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Feedback: <http://goo.gl/VF47I>

Twitter: #TechTalk

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# Make The Web Faster

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# Agenda

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**mod\_pagespeed**

**Joshua Marantz**

WebP

Richard Rabbat

Opera and WebP

Håkon Wium Lie

# Why make your Web-site Fast?

- Benefits

- User Satisfaction
- Better Engagement & More Revenue

- Challenges

- Its hard!
- Maintainability Trade-off: sprites & minified versions
- Agility Trade-off: Caching vs rapid site change propagation
- Old browsers lack support for new techniques
- New techniques are created all the time, e.g., mobile-focused best practice



- Solution: Use Automated Tools

# Why use mod\_pagespeed?

Optimize Your Web-Site without changing it

Do not change your content generation flow

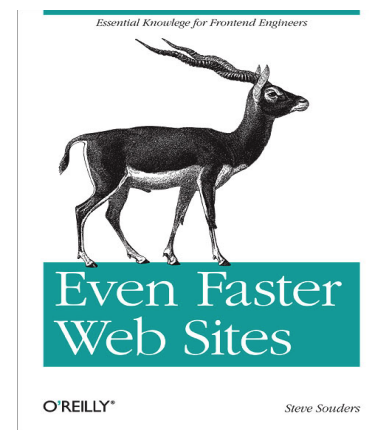
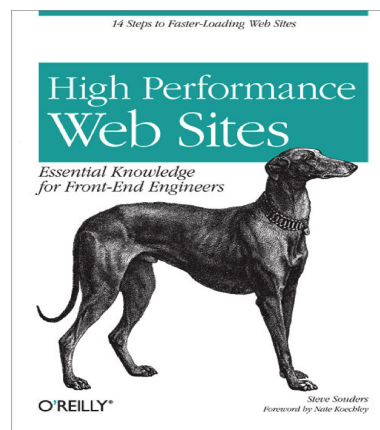
Don't change your HTML, CSS, or JavaScript

Don't manually run compression on all your photos

***Get a machine to do that for you.***

# What does mod\_pagespeed do?

- Automatic Image Compression & Resizing
- Minify CSS, JavaScript and HTML
- Inline small images, CSS, and JavaScript
- Cache Extension
- CSS Combining
- Domain Mapping
- Domain Sharding



## mod\_pagespeed Filter Examples

Here are some of the most useful filters provided by mod\_pagespeed. Each one has a simple HTML example attached; click "before" to see the original file, and "after" to see what mod\_pagespeed produces with that filter (and only that filter) enabled. The two versions should look exactly the same, but the "after" one will be (slightly) speedier. Use "view source" to see the mod\_pagespeed difference!

<a href="#">add_instrumentation</a>	Adds client-side latency instrumentation.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">extend_cache</a>	Improves cacheability.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">collapse_whitespace</a>	Removes unnecessary whitespace in HTML.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">combine_css</a>	Combines multiple CSS files into one.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">combine_heads</a>	Combines multiple <head> elements into one.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">move_css_to_head</a>	Moves CSS into the <head> element.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">elide_attributes</a>	Removes unnecessary attributes in HTML tags.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">inline_css</a>	Inlines small external CSS files.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">inline_javascript</a>	Inlines small external Javascript files.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">outline_css</a>	Moves large inline <style> tags into external files for cacheability.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">outline_javascript</a>	Moves large inline <script> tags into external files for cacheability.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">remove_quotes</a>	Removes unnecessary quotes in HTML tags.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">remove_comments</a>	Removes HTML comments.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">trim_urls</a>	Removes unnecessary prefixes from URLs.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">make_google_analytics_async</a>	Converts synchronous Google Analytics code to load asynchronously.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">rewrite_css</a>	Minifies CSS.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">rewrite_css + cache_extend</a>	Cache extends images in CSS.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">rewrite_css + rewrite_images</a>	Re-compress images in CSS.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">rewrite_images</a>	Rescales, and compresses images; inlines small ones.	<a href="#">before</a>	<a href="#">after</a>
<a href="#">rewrite_javascript</a>	Minifies Javascript.	<a href="#">before</a>	<a href="#">after</a>

# Example: Combining multiple CSS files

```
<head>
  <link rel="stylesheet" type="text/css" href="styles/yellow.css">
  <link rel="stylesheet" type="text/css" href="styles/blue.css">
  <link rel="stylesheet" type="text/css" href="styles/big.css">
  <link rel="stylesheet" type="text/css" href="styles/bold.css">
</head>
<body>
  <div class="blue yellow big bold">Hello, mod_pagespeed!</div>
</body>
```

