Differences Between Windows XP Embedded and Windows XP Professional

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Applies to Microsoft Windows XP Embedded

Summary

Microsoft® Windows® XP Embedded is a componentized version of the Microsoft® Windows® XP Professional operating system that brings the rich feature set of Windows XP Professional to embedded devices. However, there are some differences between Windows XP Professional and Windows XP Embedded. The major difference is that Windows XP Embedded is engineered specifically to support embedded devices and their manufacturers. This white paper describes Windows XP Embedded solutions for common embedded scenarios, and describes Windows XP Professional features that Windows XP Embedded does not include.

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Introduction

Microsoft Windows XP Embedded brings the stability, security, and the rich feature set of Windows XP Professional to embedded devices. Windows XP Embedded is a componentized version of the Windows XP Professional operating system that was created for embedded devices. Windows-based applications can run on Windows XP Embedded, and embedded application developers can use the Windows API set to write applications, just like Windows XP Professional developers do.

However, there are differences between Windows XP Embedded and Windows XP Professional. Most importantly, Windows XP Embedded is engineered for embedded devices, and to support the work of the application developers and OEMs who build embedded devices. Windows XP Embedded provides solutions to support embedded scenarios, including point-of-sale devices, Windows-based terminals, and kiosks.

Componentization makes it easy to build fixed-function devices, and to reduce the footprint of a target run-time image. You can use Windows XP Embedded to build a run-time image that includes only the Windows components that your device requires. As long as you include the required dependencies in your run-time image, you can maintain the application compatibility that you need to run your applications.

Componentization also makes it easier to reduce security risks by designing run-time operating systems with limited surface area. The smaller the footprint of your run-time image, the smaller the surface area of the operating system. Less surface area means

less risk of intrusion. For example, if you do not require networking capabilities, you can exclude networking components from your run-time image.

This white paper describes specific embedded scenarios and the solutions that Windows XP Embedded provides for them. This white paper also describes some Windows XP Professional features that Windows XP Embedded does not include.

Windows XP Embedded Solutions for Common Embedded Scenarios

Windows XP Embedded supports the development of embedded devices and applications by providing solutions for common embedded scenarios. This section describes some common embedded scenarios and the solutions that Windows XP Embedded provides for them.

Manage Run-Time Images

Windows XP Embedded provides tools to help you manage your run-time images. Use System Deployment Image (SDI) in Windows XP Embedded to create file-backed virtual disk drives to serve as a staging area for your run-time images. This feature uses a disk image (.sdi) file that is located on an existing file system to simulate a storage medium. You can use SDI to create, add, connect, remove, and disconnect virtual disk drives. The storage medium can be used in both online and offline modes.

For more information about how to create a file-backed virtual disk drive, see SDI.

Protect Disk Volumes

Embedded device disk volumes often require protection against improper disk write operations. Windows XP Embedded provides Enhanced Write Filter (EWF) as a solution for this scenario. EWF protects the contents of disk volumes by redirecting write operations to a different storage location, which is called an overlay. This strategy allows write operations to be made without affecting the original contents of a disk volume. Configuration information about the EWF-protected volumes on a device is stored in unpartitioned disk space on the same disk. You can use EWF on devices that start from a bootable CD-ROM because EWF allows read-only media, including CD-ROM and flash, to boot and run.

For more information about how to reduce the wear on a compact flash device by using EWF, see How to Configure EWF for Compact Flash.

Boot and Run an Operating System from a CD-ROM

Embedded OEMs can create a bootable CD-ROM when a run-time image is ready to be deployed. Your deployment scenario could call for a single CD-ROM image to be duplicated and used on many target systems. Or maybe you want to run your operating system from read-only media to protect your file system from corruption. Windows XP Embedded supports both of these scenarios by implementing the El Torito Bootable CD-ROM specification.

For more information about how to create a bootable CD-ROM, see How to Create a Bootable CD-ROM.

Boot a Device Over a Network

Some embedded scenarios require network booting and configuration of devices. For example, devices that do not contain a hard disk may require a remote boot. Windows XP Embedded supports remote booting by providing the Remote Boot service. The Remote Boot service uses the Pre-boot Execution Environment (PXE) protocol to boot a device over a network. The PXE communicates with the server and retrieves a boot image over a network.

For more information about how to remotely boot a device, see Remote Boot.

Service a Run-Time Image Remotely

Servicing embedded devices after deployment can be difficult. Windows XP Embedded provides a solution in Device Update Agent (DUA). DUA is a lightweight service that performs administrative tasks such as copying files, creating registry keys, and executing processes. DUA runs on the device operating system and works by polling a specific remote or local path for a script file.

