Deploy Linux-Based Apps on Your Windows Infrastructure

Microsoft

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SCALERS AI

ARROW
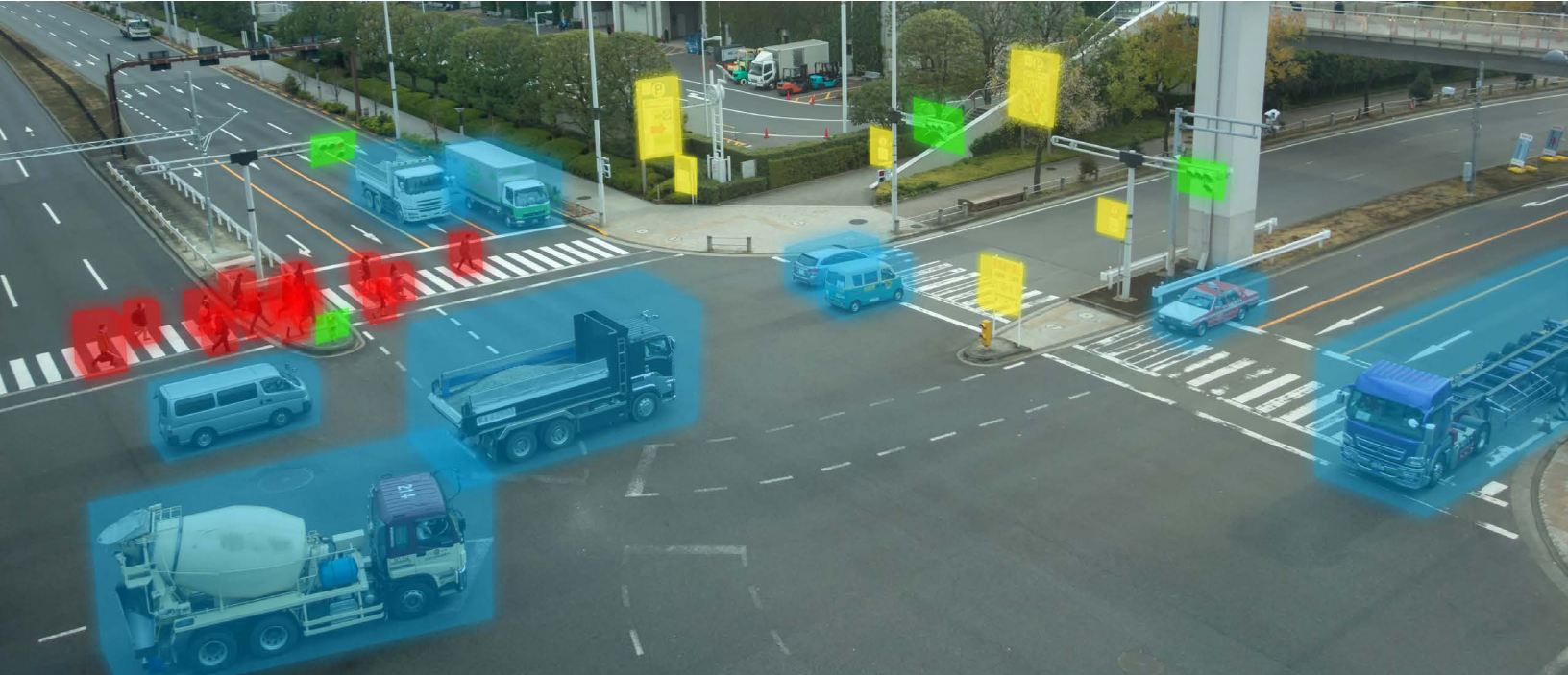
Reimagine the Possibilities with the Best of Windows 10 IoT Enterprise and Linux

Connected devices and the internet of things (IoT) have created new opportunities and challenges for technology providers. While new business models, competitive differentiation, and new opportunities for value creation are now made possible, IoT has significantly increased the complexity of technology deployments.

