Seminar: Static Analysis
Kickoff Meeting

Julian Erhard, Michael Schwarz, Sarah Tilscher

Winter Semester 2023/24

Outline

Organization

Schedule

July. 11th	Pre-course meeting
Oct. 18th	Kickoff meeting
Oct 25th	Deadline for topic preferences and drop-out (provide at least 3 preferences)
Oct. 27th	Topic distribution
Until Nov 24th	At least 1 individual meeting (contact your advisor to set a date, send any references you want to discuss in advance)
Dec. 22nd	Draft report submission
Jan. 10th	Review submisson
Jan. 21st	Final paper submission
Jan. 28th	Voluntary slide submission (if you like to get feedback)
Feb. 5th and 6th, approx. 9am-4pm	Talks

Deliverables and Grading

- ▶ Report (50%)
    - ▶ 4-6 pages
    - ▶ use the provided double-column LaTeX-template
- ▶ Presentation (30%)
    - ▶ 20 min + 5 min questions
- ▶ 2 Reviews (20%)

- ▶ It is mandatory to be present during the 2-3 days of presentations
- ▶ We do not tolerate any plagiarism and report it. If in doubt - declare!

Literature

Citable Literature

Good to use

- Papers (conf./journal)
- Books, book chapters
- Published articles
- Manuals

Try to avoid

- Websites, Blog articles
- Wikipedia
- Advertisements
- Lecture slides and notes
- Source code

Finding literature

- ▶ Starting points: ACM DL, Google Scholar, . . .
  - ▶ Select appropriate keywords
  - ▶ Many papers/books accessible freely via the library
- ▶ Graph algorithms
  - ▶ Publications of the same author(s)
  - ▶ Publications at the same venue
  - ▶ Cites . . . (listed references)
  - ▶ Cited by . . .
- ▶ Relevant conferences: POPL, OOPSLA, PLDI, TACAS, SAS
- ▶ Other starting point: your advisor

How to read a paper

Run 1:

- ▶ Abstract
- ▶ What does the paper present? (technique/tool/...)

Run 2:

- ▶ Abstract + Introduction + Conclusion
- ▶ Skim the rest, no details

Run 3:

- ▶ Full text in detail

How to read a paper

- ▶ Keep notes and questions as you read
  - ▶ annotate the paper, or whatever suits you
- ▶ Try to summarize it with your own words
  - ▶ don't copy or look at the abstract
- ▶ Make a list of pro's & con's
- ▶ What are the key ideas and insights?
  - ▶ may not be the same!
- ▶ What is new?
  - ▶ you don't have the background, but try to 'guess' from the paper itself

Scientific Writing

Writing Style

- ► Factual, precise, focused
  - ► Stay on topic, no story telling, . . .
  - ► Limit to important and necessary topics
  - ► Don't omit necessary prerequisites
- ► Avoid forward references
- ► Avoid *I*, prefer *we* (or passive voice)
- ► 'We' only describes the authors, not the reader

Citing

- ▶ All work that is not yours must be cited
    - ▶ Clearly describe the source
    - ▶ But: no wrong/inaccurate attributions
- ▶ Citing styles:
    - ▶ Literal (direct) quote
    - ▶ indirect quote (rephrase) ← strongly preferred
- ▶ Exception: foundations can be assumed (generally first few Bachelor semesters)

Citing: Examples

The x86 architecture defines the register CR2 [1].

```
The x86 architecture defines the
register CR2 ~\cite{intel2019man}.
```

The x86 architecture defines the register CR2. It can be used with the instruction MOV. [1]

```
The x86 architecture defines the
register CR2. It can be used with the
instruction MOV.~\cite{intel2019man}
(Absatz)
```

Valgrind [1] is a tool for run-time instrumentation.

```
Valgrind~\cite{nethercote2007} is a
tool for run-time instrumentation.
```

Other approaches [1,2,3] . . .

```
Other approaches~\cite{foo,bar,baz}
\dots
```

Do not use citations as a subject within the sentence!
[1] propose an approach to . . .

Further Material

- Courses on literature search offered by the university library
- TUM English Writing Center
- Writing in Computer Science, Justin Zobel, Springer, 2015

Seminar Report

- like a *Review Paper*

- Abstract: brief summary of the area, problem, approach
- Introduction: problem statement, motivation, . . .
- Background: required prerequisites
- Main part: summarize/explain different approaches, show applications/examples, evaluation, comparison, discussion
    - Bachelor's: focus on explaining the general approach and present its weaknesses/advantages
    - Master's: focus on comparing different approaches in detail
- Summary and outlook

Reviews

Review

- short summary 1-2 paragraphs
- obligatory: positive feedback
- if necessary: negative feedback in a **constructive form**, suggestions for improvement
- focus on content-wise feedback
- mention small details (e.g. spelling, . . .) in a separate section

Presentation

Content Selection

Presentation for the audience!

- ▶ What do you want the audience to take away?
  (Not: what can I talk about!)
- ▶ What are the key points?
- ▶ How much content fits into the time slot?

Structure

For example:

- ▶ Motivation
  - ▶ Why is the topic relevant?
- ▶ Background
  - ▶ Consider referencing information from previous talks
- ▶ Concept
  - ▶ Use good/helpful examples
- ▶ Evaluation
  - ▶ How good is the described concept?
  - ▶ Critical discussion of the topic
- ▶ Conclusions and outlook

Media

- Slides
  - For use during the talk
  - Good to prepare
  - Backup slides as preparation for questions
- Whiteboard, blackboard
  - Permanently needed information
  - Answering questions
- Hardware, demonstrators, etc.
- Check possibilities in advance

Slides: Style

- ▶ Title page: Title, name, institution, date, location
- ▶ Show slide numbers
- ▶ One topic per slide
- ▶ Avoid text
  - ▶ ≤ 8 lines
- ▶ Prefer graphics/illustrations
  - ▶ You may copy figures from the paper
- ▶ No unused points
  - ▶ Cover everything on the slides in your talk

Slides: Colors

- ▶ Few colors
  - ▶ Use colors sparingly, but systematically
- ▶ Sufficient contrast
  - ▶ Dark on white
  - ▶ Be careful with gradients
- ▶ Use special effects **only** when necessary
  - ▶ No annoying backgrounds (wave textures, etc.)
  - ▶ Animations only with sufficiently added value

Before the Talk

- ▶ Prepare slides, etc.
- ▶ Do a dry-run
    - ▶ Always recommended
    - ▶ Helps with uncertainity and time estimation
- ▶ Prepare on-site
    - ▶ Laptop, projector, laser pointer, timer, etc.

Talking Style

- ▶ Speak freely
- ▶ Don't go too fast/slow
- ▶ Stay in contact with the audience
  - ▶ Eye contact, position, etc.
- ▶ Usually at least 1 minute per slide
- ▶ Stay in time limit
  - ▶ Optional slides can fill time
  - ▶ Regularly consult a watch
- ▶ Stay calm

Topics

Topics BA

- CPAChecker
- Symbiotic
- Frama-C WP
- Ultimate Automizer
- FB Infer
- CBMC and its descendants
- Predator

Topics MA

Starting from:

- ▶ Miné: Relational thread-modular static value analysis by abstract interpretation. VMCAI '14
- ▶ Farzan et al.: Stratified Commutativity in Verification Algorithms for Concurrent Programs. POPL '23
- ▶ He et al.: Satisfiability modulo ordering consistency theory for multi-threaded program verification. PLDI '21.
- ▶ Jeannet: Relational interprocedural verification of concurrent programs. Software & Systems Modeling '13
- ▶ Gotsman et al.: Thread-modular shape analysis. PLDI '07