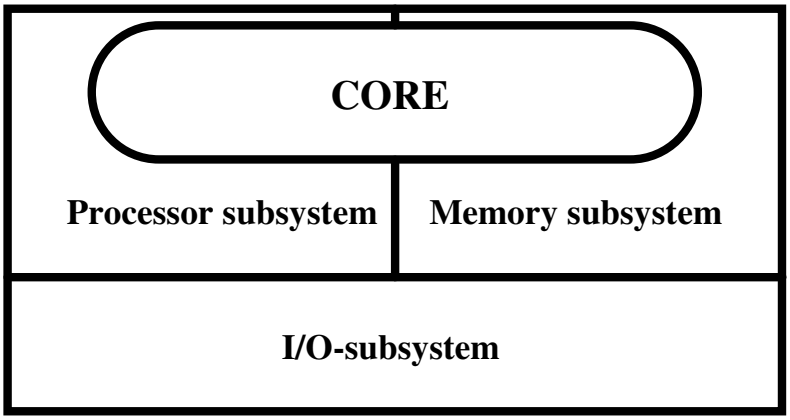
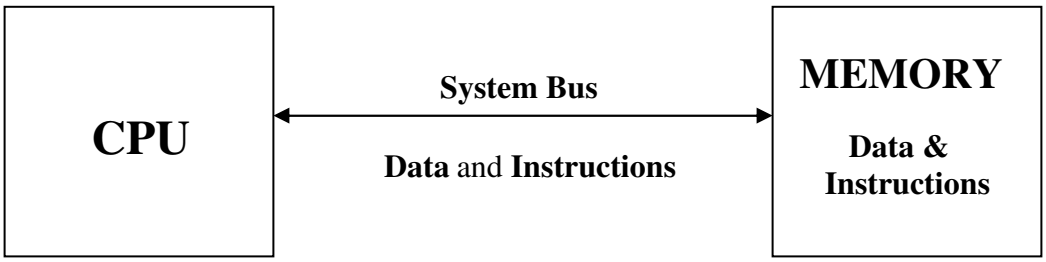
Computer Architecture

