Designing for Performance

Lara Callender Hogan
@lara_hogan
Performance is user experience.
Users expect **2 seconds**.
After **3 seconds**, 40% will abandon your site.
+160k to a page = 
+12% Etsy’s bounce rate on mobile
When we eliminated jank:
people favored more often
and favored more items
-1 redirect =
+12% Double-Click click-through rate
Performance + aesthetics = the user experience.
Our industry has not designed for performance.
Fast page load time builds trust in your website.
performance + beauty = overall user experience
Why is my site slow, especially on mobile?
A cellular device has to establish a radio channel before it can send/get data.
Average round trip:

Desktop Wifi: <50ms

Mobile Network: >300ms

source: Taming the Mobile Beast
So how can we optimize for networks?
Test a website's performance

Enter a Website URL

Test Location: Dulles, VA USA (IE 6-11, Chrome, Firefox) Select from Map

Browser: IE 9

Advanced Settings: 1 run, Cable connection, results are public

Run a free website speed test from multiple locations around the globe using real browsers (IE and Chrome) and at real consumer connection speeds. You can run simple tests or perform advanced testing including multi-step transactions, video capture, content blocking and much more. Your results will provide rich diagnostic information including resource loading waterfall charts, Page Speed optimization checks and suggestions for improvements.

If you have any performance/optimization questions you should visit the Forums where industry experts regularly discuss Web Performance Optimization.
Perceived performance

https://www.etsy.com

0.0
User’s Phone

Cell Tower

Your Web Host

HTML

CSS and JS in head

Body images
Number of requests

https://www.etsy.com/

1. www.etsy.com - /
   454 ms (302)
2. www.etsy.com - /
   281 ms
3. site.etsystatic...20131112190040.css
   0 ms (request canceled)
4. site.etsystatic...20131112191256.css
   176 ms
5. site.etsystatic...20131112190040.css
   281 ms
6. img0.etsystatic.com - largeheader.jpg
   3037 ms
7. img7.etsystatic...43334771_1mob.jpg
   1188 ms
8. img0.etsystatic...52525490_1t5o.jpg
   2049 ms
9. img0.etsystatic...48068718_r2wv.jpg
   2049 ms
10. img0.etsystatic...51077599_27kh.jpg
   2049 ms
11. site.etsystatic...2013106185590.js
   2160 ms
12. site.etsystatic...2013113161149.js
   2049 ms
13. site.etsystatic...201310618550.js
   2049 ms
14. img1.etsystatic...47312376_4034.jpg
   1526 ms
15. img1.etsystatic...49914871_kt2.jpg
   754 ms
16. img1.etsystatic...23650461_ec00.jpg
   233 ms
17. site.etsystatic...n-EgoTT-Light.eot
   1978 ms
18. site.etsystatic...EgoTT-Medium.eot
   2164 ms
19. img1.etsystatic...60763281_3mvv.jpg
   733 ms
20. img0.etsystatic...40313799_cdt1.jpg
   1329 ms
21. site.etsystatic...T-Text-Regular.eot
   3542 ms
22. img0.etsystatic...24022528_a9d5.jpg
   472 ms
23. img1.etsystatic...51306329_rscf.jpg
   1701 ms
24. site.etsystatic...ext-Regular.ttf
   3454 ms
25. img1.etsystatic...75x75.05645972.jpg
   375 ms
26. site.etsystatic...Egypti-Regular.eot
   1478 ms
User’s Phone

1 HTML file

Cell Tower

15 CSS files

Your Web Host
# Size of requests

<table>
<thead>
<tr>
<th>Request</th>
<th>Bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.etsy.com/">http://www.etsy.com/</a></td>
<td>15.2 KB</td>
</tr>
<tr>
<td><a href="http://site.etsystat...3.20131108201356.css">http://site.etsystat...3.20131108201356.css</a></td>
<td>8.7 KB</td>
</tr>
<tr>
<td><a href="http://site.etsystat...e.20131112190040.css">http://site.etsystat...e.20131112190040.css</a></td>
<td>26.8 KB</td>
</tr>
<tr>
<td><a href="http://img0.etsystat...ousel/largehero1.jpg">http://img0.etsystat...ousel/largehero1.jpg</a></td>
<td>74.2 KB</td>
</tr>
<tr>
<td>http://img1.etsystat...5.413394771_1md6.jpg</td>
<td>12.5 KB</td>
</tr>
</tbody>
</table>
1. Images
2. Fonts
3. Markup
4. Culture

Hold on to your butts.
Images

Average Bytes per Page by Content Type

httparchive.org/interesting.php
Images
*(the nerdy parts)*

Average Bytes per Page by Content Type

httparchive.org/interesting.php
Joint Photographic Experts Group

Group began in 1986.
JPEG

Best for: Photos, images with many colors.
JPEGs are **lossy**.

