

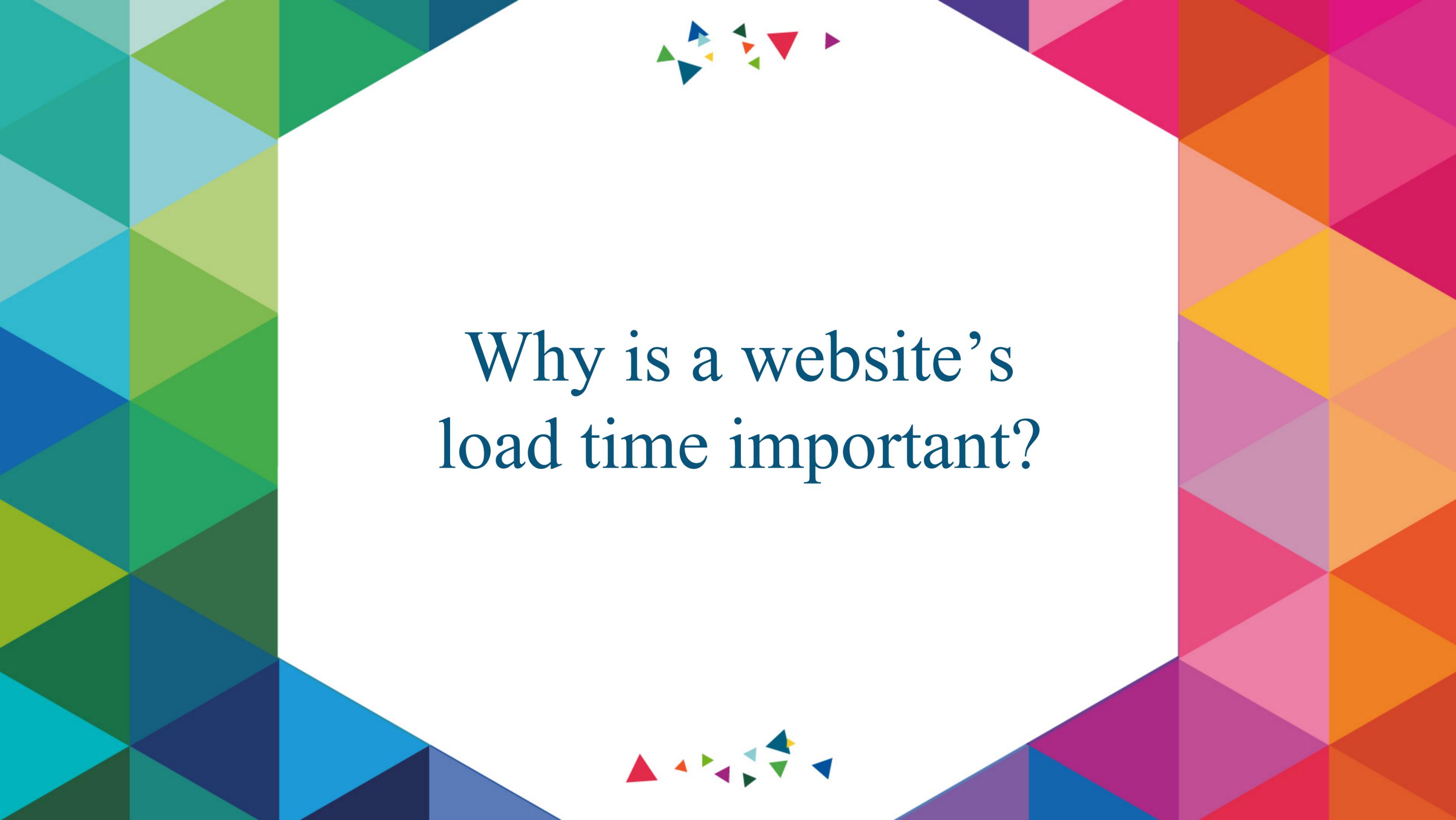


**DrupalCon**  
GLOBAL 2020

# Historical page load time monitoring using Drupal and WebPageTest

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**Rackspace Technology**

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**Slides: <https://tinyurl.com/performance-budget>**



Why is a website's  
load time important?



“

A 100-millisecond delay in website load  
time can hurt conversion rates by 7  
percent”

Akamai Technologies, 2017



A two-second delay in web page  
load time increases bounce rates by 103  
”  
percent

Akamai Technologies, 2017



“

53 percent of mobile site visitors will  
leave a page that takes longer than three  
seconds to load”

