

COM S 413/513 Final Project

September 21, 2023

Learning Objectives:

1. Teamwork and collaboration
2. Connect program analysis and software engineering knowledge learned throughout the semester
3. Implementation and research experience in the area of program analysis

Description

You will work in a team of 3–4 students to accomplish a final project on the subject of your interest. COM S 413 students are expected to finish an implementation project, or the implementation part of a research project. COM S 513 students are expected to work on developing a new research idea or adding some research components into an implementation project. In the following I provided a list of potential project ideas for your considerations. You are welcome to propose your own ideas.

A list candidate projects:

- COM S 413: Implement a static bug detector using dataflow analysis. Select one type of bugs, e.g., buffer overflow, memory leak or null-pointer dereferences.
- COM S 413: Implement an abstraction interpretation system for programs with integer inputs
- COM S 413: Implement a fuzzer using the methods you learned in class and from research paper
- COM S 513: Perform symbolic execution on CodeNet ¹ programs.

Timeline, Deliverables and Grading Criteria

1. (3 pt) Project proposal: midterm week (week 8)
 - Deliverable: A PDF to canvas, which includes project title, list of team members, project description and planned steps with timelines.
 - Grading criteria (3 pt): Your proposal contains a properly scoped idea with realizable timeline and description is clear.
2. (8 pt) Presentation and demo: prep week
 - Deliverable: presentation in class
 - COM S 413: (5 min) Introduce the goal and give a demo
 - COM S 513: (10 min) Research presentation and give a demo

¹https://github.com/IBM/Project_CodeNet

- Grading criteria (8 pt)
 - (3 pt) Clarity of the presentation
 - (5 pt) Success of the demo
3. (19 pt) Final report: exam week
- Deliverable: Upload to Canvas in one zip file
 - COM S 413:
 - (a) README: Using README, we should be able to run your tool and find where the source code, test cases, and output are located. If the setup is complex, you are welcome to provide a docker container.
 - (b) Design Document: Using design document, we should be able to navigate through your code and understand your design decisions.
 - COMS 513:
 - (a) Research Report: Maximum 6 pages including references using Latex ACM conference proceedings ². It must include the following sections:
 - i. Problem Statement, stating why it is important
 - ii. Approaches or algorithms you developed
 - iii. Experimental Setup
 - iv. Results
 - v. Related Works
 - vi. Conclusion and Future Work
 - (b) Artifacts: All the code and data with a README that explains how to run the code and how the files are structured.
 - Grading Criteria (19 pt)
 - COM S 513: Significant research results and novelty of the findings and ideas (5 pt)
 - COM S 413: The completeness of the implementation, the tool works with a comprehensive set of test cases (5 pt)
 - Your approach is correct (4 pt)
 - Your technical writing is complete and easy to understand (5 pt)
 - Antiaircraft quality: can the code be run and the package easy to navigate (5 pt)?

²<https://www.acm.org/publications/proceedings-template>