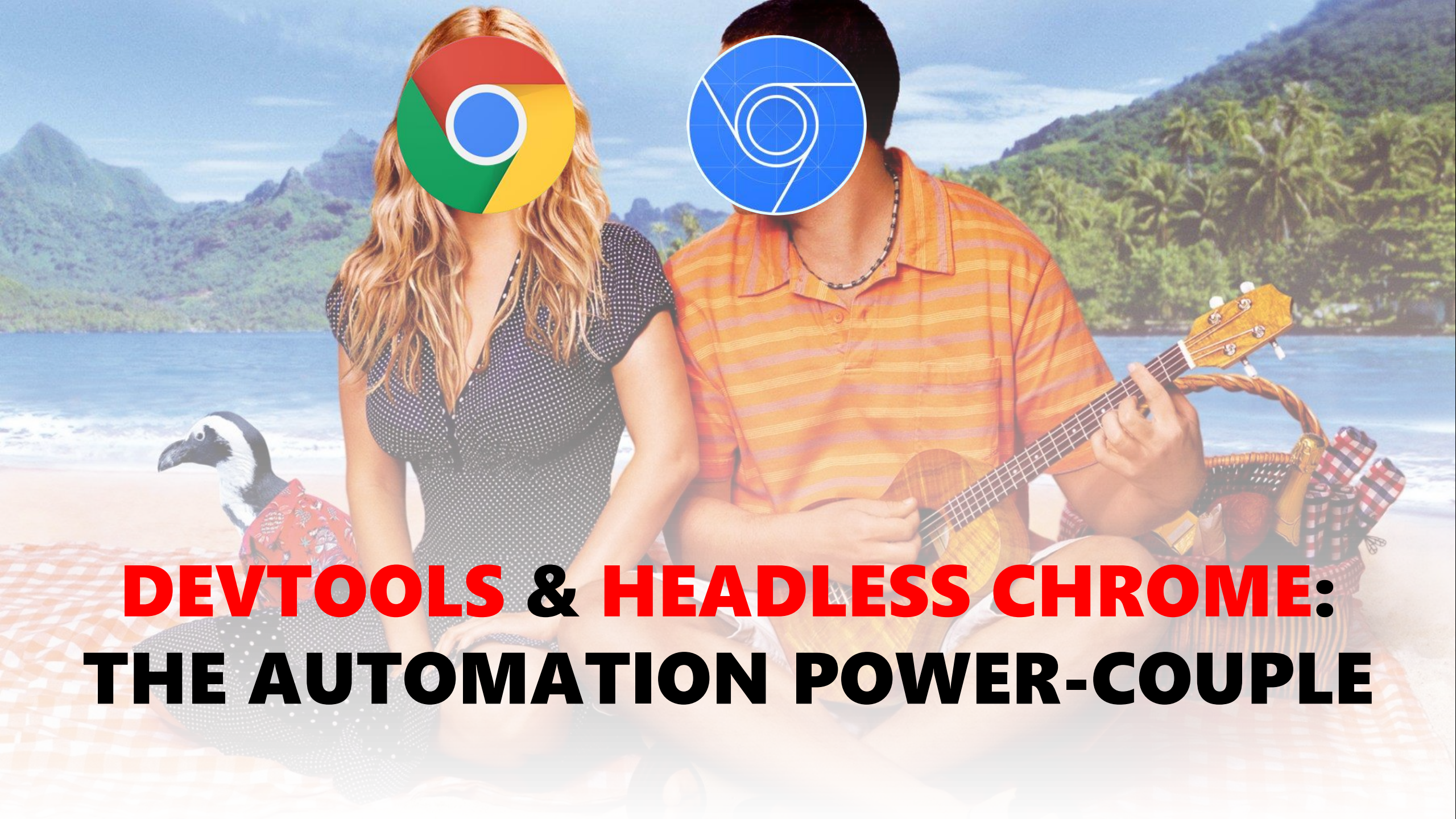


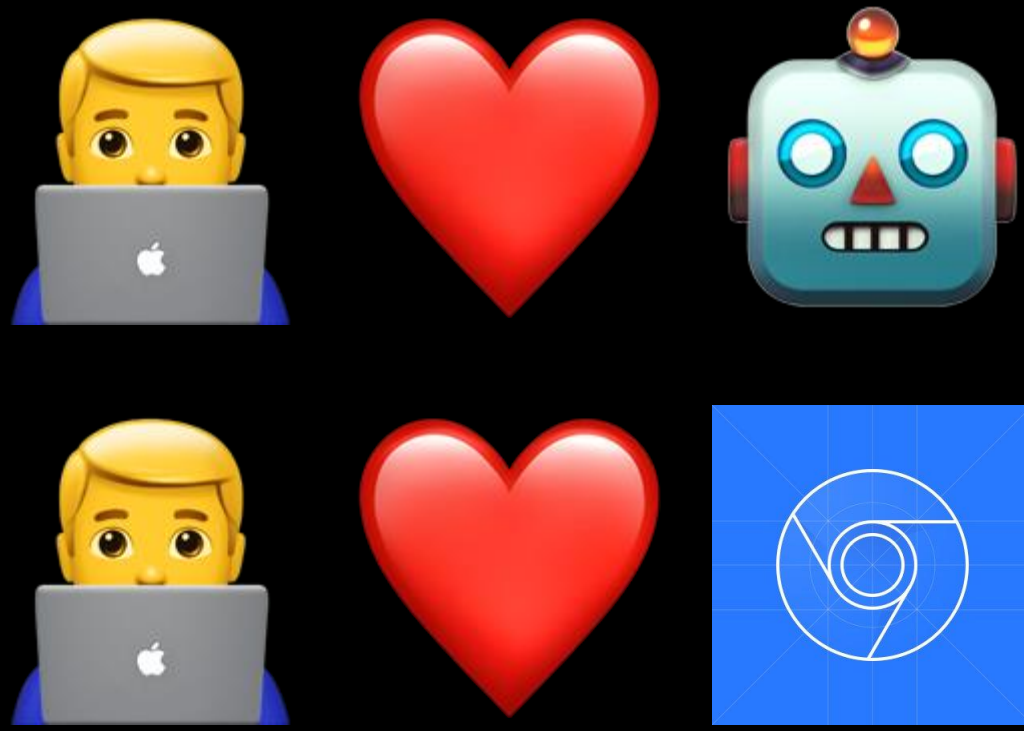
DEVTOOLS & HEADLESS CHROME: THE AUTOMATION POWER-COUPLE

Yonatan Mevorach

👨‍💻 ❤️ 👩‍👧‍👦

{{company}}

@cowchimp



”I can´t automate this”

-- no one ever
(after watching this talk)

