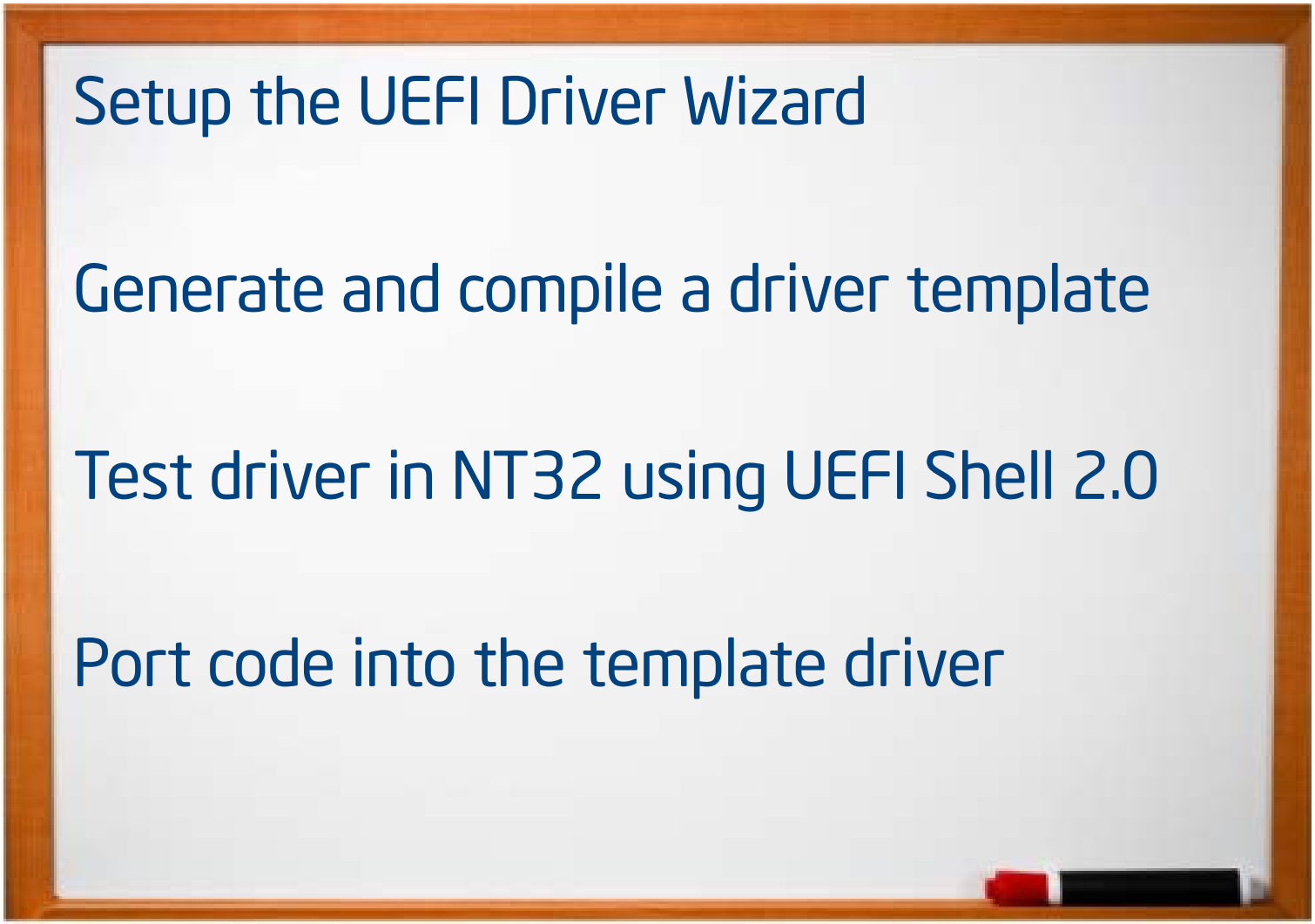
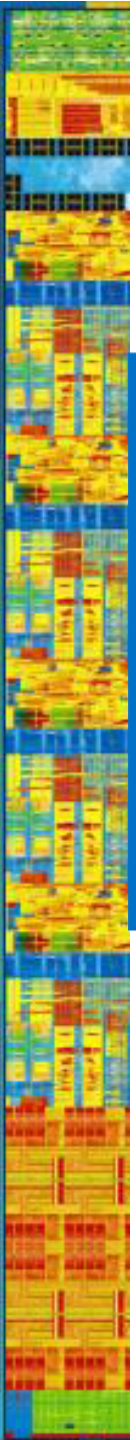
UEFI & EDK II Base Training

Lesson 8
UEFI Driver Wizard Lab

Intel Corporation
Software and Services Group

Lesson 8 Objectives





UEFI Driver Review

Defining a UEFI Driver?

