UNIVERSITY OF ENGINEERING AND TECHNOLOGY, TAXILA

FACULTY OF TELECOMMUNICATION AND INFORMATION ENGINEERING

COMPUTER/SOFTWARE ENGINEERING DEPARTMENT

PARALLEL PROCESSING

2K5-CP,SE

INSTRUCTOR: ENGR.WAJAHAT ABBAS

Lecture-3

- Decades of Computing
- Models of Computation (Flynn's Classification)

Decades of Computing

Batch Era

- IBM System/360 mainframe dominated the corporate computer centers. It was the typical batch processing machine with punched card readers, tapes and disk drives, but no connection beyond the computer room.
- The IBM System/360 had an operating system, multiple programming languages, and 10 megabytes of disk storage.

Time-Sharing Era

- Advances in semiconductor technology made the solid-state memory and integrated circuit feasible.
- Small, fast, and inexpensive enough to be spread throughout the company at the divisional level.
- Too expensive

Desktop Era

- Personal computers from Compaq, Apple, IBM, Dell, and many others became pervasive, and changed the face of computing.
- Local area networks (LAN) of powerful personal computers and workstations began to replace mainframes and minis.

Network Era

- Rapid advances in network technology.
- Introduction of many commercial parallel computers with multiple processors.

FLYNN'S TAXONOMY OF COMPUTER ARCHITECTURE

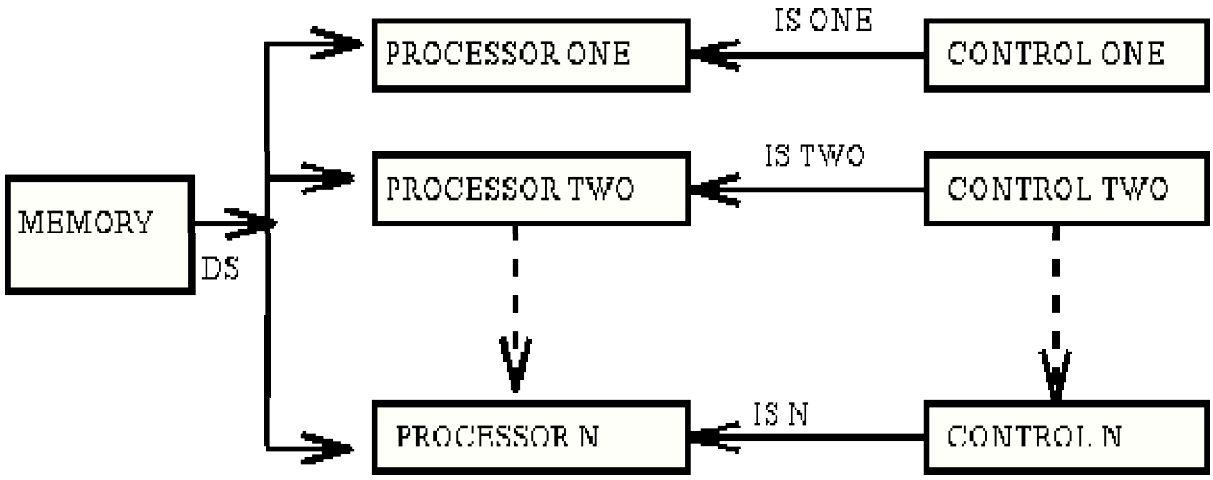
- Any computer, whether sequential or parallel, operates by executing instructions on data.
  - A stream of instructions (the algorithm) tells the computer what to do.
  - A stream of data (the input) is affected by these instructions.
- Depending on whether there is one or several of these streams, we have four classes of computers.
  - § Single Instruction Stream, Single Data Stream : SISD.
  - § Multiple Instruction Stream, Single Data Stream : MISD.
  - § Single Instruction Stream, Multiple Data Stream : SIMD.
  - § Multiple Instruction Stream, Multiple Data Stream : MIMD.

SISD

- A single processing unit receives a single stream of instructions that operate on a single stream of data.

MISD

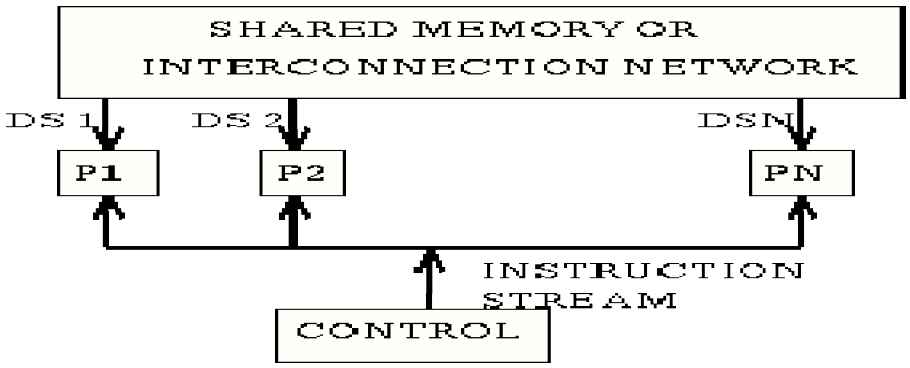
- N processors, each with its own control unit, share a common memory



