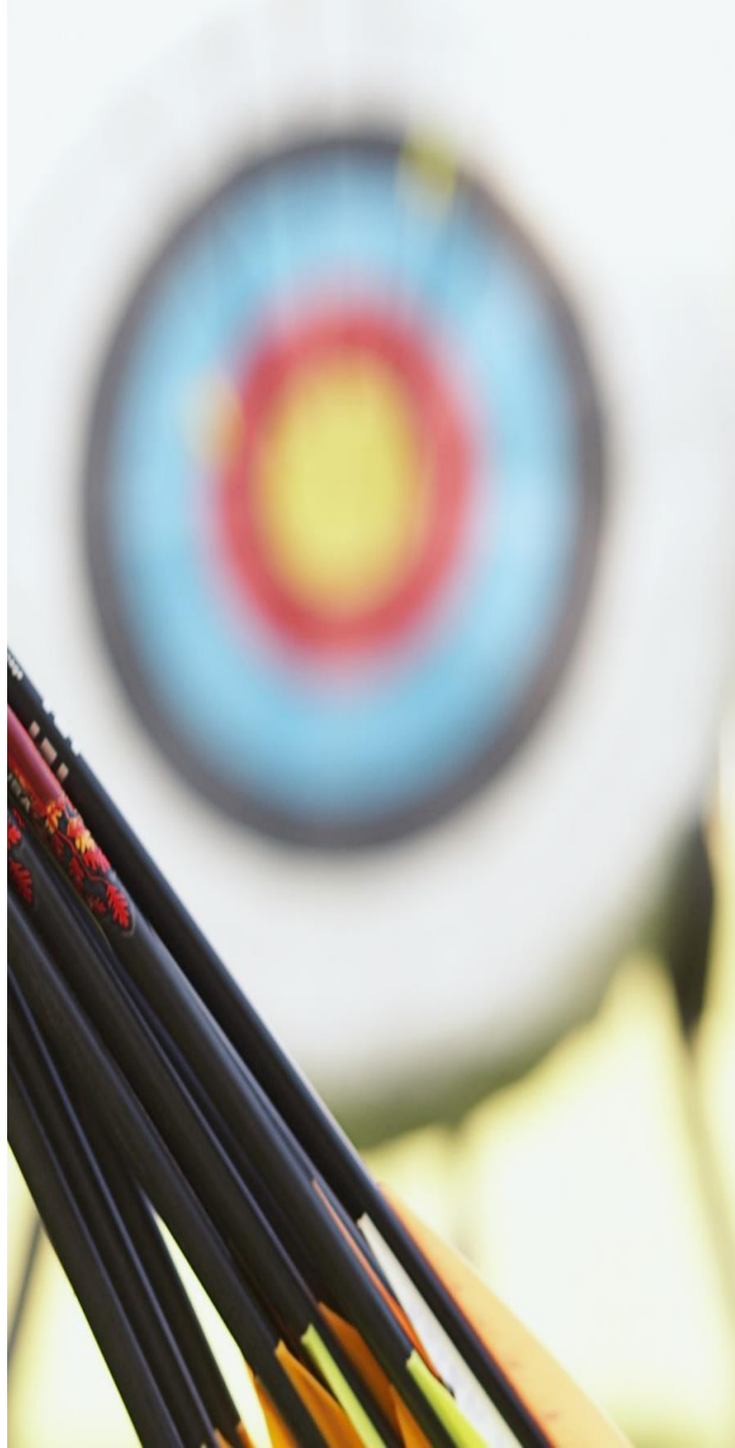
Windows Tech Series

Windows 10 IoT Core

Windows

Objectives

- Review Key Facts for Windows 10 IoT Core
- List the options for building Windows 10 IoT Core devices and solutions
- Describe the Windows 10 IoT Core user experience



