Operating Systems (CS3000)

Lecture – 1

(Course Overview)

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY,
DESIGN AND MANUFACTURING,
KANCHEEPURAM

Dr. Jaishree Mayank

Assistant Professor

Department of Computer Sc. and Engg.

Course Evaluation Components

- Mid Sem: 25 (1st week October 2024)
- End Sem : 55 (4th week November)
- Assignments : 20

Course Administration (3000)

- Prior knowledge: C, Data Structures, Computer Organization and Design
- Lecture slides will be available on moodle after lecture.
- Some reading material will be provided before/after the lecture.
- Discussion Time: Anytime except when we have class or laboratory (prior email is preferable).
- Lab: Once a week (Good Learning Experience).
- Easiest way to get a good grade in CS3000 is to pay attention in the class.
- 85% attendance is mandatory.
- Total = 42 Lectures, 14 Tutorials

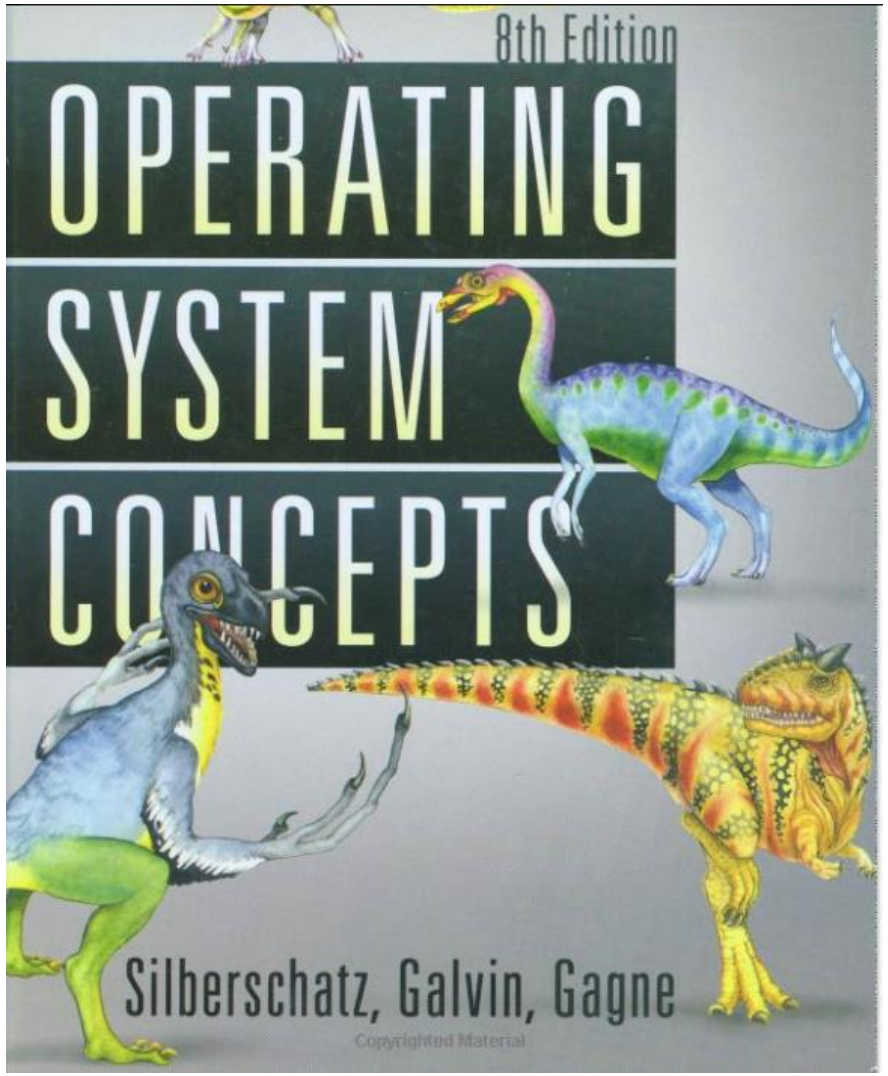
CS3000			
L	T	P	Credits
3	1	0	4

Time Table

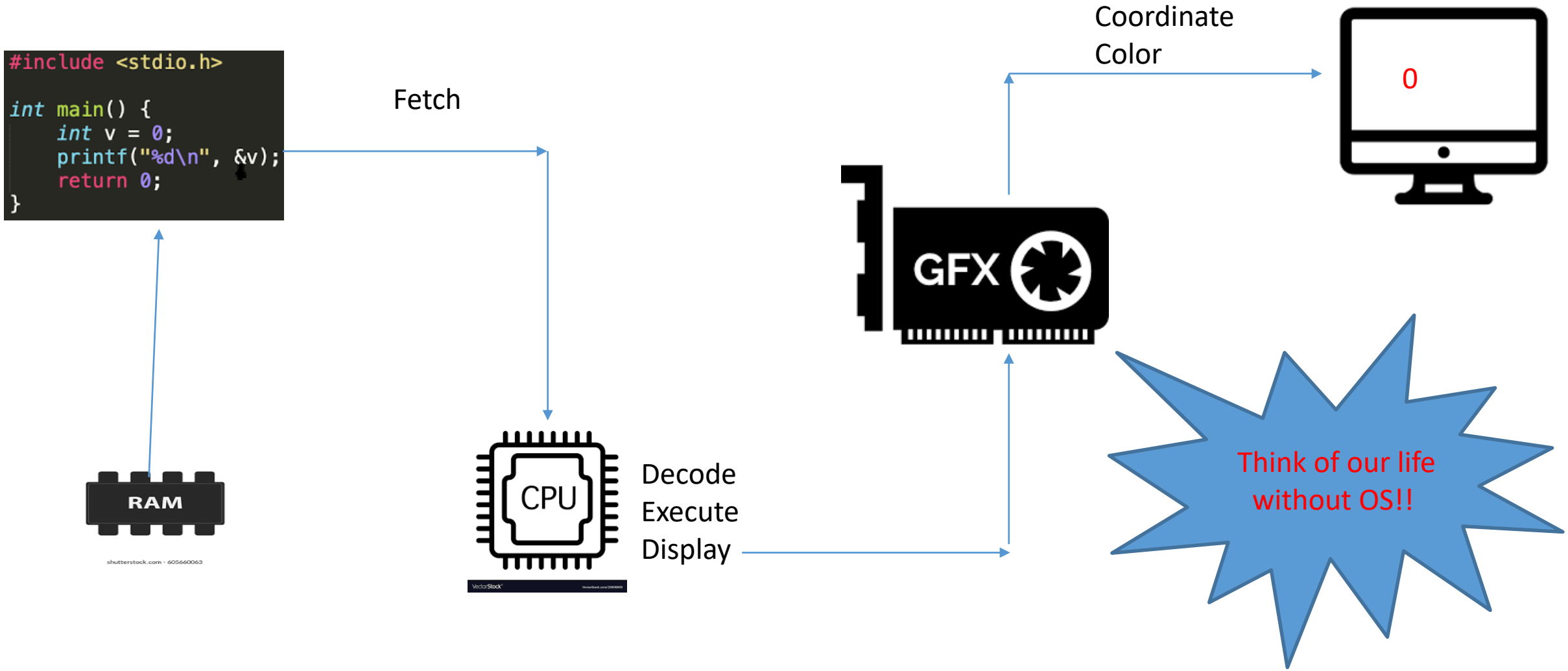
Monday –11:00 AM – 11:50 AM
Tues – 8:00 AM – 8:50 AM
Wed – 12:00 PM – 12:50 PM
Thurs – 09:00 AM – 09:50 AM

