

Windows Embedded

Based on presentation by

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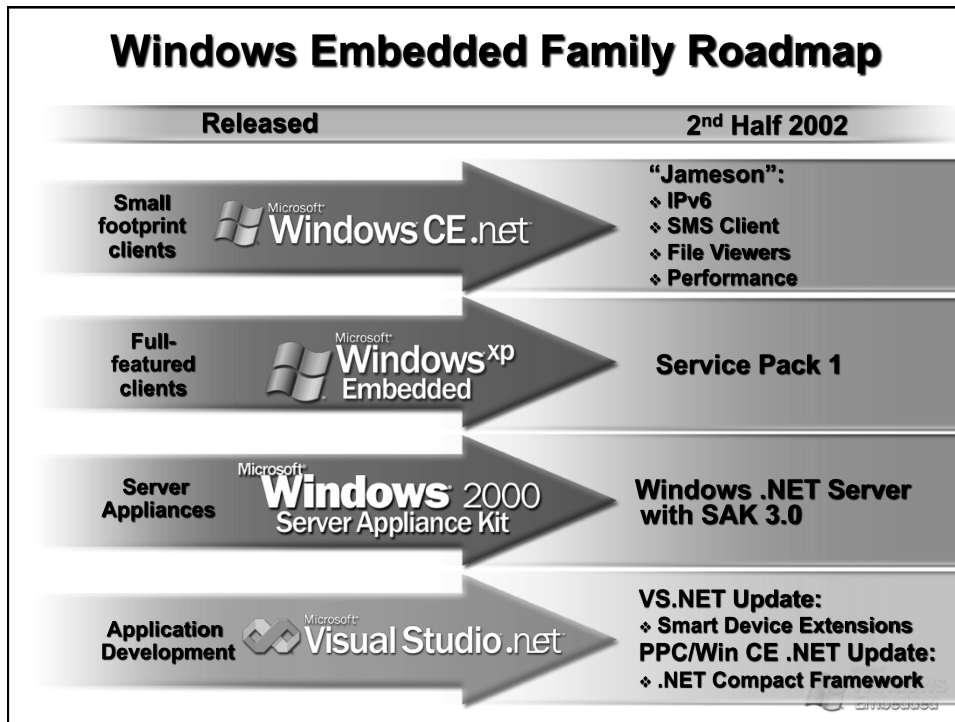


Windows Embedded

Windows NT Embedded →	The logo for Microsoft Windows XP Embedded, featuring the four-pane Windows logo in a 3D style, followed by the text "Microsoft Windows xp Embedded" in a sans-serif font.
Windows CE 3.0 →	The logo for Microsoft Windows CE.net, featuring the four-pane Windows logo in a 3D style, followed by the text "Microsoft Windows CE.net" in a sans-serif font.
eMbedded Visual Tools →	The logo for Microsoft Visual Studio .NET, featuring the four-pane Windows logo in a 3D style, followed by the text "Microsoft Visual Studio.net" in a sans-serif font.



Windows Embedded Family Roadmap



Windows XP Embedded



What Is Windows XP Embedded ?

Design Goals:

- **Componentized version of Windows XP Pro**
 - **Based on the same binaries as retail version of Windows XP Professional**
 - **Choose only features and services you need**
- **Includes additional embedded-enabling features**
 - **Enable broad range of devices to utilize rich Windows XP Professional features**
- **Powerful authoring tools**
 - **Streamline the end-to-end embedded device development process**



Windows Embedded Studio Tool Set

- **Windows XP Embedded**
 - **Target Designer**
 - **Component Designer**
 - **Component Database Manager**
 - **Additional Tools**
- **Application Development**
 - **Visual Studio .NET**
 - **Other...**



Windows Embedded Studio Installation Options

- **Supported Installation Scenarios**
 - **Standalone User Install**
 - **Tools Only Install**
 - **Shared Component Database Install**
- **The complete product is contained in two separate installation packages**
 1. **Tools Installation Package**
 2. **Component Database Installation Package**



Windows Embedded Studio Detecting Target Hardware

- **TAP.exe**
 - **Most functional Target Analyzer probe**
 - **Runs only on Win2K or XP**
 - **Generates a small hardware definition file**
- **TA.exe**
 - **Basic Target Analyzer probe**
 - **Runs on MS DOS (via boot floppy disk)**
 - **Generates a small hardware definition file**



