Aptio – Product Overview

A complete UEFI solution …
from concept to product

Updated June 2007

What is Aptio?

- **Aptio is AMI's EFI/UEFI product name**
- **Aptio is not just code … it is a *solution***
  - Extensive source library
  - Integrates with open-source Intel EFI Development Kit (EDK)
  - Development & deployment tools
  - Support & training
  - Porting services
- **A *clean* solution built on new standards**
  - Not just UEFI stuck on top of legacy BIOS code

Aptio™

AMI Aptio - Brief History

- **AMI first started working on EFI about eight years ago for the Intel Itanium (IA64)**
- **AMI has worked closely with Intel on the Framework, first full implementation for EFI, since it was introduced**
- **UEFI is the new industry group driving updated standards & specifications**
  - AMI is a founder & member of the board of directors
- **Aptio 4.5 is AMI's latest version**
  - UEFI + Framework + AMI Experience
  - Reliability & Standards Compliance
  - Focus on the customer's firmware needs
  - Builds from experience with AMIBIOS8

AMI Aptio - Approach

- **Aptio integrates UEFI & the Framework with AMI's experience in a complete product**
  - Based on working experience & OEM feedback
  - Apply the "template-based porting" model from AMIBIOS8 to UEFI
  - One core for all x86/x64 market segments

AMI Aptio 4.0

- **Take the best features from AMIBIOS8 …**
  - Development tools designed specifically for firmware
    - Visual eBIOS (VeB) and AMI Debug
  - Template-based porting
  - Large library of silicon support
  - Complete utility suite (flash & ROM maintenance)
  - Ability to support worldwide customers
- **Combine our AMIBIOS8 experience with the standards-based approach of EFI & UEFI**
- **First demonstrated at WinHEC 2005**
  - Used 100% non-Intel hardware to boot an EFI OS loader
  - Goal: Prove EFI & Framework standards can work for the entire PC industry

AMI Aptio 4.5 and beyond

- **Combines Aptio 4.0 with Intel's open-source effort to expand EFI/UEFI adoption**
- **Compatible with EDK in Tianocore.org ("Foundation")**
  - Compatibility with third party EFI drivers
  - The Framework EDK Foundation (PEI/DXE Core)
  - Support for EDK Library and Headers
  - Source compatible with The Framework Modules
- **Compatible with modules developed for Aptio 4.0**
- **Source structure simplified**
- **Support for a wide range of silicon**
  - Desktop, Server, Notebook & Embedded

Aptio Release 4.6

Available now

Aptio 4.6 Core Features

- **UEFI 2.0 compliance**
  - Native x64 build
- **UEFI x64 for Windows Server**
  - Windows Vista SP1 & the next edition of Microsoft Windows Server will include a x64 UEFI firmware loader
  - Requirements to be introduced at WinHEC 2007 (*"Hardware Support and Directions for Microsoft Windows Server"*)
- **Visual Studio 2005 Compiler Support**
  - Aptio will work with MS DDK or Visual Studio 2003/2005
  - Aptio is validated using MS DDK compiler (32-bit & 64-bit)
- **Hot Plug PCI, PCI-X & PCIe**
  - Requires OS & hardware support

Aptio 4.6 Drivers

- **Intel AMT 2.5**
  - Validated on Intel Santa Rosa CRB
- **Human Interface Infrastructure (HII) 0.92 Updates**
  - Configuration and translation info for display localization
- **Support UEFI PCI Option ROM**
  - Multi-Image PCI OpROM: Legacy, EBC, EFI IA32 & x64
  - Hardware verified at Dec. 2006 UEFI Plugfest
- **Graphics Output Protocol Support**
  - Windows Vista SP1 & Server support new UEFI Graphics Output Protocol to render glyphs for UNICODE displays
- **EFI Network Stack using legacy UNDI**

Aptio 4.6 New Features

- **SPI Flash Support**
  - Utilized on newer Intel chipsets
- **TPM 1.2 Support**
  - Based on Trusted Computing Group (TCG) specifications
- **MPS 1.4 (for legacy compatibility)**
- **ACPI Tables: SLP 2.0, SLIT & SRAT**
  - SLP 2.0 - System Locked Pre-installation for Microsoft Windows Vista OEM activation process
  - SLIT - System Locality Information Table (x64 NUMA)
  - SRAT - Static Resource Affinity Table (x64 NUMA)

Aptio 4.6 Features: AMD

- **AMD PowerNOW! with Optimized Power Management (OPM) for notebook and server**
  - Provides enhanced power management capabilities
  - Less strain on data center cooling and power requirements
  - Provides performance-on-demand by dynamically adjusting performance based on CPU utilization
  - Optimizes Platform Power Consumption
  - Can reduce CPU power at Idle by 75%
- **AMD Cool'n'Quiet for Notebooks**
  - Lowers power consumption
  - Enables a quieter-running system while delivering performance-on-demand

