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Foundations of Information & Communication Technology

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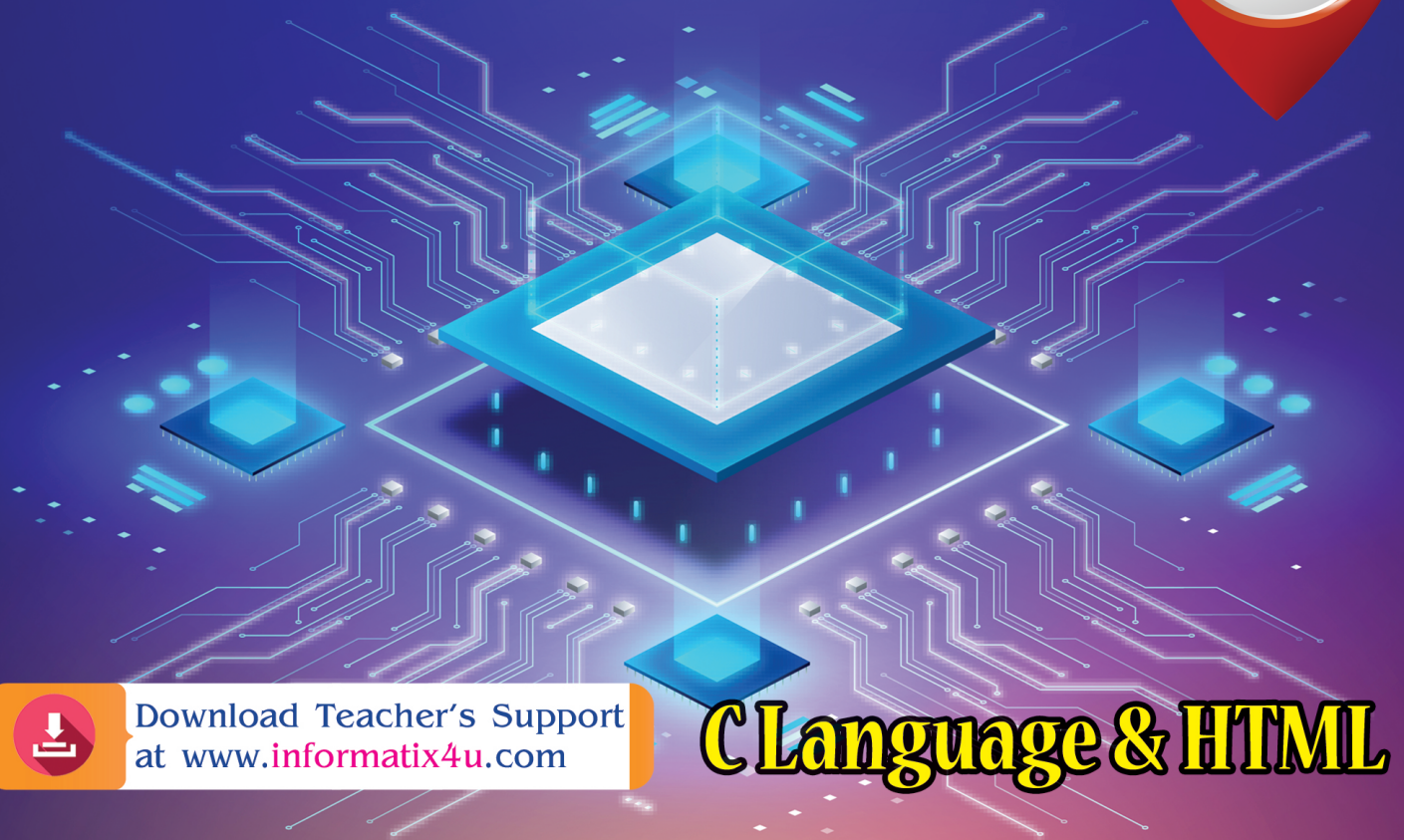
Updated to Windows 10 MS Office 2010



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C Language & HTML

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Preface

We are living in a world powered by computers. Today, computers are present in all sectors of our society. Thus, knowledge of Computer Science is increasingly becoming an essential skill for staying competitive in the future.

