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You make possible

Docker+VM+LXC = IOx?

Flo Pachinger, Developer Advocate
@flopachinger

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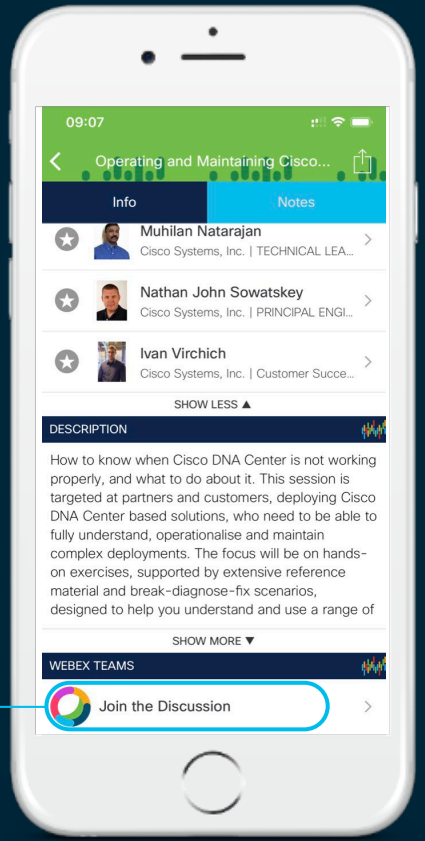
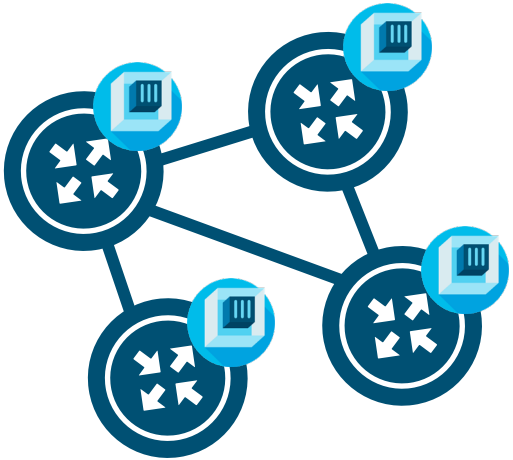


Agenda

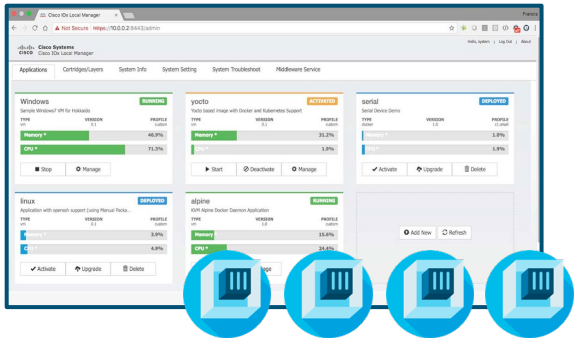
- Introduction to IOx & App Hosting
- Overview on each platform
- Behind the scenes
- Use-Cases
- Conclusion

What is IOx?

Cisco IOx is an Application Management Framework that allows you to execute IoT Applications on the Edge.

