

## Memory mapped I/O and Isolated I/O

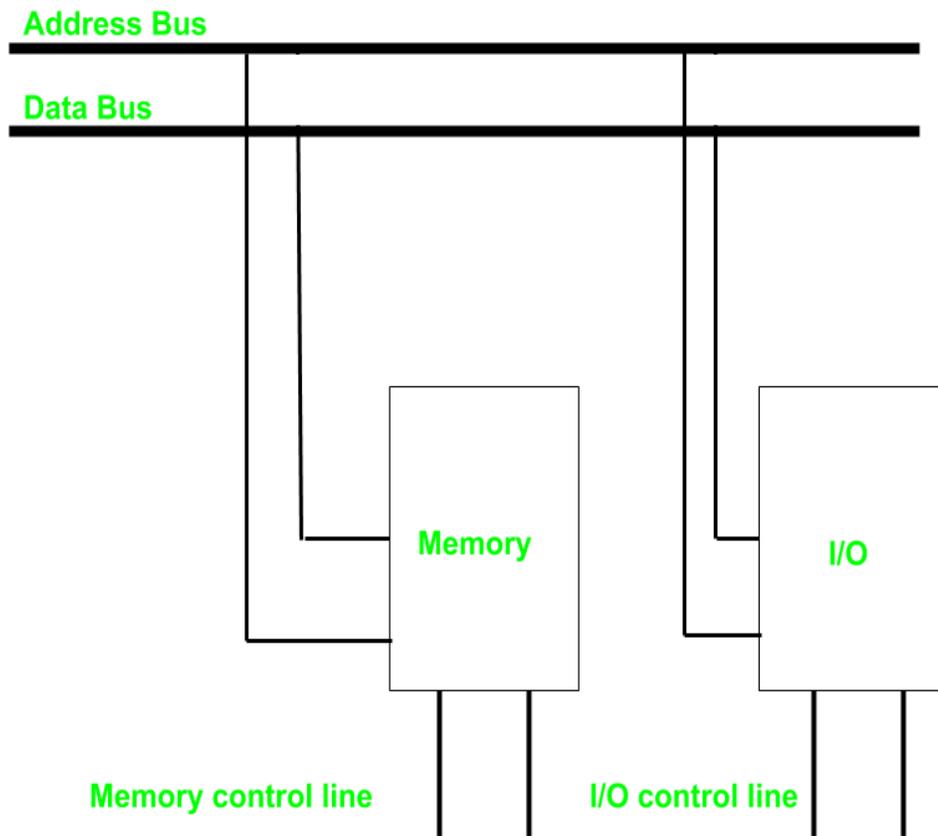
As a CPU needs to communicate with the various memory and input-output devices (I/O) as we know data between the processor and these devices flow with the help of the system bus. There are three ways in which system bus can be allotted to them :

1. Separate set of address, control and data bus to I/O and memory.
2. Have common bus (data and address) for I/O and memory but separate control lines.
3. Have common bus (data, address, and control) for I/O and memory.

In first case it is simple because both have different set of address space and instruction but require more buses.

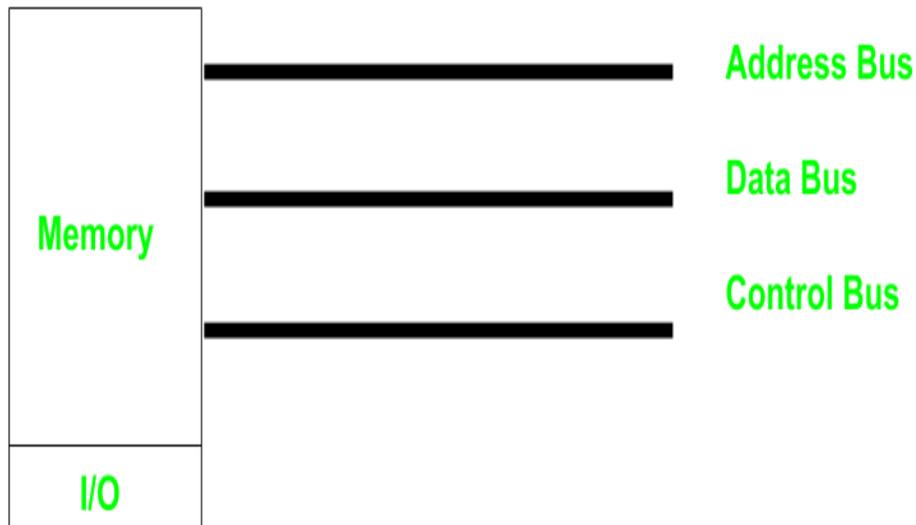
### *Isolated I/O –*

Then we have Isolated I/O in which we Have common bus(data and address) for I/O and memory but separate read and write control lines for I/O. So when CPU decode instruction then if data is for I/O then it places the address on the address line and set I/O read or write control line on due to which data transfer occurs between CPU and I/O. As the address space of memory and I/O is isolated and the name is so. The address for I/O here is called ports. Here we have different read-write instruction for both I/O and memory.



### *Memory Mapped I/O –*

In this case every bus is in common due to which the same set of instructions work for memory and I/O. Hence we manipulate I/O same as memory and both have the same address space, due to which the addressing capability of memory becomes less because some part is occupied by the I/O.



**Differences between memory mapped I/O and isolated I/O –**

ISOLATED I/O	MEMORY MAPPED I/O
Memory and I/O have separate address space	Both have same address space
All address can be used by the memory	Due to addition of I/O addressable memory become less for memory
Separate instruction control read and write operation in	Same instructions can control both I/O and Memory

## ISOLATED I/O

## MEMORY MAPPED I/O

I/O and Memory

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In this I/O address are called ports.

Normal memory address are for both

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More efficient due to separate buses

Lesser efficient

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Larger in size due to more buses

Smaller in size

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It is complex due to separate logic is used to control both.

Simpler logic is used as I/O is also treated as memory only.