Web Automation

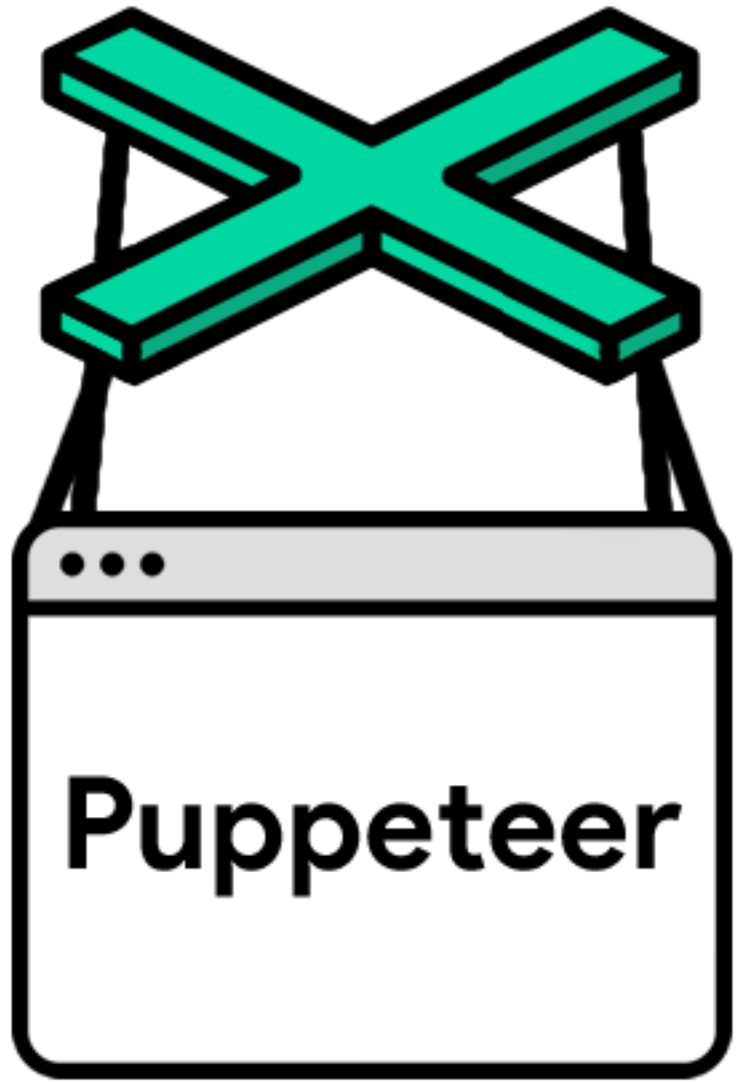
youtu.be/fsF7enQY8uI

Headless Browsers

Chrome

headless

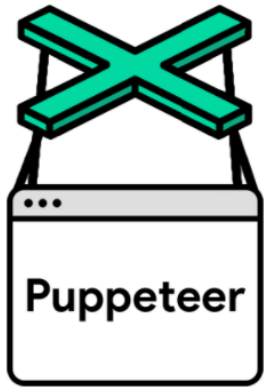
Chrome


Puppeteer

puppeteer public

API | FAQ | Contributing

> Puppeteer is a Node library which provides a high-level API to control **headless** Chrome over the **DevTools Protocol**. It can also be configured to use full (non-headless) Chrome.



What can I do?

Most things that you can do manually in the browser can be done using Puppeteer! Here are a few examples to get you started:

- Generate screenshots and PDFs of pages.
- Crawl a SPA and generate pre-rendered content (i.e. "SSR").
- Scrape content from websites.
- Automate form submission, UI testing, keyboard input, etc.
- Create an up-to-date, automated testing environment. Run your tests directly in the latest version of Chrome using the latest JavaScript and browser features.
- Capture a **timeline trace** of your site to help diagnose performance issues.

Getting Started

We ♥ your boss

Selectively mirror the npm registry inside your firewall. Filter packages based on security, licensing, code quality and more. Build awesome stuff faster.

Try npm Enterprise for free…

```
npm install puppeteer
```

how? learn more

aslushnikov published 6 days ago

0.11.0 is the latest of 6 releases

github.com/GoogleChrome/puppeteer

Apache-2.0

Collaborators list

reversim

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Yoav Abrahami is the head of the Wix Code program at Wix. Before the Wix Code project, yoav founded the Wix App Market while acting as the Chief Architect at Wix.com. Yoav's experties are in software development, continuous delivery, devops, performance and building developer facing products.

Yoav Abrahami
Doing creative stuff at Wix

I am a Tech Lead with an expertise in frontend technologies, and my passion is creating high-end, quality, beautiful and performant web applications. With 9 years of experience, I'm a thought leader in the latency and web performance domain, making ShopYourWay one of the fastest e-commerce mWeb sites in the world. I'm also an OSS contributor, blogger, active member of the local tech meetup scene, ...and yet I'm still introduced to new employees as "the Javascript guy"

Yonatan Mevorach
Frontend Tech Lead at Sea

i.fa.fa-github | 12 × 14

Elements Console Network Performance Sources Application Memory Security Audits

```
▶<a target="_blank" class="flex-1 text-center" href="https://twitter.com/@cowchimp">…</a>
▶<a target="_blank" class="flex-1 text-center" href="https://www.linkedin.com/in/yonatan-mevorach-20808812a/">…</a>
▼<a target="_blank" class="flex-1 text-center" href="https://github.com/cowchimp"> == $0
  ▼<i class="fa fa-github">
      ::before
    </i>
  </a>
```

... div div div div div a div div div div a.flex-1.text-center i.fa.fa-github ::before

Styles Computed Event Listeners »

Filter :hov .cls +

```
element.style {
}
.IhePjM96IsBefXy5SpAJ Speaker.css:213
T._1RjJu9yk7YvZVGAb0fuLIZ ._2ws-
nlJPxUrZbLtoP3pHy1 a {
  color: #fff;
}
```

Puppeteer Example

```
1. const puppeteer = require('puppeteer');
2. const githubService = require('./github-service');
3.
4. init();
5.
6. async function init() {
7.   const browser = await puppeteer.launch();
8.
9.   const page = await browser.newPage();
10.  const url = 'https://summit2017.reversim.com/speakers';
11.  await page.goto(url);
12.
```

```
1. const puppeteer = require('puppeteer');
2. const githubService = require('./github-service');
3.
4. init();
```

require Puppeteer

```
7.   const browser = await puppeteer.launch();
```

```
1.  const puppeteer = require('puppeteer');
2.  const githubService = require('./github-service');
3.
4.  init();
5.
6.  async function init() {
7.    const browser = await puppeteer.launch();
8.
9.    const page = await browser.newPage();
10.   const url = 'https://summit2017.reversim.com/speakers';
13.   const usernames = await page.evaluate(function() {
```

launch Chrome

```
1.  const puppeteer = require('puppeteer');
2.  const githubService = require('./github-service');
3.
4.  init();
5.
6.  async function init() {
7.    const browser = await puppeteer.launch();
8.
9.    const page = await browser.newPage();
10.   const url = 'https://summit2017.reversim.com/speakers';
11.   await page.goto(url);
12.
```

