



监控**Astra**数据存储 Astra Data Store

NetApp
June 13, 2022

目录

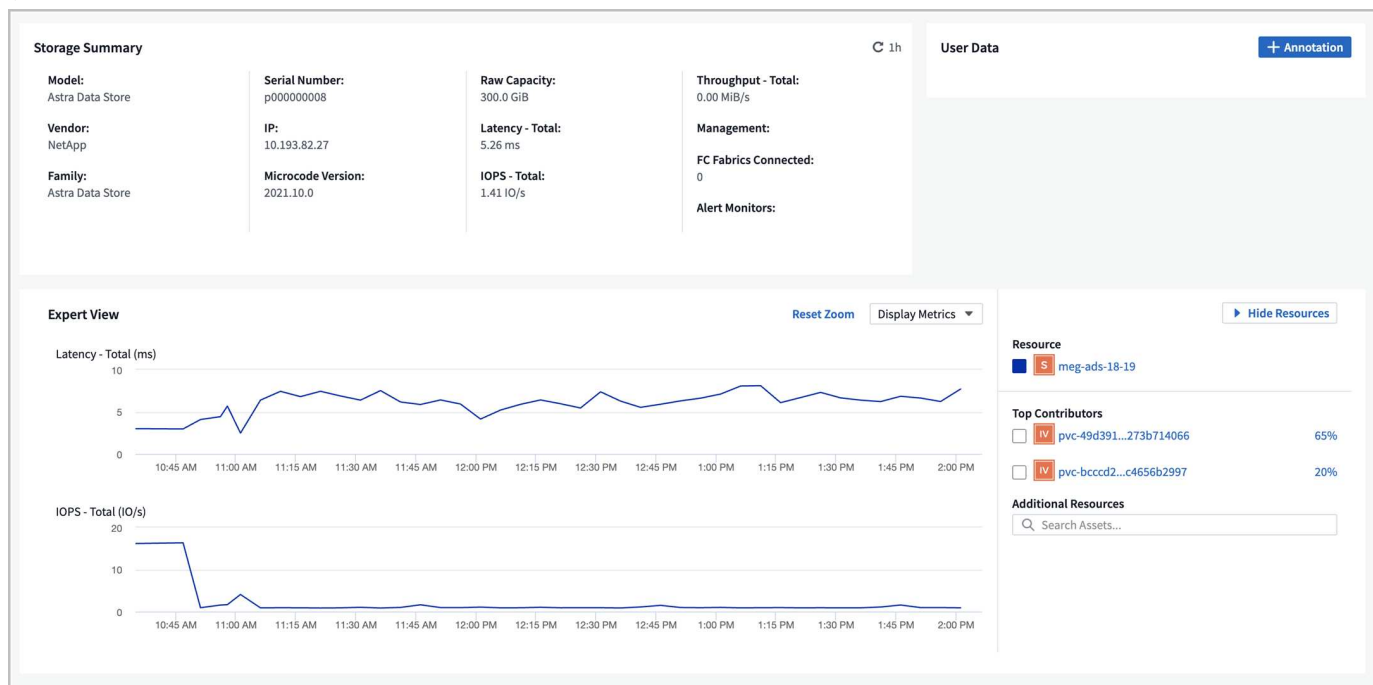
- 监控Astra数据存储 1
 - 使用 Cloud Insights 监控指标 1
 - 使用 Prometheus 和 Grafana 监控指标 12
 - 配置和监控事件日志 14

监控Astra数据存储

使用 Cloud Insights 监控指标

您可以使用Cloud Insights 监控Astra数据存储指标。

以下是Cloud Insights 中显示的一些示例Astra数据存储指标：



您还可以使用显示在Astra数据存储中生成的指标列表 [\[Open Metrics API help\]](#)。

您可以完成以下任务：

- [\[Complete Cloud Insights connection prerequisite tasks\]](#)
- [\[Acquisition Unit storage\]](#)
- [\[Download and run the installation script\]](#)
- [\[Edit the Cloud Insights connection\]](#)
- [\[Disconnect from Cloud Insights\]](#)

