



TURN IT UP

CISCO *Live!*



The bridge to possible



How to leverage Cisco IOx to host your application?

Microservices at the Networks Edge

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DEVWKS-2934



A decorative graphic on the left side of the slide, consisting of several overlapping, teardrop-shaped and circular elements in various colors including blue, green, yellow, red, and dark blue, radiating from a central point.

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

Who is working with linux
How heard about iox/ios?
Who is familiar with docker?

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

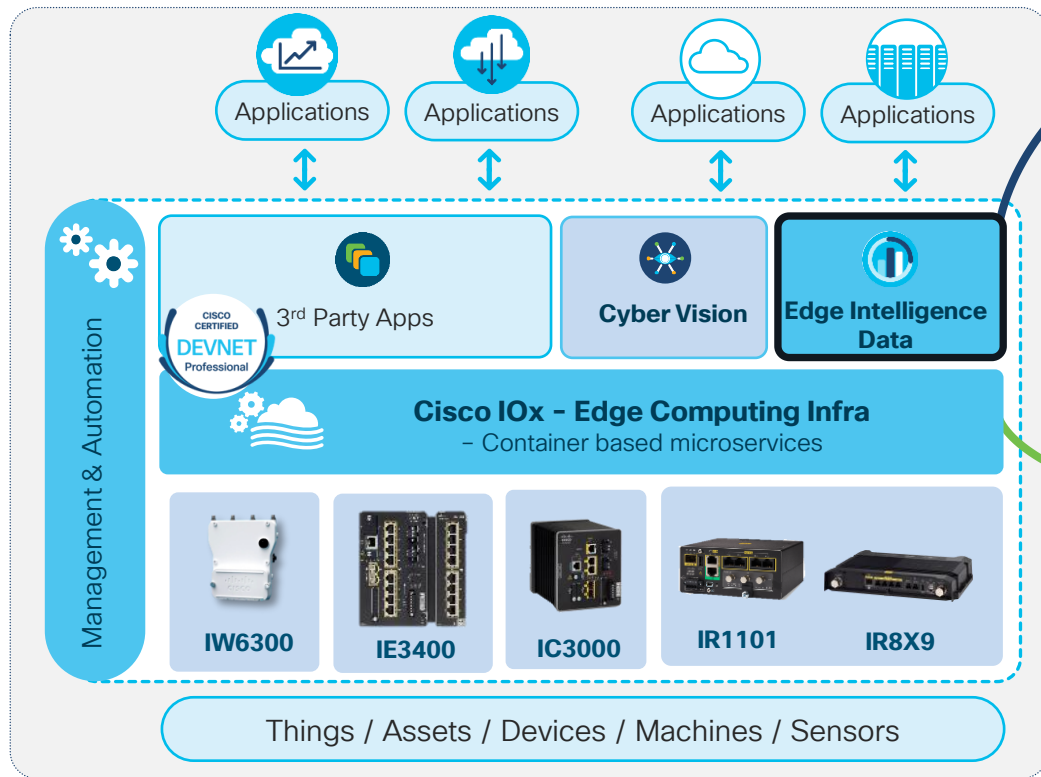
Please...

- 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 category filter for 'IoT' and a list of categories: 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	Reserve Button
Cisco Partner Solution: Alleantia	Version 1.0	Plug&Play gateway for codeless IoT integration with Cisco I/Ox 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 - IoT Operations Dashboard	Version 1.0	Extract Data from Edge to Cloud	RESERVE
Cisco Partner Solution: Eximprod	Version 1.0	IOx 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 CICD 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

