

High Performance Mobile





the
WPO
Industry is Here

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30 March 2010

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Fred Wilson's 10 Golden Principles of Successful Web Apps

BY KEIR WHITAKER



FUTURE OF WEB APPS
CONFERENCE 14 MAY 2010 DUBLIN

In February 2010 [Fred Wilson](#), a New York-based tech investor, spoke at the annual [Future of Web Apps](#) conference. In a talk, clocking in at just under 30 minutes, looks at his top 10 principles for creating a successful web app. A full transcript is available below.

The 10 Golden Principles of Successful Web Apps



27:41

17

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#1. Speed: “First and foremost, we believe that speed is more than a feature. Speed is the most important feature.”

Think Vitamin Radio

Think Vitamin Radio: Episode #5

0:00

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Recent Articles

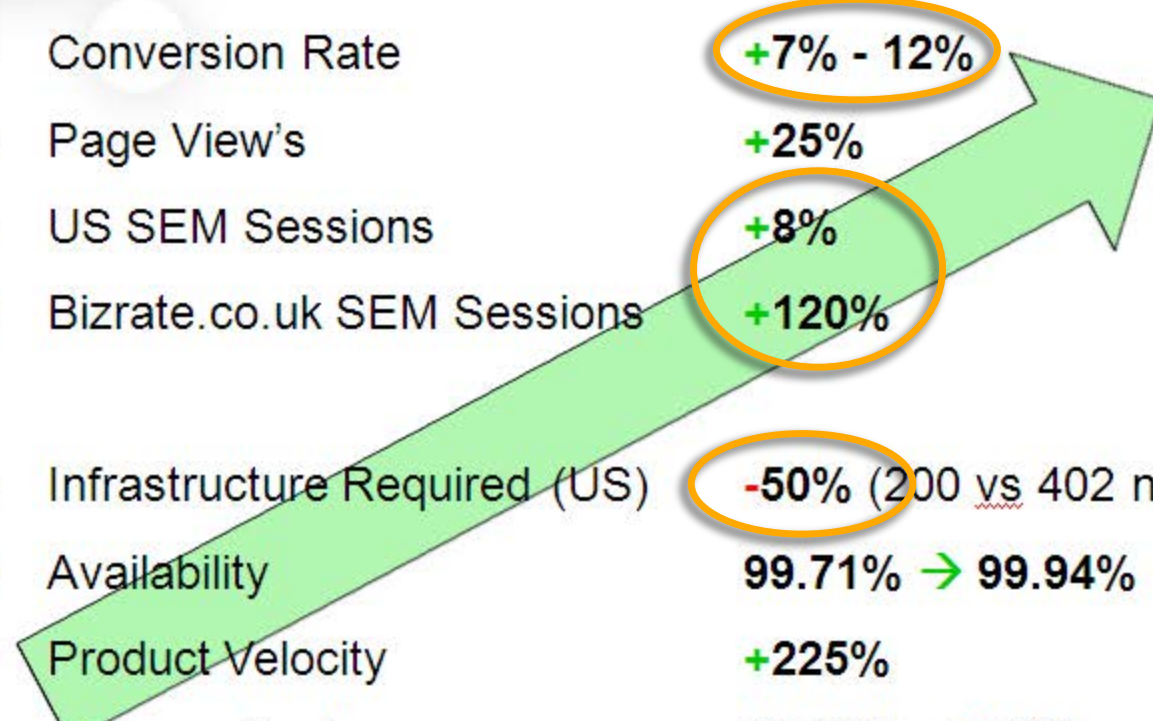
Server Delays Experiment: Results

	Distinct Queries/User	Query Refinement	Revenue/User	Any Clicks	Satisfaction	Time to Click (increase in ms)
50ms	-	-	-	-	-	-
200ms	-	-	-	-0.3%	-0.4%	500
500ms	-	-0.6%	-1.2%	-1.0%	-0.9%	1200
1000ms	-0.7%	-0.9%	-2.8%	-1.9%	-1.6%	1900
2000ms	-1.8%	-2.1%	-4.3%	-4.4%	-3.8%	3100

- Means no statistically significant change

- Strong negative impacts
- Roughly linear changes with increasing delay
- Time to Click changed by roughly double the delay

Performance Summary

- 
- Conversion Rate **+7% - 12%**
 - Page View's **+25%**
 - US SEM Sessions **+8%**
 - Bizrate.co.uk SEM Sessions **+120%**
 - Infrastructure Required (US) **-50%** (200 vs 402 nodes)
 - Availability **99.71% → 99.94%**
 - Product Velocity **+225%**
 - Release Cost **\$1,000's → \$80**



WPO

Web
Performance
Optimization

drives traffic

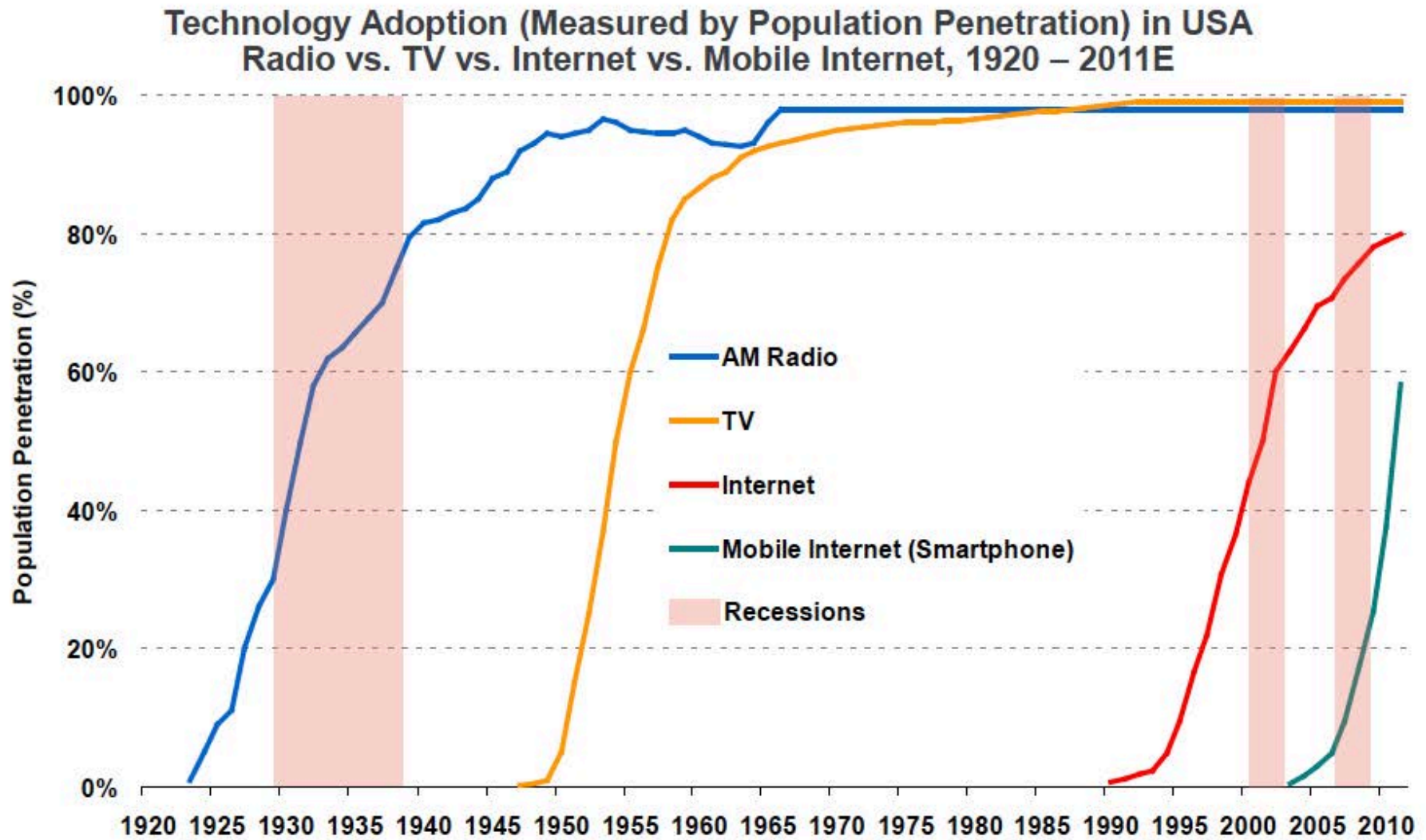
improves UX

increases revenue

reduces costs

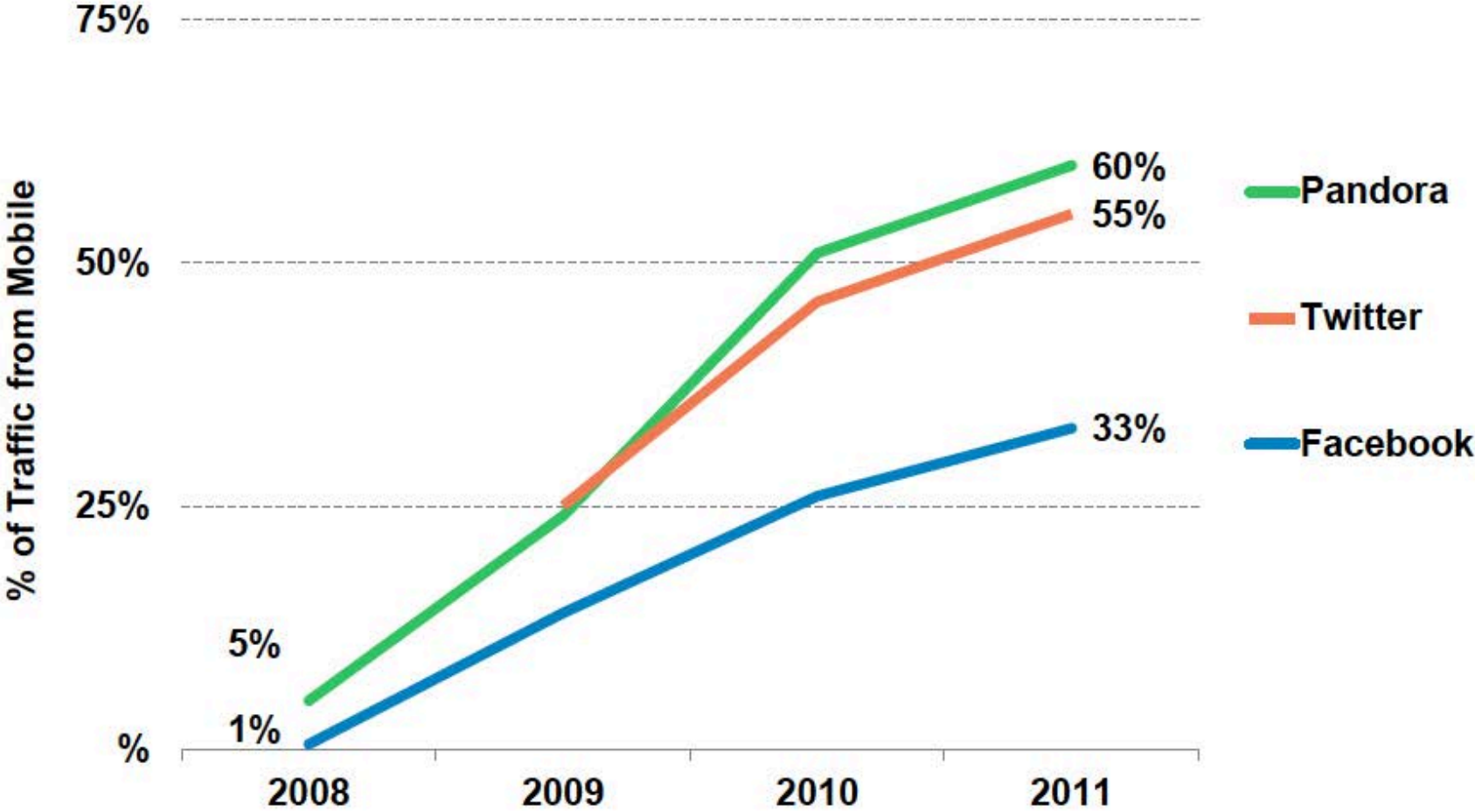
The background is a dynamic, abstract composition of blue and white light streaks that create a sense of rapid motion and depth, resembling a high-speed tunnel or a digital data stream. The streaks are most prominent in the lower half of the image, where they curve and sweep across the frame.

the
WPO **mobile**
Industry is Here



Source: Radio penetration data per Broadcasting & Cable Yearbook 1996, Internet penetration data per World Bank / ITU, Mobile Internet (smartphone) data per Morgan Stanley Research; 3G data per Informa.

