

Process management

- managing The running of programs

Process STATE Transition

↳ Refers To diffrent (5) states

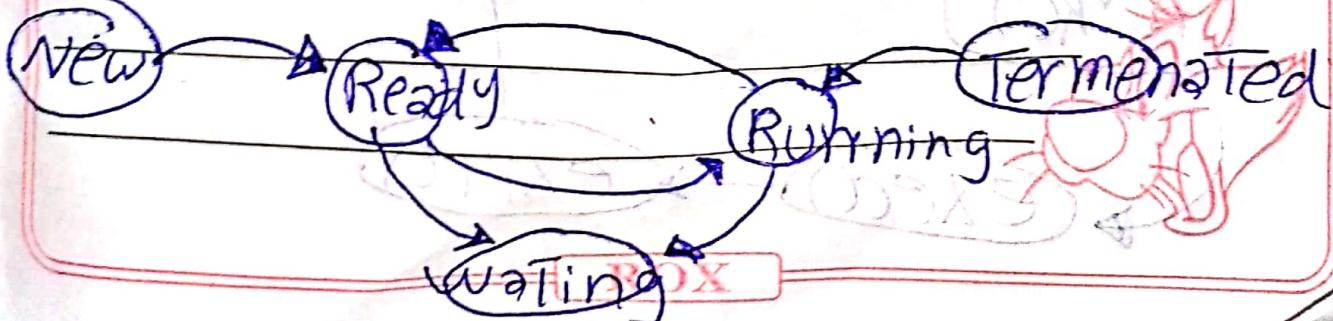
Process Can be

1- NEW → Process is begin created
2- Ready → waiting To assigned To processor

3- Running → is currently being executed

4- Blocked → Process is waiting for event or resource (I/O)

5- Terminated → Process finished



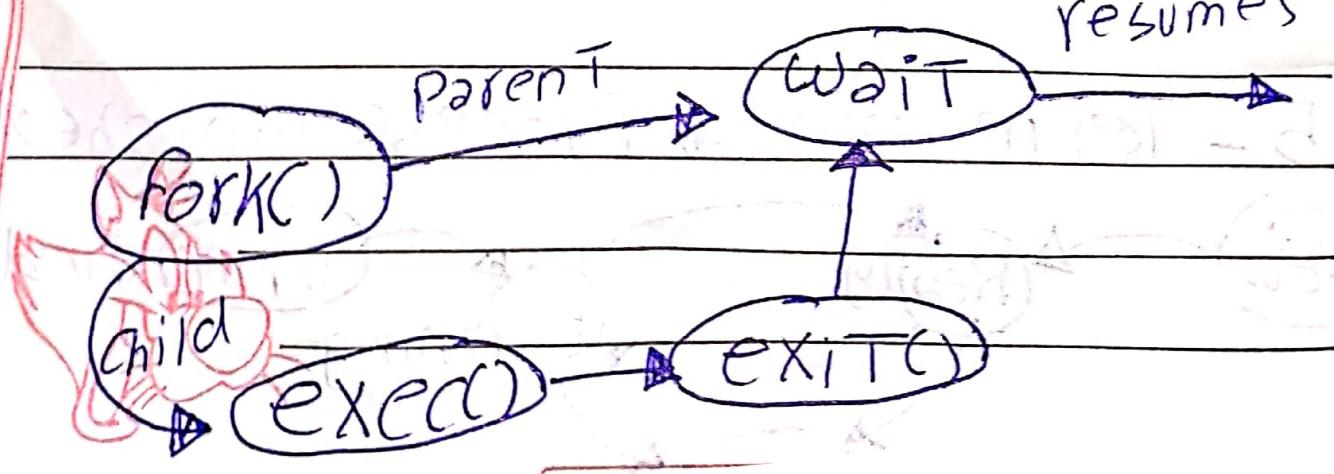
PROCESS CREATION GATE

Problem

→ is the difficulty that an operating system face that only one process can create another process at a time. (It's important to avoid conflicts and ensure proper management of system resources.)