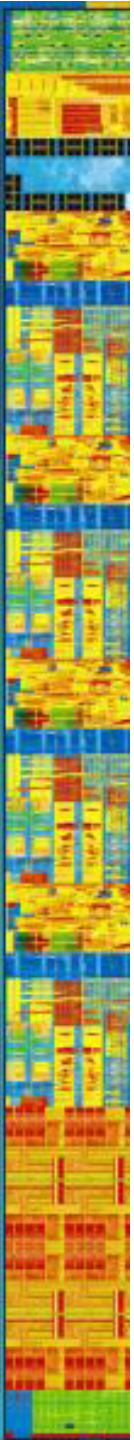
UEFI Loadable Image

May produce/consume protocols

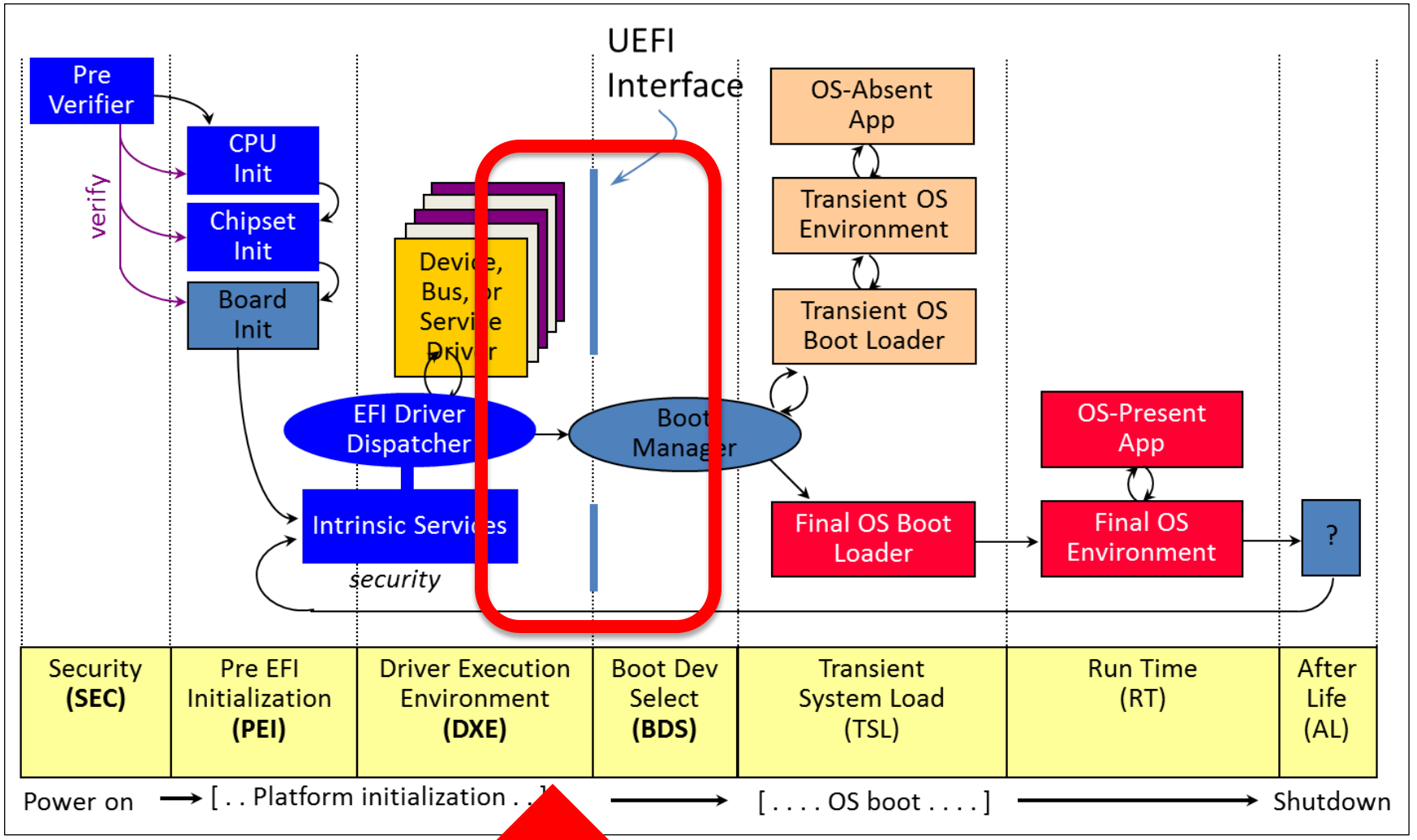
Supports complex bus hierarchies

Driver Binding Protocol matches drivers to devices, adds version management

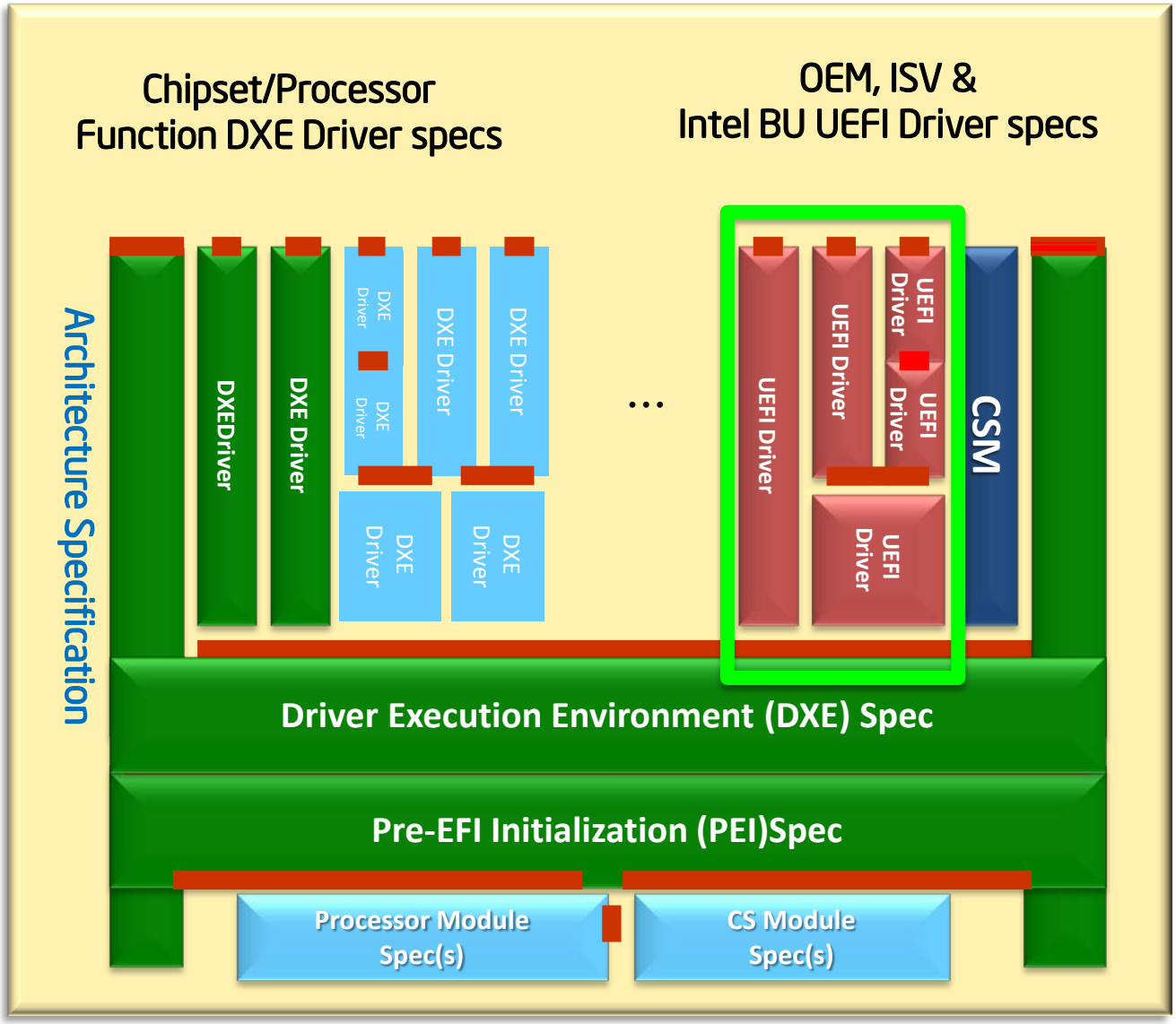
Supports specific hardware, can be unloaded or override an existing driver



