CSCI426/CSCI926 Software Testing and Analysis

Subject Introduction

Lecture and Workshop/Lab

- Lecture (2 hours)
 - Monday 12:30 14:30
- Workshop (1 hour)
 - One hour (Tuesday)
 - Between Week 2 and Week 12.

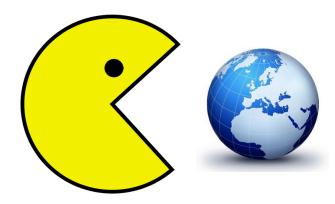
"Software eats the World"

"We are in the middle of a dramatic and broad technological and economic shift in which software companies are poised to take over large swathes of the economy"

(Marc Andreessen, "Why Software is Eating the World", The Wall Street Journal,

http://online.wsj.com/article/SB100014240531119034809 04576512250915629460.html)

More and more major businesses and industries are being run on software and delivered online services.



"Software eats the World" (cont.)

Good news for us

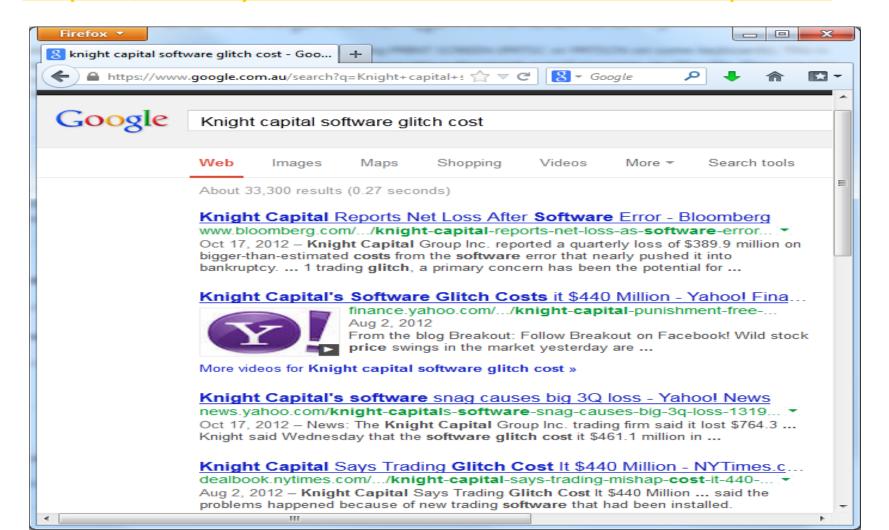


But "With great power there must also come great responsibility" ...



Low-quality software costs jobs ...

https://www.youtube.com/watch?v=7BKNnpJfWII



Low-quality software costs money ...

On the 4th June 1996 at 1233 GMT (UTC) the European Space Agency launched a new rocket, **Ariane 5**, on its maiden unmanned flight,

https://www.youtube.com/watch?v=kYUrqdUyEpI

"It took the European Space Agency **10 years** and **\$7 billion** to produce **Ariane 5**, a giant rocket capable of hurling a pair of three-ton satellites into orbit with each launch and intended to give Europe overwhelming supremacy in the commercial space business.

All it took to explode that rocket less than a minute into its maiden voyage last June, scattering fiery rubble across the mangrove swamps of French Guiana, was a **small computer program** trying to stuff a 64-bit number into a 16-bit space"

