C Interview Questions

What are main characteristics of C language?

C is a procedural language. The main features of C language include low-level access to memory, simple set of keywords, and clean style. These features make it suitable for system programming like operating system or compiler development.

What is scope of a variable? How are variables scoped in C?

Scope of a variable is the part of the program where the variable may directly be accessible. In C, all identifiers are lexically (or statically) scoped. See this for more details.

How will you print “Hello World” without semicolon? How to write your own sizeof operator? What are different storage class specifiers in C?

```
int main(void)
{
    if (printf("Hello World")) ;
}
```

```
#define my_sizeof(type) (char *)(&type+1)-(char*)(&type)
```

What is the difference between Call by Value and Call by Reference?

When using Call by Value, you are sending the value of a variable as parameter to a function, whereas Call by Reference sends the address of the variable. Also, under Call by Value, the value in the parameter is not affected by whatever operation that takes place, while in the case of Call by Reference, values can be affected by the process within the function.

When should we use pointers in a C program?

1. To get address of a variable
2. For achieving pass by reference in C: Pointers allow different functions to share and modify their local variables.
3. To pass large structures so that complete copy of the structure can be avoided.
4. To implement “linked” data structures like linked lists and binary trees.

What is NULL pointer?

should make a pointer NULL when memory pointed by it is deallocated in the middle of a program.

What is Dangling pointer?

Dangling Pointer is a pointer that doesn't point to a valid memory location. Dangling pointers arise when an object is deleted or deallocated, without modifying the value of the pointer, so that the pointer still points to the memory location of the deallocated memory. Following are examples.

```
// EXAMPLE 1
int *ptr = (int *)malloc(sizeof(int));
.............
.............
free(ptr);

// ptr is a dangling pointer now and operations like following are invalid
*ptr = 10; // or printf("%d", *ptr);

// EXAMPLE 2
int *ptr = NULL
{
int x = 10;
ptr = &x;
}
// x goes out of scope and memory allocated to x is free now.
// So ptr is a dangling pointer now.
```

What is memory leak? Why it should be avoided?

by definition never terminate.

```
/* Function with memory leak */
#include <stdlib.h>

void f()
{
int *ptr = (int *) malloc(sizeof(int));
/* Do some work */
return; /* Return without freeing ptr*/
}
```

What are local static variables? What is their use?

A local static variable is a variable whose lifetime doesn't end with a function call where it is declared. It extends for the lifetime of complete program. All calls to the function share the same copy of local static variables. Static variables can be used to count the number of times a function is called. Also, static variables get the default value as 0. For example, the following program prints "0 1"

```
#include <stdio.h>
void fun()
{
// static variables get the default value as 0.
static int x;
printf("%d ", x);
x = x + 1;
}

int main()
{
fun();
fun();
return 0;
}
// Output: 0 1
```

What is a sequential access file? What is the use of a '\0' character?

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.

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

What is the difference between functions abs() and fabs()?

These 2 functions basically perform the same action, which is to get the absolute value of the given value. Abs() is used for integer values, while fabs() is used for floating type numbers. Also, the prototype for abs() is under <stdlib.h>, while fabs() is under <math.h>.

How do you convert strings to numbers in C?

integer value, and atol to convert to a long integer value.

Is there a built-in function in C that can be used for sorting data?

Yes, use the qsort() function. It is also possible to create user defined functions for sorting, such as those based on the balloon sort and bubble sort algorithm.

What are the advantages and disadvantages of a heap?

Storing data on the heap is slower than it would take when using the stack. However, the main advantage of using the heap is its flexibility. That's because memory in this structure can be allocated and remove in any particular order. Slowness in the heap can be compensated if an algorithm was well designed and implemented.

How do you search data in a data file using random access method?

What are static functions? What is their use?

In C, functions are global by default. The “static” keyword before a function name makes it static. Unlike global functions in C, access to static functions is restricted to the file where they are declared. Therefore, when we want to restrict access to functions, we make them static. Another reason for making functions static can be reuse of the same function name in other files. See this for examples and more details.

What is difference between i++ and ++i?

1) The expression ‘i++’ returns the old value and then increments i. The expression ++i increments the value and returns new value.
2) Precedence of postfix ++ is higher than that of prefix ++.
3) Associativity of postfix ++ is left to right and associativity of prefix ++ is right to left.
4) In C++, ++i can be used as l-value, but i++ cannot be. In C, they both cannot be used as l-value.

l-value or location value refers to an expression that can be used on left side of assignment operator. For example in expression “a = 3”, a is l-value and 3 is r-value.
l-values are of two types:
“nonmodifiable l-value” represent a l-value that can not be modified. const variables are “nonmodifiable l-value”.
“modifiable l-value” represent a l-value that can be modified.

How will you print numbers from 1 to 100 without using loop?

```
We can use recursion for this purpose. /* Prints numbers from 1 to n */
void printNos(unsigned int n)
{
    if(n > 0)
{
    printNos(n-1);
    printf("%d ", n);
}
}
```

What is volatile keyword?

changed by code outside the scope of current code at any time.

Can a variable be both const and volatile?

yes, the const means that the variable cannot be assigned a new value. The value can be changed by other code or pointer. For example the following program works fine.

```
int main(void)
{
const volatile int local = 10;
int *ptr = (int*) &local;
printf("Initial value of local : %d \n", local);
*ptr = 100;
printf("Modified value of local: %d \n", local);
return 0;
}
```

What is far pointer,dangling pointer, pointer to pointer in C?

A pointer which can access all the 16 segments (whole residence memory) of RAM is known as far pointer.

If a pointer is pointing any memory location but meanwhile another pointer deletes the memory occupied by first pointer while first pointer still points to that memory location, first

What is static & dynamic memory allocation?

In case of static memory allocation, memory is allocated at compile time and memory can't be increased while executing the program. It is used in array. In case of dynamic memory allocation, memory is allocated at run time and memory can be increased while executing the program. It is used in linked list.

What is the difference between malloc() and calloc()? What is the difference between getch() and getche()?

malloc(): The malloc() function allocates single block of requested memory. It has garbage value initially.
calloc(): The calloc() function allocates multiple block of requested memory. It initially initializes all bytes to zero.
The getch() function reads a single character from keyboard. It doesn't uses any buffer, so entered data is not displayed on the output screen.
The getche() function reads a single character from keyword but data is displayed on the output screen. Press Alt+f5 to see the entered character.

Codenza