

2021-22

HANDWRITTEN NOTES

LATEST EDITION

राजस्थान
कंप्यूटर अनुदेशक
(शिक्षक)

COMPUTER INSTRUCTOR

{Part- 4}

Computer Study-2

COMPUTER STUDY - II

1. Programming Fundamentals

1-488

- *Introduction to C, C++,*
- *Java*
- *DotNet*
- *Artificial Intelligence*
- *Machine Learning*
- *Python and Block chain*
- *Principles and Programming Techniques*
- *Introduction to OOPs Concepts*
- *Introduction to IDE and it's advantages.*

Chapter - 1

PROGRAMMING FUNDAMENTAL

Introduction of C:

What is C ?

C is a Structured Oriented Middle Level Programming Language, which is basically used to develop various Application Softwares and Systems Softwares of Computer.

C Language was developed by Dennis Ritchie . After that in 1978 Denis Ricchie and Brain Kernighan published the first version of C language, The C Programming Language.

C language is also called Mother Language, why whatever language was created after C language for example (Java, PHP, C#, or C++)

History of C Language

C Language was published by Brian Kernighan and Dennis Ritchie in 1978. So far many versions of C language have come, which are -

K & R - This is the original language of C language. This version was introduced in 1978. And in this version a function like Standard I/O library was available.

ANSI C and ISO C – This version is called American National Standards Institute (ANSI) and it was published by the International Organization for Standardization (ISO) in 1989/1990.

C99 – This version was published in 1999. And in this version some new features were added like – inline functions, several new data types, long int etc.

C11 – This version was published in 2011. And in this version also some new features were added like – library, including type generic macros, anonymous structures etc

History of C Language (Tabular Form) -

Language	Year	Developed By
Algo	1960	International Group
BCPL	1966	Martin Richard
Traditional C	1969	Ken Thompson
K & R C	1972	Dennis Ritchie
ANSI C	1978	Kernighan & Dennis Ritchie
ANSI/ISO C	1989	ANSI Committee
C90	1990	ISO Committee

C99	1999	ISO Committee
C11	2011	Standardization Committee
C18	2018	Standardization Committee

Feature of C

1. Portability

Programs written in C language are quite portable, meaning programs written in C language can be easily run on different machines or PCs without any changes. The compiler and preprocessor make it possible to run on different PCs.

2. Powerful Programming Language

C programming language is very fast and efficient programming language because it uses Data Types, Function and Control Statements.

3. Simple Programming Language

C language has commands like English, which makes it very easy for the programmer to write and understand the code.

4. Structured Oriented Language

C Language is Structured Oriented Programming Language. Structured Oriented Programming Language reduces the complexity of the code, which leads to a lot of clarity in the programs.

5. Compiler Based

C Language is Compiler Based Programming Language, it means C language programs cannot be executed or run without compiling.

6. Syntax Based Language

C language is Syntax Based Programming Language. Syntax Based Programming Language is the language which follows the rules and regulation very strictly like C Language, C++ Language, Java Language etc. If a programming language does not strictly follow the Rules and Regulation, then such programming language is loosely called Syntax based programming language like HTML.

7. Efficient Use of Pointers

Pointer is a variable that points to the address of another variable.

8. Middle Level Language

C language is a Middle Level Programming Language, meaning low level programming can be done in it and high level programming can also be done, due to which both Application Software and System Software can be made very easily with the help of C Language.

9. Case Sensitive

C language is a case sensitive programming language. We understand the meaning of Case Sensitive with an example, if we write printf like this in one place in C language and write PRINTF like this in another place, then both mean different in C language.

Application of C Language

C language is used to create computer application software such as database, spread sheet etc.

C language is used to write Embedded Software.

C language is used to create system software such as Operating System.

To create applications related to graphics such as computer and mobile games.

Unix kernel is completely developed in C language.

C language is used to create network devices and device drivers.

C language is used to make compiler. Compiler converts high level code into low level code or machine code.

Installation of C on your system

There are many compilers available for C language . You can download any one. Here, we are going to install Turbo C++. We can use it for

both C and C++. To install the Turbo C software, you need to follow following steps.

Download Turbo C++ online.

Create turboc directory inside C drive and extract the tc zip inside c:\turboc

Double click on install.exe file and installation will start.

Click on the tc (shortcut symbol) application file located inside c:\TC\BIN to write the c program

1) Download Turbo C++ software online

You can download turbo c++ online from many sites .

2) Create turbo c directory in c drive and extract the tc3.zip

For C installation now, you need to create a new directory turbo c inside the C: drive. Now extract the tc3.zip file in c:\truboc directory.

3) Double click on the install.exe file for installation

Now, click on the install icon located inside the c:\turboc and after following step by step the installation process will complete.

In Windows 7 or Windows 8, it will show a dialog block to ignore and close the application because fullscreen mode is not supported. Click on the Ignore button.

First C Program

Before starting the program of C language, you need to learn how to write, compile and run the program in c console.

How to create 1.first c program :-

Before making the first program of friends c, you have to take care of some important things. Which is the following :-

It is necessary to include the header file.

Header file has to start with # tag.

It is very important to have a main function in your program.

Capital and small letters have to be taken care of while writing statements in c.

Almost all statements in c must be terminated with a semicolon.

open the C console and write the following code:

```
#include <stdio.h>
```

```
int main(){  
  
printf("Wellcome to Infusion notes");  
  
return 0;  
  
}
```

Output :-

Wellcome to infusion notes

`#include <stdio.h>` includes the standard input output library functions.

The `printf()` function is defined in `stdio.h`.

`int main()` The `main()` function is the entry point of every program in c language.

How to compile and run the c program in Hindi

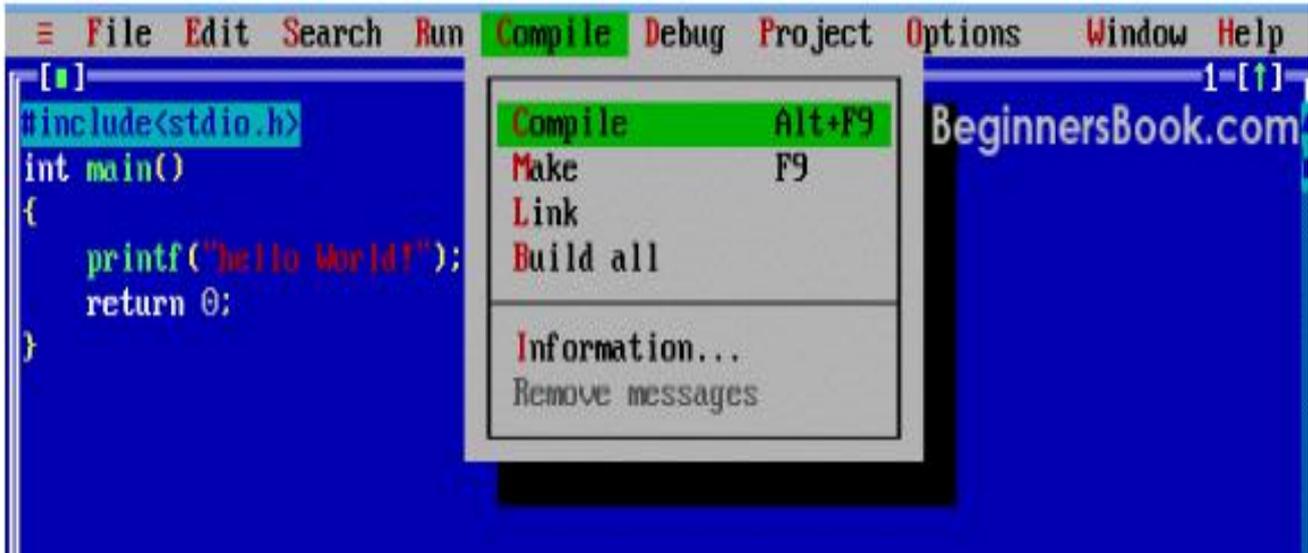
There are 2 ways to compile and run a C program, by menu and by shortcut.

c program output

by Menu

Now click on compile menu and then compile sub menu to compile C program.

Then click on run menu and then run sub menu to run C program.



from shortcut

Or, press ctrl + f9 keys and run the program directly.

You will see the following output on the user screen.

You can view the user screen at any time by pressing Alt + F5 keys.

Now press Esc to go back to Turbo c++ console



Introduction of Flowchart

Flow chart is the graphical representation of our program. Whenever someone writes a program in C language, he writes without flow chart. If we want to understand our program, then the program will not understand. That is why we can through our flow chart represent the program graphically. So that anyone can easily understand the program's logic.

When we work as a programmer in a company . Then we have to make flowchart before coding.

The project we have created is easily understood and worked on by someone else, so we have to make flow charts.

Flow chart provides a deep knowledge of our program. That is, we can understand the errors and results coming in the program before coding

After making flowchart complete, we only have to write coding according to flowchart. It also saves a lot of time

The largest benefit of flow chart is this. By looking at the flow chart, you can implement the process of flow chart in any programming language. That is, you can create your program

Flowchart is the blueprint of our program. And flow also takes a lot of time to make chart. Even Algorithms is also made according to flow chart

Symbols of Flowchart

We have to use some symbols to represent graphically the program. This is the symbol we provide. These are called flow chart symbols

Name	Symbols	Explanation
Start/End		This symbol is called oval symbol. And also called terminal symbol. It is used to start and end flow chart
Processing		This symbol is called processing symbol. Which is used for processing .
Input/Output		This symbol is called parallelogram symbol. It is used to denote symbol input and output .
Decision		This is called diamond symbol . Which uses to denote decision making statements.
Arrow (Flow)		This is called arrow symbol . Which is used arrow symbol to show the flow of the program

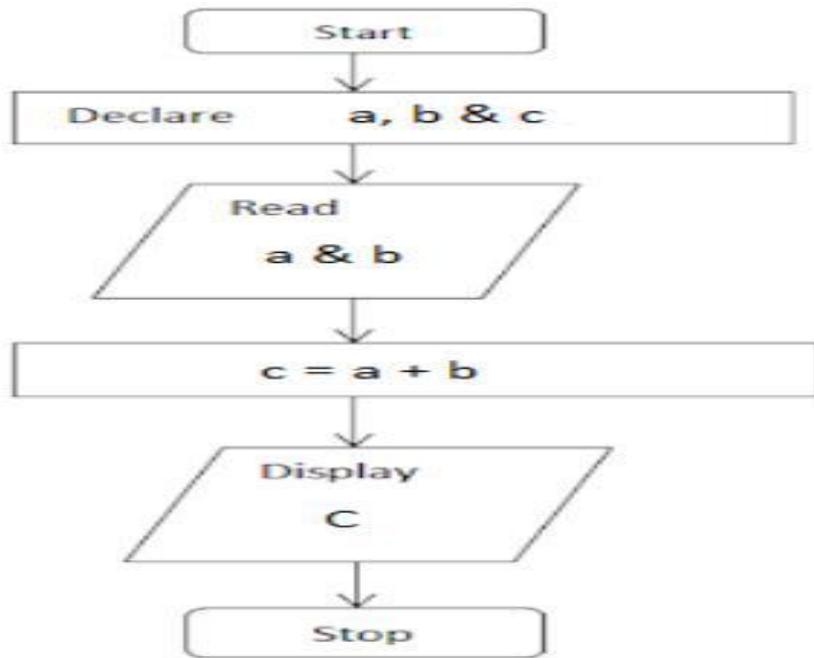
Every symbol in flow chart has a meaning .Which the flyer can easily understand. The below flow chart symbols are being told

Example of Flow Chart

Suppose we want to program an addition. In which user will enter 2 numbers and have to display result by adding both of those numbers. So for this we will create flow chart like this. Which is being given below .

