

CSC 448 Introduction to Compiler Design
2013-2014 Spring Quarter
Mon 5:45PM – 9:00PM
Lewis 1111
<http://d2l.depaul.edu/>

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M: 4:00-5:30PM W: 11:40-1:10

Summary Of Course

In this course we will introduce some basic concepts in compiler construction. There will be extensive programming as we try to write our own compiler for a simple C-like language in Java. We will attempt to cover the following topics:

- Lexical analysis, finite automata
- Syntactic analysis, context-free grammars
- Abstract Syntax Trees, semantic analysis, tree transformations, visitor pattern
- Code generation and x86 assembly
- As time permits, data-flow and control flow analysis

Prerequisites

The formal prerequisite for this course is Programming Languages (CSC447). But I want to make explicitly mention two classes in particular that are part of the prerequisite chain for CSC447. First is Data Structures II (CSC403). We will be making extensive use of recursion on trees. If you are not comfortable with this yet, you will need to be to complete this class. Second is Systems I (CSC406). The output of the compiler is x86 assembly. You must already be familiar with how C is translated into assembly. The bomb lab from CSC406 is crucial here. If you did not do the bomb lab in CSC406, you will be at a serious disadvantage in this class.

Grading Policy

Your overall grade for the course will be computed as follows:

Homework	30%
Exam (week 6)	30%
Final Project	40%

Letter grades will be assigned as follows:

93-100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
60-66	D
0-59	F

Textbooks and Printed Resources

Crafting a Compiler. Fischer, Cytron, and LeBlanc, 2010. ISBN: 978-0-13-606705-4

Homework

All homework and all final project deliverables must be submitted on D2L before the deadline. Late submissions will not be accepted, so make sure to submit whatever you have before the deadline.

Students may work in groups of at most 3 students on homework assignments. A single student from each team/group must submit the group assignment for everyone. The person submitting should write the names of all the students in the group in the comment box when submitting and everyone's names should appear within the submission itself (the document or code). Group members who are not submitting should submit a comment indicating who else is in the group and who is responsible for submitting the group's work.

Homework will involve making additions/modifications to a substantial codebase and I don't have time to track down errors, missing files, changes, etc. For this reason, students must do the following:

- Your submission **must** include a text README file that describes the changes you made. This is especially important if you failed to complete the assignment. You need to explain to me what changes you made, what successes you think you had and a description of what is going wrong. If your code doesn't work and you don't explain to me what you did, that I have no basis on which to give you partial credit.
- Your submission must be created using "ant submit" as described in class. This will create a zip file for you to submit.
- You must test your submission! Download your submission into an empty folder. Run ant on it and see if the resulting executable works. Also check to make sure it includes your README file!

- Read the write-up for each assignment carefully. Some assignments may require you to submit screenshots of the execution of the test cases in addition to as the code itself.

Failure to abide by these guidelines will result in a significant reduction in points (at least 10 points).

Exam – May 5 (week 6)

The exam is closed book and closed notes except for a single 8.5" by 11" sheet of notes (both sides). The sheet of notes must be turned in with your exam and will not be returned so please make a copy for yourself before taking the exam. The exam will take place in class on Monday, May 5, during the regular class time. Place this on your calendar now. Make-up exams will only be given for true emergencies and require documentation.

Final Project

There is no final exam for this class. Instead you will have a project where you will be making a substantial change to a toy compiler. The project will be divided into 4 parts, due at different times. Because there is no final exam, the last part of the project will most likely be due during final exam week, but by that time you will have already completed 75% of the project.

Required Tools

We will be working on a real compiler for a subset of the C language. The compiler is written in Java, but will compile into GAS x86 assembly. This means it is NOT enough to just have Java on your machine. In order to test your code you must have a GAS x86 assembler as well as a machine that runs x86 code. I will assume you have access to a Windows machine on which you will be doing your work. I cannot provide support any other type of system.

You will need the following software

- Java JDK (Java 7)
- Apache Ant
- MinGW
- SableCC (a jar file)

The first assignment will step you through the installation process.

Note that Java 8 was released less than 2 weeks ago. It is best/easiest if we stick with Java 7 for this course. In addition, the projects will start getting large enough that a graphical development environment will be extremely useful. We will be using Eclipse in class and the assignments will be

packaged as Eclipse workspaces/ projects. You should install Eclipse too, although strictly speaking it is not required.

Email

Email is the primary way I communicate with students outside of class. To make email communication as smooth as possible, please make sure to do the following:

- Students should be sure their email listed under "demographic information" at <http://campusconnect.depaul.edu> is correct. All my emails to you will go to that address. When I reply to homework questions, I reply to the whole class and so the reply gets sent to your campus connect email address and not necessarily to the one from which you sent me the question.
- Send questions from an email address that identifies who you are. You have the best chance of getting through the email spam filter if you use your DePaul email address. You have the greatest chance of the email being filtered or of me ignoring it if you send it from an address that I cannot recognize immediately as a student in my class. (I once had a student send me email from way2sexy@hotmail.com and then complain two weeks later that I wasn't answering his emails.)
- Include the course number in the subject of all emails. If I receive an email from you without the course number (CSC448) in the subject, I will not notice that it is from a student and there will be a delay in your receiving a reply. If I do not recognize what course you are in, I will not waste time looking up which course you are in, I will simply reply asking you which course you are in. This will of course add to the delay in getting your question answered, so just avoid all this and include the course number in the subject line.
- If your question was answered in the lecture or in another email, I will simply refer to the lecture or email. So if you did not understand something I said in class or in an email, be specific. Point out exactly what you didn't understand in my prior communication so that you don't get the generic reply of watch the video/read the email.

Online Teaching Evaluation

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. They are a requirement of the course and are key to continue to provide you with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Students complete the evaluation online in CampusConnect at <http://campusconnect.depaul.edu>

Academic Integrity Policy

This course will be subject to the faculty council rules on the Academic Integrity Policy

Plagiarism

The university and school policy on plagiarism can be summarized as follows: Students in this course, as well as all other courses in which independent research or writing play a vital part in the course requirements, should be aware of the strong sanctions that can be imposed against someone guilty of plagiarism. If proven, a charge of plagiarism could result in an automatic F in the course and possible expulsion. The strongest of sanctions will be imposed on anyone who submits as his/her own work a report, examination paper, computer file, lab report, or other assignment which has been prepared by someone else. If you have any questions or doubts about what plagiarism entails or how to properly acknowledge source materials be sure to consult the instructor. See the plagiarism handout for some specific examples of what constitutes plagiarism in this class.

Incomplete

An incomplete grade is given only for an exceptional reason such as a death in the family, a serious illness, etc. Any such reason must be documented. Any incomplete request must be made at least two weeks before the final, and approved by the Dean of the College of Computing and Digital Media. Any consequences resulting from a poor grade for the course will not be considered as valid reasons for such a request.

Resources for Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential.

To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you contact the Center for Students with Disabilities (CSD) at:

Student Center, LPC, Suite #370

Phone number: (773)325.1677

Fax: (773)325.3720

TTY: (773)325.7296