Cisco IOx Fog Director User Guide

September 30, 2015

Cisco IOx is an end-to-end application enablement platform that provides application hosting capabilities for different application types in a consistent and uniform manner across various Cisco network platforms. The IOx platform allows you to manage the whole life cycle of applications including development, distribution, deployment, hosting, monitoring, and management.

Cisco IOx comes with the following features:

- A common software infrastructure to host applications in network devices such that they are independent of heterogeneous hosting hardware.
- User friendly interface that makes it easy for developers and administrators to build and deploy IOx applications.
- Provides complete life cycle management capabilities for applications hosted on network devices.

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Installing Fog Director

This section explains how to install Fog Director using OVA (Open Virtualization Archive) method.

System Requirements

Operating System	Machine Configuration
Ubuntu Server 14.04.1 LTS – 64 bit or newer (Headless)	4 Core CPU 6 GB RAM 100 GB HDD

Before You Begin

Before you begin the installation, make sure that your VMware infrastructure supports the following requirements:

- 4 Core CPU
- 6 GB RAM
- 100 GB HDD

Procedure

Step 1 Launch vSphere and connect to your VMware Host.

Step 2 Choose **File > Deploy OVF Template.**

Step 3 Browse to the Fog Director OVA location and click **Next**.

Step 4 Follow the vSphere wizard instructions.

Step 5 After you deploy OVA successfully, you can access Fog Director by typing the following URL at your browser's address bar: https://<*ip-address*>.

Note If you do not have a DHCP server, you must follow the Static IP Address configuration. See "DHCP vs Static IP Address Configuration" section on page 3.

Note The default username and password for SSH is **fogdir/fogdir**. The default username and password for Web interface is **admin/admin**.

DHCP vs Static IP Address Configuration

By default, the Fog Director OVA is configured to acquire an IP address from your DHCP server. If your environment does not have DHCP option, follow these steps to configure the IP address:

Step 1 Edit the interface file (**sudo vi /etc/network/interfaces**) and add appropriate values for IP address, Subnetmask, Default gateway, and Name server address (upto 3 address).

