Web server reconnaissance

Reconnaissance and fingerprinting

- Finding information about a target web server/web site
  - May be illegal to perform reconnaissance on a web server and web site without prior approval/permission.
  - Simulate via war games to demonstrate issues with trusting clients with URLs and filenames
- Fingerprinting information
  - Name and version of server
  - Database backend
  - Use of reverse proxy (nginx)
  - Programming language and web application server

1. Viewing HTTP headers

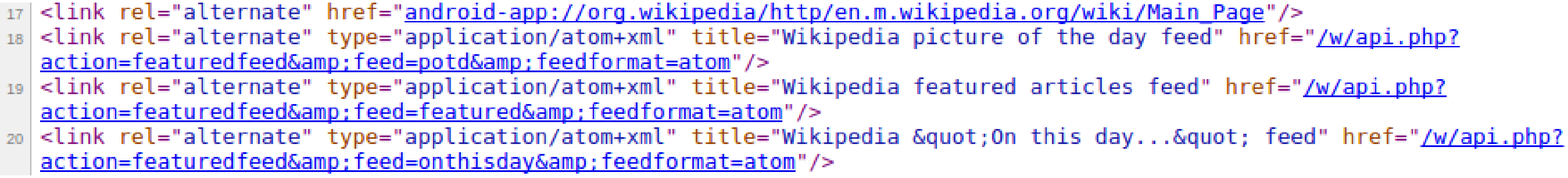
```
$ nc –C vulnerable 80
GET / HTTP/1.1
Host: vulnerable

HTTP/1.1 200 OK
Date: Sun, 03 Mar 2013 10:56:20 GMT
Server: Apache/2.2.16 (Debian)
X-Powered-By: PHP/5.3.3-7+squeeze14
Content-Length: 6988
Content-Type: text/html
```

```
$ nc –C oregonctf.org 80
HEAD / HTTP/1.1
Host: foobar
```

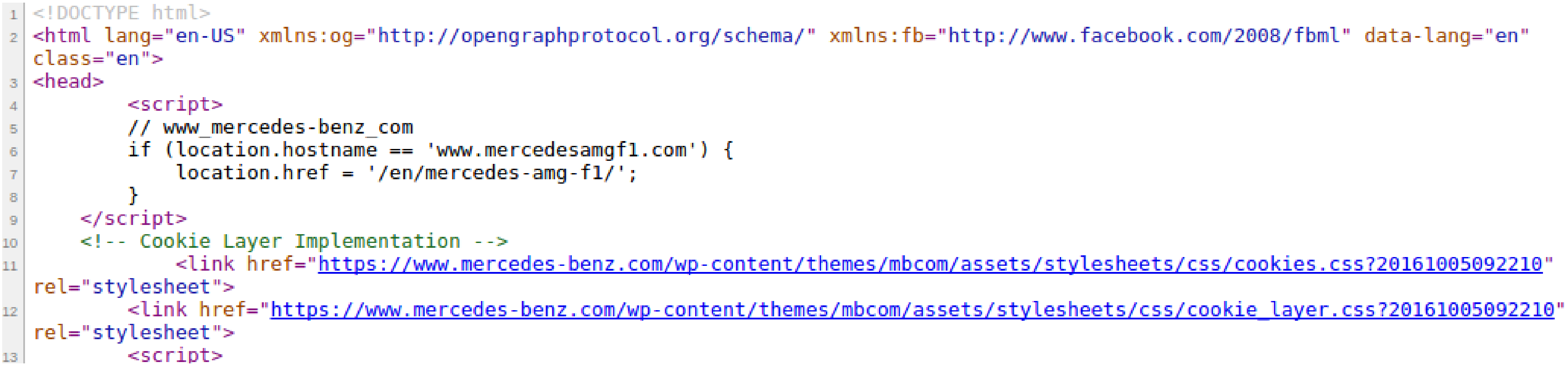
```
$ nc –C cs410.oregonctf.org 80
HEAD / HTTP/1.1
Host: cs410.oregonctf.org
```