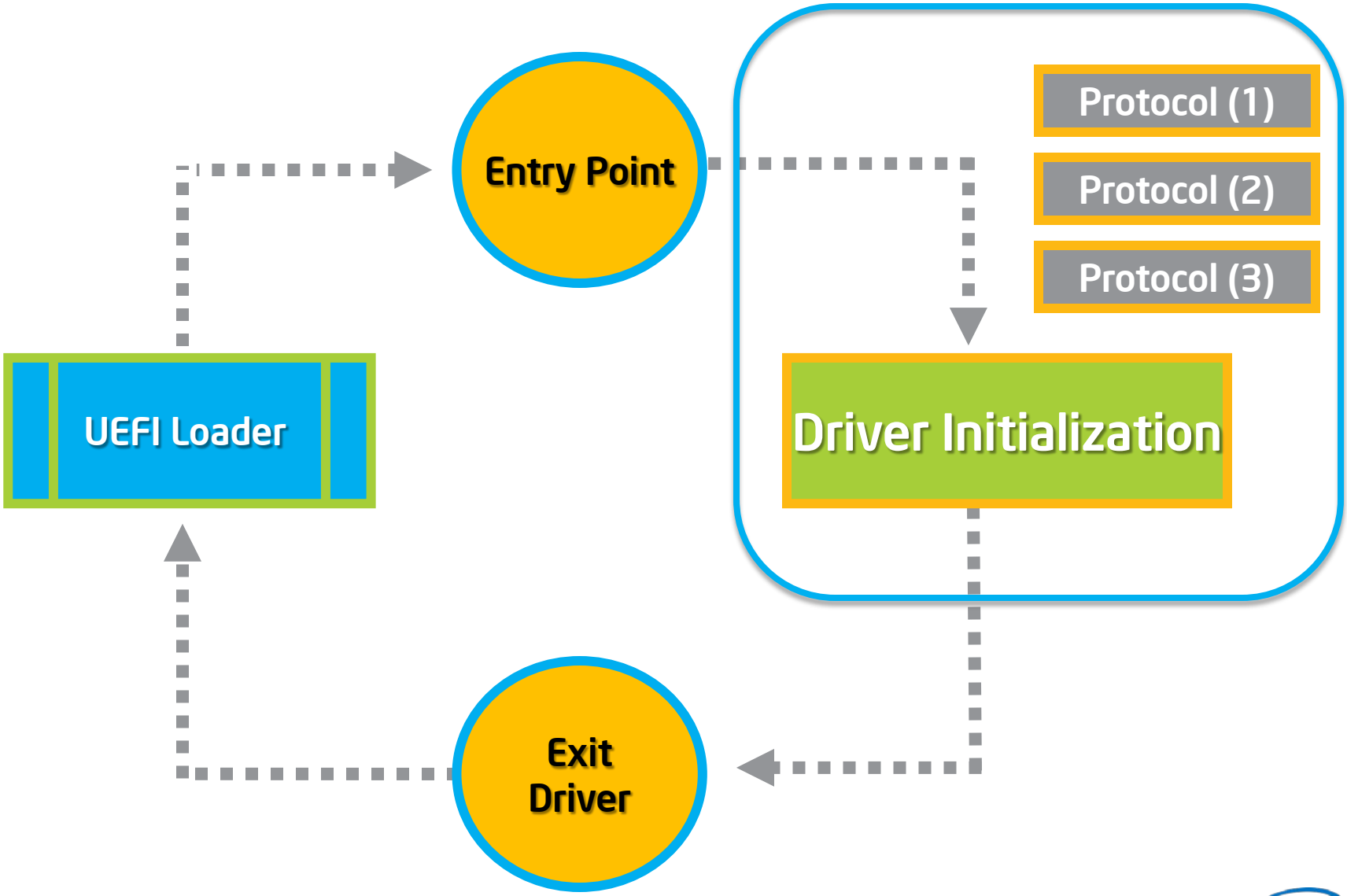
UEFI Drivers - Location



UEFI Drivers - Location



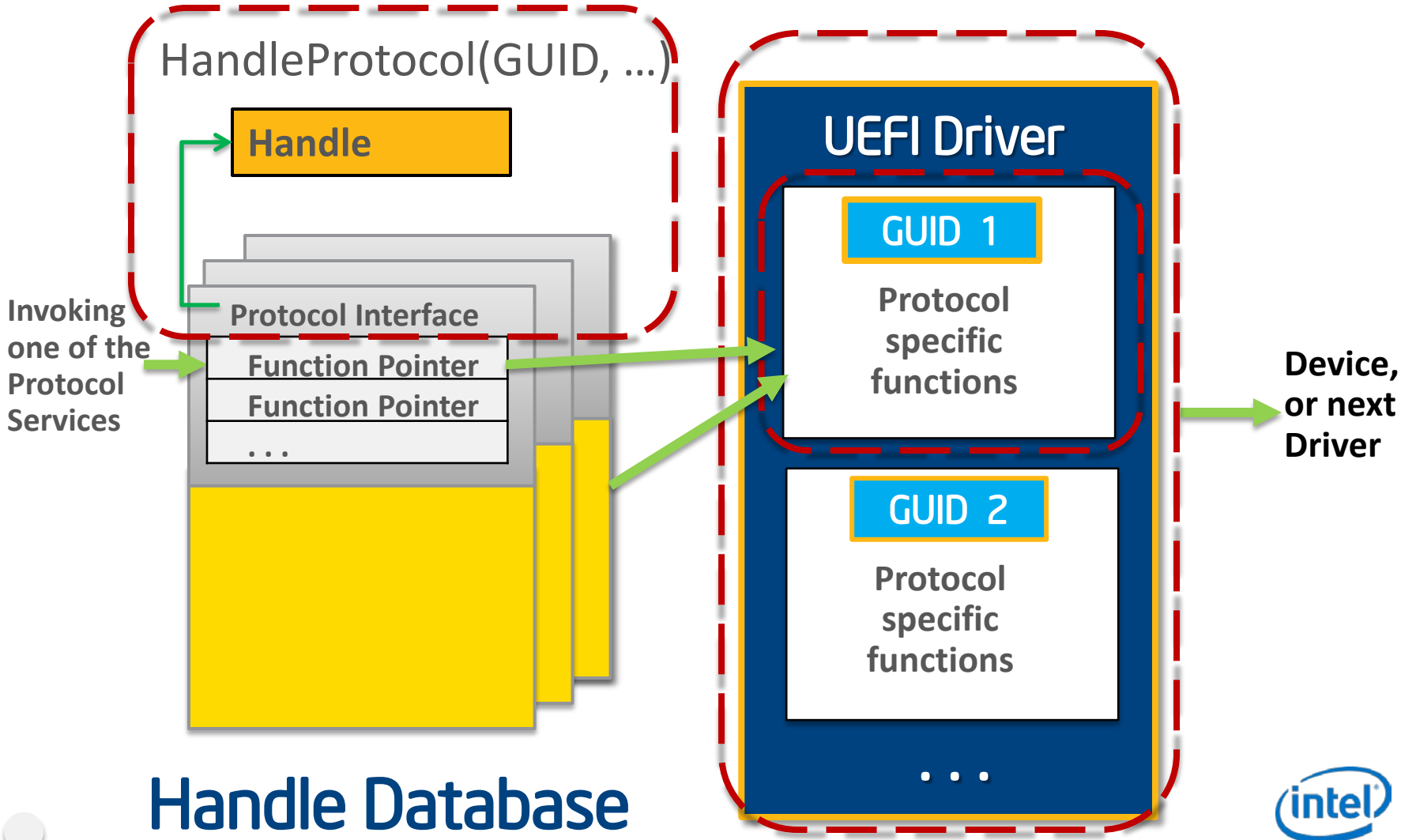
UEFI Drivers Vs. Applications



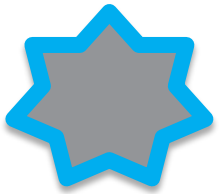
Drivers Produce Protocols

`InstallProtocolInterface`

Construction of a protocol



Driver Binding Protocol



`Supported()`

Determines if a driver supports a controller

`Start()`

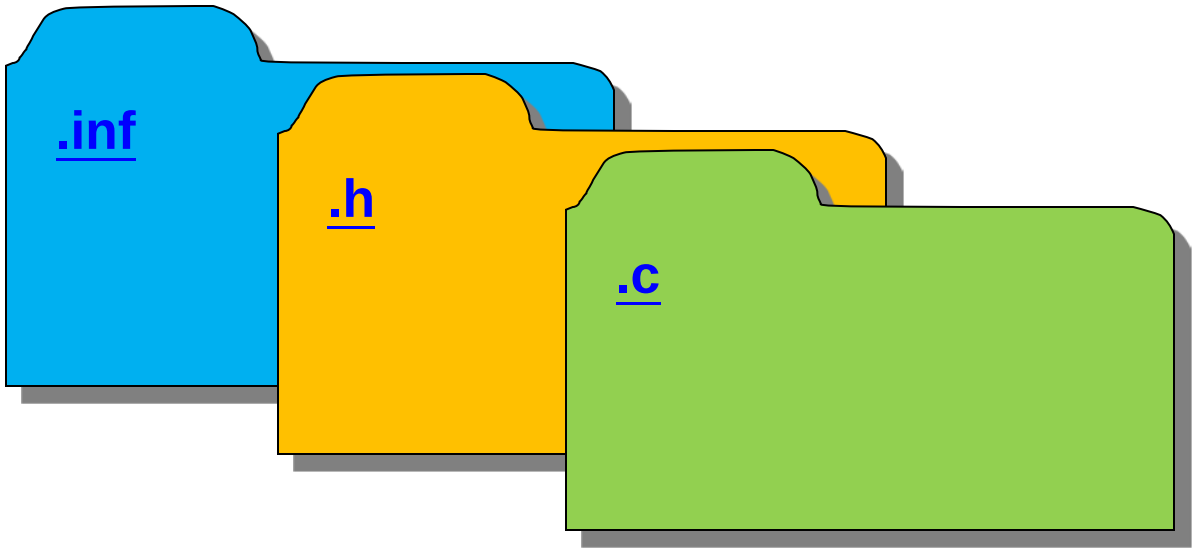
