

## I Own Your Web App

Oct 10, 2014



### **OWASP**



- OWASP.org
- Security tips, tools, and coding guidance for Web applications

OWASP Top 10 – 2013 (New)		
A1 – Injection		
A2 – Broken Authentication and Session Management		
A3 – Cross-Site Scripting (XSS)		
A4 – Insecure Direct Object References		
A5 – Security Misconfiguration		
A6 – Sensitive Data Exposure		
A7 – Missing Function Level Access Control		
A8 – Cross-Site Request Forgery (CSRF)		
A9 – Using Known Vulnerable Components		
A10 – Unvalidated Redirects and Forwards		
Merged with 2010-A7 into new 2013-A6		

A1 - Injection

Injection flaws, such as SQL, OS, and LDAP injection occur when untrusted data is sent to an interpreter as part of a command or query. The attacker's hostile data can trick the interpreter into executing unintended commands or accessing data without proper authorization.

A2 – Broken
Authentication and
Session
Management

Application functions related to authentication and session management are often not implemented correctly, allowing attackers to compromise passwords, keys, or session tokens, or to exploit other implementation flaws to assume other users' identities.

A3 – Cross-Site Scripting (XSS)

XSS flaws occur whenever an application takes untrusted data and sends it to a web browser without proper validation or escaping. XSS allows attackers to execute scripts in the victim's browser which can hijack user sessions, deface web sites, or redirect the user to malicious sites.

A4 – Insecure Direct Object References

A direct object reference occurs when a developer exposes a reference to an internal implementation object, such as a file, directory, or database key. Without an access control check or other protection, attackers can manipulate these references to access unauthorized data.

A5 – Security Misconfiguration Good security requires having a secure configuration defined and deployed for the application, frameworks, application server, web server, database server, and platform. Secure settings should be defined, implemented, and maintained, as defaults are often insecure. Additionally, software should be kept up to date.

#### A6 – Sensitive Data Exposure

Many web applications do not properly protect sensitive data, such as credit cards, tax IDs, and authentication credentials. Attackers may steal or modify such weakly protected data to conduct credit card fraud, identity theft, or other crimes. Sensitive data deserves extra protection such as encryption at rest or in transit, as well as special precautions when exchanged with the browser.

#### A7 – Missing Function Level Access Control

Most web applications verify function level access rights before making that functionality visible in the UI. However, applications need to perform the same access control checks on the server when each function is accessed. If requests are not verified, attackers will be able to forge requests in order to access functionality without proper authorization.

#### A8 - Cross-Site Request Forgery (CSRF)

A CSRF attack forces a logged-on victim's browser to send a forged HTTP request, including the victim's session cookie and any other automatically included authentication information, to a vulnerable web application. This allows the attacker to force the victim's browser to generate requests the vulnerable application thinks are legitimate requests from the victim.

#### A9 - Using Components with Known Vulnerabilities

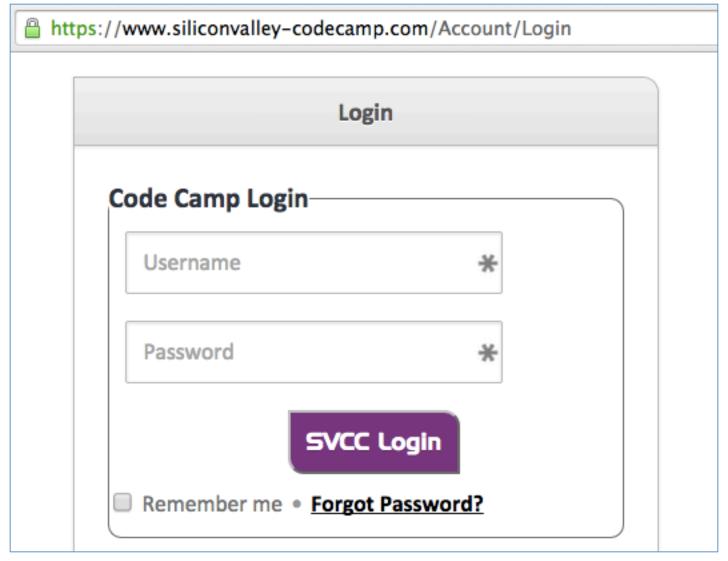
Components, such as libraries, frameworks, and other software modules, almost always run with full privileges. If a vulnerable component is exploited, such an attack can facilitate serious data loss or server takeover. Applications using components with known vulnerabilities may undermine application defenses and enable a range of possible attacks and impacts.

#### A10 – Unvalidated Redirects and Forwards

Web applications frequently redirect and forward users to other pages and websites, and use untrusted data to determine the destination pages. Without proper validation, attackers can redirect victims to phishing or malware sites, or use forwards to access unauthorized pages.

