Computers Are Your Future

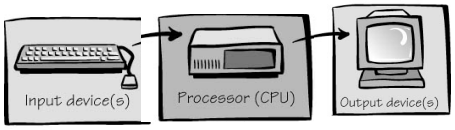
Understanding the Computer: Basic Definitions

Hardware

Software

- ✓ **Computer system** – A collection of related components that are designed to work together
  - A system includes hardware and software

How does it work?

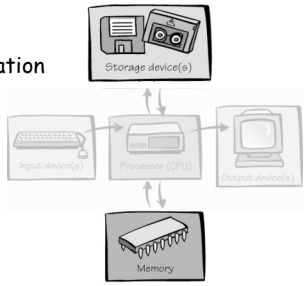


Receive input

Process Information

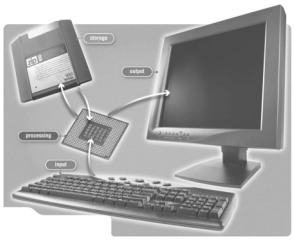
Produce Output

Store Information



Understanding the Computer: Basic Definitions

- ✓ **Computer** – A machine that performs the four basic operations of the information-processing cycle:
  - input
  - processing
  - output
  - storage



Input: Getting Data into the Computer

- ✓ **Data** – Unorganized raw materials made up of words, numbers, images, or sounds
- ✓ The first operation: input
  - Input devices enable the user to enter data into the computer
  - The computer accepts data

Input Devices

Keyboard

Mouse – pointing device

Microphone – speech-recognition

Digital Cameras

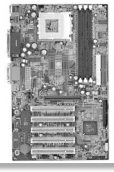
Processing: Transforming Data into Information

DATA IN →  → **INFORMATION OUT**

✓ The second operation: processing
- Computers transform data into information
- Processing circuitry:
  - Central processing unit (CPU)
  - Random access memory (RAM)

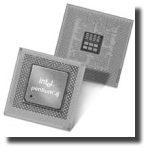
Processing Devices

Motherboard



Expansion Card

Central Processing Unit – CPU



Random Access Memory– RAM

Output: Displaying Information

✓ The third operation: output
- The computer shows the results of the processing operation in a way people can understand
- Output devices show the results of processing operations

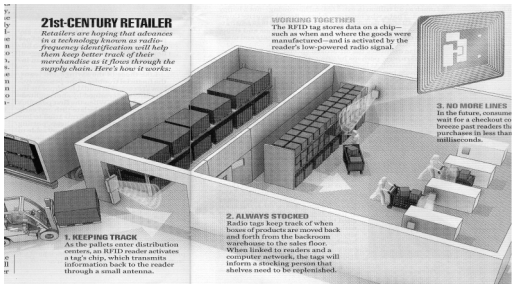
Output Devices

Monitor

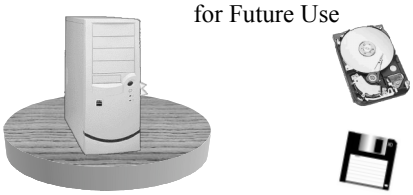
Printer

Speakers

RFID tags
Radio Frequency Identification tags

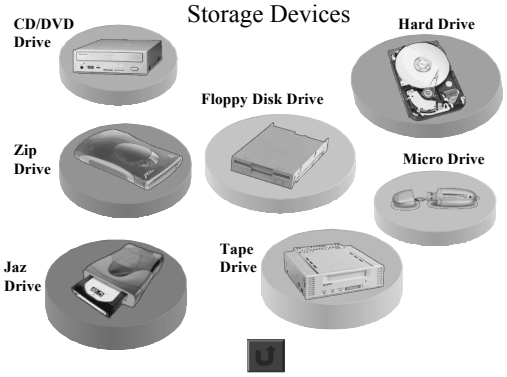


Storage: Holding Programs and Data for Future Use



- ✓ The fourth operation: storage
  - The computer saves the data or output so that it can be used again later
  - Storage devices hold all programs and data that the computer uses

Storage Devices

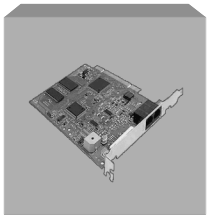


Communications: Moving Data between Computers

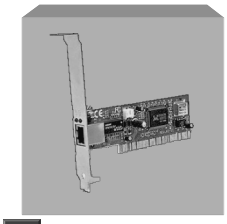
- ✓ A fifth operation: communications
  - Moving data within the computer or between computers
    - Communications devices – Enable computers to connect to a computer network
    - **Network** – Two or more computer systems that are connected
    - **Modem** – A device that enables the computer to access other computers

Communications Devices

Modem



Network Interface Card – NIC



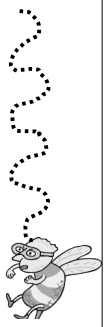
Information

Information comes in many forms

- Words . . . Numbers . . . Pictures . . . Sounds
- Computers only understand information in digital form
  - Information must be broken into bits

Bits, Bytes, and Buzzwords

- ✓ Common terms might describe file size or memory size:
  - **Bit**: smallest unit of information
  - **Byte**: a grouping of eight bits of information



More about Bits

- ✓ Each switch can be used to store a tiny amount of information, such as:
  - ➢ An answer to a yes/no question
  - ➢ A signal to turn on a light

- Larger chunks of information are stored by grouping bits as units
  - 8 bits (byte) = 256 different codes

"That's one small step for man, one giant leap for mankind"

Bits as Codes

- ✓ **ASCII** - American Standard Code for Information Interchange
  - ➢ most widely used code, represents each character as a unique 8-bit code.