The flow chart above is first started by flowchart with oval symbol. Then 3 variables a, b and c are declare by rectangle symbol or processing symbol.

Then the process of reading a and b is shown by the parallelogram symbol. Then the addition of both numbers is done in c variable by rectangle symbol.



Then the process of displaying c variable by parallelogram is shown. The flowchart is then stopped by the terminal symbol.

Character Set

Characters are letters that are used to make words in any language. Sentences are formed from words, which reveal the semantic meaning of that word.

Computer language is a language using which we can tell the computer about our needs.

Therefore this language also has grammar like other languages.

The very first step in learning any language is to know its character set which is called character set in English.

Like - When we learn any language, we are first taught a, b, c, d of that language . or while learning English a, b. In the same way, before learning C language, you need to know about its characters. The character set in the language is divided into four parts, which are as follows.

Letters: The English language alphabet A to Z and 3 to 2 are its letters which are used to write programs. "C" is case sensitive language. So "C" treats both a and A as separate letters. Identifiers, Keyword String etc. are formed by adding these letters.

Digit: Digit is also used in C language, which are used for identifiers numeric value. There are only ten (0,1,2,3,4,5,6,7,8, 9) in this number, but you can also use

नोट - प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नहीं हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको राजस्थान कंप्यूटर अनुदेशक (शिक्षक) के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी राजस्थान कंप्यूटर अनुदेशक (शिक्षक) की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /

संपर्क करें - 8233195718, 9694804063, 8504091672

प्रिय दोस्तों, अब तक हमारे नोट्स में से अन्य परीक्षाओं में आये हुए प्रश्नों के परिणाम -

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- Operators -

Operators are very important in C language. Because whenever we perform any operation with variables then we have to use operators.

In C language, operators are used to set the condition. Because we cannot create any program without using operator in C language.

Types of operators in c language

Arithmetic Operators

Relational Operators

Logical Operators

Bitwise Operators

Assignment Operators

Increment Operators

Decrements operators

Conditional Operator

Special Operators

Access operator

Arithmetic Operators (+, -, *, /, %, ++, --)

Arithmetic Operators are used to perform arithmetic operations like Addition, Subtraction, Multiplication, Division etc. The following operators come under Arithmetic Operators -: (, - , * , / , % , post-increment, pre-increment, post-decrement, pre-decrement) |

There are two types of Arithmetic Operators.

Unary Operators

Binary Operators:

1) Unary Operators

Operators who perform mathematical operations on single operands . They are called Unary Operators.

2) Binary Operators:

Operators who perform mathematical operations on two operands . It is called Binary Operator.

Addition (+) -- The numbers of two variables are added by this operator.

Subtraction (-) - This operator is used to subtract the value of another variable from the value of one variable.

Multiplication (x) -This operator is used to multiply the values of 2 variables.

Division (/) - This operator is used to divide the value of one variable by the value of another variable.

Modulus (%) - Division operation is also performed by this operator. But the value that saves the remainder. Modulus operator is used to get them.

2. Relational Operators

Relational Operators are used to make comparison between any two operands such as -: To find out whether one of the operands is equal to the other operands, which of the two operands is greater and which is smaller. Relational Operators are used in this type of operation to know what is there.

Relational operators provide the result as True or False. Some examples of relational operators are: (== , >= , <=)

Equal To (==) - This operator checks that the values on both sides are equal. or not If the values are not equal, the condition becomes false.

Not Equal (!=) - This operator checks. whether the values of both the variables are non equal or not. This condition becomes false when the values are equal.

Less Than (<) - this operator checks. whether the value of the left variable is less than the value of the right variable. The condition becomes false after the value is large.

Greater Than (>) - This operator checks, whether the value of the right variable is greater than the value of the left variable. The condition becomes false after the value is small.

Less than Equal (<=) - This operator checks whether the value of the left variable is less than or equal to the value of the right variable. If the value is large then the condition becomes false.

Greater than Equal (>=) - This operator checks whether the value of the left variable is greater than or equal to the value of the right variable. If the value is smaller then the condition becomes false.

3. Logical Operators -

Logical Operators are used to combine two and more than two conditions, result by Logical Operators always get Boolean Value means result as True or False and we consider True as 1 and False as 0 is |

AND (&&) - When both the conditions are true. Then the program moves forward. Otherwise the code is not executed.

OR (||) - In this, the condition on one side is true and the condition on the other side is false and when any one condition is true. So the program is executed.

NOT (!) - This operator is used with the same condition. When condition is false. Only then the program is executed.

4. Bitwise Operators

Bitwise Operators are used to perform operations in the bit level between the operands. Bitwise Operators first converts the operands to bits and then performs the operation. For processing mathematical operations like addition, subtraction, multiplication etc. in a fast way, Bitwise Operators are done at the Bit level.

Bitwise AND (&) - The multiplication of binary numbers is done with this operator. Then after that it is converted into decimal.

Bitwise OR (|) - The addition of binary numbers is done with this operator. Then after that it is converted into decimal.

Bitwise NOT (~) - This operator is used with any variable. All the bits of that variable become opposite. For example - If it is 0 then it becomes 1 and if it is 1 then it becomes 0.

Bitwise XOR (^) - XOR operators return 1 if they have opposite bits. And returns 0 if the same bits are there. Then after that it is converted to decimal.

Bitwise Left Shift (<<) - With this operator, binary bits are equal to the value given in the variable. Adds bits to the right side .

Bitwise Right Shift (>>) With this operator, binary bits are equal to the value given in the variable. Removes left side bits.

5. Assignment Operators (=, +=, -=, *=, %=, &=)

Assignment operators are used to assign a value to a variable. The operator which is on the left side of Assignment Operators is the variable and the operator on the right side is the value which is to be stored in the left side operands (variable).

(=) - This operator assigns the value of the right variables to the left side variable.

(+ =) - This operator assigns the left side variable to the left side variable which is the result by adding the value of left side and right side.

(-=) - This operator assigns the left side variable to the left side variable which is the result by subtracting the value of left side and right side.

(* =) - This operator, by multiplying the value of the left side and the right side, assigns the result to the variable on the left side.

(/=) - This operator divides the value of the left side and the right side and assigns the result to the left side variable.

(%=) - This operator saves the remainder by dividing the value of the left side and the right side. Assigns it to the left side variable.

6. Increment / Decrements operators

In C language, we use increment or decrements operators to increase or decrease the value of any variable by a number.

Increment (+) -

The increment operator is used to increment the value of a variable in an expression.

In the Pre-Increment, value is first incremented and then used inside the expression.

Whereas in the Post-Increment, value is first used inside the expression and then incremented

Syntax:-

// PREFIX

++v

// POSTFIX

v++

where v is a variable

```
#include <stdio.h>
```

```
int increment(int a, int b)
{
a = 5;

// POSTFIX

b = a++;

printf("%d", b); .....
```

नोट - प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नहीं हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /

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Comments in C Programming Language -

Comments in C: - While writing the program in "C" language, different types of comments can be given.

Programmer writes these comments for his convenience.

Through various types of comments, a programmer specifies the flow of the program and the special tricks used in the program, which makes the program readable.

Usually comments are written in the documentation section of the program, but a programmer can write comments at any place in the program.

`/* ... */` is used to write comments in the "C" language program. Statements written between this symbol are useful only in the source file. Comments are never compiled.

The compiler always ignores the various comments written in a source file at the time of compilation, so the size of the executable file never changes due to comments.

We can write a comment at any place in a program. But you cannot nest another comment inside one comment. As

```
/* This is my first C Program */
```

This is a general comment. But

```
/* This is my /*first*/ C Program */
```

This is a wrong comment, because in this another comment has been nested inside a comment. We cannot write Comment in any function like `printf()` or `scanf()`. If we do this, then the program is compiled, but that comment also gets printed in the output. As:

```
printf("/*This is my first printf() function */ Hello");
```

Output:

```
/*This is my first printf() function */ Hello
```

We can see that the comment is also being compiled in the output of this statement

Constant

Constant is a any value that cannot be changed during program execution.

In C, any number, single character, or character string is known as a constant.

A constant is an entity that doesn't change whereas a variable is an entity that may change.

For example, the number 50 represents a constant integer value.

The character string "Programming in C is

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- **Loop -**

Loop means ring, which is round. The name of the loop itself suggests that it loops through a particular code, until the condition becomes true. It has a simple meaning. Looping or repeating a particular code until a condition is met is called looping or loop.

loop is used why: -

So guys now we know why we use loop ?

Friends loop in c is a very important concept of programming. If c programming does not have this concept, then we may have to face a lot of coding problem.

By the way, we can do the same thing as a loop with the help of go to statement but a lot of problems can come in it. Our code becomes quite large and complex. The highest problem of not using the loop would be to write the same code over and over again is. And the loop keeps us from this problem.

Another important use of a loop is to repeat a code based on a condition. The go to statement as we know also works to replicate the code. But the go to statement does not ensure when to close the process of repeating the code To do while the loop knows when to stop repeating the code of.

All these advantages are to use loops. You can choose any loop as you need and use it in your program. We use all loops based on the problem as the problem is, so the loop is used is.

Type of loop :-

So guys now we know the type of loops (types) of how many types of loops are in c programming ?

Friends c programming consists of the main four types of loops which are :-

while loop

do while loop

for loop

nested loop

1. While Loop

While Loop is used when we do not already know how often to run a loop .

In Where Loop we write the condition in the parenthesis "(" after the keyword where the condition is correct (True), then the control enters the body of the Where Loop and runs the statements inside the Where Loop .

