Secure Software Development – SSD

Tutorial - Tools 1

Andreas Kogler, David Schrammel

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Winter 2022/23, www.iaik.tugraz.at/ssd

Agenda

- BUGs
- Compilers
- Fuzzing
- Assembly Tools
- Q & A
- https://extgit.iaik.tugraz.at/sase/practicals/2022/exercise2022-demos

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BUGs We Will See Today

- Race Conditions (SLP/OS)
  - Threads **modify** shared variable
- Buffer Overflows (INFOSEC)
  - Fill array with to many elements
  - C-strings are terminated with **0**
- Integer Overflows (INFOSEC)
  - Unsigned integers *wrap* arround
  - For n bit addition: $c = (a + b) \bmod 2^n$
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Compilers

- How to enable warnings:
  - `-Wall`
  - `-Wextra`
  - `-Wpedantic`
  - `-Weverything` (`clang` only)
- `-Wno-***`
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Demo - Sanitizers

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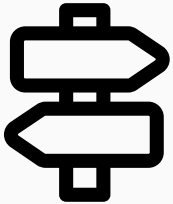

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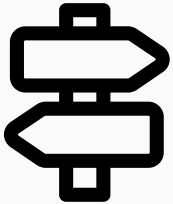

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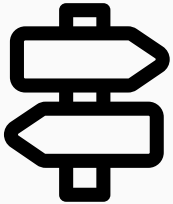

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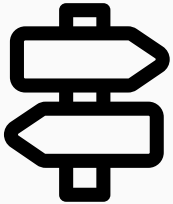

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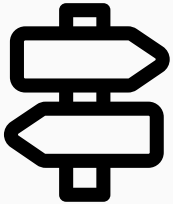

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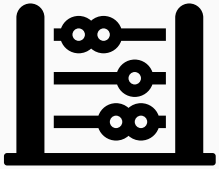

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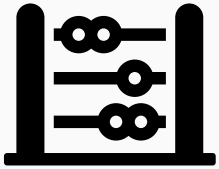

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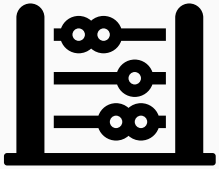

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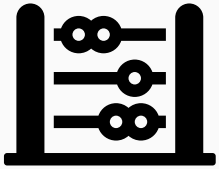

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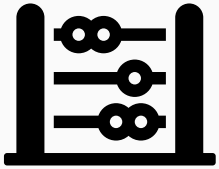

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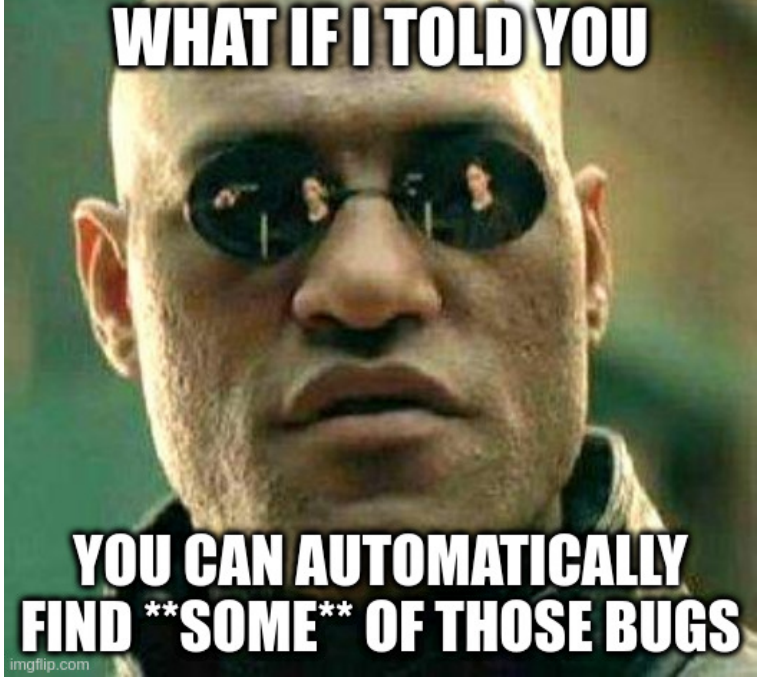
WHAT IF I TOLD YOU
YOU CAN AUTOMATICALLY FIND **SOME** OF THOSE BUGS
imgflip.com

Fuzzing

- American Fuzzy Lop (AFL/AFL++)
- Run a program with *pseudo* random input
- Check if the program crashed
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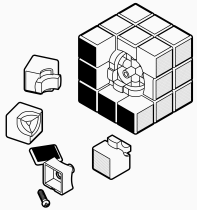
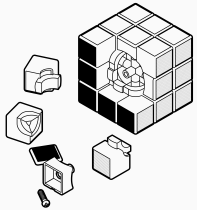
Assembly Tools



- What if the source code is **unavailable**
- Disassembler (e.g., Radare2, Ghidra, IDA)
- Decompilers (e.g., Ghidra, IDA)
- My personal daily driver: Cutter



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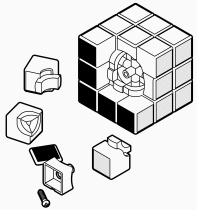

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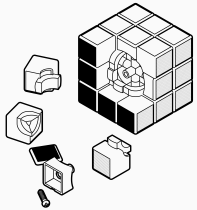

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