Nishit Anand and Yash Phansalkar.

CS214: Systems Programming

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Read Me

Assignment 1: A better malloc() and free()

Our program has three main files, memgrid.c, mymalloc.c, and mymalloc.h.

Below, we are describing the contents of each file and their algorithm:

- mymalloc.h: This program has the structure of our node, along with the definitions of the malloc and the free functions. It also has the printf directives (provided in the assignment definition) to print messages.
- mymalloc.c: This file has our main functions, which are mymalloc and myfree. mymalloc is the function which allocates the data bits to the memory block with the help of pointers, along with keeping the track of the next, previous block of memory. It also keeps the track of the data bit size and stores it in the dSize integer constant. myfree is the function that frees up the node and merges it with the old empty memory, making it available for the next call to mymalloc.
- memgrind.c: This C file contains the main of the actual program. Without this file our program would not run. In this program, we have different test cases, where we malloc and test our code and the final output give us the message stating whether the program is performing the correct function or not (by printing out what changes occurred in our program and what was the end result of it). This program mainly compiles mymalloc.c and mymalloc.h file to run the overall program.

Our structure (which is the struct Node) has four data types, which are as follows:

1. Node previous: This is a pointer that points to the previous location of the data chunk.
2. Node next: This is also a pointer like the Node previous pointer, it holds the next free of data location, depending if the next is free or occupied. If free, then it would be equal to null.
3. int isFree: We use this as an integer value to see if the next node is free or has some stored data (like true or false).
4. int dSize: This is an integer constant that stores the size of the actual data that we store in our memory (basically it stores the total size of the data we malloc).