

# Comp 100

## Lecture Notes

### Chapter 5

Screen Capture  
Snipping

PrtScr  
Windows 7 : Start → All Programs → Accessories  
Windows & Mac : [www.techsmith.com/jing](http://www.techsmith.com/jing)

#### Operating Systems

- Real-Time Operating Systems execute specified tasks within an exact limit of time designed for specific devices  
no commercially available standard RTOS
- Embedded Real-Time Operating Systems RTOS burned into a ROM chip

Aircraft, Nuclear Reactors, Scientific Equipment, Orbital Satellites, Fuel-Injection Systems, inkjet & laser printers, electronic thermostats, microwave ovens, washing machines, clothes dryers, digital cable TV systems, robotic equipment

- Network Operating Systems
  - Multiuser Operating System
  - Client-Server Operating System

Microsoft Windows & Mac OS/X both allow users to establish small networks for use in homes or small businesses

- Unix Operating Systems  
multiuser, multitasking network operating system [http://en.wikipedia.org/wiki/UNIX\\_System\\_V](http://en.wikipedia.org/wiki/UNIX_System_V)  
brand name is currently owned by The Open Group [http://en.wikipedia.org/wiki/The\\_Open\\_Group](http://en.wikipedia.org/wiki/The_Open_Group)  
any vendor that
  - meets the testing requirements &
  - pays a feecan use the Unix name and modify the Unix code to run on their hardware  
[www.unix.org/trademark.html](http://www.unix.org/trademark.html)  
[www.en.wikipedia.org/wiki/Unix](http://en.wikipedia.org/wiki/Unix)

e.g., HP/UX – Hewlett-Packard  
Solaris – Sun  
AIX – IBM  
[Mac OS X v10.5](http://en.wikipedia.org/wiki/Mac_OS_X_v10.5) "Leopard" gained [UNIX 03](http://en.wikipedia.org/wiki/UNIX_03) certification while running on [Intel](http://en.wikipedia.org/wiki/Intel) processors.  
[http://en.wikipedia.org/wiki/Mac\\_OS\\_X](http://en.wikipedia.org/wiki/Mac_OS_X)  
[http://en.wikipedia.org/wiki/Macintosh\\_OS\\_X](http://en.wikipedia.org/wiki/Macintosh_OS_X)

For a full lists see of licensees, including Apple, see <http://www.opengroup.org/openbrand/register/>

- Mainframe Computers
  - Massive I/O Requirements
  - Minimal Computational Requirements
  - Responsible for
    - storing,
    - managing,
    - processing and
    - retrieving

Unix,  
IBM i [www.en.wikipedia.org/wiki/IBM\\_i](http://en.wikipedia.org/wiki/IBM_i),  
z/OS <http://en.wikipedia.org/wiki/Z/OS>  
<http://searchdatacenter.techtarget.com/definition/z-OS>

massive amounts of data from potentially numerous users

- **Supercomputers**
  - Minimal I/O Requirements
  - Massive Computational Requirements

Single computer with multiple processors  
Multiple computers connected together

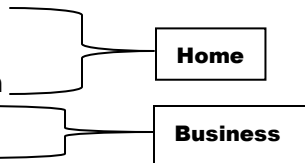
- **Mobile Devices**
  - Smartphones
    - productivity features
    - modest multitasking features

**Symbian by Nokia**  
<http://en.wikipedia.org/wiki/Symbian>  
**Blackberry by RIM**  
<http://en.wikipedia.org/wiki/BlackBerry>  
**Android by Google**  
[http://en.wikipedia.org/wiki/Android\\_%28operating\\_system%29](http://en.wikipedia.org/wiki/Android_%28operating_system%29)  
**Microsoft**  
[http://en.wikipedia.org/wiki/Windows\\_Mobile](http://en.wikipedia.org/wiki/Windows_Mobile)  
**iPhone OS X by Apple**  
<http://en.wikipedia.org/wiki/iOS>  
**webOS by Palm (Palm Pre)**  
<http://en.wikipedia.org/wiki/WebOS>