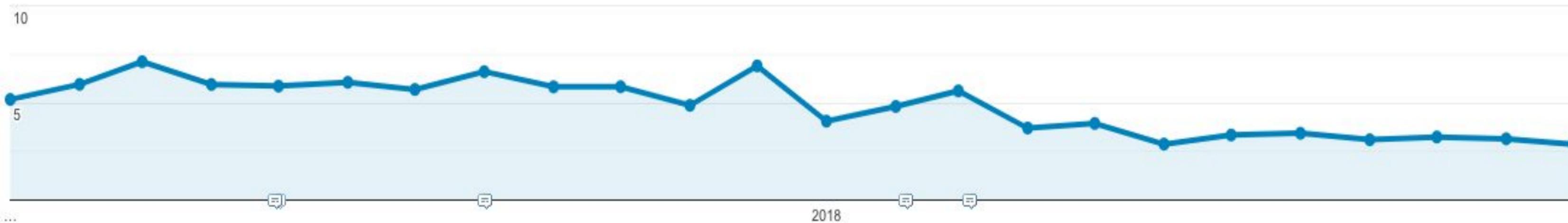
Akamai Technologies, 2017



# Real user data from rackspace.com

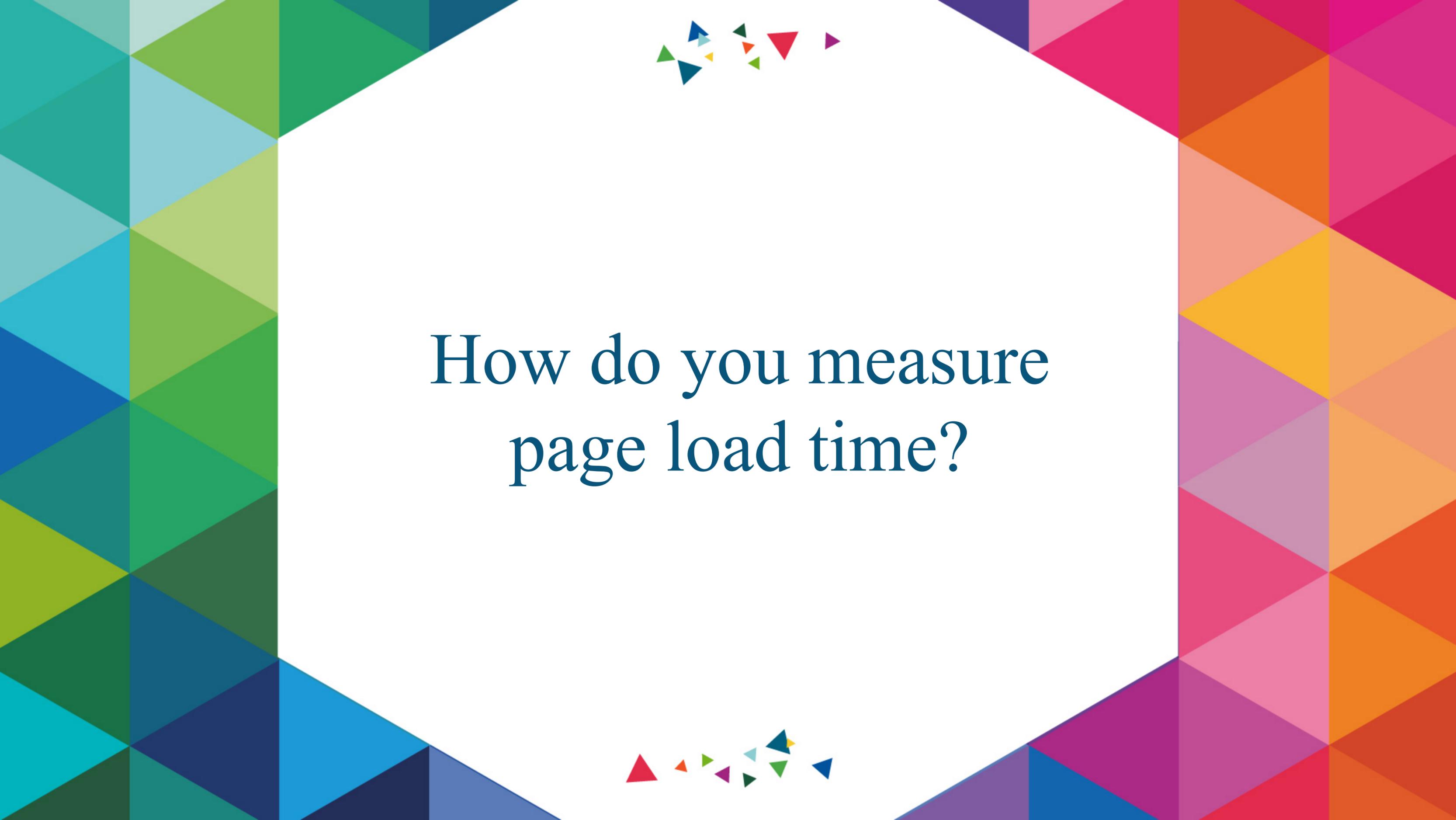
Source: Google Analytics — 2017 & 2018

## Page Load Time



## Bounce Rate



The background features a large white hexagon in the center. The corners of the page are filled with a pattern of overlapping triangles in various colors, including shades of green, blue, purple, pink, orange, and yellow. At the top and bottom center of the white hexagon, there are small clusters of colorful triangles pointing in different directions.

How do you measure  
page load time?



# Tools for Measuring Load Time

- **Your Browser**

<https://developers.google.com/web/tools/chrome-devtools/network>

[https://developer.mozilla.org/en-US/docs/Tools/Network\\_Monitor](https://developer.mozilla.org/en-US/docs/Tools/Network_Monitor)

<https://developer.apple.com/safari/tools/>

<https://docs.microsoft.com/en-us/microsoft-edge/devtools-guide/network>

- **Google Analytics** — <https://analytics.google.com/>

- **Google PageSpeed Insights**

<https://developers.google.com/speed/pagespeed/insights/>

- **WebPageTest.org** — <https://webpagetest.org/>

- **Drupal ???**



# WebPageTest Metrics

- **Time to First Byte (TTFB)**

How long until very first byte is received by the browser

- **Start Render/First Paint**

How long until anything (not just content) is rendered on the screen

- **First Contentful Paint**

How long until content is first rendered on the screen

- **Load Time**

How long until document complete event is triggered (i.e. DOM ready)



## WebPageTest Metrics (continued)

- **Fully Loaded**

How long until there was 2 seconds of network inactivity, following the document complete event

- **Speed Index**

How long until content within the browser viewport is fully rendered

- **DOM Elements**

Total number of HTML elements rendered by the browser upon completion of the fully loaded event



# WebPageTest Views

- **First View**

All metrics are captured on a browser **with cleared cookies/cache.**

Simulates a first-time visitor.

- **Repeat View**

All metrics are captured again **without clearing cookies/cache.**

Simulates a returning visitor.



# Example WebPageTest.org Run





How does Drupal  
come into play?



# The Performance Budget Module

## Performance Budget

[View](#) [Edit](#) [Version control](#) [View history](#) [Maintainers](#) [Automated testing](#)

By [bighappyface](#) on 7 February 2017, updated 13 July 2020

This project is not covered by Drupal's [security advisory policy](#).

### Synopsis

The Performance Budget module allows you to use Drupal in combination with [WebPageTest](#) to perform web performance scans on local and remote websites, all within the familiar Drupal admin interface. The module supports both public and private WebPageTest instances.

Although it can do a lot of things, it serves two key functions:

1. Historical performance trending
2. Threshold monitoring

### Dependencies

- [Web Page Archive](#) – While the archiving and visual regression features of that module aren't needed for performance scanning, it does provide some basic *capture and compare* functionality that made for a good framework for this module.
- [Key](#) (optional) – The key module can optionally be used for managing the [webpagetest.org](#) API credentials (recommended)

### Getting Started

- Project Documentation: [Getting Started with Performance Budget](#)
- Watch the [Historical Page Load Time Monitoring Using WebPageTest & Drupal](#) presentation from Texas Camp 2019
- See the [presentation slides](#).

### Help wanted!

If you would like to assist in the development of this module, we welcome your help.

Please follow the [Drupal Coding Standards](#).

### Ways you can help:

- Use the Module and Let Us Know Your Thoughts
- Report Bugs
- Submit Ideas/Patches on [drupal.org](#)
- Submit Pull Requests on [github.com](#)
- Write Tests
- Write/Edit Documentation

### Helpful Links:

- [Official Performance Budget Documentation](#)
- [Drupal.org Issue Queue](#)
- [WebPageTest documentation](#)

### Project Maintainers:

- David Stinemetze ([@WidgetsBurritos](#))



★ Unstar 7 [Followed](#)

### Maintainers for Performance Budget

[WidgetsBurritos](#) – 35 commits  
last: 11 hours ago, first: 11 months ago

[bighappyface](#) – 6 commits  
last: 2 years ago, first: 3 years ago

[View all committers](#)  
[View commits](#)

### Issues for Performance Budget

To avoid duplicates, please search before submitting a new issue.

