

CS 222 Computer Organization and Machine Level Programming

Fall 2006

M-W-F 2:20–3:30pm HOS-123

<http://www.cs.moravian.edu/cs222>

CS 222. Computer Organization and Machine Level Programming. (1u) An introduction to classical internal organization of computers with emphasis on low-level (machine language and assembly language) programming. Topics covered include performance measures, low-level data representations, instruction sets, implementation of data path and control, memory organization and cache, and I/O organization. Laboratory work stresses low-level algorithm implementation on RISC processors. Prerequisite: CS 121.

1 Instructor

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Office Hours: MF 10:30--11:30,

R 11:30--12:30

2 Goals

- You will review the necessary aspects of digital design from CS 121 including number systems, computer arithmetic, logic gates, and combinational and sequential design.
- You will become familiar with design, implementation, and testing of an assembly language programming for at least one real-world processor.
- You will understand the different levels of computer hardware and their interrelationships.
- You will gain a better understanding of the interaction between the system hardware and the systems software such as assemblers, linkers, loaders, and operating systems.
- You will understand the concept of performance and be able to evaluate benchmark tests and results.

3 Text

The primary text for the course is Computer Organization and Design: The Hardware/Software Interface, 3/e, by Patterson and Hennesey. Additional references for the MIPS machine/assembly language will be made available as needed. An additional text is Guide to LaTeX, 4/e, by Kopka, Helmut and Daly.

4 Prerequisites

Students are expected to have a strong understanding of procedural programming and a basic understanding of number systems and boolean logic.

5 Assignments, Programs, and Tests

Programming assignments will mostly consist assembly language programming assignments. Other work will be a mix of homework exercises from the textbook as well as “projects” and short papers.. Tests will consist of three hour exams and a comprehensive final.

5.1 Tests

No makeup exams will be given. Students missing one or more tests, in a properly excusable fashion, will be graded based on the available scores as the total score. The hour exams will likely be closed book and closed notes, unless explicitly stated otherwise. The final exam will likely be a mixture of open and closed book and notes.

5.2 Homework

Each homework (non-program) will be graded out of a possible 100 points. Late homework will be penalized with the same schedule as late programs (see below).

5.3 Programs

- Each program will be graded out of 100 points, but will be weighted to reflect its relative complexity. Programs will be graded on correctness (~70%), style (~20%), and documentation (~10%). If an assignment is one *class-day* late, it will be penalized 10%. If it is no more than *class-week* late, it will be penalized 50%. After one class-week, it is worth no credit.
- Unless explicitly stated otherwise, programs are due electronically on midnight on the due date.
- Failing to turn in correct programming assignments in a timely fashion is hazardous to your grade, directly and indirectly. If you start missing assignments, I will notify your academic advisor.

Keep in mind the following items about submitting programs.

1. Program source files must contain the program header in a comment section as well as a code section. This header consists of the program title, number, author, course, and due date.
2. Programs are collected electronically. Pay close attention to directory and files names, including case.
 - You must execute `touch DONE` in the proper directory, `cs222.074/x`.
 - A collect program will periodically look for these *DONE* files.
 - If the *DONE* file is found, the contents of the directory will be copied, a *.collected* file will be deposited, and a congratulatory email message will be sent.
 - If no *DONE* file is found, an email will be sent pointing out that no collection was done.
 - If you are asked to resubmit a program you must delete (`rm`) the *.collected* file and `touch DONE` again. You must also physically resubmit the grading worksheet.

6 Computer Resources

The primary computer resources will be the Unix-based Sun Solaris 2.x workstations on MoCoSIN. The software will likely be the SPIM simulator for the MIPS architecture, but students are encouraged to experiment with other instruction sets as well.

You are expected to comply with all MoCoSIN, CIT and campus policies with respect to use of the computer resources. This includes, but is not limited to, such policies as not locking workstations, not using an account other than your own, etc.

7 Grading

7.1 Weighting

Programs and Labs	25
Homework and Quizzes	20
Hour Exams	30
Final Exam	25
Total	100 %

7.2 Policies

- Incomplete grades will **not** be assigned for failure to do the work as required during the semester.

- Attendance is very important, and pop quizzes (especially reading quizzes), which would count in the homework category, may spontaneously occur. You are responsible for everything discussed in class.

8 Important Dates

Aug 27	M	First day of classes
Sep 3	M	Labor day—no classes
Sep 4	T	Last Day to Add/Drop
Sep 26	F	Hour Exam I
Oct 5	F	<i>MidTerm</i>
Oct 6–9	S–T	Fall Recess
Oct 12	F	CCSC-E 2007 Conference – Class?
Oct 26	F	Hour Exam II
Nov 9	F	Last Day to Withdraw with a W
Nov 21–25	W–U	Thanksgiving Break
Nov 30	M	Hour Exam III
Dec 10	M	Last Day of Classes
Dec 11,	T	Reading Day
Dec 12–15	W–S	Final Examinations
Dec 16	U	Reading Day
Dec 17–19	M–W	Final Examinations

9 General

- Keep backups of all assignments, especially during program development.
- Special circumstances, will, of course, be considered on an individual basis. Please see us as soon as possible if any such circumstances arise.
- All work, unless explicitly stated in the problem definition, is to be an individual effort. Students are encouraged to discuss approaches so long as the final submission has a single, clearly identifiable author. Violations of this will be dealt with as a case of academic dishonesty, see below.
- Students are encouraged to read and understand the college policy on academic honesty. Violations of this policy will certainly result in reduced (0?) scores on the assignments and may result in a failure of the class. In addition, students are expected to read and comply with the course specific policy on improper collaboration.

10 Terms and Conditions

I consider this syllabus to be a contract between myself as instructor and you as student. Therefore, I will do my best to adhere to the policies herein. However, if the circumstances warrant, there may need to be changes. Such changes will clearly be communicated to the class.