mitmproxy.org
How MITMproxy has been slaying SSL Dragons

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OWASP

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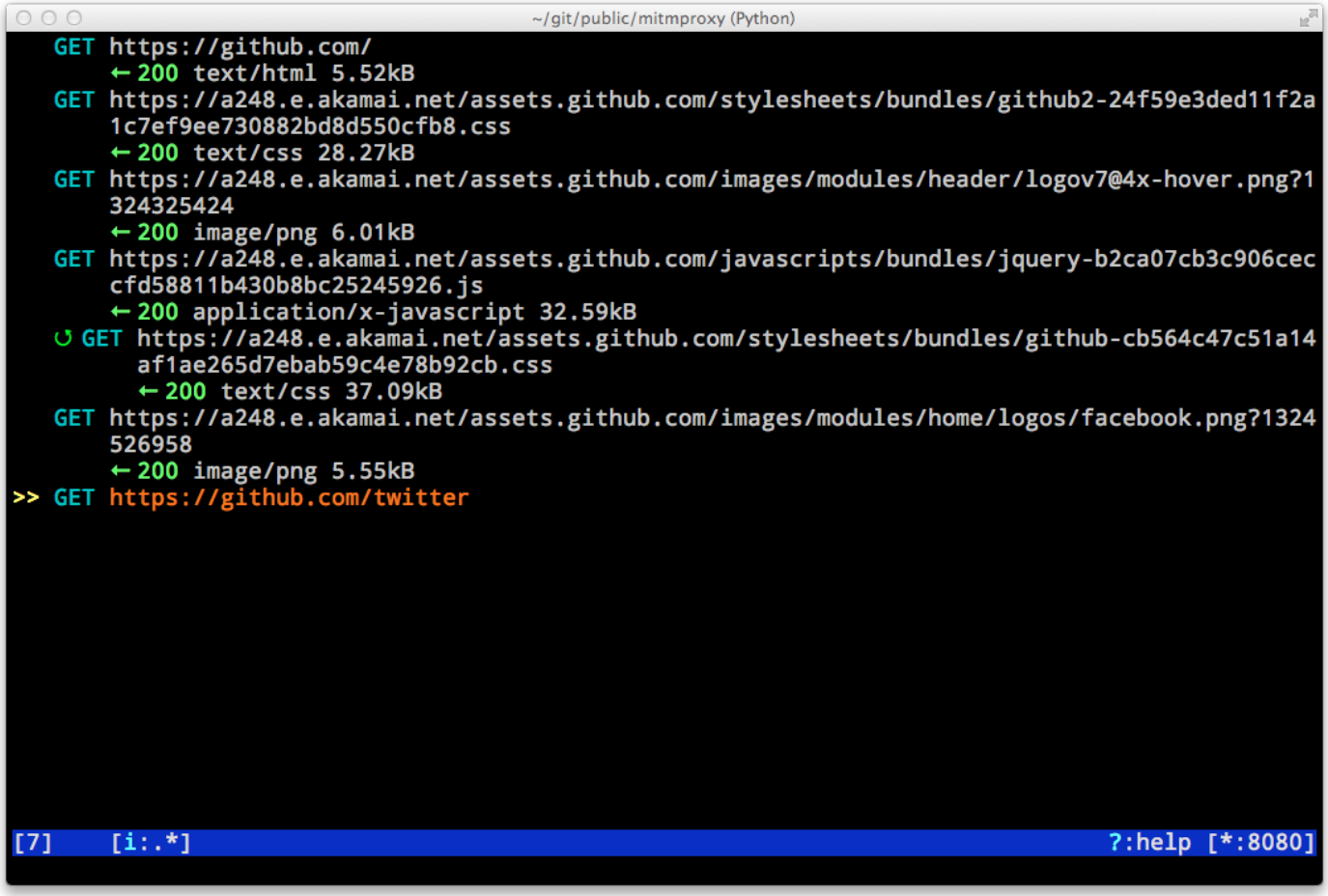
Introduction

- What is MITMproxy?
- Why is it useful?
- Dragon-slaying successes
- How does it work?
- How do we use it? (Demos)

What is MITMproxy?

- "An SSL-capable man-in-the-middle proxy"
- Generic pentest/debug tool
- Interactive, console based – intercept &| modify
- Passive – like tcpdump/tshark
- Replay previous data
- Preserve cookies & authentication
- **Extensible** – invoke Python modules
  - Or system commands
- Programmable via libmproxy

Not just good looks



Project maturity

- Initial: v0.2 – March 2010
- Current: v0.8 – 9 April 2012
- License: GPL v3 (+OpenSSL)
- Author: Aldo Cortesi
  - Network security, penetration testing, security architecture, source audits, risk assessment, software development

Why is MITMproxy useful?

