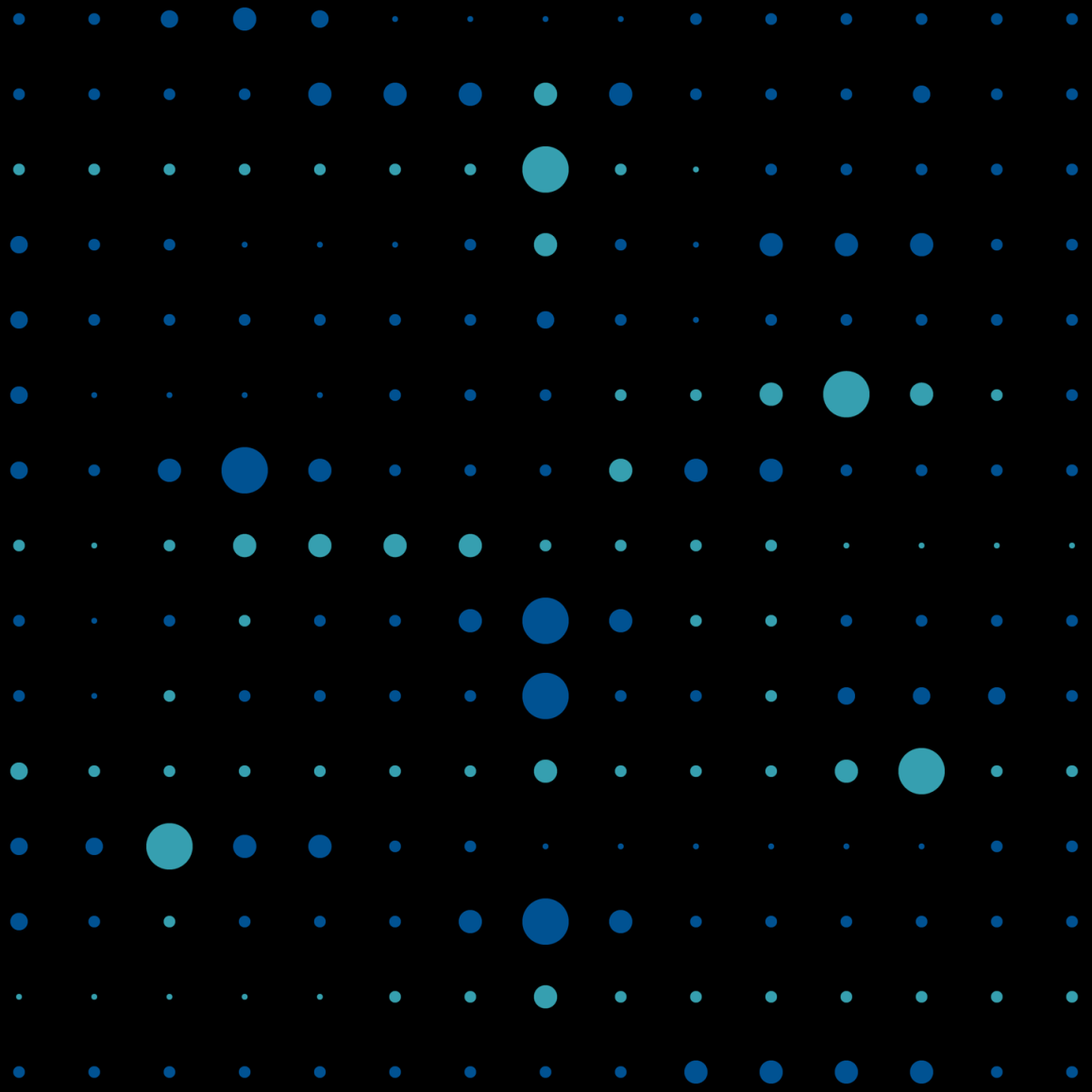
Microsoft Azure



Windows IoT

Azure IoT Academy

May 2021

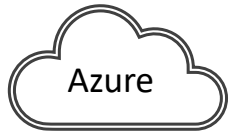
Agenda (all timings are in EST)

- 11:00am - 11:30am EST : Windows IoT Theory
- 11:30am - 1:00pm EST : HOLs
- 1:00pm - 1:45pm EST : Lunch break
- 1:45pm - 3:15pm EST : HOLs
- 3:15pm - 3:30pm EST : Coffee Break
- 3:30pm - 4:30pm EST : HOLs

Session Agenda

- Product Overview
- Windows IoT + Linux + Azure == Better Together
- Live Video Analytics Lab

Azure Edge Device Categories



IoT Devices

Tiny Edge

MCU Class Devices

Sensors, Actuators

Azure RTOS
Azure Sphere

Light Edge

MPU Class Devices
(ARM 32/64 & X64)

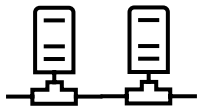
Medical equipment, gateways, kiosks, digital signs, industrial PCs, point-of-sale, factory-floor HMIs, robots

Windows IoT
EFLOW
AKS on Windows IoT
Azure Percept

Hybrid Cloud Devices

Heavy Edge

Server,
Hyper Converged Infra

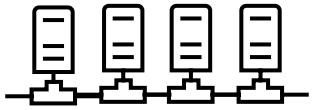


Private DC, Hosters, Telco DC, Branch Office, Server closets

Azure Stack HCI & Edge
AKS on HCI
Windows Server
Windows Server IoT

On Prem Cloud

Cloud Native 1P



Private DC, Hosters, Telco DC

Azure Stack Hub
Azure Edge Zones Enterprise
Azure Edge Zones by Microsoft

End-User Devices

PC
Phone
Tablet
Console
Watch
Smart speakers

Consumer and Enterprise productivity devices

Windows
M365
Xbox

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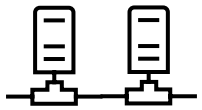

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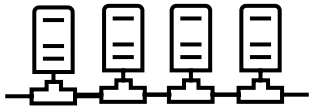

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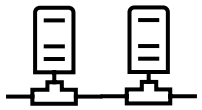

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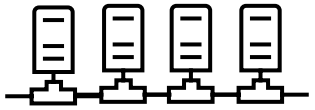

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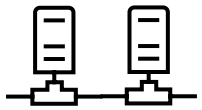

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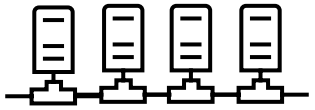

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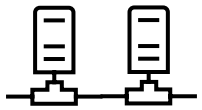

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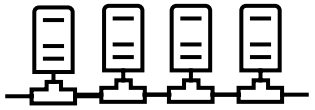

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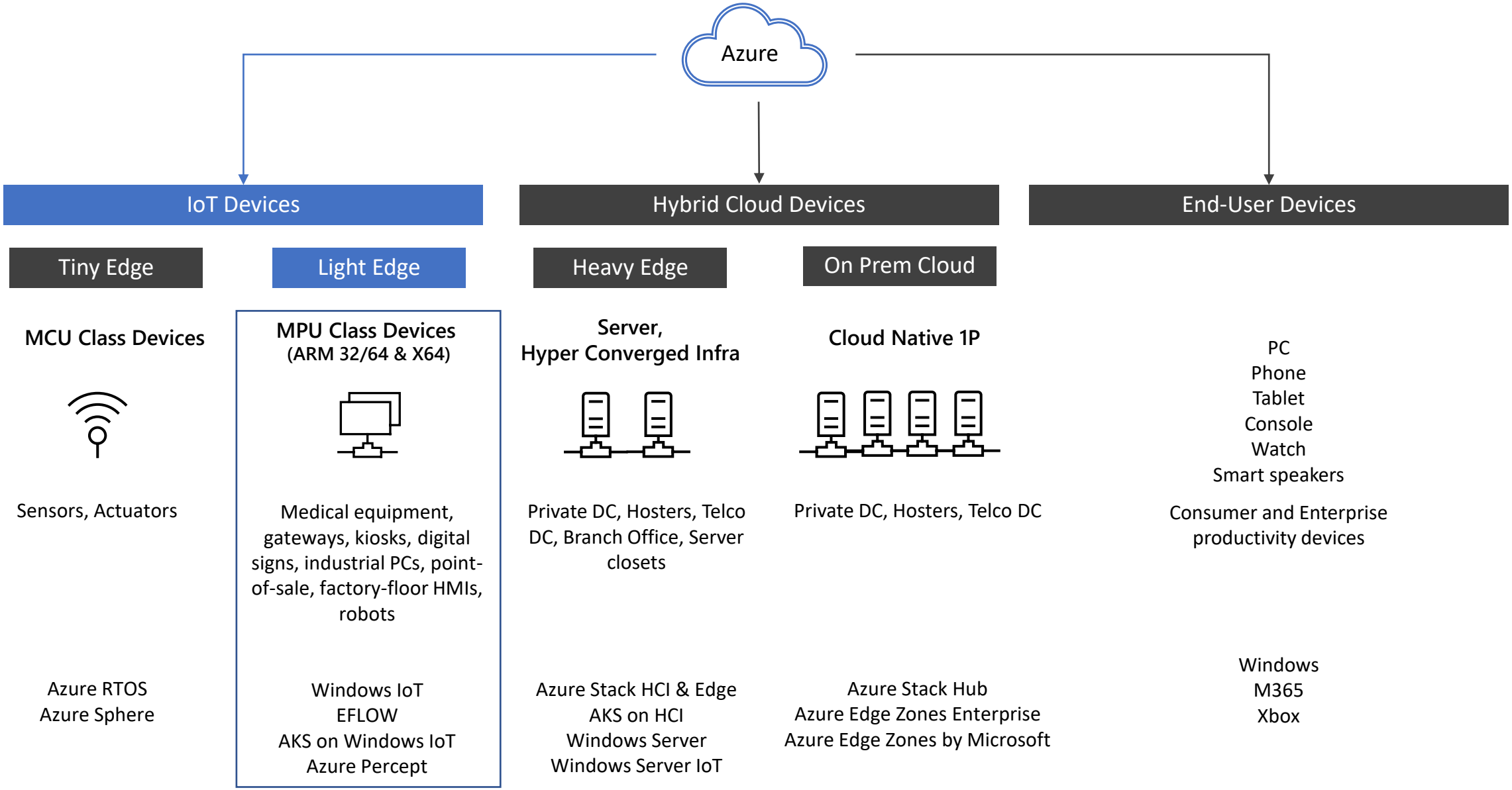
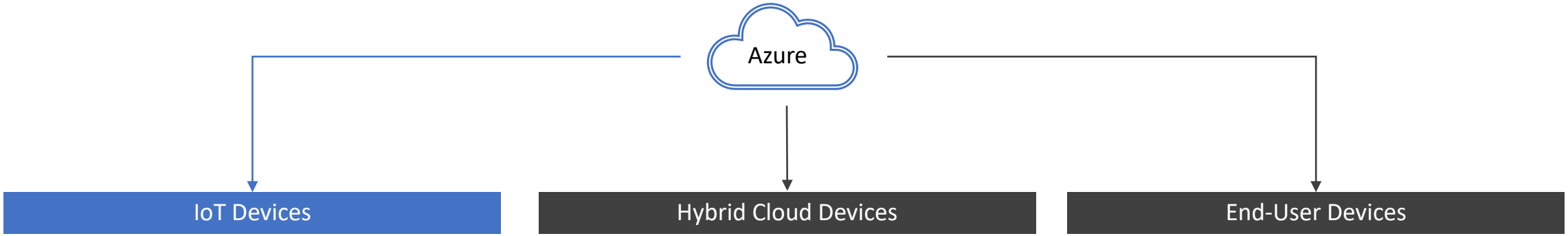


Azure Edge Device Categories



Tiny Edge	Light Edge	Heavy Edge	On Prem Cloud	
MCU Class Devices	**MPU Class Devices** (ARM 32/64 & X64)	**Server, Hyper Converged Infra**	**Cloud Native 1P**	PC Phone Tablet Console Watch Smart speakers
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Azure RTOS Azure Sphere	**Windows IoT** **EFLOW** AKS on Windows IoT Azure Percept	Azure Stack HCI & Edge AKS on HCI Windows Server Windows Server IoT	Azure Stack Hub Azure Edge Zones Enterprise Azure Edge Zones by Microsoft	Windows M365 Xbox