完成 Cloud Insights 连接前提条件任务

在将 Astra 数据存储与 Cloud Insights 连接之前，您需要完成以下任务：

- "安装 Astra 数据存储监控操作员" 这是Astra Data Store安装说明的一部分。
- "安装 kubectl-astrad 二进制文件" 这是Astra Data Store安装说明的一部分。
- "创建 Cloud Insights 帐户"。
- 确保以下命令可用： `jk` ， `curl` ， `grep` 和 `JQ`

收集以下信息：

- 对以下类别具有读 / 写权限的 * Cloud Insights API 访问令牌 *：采集单元，数据收集，数据载入和日志载入。此选项将用于读 / 写操作，设置采集单元以及设置数据载入过程。
- * Kubernetes API 服务器 IP 地址和端口 *。用于监控Astra数据存储集群。
- * Kubernetes API 令牌 *。此选项用于调用 Kubernetes API。
- * 永久性卷配置 *。有关如何配置永久性卷的信息。

采集单元存储

采集单元需要三个永久性卷来存储安装文件，配置数据和日志。监控操作员使用默认存储类创建永久性卷请求。在运行安装程序脚本时，您可以使用 `-s` 选项指定其他存储类名称。

如果您的 Kubernetes 集群没有存储配置程序（例如 NetApp Trident），您可以在运行安装程序脚本时使用 `-r` 选项提供本地文件系统路径。设置 `-r` 选项后，安装程序脚本会在提供的目录中创建三个永久性卷。此目录至少需要 150 GB 的可用空间。

下载并运行安装脚本

Cloud Insights 提供了Bash脚本、用于通过监控操作员启用Astra数据存储监控。安装脚本将安装一个采集单元、其中包含Astra Data Store收集器和一个Fluent Bit Agent。

下载 Cloud Insights 租户域名和选定的 Cloud Insights API 访问令牌后，此令牌将嵌入安装程序脚本中。

然后，指标将按如下所示发送：

- Cloud Insights 采集单元将指标发送到Cloud Insights 数据湖。
- Fluent Bit 会将日志发送到日志载入服务。

显示安装程序脚本帮助

安装程序脚本的完整帮助文本如下所示：

显示安装程序脚本帮助文本：

```
./cloudinsights-ads-monitoring.sh -h
```

响应：

```

USAGE: cloudinsights-ads-monitoring.sh [OPTIONS]
Configure monitoring of Astra Data Store by Cloud Insights.
OPTIONS:
  -h                                Display this help message.
  -d ci_domain_name                 Cloud Insights tenant domain name.
  -i kubernetes_ip                  Kubernetes API server IP address.
  -k ci_api_key                     Cloud Insights API Access Token.
  -n namespace                       Namespace for monitoring components. (default:
netapp-monitoring)
  -p kubernetes_port                 Kubernetes API server port. (default: 6443)
  -r root_pv_dir                     Create 3 Persistent Volumes in this directory
for the Acquisition Unit.
                                     Only specify this option if there is no Storage
Provisioner installed and the PVs do not already exist.
  -s storage_class                  Storage Class name for provisioning Acquisition
Unit PVs. If not specified, the default storage class will be used.
  -t kubernetes_token                Kubernetes API server token.

```

运行安装脚本

1. 如果您还没有 Cloud Insights 帐户，请创建一个。
2. 登录到 Cloud Insights。
3. 从 Cloud Insights 菜单中，单击 * 管理 * > * 数据收集器 *。
4. 单击 * + Data Collector* 以添加新收集器。



5. 单击 * Astra Data Store* 图块。
6. 选择正确的 Cloud Insights API 访问令牌或创建新令牌。
7. 按照说明下载安装程序脚本，更新权限并运行此脚本。

此脚本包含您的 Cloud Insights 租户 URL 和选定的 Cloud Insights API 访问令牌。



Kubernetes

default_ads_api_key1 (...d0gHof) ▼

Production Best Practices ?