AMI Aptio 4.x: Benefits

- **One source base for all chipsets and CPUs**
  - Working with *multiple* CPU & chipset vendors
- **AMI responsible for code & quality control**
- **AMI creates & supports the product**
- **Well defined porting framework & code structure**
  - Consistent file and module structure
  - Reduced number of source files & modules
  - Template-based porting
- **Full suite of tools & deployment utilities**
  - Development, production & end user tools
- **An end-to-end solution for UEFI**

Aptio 4.x: Standards Compliance

- **Compliant with EFI 1.10 & UEFI 2.0**
  - Developing for UEFI 2.1 and beyond
- **Compliant with Intel Framework specifications**
- **Source compatible with Intel modules**
  - Memory Reference Code
  - CPU & Chipset Initialization Modules
  - Leverages the open-source Intel EFI Development Kit (EDK)
    - No changes required to Aptio 4.5 Design
    - EDK2.0 can be added as an eModule
- **x64 UEFI Boot Loader support**
  - Developed in partnership with Microsoft
  - Introduced at UEFI Plugfest in 2006

Compatibility Support Module (CSM)

- **The Compatibility Support Module (CSM) allows "legacy" operating systems to operate on Aptio**
  - UEFI does not implement the software interfaces required by existing operating systems (INT XXh, BDA, EBDA, …)
- **AMI CSM is based on AMIBIOS8**
  - Maximum compatibility with existing software
- **Implemented as an eModule**
  - Standalone CSM16 (16-bit binary) component
  - Module requires no porting
  - OEM binary can be included to implement unique features, such as INT 15h calls, without changing base CSM16 code
  - Enables legacy hardware in a UEFI environment
- **CSM is the most tested component in the Aptio library**
  - A key piece of our transition solution to UEFI

Aptio 4.x: Development Partners

- **Working with major CPU & chipset vendors**
  - Aptio is enabling silicon in *all* x86/x64 computing markets
- **Available on Intel Customer Reference Boards (CRB)**
  - Intel IPD (embedded) uses Aptio 4.5 to develop CRB firmware for new chipsets
  - Intel MPG (mobile) ships Santa Rosa Mobile CRB using firmware based on Aptio 4.5
  - Support for Intel MPG carries over into enabling future Intel IPD platforms, once chipsets move to the long-life roadmap

AMI Quality Assurance

- **Look at the product with multiple eyes**
  - AMI, silicon vendors, OEM/ODM partners
- **Full validation in AMI BIOS QA Labs**
  - USA, Taipei & India
- **Full validation in Intel MPG labs**
  - Meet the QA standards of MPG for their CRB
  - Supporting MPG in Hillsboro, Taipei & Bangalore
- **Validated by silicon partners and OEMs**
  - OEM & ODM beta partners
- **Validated on Embedded, Notebook, Desktop and Server platforms**

Migrating Customers From AMBIOS8 to Aptio

AMI solutions simplify the transition from BIOS to UEFI

Aptio & UEFI Adoption

- **2007 is the year to consider adopting Aptio**
  - Aptio products are being shipped by Intel and a major embedded OEM
  - Major OEMs are evaluating Aptio
  - Microsoft will announce UEFI requirements for Microsoft Windows Server at WinHEC 2007
  - Contact AMI for training or porting services
- **Intel IPD will switch to UEFI in 2008**
  - Intel IPD will be porting Aptio to new CRB
  - AMIBIOS8 will be available as reference on some platforms during the transition

Our Commitment To AMIBIOS8

- **AMI understands each customer will set their own pace to switch to UEFI**
  - For the embedded market, an immediate switch may not make sense to some customers
  - Current customers need BIOS support for long-life products
- **AMIBIOS8 available for many years to come**
  - No “firm date” is set to stop supporting BIOS
  - AMI is porting new chipsets to both code bases
  - AMI engineers are cross-trained to support both Aptio & AMIBIOS8 customers
  - AMIBIOS8 will be phased out based on market demand
  - Customers choose when they want to switch to UEFI

Smooth Transition for AMIBIOS8 Customers

- **When customers move from BIOS to UEFI, AMI helps make the transition easier …**
- **Visual eBIOS (VeB): Used by AMIBIOS8 and Aptio**
  - No need to learn a new porting tool
- **Compatibility Support Module (CSM)**
  - Allows UEFI firmware to boot legacy OS
  - Based on AMIBIOS8 - maximum compatibility
  - Easily removed if not required
- **Engineering Support – Same Teams**
  - Transfer years of experience in BIOS porting to UEFI designs
- **Support for a wide variety of silicon**
- **Training is available now!**

