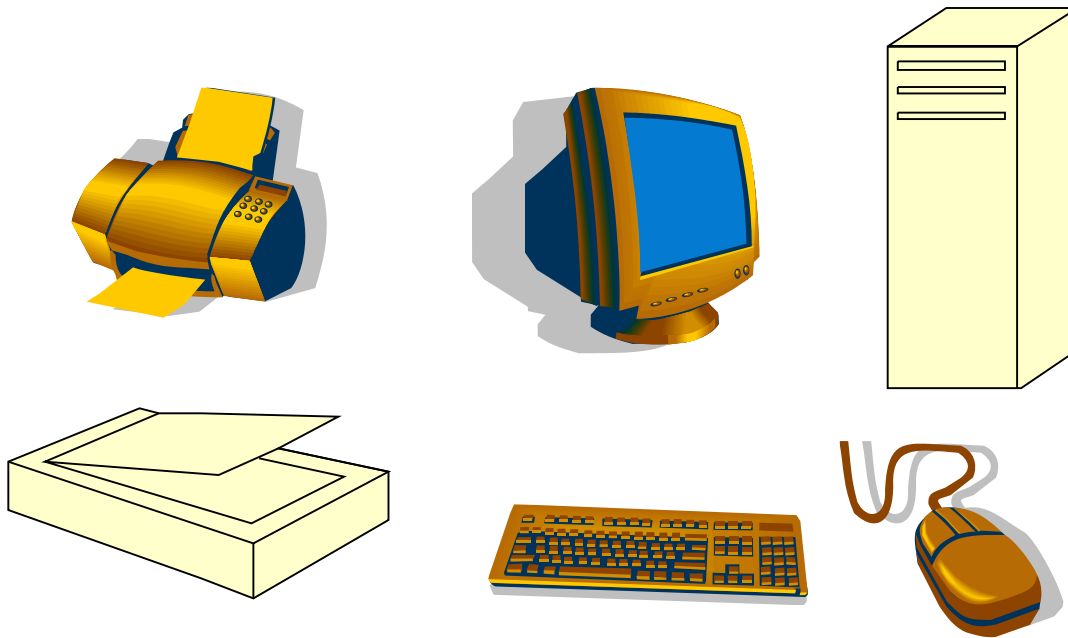


Basics Of Computers

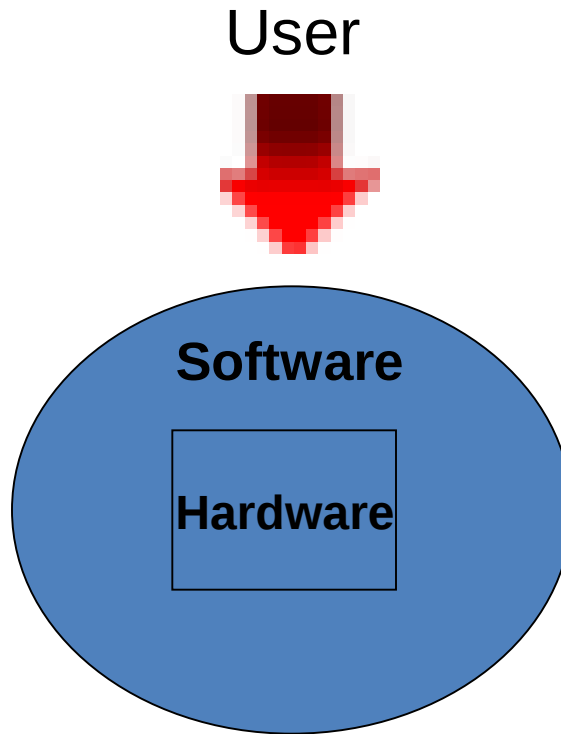


A Desktop Machine



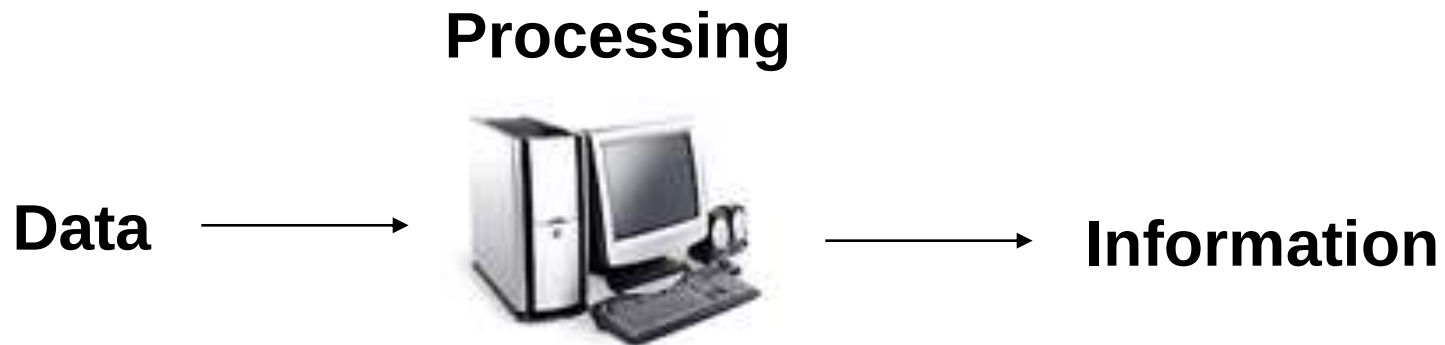
A Computer System

- Hardware
- Software
- User



A Computer System (Contd.)

- In general, a computer is a machine which accepts data, processes it and returns new information as output.



Software

- Software is set of programs (which are step by step instructions) telling the computer how to process data.
- Software needs to be installed on a computer, usually from a CD.
- Softwares can be divided into two groups:
 - System SW
 - Application SW

Software (Contd.)

System Software

- It controls the overall operation of the system.
- It is stored in the computer's memory and instructs the computer to load, store, and execute an application.
- Examples: Operating System (OS), Translators
DOS, Windows, Unix etc.

Software (Contd..)

Application Software

- They are Softwares written to perform specific tasks.
- The basic types of application software are:
word processing, database, spreadsheet,
desktop publishing, and communication.
Examples: MSOffice, Tally, MSOutlook,

Advantages of Using Computers

- **Speed**: Computers can carry out instructions in less than a millionth of a second.
- **Accuracy** : Computers can do the calculations without errors and very accurately.
- **Diligence** : Computers are capable of performing any task given to them repetitively.
- **Storage Capacity** : Computers can store large volume of data and information on magnetic media.

