Web Fonts Performance

@bram_stein
Web Font Usage

Source: HTTP Archive
Font Requests

Source: HTTP Archive
Font Size

Source: HTTP Archive
300kB of web fonts

(2.8 × 107kB)
@font-face {
    font-family: Elena;
    src: url(font.woff2) format("woff2"),
        url(font.woff) format("woff");
}
A web font is only downloaded when it is used in a CSS selector that matches a DOM connected node.
<p>Hello!</p>

@font-face {
    font-family: Elena;
    src: url(font.woff2) format("woff2"),
        url(font.woff) format("woff");
}
<p>Hello!</p>

@font-face {
  font-family: Elena;
  src: url(font.woff2) format("woff2"),
       url(font.woff) format("woff");
}

p {
  font-family: Elena, Georgia, serif;
}
Lazy loading of fonts

Home  Products  Stores  About

Regular.woff  **Bold.woff**  *Italic.woff*
Lazy loading of fonts
Lazy loading of fonts

Home

Products

Stores

About

Regular.woff  Bold.woff  Italic.woff
Font Loading

@font-face {
  font-family: Font A;
  src: url(fonta.woff);
}

@font-face {
  font-family: Font B;
  src: url(fontb.woff);
}
Font Loading
Font Loading

100 MS  200 MS  300 MS  400 MS  500 MS  600 MS  700 MS

HTML

CSS
Font Loading

Font loading starts

- HTML
- CSS
- FONT A
- FONT B
Font Loading

- Font B starts loading at 400 MS
- Font B is rendered after 500 MS

Timeline:
- HTML: 100 MS to 200 MS
- CSS: 200 MS to 400 MS
- Font A: 500 MS to 600 MS
- Font B: 600 MS to 700 MS

Key Events:
- Font loading starts at 400 MS
- Font A is rendered at 500 MS
Font Loading

- HTML: 100 MS - 200 MS
- CSS: 200 MS - 500 MS
- Font A: 500 MS - 600 MS
- Font B: 600 MS - 700 MS

Font loading starts at 300 MS and web fonts are rendered at 700 MS.
Font Loading

- HTML
- CSS
- FONT A
- FONT B

By 400 MS, font loading starts.
By 500 MS, web fonts are rendered.
FOUT versus FOIT

Flash Of (Unstyled|Invisible) Text
THE FROG KING, OR IRON HENRY

In olden times when wishing still helped one, there lived a king whose daughters were all beautiful, but the youngest was so beautiful that the sun itself, which has seen so much, was astonished whenever it shone in her face. Close by the king’s castle lay a great dark forest, and under an old lime-tree in the forest was a well, and when the day was very warm, the king’s child went out into the forest and sat down by the side of the cool fountain, and when she was bored she took a golden ball, and threw it up on high and caught it, and this ball was her favourite plaything.

Now it so happened that on one occasion the princess’s golden ball did not fall into the little hand which she was holding up for it, but on to the ground beyond, and rolled straight into the water.
In olden times when wishing still helped one, there lived a king whose daughters were all beautiful, but the youngest was so beautiful that the sun itself, which has seen so much, was astonished whenever it shone in her face. Close by the king’s castle lay a great dark forest, and under an old lime-tree in the forest was a well, and when the day was very warm, the king’s child went out into the forest and sat down by the side of the cool fountain, and when she was bored she took a golden ball, and threw it up on high and caught it, and this ball was her favourite plaything.

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example.com
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hand which she was holding up for it, but on to
the ground beyond, and rolled straight into the

The Frog King, or Iron Henry
The Brothers Grimm
Grimm's Household Tales
# FOUT versus FOIT

<table>
<thead>
<tr>
<th>Browser</th>
<th>FOIT</th>
<th>FOIT</th>
<th>FOIT</th>
<th>FOIT</th>
<th>FOUT</th>
<th>FOUT</th>
<th>FOUT</th>
<th>FOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chrome</td>
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</tr>
</tbody>
</table>
## FOUT versus FOIT

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<th>FOIT</th>
<th>FOUT</th>
<th>FOUT</th>
<th>FOUT</th>
<th>FOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chrome</td>
<td>3 sec.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Firefox</td>
<td>3 sec.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Safari</td>
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</tr>
<tr>
<td>Opera</td>
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<td>IE9</td>
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<td>IE10</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
FOUT is progressive enhancement
Flash Of Fallback Text

(FOFT – for the acronym lovers)
CSS font-display
(coming soon)
CSS font-display

@font-face {
  font-family: My Font;
  src: url(myfont.woff);
  font-display: auto|block|swap|fallback|optional;
}
In olden times when wishing still helped one,
there lived a king whose daughters were all
beautiful, but the youngest was so beautiful that
the sun itself, which has seen so much, was
astonished whenever it shone in her face. Close
by the king's castle lay a great dark forest, and
under an old lime-tree in the forest was a well,
and when the day was very warm, the king's child
got out into the forest and sat down by the side
of the cool fountain, and when she was bored she
took a golden ball, and threw it up on high and
caught it, and this ball was her favourite
plaything.

