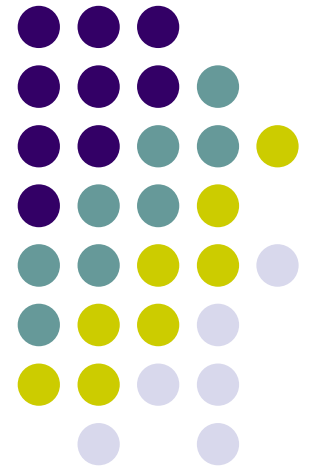




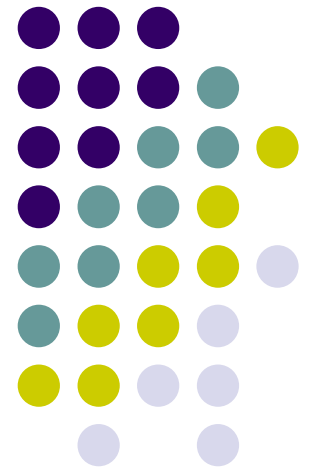
Windows Mobile



Windows Mobile OS

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Topics



- Introduction
- History
- Product
- Design
- Kernel
- Application Development
- Future
- Conclusions

Introduction



- Windows mobile is a compact mobile operating system developed by Microsoft.
- The current version is called Windows Mobile 6.5.
- It is based on the Windows CE 5.2 kernel, and features a suite of basic applications developed using the Microsoft Windows API.
- It is designed to be similar to desktop versions of windows, feature-wise and aesthetically. 3rd party software development is available for Windows Mobile.
- Windows Mobile currently holds a 8.8% share in the worldwide smartphone market.
- Closed Source, cannot be changed or modified by developers.



Market Share

Worldwide smart phone market by OS vendor

Market shares 2009, 2008

OS vendor	2009		2008		Growth 2009/2008
	shipments	% share	shipments	% share	
Total	166,271,050	100.0%	143,067,530	100.0%	16.2%
Symbian	78,511,980	47.2%	74,926,550	52.4%	4.8%
RIM	34,544,100	20.8%	23,562,650	16.5%	46.6%
Apple	25,103,770	15.1%	13,727,740	9.6%	82.9%
Microsoft	14,679,720	8.8%	19,945,530	13.9%	-26.4%
Google (Android)	7,786,870	4.7%	663,550	0.5%	1073.5%
Others	5,644,610	3.4%	10,241,510	7.2%	-44.9%

Source: Canals estimates, © Canals 2010

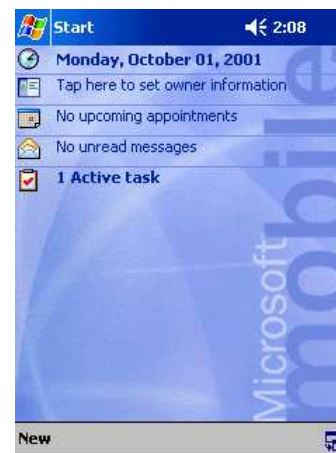


History

- Pocket PC 2000
 - Pocket Office
 - Pocket Internet Explorer
 - Windows Media Player



