Prof. Ramadan CS240

KAUST

Programming Assignment #2

Please ensure you have reviewed the GeneralAssignmentInstructions.

Due date: Oct. 13, 2014.

Programming Assignment #2 is individual (no teams).

You are required to change the kernel's memory allocator (kalloc.c) to use a bitmap, instead of a linked-list, to keep track of free pages.

You should start with the original copy of xv6, not build on your previous assignment.

If you only need to modify kalloc.c, you can simply include that in your submission, instead of creating a tar file for it.

The bitmap should be static (does not need to grow), and should be placed immediately starting at "end". (the term used by the commentary and code)

You will need to calculate exactly how big the bitmap needs to be depending on how much memory the QEMU machine is configured with.

Note that initialization will be different, since before (with linked list) you couldn't initialize all memory since initialization included setting up the linked list.

It is possible that with bitmap you can initialize everything early, but you simply need to ensure that you do not *allocate* more memory than is mapped at that time. Requests to allocate more memory before kinit2 is called should fail (just like they would with the linked list implementation).

Since the allocator allocates at the granularity of pages, each "bit" in your bitmap should represent an entire page's allocation state.

Eid break is also a perfect time to read through a C book as you perform this assignment, and it will help you when you do the more substantial Assignment 3.