

Monitor Single-Page Applications

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Browser RUM's single-page application (SPA) monitoring enables you to:

- Monitor the performance/throughput of user experiences of SPAs.
- Troubleshoot and resolve SPA problems within the context of the page load.
- Assist with business decisions by analyzing SPA data through analytics.
- Enable developers to quickly ship better web applications to the marketplace.

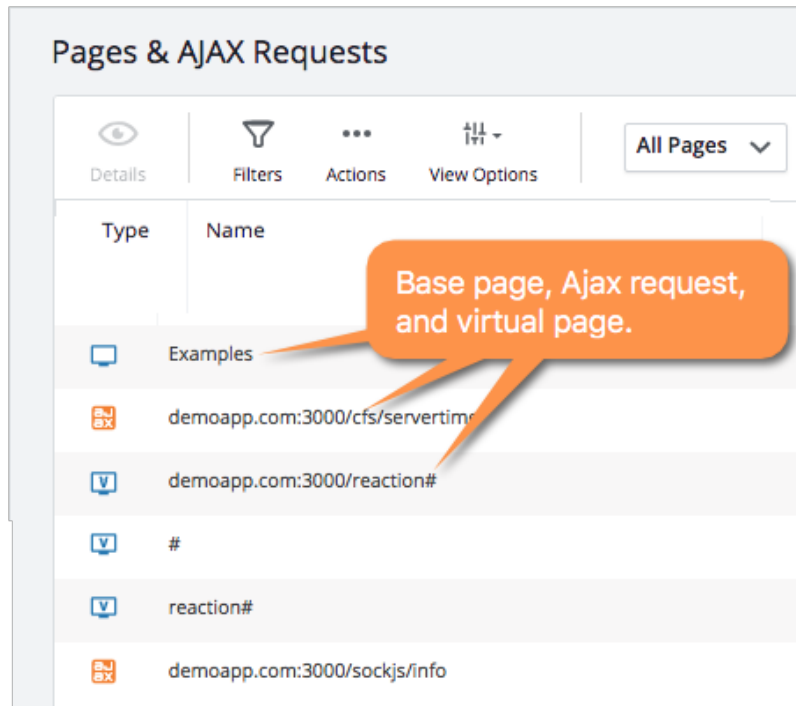
What Is SPA?

A single-page application (SPA) is a web technology and design paradigm that reduces browser-level page loads by using JavaScript to fetch resources and build pages. This creates a smoother, faster user experience more similar to a desktop or mobile application than a traditional web page. [React](#) and [Angular](#) are two popular JavaScript frameworks used to create SPAs.

Base Pages vs. Virtual Pages

When a user navigates to an SPA, the initial page download is considered the "base page". The base page includes the HTML skeleton, the core CSS, and the JavaScript framework for fetching and constructing new content. The ensuing pages are constructed from resources downloaded with the base page or fetched dynamically from the backend in response to user interaction. This new content (or views) constructed from different sources by the SPA are called "virtual pages".

For SPAs, you will have base pages, virtual pages, and Ajax requests. From **Pages & AJAX Requests**, you are able to view all three types and details for each as shown below.



SPA1 and SPA2 Monitoring

Until 4.4.3, Browser RUM only provided auto-instrumentation for AngularJS 1 SPA applications. For other frameworks, you had to manually report events with the JavaScript Agent API. This limited auto-instrumentation for SPA is known as *SPA1 monitoring*.

From 4.4.3 and later, Browser RUM supports auto-instrumentation for all SPA frameworks and has been certified to correctly auto-instrument Angular 1-5 and React SPAs. This support for the auto-instrumentation for all SPA frameworks is known as *SPA2 monitoring*.

The table below describes the support for SPA1 and SPA2 monitoring:

SPA Monitoring Version	Auto-Instrumentation	Metrics	JavaScript API
SPA1	AngularJS 1 only	<ul style="list-style-type: none"> • Base / Virtual Pages: Browser RUM page timing metrics • Ajax Requests: All available Ajax metrics 	Yes
SPA2	All SPA frameworks. Auto-instrumentation is certified for Angular 1-5 and React.	<ul style="list-style-type: none"> • Base pages: Browser RUM page timing metrics • Virtual Pages: End User Response Time (EURT) • Ajax Requests: All available Ajax metrics 	Yes

Which SPA Monitoring to Use?

In general, you are highly recommended to use SPA2 monitoring. For most applications, the JavaScript Agent using SPA2 monitoring identifies the SPA transitions deterministically and captures the metrics and resources correctly without you having to write any special configuration or call methods from the JavaScript Agent API. If your SPA applications are built with AngularJS 1, you can simply add some configuration to enable auto-instrumentation.

Only use SPA1 monitoring if you are using AngularJS 1 and require Browser RUM page timing metrics for virtual pages.

View SPA2 Monitoring Data

You can view end user response time (EURT) for SPAs in many places in the Controller. The EURT measures the time from when the user navigates to a virtual page until all resources are downloaded for the page. To learn how the EURT is calculated, see [How the End-User Response Time Is Measured](#).

Browser Snapshots

The **Browser Snapshots** tab displays a list of different types of pages as shown below. You can view the EURT for all the pages and other metrics for base pages and Ajax requests.

Time ↓	End User Response Time (ms)	First Byte Average Time (ms)	Front End Average Time (ms)	Resource Fetch Average Time (ms)	URL	Page, AJAX Request, IFrame, or Virtual Page	Page Type
09/05/18 3:40:02 PM	6				http://demo-react-app.com:3000/		Virtual Page
09/05/18 3:39:25 PM	6				http://demo-react-app.com:3000/reaction/product/example-productS...	reaction#	Virtual Page
09/05/18 3:39:09 PM	6				http://demo-react-app.com:3000/		Virtual Page
09/05/18 3:38:52 PM	191				http://demo-react-app.com:3000/		Virtual Page
09/05/18 3:38:05 PM	8				http://demo-react-app.com:3000/reaction/product/example-productS...	reaction#	Virtual Page
09/05/18 3:37:50 PM	5				http://demo-react-app.com:3000/reaction/tag/shop	reaction#	Virtual Page
09/05/18 3:37:48 PM					http://demo-react-app.com:3000/reaction/notifications	reaction#	Virtual Page
09/05/18 3:37:25 PM	309				http://demo-react-app.com:3000/		Virtual Page
09/05/18 3:36:45 PM	11				http://demo-react-app.com:3000/reaction/tag/shop	reaction#	Virtual Page
09/05/18 3:36:45 PM	3,544	21	3,523	23	http://demo-react-app.com:3000/resources/adrum-xd.64575a4f0ccc4...	demo-react-app.com:3000/resources	IFrame
09/05/18 3:36:45 PM	704	699			http://demo-react-app.com:3000/cfs/servertime	demo-react-app.com:3000/cfs/servertime	AJAX
09/05/18 3:36:45 PM	271	265			http://demo-react-app.com:3000/sockjs/info?cb=zujn0conv_	demo-react-app.com:3000/sockjs/info	AJAX
09/05/18 3:36:45 PM	405				http://demo-react-app.com:3000/resources/adrum-xd.64575a4f0ccc4...	resources#	Virtual Page
09/05/18 3:36:40 PM	10,457	5,834	4,623	116	http://demo-react-app.com:3000/	demo-react-app.com:3000	Base Page
09/05/18 3:36:40 PM	1,930				http://demo-react-app.com:3000/		Virtual Page

Snapshot Details: Summary





To get to the **Snapshot Details** dialog shown below, you double-click one of the browser snapshots in the **Browser Snapshots** page. The **Summary** tab is the default tab for the dialog, and it gives some additional information such as the parent page URL.

 reaction#

[Generate a Synthetic Snapshot](#) [View Session](#)

Real User Snapshot

Details

User Experience	✔ Normal
Time	09/05/18 3:39:25 PM
End User Response Time (ms)	6 ms
Application Server Time	0 ms
Name	 reaction#
URL	http://demo-react-app.com:3000/reaction/product/example-product/SMr4rhDFnYvFMtDTX
Base Page	 demo-react-app.com:3000
Base Page URL	http://demo-react-app.com:3000/
Parent Page	 demo-react-app.com:3000
Parent Page URL	http://demo-react-app.com:3000/
<hr/>	
IP Address	
Page Referrer	
<hr/>	
Browser	Chrome 68
Device	Computer
OS	Mac
<hr/>	
Country	United States
State / Region	California
City	San Francisco
<hr/>	
Base Request	 demo-react-app.com:3000
Client Request GUID	b5645fb1_db65_22d4_e24d_6faba7f20081

Snapshot Details: Resource Details

The **Resource Details** tab shown below provides details about resources such as the number and type of resources, the domains where the resources were requested, and resource load times.

📄 reaction#

Generate a Synthetic Snapshot

View Session

TOTAL # OF RESOURCES

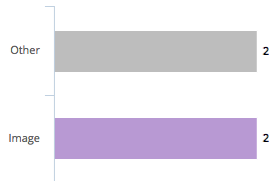
4 Resources

AVERAGE RESOURCE DURATION

1470 ms

Real User Snapshot

Resources By Type



Domains Requested



[See Details](#)

Resource Waterfall

All Types

🔍

Showing 4 of 4 Resources

First Byte Time (-1 ms) DOM Ready Time (-1 ms) Load Event (6 ms)

Resource	Domain	Type	Durati...	Timeline ↑
SMr4rhDFnyVfMtDTX	demo-react-app.com:3000	Other	5840 ms	
adrum	shadow-master-eum-c...	Other	33 ms	
favicon-32x32.png	assets.reactioncomme...	Image	5 ms	
favicon-16x16.png	assets.reactioncomme...	Image	3 ms	

Domains Requested

Name	# ↓	Total Time (ms)	Average Time (ms)	DNS (ms)
assets.reactioncommerce.com	2	8	4	
eum-col.appdynamics.com	1	33	33	
demo-react-app.com:3000	1	5,840	5,840	0

Pages & AJAX Requests

The **Pages & AJAX Requests** page as shown below enables you to view the number of requests for each type of page and the average metrics per page. You can also select which page types to view, such as virtual pages.

Pages & AJAX Requests 🔄 last 1 hour 📄 ?

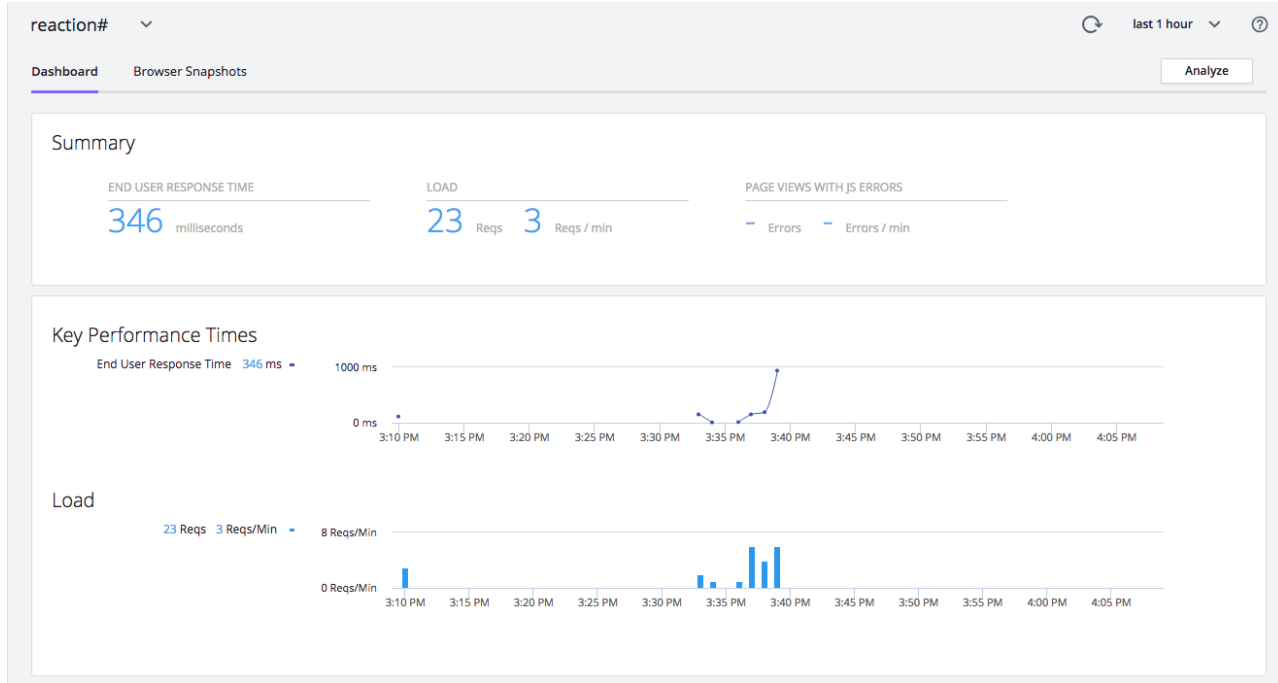
👁️ Details | 🎯 Filters | ⋮ Actions | 📄 View Options | All Pages | 🔍

Showing 7 of 10

Type	Name	Requests ↓	Requests per Minute	End User Response Time (ms)	DOM Ready Time (ms)	First Byte Time (ms)	Page views with JavaScript Errors
📄	demo-react-app.com:3000/sockjs/info	48	5	21	-	20	0
📄	reaction#	24	3	332	-	-	0
📄	#	9	1	275	-	-	0
📄	demo-react-app.com:3000/cfs/servertime	3	3	323	-	321	0
📄	resources#	2	2	454	-	-	0
📄	demo-react-app.com:3000/resources	2	2	3,288	3,258	75	0
📄	demo-react-app.com:3000	1	1	10,45	10,341	5,834	0

Page, Ajax, and Iframe Dashboards

From the **Pages & AJAX Requests** page, you can double-click a page to view the **Page and IFrame Dashboards**. Dashboards for each page type will have a **Summary** section displaying the average metrics as well as a **Key Performance Times** section showing the requests and the metrics on a timeline.

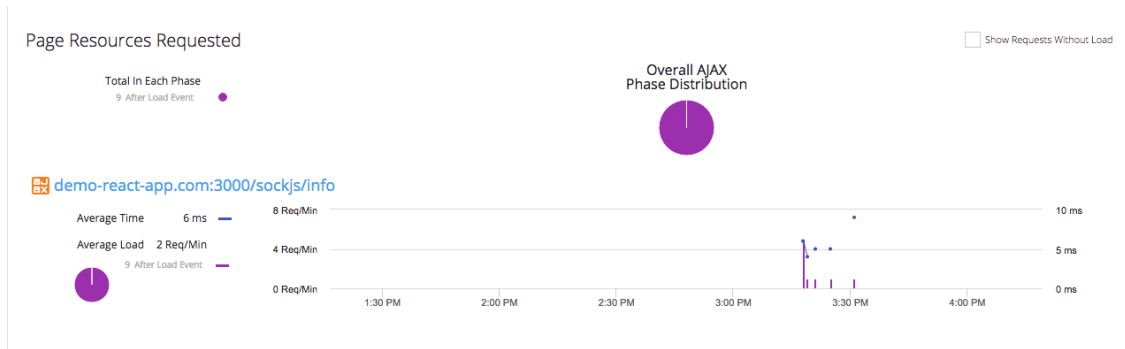


The tabs below show the differences in the dashboard for each page type.



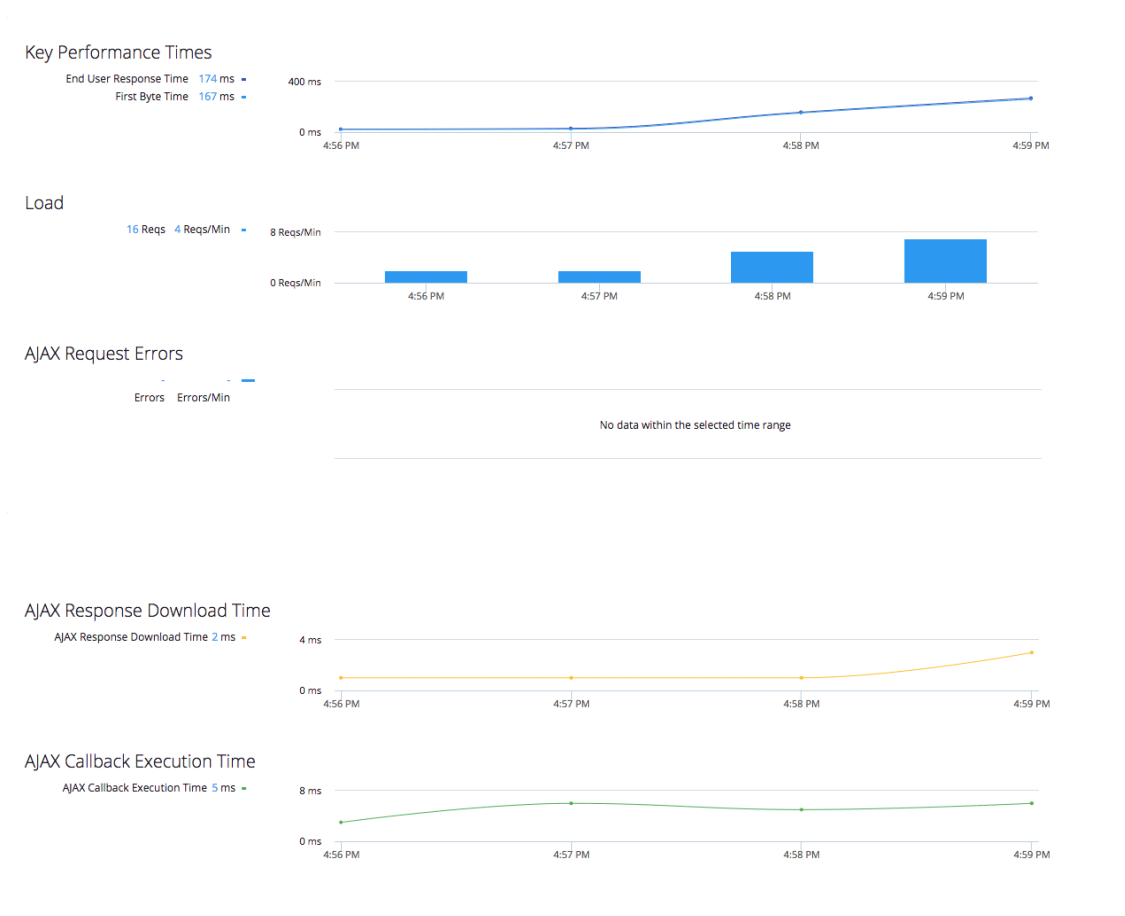
Virtual Pages

Virtual pages provide the resources requested.



AJAX Requests

Ajax Requests include a more limited set of timing metrics as well as Ajax-specific section for the **AJAX Response Download Time** and the **AJAX Callback Execution Time**.



Browser Analyze

From **Browser Analyze**, you can filter by criteria, such as page types shown in the screenshot below, and configure the fields you want to view.

The screenshot displays the 'Analyze' interface with a chart at the top and a table of performance metrics below. The chart shows data points over time from 4:00 PM to 5:10 PM. The table lists various performance metrics with columns for Timestamp, Page Experience, Parent Page URL, Page Type, Page Name, and End User Response Time (ms).

	Timestamp	Page Experience	Parent Page URL	Page Type	Page Name	End User Response Time (ms)
<input type="checkbox"/> # Application Server Time (...)	09/05/18 5:02:33 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	979
<input type="checkbox"/> # Browser Queue Time (ms)	09/05/18 5:02:33 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	1,573
<input type="checkbox"/> # Digest Cycles	09/05/18 5:02:14 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	6,131
<input type="checkbox"/> # DOM Building Time (ms)	09/05/18 5:02:14 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	6,131
<input type="checkbox"/> # DOM Ready Time (ms)	09/05/18 5:02:13 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	5,722
<input type="checkbox"/> # Domain Lookup Time (ms)	09/05/18 5:02:13 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	5,722
<input checked="" type="checkbox"/> # End User Response Time (...)	09/05/18 5:02:01 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	11,694
<input type="checkbox"/> # Estimated BT Time	09/05/18 5:02:01 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	11,694
<input type="checkbox"/> # First Byte Time (ms)	09/05/18 5:01:56 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	6,299
<input type="checkbox"/> # Front End Time (ms)	09/05/18 5:01:39 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	21,140
<input type="checkbox"/> # HTML Download and DO...	09/05/18 5:01:39 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	21,140
<input type="checkbox"/> # HTML Download Time (ms)	09/05/18 5:01:32 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	687
<input type="checkbox"/> # Images Loaded per Pagevi...	09/05/18 5:01:32 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	687
<input type="checkbox"/> # Resource Fetch Time (ms)	09/05/18 5:01:27 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	10,629
<input type="checkbox"/> # Resources Loaded per Pag...	09/05/18 5:01:27 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	10,629
<input type="checkbox"/> # Response Available Time (...)	09/05/18 5:01:26 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	2,474
<input type="checkbox"/> # Scripts Loaded per Pagevi...	09/05/18 5:01:19 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	resources#	673
<input type="checkbox"/> # Server Connection Time (...)	09/05/18 5:01:19 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	7,550
<input type="checkbox"/> # SSL Handshake Time (ms)	09/05/18 5:01:19 PM	✓	http://demo-react-app.com:3000/resources/adrum- xd.64575a4f0ccc435ef3de4778c280c647.html	📄	demo-react- app.com:3000/resources	7,550