Guided Exercise: Assess the Health of an OpenShift Cluster

Verify the health of an OpenShift cluster by querying the status of its cluster operators, nodes, pods, and systemd services. Also verify cluster events and alerts.

Outcomes

- View the status and get information about cluster operators.
- Retrieve information about cluster pods and nodes.
- Retrieve the status of a node's systemd services.
- View cluster events and alerts.
- Retrieve debugging information for the cluster.

As the `student` user on the `workstation` machine, use the `lab` command to prepare your system for this exercise. This command ensures that all resources are available for this exercise.

```
[student@workstation ~]$ lab start cli-health
```

Instructions

1. Retrieve the status and view information about cluster operators.

   Log in to the OpenShift cluster as the `admin` user with the `redhatocp` password.

   ```
   [student@workstation ~]$ oc login -u admin -p redhatocp \
     https://api.ocp4.example.com:6443
   Login successful
   ...output omitted...
   ```

   List the operators that users installed in the OpenShift cluster.

   ```
   [student@workstation ~]$ oc get operators
   NAME                                AGE
   lvms-operator.openshift-storage     69d
   metallb-operator.metallb-system     69d
   ```

   List the cluster operators that are installed by default in the OpenShift cluster.

   ```
   [student@workstation ~]$ oc get clusteroperators
   NAME                       VERSION   AVAILABLE   PROGRESSING   DEGRADED   ...
   authentication             4.18.6    True        False         False      ...
   baremetal                  4.18.6    True        False         False      ...
   cloud-controller-manager   4.18.6    True        False         False      ...
   cloud-credential           4.18.6    True        False         False      ...
   cluster-autoscaler         4.18.6    True        False         False      ...
   config-operator            4.18.6    True        False         False      ...
   console                    4.18.6    True        False         False      ...
   control-plane-machine-set  4.18.6    True        False         False      ...
   csi-snapshot-controller    4.18.6    True        False         False      ...
   dns                        4.18.6    True        False         False      ...
   etcd                       4.18.6    True        False         False      ...
   ...output omitted...
   ```

   Use the `describe` command to view detailed information about the `openshift-apiserver` cluster operator, such as related objects, events, and version.

```
[student@workstation ~]$ oc describe clusteroperators openshift-apiserver
Name:         openshift-apiserver
Namespace:
Labels:       <none>
Annotations:  exclude.release.openshift.io/internal-openshift-hosted: true
              include.release.openshift.io/self-managed-high-availability: true
              include.release.openshift.io/single-node-developer: true
API Version:  config.openshift.io/v1
Kind:         ClusterOperator
Metadata:
...output omitted...
Spec:
Status:
  Conditions:
    Last Transition Time:  2025-05-22T10:49:18Z
    Message:               All is well
    Reason:                AsExpected
    Status:                False
    Type:                  Degraded
...output omitted...
  Extension:               <nil>
  Related Objects:
    Group:      operator.openshift.io
    Name:       cluster
    Resource:   openshiftapiservers
    Group:
    Name:       openshift-config
    Resource:   namespaces
    Group:
    Name:       openshift-config-managed
    Resource:   namespaces
    Group:
    Name:       openshift-apiserver-operator
    Resource:   namespaces
    Group:
    Name:       openshift-apiserver
    Resource:   namespaces
...output omitted...
  Versions:
    Name:     operator
    Version:  4.18.6
    Name:     openshift-apiserver
    Version:  4.18.6
Events:       <none>
```

The `Related Objects` attribute includes information about the name, resource type, and groups for objects that are related to the operator.

List the pods in the `openshift-apiserver-operator` namespace. Then, view the detailed status of an `openshift-apiserver-operator` pod by using the JSON format and the `jq` command. Your pod names might differ.

```
[student@workstation ~]$ oc get pods -n openshift-apiserver-operator
NAME                                          READY   STATUS    RESTARTS   AGE
openshift-apiserver-operator-85fc9669d-g58sl  1/1     Running   12         81d
```

```
[student@workstation ~]$ oc get pod -n openshift-apiserver-operator \
  openshift-apiserver-operator-85fc9669d-g58sl \
  -o json | jq .status
{
  "conditions": [
...output omitted...
    {
      "lastProbeTime": null,
      "lastTransitionTime": "2025-08-11T17:52:20Z",
      "status": "True",
      "type": "Ready"
    },
...output omitted...
  ],
  "containerStatuses": [
    {
...output omitted...
      "name": "openshift-apiserver-operator",
      "ready": true,
      "restartCount": 12,
      "started": true,
      "state": {
        "running": {
          "startedAt": "2025-08-11T17:52:19Z"
        }
      }
    }
  ],
  "hostIP": "192.168.50.10",
...output omitted...
  "phase": "Running",
  "podIP": "10.8.0.17",
...output omitted...
}
```