History of Evolution Of Computers

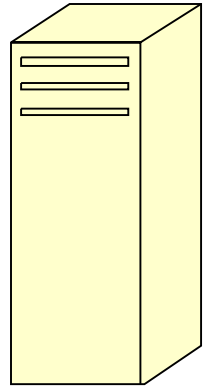
Two Eras:

- Mechanical Era (Before 1945)
- Electronic Era (1945 -)

Can be divided into generations.

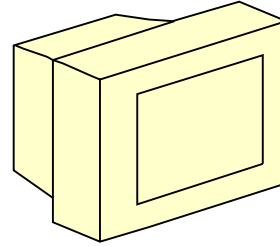
- First Generation (1945 – 1954)
- Second Generation (1955 – 1964)
- Third Generation (1965 – 1974)
- Fourth Generation (1975 -)

CPU (Central Processing Unit)



- The central processing unit (CPU), also known as just a "processor", is the "brain" of your computer.
- It contains various electronic circuits.

VDU (Monitor)



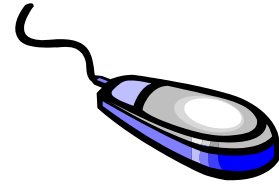
- This is the television-like screen where the results of a computer's tasks are displayed.
- Monitors come in all sizes, but most commonly they are either 15 or 17 inches  (measured diagonally from one corner of the screen to the opposite corner).

Keyboard



- The keyboard looks like a typewriter.
- It contains all the letters of the alphabet, numbers and some special symbols.
- It operates like a typewriter keypad, but instead of moving an arm, which strikes the paper, it sends an electronic impulse to the computer, which displays a character on the monitor.

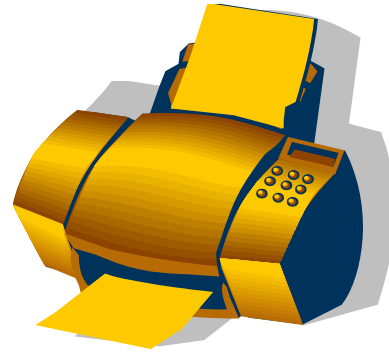
Mouse



- Its a device that is used to control the computer. A cable connects the mouse to the computer.
- When the mouse is moved on a pad, called a mouse pad, the cursor on the screen moves.

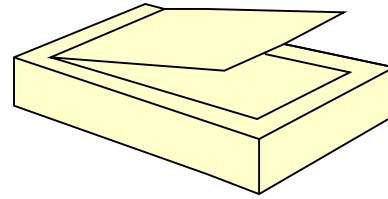
- A cursor is a small symbol displayed on the computer screen (normally a diagonal arrow that is used as a pointer) that shows you what the mouse is referencing on the screen.

Printer



- A printer is designed to output information from a computer onto a piece of paper.
- There are three kinds of printers:
dot matrix, laser, and inkjet.

Scanner



- A scanner is a device used to copy an image off paper and convert it into a digital image, which can be saved as a computer file and stored on a hard drive.
- Scanners can also use a special kind of technology called Optical Character Recognition (OCR) to read text from paper and save it as an editable document file

Inside The CPU Cabinet



A Look Inside ..



A Look Inside...

- Identify all the major components:
 - Power Supply
 - Motherboard
 - Memory
 - Card Slots
 - Cards (sound, video, network)
 - CPU, heatsink and fan
 - Drives (floppy, hard and CD-ROM)

A Look Inside....

RAM
BANK



Card Slots (ISA & PCI)

CPU, Fan, Heatsink

What these components do.

- **Power Supply** – (heart) supplies power to all the circuitry and devices.
- **Motherboard** – (body) acts as a manager for everything on the computer – connects all the other components together.
- **CPU** – Central Processing Unit – (brain) this does all the work of computing.

What these components do..

- **RAM** – Random Access Memory – (**short-term memory**) holds data and program instructions that the computer is currently using.
- **Hard Drive** – (**long-term memory**) holds all of the information that needs to be stored between uses of the computer.
- **Floppy and CD-ROM drives** – (**mouth/ears**) allow you to give data to the computer and take data away from the computer.

What these components do...

- **Card Slots** – (**fingers**) Allows other components to be added to the computer.
- **Video card** – (**face**) Does all of the processing necessary to get stuff looking nice on screen, quickly.
- **Sound card** – (**vocal cords**) Allows sounds from HD or CD-ROM to be played.
- **Network Card** – (**telephone**) allows computer to talk to other computers over a wire.

