使用Vagrant和Virtualbox/VMWare構建IOx應用

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簡介

本文檔介紹如何使用Vagrant和Virtualbox構建IOx應用程式，以及如何在IOx本地管理器GUI中部署它們。

必要條件

Windows/ MAC Intel/ Linux

- Git
- 流浪漢
- Virtualbox

基於MAC ARM - M1/M2/M3

- Git
- 流浪漢
- VMWare融合
- vagrant-vmware-desktop外掛

下載：

- 流浪漢
- VirtualBox

使用Vagrant建立環境的程式

行動摘要

- vagrantfile 配置基於其主機體系結構設定VM環境。
- 它根據體系結構將VM配置為使用VMware Fusion或VirtualBox
- 它為VM調配必要的軟體和工具，包括QEMU（快速EMUlator）、Docker和ioxclient。
- 配置自動為amd64目標思科平台裝置構建一個iperf應用示例。

步驟 1.在本地系統中克隆Github儲存庫：

```
git clone https://github.com/suryasundarraj/cisco-iox-app-build.git
```

或者，複製配置盤櫃的內容並貼上到「Vagrantfile」中。這樣會在本機系統中建立名為「Vagrantfile」的檔案：

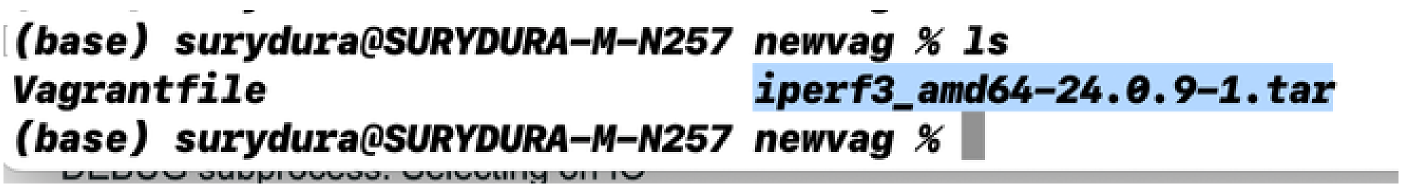
```
# -*- mode: ruby -*-
# vi: set ft=ruby :

# All Vagrant configuration is done below. The "2" in Vagrant.configure
# configures the configuration version (we support older styles for
# backwards compatibility). Please don't change it unless you know what
# you're doing.
Vagrant.configure('2') do |config|
  arch = `arch`.strip()
  if arch == 'arm64'
    puts "This appears to be an ARM64 machine! ..."
    config.vm.box = 'gyptazy/ubuntu22.04-arm64'
    config.vm.boot_timeout = 600
    config.vm.provider "vmware_fusion" do |vf|
      #vf.gui = true
      vf.memory = "8192"
      vf.cpus = "4"
    end
    config.vm.define :ioxappbuild
  else
    puts "Assuming this to be an Intel x86 machine! ..."
    config.vm.box = "bento/ubuntu-22.04"
    config.vm.network "public_network", bridge: "ens192"
    config.vm.boot_timeout = 600
    config.vm.provider "virtualbox" do |vb|
      #vb.gui = true
      vb.memory = "8192"
      vb.cpus = "4"
    end
    config.vm.define :ioxappbuild
  end

  config.vm.provision "shell", inline: <<-SHELL
    #!/bin/bash
    # apt-cache madison docker-ce
    export VER="5:24.0.9-1~ubuntu.22.04~jammy"
    echo "!!! installing dependencies and packages !!!"
    apt-get update
    apt-get install -y ca-certificates curl unzip git pcregrep
    install -m 0755 -d /etc/apt/keyrings
    curl -fsSL https://download.docker.com/linux/ubuntu/gpg -o /etc/apt/keyrings/docker.asc
    chmod a+r /etc/apt/keyrings/docker.asc
    echo "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc] https://downlo
    apt-get update
    apt-get install -y qemu binfmt-support qemu-user-static
    apt-get install -y docker-ce=$VER docker-ce-cli=$VER docker-ce-rootless-extras=$VER containerd.io d
    # apt-get install -y docker.io docker-compose docker-buildx
    usermod -aG docker vagrant
    echo "!!! generating .ioxclientcfg.yaml file !!!"
    echo 'global:' > /home/vagrant/.ioxclientcfg.yaml
    echo '  version: "1.0"' >> /home/vagrant/.ioxclientcfg.yaml
    echo '  active: default' >> /home/vagrant/.ioxclientcfg.yaml
    echo '  debug: false' >> /home/vagrant/.ioxclientcfg.yaml
    echo '  fogportalprofile:' >> /home/vagrant/.ioxclientcfg.yaml
    echo '    fogpip: ""' >> /home/vagrant/.ioxclientcfg.yaml
    echo '    fogpport: ""' >> /home/vagrant/.ioxclientcfg.yaml
    echo '    fogpapiprefix: ""' >> /home/vagrant/.ioxclientcfg.yaml
    echo '    fogpurlscheme: ""' >> /home/vagrant/.ioxclientcfg.yaml
    echo '  dockerconfig:' >> /home/vagrant/.ioxclientcfg.yaml
    echo '    server_uri: unix:///var/run/docker.sock' >> /home/vagrant/.ioxclientcfg.yaml
    echo '    api_version: "1.22"' >> /home/vagrant/.ioxclientcfg.yaml
    echo 'author:' >> /home/vagrant/.ioxclientcfg.yaml
    echo '  name: |' >> /home/vagrant/.ioxclientcfg.yaml
    echo '    Home' >> /home/vagrant/.ioxclientcfg.yaml
    echo '  link: localhost' >> /home/vagrant/.ioxclientcfg.yaml
    echo 'profiles: {default: {host_ip: 127.0.0.1, host_port: 8443, auth_keys: cm9vdDpyb290,' >> /home/
    echo '    auth_token: "", local_repo: /software/downloads, api_prefix: /iox/api/v2/hosting/,' >> /h
    echo '    url_scheme: https, ssh_port: 2222, rsa_key: "", certificate: "", cpu_architecture: "",' >
    echo '    middleware: {mw_ip: "", mw_port: "", mw_baseuri: "", mw_urlscheme: "", mw_access_token: "
    echo '    conn_timeout: 1000, client_auth: "no", client_cert: "", client_key: ""}}' >> /home/vagran
    cp /home/vagrant/.ioxclientcfg.yaml /root/.ioxclientcfg.yaml
    chown vagrant:vagrant /home/vagrant/.ioxclientcfg.yaml
    arch=$(uname -m)
    if [[ $arch == x86_64 ]]; then
      # download page https://developer.cisco.com/docs/iox/iox-resource-downloads/
      echo "!!! downloading and extracting ioxclient for x86_64 architecture !!!"
      curl -O https://pubhub.devnetcloud.com/media/iox/docs/artifacts/ioxclient/ioxclient-v1.17.0.0/iox
      tar -xvf /home/vagrant/ioxclient_1.17.0.0_linux_amd64.tar.gz
      cp /home/vagrant/ioxclient_1.17.0.0_linux_amd64/ioxclient /usr/local/bin/ioxclient
      rm -rv /home/vagrant/ioxclient_1.17.0.0_linux_amd64
    elif  [[ $arch = aarch64 ]]; then
      # download page https://developer.cisco.com/docs/iox/iox-resource-downloads/
      echo "!!! downloading and extracting ioxclient for arm64 architecture !!!"
      curl -O https://pubhub.devnetcloud.com/media/iox/docs/artifacts/ioxclient/ioxclient-v1.17.0.0/iox
      tar -xvf /home/vagrant/ioxclient_1.17.0.0_linux_arm64.tar.gz
      cp /home/vagrant/ioxclient_1.17.0.0_linux_arm64/ioxclient /usr/local/bin/ioxclient
      rm -rv /home/vagrant/ioxclient_1.17.0.0_linux_arm64
    fi
    chown vagrant:vagrant /usr/local/bin/ioxclient
    echo "!!! pulling and packaging the app for x86_64 architecture !!!"
    docker pull --platform=linux/amd64 mlabbe/iperf3
    ioxclient docker package mlabbe/iperf3 .
    cp package.tar /vagrant/iperf3_amd64-$(echo $VER | pcregrep -o1 ':([0-9.-]+)~').tar
  SHELL
end
```

