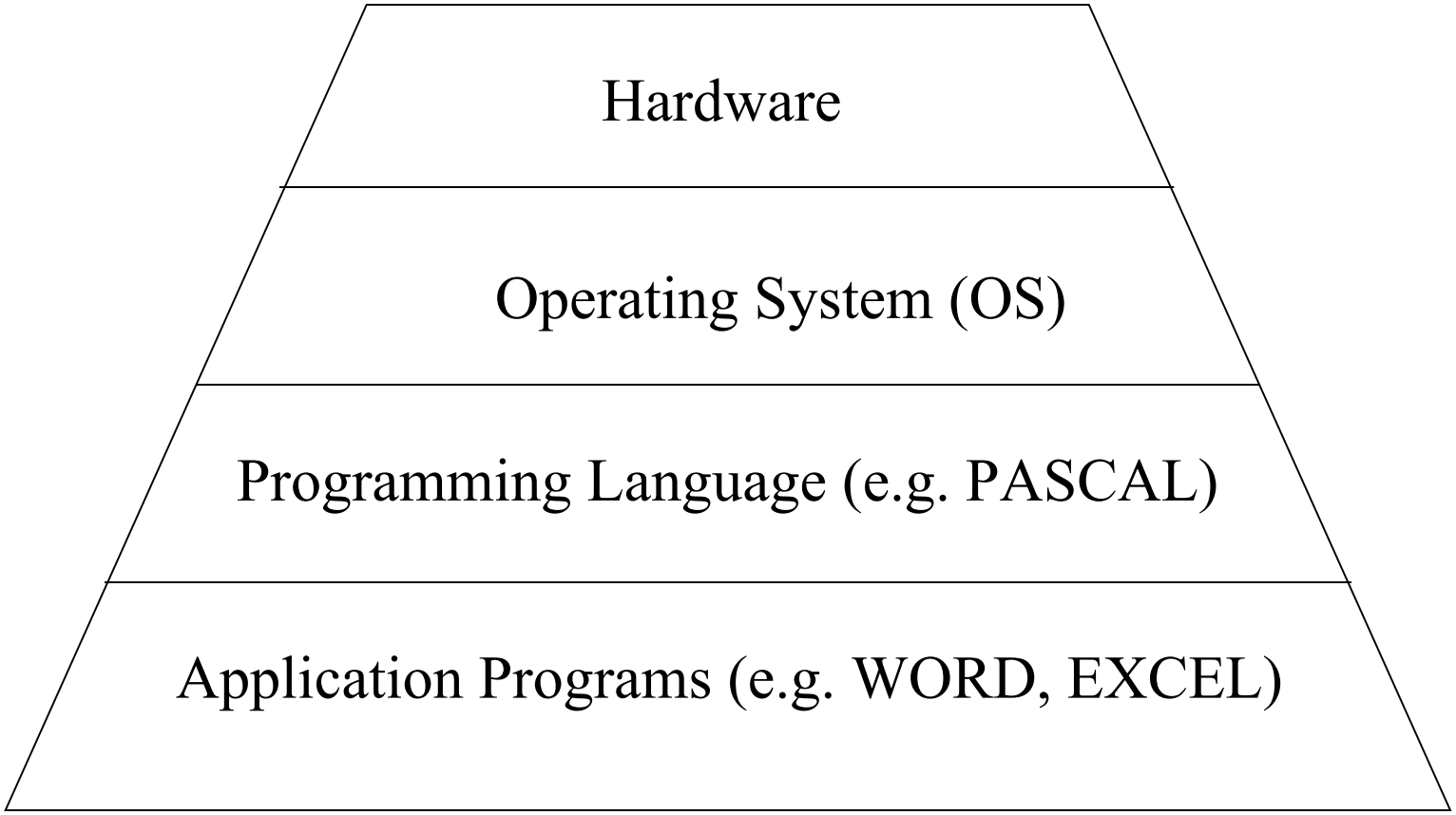
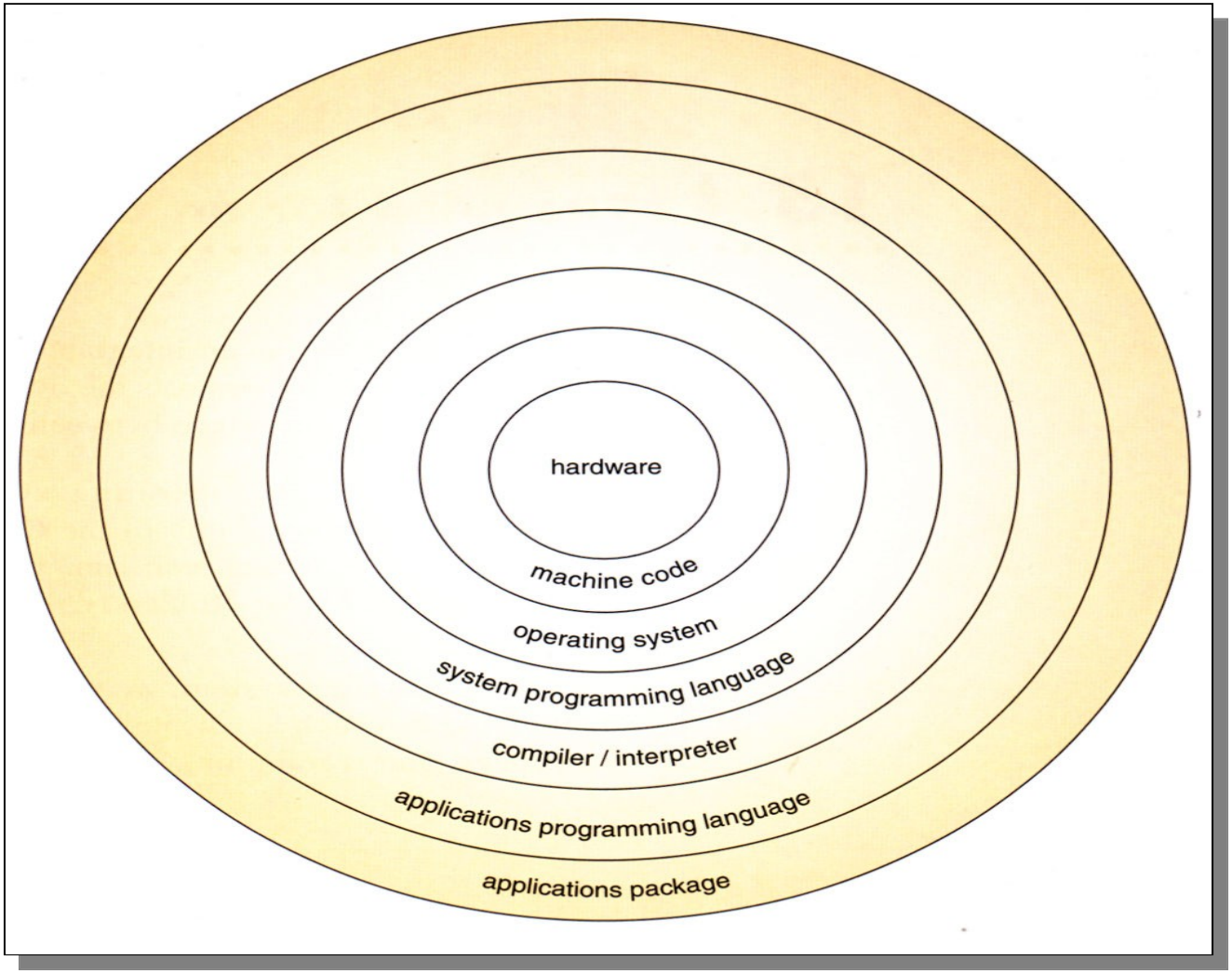
Operating System