Windows IoT

Gas Pumps

Industrial Machinery

Essential Devices

Windows IoT + Azure

Kiosks

Medical Devices

Voting Machines

Windows 10 IoT Offerings

Windows 10 IoT Core and Services

For smallest-footprint, lowest-cost devices

Windows 10 IoT Enterprise

For powerful, smart devices

Locked down, full edition of Windows 10

Windows Server IoT

For the most demanding edge computing workloads

SQL Server IoT

For embedded solutions requiring the full power of SQL Server

Customer Value Prop

1. 10 Years of Long-Term Servicing (LTSC)
2. World-class security
3. Enterprise-grade device management
4. Seamlessly connect with Azure
5. Build beautiful user experiences with natural input
6. Extensive Win32 app ecosystem, 1B Windows devices
7. Out-of-the-box solution

Bringing Linux, Azure and Cloud Native Microservices to Windows IoT

Azure IoT Edge for Linux on Windows (EFLOW)

Enabling Linux-based Edge Modules on Windows

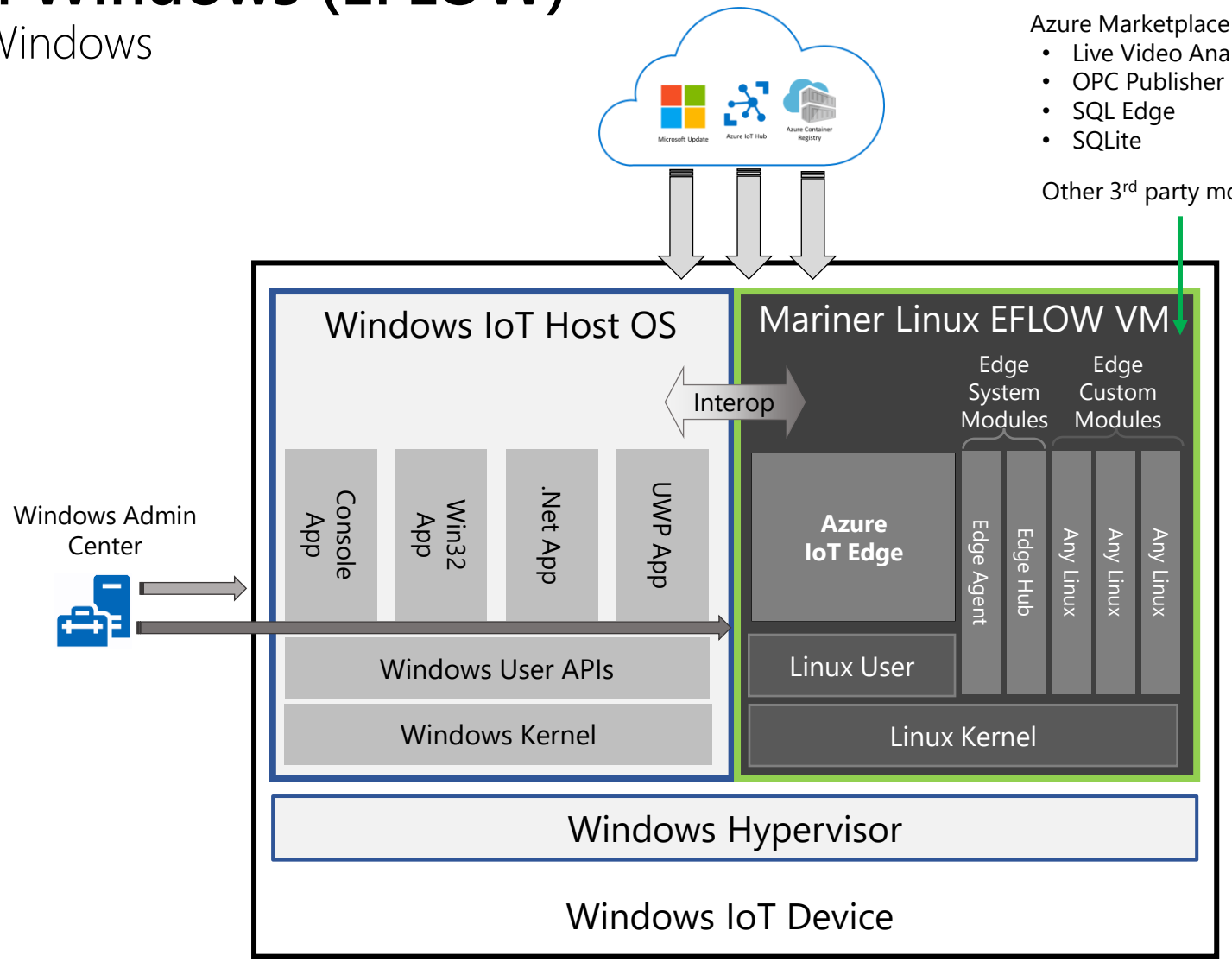
Windows IoT Strengths

- Apps with Interactive UI
- Win32 app ecosystem
- 10-year long-term servicing
- World-class security
- Enterprise-grade device management
- Out-of-the box solution

+

Linux Strengths

- Flexibility / Customizability
- Low Cost of Entry
- AI workloads
- Cloud Native Programming Models
  - Containerized Microservices



Example Modules

Azure Marketplace

- Live Video Analytics
- OPC Publisher
- SQL Edge
- SQLite

Other 3rd party modules

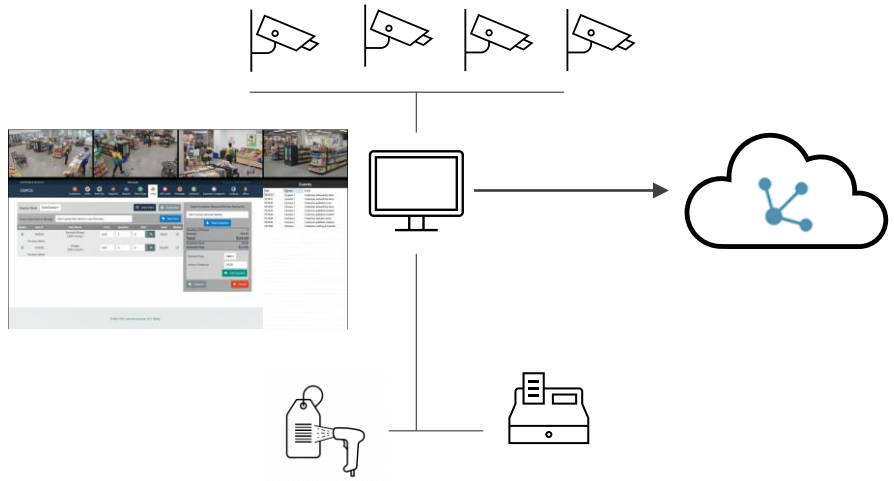
Edge Vision AI – Partner Solutions

Windows + Live Video Analytics + Azure

Store Surveillance and Business Insight

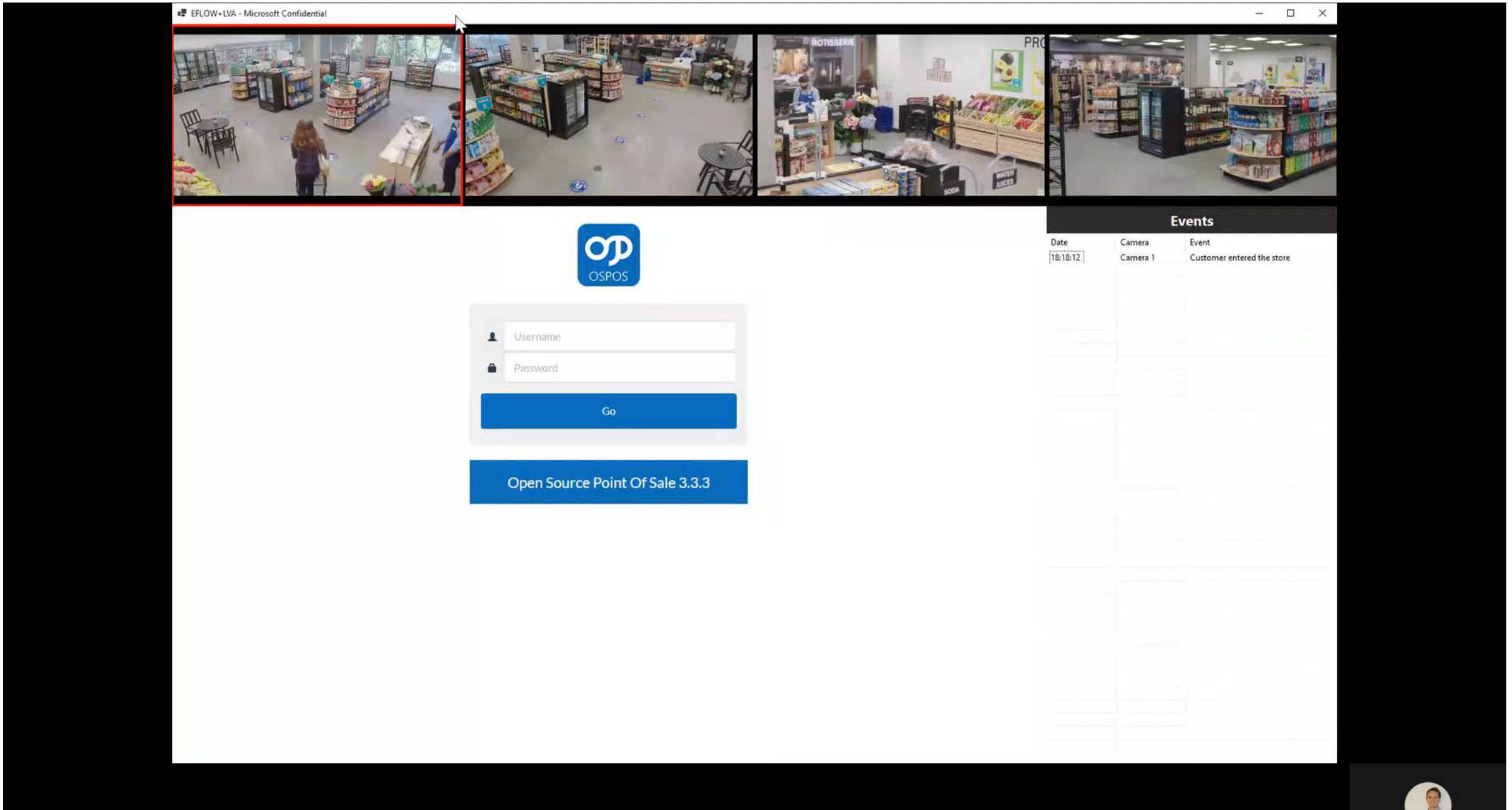
Small Business Stores across India and China with two screen POS and video surveillance setup. POS operation diverts attention from video system which needs constant attention to be effective. Windows + LVA Edge AI enables:

- AI based theft and tampering detection, staff and people flow monitoring
- Integrated POS and store video surveillance improving user experience and reducing TCO
- Cloud device management and store operation insight



Demo: Windows IoT + EFLOW + Azure Live Video Analytics

Win 32 point-of-sale application + Win32 RTSP app + Linux LVA running in EFLOW VM, all on one Windows IoT Device



Windows IoT + EFLOW

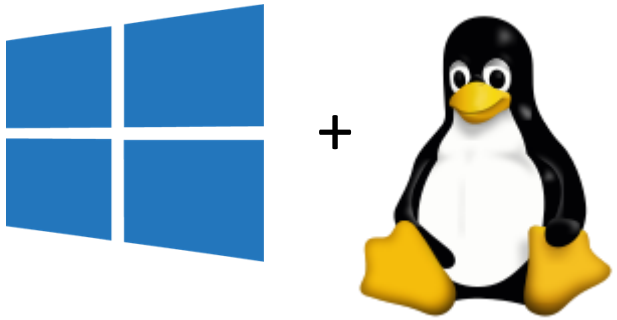
The best of Windows and Linux

Lower Cost

One device can do it all

Simple to deploy, manage, and update with existing tooling

Maintain Windows application investments



New Capabilities

Easily connect to Azure

Run Linux workloads on Windows IoT, without needing a Linux team

Run the broadest set of AI modules

Blog Post: https://aka.ms/azeflow-blog

Documentation: https://aka.ms/azeflow-docs

Lab Overview

Goal: Simulate a Win 32 application + Win32 RTSP app + Linux LVA running in EFLOW VM, all on one Windows IoT Device