Windows Embedded Studio Component Designer

- **Primary tool used to author custom components**
- **Generates a 'Component Definition' file (.SLD)**
- **Captures file, registry, and dependency information for a discrete set of functionality**
- **Importing of .INF files is supported for easy creation of driver components**



Windows Embedded Studio Component Database Manager

- **Provides functionality to allow management of the component collection**
 - **Allows importing of .SLD files into the database (for Target Designer use)**
 - **Management of Repository locations**
 - **Management of Component Packages**
 - **View complete database contents**
 - **Change the Component Database Server name**



Windows Embedded Studio Target Designer

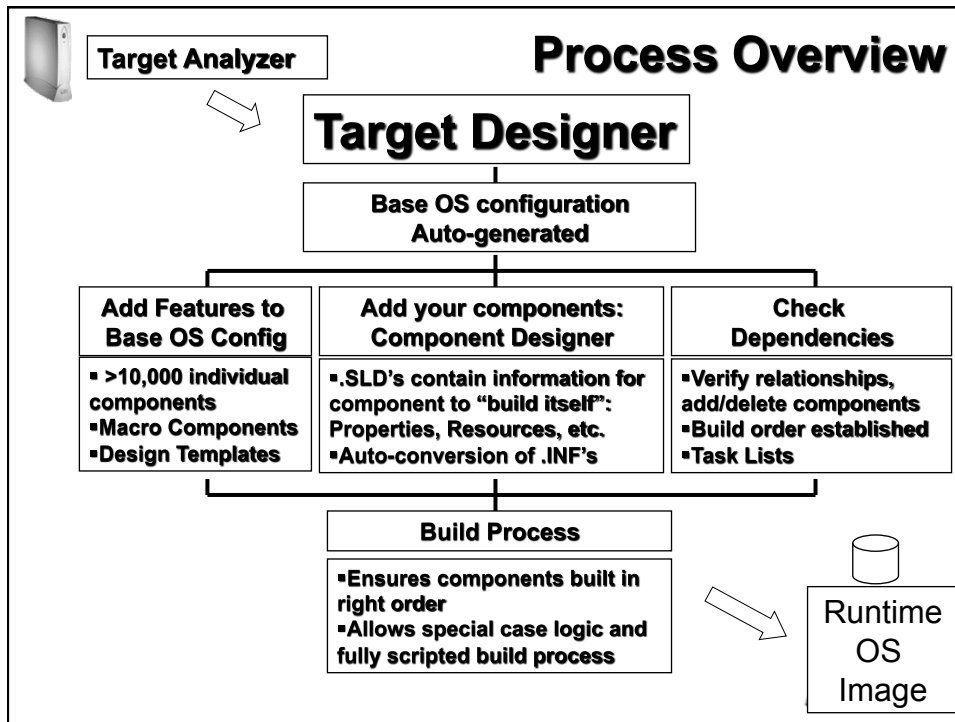
- **Target Designer is the tool used to build runtime images**
- **Generates a 'Configuration' file (.SLX)**
- **Import a hardware definition file**
 - **Matches components in the database with PnP IDs found by TAP/TA and adds them to the configuration**
- **Disable non-critical devices in the configuration**
 - **Can significantly reduce footprint by removing devices (and their associated dependencies) from the runtime image**



Design Templates

- **Project Starting Points**
 - **Advanced Set Top Box**
 - **Basic Set Top Box**
 - **Digital Set Top Box**
 - **Home Gateway**
 - **Information Appliance**
 - **Kiosk/Gaming Console**
 - **Network Attached Storage**
 - **Retail Point of Sale Terminal**
 - **Windows Based Terminal Professional**





Embedded Enabling Features

- **El Torito Support**
- **Enhanced Write Filter**
- **Headless Support**
- **Compact PCI**
- **Language Support**



Application Development

- **Utilize existing off-the-shelf applications**
 - **Full Win32 API support**
 - **Little or no porting required**
- **Rapid application development**
 - **Use familiar tools to write applications**



Windows CE .NET



What is Windows CE ?