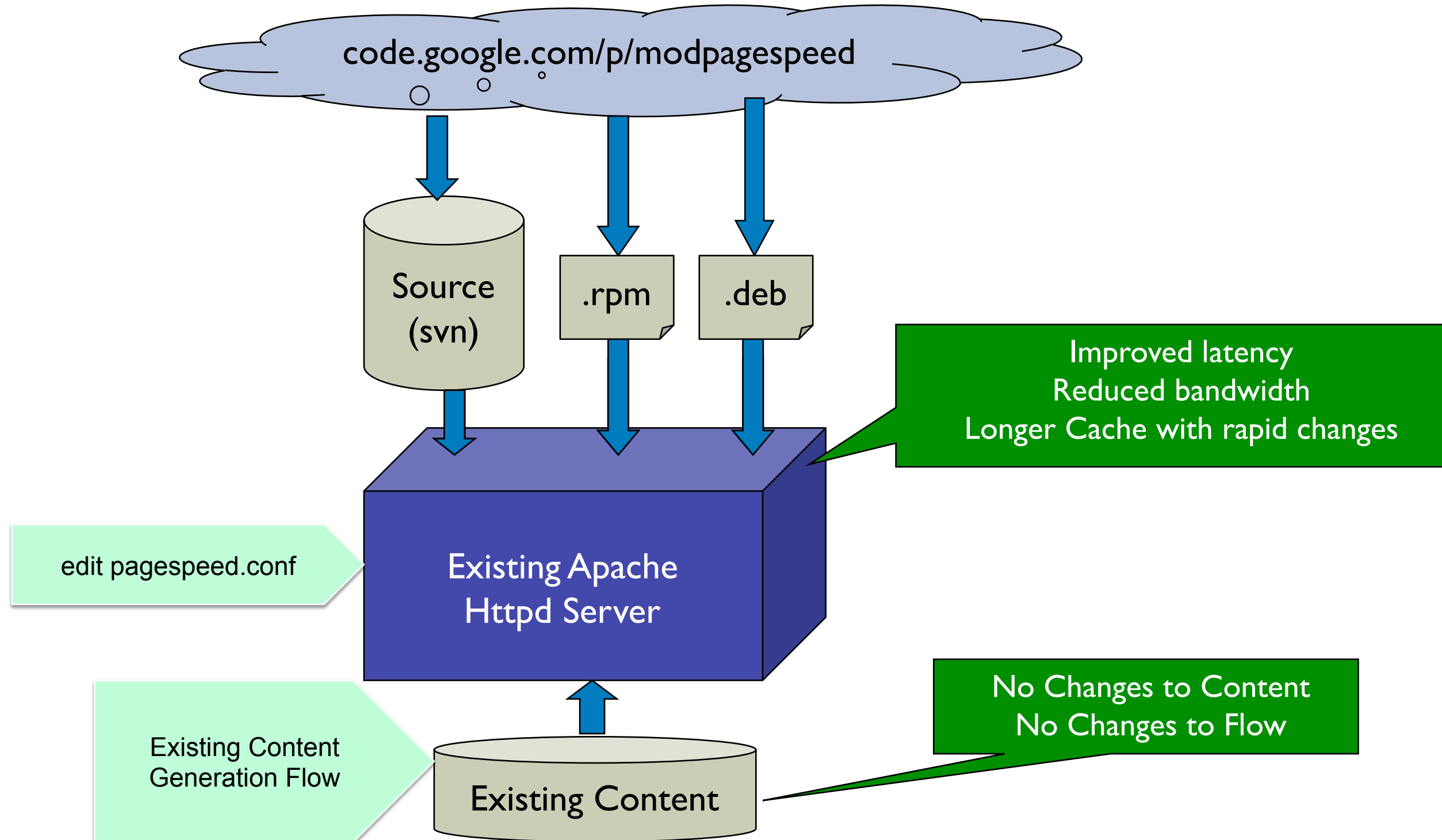


md5 sum of combined CSS file

```
<head>
  <link rel="stylesheet" type="text/css"
    href="styles/yellow.css+blue.css+big.css+bold.css.pagespeed.cc.HASH.css">
</head>
<body>
  <div class="blue yellow big bold">Hello, mod_pagespeed!</div>
</body>
```