- Game Consoles & Personal Media Players
    - firmware – system software burned into a chip
    - operating systems support
      - ✓ web browsing
      - ✓ manage music files
      - ✓ rip audio CD's
      - ✓ file management of media & photos
      - ✓ DVD support
      - ✓ game playing

- **Microsoft Windows Operating System**

- MS-DOS
- Windows 95 (1995)
- Windows XP
- Windows Vista
- Windows 7
  - Starter
  - Home Basic
  - Home Premium
  - Professional
  - Enterprise
  - Ultimate -- combination ??



**RAM Memory ≤ 4 GB requires 32 bit version (Windows)**  
**Ram Memory > 4 GB requires 64 bit version (Windows)**

- **Mac Operating System**  
[http://en.wikipedia.org/wiki/Mac\\_OS\\_X](http://en.wikipedia.org/wiki/Mac_OS_X)
- **Platform – combination of processor & operating system**

- Linux – open source version of Unix developed by Linus Torvalds with Free Software Foundation GNU Project programmers [www.gnu.org](http://www.gnu.org)

- Android (Google) is Linux based
- open source distributors
  - Ubuntu
  - Fedora
  - Suse
  - Debian GNU/Linux
  - Gentoo Linux
- proprietary source distributors
  - Red Hat
  - [www.distrowatch.com](http://www.distrowatch.com)

**Web-Based Operating Systems**  
 Google Chrome Browser + Docs  
[www.eyeyeOS.org](http://www.eyeyeOS.org)

warning

[www.gogui.com](http://www.gogui.com) → <http://piev.com/>

- Operating System

- provides User Interface
  - command driven interface
  - menu driven interface
  - graphical user interface (GUI)

**Linux GUI choices**

- GNOME – select either Mac or Windows interface
- KDE

- manages CPU (central processing unit)
  - multitasking – timeslicing processes & timesharing CPU
  - device creates actions or **events**
  - single device creates **sequential events** or
  - multiple devices operating simultaneously create **concurrent events**
  - interrupts + interrupt handlers
  - interrupt table – storage location for multiple interrupts
  - operating system switches back and forth between processes responding to the timing of events produced by all the activities currently being managed
  - tasks are assigned relative priorities : some higher than others
  - **preemptive multitasking** -- o/s processes tasks with higher priorities before tasks with lower priorities
  - printer queues & printer daemons
- manages memory & storage
  - **O/S manages space allocation in RAM**
    - ✓ instructions must reside in RAM in order to be executed
    - ✓ data resides in RAM for convenience of execution
  - **Virtual Memory** -- optimizing space allocation in RAM by borrowing hard drive space and moving data &/or instructions from RAM to the hard drive
    - ✓ swapping -- swap file
    - ✓ pages – frames – blocks
    - ✓ excessive paging ↔ thrashing
  - **File Management System** –
    - ✓ name of every file stored
    - ✓ location of file on disk drive indexed by name
- provides security & protection
  - login id + passwords
  - schedules virus protection software execution times
  - provides backup & restore software

**Virtual Memory**  
**optimizing space allocation in RAM**  
**by borrowing hard drive space**

- manages peripheral equipment
  - **device driver** – translates device commands into file management commands and vice versa
  - Plug and Play (PnP)
  - [www.driverzone.com](http://www.driverzone.com)
  - [www.driverguide.com](http://www.driverguide.com)
  - Windows : Control Panel → System & Maintenance → Device Manager dialog box → Roll Back Driver
- enables communication
  - provides an environment for browsers, search engines, etc.
  - manages communication portal hardware & software
- Software Application Software

**Software**

**API code blocks**

**Hardware**

- **Application Programming Interface (API)**
- Microsoft DirectX
  - ✓ group of multimedia API's which improve graphics and sound
- **programmers need only refer to the API code blocks**; they don't have to write the code for each application program
- reduces programming workloads
- reduces redundant code
- provides for similar interface features, e.g., toolbars & menus
- makes it easier to share data between applications with similar interface features

