

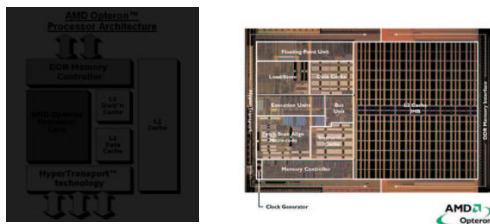
Buses

4-23-2003

Opening Discussion

- What did we talk about last class?
- Have you seen anything interesting in the news?

Opteron Diagrams

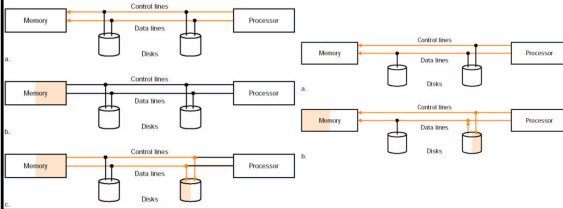


Buses

- The different components of a computer have to talk. The way they do that is with a bus.
- We could use direct connections between components, but a bus is shared and cheap. It can become a bottleneck.
- High bandwidth often competes with low latency. We discussed this with DDRII.

Bus Makeup

- A bus is basically a set of lines that devices can connect to for communication. We have lines for control and for data.

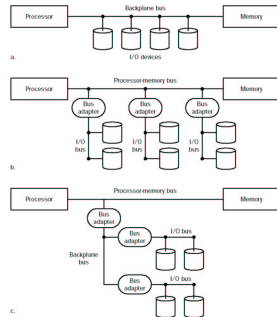


Types of Buses

- Processor-memory: short and high speed.
- I/O: long with many types of devices. Don't connect directly to memory.
- Backplane: allow the other two to exist on a single bus.
- The later two typically use standard formats while the former is often proprietary. Some distinctions are getting smaller.

Bus Configurations

- Given the types of buses there are many ways we can configure them. We would like to have maximum speed and flexibility.



Synchronous vs. Asynchronous

- Synchronous uses a clock to control the signaling on the control lines. Requires everything to run at the same clock rate. Must be a short bus as a result.
- Asynchronous buses aren't clocked and can be far more flexible, but they require more logic. A handshaking protocol must be used to get conversants talking properly.

Bandwidth Considerations

- Data bus width: how many bits can go across at one time?
- Separate lines: does one set of lines give both address and data?
- Block transfers: is there a burst mode where multiple words can be sent in succession?

Bus Arbitration

- Bus masters control who can “talk” on a bus at any given time. When you have multiple masters, decided which of them gets to use the bus is the arbitration.
- Granting bus requests is done with a triage type of system.
 - Daisy-chain: order gives priority (can be unfair).
 - Centralized: single central arbiter.
 - Distributed with self-selection: each knows priority of others.
 - Distributed with collision detection

Minute Essay

- If buses can be bottle necks why do we use them so much in your computers?
- Remember that assignment #7 is due tomorrow.