Millions of edge solutions in manufacturing, retail, healthcare, signage, and public safety use Windows IoT operating systems due to long-term support, lock-down capabilities, and advanced security features. While Windows IoT offers many advantages, Linux also has an extensive portfolio of pre-validated modules needed for next-generation AI. As AI-based edge devices advance and become essential in a more connected world, practitioners will need mixed environments that support both Windows IoT and Linux.
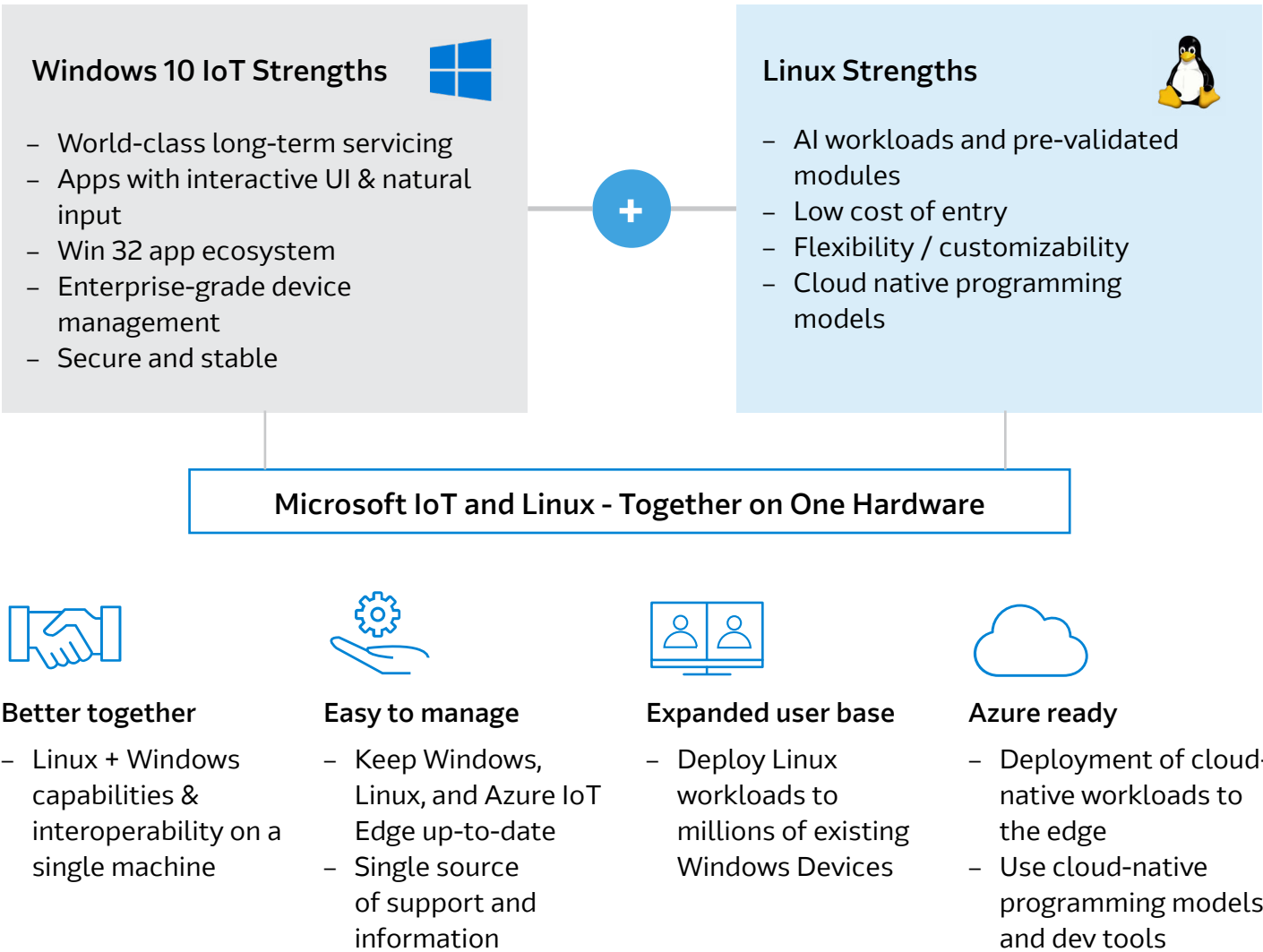
In environments where both Windows 10 IoT Enterprise and Linux operating systems can be used to deliver a comprehensive value proposition for customers, technology providers have to contend with multiple hardware systems and increased management of infrastructure. Microsoft is alleviating this problem by giving technology practitioners the option to have single hardware with one management system that supports both Windows IoT and Linux operating systems.

Running Linux modules on Windows 10 IoT Enterprise offers the advantages of both Windows IoT and Linux while accelerating new product development and enabling new possibilities.

Azure IoT Edge for Linux on Windows (EFLOW)

There is no longer a need to choose between Windows or Linux – designers can now leverage the best of both platforms. Azure IoT Edge for Linux on Windows (EFLOW) allows you to run containerized Linux workloads alongside Windows applications in Windows IoT deployments. Businesses that rely on Windows IoT to power their edge devices can now take advantage of the cloud-native analytics solutions being built in Linux.

This opens a world of capabilities for commercial IoT as well as AI/ML with the availability of pre-built modules. Developers may also choose to implement their own custom modules using a Linux distribution of choice to address specific business requirements.

