

Which embedded operating system is right for my design?

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Overview

OEMs can now choose between the newest member of Microsoft's embedded family, which leverages the power of Windows 7 technologies, Windows Embedded Standard 7, or the broadly-deployed Windows Embedded Standard 2009.

Microsoft has consistently offered OEMs, project managers, operating systems developers and systems designers a broad selection of embedded operating systems to choose from as they build their embedded devices. Just as each manufacturer's device is unique, offering end users a selection of features and functionalities which best fit their needs too is Microsoft's broad selection of embedded operating systems.

Here's an overview:

- Windows Embedded for Point-of-Sale (WEPoS) and Windows POSReady 2009 focus on the point-of-service/point-of-sale market.
- Windows CE 5.0, Windows CE Embedded 6.0 and Windows Mobile are extremely popular choices when it comes to real-time, portable, compact and deeply embedded devices. And for the designer that needs the full, rich features of the desktop operating systems, the embedded channel offers
- Windows XP Professional For Embedded Systems (XP Pro FES) and Windows 7 For Embedded Systems (Win 7 FES) are both bit-by-bit compatible with the retail channel products.
- At the high end of the range, is the cost effective and scalable Windows Embedded Server 2003 family; Windows Embedded Server 2008 family and SQL 2005/2008 family of storage and database options. As with XP Pro FES and Win 7 FES, these server choices are 100% bit-by-bit compatible with the conventional operating systems, but offer a much higher degree of flexibility in pricing, functionality and scal-

able technology.

- To fulfill the needs of designers for an operating system between the desktop and the compact selections, OEMs can select either the often-deployed and well-tested Windows Embedded Standard 2009 (WES 2009) or the newest member of the embedded family, which leverages the power of Windows 7 technologies Windows Embedded Standard 7 (WES 7). When compared with the retail versions of Windows XP Professional or Windows 7, both of these truly embedded operating systems put forward a highly compatible, yet a totally customizable and flexibly deployable image.

With **WES 2009** and **WES 7** in mind, let's take a closer look at what criteria a developer of a medical device, or a maybe POS retailer, might consider important.

The reliability of the system is paramount

The need for a totally dependable and reliable operating system is high on the list of all device manufacturers. Reliability means more to Microsoft than just making dependable software and providing support. It also means continued investments in processes and technology to improve reliability, active partnership with a wide variety of software and hardware companies and a continuing focus on every customer's experience. Achieving technology reliability is a fundamental objective of **Microsoft's Trustworthy Computing initiative**.⁽¹⁾

WES 2009 is built upon the long-tested and heavily-deployed Windows XP Pro kernel; however, it is a very highly componentized and modular product. By removing unneeded operating system processes and features from the OEM's deployable image, WES 2009 decreases the chances that a system failure can occur. This selectivity reduces the OS footprint, and correspondingly, the potential attack surfaces of the operating system, so an OS or system failure from unauthorized software is greatly lessened.

WES 7 is also a modular OS, offering the developer over 160 feature sets and 400 to 500 packages -- and those numbers are still growing -- allowing the developer to custom design the most efficient and secure system possible. WES 7 is built upon the newest and most secure technology, the Windows 7 kernel. Although the WES 7 deployable OS footprint is larger when compared to the WES 2009 footprint, the comparative ratio of WES 7 image to the Windows 7 desktop OS image is still much smaller. This smaller size increases the reliability factor by removing many drivers, services and applications when potential failure can occur.

Security, security and more security

Very closely tied to reliability is the overall security of the system.

Viruses, malware and spyware simply can't run if the image doesn't host the software venue or low level operating system agents that they require. For example, if a particular malware is introduced into a system by an e-mail message and then propagated via attacking the Address Book, there is no chance that can happen if Outlook is not included in the final image or greatly curtailed.

Both WES 2009 and the WES 7 extend the security and robustness of the systems by offering security hardening technologies such as **Enhanced Write Filter (EWF)** and **File Based Write Filter (FBWF)**, putting the decision of "what information to write to the persistent storage" and "when to write that data to the persistent storage" in the hands of the designer/developer and not the operating system itself.

HORM (or Hibernate Once, Resume Many) provides the engineer the capability of a quick system start and a locked-down image that will consistently boot to a developer's pre-determined start-up point every time. Inadvertently pulling the plug, power failures or improper shutdown procedures will have no effect on the performance or integrity of the image. Like the famous pink bunny, it keeps on running.