Architecture of Computer System



Detail Layered View of Computer



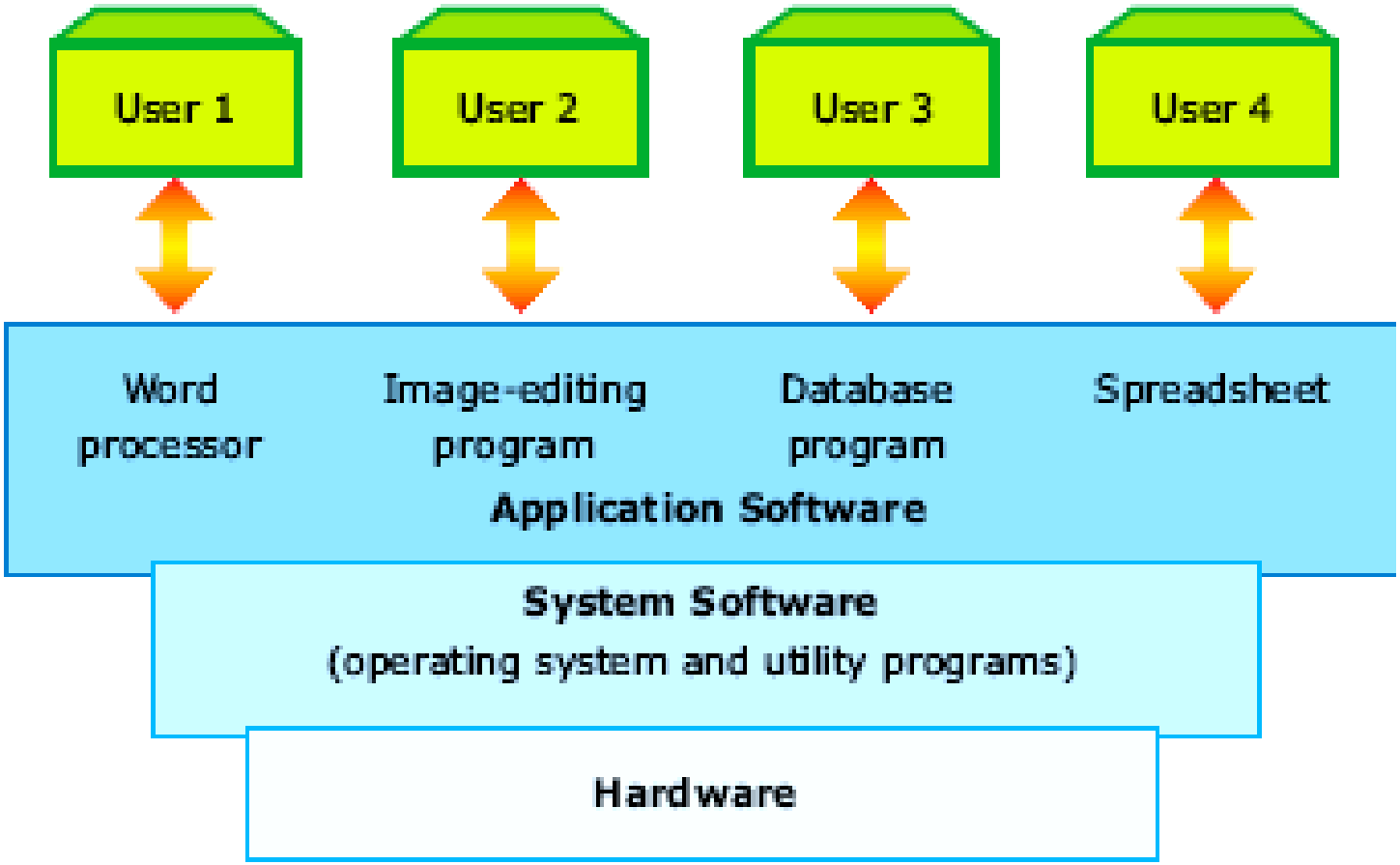
System Software, Application Software and Driver Programs

