SWE 265P
Reverse Engineering and Modeling

Lecture 1

Duplication of course material for any purpose without the explicit written permission of the professor is prohibited.
“One thing that was counterintuitive is that in my first ‘real’ software engineering jobs, I spent 80-90% of my coding time reading and 10% writing.” – Eric Dashofy [General Manager & Deputy CIO, The Aerospace Corporation]
Today

• Logistics
• Nature of the course
• Why reverse engineering
• Setting up your environment
• First homework
Logistics

- Professor: André van der Hoek (andre@uci.edu)
- TA: Kaj Dreef (kdreef@uci.edu)
Logistics

• Office hours
  – every Tuesday, 09:00-10:00
  – by appointment

• Open door policy
  – DBH 5038

• Slack
  – SWE-265P-W2020

• TA will have office hours every Wednesday, 10:00-11:00, and you can also reach him via e-mail
Goals

• For you to be able to effectively use a set of strategies and tools for understanding, working with, and changing large software

• For you to be able to effectively model different aspects of large software

• For you to initiate or expand your professional portfolio by making small contributions to a large open source software system
Secondary goal

• For you to be able to talk intelligently about this course and smartly draw upon its content when you interview
A note on the course title

- SWE 265P – Reading code
- SWE 265P – Software understanding
- SWE 265P – Program comprehension
- SWE 265P – Making sense of source code (at scale)
- SWE 265P – Software models, visualization, and change
- SWE 265P – ...
Place in the curriculum

• SWE 241P–248P
  – hands-on software development, focused topics
  – small programs

• SWE 264P
  – theory and practice of software architecture
  – large-scale software

• SWE 261P
  – theory and practice of software quality
  – large-scale software

• SWE 265P
  – theory and practice of reading code
  – large-scale software
Structure of the course

• Lecture

• Practice in class

• Learn from professionals

• Course project
  – five parts

• Midterm & final

• Diary
Grading

• Course project (50%)
  – each part 10%

• Diary (10%)

• Midterm (15%)

• Final (25%)

• *Up to two parts of the homework project can be resubmitted to improve your grade, each within five days of receiving the grade*
Basic tenor of the course

- Weeds
- Hands-on
  - bring laptop to class every lecture
- Trial and error
- No ‘reverse engineering recipe’
Basic tenor of the course

• Conversation
• Challenges
• Mistakes
• Tenacity
• Work
Working together, working alone

- All work on your project shall be performed with your team only

- The midterm and the final shall be performed by yourself only

- Failure to do so will be considered a violation of academic integrity
  - aisc.uci.edu
Questions?
My question #1

• What are some reasons that we need to read and comprehend source code?
Answer #1

- Learning to read before learning to write
- Understanding the functionality that the software has
  - what it already does
  - what it does not do
- Understanding how the code realizes its functionality before changing it
- Compensating for documentation that might not be accurate/up-to-date
- Reviewing code (pull requests) as part of organizational ethos
- Programming/debugging with a partner
Answer #1 (continued)

• Finding help on StackOverflow (or other fora) for a programming issue being faced

• Looking for how another software system might have solved a given programming problem
  – same programming language
  – other programming language

• Expanding repertoire of design/coding solutions for personal growth

• Assessing components, libraries, and services before adopting them (or not)

• Forgetting the exact details of and/or rationale for an old piece of code
My question #2

• What is the largest piece of software you have worked on?
  – what did it do?
  – what specific task or tasks did you work on?
My question #3

• Give examples of when it was easy to read, understand, and perhaps modify a piece code
  – why was it easy?
My question #4

• Give examples of when it was **difficult** to read, understand, and perhaps modify a piece code
  – why was it difficult?
Answer #3/#4: factors affecting program readability

• Reader characteristics

• Intrinsic factors

• Representational factors

• Typographic factors

• Environmental factors
Theory and practice

• Little theory exists on how to "best" read software

• Many tools exist, but each has its (significant) limitations
  – functionality
  – correctness
  – no rationale

• Much, ultimately, is rooted in practice and as a result of such practice building an understanding of one’s own patterns of what works and what does not work, when

• Work
  – practice
  – reflection
Setting up your environment

• Java

• Git
  – https://git-scm.com/downloads

• Subversion
  – https://www.collab.net/downloads/subversion
Setting up your environment (continued)

- IntelliJ IDEA
  - https://www.jetbrains.com/idea/

- Statistic plug-in
  - <ctrl-alt-s>
  - <plug-ins>
  - <marketplace>
  - <Statistic>
  - <install>
Setting up your environment (continued)

• Download, build, and run:
  https://github.com/githubtraining/hellogitworld.git

• Download, build, and run:
  svn://svn.code.sf.net/p/jedit/svn/jEdit/trunk/
Theory and practice

• Little theory exists on how to ”best” read software

• Numerous tools exist, but each has its (significant) limitations
  – functionality
  – correctness
  – intent

• Much, ultimately, is rooted in practice and as a result of such practice building an understanding of one’s own patterns of what works and what does not work, when

• Work
  – practice
  – reflection
Reflection

• Maintain an ongoing diary
  – date
  – time
  – participants (as applicable)
  – goal
  – accomplishments
  – insights
  – mood

• Submit regularly through GitHub pull requests
Setting up your environment (continued)

- Clone:
  https://github.com/swe-265P/W2020

- Inside the folder *diaries*, copy *diary-template.xlsx* to *diary-<yourname>.xlsx*

- Add today’s activity

- Submit pull request
Homework

• Make sure you are familiar with the basics of IntelliJ IDEA

• Download a few Java open source applications, of varying sizes, build them, and run them (minimum 3)

• By midnight of Wednesday, January 15, submit your updated diary as a pull request on GitHub
Homework (continued)

• Form a team of 3, which will be your team for the duration of the quarter
  – one team will be 4

• Create a team directory in swe-265P, add your names to the teams.xlsx spreadsheet, and submit a pull request
A final word

• SWE 265P is a unique course

• SWE 265P is experimental in nature

• SWE 265P will be what you make of it
  – in engaging with the materials
  – in providing feedback on course direction & content