IS = INSTRUCTION STREAM DS = DATA STREAM

SIMD

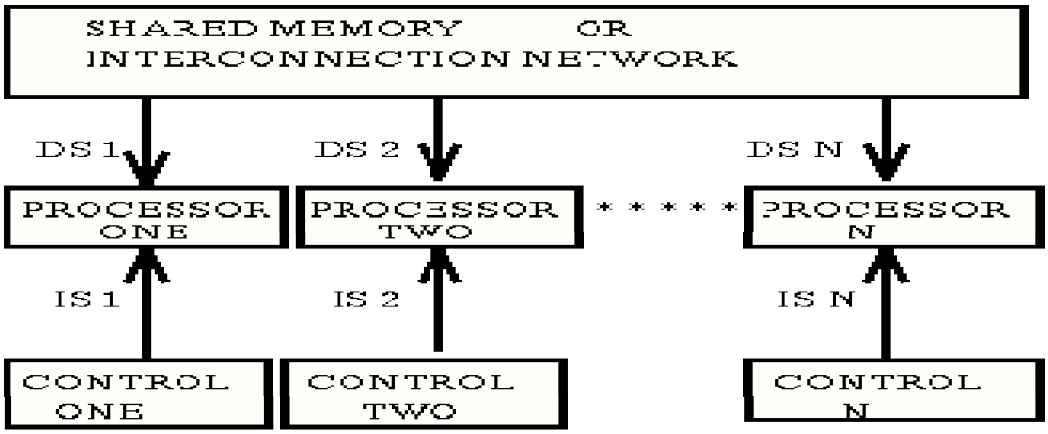
- All N identical processors operate under the control of a single instruction stream issued by a central control unit.



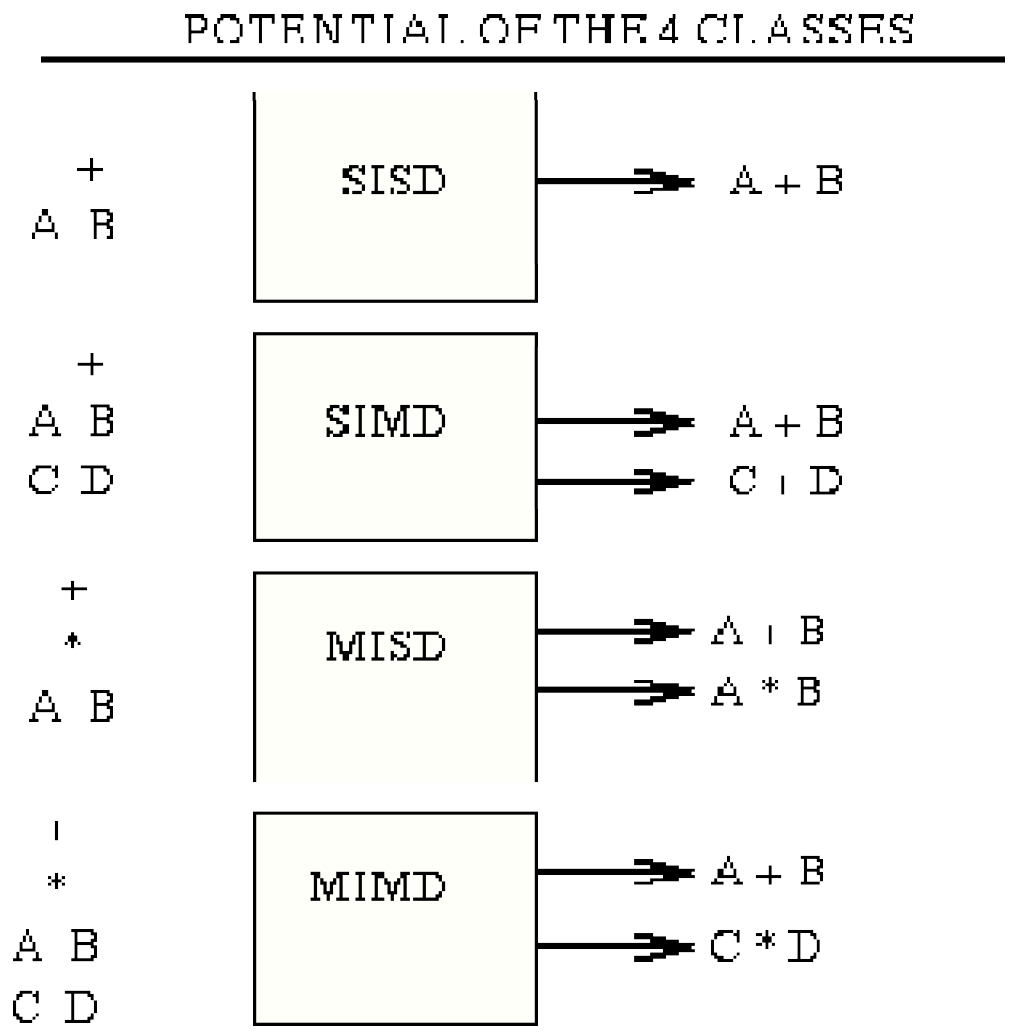
P = PROCESSOR
DS = DATA STREAM

MIMD

- This is the most general and most powerful of our classification. We have N processors, N streams of instructions and N streams of data.



DS = DATA STREAM IS = INSTRUCTION STREAM



Note: SIMD and MIMD Configurations will be discussed in detail in next lecture.