

Experimenting with First Input Delay in the Chrome UX Report



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The goal of the [Chrome User Experience Report](#) is to help the web community understand the distribution and evolution of real user performance. To date, our focus has been on paint and page load metrics like First Contentful Paint (FCP) and Onload (OL), which have helped us understand how websites *visually* perform for users. Starting with the June 2018 release, we're experimenting with a new user-centric metric that focuses on the *interactivity* of web pages: [First Input Delay](#) (FID). This new metric will enable us to better understand how responsive websites are to user input.

FID was recently made available in Chrome as an [origin trial](#), which means that websites can opt into experimenting with this new web platform feature. Similarly, FID will be available in the Chrome UX Report as an *experimental* metric, which means it will be available for the duration of the origin trial within a separate "experimental" namespace.

How FID is measured

So what exactly is FID? Here's how it's defined in the [First Input Delay](#) announcement blog post:

First Input Delay (FID) measures the time from when a user first interacts with your site (i.e. when they click a link, tap on a button, or use a custom, JavaScript-powered control) to the time when the browser is actually able to respond to that interaction.

Animation showing how a busy main thread delays the response to a user interaction.

It's like measuring the time from ringing someone's doorbell to them answering the door. If it takes a long time, there could be many reasons. For example, maybe the person is far away from the door or maybe they cannot move quickly. Similarly, web pages may be busy doing other work or the user's device may be slow.

Exploring FID in the Chrome UX Report

With one month of FID data from millions of origins, there is already a wealth of interesting insights to be discovered. Let's look at a few queries that demonstrate how to extract these insights from the Chrome UX Report on BigQuery.

Let's start by querying for the percent of fast FID experiences for developers.google.com. We can define a fast experience as one in which FID is less than 100 ms. Per [RAIL recommendations](#), if the delay is 100 ms or better, it should feel instantaneous to the user.

```
SELECT
  ROUND(SUM(IF(fid.start < 100, fid.density, 0)), 4) AS fast_fid
FROM
  `chrome-ux-report.all.201806`,
  UNNEST(experimental.first_input_delay.histogram.bin) AS fid
WHERE
  origin = 'https://developers.google.com'
```



The results show that 95% of FID experiences on this origin are perceived as instantaneous. That seems really good, but how does it compare to all origins in the dataset?

```
SELECT
  ROUND(SUM(IF(fid.start < 100, fid.density, 0)) / SUM(fid.density), 4) AS fast_f
FROM
  `chrome-ux-report.all.201806`,
  UNNEST(experimental.first_input_delay.histogram.bin) AS fid
```



The results of this query show that 84% of FID experiences are less than 100 ms. So developers.google.com is above average.

Note: This is also your periodic reminder that origin popularity is not represented anywhere in the dataset. So an origin that gets a few million instant FID experiences may have the same density as one that only gets a few hundred visitors with instant FID experiences.

Next, let's try slicing this data to see if there's a difference between the percent of fast FID on desktop versus mobile. One hypothesis is that mobile devices have slower FID values, possibly due to slower hardware compared to desktop computers. If the CPU is less powerful, it may be busier for a longer time and result in slower FID experiences.

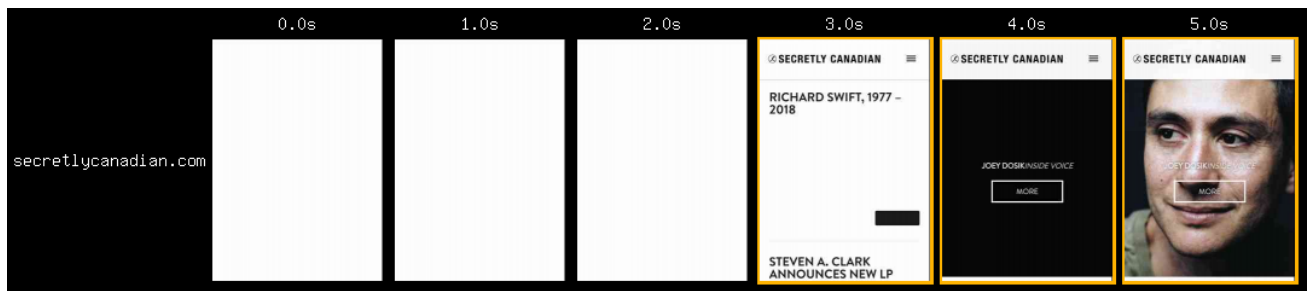
```
SELECT
  form_factor.name AS form_factor,
  ROUND(SUM(IF(fid.start < 100, fid.density, 0)) / SUM(fid.density), 4) AS fast_f
FROM
  `chrome-ux-report.all.201806`,
  UNNEST(experimental.first_input_delay.histogram.bin) AS fid
GROUP BY
  form_factor
```

