OpenShift Dedicated 4

安全性与合规性

在 OpenShift Dedicated 中配置安全性上下文约束

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法律通告

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摘要

本文档提供在 OpenShift Dedicated 中配置安全性上下文约束的说明。

目录

第 1 章 查看审计日志

OpenShift Dedicated auditing（审计）提供一组安全相关的按时间排序的记录，记录各个用户、管理员或其他系统组件影响系统的一系列活动。

1.1. 关于 API 审计日志

审计在 API 服务器级别运作，记录所有传入到服务器的请求。每个审计日志包含以下信息：

表 1.1. 审计日志字段

字段	描述
level	生成事件的审计级别。
auditID	为每个请求生成的唯一审计 ID。
stage	生成此事件实例时请求处理的阶段。
requestURI	客户端向服务器发送的请求 URI。
verb	与请求相关联的 Kubernetes 操作动词。对于非资源请求，这是小写 HTTP 方法。
user	经过身份验证的用户信息。
impersonatedUser	可选。如果请求模拟了另一个用户，则为被模拟的用户信息。
sourceIPs	可选。源 IP，请求发起的源和任何中间代理。
userAgent	可选。客户端报告的用户代理字符串。请注意，用户代理由客户端提供，且必须不可信任。
objectRef	可选。这个请求的目标对象引用。这不适用于 **List** 类型请求，或者非资源请求。
responseStatus	可选。响应的状态，即使 **ResponseObject** 不是 **Status** 类型也会生成。对于成功的响应，这只会包括代码。对于非状态类型错误响应，这将自动生成出错信息。
requestObject	可选。请求中的 API 对象，采用 JSON 格式。在进行 version conversion、defaulting、admission 或 merging 之前，在请求中的 **RequestObject** 记录（可能会被转换为 JSON 格式）。这是一个外部版本化的对象类型，可能自身并不是一个有效的对象。对于非资源请求，这会被忽略，且只在 Request 级别或更高级别中被记录。
responseObject	可选。响应中返回的 API 对象，使用 JSON 格式。在转换为外部类型后，**ResponseObject** 被记录，并被序列化为 JSON 数据。在非资源请求中会省略它，且仅在 Response 级别中记录。

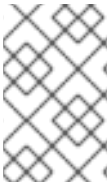
字段	描述
requestReceivedTimestamp	请求到达 API 服务器的时间。
stageTimestamp	请求到达当前审计阶段的时间。
annotations	可选。一个无结构的键值映射，它存储在一个审计事件中，可以通过在请求服务链中调用的插件来设置它，包括认证、授权和准入插件。请注意，这些注解用于审计事件，且与所提交对象的 **metadata.annotations** 没有关联。标识信息组件的键应该是唯一的以避免名称冲突，例如 **podsecuritypolicy.admission.k8s.io/policy**。值应该较短。注解包含在 Metadata 级别中。

Kubernetes API 服务器的输出示例：


```
{"kind":"Event","apiVersion":"audit.k8s.io/v1","level":"Metadata","auditID":"ad209ce1-fec7-4130-8192-c4cc63f1d8cd","stage":"ResponseComplete","requestURI":"/api/v1/namespaces/openshift-kube-controller-manager/configmaps/cert-recovery-controller-lock?timeout=35s","verb":"update","user":{"username":"system:serviceaccount:openshift-kube-controller-manager:localhost-recovery-client","uid":"dd4997e3-d565-4e37-80f8-7fc122ccd785","groups":["system:serviceaccounts","system:serviceaccounts:openshift-kube-controller-manager","system:authenticated"]},"sourceIPs":["::1"],"userAgent":"cluster-kube-controller-manager-operator/v0.0.0 (linux/amd64) kubernetes/$Format","objectRef":{"resource":"configmaps","namespace":"openshift-kube-controller-manager","name":"cert-recovery-controller-lock","uid":"5c57190b-6993-425d-8101-8337e48c7548","apiVersion":"v1","resourceVersion":"574307"},"responseStatus":{"metadata":{},"code":200},"requestReceivedTimestamp":"2020-04-02T08:27:20.200962Z","stageTimestamp":"2020-04-02T08:27:20.206710Z","annotations":{"authorization.k8s.io/decision":"allow","authorization.k8s.io/reason":"RBAC: allowed by ClusterRoleBinding \"system:openshift:operator:kube-controller-manager-recovery\" of ClusterRole \"cluster-admin\" to ServiceAccount \"localhost-recovery-client/openshift-kube-controller-manager\""}}
```