2. Viewing source content

- Look for comments, links, or directory structure
- Wikipedia (en.wikipedia.org)



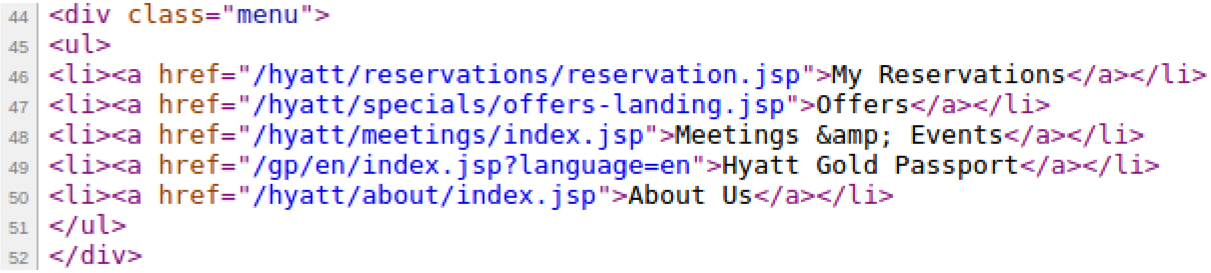
```
<link rel="alternate" href="android-app://org.wikipedia/http/en.m.wikipedia.org/wiki/Main_Page"/>
<link rel="alternate" type="application/atom+xml" title="Wikipedia picture of the day feed" href="/w/api.php?action=featuredfeed&amp;feed=potd&amp;feedformat=atom"/>
<link rel="alternate" type="application/atom+xml" title="Wikipedia featured articles feed" href="/w/api.php?action=featuredfeed&amp;feed=featured&amp;feedformat=atom"/>
<link rel="alternate" type="application/atom+xml" title="Wikipedia &quot;On this day...&quot; feed" href="/w/api.php?action=featuredfeed&amp;feed=onthisday&amp;feedformat=atom"/>
```



```
<!DOCTYPE html>
<html lang="en-US" xmlns:og="http://opengraphprotocol.org/schema/" xmlns:fb="http://www.facebook.com/2008/fbml" data-lang="en" class="en">
<head>
        <script>
        // www_mercedes-benz_com
        if (location.hostname == 'www.mercedesamgf1.com') {
            location.href = '/en/mercedes-amg-f1/';
        }
    </script>
    <!-- Cookie Layer Implementation -->
            <link href="https://www.mercedes-benz.com/wp-content/themes/mbcom/assets/stylesheets/css/cookies.css?20161005092210" rel="stylesheet">
        <link href="https://www.mercedes-benz.com/wp-content/themes/mbcom/assets/stylesheets/css/cookie_layer.css?20161005092210" rel="stylesheet">
        <script>
```