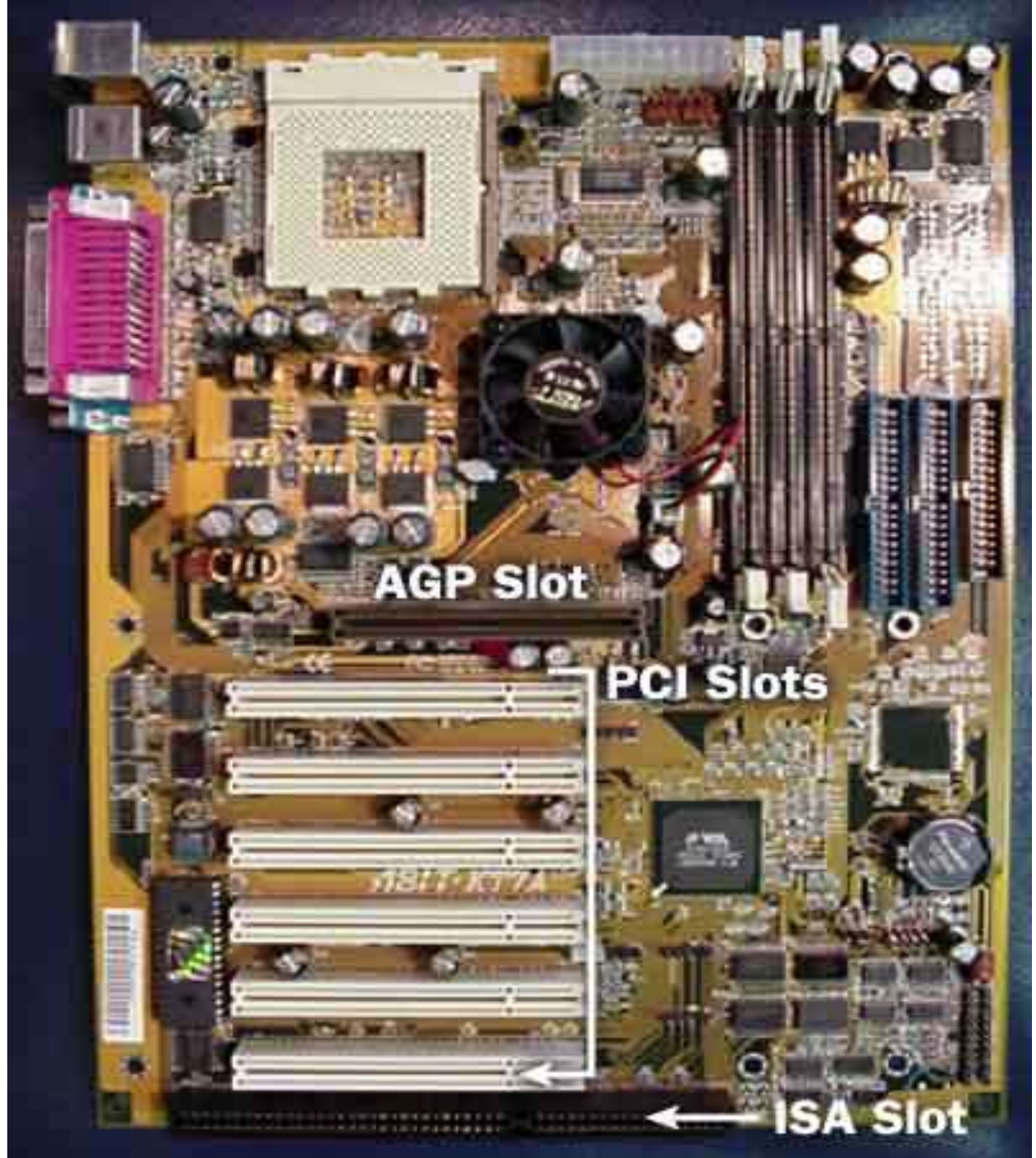
Power Supply

SMPS – Switch Mode Power Supply
Switching Transistors

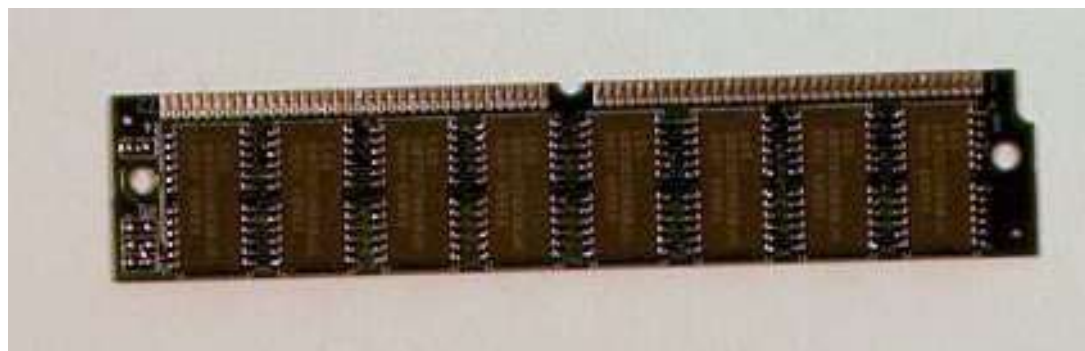
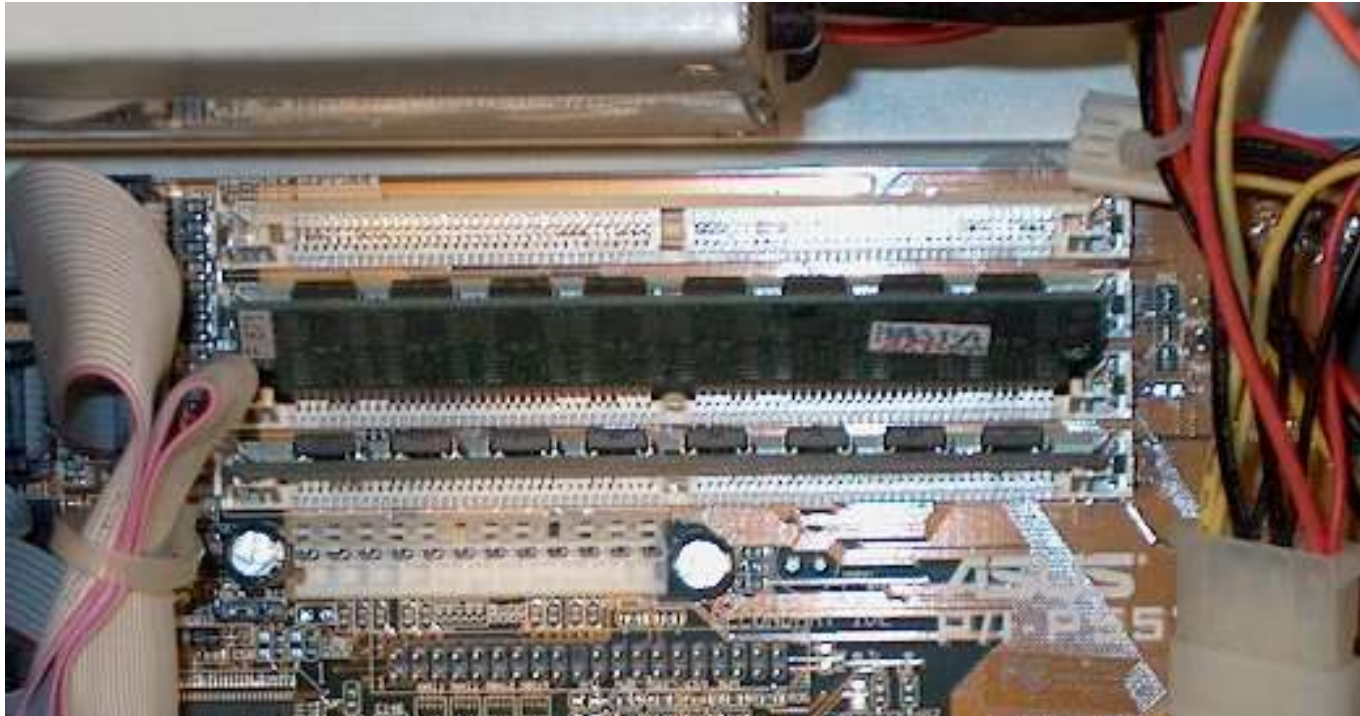
Outputs + 5V, -5V, +12 V, -12 V

Usually, SMPS comes with the CPU Cabinet.

