Presentation on Flynn classification

Presented by

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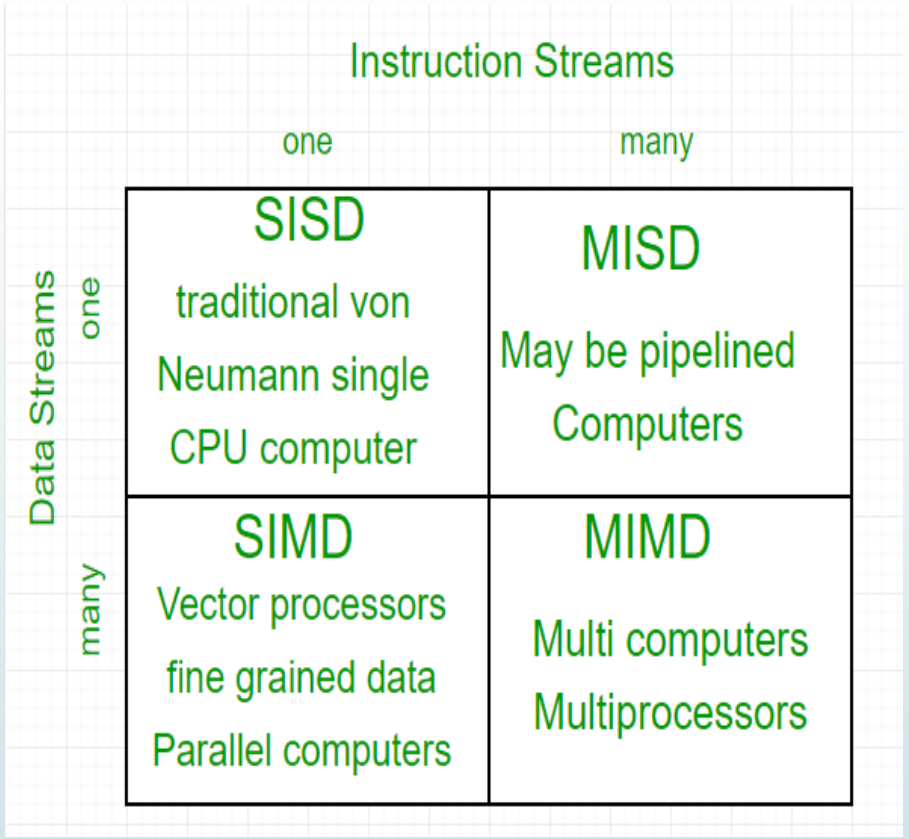
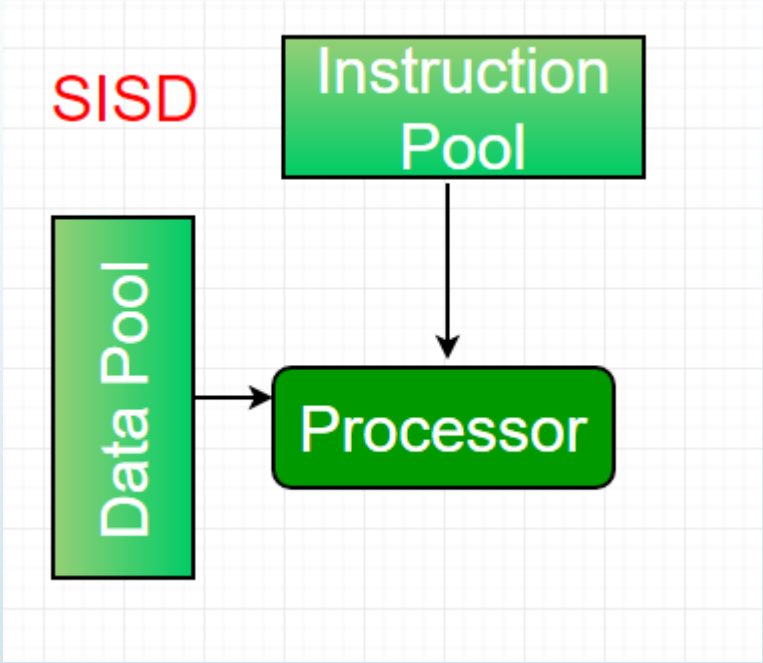
Flynn classification

- M.J. Flynn proposed a classification for the organization of a computer system by the number of instructions and data items that are manipulated simultaneously.
- The sequence of instructions read from memory constitutes an **instruction stream**.
- The operations performed on the data in the processor constitute a **data stream**.
- **Parallel computing** is a computing where the jobs are broken into discrete parts that can be executed concurrently. Each part is further broken down to a series of instructions. Instructions from each part execute simultaneously on different CPUs. Parallel systems deal with the simultaneous use of multiple computer resources that can include a single computer with multiple processors, a number of computers connected by a network to form a parallel processing cluster or a combination of both.