Books & Reference Materials

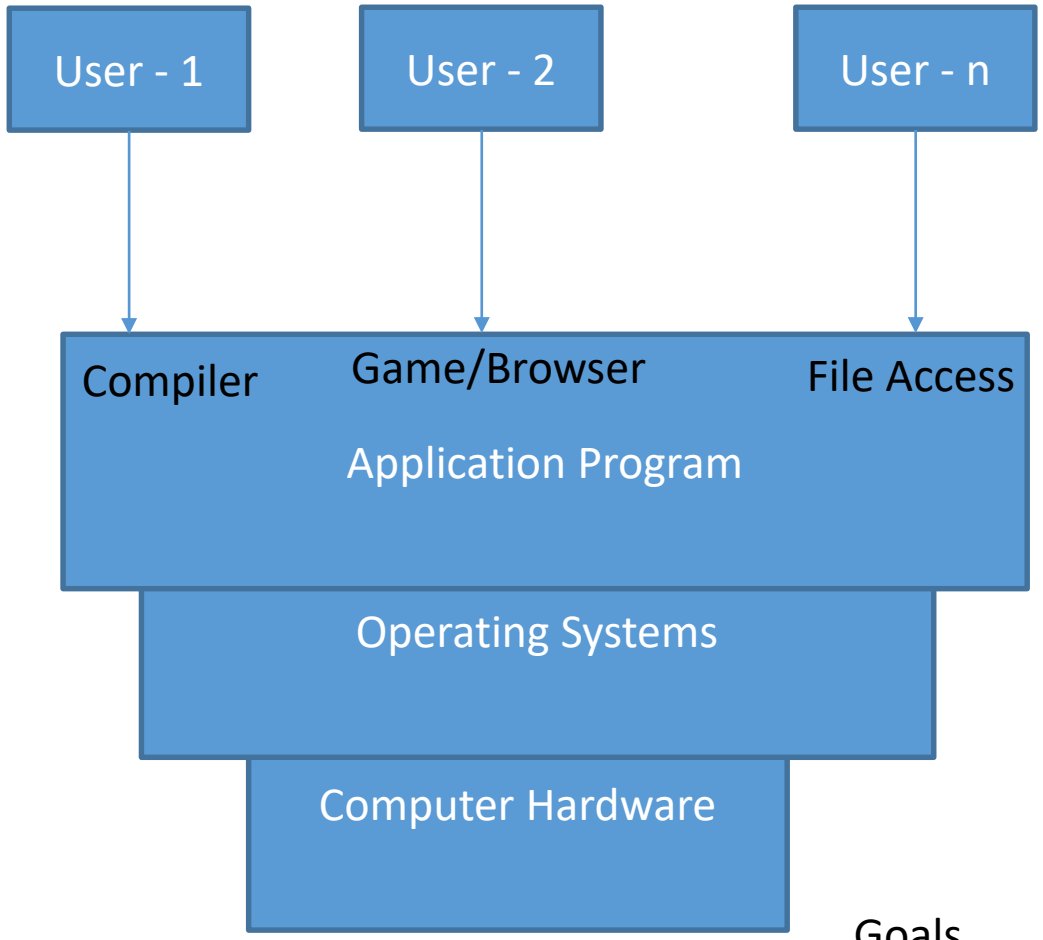
1. Operating System Concepts, 8th Edition by Silberschatz et.al.
2. Operating Systems: Internals and Design Principles, 8th Edition by William Stallings
3. Online Resources

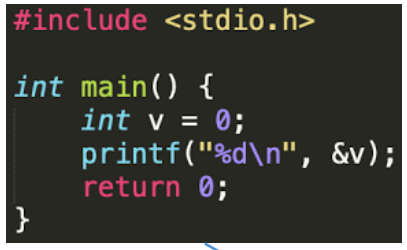


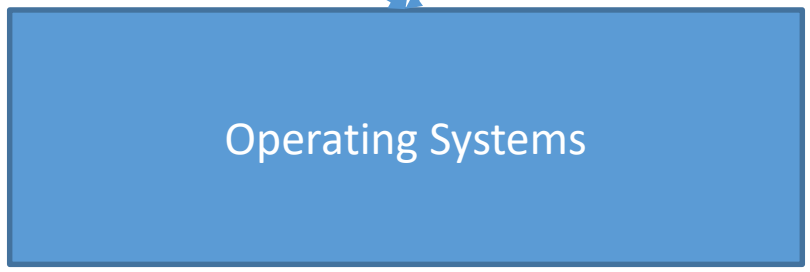
Why Operating Systems Required?

