CSE 5343: Compiler Design and Implementation, Autumn 2018

Instructor: Atanas (Nasko) Rountev

Course Summary
Lexical and syntax analyses using compiler generation tools; type checking; intermediate code; control-flow analysis; data-flow analysis; code optimizations; code generation; compiler projects. 3 credits.

Objectives
- Master using tools for generation of lexical analyzers and parsers
- Master generating intermediate code
- Be competent with control-flow and data-flow analysis
- Be competent with simple code optimizations
- Be familiar with techniques for top-down and bottom-up parsing
- Be familiar with type checking
- Be familiar with generation of machine code
- Be familiar with optimizations for parallelism and locality
- Be exposed to techniques for lexical analysis
- Be exposed to register allocation

Prerequisites/Exclusions
(CSE 3901 or 3902 or 3903 or 560) and (CSE 3341 or 655); working knowledge of C++. Not open to students with credit for CSE 756.

General Information
- Class time and location: Tuesday and Thursday, 2:20 pm – 3:40 pm, Caldwell Labs 120
- Instructor: Atanas (Nasko) Rountev, rountev@cse.ohio-state.edu; office hours: DL 685, Tuesday and Thursday 1:00 pm – 2:00 pm, or by appointment
- Grader: Hailong Zhang, zhang.4858@osu.edu; office hours: ?, ?, or by appointment

Topics
Compiler structure; Lexical analysis; Parsing; Type checking; Intermediate representations; Control-flow analysis; Data-flow analysis; Code optimizations; Generation of machine code; Parallelism and locality; Register allocation

Reading

In addition to the book, your most important reading will be the lecture notes and your own notes. Copies of all notes will be handed out in class, and will also be available on the course web page. For each topic, I will provide pointers to relevant parts of the book.

Course Web Page
http://www.cse.ohio-state.edu/~rountev/5343: the course web page will contain all notes, handouts, assignments, a detailed schedule, pointers to reading materials, etc.

Piazza Discussions
We will use Piazza for questions and discussions. Sign up at piazza.com/osu/autumn2018/cse5343. If you have a question, it is highly preferable to post it to Piazza instead of emailing me directly. If you prefer,
you can post anonymously. When a question is posted and answered on Piazza, it benefits everyone.

Projects

- There will be several programming projects, which have to be submitted electronically on carmen.osu.edu by midnight on the due date. The projects must compile and run on stdlinux. Some students prefer to implement the projects on a different machine, and then port them to stdlinux. If you decide to use a different machine, it is entirely your responsibility to make the code compile and run correctly on stdlinux before the deadline. In the past many students have tried to port their code to stdlinux too close to the deadline, leading to last-minute problems and missed deadlines.
- Projects should be done independently. General high-level discussion of projects with other students in the class is allowed, but you have to do all design, programming, testing, and debugging independently. Projects that show excessive similarities will be taken as evidence of cheating and dealt with accordingly.
- The projects are due by 11:59 pm on the due day. No exceptions will be made to this deadline: if you submit at 12:00 am, your submission will be considered to be late. Please plan your time carefully and do not submit in the last minute. You can submit up to 24 hours after the deadline; if you do so, your project score will be reduced by 10%. If you submit more than 24 hours after the deadline, the submission will not be accepted and you will receive zero points for this project.

Exams

- There will be two 50-minute quizzes, in-class, closed book. You can use a cheat sheet — one letter-size piece of paper, with notes on both sides.
- Missing a quiz without prior written (e-mail) approval from me will result in a score of zero for that quiz. To get my approval to reschedule, e-mail me at least one week before the quiz is scheduled. I will not give such approval unless the reasons are justifiable.

Grading

Projects: 80%; Quiz 1: 10%; Quiz 2: 10%

Grading Policy

The entire course will be graded on a curve. I expect the median grade to be around B+. Statistics will be provided to help you understand your standing in the class. I will grade the quizzes. The grader will grade the projects. The person who graded something will be responsible for handling grading disputes. A grade become final one week after being handed back. This should leave plenty of time to resolve grading disputes.

If there are unforeseen emergencies that affect the planned grading scheme, appropriate adjustments will be made. I will provide as much advance notification of such changes as possible under the circumstances.

Academic Integrity

I will treat you as professionals, and you should conduct yourselves as such. You are free to discuss the projects with others. However, the solutions you submit should be developed entirely by yourself. Cheating is a very serious offense and will not be tolerated. Supplying others with materials is also against this rule. Additional details on academic integrity are available at oaa.osu.edu/coamresources.html. Please read this information carefully.

Students with Disabilities

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.