Computers

Software
Software Classifications

- System Software (operating system)
- Application Software
- Utility Software
- Malware
  - Viruses and worms
  - Trojan horses
  - Spyware and adware
Practice

- http://software.ucdavis.edu
- Click on Antivirus software
- Sophos (for university owned Mac computers)
- Microsoft Security Essentials for Windows
- Enable automatic update
  - Windows
  - Mac: https://www.apple.com/softwareupdate/
The operating system
The operating system

Definition found on Wikipedia:

“An operating system (OS) is the software that manages the sharing of the resources of a computer and provides programmers with an interface used to access those resources”
Popular Operating Systems

- Windows
- Unix
- Linux
- MAC OS
- Android
- iOS 8 (previously iPhone OS)
- Chrome OS
- Windows Phone 8
- Symbian (obsolete)
- Blackberry OS (discontinued)
Operating system

- Process management
- Memory management
- Disk and file system
- Event management and Device drivers
- Output device management
- Networking
- Graphical User Interface
- Security
Process management

- Multitasking
- A process
  - Running, ready, blocked
- Time slicing and task switching
File management

- Logical and physical structure
- mapping
Memory management:

Current computers organize memory resources hierarchically, from registers, CPU cache, RAM and disks.

The virtual memory manager coordinates the use of these resources by tracking which one is available, which is to be allocated or deallocated and how to move data between them.
Thrashing

- Thrashing: in the extreme case, there are so many active processes competing for main memory that the computer spends most of its time swapping pages.

- What can you do?
Event management

- An event is a specific action that produces a reaction in some program.
  - Type a letter
  - Move the mouse
  - Time display

- Device driver
  - a computer program allowing higher-level programs to interact with a hardware device
  - Hardware specific and operating-system dependent

- Output device management
- Press a key “S” in writing your term paper
Most operating systems come with an application that provides a user interface for managing the operating system, such as a command line interpreter or graphical user interface (GUI).

Operating systems provide a software platform on top of which other programs, called application programs, can run.

Your choice of operating system determines the applications you can run.

Interaction between operating systems and microprocessors
Questions:

- Is web browser a part of an operating system?
- Is multimedia play a part of an operating system?
Suite and component

- **Suite**
  - A set of applications, e.g., Office 2013
  - Interoperability
  - Sharing code/functionality
  - Similar feeling

- **Component**
  - With standard interface for interoperability
Web-based Applications

- An application that is accessed via web browser over a network
- A computer software application that is coded in a browser-supported language (such as HTML, JavaScript, Java, etc.) and reliant on a common web browser to render the application executable.

Advantages: Little disk space, automatic upgrade, integrate with other web procedures, cross-platform compatibility, mobility friendly, business reasons

Limits: Internet connectivity, inconsistency in browser implementations, (currently) limited functionalities

Applications: webmail, online sale, wikis, etc.

Why did Google develop Chrome/Android?
An example

- Google application suite
Progress

- Hardware
- Software
- Service
  - Computing as a service …
  - Software as a service …
  - Storage as a service

Software

- Software is written in programming languages.
- A programming language is an artificial language that can be used to control the behavior of a computer.
- Programming languages are used to facilitate communication about the task of organizing and manipulating information, and to express algorithms precisely.
- An algorithm is a list of well-defined instructions for completing a task; that is, given an initial state, it will proceed through a well-defined series of successive states, eventually terminating in an end-state.
  - Deterministic or random

Acknowledgement: Prof. Koehl
Three main levels of programming languages:

- **Machine languages**: refers to the "ones and zeroes" that processors use as instructions. Give it one pattern of bits (such as 11001001) and it will add two numbers, give it a different pattern (11001010) and it will instead subtract one from the other. Often known as binary object file.

- **Assembly languages**: Alternative form of machine language using letters and normal numbers so people can understand it. Ex: `ADD 20, 40, 24`

- **High level languages**: A vocabulary and set of grammatical rules for instructing a computer to perform specific tasks. Each language has its own set of keywords and its own syntax.
Programming language (cont'd)

- **High-level programming languages**
  - Most modern software is written in high-level notation, which is then translated into binary.
  - Have special statement forms to help programmers give complicated instructions.
    - Example: Three-part if statement
      - Yes/no question to test
      - Instructions to operate if test is true
      - Instructions to operate if test is false
  - Examples: Java, c, c++, perl, fortran, matlab, html, and of course Python.
Execution: Interpret or Compile?

Regardless of what language you use, you eventually need to convert your program into machine language so that the computer can understand it. There are two ways to do this:

- interpret the program through an interpreter
- compile the program through a compiler

The main disadvantage of interpreters is that when a program is interpreted, it runs slower than if it had been compiled.
An interpreter is a program that translates source code into some efficient intermediate representation or precompiled code to execute.
A compiler is a program that translates source codes into object codes. The compiler derives its name from the way it works, looking at the entire source code and collecting and reorganizing the instructions.

Thus, a compiler differs from an interpreter, which analyzes and executes each line of source code successively, without analyzing the entire program.
Programming languages: Examples

**Interpreted languages:**
- Perl, 
- Python, 
- Matlab 
- Java

**Compiled languages:**
- Fortran 
- C, C++ 
- Pascal 
- Basic 
- Cobol 
- ADA
Software

- What is the difference between Internet Explorer and Chrome?
Software

- Proprietary „
- Open-Source
Applications

- What is your favorite?
- Adobe professional, Office, Skype, Dropbox, Chrome
- On phone: audible, NPR, Quora, Ted, Wechat, Kindle, (and maps), and disable a few

- Be very careful what you install.
Corrupted Files

- Enough free space in main partition
- Power off appropriately
- Surge protection
- Restore
Top time-saving tech tips

- David Pogue
- Web: Tap space to scroll down a page
  - Shift-space to scroll up
- Web: Tab between boxes
  - Pop-up, tap to enter your state
- Web: Bigger text, ctrl +
- Phone: how to capital (Space bar twice)
- Phone: call again
- Google: Define any word, unit conversion
- Text:
  - Double click to highlight a word
  - Triple click to highlight a paragraph (you need to click fast)
  - Type over (no need to delete)
- Camera
  - Eliminate shutter lag
- Presentation
  - Black out and white out.
Keyboard shortcuts for Windows

- **Windows System**
  - F1: Help
  - CTRL+ESC or Windows Logo: Open Start menu
  - ALT+TAB: Switch between open programs
  - ALT+F4: Quit program
  - SHIFT+DELETE: Delete item permanently
  - Windows Logo+L: Lock the computer (without using CTRL+ALT+DELETE)
Windows program key combinations

- CTRL+C: Copy
- CTRL+X: Cut
- CTRL+V: Paste
- CTRL+Z: Undo
- CTRL+B: Bold
- CTRL+U: Underline
- CTRL+I: Italic
How often do you check phones, emails, facebook, whatsapp?

A serious time/energy drain and can be counter-productive

It can change brain, and damage body

Put phones away (from reach), turn it off when rest, do not open emails/social media too often, sometimes disconnect network