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1. What are the key features in the C programming language?

- ✓ Portability – Platform independent language.
- ✓ Modularity – Possibility to break down large programs into small modules.
- ✓ Flexibility – The possibility to a programmer to control the language.
- ✓ Speed – C comes with support for system programming and hence it is compiling and executes with high speed when compared with other high-level languages.
- ✓ Extensibility – Possibility to add new features by the programmer.

2. What are the basic data types associated with C?

- Int – Represent the number (integer).
- Float – Number with a fraction part.
- Double – Double-precision floating-point value
- Char – Single character
- Void – Special purpose type without any value.

3. What are syntax errors?

The mistakes when creating a program called syntax errors. Misspelled commands or incorrect case commands, an incorrect number of parameters when called a method /function, data type mismatches can identify as common examples for syntax errors.

4. What is the process to create increment and decrement statement in C?

There are two possible methods to perform this task.

- 1) Use increment (++) and decrement (-) operator.
Example When $x=4$, $x++$ returns 5 and $x-$ returns 3.
- 2) Use conventional + or - sign.

When $x=4$, use $x+1$ to get 5 and $x-1$ to get 3.

5. What are reserved words with a programming language?

The words that are part of the standard C language library are called reserved words. Those reserved words have special meaning and it is not possible to use them for any activity other than its intended functionality.

Example void, return int.

6. What is the explanation for the dangling pointer in C?

When there is a pointer pointing to a memory address of any variable, but after some time the variable was deleted from the memory location while keeping the pointer pointing to that location.

7. What is the difference between abs() and fabs() functions? (Multiply with (-))

Both functions are to retrieve absolute value. abs() is for integer values and fabs() is for floating type numbers. Prototype for abs() is under the library file < stdlib.h > and fabs() is under < math.h >.

8. What is the difference between ++a and a++?

'++a' is called prefixed increment and the increment will happen first on a variable. 'a++' is called postfix increment and the increment happens after the value of a variable used for the operations.

9. Describe the difference between = and == symbols in C programming?

'==' is the comparison operator which is used to compare the value or expression on the left-hand side with the value or expression on the right-hand side.
 '=' is the assignment operator which is used to assign the value of the right-hand side to the variable on the left-hand side.

10. What is the explanation for prototype function in C?

Prototype function is a declaration of a function with the following information to the compiler.

- Name of the function.
- The return type of the function.
- Parameters list of the function.

11. Describe the header file and its usage in C programming?

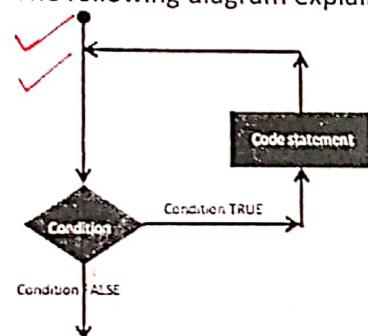
The file contains the definitions and prototypes of the functions being used in the program are called a header file. It is also known as a library file.

Example—The header file contains commands like printf and scanf is the stdio.h.

12. What are the general description for loop statements and available loop types in C?

A statement that allows executing statements or groups of statements in a repeated way is defined as a loop. Following diagram explains

The following diagram explains a general form of a loop.



✓ There are 4 types of loop statements in C.

- While loop
- For Loop
- Do...While Loop
- Nested Loop

13. What is a nested loop?

A loop running within another loop is referred to as a nested loop. The first loop is called the Outer loop and inside the loop is called the Inner loop. The inner loop executes the number of times define an outer loop.

14. What is the general form of function in C?

Function definition in C contains four main sections.

```
return_type function_name( parameter list )  
{  
    body of the function  
}
```

- ✓ Return Type -> Data type of the return value of the function.
- ✓ Function Name -> The name of the function and it is important to have a meaningful name that describes the activity of the function.
- ✓ Parameters -> The input values for the function that needs to use perform the required action.
- ✓ Function Body -> Collection of statement that needs to perform the required action.

15. What are the valid places to have keyword "Break"?

The purpose of the Break keyword is to bring the control out of the code block which is executing. It can appear only in Looping or switch statements.

16. What is the significance of C program algorithms?

The algorithm needs to create first and it contains step by step guidelines on how the solution should create. Also, it contains the steps to consider and the required calculations/operations within the program.