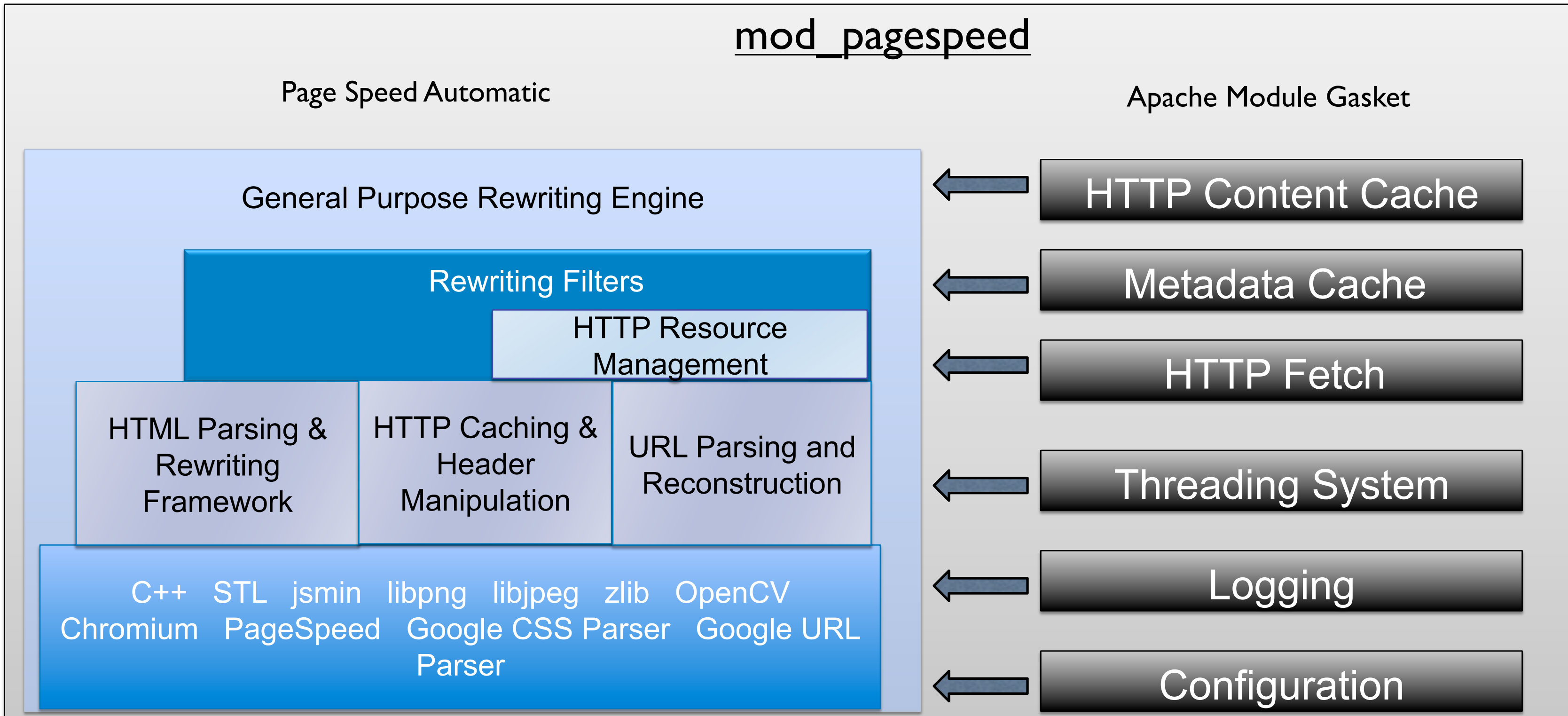
Combined file Served  
with 1-year TTL

# mod\_pagespeed Adoption Flow





# mod\_pagespeed Architecture

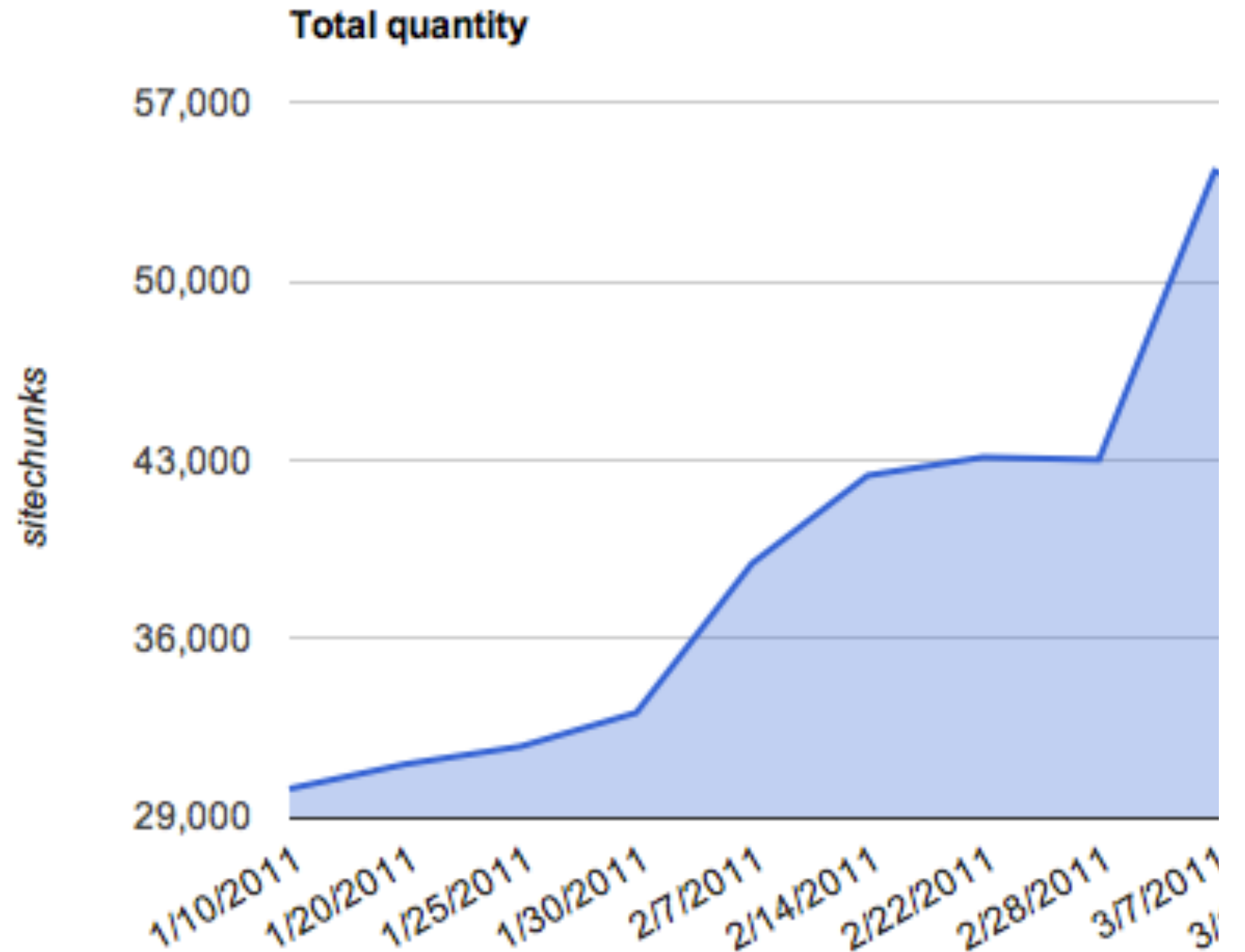


# mod\_pagespeed Results

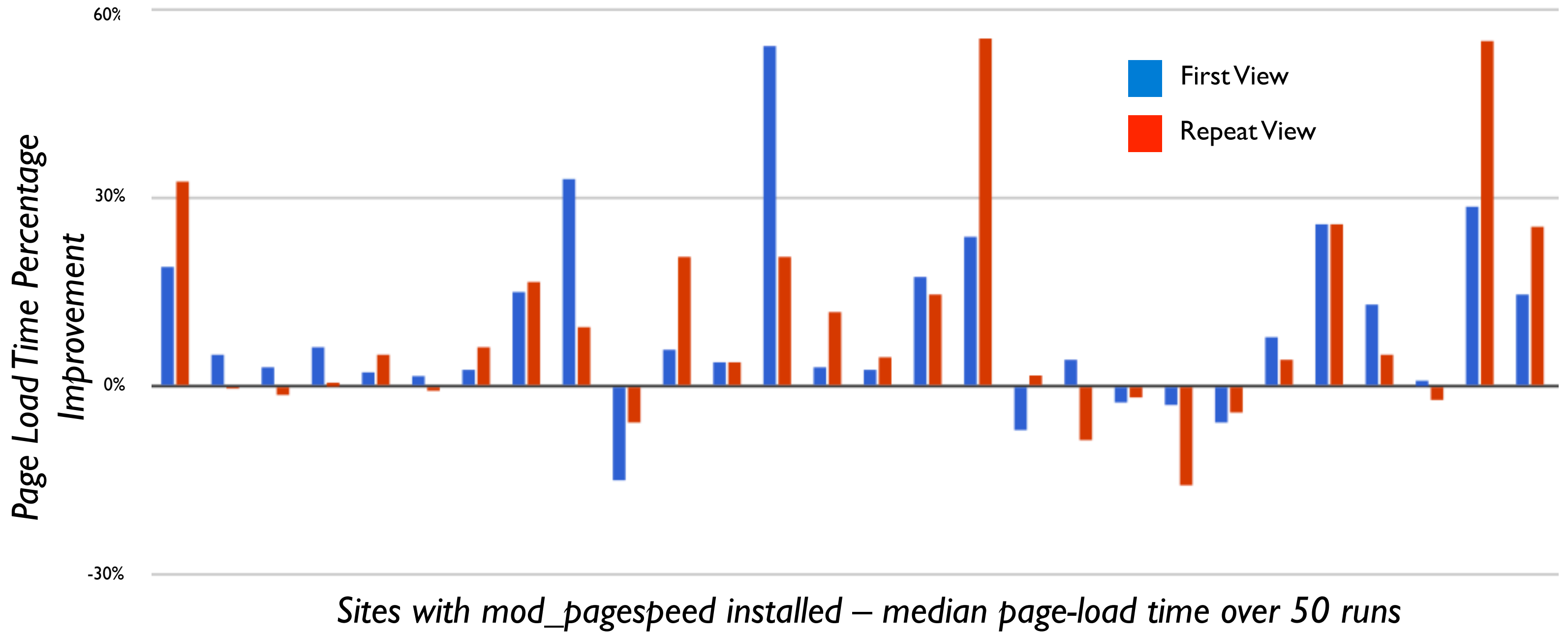
*How Much Faster Is The Web Now?*

# mod\_pagespeed adoption on the web

Launch Date	November 3, 2011
DreamHost support	November 5, 2011
Go Daddy support	January 27, 2011
Lines of Code	65,000