步驟 2.確保「export VER="5:24.0.9-1~ubuntu.22.04~jammy」行未增加註釋，並註釋所有其他導出語句。這對應於您想要在此Vagrant環境中安裝的Docker Engine版本：

```
cisco@cisco-virtual-machine:~/Desktop/ioxappbuild$ cat Vagrantfile | grep 'export' | grep -v '#'
export VER="5:24.0.9-1~ubuntu.22.04~jammy"
```

步驟 3.使用Vagrantfile所在目錄中的vagrant up命令啟動Vagrant環境，並觀察為amd64 tar檔案成功構建的iperf IOx應用程式：

```
vagrant up
```



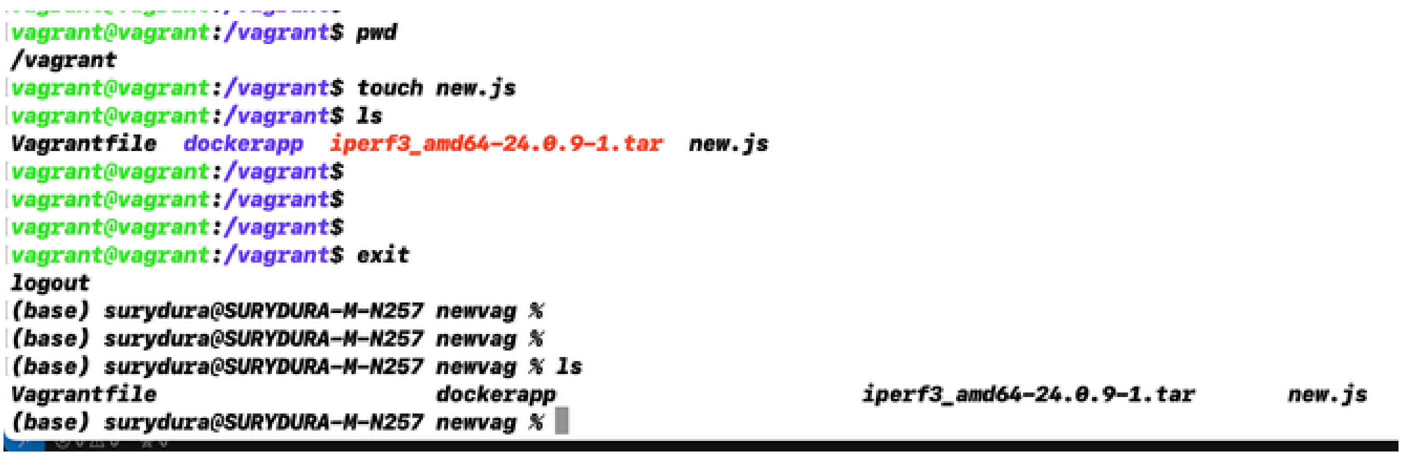
```
(base) surydura@SURYDURA-M-N257 newvag % ls
Vagrantfile                        iperf3_amd64-24.0.9-1.tar
(base) surydura@SURYDURA-M-N257 newvag %
```

