System Software and Application Software

A overview of Software Tools

Software

- The software is a bunch of related programs.
- Software is lifeline of hardware
- Software can be engineered as Hardware
- Programmers make them as per requirement
- Software can be divided into two categories:
  - System Software
  - Application Software

Two Types of Software

- Application Software

- System Software

Application Software

- Programs that work with operating system software to help the computer to do specific types of work.
- There are six basic types of application software...

Application Software

1. Business software: word processors, spreadsheets, and database programs.
2. Communication software: allows computers to communicate with other computers: fax software, Novell NetWare, AOL, Modem Software.
3. Graphics software: software that allows users to create and manipulate graphics...Photoshop, Print Shop, etc.

Application Software

4. Education and Reference Software: Programs that help teach new material and ideas, and programs that can be used to find information...Encarta, Worldbook Encyclopedia, Jumpstart Kindergarten, MicroType.
5. Entertainment and Leisure Software... Warcraft, Age of Empires, Barbie Design Center, Pacman, Solitair, Candy Crush, Teen Patti
6. Integrated Software: Combines several types of software into one program or package...Quicken (Spreadsheet/data base/communications/reference) or Print Shop (Graphics/Word processor), MS-Office.

Operating System Software

- Directs all the activities and sets all the rules for how the hardware and software will work together.

Examples would be:

DOS, Windows 95, 98, ME, NT, XP, Vista, Windows 7, Windows 8, Windows 10.

Unix, Linux,

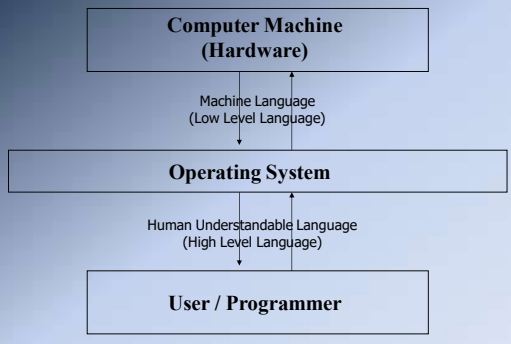
MAC system OS 6,7,8,9,10

Definition

- An **Operating system (OS)** is a software which acts as an interface between the end user and computer hardware.
- Every computer must have at least one OS to run other programs.
- An application like Chrome, MS Word, Games, etc needs some environment in which it will run and perform its task.
- The OS helps you to communicate with the computer without knowing how to speak the computer's language.

Features

- Protected and supervisor mode
- Allows disk access and file systems Device drivers Networking Security
- Program Execution
- Memory management Virtual Memory Multitasking
- Handling I/O operations
- Manipulation of the file system
- Error Detection and handling
- Resource allocation
- Information and Resource Protection



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Functions

- **Process management**:- Process management helps OS to create and delete processes. It also provides mechanisms for synchronization and communication among processes.
- **Memory management:-** Memory management module performs the task of allocation and de-allocation of memory space to programs in need of this resources.
- **File management**:- It manages all the file-related activities such as organization storage, retrieval, naming, sharing, and protection of files.

Functions (Continued...)

- **Device Management**: Device management keeps tracks of all devices. This module also responsible for this task is known as the I/O controller. It also performs the task of allocation and de-allocation of the devices.
- **I/O System Management:** One of the main objects of any OS is to hide the peculiarities of that hardware devices from the user.
- **Secondary-Storage Management**: Systems have several levels of storage which includes primary storage, secondary storage, and cache storage. Instructions and data must be stored in primary storage or cache so that a running program can reference it.

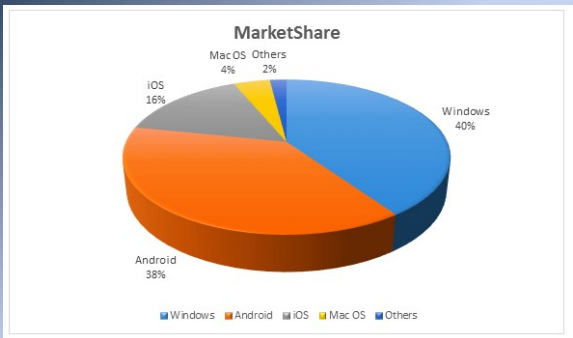
Functions (Continued...)