<https://devnetsandbox.cisco.com>

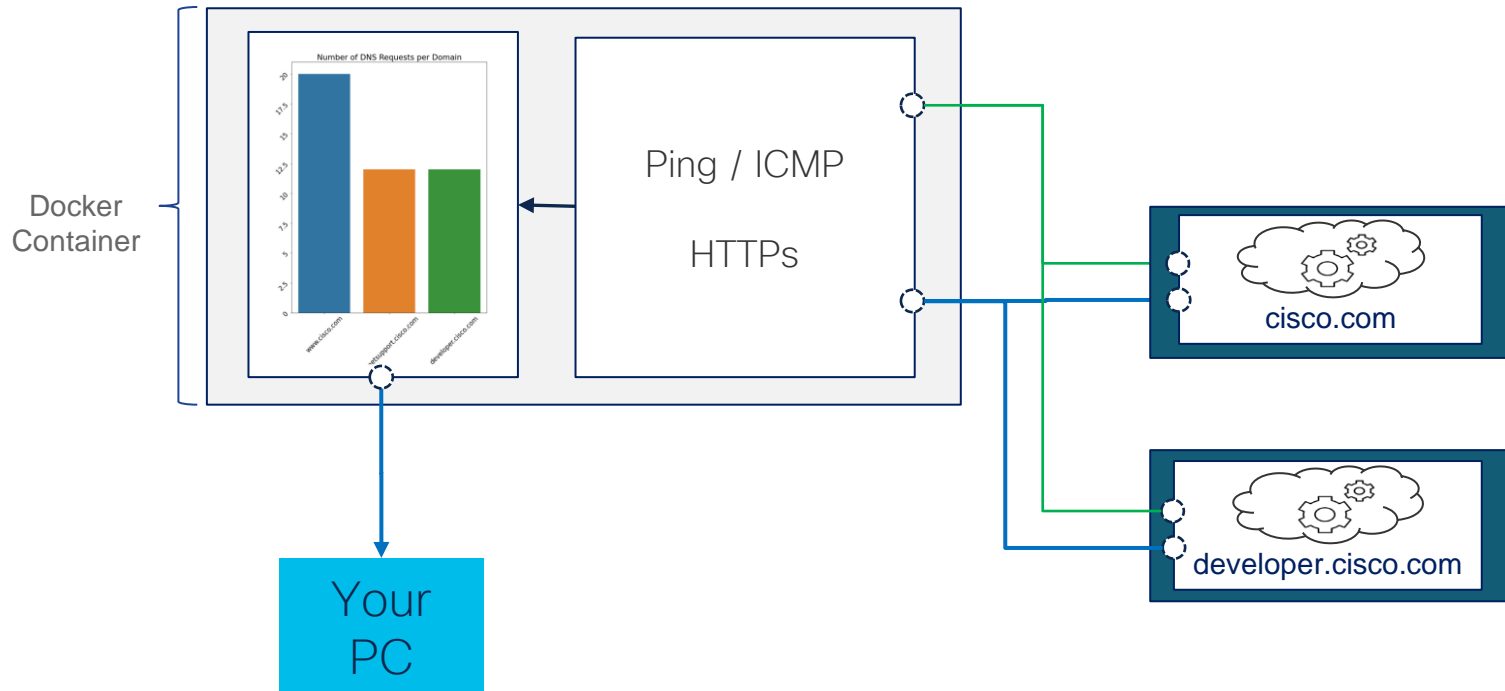
<https://devnetsandbox.cisco.com/RM/Diagram/Index/74f1d717-5856-48fb-9d24-85bb2d3fce7c?diagramType=Topology>

cisco *Live!*

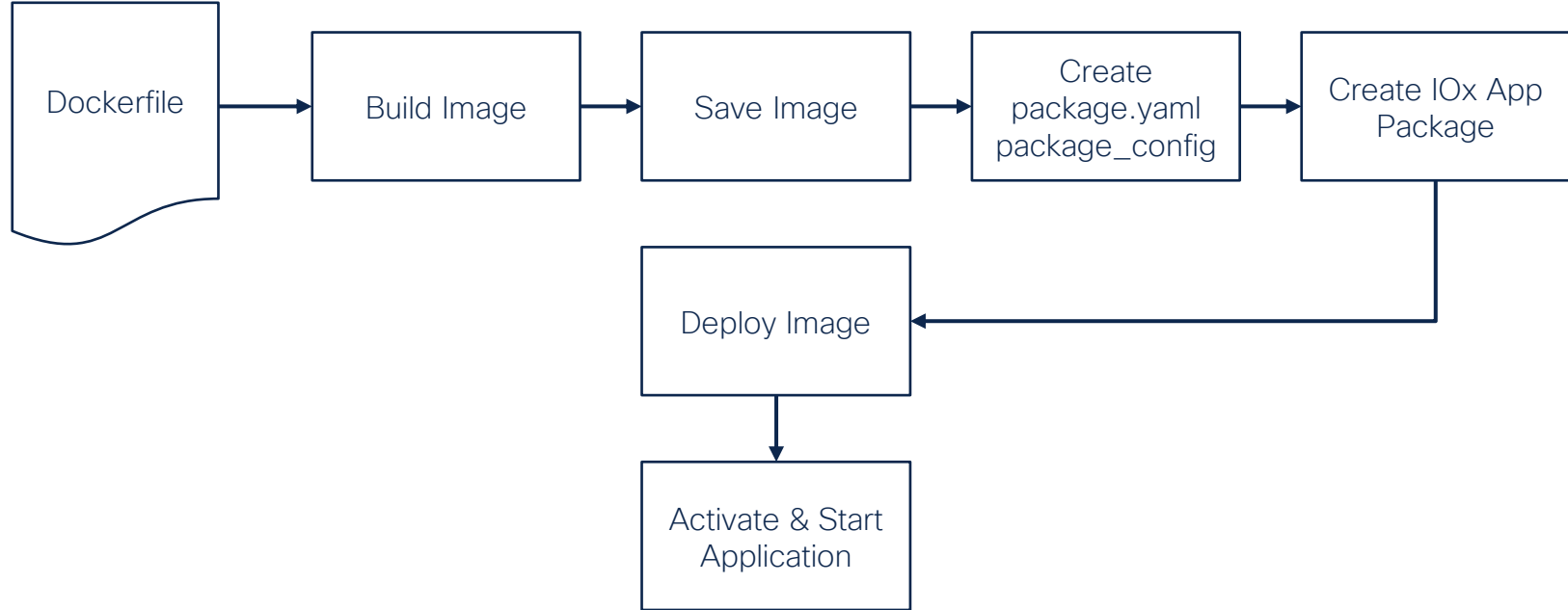
Let's prepare and
install your application!



