Benchmarks, metrics, tools @ PLDI 2019

Ulan Degenbaev, ulan@google.com

Agenda

- Benchmarks
  - Catapult/Telemetry performance testing framework
  - Recording web page interaction
  - Replaying web page interaction

- Traces and Metrics
  - Trace events
  - Recording trace
  - Defining metric

- Tools
  - DevTools
  - Built-in tools

Google

Benchmarks
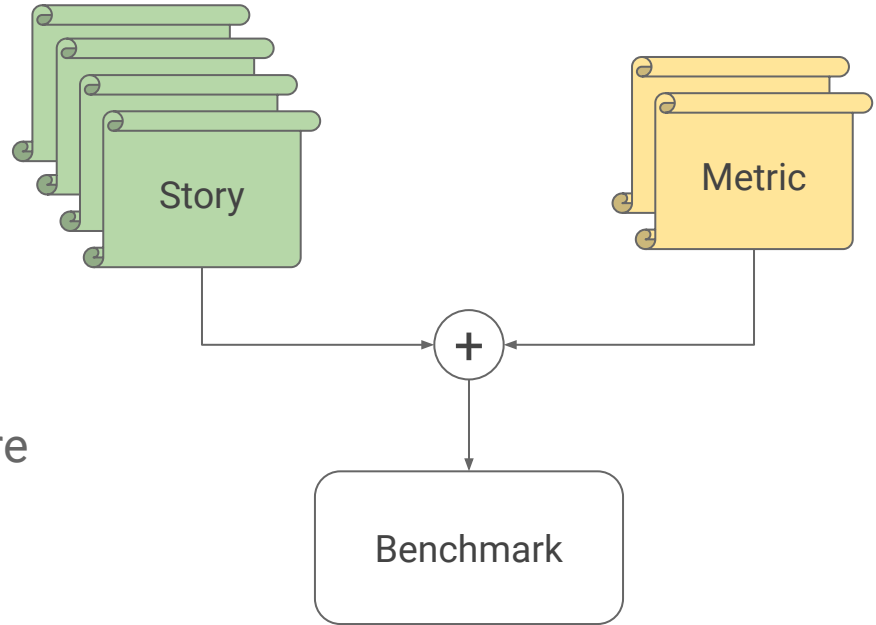
Catapult/Telemetry

Chrome's performance testing framework

- Perform arbitrary interactions on a web page

- Record and replay interactions

- Report metrics about it

- Source:

  - https://github.com/catapult-project/catapult/tree/master/telemetry

  - https://cs.chromium.org/chromium/tools/perf
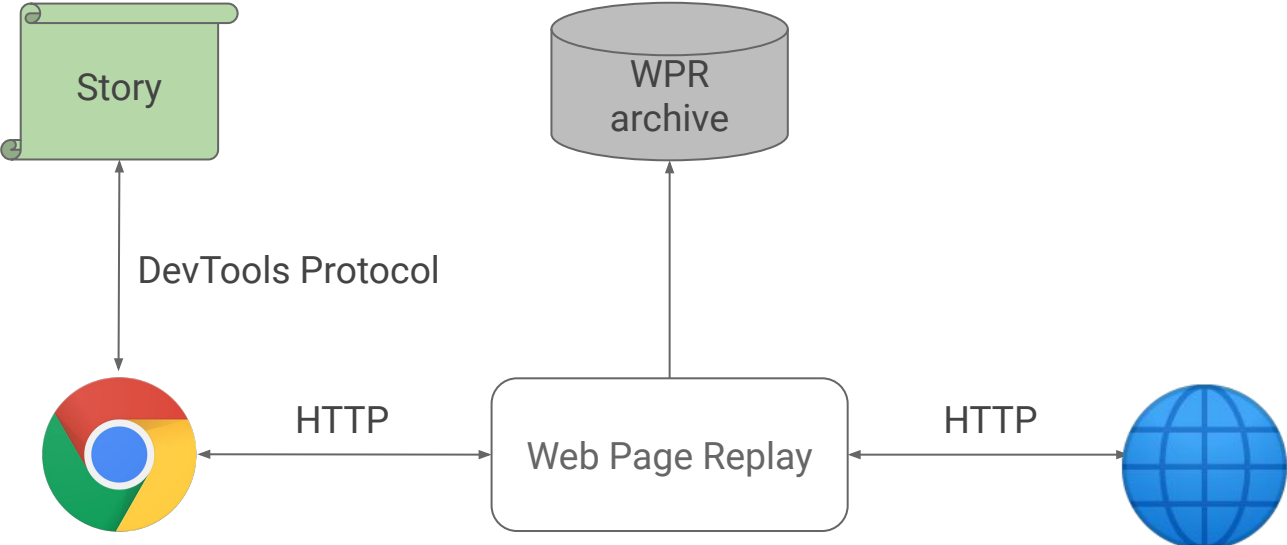
Creating a benchmark

