Chapter 12: Multiprocessor Architectures

Lesson 06:

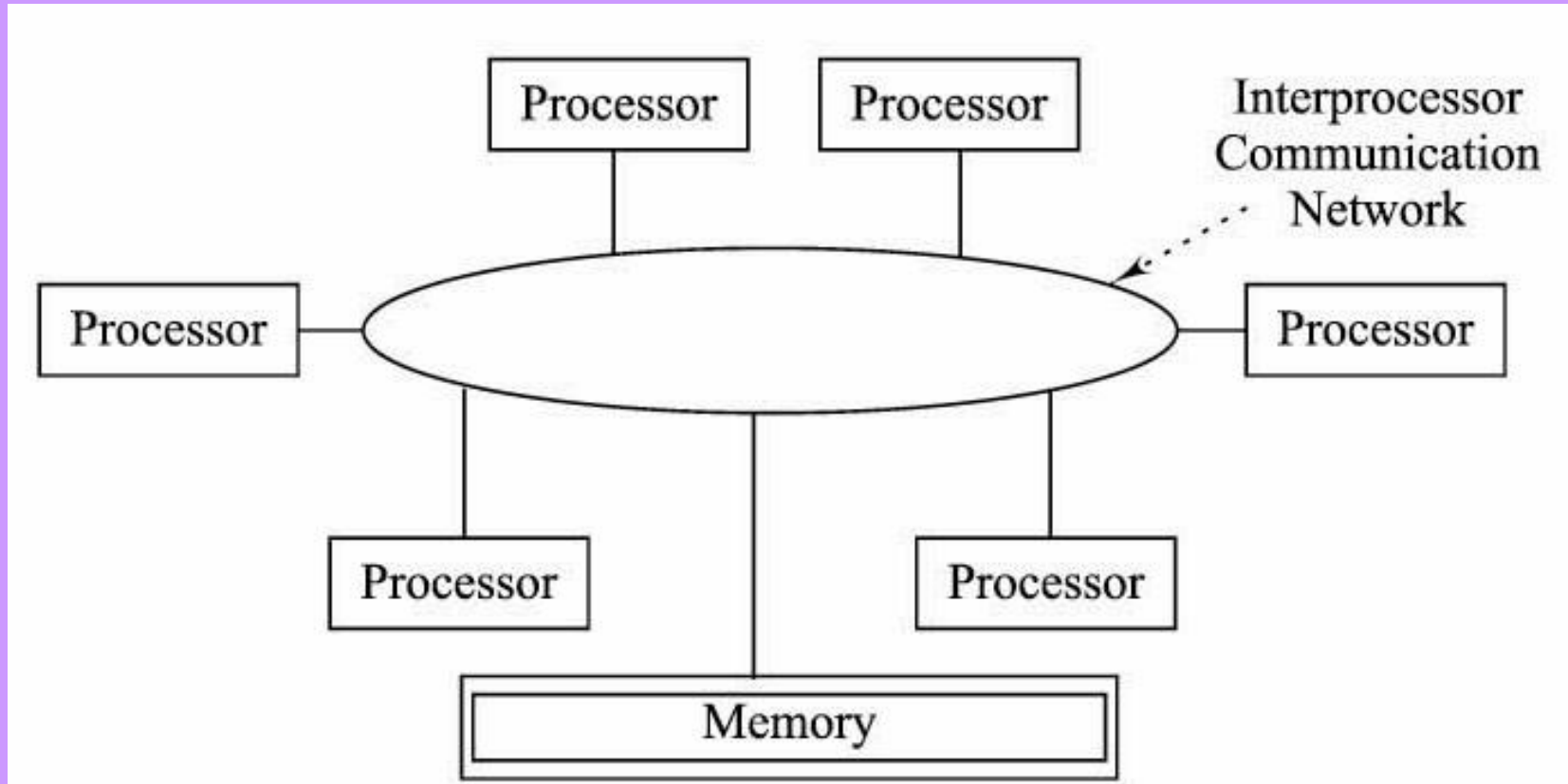## Centralized Shared Memory Architecture

Objective

- To understand centralized memory architectures of multiprocessor systems

Centralized memory systems

Centralized memory architecture

- One memory system for the entire multiprocessor system

- Memory references from all of the processors go to that memory system

Centralized Memory Architecture

Advantages of Centralized memory systems

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- All of the data in the memory accessible to any processor

- Never a problem with multiple copies of a given datum existence

The limitations

Limitations of Centralized memory systems

- Bandwidth of the centralized memory system does not grow as the number of processors in the machine increases

- Latency of the network added to the latency of each memory reference

Addressing the limitations

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- Many centralized-memory multiprocessors provide a local cache for each processor

- Only send requests that miss in the processor's cache over the network to the main memory

Addressing the limitations

- Requests that hit in the cache handled quickly and do not need to travel over the network

- Reducing the amount of data that the network must carry

- Thus allowing the main memory to support more processors

Problem with more than one copy in caches

- More than one cache may have a copy of a given memory location, creating some cache coherence problem

Preference for centralized in small multiprocessor systems

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- Centralized memory systems often the better design when the number of processors in the system small

- For these systems, a single memory system may be able to meet the bandwidth demands of the processors, particularly if each processor has a local cache memory

Advantages of meeting bandwidth demand

- The reduction in design and programming complexity that comes from not having to manage multiple independent memories

Summary

We Learnt

- Centralized memory system

- Limitations of centralized

- Better for small multiprocessors systems

End of Lesson 06 on
Centralized Shared Memory Architecture