High Performance in the Critical Path
Measure!

What is going on?
DevTools Audits

Select audits to run
- Select All
- Network Utilization
- Web Page Performance

Audit Present State
- Reload Page and Audit on Load

Run  Clear
DevTools Audits

Network Utilization
- Combine external JavaScript (24)
- Enable gzip compression (2)
- Leverage browser caching (87)
- Leverage proxy caching (46)
- Minimize cookie size (8)
- Serve static content from a cookieless domain (11)

Web Page Performance
- Optimize the order of styles and scripts (8)
- Put CSS in the document head (4)
- Remove unused CSS rules (3087)
- Use normal CSS property names instead of vendor-prefixed ones (48)
DevTools Audits

Per-resource advice

Caching best practices
PageSpeed Insights

Make your web pages fast on all devices.

Enter a web page URL

developers.google.com/speed/pagespeed/insights
PageSpeed Insights

PageSpeed Insights

http://ponyfoo.com/

96 / 100 Speed

Consider Fixing:
Leverage browser caching
Show how to fix
PageSpeed Insights

Mobile, desktop

Get a rough (1..100) score

Best practices

Practical advice
Test a website's performance

Enter a Website URL

Test Location: San Francisco, CA USA (IE 11, Chrome, Firefox, Safari)

Browser: Chrome

Advanced Settings: 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.

webpagetest.org
PageSpeed 1.12 Score: 88/100

- First Byte Time: A
- Keep-alive Enabled: A
- Compress Transfer: C
- Compress Images: B
- Cache static content: D
- Effective use of CDN: X

webpagetest.org
# WebPageTest

## Full Optimization Checklist

<table>
<thead>
<tr>
<th>URL</th>
<th>Keep-Alive</th>
<th>GZip</th>
<th>Compress Img</th>
<th>Progressive</th>
<th>Cache Static</th>
<th>CDN Detected</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://ponyfoo.com">http://ponyfoo.com</a></td>
<td>100%</td>
<td>100%</td>
<td></td>
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</tr>
<tr>
<td>ponyfoo.com - /</td>
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<tr>
<td>assets.servedby...sellads.com - 20881</td>
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<td>ponyfoo.com - favicon.ico</td>
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<td>static.getclicky.com - js</td>
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<tr>
<td><a href="http://www.google-analytics.com">www.google-analytics.com</a> - analytics.js</td>
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[webpagetest.org](http://webpagetest.org)
WebPageTest

Makes it easy to spot FOIT
Calculates SpeedIndex
SpeedIndex takes the visual progress of the visible page loading and computes an overall score for how quickly the content painted
WebPageTest

Inspect every request
Analyze TCP traffic
Identify bottlenecks
Visualize progress
Automate!

Measure early.
Measure often.
npm install psi

52 / 100 Speed

1. Should Fix:
   - Optimize images
     - Show how to fix
   - Eliminate render-blocking JavaScript and CSS
     - Show how to fix

1. Consider Fixing:
   - Enable compression
     - Show how to fix
   - Leverage browser caching
     - Show how to fix

```
var gulp = require('gulp');
var psi = require('psi');
gulp.task('mobile', function (cb) {
  psi({
    nokey: 'true',
    url: 'http://ponyfoo.com',
    strategy: 'mobile',
  }, cb);
});
```
npm install webpagetest-api underscore-cli
npm install grunt-yslow --save-dev
Budgets!

Enforce a *performance budget*

Track impact of *every commit*

*What should I track?*

timkadlec.com/2014/11/performance-budget-metrics
Milestone Timings
Load time, time to interact, "time to first tweet"

**SpeedIndex**
Average time at which parts of a page are displayed

*Quantity based metrics*
Request count, page weight, image weight...

*Rule based metrics*
YSlow grade, PageSpeed score, etc.
npm install grunt-perfbudget --save-dev

```javascript
perfbudget: {
  default: {
    options: {
      url: 'http://',
      key: 'API_KEY',
      runs: 5,
      budget: {
        visualCompleteness: 
      }
    }
  }
}
```
Beyond minification

Or, what can be done to improve performance?
Web Stack

TCP
HTTP(S)
HTML
CSS
Fonts
Images
JavaScript
Networking
But not the kind you do at conferences
Optimizing TCP

Increase initial TCP cwnd size

Sender-side limit for in-flight data (cwnd)
More data in first TCP roundtrip
Accelerates connection ramp up

Disable slow-start restart (SSR)

Long-lived, bursty TCP connections can't afford SSR
Improve HTTP performance by disabling it

sysctl -w net.ipv4.tcp_slow_start_after_idle = 0
Optimizing HTTP

Make less requests!

- Turn on keep-alive
- GZip all the text
- Add Expires and ETag headers
- Use a CDN
HTTPS/2!
SPDY?
Yes.
Why?

