

shared memory VS message passing (MPI, sockets, fax), Pipes
 → mailbox or direct

non-preemptive: process changes to "waiting" or exits, voluntary relinquish of CPU time

preemptive: there are situations where the running process gets descheduled, in favour of others (i.e. interrupt-serve, higher priority, ...) (context-switch)

FCFS: First Come, First Served, FIFO Scheduling

SJF: Shortest Job First → SRT: Shortest Remaining Time, preemptive SJF

RR: Round Robin, time-slices, everyone gets them

Priority Scheduling / Multilevel Queues (w/ feedback, change of levels)

Locks / Semaphores / Critical Sections | Amdahl's Law: $\frac{1}{(1-P) + \frac{P}{N}} \Rightarrow P = \text{Parallel \%}$
 $N = \text{Num Processors}$

Deadlock → Mutual Exclusion, Hold and Wait, No Preemption, Circular Wait

Resource Allocation Graph: \circ process, \square Resource (instances), \uparrow^R request, \uparrow^H holds resource
 cycle → Deadlock (but only if resources exclusive, i.e. only 1 available)

Deadlock Avoidance: RAG with claim Edge OR Banker's Algorithm (Allocation, Max, Available)
 Need, sequences

Translation/Linking/Loading | Logical (CPU) VS Physical (effective memory/RAM)

Swapping / Thrashing (working set > memory) continuous swapping to backing store

limit register + relocation (base) register = MMU

First Fit / Best Fit / Worst Fit

Paging: divide memory into frames, assign Pages, permits non-contiguous physical memory

TLB: Translation Lookaside Buffer (fast lookup cache)

Shared Pages / MultiLevel Page Tables / Hash-based

Inverted Page Tables (page → vaddr) / Page Tables (w/ chaining)

Segmentation: logical space of segments, each with particular permissions and roles

Virtual Memory: ~~not~~ available logical address space > real physical space

Demand Paging (page table extended with "in-memory" bit) → Page fault
 $(1-p) \times \text{memact} + p \times \text{pfault} = \text{effective access time}$

Page Replacement (swap out inactive pages, only if not modified, dirty bit)

- FIFO (Belady's Anomaly)
 - Optimal Replacement (need to know accesses beforehand)
 - LRU (Least Recently Used) (w/ Reference Tracking bit, to first evict never used)
 - Second Chance (FIFO w/ Reference Tracking bit)
 - LFU (Least Frequently Used)
 - MFU (Most Frequently Used)
- } counting-based