Starts a driver on a controller & Installs Protocols

`Stop()`

Stops a driver from managing a controller

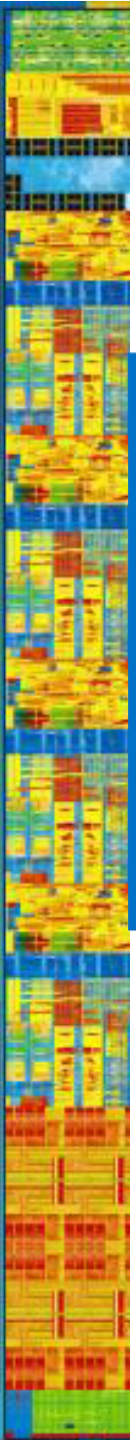
Example of UEFI Driver source code

- C:\FW\edk2\MdeModulePkg\Bus\Scsi\ScsiDiskDxe
  - ScsiDiskDxe.inf
  - ScsiDisk.c
  - ScsiDisk.h

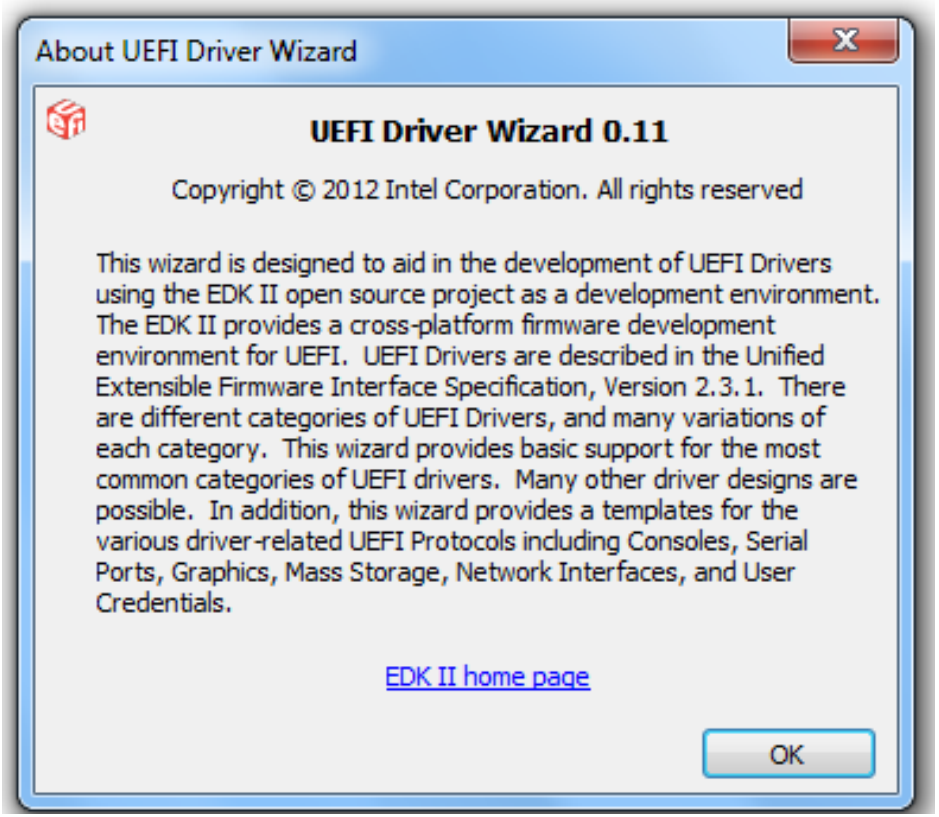


- [.inf] Entry point, Global Protocols
- [.h] Driver's Private Data Structure declaration
- [.c] Review the Supported, Start and Stop functions

