PROGRAMMING LANGUAGES & TRANSLATORS

Instructor: Baishakhi Ray

Fall 2020

Instructor

Prof. Baishakhi Ray

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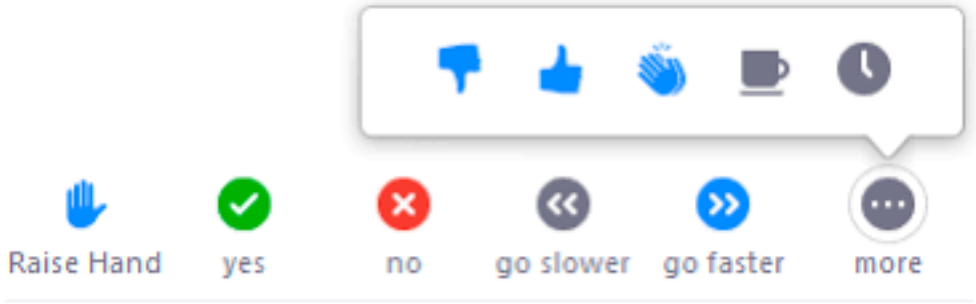
https://rayb.info

Office Hour: Wednesday 2:30am-3:30pm/by Appointment

- If you have any clarification question, please raise your hand in zoom



- You can also type your questions in zoom chat
  - I will take Q&A pause periodically and answer those questions

This Class

- Theory: Learn different phases of a compiler design
- Programming: Implement different phases of compilers
  - Implement modules on top of an existing compiler (Clang/LLVM)

Theory deliverables:
- Written assignments
- Midterm
- Final

	Lectures	Programming
1	Introduction	
2	Lexical Analysis	Prog1
3	Syntax Analysis	Prog2
4	Semantic Analysis	Prog3
5	Run-Time Environment	
6	Code Generation	Prog4
7	Optimization	Prog5, Prog6

Programming deliverables:
6 prog assignments

All are individual assignments

Assignments and Grading

• Programming Assignments	40%
• Written Assignments	10%
• Midterm	25%
• Final	25%
• Extra Credit	10%

- Programming assignments are most important, but most students do well on it. Grades for tests often vary more.

Extra Credit:

- 10% of earned (extra credit/total extra credit) will be added with the original 100% from other assignments/exams
  - If you earn 50 out of 100 in extra credit, 5 will be added with your total (100%) achievement.

Assignments Policy

- Hard Deadline
  - There will be no extension unless you produce medical certificate or permission from school authorities
  - The instructor or TAs will not reply to such email requests.
  - Plan ahead so that you can finish the assignments on time.
    - There can be challenges that you have not anticipated

- Written Assignments will be submitted through Gradescope
  - Find Gradescope entry code in Piazza
  - Type your submission

- Programming Assignments will be submitted through Github Classroom
  - TAs will send you detailed instructions

Assignments Policy

- Work individually
- Programming assignments: work individually.
  - You can discuss with TAs/Instructor/Classmate
- Written assignments: do by yourself.
  - No discussion
  - Only clarification questions are allowed on Piazza
  - TAs/Instructors will not respond to individual email

Exam Policy

- Exams: Open book
  - We will open the exam for the whole day.
  - Once you start the exam, you have to finish within fixed hours.
  - Follow CU honor code.

- In-Class Participations
  - Class participation is important
  - Instructor will ask questions that you have to answer using PollEverywhere in real-time
  - Go to https://pollev.com/plt4115 for participations

Which Compilers have you used so far?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

Prerequisites

- Make sure the students are prepared with C/C++ (required)
- Computer Organization/Architecture (recommended but not required)
- Theory of Computation beneficial (recommended but not required)
- Classes you are expected to know (recommended but not required)
  - COMS W3157 Advanced Programming
    - How to work on a large software system in a team
    - Makefiles, version control, test suites
    - Testing will be as important as coding
  - COMS W3261 Computer Science Theory
    - Regular languages and expressions
    - Context-free grammars
    - Finite automata (NFAs and DFAs)

Submission Policy

Don’t be a cheater (e.g., copy from each other).
If I catch you cheating I will send you to the dean.

