Binary Exploitation I — Summer 2018
Practical Course

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Exploiting buggy C programs on modern x86_64 Linux systems.
What is this?

Exploiting buggy C programs\(^1\) on modern x86\_64 Linux systems.

\(^1\)Disclaimer: There might be a little C++ as well...
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Exploiting buggy C programs\textsuperscript{1} on modern x86\textsubscript{64}\textsuperscript{2} Linux systems.

\textsuperscript{1}Disclaimer: There might be a little C++ as well...
\textsuperscript{2}Disclaimer: There might be a little 32-bit x86 as well...
What is this?

Exploiting buggy C programs\(^1\) on modern x86\(_{-}64\)^2 Linux\(^3\) systems.

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\(^1\)Disclaimer: There might be a little C++ as well...
\(^2\)Disclaimer: There might be a little 32-bit x86 as well...
\(^3\)Just kidding — no Windows (yet). We kindly refer you to abx.😊
You should...

- understand how computers work
- know the basics of the Intel x86 assembly language
- have a reasonable grasp of the C programming language

...but most importantly:
You should...

▶ ...understand how computers work
▶ ...know the basics of the Intel x86 assembly language
▶ ...have a reasonable grasp of the C programming language

...but most importantly:
▶ ...enjoy banging your head against tough challenges
Process

Phase I (∼ 10 weeks):
- “Usual” practical course (weekly meetings and assignments)

Phase II (∼ 4 weeks):
- Final project (vulnerable program, exploit and presentation)
### Scores

|   | Team         | x1 | x2 | x3 | x4 | x5 | s0 | s1 | s2 | s3 | s4 | s5 | s6 | s7 | s8 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | Σ  |
|---|--------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|    |    |
| 1 | team203      |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 93 |
| 2 | team202      |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 83 |
| 3 | PwnRM        |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 73 |
| 4 | /sayget_flag |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 63 |
| 5 | -_-           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 55 |
| 6 | team207      |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 49 |
| 7 | 138701N1D45  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 12 |
| 8 | hunter2      |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 11 |
| 9 | XORX35       |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  3 |

### Graphs

[Graph image]

The graphs visually represent the position changes over time, with each line indicating the performance of a team across the specified time periods. The x-axis represents time intervals, and the y-axis shows the position in the ranking.
Process — Phase I

- Teams of two
- Every week: Introduction to a new topic
  - Submission of solutions before the following week's meeting
  - Private explanation of the solution during that meeting
Process — Phase II

Final project

▶ Development of a **vulnerable application**
▶ Creation of an **exploit** (ab)using the vulnerability/ies
▶ **Presentation**
▶ **Hack the other teams’ applications 😊**
▶ Details follow when the time has come
Contents

- Analysis and debugging tools
- Hijacking the control flow
- Shellcode
- Format string vulnerabilities
- Stack- and heap-based buffer overflows
- Exploiting heap management logic
- Bypassing protection mechanisms
Don’t say we didn’t warn you

- Assume up to **30h of workload per week**
- (But: You reach **state-of-the-art uber 1337 h4x0r skillz** knowledge about binary exploitation techniques on Linux systems)
Time and place

When?  Wednesday, 14:00
Where? 01.05.013
Registration

- Solve our qualification challenge!
- Available at: 172.104.146.103:1337
- Description and registration https://kirschju.re/bx18s
- **Deadline**: 2018-02-14 (00:00 am)
- Details: See the course web page after the premeeting
- Registration using the **matching system** (formally required)
- $2^4$ slots
Contact us at {kirschju,jonischk}@sec.in.tum.de

PGP fingerprints:

• F949 CFBF 140A 6DD0 71E9 0B8C DC24 396B 6D45 1038
• A903 76D1 65F3 25F9 8594 280A 2BA0 1592 EFAC B551
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Questions?