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Quotas, LimitRanges, and Templates

Scenario

MitziCom is starting production, and they are very concerned that they may run out of resources. In order to address these concerns, you need to set quotas and limits on the system.

MitziCom has decided to deploy Red Hat 3scale API Management in their RHOCP environment to evaluate its performance impact on the cluster. They have asked you to create a template to deploy 3scale API Management in a repeatable manner, taking into account its resource requirements. You need to edit the template that deploys 3scale API Management in order for users to use it be able to deploy it with enough resources and appropriate limits to function properly.

Goals

- Create quotas for the cluster
- Import the 3scale AMP template to set up 3scale API Management
- Deploy the system
- Edit the template to launch 3scale properly

1. Create Quotas for Cluster

1. Switch to the `system:admin` user to set a quota on `andrew`:

   ```
   oc login -u system:admin
   ```

2. Create a limited cluster resource quota that sets the following hard limits:

   - `pods=25`
   - `requests.memory=6Gi`
   - `requests.cpu=5`
   - `limits.cpu=25`
   - `limits.memory=40Gi`
   - `configmaps=25`
   - `persistentvolumeclaims=25`
   - `services=25`
   - `project-annotation-selector` for the `andrew` user

3. View the cluster resource quota:

   ```
   oc get clusterresourcequota
   ```

   Sample Output

   ```
   NAME                  LABEL SELECTOR   ANNOTATION SELECTOR
   clusterquota-andrew   <none>           map[openshift.io/requester:andrew]
   ```

4. Describe the cluster resource quota. Note that you wont have any values shown yet, because the requester has no projects yet.

   ```
   oc describe clusterresourcequota clusterquota-andrew
   ```

   Sample Output

   ```
   Name:           clusterquota-andrew
   Created:        18 seconds ago
   Labels:         <none>
   Annotations:    <none>
   Namespace Selector: []
   Label Selector:
   AnnotationSelector: map[openshift.io/requester:andrew]
   Resource        Used    Hard
   --------        ----    ----
   ```

For some reason the `oc describe` command does not display the actual resources. To see that you created the clusterresourcequota correctly use `oc get clusterresourcequota clusterquota-andrew -o yaml`.

2. Download 3scale Templates from Internet

1. Get the 3scale AMP template:

```
wget https://raw.githubusercontent.com/3scale/3scale-amp-openshift-
templates/2.1.0-GA/amp/amp.yml
```

3. Deploy 3scale System

3.1. Import 3scale AMP Template

1. Switch to the `andrew` user:

```
oc login -u andrew -p r3dh4t1!
```

2. Create a new project for 3scale API Management:

```
oc new-project 3scale
```

3. Create the 3scale AMP template and, optionally, the APIcast template:

```
oc create -f amp.yml
oc get template
```

Sample Output:

```
NAME      DESCRIPTION   PARAMETERS     OBJECTS
system                  23 (1 blank)   49
```

4. Create a 3scale Admin Portal with `oc new-app`:

```
oc new-app --template=system --param
WILDCARD_DOMAIN=apps.cluster-$GUID.$GUID.ocp4.opentlc.com
```

Sample Output

```
[...]
    deploymentconfig.apps.openshift.io "zync-database" created
--> Success
    Access your application via route '3scale-admin.apps.cluster-
ede2.ede2.ocp4.opentlc.com'
    Access your application via route 'backend-3scale.apps.cluster-
ede2.ede2.ocp4.opentlc.com'
    Access your application via route '3scale.apps.cluster-
ede2.ede2.ocp4.opentlc.com'
    Access your application via route 'api-3scale-apicast-
staging.apps.cluster-ede2.ede2.ocp4.opentlc.com'
    Access your application via route 'api-3scale-apicast-
production.apps.cluster-ede2.ede2.ocp4.opentlc.com'
    Access your application via route 'apicast-wildcard.apps.cluster-
ede2.ede2.ocp4.opentlc.com'
    Run 'oc status' to view your app.
```

5. Verify that no pods were launched:

```
oc get pods -n 3scale
```

Sample Output

```
No resources found.
```

6. Find out why:

```
oc get events | grep clusterquota
```

Sample Output

```
10s         Warning   FailedCreate           DeploymentConfig        Error cr
1s          Warning   FailedCreate           DeploymentConfig        Error cr
[...]
```

`failed quota: ... must specify limits.etc,` etc. means that we forgot to deploy a **`LimitRange`**. Try again by redeploying, this time setting the LimitRange.

4. Redeploy 3scale With a Limit Range

1. Delete the 3scale project to easily start over

```
oc delete project 3scale
```

2. Create the Project Again

```
oc new-project 3scale
```

3. Create a file called **`limits.yaml`** with a LimitRange
4. Deploy a limit range to specify limits on all objects in the 3scale project.

```
oc login -u system:admin
oc create -f ./limits.yaml
```

5. Create the template and deploy the template again:

```
oc login -u andrew -p r3dh4t1!
oc create -f ./amp.yml
oc new-app --template=system --param
WILDCARD_DOMAIN=apps.cluster-$GUID.$GUID.ocp4.opentlc.com
```

Now you will encounter a new error. The Quota will not complain about "no limits set". Rather, deploying a template with ten deployments of one pod exceeds your pod quota. Why?

1. Have a look at the `ClusterResourceQuotas` that are applied in the current context

   ```
   oc describe AppliedClusterResourceQuota
   ```

   Sample Output

   ```
   Name:           clusterquota-andrew
   Created:        4 minutes ago
   Labels:         <none>
   Annotations:    <none>
   Namespace Selector: ["3scale"]
   Label Selector:
   AnnotationSelector: map[openshift.io/requester:andrew]
   Resource                Used   Hard
   --------                ----   ----
   configmaps              2      25
   limits.cpu              1250m  25
   limits.memory           2500Mi 40Gi
   persistentvolumeclaims  4      25
   pods                    25     25
   requests.cpu            1250m  5
   requests.memory         2500Mi 6Gi
   services                10     25
   ```

2. Find out why all 10 pods aren’t deploying correctly:

   ```
   oc get events
   ```

   Sample Output

   ```
   [...]
   2m33s       Warning   FailedCreate            ReplicationController   Error
   2m33s       Warning   FailedCreate            ReplicationController   Error
   2m33s       Warning   FailedCreate            ReplicationController   Error
   [...]
   ```

> Examine resource utilization of all the pods with `oc adm top pod`. Note however that this command currently does not work in OpenShift 4 (0.13).

3. Edit the container requests and limits in your template to restrict CPU and RAM for the `system-app` pod and the other containers in the template so they start reliably.

> You can experiment with settings by using `oc edit dc` for the various deploymentconfigs for pods that are failing to deploy. Note also the livenessProbe and readinessProbe timeouts, you may need to extend them.

5. Clean Up Environment

1. Remove the project from your environment:

```
oc login -u system:admin
oc delete project 3scale
```

2. Confirm that you still have cluster quotas in your system:

```
oc get clusterresourcequota
```

3. Optionally, remove the cluster quota:

```
oc delete clusterresourcequota clusterquota-andrew
```

This completes the 3scale API Management lab.

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