

Developers Guide to Web Images

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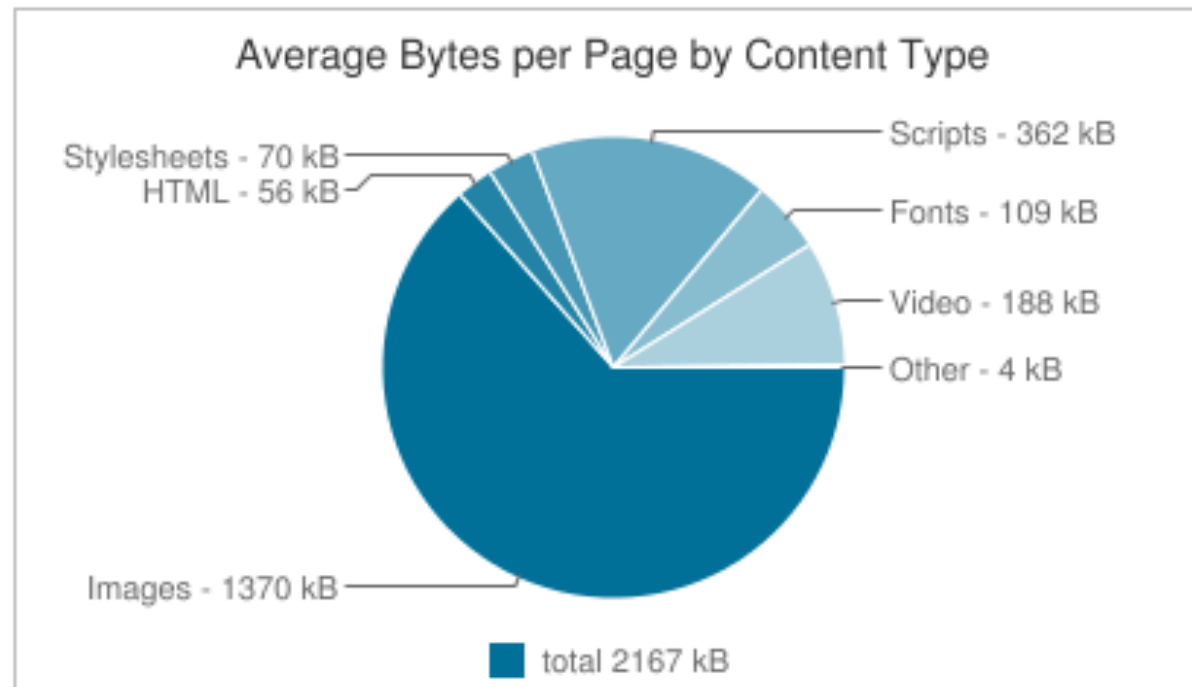
About Me

- Web developer since 1995
- Pluralsight Author
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- ASP.NET MVP

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Why Should I Care About Images?

- Images are 63% of average page size!!
- Average of 54 image requests/page



<http://httparchive.org/interesting.php#bytesperpage> September 2015

Tools

Fiddler

- Tracing tool specifically for HTTP
- Shows complete request and response (not packets)
- telerik.com/fiddler

Paint.NET

- Free image editing software for Windows
- <http://getpaint.net/>
- Basic image editing
 - Crop
 - Resize (watch aspect ratio)
 - Rotate
 - Save in major formats
 - Optimizations

Corel PaintShop Pro X8

- Low cost image editing software
- <http://tinyurl.com/qa8ubst>
- Intermediate image editing
 - Transparency
 - Progressive
 - Easy photo enhancements
 - Batch processing

Image Types

Image Types

- Raster/bitmap
 - Rectangular grid of single color pixels
 - Color-depth (bits per pixel)
 - Resolution
 - Number of horizontal pixels X number of vertical pixels
 - Can't zoom in or scale up without distortion
- Vector
 - Defined by mathematical equations
 - Zoom or scale