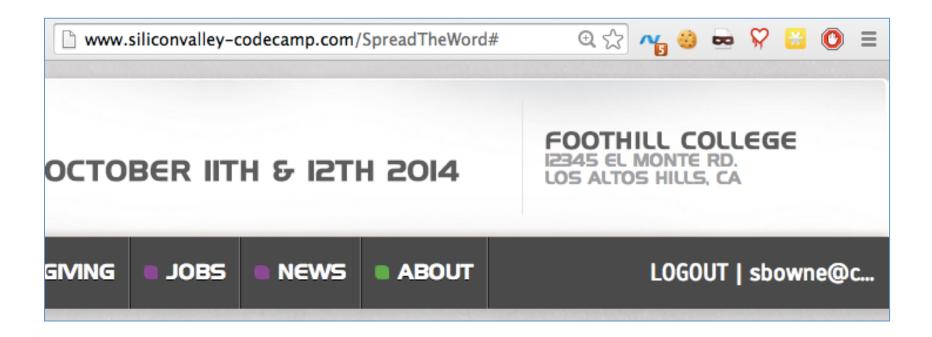
## **Cross-Site Request Forgery**

## Login Secured with HTTPS



All materials posted at samsclass.info and free to use

## Authenticated Traffic Not Encrypted



### **Authentication Cookie**

- .siliconvalley-codecamp.com | \_utma
- siliconvalley-codecamp.com | \_utmb
- siliconvalley-codecamp.com | \_utmc
- siliconvalley-codecamp.com | \_utmz
- www.siliconvalley-codecamp.com | .ASPROLES
- www.siliconvalley-codecamp.com | .ASPXAUTH



#### Value



5997076A8D292271A1F8D592C3614BFACA63C10C170B1916170EECAB4BA60A4C1B3 B76E15832B1B3B6132F497F43AF27ACBBB5F08398AD6F740C374FF856FA2870B606D 549C0CAB60DC6945B45C19A9D1B7A5F44797497C741D9405009060DA3F510CD3FCC 90110C4B779B30DA63AC6D63274B7F48962570D461DAA6D5BA6C0515664CE8D52D B1A7FD041FA668CC243F2CDC52BFA1A23AD848638DDE6C0A4FB3



Cross-Site Request Forgery (CSRF) Prevention Cheat

Sheet

```
1 Introduction
```

- 2 Prevention Measures That Do NOT Work
  - 2.1 Using a Secret Cookie
  - 2.2 Only Accepting POST Requests
  - 2.3 Multi-Step Transactions
  - 2.4 URL Rewriting
- 3 General Recommendation: Synchronizer Token Pattern
  - 3.1 Disclosure of Token in URL
  - 3.2 Viewstate (ASP.NET)
  - 3.3 Double Submit Cookies
  - 3.4 Encrypted Token Pattern
    - 3.4.1 Overview
    - 3.4.2 Validation
- 4 CSRF Prevention without a Synchronizer Token
  - 4.1 Checking The Referer Header
  - 4.2 Checking The Origin Header
  - 4.3 Challenge-Response
- 5 Client/User Prevention
- 6 No Cross-Site Scripting (XSS) Vulnerabilities

### **Blanket Solution: HTTPS**

- Use HTTPS for all transactions
- But that might be
  - Expensive
  - Complicated
  - Slow







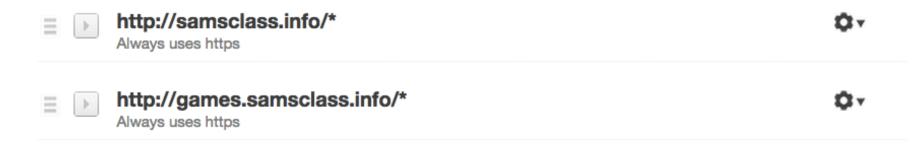


Websites

**Dashboards** 

### Page Rules for samsclass.info

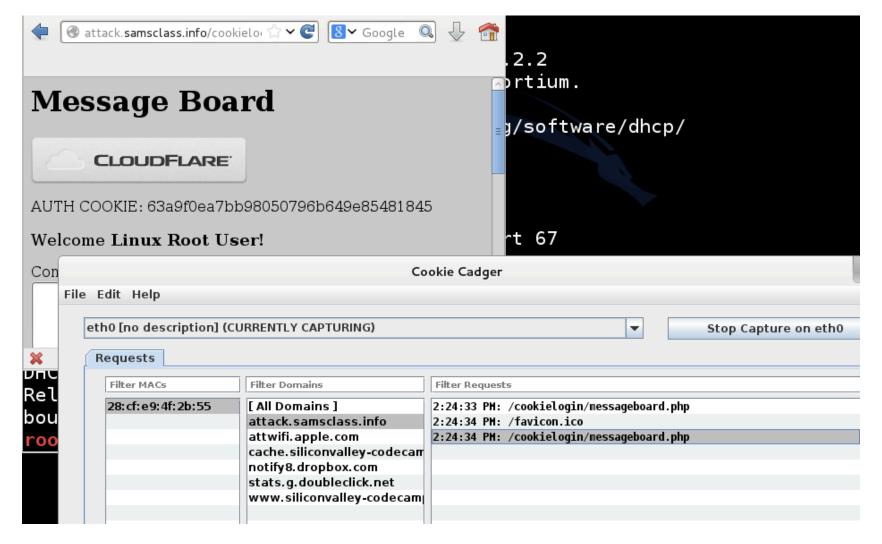
From this editor you may set rules that apply to sub sections of your website. You can forward, set a custom cache level and exclude certain CloudFlare settings and apps. Page rule priority is determined by their position in the list. If multiple rules match a URL, rules at the top take higher priority. You can reorder the priority of a rule by dragging the rule higher using the icon on the left-hand side.