Computer Model

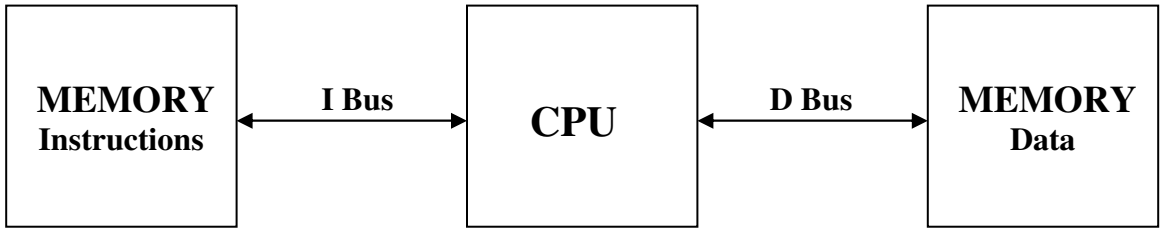


Classical Architectures

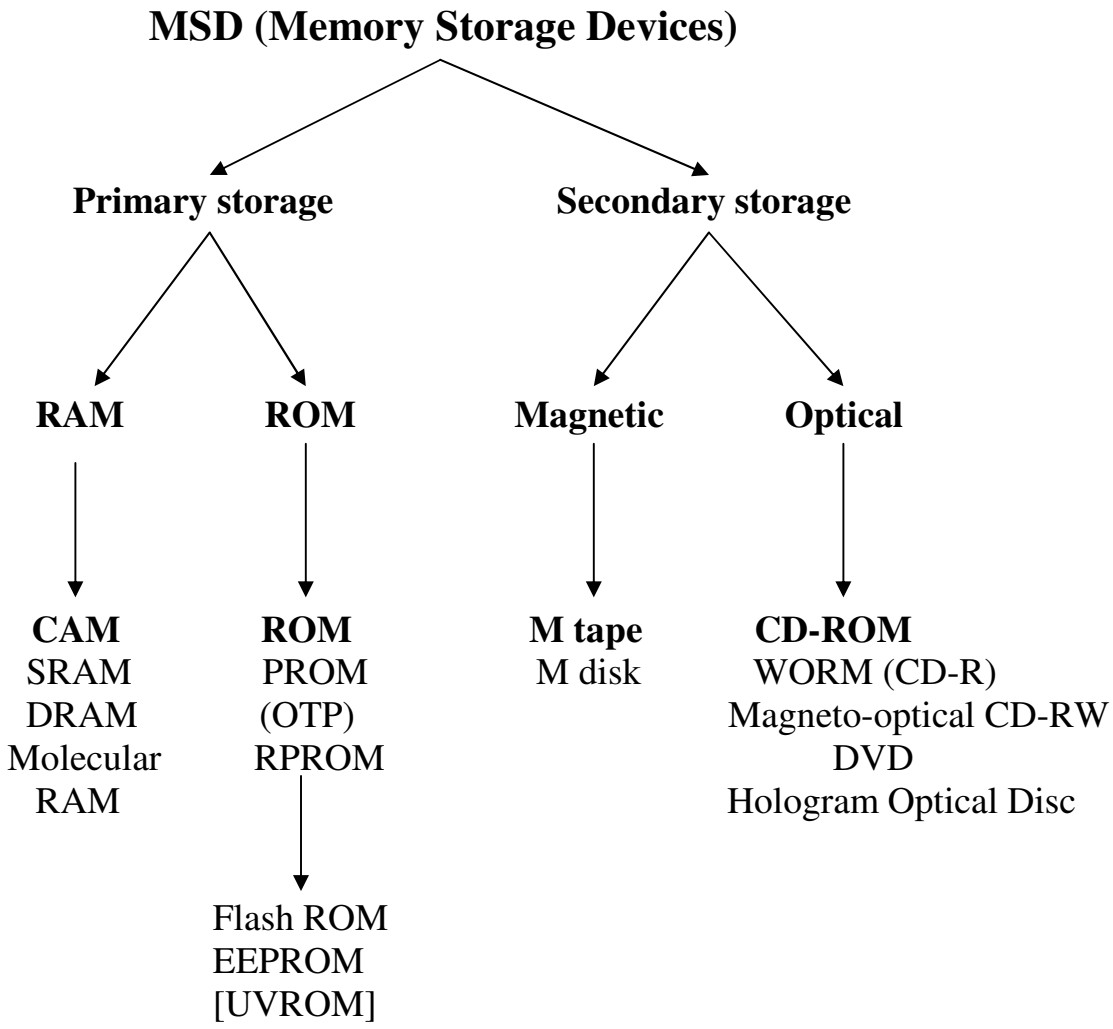
Princeton or **von Neumann architecture**