As the control comes at the end of the Where Loop, the control again goes near the While Loop and the condition is checked again and if the condition is true this time, the inside of the While Loop runs again.

While Loop's condition does not go wrong (False) until this action continues. We also use increment (++) and decrement (-) operators to keep changing the condition of the while Loop

While Loop is also called entry control loop because while the block of loop has a condition check before the control is reached and if the condition is correct then the control enters the body of the file loop and runs the statement inside it.

While Loop's syntax is something like this:

Syntax

```
while (condition)
```

```
{
```

```
//code to be reviewed
```

```
statements;
```

```
statements;
```

```
.
```

```
}
```

Example of while loop

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
int count=1;
```

```
while (count <= 5)
```

```
{
```

```
printf("%d ", count);
```

```
count++;
```

```
}
```

```
return 0;
```

```
}
```

Output:

1 2 3 4 5

Explanation:-

step1: The variable count is initialized with value 1 and then it has been tested for the condition.

step2: If the condition returns true then

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- **Function -**

Functions in c:-

A function is a block of statements that performs a specific task. Let's say you are building an application in C language and in one of your programs, you need to do the same task more than once. In such a case you have two options -

Use the same set of statements each time you want to perform the task

Create a function to perform that task and just call it every time to perform that task.

Function is a piece of code, in other words, it works like a sub-program in a program.

While making a program, sometimes we need that we have to use the result obtained from the execution of some code again and again in the program, in which case the code is not written again and again but as a function `main()` is defined outside the function and used in one place. And to use the result obtained from the function in the program, that function is called.

The advantage of functions is that it saves both our time and space.

Need of function in c in Hindi

The work is done for the following reasons -

- a) To improve the readability of the code.
- b) Improves the reusability of the code, the same function can be used in any program instead of writing the same code from scratch.
- c) If you use functions, it will be easier to debug the code, because it is easier to detect errors.
- d) Reduces the size of the code, with the duplicate set of states being replaced by function calls.

There are two types of functions in the programming language "C".

1:- Built-in-functions

2:- user defined functions

1:- Built-in-function :-

Built-in functions are those functions whose prototypes are preserved in the header file of the programming language "C". These functions are called by simply writing their name in the program and they get executed in the program. Examples of this:- `scanf()`;; `printf()`;; `strcat()`;; e.t.c.

These functions are also called library functions of the "C" programming language. All these functions are related to a specific "C" library file. These special library files are called header files and their extension name is `.h`. Therefore, all those files located in the library of "C" whose extended name is `.h`, are called header files.

There are many header files in "C", some of them are as follows:-

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`stdio.h`

`Math.h`

`string.h`

`conio.h`

`time.h`

`ctype.h`

Syntax of a function

`return_type function_name (argument list)`

`{`

Set of statements – Block of code

`}`

`return_type`: The return type can be of any data type such as `int`, `double`, `char`, `void`, `short` etc. Don't worry you will be able to understand these terms better after going through the examples given below.

`function_name`: It can be anything, however it is advisable to have a meaningful name for the functions, so that only the purpose of the function is easy to understand.

Argument list: The argument list contains the variable names along with their data types. These arguments are the types of input to the function. For example - a function that is used to add two integer variables will have two integer arguments.

Block of Code: Set of C statements that will be executed whenever the function is called.

User Defined Functions -

C allows you to define functions according to your need. These functions are known as user-defined functions.

Suppose, you need to create a circle and color it

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• Recursion in C - What is Recursion in C? -

In C language, Recursion is a process in which a function calls itself repeatedly. This function is called recursive function.

This type of function call is called recursive call. There are many recursive calls in Recursion, so it is necessary to use terminate condition to terminate it.

We cannot apply Recursion to all the problems, but by using it we can easily solve some problems. For example - we can use it to solve problems like sorting , searching , traversal etc.

The C programming language supports recursion. But while using it, it is necessary for the programmer to define the exit condition in the function, otherwise it will continue till infinite loop.

Recursive functions are very useful in solving many mathematical problems such as - calculating the factorial of a number, generating fibonacci series etc.

To find the factorial of a number using recursion

```
-#include<stdio.h>
```

```
long factorial(int n)
```

```
{
```

```
if (n == 0)
```

```
return l;  
  
else  
  
return(n * factorial(n-1));  
  
}
```

```
void main()
```

```
{
```

```
int number;
```

```
long fact;
```

```
printf("Enter a number: ");
```

```
scanf("%d", &number);
```

```
fact = factorial(number);
```

```
printf("Factorial of %d is %d\n", number, fact);
```

```
return 0;
```

```
}
```

```
.....
```

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▪ Union & Structure

What is Structure in C Programming?

Structure is a user defined data type that we use as a single data type by combining variables of different data types.

Now because the structure data type is created by grouping the variables of different data types, you can store data of different data types in a single variable of the structure.

In C programming, the best choice is to use variables or arrays of structure data type for this type of work.

Define Structures in C Programming

To declare the structure, we use the keyword `struct`. With the help of `struct` keyword, you create a new data type by grouping the variables of different data types.

Therefore the structure is called user (programmers) type or derived data type.

Structure Declaration

Syntax:

```
struct structure_name
```

```
{
```

```
data type member1;
```

```
data type member 2;
```

```
data type member(n);
```

```
defined data
```

```
};
```

You can define the structure in your C programs like variables and arrays in global scope or local scope.

If you declare it outside any function i.e. in global scope then you can use it in any function and if you declare it inside function i.e. in local scope then you can use it only inside that function.

Structure Declaration

Example 1:

```
struct students
```

```
{
```

```
int roll;
```

```
char name[20];
```

```
float cgpa;
```

```
};
```

While declaring the structure, after the struct keyword, we give a name to the structure, following the C identifier rules of our own free will.

After giving the structure name, we declare variables of different data types inside the curly braces {} of the structure and we call these variables as structure members.

Declaring structure members is the same way as you have been declaring variables and arrays till now.

the semicolon after the closing curly braces at the end of the structure declaration; It is necessary to put

Variable Declaration

Above we taught how we can define structure data type with the help of struct keyword, but only by defining structure you cannot use it in your program.

Because any data type is useless until you create variables for

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- (C++) -

Introduction of C++

C++ is an object-oriented programming language. It was developed by Bjarne Stroustrup at AT&T Bell Laboratories in Murray Hill, New Jersey, USA, in the early 1980's.

Stroustrup, an admirer of Simula67 and a strong supporter of C, wanted to combine the best of both the languages and create a more powerful language that could support object-oriented programming features and still retain the power and elegance of C.

The result was C++. Therefore, C++ is an extension of C with a major addition of the class construct feature of Simula67.

Since the class was a major addition to the original C language, Stroustrup initially called the new language 'C with classes'.

However, later in 1983, the name was changed to C++. The idea of C++ comes from the C increment operator ++, thereby suggesting that C++ is an augmented version of C.

C++ is a superset of C. Almost all C programs are also C++ programs. However, there are a few minor differences that will prevent a C program to run under C++ compiler.

We shall see these differences later as and when they are encountered. The most important facilities that C++ adds on to C are classes, inheritance, function overloading and operator overloading.

These features enable creating of abstract data types, inherit properties from existing data types and support polymorphism, thereby making C++ a truly object-oriented language.

1. OOP (Object-Oriented Programming) -

C++ is an object-oriented language, unlike C which is a procedural language.

This is one of the most important features of C++. It employs the use of objects while programming.

These objects help you implement real-time problems based on data abstraction, data encapsulation, data hiding, and polymorphism.

We have briefly discussed all the 5 main concepts of object-oriented programming.

The OOP concepts are:

Objects

Objects are the basic run time entities in an object-oriented system.

They may represent a person, a place, a bank account, a table of data or any item that the program has to handle.

They may also represent user-defined data such as vectors, time and lists.

Programming problem is analyzed in term of objects and the nature of communication between them.

Program objects should be chosen such that they match closely with the real-world objects.

Objects take up space in the memory and have an associated address like a record in Pascal, or a structure in c.

When a program is executed, the objects interact by sending messages to one another.

For example, if “customer” and “account” are to object in a program, then the customer object may send a message to the account object requesting for the bank balance.

Each object contain data, and code to manipulate data.

Objects can interact without having to know details of each other's data or code.

It is a sufficient to know the type of message accepted, and the type of response returned by the objects.

OBJECTS: STUDENT

DATA

Name
Date-of-birth
Marks

FUNCTIONS

Total
Average
Display

Classes

We just mentioned that objects contain data, and code to manipulate that data.

The entire set of data and code of an object can be made a user-defined data type with the help of class.

In fact, objects are variables of the type class.

Once a class has been defined, we can create any number of objects belonging to that class.

Each object is associated with the data of type class with which they are created.

A class is thus a collection of objects similar types. For examples, Mango, Apple and orange members of class fruit.

Classes are user-defined that types and behave like the built-in types of a programming language.

The syntax used to create an object is not different then the syntax used to create an integer object in C.

If fruit has been defines as a class, then the statement `Fruit Mango;` Will create an object mango belonging to the class fruit.

Data Abstraction and Encapsulation-

The wrapping up of data and function into a single unit (called class) is known as encapsulation.

Data and encapsulation is the most striking feature of a class. The data is not accessible to the outside world, and only those functions which are wrapped in the class can access it.

These functions provide the interface between the object's data and the program.

This insulation of the data from direct access by the program is called data hiding or information hiding.

Abstraction refers to the act of representing essential features without including the background details or explanation.

Classes use the concept of abstraction and are defined as a list of abstract attributes such as size, wait, and cost, and function operate on these attributes.

They encapsulate all the essential properties of the object that are to be created.

The attributes are some time called data members because they hold information.

The functions that operate on these data are sometimes called methods or member function.

Inheritance

Inheritance is the process by which objects of one class acquired the properties of objects of another classes.

It supports the concept of hierarchical classification.

For example, the bird, 'robin' is a part of class 'flying bird' which is again a part of the class 'bird'.

This means that we can add additional features to an existing class without modifying it.

This is possible by deriving a new class from the existing one.

The new class will have the combined feature of both the classes.

Polymorphism

Polymorphism is another important OOP concept.

Polymorphism, a Greek term, means the ability to take more than one form.

An operation may exhibit different behavior in different instances. The behavior depends upon the types of data used in the operation. For example, consider the operation of addition.

For two numbers, the operation will generate a sum. If the operands are strings, then the operation would produce a third string by concatenation.

The process of making an operator to exhibit different behaviors in different instances is known as operator overloading.

Polymorphism plays an important role in allowing objects having different internal structures to share the same external interface.

This means that a general class of operations may be accessed in the same manner even though specific actions associated with each operation may differ.

Polymorphism is extensively used in implementing inheritance.

Dynamic Binding

Binding refers to the linking of a procedure call to the code to be executed in response to the call.

Dynamic binding means that the code associated with a given procedure call is not known until the time of the call at run time.

It is associated with polymorphism and inheritance.

A function call associated with a polymorphic reference depends on the dynamic type of that reference.

Message Passing

An object-oriented program consists of a set of objects that communicate with each other.

The process of programming in an object-oriented language, involves

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प्रिय दोस्तों, अब तक हमारे नोट्स में से अन्य परीक्षाओं में आये हुए प्रश्नों के परिणाम -

EXAM (परीक्षा)	DATE	हमारे नोट्स में से आये हुए प्रश्न	कट ऑफ
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अन्य परीक्षाओं में भी इसी तरह प्रश्न आये हैं Proof देखने के लिए हमारे youtube चैनल (Infusion Notes) पर इसकी वीडियो देखें या हमारे नंबरों पर कॉल करें।

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■ C++ - character

The 'char' keyword is used to declare the variable in the Character Data Type.

Can declare only one character. for eg. 'H'

If multiple character means to print the whole string then use double quotes(""). for eg. char arr[10] = "Hello";

Character Data Type is of 1 byte.

for eg.