About your application for today



Workflow to create your Docker application



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/libgcrypt.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

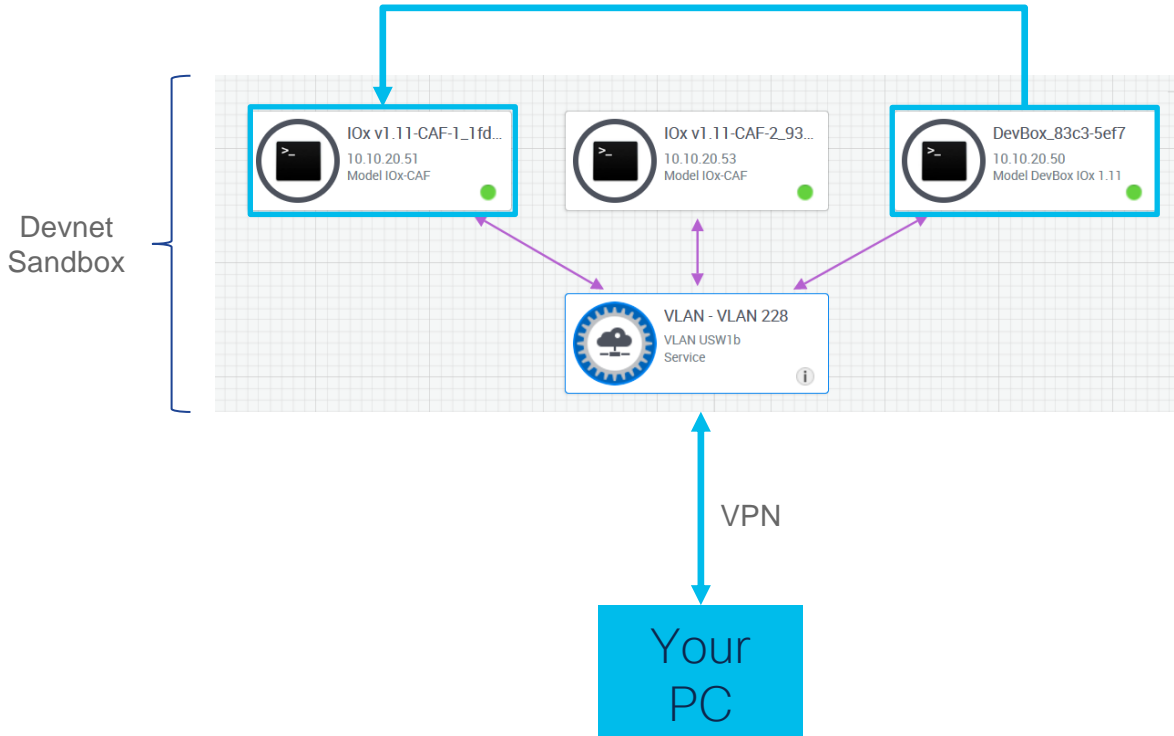
What we heard so far ...

- **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 a Docker image
3. Create IOx application
4. Create IOx application
5. Deploy your image
6. Start your application

But before we start!



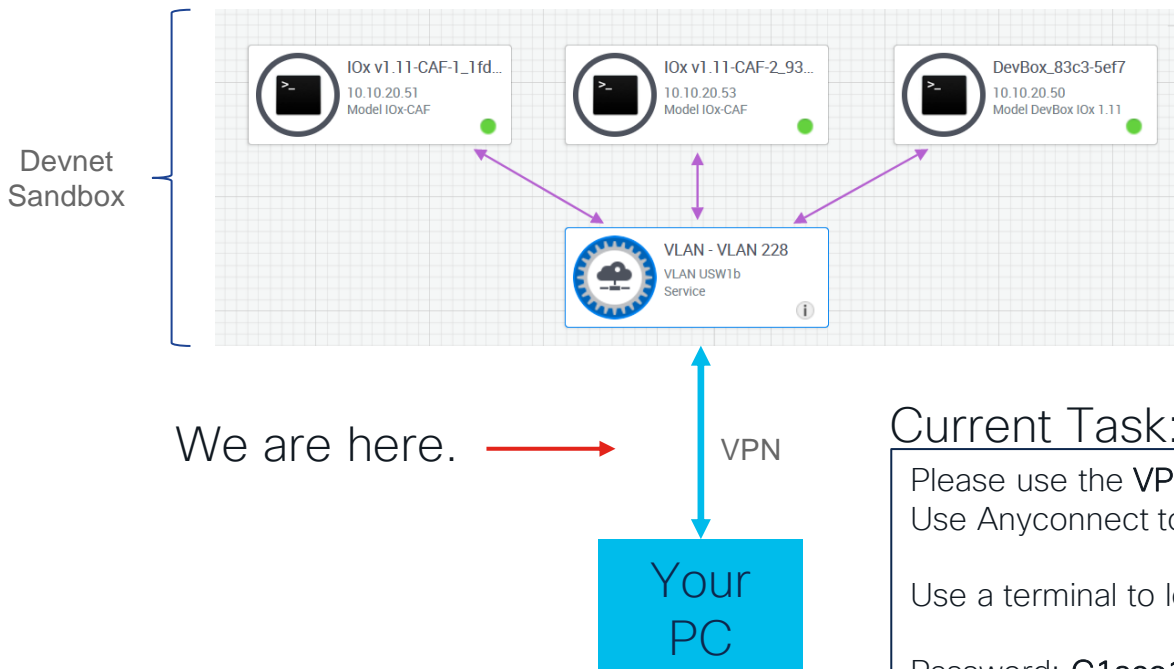
<https://bit.ly/cl2022-iox>



What are we going to do exactly?