Motherboard



RAM

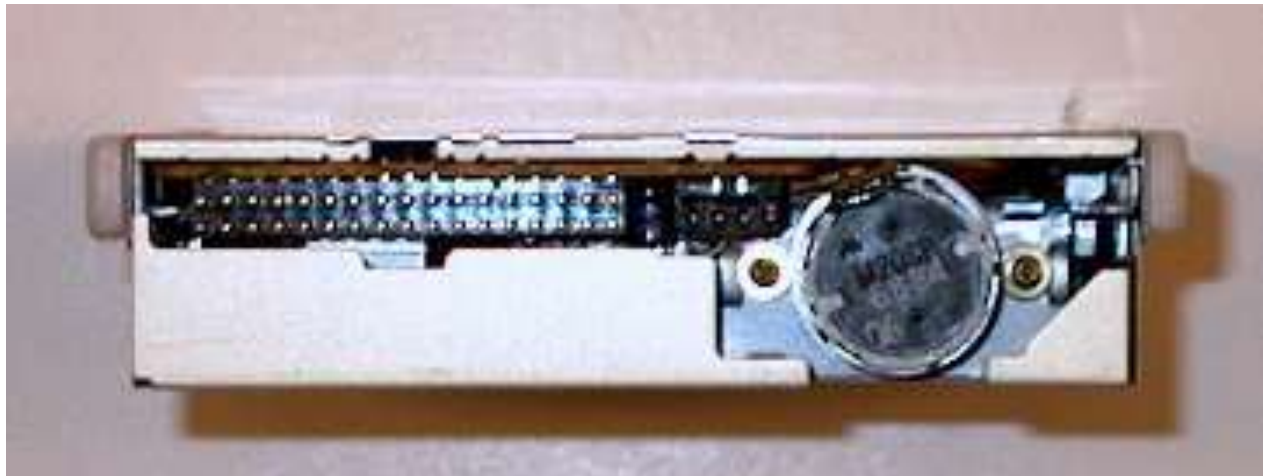
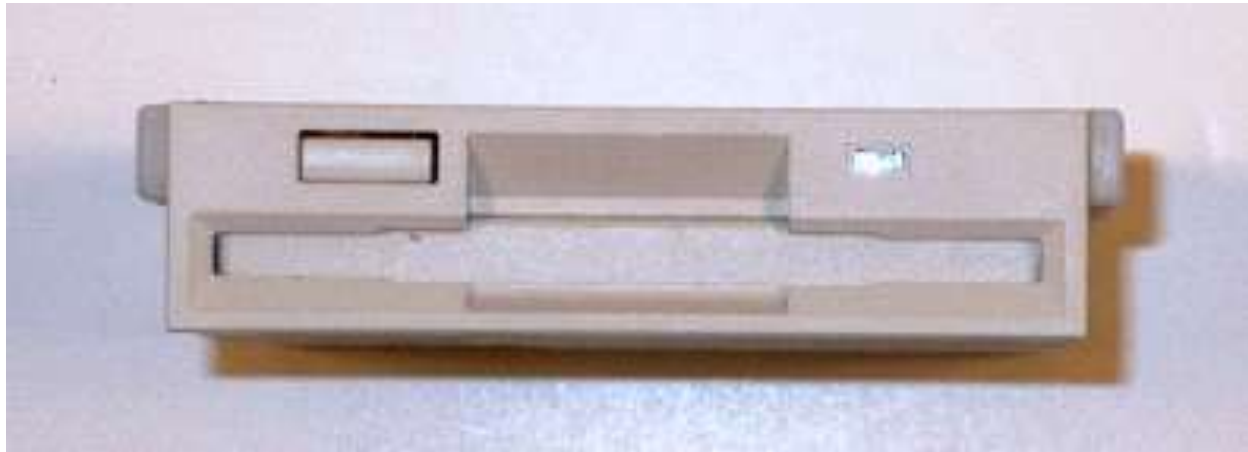


Hard Drive

We won't remove this.



Floppy Drive



CD-ROM Drive



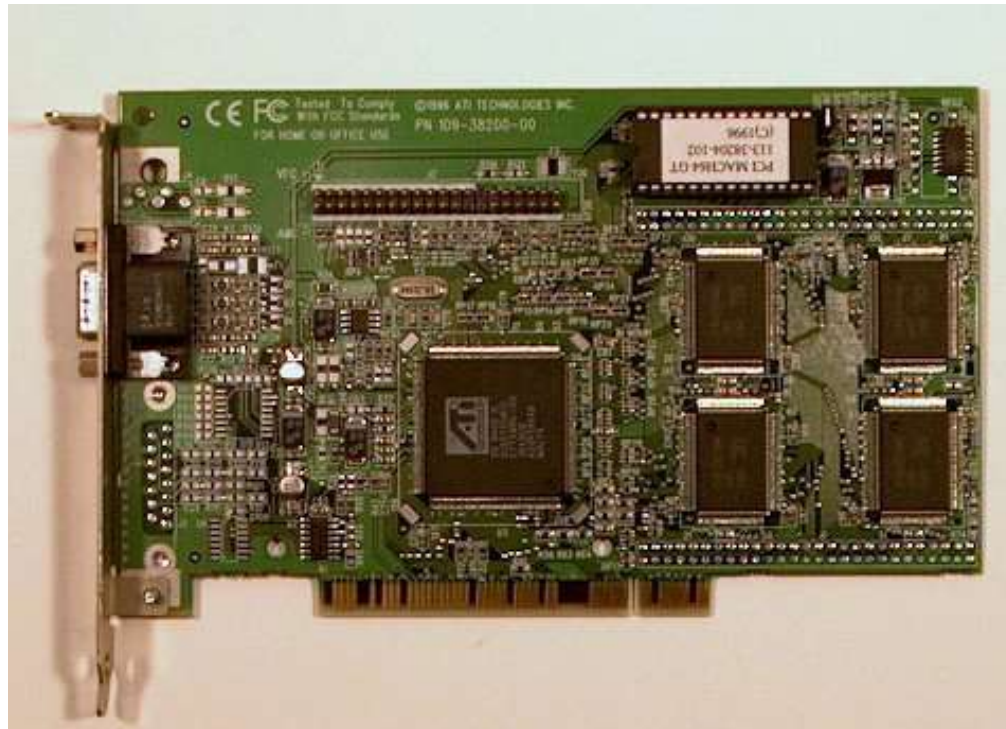
Ribbon Cables



polarized



Video Card



Sound Card



Back of Computer



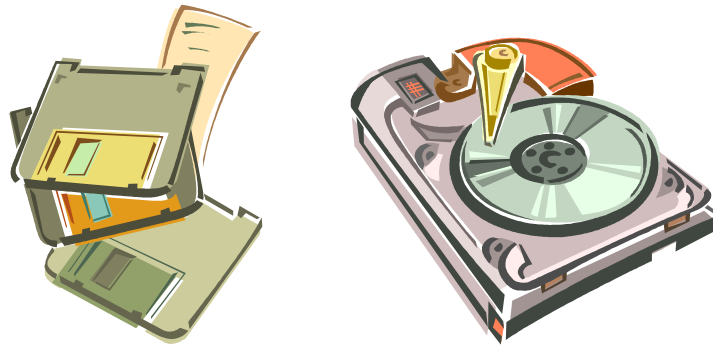
Remove these screws

CPU

- The central processing unit or (CPU) is the "brain" of your computer. It contains the electronic circuits that cause the computer to follow instructions from memory.
- The CPU contains three main parts, all housed in a single package (Chip):
 - Control Unit (CU)
 - Arithmetic Logic Unit (ALU)
 - Memory

