

Getting your Team **Passionate About Web Performance** to Achieve **Performant Web Apps**

OUTLINE

- > WHY PERFORMANCE MATTERS
- > THE LEAN PHILOSOPHY
- > THE RIGHT TOOLS
- > PERFORMANCE IS A LONG GAME

Why performance **matters**

OUTLINE

✓ WHY PERFORMANCE MATTERS

THE BUSINESS STANDPOINT

THE ETHICS OF WEB PERFORMANCE

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Performance matters for **your business**

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Performance matters for **your business**



Zalando saw a **0.7% increase** in revenue when they shaved **100ms** off their load time.

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 zalando

 trainline

Trainline reduced latency by **0.3 seconds** across their funnel and customers spent an extra **£8 million** (~€9.1 million) a year.

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FINANCIAL TIMES

Tests of the new, faster FT.com showed users were up to **30% more engaged**—meaning more visits and more content being consumed.

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BBC

BBC has seen that they **lose an additional 10% of users for every additional second** it takes for their site to load

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 BBC

 Pinterest

Rebuilding Pinterest pages for performance resulted in a **15% increase in SEO traffic** and a **15% increase in conversion rate to signup**.

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The **ethics** of web performance

“Poor performance can, and does, lead to exclusion.”

— Tim Kadlek

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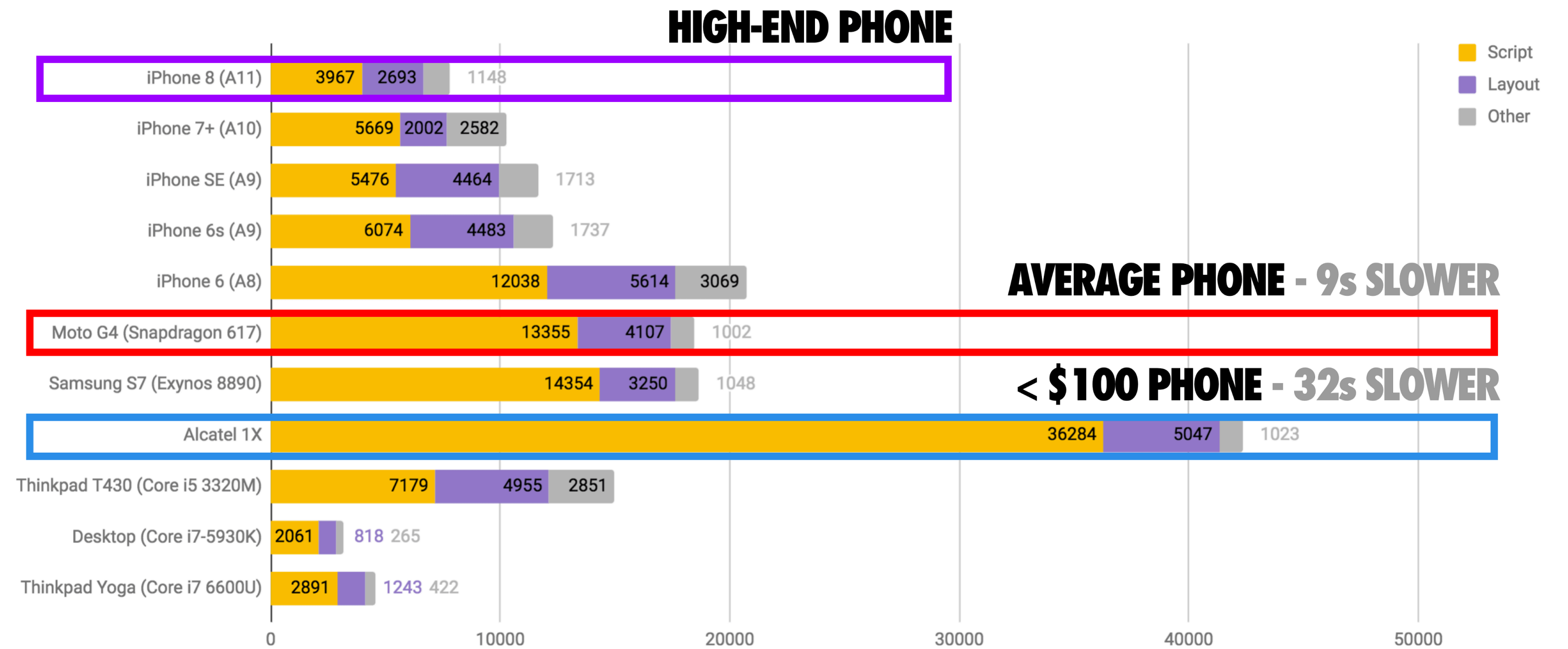
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JS PROCESSING FOR CNN.COM



