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# XP Embedded Now and the future

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System Engineer  
Asia OED and Global Ecosystem  
Microsoft (China)

# Agenda

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Windows XP Embedded Development  
and Deployment Model Overview

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Windows XP Embedded Component Model

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Windows XP Embedded Studio Tools

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Embedded Enabling Technologies

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Integration with Microsoft Products

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# Microsoft Windows XP Embedded Product Highlights

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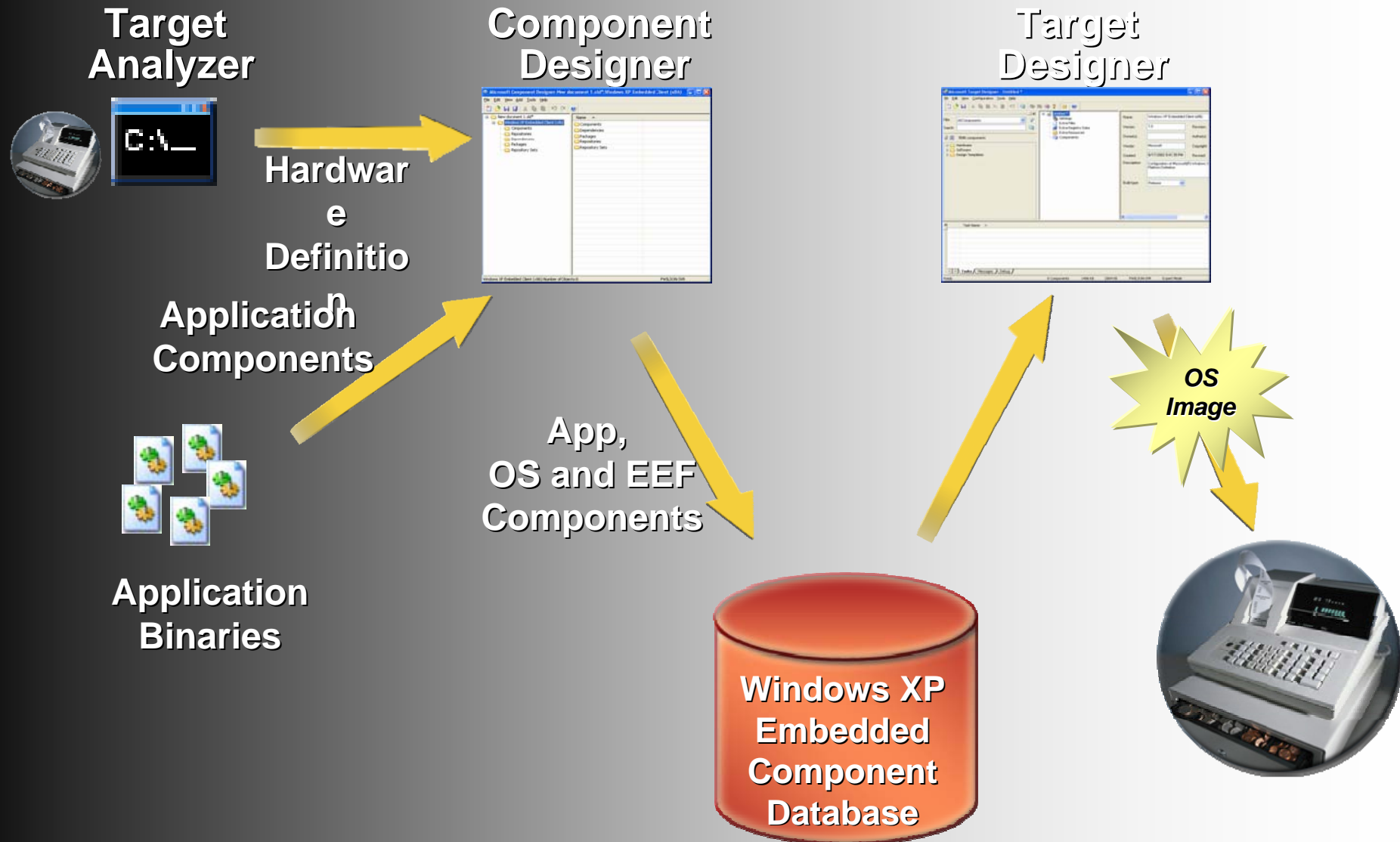
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- Componentized version of Windows XP Professional
  - ~ 12,000 components and updates as of Service Pack 2
  - Flexible localization
- Same binaries and API as Windows XP Professional
  - Hotfixes and service packs
  - Embedded Enabling Features
- Runs on standard PC hardware
- Supports boot on hard drives, compact flash, DiskOnChip and read-only media
- Support for remote install and remote boot
- Headless device and remote management support
- Integration with Microsoft management tools
- Sample devices:
  - Set top boxes, thin clients, POS, security, medical, manufacturing controllers, martini mixers

