

MyHeap

Deadline: September 28th, 2014

1 Instructions

Implement your own version of C's `malloc`, `realloc` and `free` using only `mmap` and `munmap`.

Function	Description
<code>my_malloc(x)</code>	Allocate <code>x</code> bytes of memory and returns a pointer to the allocated memory. Return 0 if no memory could be allocated. The return address must be sufficiently aligned for C's <code>long</code> and <code>void*</code> data types.
<code>my_free(p)</code>	Deallocate the allocation pointed to by <code>p</code> , or do nothing if <code>p</code> is 0.
<code>my_realloc(p, n)</code>	Reallocate the memory pointed to by <code>p</code> to fit <code>n</code> bytes of memory instead. Return a pointer to the reallocated memory, or 0 if the reallocation failed.

- each function must be implemented in a `.c` file of its own, named after the function it contains. The function prototypes must be declared in a `.h` file, in accordance with the C coding standard. The submitted archive may (but needs not) include a test program. You must include a `Makefile` which properly places the functions in `libminic.a`.
- you may assume a page size of 8192 bytes.
- the only standard/system header you may include are `<stddef.h>` and `<sys/mman.h>`; the only external functions you may use are `mmap` and `munmap` (you may use functions from a previous assignment, by including their source in your submission).

2 Grading

- 6 points if `my_malloc/my_free/my_realloc` work as described. Tip: correctness > performance.
- +1 point if the implementation makes a best effort to fit multiple small objects in a page.
- +0.5 point if `my_malloc` attempts to reuse memory that was most recently freed.
- +1 point if the implementation makes a best effort at releasing pages to the operating system.
- +0.5 point if the implementation determines the page size automatically (using a portable mixture of `getpagesize` and `sysconf`; for this extra grade you may include `<unistd.h>`).
- +1 point if the implementation provides its own wrappers for system calls.

3 Copyright and licensing

Copyright © 2014, [Raphael Poss](#). Permission is granted to distribute, reuse and modify this document and other documents for the Systems Programming course by the same author according to the terms of the Creative Commons Attribution-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-sa/4.0/>.