- System Software- Performs essential operation tasks
  - Operating system
  - Utility programs
- Application Software - Performs specific tasks for users
  - Business application
  - Communications application
  - Multimedia application
  - Entertainment and educational software
- Driver Programs (Device Driver)
  - small program that allows a specific input or output device to communicate with the rest of the computer system

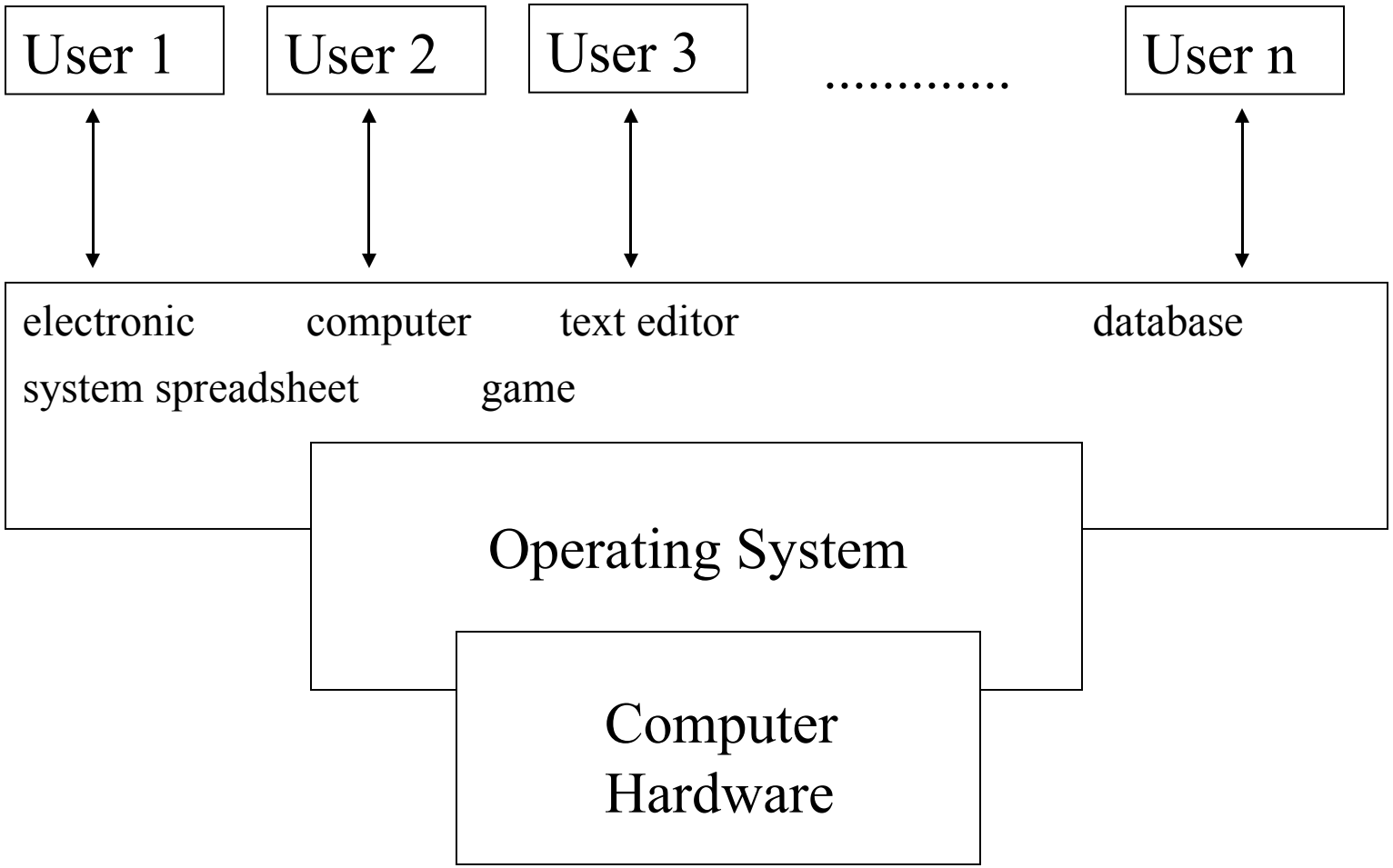
3 type of programs

- user / application programs
  - programs used by the users to perform a task
- system programs
  - an interface between user and computer
- driver programs
  - communicate I/O devices with computer