[BACK](#)

Computer Peripherals



Major Peripherals

- Keyboard
- Mouse
- Hard Disk
- Floppy Disk
- CD ROM
- Printer
- Scanner
- Joystick

Keyboard

- Keypad contains:
 - Alphabets
 - Numbers
 - Special Symbols
 - Function Keys
- **qwerty** Keyboard (Typewriter Keyboard).
- On key press it sends a code (ASCII Code) to the CPU.
- Plug N Play device.
- Typical Cost is Rs.300 – Rs.1200

Mouse

- Pointing & Click Device.
- Two / Three Buttons
- Wheel / Optical Mouse
- *Normally* Left Click – Select/ Run
Right Click – Popup Menu

Hard Disk

- Magnetic Memory Device.
- Non-removable storage device.
- Several Circular Magnetic Disks are housed in a single case.
- Data is stored as 1s & 0s.
- Typical Capacity is 20 GB -80 GB
- Typical Cost is Rs.2200 – Rs6000
- Cost/Bit is Low.

Floppy Disk

- Magnetic Memory Device.
- Removable storage.
- A single circular mylar plastic disk, coated with magnetic material is packed in a protective plastic casing.
- Typical size is 3.5" & Capacity is 1.44MB
- Typical Costs are:
 - Floppy Drive -- Rs.300
 - Floppy Disk -- Rs.10

CD ROM

- Optical Device.
- Removable Storage.
- Read Only Memory.
- Typical Capacity is 550 Mb – 800MB
- Typical Costs are:
 - Drive -- Rs.1000
 - Disk Rs10 – Rs.35
- Related Terms:
 - CD Writer
 - WORM
 - CD RW

Printer

- Output Device, Produces Hard Copy
- Types:
 - Dot Matrix
 - Inkjet
 - Laser
- Typical Cost Ranges from Rs.3500 – Rs.2 lacs
- Related Terms:
 - Impact – Non Impact
 - Ribbon, Cartridge, Toner, Duty Cycle
- Major Vendors in India:
 - HP, Cannon, Samsung, TVS, Epson etc.

Scanner

- Input Device, Converts a hard copy into a computer file.
- Used to Scan Signatures, Photographs etc.
- Optical Device.
- Typical Cost Rs.4000 – Rs.75000
- Major Vendors in India:
 - HP, Umax, Cannon
- Nowadays Scanners with OCR produces editable documents.

Algorithms and Flow Charts

ALGORITHMS AND FLOWCHARTS

- A typical programming task can be divided into two phases:
- ***Problem solving phase***
 - produce an ordered sequence of steps that describe solution of problem
 - this sequence of steps is called an ***algorithm***
- ***Implementation phase***
 - implement the program in some programming language

Steps in Problem Solving

- First produce a general algorithm
- Refine the algorithm successively to get step by step detailed ***algorithm*** that is very close to a computer language.

Pseudocode & Algorithm

- **Example 1:** Write an algorithm to determine a student's final grade and indicate whether it is passing or failing. The final grade is calculated as the average of four marks.

Pseudocode & Algorithm

Pseudocode:

- *Input a set of 4 marks*
- *Calculate their average by summing and dividing by 4*
- *if average is below 50*
 Print "FAIL"
else
 Print "PASS"

Pseudocode & Algorithm

- Detailed Algorithm
- Step 1: Input M1,M2,M3,M4
- Step 2: $\text{GRADE} \leftarrow (M1+M2+M3+M4)/4$
- Step 3: if (GRADE < 50) then
 Print "FAIL"
 else
 Print "PASS"
 endif

The Flowchart

- (Dictionary) A schematic representation of a sequence of operations, as in a manufacturing process or computer program.
- (Technical) A graphical representation of the sequence of operations in an information system or program. Information system flowcharts show how data flows from source documents through the computer to final distribution to users. Program flowcharts show the sequence of instructions in a single program or subroutine. Different symbols are used to draw each type of flowchart.

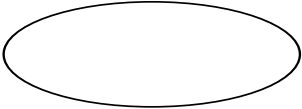
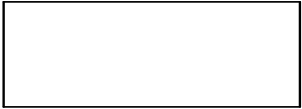
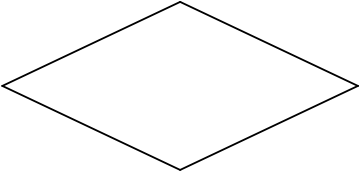
The Flowchart

A Flowchart

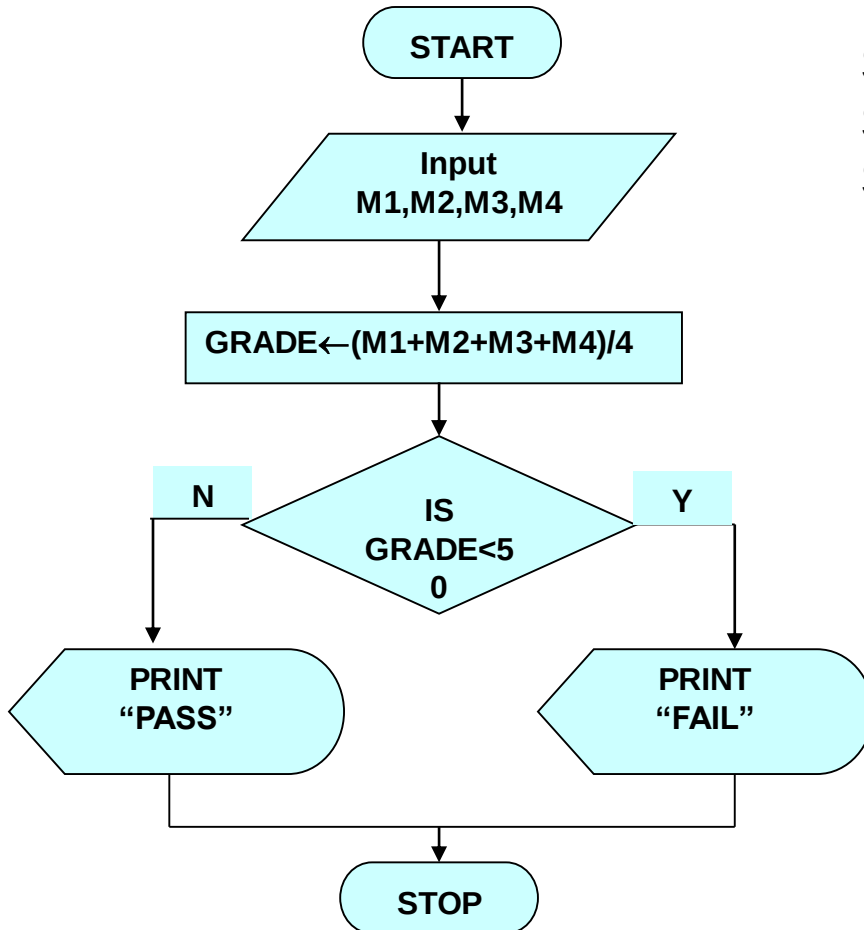
- shows logic of an algorithm
- emphasizes individual steps and their interconnections
- e.g. control flow from one action to the next