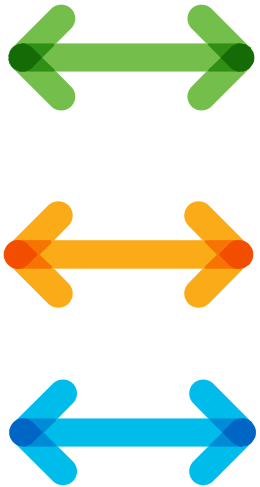


IOx enabled Cisco Gateways



Application Management Interface & API

General IOx Architecture



Local: Local Manager

Cloud: Kinetic Gateway Management Module

On-Premise: Field Network Director

Leveraging Edge Computing

Safety
react fast in emergency Situations

Data Protection
confidential Data remains On-site

Bandwidth
low-bandwidth Usage

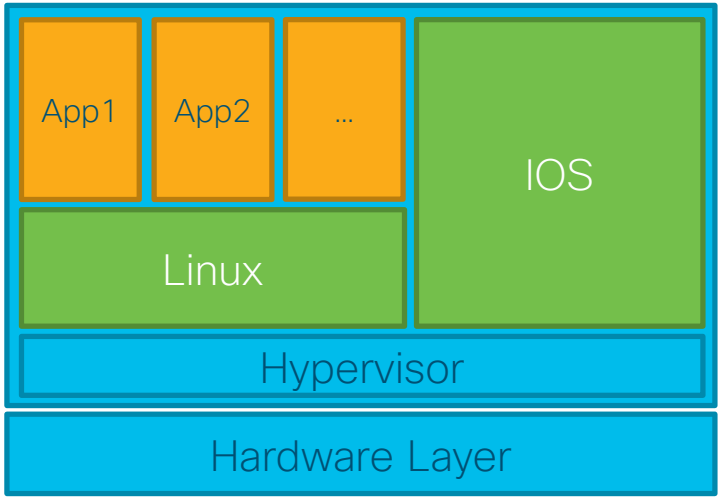
Latency
low latency and faster Response Time

Always-on Connectivity
independent of Cloud Connectivity

Connecting Heterogeneous Systems
collecting data from heterogeneous Systems to an open normalized Network

IOx on Classic IOS

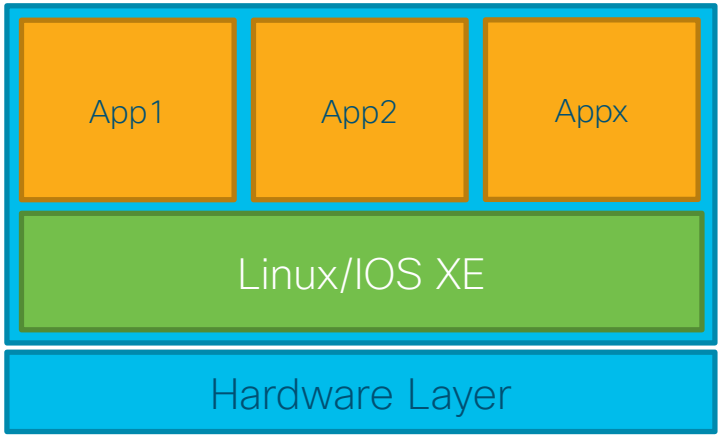
- Products:, IR809/829, IE4000, CGR Compute Module
- Open Linux-based Framework to install applications at the Gateway
- Docker-Container Support
- Application & Gateway Configuration Updates after initial installation