Windows 10 IoT Core – Key Facts

Windows 10 IoT Core

Description	An optimized version of Windows that enables building smaller footprint and lower cost devices but still delivers the same capabilities customers expect in Windows.	
Hardware	Display	No display
Processor	ARM, x86 600MHz +	ARM, x86 400MHz +
Memory (minimum)	512 MB (Design dependent)	256 MB (Design dependent)
Storage (minimum)	2 GB Flash	2 GB Flash
Display	Frame buffer graphics and 2D optional (720p HDMI/1080p+ HDMI / 3D GPU optional for modern UI support)	N/A
Key Features	• No shell; UI customizable for your brand • Single application; boot straight to application	
Typical Usage	• Ultra-Thin Client • Digital Signage • Smart Building • IoT Gateway	• HMI • Smart Home Devices • Home Medical Devices

Broad silicon support

Reaching makers:

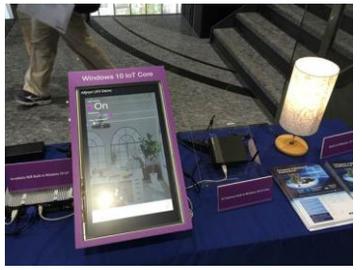
- www.windowsondevices.com

Maker boards:

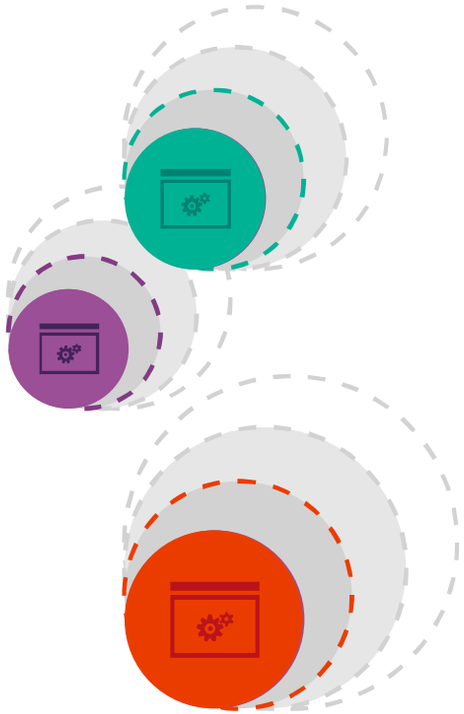
- Raspberry Pi 2
- Minnowboard Max
- Qualcomm 8016-Dragonboard

Industry devices (many):

