INPUT/OUTPUT ORGANIZATION - UNIT-V

Accessing I/O Devices :

A simple arrangement to connect I/O devices to a computer is to use a single bus arrangement. Each I/O device is designed assigned a unique set of address. When the processor places a particular address on the address lines, the device that recognize this address responds to the command issued. On the control lines. The processor requests either a read or a write operation which is transferred over the data lines.

When I/O devices and the memory share the same address space, the arrangement is called memory - mapped I/O.

memory mapped I/O, If DATAIN is the address of the input buffer of the keyboard. MOVE ·DATAIN, R0 and DATA OUT is the address of the output buffer of the display/printer MOVE R0, DATA OUT

```
┌──────────┐        ┌──────────┐
│ Processor│        │ Memory   │
└────┬─────┘        └────┬─────┘
     │                   │
─────┴───────────────────┴────────
     │                   │
┌────┴───────┐      ┌─────┴──────┐
│ I/o device1│   .  │ I/o device n│
└────────────┘      └────────────┘
```
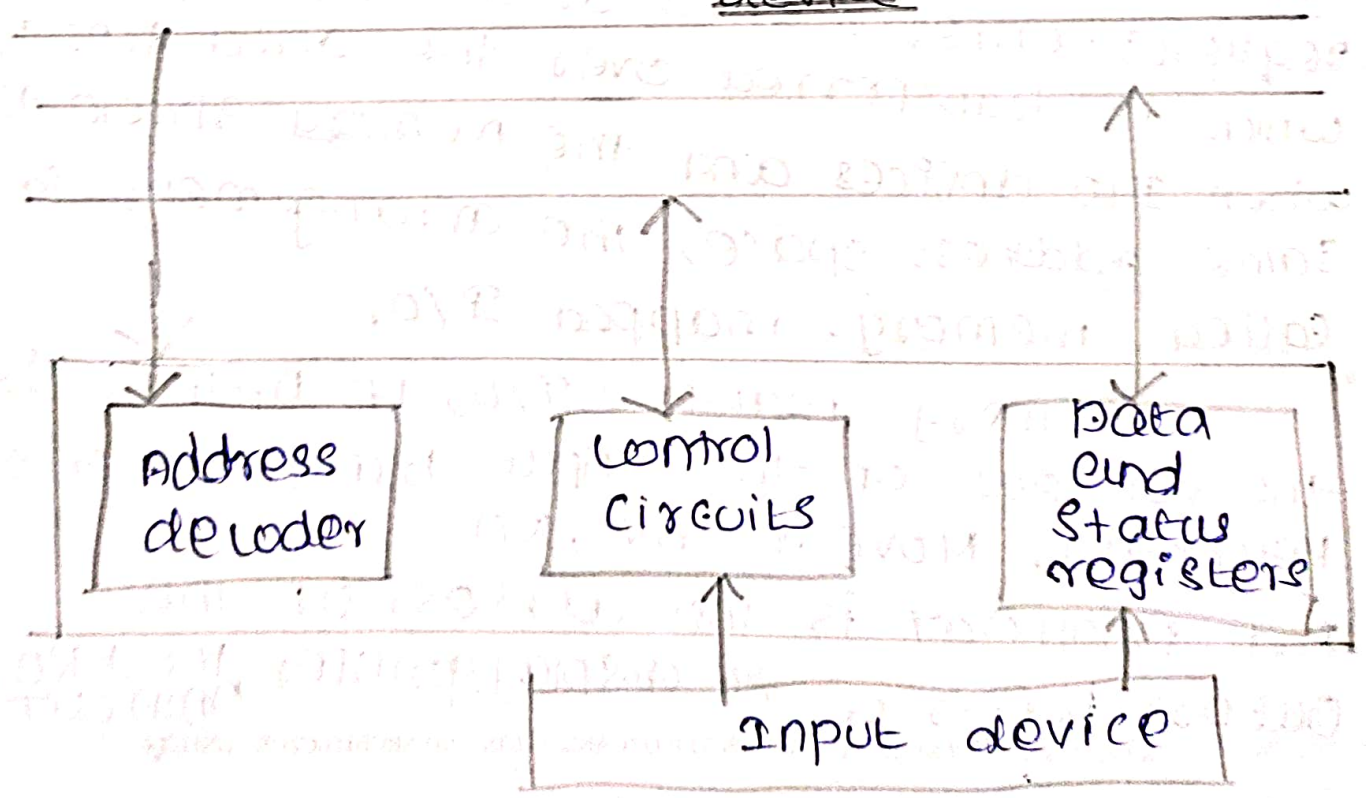
This sends the contents of register R0 to location DATAOUT, which may be the output data buffer of a display unit or a printer.

Most computer systems use memory-mapped I/O. Some processors have special I/O instructions to perform I/O transfers. The hardware required to connect an I/O device to the bus is show below

<u>I/o interface For an input device</u>


```
┌─────────────┐   ┌──────────┐   ┌─────────────┐
│  Address    │   │ Control  │   │   Data      │
│  decoder    │   │ Circuits │   │   and       │
│             │   │          │   │  Status     │
│             │   │          │   │  registers  │
└─────────────┘   └────┬─────┘   └─────────────┘
                       │
              ┌────────┴────────┐
              │  Input device   │
              └─────────────────┘
```

The address decorder enables the device to recognize its address when this address appears on the address lines. The data registers holds the data. The status register contains information. The address decorder, data and status registers and controls requires to coordinate I/O tranfer constitutes interface circuit.

For Example: keyboard, an instruction that reads a character from the keyboard should be executed only when a character is avai -lable in the input buffer of keyboard interface. The processor repeatedly checks a status flag to achieve the synchronization between processor and I/o device is called as program controlled I/o

Two commonly used mechanisms for implementing I/o operations are

* Interrupts and
* Direct memory access