[Search](#)

#### Advanced search

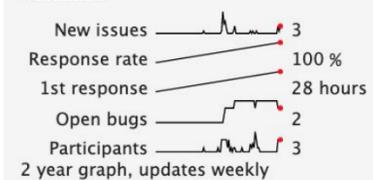
All issues

13 open, 38 total

Bug report

3 open, 11 total

Statistics



### Documentation

[Performance Budget 8.x](#)

### Resources

[Read license](#)  
[View project translations](#)

### Development

[View pending patches \[0 issues\]](#)  
[Browse code repository](#)  
[View commits](#)

- Beta release module for D8/9
- Integrates with WebPageTest for capturing performance data
- Provides two key functions
  - Historical performance trending
  - Threshold monitoring
- Built upon Web Page Archive module

The image features a large white hexagonal area in the center, surrounded by a decorative border of colorful triangles. The border is composed of various shades of green, blue, purple, pink, orange, and yellow. At the top and bottom center of the white hexagon, there are small clusters of colorful triangles pointing towards each other.

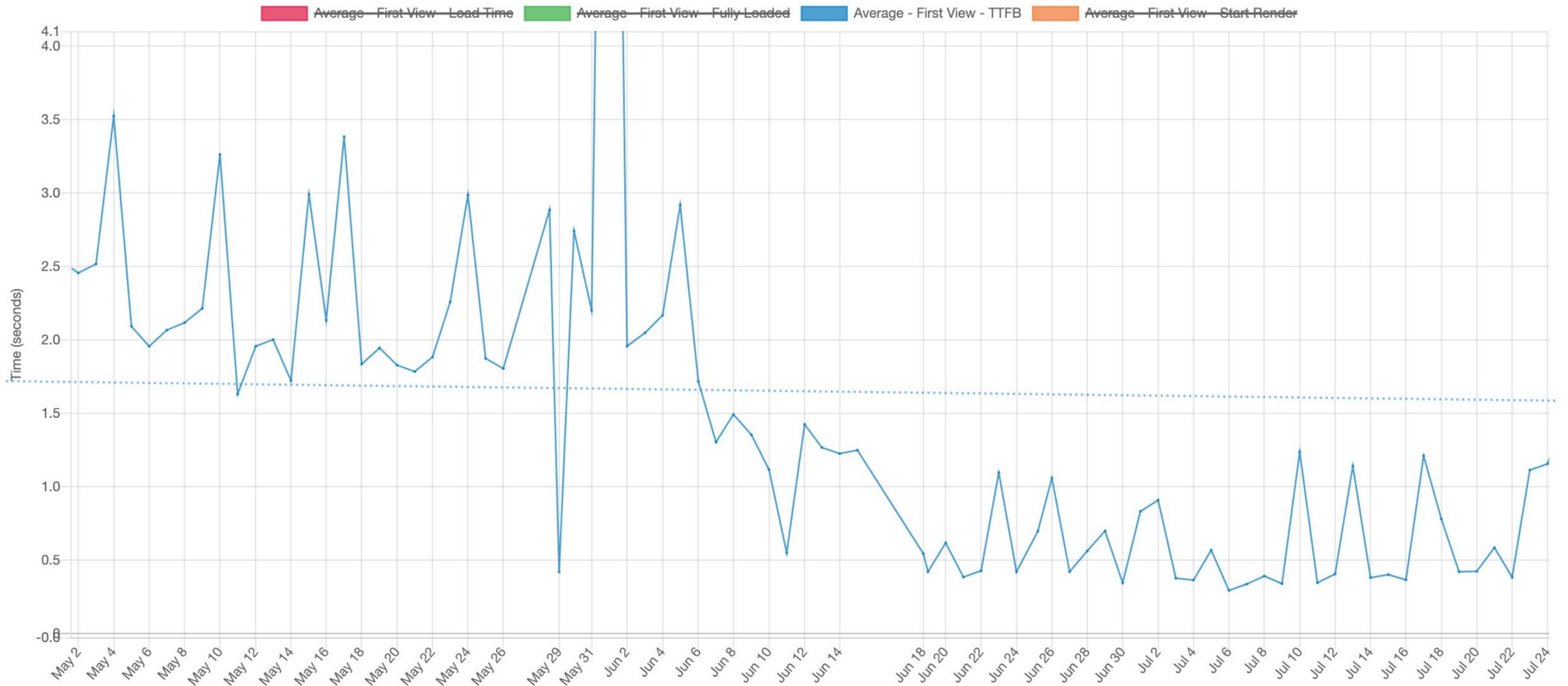
# Demo Time



# Example #1

## Drupal 7 → 8 Migration

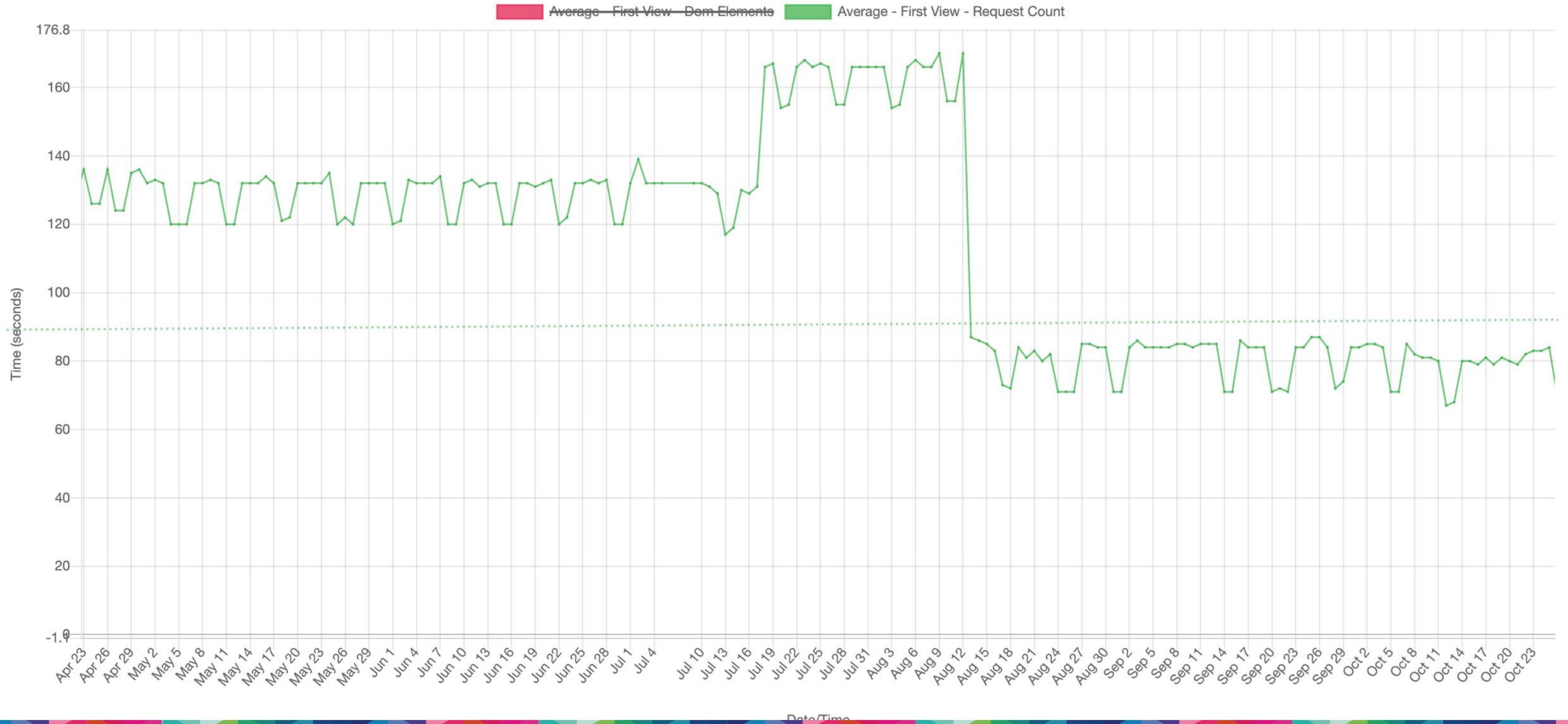
{First View Page Load KPIs}: <https://www.rackspace.com/empty-page>