- Balance of power has shifted
  - The browser is not the only user of HTTPS
  - The mobile platform is not generic
- HTTP-using code is increasingly opaque
  - Large JavaScript 'applications'
  - Application Stores: “Free = Ads”
- Existing tools are inflexible
  - Wireshark is great, but read-only
  - ~~Webscarab~~ ZAP, Fiddler, Paros, Charles – all GUI
  - Writing your own site-specific tests?

Feature highlights

- Rich filtering language
  - ~t “text/html”
  - ~hs Set-Cookie
- Anticache, anticomp
  - Makes sure you capture *all* the traffic
- Replay
  - Server-side replay fixes date,expired,last-modified
- Nice display modes
  - Hex, EXIF, JSON, JS

Dragon-slaying success

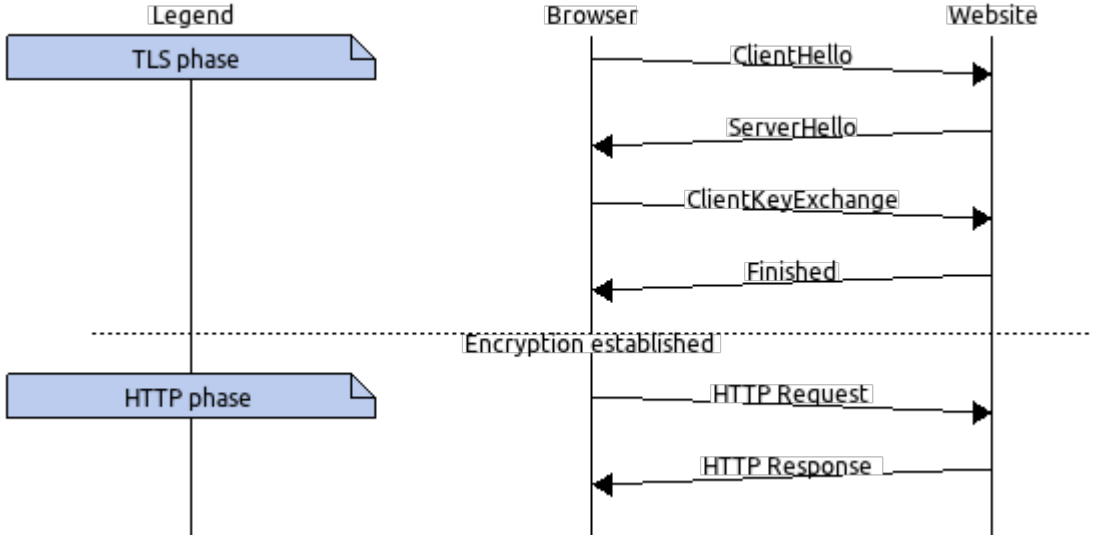
- Apple GameCenter
  - Super MegaWorm highscore
  - Game switched to OpenFeint
- Apple UDID
  - OpenFeint de-anonymized
  - `https://api.openfeint.com/users/for_device.xml?udid=XXX`
  - Apple withdrew UDID
- Apple Contacts data
  - path.com, Hipster
  - Apple withdrew implicit permission

How does MITMproxy do its job?

- Standard Proxy instance
  - A Proxy *is* a Man-in-the-Middle
  - But a proxy does not usually rewrite data
- HTTPS = TLS + HTTP
- MITM = TLS Man-in-the-Middle
- SSL Certificates are changed
  - But who checks the CA provenance?