1. Open VPN Tunnel
2. Log in to your linux VM
3. Clone application repository
4. Build docker image
5. Save docker image
6. Create IOx client profile
7. Package IOx application
8. Deploy & activate IOx application
9. Start application
10. Access application dashboard

Access your Sandbox



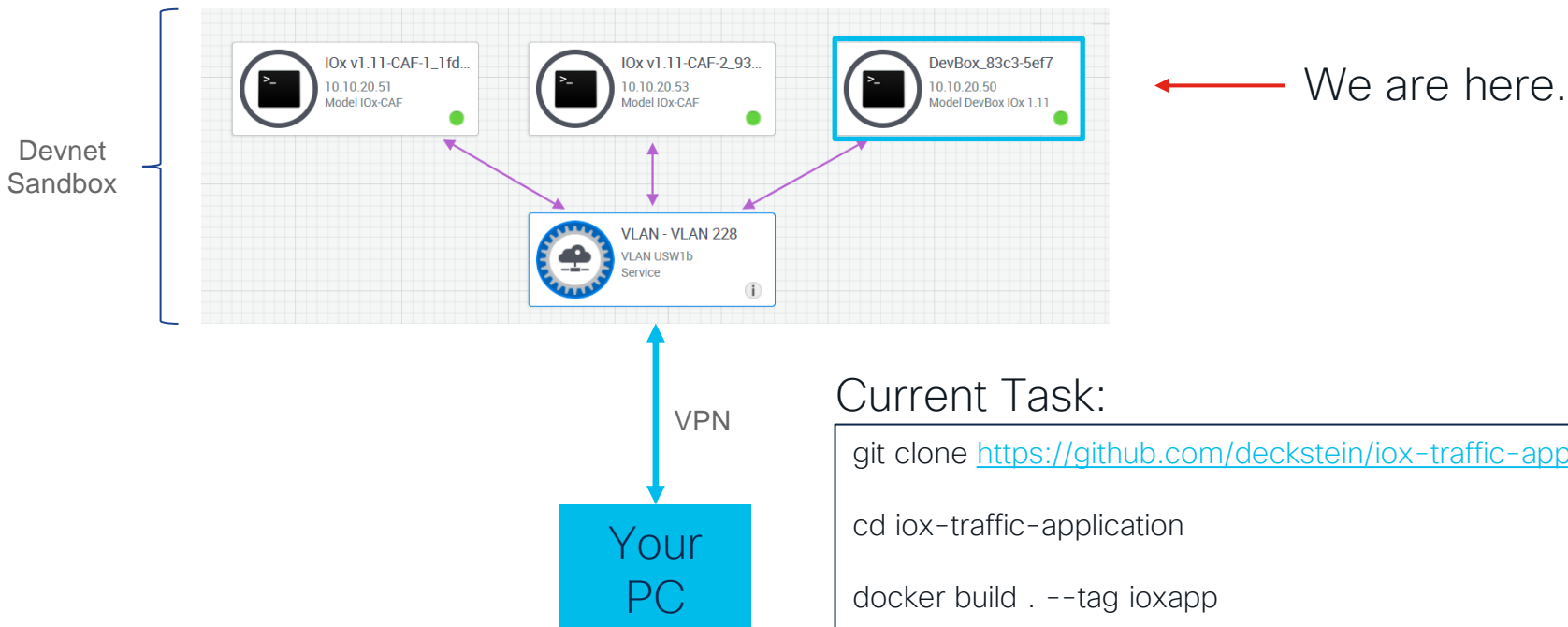
Current Task:

Please use the **VPN credentials** provided at your desk.
Use Anyconnect to open a VPN connection to your sandbox.