Their algorithm is based loosely on how humans see and process information.
JPEG

**Good at:**
Smooth gradients, low contrast.

**Bad at:**
High contrast areas, edges.
Optimization options:

Reduce noise and other complexity.

Decrease export quality.

Blur unimportant areas.
Before blur: 211KB

After blur: 150KB

responsivedesign.is/articles/reducing-image-sizes
Left crop: 50KB

Center crop: 57KB

Right crop: 60KB
Graphics Interchange Format

Introduced by CompuServe in 1987.
**GIF**

**Best for:** Animations that can’t be replaced with CSS.
GIF

Contain up to **256 colors** (per frame).

Are **lossless**.

Please don’t use them.
... if you must use a GIF...
Dithering gives the appearance of a smoother blend.
Dithering set to 0: 4.8KB

Dithering set to 100: 9.7KB
Horizontal pattern: 9.7KB

Vertical pattern: 21KB
Their compression algorithm removes **horizontal redundancy**.

The more details or noise, the larger the file will be.
So seriously, folks:

Replace GIF animations with **CSS**.

Replace non-animated GIFs with **PNG-8s**.

Replace movie GIFs with **asynchronously-loading videos**.
Portable Network Graphics

Created as an improved, *non-patented* replacement for GIF in 1996.
PNG-8

**Best for:** Images with few colors.
PNG-8

- Lossless (like GIFs!)
- 256 color palette (like GIFs!)
- Dither (like GIFs!)
- Recognize horizontal and vertical patterns.
PNG-24

No restriction on color palette.

Handles **transparency** differently.
Optimization options:

Decrease noise.

Decrease number of colors.
Designing for Performance
Designing for Performance
WebP

Google announced WebP in 2010.

Both *lossless* and *lossy* compression.
Supports transparency and animation.
WebP

Predicts a value, then encodes the difference between the prediction and actual value.
WebP

**Creation:** there's a Photoshop plugin, and online conversion tools.

**Support:** only Chrome, Opera, and Android Browser.
Save even more bytes and requests
Replace simple images with SVG.
Scalable Vector Graphics

XML-based vector image format, born out of competing standards submitted to W3C.

Became a W3C recommendation in 2001.
SVG

Scales up beautifully for **retina** devices.

If inline, eliminates an HTTP **request**.

Not supported ≤ **IE8**.

Exports with a lot of **cruft**.
<svg version="1.1" xmlns="http://www.w3.org/2000/svg"
    xmlns:xlink="http://www.w3.org/1999/xlink" x="0px" y="0px"
    width="20px" height="20px" viewBox="0 0 20 20" enable-
    background="new 0 0 20 20" xml:space="preserve">
    <polygon fill="#FFFFFF" stroke="#000000" stroke-miterlimit="10"
        points="10,2.003 11.985,8.112 18.407,8.112 13.212,11.887
        15.196,17.996 10,14.221 4.803,17.996 6.789,11.887 1.592, 8.112
        8.015,8.112 "/>
</svg>
You can apply it as a background:

```css
.star {
    background: url(star.svg);
    display: block;
    width: 83px;
    height: 83px;
    background-size: 83px 83px;
}
```
Or inline the SVG into your HTML:

```html
<body>
  <svg version="1.1" xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink" x="0px" y="0px" width="20px" height="20px" viewBox="0 0 20 20" enable-background="new 0 0 20 20" xml:space="preserve">
  </svg>
</body>
```
Inlined SVG removes cacheability and makes your HTML file size larger.

So, as with everything else, test it.
Sprites
#main-nav a {
    background-image: url(sprite.png);
}

#main-nav #convos {
    background-position: -220px 0;
}

#main-nav #favorites {
    background-position: -340px 0;
}
Dyn - Managed DNS and Email Delivery

WHERE WE'LL BE

Jul 16 – 20, 2012
OSCON - Portland, OR
Join the world’s open source pioneers, builders, and innovators for five intense days where you will learn about open development, challenge your assumptions, and fire up your brain.