1. Write a script to interact with a web page via Chrome DevTools protocol:
    - Navigate URL,
    - Wait for event / condition,
    - Click on a DOM element,
    - Enter text,
    - Scroll

2. Record HTTP(S) responses using Web-Page-Replay tool

3. Run Chrome with recorded archive and collect traces

4. Run metrics on traces to get scores:
    - Memory footprint
    - GC latency
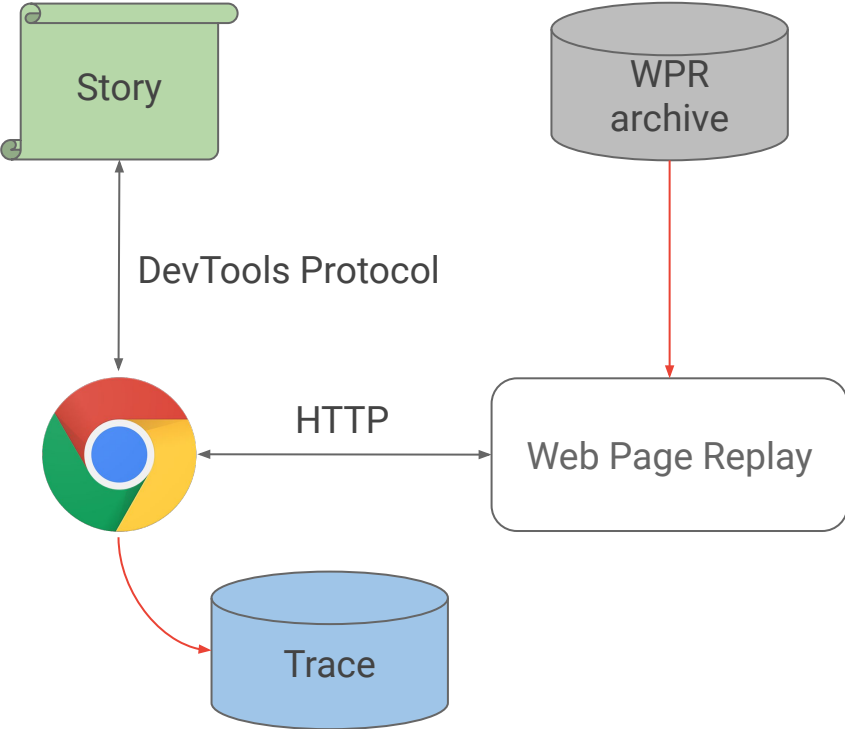   - Parsing time

Google

Creating a benchmark

- Benchmark:
  - set of stories
  - set of metrics

- Story is a script that drives Chrome to interact with a web page

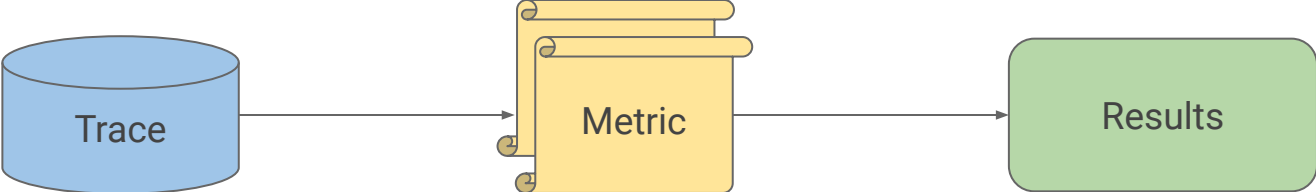- Metric is a script that computes score from a trace

Story

Metric

+

Benchmark

Google

Recording

Story

WPR archive

DevTools Protocol

HTTP

Web Page Replay

HTTP

Replaying

Demo

Where to find code in Chromium

- Benchmarks definitions: src/tools/perf/benchmarks
- Story definitions: src/tools/perf/page_sets
- Metric definitions: src/third_party/catapult/tracing/tracing/metrics
- Web Page Replay: src/third_party/catapult/web_page_replay_go
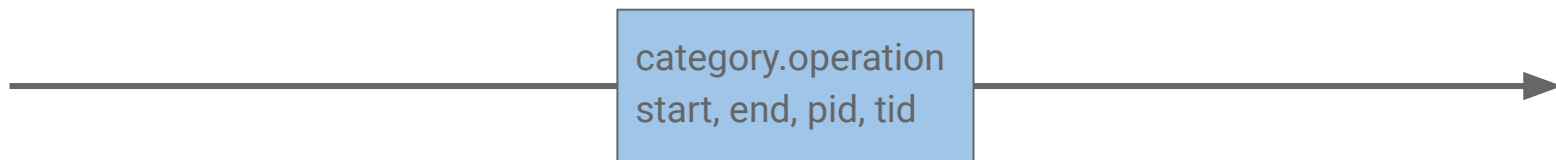
Traces and Metrics

