

# **A multi-year quest for the best web test**

# ACT I

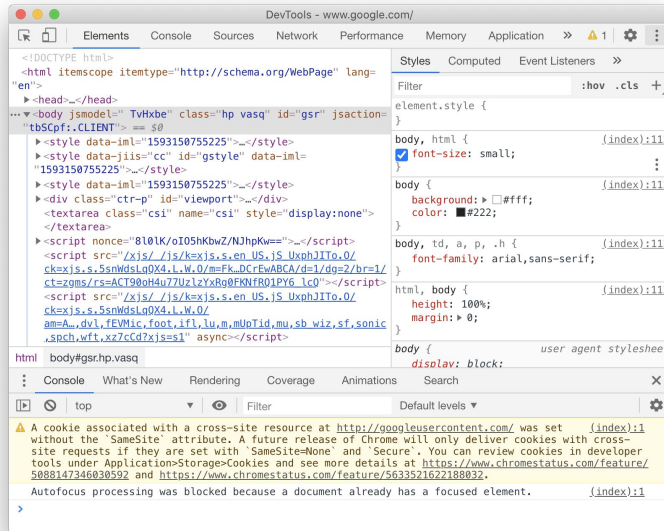
## History of Debugging Protocols

**2012**



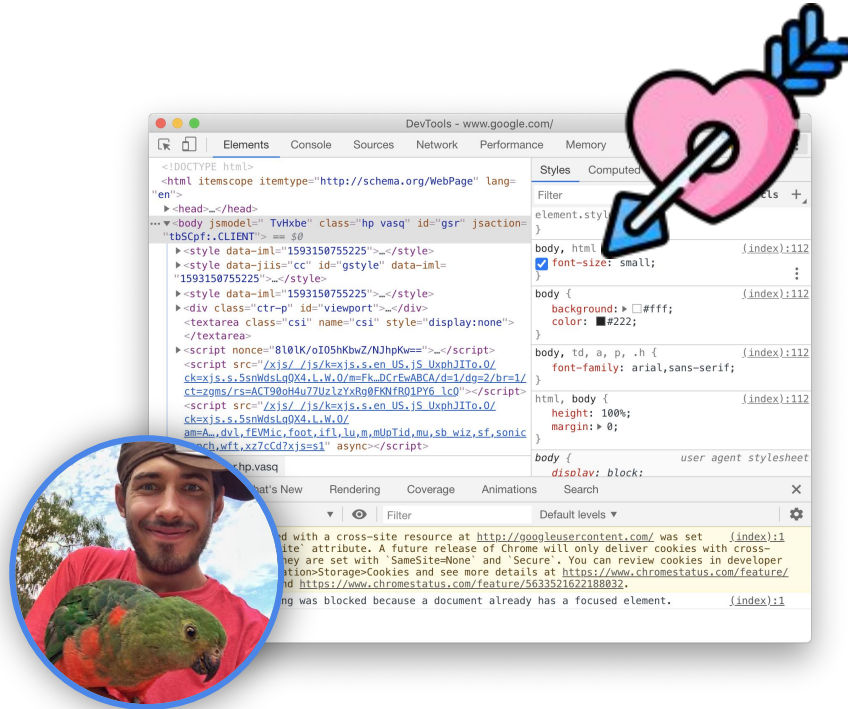
**St. Petersburg**

# 2012: Chrome DevTools Team

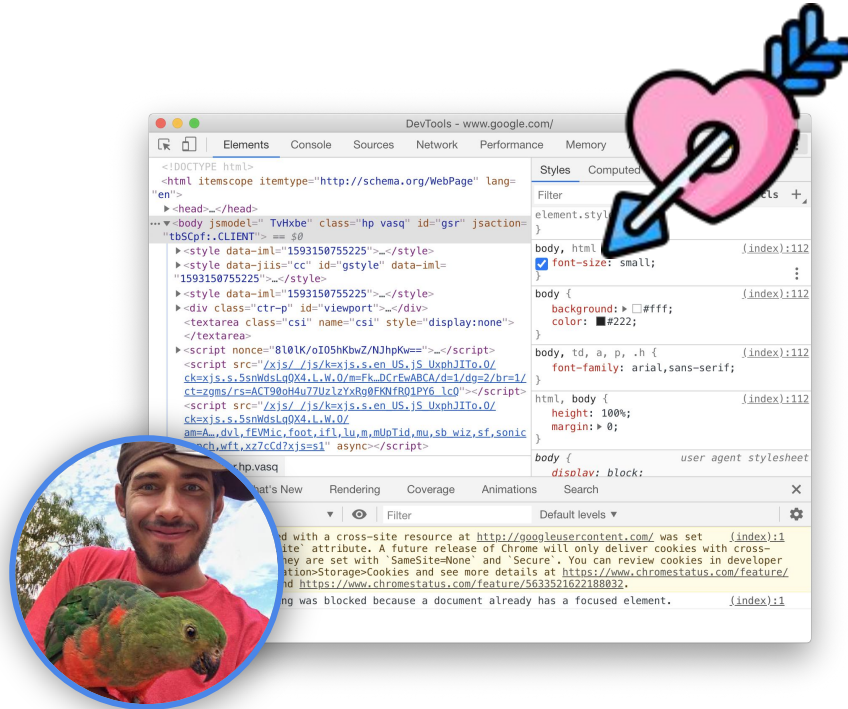




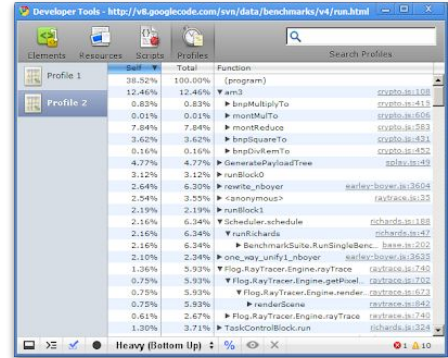
# 2012: Chrome DevTools Team



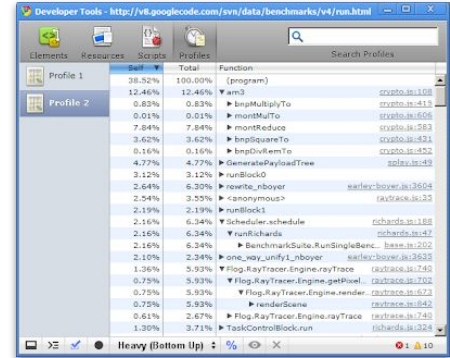
# 2012: Chrome DevTools Team



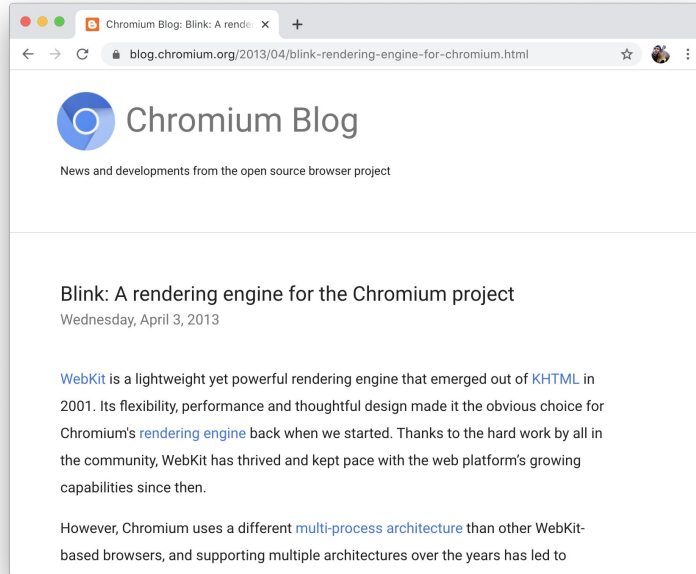
# 2012: Web Inspector Protocol



# 2012: Web Inspector Protocol



# 2013: Chrome Forked WebKit!



# 2013: Chrome DevTools Protocol



# 2015: Chrome DevTools Protocol



- 273 methods
- 98 events
- Used by IDEs for debugging
- Used by Chrome Driver internally

**2015**



**San Francisco**





**2015**



**San Francisco**



**2015**



**San Francisco**

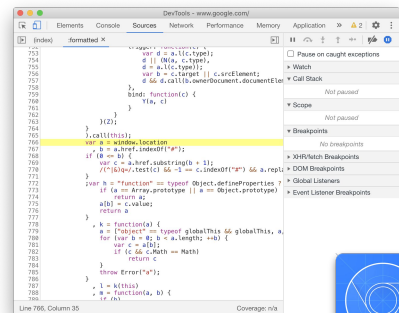
# 2015: V8 Debugging



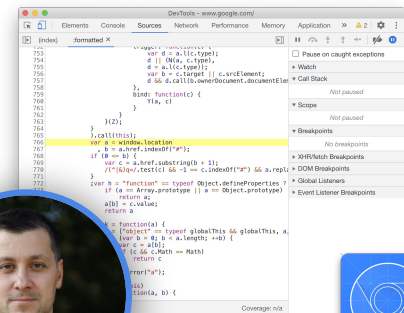
# 2015: V8 Debugging



# 2015: V8 Debugging

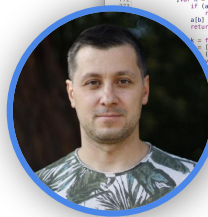
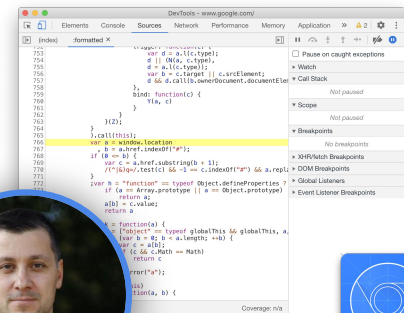


# 2015: V8 Debugging

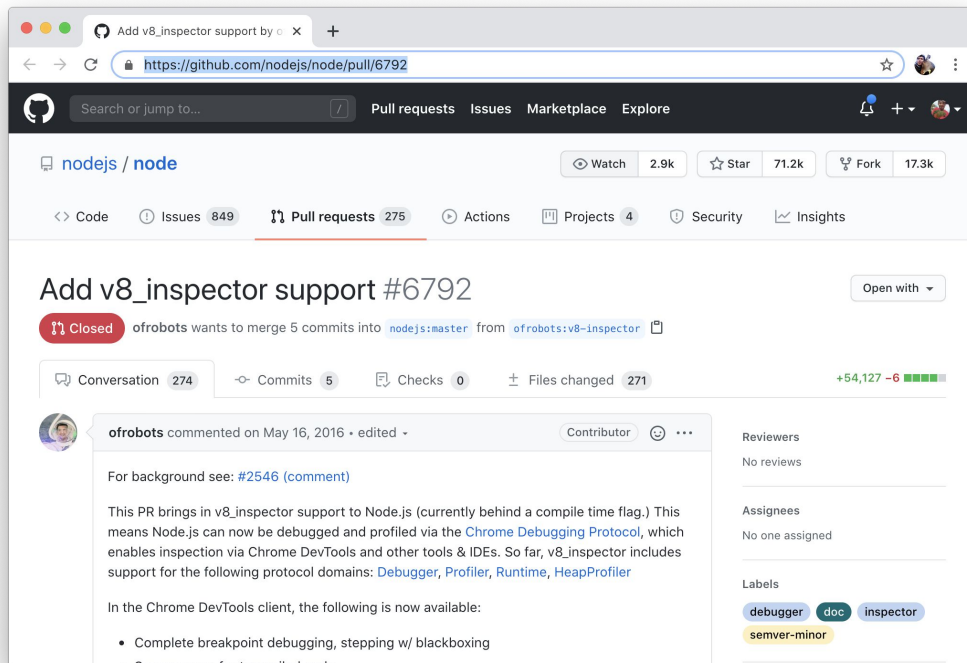


# 2015: V8 Debugging

~1.5 years of work!



