I.Ch 3 System Software

A.Competencies

1. **Describe the differences between system software and application software**
2. **Discuss the three basic functions of an operating systems**
3. **Describe the three categories of operating systems**
4. **Describe the purpose of utilities and utility suites**
5. **Identify the five most essential utilities**
6. **Define device drivers and language translators**

B.System Software

- System software consists of **operating systems**, **utilities**, **device drivers**, and **language translators**.
- System software works with end users, application software and computer hardware to handle the majority of technical details like where a program is stored, how commands are converted to get processed, where a document or file is saved, how output is printed.
- **System software is *not a single program*. It is a *collection* or a *system of programs.***
- System software consists of four types of programs:
  - **Operating systems**: programs that coordinate computer resources, provide a user interface, and run applications, for example the *Windows XP* operating system.
  - **Utilities** (aka **service programs**) perform specific tasks related to managing computer resources, for example, a file compression utility like *WinZip*.
  - **Device drivers** allow input and output devices to communicate with the rest of the computer system, for example, a printer driver.
  - **Language translators** convert programming instructions written by programmers into a language that computers understand and process. For example, you may have a C++ compiler that translates the C++ source code into an executable file the computer can run.

C.Operating Systems

- An **operating system** is a collection of programs that manage computer resources, provides a user interface, and runs applications.
- Computer **resources** include *memory*, *processing*, *storage*, *input* & *output devices*.
- The OS also *monitors* system performance, *schedules jobs*, and provides some *security* for the computer.

- **User Interface**: users interact with application programs and computer hardware through a user interface. In older systems, a character based interface may have been used, e.g. "Copy A:assign.doc C:". Most operating systems today use a windows like Graphical User Interface (GUI) in which graphical objects called **icons** represent commonly used features.
- **Applications**: these programs load and run applications such as word processors and spreadsheets.
- Most operating systems allow "**multitasking**", the running of more than one application at a time. The program you are currently running is in the "foreground", and those that are running, but not currently active are in the "background".

Categories

- There are three basic categories of operating systems:

a)Embedded Operating Systems:

- Used for handheld computers and smaller devices like PDAs. It is called embedded because entire OS is stored within the device in its ROM memory.
- Examples include Windows CE and Palm OS

b)Network Operating Systems (aka NOS):

- Used to control and coordinate computers that are linked together. NOS are typically located on one computer's hard disk in the network, the **Network Server** that coordinates all communication.
- Examples include Novell NetWare, Windows NT Server, and UNIX.

c)Stand alone OS (aka desktop OS):

- Control a single desktop or notebook computer.
- If the computer is connected on a network, it may have a **client operating system** that works with NOS to share resources.
- Examples of stand alone systems include Windows, Mac OS, and some versions of UNIX.

- OS are often referred to as the *Software Environment* or **Platform**.
- Most OS are Proprietary OS: they are owned and licensed by a corporation.
- Some OS are Non-Proprietary OS: they are not owned by any one corporation. These are also called Open Source programs. An example is **Linux**.

2.Windows

- **Microsoft Windows** is by far the most popular microcomputer operating system with over 80% of the market designed to run with Intel and Intel-compatible microprocessors like Pentium IV.

- There are a variety of versions of Windows such as Windows NT Workstation, Windows 2000 Professional, Windows ME, etc.
- Windows CE is designed to work with handheld computers including PDAs.

Features

- *Booting*: starting or restarting a computer
- *Warm boot*: restart without turning off the power
- *Cold boot*: start after power has been off.
- *Desktop*: the place to access computer resources – items you'll typically find on the desktop include:

a)Icons:

- Graphical representations of a program or function

b)Pointer:

- Controlled by the mouse, changes appearance depending on the current function.

c)Windows:

- Rectangular areas for displaying information and running programs.

d)Menus:

- Provide a list of options or commands
- **Start Menu**: provides access to many programs.

e)Dialog boxes:

- Provide info or request input, e.g. File Save dialog box

f)Help:

- Provides online assistance for OS functions and procedures.

- *Files*: used to store data and programs
- *Folders*: related files are stored in folders. A folder can contain other folders.

