**COLORADO SCHOOL OF MINES**
**ELECTRICAL ENGINEERING & COMPUTER SCIENCE DEPARTMENT**

**CSCI-410**
**Elements of Computing Systems**
**Spring 2014**

**ECS-07A**

Project ECS-07 differs from the reference ECS-07 (i.e., the one in the book) in two ways:

1) The project is broken into two pieces that are to be submitted separately. This is consistent with the recommended approach described in the book (Sec 7.5) in which you first implement Stage II for the stack arithmetic commands (ECS-07A) and then implement Stage II for the memory access commands (ECS-07B).

2) Your assembler must add annotations to the assembler code that is generated.

NOTE: Because of the delay in getting ECS-07A posted, your submitted code does not have to add any annotation comments other than the header for this first part of the project, but it must do so for the final code submitted for ECS-07B.

**Required Annotation**

Your translator must output three types of annotative comments as part of the .asm file that it generates.

1) The normal header that is required for any .asm file that you produce. The "project" field for this header should read "translated" indicating that it was produced automatically via a VM translation tool. The filename should, of course, be the same as the actual name of the .asm file.

2) VM File Demarcation comment. Each time you start translating a new .vm file, the following comment should appear in the .asm file before the first line of translated code:

```
// ================================================
// VM File: Fred.vm
// ================================================
```

There should be 50 equal signs in the bounding lines. The filename should use the same capitalization as the computer's file system (which should mean that you simply want to use the name (less any path information) as provided by the FileSet class.

3) VM Command comment. Each VM command should appear in the file directly above the sequence of assembly code instructions that implement it. Those comments should be of the form:

```
// -------------------------------------
//                  push constant 32195
// -------------------------------------
```

The VM command should start in column 21. The reason for the offset is to create the effect of two columns in the .asm file with the first being the assembly instructions and the second the VM commands that produced them.

**File Submission**

Be sure to adhere to the File Header Formats and the Submission Procedures.

If you wish, you may complete everything for both stages at once; but you must still submit separate and properly named ZIP files for each stage. Also, each ZIP file must extract to the proper directory, either 07A or 07B as appropriate. Other than that the contents of the two ZIP files can be identical.

In your file headers for ECS-07A you may make them all ECS07 for ECS07A (or you can make them ECS07A, that is up to you). But in ECS07B you need to use ECS07B if there are ANY changes to the file compared to the one submitted for ECS07A.