Managing Role Based Access Controls

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Course Overview

Kubernetes Security Fundamentals

Managing Certificates and kubeconfig Files

Managing Role Based Access Controls

Summary

What is Role Based Access Control (RBAC)

API Objects for configuring RBAC

- Role and ClusterRole
- RoleBinding and ClusterRoleBinding

Role Based Access Control (RBAC)

Authorization plugin enabled on the API Server

Allowing a requestor to perform actions on resources

RESTful API semantics

  Verb on Noun

Default deny, rules are written to permit actions on the resource

Subjects - users, groups or `ServiceAccounts`

API Objects for Implementing RBAC Rules

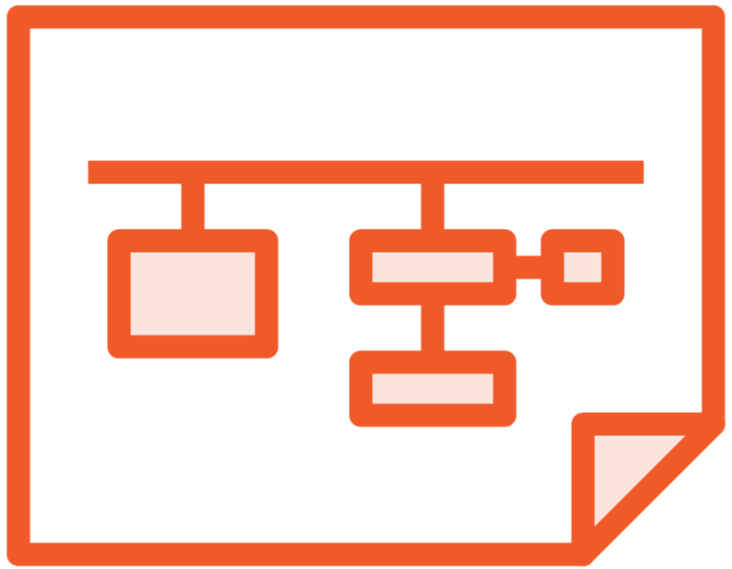
`Role`

`ClusterRole`

`RoleBinding`

`ClusterRoleBinding`

Roles



`Roles` are what can be done to Resources

`Roles` are made up of one or many `Rules`

Verbs on resources

Get Pods, Create Deployment

Default deny, add permissions to Resources

There is no deny permission

Roles are namespaced

ClusterRoles

Similar to a `Role`, enables access to Resources

Cluster scoped resources

`Nodes`, `PersistentVolumes`

Give access across more than one namespace or all namespaces

Defining `Roles` in each namespace can increase administrative overhead and can be error prone

RoleBinding

`Role/ClusterRole` only say what can be done

Defines the Subjects and refers to a `Role/ClusterRole`

Who can do what defined in a `Role/ClusterRole`

`Role` and `RoleBinding` are used in namespaced scoped security

`ClusterRole` and `RoleBinding` are used provide access to more than one namespace or the whole cluster

ClusterRoleBinding

`ClusterRoleBinding` grants access cluster-wide

Combing a `ClusterRole` with a `ClusterRoleBinding`

Will scope security independent of namespace

- Non-namespaced
- Cluster-scoped resources

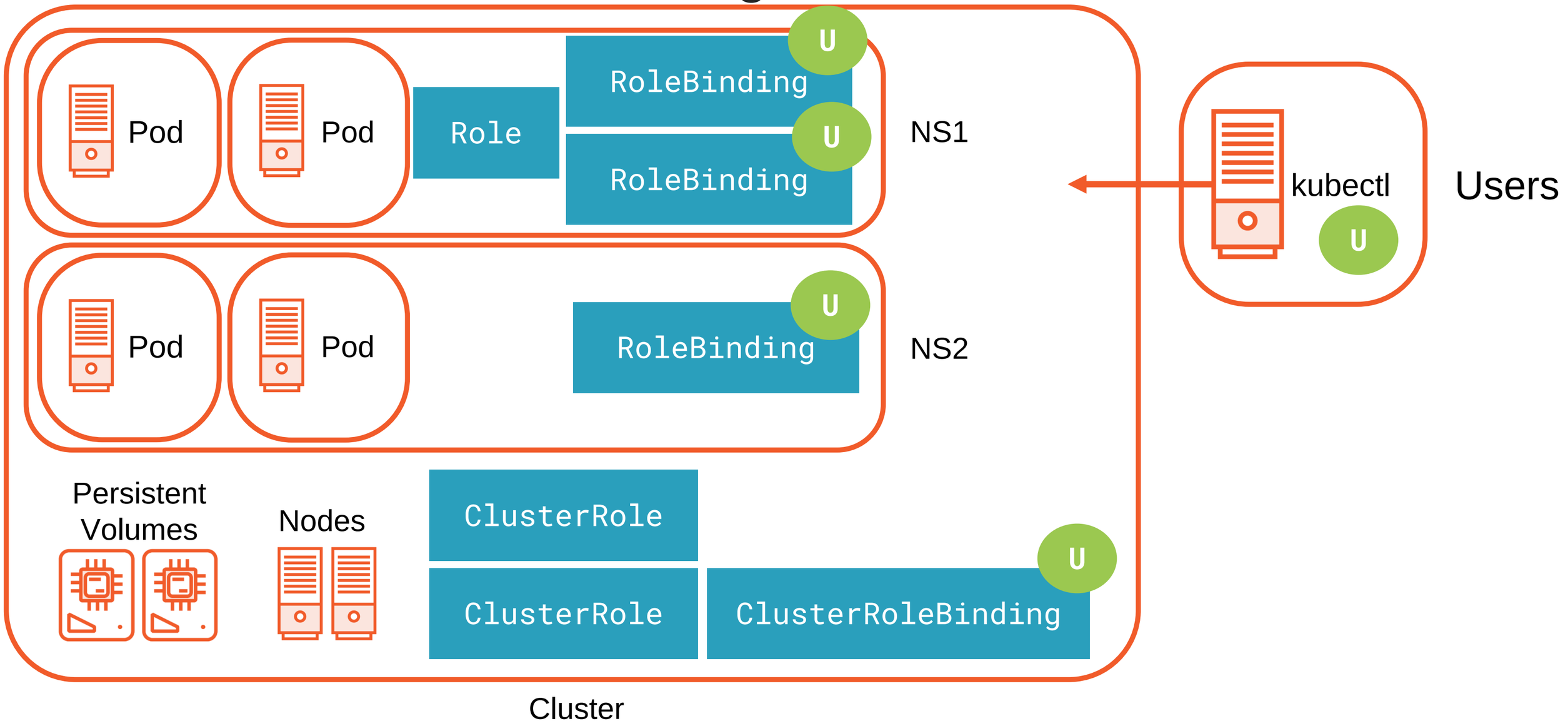
What to use when?