Jul 16 – 18, 2012
HostingCon – Boston, MA
The premier conference and trade show for the hosted services industry. The best and brightest from the industry will be in attendance to learn about the latest news, ideas and technology affecting their businesses.

BLOG & NEWS

Jun 29, 2012
Velocity 2012: Like A Band, Become The Company People Like

Jun 27, 2012
Dyn Prepares For Bold Future With Technology Leadership Shifts

Jun 26, 2012
Velocity 2012: Performance is the Most Important Type of DNS Security

@DYNINC
UX Manager @LaraSwanson will be the keynote speaker at @CapitalCampDC http://t.co/bl1exny0 #webperf UX
Serve the right amount of bytes.
<img srcset="small.jpg 400w, medium.jpg 800w, full.jpg 1300w"
sizes="(max-width: 480px) 75vw, (min-width: 960px) 95vw, 60vw"
src="medium.jpg"
alt="image title"
title="image title">
<img
  srcset="small.jpg 400w,
          medium.jpg 800w,
          full.jpg 1300w"
  sizes="(max-width: 480px) 75vw,
          (min-width: 960px) 95vw,
          60vw"
  src="medium.jpg"
  alt="image title"
  title="image title">
<img srcset="small.jpg 400w, medium.jpg 800w, full.jpg 1300w"
sizes="(max-width: 480px) 75vw, (min-width: 960px) 95vw, 60vw"
src="medium.jpg"
alt="image title"
title="image title">
<picture>
  <source type="image/svg+xml" srcset="pic.svg"/>
  <img src="pic.png" alt="Description"/>
</picture>
Additional lossless compression
<table>
<thead>
<tr>
<th>File</th>
<th>Size</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>11298416615_eddc5e0fce_o.jpg</td>
<td>1,147,598</td>
<td>20.9%</td>
</tr>
<tr>
<td>q75-left-crop.jpg</td>
<td>498,725</td>
<td>0%</td>
</tr>
<tr>
<td>q75-right-crop.jpg</td>
<td>567,606</td>
<td>0%</td>
</tr>
<tr>
<td>Screen Shot 2015-02-20 at 11.54.58 AM</td>
<td>252,595</td>
<td>14.8%</td>
</tr>
</tbody>
</table>

Saved 347.1KB out of 2.8MB. 12.3% overall (up to 20.9% per file)
We ran all PNGs in Etsy’s templates through lossless compression.

Average per-file space savings 19.76%

Total space savings 44.34%
Automate the extra compression.
**ImageOptim CLI**
github.com/JamieMason/ImageOptim-CLI

**Wordpress plugin**
wordpress.org/plugins/ewww-image-optimizer/

**SVG scrubber**
codedread.com/scour/ or github.com/svg/svgo
Fonts
IE6-8 downloads all @font-face files, even if they’re not used!
Only @import the font weights you absolutely need.
@font-face {
  font-family: 'FontName';
  src: url('fontname.woff') format('woff');
}

body {
  font-family: Georgia, serif;
}

@media (min-width: 1000px) {
  body {
    font-family: 'FontName', Georgia, serif;
  }
}
Optimize your character subsetting.
<table>
<thead>
<tr>
<th>Subsetting:</th>
<th>Basic Subsetting (Western languages)</th>
<th>Custom Subsetting... (Custom language support)</th>
<th>No Subsetting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character Encoding:</td>
<td>Mac Roman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Character Type:</td>
<td>Lowercase</td>
<td>Currency</td>
<td>Lower Accents</td>
</tr>
<tr>
<td></td>
<td>Uppercase</td>
<td>Typographics</td>
<td>Upper Accents</td>
</tr>
<tr>
<td></td>
<td>Numbers</td>
<td>Math Symbols</td>
<td>Diacriticals</td>
</tr>
<tr>
<td></td>
<td>Punctuation</td>
<td>Alt Punctuation</td>
<td></td>
</tr>
<tr>
<td>Language:</td>
<td>Albanian</td>
<td>Faroese</td>
<td>Maltese</td>
</tr>
<tr>
<td></td>
<td>Bosnian</td>
<td>French</td>
<td>Norwegian</td>
</tr>
<tr>
<td></td>
<td>Catalan</td>
<td>German</td>
<td>Polish</td>
</tr>
<tr>
<td></td>
<td>Croatian</td>
<td>Greek</td>
<td>Portuguese</td>
</tr>
<tr>
<td></td>
<td>Cyrillic</td>
<td>Hebrew</td>
<td>Romanian</td>
</tr>
<tr>
<td></td>
<td>Czech</td>
<td>Hungarian</td>
<td>Serbian</td>
</tr>
<tr>
<td></td>
<td>Danish</td>
<td>Icelandic</td>
<td>Slovak</td>
</tr>
<tr>
<td></td>
<td>Dutch</td>
<td>Italian</td>
<td>Slovenian</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>Latin</td>
<td></td>
</tr>
</tbody>
</table>
Document subsetting so others can know and, if needed, edit it.
Hey everyone,

We've been asking around but it looks like there are some horse-related issues affecting reviews on some pages:

https://www.etsy.com/teams/7720/bugs/discuss/14559563/page/1
Horse covers up my last star on my reviews.

