UEFI Driver Development Training
Image Types

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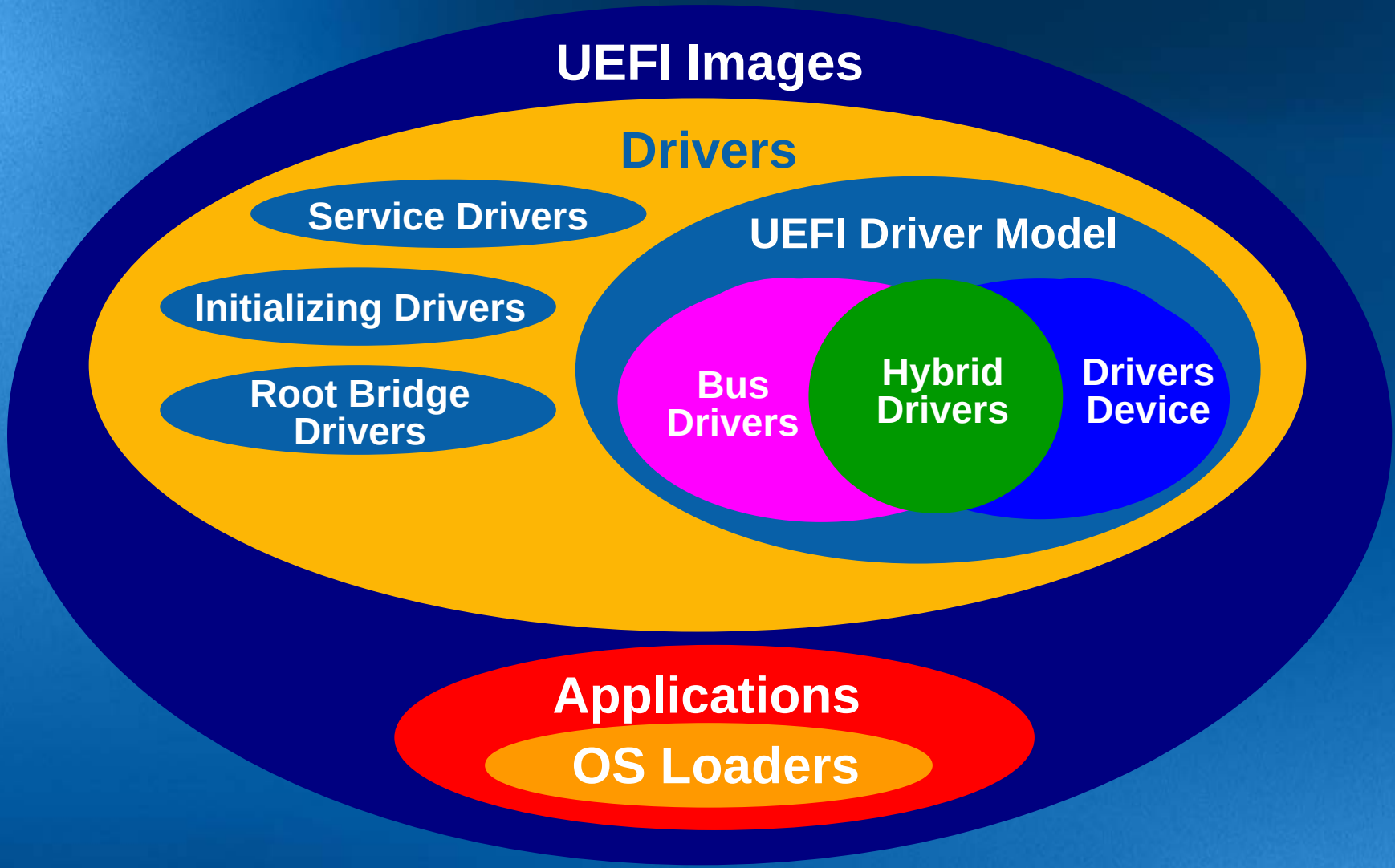
UEFI Development
Intel

Agenda

- UEFI Image Types
- Application
- Driver
- Driver Categories
  - Device driver
  - Bus driver
  - Hybrid driver
  - Service driver
  - Initializing driver
  - Root Bridge driver
- Target platforms (IA32, IA64, Intel-64, EBC)
- Images Distribution methods