1.2. 查看审计日志

您可以查看每个 control plane 节点的 OpenShift API 服务器、Kubernetes API 服务器、OpenShift OAuth API 服务器和 OpenShift OAuth 服务器的日志。



注意

在 OpenShift Dedicated 部署中，不使用客户云订阅(CCS)模型的客户必须通过联系红帽支持来请求集群审计日志的副本。这是因为查看 API 服务器审计日志需要 **cluster-admin** 权限。

流程

查看审计日志：

- 查看 OpenShift API 服务器审计日志：
  a. 列出每个 control plane 节点可用的 OpenShift API 服务器审计日志：

```
$ oc adm node-logs --role=master --path=openshift-apiserver/
```

输出示例

```
ci-ln-m0wpfjb-f76d1-vnb5x-master-0 audit-2021-03-09T00-12-19.834.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-0 audit.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-1 audit-2021-03-09T00-11-49.835.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-1 audit.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-2 audit-2021-03-09T00-13-00.128.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-2 audit.log
```

b. 通过提供节点名称和日志名称来查看特定的 OpenShift API 服务器审计日志：

```
$ oc adm node-logs <node_name> --path=openshift-apiserver/<log_name>
```

例如：

```
$ oc adm node-logs ci-ln-m0wpfjb-f76d1-vnb5x-master-0 --path=openshift-
apiserver/audit-2021-03-09T00-12-19.834.log
```

输出示例


```
{"kind":"Event","apiVersion":"audit.k8s.io/v1","level":"Metadata","auditID":"381acf6d-5f30-
4c7d-8175-
c9c317ae5893","stage":"ResponseComplete","requestURI":"/metrics","verb":"get","user":
{"username":"system:serviceaccount:openshift-monitoring:prometheus-
k8s","uid":"825b60a0-3976-4861-a342-3b2b561e8f82","groups":
["system:serviceaccounts","system:serviceaccounts:openshift-
monitoring","system:authenticated"]},"sourceIPs":
["10.129.2.6"],"userAgent":"Prometheus/2.23.0","responseStatus":{"metadata":
{},"code":200},"requestReceivedTimestamp":"2021-03-
08T18:02:04.086545Z","stageTimestamp":"2021-03-
08T18:02:04.107102Z","annotations":
{"authorization.k8s.io/decision":"allow","authorization.k8s.io/reason":"RBAC: allowed by
ClusterRoleBinding \"prometheus-k8s\" of ClusterRole \"prometheus-k8s\" to
ServiceAccount \"prometheus-k8s/openshift-monitoring\""}}
```


- 查看 Kubernetes API 服务器审计日志：

a. 列出每个 control plane 节点可用的 Kubernetes API 服务器审计日志：

```
$ oc adm node-logs --role=master --path=kube-apiserver/
```

输出示例

```
ci-ln-m0wpfjb-f76d1-vnb5x-master-0 audit-2021-03-09T14-07-27.129.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-0 audit.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-1 audit-2021-03-09T19-24-22.620.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-1 audit.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-2 audit-2021-03-09T18-37-07.511.log
ci-ln-m0wpfjb-f76d1-vnb5x-master-2 audit.log
```

b. 通过提供节点名称和日志名称来查看特定的 Kubernetes API 服务器审计日志：

```
$ oc adm node-logs <node_name> --path=kube-apiserver/<log_name>
```

例如：

```
$ oc adm node-logs ci-ln-m0wpfjb-f76d1-vnb5x-master-0 --path=kube-apiserver/audit-2021-03-09T14-07-27.129.log
```

输出示例


```
{"kind":"Event","apiVersion":"audit.k8s.io/v1","level":"Metadata","auditID":"cfce8a0b-b5f5-4365-8c9f-79c1227d10f9","stage":"ResponseComplete","requestURI":"/api/v1/namespaces/openshift-kube-scheduler/serviceaccounts/openshift-kube-scheduler-sa","verb":"get","user":{"username":"system:serviceaccount:openshift-kube-scheduler-operator:openshift-kube-scheduler-operator","uid":"2574b041-f3c8-44e6-a057-baef7aa81516","groups":["system:serviceaccounts","system:serviceaccounts:openshift-kube-scheduler-operator","system:authenticated"]},"sourceIPs":["10.128.0.8"],"userAgent":"cluster-kube-scheduler-operator/v0.0.0 (linux/amd64) kubernetes/$Format","objectRef":{"resource":"serviceaccounts","namespace":"openshift-kube-scheduler","name":"openshift-kube-scheduler-sa","apiVersion":"v1"},"responseStatus":{"metadata":{},"code":200},"requestReceivedTimestamp":"2021-03-08T18:06:42.512619Z","stageTimestamp":"2021-03-08T18:06:42.516145Z","annotations":{"authentication.k8s.io/legacy-token":"system:serviceaccount:openshift-kube-scheduler-operator:openshift-kube-scheduler-operator","authorization.k8s.io/decision":"allow","authorization.k8s.io/reason":"RBAC: allowed by ClusterRoleBinding \"system:openshift:operator:cluster-kube-scheduler-operator\" of ClusterRole \"cluster-admin\" to ServiceAccount \"openshift-kube-scheduler-operator/openshift-kube-scheduler-operator\""}}
```