1. Set up an Azure Resources
2. Set up EFLOW
3. Set up Live Video Analytics
4. Clean-up Resources

AZURE IOT ACADEMY

EPISODE I

THE AZURE RESOURCES

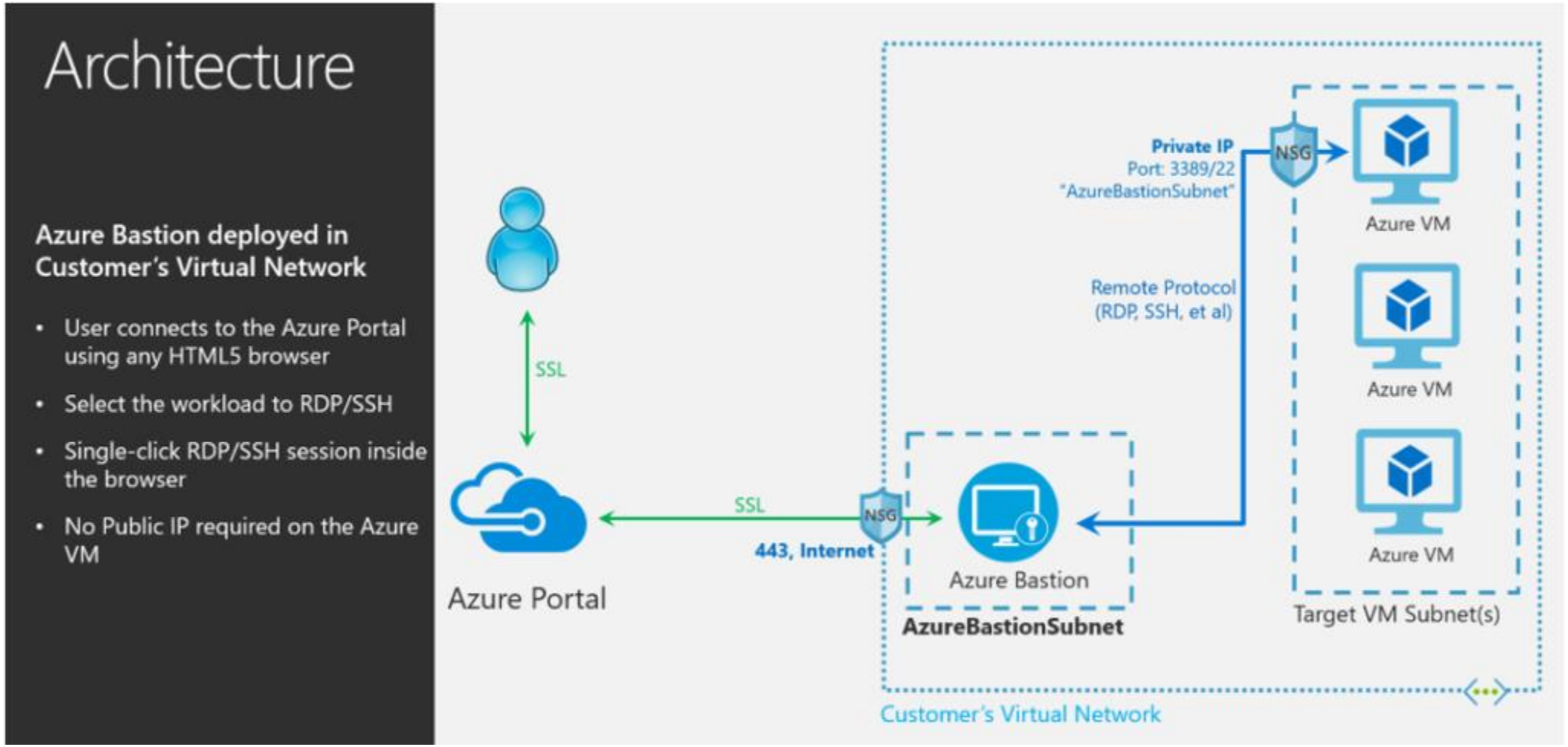
Objective: Set up Azure Resources

- Task 1: Virtual Network
- Task 2: Virtual Machine
- Task 3: Connect to Virtual Machine

Mission: Set up Azure Resources

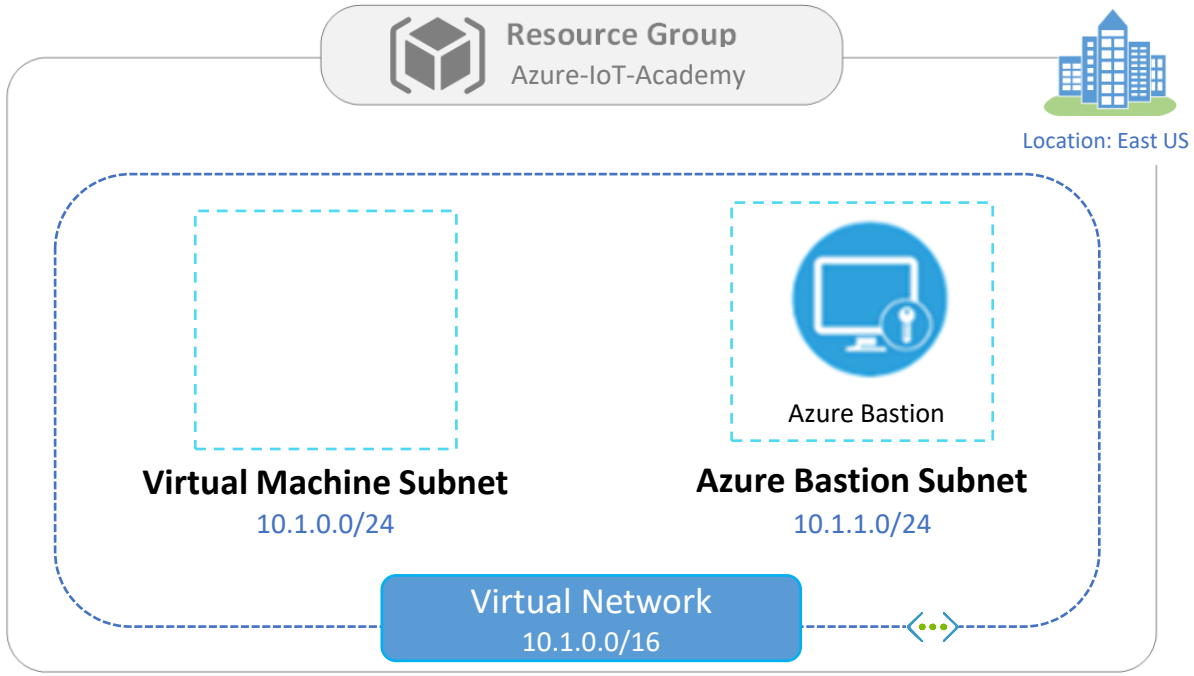
- This lab will be completed in a Windows Virtual Machine
  - We want both PC users and Mac users to have an identical experience
- We will be using **Azure Bastion**
  - Bastion allows you to create a virtual machine in a Tab of your Browser Window

Resource: Azure Bastion

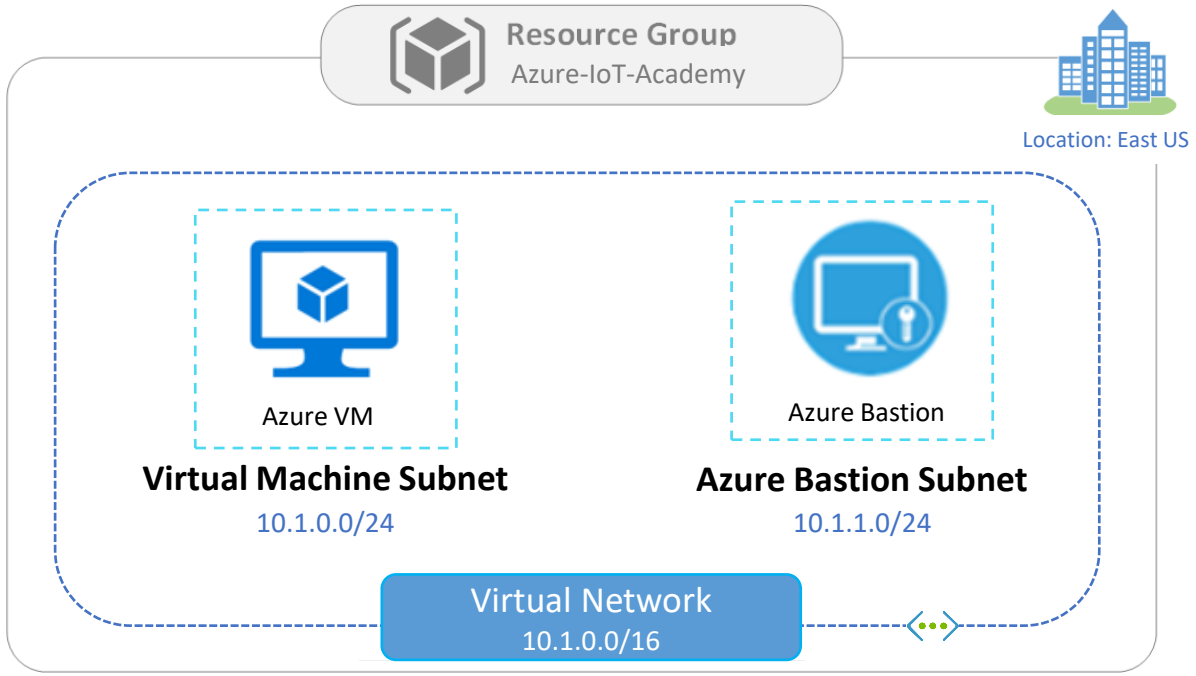


Task 1: Virtual Network

- We want to create a virtual network that will support the VM and Bastion connection



Task 2: Virtual Machine



Task 2: Virtual Machine

- This lab requires we create a Virtual Machine (VM)
- VM needs to Azure IoT Edge for Linux on Windows (EFLOW) + LVA
  - Editions: Windows 10 version 1809 or later; build 17763 or later
    - Professional, Enterprise, IoT Enterprise
  - Hardware requirements
    - Minimum Free Memory: 1 GB
    - Minimum Free Disk Space: 10 GB

Instance details

Virtual machine name * myVM1

Region * (US) East US

Availability options Availability zone

Availability zone * 1

Image * Windows 10 Pro, vNext - Gen1

See all images

Marketplace

You have private offers available. View private offers

Windows 10

Offer Type : **Virtual Machine**

Pricing : **All**

Operating System : **All**

Publisher Type : **All**

VM Generation : **All**

Publisher name : **All**

Azure benefit eligible only

Showing results for 'Windows 10'.

Windows 10 Preview

Microsoft

No rating

Virtual Machine

Windows 10 Preview

Bring your own license

Select

IIS 10 on Windows Server for Python, MySQL and PHP

Apps4Rent LLC

★★★★★ 5.0 (1 ratings)

Virtual Machine

Get the latest versions of with Python, MySQL, and PHP with IIS on Windows Server 2016.

Bring your own license

Select

Microsoft Windows 10

Microsoft Corporation

★★★★½ 4.5 (6 ratings)

Virtual Machine

Microsoft Windows 10 Desktop Virtual Machine Images

Select

Joget DX Low Code Platform - Windows - 10

Joget Inc.

No rating

Virtual Machine

Joget is an open source no-code/low-code application platform.

Software plan starts at
$0.10/hour

Select

iPerf3 Server on Debian 10

Virtual Pulse S. R. O.

