Interfaces

- Interface is a shared boundary between two separate components of the computer system which can be used to attach two or more components to the system for communication purposes.
- There are two types of interface:

➢ CPU Interface

➢ I/O Interface

Modes of I/O Data Transfer

- Data transfer between the central unit and I/O devices can be handled in generally three types of modes which are given below:

1. Programmed I/O
2. Interrupt Initiated I/O
3. Direct Memory Access

Programmed I/O

- Programmed I/O instructions are the result of I/O instructions written in computer program. Each data item transfer is initiated by the instruction in the program.
- Usually the program controls data transfer to and from CPU and peripheral.
- Transferring data under programmed I/O requires constant monitoring of the peripherals by the CPU.

Programmed I/O

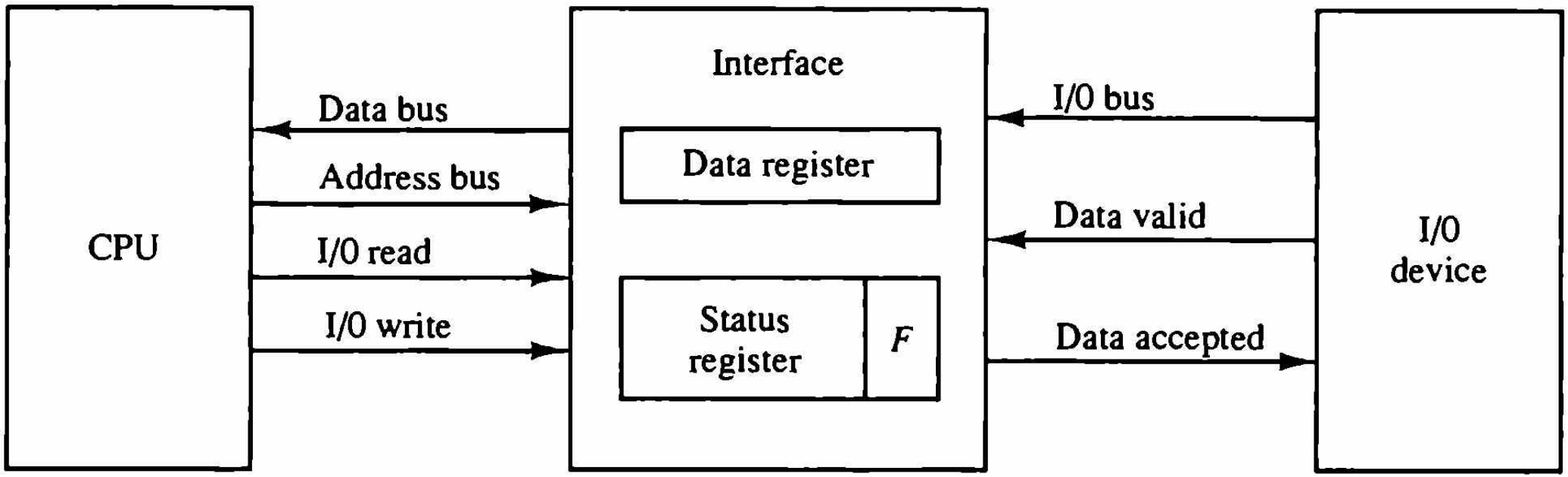
- **Example**:
- In this case, the I/O device does not have direct access to the memory unit. A transfer from I/O device to memory requires the execution of several instructions by the CPU, including an input instruction to transfer the data from device to the CPU and store instruction to transfer the data from CPU to memory.
- In programmed I/O, the CPU stays in the program loop until the I/O unit indicates that it is ready for data transfer. This is a time consuming process since it needlessly keeps the CPU busy.

Programmed I/O

- An example of data transfer from an i/o device through an interface into the CPU is shown in fig.
- The device transfers bytes of data one at a time as they are available. When a byte is available the device places it in the I/O bus and enables its data valid line. The interface accepts the byte into its register and enables the data accepted line. The interface sets a bit in the status register that we will refer to as an F or “flag register”
- The device can now disable the data valid line, but will not transfer another type until the data accepted line is disabled by the interface.

Programmed I/O

Figure 11-10 Data transfer from I/O device to CPU.



F = Flag bit

Programmed I/O

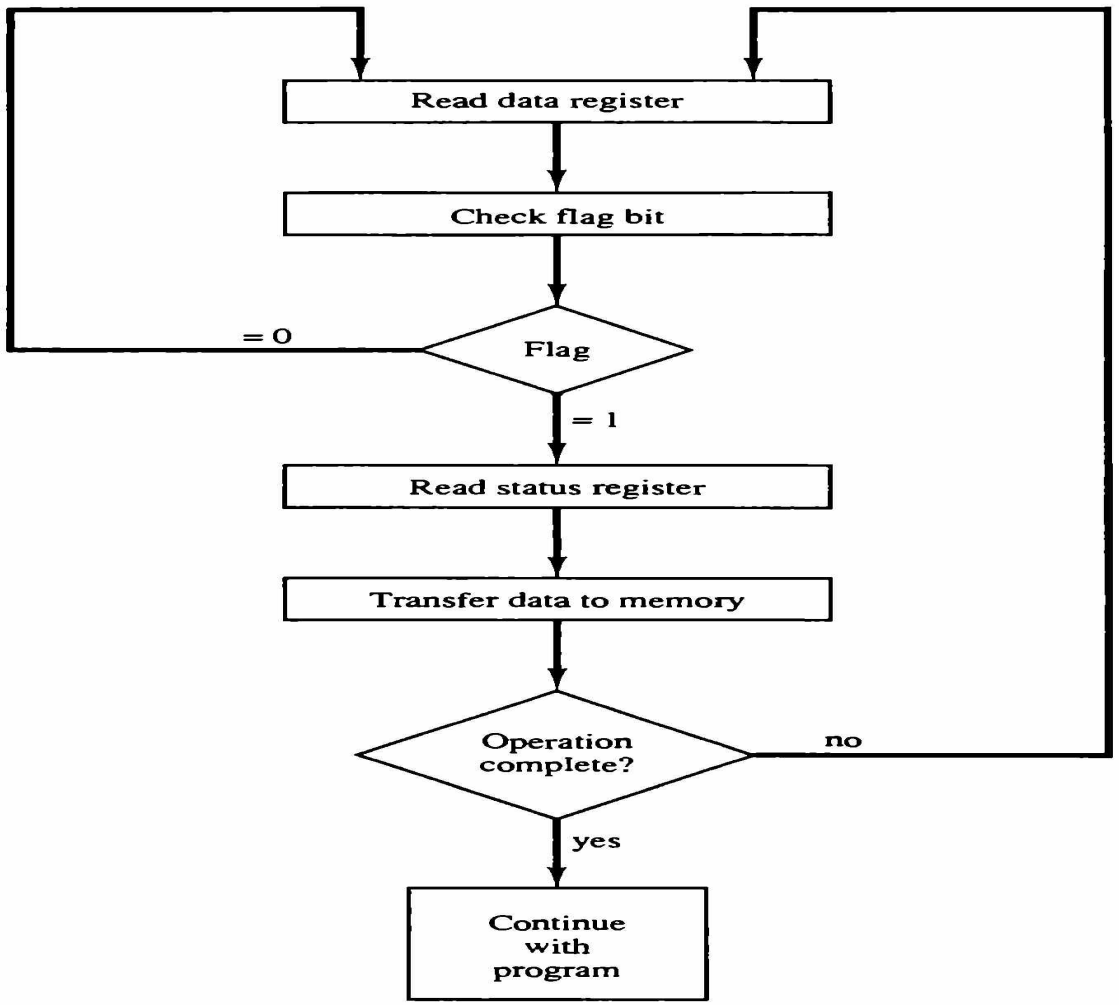


Figure 11-11 Flowchart for CPU program to input data.

Interrupt Initiated I/O

- In the programmed I/O method the CPU stays in the program loop until the I/O unit indicates that it is ready for data transfer. This is time consuming process because it keeps the processor busy needlessly.
- This problem can be overcome by using **interrupt initiated I/O**.
- In this when the interface determines that the peripheral is ready for data transfer, it generates an interrupt.
- After receiving the interrupt signal, the CPU stops the task which it is processing and service the I/O transfer and then returns back to its previous processing task.

Interrupt Initiated I/O

- the interface meanwhile keeps monitoring the device. Whenever it is determined that the device is ready for data transfer it initiates an interrupt request signal to the computer.
- Upon detection of an external interrupt signal the CPU stops momentarily the task that it was already performing, branches to the service program to process the I/O transfer, and then return to the task it was originally performing.