- **Runs on broad range of processor architectures**
 - ARM/StrongARM/XScale, MIPS, SuperH, X86
- **Support small systems**
 - Highly modular and componentized
 - Foot print from 200k
- **Rich Base Operating System**
 - 32bit, multi-threaded, multi-tasking, 'real-time'

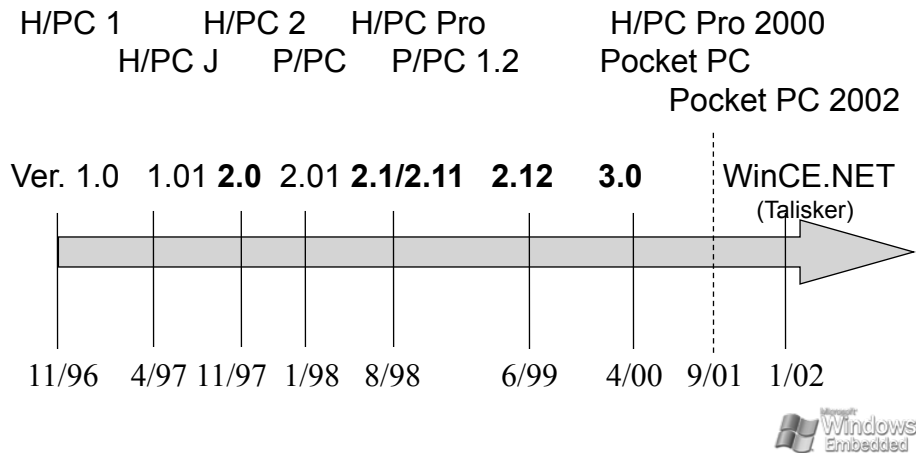


What is Windows CE ?

- **Shell and User Interface options**
 - Supports everything from no UI to full windowing system
- **Networking and connectivity**
 - PAN, LAN, WAN - TCP/IP, IP Telephony TAPI 2.1
- **Comprehensive Web and Multimedia support**
 - Internet Explorer, HTTP Server, Windows Media Player



Windows CE History



Embedded vs. Predefined Platforms

- **Predefined Platforms**
 - **Pocket PC, Auto PC, WBT, Others...**
 - Platform specific applications and shell
 - Device specific Software Development Kit
 - Additional platform specific technologies
 - Device Specific Adaptation Kit (?AK)
- **Embedded Devices**
 - **Customized O/S image**
 - **Specific O/S technologies**
 - **Custom SDK**

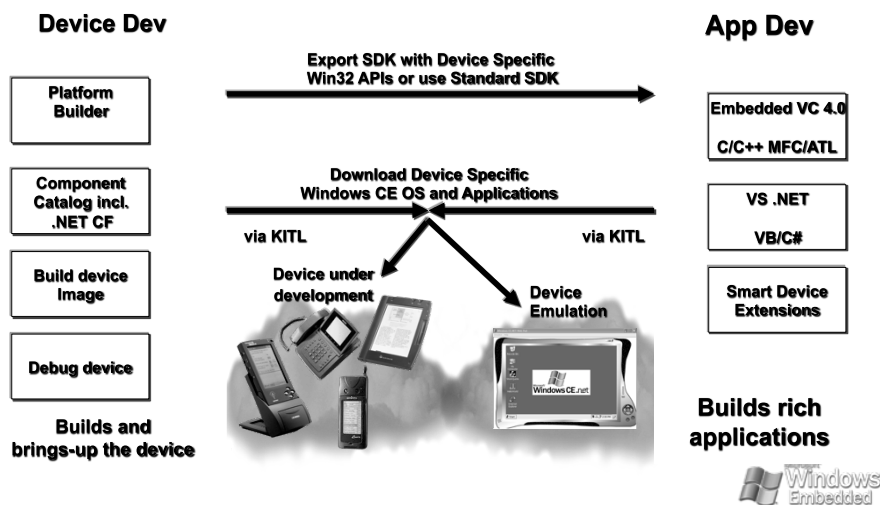


Windows CE .NET Tools

- **Platform Builder**
 - **Configure, Build, Debug and Deploy O/S Images**
- **Application Development**
 - **eMbedded Visual C++ 4.0**
 - 'Native' Application development
 - C, C++, MFC, ATL
 - **Visual Studio.NET**
 - 'Managed' Application development
 - Visual Basic, C#



