英特尔® UEFI 开发套件 2010 和 英特尔® Boot Loader 开发套件：高级嵌入式开发基础

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EFIS004

英特尔®与你共创明天™ intel

议程

- Intel® UDK2010 的主要特点
- 嵌入式设备的启动引导程序
- Intel® BLDK 的主要特点
- 总结

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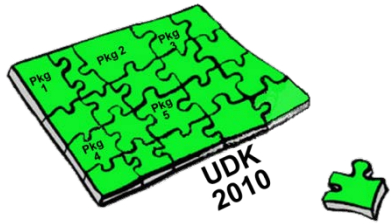
Intel® UDK2010 适用于各类计算设备固件开发

Intel® UDK2010 的主要特点

- 遵循UEFI规范
- 灵活的包管理机制
- 支持多种编译器和操作系统
- 平台配置数据库(PCD)
- 优化的库函数
- 内嵌源代码调试工具
- 增强的安全支持
- 支持IPv6网络

支持UEFI规范



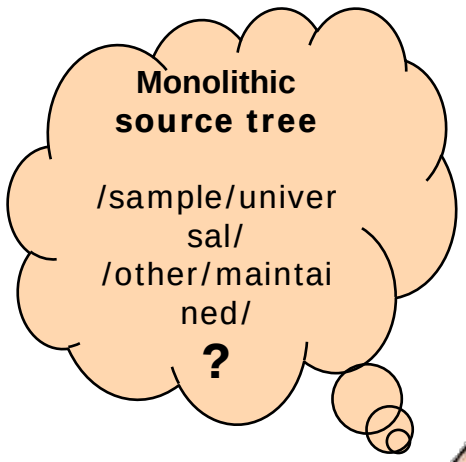
- Intel® UDK2010 原生支持:
  - 支持最新的 UEFI 2.2, UEFI 2.3, PI 1.1和PI 1.2规范（同时兼容以前各版本的UEFI, EFI和PI 规范)
    - 在单独的Shell包中支持Shell 2.0规范
  - Pre-UDK 包括所有 UEFI 2.0, UEFI 2.1, PI 1.0 and Framework 0.9x 规范的定义 (PEI Core, DXE Core, PEIMs, DXE驱动程序, UEFI驱动程序和库函数)

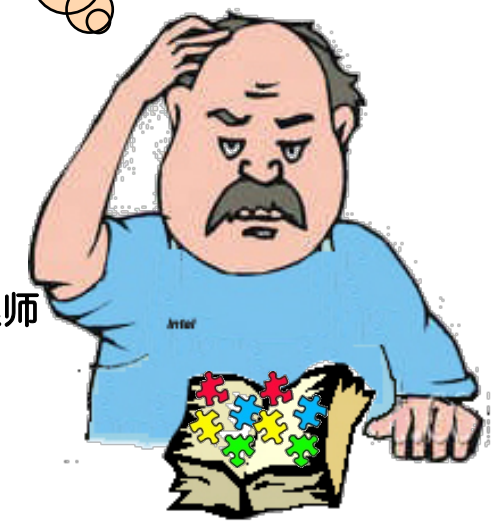
安全和网络 - UEFI 2.3
- IPV6/IPSec – 下一代互联网IP地址的分配及网络安全
- 用户认证和驱动程序签名
- iSCSI & VLAN

Human Infrastructure Interface (HII) – UEFI 2.1

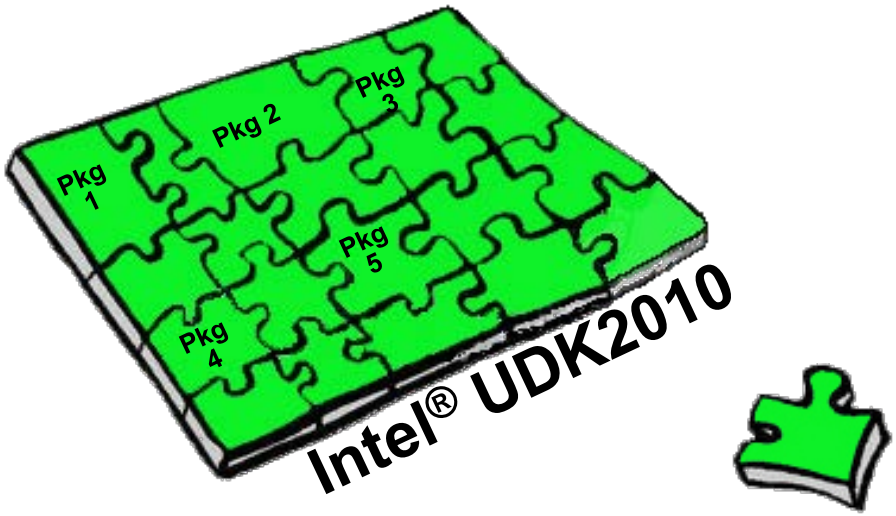
基于高级工业规范的特性

包管理：有利于高级功能的快速交付





固件开发工程师

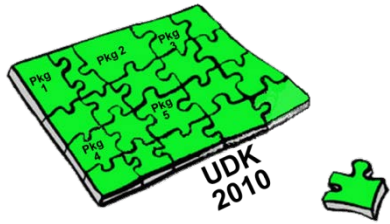


基于包的部署实例

- **Package 1** 工业标准模块和驱动
- **Package 2** 芯片的PEI模块和DXE模块
- **Package 3** 板级开发代码
- **Package 4** OEM增值代码

