

# **CS510 Languages and Low Level Programming: Portfolio submission #1**

Due on April 8, 2016 at 12:00pm

*Mark P. Jones Spring 2016*

**Konstantin Macarenco**

**Attempted Topics:**

1. Write simple programs that can run in a bare-metal environment using low-level programming languages.
2. Discuss common challenges in low-level systems software development, including debugging in a bare metal environment.

## Narrative 1.

I attempted to write simple "editor" that allows to enter and delete text (unfortunately without navigation keys). I also reused all the functions we written for the first lab (setAttr, cls, outc, outhex), by adding videoasm to the hello.

Input is easily by reusing provided "simpleio" library,

## Narrative 2.

Debugging bare metal programs is not an easy task. Lack of simple tools like logger, printing facilities and the most important debugger, make the task non-trivial. There is no way to easily go through program logic, inspect memory and variables values to see what goes wrong.

There are several approaches that attempt to solve this problem.

1. To run bare metal application within instrumented virtual machine that emulate desired computer architecture , and provide similar functionality as a debugger.  
BIOS for example solves this problem by introducing