



# Installing Thunder Observability Agent 1.0.0

June, 2023

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# Introduction

---

Thunder Observability Agent (TOA) is a lightweight autonomous data processing engine that can be externally installed and configured for any Thunder device.

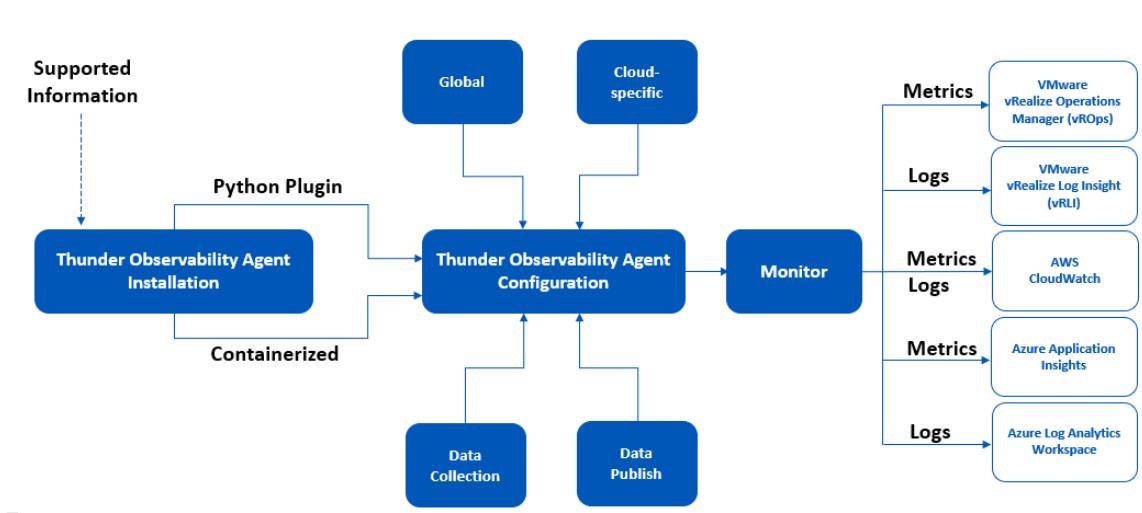
The TOA offers the following capabilities for Thunder® Application Delivery Controller (ADC):

- Collects, processes, and publishes 14 Thunder metrics. The default data collection frequency is 1 minute. The metrics can be published on the same platform where the Thunder instance is deployed. For more information on Thunder metrics, see [Supported Thunder Metric](#).
- Collects, processes, and publishes Thunder Syslogs. The default data collection frequency is 1 minute. The logs can be published on the same platform where the Thunder instance is deployed. Additionally, logs can also be sent to any AWS, Azure, or VMware platforms. For more information on Thunder logs, see [Supported Thunder Logs](#).
- Manages the data collection, processing, aggregation, and publishing internally.
- Provides multitasking capabilities to collect and process data from multiple Thunder instances and their partitions simultaneously. By default, it collects data from a shared partition.
- TOA supports Shared and L3V partitions. The maximum number of partitions supported per Thunder is 20.
- Installs on any orchestration platform such as public cloud compute instances, private cloud physical or virtual machines, hypervisor VMs, and on-premise physical hardware and is self-driven.
- Supports Linux, CentOS, and Ubuntu platforms as a Python Plugin installation package and Docker containerization.
- Supports single or multiple Thunder instances.
- Supports Thunder instances running under AAWS Auto Scaling Group or Azure Virtual Machine Scale Set (VMSS).

- Collects data from any type of Thunder device installed on public cloud compute instances, private cloud physical or virtual machines, hypervisor VMs, and on-premise physical hardware installation.
- Publishes data to [Azure Cloud](#), [AWS Cloud](#), and [VMware ESXi](#).

The following figure shows the TOA workflow.

Figure 1 : TOA Workflow



## Supported Information

The following topics are covered:

- [Supported Technology](#)
- [Supported Thunder Metrics](#)
- [Supported Thunder Logs](#)
- [Supported ACOS versions](#)
- [Supported Cloud Apps](#)
- [License Information](#)

## Supported Technology

The following table provides TOA-supported technologies:

Table 1 : Supported Technologies

| Name     | Version | License  |
|----------|---------|--|
| Python   | 3.10    | PSF License<br><a href="#">Python 3.3 license   Python.org</a> |
| Requests | 2.27.1  | Apache Software License 2.0                                    |
| Boto3    | 1.24.25 | <a href="#">Apache 2.0 (amazon.com)</a>                        |

## Supported Thunder Metrics

The following table lists the TOA-supported Thunder metrics:

Table 2 : Supported Thunder Metrics

| Metric                       | Description   |
|------------------------------|---|
| CPU Usage Percentage (Data)  | Average data CPU usage, in percentage, for all data CPU configured within a Thunder instance for the last data collection cycle.  |
| Memory Usage Percentage      | Memory (RAM) usage, in percentage, of a Thunder instance for the last data collection cycle.  |
| Disk Usage Percentage        | Average disk storage usage, in percentage, for all disks associated with a Thunder instance for the last data collection cycle.   |
| Throughput Rate (Global/BPS) | Total Thunder system global throughput bits per sec from Thunder instance to the server for the last data collection cycle.   |
| Interface Down Count (Data)  | Count of the total data network interfaces configured for a Thunder instance which is inactive for the last data collection cycle.  |
| Total New Connection (Sec)   | Count of the total new connections sent from Thunder instance to the server for the last data collection cycle per second. This includes (L4-conns-per-sec, L7-conns-per-sec, L7-trans-per-sec, ssl-conns-per-sec, ip-nat-conns-per-sec). |
| Transactions Rate            | Count of the total L7 transactions made per second from   |

Table 2 : Supported Thunder Metrics

| Metric                 | Description  |
|------------------------|--|
| (Sec)                  | Thunder instance to the server for the last data collection cycle.   |
| Server Down Count      | Count of the total web or app servers configured in the Thunder instance that are not reachable from Thunder for the last data collection cycle.   |
| Server Down Percentage | Percentage of the total web or app servers configured in the Thunder instance that are not reachable from Thunder for the last data collection cycle.  |
| SSL Errors Count       | Count of the total errors that occurred during data transmission from Thunder to the server due to SSL connection, negotiate, encrypt, and decrypt for the last data collection cycle.                       |
| Server Errors Count    | Count of the total errors that occurred during data transmission from Thunder to the server with status codes 4xx and 5xx for that last data collection cycle.   |
| Total Session Count    | Count of the total active sessions of the Thunder instance for the last data collection cycle.   |
| Packet Rate (Sec)      | Count of the total packets sent from or received at the Thunder instance for the last collection cycle.<br><br><b>NOTE:</b> Applicable for ACOS 5.2.1-P7, ACOS 6.0.0, and higher                             |
| Packet Drop Rate (Sec) | Count of the total packets dropped while sending data from or receiving data at the Thunder instance for the last collection cycle.<br><br><b>NOTE:</b> Applicable for ACOS 5.2.1-P7, ACOS 6.0.0, and higher |

## Supported Thunder Logs

The following table lists the TOA-supported Thunder logs:

Table 3 : Supported Thunder Logs

| Logs    | Description   |
|---------|---|
| SysLogs | <p>Thunder internal logs such as:</p> <ul style="list-style-type: none"> <li>• SSL connection, negotiate, encrypt, and decrypt</li> <li>• Status codes 4xx and 5xx</li> </ul> |

## Supported ACOS versions

The following table provides the TOA-supported ACOS versions:

Table 4 : Supported ACOS versions

| ACOS Version  | TOA Version | ADC | CGN | SSLi | TPS |
|---|-------------|-----|-----|------|-----|
| <a href="#"><u>64-bit Advanced Core OS (ACOS) version 6.0.0-P2-SP1, build 6</u></a> | 1.0.0       | ✓   | X   | X    | X   |
| <a href="#"><u>64-bit Advanced Core OS (ACOS) version 6.0.0-P1, build 47</u></a>    | 1.0.0       | ✓   | X   | X    | X   |
| <a href="#"><u>64-bit Advanced Core OS (ACOS) version 5.2.1-P7, build 160</u></a>   | 1.0.0       | ✓   | X   | X    | X   |
| <a href="#"><u>64-bit Advanced Core OS (ACOS) version 5.2.1-P6, build 74</u></a>    | 1.0.0       | ✓   | X   | X    | X   |
| <a href="#"><u>64-bit Advanced Core OS (ACOS) version 5.2.1-P5, build 114</u></a>   | 1.0.0       | ✓   | X   | X    | X   |
| <a href="#"><u>64-bit Advanced</u></a>  | 1.0.0       | ✓   | X   | X    | X   |

Table 4 : Supported ACOS versions

| ACOS Version   | TOA Ver-sion | ADC | CGN | SSLi | TPS |
|--|--------------|-----|-----|------|-----|
| <a href="#"><u>Core OS (ACOS)<br/>version 4.1.4-<br/>GR1, build 34</u></a> |              |     |     |      |     |

## Supported Cloud Apps

The following table provides the TOA supported cloud platforms and monitoring applications:

Table 5 : Supported Cloud platforms and their monitoring applications

| Cloud Platform | Monitoring Applications  |
|----------------|--|
| AWS            | <ul style="list-style-type: none"> <li>• CloudWatch</li> </ul>   |
| Azure          | <ul style="list-style-type: none"> <li>• Application Insights</li> <li>• Log Analytics Workspace</li> </ul>                    |
| VMware ESXi    | <ul style="list-style-type: none"> <li>• vRealize Operations Manager (vROps)</li> <li>• vRealize Log Insight (vRLI)</li> </ul> |

## License Information

For TOA License information, see [THUNDER OBSERVABILITY AGENT END USER SOFTWARE LICENSE AGREEMENT](#).

# Install TOA

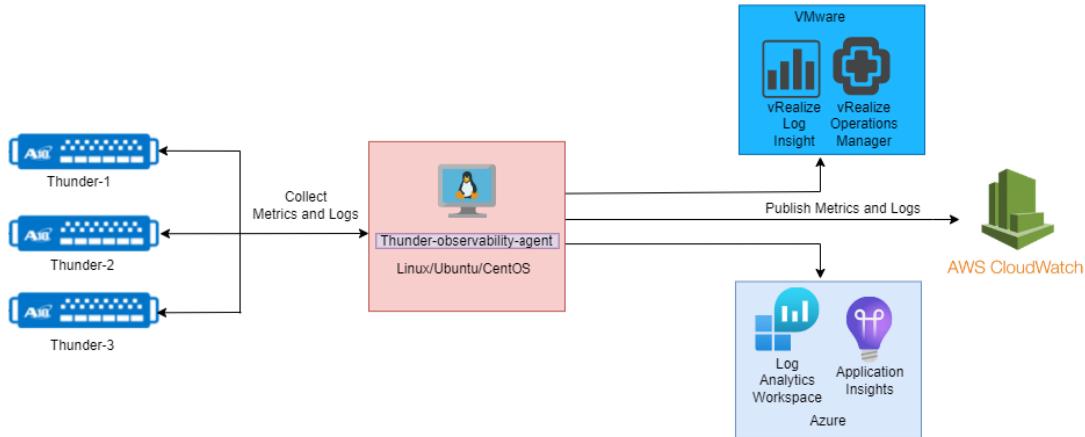
TOA is a standalone software that can be installed on any orchestration platform. The following installation options are available:

- [Python Plugin Installation](#)

TOA is installed on Linux/CentOS/Ubuntu platform using a Python plugin.

[Figure 2](#) illustrates the installation of TOA in the Python plugin architecture.

Figure 2 : Python Plugin Installation Architecture

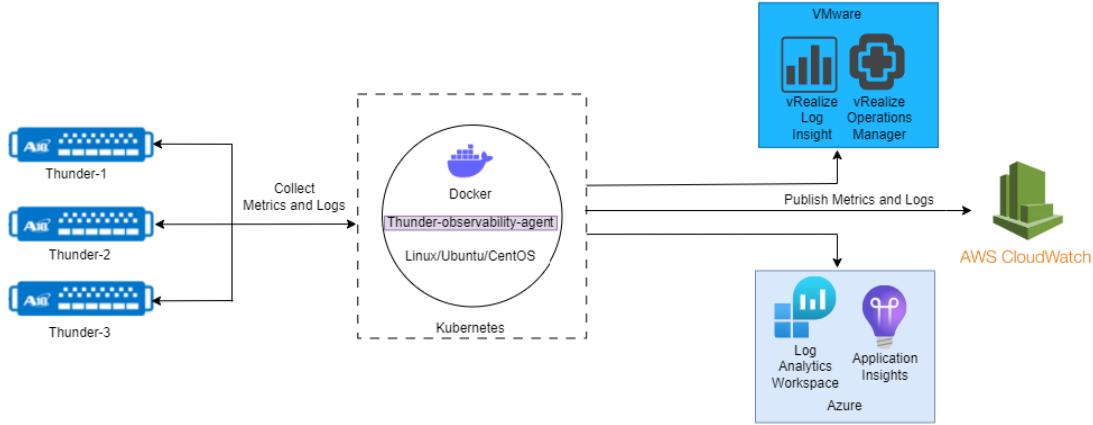


- [Containerized Installation](#)

TOA is installed on the Kubernetes cluster using a docker image.

[Figure 3](#) illustrates the installation of TOA in a containerized architecture.

Figure 3 : Containerized Installation Architecture



## Python Plugin Installation

This section describes how to install and configure a Thunder Observability Agent (TOA) on any public cloud, private cloud, hypervisor VM, or on-premise machine using Python plugin.

The following topics are covered:

- [Prerequisites](#)
- [Installation Steps](#)

## Prerequisites

The following tables list the prerequisites for installing TOA using the Python plugin:

### Hardware Dependencies

Table 6 : Hardware Dependencies

| Requirement     | Description  |
|-----------------|--|
| Virtual Machine | <p>2 GB RAM, 1 CPU, 4 GB</p> <p><b>NOTE:</b> The hardware configuration is applicable for one to ten Thunder instances with moderate transactions.</p> |

Table 6 : Hardware Dependencies

| Requirement   | Description  |
|---------------|--|
| Platform      | Any public cloud, private cloud, hypervisor VM, or on-premise machine. |
| Instance Type | Dedicated or Shared.   |

## Software Dependencies

Table 7 : Software Dependencies

| Requirement      | Description   |
|------------------|---|
| Operating System | <ul style="list-style-type: none"> <li>• <a href="#">CentOS 7</a> or higher</li> <li>• <a href="#">Ubuntu 20</a> or higher</li> </ul> |
| Python           | 3.6 or higher   |
| Access-level     | Root  |

## Installation Steps

To install TOA using the Python plugin, perform the following steps:

1. Log in to the instance where you want to install TOA.
2. Depending on your operating system, install Python version, Crontab, and Syslog.  
For the installation steps, see [Install Python, Crontab, and Syslog](#).  
If the Python version, Crontab, and Syslog are already installed, skip this step.
3. Create a virtual environment.

```
pip3 install virtualenv
cd /usr
virtualenv toaenv
source toaenv/bin/activate
```

4. Run the following command to install the TOA:

```
pip3 install thunder-observability-agent
```

After the execution, all the following configuration files are available at the default location /usr/toaenv/thunder-observability-agent:

- main.properties
- config.json
- logging.conf
- init.sh

5. Run init.sh, a one-time execution script, to enable crontab job for data collection and create credential files for Thunder and cloud providers:

```
cd /usr/toaenv/thunder-observability-agent  
sh init.sh
```

After the execution, all the following files are available at the /root/ hidden folder:

- .thunder/credentials
- .aws/config
- .aws/credentials
- .azure/credentials
- .vmware/credentials

6. If you want to change the default location of the TOA config files, update the environment variable `TOA_CONFIG_PATH` and the [Logging](#) file.

If you do not want to change the default location, skip this step.

7. If you want to change the credentials file location, update the [Main Properties](#) file.

8. Verify [Crontab](#) configuration.

9. Verify TOA installation.

The `agent.log` file is created at the /var/log/thunder-observability-agent path. For the sample `agent.log` file, see [TOA Logging](#).

10. Edit the configuration files.

Depending on your cloud provider, configure the following files mentioned in [Table 8](#):

- Thunder credentials to collect data from Thunder.
- Cloud credentials to establish a connection with the cloud provider.
- Config.json to publish required metrics or logs.

Table 8 : Cloud specific Configuration Files

| Cloud  | File name   |
|--------|---|
| AWS    | <ul style="list-style-type: none"> <li>• <a href="#">Thunder Credentials</a></li> <li>• <a href="#">AWS Config</a></li> <li>• <a href="#">AWS Credentials</a></li> <li>• <a href="#">Config JSON</a></li> </ul> |
| Azure  | <ul style="list-style-type: none"> <li>• <a href="#">Thunder Credentials</a></li> <li>• <a href="#">Azure Credentials</a></li> <li>• <a href="#">Config JSON</a></li> </ul>                                     |
| VMware | <ul style="list-style-type: none"> <li>• <a href="#">Thunder Credentials</a></li> <li>• <a href="#">VMware Credentials</a></li> <li>• <a href="#">Config JSON</a></li> </ul>                                    |

## 11. Monitor Thunder metrics and logs.

For more information, see [Monitor Dashboard](#).

## Containerized Installation

This section describes how to install TOA in a single container pod of the Kubernetes cluster using YAML files.

The following topics are covered:

- [Prerequisites](#)
- [Installation Steps](#)

## Prerequisites

The following are the prerequisites for installing TOA using Containers:

- Kubernetes environment
- Download the [Kubernetes TOA manifest files](#) installation files.

## Installation Steps

To install the TOA in a container, perform the following steps:

1. Run the following command to create TOA namespace:

```
kubectl create namespace thunder-observability-agent
```

2. Run the following command to set TOA as the default Kubernetes namespace:

```
kubectl config set-context --current --namespace=thunder-observability-agent
```

3. Edit the YAML files.

Depending on your cloud provider, configure the following files mentioned in [Table 9](#):

- Thunder credentials to collect data from Thunder.
- Cloud credentials to establish a connection with the cloud provider.
- configmap.yaml to publish required metrics or logs.

Table 9 : Cloud specific Configuration Files

| Cloud | File name          | Reference  |
|-------|--------------------|--|
| AWS   | aws-configmap.yaml | <ul style="list-style-type: none"> <li>• <a href="#">Main Properties</a></li> <li>• <a href="#">Config JSON</a></li> <li>• <a href="#">Logging</a></li> </ul>            |
|       | aws-secret.yaml    | <ul style="list-style-type: none"> <li>• <a href="#">AWS Config</a></li> <li>• <a href="#">AWS Credentials</a></li> <li>• <a href="#">Thunder Credentials</a></li> </ul> |

Table 9 : Cloud specific Configuration Files

| Cloud  | File name             | Reference   |
|--------|-----------------------|---|
| Azure  | azure-configmap.yaml  | <ul style="list-style-type: none"> <li>• <a href="#">Main Properties</a></li> <li>• <a href="#">Config JSON</a></li> <li>• <a href="#">Logging</a></li> </ul> |
|        | azure-secret.yaml     | <ul style="list-style-type: none"> <li>• <a href="#">Azure Credentials</a></li> <li>• <a href="#">Thunder Credentials</a></li> </ul>                          |
| VMware | vmware-configmap.yaml | <ul style="list-style-type: none"> <li>• <a href="#">Main Properties</a></li> <li>• <a href="#">Config JSON</a></li> <li>• <a href="#">Logging</a></li> </ul> |
|        | vmware-secret.yaml    | <ul style="list-style-type: none"> <li>• <a href="#">VMware Credentials</a></li> <li>• <a href="#">Thunder Credentials</a></li> </ul>                         |

4. Run the following commands to apply the cloud-specific configuration:

```
kubectl apply -f <cloud-provider>-configmap.yaml
kubectl apply -f <cloud-provider>-secret.yaml
```

5. Run any of the following commands to apply and create a container:

```
kubectl apply -f <cloud-provider>-pod.yaml
```

or

```
kubectl apply -f <cloud-provider>-cronjob.yaml
```

6. Verify TOA installation.

The `agent.log` file is created at the `/var/log/thunder-observability-agent` path. For the sample `agent.log` file, see [TOA Logging](#).

7. Monitor Thunder metrics and logs.

For more information, see [Monitor Dashboard](#).

---

**NOTE:**

By default, the system works using the default configuration.  
TOA only supports a single pod installation.

---

# Configure TOA

---

This section lists the global TOA configuration files and cloud-specific configuration files that are required to establish a connection with TOA.

The following topics are covered:

|   |    |
|---|----|
| <a href="#">Global Configuration</a>          | 18 |
| <a href="#">Cloud-specific Configuration</a>  | 23 |
| <a href="#">Data Collection Configuration</a> | 27 |
| <a href="#">Data Publish Configuration</a>    | 32 |

## Global Configuration

The following files are used for the global TOA configurations:

- [Main Properties](#)
- [Logging](#)
- [Crontab](#)

## Main Properties

---

This file lists the global TOA configuration parameters. If you want to change the configuration file path, this file must be updated with the correct paths.

**File Path:** /usr/toaenv/thunder-observability-agent/main.properties

Table 10 : File Parameters

| Parameter                | Description  | Default Value |
|--------------------------|--|---------------|
| log_collection_delay_min | Specifies the latency of log collection in minutes.<br><br>The system considers the Thunder logs that are generated from the Start Time until the End Time as: | 0             |

Table 10 : File Parameters

| Parameter              | Description  | Default Value |
|------------------------|--|---------------|
|                        | <p>Start Time = Last data collection time</p> <p>End Time = Current data collection time - &lt;log_collection_delay_min&gt;</p> <p><b>Example</b></p> <p>If the current data collection time is 10:00:00 AM and the last data collection time is 09:59:00 AM, then:</p> <p>the Start Time is 9:59:00 AM.</p> <p>the End Time is 10:00:00 AM (which is 10:00:00 AM - 0 minutes).</p> <p>So, TOA collects all the logs generated by Thunder instance from 9:59:00 AM to 10:00:00 AM.</p> |               |
| cron_job_frequency_min | <p>Specifies the cron job frequency in minutes.</p> <p>This parameter should match with the crontab -e job definition. The system considers crontab -e for job scheduling. If the frequency is changed in this parameter, it should also change in the crontab file.</p> <p>For more information, see <a href="#">Crontab</a>.</p>   | 1             |
| http_ssl_verify        | <p>Disables SSL certificate verification over HTTPS.</p> <p>If a user wants to enable SSL:</p> <ul style="list-style-type: none"> <li>For CA signed certificate configured in Thunder, set the parameter to <b>True</b>.</li> </ul>  | False         |

Table 10 : File Parameters

| Parameter                   | Description  | Default Value                                       |
|-----------------------------|--|---|
|                             | <p><b>NOTE:</b> For a self-signed certificate configured in Thunder, create a *.pem file, import the Thunder public certificate, and provide the path in place of <b>True</b>.</p> <p><b>Example</b><br/> <code>/usr/toaenv/thunder-observability-agent/toa.pem</code></p> <hr/> <p><b>NOTE:</b> If vROps and vRLI have self-signed certificates, then their public certificates must be imported in *.pem file.</p> |   |
| http_connection_timeout_sec | Specifies the maximum amount of time, in seconds, that the TOA waits to set up an HTTP connection to communicate with any Thunder instance.  | 15  |
| max_threads                 | Specifies the maximum number of threads to be created at the same time.  | 2000  |
| config_path                 | Specifies the configuration file path for publishing logs and metrics.   | /usr/toaenv/thunder-observability-agent/config.json |
| thunder_credentials_path    | <p>Specifies the configuration file path to collect data from any of the following:</p> <ul style="list-style-type: none"> <li>• <a href="#">Single Thunder Instance</a></li> <li>• <a href="#">Multiple Thunder Instances</a></li> <li>• <a href="#">Thunder Instances in AWS Auto scaling Group</a></li> <li>• <a href="#">Thunder Instances in Azure VMSS</a>.</li> </ul>   | /root/.thunder/credentials                          |

Table 10 : File Parameters

| Parameter               | Description   | Default Value             |
|-------------------------|---|---------------------------|
| aws_credentials_path    | <p>Specifies the AWS credentials file path to establish a connection and publish the data to AWS CloudWatch.</p> <p><b>NOTE:</b> Applicable only if you want to publish the Thunder data to AWS CloudWatch.</p>                                 | /root/.aws/credentials    |
| aws_config_path         | <p>Specifies the AWS configuration file path to publish the data.</p> <p><b>NOTE:</b> Applicable only if you want to publish the Thunder data to AWS CloudWatch.</p>  | /root/.aws/config         |
| azure_credentials_path  | <p>Specifies the Azure credentials file path to establish the connection and publish the data.</p> <p><b>NOTE:</b> Applicable only if you want to publish the Thunder data to Azure Application Insights and Azure Log Analytics Workspace.</p> | /root/.azure/credentials  |
| vmware_credentials_path | <p>Specifies the VMware credentials file path to establish the connection and publish the data.</p> <p><b>NOTE:</b> Applicable only if you want to publish the Thunder data to VMware vROps.</p>  | /root/.vmware/credentials |

## Logging

This file lists the TOA logging configurations.

**File Path:** /usr/toaenv/thunder-observability-agent/logging.conf

## Configure TOA

```
[loggers]
keys=root

[handlers]
keys=hand01

[formatters]
keys=form01

[logger_root]
level=INFO
handlers=hand01


[handler_hand01]
class=logging.handlers.RotatingFileHandler

# ERROR, INFO
level=INFO
formatter=form01

# logFilePath, append, maxBytes, backupCount
args=('/var/log/thunder-observability-agent/agent.log', 'a', 5000000,
100)

[formatter_form01]
format=%(asctime)s - %(filename)s:%(lineno)d - %(levelname)s - %
(message)s
datefmt=
style=%
validate=True
class=logging.Formatter
```

## Crontab

By default, TOA creates the crontab configuration file that contains the command to configure the data collection frequency. This command is executed at regular

intervals.