Intel® UDK2010 方便各种模块的整合

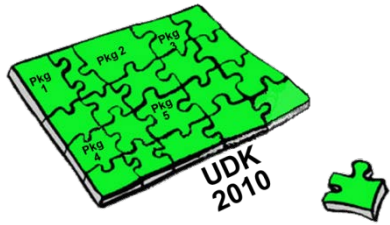
支持多种编译器和操作系统

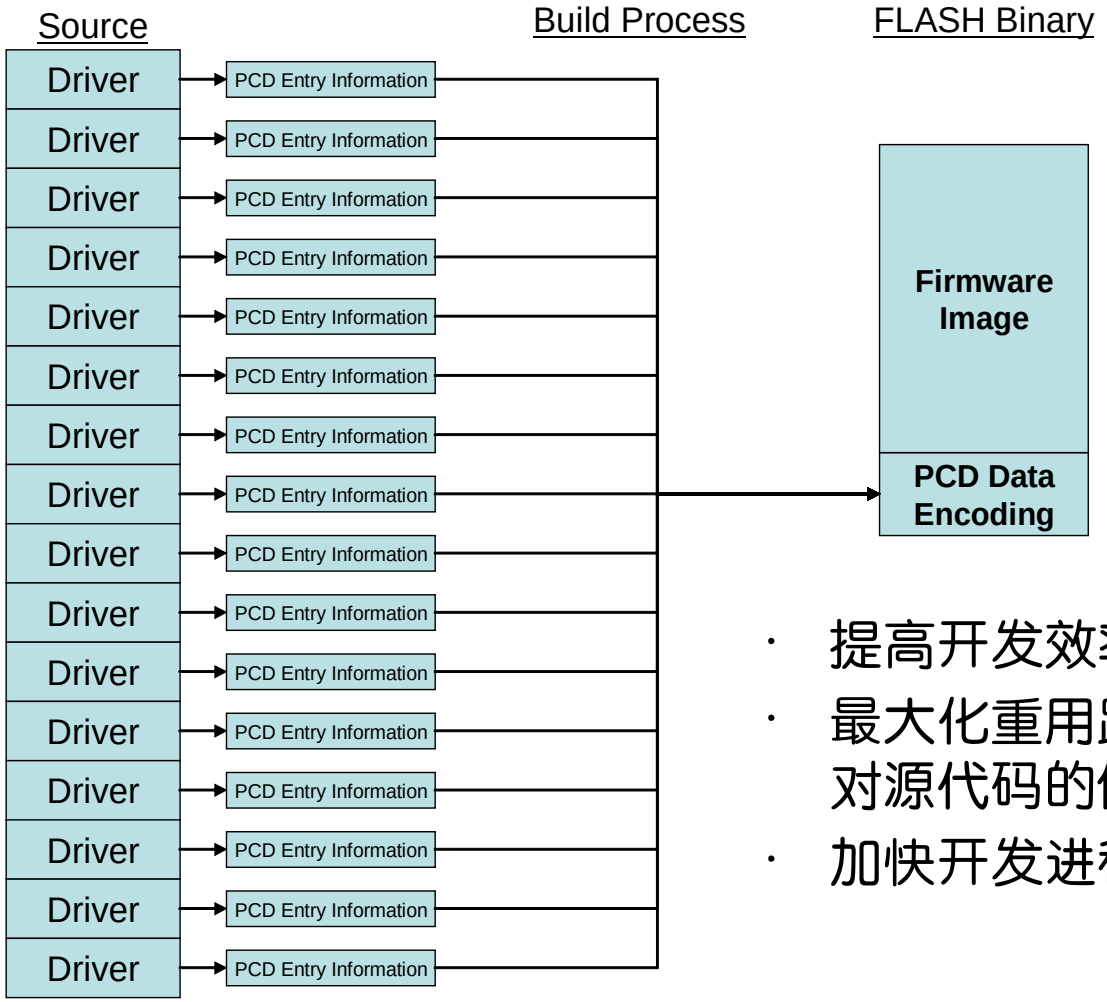


	EDK	Intel® UDK2010
操作系统	Windows* XP	Windows XP, Vista32, Vista64, Windows 7, Linux*, OS/X*
编译器、链接器	Visual Studio 2003, 2005, WinDDK	Visual Studio 2003*, 2005*, 2008*, WinDDK*, Intel® C++Compiler, GCC
Build	nmake	nmake, gmake
Build Tools	C	POSIX C, Python*

GCC GNU Compiler Collection for C++
POSIX C Portable Operating System Interface for Unix