# Development Overview

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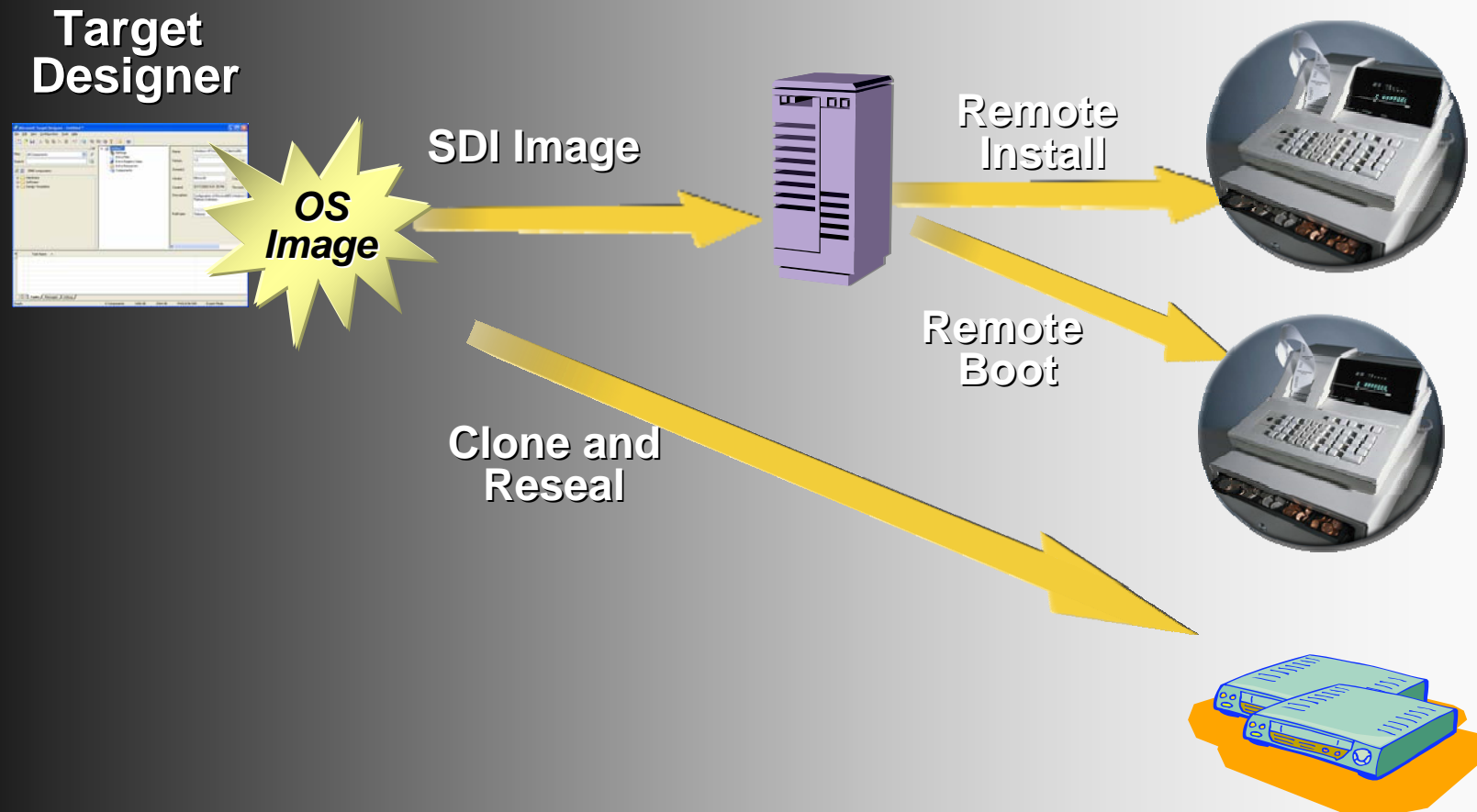
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# Microsoft Windows XP Embedded Deployment Overview





# Windows XP Embedded Components

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- Componentized version of Microsoft Windows XP Professional
  - Same binaries as Windows XP Professional
  - Full Win32 and .net API
  - Bug for bug compatible protocols
  - Support for all Windows Device Drivers
  - Service Pack 2 security tools
    - Windows Firewall
    - IPsec
    - SmartCard support
    - Kerberos
    - Encrypted file system and NTFS
  - Access to the best tools and developers
    - 1,600 partners in 55 countries
    - Community

# Windows XP Embedded Components

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- XML wrapped components
  - ~1,000 OS components
  - ~9,000 device drivers
  - Reduced component dependencies
- Each component contains
  - File resources
  - Settings, with DHTML Configuration UI
  - Registry state
  - Dependencies
  - Help text
  - Setup custom actions

# Windows XP Embedded Component Macros

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- Macros enable rapid prototyping
- Design templates:  
Starting point for device development
  - Set Top Box
  - Home Gateway
  - Information Appliance
  - Kiosk
  - Network Attached Storage
  - Point of Sale
  - Windows Based Terminal
- Helper Macros
  - A generic set of components that allows the user to quickly build a run-time image without identifying specific hardware
  - Eliminates tasks by configuring commonly-used settings
- Technology Macros
  - Aggregation of functionally related components
  - DirectX, Internet Explorer, etc.