```
#include <iostream.h>
```

```
using namespace std;
```

```
int main ()
```

```
{
```

```
char str1='H'; // declare variable in single quotes
```

```
//char str2[10]='Hello'; // Get Warning Error
```

```
char str3[10]="Hello";
```

```
cout<<"Single quoted Print Character : "<<str1<<endl;  
  
//cout<<"Single quoted Print String : "<<str2<<endl; //Get Warning Error  
  
cout<<"Double quoted Print Character : "<<str3<<endl;  
  
return 0;  
  
}
```

Note: The above program will give a warning error. User has given above program to know the difference between single quotes and double quotes.



Single quoted Print Character : H

Double quoted Print Character : Hello

Character data type-

Data Types	Storage Size	Range
char	1 Byte	-128 to 127
unsigned char	(16-bit)	1 Byte 0 to 255

<code>signed char</code>	<code>1 Byte</code>	<code>--128 to 127</code>
--------------------------	---------------------	---------------------------

sizeof Find out the size of char data types with this keyword.

Source Code :

```
#include <iostream.h>
using namespace std;
```

```
int main ()
```

```
{
```

```
cout<<"char storage size : "<<sizeof(char)<<endl;
```

```
cout<<"unsigned char storage size : "<<sizeof(unsigned char)<<endl;
```

```
cout<<"signed char storage size : "<<sizeof(signed char)<<endl;
```

```
return 0;
```

```
}
```

Output

char storage size : 1

unsigned char storage size : 1

signed char storage size : 1

C++ - float data type

To declare a variable in a floating-point data type, the 'float' keyword is used.

Floating-point data type is of 4 bytes.

for eg.

```
#include <iostream.h>
```

```
using namespace std;
```

```
int main ()
```

```
{
```

```
float a=5, b=3.145;
```

```
cout<<"Value of Float variable : "<<a<<endl;
```

```
cout<<"Value of b : "<<b<<endl;
```

```
return 0;
```

```
}
```

Output

Value of Float variable : 5

Value of b : 3.145000

Floating-point Data Type

Data Types	Storage Size	Range	Digits of Precision
float	4 Bytes	1.2E-38 to 3.4E+38	6

sizeof Find out the size of char data types with this keyword.

Example -

```
#include <iostream.h>
```

```
using namespace std;
```

int main ()

{

cout<<"Floating-point Storage size : "<<sizeof(float);

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■ C++ - What is Variable

It stores the values of data types inside itself.

Variable This is also the name of a memory location.

Variable's rules

This variable is case-sensitive. for eg int a and int A are different variables.

Variable starts with any alphabet(az, AZ) or underscore(_).

Variables can be named alphanumeric. For eg. a1 = 5, var1, var2

Variable does not allow this space.

Variable name is not any C++ Keywords.

Variable Declaration

When the variable is declared, then it allocates memory according to the data type of the variable.

After variable declaration, it takes Garbage Value inside itself.

Garbage Value: Garbage Value Variable is given by the Compiler.

Syntax for Single Variable Declaration

`data_type single_variable_name;`

for eg.

```
int a;
```

Source Code :

```
#include <iostream.h>
```

```
using namespace std;
```

```
int main ()
```

```
{
```

```
int a;
```

```
cout<<"Value of a : "<<a;
```

```
return 0;
```

```
}
```

Output :

Value of a : 4309822

Variable_name a

Variable_value 4309822 Garbage Value

Address 0x69fetc

Syntax for Multiple Variable Declaration

`data_type multiple_variable_name;`

for eg.

```
int a, b, c;
```

Source Code :

```
#include <iostream.h>
```

```
using namespace std;
```

```
int main ()
```

```
{
```

```
int a, b, c;
```

```
cout<<"Value of a : "<<a<<endl;

cout<<"Value of b : "<<b<<endl;

cout<<"Value of c : "<<c<<endl;

return 0;

}
```

Output :

Value of a : 4309822

Value of b : 6946708

Value of c : 4309728

Variable_name a b c

Variable_value 4309822 6946708 4309728 Garbage Value

Address 0x69fefc 0x69fef8 0x69fef4

Variable Initialization

When the variable is initialized then it allocates memory according to the data type of the variable. for eg. int for 2bytes(16-bit) | 4bytes(32-bit) | 8bytes(64-bit), char

In variable initialization, the variable is given a normal value.

In variable initialization a variable takes only

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■ C++ - Relational Operators

Types of Relational Operators

There are a total of 6 different types of Relational Operators in computer science programming languages. They are as follows -

Greater than (>)

This relational operator is used to find out which operand is greater than the other operand in comparison.

The symbol used for comparison is '>'.

If the condition is True then it will give 1 as the output and if the condition is False then it will return 0 as the output.

Example

```
int main()
```

```
{
```

```
int x = 15 ;
```

```
int y = 10 ;
```

```
cout << (x > y) << endl;
```

```
return 0;
```

```
}
```

Output

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▪ C++ - Input and Output console files

Streams are used for input and output in C++. In normal life also there are two main input and output devices. One is Keyboard and the other is Desktop/Monitor. The input given from the keyboard is visible through the Output on the screen of the Monitor / Desktop.

There are some such header files in C++ and these header files have input/output |for eg. cin and cout

There are three header files in C++ for Input/Output.

iostream

iomanip

fstream

iostream: This header file is used to read and write data from standard stream. For input/output in C++ program, *iostream* has to include this header file.

iomanip : *iomanip* is also part of an input/output library. In which there are manipulator functions with arguments. *iomanip* is used for formatted input/output.

fstream: *fstream* is used for files. If you want to read and write the file, then it is necessary to include this header file.

C++ - cout Console Output

cout(Console Output) : Standard Output Stream

cout shows on the output screen.

cout This is the object of the ostream class.

The insertion operator(<<) is also used with *cout*.

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Multiple insertion operators (<<) are used with variables in the same line to the insertion operator.

The insertion operator is used for 'output'.

endl is also used with the insertion operator. It is used at the end of the line.

Source Code:

```
#include <iostream.h>  
  
using namespace std;
```

```
int main(){  
    cout<<"Hello World!"<<endl;  
  
    return 0;  
  
}
```

Output:

Hello World!

C++ - cin Console Input

Inputs data from cin keyboard.

`cin` is the object of the `istream` class.

Extraction operator(`>>`) is also used with `cin`.

The extraction operator is used to use multiple extraction operators(`>>`) with variables in the same line.

Source Code :