# 2016: node.js debugging!



The screenshot shows a GitHub pull request page for the repository 'nodejs / node'. The pull request is titled 'Add v8\_inspector support #6792' and is in a 'Closed' state. It was created by 'ofrobots' and aims to merge 5 commits into the 'nodejs:master' branch from the 'ofrobots:v8-inspector' branch. The page shows 274 conversations, 5 commits, 0 checks, and 271 files changed. A progress bar indicates +54,127 lines added and -6 lines removed. The pull request description includes a reference to issue #2546 and explains that this PR adds v8\_inspector support to Node.js, enabling debugging and profiling via the Chrome Debugging Protocol. It lists the supported protocol domains: Debugger, Profiler, Runtime, and HeapProfiler. A list of features available in the Chrome DevTools client is provided, including complete breakpoint debugging and source maps for transpiled code.

nodejs / node

Watch 2.9k Star 71.2k Fork 17.3k

Code Issues 849 Pull requests 275 Actions Projects 4 Security Insights

## Add v8\_inspector support #6792

Closed ofrobots wants to merge 5 commits into nodejs:master from ofrobots:v8-inspector

Conversation 274 Commits 5 Checks 0 Files changed 271 +54,127 -6

ofrobots commented on May 16, 2016 · edited · Contributor

For background see: [#2546 \(comment\)](#)

This PR brings in v8\_inspector support to Node.js (currently behind a compile time flag.) This means Node.js can now be debugged and profiled via the [Chrome Debugging Protocol](#), which enables inspection via Chrome DevTools and other tools & IDEs. So far, v8\_inspector includes support for the following protocol domains: [Debugger](#), [Profiler](#), [Runtime](#), [HeapProfiler](#)

In the Chrome DevTools client, the following is now available:

- Complete breakpoint debugging, stepping w/ blackboxing
- Source maps for transpiled code

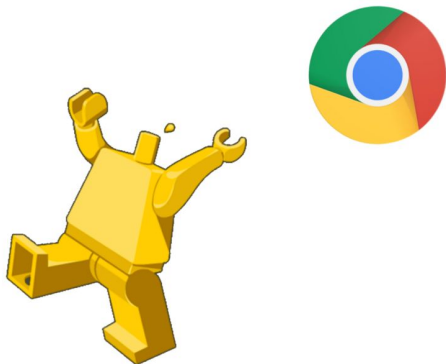
Reviewers: No reviews

Assignees: No one assigned

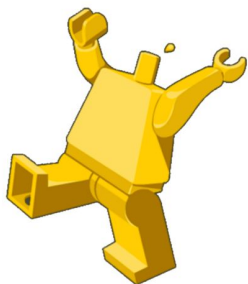
Labels: debugger, doc, inspector, semver-minor



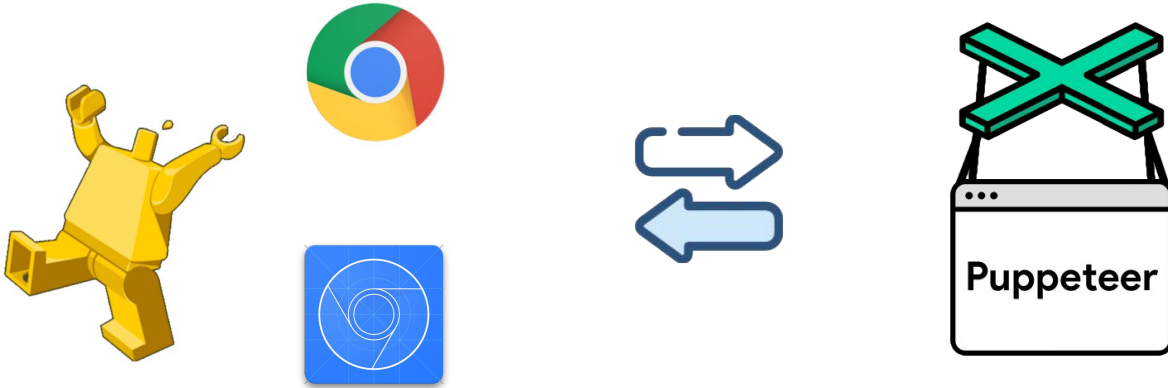
# 2017: Chrome Headless



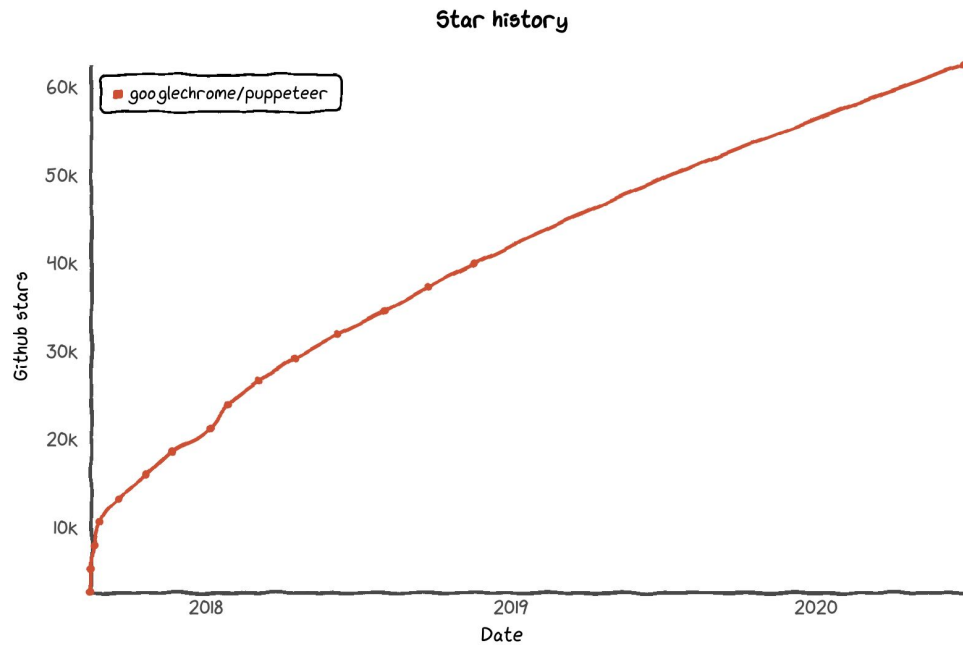
# 2017: Chrome Headless



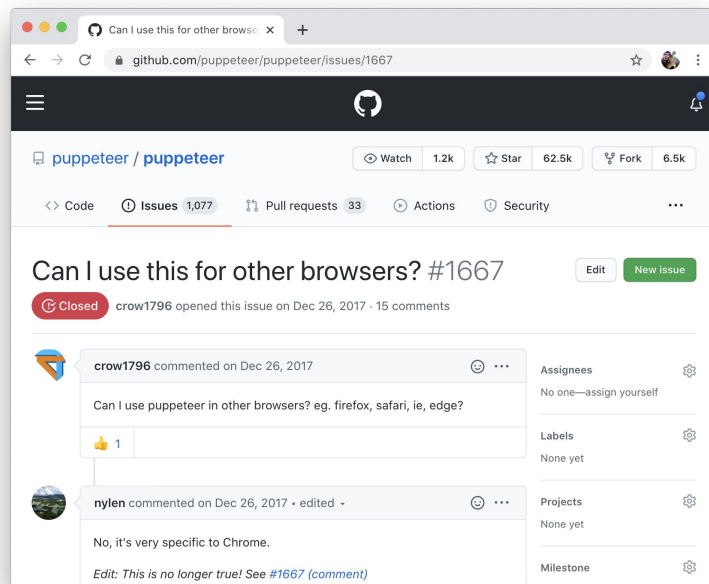
# 2017: Chrome Headless



# 2017: Puppeteer



# 2017: Cross-Browser Puppeteer



# 2018: puppeteer-firefox



# 2018: puppeteer-firefox



# 2019: puppeteer-firefox





# Remote Debugging Protocols



Web Inspector protocol (**2009** - ...)



Chrome DevTools protocol (**2013** - ...)



"Juggler" protocol (**2018** - ...)

# ACT II

## Browser vs Browser Engine

Hacker News

news.ycombinator.com

Apps Hacker News

**Hacker News** [new](#) | [past](#) | [comments](#) | [ask](#) | [show](#) | [jobs](#) | [submit](#) [login](#)

1. ▲ **iOS14 reveals that TikTok may snoop clipboard contents every few keystrokes** (twitter.com)  
972 points by georgespenner 9 hours ago | hide | 394 comments
2. ▲ **Amazon Honeycode – build web and mobile apps without writing code** (amazon.com)  
458 points by bscanlan 10 hours ago | hide | 230 comments
3. ▲ **An even worse anti-encryption bill than EARN IT** (stanford.edu)  
59 points by abecedarius 3 hours ago | hide | 10 comments
4. ▲ **Face ID and Touch ID for the Web** (developer.apple.com)  
539 points by gok 12 hours ago | hide | 228 comments
5. ▲ **Software reuse is more like an organ transplant than snapping Lego blocks (2011)** (johndcook.com)  
517 points by nilsandrey 13 hours ago | hide | 173 comments
6. ▲ **Eastern European Movies** (easterneuropeanmovies.com)  
52 points by danielam 2 hours ago | hide | 21 comments
7. ▲ **How to Write PureScript React Components to Replace JavaScript** (thomashoneyman.com)  
40 points by JacksonGariety 4 hours ago | hide | 6 comments
8. ▲ **Amazon establishes new Counterfeit Crimes Unit** (aboutamazon.com)  
281 points by ssully 14 hours ago | hide | 211 comments
9. ▲ **No, Safari 14 does not block Google Analytics** (simoahava.com)  
196 points by TomAnthony 11 hours ago | hide | 42 comments
10. ▲ **Perl 7 is going to be Perl 5.32, mostly** (perl.com)  
581 points by datanut 14 hours ago | hide | 485 comments



Browser

The screenshot shows a web browser window with the following details:

- Tab: Hacker News
- Address bar: news.ycombinator.com
- Page title: Hacker News
- Page content: A list of 10 news items, each with a title, source, points, author, and time.