Windows 10 IoT Strengths

– World-class long-term servicing
– Apps with interactive UI & natural input
– Win 32 app ecosystem
– Enterprise-grade device management
– Secure and stable

+

Linux Strengths

– AI workloads and pre-validated modules
– Low cost of entry
– Flexibility / customizability
– Cloud native programming models

Microsoft IoT and Linux - Together on One Hardware

Better together

– Linux + Windows capabilities & interoperability on a single machine

Easy to manage

– Keep Windows, Linux, and Azure IoT Edge up-to-date
– Single source of support and information

Expanded user base

– Deploy Linux workloads to millions of existing Windows Devices

Azure ready

– Deployment of cloud-native workloads to the edge
– Use cloud-native programming models and dev tools

How EFLOW Works

EFLOW works by running a Linux virtual machine on a Windows device. The Linux virtual machine comes pre-installed with the IoT Edge runtime. Any IoT Edge modules deployed to the device run inside the virtual machine. Meanwhile, Windows applications running on the Windows host device can communicate with the modules running in the Linux virtual machine.

Bi-directional communication between Windows process and the Linux virtual machine means that Windows processes can provide user interfaces or hardware proxies for workloads run in the Linux containers.

Microsoft EFLOW Components:

- **A Linux Virtual Machine Running Azure IoT Edge:** A Linux virtual machine, based on Microsoft's first party CBL-Mariner operating system, is built with the IoT Edge runtime and validated as a tier 1 supported environment for IoT Edge workloads.
- **Windows Admin Center:** An IoT Edge extension for Windows Admin Center facilitates installation, configuration, and diagnostics of IoT Edge on the Linux virtual machine. Windows Admin Center can deploy IoT Edge for Linux on Windows on the local device, or can connect to target devices and manage them remotely.
- **Microsoft Update:** Integration with Microsoft Update keeps the Windows runtime components, the CBL-Mariner Linux VM, and IoT Edge up to date.
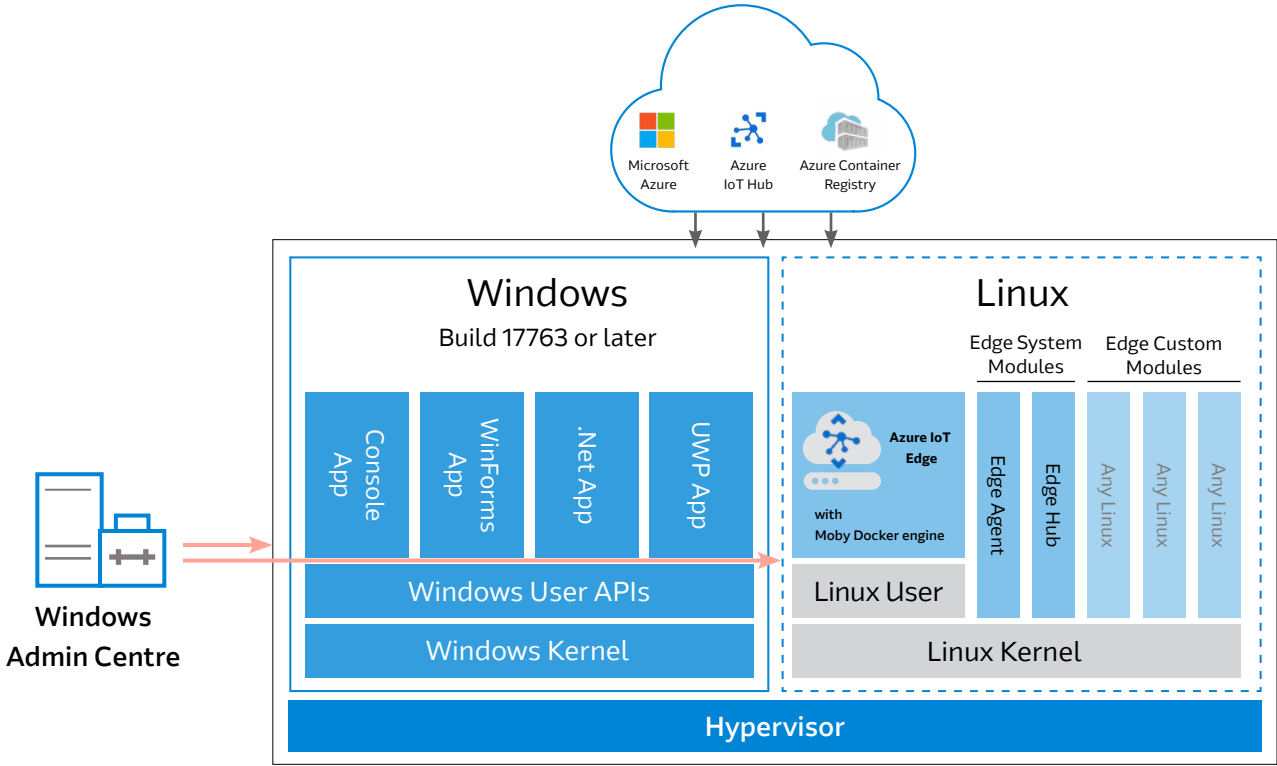
Running Linux modules on Windows 10 IoT Enterprise offers the advantages of both Windows IoT and Linux

