REAL TIME OPERATING SYSTEM PROGRAMMING-II: Windows CE, OSEK and Real time Linux

Lesson-1:

WINDOWS CE Features

1. Windows CE

Windows CE

- An operating system for handheld computers and mobile systems, developed by Microsoft
- Microsoft perception─ compact, connectable, compatible, companion, and efficient
- Can also be perceived as Windows for consumer electronics systems

Windows CE…

- Applications don't limit to consumer electronics systems
- One of the most popular OSes for the handheld systems
- A Windows platform for the systems, which have resource constraints of power, memory, touch screen or display screen size and processing speeds

2. Windows CE.NET

Windows CE.NET

- Dot NET framework provides for compiling the managed code
- Managed code— one that is compiled in CIL (common Intermediate Language)
- CIL gives platform independent CPU neutral compilation as the byte codes

Windows CE.NET…

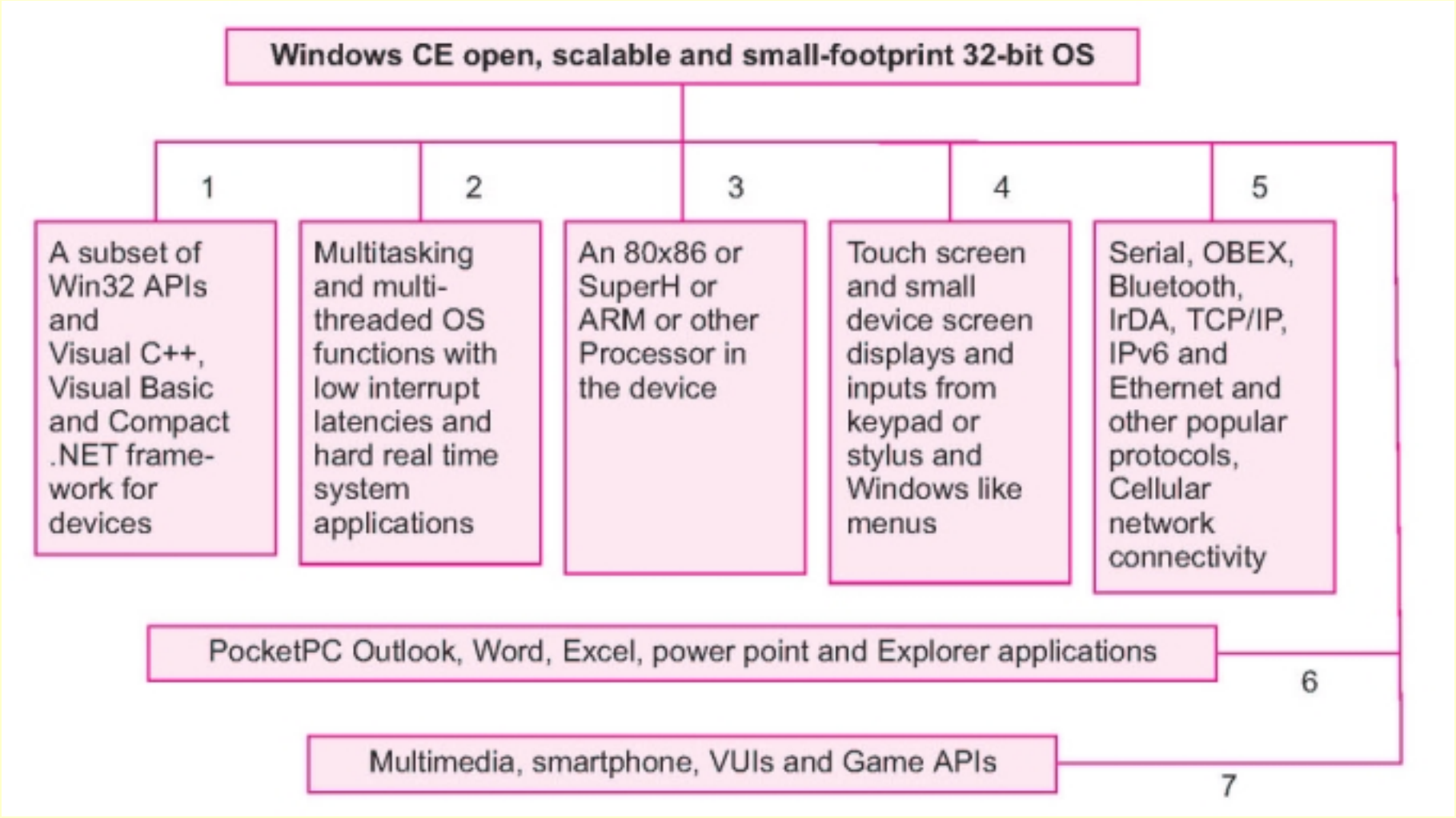
- A runtime environment converts the byte code instructions into the native machine and platform instruction
- Bytes code─ can run on different platforms and be distributed.