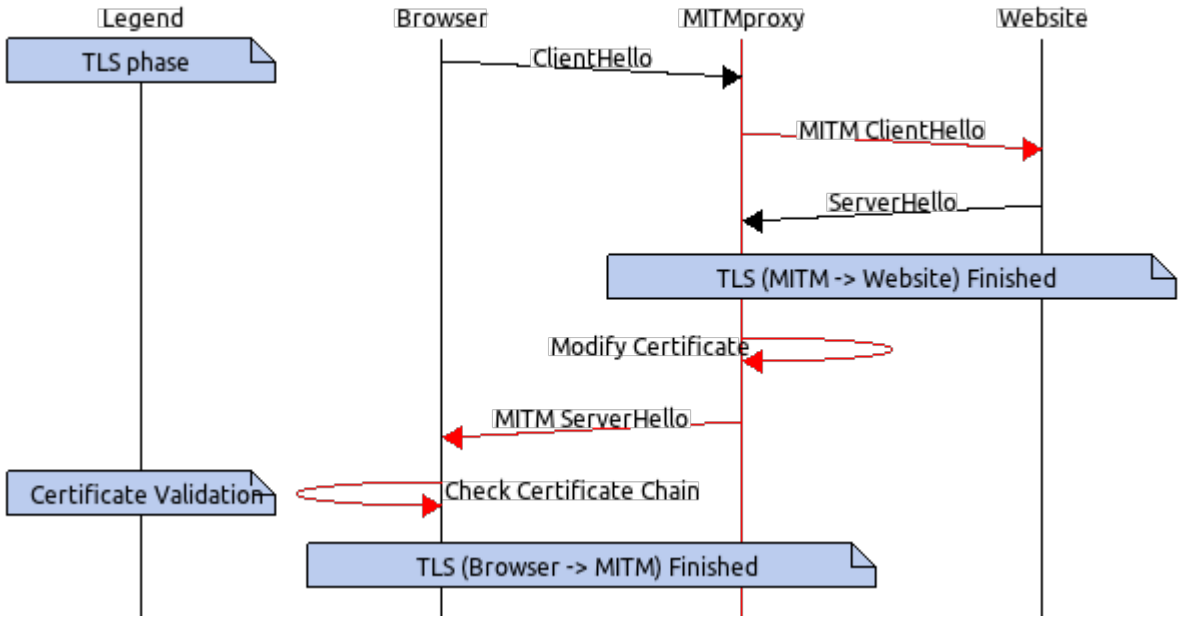
HTTPS = TLS + HTTP

- Establish TLS first
- Then use normal HTTP in the TLS session



TLS Man-in-the-Middle

- Default: just present a fake certificate
- Transparent: read data from the upstream certificate, and insert into the fake



How do we use MITMproxy?

- MITMproxy is **not** an attack tool
- Explicitly configure it as a proxy
  - Transparent proxy in v0.8
  - This is not ideal – data is lost
- Import the (auto-generated) CA Root cert
  - Or configure your own sub-CA
  - Or just keep pressing [Accept] – if you can
- Run as interactive console app
  - Or standalone 'mitmdump'
  - Or in your own Python code

The Android Problem

- Android provides no API for proxy settings
  - Bug 1273, 2008
- Android provides no root access
  - Rooting has implications for support/warranty
- Transparent proxy solutions are available
  - SNI is of course broken
  - Intent is lost: URLs → IP addresses
- Large sites rely heavily on SAN fields
- v0.8 introduces `--upstream-cert`

Demos

- Inspect a browser session
  - Login to a fastmail.fm account
- Intercept and edit a request or response
  - `i ~u google.*/search`
  - Edit 302 Location: response header

Demos

- Run all traffic through a script
  - nowasp.py

```
import re
def request(context, flow):
    if (re.search('google\.',flow.request.host) and
                        re.search('/search',flow.request.path)):
            flow.request.path = re.sub('q=OWASP','q=Anonymous',
                                flow.request.path,0,re.IGNORECASE)
$ mitmdump -s nowasp.py
```

Demos

- Client replay / hotspot wifi login

```
$ mitmdump -w session.mf
$ mitmproxy -r session.mf
```

  - # 'd' to delete un-needed requests
  - # 'eb' to edit a request body
  - # 'w' to save the final flow

```
$ mitmdump -c session.mf
```

- **BUT** other tools are still useful :-

```
$ echo “” | POST http://1.1.1.1/logout.cgi | grep 'You have used'
You have used 1:37
```

Demos

- Upside-Down-Ternet
  - Identify data by Content-Type
    - Images (but not CSS sprites)
      - Pass through OS utility ('convert' from ImageMagick)
      - Or use native Python modules (as per project docs)
    - Text (according to BeautifulSoup)
      - Pass through upsidedown.py
      - Decode the page first!

Upside-down-ternet code dump

```
import re
import subprocess
from BeautifulSoup import BeautifulSoup
import upsidedown

def response(ctx, flow):
  try:

    # Flip images using ImageMagick
    if re.match('image/',flow.response.headers["content-type"][0]):
      proc = subprocess.Popen('/usr/bin/convert -flip - -',
             shell=True,
             stdin=subprocess.PIPE,
             stdout=subprocess.PIPE,)
      flow.response.content=proc.communicate(flow.response.content)[0]
      proc.stdin.close()

    # Flip text using BeautifulSoup and upsidedown
    if re.match('text/html',flow.response.headers["content-type"][0]):
    flow.response.decode()
    soup = BeautifulSoup(flow.response.content)
            for text in soup.findAll(text=True):
           text.replaceWith(upsidedown.transform(text))
            flow.response.content=str(soup)

  except IndexError:
      ctx.log("no content-type[0]")
```

Resources

- http://mitmproxy.org/
- https://github.com/cortesi/mitmproxy
- http://corte.si/