To verify the crontab configuration, perform the following steps:

1. Run the following command to verify the Python version:

```
python3 --version
```

In case if the version is other than `python3.10`, then replace in the crontab.

2. Run the following command to open the crontab file:

```
$ crontab -e
```

3. In case if required, edit the Python version as appropriate:

```
*/1 * * * * /usr/toaenv/bin/python3 /usr/toaenv/lib/python3.10/site-packages/thunder-observability-agent/toa.py
```

---

**NOTE:** By default, TOA collects data at a frequency of 1 minute. If you are changing the frequency in the `crontab` file, you should change the `cron_job_frequency_min` parameter in the `main.properties` as well and vice-versa. For more information, see [Main Properties](#).

---

## Cloud-specific Configuration

The following information is required to setup the cloud-specific configuration to publish the Thunder metrics and logs.

- [AWS Config](#)  
(Applicable only if you want to publish the data to AWS CloudWatch)
- [AWS Credentials](#)  
(Applicable only if you want to publish the data to AWS CloudWatch)
- [Azure Credentials](#)  
(Applicable only if you want to publish the data to Azure Application Insights and Azure Log Analytics Workspace)
- [VMware Credentials](#)  
(Applicable only if you want to publish the data to vRealize Operations (vROps))

## AWS Config

This file lists the AWS configurations to publish the Thunder metrics or logs to AWS CloudWatch.

**File Path:** /root/.aws/config

Update the following parameters according to your AWS setup:

```
[default]
region = XXXX
output = XXXX
```

Table 11 : AWS Config File Parameters

| Parameter | Description  |
|-----------|--|
| region    | Specifies the AWS logged-in user's working <a href="#">region</a> .<br><br><b>Example</b><br>us-east-1 |
| output    | Specify <code>json</code> as the AWS CLI output format.  |

For sample configuration, see [Examples](#).

## AWS Credentials

This file lists the AWS credential configurations to publish the Thunder metrics or logs to AWS CloudWatch.

**File Path:** /root/.aws/credentials

Update the following parameters according to your AWS setup:

```
[default]
aws_access_key_id = XXXX
aws_secret_access_key = XXXX
```

Table 12 : AWS Credentials File Parameters

| Parameter             | Description   |
|-----------------------|---|
| aws_access_key_id     | To get the access key ID and secret access key, perform the following steps:<br><ol style="list-style-type: none"> <li>1. Open the <a href="#">IAM console</a>.</li> <li>2. On the navigation menu, select <b>Users</b>.</li> <li>3. Select your IAM user name.</li> <li>4. Open the <b>Security credentials</b> tab, and select <b>Create access key</b>.</li> <li>5. To view the new access key, select <b>Show</b>.</li> </ol> |
| aws_secret_access_key |   |

For sample configuration, see [Examples](#).

## Azure Credentials

This file lists the Azure credential configurations to publish the Thunder metrics or logs to Azure Application Insights and Azure Log Analytics Workspace respectively.

**File Path:** /root/.azure/credentials

Update the following parameters according to your Azure setup:

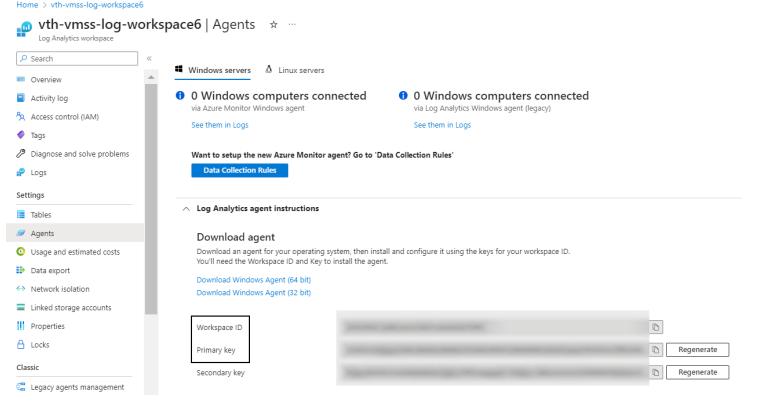
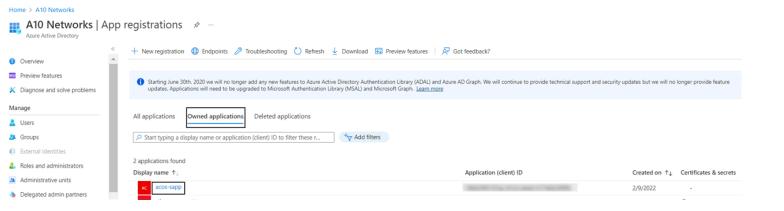
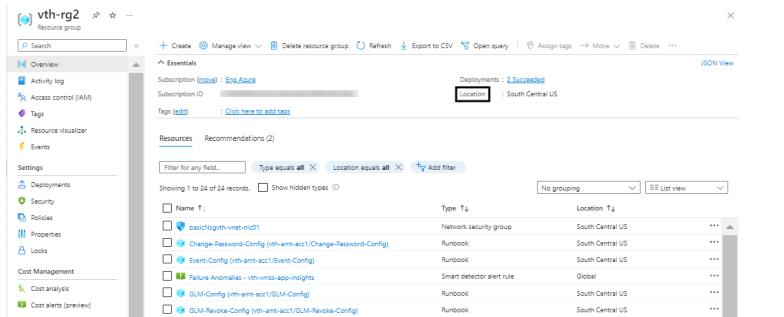
```
azure_workspace_primary_key = XXXX
azure_client_id = XXXX
azure_secret_id = XXXX
azure_tenant_id = XXXX
azure_location = XXXX
```

Table 13 : Azure Credentials File Parameters

| Parameter                   | Description  |
|-----------------------------|--|
| azure_workspace_primary_key | To get the workspace primary key, go to <b>Azure Portal</b> > <b>Azure services</b> > <b>Log Analytics workspaces</b> > < <i>log_analytics_workspace</i> > > <b>Settings</b> > <b>Agents</b> .<br>Figure 4 : Agents window |

## Configure TOA

Table 13 : Azure Credentials File Parameters

| Parameter       | Description   |
|-----------------|---|
|                 |   |
| azure_client_id | To get the client ID, secret ID, and tenant ID, go to <b>Azure Portal &gt; Azure services &gt; Azure Active Directory &gt; App Registration &gt; Owned applications &gt; &lt;application_name&gt;</b> . |
| azure_secret_id |    |
| azure_tenant_id |   |
| azure_location  | To get the location, go to <b>Azure Portal &gt; Azure services &gt; Resource Groups &gt; &lt;your_resource_group&gt; &gt; Overview &gt; Essentials &gt; Location</b> .                                  |
|                 |   |

For sample configuration, see [Examples](#).

## VMware Credentials

This file lists the VMware credential configurations to publish the metrics or logs.

**File Path:** /root/.vmware/credentials

Update the following parameters according to your VMware setup:

```
vmware_vrops_username = XXXX
vmware_vrops_password = XXXX
```

Table 14 : VMware Credentials File Parameters

| Parameter             | Description                             |
|-----------------------|---|
| vmware_vrops_username | Specifies your vROps login credentials. |
| vmware_vrops_password |   |

For sample configuration, see [Examples](#).

## Data Collection Configuration

In your topology, there can be a single, multiple, or auto scale Thunder instances that are either installed on AWS, Azure, or VMware compute instances. To collect the Thunder metrics or logs, configure the Thunder `credentials` file depending on the type of Thunder instance/s:

- [Single Thunder Instance](#)
- [Multiple Thunder Instances](#)
- [Thunder Instances in AWS Auto scaling Group](#)
- [Thunder Instances in Azure VMSS](#)

For more information on TOA - Thunder configuration with, see [TOA Thunder Configuration Matrix](#).

## Thunder Credentials

This file lists the Thunder credential configurations to collect the Thunder metrics, logs, or both.

**File Path:** /root/.thunder/credentials

Update the Thunder `credentials` file to provide the credentials of the Thunder instance/s whose metrics or logs are to be monitored as per the type of Thunder instance:

### Single Thunder Instance

Provide the details of the Thunder instance running on any platform.

```
{  
    "thunders": [ {  
        "ip": "XXXX",  
        "username": "XXXX",  
        "password": "XXXX",  
        "resource_id": "XXXX"  
        "active_partitions": "shared"  
    } ]  
}
```

### Multiple Thunder Instances

Provide the details of the Thunder instances running on any platform.

```
{  
    "thunders": [{  
        "ip": "XXXX",  
        "username": "XXXX",  
        "password": "XXXX",  
        "resource_id": "XXXX"  
        "active_partitions": "shared"  
    },  
    {  
        "ip": "XXXX",  
        "username": "XXXX",  
        "password": "XXXX",  
        "resource_id": "XXXX"  
        "active_partitions": "shared"  
    }]  
}
```

### Thunder Instances in AWS Auto scaling Group

Provide the details of the Thunder instances running in AWS Auto Scaling Group.

```
{  
    "autoscale" : 1,  
    "provider" : "aws",  
    "thunders": [{  
        "username": "XXXX",  
        "password": "XXXX",  
        "resource_id": "XXXX"  
        "active_partitions": "shared"  
    }]  
}
```

### Thunder Instances in Azure VMSS

Provide the details of Thunder instances running in Azure VMSS.

```
{
    "autoscale" : 1,
    "provider" : "azure",
    "thunders": [
        {
            "username": "XXXX",
            "password": "XXXX",
            "resource_id": "XXXX"
            "active_partitions": "shared"
        }
    ]
}
```

Table 15 : Thunder Credentials File Parameters

| Parameter   | Description   |
|-------------|---|
| autoscale   | Specify 1 if the Thunder instance is in AWS auto scale group or Azure virtual machine scale set.<br>By default, it is disabled.   |
| provider    | Specifies the cloud provider only if the Thunder instance is in AWS auto scale group or Azure virtual machine scale set ( <code>autoscale=1</code> ). The following options are available: <ul style="list-style-type: none"> <li>• aws</li> <li>• azure</li> </ul> |
| thunders    | Specifies the Thunder instance details. The following parameters are available: <ul style="list-style-type: none"> <li>• ip</li> <li>• username</li> <li>• password</li> <li>• resource_id</li> </ul>   |
| ip          | Specifies the Thunder instance IP address.  |
| username    | Specifies the Thunder instance username.  |
| password    | Specifies the Thunder instance password.  |
| resource_id | Specifies the compute instance resource IDS on which Thunder is deployed.   |

Table 15 : Thunder Credentials File Parameters

| Parameter         | Description  |
|-------------------|--|
| active_partitions | <p>For more information, see <a href="#">Get Resource ID</a>.</p> <p>Specifies one or more comma-separated partition/s for which the Thunder metrics or logs are viewed. By default, the active partition is "Shared".</p> <p><b>For example:</b> "SHARED, Px"</p> <p>The maximum number of partitions supported per Thunder is 20.</p> <p>Only L3V active partitions are supported.</p> <p>To view Thunder metrics or logs of all active partitions, specify "*".</p> <p>To collect data from one active partition, one session is required through management interface.</p> <p><b>For example:</b> If a user has defined 20 partitions in one Thunder device then 20 concurrent sessions are created in the device while collecting the data.</p> |

For sample configuration, see [Examples](#).

## TOA Thunder Configuration Matrix

The following table provides the TOA Thunder Configuration Matrix.

Table 16 : TOA Thunder Configuration Matrix

| Logs    | Metrics | Cron Cycle | Partition per Thunder               | Maximum Number of Thunder devices |
|---------|---------|------------|-------------------------------------|-----------------------------------|
| Enabled | Enabled | 1 min      | Up to 20 Partitions on each Thunder | Up to 05 Thunder Device           |
| Enabled | Enabled | 1 min      | Up to 08 Partitions on each Thunder | Up to 10 Thunder Device           |
| Enabled | Enabled | 1 min      | Up to 06 Partitions on each Thunder | Up to 15 Thunder Device           |

**For example:** If all logs and all metrics are enabled for every 1 minute of the data collection cycle with 20 active partitions on each Thunder device, ideally up to 5 Thunder devices can be configured per TOA instance.

## Data Publish Configuration

The Thunder metrics and logs can be published on the cloud platforms such as AWS, Azure, or VMware. To publish the Thunder metrics or logs, configure the `config.json` file with the appropriate TOA parameters for the required cloud platform:

- Metrics
  - [AWS](#)
  - [Azure](#)
  - [VMware](#)
- Logs
  - [AWS](#)
  - [Azure](#)
  - [VMware](#)

## Config JSON

This file lists the TOA configurations to collect Thunder metrics or logs and enable the required cloud provider.

**File Path:** `/usr/toaenv/thunder-observability-agent/config.json`

### Metrics

Depending on your cloud platform, configure the parameters to publish the Thunder metrics.

#### AWS

Configure the following parameters in the `config.json` to publish Thunder metrics to the AWS CloudWatch. By default, all the metrics are enabled. You can enable one or more [Thunder Metrics](#).

**NOTE:** For better throughput, you must enable only those metrics which are required.

Table 17 : AWS Configuration Parameters

| Parameter    | Description   | Default Value |
|--------------|---|---------------|
| aws_provider | <p>Specify 1 to publish selected metric/s, logs, or both to AWS.</p> <p>By default, it is disabled and does not send metric to AWS. To publish metric/s it is mandatory to enable AWS as a provider.</p>  | 0             |
| aws_metric   | <p>Specify 1 to publish metrics to AWS CloudWatch. It sends the data only if aws_provider is also enabled.</p> <p>By default, it is disabled.</p>   | 0             |
| aws_cpu      | <p>Specify 1 to publish the deployed Thunder instances' average data CPU usage (percentage) on the AWS CloudWatch. If the aws_provider and aws_metrics parameters are enabled, TOA sends this metric to the AWS CloudWatch.</p> <p>By default, it is enabled.</p> | 1             |
| aws_memory   | <p>Specify 1 to publish the deployed Thunder instances' memory usage (percentage) on the AWS CloudWatch.</p> <p>By default, it is enabled.</p>  | 1             |
| aws_disk     | <p>Specify 1 to publish the deployed Thunder instances' storage disk usage on the AWS CloudWatch.</p> <p>By default, it is enabled.</p>   | 1             |

Table 17 : AWS Configuration Parameters

| Parameter                  | Description  | Default Value |
|----------------------------|--|---------------|
| aws_throughput             | Specify 1 to publish the deployed Thunder instances' active throughput on the AWS CloudWatch.<br><br>By default, it is enabled.                          | 1             |
| aws_interfaces             | Specify 1 to publish the deployed Thunder instances' interface down count on the AWS CloudWatch.<br><br>By default, it is enabled.                       | 1             |
| aws_cps                    | Specify 1 to publish the deployed Thunder instances' new connection rate per second on the AWS CloudWatch.<br><br>By default, it is enabled.             | 1             |
| aws_tps                    | Specify 1 to publish the deployed Thunder instances' transaction rate per second on the AWS CloudWatch.<br><br>By default, it is enabled.                | 1             |
| aws_server_down_count      | Specify 1 to publish the deployed Thunder instances' server down count on the AWS CloudWatch.<br><br>By default, it is enabled.                          | 1             |
| aws_server_down_percentage | Specify 1 to publish the deployed Thunder instances' configured web/app servers down percentage on the AWS CloudWatch.<br><br>By default, it is enabled. | 1             |
| aws_ssl_cert               | Specify 1 to publish the deployed Thunder instances' SSL cert error count on the AWS CloudWatch.   | 1             |

Table 17 : AWS Configuration Parameters

| Parameter        | Description  | Default Value |
|------------------|--|---------------|
|                  | By default, it is enabled.   |               |
| aws_server_error | Specify 1 to publish the deployed Thunder instances web/app servers 4xx, 5xx errors count on the AWS CloudWatch.<br>By default, it is enabled. | 1             |
| aws_sessions     | Specify 1 to publish the deployed Thunder instances' active session count on the AWS CloudWatch.<br>By default, it is enabled.                 | 1             |
| aws_packet_rate  | Specify 1 to publish the deployed Thunder instances' packet rate on the AWS CloudWatch.<br>By default, it is enabled.                          | 1             |
| aws_packet_drop  | Specify 1 to publish the deployed Thunder instances' packet drop count on the AWS CloudWatch.<br>By default, it is enabled.                    | 1             |

## Azure

Configure the following parameters in the `config.json` to publish Thunder metrics to the Azure Application Insights. By default, all the metrics are enabled. You can enable one or more [Thunder Metrics](#).

---

|              |   |
|--------------|---|
| <b>NOTE:</b> | For better throughput, you must enable only those metrics which are required. |
|--------------|---|

---

Table 18 : Azure Configuration Parameters

| Parameter                | Description  | Default Value              |
|--------------------------|--|----------------------------|
| azure_provider           | <p>Specify 1 to publish selected metric/s, logs, or both to Azure.</p> <p>By default, it is disabled and does not send metrics to Azure. To publish metric/s it is mandatory to enable Azure as a provider.</p>  | 0                          |
| azure_metric             | <p>Specify 1 to send metrics to Azure Application Insights. It sends the data only if <code>azure_provider</code> is also enabled.</p> <p>By default, it is disabled.</p>  | 0                          |
| azure_metric_resource_id | <p>Specifies the Azure Application Insights resource ID.</p> <p>To get this value, go to <b>Azure Portal &gt; Azure services &gt; Application Insights &gt; &lt;your_Thunder_instance&gt; &gt; Properties &gt; Resource ID</b>.</p> <p><b>Example</b></p> <pre>/subscriptions/07dxxxxxxxxxxxxx/ resourceGroups/ &lt;resource_group_name&gt;/ providers/microsoft.insights/ components/&lt;app-insight-name&gt;</pre> | <azure_metric_resource_id> |
| azure_cpu                | <p>Specify 1 to publish the deployed Thunder instances' average data CPU usage (percentage) on the Azure Application Insights. If the <code>azure_provider</code> and <code>azure_metrics</code> parameters are enabled, TOA sends this metric to the Azure Application Insights.</p> <p>By default, it is enabled.</p>  | 1                          |

Table 18 : Azure Configuration Parameters

| Parameter               | Description   | Default Value |
|-------------------------|---|---------------|
| azure_memory            | Specify 1 to publish the deployed Thunder instances' memory usage (percentage) on the Azure Application Insights.<br><br>By default, it is enabled.   | 1             |
| azure_disk              | Specify 1 to publish the deployed Thunder instances' storage disk on the Azure Application Insights.<br><br>By default, it is enabled.                | 1             |
| azure_throughput        | Specify 1 to publish the deployed Thunder instances' active throughput on the Azure Application Insights.<br><br>By default, it is enabled.           | 1             |
| azure_interfaces        | Specify 1 to publish the deployed Thunder instances' interfaces down count on the Azure Application Insights.<br><br>By default, it is enabled.       | 1             |
| azure_cps               | Specify 1 to publish the deployed Thunder instances' new connection per second on the Azure Application Insights.<br><br>By default, it is enabled.   | 1             |
| azure_tps               | Specify 1 to publish the deployed Thunder instances' transaction rate per second on the Azure Application Insights.<br><br>By default, it is enabled. | 1             |
| azure_server_down_count | Specify 1 to publish the deployed Thunder instances' web/app servers down count on the Azure Application Insights.                                    | 1             |

Table 18 : Azure Configuration Parameters

| Parameter                    | Description  | Default Value |
|------------------------------|--|---------------|
|                              | By default, it is enabled.   |               |
| azure_server_down_percentage | Specify 1 to publish the deployed Thunder instances' configured web/app servers down percentage on the Azure Application Insights.<br><br>By default, it is enabled. | 1             |
| azure_ssl_cert               | Specify 1 to publish the deployed Thunder instances' SSL error count on the Azure Application Insights.<br><br>By default, it is enabled.                            | 1             |
| azure_server_error           | Specify 1 to publish the deployed Thunder instances' web/app servers 4xx, 5xx errors count on the Azure Application Insights.<br><br>By default, it is enabled.      | 1             |
| azure_sessions               | Specify 1 to publish the deployed Thunder instances' active session count on the Azure Application Insights.<br><br>By default, it is enabled.                       | 1             |
| azure_packet_rate            | Specify 1 to publish the deployed Thunder instances' packet rate on the Azure Application Insights.<br><br>By default, it is enabled.                                | 1             |
| azure_packet_drop            | Specify 1 to publish the deployed Thunder instances' packet drop count on the Azure Application Insights.<br><br>By default, it is enabled.                          | 1             |

## VMware

Configure the following parameters in the `config.json` to publish Thunder metrics to the VMware vROps. By default, all the metrics are enabled. You can enable one or more [Thunder Metrics](#).

---

|              |   |
|--------------|---|
| <b>NOTE:</b> | For better throughput, you must enable only those metrics which are required. |
|--------------|---|

---

Table 19 : VMware Configuration Parameters

| Parameter                      | Description  | Default Value                                |
|--------------------------------|--|--|
| <code>vmware_provider</code>   | Specify 1 to publish selected metric/s, logs, or both to VMware.<br><br>By default, it is disabled and does not send metric to VMware. To publish metric/s it is mandatory to enable VMware as a provider.   | 0  |
| <code>vmware_metric</code>     | Specify 1 to publish the metrics to VMware vROps. It sends the data only if <code>vmware_provider</code> is also enabled.<br><br>By default, it is disabled.   | 0  |
| <code>vmware_vrops_host</code> | Specifies the VMware vROps host IP address. To get the host, go to <b>ESXi host &gt; Virtual Machines &gt; &lt;your_vROps_VM&gt; &gt; Networking &gt; IP Address</b> .   | <code>&lt;vmware_vrops_host_or_ip&gt;</code> |
| <code>vmware_cpu</code>        | Specify 1 to publish the deployed Thunder instances' average data CPU usage (percentage) on the VMware vROps. If the <code>vmware_provider</code> and <code>vmware_metrics</code> parameters are enabled, TOA sends this metric to the VMware vROps.<br><br>By default, it is enabled. | 1  |
| <code>vmware_memory</code>     | Specify 1 to publish the deployed Thunder instances' memory usage  | 1  |

Table 19 : VMware Configuration Parameters

| Parameter                     | Description   | Default Value |
|-------------------------------|---|---------------|
|                               | (percentage) on the VMware vROps.<br>By default, it is enabled.   |               |
| vmware_disk                   | Specify 1 to publish the deployed Thunder instances' storage disk on the VMware vROps.<br>By default, it is enabled.                | 1             |
| vmware_throughput             | Specify 1 to publish the deployed Thunder instances' active throughput on the VMware vROps.<br>By default, it is enabled.           | 1             |
| vmware_interfaces             | Specify 1 to publish the deployed Thunder instances' interfaces down count on the VMware vROps.<br>By default, it is enabled.       | 1             |
| vmware_cps                    | Specify 1 to publish the deployed Thunder instances' new connections per second on the VMware vROps.<br>By default, it is enabled.  | 1             |
| vmware_tps                    | Specify 1 to publish the deployed Thunder instances' transaction rate per second on the VMware vROps.<br>By default, it is enabled. | 1             |
| vmware_server_down_count      | Specify 1 to publish the deployed Thunder instances' web/app servers down count on the VMware vROps.<br>By default, it is enabled.  | 1             |
| vmware_server_down_percentage | Specify 1 to publish the deployed Thunder instances' configured web/app   | 1             |

Table 19 : VMware Configuration Parameters

| Parameter           | Description   | Default Value |
|---------------------|---|---------------|
|                     | servers down percentage on the VMware vROps.<br><br>By default, it is enabled.  |               |
| vmware_ssl_cert     | Specify 1 to publish the deployed Thunder instances' SSL error count on the VMware vROps.<br><br>By default, it is enabled.                       | 1             |
| vmware_server_error | Specify 1 to publish the deployed Thunder instances' web/app servers 4xx, 5xx errors count on the VMware vROps.<br><br>By default, it is enabled. | 1             |
| vmware_sessions     | Specify 1 to publish the deployed Thunder instances' active session count on the VMware vROps.<br><br>By default, it is enabled.                  | 1             |
| vmware_packet_rate  | Specify 1 to publish the deployed Thunder instances' packet rate on the VMware vROps.<br><br>By default, it is enabled.                           | 1             |
| vmware_packet_drop  | Specify 1 to publish the deployed Thunder instances' packet drop count on the VMware vROps.<br><br>By default, it is enabled.                     | 1             |

## Logs

Depending upon your cloud platform, configure the following parameters to publish the Thunder logs:

### AWS

Configure the following parameters in the `config.json` to publish [Thunder logs](#) to

the AWS CloudWatch.

Table 20 : AWS Configuration Parameters

| Parameter          | Description  | Default Value                       |
|--------------------|--|-------------------------------------|
| aws_provider       | <p>Specify 1 to publish selected metric/s, logs, or both to AWS.</p> <p>By default, it is disabled and does not send logs to AWS. To publish logs it is mandatory to enable AWS as a provider.</p>                         | 0                                   |
| aws_log            | <p>Specify 1 to publish the logs to AWS CloudWatch. It sends the data only if <code>aws_provider</code> is also enabled.</p> <p>By default, it is disabled.</p>  | 0                                   |
| aws_log_group_name | <p>Specifies the log group name under which all logs are sent to AWS CloudWatch.</p> <p>To get this folder, it can be found under <b>AWS Management Console &gt; CloudWatch &gt; Logs &gt; &lt;log_group_name&gt;</b>.</p> | < <code>aws_log_group_name</code> > |

## Azure

Configure the following parameters in the `config.json` to publish [Thunder logs](#) to the Azure Log Analytics Workspace.

