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# Monitoring Docker

Beta Version

Docker PowerPack version 101

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# Chapter 1

## Overview

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### Introduction

This manual describes how to monitor the Docker platform in the ScienceLogic platform using the *Docker PowerPack*.

The following sections provide an overview of the Docker platform and the *Docker PowerPack*:

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**NOTE:** ScienceLogic provides this documentation for the convenience of ScienceLogic customers. Some of the configuration information contained herein pertains to third-party vendor software that is subject to change without notice to ScienceLogic. ScienceLogic makes every attempt to maintain accurate technical information and cannot be held responsible for defects or changes in third-party vendor software. There is no written or implied guarantee that information contained herein will work for all third-party variants. See the End User License Agreement (EULA) for more information.

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### What is Docker?

Docker is a platform that automates the process of deploying applications using software containers. These containers include individual deployment components (e.g., software code, system libraries, etc.) that, when combined, contain everything needed to run the application.

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## What Does the Docker PowerPack Monitor?

The *Docker PowerPack* includes:

- An example Basic/Snippet credential for discovering Docker devices
- Dynamic Applications and Run Book Actions to discover, model, and monitor the following Docker component devices:
  - Hosts
  - Containers
  - Swarms
  - Stacks
  - Services
- Device Classes for each type of Docker component device the ScienceLogic platform monitors
- Event Policies that are triggered when Docker component devices meet certain status criteria

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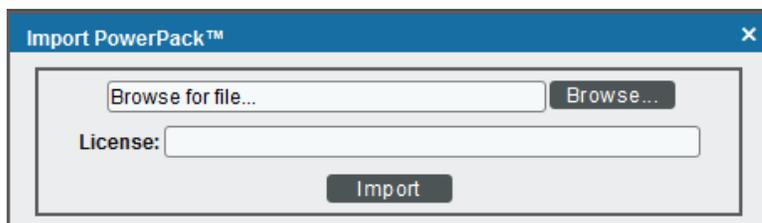
## Installing the Docker PowerPack

Before completing the steps in this manual, you must import and install the latest version of the *Docker PowerPack*.

To download and install a PowerPack:

**TIP:** By default, installing a new version of a PowerPack overwrites all content in that PowerPack that has already been installed on the target system. You can use the **Enable Selective PowerPack Field Protection** setting in the **Behavior Settings** page (System > Settings > Behavior) to prevent new PowerPacks from overwriting local changes for some commonly customized fields. (For more information, see the **System Administration** manual.)

1. Download the PowerPack from the [ScienceLogic Customer Portal](#).
2. Go to the **PowerPack Manager** page (System > Manage > PowerPacks).
3. In the **PowerPack Manager** page, click the **[Actions]** button, then select *Import PowerPack*.
4. The **Import PowerPack** dialog box appears:



5. Click the **[Browse]** button and navigate to the PowerPack file.
6. When the **PowerPack Installer** modal page appears, click the **[Install]** button to install the PowerPack.

**NOTE:** If you exit the **PowerPack Installer** modal page without installing the imported PowerPack, the imported PowerPack will not appear in the **PowerPack Manager** page. However, the imported PowerPack will appear in the **Imported PowerPacks** modal page. This page appears when you click the **[Actions]** menu and select *Install PowerPack*.

## Configuring Docker Monitoring

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### Overview

The following sections describe how to configure and discover the Docker platform and its component devices for monitoring by the ScienceLogic platform using the *Docker PowerPack*:

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### Enabling the Docker API

Before you discover Docker components using the *Docker PowerPack*, you must first enable the Docker API. This section describes how to do so for Windows, CentOS, Red Hat Enterprise Linux (RHEL), and Oracle Linux operating systems.

#### **Windows**

To enable the Docker API for Windows using the Docker Toolbox:

1. Start Docker Quickstart Terminal.
2. To determine the IP address of the Docker host machine, type the following command:

```
$ docker-machine ip
```

3. Log in to the host machine:

```
$ docker-machine ssh
```

4. Navigate to Boot2Docker:

```
$ cd /var/lib/boot2docker
```

5. Edit the Boot2Docker profile:

```
$ sudo vi profile
```

6. In the profile, change "DOCKER\_HOST" to "DOCKER\_HOST='-H tcp://0.0.0.0:4243'", and set DOCKER\_TLS=no.

7. Exit the SSH session, and then restart Docker:

```
$ exit  
$ docker-machine restart
```

8. To verify that the Docker API is accessible, open a browser and navigate to `http:<IP address>:4243/version`.

If the Docker API is successfully enabled, the version returns something similar to the following:

```
{"Version":"17.10.0-ce","ApiVersion":"1.33","MinAPIVersion":"1.12","GitCommit":  
"f4ffd25","GoVersion":"go1.8.3","Os":"linux","Arch":"amd64","KernelVersion":  
"4.4.93-boot2docker","BuildTime":"2017-10-17T19:05:23.000000000+00:00"}
```

