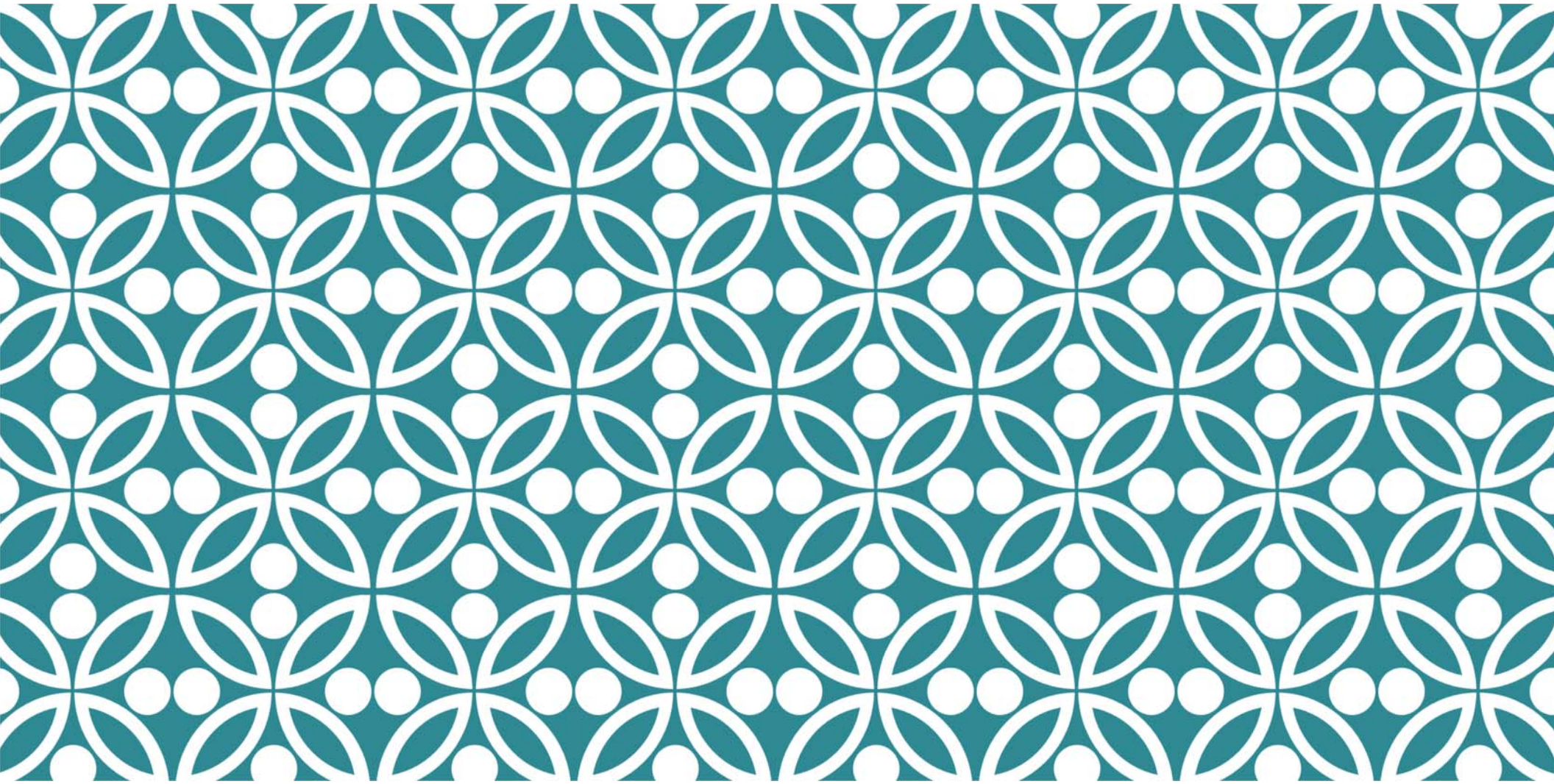

OPTIMIZING MEDIA QUERIES

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DOES THE WAY WE WRITE MEDIA QUERIES IMPACT PAGE PERFORMANCE?

WHICH TECHNIQUE YIELDS THE BEST PERFORMANCE?

