HOT FUZZING WITH ZZUF

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OVERVIEW

- What’s fuzzing?
- Zzuf introduction
- Getting started
- Our way to a few 0-days
- What next?

What's fuzzing?

- Feed a program with random data
  - White noise
  - Slightly modified input
  - Content-aware fuzzing
- Increasing use nowadays
  - Test suites
  - Attack tools

WHAT TO FUZZ?

- Complex data formats
  - Images, sound, videos…
  - Executables, bytecode
- Protocols
  - Network protocols
  - Databases
- Any user-provided data

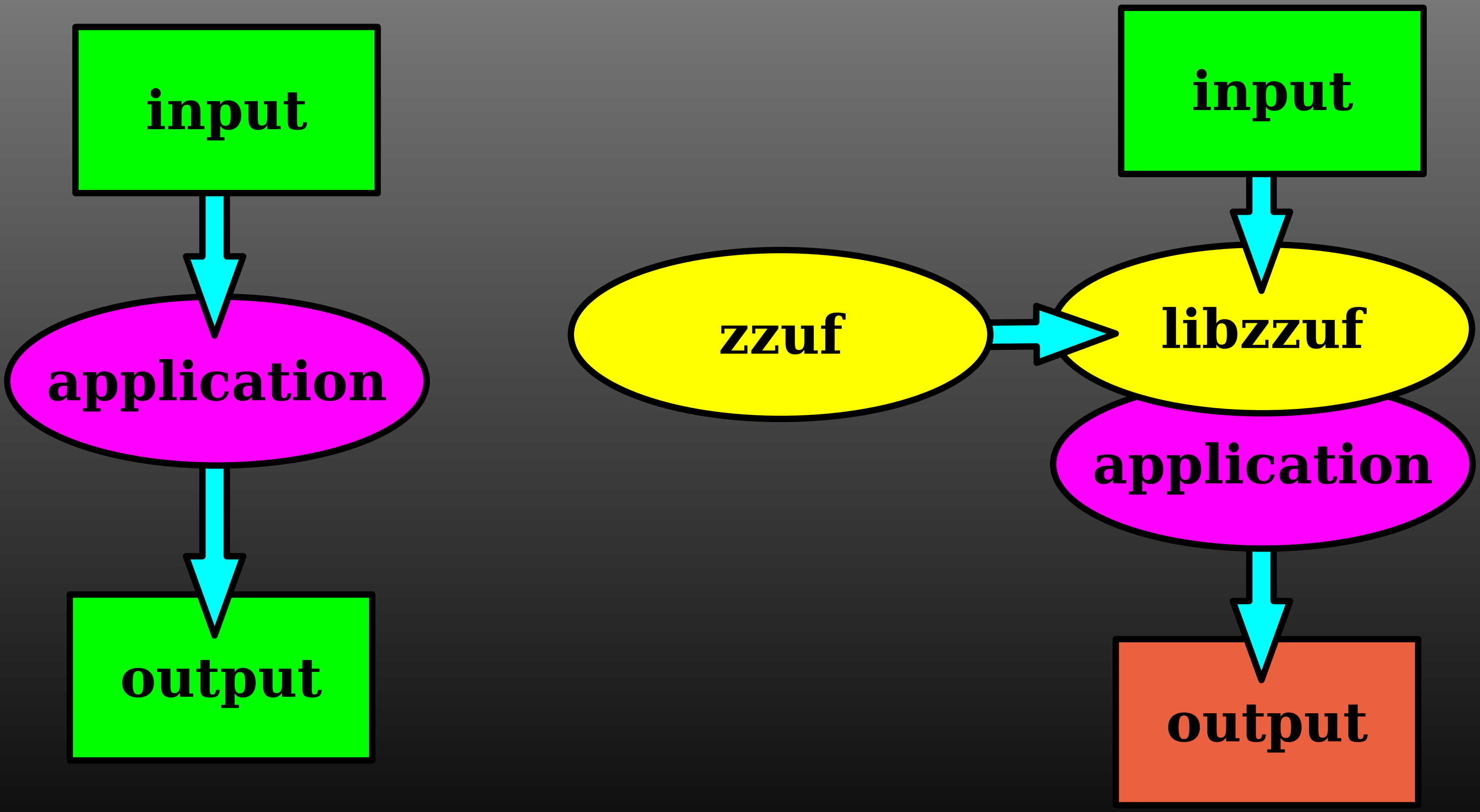
FUZZING RESULTS

- Bugs
  - Exploitable bugs: good old buffer overflows
  - DoS: crashes, memory exhaustion, CPU bombs, deadlocks, data corruption...
- Without even reading the code!

ZZUF INTRODUCTION

- All-in-one fuzzing tool
  - Easy to use
  - Reproducible behaviour
  - Fuzzes everything on the fly
- Simple
  - No configuration file
  - No context-aware fuzzing

zzuf architecture



zzuf internals

- **Controlling `zzuf` binary**
  - **forks tested program**
  - **checks `stdout`, exit value, signals...**
- **`LD_PRELOAD` mechanism**
  - **intercepts file reading functions**
    - `open(), read(), fopen(), fread()`...
  - **also `malloc()` to check memory usage**

Basic features

- **Random seeds (`-s`)**
- **Fuzzing ratio (`-r`)**
- **Cherry-pick fuzzed data**
  - **Include/exclude file patterns (`-I`, `-E`)**
  - **Network (`-n`), standard input (`-i`)**
  - **Fuzz depending on byte offsets (`-b`)**
  - **Fuzz depending on byte values (`-P`)**

Other Features

- Parallel processing (`-j`)
- Detect stuck processes
  - Set maximum memory allocation (`-M`)
  - Set maximum running time (`-T`)
  - Set maximum `stdout` output (`-B`)
- See manual page for more

Getting Started

- http://libcaca.eu/wiki/zzuf
- From Subversion:
  - `svn co svn://svn.zoy.org/libcaca/zzuf/trunk`
  - `./bootstrap`
  - `./configure`
  - `make`
  - You’re done!

First Steps

- Standard utilities
  - cat, more
  - grep
  - cp, dd
- Network fuzzing
- Finding a real bug

Finding 0-day bugs

- **objdump**
- **Image viewers**
- **MPlayer**
- **Firefox**
- ***[your suggestion here]***

conclusions

- Fuzzing is cheap and easy
- It finds real, scary bugs
- Binary formats == easy targets
- Seldom used == seldom tested
- Warning: zzuf-proof != bug-free

ZZUF'S FUTURE

- Context-dependent fuzzing
  - ignore or recompute CRCs
  - divert the zlib library, too (for PNGs)
- Finish the Windows® port
  - help needed
- Attach to a debugger
- Visit http://libcaca.eu/wiki/zzuf

THANKS!

ANY QUESTIONS?