IOS = Internet Operating System

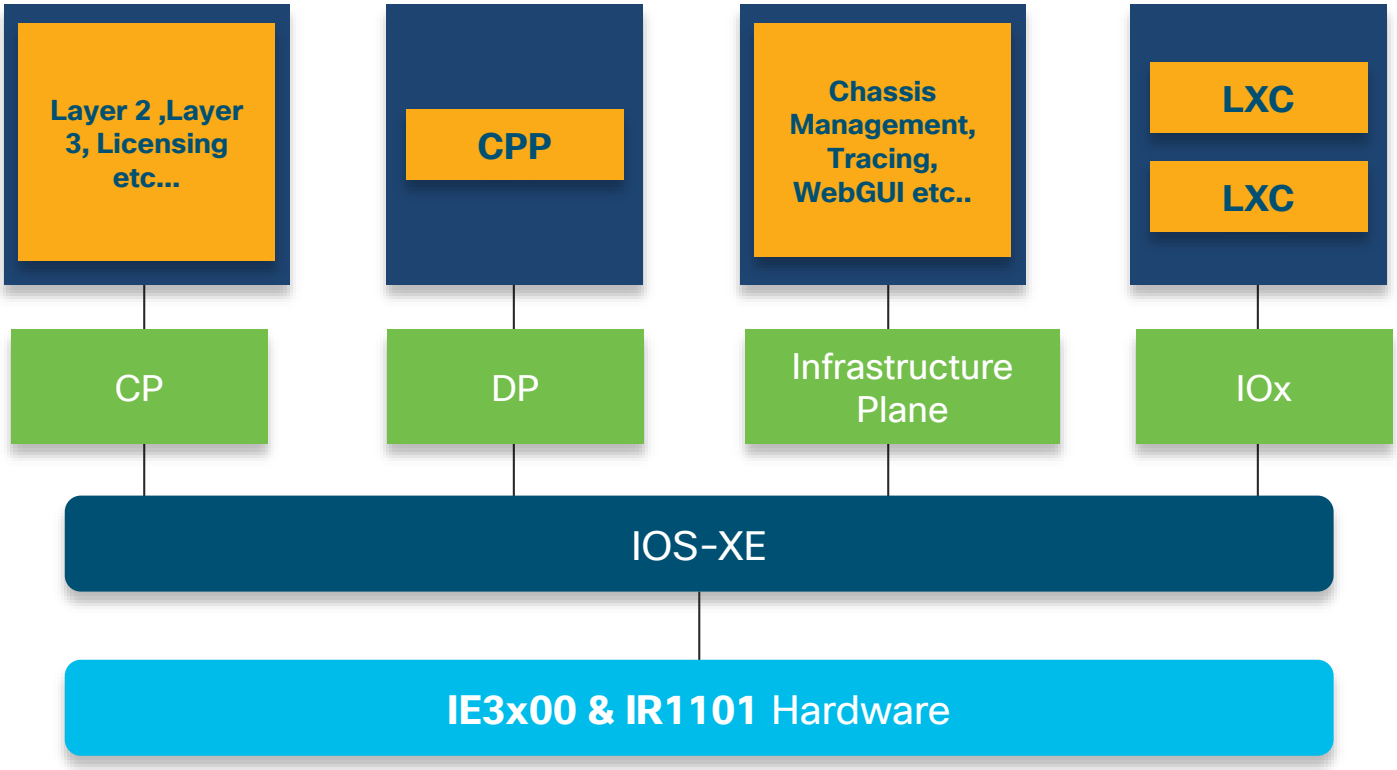
IOx on IC3000 & IOS XE

- Products: IC3000, IR1101, IE3400
- Open Linux-based Framework to install applications at the Gateway
- Docker-Container Support
- Application & Gateway Configuration Updates after initial installation