No rating

Virtual Machine

Production-ready and Cross-platform Tool for Network Performance Measurement and Tuning

Software plan starts at
$0.027/hour

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Jenkins With Debian 10

Cognosys

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Jenkins 2.263.4 With Debian

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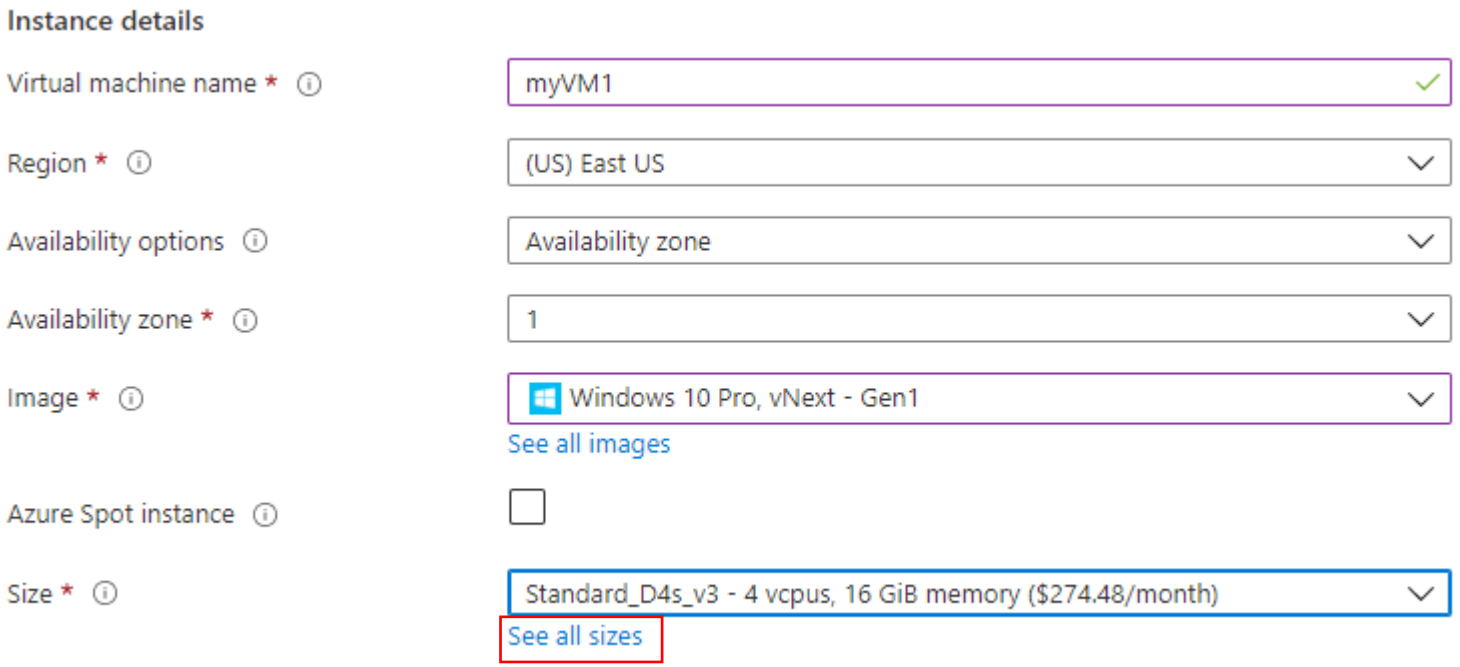
Task 2: Virtual Machine – Azure VM

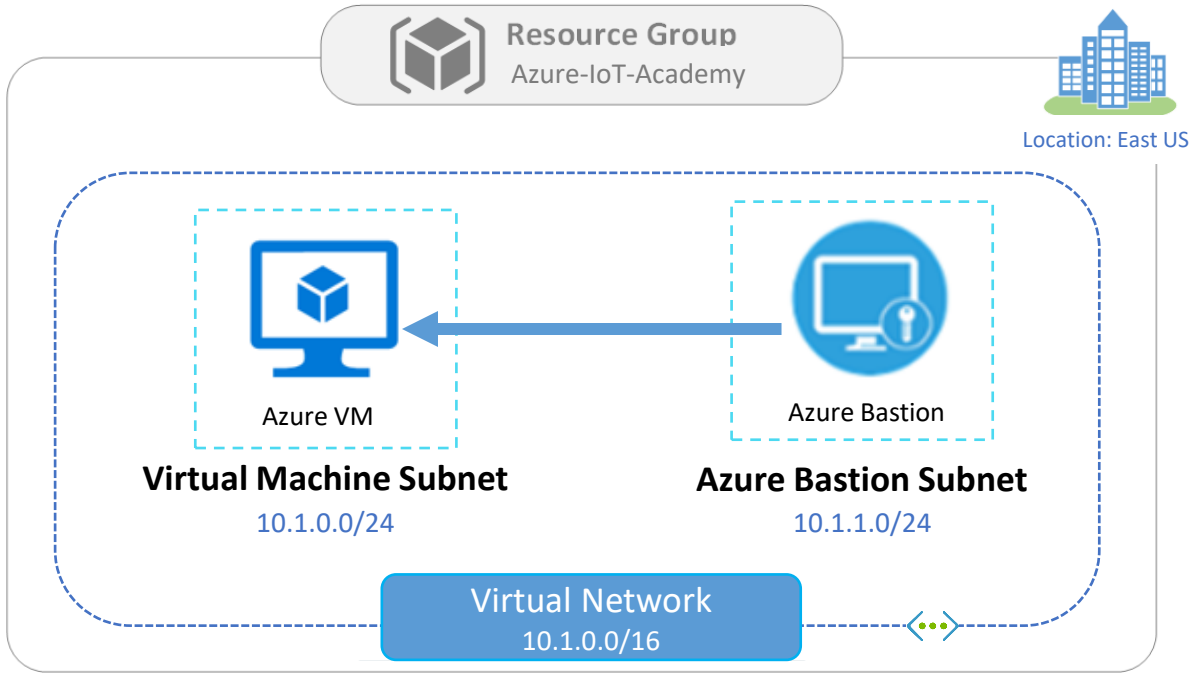
- Size: Standard_D4s_v3 - 4 vcpus, 16 GiB memory



Showing 407 VM sizes. | Subscription: IOT-Athens-SLFHST | Region: East US | Current size: Standard_D4s_v3 | Image: Windows 10 Enterprise 2019 LTSC | Learn more about VM sizes

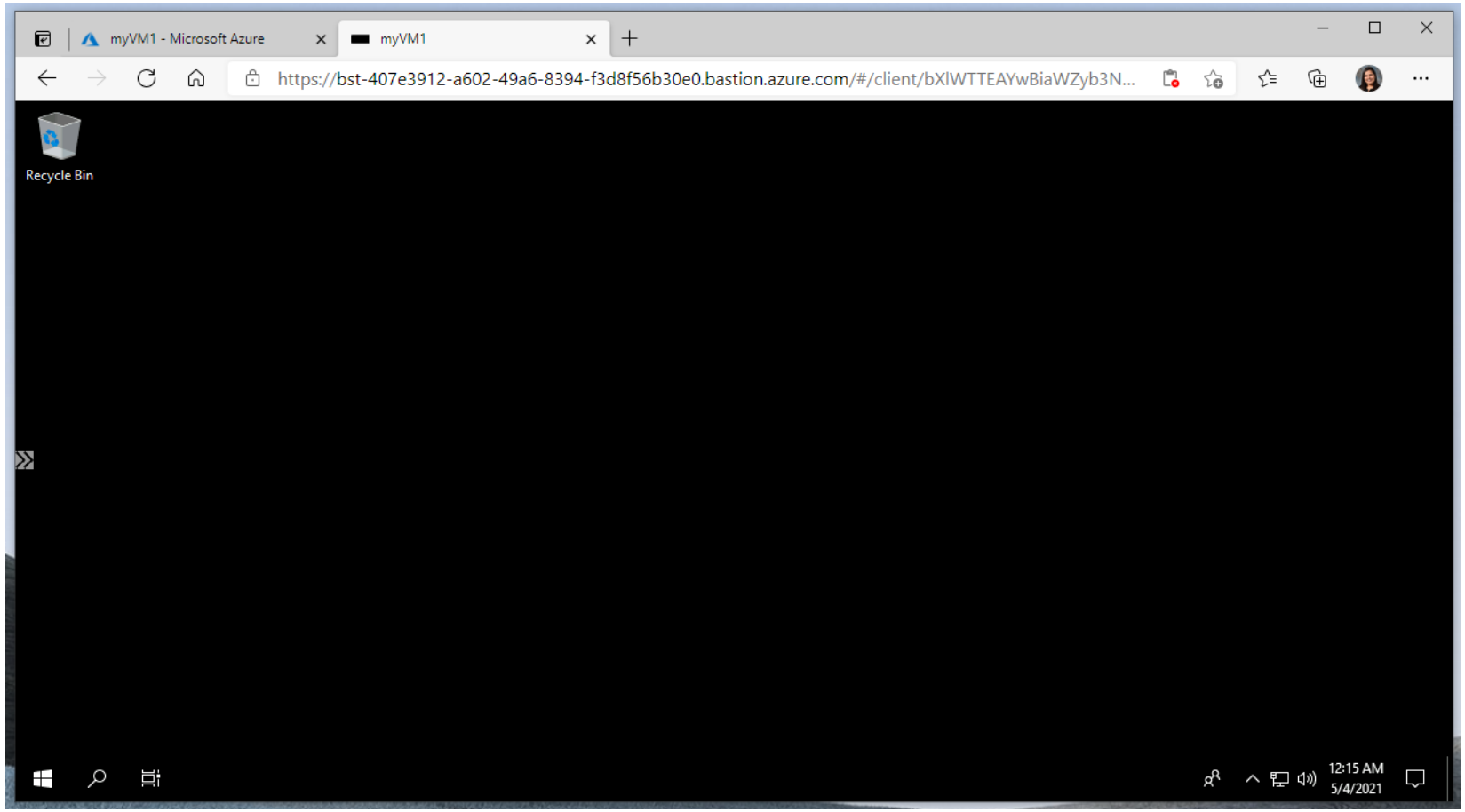
VM Size	Family	vCPUs	RAM (GiB)	Data disks	Max IOPS	Temp storage (GiB)	Premium disk
Most used by Azure users		The most used sizes by users in Azure					
DS1_v2	General purpose	1	3.5	4	3200	7	Supported
D2s_v3	General purpose	2	8	4	3200	16	Supported
D2as_v4	General purpose	2	8	4	3200	16	Supported
B2s	General purpose	2	4	4	1280	8	Supported
B1s	General purpose	1	1	2	320	4	Supported
B2ms	General purpose	2	8	4	1920	16	Supported
B1ls	General purpose	1	0.5	2	160	4	Supported
DS2_v2	General purpose	2	7	8	6400	14	Supported
B4ms	General purpose	4	16	8	2880	32	Supported
D4s_v3	General purpose	4	16	8	6400	32	Supported
DS3_v2	General purpose	4	14	16	12800	28	Supported
D8s_v3	General purpose	8	32	16	12800	64	Supported

Task 3: Connect to the Virtual Machine



Task 3: Connect to Virtual Machine

- Use the Bastion client to open up the Virtual Machine

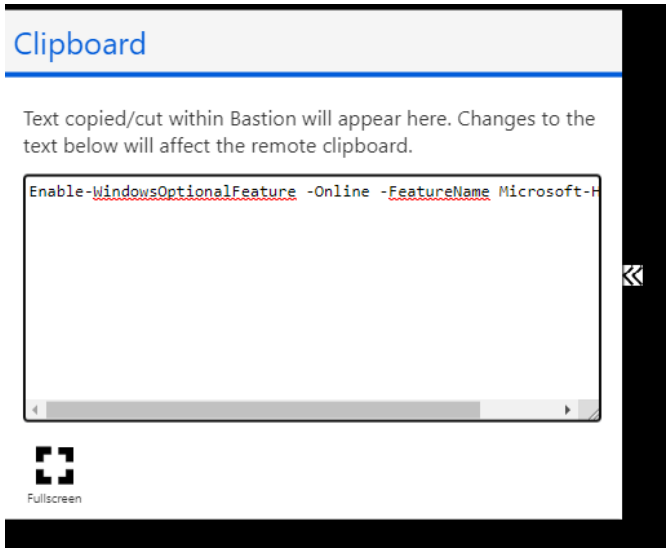


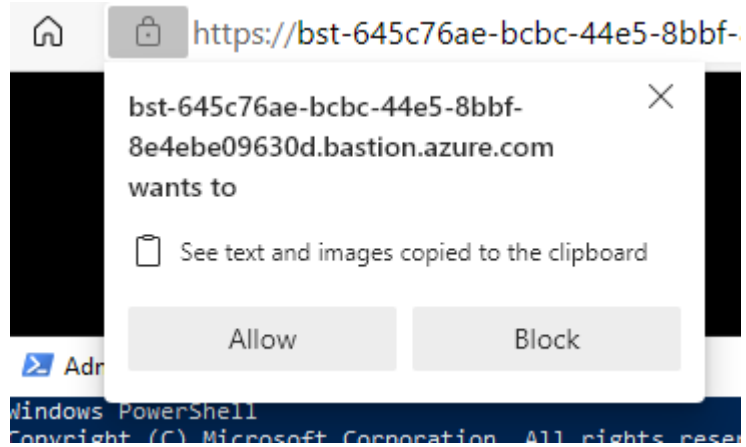
Quick Battle Check!

