Introduction to Parllel Processing

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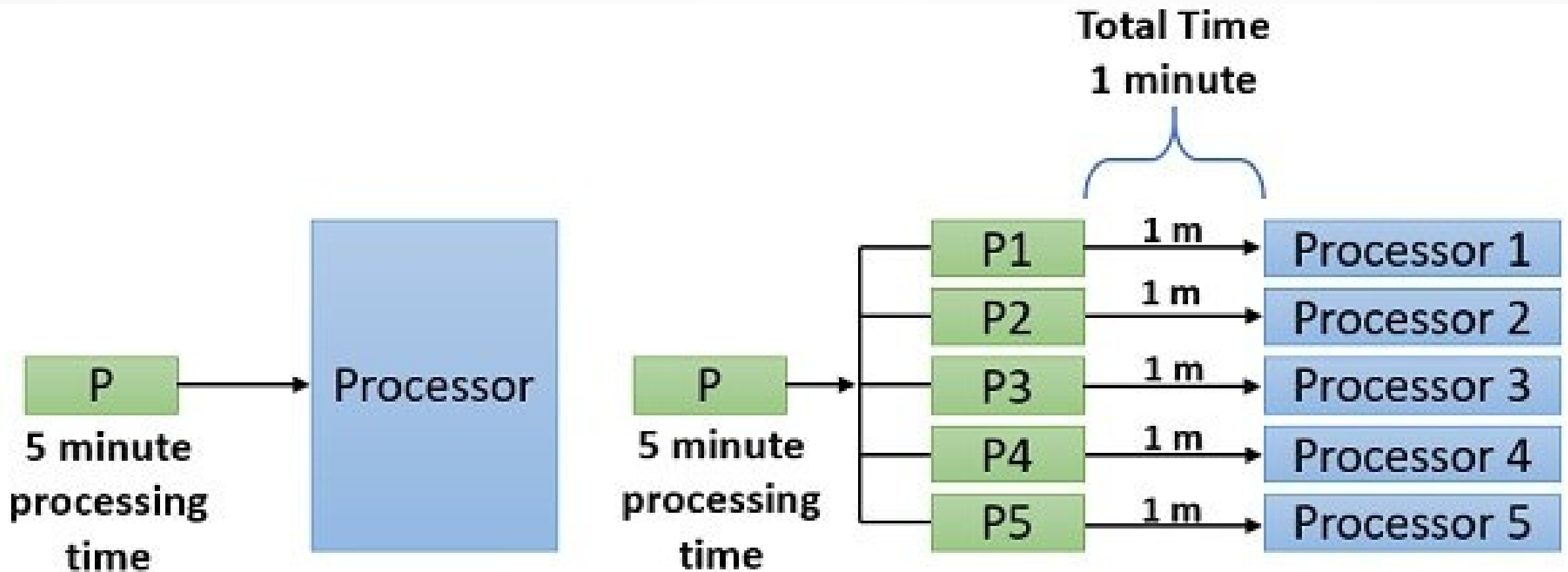- What is Parllel Processing?

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What is Parllel Processing?

- Parllel processing is a technique or a method.It enables a system to perform concurrent data processing to achieve faster execution time.

- If a instruction executes in sequential manner,execution time will be more.So,system performance is degraded.

- Instead of processing each instruction sequentially as in a conventional computer,a parllel processing system is able to perform simaltaneous data processing tasks.

Total Time
1 minute

| | | 1 m | Processor 1 |
P1

| P2 | 1 m | Processor 2 |

P3 | 1 m | Processor 3

P4 | 1 m | Processor 4

P5 | 1 m | Processor 5

P

5 minute processing time

Processor

P

5 minute processing time

Single Processor Vs Multiprocessor in Parallel processing

- If we want to enhance performance of the computer,then we have to use parllel processing systems.

- The underlying idea in parllel computing is that the computational problem can be split into smaller subtasks.Multiple subtasks can then be executed simaltaneously by multiple processing units.

- For instance,while an instruction is being processed in the ALU component of the CPU,the next instruction can be read from memory.

- The system may have two or more ALUs and be able to execute two or more instructions at the same time.Furthermore,the system may have two or more processors operating concurently.

- The purpose of parllel processing is to speed up the computer processing capability and increase its throughput i.e.the amount of processing that can be accomplished during a given interval of time.

- The major advantage of parllel processing is,it increases the system performance.

- Somewhat the disadvantage is the amount of hardware increases with parllel processing and with it, the cost of the system increases.However,some technological developments have reduced hardware costs.

- That is,parllel processing techniques are economically feasible.

Multiple functional units of ALU:

- Parllel processing is established by distributing the data among the multiple functional units.

- For example,the arithmetic,logic and shift operations can be separated into three units and the operands diverted to each unit under the supervision of a control unit.