Utilities for Aptio

From development to deployment

Utility Overview

- Aptio utilities cover every aspect of the platform … from development to deployment

Utility	Chipset Porting	R & D	OEM	Factory	System Integrator	END User
VeB	X	X	X			
AMI Debug	X	X	X			
AMI Flash Update	X	X	X	X	X	X
DMIEdit			X	X	X	X
MMTool	X	X	X		X	
ChangeLogo			X		X	X
BCP			X		X	
AMIDiag			X	X	X	X
Rescue				X	X	X
Custom Tools				X		

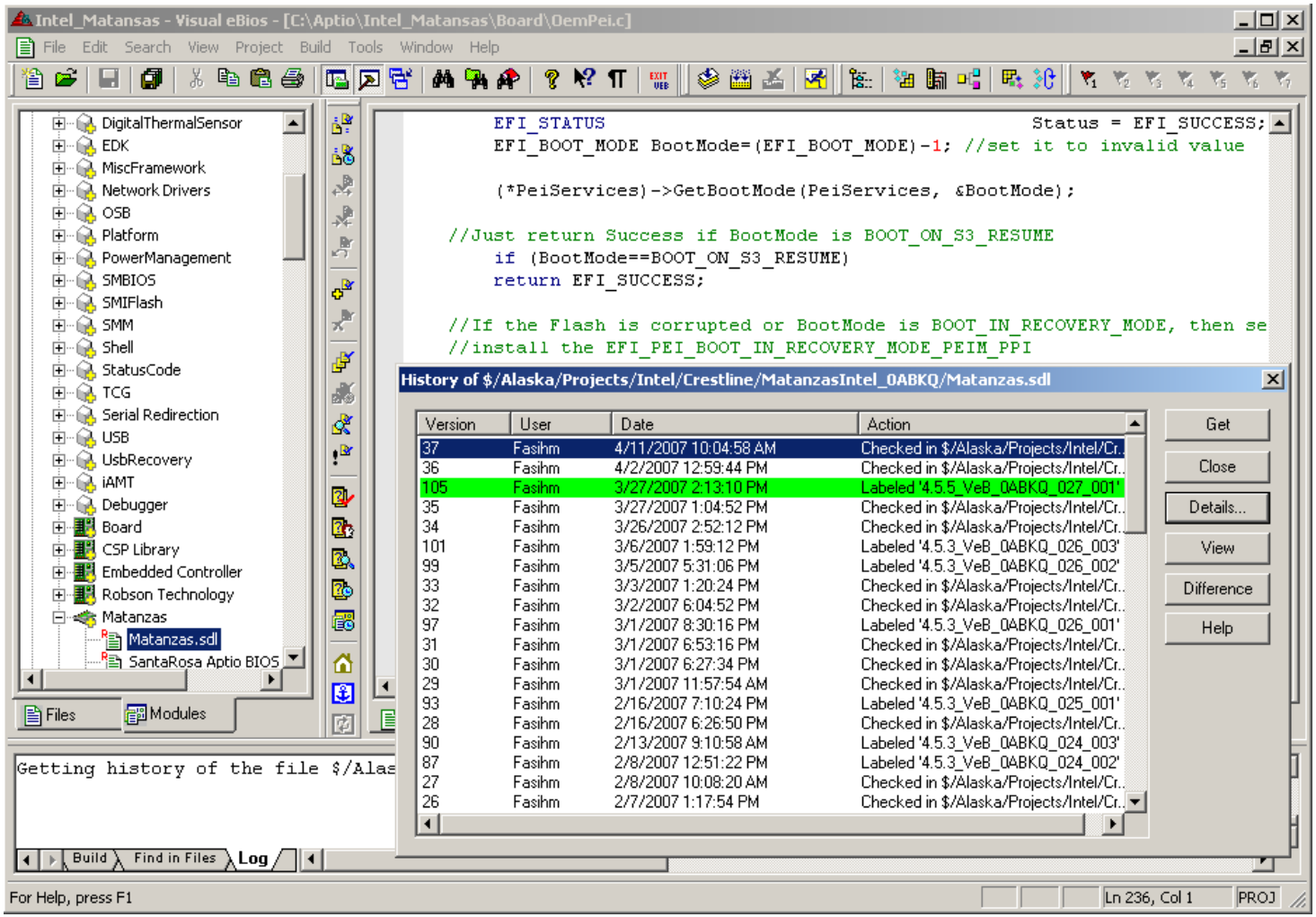
Utility Overview

- **Visual eBIOS (VeB)**
  - Development environment for Microsoft Windows
  - Common environment between AMIBIOS8 & Aptio
  - Helps make a smooth transition from BIOS to UEFI
- **AMI Debugger**
  - Software Debugger - USB and Serial Port interfaces
- **AMI BIOS Configuration Program (AMIBCP)**
  - Customize without rebuilding the ROM image from source code
  - Setup option defaults, multi-language strings & static SMBIOS Data
- **AMIDIAG for EFI, DOS & Windows**
  - True hardware diagnostics
- **Pre-boot Applications**
  - AMI Rescue™ & AMI Rescue™ Plus
  - Launch OEM applications with AMI PBA launcher