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

Password: **C1sco12345**

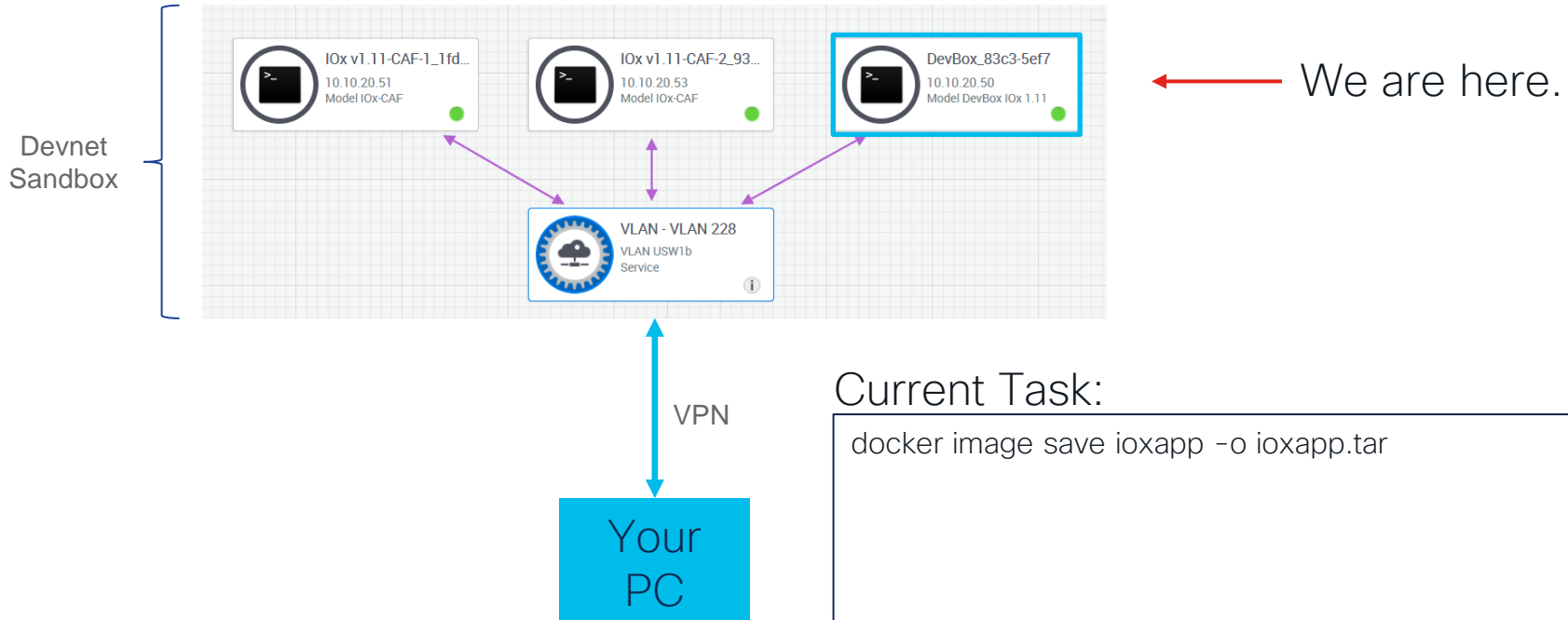
Create your Docker Image



Current Task:

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

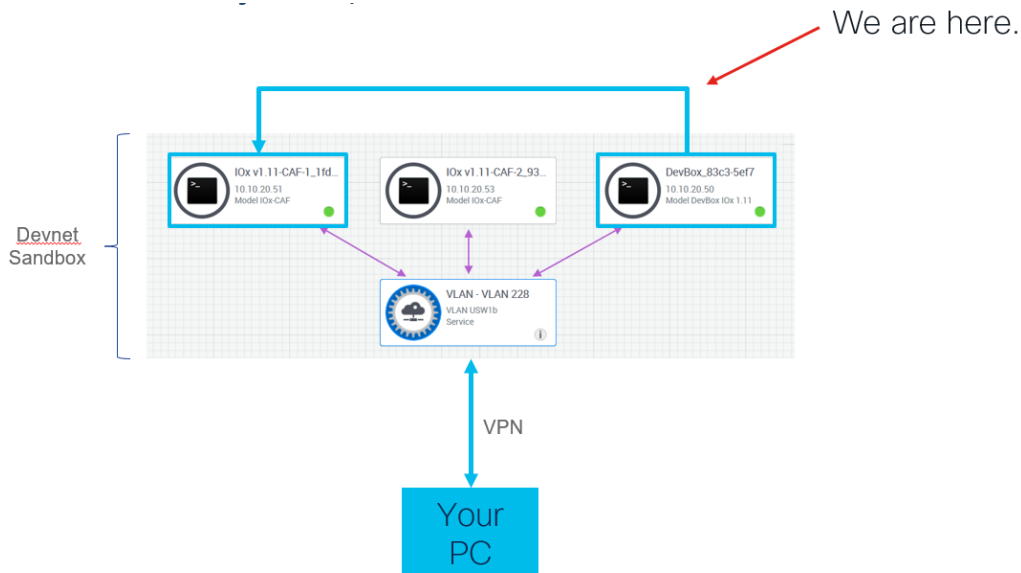
Save your Docker Image



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

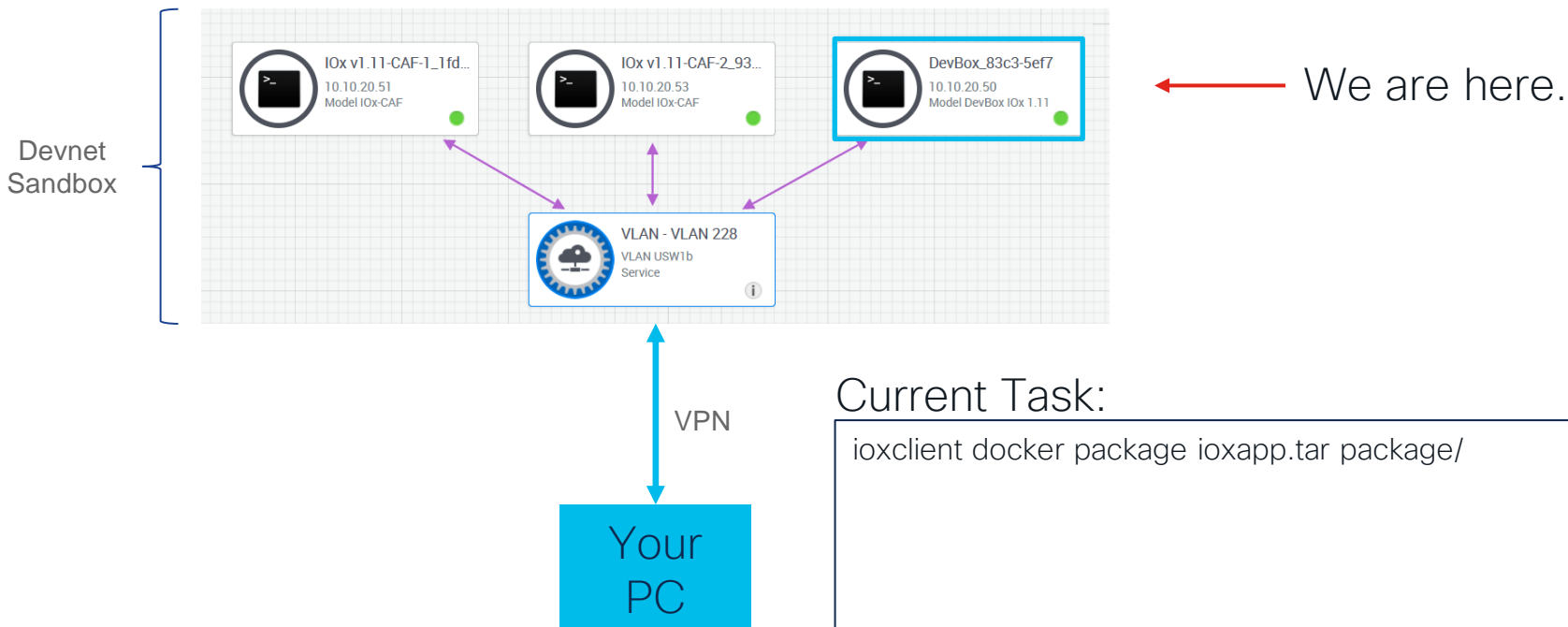
Your package.yaml

```
[developer@devbox iox-traffic-application]$ cat package/package.yaml
descriptor-schema-version: "2.2"
info:
  name: iox-traffic
  version: "0.1"
app:
  cpuarch: "x86_64"
  env:
    PATH: /usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
resources:
  cpu: 1000
  memory: 600
  disk: 100
  network:
    - interface-name: eth0
      ports:
        tcp:
          - "8080"
  profile: custom
startup:
  rootfs: ioxapp.tar
  target:
    - /bin/sh
    - -C
    - /start.sh
type: docker
```

package.yaml:

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

Create your IOx application package

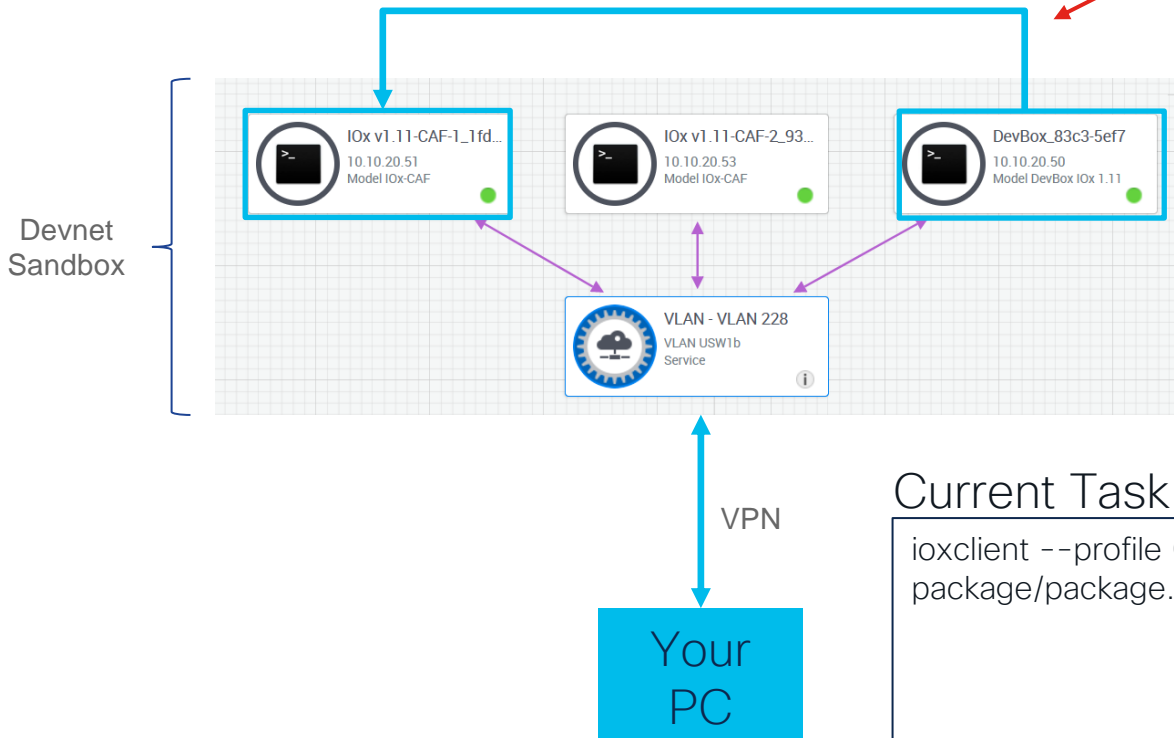


Current Task:

ioxclient docker package ioxapp.tar package/

Deploy your IOx application package

We are here.