PART 1: TEST MEDIA QUERY SPECIFICITY

Media queries that use cascading expressions

VS

Media queries bound to specific screen sizes

```
@media screen and (min-width:
600px) {
     body {color:black}
}

@media screen and (min-width:
768px) {
     body {margin:1em}
}

@media screen and (min-width:
975px) {
     body {background:url(…)}
}
```

```
@media screen and (min-width:
600px) and (max-width: 767px) {
     body {color:black}
}

@media screen and (min-width:
768px) and (max-width: 974px) {
     body {color:black;
           margin:1em}
}

@media screen and (min-width:
975px) {
     body {color:black;
           margin:1em;
           background:url(…)}
}
```

PART 2: TEST CODE STRUCTURE

@media blocks consolidated at end

```
/* All CSS rules for MVP/LCD */

@media screen and … {
   /* All for “tablet” */
}

@media screen and … {
  /* All for “desktop” */
}
```

VS

@media blocks interspersed throughout

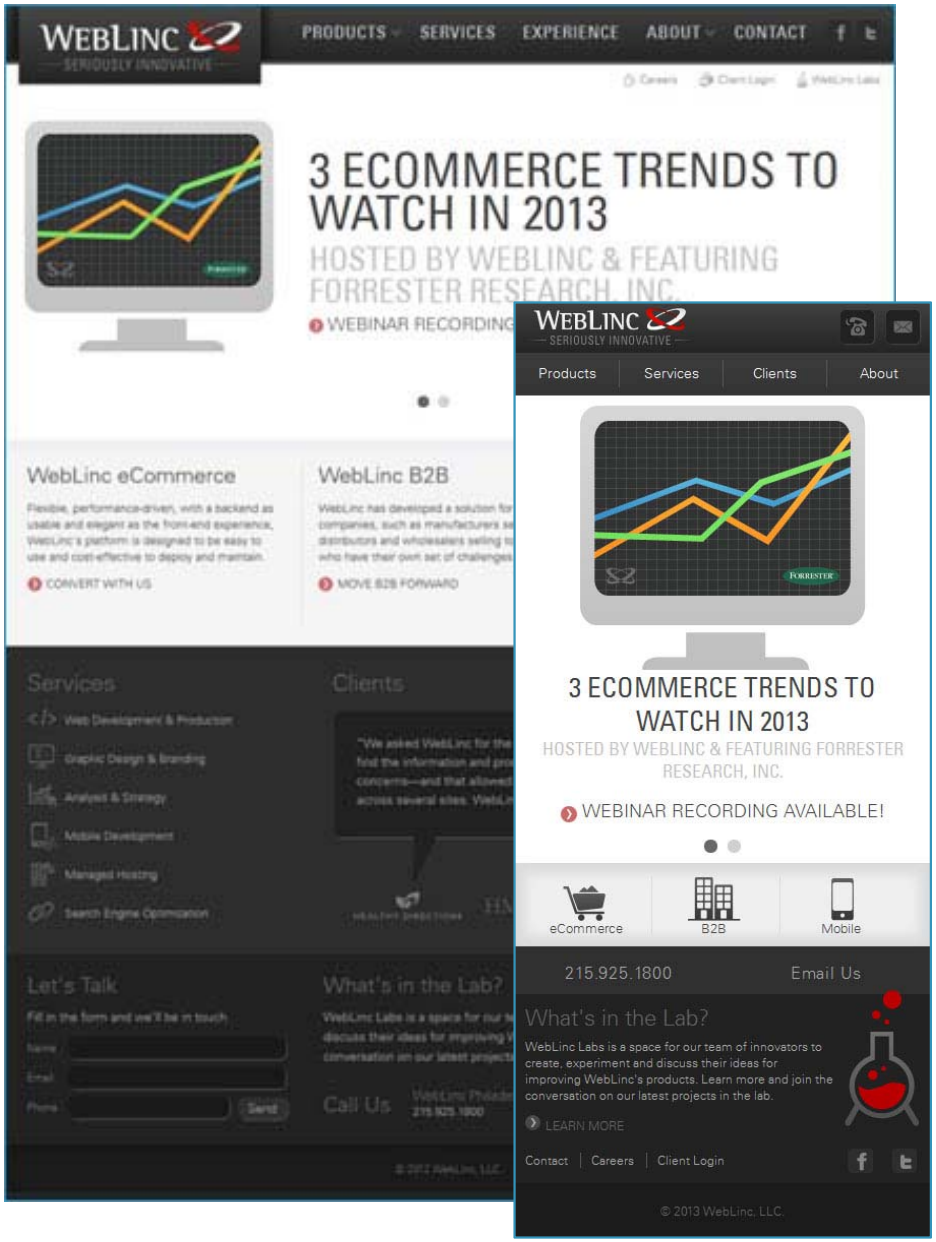
```
/* Component CSS for MVP/LCD */

@media screen and … {
  /* Component for “tablet” */
}

@media screen and … {
  /* Component for “desktop” */
}
```

x *N*

MVP = minimum viable product
LCD = lowest common denominator

THE TEST SUBJECT: WEBLINC.COM

- Responsive design with three breakpoints, but no responsive images
- All tests run against production hardware, which is CDN-fronted and runs mod_pagespeed
- Tests run on Saturdays and Sundays around 3 AM (minimal traffic/load)
- Copies of test files and data available at http://presentations.kimberlyblessing.com/2012/cssdevconf/