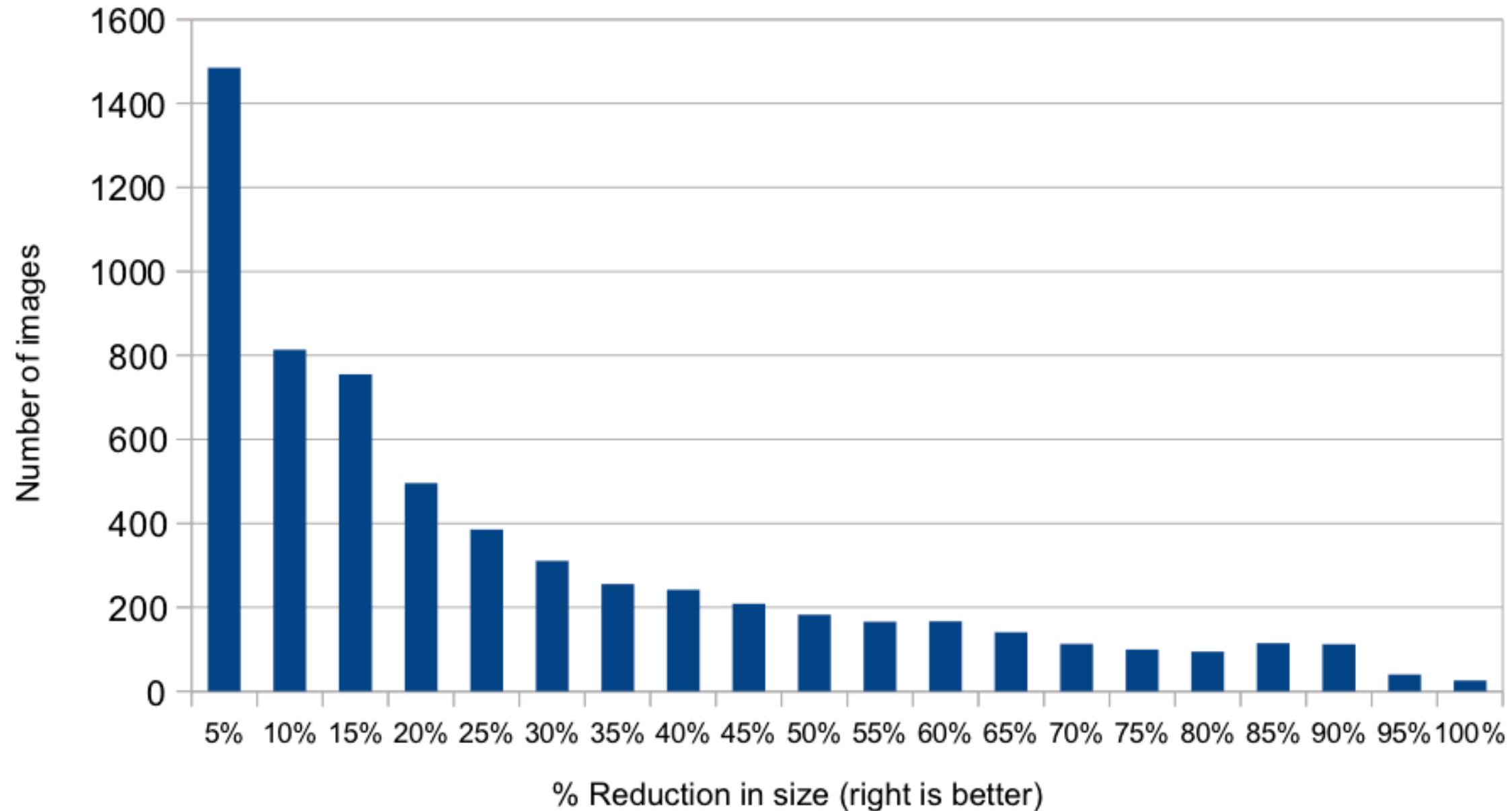


# mod\_pagespeed site latency improvements: 28 sites



# mod\_pagespeed image size reduction on the Alexa 1000

Effectiveness of mod\_pagespeed Image Optimizations



# Case Study: androidacademy.com

The screenshot displays the website's header with the Android Academy logo, a search bar, and several featured articles. Below the header is a navigation menu with icons for About, Features, News, Timeline, Tutorials, Downloads, Developers Register, Forums, and Contact. The main content area includes a featured article about mobile UI, a sidebar with a tip about calories, and a large advertisement for Full Sail University. A browser developer tool is open at the bottom, showing the response headers for the GET request to androidacademy.com.

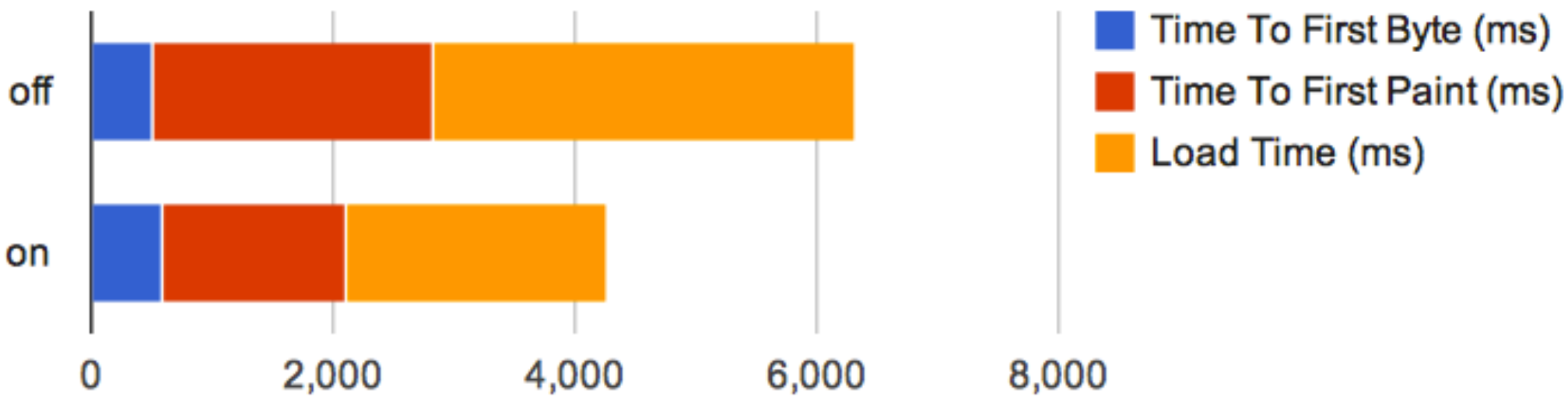
URL	Status	Domain	Size	Timeline
GET androidacademy.coi	200 OK	androidacademy.com	40 KB	1.22s

**Response Headers**

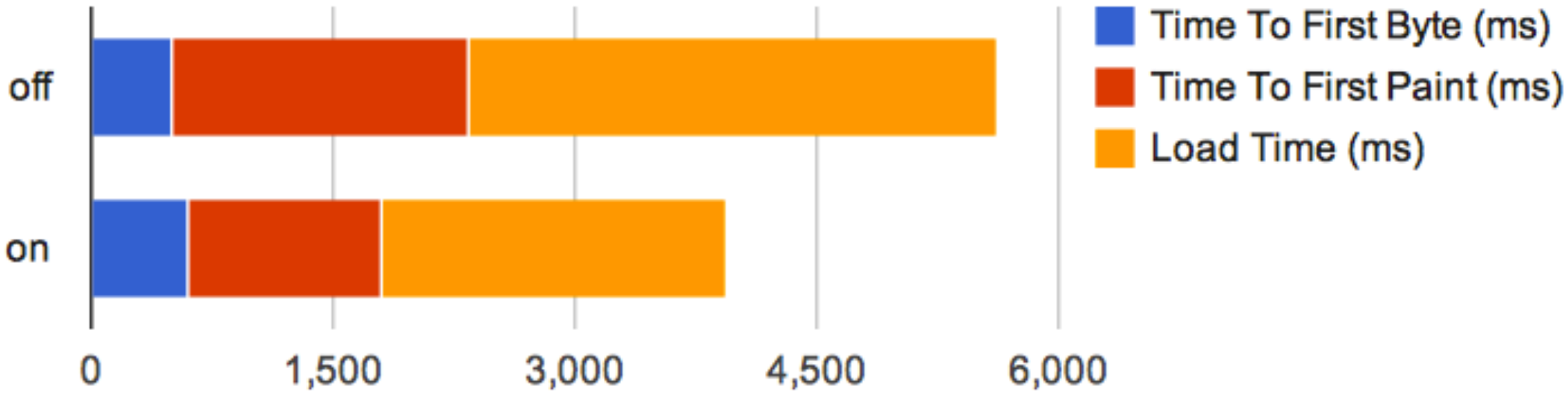
```
Date: Fri, 22 Apr 2011 19:57:59 GMT
Server: Apache/2.2.14 (Ubuntu)
X-Powered-By: PHP/5.3.2-lubuntu4.7
P3P: CP="NOI ADM DEV PSAi COM NAV OUR OTRo STP IND DEM"
X-Content-Encoded-By: Joomla! 1.5
Cache-Control: max-age=0, no-cache, no-store
Pragma: no-cache
X-Mod-Pagespeed: 0.9.16.9-576
Vary: Accept-Encoding
Content-Encoding: gzip
```

