System Software

Computer Software

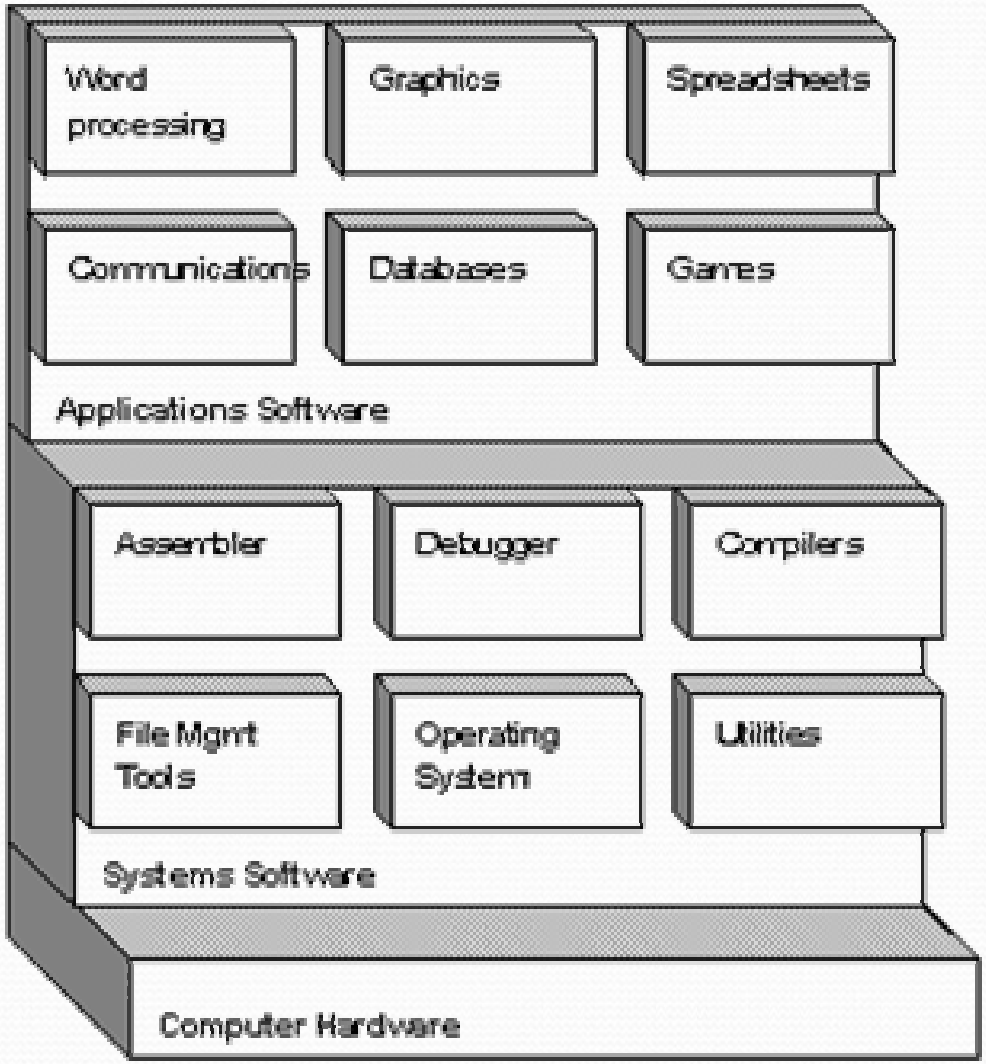
- A computer contains two major sets of tools, software and hardware.
- Software is generally divided into **Systems software** and **Applications software**.
- **Systems software** provides infrastructure for application software which consists of operating system and utility software such as compilers, loaders, linkers, and debuggers.
- **Applications software** comprises of programs designed for an end user, such as word processors, database systems, and spreadsheet programs.

System Software

What is System software?