**Hacker News** new | past | comments | ask | show | jobs | submit login

1. ▲ iOS14 reveals that TikTok may snoop clipboard contents every few keystrokes (twitter.com)  
972 points by georgespenner 9 hours ago | hide | 394 comments
2. ▲ Amazon Honeycode – build web and mobile apps without writing code (amazon.com)  
458 points by bscanlan 10 hours ago | hide | 230 comments
3. ▲ An even worse anti-encryption bill than EARN IT (stanford.edu)  
59 points by abecedarius 3 hours ago | hide | 10 comments
4. ▲ Face ID and Touch ID for the Web (developer.apple.com)  
539 points by gok 12 hours ago | hide | 228 comments
5. ▲ Software reuse is more like an organ transplant than snapping Lego blocks (2011) (johndcook.com)  
517 points by nilsandrey 13 hours ago | hide | 173 comments
6. ▲ Eastern European Movies (easterneuropeanmovies.com)  
52 points by danielam 2 hours ago | hide | 21 comments
7. ▲ How to Write PureScript React Components to Replace JavaScript (thomashoneyman.com)  
40 points by JacksonGariety 4 hours ago | hide | 6 comments
8. ▲ Amazon establishes new Counterfeit Crimes Unit (aboutamazon.com)  
281 points by ssully 14 hours ago | hide | 211 comments
9. ▲ No, Safari 14 does not block Google Analytics (simoahava.com)  
196 points by TomAnthony 11 hours ago | hide | 42 comments
10. ▲ Perl 7 is going to be Perl 5.32, mostly (perl.com)  
581 points by datanut 14 hours ago | hide | 485 comments



# Browser



**Hacker News** new | past | comments | ask | show | jobs | submit login

1. ▲ **iOS14 reveals that TikTok may snoop clipboard contents every few keystrokes** (twitter.com)  
972 points by georgespenner 9 hours ago | hide | 394 comments
2. ▲ **Amazon Honeycode – build web and mobile apps without writing code** (amazon.com)  
458 points by bscanlan 10 hours ago | hide | 230 comments
3. ▲ **An even worse anti-encryption bill than EARN IT** (stanford.edu)  
59 points by abecedarius 3 hours ago | hide | 10 comments
4. ▲ **Face ID and Touch ID for the Web** (developer.apple.com)  
539 points by gok 12 hours ago | hide | 228 comments
5. ▲ **Software reuse is more like an organ transplant than snapping Lego blocks (2011)** (johndcook.com)  
517 points by nilsandrey 13 hours ago | hide | 173 comments
6. ▲ **Eastern European Movies** (easterneuropeanmovies.com)  
52 points by danielam 2 hours ago | hide | 21 comments
7. ▲ **How to Write PureScript React Components to Replace JavaScript** (thomashoneyman.com)  
40 points by JacksonGariety 4 hours ago | hide | 6 comments
8. ▲ **Amazon establishes new Counterfeit Crimes Unit** (aboutamazon.com)  
281 points by sully 14 hours ago | hide | 211 comments
9. ▲ **No, Safari 14 does not block Google Analytics** (simoahava.com)  
196 points by TomAnthony 11 hours ago | hide | 42 comments
10. ▲ **Perl 7 is going to be Perl 5.32, mostly** (perl.com)  
581 points by datanut 14 hours ago | hide | 485 comments



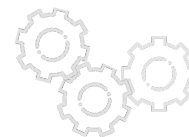
Browser



Hacker News  
news.ycombinator.com

Hacker News  
new | past | comments | ask | show | jobs | submit login

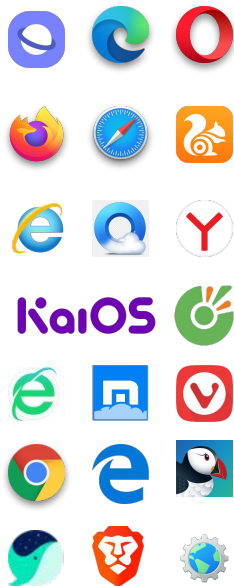
1. ▲ iOS14 reveals that TikTok may snoop clipboard contents every few keystrokes (twitter.com)  
972 points by georgespencer 9 hours ago | hide | 394 comments
2. ▲ Amazon Honeycode – build web and mobile apps without writing code (amazon.com)  
458 points by bscanlan 10 hours ago | hide | 230 comments
3. ▲ An even worse anti-encryption bill than EARN IT (stanford.edu)  
59 points by abecedarius 3 hours ago | hide | 10 comments
4. ▲ Face ID and Touch ID for the Web (developer.apple.com)  
539 points by gok 12 hours ago | hide | 228 comments
5. ▲ Software reuse is more like an organ transplant than snapping Lego blocks (2011) (johndcook.com)  
517 points by nilsandrey 13 hours ago | hide | 173 comments
6. ▲ Eastern European Movies (easterneuropeanmovies.com)  
52 points by danielam 2 hours ago | hide | 21 comments
7. ▲ How to Write PureScript React Components to Replace JavaScript (thomashoneyman.com)  
40 points by JacksonGariety 4 hours ago | hide | 6 comments
8. ▲ Amazon establishes new Counterfeit Crimes Unit (aboutamazon.com)  
281 points by ssully 14 hours ago | hide | 211 comments
9. ▲ No, Safari 14 does not block Google Analytics (simoahava.com)  
196 points by TomAnthony 11 hours ago | hide | 42 comments
10. ▲ Perl 7 is going to be Perl 5.32, mostly (perl.com)  
581 points by datanut 14 hours ago | hide | 485 comments



Browser Engine

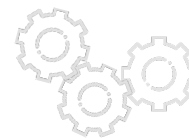


Browser

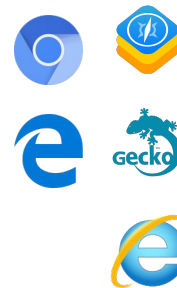


Hacker News  
new | past | comments | ask | show | jobs | submit login

1. ▲ iOS14 reveals that TikTok may snoop clipboard contents every few keystrokes (twitter.com)  
972 points by georgespencer 9 hours ago | hide | 394 comments
2. ▲ Amazon Honeycode – build web and mobile apps without writing code (amazon.com)  
458 points by bscanlan 10 hours ago | hide | 230 comments
3. ▲ An even worse anti-encryption bill than EARN IT (stanford.edu)  
59 points by abecedarius 3 hours ago | hide | 10 comments
4. ▲ Face ID and Touch ID for the Web (developer.apple.com)  
539 points by gok 12 hours ago | hide | 228 comments
5. ▲ Software reuse is more like an organ transplant than snapping Lego blocks (2011) (johndcook.com)  
517 points by nilsandrey 13 hours ago | hide | 173 comments
6. ▲ Eastern European Movies (easterneuropeanmovies.com)  
52 points by danielam 2 hours ago | hide | 21 comments
7. ▲ How to Write PureScript React Components to Replace JavaScript (thomashoneyman.com)  
40 points by JacksonGariety 4 hours ago | hide | 6 comments
8. ▲ Amazon establishes new Counterfeit Crimes Unit (aboutamazon.com)  
281 points by sully 14 hours ago | hide | 211 comments
9. ▲ No, Safari 14 does not block Google Analytics (simoahava.com)  
196 points by TomAnthony 11 hours ago | hide | 42 comments
10. ▲ Perl 7 is going to be Perl 5.32, mostly (perl.com)  
581 points by datanut 14 hours ago | hide | 485 comments



Browser Engine



# Browser Engines 2020



Chromium (2008 – ...)



WebKit (1998 – ...)



Gecko (1997 – ...)



# Browser Engines 2020



Chromium (2008 – ...)



Trident (1997 - **2014**)



WebKit (1998 – ...)

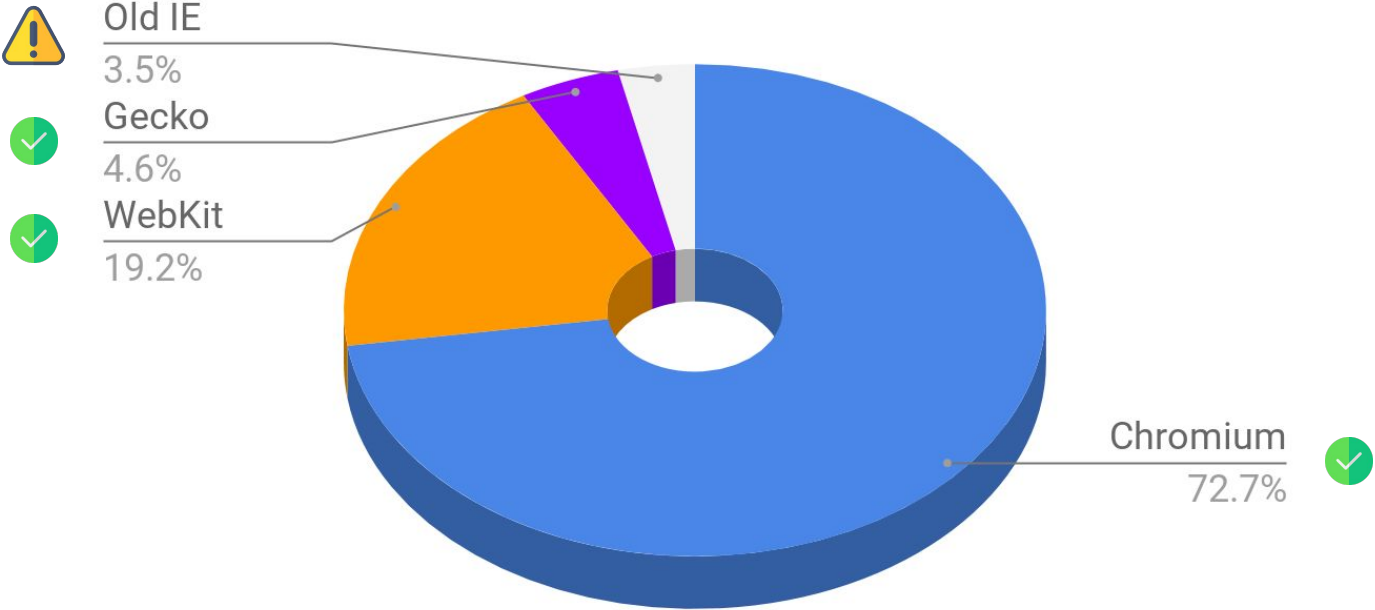


EdgeHTML (2014 – **2018**)

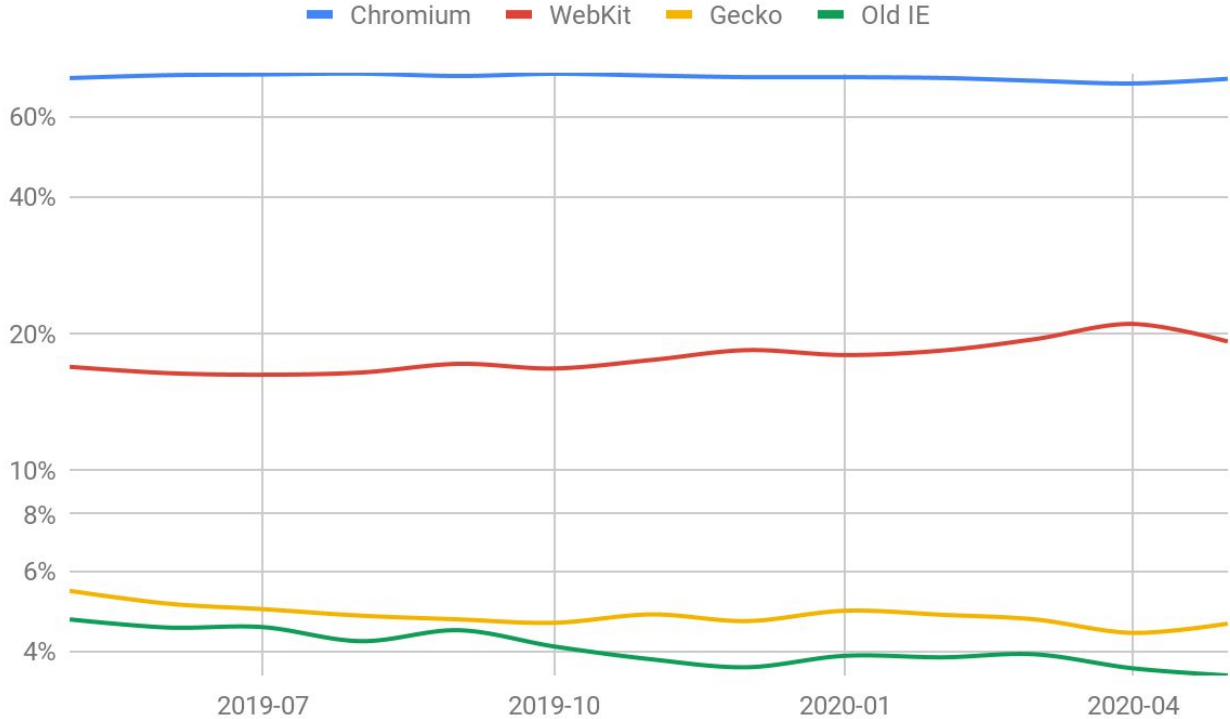


Gecko (1997 – ...)

