

# Chapter 0

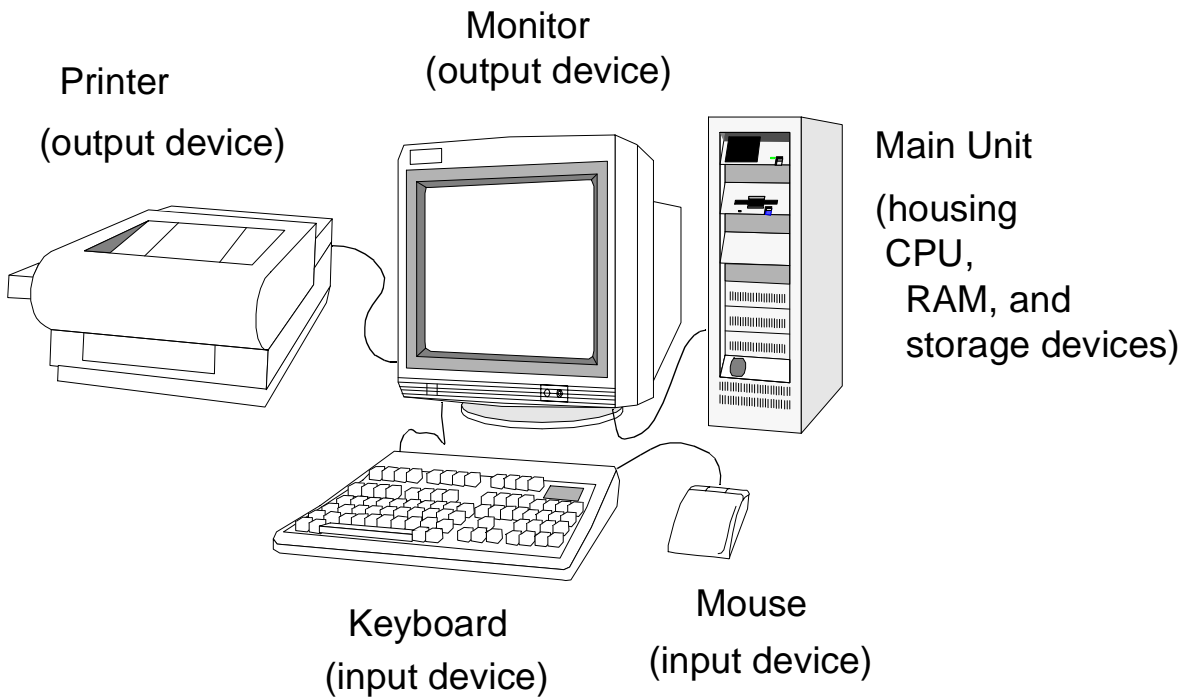
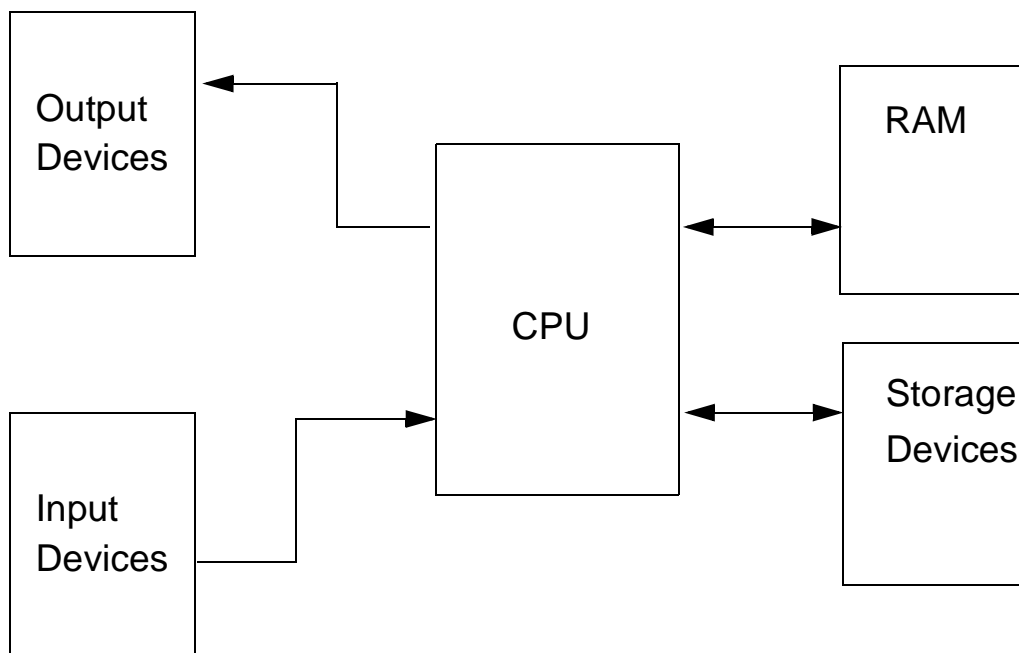
## Introduction to Computers and Programming Languages