# Example #2

## Enabling CSS/JS Aggregation

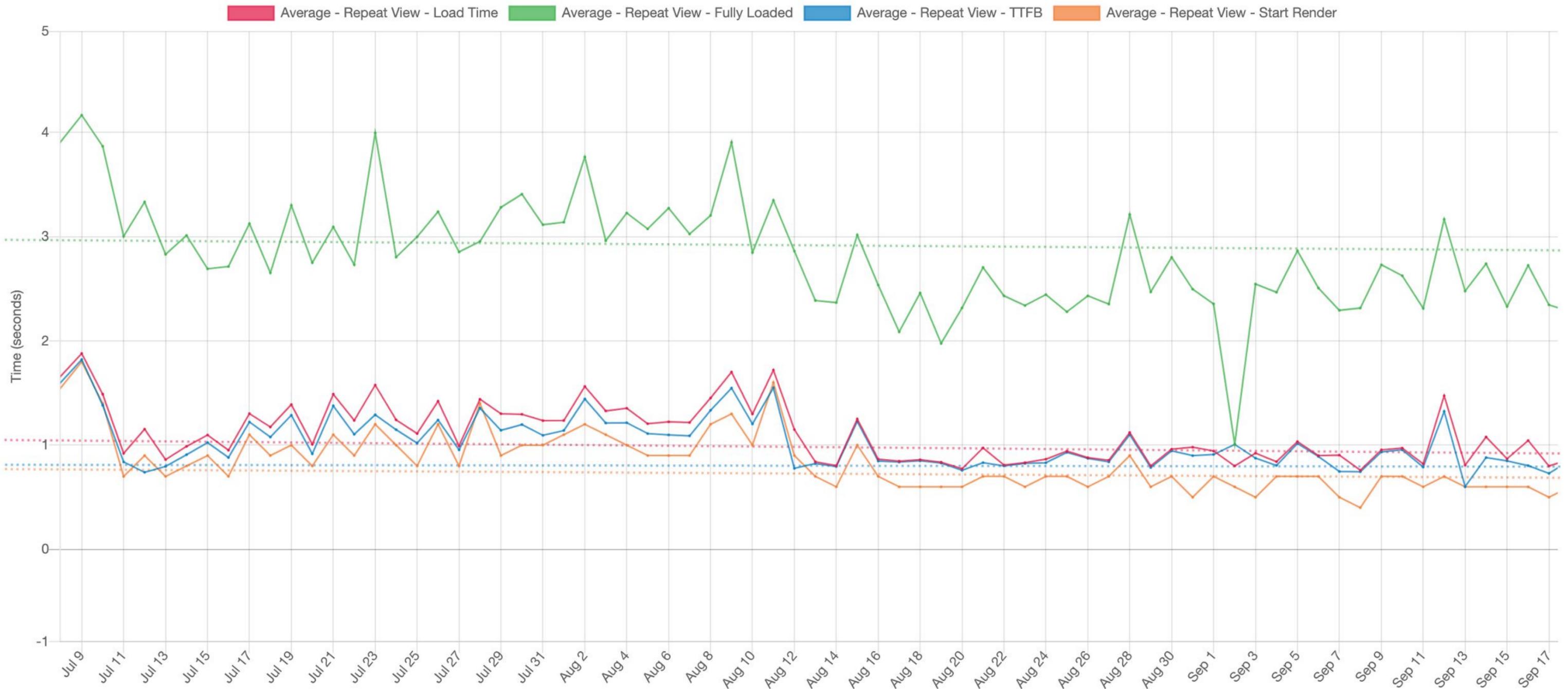




# Example #2 (continued)

## Enabling CSS/JS Aggregation

{Repeat View Page Load KPIs}: <https://www.rackspace.com/empty-page>

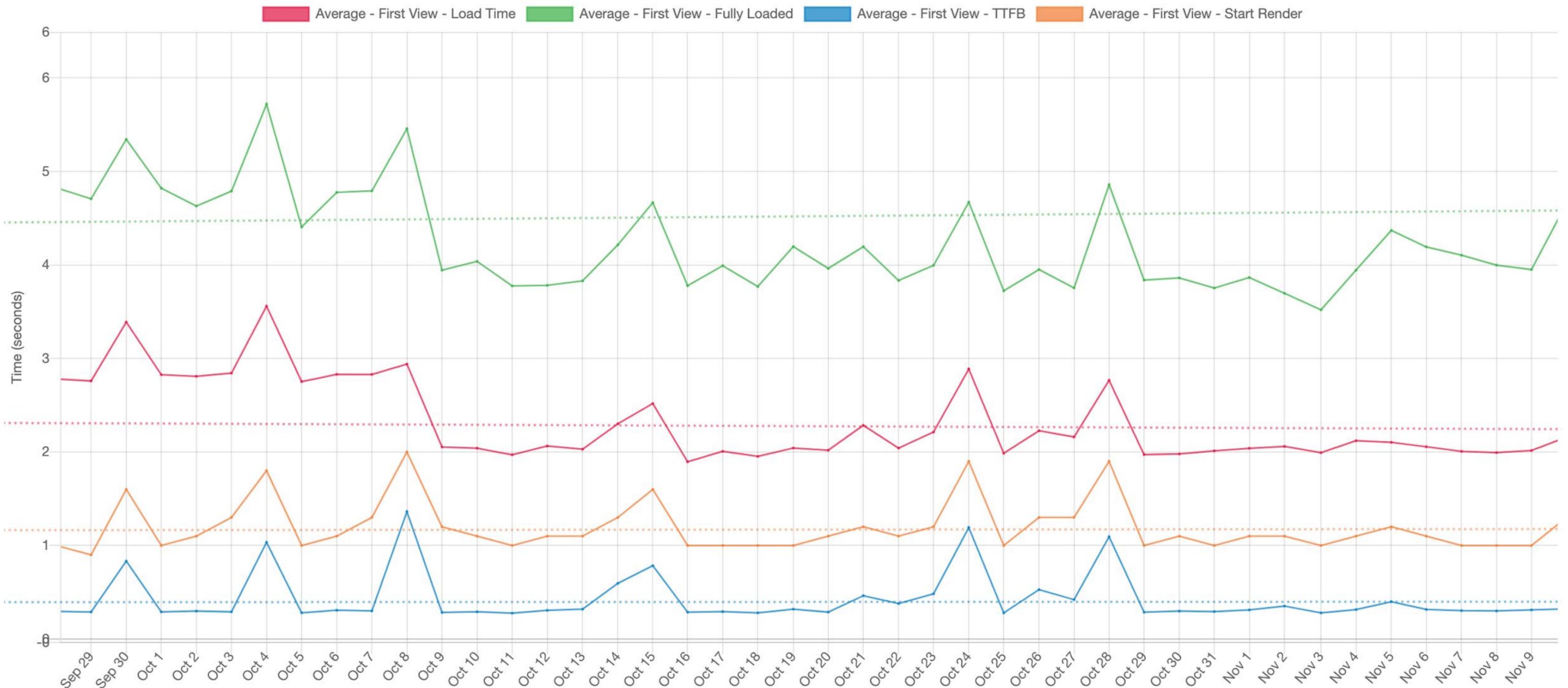




# Examples #3 & #4

## Dropping font weights and reducing DNS hops

{First View Page Load KPIs}: <https://www.rackspace.com>

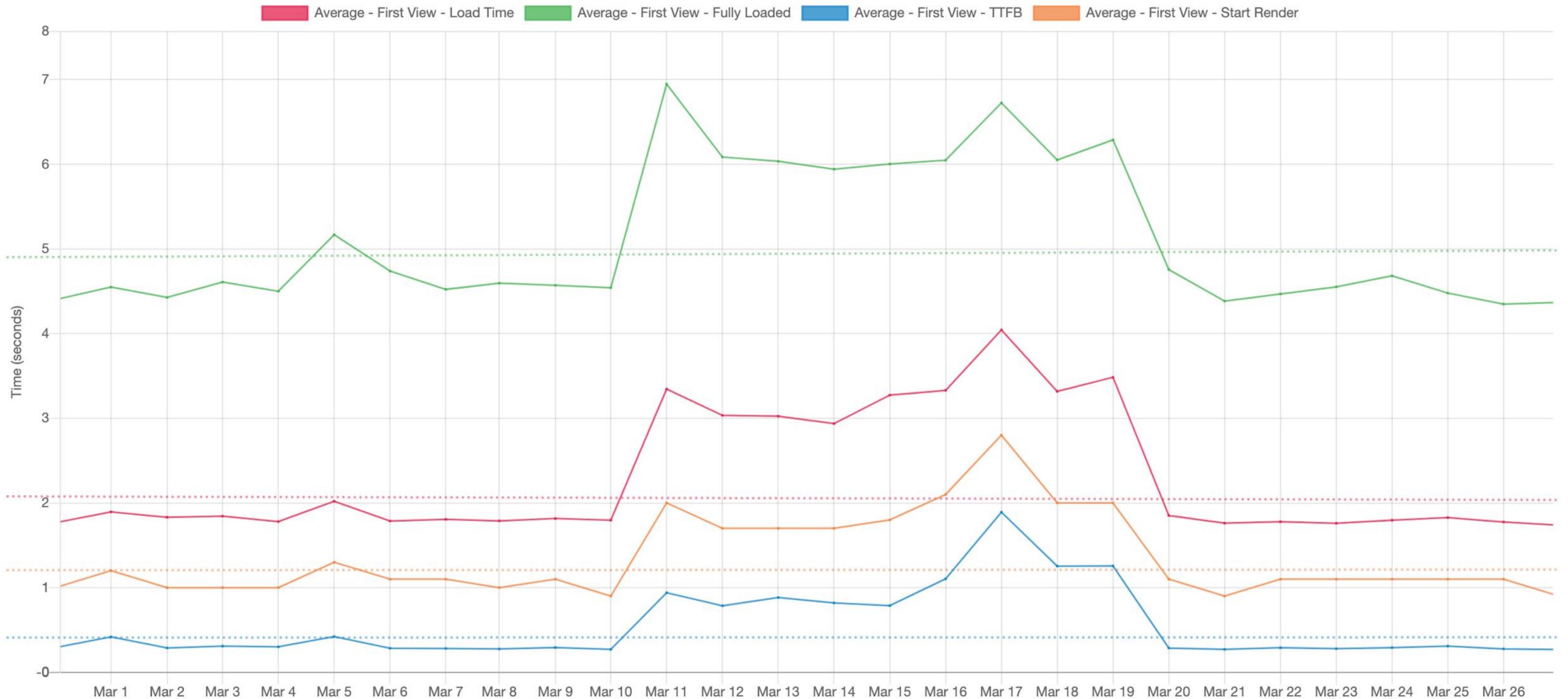




# Example #5

## Impact of Embedded Form A/B Test

{First View Page Load KPIs}: <https://www.rackspace.com>





# Setting up Key Performance Indicator (KPI) Groups

1. Configuration → System → Web page archive

2.) Click “Web Page Test KPI Groups”

The screenshot shows the top navigation bar of the Drupal administration interface. The 'Configuration' menu is open, displaying a list of categories. A blue arrow points from the 'Web page archive' option in the 'System' category to the right.

- Configuration
- People
- Reports
- Help
- People
- System
  - Basic site settings
  - Cron
  - Keys
  - Web page archive**
- Content authoring
- User interface
- Development
- Media
- Search and metadata
- Regional and language
- Web services
- Workflow

The screenshot shows the 'Web Page Archive' configuration page. A blue arrow points from the 'Web Page Test KPI Groups' tab to the right. Below the tabs is a breadcrumb trail and a '+ Add Archive' button. A table lists various web page archive entities with their machine names, run counts, schedules, and 'View Run History' buttons.

