Hardware Security Extensions

Bachelor/Master Seminar WiSe 2021/2022
Konrad Hohentanner and Vincent Ahlrichs
July 8, 2021
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

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)

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
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<tbody>
<tr>
<td>08.07.2021</td>
<td>Preliminary Meeting (today)</td>
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<tr>
<td>20.07.2021</td>
<td>Deadline for Registration</td>
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<tr>
<td>02.09.2021</td>
<td>Kickoff Meeting with Topic Distribution</td>
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<tr>
<td>25.10.2021</td>
<td>Deadline for Deregistration (afterwards 5.0 grade)</td>
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<tr>
<td>07.11.2021 23:59 h</td>
<td>Deadline Structure/Table of Contents</td>
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<tr>
<td>10.11. – 24.11.2021</td>
<td>Feedback Meetings for Structure</td>
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<tr>
<td>09.01.2022 23:59 h</td>
<td>Deadline Peer Reviews</td>
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<tr>
<td>12.01.2022</td>
<td>Feedback Review</td>
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<tr>
<td>30.01.2022 23:59 h</td>
<td>Camera-ready Version</td>
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<tr>
<td>06.02.2022 23:59 h</td>
<td>Slides</td>
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<tr>
<td>14.02. – 18.02.2022 (tentative)</td>
<td>Presentation meetings¹</td>
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</tbody>
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**All deadlines are hard deadlines**

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

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