- **Boot Process**

- **BIOS (ROM) chip** contains
  - the location of Operating System on the Disk Drive
  - instructions for
    - ✓ loading the Operating System into RAM and
    - ✓ turning control over to the O/S

Boot Process derives from Bootstrap Loader, i.e., a small program that is used to start a larger program

**Bios handles all data exchanges between the O/S and all input &/or output devices attached to the system**

- Bootstrap Process
  1. Turning on the power to the CPU activates **the BIOS chip, i.e., the Basic Input/Output system**
  2. BIOS activates the **Power-On-Self-Test (POST)** which checks that all attached devices are in place and ready for action
  3. **BIOS locates and loads the O/S into RAM**
  4. **Configuration & Customization settings** are checked
  5. Control is turned over to the O/S

**Bios POST Tasks**

- **Video Card Test**
- **Video Memory Test**
- **BIOS Identification Process**
  - Google “BIOS Identification ‘Windows 7’ ” for list of BIOS problems
- **Memory Test**
- **Peripheral Equipment Tests**
- **Compare results of POST to hardware configurations stored in CMOS**
  - CMOS, i.e., complementary metal-oxide semiconductor, is a type of RAM memory that requires only a small battery to maintain its contents
  - If the results do not agree, you will be notified

- Loading the O/S
  - BIOS searches through a preconfigured list of devices for the drive that contains the O/S, when it is located the
  - BIOS loads a small section of the O/S from the disk into RAM and releases control to that code
  - the O/S section loads the **kernel** of the O/S from the disk into RAM
  - the kernel, i.e., supervisory program, is the essential component of the O/S; it remains **memory resident**, i.e., in the RAM, for the entire time that the system is operational (powered on)
  - the kernel assumes control of the O/S as soon as it is loaded into RAM
  - other portions of the O/S, i.e., **nonresident programs**, are copied into RAM as needed, e.g., program to send a document to the printer, when they are no longer essential, they are removed
- Registry
  - contains all the configurations (settings) used by the O/S and other applications, e.g., mouse speed,, display settings, program loading priorities, etc.
  - in the last phase of the boot process, the O/S checks the Registry for the configuration requirements of the other system components

**Login Name & Password  
Authentication**

- **Multiple Users on a Computer System**
- **Each User is provided an Account, i.e., a separate memory segment and storage location**
- **Authentication ↔ Verification of Login Name & Password**
- **used to protect your Account from access by another user**

- Boot Process Errors
  - Restart computer (see if error is repeated)
  - Determine if all equipment is properly connected, i.e., keyboard has lost its USB connection
  - Uninstall newly installed hardware, see  
(Control Panel → Add/Remove Programs feature)
  - Restart computer in Safe Mode (press F8 key during boot process)
  - Safe Mode
    - ✓ diagnostic mode, only essential devices are activated
    - ✓ graphics device driver is not activated
    - ✓ Device Manager is activated
  - Windows Advanced Operations Menu (press F8 during boot process)
    - ✓ Windows logs the configuration of every successful boot operation
    - ✓ **Last Known Good Configuration** allows you to restart the computer by using the registry information saved during the last good shutdown
  - When all other attempts fail, execute a System Restore
  - If that fails, rebuild your system