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet static
address <ip address>
netmask <subnet mask>
gateway <gateway ip address>
dns-nameservers <name server add 1> <name server add 2> <name server add 3> //optional
```

Step 2 After you update the file, reboot your VM.

Cisco IOx Fog Director

Fog Director enables you to manage the life-cycle of an App on multiple devices. It provides an App centric view and Device centric view to a network administrator. Fog Director enables an Administrator to do the following activities:

- Installation and uninstallation of Apps
- Starting and stopping Apps
- Viewing Apps status
- Collecting statistics, monitoring, and restarting Apps
- Upgrading Apps
- Backup and restore of App data
- Collecting Debug Logs

Figure 1 shows the App centric view of Fog Director:

Figure 1 App Centric View of Fog Director

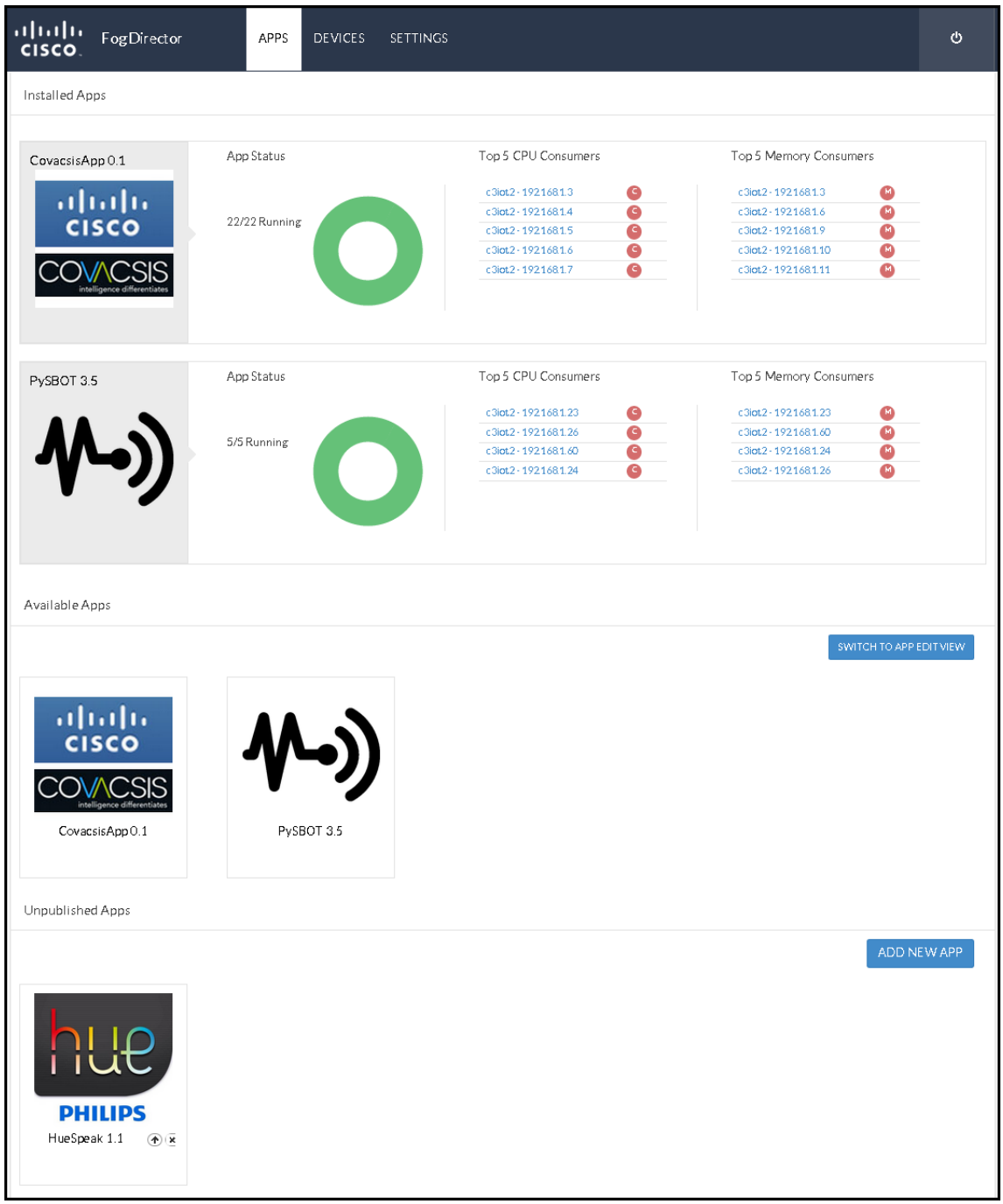
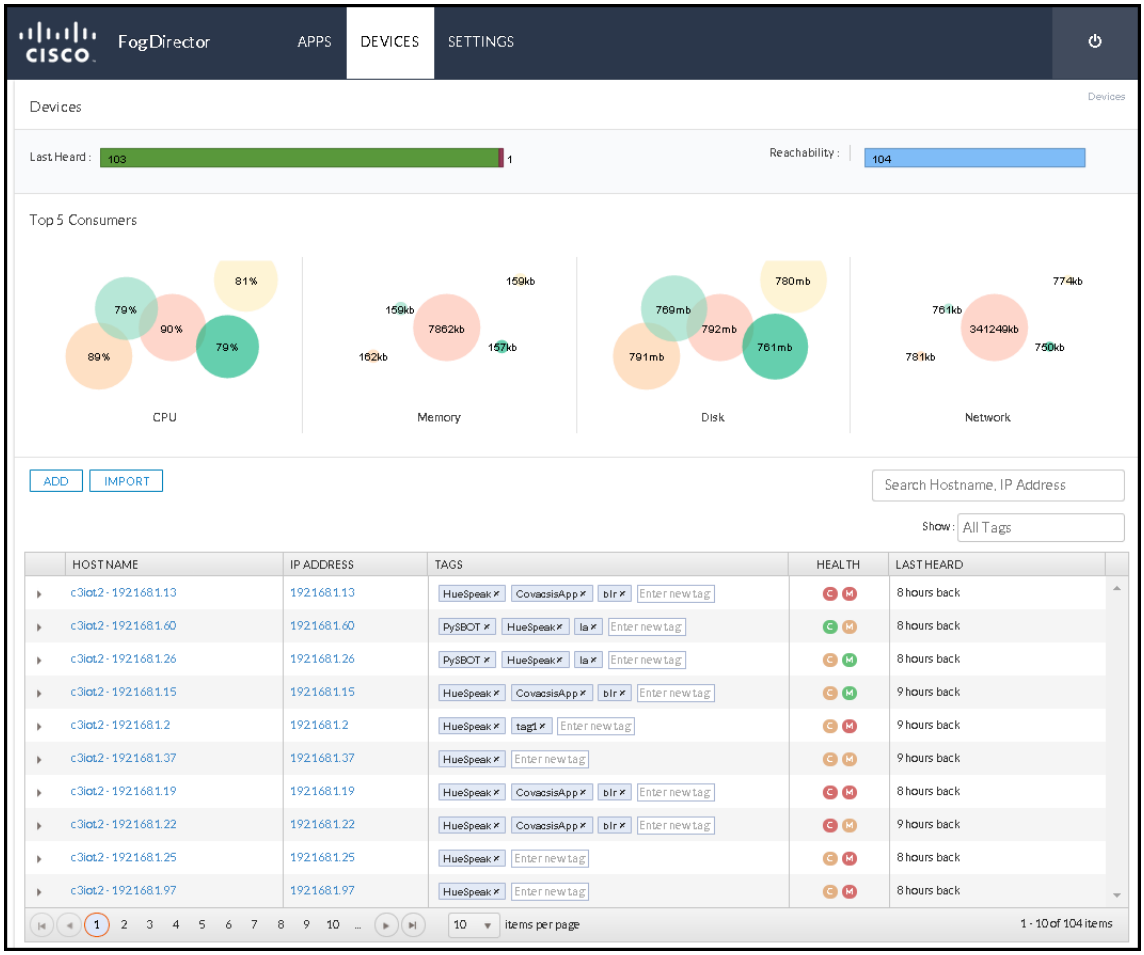


Figure 2 shows the Device centric view of Fog Director:

Figure 2 Device Centric View of Fog Director



Unpublished Apps

A newly imported App is called an Unpublished App. An App in Unpublished state is not yet ready for deployment.

After you upload an App to the Fog Director, the App moves to the Unpublished App section. You have to publish this App before you install it on any devices. An unpublished App cannot be installed on a device before publishing it. After you publish an App, the App moves to the Available Apps section.

Available Apps

A published App is called an Available App. Available Apps can be installed on a device or devices.

Installed Apps

An App that is installed on at least one device is called an Installed App.

Device

A device is an IOx capable Cisco IOS device. You can install Apps only on those devices that support Cisco IOx. The following devices support IOx starting from Cisco IOS Release 15.5(1)T:

- Cisco 819 Series Routers
- Cisco 800 M Series Routers

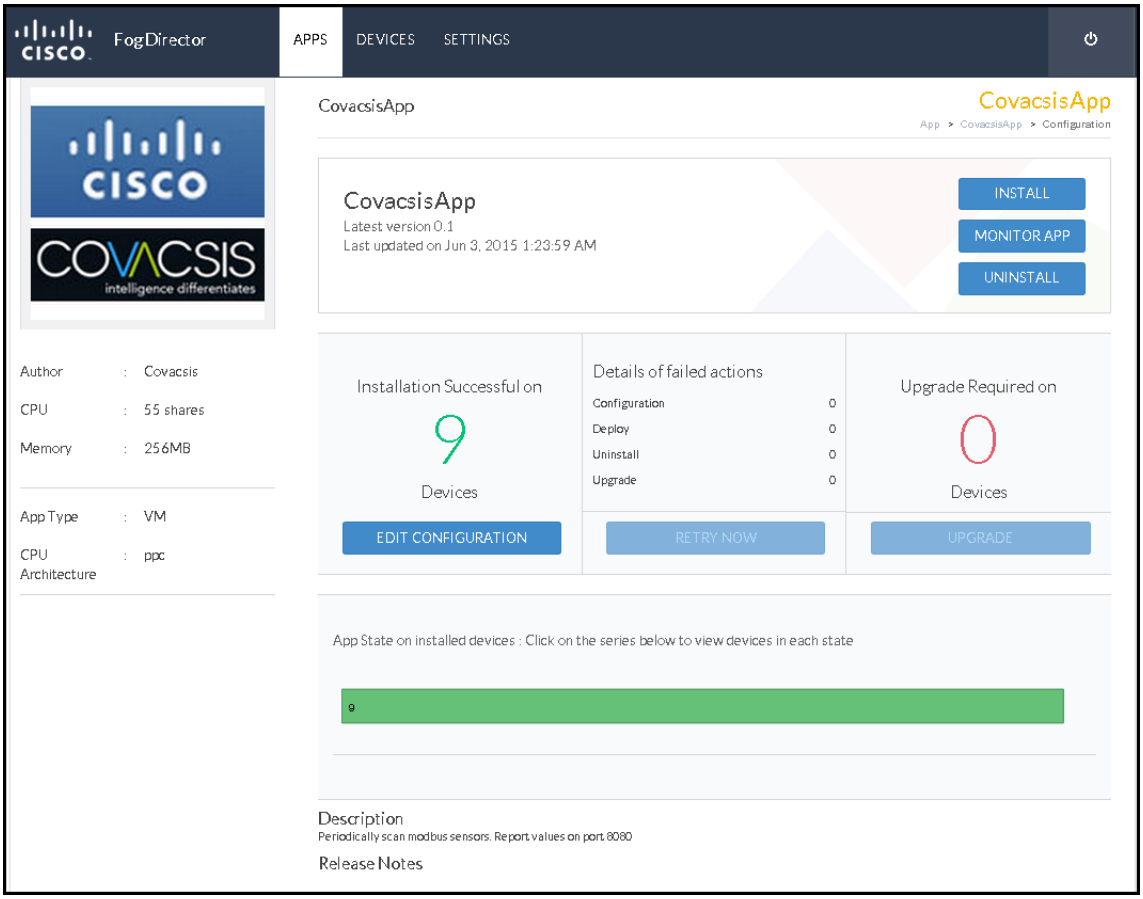
App Configuration Page

An App Configuration page acts as a hub of all App activities. A user can perform the following activities on an App Configuration page:

- Install an App
- Uninstall an App
- Upgrade an App
- Edit the Configuration File of an App

Figure 3 shows the App Configuration Page.

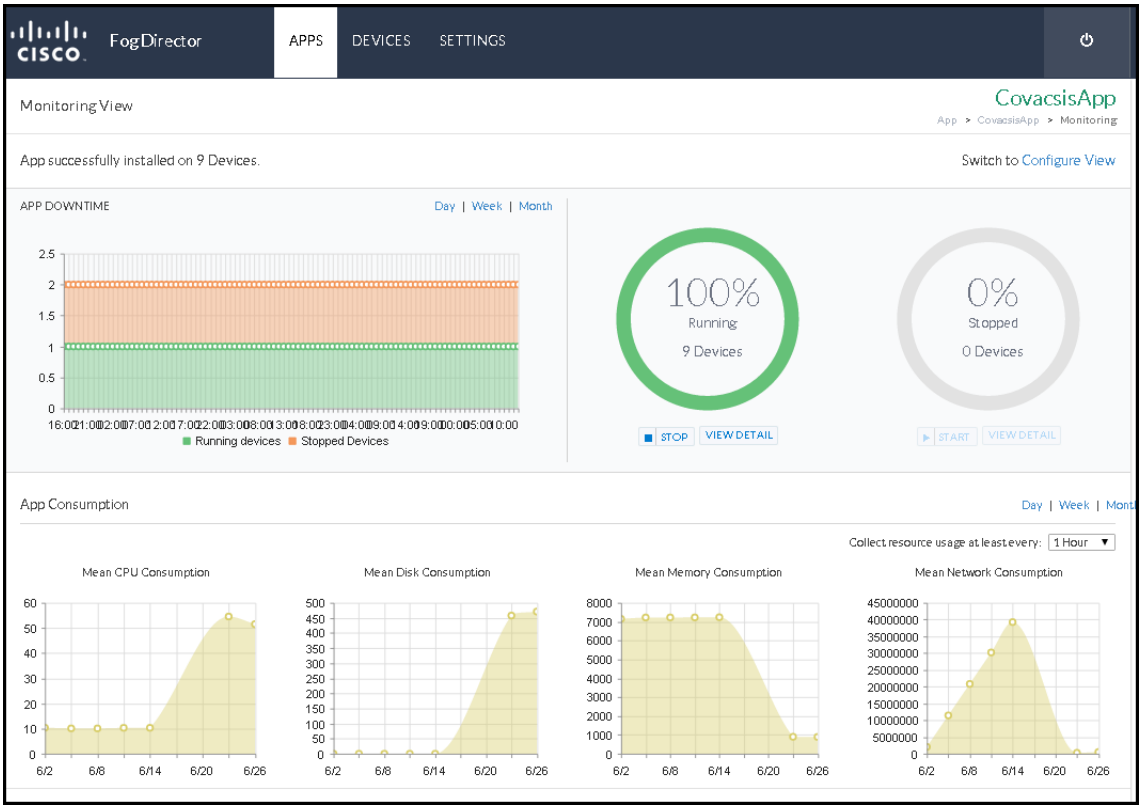
Figure 3 App Configuration Page



App Monitoring Page

An App Monitoring page acts as a hub of all App monitoring. A user can get all the monitoring parameters of an App from this page. Figure 4 shows the App Monitoring Page:

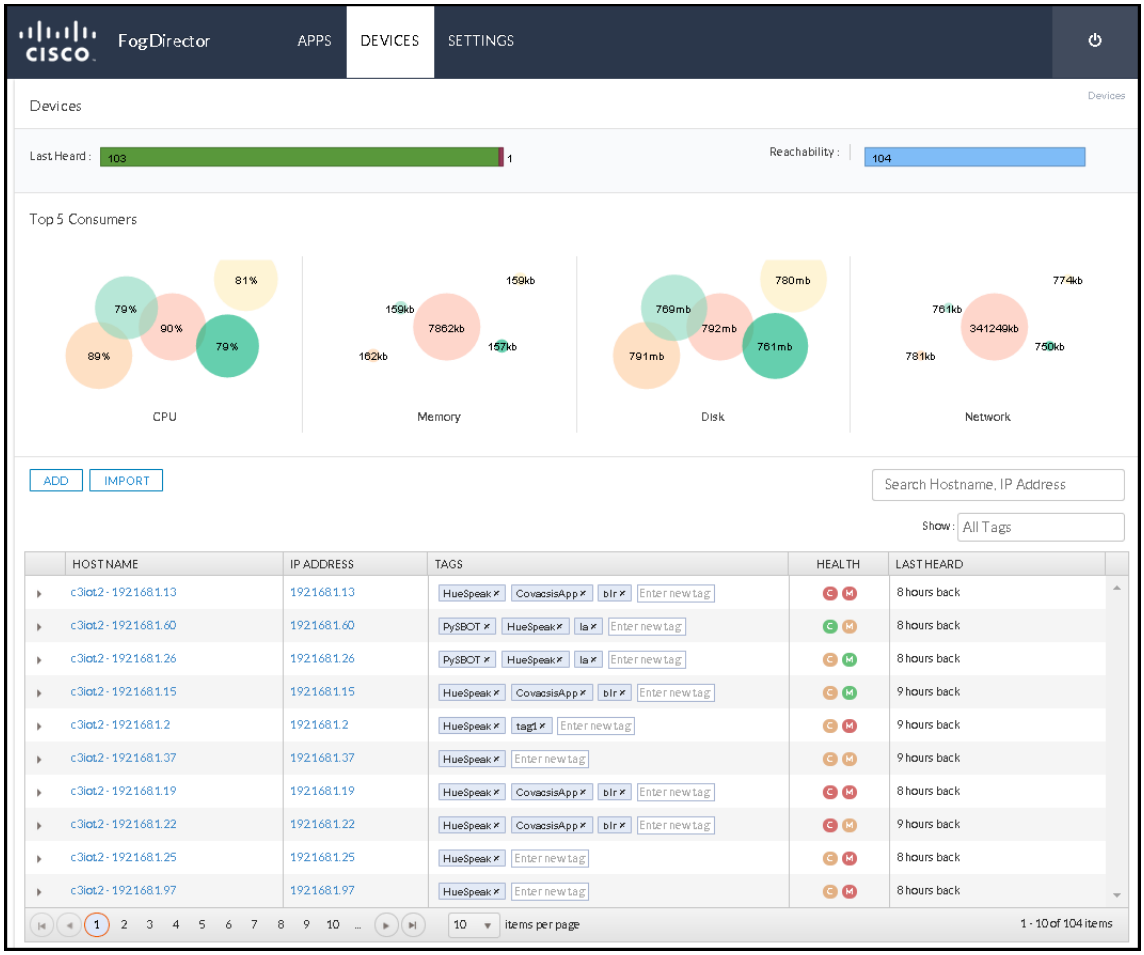
Figure 4 App Monitoring Page



Device Management Page

Device Management page allows you to manage the IOx supported devices.This page lists all the devices added to the Fog Director. Figure 5 shows the Device Management Page:

Figure 5 Device Management Page



User Workflows

The following workflows help you perform some of the basic tasks that you will be performing after you set up Fog Director:

- Installing an App on a Device for the First Time
- Stopping the Installation of an App
- Upgrading an App on a Device
- Reverting to an Older Version of an App
- Restoring an App from the Back-up File
- Removing an Installed App from Fog Director
- Reconfiguring Apps on Selected Devices
- Reconfiguring Apps on a Single Device
- Troubleshooting Fog Director
- Troubleshooting a Device

- Finding the Root Cause of an App Failure on a Device

Installing an App on a Device for the First Time