## **CentOS**

To enable the Docker API for CentOS:

1. Log in to the command-line interface of the server running Docker and navigate to `systemd/system`:

```
$ cd /etc/systemd/system
```

2. Create a new "docker.service.d" folder, then navigate to that folder:

```
$ mkdir docker.service.d  
$ cd docker.service.d
```

3. Create a new `docker.conf` file:

```
$ vi docker.conf
```

4. Paste the following:

```
INSERT  
[Service]  
ExecStart=  
ExecStart=/usr/bin/dockerd -H tcp://0.0.0.0:4243 -H unix:///var/run/docker.sock
```

5. Reload daemon, restart Docker, and open port 4243 on the firewall by typing the following:

```
$ systemctl daemon-reload
$ systemctl restart docker
$ firewall-cmd --add-port=4243/tcp
```

6. Verify that the Docker API is accessible by typing the following:

```
$ *curl http://localhost:4243/version*
```

If the Docker API is successfully enabled, the version returns something similar to the following:

```
{"Version":"17.06.1-ce","ApiVersion":"1.30","MinAPIVersion":"1.12","GitCommit":
:"874a737","GoVersion":"go1.8.3","Os":"linux","Arch":"amd64","KernelVersion":
:"3.10.0-514.26.2.el7.x86_64","BuildTime":"2017-08-17T23:01:50.155177940+00:00"}
```

## **RHEL 7 and Oracle Linux 7**

To enable the Docker API for RHEL 7 or Oracle Linux 7:

1. Log in to the command-line interface of the server running Docker and navigate to `systemd/system`:

```
$ cd /usr/lib/systemd/system
```

2. Edit the `service.docker` file:

```
$ sudo vi service.docker
```

3. Find the line that starts with `"ExecStart=/usr/bin/dockerd"` and add `"-H tcp://0.0.0.0:4243"` so that the updated line looks like this:

```
ExecStart=/usr/bin/dockerd -H tcp://0.0.0.0:4243
```

4. Reload daemon, restart Docker, and open port 4243 on the firewall by typing the following:

```
$ systemctl daemon-reload
$ systemctl restart docker
$ firewall-cmd --add-port=4243/tcp
```

5. Verify that the Docker API is accessible by typing the following:

```
$ *curl http://<IP address>:4243/version*
```

If the Docker API is successfully enabled, the version returns something similar to the following:

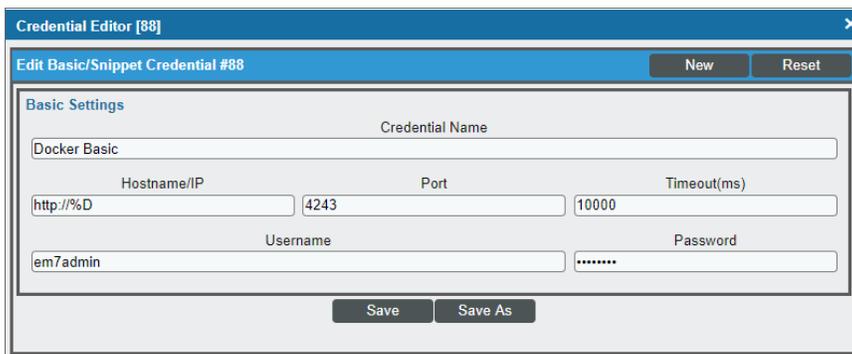
```
{"Version":"17.06.2-ee-4","ApiVersion":"1.30","MinAPIVersion":"1.12","GitCommit":
:"dd2c358","GoVersion":"go1.8.3","Os":"linux","Arch":"amd64","KernelVersion":
:"3.10.0-514.el7.x86_64","BuildTime":"2017-10-12T16:19:56.386620861+00:00"}
```

# Configuring a Docker Credential

To configure the ScienceLogic platform to monitor the Docker platform, you must first create a Basic/Snippet credential that allows the Dynamic Applications in the *Docker PowerPack* to connect with Docker hosts and swarms. An example Basic/Snippet credential that you can edit for your own use is included in the *Docker PowerPack*.

To create a Basic/Snippet credential to access Docker hosts and swarms:

1. Go to the **Credential Management** page (System > Manage > Credentials).
2. Locate the example **Docker Basic** credential, and then click its wrench icon (🔧). The **Edit Basic/Snippet Credential** modal page appears.
3. Complete the following fields:



The screenshot shows a 'Credential Editor' window titled 'Edit Basic/Snippet Credential #88'. It contains a 'Basic Settings' section with the following fields: 'Credential Name' (Docker Basic), 'Hostname/IP' (http://%D), 'Port' (4243), 'Timeout(ms)' (10000), 'Username' (em7admin), and 'Password' (masked with dots). There are 'New' and 'Reset' buttons at the top right, and 'Save' and 'Save As' buttons at the bottom.