Who will Benefit from EFLOW

If your organization	EFLOW provides
– Is a Microsoft shop and does not want to introduce a different OS – Does not have Linux knowledge in-house or on location	Familiar windows management tools for deploying Linux workloads
– Is sometimes deploying solutions in remote, less accessible locations – Has network latency, outages and/or delays that prohibits running workload in the cloud	Deployment of cloud-native workloads to the edge
– Is using Linux today but would prefer Windows to perform the same function	Ability to use existing Linux modules but manage & secure your devices with Windows
– Wants to keep the cost of hardware assets in check – Has both Windows and Linux devices and wants to reduce overhead	Linux + Windows capabilities and interoperability on a single machine
– Is developing IoT Edge solutions and selling those in the IoT Edge marketplace	Linux IoT Edge modules run on Windows devices

Summary of EFLOW Benefits:

- Efficiently distribute workloads between Windows and Linux
- Build new solutions faster and transform your offerings
- Reduce complexity by minimizing hardware SKUs
- Maximize return on investment with leading technologies
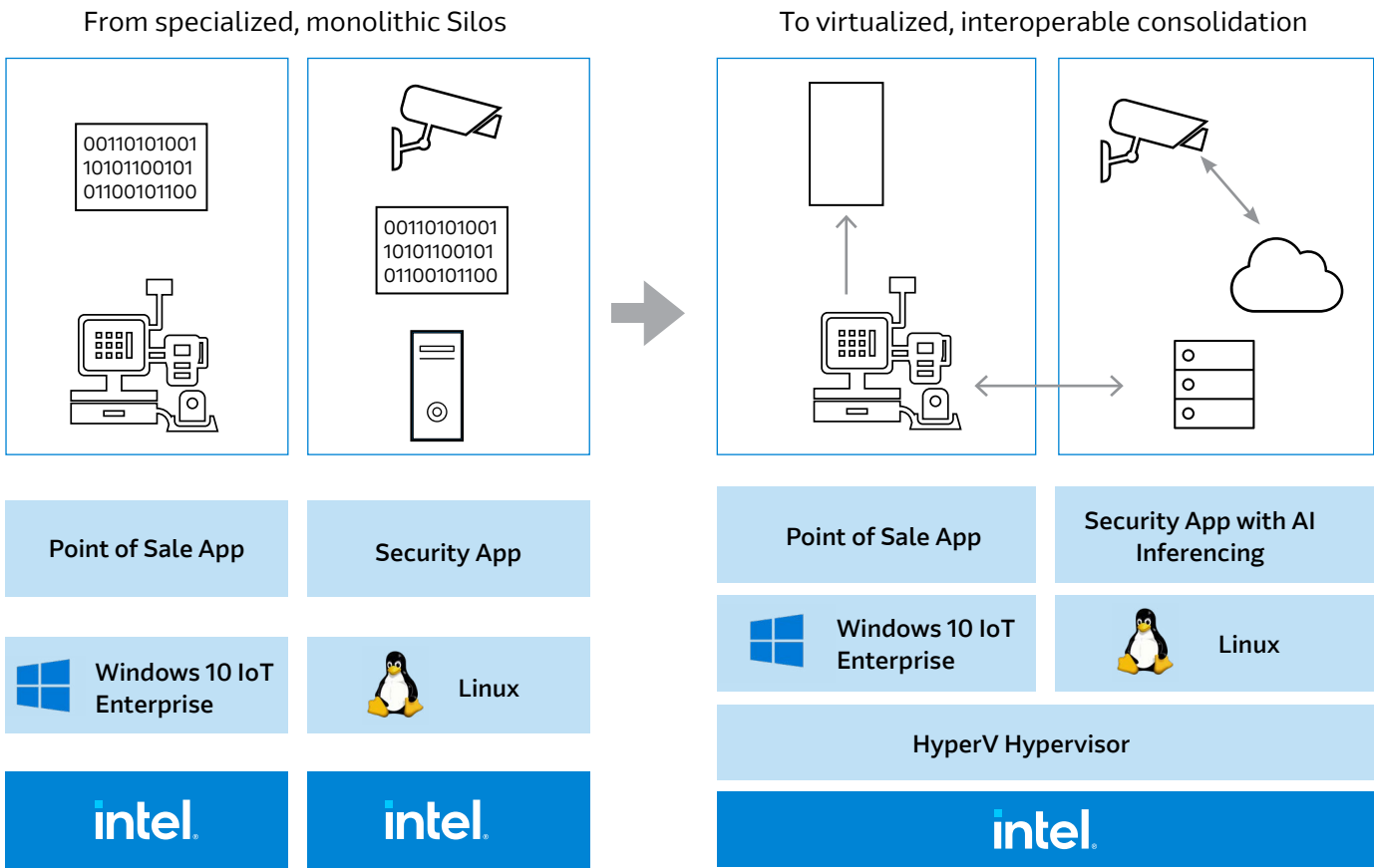- Future-proof systems and build scalable solutions