### **CSRF** Demo

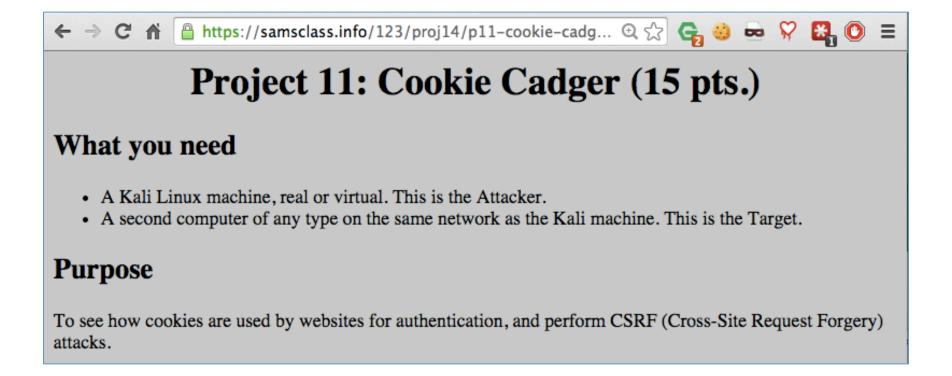


## Cookie Cadger



All materials posted at samsclass.info and free to use

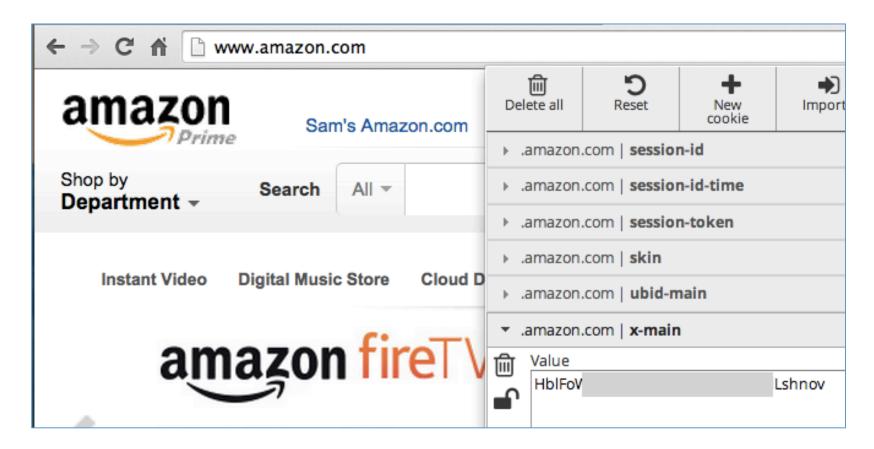
## Homework Project



### **Vulnerable Sites**

- Amazon.com
- AOL.com
- siliconvalley-codecamp.com

## Amazon Sends Authentication Token Unencrypted



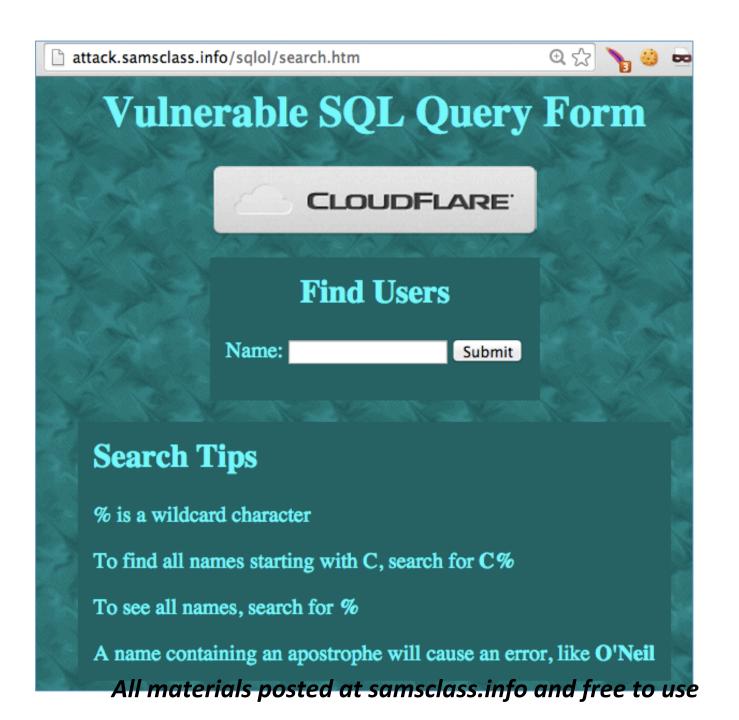
## **HTTPS-Only Sites**

- Google and Gmail
- Live.com (Microsoft)
- Yahoo.com
- Paypal.com

## Partially Vulnerable Sites

- Tigerdirect.com
- Wordpress.com

## **SQL** Injection



## **SQL** Injection

- Vulnerability caused by using input from the user which can be misinterpreted as active code
- Weak defense: filter out special characters
- Strong defense: parameterized queries

```
SAFER CODE USING PARAMETERIZED OUERIES STARTS HERE
# PDO CONNECTION CODE
|$dbConnection = new PDO('mysql:dbname=sqlol;host=127.0.0.1;charset=utf8', $username, $password);
sdbConnection->setAttribute(PDO::ATTR EMULATE PREPARES, false);
$dbConnection->setAttribute(PDO::ATTR ERRMODE, PDO::ERRMODE EXCEPTION);
$where clause = 'WHERE username LIKE :uname';
$query = "SELECT $column name FROM $table name $where clause $group by clause $order by clause ";
$displayquery = $query;
$stmt = $dbConnection->prepare($query);
$qin = $ REQUEST['q'];
$stmt->execute(array(':uname' => $qin));
while ($row = $stmt->fetch()) {
print r($row);
echo "<br>\n";
 END OF PARAMETERIALD materials posted at samsclass.info and free to use
```