### OBJECTIVES

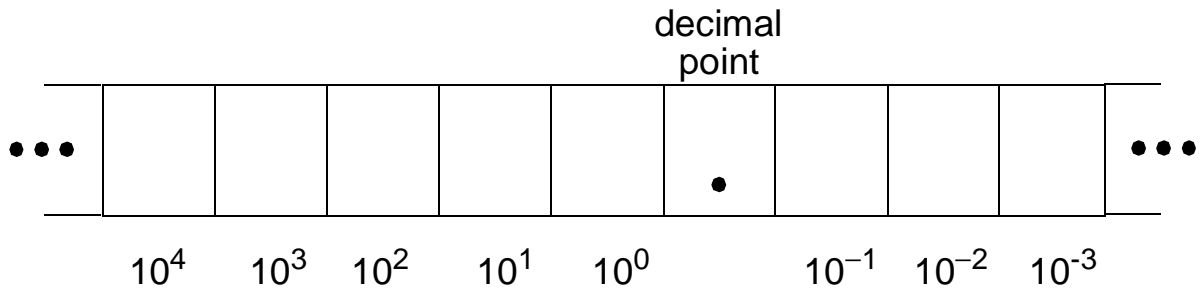
After you have read and studied this chapter, you should be able to

- State briefly a history of computers.
- Name and describe four major components of the computer.
- Convert binary numbers to decimal numbers and vice versa.
- State the difference between the low-level and high-level programming languages.

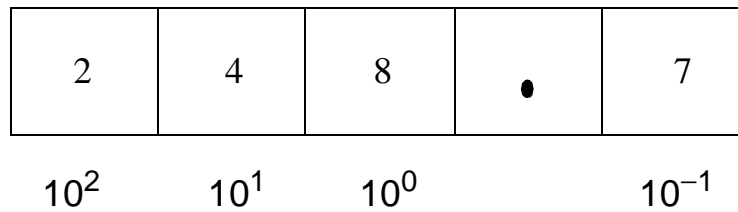
FIGURE 0.1 A simplified view of an architecture for a typical computer.