Use Case
Workflow Consolidation with EFLOW in Retail

Workload consolidation unites multiple computerized operations onto fewer platforms, replacing separate purpose-built hardware machines with a single hardware. Reducing hardware infrastructure and utilizing existing resources helps optimize operations.

Unlike running multiple user applications on a single, multi-tasking operating system (OS), workload consolidation creates separate, isolated environments, each with its own OS, on a single, powerful platform. Virtualization creates isolated environments that access the underlying hardware through a central layer called a hypervisor. Each virtual machine runs as though it was the only environment on the platform with its OS and virtualized network and storage resources.
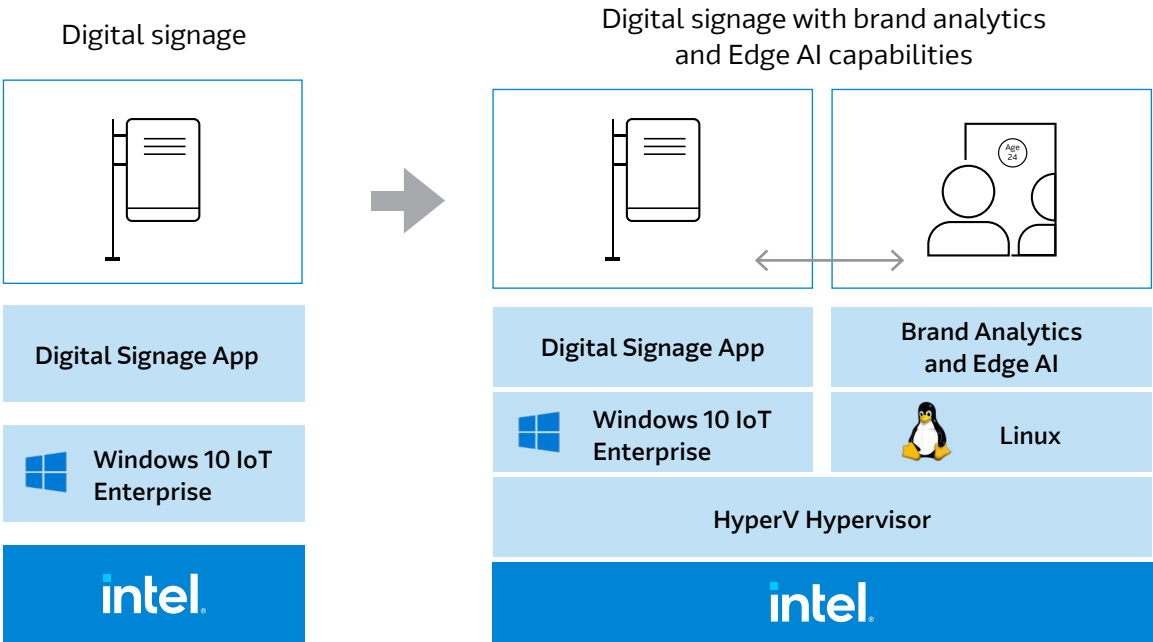
In this use case, EFLOW is used to consolidate separate point-of-sale and security appliances into a single appliance that runs both Windows IoT and Linux.
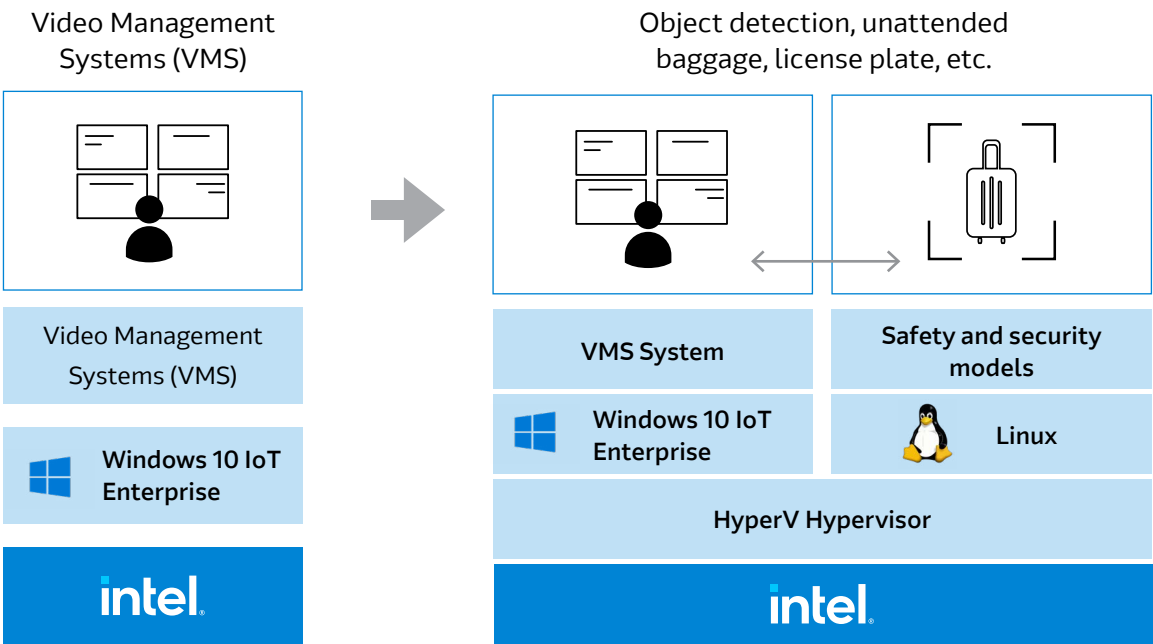
From specialized, monolithic Silos   To virtualized, interoperable consolidation