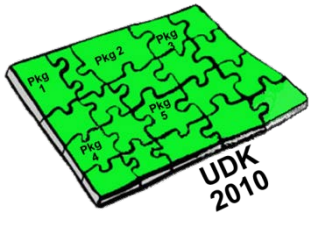
平台配置数据库

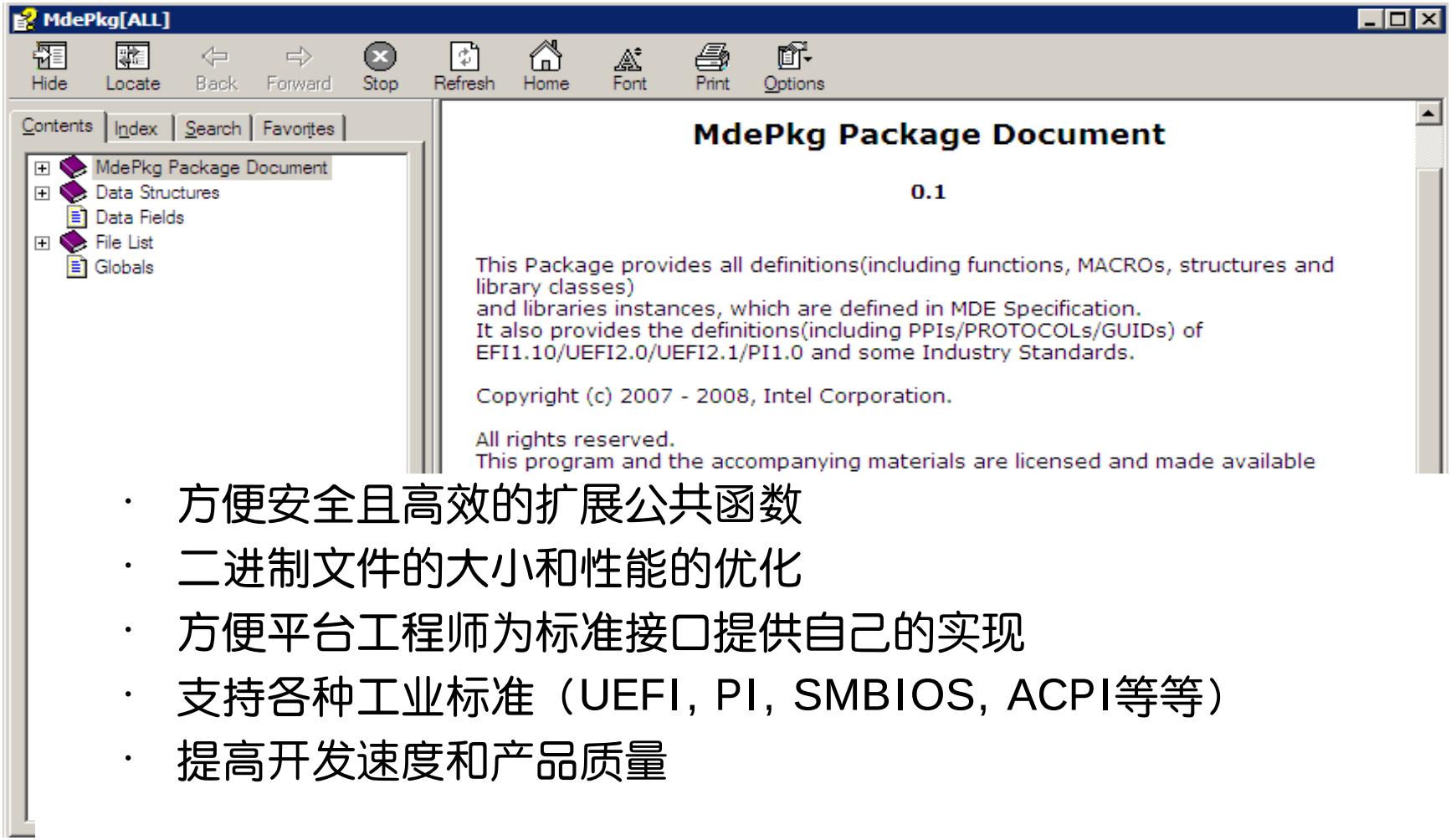




- 提高开发效率
- 最大化重用跨平台代码，最小化对源代码的修改
- 加快开发进程

优化的库函数



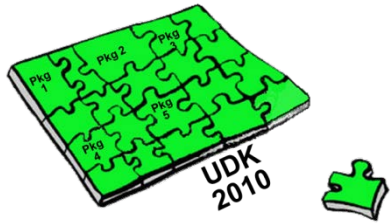


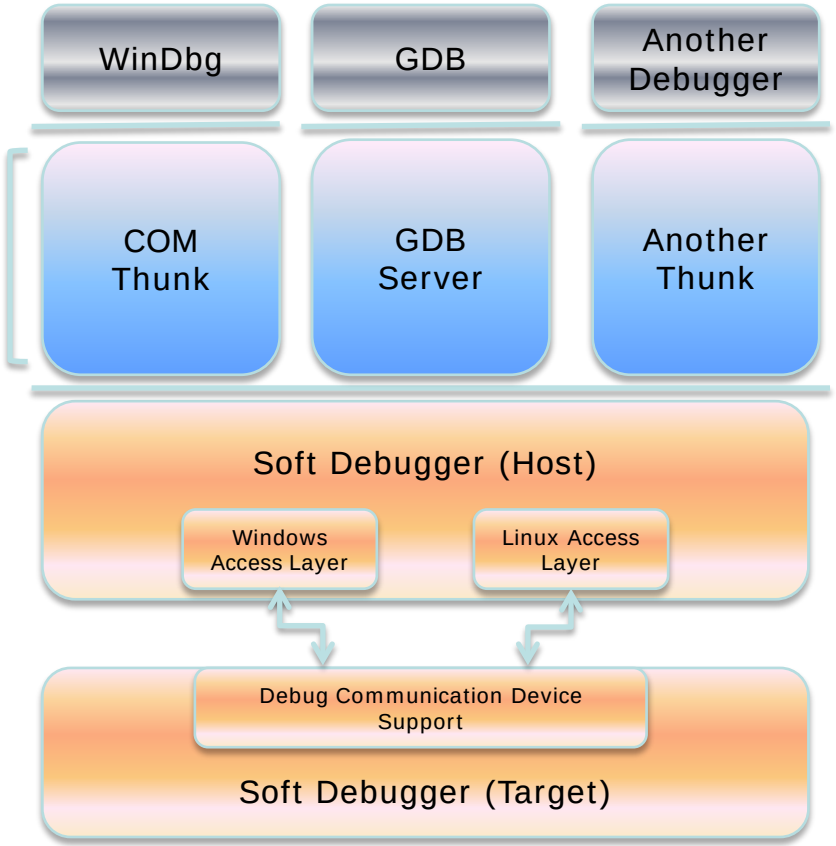
- 方便安全且高效的扩展公共函数
- 二进制文件的大小和性能的优化
- 方便平台工程师为标准接口提供自己的实现
- 支持各种工业标准（UEFI，PI，SMBIOS，ACPI等等）
- 提高开发速度和产品质量

源代码调试

Intel® UDK2010 包含源代码调试工具：

- 类似于标准的Windows* WinDBG* 工具
  - 易学习
  - 功能强大
  - 支持早期预启动阶段的调试
- 直接集成于平台的预启动映像文件
- 使用串口和USB作为与开发主机的通信接口





Intel® UDK2010 可在www.tianocore.org 获得

tianocore.org

Intel® UDK2010
Open Source
UEFI Development Kit

Develop. Contribute. Advance.

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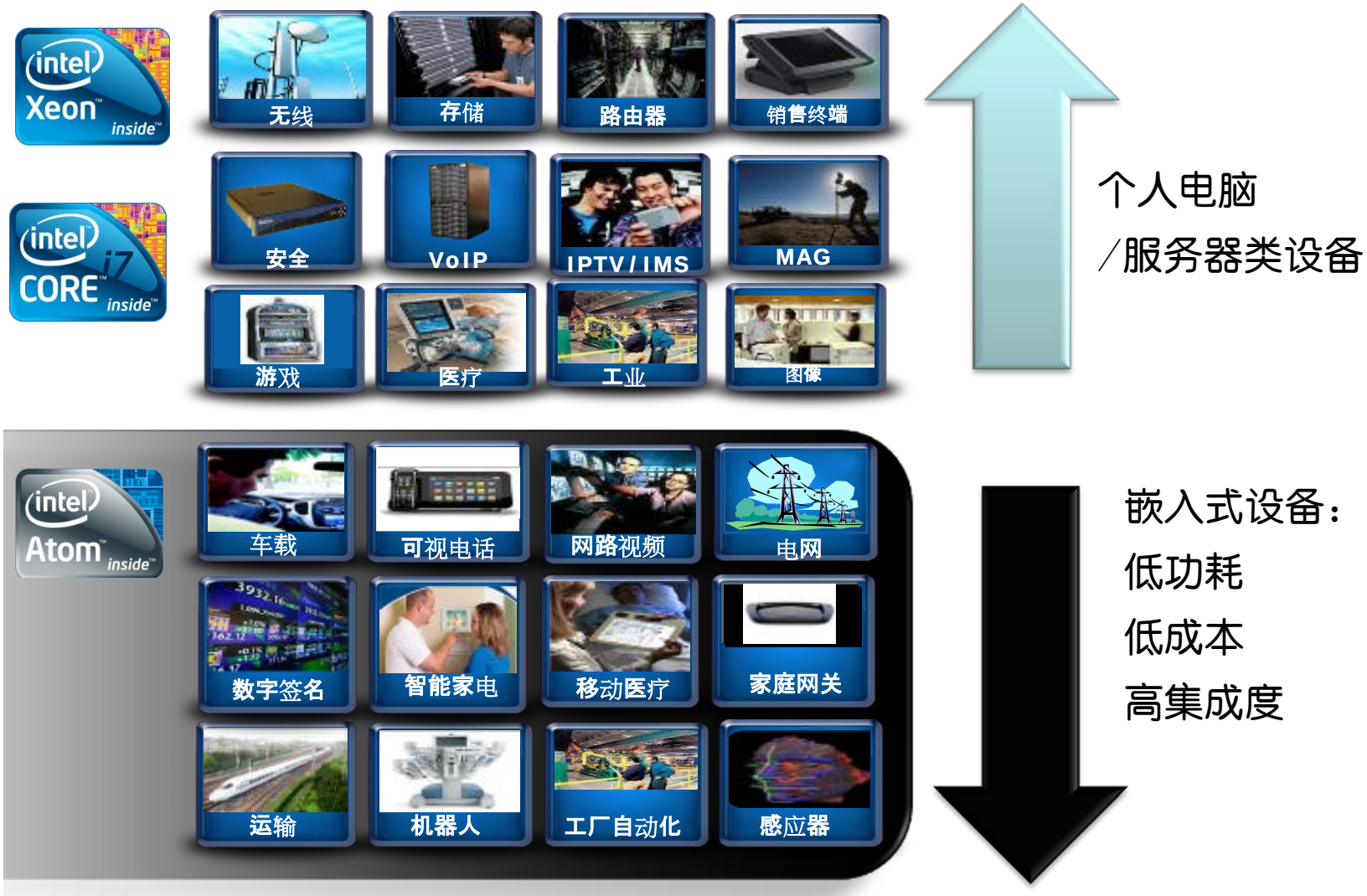
嵌入式领域发展的现状与展望



