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The bridge to possible

How to leverage Cisco IOx to host your application?

Microservices at the Networks Edge

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DEVWKS-2934



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Agenda

- Introduction
- What is IOx?
- What is a DevNet Sandbox?
- Let's prepare and install an application!
- Conclusion and Next Steps

Introduction

About our workshop

We will:

- Familiarize with Cisco IOx
- Get to know Cisco DevNet Sandboxes
- Prepare, install and operate your application to IOx

We will not:

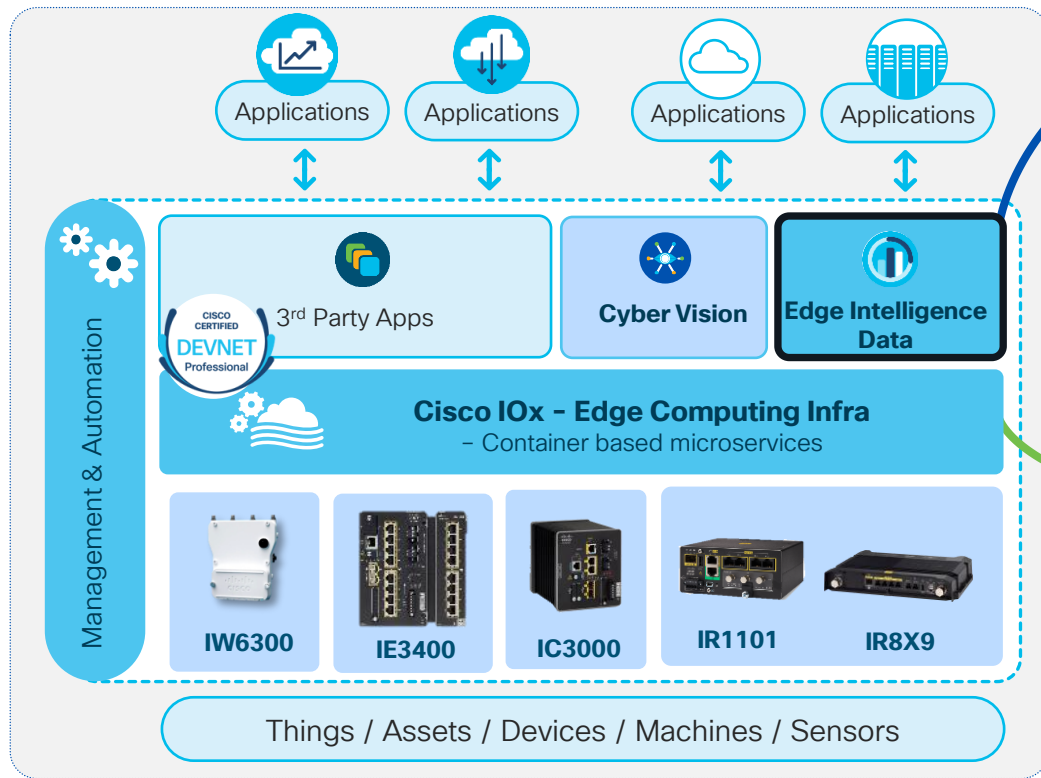
- Use an automated control-plane or build-pipeline
- Optimize the application or the application image

Please...

- If you have questions, don't hesitate to ask!
- If you don't want to ask during the workshop, I will be around!
- If you want to exchange later: daeckste@cisco.com
- Do not follow the guide blindly!

What is IOx?

Cisco IOx



{Buy}

Get Started Fast



Using Cisco Edge Intelligence for edge data processing is the fastest and easiest way to process and send data from the edge

{Or Build}

Your Own App



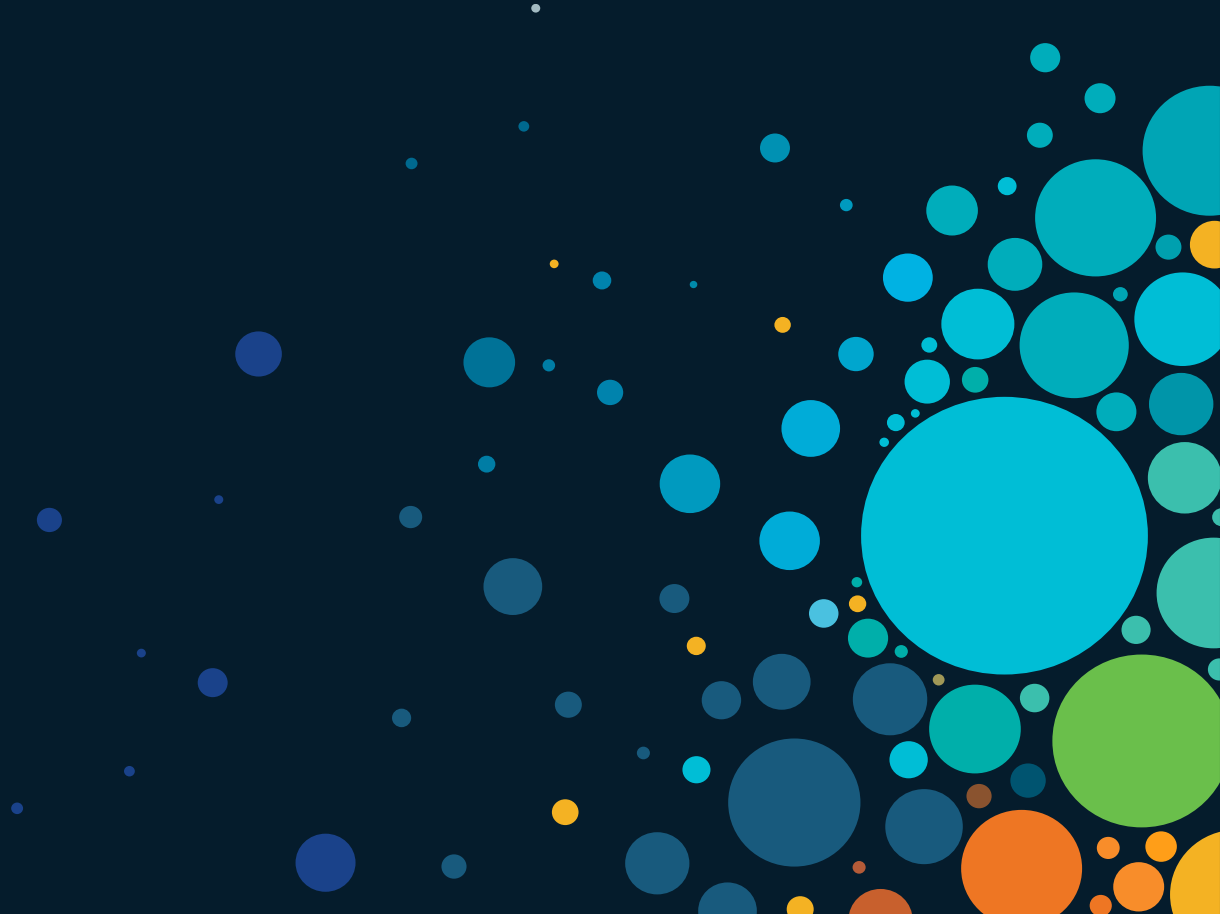
Using Cisco IOx compute infrastructure and development environment you can build your own Docker app that runs at the edge. You manage the lifecycle of your application and monitor its operation.