# Windows XP Embedded

## Component Database

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- Components and Macros metadata stored in SQL Database
  - Local database in MSDE
  - Shared database in SQL Server
- Component repository (OS binaries) in file system
- Database Updates with Service Pack 1, Service Pack 2
  - Unmodified RTM components and updated Service Pack components
  - All QFEs
  - Security improvements for Service Pack 2

# Target Analyzer

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- Target Analyzer simplifies configuring OS image for target hardware
  - Application that runs on target device
  - Generates XML definition of target hardware (.pmq file)
  - Hardware definition
    - Imported into Component Designer creates component with dependencies on the identified hardware drivers
    - Imported into Target Designer, adds appropriate device drivers to configuration
  - Runs under Windows XP, Windows PE, DOS

# Component Designer

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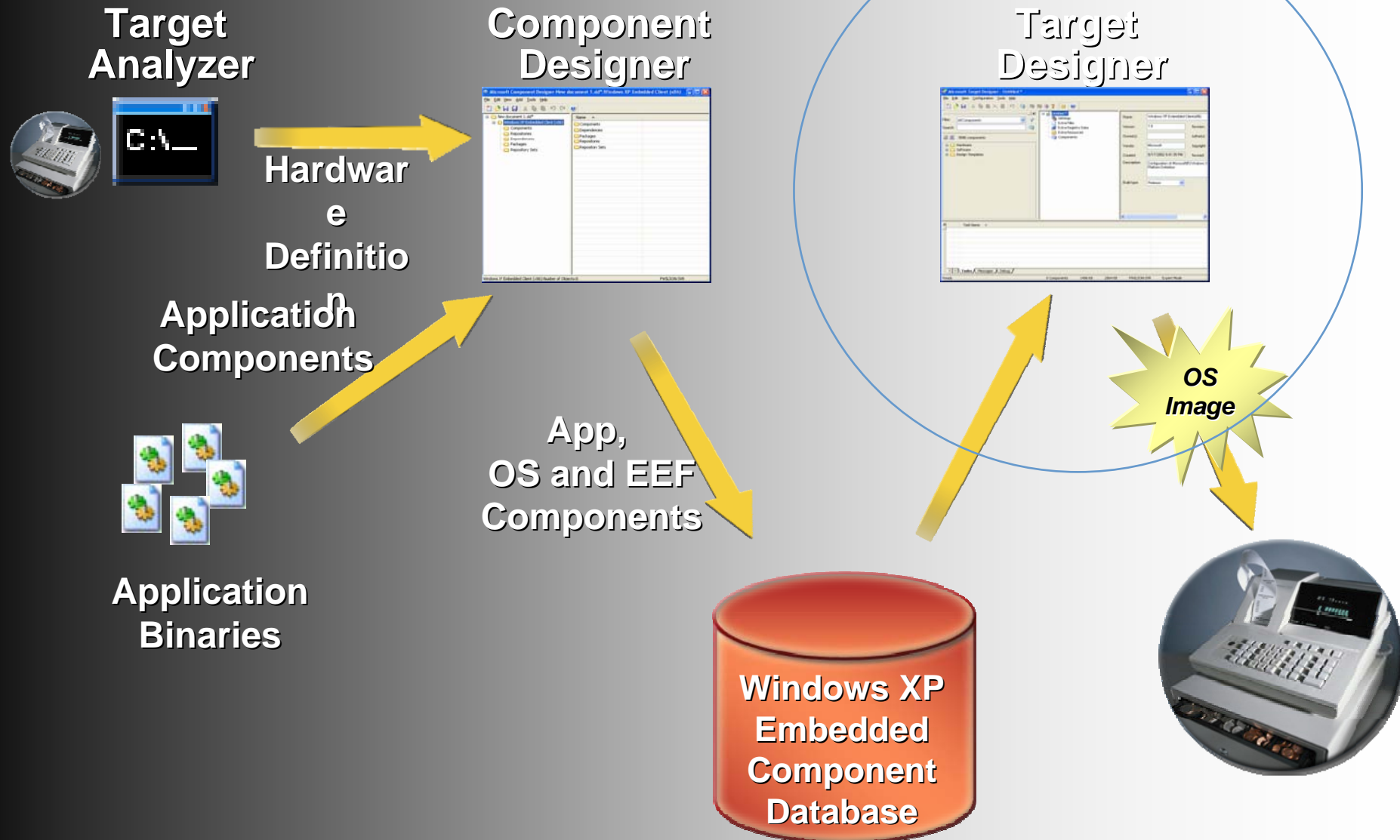
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- Creation and editing of components for use on embedded devices
- Developer specifies
  - Name, version, author, etc.
  - Files and Registry data (from local PC)
  - Group or File dependency (from Component DB)
  - Component category membership
  - Build order dependencies
  - Required system resources
- Component saved as .sld file
  - Files and metadata are imported into repository and database