[Need Help?](#)

- ## 2 Copy Installer Script

```
#!/usr/bin/env bash
SCRIPT='basename $0'

CI_DOMAIN_NAME="f49uaky.gstabler-ads.cloudinsights-dev.netapp.com"
CI_API_KEY="eyJraWQ0i0i50Tk5iIiwidHlwIjo1SldUIiwiYXNjIjo1SFZmZDQ0Iiw0Iiw0IjZG1pbmliImRpc3B3YXl0YW1LIjo1ZGVmYXVsdF9hZHNlYXByX2t0eEgK9uIGJlaGFzZiBvZiBhZG1pbmli"
```

- #### 4 Copy Permissions Command

```
chmod +x cloudinsights-ads-monitoring.sh
```

- 6 Copy Install Command

```
./cloudinsights-ads-monitoring.sh -i <KUBERNETES_IP> -t <KUBERNETES_TOKEN>
```

- ## 8 Complete Setup

4



如果脚本因错误而退出，您可以稍后在解决错误后再次运行它。如果您的环境不使用默认设置，则该脚本支持其他参数，例如监控操作员命名空间和 Kubernetes API 服务器端口。使用 `./cloudinsights-ads-monitoring.sh -h` 中的 `-h` 选项查看使用情况和帮助文本。

如果配置成功，安装脚本将生成如下输出：

```
Configuring Cloud Insights monitoring for Astra Data Store . . .
Configuring monitoring namespace
...
Configuring output sink and Fluent Bit plugins
Configuring Acquisition Unit
...
Acquisition Unit has been installed successfully.
Configuring Astra Data Store data collector
Astra Data Store collector data '<CLUSTER_NAME>' created
Configuration done!
```

代理 CR 示例

以下是运行安装程序脚本后 monitoring-NetApp 代理 CR 的外观示例。

```

spec:
  au:
    isEnabled: true
    storageClassName: auto-sc
  cluster-name: meg-ads-21-22-29-30
  docker-repo: docker.repo.eng.netapp.com/global/astra
  fluent-bit:
  - name: ads-tail
    outputs:
    - sink: ADS_STDOUT
    substitutions:
    - key: TAG
      value: firetapems
    - key: LOG_FILE
      values:
      - /var/log/firetap/*/ems/ems
      - /var/log/firetap/ems/*/ems/ems
    - key: ADS_CLUSTER_NAME
      value: meg-ads-21-22-28-29-30
  - name: agent
  - name: ads-tail-ci
    outputs:
    - sink: CI
    substitutions:
    - key: TAG
      value: netapp.ads
    - key: LOG_FILE
      values:
      - /var/log/firetap/*/ems/ems
      - /var/log/firetap/ems/*/ems/ems
    - key: ADS_CLUSTER_NAME
      value: meg-ads-21-22-28-29-30
  output-sink:
  - api-key: abcd
    domain-name: bz19ngz.gst-adsdemo.ci-dev.netapp.com
    name: CI
  serviceAccount: sa-netapp-monitoring
status:
  au-pod-status: UP
  au-uuid: eddeccc6-3aa3-4dd2-a98c-220085fae6a9

```

编辑 Cloud Insights 连接

您可以稍后编辑 Kubernetes API 令牌或 Cloud Insights API 访问令牌：

- 如果要更新 Kubernetes API 令牌，应从 Cloud Insights UI 编辑 Astra 数据存储收集器。
- 如果要更新用于遥测和日志的 Cloud Insights API 访问令牌，应使用 kubectl 命令编辑监控操作员 CR。

更新 **Kubernetes API** 令牌

1. 登录到 Cloud Insights。
2. 选择 * 管理 * > * 数据收集器 * 以访问数据收集器页面。
3. 找到 Astra Data Store 集群的条目。
4. 单击页面右侧的菜单，然后选择 * 编辑 *。
5. 使用新值更新 Kubernetes API Token 字段。
6. 选择 * 保存收集器 *。

更新 **Cloud Insights API** 访问令牌

1. 登录到 Cloud Insights。
2. 选择 * 管理 * > * API 访问 * 并单击 * + API 访问令牌 *，创建新的 Cloud Insights API 访问令牌。
3. 编辑代理 CR：

```
kubectl --namespace netapp-monitoring edit agent agent-monitoring-netapp
```