WEB PAGE ARCHIVE ENTITY	MACHINE NAME	RUNS	SCHEDULE	OPERATIONS
** Shortlist: Rackspace.com (1280)	_shortlist_rackspace_com_1280_	30 runs	Next run: 2020-07-07 @ 2:00am CDT	<a href="#">View Run History</a>
Accessibility Scanner (508 compliance)	accessibility_scanner_508_compliance	41 runs	Next run: 2020-07-12 @ 12:00am CDT	<a href="#">View Run History</a>
Accessibility Scanner (WCAG 2.0 AA)	accessibility_scanner_wcag_2_0_aa	46 runs	Next run: 2020-07-12 @ 12:00am CDT	<a href="#">View Run History</a>
Drupal.org	drupal_org	90 runs	Next run: 2020-07-07 @ 5:00am CDT	<a href="#">View Run History</a>
Drupal.org - HTML	drupal_org_html	90 runs	Next run: 2020-07-07 @ 3:00am CDT	<a href="#">View Run History</a>
Environmental Home Pages	home_page_test	3 runs	Next run: 2020-07-07 @ 1:00am CDT	<a href="#">View Run History</a>
MTE-5229: Drupal 8.8.1	mte_5229_drupal_8_8_1	1 run	Never	<a href="#">View Run History</a>
MTE-5250: Drupal 8.8.0	mte_5250_drupal_8_8_0	2 runs	Never	<a href="#">View Run History</a>



# Setting up KPI Groups (continued)

3.) Click “+Add Web Page Test KPI Group” or the “Edit” link next to an existing group

Web Page Test KPI Group entities ☆

Web Page Archive Compare Runs Previous Run Comparisons Settings Web Page Test KPI Groups Prepare uninstall

Home » Administration » Configuration » System » Web Page Archive

+ Add Web Page Test KPI Group

WEB PAGE TEST KPI GROUP	MACHINE NAME	KPIS	OPERATIONS
Counts	speed_index	Average : First View : Dom Elements Average : First View : Request Count	Edit
Counts (Repeat)	counts_repeat	Average : Repeat View : Dom Elements Average : Repeat View : Request Count Average : Repeat View : 200 Response Count Average : Repeat View : 404 Response Count Average : Repeat View : Other Response Count	Edit
First View Page Load KPIs	standard_page_load_kpis	Average : First View : Load Time - Maximum value: 2000 Average : First View : Fully Loaded Average : First View : TTFB Maximum value: 750	Edit

## 4.) Specify KPIs/Thresholds

Edit *First View Page Load KPIs* ☆

Home » Administration » Configuration » System » Web Page Archive » Web Page Test KPI Group entities » First View Page Load KPIs

Label \*  
First View Page Load KPIs Machine name: standard\_page\_load\_kpis  
Label for the Web Page Test KPI Group.

▼ KEY PERFORMANCE INDICATOR  
Select which KPIs you are interested in tracking in this group.

▼ AVERAGE  
The average value of the given metric across all of the runs for the given test.

▼ FIRST  
Cache is cleared and page is loaded.  
 Load Time  
The Load Time is measured as the time from the start of the initial navigation until the beginning of the window load event (onload).

THRESHOLDS  
 Has minimum value?  
Check this box if you want to trigger notifications when values below the minimum are detected.  
 Has maximum value?  
Check this box if you want to trigger notifications when values above the maximum are detected.  
Maximum value (milliseconds) \*  
2000  
Any detected values higher than this value would trigger a notification.

Fully Loaded  
The Fully Loaded time is measured as the time from the start of the initial navigation until there was 2 seconds of no network activity after Document Com after the main page loads.

THRESHOLDS

▶ REPEAT VIEW

Save Delete

5.) Click “Save”



# Setting up a New Job

1. Admin → System → Web page archive

Configuration | People | Reports | Help

- People >
- System > Basic site settings
- Content authoring > Cron
- User interface > Keys
- Development > **Web page archive**
- Media >
- Search and metadata >
- Regional and language >
- Web services >
- Workflow

2.) Click “+Add Archive”

Web Page Archive ☆

Web Page Archive | Compare Runs | Previous Run Comparisons | Settings | Web Page Test KPI Groups | Prepare uninstall

Home » Administration » Configuration » System

**+ Add Archive**

WEB PAGE ARCHIVE ENTITY	MACHINE NAME	RUNS	SCHEDULE	OPERATIONS
** Shortlist: Rackspace.com (1280)	_shortlist_rackspace_com_1280_	30 runs	Next run: 2020-07-07 @ 2:00am CDT	<a href="#">View Run History</a>
Accessibility Scanner (508 compliance)	accessibility_scanner_508_compliance	41 runs	Next run: 2020-07-12 @ 12:00am CDT	<a href="#">View Run History</a>
Accessibility Scanner (WCAG 2.0 AA)	accessibility_scanner_wcag_2_0_aa	46 runs	Next run: 2020-07-12 @ 12:00am CDT	<a href="#">View Run History</a>
Drupal.org	drupal_org	90 runs	Next run: 2020-07-07 @ 5:00am CDT	<a href="#">View Run History</a>
Drupal.org - HTML	drupal_org_html	90 runs	Next run: 2020-07-07 @ 3:00am CDT	<a href="#">View Run History</a>
Environmental Home Pages	home_page_test	3 runs	Next run: 2020-07-07 @ 1:00am CDT	<a href="#">View Run History</a>
MTE-5229: Drupal 8.8.1	mte_5229_drupal_8_8_1	1 run	Never	<a href="#">View Run History</a>
MTE-5250: Drupal 8.8.0	mte_5250_drupal_8_8_0	2 runs	Never	<a href="#">View Run History</a>



# Setting up a New Job (continued)

## 3.) Fill out job criteria

Add Archive ☆

Home » Administration » Configuration » System » Web Page Archive

Label \*

WPT Job

Machine name: wpt\_job [Edit]

Label for the Web page archive entity.

Run capture job automatically.

Yes ▾

Crontab schedule (relative to PHP's default timezone)

0 5 \* \* \*

Crontab format (see <https://crontab.guru/>)

Timeout (ms)

500

Amount of time to wait between captures, in milliseconds.

Capture Type

URL ▾

Honor robots.txt restrictions.

Yes ▾

If checked, capture utility will respect robots.txt crawling rules.

Browser user agent

WPA

Specify the browser user agent. e.g. "Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_12\_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/59.0.3071.115 Safari/537.36"

Data retention type

Keep all revisions ▾

Determines the data retention policy for a job.

Warning: Changing this on existing jobs may result in data loss.

URLs to Capture \*

<https://www.drupal.org>

A list of urls to capture.

Create new archive

4.) Click “Create new archive”



## Setting up a New Job (continued)

5. Select the “Web page test capture utility”

[Show row weights](#)

CAPTURE UTILITY	OPERATIONS
<div><p>✚</p><ul style="list-style-type: none"><li>✓ Select a new capture utility</li><li>Web page test capture utility</li><li>Achecker Accessibility Scanner</li><li>HTML capture utility</li><li>Screenshot capture utility</li><li>Skeleton capture utility</li></ul></div>	<div>Add</div>

6.) Click “Add”



# Setting up a New Job (continued)

7.) Specify API information

8.) Optionally auto-generate historical reports when new runs occur

**WEBPAGETEST.ORG API KEY**

**API Hostname \***  
  
The protocol and hostname on which to make API calls (e.g. https://www.webpagetest.org).

**webpagetest API key storage method \***  
  
The method for mapping a job with an API key. It is highly recommended to use the key module for better key storage security.

**Select a key \***  
  
Select a valid key from the key module.

**AUTOGENERATE HISTORICAL REPORT SETTINGS**

Enabled?  
Use this checkbox to force the regeneration of the historical report (i.e. the visual trend graph) upon every capture.