open a new tab

```
1.  const puppeteer = require('puppeteer');
2.  const githubService = require('./github-service');
3.
4.  init();
5.
6.  async function init() {
7.    const browser = await puppeteer.launch();
8.
9.    const page = await browser.newPage();
10.   const url = 'https://summit2017.reversim.com/speakers';
11.   await page.goto(url);
12.
13.   const usernames = await page.evaluate(function() {
14.     return Array.from(document.querySelectorAll('.fa-github'))
```

go to Speakers page

```
1.  const puppeteer = require('puppeteer');
2.  const githubService = require('./github-service');
3.
4.  init();
5.
6.  async function init() {
7.    const browser = await puppeteer.launch();
8.
9.    const page = await browser.newPage();
10.   const url = 'https://summit2017.reversim.com/speakers';
11.   await page.goto(url);
12.
13.   const usernames = await page.evaluate(function() {
14.     return Array.from(document.querySelectorAll('.fa-github'))
15.       .map(x => x.parentNode.href)
16.       .map(x => x.replace('https://github.com/', ''));
19.   const topUser = await githubService.getTopUser(usernames);
```

execute JS on the client

```
3.
4. init();
5.
6. async function init() {
7.   const browser = await puppeteer.launch();
8.
9.   const page = await browser.newPage();
10.  const url = 'https://summit2017.reversim.com/speakers';
11.  await page.goto(url);
12.
13.  const usernames = await page.evaluate(function() {
14.    return Array.from(document.querySelectorAll('.fa-github'))
15.      .map(x => x.parentNode.href)
16.      .map(x => x.replace('https://github.com/', ''));
17.  });
18.
```

fetch github usernames with DOM manipulation

```
21.  const { username, followersCount } = topUser;
```

```
 7.   const browser = await puppeteer.launch();
 8.
 9.   const page = await browser.newPage();
10.   const url = 'https://summit2017.reversim.com/speakers';
11.   await page.goto(url);
12.
13.   const usernames = await page.evaluate(function() {
14.     return Array.from(document.querySelectorAll('.fa-github'))
15.       .map(x => x.parentNode.href)
16.       .map(x => x.replace('https://github.com/', ''));
17.   });
18.
19.   const topUser = await githubService.getTopUser(usernames);
20.
21.   const { username, followersCount } = topUser;
22.   console.log(`${username} has ${followerCount} followers!`);
```

get follower counts via the github API

```
10.    const url = 'https://summit2017.reversim.com/speakers';
11.    await page.goto(url);
12.
13.    const usernames = await page.evaluate(function() {
14.      return Array.from(document.querySelectorAll('.fa-github'))
15.        .map(x => x.parentNode.href)
16.        .map(x => x.replace('https://github.com/', ''));
17.    });
18.
19.    const topUser = await githubService.getTopUser(usernames);
20.
21.    const { username, followersCount } = topUser;
22.    console.log(`${username} has ${followerCount} followers!`);
23.
24.    await browser.close();
25.  }
```

print the result

shlomi-noach has 208 followers!

```
11.   await page.goto(url);
12.
13.   const usernames = await page.evaluate(function() {
14.     return Array.from(document.querySelectorAll('.fa-github'))
15.       .map(x => x.parentNode.href)
16.       .map(x => x.replace('https://github.com/', ''));
17.   });
18.
19.   const topUser = await githubService.getTopUser(usernames);
20.
21.   const { username, followersCount } = topUser;
22.   console.log(`${username} has ${followerCount} followers!`);
23.
24.   await browser.close();
25. }
```

close the browser

Try Puppeteer v0.11.0

Run an example: screenshot.js

```
1 const browser = await puppeteer.launch();
2 const page = await browser.newPage();
3 const url = 'https://summit2017.reversim.com';
4 await page.goto(url);
5 await page.screenshot();
6 await browser.close();
```

RUN IT

Note: There's no need to require('puppeteer') in the editor. It's done for you!

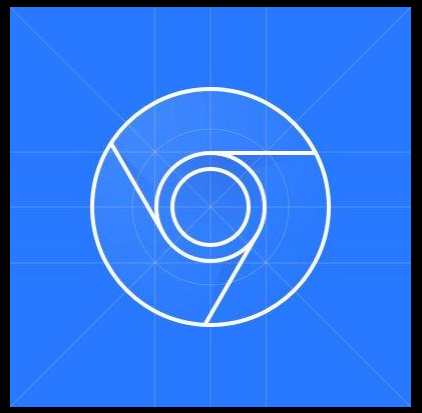
RESULT

headless

Chrome

headless

Firefox



Chrome DevTools

reversim

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About

h4.mb-4 | 540 × 19

General Info

About Reversim Summit

Reversim summit is our intention to create a conference for developers by developers. Like in the podcast, we bring you the content we are interested in, and we hope you will be too.

This is the fifth(!) Reversim Summit. The summits of 2013 and 2014 (TLV Campus), 2015 (Technion) and 2016 (Weizmann Institute of Science) also featured community content. Watch previous years' sessions to get the general feel of the Revesim Summit spirit.

Elements Console Network Performance Sources Application Memory Security Audits

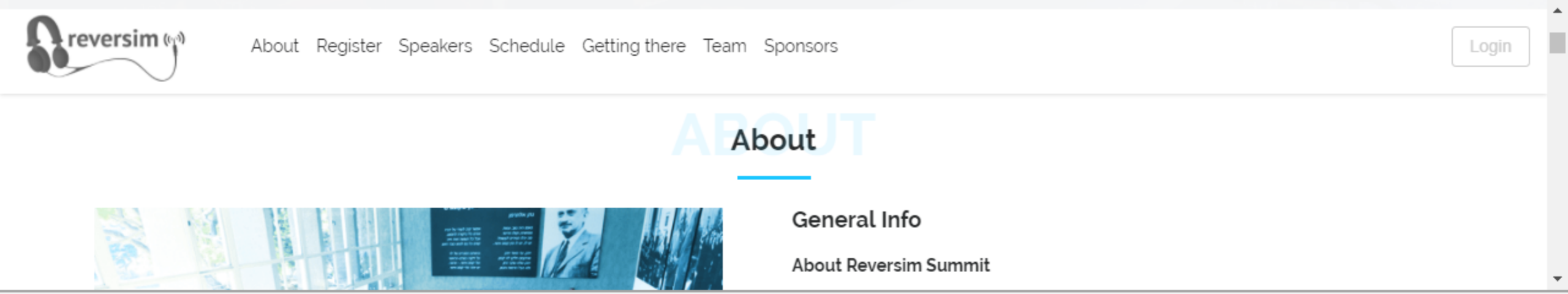
```
data-text="About">…</h3>
▼<div class="container">
  ▼<div class="row">
    ▶<div class="pr-5 mb-5 ml-lg-auto col-12 col-lg-6">…</div>
    ▼<div class="col">
      <h4 class="mb-4">General Info</h4> == $0
      <h5>About Reversim Summit</h5>
      ▶<p>…</p>
      ▶<p class="mb-4">…</p>
      <h5>About Reversim Podcast</h5>
      ▶<p>…</p>
```