- Example: Advantech Gateways



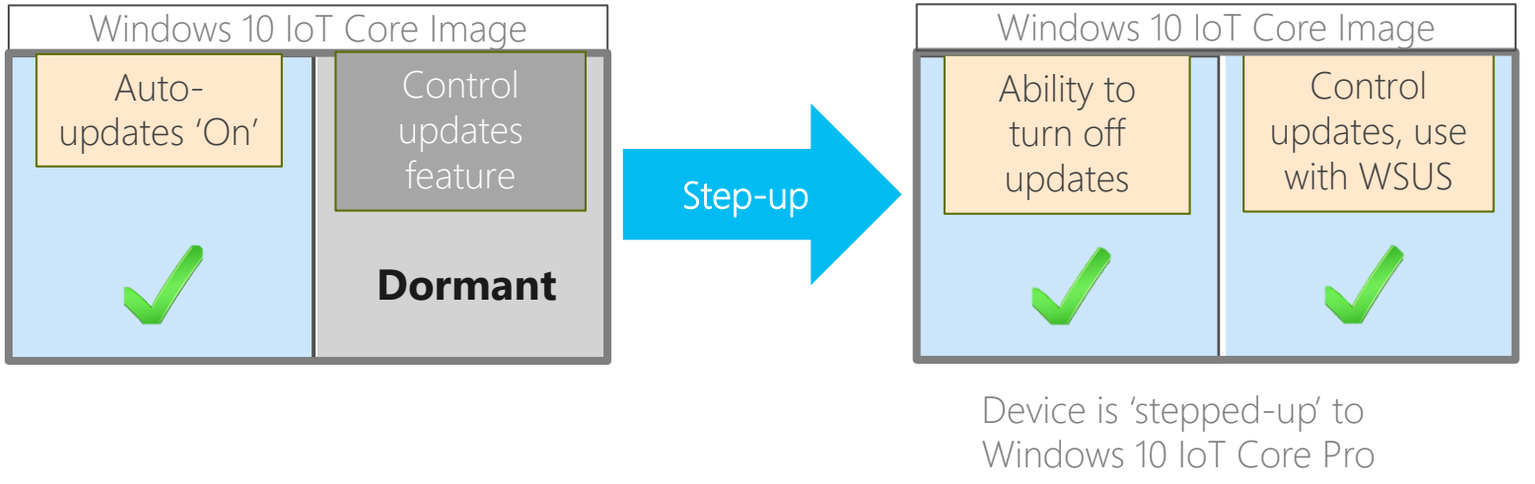
Core devices



- Windows 10 IoT Core is designed specifically for small, low-cost devices:
  - Targets both ARM and x86 and only supports Universal apps (no classic Win32/.NET app)
  - Targets devices with lower system requirements— that is, processor speed, RAM, storage, and so on (for example, 256 MB RAM available for OS, 400 MHz, 2 GB storage)
- No Windows certification requirements
- Available as “Royalty-free” SKU

Windows 10 IoT Core Pro

- Same physical image as Windows 10 IoT Core -> no additional bits
- Only for OEMs
- You can **Step-up** to Win 10 IoT Core Pro to control updates
- Step-up is done by injecting a license file, either at image creation time or through device management
- Enterprise license file will be made available via **http://myoem.microsoft.com** or the Business Support Portal



Activation

- There is no activation with Core (for either SKU).