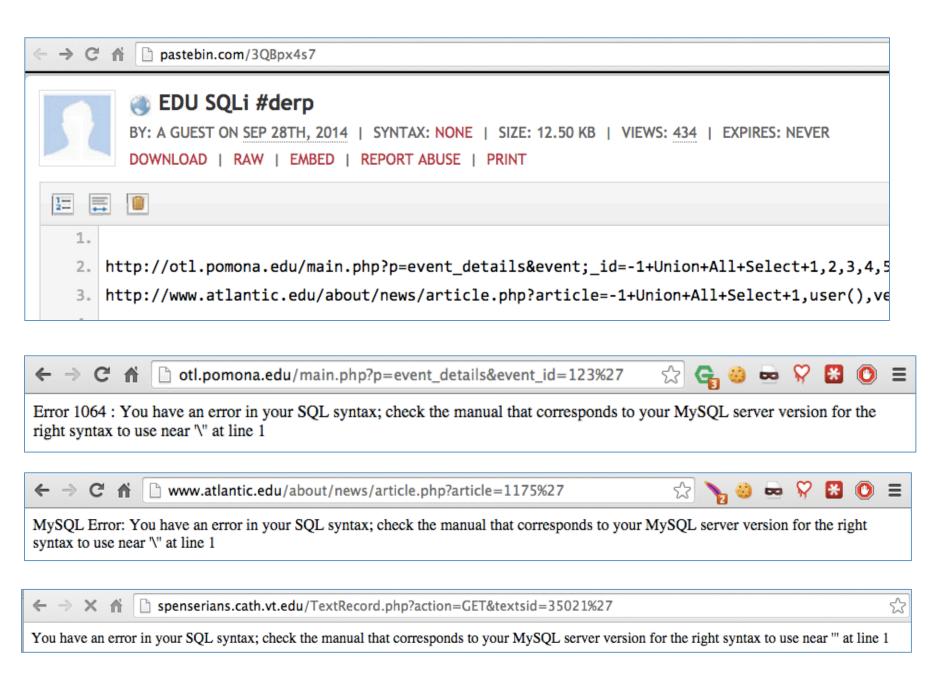
## SQLi on Pastebin





### **URL for Live Demo**

http://app.ocp.dc.gov/RUI/information/ awards/detail.asp? award\_id=4279%27%20AND %20999=991%20AND%20%27AEEs%27= %27AEEs

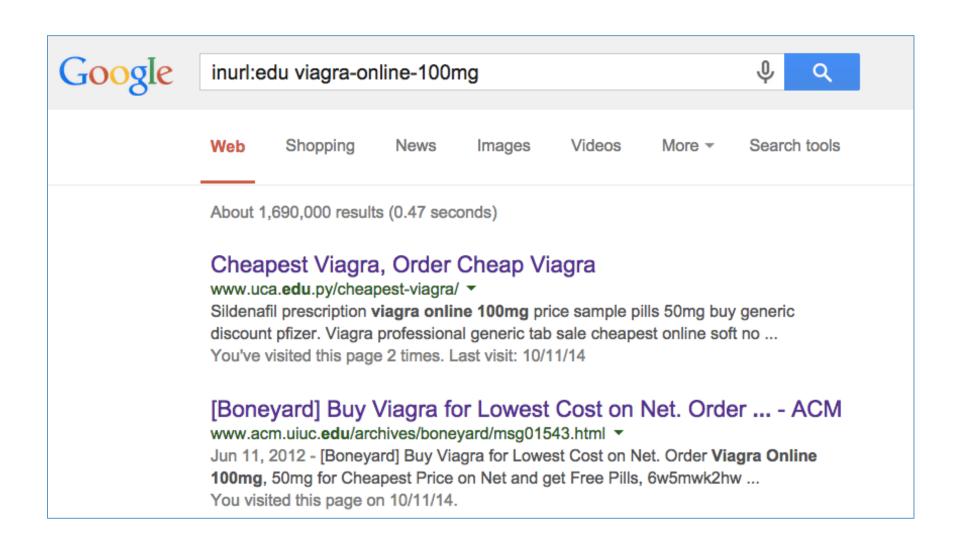


## **Extracting Data**

No apostrophe required



## Pharma Infections at Colleges



## 19 Colleges Infected with Pharma

- 5 Fixed within a few weeks
- 7 Fixed within 8 months
- 7 Still Infected on 7-19-14
- http://samsclass.info/125/proj11/subtle-infect.htm#19more