建立自訂IOx應用程式的程式

本節介紹如何使用vagrant環境構建自定義IOx應用程式。

註：VM中的目錄「/vagrant」與主機系統中包含「Vagrantfile」的目錄同步。

如圖所示，new.js檔案在VM內建立，也可以在主機系統上訪問：



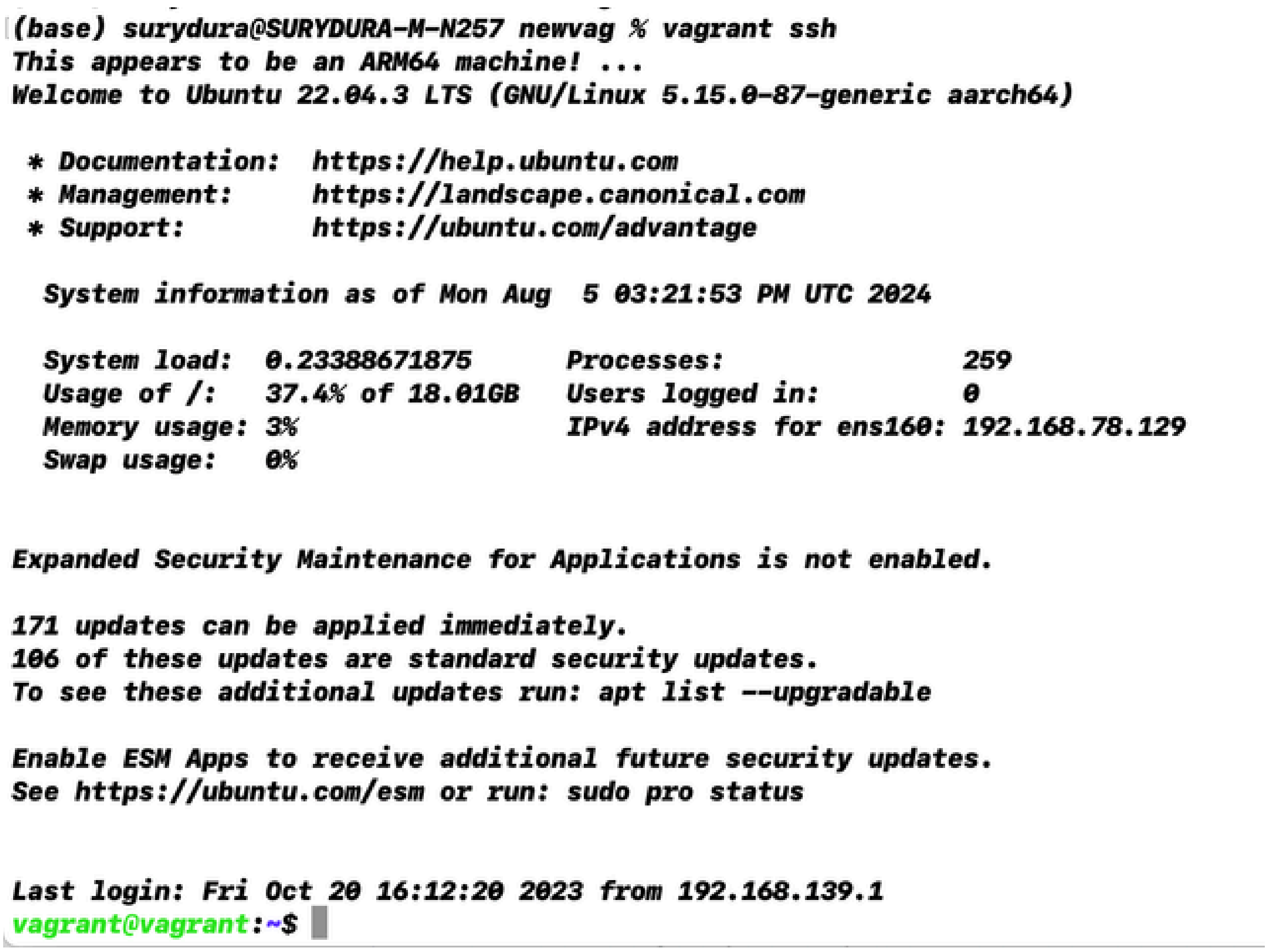
```
vagrant@vagrant:/vagrant$ pwd
/vagrant
vagrant@vagrant:/vagrant$ touch new.js
vagrant@vagrant:/vagrant$ ls
Vagrantfile  dockerapp  iperf3_amd64-24.0.9-1.tar  new.js
vagrant@vagrant:/vagrant$
vagrant@vagrant:/vagrant$
vagrant@vagrant:/vagrant$
vagrant@vagrant:/vagrant$ exit
logout
(base) surydura@SURYDURA-M-N257 newvag %
(base) surydura@SURYDURA-M-N257 newvag %
(base) surydura@SURYDURA-M-N257 newvag % ls
Vagrantfile                     dockerapp                    iperf3_amd64-24.0.9-1.tar      new.js
(base) surydura@SURYDURA-M-N257 newvag %
```

步驟 1.將範例應用程式複製到「Vagrantfile」所在的相同資料夾。本示例中使用的是iox-multiarch-nginx-nyancat-sample應用程式：

```
git clone https://github.com/etychon/iox-multiarch-nginx-nyancat-sample.git
```

步驟 2.SSH進入流浪者機器：

```
vagrant ssh
```

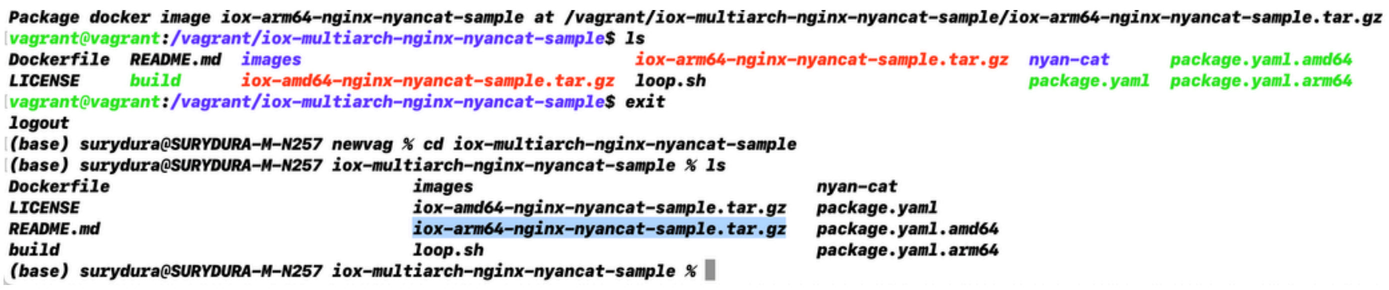


```
(base) surydura@SURYDURA-M-N257 newvag % vagrant ssh
This appears to be an ARM64 machine! ...
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-87-generic aarch64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Mon Aug  5 03:21:53 PM UTC 2024

  System load:  0.23388671875      Processes:               259
  Usage of /:   37.4% of 18.01GB   Users logged in:         0
  Memory usage: 3%                 IPv4 address for ens160: 192.168.78.129
  Swap usage:   0%


Expanded Security Maintenance for Applications is not enabled.

171 updates can be applied immediately.
106 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


Last login: Fri Oct 20 16:12:20 2023 from 192.168.139.1
vagrant@vagrant:~$
```

