Course Contents

Introduction and Overview of Operating Systems

Components of an operating system. Operating system functions. Operating system types - basic terminology. Multi-user systems and Unix, Unix implementations, command set and scripting, Resource Management

Processes

CPU time, single and multiple processes, multi-tasking, creation and removal of processes, process states and scheduling, process deadlock.

Storage Management

Files and file reference information; File Buffers; Disk mapping, directory structures, clustering, fragmentation and de-fragmentation, file caching, File system facilities, shared file access and inconsistency

Commands

Linux Command Line and Scripting (maybe Windows Command Line and Batch Files)

Reading material ...

Required Reading

The Course materials on Moodle!

Recommended Reading

Silberschatz: Operating System Concepts, International Student Version, 10th Edition, publisher: Wiley (2018)

Acknowledgement: Many slides adapted from the slides on this book's website

Modern Operating Systems, Tanenbaum, 4th Edition, Pearson (2021).

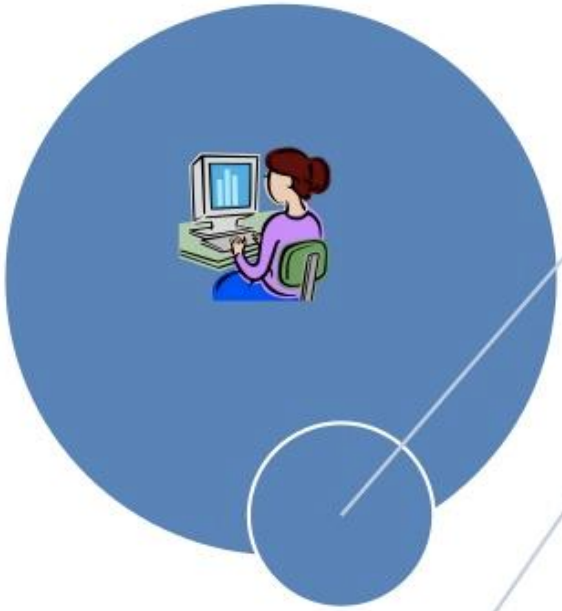
Supplementary Reading

Operating Systems: Internals and Design Principles by William Stallings, 9th edition, Pearson (2018)

Some Pictures

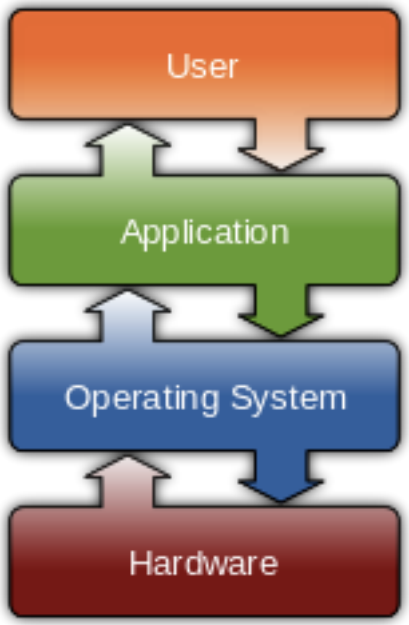
Where does OS fit in … ?

