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FACULTY OF ENGINEERING & TECHNOLOGY

BCS-501 Operating System

Lecturer-40

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Windows 7

- History
- Design Principles
- System Components
- Environmental Subsystems
- File system

Windows 7

- To explore the principles upon which Windows 7 is designed and the specific components involved in the system
- To understand how Windows 7 can run programs designed for other operating systems
- To provide a detailed explanation of the Windows 7 file system
- To illustrate the networking protocols supported in Windows 7
- To cover the interface available to system and application programmers

Windows 7

•32-bit preemptive multitasking operating system for Intel microprocessors

•Key goals for the system:
- portability
- security
- POSIX compliance
- multiprocessor support
- extensibility
- international support
- compatibility with MS-DOS and MS-Windows applications.

•Uses a micro-kernel architecture

•Available in six client versions, Starter, Home Basic, Home Premium, Professional, Enterprise and Ultimate. With the exception of Starter edition (32-bit only) all are available in both 32-bit and 64-bit.

•Available in three server versions (all 64-bit only), Standard, Enterprise and Datacenter

History

•In 1988, Microsoft decided to develop a “new technology” (NT) portable operating system that supported both the OS/2 and POSIX APIs

•Originally, NT was supposed to use the OS/2 API as its native environment but during development NT was changed to use the Win32 API, reflecting the popularity of Windows 3.0.

Design Principles

•Extensibility — layered architecture
- ➢Executive, which runs in protected mode, provides the basic system services
- ➢On top of the executive, several server subsystems operate in user mode
- ➢Modular structure allows additional environmental subsystems to be added without affecting the executive

•Portability — Windows 7 can be moved from one hardware architecture to another with relatively few changes
- ➢Written in C and C++
- ➢Processor-specific portions are written in assembly language for a given processor architecture (small amount of such code).
- ➢Platform-dependent code is isolated in a dynamic link library (DLL) called the “hardware abstraction layer” (HAL)

•Reliability — Windows 7 uses hardware protection for virtual memory, and software protection mechanisms for operating system resources

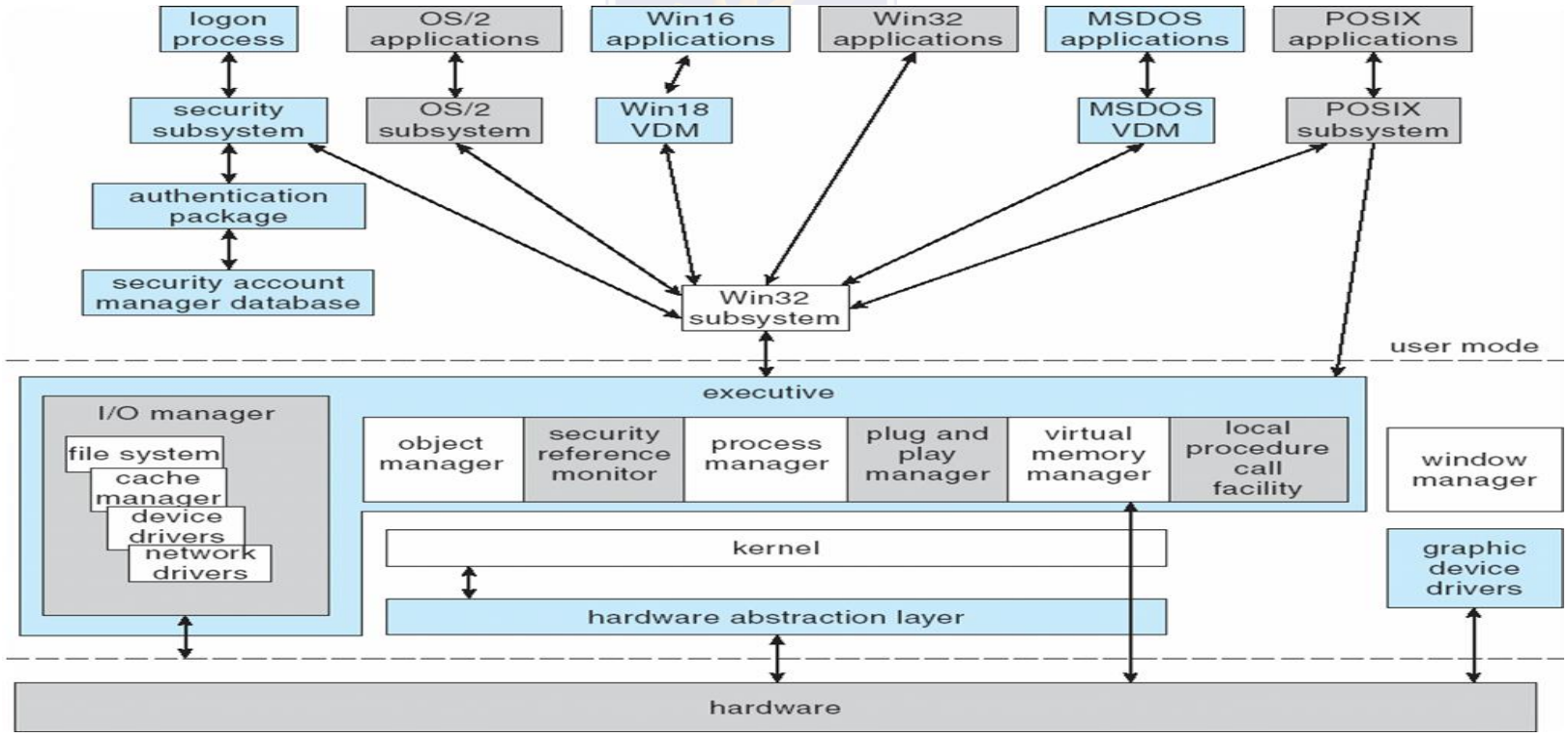
•Compatibility — applications that follow the IEEE 1003.1 (POSIX) standard can be complied to run on 7 without changing the source code