Table 21 : Azure Configuration Parameters

| Parameter      | Description   | Default Value |
|----------------|---|---------------|
| azure_provider | <p>Specify 1 to publish the selected metric/s, logs, or both to Azure.</p> <p>By default, it is disabled and does not send logs to Azure. To publish logs, it is mandatory to enable Azure as a provider.</p> | 0             |
| azure_log      | Specify 1 to publish the logs to Azure  | 0             |

Table 21 : Azure Configuration Parameters

| Parameter                           | Description   | Default Value                               |
|-------------------------------------|---|---|
|                                     | <p>Log Analytics Workspace. It sends the data only if <code>azure_provider</code> is also enabled.</p> <p>By default, it is disabled.</p>   |   |
| <code>azure_log_workspace_id</code> | <p>Specifies the Azure Log Analytics Workspace ID.</p> <p>To get this value, go to <b>Azure Portal &gt; Azure services &gt; Log Analytics workspaces &gt; &lt;your_log_analytics_workspace&gt; &gt; Settings &gt; Agents</b>.</p> | <code>&lt;azure_log_workspace_id&gt;</code> |

## VMware

Configure the following parameters in the `config.json` to publish [Thunder logs](#) to the VMware vRLI.

Table 22 : VMware Configuration Parameters

| Parameter                    | Description  | Default Value |
|------------------------------|--|---------------|
| <code>vmware_provider</code> | <p>Specify 1 to publish the selected metric/s, logs, or both to VMware.</p> <p>By default, it is disabled and does not send logs to VMware. To publish logs, it is mandatory to enable VMware as a provider.</p> | 0             |
| <code>vmware_log</code>      | <p>Specify 1 to publish the logs to VMware vRLI. It sends the data only if <code>vmware_provider</code> is also enabled.</p> <p>By default, it is disabled.</p>  | 0             |

Table 22 : VMware Configuration Parameters

| Parameter        | Description   | Default Value            |
|------------------|---|--------------------------|
| vmware_vrli_host | Specifies the VMware vRLI host IP address. To get the host, go to <b>ESXi host &gt; Virtual Machines &gt; &lt;your_vRLI_VM&gt; &gt; Networking &gt; IP Address.</b> | <vmware_vrli_host_or_ip> |

For sample configuration, see [Examples](#).

# Monitor Dashboard

---

This section describes how to track and monitor the health, throughput, and performance of your Thunder instances.

The following topics are covered:

|  |       |    |
|--|-------|----|
| <a href="#"><u>Monitor Metrics</u></a> | ..... | 45 |
| <a href="#"><u>Monitor Logs</u></a>    | ..... | 70 |

## Monitor Metrics

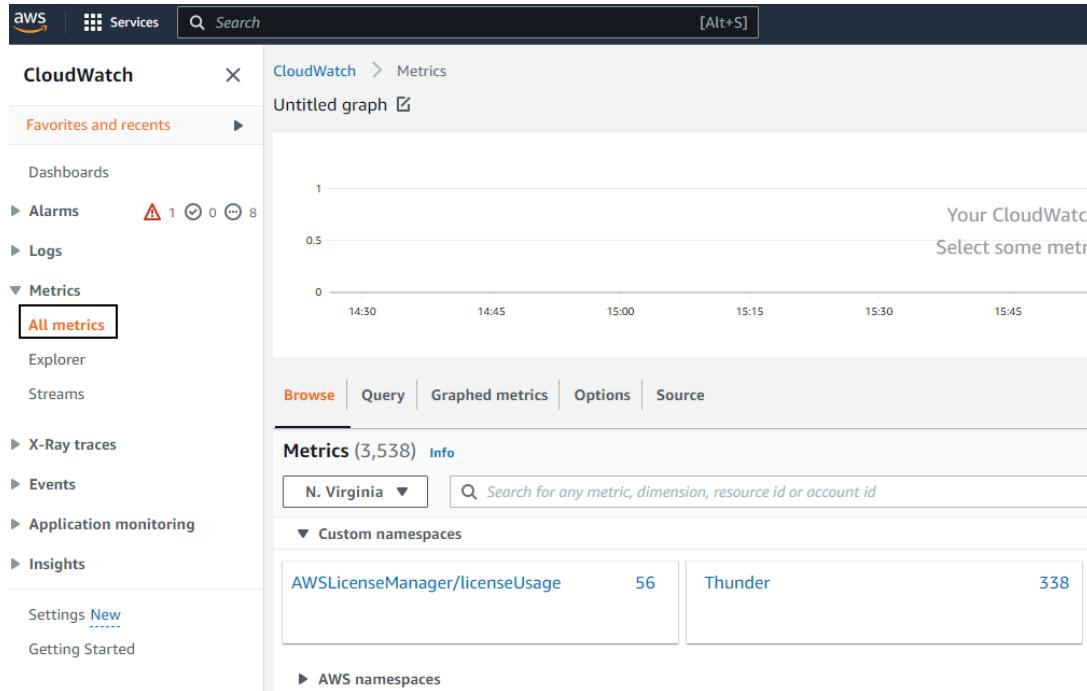
Depending on your cloud provider, the steps are provided to monitor the configured metrics.

### AWS CloudWatch

To monitor the Thunder metrics on AWS CloudWatch, perform the following steps:

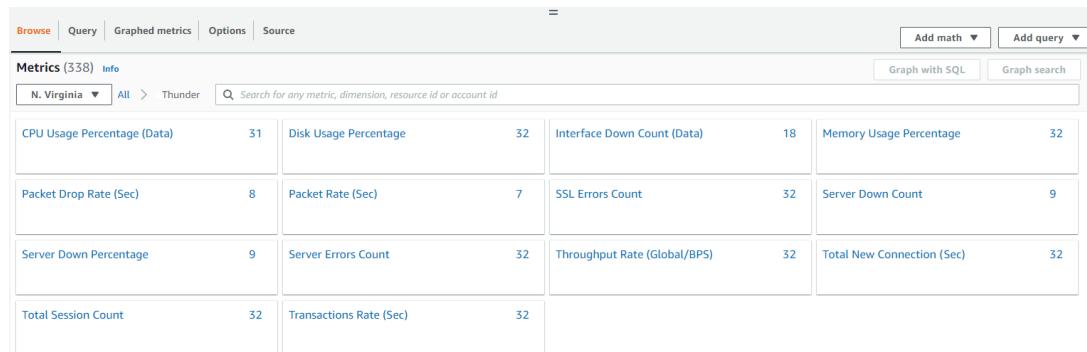
1. From the **AWS Management Console**, go to **CloudWatch > Metrics > All metrics**.

Figure 7 : AWS All metrics



2. Select **Browse** > *<your\_Thunder\_metric\_namespace>*.

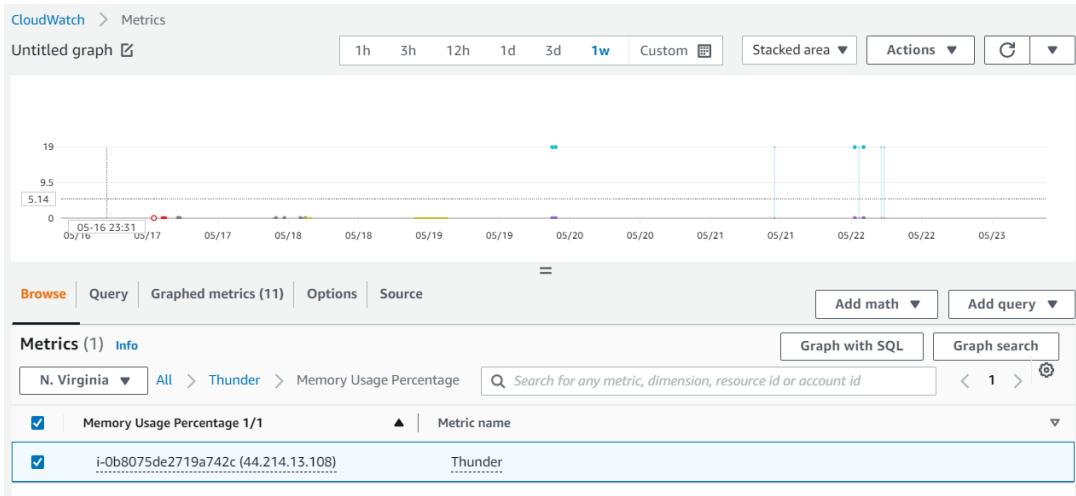
Figure 8 : Thunder Metrics



3. Click the required metric to be monitored from the **Metrics** panel. For the list of available Thunder metrics, see [Supported Thunder Metrics](#).
4. Select one or multiple Thunder instance/s resource ID to be monitored.

As the Thunder instances are selected, the metric data gets populated in the **Untitled Graph** panel for the selected the time range. For more information, see [Graph a metric](#).

Figure 9 : Selected metric graph



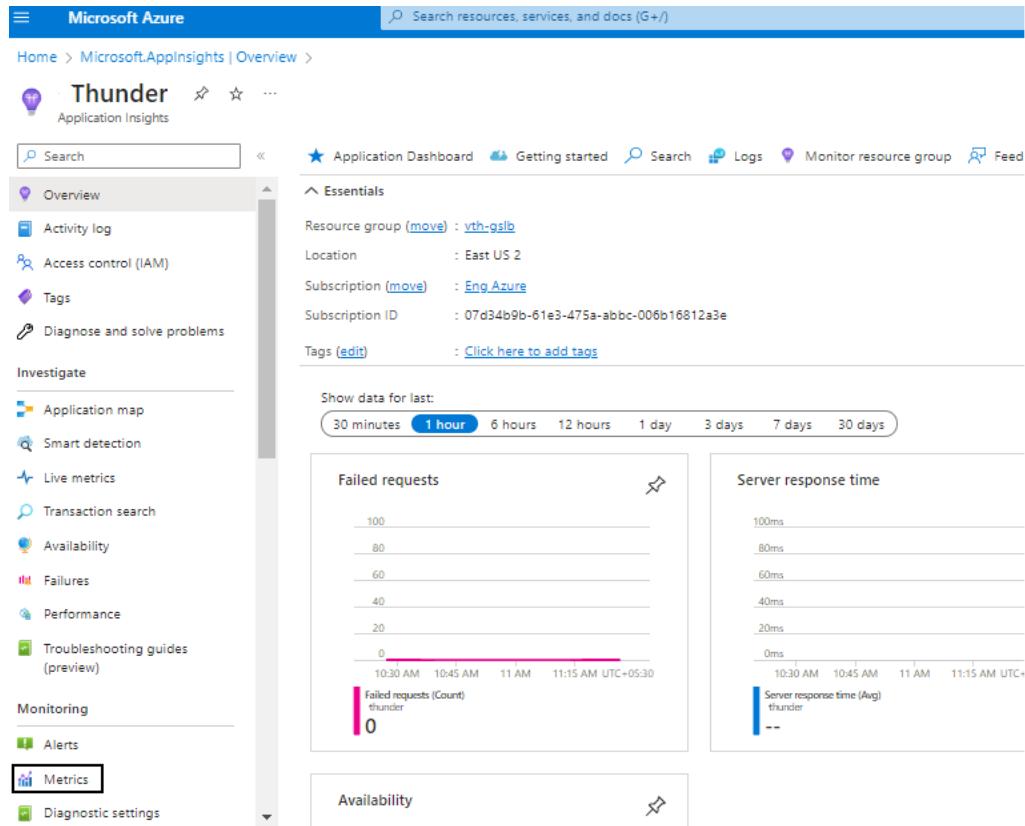
## Azure Application Insight

To monitor the Thunder metrics on Azure Application Insight, perform the following steps:

1. From the **Azure Portal**, go to **Azure services > Resource Groups > <your\_resource\_group>** and click your app insight name.

The selected app insight - Overview window is displayed.

Figure 10 : Selected app insight - Overview window

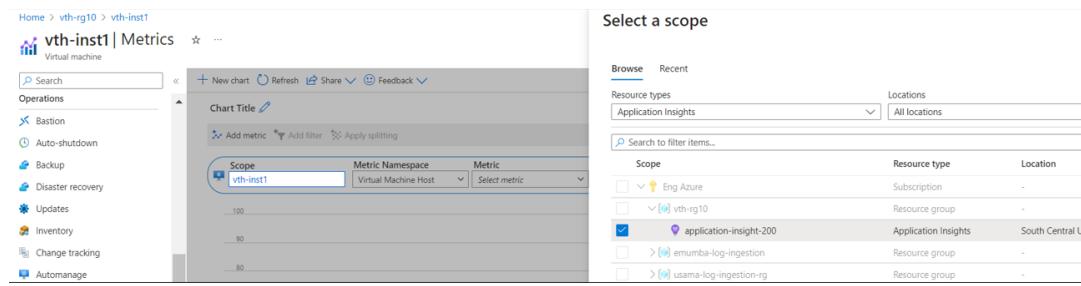


The screenshot shows the Azure Application Insights Overview page for the 'Thunder' application. The left sidebar has 'Metrics' selected. The main area displays two charts: 'Failed requests' (a line chart showing 0 failures from 10:30 AM to 11:15 AM UTC+05:30) and 'Server response time' (a line chart showing 0ms from 10:30 AM to 11:15 AM UTC+05:30). The top navigation bar includes links for Home, Microsoft.AppInsights | Overview, Application Dashboard, Getting started, Search, Logs, Monitor resource group, and Feed.

OR

From the **Azure Portal**, go to **Azure services > Resource Groups > <your\_resource\_group>** and click your Thunder instance name whose metric is to be monitored.

Figure 11 : Thunder instance window

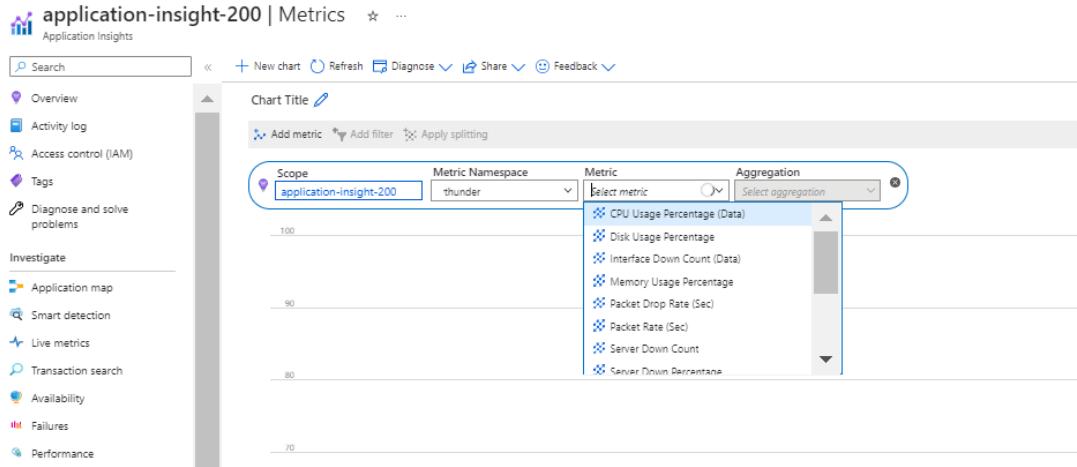


The screenshot shows the Azure portal's Metrics section for the 'vth-inst1' virtual machine. The left sidebar lists various monitoring operations. The main area shows a chart for 'vth-inst1' with 'Virtual Machine Host' as the metric namespace and 'Select metric' as the metric. To the right, a 'Select a scope' pane is open, showing a tree view of resource groups and applications. The 'application-insight-200' application under 'vth-rg10' is selected.

2. Click **Metrics** from the left **Monitoring** panel.

A scope picker is displayed in the Metric dashboard.

Figure 12 : Scope Picker



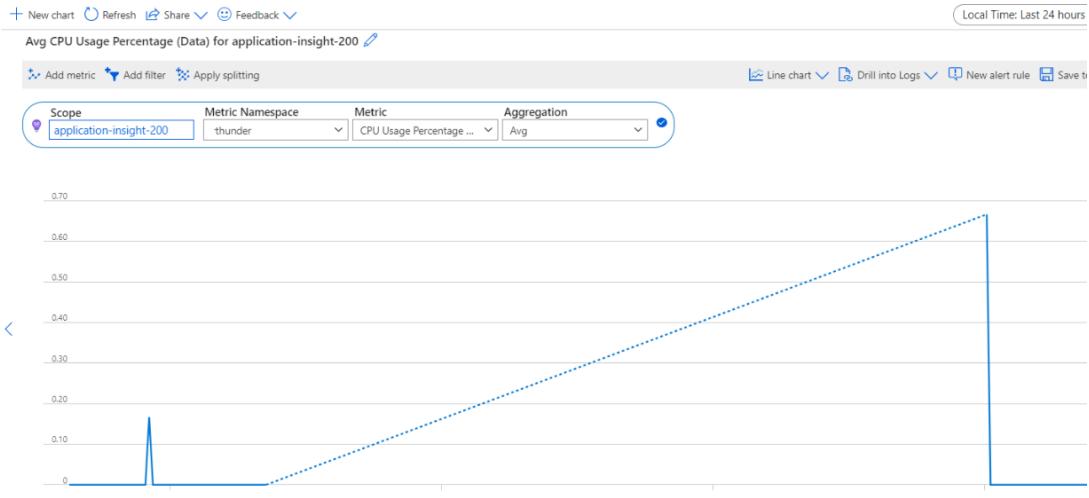
3. Select the appropriate resources whose metrics you want to view:

Table 23 : Thunder Metrics

| Field Name       | Description   |
|------------------|---|
| Scope            | If you are adding the metric from <b>Application Insight</b> window, the selected app insight name is auto-populated.<br><br>If you are adding the metric from Thunder instance window, select your app insight name. |
| Metric Namespace | Select <b>Thunder</b> .   |
| Metric           | Select a metric from the drop-down. For the list of available Thunder metrics, see <a href="#">Supported Thunder Metrics</a> .  |

As the metric is selected, the corresponding data is plotted in the chart area for the selected the time range.

Figure 13 : Plotted metric data



- To view multiple metrics on the same chart, click **Add metric** and repeat the above step. For more information, see [Metrics Explorer](#).

## VMware vROps

To monitor the Thunder metrics on vROps, perform the following steps:

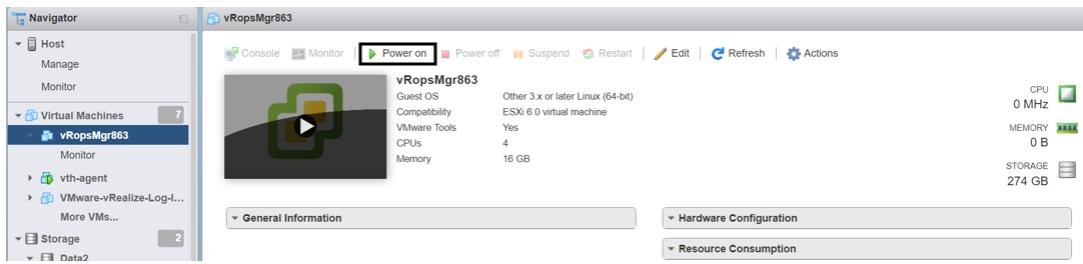
- [Start vROps VM](#)
- [Create a Dashboard](#)
- [Create an Alert](#)
- [Create a Notification](#)
- [View Thunder Metrics](#)

### Start vROps VM

To start the vROps virtual machine, perform the following steps:

- From the **VMware ESXi** console, go to **Navigator > Virtual Machines > <your\_vROps\_VM>** and click **Power on**.

Figure 14 : Start vROps VM

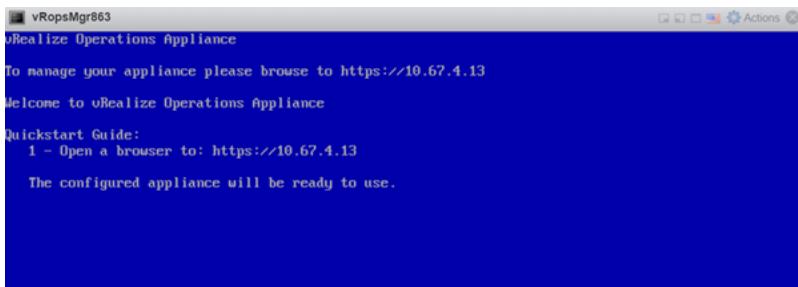


**NOTE:** The system may take a few minutes to start the vROps virtual machine.

- Click **Console** to launch vROps virtual machine.

The vROps virtual machine is powered on and is reachable.

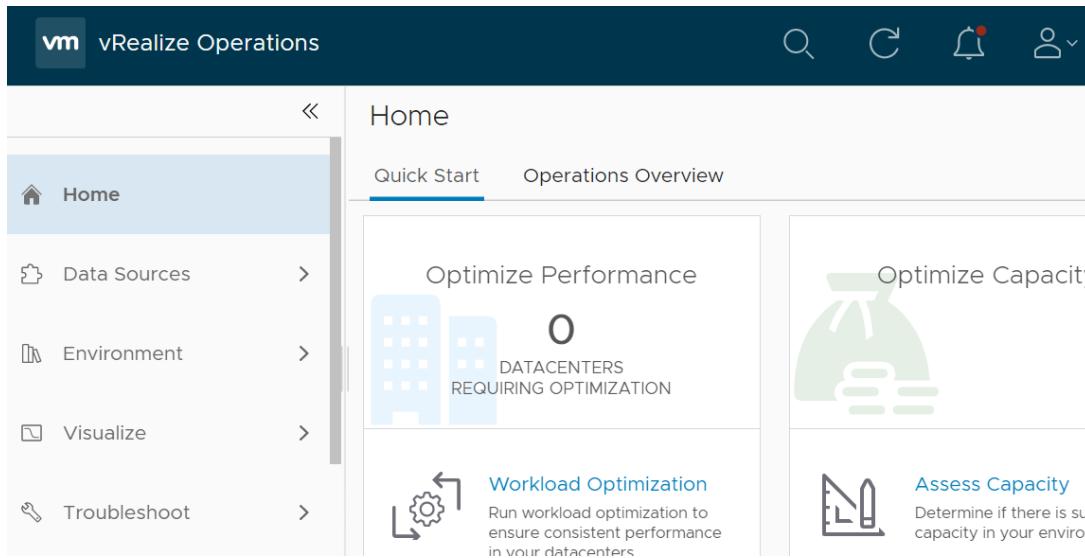
Figure 15 : vRealize Operations Appliance



- Log in to the **vRealize Operations Web UI** with your admin credentials.

The vRealize Operations Home page is displayed.

Figure 16 : vRealize Operations - Home page



## Create a Dashboard

The dashboard can be created using either of the following options:

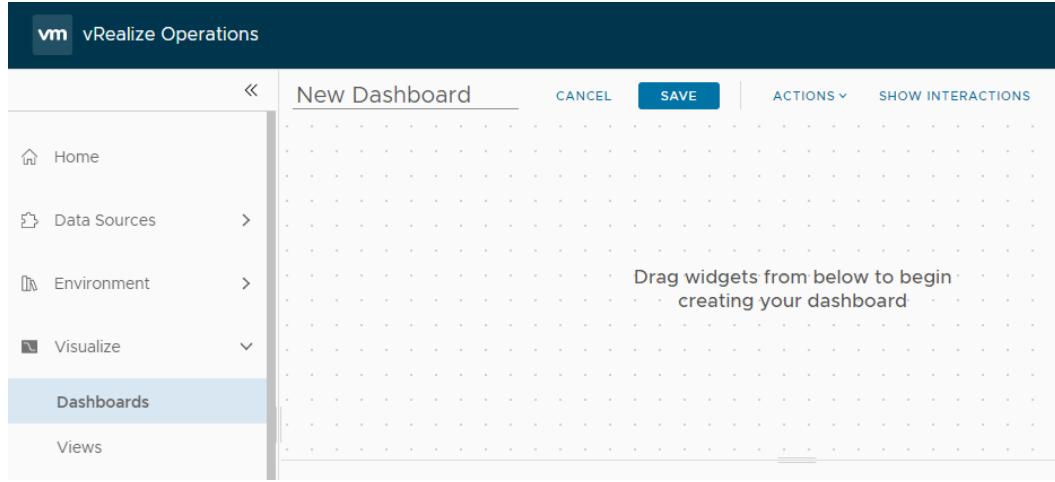
- Import a dashboard template  
To import a dashboard using JSON file, see [Import a Dashboard](#).
- Create a dashboard manually

To create a dashboard manually, perform the following steps:

1. From the **vRealize Operations Web UI**, go to **Home > Visualize > Dashboards** and click **Create** to add a new dashboard.

The New Dashboard window is displayed.

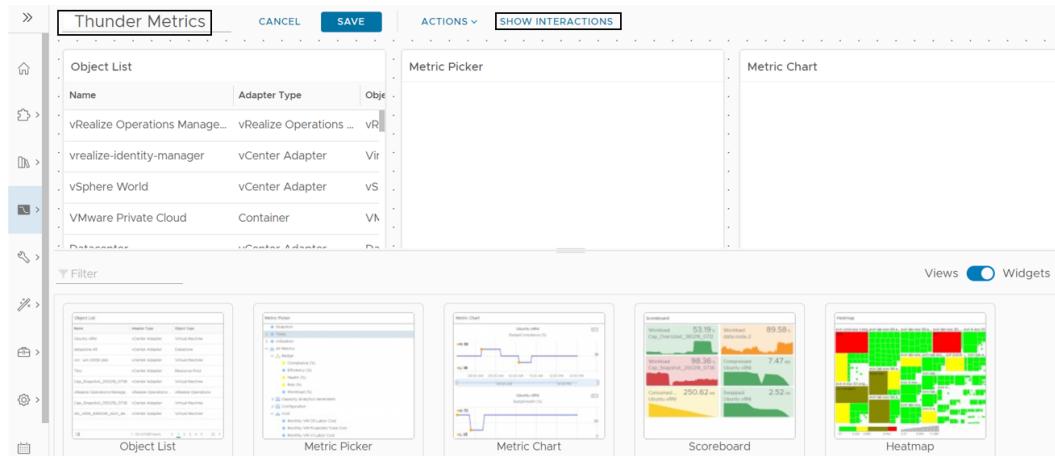
Figure 17 : New Dashboard window



2. Provide a name to the new dashboard and double-click or drag the following widgets:

- Object List
- Metric Picker
- Metric Chart

Figure 18 : Dashboard widgets



3. Click **Show Interactions** to create interactions.

Figure 19 : Interactions



4. Drag the connectors and create interactions as shown in the [Figure 19](#).
5. Click **Save** to save the changes.

A dashboard for Thunder metrics is created.