Hierarchy of computer software



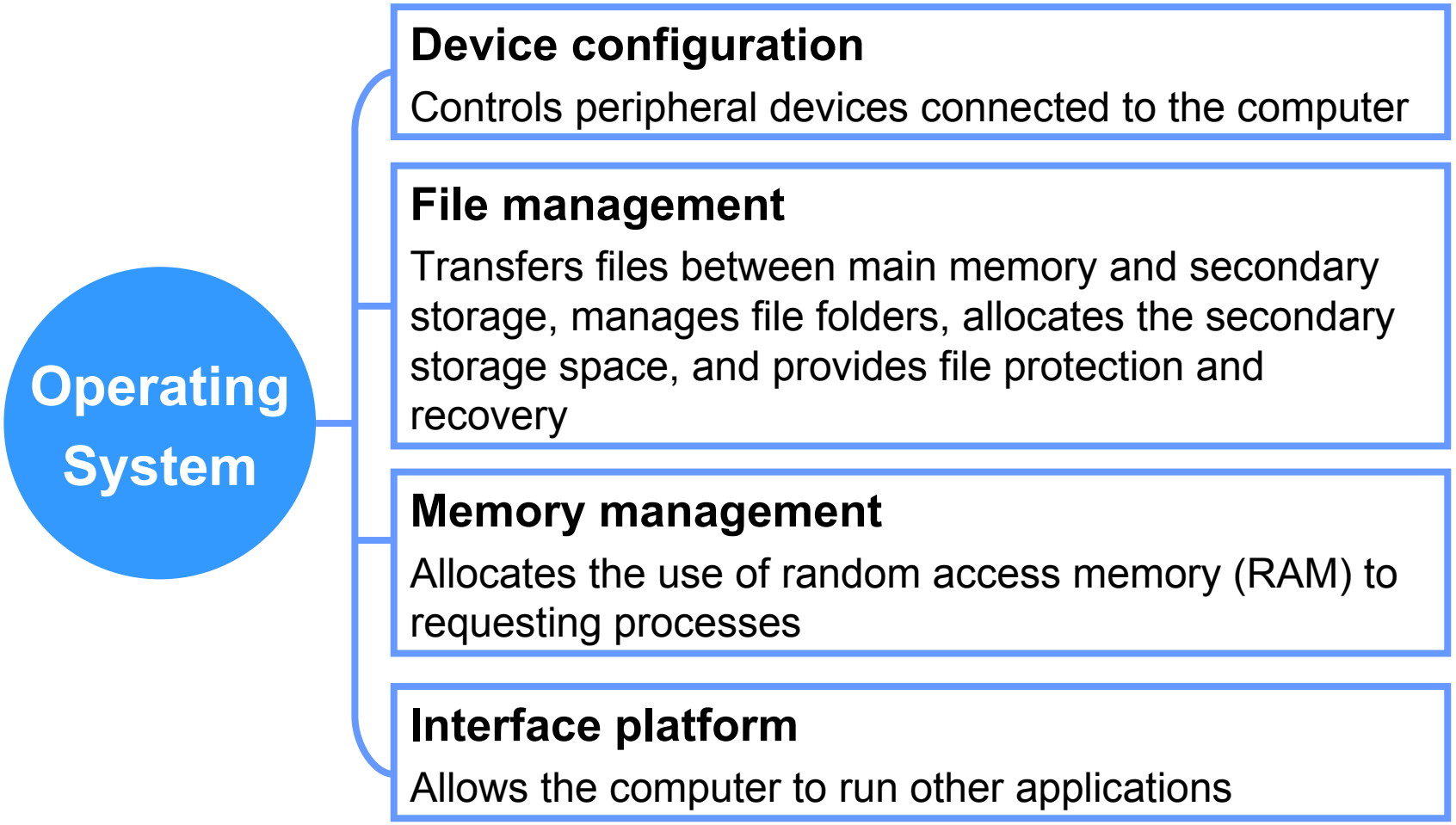
Program Hierarchy



Operating System

- a collection of programs which control the resources of a computer system
- written in low-level languages (i.e. machine-dependent)
- an interface between the users and the hardware
- when the computer is on, OS will first load into the main memory

Basic functions of the operating system



Other function of Operating System

- best use of the computer resources
- provide a background for user's programs to execute
- display and deal with errors when it happens
- control the selection and operation of the peripherals
- act as a communication link between users
- system protection

