

COURSE: BCA

PAPER 3: - FUNDAMENTALS OF IT

UNIT 1

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# Topics

- Information Representation
- Definition of Computer
- Characteristics of a Computer
- Classification of Computers
- Applications of Computer
- Components of Computer and their Functions

# Information Representation

- All information must be converted into binary first, in order to be processed and stored on a computer.
- Besides numbers, almost all applications must store characters and string information.
- Images are pervasive in today's internet world and must be rendered in binary to be handled by internet browsers.

# For Character Representation the following coding schemes are used

- ASCII coding for PC workstations
- EBCDIC – IBM Mainframes
- Unicode – International Character sets

# ASCII

(American Standard Code for Information Interchange)

- Uses 7-bits for coding.
- Specifies coding of space and a set of 94 characters (letters, digits and punctuation or mathematical symbols) suitable for the interchange of basic English language documents. Forms the basis for most computer code sets.

# ASCII

Decimal	Hex	Char	Comment	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	00	NULL	Null	32	20	Space	64	40	@	96	60	`
1	01	SOH	Start of Heading	33	21	!	65	41	A	97	61	a
2	02	STX	Start of Text	34	22	"	66	42	B	98	62	b
3	03	ETX	End of Text	35	23	#	67	43	C	99	63	c
4	04	EOT	End of Transmission	36	24	\$	68	44	D	100	64	d
5	05	ENQ	Enquiry	37	25	%	69	45	E	101	65	e
6	06	ACK	Acknowledge	38	26	&	70	46	F	102	66	f
7	07	BEL	Bell (Ding!)	39	27	'	71	47	G	103	67	g
8	08	BS	Backspace	40	28	(	72	48	H	104	68	h
9	09	HT	Horizontal Tab	41	29	)	73	49	I	105	69	i
10	0A	LF	Line Feed	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	Vertical Tab	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	Form Feed (new page)	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	Carriage Return	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	Shift Out	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	Shift In	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	Data Link Escape	48	30	0	80	50	P	112	70	p
17	11	DC1	Device Control 1	49	31	1	81	51	Q	113	71	q
18	12	DC2	Device Control 2	50	32	2	82	52	R	114	72	r
19	13	DC3	Device Control 3	51	33	3	83	53	S	115	73	s
20	14	DC4	Device Control 4	52	34	4	84	54	T	116	74	t
21	15	NAK	Negative Acknowledge	53	35	5	85	55	U	117	75	u
22	16	SYN	Synchronous Idle	54	36	6	86	56	V	118	76	v
23	17	ETB	End of Transmission Block	55	37	7	87	57	W	119	77	w
24	18	CAN	Cancel	56	38	8	88	58	X	120	78	x
25	19	EM	End of Medium	57	39	9	89	59	Y	121	79	y
26	1A	SUB	Substitute	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	Escape	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	File Separator	60	3C	<	92	5C	\	124	7C	
29	1D	GS	Group Separator	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	Record Separator	62	3E	>	94	5E	^	126	7E	~
31	1F	US	Unit Separator	63	3F	?	95	5F	_	127	7F	DEL (Delete)

# EBCDIC

**(Extended Binary Coded Decimal Interchange Code)**

- **Proprietary specification developed by IBM**
- **A set of national character sets for interchange of documents between IBM mainframes. Most EBCDIC character sets do not contain all of the characters defined in the ASCII code.**