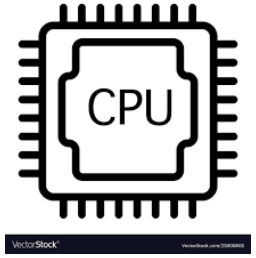


Goal of OS









Goals
1 – Convenient to Use / User Friendly
2 – Efficiency

Usages of Operating System

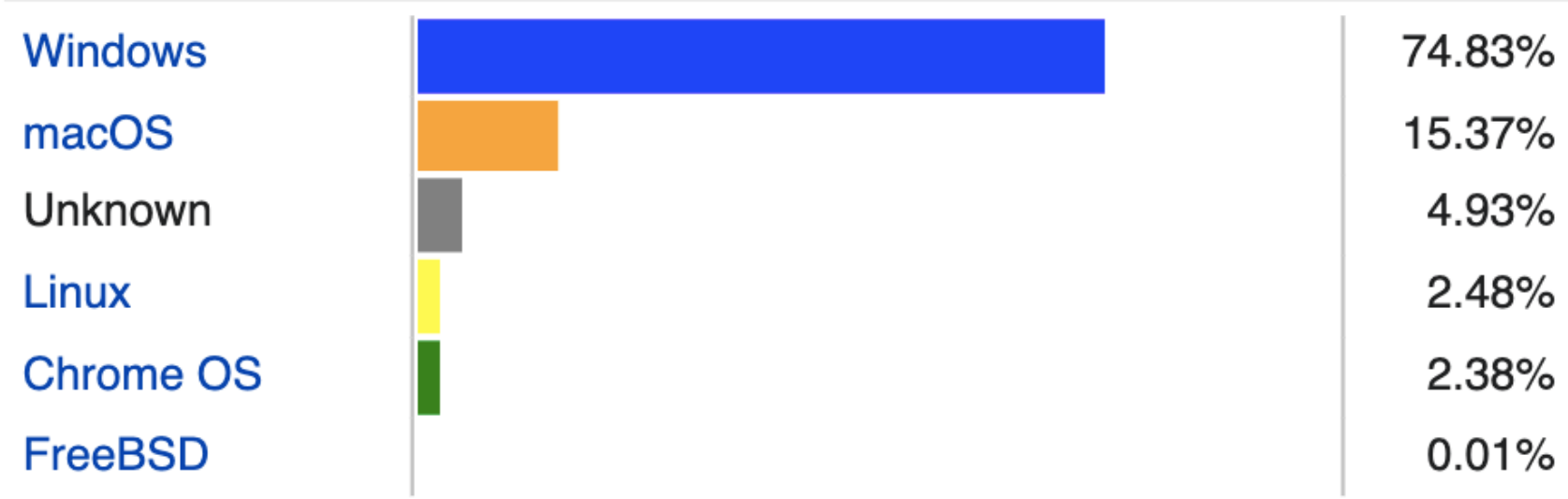
- OS Provide Abstraction
- Easy to program
  - No more small details are required
- Reusable functionality
  - Different programs can use the OS functionality
- Portable
  - OS interface are consistent. The program does not change when the hardware changes

- OS as a Resource Manager
- OS must manages CPU, memory, secondary memory(hard disk), network, etc.
- Resource Management
  - Allows multiple programs to share resources
  - Protect programs from each other
  - Improved the utilization of resources

Why this Course?

- Most Essential Part of a Computer System
- A program that acts as an intermediary
  - between a user of a computer and the computer hardware
- A program that is a resource manager
  - Memory, CPU, I/O
- Acts like Government
  - No useful function by itself
  - Sets up environment for other applications to achieve their tasks
- Time/Deadline Based
- Event Driven
- Challenges in the OS design
- Tradeoffs in OS design

Operating System Market Share



Source:StatCounter

Types of OS (Types of Applications)

• Desktops	• Mac OS, Windows, Ubuntu
• Servers	• Windows Server, Redhat
• Embedded OS	• Contiki OS
• Mobile OS	• Android, iOS
• RTOS	• RTLinux
• Secure Environment	• SeLinux

Course Contents

- Structure of Operating System
- Functionalities & Services of an Operating System
  - Process Concept - System Calls & Management
  - Process Synchronization
  - Process Scheduling
  - Deadlock
  - Memory Management
  - I/O Management

Types of OS

Every Job or Task has -
- CPU Time
- IO Time

- Batch OS
  - Transistors
  - Starts another job only after the present job is completed entirely
  - both CPU and IO Parts to be completed
- Poor CPU Utilization
- Low Throughput (Efficiency Aspect)

