Smartfuzzing The Web

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Friday, August 5, 2011

Us

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Overview

- Problems with current tools
- Current workarounds
- Proposed solutions
- Introduction to RAFT

We Aren't…

- Going to beat up on a particular vendor
  - Although we may be tempted ;)
- Solve every problem outlined in this talk
  - Although we are working on them
- Sell you a solution
  - These are people / technology problems

Our Goals

- Raise awareness
- Put focus back on the individual tester
- Get you to submit bug reports and feature requests for RAFT

Clarification

VS

Testing Tools Are Lacking

- Hey, Y2K Just called
  - Semi-automated tools fall down
  - Session and state problems
  - Problems with complicated applications
- What about modern technologies?
  - CSRF tokens and randomized DOM
  - RIA, AJAX, and Web Services

The Problems Continue

- Import of externally collected data
- Typically no analysis of results
  - Current request
  - Previous requests
  - HTTP is stateless, but analysis shouldn't be
- Testers need interaction not abstraction

The Problems Continue

- Missing “hidden” portions of the application
  - “Accept” Header manipulation

```
GET /viaf/75785466/ HTTP/1.1
Host: viaf.org
Accept: application/rdf+xml
```

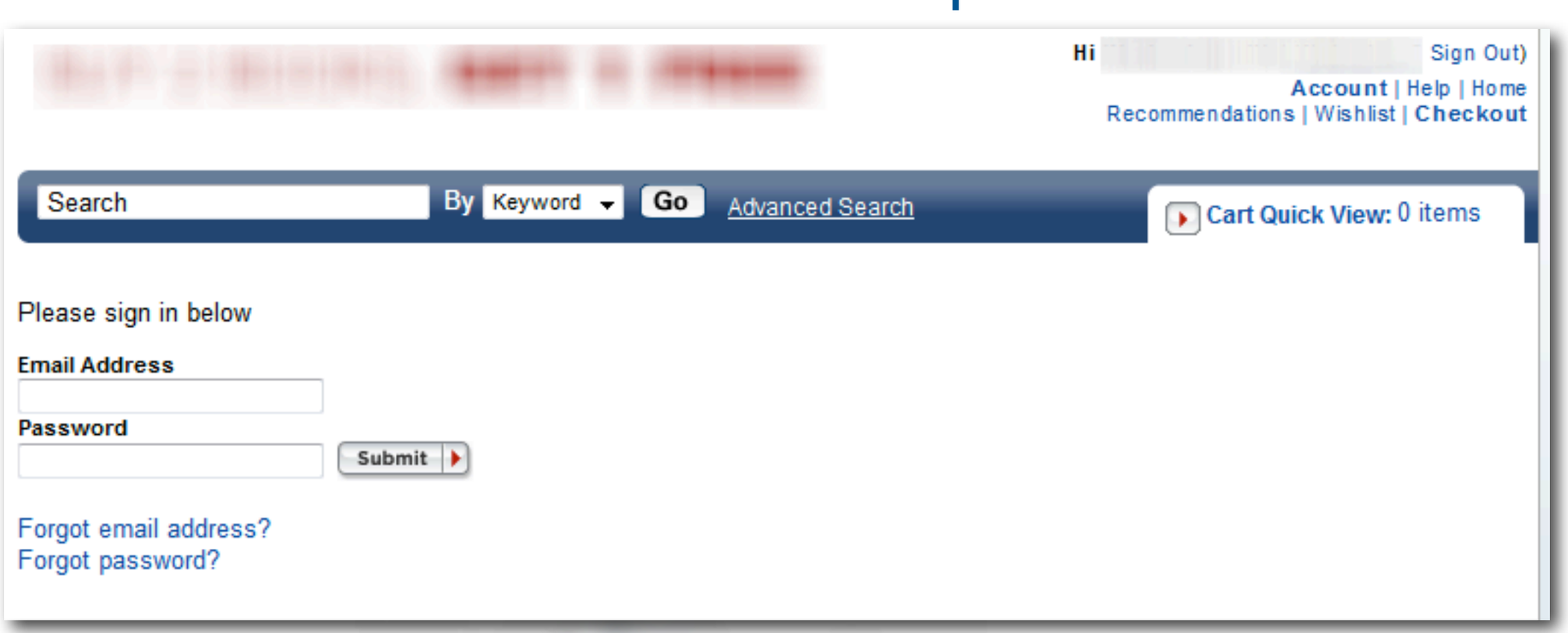
!=

```
GET /viaf/75785466/ HTTP/1.1
Host: viaf.org
```