# EBCDIC

00	NUL	20	DS	40	SP	60	-	80		A0	{	E0	\
01	SOH	21	SOS	41		61	/	81	a	A1	~	E1	
02	STX	22	FS	42		62		82	b	A2	s	E2	S
03	ETX	23		43		63		83	c	A3	t	E3	T
04	PF	24	BYP	44		64		84	d	A4	u	E4	U
05	HT	25	LF	45		65		85	e	A5	v	E5	V
06	LC	26	ETB	46		66		86	f	A6	w	E6	W
07	DEL	27	ESC	47		67		87	g	A7	x	E7	X
08		28		48		68		88	h	A8	y	E8	Y
09		29		49		69		89	i	A9	z	E9	Z
0A	SMM	2A	SM	4A	€	6A	.	8A		AA		EA	
0B	VT	2B	CU2	4B		6B	,	8B		AB		EB	
0C	FF	2C		4C	<	6C	%	8C		AC		EC	
0D	CR	2D	ENQ	4D	(	6D		8D		AD		ED	
0E	SO	2E	ACK	4E	+	6E	>	8E		AE		EE	
0F	SI	2F	BEL	4F		6F	?	8F		AF		EF	
10	DLE	30		50	&	70		90		B0	}	F0	0
11	DC1	31		51		71		91	j	B1	J	F1	1
12	DC2	32	SYN	52		72		92	k	B2	K	F2	2
13	TM	33		53		73		93	l	B3	L	F3	3
14	RES	34	PN	54		74		94	m	B4	M	F4	4
15	NL	35	RS	55		75		95	n	B5	N	F5	5
16	BS	36	UC	56		76		96	o	B6	O	F6	6
17	IL	37	EOT	57		77		97	p	B7	P	F7	7
18	CAN	38		58		78		98	q	B8	Q	F8	8
19	EM	39		59		79		99	r	B9	R	F9	9
1A	CC	3A		5A	!	7A	:	9A		BA		FA	
1B	CUI	3B	CU3	5B	\$	7B	#	9B		BB		FB	
1C	IFS	3C	DC4	5C	.	7C	@	9C		BC		FC	
1D	IGS	3D	NAK	5D	)	7D	'	9D		BD		FD	
1E	IRS	3E		5E	:	7E	=	9E		BE		FE	
1F	IUS	3F	SUB	5F	-	7F	"	9F		BF		FF	

STX	Start of text	RS	Reader Stop	DC1	Device Control 1	BEL	Bell
DLE	Data Link Escape	PF	Punch Off	DC2	Device Control 2	SP	Space
BS	Backspace	DS	Digit Select	DC4	Device Control 4	IL	Idle
ACK	Acknowledge	PN	Punch On	CUI	Customer Use 1	NUL	Null
SOH	Start of Heading	SM	Set Mode	CU2	Customer Use 2		
ENQ	Enquiry	LC	Lower Case	CU3	Customer Use 3		
ESC	Escape	CC	Cursor Control	SYN	Synchronous Idle		
BYP	Bypass	CR	Carriage Return	IFS	Interchange File Separator		
CAN	Cancel	EM	End of Medium	EOT	End of Transmission		
RES	Restore	FF	Form Feed	ETB	End of Transmission Block		
SI	Shift In	TM	Tape Mark	NAK	Negative Acknowledge		
SO	Shift Out	UC	Upper Case	SMM	Start of Manual Message		
DEL	Delete	FS	Field Separator	SOS	Start of Significance		
SUB	Substitute	HT	Horizontal Tab	IGS	Interchange Group Separator		
NL	New Line	VT	Vertical Tab	IRS	Interchange Record Separator		
LF	Line Feed	UC	Upper Case	IUS	Interchange Unit Separator		



# UNICODE

- Can represent all of the world's characters in modern computer use, including technical symbols and special characters used in publishing.
- Each Unicode code value is 16 bits wide.
- It is possible to have separate values for up to 65,536 characters.
- Unicode-enabled functions are often referred to as "wide-character" functions.

# Definition of Computer

A Computer is an electronic machine used for performing calculations and controlling operations that can either be expressed in logical or numerical terms.

In simple terms it is an electronic devices that takes some input processes it and produced the desired output.

Using these machines millions of complex calculations can be done in a mere fractions of time and difficult decisions can be made with more accuracy at low cost.

# Characteristics of a computer

- **Speed** : Computers process data at an extremely fast rate – Millions Instructions Per Seconds (MIPS). The speed of a computer is calculated in MHz(Mega Hertz), Giga Hertz(GHz), etc .
- **Accuracy**: The level of accuracy depends on the instructions and the type of machine being used.

# Continued...

- **Diligence:** Computer does not suffer from tiredness and lack of concentration.
- **Reliability:** The performance of computers with minimum or no errors. Computers have built-in diagnostic capabilities which help in continuous monitoring of the system

# Continued...

- **Storage capability**: Computers can store large amount of data. The unit of storage is bits, byte, KiloBytes, Megabytes, and so on.
- **Versatile**: Can perform multiple tasks
- **Resource Sharing**: Computers can be connected with each other and thus share the resources.