Windows 10 IoT Core

Windows 10 IoT Core Pro

Building Devices Using Windows 10 IoT Core

Building IoT devices with UWP

"Embedded" Mode

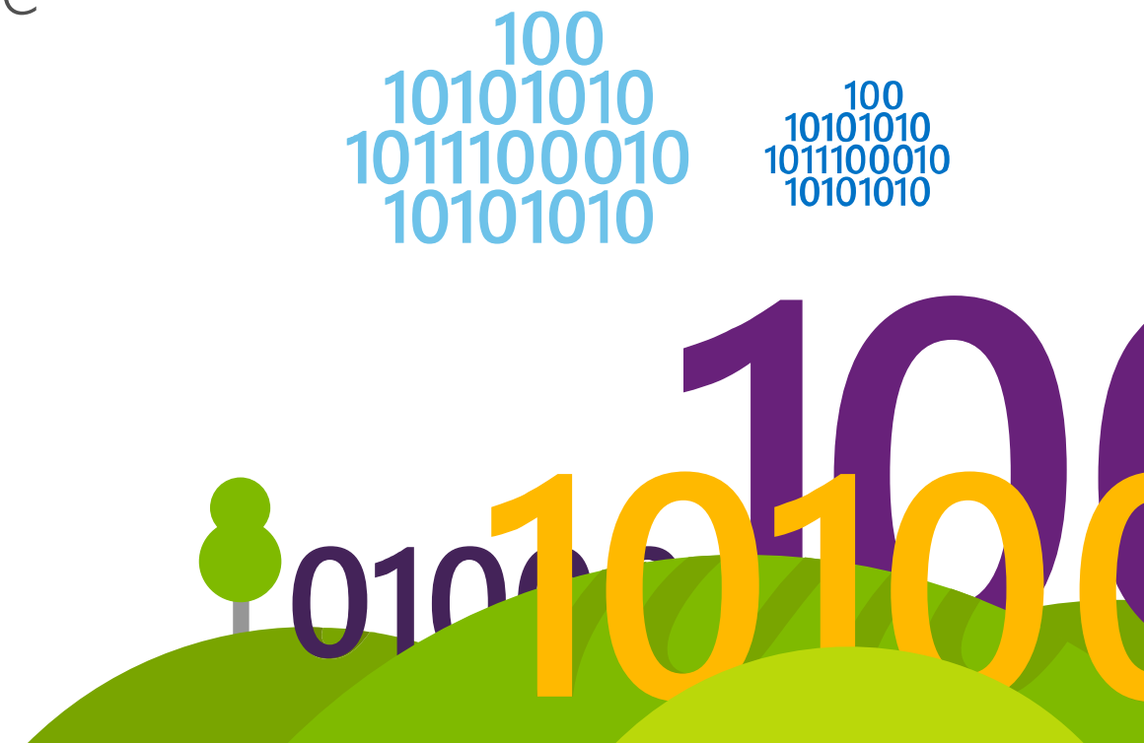
Access to system settings

APIs to access busses

Background Services for long running tasks

Migrate existing business logic

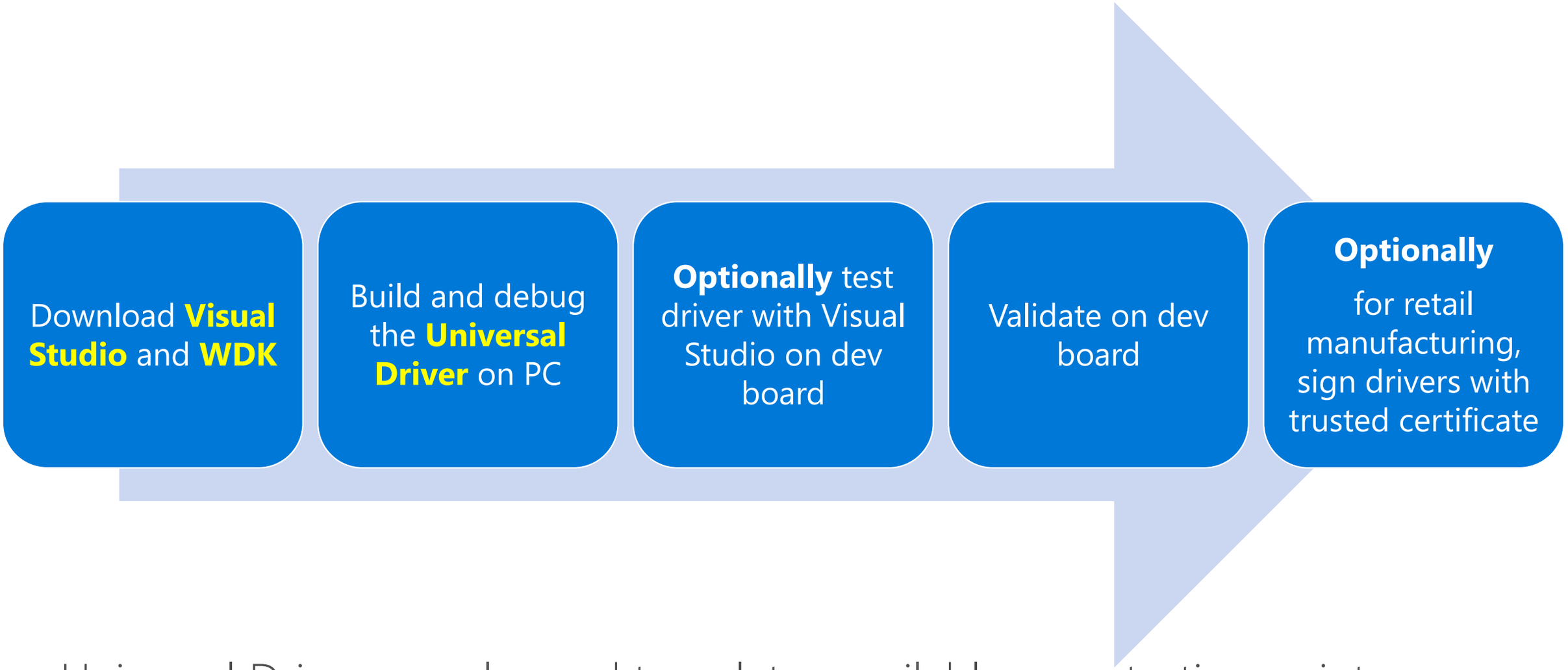
- **API Porting Tool** – you don't have to start from scratch
- Verifies how much of your existing code will run on Windows 10 IoT Core
- Identifies equivalent APIs



