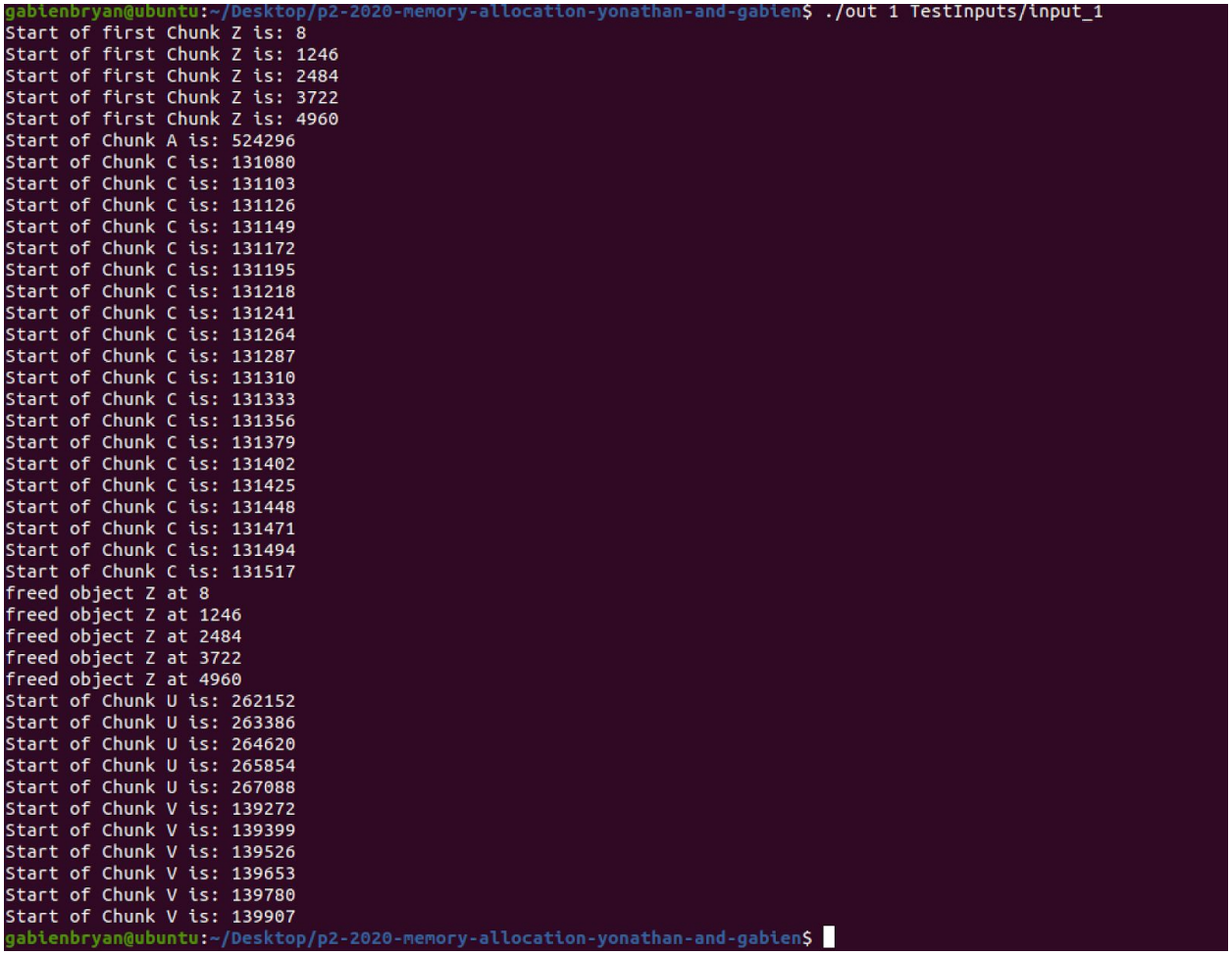
Similarly to the last project, some of the main challenges and obstacles in this project were the overall project design and implementation. Over the course of working on this project, the implementation progressed from a simplistic placement of each allocation to a completely working Buddy System and minorly working Slab Allocator. We started this project by implementing a linked list format. This linked list was virtually used as the actual 1MB of free memory. The nodes in this double linked list held we had structs that contained the header for the buddy system or the slab descriptor table depending on the input. In Buddy we used two of the four structs. We used node and data, node was meant to be used for the linked list and data is a part of the node struct with a struct parameter called header with the struct data type. The data struct simulated the header used in Buddy, so we knew what to free. In Slab we used the remaining structs s_node and slab. The struct slab is our implementation of the Slab Description Table which was a linked list of slabs pointing to one another. The s_nodes structs have the slab struct's parameters and it was a linked list of the objects that point to one another. We attempted to make our my_malloc and my_free work in a similar manner to our buddy version, but we ran into problems.Similar in the sense of our methods of keep track of block, slab, and object sizes and how we kept track of the starting and ending addresses of each mentioned respectively.These objects acted as the physical allocation spots for each object passed into my_malloc.