- **Credential Name.** Type a new name for the Docker credential.
- **Hostname/IP.** Type "%D".
- **Port.** Type "4243".
- **Timeout(ms).** Type "10000".
- **Username.** Type a value for the username.
- **Password.** Type a value for the password.

**NOTE:** The Docker platform does not require a specific username and password to access the platform, but the ScienceLogic platform does require the **Username** and **Password** fields to have values when using Basic/Snippet credentials to monitor Docker. Therefore, those fields must have entries, but the values themselves do not matter.

4. Click the **[Save As]** button.
5. When the confirmation message appears, click **[OK]**.

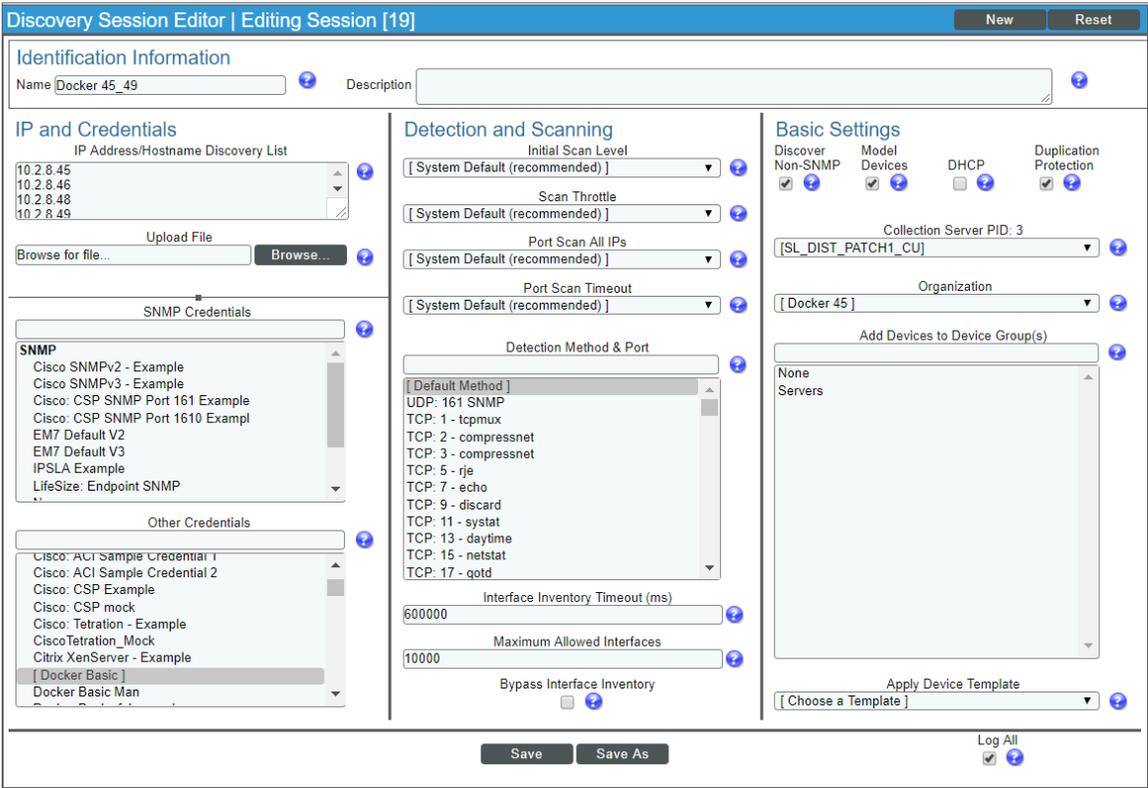
# Discovering Docker Components

To discover and model your Docker component devices for monitoring, you must run a discovery session. The discovery session will discover the Docker hosts and swarms that the platform will use as the root devices for monitoring the Docker components.

Several minutes after the discovery session has completed, the Dynamic Applications in the *Docker PowerPack* will automatically align to the Docker root devices. These Dynamic Applications will discover, model, and monitor the remaining components in your Docker system.

To discover Docker components, perform the following steps:

1. Go to the **Discovery Control Panel** page (System > Manage > Discovery), and then click the **[Create]** button. The **Discovery Session Editor** page appears.
2. In the **Discovery Session Editor** page, complete the following fields:



- **Name.** Type a name for your discovery session.
- **IP Address/Hostname Discovery List.** Type the IP addresses for all of the Docker hosts in the swarm that you want to discover.

