



Computer Fundamentals

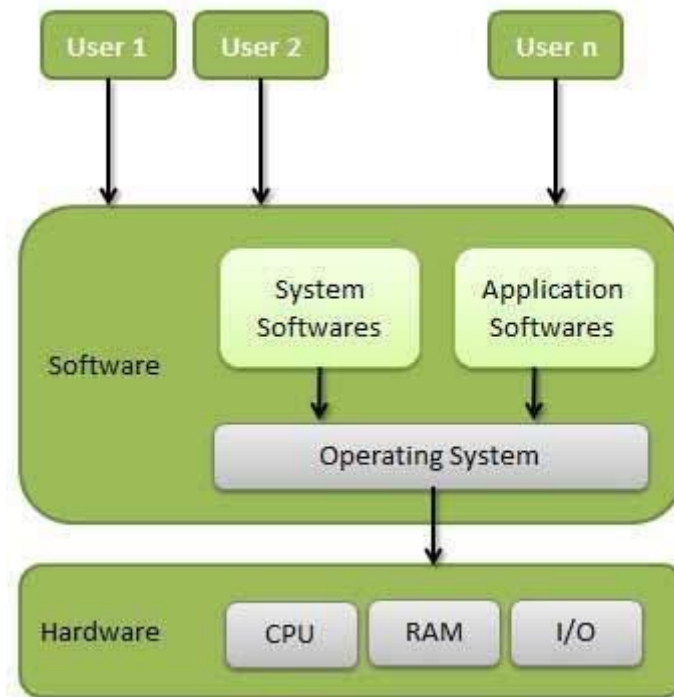
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Lecture 16



Operating Systems

- Program that acts as interface
 - ❑ Between user and computer hardware
- Controls execution of all kind of programs





Important Uses of OS

- Memory management
- Processor management
- Device management
- File management
- Security
- Control over system performance
- Error detecting aids
- Coordination between other software and users



Memory Management

- Keeps tracks of primary memory
 - ❑ What part of it are in use by whom, what part are not in use
- OS decides which process gets memory when and how much
- Allocates memory when process requests
- De-allocates memory when process no longer needs it or has been terminated



Processor Management

- Keeps tracks of processor and status of process
 - ❑ Program responsible for this task is traffic controller
- Allocates processor to process
- De-allocates processor when no longer required



Device Management

- Keeps tracks of all devices
 - ❑ Program responsible for this task is I/O controller
- Decides which process gets device when and for how much time
- Allocates device in efficient way
- De-allocates devices



File Management

- Keeps track of information, location, uses, status etc.
- Decides who gets resources
 - ❑ Allocates resources
 - ❑ De-allocates resources



Other Uses

- Security
 - ❑ By means of password and similar other techniques
 - ❑ Preventing unauthorized access to programs and data
- Control over system performance
 - ❑ Recording delays between request for service and response from system
- Error detection
 - ❑ Production of dumps, traces, error messages and debugging
- Coordination between software and users
 - ❑ Coordination and assignment of other software to users of computer



Functions of Operating Systems

- Provide a user interface
- Load/Run programs
- Manage hardware devices
- Organized file storage



Types of Operating Systems

- Real-time operating system
- Single user/Single tasking OS
- Single user/Multitasking OS
- Multi user/Multitasking OS



Types of Operating Systems (cont.)

- Real-time operating system
 - ❑ Fast but relatively small
 - ❑ Usually embedded onto a system
 - Not loaded from disk drive
 - ❑ Designed for real time applications
 - Must respond quickly (in fraction of second)
 - ❑ Used in various fields
 - Medical diagnostics
 - Industrial systems
 - Aircrafts
 - Robotics
 - ...



Types of Operating Systems (cont.)