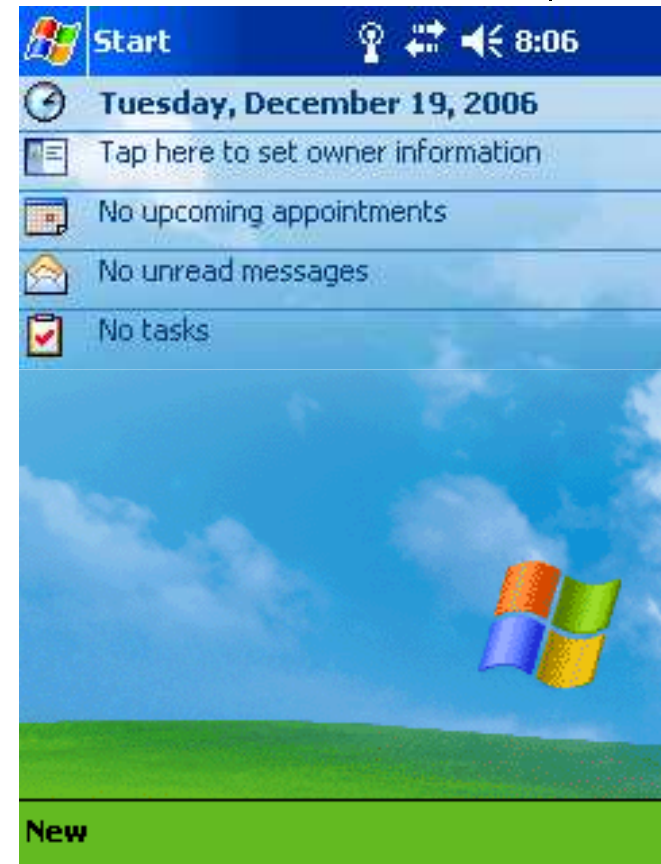
- Pocket PC 2002
 - Spell Checker
 - MSN Messenger
 - Terminal Services



History

- Windows Mobile 2003
 - Bluetooth support
 - Pictures application with viewing cropping, e-mail support
 - SMS replay options for Phone edition

- Windows Mobile 2003 SE
 - Portrait and Landscape switching for Pocket PC's
 - Wi-Fi Protected Access



History

- Windows Mobile 5
 - New Office Mobile
 - Photo Caller ID
 - GPS support
 - DirectShow support
 - Picture and Video package