% of Traffic From Mobile Devices, Pandora, Twitter & Facebook, 2008 – 2011



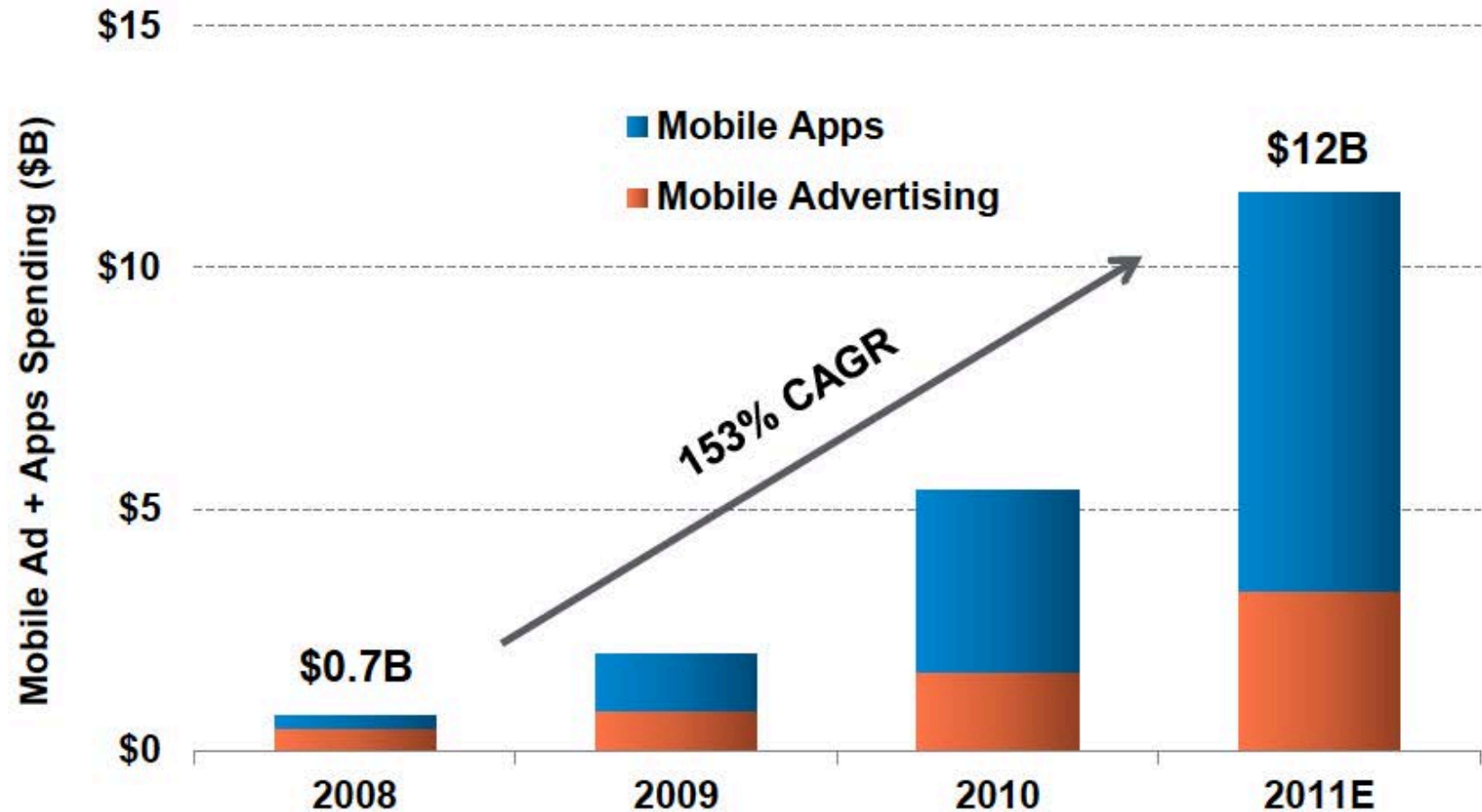
Source: Pandora S1, Twitter, Facebook.

Copyright 2011. All rights reserved.

- **Pace of innovation in Silicon Valley may be unprecedented.**
- **Intensity / focus / leadership of USA-based companies (Apple / Google / Amazon.com / Facebook) may be unprecedented.**
- **Combination of technology improvements and elegant design may be unprecedented.**

Global Mobile App + Advertising Revenue = \$12B in 2011E Revenue, Up 17x in 3 Years

Global Mobile App + Advertising Revenue, 2008 vs. 2011E

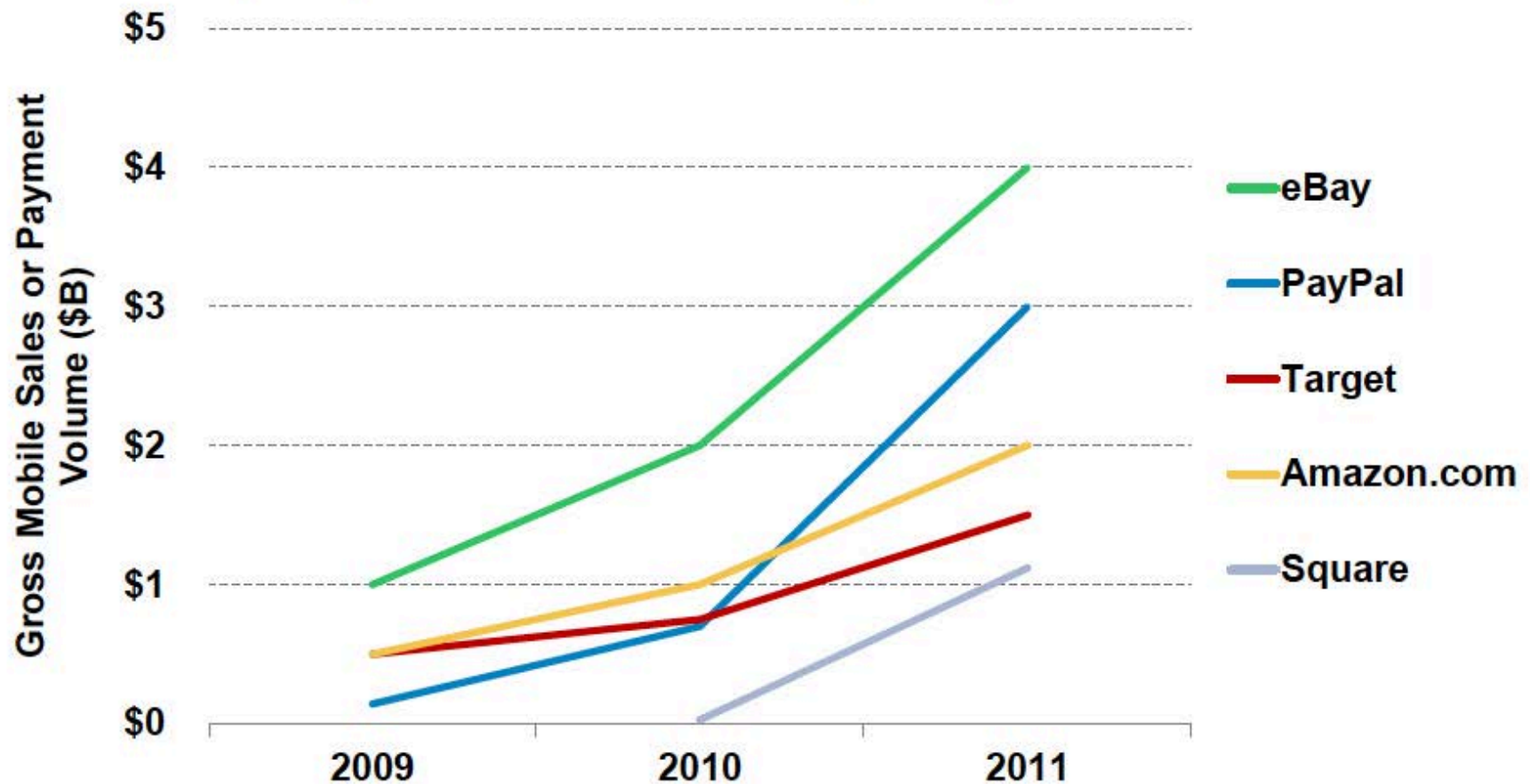


Source: Gartner. CAGR is compound annual growth rate.

Note: Apple has paid >\$3B \$'s to developers as of 9/11, implying gross app market revenue of \$4B in 3 years; Google indicated during CQ3 earnings call that it expects \$2.5B mobile ad revenue in 2011E.