The Frog King, or Iron Henry
The Brothers Grimm
Grimm's Household Tales
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The Brothers Grimm

Grimm's Household Tales

CSS font-display

@font-face {
  ...
  font-display: fallback; /* load inside timeout */
}

request page

start loading web fonts

web fonts loaded
In olden times when wishing still helped one,
there lived a king whose daughters were all
beautiful, but the youngest was so beautiful
that the sun itself, which has seen so much,
was astonished whenever it shone in her face.
Close by the king's castle lay a great dark
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CSS font-display

@font-face {
  ...
  font-display: optional; /* cached */
}
No browser support?

Use JavaScript.
Web Font Loader

github.com/typekit/webfontloader
Web Font Loader

```
.wf-loading {
    /* styles to use when web fonts are loading */
}

.wf-active {
    /* styles to use when web fonts are active */
}

.wf-inactive {
    /* styles to use when web fonts are inactive */
}
```
Font Face Observer

github.com/bramstein/fontfaceobserver
Font Face Observer

```javascript
var elena = new FontFaceObserver('Elena');

elena.check().then(function () {
  // font is loaded
});
```
CSS Font Loading API

w3.org/TR/css-font-loading
CSS Font Loading API

```javascript
var font = new FontFace('Elena', 'url(font.woff)');

font.load().then(function () {
    // font is loaded
});
```
## CSS Font Loading API

<table>
<thead>
<tr>
<th></th>
<th>IE9</th>
<th>IE10</th>
<th>IE11</th>
<th>Edge</th>
<th>Chrome</th>
<th>Firefox</th>
<th>Safari</th>
<th>Opera</th>
<th>Android</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No†</td>
<td>No*</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

† In progress  
* Almost in progress
Dealing with the Flash
Faster Loading

- HTML
- CSS
- FONT A
- FONT B

Font loading starts + fallback fonts render

Font events fire + web fonts render
Faster Loading

CONNECT  WAIT  TRANSFER

CONNECT  WAIT  TRANSFER
Compression
WOFF + WOFF2. Done.
New bulletproof @font-face

@font-face {
    font-family: My Family;
    src: url(myfont.woff2) format("woff2"),
        url(myfont.woff) format("woff");
}
Subsetting
Faster Loading

400 MS  
500 MS  
600 MS  
700 MS

FONT A

CONNECT  WAIT  TRANSFER

FONT B

CONNECT  WAIT  TRANSFER
Faster Loading

<table>
<thead>
<tr>
<th></th>
<th>400 MS</th>
<th>500 MS</th>
<th>600 MS</th>
<th>700 MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FONT A</td>
<td></td>
<td>CONNECT</td>
<td>WAIT</td>
<td>TRANSFER</td>
</tr>
<tr>
<td>FONT B</td>
<td></td>
<td>CONNECT</td>
<td>WAIT</td>
<td>TRANSFER</td>
</tr>
</tbody>
</table>
Faster Loading

~30ms faster
Latency is the real performance killer
Faster Loading

~30ms faster
Faster Loading

~90ms faster
Faster Loading

- HTML
- CSS
- FONT A
- FONT B

font loading starts

web fonts render
Faster Loading

- HTML
- CSS
- FONT A
- FONT B

Font loading starts at 300 MS and web fonts render at 500 MS.
Lazy loading is bad
(For web fonts)
Preload instructions