Cyber wave Computers is a series of 10 books for classes 1 to 10. The series introduces concepts in a step-by-step manner using simple language. The content provides the latest facts and figures. The screenshots included in the series are of **Windows 7**, updated to **windows 10** and **Microsoft Office 2010** version.

In Books 1 and 2, the basics of computers, including its various parts, have been introduced. MS Paint software, which will help students to acquire skills for using mouse and keyboard, has been introduced. In Books 3 to10, **programming language** software, **animation software** and **coding** have been introduced in respective classes.

Most of the topics/chapters have been covered in a child-friendly manner along with sufficient definitions, diagrams and tables.

Activities are designed to bring out the joy of learning by discovering. Exercises, Worksheets, lab questions have been developed keeping in mind the learning ability of the students.

We sincerely welcome constructive feedback and suggestions to improve the series which will be incorporated in further publication.

Email:informatix4u@gmail.com

With regards
Informatix & Team

Contents

1 Program and Programming

A Computer program is a set of commands or instructions which tells the computer to do certain data processing job. A program is not written in ordinary human language. It is written using programming language. Now we know that without software computer cannot do any job. Software helps to develop a program The working of a computer is totally based on the programs loaded in the computers.

Sample Program

This is a basic program to add two numbers and print the total.

```
Let A =10
Let B = 20
Let C =A+ B
Print C
```

Those persons who specialize in computer programs are called programmers. The process of writing instructions or commands in a particular computer language is called programming. Earlier programs were written in machine language. It was indeed a very difficult process. Today programmers write instructions and commands in different computer languages and then they are converted into machine language. Therefore, programming is not so difficult today.

Types of Programs

There are two types of programs, they are System programs and application programs.

1. System Programmes

System program is that which performs the operation of the computer system itself. DOS (Disk Operating System) & UNIX are examples of system programs. They are also known as Operating systems. DOS is the most commonly used operating system. Today in many computers different WINDOWS programs work as advanced Operating Systems.

2. Application Programs

In the computer field application means doing a particular activity. Application programs are those programs specially designed for particular kind of works.

Examples of Application Programs are :

Foxpro, Ms-excel, Visual Basic.

Let us Practice

I. Answer the following Questions

1. What is programming ?
2. Who is a programmer ?
3. Why programming is comparatively easier today than a few years ago ?
4. What is a system program ? Give example?
5. What is an application program ? Give example ?

II. Fill in the blanks.

1. Example for system programme _____
2. Example for application programme _____
3. Unix is _____ software.
4. Ms-excel is _____ software.
5. PC stands for _____

2 Algorithms and Flowcharts

As we know to do a particular job,a plan with a step-by-step procedure or instructions are requied. After completion of the job, a decision is taken.

A plan has a number of steps and a good plan must show the sequence of steps. There should be clear instructions for the plan to be completed successfully.

Necessity of Planning C

Planning is required at every stage of life. We come to school, study as per the timetable, go back to home, play in the evening, study and go off to sleep. Our day-to-day activities should be planned, otherwise we cannot achieve success. Some experienced programmers write programs with out drawing a single line of flowchart. yes! It is possible only to those who are expert in programming but for a beginner it is essential to draw flow charts if you start writing programmes.

Algorithm and Flowcharts C

Preparing set of steps to solve a given problem is termed as an 'Algorithm'. Basically it is a step-by-step procedure to solve a given problem. There should be a provision to include 'decision'. The steps can be put into a graphical form called 'Flowchart'. In other words, a flowchart gives a pictorial representation of an algorithm. A flowchart always helps us to understand the steps of a plan easily. We use certain standard symbols in a flowchart.

Flowchart C

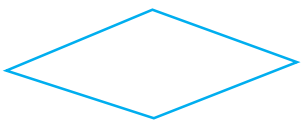
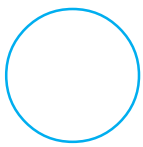
A flowchart is a graphical representation of an algorithm in which steps are laid out in a logical order. It is a tool to write a program.