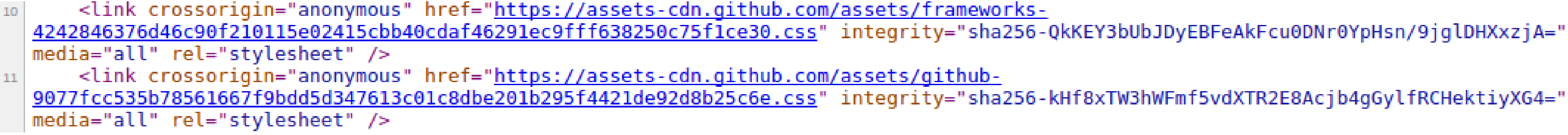
2. Viewing source content

- Hyatt.com



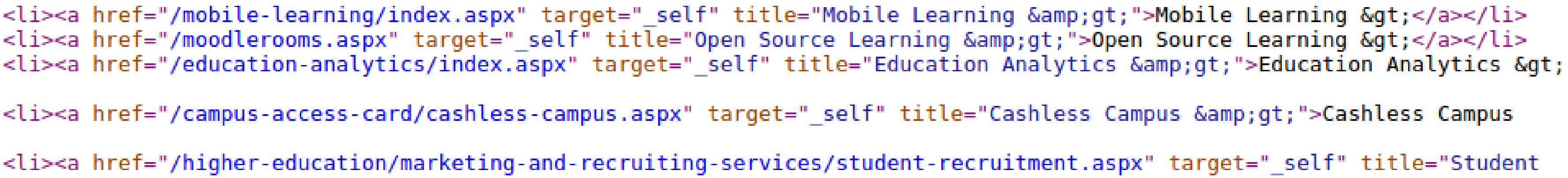
```
<div class="menu">
<ul>
<li><a href="/hyatt/reservations/reservation.jsp">My Reservations</a></li>
<li><a href="/hyatt/specials/offers-landing.jsp">Offers</a></li>
<li><a href="/hyatt/meetings/index.jsp">Meetings &amp; Events</a></li>
<li><a href="/gp/en/index.jsp?language=en">Hyatt Gold Passport</a></li>
<li><a href="/hyatt/about/index.jsp">About Us</a></li>
</ul>
</div>
```

- GitHub
  - Hint: Asset cache busting pipeline



```
    <link crossorigin="anonymous" href="https://assets-cdn.github.com/assets/frameworks-
4242846376d46c90f210115e02415cbb40cdaf46291ec9fff638250c75f1ce30.css" integrity="sha256-QkKEY3bUbJDyEBFeAkFcu0DNr0YpHsn/9jglDHXxzjA="
media="all" rel="stylesheet" />
    <link crossorigin="anonymous" href="https://assets-cdn.github.com/assets/github-
9077fcc535b78561667f9bdd5d347613c01c8dbe201b295f4421de92d8b25c6e.css" integrity="sha256-kHf8xTW3hWFmf5vdXTR2E8Acjb4gGylfRCHektiyXG4="
media="all" rel="stylesheet" />
```

- Blackboard



```
<li><a href="/mobile-learning/index.aspx" target="_self" title="Mobile Learning &amp;gt;">Mobile Learning &gt;</a></li>
<li><a href="/moodlerooms.aspx" target="_self" title="Open Source Learning &amp;gt;">Open Source Learning &gt;</a></li>
<li><a href="/education-analytics/index.aspx" target="_self" title="Education Analytics &amp;gt;">Education Analytics &gt;

<li><a href="/campus-access-card/cashless-campus.aspx" target="_self" title="Cashless Campus &amp;gt;">Cashless Campus

<li><a href="/higher-education/marketing-and-recruiting-services/student-recruitment.aspx" target="_self" title="Student
```

2. Viewing source content

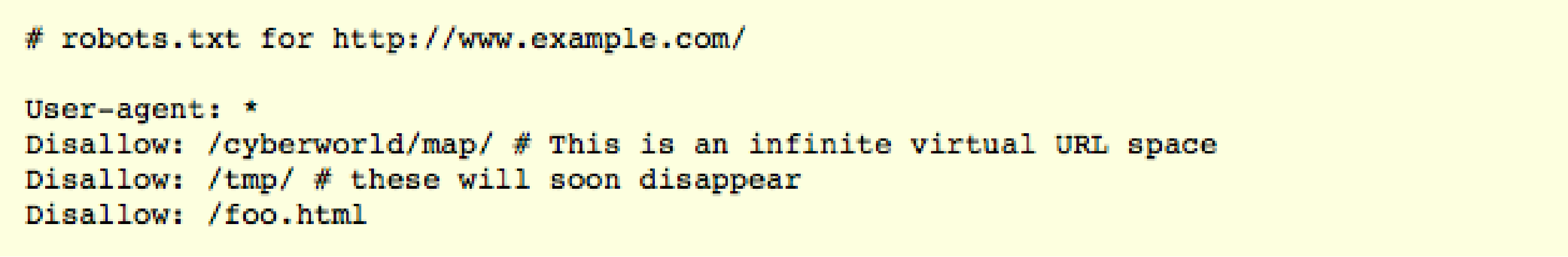
- External services
  - https://builtwith.com
  - https://wappalyzer.com
  - https://urlscan.io