步驟 3.建置應用程式：

```
cd /vagrant/iox-multiarch-nginx-nyancat-sample/
chmod +x build
sh ./build
```

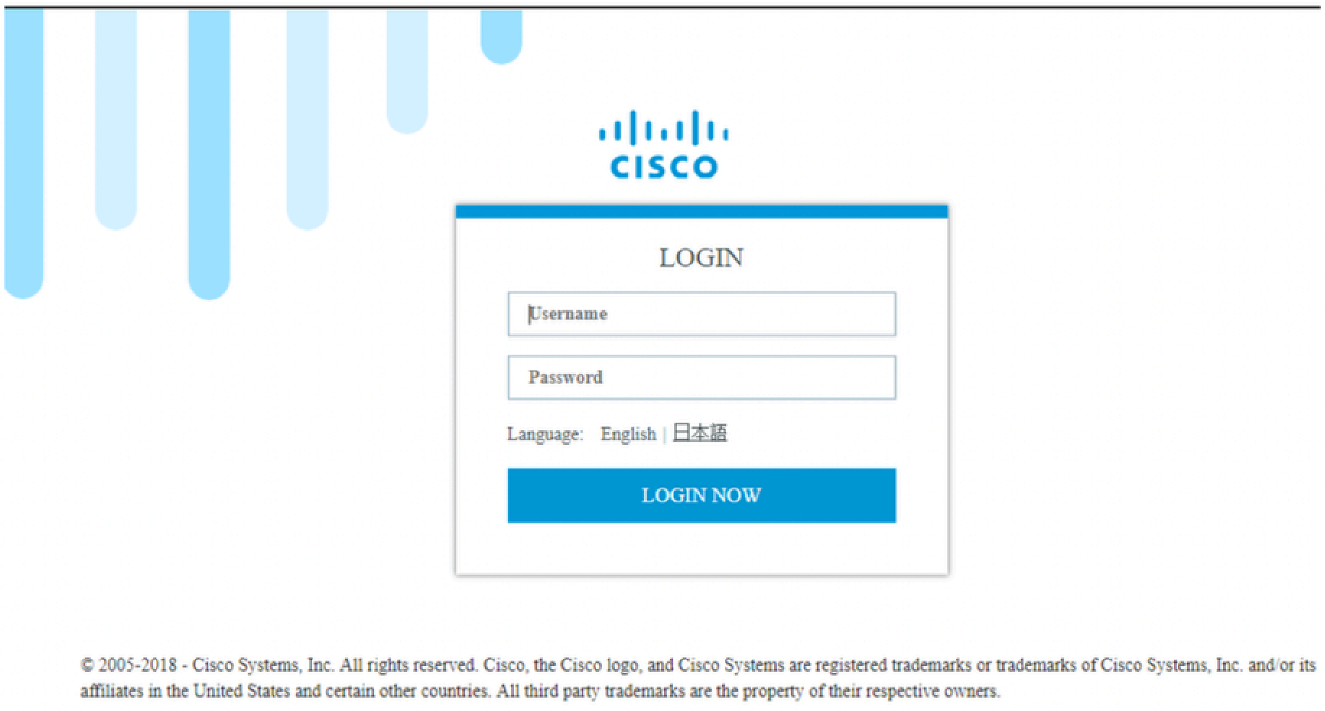
建置程式完成後，您現在擁有兩個可供部署的IOx應用程式(amd64為「iox-amd64-nginx-nyancat-sample.tar.gz」，目標平台為「iox-arm64-nginx-nyancat-sample.tar.gz」)：



```
Package docker image iox-arm64-nginx-nyancat-sample at /vagrant/iox-multiarch-nginx-nyancat-sample/iox-arm64-nginx-nyancat-sample.tar.gz
vagrant@vagrant:/vagrant/iox-multiarch-nginx-nyancat-sample$ ls
Dockerfile  README.md  images                                   iox-arm64-nginx-nyancat-sample.tar.gz  nyan-cat      package.yaml.amd64
LICENSE     build      iox-amd64-nginx-nyancat-sample.tar.gz    loop.sh                                package.yaml  package.yaml.arm64
vagrant@vagrant:/vagrant/iox-multiarch-nginx-nyancat-sample$ exit
logout
(base) surydura@SURYDURA-M-N257 newvag % cd iox-multiarch-nginx-nyancat-sample
(base) surydura@SURYDURA-M-N257 iox-multiarch-nginx-nyancat-sample % ls
Dockerfile                              images                                  nyan-cat
LICENSE                                 iox-amd64-nginx-nyancat-sample.tar.gz   package.yaml
README.md                               iox-arm64-nginx-nyancat-sample.tar.gz   package.yaml.amd64
build                                   loop.sh                                 package.yaml.arm64
(base) surydura@SURYDURA-M-N257 iox-multiarch-nginx-nyancat-sample %
```