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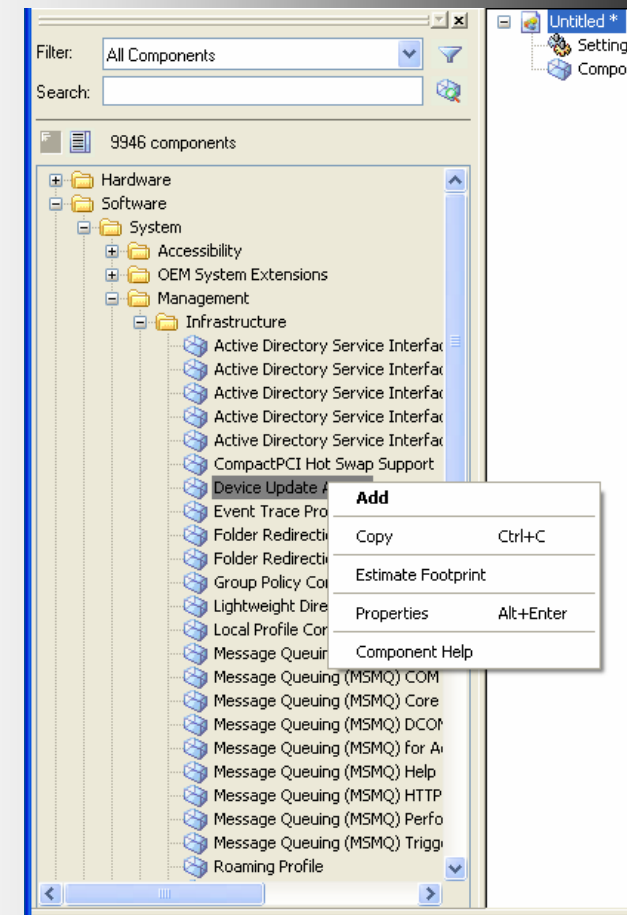
# TD

## Component selection

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- Selection of macro or component
  - Browse by category
  - Search and filtering
  - Pre-selection estimation of footprint impact
  - Component help

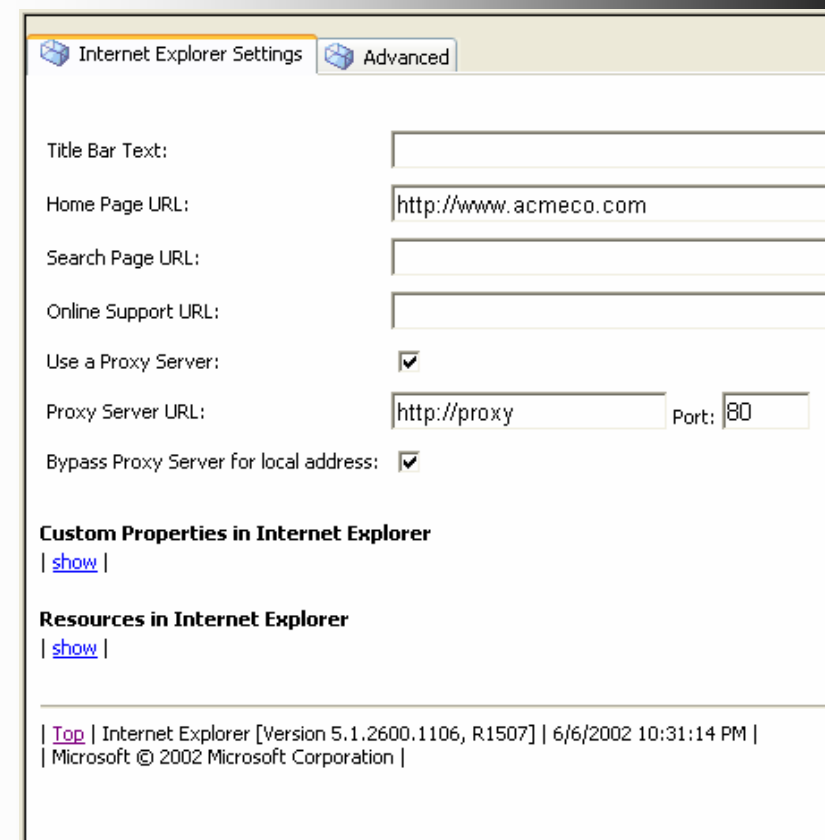


# TD Configuration

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- OS and Components are configured for target device
- OS Configuration
  - Hardware support
  - File system
  - Machine name
  - Pagefile
  - Destination drive
  - etc.
- Component Configuration
  - Varies by component
  - Configurable through DHTML
- Equivalent to OS setup time configuration