4. 找到 output-sink 部分，找到名为 CI 的条目。
5. 对于标签 api-key，请将当前值替换为新的 Cloud Insights API 访问令牌。

此部分如下所示：

```
output-sink:
  - api-key: <api key value>
    domain-name: <tenant url>
    name: CI
```

6. 保存并退出编辑器窗口。

监控操作员将更新 Fluent Bit 以使用新的 Cloud Insights API 访问令牌。

断开与 **Cloud Insights** 的连接

要断开与 Cloud Insights 的连接，您需要先从 Cloud Insights UI 中删除 Astra 数据存储收集器。完成此操作后，您可以从监控操作员中删除采集单元、Telegraf (如果已配置) 和 Fluent Bit 配置。

删除 **Astra** 数据存储收集器

1. 登录到 Cloud Insights。

2. 选择 * 管理 * > * 数据收集器 * 以访问数据收集器页面。
3. 找到 Astra Data Store 集群的条目。
4. 选择屏幕右侧的菜单，然后选择 * 删除 *。
5. 单击确认页面上的 * 删除 *。

删除采集单元、Telegraf (如果已配置)和Fluent Bit

1. 编辑代理 CR：

```
kubectl --namespace netapp-monitoring edit agent agent-monitoring-netapp
```

2. 找到 au 部分并将 isenabled 设置为 false
3. 找到 flual-bit 部分，然后删除名为 ads-tail -CI 的插件。如果没有其他插件，您可以删除 flual-bit 部分。
4. 如果配置了Telegraf、请找到`telegraf`部分、然后删除名为`ads-open-metric`的插件。如果没有其他插件，您可以删除 电报 部分。
5. 找到 output-sink 部分，然后卸下名为 CI 的接收器。
6. 保存并退出编辑器窗口。

监控操作员将更新Telegraf (如果已配置)和Fluent Bit配置、并删除采集单元POD。

7. 如果您使用本地目录作为采集单元 PV，而不是存储配置程序，请删除这些 PV：

```
kubectl delete pv au-lib au-log au-pv
```

然后，删除运行采集单元的节点上的实际目录。

8. 删除采集单元 POD 后，您可以从 Cloud Insights 中删除采集单元。
 - a. 在 Cloud Insights 菜单中，选择 * 管理 * > * 数据收集器 *。
 - b. 单击 * 采集单元 * 选项卡。
 - c. 单击采集单元 POD 旁边的菜单。
 - d. 选择 * 删除 *。

监控操作员将更新Telegraf (如果已配置)和Fluent Bit配置、并删除采集单元。

打开指标 API 帮助

下面列出了可用于从Astra数据存储收集指标的API。

- "help" 行说明了指标。
- "type" 行表示指标是量表还是计数器。

```

# HELP astrads_cluster_capacity_logical_percent Percentage cluster logical
capacity that is used (0-100)
# TYPE astrads_cluster_capacity_logical_percent gauge
# HELP astrads_cluster_capacity_max_logical Max Logical capacity of the
cluster in bytes
# TYPE astrads_cluster_capacity_max_logical gauge
# HELP astrads_cluster_capacity_max_physical The sum of the space in the
cluster in bytes for storing data after provisioning efficiencies, data
reduction algorithms and replication schemes are applied
# TYPE astrads_cluster_capacity_max_physical gauge
# HELP astrads_cluster_capacity_ops The IO operations capacity of the
cluster
# TYPE astrads_cluster_capacity_ops gauge
# HELP astrads_cluster_capacity_physical_percent The percentage of cluster
physical capacity that is used (0-100)
# TYPE astrads_cluster_capacity_physical_percent gauge
# HELP astrads_cluster_capacity_used_logical The sum of the bytes of data
in all volumes in the cluster before provisioning efficiencies, data
reduction algorithms and replication schemes are applied
# TYPE astrads_cluster_capacity_used_logical gauge
# HELP astrads_cluster_capacity_used_physical Used Physical capacity of a
cluster in bytes
# TYPE astrads_cluster_capacity_used_physical gauge
# HELP astrads_cluster_other_latency The sum of the accumulated latency in
seconds for other IO operations of all the volumes in a cluster. Divide by
astrads_cluster_other_ops to get the average latency per other operation
# TYPE astrads_cluster_other_latency counter
# HELP astrads_cluster_other_ops The sum of the other IO operations of all
the volumes in a cluster
# TYPE astrads_cluster_other_ops counter
# HELP astrads_cluster_read_latency The sum of the accumulated latency in
seconds of read IO operations of all the volumes in a cluster. Divide by
astrads_cluster_read_ops to get the average latency per read operation
# TYPE astrads_cluster_read_latency counter
# HELP astrads_cluster_read_ops The sum of the read IO operations of all
the volumes in a cluster
# TYPE astrads_cluster_read_ops counter
# HELP astrads_cluster_read_throughput The sum of the read throughput of
all the volumes in a cluster in bytes
# TYPE astrads_cluster_read_throughput counter
# HELP astrads_cluster_storage_efficiency Efficacy of data reduction
technologies. (logical used / physical used)
# TYPE astrads_cluster_storage_efficiency gauge
# HELP astrads_cluster_total_latency The sum of the accumulated latency in
seconds of all IO operations of all the volumes in a cluster. Divide by
astrads_cluster_total_ops to get average latency per operation