**KPI Groups \***  
  
Select which KPIs to apply to this job. [Create a new KPI group.](#)

9.) Specify desired KPI groups

10.) Optionally, configure email notifications

**Notification Method(s)**

Notify: Email

▶ NOTIFY: EMAIL - SINGLE CAPTURE COMPLETION

▼ NOTIFY: EMAIL - PERFORMANCE BUDGET THRESHOLD VIOLATION

This context occurs when a threshold violation is detected during a capture.

Enable this notification utility

**Recipient Email Address \***

**Email Format \***

**Email Subject \***

**Email Body \***

```
<h3>Violations:</h3>
<pre>
@violations
</pre>
```

The following variables are available to the above field(s):

@wpa\_id  
Web page archive configuration entity ID

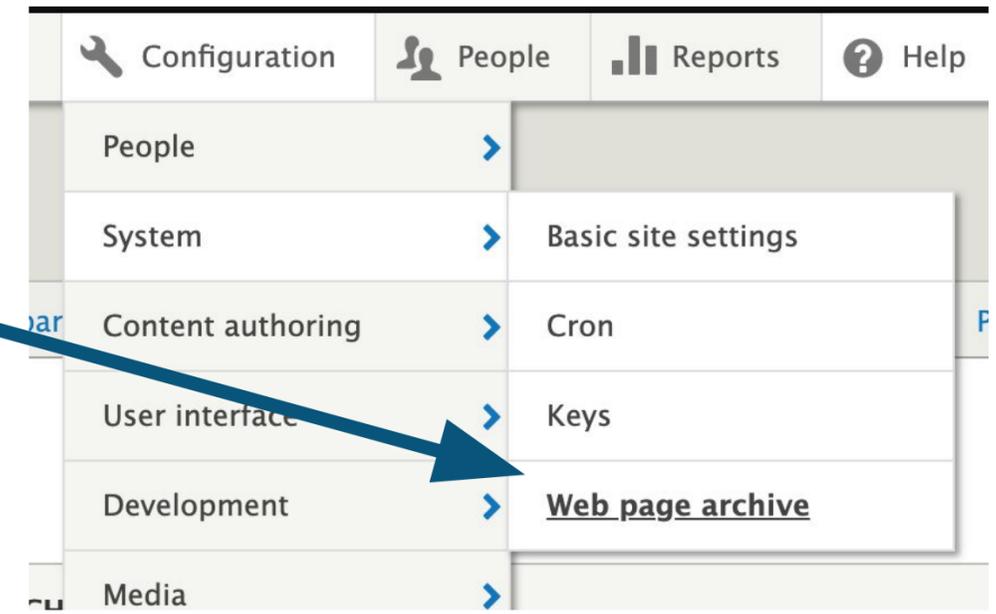
@wpa\_label  
Web page archive configuration entity label



# Fetching Results

1.) *Configuration* → *System* → *Web Page Archive*

2a.) If you set *Run capture job automatically* to “Yes”, just wait until the cronjob processes the results, click *View Run History* and proceed to slide 30.



Job Name	URL	Runs	Next Run	Action
Performance Budget (Rackspace.com - Empty Page)	performance_budget_rackspace_com_	1010 runs	Next run: 2020-07-14 @ 5:00am CDT	<a href="#">View Run History</a>
		218	Next run: 2020-07-14 @	

2b.) If you set *Run capture job automatically* to “No”, click *Start Run* next to the job you want to initiate.

TexasCamp	texascamp	27 runs	Never	<a href="#">View Run History</a>
WPT	wpt	2 runs	Never	<a href="#">View Run History</a> <a href="#">Start Run</a> <a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Devel</a>
XML Sitemaps	xml_sitemaps	7 runs	Next run: 2020-07-20 @ 4:00am CDT	



# Fetching Results (continued)

3.) Click “Start Run” button

## Web Page Archive Queue ☆

[Home](#) » [Administration](#) » [Configuration](#) » [System](#) » [Web Page Archive](#) » [WPT](#)

Click "Start Run" to capture these urls:

- <https://www.rackspace.com/>

**Start Run**

CREATED	CAPTURE UTILITIES	ITEMS CAPTURED	CAPTURE SIZE (BYTES)	OPERATIONS
Mon, 07/13/2020 - 21:28	Web page test capture utility	0	0 bytes	<a href="#">View Details</a>
Sun, 07/12/2020 - 21:36	Web page test capture utility	1	1.75 MB	<a href="#">Download Run</a>
Sun, 07/12/2020 - 21:34	Web page test capture utility	1	1.7 MB	<a href="#">Toggle Retention Lock</a>
				<a href="#">Delete Revision</a>
				<a href="#">Fetch WebPageTest Results</a>

4.) Click “Fetch WebPageTest” Results

## Fetch Results: WPT ☆

[Home](#) » [Administration](#) » [Configuration](#) » [System](#) » [Web Page Archive](#) » [8632](#)

This run may have pending results available from WebPageTest. Click "Fetch Results" to attempt to download the test results.

**Fetch Results**

5.) Click “Fetch Results”



## Fetching Results (continued)

6.) If you clicked too quickly, you may see a notice that the “Test Started X seconds ago”. Just wait a minute or so, and try again.

**Fetch Results: WPT** ☆

[Home](#) » [Administration](#) » [Configuration](#) » [System](#) » [Web Page Archive](#) » 8632

✓ WebPageTest 100 API status for test [200714\_3Y\_447e2a74e1159fda81f31bdb448ae5cb]: Test Started 27 seconds ago

This run may have pending results available from WebPageTest. Click "Fetch Results" to attempt to download the test results.

**Fetch Results**



# Fetching Results (continued)

7a.) To view individual run results, click the *View Details* link next to the run.

Performance Budget (Rackspace.com – Empty Page) ☆

Home » Administration » Configuration » System » Web Page Archive

[+ View Historical Report](#)

Capture utilities:  Sort by:  Order:  Items per page:

CREATED	CAPTURE UTILITIES	ITEMS CAPTURED	CAPTURE SIZE (BYTES)	OPERATIONS
Mon, 07/13/2020 – 20:36	Web page test capture utility	0	0 bytes	<input type="button" value="View Details"/> ▾
Sun, 07/12/2020 – 10:18	Web page test capture utility	1	1.4 MB	<input type="button" value="View Details"/> ▾
Sat, 07/11/2020 – 20:32	Web page test capture utility	1	1.4 MB	<input type="button" value="View Details"/> ▾
Fri, 07/10/2020 – 08:52	Web page test capture utility	1	1.54 MB	<input type="button" value="View Details"/> ▾

7b.) To view the trend charts, click the *View Historical Report* link



# Email/Slack Notifications



**EJ's Ghost** APP 5:04 AM

Email ▾

From <apache@wpa-a-d1.ord.rakr.net (Apache)>

To EJ's Ghost

Subject **Performance budget violation report for**  
**<https://www.rackspace.com/empty-page>**