**NOTE:** Swarms are created only when the swarm leader is discovered.

- **Other Credentials.** Select the [Basic/Snippet credential](#) you created for Docker.
  - **Discover Non-SNMP.** Select this checkbox.
  - **Model Devices.** Select this checkbox.
3. Optionally, you can enter values in the other fields on this page. For more information about the other fields on this page, see the [Discovery & Credentials](#) manual.
  4. Click the **[Save]** button to save the discovery session, and then close the **Discovery Session Editor** window.
  5. The discovery session you created displays at the top of the **Discovery Control Panel** page. Click its lightning-bolt icon (  ) to run the discovery session.
  6. The **Discovery Session** window appears. When a root device is discovered, click its device icon (  ) to view the **Device Properties** page for that device.

## Manually Aligning Dynamic Applications

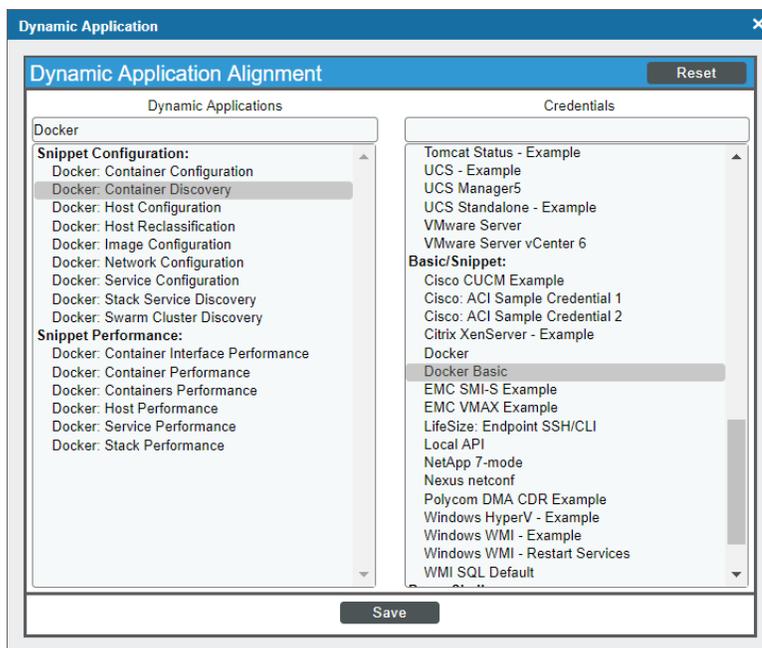
To verify that the ScienceLogic platform has automatically aligned the correct Dynamic Applications during discovery:

1. From the **Device Properties** page (Registry > Devices > wrench icon (  )) for the Docker root device, click the **[Collections]** tab. The **Dynamic Application Collections** page appears.
2. The following Dynamic Applications should appear in the list of aligned Dynamic Applications:
  - For Docker Hosts:
    - Docker: Container Discovery
    - Docker: Containers Performance
    - Docker: Host Configuration
    - Docker: Host Performance
    - Docker: Host Reclassification
    - Docker: Image Configuration
    - Docker: Image Performance
    - Docker: Network Configuration
    - Docker: Swarm Cluster Discovery
  - For Docker Swarms:
    - Docker: Stack Discovery
    - Docker: Swarm Configuration
    - Docker: Swarm Performance
    - Docker: Swarm Service Discovery

**NOTE:** It can take several minutes after discovery for Dynamic Applications to display on the **Dynamic Application Collections** page. If the listed Dynamic Applications do not display on this page, try clicking the **[Reset]** button.

If the Dynamic Applications have not been automatically aligned, you can align them manually. To do so, perform the following steps:

1. Go to the **Device Properties** page (Registry > Devices > wrench icon (🔧)) for the Docker root device and click the **[Collections]** tab. The **Dynamic Application Collections** page appears.
2. On the **Dynamic Application Collections** page, click the **[Action]** button and then select *Add Dynamic Application* from the menu. The **Dynamic Application Alignment** page appears.