Non-blocking Multiplexing
One Connection per Origin
Header Compression
Proactive Server Push
The Web Needs you #perfmatters
Optimizing HTML

- Render server-side!
- Become a Single Page App later
- Defer non-critical asset loading
- Keep it accessible with aria
Optimizing CSS

Inline critical CSS

- Remove unused styles
- Avoid `m`. Be responsive
- Concatenate and minify

Follow a style guide. Seriously.
Optimizing Fonts

Load asynchronously

Use a fallback while fonts load

Prevent FOIT using JavaScript

Use fewer fonts, avoid repaints

Cache them aggressively
Optimizing Images

Minify and shrink

- Defer images below the fold
- Create spritesheets with tools
- Try inlining tiny dynamic images
- Use CSS for simple icons
Optimizing JavaScript

You can live without it

Defer all of it

Use small modules

Use asset hashing

Cache vendor scripts separately
HOW?
NGiNX

Reverse proxy
Static asset caching
Supports SPDY
GZip compression
Set up a CDN!

fastly

Cloudflare

Amazon CloudFront
Shared Rendering

- Needs Rendr
- Presumably in 2.0
- Native support
- Native support
Defer Assets

```javascript
function (document) {
    var elem = document.createElement('link');
    var head = document.getElementsByTagName('head')[0];
    elem.rel = 'stylesheet';
    elem.media = 'only x';
    head.appendChild(elem);
    setTimeout(function () {
        elem.media = 'all';
    });
}(document);
```
Remove Unused CSS

Useful when using Bootstrap or other CSS frameworks

```javascript
var gulp = require('gulp');
var uncss = require('gulp-uncss');

gulp.task('default', function() {
  return gulp.src('all.css')
    .pipe(uncss({
      html: ['http://ponyfoo.com']
    }))
    .pipe(gulp.dest('./build'));
});
```
Inline Critical CSS

```javascript
var penthouse = require('penthouse');
var path = require('path');
penthouse(
    url: 'http://ponyfoo.com',
    css: 'build/css/all.css',
}, function(err, critical) {
    console.log(critical);
});
```

Only what's seen!

Remove roadblocks from the critical path
Use a font loader

```javascript
npm install fontfaceonload

FontFaceOnload("My Custom Font Family", {
  success: function() {
    document.documentElement.className += " my-custom-font-family";
  }
});
```
Optimize Images

Up to 90% in savings!

```javascript
var Imagemin = require('imagemin');

var imagemin = new Imagemin()
    .use(Imagemin.jpegtran({progressive: true}));

$ imagemin --help

Usage
$ imagemin <file> <directory>
$ imagemin <directory> <output>
$ imagemin <file> > <output>
$ cat <file> | imagemin > <output>
```

```json
imagemin: {
    release: {
        files: [{
            expand: true,
            src: 'build/img/**/*.jpg'
        }],
        options: {
            progressive: true
        }
    }
}
```
Create Spritesheets

```javascript
var spritesmith = require('spritesmith');
var sprites = ['fork.png', 'github.png', 'twitter.png'];
spritesmith({ src: sprites }, function (err, result) {
    result.image; // binary string representation of image
    result.coordinates; // maps filename to {x, y, width, height} of image
    result.properties; // spritesheet metadata {width, height}
});

grunt.initConfig({
    sprite: {
        icons: {
            src: 'public/img/icons/*.png',
            destImg: 'build/img/icons.png',
            destCSS: 'build/css/icons.css'
        }
    }
});
```

Save bandwidth by keeping the noise to a minimum
Inline Images

Save a request by inlining a base64 image

```
var Datauri = require('datauri'),
dUri = Datauri('test/myfile.png');

console.log(dUri);  //=> "data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAA..."
```

Careful: Data URIs are slow on mobile!
Use a module system

```javascript
var $ = require('dominus');
var taunus = require('taunus');
var moment = require('moment');
```

```javascript
// lib/math.js
export function sum(x, y) {
    return x + y;
}
export var pi = 3.141593;
```

```javascript
// app.js
import * as math from "lib/math";
alert("2π = " + math.sum(math.pi, math.pi));
```

```javascript
// otherApp.js
import {sum, pi} from "lib/math";
alert("2π = " + sum(pi, pi));
```
In Summary...
Measure your metrics
In Summary...

Automate your metrics
In Summary...
Define your budget
In Summary...

Enforce your budget
In Summary...

Prioritize your content
In Summary...

Optimize your content
In Summary...

Respect your humans
In Summary...

Respect our web
4 Mayo
@BeerJSBA
Puerta Roja
San Telmo
Buenos Aires
Thanks!

@nzgb

ponyfoo.com