Styles Computed Event Listeners

Filter :hov .cls +

```
element.style {
}
.mb-4 {                                  _spacing.scss:15
  margin-bottom: 1.5rem!important;
}
h4 {                                     index.css:24
  font-size: 18px;
```

html body div#root div div div section.mt-5 div.container div.row div.col h4.mb-4



Elements Console Network Performance Sources Application Memory Security Audits

```
<div class="col">
  <h4 class="mb-4">General Info</h4> == $0
  <h5>About Reversim Summit</h5>
  ▶<p>…</p>
```

html body div#root div div div section.mt-5 div.container div.row div.col h4.mb-4

Styles Computed Event Listeners

Filter :hov .cls +

```
element.style {
}
```

Console Network conditions Rendering Request blocking Coverage Sensors Animations Remote devices

URL filter Content scripts

URL	Type	Total Bytes	Unused Bytes	
https://summit2017.reversim.com/.../main.09d7d19c.js	JS	824 383	343 157	41.6 %
https://maxcdn.bootstrapcdn.com... /bootstrap.min.css	CSS	150 996	139 530	92.4 %
https://maps.googleapis.com/maps-api-v3/api.../util.js	JS	134 046	85 091	63.5 %
https://maps.googleapis.com/maps-api-... /common.js	JS	116 972	38 801	33.2 %
/js?v=3.exp&key=AIzaSyB4ZHy0mFjv2O9JL4vcjnrhVLX	JS	79 355	28 344	35.7 %
https://maps.googleapis.com/maps-api-v... /controls.js	JS	78 546	25 171	32.0 %

704 KB of 1.5 MB bytes are not used. (45%)

ChromeDevTools / devtools-frontend

Watch 41 Star 500 Fork 65

The Chrome DevTools UI https://www.npmjs.com/package/chrome-...

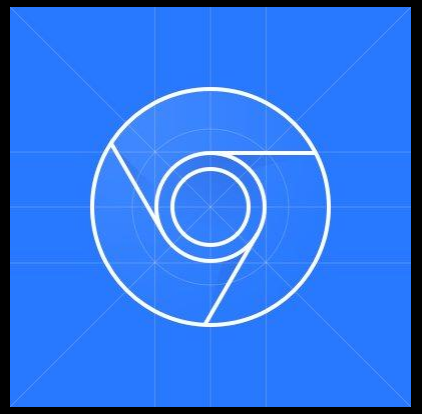
chrome-devtools javascript instrumentation

3,598 commits 1 branch 0 releases 102 contributors

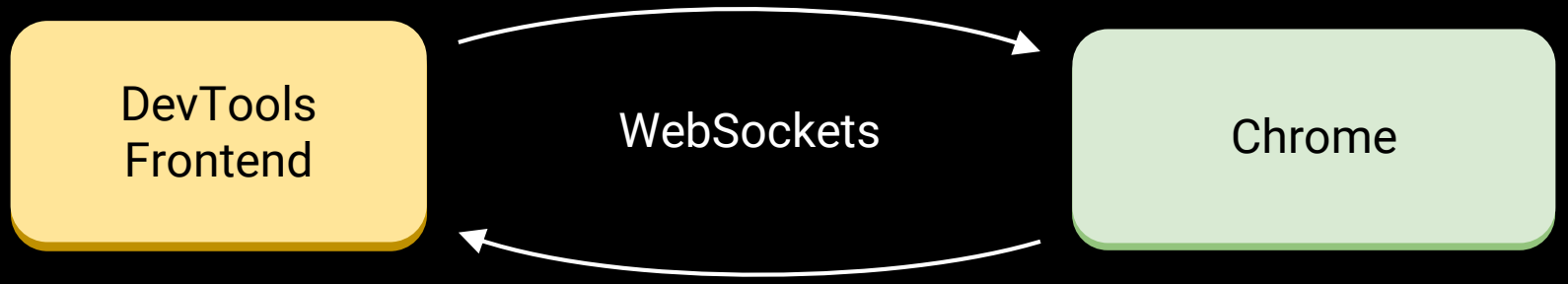
Branch: master New pull request Find file Clone or download

eugeneo committed with Commit Bot [DevTools] Allow the user to customize SW events ... Latest commit 0394cbf 4 days ago

front_end	[DevTools] Allow the user to customize SW events	4 days ago
scripts	DevTools: move http/tests/inspector-enabled tests (part 13)	5 days ago
services	[DevTools] Move main target/connection to TargetManager.	11 months ago
.clang-format	DevTools: clang format all the source + clang config landed.	11 months ago
.eslintignore	DevTools: Validate module.json	3 months ago
.eslintrc.js	DevTools: use contexts per domain when logging protocol messages	a month ago
.gitignore	DevTools: Allow tabbing into styles sidebar	a month ago
.npmignore	DevTools: Added package.json, LICENSE, and .npmignore	a year ago
.style.yapf	DevTools: format python scripts using yapf	8 months ago

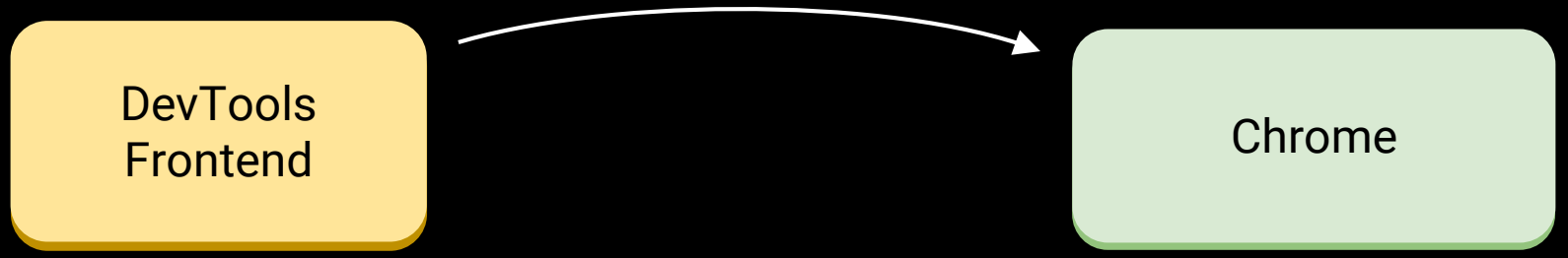


Chrome DevTools protocol



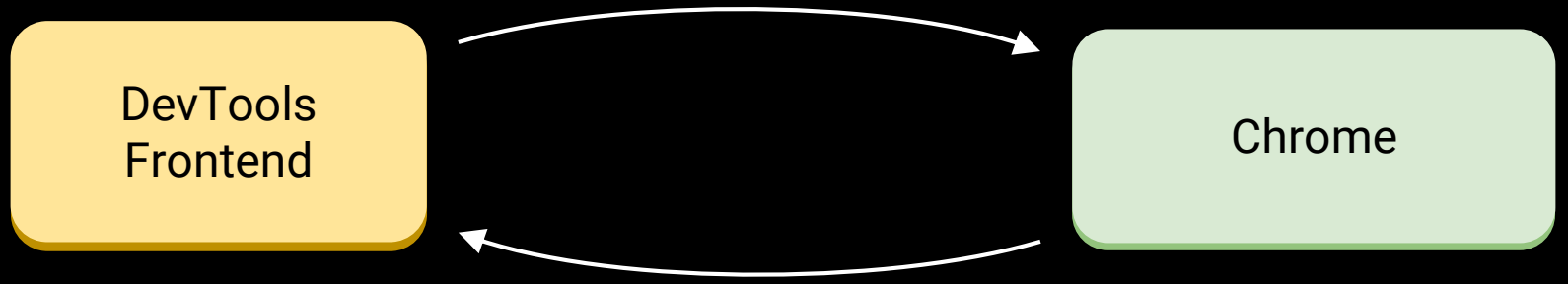
Adapted from content by © Sami Kyöstilä, Google goo.gl/yQi9kZ

```
{
  id: 1,
  method: "Runtime.evaluate",
  params: { expression: "1 + 1" }
}
```



