JMU Masters in Secure Software Engineering

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Outline

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- Projects
- Initial Course’s Syllabus and Readings
- Conclusion

Introduction

- In 2003, Computer Science Department at James Madison University decided to offer a Masters degree in Secure Software Engineering
  - Motivated by faculty interests and desire to increase enrollment
- Started Fall 2004
- Courses: Four software engineering (1 + 3), Introduction to security, Network security, traditional CS courses, electives, and optional thesis
- Third group of students graduating this Spring

Start Up

- At start, faculty expertise in information security and software engineering
  - But I was only one with interests spanning software engineering and security
- In summer 2005, taught faculty seminar to six software engineering faculty
- By third year software engineering courses integrated security throughout

Some Development Projects Used

- Initial Course
  - System to supply parents photos of current, ongoing activity in their children's' daycare center over the Web
  - Secure single person, single machine file system
  - Game that avoids the problems described in *Exploiting Online Games* by Greg Hoglund and Gary McGraw
- The three semester sequence's projects include ones to produce
  - Secure on-site storage
  - Secure distributed Internet messaging (IM) for the financial community
  - Secure off-site storage service
- Notable features involved include
  - Allowing of students to assume the secure operation of the operating system and its associated file system except for published vulnerabilities
  - Use of assurance case

Syllabus for Initial Course

1. Introduction to Course, Software Engineering, Quality, Security
2. Software Systems Engineering
3. Dependability, Security, Assurance and Assurance Case
4. Security Principles, Critical Systems, Management Roles, Project Problem
5. Projects and processes
6. Requirements, Introduction to Security Functionality
7. Project Management
8. Introduction to Formal Methods
9. Configuration Management
10. Architecture
11. Architecture, Planning
12. Design, Team building
13. Assurance Case, Software Quality Assurance,
14. Secure Software Assurance revisited, Software Construction
15. Software Construction
16. Project Assurance Cases: Presentations and Discussion
17. Static Analysis, Inspections, Inspection Exercise; Due at end of class: Inspection report
18. Student Status Presentations
19. Testing
20. VV& E
21. Tools
22. Z
23. Evolution, Reuse
24. Assurance Case, Using Cryptography
25. Other Development Approaches , Professionalism, How to become world class
26. Party, Demo, Lessons Learned

Readings for Initial Course

- *Software Assurance*, Samuel T. Redwine, Jr. (Editor), US DHS
- Excerpts from
  - *High-Assurance Design*, Clifford Berg, Addison Wesley, 2006
  - *Building a Secure Computer System*, Morrie Gasser, Van Nostrand Reinhold, 1988
  - *Software Engineering,8th Edition,* Ian Summerville, Addison Wesley, 2006
  - *Towards an Organization for Software System Security Principles and Guidelines*, Sam Redwine, JMU IIIA Pub. 0801, 2008
- And ~15 articles or chapters plus few more optional
- Websites: CWE, CAPEC, SAMATE, & SUN Java

Conclusion

- Critical
  - Faculty interest, willingness, and time to learn and change courses
  - Training software faculty in security
- Integrate security throughout software engineering
- Always a limit to amount can cover even in 6 semesters

- Please put on calendars:

  International Symposium on Engineering Secure Software and Systems, February 04-06, 2009, in Leuven, Belgium