部署IOx應用程式

步驟 1.使用Web介面訪問IR1101：



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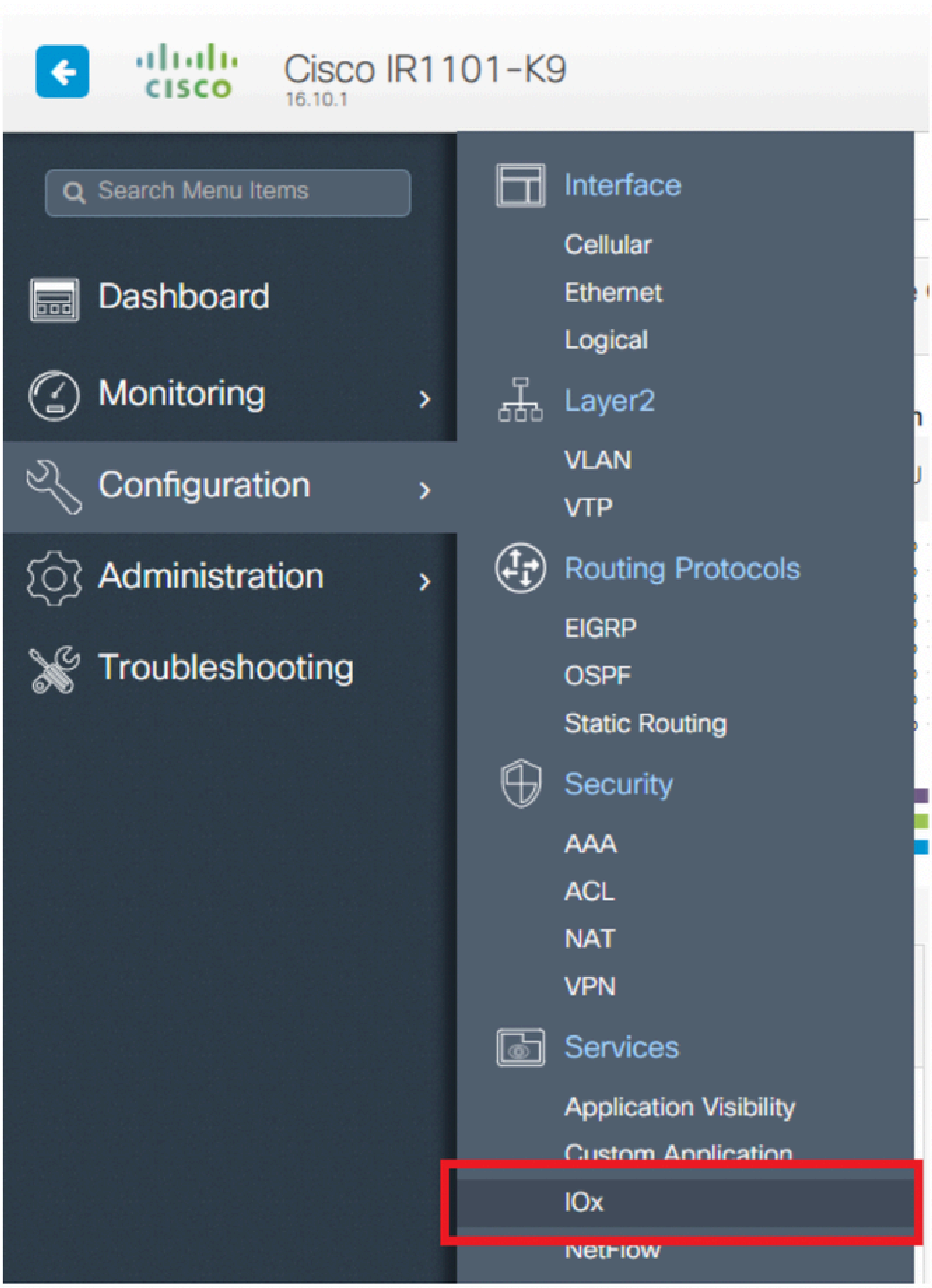
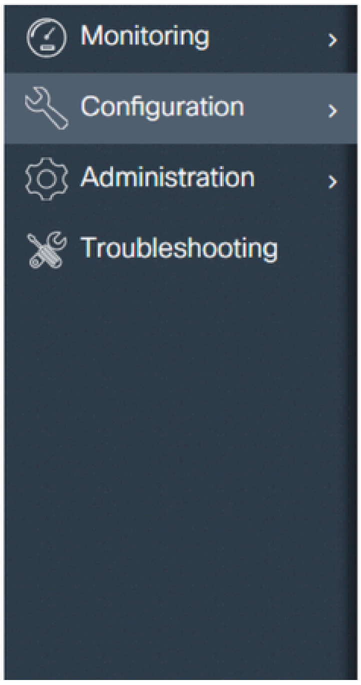
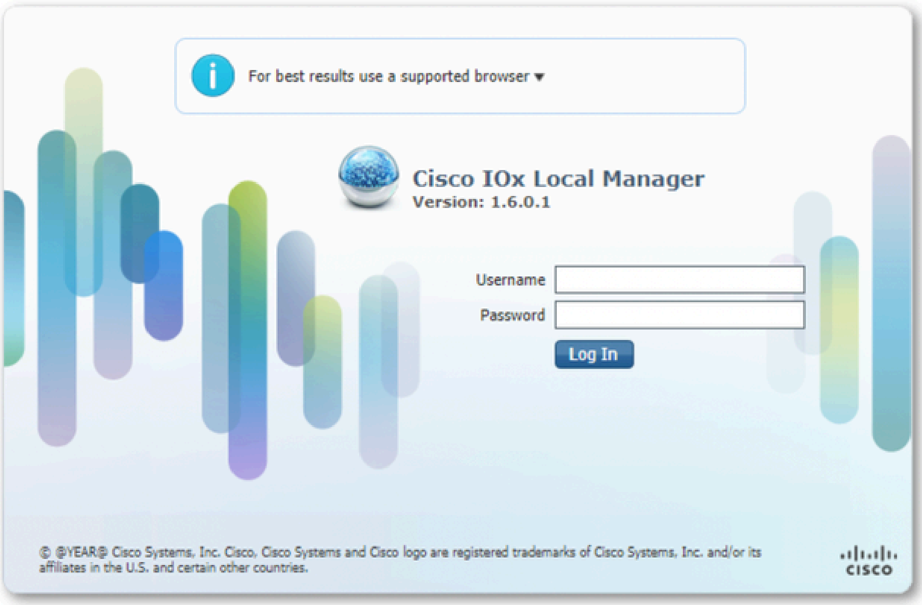
步驟 2.使用許可權15帳戶：



