OS Assignment 2

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Tested on ls.cs.rutgers.edu

**Introduction**: This is a program meant to simulate the pthread, mutex, and malloc libraries. The functions allow you to create new threads, yield, exit, and join them, and create mutexes which you can lock and unlock. In addition, the program simulates main memory with an array and allows you to malloc to this main memory array, free from it, and malloc to shared space.

**Mymalloc**: Our malloc function contains memory within a static char array of 8 MB. This 8 MB is split into 4 KB pages and metadata for each page. Within each page is further metadata to keep track of every block of memory that is being used for malloc. Thus, our program consists of both PageData, which keeps track of which thread is using a page, and MemoryData, which keeps track of what memory inside a page is being used and how much by a single malloc call.

This memory is used in conjunction with the scheduler. Thus, depending on which page is running, different pages are swapped in and out of memory. All pages of a given thread are swapped to the beginning of memory when a thread runs. A thread can have multiple pages, which must be put adjacent in memory in order for the malloc call to return a block of memory that is large enough and contiguous.

**Functions**: The functions we implemented were as follows:

My\_allocate: It mallocs the given amount of space and returns a pointer to the memory that was malloc’ed. If there is no more space in memory or the swap file, it returns NULL.

my\_deallocate: It frees the memory pointed to by the ptr that’s passed in as the argument. If the ptr that’s passed in does not correlate to a memory block allocated by the currently running thread, then it returns NULL.

In addition, there are helper functions to help facilitate the above, such as functions to get the page corresponding to the address given, and functions to swap the pages around so that they would be contiguous in memory.