15.5 Polling

The basic form of synchronization that a processor uses with an I/O device is known as *polling*. In essence, polling requires the processor to repeatedly ask the device whether an operation has completed before the processor starts the next operation. Thus, to perform the *print* operation described below, a processor must use polling at each step. Figure 15.1 lists the steps required.

- Cause the printer to advance the paper
- Poll to determine when paper has advanced
- Move the print head to the beginning of the line
- Poll to determine when the print head reaches the beginning of the line
- Specify a character to print
- Poll to determine when the character is locked in position
- Cause the hammer to strike the character
- Poll to determine when the hammer is finished striking

Figure 15.1 Illustration of synchronization between a processor and an I/O device. The processor must wait for each step to complete.

15.6 Code For Polling

How does software perform polling? Because I/O devices connect to a bus, and a bus follows the fetch-store paradigm, polling uses a *fetch* operation. That is, one or more of the addresses assigned to the device correspond to status information — when the processor fetches a value from the address, the device responds by giving its current status.

Before we can see an example of code that uses polling, we need to specify the exact details of a hardware device. To keep the example simple, we will assume our imaginary printing device uses sixteen bytes which it interprets as Figure 15.2 lists.

Addresses	Operation	Meaning
0 through 3	store	Nonzero starts paper advance
4 through 7	store	Nonzero starts head moving to beginning of line
8 through 11	store	Character to print (low-order byte)
12 through 12	store	Nonzero starts hammer striking
13 through 16	fetch	Busy: nonzero when device is busy

Figure 15.2 An example specification that shows how the fetch-store paradigm can allow a processor to control a device or determine the current status. The specification is for an imaginary printing device.