  - User-Agent

And again

- Difficult cases
  - Risk based logins
  - In-session detection
  - Confirmation on next step



It's The Simple Things

- Missing simple features
  - Request time
  - Authorization checks
  - Client-side storage locations

Mo Tools, Mo Problems

- External tools and custom scripts
  - Can be painful with no analysis help
  - Request/response diffs
  - Full request/response logging?
- Data in multiple sources
  - No cross-tool analysis
  - Limited ability to find “new” bugs in old data

Current Solutions

- Test manually
  - Totally not time consuming, at all!
  - Modify existing tools for purposes which they weren't intended
    - Custom one-off tools and scripts
- End up missing the point
  - Results in custom formats
  - Common vulns can be missed

So Adapt Or...

- Some tools need to adapt or become useless

Want Some Examples?

- Still using Nikto?
  - What about a tool based on Nikto?
  - Do you know what your Nikto is doing?
- What about your Buster?
  - DirBuster!

A Word on Word Lists

- The DirBuster word lists have not been updated since 2007
- Many common directories and words missing from the lists
- Generating a list from spidering websites leads to poor word values
  - Only find the directories that site exposes
  - SEO poisoning can skew results

What Have You Been Missing?

- Not in DirBuster small and medium list:
  - aspnet_client
  - _notes
  - _vti_cnf
  - _vti_log
  - _vti_pvt
  - App_Code
  - App_Data
  - pkginfo
  - _vti_bin

DirBuster WTF?

- When was the last time you found Jeremiah Grossman on your web site?

```
$ grep -i -n 'j.*grossman' directory-list-2.3-medium.txt
218265:jeremiahgrossman
218267:jgrossman
218269:http%3A%2F%2Fjeremiahgrossman
$
```

RAFT Word Lists

- Generated from “robots.txt” files
- Word selections based on Disallow
- Requested “robots.txt” from 1.7 million sites

- Alexa and Quantcast Top Million data sets
- Almost 1 million files processed
- About 350 thousand unique files
- SEO pharma and mortgage excluded

Remember

- Tools don’t find vulnerabilities, people do

A Web Smart Fuzzer?

Web Smart Fuzzer Components

- Session Management
  - Without need for complex user interaction
  - Shared cookie jar object
  - Proper in-session detection
- Sequence building and running
  - Login sequences / clean up sequences
  - Multi-stepped operations
  - Grabbing data from previous requests