3.Mac OS

- Introduced in 1984, it provided one of the first GUIs.
- It is designed to run on Macintosh computers.
- Has a much smaller market share, but is still popular with professional graphic designers, desktop publishers, and some home users.
- One of the latest versions is **Mac OS X** featuring a intuitive user interface called **Aqua**. The desktop features **Dock**, a tool for visually organizing files. It also has the **Sherlock** search tool to help locate information on the web & system.

4.UNIX and Linux

- Unix OS was originally designed to run on *networked minicomputers*.
- Now, it's used by powerful *microcomputers* and by **servers** on the *Web*.
- **Linux** is one of the many versions of UNIX.
- Linux is open source, created by Linus Torvalds in 1991.
- Linux is one of the most popular and powerful alternatives to Windows.

D.Utilities

Utilities are **specialized programs** that make computing easier. Some of the most essential utilities include:

- *Troubleshooting* or *diagnostic* programs: recognize and correct problems before they become serious
- *Antivirus* programs: guard your computer against viruses and other damaging programs that can invade your computer system
- *Uninstall* programs: allow you to safely and completely remove un-needed programs and related files from your hard disk
- *Backup* programs: make copies of important files in case the original are lost or damaged.
- *File compression* programs: reduce the size of files so they can be stored and/or sent over a network more efficiently.

Many of these utilities are included with modern operating systems, and some may be purchased from a third party either separately or in utility suites. McAfee Office, Norton SystemWorks, eSafe Desktop are utility suites.

1.Windows Utilities

- Windows has several utilities that can be accessed from the Systems Tools menu:
- **Backup**: makes copies of selected or all files saved onto a disk onto another storage medium protecting us from disk failure.
- **Disk Cleanup**: identifies and removes unnecessary files such as temporary Internet files thus freeing up valuable disk space and improves system performance.
- **Disk Defragmenter**: locates and eliminates unnecessary file fragments and rearranges files and unused disk space to optimize operations. When large files are stored on hard drives, they are broken up or fragmented into small parts and then these parts are stored wherever space is available. After a period of time when the hard disk is highly fragmented, the operations gets slow.

2.Utility Suites

- *Utility suites* combine several utility programs into one package.
- An advantage of a Utility Suite is it is *cheaper* than buying each program separately.
- Examples include McAfee Office, and Norton SystemWorks, and V Communications SystemSuite.

- **Norton SystemWorks** is one of the most widely used *Utility Suites*. It includes the following components:
  - *Norton Utilities*: a collection of trouble shooting utilities that can find and fix problems, improve system performance.
  - *Norton Antivirus*: a collection of antivirus programs that protects your system from over 21000 different computer viruses
  - *Norton Cleansweep*: a collection of programs that safely removes programs and files that are no longer needed; archive, move and backs up the hard drive, and protects existing files when installing new software.

E.Device Drivers

- **Device Drivers** are specialized programs that allow devices such as mouse or keyboard to work with the rest of the system.
- **Device driver** or simply **driver** works with the operating system to allow communications between the device and the rest of the computer system.
- Each time the computer is booted, the OS loads all device drivers into *memory*.
- If a new device is added to computer system, you need to add the device driver to your computer before the device can be used.
- Microsoft Windows has wizards that can help in this process, such as the Windows Add Printer Wizard.
- Windows Update can help you to make sure you have all the latest versions of your device drivers.

F.Language Translators

- **Language translators** convert human-oriented *programming languages* to *machine language*.
- Computers can understand only a language of 0's and 1's called **machine language**.
- Since it is very difficult to write programs in machine language programs are written in programming languages that are similar to human languages and then they are translated into machine language by *language translators*.