Mobile Commerce = *We Have Lift Off!*

**Mobile Sales or Payment Volume –
eBay / PayPal / Amazon.com / Target / Square, 2009-2011E**

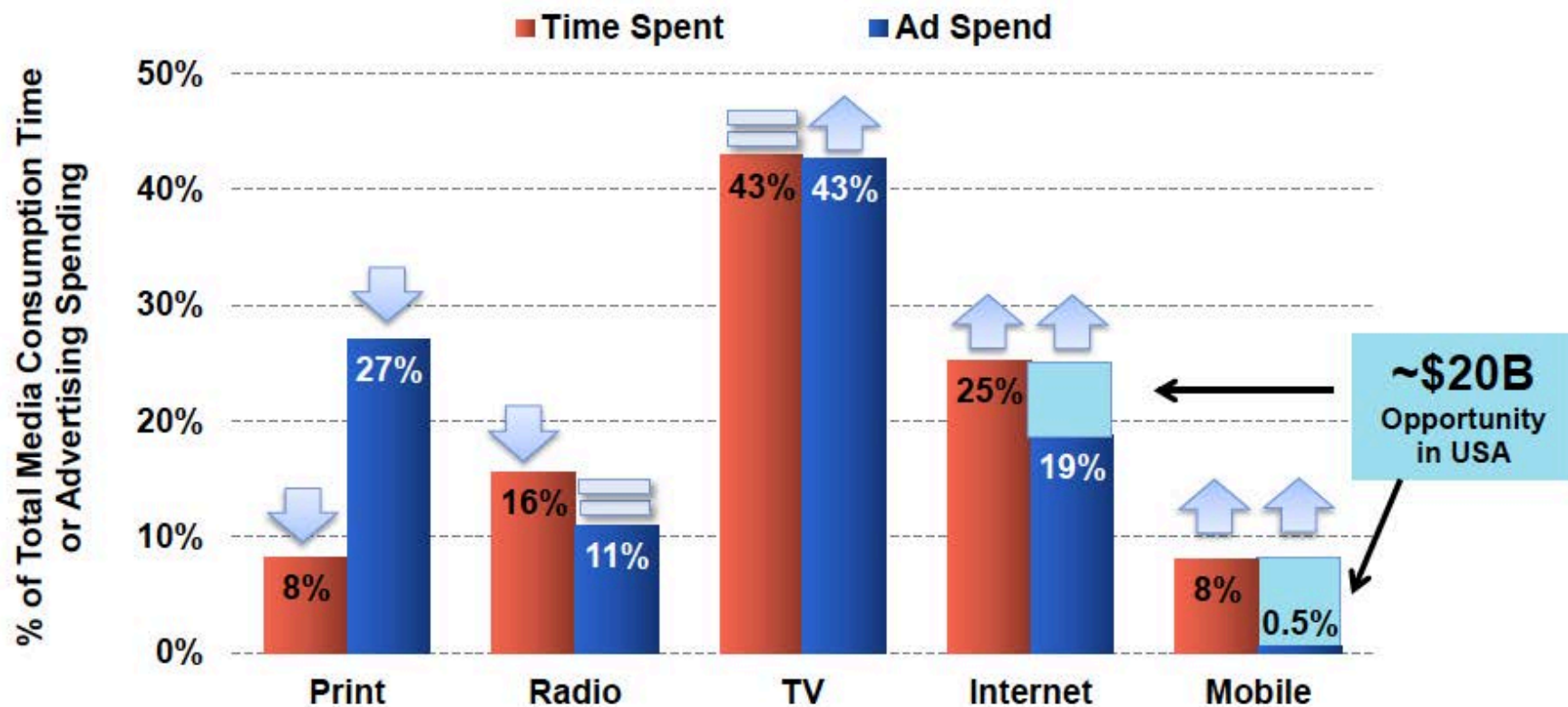


Note: Amazon.com disclosed 2010 mobile gross sale, 2009 / 2011 data are KPCB estimates.
Source: eBay, Amazon.com, Target, Square.

Media Time Spent vs. Ad Spend Still Out of Whack

Internet / Mobile (upside...) vs. Print (downside...)

% of Time Spent in Media vs. % of Advertising Spending, USA 2010



Note: Print includes newspaper and magazine. \$20B opportunity calculated assuming Internet and Mobile ad spend share equal their respective time spent share. Source: eMarketer, 3/11.

- **Smartphones + tablets outshipped PCs (notebooks + desktops) in Q4:10.**
- **Windows operating system fell to installation on <50% of Internet-enabled devices in Q2:10.**

- **85%** of world's population covered by commercial wireless signals, providing greater reach vs. electrical grid (80%).*
- **200MM+** farmers in India receiving government payments / subsidies via mobile devices.**

Source: *GSM Association, United Nations. **There are 90MM Kisan credit card users and 118MM job card users, both of which do not require bank accounts but utilize mobile phones as identity verification / payment confirmation, per Ministry of Rural Development, Government of India.

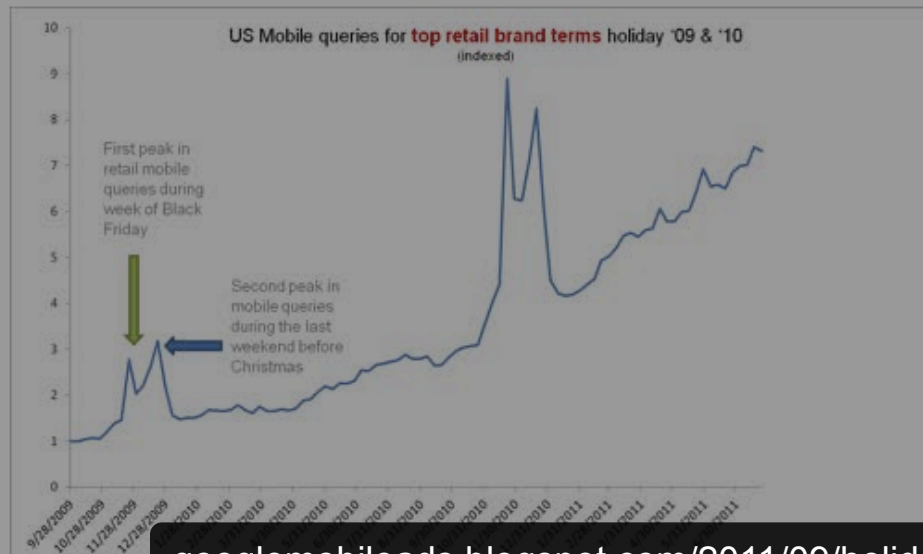
Holiday Retail Mobile Insights

Tuesday, September 6, 2011 | 11:38 AM

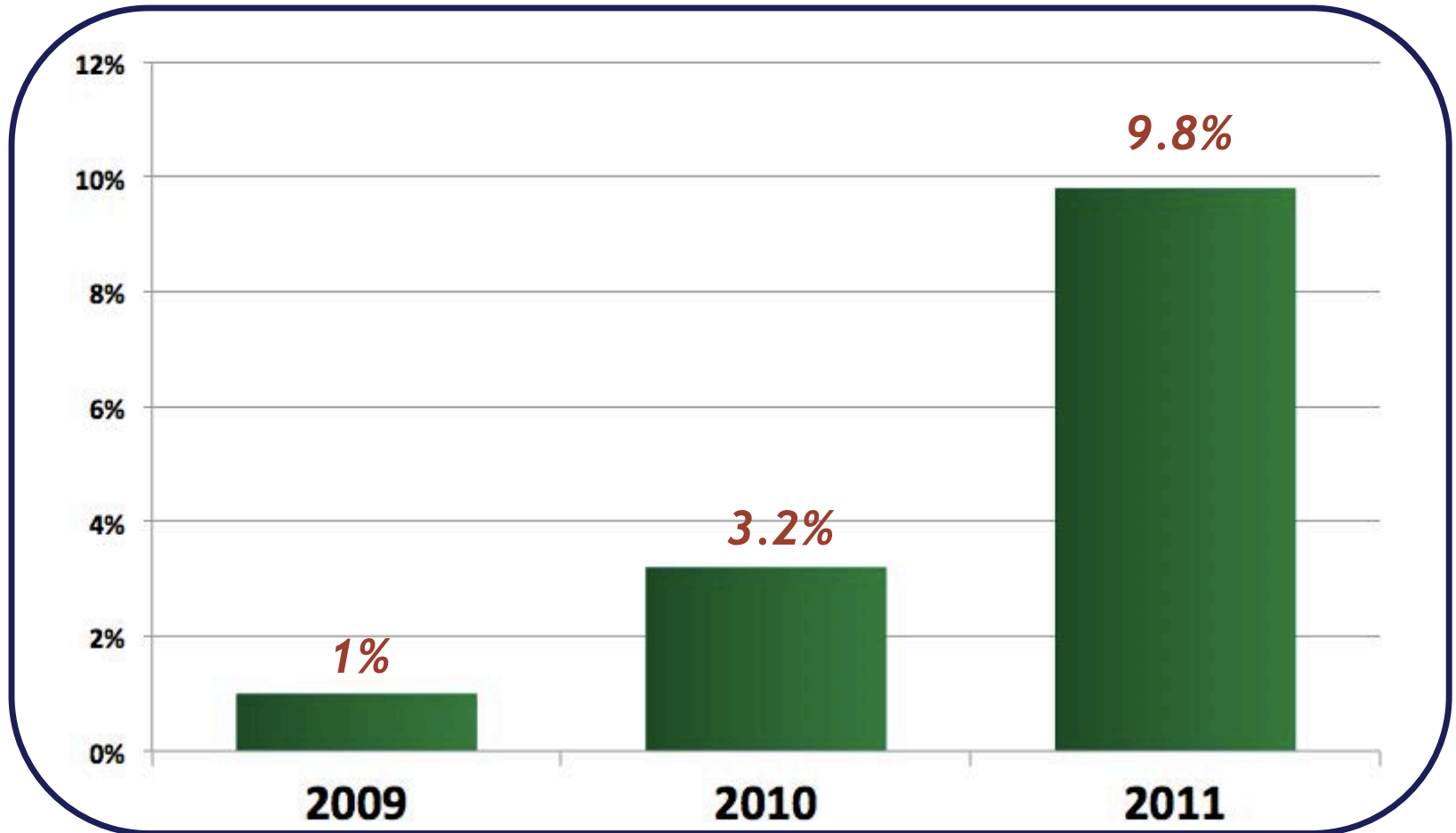
Labels: [advertisers](#), [best practices](#), [research](#)

Now that the final days of summer have come to an end, retailers are in the thick of planning for the busy holiday shopping season. As you start to plan your campaigns, it's important to take a step back and look at how consumers are using their mobile and tablet devices to drive in-store and on-device purchases. Here are a few insights that may surprise you:

- *44% of total searches for last minute gifts and store locator terms will be from mobile devices this holiday season*



