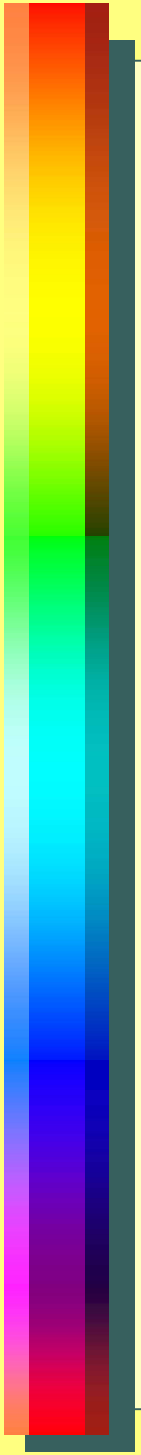
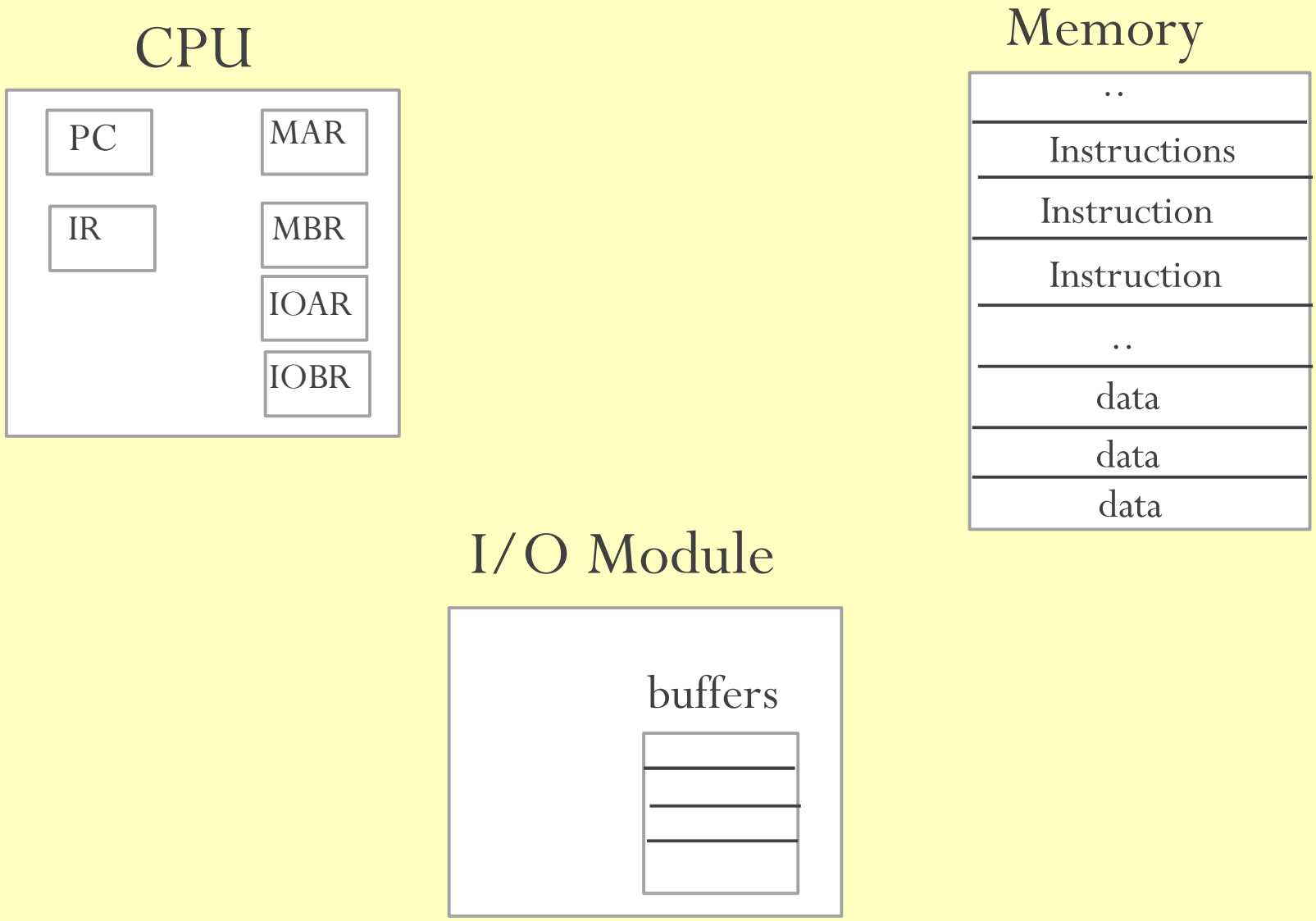


Computer and Operating Systems

Overview

Computer Systems



Processor Registers

- **User visible registers**
  - **data registers**
  - **address registers**
- **Control and status registers**
  - **program counter**
  - **instruction register**
  - **PSW - program status word**
    - PSW is an IBM System/360 architecture and successors control register which performs the function of a status register and program counter in other architectures.