Adapted from content by © Sami Kyöstilä, Google goo.gl/yQi9kZ

```
{
  id: 1,
  method: "Runtime.evaluate",
  params: { expression: "1 + 1" }
}
```




```
{
  id: 1,
  result: {
    result: { type: "number", value: 2, description: "2" },
    wasThrown: false
  }
}
```

Adapted from content by © Sami Kyöstilä, Google goo.gl/yQi9kZ

Version
latest (tip-of-tree)

Chrome DevTools Protocol Viewer

Domains

Accessibility
Animation
ApplicationCache
Audits
Browser
CSS
CacheStorage
Console
DOM
DOMDebugger
DOMSnapshot
DOMStorage

Fork me on GitHub

The **Chrome DevTools Protocol** allows for tools to instrument, inspect, debug and profile Chromium, Chrome and other Blink-based browsers. Many existing projects currently use the protocol. The Chrome DevTools uses this protocol and the team maintains its API.

Instrumentation is divided into a number of domains (DOM, Debugger, Network etc.). Each domain defines a number of commands it supports and events it generates. Both commands and events are serialized JSON objects of a fixed structure. You can either debug over the wire using the raw messages as they are described in the corresponding domain documentation, or use extension JavaScript API.

Protocol API Docs

The latest (tip-of-tree) protocol (tot)

It changes frequently and can break at any time. However it captures the full capabilities of the Protocol, whereas the stable release is a subset. There is no backwards compatibility support guaranteed for the capabilities it introduces.

v8-inspector protocol (v8)

It is available in node 6.3+ and enables debugging & profiling of Node.js apps.

stable 1.2 protocol (1-2)

The stable release of the protocol, tagged at Chrome 54. It includes a smaller subset of the complete protocol compatibilities.

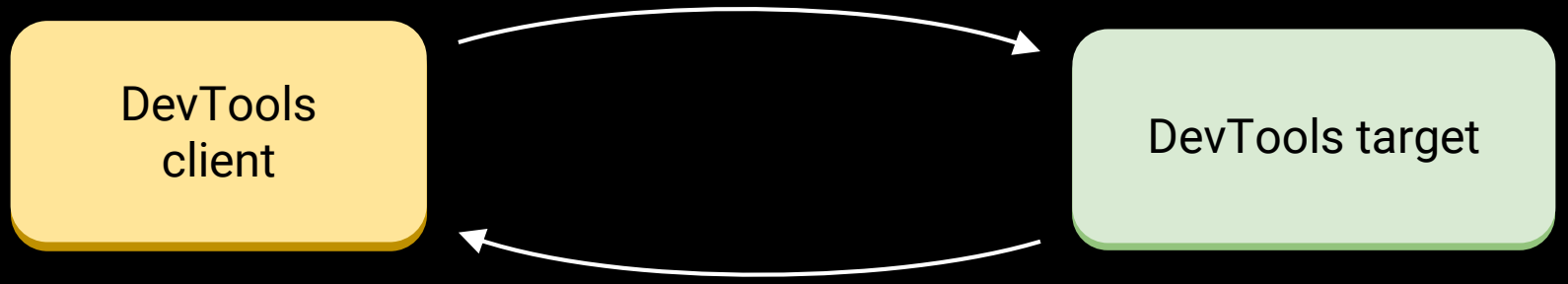
Resources

Consider subscribing to the chrome-debugging-protocol mailing list.

The devtools-protocol repo issue tracker can also be used for concerns with the protocol. It also hosts the canonical copy of the json files.

Accessibility
Animation
Application cache
Cache storage
Console
CSS
Database
Debugger
Device orientation
DOM
DOM debugger
DOM storage
Emulation
Heap profiler
IndexedDB
Input
Inspector
IO
Layer tree
Memory
Network
Page
Profiler
Rendering
Runtime
Security
Service worker
Tracing
Worker

Adapted from content by © Sami Kyöstilä, Google goo.gl/yQi9kZ



Adapted from content by © Sami Kyöstilä, Google goo.gl/yQi9kZ

```
node --inspect index.js
```

Developer Tools - Node.js

Connection | Console | Profiler | Sources | Memory | Redux

C:\Users\Yonata...-master\app.js

```
(function (exports, require, module, __filename, __dirname) { var http = require('http'
    path = require('path'),
    methods = require('methods'),
    express = require('express'),
    bodyParser = require('body-parser'),
    session = require('express-session'),
    cors = require('cors'),
    passport = require('passport'),
    errorhandler = require('errorhandler'),
    mongoose = require('mongoose');

var isProduction = process.env.NODE_ENV === 'production';

// Create global app object
var app = express();

app.use(cors());

// Normal express config defaults
app.use(require('morgan')('dev'));
app.use(bodyParser.urlencoded({ extended: false }));
app.use(bodyParser.json());

app.use(require('method-override')());
app.use(express.static(__dirname + '/public'));
```