Utility Overview

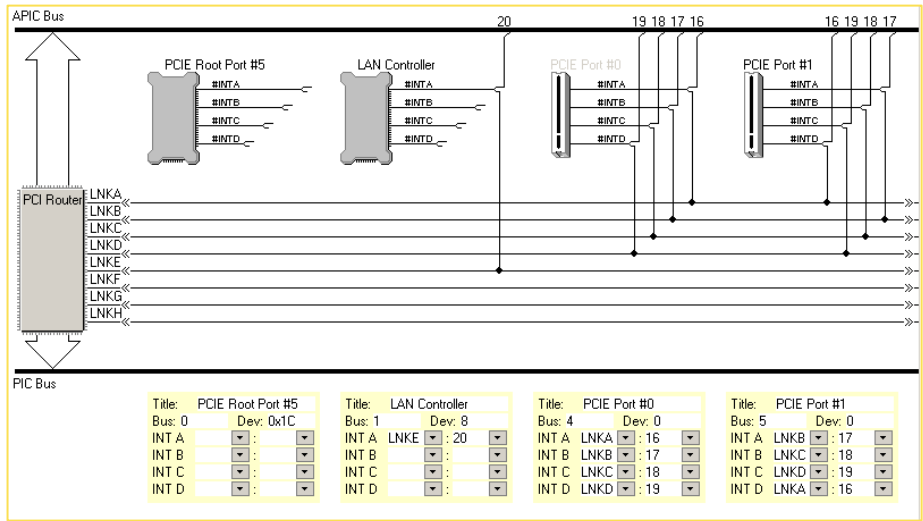
- **AFU (AMI Firmware Update)**
  - Supported in DOS, EFI, Windows, Linux and FreeBSD
  - Command line utility – x86 & x64
  - GUI available for Microsoft Windows
- **ChangeLogo**
  - OEM Logo Customization Utility
- **MMTool**
  - Manage drivers/modules contained in a firmware image
  - Add, delete, replace & extract components
  - PEIM, DXE drivers & legacy OpROM
  - Command line interface for manufacturing environments
- **DMIEDIT**
  - Modify static data associated with SMBIOS tables
  - Command line interface for manufacturing environments

Visual eBIOS (VeB): Development Environment



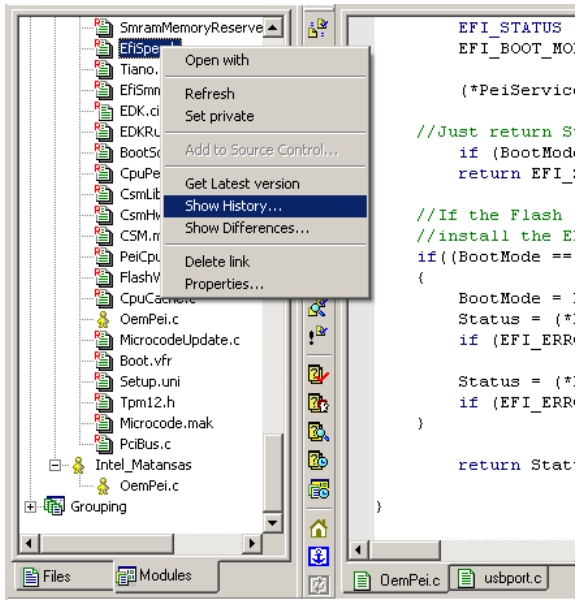
Visual eBIOS (VeB): Development Environment