TESTING METHODOLOGY

Test Scenarios

1. CSS with no media queries (MVP/LCD)
2. Cascading media queries consolidated at end
3. Cascading media queries interspersed throughout
4. Targeted screen size media queries consolidated at end
5. Targeted screen size media queries interspersed throughout

Data Collection

- File size and code complexity metrics
- CSS profiling statistics, collected using Opera's Developer Tools
- Page load times for home page (first and repeat views) on major desktop browsers and iPhone, collected with WebPageTest

FILE SIZE AND CODE COMPLEXITY

	Minified (bytes)	Min + GZIP (bytes)	# MQs	# MQs applied	# CSS rules applied
No MQs	22,226	5,467	0	0	251
Cascade/End	43,694	9,954	8	4	485
Cascade/Inter	44,434	9,298	28	21	485
Targeted/End	53,221	10,107	8	2	445
Targeted/Inter	54,152	9,477	29	13	445

* Number of media queries/rules applied at 1024px screen width

CSS PROFILING STATISTICS

	CSS Parsing	Reflow	Style Recalculation	Layout	Paint
No MQs	6.0	2.2	13.4	9.6	224.2
Cascade/End	8.0	3.8	17.6	16.8	237.0
Cascade/Inter	9.4	3.2	18.4	17.6	252.0
Targeted/End	9.6	2.8	16.8	17.2	256.8
Targeted/Inter	9.6	3.0	20.2	17.4	251.2

** Times in milliseconds*

Average of 5 test runs using Opera Developer Tools

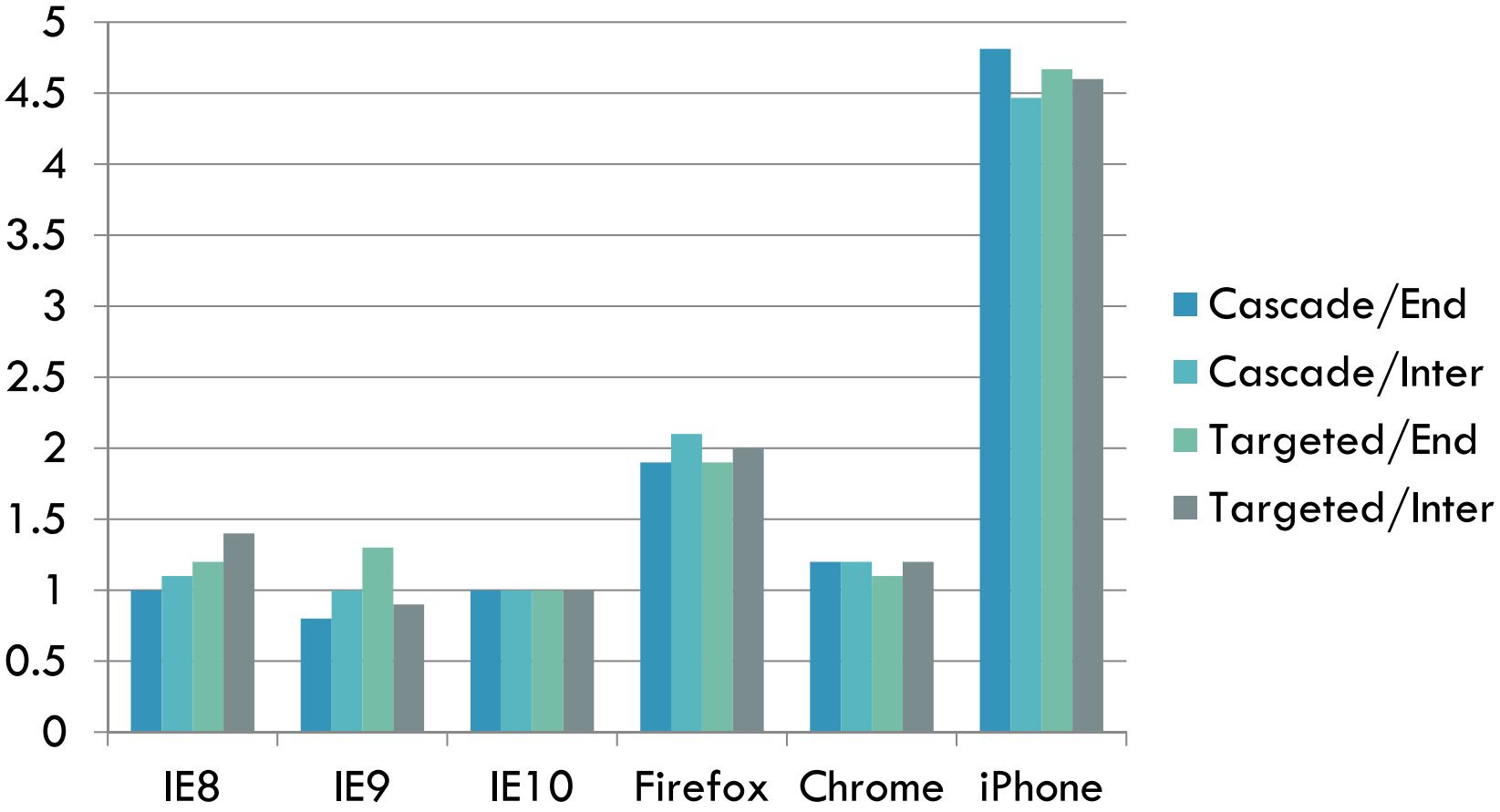
PAGE LOAD TIMES* (FIRST VIEW)