Leverage Universal Windows Drivers

- Leverage Universal Windows Drivers for Windows 10 IoT Core
  - Developers can create a single driver that runs across multiple different device types, from embedded systems to tablets and desktop PCs
  - Hardware providers can use their existing components and device drivers across different form factors

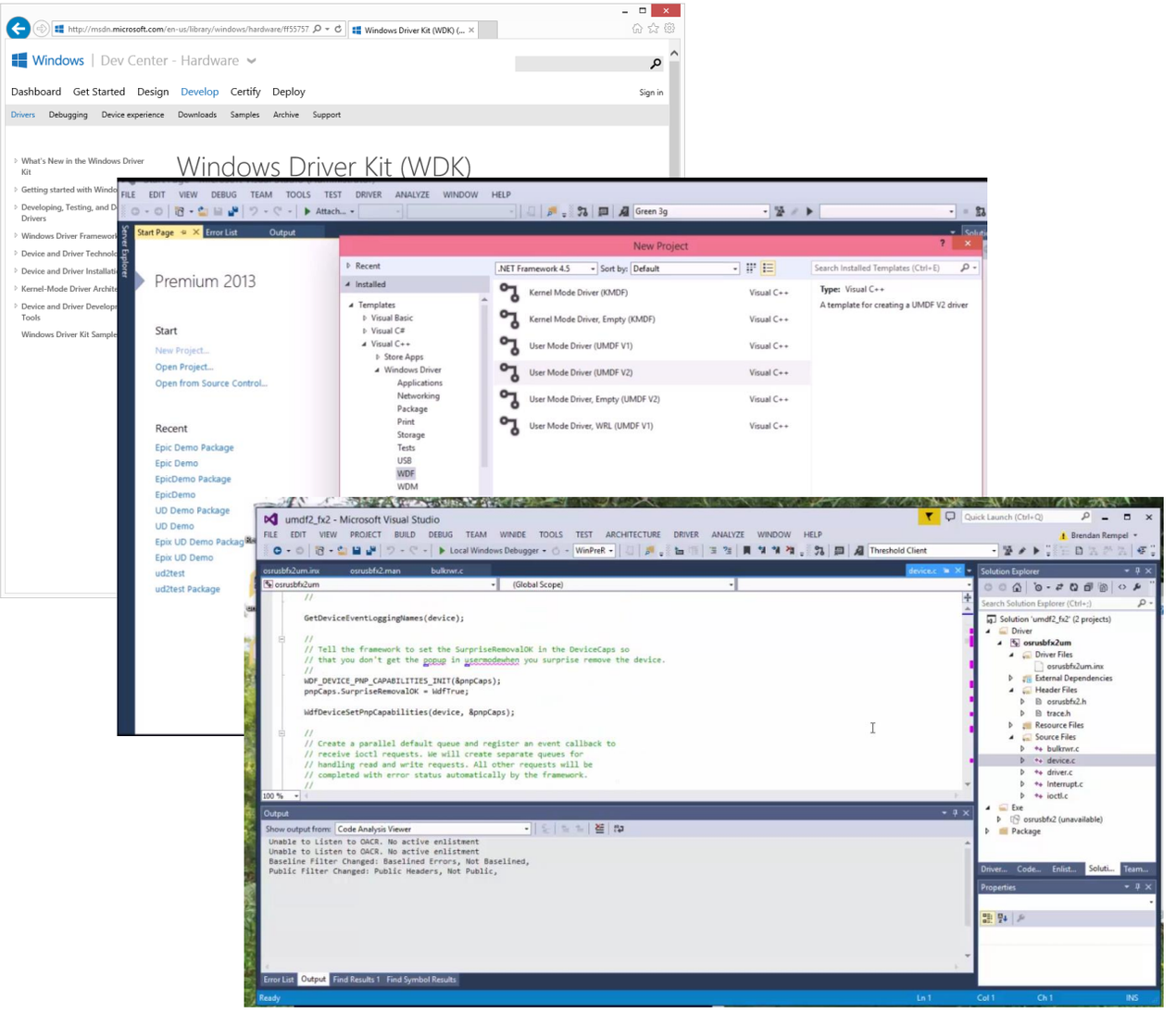
Easily Build Universal Drivers for IoT Core