Cisco IOx - Summary

- Cisco IOx
 - is short for “Cisco IOS + Linux”
 - allows you to host custom applications
 - grants your application a share of the device-resources
 - provides access to subsystems and subtended devices
 - is being supported on many devices from the Cisco portfolio
- Applications
 - can be created in VM-style or Docker-style
 - can be managed via CLI, IoT OD or Local-Manager

See: <https://www.cisco.com/c/en/us/products/cloud-systems-management/iox/index.html>

What is a DevNet Sandbox?



Cisco DevNet

- DevNet supports Developers with various resources



- DevNet covers all areas of Cisco Business



Cisco DevNet – Sandbox

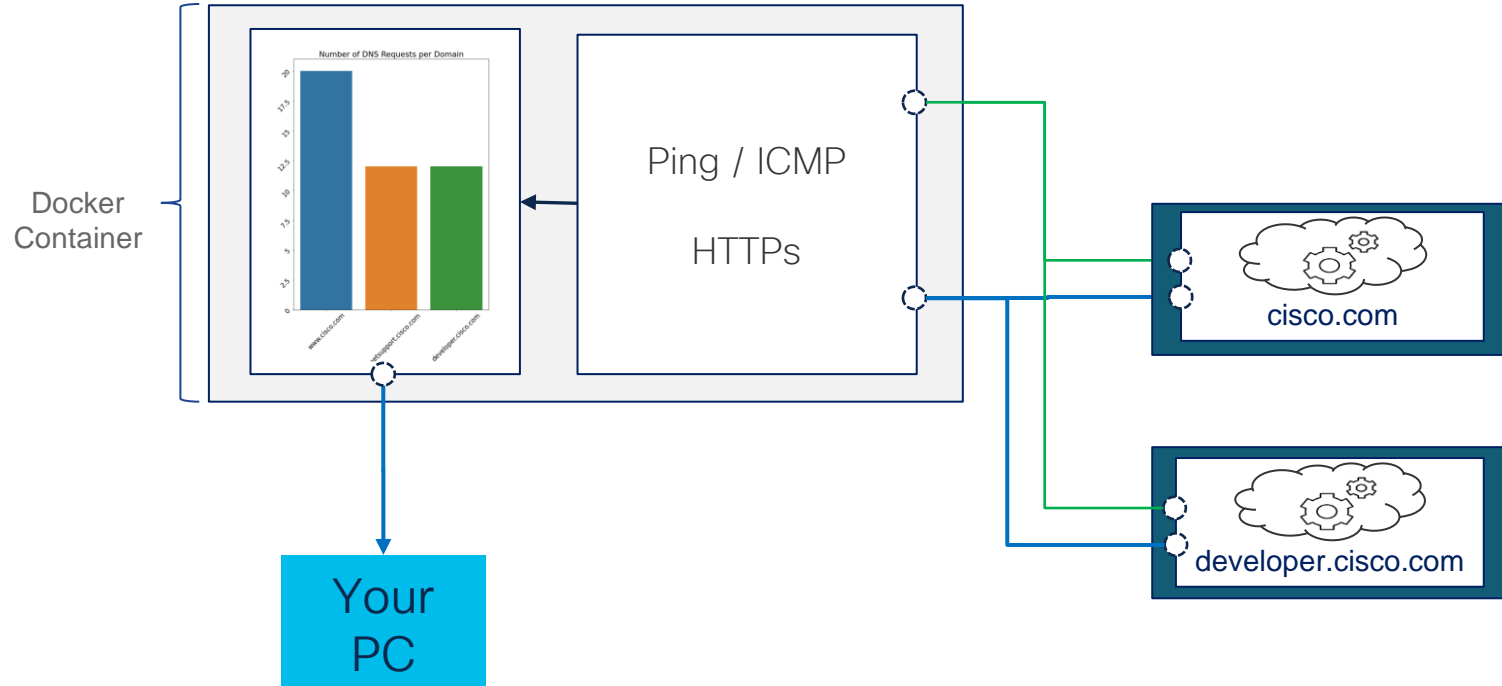
The screenshot displays the Cisco DevNet Sandbox Labs interface. The top navigation bar includes the Cisco DevNet logo, 'SANDBOX LABS', 'RESERVATIONS', and user information 'DAECKSTE' and 'DEVNET'. A search bar is located on the left. The main content area is titled 'IoT (14)' and shows a grid of 10 sandbox labs, each with a green card, a version number, a title, a description, and a 'RESERVE' button. The labs are arranged in two rows of five. The right sidebar shows a folder icon for 'IoT' and a list of 'ALL CATEGORIES' including Networking, Collaboration, IoT, Data Center, Cloud, Security, and Open Source. A status indicator at the bottom right shows '1 Currently reserved by me'.