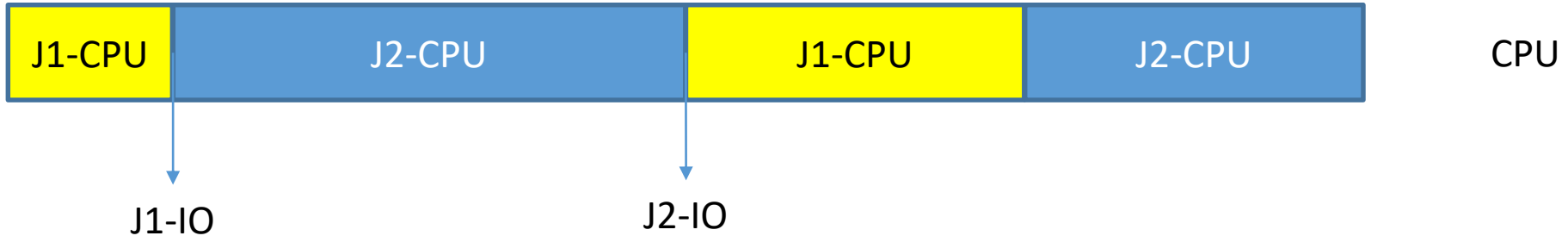
No of Jobs or Tasks completed per unit time

- Stored Program Architecture
- Multiple Programs or Jobs are allowed to be in Main Memory

Types of OS

- Multi Programming OS
  - Overlapped execution of CPU and IO Operations Tasks
  - When CPU is idle, switch to other Job
  - Better CPU Utilization – when J1 is busy on IO; J2's CPU part is allowed
    - Betters Throughput

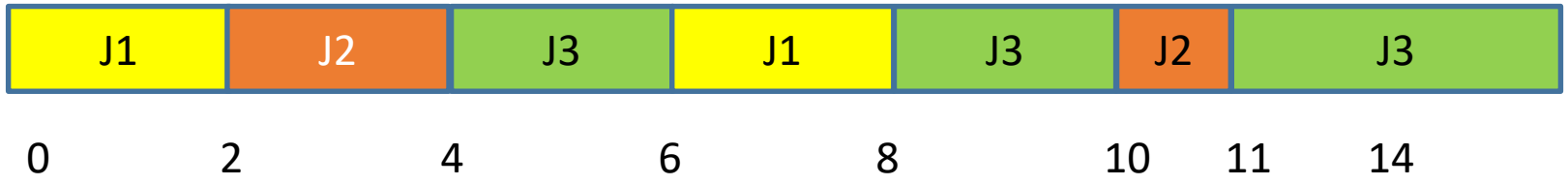
J1 – CPU, IO, CPU
J2 – CPU, IO, CPU



Types of OS

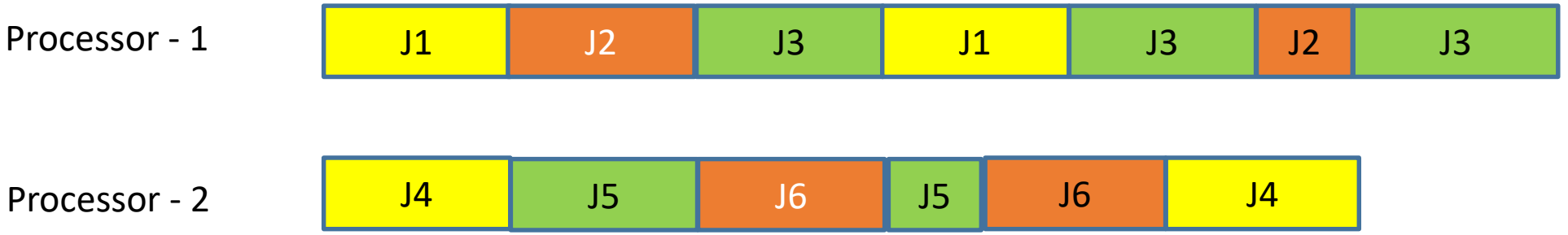
- Multi Tasking OS
  - Based on the concept of Time Sharing (= 2sec)
  - Time Sliced Execution of Tasks
  - Illusion of Simultaneous Execution of Tasks