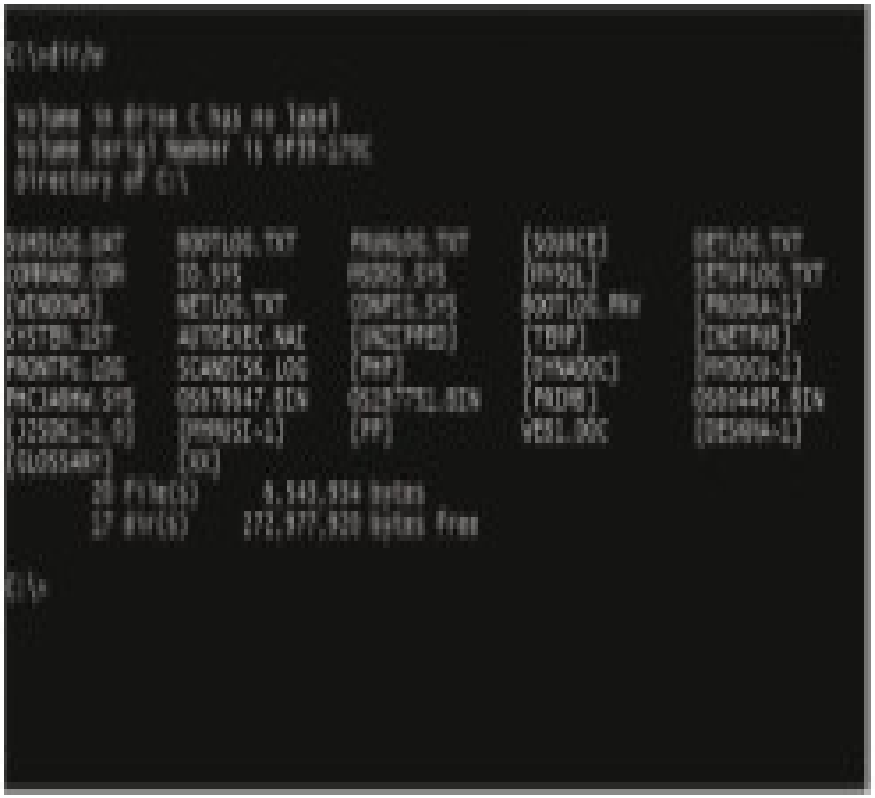
Common Operating Systems and Their Differences

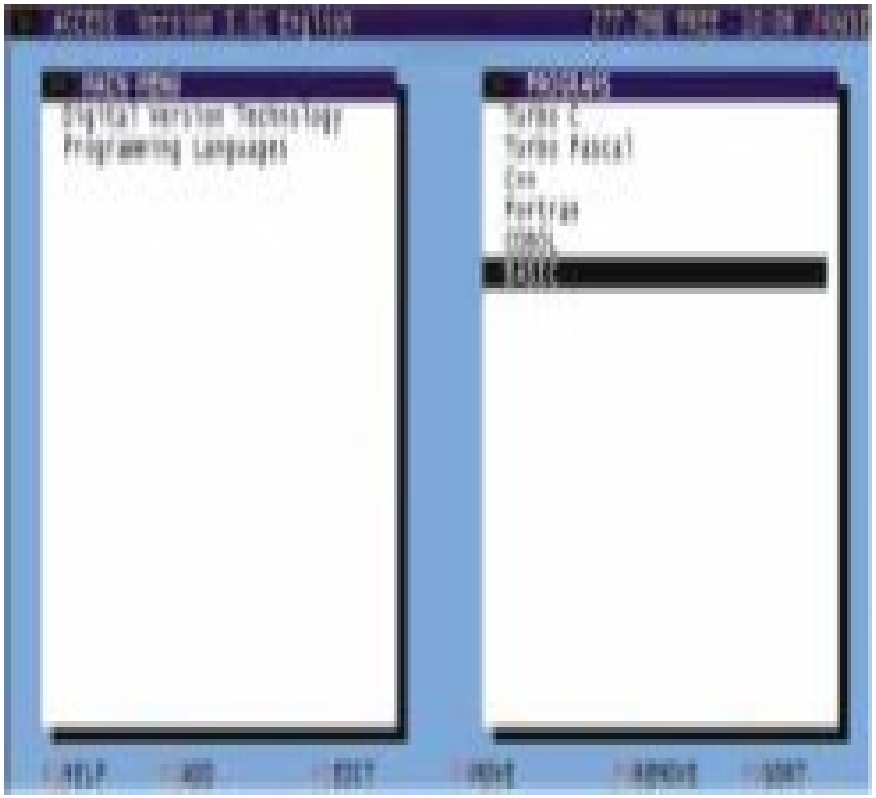
- Network Operating System
  - UNIX / Linux / MS Windows2000 Server
- Desktop Operating System
  - MS Windows 9X/Me / Mac OS / DOS
- Mobile Operating System
  - Palm OS and Pocket PC