Development Cycle From Platform to Applications



Platform Builder

- **Get started quickly**
 - Platform Wizards provide easy starting point for common device types
 - Catalog displays available components
 - Platform sizing information
- **Make the hard things easier**
 - Dependency Viewer to examine component's dependencies
 - BSP Wizard helps automate process of creating a BSP
 - Export Components



Predefined OS Configurations

- **PDA or Mobile Handheld**
- **Cell Phone**
- **Industrial Automation Device**
 - Programmable Logic Controller, Human Machine Interface (HMI) panel
- **Internet Appliance / Web Pad**
- **Media Appliance**
 - Portable / Digital Audio Receiver Jukebox, Digital Media Receiver, Portable DVD Player, Electronic Picture Frame
- **Set Top Box**
- **Residential Gateway**
- **Retail Point of Sale**
 - Retail Point-of-Sale Workstation, Electronic Payment Terminal, Self-Service Kiosk
- **Windows Thin Client**
 - With optional browser
- **Kernel only**
 - ~200KB!
- **Custom**
 - Custom Device without Display
 - Custom Device with Shell and Graphical User Interface (GUI)



Board Support Packages

- **Available for a Selection of CPUs**
 - **Design flexibility**
 - **4 Major CPU architecture families**
 - ARM/SA/XScale, MIPS, SH, x86
 - Over 2000 CPU types
 - **10 integrated Board Support Packages**
 - Extensible CPU/BSP plug-in model for 3rd party BSPs
 - BSP Wizard, Export Wizard and other PB tools avail
 - **Third parties can install BSPs for their hardware into Platform Builder**



Broad selection of drivers

- **CPU-native or companion chip (aka "CSP") drivers**
- **Block level storage drivers**
 - ATA/IDE (HDD, CD-ROM, DVD, Floppy, PC Cards), SD Card, RFA
- **Installable File System Drivers**
 - FATFS, UDFS, ISO-9660, and File filters
- **IEEE 1394**
 - SBP/2 Storage and AV/C device protocol support
- **USB Class drivers**
 - Printer, Mass Storage, Remote NDIS (Ethernet only)
- **NDIS/Ethernet drivers - 10/100, 802.11, Bluetooth USB and UART**
- **DDI/DDHAL Display/Video Drivers**
 - Tvia 5000, MediaQ MQ200, MediaGX Video, ATI XL, FLAT, S3Virge
- **DX8 D3D Multimedia Driver**
 - 3D Labs Permedia D3D driver
- **Wave/DSHAL Audio Drivers**
 - MediaGX, Ensoniq, Philips, Unified DX and WAV audio driver model



Technologies

- **User Interface**
 - Skinnable Controls
 - Multi-Monitor support
 - Dynamic screen reorientation
 - ClearType support
- **Instant Messenger**
 - text messaging
 - Presence
 - notifications and audio (VoIP)
- **Communications**
 - Dial Up Networking / Virtual Private Networking
 - Winsock 2.0
 - Service Providers enable flexibility under the Winsock SPI for alternate stacks like Bluetooth and shims like security
 - WINS Name Registration
 - TCP/IP including TCP/UDP and Multicast
 - NDIS 5.1
- **Multimedia**
 - DirectX 8
 - Media Player Application
- **Web Browser**
 - Internet Explorer 5.5
- **Networking**
 - Terminal Services Client – RDP 5.1
 - Internet Connection Sharing
 - IP Bridging
 - RAS, FTP, Telnet (both client and servers)
 - Web Server
 - SSL support (for HTTPS)
 - Supports Active Server Pages (ASP)
 - Personal Area Networking (PAN)
 - IrDA, Bluetooth
 - Local Area Networking (LAN)
 - NDIS 5.1
 - 802.11
 - RNDIS (enabling USB NIC on a string)
 - Wide Area Networking (WAN)
 - Selection of 3rd party solutions for DSL, ISDN, GSM, GPRS, WCDMA

Kernel

- **Real-time performance is consistent with Windows CE v3.0**
 - Independent performance validation by Dedicated System magazine
 - Meets the requirements of the OMAC consortium
 - Boeing, GM, Ford, Proctor & Gamble, Phillip Morris
 - Real world applications deployed by Siemens, GEFanuc, ABB Robotics, Rockwell, and others
 - New stack scavenging prevention
 - Prevents real-time threads from being suspended
- **Better Memory Configurability**
 - Multiple Contiguous Physical Memory Sections