3. Search engine signals

- Google, Yahoo, Bing, will crawl everything on your site unless you tell them otherwise.
  - Prevent via use of robots.txt file
  - Instructs search engine spiders how to interact with your content.
  - Can also reveal sensitive information

3. Search engine signals

- For hacker, robots.txt can contain interesting folders, files, and data to investigate.
  - Sometimes even passwords, usernames, ...
- Example
  - Specifies that no robots should visit any URL starting with "/cyberworld/map/" or "/tmp/", or /foo.html.

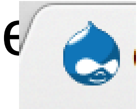


```
# robots.txt for http://www.example.com/

User-agent: *
Disallow: /cyberworld/map/ # This is an infinite virtual URL space
Disallow: /tmp/ # these will soon disappear
Disallow: /foo.html
```

```
# If the Joomla site is installed within a folder such as at
# e.g. www.example.com/joomla/ the robots.txt file MUST be
# moved to the site root at e.g. www.example.com/robots.txt
# AND the joomla folder name MUST be prefixed to the disallowed
# path, e.g. the Disallow rule for the /administrator/ folder
# MUST be changed to read Disallow: /joomla/administrator/
#
# For more information about the robots.txt standard, see:
# http://www.robotstxt.org/orig.html
#
# For syntax checking, see:
# http://tool.motoricerca.info/robots-checker.phtml

User-agent: *
Disallow: /administrator/
Disallow: /cache/
Disallow: /cli/
Disallow: /components/
Disallow: /images/
Disallow: /includes/
Disallow: /installation/
Disallow: /language/
Disallow: /libraries/
Disallow: /logs/
Disallow: /media/
Disallow: /modules/
Disallow: /plugins/
Disallow: /templates/
Disallow: /tmp/
```

4. Artifacts

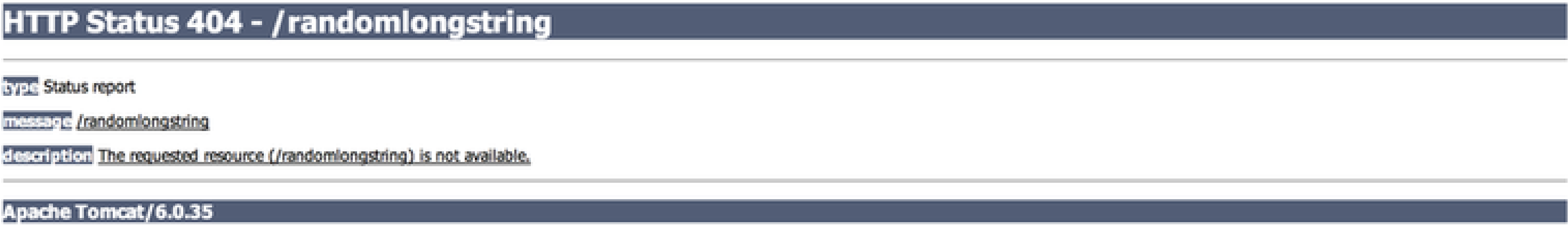
- favicon.ico
  - Default icons indicate software package being used
  - Which package



  - Search-engine worms (Santy worm 2004)
    - phpBB

4. Artifacts

- Application-specific 404 error pages
  - Tomcat, Ruby on Rails



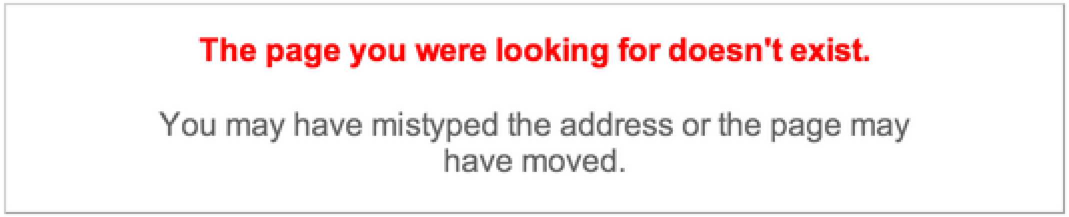
HTTP Status 404 - /randomlongstring

type Status report

message /randomlongstring

description The requested resource (/randomlongstring) is not available.