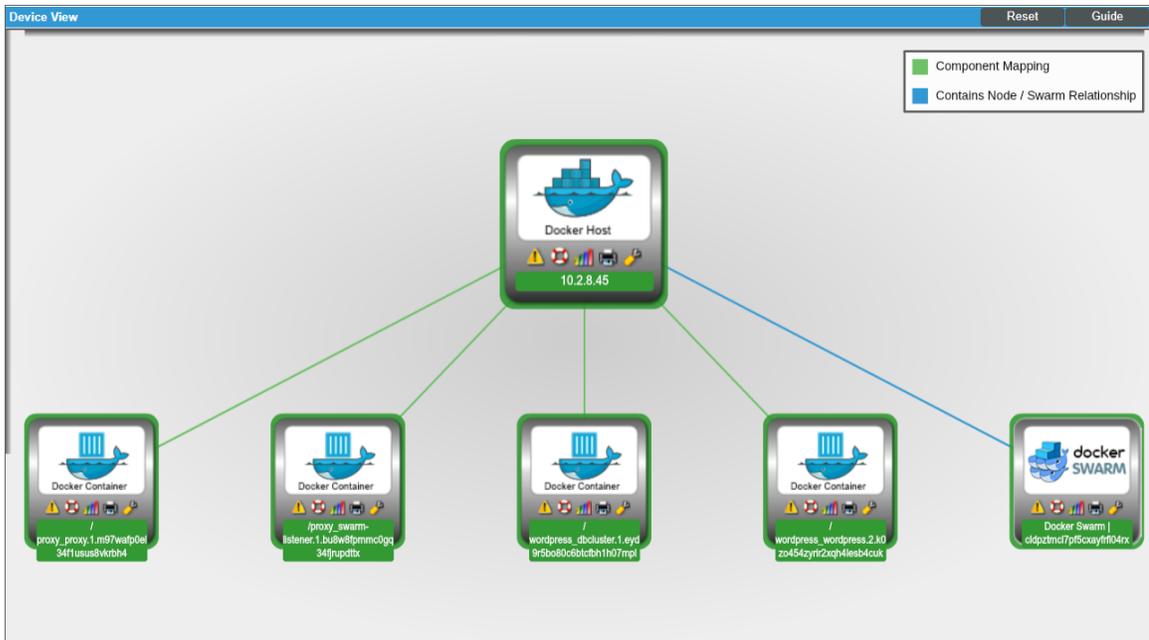


3. In the **Dynamic Applications** field, select a Dynamic Application to align.
4. In the **Credentials** field, select the **Basic/Snippet credential** you created for Docker.
5. Click the **[Save]** button.
6. Repeat steps 2-5 as needed to align any additional Dynamic Applications.

## Viewing Docker Component Devices

In addition to the **Device Manager** page (Registry > Devices > Device Manager), you can view the Docker platform and all of its component devices in the following places in the user interface:

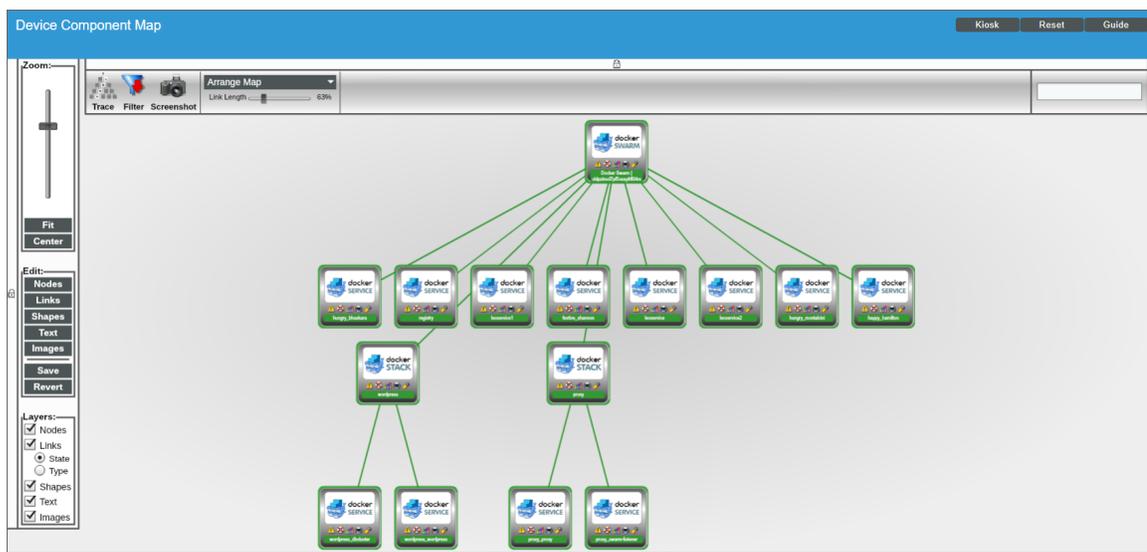
- The **Device View** modal page (Registry > Devices > Device Manager > graph icon > Topology) displays a map of a particular device and all of the devices with which it has parent-child relationships. Double-clicking any of the devices listed reloads the page to make the selected device the primary device:



- The **Device Components** page (Registry > Devices > Device Components) displays a list of all root devices and component devices discovered by the ScienceLogic platform in an indented view, so you can easily view the hierarchy and relationships between child devices, parent devices, and root devices. To view the component devices associated with Docker, find the Docker Host or Docker Swarm device and click its plus icon (+):