Internationalization

- **Operating System is fully Unicode**
- **MUI support**
- **Full Localization of Operating System and Applications - WWE**

French	Japanese	Simplified Chinese
German	Korean	Spanish
Italian	Portuguese (Brazil)	Traditional Chinese

- **Full Localization of Operating System excluding Applications**

Dutch	Swedish
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Debug Support

- **KITL – Debug over any communications channel**
 - **Kernel Independent Transport Layer**
 - **Abstracts the protocol from the communications**
 - **USB, Ethernet, and Serial transports included**
- **Use the same net card for application and debug**
- **Extensible – add additional debug support.**



Software Development Kit

- **Expanded SDK Export Wizard**
 - **Creates an SDK installation package in MSI format**
 - including documentation
 - **Installs into eVC++ and/or VS.NET**
- **Standard SDK**
 - **Standard set of common components**
 - **Easy to set up in Platform Builder**
 - **Enables easier application porting between device classes**



Remote Tools

- **Verification/Performance**
 - **Kernel Tracker**
 - **Remote Call Profiler**
 - **Remote Performance Monitor**
- **Debugging**
 - **Remote SPY++**
 - **Remote Heap Walker**
 - **Remote Process Viewer**
- **Informational/Utility**
 - **Remote Zoom-in**
 - **Remote File Viewer**
 - **Remote Registry Viewer**
 - **Remote System Info**



Shared Source Overview:

- **1.5 MM lines of Windows CE Source**
- **Ships with ALL versions of Windows CE .NET**
 - **Additional Folder - \WINCE400\PRIVATE**
 - **Use as a reference to better understand how your platform works**
 - **Make modifications such as breakpoints for in-house development and debugging**
 - **Get better support from the online community**



Folder Structure

- **\WINCE410**
 - **\Platform**
 - Platform specific code, board support packages
 - **\Public**
 - User Projects
 - Common Drivers
 - public\common\oak\drivers
 - Skinnable UI components
 - Platform Dependent Files
 - public\common\oak\lib
 - **\Private**
 - Shared Source
 - Kernel, HTTP Server, Filesys



Emulator

- **Full functioning 'CEPC' device emulator**
 - **Emulates X86 CPU with many common peripherals**
 - Ethernet, display, pointer, keyboard, audio, serial, parallel
 - Additional Drivers through DMA interface
 - **Same emulator as PocketPC 2002**
- **High performance**
 - **Runs at about 50% of the host pc speed**

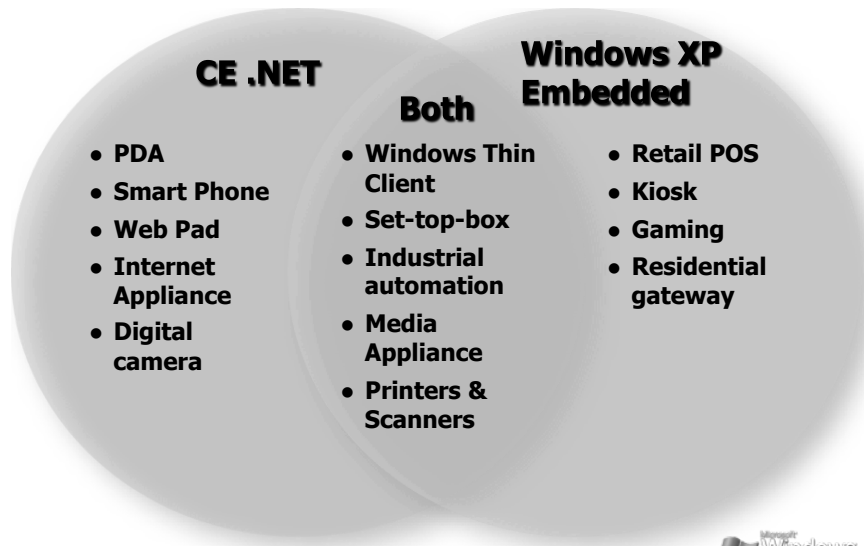


Application Development

- **Platform Builder**
 - **Configure, Build, Debug and Deploy O/S Images**
 - **Generate Software Development Kit**
- **Application Development**
 - **eMbedded Visual C++ 4.0**
 - **Standard SDK**
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Key Device Categories



Microsoft®

