Historical Page Load Time Monitoring Using WebPageTest and Drupal

TexasCamp 2019 – October 19, 2019

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- Twitter: @davidstinemetze

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TM

Why is Page Load Time Important?

Because people are impatient.

Why is Page Load Time Important?

Akamai State of Online Retail Performance Report

In 2017, Akamai released these findings in their State of Online Retail Performance report:

- "A 100-millisecond delay in website load time can hurt conversion rates by 7 percent”
- “A two-second delay in web page load time increase bounce rates by 103 percent”
- “53 percent of mobile site visitors will leave a page that takes longer than three seconds to load”

SOURCE: 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

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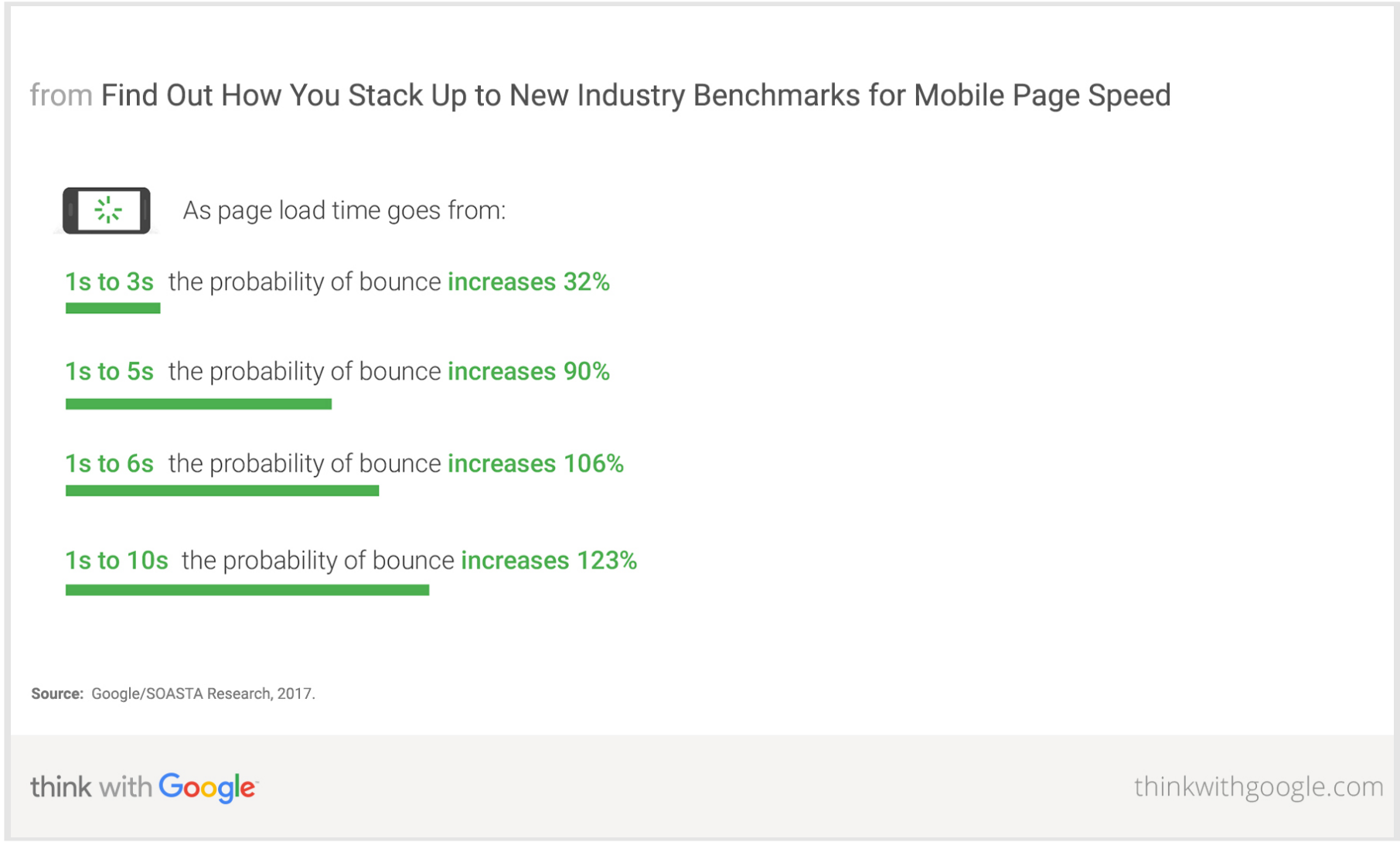
Why is Page Load Time Important?

Google's Industry Benchmarks for Mobile Site Performance

Around the same time, Google provided new industry benchmarks for mobile site performance:

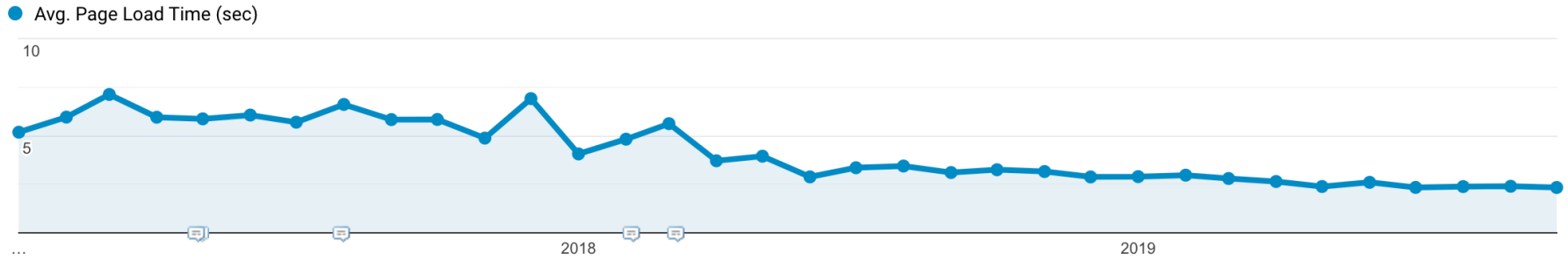


SOURCE: thinkwithgoogle.com - Find out how you stack up to new industry benchmarks for mobile page speed
https://www.thinkwithgoogle.com/marketing-resources/data-measurement/mobile-page-speed-new-industry-benchmarks/

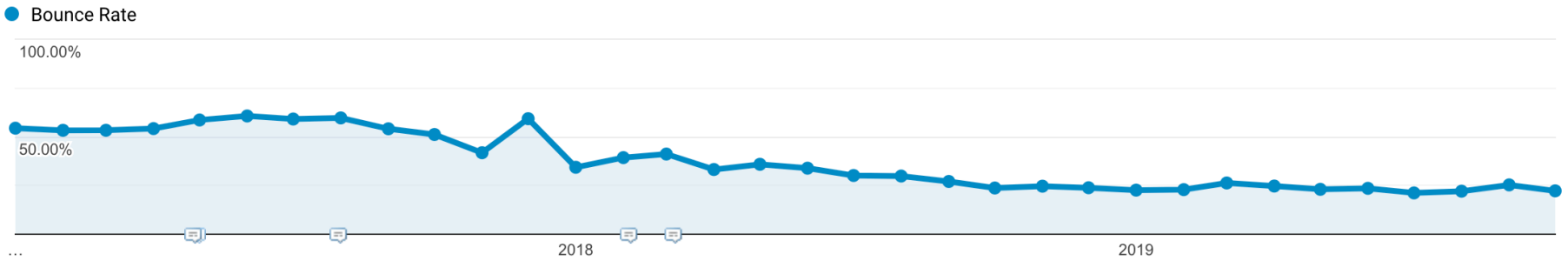
Why is Page Load Time Important?

Real user data for Rackspace.com

- Average Page Load Time since January 1, 2017



- Average Bounce Rate from September 1, 2016 through October 18, 2019



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How to Measure Page Load Time

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How to Measure Page Load Time

Important Terms and Metrics*

*as defined by WebPageTest

- **Metrics**
  - **Time to First Byte (TTFB)** – When very first byte received by the client.
  - **Start Render/First Paint** – When anything is first rendered on the screen. (not necessarily content)
  - **First Contentful Paint** – When content is first rendered on the screen.
  - **Load Time** – When document complete event is triggered (i.e. DOM Ready).
  - **Fully Loaded** – Last network activity within 2 seconds of document complete.
  - **Speed Index** – How quickly page rendered user-visible content.
  - **DOM Elements** – Count of total DOM elements at the end of the test.
- **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.