- System Software is a computer software designed to operate the computer hardware and to provide and maintain a platform for running application software

- System software refers to the files and programs that make up your computer's operating system. System files include libraries of functions, system services, drivers for printers and other hardware, system preferences, and other configuration files.



COMPUTER SOFTWARE DESIGN LAYOUT

- The most basic types of system software are:
  - BIOS
  - Device driver
  - Operating system
  - Utility software
  - Compilers
  - Interpreters
  - Assemblers
  - Debugger

Device driver

- Provides basic functionality to operate and control the hardware connected to or built into the computer.

Operating system

- Allows the parts of a computer to work together by performing tasks like transferring data between memory and disks or rendering output onto a display device.
- It also provides a platform to run high-level system software and application software.

Utility software

- Helps to analyze, configure, optimize and maintain the computer.
- Examples are disk cleaners, anti virus softwares, data compression programs, disk drive partition utilities, storage, backup and archiving programs.

Interpreters

- Analyzes and executes each line of source code in succession, without looking at the entire program. Interpreters can execute a program immediately.

Compilers

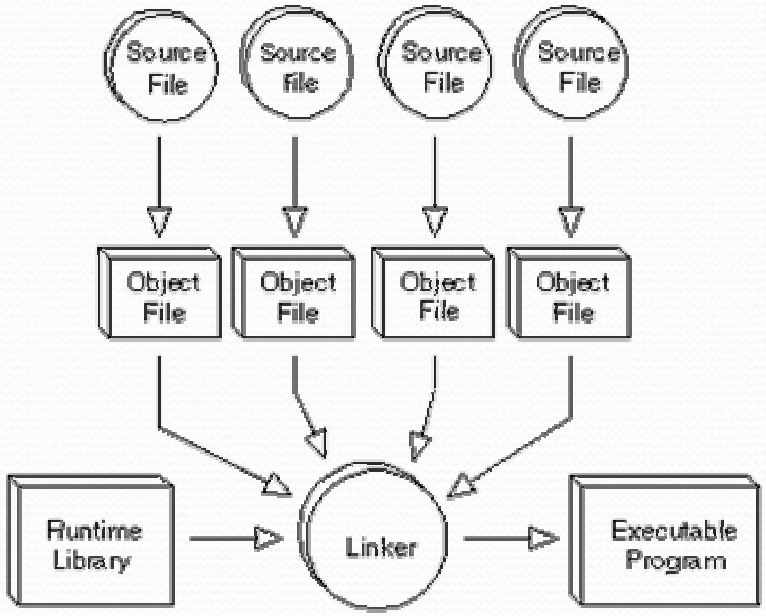
- A program that translates *source code* into *object code*. Compiler looks at the entire piece of source code , collects and reorganizes the instructions.
- Compilers require some time before an executable program emerges.
- Programs produced by compilers run much faster than the same programs executed by an interpreter.

Assemblers / Debugger

- A special program used to find errors (*bugs*) in other programs. A debugger allows a programmer to stop a program at any point and examine and change the values of variables.

Linkers

- Also called *link editor* and *binder,* a linker is a program that combines object modules to form an executable program.
- Many programming languages allow you to write different pieces of code, called *modules*, separately. This simplifies the programming task because you can break a large program into small, more manageable pieces. Eventually, though, you need to put all the modules together. This is the job of the linker.



Loaders

- An operating system utility that copies programs from a storage device to main memory, where they can be executed.
- In addition to copying a program into main memory, the loader can also replace virtual addresses with physical addresses.

HARDWARE LAB ACTIVITY 2

- Find the nearest Motherboard
- Identify:
  - Motherboard brand and model.
  - Hard disk IDE or SATA connector.
  - ATX Motherboard power connector.
  - Network Interface Card (NIC)Chipset and brand.
  - VGA Built-in chipset and brand.

Application Software

What is application software?

- Application software (also called **end-user programs**) includes database programs, word processors, and spreadsheets.
- Application programs interact with systems software, systems software then directs computer hardware to perform the necessary tasks.
- Figuratively speaking, applications software sits on top of systems software because it is **unable to run without the operating system and system utilities**.

