OS Assignment 2

Derek Mao mm2180, Kevin Pei ksp98, Quzhi Li ql88  
Tested on ls.cs.rutgers.edu

**Introduction**: This is a program meant to implement FUSE in order to create a simple file system. We implemented init, getattr, readdir, create, unlink, open, release, write, and read. In order to do so, we use blocks of memory to represent data.

**Filesystem Layout**: In order to represent data, we used the i-node p-node structure that Linux uses. I-nodes store information about a given file, such as the file size, when it was last modified, and the user that owns it. The i-node in turn contains several direct-mapped data nodes. If the file is too large to be stored in the direct-mapped segments, then a single-indirect mapping is used, where the i-node points to a p-node which itself stores direct-mapped data. If there still isn't enough room, then the i-node uses double-indirect mapping, which points to p-nodes which point to more p-nodes which each have direct-mapping. If the file is still too large to be stored using double indirect mapping, then the file is too large and no more can be written to the file.

Each block is 512 bytes large and are referred to by number. Our memory is laid out so that the first 30,000 blocks of our memory are devoted to i-nodes. This means that there is a max of 30,000 files in our filesystem. Our i-nodes also have 256 bytes dedicated to storing the path, meaning that the maximum path length of a file is 256 characters, including null characters.

**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.

Shalloc: It allocates the given amount of space in the shared pages and returns a pointer to the memory that was shalloc’ed. If there is no more space in the shared memory space, 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.