### Create an Alert

The alert definition can be created using either of the following options:

- Import an alert definition template

To import an alert definition using XML file, see [Import an Alert Definition](#).

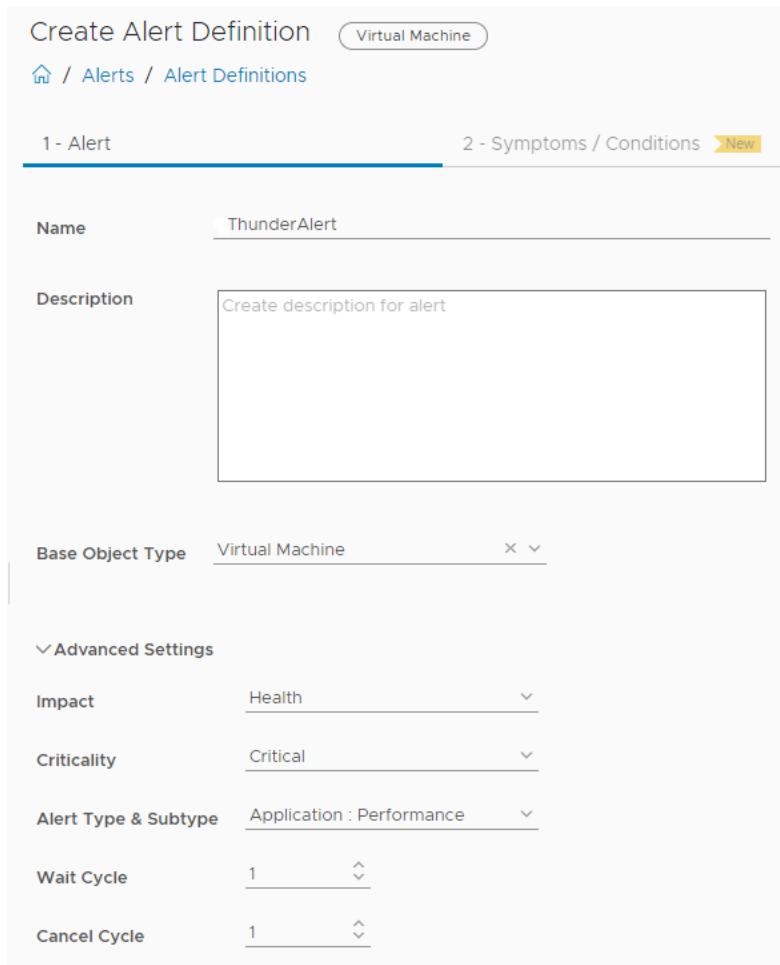
- Create an alert definition manually

To create an alert definition manually, perform the following steps:

1. From the vRealize Operations Web UI, go to **Home > Configure > Alerts** and click **Alert Definitions**.
2. Click **Add** in the **Alert Definitions** window.

The **Create Alert Definition** panel with **Alert** tab is displayed.

Figure 20 : Create Alert Definition window



Create Alert Definition Virtual Machine

[/ Alerts / Alert Definitions](#)

1 - Alert 2 - Symptoms / Conditions New

---

|                  |  |
|------------------|--|
| Name             | <input type="text" value="ThunderAlert"/>  |
| Description      | <input type="text" value="Create description for alert"/>  |
| Base Object Type | <input type="text" value="Virtual Machine"/> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">X</span> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">▼</span> |

▼ Advanced Settings

|                      |  |
|----------------------|--|
| Impact               | <input type="text" value="Health"/> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">▼</span>   |
| Criticality          | <input type="text" value="Critical"/> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">▼</span>   |
| Alert Type & Subtype | <input type="text" value="Application : Performance"/> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">▼</span>  |
| Wait Cycle           | <input type="text" value="1"/> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">^</span> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">▼</span> |
| Cancel Cycle         | <input type="text" value="1"/> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">^</span> <span style="border: 1px solid #ccc; border-radius: 5px; padding: 0 5px;">▼</span> |

3. Enter or select the appropriate values in the following fields:

Table 24 : Alert tab fields

| Field Name       | Description  |
|------------------|--|
| Name             | Enter the alert name.<br><b>Example</b><br>In the <a href="#">Figure 20</a> , the alert definition name is ThunderAlert. |
| Base Object Type | Select vCenter Adapter > Virtual Machine.  |

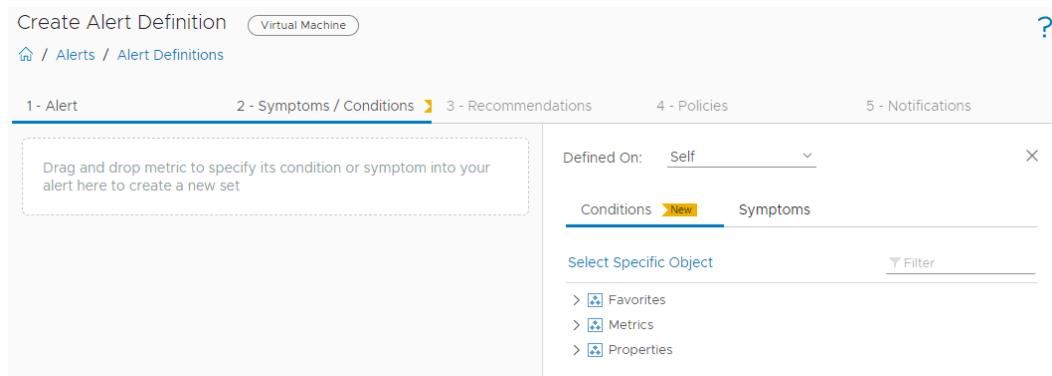
Table 24 : Alert tab fields

| Field Name                          | Description                               |
|-------------------------------------|---|
| <b>Under the Advanced Settings:</b> |   |
| Impact                              | Select <b>Health</b> .                    |
| Criticality                         | Select <b>Critical</b> .                  |
| Alert Type & Subtype                | Select <b>Application : Performance</b> . |

4. Click **Next**.

The **Symptoms / Conditions** tab is displayed.

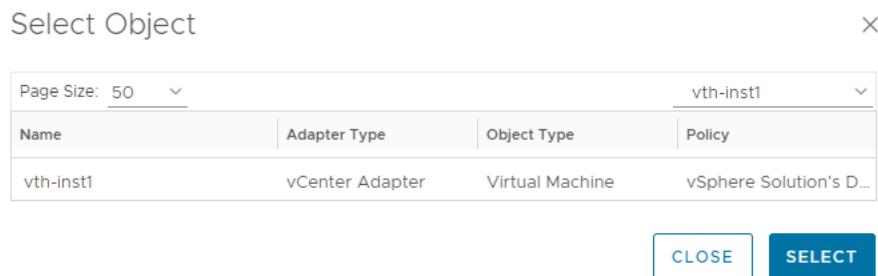
Figure 21 : Symptoms / Conditions tab



5. Click **Select Specific Object** to select your Thunder instance.

The **Select Object** window is displayed.

Figure 22 : Select Object window

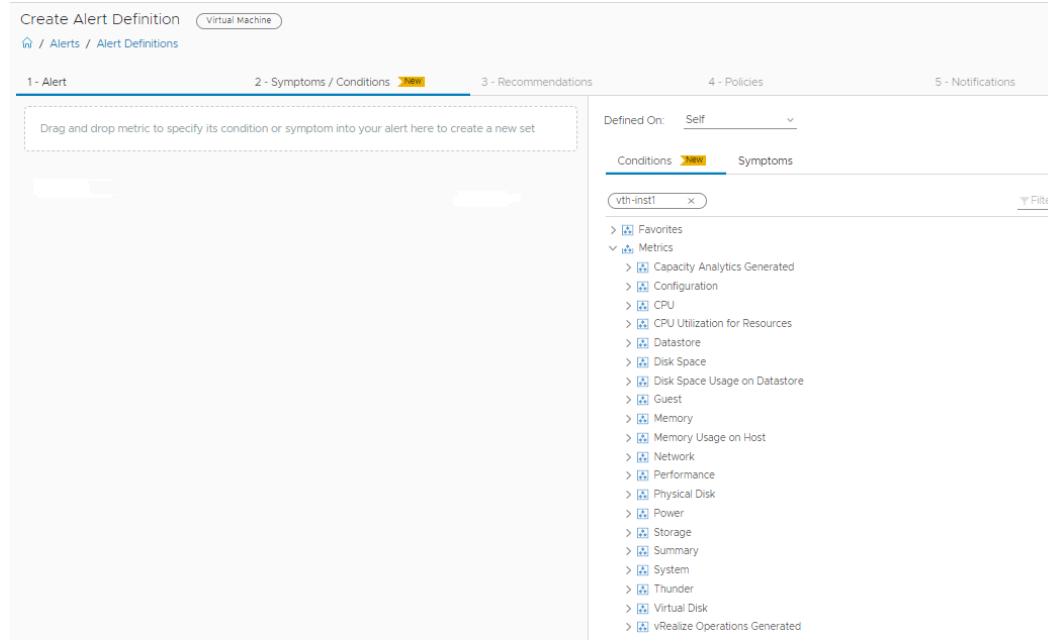


| Name      | Adapter Type    | Object Type     | Policy                  |
|-----------|-----------------|-----------------|-------------------------|
| vth-inst1 | vCenter Adapter | Virtual Machine | vSphere Solution's D... |

6. Select your Thunder instance and click **Select**.

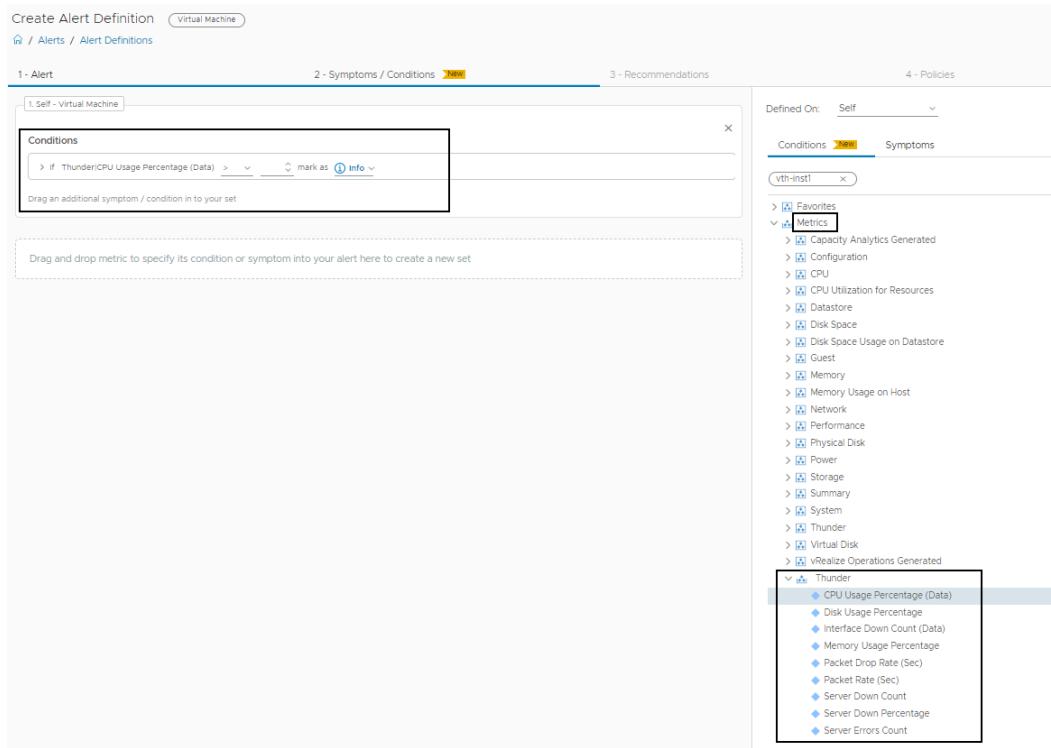
The selected Thunder instance is listed under **Conditions**.

Figure 23 : Selected Thunder instance

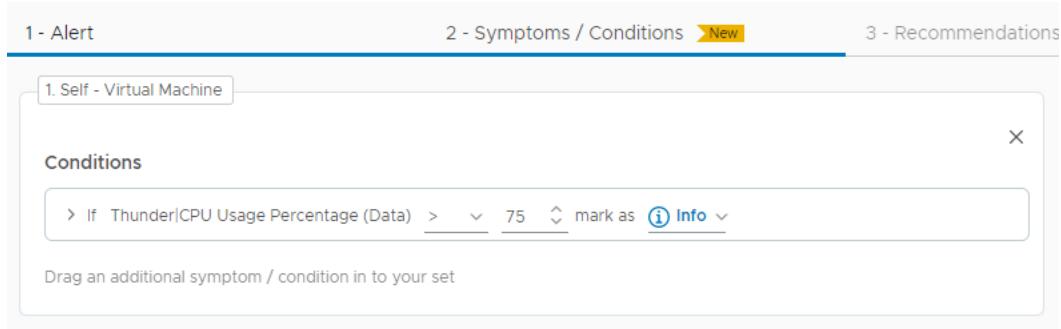


The screenshot shows the 'Create Alert Definition' interface with the 'Virtual Machine' filter applied. The top navigation bar includes 'Create Alert Definition' (with a 'Virtual Machine' filter), 'Alerts / Alert Definitions', and tabs for '1 - Alert', '2 - Symptoms / Conditions' (which is active and highlighted in yellow), '3 - Recommendations', '4 - Policies', and '5 - Notifications'. The main content area has a placeholder message: 'Drag and drop metric to specify its condition or symptom into your alert here to create a new set.' On the right side, there is a sidebar titled 'Defined On: Self' with sections for 'Conditions' (highlighted) and 'Symptoms'. A search bar contains the text 'vth-inst1'. Below the search bar is a list of metrics under the 'Metrics' section, which includes: Capacity Analytics Generated, Configuration, CPU, CPU Utilization for Resources, Datastore, Disk Space, Disk Space Usage on Datastore, Guest, Memory, Memory Usage on Host, Network, Performance, Physical Disk, Power, Storage, Summary, System, Thunder, Virtual Disk, and vRealize Operations Generated.

7. Select **Metrics > Thunder** and drag the required metrics to the left-side panel.

**Figure 24 : Drag metric**

## 8. Specify the appropriate alert condition.

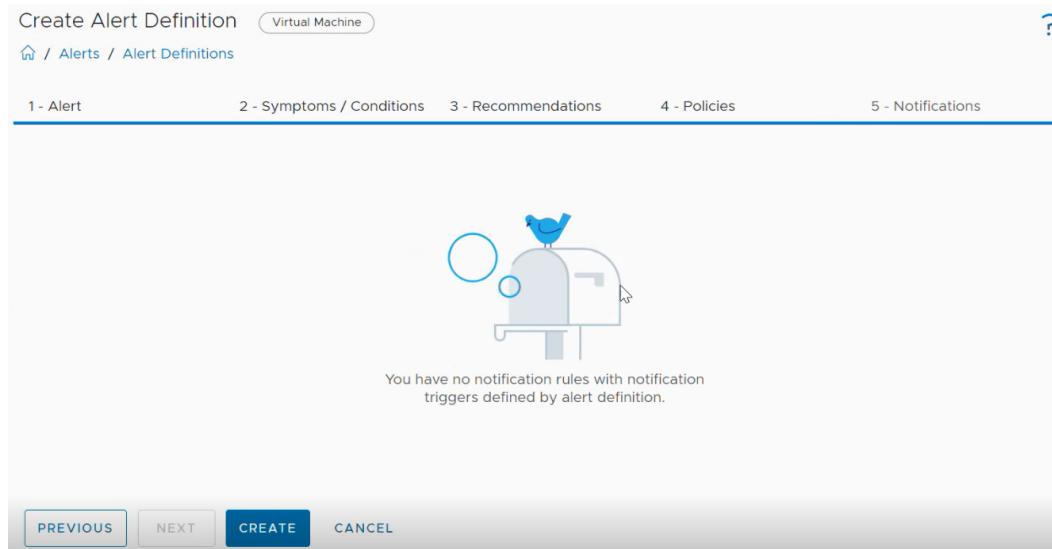
**Figure 25 : Alert condition**

## 9. Click **Next**.

10. Add the appropriate recommendations in the **Recommendations** tab, if needed.
11. Click **Next**.

12. Select appropriate policy in the **Policies** tab, if needed.
13. Click **Next**.

The **Notification** tab is displayed. The notification can be created after the alert definition is created. For more information, see [Create a Notification](#).



14. Click **Create** in the **Notification** tab.

An alert definition is created and is listed in the **Alert Definition** window.

Figure 26 : Verify Alert Definition

| Alert Definitions  |              |          |        |             |               |             |        |           |               |             |
|--|--------------|----------|--------|-------------|---------------|-------------|--------|-----------|---------------|-------------|
| <input type="button" value="ADD"/> <input type="button" value="..."/> <span>Name : Thunder</span> <input type="button" value="ALL FILTERS"/> <input type="button" value="quick filter"/> |              |          |        |             |               |             |        |           |               |             |
|  | Name         | Adapt... | Obj... | Alert Type  | Alert Subtype | Criticality | Impact | Define... | Last Modified | Modified By |
| <input type="checkbox"/>   | ThunderAlert | vCe...   | Vir... | Application | Performance   |             |        | Health    | User 5:31 PM  | admin       |

## Create a Notification

The notification can be created using either of the following options:

- Import a notification template

To import a notification using JSON file, see [Import a Notification](#).

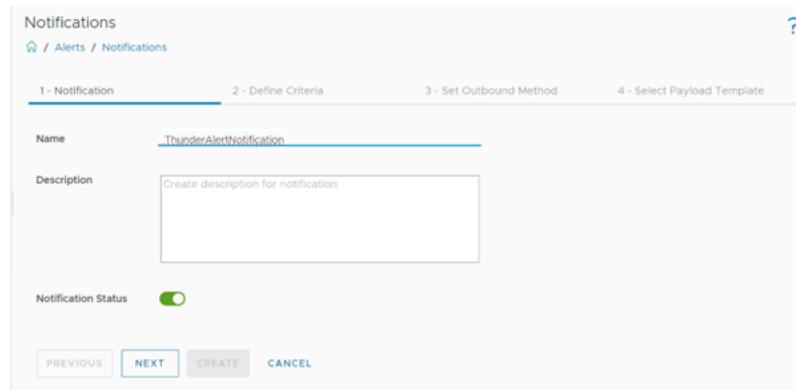
- Create a notification manually

To create a notification manually, perform the following steps:

1. From the **vRealize Operations Web UI**, go to **Home > Configure > Alerts** and click **Notifications**.
2. Click **Add** in the **Notifications** window.

The **Notifications** panel with **Notification** tab is displayed.

Figure 27 : Notifications tab



3. Enter or select the appropriate values in the following fields:

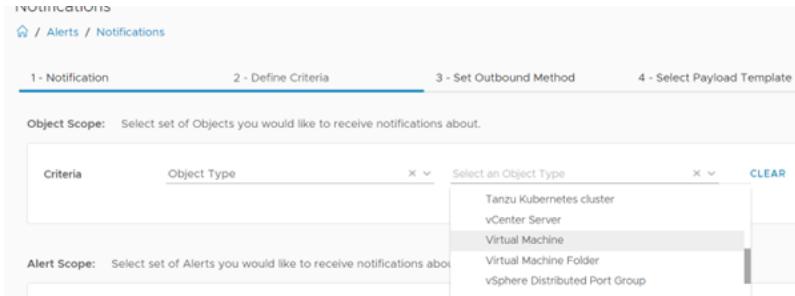
Table 25 : Notifications tab

| Field Name          | Description   |
|---------------------|---|
| Name                | Enter the notification name.<br><b>Example</b><br>In the <a href="#">Figure 27</a> , notification name is ThunderAlertNotification. |
| Notification Status | Select <b>Enable</b> .  |

4. Click **Next**.

The **Define Criteria** tab is displayed.

Figure 28 : Define Criteria tab



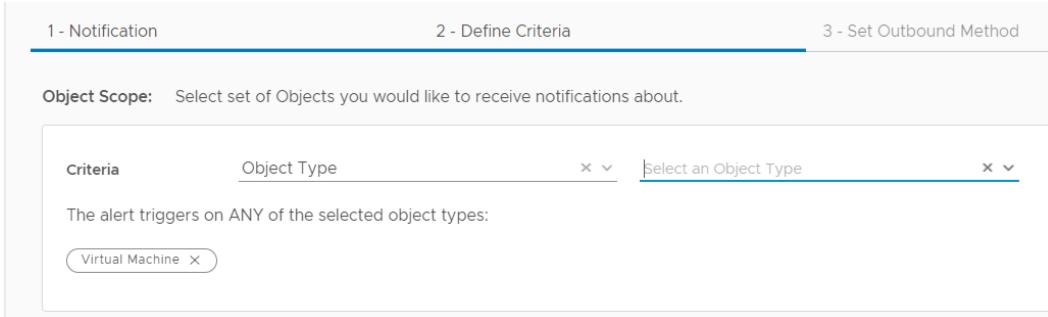
5. In the **Criteria** field, select **Object Type** from the drop-down.

A field appears to select the object type.

6. Expand **vCenterAdapter** and select **Virtual Machine** from the drop-down.

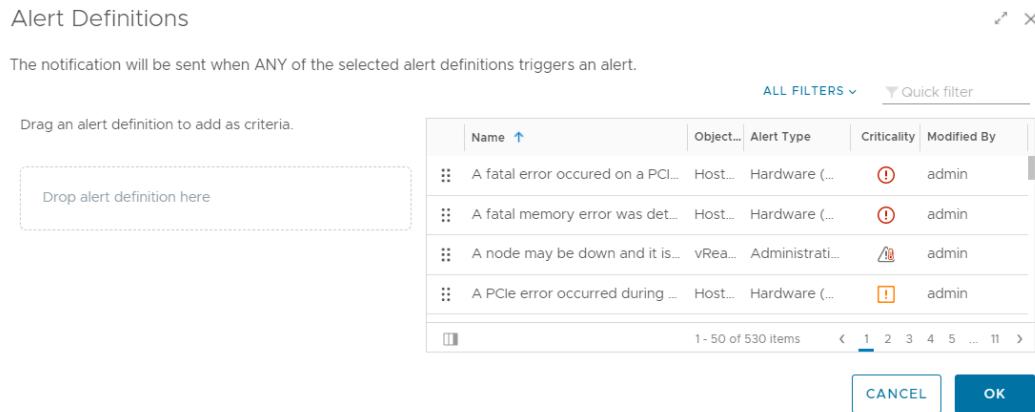
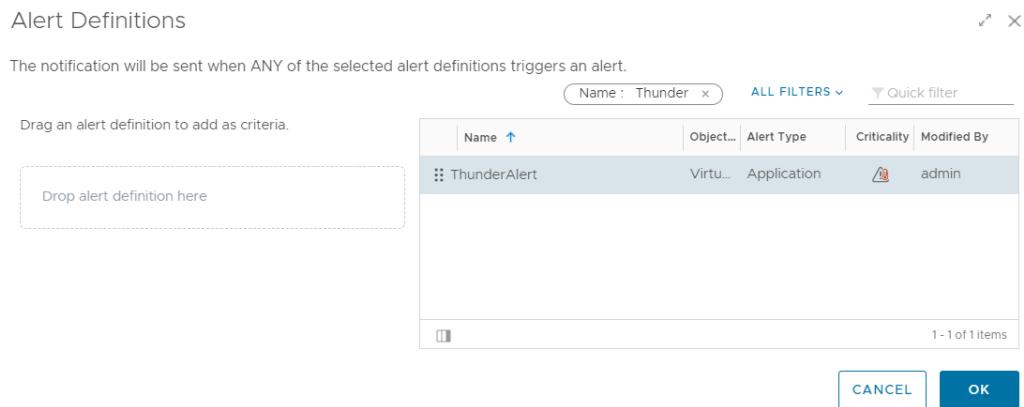
The selected object type is listed under **Criteria**.

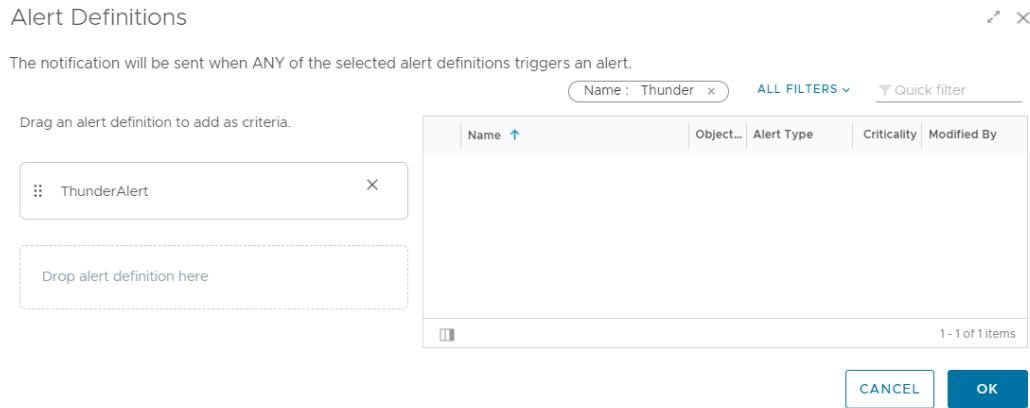
Figure 29 : Criteria defined



7. In the **Category** field, select **Alert Definition** from the drop-down created in the [Create an Alert](#).

An **Alert Definition** pop-up is displayed.

