Collection of use cases of performance.memory

Attention: public document

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Web developers, please add your use cases of the performance.memory API.

Use cases:

1. [Analysis] A web developer wants to collect and perform statistical analysis of memory usage data of the application. For example, check if memory usage correlates with business metrics.
   - Facebook: “*To make a case for prioritizing Facebook.com memory use, we measured the effect of memory-use fixes on user metrics with an A/B experiment. The ability to precisely quantify the correlation between reduced memory use and user metrics is important”*
   - YouTube: *"We have measured that there is a sensitivity to memory on certain device classes, especially on low memory devices such as phones and TVs. YouTube serves a lot of video, some of them at very high resolution. Understanding the effect of bumping up our memory usage vs. user experience helps us prioritize our work."*
   - <you>: *"your example"*
2. [Regression detection] A web developer wants to catch unexpected memory issues in new versions of the application. The memory issues include memory leaks, accidental allocations of large objects, unused objects, etc.
   - GSuite: *"We run continuous tests to alert on any changes in memory usage, and monitor memory metrics in production as an additional safety net. This can catch accidental large memory allocations or large memory leaks. Production tracking via performance.memory is more likely to catch leaks that only affect long-running pages or only appear in special circumstances."*

- Facebook: *"We measure memory use in automation but measurements from production are always needed since every user is in their own unique set of A/B experiments and takes very different paths through the code"*
- YouTube: *"As developers make changes to the codebase, we want to monitor the impact this has on memory usage across a set of different devices. This lets us know whether changes decrease or increase JavaScript memory usage which can help us catch regressions and quantify improvements. In addition the performance.memory API enables us to setup automated long-running endurance tests where we track memory usage over time in order for us to be able to identify memory leaks and other long term memory issues. Capturing this data in production for regression detection is important due to the long user sessions that we need to support as well as the diverse set of features and pages that users may navigate through that are hard to replicate in a clean room environment."*
- <you>: *"your example"*

3. [Feature launch] A web developer wants to measure memory impact of a new feature in an A/B experiment and verify that it is in line with expectations.
   - GSuite: *"New features and functionality may come at the cost of increased memory usage. When memory impact is expected, we generally evaluate memory usage during development to ensure we're not using more than necessary. However, our testing cannot possibly cover all cases and configurations. Production data from actual users ensure that we stay within expected memory increases, and that we can respond quickly to any unexpected events.*
     Additionally, we track memory usage for large-scale refactorings. As with features, we evaluate memory usage during development and through testing, but also monitor memory usage in production as these changes roll out to users."
   - YouTube: *"We would like to be able to attach memory usage statistics to feature experiments so that we can better understand the impact features have on memory, in the field. By including memory usage as an experiment metric we can use it to help identify and explain other metrics, for example if usage rates*

are lower and memory usage is higher, a plausible story is that users' devices are running out of memory."

   - <you>: *"your example"*

4. [Optimization] A web developer wants to understand the performance/memory trade-off of a new optimization in an A/B experiment. For example, check if a new cache increases the memory usage of the application by 1%, 10%, or 100%.
   - GSuite: *"A/B test in production for background syncing helped determine ideal number of messages to sync."*
   - <you>: *"your example"*
5. [Optimization] A web developer wants to find workflows in the application that lead to high memory usage and fix them. This includes finding memory leaks with unbounded memory usage growth over time.
   - GSuite: "*Analysis of the JS heap for large presentations revealed a few JS objects created per shape that aren't needed in all cases. This only stood out as significant memory usage for large presentations with many shapes. To track the impact of removing these unnecessary objects, this was rolled out as an A/B experiment to a fraction of users, and we were able to see a meaningful difference in reported performance.memory data in the average when filtered for particularly large presentations."*
   - Facebook: "*Being able to attribute large memory usage increases to specific short interactions would make it much easier to find leaks or badly tuned caches"*
   - YouTube: *"Metrics collection on highly aggregated way does not always yield the best results for debugging. Being able to associate a memory regression with a specific flow or piece of code is extremely valuable for developer productivity."*
   - <you>: *"your example"*
6. [Browser regression detection] A web developer wants to catch and report browser changes that negatively impact their application.
   - GSuite: *"Google internal site isolation roll-out exposed poor heuristic for process spawning in Chrome 63."*
   - GSuite: *"Chrome 44 shipped with a V8 garbage collection problem for background tabs. Investigation on the Chrome side was triggered by Gmail observing increased memory usage in their production tracking."*

  - YouTube: *"Our application uses a lot of native APIs due to video serving, understanding how a new browser may affect memory usage can help us identify and tune our video serving strategy."*
  - <you>: *"your example"*

References:

- GSuite performance.memory perspective