This workflow shows how to install an App on a device when you use Fog Director for the first time:

Step 1 Add a device to Fog Director. For detailed information, see Adding Devices, page 12.

Step 2 Add an App to Fog Director. For detailed information, see Uploading Apps, page 15.

Step 3 Publish the added App. For detailed information, see Publishing Apps, page 19.

Step 4 Install the App on the device added in step 1. For detailed information, see Installing Apps, page 20.

Stopping the Installation of an App

You may want to stop the installation of an App when you realize that a new version of an App is problematic. In that scenario, you can stop further installation of an App. To disable App install button, follow these steps:

Step 1 Choose **APPS** menu.

Step 2 In the Available App section, click **SWITCH TO APP EDIT VIEW.**

Step 3 Click Unpublish button on the App icon. This will disable the **Install** button on the App Configuration Page.

Upgrading an App on a Device

This workflow shows how to upgrade an already installed App on a device:

Step 1 Upload the latest version of the App to Fog Director. For detailed information, see Uploading Apps, page 15.

Step 2 After you upload the latest version of an App, you can upgrade the App installed on devices. For detailed information, see Upgrading an App, page 23.

Step 3 Publish the upgraded App.

Reverting to an Older Version of an App

You can revert to an older version of an App. There are two scenarios where you can revert to an older version:

Scenario 1: An older version of the App is in published state. In this scenario, if you want to revert to the older version, follow these steps:

Step 1 Uninstall the current version of the App from the device or devices.

Step 2 Switch to App Edit View and unpublish the App. The App will revert to the older version.

Scenario 2: An older version of the App is not published. In this scenario, if you want to revert to the older version, follow these steps:

Step 1 Switch to App Edit View and unpublish the latest version of the App. The App moves to unpublished App section.

Step 2 Remove the latest version of the App from the unpublished App section. The App will automatically revert to previous version.

Restoring an App from the Back-up File

You can back-up Apps using the Export Apps functionality. This feature is available only in the App Edit view. The exported ZIP file can be imported into Fog Director using the import Apps functionality. For detailed information, see Importing Apps, page 27.

Removing an Installed App from Fog Director

This workflow shows how to remove an installed App from Fog Director:

Step 1 Choose the App from the installed Apps section.

Step 2 Uninstall the selected App. For detailed information, see Uninstalling Apps, page 26.

Step 3 Switch to App Edit View and remove the App from the Installed Apps section.

Step 4 Unpublish the App from the Available Apps section.

Step 5 Remove the App from the Unpublished Apps section.

Reconfiguring Apps on Selected Devices

You can reconfigure the App parameter on multiple devices. After you apply the new configuration, it will be applied on the selected devices. You can also restart the Apps using config change. To reconfigure the App parameters on multiple devices, follow these steps:

Step 1 Choose the App from the Installed or Available App section.

Step 2 Click **Edit Configuration**. The Device Listing page is displayed. This page lists all the devices where you can change the configuration parameters.