**Figure 30 : Alert Definition pop-up****8. Search your alert definition.****Figure 31 : Search alert definition****9. Select your alert definition and drag it to add as the criteria.**

**Figure 32 : Drag alert definition**

**10. Click OK.**

The selected alert definition is listed under Category.

**Figure 33 : Selected alert definition**

**Alert Scope:** Select set of Alerts you would like to receive notifications about.

| Category | Alert Definition |
|----------|------------------|
|          | ThunderAlert     |

The alert is ANY of the selected (1):

ThunderAlert

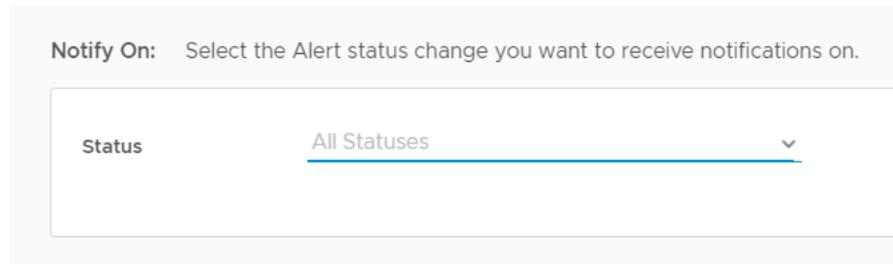
| Criticality | All Criticality |
|-------------|-----------------|
|             | All States      |

Control State

PREVIOUS NEXT CREATE CANCEL

**11. In the Status field under Notify On, select the alert status for which you want to receive the notifications.**

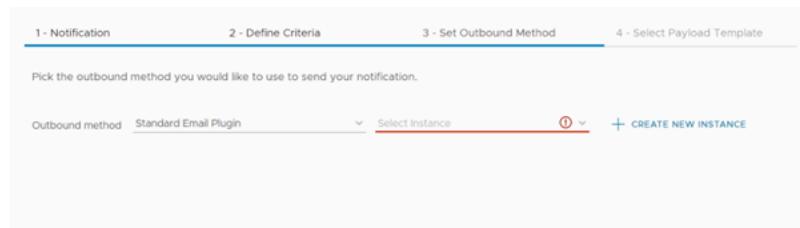
Figure 34 : Notify On



**12. Click **Next**.**

The **Set Outbound Method** tab is displayed.

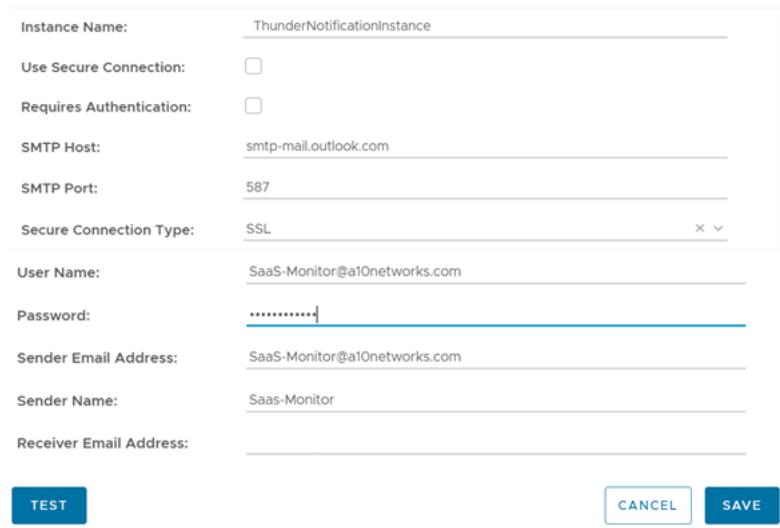
Figure 35 : Set Outbound Method tab



- 13. In the **Outbound method** field, select **Standard Email Plugin** from the drop-down list.**
- 14. Click **Create New Instance** to create a new instance for corresponding Outbound method.**

The fields for creating a new instance are displayed.

Figure 36 : Create New Instance fields



Instance Name: ThunderNotificationInstance

Use Secure Connection:

Requires Authentication:

SMTP Host: smtp-mail.outlook.com

SMTP Port: 587

Secure Connection Type: SSL

User Name: SaaS-Monitor@a10networks.com

Password: .....|

Sender Email Address: SaaS-Monitor@a10networks.com

Sender Name: Saas-Monitor

Receiver Email Address:

**TEST** **CANCEL** **SAVE**

15. Enter or select the appropriate values in the following fields:

Table 26 : Create New Instance

| Field Name             | Description  |
|------------------------|--|
| Instance Name          | <p>Enter the notification instance name.</p> <p><b>Example</b></p> <p>In the <a href="#">Figure 36</a>, the notification instance name is ThunderNotificationInstance.</p> |
| SMTP Host              | Enter the URL or IP address of the email host server.  |
| SMTP Port              | Enter the SMTP port number used to connect with the email host server.   |
| Secure Connection Type | Select <b>SSL</b> .  |
| User Name              | Enter the username that is used to connect to the email server.  |
| Password               | Enter the password for the connection username that appears on the notification message.   |

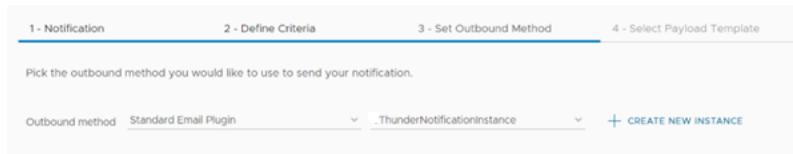
Table 26 : Create New Instance

| Field Name             | Description   |
|------------------------|---|
| Sender Email Address   | Enter the email address of the sender.                                  |
| Sender Name            | Enter the display name of the sender email address.                     |
| Receiver Email Address | Enter the email address of the receiver that receives the notification. |

16. Click **Save** to save the changes.

The new instance is populated in the **Select Instance** field.

Figure 37 : Selected New Instance

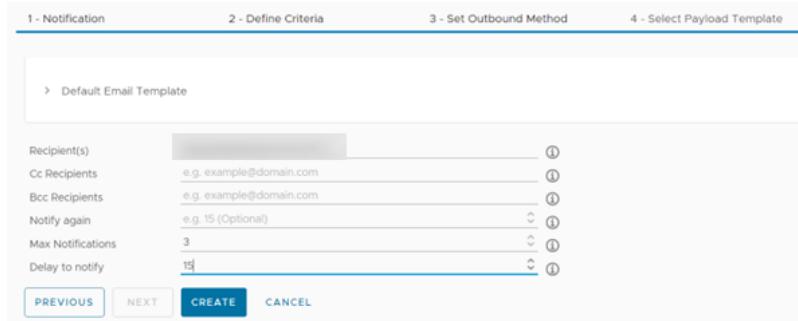


A screenshot of a dropdown menu titled "Select Instance". The menu lists "ThunderNotificationInstance" as the selected item. Other options visible include "Standard Email Plugin" and a "+ CREATE NEW INSTANCE" button.

17. Click **Next**.

The **Select Payload Template** tab is displayed.

Figure 38 : Select Payload Template tab



A screenshot of the "Select Payload Template" tab. It shows a section for "Default Email Template" with fields for "Recipient(s)" (e.g. example@domain.com), "Cc Recipients" (e.g. example@domain.com), "Bcc Recipients" (e.g. example@domain.com), "Notify again" (e.g. 15 (Optional)), "Max Notifications" (3), and "Delay to notify" (15). At the bottom are buttons for "PREVIOUS", "NEXT", "CREATE", and "CANCEL".

18. Enter or select the appropriate values in the following fields for the default template:

Table 27 : Select Payload Template tab

| Field Name   | Description                                   |
|--------------|---|
| Recipient(s) | Enter the email addresses of the recipient to |

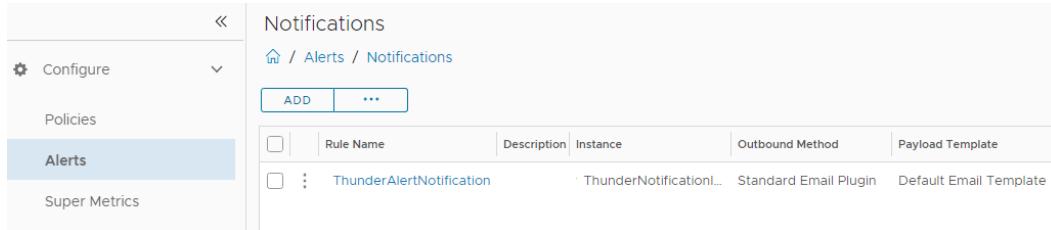
Table 27 : Select Payload Template tab

| Field Name        | Description  |
|-------------------|--|
|                   | receive the notification.  |
| Max Notifications | Enter the maximum number of notification to be sent for the active alert.                    |
| Delay to notify   | Enter the delay time in minutes before sending a notification when a new alert is generated. |

19. Click **Create**.

A new notification is created for the selected alert definition and it is listed in the **Notifications** window.

Figure 39 : Verify Notification



|                          | Rule Name                | Description | Instance               | Outbound Method       | Payload Template       |
|--------------------------|--------------------------|-------------|------------------------|-----------------------|------------------------|
| <input type="checkbox"/> | ThunderAlertNotification |             | ThunderNotification... | Standard Email Plugin | Default Email Template |

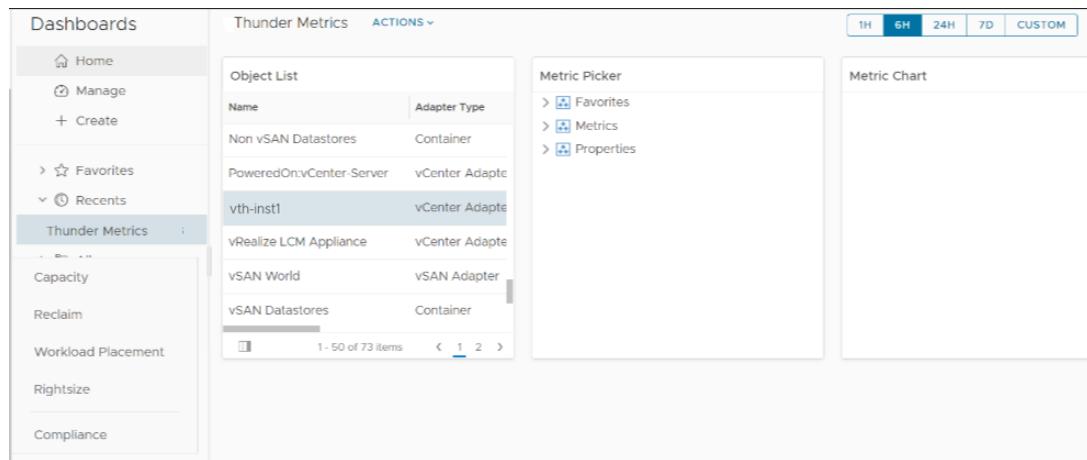
## View Thunder Metrics

To view the Thunder metrics, perform the following steps:

1. From the **vRealize Operations Web UI**, go to **Home > Visualize > Dashboard** and select your dashboard created for Thunder metrics.

The selected dashboard is displayed.

Figure 40 : Selected dashboard

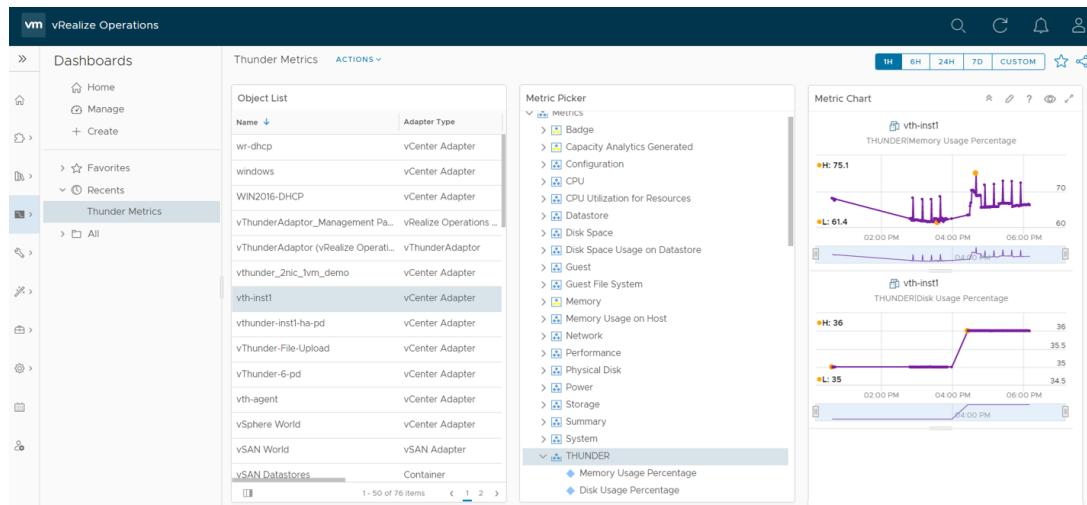


The screenshot shows the 'Thunder Metrics' dashboard. On the left, there's a sidebar with links like Home, Manage, Create, Favorites, Recents, Capacity, Reclaim, Workload Placement, Rightsize, and Compliance. The 'Thunder Metrics' link is highlighted. The main area has three panels: 'Object List' (listing various vCenter and vSAN components), 'Metric Picker' (showing categories like Favorites, Metrics, Properties), and 'Metric Chart' (which is currently empty).

2. From **Object List**, double-click your Thunder instance.
3. From **Metric Picker**, expand **Metrics > THUNDER** and double-click the following common metrics:
  - Memory Usage Percentage
  - Disk Usage Percentage

As the metric is selected, the corresponding data gets populated in the **Metric Chart** panel for the selected the time range.

Figure 41 : THUNDER Dashboard



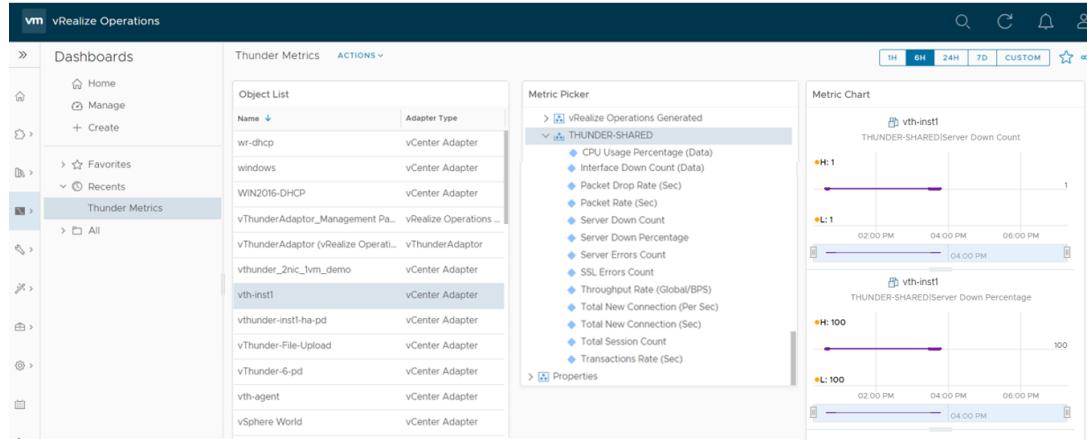
4. From **Metric Picker**, expand **Metrics > THUNDER-SHARED or THUNDER-Px** and

double-click the following metrics:

- CPU Usage Percentage (Data)
- Throughput Rate (Global/BPS)
- Interface Down Count (Data)
- Total New Connection (Sec)
- Transactions Rate (Sec)
- Server Down Count
- Server Down Percentage
- SSL Errors Count
- Server Errors Count
- Total Session Count
- Packet Rate (Sec)
- Packet Drop Rate (Sec)

As the metric is selected, the corresponding data gets populated in the **Metric Chart** panel for the selected the time range.

Figure 42 : THUNDER-SHARED Dashboard



To view multiple metrics data, select each of those metrics. The data corresponding to each metric is displayed in the **Metric Chart** panel. For the list of available Thunder metrics, see [Supported Thunder Metrics](#).

## Monitor Logs

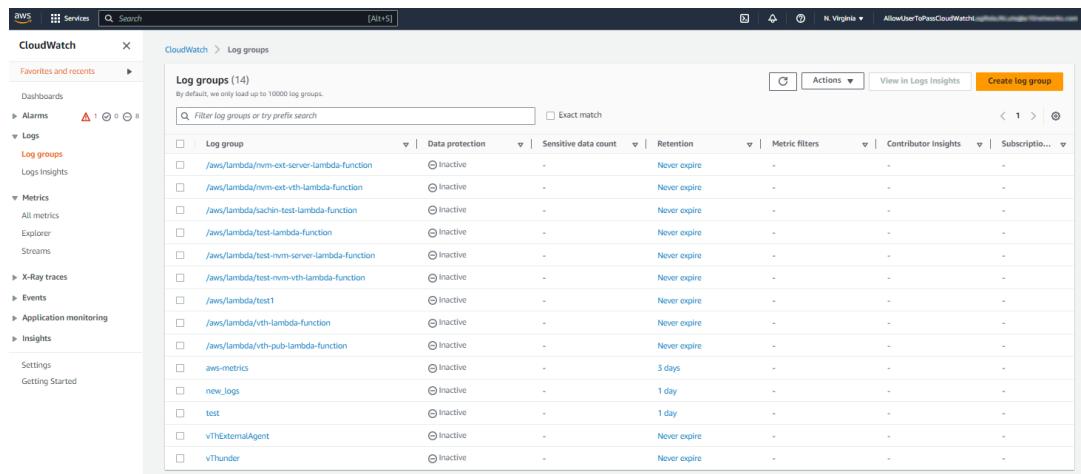
Depending on your cloud provider, the steps are provided to monitor the configured logs.

### AWS CloudWatch

To monitor the Thunder logs on the AWS CloudWatch, perform the following steps:

- From the **AWS Management Console**, go to **CloudWatch > Logs > Log groups**.

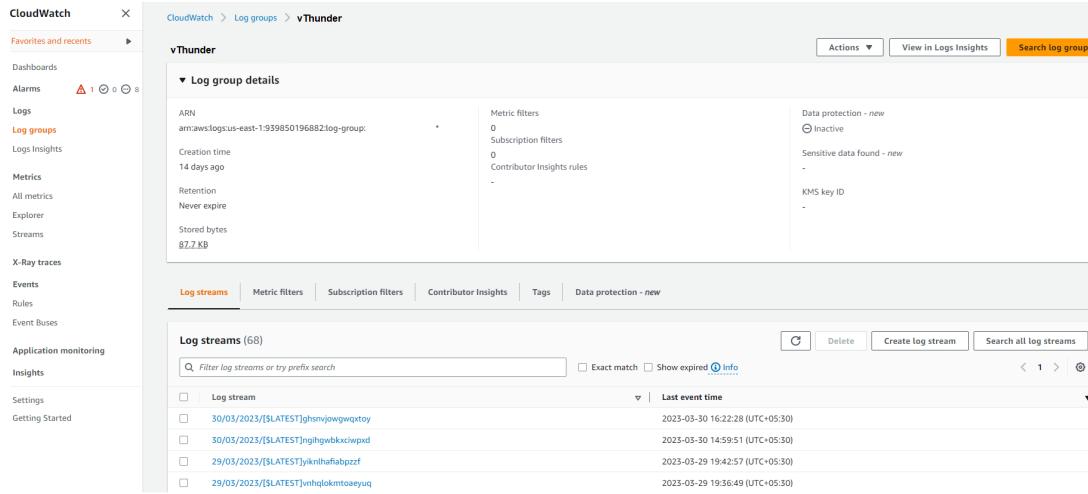
Figure 43 : AWS Log Groups



The screenshot shows the AWS CloudWatch interface with the 'Logs' section selected. On the left, there's a sidebar with various monitoring options like Alarms, Metrics, X-Ray traces, Events, Application monitoring, and Insights. The main area is titled 'Log groups (14)' and displays a table of log groups. Each row in the table represents a log group with columns for Log group name, Data protection (Inactive), Sensitive data count (0), Retention (Never expire), Metric filters (0), Contributor insights (0), and Subscriptions (0). The log groups listed include '/aws/lambda/nvm-ext-server-lambda-function', '/aws/lambda/nvm-ext-veth-lambda-function', '/aws/lambda/actin-test-lambda-function', '/aws/lambda/test-lambda-function', '/aws/lambda/test-nvm-server-lambda-function', '/aws/lambda/test-nvm-veth-lambda-function', '/aws/lambda/test1', '/aws/lambda/veth-lambda-function', '/aws/lambda/vth-pub-lambda-function', 'aws-metrics', 'new\_logs', 'test', 'vTHExternalAgent', and 'vThunder'. The 'vThunder' log group is highlighted with a yellow background.

- Click **Thunder** log group.

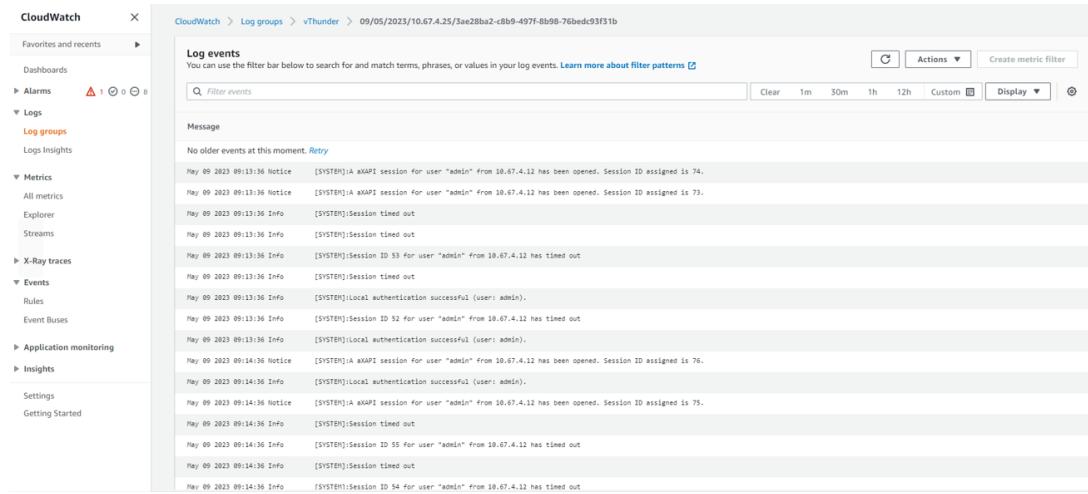
Figure 44 : Thunder Log Group



3. Under the **Log streams** tab, click the required log stream to be monitored.

All logs are displayed in tabular format with expandable details.

Figure 45 : Logs events on AWS CloudWatch



## Azure Log Analytics Workspace

To monitor the Thunder logs on the Azure Log Analytics Workspace, perform the following steps:

- From the **Azure Portal**, go to **Azure services > Resource Groups > <your\_resource\_group>** and click your log analytics workspace name.

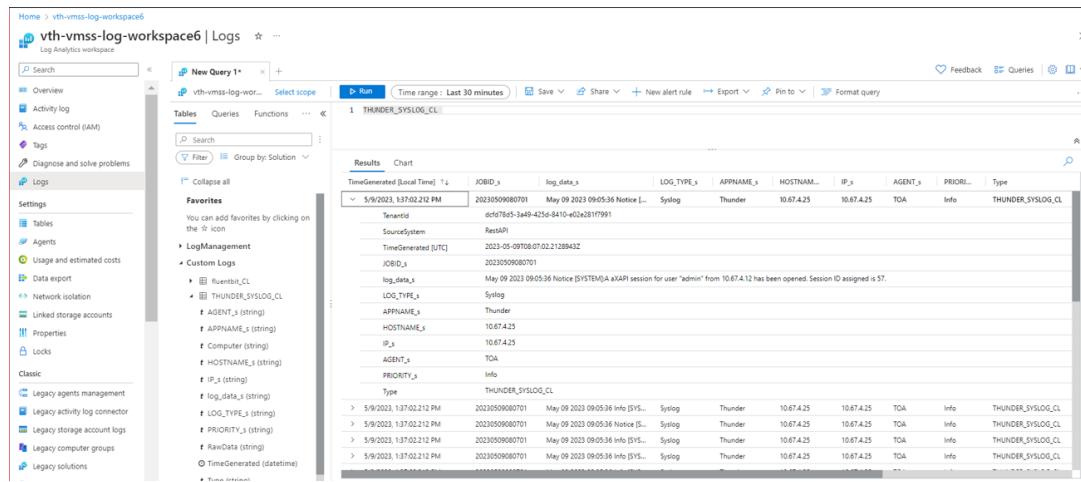
2. Click **Logs** from the left **General** panel.

You can close the **Queries** pop-up window.

3. From **New Query1 > Tables** tab, expand **Custom Logs**.
4. Double click **THUNDER\_SYSLOGS\_CL**.

The **THUNDER\_SYSLOGS\_CL** query window is displayed.