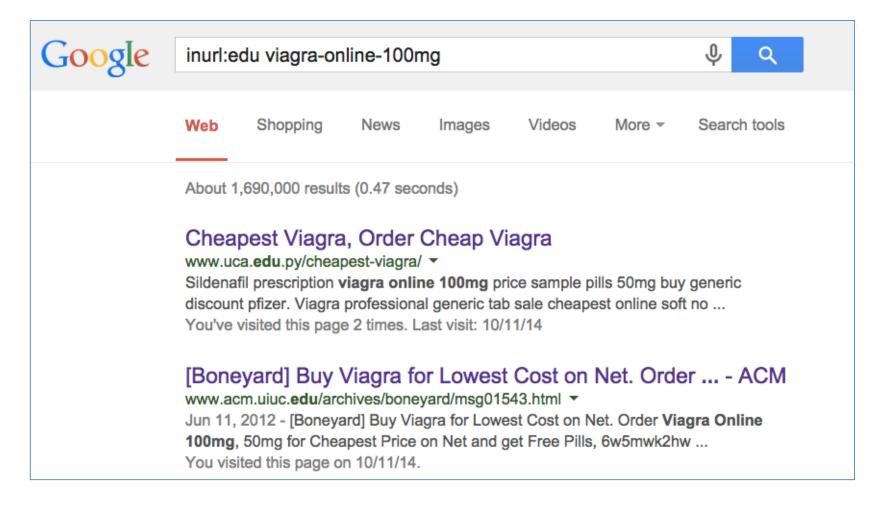
rickgalvanlaw.com/employment-law-blog/mcccd-security-breach-timeline-events/

## Maricopa Security Breach

1/2011	Maricopa main webservers compromised.  Maricopa security monitoring system (OVIS)  compromised.	
4/2013	Maricopa webservers that were compromised in 2011 are once again compromised in 2013.	

Maricopa Executives had received more than 12 warnings and notifications of risk/impact to Maricopa since the 2011 incident by the same Maricopa IT employees now being blamed for the 2013 security incident.

### Infections at UC Santa Cruz



# Letter to Jerry Brown and Janet Napolitano Re: UCSC Compromise

To: Governor Jerry Brown and UC President Janet Napolitano

Sent by email to: president@ucop.edu CC: chancellor@ucsc.edu

- UCSC cleaned their server
- Re-infected a week later
- NEED ROOT CAUSE ANALYSIS

## Many More Pharma Infections

- Dozens of other schools, businesses, foreign sites, etc.
- http://samsclass.info/125/proj11/subtleinfect.htm#19more

# **Exposed Data**

#### **Exposed Error Logs**

- Can leak cookies
- Even when secured by HTTPS



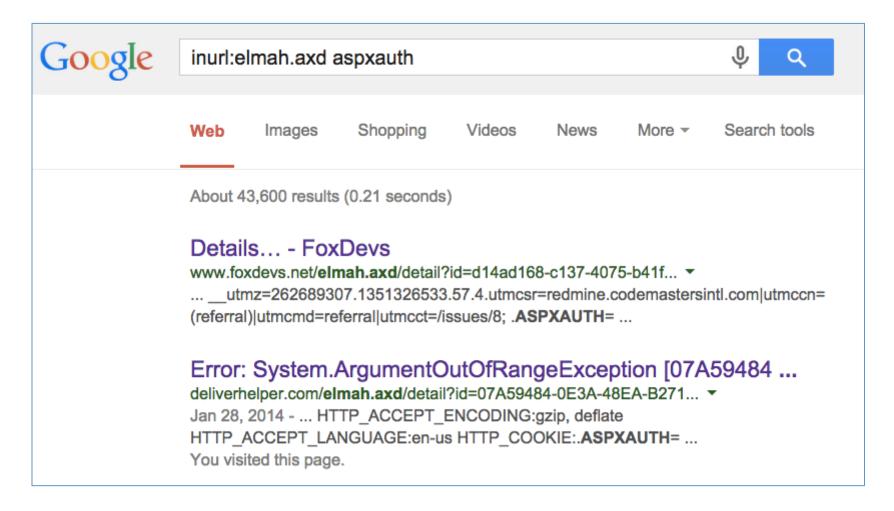
#### Error Log for ROOT on WEB1

RSS FEED RSS DIGEST DOWNLOAD LOG HELP ABOUT

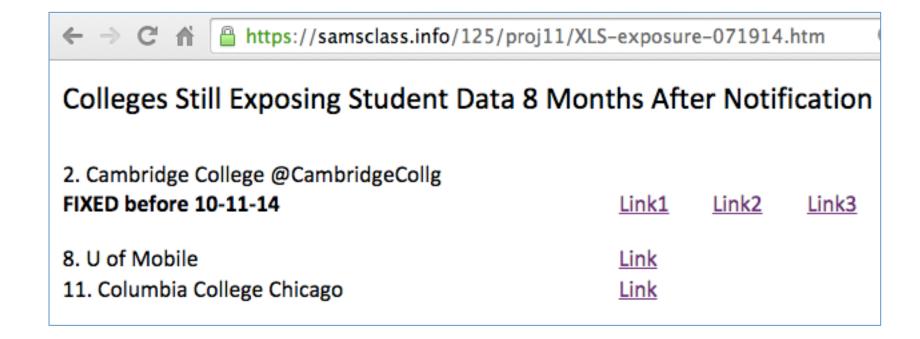
Errors 1 to 15 of total 3,795 (page 1 of 253). Start with 10, 15, 20, 25, 30, 50 or 100 errors per page.

