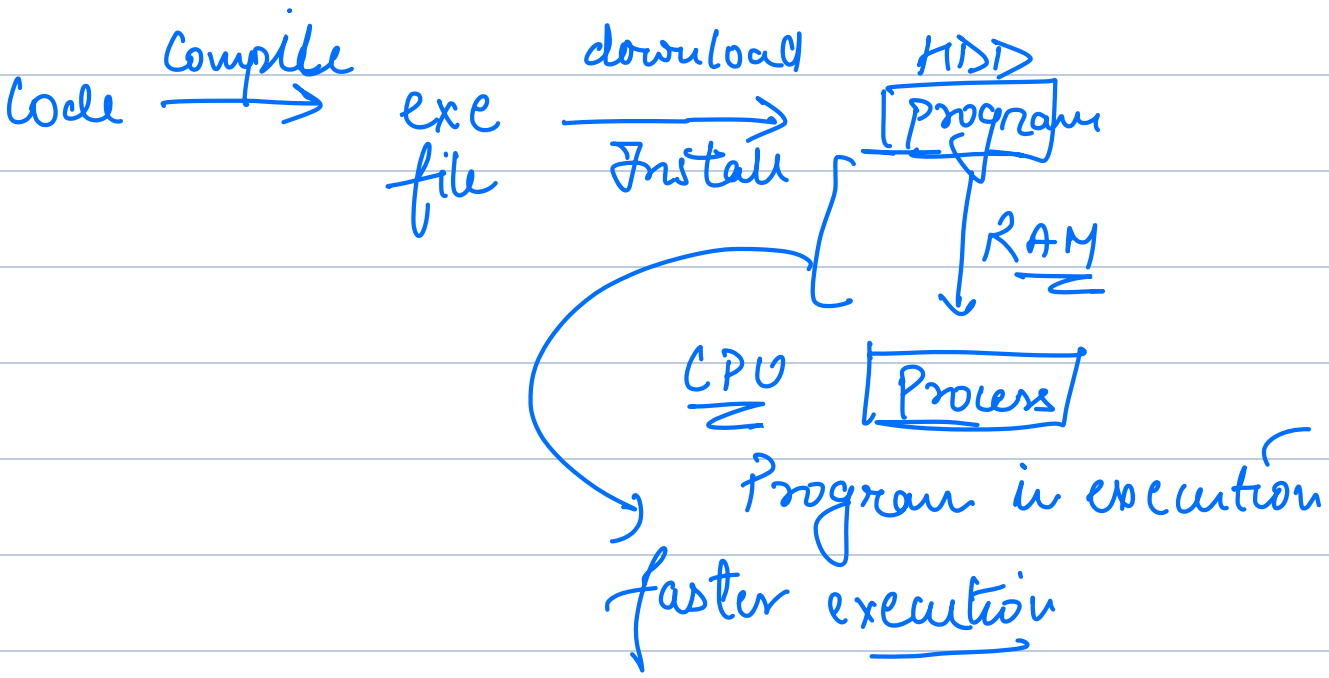
Agenda

1) Processes
2) Threads
3) Context switch
4) Concurrency & Parallelism
5) Code Multithreaded function in JAVA

Thread pool



Process → PCB (Program Control Block)

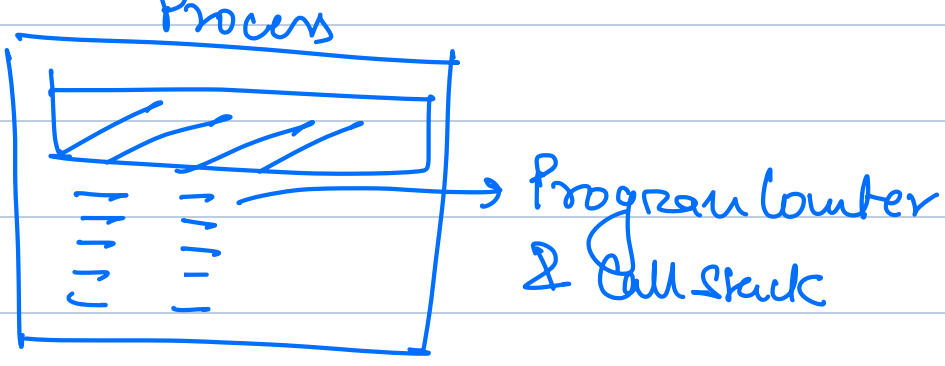
Data structure that store all info about a process.