Use `Role` and a `RoleBinding` to scope security to a single namespace

Use `ClusterRole` and `RoleBinding` to scope security to several or all namespaces

Use `ClusterRole` and `ClusterRoleBinding` to scope security to all namespaces OR cluster-scoped resources

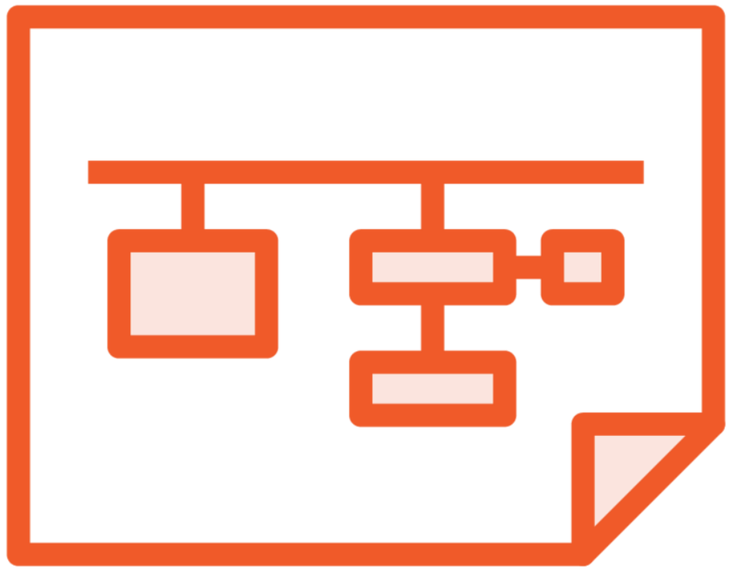
Using RBAC


Pod
Pod
Role
RoleBinding
U
RoleBinding
U
NS1
Pod
Pod
RoleBinding
U
NS2
kubectl
U
Users
Persistent Volumes
Nodes
ClusterRole
ClusterRole
ClusterRoleBinding
U
Cluster

Default ClusterRoles

`cluster-admin`	`admin`	`edit`	`view`
Cluster-wide super user	Full access within a Namespace	Read/write within a Namespace	Read-only within a Namespace
`RoleBinding` - full admin within a Namespace	`RoleBinding` - full admin within a Namespace	NOT view/edit `Roles` `RoleBindings` Resource Quotas	NOT view/edit `Roles` `RoleBindings` Resource Quotas
Edit `Roles` `RoleBindings` Resource Quotas	Edit `Roles` `RoleBindings`	Access to `Secrets`	No Access to `Secrets`

Defining Roles and ClusterRoles



`Rules`

`apiGroups`

An empty string designates the Core API group

Resources

`Pods`, **`Services`**, **`Deployments`**, **`Nodes`** and more

`Verbs`

`get, list, create, update, patch, watch, delete, deletecollection`

`Roles/ClusterRoles` can have several **`Rules`** defined

https://bit.ly/314xJ24

Defining RoleBindings and ClusterRoleBindings

```
roleRef
 RoleBinding -> Role/ClusterRole
 ClusterRoleBinding -> ClusterRole
Subjects
 kind (User/Group/ServiceAccount)
 Name
 Namespace
```

Role and RoleBinding

```
apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
 name: demorole
 namespace: ns1
rules:
- apiGroups: [""]
  resources: ["pods"]
  verbs: ["get", "list"]
```

```
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: demorolebinding
  namespace: ns1
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: Role
  name: demorole
subjects:
- apiGroup: rbac.authorization.k8s.io
  kind: User
  name: demouser
```

Role and RoleBinding

```
kubectl create role demorole \
   --verb=get,list \
   --resource=pods
   --namespace ns1

kubectl create rolebinding demorolebinding \
   --role=demorole \
   --user=demouser \
   --namespace ns1
```

Demo

Role-based Access Controls - RBAC

- Roles and RoleBindings
- ClusterRoles and ClusterRoleBindings
- ClusterRoles and RoleBindings

Review

What is Role Based Access Control (RBAC)

API Objects for configuring RBAC

- Role and ClusterRole
- RoleBinding and ClusterRoleBinding

Thank You!
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