```
#include <iostream.h>
```

```
using namespace std;
```

```
int main()
{
    int a, b;
    cout << "Enter Two numbers"<<endl;
    cin >>a>>b;
    cout <<"Value of a : "<<a<<endl;
    cout <<"Value of b : "<<b<<endl;
    return 0;
}
```

Output :

Enter Two numbers

5

6

Value of a : 5

Value of b : 6

C++ - cerr Console Error

cerr(Console Error) : Standard Output Stream for Error

cout and cerr These two objects are the same.

Cerr- This object is of stream class.

cerr is an unbuffered standard output stream

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■ C++ - Function Introduction

As always, a function is a module of code that takes information in (referring to that information with local symbolic names called parameters), does some computation, and (usually) returns a new piece of information based on the parameter information.

Function advantages:

The code written in the function does not have to be written again and again.

Function saves programmer's time and program space.

A large program can be divided into smaller functions.

If there is an error in the program, then it can be easily removed.

Where necessary, the function can be called repeatedly.

There are two types of Function.

In-built / Predefined Function

User-defined Function

In-built / Predefined Function

In-built Functions are also called Predefined or Library Functions.

In-built Functions, a separate header file or preprocessor has been created for each of the functions.

The declaration of the function is in the definition header files.

There are many header files in C++, in which different functions are kept grouped.

If the programmer wants, he can also create his own header files.

for example

cout: This Object iostream.h comes under this header file. If Programmer #include <iostream.h> it does not include in preprocessor program then

.....



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▪ C++ - File Handling Classes Modes and Member Functions

In file handling, the data is stored permanently in the secondary storage device (hard disk).

File Handling is used for open, close, read, write.

Earlier cin and cout have been using iostream.h for both these objects. When iostream does not use this header file, cin of istream class and cout of ostream class do not have any value. The same is true for File Handling as well.

File Handling in C++ is a topic that has been given a separate header file, its name is fstream.

Why use File Handling?

In the program cin and cout, it stores the memory only for a short time, that is, when the programmer closes the program, then all the data of the program is destroyed.

Programmer uses some variables, arrays, structures, unions to store data in the program, but this data is not stored permanently.

File handling is used only to store it permanently.

Files created during file handling, whether they are of different types (.txt, .doc etc.), are portable. It is also used in other computers.

Finally, for file handling, this header file has to be used `fstream`.

`fstream` There are three classes in this header file.

`ifstream`

`ofstream`

`fstream`

`ifstream`: `ifstream` is used to read the file.

`ofstream`: `ofstream` is used to write the file.

`fstream` : `fstream` is used to read and write the file.

There are two `ifstream` and `ofstream` classes in the `fstream` class.

If a file is to be read, an `ifstream` is required, and to write data to a file, an `ofstream` is required.

But it should be understood in which mode the file has

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कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी राजस्थान कंप्यूटर अनुदेशक (शिक्षक) की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद !

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• (Java) -

Introduction -

Java is a General Purpose Programming Language, which was developed by Sun Microsystems.

It is used to build desktop and mobile applications. It is completely based on Object Oriented Programming.

C++ and Java are very similar to each other, yet Java has more advanced and simple features.

Java programming works on its purpose of “write once, run anywhere” (WORA). That is, it has the capability to reuse the code once written. This platform is also independent, that is, compiled java code can run in all operating systems (OS). To achieve this situation, its program is compiled into Bytecode.

We save a Java file (which contains user-written code) in the java extension.

If you understand the basics of OOP concept then it is very easy to learn.

Java is also more secure in comparison to other programming languages.

It has emerged as a popular programming language in the last several years on the basis of many of its best features.

Why Use Java?

Java works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc.).

It is one of the most popular programming language in the world.

It is easy to learn and simple to use.

It is open-source and free.

It is secure, fast and powerful.

It has a huge community support (tens of millions of developers).

Java is an object oriented language which gives a clear structure to programs and allows code to be reused, lowering development costs.

As Java is close to C++ and C#, it makes it easy for programmers to switch to Java or vice versa.

History of java -

In 1991, a group of engineers from Sun Microsystems led by James Gosling decided that they would develop a programming language for consumer devices.

He named it Green Project.

The aim of this project was to build a distributed system that would allow consumer electronic devices to communicate with each other.

However, then C ++ was kept as the first choice.

Now because CPU flexibility was a big demand for this process so he thought of expanding to C++.

But they soon understood that in spite of its expansion it would not be enough. C++ was a really complex language then.

After all this, a new programming language "Oak" was born.

It was named by James Gosling after the tree Oak as seen from his office window.

Earlier it was named Greentalk and then its file extension was .gt. In

1995 its name was changed to Oak and then it was renamed as Java.

Because this name was already trademarked by Oak Technology.

The intention behind developing such a language was to create a programming language that is simple, robust, portable, platform-independent, secure, multi-threaded, object-oriented, interpreted and dynamic.

By the way, Java was developed for digital devices like set-top boxes and television etc.

But due to its excellent features, soon it was also used for Internet programming and WWW-based applications.

To prove this language better, he developed a web browser Hotjava which is capable of running mini java applications (Applets).

In 1995, when Sun Microsystems released the initial Java Development Kit (JDK) and Hotjava.

After which it came out as a popular programming language. It was acquired by Oracle in 2009. So far many Java versions have been released, let's take a look at their history.

Versions of Java

Versions	Release Date
JDK Beta	1995
JDK 1.0	1996
JDK 1.1	1997
J2SE 1.2	1998
J2SE 1.3	2000
J2SE 1.4	2002
J2SE 5.0	2004
JAVA SE 6	2006
JAVA SE 7	2011

JAVA SE 8	2014
JAVA SE 9	2017
JAVA SE 10	2018

How to install Java on windows -

Step 1. Click here to download the latest version of Java Development Kit i.e. jdk

Step 2. Now Click on JDK Download. This link will open a new URL, now scroll down with the help of scroll and click on jdk-15_windows-x64_bin.exe.

Step 3. Now a pop-up window will open. Select the given check-box and click on download.

Step 4. As soon as the JDK is downloaded, you will get the application file of JDK.

Step 5. Double click on JDK application file and click on Next button.

Step 6. To install JDK, select the appropriate folder path and click on the Next button

Step 7. After the installation is complete, click on the Close button.

Now the latest version of JDK has been installed in your system. To verify, open command prompt and type `java -version`.

How to set Environment Variables?

Step 1. On the desktop of your system, right click on My Computer icon and click on Properties.

Step 2. Click on Advance system setting.

Step 3. Click on Environment Variables.

Step 4. Click on the New button of User variables.

Step 5. Write PATH in front of the variable name.

Step 6. Copy the path to the installed bin folder inside the JDK folder by right-clicking on it.

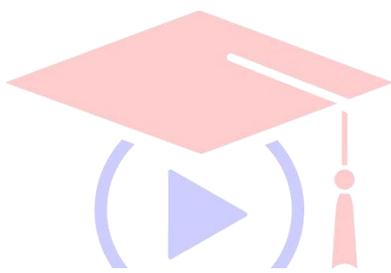
Step 7. Paste the path of the bin folder in front of the variable

.....

नोट - प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नहीं हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर

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INFUSION NOTES
WHEN ONLY THE BEST WILL DO

■ How to Run Java Program ?

When Java's program is written on notepad, then .

java is given with this extension.

The name of the file of java is the name of the class.

If a java file contains more than one class, then the class within which the main method is, then the name of that class is the name of the file.

First character of any class name and file name; is in uppercase.

For example,

HelloProgram.java

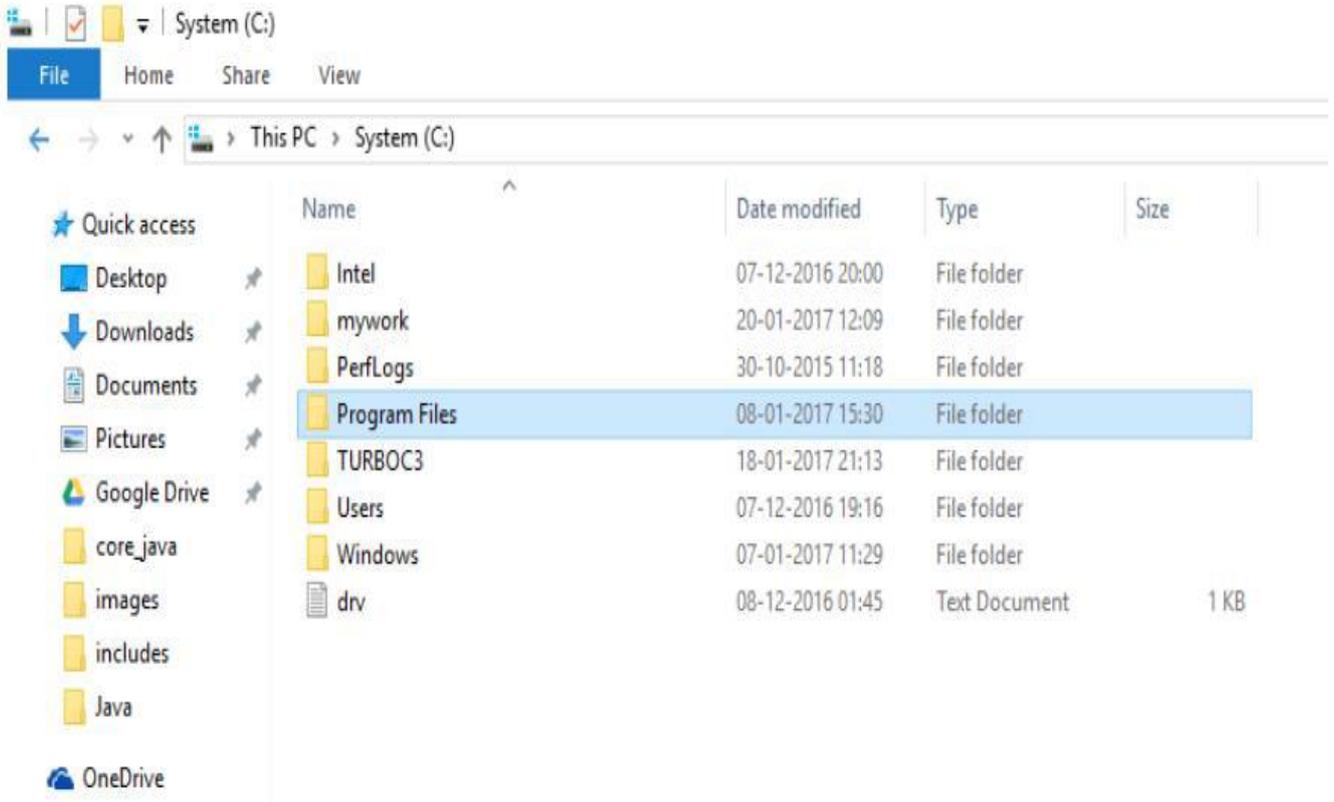
This file is saved on the bin directory of java

For example. C:\Program Files\Java\jdk1.8.0_111\bin

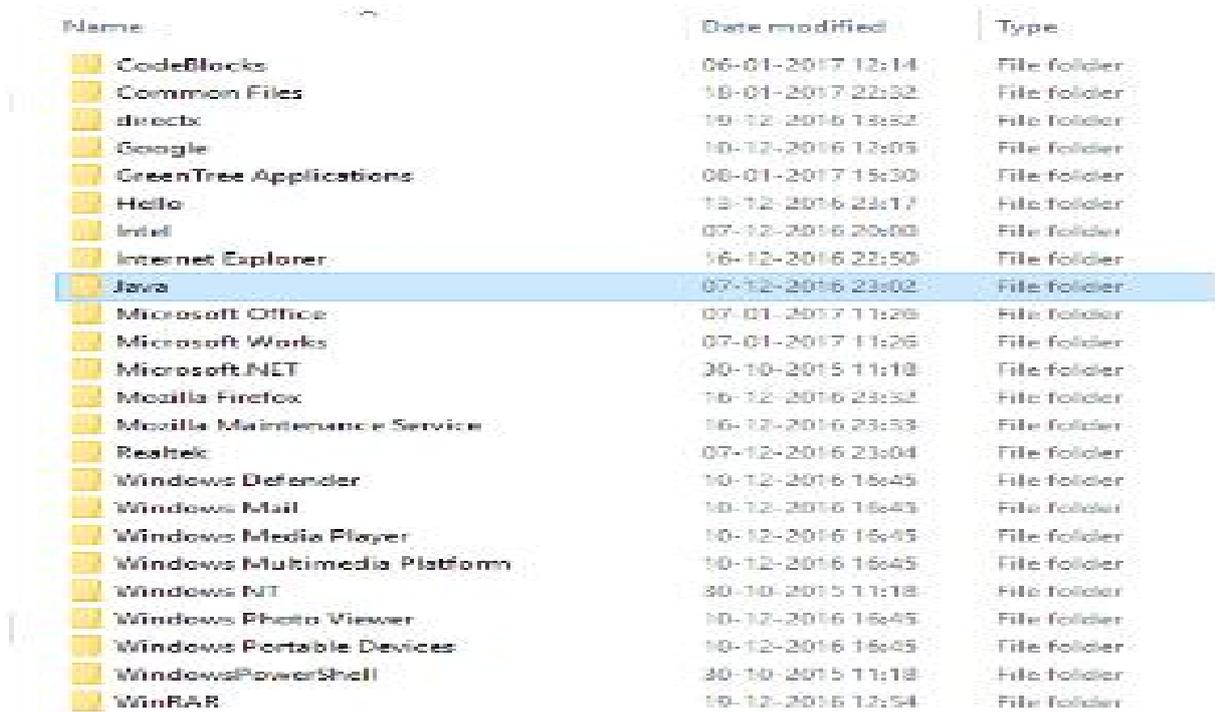
When it comes time to save on this directory, then file; Permission is not given by the operating system to save.

Below are the pictures to solve this problem.

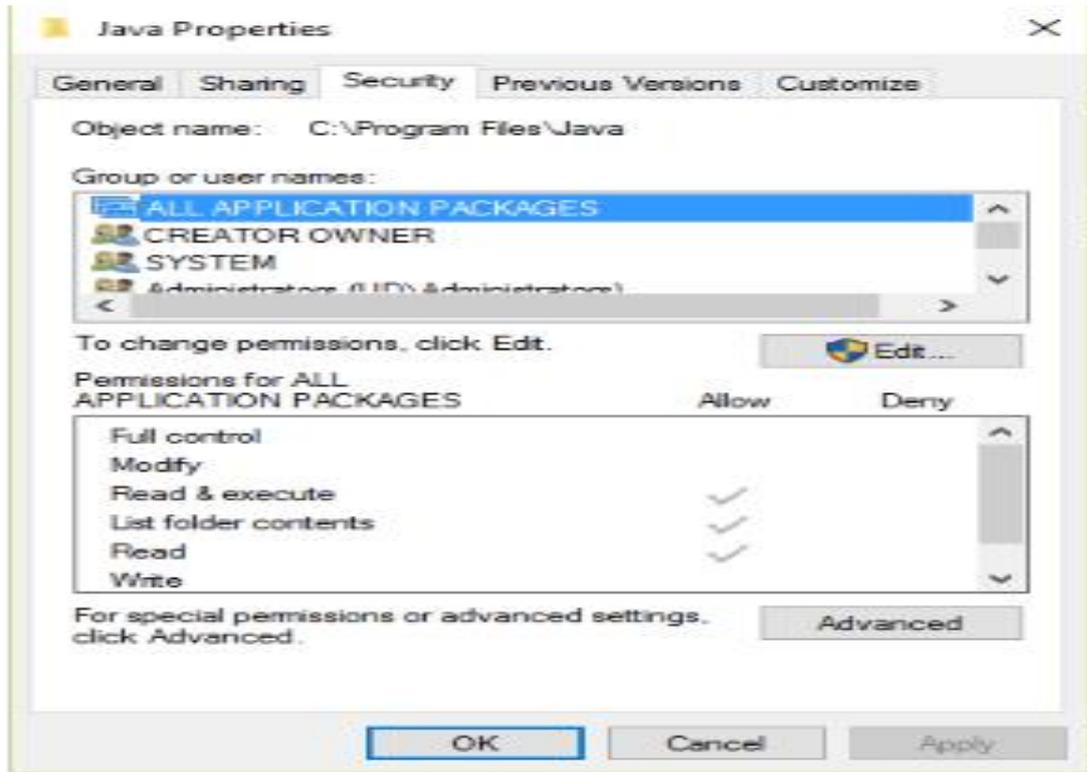
First click on Program Files of C: drive.



After that java right click on this folder.

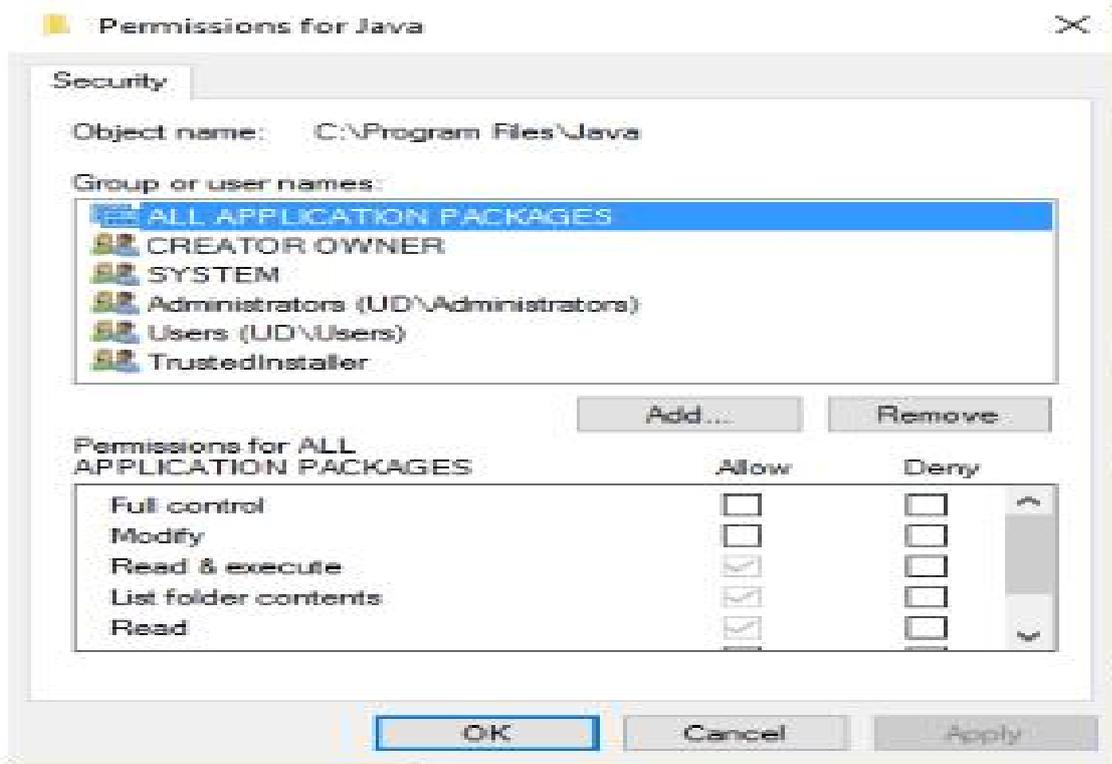


After that a dialog box will open. After that go to properties. After that click on the security tab.



After that click on Edit button

FREE



After that click on Add button then a

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▪ Java- Variable

A Java variable is a piece of memory that can contain a data value. A variable thus has a data type.

Data types are covered in more detail in the text on Java data types.

Variables are typically used to store information which your Java program needs to do its job.

This can be any kind of information ranging from texts, codes (e.g. country codes, currency codes etc.) to numbers, temporary results of multi step calculations etc.

Variable Declaration

Syntax -