(Also coming soon)
Preload

<head>
  ...
  <link rel="preload" href="font.woff" as="font">
</head>

Link: <font.woff>; rel=preload; as=font
Preload

<head>
  ...
  <link rel="preload" href="font.woff" as="font">
</head>

Link: <font.woff>; rel=preload; as=font
Preload

- 100 MS: HTML
- 200 MS: CSS
- 400 MS: FONT A
- 500 MS: FONT B
- 600 MS: font loading starts
- 700 MS: web fonts render
Preload

font loading starts

web fonts render
Preload

Font loading starts

100 MS 200 MS 300 MS 400 MS 500 MS 600 MS 700 MS

HTML CSS FONT A FONT B

web fonts render
~270ms faster

~270ms faster
Prefetch

<head>
  ...
  <link rel="prefetch" href="font.woff">
</head>

Link: <font.woff>; rel=prefetch
## Prefetch browser support

<table>
<thead>
<tr>
<th></th>
<th>IE9</th>
<th>IE10</th>
<th>IE11</th>
<th>Edge</th>
<th>Chrome</th>
<th>Firefox</th>
<th>Safari</th>
<th>Opera</th>
<th>Android</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
HTTP/2 server push
Preload

- HTML
- CSS
- FONT A
- FONT B

font loading starts  web fonts render
HTTP/2 browser support

<table>
<thead>
<tr>
<th>Browser</th>
<th>IE9</th>
<th>IE10</th>
<th>IE11</th>
<th>Edge</th>
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<th>Safari</th>
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<th>Android</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>Yes†</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No*</td>
<td>Yes</td>
</tr>
</tbody>
</table>

† Only in Windows 10

* HTTP/2 support is coming in Safari 9

Warn that this should only be used for your most important content.
Critical CSS fonts
web font anti-patterns
(it seemed like a good idea at the time...)
Using web fonts

(for everything)
Typekit is a subscription font service that brings thousands of fonts from foundry partners into one library for quick
inlining fonts

(OMG... it's full of base64)
Inlining Fonts

```css
@font-face {
    font-family: My Family;
    font-weight: 400;
    src: url(data:font/opentype;base64,d09GRgAB...);
}

@font-face {
    font-family: My Family;
    font-weight: 600;
    src: url(data:font/opentype;base64,d09GRgAB...);
}
...
Inlining Fonts

100 MS
200 MS
300 MS
400 MS
500 MS
600 MS
700 MS

HTML
CSS
FONT A
FONT B
FONT C
Inlining Fonts

- HTML
- CSS
- FONT A + FONT B + FONT C
Benefits

- Avoids HTTP overhead
Downsides

- Breaks parallel downloads
- Only supports a single font format
- No progressive rendering
- Caching
Reimplement caching

(Guardian & Smashing Magazine)
if (localStorage.fonts) {
    insertStylesheet(localStorage.fonts);
} else {
    var request = new XMLHttpRequest();
    request.open('GET', 'myfonts.css');
    request.onload = function () {
        var fonts = request.responseText;
        localStorage.fonts = fonts;
        insertStylesheet(fonts);
    };
    request.send();
}
Benefits

• Fonts are requested once
• Avoids lazy loading
• Avoids FOUT/FOIT in most browsers
• Optimises for frequent visitors
Downsides

- Same downsides as inlining
- Pollutes localStorage of casual visitors
- Custom cache mechanism
- Licensing
Keep it simple (but not stupid)
@font-face {
  font-family: My Family;
  font-weight: 400;
  src: url(myfamily.woff2) format("woff2"),
       url(myfamily.woff) format("woff");
}

body {
  font-family: sans-serif;
}

.fonts-loaded body {
  font-family: My Family, sans-serif;
}
<script>
(function(){'use strict';function h(a){document.body?

</script>

<script>
    var myfamily = new FontFaceObserver('My Family');

    myfamily.check().then(function () {
        var html = document.documentElement;
        html.classList.add('fonts-loaded');
    });
</script>
Benefits

- Fonts load as soon as possible
- Consistent FOUT in all browsers
- Re-use the browser cache
- Support multiple formats
- Fonts are downloaded in parallel
Downsides

- Requires a (little) bit of code
- FOUT on each request
<script>
  var myfamily = new FontFaceObserver('My Family');

  myfamily.check().then(function () {
    var html = document.documentElement;
    html.classList.add('fonts-loaded');
    sessionStorage.fontsloaded = true;
  });
</script>
<script>
    if (sessionStorage.fontsloaded) {
        var html = document.documentElement;
        html.classList.add('fonts-loaded');
    }
</script>
Downsides

- Requires a (little) bit of code
- FOUT on each request
font loading strategy
optimise start & load
fonts are enhancement
Web Fonts
Performance

@bram_stein
https://www.bramstein.com

FF Enzo by Tobias Kvant
Source Code Pro by Paul D. Hunt