Types of application software for modern usage:

- Application software often includes multiple applications bundled together as a package or suite, like Microsoft Office or OpenOffice which both contain a suite of applications for common office usage. There are many types of applications software.

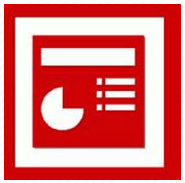
- ***Word Processing Software***
  - This software enables the users to create and edit documents.
  - The most popular examples of this type of software are MS-Word, WordPad, Notepad and some other text editors.

- ***Database Software***
  - Database is a structured collection of data. A computer database relies on database software to organize the data and enable the database users to achieve database operations.
  - Database software allows the users to store and retrieve data from databases.
  - Examples are ORACLE, Microsoft Access, etc.

- ***Spreadsheet Software***
  - Spreadsheet software allows users to perform calculations. They simulate paper worksheets by displaying multiple cells that make up a grid.
  - Examples of spreadsheet software are Excel, Lotus 1-2-3 and Apple Numbers.

- ***Multimedia Software***
  - A software that allow the users to create and play audio and video media.
  - The software are capable of playing media files. Audio converters, players, burners, video encoders and decoders are some forms of multimedia sof
  - Examples of this type of software include Real Player and Media Player.

- ***Presentation Software***
  - A software that is used to display information in the form of a slide show is known as presentation software.
  - This type of software includes three functions, namely, editing that allows insertion and formatting of text, methods to include graphics in the text and a functionality of executing the slide shows.
  - Microsoft PowerPoint is the best example of presentation software.



- ***Enterprise software***
  - A software which addresses the needs of organization processes and data flow often in a large distributed environment.
  - Examples include financial systems, customer relationship management (CRM) system.

- ***Information worker software***
  - A software which addresses the needs of individuals to create and manage information, often for individual projects within a department, in contrast to enterprise management.
  - Examples include time management, resource management, documentation tools, analytical, and collaborative.

- ***Content access software***
  - A software used primarily to access content without editing.
  - Examples include Media Players, Web Browsers, Help browsers, and Games

- ***Educational software***
  - It has the capabilities of running tests and tracking progress. It also has the capabilities of collaborative software.
  - It is often used in teaching and self-learning.

- ***Simulation software***
  - Computer software for simulation of physical or abstract systems for either research, training or entertainment purposes.
  - Examples are flight simulators and scientific simulator

- ***Media development software***
  - A software which addresses the needs of individuals who generate print and electronic media for others to consume, most often in a commercial or educational setting.
  - Examples are Graphic Art software, Desktop Publishing software, Multimedia Development software, HTML editors, Digital Animation editors, Digital Audio and Video composition, and many others.

Operating System

- An **operating system (OS)** is a software, consisting of programs and data, that runs on computers, manages computer hardware resources, and provides common services for execution of various application software.
- The operating system is the most important type of **system software** in a computer system.
- Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.
- The operating system is also responsible for security, ensuring that unauthorized users do not access the system.*

WHAT is the OS of your computer? How do you check it?

How about mobile phones?

Major Operating System for personal computers

- **Microsoft Windows**

  Microsoft Windows is a family of proprietary operating systems most commonly used on personal computers. It is the most common family of operating systems for the personal computer, with about 90% of the market share.*

  - **Windows XP Professional**
    This is built upon the Windows 2000 architecture and ideal for business and advanced home computing.

  - **Windows XP Home**
    An upgrade to Windows ME incorporating some of the features and functionality of Windows XP Professional.

  - **Windows 98**
  - The replacement for Windows 95. Supports new advancements such as USB, and MMX (Multimedia Instructions) which integrated text, video, graphics and sound.

  - **Windows 95**
    Introduced several improvements and advances that included applications to run much faster if written for Windows 95, and support of the mouse as a new interface.

- **Windows 2000**
  This is built upon the Windows NT architecture and the best choice for most business uses. This is **NOT** an upgrade of Windows 98.