form_factor	fast_fid
desktop	96.02%
phone	79.90%
tablet	76.48%

The results corroborate our hypothesis. Desktop has a higher cumulative density of fast FID experiences than phone and tablet form factors. Understanding *why* these differences exist, eg CPU performance, would require A/B testing outside the scope of the Chrome UX Report.

Now that we've seen how to identify whether an origin has fast FID experiences, let's take a look at a couple of origins that perform really well.

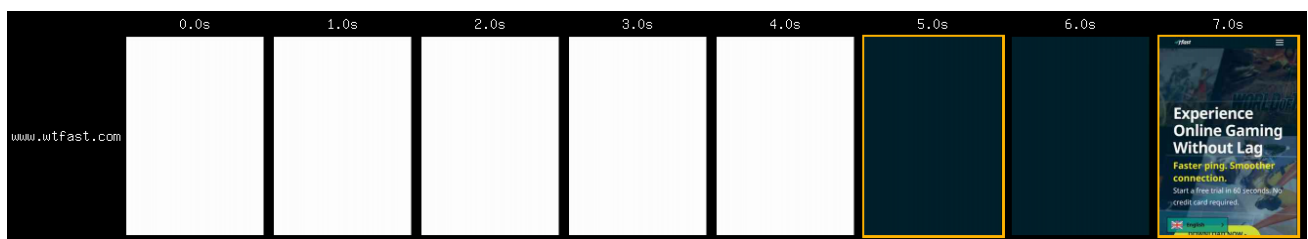
Example 1: <http://secretlycanadian.com>



This origin has 98% of FID experiences under 100 ms. How do they do it? Analyzing how it's built in [WebPageTest](#), we can see that it's quite an image-heavy WordPress page but it has 168 KB of JavaScript that executes in about 500 ms on our lab machine. This is not very much JavaScript according to the [HTTP Archive](#), which puts this page in the 28th percentile.

The pink bar spanning 2.7 to 3.0 seconds is the *Parse HTML* phase. During this time the page is not interactive and appears visually incomplete (see "3.0s" in the filmstrip above). After that, any long tasks that do need to be processed are broken up to ensure that the main thread stays quiescent. The pink lines on row 11 demonstrate how the JavaScript work is spread out in quick bursts.

Example 2: <https://www.wtfast.com>



This origin has 96% instant FID experiences. It loads 267 KB of JavaScript (38th percentile in HTTP Archive) and processes it for 900 ms on the lab machine. The filmstrip shows that the page takes about 5 seconds to paint the background and about 2 more seconds to paint the content.

What's most interesting about the [results](#) is that nothing interactive is even visible while the main thread is busy between 3 and 5 seconds. *It's actually the slowness of this page's FCP that improves the FID.* This is a good example of the importance of using many metrics to represent the user experience.

Start exploring

You can learn more about FID in this week's episode of *The State of the Web*:

Having FID available in the Chrome UX Report enables us to establish a baseline of interactivity experiences. Using this baseline, we can observe its change in future releases or benchmark individual origins. If you'd like to start collecting FID in your own site's field measurements, sign up for the origin trial by going to bit.ly/event-timing-ot and select the Event Timing feature. And of course, [start exploring](#) the dataset for interesting insights into the state of interactivity on the web. This is still an experimental metric, so please give us your feedback and share your analysis on the [Chrome UX Report discussion group](#) or [@ChromeUXReport](#) on Twitter.

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