SOURCE: WebPageTest Documentation – Metrics
https://sites.google.com/a/webpagetest.org/docs/using-webpagetest/metrics

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How to Measure Page Load Time

Tools and Resources

- There are many tools out there for measuring page load times. We will focus on:
  - **Google Chrome Developer Tools:** https://developers.google.com/web/tools/chrome-devtools/network
  - **WebPageTest.org:** https://webpagetest.org/
- Additional tools worth exploring:
  - **Google PageSpeed Insights:** https://developers.google.com/speed/pagespeed/insights/
  - **Google Mobile Speed Report:** https://www.thinkwithgoogle.com/feature/testmysite/
  - **GTmetrix:** https://gtmetrix.com

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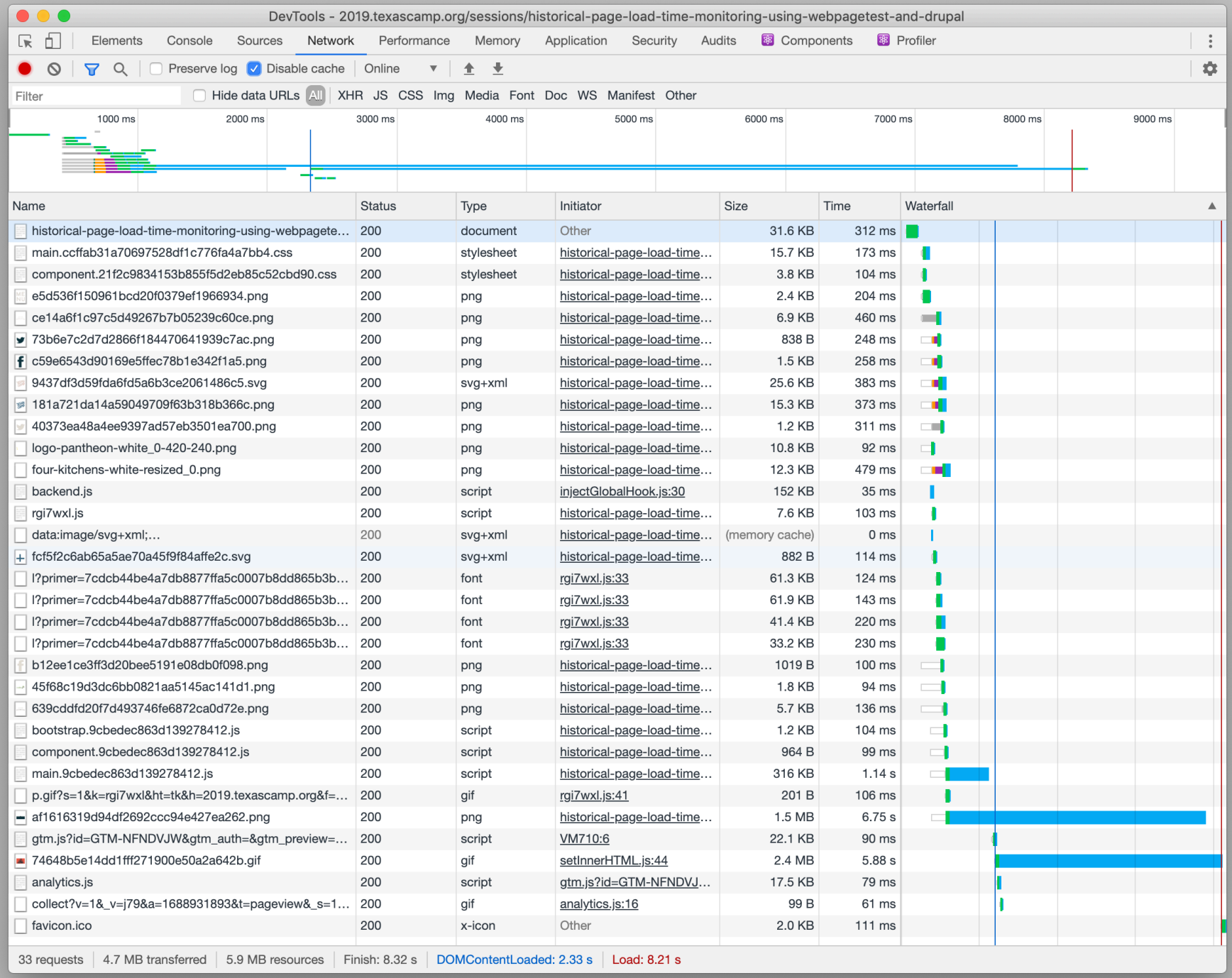
How to Measure Page Load Time

Google Chrome Developer Tools



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How to Measure Page Load Time

WebPageTest (WPT) Sample Overview

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Web Page Performance Test for

https://2019.texascamp.org/sessions/historical-page-load-time-monitoring-using-webpagetest-and-drupal

From: Dulles, VA - **Chrome** - **Cable**
10/15/2019, 3:40:37 PM

Need help improving?

A	B	A	A	B	X
First Byte Time	Keep-alive Enabled	Compress Transfer	Compress Images	Cache static content	Effective use of CDN

Summary | Details | Performance Review | Content Breakdown | Domains | Processing Breakdown | Screenshot | Image Analysis | Request Map

Tester: VM02-07-172.16.20.224
First View only
Test runs: **3**
Re-run the test

Raw page data - Raw object data
Export HTTP Archive (.har)
View Test Log

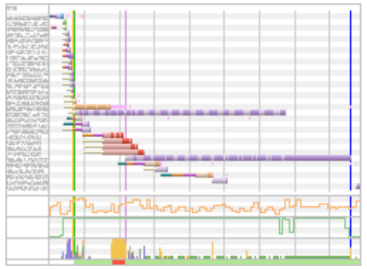
Performance Results (Median Run)

								Document Complete			Fully Loaded			
	Load Time	First Byte	Start Render	First Contentful Paint	Speed Index	Last Painted Hero	First CPU Idle	Time	Requests	Bytes In	Time	Requests	Bytes In	Cost
First View (Run 2)	8.664s	0.342s	0.700s	0.658s	1.010s	4.100s	2.306s	8.664s	30	4,614 KB	8.849s	31	4,616 KB	$$$$$

Plot Full Results

Test Results

Run 1:

	Waterfall	Screenshot	Video
First View (8.611s) Timeline (view) Processing Breakdown Trace (view)			Filmstrip View - Watch Video

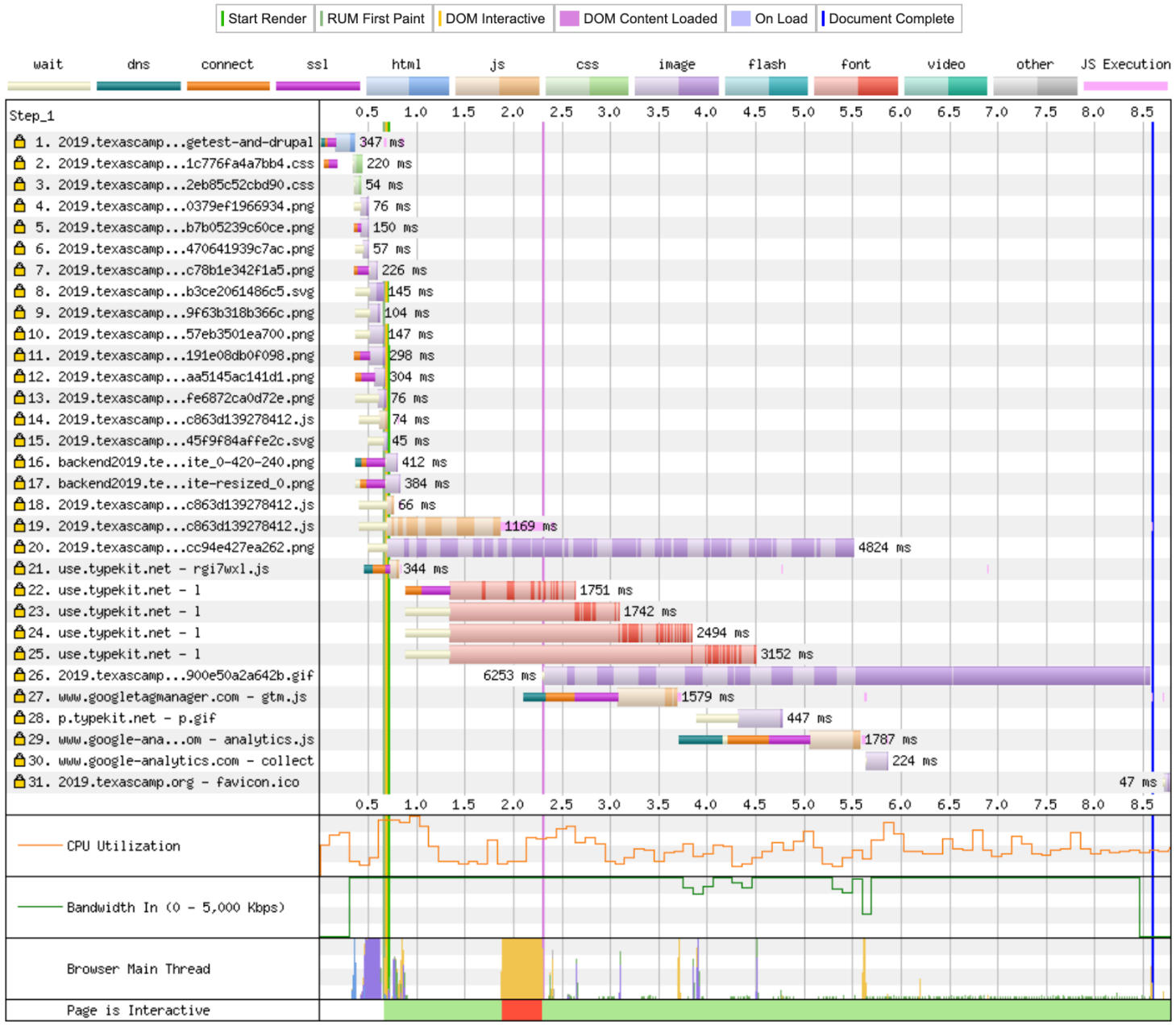
Run 2:

	Waterfall	Screenshot	Video
First View (8.664s) Timeline (view) Processing Breakdown Trace (view)			Filmstrip View - Watch Video

How to Measure Page Load Time

WebPageTest (WPT)
Sample Waterfall View

Waterfall View



customize waterfall • View all Images • View HTTP/2 Dependency Graph • Filmstrip

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How to Measure Page Load Time

WebPageTest (WPT) Sample Request Details

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Request Details

Before Start Render | Before On Load | After On Load

Request Details

#	Resource	Content Type	Request Start	DNS Lookup	Initial Connection	SSL Negotiation	Time to First Byte	Content Download	Bytes Downloaded	Certificates	Error/Status Code	IP
1	https://2019.texasca...bpagetest-and-drupal	text/html	0.163 s	28 ms	35 ms	87 ms	151 ms	46 ms	30.4 KB	-	200	34.237.122.21
2	https://2019.texasca...8df1c776fa4a7bb4.css	text/css	0.347 s	-	36 ms	95 ms	41 ms	48 ms	15.2 KB	-	200	34.237.122.21
3	https://2019.texasca...f5d2eb85c52cbd90.css	text/css	0.362 s	-	-	-	48 ms	6 ms	3.4 KB	-	200	34.237.122.21
4	https://2019.texasca...20f0379ef1966934.png	image/png	0.422 s	-	-	-	63 ms	13 ms	2.1 KB	-	200	34.237.122.21
5	https://2019.texasca...267b7b05239c60ce.png	image/png	0.427 s	-	34 ms	41 ms	71 ms	4 ms	6.5 KB	-	200	34.237.122.21
6	https://2019.texasca...184470641939c7ac.png	image/png	0.444 s	-	-	-	56 ms	1 ms	0.5 KB	-	200	34.237.122.21
7	https://2019.texasca...ffec78b1e342f1a5.png	image/png	0.507 s	-	31 ms	114 ms	78 ms	3 ms	1.1 KB	-	200	34.237.122.21
8	https://2019.texasca...5a6b3ce2061486c5.svg	image/svg+xml	0.507 s	-	-	-	81 ms	64 ms	25.2 KB	-	200	34.237.122.21
9	https://2019.texasca...9709f63b318b366c.png	image/png	0.509 s	-	-	-	99 ms	5 ms	14.9 KB	-	200	34.237.122.21
10	https://2019.texasca...7ad57eb3501ea700.png	image/png	0.51 s	-	-	-	144 ms	3 ms	0.8 KB	-	200	34.237.122.21
11	https://2019.texasca...ee5191e08db0f098.png	image/png	0.511 s	-	50 ms	96 ms	147 ms	5 ms	0.7 KB	-	200	34.237.122.21
12	https://2019.texasca...821aa5145ac141d1.png	image/png	0.569 s	-	53 ms	151 ms	95 ms	5 ms	1.5 KB	-	200	34.237.122.21
13	https://2019.texasca...746fe6872ca0d72e.png	image/png	0.605 s	-	-	-	68 ms	8 ms	5.4 KB	-	200	34.237.122.21
14	https://2019.texasca...edec863d139278412.js	application/javascript	0.617 s	-	-	-	57 ms	17 ms	0.8 KB	-	200	34.237.122.21
15	https://2019.texasca...70a45f9f84affe2c.svg	image/svg+xml	0.654 s	-	-	-	43 ms	2 ms	0.5 KB	-	200	34.237.122.21
16	https://backend2019....-white_0-420-240.png	image/png	0.682 s	48 ms	51 ms	196 ms	114 ms	3 ms	10.3 KB	-	200	34.237.122.21
17	https://backend2019....-white-resized_0.png	image/png	0.683 s	-	51 ms	196 ms	134 ms	3 ms	11.9 KB	-	200	34.237.122.21
18	https://2019.texasca...edec863d139278412.js	application/javascript	0.688 s	-	-	-	58 ms	8 ms	0.5 KB	-	200	34.237.122.21
19	https://2019.texasca...edec863d139278412.js	application/javascript	0.688 s	-	-	-	60 ms	1109 ms	315.7 KB	-	200	34.237.122.21
20	https://2019.texasca...92ccc94e427ea262.png	image/png	0.689 s	-	-	-	183 ms	4641 ms	1,506.2 KB	-	200	34.237.122.21
21	https://use.typekit.net/rgi7wxl.js	text/javascript	0.724 s	74 ms	125 ms	58 ms	75 ms	12 ms	7.4 KB	-	200	104.111.222.25
22	https://use.typekit....2257a9191&fvd=n4&v=3	application/font-woff2	1.343 s	-	156 ms	302 ms	330 ms	963 ms	61.0 KB	-	200	104.111.222.25
23	https://use.typekit....2257a9191&fvd=n4&v=3	application/font-woff2	1.343 s	-	-	-	1293 ms	449 ms	33.0 KB	-	200	104.111.222.25
24	https://use.typekit....2257a9191&fvd=n4&v=3	application/font-woff2	1.343 s	-	-	-	1743 ms	751 ms	61.6 KB	-	200	104.111.222.25
25	https://use.typekit....2257a9191&fvd=n4&v=3	application/font-woff2	1.343 s	-	-	-	2496 ms	656 ms	41.1 KB	-	200	104.111.222.25
26	https://2019.texasca...271900e50a2a642b.gif	image/gif	2.312 s	-	-	-	248 ms	6005 ms	2,416.6 KB	-	200	34.237.122.21
27	https://www.googleta...w=>m_cookies_win=x	application/javascript	3.073 s	211 ms	308 ms	446 ms	493 ms	121 ms	22.0 KB	-	200	172.217.11.8
28	https://p.typekit.ne...e=js&_=1570590574677	image/gif	4.323 s	-	-	-	433 ms	14 ms	0.0 KB	-	200	104.111.222.25
29	https://www.google-a...ics.com/analytics.js	text/javascript	5.051 s	432 ms	412 ms	422 ms	457 ms	64 ms	17.4 KB	-	200	172.217.15.110
30	https://www.google-a...NFNDVJW&z=1459257082	image/gif	5.633 s	-	-	-	220 ms	4 ms	0.0 KB	-	200	172.217.15.110
31	https://2019.texascamp.org/favicon.ico	image/x-icon	8.718 s	-	-	-	44 ms	3 ms	1.6 KB	-	200	34.237.122.21

How Does Drupal Come Into Play?

How Does Drupal Come Into Play?

Introducing the Performance Budget Module

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Performance Budget

View | Version control | Automated testing

By bighappyface on *8 February 2017*, updated *8 June 2017*

★ 3

This project is not covered by Drupal's security advisory policy.

Web page performance is as important as ever and, using best-of-breed tooling, performance budgets can be defined and automated to help us keep things the best that they can be.

Key Features

- Multiple budgets
- Plugin design to facilitate adding providers
- Stored results broken out by budget dimension
- Customizable schedule for budget analysis

8.x-1.0 goals

- High test coverage / Dominant unit tests
- Budget Entity, List, and CRUD
- Cron integration for budget analysis schedules
- Pass/Fail alerts
- Pass/Fail thresholds (may be plugin specific)
- Budget enable/disable
- WebPageTest plugin (High Priority)
- Google PageSpeed Insights plugin (Medium Priority)

Supporting organizations:
Rackspace Hosting

Project information

Module categories: Performance and Scalability

364 downloads

This project is not covered by the security advisory policy.
Use at your own risk! It may have publicly disclosed vulnerabilities.

Downloads

8.x-1.0-alpha6 released 11 September 2019
⬇ tar.gz (1000.98 KB) | zip (1.02 MB)

Development version: 8.x-1.x-dev updated 11 Sep 2019 at 21:53 UTC

Testing result: PHP 7.2 & MySQL 5.5, D8.8 31 pass all results

View all releases

Maintainers for Performance Budget

WidgetsBurritos - 14 commits
last: 4 weeks ago, first: 2 months ago

bighappyface - 6 commits
last: 2 years ago, first: 2 years ago

View all committers
View commits

Issues for Performance Budget

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

Search

Advanced search

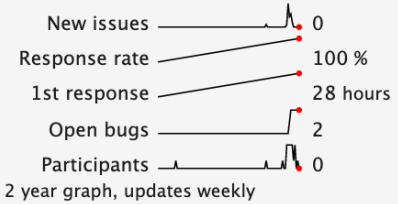
All issues

9 open, 24 total

Bug report

2 open, 5 total

Statistics



2 year graph, updates weekly

Documentation

No documentation guides

Resources

Read license
View project translations

How Does Drupal Come Into Play?

