

Drupal Frontend Performance & Scalability

Santa Barbara Drupal, December 2012

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Drupal Frontend Performance & Scalability

- Who's Your Presenter?

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- Why We Care About Performance

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- **Frontend vs. Backend Performance**

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- **Anatomy of a Web Page**

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- **Tools and Techniques**

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- Tools and Techniques
- **The Future of HTTP**

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- Tools and Techniques
- The Future of HTTP
- Questions and Comments

Drupal Frontend Performance & Scalability

Who's Your Presenter?

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Christefano Reyes

- Drupal Evangelist
- [Drupal.org/user/104](https://drupal.org/user/104)
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Downtown Los Angeles Drupal

- Drupal Adventure Guide
- DowntownDrupal.org
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Droplabs

- Lead Burrito Analyst
- Droplabs.net
- @Droplabs

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Why We Care About Frontend Performance

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What We Care About Frontend Performance

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- Google Maps: -30% in Filesize Equals +30% Requests

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Faster Websites → Faster Users → More Usage

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- Nielsen Norman Group:
 - Speed (Especially Slowness) Affects Brand Identity

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 - Design for Human Need, Not Various Technologies

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Frontend vs. Backend Performance

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Frontend vs. Backend Performance

Backend Performance:

Type of Hosting

- Shared / Grid
- VPS / Cloud
- Dedicated / Co-Located

Types of Hardware

- Disks (faster DBs!)
- RAM (more cache!)
- Cores (faster processing!)

Multiple Servers and DBs

DB Storage Engines

Networked Storage

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Frontend Performance:

- Overall Page Size
- Time for DOM to Load
- Time Until DOM is Rendered
- Time Until DOM is Functional

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- Overall Page Size
- Time for DOM to Load
- Time Until DOM is Rendered
- Time Until DOM is Functional

(In other words, most frontend performance is experienced in the browser!)

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Anatomy of a Web Page

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Anatomy of a Web Page

What Does a Web Page Contain?

- ...

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Anatomy of a Web Page

What Does a Web Page Contain?

- HTML
- CSS and styles
- JavaScripts
- Background Images
- Images and Other Media

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What Happens During a Page Load

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In Which Order Do the Contents of a Web Page Load?

- ...

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What Happens During a Page Load

In Which Order Do the Contents of a Web Page Load?

1. HTML
2. CSS and styles
3. JavaScripts
4. Background Images
5. Images and Other Media

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1. HTML
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What Happens During a Page Load

So, What's Doing What?

1. HTML ← Web Application Generates HTML
2. CSS and styles
3. JavaScripts
4. Background Images
5. Images and Other Media

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What Happens During a Page Load

So, What's Doing What?

1. HTML ← Web Application
2. CSS and styles ← Web App (SASS, LESS, etc.)
3. JavaScripts
4. Background Images
5. Images and Other Media ← Web App (Image Derivatives)

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Tools and Techniques

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Tools and Techniques

- **Firebug "Net" panel**
 - <http://ex.tl/ZNi>
- **Web Page Test**
 - <http://ex.tl/Zxt>
- **Pingdom**
 - <http://ex.tl/ZNU>
- **YSlow for Firefox / FireBug**
 - <http://ex.tl/ZN3>
- **Google PageSpeed Insights**
 - <http://ex.tl/ZNZ>

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Tools and Techniques

1. Reduce Requests

- Every file produces an HTTP request
- Fewer requests are better than smaller files
- HTTP 1.1 says to parallelize 2 components per host
- Sprites
 - Many Images in One File
 - Shift Into View With `background-position`
 - Be Careful When Using Both Vertical and Horizontal Sprites
- Aggregate scripts and styles
- No redirects
- Use CSS instead of images
- Use `data:` URIs in stylesheets

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Tools and Techniques

2. Use a CDN

- Content Delivery Network
 - Akamai
 - CDNLayer
 - Amazon CloudFront
 - Rackspace Cloud Files
 - SimpleCDN
- Content Servers Distributed Around the World
- Close Proximity Reduces Roundtrip Times
- Affordable and Nothing to Lose!