```
data_type_name variable_name; //or
```

```
data_type_name variable_name1, variable_name2;
```

Example 1-

```
int a;
```

```
int b, c;
```

```
data_type variable_name = variable_value;
```

Example2-

```
int a = 5;
```

```
int b = 10, c = 15;
```

Types of Variables -

There are three types of variables for Java.

Local Variable

Instance Variable

Static Variable

1. Local Variable

Local variables are inside blocks, methods and constructors.

Local Variable's scope is local. These are visible only for inside methods and constructors.

When Local Variables go outside of methods and constructors, then they are destroyed.

Example -

```
class sandeep
```

```
{
```

```
void display( )
```

```
{
```

```
int a = 9; //Local Variable .....
```

नोट - प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नहीं हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /

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▪ Java - Introduction of Exception Handling

When a problem occurs during program execution, it is called an exception.

Exception occurs at runtime.

There are two types of errors in Java.

Compile-Time Error

Run-Time Error

Compile-Time Error: This is a common error that comes by the compiler. When curly brace, semi-colon or comma is not given in any syntax in the program, then this error occurs at compile-time.

Run-Time Error: Here the program is successfully run. But some such internal errors come, which are given by the interpreter. This also closes the program.

If you see about the exception, when the program is successfully run at compile-time, then some statements in the program are such that they are not executed by the compiler, at the same time it creates an object related to those statements by

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▪ Package -

Java - Package Introduction -

Packages are those class which contains methods without the main method in them.

Packages are mainly used to reuse the classes which are already created/used in other program.

We can define many number of classes in the same package.

Packages are mainly divided into two types.They are

1.Built in packages

2.User defined Packages.

Java's package is used in every program in Java.

Java's packages contain sub-packages, classes and sub-packages.

The concept of packages is like 'data encapsulation'.

Java package is used to categorize the classes and interfaces so that they can be easily maintained.

Java package provides access protection.

Java package removes naming collision.

Java - In Built Packages

Many classes are present in these packages which are a part of Java API.

For Eg. `java.lang`, `java.io`, `java.applet`, `java.awt` .

`java.lang`: This is already imported in java's program, it does not need to be imported separately. It contains all data types, String Methods, Characters Methods, Math Methods.

`java.io`: Here input /output operations like console I/O, file I/O etc. are done with this package.

`java.applet` : This package is used to create Applets.

`java.awt` : It is used for Windows GUI application, which contains Buttons, Frames, Menu etc.

If all the classes of a package are to be used,

Syntax:

```
import package_name.*;
```

Example:

```
import java.io.*; //import all classes from io package
```

If only one class is to be used from any package, then

Syntax:

```
import package_name.Class_name;
```

Example:

```
import java.io.File; //import File classe from io package
```

User Defined Packages

Rules For Creating Packages

To create packages, the name of the package is written along with the package keyword.

Packages should not have a main method.

Packages should have public access modifiers with class name and interface.

If you want to save packages, then use public class or public interface.

To create a user defined package the following steps should be involved

:-

1: Declare the package at the beginning of a file using the syntax :-