JPEG

- Best format for photos
- **Lossy compression**
 - Don't save multiple times!
 - Tradeoff size and quality
 - Often cut 50+% from original sizes with no visible impact!
- Progressive (optional)
 - Entire image appears initially but fuzzy, quality improves slowly

GIF

- Lossless compression
 - Lempel-Ziv-Welch (LZW) was patented
 - Patent issues, now expired
- 8 bits per pixel (palette of 256 colors)
- **Animated GIFs**

PNG

- Designed to replace GIF
- Lossless compression
- 8-32 bit
- **Transparency**
 - Indexed - each color in palette can be on/off
 - Variable (alpha) - opacity value for each color
- Interlaced (optional)

WebP

- Google (2010)
 - <http://code.google.com/speed/webp/>
- **Animation**
- **Transparency**
- Supported by Chrome and Opera

- Need to add a MIME type for IIS (image/webp)

Scalable Vector Graphics (SVG)

- W3C (1999)
- XML format
- 2D graphics
- Free web based editor (<http://tinyurl.com/yhbt7zh>)

Icon Fonts

- List of various font icons
 - <http://tinyurl.com/ozfeqpk>
- Font Awesome - <http://tinyurl.com/fontawe>
 - LESS and Sass

General Info

Aspect ratio

- Proportional relationship between width and height
- Critical when resizing!! Keep this consistent or get distortions

Img

- alt - alternative text if image cannot be displayed (previously used for tooltips)
- title - most often displayed as tooltip
- width/height
 - Faster perceived rendering (no reflow)
 - Don't scale down or up! (lose clarity or waste bandwidth)
 - Use only for fixed images (non-responsive)
- **Url case sensitivity for caching**

Responsive Images

Responsive Use Cases

- High Pixel Density Displays
- Resolution Switching

- Art Direction
- Image Types

- *Early responsive web sites often served largest and highest pixel density images to everyone*
- *Avoid raster images where possible*

Responsive Images - Custom JavaScript

- Original solution before other options
- Used convention for concise/minimal markup
- Handled browser resizes (intelligently)
- No double download penalty
- Supported lazy loading
- Slightly later in rendering process
- Built in browser features might be faster and offer better control

Responsive Images - ``

- Let browser make the best choice!
- Pixel density
- Render size hints
- Physical image sizes
- Future?
 - Connection speed?
 - User preferences?

Responsive Images - <picture>

- Source - list out options and it picks the first match
- Need to have tag
- Use for art direction or different image types

Responsive Images - Picturefill

- Polyfill for srcset and <picture>
- <http://scottjehl.github.io/picturefill/>
- Leave off src or browsers that need polyfill will download twice

jQuery Plugins

Cycle Plugin

- Rotate with various transitions through a series of images
 - Zoom
 - Curtains
 - Fade in
 - Scroll
- <http://malsup.com/jquery/cycle/>

jCarousel Lite

- Show a portion of a set of images with previous and next navigation
- <http://tinyurl.com/4cdghoq>

Image Zoom

- Move mouse around an image and see an zoomed in version of a portion of it
 - Original larger photo with details
 - Smaller version of the photo to show on the page
- <http://www.mind-projects.it/projects/jqzoom/>

Image Overlays

- Overlay with more info appears when hover over an image

Lazy Load Images

- jQuery plugin and modified HTML to request images as scroll down
 - data-original - set to image URL
 - src - set to 1x1 clear pixel image
- Pages with lots of images only load those “above the fold”
- <http://www.appelsiini.net/projects/lazyload>

Disable Right Click Menu

- Turn off the right click menu at a document or element level

Performance

Content Expirations

- Client asks “if-modified-since”
- Small content files it is just as expensive to see if modified as to receive content
- Leverage user’s browser cache

- Setup expiration times for content folders
- Avoid requests for files that seldom change (.js, .css, images, etc)
- Rename the file if need to override browser caching

Content Expirations (cont.)



HTTP Response Headers

Use this feature to configure HTTP headers that are added to responses from the Web server.

