CLEMSON UNIVERSITY

CPSC 2910
Lesson 13

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Class Update

- 3 more classes including today
- Review quiz before Dec 4 (open-book)
- Grades remaining – Ch. homework, Interview Project, Review Quiz
- Final Exam will be optional for everyone
  - I will provide your class grade by Dec 4 for you to make this decision.
  - If you want to opt out of the exam, I will need an email from you.

Errors, Failures, & Risks
Professional Ethics

- Failures and Errors in Computer Systems
- Increasing Reliability and Safety
- What Are “Professional Ethics”?
- Ethical Guidelines for Computer Professionals

Failures and Errors in Computer Systems

- Most computer applications are so complex it is virtually impossible to produce software with no errors
- The cause of failure is often more than one factor
- Computer professionals must study failures to learn how to avoid them as well as to understand the impacts of poor work

Voting System Failures

- Technical failures
- Programmers or hackers rigging software to produce inaccurate results.
- Vulnerability to viruses
- Examples of flaws (**not 2020!**):
  - Machines in North Carolina failed to count more than 400 votes because of a technical problem.
  - One county lost more than 4000 votes because the machine's memory was full.
  - A programming error generated 100,000 extra votes in one Texas county.
  - A programming error caused some candidates to receive votes actually cast for other candidates.

Healthcare.gov

- Only 7 months of development for large complex system
- Many different contracting companies that needed to work together
- Limited testing
- Abysmal launch (6 out of 4.7 million could successfully register on Day 1)
- It took another 2 months to make the website usable

Heathcare.gov

Discussion

Some critics of the HealthCare.gov website development project make comparisons with Facebook with respect to number of users, cost of development, complexity, ease of access, and so on. Discuss such comparisons and reasons for the differences.

What Goes Wrong?

What are some of the reasons we have so many system failures?

Poor testing
Rushing to production (not enough time)
Unpredictability of users
Overloaded (scale)
Not understanding the requirements

What Goes Wrong

- Lack of clear, well-thought-out goals and specifications
- Poor management and poor communication among customers, designers, programmers, etc.
- Institutional and political pressures that encourage unrealistically low bids, low budget requests, and underestimates of time requirements
- Use of very new technology, with unknown reliability and problems
- Refusal to recognize or admit a project is in trouble
- Legacy systems that few understand
- Insufficient testing
- User Errors – bad UI and/or lack of training

Increasing Reliability and Safety

- Importance of good software engineering and professional responsibility
- User interfaces and human factors
- Redundancy and self-checking
- Testing
- Include real world testing with real users

Discussion

Suppose you are responsible for the design and development of a computer system to control an amusement park ride. Sensors in the seats will determine which seats are occupied, so the software can consider weight and balance. The system will control the speed and duration of the ride. The amusement park wants a system where, once the ride starts, a person is not needed to operate it.

What are some important things that you can or should do to ensure the safety of the system? Consider all aspects of development, technical issues, operating instructions, and so on.

What is "Professional Ethics"?

- Professional ethics includes relationships with and responsibilities toward customers, clients, coworkers, employees, employers, others who use one's products and services, and others whom they affect
- A professional has a responsibility to act ethically. Many professions have a code of ethics that professionals are expected to abide by
  - Medical doctors
  - Lawyers and judges
  - Accountants

Ethical Guidelines for Computer Professionals

- Understand what success means
- Include users in the design and testing stages to provide safe and useful systems
- Do a thorough, careful job when planning and scheduling a project and when writing bids or contracts
- Don’t assume existing software is safe or correct; review and test it
- Be open and honest about capabilities, safety, and limitations of software
- Require a convincing case for safety
- Pay attention to defaults
- Develop communication skills

Discussion Topic 1

Which do you think is less risky: developing fair software for sentencing criminals or developing safe software for self-driving cars? Which would you be more comfortable working on? Why?

Discussion Topic 2

It is early December. You are the manager of the IT department of a large retail chain, and you are ready to switch all the stores in the chain to a new system for processing customer credit card payments. The new system should be quicker and more secure. Give reasons for and against installing it now rather than waiting until after the holiday season.

Discussion Topic 3

You are a high-level manager at an automobile company. You must decide whether to approve a proposed project to add a screen on which the front-seat passenger will have full Internet access. The driver would not be able to see the screen easily or well from the driver's seat. What are the issues? Make a decision and explain it.