{} Line 46, Column 1

Debugger paused

▼ Threads

Node.js: file:///C:/_Users_Yonatan_... paused

▶ Watch

▼ Call Stack

(anonymous) C:\Users\Yonata...aster\app.js:1

Module._compile module.js:566

Module._extensions..js module.js:580

Module.load module.js:503

tryModuleLoad module.js:466

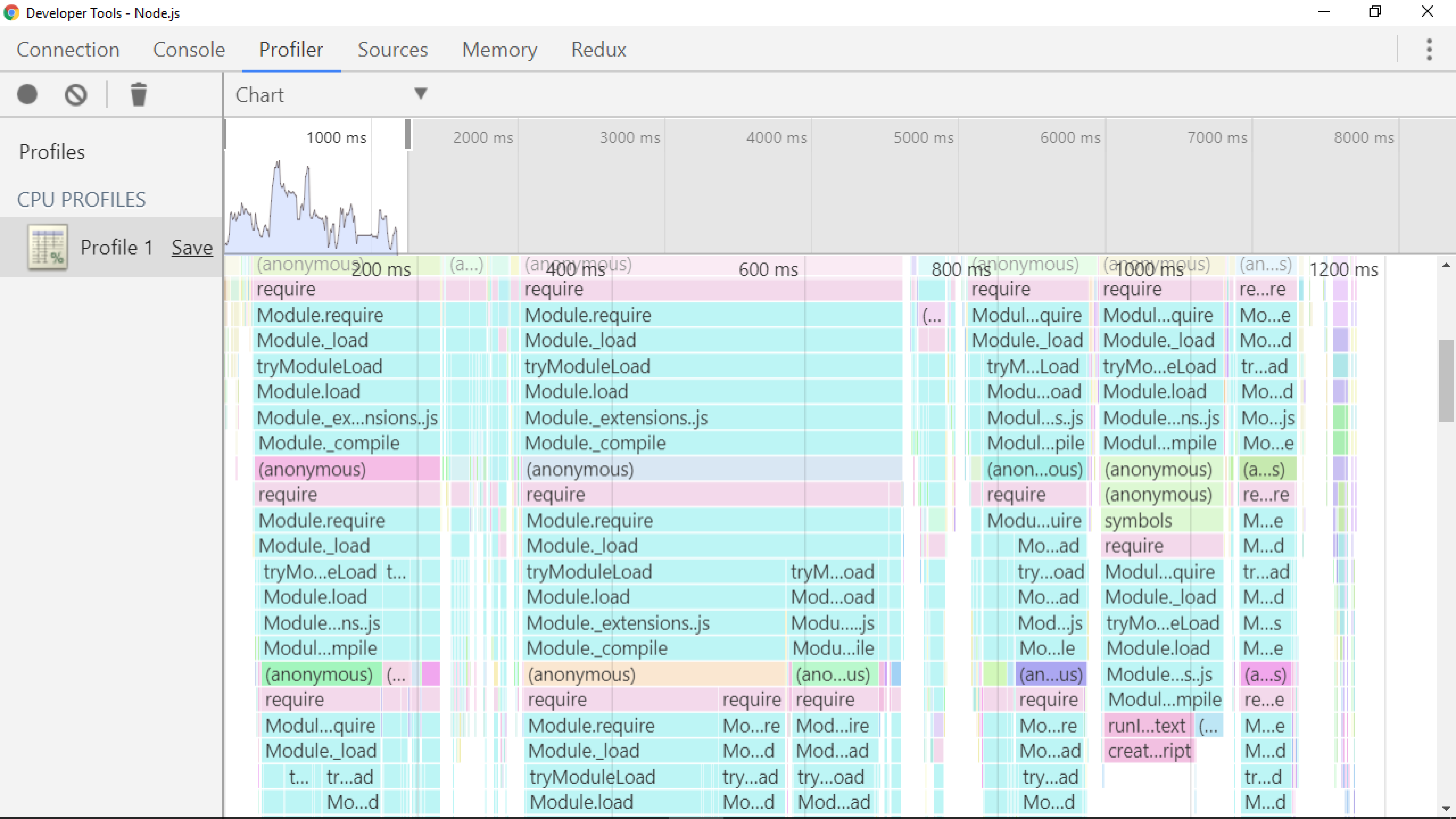
Module._load module.js:458

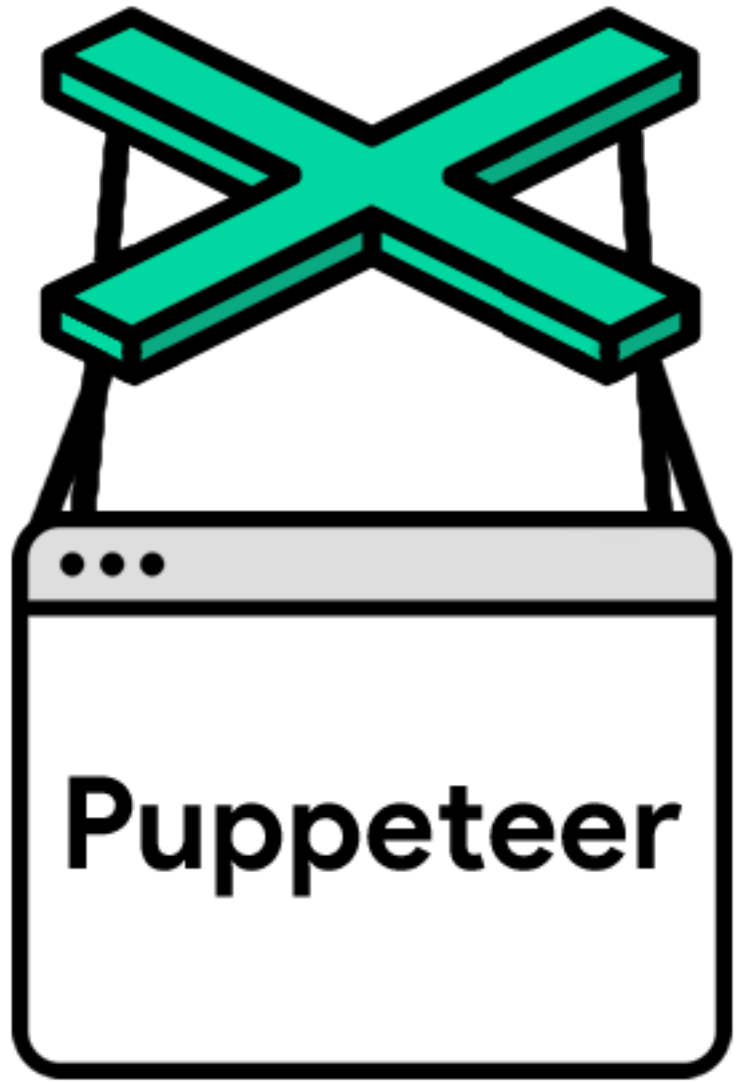
Module.runMain module.js:605

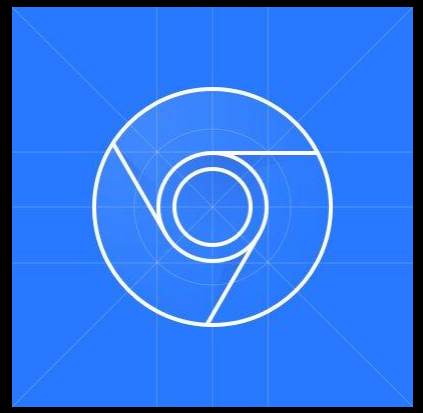
startup bootstrap_node.js:158

(anonymous) bootstrap_node.js:575

▼ Scope


Developer Tools - Node.js
Connection
Console
Profiler
Sources
Memory
Redux
Chart
Profiles
CPU PROFILES
Profile 1
Save
1000 ms
2000 ms
3000 ms
4000 ms
5000 ms
6000 ms
7000 ms
8000 ms
200 ms
400 ms
600 ms
800 ms
1000 ms
1200 ms
(anonymous)
require
Module.require
Module._load
tryModuleLoad
Module.load
Module._extensions..js
Module._compile
(anonymous)
require
Module.require
Module._load
tryModuleLoad
Module.load
Module._extensions..js
Module._compile
(anonymous)
require
Module.require
Module._load
tryModuleLoad
Module.load
symbols
runI...text
creat...ript


