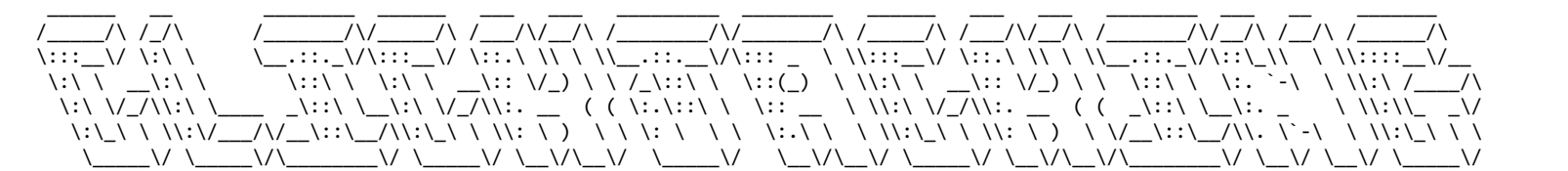


# Clickjacking (UI Redress)

- When the attacker uses multiple transparent or opaque layers to trick a user into clicking on a button or link on another page when they were intending to click on the top level page
- Clicks are “hijacked” and routed to another page
- You can kind of think of it as a more involved and more “physical” CSRF attack

# Example

- Assumption: victim is logged into social network
- Imagine a page with a “click to view embarrassing photos” link
- On top of that page (and invisible to the user) the attack has loaded an iFrame with their page on a social network
- The attacker lines up the “add friend” button on their profile page up with the “click to view” link
- When the user clicks to view the embarrassing photos they are actually clicking the “add friend” button
- The user is tricked into adding the attacker as their friend on the social network

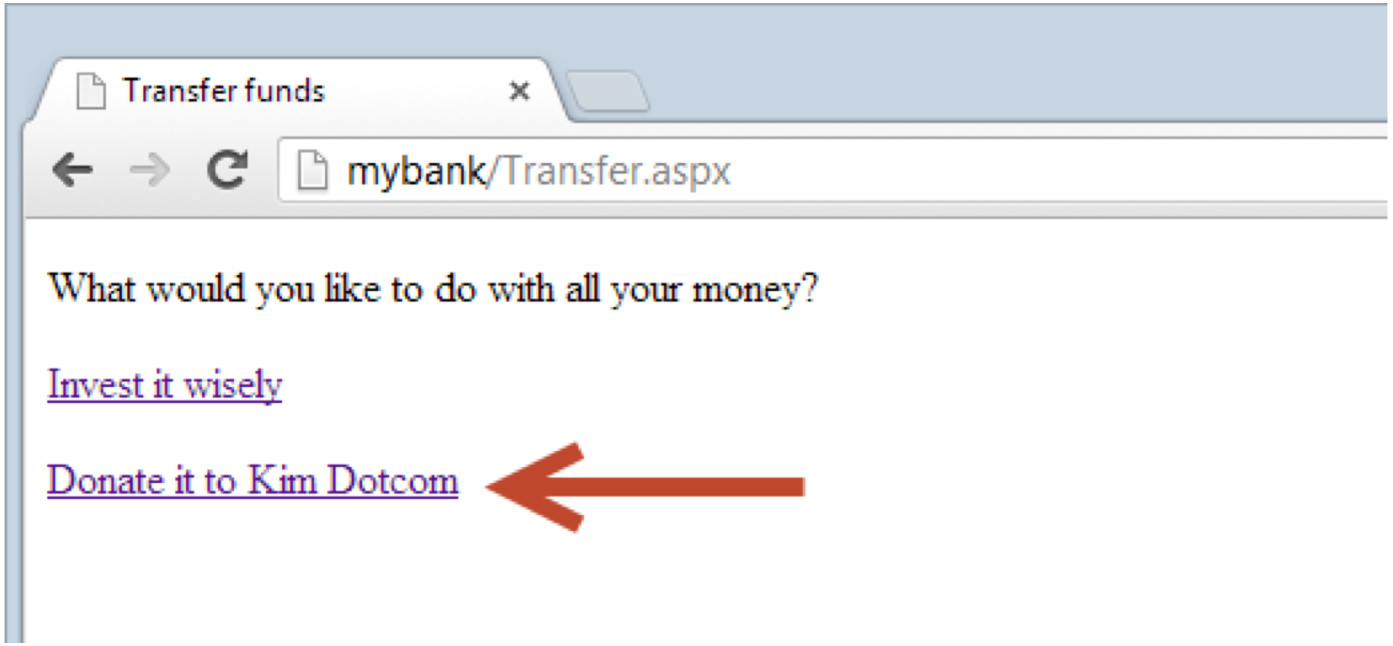

Figure 1: Visualization of a clickjacking attack on Twitter's account deletion page.

Win an iPad Mini!!!

winipad/

Hey - we're giving away iPad minis!!! Just click the WIN button and it's yours!!!

>> WIN <<


Transfer funds
mybank/Transfer.aspx
What would you like to do with all your money?
Invest it wisely
Donate it to Kim Dotcom

Win an iPad Mini!!!

winipad/

Hey - we're giving away iPad minis!!! Just click the WIN button and it's yours!!!

What would you like to do with all your money?