	IE 8	IE 9	IE 10	Firefox	Chrome	iPhone
No MQs	1.1	0.9	1.0	1.8	1.0	3.5
Cascade/End	1.0	0.8	1.0	1.9	1.2	4.8
Cascade/Inter	1.1	1.0	1.0	2.1	1.2	4.5
Targeted/End	1.2	1.3	1.0	1.9	1.1	4.7
Targeted/Inter	1.4	0.9	1.0	2.0	1.2	4.6

** Times in seconds*

Average of 10 test runs with WebPageTest. Outliers have been removed.

PAGE LOAD TIMES (FIRST VIEW)



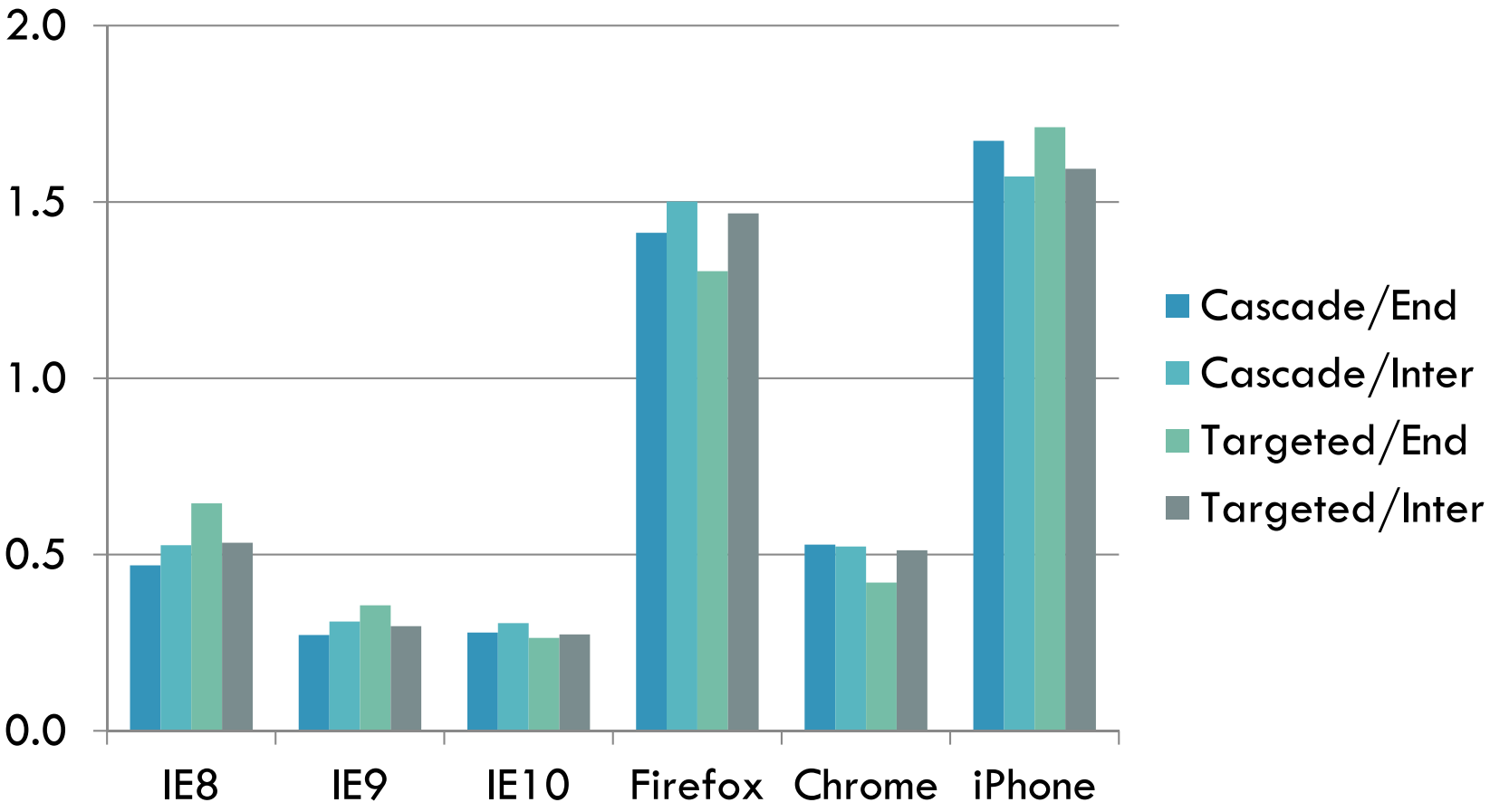
PAGE LOAD TIMES* (REPEAT VIEW)

