

Shared Bus Operation

- A *multiprocessing* system (also called distributed system) uses more than one microprocessor to accomplish the work.
- A *multitasking* system performs more than one task at a time.
- In a distributed, multiprocessing, multitasking environment, each microprocessor accesses two buses: (1) the local bus and (2) the remote or shared bus.

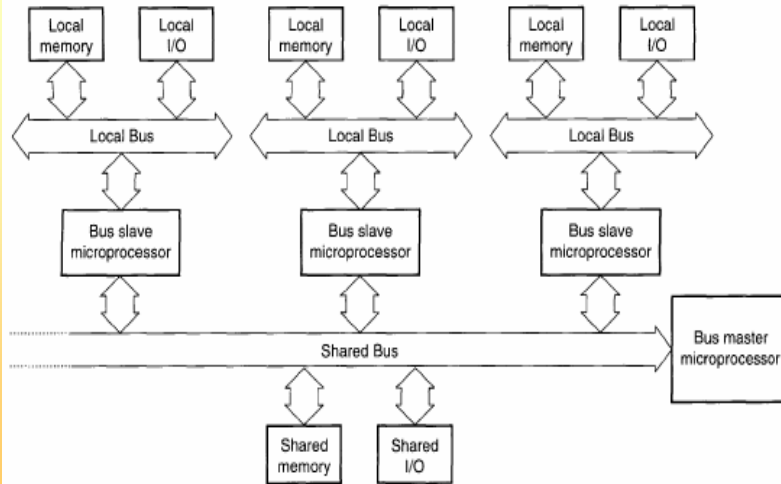


Shared Bus Operation

- The *local bus* is connected to memory and I/O devices that are directly accessed by a single microprocessor without any special protocol or access rules.
- The *shared bus* contains memory and I/O that are accessed by any microprocessor in the system.



Shared Bus Operation



A block diagram illustrating the shared and local buses



Local Bus and Shared Bus

- Characteristics of buses:
 - Local bus
 - Resident to the microprocessor
 - Contains the resident or local memory and I/O
 - Shared bus
 - Is connected to all microprocessors in the system
 - Is used to exchange data between microprocessors in the system



Local Bus and Shared Bus

- The shared bus in the personal computer is what we often call the local bus in the personal computer as it is local to the microprocessor in the personal computer.
- A *bus master* is a device (microprocessor or otherwise) that can control a bus containing memory and I/O.
- A remote bus master microprocessor can execute variable software but the DMA controller can only transfer data.



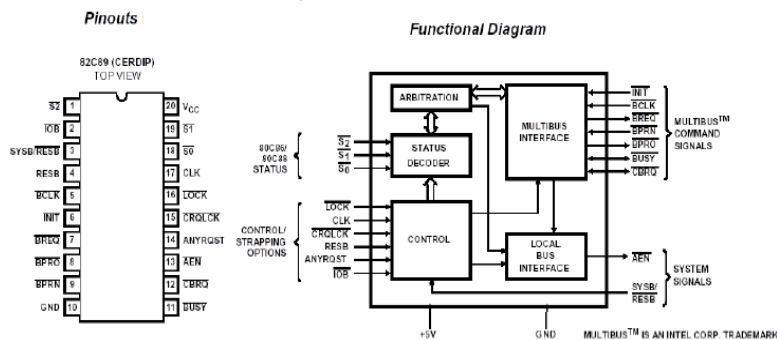
Local Bus and Shared Bus

- Access to the shared bus for the remote bus master is accomplished via a bus arbiter.
- A *bus arbiter* functions to resolve priority between bus masters and allows only one device at a time to access the shared bus.



Bus Arbiter

- The 8289 bus arbiter controls the interface of a bus master to a shared bus.
- The 8289 is designed to function with the 8086/8088 microprocessors.



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General 8289 Operation

- Three basic operation modes of an 8289:
 - (1) I/O peripheral bus mode: All devices on the local bus are treated as I/O, including memory, and are accessed by I/O instructions. The shared bus is accessed by memory access.
 - (2) Resident bus mode: Allows memory and I/O accesses on both the local and shared bus.
 - (3) Single-bus mode: Cannot access local memory and local I/O



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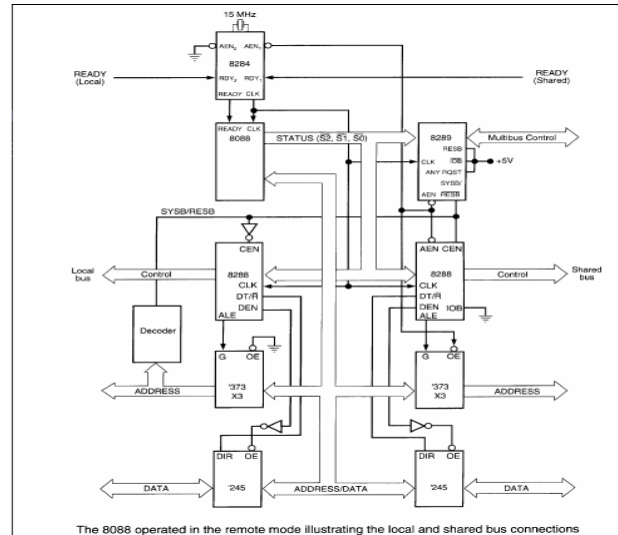
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Remote Mode Operation of the 8088 MP

Example:

8088 operates in the remote mode with the local and shared bus connection



The 8088 operated in the remote mode illustrating the local and shared bus connections



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Remote Mode Operation of the 8088 MP

- The 8288 is used as a bus controller when the 8088 operates in MAX mode.
- The shared bus is only to pass information from one processor to another.
- The bus masters function in their own local bus modes using their own local programs, memory, and I/O space.



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Remote Mode Operation of the 8088 MP

- Microprocessors connected in a system like this is called *parallel* or *distributed processors* as they can execute software in parallel.
- The shared bus is mapped to some particular address locations such that accessing these address locations implies accessing the shared bus.
- The address decoder can detect the intention of accessing the shared bus and then activates the corresponding 8288 and configures the 8289 via 8289's RESB input pin.



Remote Mode Operation of the 8088 MP

- Blocking occurs whenever another microprocessor is accessing the shared bus.
- The 8289 controls the shared bus by making the READY input to the microprocessor be 0 if access to the shared bus is denied.
- Wait states are added until READY is 1.