Invest it wisely

>> Donate it to Kim Dotcom <<

WIN

# Code Example

```
<div style="position: absolute; left: 10px; top: 10px;">Hey - we're giving away iPad minis!!! Just click
the WIN button and it's yours!!!</div>
<div style="position: absolute; left: 200px; top: 50px;">
  <img src="http://images.apple.com/my/ipad-mini/overview/images/hero.jpg" width="250">
</div>
<div style="position: absolute; left: 10px; top: 101px; color: red; font-weight: bold;">>>> WIN <<<</div>
<iframe style="opacity: 0;" height="545" width="680" scrolling="no" src="http://mybank/Transfer.aspx">
</iframe>
```

# Two Main Defenses

- X-Frame-Options HTTP response header
- Framebusting UI code

# X-Frame-Options header

- The only “real” solution
- Tells the browser whether a requested page can be framed
- Can be tweaked per page
- Three values:
  - DENY - no framing period
  - SAMEORIGIN - can only be framed in the same domain
  - ALLOW-FROM - can only be framed by trusted pages

# Framebusting UI code

- Check to see if the page is same as the one loaded from the address bar

```
if (top.location != location) {
  top.location = self.location;
}
```

# Common Defenses

| unique sites | conditional statement |
|---|---|
| 38% | `if (top != self)` |
| 22.5% | `if (top.location != self.location)` |
| 13.5% | `if (top.location != location)` |
| 8% | `if (parent.frames.length > 0)` |
| 5.5% | `if (window != top)` |
| 5.5% | `if (window.top !== window.self)` |
| 2% | `if (window.self != window.top)` |
| 2% | `if (parent && parent != window)` |
| 2% | `if (parent && parent.frames && parent.frames.length>0)` |
| 2% | `if((self.parent&&!(self.parent===self))&&(self.parent.frames.length!=0))` |

Table 2: Frame busting conditional statement

Can anyone think of bypasses to these?

# Framebusting Arms Race

- Frame buster busters such as:
  - Nesting the victim site in two frames as the double framing causes the descendent frame navigation policy to disable redirection
  - Tapping into the onBeforeUnload event to cancel the redirection (albeit with some user input) when the frame buster attempts to unload the page
  - Exploiting XSS filters designed to prohibit Cross-Site Scripting in order to cancel out the frame buster

Can you think of a bypass?

# USBank framebusting

```
if (self != top) {
  var dom = getDom(document.referrer);
  var okDom = /usbank|localhost|usbnet/;
  var matchDomain = dom.search(okDom);

  if (matchDomain == -1) {  //bust }
```

# USBank framebusting issues

- Still allows domains with the word usbank in it
- Can be framed by:
  - http://www.husbanken.no
  - http://www.rusbank.org
  - Or any domain registered by an attacker with usbank in it

# Myspace framebusting

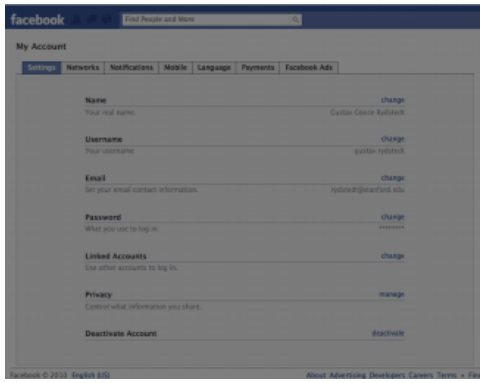
```
try{
  A=!top.location.href
}catch(B){}
A=A&&!(document.referrer.match(
  /^https?:\/\/[-a-z0-9.]*\.google\.(co\.
  |com\.)?[a-z]+\/imgres/i))
  &&!(document.referrer.match(
  /^https?:\/\/([^\/]*\.)?(myspace\.com
    |myspace\.cn
    |simsidekick\.com
    |levisawards\.com\//i));
if(A) { // frame bust }
```

# Myspace framebusting issues

- Allows for framing by Google images
- Google images does not employ frame busting
- An attack simply frames Google images and then cause Google images to frame Myspace

# A Clever Clickjacking Protection

- Facebook.com inserts a gray semi-transparent div that covers all of the content when a profile page is framed
- Allows framing but blocks clickjacking attacks




```
if (top != self) {
  window.document.write(''<div style=
      'background: black; opacity: 0.5;
      filter: alpha(opacity = 50);
      position: absolute; top: 0px; left: 0px;
      width: 9999px; height: 9999px;
      z-index: 1000001'
 onClick='top.location.href=window.location.href'>
  </div>'');
}
```

# Facebook.com bypass

- Make the enclosing frame so large that the center of the frame is outside of the dark div
- The content centers itself automatically
- The scrollTo function dynamically scrolls to the center

```
<body style="overflow-x:hidden;
border:0px;margin:0px;">

<iframe width="21800px" height="2500px"
  src="http://facebook.com/"
  frameborder="0"
  marginheight="0" marginwidth="0" >
</iframe>

<script> window.scrollTo(10200,0);
</script>
```

# Resources

- http://www.troyhunt.com/2013/05/clickjack-attack-hidden-threat-right-in.html
- http://seclab.stanford.edu/websec/framebusting/framebust.pdf
- https://www.owasp.org/index.php/Clickjacking