Drupal Frontend Performance & Scalability
DrupalCamp Ohio 2012

Christefano Reyes
christo@larks.la, @christefano

Drupal Frontend Performance & Scalability

- Who's Your Presenter?

Drupal Frontend Performance & Scalability

- Who's Your Presenter?
- **Why We Care About Performance**

Drupal Frontend Performance & Scalability

- Who's Your Presenter?
- Why We Care About Performance
- **Frontend vs. Backend Performance**

Drupal Frontend Performance & Scalability

- Who's Your Presenter?
- Why We Care About Performance
- Frontend vs. Backend Performance
- **Anatomy of a Web Page**

Drupal Frontend Performance & Scalability

- Who's Your Presenter?
- Why We Care About Performance
- Frontend vs. Backend Performance
- Anatomy of a Web Page
- **What Happens During a Page Load**

Drupal Frontend Performance & Scalability

- Who's Your Presenter?
- Why We Care About Performance
- Frontend vs. Backend Performance
- Anatomy of a Web Page
- What Happens During a Page Load
- Tools and Techniques

Drupal Frontend Performance & Scalability

- Who's Your Presenter?
- Why We Care About Performance
- Frontend vs. Backend Performance
- Anatomy of a Web Page
- What Happens During a Page Load
- Tools and Techniques
- **The Future of HTTP**

Drupal Frontend Performance & Scalability

- Who's Your Presenter?
- Why We Care About Performance
- Frontend vs. Backend Performance
- Anatomy of a Web Page
- What Happens During a Page Load
- Tools and Techniques
- The Future of HTTP
- **Questions and Comments**

Drupal Frontend Performance & Scalability

Who's Your Presenter?

Drupal Frontend Performance & Scalability

Who's Your Presenter?

Christefano Reyes
- Drupal Evangelist
- Drupal.org/user/104
- @christefano

Drupal Frontend Performance & Scalability

Who's Your Presenter?

Christefano Reyes
- Drupal Evangelist
- Drupal.org/user/104
- @christefano

Exaltation of Larks
- CEO, Co-Founder
- www.larks.la
- @LarksLA

Drupal Frontend Performance & Scalability

Who's Your Presenter?

Christefano Reyes
- Drupal Evangelist
- Drupal.org/user/104
- @christefano

Exaltation of Larks
- CEO, Co-Founder
- www.larks.la
- @LarksLA

Downtown Los Angeles Drupal
- Drupal Adventure Guide
- DowntownDrupal.org
- @DowntownDrupal

Drupal Frontend Performance & Scalability

Who's Your Presenter?

Christefano Reyes
- Drupal Evangelist
- Drupal.org/user/104
- @christefano

Exaltation of Larks
- CEO, Co-Founder
- www.larks.la
- @LarksLA

Downtown Los Angeles Drupal
- Drupal Adventure Guide
- DowntownDrupal.org
- @DowntownDrupal

Droplabs
- Lead Burrito Analyst
- Droplabs.net
- @Droplabs

Drupal Frontend Performance & Scalability

Why We Care About Frontend Performance

Drupal Frontend Performance & Scalability

What We Care About Frontend Performance

- Amazon: +100ms in Page Load Equals -1% in Sales

Drupal Frontend Performance & Scalability

What We Care About Frontend Performance

- Amazon: +100ms in Page Load Equals -1% in Sales
- Google: +500ms in Page Load Equals -20% Searches

Drupal Frontend Performance & Scalability

What We Care About Frontend Performance

- Amazon: +100ms in Page Load Equals -1% in Sales
- Google: +500ms in Page Load Equals -20% Searches
- Google Maps: -30% in Filesize Equals +30% Requests

Drupal Frontend Performance & Scalability

What We Care About Frontend Performance

- Amazon: +100ms in Page Load Equals -1% in Sales
- Google: +500ms in Page Load Equals -20% Searches
- Google Maps: -30% in Filesize Equals +30% Requests

Faster Websites → Faster Users → More Usage

Drupal Frontend Performance & Scalability

What We Care About Frontend Performance

- Amazon: +100ms in Page Load Equals -1% in Sales
- Google: +500ms in Page Load Equals -20% Searches
- Google Maps: -30% in Filesize Equals +30% Requests

Faster Websites → Faster Users → More Usage

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

Drupal Frontend Performance & Scalability

What We Care About Frontend Performance

- Amazon: +100ms in Page Load Equals -1% in Sales
- Google: +500ms in Page Load Equals -20% Searches
- Google Maps: -30% in Filesize Equals +30% Requests

Faster Websites → Faster Users → More Usage

- Nielsen Norman Group:
  - Speed (Especially Slowness) Affects Brand Identity
  - Delays Move Websites Out Of the User's Control

Drupal Frontend Performance & Scalability

What We Care About Frontend Performance

- Amazon: +100ms in Page Load Equals -1% in Sales
- Google: +500ms in Page Load Equals -20% Searches
- Google Maps: -30% in Filesize Equals +30% Requests

Faster Websites → Faster Users → More Usage

- Nielsen Norman Group:
  - Speed (Especially Slowness) Affects Brand Identity
  - Delays Move Websites Out Of the User's Control
  - Design for Human Need, Not Various Technologies

Drupal Frontend Performance & Scalability

Frontend vs. Backend Performance

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Frontend Performance:

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

Drupal Frontend Performance & Scalability

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

Frontend Performance:

- 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!)

Anatomy of a
Web Page

Drupal Frontend Performance & Scalability

Anatomy of a Web Page

What Does a Web Page Contain?

- …

Drupal Frontend Performance & Scalability

Anatomy of a Web Page

What Does a Web Page Contain?

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

Drupal Frontend Performance & Scalability

What Happens During a Page Load

Drupal Frontend Performance & Scalability

What Happens During a Page Load

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

- …

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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)

Drupal Frontend Performance & Scalability

Tools and Techniques

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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!

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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.

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

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.

Drupal Frontend Performance & Scalability

The Future of HTTP

Drupal Frontend Performance & Scalability

The Future of HTTP

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

Drupal Frontend Performance & Scalability

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)

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

Remember 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.

Drupal Frontend Performance & Scalability

SPDY Fixes Problems With HTTP

1.1:

- Minimize HTTP requests

- GZip components
- Put stylesheets at the top
- Put scripts at the bottom

- Make JS and CSS external

- Reduce DNS lookups
- Minify JS and CSS

- Post-load Components
- Preload Components

- Split Components Across Domains

Drupal Frontend Performance & Scalability

Resources

Drupal Frontend Performance & Scalability

Resources

- **Firebug "Net" panel**
  - http://ex.tl/ZNi
- **AOL Page Test**
  - http://ex.tl/ZNw
- **Pingdom**
  - http://ex.tl/ZNU
- **YSlow for Firefox / Firebug**
  - http://ex.tl/ZN3
- **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

Drupal Frontend Performance & Scalability

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

Drupal Frontend Performance & Scalability

Questions? Comments?

Give Your Feedback! http://ex.tl/ZGZ