```

```

# TYPE astrads_cluster_total_latency counter
# HELP astrads_cluster_total_ops The sum of the IO operations of all the
volumes in a cluster
# TYPE astrads_cluster_total_ops counter
# HELP astrads_cluster_total_throughput The sum of the read and write
throughput of all the volumes in a cluster in bytes
# TYPE astrads_cluster_total_throughput counter
# HELP astrads_cluster_utilization_factor The ratio of the current cluster
IO operations based on recent IO sizes to the cluster iops capacity. (0.0
- 1.0)
# TYPE astrads_cluster_utilization_factor gauge
# HELP astrads_cluster_volume_used The sum of used capacity of all the
volumes in a cluster in bytes
# TYPE astrads_cluster_volume_used gauge
# HELP astrads_cluster_write_latency The sum of the accumulated latency in
seconds of write IO operations of all the volumes in a cluster. Divide by
astrads_cluster_write_ops to get the average latency per write operation
# TYPE astrads_cluster_write_latency counter
# HELP astrads_cluster_write_ops The sum of the write IO operations of all
the volumes in a cluster
# TYPE astrads_cluster_write_ops counter
# HELP astrads_cluster_write_throughput The sum of the write throughput of
all the volumes in a cluster in bytes
# TYPE astrads_cluster_write_throughput counter
# HELP astrads_disk_base_seconds Base for busy, pending and queued.
Seconds since collection began
# TYPE astrads_disk_base_seconds counter
# HELP astrads_disk_busy Seconds the disk was busy. 100 *
(astrads_disk_busy / astrads_disk_base_seconds) = percent busy (0-100)
# TYPE astrads_disk_busy counter
# HELP astrads_disk_capacity Raw Capacity of a disk in bytes
# TYPE astrads_disk_capacity gauge
# HELP astrads_disk_io_pending Summation of the count of pending io
operations for a disk times time. Divide by astrads_disk_base_seconds to
get the average pending operation count
# TYPE astrads_disk_io_pending counter
# HELP astrads_disk_io_queued Summation of the count of queued io
operations for a disk times time. Divide by astrads_disk_base_seconds to
get the average queued operations count
# TYPE astrads_disk_io_queued counter
# HELP astrads_disk_read_latency Total accumulated latency in seconds for
disk reads. Divide by astrads_disk_read_ops to get the average latency per
read operation
# TYPE astrads_disk_read_latency counter
# HELP astrads_disk_read_ops Total number of read operations for a disk
# TYPE astrads_disk_read_ops counter

