# CS214 Project 1

1. Introduction

Our memory is stored in a array of char bytes. The memory array has a length of 4096-Bytes (up to 4095 in index). Our metadata has a fixed length of 5 bytes. The first byte of the metadata is called Allocation flag, or status. Status is 1 user data is malloced, and 0 if it is free, and status is 0 when user data is freed. One byte at the beginning of the memory array, not associated with any metadata, is used to indicate whether the memory array is initialized.

2. How malloc works

malloc() allocates space on the heap, in this case, the memory array. First it checks if there is enough space left to fit the requested memory. Then it traverses the list until it finds an empty block where it fits. Then it either fills the block according to the size requested. If there is excess room, malloc() creates a new metadata after the current user data. It then returns a pointer to the start of the user data.

3. How free works

free() receives a pointer, clears out the user data, then attempts to coalesce with other free blocks nearby using the coalesce() method.

4. How coalesce works

The coalesce() methods receives no parameters, iterates through the entire memory, then if there is blocks that are adjacent to each other and both are freed block, coalesce() merges them into one metadata block.

5. Error reporting

Error reporting is done by malloc() or free() catching errors or unusual activity, reporting the precise area this activity happened to error(), then error prints out an error message accordingly, then terminates the program using exit();