17. What is the code in a while loop that returns the output of the given code?

```
1 #include <stdio.h>  
2  
3 int main () {  
4     int a;  
5  
6     /* for loop execution */  
7     for( a = 1; a <= 100; a++ )  
8     {  
9         printf("%d\n", a * a);  
10    }  
11  
12    return 0;  
13 }
```

$$a = 1; a \leq 100; a++$$

$$a * a$$

$$= 1 * 1 \Rightarrow 1$$

$$\Rightarrow 2 * 2 \Rightarrow 4$$

```
1 #include <stdio.h>  
2  
3 int main () {  
4     int a;  
5  
6     while (a <= 100)  
7     {  
8         printf (" %d\n", a * a);  
9         a++;  
10    }  
11  
12    return 0;  
13 }
```

18. What is the incorrect operator form following list($=$, \neq , $>$, \leq) and what is the reason for the answer?

Incorrect operator is ' \neq '. This is the format correct when writing conditional statements, but it is not a correct operation to indicate not equal in C programming and it gives compilation error as follows.

19. Describe the modifier in C?

Modifier is a prefix to the basic data type which is used to indicate the modification for storage space allocation to a variable.

Example— In 32-bit processor storage space for the int data type is 4. When we use it with modifier the storage space change as follows.

- Long int -> Storage space is 8 bit
- Short int -> Storage space is 2 bit

$$\rightarrow \text{in} = 2 \times 2$$

$$\rightarrow \text{in} = 4 \times 2$$

Q

20. What are the modifiers available in C programming language?

There are 5 modifiers available in C programming language as follows.

- ✓ Short
- ✓ Long
- ✓ Signed
- ✓ Unsigned
- ✓ long long

21. Describe newline escape sequence with a sample program?

The Newline escape sequence is represented by `\n`. This indicates the point that the new line needs to start to the compiler and the output creates accordingly. The following sample program demonstrate the use of the newline escape sequence.

Code

```

1   /* C Program to print string
2
3
4   #include <stdio.h>
5   #include <string.h>
6
7   int main(){
8
9       printf("String 01 ");
10      printf("String 02 ");
11      printf("String 03 \n");
12
13
14      printf("String 03 \n");
15      printf("String 02 \n");
16      return 0;
17 }
```

Output screen

```

1 String 01 String 02 String 03
2 String 01
3 String 02
```

✓22. Is that possible to store 32768 in an int data type variable?

(Int data type only capable of storing values between -32768 to 32767. To store 32768 a modifier needs to use with the int data type. Long Int can use and also if there are no negative values unsigned int is also possible to use.)

✓23. Is that possible to add pointers to each other?

There is no possibility to add pointers together. Since pointer contains address details there is no way to retrieve the value from this operation.

✓24. What is indirection?

If you have defined a pointer to a variable or any memory object, there is no direct reference to the value of the variable. This is called indirect reference. But when we declare a variable it has a direct reference to the value.)

✓25. What are the ways to a null pointer that can use in the C programming language?

Null pointers are possible to use in three ways.

- ✓ As an error value.
- ✓ As a sentinel value.
- ✓ To terminate indirection in the recursive data structure.

✓26. What is the explanation for modular programming?

(The process of dividing the main program into executable subsection is called module programming. This concept promotes reusability.)

✓27. What is a sequential access file?

When writing programs that will store and retrieve data in a file, it is possible to designate that file into different forms. A sequential access file is such that data are saved in sequential order: one data is placed into the file after another. To access a particular data within the sequential access file, data has to be read one data at a time, until the right one is reached.)

✓28. What is variable initialization and why is it important?

This refers to the process wherein a variable is assigned an initial value before it is used in the program. Without initialization, a variable would have an unknown value, which can lead to unpredictable outputs when used in computations or other operations.

✓29. In C programming, how do you insert quote characters (' and ") into the output screen?

This is a common problem for beginners because quotes are normally part of a printf statement. To insert the quote character as part of the output, use the format specifiers \' (for single quote), and \" (for double quote). -

✓30. What is the use of a '\0' character?

It is referred to as a terminating null character, and is used primarily to show the end of a string value.

31. Compare and contrast compilers from interpreters.

Compilers and Interpreters often deal with how program codes are executed. Interpreters execute program codes one line at a time, while compilers take the program as a whole and convert it into object code, before executing it. The key difference here is that in the case of Interpreters, a program may encounter syntax errors in the middle of execution, and will stop from there. On the other hand, compilers check the syntax of the entire program and will only proceed to execution when no syntax errors are found.

32. How do you declare a variable that will hold string values?

The `char` keyword can only hold 1 character value at a time. By creating an array of characters, you can store string values in it. Example: `"char MyName[50];"` declares a string variable named `MyName` that can hold a maximum of 50 characters.

