

HPC Chapter 1: Introduction to Parallel Computing

Classification Models: Architectural Schemes (Flynn 's, Feng 's, Handler 's)

Flynn 's Classification Scheme is based on the notion of a stream of information. Two types of information flow into a processor: instructions and data.

The instruction stream is defined as the sequence of instructions performed by the processing unit.

The data stream is defined as the data traffic exchanged between the memory and the processing unit.

Types of Flynn 's Taxonomy:

1. SISD single-instruction single data stream
2. SIMD single-instruction multiple data stream
3. MISD multiple-instructions single data stream
4. MIMD multiple instructions multiple data stream

SISD (Single Instruction Single Data): Traditional single processor von Neumann computers are classified as SISD.

SIMD (Single Instruction Multiple Data): Multiple processors execute same instruction on different data in parallel.

MISD (Multiple Instruction Single Data): Multiple processors execute different instructions on the same data (not commonly used).

MIMD (Multiple Instruction Single Data): Multiple processors execute different instructions on the different data.

Further classified into:

- Shared Memory (SMP)
- Message Passing (Distributed Memory)

Feng 's Classification suggested the use of degree of parallelism to classify various computer architecture.

The maximum number of binary digits that can be processed within a unit time by a computer system is called the maximum parallelism degree P .

A bit slice is a string of bits one from each word at the same vertical position.

Types of Feng 's classification:

1. Word Serial Bit Serial (WSBS)
2. Word Parallel Bit Serial (WPBS)
3. Word Serial Bit Parallel (WSBP)
4. Word Parallel Bit Parallel (WPBP)