HTTP Fuzzing: Using JBroFuzz to fuzz the web away

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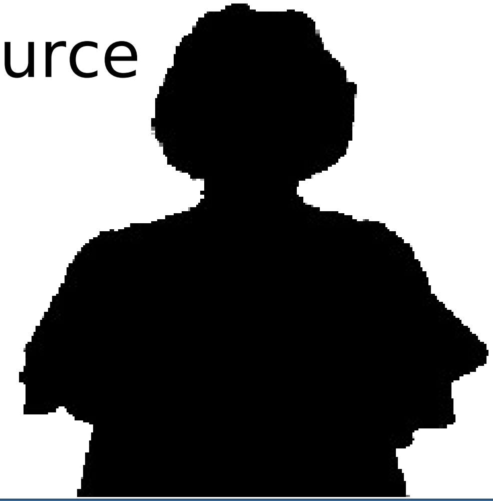
Presentation Overview

- Fuzzing in general
- Fuzzing in the web world
- HTTP Fuzzing with JBrofuzz
- Other fuzzing options
- Conclusions and such

About Matt

- Varied IT Background
  - Developer, DBA, Sys Admin, Pen Tester, Application Security, CISSP, CEH, RHCE, Linux+
- Long history with Linux & Open Source
  - First Linux install ~1998
  - DBA and Sys Admin was all open source
  - Contributor to many projects, leader of one
- A bit of OWASP too.



Fun pics of me – just so Brad's happy

Fun pics of me | more

I clean up really well

Nobody's safe

A fuzz by any other name…

- 1913 Websters:
  “To make drunk.”

- WordNet 2.0:
  “uncomplimentary terms for a policeman

  “the first beard of an adolescent boy”

- For today: “a method to discover software flaws by providing unexpected inputs”

Where did fuzzing start?

- Similar to Boundary value analysis

- 1989 Professor Barton Miller
  - Early fuzzer of Unix applications
  - Pure black box approach with random strings
  - Code quality and reliability were drivers

- Next protocol specifications, network-enabled applications, browser rendering, file format fuzzing, ...

Developing your web fuzz

- Identify Target(s)
- Identify Inputs
- Create Fuzz Data
- Send/Submit Fuzz Data
- Monitor for Problems or Changes
- Verify Exploitability

Details for getting your web fuzz on

- Identify Target(s)
  - Scope of engagement determines
  - Look at components of the application
    - Libraries, AJAX Frameworks, ...
  - Size requires focus on soft spots/sensitive areas

- Identify Inputs
  - You've done IG-003. right?
    - OWASP Testing Guide, Information Gathering Section
  - Look for those inputs “you can't change”
    - Buttons, cookies, referer, hidden fields

Details for getting your web fuzz on

- Create Fuzz Data
  - Sometimes auto-generated by the tool
  - Fuzz lists
  - Tailored vs Brute

- Send/Submit Fuzz Data
  - GET vs POST
  - Other methods
    - SOAP, RESTful Services, WebDAV, ...
  - Very painful if not automated

Details for getting your web fuzz on

- Monitor for Problems or Changes
  - HTTP Status Codes
    - HTTP 500
  - Response page size
  - Response timing

- Verify Exploitability
  - Error != Vulnerable
  - Manually verify and refine testing
  - Engagement scope determines

Fuzzing fail

- Stateful testing
  - Especially authorization testing
  - Typically blind to roles and privileges
- Logic errors or poor design
  - Too close to see higher level issues
- Incubated or multi-step vulnerabilities
  - Focus is too narrow for this much context

Fuzzing Fail continued

- Hidden functionality
  - Orphaned pages or functions
  - Backdoors
    - e.g. hard coded passwords
- Server side errors
  - Memory errors
  - Stalled threads (short of DOS)
  - Depends on how 'crystal' your box is

Types o'Fuzz

- Mutation-based fuzzing
  - Use existing valid data
  - Mangle valid data to create test cases
- Generation-based fuzzing
  - Create test cases from nothing
  - Model existing target's data to create test cases

Fuzzing Sub-catagories

- Pre-generated test cases
  - Create standard test cases and apply consistently
    - Results between tests are easily compared
    - Complete coverage = lots of test cases = work++
  - No random elements
    - limited to quality of the initially created test cases

- Random
  - Quick and dirty approach
    - Lacks targeting, longer test runs, inefficient

Fuzzing Sub-catagories

- Manual Manipulation
  - Tester is the random element
  - Good as the testers knowledge & experience
  - Works well for custom situations