```

```

# HELP astrads_disk_read_throughput Total bytes read from a disk
# TYPE astrads_disk_read_throughput counter
# HELP astrads_disk_write_latency Total accumulated latency in seconds for
disk writes. Divide by astrads_disk_write_ops to get the average latency
per write operation
# TYPE astrads_disk_write_latency counter
# HELP astrads_disk_write_ops Total number of write operations for a disk
# TYPE astrads_disk_write_ops counter
# HELP astrads_disk_write_throughput Total bytes written to a disk
# TYPE astrads_disk_write_throughput counter
# HELP astrads_value_scrape_duration Duration to scrape values
# TYPE astrads_value_scrape_duration gauge
# HELP astrads_volume_capacity_available The minimum of the available
capacity of a volume and the available capacity of the cluster in bytes
# TYPE astrads_volume_capacity_available gauge
# HELP astrads_volume_capacity_available_logical Logical available
capacity of a volume in bytes
# TYPE astrads_volume_capacity_available_logical gauge
# HELP astrads_volume_capacity_percent Percentage of volume capacity
available (0-100). (capacity available / provisioned) * 100
# TYPE astrads_volume_capacity_percent gauge
# HELP astrads_volume_capacity_provisioned Provisioned capacity of a
volume in bytes after setting aside the snapshot reserve. (size - snapshot
reserve = provisioned)
# TYPE astrads_volume_capacity_provisioned gauge
# HELP astrads_volume_capacity_size Total capacity of a volume in bytes
# TYPE astrads_volume_capacity_size gauge
# HELP astrads_volume_capacity_snapshot_reserve_percent Snapshot reserve
percentage of a volume (0-100)
# TYPE astrads_volume_capacity_snapshot_reserve_percent gauge
# HELP astrads_volume_capacity_snapshot_used The amount of volume snapshot
data that is not in the active file system in bytes
# TYPE astrads_volume_capacity_snapshot_used gauge
# HELP astrads_volume_capacity_used Used capacity of a volume in bytes.
This is bytes in the active filesystem unless snapshots are consuming more
than the snapshot reserve. (bytes in the active file system + MAX(0,
snapshot_used-(snapshot_reserve_percent/100*size))
# TYPE astrads_volume_capacity_used gauge
# HELP astrads_volume_other_latency Total accumulated latency in seconds
for operations on a volume that are neither read or write. Divide by
astrads_volume_other_ops to get the average latency per other operation
# TYPE astrads_volume_other_latency counter
# HELP astrads_volume_other_ops Total number of operations for a volume
that are neither read or write
# TYPE astrads_volume_other_ops counter
# HELP astrads_volume_read_latency Total accumulated read latency in

```

```
seconds for a volume. Divide by astrads_volume_read_ops to get the average
latency per read operation
# TYPE astrads_volume_read_latency counter
# HELP astrads_volume_read_ops Total number of read operations for a
volume
# TYPE astrads_volume_read_ops counter
# HELP astrads_volume_read_throughput Total read throughput for a volume
in bytes
# TYPE astrads_volume_read_throughput counter
# HELP astrads_volume_total_latency Total accumulated latency in seconds
for all operations on a volume. Divide by astrads_volume_total_ops to get
the average latency per operation
# TYPE astrads_volume_total_latency counter
# HELP astrads_volume_total_ops Total number of operations for a volume
# TYPE astrads_volume_total_ops counter
# HELP astrads_volume_total_throughput Total throughput for a volume in
bytes
# TYPE astrads_volume_total_throughput counter
# HELP astrads_volume_write_latency Total accumulated write latency in
seconds for volume. Divide by astrads_volume_write_ops to get the average
latency per write operation
# TYPE astrads_volume_write_latency counter
# HELP astrads_volume_write_ops Total number of write operations for a
volume
# TYPE astrads_volume_write_ops counter
# HELP astrads_volume_write_throughput Total write throughput for a volume
in bytes
# TYPE astrads_volume_write_throughput counter
```

使用 Prometheus 和 Grafana 监控指标

您可以使用Prometheus和Grafana监控Astra数据存储指标。您可以将Prometheus配置为从Astra Data Store Kubernetes集群指标端点收集指标、并且可以使用Grafana将指标数据可视化。

您需要什么？ **#8217** ； 将需要什么

- 确保已在Astra数据存储集群或可与Astra数据存储集群通信的其他集群上下载并安装Prometheus和Grafana软件包。按照官方文档中的说明安装每个工具：
 - ["安装 Prometheus"](#)
 - ["安装 Grafana"](#)
- Prometheus和Grafana需要能够与Astra Data Store Kubernetes集群进行通信。如果Astra Data Store集群上未安装Prometheus和Grafana、则需要确保它们可以与Astra Data Store集群上运行的指标服务进行通信。