IOS = Internet Operating System

IOS-XE Software Block Diagram



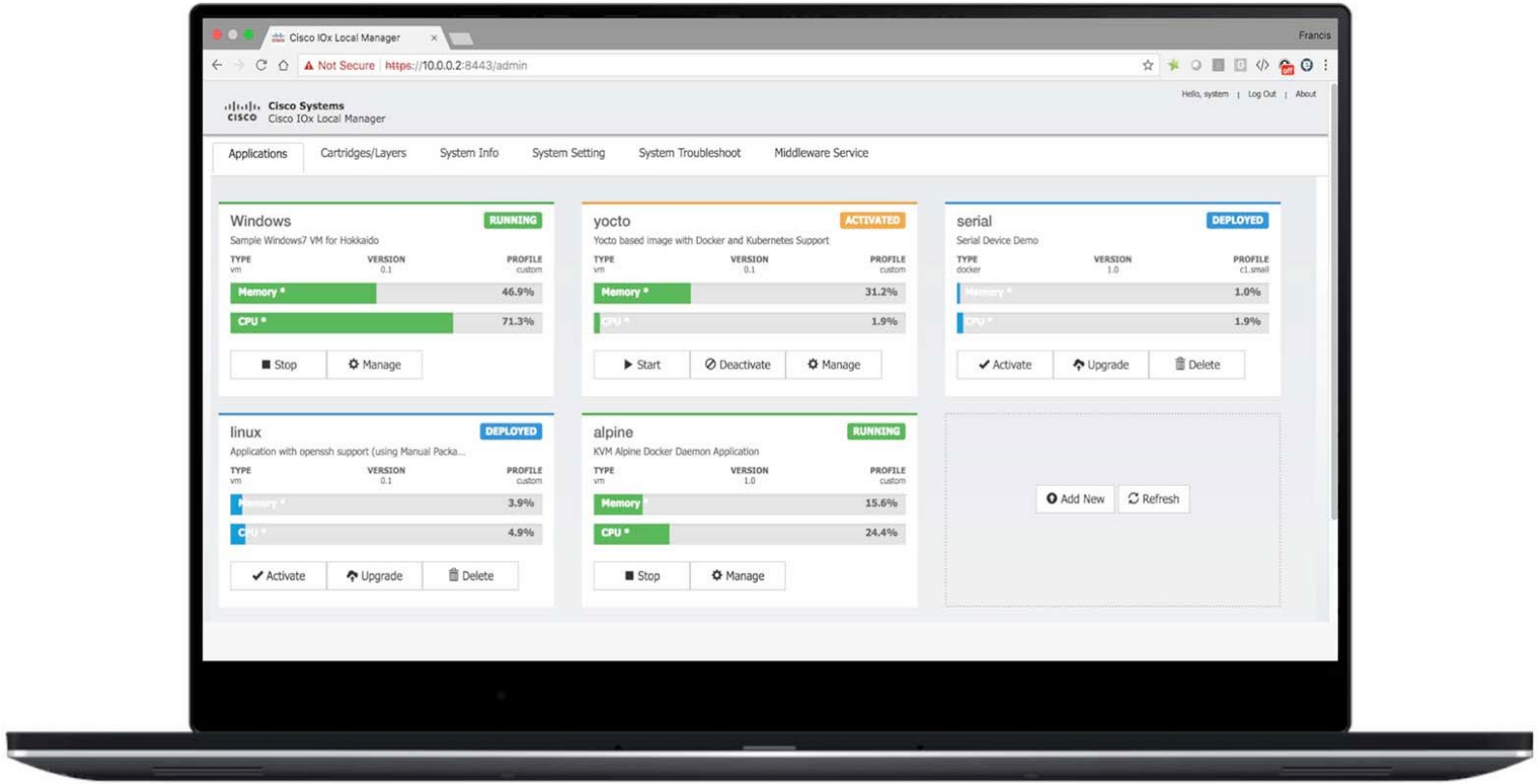
Cisco Edge Compute Products



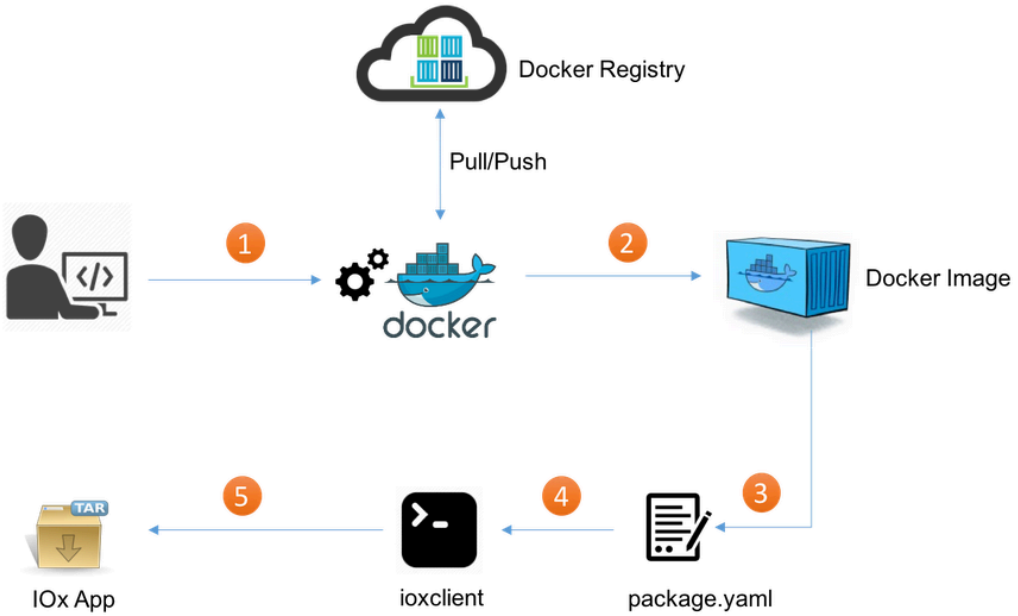


	IE4000	IR8x9	CGR 1000	IC3000	IR1101
Ruggedized HW	IP30	IR809: IP30 IR829: IP40	CGR1120: IP30 CGR 1240: IP67	IP30	IP30
Industrial rating	-40° C to +70° C	-40ºC to +60ºC	-40° C to +70° C	-40ºC to +60ºC	-40ºC to +60ºC
CPU	PowerPC ~600 MHz 1 dedicated core for IOx	Intel Rangeley 1.25GHz 2-core with 50% of one core to IOX	4-Core 800Mhz AMD Gx-410VC on Compute module	Intel Rangeley 1.25GHz 4-core	ARM 4-Core 1.2GHz
Memory	512 MB RAM	2GB with 760MB for IOX	4GB	8GB	4 GB
Storage mSATA for R/W longevity	256 MB flash storage	512MB-1.5GB storage, 50-100GB (IR829 mSATA)	64 (50)- 128 (100) GB mSATA	128 (100) GB mSATA	512MB-1.5GB storage, 100GB (mSATA)

IOx Local Manager



Using the Docker tool chain to generate IOx applications



1. Use docker tools and images
2. Generate required docker image
3. Write suitable package descriptor file
4. Use ioxclient wrapper command and point it to generated docker image and package.yaml
5. Generates IOx compatible app

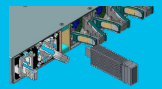
Catalyst 9000 App Hosting

Catalyst 9000 switch storage and compute

	Resource type	Catalyst 9200	Catalyst 9300	Catalyst 9400	Catalyst 9500*	Catalyst 9500 High Perf*	Catalyst 9600*
Networking	Front panel ports (1G)	No	Yes	Yes*	No	No	No
Resources	Memory	No	2GB	up to 8GB	up to 8GB	up to 8GB	up to 8GB
	CPU	No	1 core (25%)	1 core (25%)	1 core (25%)	1 core (25%)	1 core (25%)
