

SYSTEMS II — PROJECT 0

Writing a BIOS for a new ISA, assembler, and simulator

1 Overview and motivation

For this course, I assume that you have some background with assembly programming. However, before we delve into more complex tasks, this project will serve as a “warm-up.” Specifically, you will complete an existing assembly program using the assembler and simulated processor that will serve as the basis of our projects throughout the semester.

2 Your assignment

Your goal with this assignment is to complete, in assembly, the code needed to bootstrap our simulated, hard-disk-less system. Much of this BIOS is written, but it lacks one critical portion of its code that you must fill in. So, to complete this assignment, you must:

1. **Grok:** Read the code already in `bios.asm` and grasp, to the greatest extent possible, what it does and how it does it. As a broad outline, here’s what the BIOS, when complete, must accomplish:
 - (a) Find the **second ROM** in the physical address space. Both your BIOS and users of it assume that this second ROM is the *kernel*.
 - (b) Find the **RAM** in the physical address space.
 - (c) Copy the kernel (2^{nd} ROM) into main memory (RAM) [see **Complete**, below].
 - (d) JUMP to the copied kernel’s first machine code instruction.
2. **Complete:** You will find, in a procedure named `_procedure_copy_kernel`, an incomplete chunk of code (clearly marked with comments). This portion of the code must perform the actual copying of bytes from the kernel ROM and into RAM.

Notice that you must, for now, use a *dummy kernel*. Since we have not yet written any part of a true OS kernel, then any executable image (e.g., `do-nothing.vmx`, assembled from the provided `do-nothing.asm`) will suffice.

3 How to submit your work

Use the CS submission systems to submit your work. Specifically, you will need to submit your `bios.asm` file. You may use either of two ways, from the servers and/or workstations, to use the submission system:

1. **Web-based:** Open a browser,¹ and point it at:

```
https://www.cs.amherst.edu/submit
```

2. **Command-line based:** From a shell running on any of the servers (`remus/romulus/vega.cs`), or on any of the workstations in Seeley Mudd 007, you can submit your work via the following command:

```
$ ~lamcgeoch/submit bios.asm
```

You must, of course, be within whichever directory contains your BIOS code. Once you issue this command, you will be prompted to select the correct course and assignment for which you are submitting work; those choices should, I hope, be self-evident.

This assignment is due at **11:59 pm on Sunday, February 7th**.

¹Be sure to open it from within the server or the workstation! If you're using your own laptop or a public Windows/Mac machine, don't open the browser from within there, since it won't have access to the files on the server/workstations.