嵌入式设备在各式各样的应用领域得到飞速发展

传统BIOS和嵌入式领域Boot Loader

BIOS
根据个人电脑工业标准进行动态配置

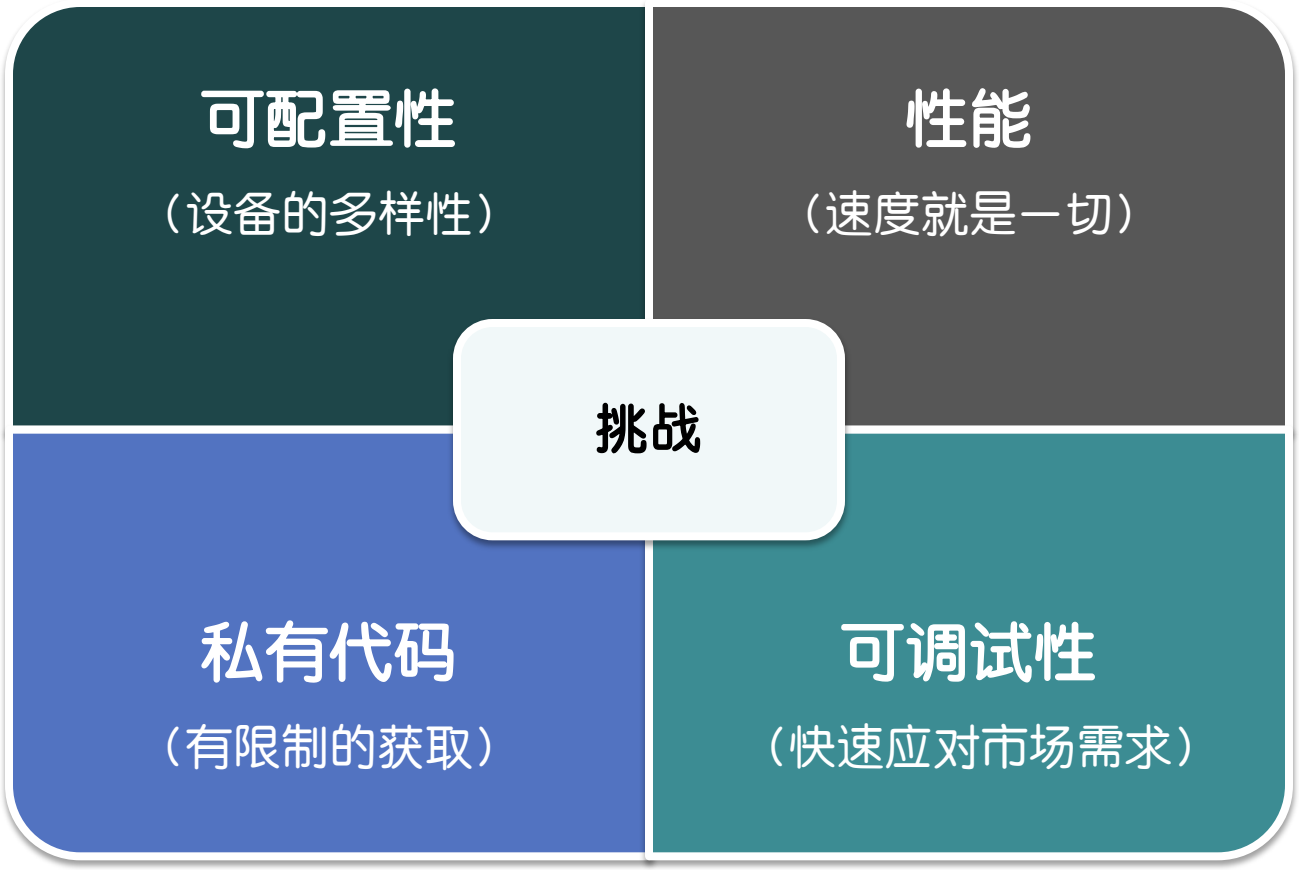
- 兼容标准的操作系统
- 具有丰富的功能特性
- 适用于大多数的应用场景
- 支持多种启动路径
- 可获得额外的技术支持和服务
- 需要付费

Boot Loader
针对一种特定的应用进行静态配置

- 定制化的操作系统和应用程序
- 提供最基本的IA架构的初始化
- 快速且精巧
- 适用于单一应用场景
- 支持特定的启动路径
- 无需炫目的配置界面
- 无需深度的技术支持
- 免授权费

Intel® BLDK 可将使用模型
从传统 BIOS扩展到嵌入式领域 Boot Loader

嵌入式设备的启动引导程序面临的挑战



Intel® UDK2010 能够帮助您应对嵌入式领域的挑战

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Intel® BLDK 的组成元素

技术文档

- 易于理解的指导性文档可以帮助客户自我学习
- 高效、可扩展的技术支持的方法

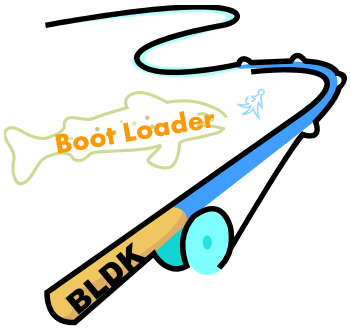
CRB和参考固件代码

- 开发客户系统的起点

图形用户接口和工具软件

- 通过使用图形化的功能模块和编译工具，客户可以在不直接修改源代码的情况下定制启动引导程序
- 集成开发环境大大方便了代码的浏览和修改

Intel® BLDK 为客户提供了开发专属的启动引导程序的机制



关于 Intel® BLDK 的详情，请访问 http://www.intel.com/go/bldk

Intel® BLDK 的主要特点

支持各种工业标准
- UEFI 2.0, UEFI 2.1, UEFI 2.2, UEFI 2.3 and PI 1.0, PI 1.1, PI 1.2
- ACPI, USB, ATA, SMBIOS, TCP/IP等等

支持二进制文件可配置
- 无需改变任何源代码，即可选择功能特性和修改二进制文件

支持多种工具
- MSFT (VS2003, VS2005, VS2008, WinDDK), GNU (GCC), INTEL (ICC)