- Below fig shows one possible way of separating the execution unit into 8 functional units operating in parllel.
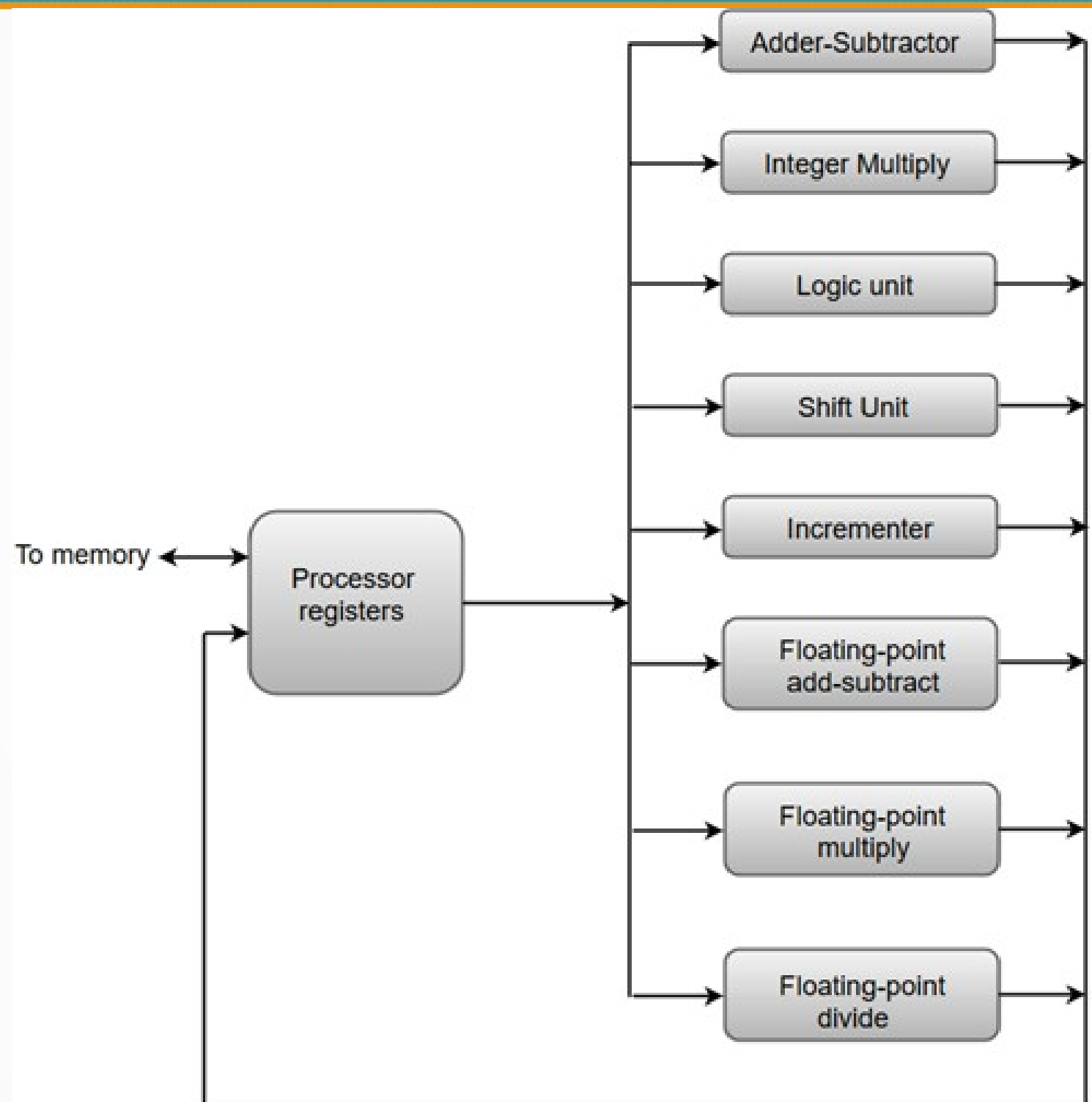
Flynn's Classification:

- There are a variety of ways that parllel processing can be classified.

- One classification introduced by M.J.Flynn considers the orginization of a computer system by the no.of instructions and data items that are manipulated simultaneously.

- The normal operation of a computer is to fetch instructions from memory and executes them in the processor.

- The sequence of instructions read from "memory" constitutes an "instruction stream".The operations performed on the data in the "processor" constitutes a "data stream".

- Flynn's classification divides computers into four major groups as follows:

  1.Single Instruction stream,Single Data stream(SISD)

  2.Single Instruction stream,Multiple Data stream(SIMD)

  3.Multiple Instruction stream,Single Data stream(MISD)

  4.Multiple Instruction stream,Multiple Data stream(MIMD)