Apache Tomcat/6.0.35

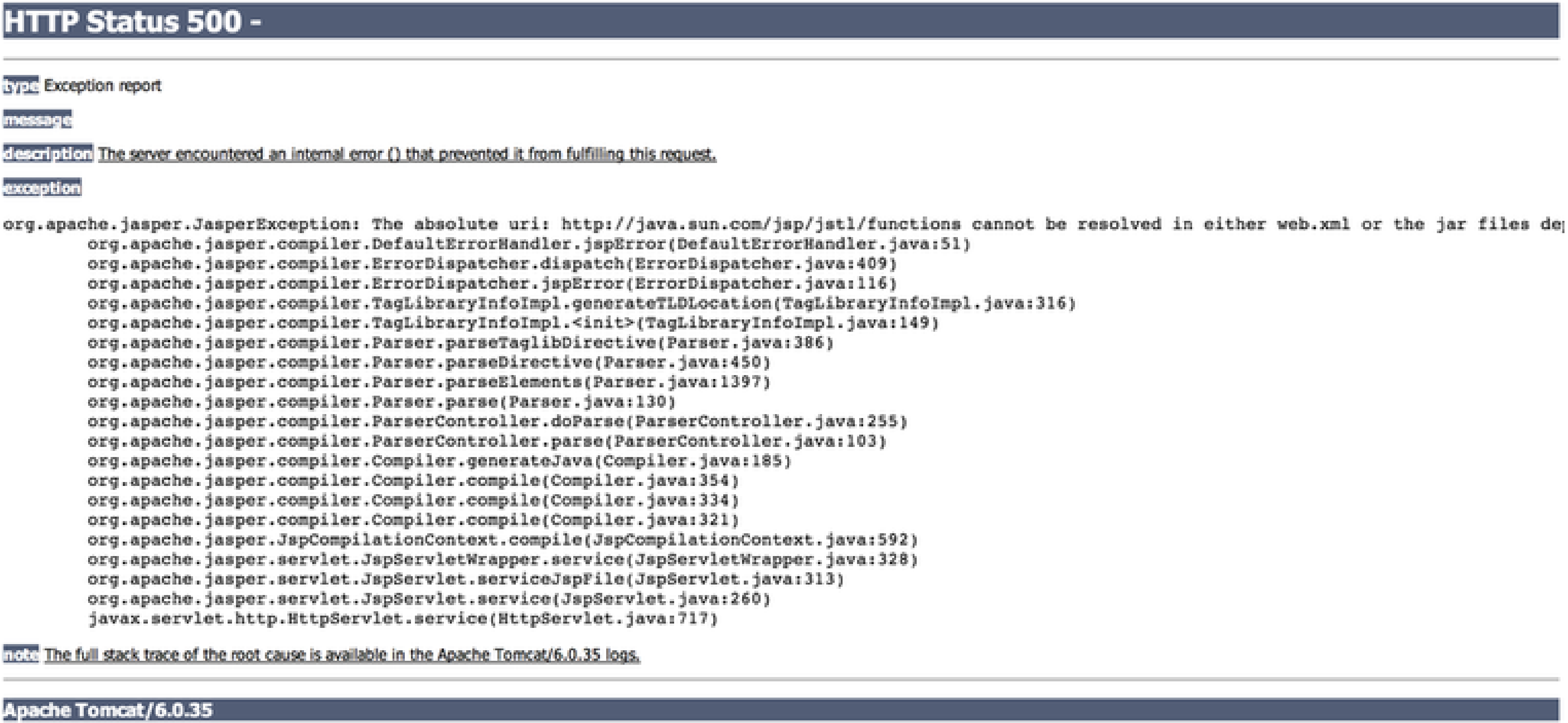


The page you were looking for doesn't exist.

