CSE 484 / CSE M 584: Computer Security and Privacy

Autumn 2019

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What’s Wrong With This Picture?
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Course Staff

• Instructor:
  – Tadayoshi Kohno (Yoshi)

• TAs:
  – Isaac Ahn
  – David Chen
  – Chris Gao
  – Melissa Hovik
  – Stephen Jonany
  – Jack Xu
Communication

• yoshi@cs.washington.edu
  – Use this if something is sensitive, confidential, etc.
  – Please put “484” in subject line, and follow up if I don’t reply

• cse484-tas@cs.washington.edu
  – Use this to reach all course staff

• Google Group
  – Use this if other students in the class would benefit from your question/answers

• We will do our best to be responsive, but please be professional, and plan ahead!
Quiz Sections and Office Hours

• Quiz sections on Thursdays:
  – 1:30-2:20pm, CSE2 G10
  – 2:30-3:20pm, CSE2 G10
  – 3:30-4:20pm, CSE2 G10

• Office hours
  – To be announced later this week
Prerequisites (CSE 484)

• Required: Data Abstractions (CSE 332)
• Required: Hardware/Software Interface (CSE 351)
• Assume: Working knowledge of C and assembly
  – One of the labs will involve writing buffer overflow attacks in C
  – You must have detailed understanding of x86 architecture, stack layout, calling conventions, etc.
• Assume: Working knowledge of software engineering tools for Unix environments (gdb, etc)
• Assume: Working knowledge of Java and JavaScript
• Assume: Ability to learn new programming languages easily
Prerequisites (CSE 484)

• Recommended: Computer Networks; Operating Systems
  – Will help provide deeper understanding of security mechanisms and where they fit in the big picture

• Recommended: Complexity Theory; Discrete Math; Algorithms
  – Will help with the more theoretical aspects of this course.
Prerequisites (CSE 484)

• Most of all: **Eagerness to learn!**
  – This is a 400 level course.
  – We expect you to push yourself to learn as much as possible.
  – We expect you to be a strong, independent learner capable of learning new concepts from the lectures, the readings, and on your own.
Course Logistics (CSE 484)

• Lectures:  MWF: 10:30-11:20am
  Sections:  Thurs: 1:30-2:20pm, 2:30-3:20pm, 3:30-4:20pm
• Security is a contact sport!
• Labs (45% of the grade)
  – Hands-on experience with security issues
  – Can generally be done in teams of 3 students
    (see specific lab descriptions for details)
• Homework (25% of grade)
• Participation and in-class activities (10% of the grade)
• Final project (20% of the grade)
Course Logistics (CSE M 584)

• Same as before, but…
• Labs (42% of the grade) [-3%]
• Homework (22% of grade) [-3%]
• Research readings (10%) [+10%]
• Participation and in-class activities (10%)
• Final (16% of the grade) [-4%]
Labs

• General plan:
  – 3 labs (likely, possibly 2, definitely not 4)
    • First lab out soon, likely next week
  – Submit to Canvas
  – Groups of up to three generally allowed (check each project page for details)
Labs

• First lab: Software security
  – Buffer overflow attacks, double-free exploits, format string exploits, ...

• Second lab: Web security
  – XSS attacks, SQL injection, ...

• Third lab: Smart homes
Homework

• 2 or 3 homeworks distributed across quarter
  – First homework out now (due April 12)

• Do now (no later than October 2): sign ethics form!
Final Project

• No midterm or final exam!
• Instead: **12-15 min video** about a security/privacy topic of your choice
  – Groups of up to 3 people
  – Security is a broad field, and this class can’t remotely cover everything – **this is your chance to explore a security or privacy topic in more detail!**
  – Multiple checkpoint deadlines throughout quarter
• Details on website soon (will be linked from assignment page)
Participation

• In-class activities (like the one from today!)
  – You’ll have 5 free in-class days (for travel, etc)

• We also encourage contributions to the discussion forum (e.g., questions, general discussion)

• In class: Class too large to make grading upon participation fair, but you are still encouraged to speak up in class, ask questions, etc

• Discussion section: More opportunities for discussion
Ethics

• To learn to defend systems, you will learn to attack them. You must use this knowledge ethically.