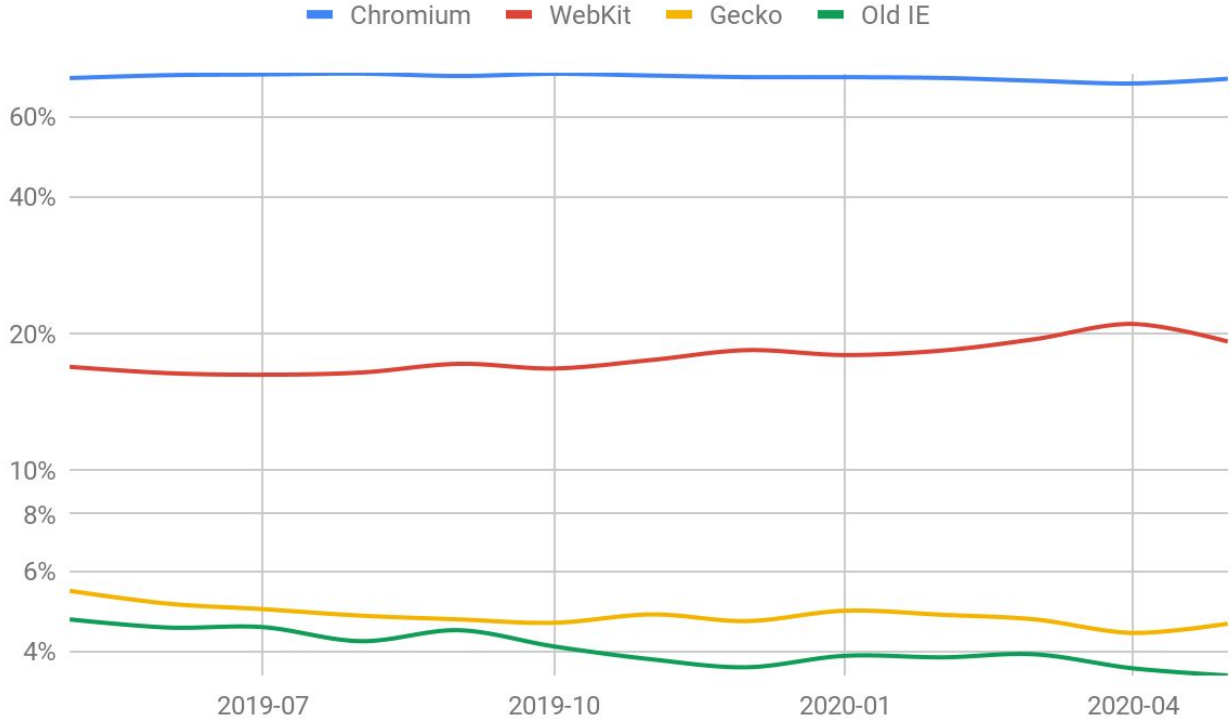
# Browser Engines Market Share 2020



# Market Share Dynamics 2020



# Market Share Dynamics 2020



# Web Testing = 3 Browser Engines



Chrome / Chromium



Safari / WebKit

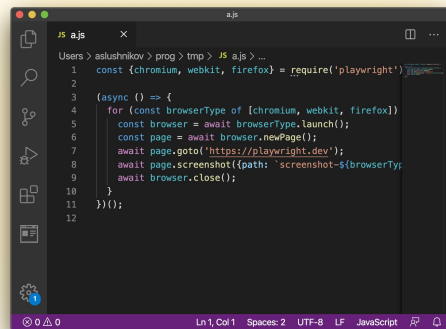


Firefox / Gecko

# ACT III

## Web Testing Drama

# Web Testing



```
Users > aslushnikov > prog > tmp > .\ .js > ...
1  const {chromium, webkit, firefox} = require('playwright');
2
3
4  (async () => {
5    for (const browserType of [chromium, webkit, firefox])
6      const browser = await browserType.launch();
7      const page = await browser.newPage();
8      await page.goto('https://playwright.dev');
9      await page.screenshot({path: `screenshot-${browserType}`});
10     await browser.close();
11   })();
12
```

Ln 1, Col 1 Spaces: 2 UTF-8 LF JavaScript

# Web Testing

```
Users > aslushnikov > prog > tmp > $S ajs > ...
1  const {chromium, webkit, firefox} = require('playwright');
2
3
4  (async () => {
5    for (const browserType of [chromium, webkit, firefox])
6      const browser = await browserType.launch();
7      const page = await browser.newPage();
8      await page.goto('https://playwright.dev');
9      await page.screenshot({path: `screenshot-${browserType}`});
10     await browser.close();
11   })();
12
```



PWA

JS





# Web Testing

```
Users > aslushnikov > prog > tmp > .\ ajs > ...
1  const {chromium, webkit, firefox} = require('playwright');
2
3
4  (async () => {
5    for (const browserType of [chromium, webkit, firefox])
6      const browser = await browserType.launch();
7      const page = await browser.newPage();
8      await page.goto('https://playwright.dev');
9      await page.screenshot({path: `screenshot-${browserType}`});
10     await browser.close();
11   })();
12
```



PWA



JS



# Web Testing

```
Users > aslushnikov > prog > tmp > .\s ajs > ...
1  const {chromium, webkit, firefox} = require('playwright');
2
3
4  (async () => {
5    for (const browserType of [chromium, webkit, firefox])
6      const browser = await browserType.launch();
7      const page = await browser.newPage();
8      await page.goto('https://playwright.dev');
9      await page.screenshot({path: `screenshot-${browserType}`});
10     await browser.close();
11   })();
12
```



PWA



JS



+ headless

# Web Testing



```
1 jhnikov > prog > tmp > $S ajs > ...  
2  
3 const {chromium, webkit, firefox} = require('playwright')  
4  
5 (async () => {  
6   for (const browserType of [chromium, webkit, firefox])  
7     const browser = await browserType.launch();  
8     const page = await browser.newPage();  
9     await page.goto('https://playwright.dev');  
10    await page.screenshot({path: `screenshot-${browserType}.png`});  
11  })();  
12
```



PWA



+ headless

JS



# Web Testing

**DOES NOT EXIST\***



aws



PWA












JS

+ headless












# Problem #1: WebKit






			
Headful			
Headless			

# Problem #1: WebKit



			
Headful			
Headless			

# Problem #2: Automation Technology




				<b>PWA</b>
<b>WebDriver</b>				
<b>Chrome DevTools Protocol</b>				
<b>WebInspector protocol</b>				
<b>Juggler protocol</b>				

# Problem #2: Automation Technology

Permissions,  
Geolocation,  
ServiceWorkers,  
Network,

...






















				<b>PWA</b>
<b>WebDriver</b>				
<b>Chrome DevTools Protocol</b>				
<b>WebInspector protocol</b>				
<b>Juggler protocol</b>				



# Problem #2: Automation Technology

Permissions,  
Geolocation,  
ServiceWorkers,  
Network,  
...























				<b>PWA</b>
<b>WebDriver</b>				
<b>Chrome DevTools Protocol</b>				
<b>WebInspector protocol</b>				
<b>Juggler protocol</b>				

# Problem #2: Automation Technology

Permissions,  
Geolocation,  
ServiceWorkers,  
Network,

...

				<b>PWA</b> 
<b>WebDriver</b>				
<b>Chrome DevTools Protocol</b>				
<b>WebInspector protocol</b>				
<b>Juggler protocol</b>				

# ACT IV

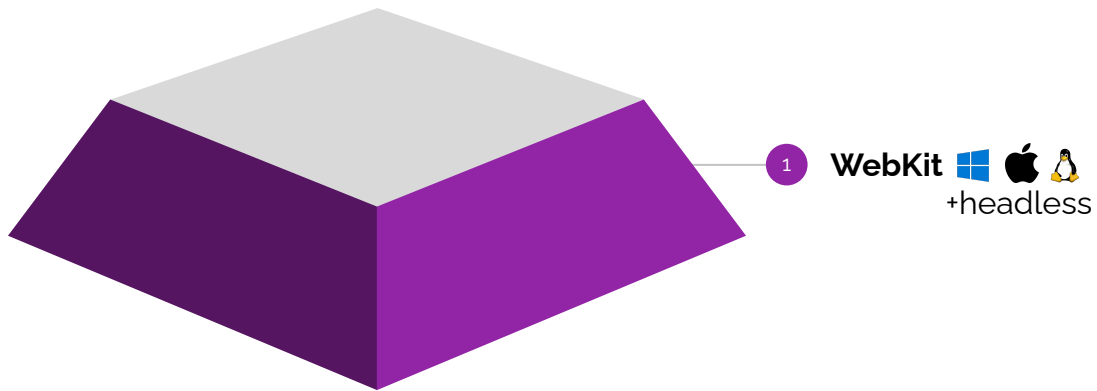


# Playwright

[github.com/microsoft/playwright](https://github.com/microsoft/playwright)



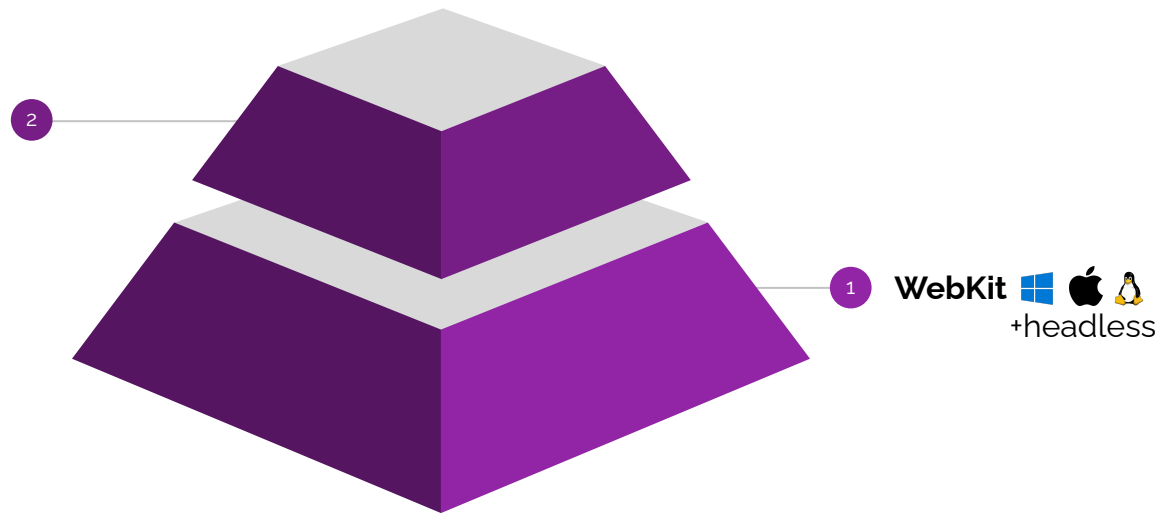
# Project “Playwright”