2. Retrieve the status, resource consumption, and events of cluster pods.

   List the memory and CPU usage of all pods in the cluster. Use the `--sum` option to print the sum of the resource usage. The resource usage on your system probably differs.

```
[student@workstation ~]$ oc adm top pods -A --sum
NAMESPACE              NAME                                  CPU(cores) MEMORY(bytes)
...output omitted...
metallb-system         metallb-operator-controller-manager-...  2m         58Mi
metallb-system         metallb-operator-webhook-server-...      1m         27Mi
metallb-system         speaker-nrvz4                            4m         98Mi
...output omitted...
                                                                505m       8982Mi
```

   List the pods and their labels in the `openshift-etcd` namespace.

```
[student@workstation ~]$ oc get pods -n openshift-etcd --show-labels
NAME                  READY   STATUS      RESTARTS   AGE   LABELS
etcd-master01         5/5     Running     55         81d   app=etcd,etcd=true,k8s-app=etcd,revision=2
installer-1-master01  0/1     Completed   0          81d   app=installer
installer-2-master01  0/1     Completed   0          81d   app=installer
```

   List the resource usage of the containers in the `etcd-master01` pod in the `openshift-etcd` namespace. The resource usage on your system probably differs.

```
[student@workstation ~]$ oc adm top pods etcd-master01 \
  -n openshift-etcd --containers
POD             NAME           CPU(cores)   MEMORY(bytes)
etcd-master01   etcd           44m          269Mi
etcd-master01   etcd-metrics   8m           30Mi
etcd-master01   etcd-readyz    4m           47Mi
etcd-master01   etcd-rev       1m           44Mi
etcd-master01   etcdctl        0m           0Mi
```

   Display a list of all resources, their status, and their types in the `openshift-monitoring` namespace.

```
[student@workstation ~]$ oc get all -n openshift-monitoring
Warning: apps.openshift.io/v1 DeploymentConfig is deprecated in v4.14+, unavailable in v4.10000+
NAME                                                READY   STATUS    ...
pod/alertmanager-main-0                             6/6     Running   ...
pod/cluster-monitoring-operator-56b769b58f-dtmqj    1/1     Running   ...
pod/kube-state-metrics-75455b796c-8q28d             3/3     Running   ...
...output omitted...
NAME                                        TYPE        CLUSTER-IP       ...
service/alertmanager-main                   ClusterIP   172.30.90.122    ...
service/alertmanager-operated               ClusterIP   None             ...
service/cluster-monitoring-operator         ClusterIP   None             ...
service/kube-state-metrics                  ClusterIP   None             ...
...output omitted...
```

View the logs of the `alertmanager-main-0` pod in the `openshift-monitoring` namespace. The logs might differ on your system.

```
[student@workstation ~]$ oc logs alertmanager-main-0 -n openshift-monitoring
...output omitted...
ts=2025-08-11T17:50:17.481Z caller=coordinator.go:113 level=info component=configuration msg="Loading configuration file"
file=/etc/alertmanager/config_out/alertmanager.env.yaml
ts=2025-08-11T17:50:17.483Z caller=coordinator.go:126 level=info component=configuration msg="Completed loading of configu
ration file" file=/etc/alertmanager/config_out/alertmanager.env.yaml
...output omitted...
```

Retrieve the events for the `openshift-kube-controller-manager` namespace.

```
[student@workstation ~]$ oc get events -n openshift-kube-controller-manager
LAST SEEN   TYPE     REASON             OBJECT                              ...
169m        Normal   LeaderElection     lease/cert-recovery-controller-lock...
169m        Normal   LeaderElection     lease/cluster-policy-controller-lock...
172m        Normal   Pulled             pod/kube-controller-manager-master01...
...output omitted...
```

3. Retrieve information about cluster nodes.

   View the status of the nodes in the cluster.

```
[student@workstation ~]$ oc get nodes
NAME       STATUS   ROLES                         AGE   VERSION
master01   Ready    control-plane,master,worker   81d   v1.31.6
```