Date Today at 5:04 AM

## Violations:

[Average : First View : Load Time] 2.029s > 2s

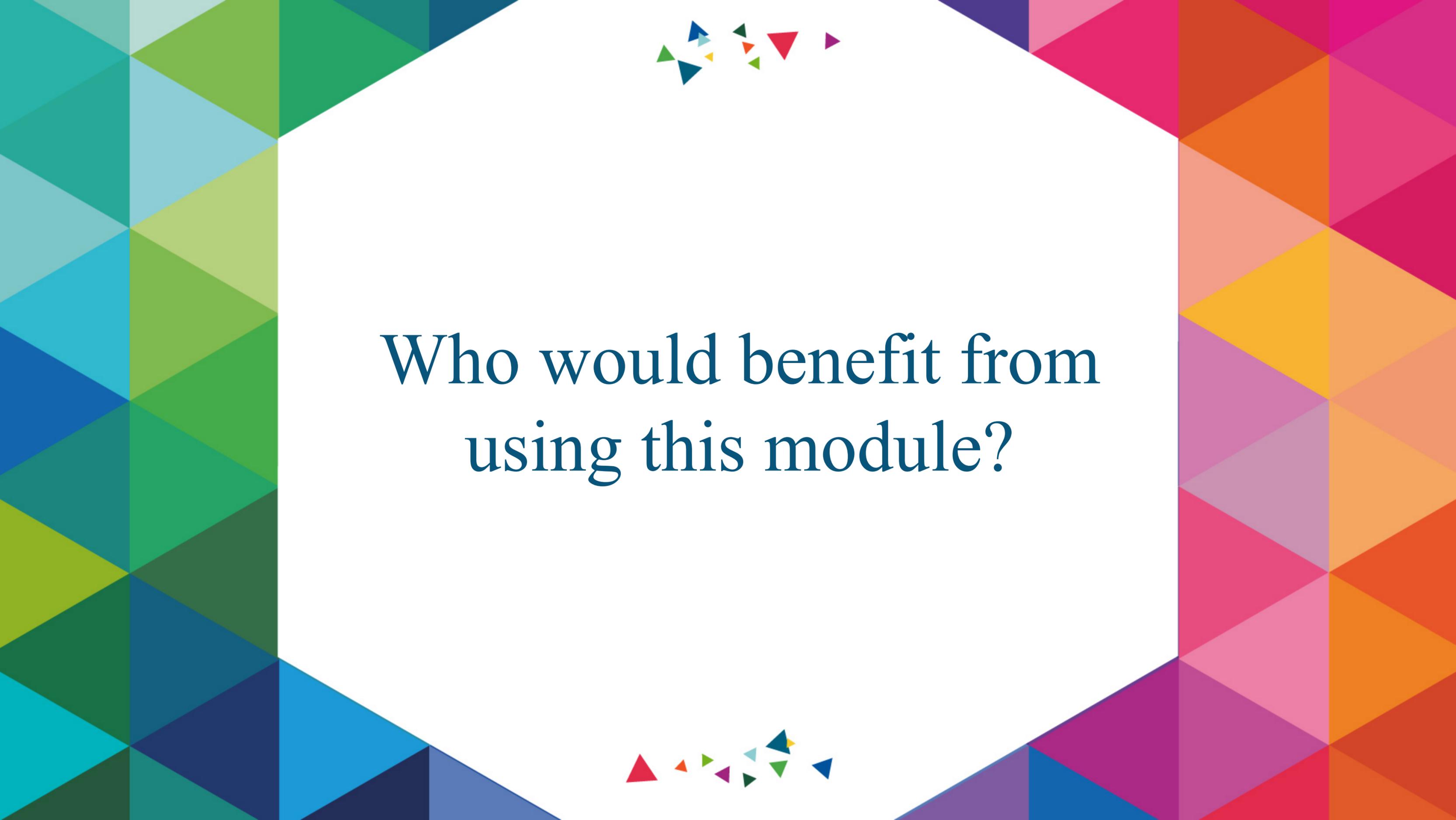
## First View:

- URL: <https://www.rackspace.com/empty-page>
- Load Time: 2.029s
- Fully Loaded: 4.637s
- TTFB: 0.722s
- Render: 1.5s

## Repeat View:

- URL: <https://www.rackspace.com/empty-page>
- Load Time: 0.946s
- Fully Loaded: 3.549s
- TTFB: 0.341s
- Render: 0.7s

[See more information here](#)



Who would benefit from  
using this module?



# Who should use the performance budget module?

- Enterprise website maintainers
- Ecommerce website maintainers
- Agencies/Contract Developers  
(Even if you're building non-Drupal websites for your customers)
- Marketers/Sales Leaders/Business Owners



# Learning Resources



# FAQs

- **Does it only monitor Drupal-based websites?**

No. It can monitor any publicly-accessible website

(Please adhere to the robots.txt policy for any site you don't own).

- **Can performance budget monitor intranet or password-protected sites?**

Not in its present state, but it is open source...

- **Can I install it on the same server I have my Drupal website on?**

Yes, but it's not recommended due to recommended cron frequency.

- **WebPageTest is open source. Can the performance budget module use a private WPT instance instead of the public instance?**

Yes. You can point at both public and private instances of WebPageTest

- **What about accessibility concerns?**

We definitely need help here. [https://www.drupal.org/project/performance\\_budget/issues/3159174](https://www.drupal.org/project/performance_budget/issues/3159174)



# Related Links and Sources

- **Akamai Online Retail Performance Report: Milliseconds Are Critical**

<https://www.akamai.com/uk/en/about/news/press/2017-press/akamai-releases-spring-2017-state-of-online-retail-performance-report.jsp>

- **thinkwithgoogle.com - Find out how you stack up to new industry benchmarks for mobile page speed**

<https://www.thinkwithgoogle.com/marketing-resources/data-measurement/mobile-page-speed-new-industry-benchmarks/>

- **WebPageTest Documentation – Metrics**

<https://sites.google.com/a/webpagetest.org/docs/using-webpagetest/metrics>

- **WebPageTest.org** – <https://webpagetest.org/>

- **Performance Budget** – [https://www.drupal.org/project/performance\\_budget](https://www.drupal.org/project/performance_budget)

- **Web Page Archive** – [https://www.drupal.org/project/web\\_page\\_archive](https://www.drupal.org/project/web_page_archive)

- **Resource Hints** – [https://www.drupal.org/project/resource\\_hints](https://www.drupal.org/project/resource_hints)



# What did you think?

**Session Feedback:**

<https://tinyurl.com/drupalcon2020-wpt>

**Presentation Slides:**

<https://tinyurl.com/performance-budget>

**Performance Budget Module:**

[https://drupal.org/project/performance\\_budget](https://drupal.org/project/performance_budget)

**Twitter: @DavidStinemetze**

**Drupal.org/Slack: @WidgetsBurritos**



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