Instruction Streams
one
many
Data Streams
one
many
SISD
traditional von Neumann single CPU computer
MISD
May be pipelined Computers
SIMD
Vector processors
fine grained data
Parallel computers
MIMD
Multi computers
Multiprocessors

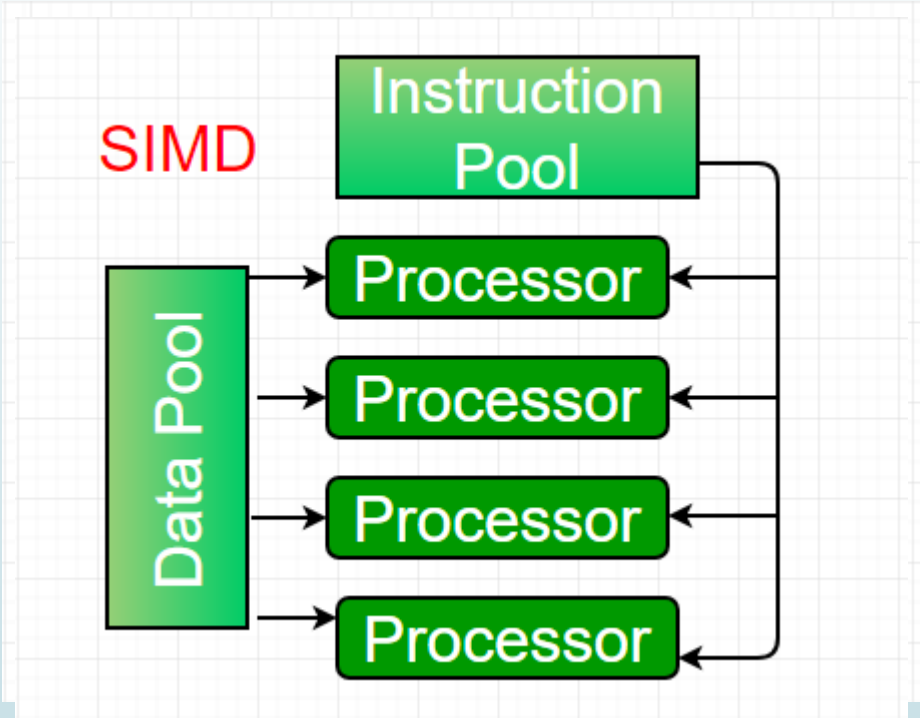
- **Single-instruction, single-data (SISD) systems –**

An SISD computing system is a uniprocessor machine which is capable of executing a single instruction, operating on a single data stream. In SISD, machine instructions are processed in a sequential manner and computers adopting this model are popularly called sequential computers. Most conventional computers have SISD architecture. All the instructions and data to be processed have to be stored in primary memory.


SISD
Instruction Pool
Data Pool
Processor

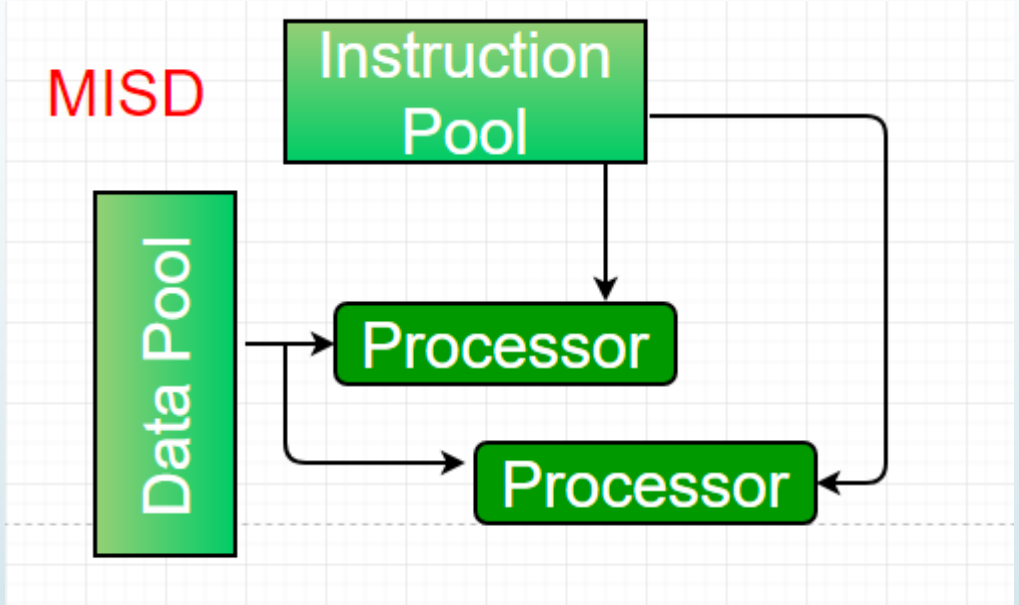
- **Single-instruction, multiple-data (SIMD) systems –**

An SIMD system is a multiprocessor machine capable of executing the same instruction on all the CPUs but operating on different data streams. Machines based on an SIMD model are well suited to scientific computing since they involve lots of vector and matrix operations. So that the information can be passed to all the processing elements (PEs) organized data elements of vectors can be divided into multiple sets(N-sets for N PE systems) and each PE can process one data set.