- Universal Driver samples and templates available as a starting point

Building Universal Drivers (1)

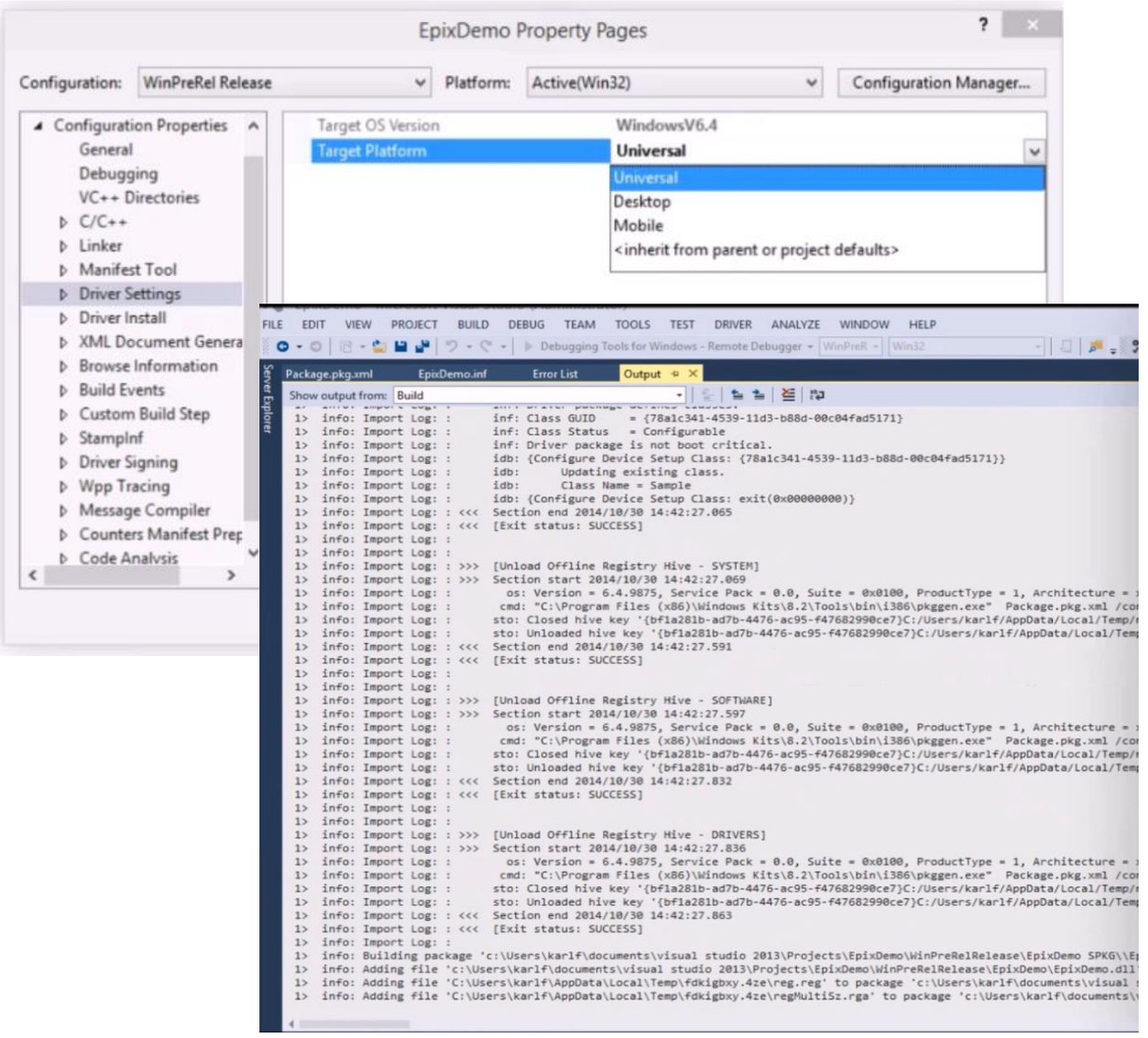
1. Install WDK on your Visual Studio development machine.
2. Start Visual Studio.
3. Create a new project using a driver template.
4. Write driver code (or import existing code if evolving an existing driver to UD).