Can you open up the Bastion connection in a Tab?

Quick Bastion Tips

- If asked for permission – Allow Clipboard to be shared
- You can see what is in your clipboard (arrows)
- Paste clipboard contents by right-clicking
  - Helpful for PowerShell Commands





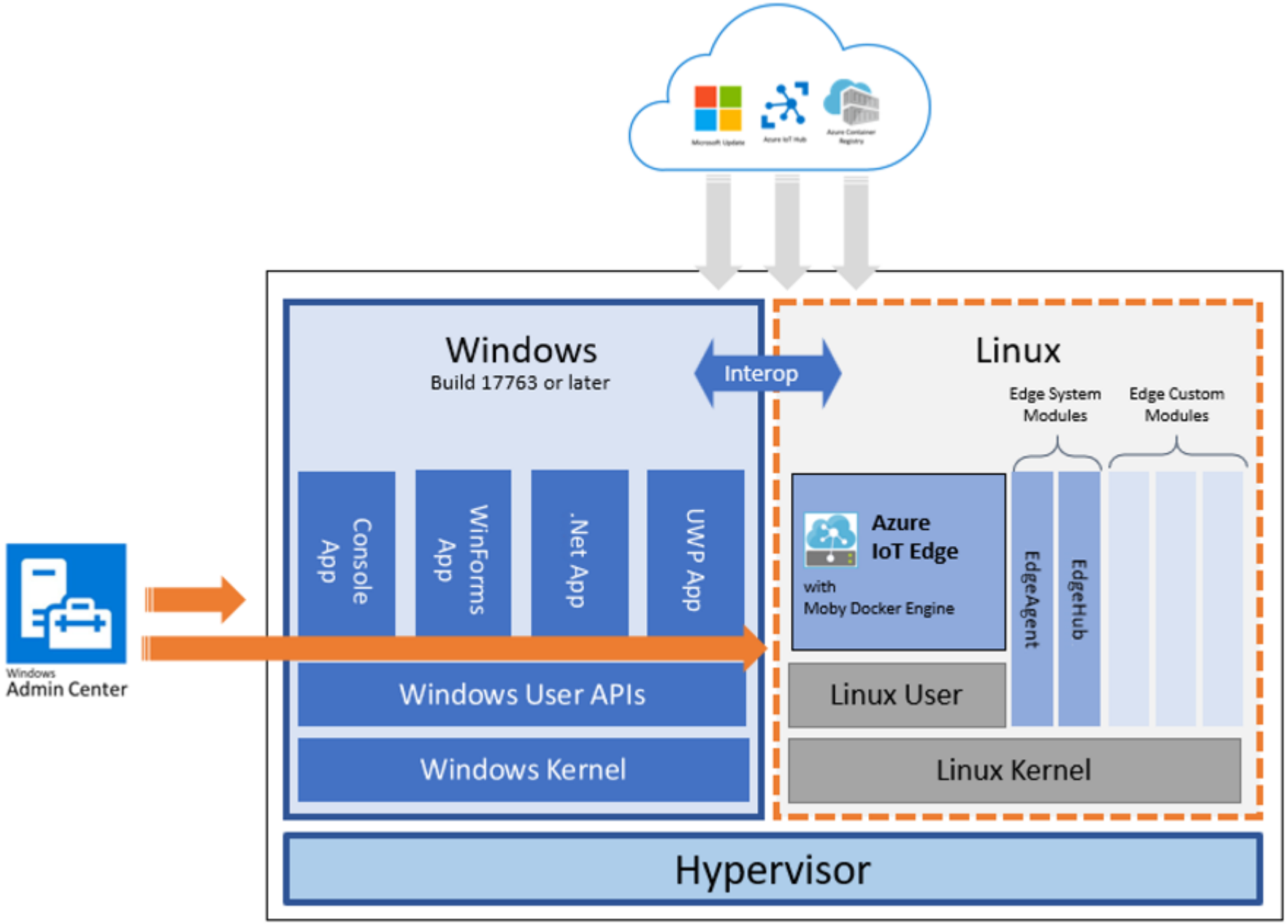
AZURE IOT ACADEMY

EPISODE II

CONJUNCTION OF THE OS

Objective: Set up EFLOW

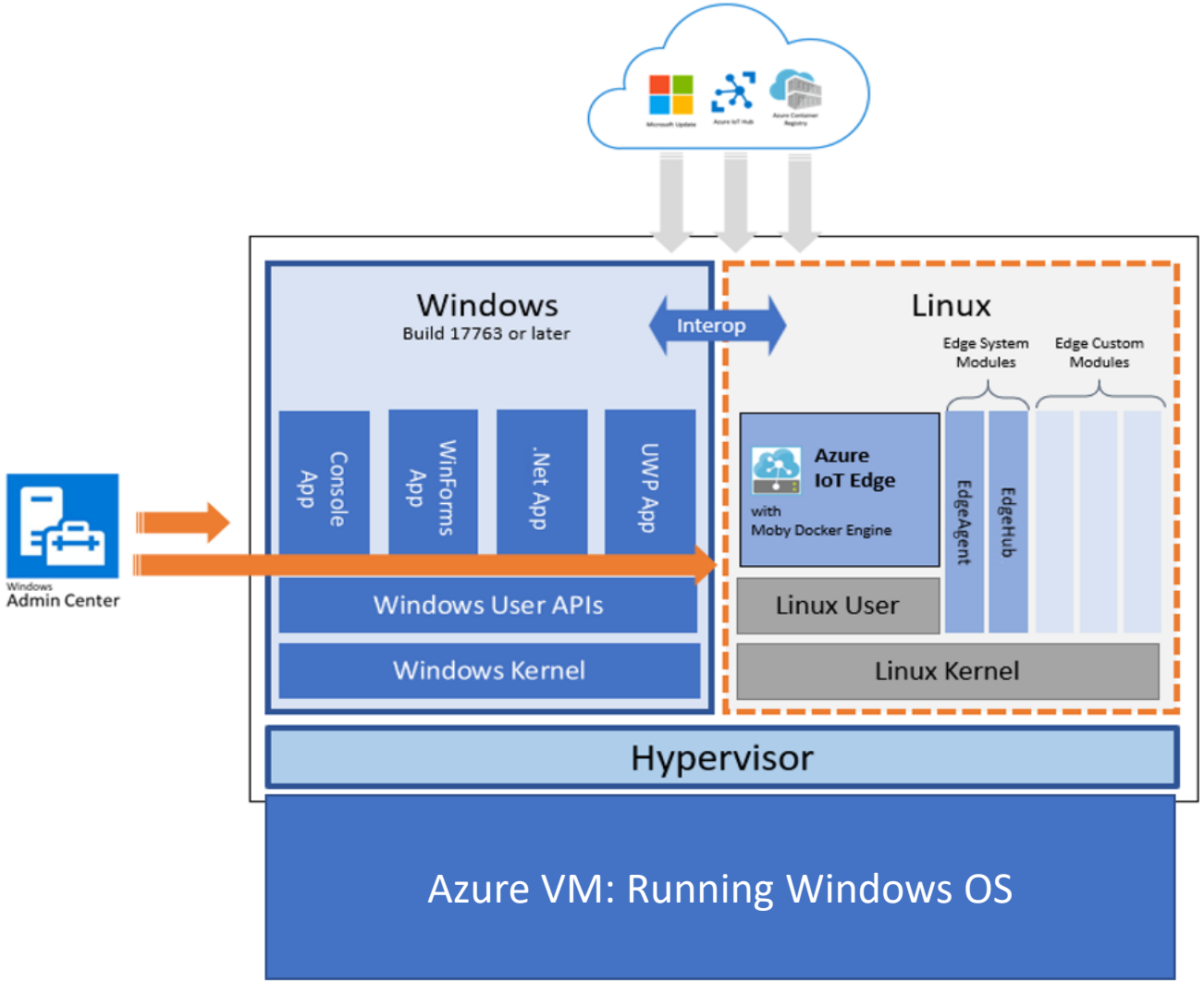
- Task 1: Enable Hyper-V
- Task 2: Set up Azure IoT Hub
- Task 3: Register an IoT Hub Device
- Task 4: Download Windows Admin Center
- Task 5: Create a new deployment
- Task 6: Verify successful configuration


Windows
Admin Center
Windows
Build 17763 or later
Interop
Linux
Edge System Modules
Edge Custom Modules
Console App
WinForms App
.Net App
UWP App
Azure IoT Edge
with
Moby Docker Engine
EdgeAgent
EdgeHub
Windows User APIs
Linux User
Windows Kernel
Linux Kernel
Hypervisor

Task 1: Enable Hyper-V

- To run EFLOW – you need to run a Linux VM on the Windows Host
- Enable Hyper-V to run a VM
- Your VM must support ‘Nested Virtualization’

Task 1: Enable Hyper-V

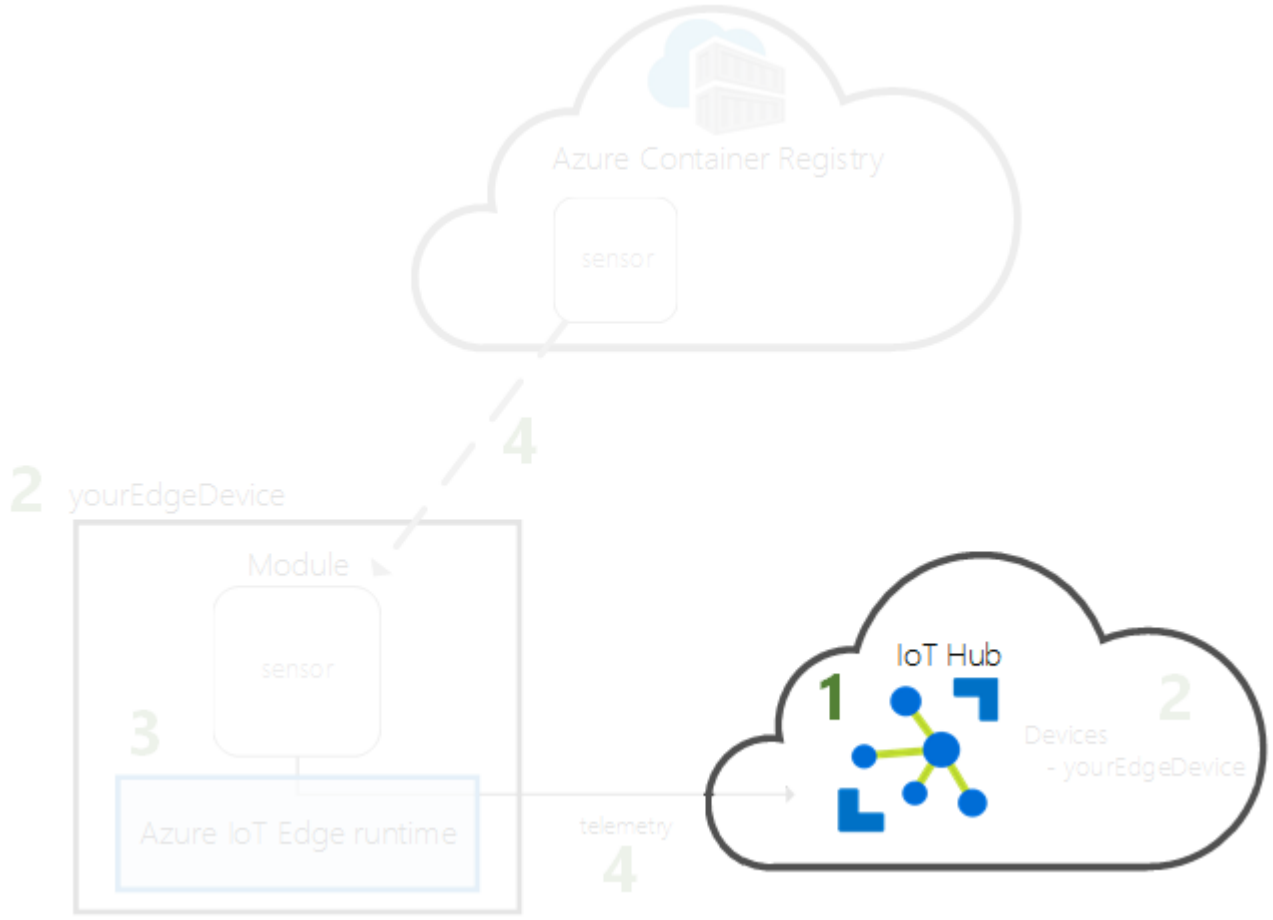



Quick Battle Check!
Did you (or did your) virtual machine restart after enabling Hyper-V?