步驟 3.在IOx Local Manager登入中，使用相同的帳戶繼續，如圖所示：




For best results use a supported browser
Cisco IOx Local Manager
Version: 1.6.0.1
Username
Password
Log In
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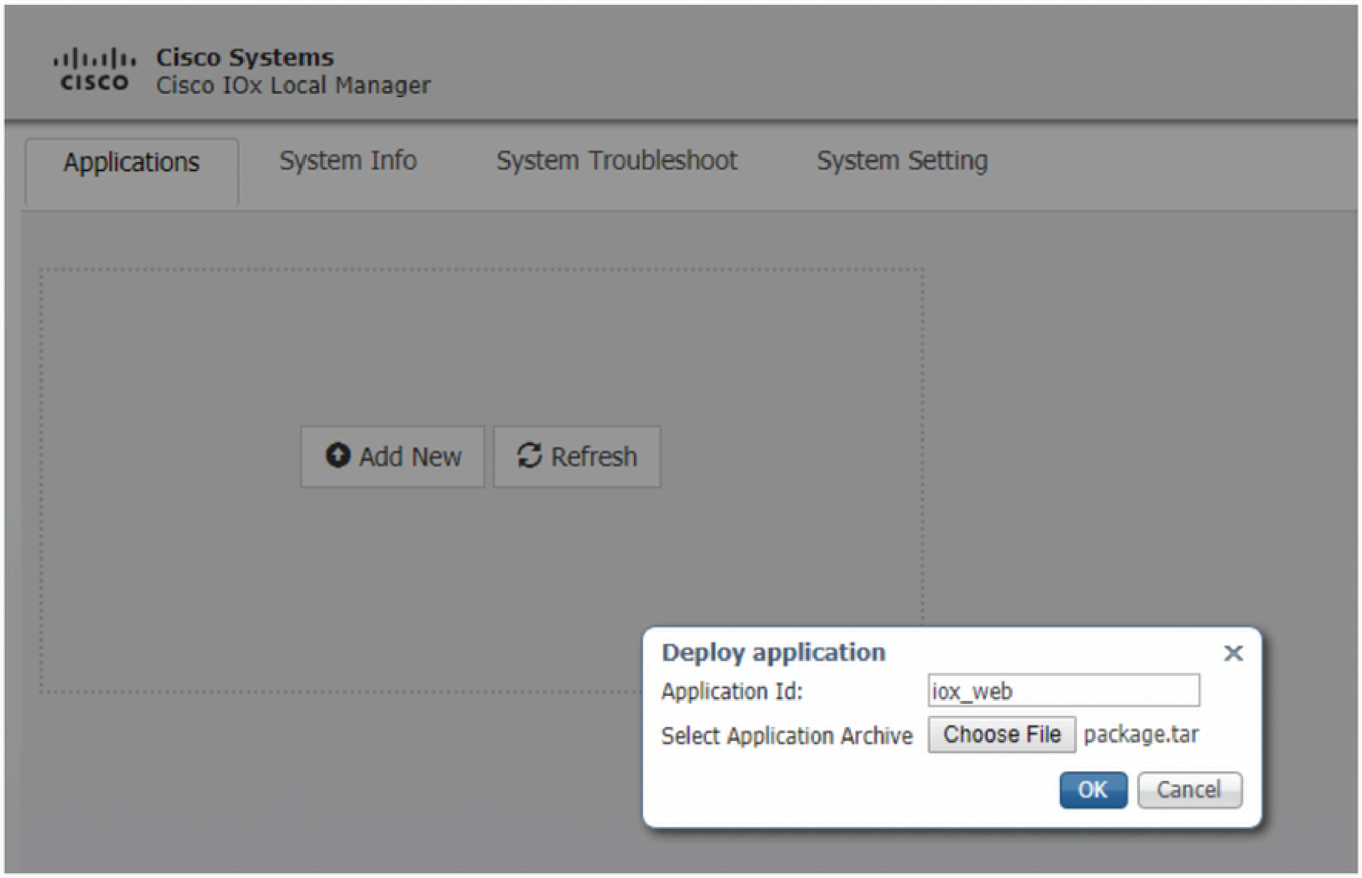
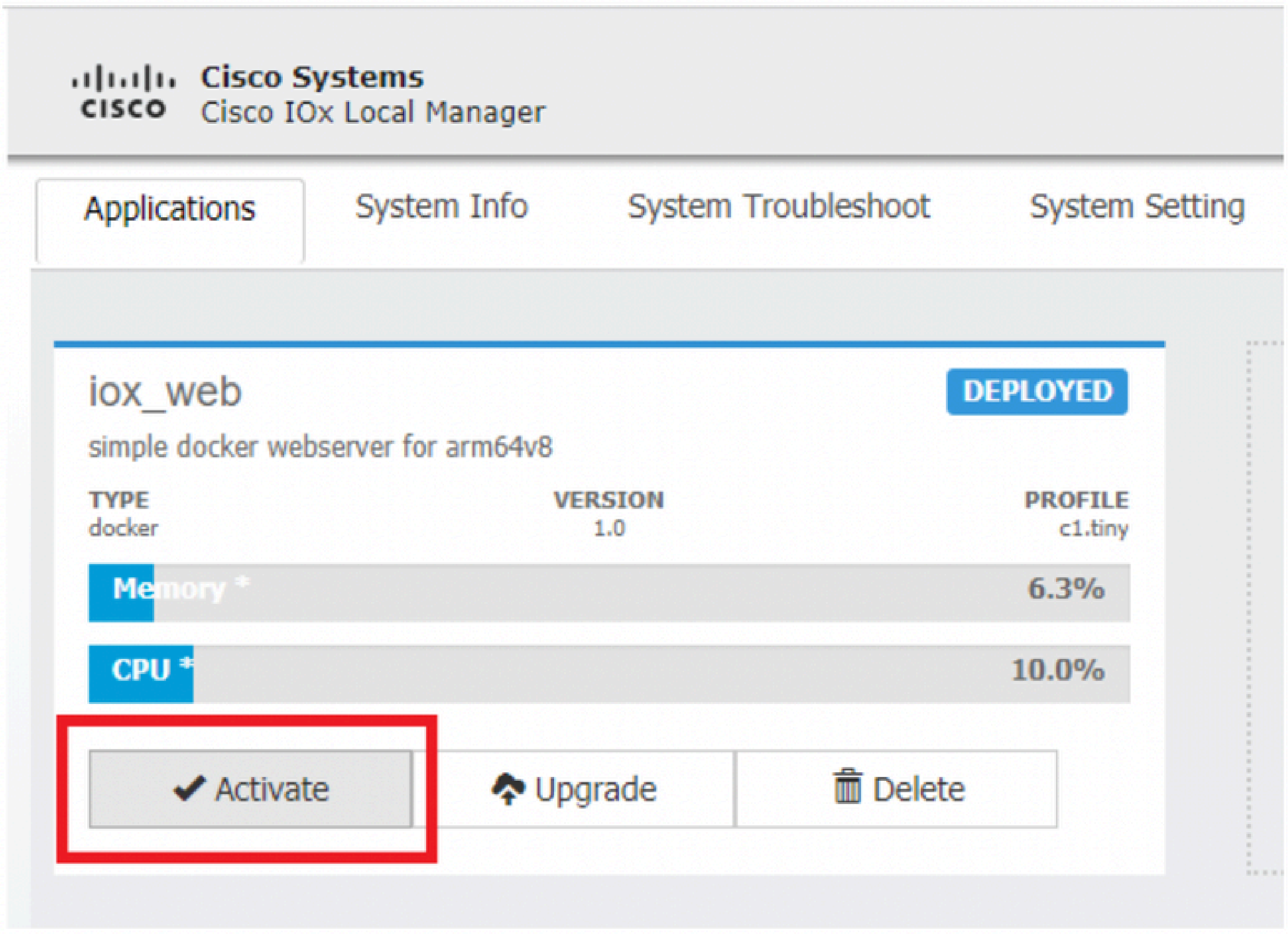
步驟 4.按一下Add New，選擇IOx應用程式的名稱，並選擇Procedure to Set Up Environment Using Vagrant部分的第3步中構建的package.tar，如下圖所示：