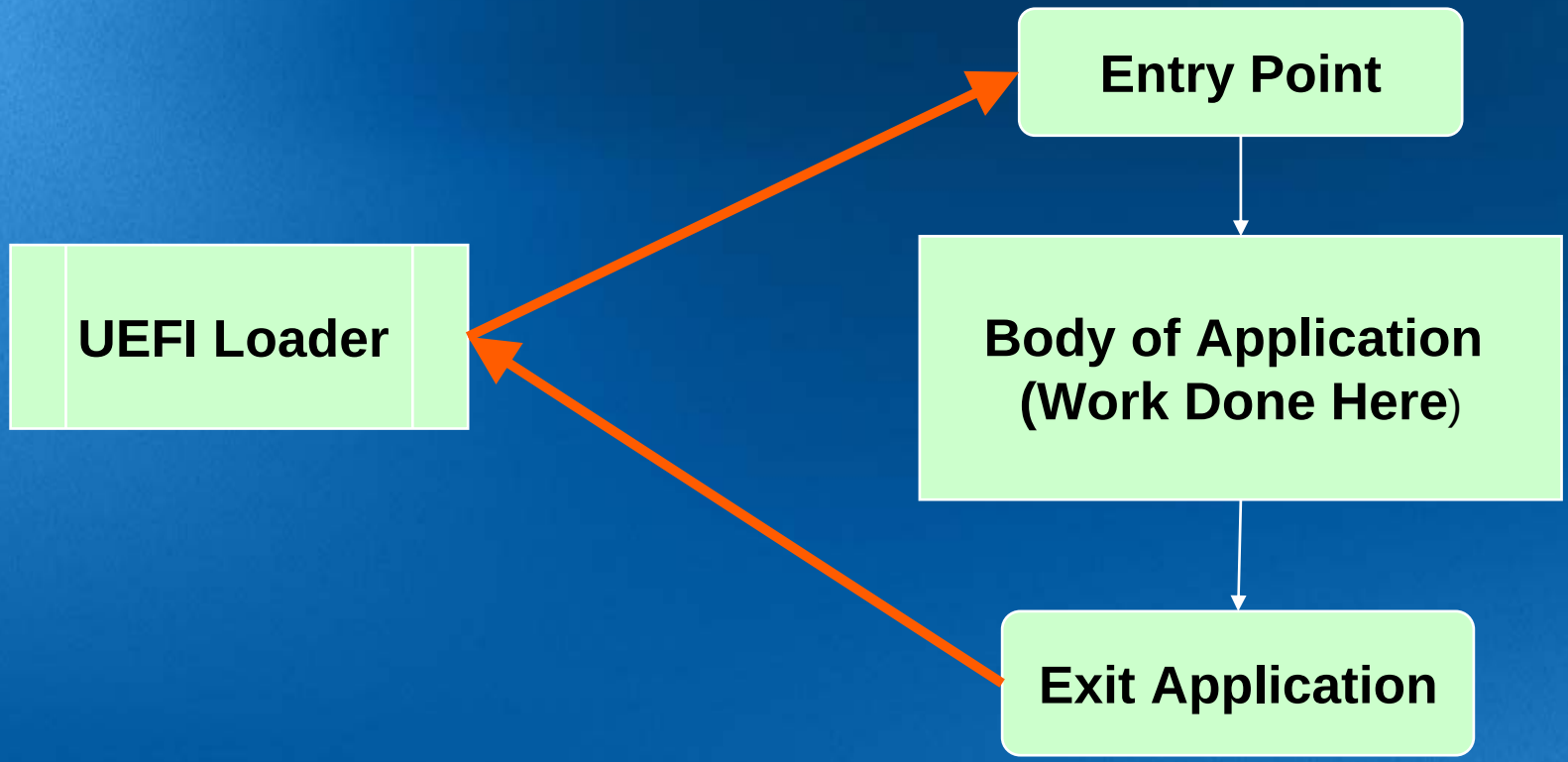

UEFI Images
Drivers
Service Drivers
Initializing Drivers
Root Bridge Drivers
UEFI Driver Model
Bus Drivers
Hybrid Drivers
Drivers Device
Applications
OS Loaders

What do UEFI Applications do?