Building Universal Drivers (2)

5. Set Target Platform: **Universal**.
6. Build.
7. UD guardrails will alert on non-UD compliance:

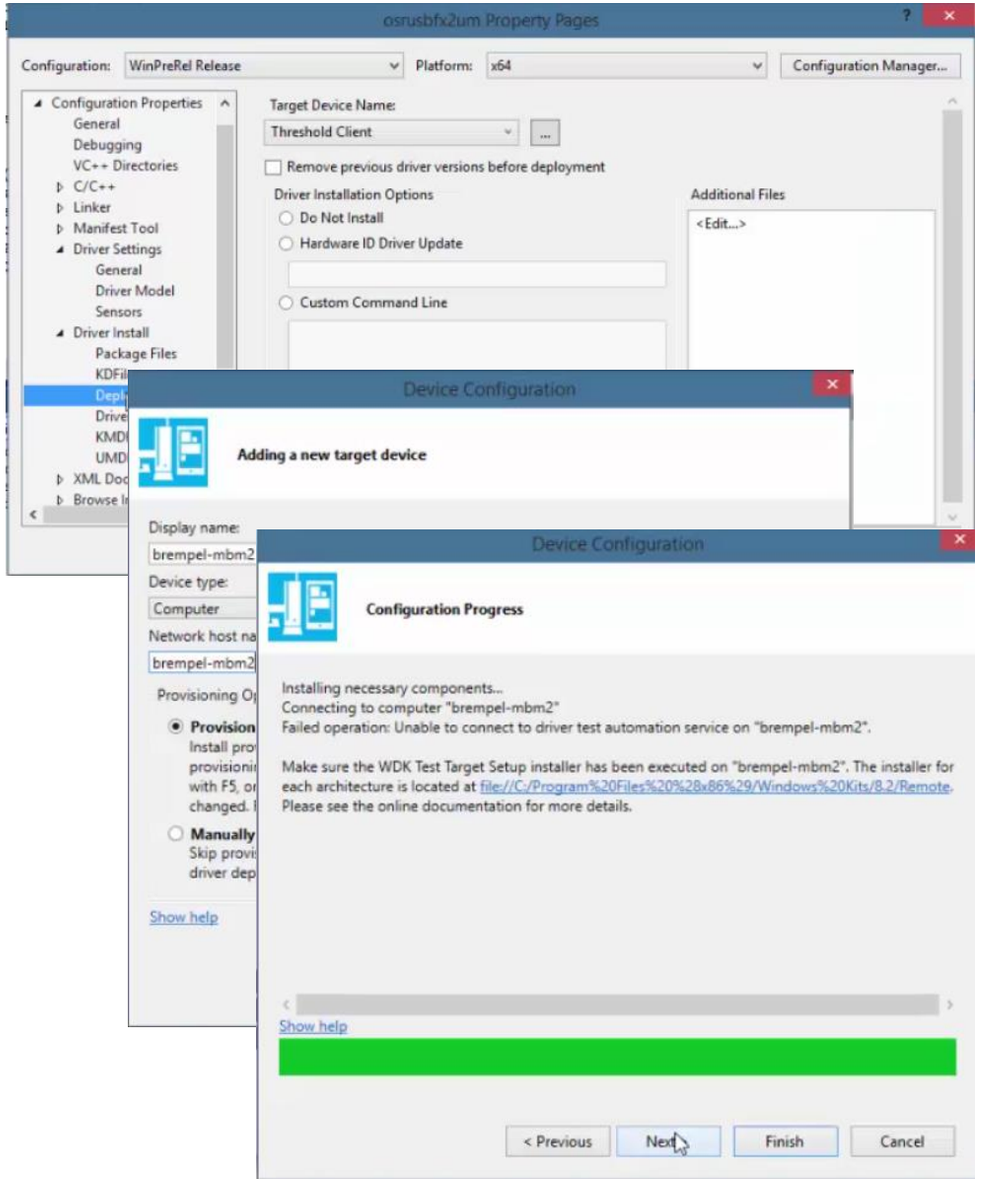
   “FooBar.exe: warning: API TlsSetValue in kernel32.dll is not supported. CameraPlugin.dll calls this API.”