Step 3 Select the device or devices from the list.

Step 4 Click **Add Selected Devices**. The selected devices will be listed below.

Step 5 The Customize Configuration section lists the configuration parameters. Change the parameter value.

Step 6 Finally, click **Done, Let's Go**.

Reconfiguring Apps on a Single Device

You can change the configuration parameters of an App on a single device. To reconfigure the App parameter on a single device, follow these steps:

Step 1 Choose **Devices**.

Step 2 Select the device from the device list. The device details page is displayed. This page lists the App information if an App is installed on this device.

Step 3 Select the **Edit Configuration** tab and change the App parameter.

Step 4 Finally, click **RECONFIGURE APP.**

Troubleshooting Fog Director

This workflow shows how to troubleshoot Fog Director:

Step 1 Choose **Settings.**

Step 2 Enable collection of debug logs. To enable collection of debug logs, click **Yes**.

Step 3 Reproduce the problem for which you are collecting the debugs.

Step 4 After you reproduce the problem, click **DOWNLOAD LOGS** to download the debug logs.

Troubleshooting a Device

This workflow shows how to troubleshoot a device:

Step 1 Choose **Devices.**

Step 2 Click on a Host Name. The Device Details page is displayed. To enable collection of debug logs, click **Yes**.

Step 3 Reproduce the problem for which you are collecting the debugs.

Step 4 After you reproduce the problem, click **VIEW DEVICE LOGS** or **DOWNLOAD TECH SUPPORT LOGS** to download the debug logs.

Finding the Root Cause of an App Failure on a Device

This workflow shows how to find the root cause of an App failure:

Step 1 Choose the App from the Installed Apps section.

Step 2 Click **MONITOR APP**.

Step 3 Click **VIEW DETAIL.**

Step 4 Click **View App Log**. The App Log will help you find the root cause of the failure.

Managing Apps and Devices

This section describes how to manage Apps and devices using Fog Director.

Adding Devices

Before you install an App on a device, that device should be added to the Fog Director. To add a device, follow these steps:

Step 1 Log in to Fog Director.

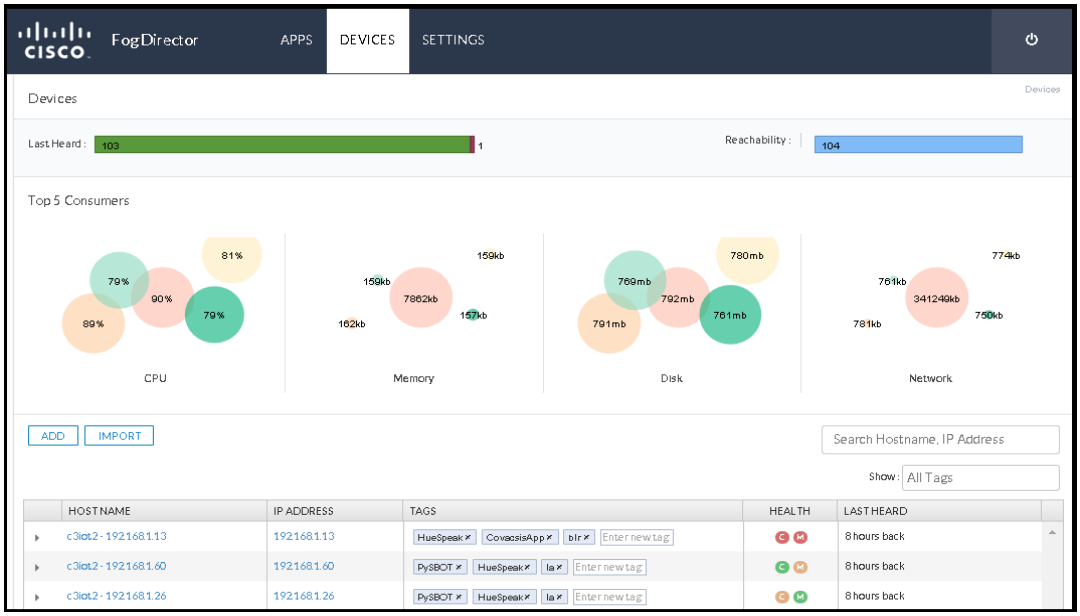
Step 2 Choose **Devices** from the menu.

Step 3 Click **ADD** button. Refer Figure 1-6.

Step 4 Enter the device details in the Add New Device popup. The IP Address, Username, and Password are mandatory fields.

Step 5 Click **Save & Close** to save the device information. Click **Save & Add More** if you want to add more devices after you save the device details.

Figure 1-6 Add Device Screen



Importing Devices

You can import device information from a spreadsheet that lists all of your devices and attributes. To import the device information, follow these steps:

Step 1 Choose **Devices.**

Step 2 Click **Import**.

Step 3 Click **Select Files** to browse to the CSV file that contains the devices that you want to import. Table 1-1 lists the device details that should be part of the CSV file.

Step 4 Select the CSV file and click **Open**.

Note You can download a sample CSV file from the import popup window. Table 1-1 lists the device details that should be part of the CSV file.

Table 1-1 CSV Field Description

Field Name	Description
IPv4 Address	IP address of the device that you are adding to the Fog Director.
HTTPS Port	Port number of the HTTPS server.

Field Name	Description