Device Components   Devices Found [2]										Actions	Reset	Guide																																																																																																																																		
Device Name	IP Address	Device Category	Device Class   Sub-class	DID	Organization	Current State	Collection Group	Collection State																																																																																																																																						
10.2.8.45	10.2.8.45	Compute	Host   Docker Host	4112	Docker 45	Healthy	CUG1	Active																																																																																																																																						
<table border="1"> <thead> <tr> <th>Device Name</th> <th>IP Address</th> <th>Device Category</th> <th>Device Class   Sub-class</th> <th>DID</th> <th>Organization</th> <th>Current State</th> <th>Collection Group</th> <th>Collection State</th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>/proxy_proxy 1.m97wafp0e34f1usus8</td> <td>--</td> <td>Service</td> <td>Container   Docker Container</td> <td>4118</td> <td>Docker 45</td> <td>Healthy</td> <td>CUG1</td> <td>Active</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>/proxy_swarm_listener 1.bu8w8fprmc</td> <td>--</td> <td>Service</td> <td>Container   Docker Container</td> <td>4117</td> <td>Docker 45</td> <td>Healthy</td> <td>CUG1</td> <td>Active</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>/wordpress_dbcluster 1.eyd9r5bo80cd</td> <td>--</td> <td>Service</td> <td>Container   Docker Container</td> <td>4115</td> <td>Docker 45</td> <td>Healthy</td> <td>CUG1</td> <td>Active</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>/wordpress_wordpress 2.k0zo454zyr</td> <td>--</td> <td>Service</td> <td>Container   Docker Container</td> <td>4116</td> <td>Docker 45</td> <td>Healthy</td> <td>CUG1</td> <td>Active</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>													Device Name	IP Address	Device Category	Device Class   Sub-class	DID	Organization	Current State	Collection Group	Collection State					/proxy_proxy 1.m97wafp0e34f1usus8	--	Service	Container   Docker Container	4118	Docker 45	Healthy	CUG1	Active					/proxy_swarm_listener 1.bu8w8fprmc	--	Service	Container   Docker Container	4117	Docker 45	Healthy	CUG1	Active					/wordpress_dbcluster 1.eyd9r5bo80cd	--	Service	Container   Docker Container	4115	Docker 45	Healthy	CUG1	Active					/wordpress_wordpress 2.k0zo454zyr	--	Service	Container   Docker Container	4116	Docker 45	Healthy	CUG1	Active																																																																					
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leoservice2	--	Service	Service   Docker Service	4124	Docker 45	Healthy	CUG1	Active																																																																																																																																						
proxy	--	Service	Stack   Docker Stack	4128	Docker 45	Healthy	CUG1	Active																																																																																																																																						
registry	--	Service	Service   Docker Service	4120	Docker 45	Healthy	CUG1	Active																																																																																																																																						

- The **Component Map** page (Views > Device Maps > Components) allows you to view devices by root node and view the relationships between root nodes, parent components, and child components in a map. This makes it easy to visualize and manage root nodes and their components. The ScienceLogic platform automatically updates the **Device Component Map** as new component devices are discovered. The platform also updates each map with the latest status and event information. To view the map for Docker, go to the **Device Component Map** page (Views > Device Maps > Components) and select the map from the list in the left NavBar. To learn more about the **Device Component Map** page, see the **Views** manual.



## Relationships Between Component Devices

In addition to parent/child relationships between component devices, the ScienceLogic platform also creates relationships between the following component devices:

- Swarms and Nodes
- Services and Containers

---

# Chapter

# 3

## Docker Dashboards

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### Overview

The following sections describe the device dashboards that are included in the *Docker PowerPack*:

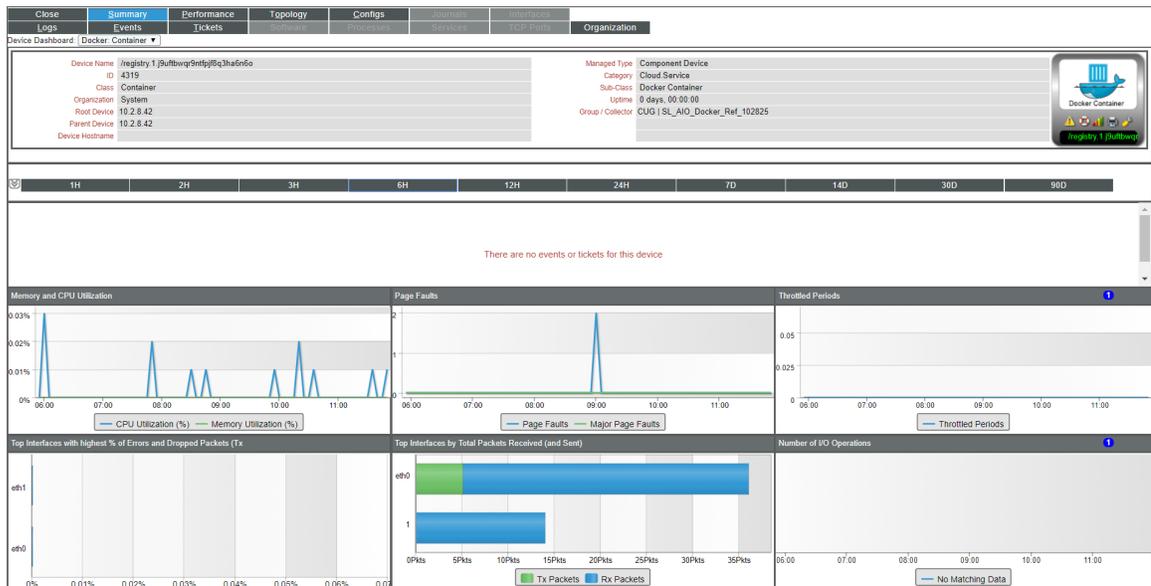
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<i>Docker: Container</i> .....	17
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<i>Docker: Service</i> .....	19
<i>Docker: Stack</i> .....	20
<i>Docker: Swarm</i> .....	21