Building Universal Drivers (3)

8. Select device for driver deployment.
9. Provision target device for driver deployment and debug.
10. F5 to deploy driver to target device.
11. Debug driver through VS.
12. For retail manufacturing (public release) of the driver, sign with a trusted certificate.

List of trusted certificates here:
https://msdn.microsoft.com/en-us/library/windows/hardware/dn170454(v=vs.85).aspx



Client Speech Recognition and Vision

- Computer Vision – OpenCV
  - Facial recognition, Egomotion (depth and scale), Gesture recognition, Object identification, Motion tracking
- Windows Sensor and Perception APIs
  - Perception APIs: leverage depth and IR camera (high bandwidth, multiple streams)
  - Sensor framework APIs for simple sensors (gyro, accelerometer, LIDR light)
- Speech Recognition and Synthesis APIs
  - Speech-to-Text and Text-to-Speech enabled by Microsoft speech platform
  - Near/Far acoustic models

Windows IoT Core User Experience

Design devices with and without displays

- Windows 10 IoT Core is optimized for devices with and without displays

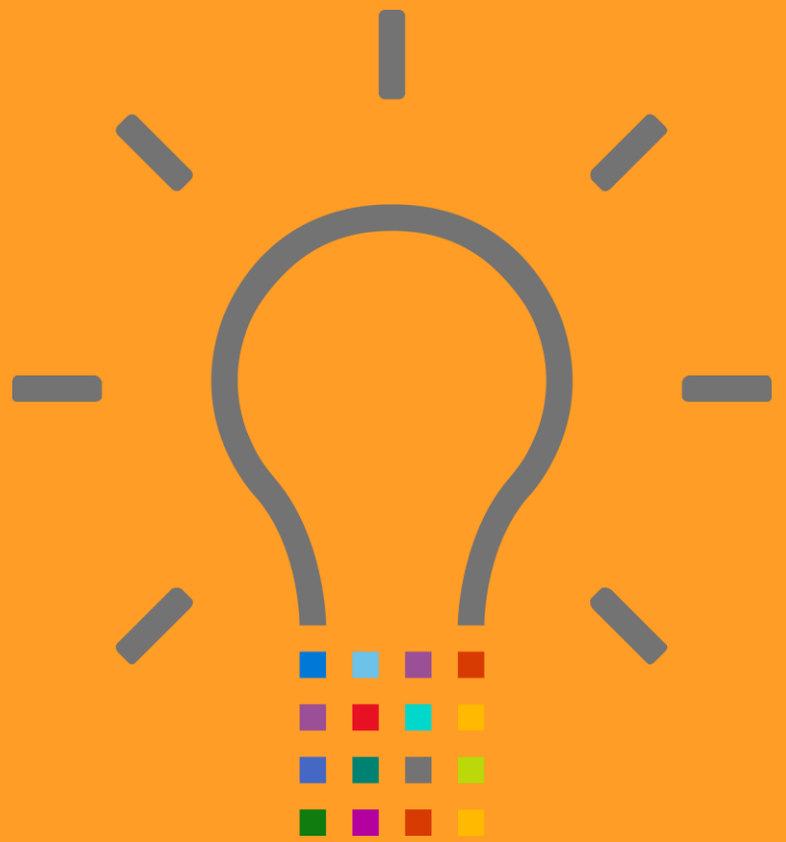
Device categories

- **Headed** devices have a video display and use the Windows Video subsystem and drivers to address it
  - Headed devices have what would be recognized as a “typical” consumer display as you might see on a laptop or tablet
- **Headless** IoT devices have no display
- Headed versus Headless is controlled by **configuration** settings (read at boot time)
- Windows 10 IoT Core headed devices use a custom shell

Module review

In this module, you learned about:

- Key Facts for Windows 10 IoT Core
- The options for building Windows 10 IoT Core devices and solutions
- The Windows 10 IoT Core user experience



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