- extend firmware abstractly
  - Without hardware or OS dependence
- Portable across platforms
  - IA32, IA64, Intel-64, XScale, Apple*, NT32 emulator
- Enable rapid application development

*Other names and brands may be claimed as the property of others.

Application Execution



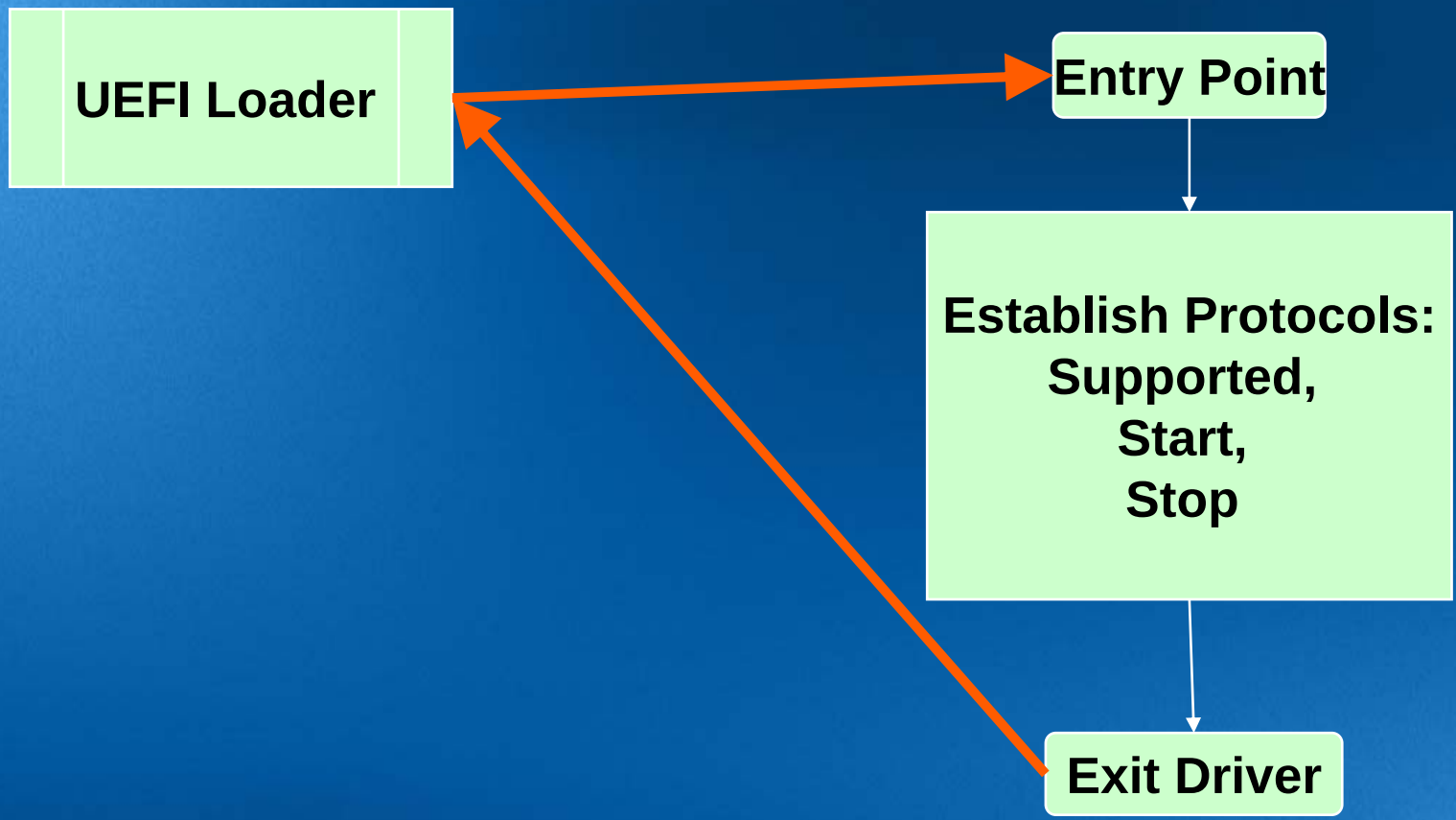
What is an UEFI Application

- An UEFI Loadable Image
  - Loaded by UEFI loader
  - May not produce protocols
  - May Consume protocols
  - Typically user driven (exits when task completed)
  - Same set of interfaces as drivers
- Must be used for
  - OS Loader
- Can be used for
  - Platform diagnostics
  - Factory diagnostics
  - Utilities
  - Driver prototyping
  - ‘Platform’ applications

