0905CS201172



# Activity :- 3

COA

- Case Study on Working of DMA Controller

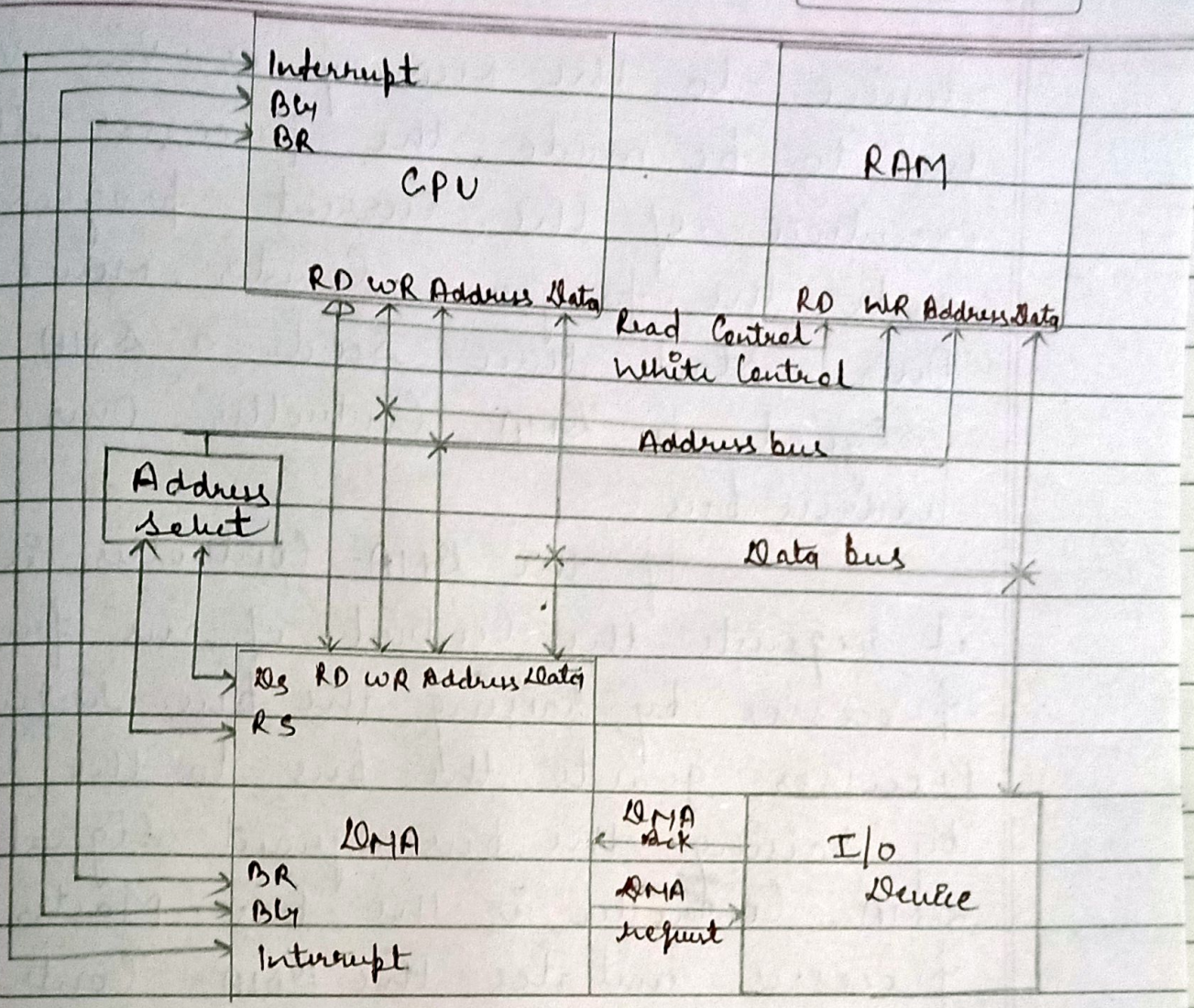
DMA Controller :- The term DMA Stands for direct Memory access. The hardware device used for direct Memory access is Called the DMA Controller. DMA Controller is a Control Unit, part of I/O device's interface Circuit, which can transfer blocks of data between I/O devices and main memory with minimal ~~interface~~ intervention from the processor

## Working of DMA Controller :-

DMA Controller has to share the bus with the processor to Make the data transfer. The device that holds the bus at a given time is Called bus Master. When a transfer from I/O

device to the memory or vice-versa has to be made, the processor stops the execution of the current program, increments the program counter, moves data over stack then sends a DMA select signal to DMA Controller over the address bus.

If the DMA Controller is free, it requests the control of bus from the processor by raising the bus request signal. Processor grants the bus to the Controller by raising the bus grant signal, now DMA Controller is the bus Master. The processor initiates the DMA Controller by sending the Memory address, number of blocks of data to be transferred and direction of data transfer. After assigning the data transfer task to the DMA Controller, instead of waiting ideally till Completion of data transfer, the processor resumes the execution of the program after retrieving instructions from the stack.




DMA Controller now has the full Control of buses and Can interact directly with Memory and I/O devices independent of CPU. It Moves the data transfer according to the Control instructions received by the processor. After Completion of data transfer, it disables the bus request Signal and CPU disables the bus grant Signal thereby Moving Control of buses to the CPU

When an I/O device wants to initiate the transfer then it sends a DMA request signal to the DMA Controller; for which the Controller acknowledges if it is free then the Controller requests the process for the bus, raising the bus request signal After receiving the bus grant signal it transfer the data from the device for n channeled DMA Controller n number of external devices Can be Connected

- The DMA transfer the data in three Modes which include the following.

a) Brust Mode :- In this Mode DMA handover the buses to CPU Only after Completion of whole data transfer.

b) Cycle Stealing Mode :- In this Mode, DMA gives Control of buses to CPU after transfer of Every byte

c) Transparent Mode :- Here, DMA transfer data Only when CPU is Executing the instructions which does not require the use of buses