# Project “Playwright”

## Browser Automation Protocols

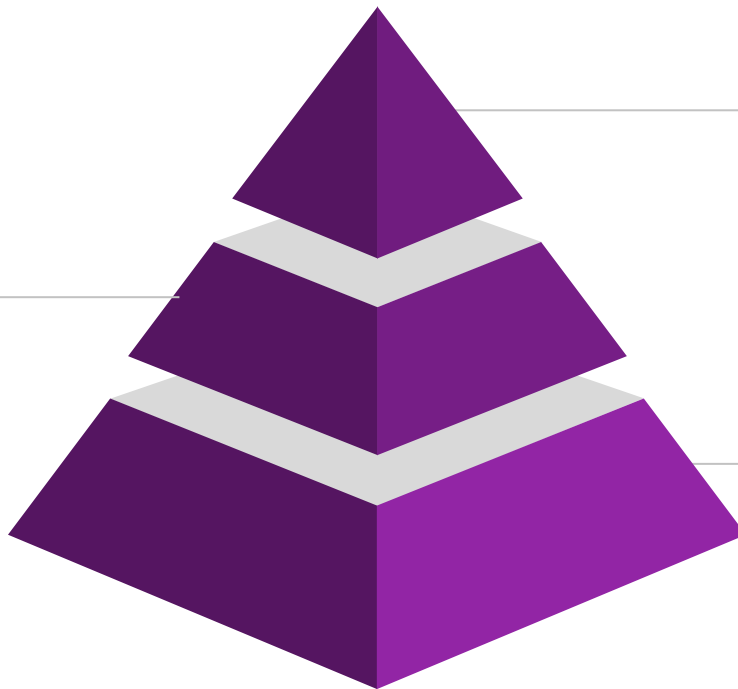
- Chrome DevTools protocol
  - WebInspector protocol
    - Juggler protocol
    -



# Project “Playwright”

## Browser Automation Protocols

- Chrome DevTools protocol
- WebInspector protocol
  - Juggler protocol
  -



“Playwright” 

Library for browser automation

1 **WebKit**     
+headless

⌘1

Default

aslushnikov:~/demo\$



⌘1

Default

```
aslushnikov:~/demo$ npm i playwright
```

⌘1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [==                ] 9% 20.7s █
```

⌘1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [===== ] 73% 5.5s █
```

⌘1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [=====] 100% 0.0s
```

```
chromium v775089 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/chromium-775089
```

```
Downloading firefox v1106 - 69.5 Mb [=== ] 16% 22.3s █
```

⌘1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [=====] 100% 0.0s
```

```
chromium v775089 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/chromium-775089
```

```
Downloading firefox v1106 - 69.5 Mb [===== ] 81% 3.8s █
```

⏏️ ⏏️ ⏏️ ㄿ⌘1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [=====] 100% 0.0s
```

```
chromium v775089 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/chromium-775089
```

```
Downloading firefox v1106 - 69.5 Mb [=====] 100% 0.0s
```

```
firefox v1106 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/firefox-1106
```

```
Downloading webkit v1269 - 47.6 Mb [==== ] 22% 9.6s █
```

⏏️ ⏏️ ⏏️ ㏸1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [=====] 100% 0.0s
```

```
chromium v775089 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/chromium-775089
```

```
Downloading firefox v1106 - 69.5 Mb [=====] 100% 0.0s
```

```
firefox v1106 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/firefox-1106
```

```
Downloading webkit v1269 - 47.6 Mb [===== ] 86% 1.7s █
```

⏏️ ⌘1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [=====] 100% 0.0s
```

```
chromium v775089 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/chromium-775089
```

```
Downloading firefox v1106 - 69.5 Mb [=====] 100% 0.0s
```

```
firefox v1106 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/firefox-1106
```

```
Downloading webkit v1269 - 47.6 Mb [=====] 100% 0.0s
```

```
webkit v1269 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/webkit-1269
```

```
npm WARN demo@1.0.0 No description
```

```
npm WARN demo@1.0.0 No repository field.
```

```
+ playwright@1.1.1
```

```
updated 1 package and audited 37 packages in 60.497s
```

```
found 0 vulnerabilities
```

```
aslushnikov:~/demo$ █
```



⬤ ⬢ ⬤ ~\$1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [=====] 100% 0.0s
```

```
chromium v775089 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/chromium-775089
```

```
Downloading firefox v1106 - 69.5 Mb [=====] 100% 0.0s
```

```
firefox v1106 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/firefox-1106
```

```
Downloading webkit v1269 - 47.6 Mb [=====] 100% 0.0s
```

```
webkit v1269 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/webkit-1269
```

```
npm WARN demo@1.0.0 No description
```

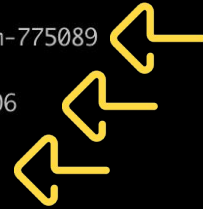
```
npm WARN demo@1.0.0 No repository field.
```

```
+ playwright@1.1.1
```

```
updated 1 package and audited 37 packages in 60.497s
```

```
found 0 vulnerabilities
```

```
aslushnikov:~/demo$ █
```



⬤ ⬢ ⬤ ~\$1

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [=====] 100% 0.0s
```

```
chromium v775089 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/chromium-775089
```

```
Downloading firefox v1106 - 69.5 Mb [=====] 100% 0.0s
```

```
firefox v1106 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/firefox-1106
```

```
Downloading webkit v1269 - 47.6 Mb [=====] 100% 0.0s
```

```
webkit v1269 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/webkit-1269
```

```
npm WARN demo@1.0.0 No description
```

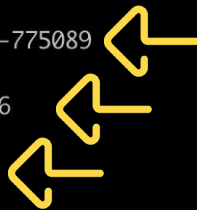
```
npm WARN demo@1.0.0 No repository field.
```

```
+ playwright@1.1.1
```

```
updated 1 package and audited 37 packages in 60.497s
```

```
found 0 vulnerabilities
```

```
aslushnikov:~/demo$ █
```



Browsers are reused!

aslushnikov:~/demo\$

Default

```
aslushnikov:~/demo$ npm i playwright
```

```
> playwright@1.1.1 install /Users/aslushnikov/demo/node_modules/playwright
```

```
> node install.js
```

```
Downloading chromium v775089 - 125.5 Mb [=====] 100% 0.0s
```

```
chromium v775089 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/chromium-775089
```

```
Downloading firefox v1106 - 69.5 Mb [=====] 100% 0.0s
```

```
firefox v1106 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/firefox-1106
```

```
Downloading webkit v1269 - 47.6 Mb [=====] 100% 0.0s
```

```
webkit v1269 downloaded to /Users/aslushnikov/Library/Caches/ms-playwright/webkit-1269
```

```
npm WARN demo@1.0.0 No description
```

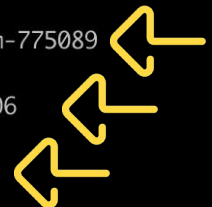
```
npm WARN demo@1.0.0 No repository field.
```

```
+ playwright@1.1.1
```

```
updated 1 package and audited 37 packages in 60.497s
```

```
found 0 vulnerabilities
```

```
aslushnikov:~/demo$
```



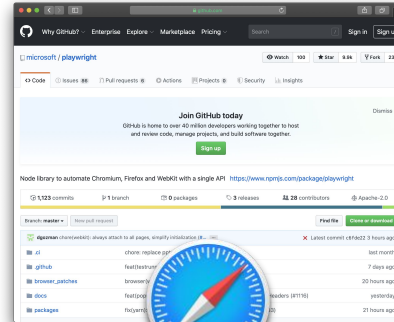
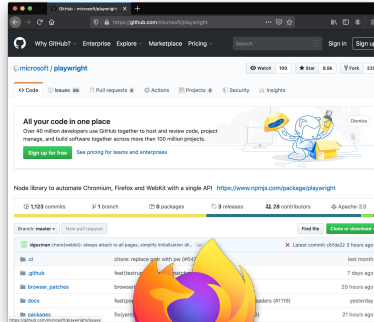
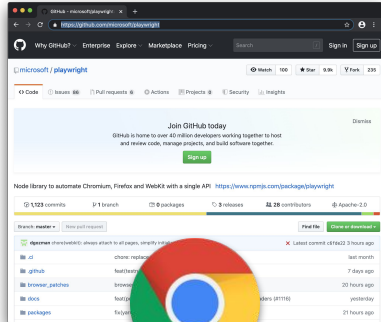


# Demo Time!

[github.com/aslushnikov/holyjs-2020-demo](https://github.com/aslushnikov/holyjs-2020-demo)

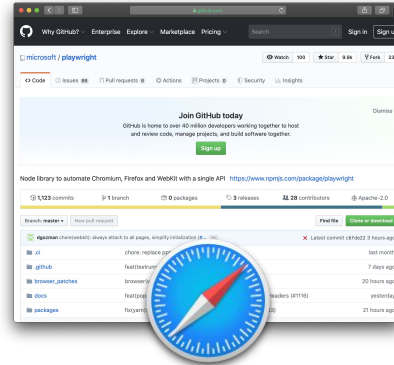
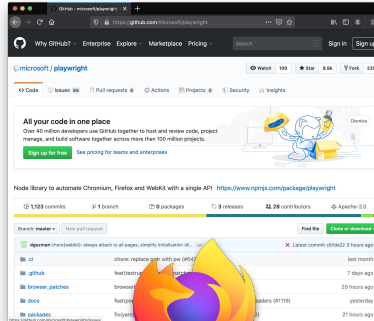
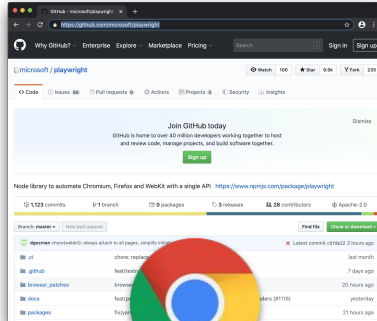


# Playwright



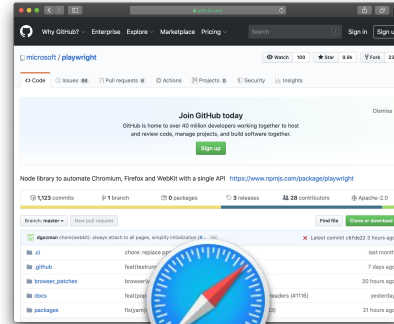
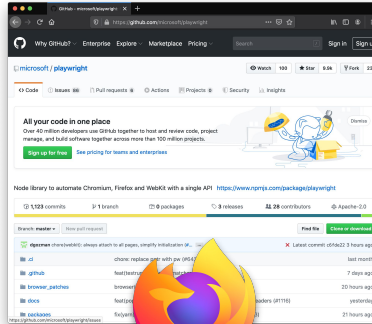
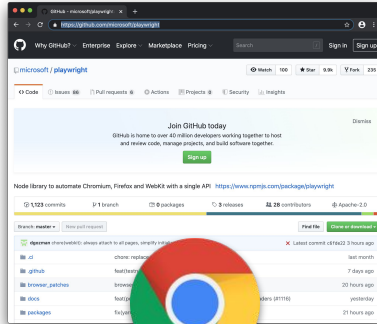


# Playwright





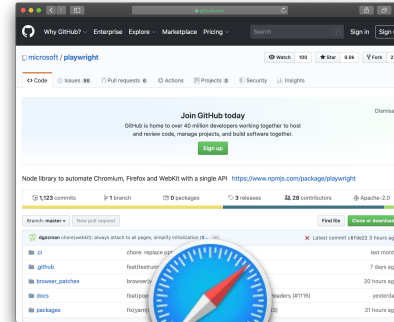
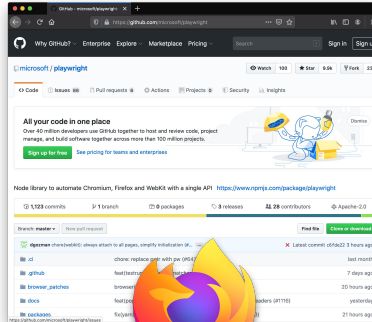
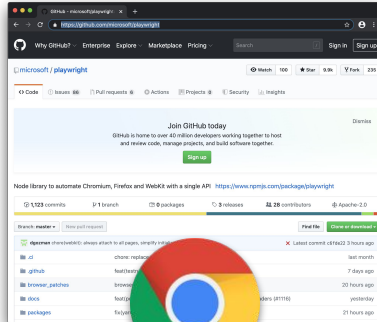
# Playwright



+ headless



# Playwright



+ headless



# Web Testing