You can also use Microsoft Systems Management Server (SMS) to service embedded devices running Windows XP Embedded. SMS is used to manage clients in large, enterprise-level Windows environments. For information about SMS, see Systems Management Server 2003 SP1 Product Overview on the Microsoft Web site.

Licensed OEMs can also make use of the Microsoft Windows XP Embedded Desktop QFE Installer Tool (the "Installer Tool"). The Installer Tool makes it possible to run many Microsoft-issued security updates that were released after May 11, 2004 on Windows XP Embedded-based devices. Security updates that are compatible with Windows XP Embedded-based devices can be obtained from the Microsoft Windows Embedded OEM restricted access Web site. For more information about the Desktop QFE Installer Tool Version 1.0, and to download the Installer Tool, see the Customer Communication entitled "Now Available: Microsoft® Windows® XP Embedded Desktop QFE Installer Tool 1.0" at https://microsoft.embeddedoem.com.

For more information about how to remotely service a device, see Managing and Servicing a Run-Time Image.

Create Single-User Environments

A single-user environment can be the best option for some embedded device scenarios, for example, in small footprint situations where users have only limited access to the file system. Windows XP Embedded provides a solution for this scenario with Minlogon, a feature that provides Windows logon support. Minlogon does not differentiate between different levels of access privileges and therefore does not support user accounts or administrator accounts. Nor does Minlogon provide authentication verification or domain joining.

For more information about how to create a single-user environment, see Building a Minlogon Baseline Configuration.

Windows XP Professional Features That Windows XP Embedded Does Not Include

Even though Windows XP Embedded is built from the same binary files that Windows XP Professional uses, Windows XP Embedded does not share all the features of Windows

Professional. Some features in Windows XP Professional are not appropriate for embedded device scenarios. The following Windows XP Professional features are not included in Windows XP Embedded:

- **Windows File Protection (WFP)**

  On Windows XP Professional, WFP prevents system files from being overwritten unless the files that are being installed are digitally signed by Microsoft. Windows XP Embedded does not enforce system file protection, however, because embedded device users do not typically install software. There are also some benefits to excluding WFP from Windows XP Professional. For example, Device Update Agent (DUA), a management tool that was created specifically to support embedded scenarios, performs better when WFP is not included in a run-time image. Another benefit of not including WFP in Windows XP Embedded is a reduced footprint. However, because Windows XP Embedded does not include WFP, it is critical for run-time images to be built with the correct versions of system files.

- **Windows XP Tour**

  Windows XP Professional includes an interactive, animated tour of the operating system. This tour is not appropriate for end users of embedded devices that run highly customized Windows-based operating systems, so it is not included in Windows XP Embedded.

- **Windows Setup**

  Windows XP Embedded does not include certain user interface and infrastructure elements that Windows Setup uses to install Windows XP Professional. Windows XP Embedded does not support the Control Panel user interface that is used to install additional Windows operating system components, for example, the **Add/Remove Windows Components** option in Control Panel.

- **Online product activation**

  Windows XP Embedded does not include online product activation. Instead, Windows XP Embedded-based run-time images are activated by using a run-time product key in the Microsoft Windows Embedded Studio tools.

- **Out-Of-Box Experience (OOBE)**

  Windows XP Professional includes welcome screens and wizards to help new users set up Internet connections and other operating system features. These are not included in Windows XP Embedded because of the highly customized nature of Windows XP Embedded-based operating systems.

- **Windows Update**

  Windows XP Embedded does not use the Windows Update Web site (http://www.windowsupdate.com) to detect and patch software components. However, Windows Update can be used with a corporate server running Microsoft Software Update Services (SUS).

- **System files that support upgrade scenarios**

  Windows XP Embedded does not include system files that support upgrade scenarios to Windows XP Professional from Windows 98 or Windows 2000. These files are not necessary in Windows XP Embedded because embedded run-time operating systems are not upgraded in the same way as desktop operating systems such as Windows XP Professional.

- **Obsolete Windows Image Acquisition files**

Windows XP Embedded does not include older versions of Windows Image Acquisition system files. These files are not necessary in Windows XP Embedded and their absence does not affect application compatibility.

- **MSN Explorer**

  MSN Explorer is included in Windows XP Professional, but no longer ships in Windows XP Embedded.

- **Microsoft Java Virtual Machine**

  Microsoft Java Virtual Machine is included in Windows XP Professional Service Pack 1, but is not included in Windows XP Embedded.

Features that are specific to Windows 2000 Server and Windows Server 2003 are also not included in Windows XP Embedded. If an application runs on a Windows Server operating system but does not run on Windows XP Professional, that application will not run on Windows XP Embedded.

For More Information

For more information about Windows XP Embedded, see the Microsoft Windows Embedded Developer Center at http://msdn.microsoft.com/embedded.