Examples

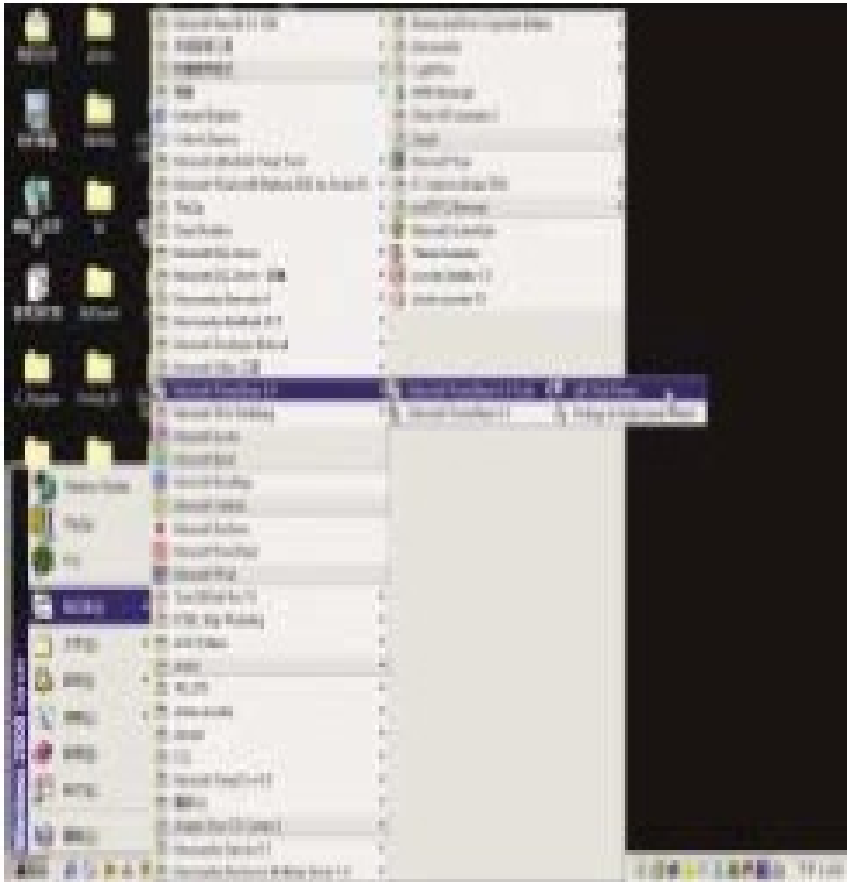
- Common operating systems
  - WINDOW
    - used in IBM compatible microcomputers
  - UNIX
    - multi-user, multi-tasking OS used in minicomputers and microcomputers
  - VAX/VMS
    - used in DEC's VAX series of minicomputers

DOS interface





GUI



Different Types of Operating System

UNIX	DOS	Mac OS	MS Windows	Linux	Palm OS/Pocket PC
Multi-user, multi-tasking	Single-user, single-tasking	Single-user, multi-tasking	Single-user, multi-tasking	Multi-user, multi-tasking	Single-user, multi-tasking
Command-line user interface	Command-line user interface	GUI	GUI	Command-line user interface, GUI	GUI
UNIX has serveral versions but they lack interoperability.	DOS has been replaced by MS Windows OS.	Mac OS has easy-to-use GUI.	The first true MS Windows OS is MS Windows 95.	Linux is an open-source software.	They are specifically designed for PDA.
Network OS	Desktop OS	Desktop OS	Desktop OS	Network OS	Mobile OS

Cross-Platform Issues

- Cross-Platform
  - developing software for, or running software, on more than one type of operating platform.
- Machine-independent Programming Languages
  - JVM
- Makeup Languages
  - HTML
  - XML
- Advantages
  - cost-effective
  - saves time
  - develop the program on different computers

Disk Operating System (DOS)

- a part of operating system to control disk operation
- 2 parts
  - small system data
    - keep track of key information of the disk
  - data area
    - where data file is stored

SMALL SYSTEM AREA in DOS

- 3 parts
  - boot/boot record
    - i.e. a short program for loading DOS into computer's memory
  - file allocation table (FAT)
    - i.e. record the status of each part of the disk and keep track of all data
  - root directory
    - i.e. record the filename, size of the file , date and time

Good Operating System

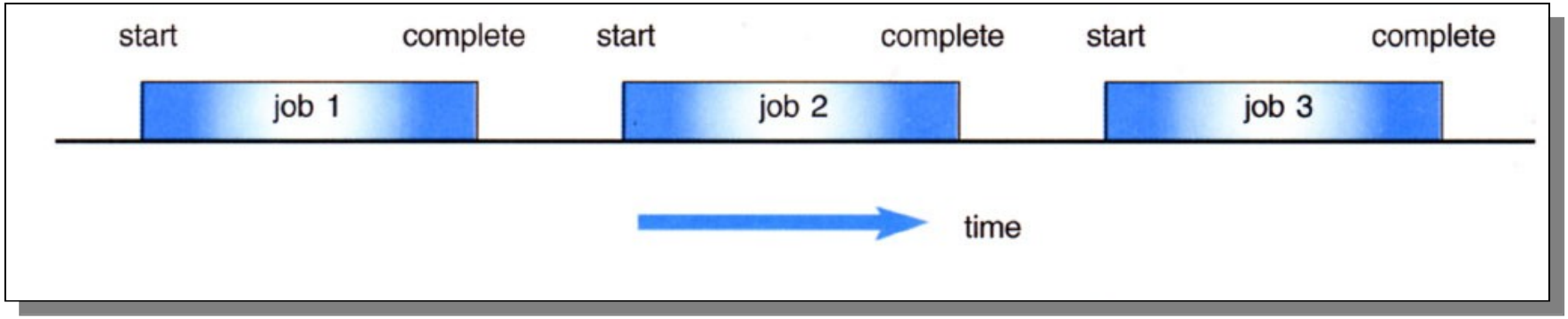
- efficient
  - time spent to execute its programs should be short
- small in size
  - memory occupied should be as small as possible
- reliable

Type of Operating System

- Batch processing
- Real time processing
- Time sharing processing

Batch processing

- Jobs, together with input data, are fed into the system in a batch.
- The jobs are then run one after another.
- No job can be started until previous job is completed



