C Intermediate Questions

Specify different types of decision control statements?

All statements written in a program are executed from top to bottom one by one. Control statements are used to execute/transfer the control from one part of the program to another depending on the condition.

- If-else statement.
  - normal if-else statement.
  - Else-if statement
  - nested if-else statement.
- Switch statement.

What is an r-value and l-value?

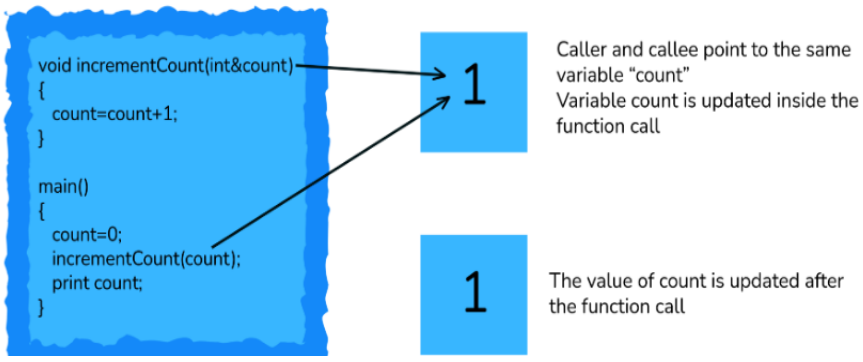
- The term "r-value" refers to a data value stored in memory at a given address. An r-value is an expression that cannot have a value assigned to it, hence it can only exist on the right side of an assignment operator(=).
- The term "l-value" refers to a memory location that is used to identify an object. The l-value can be found on either the left or right side of an assignment operator(=). l-value is frequently used as an identifier.

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

calloc() and malloc() are memory dynamic memory allocating functions. The main difference is that malloc() only takes one argument, which is the number of bytes, but calloc() takes two arguments, which are the number of blocks and the size of each block.

What is pass by reference in functions?

In Pass by reference, the callee receives the address and makes a copy of the address of an argument into the formal parameter. Callee function uses the address to access the actual argument (to do some manipulation). If the callee function changes the value addressed at the passed address it will be visible to the caller function as well.



What is a memory leak?

When we assign a variable, it takes space of our RAM (either heap or RAM)dependent on the size of data type, however, if a programmer uses a memory available on the heap and forgets to a delta it, at some point all the memory available on the ram will be occupied with no memory left this can lead to a memory leak.

```
int main()
{
   char * ptr = malloc(sizeof(int));

   /* Do some work */
   /*Not freeing the allocated memory*/
   return 0;
}
```

What is Dynamic memory allocation in C? Name the dynamic allocation functions.

C is a language known for its low-level control over the memory allocation of variables in DMA there are two major standard library malloc() and free. The malloc() function takes a single input parameter which tells the size of the memory requested It returns a pointer to the allocated memory. If the allocation fails, it returns NULL. The prototype for the standard library function is like this:

void *malloc(size_t size);
The free() function takes the pointer returned by malloc() and de-allocates the memory. No indication of success or failure is returned. The function prototype is like this:

void free(void *pointer);
There are 4 library functions provided by C defined under <stdlib.h> header file to facilitate dynamic memory allocation in C programming. They are:

- malloc()
- calloc()
- free()
- realloc()

What is typedef?

typedef is a C keyword, used to define alias/synonyms for an existing type in C language. In most cases, we use typedef's to simplify the existing type declaration syntax. Or to provide specific descriptive names to a type.

```
typedef <existing-type> <new-type-identifiers>;
```

What is the difference between ‘g’ and “g” in C?

In C double-quotes variables are identified as a string whereas single-quoted variables are identified as the character. Another major difference being the string (double-quoted) variables end with a null terminator that makes it a 2-character array.

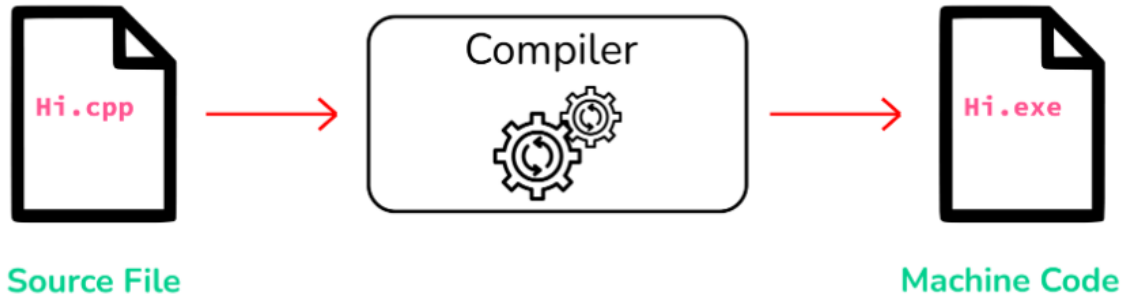
What is a near pointer and a far pointer in C?

- **Near Pointer**: In general, the near pointer can be considered because it is used to hold the address, which has a maximum size of just 16 bits. We can't store an address with a size larger than 16 bits using the near pointer. All other smaller addresses that are within the 16-bit limit, on the other hand, can be stored. Because we can only access 64kb of data at a time, you might assume the 16 bits are insufficient. As a result, it is regarded as one of the near-pointer's biggest drawbacks, which is why it is no longer commonly used.
- **Far Pointer:** A far pointer is considered a pointer of size 32 bits. It can, however, use the current segment to access information stored outside the computer's memory. Although, to use this type of pointer, we usually need to allocate the sector register to store the data address in the current segment.

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

It is majorly related to how the compiler reads(or parses) the entire code and breaks it into a set of instructions(or statements), to which semicolon in C acts as a boundary between two sets of instructions.

Differentiate Source Codes from Object Codes



The difference between the Source Code and Object Code is that Source Code is a collection of computer instructions written using a human-readable programming language while Object Code is a sequence of statements in machine language, and is the output after the compiler or an assembler converts the Source Code.

The last point about the Object Code is the way the changes are reflected. When the Source Code is modified, each time the Source Code needs to be compiled to reflect the changes in the Object Code.

What are header files and what are its uses in C programming?

In C header files must have the extension as .h, which contains function definitions, data type definitions, macro, etc. The header is useful to import the above definitions to the source code using the #include directive. For example, if your source code needs to take input from the user do some manipulation and print the output on the terminal, it should have stdio.h file included as #include <stdio.h>, with which we can take input using scanf() do some manipulation and print using printf().