job will have 3 replicas running at the same time
  completions: 3 # This Job requires 3 completions
  suspend: true # Set to true to allow Kueue to control the Job when it starts
  template:
    spec:
      containers:
        - name: job-cpu
          image: busybox
          imagePullPolicy: Always
          args: ["10s"] # Sleep for 10 seconds
          command: ['echo']
          args:
            - 'I want my cpu, please'
      resources:
        requests:
          cpu: "500m"
          memory: "5Mi"
        limits:
          cpu: "500m"
          memory: "5Mi"
      restartPolicy: OnFailure
```

```
1 apiVersion: batch/v1
2 kind: Job
3 metadata:
4   namespace: team-g # Job under team-g namespace
5   generateName: priority-job-gpu-
6   labels:
7     kueue.x-k8s.io/queue-name: lq-team-g # Point to the LocalQueue
8     kueue.x-k8s.io/priority-class: lower-priority
9 spec:
10  ttlSecondsAfterFinished: 6000 # Job will be deleted after 6000 seconds
11  parallelism: 3 # This Job will have 3 replicas running at the same time
12  completions: 3 # This Job requires 3 completions
13  suspend: true # Set to true to allow Kueue to control the Job when it starts
14  template:
15    spec:
16      containers:
17        - name: job-gpu
18          image: busybox
19          imagePullPolicy: Always
20          args: ["10s"] # Sleep for 10 seconds
21          command: ['echo']
22          args:
23            - 'I want my gpu, now'
24      resources:
25        requests:
26          cpu: "500m"
27          memory: "5Mi"
28        limits:
29          cpu: "500m"
30          memory: "5Mi"
31      restartPolicy: OnFailure
32
```

Example of execution

```
priority-job-cpu-v8zw8 2/3 12s 76s
priority-job-cpu-vd47n 3/3 12s 78s
priority-job-cpu-vhjm2 0/3 68s
priority-job-cpu-whnst 0/3 68s
priority-job-cpu-xcfmg 3/3 12s 78s
ramagnano@vnode-0:~/role/chiara-user$ kubectl get jobs -n team-c
NAME COMPLETIONS DURATION AGE
priority-job-cpu-5sfjt 0/3 78s
priority-job-cpu-7wz6b 3/3 12s 81s
priority-job-cpu-9jth5 0/3 78s
priority-job-cpu-glwcs 0/3 2s 78s
priority-job-cpu-jvqqq 3/3 13s 81s
priority-job-cpu-kndmd 0/3 71s
priority-job-cpu-lxhmk 0/3 71s
priority-job-cpu-nhpdk 0/3 71s
priority-job-cpu-qj8zh 0/3 78s
priority-job-cpu-smhgz 0/3 77s 81s
priority-job-cpu-v8zw8 3/3 13s 79s
priority-job-cpu-vd47n 3/3 12s 81s
priority-job-cpu-vhjm2 0/3 71s
priority-job-cpu-whnst 0/3 71s
priority-job-cpu-xcfmg 3/3 12s 81s
ramagnano@vnode-0:~/role/chiara-user$ kubectl get jobs -n team-c
NAME COMPLETIONS DURATION AGE
priority-job-cpu-5sfjt 0/3 80s
priority-job-cpu-7wz6b 3/3 12s 83s
priority-job-cpu-9jth5 0/3 80s
priority-job-cpu-glwcs 0/3 4s 80s
priority-job-cpu-jvqqq 3/3 13s 83s
priority-job-cpu-kndmd 0/3 73s
priority-job-cpu-lxhmk 0/3 73s
priority-job-cpu-nhpdk 0/3 73s
priority-job-cpu-qj8zh 0/3 80s
priority-job-cpu-smhgz 0/3 79s 83s
priority-job-cpu-v8zw8 3/3 13s 81s
priority-job-cpu-vd47n 3/3 12s 83s
priority-job-cpu-vhjm2 0/3 73s
priority-job-cpu-whnst 0/3 73s
priority-job-cpu-xcfmg 3/3 12s 83s
ramagnano@vnode-0:~/role/chiara-user$
```

```
priority-job-gpu-qb2t7 0/3 59s
priority-job-gpu-t57mv 3/3 12s 59s
priority-job-gpu-v8qb6 0/3 53s
ramagnano@vnode-0:~/role/gustavo-user$ ^C
ramagnano@vnode-0:~/role/gustavo-user$
ramagnano@vnode-0:~/role/gustavo-user$ kubectl get jobs -n team-g
NAME COMPLETIONS DURATION AGE
priority-job-gpu-dn57p 0/3 91s
priority-job-gpu-fz78v 0/3 84s
priority-job-gpu-g2sm7 0/3 76s
priority-job-gpu-g97pv 0/3 89s
priority-job-gpu-h6nzq 0/3 83s
priority-job-gpu-htfmz 0/3 83s
priority-job-gpu-hxwg8 0/3 89s
priority-job-gpu-jw56w 0/3 76s
priority-job-gpu-jw5kn 0/3 76s
priority-job-gpu-kzpcx 0/3 83s
priority-job-gpu-mz2l1 0/3 76s
priority-job-gpu-pxtjk 0/3 75s
priority-job-gpu-qb2t7 0/3 89s
priority-job-gpu-t57mv 3/3 12s 89s
priority-job-gpu-v8qb6 0/3 83s
ramagnano@vnode-0:~/role/gustavo-user$ kubectl get jobs -n team-g
NAME COMPLETIONS DURATION AGE
priority-job-gpu-dn57p 0/3 93s
priority-job-gpu-fz78v 0/3 86s
priority-job-gpu-g2sm7 0/3 78s
priority-job-gpu-g97pv 0/3 91s
priority-job-gpu-h6nzq 0/3 85s
priority-job-gpu-htfmz 0/3 85s
priority-job-gpu-hxwg8 0/3 91s
priority-job-gpu-jw56w 0/3 78s
priority-job-gpu-jw5kn 0/3 78s
priority-job-gpu-kzpcx 0/3 85s
priority-job-gpu-mz2l1 0/3 78s
priority-job-gpu-pxtjk 0/3 77s
priority-job-gpu-qb2t7 0/3 91s
priority-job-gpu-t57mv 3/3 12s 91s
priority-job-gpu-v8qb6 0/3 85s
ramagnano@vnode-0:~/role/gustavo-user$
```

Documentation

CSR: <https://kubernetes.io/docs/reference/access-authn-authz/certificate-signing-requests/#normal-user>

RBAC: <https://kubernetes.io/docs/reference/access-authn-authz/rbac/>

RBAC KUEUE: <https://kueue.sigs.k8s.io/docs/tasks/rbac/>

WORKLOAD PRIORITY CLASS: https://kueue.sigs.k8s.io/docs/concepts/workload_priority_class/