Figure 46 : Custom Logs window



| TimeGenerated [Local Time] | JobID                    | log_data  | LOG_TYPE                             | APPNAME | HOSTNAME   | IP         | AGENT      | PRIORITY | Type              |                   |
|----------------------------|--------------------------|---|--------------------------------------|---------|------------|------------|------------|----------|-------------------|-------------------|
| 5/9/2023, 1:37:02.212 PM   | 20230509080701           | May 09 2023 09:05:36 Notice [SYSTEM]A xAPI session for user "admin" from 10.67.4.12 has been opened. Session ID assigned is 57. | Syslog                               | Thunder | 10.67.4.25 | 10.67.4.25 | TOA        | Info     | THUNDER_SYSLOG_CL |                   |
|                            |                          | dctf785-3a49-425d-8410-e02e281f7991   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | SourceSystem  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | RestAPI   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | TimeGenerated [UTC]   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | 2023-05-09T08:01:32Z  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | JOBID   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | 20230509080701  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | User  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | fluentbit_CL  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | AGENT   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | AGENT_ID  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | APPNAME   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | APPNAME_s   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | Computer  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | Computer_s  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | HOSTNAME  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | HOSTNAME_s  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | IP  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | IP_s  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | LOG_TYPE  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | Syslog  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | APPNAME   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | Thunder   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | HOSTNAME  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | 10.67.4.25  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | IP  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | 10.67.4.25  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | AGENT   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | TOA   |                                      |         |            |            |            |          |                   |                   |
|                            |                          | PRIORITY  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | Info  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | Type  |                                      |         |            |            |            |          |                   |                   |
|                            |                          | THUNDER_SYSLOG_CL   |                                      |         |            |            |            |          |                   |                   |
| >                          | 5/9/2023, 1:37:02.212 PM | 20230509080701  | May 09 2023 09:05:36 Info [SYSLOG]   | Syslog  | Thunder    | 10.67.4.25 | 10.67.4.25 | TOA      | Info              | THUNDER_SYSLOG_CL |
| >                          | 5/9/2023, 1:37:02.212 PM | 20230509080701  | May 09 2023 09:05:36 Notice [SYSTEM] | Syslog  | Thunder    | 10.67.4.25 | 10.67.4.25 | TOA      | Info              | THUNDER_SYSLOG_CL |
| >                          | 5/9/2023, 1:37:02.212 PM | 20230509080701  | May 09 2023 09:05:36 Info [SYSLOG]   | Syslog  | Thunder    | 10.67.4.25 | 10.67.4.25 | TOA      | Info              | THUNDER_SYSLOG_CL |
| >                          | 5/9/2023, 1:37:02.212 PM | 20230509080701  | May 09 2023 09:05:36 Info [SYSLOG]   | Syslog  | Thunder    | 10.67.4.25 | 10.67.4.25 | TOA      | Info              | THUNDER_SYSLOG_CL |

5. Click **Run**.

All logs are displayed in tabular format with expandable details.

## VMware vRLI

To monitor the Thunder logs on the VMware vRLI, perform the following steps:

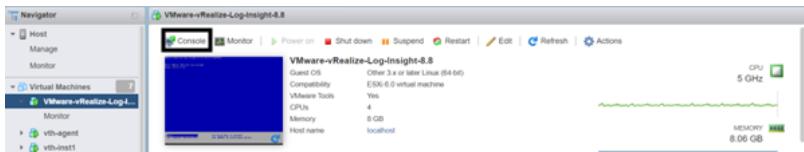
1. [Start vRLI VM](#)
2. [View Logs](#)

### Start vRLI VM

To start the vRLI virtual machine, perform the following steps:

1. From the **VMware ESXi** console, go to **Navigator > Virtual Machines > <your\_vRLI\_VM>** and click **Power on**.

Figure 47 : Start vRLI VM

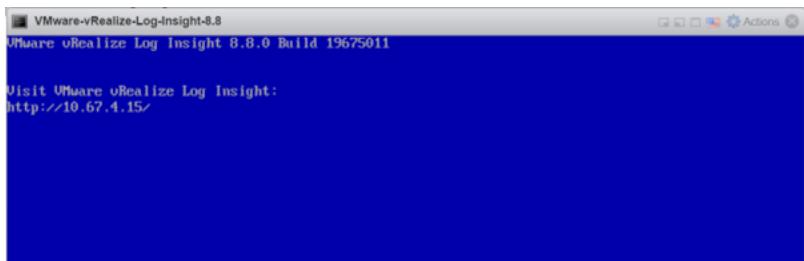
**NOTE:**

The system may take a few minutes to start the vRLI virtual machine.

2. Click **Console** to launch vRLI virtual machine.

The vRLI virtual machine is powered on and reachable.

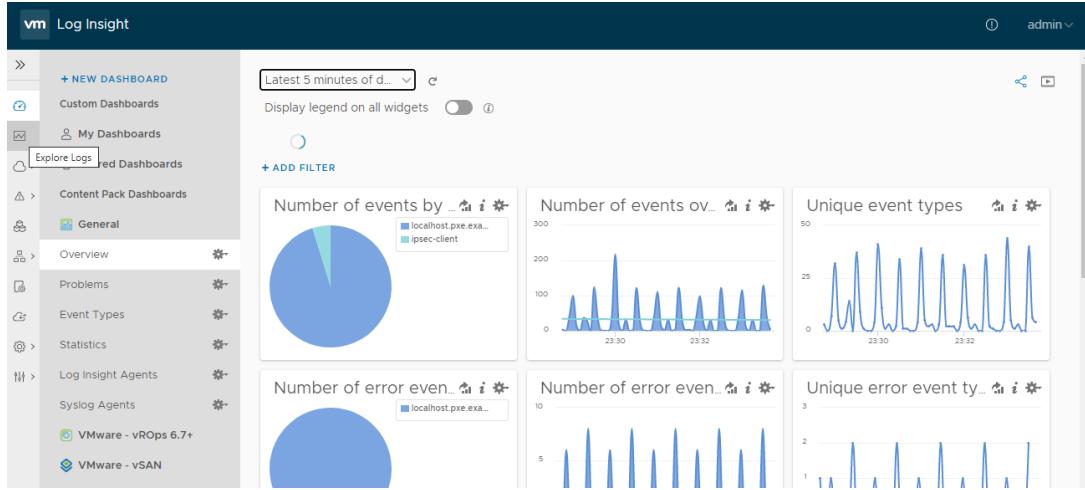
Figure 48 : VMware vRealize Log Insight

**View Logs**

1. From the **vRealize Log Insight Web UI**, go to **Home > Explore Logs** to view the logs.

The **Logs** window is displayed.

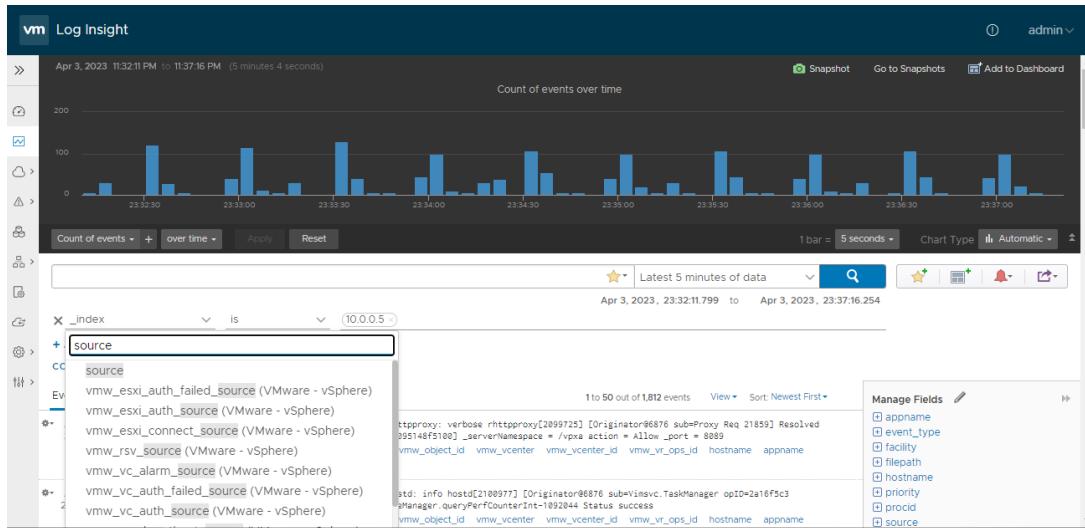
Figure 49 : vRealize Log Insight - Overview window



- Click **Add Filter** and add the following filter criteria to search all the logs received from a specific Thunder IP:

- **\_index: ip**
- **condition: is**
- **value: <Thunder\_IP>**

Figure 50 : vRealize Log Insight - Add Filter

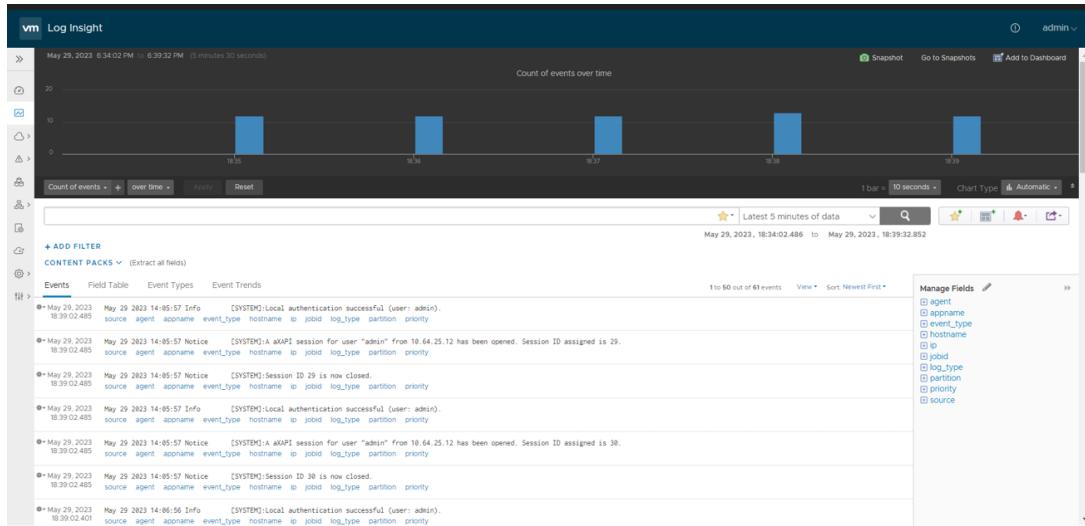


3. Add the following filter criteria to search all logs received from TOA:

- **\_index: source**
- **condition: is**
- **value: <TOA\_IP>**

4. Verify if the logs are generated.

Figure 51 : Logs on vRealize Log Insight



The following table lists the Thunder Logs filter options:

Table 28 : Log Filters

| Filter   | Description  |
|----------|--|
| Log_data | Specifies the actual log entry.  |
| hostname | Displays the Thunder resource id.                                      |
| log_type | Displays the Thunder system logs.                                      |
| appname  | Displays the application name.   |
| ip       | Displays the Thunder IP address.                                       |
| agent    | Displays the agent name.   |
| jobid    | Displays the JOB ID provided in TOA agent.log file.                    |
| priority | Displays the Notice, Info, or Error and so on as per actual log entry. |

Table 28 : Log Filters

| Filter    | Description                          |
|-----------|--------------------------------------|
| partition | Displays the Thunder partition name. |

# Troubleshoot

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## TOA Logging

TOA creates the `agent.log` file at the default directory `/var/log/thunder-observability-agent` path when the TOA cron is executed. This file contains the readable system logs from Thunder devices as per the configured frequency. It is used to troubleshoot any encountered issue.

The log file format contains logging level information. The logging level can be changed to DEBUG level for troubleshooting purpose.

A sample log file is shown below:

```
2023-05-29 06:47:01,831 - INFO - ##### TOA ##### All Rights Reserved
@A10 Networks Inc #####
2023-05-29 06:48:02,063 - INFO - Job No : 20230529104802.
2023-05-29 06:48:02,063 - INFO - Job Start Time : 2023-05-29
10:48:02.006315+00:00.
2023-05-29 06:48:02,064 - WARNING - WARNING : No log or metric is
enabled. To enable [metric, log set to [1]] in config.json.
2023-05-29 06:48:02,064 - INFO - Job Execution : 0.058001 seconds.
2023-05-29 06:48:02,064 - INFO - Job End Time : 2023-05-29
10:48:02.064316+00:00
2023-05-29 06:48:02,064 - INFO - Documentation : www.a10networks.com
or https://github.com/a10networks/thunder-observability-agent.
2023-05-29 06:48:02,064 - INFO - ##### TOA ##### All Rights Reserved
@A10 Networks Inc #####
2023-05-29 06:49:01,301 - INFO - Job No : 20230529104901.
2023-05-29 06:49:01,301 - INFO - Job Start Time : 2023-05-29
10:49:01.244429+00:00.
2023-05-29 06:49:01,301 - WARNING - WARNING : No log or metric is
enabled. To enable [metric, log set to [1]] in config.json.
2023-05-29 06:49:01,301 - INFO - Job Execution : 0.057536 seconds.
2023-05-29 06:49:01,302 - INFO - Job End Time : 2023-05-29
10:49:01.301965+00:00
2023-05-29 06:49:01,302 - INFO - Documentation : www.a10networks.com
```

```

or https://github.com/a10networks/thunder-observability-agent.

2023-05-29 06:49:01,302 - INFO - ##### TOA ##### All Rights Reserved
@A10 Networks Inc #####
2023-05-29 06:50:01,533 - INFO - Job No : 20230529105001.
2023-05-29 06:50:01,533 - INFO - Job Start Time : 2023-05-29
10:50:01.477199+00:00.
2023-05-29 06:50:01,533 - ERROR - Error : File not found or
corrupt. Please check file and path: [/usr/toaenv/thunder-observability-
agent/config.json]. Application config not found. Please check [config_
path] in main.properties.
2023-05-29 06:50:01,533 - INFO - Job Execution : 0.056567 seconds.
2023-05-29 06:50:01,533 - INFO - Job End Time : 2023-05-29
10:50:01.533766+00:00
2023-05-29 06:50:01,533 - INFO - Documentation : www.a10networks.com or
https://github.com/a10networks/thunder-observability-agent.

2023-05-29 06:54:01,462 - INFO - ##### TOA ##### All Rights Reserved
@A10 Networks Inc #####
2023-05-29 06:55:01,738 - INFO - Job No : 20230529105501.
2023-05-29 06:55:01,738 - INFO - Job Start Time : 2023-05-29
10:55:01.680906+00:00.
2023-05-29 06:55:01,738 - INFO - Log Provider : VMWARE.
2023-05-29 06:55:01,738 - INFO - Log : VMWARE_LOG.
2023-05-29 06:55:01,738 - INFO - Metric Provider : VMWARE.
2023-05-29 06:55:01,739 - INFO - Metric : VMWARE_METRIC.
2023-05-29 06:55:01,739 - INFO - No of Thunders : 1 ['10.64.25.13'].
2023-05-29 06:55:01,739 - WARNING - WARNING : No partitions found
for thunder [], setting to default 'SHARED'. Multiple L3V partition can be
configured as comma separated for example if we have partition 'P1' and
'P2' then we can define as ['partition' : 'Shared,P1,P2'] upto 20
partitions.
2023-05-29 06:55:01,739 - INFO - No of Partitions : 10.64.25.13 [Count: 1]
[shared].
2023-05-29 06:55:02,068 - INFO - Published Log : 10.64.25.13 THUNDER-
SHARED [Count: 3].
2023-05-29 06:55:02,112 - INFO - Published Metric : 10.64.25.13 THUNDER
[Count: 2] [{"Memory Usage Percentage": 63.4, "Disk Usage Percentage": 63.4}]]
```

```

36}].
2023-05-29 06:55:02,151 - INFO - Published Metric : 10.64.25.13 THUNDER-
SHARED [Count: 10] [{"Server Errors Count": 0, "Total Session Count": 0,
"SSL Errors Count": 0, "Server Down Percentage": 0, "CPU Usage Percentage
(Data)": 0.0, "Total New Connection (Sec)": 0, "Interface Down Count
(Data)": 0, "Server Down Count": 0, "Transactions Rate (Sec)": 0,
"Throughput Rate (Global/BPS)": 0}].
2023-05-29 06:55:02,161 - INFO - Job Execution      : 0.480912 seconds.
2023-05-29 06:55:02,161 - INFO - Job End Time       : 2023-05-29
10:55:02.161818+00:00
2023-05-29 06:55:02,162 - INFO - Documentation       : www.a10networks.com or
https://github.com/a10networks/thunder-observability-agent.

2023-05-29 07:00:02,016 - INFO - ##### TOA ##### All Rights Reserved
@A10 Networks Inc ##### TOA #####
2023-05-29 07:01:01,258 - INFO - Job No           : 20230529110101.
2023-05-29 07:01:01,258 - INFO - Job Start Time    : 2023-05-29
11:01:01.201609+00:00.
2023-05-29 07:01:01,259 - INFO - Log Provider      : VMWARE.
2023-05-29 07:01:01,259 - INFO - Log               : VMWARE_LOG.
2023-05-29 07:01:01,259 - INFO - Metric Provider     : VMWARE.
2023-05-29 07:01:01,259 - INFO - Metric             : VMWARE_METRIC.
2023-05-29 07:01:01,259 - INFO - No of Thunders     : 1 ['10.64.25.13'].
2023-05-29 07:01:01,259 - INFO - No of Partitions   : 10.64.25.13 [Count: 2]
[{'shared', 'p1'}].
2023-05-29 07:01:01,592 - INFO - Published Log     : 10.64.25.13 THUNDER-P1
[No Data Found].
2023-05-29 07:01:01,664 - INFO - Published Metric : 10.64.25.13 THUNDER-P1
[Count: 10] [{"Total Session Count": 0, "Server Errors Count": 0, "Server
Down Percentage": 0, "SSL Errors Count": 0, "Server Down Count": 0,
"Transactions Rate (Sec)": 0, "Interface Down Count (Data)": 1,
"Throughput Rate (Global/BPS)": 0, "Total New Connection (Sec)": 0, "CPU
Usage Percentage (Data)": 0.0}].
2023-05-29 07:01:01,673 - INFO - Published Metric : 10.64.25.13 THUNDER-
SHARED [Count: 10] [{"SSL Errors Count": 0, "Server Down Percentage": 0,
"Server Errors Count": 0, "Total Session Count": 0, "Server Down Count": 0,
"Interface Down Count (Data)": 0, "CPU Usage Percentage (Data)": 0.0,
"Transactions Rate (Sec)": 0, "Throughput Rate (Global/BPS)": 0, "Total

```

```

New Connection (Sec)': 0}]}.

2023-05-29 07:01:01,682 - INFO - Published Metric : 10.64.25.13 THUNDER
[Count: 2] [ {'Disk Usage Percentage': 36, 'Memory Usage Percentage':
66.8} ].

2023-05-29 07:01:01,701 - INFO - Published Log      : 10.64.25.13 THUNDER-
SHARED [Count: 10] .

2023-05-29 07:01:01,712 - INFO - Job Execution     : 0.51061 seconds.

2023-05-29 07:01:01,712 - INFO - Job End Time      : 2023-05-29
11:01:01.712219+00:00

2023-05-29 07:01:01,712 - INFO - Documentation      : www.a10networks.com or
https://github.com/a10networks/thunder-observability-agent.

2023-05-29 05:57:02,553 - INFO - ##### TOA ##### All Rights Reserved
@A10 Networks Inc ##### TOA #####
2023-05-29 05:58:01,786 - INFO - Job No          : 20230529095801.

2023-05-29 05:58:01,787 - INFO - Job Start Time   : 2023-05-29
09:58:01.730452+00:00.

2023-05-29 05:58:01,787 - INFO - Log Provider     : VMWARE.

2023-05-29 05:58:01,787 - INFO - Log             : VMWARE_LOG.

2023-05-29 05:58:01,787 - INFO - Metric Provider   : VMWARE.

2023-05-29 05:58:01,787 - INFO - Metric           : VMWARE_METRIC.

2023-05-29 05:58:01,787 - INFO - No of Thunders    : 1 ['10.64.25.13'].

2023-05-29 05:58:01,787 - INFO - No of Partitions : 10.64.25.13 [Count: 1]
[*] .

2023-05-29 05:58:02,848 - INFO - Published Metric : 10.64.25.13 THUNDER
[Count: 2] [ {'Disk Usage Percentage': 35, 'Memory Usage Percentage':
61.6} ].

2023-05-29 05:58:02,923 - INFO - Published Metric : 10.64.25.13 THUNDER-P1
[Count: 10] [ {'Total Session Count': 0, 'Server Errors Count': 0, 'SSL
Errors Count': 0, 'Server Down Count': 0, 'Transactions Rate (Sec)': 0,
'Total New Connection (Sec)': 0, 'CPU Usage Percentage (Data)': 0.0,
'Server Down Percentage': 0, 'Interface Down Count (Data)': 1, 'Throughput
Rate (Global/BPS)': 0} ].

2023-05-29 05:58:03,210 - INFO - Published Log      : 10.64.25.13 THUNDER-P5
[No Data Found] .

2023-05-29 05:58:03,216 - INFO - Published Log      : 10.64.25.13 THUNDER-P8
[No Data Found] .

2023-05-29 05:58:03,252 - INFO - Published Metric : 10.64.25.13 THUNDER-P7

```

[Troubleshoot](#)


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```
[Count: 10] [{"Server Errors Count": 0, "Total Session Count": 0, "SSL Errors Count": 0, "Server Down Percentage": 0, "Server Down Count": 0, "Transactions Rate (Sec)": 0, "Throughput Rate (Global/BPS)": 0, "Total New Connection (Sec)": 0, "Interface Down Count (Data)": 0, "CPU Usage Percentage (Data)": 0.0}].  
2023-05-29 05:58:03,288 - INFO - Published Log : 10.64.25.13 THUNDER-SHARED [Count: 6].  
2023-05-29 05:58:03,379 - INFO - Published Log : 10.64.25.13 THUNDER-P19 [No Data Found].  
2023-05-29 05:58:03,381 - INFO - Published Metric : 10.64.25.13 THUNDER-P15 [Count: 10] [{"Total Session Count": 0, "Server Errors Count": 0, "Server Down Percentage": 0, "SSL Errors Count": 0, "Server Down Count": 0, "Transactions Rate (Sec)": 0, "CPU Usage Percentage (Data)": 0.0, "Interface Down Count (Data)": 0, "Throughput Rate (Global/BPS)": 0, "Total New Connection (Sec)": 0}].  
2023-05-29 05:58:03,422 - INFO - Published Metric : 10.64.25.13 THUNDER-P2 [Count: 10] [{"Server Down Count": 1, "Server Down Percentage": 100.0, "Server Errors Count": 0, "Total Session Count": 0, "SSL Errors Count": 0, "Interface Down Count (Data)": 0, "Transactions Rate (Sec)": 0, "Total New Connection (Sec)": 0, "CPU Usage Percentage (Data)": 0.0, "Throughput Rate (Global/BPS)": 0}].  
2023-05-29 05:58:03,502 - INFO - Published Metric : 10.64.25.13 THUNDER-P11 [Count: 10] [{"SSL Errors Count": 0, "Total Session Count": 0, "Server Errors Count": 0, "Transactions Rate (Sec)": 0, "Server Down Percentage": 0, "Server Down Count": 0, "Total New Connection (Sec)": 0, "Interface Down Count (Data)": 0, "CPU Usage Percentage (Data)": 0.0, "Throughput Rate (Global/BPS)": 0}].  
2023-05-29 05:58:03,547 - INFO - Published Metric : 10.64.25.13 THUNDER-P4 [Count: 10] [{"Total Session Count": 0, "SSL Errors Count": 0, "Server Errors Count": 0, "Total New Connection (Sec)": 0, "Server Down Percentage": 0, "Server Down Count": 0, "Transactions Rate (Sec)": 0, "Throughput Rate (Global/BPS)": 0, "CPU Usage Percentage (Data)": 0.0, "Interface Down Count (Data)": 0}].  
2023-05-29 05:58:03,608 - INFO - Published Log : 10.64.25.13 THUNDER-P11 [No Data Found].  
2023-05-29 05:58:03,626 - INFO - Published Log : 10.64.25.13 THUNDER-P1 [No Data Found].  
2023-05-29 05:58:03,620 - INFO - Published Log : 10.64.25.13 THUNDER-
```