Lab 8.1 Creating a UEFI Driver using the UEFI Driver Wizard



UEFI Driver Wizard Overview



- ✓ **Open source tool**
- ✓ Based on *Driver Writer's Guide for UEFI 2.3.1* content
- ✓ **Intel SSG engineers contributed**
- ✓ Located on **www.TianoCore.org**

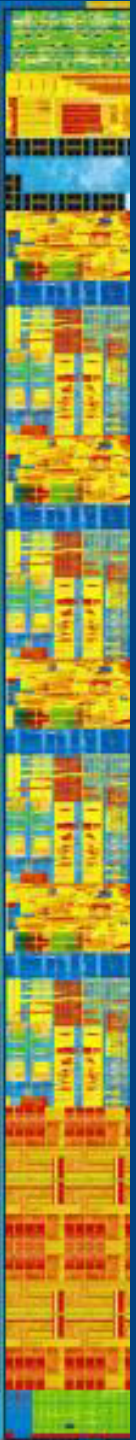
Lab 8.1: Installing the UEFI Driver Wizard

Requirements and Options

Work space must contain BaseTools, MdePkg & MdeModulePkg Packages

UDK2010 IHV release for Driver development on Tianocore.org

Uses previous lab's setup `C:\FW\Edk2`



Driver Functions

- UEFI Device Driver
- UEFI Version 2.3.1 (0x0002001F)
- Unloadable driver
- Support IA32 & x64 CPUs
- Returns component name information
- Test console device
- Option to produce strings & forms for setup