# androidacademy.com timeline (median of 50 runs)

### First View Timeline (ms)



### Repeat View Timeline (ms)

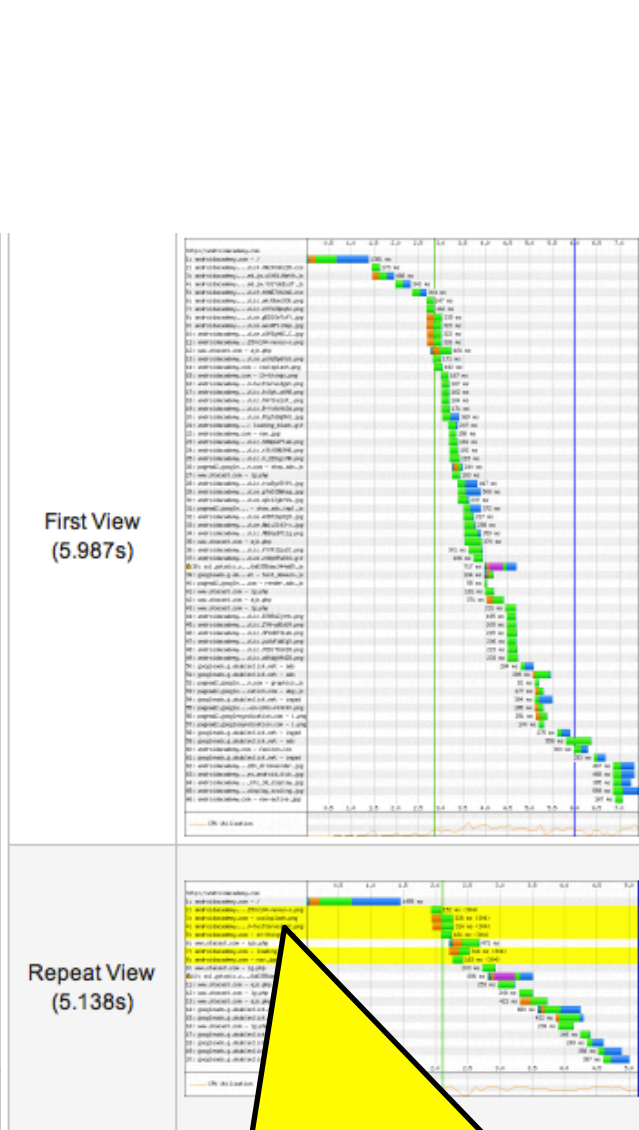
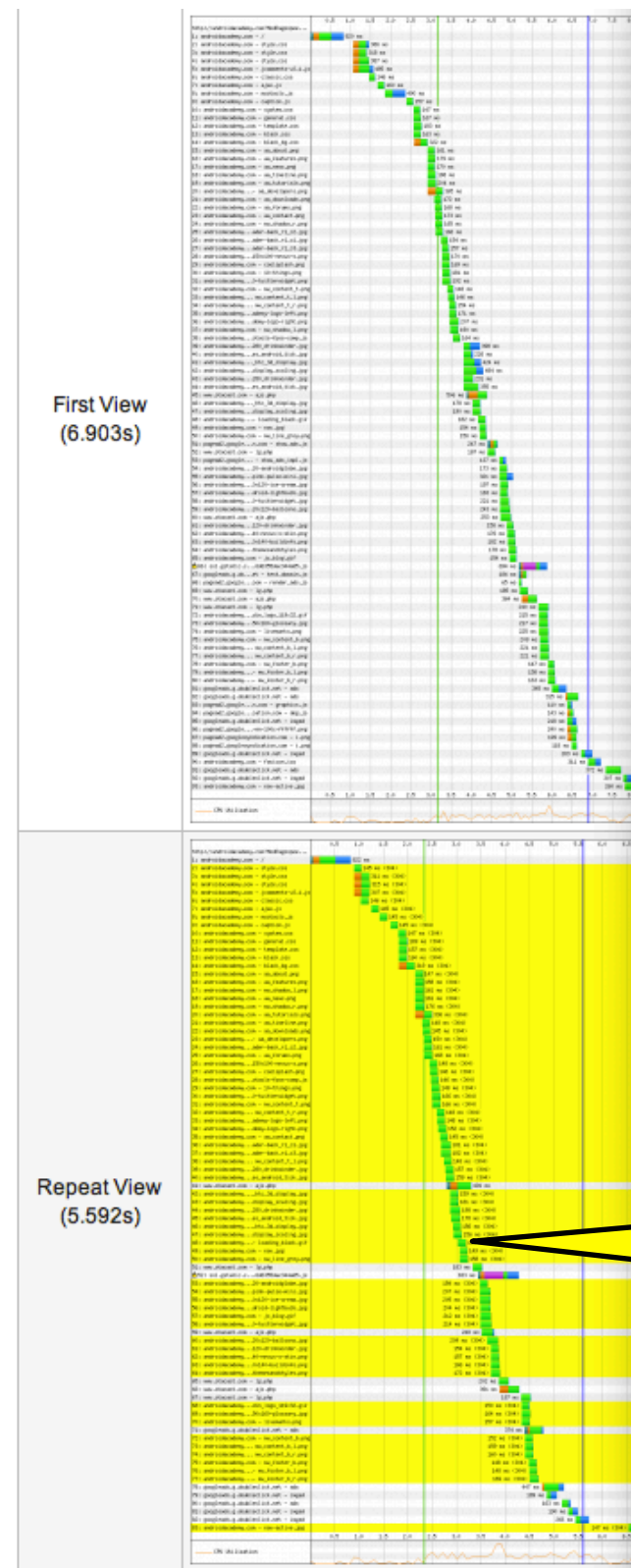