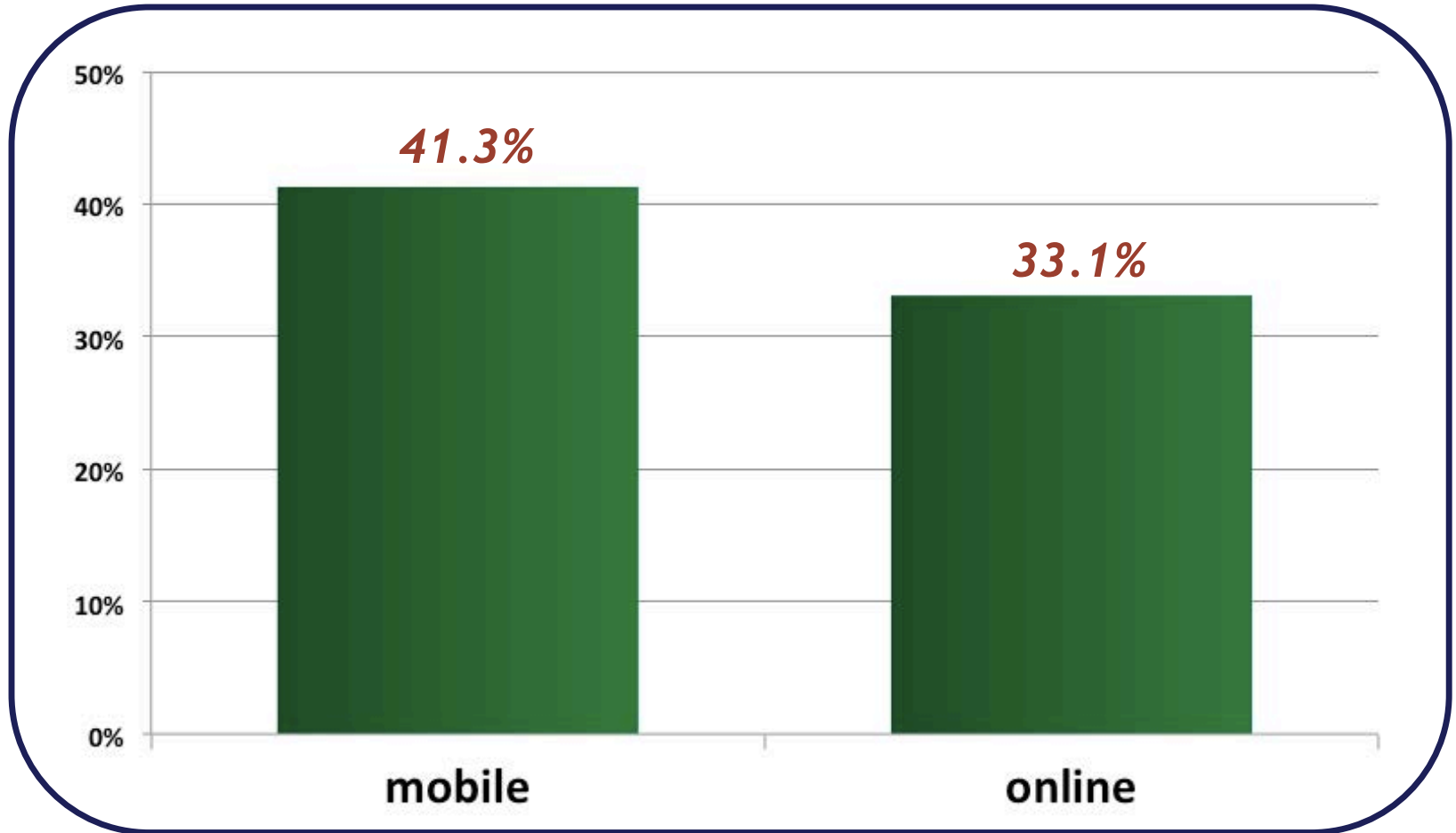
Black Friday Online Sales from Mobile



IBM Benchmark coremetrics.com/downloads/benchmark-2011-black-friday.pdf

Forbes forbes.com/sites/erikamorph/2011/11/25/mobile-sales-hit-it-out-of-the-park-on-black-friday/

Black Friday Bounce Rate



HTML DELAY EXPERIMENT RESULTS

	BOUNCE RATE	CONVERSION RATE	CART SIZE	PAGE VIEWS
200 ms	—	—	—	-1.2%
500 ms	-4.7%	-1.9%	—	-5.7%
1000 ms	-8.3%	-3.5%	-2.1%	-9.4%

— NO SIGNIFICANT CHANGE

FINDINGS:

- Strong negative impacts
- Roughly linear changes with increasing delay

The M
in TECHNOLOGY

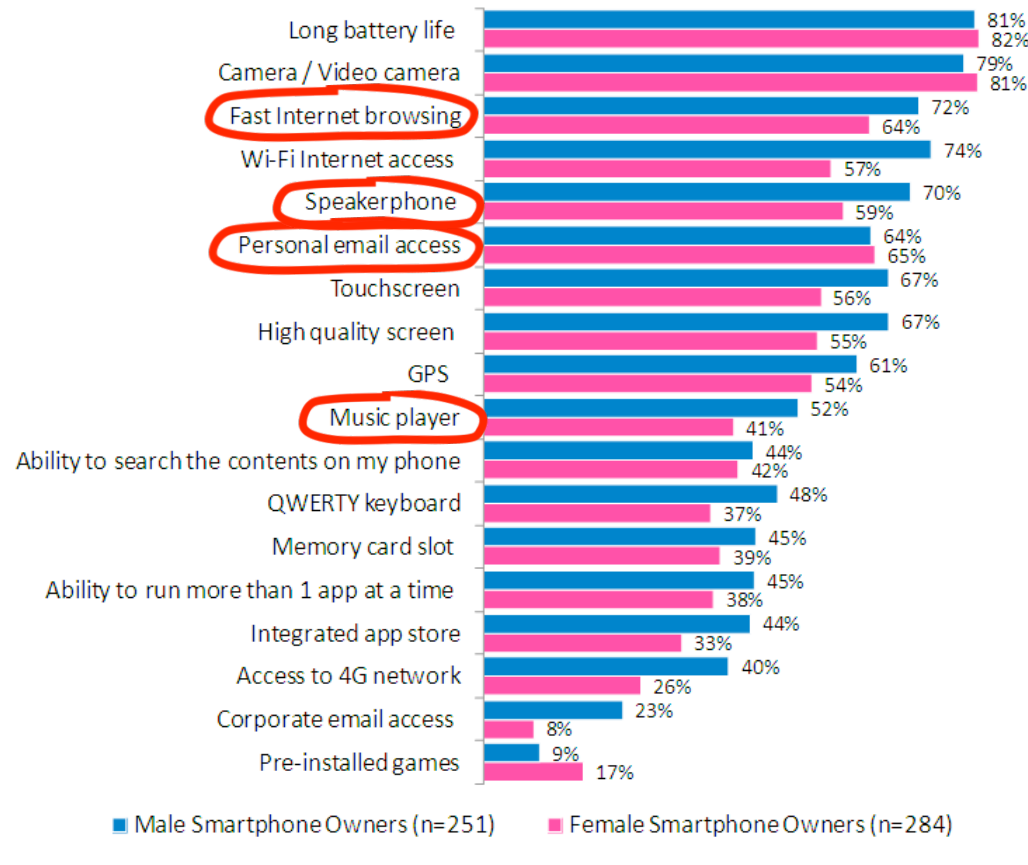


Image from: James Flint / Shutterstock

A year ago, when we segmented Smartphone Owners by gender, the male population dominated the marketplace. But sometime in early 2011, that trend shifted rather dramatically and women started adopting smartphones in greater numbers. In fact, today, more than half of the smartphone owner segment is female.

blog.compete.com/2011/11/29/the-male-vs-female-debate-goes-mobile/



iPhone 4

The fastest, highest-resolution iPhone.

fastest

\$199* 16GB**

\$299* 32GB**

Video calling with FaceTime

Retina display with 960-by-640 resolution

HD video recording

5-megapixel camera with LED flash

Dual-mic noise suppression

Apple A4 chip

MMS

Voice Control

[Learn more about iPhone 4](#) ▶



Pure Google

The new Android phone from Google.

Buy Now >

Coming soon: Nexus S 4G on Sprint



Fast just got faster



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see what's possible

Evolve faster with speeds up to 4x faster*
AT&T's already fast mobile broadband network

Discover the world of "can do" with AT&T 4G. Download songs in just a few beats. Download photos in a flash. Quickly load websites and watch smooth-streaming videos. Just think of the possibilities!

With 4G from AT&T, you can do more, see more, and enjoy more on what is already the nation's fastest mobile broadband network.

up to...



Why Verizon Wireless?

[Overview](#)[The Network](#)[Customer Guarantee](#)[Global Capabilities](#)[My Verizon Advantage](#)[Mobile to Mobile Calling](#)[Friends](#)

**MORE PEOPLE TRUST
AMERICA'S LARGEST AND MOST
RELIABLE WIRELESS NETWORK.**



VERIZON WIRELESS

Verizon 4G LTE

Verizon 4G LTE provides wireless options for a previously wired world. Blazingly fast speeds so you can share pictures and photos in a minute. Download your favorite music album in just over a minute. Download a TV show in about 5 minutes.

Blazingly fast speeds

Available in 38 markets and over 60 airports, covering approximately 110 million people. And we're aggressively expanding to cover our entire existing nationwide 3G footprint with 4G LTE by the end of 2013.

[Learn more about Verizon 4G LTE](#)

3G Network Superiority

Get connected and stay connected with America's largest and most reliable network - complete with extensive global coverage in more than 200 countries. Also enjoy America's largest and most reliable 3G Network so you can surf the web and download emails on the go!

[Learn More about our Best Network](#)







the road isn't clear

Mobile Tools

Installation

DESKTOP: Drag this link to your bookmarks toolbar or add it to your favorites:

Mobile Perf **drag this link!**

MOBILE:

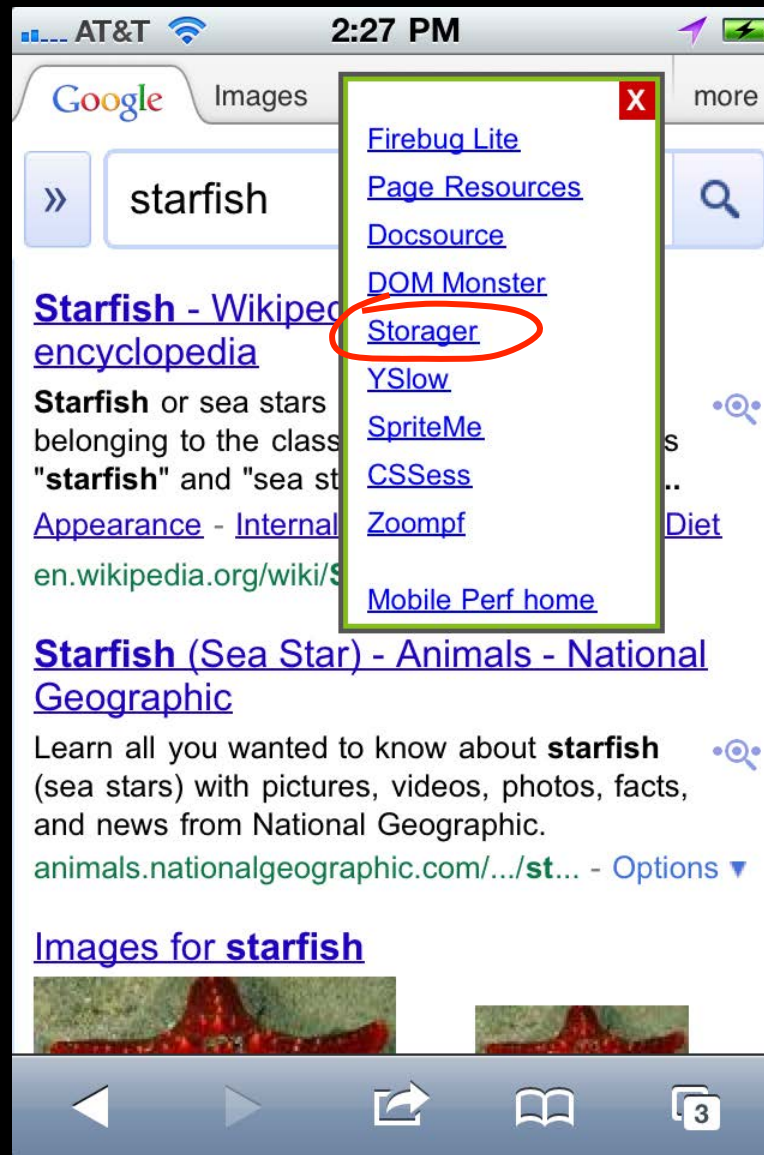
1. click this link: [Mobile Perf bookmarklet](#)
2. bookmark this page
3. edit the bookmark URL and remove everything up to and including the hash ("#") so that the bookmark URL starts with "javascript:"
(see an example of [step-by-step instructions](#))

Web development on mobile devices is especially challenging. The debuggers and profilers we use on the desktop aren't available. Bookmarklets are a good alternative. They're lightweight and work on most browsers – even mobile browsers. But installing bookmarklets in mobile browsers is a pain. You could try to find all the good bookmarklets out there and install them one by one. Or...