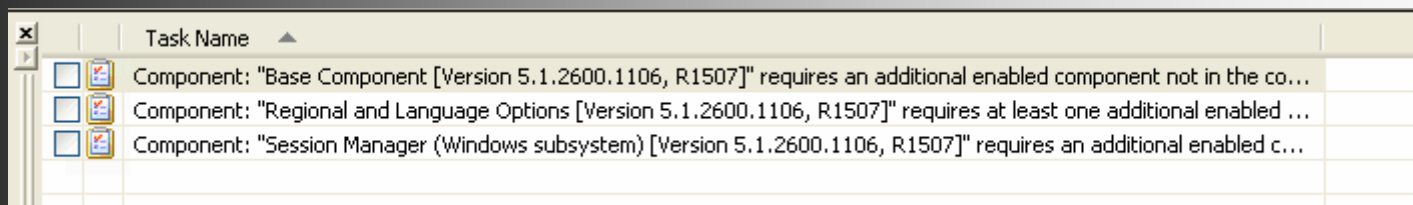
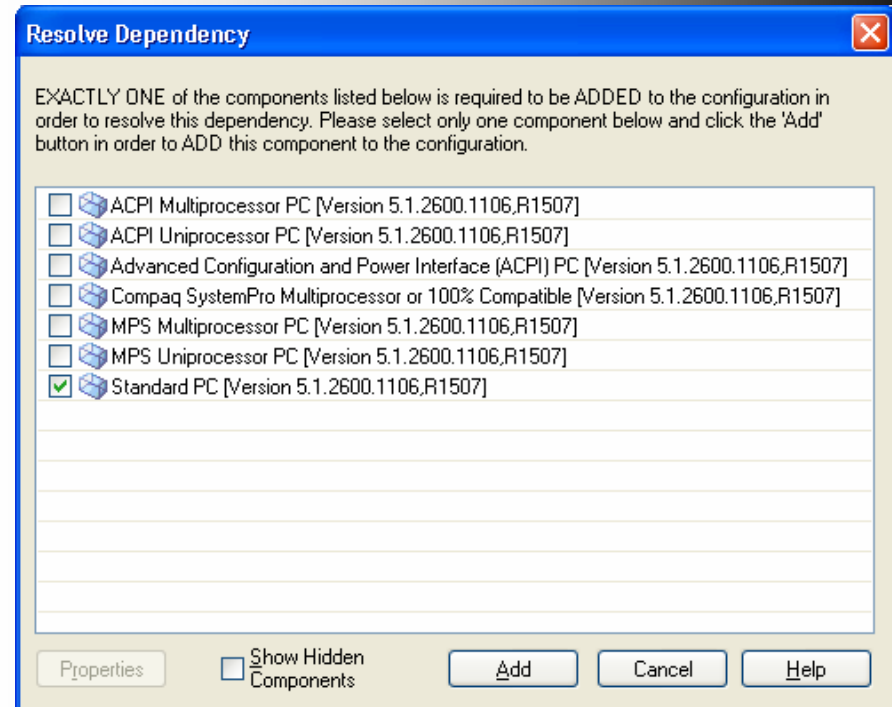
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## Check dependencies

- Check dependencies
  - Identifies and adds required components based on dependencies
  - Task list prompts user for component selection based on category

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# TD

## Build target image

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- Builds a bootable OS
  - Registry hives, folders and populating binaries to folders
  - Based-on resource information and settings of components in the configuration
- Generates file system folder containing OS files
  - Copy to bootable partition
  - Boot
  - First Boot Agent runs for online configuration



# Deploying an Image to Target HW

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- Local Dual Boot
- Swap Hard drives
- Use compact flash
- CD-ROM
- Network boot
- Remote install
  - Boot using WinPE locally or over RIS
    - SDIMgr used to download and install image
  - Remote recover
    - Target hard-drive mounted on host

# Windows PE

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- Windows PE is Windows XP Pre-install Environment
  - Lightweight servicing OS
  - Windows XP Embedded SP1 CD1 is bootable Windows PE disk
- Development time on target hardware
  - Boot Windows PE and running TA
  - Boot Windows PE and copy image
- Deployment time
  - Remote boot/Remote Install Windows PE
  - Bootstrap SDI Manager
  - Install and boot remote image to disk/RAMDisk