# androidacademy.com waterfall from webpagetest.org

mod\_pagespeed off

mod\_pagespeed on

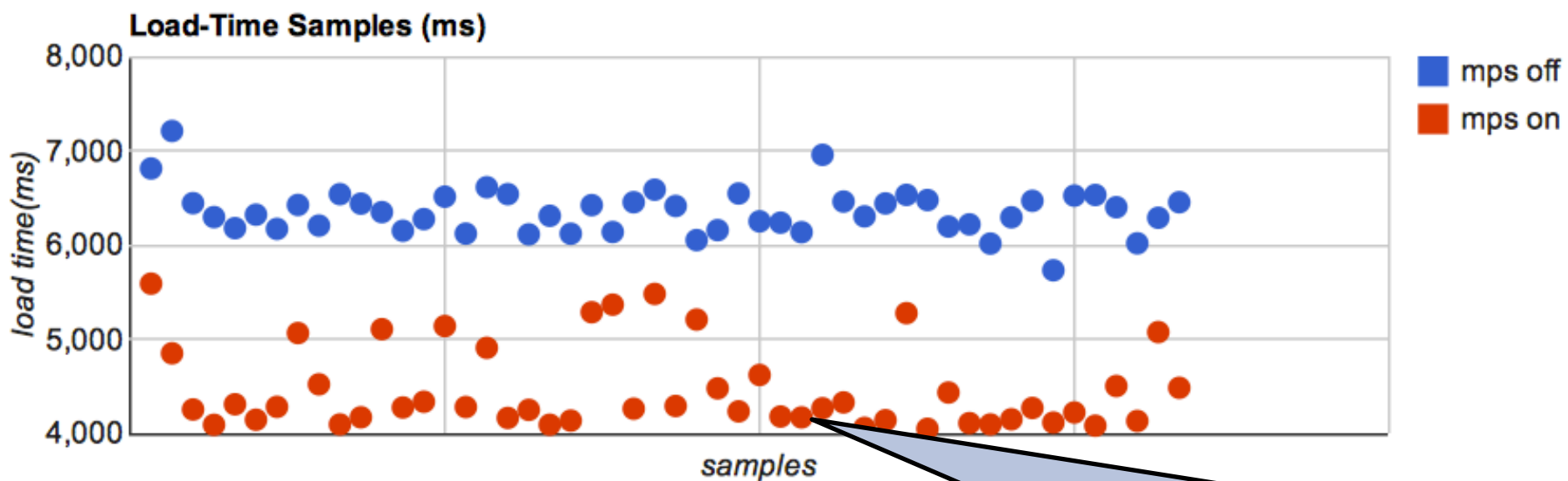


304 (not modified) responses



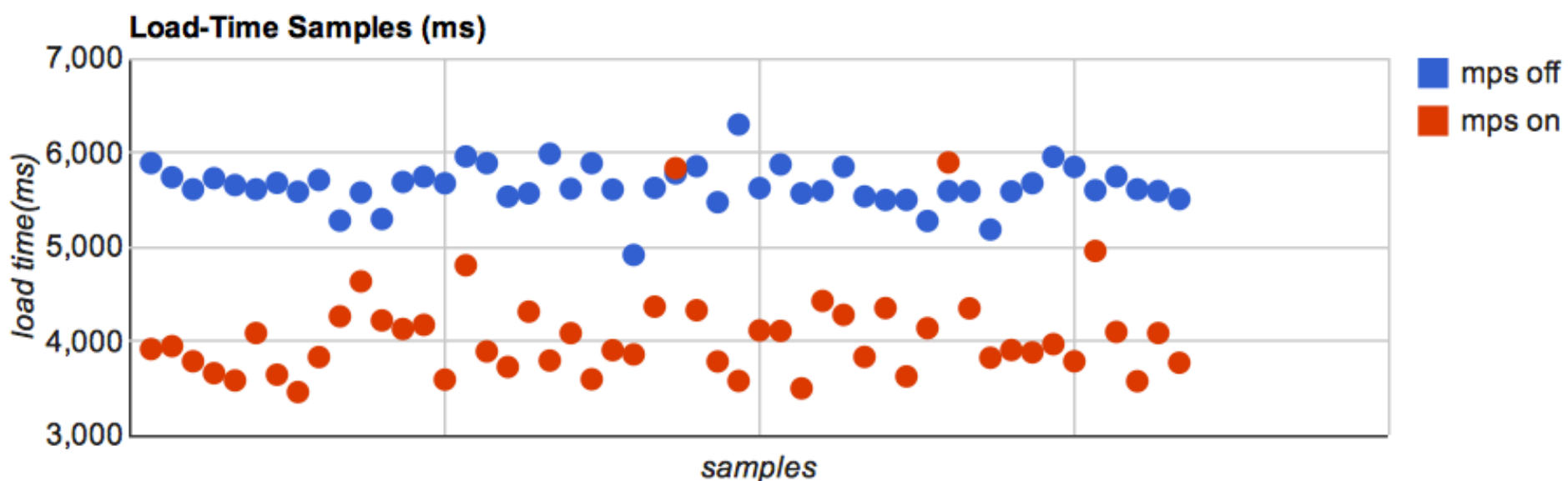
# androidacademy.com: consistency & test methodology

First View Load Time (ms) over 50 Samples



Significant measurement variance, but conclusive results

Repeat View Load Time (ms) over 50 Samples



# mod\_pagespeed roadmap

- **Make more of the web faster: 60,000 sites is a start...**
  - High-volume partners (Hosting Providers, CDNs)
  - Leveraged integrations with servers, proxies, caches, etc
  - Extreme Support
- **Make the web *more* fast**
  - Image spriting, WebP
  - Deferring JavaScript execution
- **Measure Better**
  - Which filters have the highest impact?
  - Help users evaluate mod\_pagespeed benefits

# mod\_pagespeed: Automatically Make Your Web Sites Faster

Read About It <http://code.google.com/speed/page-speed/docs/module.html>

Try It <http://www.modpagespeed.com>

Download It <http://code.google.com/speed/page-speed/download.html>

Discuss It <http://groups.google.com/group/mod-pagespeed-discuss>



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# WebP: an image format for the World Wide Web