```
1 jhnikov > prog > tmp > $S ajs > ...  
2 const {chromium, webkit, firefox} = require('playwright')  
3  
4 (async () => {  
5   for (const browserType of [chromium, webkit, firefox])  
6     const browser = await browserType.launch();  
7     const page = await browser.newPage();  
8     await page.goto('https://playwright.dev');  
9     await page.screenshot({path: `screenshot-${browserType}.png`});  
10  }  
11  })();  
12
```



PWA



+ headless

JS



# Web Testing



PLAYWRIGHT

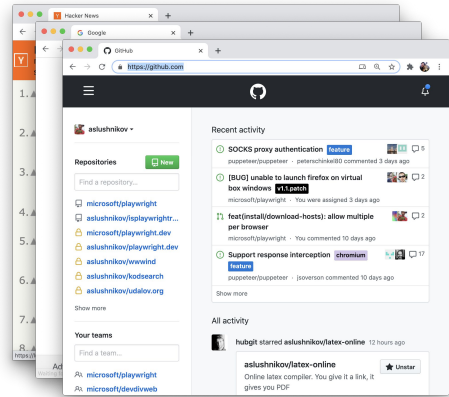
+ headless

# Act V

## Capabilities

# Browser Contexts

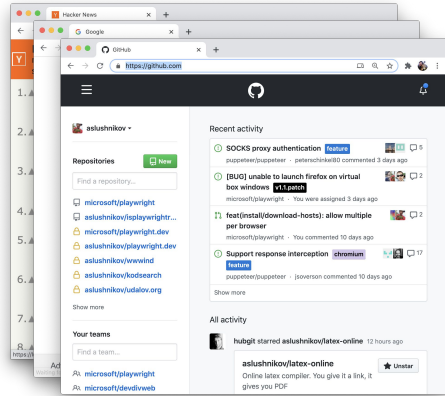
# Browser Contexts



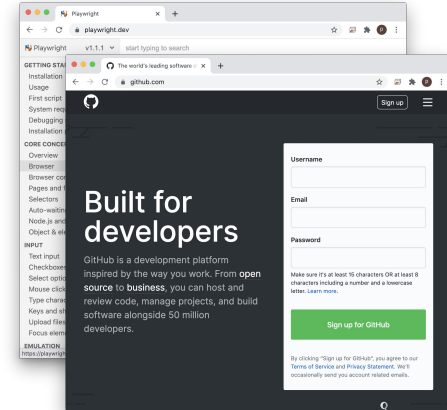
Context 1



# Browser Contexts



Context 1



Context 2





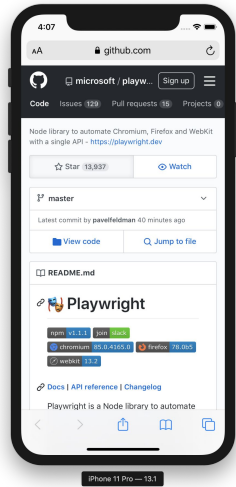
# Demo Time!

[github.com/aslushnikov/holyjs-2020-demo](https://github.com/aslushnikov/holyjs-2020-demo)

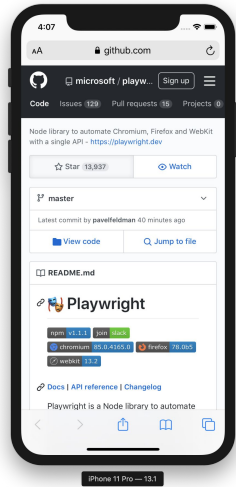
# Demo Recap



# Demo Recap

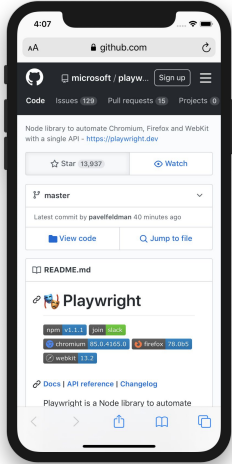


# Demo Recap



Geolocation

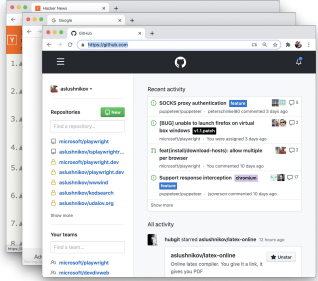
# Demo Recap



iPhone 11 Pro — 13.1

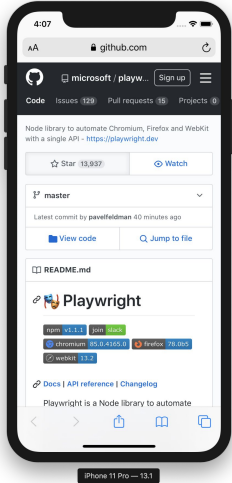


Geolocation

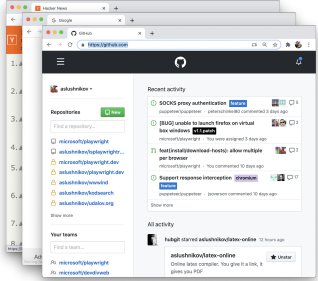


Browser Context

# Demo Recap



Geolocation

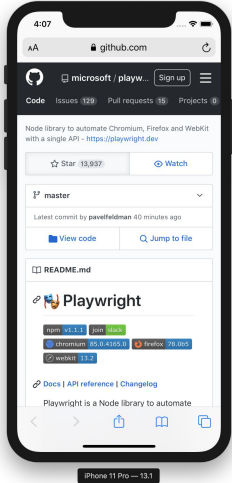


Browser Context

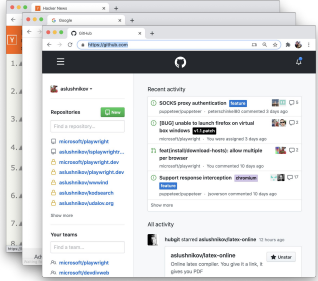
HTTP(s)



# Demo Recap



Geolocation



Browser Context

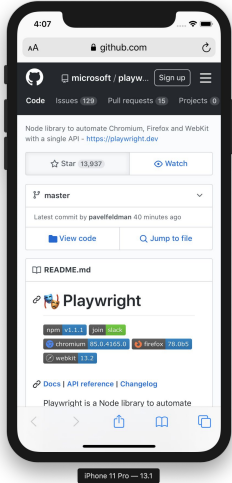
WEB Proxy



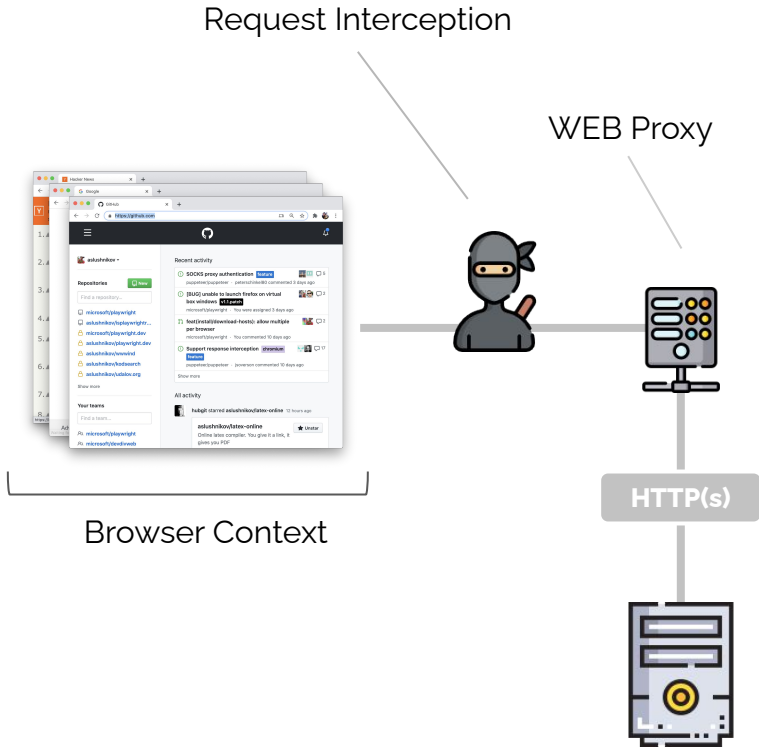
HTTP(s)



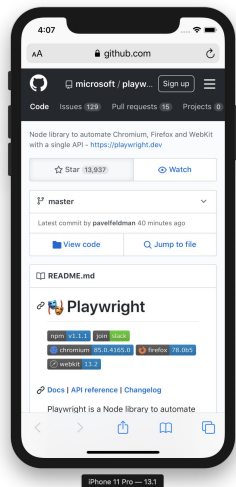
# Demo Recap



Geolocation



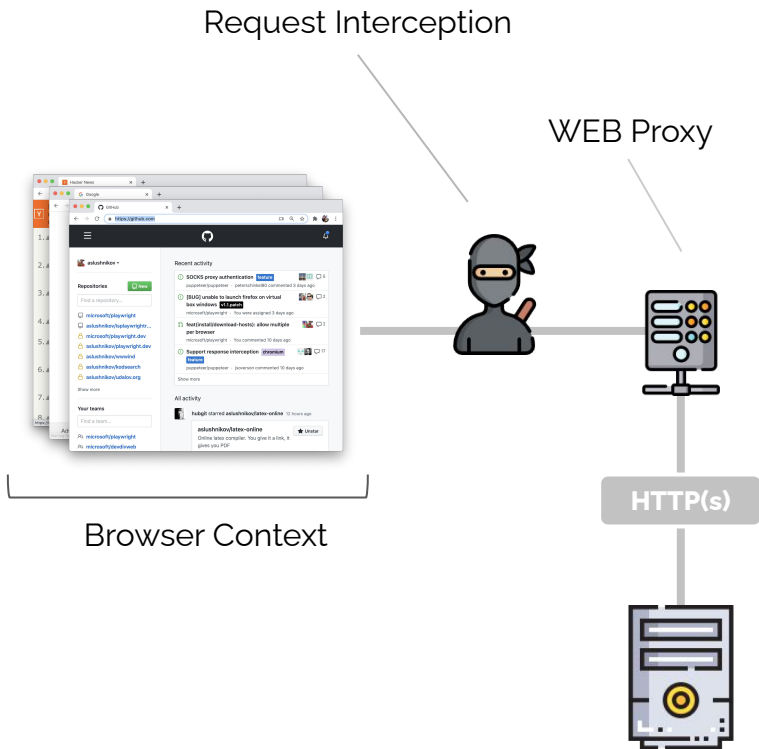
# Demo Recap



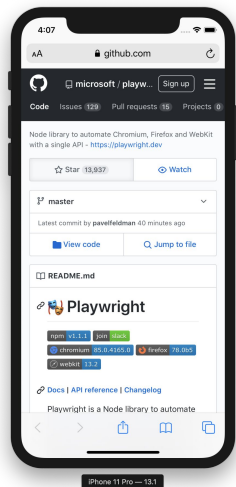
Geolocation



Timezone & Locale Emulation



# Demo Recap



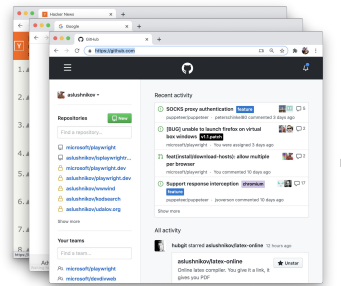
Geolocation



Timezone & Locale Emulation



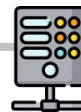
Color Scheme Emulation



Browser Context

Request Interception

WEB Proxy



HTTP(s)







**Andrey Lushnikov**



@aslushnikov



aslushnikov@gmail.com



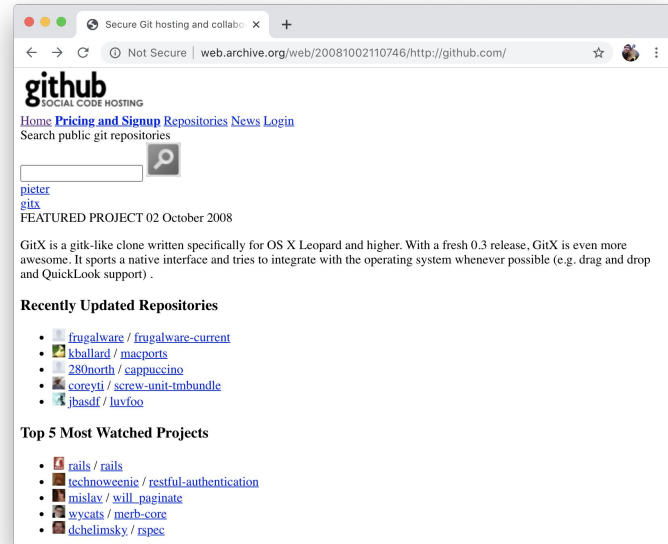
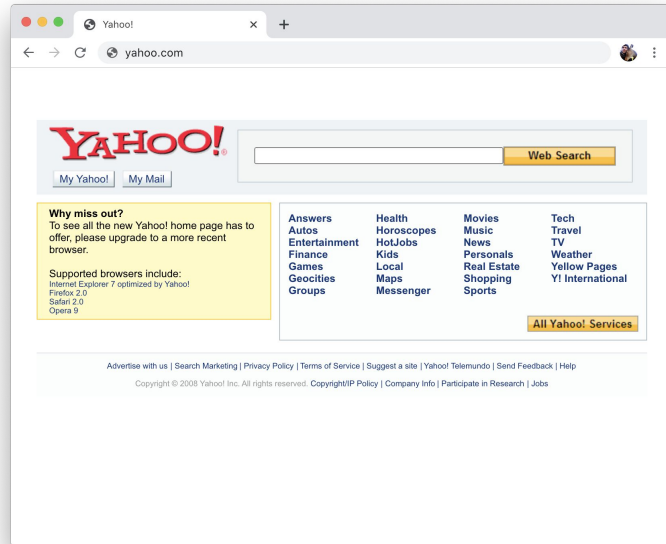




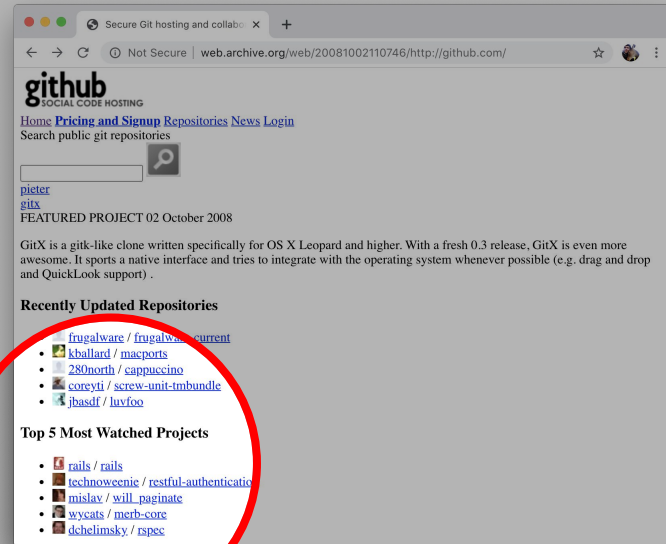