# Embedded Enabling Technologies

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- First Boot Agent (FBA)
  - Allows image configuration and customization at first boot
- SDI
  - OS Image format and supporting tools
- Image Cloning and Reseal
  - Mass deployment of near identical images
- Remote Boot
  - Allows booting from server via PXE
- Device Update Agent
  - Light-weight servicing client
- Enhanced Write Filter
  - Protect OS partition in embedded devices
- Hibernate Once Resume Many
  - Allows hibernation and faster boot
- CD-Boot

# First Boot Agent (FBA)

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- Executes once at first boot
  - Security installation
  - Plug and Play device detection
  - Network configuration
  - DLL registration
  - Registry hive files
- Custom actions for component configuration
  - Directives:
    - Generic commands, DLL registration, RunOnce,...
  - Phase
- Shutdown and Reboot commands in commandline
- Useful for headless devices



# SDI

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- SDI is a portable file format for Windows XP Embedded images
  - Virtual disk drive
  - Disk image backed by .sdi file
  - Partitioned, formatted, bootable
- Tools for building, editing and extracting images
  - SDI Loader
    - GUI tool
    - Creating, mounting, dismounting SDI files as drives
  - SDI Manager
    - Command-line tool for manipulating SDI files off-line

# Image Cloning and Reseal

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- Mass deployment on nearly identical hardware
  - Run-time image must be adjusted for serial number, MAC address, SID, machine name, etc.
- Include the System Cloning Component
  - Two phases: reseal and cloning
  - Allows FBA configuration
  - Allows manual installation of applications post build
- Use SDI to deploy resealed image

# Remote Boot

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- Overview
  - Boot an embedded device over a network
  - Targeted at POS scenarios
  - Intended for diskless devices
- Requirements
  - Windows XP Embedded run-time image
  - Device has BIOS PXE support, TCP/IP network
  - Windows 2000 Server with DHCP, PXE, and TFTP services
    - .NET Server supported with QFE at .NET Server launch

# Device Update Agent

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- Lightweight management solution for small footprint devices
- Minimal dependencies
- Flexible command set to address a broad range of scenarios

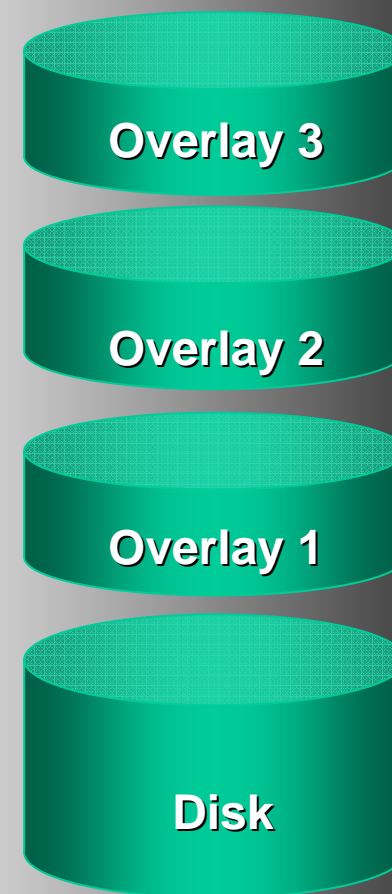


# Enhanced Write Filter

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- Protect your file system
  - Persistent
    - Requires storage mechanism on device (hard drive, flash ram, etc.)
  - Non-persistent
    - Redirects disk writes to memory
  - Use of Overlay's
    - Allow multiple levels of protection and “undo”
  - Multiple Volume Support
- Hibernate Once Resume Many (HORM)
  - Enables faster boot
  - Preserve the state across the reboots in hiberfile.sys



# CD-Boot

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- Allow Windows XP Embedded to boot from a CD
  - Windows XP Embedded implementation of El Torito
  - Only one bootable partition allowed
  - Bootable partition must be the first partition
- Enhanced Write Filter (non-persistent) to store information during the session
  - Allows use of read-only media for system
  - Use CD-ROM for system
  - Redirect disk writes to memory or other storage medium
  - Persistent EWF is not supported with CD-Boot

# OS Footprint

## Sample configurations

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Device Scenario	Image Size (uncompressed)
Minimal Kernel	3.72
Simple – MinLogon	11.3
Simple – WinLogon	42.8
Basic STB	58.8
WBT	75.4
Kiosk	92.3
Retail Point of Sale	100
NAS	111
Web Server	114
Home Gateway	119
Advanced STB	138
Information Appliance	167