| Lab Name | Version | Description | Action |
|---|--------------|---|---------|
| Cisco Partner Solution: Aleantia | Version 1.0 | Plug&Play gateway for codeless IoT integration with Cisco IOT and GMM | RESERVE |
| Cisco Control Center | | Cisco Control Center - Multi-Operator SaaS Framework | RESERVE |
| Cyber Vision | Version 3.0 | Get insights from the Industrial IoT | RESERVE |
| Edge Intelligence | Version 1.0 | IoT Operations Dashboard | RESERVE |
| Cisco Partner Solution: Eximprod | Version 1.0 | IoT Energy Utility Solution with Eximprod | RESERVE |
| Field Network Director | Version 1.0 | Manage a multi-service network and security infrastructure for IoT applications | RESERVE |
| IE3400 - Industrial Networking & Edge Compute | | IE3400 - Industrial Networking and Edge Compute | RESERVE |
| IOx CI/CD Pipeline | Version 1.11 | Continuous Integration and Delivery Pipeline for Cisco IOx | RESERVE |
| IOx CI/CD Pipeline | Version 1.7 | Continuous Integration and Delivery Pipeline for Cisco IOx | RESERVE |
| IOx Latest | Version 1.11 | Cisco's IoT Edge Compute Platform | RESERVE |

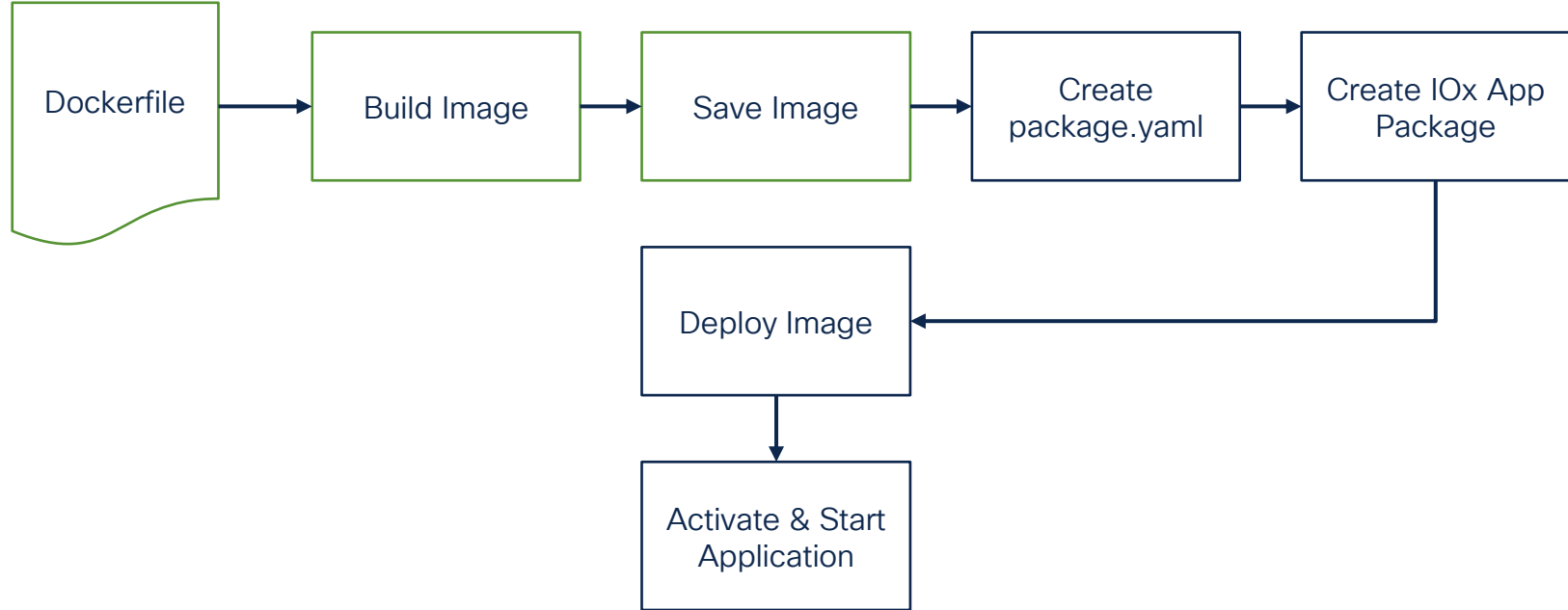
See: <https://devnetsandbox.cisco.com>

Let's prepare
and install your
application!