   Retrieve the resource consumption of the `master01` node. The resource usage on your system probably differs.

```
[student@workstation ~]$ oc adm top node
NAME       CPU(cores)   CPU%   MEMORY(bytes)   MEMORY%
master01   719m         13%    12069Mi         81%
```

   Use a JSONPath filter to determine the capacity and allocatable CPU for the `master01` node. The values might differ on your system.

```
[student@workstation ~]$ oc get node master01 -o jsonpath=\
'Allocatable: {.status.allocatable.cpu}{"\n"}'\
'Capacity: {.status.capacity.cpu}{"\n"}'
Allocatable: 5500m
Capacity: 6
```

   Determine the number of allocatable pods for the node.

```
[student@workstation ~]$ oc get node master01 -o jsonpath=\
'Allocatable Pods: {.status.allocatable.pods}{"\n"}'
Allocatable Pods: 250
```

   Use the `describe` command to view the events, resource requests, and resource limits for the node. The output might differ on your system.

```
[student@workstation ~]$ oc describe node master01
...output omitted...
Allocated resources:
  (Total limits may be over 100 percent, i.e., overcommitted.)
  Resource           Requests       Limits
  --------           --------       ------
  cpu                2809m (51%)    10m (0%)
  memory             12359Mi (83%)  0 (0%)
  ephemeral-storage  0 (0%)         0 (0%)
  hugepages-1Gi      0 (0%)         0 (0%)
  hugepages-2Mi      0 (0%)         0 (0%)
Events: <none>
```

4. Retrieve the logs and status of the systemd services on the `master01` node.

   Display the logs of the node. Filter the logs to show the most recent log for the `crio` service. The logs might differ on your system.

```
[student@workstation ~]$ oc adm node-logs master01 -u crio --tail 1
-- Logs begin at Thu 2025-05-22 10 21:19:09 UTC, end at Thu 2025-05-22 10 16:57:00 UTC. --
May 22 10:46:12.108535 master01 systemd[1]: Starting Container Runtime Interface for OCI (CRI-O)...
May 22 10:46:12.655846 master01 crio[2698]: time="2025-05-22 10:46:12.655729195Z" level=info msg="Updating config from sin
gle file: /etc/crio/crio.conf"
...output omitted...
```

   Display the two most recent log entries of the `kubelet` service on the node. The logs might differ on your system.

```
[student@workstation ~]$ oc adm node-logs master01 -u kubelet --tail 2
-- Logs begin at Thu 2025-05-22 10 21:19:09 UTC, end at Thu 2025-05-22 10 16:57:00 UTC. --
Aug 11 20:45:05.086582 master01 kubenswrapper[3028]: I0811 20:45:05.086523    3028 kubelet_volumes.go:163] "Cleaned up orp
haned pod volumes dir" podUID="a1c8c4ef-7604-426f-bc88-682cc4fb0d5e" path="/var/lib/kubelet/pods/a1c8c4ef-7604-426f-bc88-6
82cc4fb0d5e/volumes"
Aug 11 20:45:21.367632 master01 kubenswrapper[3028]: I0811 20:45:21.367580    3028 scope.go:117] "RemoveContainer" contain
erID="72ef...8dd0"
```

   Create a debug session for the node. The, use the `chroot /host` command to access the host binaries.

```
[student@workstation ~]$ oc debug node/master01
Starting pod/master01-debug-945fs ...
To use host binaries, run `chroot /host`
Pod IP: 192.168.50.10
If you don't see a command prompt, try pressing enter.
sh-5.1# chroot /host
sh-5.1#
```

   Verify the status of the `kubelet` service.

```
sh-5.1# systemctl status kubelet
● kubelet.service - Kubernetes Kubelet
   Loaded: loaded (/etc/systemd/system/kubelet.service; enabled; preset: disabled)
  Drop-In: /etc/systemd/system/kubelet.service.d
           └─01-kubens.conf, 10-mco-default-madv.conf, 20-logging.conf, 20-nodenet.conf
   Active: active (running) since Mon 2025-08-11 17:47:14 UTC; 3h 10min ago
 Main PID: 3028 (kubelet)
    Tasks: 35 (limit: 127707)
   Memory: 779.7M
      CPU: 27min 9.454s
...output omitted...
```

   Press **Ctrl**+**C** to quit the command.