- Single user/Single tasking OS
 - ❑ One user works on the system
 - ❑ Performs one task at a time
 - ❑ MS-DOS and Palm OS
 - ❑ Take up little space on disk
 - ❑ Runs on inexpensive computers



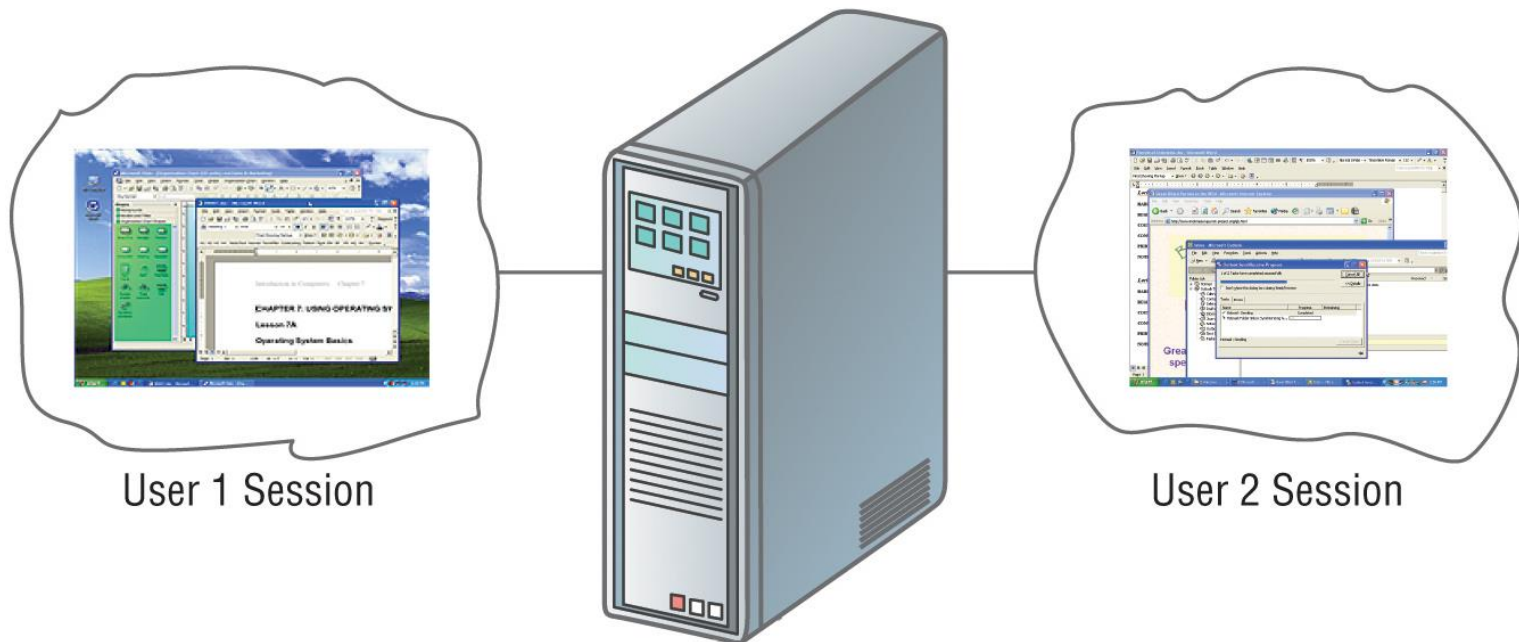
Types of Operating Systems (cont.)

- Single user/Multitasking OS
 - ❑ User performs many tasks at once
 - ❑ Most common form of OS
 - ❑ E.g. Windows, MAC OS
 - ❑ Require expensive computers
 - ❑ Tend to be complex
 - Support for multitasking
 - Instant switch between programs



Types of Operating Systems (cont.)