SIMD
Instruction Pool
Data Pool
Processor
Processor
Processor
Processor

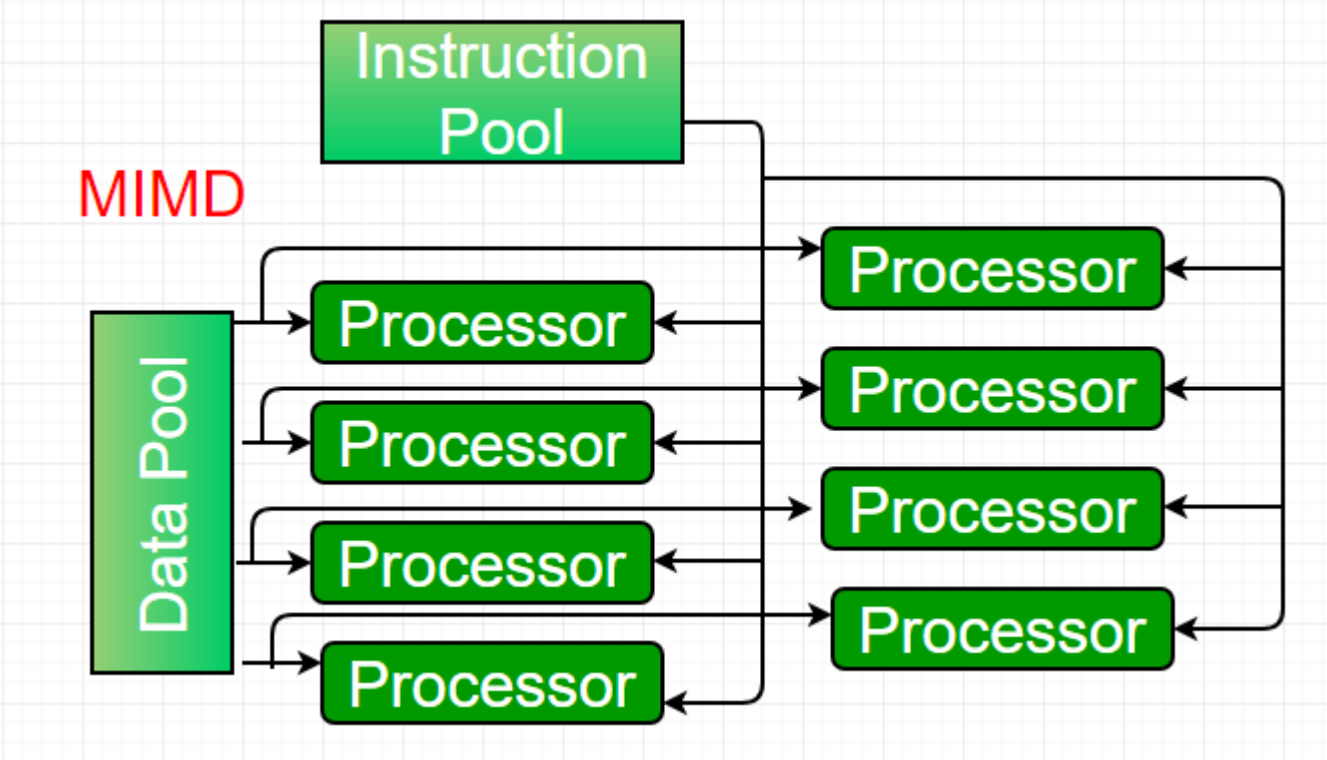
- **Multiple-instruction, single-data (MISD) systems –**

An MISD computing system is a multiprocessor machine capable of executing different instructions on different PEs but all of them operating on the same dataset .


MISD
Instruction Pool
Data Pool
Processor
Processor

- **Multiple-instruction, multiple-data (MIMD) systems –**

An MIMD system is a multiprocessor machine which is capable of executing multiple instructions on multiple data sets. Each PE in the MIMD model has separate instruction and data streams; therefore machines built using this model are capable to any kind of application. Unlike SIMD and MISD machines, PEs in MIMD machines work asynchronously.


MIMD
Instruction Pool
Data Pool
Processor
Processor
Processor
Processor
Processor
Processor
Processor
Processor