- Pid
- List<Variables>
- memory details
- priority
- —
- =
- —

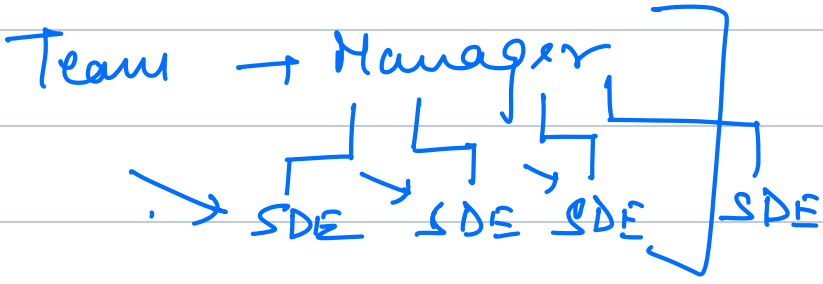
MS Word

- input — P1
- Output — P2
- auto correct — P4
- auto save — P3

Thread → a unit of execution



Thread is lightweight
easier to spawn
can share data with process



10 Tasks

1 SDE

1000 Tasks → CPU

CPU Scheduler (Algorithms)

10 Task

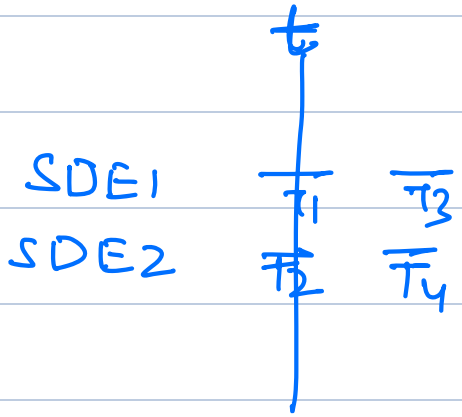
SDE — T_1 — T_2 — - - - T_{10}

One person complete tasks 1 by 1

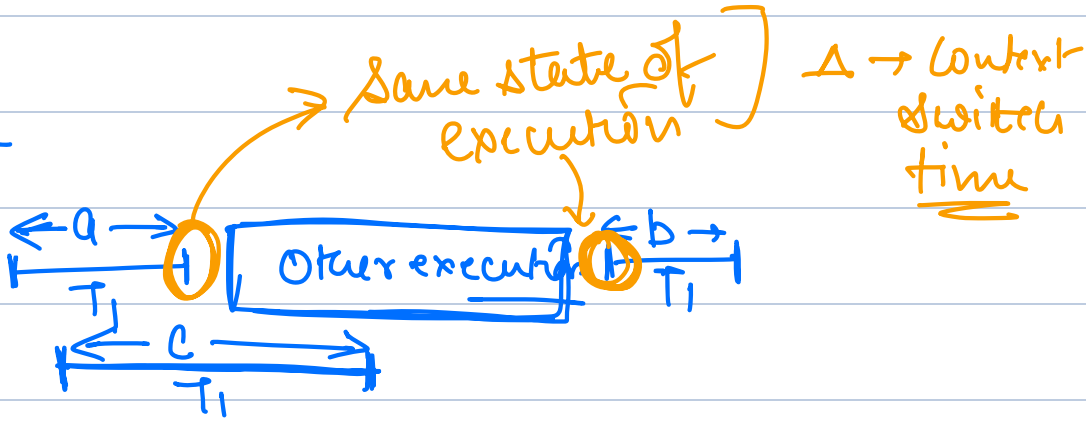
Context Switching

SDE [T_1 T_2 T_1 T_3 T_2 T_1]

Concurrency → Multiple Task in progress.