- 查看 OpenShift OAuth API 服务器审计日志：

  a. 列出每个 control plane 节点可用的 OpenShift OAuth API 服务器审计日志：

  ```
  $ oc adm node-logs --role=master --path=oauth-apiserver/
  ```

  输出示例

  ```
  ci-ln-m0wpfjb-f76d1-vnb5x-master-0 audit-2021-03-09T13-06-26.128.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-0 audit.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-1 audit-2021-03-09T18-23-21.619.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-1 audit.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-2 audit-2021-03-09T17-36-06.510.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-2 audit.log
  ```

  b. 通过提供节点名称和日志名称来查看特定的 OpenShift OAuth API 服务器审计日志：

  ```
  $ oc adm node-logs <node_name> --path=oauth-apiserver/<log_name>
  ```

  例如：

  ```
  $ oc adm node-logs ci-ln-m0wpfjb-f76d1-vnb5x-master-0 --path=oauth-apiserver/audit-2021-03-09T13-06-26.128.log
  ```

  输出示例

```
{"kind":"Event","apiVersion":"audit.k8s.io/v1","level":"Metadata","auditID":"dd4c44e2-
3ea1-4830-9ab7-
c91a5f1388d6","stage":"ResponseComplete","requestURI":"/apis/user.openshift.io/v1/users
/~","verb":"get","user":{"username":"system:serviceaccount:openshift-
monitoring:prometheus-k8s","groups":
["system:serviceaccounts","system:serviceaccounts:openshift-
monitoring","system:authenticated"]},"sourceIPs":
["10.0.32.4","10.128.0.1"],"userAgent":"dockerregistry/v0.0.0 (linux/amd64)
kubernetes/$Format","objectRef":
{"resource":"users","name":"~","apiGroup":"user.openshift.io","apiVersion":"v1"},"response
Status":{"metadata":{},"code":200},"requestReceivedTimestamp":"2021-03-
08T17:47:43.653187Z","stageTimestamp":"2021-03-
08T17:47:43.660187Z","annotations":
{"authorization.k8s.io/decision":"allow","authorization.k8s.io/reason":"RBAC: allowed by
ClusterRoleBinding \"basic-users\" of ClusterRole \"basic-user\" to Group
\"system:authenticated\""}}
```

- 查看 OpenShift OAuth 服务器审计日志：

  a. 列出每个 control plane 节点可用的 OpenShift OAuth 服务器审计日志：

  ```
  $ oc adm node-logs --role=master --path=oauth-server/
  ```

  输出示例

  ```
  ci-ln-m0wpfjb-f76d1-vnb5x-master-0 audit-2022-05-11T18-57-32.395.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-0 audit.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-1 audit-2022-05-11T19-07-07.021.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-1 audit.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-2 audit-2022-05-11T19-06-51.844.log
  ci-ln-m0wpfjb-f76d1-vnb5x-master-2 audit.log
  ```

  b. 通过提供节点名称和日志名称来查看特定的 OpenShift OAuth 服务器审计日志：

  ```
  $ oc adm node-logs <node_name> --path=oauth-server/<log_name>
  ```

  例如：

  ```
  $ oc adm node-logs ci-ln-m0wpfjb-f76d1-vnb5x-master-0 --path=oauth-server/audit-
  2022-05-11T18-57-32.395.log
  ```

  输出示例

  ```
  {"kind":"Event","apiVersion":"audit.k8s.io/v1","level":"Metadata","auditID":"13c20345-
  f33b-4b7d-b3b6-
  e7793f805621","stage":"ResponseComplete","requestURI":"/login","verb":"post","user":
  {"username":"system:anonymous","groups":["system:unauthenticated"]},"sourceIPs":
  ["10.128.2.6"],"userAgent":"Mozilla/5.0 (X11; Linux x86_64; rv:91.0) Gecko/20100101
  Firefox/91.0","responseStatus":{"metadata":
  {},"code":302},"requestReceivedTimestamp":"2022-05-
  11T17:31:16.280155Z","stageTimestamp":"2022-05-
  ```

```
11T17:31:16.297083Z","annotations":
{"authentication.openshift.io/decision":"error","authentication.openshift.io/username":"kubea
dmin","authorization.k8s.io/decision":"allow","authorization.k8s.io/reason":""}}
```