Harvard architecture

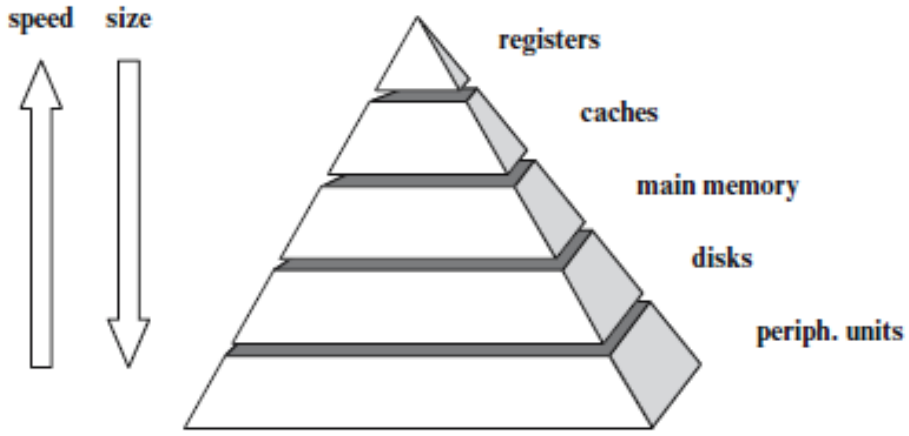


MEMORY SYSTEM

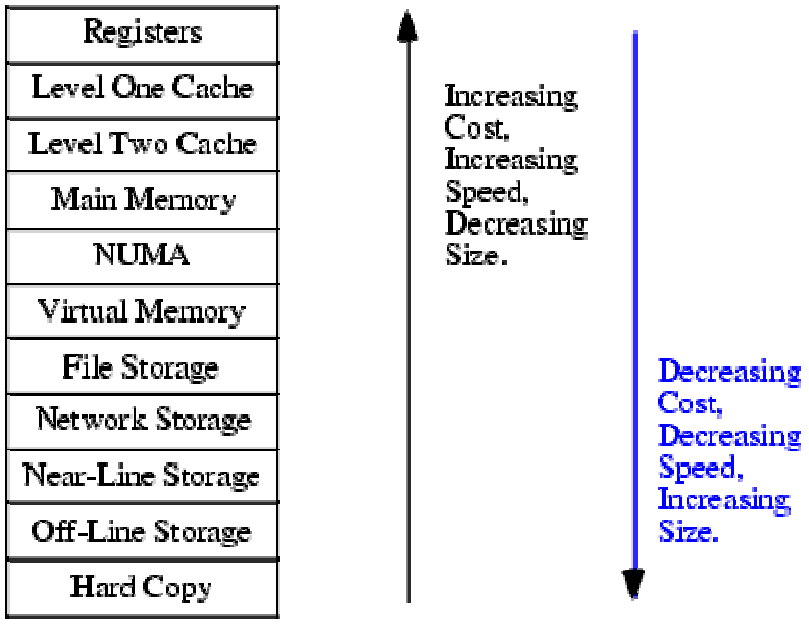


CAM – **C**ontent **A**ddressable **M**emory (Associative Memory)