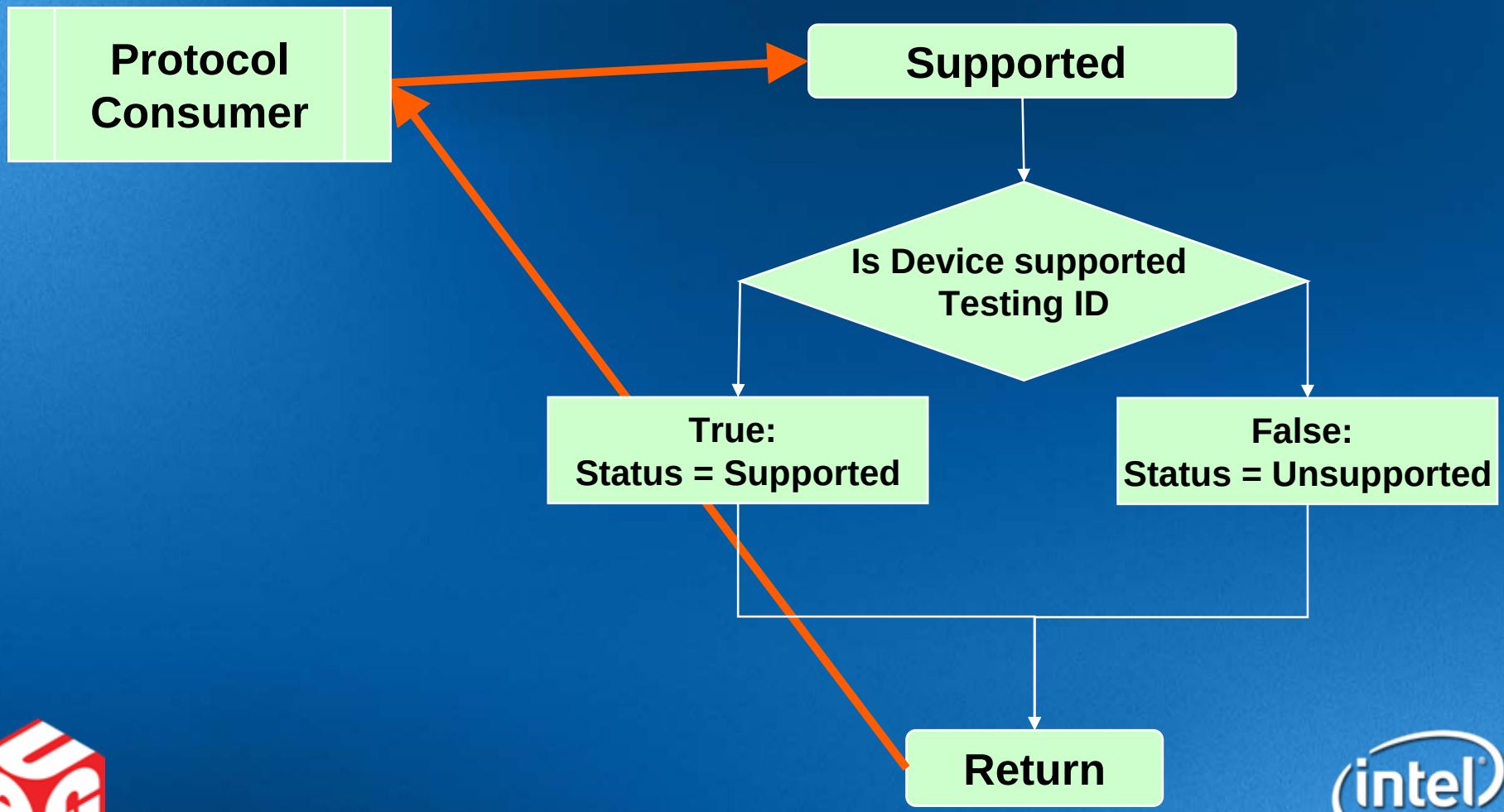
What do UEFI Drivers do?