Point of Sale App	Security App

Windows 10 IoT Enterprise	Linux

Point of Sale App	Security App with AI Inferencing
Windows 10 IoT Enterprise	Linux
HyperV Hypervisor	

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Use Case
Add New Capabilities to Existing Infrastructure with EFLOW

Integrate and Extend Leading Windows Based Digital Signage Systems with New Edge AI Capabilities

Digital signage   Digital signage with brand analytics and Edge AI capabilities

Digital Signage App
Windows 10 IoT Enterprise

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Digital Signage App	Brand Analytics and Edge AI
Windows 10 IoT Enterprise	Linux
HyperV Hypervisor	

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Extend Existing Video Management Systems (VMS) with Object Detection Capabilities using EFLOW

Video Management Systems (VMS)   Object detection, unattended baggage, license plate, etc.

Video Management Systems (VMS)
Windows 10 IoT Enterprise

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VMS System	Safety and security models
Windows 10 IoT Enterprise	Linux
HyperV Hypervisor	

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# Edge AI Solution Accelerator: Powered by EFLOW and Intel OpenVINO™

Includes: Smart Port Sample App, Scalable AI Models, Step-By-Step Developer Training Guide & GitHub

Reduce hundreds of hours of development with the Arrow Edge AI Solution accelerator. The fully integrated edge to cloud reference solution provides the ideal starting point to customize and fast-track deployment of edge AI solutions. The solution uses Microsoft EFLOW and Intel OpenVINO™ technologies to run modern AI workloads in Linux on Windows with integrated graphics acceleration, lowering the total cost of ownership. Microsoft EFLOW & Intel OpenVINO™ are complemented with industry-standard components to deliver AI in production.

The offering includes a Smart Port use case showcasing how ports can optimize truck turn times, reduce port congestion, increase operational visibility, and enhance worker safety by running Linux AI with Windows applications such as connecting windows-based alarm system to alert operators of safety violations with enhanced AI-based worker safety solutions in Linux. Documentation, code, and step-by-step developer video training are available on GitHub.

Validated hardware includes Lenovo ThinkEdge SE30 and 11th Generation Intel® NUC computers.