 - Default QWERTY keyboard support



History



Windows Mobile 6

- VoIP
- Windows Live
- HTML e-mails support
- AJAX, JavaScript and XMLDOM support on Internet Explorer Mobile
- .NET Compact Framework



History



Windows Mobile 6.5

New features:

- New Home screen
- Finger friendly
- New Menu
- Pocket Internet Explorer
- Windows Marketplace for Mobile.





Product

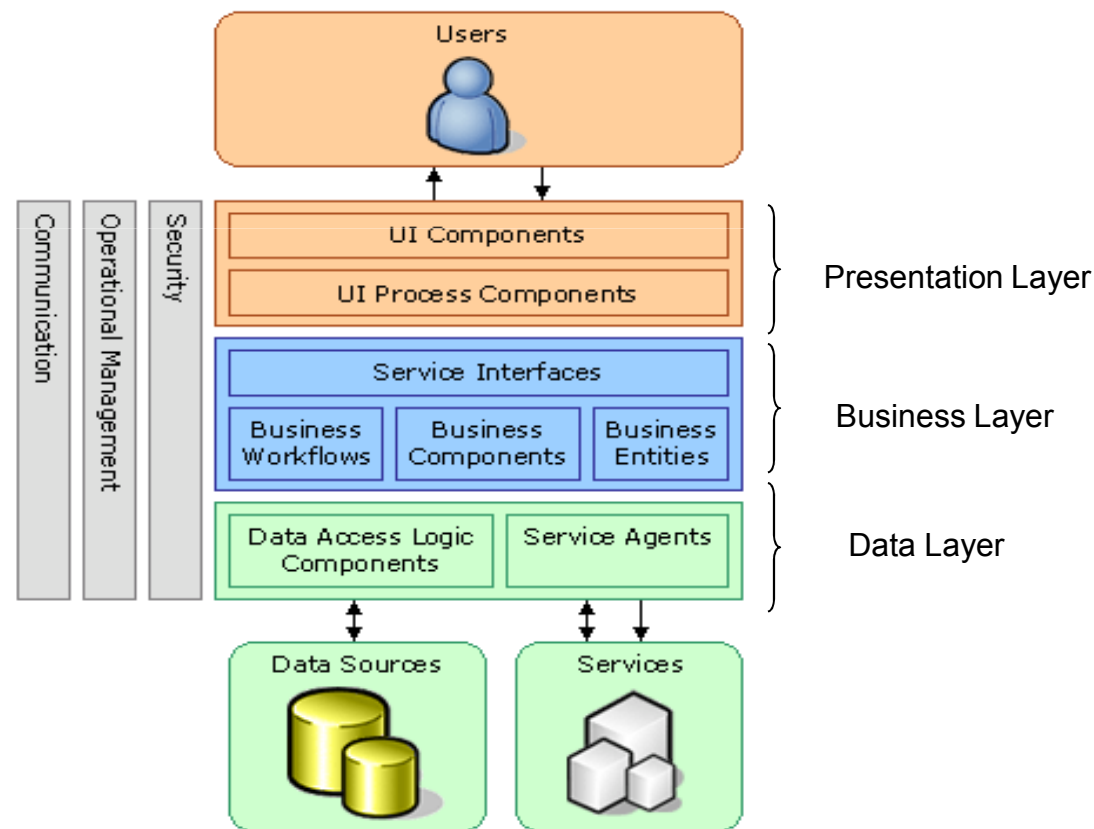
- Windows Mobile runs on an ARMv6 processor
- Written in C, C++
- 32-bit operating system
- Features:

	Android (Linux)	BlackBerry	iPhone	Symbian	Windows Mobile
Network scanning	●	○	●	~	●
Interface selection	○	●	●	●	●
Bluetooth I/O	○	●	○	●	●
Interface control	●	●	○	○	●
Background processing	●	●	●	●	●
Energy monitoring	●	●	●	●	●
Power saving control	●	●	~	●	●
Low-memory management	●	●	●	●	●
Persistent storage	●	●	●	●	●
Location sensing	●	~	●	●	●

Table 1: Summary of mobile platforms requirements. Satisfied: ● Partially satisfied: ~ Not satisfied: ○

Design

- Object Oriented Design
- Implemented an MVC system
- Modular Design
- Layers:



Source: <http://msdn.microsoft.com/en-us/library/ms978610.aspx>

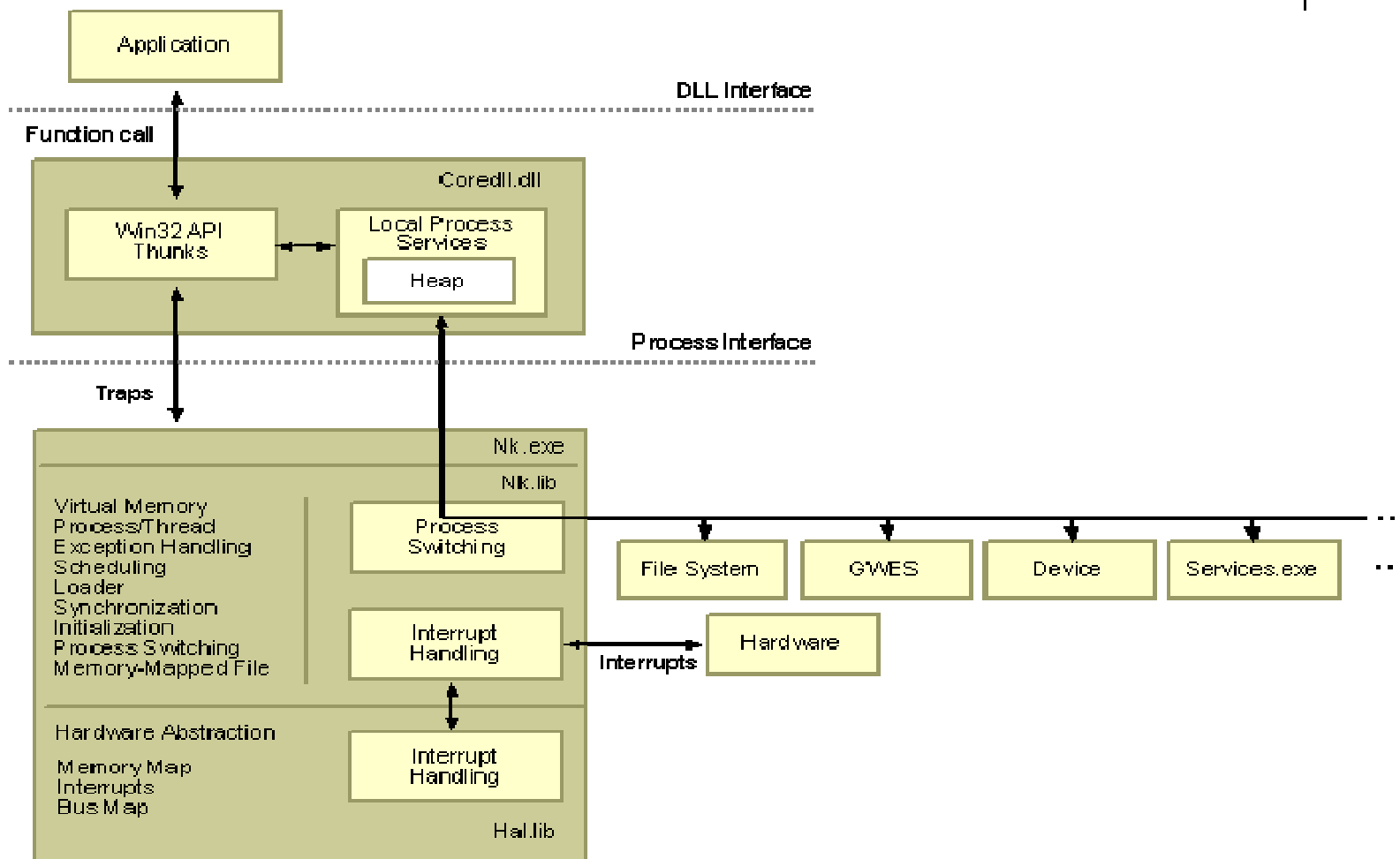


Kernel



- The kernel provides the base OS functionality for any Windows Mobile device. This functionality includes:
 - Process Management
 - Thread Management
 - Memory Management
 - File Management

Kernel



Source: [http://msdn.microsoft.com/en-us/library/aa909237\(v=MSDN.10\).aspx](http://msdn.microsoft.com/en-us/library/aa909237(v=MSDN.10).aspx)

Kernel



- Scheduling
 - Multithread Priority List
- Multitasking
 - Allows apps to run in the background
- Interrupts
 - The Kernel services an Interrupt request by trapping all exceptions and then determines the appropriate action.
- Memory Management
 - 32MB Virtual Memory, improvements due in Windows CE 6
 - RAM – issues with multimedia