Puppeteer

headless ❤️  protocol

```
chrome
   --headless
   --disable-gpu
   --remote-debugging-port=9222
   http://summit2017.reversim.com
```

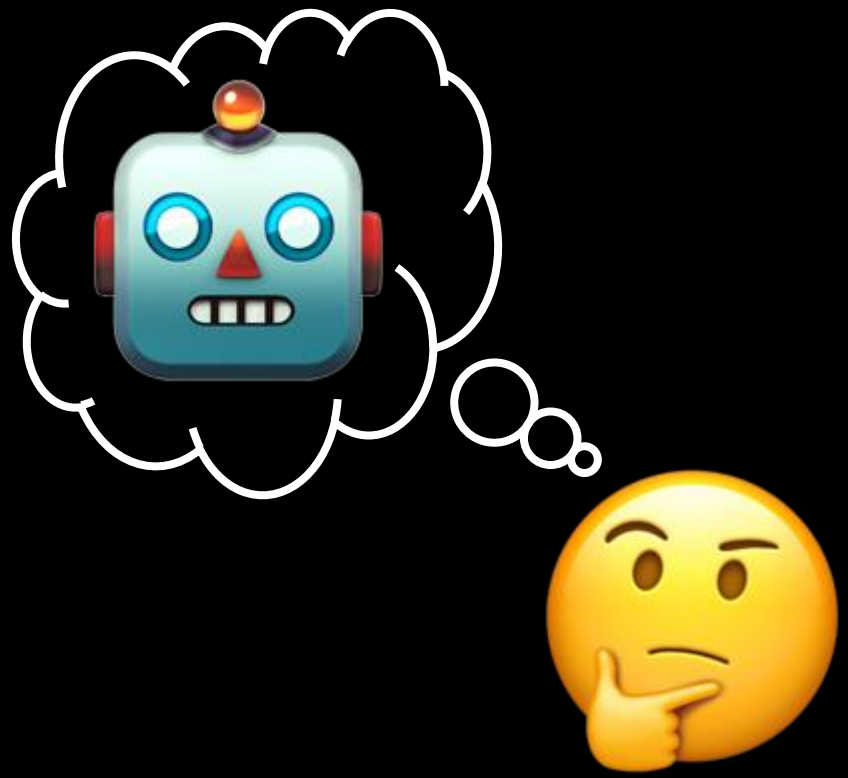
```
chrome
    --headless
    --disable-gpu
    --remote-debugging-port=9222
    http://summit2017.reversim.com
```

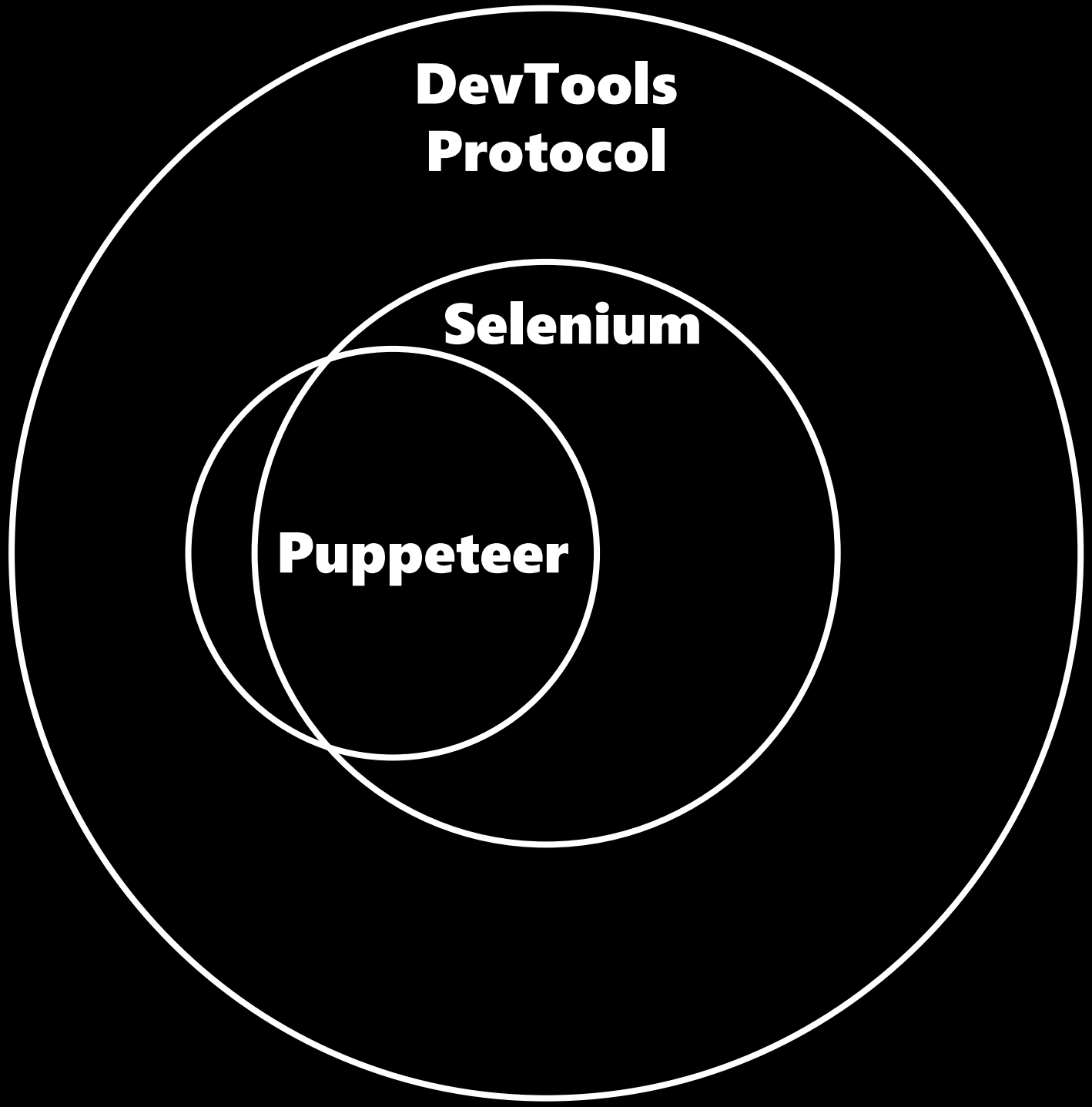
```
chrome
   --headless
   --disable-gpu
   --remote-debugging-port=9222
   http://summit2017.reversim.com
```

```
chrome
   --headless
   --disable-gpu
   --remote-debugging-port=9222
   http://summit2017.reversim.com
```

```
chrome
   --headless
   --disable-gpu
   --remote-debugging-port=9222
   http://summit2017.reversim.com
```

```
chrome
   --headless
   --disable-gpu
   --remote-debugging-port=9222
   http://summit2017.reversim.com
```




DevTools
Protocol
Selenium
Puppeteer

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Elements Console Network Performance Sources Application Memory Security Audits

Audits help you identify and fix common problems that affect your site's performance, accessibility, and user experience. Learn more

Perform an audit...