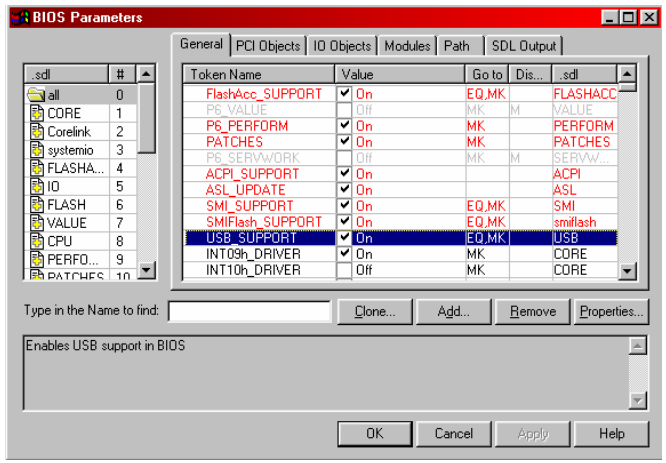
- **Integrated help & documentation**
- **Simplified code & porting structure**
- **Simplifies the transition for engineers moving from an existing BIOS code structure to Aptio**
- **Project management & integration with multiple source control databases**
  - Includes AMI RSC: 24/7 access to AMI source control databases
  - Get updates *on demand*
- **PCI Wizard**
  - Graphical IRQ routing tool

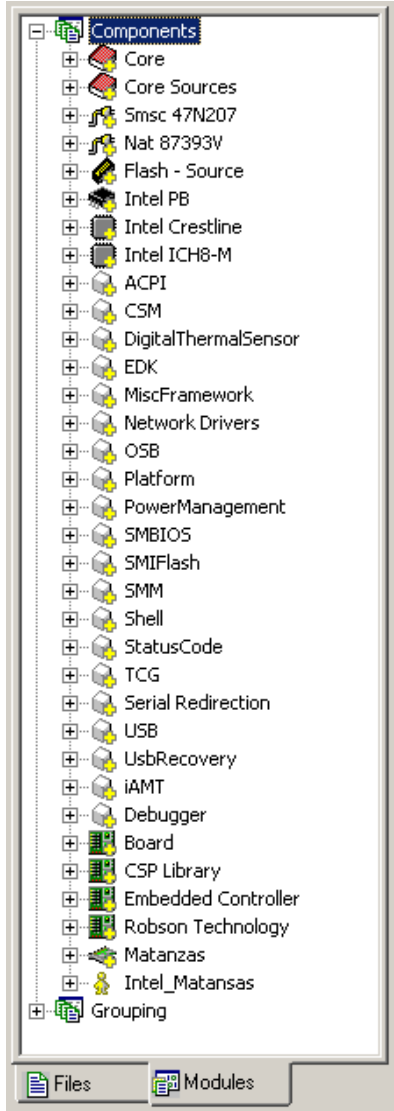


Major Features of VeB

- **Integrated text editor**
- **View project source as a collection of modules**
  - Ties into VeB source control interface
- **Modify project parameters using the SDL Wizard**
  - All project parameters on one screen
  - View all parameters, or sort by eModule