Host	Code	Туре	Error	User	Date	Time
WEB1	400	Http	A potentially dangerous Request.Path value was detected from the client (<). <u>Details</u>		10/11/2014	12:48 PM
WEB1	0	Argument	Exception of type 'System.ArgumentException' was thrown. Parameter name: name <u>Details</u>		10/10/2014	12:57 PM

# Google Dork for Exposed ELMAH Pages



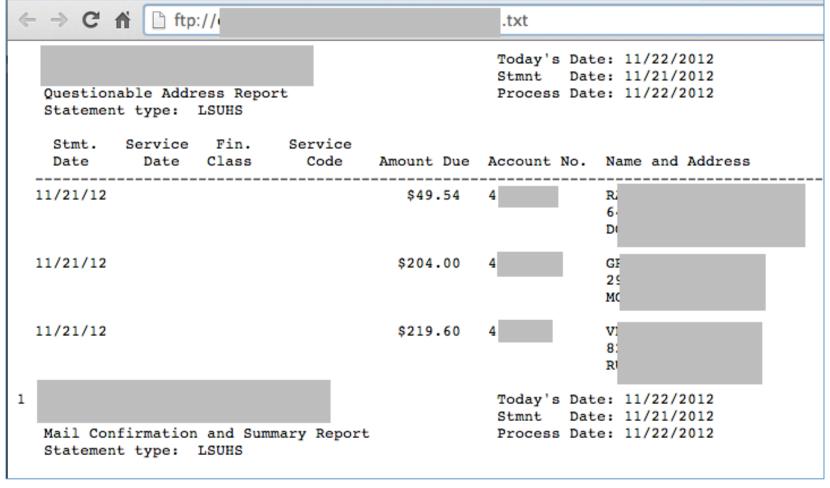
#### **Exposed Student Data**



#### **Exposed Password Hash**



## Open FTP Server with Medical Data



All materials posted at samsclass.info and free to use

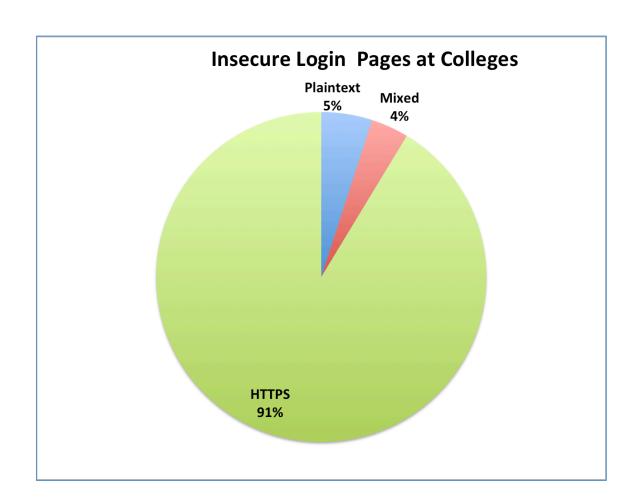
