Introduction & Update

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Agenda

• background
• terminology
• status
• sct
• eco-system
• hints and tips
.background
Facts

• Processors shipped in 2012
  – 7.9 Bu (4 Bu in 2009, 6 Bu in 2010)
• Processors shipped in total
  – 30+ Bu
• Processor licenses
  – 850+
• Semiconductor partners
  – 290+
• Process technology
  – 20nm – 250 nm
• Connected community members
  – 950+
.terminology
Terminology

Architecture

“ARMv7A”

Processor Micro-Architecture

“Cortex-A15”

Processor Hard-Macro Implementation

ARM Architecture Reference Manual

ARMv7-A and ARMv7-R edition
Introducing UEFI on ARM

• Driving forces for UEFI on ARM
  – Processor and system complexity increasing
  – Support for existing OEMs that are developing ARM processor-based solutions using UEFI
  – Help standardize the boot procedure for ARM processor-based platforms
  – On-going ARM goal is to improve the hardware-software interface for Operating Systems that target the ARM architecture

• Advantages to ARM partners and OEMs
  – Write once per platform and saves costs in boot loader development/engineering
  – UEFI specification written down and peer reviewed
  – Tested UEFI drivers available from 3rd party peripherals providers
  – Provides an environment for manufacturing test
Introducing UEFI on ARM

- UEFI ARM Binding Sub-Team (ABST) was formed in 2008
  - Apple, ARM, HP & Microsoft are the current public members
  - UEFI Specification focuses on ARMv4 to ARMv7A
  - ABST is starting to work on virtualization and ARMv8 (Aarch64) bindings

- Specification 2.3.1 released - includes the ARM Bindings
  - Specifies the state of the processor & system post UEFI initialization
  - Defines the Runtime & Pre-Boot Services ABI (post boot services)

- Verification Tests
  - Oct’11 SCT 2.3 have been updated to support ARM

- ARM-UEFI supported commercially

UEFI Summer Summit – July 2012  www.uefi.org
Public Implementations

• Tianocore EDK2 project contains ARM platform support
• ARM Holdings now maintain the ARM packages
  – Since February 2011
  – With contributions from Apple, HP, Linaro, etc...
  – ArmPkg - Architectural and standard ARM peripheral support
  – ArmPlatformPkg - ARM standard development board support
  – Plus some other ARM related packages
• Future ARM development board support provided by Linaro
  – Specifically by the Linaro ARM Landing Team
• Linaro can potentially support boards for other member companies
  – Would be supported by their Landing Team
• ARM Hardware Platforms
  - BeagleBoardPkg (OMAP3530 SoC – Cortex A8)
  - ArmPlatformPkg/ArmVExpressPkg (ARM Versatile Express Board)
    • Cortex A9x4
• ARM Fast Model Support
  - ArmPlatformPkg/ArmRealViewEbPkg (ARM RealView Emulation Board)
    • Cortex A8 & Cortex A9x2)
  - ArmPlatformPkg/ArmVExpressPkg
    • Cortex A9 MPCore and A15 MPCore
ARM Platform Status - Other

• Other ARM-based Platforms exist outside of the EDK2 repository

• ARM Development Platforms
  – ArmPlatformPkg/ArmVExpressPkg
    • Cortex A5
    • Cortex A15x2 (Limited Hardware Availability)
  – ArmPlatformPkg/ArmTuscanPkg
    • Cortex A9x2
    • PCI Bus with SATA and USB 2.0 controllers

• Other Platforms
  – SamsungPlatformPkg/OrigenBoardPkg
    • Based on Cortex A9x2
ARM UEFI SCT Implementation

- Initial port was completed in August 2010
- ARM Holdings own ARM UEFI SCT implementation
  - Initially only available as a patch from UTWG documents area
  - Now integrated with main SCT package and available in UEFI member documents area
- Builds in both Windows and Linux environments
  - Primary toolchain is ARM CC (formerly RVCT)
  - ARM GCC also supported
- ARM SCT binary is tested on Beagleboard and ARM Versatile Express Platforms
- Can extend SCT build framework to write platform specific unit test cases
.eco-system
Growing Eco-system
hints & tips
Hints & Tips (1)

• When writing a UEFI driver ensure you are not making the assumption you are running on a ARM Platform!
  – Risks are that your driver could not work on another platform even if it is a ARM-based platform (e.g.: different memory map or architectural controllers)
  – Benefit is you can reuse and test your driver on a wider range of devices

  – **Hint 1**: UEFI Specification provides methods to access architectural components
  – **Hint 2**: Avoid making your UEFI driver dependent on EDK2 Libraries
Hints & Tips (2) – Use cases

• **Architectural Timer**: On ARMv7, it exists at least two different timers (... and actually many exist!)
  – ARM SP804 DualTimer: Memory mapped controller
  – ARM Architectural Timer (used in the latest ARM Application Processors)
  – The solution is ...
    use UEFI Boot Services *(see section 6 of the UEFI Spec)*

• **Cache Management**: difficult for engineers working on ARM architecture (compare to other architectures)
  – The solution is ...
    stick with the UEFI Specification and use the Boot Services function AllocatePages() *(see section 6 of the UEFI Spec)*
Getting started

• Recommend obtaining a Cortex A8 development board
  – Available from http://beagleboard.org
• Recommend getting a copy of “Beyond the BIOS”
  – Available from Amazon
    http://www.amazon.com/Beyond-BIOS-Implementing-Extensible-Interface/dp/0974364908
• UEFI Learning Center
  – http://www.uefi.org/learning_center/
• Intel UEFI Information
Getting started

• Source tree can be found on SourceForge
  – EDK2 Source Tree
  – BeagleBoard UEFI wiki
  – Samsung Platform wiki

• Linaro (Boot Architecture)
  – https://wiki.linaro.org/OfficeofCTO/BootArchitecture

• Linaro (ARM Landing Team)
  – http://www.linaro.org/members/arm/ve_12.03#tab3
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Summary

• UEFI brings a neutral boot loader capable of booting both open-source and non-open source Operating Systems
• BSD-like license allows for security and specialized code to be hidden and not released
• UEFI is a framework that grows and shrinks depending upon requirements
• Specification written down and peer-reviewed
• Lots of validated software already written for the PC industry e.g. PCI probing
• Ability to support a 3rd party peripheral eco-system
• Write-once, validate-once, support all OSes
Questions?
Thanks for attending the UEFI Summer Summit 2012

For more information on the Unified EFI Forum and UEFI Specifications, visit http://www.uefi.org

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