- **Security**:- Security module protects the data and information of a computer system against malware threat and authorized access.
- **Command interpretation**: This module is interpreting commands given by the and acting system resources to process that commands.
- **Networking:** A distributed system is a group of processors which do not share memory, hardware devices, or a clock. The processors communicate with one another through the network.

Functions (Continued...)

- **Job accounting**: Keeping track of time & resource used by various job and users.
- **Communication management**: Coordination and assignment of compilers, interpreters, and another software resource of the various users of the computer systems.

OS Market Share



Other Source: https://www.youtube.com/watch?v=oviBftxAnBw
https://www.youtube.com/watch?v=xe9XhLM7UaM

Types of Operating Systems

- Batch Operating System
- Multitasking/Time Sharing OS
- Multiprocessing OS
- Real Time OS
- Distributed OS
- Network OS
- Mobile OS

Advantages

- Allows you to hide details of hardware by creating an abstraction
- Easy to use with a GUI
- Offers an environment in which a user may execute programs/applications
- The operating system must make sure that the computer system convenient to use
- Operating System acts as an intermediary among applications and the hardware components
- It provides the computer system resources with easy to use format
- Acts as an intermediate unit between all hardware's and software's of the system

Disadvantages

- If any issue occurs in OS, you may lose all the contents which have been stored in your system
- Operating system's software is quite expensive for small size organization which adds burden on them. Example Windows
- It is never entirely secure as a threat can occur at any time

A Second Classification

This Classification is based on the type of interface Operating System provides for the user to work in.

✓Character User Interface (CUI) OR Command Line Interface (CLI)

The User has to type the commands on the command prompt to get the work completed.

Ex. DOS, UNIX.

✓Graphical User Interface (GUI)

The User need not type any commands. He/She just point and clicks on the desired Icon to get the work done.

Ex. Windows (9X, XP, NT, 2000), Linux.

Command Line Operating Systems

DOS is an example of a command line operating system.

On the next slide, Notice that there are no:

- Icons (pictures)
- Colors
- Mouse Pointer
- Buttons
- You have to memorize commands in order to use this text based operating system.

```
               2 File(s)      5,505,067 bytes
              26 Dir(s)  388,959,109,120 bytes free

C:\Users\Asus>dir /w
 Volume in drive C is OS
 Volume Serial Number is 62BD-F11E

 Directory of C:\Users\Asus

[.]             [..]            [.anaconda]     [.conda]        .condarc        [.ipython]      [.jupyter]
[.matplotlib]   [.nuget]        [.spyder-py3]   [.VirtualBox]   [3D Objects]    [Anaconda3]     [Contacts]
[Desktop]       [Documents]     [Downloads]     [Favorites]     [Google Drive]  [Links]         [Music]
NTUSER.DAT      [OneDrive]      [Pictures]      [Saved Games]   [Searches]      [Videos]        [VirtualBox VMs]
               2 File(s)      5,505,067 bytes
              26 Dir(s)  388,959,100,928 bytes free

C:\Users\Asus>MD PAL

C:\Users\Asus>CD PAL

C:\Users\Asus\PAL>cd..

C:\Users\Asus>rd Pal
```

Operating Systems: GUI

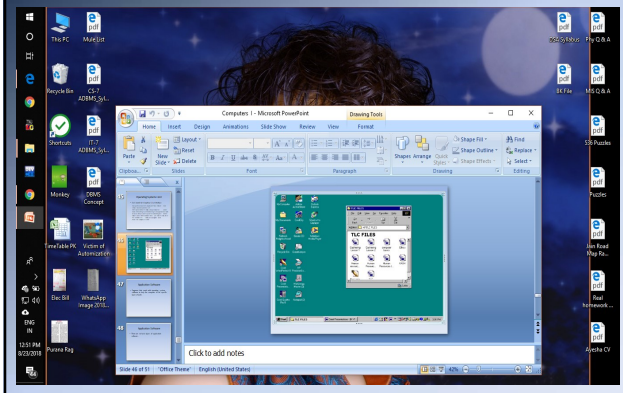
- GUI stands for Graphical User Interface

  Uses pictures (icons) to represent files, folders, disk drives, modems, printers, etc.
  GUI's were created to make using a computer easier, more interesting, non-threatening to inexperienced users.
  A mouse allows users to point at something and click to make it work. With command line you have to have all of the commands to make your programs work.
  Here is an example of a GUI

