

Windows Vista: the Windows Boot and Pre-boot Architecture

A Windows Vista Webinar by William R. Stanek

This is the second webinar in a three-part series of webinars on the Windows Vista support architecture from bestselling author and training instructor William Stanek.

William is a leading technology expert, award-winning author, and instructional trainer with over 20 years of experience in server technologies, encryption, Internet solutions, and advanced programming and development. He has written over 65 books and numerous whitepapers and training courses on a wide variety of topics. His most recent books include Microsoft Exchange Server 2007 Administrator's Pocket Consultant 2nd Edition, Microsoft Windows Server 2008 Administrator's Pocket Consultant, and Windows Server 2008 Inside Out. For more information on William's consulting and training courses, you can visit www.WilliamStanek.com.

The books featured here, Windows Vista Administrator's Pocket Consultant and Windows Server 2008 Administrator's Pocket Consultant, are William's highly acclaimed books on Windows Vista and Windows Server 2008 respectively. Most recent customer reviews have called them A Must Have manual, a great reference tool, technically accurate and best of the bunch, and the best manual for administrators.

William's highly popular books and training courses for technical professionals cover Windows Vista, Windows Server 2008, Exchange Server 2007, SQL Server 2005, and Active Directory. In this presentation, William explores one of the least understood areas of the new support architecture in Windows Vista: Windows boot and pre-boot architecture. The presentation examines:

- Windows Boot Manager
- Boot applications and Boot Configuration Data
- Windows Resume Loader and Windows Error Recovery mode
- Windows pre-installation and pre-boot
- Related administration tools

This presentation is suitable for IT managers, CIOs, executives, and administrators who are looking for a better understanding of Windows Vista. As many of these same features are in Windows Server 2008, this presentation has a twofold value in that it can also help you prepare for what's in Microsoft's next generation server operating system.

The other webinars in this series covering critical Windows Vista topics are:

- Windows Vista: the Diagnostics and Problem Resolution Framework
- Windows Vista: the User Account Control Architecture

William Stanek's Training Seminars –
www.WilliamStanek.com

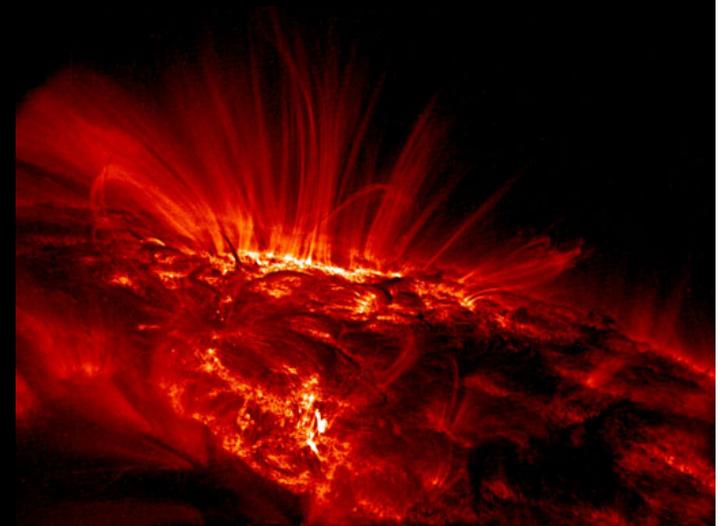


Windows Vista Support Architecture:

Boot and Pre-boot Architecture

What we're going to discuss:

- Power and Boot configurations in:
 - Hardware
 - Firmware
 - Operating Systems
- Diagnosing boot problems
- Windows boot initialization
- Windows boot applications





Session Objectives

You're in the right place if you are an IT pro who is looking for a better understanding of Windows Vista.

After completing this session, you'll have a better understanding of:

- Power management
- Firmware configuration
- Boot configuration
- Troubleshooting

Bottom Line:

- Support framework almost identical in Windows Vista and Windows Server 2008
- IT pros must understand this support architecture to succeed.





Understanding Power States

- How it Works
- Why it Breaks



Understanding Startup and Shutdown

- Not as simple or basic as you think.
- APM and ACPI power states include:
 - Standby (aka Sleep mode)
 - Resume
 - Hibernate
- In Windows Vista
 - Power states are different
 - Turn off = standby
 - Shutdown = power off



Standby and Power Off

- Enter standby mode using the power button
- Wake the computer by:
 - Pressing power button.
 - Pressing a key on the keyboard.
 - Moving the mouse.
- Turn off or on laptops by:
 - Closing the lid.
 - Opening the lid.
- The way the power button works depends on:
 - **System hardware**
 - **System state**
 - **System configuration**
- Determine how Windows Vista is configured
 - An amber power button means low-power sleep state.
 - A red power button means power off.