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Tools and Techniques

3. Use Caching

- HTTP Headers Are What Control Caching
 - Goes for Both Browsers and Reverse Proxies
 - Browsers and Proxies Check When Content is Fresh
- Change Filenames / URLs When Updating Files
- Set `Expires` to Dates In Far Future

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Tools and Techniques

4. Use Compression

- Compress Your HTML with GZip To Reduce Page Size
- Compress Your CSS and JavaScripts
 - Always Compression (and Aggregate) Your CSS & JS!
 - Always Use Advanced Aggregator (AKA advagg) in Drupal 6!
- Use mod_deflate or NginxHttpGzipModule
- Use Google PageSpeed (If You Can)
 - Makes Files Smaller
 - Combines Many Files Into One
 - Extends Browser Cache Times

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Tools and Techniques

5. CSS Up Top

- Pages Render After CSS is Loaded
- Loading CSS Later? FOUC and Re-rendering :(

6. JavaScript Down Below

- Scripts Load Sequentially
- Degrades Somewhat Gracefully
- Loading Scripts First? They Block Page Rendering
- `onClick`, `onHover`, etc. Handlers Kill Performance

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Tools and Techniques

7. Minify CSS and JavaScript

- Removes Comments and Whitespace
- Minified CSS & JS + GZip Compression > GZip alone
- Minify Core and Contributed CSS and JavaScript
 - Speedy Module and UglifyJS (Drupal 7)
 - Advanced Aggregator Module (Drupal 6)
- Why Don't We Minify HTML, Too?
 - HTML is Fragile and Constantly Changing
 - Minify Just the Content (Not the Page)
 - Look Out for Conditional Tags
 - Other Resources: Tidy, Twig's `spaceless` tag, etc.

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Tools and Techniques

8. Parallelization (AKA Pipelining and Multi-Threading)

- HTTP 1.1 States Browsers Should Make a Maximum of 2 Requests Per Hostname In Parallel
- Most Browsers Parallelize More...
 - Chrome, Firefox, Opera & Safari: 6
 - IE7: 2
 - IE8: 6
 - IE9: 8
- "Faking It" With the DNS Tricks Is Not a Long-Term Solution
 - Reduce Your DNS Lookups!
 - HTTP 2.0 is coming...
- Use Cookieless Domains

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Tools and Techniques: YSlow

- Minimize HTTP requests
- Use a CDN
- Add an Expires header
- GZip components
- Put stylesheets at the top
- Put scripts at the bottom
- Avoid CSS expressions
- Make JS and CSS external
- Reduce DNS lookups
- Minify JS and CSS
- Avoid redirects
- Remove duplicate scripts
- Configure ETags
- Make AJAX cacheable
- Post-load Components
- Preload Components
- Use GET for AJAX Requests
- Reduce # of DOM Elements
- Split Components Across Domains
- Minimize # of iframes
- No 404s
- Reduce Cookie Size
- Etc., etc.

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The Future of HTTP

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The Future of HTTP

The Past

- HTTP 0.9 (1991)
- HTTP 1.0 (1996)
- HTTP 1.1 (1997-1999)
- HTTP-NG

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The Future of HTTP

The Past

- HTTP 0.9 (1991)
- HTTP 1.0 (1996)
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- HTTP-NG

The Present

- HTTP 1.1 (2012)

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The Future of HTTP

The Past

- HTTP 0.9 (1991)
- HTTP 1.0 (1996)
- HTTP 1.1 (1997-1999)
- HTTP-NG

The Present

- HTTP 1.1 (2012)

The Future

- HTTP 2.0
 - Google SPDY
 - Microsoft HTTP Speed+Mobility

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Remember YSlow?

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SPDY Fixes Problems With HTTP

1.1:

- Minimize HTTP requests
- GZip components
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- Reduce DNS lookups
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Resources

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- **Chrome Dev Panel**
 - <http://ex.tl/ZNh>
- **Google PageSpeed**
 - <http://ex.tl/ZNZ>
- **Steve Souders**
 - <http://ex.tl/ZN5>
- **Wim Leers**
 - <http://ex.tl/ZNq>
- **Mike Carper / mikeytown2**
 - <http://ex.tl/ZNU>
- **Khalid Bayeldin / 2bits**
 - <http://ex.tl/ZNT>
- **Konstantin Kaefer**
 - <http://ex.tl/ZNS>
- **Matt Farina**
 - <http://ex.tl/ZNh>

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More Resources

- **Why Performance Matters**
 - <http://ex.tl/ZNy>
- **Website Response Times**
 - <http://ex.tl/ZNC>
- **YSlow FAQ**
 - <http://ex.tl/ZNk>
- **Modules Tagged "Performance and Scalability"**
 - <http://ex.tl/ZNJ>
- **Drupal Core Issues Tagged "Performance"**
 - <http://ex.tl/ZGv>
- **High Performance Drupal Group and Meetups**
 - <http://ex.tl/ZN4>
- **Make the Web Faster**
 - <http://ex.tl/ZNZ>
- **Google mod_pagespeed**
 - <http://ex.tl/ZN9>
- **Google SPDY**
 - <http://ex.tl/ZNo>

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Questions? Comments?

Give Your Feedback! <http://ex.tl/ZGg>