Flowchart Symbols

Basic

Name	Symbol	Use in Flowchart
Oval		Denotes the beginning or end of the program
Parallelogram		Denotes an input operation
Rectangle		Denotes a process to be carried out e.g. addition, subtraction, division etc.
Diamond		Denotes a decision (or branch) to be made. The program should continue along one of two routes. (e.g. IF/THEN/ELSE)
Hybrid		Denotes an output operation
Flow line		Denotes the direction of logic flow in the program

Example



Step 1: Input M1,M2,M3,M4

Step 2: $\text{GRADE} \leftarrow (M1 + M2 + M3 + M4) / 4$

Step 3: if (GRADE < 50) then

Print "FAIL"

else

Print "PASS"

endif

Example 2

- Write an algorithm and draw a flowchart to convert the length in feet to centimeter.

Pseudocode:

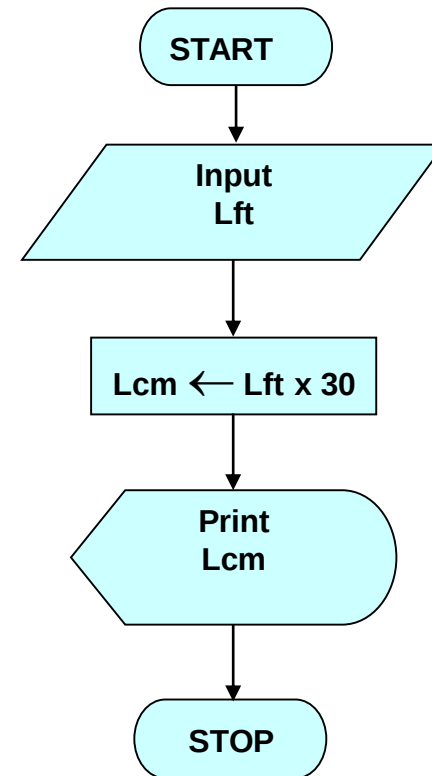
- *Input the length in feet (Lft)*
- *Calculate the length in cm (Lcm) by multiplying LFT with 30*
- *Print length in cm (LCM)*

Example 2

Algorithm

- Step 1: Input Lft
- Step 2: $Lcm \leftarrow Lft \times 30$
- Step 3: Print Lcm

Flowchart



Example 3

Write an algorithm and draw a flowchart that will read the two sides of a rectangle and calculate its area.

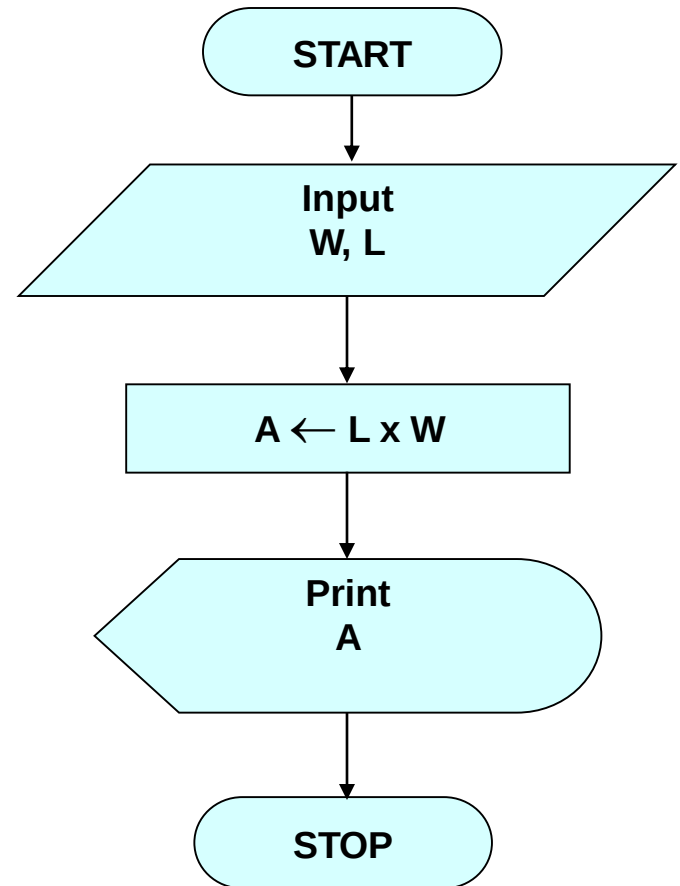
Pseudocode

- *Input the width (W) and Length (L) of a rectangle*
- *Calculate the area (A) by multiplying L with W*
- *Print A*

Example 3

Algorithm

- Step 1: Input W,L
- Step 2: $A \leftarrow L \times W$
- Step 3: Print A



Example 4

- Write an algorithm and draw a flowchart that will calculate the roots of a quadratic equation

$$ax^2 + bx + c = 0$$

- Hint: $d = \sqrt{b^2 - 4ac}$ and the roots are: $x1 = (-b + d)/2a$ and $x2 = (-b - d)/2a$