WES 7 continues to add security with many additional technologies, exactly the same as those found in Windows 7 desktop. Included in the box, AppLocker,

BitLocker, BitLocker-to-go, and Credential Manager are samples of the security enhancement technologies found in Windows 7 and also WES 7.

WES 7 now includes performance enhancing technologies such as BranchCash, faster boot-time of the operating system; improved Power Management utilities and capabilities and Windows Search. These are included out-of-the-box. On the security front, AppLocker, BitLocker, BitLocker-to-go, and Credential Manager are samples of the security enhancement technologies found in Windows 7 and WES 7.

Finally, McAfee offers a 100% guaranteed white-listing technology that ensures the WES 7 or WES 2009 will remain 100% virus, spyware and malware free, as well as many other security features.

Updates and upgrades need to be seamless

An often heard question is, "After my device has been deployed to the field, how do I apply Microsoft updates, or my own application modifications and enhancements?"

With WES 2009 it is easy. There are multiple update and upgrade technologies provided in the tool kits for inclusion in the final image, depending on the designer's goals and requirements. Device Update Agent (DUA); Windows Server Update Services (WSUS), and System Center Configuration Manager (SCCM) are included in the tool set for immediate functionality. WES 7 continues the use of WSUS and SCCM and additionally makes life easier for the end user by now permitting the use of Windows Update (WU) to keep their OS image safe and secure.

The user experience

An important design criterion that the medical device designer and the POS designer have in common is the need to provide an easy-to-use and intuitive user interface. Doctors, medical staff or store customers will not accept, and therefore, not use devices that are overly complex in delivering their intended functionality. If a self-checkout register at your local Home Depot or a vital-signs monitor at a neighborhood health clinic requires the user to press many buttons or offers a "clunky" interface that would do more harm than good.

Both WES 2009 and WES 7 provide the developer with an abundant set of options and technologies to deliver a flexible and rich user experience. With WES 2009 and WES 7 the OS designer can use any of the three OS shells that are part of the tool set or they can design and implement a “Custom Shell” to uniquely brand their devices.

Both embedded products offer Microsoft’s Silverlight. Silverlight is a powerful development platform for creating engaging, interactive user experiences for Web, desktop and mobile applications when online or offline. Silverlight 4 adds many features, such as webcam, microphone and printing, to enable the developer to create incredible applications. In addition, WES 7 gives the user experience a new look and feel with technologies such as Aero, Panning and Zooming, Multitouch and Gesture input.

Consider time to market

Well, time to market may mean different time frames to the medical device developer as compared to the POS device designer, but they can both agree that the best time spent is not in developing the operating system, but rather the all important applications and services that make each device unique.

WES 2009 provides the developer a tool set for architecting a unique embedded OS image. Although Bsquare can assist the developer with various programs (Design Recommendation and Professional Support Services) it still can a considerable time to build and perfect a deployable WES 2009 image. Although the tools and build concepts are not difficult, some learning and experimenting time is needed to get the image to build with all the features and services needed to satisfy the requirements of the applications and customer demands. Also, the developer must consider other critical

facets of the final operating system image such as method of updating the image, the level and type of security need to be implemented, the recovery mechanism in case of hardware failure, branding the image and much more.

WES 7 has taken a different approach. There are two tools to construct a WES 7 OS image. The first tool is named “Image Builder Wizard” or IBW. By running this OPK-like tool on the target hardware, the OS designer can have an image ready to go in as little as 20 to 30 minutes. Would this be the image that can be used to actually deploy on the final product in the field? Ummmm Depends! For the moment let’s say that it is a perfectly functional image that will guarantee all applications will run without errors, although it may contain functionality that the engineer never intended for the device.

The second tool in the WES 7 develop suite is the Image Configuration Editor (ICE). Using ICE, the image can be greatly customized to the unique requirements set for by the designer. Still, with all this flexibility, the OS image can be generated in perhaps a couple of days.

Deployment is very simple

Once your design is complete and tested, getting the product deployed to the field is very simple if you are using WES 2009 or WES 7.

With both products, you simply use the tools in the kit to build the desired image, adding all the functionality and technology that you need and eliminate what you don’t want. When you have the perfect image, you need to do nothing more than build one last time and enter the Product Identification Key, one time. The final deployable image then is set for copying to the target systems. And the best part -- there is no in field product activation -- ever.

Do it only once and you’re done.

For more information, please visit www.bsquare.com. Or email us at sales@bsquare.com

At Bsquare

Bsquare is a solution provider to the global embedded device community. Our teams collaborate with OEMs at any stage in their device development to bring quality products to market faster. Since 1994, Bsquare has been a trusted partner to smart device makers worldwide.

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