G.Key Terms

Add a Printer Wizard	Microsoft Windows utility making it easy to install a new printer to your computer
antivirus utility	program that guards a computer system from viruses or other damaging programs
application	program, such as a word processor, a spreadsheet, or a specialized software program
Aqua	new user interface on the Apple Mac OS X operating system
background	programs that are running, but not currently utilized by the user, e.g. virus checker running in the backg while you type a paper
backup	making a copy of a file for safekeeping - most computers have backup utilities to copy files from a hard another medium
backup program	a system software utility that makes copies of files for safekeeping on an additional storage medium
booting	starting up a computer

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character based interface		a method a user can interact with a computer using keystrokes rather than mouse clicks e.g. the old D based interface
client operating system		aka desktop OS; the key system programs used on a stand alone computer, or a node on a network
cold boot		re-starting a computer after it has been "powered down"
computer virus		a rogue program often sent via the Internet that can damage a client or server computer
desktop		the main screen when you start up a GUI based operating system
desktop operating system		aka client OS; the key system programs used on a stand alone computer, or a node on a network
device driver		aka driver; one type of system software that standardizes the communication between a computer and peripheral equipment
diagnostic utility		a type of system software program that checks the performance of the system, and recommends how improve it.
dialog box		a window that requests additional input from the user, e.g. clicking File Open opens a dialog box reque the drive & folders
Disk Cleanup		a utility program that improves system performance by eliminating temporary files, esp. those make wh browsing the Web
Disk Defragmenter		a utility program that enhances disk performance by eliminating file fragments
Dock		a Mac OS feature to visually organize files
driver		aka device driver; one type of system software that standardizes the communication between a compu the peripheral equipment
embedded operating system		an OS "burned" onto a ROM chip for faster performance, typically found on handheld computing device
file		a collection of related data, programs or records on a computer
file compression utility		system software used to remove redundant bits from files, making the files smaller for easier storage a transport
folder		a grouping of files on a computer
foreground		the currently active program running on a computer is said to be "running in the foreground"
fragmented		files that are "broken up" when physically stored on a storage medium
graphical user interface	GUI	a method through which a user can interact with a computer using mouse clicks and visual cues rather just using keystrokes
Help		a feature to provide additional information about computing tasks to a user
icon		a small image used to represent a file or program on a computer
language translator		system software that translates a user created source file into an executable program the computer ca
Linux		an "open source" operating system that can run on both microcomputers and larger server computers
Luna		new user interface on the Windows XP operating system
Mac OS		a proprietary operating system that runs on Apple computers
Mac OS X		one of the versions of the Mac OS
menu		a choice of options for a particular software application
multitasking		running multiple programs at the same time on a computer
network operating system	NOS	a multiple computer operating system to enhance the sharing of data and computer systems across co computers
network server		the main computer on a network, it typically provides files and resources to the client computers on the network
nonproprietary operating system		an operating system that is NOT owned or licensed by any one company or organization
One Button Checkup		a feature of Norton Utilities that offers diagnostics with the click of "one button"
open source		a software licensing option in which many independent software developers can enhance the system
operating system		a key type of system software, it allows the computer to run apps, provide an interface, and manage re
platform		aka software environment; term used to describe the operating system used by a computer, e.g. it runs Linux platform
pointer		the cursor for a mouse as it appears on the screen
proprietary operating system		an operating system that IS owned or licensed by one company or organization

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resource	refers to the hardware attached to a computer system
sectors	pie shaped portions of a disk storage system, which files are stored on
service program	aka utility program; adds enhancements to a computer's operating system
Sherlock	a search feature on the Mac OS used to locate items on the local computer or the Web
software environment	aka platform; term used to describe the operating system used by a computer, e.g. it runs on a Linux p
software platform	aka environment; term used to describe the operating system used by a computer, e.g. it runs in a Linu environment
stand-alone operating system	aka desktop OS; the key system programs used on a stand alone computer, or a node on a network
Start menu	Windows OS feature that provides access to all programs, searching, etc.
system software	main programs serving as an interface between the computer hardware and the application programs
tracks	concentric circular portions of a disk storage system, which files are stored on
troubleshooting utility	a type of system software program that checks the performance of the system, and recommends how t improve it.
uninstall utility	system software program to remove un-needed programs from your computer
UNIX	an operating system originally designed for networked computer, it runs on a variety of hardware syste
user interface	the look and feel on how a user works with a computer
utility	aka utility program; adds enhancements to a computer's operating system
utility suite	a group of utility programs bundled together for marketing purposes
warm boot	restarting a computer without shutting it down completely (the power stays on)
window	a rectangular area that displays an application or dialog box in a Microsoft Windows GUI
Windows	Microsoft's operating system product
Windows Update	a utility that checks to see if all the drivers are current
Windows XP	one of the versions of Microsoft's OS