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### Device Dashboards

The *Docker PowerPack* includes device dashboards that provide summary information for Docker component devices. Each of the device dashboards in the *Docker PowerPack* is set as the default device dashboard for the equivalent device class.

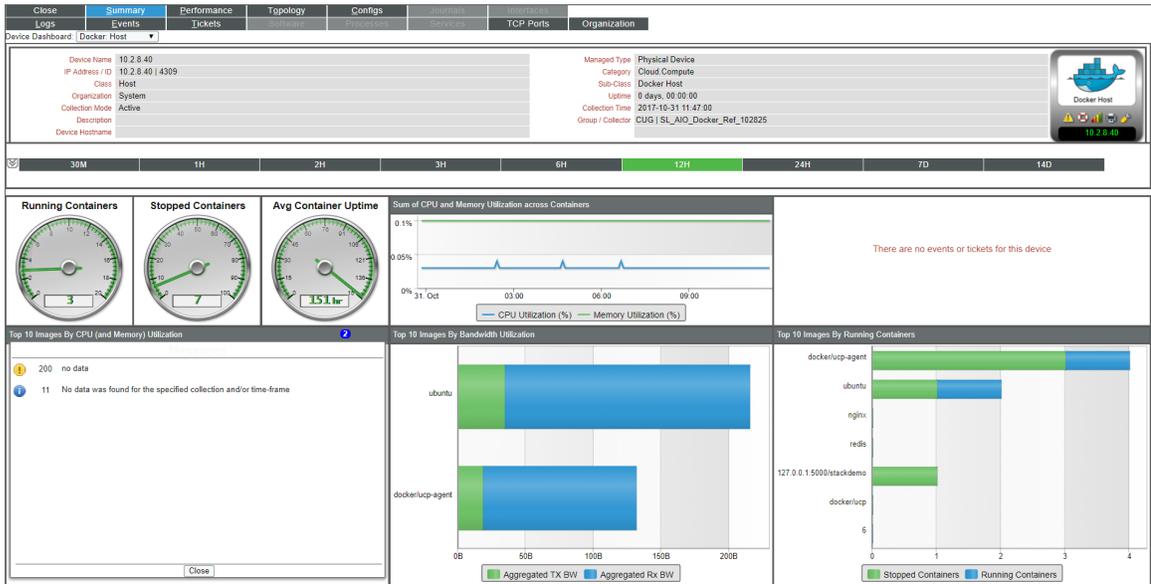
# Docker: Container



The Docker: Container device dashboard displays the following information:

- Events and tickets for the device
- Memory and CPU utilization over a specified period of time
- Page faults over a specified period of time
- Throttled periods over a specified period of time
- Top interfaces with the highest percentage of errors and dropped packets over a specified period of time
- Top interfaces by total packets received over a specified period of time
- Number of input and output operations over a specified period of time