Source: http://www.around.com/ariane.html

Low-quality software costs lives

Q

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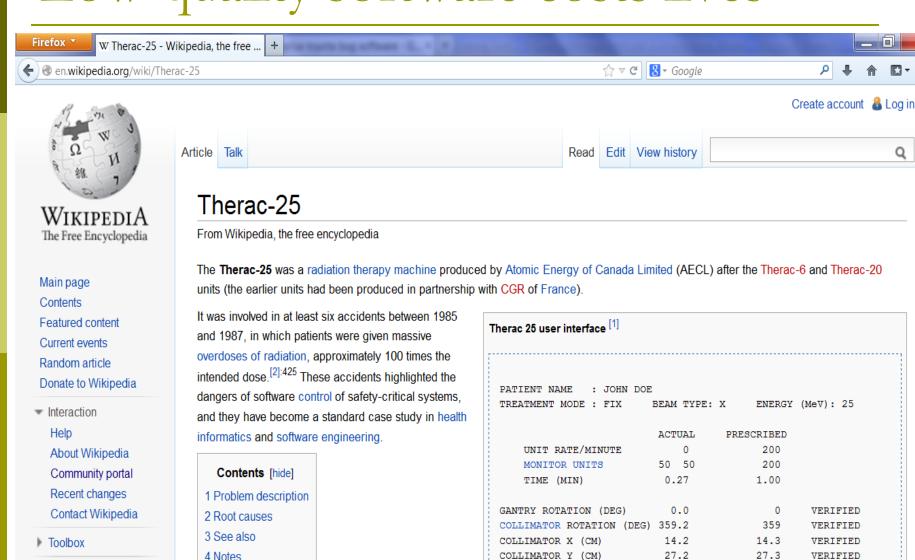
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WEDGE NUMBER

ACCESSORY NUMBER

Print/export

5 External links

Questions of the day



What do you think defining the quality of a software?

How do we deliver a high-quality software?

Subject objectives

- On successful completion of this subject, students will be able to:
 - Identify key qualities for different types of software applications.
 - Develop appropriate software testing and analysis strategies to verify key qualities of industrial software applications.
 - Explain the **principles** on which state-of-the-art software testing tools work.
 - Make effective use of existing tools for software testing and their application.
 - Discuss the major open problems in software testing and analysis.

Topics

- Software Test and Analysis in a Nutshell
- A Framework for Testing and Analysis
- Testing and Analysis Principles
- Finite Models and Data Flow Models
- Symbolic Execution
- Functional Testing
- Random Testing and Feedback-Based Testing
- Test Case Selection and Adequacy Criteria
- Structural Testing
- Combinatorial testing
- Advanced topics in software testing

Books

Textbook

 Mauro Pezzè and Michal Young, Software Testing and Analysis: Process, Principles, and Techniques, John Wiley & Sons, (2007 or later edition).

Reference books:

- Paul Ammann and Paul Ammann, Introduction to Software Testing, Cambridge University Press, (2008 or later edition).
- Andreas Zeller, Why Programs Fail: A Guide to Systematic Debugging, Morgan Kaufmann (2009 or later edition).

Resources

- Lectures
 - PDF files with slides from lectures
- Assignments
- Supplementary materials

One-stop shop: Moodle

Overall assessment

- Group project (40%)
 - Progress report Week 4 and Week 8 Workshop/Lab.
 - Final deliverables and project presentations Week 12.
 - Any necessary change will be informed by SOLS messages or on Moodle
- Examination (60%)
 - Technical Fail
 - To be eligible for a Pass in this subject a student must achieve a mark of at least 40% in the Final Examination.
 - Students who fail to achieve this minimum mark & would have otherwise passed may be given a TF (Technical Fail) for this subject.

The group project

- □ Group size: ~6 people
- Formation of groups is your responsibility.
- You will have to form a group ASAP, and submit details of group membership by the end of Week 2.
 - Go to the Moodle site of the subject and you will see a link for group registration.
 - Only 1 registration per group.
 - Registration will be closed by the end of Week 2.
- A forum has been created on Moodle which you can use to find other students to form a group for the project

Q & A

- Q: Can we obtain a HD in this subject?
 - A: "Yes, we can!"
- Q: Great! Sounds easy but how?
 - A: Sure, you need to do exercises in the Lab, work hard on the project and do well in the exam.
- Q: Of course, but still how?
 - A: Yes, you need to attend the lectures <u>regularly</u> (very important in this subject), read reference texts, and read Lecture slides.
 - You should also do Lab exercises
- Q: Hmmm, it's not that easy but it's ok, I can do it in just only 1 week before the exam, huh?
 - A: No, you have to do it every week.
- Q: Oh no, it's so difficult ⊗. I don't want a HD anymore, I just want a P. So less work?
 - A: Yes, but you still have to do the same things.