CS 6156

Course Project Discussion

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Fall 2020

Advice precedence (previous lecture)

- Question: what is the resolution order if two pieces of advice apply to the same join point?

- Cases:
  1. The two pieces of advice are in different aspects
  2. The two pieces of advice are in the same aspect

https://www.eclipse.org/aspectj/doc/next/progguide/semantics-advice.html

Advice precedence – Case 1

- if `declare precedence : A B`, all advice in A have precedence over all advice in B
- else-if A is a subaspect of B, all advice in A have precedence over all advice in B
- else advice precedence is undefined ☹

Advice precedence – Case 2

- if A and B are `after` advice, then the one that appears later in the file has precedence

- else if A and B are `before` or `around` advice, then the one that appears earlier in the file has precedence

Advice precedence – Circularity!

```
aspect A {
      before(): execution(void main(String[] args)) {}
      after():  execution(void main(String[] args)) {}
      before(): execution(void main(String[] args)) {}
}
```

AspectJ Compiler: Advice precedence circularity error!

https://www.eclipse.org/aspectj/doc/next/progguide/semantics-advice.html

Hands-on demo of AspectJ

- In your JavaMOP Docker container

```
$ wget https://www.cs.cornell.edu/courses/cs6156/2020fa/resources/example-aspecj.tgz
$ tar xf example-aspecj.tgz
$ cd example-aspecj
$ # open README.txt
```

Course project – goals and teams

- Goal: gain deeper RV knowledge and expertise than we can cover in class + homework

- Side goals:
  - Help bootstrap your research (new PhD students)
  - Find intersections between your research and RV

- Work individually or in self-assigned pairs
  - Pairs will do roughly 2x more work than individuals
  - Pairs will get the same grade on all components
  - Pairs should be formed by project proposal deadline

Course project – timeline

Milestone	When
Discuss some concrete project topics in class	By 9/17
Meet Owolabi to discuss your project proposal*	Before 10/5
Project proposal is due (up to 1 page)	10/6
Meet Owolabi to discuss project progress*	Before 10/26
Project progress report 1 is due (up to 2 pages)	10/27
Meet Owolabi to discuss project progress*	Before 11/18
Project progress report is due (up to 2 pages)	11/19
Present final project in class	TBD
Final project report is due	12/17

* These meetings are mandatory

Some possible project directions

- Apply your research solve some problem in RV
  - Or apply RV to your own research
- Come up with an idea and explore it
  - Owolabi is happy to help!
- Reproduce and extend results from RV papers
- Extend RV tools, components, and systems
- Compare other RV models with the one in CS6156
- Survey the literature on some aspect(s) of RV
  - A good option for undergraduates or MEng students

RV in my (RV + testing) research

- Monitored the tests in 229 open source software
- RV found 219 bugs that testing missed
  - Many bugs have been confirmed
- But there are still many challenges
  - You'll discover some of them in this class
- Even without recovery, RV is very useful

Project considerations

- You will need to deliver something tangible at the end of the semester
  - Bad: my code/tool/benchmark did not compile/run
- Well-defined and doable scope
- If scope is too broad, find a part that you can do in CS 6156 and build on later

Project ideas

- Many great thoughts/ideas in reading-4 submissions
  - Owolabi will grade reading-4 by 9/22

- Help for those who are still searching for ideas?

How to find good (research) ideas?

- **Marinov's four methods:**
  - Talking
  - Reading
  - Hacking
  - Dreaming

Marinov's methods, the bad way

- **Talking**
  - "Hey, you are the prof – tell me a good idea."
- **Reading**
  - Find ideas by reading limitation sections of papers
- **Hacking**
  - Let me read all JavaMOP code before doing research
- **Dreaming**
  - Sleep → Apple → Gravity

Marinov's methods, the good way

- **Talking**
  - Articulate the problem you want to solve
    - Why it's important and why it hasn't been addressed?
  - Pitch your idea with concrete examples or data points
    - Why your idea can solve the problem in a better way?
- **Reading**
  - Good for finding inspiration but don't get stuck.
- **Hacking**
  - Look at the design and implementation of existing systems
  - Hack those systems only if a hack is needed
- **Dreaming**
  - What's your wish list?

An Important Principle

- **Understand the problem first!**
  - Innovation without understanding leads to failure
  - **Understanding itself could be a huge contribution**
  - Empirical studies and measurements are great ways to develop understanding
  - If you have a topic/direction/problem but don't have a crisp idea, (maybe) work on a study or a measurement.
    - Ask yourself questions – let your curiosity guide you.

Zoom break – 4 minutes

Mandatory meetings

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Mandatory meetings - goals

- Keep track of project progress
- Find and resolve problems early
- Avoid procrastination
- (Optional) Get Owolabi’s involvement

Mandatory meetings - modalities

- Sign-up (Google) sheets will be open after each project milestone
  - Experience with the reading assignment Google sheet?
- If none of the times work for you, email Owolabi with 3-4 suggested times + zoom link
- Pairs should meet Owolabi together
- Recommended: Meet Owolabi right after each milestone

Maximizing mandatory meetings

- Optional:
  - Send Owolabi the items that will be discussed (ideally no less than 24 hours) ahead of time

- Come to meetings prepared with demos, findings, etc.

Outside the mandatory meetings

- If you need to meet more, email Owolabi with 3-4 suggested times + zoom link
- No guarantees that Owolabi will be able to meet
- Such meetings should be short and focused on problems faced or new ideas discovered.

Project proposal principles

- The Heilmeier Catechism[1]
  - What are you trying to do? Articulate using absolutely no jargon.
  - How is it done today, and what are the limits of current practice?
  - What's new in your approach and why do you think it'll succeed?
  - Who cares? If you are successful, what difference will it make?
  - What are the risks?
  - How much will it cost?
  - How long will it take?
  - What are the mid-term and final "exams" to check for success?

[1]https://www.darpa.mil/work-with-us/heilmeier-catechism

Project proposal - deadline

- 10/6/2020 at 11:59pm AoE
- That's in 18 days – plan ahead!
- Only one page

Two project midterms

- Progress report 1: due 10/27/2020 at 11:59pm AoE
  - Three weeks after proposals are due
- Progress report 2: due 11/19/2020 at 11:59pm AoE
  - Three weeks after progress report 1
- Up to two pages:
  - What is working so far and how was it done?
  - What is not working and how it will be fixed?
  - What will be done before the next deadline?
- Reasonable course corrections are allowed

Final project presentation

- We will talk about modalities later
- Likely: multiple talks during a 75-mins lecture slot
- Slides will need to be sent ahead of your slot
  - See course web page for details

Questions about the project?

- Owolabi is always here to help
  - Office Hours
  - Appointment
  - Email

Student discussion leads

- Plan to speak for about 45 mins, 30 mins Q&A
  - ~45 slides
  - Questions during presentation are highly encouraged
- Many of the papers have slides that you may reuse
  - Ask Owolabi before you ask the authors
  - That's not an excuse to give a bad presentation
- Meet Owolabi a week ahead of your assigned day
  - Slides must be sent to Owolabi 48 hours before class
- Owolabi will send questions from other students to the discussion lead

On Griswold's great advice

- Please save a tree when you can
  - Fully electronic penmanship is possible these days
  - Does the department have free printing for students?

- There are also free electronic ways to keep track of papers you have read

On Shaw's paper

- Some of you are new to software engineering research
- ICSE is a top venue for publishing SE work
- The acceptance rates and number of submissions grew since Shaw's 2002 paper

Next week

- Begin a four-part series on monitor synthesis