- Multi user/Multitasking OS
 - ❑ Many users connect to one computer
 - ❑ Each user has a unique session
 - ❑ UNIX, Linux, and VMS
 - ❑ Maintenance can be easy
 - ❑ Requires a powerful computer





Providing a User Interface

- User interface
 - ❑ How a user interacts with a computer
 - ❑ Require different skill sets

 - ❑ Graphical User Interface
 - ❑ Command Line Interface

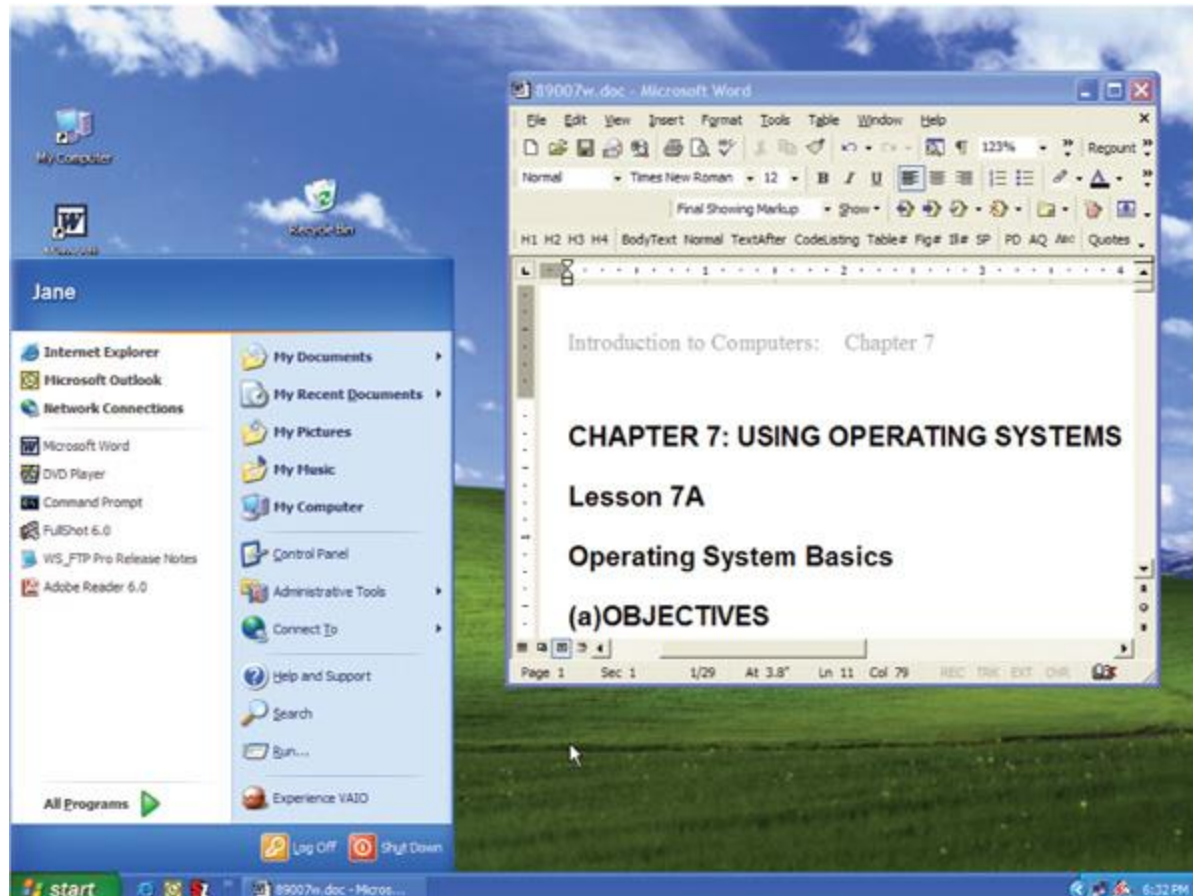


Providing a User Interface (cont.)

- Graphical user interface (GUI)
 - ❑ Most common interface
 - Windows, OS X, Gnome, KDE
 - ❑ Uses a mouse to control objects
 - ❑ Uses a desktop metaphor (symbolic representation)
 - Shortcuts open programs or documents
 - ❑ Open documents have additional objects
 - ❑ Task switching
 - ❑ Dialog boxes allow choosing possible choice of action
 - Given by OS or application



