**Chapter 14: Interlude: Memory API**

We will talk about memory allocation interfaces in UNIX systems.

**14.1 Types of Memory**

In a running C program, there are two types of memory that are allocated. The first is called the **stack** memory. Allocations and deallocations of it are managed implicitly by the compiler for you, the programmer. For this reason, it is sometimes called **automatic** memory.

When we declare a piece of memory, like “*int x;*” The compiler will do everything: make sure to make space on the stack and deallocate the memory.

This needs for a long-lived memory, named **heap** memory where all allocations and deallocations are explicitly handled by us, the programmer.

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In the above declaration of heap memory, the compiler also allocates for a pointer in the stack.

**14.2 The malloc() call**

The malloc() call is simple as we just need to pass it a size asking for some room in the heap. If it succeeds and gives you back a pointer to the newly-allocated space, else if it fails and returns NULL. TO use this, include the header file stdlib.h. Example:



We must also be careful with string. When declaring space for a string, use the following idiom: malloc(strlen(s) + 1), which gets the length of the string using the function strlen(), and adds 1 to it in order to make room for the end-of-string character.

Malloc returns a pointer to type void. This is just for the programmer to decide what to do with is using **cast**. In the above example, we use (double \*).

**14.3 The free() Call**

To free memory that is no longer in use in the heap, programmers simply call free(), which takes one argument, which is the pointer returned by malloc().

**14.4 Common Errors**