Windows 7: Introduction

- The desktop is the screen that displays once you have turned on the computer and responded to prompts for your user name and password. This is your workspace. It is where you manage tasks on the computer
- The taskbar provides you with access to the software applications, enables you to move between the applications, and gives you access to system resources. It is a horizontal bar that appears at the bottom of the screen.
- A window is a space on the desktop representing a program, system resource, or data. Multiple windows can be open at one time, Windows can be moved around the desktop, minimized to take up less space, and maximized to fill the desktop.
- Icons are small pictures that represent programs, files, folders, or other things on the desktop. Objects with the same characteristics, like file folders, have the same icon. Software icons are unique so that you can quickly find the software application.

Windows Desktop



Windows 7 Desktop

- Operating system
- Desktop
- Taskbar
- Window
- Icon

What is Linux?

- Linux is a Unix clone written from scratch by Linus Torvalds with assistance from a loosely-knit team of hackers across the Net.
- Unix is a multitasking, multi-user computer operating system originally developed in 1969 by a group of AT&T employees at Bell Labs.
- Linux and Unix strive to be POSIX compliant.
- 64% of the world's servers run some variant of Unix or Linux. The Android phone and the Kindle run Linux.

Linux Has Many Distributions

Android

An OS to hand held devices

The Players

- Android – Open source mobile OS developed ny the Open Handset Alliance led by Google. Based on Linux 2.6 kernel
- iOS – Apple's proprietary mobile OS, iPhone, iPod Touch, iPad. Derived from OS X, very UNIX like
- Symbian – acquired by Nokia 2008
- Windows Phone 7 – Microsoft – Kin, discontinued 6 weeks after initial launch
- Blackberry OS – RIM (Research in Motion), proprietary OS

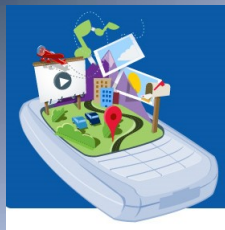
The Smartphone Platform

- With the iPhone being the first to the marketplace it sets the configuration of the Smartphone Platform
  - 3G/4G connectivity
  - WiFi connectivity
  - Bluetooth connectivity
  - accelerometer w/compass
  - ambient light sensor
  - proximity sensor
  - GPS
  - gyroscope

What is Android

- Android is an open source operating system, created by Google specifically for use on mobile devices (cell phones and tablets)
- Linux based (2.6 kernel)
- Can be programmed in C/C++ but most app development is done in Java (Java access to C Libraries via JNI (Java Native Interface))
- Supports Bluetooth, Wi-Fi, and 3G and 4G networking

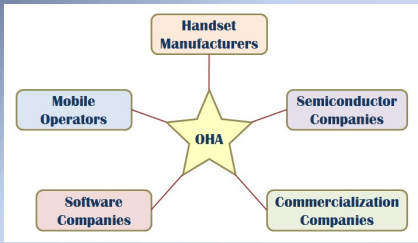
What is Android?



- Android is a software stack for mobile devices that includes an operating system, middleware and key applications.

OHA (Open Handset Alliance)

- A business alliance consisting of 47 companies to develop open standards for mobile devices



Brief History

- 1996
  - The WWW already had websites with color and images
  - But, the best phones displayed a couple of lines of monochrome text!
  - Enter:
    - Wireless Application Protocol (WAP) – stripped down HTTP for bandwidth reduction
    - Wireless Markup Language (WML) – stripped down HTML for content

Brief History

- Many issues (WAP = "Wait And Pay")
  - Few developers to produce content (it wasn't fun!)
  - Really hard to type in URLs using the small keyboards
  - Data fees frightfully expensive
  - No billing mechanism – content difficult to monetize
- Other platforms emerged
  - Palm OS, Blackberry OS, J2ME, Symbian (Nokia), BREW, OS X iPhone, Windows Mobile

Brief History - Android

- 2005
  - Google acquires startup Android Inc. to start Android platform
  - Work on Dalvik VM begins
- 2007
  - Open Handset Alliance announced
  - Early look at SDK
- 2008
  - Google sponsors 1st Android Developer Challenge
  - T-Mobile G1 announced
  - SDK 1.0 released
  - Android released open source (Apache License)
  - Android Dev Phone 1 released

Brief History cont.