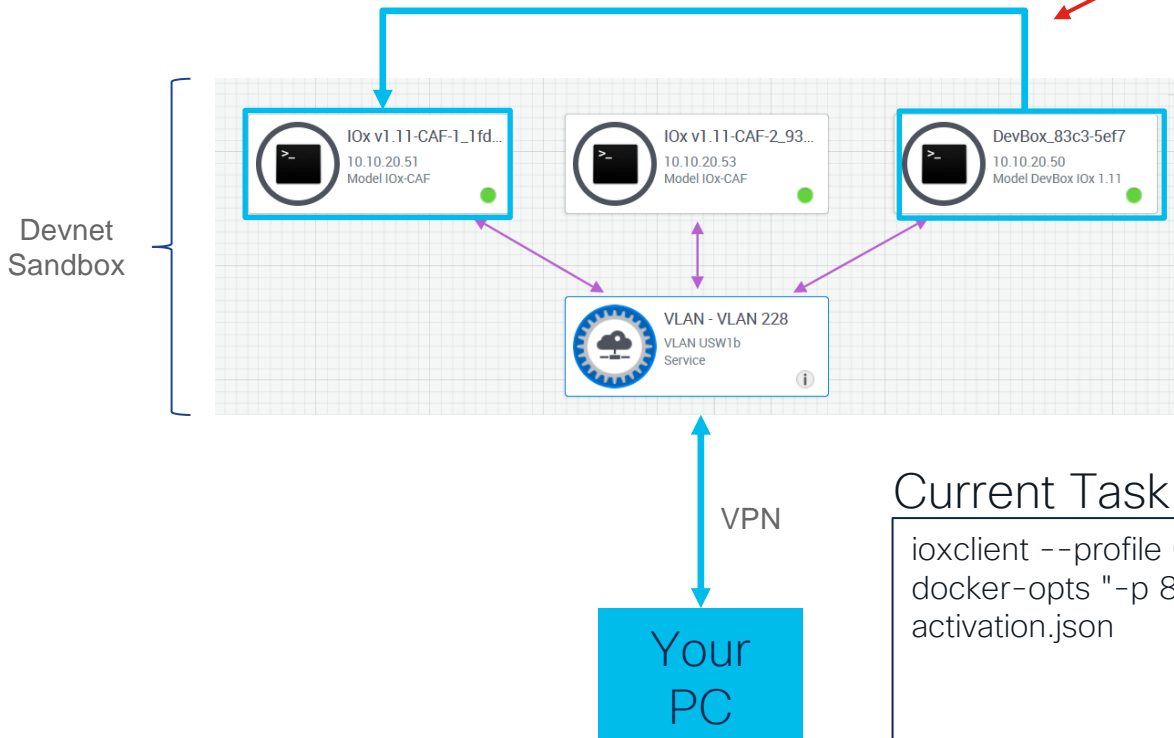


Current Task:

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

Activate your IOx application

We are here.