支持多种启动设备
- 可从以下设备启动：ATA, SSD, CF, SD, USB, FWH, SPI, iSCSI, PXE

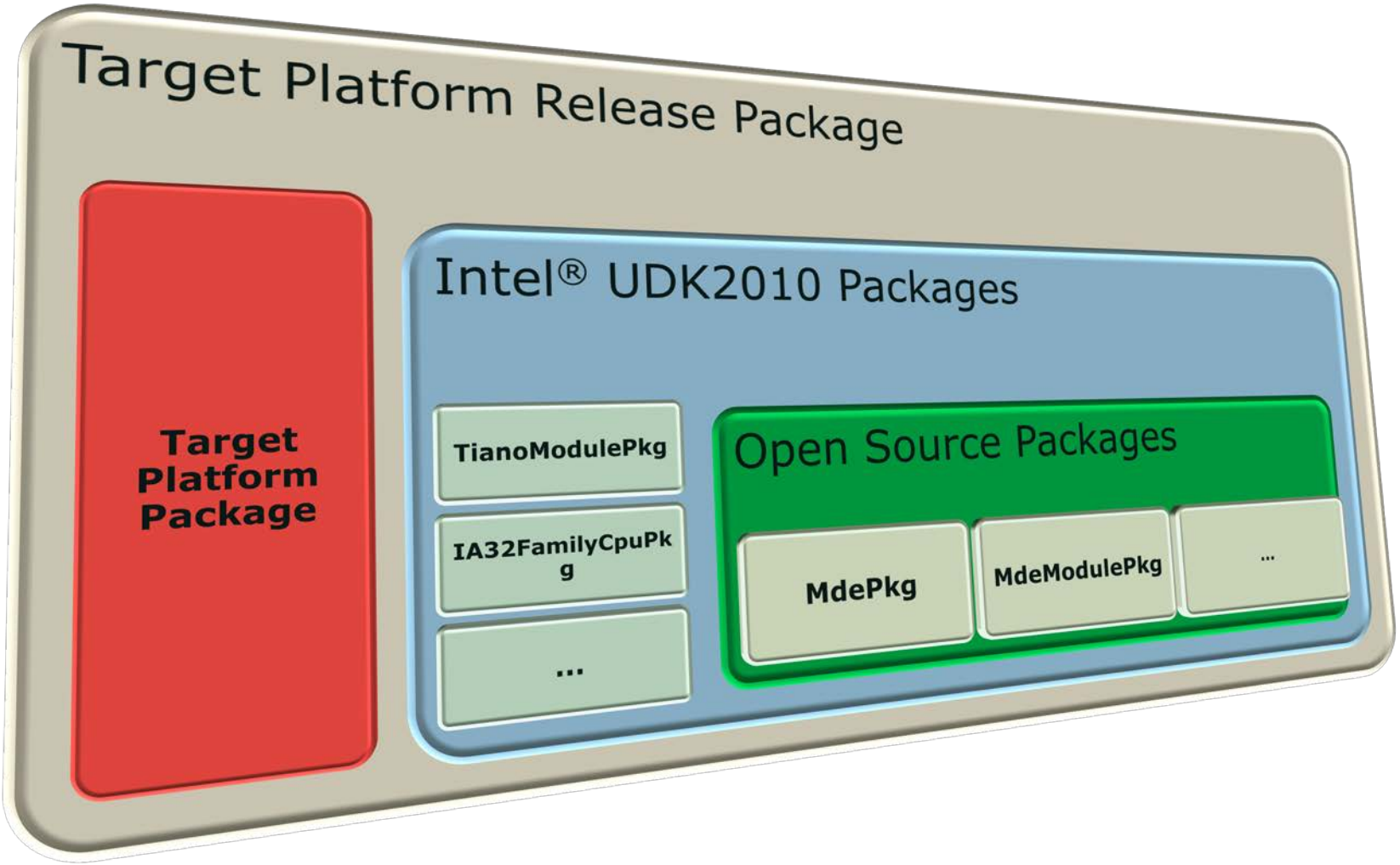
支持源代码级调试
- UDK 调试工具提供纯软件的调试方案

可扩展的基础代码
- 进入操作系统前的安全性，丰富的网络功能和管理能力等等

免授权费的源代码
- 绝大部分源代码可以从 www.tianocore.org 获得

Intel® UDK2010是嵌入式固件开发的最佳选择

配有英特尔® 凌动™ E6xx 系列处理器和英特尔® 平台控制器 EG20T的平台 – 基于Intel® UDK2010



应对挑战-可配置

- 可配置能力是嵌入式领域的关键特性
  嵌入式设备和普通个人电脑的不同在于，具有针对特定应用环境进行定制和性能进行优化的能力，这需要改变传统的行为模式。
  - 是否需要运行一个用户界面?

交互式启动

无交互式启动

  - 在运行payload之前必须初始化哪些硬件设备?

嵌入式领域通常有特定的启动策略

应对挑战-性能

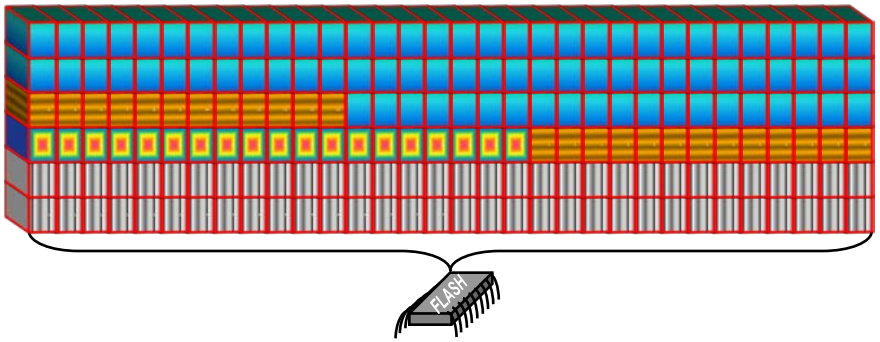
- 启动目标硬件的选择
  - 启动设备的延时影响启动性能
  - 使用固态硬盘代替传统磁盘媒质可以节省数秒的启动时间

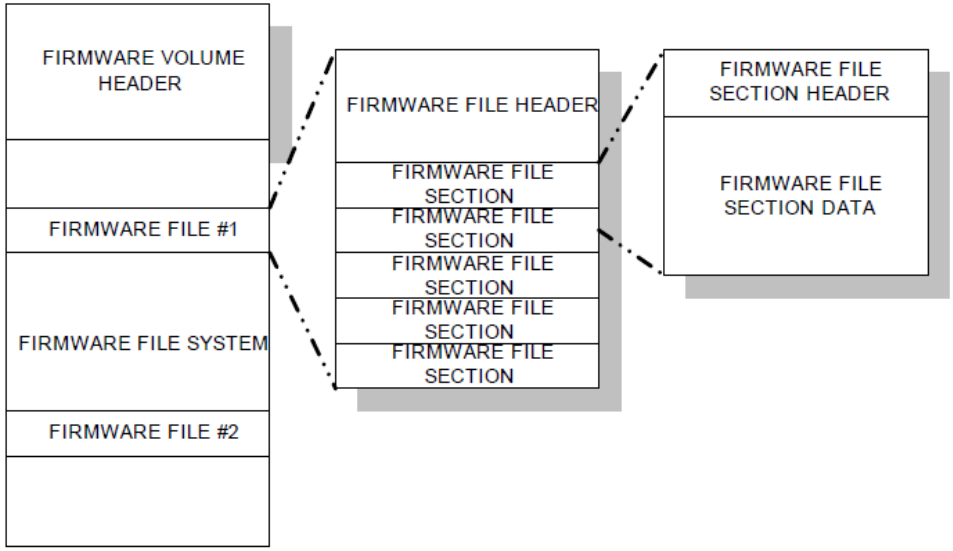
	DRAM	SSD (34nm)	EIDE
Read Latency	~30 ns	65 µs	8.5 ms
Read BW (MB/s)	1800	250	120
Write Latency	~30 ns	85 µs	10 ms
Write BW (MB/s)	1800	70	120
Spin-up/down time	N/A	N/A	1-2s++

