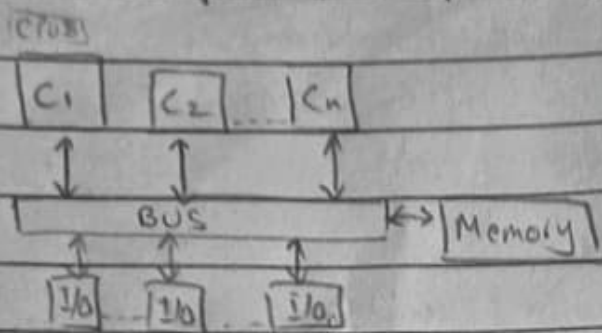# Parallel Computing

Parallel Architecture:-

↳ **Parallel Computer:** A computer system with multiple processors.

A network of computers can be categorized as a parallel ~~comuter~~ computer, however the communication will be slow because the computers were designed as independent machines. An example where this type of architecture could work is called "Special Parallel Machine".

→ Multiple processors allows n times for the instructions to be executed in a given amount of time. Performance ↑, Execution Time ↓. Performance $\propto \dfrac{1}{\text{Exection Time}}$

→ If 1 processor fails, other processors can work
   ↳ for e.g Banks

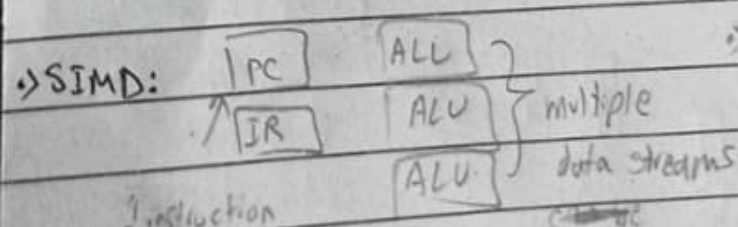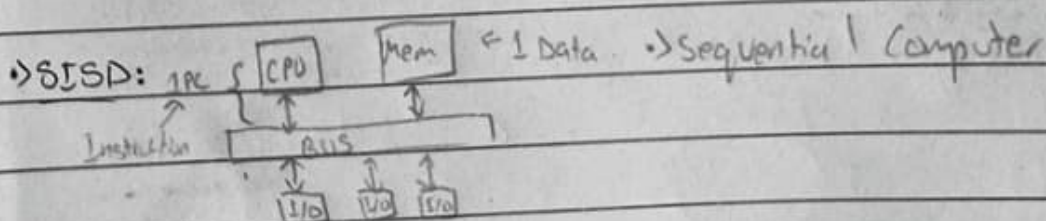| Classification of Parallel Computers	* Instruction :- Path to instruction memory i.e PC
	* Data: Path to data memory i.e e
	SISD, SIMD, MIMD

Flynn's classification: Classified by * Instruction Stream & * Data Stream

→ **SISD:** 1PC, CPU, mem ← 1 Data. → Sequential Computer

→ **SIMD:** PC, IR, ALU, ALU, ALU → multiple data streams
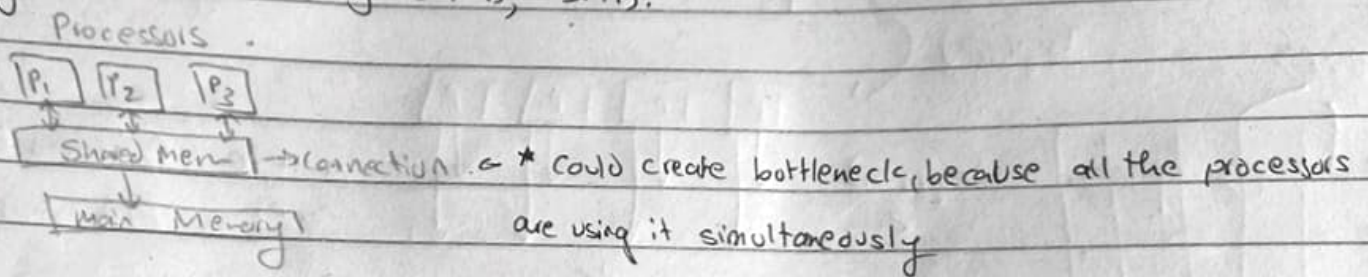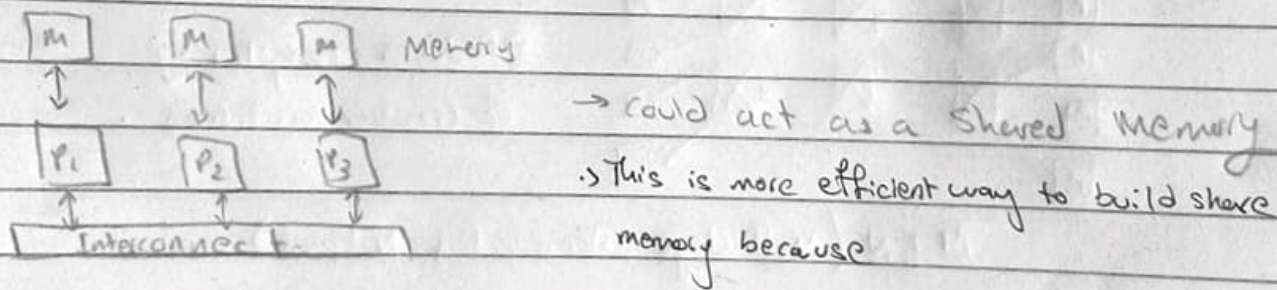   → For Vectors, Vector Computers,
   → Graphics

MIMD: ~~Having~~ A computer that can run multiple processes or ~~a~~ threads ~~consequently~~ but ~~not~~ towards a common object but not cocurrently. They can also run independent programs at the same time (because of multiple processors).

Shared Memory Vs Message Passing

Shared Memory Machine: N processors share the same physical address space i.e (Memory), could be done by SIMD, MIMD.

Processors

P_1 | P_2 | P_3

Shared Mem → Connection ← * Could create bottleneck, because all the processors are using it simultaneously

Main Memory

> Alternate to shared Memory machine is called Message Passing Machine or Distribute Memory Machine.

M | M | M   Memory

P_1 | P_2 | P_3

Interconnect

→ Could act as a Shared Memory
.) This is more efficient way to build share memory because

Interconnections: ~~Processors~~

multiple bus, crossba

.) **Indirect:** Processors are not directly connected to each other but through a medium (Shared b

.) **Direct:-** Processors are directly connected to each other e.g ring, star, mesh, torus)

↳ Routing Technique:- how the route is taken for the message to be ~~delived~~ delivered from source to the ~~bus~~ destination.