### Decimal Number

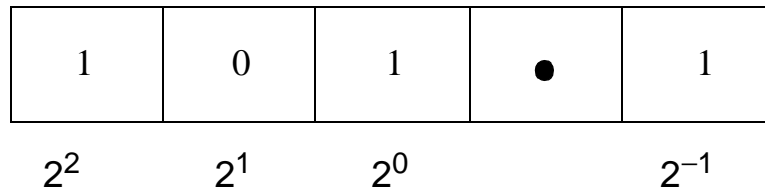
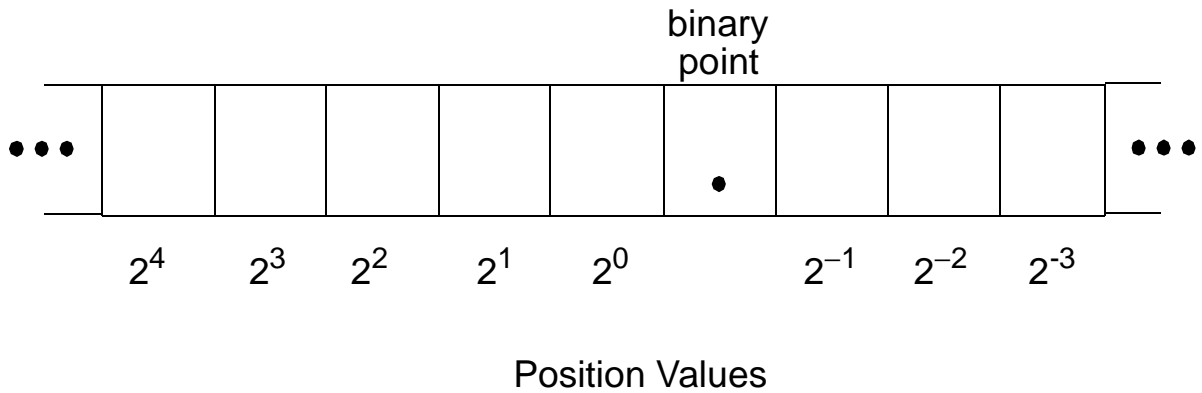


### Position Values



$$\begin{aligned}
 &= 2 \times 10^2 + 4 \times 10^1 + 8 \times 10^0 + 7 \times 10^{-1} \\
 &= 2 \times 100 + 4 \times 10 + 8 \times 1 + 7 \times 1/10 \\
 &= 200 + 40 + 8 + 7/10 = 248.7
 \end{aligned}$$

### Binary Number



binary-to-decimal  
conversion

$$\begin{aligned}
 &= 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-1} \\
 &= 1 \times 4 + 0 \times 2 + 1 \times 1 + 1 \times 1/2 \\
 &= 4 + 0 + 1 + 1/2 = 5.5
 \end{aligned}$$

decimal-to-binary  
conversion

Division #5	Division #4	Division #3	Division #2	Division #1						
$2 \overline{) 0}$	$2 \overline{) 1}$	$2 \overline{) 3}$	$2 \overline{) 6}$	$2 \overline{) 12}$	$2 \overline{) 25}$					
$\underline{0}$	$\underline{2}$	$\underline{6}$	$\underline{12}$	$\underline{24}$						
1	1	0	0	1						
$2^4$	$2^3$	$2^2$	$2^1$	$2^0$						
16	+	8	+	0	+	0	+	1	=	25

1. Divide the number by 2.
2. The remainder is the bit value of the  $2^0$  position.
3. Divide the quotient by 2.
4. The remainder is the bit value of the  $2^1$  position.
5. Divide the quotient by 2.
6. The remainder is the bit value of the  $2^2$  position.
7. Repeat the procedure until you cannot divide any further; that is, the quotient becomes 0.

TABLE 0.1 A table of Intel processors. For some CPUs, more than one type with different clock speeds are possible. In such case, only the fastest clock speed is shown. For more information on Intel CPUs, visit <http://www.intel.com/intel/museum>.

	<b>CPU</b>	<b>Date Introduced</b>	<b>Clock Speed (MHz)</b>
<b>1970s</b>	4004	11/15/71	0.108
	8008	04/01/72	0.108
	8080	04/01/74	2
	8088	06/01/79	9
<b>1980s</b>	80286	02/01/82	12.5
	80386SX	06/16/88	33
	80486DX	04/10/89	50
<b>1990s</b>	Pentium	03/22/93	166
	Pentium Pro	11/01/95	200
	Pentium II	05/07/97	300
	Pentium Xeon	06/29/98	400