About the Performance Budget Module

- Alpha release module for Drupal 8 (Drupal 9 support is on the roadmap)
- Provides historical performance trending capabilities
- Built on the web page archive (WPA) ecosystem
  - https://www.drupal.org/project/web_page_archive
  - Originally a screenshot archiving tool (built on Headless Chrome/PhantomJS)
    - Crawls a list of URLs or XML sitemaps
    - Runs automatically on a custom recurring schedule
  - We later added other functionality (e.g. HTML capturing and visual regression)
  - Became generic capture & compare system
- Early in WPA development cycle we had idea for performance budget module
  - Built WebPageTest capture utility
- Project fell off our radar for almost 2 years
  - Picked back up again to fix D9 deprecation issues
- Then we realized we were sitting on 2 years of performance data.
  We became curious!

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Stop talking already
and show us!

Looking Ahead

Goals of the performance budget module

1. Threshold Monitoring (i.e. actual performance budgeting)
   https://www.drupal.org/project/performance_budget/issues/3074048
2. Plugin-based notification system (e.g. email, slack)
   https://www.drupal.org/project/web_page_archive/issues/3074051
3. Support private WPT instances
   https://www.drupal.org/project/performance_budget/issues/3086671
4. Advanced data normalization
   https://www.drupal.org/project/performance_budget/issues/3088194
5. Google PageSpeed Insights support
   https://www.drupal.org/project/performance_budget/issues/3088196
6. Plus several other bug fixes, feature improvements and lots of documentation.

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Getting Started

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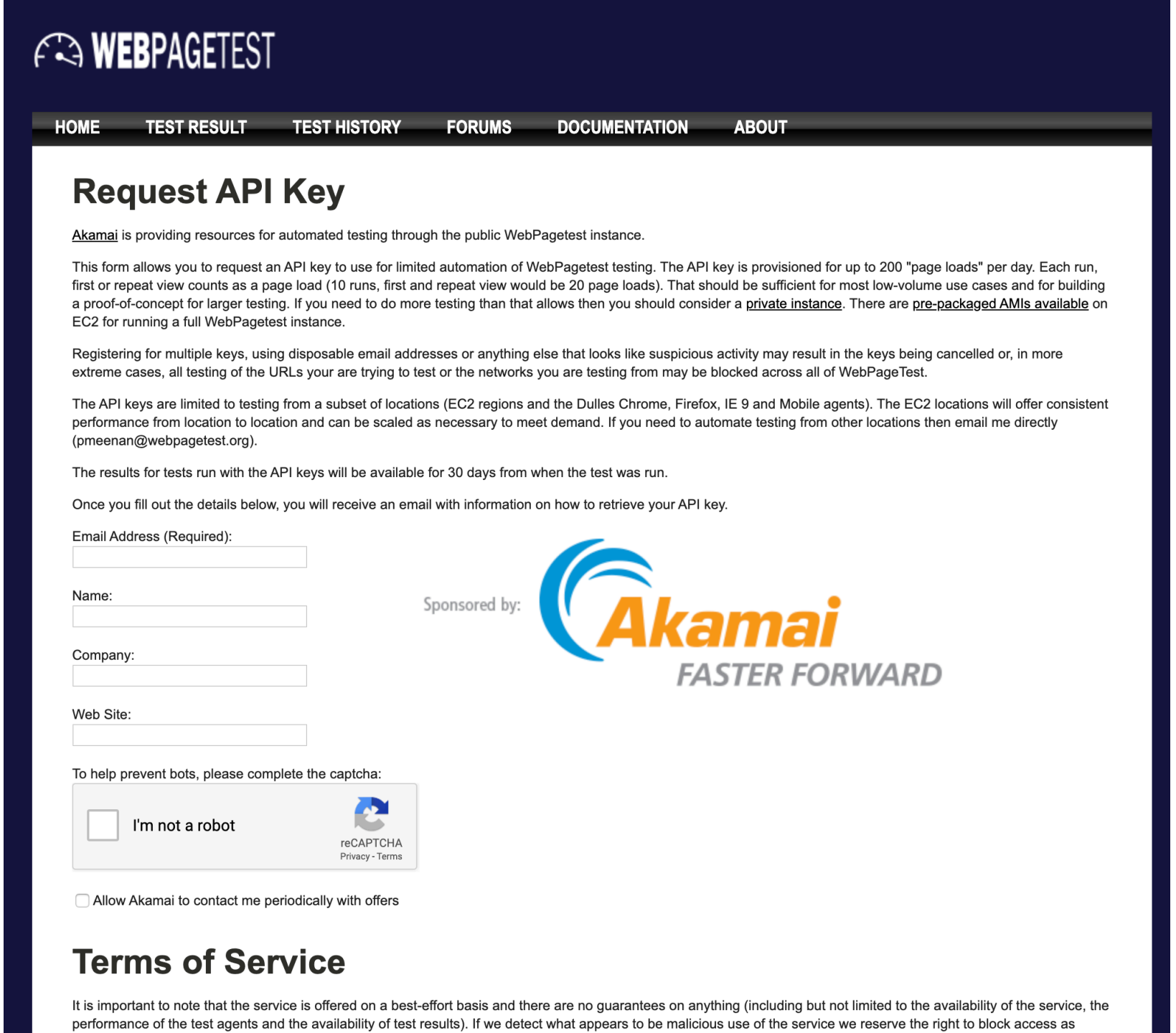
Getting Started

Request an API Key from WebPageTest.org



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Getting Started

Install the modules inside Drupal

```
$ composer require drupal/performance_budget

$ drush pm:enable -y performance_budget
```

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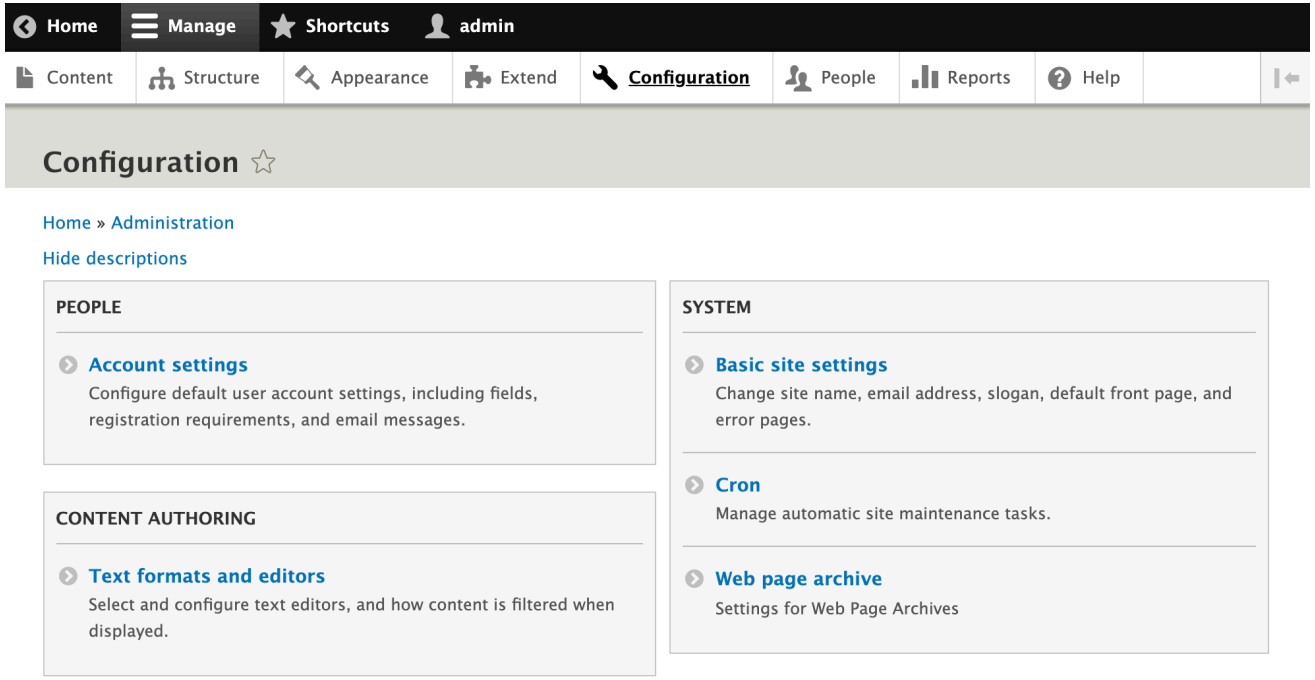
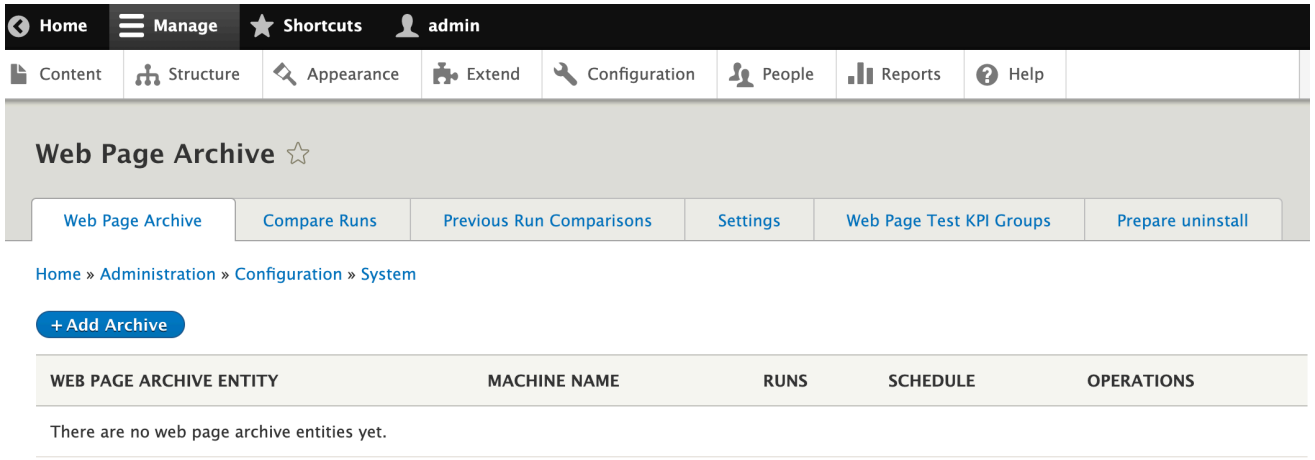
Getting Started