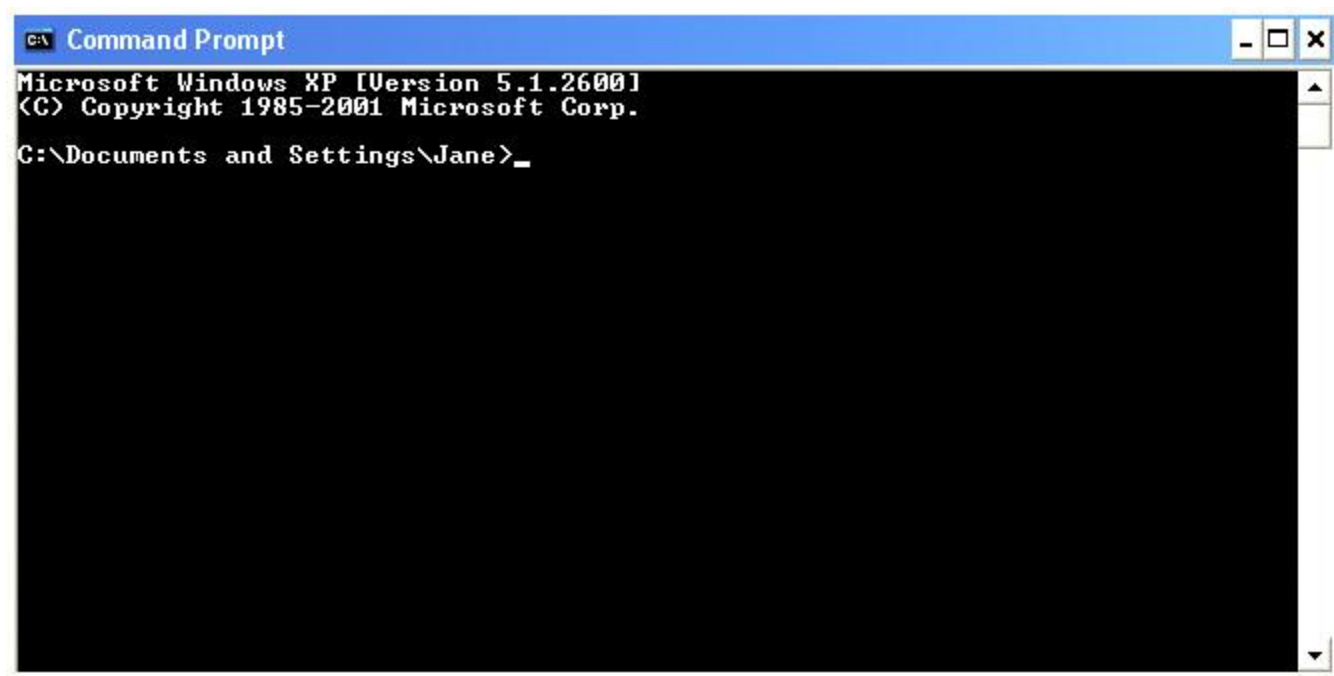
Providing a User Interface (cont.)





Providing a User Interface (cont.)

- Command line interfaces
 - ❑ Older interface
 - DOS, Linux, UNIX
 - ❑ User types commands at a prompt
 - ❑ User must remember all commands
 - ❑ Included in all GUIs