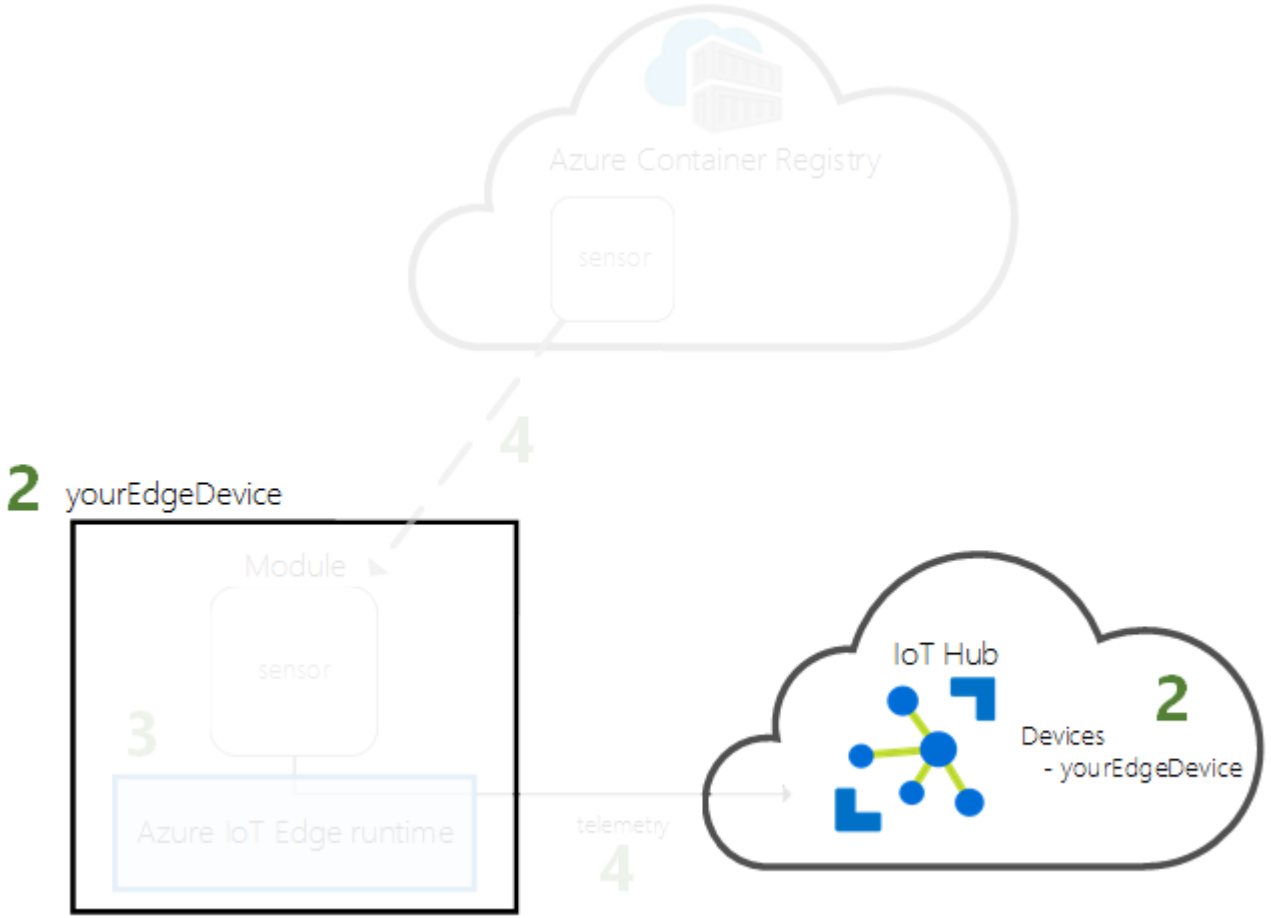
Task 2: Set up Azure IoT Hub

Azure IoT Hub provides feature support in the following areas:

- Security
- Scalability
- Routing
- Service Integration
- Device Management
- Monitoring



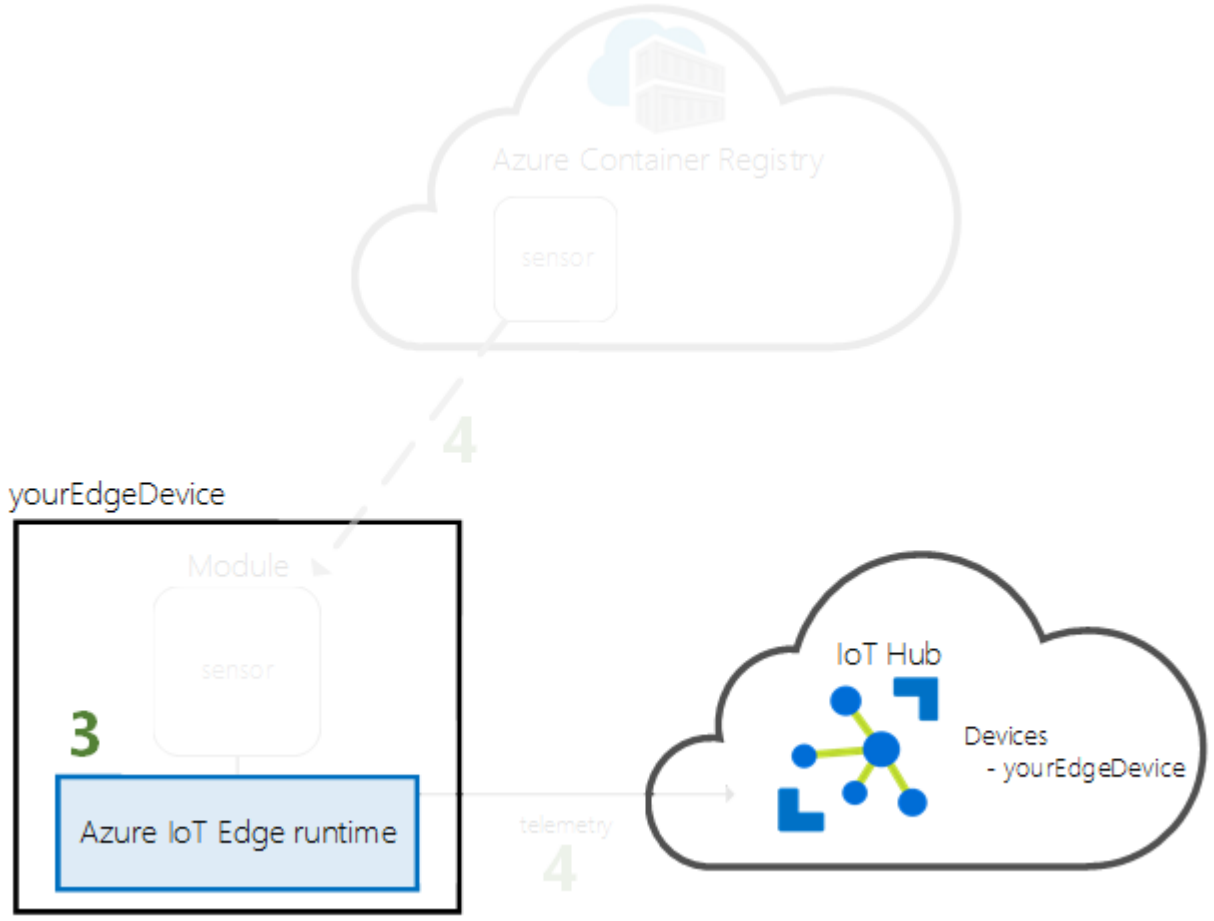
Task 3: Register an IoT Hub Device



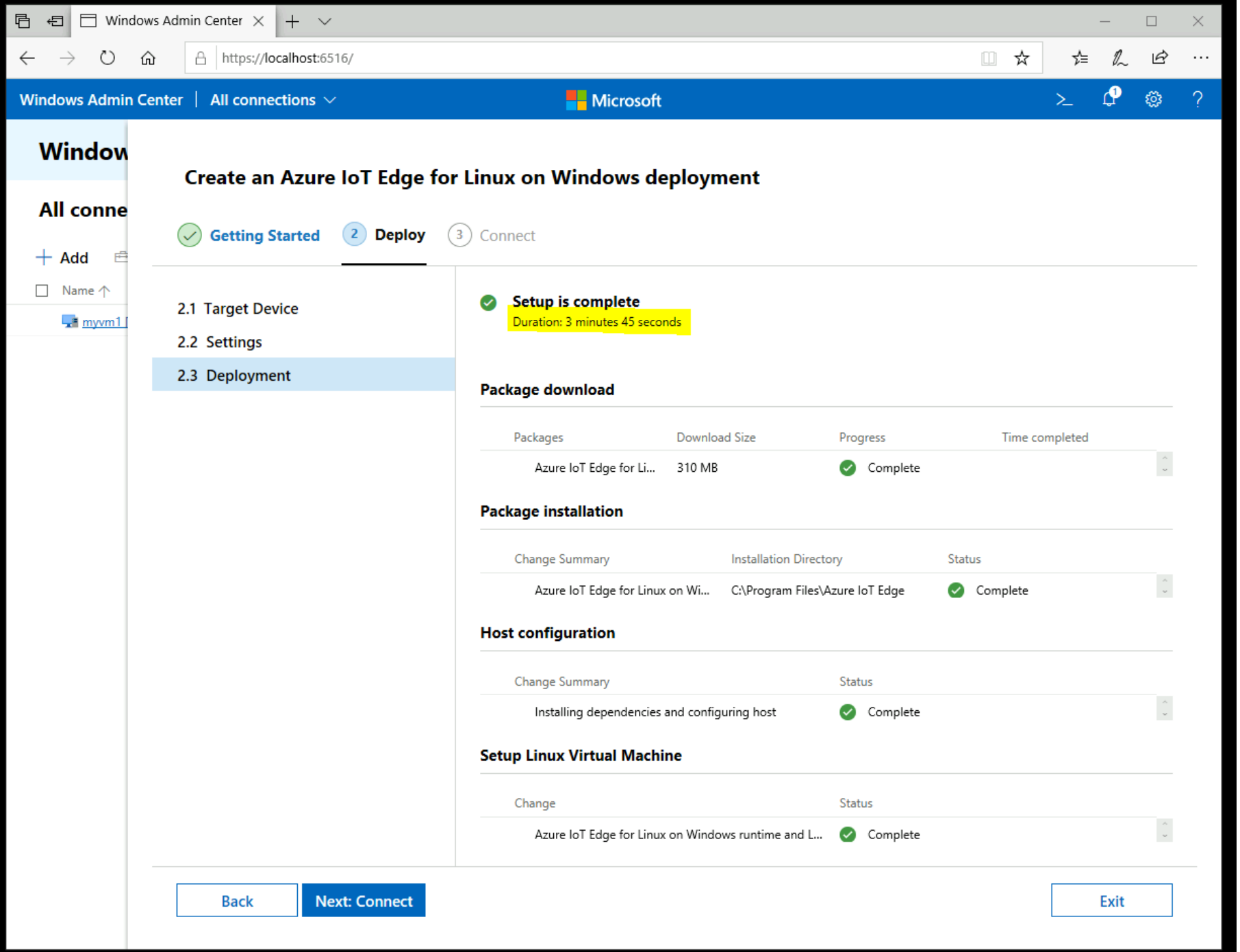
Task 4: Download Windows Admin Center

- We use Windows Admin Center to Deploy the Linux VM
- Make sure to download this in your **Azure VM**

Task 5: Create a new deployment



Install IoT Edge for Linux on Windows on your VM and configure it with the device connection string.