```
P16 [No Data Found].  
2023-05-29 05:58:03,674 - INFO - Published Metric : 10.64.25.13 THUNDER-P5  
[Count: 10] [{"SSL Errors Count": 0, "Server Errors Count": 0, "Total Session Count": 0, "Server Down Count": 0, "Transactions Rate (Sec)": 0, "Server Down Percentage": 0, "Total New Connection (Sec)": 0, "CPU Usage Percentage (Data)": 0.0, "Interface Down Count (Data)": 0, "Throughput Rate (Global/BPS)": 0}].  
2023-05-29 05:58:03,740 - INFO - Published Metric : 10.64.25.13 THUNDER-P17  
[Count: 10] [{"Server Errors Count": 0, "SSL Errors Count": 0, "Total Session Count": 0, "Server Down Count": 0, "Transactions Rate (Sec)": 0, "Server Down Percentage": 0, "Throughput Rate (Global/BPS)": 0, "CPU Usage Percentage (Data)": 0.0, "Total New Connection (Sec)": 0, "Interface Down Count (Data)": 0}].  
2023-05-29 05:58:03,809 - INFO - Published Metric : 10.64.25.13 THUNDER-P8  
[Count: 10] [{"Server Down Percentage": 0, "Server Errors Count": 0, "SSL Errors Count": 0, "Total Session Count": 0, "Transactions Rate (Sec)": 0, "Server Down Count": 0, "Total New Connection (Sec)": 0, "CPU Usage Percentage (Data)": 0.0, "Throughput Rate (Global/BPS)": 0, "Interface Down Count (Data)": 0}].  
2023-05-29 05:58:04,082 - INFO - Published Log : 10.64.25.13 THUNDER-P9  
[No Data Found].  
2023-05-29 05:58:04,248 - INFO - Published Metric : 10.64.25.13 THUNDER-P19  
[Count: 10] [{"Total Session Count": 0, "Server Down Count": 0, "Server Errors Count": 0, "SSL Errors Count": 0, "Transactions Rate (Sec)": 0, "Server Down Percentage": 0, "CPU Usage Percentage (Data)": 0.0, "Throughput Rate (Global/BPS)": 0, "Interface Down Count (Data)": 0, "Total New Connection (Sec)": 0}].  
2023-05-29 05:58:04,250 - INFO - Published Metric : 10.64.25.13 THUNDER-P9  
[Count: 10] [{"Server Down Count": 3, "Server Down Percentage": 100.0, "Server Errors Count": 0, "Total Session Count": 0, "SSL Errors Count": 0, "Total New Connection (Sec)": 0, "Transactions Rate (Sec)": 0, "Interface Down Count (Data)": 0, "CPU Usage Percentage (Data)": 0.0, "Throughput Rate (Global/BPS)": 0}].  
2023-05-29 05:58:04,258 - INFO - Published Metric : 10.64.25.13 THUNDER-P3  
[Count: 10] [{"Server Down Percentage": 100.0, "Server Down Count": 2, "Transactions Rate (Sec)": 0, "SSL Errors Count": 0, "Total Session Count": 0, "Server Errors Count": 0, "Total New Connection (Sec)": 0, "Throughput Rate (Global/BPS)": 0, "CPU Usage Percentage (Data)": 0.0, "Interface Down Count (Data)": 0}].
```

```
'Interface Down Count (Data)': 0}].  
2023-05-29 05:58:04,260 - INFO - Published Log      : 10.64.25.13 THUNDER-  
P12 [No Data Found].  
2023-05-29 05:58:04,267 - INFO - Published Metric : 10.64.25.13 THUNDER-  
P13 [Count: 10] [{"Total Session Count": 0, "Server Down Percentage": 0,  
"Server Errors Count": 0, "SSL Errors Count": 0, "Transactions Rate  
(Sec)": 0, "Server Down Count": 0, "Total New Connection (Sec)": 0, "CPU  
Usage Percentage (Data)": 0.0, "Interface Down Count (Data)": 0,  
"Throughput Rate (Global/BPS)": 0}].  
2023-05-29 05:58:04,308 - INFO - Published Log      : 10.64.25.13 THUNDER-P4  
[No Data Found].  
2023-05-29 05:58:04,377 - INFO - Published Log      : 10.64.25.13 THUNDER-  
P18 [No Data Found].  
2023-05-29 05:58:04,396 - INFO - Published Metric : 10.64.25.13 THUNDER-  
SHARED [Count: 10] [{"Server Errors Count": 0, "Total Session Count": 0,  
"SSL Errors Count": 0, "Transactions Rate (Sec)": 0, "Server Down Count":  
0, "CPU Usage Percentage (Data)": 0.0, "Throughput Rate (Global/BPS)": 0,  
"Server Down Percentage": 0, "Total New Connection (Sec)": 0, "Interface  
Down Count (Data)": 0}].  
2023-05-29 05:58:04,468 - INFO - Published Log      : 10.64.25.13 THUNDER-P7  
[No Data Found].  
2023-05-29 05:58:04,469 - INFO - Published Metric : 10.64.25.13 THUNDER-  
P16 [Count: 10] [{"Server Errors Count": 0, "SSL Errors Count": 0, "Total  
Session Count": 0, "Server Down Percentage": 0, "Server Down Count": 0,  
"CPU Usage Percentage (Data)": 0.0, "Throughput Rate (Global/BPS)": 0,  
"Interface Down Count (Data)": 0, "Total New Connection (Sec)": 0,  
"Transactions Rate (Sec)": 0}].  
2023-05-29 05:58:04,472 - INFO - Published Log      : 10.64.25.13 THUNDER-P2  
[No Data Found].  
2023-05-29 05:58:04,474 - INFO - Published Log      : 10.64.25.13 THUNDER-  
P15 [No Data Found].  
2023-05-29 05:58:04,599 - INFO - Published Log      : 10.64.25.13 THUNDER-  
P17 [No Data Found].  
2023-05-29 05:58:04,607 - INFO - Published Log      : 10.64.25.13 THUNDER-  
P10 [No Data Found].  
2023-05-29 05:58:04,624 - INFO - Published Metric : 10.64.25.13 THUNDER-  
P10 [Count: 10] [{"Transactions Rate (Sec)": 0, "SSL Errors Count": 0,  
"Total Session Count": 0, "Server Down Percentage": 0, "Server Down
```

[Troubleshoot](#)

```
Count': 0, 'Server Errors Count': 0, 'Total New Connection (Sec)': 0,
'Interface Down Count (Data)': 0, 'Throughput Rate (Global/BPS)': 0, 'CPU
Usage Percentage (Data)': 0.0}].
2023-05-29 05:58:04,742 - INFO - Published Log      : 10.64.25.13 THUNDER-
P14 [No Data Found].
2023-05-29 05:58:04,844 - INFO - Published Metric : 10.64.25.13 THUNDER-
P18 [Count: 10] [{SSL Errors Count': 0, 'Total Session Count': 0, 'Server
Errors Count': 0, 'Server Down Count': 0, 'Server Down Percentage': 0,
'Throughput Rate (Global/BPS)': 0, 'Interface Down Count (Data)': 0,
'Transactions Rate (Sec)': 0, 'Total New Connection (Sec)': 0, 'CPU Usage
Percentage (Data)': 0.0}].
2023-05-29 05:58:04,910 - INFO - Published Log      : 10.64.25.13 THUNDER-P3
[No Data Found].
2023-05-29 05:58:04,919 - INFO - Published Log      : 10.64.25.13 THUNDER-
P13 [No Data Found].
2023-05-29 05:58:04,922 - INFO - Published Metric : 10.64.25.13 THUNDER-
P14 [Count: 10] [{Server Down Percentage': 0, 'Total New Connection
(Sec)': 0, 'Transactions Rate (Sec)': 0, 'Total Session Count': 0, 'Server
Errors Count': 0, 'SSL Errors Count': 0, 'Server Down Count': 0, 'CPU
Usage Percentage (Data)': 0.0, 'Interface Down Count (Data)': 0,
'Throughput Rate (Global/BPS)': 0}].
2023-05-29 05:58:04,942 - INFO - Published Log      : 10.64.25.13 THUNDER-P6
[No Data Found].
2023-05-29 05:58:04,978 - INFO - Published Metric : 10.64.25.13 THUNDER-
P12 [Count: 10] [{Server Errors Count': 0, 'Server Down Percentage': 0,
'Total Session Count': 0, 'SSL Errors Count': 0, 'CPU Usage Percentage
(Data)': 0.0, 'Server Down Count': 0, 'Transactions Rate (Sec)': 0,
'Interface Down Count (Data)': 0, 'Throughput Rate (Global/BPS)': 0,
'Total New Connection (Sec)': 0}].
2023-05-29 05:58:05,002 - INFO - Published Metric : 10.64.25.13 THUNDER-P6
[Count: 10] [{Throughput Rate (Global/BPS)': 0, 'Server Down Percentage':
0, 'Server Errors Count': 0, 'Total New Connection (Sec)': 0, 'SSL Errors
Count': 0, 'Transactions Rate (Sec)': 0, 'Total Session Count': 0, 'Server
Down Count': 0, 'CPU Usage Percentage (Data)': 0.0, 'Interface Down Count
(Data)': 0}].
2023-05-29 05:58:05,013 - INFO - Job Execution    : 3.282716 seconds.
2023-05-29 05:58:05,013 - INFO - Job End Time   : 2023-05-29
09:58:05.013168+00:00
```

```
2023-05-29 05:58:05,013 - INFO - Documentation      : www.a10networks.com or  
https://github.com/a10networks/thunder-observability-agent.
```

# Examples

---

The following topics are covered:

|                        |    |
|------------------------|----|
| <a href="#">AWS</a>    | 86 |
| <a href="#">Azure</a>  | 90 |
| <a href="#">VMware</a> | 95 |

## AWS

Borse Inc. is a regular A10 client. The company has purchased multiple instances of Thunder and deployed it on their AWS platform. The instances are configured as an ADC load balancer for their gaming applications named [Pokers]. The company is receiving timeout/failover complaints from their online customers especially when there is a high traffic load caused by an event, festival, or holiday. The client wants a standard way to monitor using AWS CloudWatch and to get an email alert when the aggregated CPU usage crosses 75% so that proper action can be taken on time.

The client has shared the following environment details:

| Parameter                     | Description                     |
|-------------------------------|---------------------------------|
| Linux Environment IP          | 10.22.32.51                     |
| Hardware                      | 2 GB RAM, 1 CPU, 4 GB memory    |
| <b><i>Thunder details</i></b> |                                 |
| Thunder instance              | 1                               |
| Thunder IP                    | 10.22.32.01                     |
| User Name                     | Online_Pokers_TH                |
| Password                      | Thunder@Borse@3201              |
| Resource_Name                 | North_Virginia_Online_Pokers_TH |
| resource_id                   | i-1234567890abcdef0             |
| Thunder instance              | 2                               |
| Thunder IP                    | 10.22.32.02                     |

| Parameter                     | Description                              |
|-------------------------------|--|
| User Name                     | Online_Pokers_TH2                        |
| Password                      | Thunder@Borse@3202                       |
| Resource_Name                 | North_Virginia_Online_Pokers_TH2         |
| resource_id                   | i-1234567890uvwxyz0                      |
| Thunder instance              | 3  |
| User Name                     | Online_Pokers_TH3                        |
| Password                      | Thunder@Borse@3203                       |
| Resource_Name                 | vth-auto-scale-group                     |
| <b>AWS Monitoring details</b> |  |
| aws_log_group_name            | Thunder                                  |
| aws_access_key_id             | AKIA5VU3P46JEI7OQU54                     |
| aws_secret_access_key         | 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 |
| region                        | us-east-1                                |

## Solution

A10 Support team will propose to install **Thunder Observability Agent (TOA)** for collecting and publishing logs on AWS CloudWatch:

1. Install Python if the recommended version is not already installed on the shared Linux instance IP 10.22.32.51.

```
apt update
apt-get install python3.10
apt install python3-pip
apt install cron
apt install rsyslog
```

2. Install TOA.

```
pip install virtualenv
virtualenv venv
source venv/bin/activate
pip install thunder_observability_agent
```

### 3. Configure TOA.

- Configure Thunder details in the `/root/.thunder/credentials` file depending on the type of Thunder instance:

#### Single instance

```
{
    "autoscale" : 0,
    "provider" : "XXXX",
    "thunders": [
        {
            "ip": "10.22.32.01",
            "username": "Online_Pokers_TH",
            "password": "Thunder@Borse@3201",
            "resource_id": "i-1234567890abcdef0"
            "active_partitions": "shared"
        }
    ]
}
```

#### Multiple instances

```
{
    "autoscale" : 0,
    "provider" : "XXXX",
    "thunders": [
        {
            "ip": "10.22.32.01",
            "username": "Online_Pokers_TH",
            "password": "Thunder@Borse@3201",
            "resource_id": "i-1234567890abcdef0"
            "active_partitions": "shared"
        },
        {
            "ip": "10.22.32.02",
            "username": "Online_Pokers_TH2",
            "password": "Thunder@Borse@3202",
            "resource_id": "i-1234567890uvwxyz0"
            "active_partitions": "P1"
        }
    ]
}
```

### Auto Scale instance

```
{  
    "autoscale" : 1,  
    "provider" : "AWS",  
    "thunders": [  
        {  
            "ip": "XXXX",  
            "username": "Online_Pokers_TH",  
            "password": "Thunder@Borse@3201",  
            "resource_id": "vth-auto-scale-group-name"  
            "active_partitions": "shared"  
        }  
    ]  
}
```

- b. Update the following configurations in the `/root/.aws/config` file.

```
[default]  
region = us-east-1  
output = json
```

- c. Update the AWS credentials in the `/root/.aws/credentials` file.

```
[default]  
aws_access_key_id = AKIA5VU3P46JEI7OQU54  
aws_secret_access_key = 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
```

- d. Update AWS configuration properties in the `/usr/toaenv/thunder-observability-agent/config.json` file.

```
{  
    "aws_provider": 1,  
    "aws_metric": 1,  
    "aws_cpu": 1,  
    "aws_memory": 1,  
    "aws_disk": 1,  
    "aws_throughput": 1,  
    "aws_interfaces": 1,  
    "aws_cps": 1,  
    "aws_tps": 1,  
    "aws_server_down_count": 1,  
    "aws_server_down_percentage": 1,  
    "aws_ssl_cert": 1,  
    "aws_server_error": 1,  
    "aws_sessions": 1,  
    "aws_packet_rate": 1,  
    "aws_packet_drop": 1,  
    "aws_log": 1,  
    "aws_log_group_name": "Thunder",  
}
```

4. Check logs at `/var/log/thunder-observability-agent/agent.log`.

For more examples, see [GitHub](#).

## Azure

ABC Corp. is a regular A10 client. The company has purchased multiple instances of Thunder and deployed it on their Azure platform. The instances are configured as an ADC load balancer for their gaming applications named [Football]. The company is receiving timeout/failover complaints from their online customers especially when there is a high traffic load caused by an event, festival, or holiday. The client wants a standard way to monitor using Azure Application Insight and Log Analytics Workspace and to get an email alert when the aggregated CPU usage crosses 75% so that proper action can be taken on time.

The client has shared the following environment details:

| Parameter                              | Description  |
|--|--|
| Linux Environment IP                   | 10.22.32.51  |
| Hardware                               | 2 GB RAM, 1 CPU, 4 GB memory   |
| <b><i>Thunder details</i></b>          |  |
| Thunder instance                       | 1  |
| Thunder IP                             | 10.22.32.01  |
| User Name                              | Online_Football_TH   |
| Password                               | Thunder@ABC@3201   |
| Resource_Name                          | North_Virginia_Online_Football_TH  |
| resource_id                            | i-1234567890lmnopq0  |
| Thunder instance                       | 2  |
| Thunder IP                             | 10.22.32.02  |
| User Name                              | Online_Football_TH2  |
| Password                               | Thunder@ABC@3202   |
| Resource_Name                          | North_Virginia_Online_Football_TH2   |
| resource_id                            | i-1234567890rstuvwxyz0   |
| Thunder instance                       | 3  |
| User Name                              | Online_Football_TH3  |
| Password                               | Thunder@ABC@3203   |
| Resource_Name                          | vth-auto-scale-group   |
| <b><i>Azure Monitoring details</i></b> |  |
| azure_location                         | southcentralus   |
| azure_metric_resource_id               | /subscriptions/07d34b9b-61e3-475a-abbc-006b16812a3e/<br>resourceGroups/vth-rg6/<br>providers/microsoft.insights/<br>components/vth-vmss-app-insights |
| azure_workspace_primary_key            | tewPsyMYkdGOThRjEy *****<br>*****<br>F8CzJ49ZRgw==   |

| Parameter              | Description                            |
|------------------------|--|
| azure_client_id        | 10724xxx-xxx-xxxx-xxxx-xxxx2c14726d    |
| azure_secret_id        | 9-xxx~jIxxxEVyxxxxHNxxxOwv_xxxxZLxxxTM |
| azure_tenant_id        | 91d27xxx-xxxx-xxxx-xxxx-xxxxf81fcbb2f  |
| azure_log_workspace_id | dcf7xxx-xxxx-xxxx-xxxx-xxxxf81fc991    |

## Solution

A10 Support team will propose to install **Thunder Observability Agent (TOA)** for collecting and publishing logs on the Azure platform:

1. Install Python if the recommended version is not already installed on the shared Linux instance IP 10.22.32.51.

```
apt update
apt-get install python3.10
apt install python3-pip
apt install cron
apt install rsyslog
```

2. Install TOA.

```
pip install virtualenv
virtualenv venv
source venv/bin/activate
pip install thunder_observability_agent
```

3. Configure TOA.

- a. Configure Thunder details in the `/root/.thunder/credentials` file depending upon the type of Thunder instance:

### Single instance

```
{
    "autoscale" : 0,
    "provider" : "XXXX",
    "thunders": [
        {
            "ip": "10.22.32.01",
            "username": "Online_Football_TH",
            "password": "Thunder@ABC@3201",
```

```

        "resource_id": "i-1234567890lmnopq0"
        "active_partitions": "shared"
    } ]
}

```

## Multiple instances

```

{
    "autoscale" : 0,
    "provider" : "XXXX",
    "thunders": [
        {
            "ip": "10.22.32.01",
            "username": "Online_Football_TH",
            "password": "Thunder@ABC@3201",
            "resource_id": "i-1234567890lmnopq0"
            "active_partitions": "shared"
        },
        {
            "ip": "10.22.32.02",
            "username": "Online_Football_TH2",
            "password": "Thunder@ABC@3202",
            "resource_id": "i-1234567890rstuvwxyz0"
            "active_partitions": "shared"
        }
    ]
}

```

## Auto Scale (VMSS) instance

```

{
    "autoscale" : 1,
    "provider" : "Azure",
    "thunders": [
        {
            "username": "Online_Football_TH3",
            "password": "Thunder@ABC@3203",
            "resource_id": "vth-auto-scale-group"
            "active_partitions": "shared"
        }
    ]
}

```

- Update the Azure credentials in the `/root/.azure/credentials` file.

```

    azure_workspace_primary_key =
"tewPsyMYkdGOThRjEyl*****F8CzJ49ZRgw=="
*****azure_client_id = "10724xxx-xxx-xxxx-xxxx-xxxx2c14726d"
azure_secret_id = "9-xxx~jIxxyEVyxxxxHNxxxOwv_xxxxZLxxxTM"
azure_tenant_id = "91d27xxx-xxxx-xxxx-xxxx-xxxxf81fcb2f"
azure_location = "southcentralus"

```

- c. Update Azure configuration properties in the `/usr/toaenv/thunder-observability-agent/config.json` file.

```
{
  "azure_provider": 1,
  "azure_metric": 1,
  "azure_metric_resource_id": "/subscriptions/07d34b9b-61e3-475a-abbc-006b16812a3e/resourceGroups/vth-rg6/providers/microsoft.insights/components/vth-vmss-app-insights",
  "azure_cpu": 1,
  "azure_memory": 1,
  "azure_disk": 1,
  "azure_throughput": 1,
  "azure_interfaces": 1,
  "azure_cps": 1,
  "azure_tps": 1,
  "azure_server_down_count": 1,
  "azure_server_down_percentage": 1,
  "azure_ssl_cert": 1,
  "azure_server_error": 1,
  "azure_sessions": 1,
  "azure_packet_rate": 1,
  "azure_packet_drop": 1,
  "azure_log": 1,
  "azure_log_workspace_id": "dcfd7xxx-xxxx-xxxx-xxxx-xxxxf81fc991"
}
```

4. Check logs at `/var/log/thunder-observability-agent/agent.log`.

For more examples, see [GitHub](#).

## VMware

LMQ Corp. is a regular A10 client. The company has purchased multiple instances of Thunder and deployed it on their VMware platform. The instances are configured as an ADC load balancer for their gaming applications named [Baseball]. The company is receiving timeout/failover complaints from their online customers especially when there is a high traffic load caused by an event, festival, or holiday. The client wants a standard way to monitor using VMware vRealize Operations Manager (vROps) and vRealize Log Insight (vRLI) and to get an email alert when the aggregated CPU usage crosses 75% so that proper action can be taken on time.

The client has shared the following environment details:

| Parameter                     | Description                        |
|-------------------------------|------------------------------------|
| Linux Environment IP          | 10.22.32.51                        |
| Hardware                      | 2 GB RAM, 1 CPU, 4 GB memory       |
| <b><i>Thunder details</i></b> |                                    |
| Thunder instance              | 1                                  |
| Thunder IP                    | 10.22.32.01                        |
| User Name                     | Online_Baseball_TH                 |
| Password                      | Thunder@LMQ@3201                   |
| Resource_Name                 | North_Virginia_Online_Baseball_TH  |
| resource_id                   | i-1234567890lmnopq0                |
| Thunder instance              | 2                                  |
| Thunder IP                    | 10.22.32.02                        |
| User Name                     | Online_Baseball_TH2                |
| Password                      | Thunder@LMQ@3202                   |
| Resource_Name                 | North_Virginia_Online_Baseball_TH2 |
| resource_id                   | i-1234567890rstuvwxyz0             |
| Thunder instance              | 3                                  |
| User Name                     | Online_Baseball_TH3                |
| Password                      | Thunder@LMQ@3203                   |

| Parameter                        | Description          |
|----------------------------------|----------------------|
| Resource_Name                    | vth-auto-scale-group |
| <b>VMware Monitoring details</b> |                      |
| vRLI IP                          | 10.22.32.11          |
| vROPs IP                         | 10.22.32.12          |
| vROPs User Name                  | vROPsAdmin           |
| vROPs Password                   | vROPs@Borse@3212     |

## Solution

A10 Support team will propose to install **Thunder Observability Agent (TOA)** for collecting and publishing logs on the VMware platform:

1. Install Python if the recommended version is not already installed on the shared Linux instance IP 10.22.32.51.

```
apt update
apt-get install python3.10
apt install python3-pip
apt install cron
apt install rsyslog
```

2. Install TOA.

```
pip install virtualenv
virtualenv venv
source venv/bin/activate
pip install thunder_observability_agent
```

3. Configure TOA.

- a. Configure Thunder details in the /root/.thunder/credentials file depending upon the type of Thunder instance:

### Single instance

```
{
    "autoscale" : 0,
    "provider" : "XXXX",
    "thunders": [ {
```

```

        "ip": "10.22.32.01",
        "username": "Online_Baseball_TH",
        "password": "Thunder@LMQ@3201",
        "resource_id": "i-12345678901mnopq0"
        "active_partitions": "shared"
    } ]
}

```

## Multiple instances

```

{
    "autoscale" : 0,
    "provider" : "XXXX",
    "thunders": [
        {
            "ip": "10.22.32.01",
            "username": "Online_Baseball_TH",
            "password": "Thunder@LMQ@3201",
            "resource_id": "i-12345678901mnopq0"
            "active_partitions": "shared"
        },
        {
            "ip": "10.22.32.02",
            "username": "Online_Baseball_TH2",
            "password": "Thunder@LMQ@3202",
            "resource_id": "i-1234567890rstuvwxyz0"
            "active_partitions": "shared"
        }
    ]
}

```

- b. Update the VMware credentials in the `/root/.vmware/credentials` file.

```

vmware_vrops_username = vROPsAdmin
vmware_vrops_password = vROPs@Borse@3212

```

- c. Update VMware configuration properties in the `/usr/toaenv/thunder-observability-agent/config.json` file.