Template File Contents

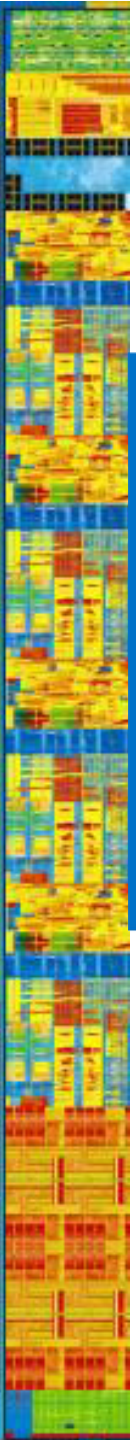
Proper UEFI driver entry point

Basic driver libraries/headers

Skeletons for common driver functions

Error values until ported
EFI_UNSUPPORTED, EFI_DEVICE_ERROR

Lab 8.2 Building a UEFI Driver



Lab 8.3 Editing MyWizardDriver/ComponentName.c

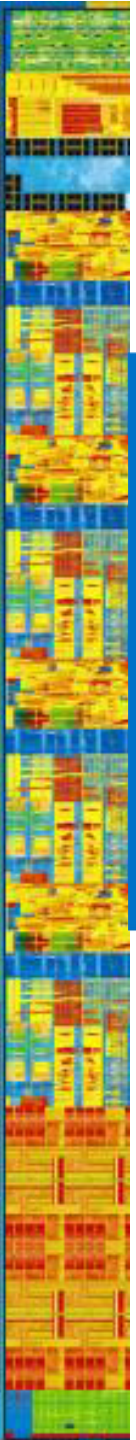
Porting Driver Code

Change the driver's name

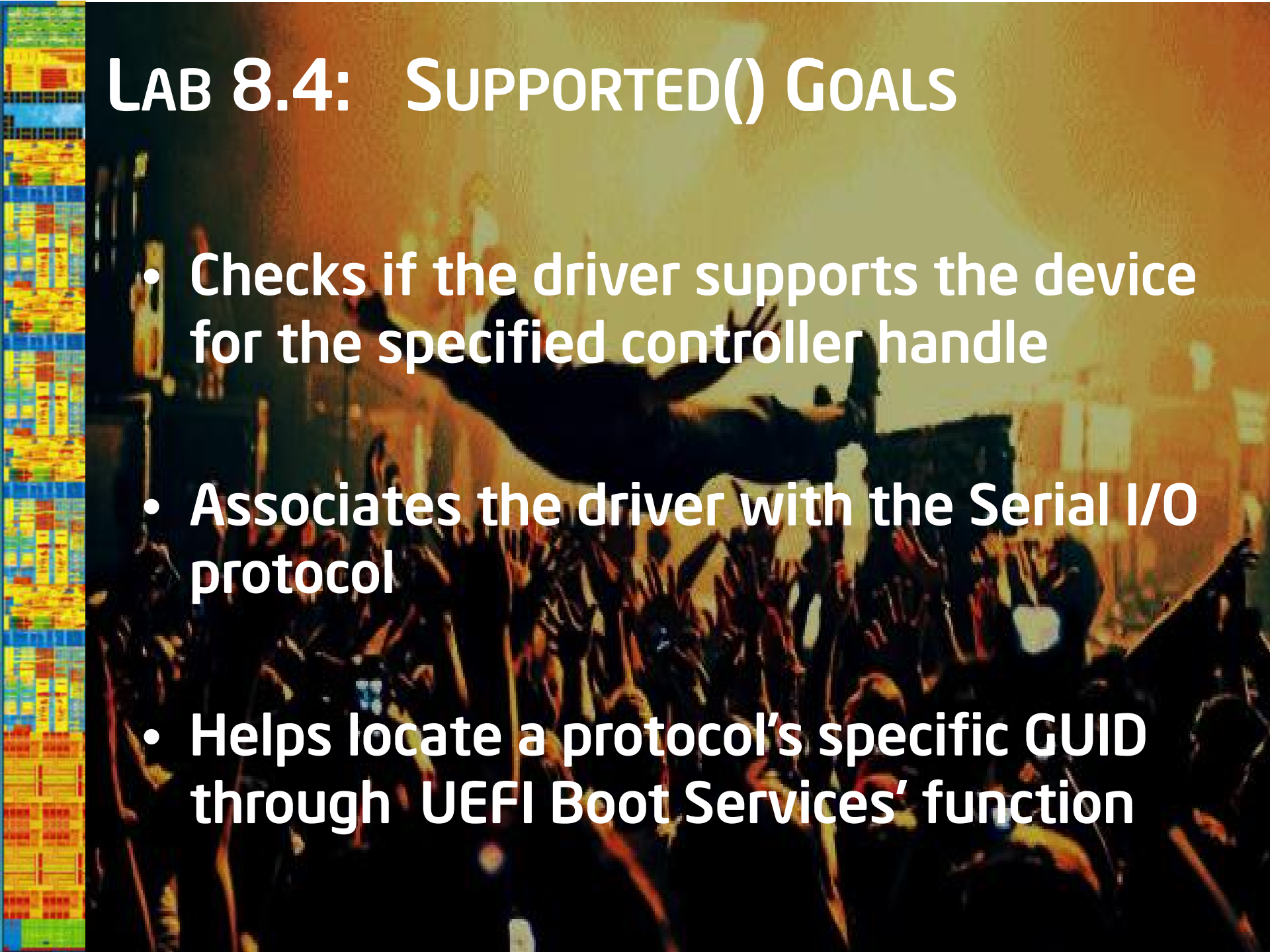
Port `Supported()`

Port `Start()`

LAB 8.4 WRITING THE SUPPORTED FUNCTION FOR A UEFI DRIVER



Lab 8.4: Supported() Goals



- Checks if the driver supports the device for the specified controller handle
- Associates the driver with the Serial I/O protocol
- Helps locate a protocol's specific GUID through UEFI Boot Services' function

START() GOALS

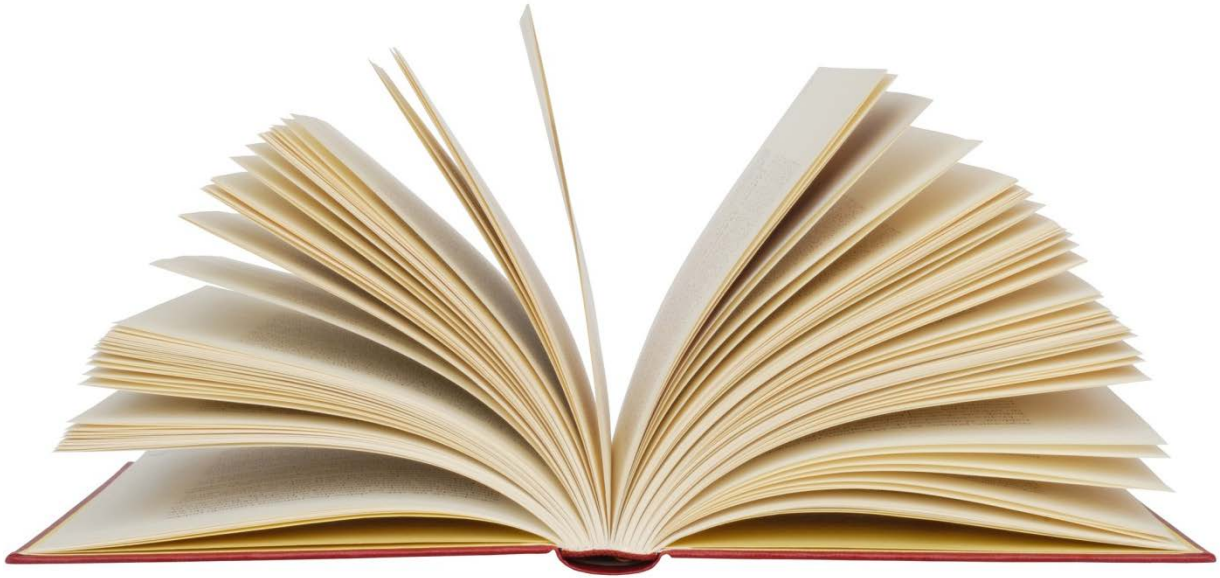
Allocate a string buffer in memory

Fill the memory range with a pattern

ROBUST LIBRARIES

- **AllocateZeroPool()**
  [MemoryAllocationLib.h]

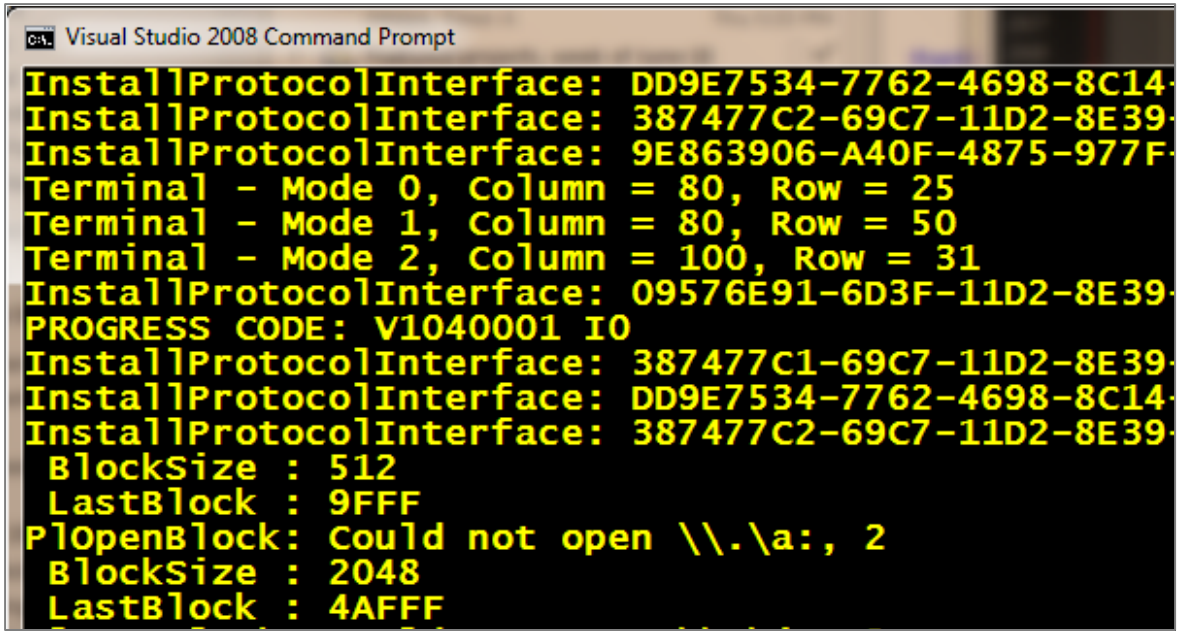
- **SetMem16()**
  [BaseMemoryLib.h]



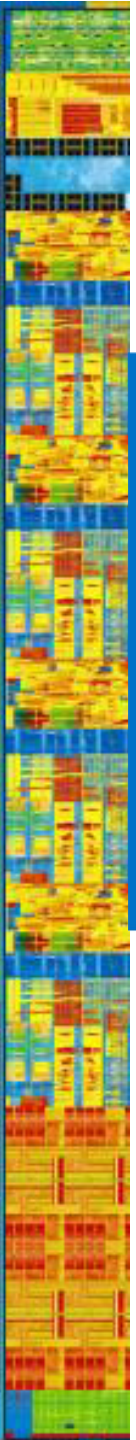
Check the **MdePkg** *help file (.chm format)*