Tara from ShabbyWorks  12:21 am May 20, 2014 EDT

Why is there a horse emoji (spelling?) covering up the 5th star of my reviews?? Been like this all day!
Tara
Durant, OKLAHOMA, United States

Contact Tara

Request Custom Order

64 Reviews
181 Followers

More Info

Shop home (all items)

Sections Sort

6 Letter Horseshoe Sign made with real horseshoes....
I'm sorry you got saddled with this. But I'm glad you've
Semantics & Repurposability
Save **development** time and **page load** time.
Effects of a semantics and repurposability template cleanup

*(not a redesign)*
Create repurposable code.
Rename **non-semantic** elements.

`.blue{}`

.tags
Remove *inefficient selectors*.

\[
\texttt{.wide \#sidebar a.search} \}
\]

\[
\texttt{\#sidebar .search} \} \textit{or just} \texttt{.search} \}
\]
Remove unnecessary elements (**divitis**).
Create patterns.
Consistency, clarity in patterns = better **product** and **brand alignment**.
1 font weight for **headlines**.
No more Guardian for body copy.

*Consistently across Desktop and Apps.*
This paper cut holiday card was carefully hand-painted, and features a red banner weaving in and out of a birch tree forest. The banner reads “happy holidays” in black handwriting.
Brian the Bear Lambswool Plush Toy - Made to order

$63.55 USD

Only 1 available

Overview
- Handmade item
- Materials: lambswool, polyestersstuffing
- Feedback: 441 reviews
- Ships worldwide from United Kingdom

This shop accepts Etsy Gift Cards

Add to Cart
Saved roughly 270KB of page weight and 5 requests.
Make performance part of everyone’s workflow.
Use a mobile-first workflow.
Create a performance **budget**.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Goal</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total page load time</td>
<td>2 seconds</td>
<td>For all breakpoints</td>
</tr>
<tr>
<td>Total page weight</td>
<td>500kb</td>
<td>min-width: 900px</td>
</tr>
<tr>
<td>Total page weight</td>
<td>300kb</td>
<td>max-width: 640px</td>
</tr>
<tr>
<td>Speed Index</td>
<td>1,000</td>
<td>For all breakpoints</td>
</tr>
</tbody>
</table>
Be **deliberate** about loading assets like images, fonts and JavaScript files.
We are Infrastructure-as-a-Service (IaaS) experts, powering DNS & email delivery for enterprise, small business & personal users. Uptime is the Bottom Line.
At the outset of a project, you may find yourself weighing tough choices.
Can I put a large hero image at the top of every article?

**Pro:** Represents the brand well.

**Con:** This could be a really large file, and we want to minimize page weight.
Can I put a large hero image at the top of every article?

Compromise:

We’ll make sure that few colors are used in the hero, and it’s compressed correctly.
Should I @font-face three display weights and a text weight?

**Pro:** Lots of flexibility in typography.

**Con:** More requests and page weight.
Should I `@font-face three display weights and a text weight`?

Compromise:

We’ll use two display weights and a system font for the body content.
How will I demonstrate how this product works?

**Pro:** A video or animated GIF will clearly convey more information.

**Con:** Videos and GIFs can be pretty heavy.
How will I demonstrate how this product works?

Compromise:

We’ll self-host a video that asynchronously loads.
Make it easy for non-developers to do performance.
Automate compression.
Utilize style guides.
Automate performance tests.
Automate image resizing.
Inspiring Workspaces: Texturable

Peek inside the light-filled studio in Uruguay where Claudia Rosillo weaves together her love of nature with her family’s farming heritage.