# The state of images on the Web

- Most of the images are JPEG images

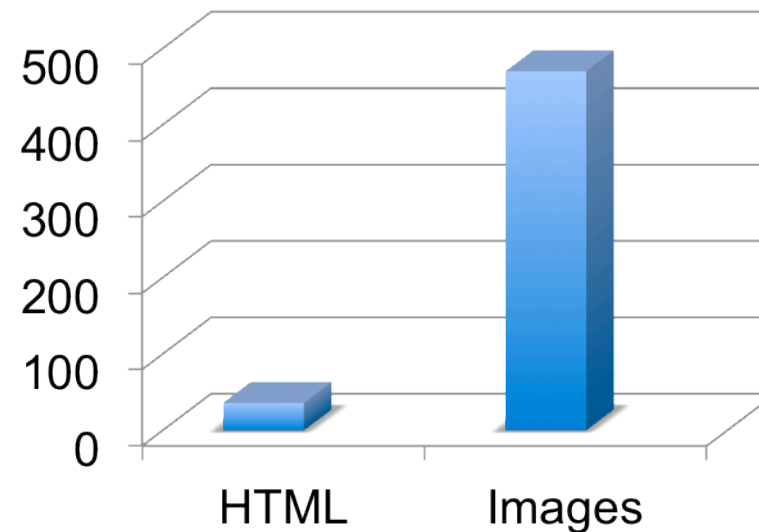


- GIF for specific use-cases such as transparency and animation

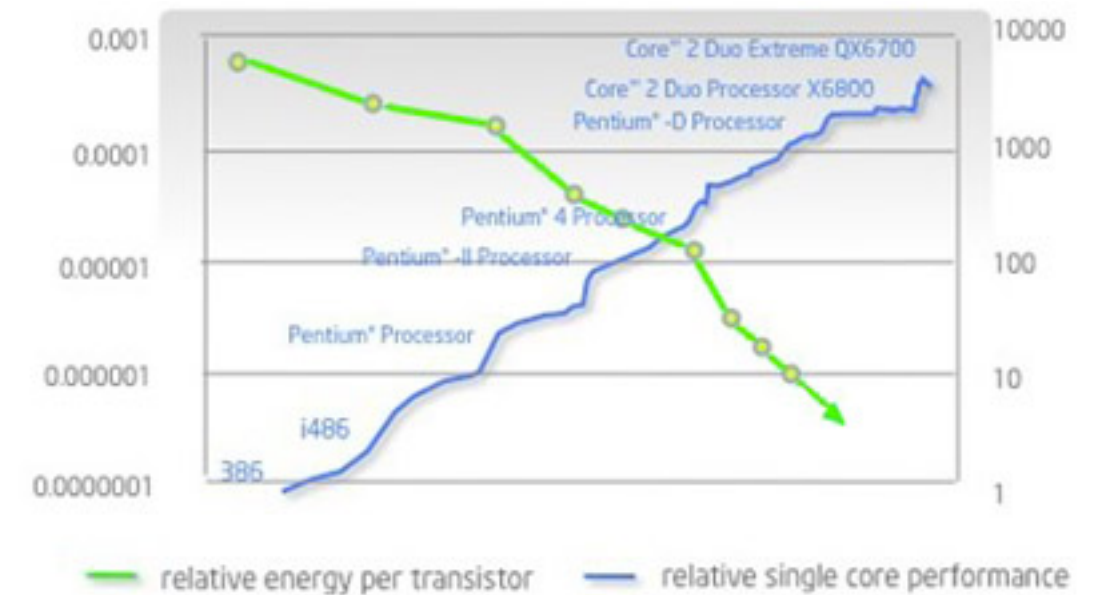


- PNG for high-quality icons, text, graphs and really high-end digital photos

- An image is worth a 1000 words –almost literally



- Lossy compression stuck at JPEG, but the world has changed...



Source: Intel Corporation

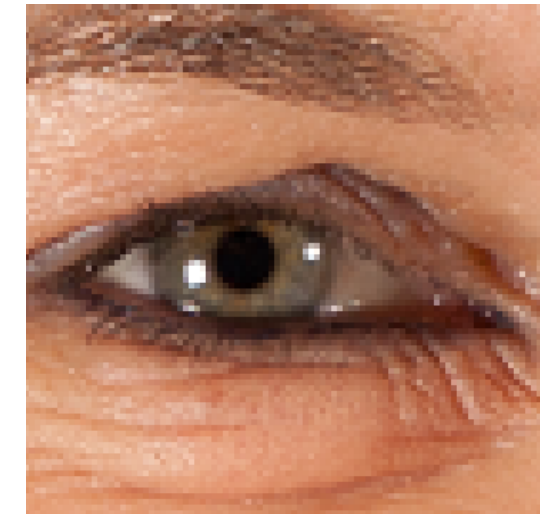
- Algorithmic improvements

# WebP – or how to squeeze every byte of data

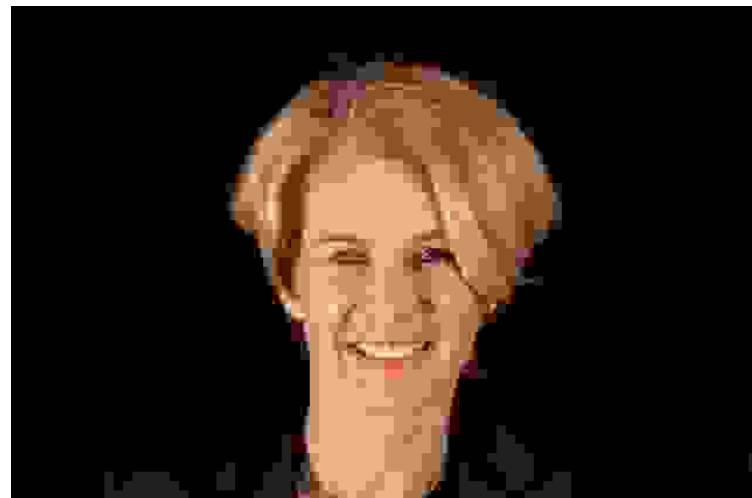
- Based on VP8 bitstream, it's basically a key frame
- PSNR study: 900K JPEGs
  - a. WebP compression: -39.8% bytes
  - b. JPEG re-compression: -14.2% bytes
- SSIM study: 26K PNGs
  - a. JPEG compress  $q=75$ .
  - b. Identify ssim
  - c. WebP compress for equivalent ssim
    - WebP is 40.4% smaller
- Performant at low bit-rate, the wireless use-case
- Delightful at high bit-rate