DEBUGGING BEFORE TESTING THE DRIVER

- UEFI drivers can use the EDK II debug library
  - Enables **DEBUG()** **ASSERT()**
- **DEBUG()** statements



Lab 8.5 Returning a Successfully Supported Function



Lab 8.5: Returning a Successful Supported Function

Create Non-Volatile UEFI Variable

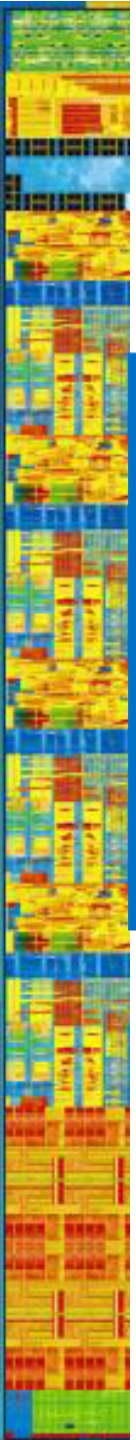
Runtime Services - SetVariable(. . .)

Runtime Services - GetVariable(. . .)

Adding Non-Volitile UEFI Variables

- Create .h file with new `typedef` and GUID
- Include new .h file
- **`EntryPoint()`** Init new buffer for NVRam Variable
- **`Supported()`** Call function to set/get NVRam Variable

Lab 8.5 Porting Unload( ) and Stop( ) functions

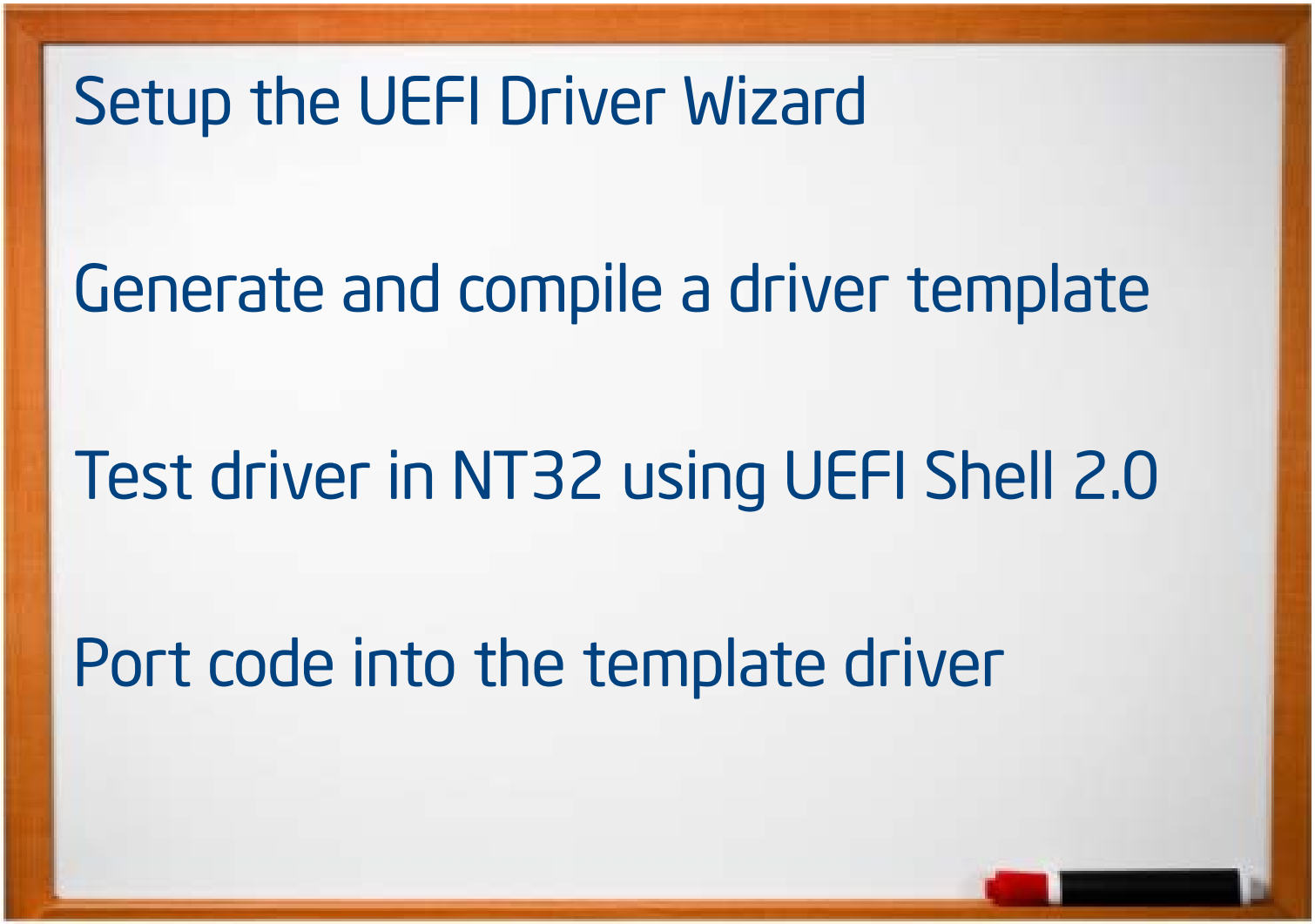


Porting Unload() and Stop() functions

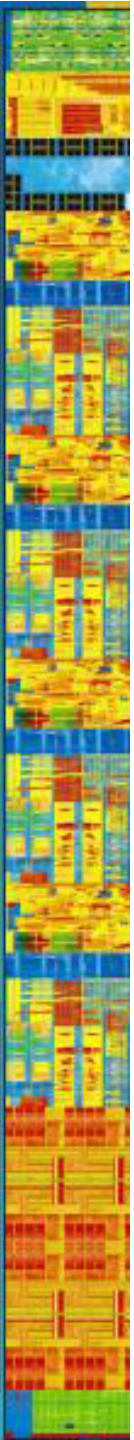
Additional Porting

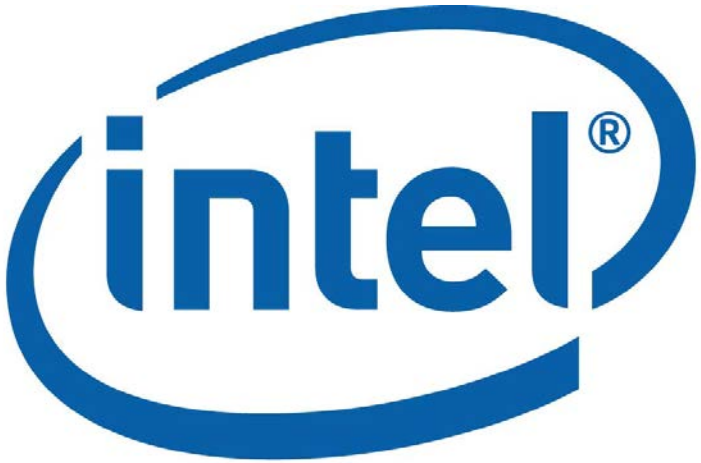
- Adding strings and forms to setup (HII)
- Publish & consume protocols
- Hardware initialization