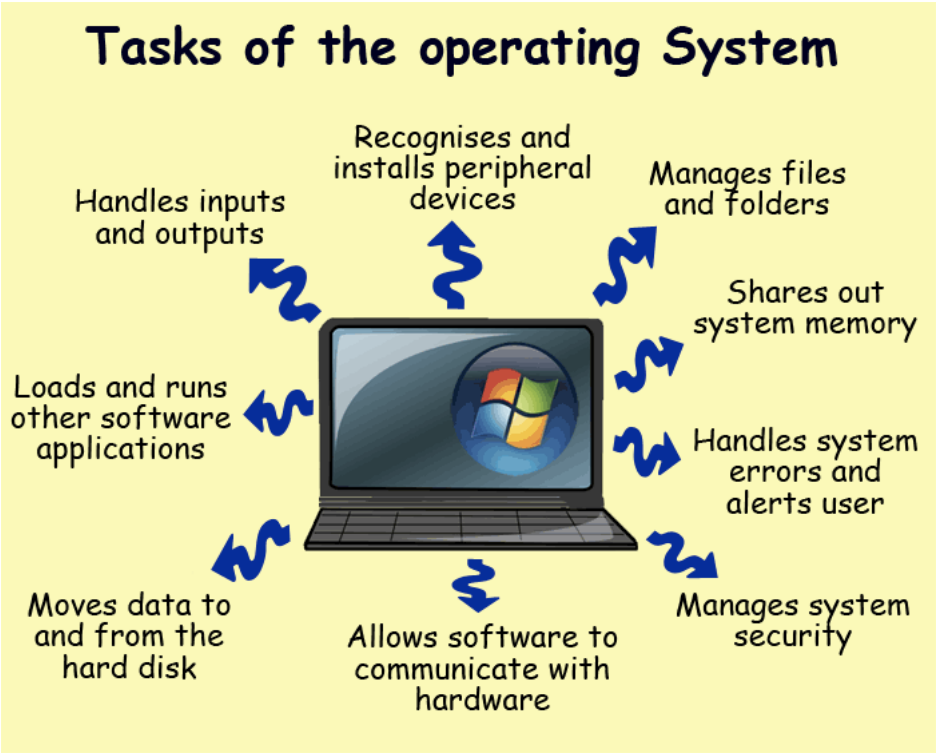
What is Software?



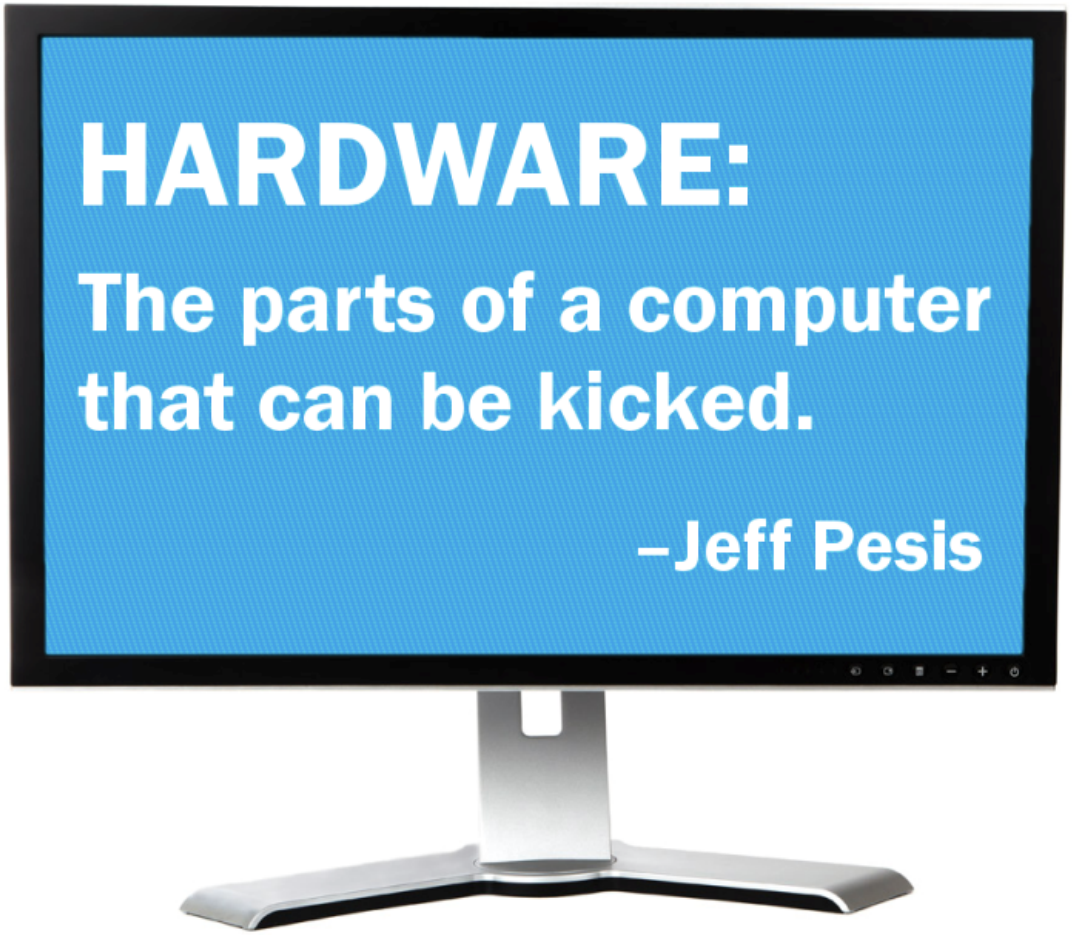
Software is a general term for the various kinds of programs used to operate computers and related devices. (The term hardware describes the physical aspects of computers and related devices.)