Group by: No Grouping

Name	Value	Entry Type
X-Powered-By	ASP.NET	Inherited

Set Common HTTP Response Headers

Enable HTTP keep-alive

Expire Web content:

- Immediately
- After:
1 Day(s)
- On (in Coordinated Universal Time (UTC)):
Sunday, June 27, 2010 12:00:00 AM

OK Cancel

CSS Sprites

- Combine **small** images into a single image
- Use CSS to “index” into the larger image

- Often 70-95% of time taken for a user is time requesting components (images, .css, .js)
- Reduce the number of requests

- <http://spritegen.website-performance.org/>
- Web Essentials

Data URI

- Embed small files directly into URL (images, CSS), RFC 2397
- Primary advantage is doesn't require a separate download
- Limitations
 - Only usable on <OBJECT>, , <LINK> and in CSS
 - No script is allowed
 - Maximum size is 32K
- Drawbacks
 - Can't set expirations
 - Not single place to change (can place in .css)
 - Base64 encoding can increase size by 33%

Image Optimization

- Tools
 - Jpegtran - removes unnecessary metadata, lossless
 - Pngcrush - PNG optimizer
 - OptiPNG - PNG optimizer
 - Smush.it, <http://tinyurl.com/r4b36b>
 - Image Optimizer, <http://tinyurl.com/7zkmb77>
 - Visual Studio Extension

Content Delivery Network (CDN)

- Akamai, Limelight, Internap, Amazon
 - Global network of servers
 - Geographically closer to users
 - Offloads work for your servers
 - Typically used for static files (images, CSS, JavaScript, etc)
- Download of home page images were 70% faster when using CDN (2.205 seconds down to 0.589 seconds)

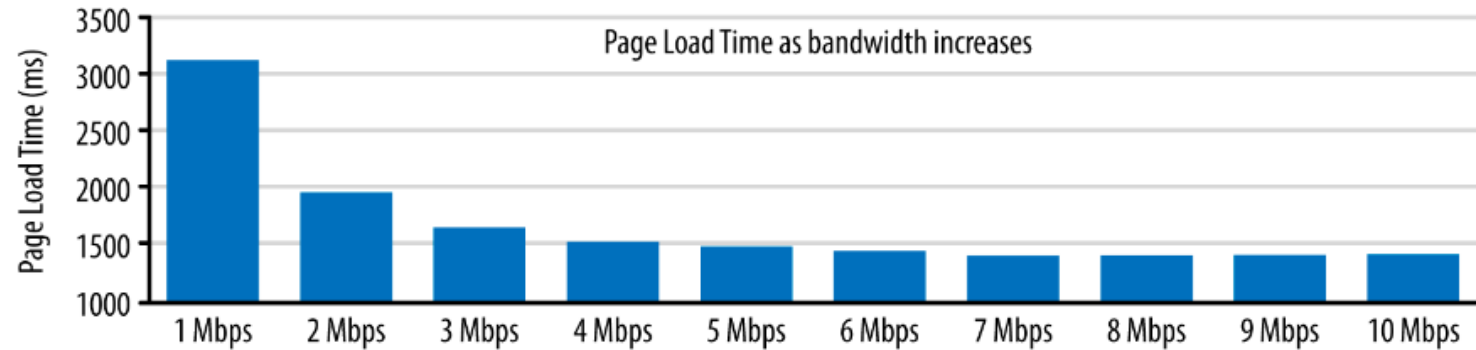
Multiple Domains for Static Resources

- Browsers will open multiple background connections to retrieve objects from web servers
 - HTTP RFC specified using 2 connections
 - Recent browsers have continued to increase the number used
- Recent testing with CDN and using 3 domains for images was about 20% faster
- Tradeoff of time to lookup another DNS name and benefit of multiple connections
- **WARNING:** Need to ensure that a given image is served from the same domain or this will override browser cache and nullify expirations!