```
{  
    "vmware_provider": 1,  
    "vmware_metric": 1,  
    "vmware_vrops_host": "10.22.32.12",  
    "vmware_cpu": 1,  
    "vmware_memory": 1,  
    "vmware_disk": 1,  
    "vmware_throughput": 1,  
    "vmware_interfaces": 1,  
    "vmware_cps": 1,  
    "vmware_tps": 1,  
    "vmware_server_down_count": 1,  
    "vmware_server_down_percentage": 1,  
    "vmware_ssl_cert": 1,  
    "vmware_server_error": 1,  
    "vmware_sessions": 1,  
    "vmware_packet_rate": 1,  
    "vmware_packet_drop": 1,  
    "vmware_log": 1,  
    "vmware_vrli_host": "10.22.32.11"  
}
```

4. Check logs at `/var/log/thunder-observability-agent/agent.log`.

For more examples, see [GitHub](#).

# What's New

---

## 1.0.0

This release has the following enhancements for Thunder® Application Delivery Controller (ADC):

- TOA supports Linux, CentOS, and Ubuntu platforms as a Python Plugin installation package and Docker containerization.
- TOA supports AWS, Azure, and VMware cloud providers.
- Single, multiple, and auto scale Thunder instances can be configured for TOA.
- TOA provides multitasking capabilities to collect and process data from multiple Thunder instances and its partitions simultaneously. By default, it collects data from shared partition.
- TOA supports Shared and L3V partitions. The maximum number of partitions supported per Thunder is 20.
- TOA collects, processes and publishes 14 Thunder metrics. The default data collection frequency is 1 minute. The metrics can be published on the same platform where the Thunder instance is deployed. For more information on Thunder metrics, see [Supported Thunder Metrics](#).
- TOA collects, processes, and publishes Thunder Syslogs. The default data collection frequency is 1 minute. The logs can be published on the same platform where the Thunder instance is deployed or it can also be published to any AWS, Azure, or VMware platforms. For more information on Thunder logs, see [Supported Thunder Logs](#).

# Appendix

---

## Get Resource ID

To get the resource ID for single or multiple Thunder instance/s, perform the following steps depending on your cloud provider:

### AWS

1. Go to **AWS Management Console > EC2 > Instances** and select your Thunder instance.
2. From the **Details** tab, get the **Instance ID**.

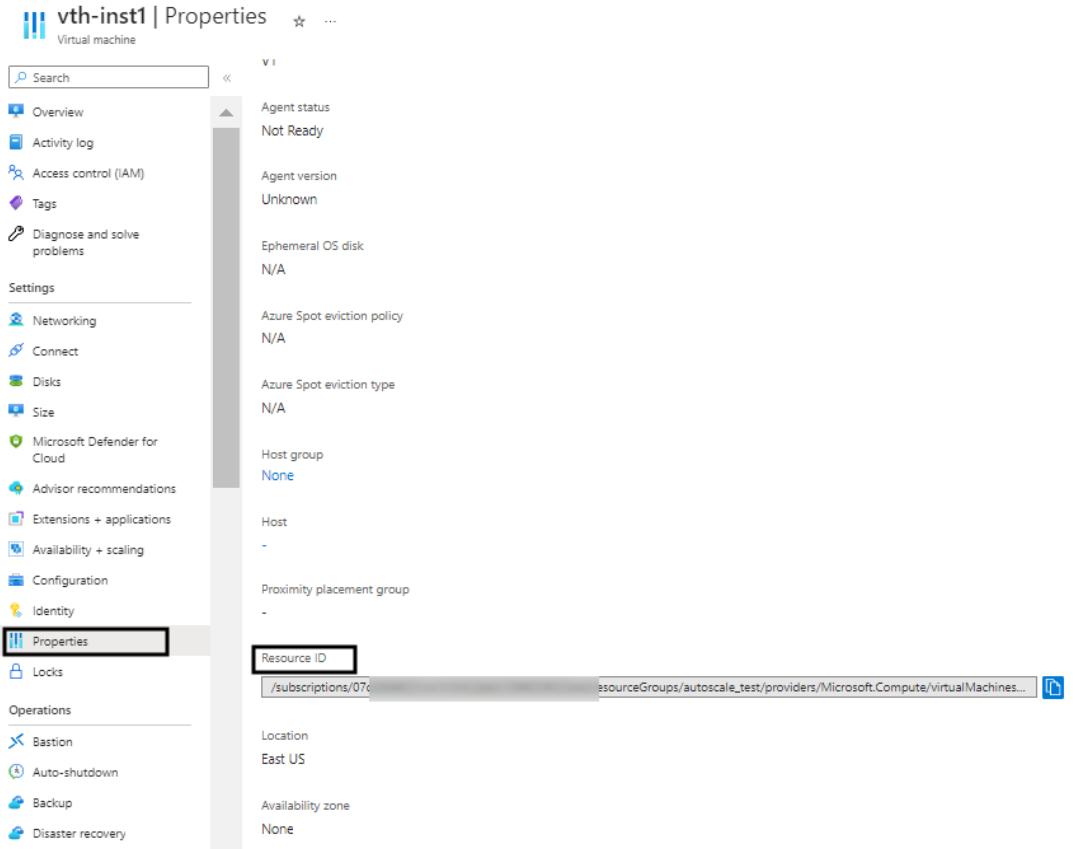
Figure 52 : Thunder instance Resource ID

The screenshot shows the AWS Management Console EC2 Instances page. On the left, there's a navigation sidebar with links like EC2 Dashboard, EC2 Global View, Events, Limits, Instances (selected), Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, and Scheduled Instances. The main area displays a table titled 'Instances (1/14)'. The table has columns for Name, Instance ID, Instance state, and Instance type. A row for 'vth-inst1' is selected, highlighted with a blue border. Below the table, a section titled 'Instance: i-0a718290e6cf3499c (vth-inst1)' shows the 'Details' tab selected. Under 'Instance summary', the 'Instance ID' field is highlighted with a red box, showing the value 'i-0a718290e6cf3499c (vth-inst1)'.

### Azure

1. Go to **Azure Portal > Azure services > Virtual machine** and select your Thunder instance.
2. From the left panel, click **Setting > Properties**.
3. Get the **Resource ID** from the right panel.

Figure 53 : Thunder instance Resource ID



## VMware

1. Log in to the **vRealize Operations Web UI** with your admin credentials to get the Thunder Resource ID once your vROPs virtual machine is powered on.

The vRealize Operations Home page is displayed.

Figure 54 : vRealize Operations - Home page

2. Go to **Home > Environment > Object Browser > All Objects > vCenter Adapter > Virtual Machine** and click **Thunder**.

Figure 55 : vRealize Operations - Virtual machine window

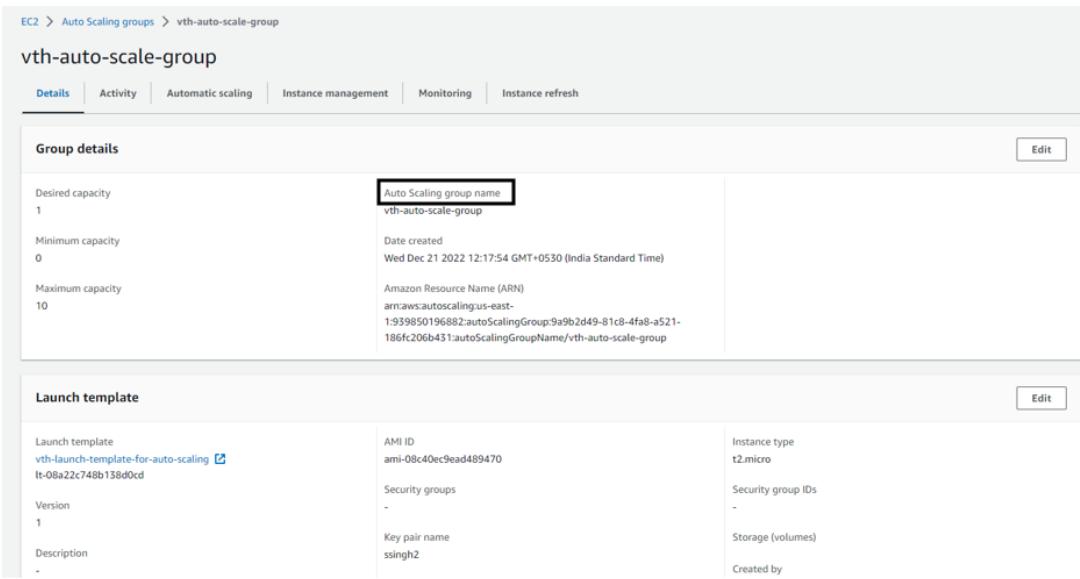
3. Get the resource ID from the URL.

To get the resource ID for Thunder instance in auto scaling group or in VMSS, perform the following steps depending on your cloud provider:

## AWS

1. Go to **AWS Management Console > EC2 > Auto Scaling Groups** and select your Thunder auto scale group instance.
2. From the **Details** tab, get the **Auto Scaling group name**.

Figure 56 : Thunder Auto Scaling instance Resource ID



The screenshot shows the AWS EC2 Auto Scaling Groups interface. The top navigation bar includes 'EC2 > Auto Scaling groups > vth-auto-scale-group'. Below the navigation is a tab bar with 'Details' (selected), 'Activity', 'Automatic scaling', 'Instance management', 'Monitoring', and 'Instance refresh'. The main content area is divided into two sections: 'Group details' and 'Launch template'.

**Group details:**

- Auto Scaling group name: vth-auto-scale-group
- Desired capacity: 1
- Minimum capacity: 0
- Maximum capacity: 10
- Date created: Wed Dec 21 2022 12:17:54 GMT+0530 (India Standard Time)
- Amazon Resource Name (ARN): arn:aws:autoscaling:us-east-1:939850196882:autoScalingGroup:9a9b2d49-81c8-4fa8-a521-186fc206b431:autoScalingGroupName/vth-auto-scale-group

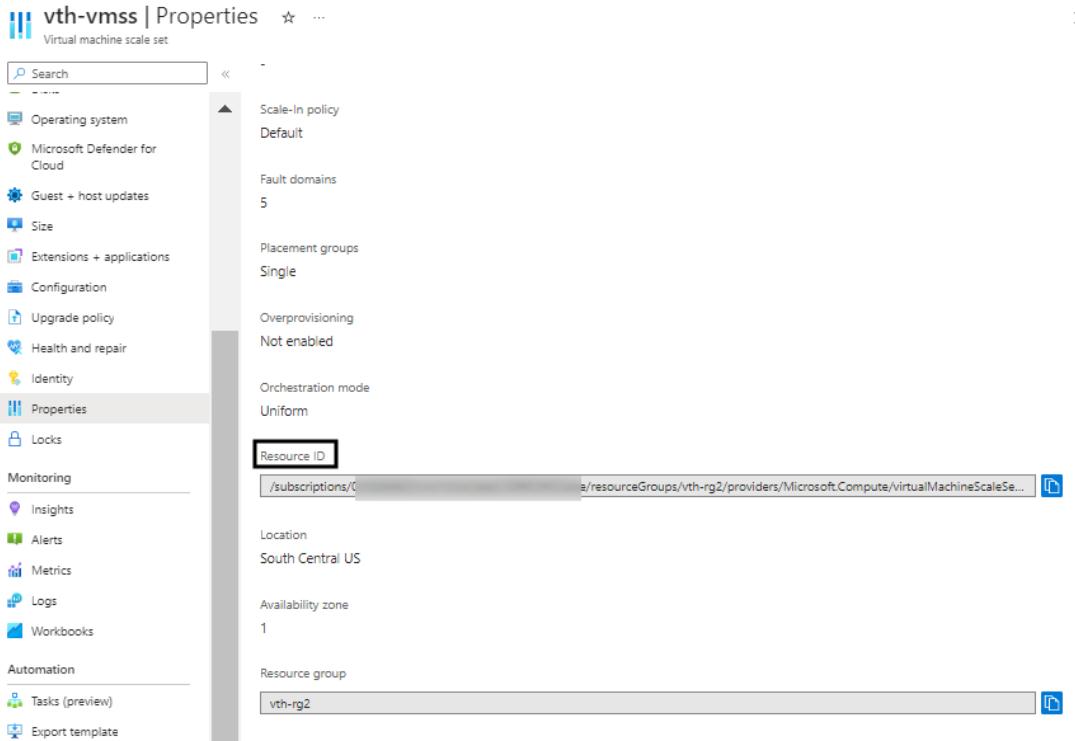
**Launch template:**

- Launch template: vth-launch-template-for-auto-scaling
- AMI ID: ami-08c40ec9ead489470
- Instance type: t2.micro
- Version: 1
- Security groups: -
- Security group IDs: -
- Description: ssingh2
- Key pair name: ssingh2
- Storage (volumes): -
- Created by: -

## Azure

1. Go to **Azure Portal > Azure services > Virtual machine scale set** and select your Thunder VMSS instance.
2. From the left panel, click **Setting > Properties**.
3. Get the **Resource Group name** from the right panel.

Figure 57 : Thunder VMSS instance Resource ID



## Install Python, Crontab, and Syslog

Depending on your operation system, install Python (3.6 or higher), Crontab, and Syslog:

### CentOS

To install latest Python from OS repository, perform the following steps:

```
yum install -y python3
```

To install Crontab and Syslog, perform the following steps:

```
yum install cronie
yum install rsyslog
```

### Linux/Ubuntu

To install Python, perform the following steps:

```
apt update  
apt-get install python3.10  
apt install python3-pip
```

To install Crontab and Syslog, perform the following steps:

```
apt install cron  
apt install rsyslog
```

## Uninstall TOA

To uninstall TOA, perform the following steps:

1. Run the following commands to uninstall TOA:

```
cd /usr  
source toaenv/bin/activate  
pip uninstall thunder-observability-agent
```

2. Run the following commands to remove the cloud-specific configuration files:

```
cd /root  
rm -rf .aws .azure .vmware .thunder
```

3. Run the following commands to remove the TOA configuration files:

```
cd /usr  
rm -rf toaenv
```

4. Run the following command to remove the crontab configuration:

```
crontab -e
```

5. Remove the following entry from the crontab file:

```
*/1 * * * * /usr/toaenv/bin/python3 /usr/toaenv/lib/python3.10/site-packages/thunder-observability-agent/toa.py
```

6. Run the following commands to remove TOA:

```
cd /var/log/  
rm -rf thunder-observability-agent
```

## Import vROps Template

The vRealize Operations Manager (vROps) creates a dashboard and a notification by importing a JSON files. It also creates alert definition by importing an XML file.

The following topics are covered:

- [Import a Dashboard](#)
- [Import an Alert Definition](#)
- [Import a Notification](#)

## Import a Dashboard

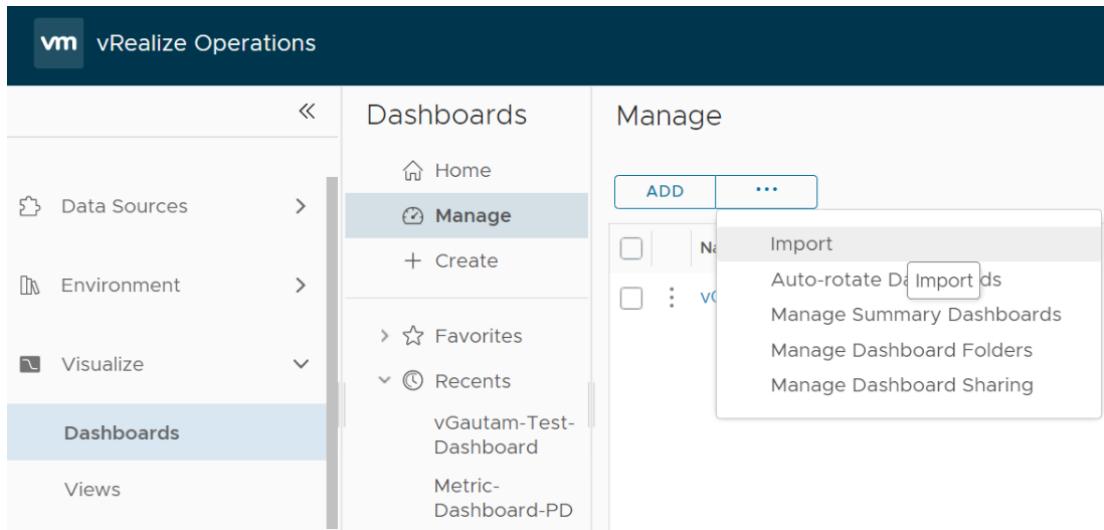
---

To import a dashboard using the JSON file, perform the following steps:

1. Download and open the [dashboard-template](#) JSON file.
2. Edit the following parameter values in the JSON file:
  - id
  - name
3. Save the changes in the JSON file.
4. From the **vRealize Operations Web UI**, go to **Home > Visualize > Dashboards** and click **Manage**.

The **Manage** window is displayed.

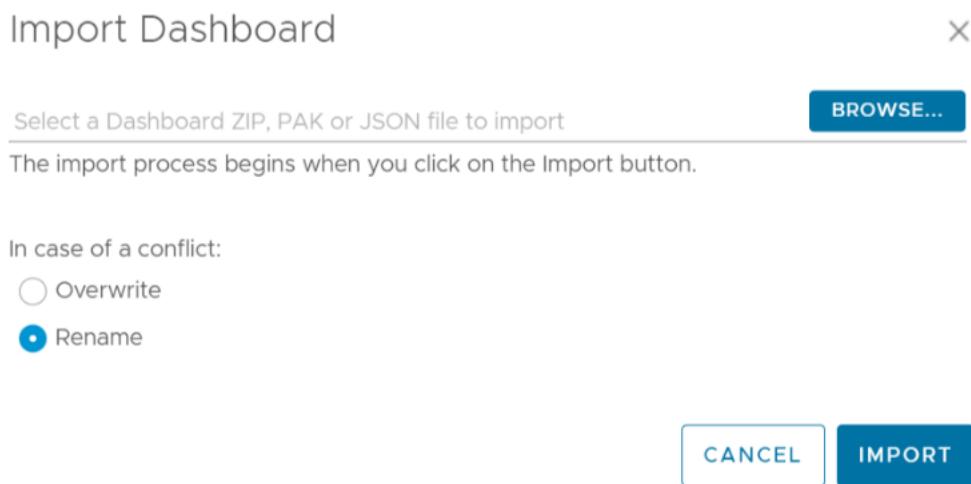
Figure 58 : Manage window



- Click ... > Import in the Manage panel.

The Import Dashboard window is displayed.

Figure 59 : Import Dashboard window



- Browse and select the **dashboard-template.json** file.

- Click **Import**.

The new dashboard is imported and listed in the **Dashboards** window.

## Import an Alert Definition

To import an alert definition using the XML file, perform the following steps:

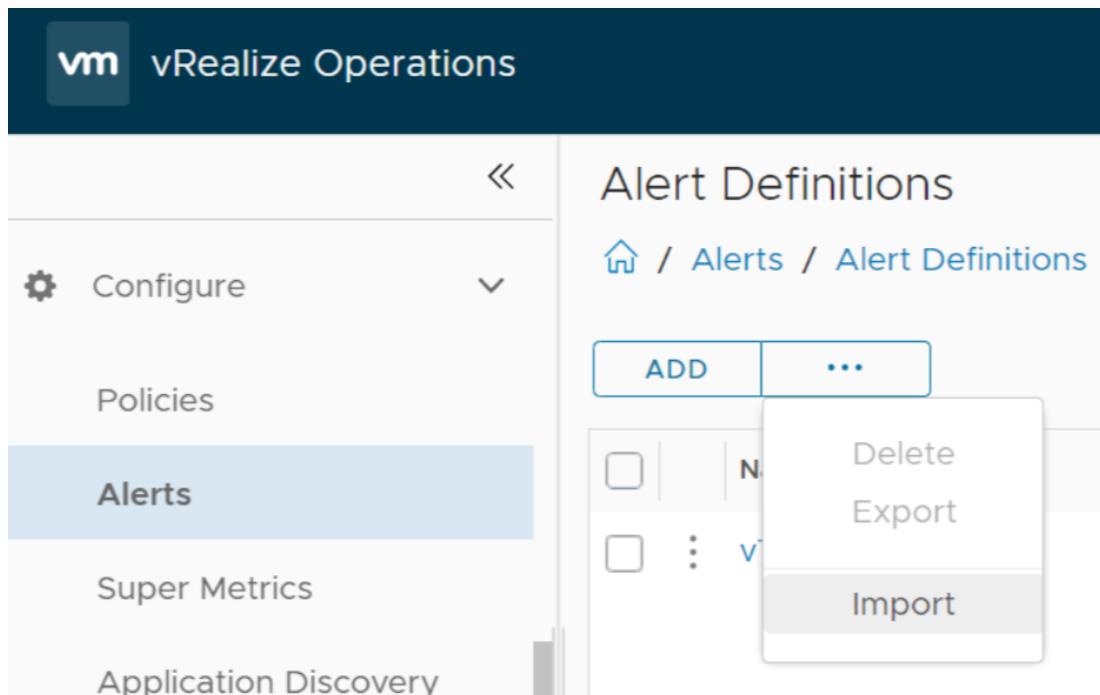
1. Download and open the [alert-template](#) XML file.
2. Enter the following parameter values in the XML file as appropriate:
  - id
  - name

**NOTE:** The `id` and `name` must have unique values.

3. Save the changes in the XML file.
4. From the **vRealize Operations Web UI**, go to **Home > Configure > Alerts** and click **Alert Definitions**.

The **Alert Definitions** window is displayed.

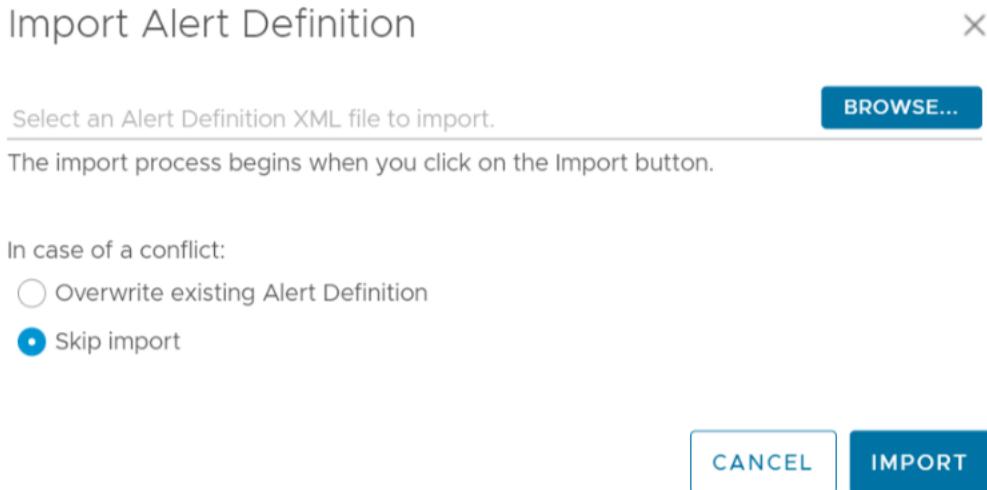
Figure 60 : Alert Definitions window



5. Click ... > Import in the **Alert Definition** window.

The **Import Alert Definition** window is displayed.

Figure 61 : Import Alert Definition window



6. Browse and select the **alert-template.json**.

7. Click **Import**.

The new alert definition is imported and listed in the **Alert Definitions** window.

## Import a Notification

---

To import a notification using the JSON file, perform the following steps:

1. Download and open the [notification-template](#) JSON file.
2. Update the alert definition id in the following parameter:

```
{  
    "ConditionType": "ALERT_DEFINITION_ID",  
    "NotificationRuleAlertDefinitionCondition": {  
        "AlertDefinitionIds": [  
            {  
                "AlertDefinitionID": "AlertDefinition-<alert-  
definition-id>"  
            }  
        ]  
    }  
}
```

---

**NOTE:** The AlertDefinitionID must have the same value as provided in the **alert-template.json**.

---

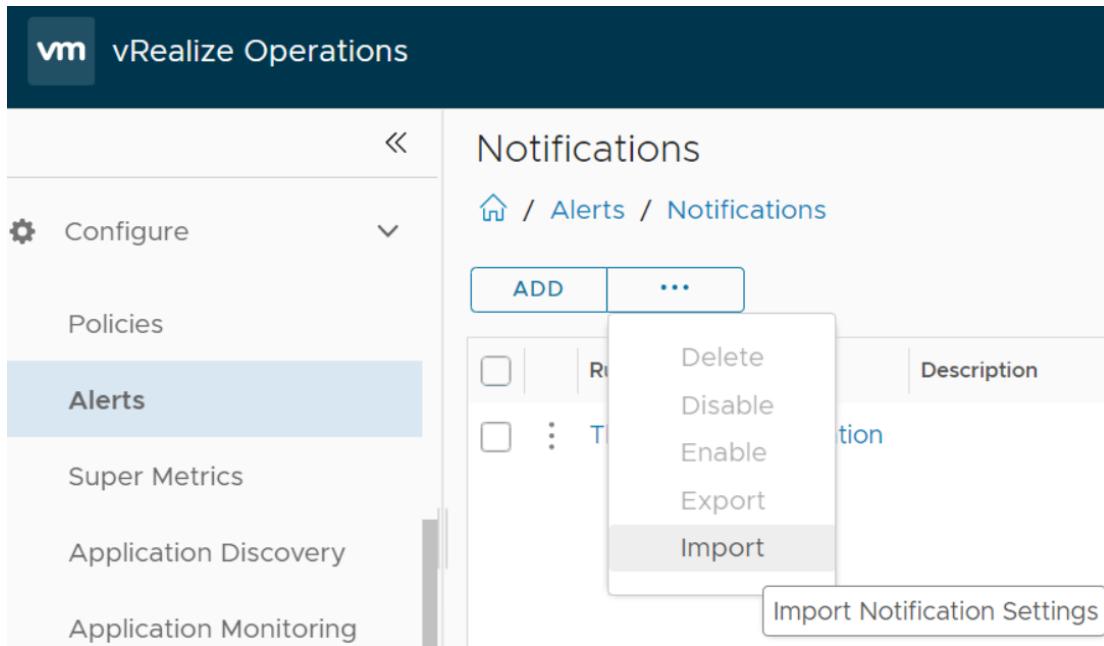
3. Update the sender and recipient email address values in the following parameter:

```
"PluginNotificationProperty": [  
    {  
        "PropertyName": "emailaddr",  
        "PropertyValue": "user1@example.com"  
    },  
    {  
        "PropertyName": "ccRecipients",  
        "PropertyValue": "usergroup@example.com"  
    }  
,
```

4. Save the changes in the JSON file.
5. From the **vRealize Operations Web UI**, go to **Home > Configure > Alerts** and click **Notifications**.

The **Notifications** window is displayed.

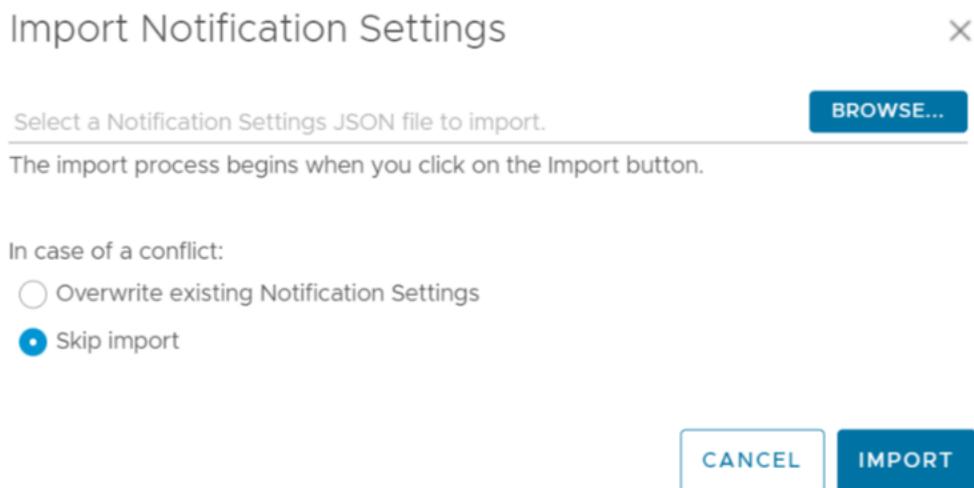
Figure 62 : Notifications window



6. Click ... > Import in the Notifications panel.

The Import Notification Settings window is displayed.

Figure 63 : Import Notification Settings window



7. Browse and select the notification-template.json file.
8. Click Import.

The new notification is imported and listed in the **Notifications** window.