# Classification of Computers

Computers are designed for different purposes. According to the need they can be classified into two basic types:

- General purpose Computers
- Special purpose Computers

# Continued....

Classification according to Type of Data Handling Techniques:

- Analog Computers
- Digital Computers
- Hybrid Computers- Combination of analog and digital computers.

# Continued....

Classification of Computers according to functionality:

- Micro computers
- Mini Computers
- Mainframes
- Super Computers



# Micro Computers

- Small, low cost digital computers
- Consists of microprocessor, a storage unit, input and output channel.
- Examples- IBM-PC pentium 100, IBM-PC 200, Apple Macintosh etc.
- Includes desktop, laptop and hand held models such as Personal digital Assistants (PDAs).

# Mini Computers

- Small digital computers but can store more data than micro computers.
- Often called “ mid-range computers”
- It serves as a centralized storehouse for a cluster of workstations or as a network servers
- Examples: PDP 11, IBM 8000 series and VAX 7500.

# Mainframes

- Consists of high end processor
- High performance and speed
- Supports on-line data processing with extensive data storage and retrieval
- Faster than mini computers
- Used by large business and for scientific purposes
- Examples: VAX 8000, CDC 6600 etc.

# Super Computers

- Are special purpose machines
- Very high processing speed (range from 400-10,000 MFLOPS).
- Used for parallel processing and solving multi-variant mathematical problems
- Costly
- Examples: CRAY-3, PARAM etc.

# Application of Computers

- Computers not only save time but also save paper work. Some of the areas where computers are being used are listed as follows:
  - Education
  - Medicine and health sector
  - Engineering/Architecture/ Manufacturing
  - Entertainment
  - Communication

# Continued....

- Business applications
- Publishing Industries
- Banking
- Railways, etc .

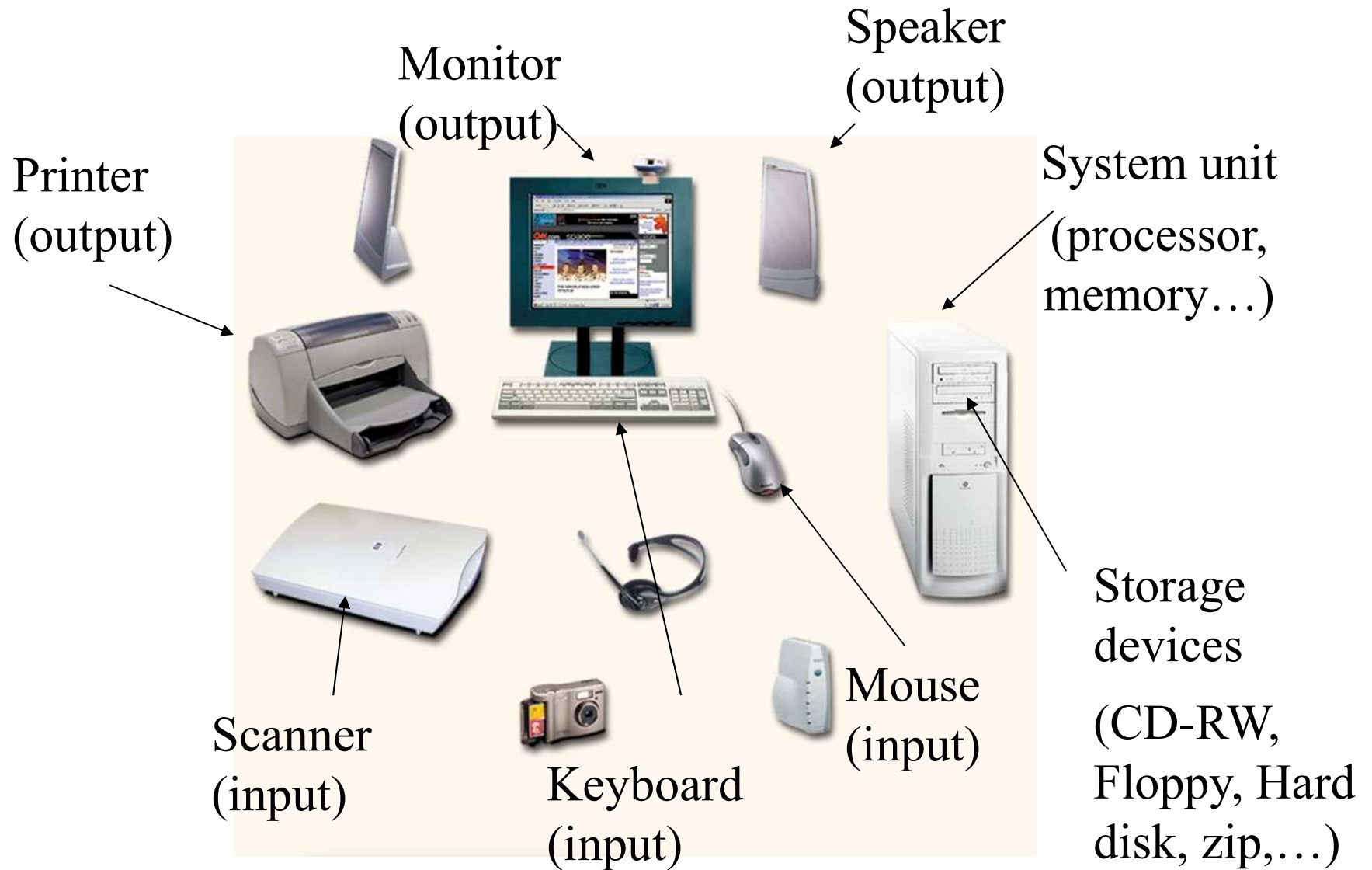
In last few decades, computers technology has revolutionized the business and other aspects of human life all over the world. Every company, large or small is now directly or indirectly dependent on computers for data processing.