In a flowchart technique, each operation is represented by drawing a specific geometric shape These flowchart symbols are connected by arrows to illustrate the sequence of operation! A flowchart conveys all the information visually by using standard symbols to represent these different functions. It uses arrows to represent the sequence in which the instructions should be performed.

Thus, a flowchart conveys the following information.

- The sequence in which steps should be performed
- The steps involved in obtaining user input or giving an output
- The steps describing processing of data
- The different conditions involved in handling the process
- The steps to be repeated

Standard Flow chart symbols C

Symbol	Name	Function
	Start / end	An oval represents a start or end point
	Arrows	A line is a connector that shows relationships between the representative shapes
	Input / output	A parallelogram represents input or output
	Process	A rectangle represents a process.
	Decision	A diamond indicates a decision
	Connector	The symbol is used to connect any two points of the flow chart.

Advantages of Flowcharts C

- Flowcharts help to understand the logic of a system better.
- They help to analyse the problems better.
- They act as a guide during analysis of a system.
- They help in debugging process.
- They help the programmer to operate the program easily.

Limitations of Flowcharts C

- Flowcharts become complex if the program logic is complicated.
- In case of alterations, they have to be completely redrawn.

Algorithm C

A set of instructions that can be followed to perform a specific task. Let us take some examples to understand Algorithms and Flowcharts clearly.

Ex. 1 : To prepare coffee.

step 1 : Start.

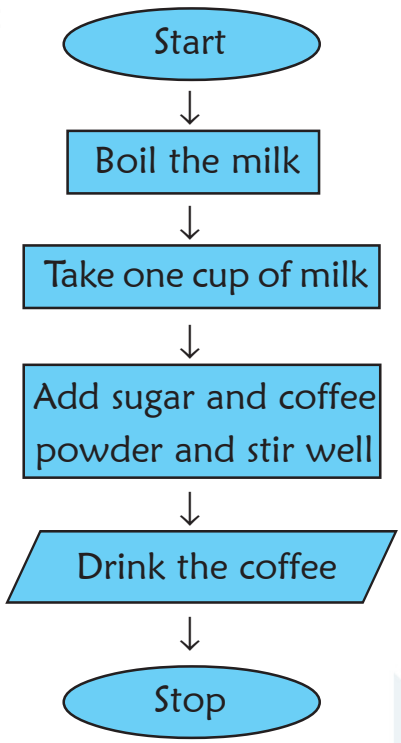
step 2 : Boil the milk.

step 3 : Take one cup of milk.

step 4 : Add sugar and coffee powder and stir well.

step 5 : Drink the coffee.

step 6 : Stop.



Do you know ?

Teacher should give many examples from our daily lives for explaining the concept of algorithms and flowcharts. It is a very important part of programming as computers are used for problem solving. Students can perform various activities and learn flowcharts in a play-way method.

Looping Flow Charts C

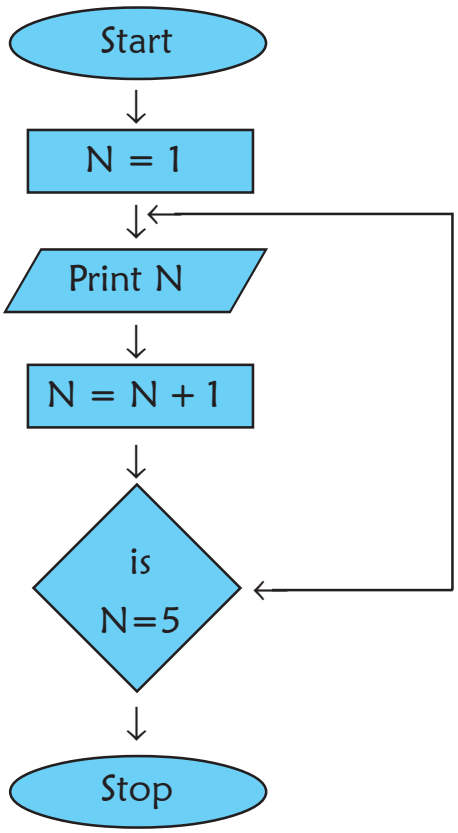
Sometimes some steps in an algorithm have to be repeated for a given number of times. This is known as a loop. A loop is the sequence of instructions that repeats a specified number of times until a particular condition is met.

