

09/06/2024

Process and Control

In Multiprogramming OS,

- OS must interleave execution of multiple processes to max. CPU utilization.

- OS must allocate resources to processes in conformance to a specific policy.

(certain apps has higher priority, and we need to avoid deadlocks.)

- OS must support interprocess communication and user creation of processes.

Process

- A program in execution

- An instance of a program running on a computer.

Process $\begin{cases} \rightarrow \text{Program code.} \\ \rightarrow \text{Program Data.} \end{cases}$

At a given time when program is running it can be uniquely characterized by number of elements.

- Identifier : An unique identifier that allows to distinguish from other processes.
- State : The state of the process (RUNNING, NOT-RUNNING, BLOCKED, ..., ETC).
- Program counter : The address of the next instruction to be executed.
- Memory pointer : pointers to program code and program data.
- Context Data : Data that are present in registers of a computer when the program is running.
- I/O status Information : Includes outstanding I/O requests, I/O devices assigned to the process, list of files used by the process, etc.
- Accounting Information : May include amount of processor time and clock time used.

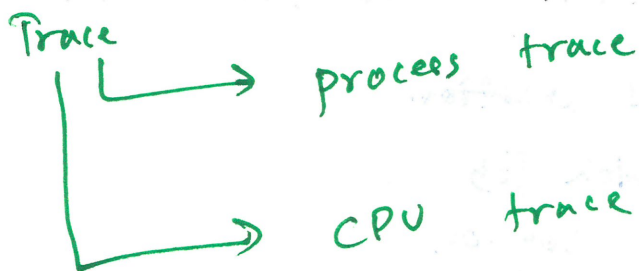
This information is stored in something called
Process Control Block (PCB)

PCB contains sufficient info, to interrupt a running process and later resume-execution as if the interruption had not occurred

When the process is interrupted current state of the program (PC, state, context data, I/O status info, etc.) is updated in PCB.

Process States

- We can characterize behaviour of a process by listing the sequence of instructions that execute for that process.
- This is called Trace



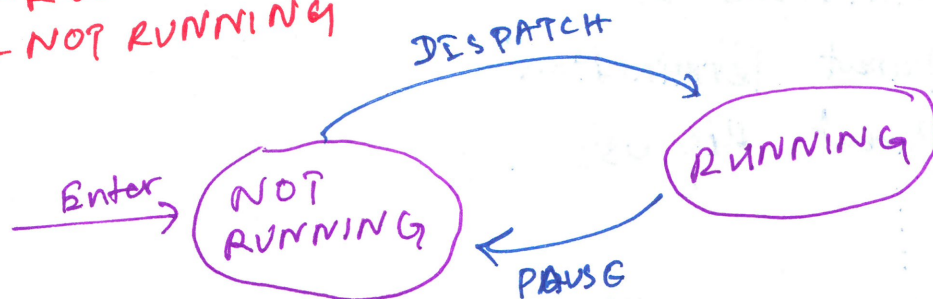
- Dispatcher is part of OS that can interrupt and switch processor from one program to another.

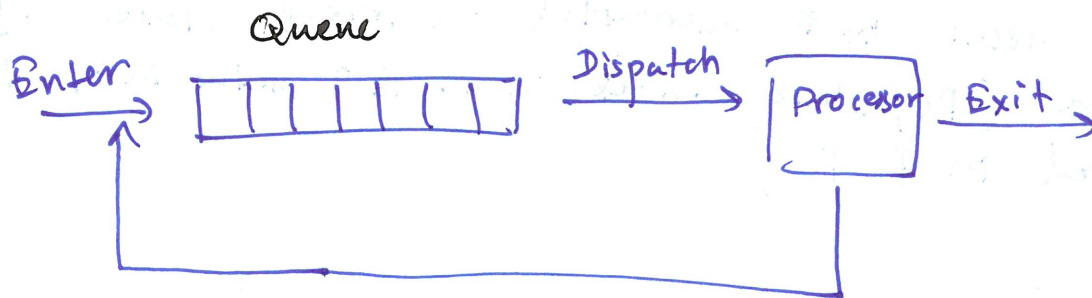
One of the principle responsibilities of OS is controlling the execution of processes.

But we need a model to describe the behaviour of a process.

The most basic model is two-state process model.

- RUNNING
- NOT RUNNING





- Queue for keeping track of not running processes.
- Each entry in the queue is pointer to a PCB of a process.

creation & Termination of Processes.

Reasons for process creation

- New Batch Job
- Interactive log-on
- Created by OS to provide service
- Spawned by existing process,
 - ↳ child process
 - ↳ parent process.

Process Termination

some Few reasons for process termination.
There are many.

- Normal completion
- Timelimit Exceeds
- Arithmetic Error
- Parent Termination
- Parent Request.

So many more.