Memory Management

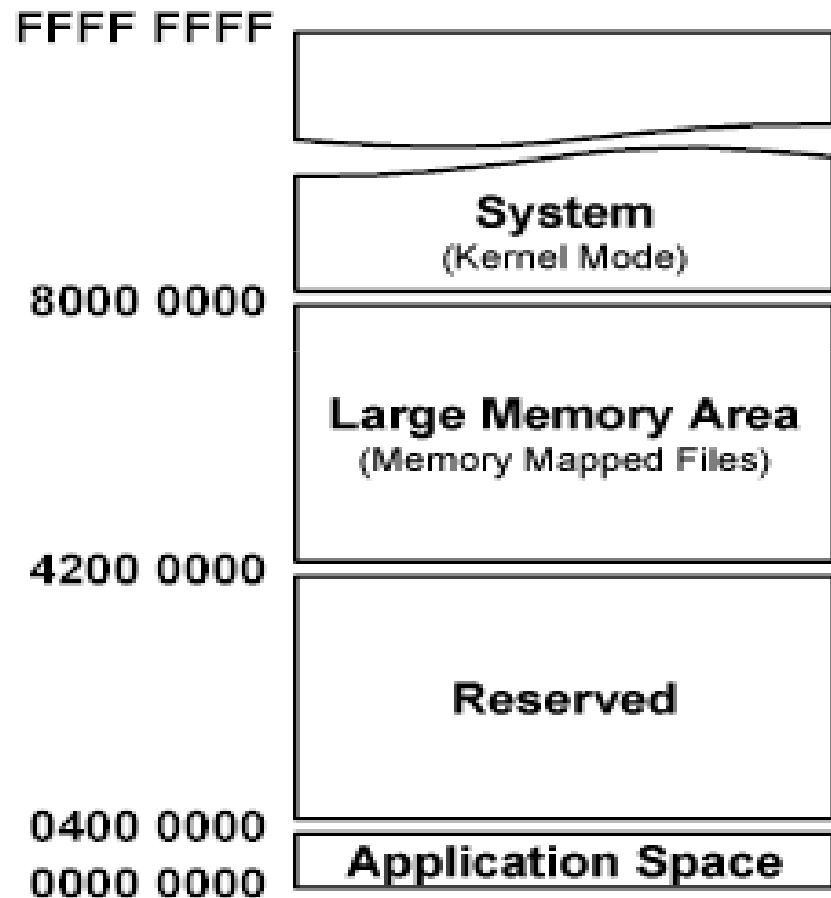


- Windows Mobile 6.5 is a 32 bit OS, because 32 bits can address a total memory of 4GB, this is also the total space that Windows mobile 5.0 can address.
- So far, the memory model is identical with the memory model of Windows XP. The similarities continue with the division of the total memory between the operating system and the applications.

Memory Management



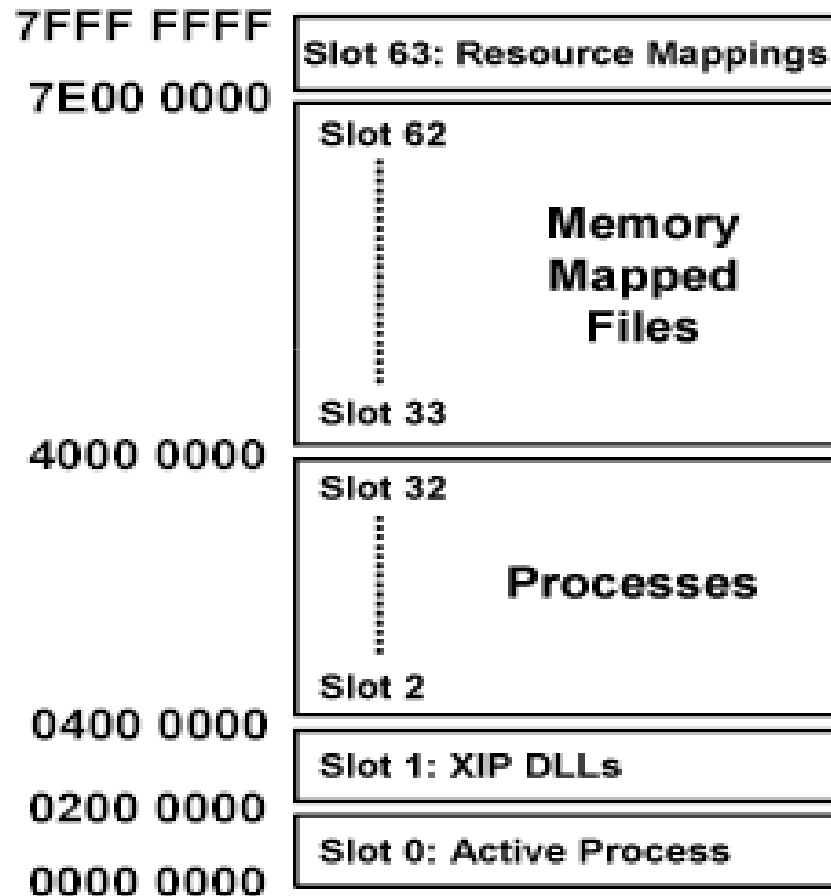
- As shown in the diagram, the operating system has a reserved area of 2GB in the upper address space where only code with privileged access can run.
- The area is often referred to as the kernel address space.
- The lower 2GB is the user address space. The application space is for currently running processes and all other processes lie in the reserve.
- This is where the similarities with Windows XP stop.