HTTPS Username	Login name for the HTTPS client connection.
HTTP Password	Password for the HTTPS client connection.
Tags	Tags to identify a device. Tagging a device helps you group similar devices. (Optional)
Contact Details	Contact details of the device. (Optional)
Description	Description of the device. (Optional)

Editing Devices

To edit device information, follow these steps:

Step 1 Choose **Devices**.

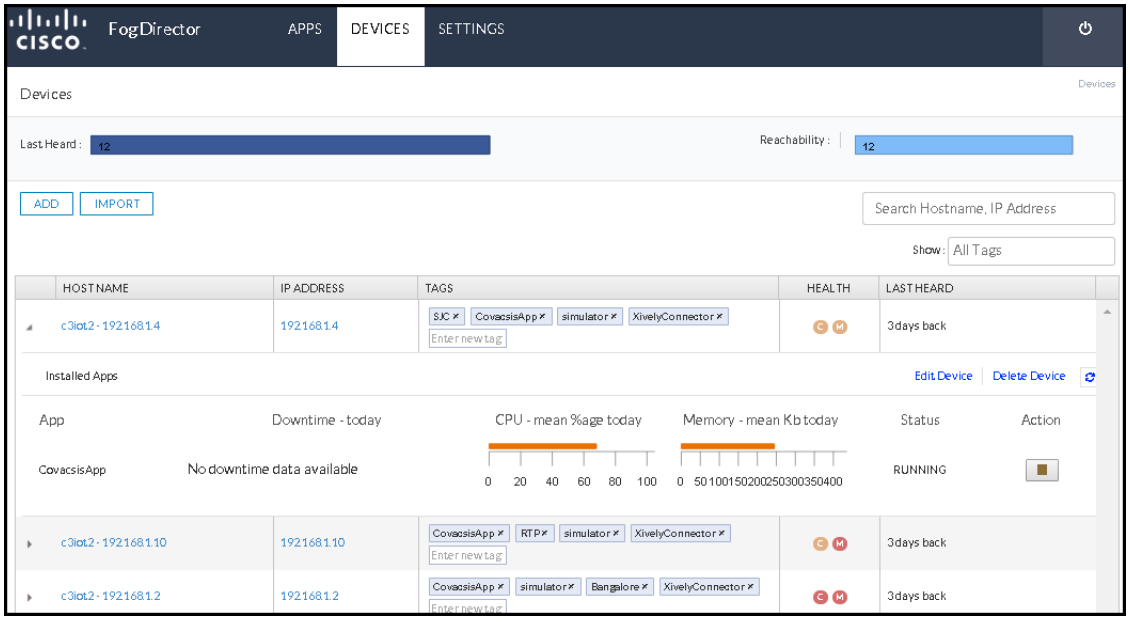
Step 2 Expand the device information. Refer Figure 1-7.

Step 3 Click **Edit Device**.

Step 4 Update the device information shown in the popup window.

Step 5 Click **Save & Close**.

Figure 1-7 Editing Devices



Deleting Devices

To delete a device from the Fog Director, follow these steps:

Step 1 Choose **Devices**.

Step 2 Expand the device information. Refer Figure 1-7.

Step 3 Click **Delete Device**.

Step 4 Click **OK**.

Tagging Devices

Tagging a device helps you group similar devices. For instance, you have 100 devices in a organization and out of that 100 devices, 30 devices are in 'San Jose'. You create a tag 'San Jose' and apply that tag to all the devices that are in San Jose. Next time, when you want to see the devices in San Jose, you can use this tag and search for it. Note that you can apply multiple tags to the same device.

To tag a device, follow these steps:

Step 1 Choose **Devices**.

Step 2 Enter the tag name in the 'Enter New Tag' field.

Step 3 Press **Enter** or **Tab**.

Uploading Apps

To upload an App, follow these steps:

Step 1 Choose **APPS** menu**.**

Step 2 Click **Add New App.** Refer Figure 1-8.

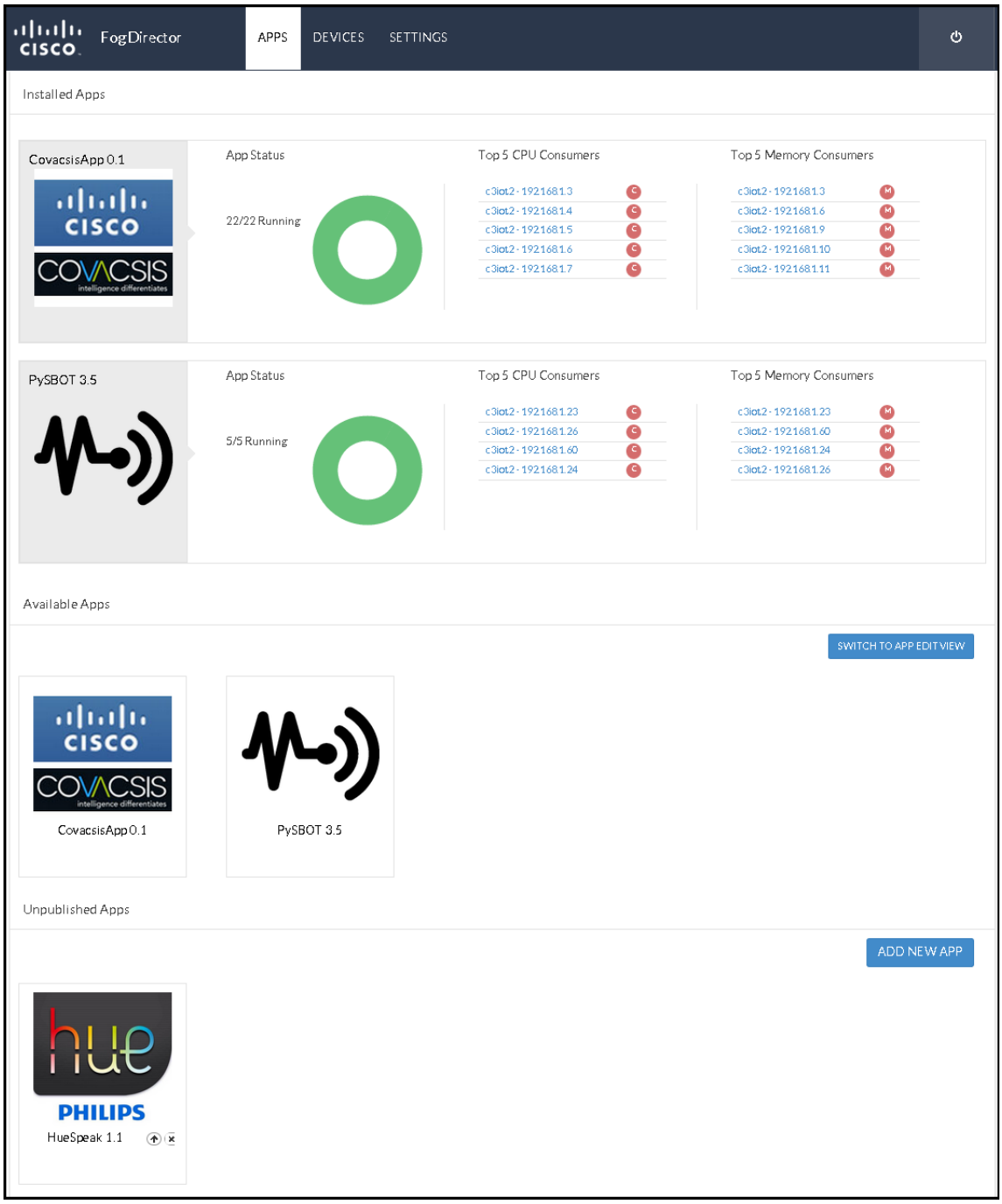
Step 3 Click **Select Files**.

Step 4 Browse to the App in your local machine and select the App.

Note The App that you use here is the output of the IOx SDK.

After you upload an App, the App moves to the Unpublished App section. Note that you have to publish an App before you install it on a device.

Figure 1-8 Uploading an App



Editing App Information

After you upload an App, you can update the following App details:

- Description of the App.
- Release Notes information.

- App Icon. You can add a new icon or change the existing one.
- External links to an App.

To update the App information, do the following:

Step 1 In the Available App section, click **SWITCH TO APP EDIT VIEW**.

Step 2 Choose the App from the list. The App page is displayed. Refer Figure 1-9.

Step 3 To update the App Description, click the **Edit** link. The Description textbox appears. Refer Figure 1-10.

Step 4 Enter the description in the textbox and click **Apply**.

Figure 1-9 Editing App Information

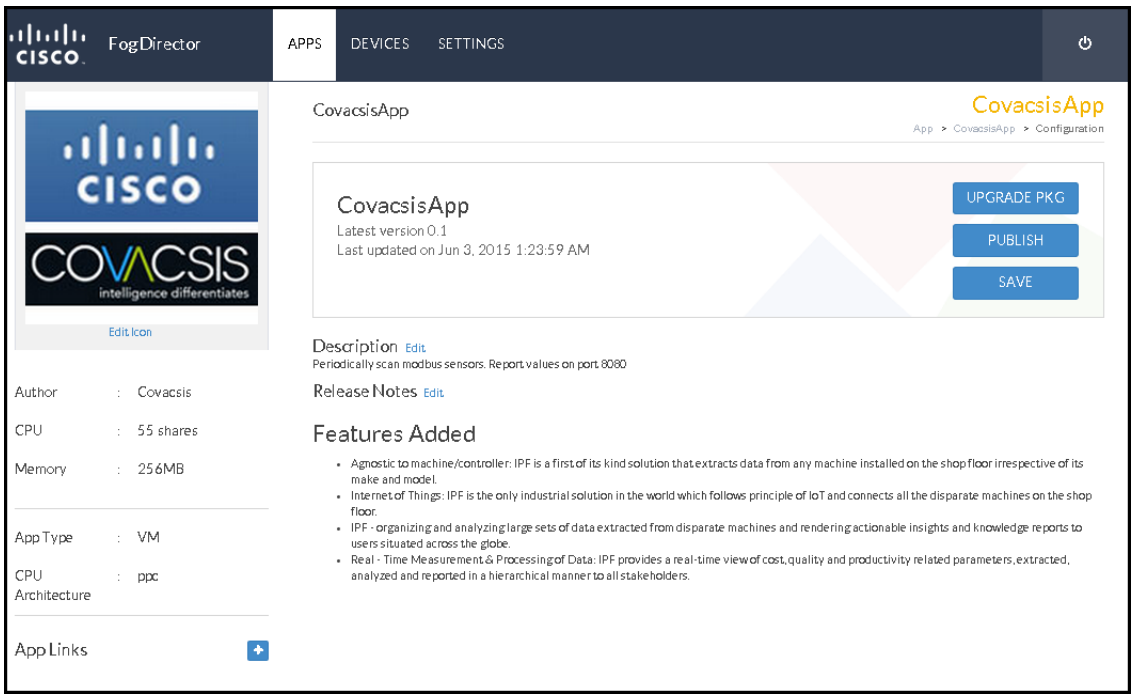
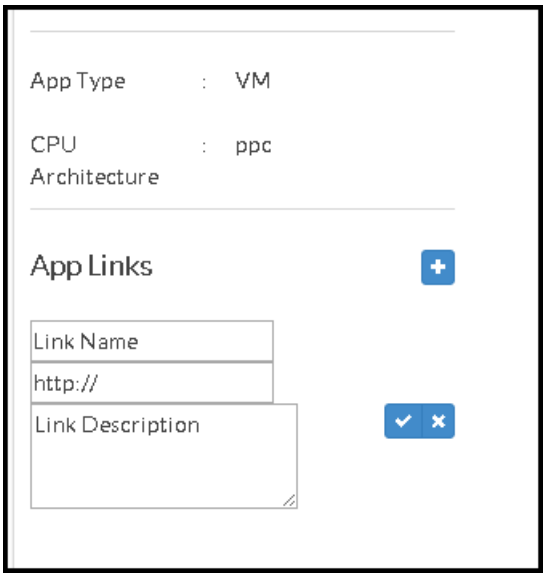


Figure 1-10 Adding Description

You can add external links to an App by clicking the + icon. Refer Figure 1-11.

Figure 1-11 Adding External App Links



Publishing Apps

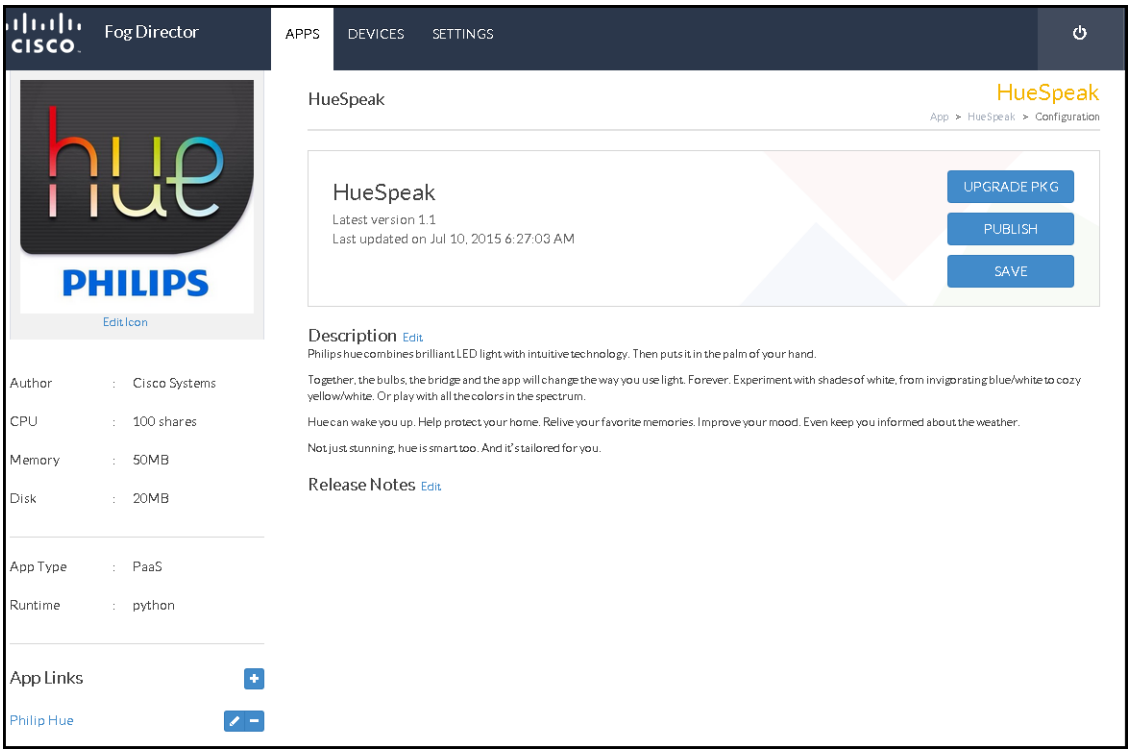
After you upload an App, the App moves to Unpublished App section in Fog Director. To publish an App, follow these steps:

Step 1 Choose your App from the Unpublished App section. The App page is displayed. Refer Figure 1-12.

Step 2 Click **Publish.** The App moves to Available App section.

The Available App section lists the Apps that are published and available for installation.

Figure 1-12 Publishing an App



Installing Apps

A published App is ready for installation. To install an App, follow these steps:

Step 1 Choose the App from the Available App section. The App Info page is displayed. Refer Figure 1-13.

Step 2 Click **Install**. The Device Listing page is displayed. This page lists the devices that are available for installation. Refer Figure 1-14.

Step 3 Select the device or devices from the list.

Step 4 Click **Add Selected Devices**. The selected devices will be listed. If you want to remove any devices from the list, click the Action icon. You can also change the App specific configuration from this page. Click **Customize Configuration** and change the parameter values. Note that the Customize Configuration option will be visible only if the App contains a **config_ini yaml** file.

Step 5 Click **Next**. The Installation Summary page is displayed. Refer Figure 1-15. This page also displays the device and the network health information. The Network Health will tell you how many of the selected devices are reachable.

Step 6 Click **Done, Let's Go**. The Device Installation page is displayed. This page tells you whether an App is installed successfully or not. If the App is not successfully installed, you can retry the installation. Refer Figure 1-16.

Figure 1-13 App Information Page

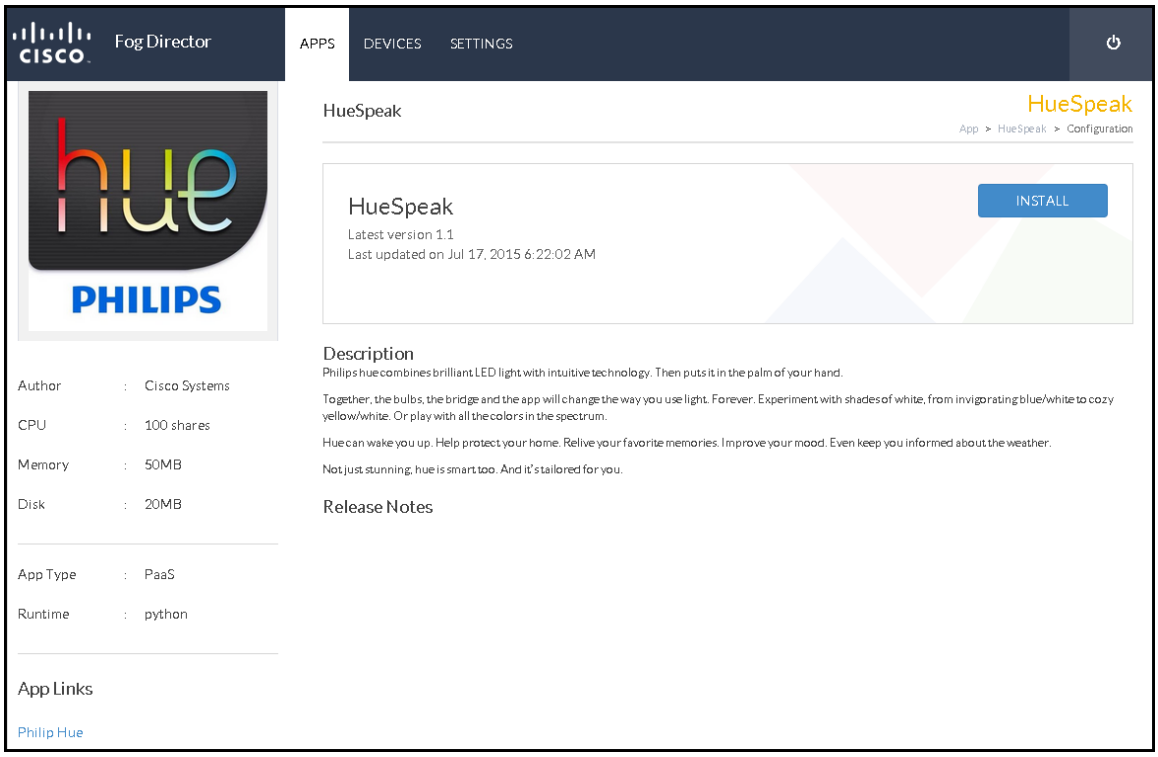


Figure 1-14 Device Filter Page

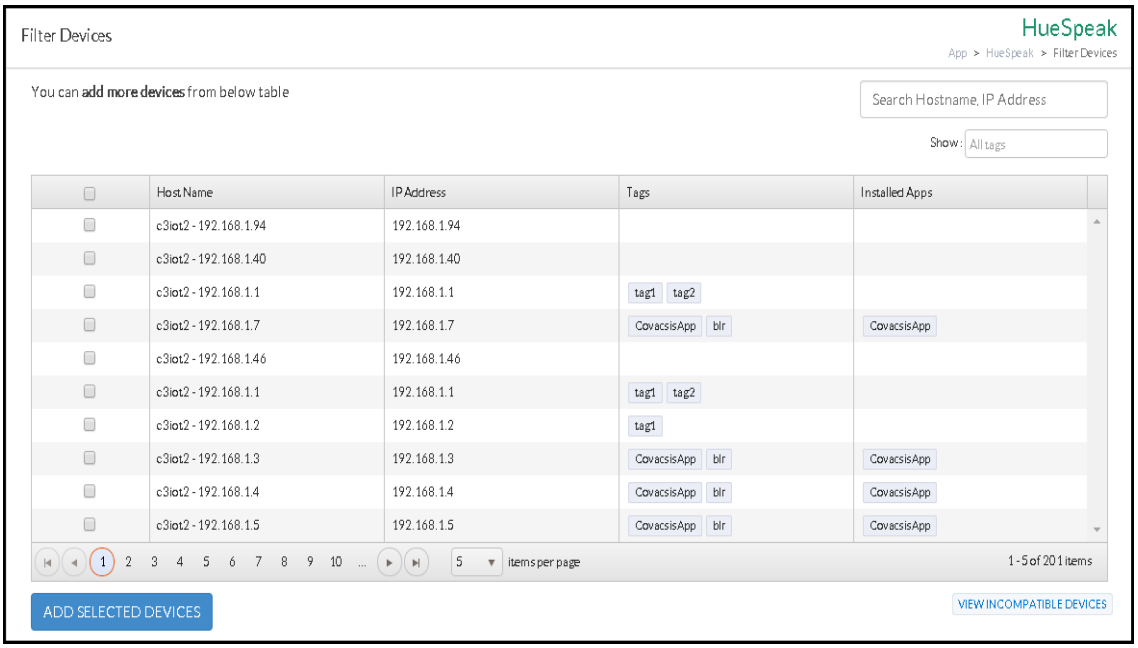


Figure 1-15 Install Summary Page

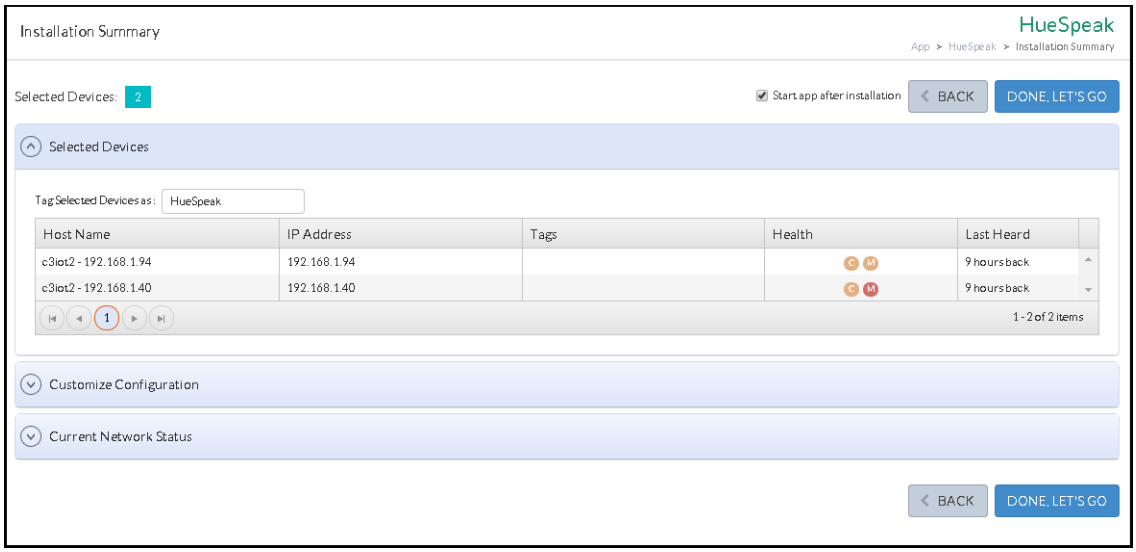
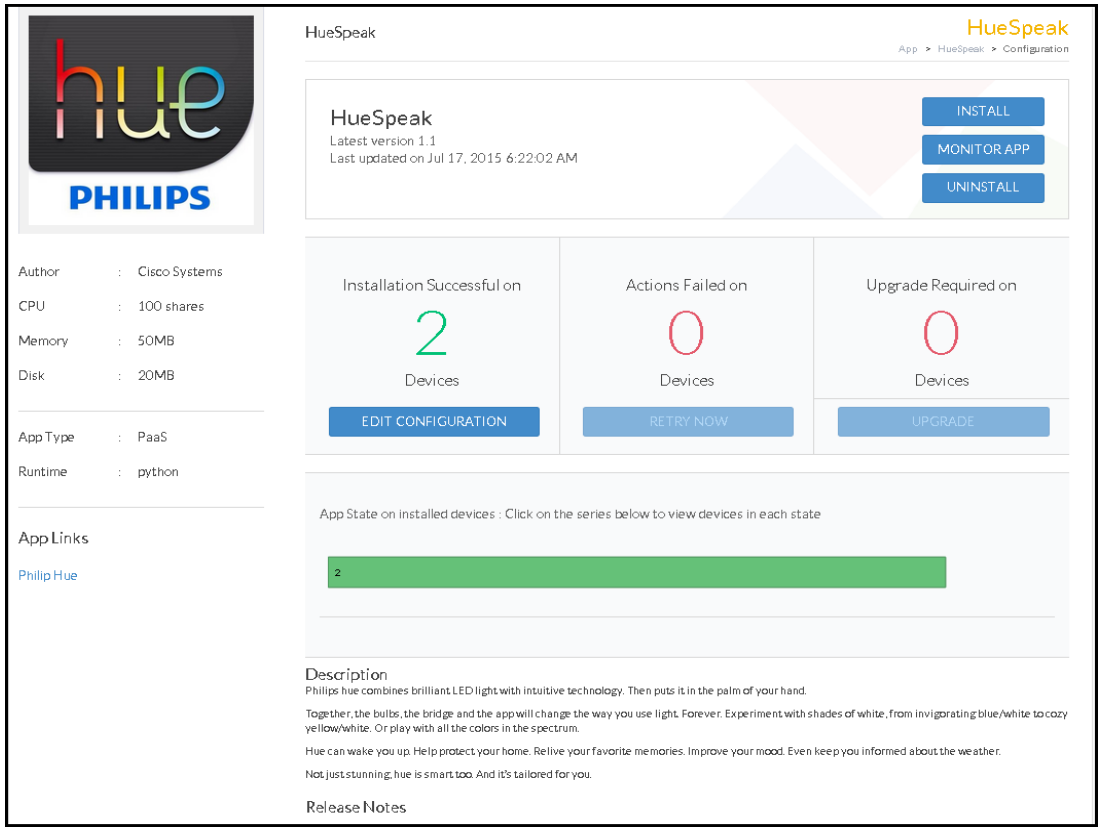


Figure 1-16 App Installation Status Page



Retrying a Failed Installation

If an App installation fails, you can redeploy it on devices where it failed.

To retry an installation, follow these steps:

Step 1 Choose the App from the Installed App section. The App page is displayed. Refer Figure 1-16.

Step 2 Click **RETRY NOW.** Select Retry Actions page is displayed. Refer Figure 1-17.

Step 3 Select the device and click **REDPLOY**. Click **REMOVE FOREVER** if you want to remove the App from the selected devices.

Figure 1-17 Retry Action Page

Configuring Apps

You can edit the configuration file of an App using the Edit Configuration option. An App can come with or without a configuration file. If an App does not have a configuration file, the Edit Configuration button will be disabled. To edit the configuration file of an App, follow these steps:

Step 1 Choose the App from the Installed or Available App section. The App Info page is displayed. Refer Figure 1-16.

Step 2 Click **Edit Configuration**. The Device Listing page is displayed. This page lists all the devices where you can change the configuration parameters.

Step 3 Select the device or devices from the list.

Step 4 Click **Add Selected Devices**. The selected devices will be listed below.

Step 5 The Customize Configuration section lists the configuration parameters. Change the parameter value.

Step 6 Finally, click **Done, Let's Go**.

Upgrading an App

Upgrade option allows you to upgrade Apps installed on devices. The Upgrade button in the Edit App page will be enabled only if there are new versions available for an App. An Administrator can upload the new version of an App to the Fog Director. To upload the new version of an App, follow these steps:

Step 1 Choose **APPS** menu.

Step 2 Click **SWITCH TO APP EDIT VIEW**. Refer Figure 1-18.

Step 3 Choose the App from the Available App section. The App information page is displayed.

Step 4 Click **UPLOAD PKG**. Refer Figure 1-19.

Step 5 Click **Select New App Package**.

Step 6 Select the package and click **OK**.