Let us take an example.

Example 1 :

For printing n numbers from 1 to 5.

In this program, we have assigned the value 1 to N. Each time the loop is executed the value of N is Printed and then incremented by 1 until its value becomes equal to 5.



To print numbers from 1 to 5

Example 2 :

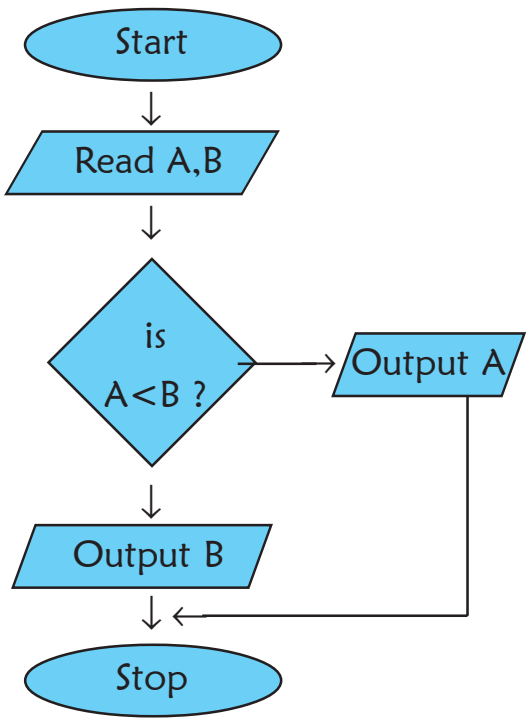
To print the smallest of two numbers.

step 1 : Start.

step 2 : Read numbers as A,B.

step 3 : Check for the smaller number and display the result.

step 4 : Stop.



To print smallest of two numbers

Let us Practice

I. Answer the following Questions

1. Define an Algorithm and a flowchart.
2. Draw the symbols used in a flowchart.
3. Give two examples of planned activities.
4. Make a flowchart for going to school.
5. What do you understand by the term 'planning' ? is planning required in our daily lives ?

II. Fill in the blanks with the suitable words.

1. A drawing of the steps used to solve a problem is called a _____
2. _____ are used to point to the next box.
3. _____ box explains the action to be taken.
4. _____ box is used to take decisions.
5. _____ shaped box is used to show the end of a flow chart.

III. There are some algorithms given below, but the steps are not placed in correct order : Number these steps in correct order.

1. Rachana making buttercd toast.
   - ❑ She takes out butter. ☐
   - ❑ She torn toaster on. ☐
   - ❑ She takes out a slice of bread. ☐
   - ❑ She puts bread into toaster. ☐
   - ❑ She butters the toast. ☐
   - ❑ She takes out the toast when it pops out. ☐
2. Manoj posting a letter.
   - ❑ He seals the envelope. ☐
   - ❑ He puts the letter in an envelope. ☐
   - ❑ He drops the letter in the post box. ☐
   - ❑ He paste the stamp on the envelope. ☐
   - ❑ He writes the address on the envelope. ☐

3 Introduction to C

C is one of the most popular and powerful programming language widely used for software development. The System programmer, Dennis M.Ritchie developed the C language at AT & T Bell laboratories in thi year 1972. It is actually adapted from a language known as BCPL (Basil Combined Programming Language) written by Ken Thompson. Programs written in C are faster and efficient and also portable, that is a program written in C can be transferred easily from one computer to another with minimal changes or none at all. Software developed in C can be System software as well as Application software and hence it is called as Middle-1 Level Language.

