COMPUTER SYSTEMS FUNDAMENTALS
(4COSC004W)

Lecture: Week 8. Part 1 of 3

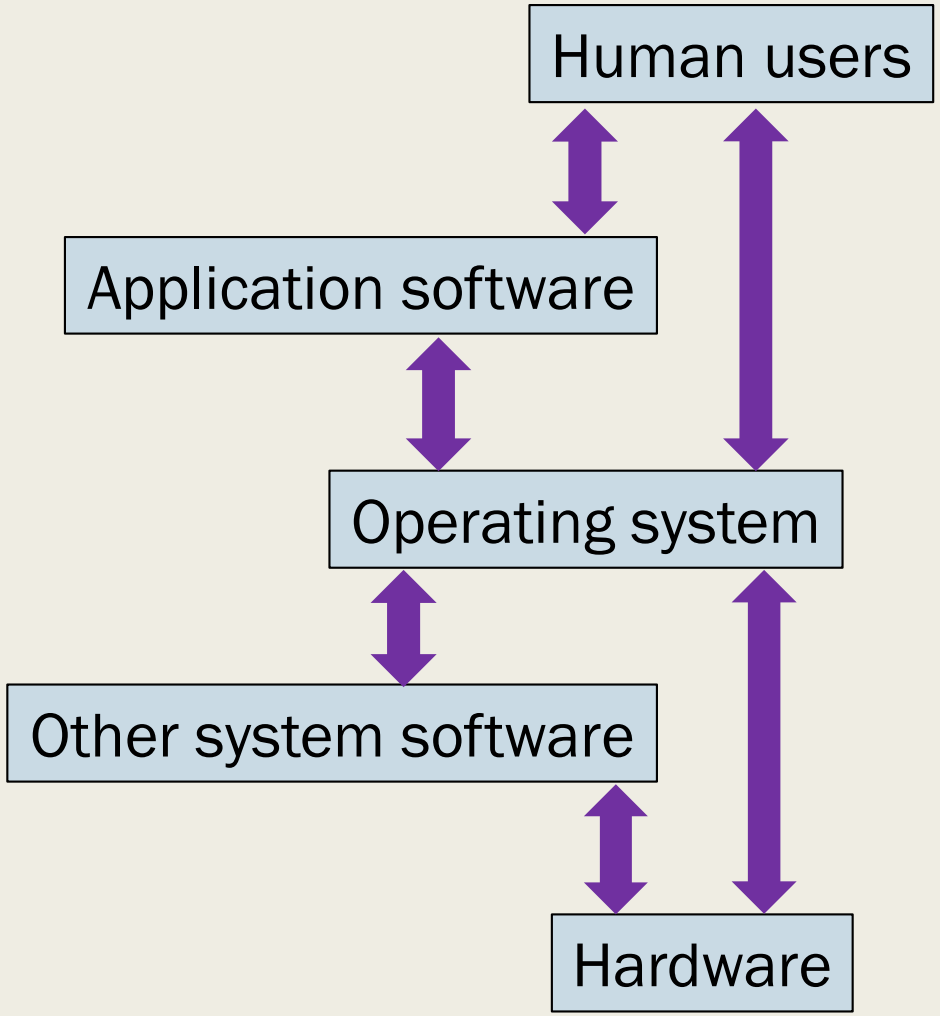
Contact details

- Module Leader:

Operating systems overview:

- Operation of Hardware is controlled by software.
  - *Operating system*
    - Every computer must have
    - Human role: King, Emperor, Director
- Different types for different purposes
- Functions
  1. *File Management*
  2. *Memory Management*
  3. *Process Management*
  4. *Input/output functionality*
  5. *General purpose functions – system information*
- File systems

Operating System interactions



This week:

- Operating Systems
  - *Types*
  - *Operations*
- Process Management
  - *Process lifecycle*
  - *Process scheduling*
- Memory Management
  - *Logical & Physical addressing*
  - *Memory management methods*
  - *Virtual memory*

In this video we will cover:

- Operating Systems
  - *Types*
  - *Functions*

TYPES OF OS

Types of OS

By the end of this unit, you will:

- Gain a brief appreciation of ;
  - *classification of OS*
  - *characteristics of types of OS*

Classification of types of OS

- Classified in terms of:
  - *Hardware they run*
  - *Number of programs that can be active*
  - *The type of interaction provided*

Microcomputer

- OS needs to:
  - *Initialise the system*
  - *Transfer data between memory and peripheral devices*
  - *Provide filing system*

Modern PC is evolved from microcomputer

- More powerful

Minicomputer

- Originally not much more powerful than microcomputer

- OS needs to:
  - *Support resource sharing*
  - *Error protection*
  - *Multi-user system*

Mainframe computer

- Late sixties

- OS needs to:
  - *Provide for many programs to be active*
  - *I/O performed by separate controller box*
  - *Terminals treated as block devices*
  - *Terminal controller echoes commands*

Single-programmed OS

- Single process operating
  - *MS-DOS running on stand-alone computer*

Multi-programmed OS

- More than one process in memory
  - *Switches execution between programs*
- Share system resources
  - *Protect user*
- Windows
- .....

Batch processing system

- User jobs submitted sequentially in batches
- No interaction between running processes and the user
- Input provided on a backing store device
  - *Single-programmed or multi-programmed OS*

Interactive system

- Users can interact with running program
- Can be:
  - *Single-user, single-programmed*
- Or:
  - *Allow time-sharing among many user-programs*
    - Each user appears to have sole use of the system,
    - Although CPU, memory and peripheral devices are, in fact, shared

Real time systems

- Time critical applications
  - *Response to a device must be handled within certain time span or data would be lost.*
    - Telecommunications
    - Air traffic control
    - Manufacturing control process
    - …

Further reading:

- Computer Science Illuminated
  - *Chapter 10*
    - P. 333-361

FUNCTIONS OF THE OS

By the end of this unit you will gain a basic understanding of:

- Principal functions of the OS
  - *File management*
  - *Process management*
  - *Memory management*
  - *Input/output functionality*
  - *General purpose functions – system information*

File management

- Files : collection of related data
- Filename
  - *Regardless of physical storage*
- Directory structure
  - *Containing information about file*
- More details next week

Process management

- Create processes & pipes
  - *Control the process*
- Scheduling of processes
- Switching between processes
- Communication between processes
- Handling interruptions of processes
- Termination of processes

Memory management

- Allocate and de-allocate
- Protect between users
- Share use of devices
- Avoid conflict & corruption

Input/output functionality

- Normally invoked by OS itself
- Managing physical input / output of devices
  - *So that simple request from filing system can be converted to codes to:*
    - initiate I/O transfer
    - Perform transfer
    - Terminate transfer

General purpose functions to provide system information

- Process queues
- Disk quotas
- Time & Date

Additional functions

- OS are software like any other
- Developed to include more functionality
  - *Anti-virus*
  - *.....*

Further reading:

- Computer Science Illuminated
  - *Chapter 10*
    - Part 10.1 (p.334 – 340)