authentication.openshift.io/decision 注解的可能值 **allow**、**deny** 或 **error**。

1.3. 过滤审计日志

您可以使用 **jq** 或另一个 JSON 解析工具来过滤 API 服务器审计日志。

注意

日志记录到 API 服务器审计日志的信息量是由设置的审计日志策略控制的。

以下流程提供了使用 **jq** 在 control plane 节点 **node-1.example.com** 上过滤审计日志的示例。有关使用 jq 的详情，请参考 **jq 手册**。

先决条件

- 您可以使用具有 **dedicated-admin** 角色的用户访问集群。
- 您已安装了 **jq**。

流程

- 根据用户过滤 OpenShift API 服务器审计日志：

```
$ oc adm node-logs node-1.example.com  \
  --path=openshift-apiserver/audit.log \
  | jq 'select(.user.username == "myusername")'
```

- 根据用户代理过滤 OpenShift API 服务器审计日志：

```
$ oc adm node-logs node-1.example.com  \
  --path=openshift-apiserver/audit.log \
  | jq 'select(.userAgent == "cluster-version-operator/v0.0.0 (linux/amd64)
kubernetes/$Format")'
```

- 通过特定 API 版本过滤 Kubernetes API 服务器审计日志，仅输出用户代理：

```
$ oc adm node-logs node-1.example.com  \
  --path=kube-apiserver/audit.log \
  | jq 'select(.requestURI | startswith("/apis/apiextensions.k8s.io/v1beta1")) | .userAgent'
```

- 通过排除动词来过滤 OpenShift OAuth API 服务器审计日志：

```
$ oc adm node-logs node-1.example.com  \
  --path=oauth-apiserver/audit.log \
  | jq 'select(.verb != "get")'
```

- 根据标识用户名和失败并显示错误的事件过滤 OpenShift OAuth 服务器审计日志：

```
$ oc adm node-logs node-1.example.com  \
  --path=oauth-server/audit.log \
  | jq 'select(.annotations["authentication.openshift.io/username"] != null and
.annotations["authentication.openshift.io/decision"] == "error")'
```

1.4. 收集审计日志

您可以使用 must-gather 工具来收集审计日志以调试集群，您可以检查或发送到红帽支持。

注意

在 OpenShift Dedicated 部署中，不使用客户云订阅(CCS)模型的客户必须通过联系红帽支持来请求集群审计日志的副本。这是因为使用 must-gather 工具需要 **cluster-admin** 权限。

流程

1. 使用 **-- /usr/bin/gather_audit_logs** 运行 **oc adm must-gather** 命令：

```
$ oc adm must-gather -- /usr/bin/gather_audit_logs
```

2. 从工作目录中刚刚创建的 **must-gather** 目录创建一个压缩文件。例如，在使用 Linux 操作系统的计算机上运行以下命令：

```
$ tar cvaf must-gather.tar.gz must-gather.local.472290403699006248 (1)
```

(1) 将 **must-gather-local.472290403699006248** 替换为实际目录名称。

3. 在红帽客户门户网站的**客户支持**页面中，将压缩文件附加到您的支持问题单中。

1.5. 其他资源

- must-gather 工具

第 2 章 SRE 集群访问所需的允许列表 IP 地址

2.1. 概述

要使 Red Hat SREs 对 OpenShift Dedicated 集群中的任何问题进行故障排除，它们必须通过允许列表 IP 地址对 API 服务器的入口访问。

2.2. 获取允许列表的 IP 地址

OpenShift Dedicated 用户可以使用 OpenShift Cluster Manager CLI 命令获取 SRE 访问 OpenShift Dedicated 集群所需的红帽机器的最新允许列表 IP 地址。

注意

这些允许列表 IP 地址不是永久性的，可能随时更改。您必须持续查看最新允许列表 IP 地址的 API 输出。

先决条件

- 已安装 OpenShift Cluster Manager API 命令行界面(**ocm**)。
- 您可以将防火墙配置为包含允许列表 IP 地址。

流程

1. 要获取 SRE 访问 OpenShift Dedicated 集群所需的当前允许列表 IP 地址，请运行以下命令：

```
$ ocm get /api/clusters_mgmt/v1/trusted_ip_addresses|jq -r '.items[].id'
```

2. 配置防火墙以授予允许列表 IP 地址的访问权限。