# Components of Computer and their functions

A computer system comprises four components:

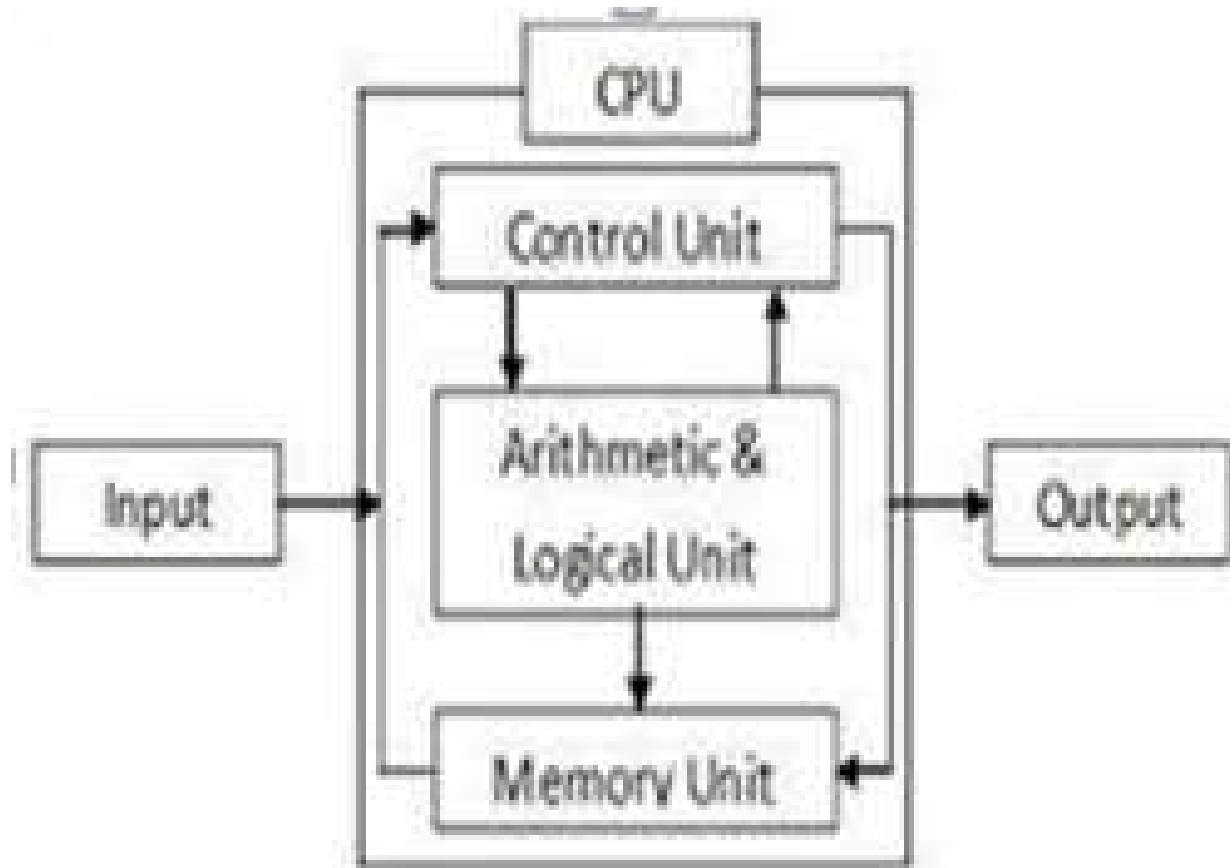
- Central Processing Unit (CPU)
- Input unit
- Output unit
- Storage unit.