- **Windows Desktop Features**
  - **Recycle Bin** contain documents from the C drive only!  
documents deleted from other locations are permanently deleted
  - **Taskbar**
    - point to an icon → preview windows of open files
    - move mouse over thumbnail → preview full-screen image
    - right-click icon → view Jump List (most recently/commonly used files)
    - hover mouse over Taskbar icon → display thumbnails of open windows  
→ hover over a thumbnail → display contents of that window in full size
  - **Windows 7 Start Menu**
    - Documents Folder → ability to create subdirectories (subfolders)
    - Computer Icon → access to disk drives, computer system & network devices
    - All Programs → scrollbar to gain access to programs not visible
    - Instant search → to facilitate locating programs
- **File Management**
  - **Directory Structure**
    - ◆ **Drives – physical storage mechanism**
      - **Libraries – display of selected files from different folders**
        - **Folders (directories) – collection of files**
          - **Files -- collection of data items treated as a single unit**
  - **Drives**
    - **C drive – root directory → contains storage information on the entire File Management System**
      - ✓ contains System Software, e.g., O/S & utility files
      - ✓ contains major application programs
    - **A drive – traditionally reserved for a floppy drive  
now generally treated as nonexistent**
    - **B drive – can be used for a second hard drive unit**
    - **D, E, F, G, etc drives – used for DVD units, etc.**
  - **Special Folders**
    - Documents
    - Pictures
    - Music
    - Videos

Libraries are used to collect all files of a specified type, which may be physically stored in diverse folders, in a convenient location

❖ **Powerpoint files stored in Comp 100 folder, but also displayed in a Powerpoint Library**
  - **Windows Explorer**
  - **TIA page 230 table of file name extensions**
    - 2007/2010 files saved in XML format
    - 2003 files saved in text (ASCII) format
  - **File Names**
    - alphanumeric + extension
    - TIA page 231 figure 5.24

- **File Path**
  - Windows TIA page 232 figure 5.25
  - Unix
  - file separators
    - ✓ Windows \
    - ✓ Mac ;
    - ✓ Unix (Linux) /
- **File Manipulation**
  - open – double click → o/s uses file extension to determine which application needs to be started to open the file
  - copy
  - move
  - delete
    - ✓ C drive files → Recycle Bin; empty Recycle Bin will delete the files
    - ✓ All other files are permanently & immediately deleted
- **Utility Programs**
  - Firewalls
  - File Compression
    - ✓ lossy compression
      - compression by permanently discarding some data
      - original file cannot be restored
      - JPEG, GIF, PGN & MP3 files
    - ✓ lossless compression
      - compression by replacing repeated character patterns by a placeholder character
      - creating a dictionary table consisting of the placeholder characters and their associated character patterns
    - ✓ Windows : right-click file/folder, select **Send To**
  - Antivirus
  - Security
  - Norton SystemWorks Maintenance
  - TIA page 234 figure 5.27
  - Control Panel
  - **Start → All Programs → Accessories → System Tools**
  - Program Installation
    - ✓ Wizard Installation Software
    - ✓ **Control Panel → Programs → Programs and Features**
  - Program Deletion
    - ✓ **Control Panel → Programs → Uninstaller**
    - ✓ Program's Uninstaller
  - Recovering Permanently Deleted Files
    - ✓ reference to file has been deleted
    - ✓ file data remains until that area is written to by another program
    - ✓ Data Recovery Programs
      - Norton Ghost

- **System Maintenance**
  - ✓ **Disk Cleanup** removes unnecessary files from the system  
**Start → All Programs → Accessories → System Tools → Disk Cleanup**
  - ✓ **Disk Defragmenter**
    - A file may not be stored in one contiguous section of a disk drive; for access efficiency, it may be stored in segments scattered throughout the drive
    - Over time the file may be broken into such small segments that the system loses whatever efficiency it originally had and if the situation is not corrected, efficiency will continue to deteriorate
    - Defragmentation is designed to restore the files to an original state of segmentation
  - ✓ **Scan Disk**
    - searches for lost files or file fragments
    - File Allocation Table
      - File Name
      - File Segment Disk Locations
  - ✓ **Task Manager**
  - ✓ **System Restore**
    - **System Restore Points**
      - snapshot of the systems settings
      - are made every week by the system
      - are made prior to system updates or installation of new software
      - can be made manually, i.e., by individual action
    - rolls back the systems settings to a specific date when everything was working correctly
    - does not affect application files
  - ✓ **Windows 7 Problem Steps Recorder TIA page 237 figure 5.31**
  - ✓ **Task Scheduler**
  - ✓ **Assistive Utility – Ease of Access Center**