	IE 8	IE 9	IE 10	Firefox	Chrome	iPhone
No MQs	0.5	0.3	0.3	1.4	0.4	1.4
Cascade/End	0.5	0.3	0.3	1.4	0.5	1.7
Cascade/Inter	0.5	0.3	0.3	1.5	0.5	1.6
Targeted/End	0.6	0.4	0.3	1.3	0.4	1.7
Targeted/Inter	0.5	0.3	0.3	1.5	0.5	1.6

** Times in seconds*

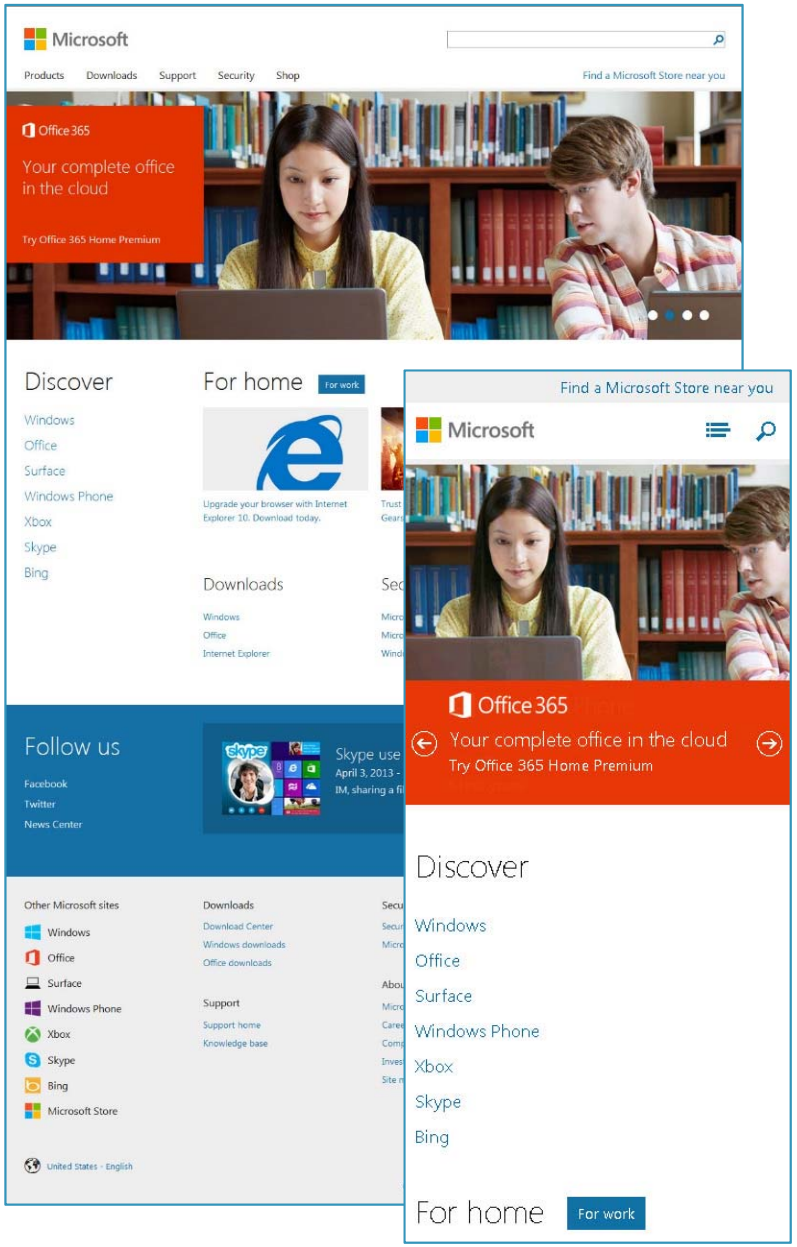
Average of 10 test runs with WebPageTest. Outliers have been removed.