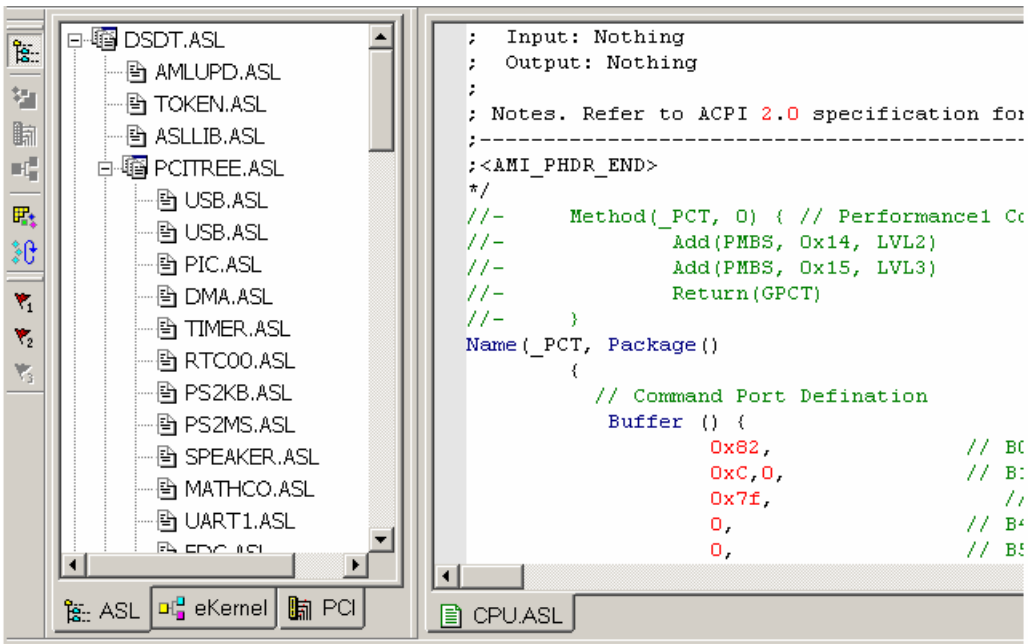


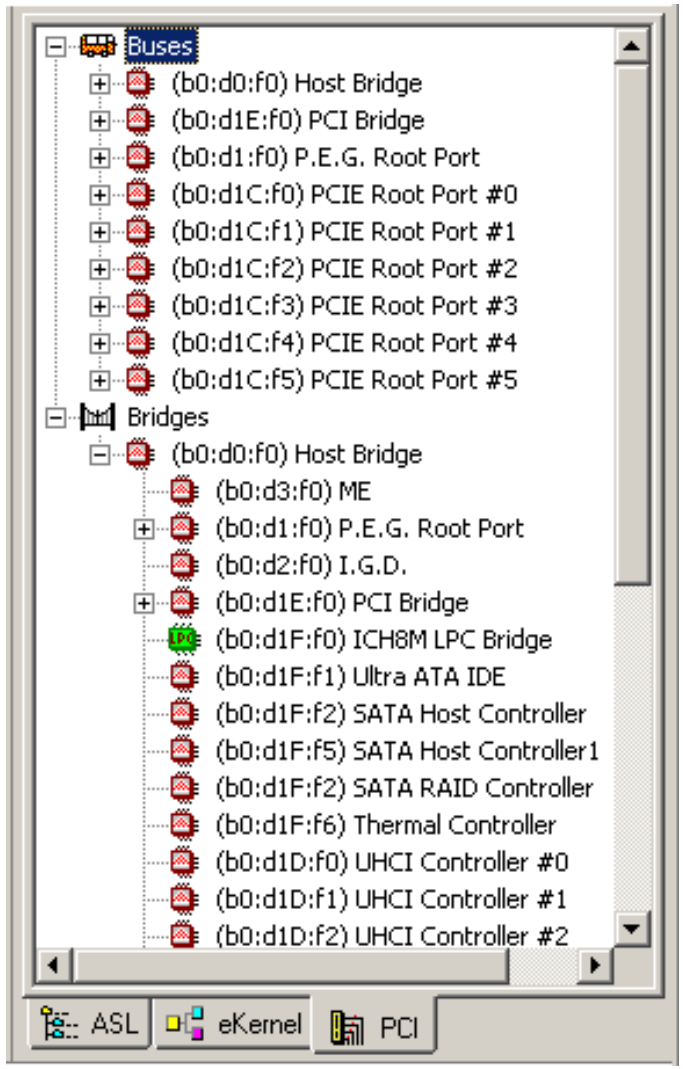




Major Features of VeB

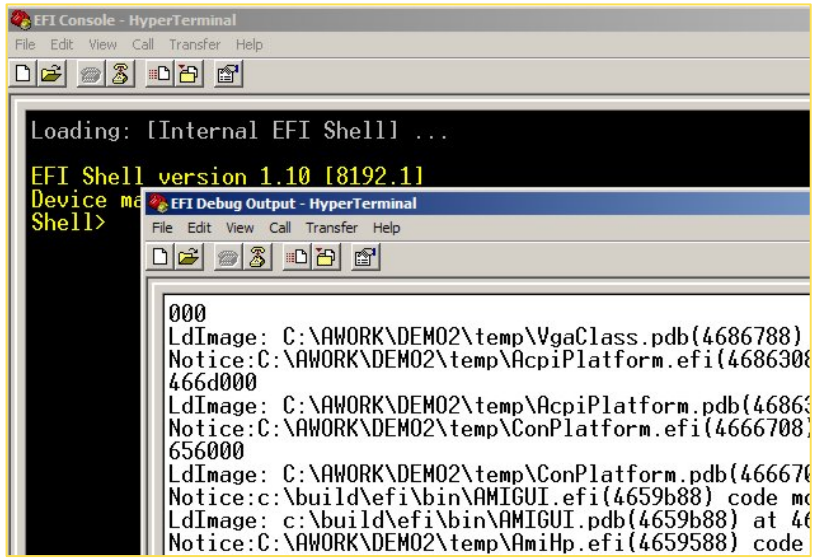
- **VeB Tools Panel**
  - ACPI Object Viewer
  - PCI Bus Hierarchy
    - Represents SDL IRQ routing data in another format