About your application for today



Workflow to create your Docker application



package.yaml: <https://developer.cisco.com/docs/iox/#!/package-descriptor>

Your application internals

```
1 FROM alpine:latest AS build
2
3 RUN apk update && \
4     apk add make g++ jpeg-dev blas-dev blas openblas openblas-dev python3 py3-pip libxml2-dev libxslt-dev gcc libxml2 python3-dev linux-headers musl-dev && \
5     apk add py3-matplotlib py3-wheel py3-numpy py3-scipy py3-pandas && \
6     pip3 install pyshark seaborn && \
7     mkdir -p /data/appdata
8
9 FROM alpine:latest
10
11 RUN apk update && \
12     apk add python3 wireshark-common tshark
13
14 COPY --from=build /usr/lib/python3.8/site-packages/ /usr/lib/python3.8/site-packages/
15 COPY --from=build /usr/lib/libxml2.so.2 /usr/lib/
16 COPY --from=build /usr/lib/libxslt.so.1 /usr/lib/
17 COPY --from=build /usr/lib/libxslt.so.0 /usr/lib/
18 COPY --from=build /usr/lib/libcrypt.so.20 /usr/lib/
19 COPY --from=build /usr/lib/libgpg-error.so.0 /usr/lib/
20 COPY --from=build /usr/lib/libopenblas.so.3 /usr/lib/
21 COPY --from=build /usr/lib/libgfortran.so.5 /usr/lib/
22 COPY --from=build /usr/lib/libgcc_s.so.1 /usr/lib/
23 COPY --from=build /usr/lib/libfreetype.so.6 /usr/lib/
24 COPY --from=build /usr/lib/libstdc++.so.6 /usr/lib/
25 COPY --from=build /usr/lib/libpng16.so.16 /usr/lib/
26 COPY --from=build /usr/lib/libbrotlidec.so.1 /usr/lib/
27 COPY --from=build /usr/lib/libbrotlicommon.so.1 /usr/lib/
28 COPY --from=build /usr/lib/libjpeg.so.8 /usr/lib/
29 COPY --from=build /usr/lib/libopenjp2.so.7 /usr/lib/
30 COPY --from=build /usr/lib/libimagequant.so.0 /usr/lib/
31 COPY --from=build /usr/lib/libtiff.so.5 /usr/lib/
32 COPY --from=build /usr/lib/libxcb.so.1 /usr/lib/
33 COPY --from=build /usr/lib/libXau.so.6 /usr/lib/
34 COPY --from=build /usr/lib/libXdmcp.so.6 /usr/lib/
35 COPY --from=build /usr/lib/libbsd.so.0 /usr/lib/
36 COPY *.py *.sh *.html /data/appdata/
37 RUN addgroup root wireshark
38
39 EXPOSE 8080
40
41 CMD ["/bin/sh", "/data/appdata/start.sh"]
```

- It is a regular Dockerfile
- Example available via github

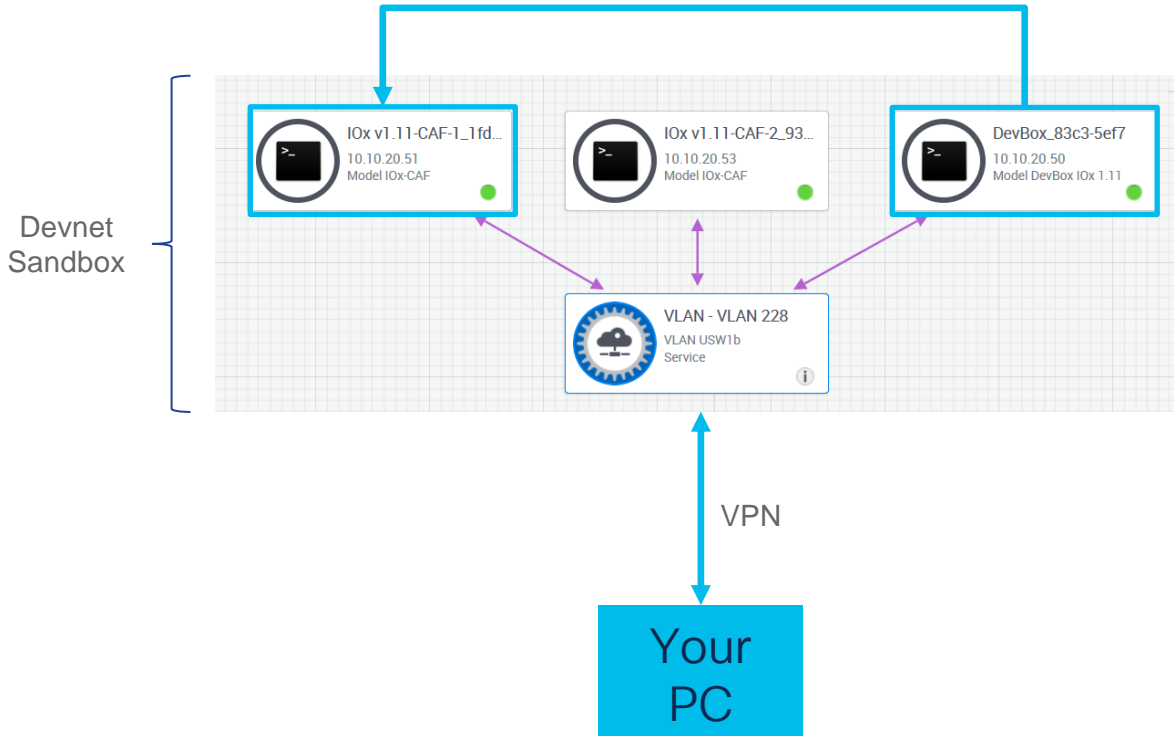
What we heard so far ...

- **Cisco DevNet** provides you resources for education, exploration and testing
- **Cisco IOx** provides you the capability to host your application on Cisco devices
- Applications can be provided as Docker images

Preparing and installing an application!

- The overall Setup
- Access your Sandbox
- Create your docker image
- Save your docker image
- Install your docker image to your IOx
- Access your running application

The overall Setup



1. Get Access
2. Create Docker image
3. Create DevBox
4. Create IOx application
5. Deploy your image
6. Start your application

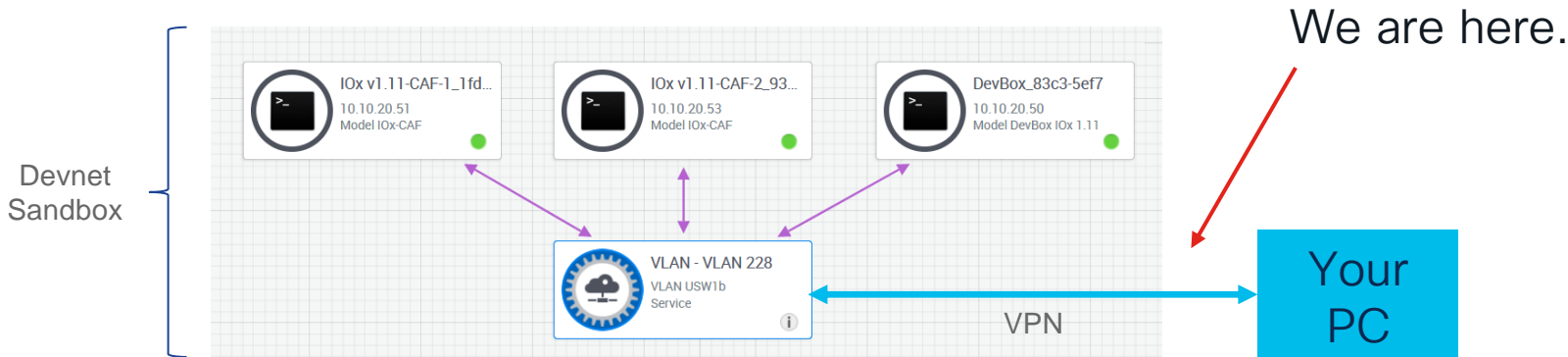
But before we start!