Memory Hierarchy



Memory hierarchy wide-spread model



Memory hierarchy complex model

Memories Internal (architectural) Organization

DRAM – dynamic RAM

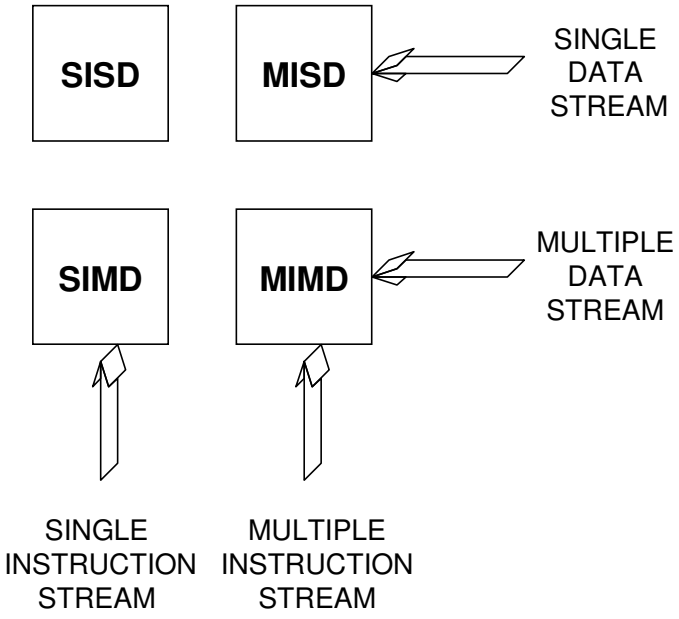
SDRAM - synchronous dynamic RAM

DDR-SDRAM - double-data-rate SDRAM

MDRAM – multi-bank DRAM

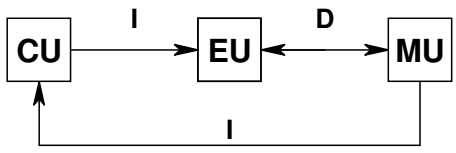
ESDRAM - cache-enhanced DRAM

MULTIPROCESSOR SYSTEMS

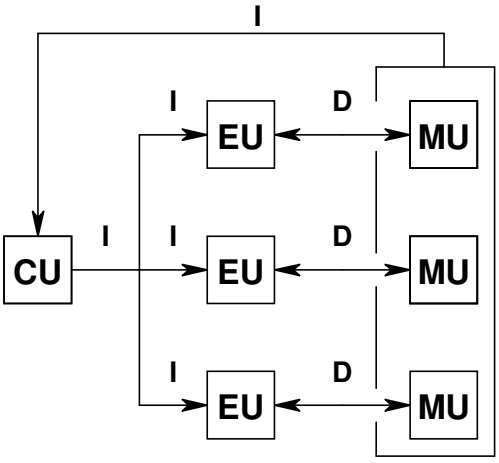


SISD Architecture

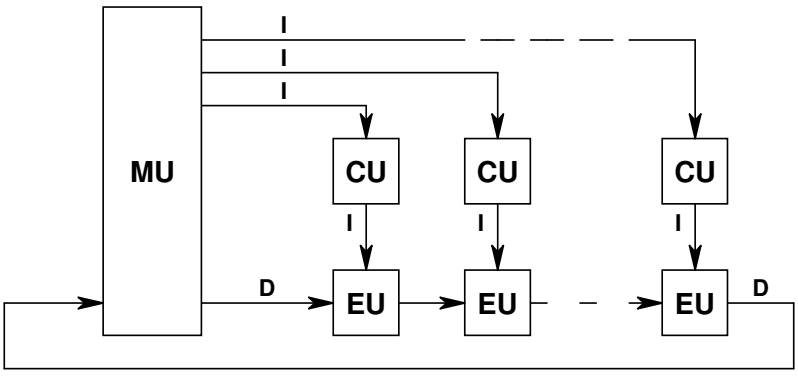
I- instructions; **D** – data



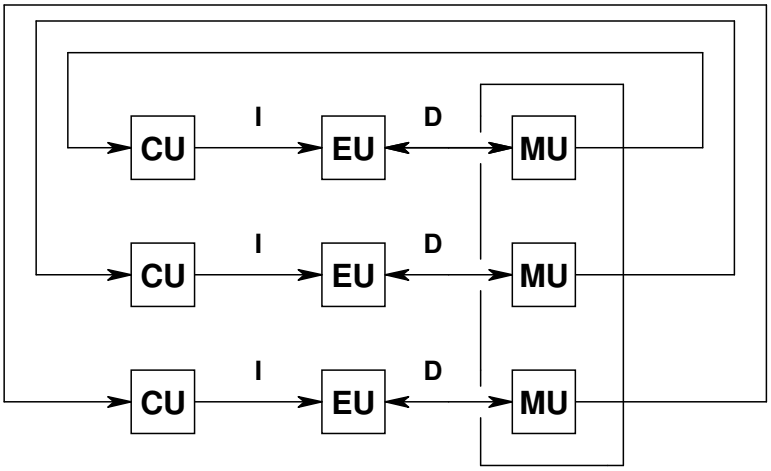
SIMD Architecture

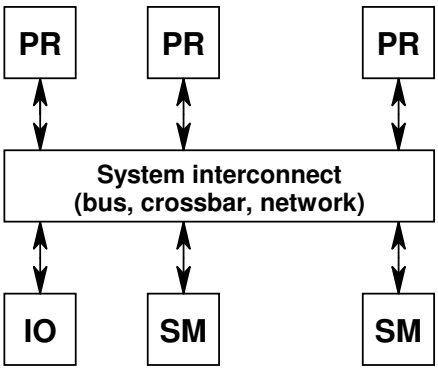