- UEFI Drivers extend firmware
  - Add support for new hardware
  - No HW dependence
  - No OS dependence
- Portable across platforms
  - IA32, IA64, Intel-64, XScale
- Enables rapid development

General Driver Execution (entry)



General Driver Execution (Supported)



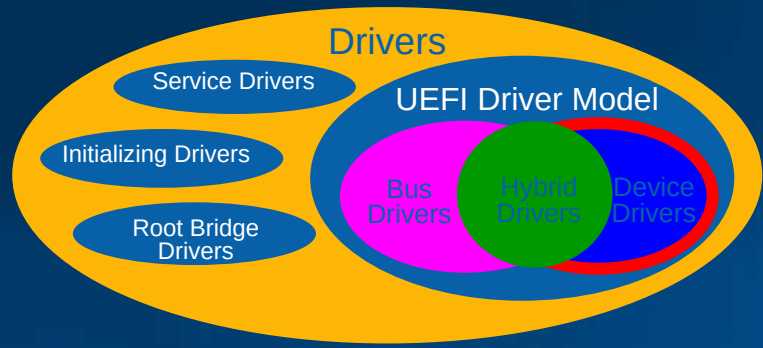
What is an UEFI Driver?

- An UEFI Loadable Image
  - Loaded by UEFI loader
  - May produce protocols
  - May consume protocols
  - Typically system driven
- Can be used for
  - Supporting specific hardware
  - Overriding an existing driver

Driver vs. Application

	Driver	Application
Loaded by:	EFI Loader	EFI Loader
Interfaces available:	ALL	ALL
Consume protocols?	YES	YES
Produce protocols?	YES	NO
Typically driven by?	System	User
Typical use	Support HW	Any

Device Driver

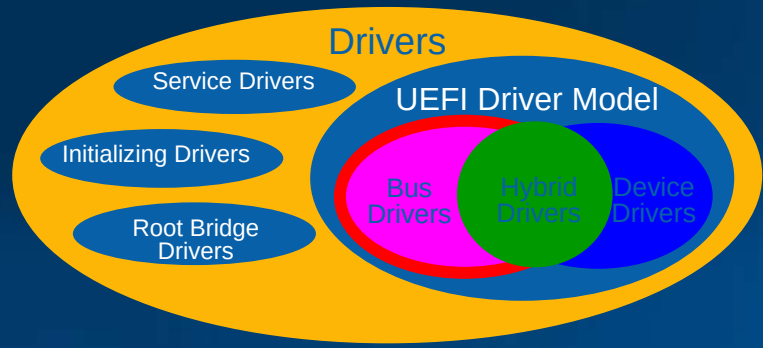


- Manages a Controller or Peripheral Device
- Start() Does Not Create Any Child Handles
- Start() Produces One or More I/O Protocols
  - Installed onto the Device's Controller Handle

Examples:

PCI Video Adapters
USB Host Controllers
USB Keyboards / USB Mice
PS/2 Keyboards / PS/2 Mice

Bus Driver



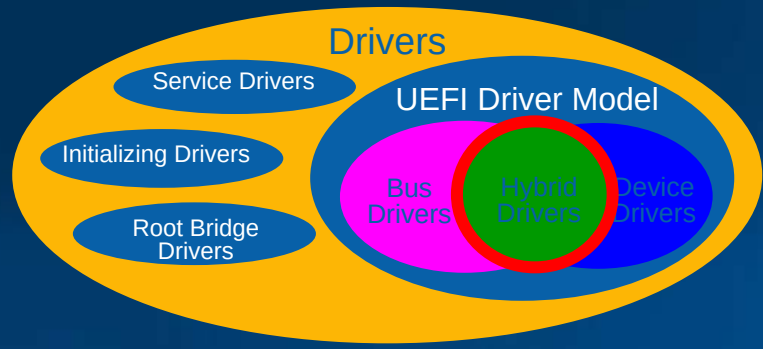
- Manages and Enumerates a Bus Controller
- Start() Creates One or More Child Handles
- Start() Produces Bus Specific I/O Protocols
  - Installed onto the Bus's Child Handles

Examples:

PCI Network Interface Controllers

Serial UART Controllers

Hybrid Driver



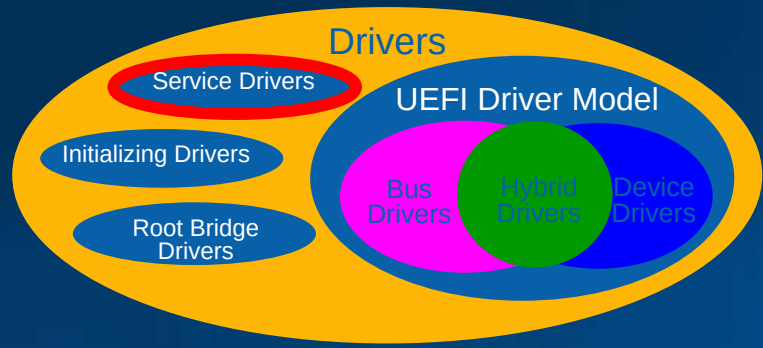
- Manages and Enumerates a Bus Controller
- Start() Creates One or More Child Handles
- Start() Produces Bus Specific I/O Protocols
  - Installed onto the Bus's Controller Handle
  - Installed onto Bus's Child Handles

Examples:

PCI SCSI Host Controllers

PCI Fiber Channel Controllers

Service Driver

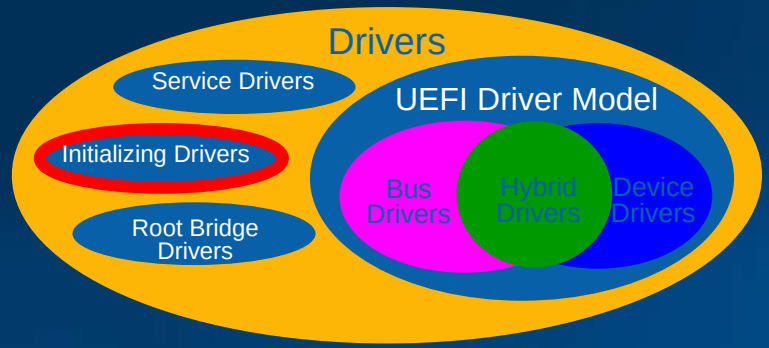


- Does Not Manage Hardware
- Provides Services to other Drivers
- Creates One or More Service Handles
- Produces Service Specific Protocols
  - Installed onto Service Handles

Examples:

EFI Decompress Protocol
EFI Byte Code Virtual Machine
Boot Integrity Services (BIS)

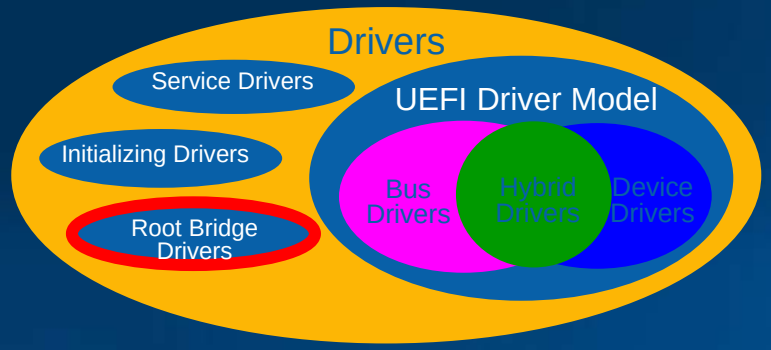
Initializing Driver



- Typically Touches Hardware
- Performs One Time Initialization Operations
- Does Not Create Any Handles
- Does Not Produce Any Protocols
- Unloaded When Finished

Examples: Memory Initialization drivers

Root Bridge Driver



- Typically Manages Part of Core Chipset
- Directly Touches Hardware
- Creates One or More Root Bridge Handles
- Produces Root Bridge I/O Protocols
  - Installed onto new Root Bridge Handles

Examples: PCI Host Bridge

Why does this matter?

- All UEFI drivers have the same access
- Category knowledge speeds development
  - Whether and how many handles to produce
  - Whether and which protocols to produce
  - Where to attach the protocols

Target Platforms

Complied for	Size	Runs on Platform(s)
IA32		IA32
Intel-64	Larger than IA32	Intel-64
IA-64	6-10 times IA32	IA-64
EBC	1.2 times IA32	IA32 Intel-64 IA-64 (Some portability issues)

Image Distribution methods

- how is the driver delivered
  - Peripheral Option ROM
  - board firmware
  - media
    - HDD
    - CD ROM
    - Floppy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