Web Smart Fuzzer Components

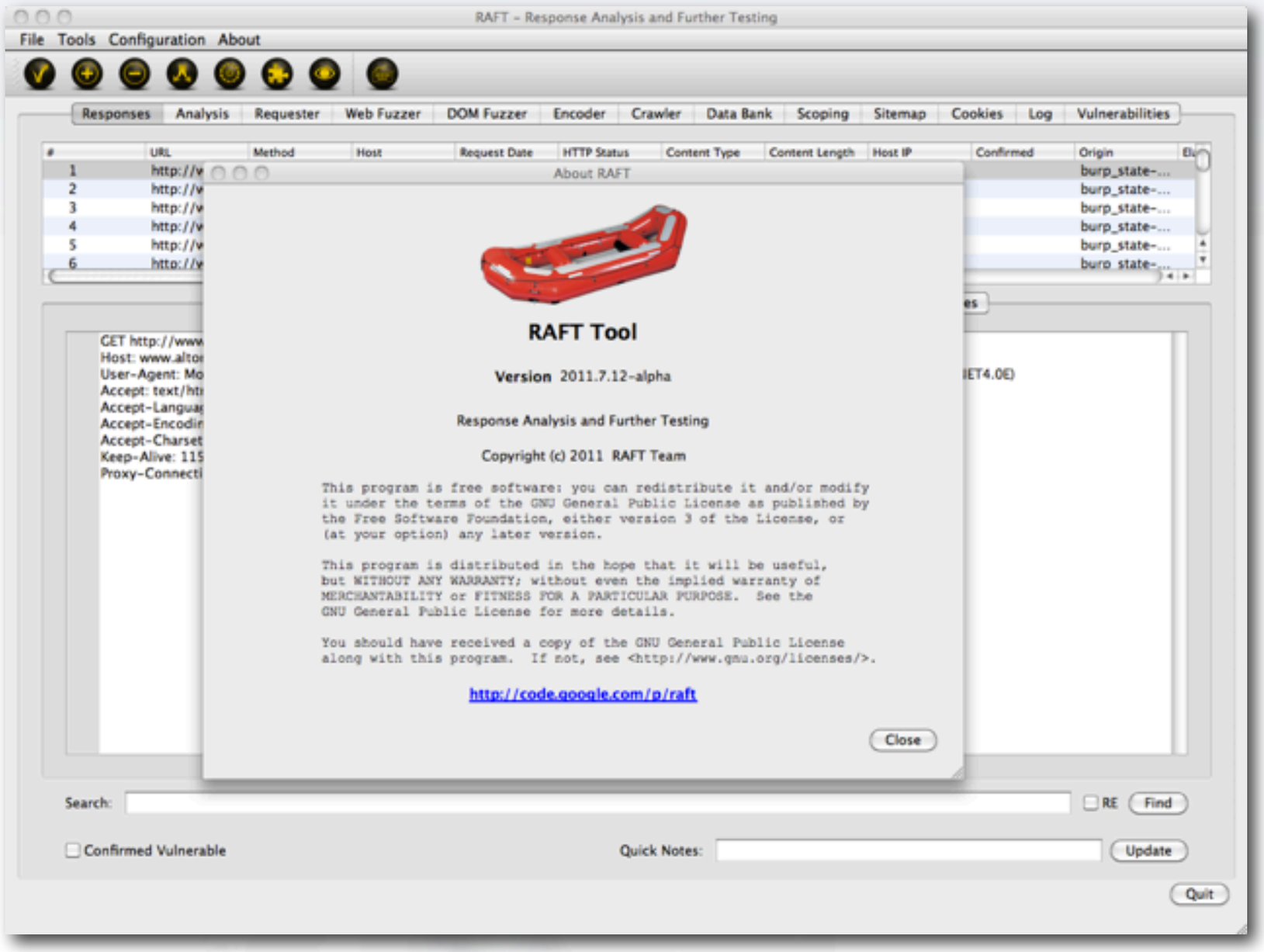
- Content discovery
  - Intelligent spidering
  - Intelligent form submission
  - Content discovery based on contextual Info
- Support modern technologies
  - HTML5
  - RIA

Web Smart Fuzzer Components

- Randomization handling
  - CSRF tokens
  - DOM data
- Payload choices
  - Based on context awareness
- Tight integration of components
- Ability to easily experiment

RAFT

- Introducing RAFT



What is RAFT?

- Response Analysis and Further Testing
- RAFT is different
  - **Not an inspection proxy!**
  - Focus on workflow
  - Analysis for other tools and scripts
- Open source (Python and QT)

Framework and Concepts

- Tool for testers
- Understands output from other tools (import from automated scanners and proxies)
  - RAFT is not an inspection proxy
- Technical Components
  - Built-In Web Browser (WebKit)
  - Fuzzers (two for the price of one!)

Platforms

- Mac OS X
  - 10.5 / 10.6
  - 10.7 probably fine with Macports
- Linux
  - Ubuntu 10.4 LTS
  - Probably just works on everything else
- Windows
  - Windows XP / Windows 7

Dependencies

- Effort is made to keep dependencies at a minimum
  - PyQT4
  - QtWebKit
  - QScintilla
  - lxml
  - pyamf
  - pydns

RAFT Download

- Check out source from project SVN
  - http://code.google.com/p/raft
- Packages for OSX and Windows coming soon
- If you find a bug, and you will, please let us know :)

