

Joshua Ross/Tarek Mohammed

CS214

Assignment 1

### Running Program:

To run the program, call the command:

make

This will create the executable memgrind. Then, to run what we want, call the executable by:

./memgrind

### Metadata Design:

Our metadata design has three parts: char (which indicates whether the metadata is free or not), unsigned short (which indicates the size), and a pointer to indicate the next metadata block. This is the smallest data type that encompasses these attributes. The metadata comes before each block of memory. We initialize by checking if the metadata size is 0, because malloc(0) is treated as an error.

### Errors Cases:

In our malloc, we accounted for the following errors:

- allocating for zero bytes, i.e.
  - malloc(0);
- allocating more bytes than we have, i.e.
  - malloc(3000000);

In our free, we accounted for following errors:

- freeing NULL pointer, i.e.
  - ptr = NULL;
  - free((void \*) ptr);
- freeing non-pointer error, i.e.
  - int i = 1;
  - free((int \*) i);
- freeing pointer not allocated by malloc, i.e.
  - int \*p = (char \*)malloc(100);
  - free(p+10);
  - int \*x;

- `free(x);`
- freeing pointer outside of the range of memory, i.e.
  - `int *p = (char *)malloc(500);`
- freeing same pointer, i.e.
  - `free(p)`
  - `free(p)`