33. What are variables and in what way is it different from constants?

Variables and constants may at first look similar in a sense that both are identifiers made up of one character or more characters (letters, numbers and a few allowable symbols). Both will also hold a particular value. Values held by a variable can be altered throughout the program, and can be used in most operations and computations. Constants are given values at one time only, placed at the beginning of a program. This value is not altered in the program. For example, you can assign a constant named `PI` and give it a value `3.1415`. You can then use it as `PI` in the program, instead of having to write `3.1415` each time you need it.

34. How do you access the values within an array?

Arrays contain a number of elements, depending on the size you gave it during variable declaration. Each element is assigned a number from 0 to number of elements-1. To assign or retrieve the value of a particular element, refer to the element number. For example: if you have a declaration that says `"int scores[5];"`, then you have 5 accessible elements, namely: `scores[0], scores[1], scores[2], scores[3]` and `scores[4]`.

35. Why is it that not all header files are declared in every C program?

The choice of declaring a header file at the top of each C program would depend on what commands/functions you will be using in that program. Since each header file contains different function definitions and prototype, you would be using only those header files that would contain the functions you will need. Declaring all header files in every program would only increase the overall file size and load of the program, and is not considered a good programming style.

36. When is the "void" keyword used in a function?

When declaring functions, you will decide whether that function would be returning a value or not. If that function will not return a value, such as when the purpose of a function is to display some outputs on the screen, then "void" is to be placed at the leftmost part of the function header. When a return value is expected after the function execution, the data type of the return value is placed instead of "void".

37. What is the advantage of an array over individual variables?

When storing multiple related data, it is a good idea to use arrays. This is because arrays are named using only 1 word followed by an element number. For example: to store the 10 test results of 1 student, one can use 10 different variable names (grade1, grade2, grade3... grade10). With arrays, only 1 name is used, the rest are accessible through the index name (grade[0], grade[1], grade[2]... grade[9]).

38. What is debugging?

Debugging is the process of identifying errors within a program. During program compilation, errors that are found will stop the program from executing completely. At this state, the programmer would look into the possible portions where the error occurred. Debugging ensures the removal of errors, and plays an important role in ensuring that the expected program output is met.

39. What are the different types of control structures in programming?

There are 3 main control structures in programming: Sequence, Selection and Repetition. Sequential control follows a top to bottom flow in executing a program, such that step 1 is first perform, followed by step 2, all the way until the last step is performed. Selection deals with conditional statements, which mean codes are executed depending on the evaluation of conditions as being TRUE or FALSE. This also means that not all codes may be executed, and there are alternative flows within. Repetitions are also known as loop structures, and will repeat one or two program statements set by a counter.

40. What is || operator and how does it function in a program?

The || is also known as the OR operator in C programming. When using || to evaluate logical conditions, any condition that evaluates to TRUE will render the entire condition statement as TRUE.

41. Can the "if" function be used in comparing strings?

No. "if" command can only be used to compare numerical values and single character values. For comparing string values, there is another function called strcmp that deals specifically with strings.

42. What are preprocessor directives?

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Preprocessor directives are placed at the beginning of every C program. This is where library files are specified, which would depend on what functions are to be used in the program. Another use of preprocessor directives is the declaration of constants. Preprocessor directives begin with the # symbol.

43. Describe the order of precedence with regards to operators in C.

Order of precedence determines which operation must first take place in an operation statement or conditional statement. On the top most level of precedence are the unary operators !, +, - and &. It is followed by the regular mathematical operators (*, / and modulus % first, followed by + and -). Next in line are the relational operators <, <=, >= and >. This is then followed by the two equality operators == and !=. The logical operators && and || are next evaluated. On the last level is the assignment operator =.

44. What are actual arguments?

When you create and use functions that need to perform an action on some given values, you need to pass these given values to that function. The values that are being passed into the called function are referred to as actual arguments.)

45. What are run-time errors?

These are errors that occur while the program is being executed. One common instance wherein run-time errors can happen is when you are trying to divide a number by zero. When run-time errors occur, program execution will pause, showing which program line caused the error.

46. When is a "switch" statement preferable over an "if" statement?

The switch statement is best used when dealing with selections based on a single variable or expression. However, ~~switch~~ statements can only evaluate integer and character data types.

47. What are global variables and how do you declare them?

Global variables are variables that can be accessed and manipulated anywhere in the program. To make a variable global, place the variable declaration on the upper portion of the program, just after the preprocessor directives section.

48. What are multidimensional arrays?

Multidimensional arrays are capable of storing data in a two or more dimensional structure. For example, you can use a 2 dimensional array to store the current position of pieces in a chess game, or position of players in a tic-tac-toe program.)