Response Analysis and F**k Testing

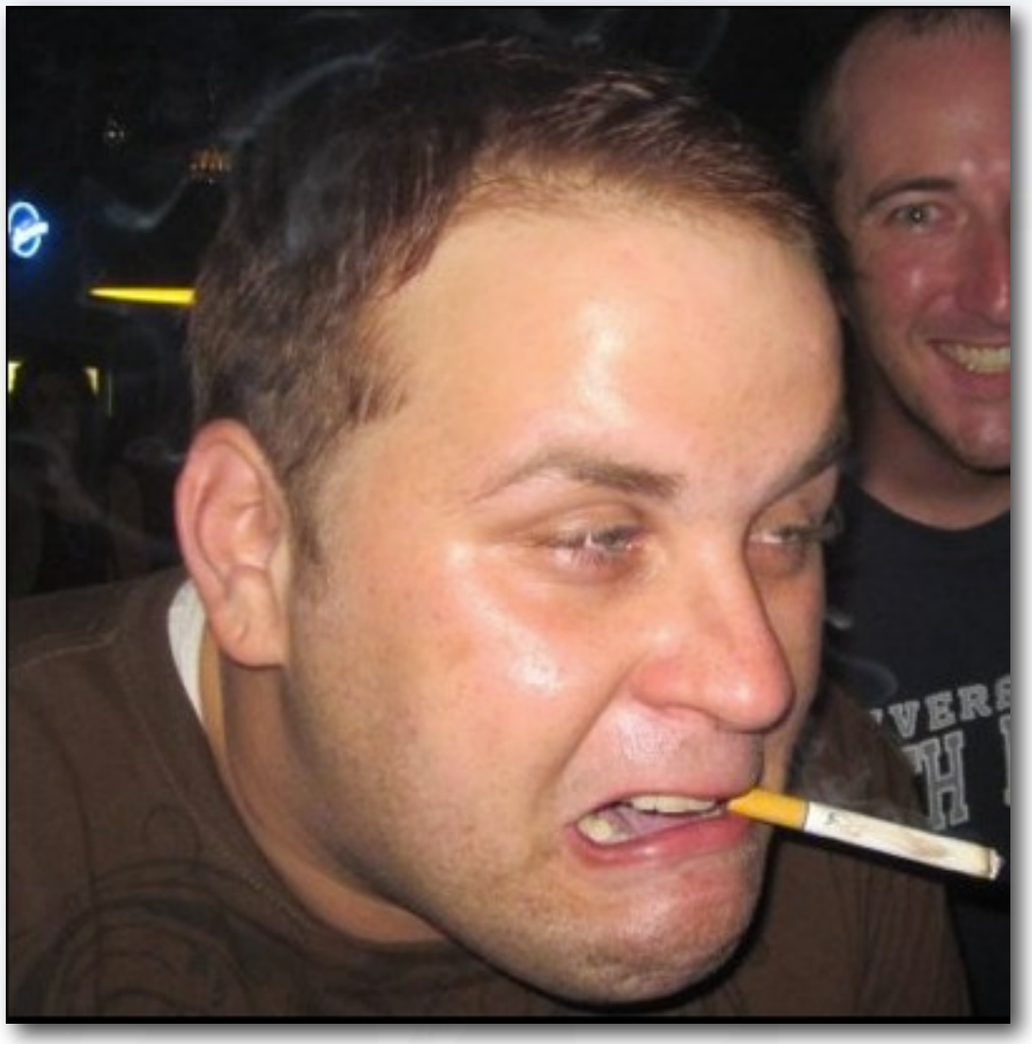
- Use RAFT for your own code
  - Modified tools and One off scripts
- RAFT Data sources
  - RAFT Capture format
  - RAFT Browser
  - Burp (Log / State / XML)
  - Webscarab
  - Paros

Interface Walkthrough

- Demo

Analysis

- Analysis - Yeah, it's kind of in the title



Analysis

- Analysis Anywhere!
  - Our concept for better tools
  - Any analysis on any data source
  - Analyzers integrated with other tools
- Modular analyzers
  - New analyzers easy to add
  - Customizable config / execution / reporting
  - Analyzers can call each other