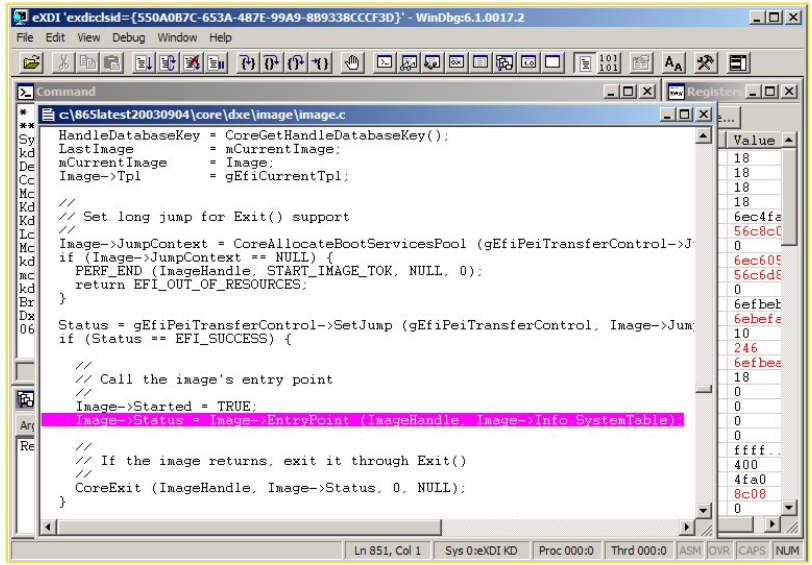




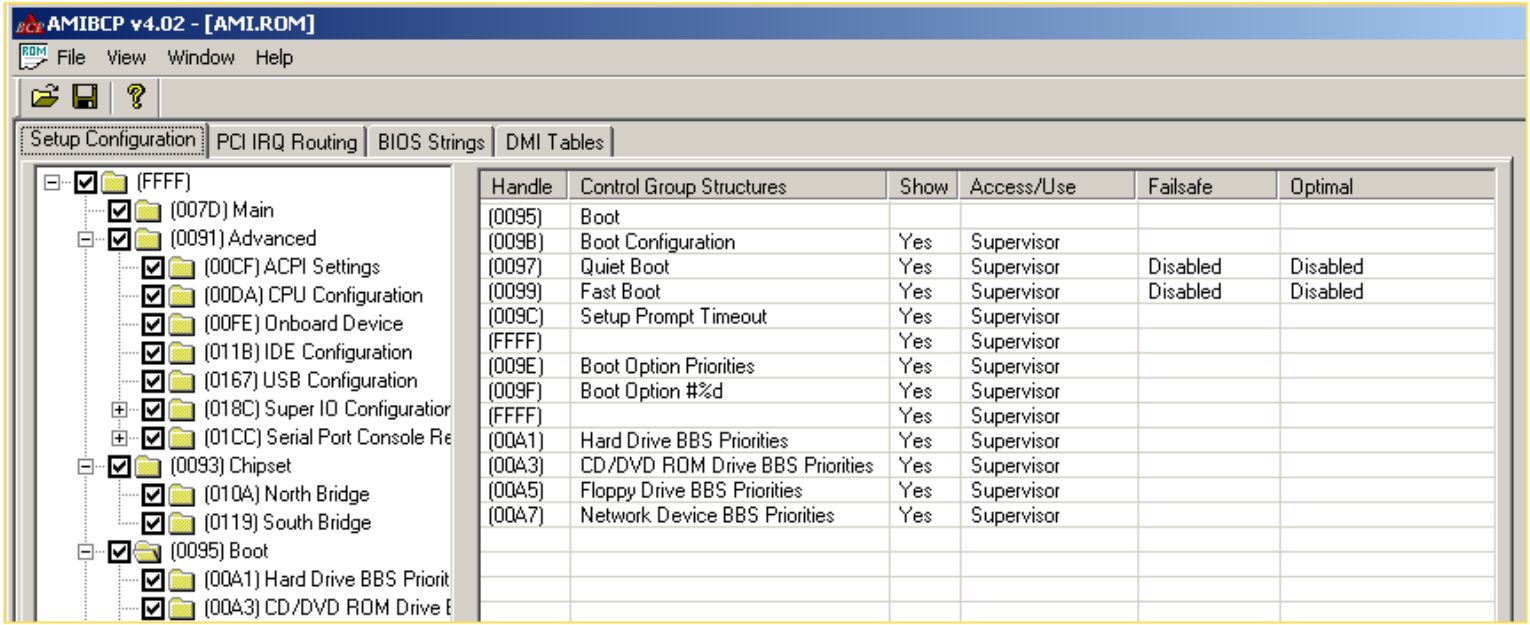
AMI Debug for EFI

- **Connects debug target to host application in Microsoft Windows**
  - Supports RS-232 & USB 2.0
  - Works in DXE, PEI & EFI Shell
  - Symbolic source-level debugging
  - View & edit memory/PCI/IO
  - Add breakpoints
  - Redirect console
  - Redirect debug messages
  - Remove when not required
- **Does not rely on ICE/ITP or JTAG**
  - Lower cost to deploy
  - Use with production hardware
- **Use with any processor or chipset**