Note: It may take a few minutes to Deploy your VM

Task 6: Verify successful configuration

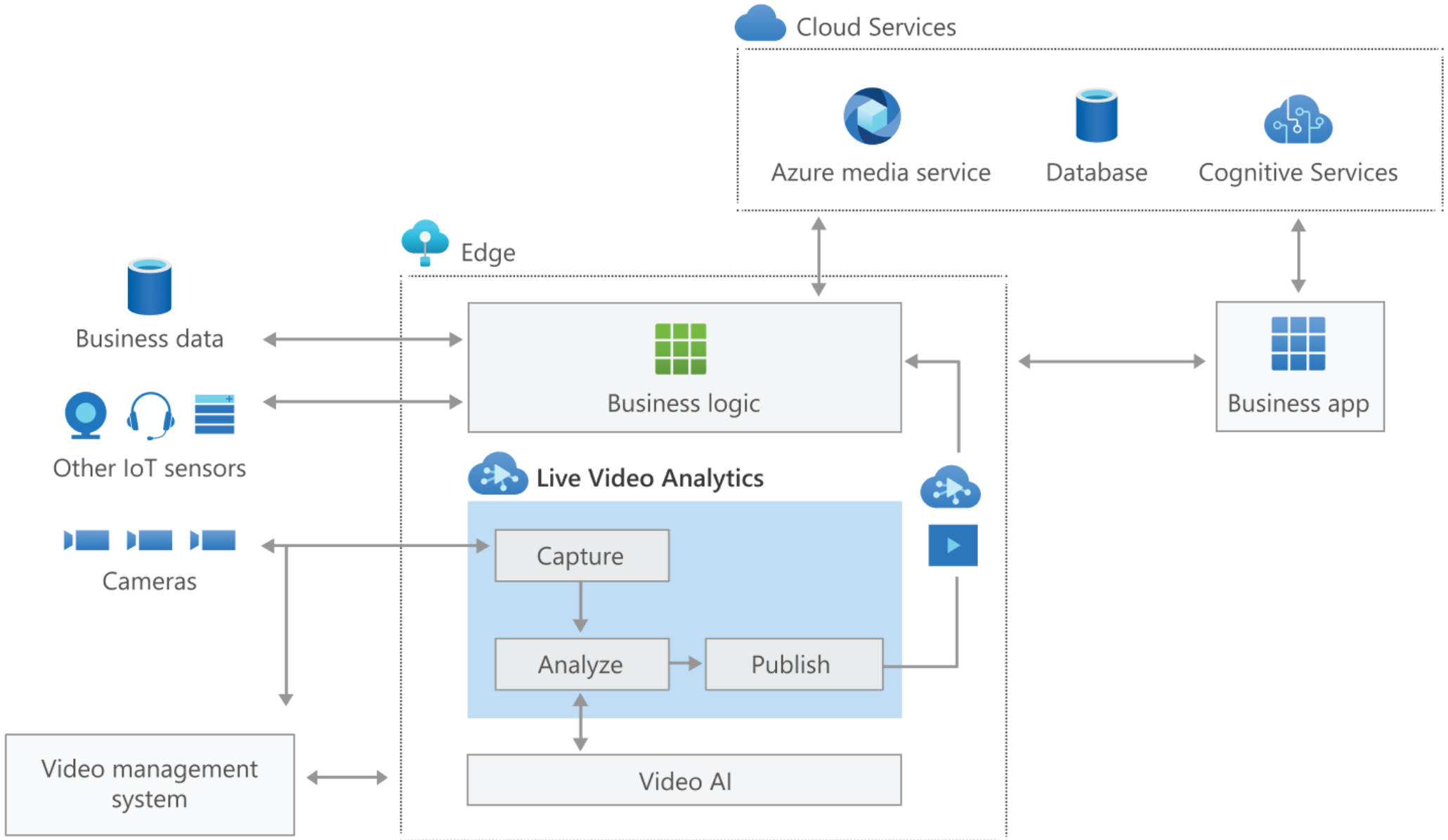
- Select your IoT Edge device from the list of connected devices in Windows Admin Center to connect to it.


Quick Battle Check!
Can you connect to your IoT Edge Device?

AZURE IOT ACADEMY

EPISODE III

CREATION OF THE LVA


Cloud Services
Azure media service
Database
Cognitive Services
Edge
Business data
Other IoT sensors
Cameras
Business logic
Live Video Analytics
Capture
Analyze
Publish
Video AI
Business app
Video management system

Objective: Set up Live Video Analytics

- Task 1: Download Tools and Resources
- Task 2: Create Azure Resources
- Task 3: Configure the Azure IoT Tools extension
- Task 4: Deploy Modules on Windows Host
- Task 5: Provision Azure IoT Edge for Linux Configuration
- Task 6: Test Video Stream
- Task 7: Enable Live Video Analytics: Inferencing
- Task 8: Connect Windows Video with Linux Inferencing

Task 1: Download Tools and Resources

- To configure LVA:
  - Visual Studio Code
- Run Windows Application:

  Net Core 3.1 SDK
- Test Video Stream:
  - VLC Media Player
- Download Files (Unzip + move to Desktop)
  - Windows Application
  - Certificates

Task 2: Create Azure Resources

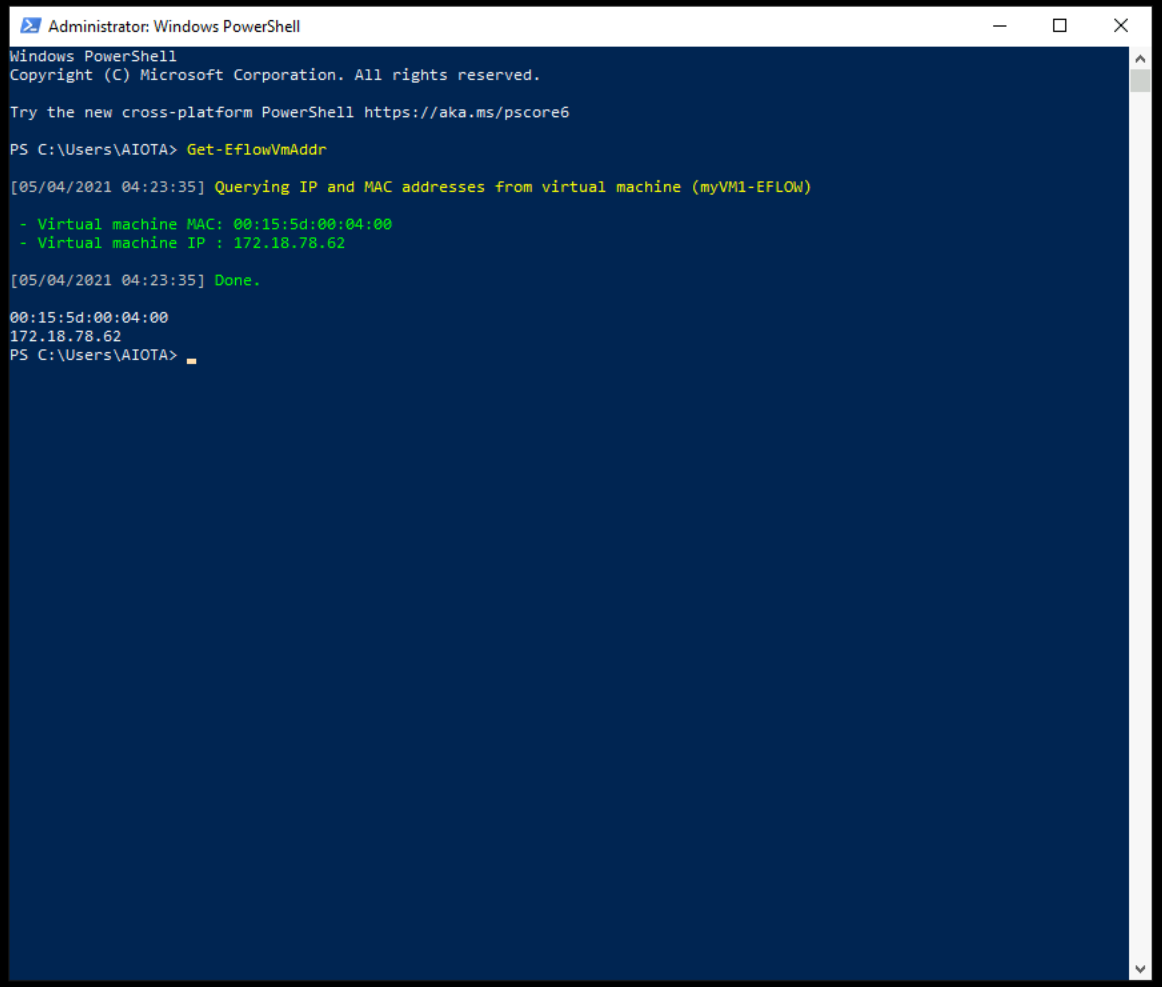
- Run a script to create/allocate all LVA Resources
- Net new:
  - **Streaming Endpoint -** This will help in the playing the recorded AMS asset
    - (we will not use in this lab)
  - **Media service account** - This helps with managing and streaming media content in Azure.
    - (we will not use in this lab)
  - **Storage account** - You must have one Primary storage account and you can have any number of Secondary storage accounts associated with your Media Services account.
  - **Container registry** - This helps in storing and managing your private Docker container images and related artifacts.

Task 3: Configure the Azure IoT Tools extension

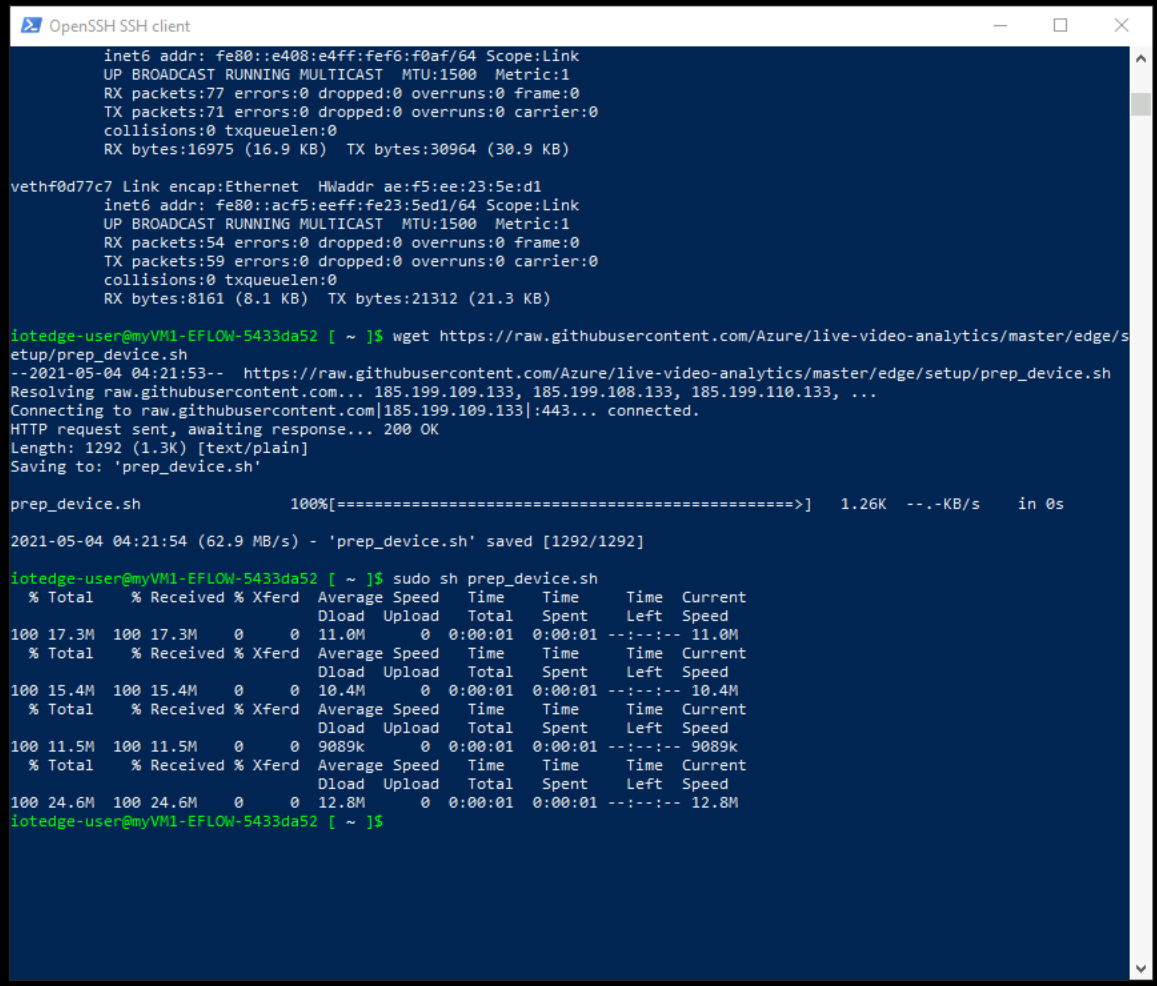
- Configure IoT Hub Extension in Visual Studio