越短的操作延时，越快的启动性能

应对挑战-性能

- FLASH的布局
  - FLASH的布局影响性能
  - 根据启动配置布局FLASH的内容，只需读取FLASH上包含启动所需核心组件模块



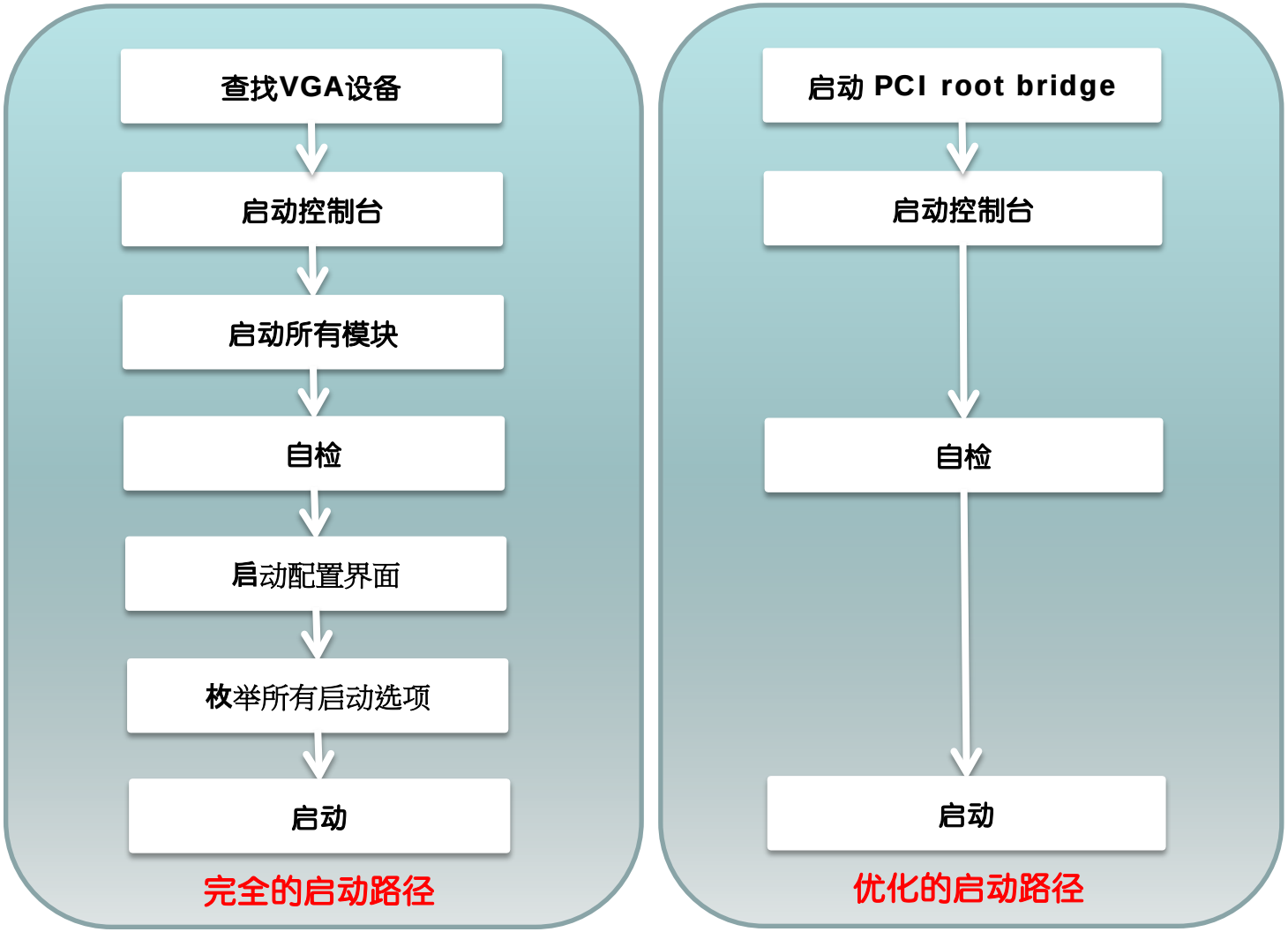


核心组件模块
数据模块
可选数据模、
空闲模块

越高效的FLASH布局，越快的启动性能

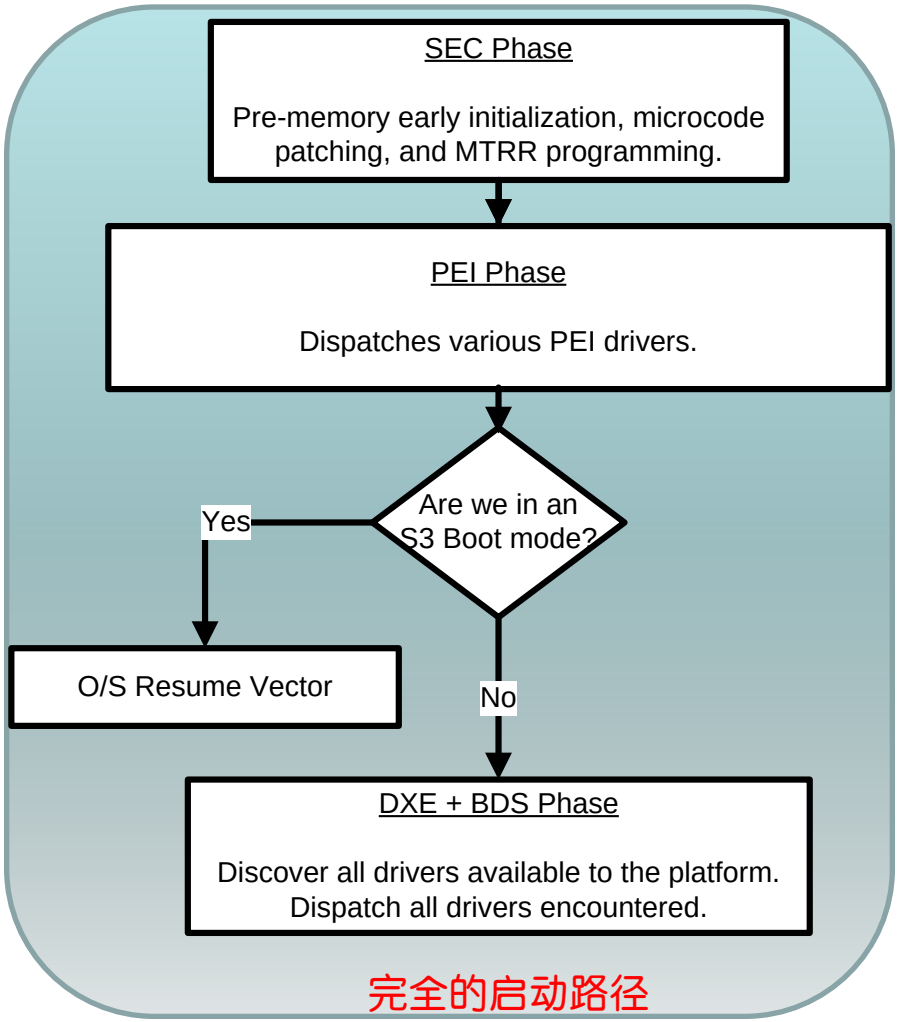
应对挑战-性能

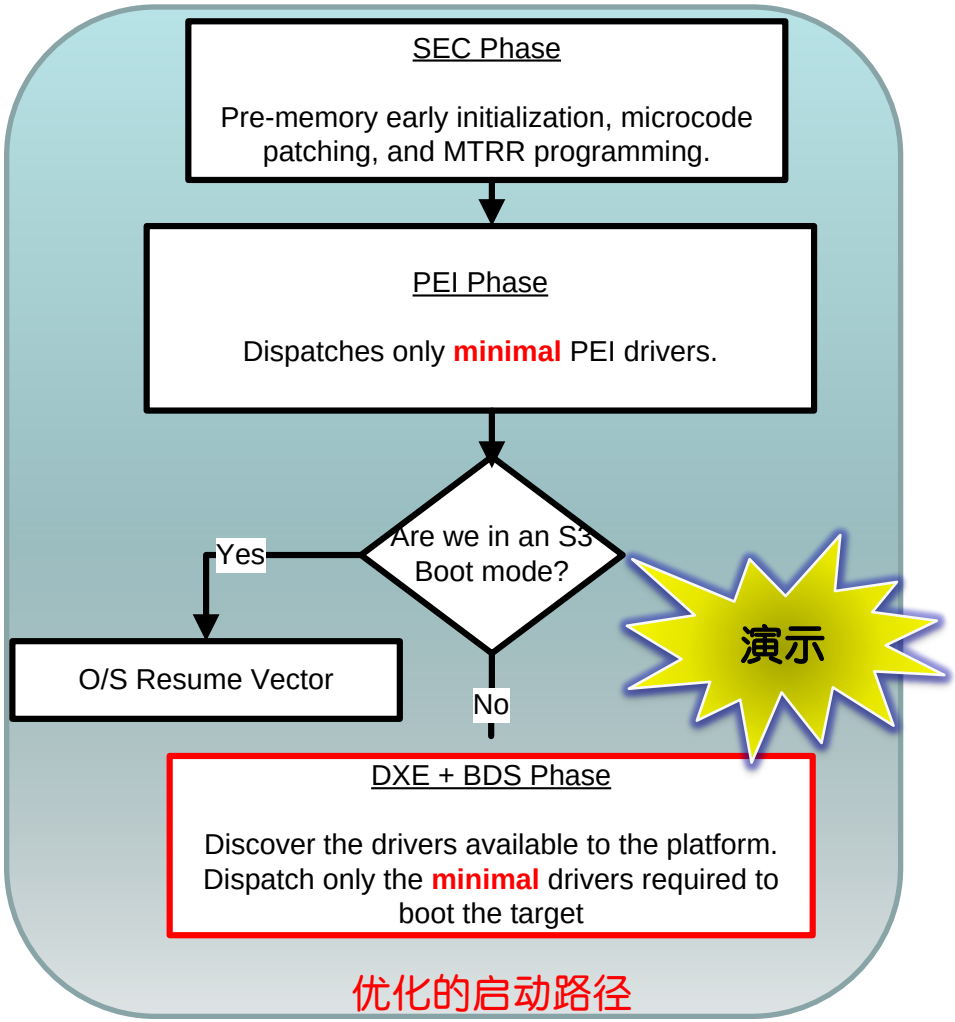
- 对于应用平台的不同需求，可以做完全不同的定制优化