	Storage	No	120GB (USB3.0/SSD)	240-960GB (SATA)	120GB (USB3.0/SSD)	240-960GB (SATA)	240-960GB (SATA)

Catalyst 9300/9500

USB 3.0
120GB



Back panel

Catalyst 9400

M2 SATA
240/480/960GB

Plug into removable SUP

Catalyst 9500 high-performance

M2 SATA
240/480/960GB

Back panel

For local storage and app hosting production

- 3rd party USB drives in front panel are not supported
- Applications can be hosted via CLI too

* Roadmap

Docker Workflow

1 Dockerfile

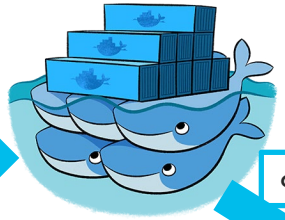
```
FROM perfsonar/testpoint

# Copy IOx Scripts
COPY iox_start.sh /etc/init.d/iox_start.sh

# Append IOx bootup daemons
COPY iox.conf /etc/iox.conf
RUN cat /etc/iox.conf >> /etc/supervisord.conf

# Setup app-hosting console login
RUN echo "cisco" | passwd root --stdin
```

2 Build Docker Image

```
docker build -t <app> .
```

or

```
docker pull  <app>
```



4 Deploy App

```
docker save myapp > myapp.tar
```

3 App Descriptor (Optional)

```
descriptor-schema-version: "2.6"

info:
  name: perfsonar
  description: PerfSONAR 4.0
  version: "1.0.0"
  author-link: "http://www.cisco.com"
  author-name: Cisco

app:
  # Indicate app type (vm, paas, lxc etc.,)
  cpuarch: x86_64
  type:
  kernel-version: 4.4.51

  resources:
    profile: custom
    vcpu: 2
    cpu: 7400
    disk: 10
    memory: 2048

    network:
    - interface-name: eth0

# Specify runtime and startup
  startup:
    rootfs: rootfs.img
    target: /etc/init.d/iox_start.sh
```

IOS XR

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