PAGE LOAD TIMES (REPEAT VIEW)



ANOTHER TEST: MICROSOFT.COM

- Responsive design with six(-ish) breakpoints and responsive images
- Tests run from my personal server with mod_pagespeed
- Tests run on a Saturday night while watching Doctor Who
- Copies of test files and data available at http://presentations.kimberlyblessing.com/2013/rwdsummit/



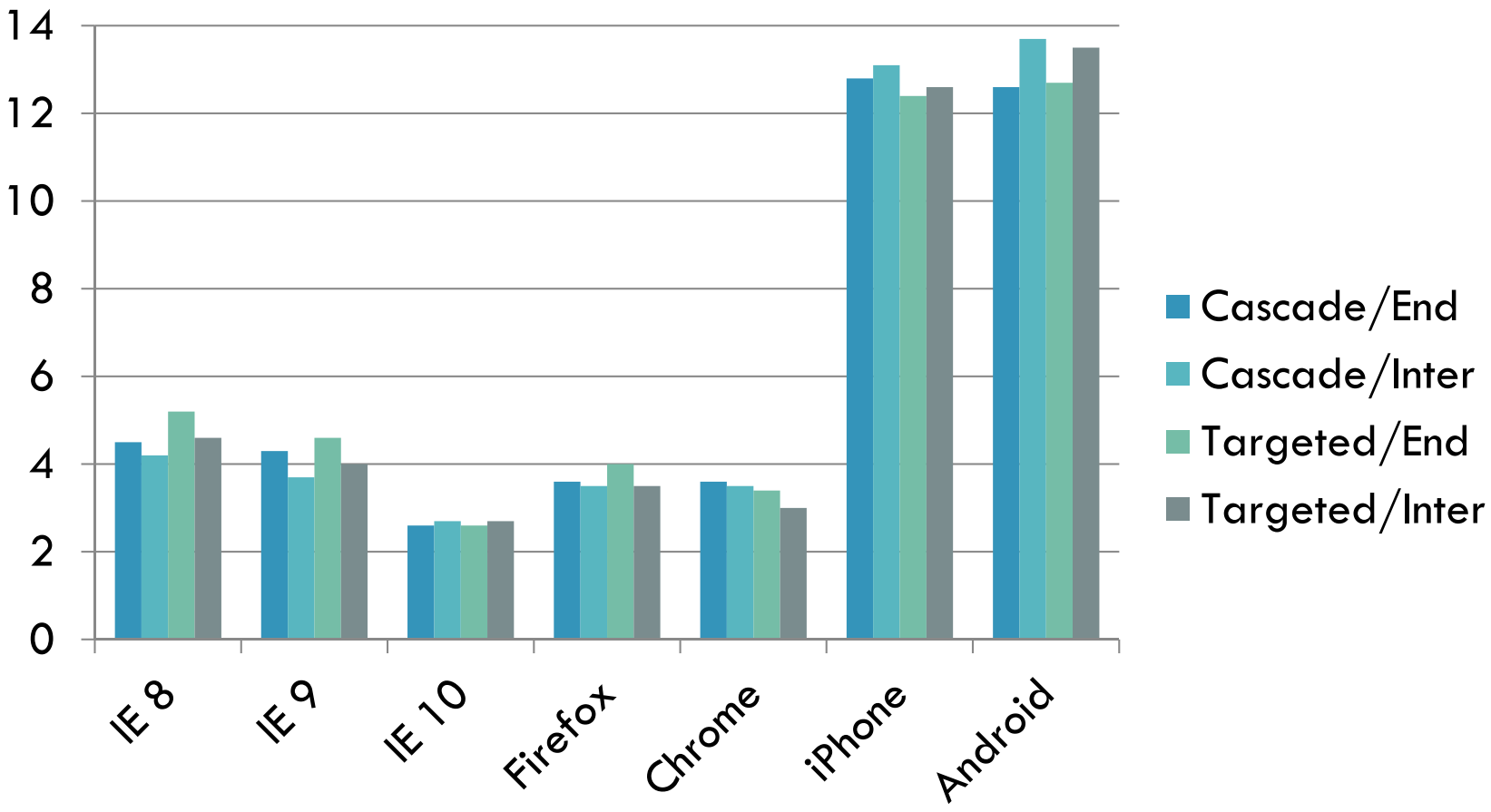
PAGE LOAD TIMES* (FIRST VIEW)

	IE 8	IE 9	IE 10	Firefox	Chrome	iPhone	Android
No MQs	4.4	4.0	2.6	2.8	2.8	13.7	15.2
Cascade/End	4.5	4.3	2.6	3.6	3.6	12.8	12.6
Cascade/Inter	4.2	3.7	2.7	3.5	3.5	13.1	13.7
Targeted/End	5.2	4.6	2.6	4.0	3.4	12.4	12.7
Targeted/Inter	4.6	4.0	2.7	3.5	3.0	12.6	13.5

** Times in seconds*

Average of 10 test runs with WebPageTest. Outliers have been removed.