Analysis

- Find what others ignore
  - Timing analysis
  - Same request, different response
  - Image analysis
    - Do you really want to know where your ~~facebook~~ Google+ friends have been?
  - Possibilities are endless

Analyzer Demo

- Demo

Smart Testing Components

- Templatized components
  - Requester
  - Fuzzer
- Sequence running
  - Login, cleanup, and fuzzing
- Browser object
  - For those hard to reach applications

Web Fuzzer Overview

- Templating approach
  - Allows for the tester to markup data
  - For a good time call for multiple payload types
- Pre and Post sequence running

Web Fuzzer Demo

- Demo

Sequence Fuzzer

- When you just need something more
- Allows for the insertion of data in sequences
- Dynamic data and CSRF token support

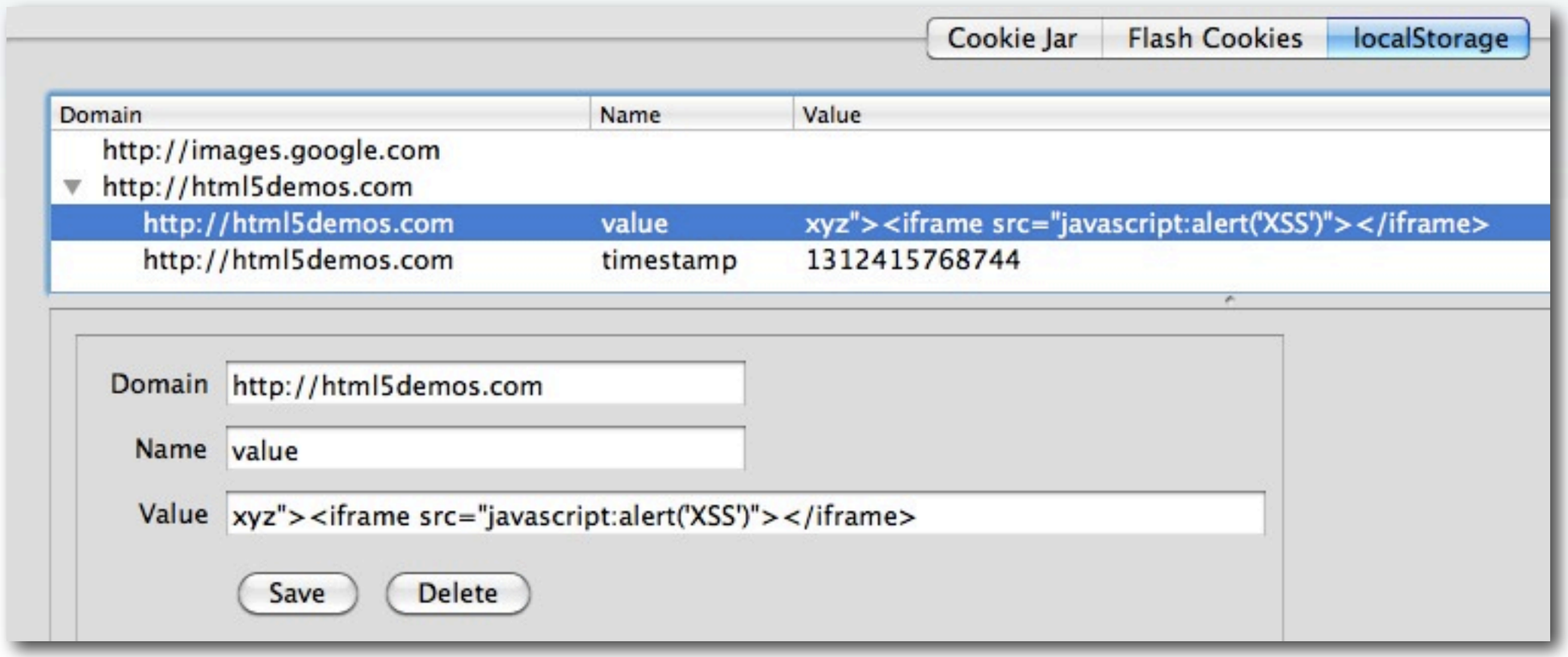
Sequence Builder

- Demo

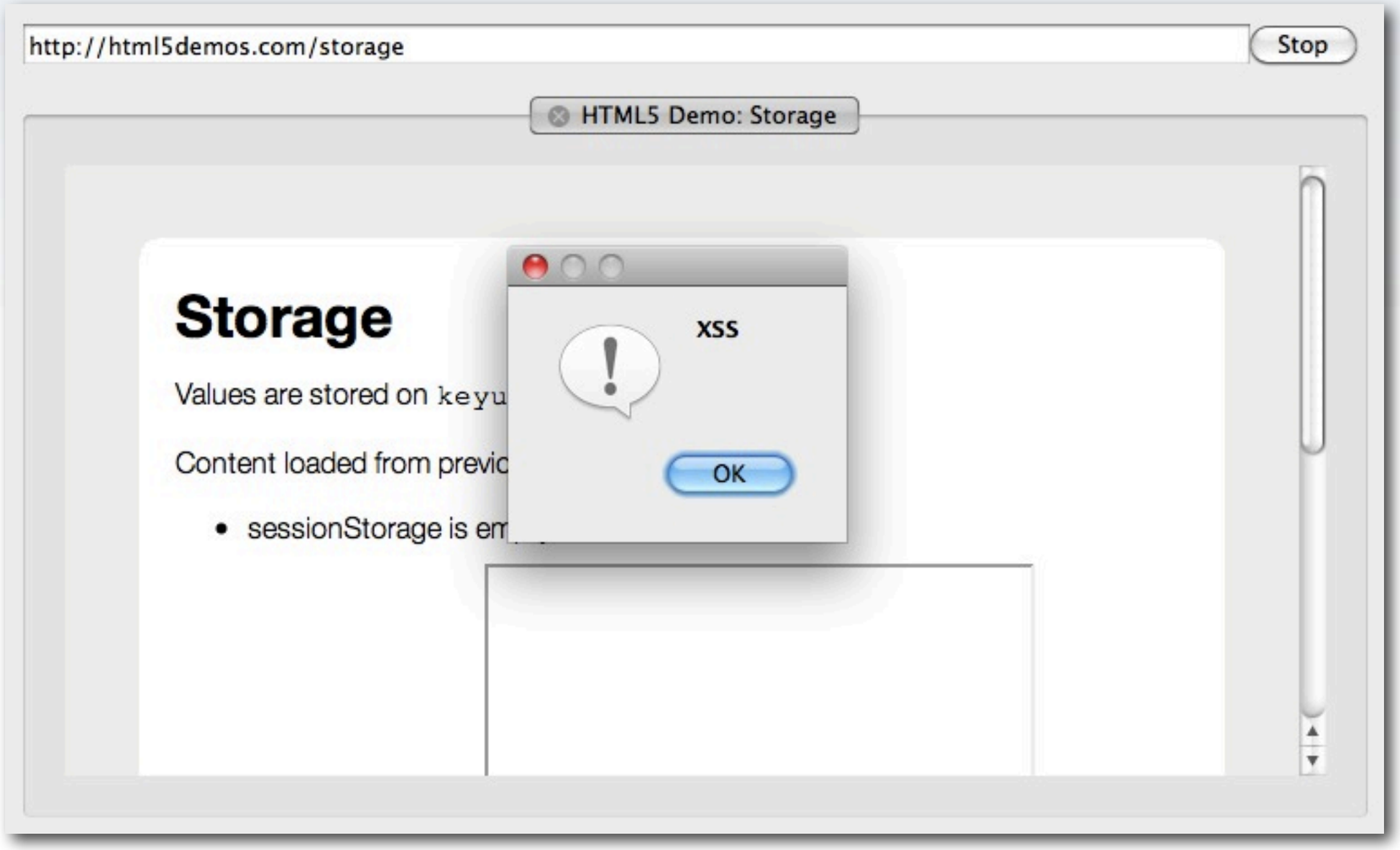
DOM Fuzzer Demo

- Demo

Deeper?