# Libel by SC Magazine



# Plaintext Login Pages at Colleges

## Insecure Login Pages at Colleges

90 colleges notified in Dec, 2013



#### Big Names

- Cornell
- Johns Hopkins
- Stanford
- UC Berkeley

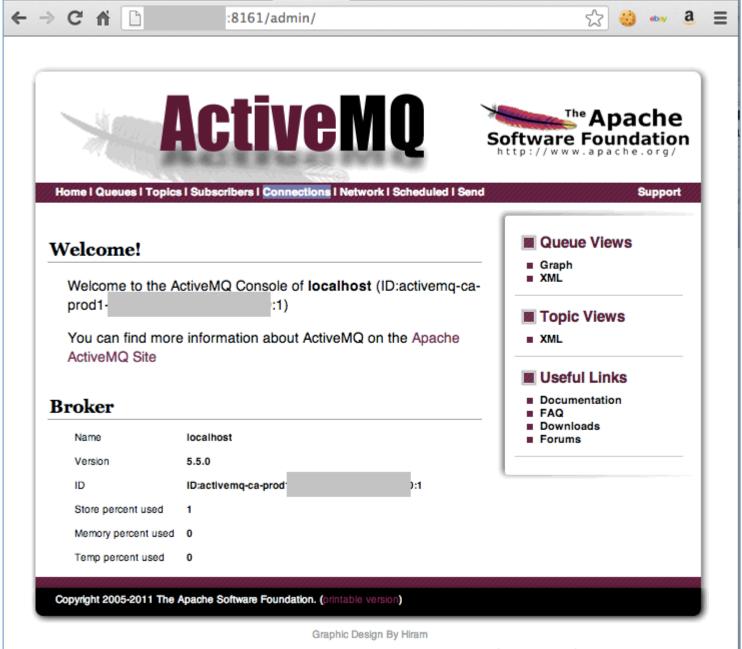
#### Results

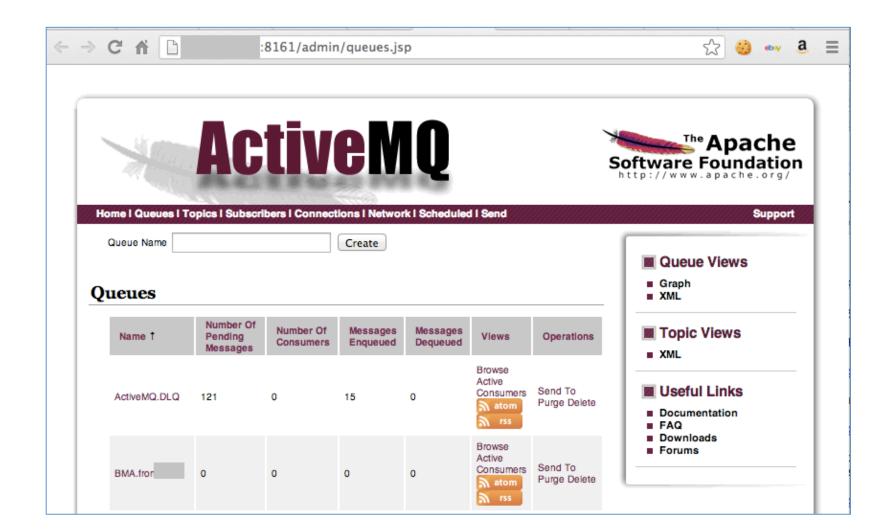
- 7 months after notification:
- 16/57 plaintext login pages fixed or improved (28%)
- 8/33 mixed login pages fixed or improved (24%)

#### **Other Problems**

#### ActiveMQ

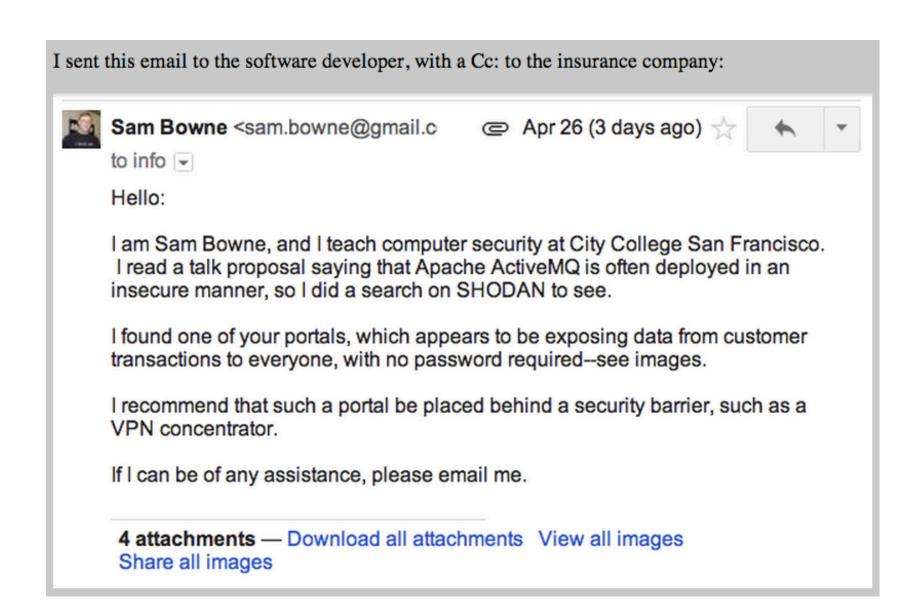
- Free open-source middleware from Apache
- A Defcon talk said it was often insecure, so I looked on SHODAN to see