Other processor concepts

- Interrupts
- CPU protection
- Multiprocessing
- Multiprogramming
- Pipelining
- CISC vs RISC
- Software vs firmware

Memory concepts

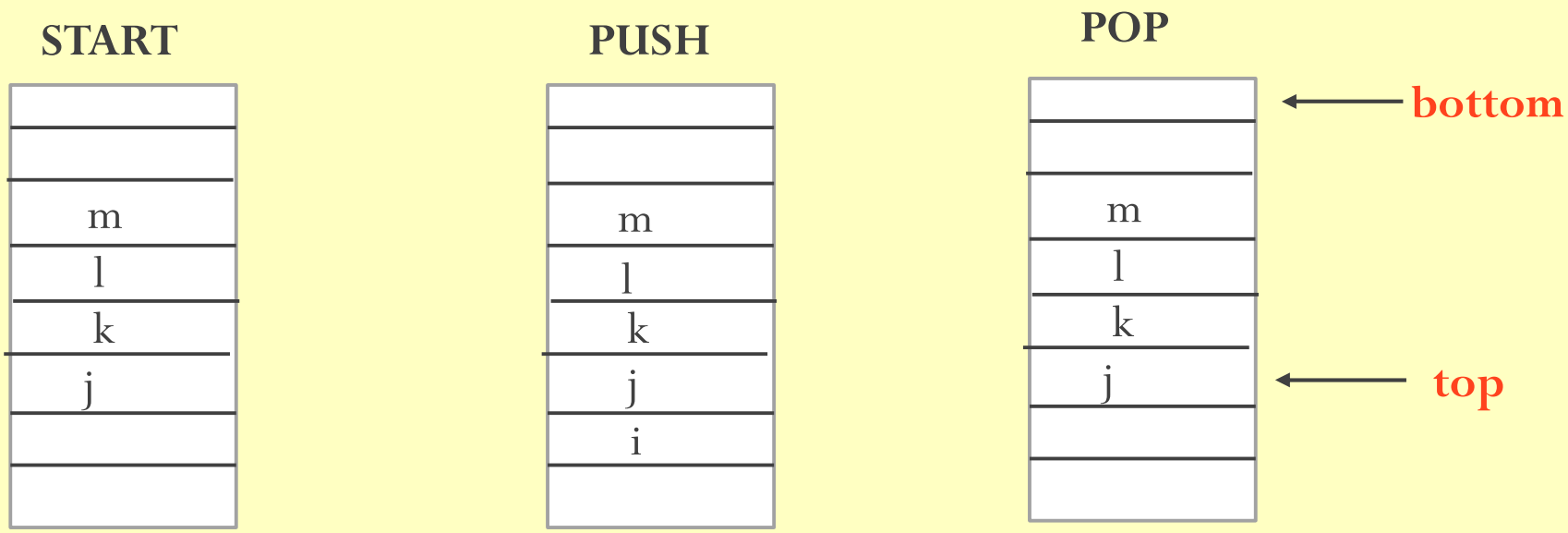
- Memory hierarchy
  - registers
  - cache
  - main memory
  - disk cache
  - external
- Memory banks
- Storage interleaving
- Virtual storage (swapfiles)

Interconnection and I/O

- Computer bus
  - control
  - address
  - data
- I/O Control module and units
- I/O communication techniques
  - programmed I/O
  - interrupt-driven I/O
  - Direct memory access (DMA)
- Channels (selectors, multiplexors)

Other concepts

- BIOS - the firmware
- IOCS - the software
- Procedure control (stacks -> LIFO)
  - nested procedures
  - reentrant procedures



Operating Systems

- Concept
  - "the programs , implemented in either software or firmware, that make the hardware usable"
  - "the computer systems resource manager"
  - "the main User/Computer interface"
- Objectives
  - convenience
  - efficiency
  - ability to evolve

OS services

- program development
- program execution
- access to system and I/O devices
  - protection
- priority
- controlled access to files
  - protection
  - sharing
- error detection and response
- accounting and statistics

Evolution of OS

- Serial processing (1950s)
- Simple batch systems (early1960s)
- Multiprogrammed systems (mid 1960's)
- Timesharing systems (1970s')
- Distributed systems (1980s, 1990s)

Use\OS	Uniprograming	Multiprograming
processor	17%	33%
memory	30%	67%
disk	33%	67%
printer	33%	67%
throughput	6 jobs/hr	12 jobs/hr

OS Trends

- distributed computing
- parallel architecture
- open systems
  - communication standards
  - OS standards
  - user interface standards
  - user application standards