Character	ASCII binary code
A	01000001
B	01000010
C	01000011
D	01000100
E	01000101
F	01000110
G	01000111
H	01001000
I	01001001
J	01001010
K	01001011
L	01001100
M	01001101
N	01001110
O	01001111
P	01010000
Q	01010001
R	01010010
S	01010011
T	01010100
U	01010101
V	01010110
W	01010111
X	01011000
Y	01011001
Z	01011010

ASCII

American

Standard

Code for

Information

Interchange

most widely used code, represents each character as a unique 8-bit code.

ASCII ENCODING TABLE

Binary	Decimal	Character	Binary	Decimal	Character	Binary	Decimal	Character
00000000	0		00111100	60	<	01011111	95	_
.	.	invisible	00111101	61	=	01100000	96	`
.	.	control	00111110	62	>	01100001	97	a
.	.	characters	00111111	63	?	01100010	98	b
00011111	31		01000000	64	@	01100011	99	c
00100000	32	blank space character	01000001	65	A	01100100	100	d
			01000010	66	B	01100101	101	e
			01000011	67	C	01100110	102	f
00100001	33	!	01000100	68	D	01100111	103	g
00100010	34	"	01000101	69	E	01101000	104	h
00100011	35	#	01000110	70	F	01101001	105	i
00100100	36	$	01000111	71	G	01101010	106	j
00100101	37	%	01001000	72	H	01101011	107	k
00100110	38	&	01001001	73	I	01101100	108	l
00100111	39	'	01001010	74	J	01101101	109	m
00101000	40	(	01001011	75	K	01101110	110	n
00101001	41	)	01001100	76	L	01101111	111	o
00101010	42	*	01001101	77	M	01110000	112	p
00101011	43	+	01001110	78	N	01110001	113	q
00101100	44	,	01001111	79	O	01110010	114	r
00101101	45	-	01010000	80	P	01110011	115	s
00101110	46	.	01010001	81	Q	01110100	116	t
00101111	47	/	01010010	82	R	01110101	117	u
00110000	48	0	01010011	83	S	01110110	118	v
00110001	49	1	01010100	84	T	01110111	119	w
00110010	50	2	01010101	85	U	01111000	120	x
00110011	51	3	01010110	86	V	01111001	121	y
00110100	52	4	01010111	87	W	01111010	122	z
00110101	53	5	01011000	88	X	01111011	123	{
00110110	54	6	01011001	89	Y	01111100	124	|
00110111	55	7	01011010	90	Z	01111101	125	}
00111000	56	8	01011011	91	[	01111110	126	~
00111001	57	9	01011100	92	\	01111111	127	delete
00111010	58	:	01011101	93	]			
00111011	59	;	01011110	94	^			

00011111	31		01000000
00100000	32	blank space character	01000001 01000010 01000011
00100001	33	!	01000100
00100010	34	"	01000101
00100011	35	#	01000110
00100100	36	$	01000111
00100101	37	%	01001000
00100110	38	&	01001001
00100111	39	'	01001010
00101000	40	(	01001011
00101001	41	)	01001100
00101010	42	*	01001101
00101011	43	+	01001110

Encoding text

- ✓ ASCII character set
  - ➢ Assigns numbers to letters
    - 7 bits 128 I s the standard ASCII
    - 8 bits 256 possible characters (only need about 150)
    - 'A' is 65 and 'a' is 97
    - '$' is 36
    - Bell is 7
  - ➢ 16 bit character set (65,000 possible characters)
    - An extension will include as many as a million characters

Encoding text

- ✓ Unicode
  - 16 bit character set (65,000 possible characters)
    - ✓ *a unique number for every character,*
      no matter what the platform,
      no matter what the program,
      no matter what the language.
  - For "the principal written" languages
    - Includes Chinese with its more than 13,000 characters of normal use (50,000 total characters)

Unicoded Language sets

- ✓ Latin, Greek, Cyrillic, Armenian, Hebrew, Arabic, Devanagari, Bengali, Gurmukhi, Gujarati, Oriya, Tamil, Telugu, Kannada, Malayalam, Thai, Lao, Georgian, Tibetan, Japanese
- ✓ Kana, modern Korean Hangul
- ✓ a unified set of Chinese/Japanese/Korean (CJK) ideographs. Ethiopic, Canadian Syllabics, Cherokee, additional rare ideographs, Sinhala, Syriac, Burmese, Khmer, and Braille.

Unicode Standard

- ✓ does not define glyph images.
- ✓ defines how characters are interpreted, not how glyphs are visually displayed
- ✓ The software or hardware-rendering engine of a computer is responsible for the appearance of the characters on the screen.
- ✓ The Unicode Standard does not specify the size, shape, nor orientation of on-screen characters.

Bits as Instructions

- ✓ The computer stores programs as collections of bits.
  - For instance, 01101010 might instruct the computer to add two numbers.

- Other bit instructions might include where to find numbers stored in memory or where to store them.

Don't Be Intimidated by Hardware

- ✓ People feel threatened by computers because they fear computers are too complicated
- ✓ Computers should be treated in the same way as any other electrical device

That's all folks!