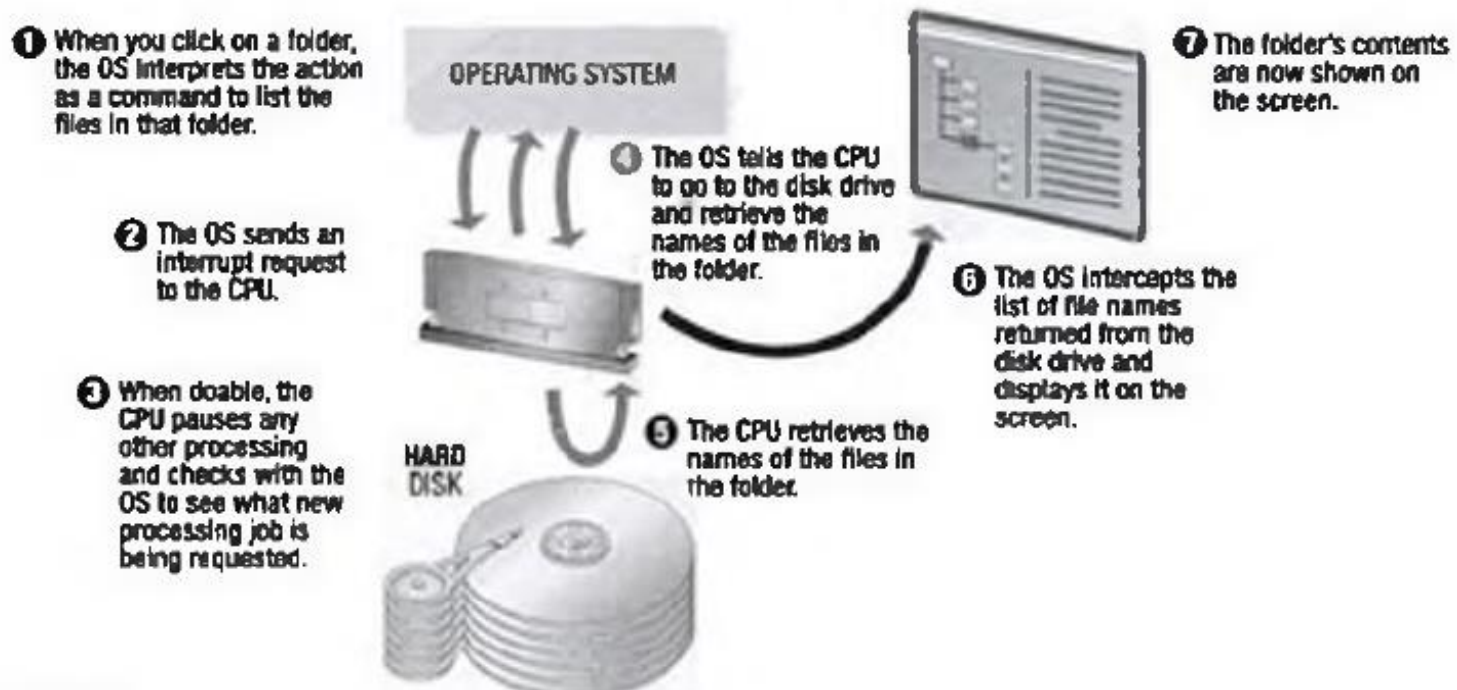
Running Programs

- Many different applications supported
- System call
 - ❑ Provides consistent access to OS features
 - E.g. clicking Open in MS word gives list of files in a specified folder
 - ❑ Result of system call sent back to application rather than desktop
- Share information between programs
 - ❑ Copy and paste
 - ❑ Object Linking and Embedding



Managing Hardware

- Programs need to access hardware
- Interrupts
 - ❑ CPU is stopped
 - ❑ Hardware device is accessed
- Device drivers control the hardware





Organizing Files and Folders

- Organized storage
 - ❑ Folders can be created and nested
- Ensure that all storage devices working properly



