Web Vulnerabilities

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Web Vulnerabilities

• once you put up a site, you *will* be attacked
• web applications make you vulnerable
  • database = opportunity to steal, modify, or add information
    • place an order in your Amazon account
    • add comment/link spam to a web site
    • delete your email
  • Javascript = opportunity to run a program on user’s machine
    • redirect you to a site
    • trick user into entering password
    • steal cookies or login credentials
    • change DNS entry to impersonate your bank
• two common attacks: XSS, CSRF
XSS
XSS

- Cross-Site Scripting (XSS) attack
  - attacker injects client-side script into a web page viewed by someone else
  - relies on browser trusting the scripts given to it by the current web site
- *if I visit Facebook, I should be safe to execute scripts the Facebook site gives me*
Example Vulnerability

- if server does not check the input, then an attacker can inject a script

```html
1  http://www.google.com/search?q=flowers
2
3  <p>Your search for 'flowers'
4  returned the following results:</p>
```
Example Vulnerability

1. `http://www.google.com/search?q=flowers+<script>alert(1)</script>`
2. `</script>`
3. `<p>Your search for ’flowers<script>alert(1)</script>’ returned the following results:</p>

- if you can execute a script, then you can
  - redirect to malware
  - deface a web site
  - steal cookies, passwords, clipboard
XSS Statistics

- WhiteHat Web Site Security Statistics Report, 2010
  - 64% of web sites vulnerable to XSS attack
  - 105 days on average to fix it (banking is faster, retail is slower)
- why aren’t they fixed?
  - no one at organization understands them or is responsible for fixing them
  - features prioritized ahead of security
  - code owned by an unresponsive third party
  - risk is accepted
XSS Types

- reflected
  - user input read from request parameters in URL and written directly to output
  - attack usually delivered via email or a neutral web site
  - get user to click on URL

- persistent
  - script stored directly on a web site (e.g. a Facebook status or Flickr caption)
  - when victim visits the web page, viewing the page triggers the attack
XSS Vulnerability, Django

- site accepts comments, stores input directly from user
- when comment is displayed, it can include anything, including script

```python
1  c = Comment()
2  c.text = request.POST['text']
3  c.save()
```
Example

- list-o-matic
- load the page xss.html in a browser
- use Firefox, compare with Chrome
Protection from XSS

- filter input
- escape output
- many web development frameworks do this for you automatically
CSRF
**CSRF**

- Cross-Site Request Forgery (CSRF) attack
  - attacker tricks victim into executing a script on a site where the victim has an account
  - relies on server trusting the user’s identity
- *if the user logs in to my bank and sends me a request to withdraw funds that contains his login cookie, then I can trust that it is really her*
Example Vulnerability

```
<html>
<body>
<p>Welcome!</p>
<img src=http://bank.example.com/transfer?fromaccount=bob&
    amount=1000000&toaccount=mallory">
</html>
```

- if you are currently logged into your bank, then the bank cannot tell that this request isn’t coming from you
CSRF Statistics

- WhiteHat Web Site Security Statistics Report, 2010
  - 24% of web sites vulnerable to CSRF attack
  - hard to capture because web site logs make it look like a legitimate user request, may be under-reported
- identified on ING Direct (banking), YouTube, MetaFilter, The NY Times in 2008
Example

- list-o-matic
- load the page csrf.html in a browser
- use Firefox, compare with Chrome
Protection from CSRF

- tokens
  - require a GET request to get a form before accepting a POST request for the form
  - send a token in the GET request that must be echoed back in the POST
  - token should be random and unique to that form
  - expire the token after a short time
- require user authorization for significant transactions