C is a case sensitive language, that it differentiates the capital and small letters and hence the word Total & TOTAL are different. It is a good practice to write C coding in small letters (capital letters are also accepted in certain cases). The most important feature of C is that it uses only 32 keywords (or Reserved words whose meaning is already explained in a broad sense). C is a structured programming language and it has a unique structure of writing a program in it.

Structure of 'C' Programming C

<header files>	:	(library files)
main ()	:	A special function
{	:	Open curly braces - a parameter usually follows main function.
declaring variables	:	Declaration of data types and variables
Statement 1	:	Input, Output and process statements
Statement 2		
}	-	Close curly braces - end of a program.

In C program all the statements are terminated with a semicolon (;) except in some statements.

Now let us examine the structure of C program.

Header files

Header files, are builtin C files, which contain the declarations, and definitions of the most commonly used Input Output functions. There are different header files for different purposes like stdio.h (Standard Input Output) for I/O functions, string.h for string functions, math.h for mathematical functions etc. The header files have to be included appropriately in all the C programs in order to make use of these functions. All the header files have the extension.h

Main ( )

Every C program consists of one or more distinct functions and one among them is main( ). It is called as a special function because it tells the compiler the logical beginning of the execution of a program. A 'C' program can contain only one main ( ) function and it is usually written at the beginning of the program (usually after preprocessor directives). If it is written anywhere else in the program the compiler executes ASCII code table, the statement after the main ( ) function leaving the previous set of statements.

Variables and Constants in 'C'

The data used in C programs must be stored and retrieved in the computer's memory for computation. They are usually stored in different storage locations which will be difficult for the user to recall it and hence a symbolic name called Variable name is given to every data. It is an entity, which stores the value, used for computation and every variable should be declared in C before it is used.

Rules for naming variables

- It should begin with an alphabet.
- The second and the succeeding character can be a number or a letter.
- No special characters are allowed except underscores (_).
- The maximum length of a variable name is 31 characters.
- No reserved words or keywords are allowed in a variable name.

Constants

Constants are data whose value does not change throughout the execution of the program. Normally the value, which is assigned to a variable, is called as constant.

Declaration in c

Declaration plays an important role in 'C' language. Declaration is nothing but an explaination to the computer about the type of data used in a program. A program may contain more than one declaration and the general form is data type variable ;.

Data type in C

The data used in a program should be organized and only then it can be used for further calculations. They are declared in the beginning of the program. The data types are classified as

- **Primary data type**
- **Derived data type**
- **User - defined data type**

Primary data types	Derived data types	User-defined data types
int	Arrays	enum
char	Structures	typedef
float	Pointers	
double	Union	

Let us know more about primary data type.

The data type int is used to store only the positive or negative integers. There are four qualifiers of int data type. They are

- **Short int** (nothing but an ordinary int)
- **long int**
- **signed int**
- **unsigned int**

long int is used to store more than the usual range (limitation) of **Int Signed int** is used to store both positive and negative numbers whereas an **unsigned** int is used to store only positive numbers and this is declared for the variables that stores only positive numbers.

Char C

The data type char is used to store any single character. It has two different qualifiers namely

- *signed*
- *unsigned*

Float C

The data type float is used to store single precision decimal (real) numbers.

Double C

The data type double is used to store a double precision floating point number. its qualifiers are double.

Data types	Limitations	Bytes occupied
short signed int	32768 to +32767	2
short unsigned int	0 to 65535	2
long signed int	-2147483648 to +2747483647	4
long unsigned int	0 to 4294967295	4
signed char	-128 to +127	1
unsigned char	0 to 255	1
float	-3.4e38 to +3.4e38	4
double	-1.7e308 to +1.7e308	8
long double	-1.7e4932 to +1.7e4932	10

Format Descriptors C

Format Descriptors are the individual composite symbols also known as Conversion Specification, which represent different data types. These strings also define how the input and output data is to be interpreted internally. These symbols are otherwise called as Control Variables. Some of the control variable strings and their meaning are given below: