

How Adblockers Work

And Why Communities Make it all Possible.

Rémi Berson

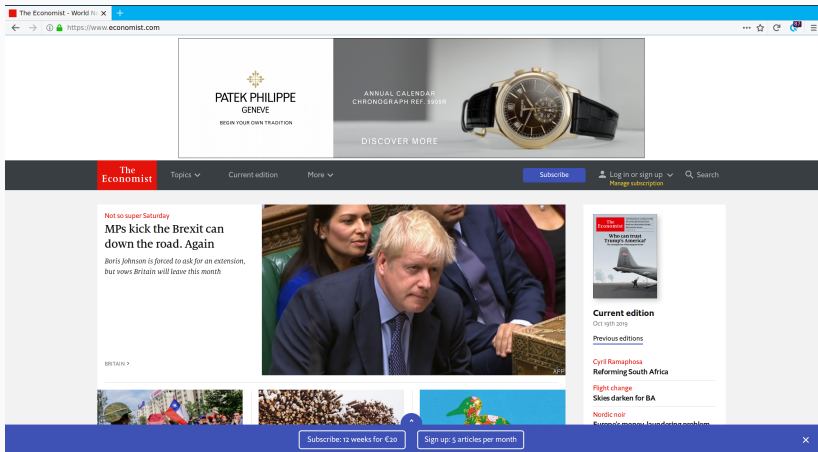
October 23th, 2019

Cliqz, Ghostery

Adblockers, adblockers...



What's a Website?



More than meets the eye.

What's an Ad?

The screenshot shows a web browser displaying the Patek Philippe website. The browser's address bar shows the URL <https://www.economist.com>. The website content features a Patek Philippe advertisement with the text "PATEK PHILIPPE GENEVE", "ANNUAL CALENDAR CHRONOGRAPH REF. 5950R", and "DISCOVER MORE". Below the advertisement, the browser's developer tools are open, showing the DOM tree. The DOM tree displays the HTML structure of the page, including the `<div>` elements and their attributes. The `document` object is selected, showing the `<div>` element with the `id` attribute set to `app-mount`. The `document` object is also visible in the console, showing the `document` object and the `document` object.

The *DOM*.

Blocking: What Can Extensions Do?

Adblockers are **extensions**:

- They are JavaScript **programs** running inside the browser.
- They can *monitor*, *modify* or **block** network requests.
- They can **hide** elements from pages.

Blocking: Network Filtering

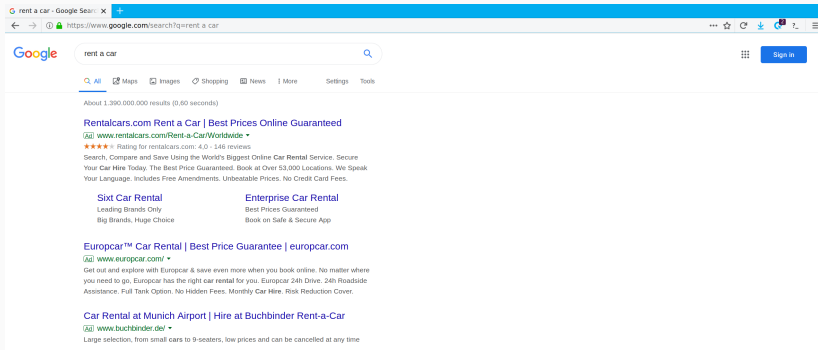
The screenshot shows a web browser displaying the Economist website. A Patek Philippe advertisement is visible at the top. The browser's developer tools are open, showing the Network tab. The following table represents the data visible in the Network tab:

| Status | Method | Domain | File | Cause | Type | Transformed | Size | Time | Size on disk | Time on disk | Time to first byte | Time to last byte | Time to connect | Time to receive | Time to send | Time to open | Time to close | Time to abort | Time to fail |
|--------|--------|--------------------------------|--|---|-------|-------------|----------|----------|--------------|--------------|--------------------|-------------------|-----------------|-----------------|--------------|--------------|---------------|---------------|--------------|
| 200 | GET | px.moadads.com | pixel.gif?w=216&h=66&co=0&156.00&14.00&00&180.00&006&yt=0&... | img | gif | | 419 B | 43 B | | 152 ms | | | | | | | | | |
| 200 | GET | securepubads.g.doubleclick.net | ads?gdf_req=1&advsid=2579552324469219&correlator=2845603661&... | xhr | plain | | 6.06 KB | 16.39 KB | | 409 ms | | | | | | | | | |
| 200 | POST | ss-sec.casalemedia.com | headerstats?w=186&h=66&co=https://www.economist.com/&w=3 | xhr | plain | | 1.23 KB | 0 B | | 78 ms | | | | | | | | | |
| 200 | GET | tpc.googlesyndication.com | 17229809439128411365 | img | | | 566 B | 0 B | | 161 ms | | | | | | | | | |
| 200 | GET | ad.doubleclick.net | 823196911.256982726.dc.trk_aid=453149783.dc.trk_cid=123170422... | img | gif | | 763 B | 42 B | | 160 ms | | | | | | | | | |
| 200 | GET | securepubads.g.doubleclick.net | ... | img | gif | | 716 B | 0 B | | 86 ms | | | | | | | | | |
| 200 | GET | px.moadads.com | ... | img | gif | | 419 B | 43 B | | 62 ms | | | | | | | | | |
| 200 | POST | api.pernix.com | ... | xhr | json | | 557 B | 79 B | | 126 ms | | | | | | | | | |
| 200 | GET | cdn.ampproject.org | ... | script | js | cached | | 19.84 KB | | | | | | | | | | | |
| 200 | GET | cdn.ampproject.org | ... | script | js | cached | | 0 B | | | | | | | | | | | |
| 200 | GET | cdn.ampproject.org | ... | script | js | cached | | 0 B | | | | | | | | | | | |
| 200 | GET | tpc.googlesyndication.com | 17229809439128411365 | img | jpg | | 63.86 KB | 63.31 KB | | 102 ms | | | | | | | | | |
| 200 | GET | z.moats.com | iframe.html | https://tpc.googlesyndication.com/simgad/17229809439128411365 | html | | 4.77 KB | 4.37 KB | | 59 ms | | | | | | | | | |
| 200 | GET | z.moats.com | moatad.js | script | js | | 8.95 KB | 34.34 KB | | 54 ms | | | | | | | | | |
| 200 | GET | z.moats.com | moatamp.js | script | js | | 6.39 KB | 16.18 KB | | 117 ms | | | | | | | | | |

Summary: 337 requests, 5.50 MB / 1.47 MB transferred, Finish: 2.03 min, DOMContentLoaded: 2.04 s, load: 12.16 s

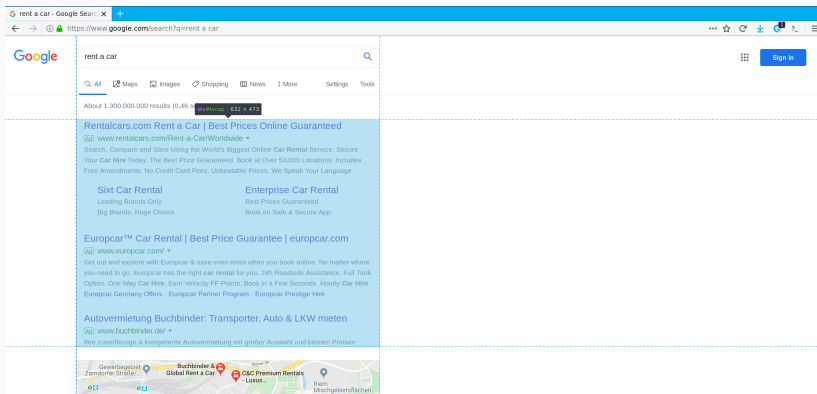
The ads have to be *fetched* somehow.

Hiding: Cosmetics Filtering



When blocking network requests is not enough.

Hiding: Cosmetics Filtering



We can remove or hide parts of the *DOM*.

Filters: Network

How to decide **which network requests to block?**

```
||example.com$script,third-party  
/ads/$image
```

~**100k** by default.

Filters: Cosmetic

How to decide **what to hide** in the page?

```
##.ad-element  
example.com##^script:has-text(loadAds)
```

~**50k** by default.









What's an Adblocker?

- Big rule engine
- Decide what to block in real-time
- Store rules in optimized format
- Needs to be *really fast*

- *fast* decision time (~ 0.01 ms per request)
- *low memory* usage (5.6 MB to 7.7 MB for **170k** filters)
- zero-cost initialization (0.1-20 ms)

whotracks.me/blog/adblockers_performance_study.html







 github.com/cliqz-oss/adblocker

-  — Hosted on *GitHub*
-  — Written in *TypeScript*
-  — Published on *NPM*
-  — Tested with *Jest*
-  — Managed with *Lerna*
-  — Bundled with *Rollup*
-  — Packaged with *Yarn*
-  — Formatted with *Prettier*






Run **everywhere** —     

Open Source?

Sharing **knowledge**: performance, designs, data, benchmarks:

-  influential work on efficient designs and features.
-  performance study and open benchmarks.
-  proposed currently most efficient approach to adblocking.
-  translated Clqz' adblocker into Rust.
-  Adblocker Dev Summit.
-  shared mobile trackers database with whotracks.me.

Adblocking is not possible without a *strong community*!

-  — github.com/easylist/easylist
-  — github.com/uBlockOrigin/uAssets 
-  — github.com/AdguardTeam/AdguardFilters 

filterlists.com counts more than **1700** subscriptions!

Contributing?

So many ways to do *better together*!

- *report* site breakage or ads not blocked
- help *maintain* up-to-date rules
- open *issues*, ask *questions*, start *discussions*
- *talk* and *write* about projects
- *share* your knowledge!

Contributing: GitHub!

🐙 — github.com/cliqz-oss/adblocker

cliqz-oss / adblocker

Used by 45 Unwatch 8 Star 111 Fork 19

Code Issues 6 Pull requests 0 Projects 0 Wiki Security Insights Settings

A fast, pure-JavaScript content-blocking library <https://cliqz.com> [Edit](#)

content-blocking javascript adblocker easylis Manage topics

322 commits 1 branch 53 releases 9 contributors MPL-2.0

Branch: master New pull request

Create new file Upload files Find file Clone or download

Contributing: GitHub!

 — github.com/ghostery/ghostery-extension

 [ghostery](#) / [ghostery-extension](#)

 Unwatch ▾ 48

 Unstar 759

 Fork 86

 Code

 Issues 20

 Pull requests 4

 Actions

 Security

 Insights

Ghostery Browser Extension for Firefox, Chrome, Opera and Edge

[firefox-extension](#)

[chrome-extension](#)

[opera-extension](#)

[edge-extension](#)

[ghostery](#)

 805 commits

 20 branches

 20 releases

 21 contributors

 MPL-2.0

Branch: master ▾

[New pull request](#)

[Create new file](#)

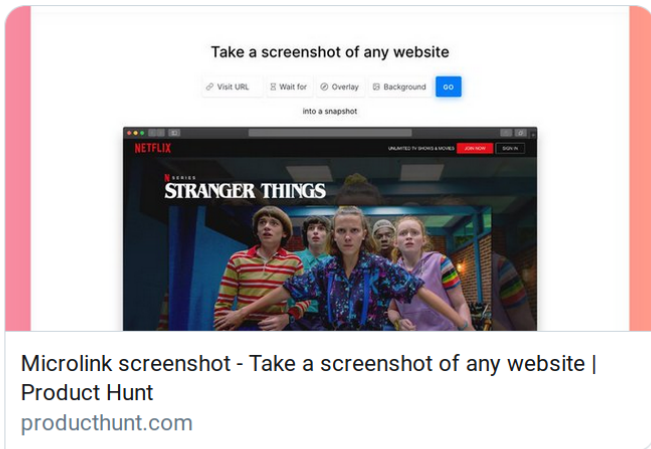
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Contributing: Twitter!

🐦 — twitter.com/@pythux or twitter.com/@cliqz



Microlink screenshot - Take a screenshot of any website |
Product Hunt
producthunt.com






Released using ghostery behind the hood 😊

Jul 18, 2019, 9:45 AM

Questions?

- *jobs@cliqz.com* is hiring!
- Ping me: remi@cliqz.com
- Twitter: @pythux

 — github.com/cliqz-oss/adblocker

-  @cliqz/adblocker-webextension
-  @cliqz/adblocker-electron
-  @cliqz/adblocker-puppeteer