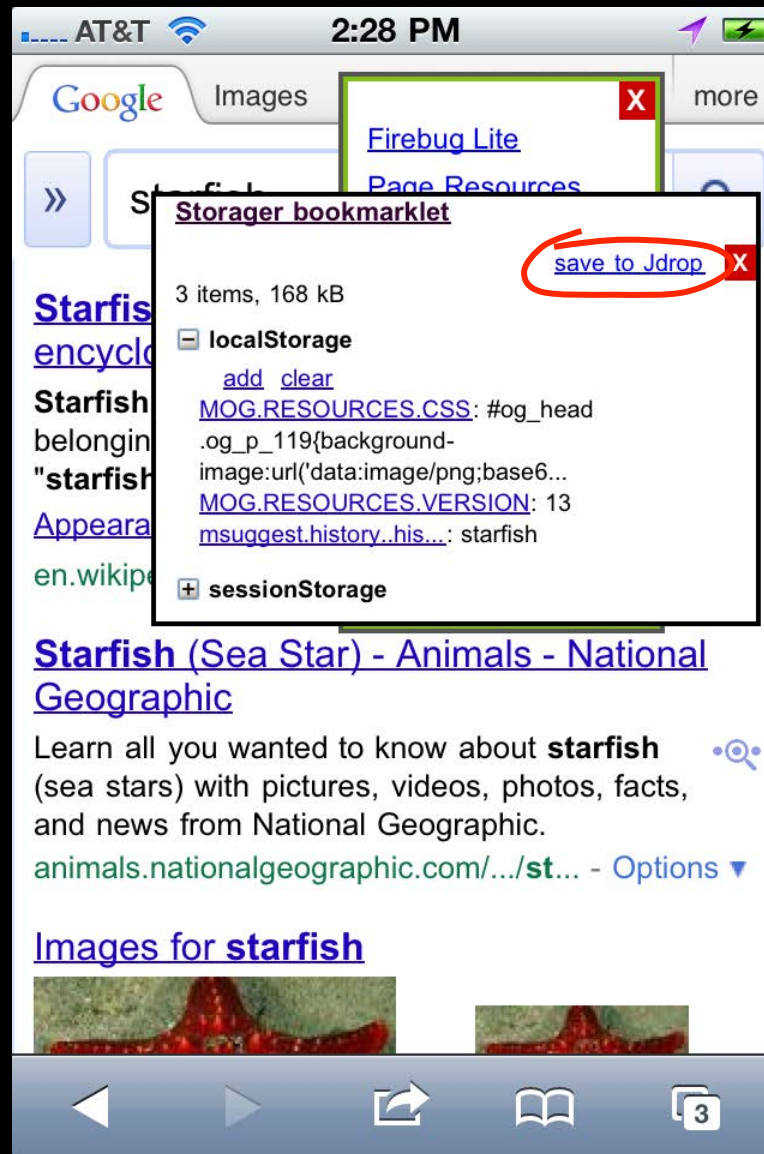
Just install the Mobile Perf bookmarklet!



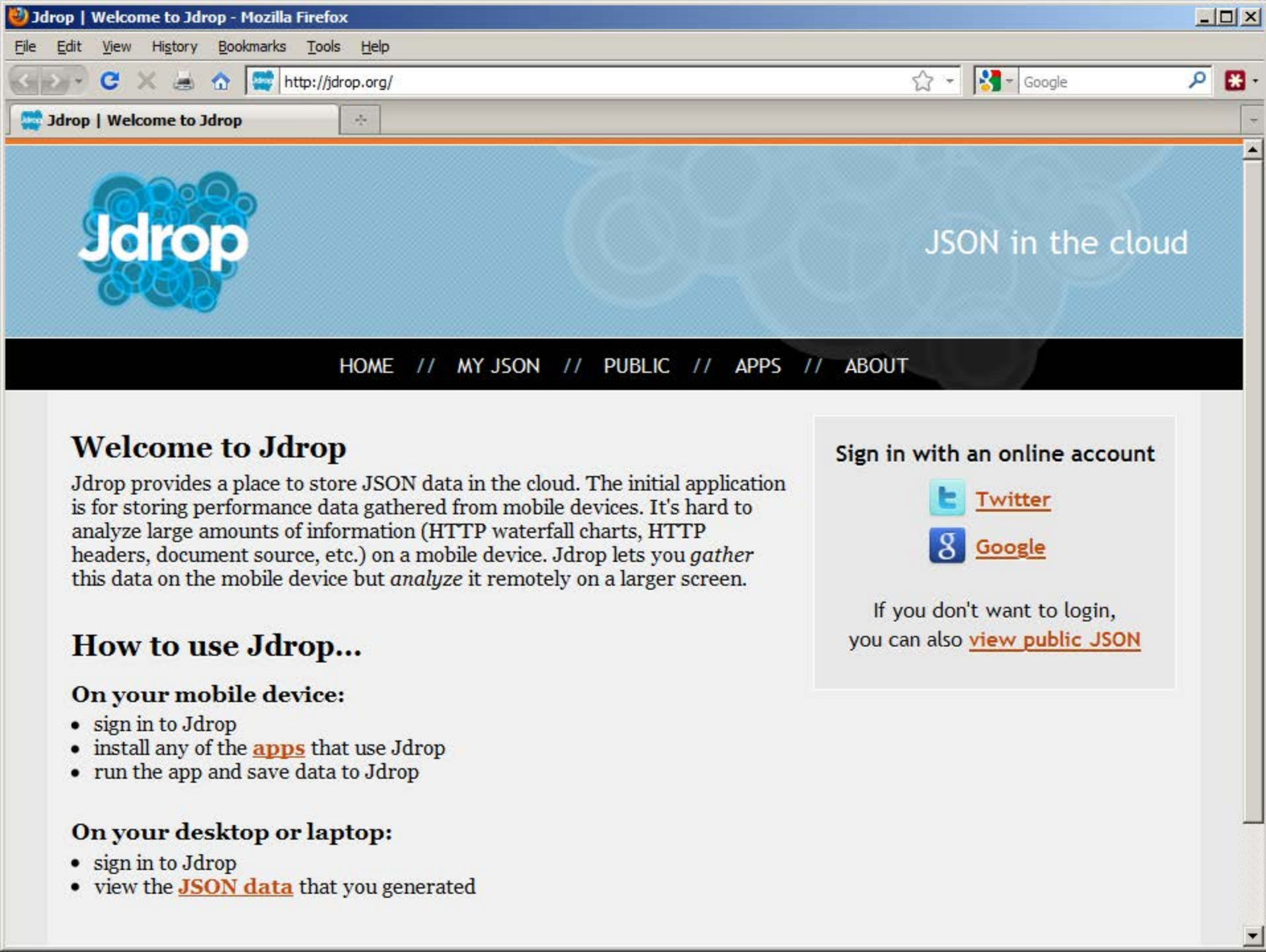
This is what the Mobile Perf bookmarklet looks like. It displays a menu with links that load other bookmarklets including [Firebug Lite](#), [Page Resources](#), [DOM Monster](#), [SpriteMe](#), [CSSess](#), and [Zoompf](#). The Mobile Perf menu is updated as new bookmarklets are released – so you get the latest tools automatically.



stevesouders.com/mobileperf



stevesouders.com/mobileperf



Welcome to Jdrop

Jdrop provides a place to store JSON data in the cloud. The initial application is for storing performance data gathered from mobile devices. It's hard to analyze large amounts of information (HTTP waterfall charts, HTTP headers, document source, etc.) on a mobile device. Jdrop lets you *gather* this data on the mobile device but *analyze* it remotely on a larger screen.

How to use Jdrop...

On your mobile device:

- sign in to Jdrop
- install any of the [apps](#) that use Jdrop
- run the app and save data to Jdrop

On your desktop or laptop:

- sign in to Jdrop
- view the [JSON data](#) that you generated

Sign in with an online account



[Twitter](#)



[Google](#)

If you don't want to login,
you can also [view public JSON](#)





MOB I TEST

Test Your Website Performance On A Mobile Device

☒ Enable Video Capture?*Note that video recording impacts load times☐ Make Results Private?☐ Run A Blaze Mobile Report**Run Performance Test****Mobitest – Mobile Performance Testing Tool**

The Mobitest Performance Tool uses real iPhone and Android agents to conduct a performance analysis of browsing your website on a mobile device. To learn more about how it works, visit the [methodology page](#).

This is a beta release of our tool. Expect to see feature additions and improvements in the upcoming months. Follow us on [Twitter](#) for updates and please report and bugs or suggestions via our [feedback module](#).

This tool is powered by the [WebPageTest.org](#) platform.

MOB I TEST

Mobile Performance Results for: <http://www.amazon.com/>

Performance Result Averages for iPhone (iOS 5.0) in Canada, Ottawa

AVERAGE LOAD TIME	AVERAGE PAGESIZE
3.1s	47.69kb

**Your website is faster than 80% of tested websites**

Want to learn more about how The Mobitest Performance Tool works and the Percentile is calculated? Visit our Methodology page

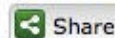
Note: Percentiles are adjusted based on factors such as device and video capture

[View Methodology](#)

0



0

[View HAR file](#)<http://www.amazon.com/>[BLAZE IT](#)