# Devices that comprise a computer system





# Block diagram of a Computer



# Central Processing Unit

The Central Processing Unit (CPU) is the brain of computer system that processes data (input) and converts it into meaningful information(output). It consist of complex electronic circuits. CPU controls all internal and external devices. CPU consists of three main subsystems: The **CU**(control Unit), **ALU** (Arithmetic Logic Unit) and **Main Memory**.

# CU (Control Unit)

- This unit checks the correctness of the sequence of operations (input)
- Fetches program instructions from the memory unit
- Interprets them and ensures their correct execution
- Controls the input and output devices.
- Known as “Power house” of computer system

# ALU (Arithmetic and Logic Unit)

- Performs arithmetic (add, subtract, etc) and logic operations (AND, OR) on data.
- It takes data from the memory, performs the operations and transfers the output back to the memory.

# Main memory

- Also known as primary memory
- It is of two types:
- **RAM**- Random Access Memory
- **ROM**- Read Only Memory

# Input Devices

- Keyboard
- Mouse
- Scanner
- Barcode reader
- Light pen
- Joysticks, etc.

## Continued....

### Keyboard.

- The most commonly used input device is the keyboard on which data is entered by manually keying in or typing certain keys. A keyboard typically has 101 or 105 keys.

Keyboard.





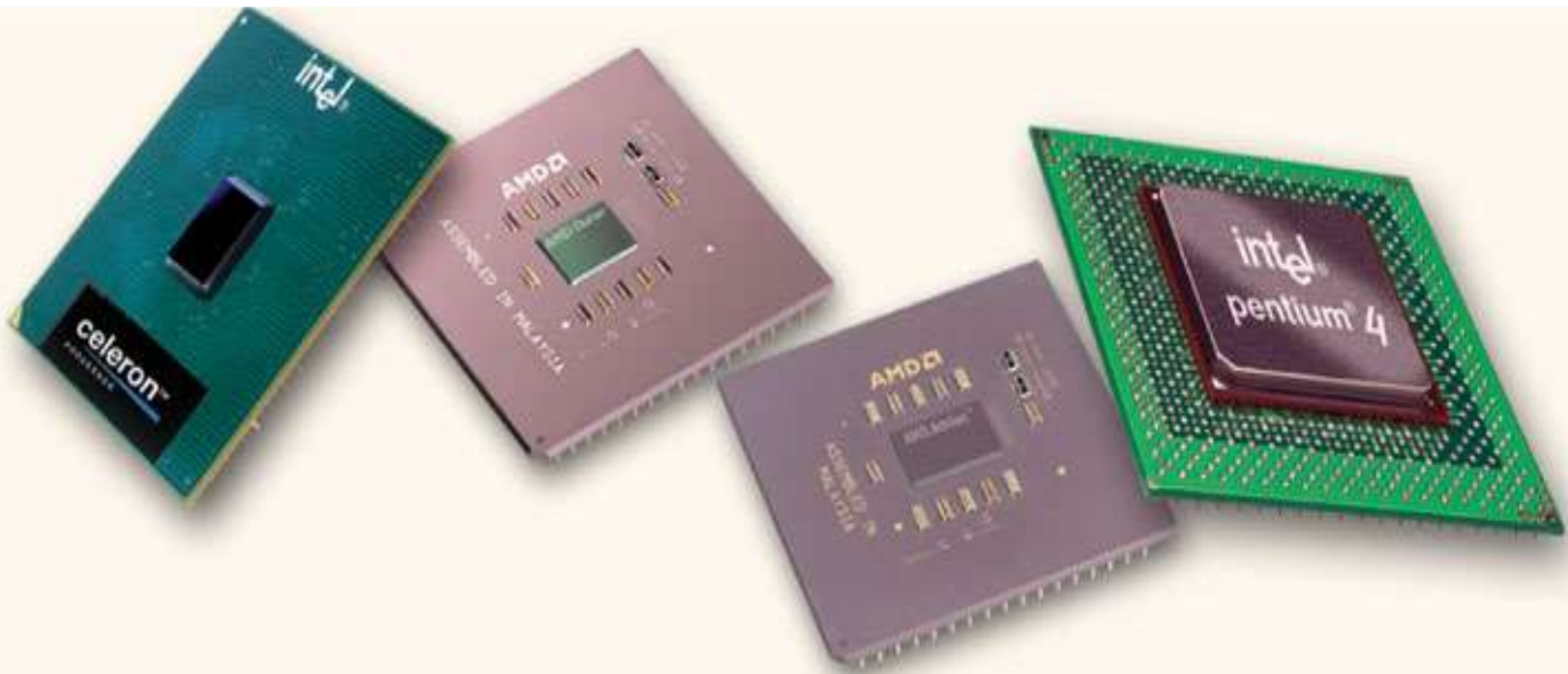
## Mouse

- Is a pointing device which is used to control the movement of a mouse pointer on the screen to make selections from the screen. A mouse has one to five buttons. The bottom of the mouse is flat and contains a mechanism that detects movement of the mouse.