H.Chapter Review

1.Crossword

a)Across

FOLDER	Location to store related files
BOOTING	Starting or restarting a computer
FRAGMENTED	Broken up file stored in different sectors
GUI	Uses graphical elements to communicate with the operating system
NETWORK	Server that coordinates all communication between other computers
FOREGROUND	Place where current programs run
UTILITYSUITE	Combination of several utility programs in one package
NOS	Used to control and coordinate networked computers

b)Down

DRIVER	Allows communication between devices and the operating system
WARM	Boot that occurs when the computer is already on
OPENSOURCE	Nonproprietary operating system
BACKUP	Program that makes copies of files in case of damage or loss
UTILITY	Also known as a service program
WINDOWS	Operating system with over 80% of the market
TRACK	Concentric ring on a disk
OSX	Latest version of Macintosh operating system

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2.Multiple Choice

1	B	utilities
2	A	Machine language – NOTE: this is not described in Ch5 – only briefly mentioned on page 122
3	A	Booting
4	E	Stand-alone operating systems
5	E	Help
6	C	Unix
7	E	Uninstall program
8	B	Fragmented
9	D	Disk defragmenter
10	D	Utility suite

3.Matching

utilities	T	Software that deals with the complexities of computer hardware
operating systems	P	Programs that coordinate computer resources
track	S	Concentric ring on a disk
sector	R	Wedge-shaped section
foreground	G	Where the active program runs
icons	I	Graphic elements that represent commonly used features
multitasking	L	A computer's ability to run more that one application at a time
embedded OS	D	Operating systems completely stored within ROM memory
NOS (network operating system)	M	Operating system used to control and coordinate computers that are linked together
open source	O	Operating system whose code is made available to outside individuals for improvements
network server	N	A computer that coordinates all communication between other computers
desktop OS	C	An operating system located on a single stand-alone hard disk
Mac OS	K	Operating system used by Macintosh computers
GUI	H	Uses graphical elements like icons
folders	F	Along with files, a component of the system that Windows stores information in
Linux	J	One popular, and free, version of the UNIX operating system
proprietary OS	Q	Operating system owned and operated by a company
antivirus program	A	Guards computer systems against damaging and invasive programs
backup program	B	Makes copies of files to be used if originals are lost or damaged
file compression program	E	Program that reduces the size of files for efficient storage

4.Open-ended

a)Describe system software. What are the four types of system programs?

- System software is the "background" software that enables application software to interact with the computer.
- It consists of operating systems, utilities, device drivers, and language translators

b)What are the basic functions of every operating system? What are the three basic operating system categories?

- Operating system software interacts between the application software and the computer hardware, handling such details as running programs, storing and processing data, and coordinating all computer resources including attached peripheral devices.
- These functions can be classified into three groups: managing computer resources, providing a user interface, and running applications.

c)Explain the differences and similarities between Windows, Mac OS, and Linux.

- All three are popular operating systems
- Mac OS runs on proprietary Apple hardware, Windows runs primarily on Intel based CPU systems, while Linux is used on a number of different system
- Linux is different in that it is an "open source" system

d)Discuss utilities. What are the five most essential utilities? What is a utility suite?

- Utilities add enhancements to standard operating systems.
- Typical utility functions help to improve storage performance, and protect the computer from viruses.
- Five important utilities include diagnostic, antivirus, uninstall, backup, and file compression functions.
- A Utility suite bundles several individual utility programs for marketing purposes.

e)Explain the role of device drivers. Discuss the Add Printer Wizard and Windows Update.