- **Windows ME**
  Designed for home use, and is the logical step for Windows 98 users. Windows Millennium Edition is a stand alone operating system unlike Windows 3.1, Windows 95 and Windows 98 that were built on TOP of DOS. ME operating system includes new system safeguards such as "System Restore" and improved help functions when troubleshooting.

- **Windows 7**
  The latest release of the Windows client operating system, built on the secure foundation of Windows Vista and Windows Server 2008.

  All the new innovations in this operating system are meant to enhance user's capability as an IT professional to better provision and manage increasingly mobile PCs, to protect data, and to improve end-user and personal productivity.*

What is the correct order of Windows version?

Windows 3.1, 95, 98, ME, 2000, XP, Vista and 7.

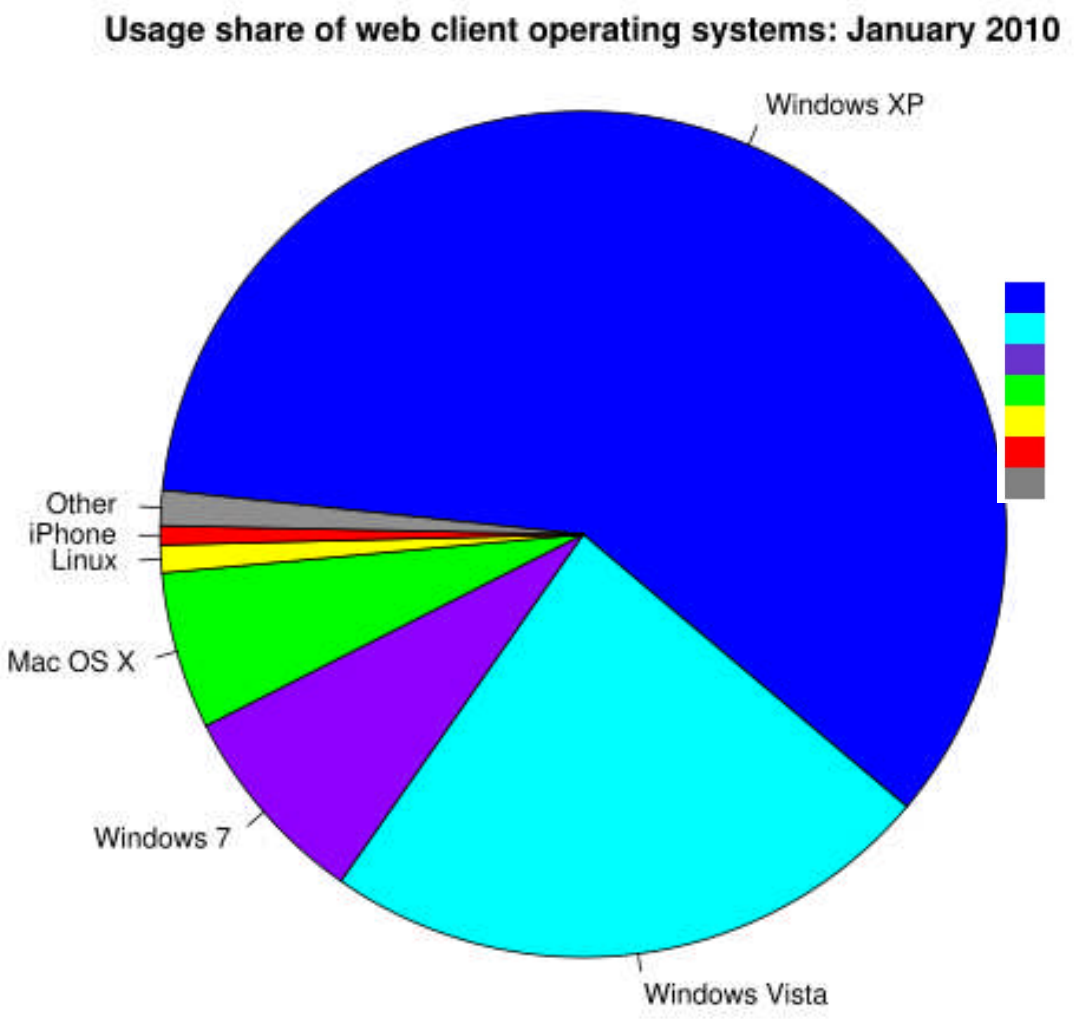
- **Mac OS**
  - Mac OS is a series of graphical user interface-based operating systems developed by Apple Inc. (formerly Apple Computer, Inc.) for their Macintosh line of computer systems.
  - It is a multitasking operating system that was the first graphical interface to achieve commercial success.
  - The current version is Mac OS X, which is version 10. Since January 2002, all new Mac computers use Mac OS X. Subversions are named Jaguar, Panther, Tiger, Leopard.