• In order to get a non-zero grade in this course, you must electronically sign the “Security and Privacy Code of Ethics” form by 11:59pm on Wed, October 2.
Late Submission Policy

• 3 free late days, no questions asked
  – Cumulative, throughout the quarter
  – Use however you wish (all at once, 3x1, ...)

• After that, late assignments will be dropped 20% per calendar day.
  – Late days will be rounded up
  – So an assignment turned in 26 hours late will be downgraded 40%
  – See website for exceptions -- some assignments must be turned in on time
Course Materials

• Textbook (suggested):
  – Additional materials linked to from course website

• Attend lectures
  – Lectures will not follow the textbook and will cover a significant amount of material that is not in the textbook
  – Lectures will focus on “big-picture” principles and ideas

• Attend sections
  – Details not covered in lecture, especially about homeworks and labs
  – More opportunity for discussion
Other Helpful Books (Online)

  - Focuses on design principles for secure systems
  - Wide range of entertaining examples: banking, nuclear command and control, burglar alarms
- Menezes, van Oorschot, and Vanstone, “Handbook of Applied Cryptography”
- Many many other useful books exist, not all online
Other Books, Movies, ...

• Pleasure books include:
  – Little Brother by Cory Doctorow
    • Available online here http://craphound.com/littlebrother/download/
  – Cryptonomicon and REAMDE by Neal Stephenson
  – The Art of Intrusion and The Art of Deception by Kevin Mitnick
  – Many more -- please feel free to post your favorites in the Google Group!

• Movies include:
  – Hackers
  – Sneakers
  – Die Hard 4
  – WarGames
  – Many more -- please feel free to post your favorites in the Google Group!

• Historical texts include:
  – The Codebreakers by David Kahn
  – The Code Book by Simon Singh
Guest Lectures

• We will have a few guest lectures throughout the quarter
  – Useful to give you a different perspective: research, industry, government, legal
Mailing List

multi_csem584a_au19@uw.edu

• Make sure you’re on the mailing list
  – We’ll send a test mail after class; everyone enrolled should receive it

• URL for mailing list on course website

• We will use the mailing list for announcements; please use the Google Group for discussions
Google Group

• We’ve set up a Google Group for this course, to discuss assignments:
  – https://groups.google.com/a/cs.washington.edu/forum/#/forum/csep546-19au-discussion
  – Find link off “Administrivia” tab on course page
• Please use it to discuss the homework assignments and labs and other general class materials
• You can also use it to exercise the “security mindset”
  – Discussions of how movies get security right or wrong
  – Discussions of news articles about security (or not about security, but that miss important security-related things)
  – Discussions about security flaws you observe in the real world
  – …
What Does “Security” Mean to You?

• See worksheet, Q1 + Q2
• (Feel free to answer Q4 + Q5 now or later)
How Systems Fail

Systems may fail for many reasons, including:

• **Reliability** deals with accidental failures
• **Usability** deals with problems arising from operating mistakes made by users
• **Security** deals with **intentional** failures created by **intelligent** parties
  – Security is about computing in the presence of an adversary
  – But security, reliability, and usability are all related
Challenges: What is “Security”?

- What does security mean?
  - Often the hardest part of building a secure system is figuring out what security means
  - What are the assets to protect?
  - What are the threats to those assets?
  - Who are the adversaries, and what are their resources?
  - What is the security policy or goals?

- Perfect security does not exist!
  - Security is not a binary property
  - Security is about risk management

Current events, security reviews, and other discussions are designed to exercise our thinking about these issues.
To Do

• Ethics form (due Wed October 2)
• Homework #1 (due Fri October 4)
  – Now: Start forming groups (e.g., use discussion board) and thinking about events and technologies you’d like to review.

Questions?

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