- Device drivers allow the system to communicate with the peripheral devices, for example, a printer driver
- The Microsoft Windows "Add Printer Wizard" eases the installation of a new printer with it's appropriate driver software
- The Microsoft Windows Update utility checks all the device drivers on the system to see if they are current. If not, it allows the user to select the most current drivers and install them on the system

II.Concept Checks at a glance

A.Ch 3

1.What is system software? What are the four kinds of system software programs?

- System software is a collection of programs that handle the technical details of running the hardware
- Four kinds of system software programs include:
- Operating systems – coordinate resources, provide a user interface
- Utilities – add additional features such as virus protection
- Device drivers – create a standard method for connecting devices such as printers
- Language translators – convert a computer program's source code into the binary language the computer understands

2.What is an operating system? Discuss operating system functions and features.

- An operating system is a collection of programs that handles many of the technical details related to using a computer, such as resource allocation, etc.
- OS Functions include: managing resources, providing a user interface, and running applications.
- OS Features include: booting (starting) the computer, GUI's with icons, pointers (cursors), windows, menus, dialog boxes, and help.

3.Describe each of the three categories of operating systems

- Embedded Operating Systems: built right into the device, e.g. the Palm OS on a Palm PDA device or Windows CE.
- Network Operating Systems: designed to run a network of computers – typically have a server version which controls all the network operations, and a client version for each device attached to the network. An example is Microsoft Windows XP Server
- Stand-alone (or desktop) operating systems: designed to run on a single computer or as a client on a network. Examples include Microsoft Windows XP Home Edition or Mac OS X

B.Ch 3 3 3

1.What is Windows? What is Luna? How is it different from the classic interface?

- Windows is Microsoft's market leading operating system
- As of 2004, the current version is Microsoft Windows XP
- You may want to reference Microsoft's website for operating systems at http://www.microsoft.com/windows/default.mspx

- Luna is the "code name" for the Windows XP interface. It differs from the "classic" windows interface in that it focuses on functions (e-mail) over programs (Outlook).

2.What is Mac OS? What is Aqua? Dock? Sherlock?

- This is Apple Computer's desktop operating system.
- As of 2004, the current version is Mac OS X version 10.3 Panther
- You may want to reference Apple Computer's Mac website at http://www.apple.com/software/
- Aqua is the name for the interface to the Mac OS
- Dock is a tool used to visually organize files on the Mac OS system.
- Sherlock is a search tool used on the Mac OS system

3.What is UNIX? What is Linux?

- UNIX is an operating system originally designed to run on minicomputers in networked environments, but now is used by powerful microcomputers and servers on the web.
- Linux is an open source operating system similar to UNIX. It is typically used on both microcomputers and servers, and is a powerful alternative to the Windows operating system.

C.Ch 3

1.What is the difference between a utility and a utility suite?

- A utility is just one program or application used to enhance a computers performance, e.g. Norton Antivirus
- A utility suite is a group of commonly used utilities, packaged so the cost of the suite is less than buying each utility separately. An example is the Norton SystemWorks suite.

2.Describe Backup, Disk Cleanup, and Disk Defragmenter?

- Backup, Disk Cleanup, and Disk Defragmenter are typical utilities found on the MS Windows system tools utilities:
- Backup will copy files to another storage medium to help recover from disk failures
- Disk Cleanup will remove unnecessary temporary files used when browsing the Web
- Disk Defragmenter can improve disk performance by removing file fragments from a hard drive.

3.What are computer viruses? How can you protect yourself against them?

- Computer Viruses are rogue programs that can damage your computer, e.g. deleting or renaming files, generating unwanted email, etc.

- You can help to protect yourself and other from computer viruses by using an updated version of antivirus software package like Norton Antivirus; avoid opening unfamiliar files, adding a personal firewall, etc.
- Common packages include Macromedia Director and Authorware.

D.Ch 3

1.What are device drivers?

- System programs that allow devices to communicate with your computer, e.g. printer drivers

2.What does the Windows Add Printer Wizard do?

- This wizard will allow you to search for the appropriate device driver to load onto your computer so you can use a new printer.

3.What is Windows Update? When would you use it?

- This utility will search for any updated device driver software in order to improve the performance of your computer.
- Occasionally, companies will update their driver software to fix bugs or problems in older versions.