Enhancing an OS

➤ Utilities

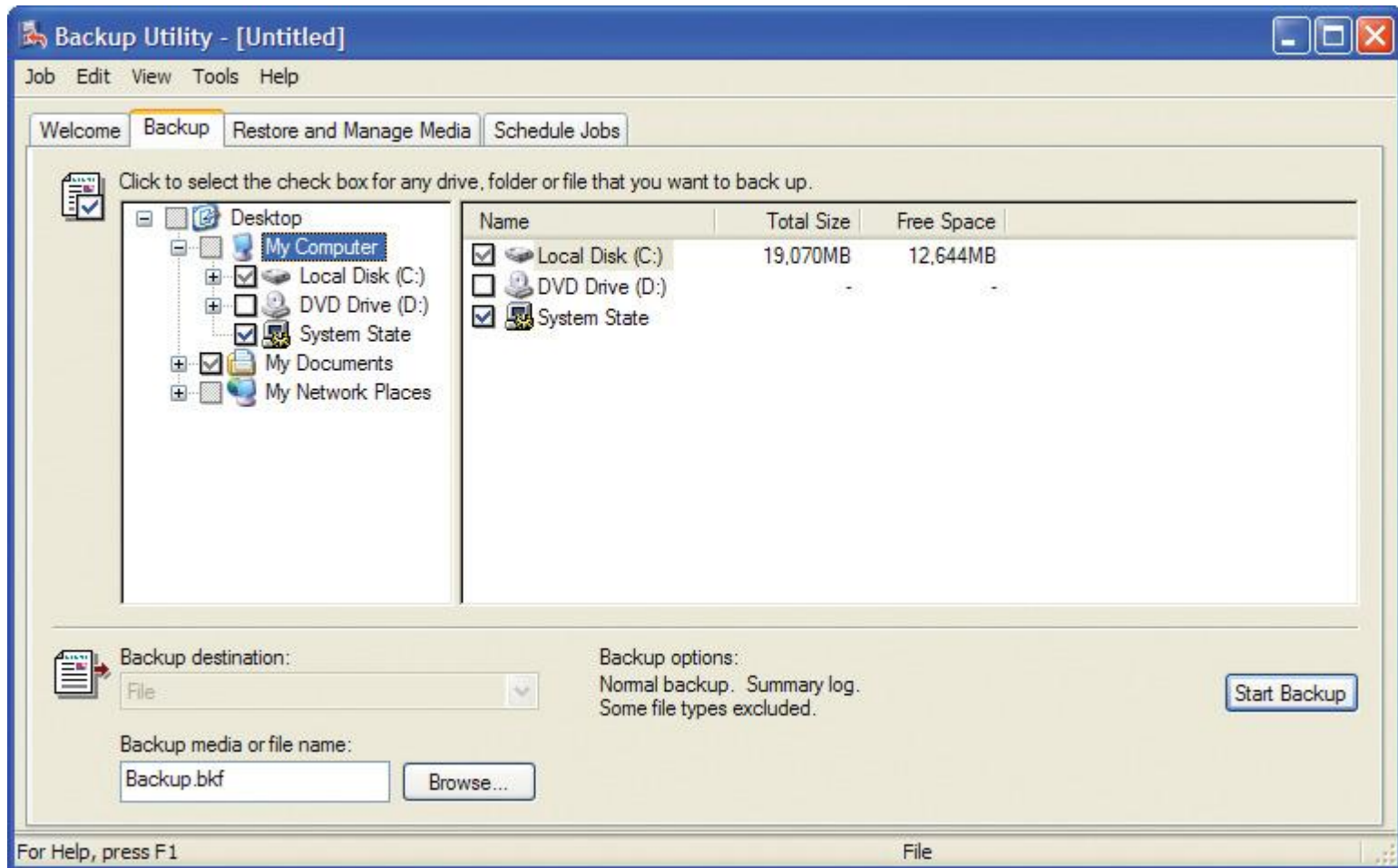
- ☐ Provide services not included with OS
- ☐ Goes beyond the four functions
- ☐ Firewall, anti-virus and compression
- ☐ Prices vary

➤ Backup software

- ☐ Archives files onto removable media
- ☐ Ensures data integrity
- ☐ Most OS include a backup package
- ☐ Many third party packages exist



Enhancing an OS (cont.)





Enhancing an OS (cont.)

- Anti-virus software
 - ❑ Crucial utility
 - ❑ Finds, blocks and removes viruses
 - ❑ Must be updated regularly
 - ❑ McAfee and Norton Anti-Virus
- Firewall
 - ❑ Crucial utility
 - ❑ Protects your computer from intruders
 - ❑ Makes computer invisible to hackers
 - ❑ Zone Labs, home firewall example
 - ❑ Cisco sells hardware firewalls
- Intrusion detection
 - ❑ Often part of a firewall package
 - ❑ Announces attempts to breach security
 - ❑ Snort is a Linux based package



Enhancing an OS (cont.)

- Screen savers
 - ❑ Crucial utility for command line systems
 - Prevents burn in
 - ❑ Merely fun for GUI systems
 - ❑ Screen saver decorates idle screens