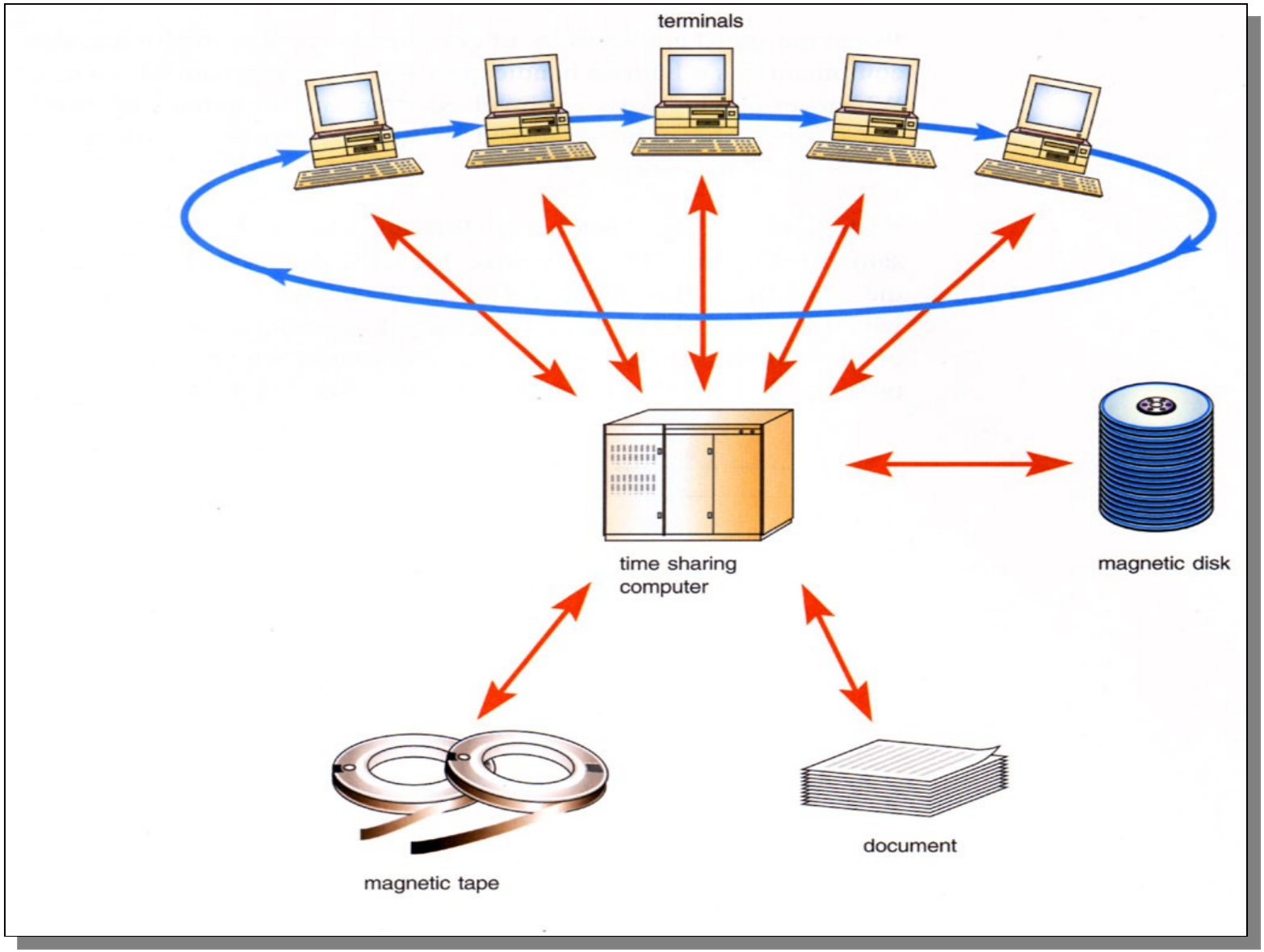
Real time processing

- immediate response is needed.

- For example
  - anti-missile defense system
  - airplane landing control system
  - interrupt error in computer system

Time sharing processing

- Each user is given a time slice to interact with the CPU.
- The size of the time slice will depend on the system.
- Each user is served in sequence.