越优化的模块启动顺序，越快的启动性能

应对挑战-性能



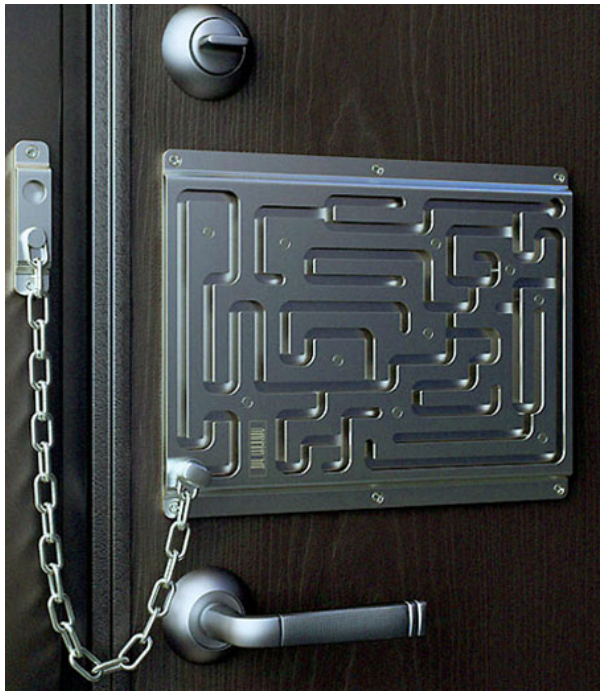


若需了解技术细节，请阅读相关白皮书：http://edc.intel.com/Link.aspx?id=4603

优化的同时保持对UEFI规范的兼容

应对挑战-私有代码

- 无法获得源代码资源
  - 传统的私有代码发布机制限制了启动引导程序源代码的获取



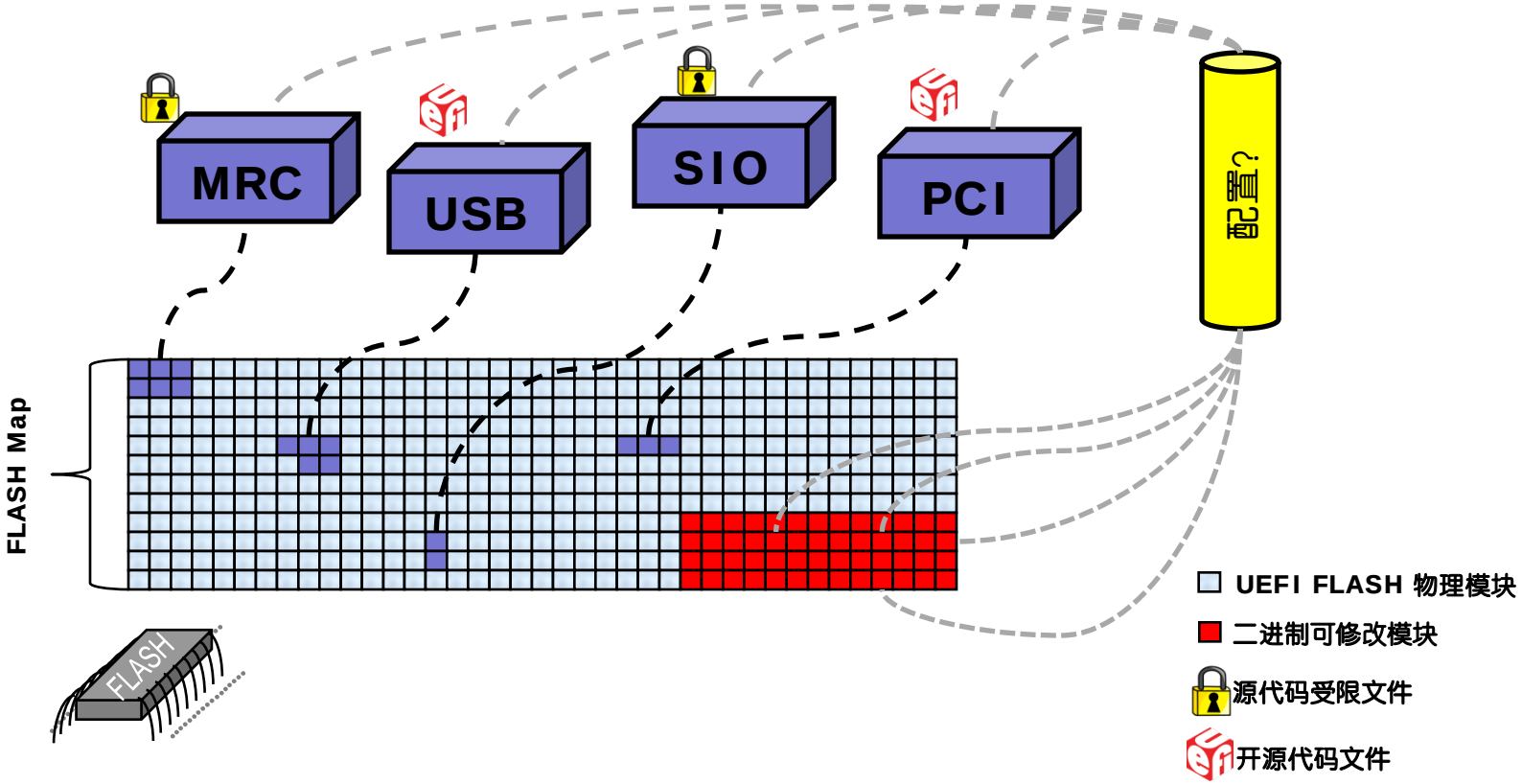
www.tianocore.org 重定向至
Source Forge repository