The latest version of the App is now uploaded to the Fog Director. To upgrade the devices with the latest version, follow these steps:

Step 1 Choose **APPS** menu.

Step 2 Choose the App from the Installed App section. The App information page is displayed. Refer Figure 1-20.

Step 3 Click **UPGRDAE**. The Device Filter Screen is displayed.

Step 4 Select the device or devices from the list. Click **ADD SELECTED DEVICES**.

Step 5 Finally, click **Done, Let's Go**.

Figure 1-18 App Edit View

Figure 1-19 Upload App Page

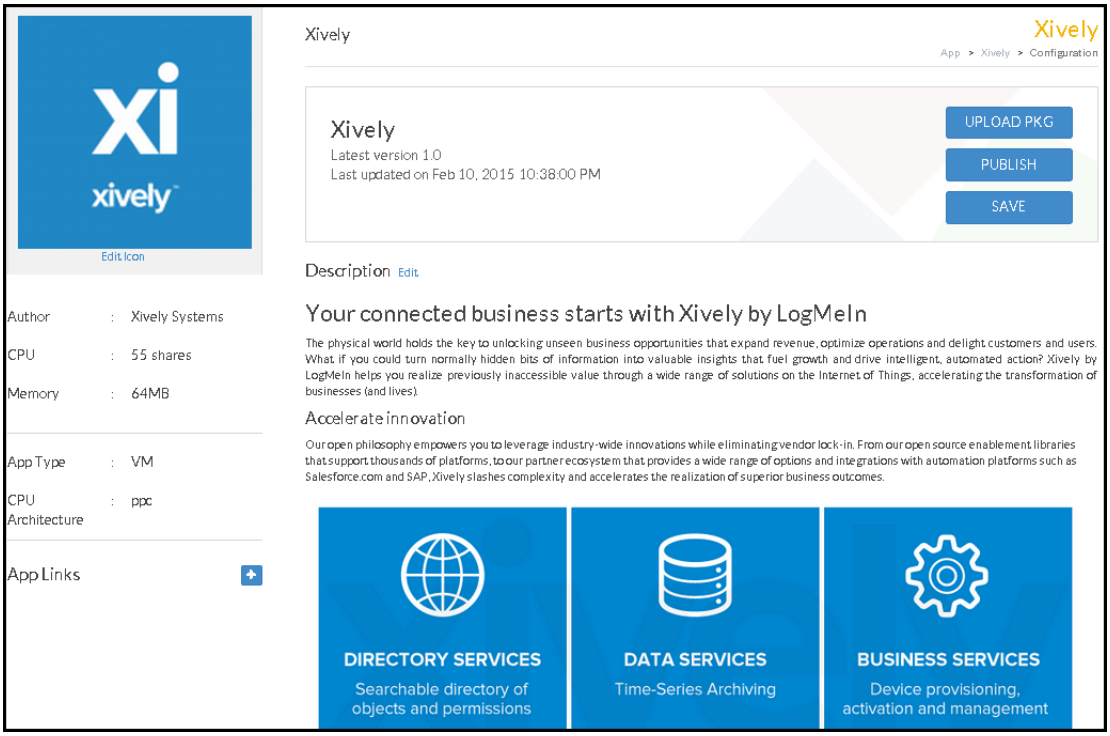
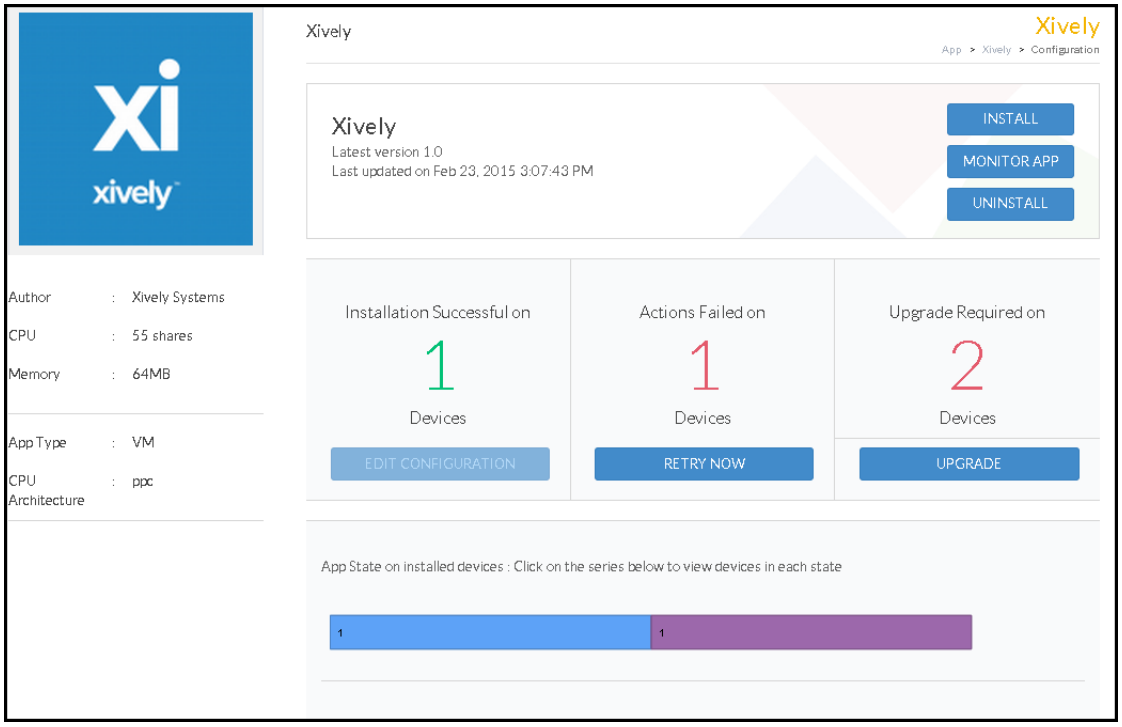


Figure 1-20 App Upgrade Page



Uninstalling Apps

To uninstall an App, follow these steps:

Step 1 Choose your App from the Installed Apps section. The App Info page is displayed.

Step 2 Click **Uninstall**. The Device Listing page is displayed. This page lists the devices where the App is installed.

Step 3 Select the device or devices from the list.

Step 4 Click **Add Selected Devices.** The selected devices will be listed.

Step 5 Click **Done, Let's Go**. The App is uninstalled from the selected devices.

Exporting Apps

Exporting Apps allows you to back up the Apps that are either in draft or published stage. To export an App, follow these steps:

Step 1 Click **Export Apps** button. The App is downloaded to your machine in a ZIP format.

Importing Apps

An exported App can be imported back to the Fog Director. To import an App, follow these steps:

Step 1 Click **Import Apps** button.

Step 2 Click **Select Apps Archive** and select the App from the archive.

Step 3 Click **OK**.

Monitoring Apps

Fog Director allows you to monitor the Apps installed on devices. The monitoring view of an App provides you the following details:

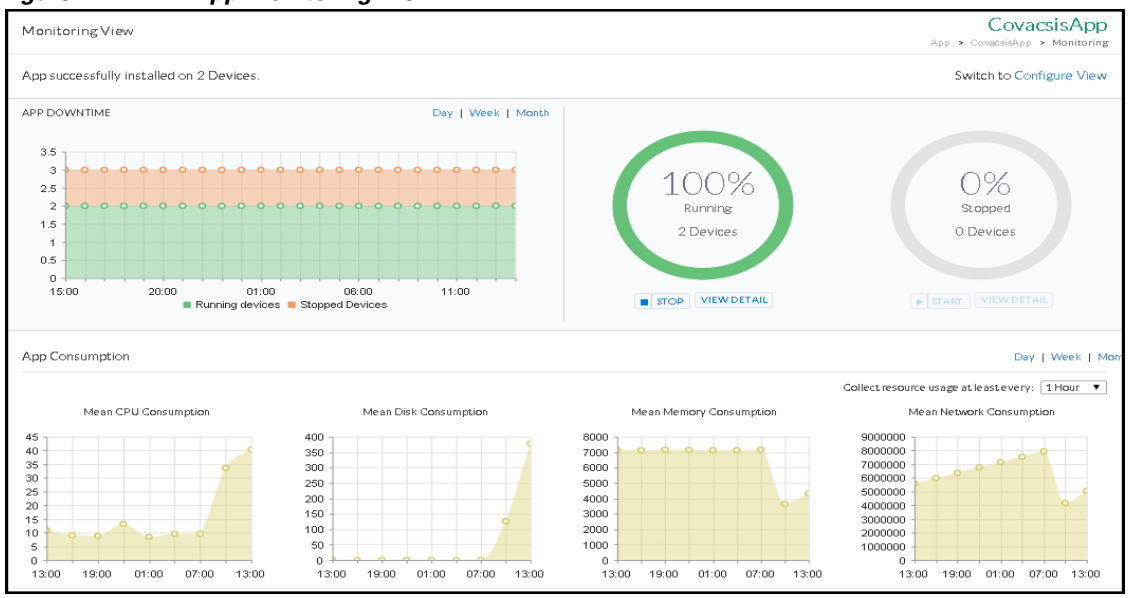
- App Downtime.
- On how many devices the App is currently running.
- On how many devices the App stopped running.
- How much CPU is consumed by the App.
- How much disk is consumed by the App.
- How much memory is consumed by the App.
- How much network is consumed by the App.

To monitor an App, follow these steps:

Step 1 Choose the App from the Installed Apps section. The App info page is displayed.

Step 2 Click **Monitor App**. The Monitoring View page is displayed. Refer Figure 1-21.

Figure 1-21 App Monitoring View



Troubleshooting

This section explains how to troubleshoot Fog Director using the Log files. Log files allow you to identify and troubleshoot issues faced by Devices and Apps. You can download the following log files:

- Device Log
- Tech Support Log
- App Log

Device Logs

Device Log provides you the log information about the devices hosted on Fog Director. If a device does not behave as expected, then this log file will file help you identify and troubleshoot the issues.

To generate Device Log, follow these steps:

Step 1 Choose **Devices.**

Step 2 Click on a Host Name. The Device Details page is displayed. Refer Figure 1-22.

Step 3 Click on **VIEW DEVICE LOGS**. The View Log info page is displayed. Refer Figure 1-23.

Figure 1-22 Device Details Page

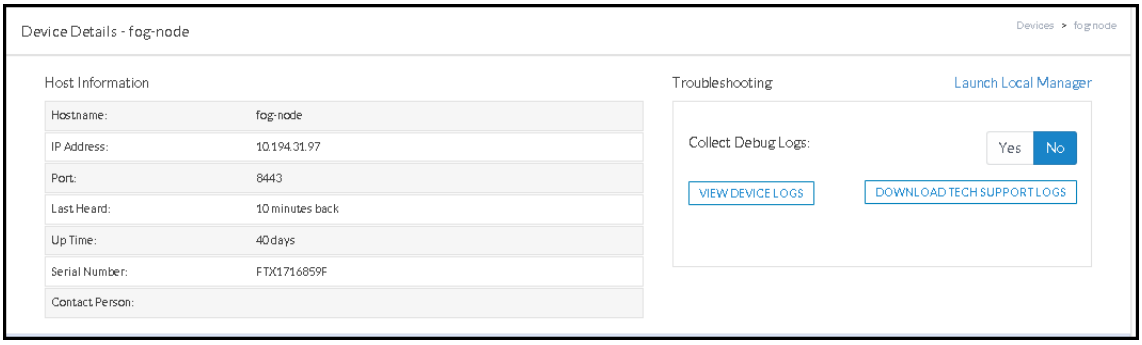
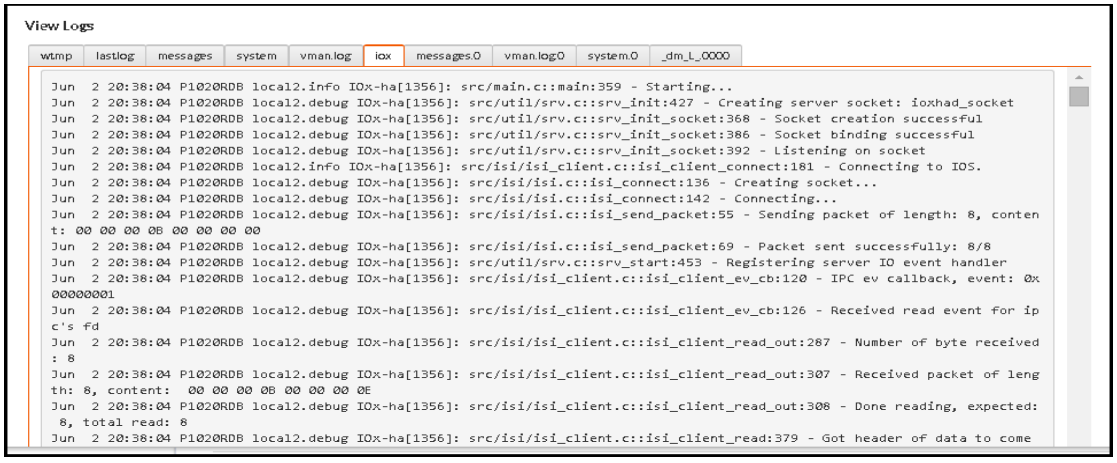


Figure 1-23 View Log Info Page



Tech Support Log

This is the log file that you should share with the Cisco Technical Support Team.

To generate Tech Support Log, follow these steps:

Step 1 Choose **Devices.**

Step 2 Click on a Host Name. The Device Details page is displayed. Refer Figure 1-22.