## Solution Architecture for the Arrow Edge AI Solution Accelerator Platform
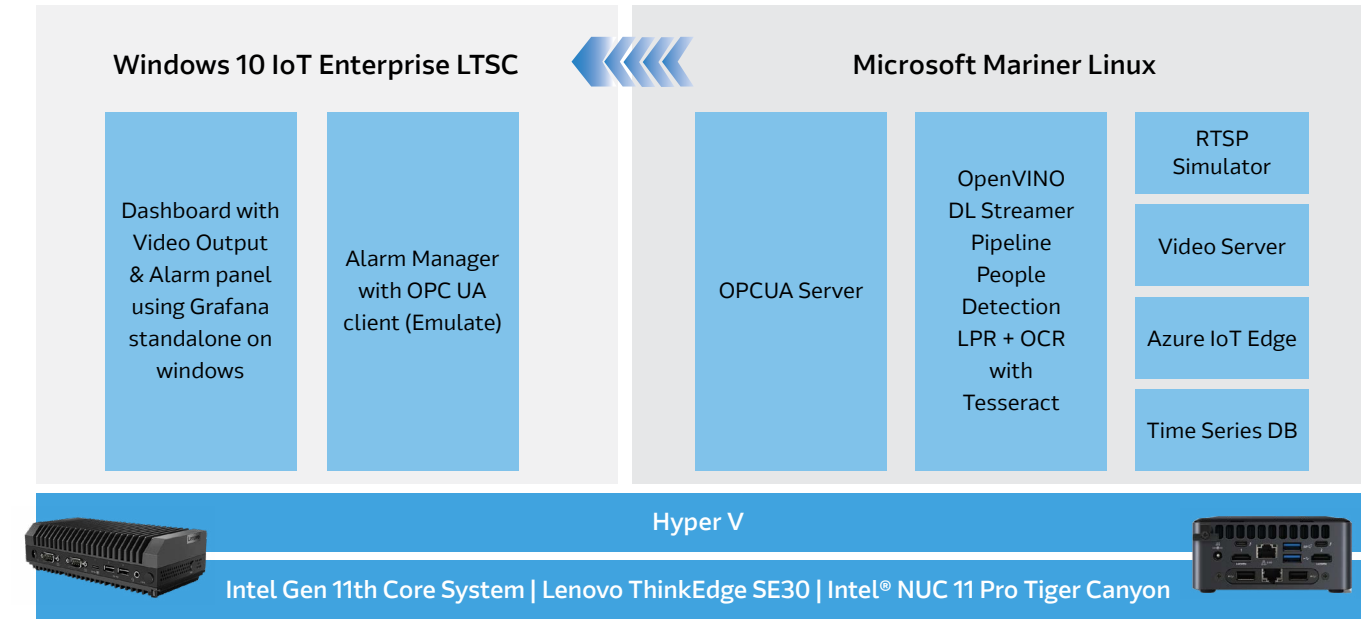
Contact Arrow for the Edge AI Solution Accelerator and save 100s of hours of development time!