MISD Architecture



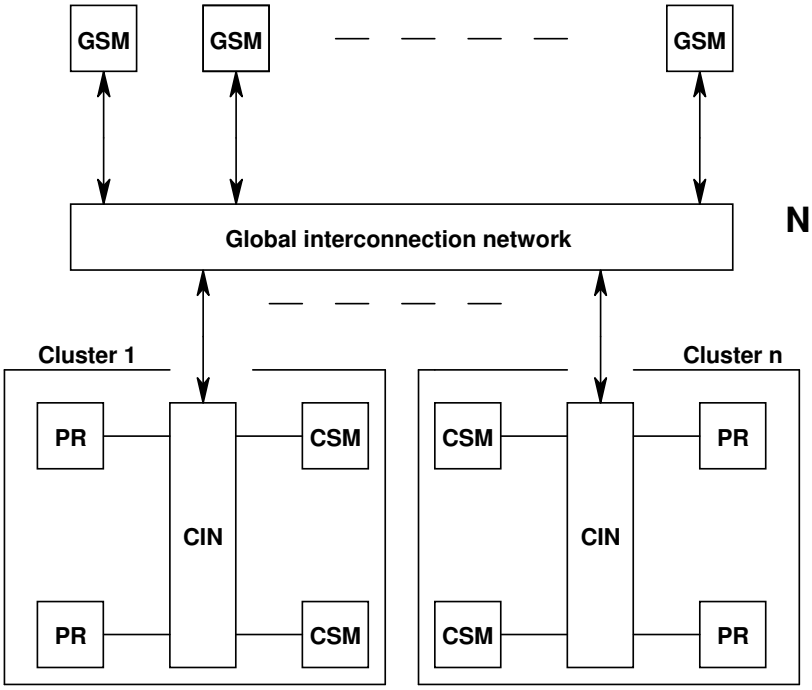
MIMD Architecture





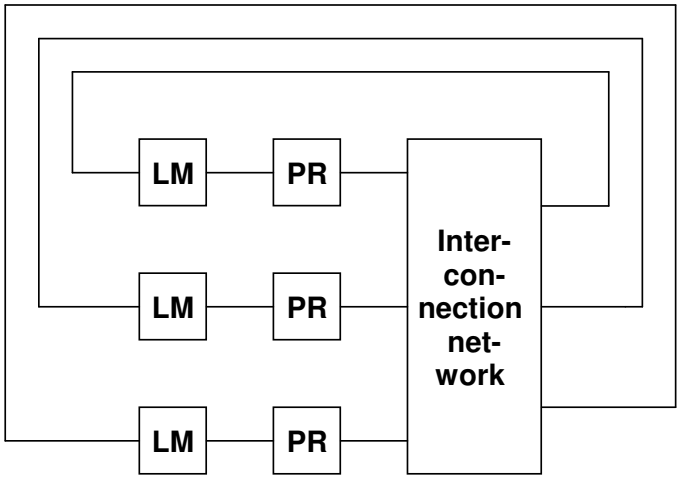
UMA model

SM - Shared Memory
LM – Local Memory



NUMA model (cluster)

PR – processor; **IO** – input-output unit; **SM** – shared memory; **LM** – local memory;
GSM – global shared memory; **CSM** – cluster shared memory;
CIN – cluster interconnection network.



NUMA model (butterfly)

Microprocessor systems capabilities are related to system processing capabilities include:

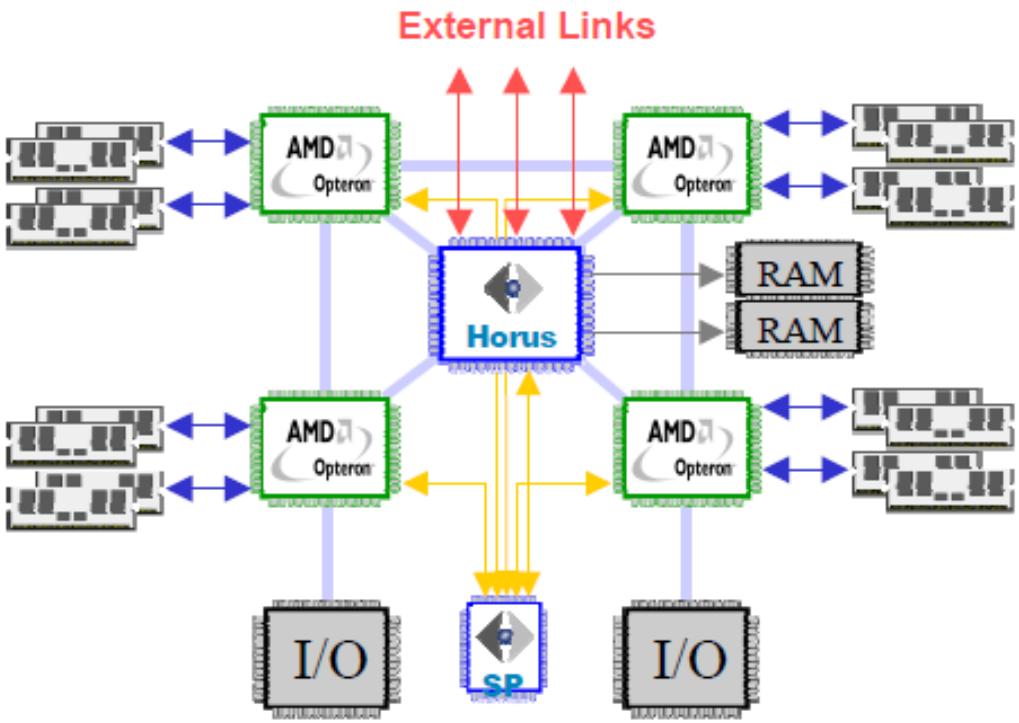
Cost-performance

Throughput (operations per time unit)

