Static Analysis Projects List

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Rules

- students can form teams of two

- two teams can not present the same project

- teams choose a project by filling the form `https://tinyurl.com/STLS2021`

- proposed projects are split into four categories A,B,C,D

A. Tools

You need to write a paper for this topic containing an introduction to the tool, how it handles the toy examples from the course plus some other suggestive examples. Briefly compare it to other existing tools.

A1) Introduction to Frama-C.
- test and present the analysis of the course programs with the EVA plug-in
- present features from the other plug-ins
- find cases where it is not working properly
- `https://frama-c.com/value.html`

A2) Introduction to static analysis with LLVM.
- test and present the analysis of the course programs
- present the available functionalities
- find cases where it is not working properly
- `https://clang-analyzer.llvm.org/`

A3) Implement the fixed point algorithms and test on course programs.

B. Formal Systems

For this project type, you need to write a paper that summarizes the articles or chapters bellow (plus their bibliography or direct references to other papers or chapters) following the main ideas and constructions. For important theoretical results you can present a sketch demonstration, without including all the technical details.

B1) "Sign Analysis" – chapter 5.1 from SPA

B2) "Constant Propagation Analysis" – chapter 5.2 from SPA

B3) "Available Expression Analysis" – chapter 5.5 from SPA

B4) "Very Busy Expressions Analysis" – chapter 5.6 from SPA

B5) "Reaching Definitions" – chapter 5.7 from SPA

B6) "Initialzied Variables Analysis" – chapter 5.7 from SPA

B7) "Taming Casting and Wrapping" – chapter 4 from VRA

B8) "Overlapping Memory Accesses and Pointers" – chapter 5 from VRA

B9) "Abstract Semantics" – chapter 6 from VRA

C. Static Analysis of Existing Programs

For this topic, choose one of the (popular) open-source programs and one of the A tools. The paper must include a presentation of the program, formalization and results obtained. It is desirable that the paper be accompanied by a practical experiment whose results are also included in the paper.

D. Student Proposed Project

The student proposes a project, related to the topics presented in the course - students can choose the topic only after receiving the teacher's consent. The proposal, accompanied by bibliographic references, must be sent to paul.irofti@fmi.unibuc.ro.