Ruby for Pentesters: The Workshop

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PROGRAMMING Language

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agenda

1415: Introductions
1420: The 20 minute tour of Ruby
1440: Blackbag
1445: Webby Blackbag
1500: Protocol Blackbag
1515: Break
1530: Fuzzing and Redis
1550: Ragweed: Part 1
1610: Ragweed: Part 2
1630: Coffee Service
1700: Making Burp better with Buby
1715: JRuby
1725: FFI

Setup

Ruby in 20 Minutes

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Gems and packages

Stuff we use

Nokogiri
eventmachine
rbkb
ragweed
Nerve
Buby
lots of others

Stuff we like

Metasploit
ronin
watir
whatweb
Arachni

Lab: The basics

Ruby basics

Ruby Blackbag (rbkb)

Do less typing

Command line tools

plugboards
encoders / decoders
utilities

Object mixins

The same stuff but
for scripts and IRB

Lab: rbkb

IRB + rbkb

Scripted Webby Stuff

What do we need to script a webapp?

Transport

Parsing

Encoding / Decoding

Lab: Simple SQLi scanner

`Curb,Nokogiri,rbkb`

Protocol Reversing w/ Blackbag

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General protocol approach

Establish the flow

Observe it

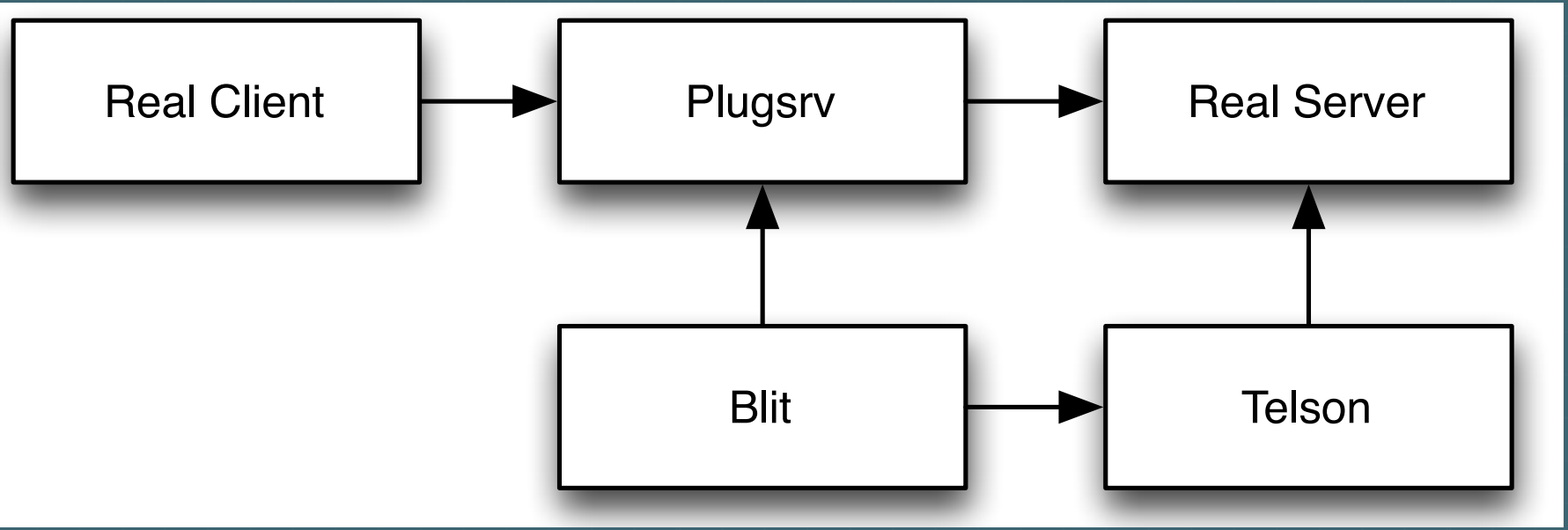
Understand it

Manipulate it

demo: when all you have is pcap...

`FeedImport`

demo: the blackbag flow



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exercise: tcp protocol lab

Get in the middle

Observe and replay

Manipulate

Exploit

exercise: build protocol structures

`BinData`

demo: eventmachine and UDP

event loops

manipulate dns

demo: TLS tricks

TLS MITM & self signed certs

SSL version scanning

Fuzzing

the what

smart

Protocol Aware
User Aware
Session Aware
Error State Aware

dumb

Bit Flipping
Boundary Trampling
Switch-a-roo
Random random everywhere

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the why

memory corruption

unexpected behavior

crypto analysis

parsers

access control test

demo: generator patterns

DFuzz + BinData

demo: the harder stuff

process control

instrumentation

binning

intro to redis

redis-server

key:value

redis object

set & get
add & delete
push & pop

redis data types

strings, lists, sets

lab: fuzzing with redis

grab your structs

mutate & send

store in redis

query

Ragweed:
Instrumentation & Getting Started

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Why a scriptable debugger?