- Mutation or Brute Force Testing
  - Start with good data and continually make small modifications
    - Very little setup or domain knowledge required
    - Problems similar to random

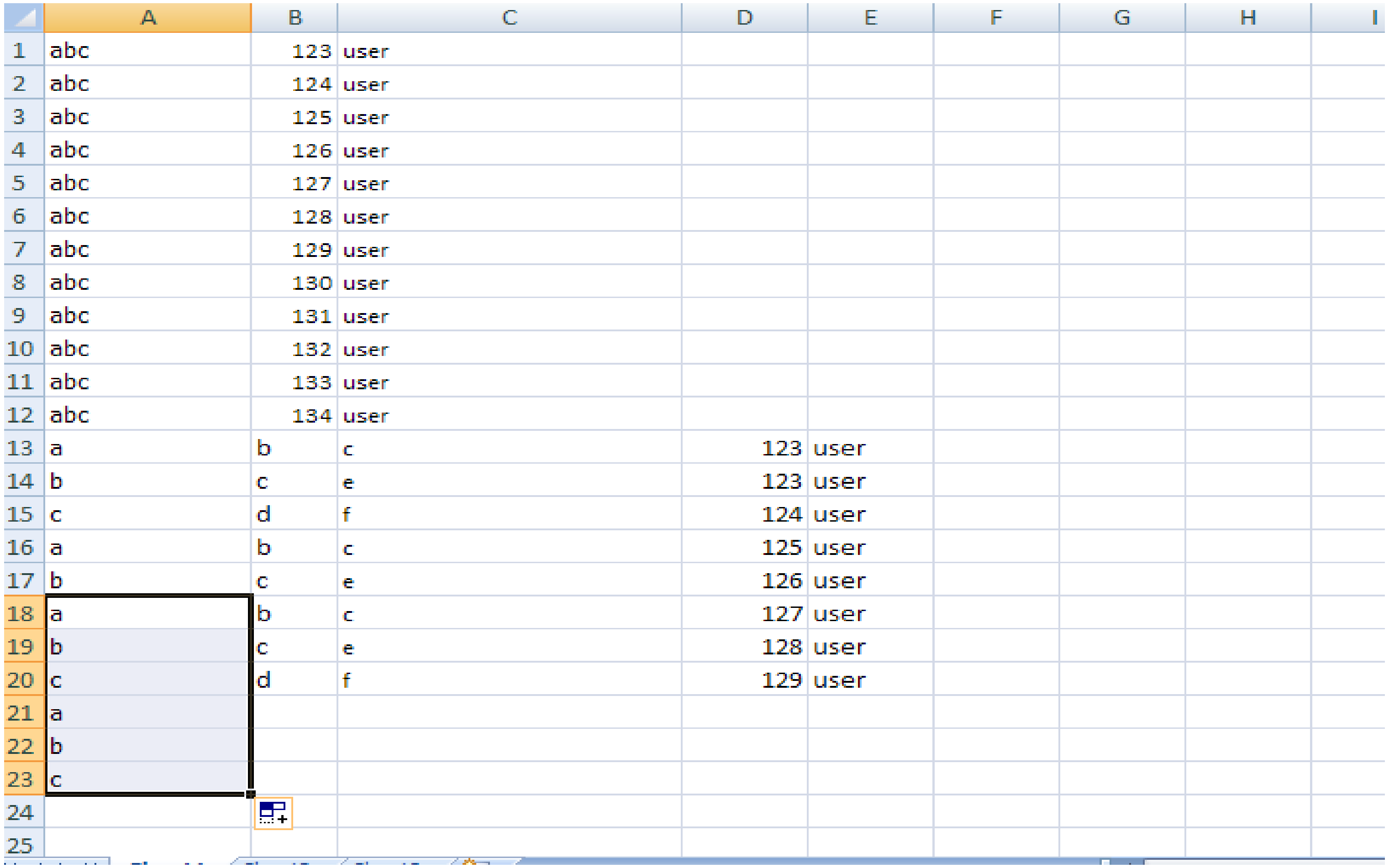
Fuzzing Sub-catagories

- Automatic Protocol Generation Testing
  - Create a grammar which describes what is being tested
  - Templates describe generalized test
  - Only portions of the template are fuzzed, others are static
  - Crucial to pick the right portions to fuzz
  - Optimized to the likely vulnerable areas

Creating your own mutations

- Using Spreadsheets for payloads
  - http://target.com/k.php?hash=abc123user
  - Select and drag feature in popular spreadsheet software makes this easy
    - abc124user
    - bcd123user
    -