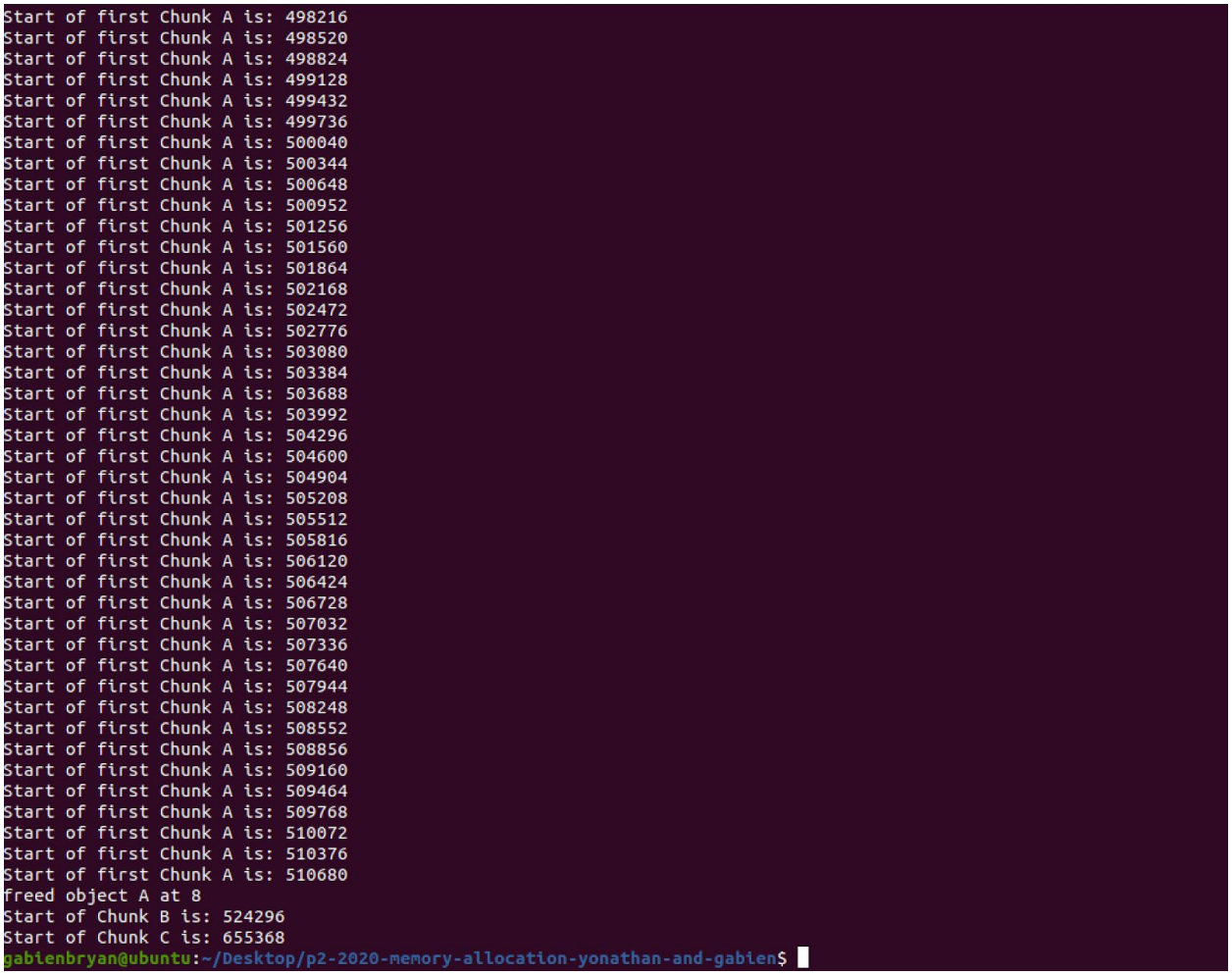
Using a double linked list implementation to set up both the Buddy System and the Slab Allocator allowed for us to manipulate and move portions of the allocated memory without having to actually manipulate the physical memory whatsoever. Our Buddy System implementation works with power of 2 math to allocate blocks based on the Buddy System allocation algorithm. Our Slab Allocator implementation uses the Buddy System to implement the slabs and then places each object of that type one after another in the slab until it is either full or no other objects remain to be placed inside that slab.

For this project we changed up how we did the breakdown and overall method of work for each of us. In the last project we attempted to work together as much as possible and did not do as much independent work. For this project we broke down what needed to be done at the very beginning and split the work of setting up the base implementation. Yonathan initially worked on getting the linked list implementation to work correctly, and Gabien initially setup the overall structure for using the Buddy System and freed the memory with the Buddy System implementation. Splitting the work in the beginning proved very beneficial as we easily merged our work on the double linked list and the Buddy System. Once the code was merged and organized, we split off to independently debug and attempt to get the Buddy System working correctly. The rest of the work done on the project was a majority of each student committing their code after any sort of breakthrough in functionality. By doing this we were able to consistently build of each other's commits and continue to make progress or improvements.

Some additional information that we wanted to include is that when running the Slab Allocator on the Ubuntu terminal we were able to get correct outputs for various of the inputs, but when we ran the Slab Allocator on the w204 machines, we encountered various errors in the output that was not evident on the Ubuntu vm. A picture of the output for the Slab Allocator ran on the

Ubuntu terminal can be found at the end of this document. For example in the picture provided, Ubuntu allows for the allocation of object A, but on the w204 machines we consistently got an error where object A was not allocated. This seemed to be the major error between the two terminals. On an Ubuntu 64-bit virtual machine, we very rarely experienced errors in the actually allocation of memory. On the w204 machines, we frequently received errors in allocation for various objects.





We did get the Buddy Allocation System to work for all the test inputs given to us, but the Slab Allocation System was not correct. We do get large portions of correct output, but it is not one hundred percent correct.