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summit2017.reversim.com 10/12/2017, 1:27:40 I

Best Practices

We've compiled some recommendations for modernizing your web app and avoiding performance pitfalls. These audits do not affect your score but are worth a look.

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5 failed audits

- Does not use HTTPS: 1 insecure request found
- Does not use HTTP/2 for all of its resources: 20 requests were not handled over HTTP/2
- Does not use passive listeners to improve scrolling performance
- Does not open external anchors using `rel="noopener"`
- Manifest's `short_name` will be truncated when displayed on homescreen

  No short_name found in manifest.

8 Passed Audits

pixabay.com/photo-175605

pixabay.com/photo-175605

Unused CSS Calculator

```
1. const puppeteer = require('puppeteer');
2.
3. init();
4.
5. async function init() {
6.   const browser = await puppeteer.launch();
7.
8.   const unusedCSS = await fetchUnusedCssPercentage(browser);
9.
10.  console.log(`${unusedCSS}% of your CSS is unused`);
11.
12.  await browser.close();
```

```
1. const puppeteer = require('puppeteer');
2.
3. init();
4.
5. async function init() {
6.     const browser = await puppeteer.launch();
7.
8.     const unusedCSS = await fetchUnusedCssPercentage(browser);
```

launch Chrome with Puppeteer

```
1. const puppeteer = require('puppeteer');
2.
3. init();
4.
5. async function init() {
6.   const browser = await puppeteer.launch();
7.
8.   const unusedCSS = await fetchUnusedCssPercentage(browser);
9.
10.  console.log(`${unusedCSS}% of your CSS is unused`);
```

fetch the percentage of unused CSS

```
3. init();
4.
5. async function init() {
6.   const browser = await puppeteer.launch();
7.
8.   const unusedCSS = await fetchUnusedCssPercentage(browser);
9.
10.  console.log(`${unusedCSS}% of your CSS is unused`);
11.
12.  await browser.close();
13. }
14.
15. async function fetchUnusedCssPercentage(browser) {
16.   const page = await browser.newPage();
17.
18.   const cp = page._client;
19.   await cp.send('Page.enable');
20.   await cp.send('DOM.enable');
```

```
4.
5.  async function init() {
6.    const browser = await puppeteer.launch();
7.
8.    const unusedCSS = await fetchUnusedCssPercentage(browser);
9.
10.   console.log(`${unusedCSS}% of your CSS is unused`);
11.
12.   await browser.close();
13. }
14.
15. async function fetchUnusedCssPercentage(browser) {
16.   const page = await browser.newPage();
17.
18.   const cp = page._client;
```

open a new tab

```
  const unusedCSS = await fetchUnusedCssPercentage(browser);

  console.log(`${unusedCSS}% of your CSS is unused`);

  await browser.close();
}

async function fetchUnusedCssPercentage(browser) {
  const page = await browser.newPage();

  const cp = page._client;
  await cp.send('Page.enable');
  await cp.send('DOM.enable');
  await cp.send('CSS.enable');
```

enable necessary "Domains" using raw DevTools Protocol commands

```
11.
12.     await browser.close();
13. }
14.
15. async function fetchUnusedCssPercentage(browser) {
16.     const page = await browser.newPage();
17.
18.     const cp = page._client;
19.     await cp.send('Page.enable');
20.     await cp.send('DOM.enable');
21.     await cp.send('CSS.enable');
22.
23.     await cp.send('CSS.startRuleUsageTracking');
24.
25.     const stylesheets = [];
```

start tracking CSS usage

```
15. async function fetchUnusedCssPercentage(browser) {
16.   const page = await browser.newPage();
17.
18.   const cp = page._client;
19.   await cp.send('Page.enable');
20.   await cp.send('DOM.enable');
21.   await cp.send('CSS.enable');
22.
23.   await cp.send('CSS.startRuleUsageTracking');
24.
25.   const stylesheets = [];
26.   cp.on('CSS.styleSheetAdded', stylesheet => {
27.     stylesheets.push(stylesheet.header);
28.   });
```

listen for when a stylesheet is loaded

```
31.   await page.goto(url);
```

```
21.   await cp.send('CSS.enable');
22.
23.   await cp.send('CSS.startRuleUsageTracking');
24.
25.   const stylesheets = [];
26.   cp.on('CSS.styleSheetAdded', stylesheet => {
27.     stylesheets.push(stylesheet.header);
28.   });
29.
30.   const url = 'https://example-site-izvafmtnha.now.sh/';
31.   await page.goto(url);
32.   await page.click('.tab.type2');
33.   await page.click('.tab.type3');
34.   await page.click('.tab.type4');
```

interact with the page (load the page and click tabs)

```
24.
25.    const stylesheets = [];
26.    cp.on('CSS.styleSheetAdded', stylesheet => {
27.      stylesheets.push(stylesheet.header);
28.    });
29.
30.    const url = 'https://example-site-izvafmtnha.now.sh/';
31.    await page.goto(url);
32.    await page.click('.tab.type2');
33.    await page.click('.tab.type3');
34.    await page.click('.tab.type4');
35.
36.    const {ruleUsage} = await cp.send('CSS.stopRuleUsageTracking');
37.
38.    return calcUnusedCssPercentage(stylesheets, ruleUsage);
```

stop tracking CSS usage and fetch used rules

```
41. function calcUnusedCssPercentage(stylesheets, ruleUsage) {
```

```
26.   cp.on('CSS.styleSheetAdded', stylesheet => {
27.     stylesheets.push(stylesheet.header);
28.   });
29.
30.   const url = 'https://example-site-izvafmtnha.now.sh/';
31.   await page.goto(url);
32.   await page.click('.tab.type2');
33.   await page.click('.tab.type3');
34.   await page.click('.tab.type4');
35.
36.   const {ruleUsage} = await cp.send('CSS.stopRuleUsageTracking');
37.
38.   return calcUnusedCssPercentage(stylesheets, ruleUsage);
39. }
40.
```

crunch the numbers

```
1.  const puppeteer = require('puppeteer');
2.
3.  init();
4.
5.  async function init() {
6.    const browser = await puppeteer.launch();
7.
8.    const unusedCSS = await fetchUnusedCssPercentage(browser);
9.
10.   console.log(`${unusedCSS}% of your CSS is unused`);
11.
12.   await browser.close();
13. }
```

print the result and close the browser

Make it generic

```
const puppeteer = require('puppeteer');

init();

async function init() {
  const browser = await puppeteer.launch();

  const unusedCSS = await fetchUnusedCssPercentage(
    browser,
    async function(page) {
      const url = 'https://example-site-izvafmtnha.now.sh/';
      await page.goto(url);
      await page.click('.tab.type2');
      await page.click('.tab.type3');
      await page.click('.tab.type4');
    }
```

pass case-specific interaction instructions as callback

```
  console.log(`${unusedCSS}% of your CSS is unused`);
```

Recap!

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