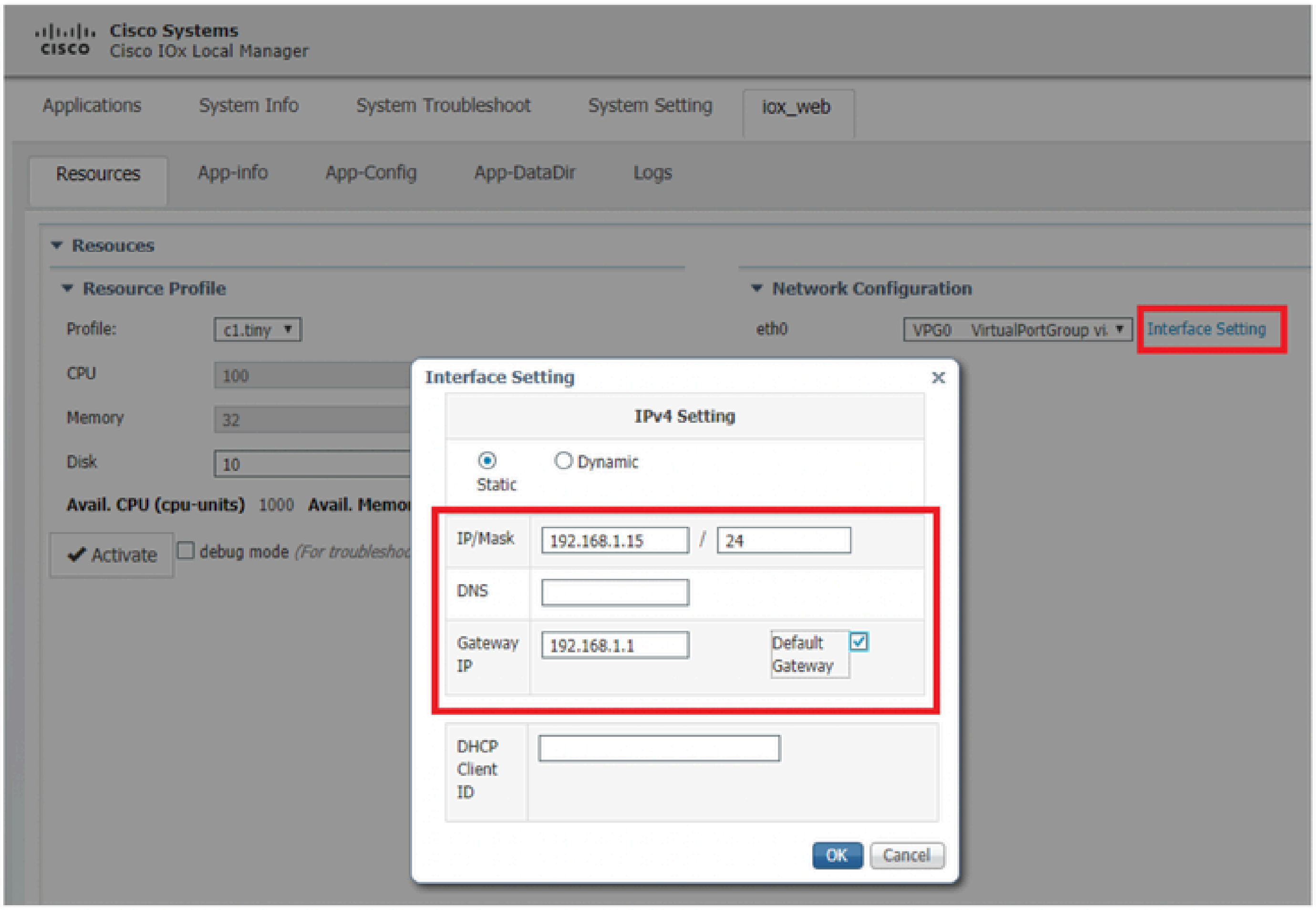


Application Id: iox_web
Select Application Archive package.tar

步驟 5.上傳封裝後，將其啟用，如下圖所示：



步驟 6.在Resources頁籤中，打開介面設定以指定要分配給應用程式的固定IP，如下圖所示：



Profile: c1.tiny
CPU 100
Memory 32
Disk 10
Avail. CPU (cpu-units) 1000 Avail. Memo
☐ debug mode *(For troublesho*
eth0 VPG0 VirtualPortGroup vi