Resource sharing

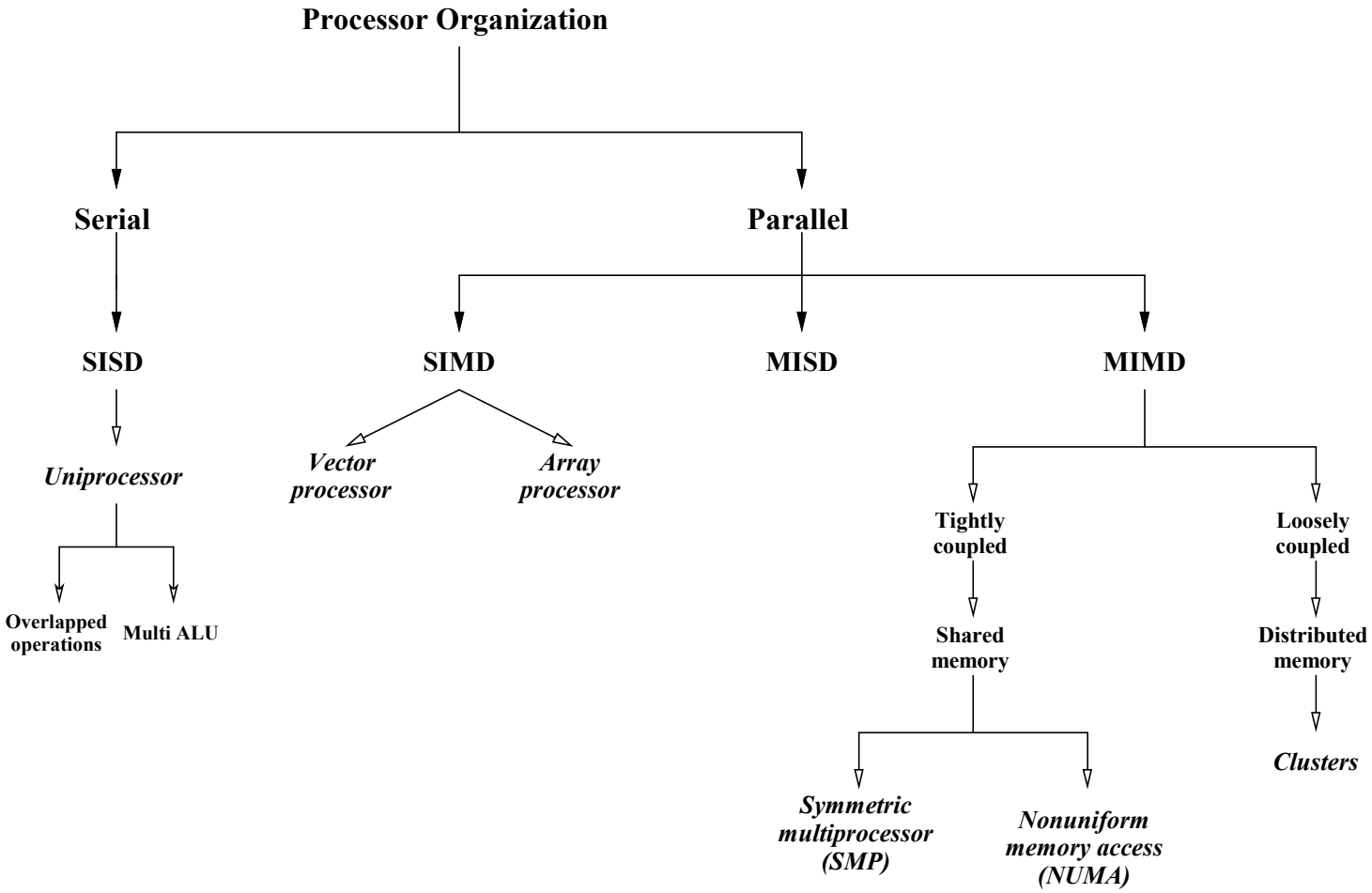
Example

The Newisys ASIC implementation ***HORUS***



Summary

Taxonomy of Mono- and Multiprocessor Organizations



Literature

Arthur W. Burks, Herman H. Goldstine, John von Neumann. Preliminary Discussion of the Logical Design of an Electronic Computing Instrument.
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http://www.cs.unc.edu/~adyilie/comp265/vonNeumann.html