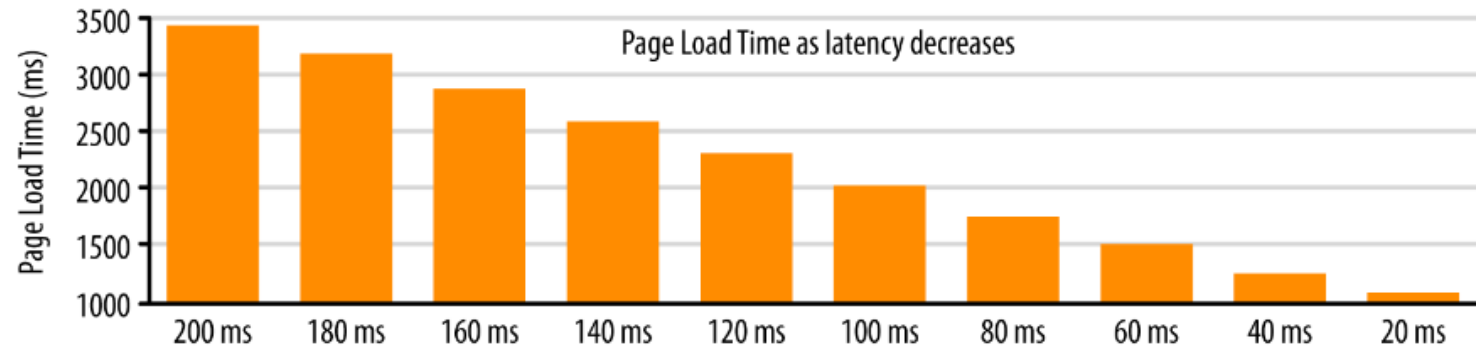
Favicon.ico Caching

- By default, most browsers automatically look for this file in root folder of site (use for favorites, address bar, etc)
- Use <link> to point to a specific image
 - Setup to use an image with expirations

Latency vs Bandwidth impact on Page Load Time



Single digit % perf improvement after 5 Mbps



Linear improvement in page load time!

<http://tinyurl.com/omyuh3x>, Ilya Grigorik

“Bandwidth Doesn’t Matter Much” - <http://tinyurl.com/btqpc1r>

HTTP/2 Goals

- Minimize impact of latency
- Avoid head of line blocking
- Use a single connection (per host)
- **Keep HTTP 1.1 semantics!**
 - Methods, status, headers
- **DON'T NEED TO CHANGE APPLICATION CODE!!**
 - Should remove some current workarounds...

HTTP/2 Major Features

- Binary framing layer
- Streams
 - Prioritization and dependencies
- **Fully multiplexed on single TCP connection**
- Header Compression (HPACK)
- *Server Push*

Techniques to Avoid (HTTP/2)

- Bundling JavaScript and CSS files
- CSS Sprites, Image Maps
- Domain Sharding
 - Using multiple host names so browsers uses more connections
- Inlining (Server Push)
 - Data URIs, CSS, JavaScript

Miscellaneous

Background Images

- Don't print (by default)
- Repeat so don't have to make too big
- Multiple background images in CSS3

Design Placeholders

- Create a placeholder for where images will be for wireframes or prototypes
- Server side
 - <http://placeholder.it/>
- Client side
 - <http://tinyurl.com/74zaejm>

HTML 5 Canvas

- A rectangular area of the screen that can be drawn on using JavaScript (canvas API)
 - Only 2D now...
 - Upper left is 0,0 positive x to right, positive y down
- Text
- Gradients (linear, radial)
- Can respond to events, able to write games
- No DOM access
- Does not remember what was drawn... Bitmap based
- ExplorerCanvas.js (support for IE)

Cool

- Deep Zoom
- PhotoSynth
- Focus Free Cameras
 - <http://www.lytro.com/>

Resources

- Pluralsight Courses
 - Web Performance
 - <http://tinyurl.com/7r687aw>
 - A Web Developer's Guide to Images
 - <http://tinyurl.com/b7zbufn>
 - Fiddler
 - <http://tinyurl.com/d8xac75>

Questions

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