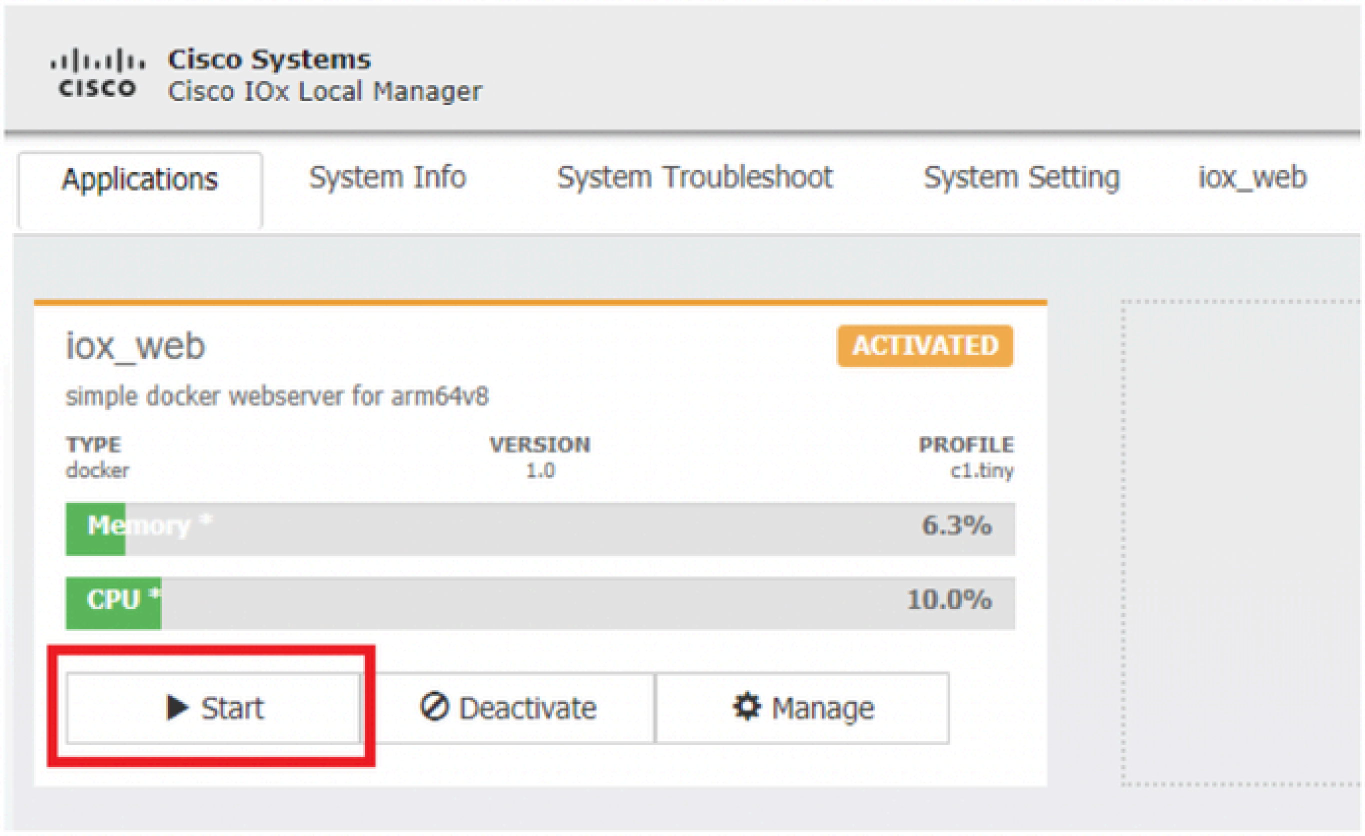
Interface Setting

IPv4 Setting

[✓ Static] Dynamic

IP/Mask	192.168.1.15 / 24	
DNS		
Gateway IP	192.168.1.1	Default Gateway ✓
DHCP Client ID		

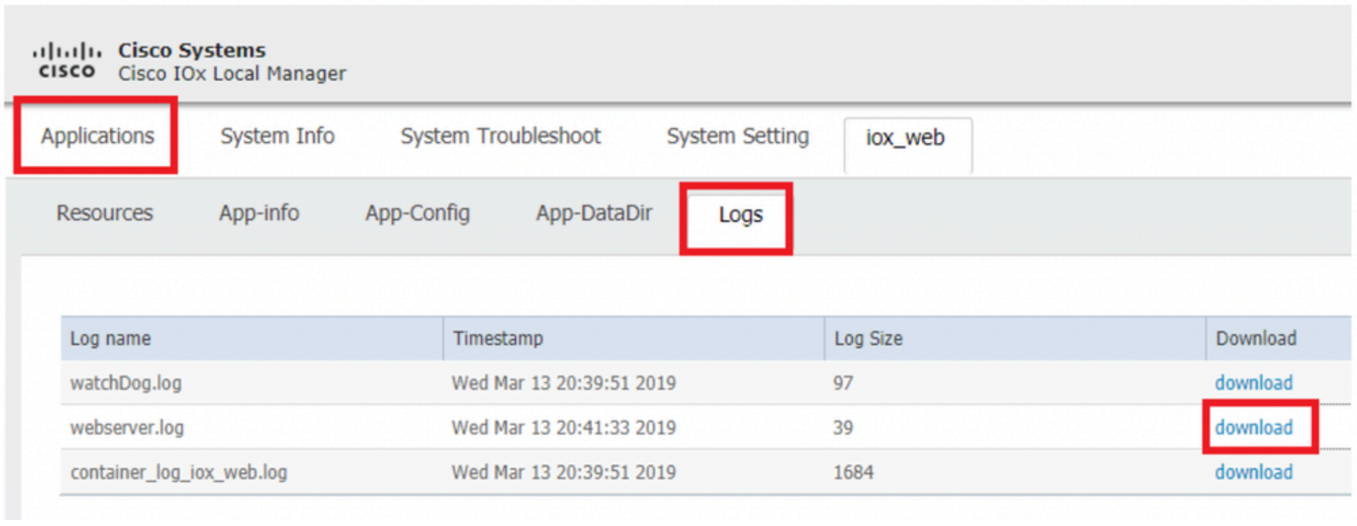
步驟 7.按一下OK，然後Activate。動作完成之後，導覽回主Local Manager頁面(頂端功能表上的Applications按鈕)，然後啟動應用程式，如下圖所示：



完成這些步驟後，您的應用程式即可開始執行。

疑難排解

為了對配置進行故障排除，請使用本地管理器檢查您在Python指令碼中建立的日誌檔案。導航到應用程式，按一下iox_web應用程式上的管理，然後選擇日誌頁籤，如圖所示：



Log name	Timestamp	Log Size	Download
watchDog.log	Wed Mar 13 20:39:51 2019	97	download
webserver.log	Wed Mar 13 20:41:33 2019	39	download
container_log_iox_web.log	Wed Mar 13 20:39:51 2019	1684	download