# Hardware

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- Windows XP Embedded devices are built on commodity PC hardware
  - X86 CPU
  - Standard or reduced motherboards
  - PC devices and drivers



# Integration with Microsoft Products

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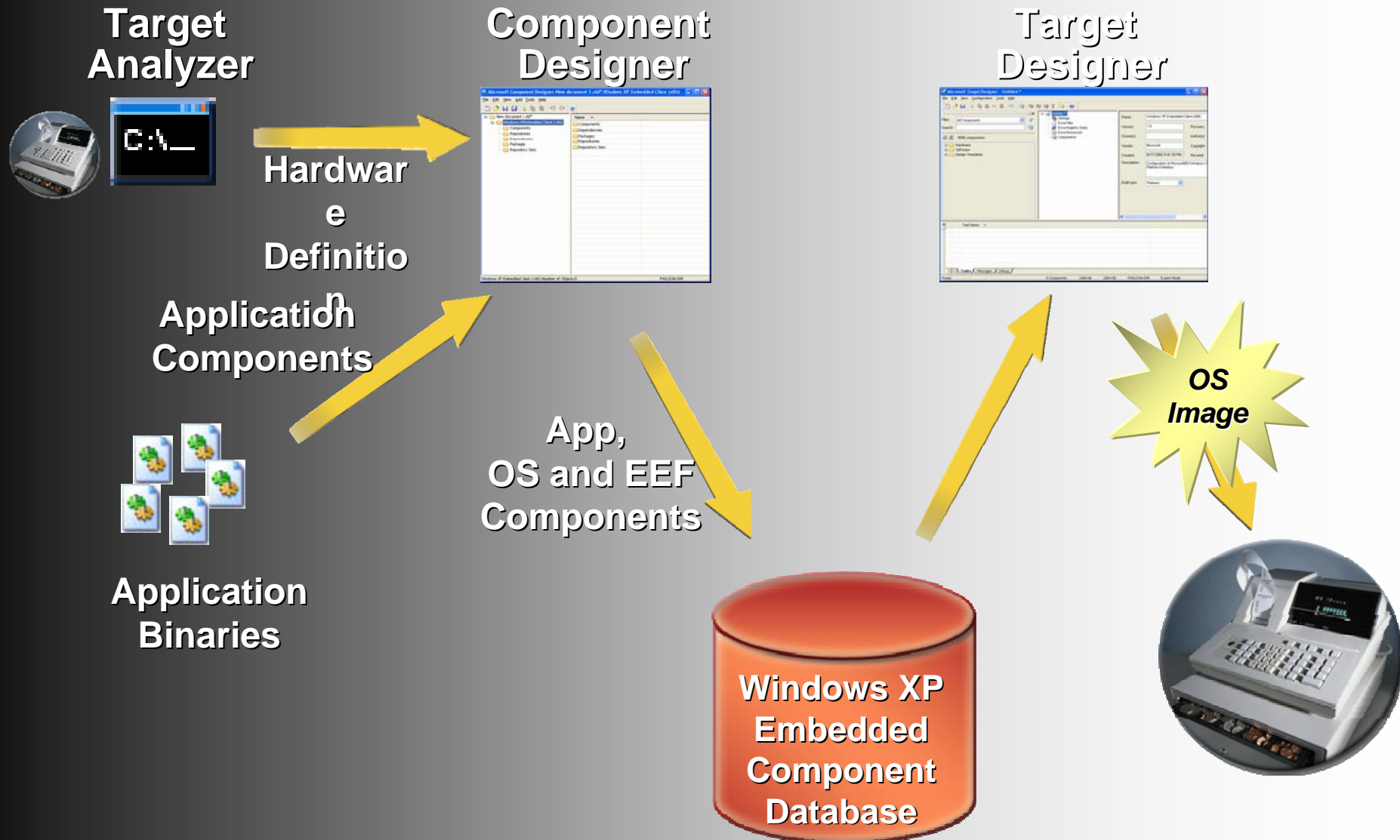
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- Microsoft Windows Server Update Services (WSUS)
- Systems Management Server (SMS)
- Microsoft Operations Manager (MOM)
- Microsoft SQL Server
- Active Directory and Group Policy
- Microsoft .NET Framework