49. Which function in C can be used to append a string to another string?

The strcat function. It takes two parameters, the source string and the string value to be appended to the source string.)

50. What is the difference between functions getch() and getche()?

Both functions will accept a character input value from the user. When using getch(), the key that was pressed will not appear on the screen, and is automatically captured and assigned to a variable. When using getche(), the key that was pressed by the user will appear on the screen, while at the same time being assigned to a variable.)

51. What are structure types in C?

Structure types are primarily used to store records. A record is made up of related fields. This makes it easier to organize a group of related data.)

52. What does the characters "r" and "w" mean when writing programs that will make use of files?

"r" means "read" and will open a file as input wherein data is to be retrieved. "w" means "write", and will open a file for output. Previous data that was stored on that file will be erased.)

53. What is the difference between text files and binary files?

Text files contain data that can easily be understood by humans. It includes letters, numbers and other characters. On the other hand, binary files contain 1s and 0s that only computers can interpret.

54. In a switch statement, what will happen if a break statement is omitted?

If a break statement was not placed at the end of a particular case portion? It will move on to the next case portion, possibly causing incorrect output.

55. Describe how arrays can be passed to a user defined function

One thing to note is that you cannot pass the entire array to a function. Instead, you pass to it a pointer that will point to the array first element in memory. To do this, you indicate the name of the array without the brackets.

56. What are pointers?

Pointers point to specific areas in the memory. Pointers contain the address of a variable, which in turn may contain a value or even an address to another memory.

57. Can you pass an entire structure to functions?

Yes, it is possible to pass an entire structure to a function in a call by method style. However, some programmers prefer declaring the structure globally, then pass a variable of that structure type to a function. This method helps maintain consistency and uniformity in terms of argument type.

58. What is gets() function?

The gets() function allows a full line data entry from the user. When the user presses the enter key to end the input, the entire line of characters is stored to a string variable. Note that the enter key is not included in the variable, but instead a null terminator \0 is placed after the last character.

59. What is the use of a semicolon (;) at the end of every program statement?

It has to do with the parsing process and compilation of the code. A semicolon acts as a delimiter, so that the compiler knows where each statement ends, and can proceed to divide the statement into smaller elements for syntax checking.

60. What is header file?

Header files are helping file of your C program which holds the definitions of various functions and their associated variables that needs to be imported into your C program with the help of pre-processor #include statement. All the header file have a '.h' an extension that contains C function declaration and macro definitions. In other words, the header files can be requested using the preprocessor directive #include. The default header file that comes with the C compiler is the stdio.h.

61. What is main function and why it is important?

Its first function or entry point of the program from where program starts executing, program's execution starts from the main. So main is an important function in c programming language.

62. What are conio.h used for?

The conio.h header file used in C programming language contains functions for console input/output. Some of its most commonly used functions are clrscr, getch, getche, kbhit etc. They can be used to clear screen, change color of text and background, move text, check whether a key is pressed or not and to perform other tasks.

63. What are stdio.h used for?

stdio.h is the header file for standard input and output. This is useful for getting the input from the user(Keyboard) and output result text to the monitor(screen). Without this header file, one can not display the results to the users on the screen or cannot input the values through the keyboard.

64. What are variables?

A variable is nothing but a name given to a storage area that our programs can manipulate. Each variable in C has a specific type, which determines the size and layout of the variable's memory; the range of values that can be stored within that memory; and the set of operations that can be applied to the variable.

65. What are primitive and non-primitive data types?

Primitive data types are predefined types of data, which are supported by the programming language. For example, integer, character, and string are all primitive data types. ... Non-primitive data types are not defined by the programming language, but are instead created by the programmer

66. Which type of format specifier is used for input bool type data?

There is no format specifier for the bool type in C. For printf, you can rely on the implicit promotion to int, and use %d as the specified formatter. For scanf, you ought to read it into an int, and convert appropriately. Again, using %d

67. What is difference between float and double type variables?

In general a double has 15 decimal digits of precision, while float has 7. So technically, double stores almost double the digits as compared to float (15 vs 7). In terms of memory, a float type variable occupies 4 bytes of memory space whereas double occupies about 8 bytes of memory space.

68. What are conditional statements?

A conditional is a statement that instructs the computer to execute a certain block of code or alter certain data only if a specific condition has been met. The most common conditional is the If-Else statement, with conditional expressions and Switch-Case statements typically used as more shorthanded methods.

