THREAD (light weight process)

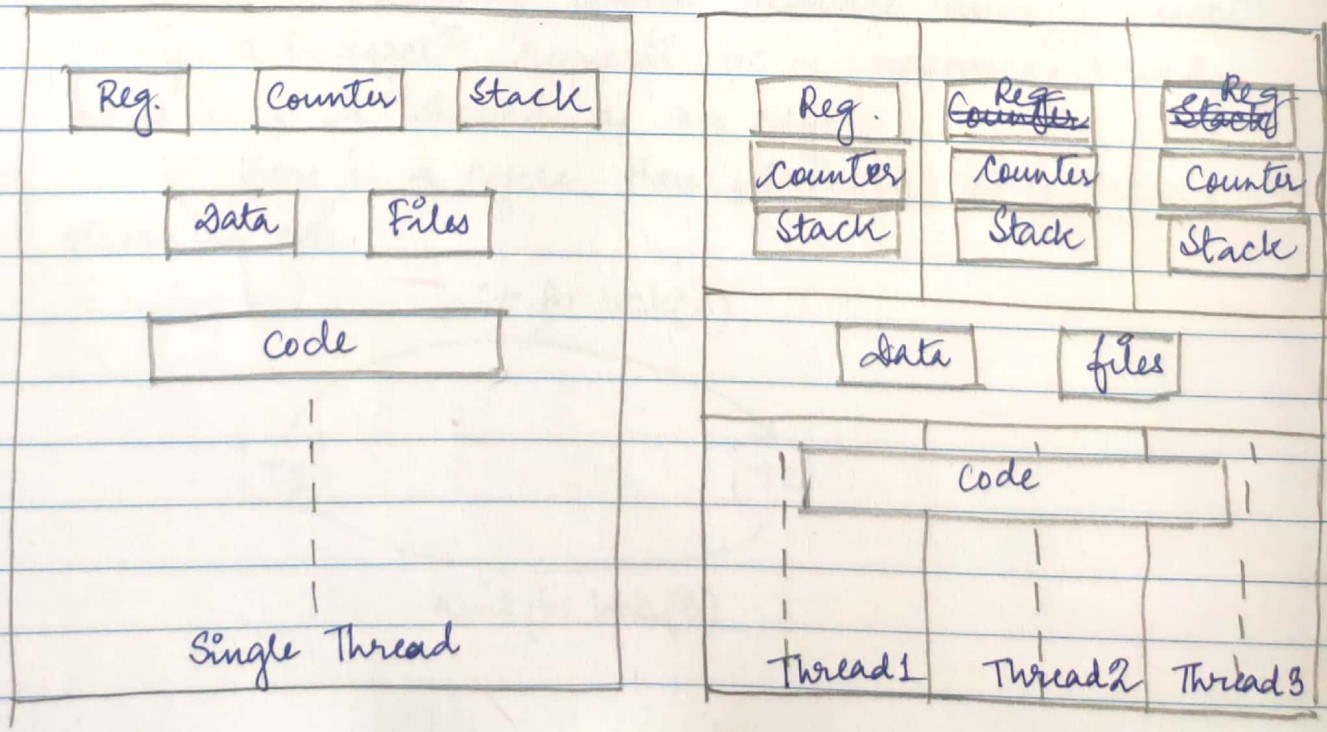
Thread: - Path of execution within a process → can have multiple threads.
- Flow of execution through process code.
- having (1) own program counter.
  - keeps track of which instruction to execute next.
  (2) system register (holds current working variable)
  (3) stack (contains execution history)

shares:
- code segment
- data segment
- open files

has its own:
- PC
- Reg. set
- stack space

NOTE:
- improves performance through parallelism.
- belongs to exactly one process.
- can't exist outside a process.

USE:
- Web server
- N/w server



Advantage: if one thread completes its execution, o/p

- Responsiveness : can be immediately returned.
- minimize context switching time (Fastest context switch)
- provide concurrency within a process
- efficient/easier communicat^{n} (as shared common address space)
- more economical to create
- allow utilizat^{n} of multi-process architecture : for multiple threads, we can schedule those on multiple processor (makes process execution faster).

Types:

- User Level → easy implementation, context switching is fast and does not need h/w support. thread mgmt kernel is not aware of existence of threads.
- Kernel Level → thread mgmt is done by kernel/OS

Eg: 1) MS Word : Edit document while the background grammar & spell checker works to add green and red squiggle under-lines.

2) MS Excel : Automatic background recalculation after cell-edit.

3) Web browser : downloading multiple files from diff. tab.

Real-world Eg.:

2 candidate → A B

n locality, n collector → multiple thread

→ voting process in each locality is a thread.

→ Threading sync^{n} (counting 1 by 1 opening box)

Multi-threading Models

- Many to many
- Many to one
- One to one

Why multi-threading?

- to achieve parallelism by dividing a process into multiple threads.

Eg: In browser, multiple tabs → different/multiple threads.

Process Vs Threads:

individual/different memory space for different process	shared memory space for different threads of a single process
	not independent