    Most statistics show that Mac are making a comeback (Feb. 2010 - see chart at bottom of page), but the total usage is still low compared to the total number of Windows systems.

- **UNIX**
  - Unix is an operating system developed by Bell Labs to handle complex scientific applications.
  - University networks are likely to use UNIX, as are Internet Service Providers.
  - Many computer old-timers love UNIX and its command line interface. But all those commands are not easy to remember for newcomers.
  - X-Windows is a graphical interface for UNIX that some think is even easier to work with than Windows 98.

- **LINUX**
  - Linux is an operating system similar to UNIX that is becoming more and more popular.
  - It is a **open-source** program created by Linus Torvalds at the University of Finland, starting in 1991.
  - Open source means that the underlying computer code is **freely available to everyone.**
  - Programmers can work directly with the code and add features. They can sell their customized version of Linux, as long as the source code is still open to others.

- The pie chart below shows statistics on operating systems as of January 2010.



Usage share of web client operating systems.
Source: Median values from **Usage share of operating systems.**

Windows XP (58.64%)
Windows Vista (23.25%)
Windows 7 (7.70%)
Mac OS X (5.12%)
Linux (1.04%)
iPhone (0.72%)
Other (1.32%)

Functions of an operating system

1. ***Processor management***

   Assignment of processor to different tasks being performed by the computer system.

2. ***Memory management***

   Allocation of main memory and other storage areas to the system programs as well as user programs and data.

3. ***Input/output management***

   Co-ordination and assignment of the different output and input device while one or more programs are being executed.

4. ***File management***

   Ensures that files in secondary storage are available when needed. Manages reading and writing in the file system and they are protected from access by unauthorized users.

5. ***Establishment and enforcement of a priority system***

   Determines and maintains the order in which jobs are to be executed in the computer system.

5. ***Networking capability***
   - Features and capabilities of the OS that aid users in connecting to a computer network
6. ***Access to system resources and security***
   - Protection against unauthorized access
   - Logins and passwords
7. ***User Interface***
   - **User interface:** allows individuals to access and command the computer system
   - **Command-based user interface:** requires that text commands be given to the computer to perform basic activities
   - **Graphical User Interface (GUI):** uses icons and menus displayed on screen to send commands to the computer system

The most important characteristics of operating systems are:

- **Single stream:** programs and data were submitted in groups or batches
- **Multi-user :** A multi-user operating system allows for multiple users to use the same computer at the same time and different times. Some examples of multi-user operating systems: Linux, Unix, Windows 2000
- **Multitasking :** An operating system that is capable of allowing multiple software processes to run at the same time. Examples of multitasking operating systems: Unix, Windows 2000
- **Multithreading :** Allows different parts of a single program to run concurrently. Examples are: Linux, Unix, Windows 2000

EXERCISE 2 – System and Application Software

- What is a BIOS and its function?

- From the list below, identify which software is Application software and which is System Software? And Why?
  - MS Access, NVidia graphic driver, Norton Antivirus, Acer System Management Utility, Internet Explorer, CounterStrike, Email Servers, Customer Relationship Management (CRM) system, Linux Ubuntu, RealMedia Player.