Setup a new web page archive capture job

- Navigate to /admin/config/system/web-page-archive



- Click “+ Add Archive”



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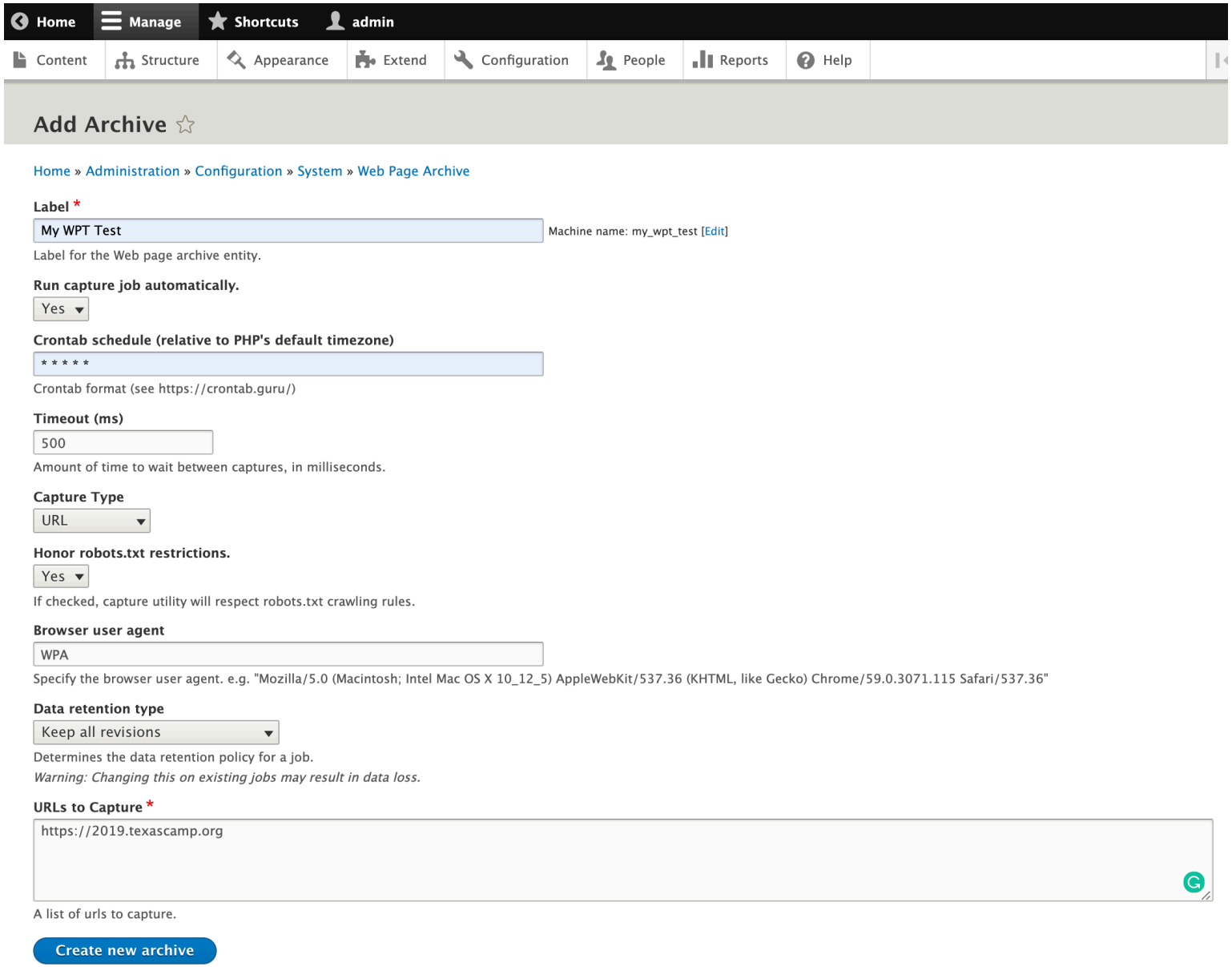
Getting Started

Create a new WPA capture job

- Fill out the job details and click “Create new archive”
  (NOTE: Only automatic jobs work currently – Drupal.org Issue #3088126)



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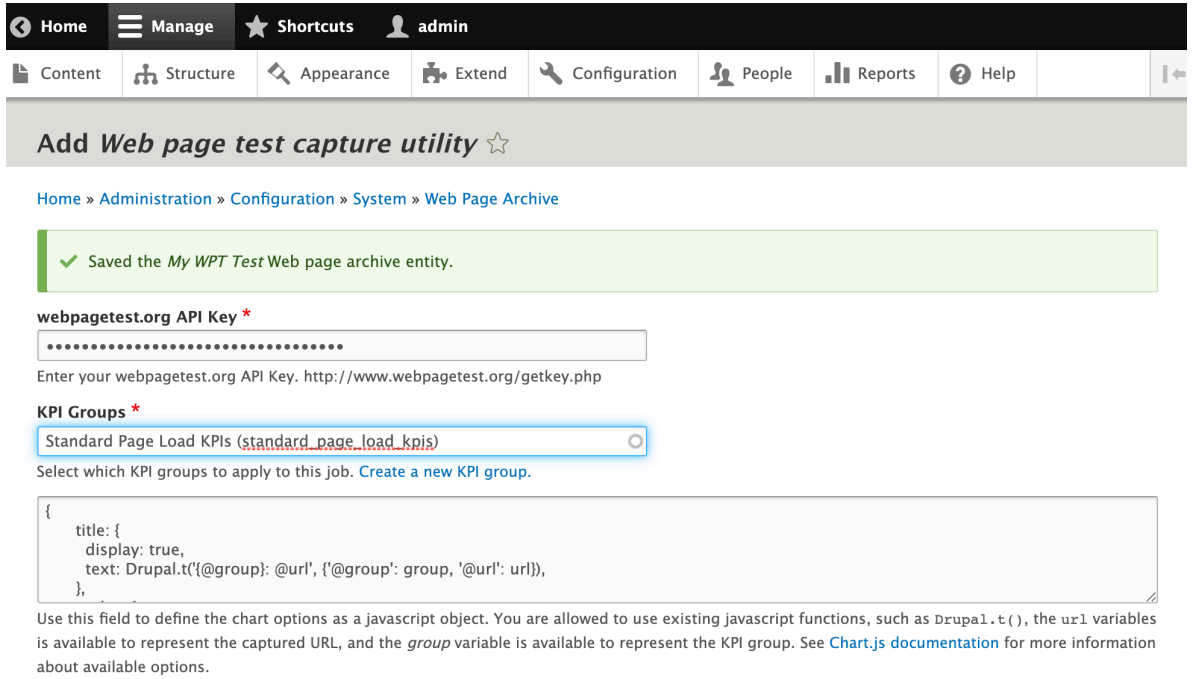
Configure the WPT Capture Utility

- Under “Capture Utility” at the bottom, select “Web page test capture utility”

- Add API key and specify the “Standard Page Load KPIs” KPI group, and leave the chart.js settings as-is.