   Confirm that the `crio` service is active.

```
sh-5.1# systemctl is-active crio
active
```

   Exit the debug pod.

```
sh-5.1# exit
exit
sh-5.1# exit
exit

Removing debug pod ...
```

5. Retrieve debugging information for the cluster.

   Retrieve debugging information of the cluster by using the `oc adm must-gather` command. Specify the `/home/student/must-gather` directory as the destination directory. This command might take several minutes to complete.

```
[student@workstation ~]$ oc adm must-gather --dest-dir /home/student/must-gather
[must-gather      ] OUT 2025-08-12T16:37:58.163228054Z Using must-gather plug-in image: quay.io/openshift-release-dev/ocp-
v4.0-art-dev@sha256:a81f...b12a
When opening a support case, bugzilla, or issue please include the following summary data along with any other requested i
nformation:
ClusterID: 6c8c6eed-26ed-4911-9df9-b081404842c8
ClientVersion: 4.18.6
ClusterVersion: Stable at "4.18.6"
ClusterOperators:
All healthy and stable
```

   Verify that the debugging information exists in the destination directory.

```
[student@workstation ~]$ ls -1 ~/must-gather
event-filter.html
quay-io-openshift-release-dev-ocp-v4-0-art-dev-sha256...
must-gather.logs
timestamp
```

   List the last five kubelet service logs, and confirm that an error occurred. Replace `quay-io…` with the generated directory name.

```
[student@workstation ~]$ tail -5 ~/must-gather/\
quay-io-openshift-release-dev-ocp-v4-0-art-dev-sha256...\gather.logs
2025-08-14T22:11:20.510531824Z Gathering data for ns/openshift-cluster-csi-drivers...
2025-08-14T22:11:21.166365975Z Wrote inspect data to must-gather.
2025-08-14T22:11:21.166420106Z error: inspection completed with the errors occurred while gathering data:
2025-08-14T22:11:21.166420106Z     [skipping gathering secrets/support due to error: secrets "support" not found, skipping
gathering endpoints/host-etcd-2 due to error: endpoints "host-etcd-2" not found]
2025-08-14T22:11:21.352314360Z error: the server doesn't have a resource type "clusters"
```

   Generate debugging information for the `openshift-apiserver` cluster operator. Specify the `/home/student/inspect` directory as the destination directory. Limit the debugging information to the last five minutes.

```
[student@workstation ~]$ oc adm inspect clusteroperator/openshift-apiserver \
  --dest-dir /home/student/inspect --since 5m
Gathering data for ns/openshift-config...
Warning: apps.openshift.io/v1 DeploymentConfig is deprecated in v4.14+, unavailable in v4.10000+
Gathering data for ns/openshift-config-managed...
Gathering data for ns/openshift-apiserver-operator...
Gathering data for ns/openshift-apiserver...
Gathering data for ns/openshift-etcd-operator...
Wrote inspect data to /home/student/inspect.
...output omitted...
```

   Verify that the debugging information exists in the destination directory.

```
[student@workstation ~]$ ls -1 inspect/
cluster-scoped-resources
event-filter.html
namespaces
timestamp
```

   Review the `cluster.yaml` file from the `~/inspect/cluster-scoped-resources/operator.openshift.io/openshiftapiservers` directory.

```
[student@workstation ~]$ cat \
~/inspect/cluster-scoped-resources/operator.openshift.io/\
openshiftapiservers/cluster.yaml
apiVersion: operator.openshift.io/v1
kind: OpenShiftAPIServer
metadata:
  annotations:
    include.release.openshift.io/hypershift: "true"
    include.release.openshift.io/ibm-cloud-managed: "true"
    include.release.openshift.io/self-managed-high-availability: "true"
    include.release.openshift.io/single-node-developer: "true"
    release.openshift.io/create-only: "true"
  creationTimestamp: "2025-05-22T10:40:34Z"
  generation: 3
  managedFields:
  - apiVersion: operator.openshift.io/v1
    fieldsType: FieldsV1
    fieldsV1:
     f:status:
        f:conditions:
...output omitted...
```

Delete the debugging information from your system.

```
[student@workstation ~]$ rm -rf must-gather inspect
```

Finish

On the `workstation` machine, use the `lab` command to complete this exercise. This step is important to ensure that resources from previous exercises do not impact upcoming exercises.

```
[student@workstation ~]$ lab finish cli-health
```