

2019.
(3.5)

Date:

Q) What is the function of control unit? Show the control signals that implement a subtraction instruction of the form SUB, A, B.

Ans: Control Unit: The control unit of the central processing unit regulates and integrates the operations of the computer. It selects and retrieves instructions from the main memory in proper sequence and interprets them so as to activate the other functional elements of the system at the appropriate moment.

The functions of Control unit:

1. Fetching instructions one by one from Primary memory and gather required data and operands to perform those instruction
2. Sending instructions to ALU to perform additions, multiplication etc.
3. Receiving and sending results of operations of ALU to Primary memory.
4. Fetching programs from input and secondary memory and bringing them to primary memory.
5. Sending results from ALU stored in primary memory to output

8 (b) Explain synchronous DRAM technology in detail 3.75

SDRAM or synchronous Dynamic Random Access memory can synchronize itself with clock of the processor and hence to the bus. With SDRAM having synchronous interface it has an internal finite state machine that pipelines incoming instructions. This enables SDRAM to operate in more complex fashion than an asynchronous DRAM.

SDRAM keeps two set of memory addresses open simultaneously. By transferring data alternately from one set of address, and then the other, SDRAM cuts down the delay. The term pipelining is used to describe the process where SDRAM can accept a new instruction before it has finished processing the previous one.

SDRAM transmits signals once per clock cycle. It can effectively process two instructions at once.

With SDRAM an on-chip burst counter allows the column part of the address to be incremented very rapidly which speeds up the retrieval of information in sequentially reads considerably. The size of the block of memory location required is provided by the memory controller and the SDRAM chip supplies the bits as fast as the CPU can take them, using

a clock to synchronize the timing of the memory chip to the CPU's system clock.

Characteristics of SDRAM:-

- Speed : SDRAM has higher operation speed, as the access time is 6 to 12 nanosecond.
- Clock : SDRAM uses one edge of clock, DDR uses both edges of the clock.
- Data transfer : SDRAM sends signals once per clock cycle, DDR transfers data twice per clock cycle.

Advantages

1. It is faster as compared to other versions of RAM.
2. It is more efficient, up to 4 times better performance.
3. Has name suggest, it gets synchronized with the system clock.

Disadvantages

1. It can't be used with older motherboards.
2. It works in a single data-rate, it can do only tasks per clock cycle.

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2018-7 @ Discuss bus arbitration using daisy chaining. Mention some problems with this scheme.

Bus arbitration refers to the process by which the current bus master accesses and then leaves the control of the bus and passes it to another bus requesting processor unit. The controller that has access to a bus at an instance is known as Bus Master.

In Daisy Chaining method all the bus masters use the same line for making bus request. The bus grants signal serially propagating through each master until it encounters the first one that is requesting access to the bus.

Some problems with Daisy Chaining -

1. The value of priority assigned to a device depends on the position of the master bus.
2. Propagation delay arises in the method.
3. If one device fails then the entire system will stop working.

The daisy-chaining method of establishing priority consists of a serial connection of all devices that request an interrupt.

The device with the highest priority is placed in the first position followed by lower-priority devices up to the device with the lowest priority which is placed last in the chain. This method of connection between devices and the CPU is shown below:-

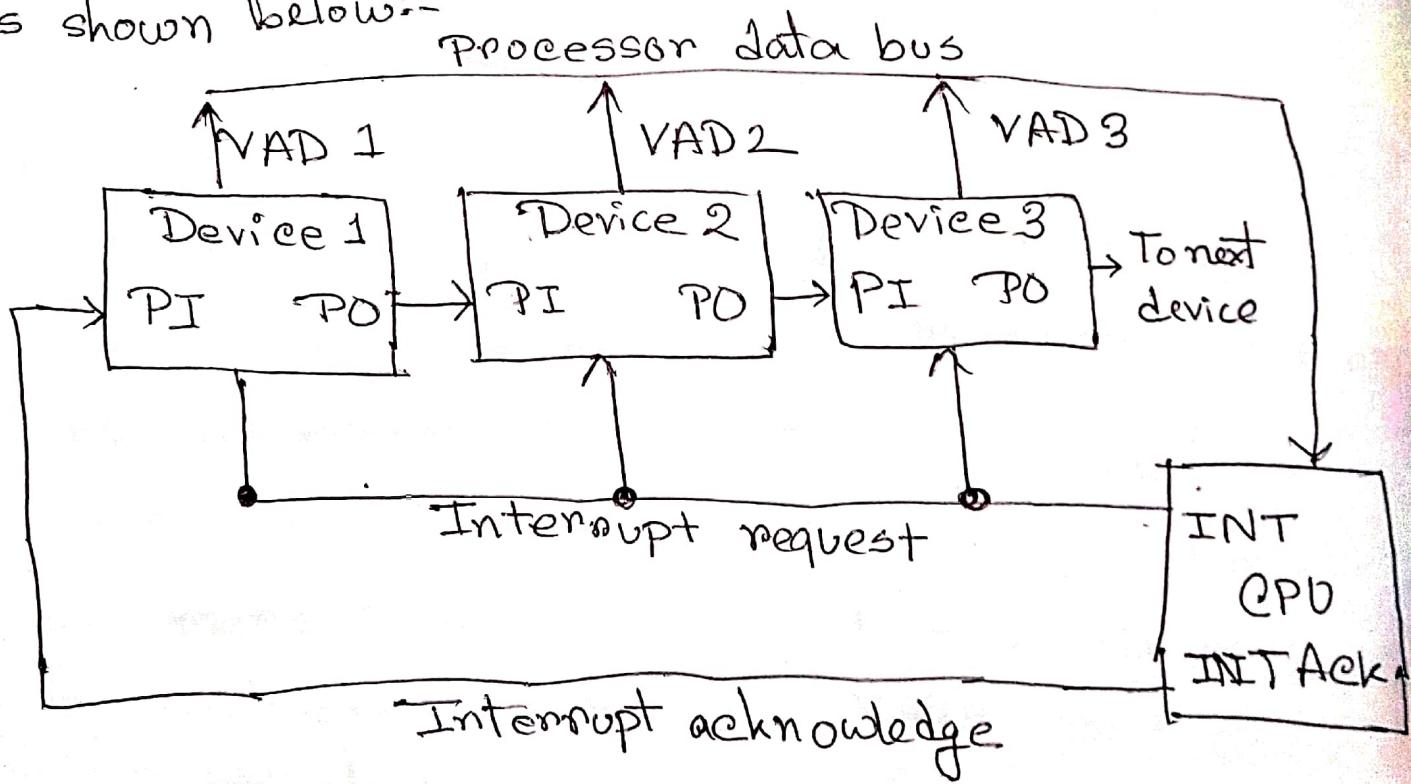


Figure: Daisy Chain Priority interrupt

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Date:

Discuss how Cache memory helps to speed up the operation of a computer system. (3)

Soln

Cache memory is a small amount of memory which is part of the CPU which is physically closer to the CPU than RAM, the more cache memory present, the more data can be stored closer to CPU.

Cache memory is beneficial because:

- Cache memory holds frequently used instructions / data which the processor may require next and it is faster access memory than RAM, since it is on the same chip as the processor
- This reduces the need for frequent slower memory retrievals from main memory, which may otherwise keep the CPU waiting.
- The more cache memory the CPU has, the less time the computer spends accessing slower main memory and as a result programs may run faster.