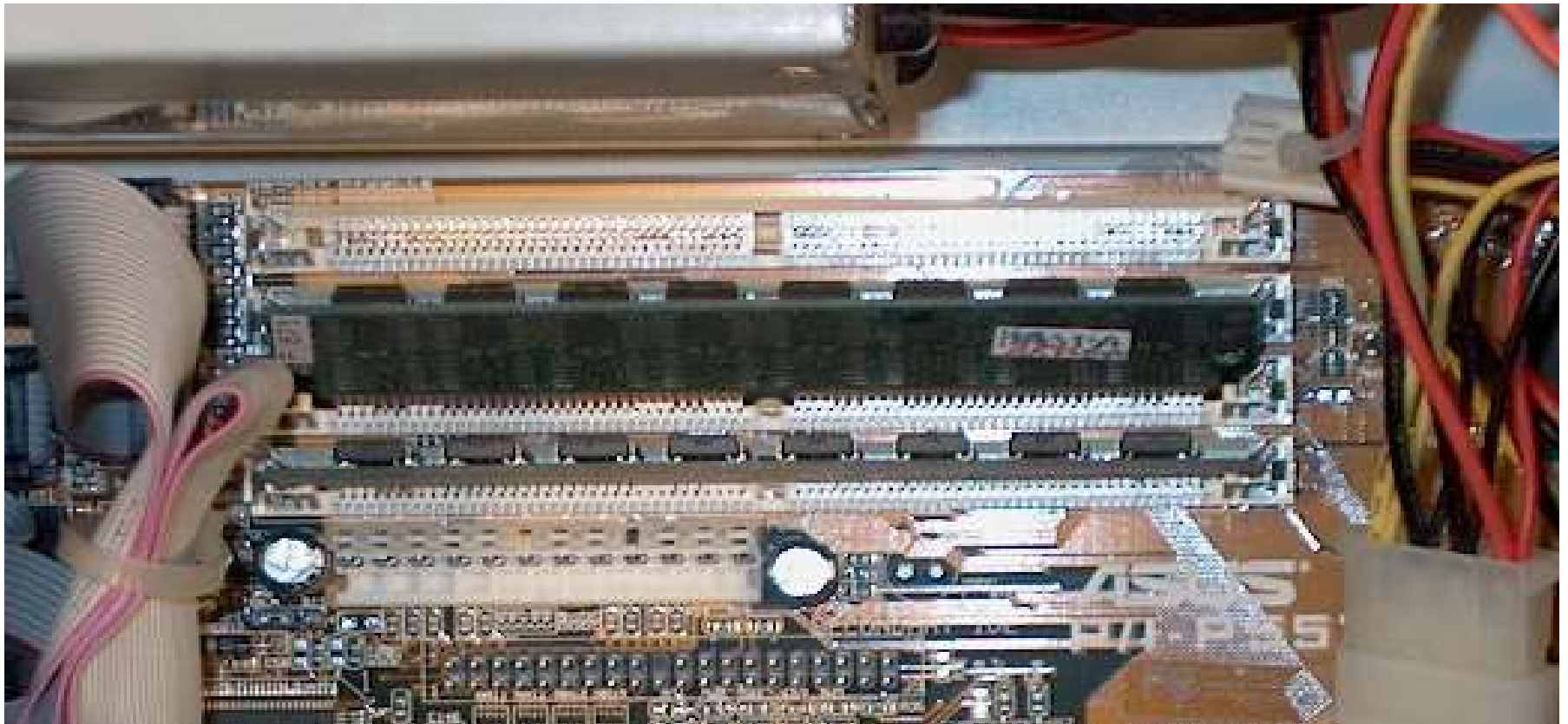
# Mouse



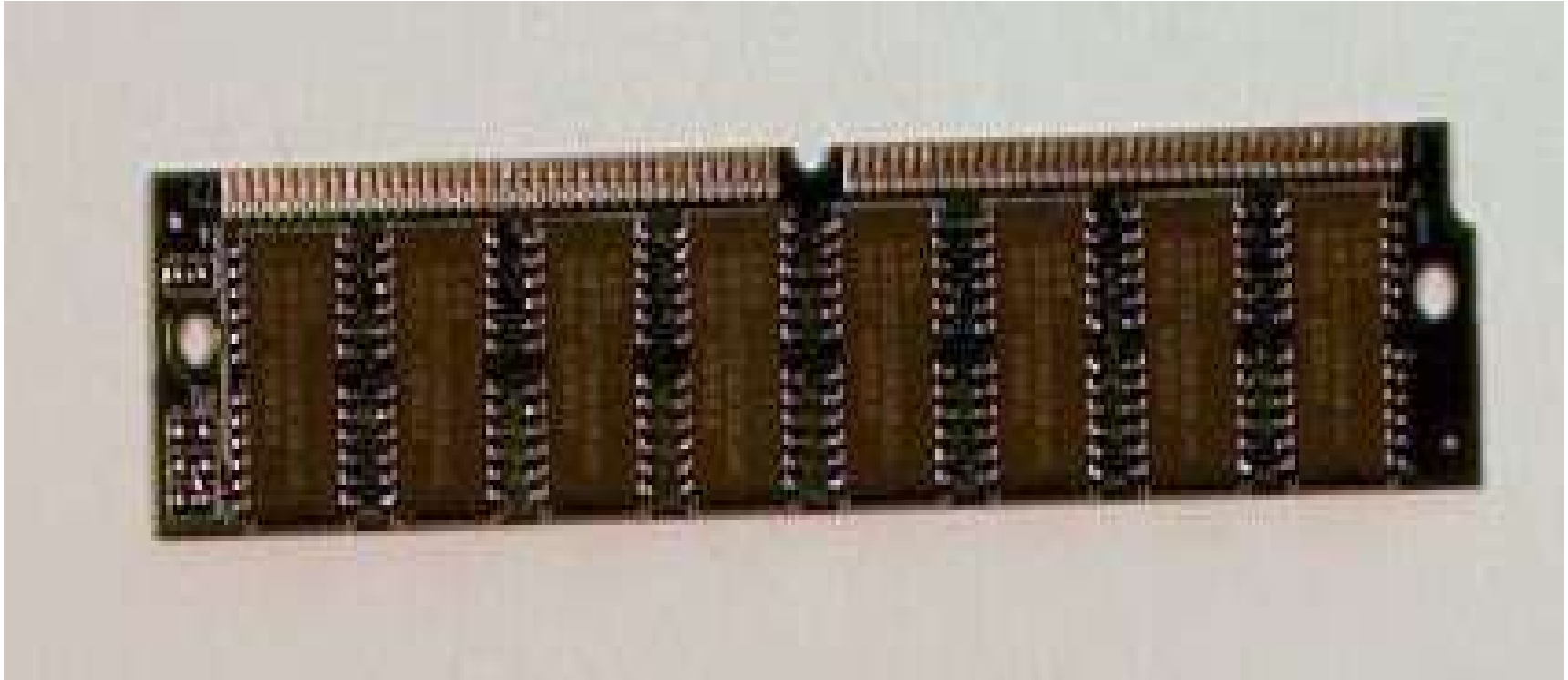
# The Central Processing Unit



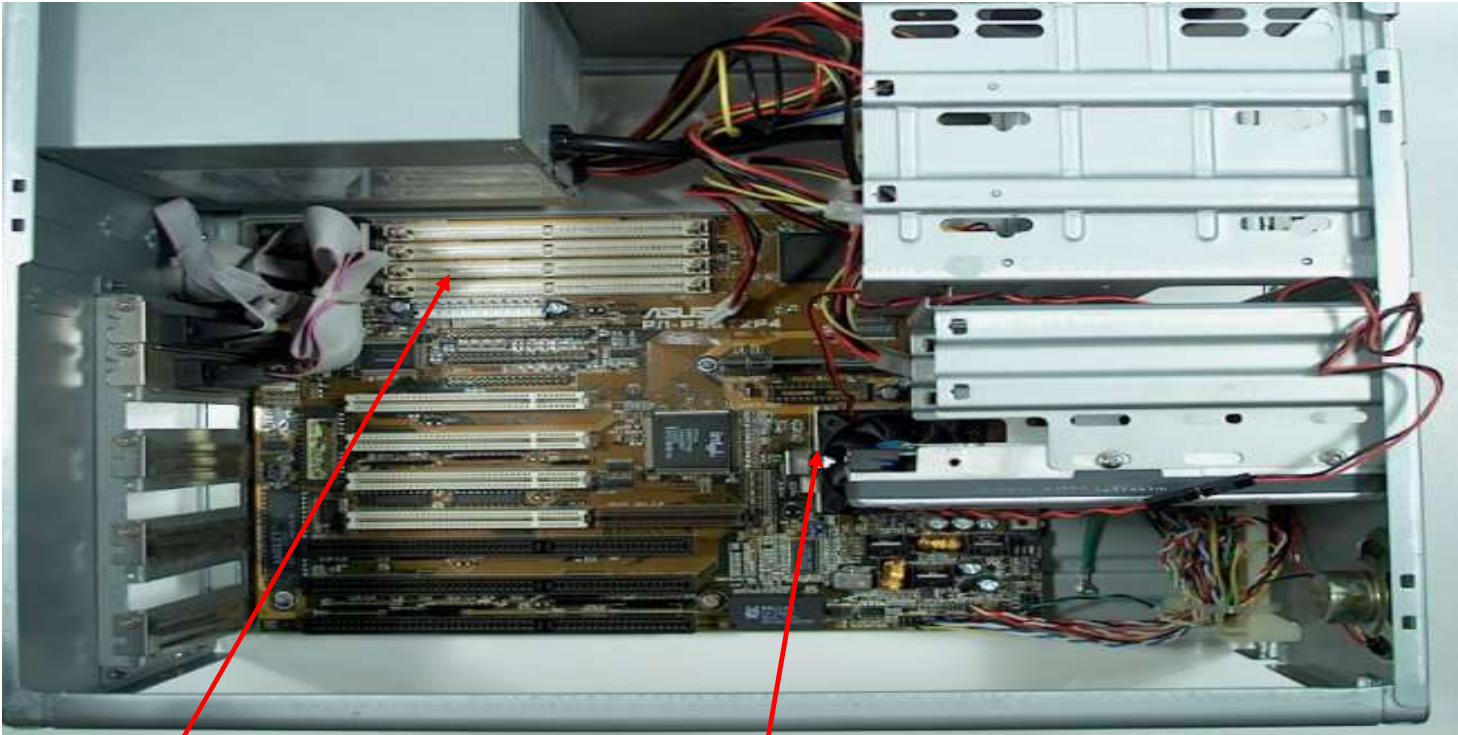
# Memory



# Memory



# Look inside your CPU



RAM BANK

CPU

# Output Devices

Some most commonly used out put devices are:

- Printers
- Monitor
- Plotters
- Speakers

## Continued....

- Output devices make the information resulting from the processing available for use.
- The printer produces a hard copy of your output, and the computer screen produces a soft copy of your output.



# Printer



# Monitor



# Suggestions

You can go through the blocks provided by the University for detail description and ask for any doubts.