BY JULIE SCHNEIDER  JUN 25, 2016
The peony is a flowering plant in the genus *Paeonia*, the only genus in the family *Paeoniaceae*. They are native to Asia, Southern Europe and Western North America. Boundaries between species are not clear and estimates of the number of species range from 25 to 40.
Image size and load time by device size

- **Average Image Size**
  - Full size image (without srcset)
  - XL: 1400px
  - MD (2x): 768px
  - L: 960px
  - MD: 768px
  - S: 320px

- **Size savings**
  - 1.2x
  - 1.2x
  - 5.5x
  - 10x
  - 14x

- **Load Time**
  - 2x Times faster

Average Image Size (Kilobytes)

Average Load Time (milliseconds)
A/B test to measure aesthetics vs. performance impact.
<table>
<thead>
<tr>
<th>Metric</th>
<th>Control (Observed)</th>
<th>ON (Observed)</th>
<th>% Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit add to cart rate</td>
<td>1.28%</td>
<td>1.35%</td>
<td>+5.64%</td>
</tr>
<tr>
<td>Visit error page view rate</td>
<td>0.50%</td>
<td>0.46%</td>
<td>-8.45%</td>
</tr>
<tr>
<td>Pages per visit</td>
<td>16.59</td>
<td>16.93</td>
<td>+2.10%</td>
</tr>
<tr>
<td>Bounces</td>
<td>25.09%</td>
<td>23.36%</td>
<td>-6.90%</td>
</tr>
<tr>
<td>Visit item favorite rate</td>
<td>6.26%</td>
<td>6.25%</td>
<td>-0.25%</td>
</tr>
<tr>
<td>Mean item favorites</td>
<td>0.42</td>
<td>0.41</td>
<td>-1.66%</td>
</tr>
</tbody>
</table>
Who is responsible for performance?
No more performance cops or janitors.
Changing culture is hard.
Help people “feel” your site’s performance.
@lara_hogan what really made an impact w/ management team was showing them the WPT compare feature video w/ our site and a competitors site

11:01 AM - 6 Jun 2015

@lara_hogan culture change way off for us but vid comp of wired vs 3G was very eye opening to management. Just starting my performance quest

2:04 PM - 5 Jun 2015

@lara_hogan I use the WPT SPOF comparison videos every time I talk to a company who still have some-instant shock, attention & understanding

2:39 PM - 6 Jun 2015

@lara_hogan we have had a lot of success using webpagetest videos to discuss and demo performance at Trulia.

1:52 PM - 5 Jun 2015
Publish performance reports.

Tech Update: Faster and Faster

Of all the awesome new features we delight in rolling out to our members, one of the most satisfying features to deliver is speed. In the past year we’ve made targeted improvements to convex, search, and relating performance, and we’ve greatly improved page delivery times to our members outside the U.S. We gain more than warm fuzzies with these improvements. Studies have shown that slow pages lead to less engaged visitors — they click fewer links, read fewer pages, and make fewer purchases. And just as you find for your loved one to go, site performance is becoming increasingly important as more of our members access Etsy through mobile devices and networks.

We have already taken our commitment to performance to the next level. We have been gathering every which-way measurements around site performance, and we will be kicking off more projects to improve performance across the board. Continuing in our spirit of transparency, we’ll be sharing some of these measurements and our progress with you here on the Etsy Blog in a quarterly Performance Weather Report. We’ll be talking about how long it takes us to generate the pages on our servers before shipping them across the Internet, and also how long it takes for our members around the world to see a fully functional page in their browser (surprisingly not always the same thing!). We’ll also share how we’re doing compared to some other sites with similar traffic to ours.

Keeping the site fast is a constant campaign. We want you to know that we are actively tracking site performance as one more measure of overall site quality, and we are committed to hardening our way to gold.
Forced us to **iterate** on and **improve** our most important pages.
Reminded us that page load times are not secret.
Motivated our development teams to get better.
Page generation time in milliseconds (smaller is better)

Listing
- Aug: 449, 580
- Nov: 359, 438

Profile
- Aug: 505, 790
- Nov: 427, 740

Search
- Aug: 492, 750
- Nov: 528, 970

Shop
- Aug: 536, 880
- Nov: 362, 530

Home
- Aug: 982, 1610
- Nov: 342, 480

whoa, awesome
Dan Miller - Performance Hero

Dan pushed for and oversaw Etsy's adoption of hhvm, an alternative PHP interpreter, that resulted in faster API and web requests for the Internal API service.

Other Heroes:
Cable connection (28ms RTT) vs 3G connection (150ms RTT)
We need to have empathy.
Good performance is good design.
For plenty more on designing for performance: designingforperformance.com