Example 4

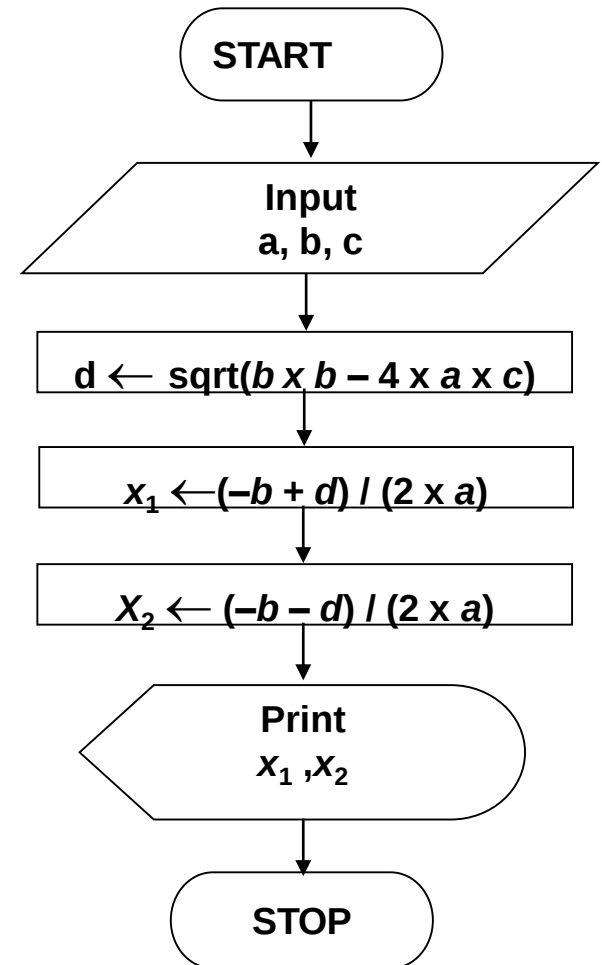
Pseudocode:

- *Input the coefficients (a , b , c) of the quadratic equation*
- *Calculate **d***
- *Calculate **x1***
- *Calculate **x2***
- *Print $x1$ and $x2$*

Example 4

- **Algorithm:**

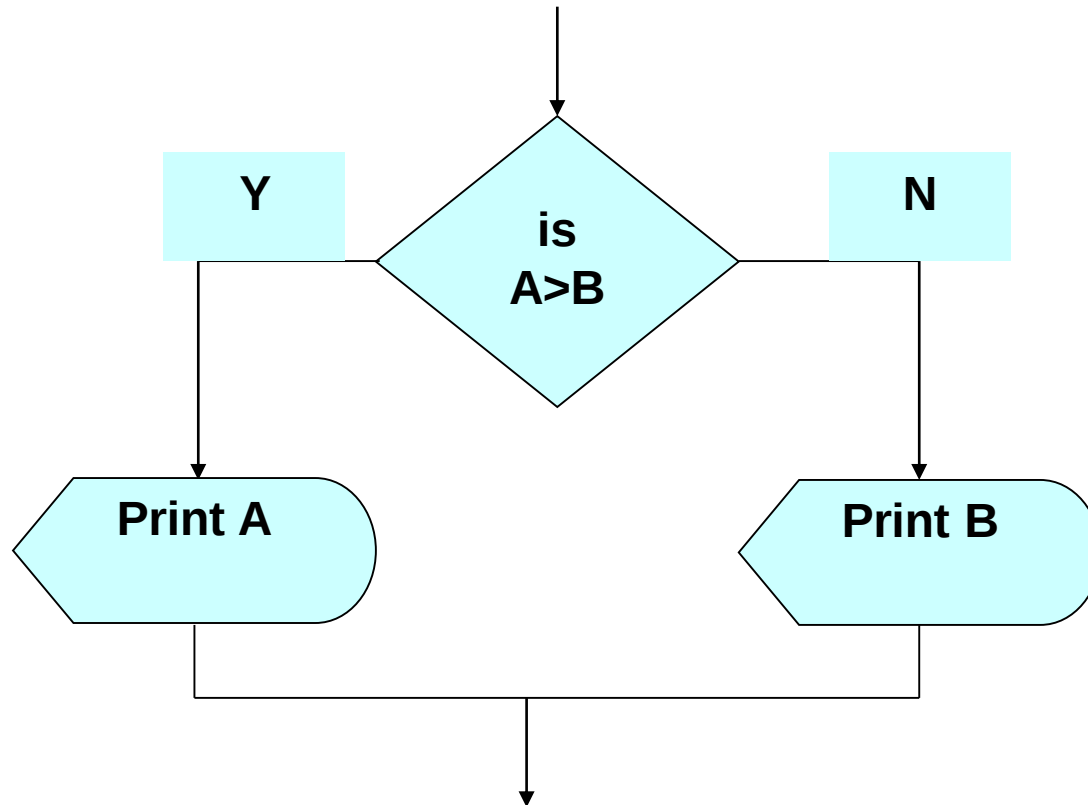
- Step 1: Input a, b, c
- Step 2: $d \leftarrow \text{sqrt}(b \times b - 4 \times a \times c)$
- Step 3: $x_1 \leftarrow (-b + d) / (2 \times a)$
- Step 4: $x_2 \leftarrow (-b - d) / (2 \times a)$
- Step 5: Print x1, x2



DECISION STRUCTURES

- The expression $A > B$ is a logical expression
- *it describes a **condition** we want to test*
- ***if $A > B$ is true (if A is greater than B)** we take the action on left*
- print the value of A
- ***if $A > B$ is false (if A is not greater than B)** we take the action on right*
- print the value of B

DECISION STRUCTURES



IF–THEN–ELSE STRUCTURE

- The structure is as follows

If condition then

true alternative

else

false alternative

endif

IF-THEN-ELSE STRUCTURE

- The algorithm for the flowchart is as follows:

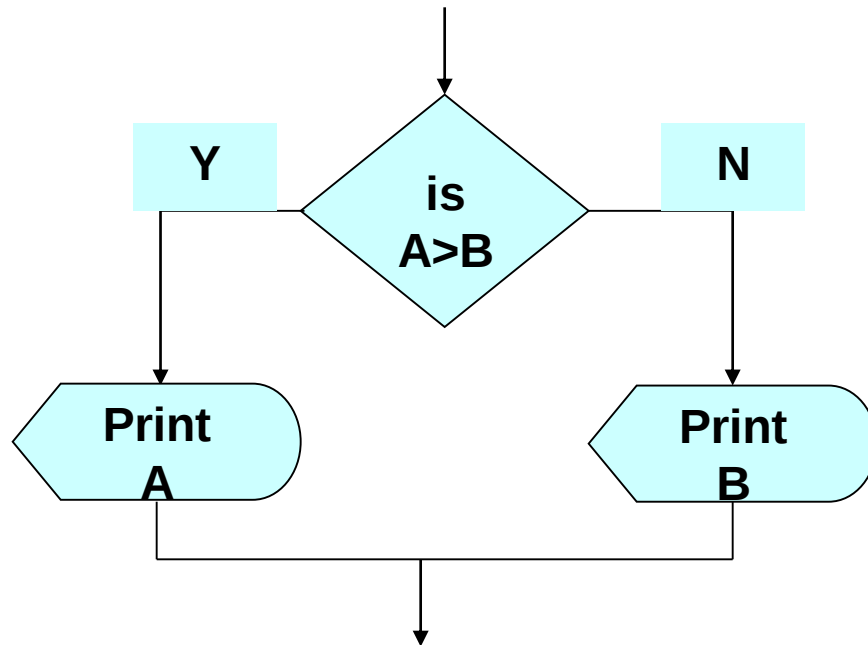
If $A > B$ then

print A

else

print B

endif



Relational Operators

Relational Operators	
Operator	Description
$>$	Greater than
$<$	Less than
$=$	Equal to
$\geq$	Greater than or equal to
$\leq$	Less than or equal to
$\neq$	Not equal to

Example 5

- Write an algorithm that reads two values, determines the largest value and prints the largest value with an identifying message.