J1 – 4 Sec
J2 – 3 Sec
J3 – 7 Sec

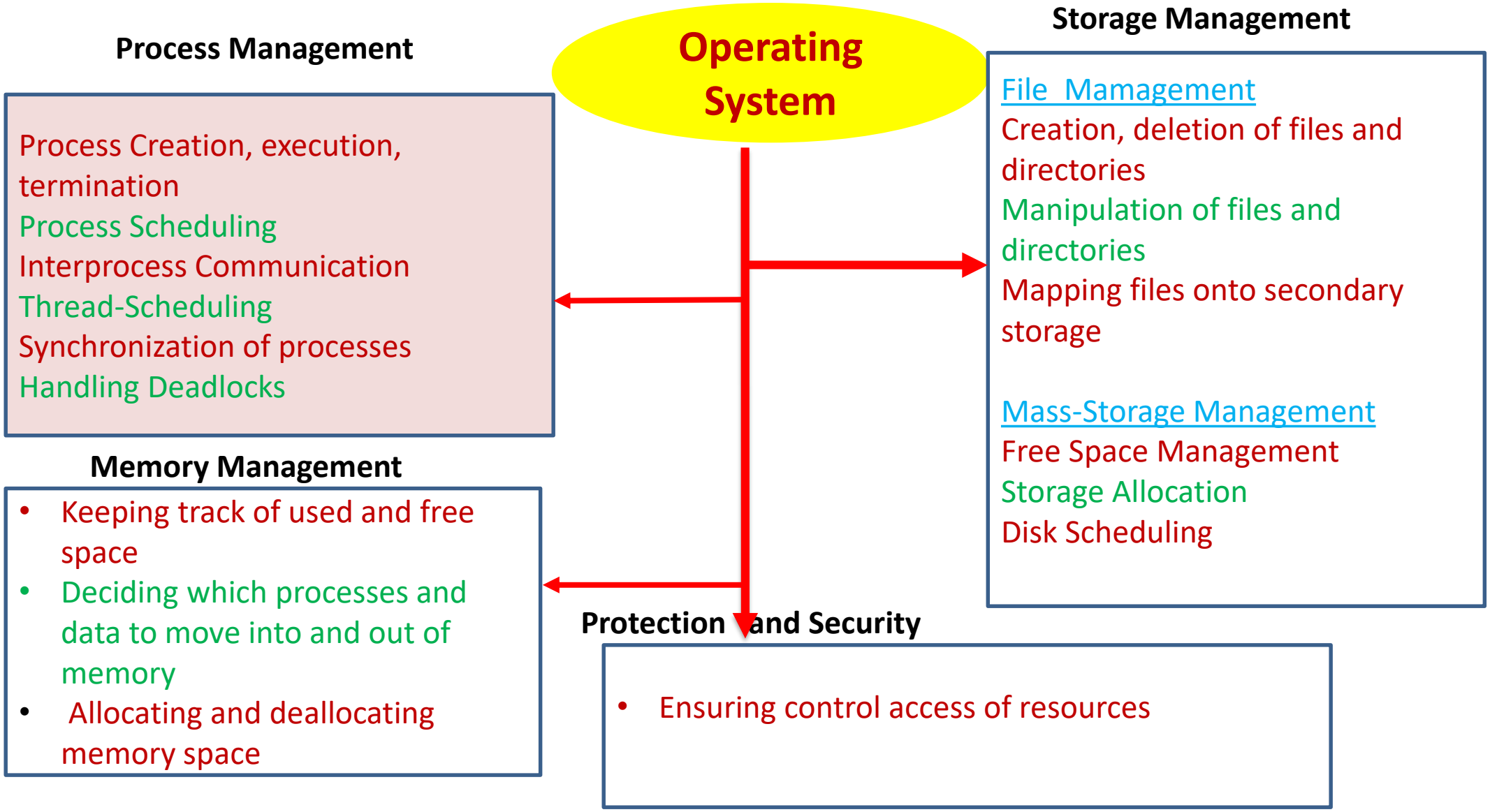


Types of OS

- Multi Processing OS
  - More than 1 Processor
  - Modern day Multicore Systems
  - True Simultaneous or Parallel Processing
  - High Throughput
  - High Reliability – Fault Tolerant Systems
  - Economical – from a user and application management view



Functionalities or Services of OS



Thank You

Any Questions?