Where does OS fit in … ?

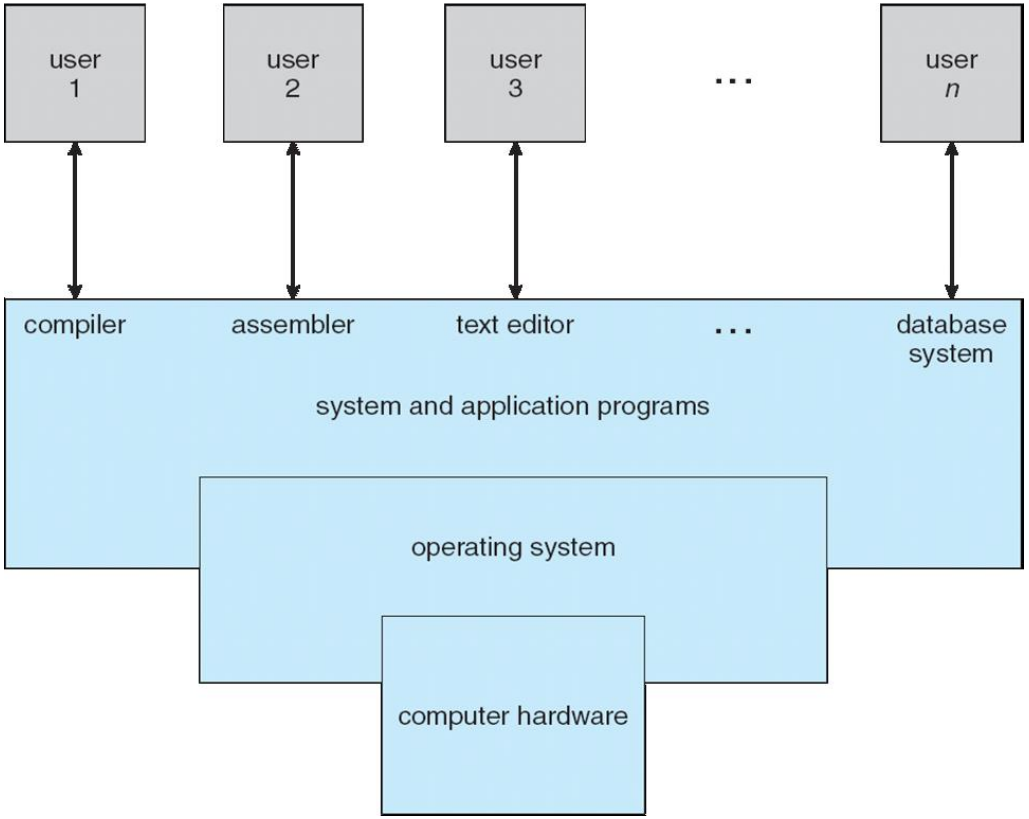


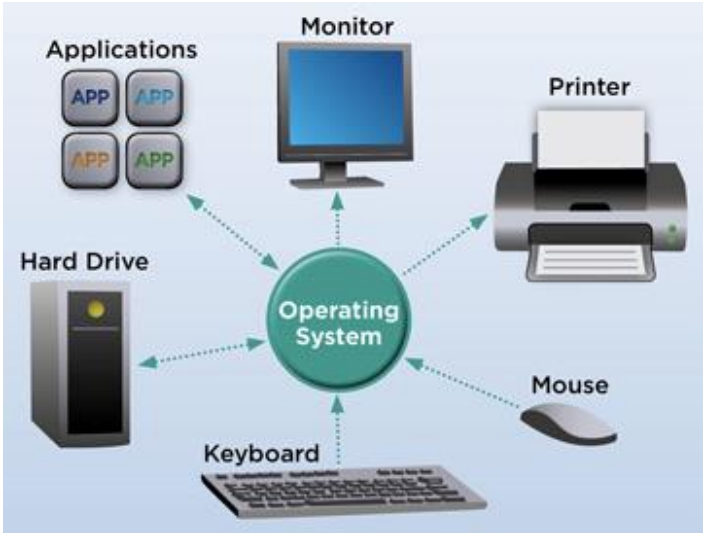


By the way ….


HARDWARE:
The parts of a computer that can be kicked.
–Jeff Pesis

Computer system Structure.. Another view

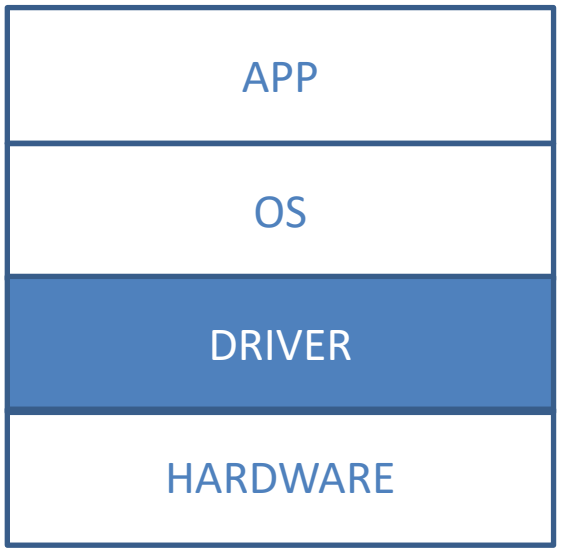




The goal of computer systems is to execute user programs/apps and to make solving user problems easier

What's a Driver ?

OS Driver



The software that links the OS and Hardware e.g. if you use different mice with your PC, that means each will have separate driver

Each piece of hardware the OS needs to talk to, needs a separate driver. e.g. USB stick, keyboard, BT module, WIFI module etc.

What is Software ?

Software is:

- A series of instructions that tell a computer what to do and how to do it
- Recall Assembly and the fact that all applications consist of binary instructions telling the hardware what to do
  - Also called a **Program** or **Application**

Two main types of software

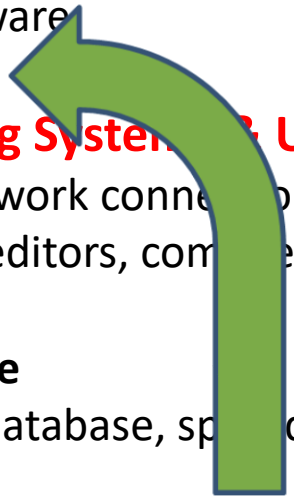
1. **Systems Software**

   Includes **Operating Syste[illegible] Utility Programs**

   File access, network conne[illegible]on, backup, disk management, printer management, editors, com[illegible]ers etc.

2. **Application Software**

   Word processors, database, sp[illegible]dsheet, games and e-mail, web browsers, etc.



This module is looking at Systems Software

Software Development looks at Application Software.

Computer System Structure

Computer systems can be divided into **four** components:

1. Hardware – provides basic computing resources
   - CPU, memory, I/O devices
2. Operating system
   - Controls and coordinates use of hardware among various applications and users
3. Application programs
   - define the ways in which the system resources are used to solve the computing problems of the users
     - Word processors, compilers, web browsers, database systems, video games
4. Users
   - People, machines, other computers

Operating System

A program that acts as an intermediary between a user of a computer and the computer hardware.