Diagnosing Startup Problems

- In hardware
- In firmware
- In software



Diagnosing Startup Problems

- Standby, Resume, and Hibernate are:
 - Provided by the hardware
 - Enabled by the operating system
- Diagnose and resolve problems by looking at:
 - Motherboard/chipset
 - Firmware
 - Operating System
- ACPI Must be supported by :
 - Motherboard/chipset
 - Firmware
 - Operating system



Firmware Interfaces

- Two prevalent firmware interfaces are:
 - Basic Input Output System (BIOS)
 - Extensible Firmware Interface (EFI)
- Firmware programming
 - Provides hardware-level interface
 - Can be updated
- ACPI aware components
 - Track the power state
 - Can generate/respond to requests



Power States in Firmware

Power State	Type	Description
S0	ON state	The system is completely operation, fully powered and completely retains the context (such as the volatile registers, memory caches, and RAM).
S1	Sleep state	The system consumes less power than S0 state. All hardware and processor contexts are maintained.
S2	Sleep state	The system consumes less power than S1 state. Processor loses power and processor context and contents of the cache are lost.
S3	Sleep state	The system consumes less power than S2 state. Processor and hardware contexts, cache contents, and chip-set context are lost. The system memory is retained.
S4	Hibernate state	The system consumes the least power compared to all other sleep states. The system is almost at an OFF state. The context data is written to hard disk and there is no context retained. The system can restart from the context data stored on the disk.
S5	OFF state	The system is in a shutdown state and the system retains no context. The system requires a full reboot to start.



Power Settings in Firmware

- Accessing firmware
 - Enter BIOS or EFI during boot
 - Navigate to the Power screen
- Power settings you may see include:
 - After Power Failure/AC Recovery
 - Wake on LAN from S5/Auto Power On
 - ACPI Suspend state/Suspend Mode



Power Settings in Firmware

- Intel and AMD also have other technologies
 - EIST/SpeedStep
 - Intel Quick Resume Technology Driver (QRTD)
- EIST enables
 - Dynamically adjusting processor voltage
 - Dynamically adjusting core frequency
- QRTD enables
 - Quick Resume mode
 - Quick Sleep mode



Boot Settings in Firmware

- Boot settings control:
 - Boot Drive Order
 - Boot to Hard Disk Drive
 - Boot to Removable Devices
 - Boot to Network
 - USB Boot
- Windows Vista
 - Doesn't boot from an initialization file.
 - Uses a boot manager to initialize.





Windows Startup and Support

- From hardware to firmware
- From firmware to software



Built-in Diagnostics

- Next generation Automated Help System
- Can be self-correcting and self-diagnosing
- Resolves automatically or helps users to diagnose
- Primarily implemented through:
 - Windows Diagnostics Infrastructure (WDI)
 - Network Diagnostics Framework (NDF)
- NDF is complimentary to WDI
- NDF diagnoses connectivity and networking issues
- WDI diagnoses device, memory, and performance issues



Resolving Boot Failure

- Windows resolves boot issues with Startup Repair Tool (StR)
- Startup Repair Tool (StR)
 - Installed automatically
 - Started when a system fails to boot
- Windows uses StR to:
 - Determine the cause of the startup failure
 - Fix problems automatically
- If StR is unable to resolve the problem:
 - Restores the system to the last known working state
 - Provides diagnostic information
- Startup Repair performs many diagnostic tests



Resolving Boot Failure

- Error detection for devices and failure detection for disk drives is automated.
- Windows Vista can automatically detect and resolve:
 - Slow application startup
 - Slow boot
 - Slow standby/resume
 - Slow shutdown
- Windows Vista can detect memory leaks and failing memory.
- You can run Windows Memory Diagnostics manually.



Exploring the Boot Environment

- The boot environment is an extensible, abstraction layer.
- Entries in the BCD data store
 - Control startup
 - Identify the boot manager to use
 - Identify boot applications available
- Windows Boot Manger
 - Is the default boot manager
 - Controls the boot experience
 - Enables you to choose boot applications
- Boot applications load a specific operating system.
- The BCD store is in the BCD registry.



Exploring the Boot Environment

- Use BCD Editor to manage the BCD store
- The BCD store contains multiple entries.
- On a BIOS-based computer, you'll see the following entries:
 - One Windows Boot Manager entry.
 - One or more Windows Boot Loader application entries.
 - One legacy operating system entry.
- Windows Boot Manager is a boot loader app. Other boot loader apps are available.



Exploring the Boot Environment

- BCD Editor is a command-line utility.
- BCD commands allow you to:
 - Create, import or export an entire BCD data store
 - Create, delete and copy individual entries in the BCD data store
 - Set or delete entry option values in the BCD data store
 - Control the boot sequence and the boot manager
- Computers can have system and non-system BCD stores.
- The system BCD store
 - Contains the OS boot entries and related boot settings
 - You'll work with the system BCD store
- Use `bcdedit /v` to view GUIDs need to manage entries.



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