```
package packageName;
```

2: Define the class that is to be put in the package & declare it public.

3: Create a subdirectory under the directory where the main source files are stored.

4: Store the listing as the classname.java file in the subdirectory created.

5: Compile the file. This create .class file in the subdirectory.

*

//save as Simple.java

package mypack;

public class Simple

{

public static void main(String args[])

{

System.out.println("Welcome to package");

}

}

If you are not using any IDE, you need to follow

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1st शिफ्ट

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- **(.NET Basic) (DotNet)**

.NET History -

Sometime in the July 2000, Microsoft announced a whole new software development framework for Windows called .NET in the Professional Developer Conference (PDC). Microsoft also released PDC version of the software for the developers to test. After initial testing and feedback Beta 1 of .NET was announced. Beta 1 of the .NET itself got lot of attention from the developer community. When Microsoft announced Beta 2, it incorporated many changes suggested by the community and internals into the software. The overall 'Beta' phase lasted for more than 1 ½ years. Finally, in March 2002 Microsoft released final version of the .NET framework.

Flavors of .NET

Contrary to general belief .NET is not a single technology. Rather it is a set of technologies that work together seamlessly to solve your business problems. The following sections will give you insight into various flavors and tools of .NET and what kind of applications you can develop.

What type of applications can I develop?

When you hear the name .NET, it gives a feeling that it is something to do only with internet or networked applications. Even though it is true that .NET provides solid foundation for developing such applications it is possible to create many other types of applications. Following list will give you an idea about various types of application that we can develop on .NET.

- 1. ASP.NET Web applications: These include dynamic and data driven browser based applications.*
- 2. Windows Form based applications: These refer to traditional rich client applications.*
- 3. Console applications: These refer to traditional DOS kind of applications like batch scripts.*
- 4. Component Libraries: This refers to components that typically encapsulate some business logic.*
- 5. Windows Custom Controls: As with traditional ActiveX controls, you can develop your own windows controls.*
- 6. Web Custom Controls: The concept of custom controls can be extended to web applications allowing code reuse and modularization.*
- 7. Web services: They are “web callable” functionality available via industry standards like HTTP, XML and SOAP*

8. *Windows Services: They refer to applications that run as services in the background. They can be configured to start automatically when the system boots up.*

Features Of .Net

1) Rich Functionality out of the box

.NET framework provides a rich set of functionality out of the box. It contains hundreds of classes that provide variety of functionality ready to use in your applications. This means that as a developer you need not go into low level details of many operations such as file IO, network communication and so on.

2) Easy development of web applications

ASP.NET is a technology available on .NET platform for developing dynamic and data driven web applications. ASP.NET provides an event driven programming model (similar to Visual Basic 6 that simplify development of web pages (now called as web forms) with complex user interface. ASP.NET server controls provide advanced user interface elements (like calendar and grids) that save lot of coding from programmer's side.

3) OOPs Support

The advantages of Object Oriented programming are well known. .NET provides a fully object oriented environment. The philosophy of .NET is – “Object is mother of all.” Languages like Visual Basic.NET now support many of the OO features that were lacking traditionally. Even primitive types like integer and characters can be treated as objects – something not available even in OO languages like C++.

4) Multi-Language Support

Generally enterprises have varying skill sets. For example, a company might have people with skills in Visual Basic, C++, and Java etc. It is an experience that whenever a new language or environment is invented existing skills are outdated. This naturally increases cost of training and learning curve. .NET provides something attractive in this area. It supports multiple languages. This means that if you have skills in C++, you need not throw them but just mould them to suit

.NET environment. Currently four languages are available right out of the box namely – Visual Basic.NET, C# (pronounced as C-sharp), Jscript.NET and Managed C++ (a dialect of Visual C++). There are many vendors that are working on developing language compilers for other languages (20+ language compilers are already available). The beauty of multi language support lies in the fact that even though the

syntax of each language is different, the basic capabilities of each language remain at par with one another.

5) Multi-Device Support

Modern life style is increasingly embracing mobile and wireless devices such as PDAs, mobiles and handheld PCs NET provides promising platform

नोट - प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नहीं हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको राजस्थान कंप्यूटर अनुदेशक (शिक्षक) के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी राजस्थान कंप्यूटर अनुदेशक (शिक्षक) की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /

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▪ Constituents of .NET Platform -

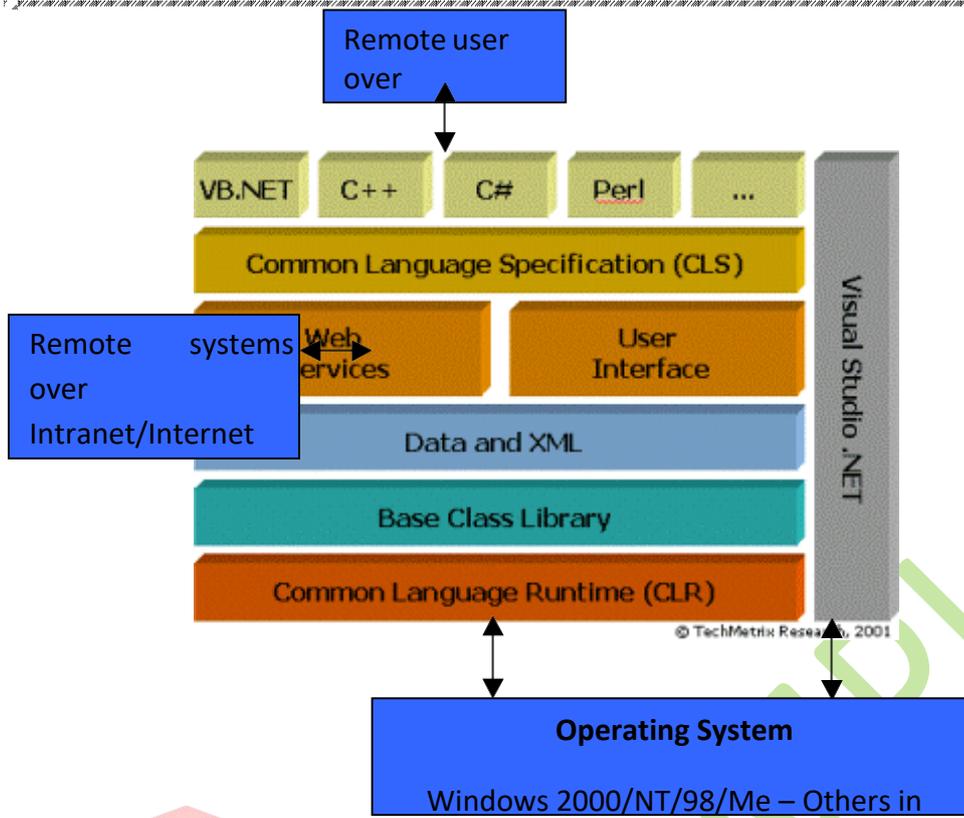
The .NET consists of the following three main parts -

.NET Framework - a completely re-engineered development environment.

.NET Products - applications from MS based on the .NET platform, including Office and Visual Studio.

.NET Services - facilitates 3rd party developers to create services on the .NET Platform.





INFUSION NOTES
 WHEN ONLY THE BEST WILL DO
 .NET

.NET Platform Architecture -

The above diagram gives you an overview of the .NET architecture. At the bottom of the diagram is your Operating System above that sits the

.NET framework that acts as an interface to it. The .NET wraps the operating system, insulating software developed with .NET from most operating system specifics such as file handling and memory allocation.

The Common Language Runtime (CLR)

At the base is the CLR. It is considered as the heart of the .NET framework. .NET applications are compiled to a common language known as Microsoft Intermediate Language or "IL". The CLR, then, handles the compiling the IL to machine language, at which point the program is executed.

The CLR environment is also referred to as a managed environment, in which common services, such as garbage collection and security, are automatically

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▪ .NET Debugging -

Debugging is the most important feature of any programming language and Visual Studio

.NET IDE provides this feature in an effective manner (but you can still do pretty good job with the .NET SDK alone). Application source code goes through two distinct steps before a user can run it. First, the source code is compiled to Microsoft Intermediate Language (MSIL) code using a .NET compiler. Then, at runtime, the MSIL code is compiled to native code. When we debug a .NET application, this process works in reverse. The debugger first maps the native code to the MSIL code. The MSIL code is then mapped back to the source code using the programmer's database (PDB) file. In order to debug an application, these two mappings must be available to the .NET runtime environment.

To accomplish the mapping between the source code and the MSIL, use the `/debug:pdbonly` compiler switch to create the PDB file (Note: When building ASP.NET applications, specify the compilation setting

debug="true" in the application's Web.config file). The second mapping between the MSIL code and native code is accomplished

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	1 st शिफ्ट		
U.P. SI 2021	21 नवम्बर 2021 1 st शिफ्ट	89 of 160	

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• Overview of Artificial Intelligence

What is AI ?

Artificial Intelligence (AI) is a branch of Science which deals with helping machines find solutions to complex problems in a more human-like fashion.

This generally involves borrowing characteristics from human intelligence, and applying them as algorithms in a computer friendly way.

A more or less flexible or efficient approach can be taken depending on the requirements established, which influences how artificial the intelligent behavior appears

Artificial intelligence can be viewed from a variety of perspectives.

*From the perspective of **intelligence** artificial intelligence is making machines "intelligent" -- acting as we would expect people to act.*

The inability to distinguish computer responses from human responses is called the Turing test.

Intelligence requires knowledge

Expert problem solving - restricting domain to allow including significant relevant knowledge

From a **business** perspective AI is a set of very powerful tools, and methodologies for using those tools to solve business problems.

From a **programming** perspective, AI includes the study of symbolic programming, problem solving, and search.

Typically AI programs focus on symbols rather than numeric processing.

Problem solving - achieve goals.

Search - seldom access a solution directly. Search may include a variety of techniques.

AI programming languages include:

LISP, developed in the 1950s, is the early programming language strongly associated with AI. LISP is a functional programming language with procedural extensions. LISP (LIST Processor) was specifically

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• (BLOCKCHAIN)

Introduction -

A blockchain is essentially a distributed database of records or public ledger of all transactions or digital events that have been executed and shared among participating parties. Each transaction in the public ledger is verified by consensus of a majority of the participants in the system. And, once entered, information can never be erased. The blockchain contains a certain and verifiable record of every single transaction ever made. To use a basic analogy, it is easy to steal a cookie from a cookie jar, kept in a secluded place than stealing the cookie from a cookie jar kept in a market place, being observed by thousands of people.

Bitcoin is the most popular example that is intrinsically tied to blockchain technology. It is also the most controversial one since it helps to enable a multibillion-dollar global market of anonymous transactions without any governmental control. Hence it has to deal with a number of regulatory issues involving national governments and financial institutions.

However, Blockchain technology itself is non-controversial and has worked flawlessly over the years and is being successfully applied to both financial and non-financial world applications. Last year, Marc
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Andreessen, the doyen of Silicon Valley's capitalists, listed the blockchain **distributed consensus model** as the most important invention since the Internet itself. Johann Palychata from BNP Paribas wrote in the Quintessence magazine that bitcoin's blockchain, the software that allows the digital currency to function should be considered as an invention like the steam or combustion engine that has the potential to transform the world of finance and beyond.

Current digital economy is based on the reliance on a certain trusted authority. Our all online transactions rely on trusting someone to tell us the truth—it can be an email service provider telling us that our email has been delivered; it can be a certification authority telling us that a certain digital certificate is trustworthy; or it can be a social network such as Facebook telling us that our posts regarding our life events have been shared only with our friends or it can be a bank telling us that our money has been delivered reliably to our dear ones in a remote country. The fact is that we live our life precariously in the digital world by relying on a third entity for the security and privacy of our digital assets. The fact remains that these third party sources can be hacked, manipulated or compromised.

