

9.7 What is polling used for? What are the disadvantages of polling? What is a better way to perform the same job?

Answer:

Polling is a processing method that is used for continuously checking the various input devices to determine that input data is waiting. Polling method provides a general interrupt that is shared by all devices. The computer identifies the interrupting device by polling each device when the interrupt occurs.

The disadvantage of polling method is that if there are too many devices to check, the time required to poll them can exceed the time available to service the I/O device.

The better way to perform the same job instead of using polling method is to use an interrupt because it can free the CPU from the necessity of continuously checking the various input devices as same as polling method do.

9.12 In general, what purpose does an interrupt serve? Stated another way, suppose there were no interrupts provided in a computer. What capabilities would be lost?

Answer:

The general purpose of interrupt is to interrupt the normal flow of a program in the computer to react to special events.

An interrupt will interrupt the CPU to hold the next instruction and execute another instruction that CPU receives from the interrupt, then continue to execute the instruction which is previously held after completion of interrupted instruction.

If there were no interrupts provided in a computer, the CPU would lost the capability to interact to the special events immediately. All special events would be executed after others instruction with higher priorities completed execution.

Chapter 9 Calculation Exercise: "If my CPU runs at 4.0GHz, and on average takes 10 clock cycles to complete an instruction, how many instructions will be completed in the time it takes to type "MY CPU IS RUNNING NOW"? Assume it takes 5 seconds to type the message. Show your work and how you arrived at the solution.

Answer: 2×10^9 instructions or 2 billions instructions

The clock speed is 4.0 GHz. (Let $A = 4.0 \text{ GHz}$)

The average clock cycles per each instruction is 10 clock cycles. (Let $B = 10 \text{ clock cycles}$)

The total time to type the message is 5 seconds (Let $C = 5 \text{ seconds}$)

The instructions (or steps) per second that this CPU can run. (Let this is D)

$$D = A / B$$

$$D = 4.0 / 10$$

$$D = 0.4 \times 10^9 \text{ instructions or steps per second.}$$

If the total time to type the message is 5 seconds, then the total instructions to type the message is the multiplication between the total time to type message (C) and the instructions per second of this CPU (D)

$$\text{The total instruction to type the message} = C \times D = 5 \times (0.4 \times 10^9) = \mathbf{2 \times 10^9 \text{ instructions}}$$