Step 3 Click on **DOWNLOAD TECH SUPPORT LOGS**.

App Log

App Log lists the log information specific to Apps. This log file helps you identify and troubleshoot App specific issues.

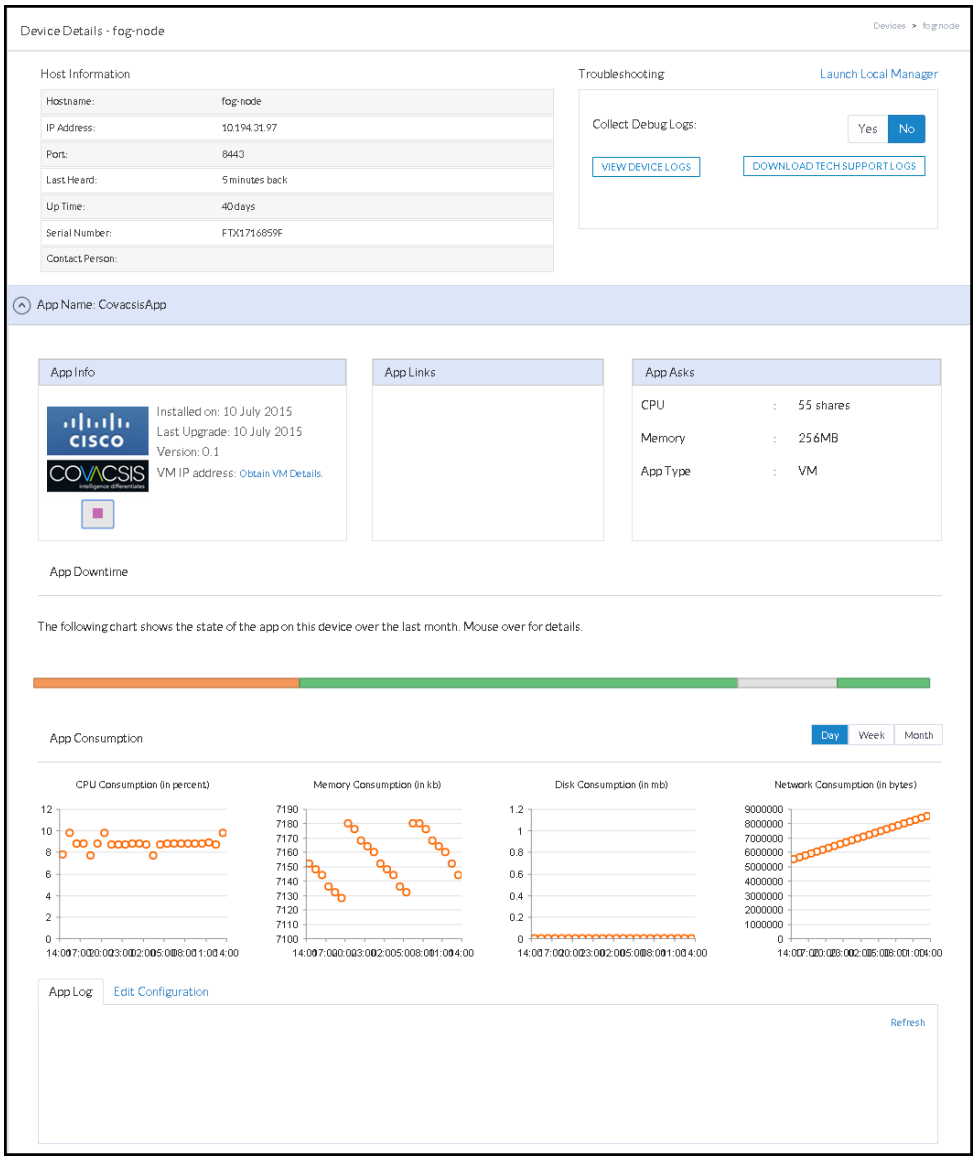
To generate App Log, follow these steps:

Step 1 Choose **Devices.**

Step 2 Click on a Host Name. The Device Details page is displayed along with App information. Refer Figure 1-24.

Step 3 Select the tab **App Log**. The App specific logs are displayed.

Figure 1-24 App Log Page



You can also access App Log files by selecting Monitoring Page -> View Detail -> App Log.

Frequently Asked Questions

I have a device with an App already installed on it. This App is installed using Fog Director. How do I ensure that the App does not go to unmanaged state when I add the device to Fog Director?

Step 1 Before you add the device to Fog Director, add the App to the Fog Director's App repository.

Step 2 After you add the App successfully, add the device to Fog Director. Inventory collection from the device will keep the App package in local App repository in sync with the installed App.

I have a device with an App already installed on it. This App is not installed using Fog Director. How do I ensure that the App does not go to unmanaged state when I add the device to Fog Director?

Step 1 Uninstall the App from the device using Cisco IOx-client or Cisco IOx Local Manager.

Step 2 Add the App and device into Fog Director.

Step 3 After you add the App and Device, install the App on the device using Fog Director.

I have an unmanaged App in the local App repository and I want to make this App manageable. How do I do it?

Step 1 Uninstall the unmanaged App from all devices. If you do not want to uninstall, you can delete the device from the Fog Director.

Step 2 Remove the App from the installed App section.

Step 3 Add this App to Local App Repository.

Step 4 Install it on the device from where it is uninstalled.

Caveats

Caveats describe unexpected behavior in Cisco IOx Fog Director.

Open Caveats

Table 1-2 lists the caveats that are open in Cisco IOx Fog Director Version 1.0:

Table 1-2 Open Caveats in Version 1.0

Bug ID	Summary
CSCuv95217	**Symptom:** Device refresh removed the device from the re-try list of the App. **Condition:** Some devices are in the failed installation list of an App. Doing a refresh removes these devices from the re-try failed list of the App. **Workaround**: Reinstall the App using the regular App installation flow.
CSCus58287	**Symptom:** User not able to see health section in Installation summary of the device inventory table. **Condition:** When Firefox is used. **Workaround**: Use Google Chrome browser.
CSCuw00979	**Symptom:** User not able to see Username and Password dialogue box unless the user scrolls down to bottom of the Login page. **Condition:** When user session expires. **Workaround**: Click Logout button or scroll down to bottom of the Login page.
CSCuw08794	**Symptom:** User not able to see Apps and Devices added to Fog Director. **Condition:** When user PC network goes down. **Workaround:** Refresh the page.

Related Documentation

In addition to this document, the Cisco IOx documentation set includes the following documents:

- Cisco 800 Series Integrated Services Routers Software Configuration Guide
- Cisco Data in Motion Application Programming Interface Reference Guide

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html.

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