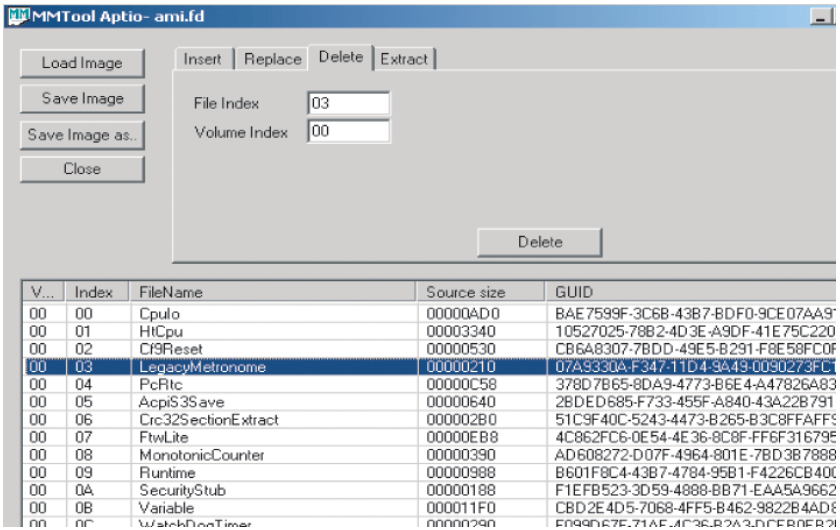


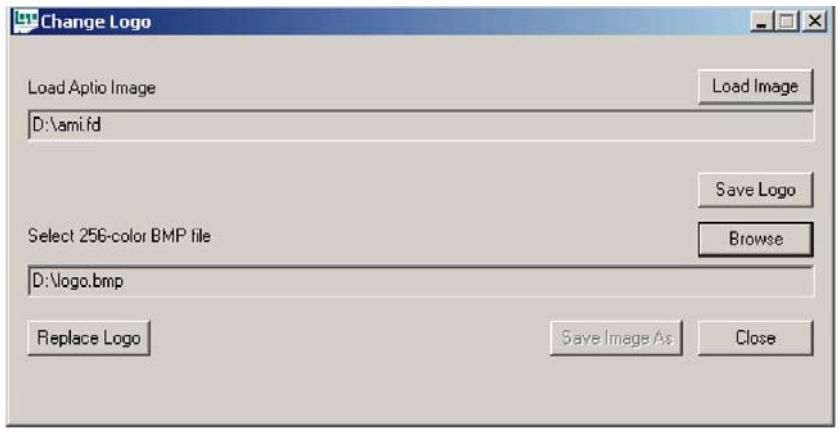
Utilities for ROM Modification: AMIBCP



- **AMIBCP - Modify ROM files *without* source**
  - Change setup option default values
  - Change Unicode strings in setup & sign-on messages
  - Edit static SMBIOS data

ROM Modification: MMTool & ChangeLogo





- **MMTool**
  - Add/remove/replace DXE drivers and legacy OpROM
  - Quickly upgrade components
  - Use in GUI or command line mode
- **ChangeLogo**
  - Change OEM “splash” logos without source code

Manufacturing Line: MMTool & DMIEdit

- **MMTool**
  - Run in command-line mode to add/remove/replace drivers & Option ROMs prior to flashing the ROM
- **DMIEdit**
  - Modify platform-specific SMBIOS data
    - UUID
    - Serial Numbers
    - Asset Tags
    - OEM Strings
  - Script-driven utility
  - Runs in DOS, Windows & EFI Shell

Pre-Boot Applications (PBA)

- **Provides an environment for running applications in pre-boot**
  - Complements AMI's firmware offering
  - Launch from ROM or hidden disk partition
- **Add value with AMI recovery tools**
  - AMI Rescue™ (Disk Image Recovery)
  - AMI Rescue™ Plus (File-based Recovery)
- **Integrate OEM or third-party apps**
  - Applications seamlessly integrate with the Pre-Boot Menu (PBM) Application

AMI Aptio in Review

- **AMI provides proven industry experience**
  - AMIBIOS experience dates back to 1985
  - AMI has worked with EFI prior to the first specification
  - Broad experience with many computer products
  - Founding member of UEFI, still on the board of directors
- **Ready to support UEFI today with AMI Aptio**
  - Reference partners with Intel MPG & IPD
  - Supported on Intel & non-Intel silicon
- **Superior customer support and support tools**
  - RSC database access for source customers
  - Direct engineer-to-engineer support
- **Flexible development and licensing options**