AVERAGE LOAD TIME

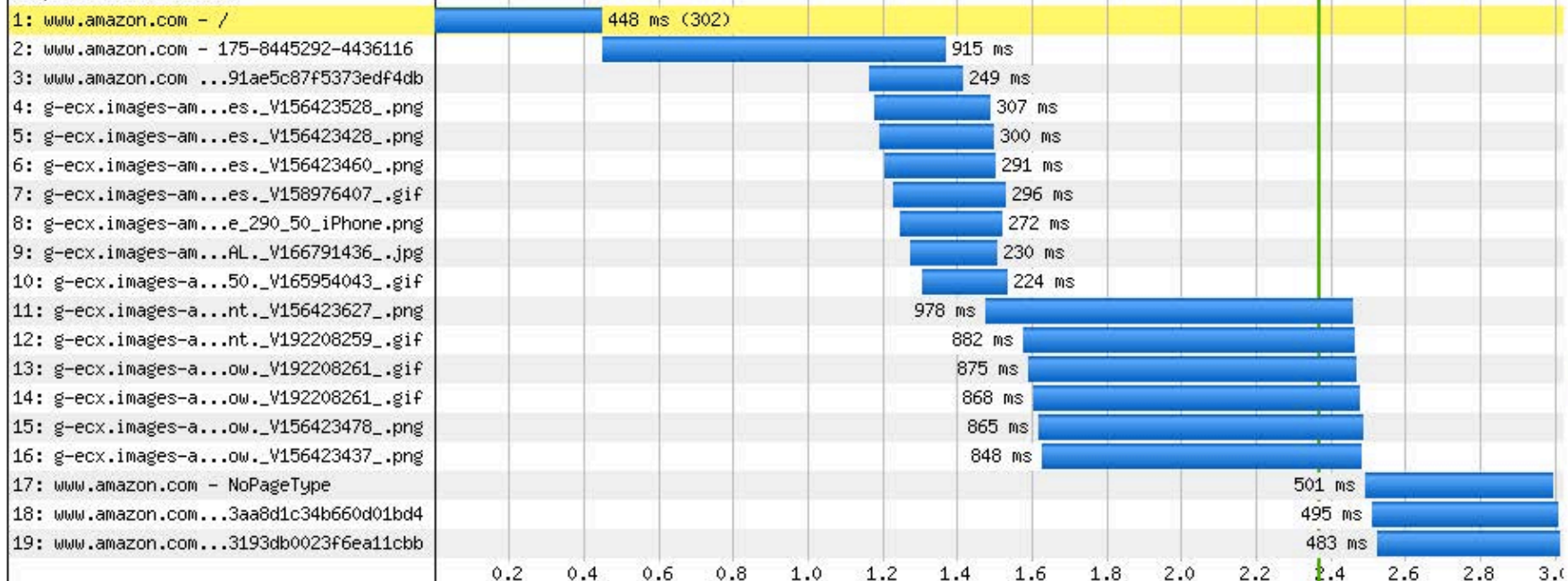
3.1s

AVERAGE PAGESIZE

47.69kb

Your website is faster than 80% of tested websites

http://www.amazon.com/



Holiday Toy List

Shop All Departments

Books

Kinship

21st

Dec 2010

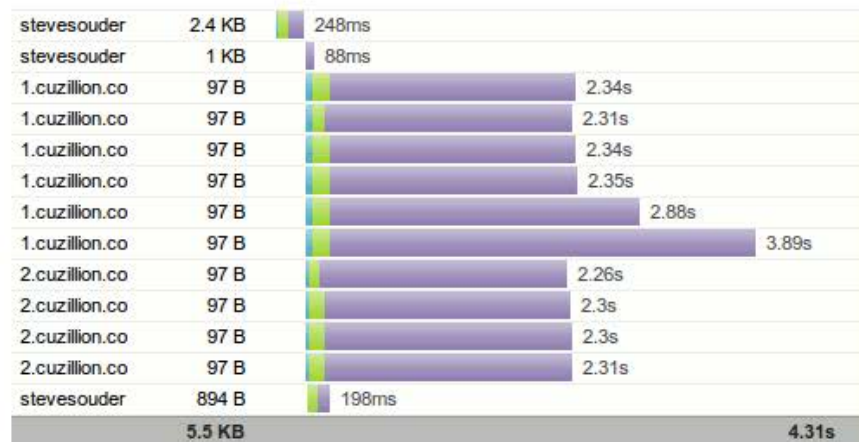
Mobile performance analysis using pcapperf

by [Bryan McQuade](#) and [Libo Song](#)

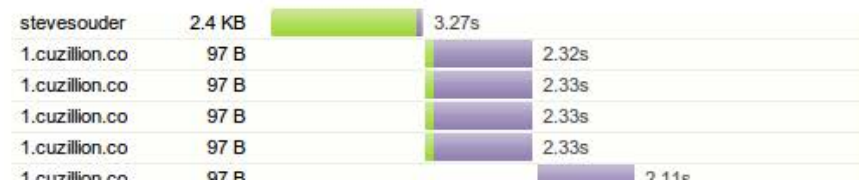
Recently, the Page Speed team has been focusing on understanding mobile web performance best practices. Unfortunately, while we have great tools like Firebug, Page Speed, YSlow!, and Chrome/Safari Developer Tools on the desktop, no such tools exist for mobile browsers.

To start, we built a tool that allows us to analyze mobile browser network characteristics, which we're releasing today. Using open file formats [PCAP](#) and [HAR](#), and open source tools [pcap2har](#), [HAR Viewer](#), and [Page Speed](#), we put together the **PCAP Web Performance Analyzer** at <http://pcapperf.appspot.com/>. You can [capture PCAP files](#) for your mobile devices, and then, using pcapperf, easily visualize the network waterfall for the PCAP file, get Page Speed suggestions based on the traffic in the PCAP file, or download a HAR file representation of the PCAP file.

Using pcapperf, we've already learned some interesting things about the performance of mobile browsers. For instance, below we confirm that the Android browser is limited to four concurrent TCP connections, as opposed to the higher limits on most other modern browsers (see [HAR Viewer](#) for [Firefox](#), [Android](#)).



<http://qoo.gl/5dP6L> in Firefox 3.6, loading 10 resources in parallel



ABOUT THE AUTHOR



[Bryan McQuade](#) ([@bryanmcquade](#)) leads the Page Speed team at Google. He has contributed to various projects that make the web faster, including Shared Dictionary Compression over HTTP and optimizing web servers to better utilize HTTP.



Libo Song is a Software Engineer at Google. He is a member of the Page Speed team. Recently, he helped

[How to Use](#) [How to Capture Mobile Traffics](#) [Open Source Project Home](#) [Request a Feature](#)

PCAP Web Performance Analyzer

Get Started

Upload a PCAP file to get started (or choose an example PCAP file below). You will be able to download a HAR file, view the HTTP waterfall using HarViewer, or get Page Speed suggestions for your network trace.

1. **Chose PCAP file:**
2. ☒ Remove cookies
3.

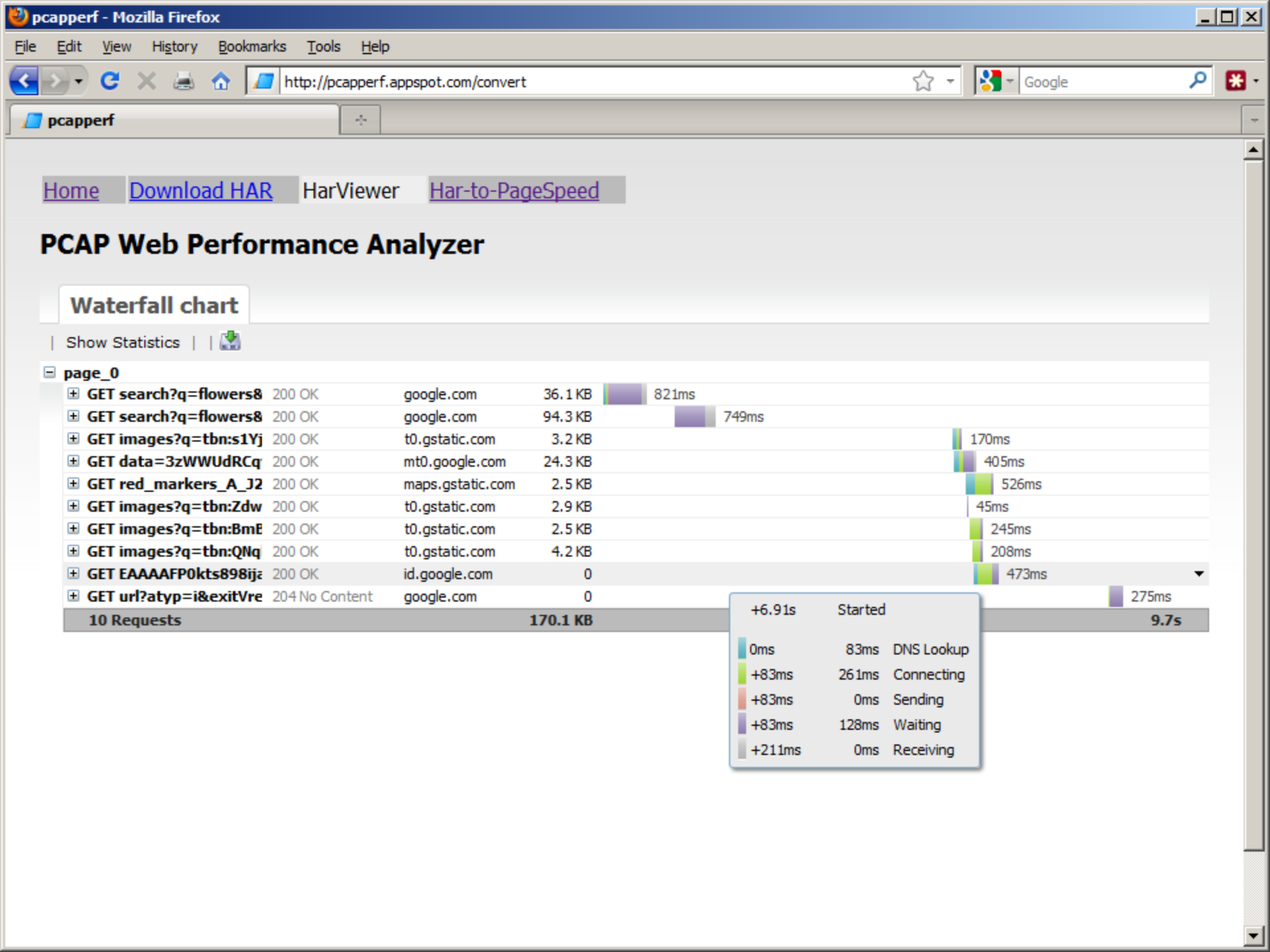
Examples:

Below are a few example PCAP files that you can use to try out the PCAP Web Performance Analyzer.

examle 1: [PCAP](#) for wikipedia.org using iPhone4 [View waterfall](#) [PageSpeed](#) [Download HAR](#)

examle 2: [PCAP](#) for sina.com.cn using iPhone4 [View waterfall](#) [PageSpeed](#) [Download HAR](#)