<https://bit.ly/cl2022-iox>



Access your Sandbox



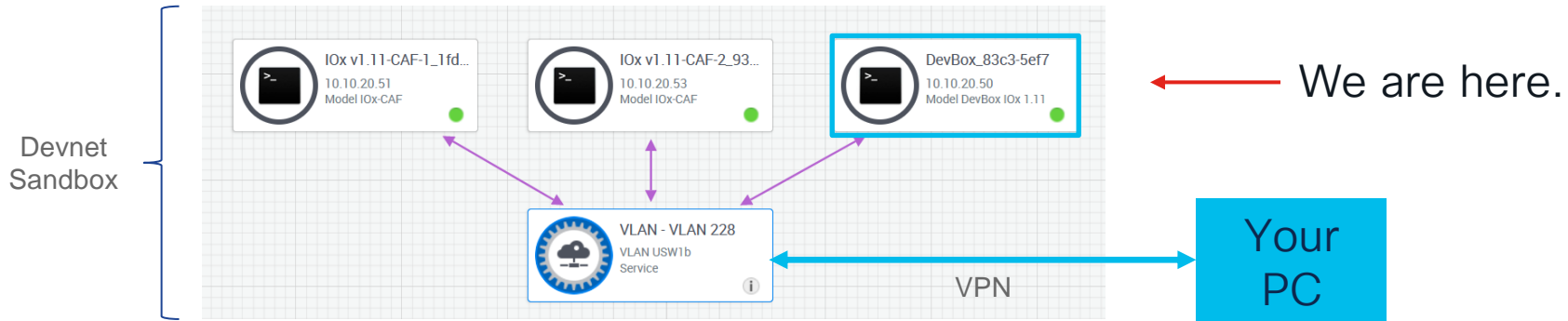
Current Task:

Use Anyconnect to open a VPN connection to your sandbox.
Please use the **VPN credentials** provided [here](#).

Use a terminal to log in: **ssh -l developer 10.10.20.50**

Password: **C1sco12345**

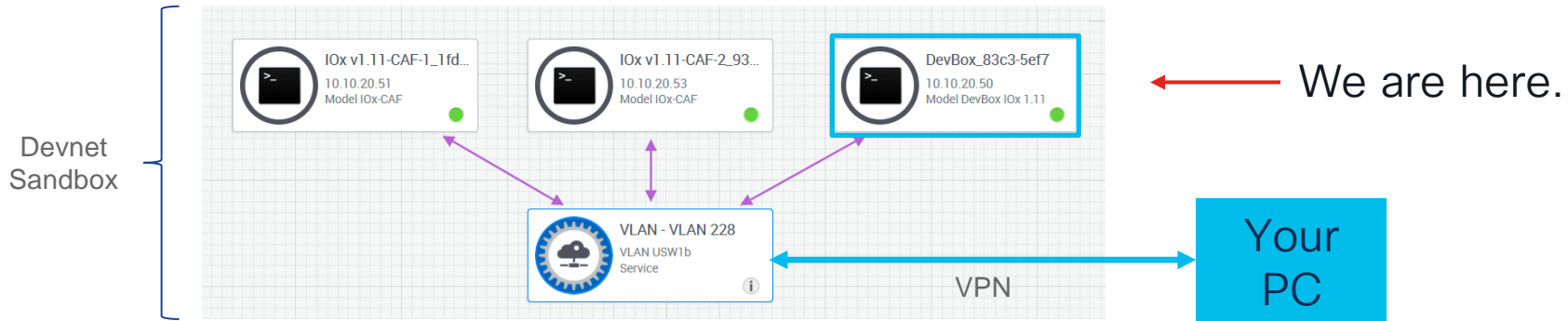
Create your Docker Image



Current Task:

```
git clone https://github.com/deckstein/iox-traffic-application
cd iox-traffic-application
docker build . --tag ioxapp
docker image ls
```