You may have mistyped the address or the page may have moved.

4. Artifacts

- Stack trace of web application
  - Inject %00, %22, %27 to check for injection vulnerabilities



HTTP Status 500 -

type Exception report

message

description The server encountered an internal error () that prevented it from fulfilling this request.

exception

```
org.apache.jasper.JasperException: The absolute uri: http://java.sun.com/jsp/jstl/functions cannot be resolved in either web.xml or the jar files de
	org.apache.jasper.compiler.DefaultErrorHandler.jspError(DefaultErrorHandler.java:51)
	org.apache.jasper.compiler.ErrorDispatcher.dispatch(ErrorDispatcher.java:409)
	org.apache.jasper.compiler.ErrorDispatcher.jspError(ErrorDispatcher.java:116)
	org.apache.jasper.compiler.TagLibraryInfoImpl.generateTLDLocation(TagLibraryInfoImpl.java:316)
	org.apache.jasper.compiler.TagLibraryInfoImpl.<init>(TagLibraryInfoImpl.java:149)
	org.apache.jasper.compiler.Parser.parseTaglibDirective(Parser.java:386)
	org.apache.jasper.compiler.Parser.parseDirective(Parser.java:450)
	org.apache.jasper.compiler.Parser.parseElements(Parser.java:1397)
	org.apache.jasper.compiler.Parser.parse(Parser.java:130)
	org.apache.jasper.compiler.ParserController.doParse(ParserController.java:255)
	org.apache.jasper.compiler.ParserController.parse(ParserController.java:103)
	org.apache.jasper.compiler.Compiler.generateJava(Compiler.java:185)
	org.apache.jasper.compiler.Compiler.compile(Compiler.java:354)
	org.apache.jasper.compiler.Compiler.compile(Compiler.java:334)
	org.apache.jasper.compiler.Compiler.compile(Compiler.java:321)
	org.apache.jasper.JspCompilationContext.compile(JspCompilationContext.java:592)
	org.apache.jasper.servlet.JspServletWrapper.service(JspServletWrapper.java:328)
	org.apache.jasper.servlet.JspServlet.serviceJspFile(JspServlet.java:313)
	org.apache.jasper.servlet.JspServlet.service(JspServlet.java:260)
	javax.servlet.http.HttpServlet.service(HttpServlet.java:717)
```

note The full stack trace of the root cause is available in the Apache Tomcat/6.0.35 logs.

Apache Tomcat/6.0.35

5. TLS transparency reports

- Rogue certificate authority can create valid certificates for sites it is not supposed to
  - Force all authorities to log every certificate (for HTTPS) issued to a central location
  - Browsers eventually will reject those that are not logged
  - But, exposes all of the names of machines an organization has generated certificates for
  - Potential targets for adversaries
    - https://transparencyreport.google.com/https/certificates
    - https://observatory.mozilla.org/ (TLS section)
  - Demo: Lookup all oregonctf.org certificates and who issued them

6. Fuzzing

- Brute-force common directory names
  - (e.g. admin, config, conf, src)
  - Brute-force admin pages with default admin credentials
- `wfuzz` tool
  - Detect directories and pages on the web server using wordlists of common resource names.

```
$ wfuzz -c -z file,wordlist/general/common.txt --hc 404
  http://vulnerable/FUZZ
```

- `nmap` tool
  - General tool supporting any number of scans
  - Can specifically be used to enumerate directories in web servers similar to wfuzz

```
nmap --script http-enum w.x.y.z
```

Lab: A0 Reconaissance

- See handout