PAGE LOAD TIMES (FIRST VIEW)



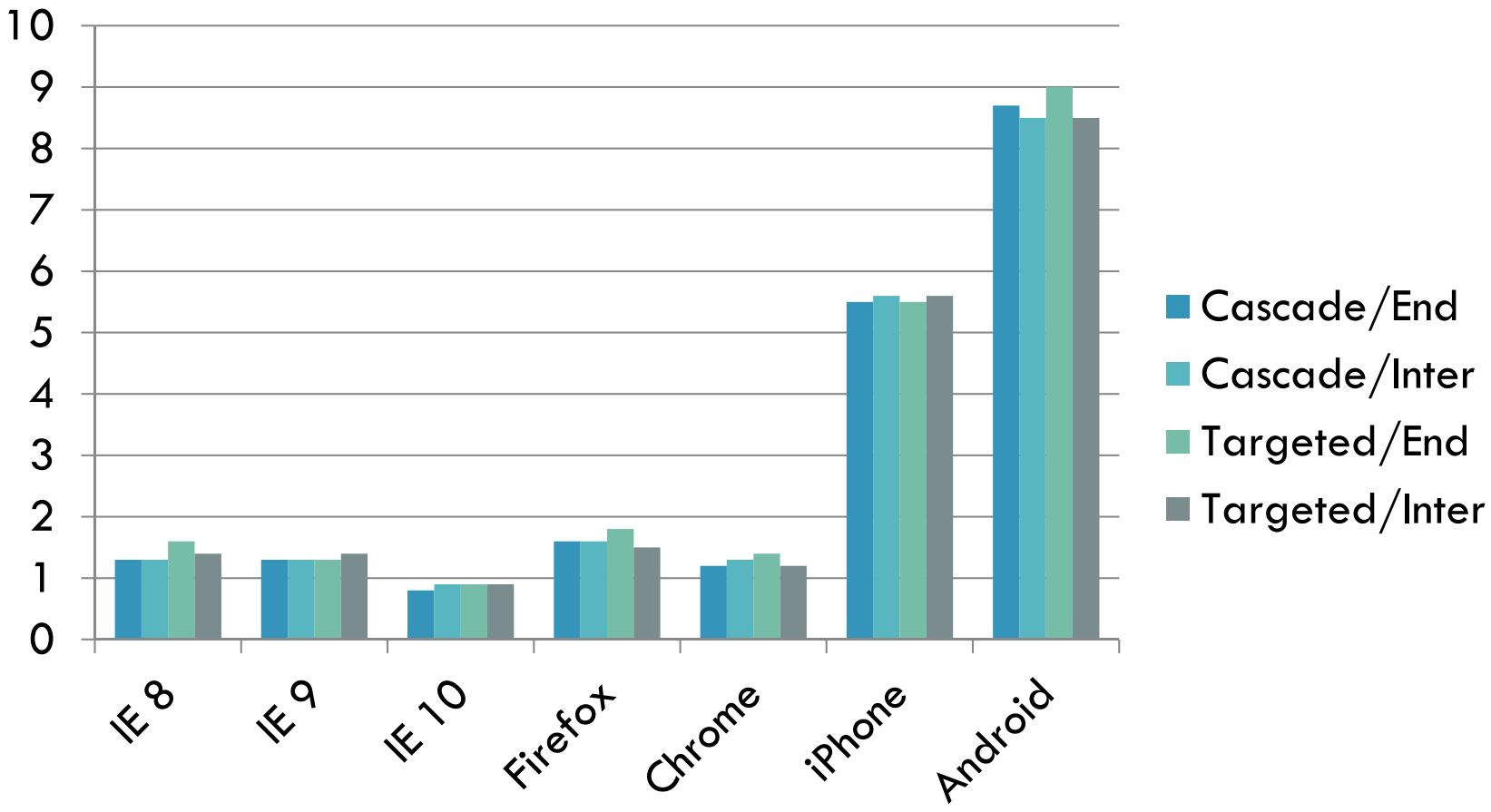
PAGE LOAD TIMES* (REPEAT VIEW)

	IE 8	IE 9	IE 10	Firefox	Chrome	iPhone	Android
No MQs	1.4	1.3	0.9	1.6	1.1	5.4	9.4
Cascade/End	1.3	1.3	0.8	1.6	1.2	5.5	8.7
Cascade/Inter	1.3	1.3	0.9	1.6	1.3	5.6	8.5
Targeted/End	1.6	1.3	0.9	1.8	1.4	5.5	9.0
Targeted/Inter	1.4	1.4	0.9	1.5	1.2	5.6	8.5

** Times in seconds*

Average of 10 test runs with WebPageTest. Outliers have been removed.

PAGE LOAD TIMES (REPEAT VIEW)



DOES THE WAY WE WRITE MEDIA QUERIES IMPACT PAGE PERFORMANCE?

YES, media query syntax and code structure have an impact on performance…

WHICH TECHNIQUE YIELDS THE BEST PERFORMANCE?

…however no particular technique stands as performance silver bullet. Writing optimized CSS overall is best!

CSS OPTIMIZATION RECOMMENDATIONS

Understand any resets and frameworks you use. Trim unused code and rewrite inefficient selectors or declarations.

Schedule periodic code reviews to prune unused code, based both on old content and old browsers.