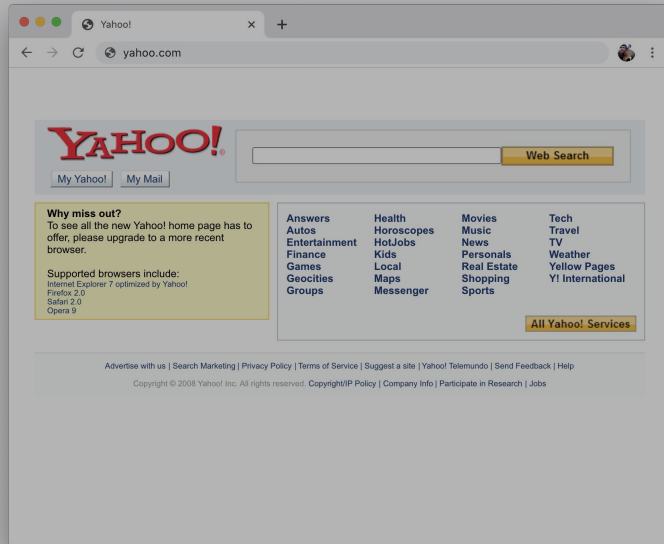


**2008**

# 2008: Web Sites

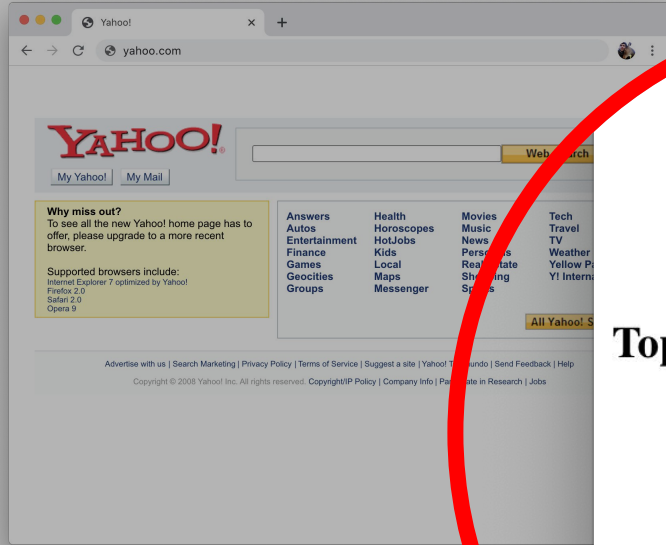


# 2008: Web Sites





# 2008: Web Sites



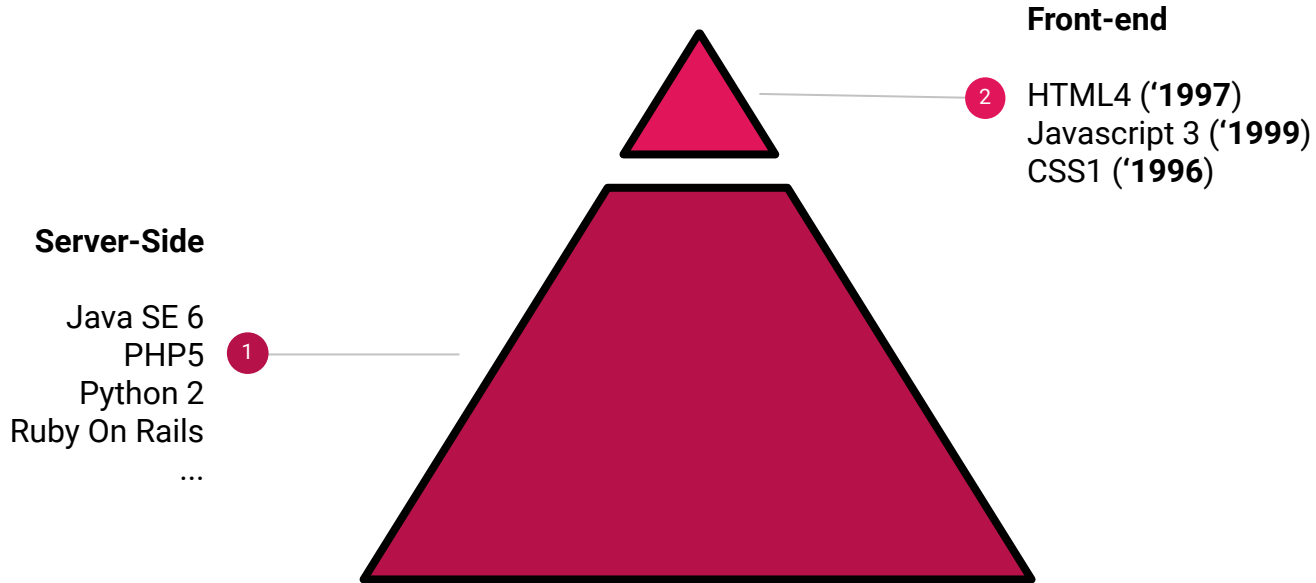
[frugalware](#) / [frugalware](#)

- [kballard](#) / [macports](#)
- [280north](#) / [cappuccino](#)
- [coreyti](#) / [screw-unit-tmbundle](#)
- [jbasdf](#) / [luvfoo](#)

## Top 5 Most Watched Projects

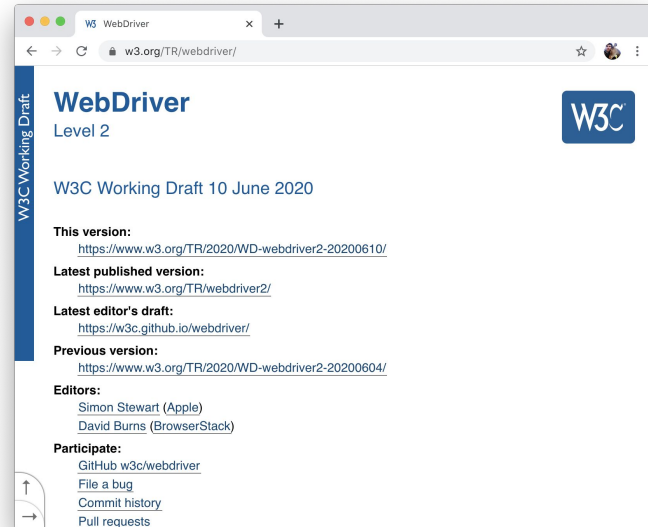
- [rails](#) / [rails](#)
- [technoweenie](#) / [restful-authentication](#)
- [mislav](#) / [will\\_paginate](#)
- [wycats](#) / [merb-core](#)
- [dchelimsky](#) / [rspec](#)

# 2008: Web Development



# 2008: Web Testing

- One protocol, all browsers
- Well-Scoped
- Black-box testing



2009

# 2009: Web Inspector Protocol



27541 - Web Inspector: Split InspectorController into InspectorController and InspectorBackend

bugs.webkit.org/show\_bug.cgi?id=27541

## WebKit Bugzilla

Bug 27541: Web Inspector: Split InspectorController into InspectorController and InspectorBackend

[Home](#) | [New](#) | [Browse](#) | [Search](#) |   [?] | [Reports](#) | [Requests](#) | [Help](#) | [New Account](#) | [Log In](#)  
[Forgot Password](#)

### Bug 27541 - Web Inspector: Split InspectorController into InspectorController and InspectorBackend

**Status:** RESOLVED FIXED      **Reported:** 2009-07-22 07:48 PDT by Pavel Feldman  
**Alias:** None      **Modified:** 2009-09-11 20:05 PDT ([History](#))  
**Product:** WebKit      **CC List:** 2 users ([show](#))  
**Component:** Web Inspector (Deprecated) ([show other bugs](#))      **See Also:**  
**Version:** S28+ (Nightly build)  
**Hardware:** All All

**Importance:** P3 Normal  
**Assignee:** Nobody

**URL:**  
**Keywords:**

**Depends on:**  
**Blocks:**

---

#### Attachments

<a href="#">(clearing review request)</a> (138 bytes, text/plain) 2009-07-25 03:00 PDT, Pavel Feldman	<i>no flags</i>	<a href="#">Details</a>
--	-----------------	-------------------------

# 2009: Web Inspector Protocol



**2010**

**2011**



**2012**

**2013**

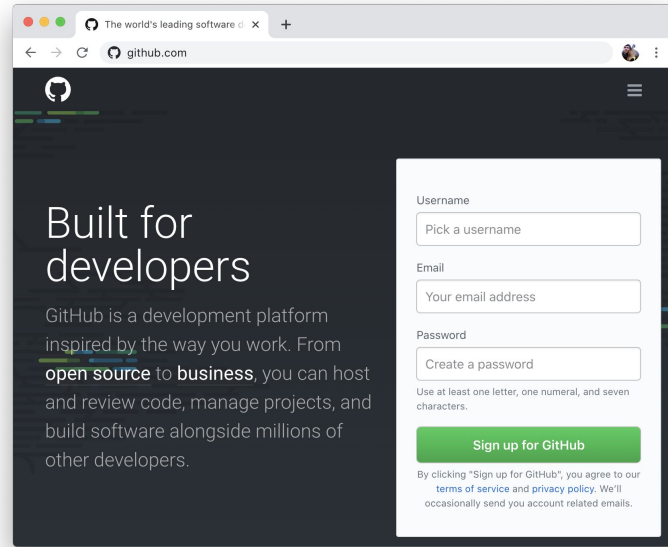
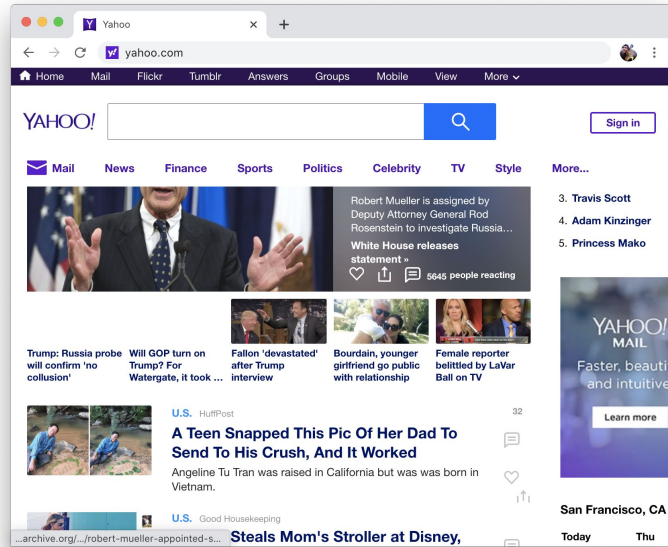
**2014**

**2015**

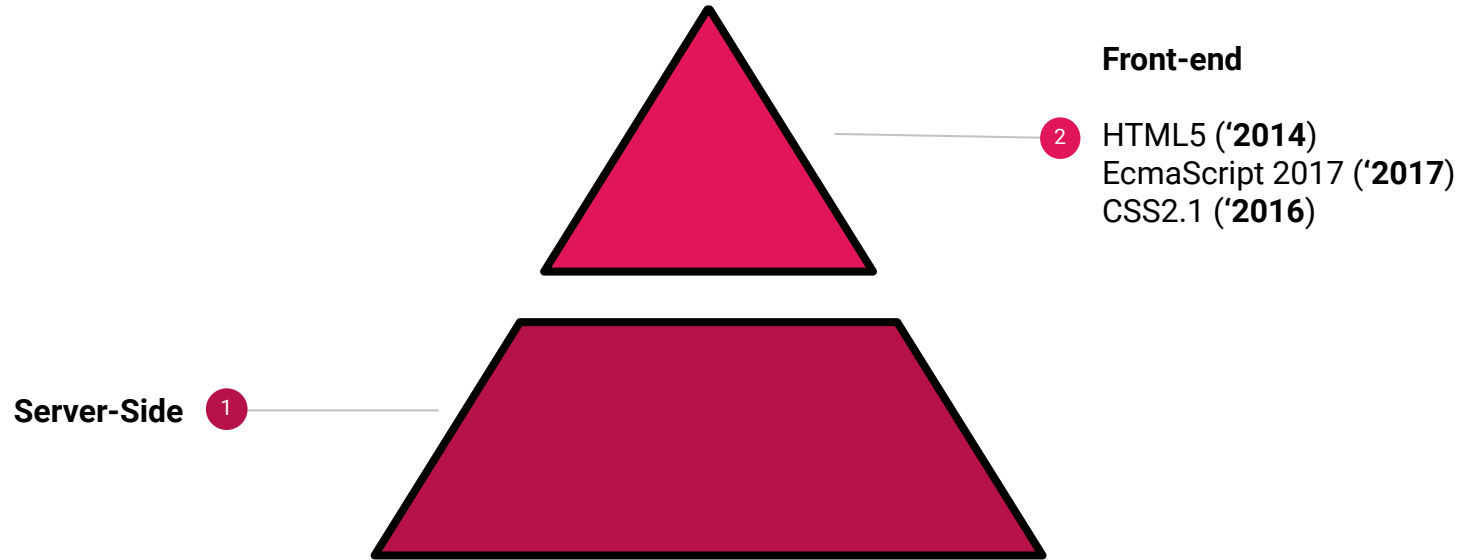