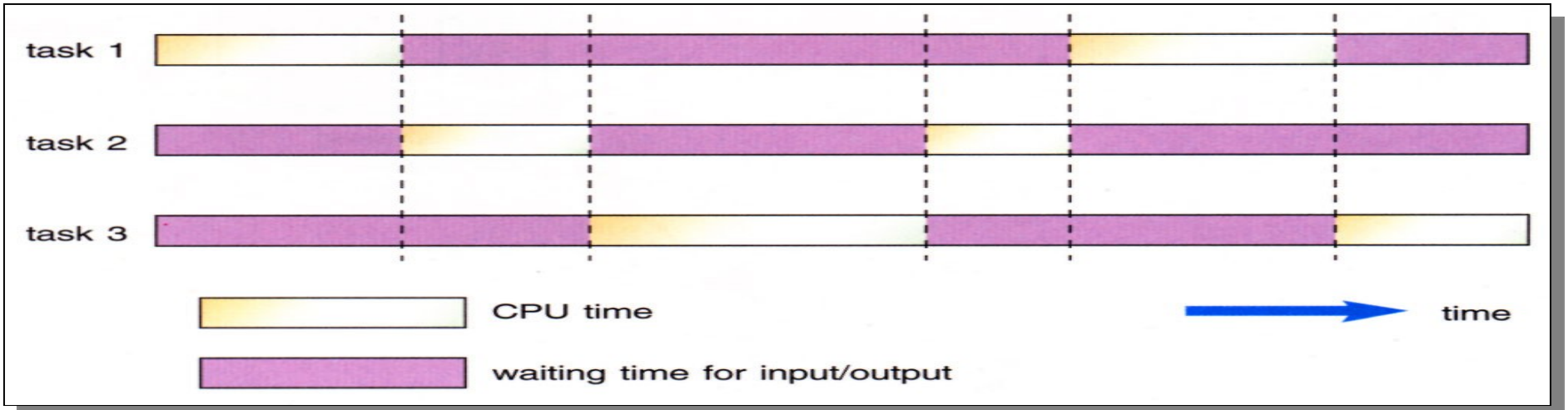

terminals
time sharing
computer
magnetic disk
magnetic tape
document

Special Features of OS

- multi-tasking
- multi-programming
- parallel processing
- buffering
- spooling

Multi-tasking

- to handle 2 or more programs at the same time from a single user ‘s perception
  - CPU can only perform one task at a time, however, it runs so fast that 2 or more jobs seem to execute at the same time

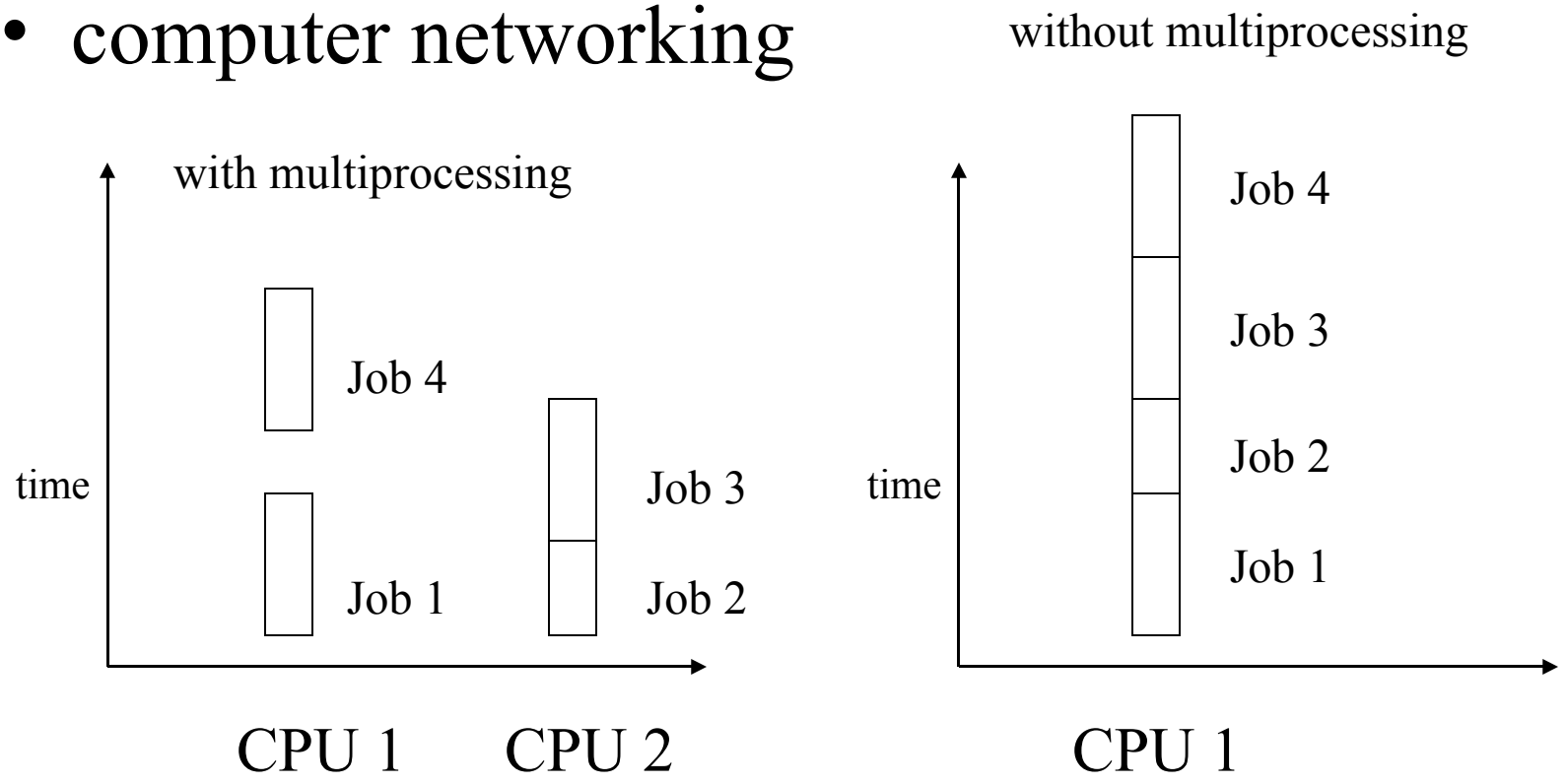


Multi-programming

- 2 or more programs store in the main memory at the same time
- when one job reeds to wait (e.g. I/O operation), CPU switch to another job to execute
- when the first job finishes waiting, CPU will get back the first job to execute

Parallel Processing

- use 2 or more CPUs to handle jobs
- computer networking



Buffering

- a temporary storage area (buffers) to read data from input device or send data to the output device
- keep CPU busy
  - because I/O operation is slow

Spooling

- a larger buffer from hard disk
- buffer store the data through I/O operation
  - because I/O operation is slow and CPU operation is fast