•Performance — Windows 7 subsystems can communicate with one another via high-performance message passing
- ➢Preemption of low priority threads enables the system to respond quickly to external events
- ➢Designed for symmetrical multiprocessing

•International support — supports different locales via the national language support (NLS) API

Windows 7 Architecture

- Layered system of module
- Protected mode — hardware abstraction layer (HAL), kernel, executive
- User mode — collection of subsystems
  - Environmental subsystems emulate different operating systems
  - Protection subsystems provide security functions



Kernel — Process and Threads

•The process has a virtual memory address space, information (such as a base priority), and an affinity for one or more processors.

•Threads are the unit of execution scheduled by the kernel's dispatcher.

•Each thread has its own state, including a priority, processor affinity, and accounting information.

•A thread can be one of six states: ready, standby, running, waiting, transition, and terminated.

•Kernel — Scheduling:----------

•The dispatcher uses a 32-level priority scheme to determine the order of thread execution.

- ➢Priorities are divided into two classes
  - ➢The real-time class contains threads with priorities ranging from 16 to 31
  - ➢The variable class contains threads having priorities from 0 to 15

•Characteristics of Windows 7's priority strategy

- ➢Trends to give very good response times to interactive threads that are using the mouse and windows
- ➢Enables I/O-bound threads to keep the I/O devices busy
- ➢Complete-bound threads soak up the spare CPU cycles in the background

•Scheduling can occur when a thread enters the ready or wait state, when a thread terminates, or when an application changes a thread's priority or processor affinity

•Real-time threads are given preferential access to the CPU; but 7 does not guarantee that a real-time thread will start to execute within any particular time limit .

- ➢This is known as soft realtime.

MCQ

Which one is a 'text editor' for Microsoft Windows?

(A) MS Word
(B) Ms Excel
(C) WordPad
(D) Notepad

Which one is the default 'Word Processor' for Microsoft Windows?

(A) MS Word
(B) Ms Paint
(C) WordPad
(D) Notepad

What is the maximum size of a word document created?

(A) 1 MB
(B) 32 MB
(C) 16MB
(D) 999KB

Which key combination is used to minimize all open windows and displays in the screen?

(A) Alt+M
(B) Shift+M
(C) Windows Key+D
(D) CTRL+D

Which web browser is provided default with a Windows machine?

(A) Opera
(B) IE
(C) Chrome
(D) Mosaic