Functions Implemented in Linux: License plate detection and reading for turn time analysis and worker safety
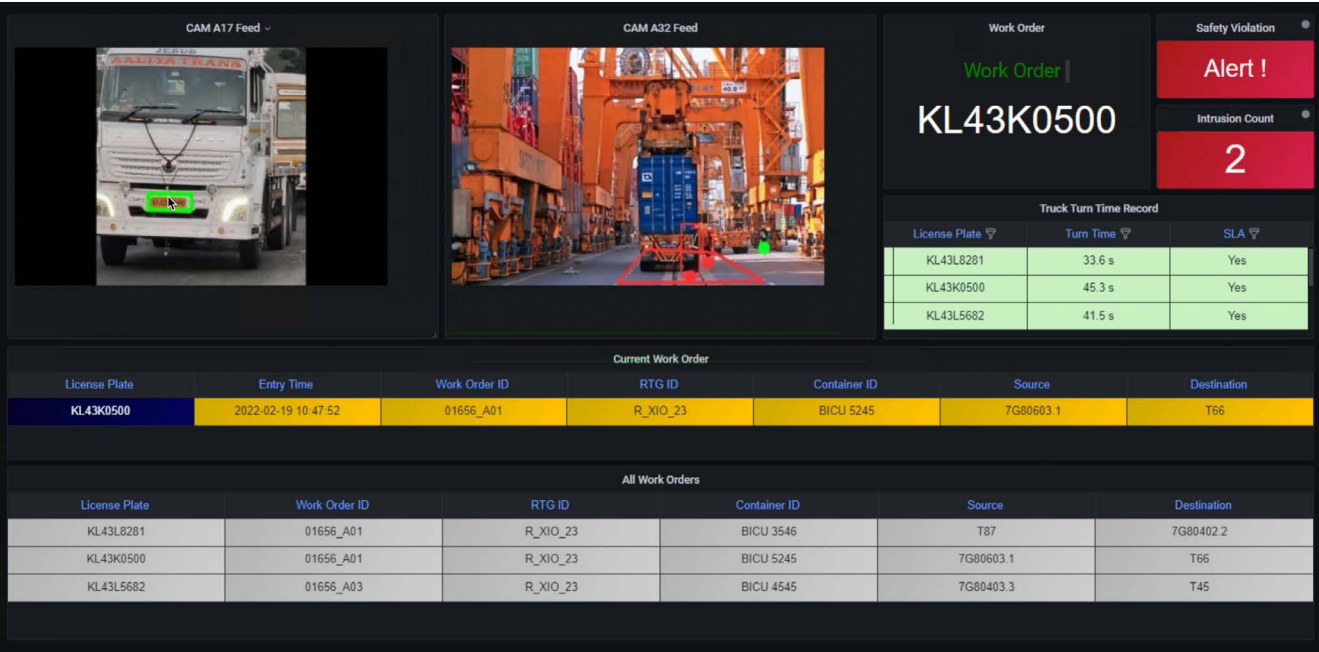
Functions Implemented in Windows: Windows user interface (UI) and existing port applications, including alarm manager
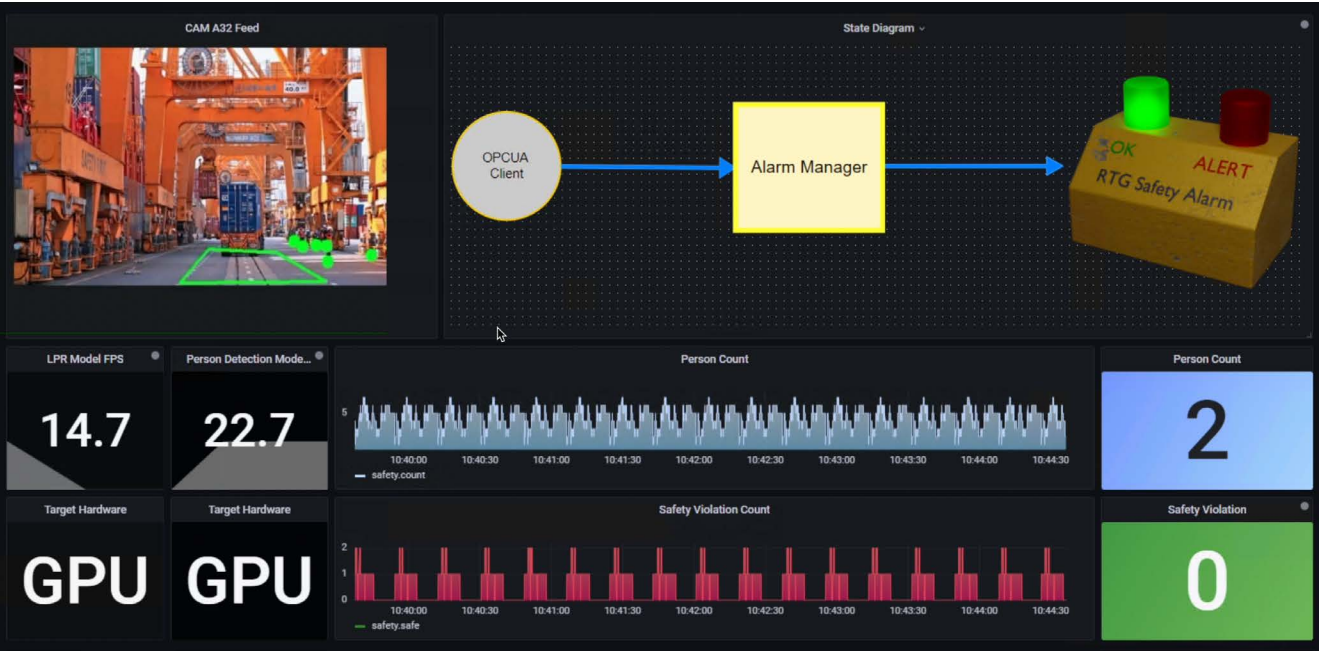
Getting Started

Minimum Requirements for EFLOW

<u>System Requirements</u>

Windows 10[1]/11 (Pro, Enterprise, IoT Enterprise)
Windows Server 2019[1]/2022

<u>Hardware Requirements</u>

Minimum Free Memory: 1 GB
Minimum Free Disk Space: 10 GB

[1] Windows 10 and Windows Server 2019 minimum build 17763 with all current cumulative updates installed

Related Resources

- <u>Fast track development time with the Arrow CloudEdge Program</u>

- <u>Windows 10 IoT Enterprise LTSC 2021</u>

- <u>Microsoft IoT Operating Systems Roadmaps 2021</u>

Save 100s of hours of development time with the Arrow Edge AI Accelerator. Contact Arrow at <u>msembedded@arrow.com</u> to learn how you can get access to the GitHub repository.

Our response time for the <u>msembedded@arrow.com</u> mailbox is less than 24 hours

About Arrow Intelligent Solutions:

As an authorized distributor of Microsoft Windows IoT operating systems and the Azure cloud, Arrow helps you create, make, manage, and deploy smart, connected devices using the full power of Windows.

From embedded devices and systems to dedicated appliances and fixed-function devices, our dedicated team of Microsoft experts is here to help you simplify your IoT experiences.

- Authorized distributor of Windows licensing and Microsoft Azure

- Trusted advisor of Microsoft offerings

- Certified Microsoft experts including Microsoft MVPs and system architects

- Global deployment capabilities

- Less than 24 hours response time

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