Windows CE.NET…

- .NET at runtime verifies the executing native environment, data source and destination types, within range array indices and other functionalities.
- Code becomes robust

3. Windows CE Features

Windows CE basic features



Windows CE platform

- Enables a user to feel, look and interact with the system using GUIs (graphic user interfaces) in a manner similar to a PC running on Windows
- Unicode 16-bit characters for International characters and languages
- Functionalities for hard real time scheduling

Windows CE Threads

- Support to 256 levels of thread priorities
- Provides for the adjustable time quantum for the threads
- Provides for the equal time slice for the threads of equal priority

Use of ISRs and ISTs

- ISTs (interrupt service threads) in addition to ISRs.
- ISTs─ are put in priority queue of threads waiting for execution.
- IST ─ the slow-level interrupt-service thread of a fast-level ISR
- Supports nested ISRs

Interrupt latencies

- Low interrupt latencies for ISRs and ISTs
- Interrupt latency control

Power Manager

- Software to reduce the power dissipation by reducing clock speed or running Wait or Stop instruction or optimizing use of caches or stopping screen or reduced intensity displays after limited wait for user input.

Virtual Memory

- Virtual memory addresses allocated for stored programs which may be of size more than physical memory size.

File-based registry and several file systems

- Flash memory based file system
- UDF 2.5 and exFAT file system

Shared source and source code access

- Componentization– two software layers.
- One sublayer consists of Microsoft developed source codes of WCE kernel and is shared with the system or device manufacturer. Then the manufacturer adds the remaining part of the kernel according to the system hardware.
- The remaining part is the hardware abstraction layer.

Kernel level objects modifications

- Freedom to modify without sharing them with the Microsoft

4. Windows CE 6.0, Windows Mobile 6 and Automotive 5.0

Latest version CE 6.0

- For home as well as office systems
- Cellular networks connectivity .

Windows CE 6.0

Number of processes 2^{16} (earlier 32), up to lower virtual memory 2 GB (earlier 32 MB) addresses per process, upper 2 GB is the kernel VM space, supports device drivers in both user mode and kernel mode (Section 8.1.2), system components which now run in kernel have been converted from EXEs to DLLs (Section 10.1.7), which get loaded into kernel space later at run time, new security infrastructure, 802.11i and 802.11e Wirelesss LAN support, new cellcore for cellular networks and easy data connections, UDF 2.5 and exFAT file system, IDE integrated with Visual Studio 5.0 and targeted to enterprise specific tools such as industrial controllers and consumer electronics devices.

Windows Mobile 6.0 Second Edition

Offfice Mobile 2007, smartphone with touch screen, improved Bluetooth stack, VoIP with AEC (acoustic echo cancellation), support to encryption of data stored in external removable storage cards, uses smart filter for fast files, e-mail, contacts and songs search, and can be set as modem for laptop.

Windows CE Automotive 5.0

Based on Windows CE 5.0 and building blocks for automobile off board service, automotive user interface toolkit (AUITK), expanded virtual memory support to enable the creation of complex 3-D graphics, and advanced navigation displays, enhanced power management and faster cold-boot times, real-time traffic updates, directions to the cheapest gas and improved performance.

Summary

We learnt

- Windows CE features
- Subset of Win32 APIs
- Windows platform enables a user to feel, look and interact with the system using GUIs
- Hard real time programming

We learnt

- 256 levels of thread priorities
- Adjustable time quantum for the threads
- Equal time slice for the threads of equal priority

We learnt

- Number of processes 2^{16} up to lower 2 GB virtual memory addresses per process
- Upper 2GB kernel VM space
- Supports device drivers running in user mode and kernel mode both

We learnt

- Windows Mobile 6 supports Offfice Mobile 2007, smartphone with touch screen, improved Bluetooth stack, VoIP wuth AEC (acoustic echo cancellation),
- Support to encryption of data stored in external removable storage cards,
- Uses Smartfilter for fast files, e-mail, contacts and songs search, can be set as modem for laptop

End of Lesson-1 of chapter 10 on

WINDOWS CE Features