Flynn's Classification Of Computer Architectures

- In 1966, Michael Flynn proposed a classification for computer architectures based on the number of instruction steams and data streams (Flynn's Taxonomy).
- Flynn uses the stream concept for describing a machine's structure
- A stream simply means a sequence of items (data or instructions).
- The classification of computer architectures based on the number of instruction steams and data streams (Flynn's Taxonomy).

Flynn Classification Of Computer architectures

Flynn's Taxonomy

- SISD: Single instruction single data
  – Classical von Neumann architecture
- SIMD: Single instruction multiple data
- MISD: Multiple instructions single data– Non existent, just listed for completeness
- MIMD: Multiple instructions multiple data – Most common and general parallel machine

SISD

- **SISD** (**S**inge-**I**nstruction stream, **S**inge-**D**ata stream)
- SISD corresponds to the traditional mono-processor (von Neumann computer). A single data stream is being processed by one instruction stream

OR

- A single-processor computer (uni-processor) in which a single stream of instructions is generated from the program.

SISD

where CU= Control Unit, PE= Processing Element,
M= Memory

SIMD

- **SIMD** (**S**ingle-**I**nstruction stream, **M**ultiple-**D**ata streams)
- Each instruction is executed on a different set of data by different processors i.e multiple processing units of the same type process on multiple-data streams.
- This group is dedicated to array processing machines.
- Sometimes, vector processors can also be seen as a part of this group.

SIMD

where CU= Control Unit, PE= Processing Element,
M= Memory

MISD

- **MISD** (**M**ultiple-**I**nstruction streams, **S**inge-**D**ata stream)
- Each processor executes a different sequence of instructions.
- In case of MISD computers, multiple processing units operate on one single-data stream .
- In practice, this kind of organization has never been used

MISD

where CU= Control Unit, PE= Processing Element,
M= Memory

MIMD

- **MIMD** (**M**ultiple-**I**nstruction streams, **M**ultiple- **D**ata stream)
- Each processor has a separate program.
- An instruction stream is generated from each program.
- Each instruction operates on different data.
- This last machine type builds the group for the traditional multi-processors. Several processing units operate on multiple-data streams.

MIMD Diagram