Memory Management

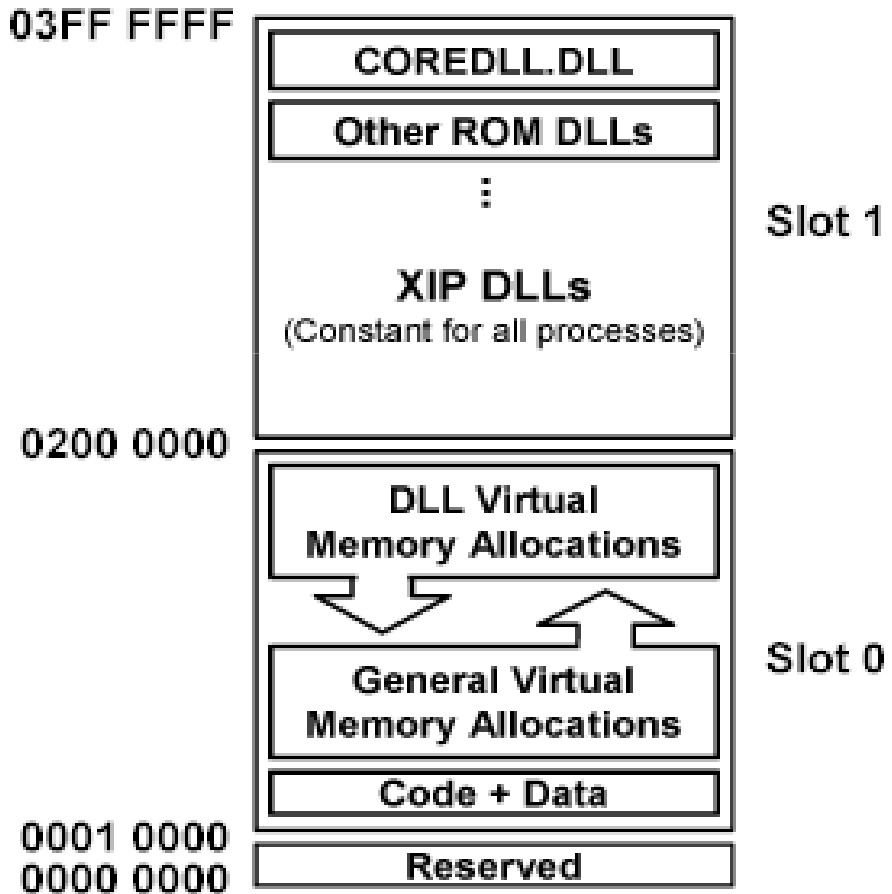
- On the desktop computer, applications can use all of this area; in Windows CE, this area is divided up into an application space, a reserved area, and a large memory area.
- The application space is used by the currently active process and the loaded ROM DLL's. The upper part of the user address space is the large memory area that includes things like memory mapped files.
- Each new process is loaded in slots 2-32, when its running it is copied to slot 0 (Active Process). This is done through aliasing with virtual memory.





Memory Management

- Just above a small reserved area, slot 0 includes the executable code and data.
- It also includes the virtual memory allocations, such as the application heaps and thread stacks.
- In a managed application, the following are located there:
 - The application domain heap,
 - Just-in-time (JIT) compiler heap,
 - Garbage collection heap
- The numerous heaps are created to avoid memory Fragmentation.