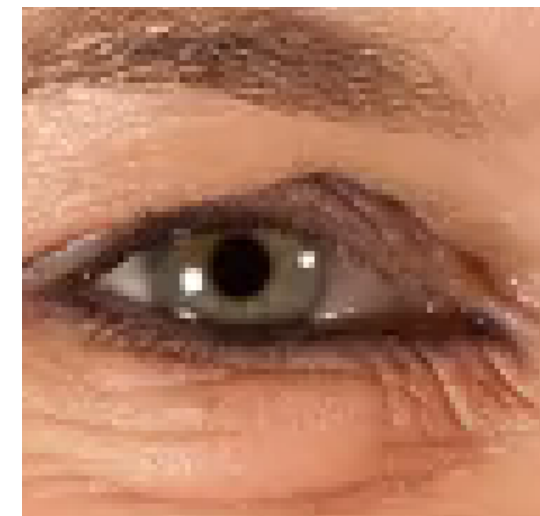
WebP



PNG



JPEG



WebP

# WebP – speed improvement for site

**JPEG** <http://www.imagescompare.com/images/jpeg.html>

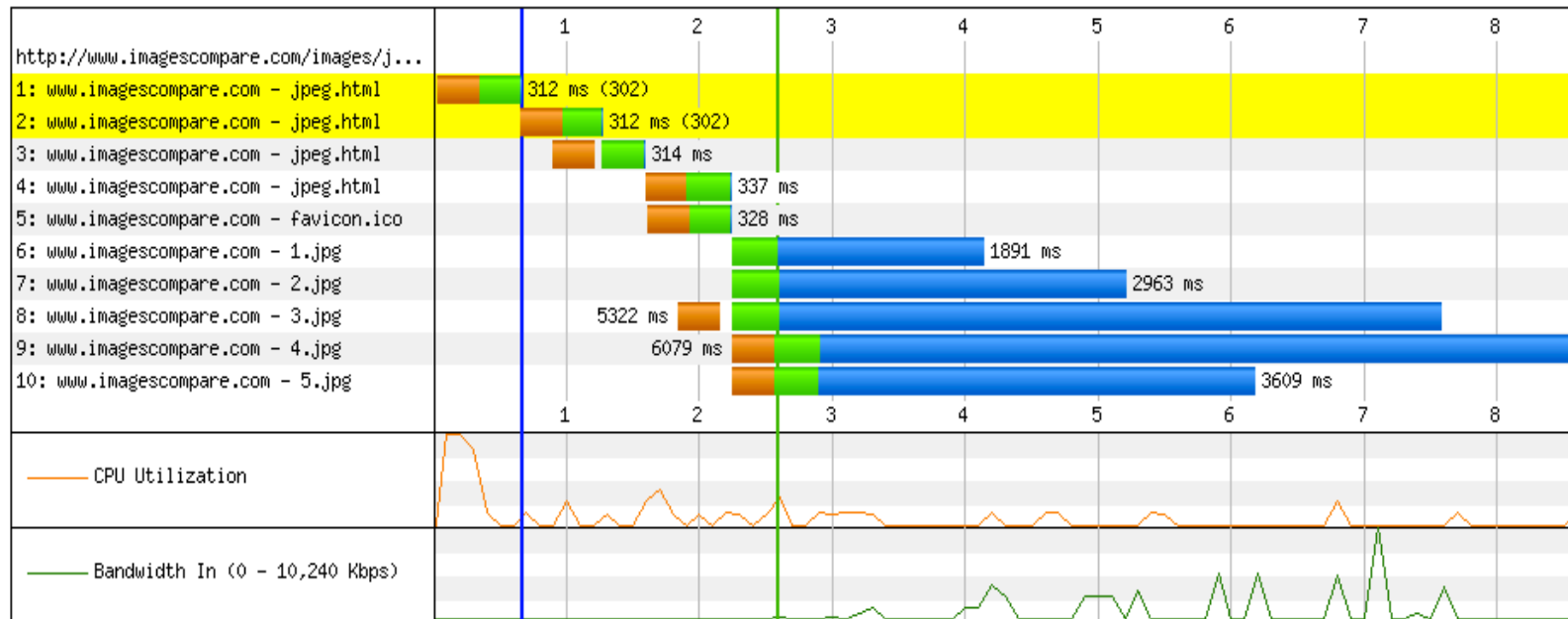
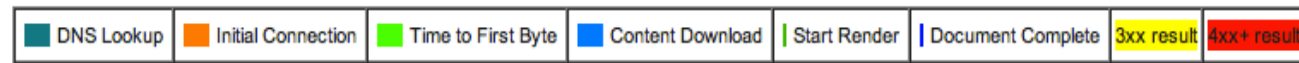
**WebP** <http://www.imagescompare.com/images/webp.html>



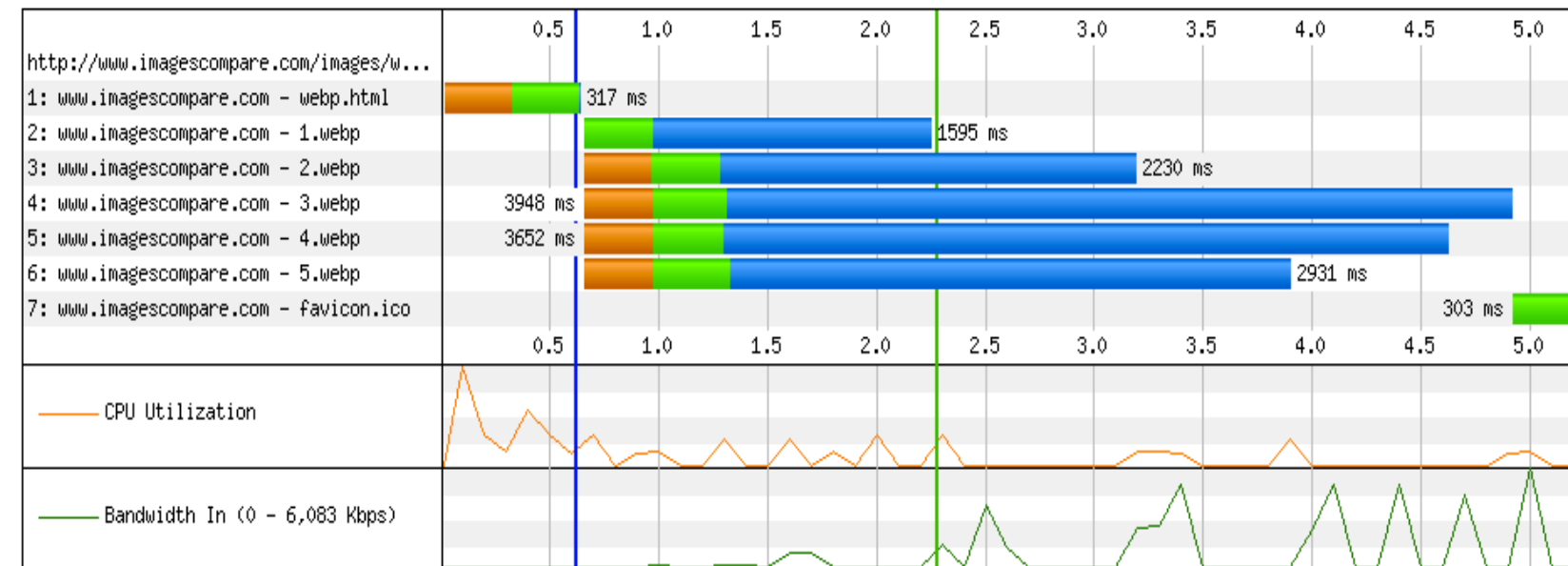
Load Time	First Byte	Start Render	Result (error code)	Document Complete			Fully Loaded		
				Time	Requests	Bytes In	Time	Requests	Bytes In
0.650s	1.584s	2.580s	0	0.650s	1	0 KB	8.652s	10	729 KB

Load Time	First Byte	Start Render	Result (error code)	Document Complete			Fully Loaded		
				Time	Requests	Bytes In	Time	Requests	Bytes In
0.610s	0.640s	2.270s	0	0.610s	1	1 KB	5.231s	7	529 KB

## Waterfall View



## Waterfall View





# WebP – speed and beyond. Delight your users!

- “Make the encoder good first” – Sep 2010
- “it should probably beat JPEG much more readily now” –Apr 2011
- New features announced today
  - eXtensible Metadata Platform (XMP)
  - Animation
  - 3D - stereoscopy
  - Tiling
  - Spriting – the fun way
  - Lossless
  - JNI interface

- Product support



- Hardware support with vp8 compatibility
- Completely new study on the compression improvement over JPEG
- Speed: 2x faster codec

- Example spriting proposal:

```
<img src = "group.webp#john">  
<img src = "group.webp#jack">
```

Group.webp is a multi-image that contains 2 images with tag #john and #jack  
No weird CSS to write 😊

- Example 3D

```
<img src = "3d.webp#left">  
<img src = "3d.webp#right">
```

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