Single Core



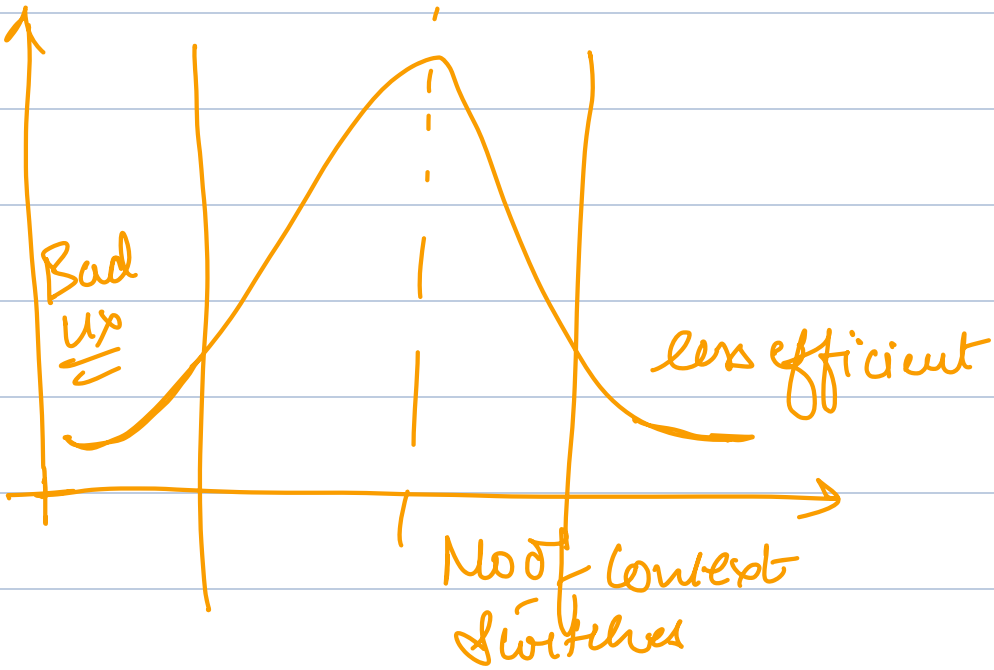
SC 1

SC 2

1) $a+b=c$

2) $a+b>c$ ✓

3) $a+b<c$



1000 Tasks

CPU → Core

2-3 GHz → 2-3 billion instr/sec

Chrome → 100 Tabs → Concurrency
→ Threads

100 tasks → 16 core

16 Tabs → 1 Inst

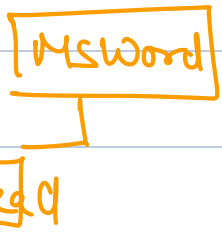
1 billion / sec

[1 / 1 billion]

16 → Cores

[Save a word doc]

↳ Task → Thread



Task

[Feature]

Manager — Process

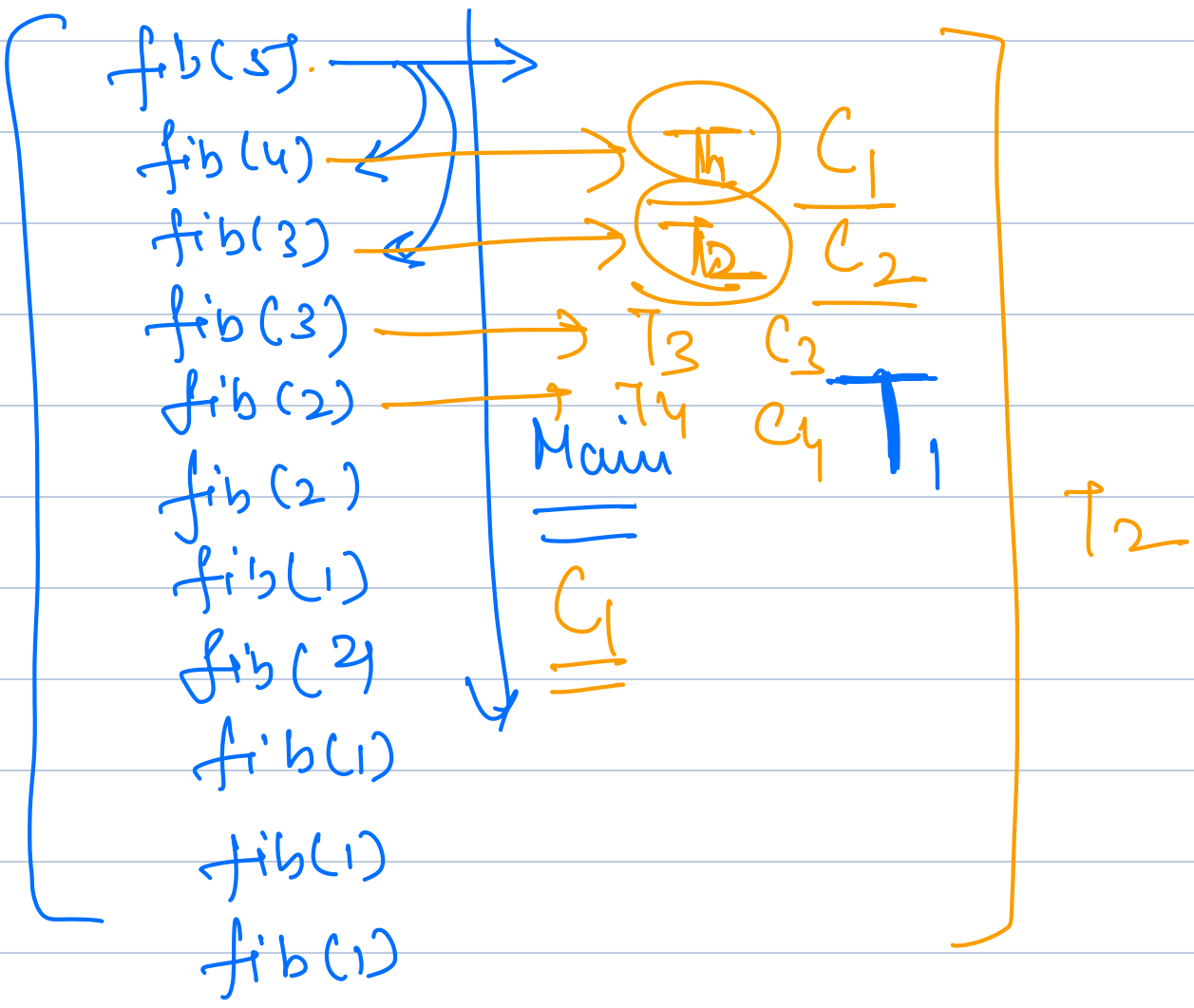
SDE — Thread

5

fib(n) → fib(n-1) + fib(n-2)

Main

n = 5



$T_2 < T_1$