Benchmark results

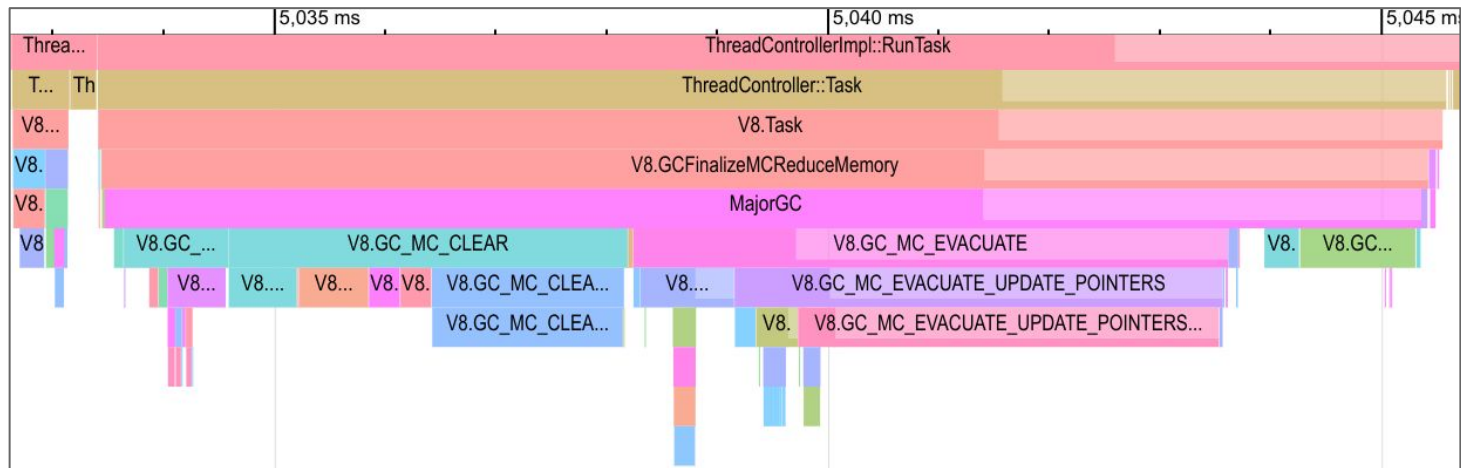Google

Trace events

In source code:

```
{
    TRACE_EVENT0("category", "operation");
    <operation>
}
```


category.operation
start, end, pid, tid

Recording and viewing trace

- Go to chrome://tracing
- Select categories
- Record

Demo

Defining a metric

```
function myMetric(trace) {
  const histogram = new Histogram('my-gc-pause');
  for (const s of trace.findTopmostSlicesNamed('MajorGC')) {
    histogram.addSample(s.duration);
  }
  return histogram;
}
```

Metrics in Chromium:

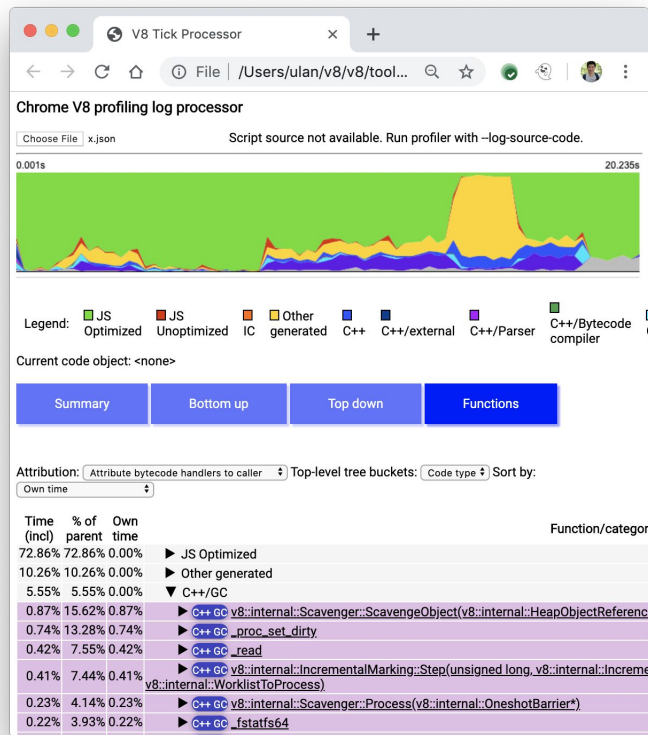src/third_party/catapult/tracing/tracing/metrics

Tools

DevTools

- Performance
  - Sampling profiler

- Memory
  - Heap snapshot
  - Sampling allocation profiler

Google

Built-in tools

- Sampling profiler
  - `--prof`

- Tracing flags
  - `--trace-gc`
  - `--trace-gc-object_stats`
  - `--trace-ic`
  - `--trace-maps`
  - and many more: ./d8 --help | grep trace

Google

Ulan Degenbaev
ulan@google.com

Thanks!

Google