Hittracing

Fuzzing

less clicking

runtime changes

What do we script?

Events

sigtrap
sigterm
event_fork

Actions

get registers
set breakpoints
manipulate memory

How?

memory locations

IDA
objdump
runtime calls

inspection/manipulation

get_registers
shared_libraries
read

set_registers
write

The target

in_circle
out_circle

```
eroot@Caladan32:~$ objdump -tj .text monte

monte:     file format elf32-i386

SYMBOL TABLE:
08048450 l    d  .text  00000000              .text
08048480 l     F .text  00000000              __do_global_dtors_aux
080484e0 l     F .text  00000000              frame_dummy
08048740 l     F .text  00000000              __do_global_ctors_aux
08048730 g     F .text  00000005              __libc_csu_fini
08048450 g     F .text  00000000              _start
080486d0 g     F .text  0000005a              __libc_csu_init
080486b6 g     F .text  00000015              out_circle
080486a1 g     F .text  00000015              in_circle
08048735 g     F .text  00000000              .hidden __i686.get_pc_thunk.bx
08048504 g     F .text  0000019d              main
```

Demo: arguments and registers

reading memory

getting registers

Exercise: function arguments

`SSL_read`

`SSL_write`

read SSL requests that our client is making

Walkthrough: function arguments

```
int SSL_read(SSL *ssl, void *buf, int num);

int SSL_write(SSL *ssl, const void *buf, int num);
```

Ragweed:
Hit Tracing and in Memory Fuzzing

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What do we mean by that?

Tracking function calls
and logic flow

Modifying memory locations
as the program runs

Automate this!

accounting

- Hash
- CSV
- IPC
- Redis

breakpoints

- CSV
- Nerve
- metaprogramming

Exercise: Break stuff!

in memory fuzzing

hit tracing

read arguments
write new arguments

output function hit
track order and count

Ragweed: the intermission

Recap

in memory fuzzing

screenshot TBA

hittracing

screenshot TBA

Burp + Jruby = Buby

buby is your friend

Access Burp data

- Proxy History
- Repeater
- Intruder
- Scan Results

Extend it

- Extend with modules
- Inline extraction
- Inline manipulation

Lab: CookieMonster

Grab and decode all cookies

evt_http_message	Fires when an HTTP message is received
IHttpRequestResponse	Extender object
#response_headers	Buby convenience method

Lab: CookieMunger

Modify cookie values inline

```
evt_http_message
IHttpRequestResponse
#get_request
#request=
```

```
Automatically:
Grab the request
Modify the cookie
Forward the request
```

Jruby tricks

demo: extending our buby example

```
load jar
```

```
import objects
```

```
make pretty graphs
```

FFI: interfacing with C

No gem, no problem

rubypython

libusb

ffi-libc

ragweed

ffi-pcap

OpenCV-FFI

the actual list is unimportant

This is your C struct

```
struct timezone {
        int     tz_minuteswest;
        int     tz_dsttime;
};

struct timeval {
        time_t          tv_sec;
        suseconds_t     tv_usec;
};
```

This is your C struct on Ruby

```ruby
module Libc
  extend FFI::Library
  ffi_lib 'libc'

  class Timezone < FFI::Struct
    layout :tz_minutewest, :int,
           :tz_dsttime, :int
  end

  class Timeval < FFI::Struct
    layout :tv_sec, :time_t,
           :tv_usec, :suseconds_t
  end
end
```

Calling C functions

definition

```
int
printf(const char *restrict format, ...);
```

setup

```
attach_function 'printf', [:string, :varargs], :int
```

call

```
Libc.printf("cputs %s %x %d", :string, "demo", :int, 0x33, :int, 42)
```

Exercise: execv

definition

```
int
execv(const char *path, char *const argv[]);
```

a pointer

```
argv = FFI::MemoryPointer.new(:pointer, args.size + 2)
argv[0].put_pointer(0, FFI::MemoryPointer.from_string(path.to_s))
```

OK 1-2-3 GO!

Walkthrough: execv spoiler

```
def execv(path, *args)
  FFI.errno = 0
  args.flatten!
  argv = FFI::MemoryPointer.new(:pointer, args.size + 2)
  argv[0].put_pointer(0, FFI::MemoryPointer.from_string(path.to_s))
  args.each_with_index do |arg, i|
    argv[i + 1].put_pointer(0, FFI::MemoryPointer.from_string(arg.to_s))
  end
  argv[args.size + 1].put_pointer(0, nil)

  Libc.execv(path, argv)
  raise SystemCallError :execv, FFI.errno
end
```

Follow along with me