# Docker: Host

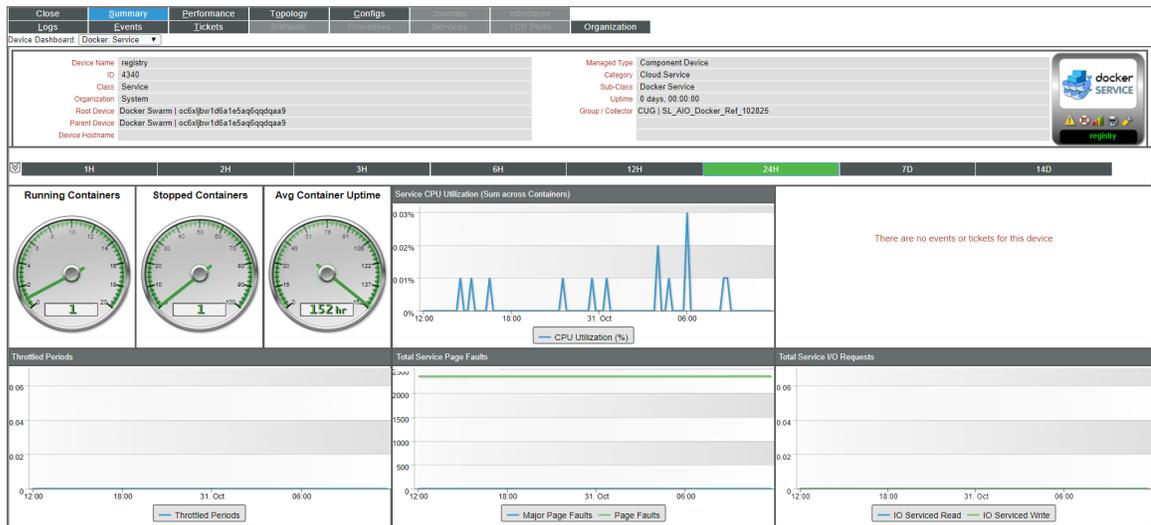


The Docker: Host device dashboard displays the following information:

- Containers running and stopped over a specified period of time, as well as average container uptime
- Total CPU utilization and memory across all containers over a specified period of time
- Events and tickets for the device
- Top 10 images by CPU and memory utilization over a specified period of time
- Top 10 images by bandwidth utilization over a specified period of time
- Top 10 images by running containers over a specified period of time



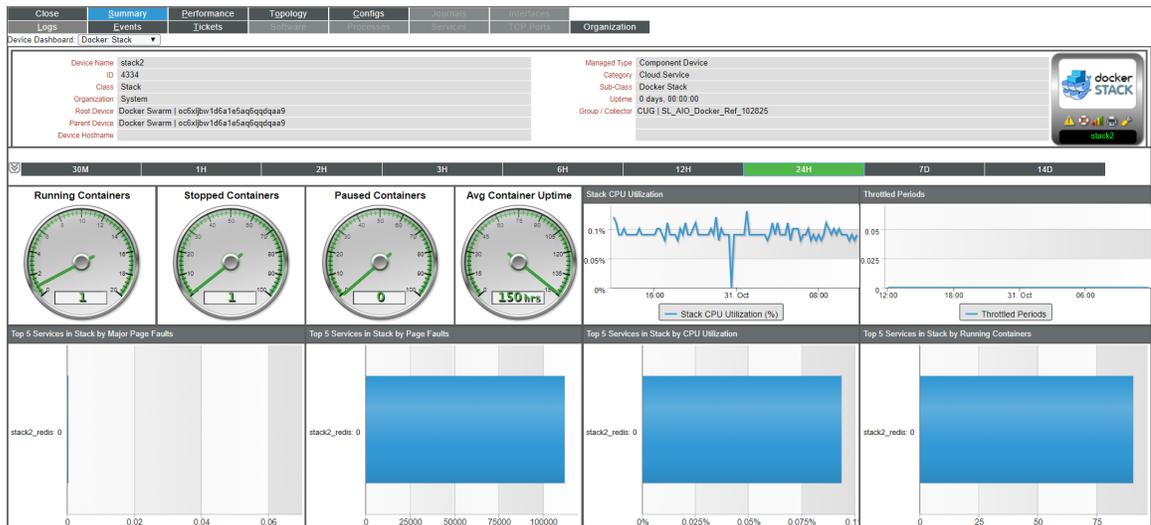
# Docker: Service



The Docker: Service device dashboard displays the following information:

- Containers running and stopped over a specified period of time, as well as average container uptime
- Service CPU utilization over a specified period of time
- Events and tickets for the device
- Throttled periods over a specified period of time
- Top service page faults over a specified period of time
- Total service input and output requests over a specified period of time

# Docker: Stack



The Docker: Stack device dashboard displays the following information:

- Containers running, stopped, and paused over a specified period of time, as well as average container uptime
- Stack CPU utilization over a specified period of time
- Throttled periods over a specified period of time
- Top 5 services in the stack over a specified period of time, based on the number of major page faults
- Top 5 services in the stack over a specified period of time, based on the number of page faults
- Top 5 services in the stack over a specified period of time, based on CPU utilization
- Top 5 services in the stack over a specified period of time, based on the number of running containers

# Docker: Swarm



The Docker: Swarm device dashboard displays the following information:

- Containers running, stopped, and paused over a specified period of time, as well as average container uptime
- Number of stacks, services, images, total nodes, and available nodes over a specified period of time
- Top 5 stacks in the swarm over a specified period of time, based on CPU utilization
- Top 5 services in the swarm over a specified period of time, based on CPU utilization
- Top 5 services in the swarm over a specified period of time, based on the number of major page faults and total page faults
- Overall swarm CPU utilization
- Overall swarm memory utilization
- Overall swarm input and output

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