69. What is nested if/else and its usage?

When a series of decision is required, nested if-else is used. Nesting means using one if-else construct within another one.

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✓ 70. What is switch statement and what are case keyword used for?

A switch statement tests the value of a variable and compares it with multiple cases. Once the case match is found, a block of statements associated with that particular case is executed. Each case in a block of a switch has a different name/number which is referred to as an identifier.

✓ 71. Why is default statement used in switch case?

Switch case statements are used to execute only specific case statements based on the switch expression. If switch expression does not match with any case, default statements are executed by the program.

✓ 72. Why break is used in every case? If break is not used what's happened?

If we do not use break statement at the end of each case, program will execute all consecutive case statements until it finds next break statement or till the end of switch case block.

✓ 73. What are loops and its importance?

Loop is used to execute the block of code several times according to the condition given in the loop. It means it executes the same code multiple times so it saves code and also helps to traverse the elements of an array.

✓ 74. Difference between for and while loop?

Basically, there are two major differences between these two loops. 1. In for loop, initialization, condition and adjustment statements are all put together in one line which make loop easier to understand and implement. While in the while loop, initialization is done prior to the beginning of the loop.

✓ 75. What is the difference between while and do-while loop?

(A while loop will always evaluate the condition first.

Used to show menus.

```
while (condition) {  
    //gets executed after condition is checked  
}
```

A do/while loop will always execute the code in the do{} block first and then evaluate the condition.

```
do {  
    //gets executed at least once  
} while (condition);
```

✓ 76. What is the difference between for and do-while loop?

A do/while loop will always execute the code in the do{} block first and then evaluate the condition.

```
do {  
    //gets executed at least once  
} while (condition);
```

A for loop allows you to initiate a counter variable, a check condition, and a way to increment your counter all in one line.

```
for (int x = 0; x < 100; x++) {
```

```
//executed until x >= 100  
}
```

77. What is difference between break and continue statement in loops.

The major difference between break and continue statements in C language is that a break causes the innermost enclosing loop or switch to be exited immediately. The continue statement is used when we want to skip one or more statements in loop's body and to transfer the control to the next iteration.

78. What is infinite loop?

A loop that repeats indefinitely and never terminates is called an Infinite loop.

79. What is casting?

Type casting is a way to convert a variable from one data type to another data type. For example, if you want to store a long value into a simple integer then you can typecast long to int.

80. What is implicit casting?

Implicit type casting means conversion of data types without losing its original meaning. ... If the operands are of two different data types, then an operand having lower data type is automatically converted into a higher data type.

81. What is explicit casting?

The type conversion performed by the programmer by posing the data type of the expression of specific type is known as explicit type conversion. The explicit type conversion is also known as type casting.

82. Differentiate between 1D and 2D arrays?

The main difference between 1D and 2D array is that the 1D array represents multiple data items as a list while 2D array represents multiple data items as a table consisting of rows and columns.

83. How are comments and how do we use them?

A good programmer who writes codes understood by a human is better than a programmer who generates codes understood only by the machine. A comment that starts with a slash asterisk /* and finishes with an asterisk slash */ and you can place it anywhere in your code, on the same line or several lines. Single-line Comments which uses a double slash // dedicated to comment single lines

84. What is variable initialization and why it is important?

Initialization plays a key role in programming as the variables that are used for writing the code occupy a certain amount of memory in the CPU. If the memory values are not defined by the user at the start of the code's execution, the CPU will set the variable value to anything that is acceptable in computer programming language, this is usually termed as garbage value.

85. What is low level Language?

A low-level language is a type of programming language that contains basic instructions recognized by a computer. ... Two common types of low-level programming languages are assembly language and machine language.

86. What is high level language?

A high-level language (HLL) is a programming language such as C, FORTRAN, or Pascal that enables a programmer to write programs that are more or less independent of a particular type of computer. Such languages are considered high-level because they are closer to human languages and further from machine languages.

87. What are logical errors and how to solve it?

A logic error (or logical error) is a 'bug' or mistake in a program's source code that results in incorrect or unexpected behavior. It is a type of runtime error that may simply produce the wrong output or may cause a program to crash while running.

88. What are escape sequence?

An escape sequence in C language is a sequence of characters that doesn't represent itself when used inside string literal or character. It is composed of two or more characters starting with backslash \. For example: \n represents new line.

89. What is linker?

In computer science, a linker is a computer program that takes one or more object files generated by a compiler and combines them into one, executable program.

90: What is run time error?

A runtime error is a program error that occurs while the program is running. There are many different types of runtime errors. One example is a logic error, which produces the wrong output.