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Getting Started

Trigger job on webpagetest.org and retrieve the results

- Run cron once to queue on the job (Note: ignore the “Failed to process” error)

```
[davi0040@local:[...ers/davi0040/tmp/pbdemo]$ drush cron
 [notice] Starting execution of comment_cron().
 [notice] Starting execution of dblog_cron(), execution of comment_cron() took 7.2ms.
 [notice] Starting execution of field_cron(), execution of dblog_cron() took 0.42ms.
 [notice] Starting execution of file_cron(), execution of field_cron() took 0.98ms.
 [notice] Starting execution of history_cron(), execution of file_cron() took 33.78ms.
 [notice] Starting execution of node_cron(), execution of history_cron() took 0.93ms.
 [notice] Starting execution of search_cron(), execution of node_cron() took 10.22ms.
 [notice] Starting execution of system_cron(), execution of search_cron() took 12.89ms.
 [notice] Starting execution of update_cron(), execution of system_cron() took 7.77ms.
 [notice] Starting execution of web_page_archive_cron(), execution of update_cron() took 979.61ms.
 [notice] Deleted directory: public://web-page-archive/pb_wpt_capture/wpt_test
 [notice] Execution of web_page_archive_cron() took 955.73ms.
 [notice] Cron run completed.
 [error]  Message: Failed to process 0 URLs.

 [notice] Message: The capture has been completed.

[davi0040@local:[...ers/davi0040/tmp/pbdemo]$ echo $?
0
```

- Wait ~5 minutes for webpagetest.org to finish processing and run cron again

```
[davi0040@local:[...ers/davi0040/tmp/pbdemo]$ drush cron
 [notice] Starting execution of comment_cron().
 [notice] Starting execution of dblog_cron(), execution of comment_cron() took 3.78ms.
 [notice] Starting execution of field_cron(), execution of dblog_cron() took 0.56ms.
 [notice] Starting execution of file_cron(), execution of field_cron() took 0.78ms.
 [notice] Starting execution of history_cron(), execution of file_cron() took 14.76ms.
 [notice] Starting execution of node_cron(), execution of history_cron() took 0.44ms.
 [notice] Starting execution of search_cron(), execution of node_cron() took 5.86ms.
 [notice] Starting execution of system_cron(), execution of search_cron() took 6.77ms.
 [notice] Starting execution of update_cron(), execution of system_cron() took 6.99ms.
 [notice] Starting execution of web_page_archive_cron(), execution of update_cron() took 13.91ms.
 [notice] Execution of web_page_archive_cron() took 10471.26ms.
 [notice] Cron run completed.
 [notice] Message: Processed 1 URLs.

 [notice] Message: The capture has been completed.
```

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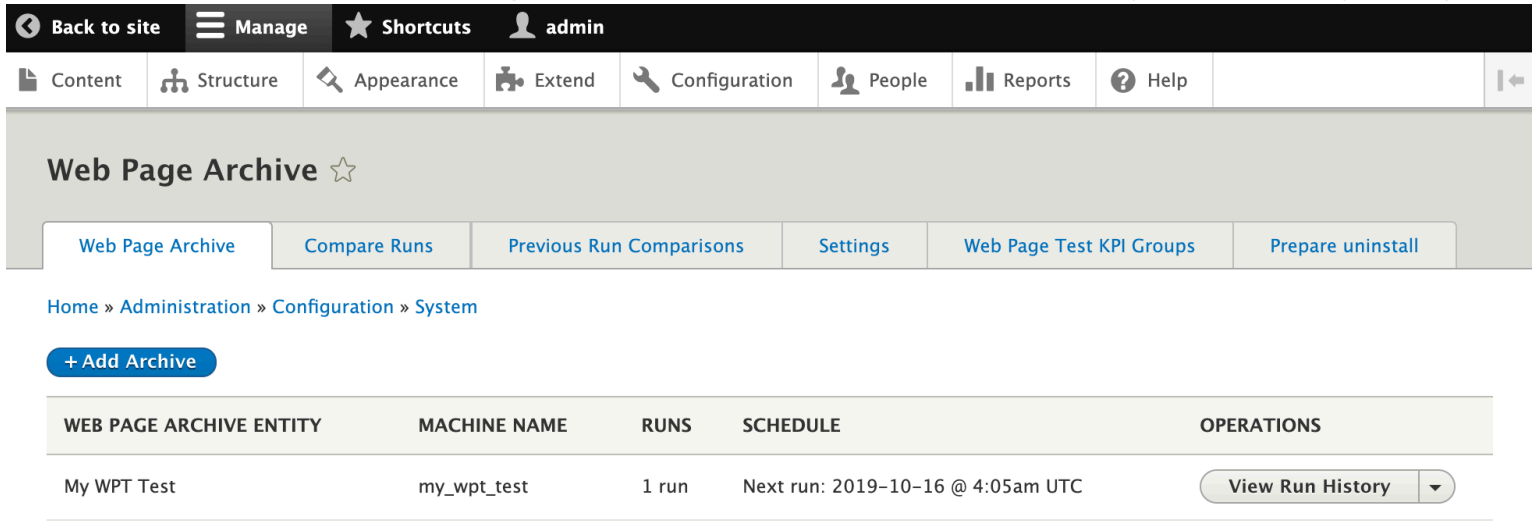
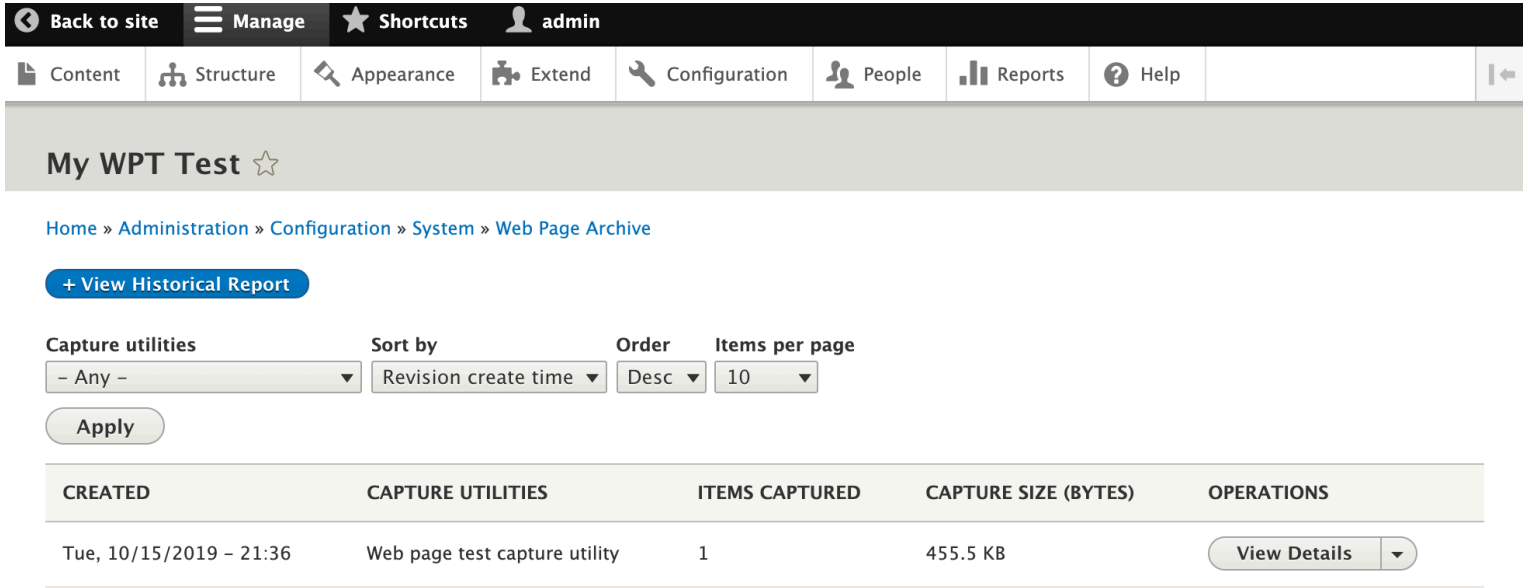
Getting Started

View Run Results

- Return to main WPA page and click “View Run History” next to your job



- Click “View Details” see details about the particular run



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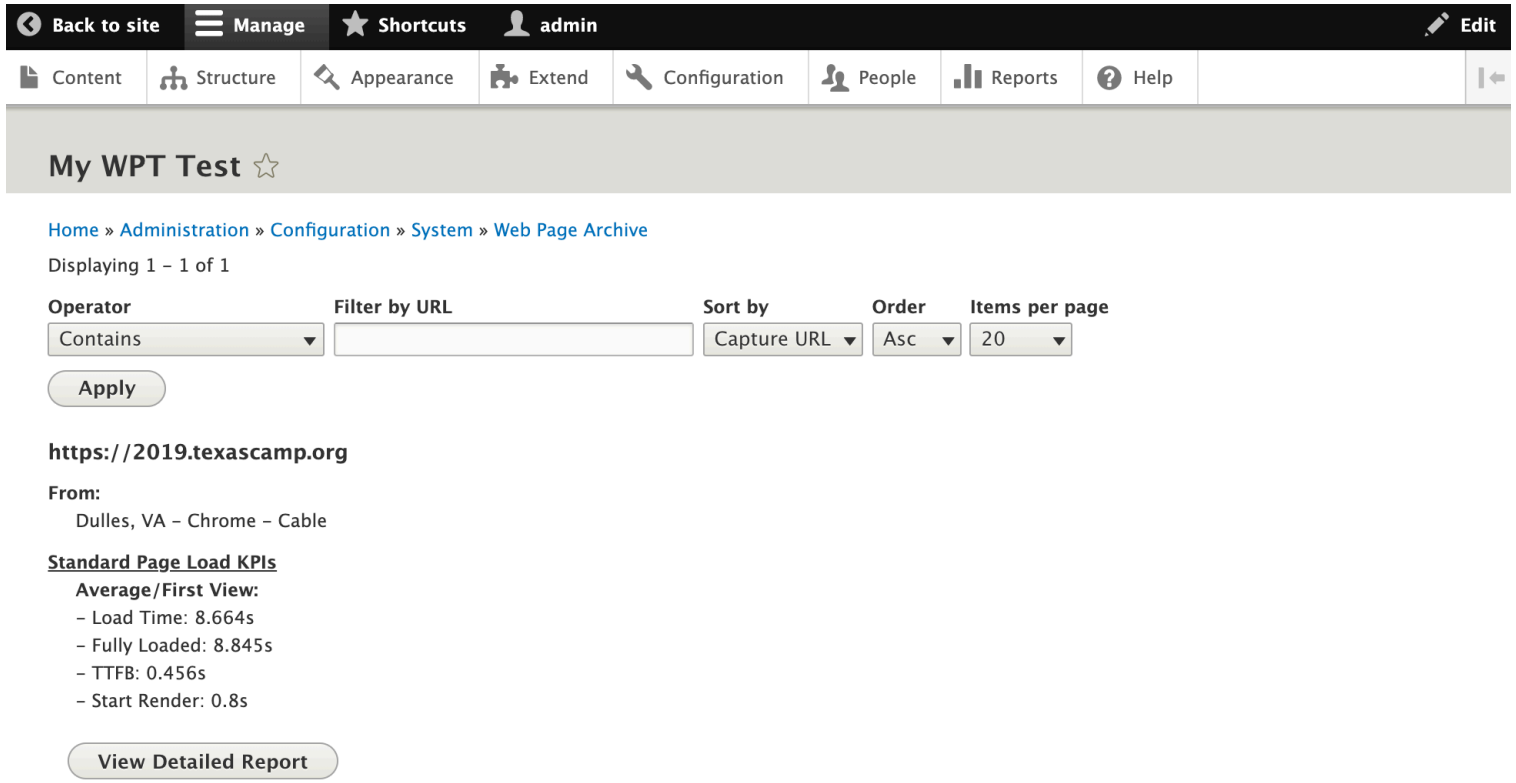
Getting Started

Report Summary

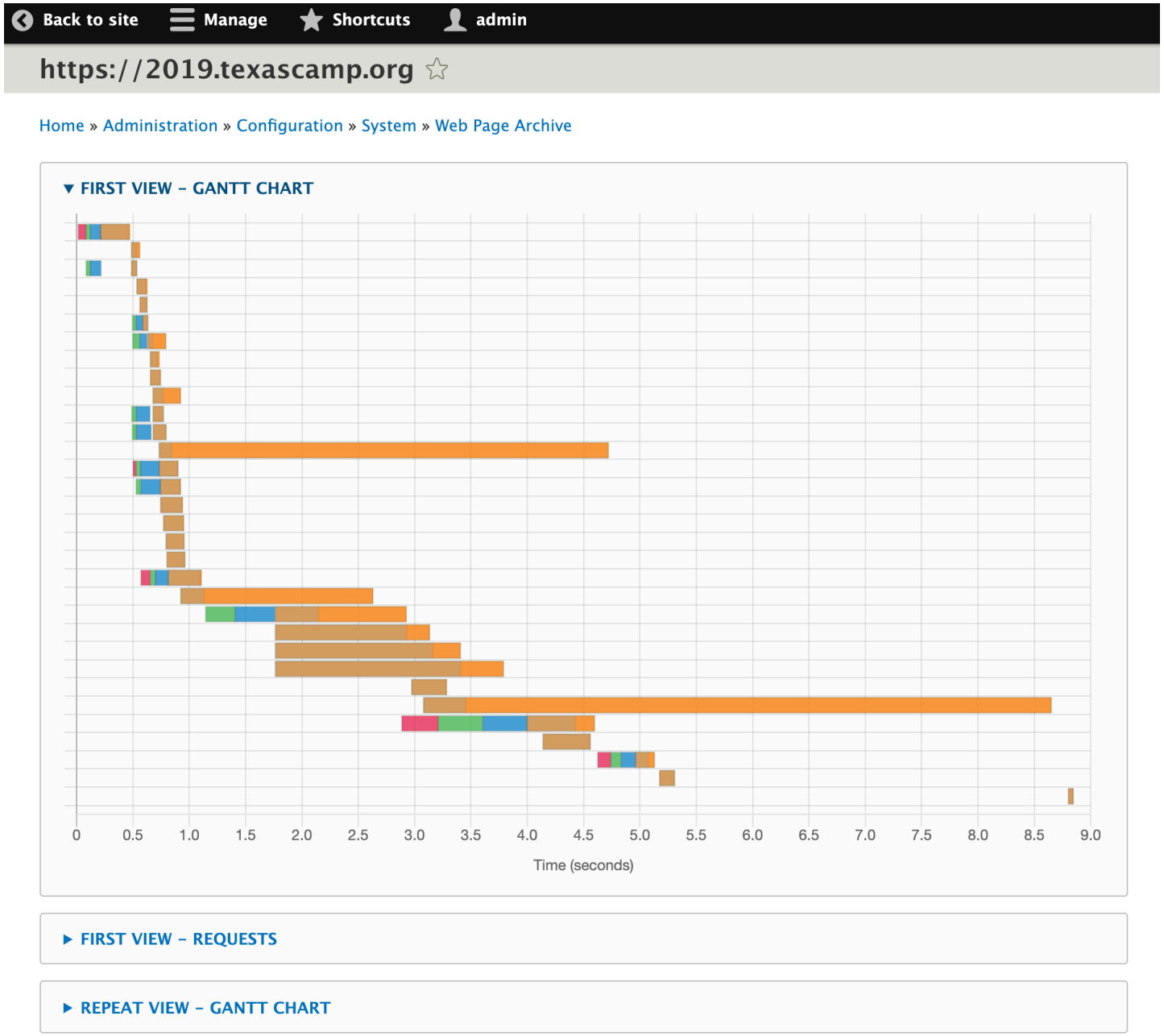
- View report summary or click “View Detailed Report” for more information



Getting Started

Detailed Report

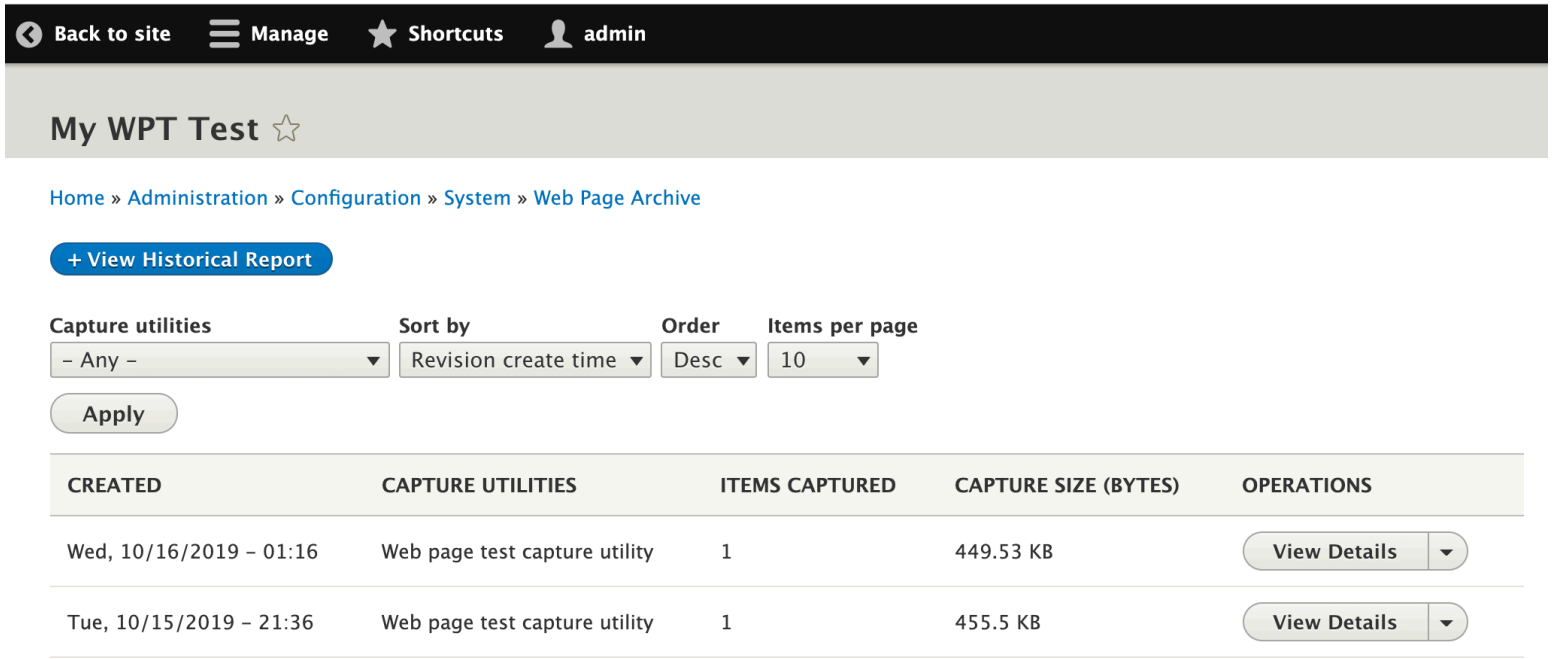
- Expand and Collapse various sections to investigate further.



Getting Started

Navigate to the Historical Report

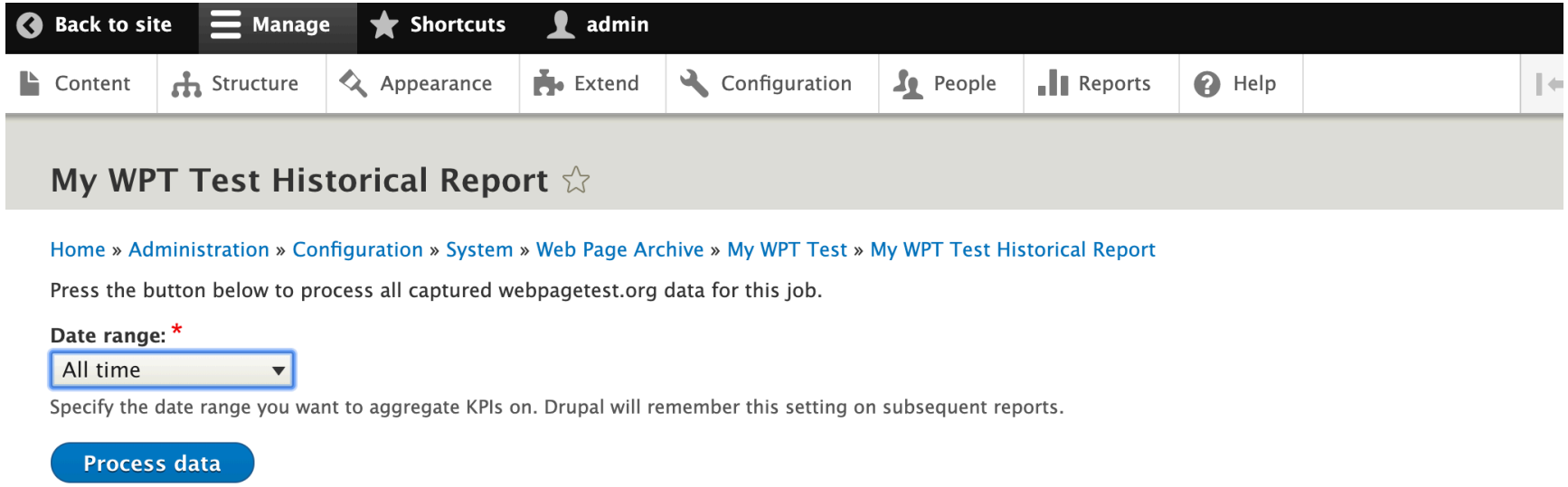
- Rerun cron a few more times to generate additional results then return to the run history page, and click “+ View Historical Report”



Getting Started

Generate the initial historical report

- If it's your first time viewing it, you will need to generate a historical report by specifying a date range (this can be changed later)



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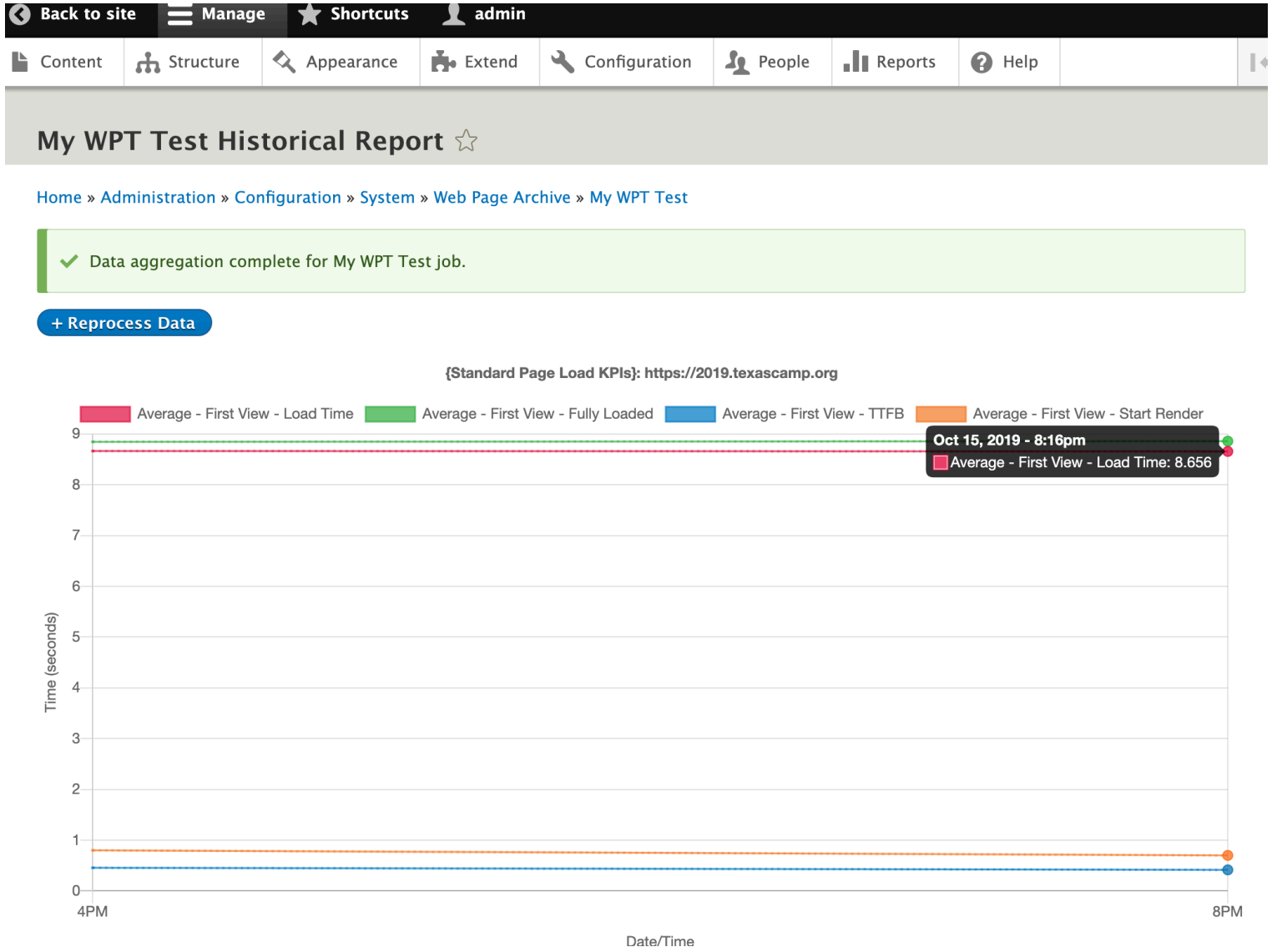
Getting Started

Use the historical report charts

- Move your cursor over the chart to identify individual run information and click if you want to see more detailed run results.



Getting Started

Use the historical report request summary

- Additionally, you can expand and collapse request summary data, which is grouped by hostname.

▼ FIRST VIEW – REQUEST SUMMARY

REQUESTED URL	FIRST TIME CAPTURED	LAST TIME CAPTURED	TOTAL REQUESTS MADE	AVERAGE LOAD TIME
https://www.googletagmanager.com	10/15/2019 – 21:36	10/16/2019 – 01:16	2	1.515s
https://use.typekit.net	10/15/2019 – 21:36	10/16/2019 – 01:16	10	1.380s
https://2019.texascamp.org	10/15/2019 – 21:36	10/16/2019 – 01:16	42	0.680s
https://backend2019.texascamp.org	10/15/2019 – 21:36	10/16/2019 – 01:16	4	0.519s
https://p.typekit.net	10/15/2019 – 21:36	10/16/2019 – 01:16	2	0.354s
https://www.google-analytics.com	10/15/2019 – 21:36	10/16/2019 – 01:16	4	0.342s

▼ REPEAT VIEW – REQUEST SUMMARY

REQUESTED URL	FIRST TIME CAPTURED	LAST TIME CAPTURED	TOTAL REQUESTS MADE	AVERAGE LOAD TIME
https://2019.texascamp.org	10/15/2019 – 21:36	10/16/2019 – 01:16	2	0.351s
https://p.typekit.net	10/15/2019 – 21:36	10/16/2019 – 01:16	2	0.167s
https://www.google-analytics.com	10/15/2019 – 21:36	10/16/2019 – 01:16	3	0.112s

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Help Wanted

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Help Wanted

Ways you can help

1. Test the module
2. Report bugs
3. Become a case study
4. Work on issues
5. Write documentation
6. Review the code
   - Performance reviews
   - Security reviews
   - Drupal best practice reviews
7. Drupal 9 preparations and testing

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Resources

List of helpful resources related to this training

- **Learning resources**
  - 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
- **Performance Tools**
  - Google Chrome Developer Tools – https://developers.google.com/web/tools/chrome-devtools/network
  - WebPageTest.org – https://webpagetest.org/
  - Google PageSpeed Insights – https://developers.google.com/speed/pagespeed/insights/
  - Google Mobile Speed Report – https://www.thinkwithgoogle.com/feature/testmysite/
  - Gtmetrix – https://gtmetrix.com
- **Drupal Modules**
  - Performance Budget – https://www.drupal.org/project/performance_budget
  - Web Page Archive – https://www.drupal.org/project/web_page_archive
  - Resource Hints – https://www.drupal.org/project/resource_hints

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Thank You

https://www.drupal.org/project/performance_budget

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