Lesson 8 Summary

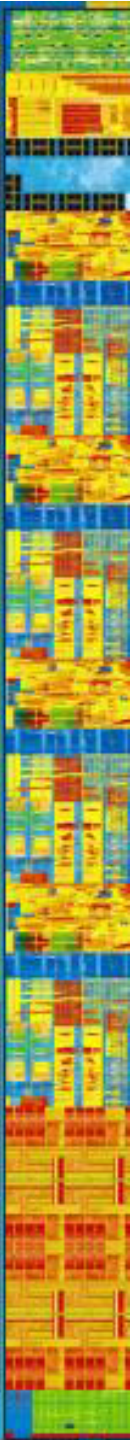



“Any questions?”



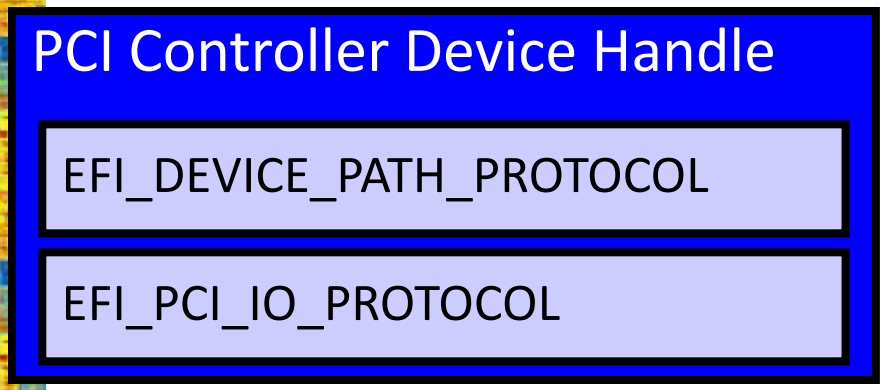


Software



BACKUP

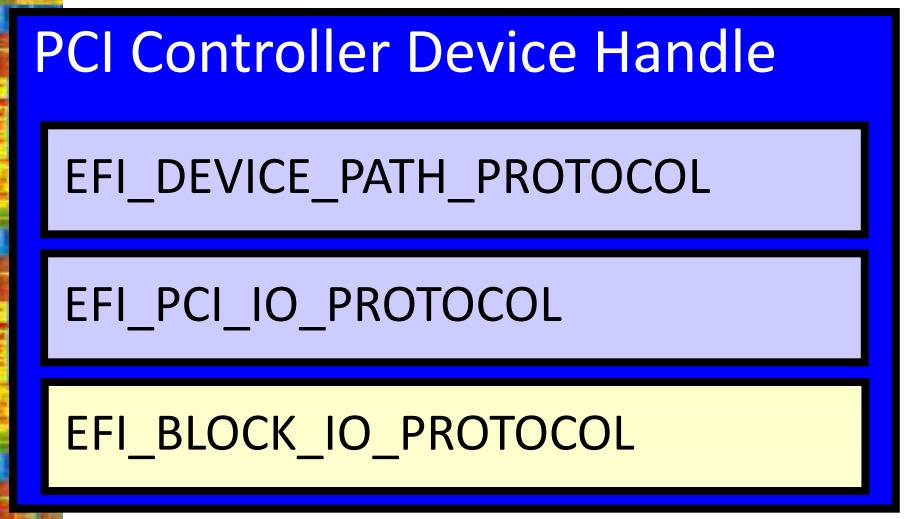
Supported - PCI Controller Device Handle



1. Opens PCI_IO Protocol
2. Checks
3. Closes PCI_IO Protocol
4. Returns: *Supported* or *Not Supported*

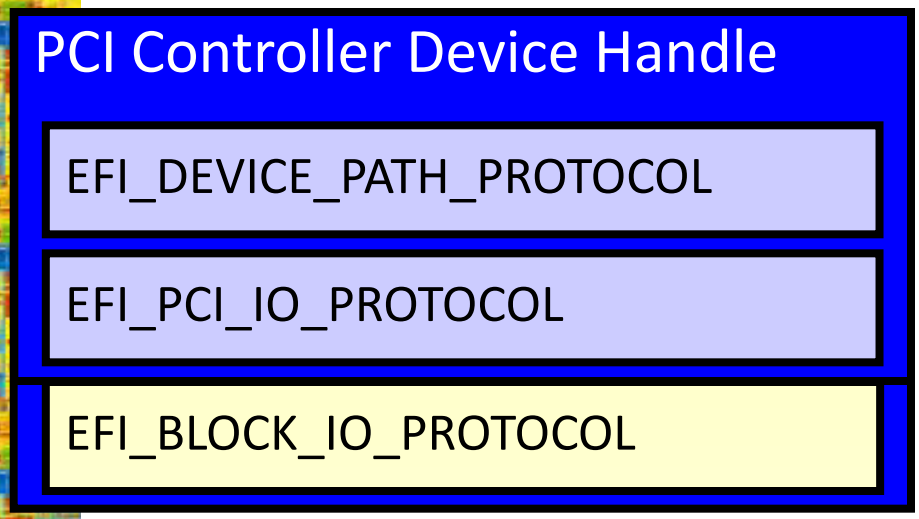
- Inputs:
  - "This"
  - Controller to manage
  - Remaining Device Path
- Supported()
  - Checks to see if a driver supports a controller
  - Check should not change hardware state of controller
  - Minimize execution time, move complex I/O to Start()
  - May be called for controller that is already managed
  - Child is optionally specified

START - PCI CONTROLLER DEVICE HANDLE



- Inputs:
  - "This"
  - Controller to manage,
  - Remaining Device Path
- Start()
  - *Opens* PCI I/O
  - Starts a driver on a controller
  - Can create ALL child handles or ONE child handle

Stop - PCI Controller Device Handle



- Inputs:
  - "This"
  - Controller to manage,
  - Remaining Device Path

- Stop()
  - *Closes* PCI I/O
  - Stops a driver from managing a controller
  - Destroys all specified child handles
  - If no children specified, controller is stopped
  - Stopping a bus controller requires 2 calls
    - One call to stop the children. A second call to stop the bus controller itself

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