Introduction to MIMD architectures

• Multi-processor
• Multi-computer
15.1 Architectural concepts
15.2 Problems of scalable computers
15.3 Main design issues of scalable MIMD computers

Multi-computer (distributed memory system):
Advantages and Disadvantages

• +Highly Scalable
• +Message passing solves memory access synchronization problem
• -Load balancing problem
• -Deadlock in message passing
• -Need to physically copying data between processes

Multi-processor (shared memory system):
Advantages and Disadvantages

• +May use uniprocessor programming techniques
• +Communication between processor is efficient
• -Synchronized access to share data in memory needed
• -Lack of scalability due to (memory) contention problem

Best of Both Worlds
(Multicomputer using virtual shared memory)

• Also called distributed shared memory architecture
• The local memories of multi-computer are components of global address space:
  ➔ any processor can access the local memory of any other processor
• Three approaches:
  ➔ Non-uniform memory access (NUMA) machines
  ➔ Cache-only memory access (COMA) machines
  ➔ Cache-coherent non-uniform memory access (CC-NUMA) machines