Cookie Jar
Flash Cookies
localStorage
Domain
Name
Value
http://images.google.com
http://html5demos.com
http://html5demos.com
value
xyz"><iframe src="javascript:alert('XSS')"></iframe>
http://html5demos.com
timestamp
1312415768744
Domain
http://html5demos.com
Name
value
Value
xyz"><iframe src="javascript:alert('XSS')"></iframe>
Save
Delete

Pop!


http://html5demos.com/storage
Stop
HTML5 Demo: Storage
Storage
Values are stored on keyu
Content loaded from previc
sessionStorage is em
xss
OK

Documentation

- Really?
  - Available on the wiki of the project page

Language Integration

Scala

Python

Smalltalk

Ruby

COBOL

Java

.Net

Fortran

Visual Basic

Visual FoxPro

RAFT Capture Format

```
<!ELEMENT raft (capture*)>
<!ATTLIST raft version CDATA #IMPLIED>
<!ELEMENT capture (request, response?, analysis?)>
<!ELEMENT request (method?, url?, host?, hostip?, datetime?, headers, body?)>
<!ELEMENT response (status?, content_type?, content_length?, elapsed?, headers, body?)>
<!ELEMENT analysis (notes?, confirmed?)>
<!ELEMENT method (#PCDATA)>
<!ELEMENT url (#PCDATA)>
<!ELEMENT host (#PCDATA)>
<!ELEMENT hostip (#PCDATA)>
<!ELEMENT datetime (#PCDATA)>
<!ELEMENT headers (#PCDATA)>
<!ATTLIST headers encoding (none|base64) "none">
<!ELEMENT body (#PCDATA)>
<!ATTLIST body encoding (none|base64) "none">
<!ELEMENT status (#PCDATA)>
<!ELEMENT content_type (#PCDATA)>
<!ELEMENT content_length (#PCDATA)>
<!ELEMENT elapsed (#PCDATA)>
<!ELEMENT notes (#PCDATA)>
<!ELEMENT confirmed (#PCDATA)>
```

RAFT Capture Example

```
<raft version="1.0"><capture>
<request>
<method>GET</method>
<url>http://www.altoromutual.com/</url>
<host>www.altoromutual.com</host>
<datetime>Thu May 12 21:16:07 2011 GMT</datetime>
<headers>GET / HTTP/1.1
User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US) AppleWebKit/533.3 (KHTML, like Gecko) Qt/4.7.1 Safari/533.3
Accept: application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8,image/png,*/*;q=0.5

</headers>
<body encoding="base64"></body>
</request>
<response>
<status>200</status>
<elapsed>703</elapsed>
<content_type>text/html; charset=utf-8</content_type>
<content_length>9645</content_length>
<headers>HTTP/1.1 200 OK
Date: Thu, 12 May 2011 22:42:57 GMT
Server: Microsoft-IIS/6.0
X-Powered-By: ASP.NET
X-AspNet-Version: 2.0.50727
Set-Cookie: ASP.NET_SessionId=wcmd5ji5cjzkwyuyuy1jcf55; path=/; HttpOnly
amSessionId=174257217159; path=/
Cache-Control: no-cache
Pragma: no-cache
Expires: -1
Content-Type: text/html; charset=utf-8
Content-Length: 9645

</headers>
<body encoding="base64">DQoNCjwhRE9DVFlQRSBodG1sIFBVQkxJQyAiLS8vVzNDLy9EVEQgWEhUTUwgMS4wIFRyYW5zaXRp
b25hbC8vRU4iICJodHRwOi8vd3d3LnczLm9yZy9UUi94aHRtbDEvRFREL3hodG1sMS10cmFuc2l0
```

Writing an Analyzer

- Example

RAFT Weaknesses

- Webkit dependence
- SQLite
- Random acts of buggery
  - Has to run in project directory
  - Hardcoded payloads
  - Absolutely no error handling

RAFT Future Features

- More analysis components
- Integrated scanner functionality
- Reporting output
- Command line interface

What We Aren't Working on

- An Inspection Proxy

Call to Action

- We need help
  - Contribute with code
  - Test and report bugs
  - Provide integration with other tools
- Future features
  - Request new features
  - Code new features yourself

???

- Questions?

Contact

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Feedback Forms

- Please Remember to Complete Your Feedback Form