Task 4: Deploy Modules on Windows Host

- Copy Raw Deployment.JSON file
- Note you will have two on-going PowerShell sessions
  1. Windows VM
  2. Ssh into the EFLOW VM



Windows Host

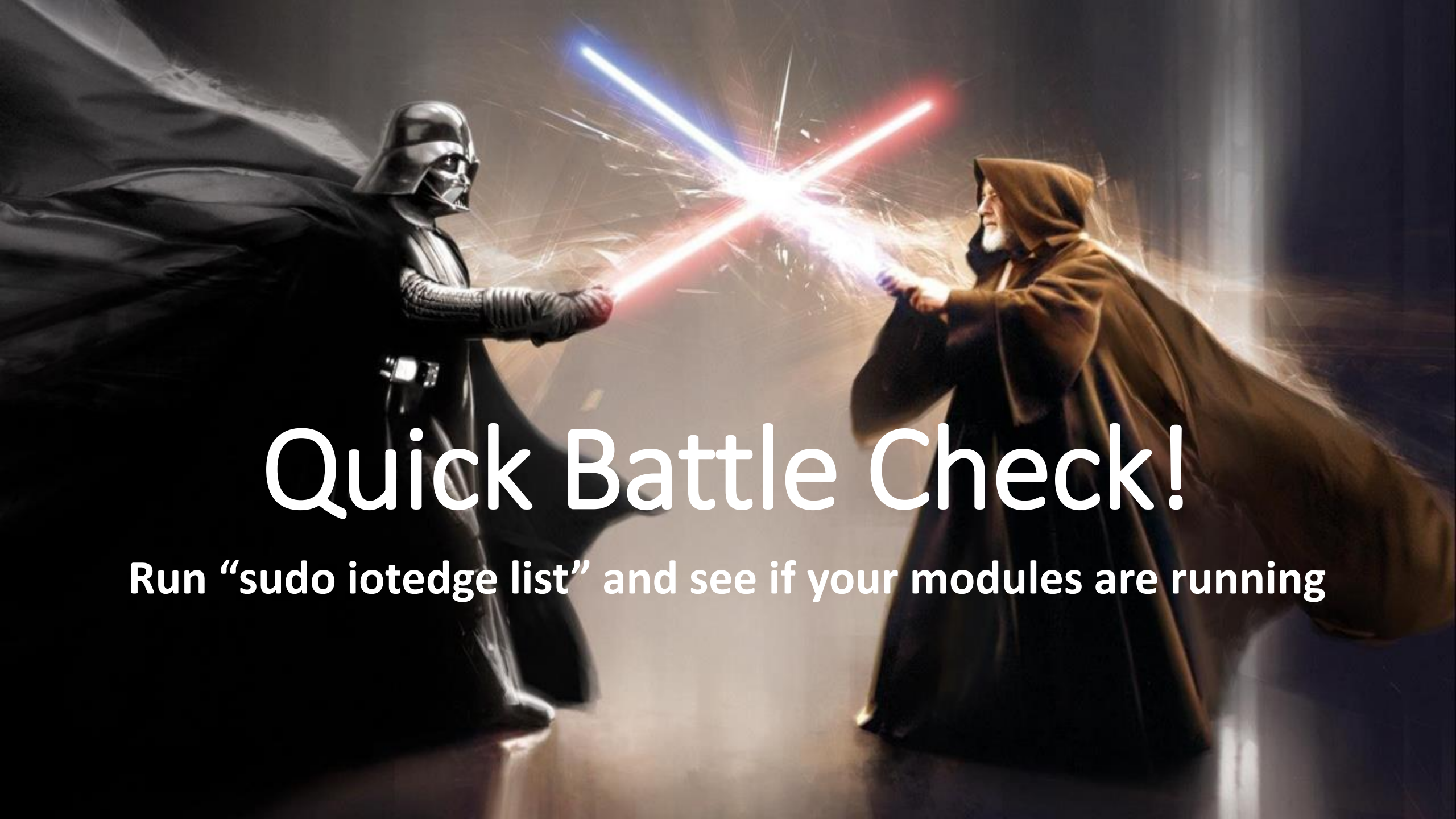


EFLOW VM

Task 5: Provision Azure IoT Edge for Linux Configuration

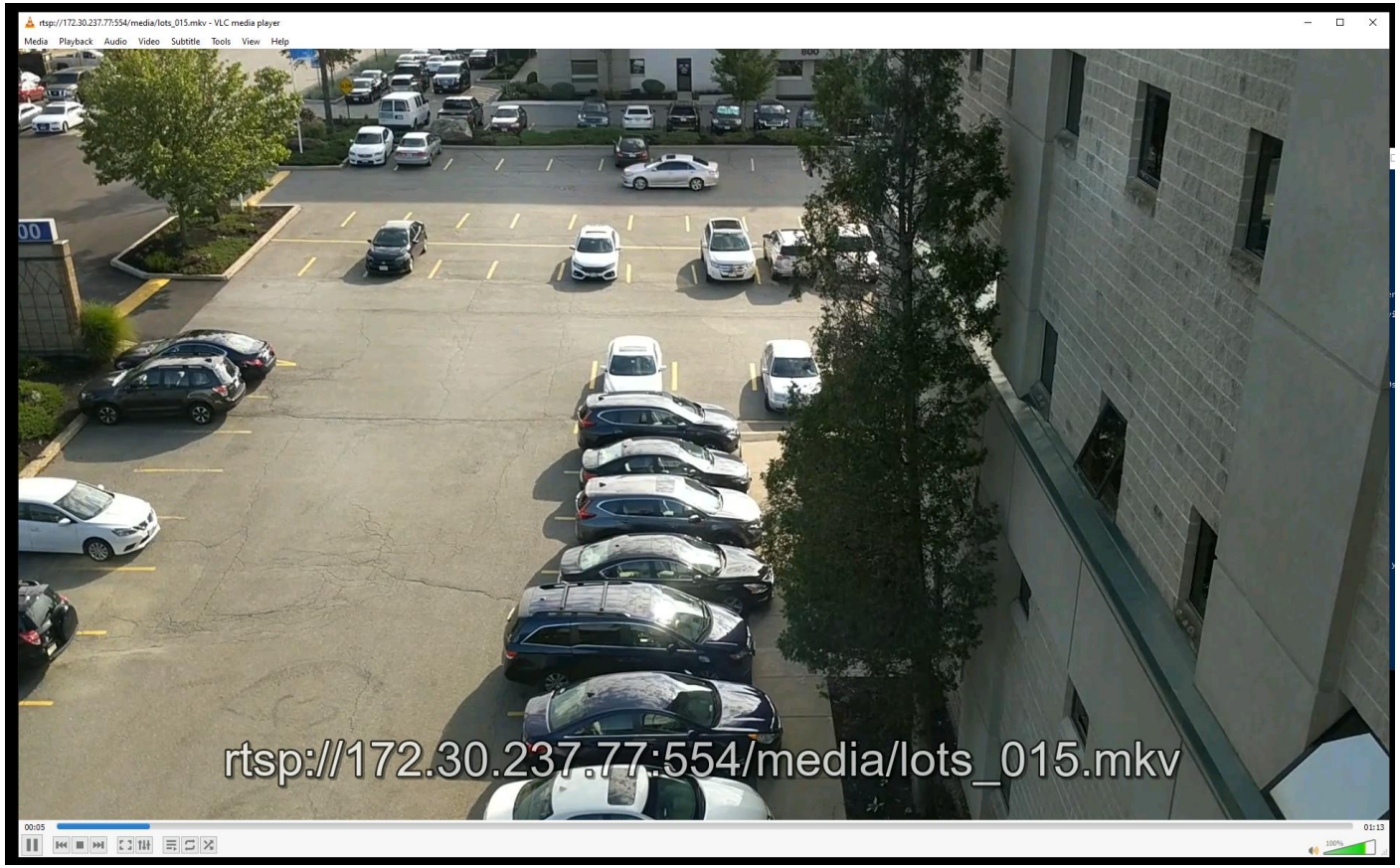
- Update file paths of Certificates
- Uncomment file paths (remove #)
- Update hostname with EFLOW VM IP

Certificates are for the interop communication between the Linux and Windows side


Quick Battle Check!
Run “sudo iotedge list” and see if your modules are running

Task 6: Test Video Stream

- Test to see if the video stream can be captured




Quick Battle Check!
Are you seeing a video stream?

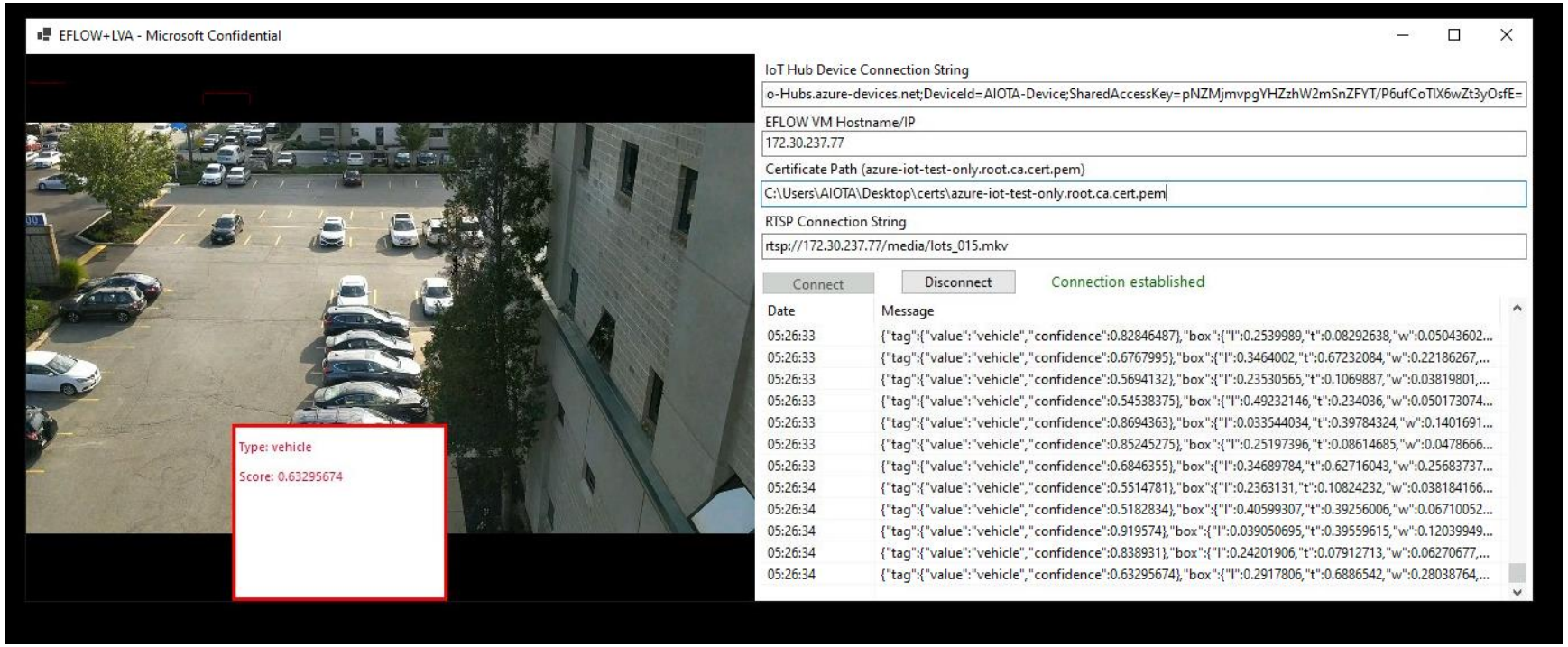
Task 7: Enable Live Video Analytics: Inferencing

- Download Live Video Analytics on IoT Edge (Visual Studio Extension)
- Create Child IoT Device
- Invoke Graph Topology
- Start Inferencing with Open Vino
- Monitor Built-In-Endpoint
- Activate Graph Instance

Purpose: Set up AI inferencing on the Linux Side

Task 8: Connect Windows Video with Linux Inferencing

- Run Windows Application
- Enable Connection Points




Quick Battle Check!
Are you seeing Live Inferencing?

Clean Up

- Delete VM
- Delete Resource Group
- Verify that everything has been deleted