配置 Prometheus

Astra数据存储在Kubernetes集群中的TCP端口9341上公开指标服务。您需要配置 Prometheus 以从此服务收集

指标。

步骤

1. 为您的 Prometheus 安装编辑 `Prometheus.yml` 配置文件。
2. 添加指向Astra Data Store服务名称及其端口的服务目标。例如：

```
scrape_configs:
static_configs:
- targets: ['astrads-metrics-service.astrads-system:9341']
```

3. 启动 Prometheus 服务。

配置 Grafana

您可以将 Grafana 配置为显示 Prometheus 收集的指标。

步骤

1. 为您的 Grafana 安装编辑 `datasources.yml` 配置文件。
2. 将 Prometheus 添加为数据源。例如：

```
apiVersion: 1

datasources:
- name: astradatastore-prometheus
  type: prometheus
  access: proxy
  url: http://localhost:9090
  jsonData:
    manageAlerts: false
```

3. 启动 Grafana 服务。
4. 按照 Grafana 文档中的说明进行操作 ["开始使用"](#)。

导入 Grafana 信息板模板

为安装Astra数据存储而下载的捆绑包文件包含Grafana信息板模板文件、您可以从Grafana中导入这些文件。这些信息板模板可帮助您查看Astra数据存储提供的指标类型以及查看方式。

步骤

1. 打开Astra Data Store `.tar.gz` 软件包。
2. 打开 `manifests` 目录。
3. 提取 `grafana_cluster.json` 和 `grafana_volume.json` 文件。
4. 使用 Grafana Web UI ， ["将信息板模板文件导入到 Grafana 中"](#)。

配置和监控事件日志

要监控事件管理系统（EMS）日志，您可以执行以下高级任务：

- [\[Configure monitoring in the Astra Data Store cluster custom resource \(CR\)\]](#)
- [\[Set up Cloud Insights\]](#)
- [\[Stream event logs to Elastic\]](#)。

在Astra Data Store集群自定义资源(CR)中配置监控

如果尚未在Astra Data Store集群CR上配置监控选项、您可以使用`astrad` extensions进行设置。

输入 ...

```
kubectl astrads monitoring setup -n <NAMESPACE OF AGENT INSTALLED> -r  
<DOCKER REPO TO FIND FLUENT/TELEGRAF ETC IMAGES>
```

其中：

- 已安装代理的命名空间：输入监控代理的命名空间，这是监控操作员的 monitoring-NetApp CR 的默认名称。
- `-r` 是可选的，用于设置 Fluent 或 Telegraf 映像所在的 Docker 注册表。默认情况下，此路径设置为 `docker.repo.eng.netapp.com/global/astra`，您可以进行更改。

设置 Cloud Insights

要查看日志，设置 Cloud Insights 是可选的；但是，使用 Cloud Insights 查看数据很有帮助。请参见 ["如何设置 NetApp Cloud Insights"](#) 用于Astra数据存储。

将事件日志流式传输到 Elastic

要将 EMS 事件和其他 POD 日志流式传输到 Elastic 等第三方端点，请使用 astrad 扩展。

输入 ...

```
kubectl astrads monitoring --host <ELASTIC HOST NAME> --port <ELASTIC HOST  
PORT> es
```



弹性主机名可以是 IP 地址。

版权信息

版权所有©2022 NetApp、Inc.。保留所有权利。Printed in the U.S.版权所涵盖的本文档的任何部分不得以任何形式或任何手段复制、包括影印、录制、磁带或存储在电子检索系统中—未经版权所有者事先书面许可。

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

本软件由NetApp按"原样"提供、不含任何明示或默示担保、包括但不限于适销性和特定用途适用性的默示担保、特此声明不承担任何任何责任。IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

商标信息

NetApp、NetApp标识和中列出的标记 <http://www.netapp.com/TM> 是NetApp、Inc.的商标。其他公司和产品名称可能是其各自所有者的商标。