This is where the blockchain technology comes handy. It has the potential to revolutionize the digital world by enabling a **distributed consensus** where each and every online transaction, past and present, involving digital assets can be verified at any time in the future. It does

this without compromising the privacy of the digital assets and parties involved. The **distributed consensus** and **anonymity** are two important characteristics of blockchain technology.

The advantages of Blockchain technology outweigh the regulatory issues and technical challenges. One key emerging use case of blockchain technology involves “**smart contracts**”. Smart contracts are basically computer programs that can automatically execute the terms of a contract. When a pre-configured condition in a smart contract among participating entities is met then the parties involved in a contractual agreement can be automatically made payments as per the contract in a transparent manner.

Smart Property is another related concept which is regarding controlling the ownership of a property or asset via blockchain using Smart Contracts. The property can be physical such as car, house, smartphone etc. or it can be non-physical such as shares of a company. It should be noted here that even Bitcoin is not really a currency--Bitcoin is all about controlling the ownership of money.

Blockchain technology is finding applications in wide range of areas—both **financial** and **non-financial**.

Financial institutions and banks no longer see blockchain technology as threat to traditional business models. The world's biggest banks are in fact looking for opportunities in this area by doing research on innovative blockchain applications. In a recent interview Rain Lohmus of Estonia's LHV bank told that they found Blockchain to be the most tested and secure for some banking and finance related applications.

Non-Financial applications opportunities are also endless. We can envision putting proof of existence of all legal documents, health records, and loyalty payments in the music industry, notary, private securities and marriage licenses in the blockchain. By storing the fingerprint of the digital asset instead of storing the digital asset itself, the anonymity or privacy objective can be achieved.

In this report, we focus on the disruption that every industry in today's digital economy is facing today due to the emergence of blockchain technology. Blockchain technology has potential to become the new engine of growth in digital economy where we are increasingly using Internet to conduct digital commerce and share our personal data and life events.

There are tremendous opportunities in this space and the revolution in this space has just begun. In this report we focus on few key applications of Blockchain technology in the area of Notary, Insurance, whatsapp- <https://wa.link/xorkms> 127 website- <https://bit.ly/computer-notes>

private securities and few other interesting non-financial applications. We begin by first describing some history and the technology itself.

Section 1: BlockChain Technology

1. Short History of Bitcoin

In year 2008, an individual or group writing under the name of Satoshi Nakamoto published a paper entitled “Bitcoin: A Peer-To-Peer Electronic Cash System”. This paper described a peer-to-peer version of the electronic cash that would allow online payments to be sent directly from one party to another without going through a financial institution. Bitcoin was the first realization of this concept. Now word cryptocurrencies is the label that is used to describe all networks and mediums of exchange

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- **Section III: Applications of Technology-Compelling Use Cases in both Financial and Non-Financial Areas**

1. Financial Applications:

1.1. Private Securities

It is very expensive to take a company public. A syndicate of banks must work to underwrite the deal and attract investors. The stock exchanges list company shares for secondary market to function securely with trades settling and clearing in a timely manner. It is now theoretically possible for companies to directly issue the shares via the blockchain. These shares can then be purchased and sold in a secondary market that sits on top of the blockchain.

Here are some examples:

NASDAQ Private Equity: NASDAQ launched its Private Equity Exchange in 2014⁶. This is meant to provide the key functionalities like Cap table and investor relationship management for the the pre-IPO or private companies. The current process of trading stocks in this exchange is inefficient and slow due to involvement of multiple 3rd parties. NASDAQ has joined hands with a San Francisco based Start-up called chain.com⁷ to implement private equity exchange on top of BlockChain. Chain.com

is implementing BlockChain based smart contracts to implement exchange functionality. This

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• **Bitcoin price in 2015 -**

This enthusiasm may be because of the large quantities of capital being injected into the digital infrastructure. Excitement grows as Bitcoin and blockchain firms have received a record US\$1 Billion in investments as the year comes to an end. American Express, Bain Capital, Deloitte, Goldman Sachs, MasterCard, the New York Life

Insurance Company, the New York Stock Exchange -- all of them have poured millions of dollars into Bitcoin firms recently.

Corporate funding into Bitcoin & Blockchain infrastructure is growing and generating interest in several segments. Nasdaq is tapping blockchain technology to create a more secure, efficient system to trade stocks. DocuSign, a company that specializes in electronic contracts, just unveiled a joint idea with Visa to use blockchain to track car rentals and reduce paperwork. Microsoft will unveil details about its venture into "smart contracts" that use blockchain technology. Meanwhile, this new obsession with blockchain technology has reached a point that companies are even experimenting with creating smaller, "private blockchains" inside their own offices. They hire companies like BlockCypher, a startup out of Redwood City, California to develop blockchain technology within their business.

Close Date	Company	Classification	Round Size (\$m)	Cumulative Funding (\$m)	Round
6-Oct-2015	Orb	Financial Services	2.30	2.70	Seed
2-Oct-2015	Coinplug	Universal	5.00	8.30	Second
29-Sep-2015	Safe Cash Payment Technologies	Financial Services	1.12	1.12	Seed
17-Sep-2015	Pey	Infrastructure	0.34	0.34	Seed
10-Sep-2015	Coinalytics	Financial Services	1.10	1.20	Seed
10-Sep-2015	Abra	Financial Services	12.00	14.00	First
10-Sep-2015	Case	Wallet	1.00	2.25	Seed
9-Sep-2015	Chain	Infrastructure	30.00	43.70	Second
8-Sep-2015	ShapeShift	Exchange	1.60	2.13	First
2-Sep-2015	Paymium	Payment Processor	1.12	1.12	Seed

Figure 8. VC funding in Sept/Oct 2015.

Section VI: Conclusions

To conclude, Blockchain is the technology backbone of Bitcoin. The distributed ledger functionality coupled with security of BlockChain, makes it very attractive technology to solve the current Financial as well as non-financial

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कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी राजस्थान कंप्यूटर अनुदेशक (शिक्षक) की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद !

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• Principles and Programming Technique

The Object-Oriented Design Principles are the core of OOP programming. Still, I have seen most of the Java programmers chasing design patterns like Singleton pattern, Decorator pattern, or Observer pattern, and not putting enough attention on learning *Object-oriented analysis and design*.

It's essential to learn the basics of Object-oriented programming like Abstraction, Encapsulation, Polymorphism, and Inheritance. But, at the same time, it's equally important to know object-oriented design principles.

10 Object-Oriented and SOLID Design Principles for Programmers -

1. DRY (Don't repeat yourself)

Our first object-oriented design principle is DRY, as the name suggests **DRY (don't repeat yourself)** means don't write duplicate code, instead use Abstraction to abstract everyday things in one place.

If you have a block of code in more than two places, consider making it a separate method, or if you use a hard-coded value more than one time, make them public final constant. The benefit of this Object-oriented design principle is in **maintenance**.

It means if you have used standard code to validate `OrderId` and `SSN`, it doesn't mean they are the same, or they will remain the same in the future.

By using standard code for two different functionality or thing, you tightly couple them forever, and when your `OrderId` changes its format, your `SSN` validation code will break.

2. Encapsulate What Changes

There is only one thing which is constant in the software field, and that is "Change," So encapsulate the code you expect or suspect to be changed in the future.

If you are coding in Java, then follow the principle of making variables and methods private by default and increasing access step-by-step.

Several of the **design patterns in Java** uses Encapsulation; the Factory design pattern is one example of Encapsulation, which encapsulates object creation code and provides flexibility to introduce a new product later with no impact on existing code.

Btw, if you are interested in learning more about design patterns in Java and Object-Oriented Programming, then you must check this **Design Pattern Library** course on Pluralsight. It's one of the best collections of design patterns and advice on how to use them in the real world.

3. Open Closed Design Principle

According to this OOP design principle, “Classes, methods, or functions should be Open for extension (new functionality) and Closed for modification.”

This is another beautiful SOLID design principle, coined by Uncle Bob on his classic **Clean Codebook**, which prevents someone from changing already tried and tested code.

Here is a Java code example which violates the Open-Closed Design Principle of Programming:

In this code `GraphicEditor` is tightly coupled with `Shape`, If you need a new `Shape` then you need to modify already tried and tested system inside `drawShape(Shape s)` method, which is both error-prone and not desirable.

Ideally, if you are adding new functionality only, then your code should be tested, and that's the goal of the Open Closed Design principle.

4. Single Responsibility Principle (SRP)

Single Responsibility Principle is another

नोट - प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नहीं हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे

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प्रिय दोस्तों, अब तक हमारे नोट्स में से अन्य परीक्षाओं में आये हुए प्रश्नों के परिणाम -

EXAM (परीक्षा)	DATE	हमारे नोट्स में से आये हुए प्रश्न	कट ऑफ
RAS PRE. 2021	27 अक्टूबर	74 (98 MARKS)	64 (84.9 M.)
राजस्थान S.I. 2021	13 सितम्बर	113 of 200	117
राजस्थान S.I. 2021	14 सितम्बर	119 of 200	117
राजस्थान S.I. 2021	15 सितम्बर	126 of 200	117
RAJASTHAN PATWARI 2021	23 अक्टूबर (1st शिफ्ट)	79 of 150	Not declared yet
RAJASTHAN PATWARI 2021	23 अक्टूबर (2 nd शिफ्ट)	103 of 150	

RAJASTHAN PATWARI 2021	24 अक्टूबर (1st शिफ्ट)	95 of 150	
RAJASTHAN PATWARI 2021	24 अक्टूबर (2nd शिफ्ट)	91 of 150	
RAJASTHAN VDO 2021	27 दिसंबर (1st शिफ्ट)	59 of 100	
RAJASTHAN VDO 2021	27 दिसंबर (2nd शिफ्ट)	61 of 100	
RAJASTHAN VDO 2021	28 दिसंबर (1st शिफ्ट)	56 of 100	
RAJASTHAN VDO 2021	28 दिसंबर (2nd शिफ्ट)	57 of 100	
U.P. SI 2021	14 नवम्बर 2021 1st शिफ्ट	91 of 160	
U.P. SI 2021	21 नवम्बर 2021 1st शिफ्ट	89 of 160	

अन्य परीक्षाओं में भी इसी तरह प्रश्न आये हैं Proof देखने के लिए हमारे youtube चैनल (Infusion Notes) पर इसकी वीडियो देखें या हमारे नंबरों पर कॉल करें /

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नोट -

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