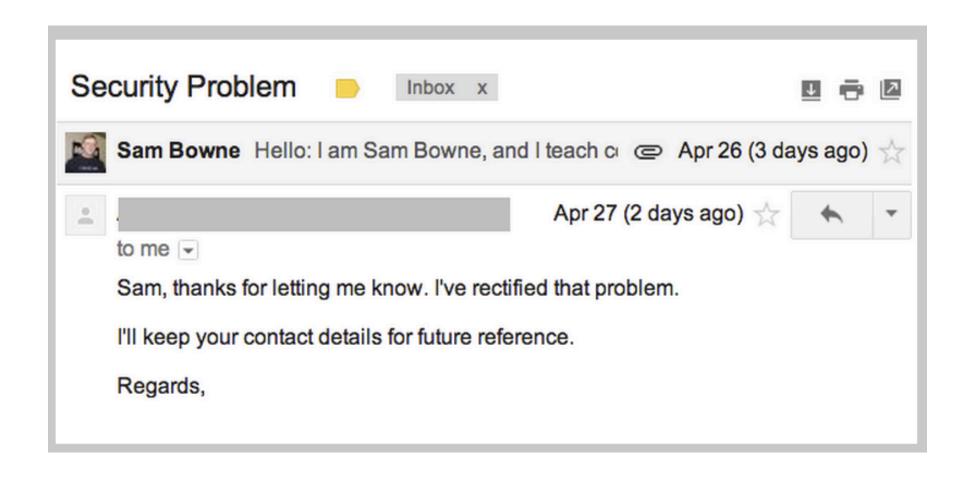




#### Real Check Data?

:8161/admin/queueBrowse/ActiveMQ.DLQ?view=rss&feedType=rss\_2.0 🖔





# **Wordpress Bots**

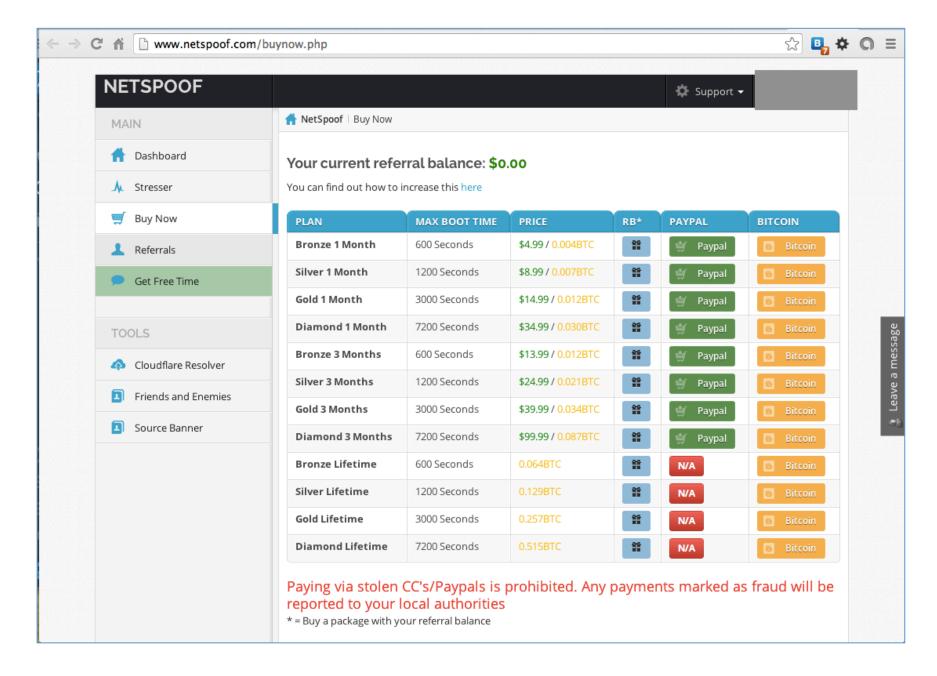
#### >2000 WordPress Bots



Thanks to Steven Veldkamp

#### WordPress Has Known for 7 Years



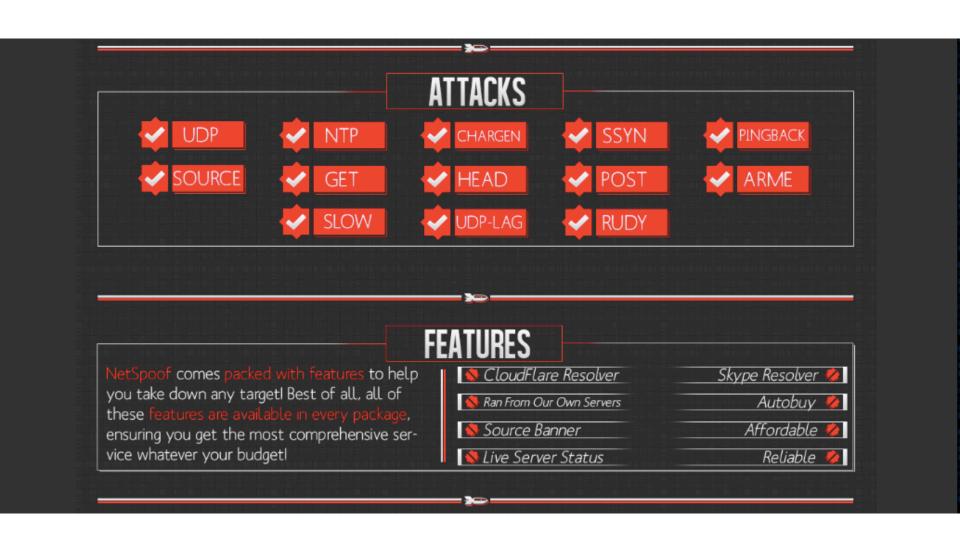


All materials posted at samsclass.info and free to use



#### **ABOUT US**

Welcome to our thread! We supply a hard hitting, reliable booter that can take down the hardest targets with ease. NetSpoof comes jam-packed with loads of features and attack methods too, to help you bring your target down as fast as possible, and make it stay down! That's not all, we supply this quality and powerful booter to you for an unbeatable price- starting at just \$4.99, there really is no contest- no other booter can provide our mixture of power, affordability and reliability!





## Open DNS Resolvers at Colleges

#### **Top USA Educational Open Resolvers**

		Number
	Name	Open
1	CSUNET-NW - California State University Network	103
2	ENA - Education Networks of America	64
3	ONENET-AS-1 - Oklahoma Network for Education Enrichment and	37
4	UNIV-ARIZ - University of Arizona	33
5	WISC-MADISON-AS - University of Wisconsin Madison	22
6	UIC-AS - University of Illinois at Chicago	20
7	UNIVHAWAII - University of Hawaii	19
8	UCSB-NET-AS - University of California, Santa Barbara	18
9	MORENET - University of Missouri - dba the Missouri Research	16
10	WEST-NET-WEST - Utah Education Network	15

#### Results

- Seven months after notification
- 38% decrease in open resolvers, from a total of 682 to 421

#### Old Wordpress Version

- Wall Street Journal
  - Wordpress version from 2012
  - Ty Ryan Satterfield (@I\_am\_ryan\_S)