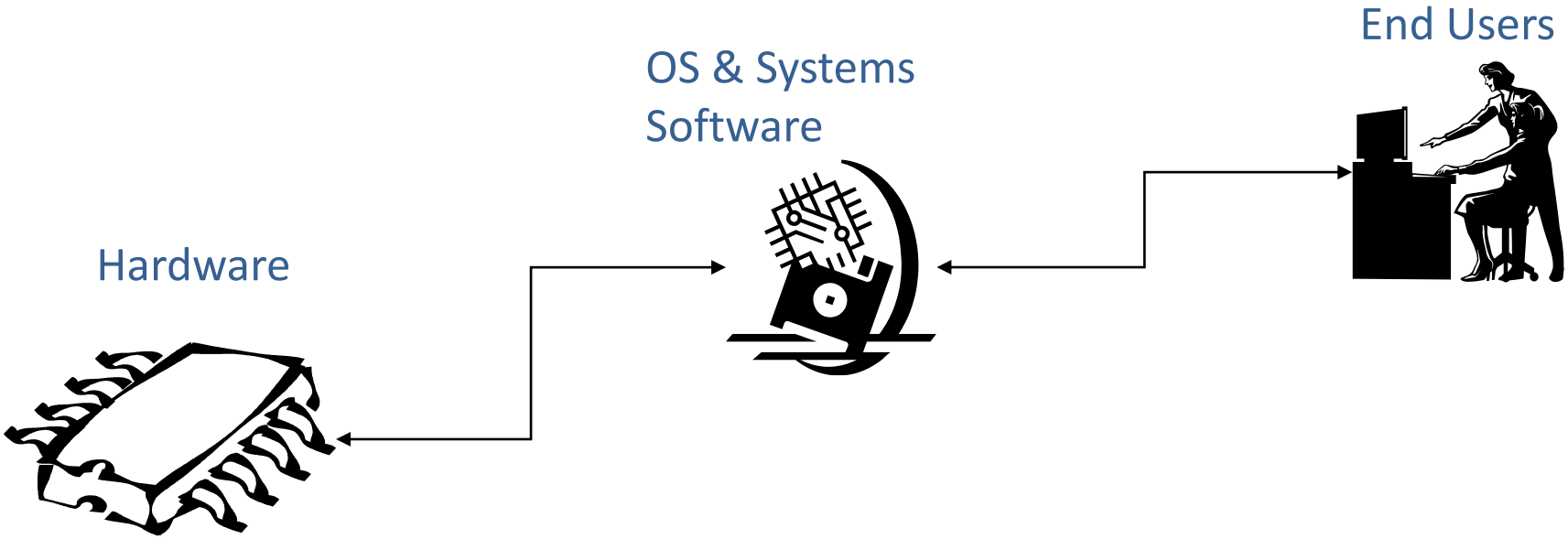
Operating system goals:

- Execute user programs and make solving user problems easier
- Make the computer system convenient to use
- Use the computer hardware in an efficient manner

Operating System

- ✓ **A set of programs that coordinate all the activities among the computer hardware**

- **Abstracts** users from the hardware
  Think of the Operating System as a Layer of software between you and the hardware



Operating System Definitions

The OS is a **resource allocator -** manages all resources, deciding between conflicting requests for efficient and fair resource use

The OS is a **control program -** controls execution of programs to prevent errors and improper use of the computer

There is no universally accepted definition of an Operating System!

"The one program running at all times on the computer" is the **kernel.**

- Everything else is either a system program (ships with the operating system) or an application program

Operating System Definitions

What does operating systems provide that application programs don't?

In general, most Operating Systems do similar things:

- Start your computer
- Provide a user interface
- Manage memory
- Manage files
- Schedule jobs
- Monitor performance

8 Common Functions of an OS

1. Process Management
2. Main Memory Management
3. File-System Management
4. I/O System Management
5. Secondary Storage Management
6. Networking
7. Protection and Security
8. User Interface