Reevaluate your browser support matrix. Limit the use of browser hacks, polyfills, and prefixed properties.

Profile CSS selectors and optimize for right-to-left parsing.

Regularly test site performance, compare data before and after code changes to understand impact

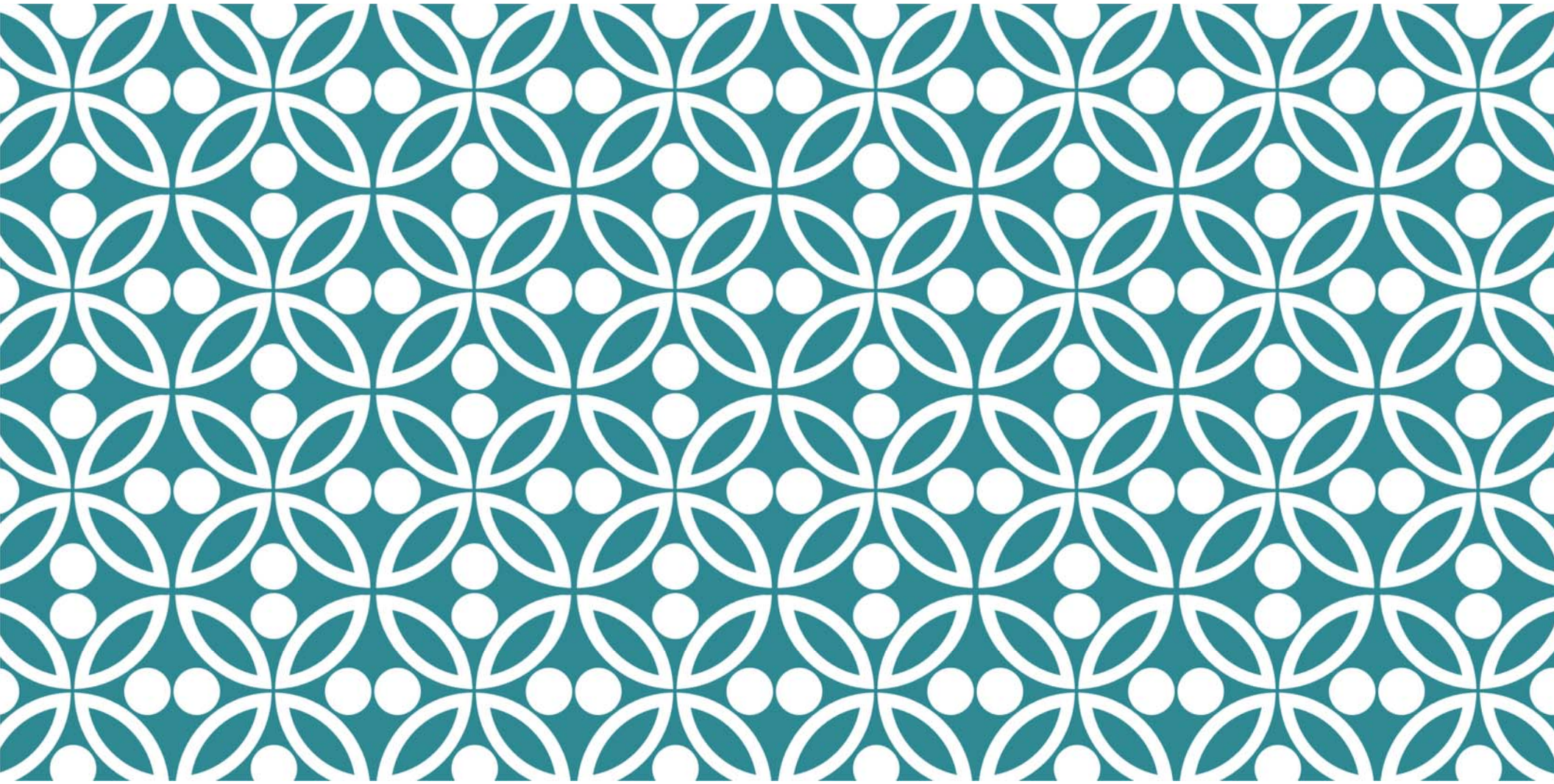
REQUIRED READING

Reflows & Repaints: CSS Performance making your JavaScript slow?
by stubbornella (Nicole Sullivan)
http://www.stubbornella.org/content/2009/03/27/reflows-repaints-css-performance-making-your-javascript-slow/

Profiling CSS for fun and profit. Optimization notes.
by kangax (Juriy Zaytsev)
http://perfectionkills.com/profiling-css-for-fun-and-profit-optimization-notes/

Real World RWD Performance
by Guy Podjarny
http://www.guypo.com/uncategorized/real-world-rwd-performance-take-2/

And… follow updates from O'Reilly's Velocity Web Performance and Operations Conference
http://velocityconf.com/



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