**2016**

**2017**

# 2017: Web Sites



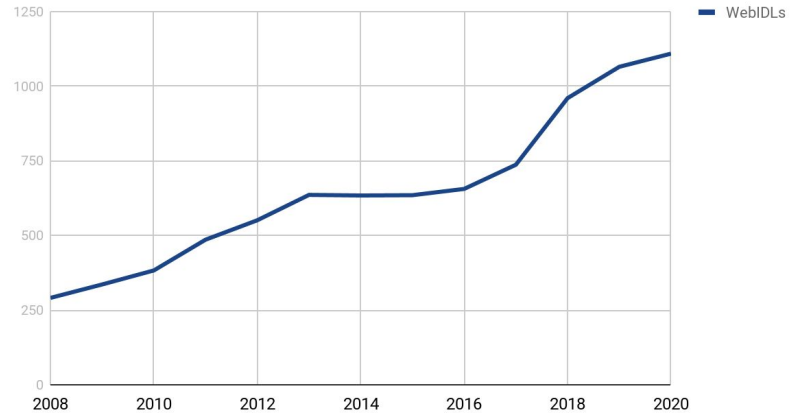
# 2017: Web Development





# 2017: Web Platform

WebCore WebIDLs



HEISENBUG



# Playwright:

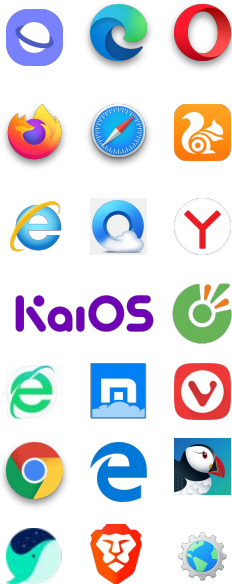
web testing without drama

# Terminology 101

Browsers vs Browser Engines

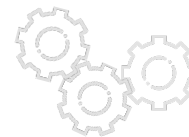


Browser

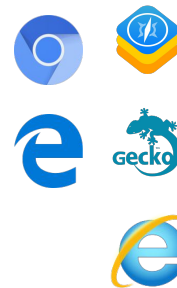


Hacker News  
new | past | comments | ask | show | jobs | submit login

1. ▲ iOS14 reveals that TikTok may snoop clipboard contents every few keystrokes (twitter.com)  
972 points by georgespenner 9 hours ago | hide | 394 comments
2. ▲ Amazon Honeycode – build web and mobile apps without writing code (amazon.com)  
458 points by bscanlan 10 hours ago | hide | 230 comments
3. ▲ An even worse anti-encryption bill than EARN IT (stanford.edu)  
59 points by abecedarius 3 hours ago | hide | 10 comments
4. ▲ Face ID and Touch ID for the Web (developer.apple.com)  
539 points by gok 12 hours ago | hide | 228 comments
5. ▲ Software reuse is more like an organ transplant than snapping Lego blocks (2011) (johndcook.com)  
517 points by nilsandrey 13 hours ago | hide | 173 comments
6. ▲ Eastern European Movies (easterneuropeanmovies.com)  
52 points by danielam 2 hours ago | hide | 21 comments
7. ▲ How to Write PureScript React Components to Replace JavaScript (thomashoneyman.com)  
40 points by JacksonGariety 4 hours ago | hide | 6 comments
8. ▲ Amazon establishes new Counterfeit Crimes Unit (aboutamazon.com)  
281 points by sully 14 hours ago | hide | 211 comments
9. ▲ No, Safari 14 does not block Google Analytics (simoahava.com)  
196 points by TomAnthony 11 hours ago | hide | 42 comments
10. ▲ Perl 7 is going to be Perl 5.32, mostly (perl.com)  
581 points by datanut 14 hours ago | hide | 485 comments



Browser Engine



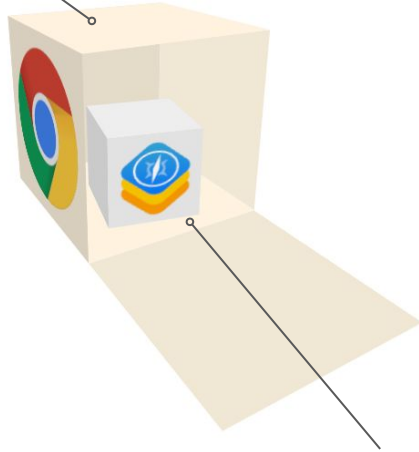
# 2012: Browser Engines

Browser "Chrome"



# 2012: Browser Engines

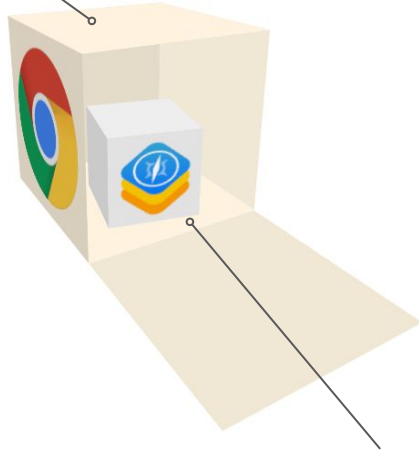
Browser "Chrome"



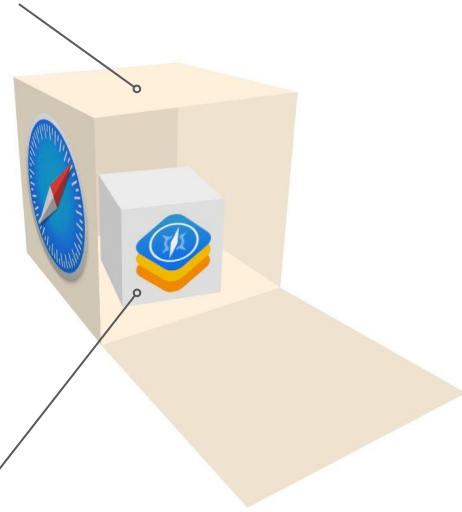
Web Engine "WebKit"

# 2012: Browser Engines

Browser "Chrome"



Browser "Safari"



Web Engine "WebKit"

**2020**