Schedule

- Lectures:
  - Mondays and Wednesdays, 1:10 PM-2:25 PM @ Zoom
  - September 9 – December 9

- Exams:
  - Midterm : October 21
  - Final: December 9

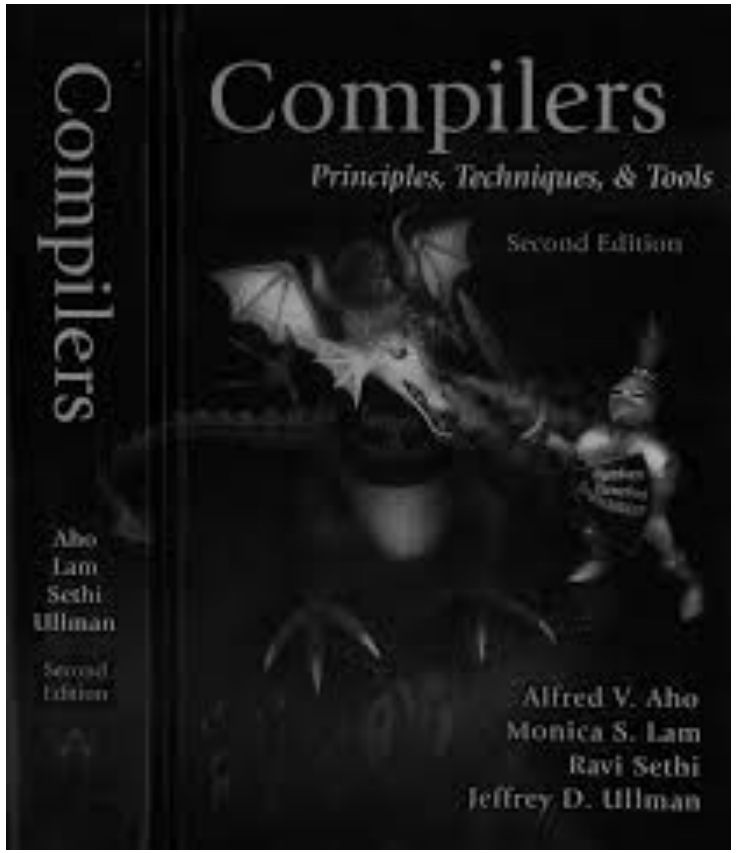
Submission Links

- **Written Assignments** : gradescope
  (Entry Code will be posted in Coursework and Piazza)
- **Programming Assignments** : github classroom
  (Details will be posted in Coursework and Piazza)
- **In-class participations** : PollEverywhere
  (Details will be posted in Coursework and Piazza)

Recommended Text

- Compilers: Principles, Techniques, and Tools
  - By Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman.
  - 2nd Edition
  - Addison-Wesley, 2006

- Research Papers
  - Distributed by the instructor



Q&A

Programming Assignments

- 6 programming assignments
- We should have a good knowledge of C/C++
- Linux is preferred operating system
  - All the instructions will be given based on Linux

Programming Assignments

- Last 5 assignments will be done on top of LLVM infrastructure
  - LLVM is a state-of-the art compiler (default compiler in MAC)
  - Some of the assignments are inter-dependent
  - We will provide Google cloud resource for LLVM related assignments
- Each student will be provided with google cloud resource from the 2nd programming assignment.

Programming Assignments

- In all the assignments, some partial code will be given.
- Based on the instructions, you have to finish the rest.
- Scripts to setup the environment and run the code will also be provided.
- Each assignment will come with a bunch of test cases
  - Your goal is to pass all the test cases.
  - However, passing all the test cases do not mean the program is correct.
- Submit all programming assignments through GitHub Classroom.

Written Assignments

- After every topic, there will be a written assignment
  - Q&A
  - Multiple Choice
  - Problem Solving
- Midterm and Finals will follow written assignments patterns

TA

- Saikat Chakraborty (Mondays & Thursdays 11 AM-12:00 PM EST)
- Aditya Sridhar (Tuesdays & Thursdays 4:30-5:30 PM EST)
- Quanxing Liu (Fridays 10 AM-12:00 PM EST)

How to use GitHub Classroom?

How to use Piazza?

Q&A