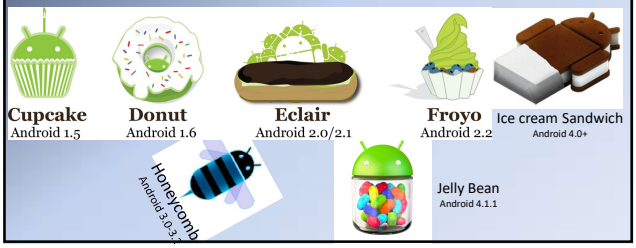
- 2009
  - SDK 1.5 (Cupcake)
    - New soft keyboard with "autocomplete" feature
  - SDK 1.6 (Donut)
    - Support Wide VGA
  - SDK 2.0/2.0.1/2.1 (Eclair)
    - Revamped UI, browser
- 2010
  - Nexus One released to the public
  - SDK 2.2 (Froyo)
    - Flash support, tethering
  - SDK 2.3 (Gingerbread)
    - UI update, system-wide copy-paste

Brief History cont.

- 2011
  - SDK 3.x (Honeycomb)
    - Optimized for tablet support
  - SDK 4.0 (Ice Cream Sandwich)
    - Virtual UI buttons
- 2012
  - SDK 4.1.1 (Jelly Bean)
    - Triple buffered graphics pipeline

Brief History cont.

- 2011
  - SDK 3.0/3.1/3.2 (Honeycomb) for tablets only
    - New UI for tablets, support multi-core processors
  - SDK 4.0/4.0.1/4.0.2/4.0.3 (Ice Cream Sandwich)
    - Changes to the UI, Voice input, NFC



Code name	Version numbers	Initial release date	API level
No codename	1.0	September 23, 2008	1
Petit Four (only internally used)	1.1	February 9, 2009	2
Cupcake	1.5	April 27, 2009	3
Donut	1.6	September 15, 2009	4
Eclair	2.0 – 2.1	October 26, 2009	5 – 7
Froyo	2.2 – 2.2.3	May 20, 2010	8
Gingerbread	2.3 – 2.3.7	December 6, 2010	9 – 10
Honeycomb	3.0 – 3.2.6	February 22, 2011	11 – 13
Ice Cream Sandwich	4.0 – 4.0.4	October 18, 2011	14 – 15
Jelly Bean	4.1 – 4.3.1	July 9, 2012	16 – 18
KitKat	4.4 – 4.4.4	October 31, 2013	19 – 20
Lollipop	5.0 – 5.1.1	November 12, 2014	21 – 22
Marshmallow	6.0 – 6.0.1	October 5, 2015	23
Nougat	7.0	August 22, 2016	24
	7.1.1 – 7.1.2	December 5, 2016	25
Oreo	8.0 – 8.1	August 21, 2017	26 – 27
Pie	9.0	August 6, 2018	28
Android 10	**10.0**	September 3, 2019	29

What is Google Android?

- A software stack for mobile devices that includes
  - An operating system
  - Middleware
  - Key Applications
- Uses Linux to provide core system services
  - Security
  - Memory management
  - Process management
  - Power management
  - Hardware drivers

Mobile Devices: Advantages

- Always with the user
- Typically have Internet access
- Typically GPS enabled
- Typically have accelerometer & compass
- Most have cameras & microphones
- Many apps are free or low-cost

Mobile Devices: Disadvantages

- Limited screen size
- Limited battery life
- Limited processor speed
- Limited and sometimes slow network access
- Limited or awkward input: soft keyboard, phone keypad, touch screen, or stylus
- Limited web browser functionality
- Range of platforms & configurations across devices

Mobile Applications

- What are they?
  - Any application that runs on a mobile device
- Types
  - Web apps: run in a web browser
    - HTML, JavaScript, Flash, server-side components, etc.
  - Native: compiled binaries for the device
    - Often make use of web services

Android Apps

- Built using Java and new SDK libraries
  - No support for some Java libraries like Swing & AWT
- Java code compiled into Dalvik byte code (.dex)
  - Optimized for mobile devices (better memory management, battery utilization, etc.)
- Dalvik VM runs .dex files

Android Devices Types

- Various Android Phones
- Note Pad
- Tablet
- Watch
- Android Powered: TV/Camera/Car Radio/PC
- Android Powered: Washing Machine/Microwave/ Refrigerator

Query Session

Its all about we discussed earlier ...

OR

Something punching you in Mind …