

CS 6704 Software Engineering Research

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Overview

- A bit about me
- A bit about you
- Course goals
- Organization

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About Me

- PhD in Computer Science from The University of Texas at Austin, 2014
- Post doc in the same department for seven months
- Assistant Professor in Computer Science of Virginia Tech since August, 2015

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Research Interests

- Software Engineering
 - Empirical study
 - To understand how developers maintain software and make code changes
 - Design and implementation of new techniques
 - To assist developers maintain software by finding bugs, diagnosing root causes, and suggesting code changes

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About You

- Your name?
- Masters or PhD?
- Research interest?
- Your advisor?
- Why are you in graduate school?

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Course Goals

- Intellectual development
 - Good understanding of problems and techniques in Software Engineering
 - Knowledge of advanced tools which can assist software development
- Practical development
 - Improve implementation and writing
 - Produce interesting research outcome

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Course Organization

- Introduction of Software Engineering (3 weeks)
 - software process, requirements analysis, testing, etc.
- Introduction of research topics in SE
 - empirical study, program differencing, fault localization
- Investigation of new research ideas

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Course Websites

- Course syllabus and schedule
 - <http://courses.cs.vt.edu/cs6704/spring19/>
- Grades
 - <https://canvas.vt.edu/courses/85071>

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Class Discussion

- Ask clarifying questions or challenging questions
- Answer other people's question based on your paper comprehension and research experience
- Deep and hard questions are highly encouraged!

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Introduction to Software Engineering

Overview

- Software in our life
- What is **software engineering**?

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Software is ubiquitous

- System software
 - OS, compilers, device drivers
- Business software
 - Payroll, accounting
- Engineering/scientific software
 - Computer-aided design, simulation
- Embedded software
 - GPS navigation, Flight control, Toaster

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Software is ubiquitous

- Product-line software (PC-like based)
 - Spreadsheets, word processing, games
- Web-based software
 - Gmail, Facebook, Youtube
- Artificial intelligence software
 - Robotics, artificial neural networks, theorem proving

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What is Software?

- Definition [Pressman]
 - The product that software professionals build and then support over the long term
- Software encompasses:
 - Executable programs
 - Data associated with these programs
 - Documents: user requirements, design documents, user/programmer guides

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Software Crisis?

- Projects running over-budget
- Projects running over-time
- Software was very inefficient
- Software was of low quality
- Software often did not meet requirements
- Projects were unmanageable and code difficult to maintain
- Software was never delivered

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What is software engineering?

Pressman's book

A discipline that encompasses

- process of software development
- methods for software analysis, design, construction, testing, and maintenance
- tools that support the process and the methods

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Process, Methods, Tools

- Various tasks required to build and maintain software
 - e.g. design, testing, etc.
- SE process: the organization and management of these tasks
 - various process models
- SE methods: ways to perform the tasks
- SE tools: assist to perform the tasks
 - UML tools, IDEs, issue tracking tools

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