Hardware Security Extensions

Bachelor/Master Seminar WiSe 2021/2022

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Fraunhofer AISEC

Introduction & Motivation

Who are we?

- Vincent Ahlrichs, Konrad Hohentanner
- Secure Operating Systems at Fraunhofer AISEC (Applied and Integrated Security)
- → Research and Integration in Industrial Applications
- Current focus on Fuzzing and Memory Safety

AISEC Building at Lichtenbergstraße 11, Garching

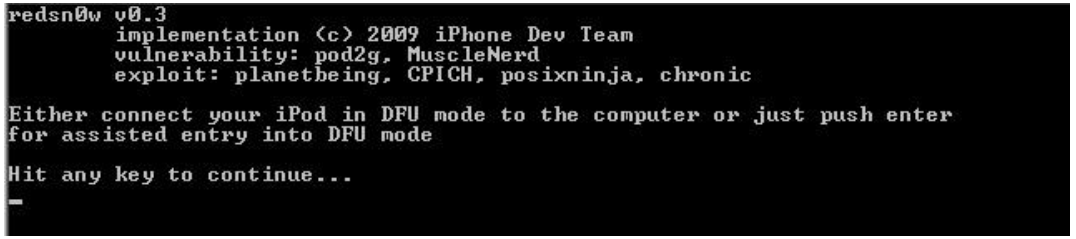
Our Goals for this Seminar

- Get to know students interested in IT Security
- Learn from your great papers and presentations

Hardware Security Extensions – Short Overview

Secure Hardware for CPUs

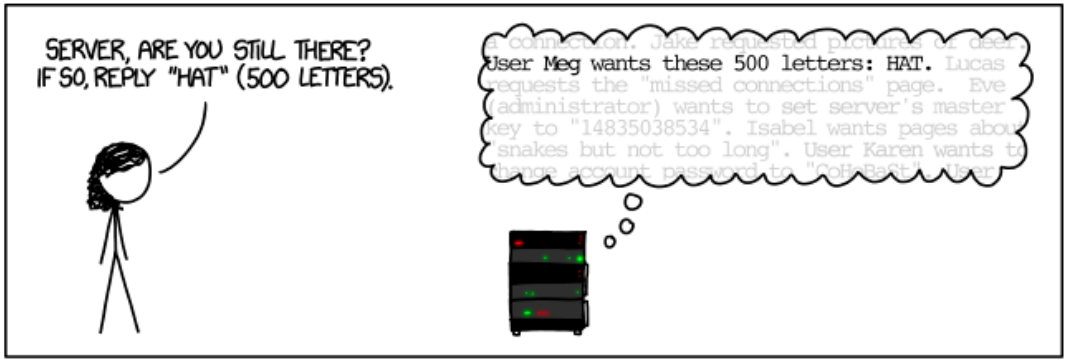
- Isolated and protected regions
- Verify integrity of running system/kernel from the beginning
- Secure Storage / Execution for high profile data (keys, boot measurements)



Jailbreak, https://de.wikipedia.org/wiki/Jailbreak_(iOS)

Memory Safe Runtime Environments

- Prevent bugs from creating vulnerabilities
- Allow integrated permission checks



Heartbleed, https://xkcd.com/1354/

Topic Suggestions

- CHERI architecture
- Memory Tagging
- Pointer Authentication Frameworks
- AMD SEV
- ARM TrustZone
- Intel Total Memory Encryption
- RISC-V Keystone
- History and Development of TPM
- ARM Security Hypervisor
- ARM v9 CCA

- Students are welcome to suggest own topics

- Get some information about the topics and see if they interest you! (Good starting points are conference presentations on youtube/etc, or

Prerequisites

- IN0009 Grundlagen: Betriebssysteme und Systemsoftware
- IN0004 Einführung in die Rechnerarchitektur
- preferable: IN2209 IT Sicherheit

Objectives

- Understanding of Hardware Security Extensions and attack vectors
- Preparing and writing a scientific paper in LaTeX (english, 10 pages IEEE)
- Presenting a scientific topic (german/english) 25-30 minutes + 15 minutes discussion
- Active participation

Grading

- Scientific Report: 50% (Content, Style, Effort, Grasp)
- Presentation: 30% (Content, Lecture Style, Understandability)
- Discussion: 10% (Participation)
- Peer Review: 10 % (2 Reviews à 1 page)

Registration

- Register in the Matching system on time
- Letter of motivation:
  - Your top 4 choice of topics
  - Why do you want to take this seminar?
  - Why do you chose a specific topic?
- Topic assignments base on choice & letter of motivation

Time Table

08.07.2021	Preliminary Meeting (today)
20.07.2021	Deadline for Registration
02.09.2021	Kickoff Meeting with Topic Distribution
25.10.2021	Deadline for Deregistration (afterwards 5.0 grade)
07.11.2021 23:59 h	Deadline Structure/Table of Contents
10.11. – 24.11.2021	Feedback Meetings for Structure
20.12.2021 23:59 h	Deadline Submission Review Paper
09.01.2022 23:59 h	Deadline Peer Reviews
12.01.2022	Feedback Review
30.01.2022 23:59 h	Camera-ready Version
06.02.2022 23:59 h	Slides
14.02. – 18.02.2022 (tentative)	Presentation meetings[1]

All deadlines are hard deadlines

[1] Presentation meetings will be held at Fraunhofer AISEC, if possible. Attendance required!

Contact Information

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