ALGORITHM

Step 1: *Input* VALUE1, VALUE2

Step 2: *if* (VALUE1 > VALUE2) *then*

 MAX ← VALUE1

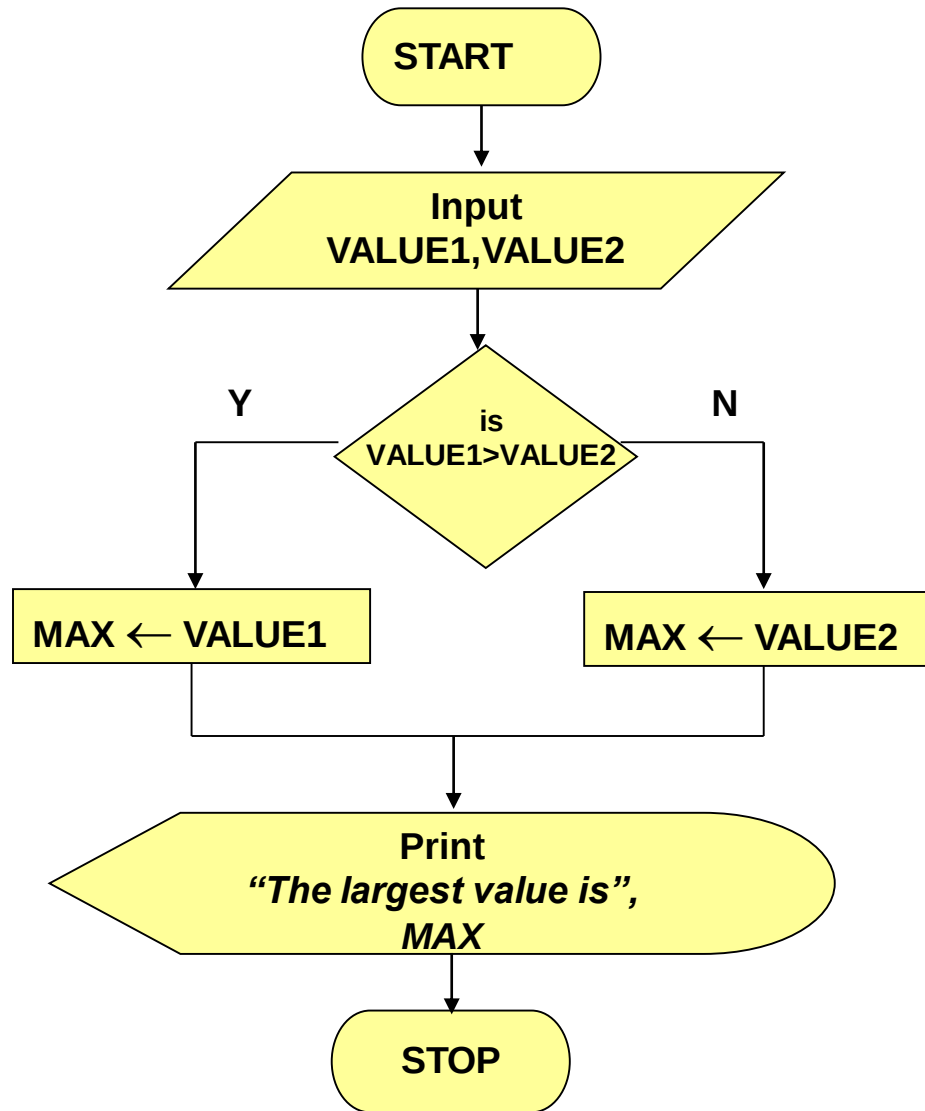
else

 MAX ← VALUE2

endif

Step 3: *Print* “The largest value is”, MAX

Example 5



NESTED IFS

- One of the alternatives within an IF–THEN–ELSE statement
 - may involve further IF–THEN–ELSE statement

Example 6

- Write an algorithm that reads **three** numbers and prints the value of the largest number.

Example 6

Step 1: *Input* $N1, N2, N3$

Step 2: *if* ($N1 > N2$) *then*

if ($N1 > N3$) *then*

$MAX \leftarrow N1$ [$N1 > N2, N1 > N3$]

else

$MAX \leftarrow N3$ [$N3 > N1 > N2$]

endif

else

if ($N2 > N3$) *then*

$MAX \leftarrow N2$ [$N2 > N1, N2 > N3$]

else

$MAX \leftarrow N3$ [$N3 > N2 > N1$]

endif

endif

Step 3: *Print* “The largest number is”, MAX

Programming Fundamentals

- **CONSTANTS**
- **VARIABLES**
- **OPERATORS**
- **EXPRESSIONS**

CONSTANTS

- A constant is an identifier (name) for a simple value. That value cannot change during the execution of the script. A constant is case-sensitive by default. By convention, constant identifiers are always uppercase
- There are two built-in constants, TRUE and FALSE (case-insensitive), which represent the two possible boolean values.

VARIABLES

- ▶ **Variables**
- ▶ Variables in PHP are represented by a dollar sign followed by the name of the variable. The variable name is case-sensitive.
- ▶ PHP supports eight primitive types:
- ▶ Four scalar types:
 - boolean
 - integer
 - float (floating-point number, aka double)
 - string
- ▶ Two compound types:
 - array
 - object
- ▶ And finally three special types:
 - resource
 - NULL
 - callable

Integers: decimal, octal or hexadecimal Var = 123;

Floating point Var = 1.3e4;

Arrays or vectors Var[2] = 123;

Text Strings Var = "A Text String¥n";

Objects Var = new oMyClass();

The scope of a variable is the context within which it is defined.

OPERATORS

- Operator Precedence
- Arithmetic Operators
- Assignment Operators
- Bitwise Operators
- Comparison Operators
- Error Control Operators
- Execution Operators
- Incrementing/Decrementing Operators
- Logical Operators
- String Operators
- Array Operators
- Type Operators

EXPRESSIONS

- Expressions are the most important building stones of PHP. The most basic forms of expressions are constants and variables.
- A very common type of expressions are comparison expressions. These expressions evaluate to either FALSE or TRUE. These expressions are most commonly used inside conditional execution, such as if statements.

Programming Statements

Control Statements