Creating your own mutations



	A	B	C	D	E	F	G	H	I
1	abc	123	user						
2	abc	124	user						
3	abc	125	user						
4	abc	126	user						
5	abc	127	user						
6	abc	128	user						
7	abc	129	user						
8	abc	130	user						
9	abc	131	user						
10	abc	132	user						
11	abc	133	user						
12	abc	134	user						
13	a	b	c	123	user				
14	b	c	e	123	user				
15	c	d	f	124	user				
16	a	b	c	125	user				
17	b	c	e	126	user				
18	a	b	c	127	user				
19	b	c	e	128	user				
20	c	d	f	129	user				
21	a								
22	b								
23	c								
24									
25									

Say hello to JBroFuzz

- JBroFuzz
  "Web application fuzzer for requests made over HTTP or HTTPS. Its purpose is to provide a single, portable application that offers stable web protocol fuzzing capabilities."

JBroFuzz features

- HTTP proxy support
- Encoder/Hash window
  - Base64, MD5, SHA-1, SHA-256, SHA-384, SHA-512 and URL (UTF-8)
- Very large selection of injection payloads
- Many built in user-agent strings
- Handles HTTP 100 Continue
- Search mechanism built in
- Syntax coloration

Its Demo time!

DEMO AHEAD

Watch out for explosions and demo gremlins

Other ways to fuzz HTTP

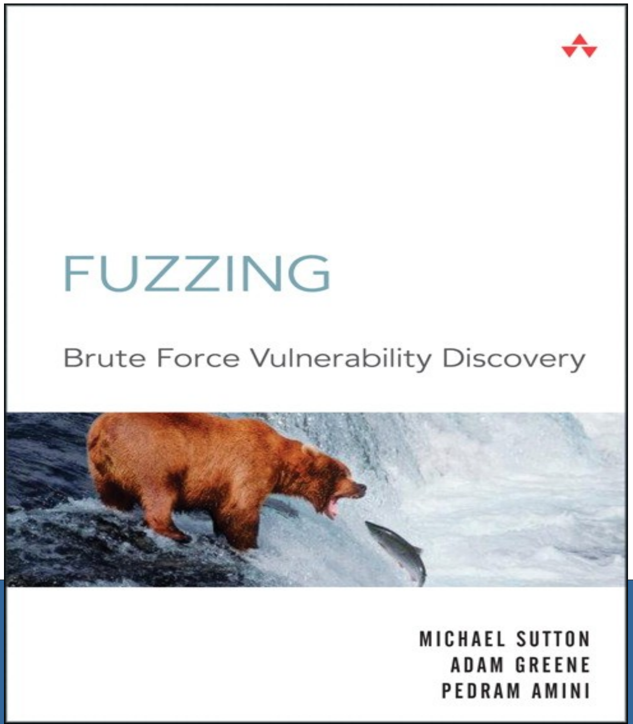
- OWASP WebScarab (Fuzzer tab)
  - Allows for fuzzing parameter(s) by priority
    - payloads: text files or generated

- Burp Proxy Suite (Intruder tab)
  - Allows for fuzzing the HTTP request in full
    - multiple positions and attack types
    - sniper, battering ram, pitchfork, cluster bomb

- WSFuzzer
  - Web Services Fuzzer
    - Command line, tons of options

Learn More

- OWASP Site:
  http://www.owasp.org/index.php/Category:OWASP_JBroFuzz
  or Google “OWASP JBroFuzz”
- http://en.wikipedia.org/wiki/Fuzzing
- Fuzzing:
  Brute Force
  Vulnerability
  Discovery
  ISBN: 0321446119



Try it before you buy it

- All the tools mentioned today are on the OWASP Live CD
  - A subproject of OWASP Web Testing Environment
- OWASP Site: http://www.owasp.org/index.php/Category:OWASP_Live_CD_Project
- Download & Community Site: http://AppSecLive.org
- Original site: http://mtesauro.com/livecd/

What's next?

- Using Selenium to hold state for web application penetration testing

  By Yiannis Pavlosoglou

  Presented at London chapter on January 14th

  PDF of slides available:
  http://www.owasp.org/images/3/37/OWASP_London_14-Jan-2009_Penetration_Testing_with_Selenium-Yiannis_Pavlosoglou_v2.pdf

  which is a uselessly long URL so search for “Selenium” in the search box on http://www.owasp.org

Questions?

THE EXPLOSION OF BOTNETS HAS MANDATED A NEW WARNING LABEL:
CLICK HERE TO REQUEST EXPLOIT ON PORT 80
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