PROCESS SCHEDULE GATE

→ a challenge in OS design where OS needs to ensure that only one process at a time can access CPU.



Concurrent Process

→ Are processes that can run simultaneously in an operating system, in other word they can execute concurrently and can share resources such as (CPU, memory, I/O devices) This allow multiple processes to run in parallel → lead to increase in performance and efficiency in the system → must be managed carefully to prevent conflicts and to ensure they doesn't interfere with each other

CONCURRENT PROCESS

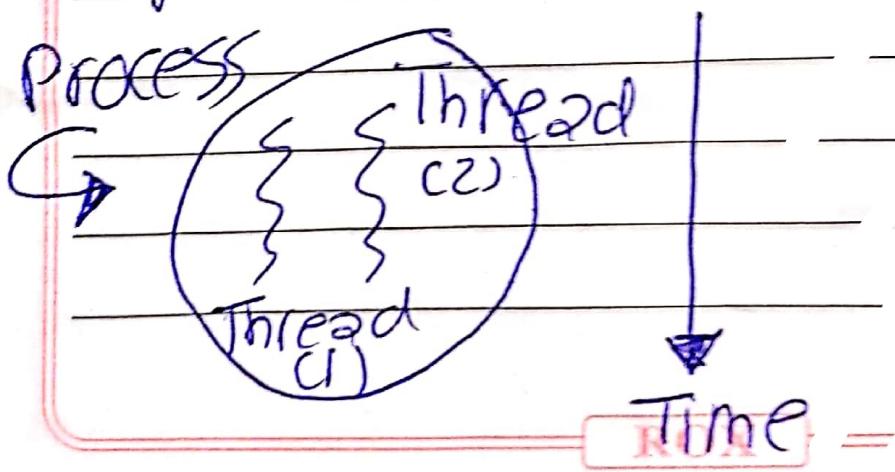
GATEWAY

mechanism used by OS to manage concurrent processes; This mechanism include techniques such as synchronization and mutual exclusion to ensure that concurrent processes access shared resources without interfering with each other.

allow OS to manage the execution of multiple processes in a safe & efficient way and prevent deadlock & data corruption

OS Thread

→ Light weight process within the process, can be executed independently and concurrently with other threads within same process, each thread has its own stack and execution context, threads are managed by OS, OS schedules and switches their execution to achieve concurrency, can be used to implement parallelism in program to allow parts of program to execute simultaneously, increase performance.



CPU Scheduling

→ A process used by OS to manage and allocate CPU Time to different processes and threads, when multiple processes and threads are competing for the CPU, the OS schedules them in a way that maximizes overall system performance, CPU schedules algorithms to determine the order in which processes and threads are executed and how much CPU time is allocated to each one, its goal is to minimize the response time and turnaround time of processes, and maximize the throughput of the system, it also ensures that no process or thread is starved of CPU time.

which can lead to
performance degradation,
some algorithms are

1. FCFS 2. SJF 3. RR
4. Priority scheduling

((FCFS) FIRST-come FIRST-Serve)

CPU algorithm used by OS, CPU is allocated to the process who arrive first and process executes until it is finished or blocked. Then the next process arrives and so on.

FCFS work well for processes that have similar length of execution time and I/O needs and bad for long process that can block CPU for long time.

SJF

Shortest Job First

→ CPU allocates the process
that have shortest execution
time

When a new process arrives, the
operating system estimates
its expected CPU time based
on previous execution times

If two processes have same
expected time FCFS used
to break the tie

Priority CPU scheduling

A algorithm used by The OS
That assigns a priority value
To each process, which
determine the order in which
processes are allocated To
~~memory~~ CPU, process with
higher priority values allocated
first

Can be implemented by
~~Preemptive~~ Preemptive or
non-Preemptive Scheduling

Preemptive → running process
can be preempted by
a higher priority process

in non-Preemptive →
process hold the CPU*
until it complete or block
even if higherPriority is
waiting