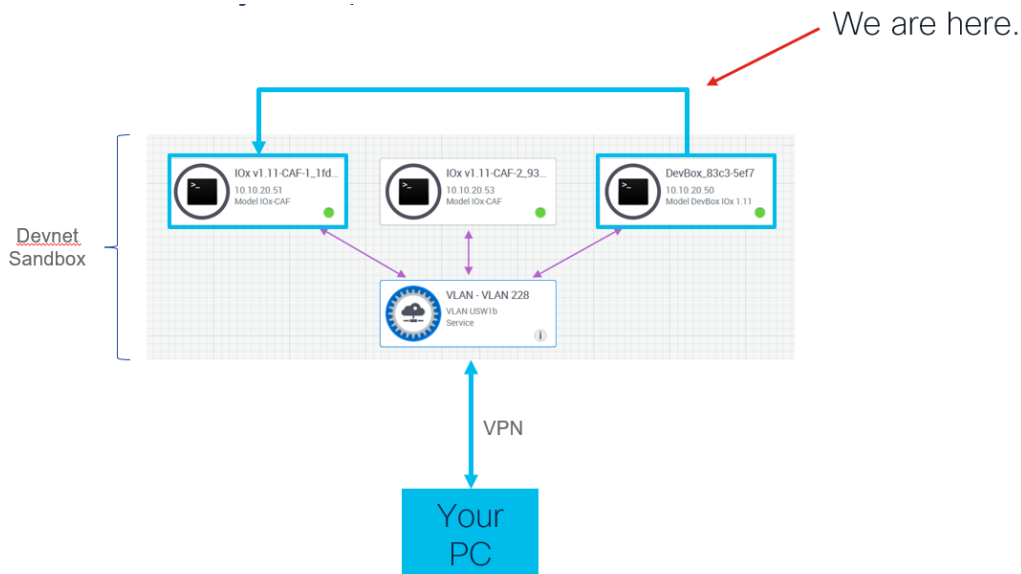
Save your Docker Image



Current Task:

```
docker image save ioxapp -o ioxapp.tar
```

Create your IOx profile



Current Task:

ioxclient

Creating one time configuration.

Your / your organization's name : **CLUS22**

Your / your organization's URL :

Your IOx platform's IP address[127.0.0.1] : **10.10.20.51**

Your IOx platform's port number[8443] :

Authorized user name[root] :

Password for root : **cisco123**

Local repository path on IOx
platform[/software/downloads]:

URL Scheme (http/https) [https]:

API Prefix[/iox/api/v2/hosting/]:

Your IOx platform's SSH Port[2222]:

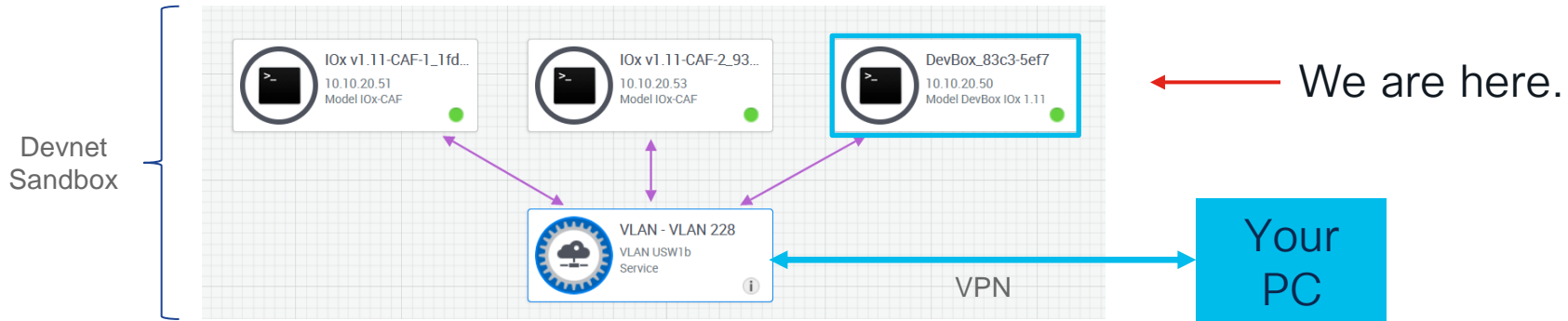
Your RSA key, for signing packages, in PEM format[]:

Your x.509 certificate in PEM format[]:

Activating Profile default

Saving current configuration

Create your IOx application package

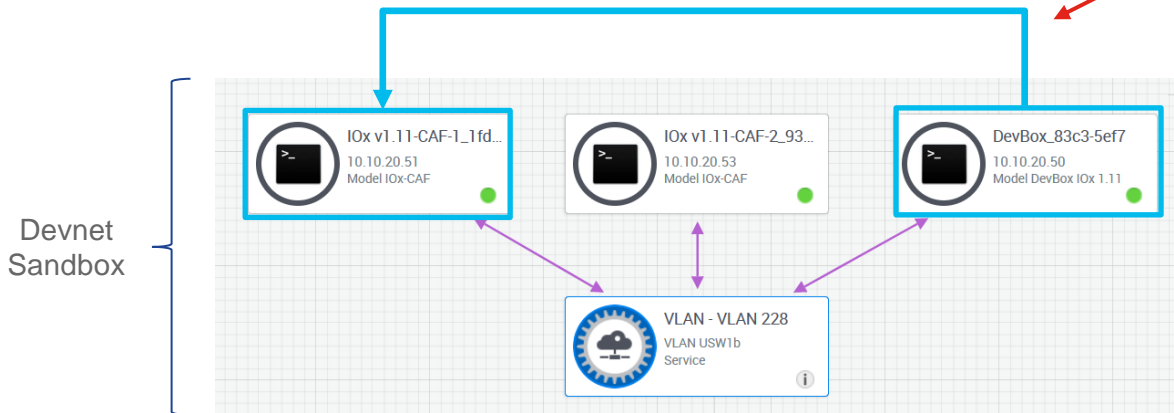


Current Task:

ioxclient docker package ioxapp.tar package/

Deploy your IOx application package

We are here.

