NetApp

Configuration

NetApp Solutions

NetApp
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Configuration

For any multitenant solution, no user can have access to more cluster resources than is required. So, the entire set of resources that are to be configured as part of the multitenancy configuration is divided between cluster-admin, storage-admin, and developers working on each project.

The following table outlines the different tasks to be performed by different users:

Role	Tasks
Cluster-admin	Create projects for different applications/workloads
	Create ClusterRoles and RoleBindings for storage-admin
	Create Roles and RoleBindings for developers assigning access to specific projects
	[Optional] Configure projects to schedule pods on specific nodes
Storage-admin	Create SVMs on NetApp ONTAP
	Create Trident backends
	Create StorageClasses
	Create storage ResourceQuotas
Developers	Validate access to create/patch PVCs/pods in assigned project
	Validate access to create/patch PVCs/pods in another project
	Validate access to view/edit Projects, ResourceQuotas, and StorageClasses

Configuration

Pre-requisites

- NetApp ONTAP cluster.
- Red Hat OpenShift cluster.
- Trident installed on the cluster.
- Admin workstation with tridentctl and oc tools installed and added to $PATH.
- Admin access to ONTAP.
- Cluster-admin access to OpenShift cluster.
- Cluster is integrated with Identity Provider.
- Identity provider is configured to efficiently distinguish between users in different teams.

Configuration: cluster-admin tasks

The following tasks are performed by the Red Hat OpenShift cluster-admin:

1. Log into Red Hat OpenShift cluster as the cluster-admin.

2. Create two projects corresponding to different projects.

```
oc create namespace project-1
oc create namespace project-2
```

3. Create the developer role for project-1.

```
cat << EOF | oc create -f -
apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  namespace: project-1
  name: developer-project-1
rules:
  - verbs:
      - '*'
    apiGroups:
      - apps
      - batch
      - autoscaling
      - extensions
      - networking.k8s.io
      - policy
      - apps.openshift.io
      - build.openshift.io
      - image.openshift.io
      - ingress.operator.openshift.io
      - route.openshift.io
      - snapshot.storage.k8s.io
      - template.openshift.io
    resources:
      - '*'
  - verbs:
      - '*'
    apiGroups:
      - ''
    resources:
      - bindings
      - configmaps
      - endpoints
```

```
          - events
          - persistentvolumeclaims
          - pods
          - pods/log
          - pods/attach
          - podtemplates
          - replicationcontrollers
          - services
          - limitranges
          - namespaces
          - componentstatuses
          - nodes
    - verbs:
        - '*'
      apiGroups:
        - trident.netapp.io
      resources:
        - tridentsnapshots
EOF
```

> ℹ️ The role definition provided in this section is just an example. Developer role must be defined based on the end-user requirements.

4. Similarly, create developer roles for project-2.

5. All OpenShift and NetApp storage resources are usually managed by a storage admin. Access for storage administrators is controlled by the trident operator role that is created when Trident is installed. In addition to this, the storage admin also requires access to ResourceQuotas to control how storage is consumed.

6. Create a role for managing ResourceQuotas in all projects in the cluster to attach it to storage admin:

```
cat << EOF | oc create -f -
kind: ClusterRole
apiVersion: rbac.authorization.k8s.io/v1
metadata:
  name: resource-quotas-role
rules:
  - verbs:
      - '*'
    apiGroups:
      - ''
    resources:
      - resourcequotas
  - verbs:
      - '*'
    apiGroups:
      - quota.openshift.io
    resources:
      - '*'
EOF
```

7. Make sure that the cluster is integrated with the organization's identity provider and that user groups are sync'd with cluster groups. The following example shows that the identity provider has been integrated with the cluster and sync'd with the user groups.

```
$ oc get groups
NAME                        USERS
ocp-netapp-storage-admins   ocp-netapp-storage-admin
ocp-project-1               ocp-project-1-user
ocp-project-2               ocp-project-2-user
```

8. Configure ClusterRoleBindings for storage admins.

```
cat << EOF | oc create -f -
kind: ClusterRoleBinding
apiVersion: rbac.authorization.k8s.io/v1
metadata:
  name: netapp-storage-admin-trident-operator
subjects:
  - kind: Group
    apiGroup: rbac.authorization.k8s.io
    name: ocp-netapp-storage-admins
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: trident-operator
---
kind: ClusterRoleBinding
apiVersion: rbac.authorization.k8s.io/v1
metadata:
  name: netapp-storage-admin-resource-quotas-cr
subjects:
  - kind: Group
    apiGroup: rbac.authorization.k8s.io
    name: ocp-netapp-storage-admins
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: resource-quotas-role
EOF
```

> ℹ️ For storage admins, two roles must be bound – trident-operator and resource-quotas roles.