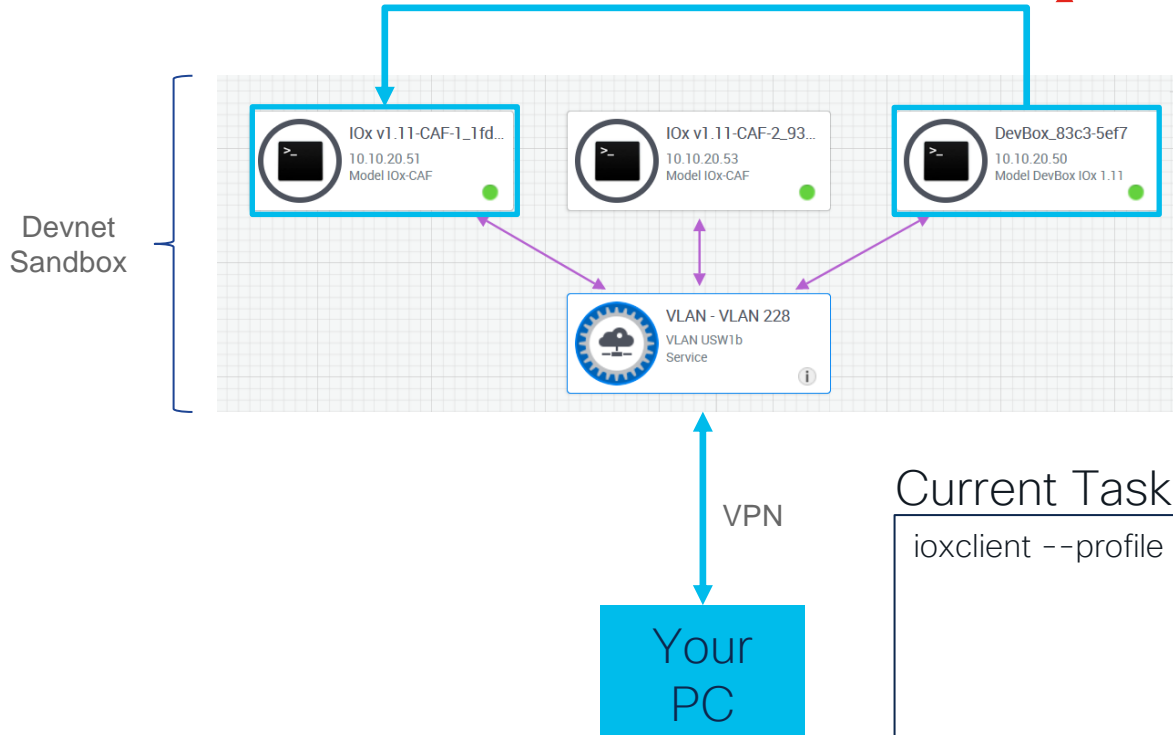


Current Task:

```
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.

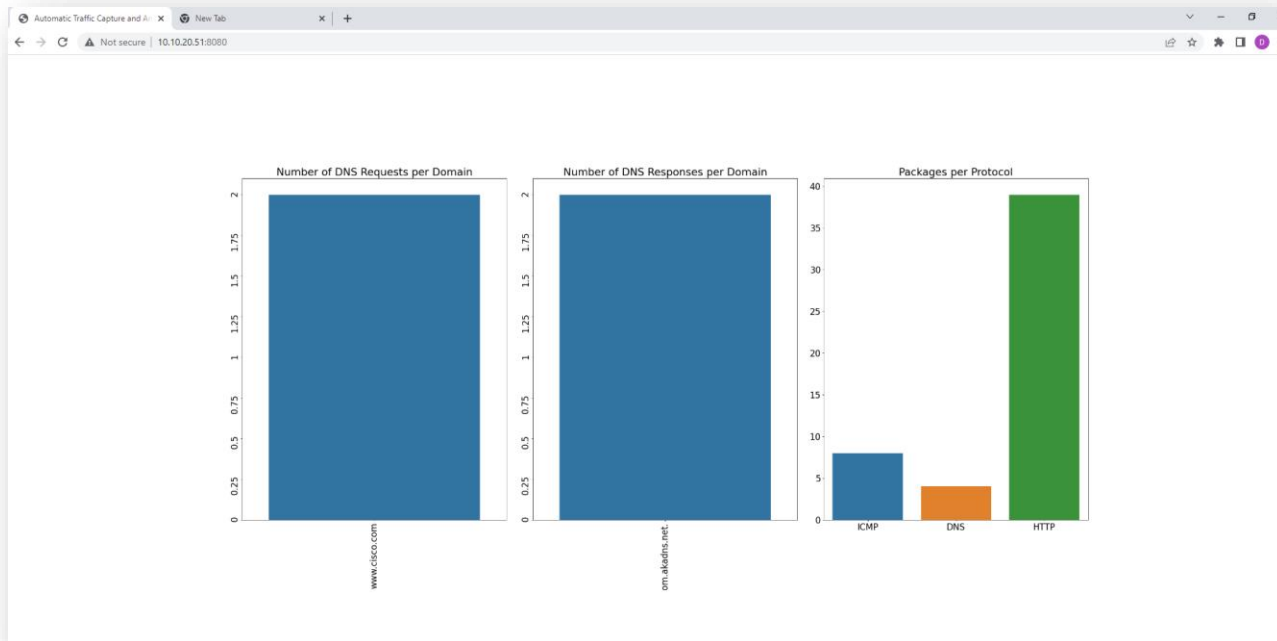


Current Task:

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

Access your application

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



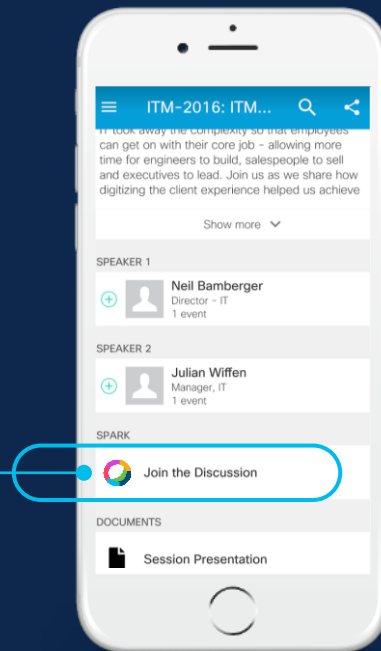
Cisco Webex

Questions?

Use Cisco Webex to chat with the speaker after the session

How

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



ciscolive.ciscoevents.com/ciscolivebot/INSERT_SESSION_ID

Continue your education



Demos in the
Cisco Showcase



Walk-In Labs



Meet the Engineer
1:1 meetings



Related sessions

Complete your online Session Survey



- Please complete a minimum of 4 session surveys and the overall conference survey (starting Thursday) to help us with the future planning of Cisco Live
- All surveys can be taken in the Cisco Events Mobile App or by logging in to the Session Catalog on ciscolive.com/emear
- Cisco Live sessions will be available for viewing on demand after the event at ciscolive.com



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Thank you

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