# Development Model - Recap

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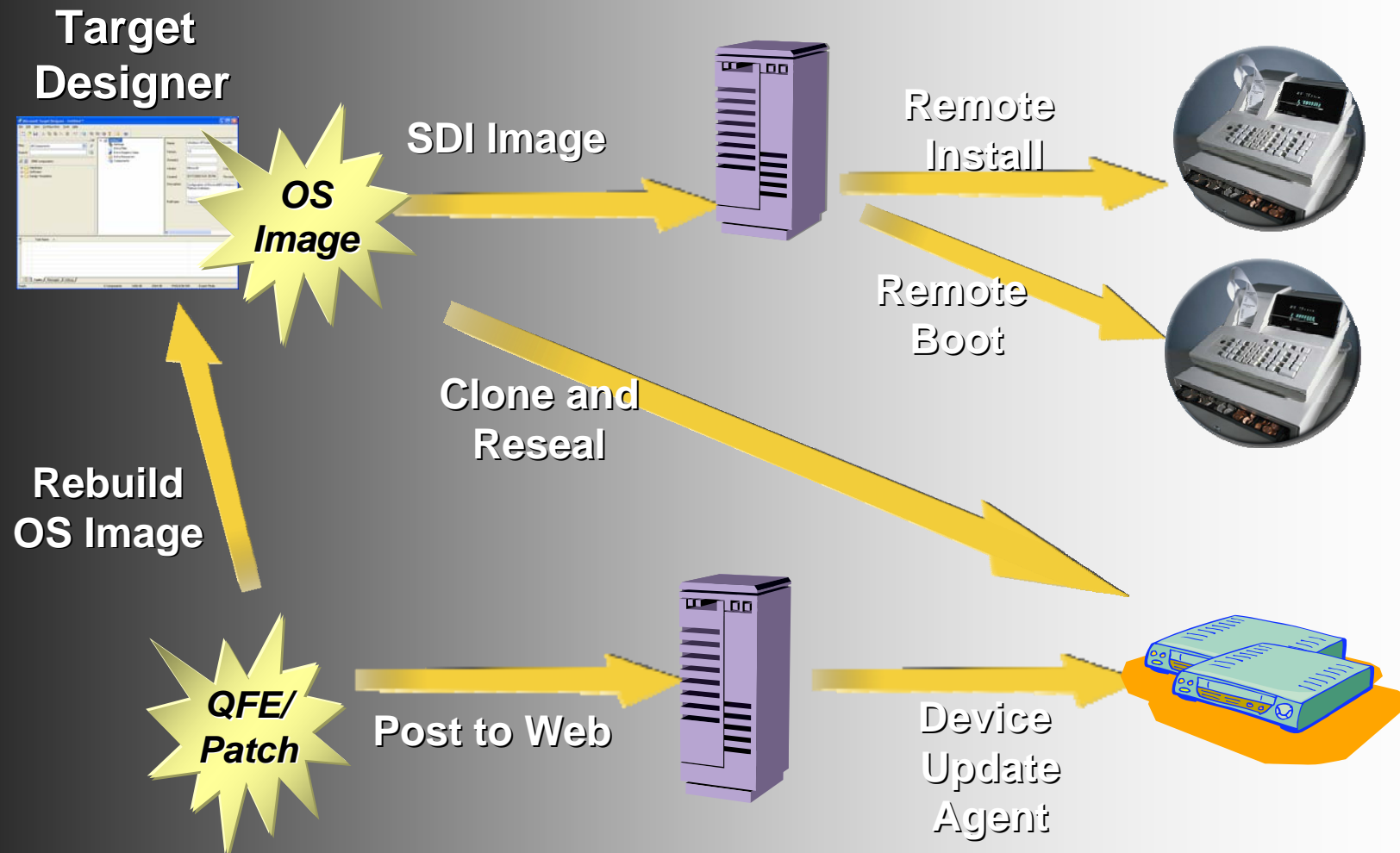


# Recap

## Windows XP Embedded deployment

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# After the Conference...

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Build ➤ Cool stuff & tell us about it:  
[msdn.microsoft.com/embedded/community](http://msdn.microsoft.com/embedded/community)

Join ➤ Windows Embedded Partner Program:  
[www.mswep.com](http://www.mswep.com)

## Develop

Install ➤ Windows Mobile 5.0 Eval Kit including Visual Studio 2005 Beta 2

Enter ➤ Mobile2Market Contest and win up to \$25000:  
[mobile2marketcontest.com](http://mobile2marketcontest.com)

Join ➤ Microsoft Solutions Partner Program:  
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## Build

## Develop

### Websites

[Msdn.microsoft.com/  
embedded](http://msdn.microsoft.com/embedded)

[Msdn.microsoft.com/  
mobility](http://msdn.microsoft.com/mobility)

### Newsgroups

[microsoft.public.  
windowsxp.embedded](mailto:microsoft.public.windowsxp.embedded)  
[windowsce.platbuilder](mailto:microsoft.public.windowsce.platbuilder)  
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### Blogs

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### Tools

Windows CE 5.0 Eval Kit  
Windows XP Embedded Eval Kit

Windows Mobile 5.0 Eval Kit



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 **问题和解答 (无问题)** ▲ X

在此会议中尚未解答任何问题。

要向演示者提问，请在此处键入问 

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