9. Create RoleBindings for developers binding the developer-project-1 role to the corresponding group (ocp-project-1) in project-1.

```
cat << EOF | oc create -f -
kind: RoleBinding
apiVersion: rbac.authorization.k8s.io/v1
metadata:
  name: project-1-developer
  namespace: project-1
subjects:
  - kind: Group
    apiGroup: rbac.authorization.k8s.io
    name: ocp-project-1
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: Role
  name: developer-project-1
EOF
```

10. Similarly, create RoleBindings for developers binding the developer roles to the corresponding user group in project-2.
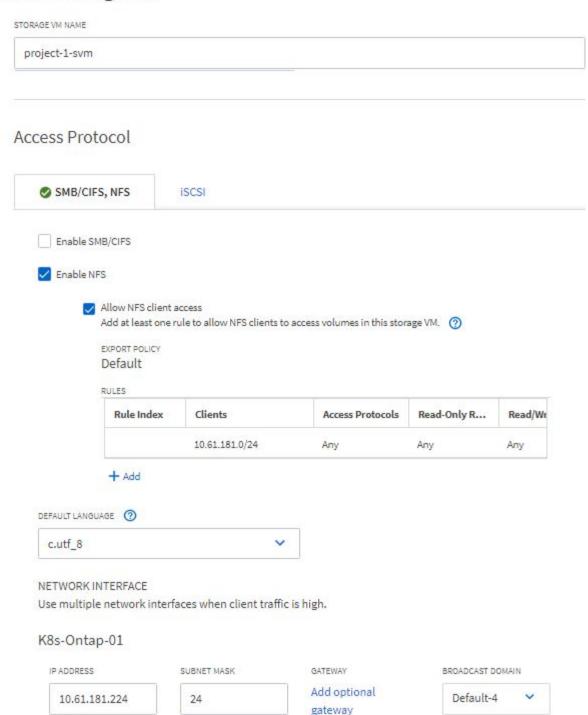
Next: Storage Administrator Tasks.

Configuration: Storage-admin tasks

The following resources must be configured by a storage administrator:

1. Log into the NetApp ONTAP cluster as admin.

2. Navigate to `Storage → Storage VMs` and click `Add`. Create two SVMs, one for project-1 and the other for project-2, providing the required details. Also create an vsadmin account to manage the SVM and its resources.

Add Storage VM   ✕

STORAGE VM NAME

project-1-svm

Access Protocol

| ✔ SMB/CIFS, NFS | iSCSI |

☐ Enable SMB/CIFS

☑ Enable NFS

☑ Allow NFS client access
Add at least one rule to allow NFS clients to access volumes in this storage VM. ⓘ

EXPORT POLICY
Default

RULES

Rule Index	Clients	Access Protocols	Read-Only R...	Read/Wr
	10.61.181.0/24	Any	Any	Any

➕ Add

DEFAULT LANGUAGE ⓘ

c.utf_8   ⌄

NETWORK INTERFACE
Use multiple network interfaces when client traffic is high.

K8s-Ontap-01

IP ADDRESS	SUBNET MASK	GATEWAY	BROADCAST DOMAIN
10.61.181.224	24	Add optional gateway	Default-4 ⌄

3. Login to the Red Hat OpenShift cluster as the storage administrator.

4. Create the backend for project-1 and map it to the SVM dedicated to the project. NetApp recommends using the SVM's vsadmin account to connect the backend to SVM instead of using the ONTAP cluster administrator.

```
cat << EOF | tridentctl -n trident create backend -f
{
    "version": 1,
    "storageDriverName": "ontap-nas",
    "backendName": "nfs_project_1",
    "managementLIF": "172.21.224.210",
    "dataLIF": "10.61.181.224",
    "svm": "project-1-svm",
    "username": "vsadmin",
    "password": "NetApp123"
}
EOF
```

> ℹ️ We are using the ontap-nas driver for this example. Use the appropriate driver when creating the backend based on the use-case.

> ℹ️ We assume that Trident is installed in trident project.

5. Similarly create the Trident backend for project-2 and map it to the SVM dedicated to project-2.

6. Next, create the storage classes. Create the storage class for project-1 and configure it to use the storage pools from backend dedicated to project-1 by setting the storagePools parameter.

```
cat << EOF | oc create -f -
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: project-1-sc
provisioner: csi.trident.netapp.io
parameters:
  backendType: ontap-nas
  storagePools: "nfs_project_1:.*"
EOF
```

7. Likewise, create a storage class for project-2 and configure it to use the storage pools from backend dedicated to project-2.

8. Create a ResourceQuota to restrict resources in project-1 requesting storage from storageclasses dedicated to other projects.

```
cat << EOF | oc create -f -
kind: ResourceQuota
apiVersion: v1
metadata:
  name: project-1-sc-rq
  namespace: project-1
spec:
  hard:
    project-2-sc.storageclass.storage.k8s.io/persistentvolumeclaims: 0
EOF
```

9. Similarly, create a ResourceQuota to restrict resources in project-2 requesting storage from storageclasses dedicated to other projects.