Powered by: [pcap2har](#) | [dpkt](#) | [harviewer](#) | [Page Speed](#) |






















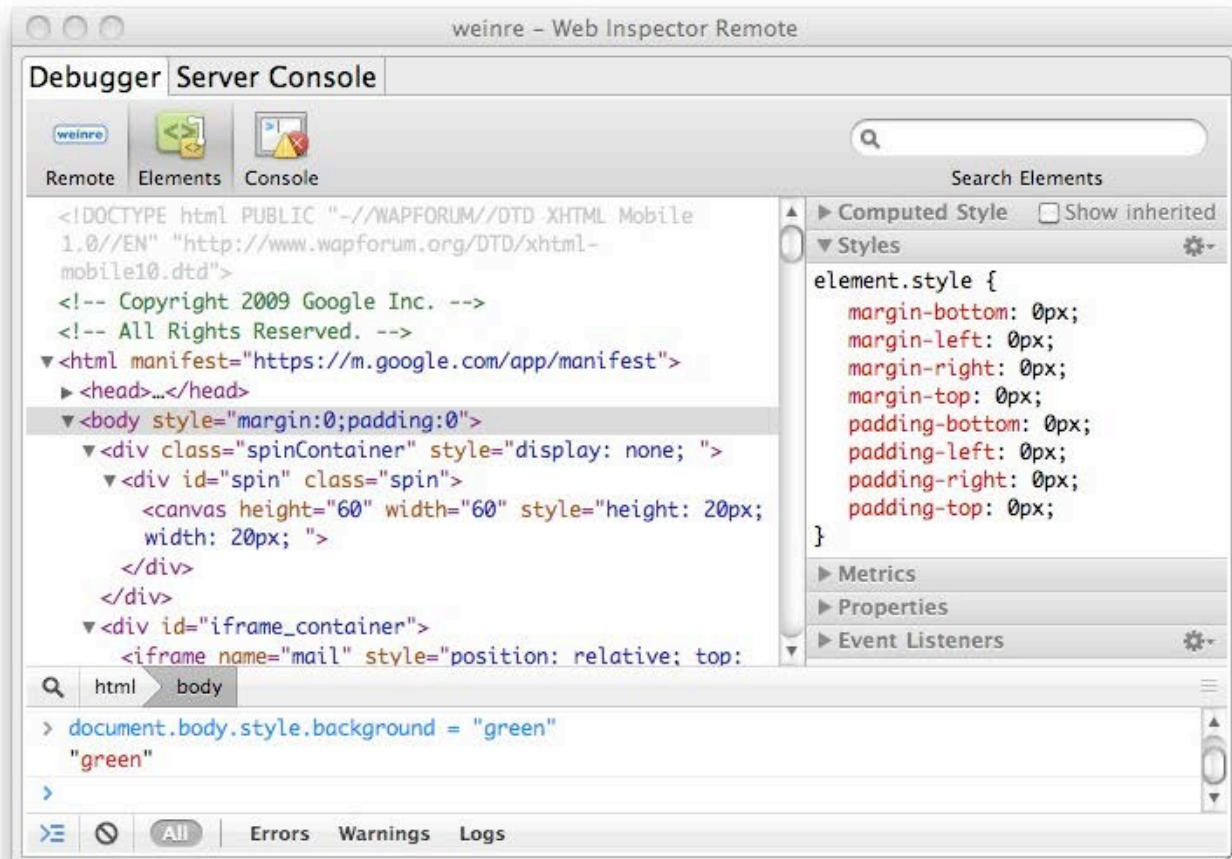
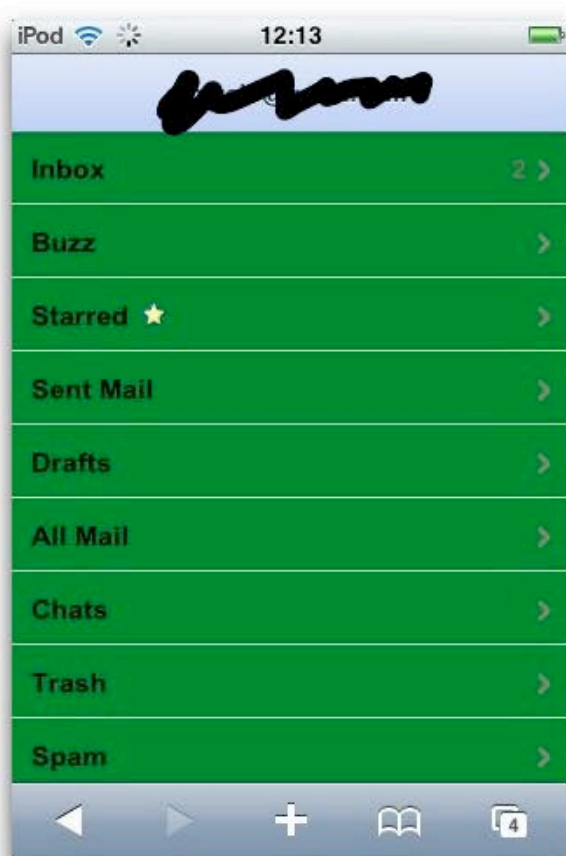
[Home](#) [Download HAR](#) [HarViewer](#) Har-to-PageSpeed

PCAP Web Performance Analyzer

Page Speed suggestions

Page Speed Score: 89/100

-  [Remove query strings from static resources](#) (33/100)
-  [Minimize DNS lookups](#) (40/100)
-  [Optimize images](#) (47/100)
-  [Minimize request size](#) (57/100)
-  [Specify a cache validator](#) (83/100)
-  [Leverage browser caching](#) (83/100)
-  [Minify HTML](#) (97/100)
-  [Parallelize downloads across hostnames](#) (100/100)
-  [Serve resources from a consistent URL](#) (100/100)
-  [Combine images into CSS sprites](#) (100/100)
-  [Specify a character set early](#) (100/100)
-  [Specify a Vary: Accept-Encoding header](#) (100/100)
-  [Minify JavaScript](#) (100/100)
-  [Combine external JavaScript](#) (100/100)
-  [Combine external CSS](#) (100/100)
-  [Avoid CSS @import](#) (100/100)
-  [Enable compression](#) (100/100)
-  [Inline Small CSS](#) (100/100)
-  [Avoid bad requests](#) (100/100)



<http://pmuellr.github.com/weinre/>



URLs: `http://www.msn.com/
http://www.cnn.com/
http://www.amazon.com/
http://www.reddit.com/
http://www.craigslist.com/
http://www.linkedin.com/
http://www.ebay.com/
http://www.yahoo.com/
http://www.bing.com/search?q=flowers
http://en.wikipedia.org/wiki/Flowers`

1: 4164 ms, <http://www.msn.com/>
2: 9929 ms, <http://www.cnn.com/>
3: 3959 ms, <http://www.amazon.com/>
4: 9867 ms, <http://www.reddit.com/>
5: 3354 ms, <http://www.craigslist.com/>
6: 13254 ms, <http://www.linkedin.com/>
7: 5121 ms, <http://www.ebay.com/>
8: 4873 ms, <http://www.yahoo.com/>
9: 1769 ms, <http://www.bing.com/search?q=flowers>
10: 8340 ms, <http://en.wikipedia.org/wiki/Flowers>

☒ record load times beacon URL:

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Flower

From Wikipedia, the free encyclopedia

(Redirected from [Flowers](#))

For other uses, see [Flower \(disambiguation\)](#).

"Floral" redirects here. For other uses, see [Floral \(disambiguation\)](#).

A **flower**, sometimes known as a bloom or **blossom**, is the [reproductive](#) structure found in [flowering plants](#) (plants of the division [Magnoliophyta](#), also called [angiosperms](#)). The biological function of a flower is to effect reproduction, usually by providing a mechanism for the union of sperm with eggs. Flowers may facilitate outcrossing (fusion of sperm and eggs from different individuals in a population) or allow selfing (fusion of sperm and egg from the same flower). Some flowers produce [diaspores](#) without fertilization ([parthenocarpy](#)). Flowers contain sporangia and are the site where [gametophytes](#) develop. Flowers give rise to fruit and seeds. Many





These are the median page load times for popular websites. The times are in milliseconds. The number of resources is shown in parentheses.

- Devices that receive mobile-specific versions of the site have a **gray background**.
- The slowest time is shown in **red**.
- The fastest time is shown in **green** for devices that received the desktop version.
- Devices that received a mobile version of the site and were faster than the desktop version are shown in **non-bold green (with a gray background)**.

Table 1: Median page load time (milliseconds)

browser	Yahoo	Amazon	Wikipedia	Craigslist	eBay	LinkedIn	Bing	MSN	Engadget	CNN	Reddit	# data
<input checked="" type="checkbox"/> Galaxy 10	4,287 (67)	3,145 (43)	12,537 (50)	793 (4)	2,982 (64)	1,810 (11)	1,406 (13)	2,930 (47)	21,614 (215)	5,264 (124)	2,015 (21)	9
<input checked="" type="checkbox"/> Galaxy 7	6,866 (67)	1,587 (43)	2,087 (50)	1,303 (4)	921 (64)	1,147 (11)	2,696 (13)	1,925 (47)	23,222 (215)	2,098 (124)	2,902 (21)	9
<input checked="" type="checkbox"/> iPad 1 5	4,082 (67)	5,383 (43)	8,625 (50)	1,307 (4)	4,557 (64)	1,592 (11)	1,520 (13)	5,540 (47)	16,410 (215)	8,997 (124)	3,440 (21)	9
<input checked="" type="checkbox"/> iPad 2 5	2,386 (67)	2,465 (43)	5,723 (50)	790 (4)	2,541 (64)	902 (11)	1,146 (13)	2,713 (47)	8,034 (215)	4,483 (124)	2,249 (21)	9
<input checked="" type="checkbox"/> Silk (accel off) 1	3,431 (67)	4,289 (43)	9,955 (50)	646 (4)	1,094 (64)	1,021 (11)	1,035 (13)	4,143 (47)	13,162 (215)	5,599 (124)	1,894 (21)	9
<input checked="" type="checkbox"/> Silk (accel on) 1	4,319 (67)	5,691 (43)	10,168 (50)	764 (4)	1,366 (64)	1,085 (11)	1,248 (13)	4,907 (47)	16,132 (215)	7,231 (124)	2,246 (21)	9

- ☐ blog post's data
☒ all data (including public)

Mobile Performance Best Practices

1. MAKE FEWER HTTP REQUESTS

2. USE A CDN

3. ADD AN EXPIRES HEADER

4. GZIP COMPONENTS

5. PUT STYLESHEETS AT THE TOP

6. PUT SCRIPTS AT THE BOTTOM

14 RULES 7. AVOID CSS EXPRESSIONS

8. MAKE JS AND CSS EXTERNAL

9. REDUCE DNS LOOKUPS

10. MINIFY JS

11. AVOID REDIRECTS

12. REMOVE DUPLICATE SCRIPTS

13. CONFIGURE ETAGS

14. MAKE AJAX CACHEABLE

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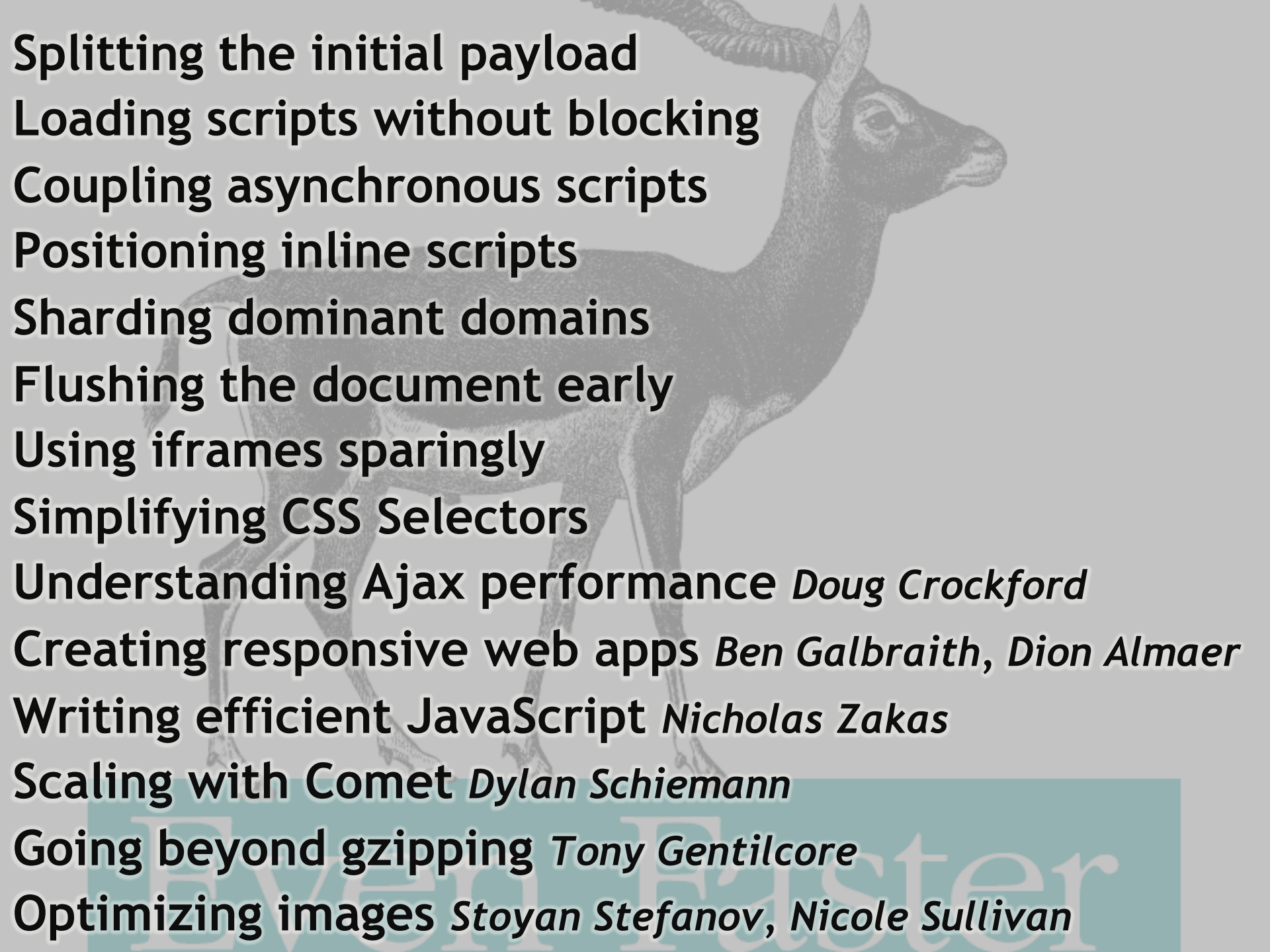
10. MINIFY JS