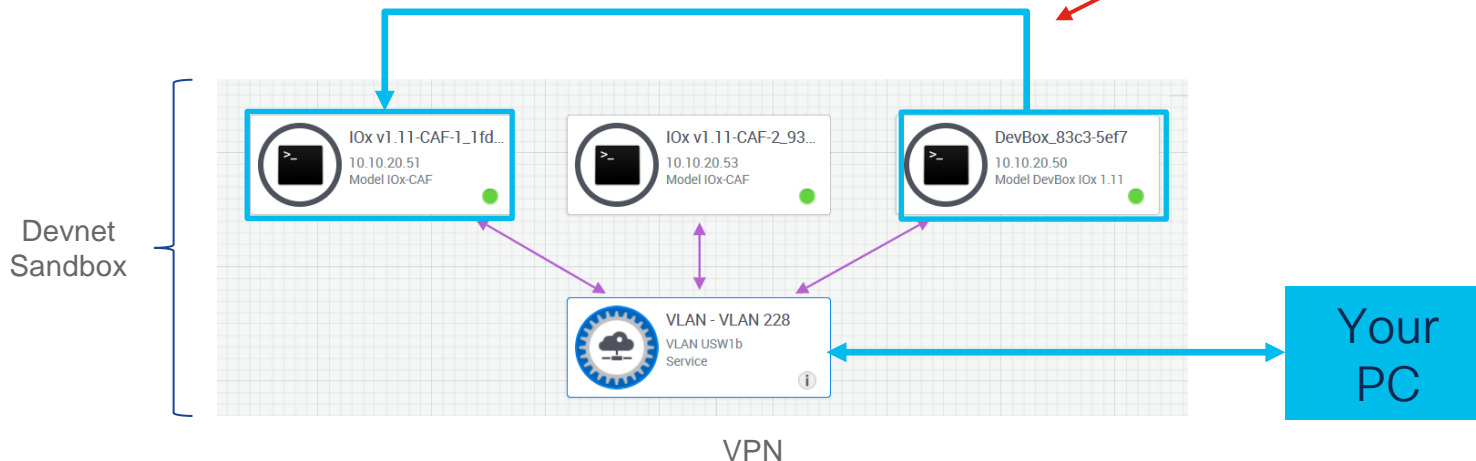


Current Task:

```
ioxclient --profile CLUS22 application install ioxapp package/package.tar
```

Activate your IOx application

We are here.

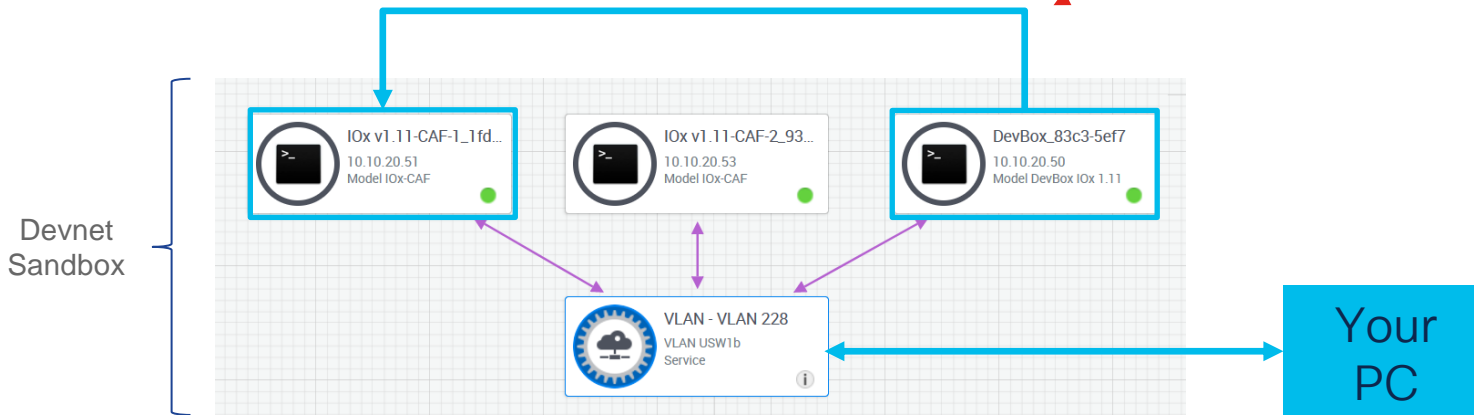


Current Task:

```
ioxclient --profile CLUS22 application activate ioxapp --docker-opts "-p 8080:8080 --dns 10.17.248.11" --payload activation.json
```

Start your application

We are here.