仅有少量受限代码

UEFI 引入了大量的开源代码

应对挑战-私有代码

- 依靠扩展二进制模块的可配置性，我们可以应对更广阔的应用场景。



对二进制文件的修改可以减少对源代码的依赖，
这种方案将被大多数用户使用

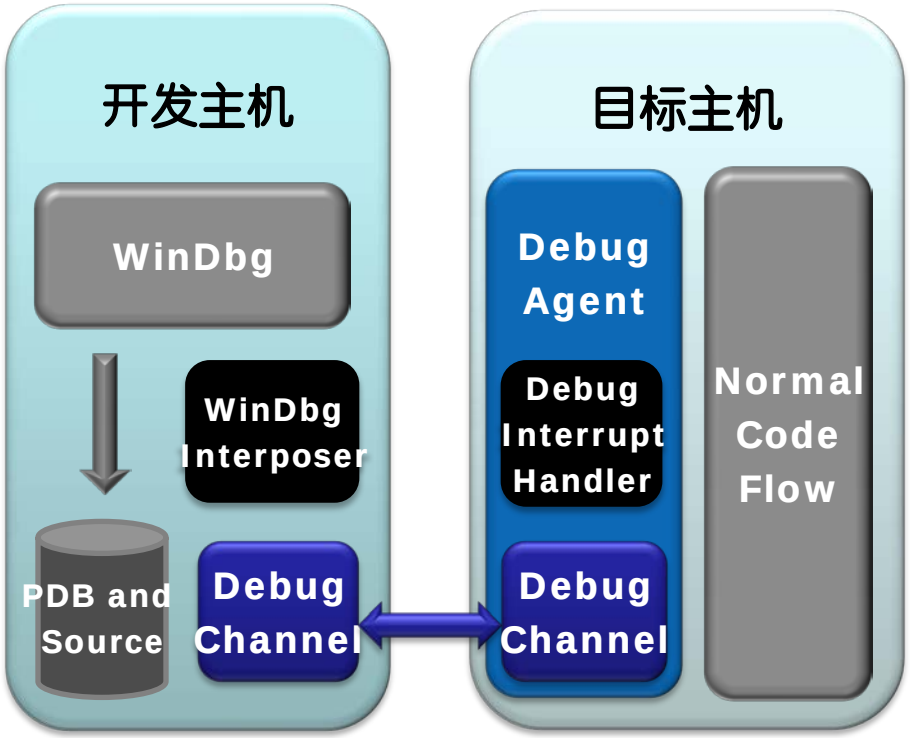
应对挑战-可调试性

- 纯软件方式的调试方案
  - 最新的Intel® UDK 调试工具（Intel® UDK Debugger Tool)
  - 无需外接JTAG接口即可进行源码调试
    - 可利用各式各样的调试端口（例如，USB和串口)
  - 使用WinDbg作为前端支持模块
  - 该调试方案几乎可以完全替代高端的硬件调试工具
    - SEC的初始代码必须预先建立堆栈
      - 通常情况下，从开机到可以调试之间有十几条指令
      - 同样，SMM 代码也要等 SMI 入口十几条指令执行完成后才可调试
    - 某些处理器模式的切换难以调试

基于UEFI的开源调试解决方案

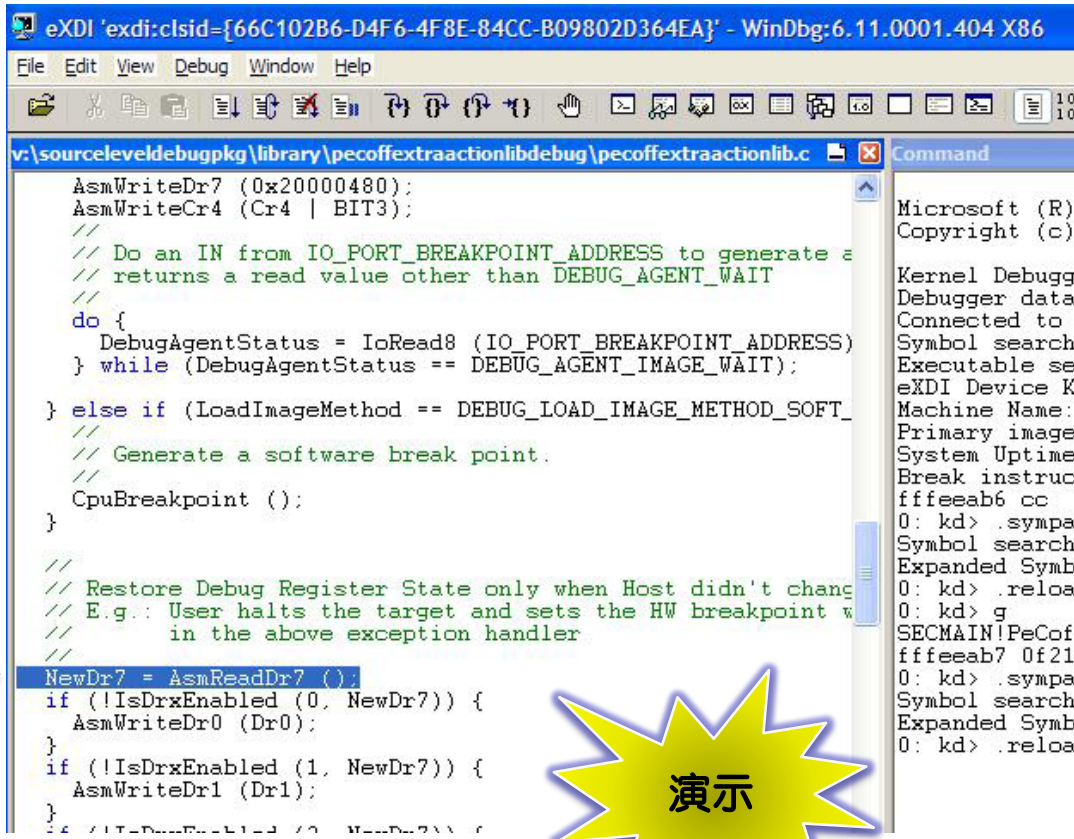
应对挑战-可调试性

- Intel® UDK Debugger Tool 的架构
  - WinDbg Interposer 解析来自WinDbg的指令
  - Debug Channel 负责开发主机和目标主机之间的通信
  - Debug Interrupt Handler 处理来自Debug Channel的命令



应对挑战-可调试性

- WinDbg 在SEC阶段的后期断下目标机器，并装载SecCore阶段的符号表，接着在如图所示窗口显示当前源代码。
- 底部窗口用来输入调试命令
  - .reboot
  - Smmentrybreak=1 or 0
  - g - Go
  - B[C|D|E][<bps>] - clear/disable/enable breakpoint(s)
  - Q - quit
  - ? – Command list



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总结

- Intel® UDK 2010 满足了最新工业标准并提供了一套完善的开发工具和基础代码。
- Intel® BLDK 提供了基于英特尔® 凌动™处理器快速开发嵌入式领域产品的解决方案。
- Intel® UDK 2010 是能够应对嵌入式领域挑战的最佳选择。

关于UEFI的更多信息：

- 其他有关UEFI的课程-下一页
- 参考链接：
  - 相关规范的下载网址 www.uefi.org, www.intel.com/technology/efi
  - EDK II 开放源码实现: www.tianocore.org

- Intel出版社的技术书籍： “Beyond BIOS: Implementing the Unified Extensible Firmware Interface with Intel’s Framework” www.intel.com/intelpress

EFI 专题讲座课程

课程编号	课程标题	日期/时间	教室
EFIS001 ✓	微软* Windows*平台演进与UEFI规范	周二 11:10	306A
EFIS002 ✓	片上系统（SoC）的 UEFI 开发与创新特性	周二 14:05	306A
EFIS003 ✓	UEFI 和透明计算技术	周二 15:10	306A
EFIS004 ✓	Intel® UDK2010 和Intel® BLDK： 高级嵌入式开发基础	周二 16:10	306A
SPCQ001	热点问题问答：Intel® BLDK	周二 17:00	306A
EFIS005	当前 UEFI 和Intel® UDK2010 在安全性和网络连接方面的进展	周三 11:10	306A

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Rev. 1/13/11