Source: <http://msdn.microsoft.com/en-us/library/aa454885.aspx>

Application Development



- Requirements

- Visual Studio 2005 Standard Edition or above, you can author, debug and package applications for delivery
- Windows Mobile SDK, development kit, documentation and library files
- ActiveSync or Windows Mobile Device Center, To deploy the application to a device or to an emulator

- Languages

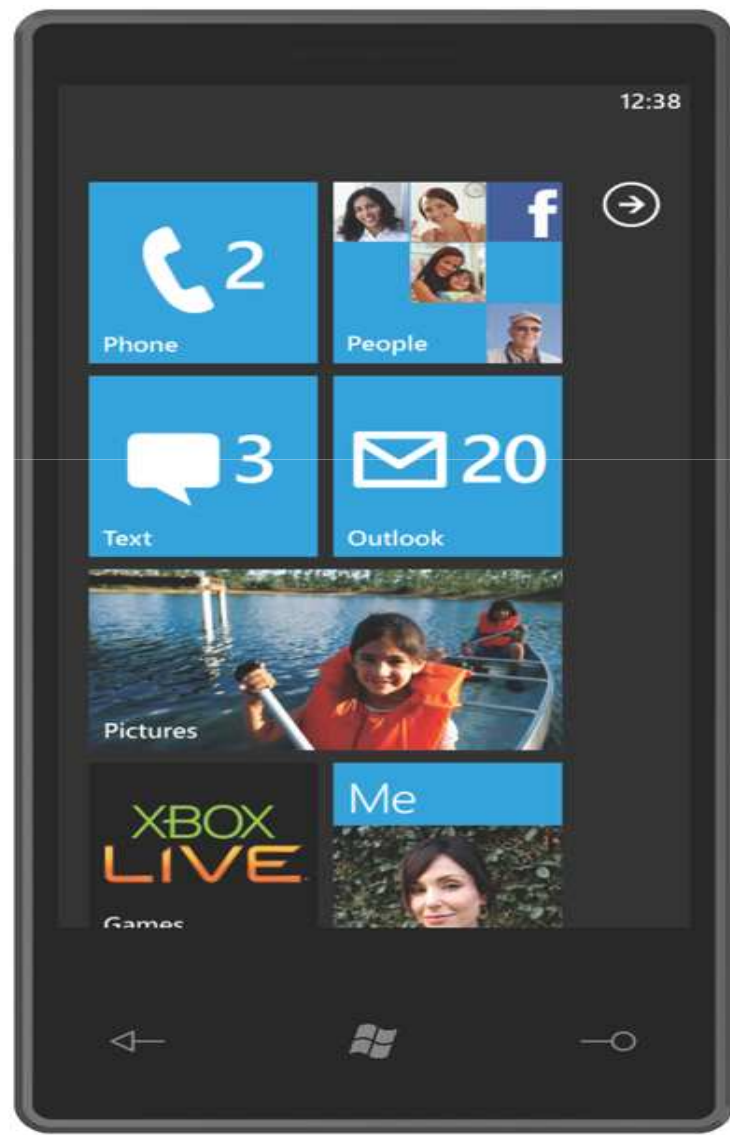
- Visual C++ for execution speed, application size and flexibility
- Visual C# and Visual Basic for reliable and rapid application development, security and language interoperability, C# is simple, powerful, type-safe, and object-oriented.



Future

- Windows Phone 7 is the next generation of Windows Phone
- Includes a number of new features including:
 - ✓ Advances in touch and handwriting recognition
 - ✓ Support for virtual hard disks
 - ✓ Improved performance on multi-core processors
 - ✓ Kernel improvements
 - ✓ Improved UI

[Introduction to Windows Phone 7](#)





Conclusions

- Windows Mobile is constantly improving
- Strength and depth in features
- It is a challenge for developers (C++)
- Windows Phone 7, shining light!



Questions?





References

- Microsoft - <http://msdn.microsoft.com>
- Artesis 2008 - mad-ip.eu/files/final_presentations/Windows%20Mobile.ppt
- Microsoft Blog - [http://blog.wmdev.net/post/A-New-Mobile-N-tier-Architecture-\(part-4\).aspx](http://blog.wmdev.net/post/A-New-Mobile-N-tier-Architecture-(part-4).aspx)
- Silberschatz et al, **Operating System Concepts 8th Edition**