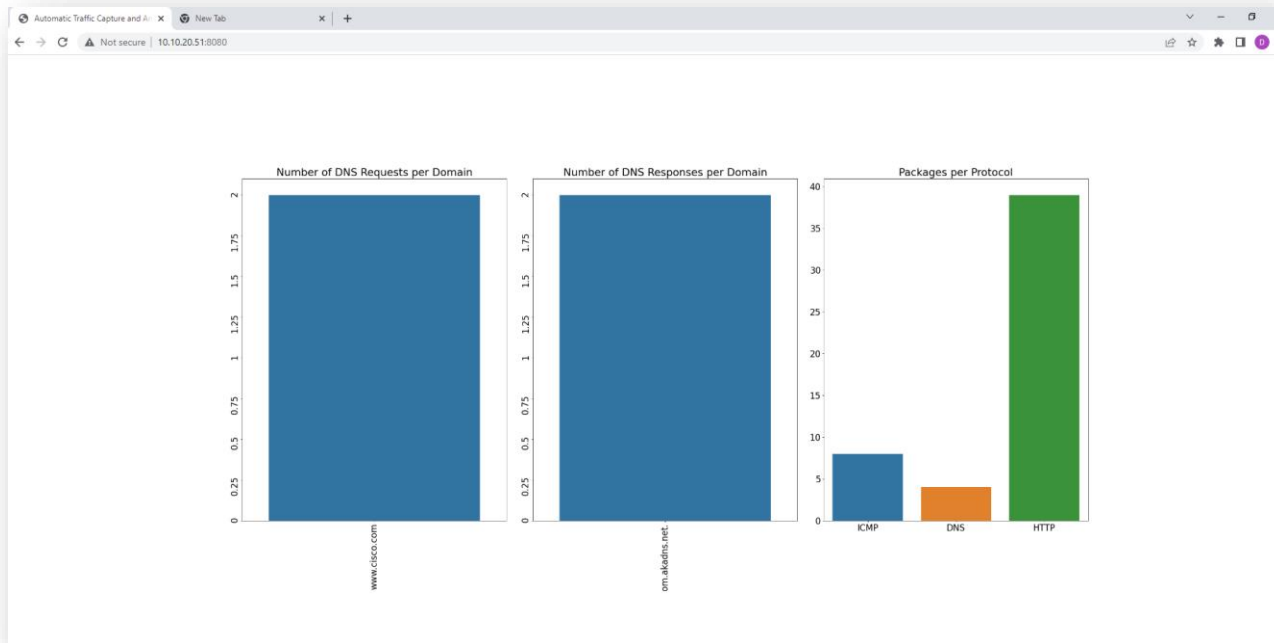


Current Task:

```
ioxclient --profile CLUS22 application start ioxapp
```

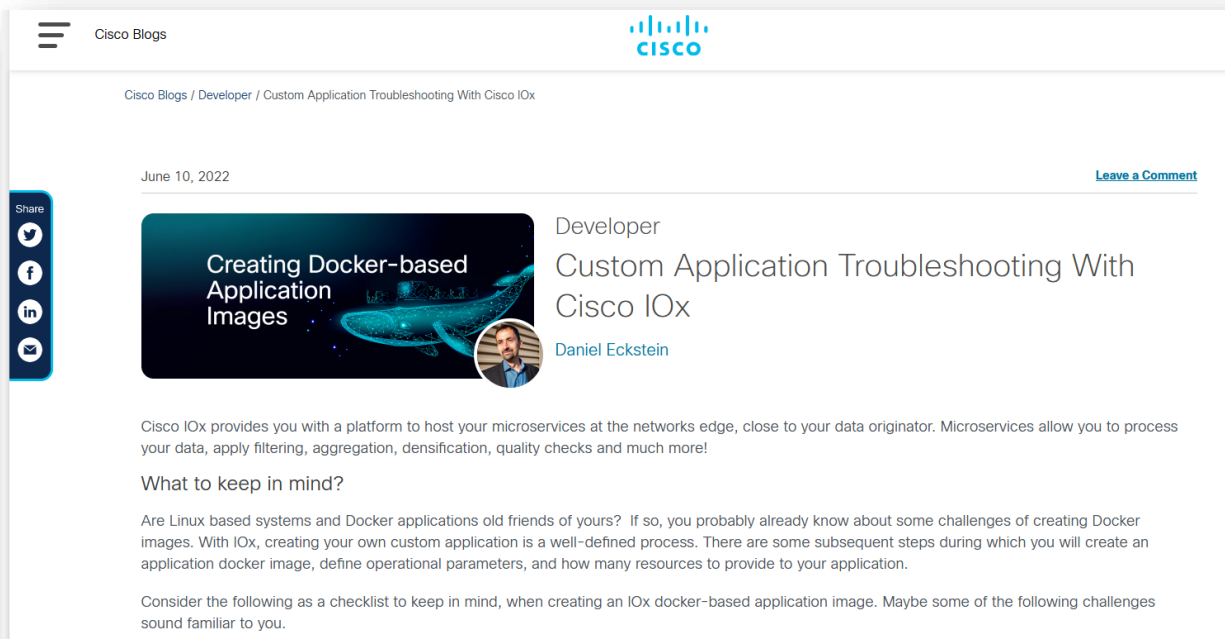
Access your application

Point your browser to: <http://10.10.20.51:8080/>



Troubleshooting

Visit: <https://blogs.cisco.com/developer/ioxapplicationtroubleshooting01>



The screenshot shows a Cisco Blogs article page. At the top, there's a navigation bar with the Cisco logo and 'Cisco Blogs' text. Below the navigation bar, the breadcrumb trail reads 'Cisco Blogs / Developer / Custom Application Troubleshooting With Cisco IOx'. The article is dated 'June 10, 2022' and has a 'Leave a Comment' link. The article title is 'Custom Application Troubleshooting With Cisco IOx' by 'Developer Daniel Eckstein'. The featured image shows a blue background with the text 'Creating Docker-based Application Images' and a glowing blue whale. The article text begins with 'Cisco IOx provides you with a platform to host your microservices at the networks edge, close to your data originator. Microservices allow you to process your data, apply filtering, aggregation, densification, quality checks and much more!' followed by the section 'What to keep in mind?' and a paragraph about Linux based systems and Docker applications.

Cisco Blogs / Developer / Custom Application Troubleshooting With Cisco IOx

June 10, 2022 [Leave a Comment](#)

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Creating Docker-based Application Images

Developer
Custom Application Troubleshooting With
Cisco IOx
Daniel Eckstein

Cisco IOx provides you with a platform to host your microservices at the networks edge, close to your data originator. Microservices allow you to process your data, apply filtering, aggregation, densification, quality checks and much more!

What to keep in mind?

Are Linux based systems and Docker applications old friends of yours? If so, you probably already know about some challenges of creating Docker images. With IOx, creating your own custom application is a well-defined process. There are some subsequent steps during which you will create an application docker image, define operational parameters, and how many resources to provide to your application.

Consider the following as a checklist to keep in mind, when creating an IOx docker-based application image. Maybe some of the following challenges sound familiar to you.

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Authorized training partners supporting Cisco technology and career certifications

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Award-winning certification program empowers students and IT Professionals to advance their technical careers

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Recertification training options for Cisco certified individuals

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Cisco Webex App

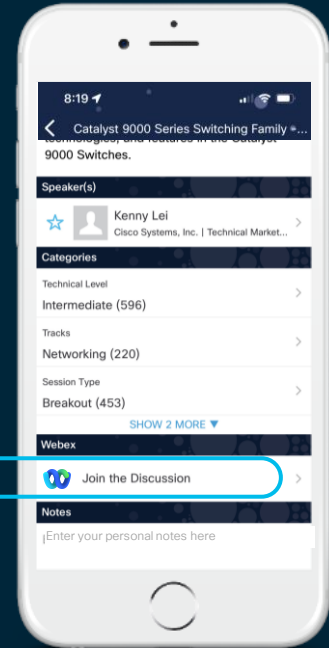
Questions?

Use Cisco Webex App to chat with the speaker after the session

How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install the Webex App or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until June 17, 2022.



<https://ciscolive.ciscoevents.com/ciscolivebot/#DEVWKS-2934>



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Thank you

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