11. AVOID REDIRECTS

12. REMOVE DUPLICATE SCRIPTS

13. CONFIGURE ETAGS

14. MAKE AJAX CACHEABLE



Splitting the initial payload
Loading scripts without blocking
Coupling asynchronous scripts
Positioning inline scripts
Sharding dominant domains
Flushing the document early
Using iframes sparingly
Simplifying CSS Selectors
Understanding Ajax performance *Doug Crockford*
Creating responsive web apps *Ben Galbraith, Dion Almaer*
Writing efficient JavaScript *Nicholas Zakas*
Scaling with Comet *Dylan Schiemann*
Going beyond gzipping *Tony Gentilcore*
Optimizing images *Stoyan Stefanov, Nicole Sullivan*

Splitting the initial payload

Loading scripts in parallel

Coupling asynchronous requests

Positioning in the DOM

Sharding domains

Flushing the browser

Using iframes

Simplifying CSS

Understanding the browser


Creating responsive layouts

Writing efficient CSS

Scaling with content

Going beyond the browser

Optimizing images

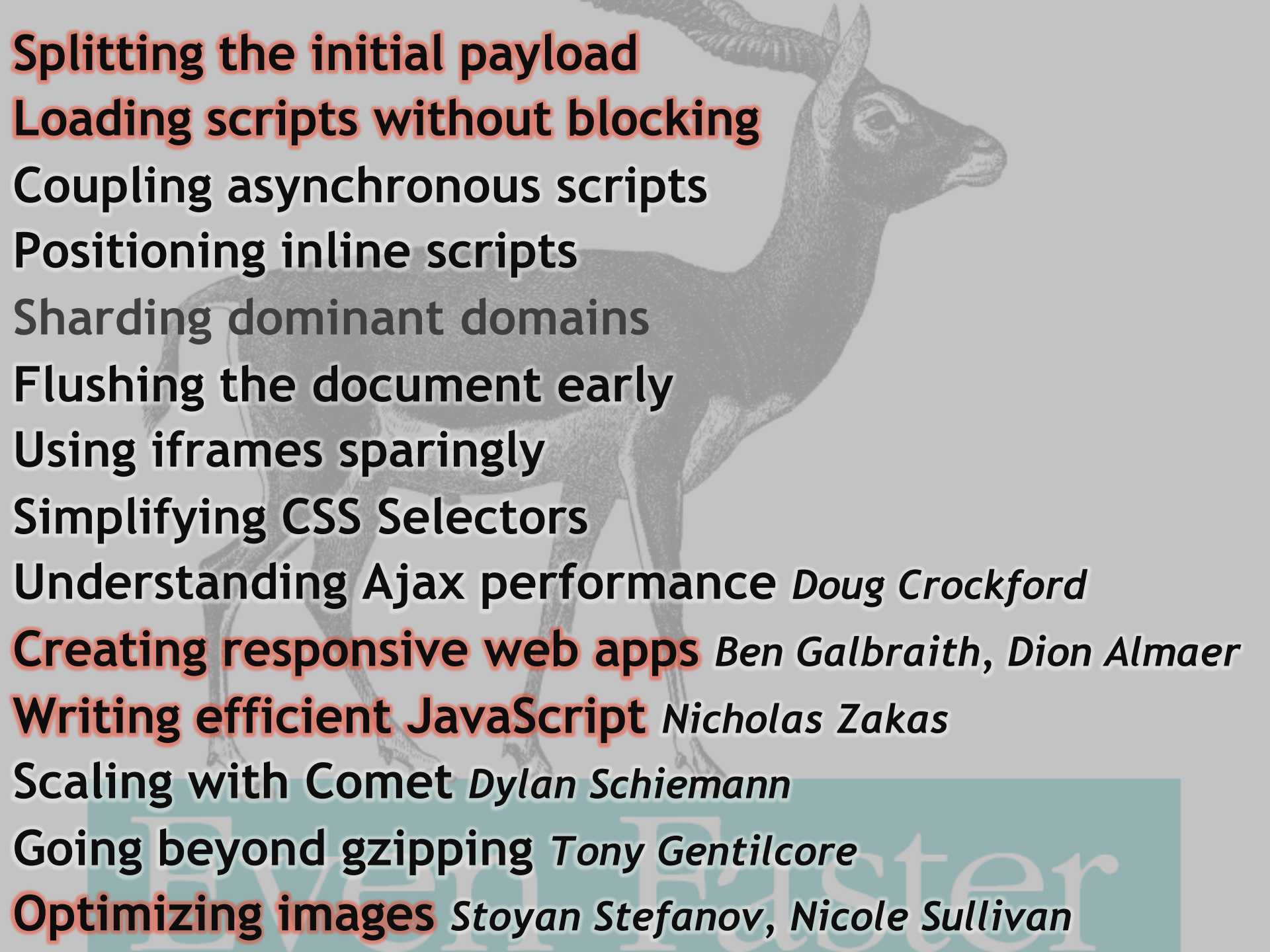
Compare 		Connections per Hostname	Max Connections
name	score		
<input type="checkbox"/> Chrome 14 →	13/16	6	35
<input type="checkbox"/> Firefox 5 →	14/16	6	30
<input type="checkbox"/> IE 7.0 →	4/16	2	54
<input type="checkbox"/> IE 9.0 →	12/16	6	35
<input type="checkbox"/> Opera 11 →	8/16	6	32
<input type="checkbox"/> Safari 5.0 →	11/16	6	30
<input type="checkbox"/> Android 2.3 →	9/16	4	8
<input type="checkbox"/> Android 3.2 →	13/16	6	35
<input type="checkbox"/> Blackberry 7.0 →	11/16	5	5
<input type="checkbox"/> IE Mobile 8.12 →	6/16	4	15
<input type="checkbox"/> iPad 4.3 →	11/16	6	35
<input type="checkbox"/> iPhone 4.3 →	11/16	6	35
<input type="checkbox"/> Nokia 95 →	8/15	7	7
<input type="checkbox"/> Opera Mobile 10.00 →	9/16	2	4

Crockford

Smith, Dion Almaer

as

Stoyan Stefanov, Nicole Sullivan



Splitting the initial payload
Loading scripts without blocking
Coupling asynchronous scripts
Positioning inline scripts
Sharding dominant domains
Flushing the document early
Using iframes sparingly
Simplifying CSS Selectors
Understanding Ajax performance *Doug Crockford*
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Even Faster

reduce HTTP requests

sprites

data: URIs

CSS3:

- border-radius

- box-shadow

- linear-gradient

- transform: rotate, scale, skew, translate

Canvas, SVG

responsive images

resize images based on screen size

example: Sencha.io Src

```
<img src='http://src.sencha.io/  
http://mydomain.com/logo.gif'>
```

UA classification: DeviceAtlas

domain sharding: `src[1-4].sencha.io`

also: <http://adaptive-images.com/>

<http://github.com/filamentgroup/Responsive-Images>

script async & defer

script src

halts parsing, blocks rendering

async

execute once script is downloaded

defer

execute after page is parsed

missing

download & execute last

download last, execute on demand

GMail Mobile

```
<script type="text/javascript">  
/*  
var ...  
*/  
</script>
```

get script DOM element's text

remove comments

eval() when invoked

awesome for prefetching JS that *might*
(*not*) be needed

<http://goo.gl/l5ZLQ>

app cache

offline apps, longer cache

```
<!doctype html>
```

```
<html manifest="myapp.appcache">
```

```
myapp.appcache:
```

```
CACHE MANIFEST
```

```
# Revision: 1.28
```

```
CACHE:
```

```
/images/logo.gif
```

```
NETWORK:
```

```
/login.html
```

```
FALLBACK:
```

```
/index.html /offline.html
```

Content-Type: text/cache-manifest

app cache gotchas

html docs w/ manifest are cached

404 => nothing is cached

size: 5MB+

must rev manifest to update resources

update is served on 2nd reload (?!?!)

1 push app
logo.gif = 🌟

2 user loads app
app cache is empty
fetch manifest
fetch logo.gif
app cache = 🌟
user sees 🌟

app cache reload

3 push app
logo.gif = ✨
rev manifest

4 user loads app
app cache = 🌟
user sees 🌟
fetch manifest
fetch logo.gif
app cache = ✨

5 user loads app again
app cache = ✨
➡ user sees ✨
fetch manifest (304)

load twice workaround

```
window.applicationCache.addEventListener('updateready',
```

```
function(e) {  
    if ( window.applicationCache.status ==  
        window.applicationCache.UPDATEREADY) {  
        if ( confirm("Load new content?" ) ) {  
            ...  
        }  
    }  
}
```

<http://www.webdirections.org/blog/get-offline/>

<http://www.html5rocks.com/en/tutorials/appcache/beginner/>

localStorage

`window.localStorage:`

`setItem()`

`getItem()`

`removeItem()`

`clear()`

also `sessionStorage`

all popular browsers, 5MB max

<http://dev.w3.org/html5/webstorage/>

<http://diveintohtml5.org/storage.html>

localStorage as cache

1st doc: write JS & CSS blocks to localStorage

```
mres.-0yDUQJ03U8Hjija: <script>(function(){...
```

set cookie with entries & version

```
MRES=-0yDUQJ03U8Hjija:-4EaJoFuDoX0iloI:...
```

later docs: read JS & CSS from localStorage

```
document.write( localStorage.getItem(mres.-0yDU  
QJ03U8Hjija) );
```

<http://stevesouders.com/blog/2011/03/28/storager-case-study-bing-google/>

there's more

audio & video tags

WebSockets

onTouchEnd instead of onClick

History

<a ping

requestAnimationFrame - not timers

native JSON parse/stringify

Thanks to...

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Paul Irish
Jason Grigsby
Brad Neuberg

takeaways

mobile WPO

speed matters

mobile tools

gaining visibility

mobile best practices

reduce requests & bytes

improve caching



THANK
YOU

Steve Souders

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stevesouders.com/docs/velocity-mobile-20111206.pptx