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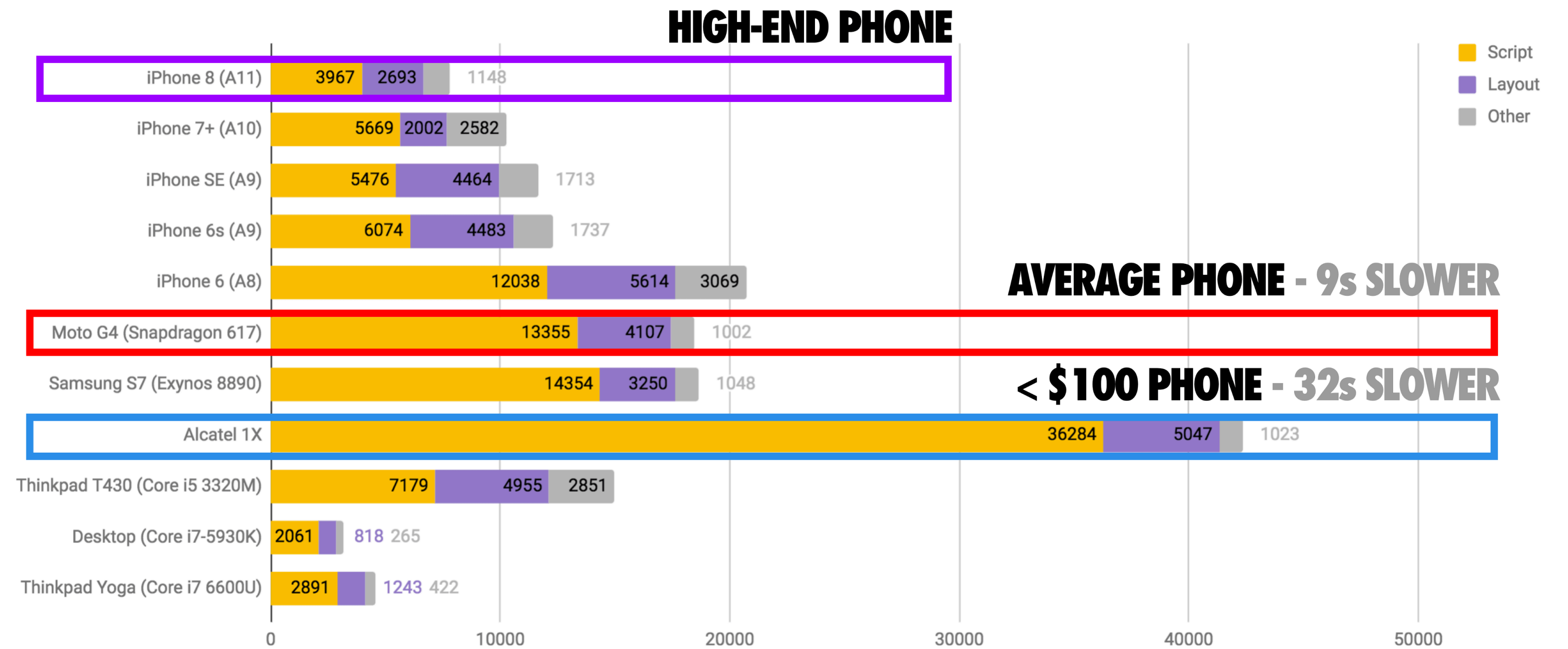
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The **ethics** of web performance

*“[Performance good practices] have well-known benefits to usability, but are also **acts of environmental protection.**”*

— Cennydd Bowles, Future Ethics

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“I need to buy a new phone”

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“My battery does not last a full day anymore”

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Web Performance is **not a zero-sum game**



Nicolas Goutay

Web Performance Evangelist
— Theodo

Twitter: [@phacks](https://twitter.com/phacks)

W E B P E R F



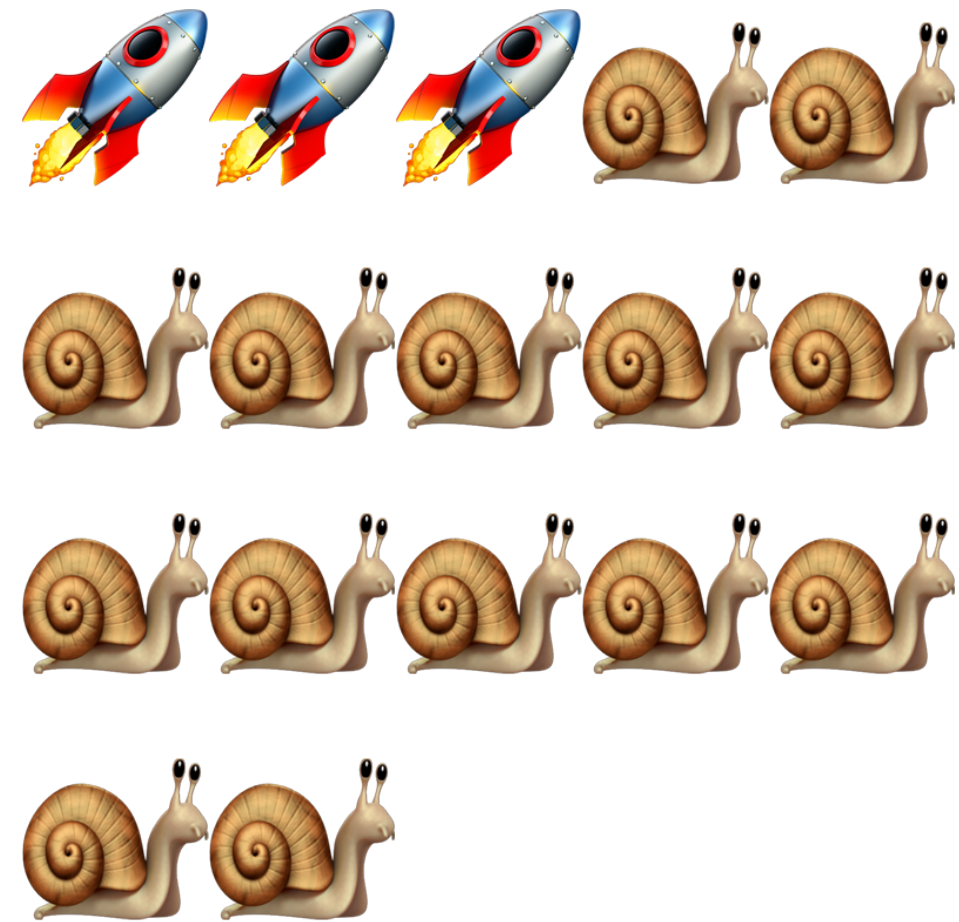
In the open space, no one can hear you scream.



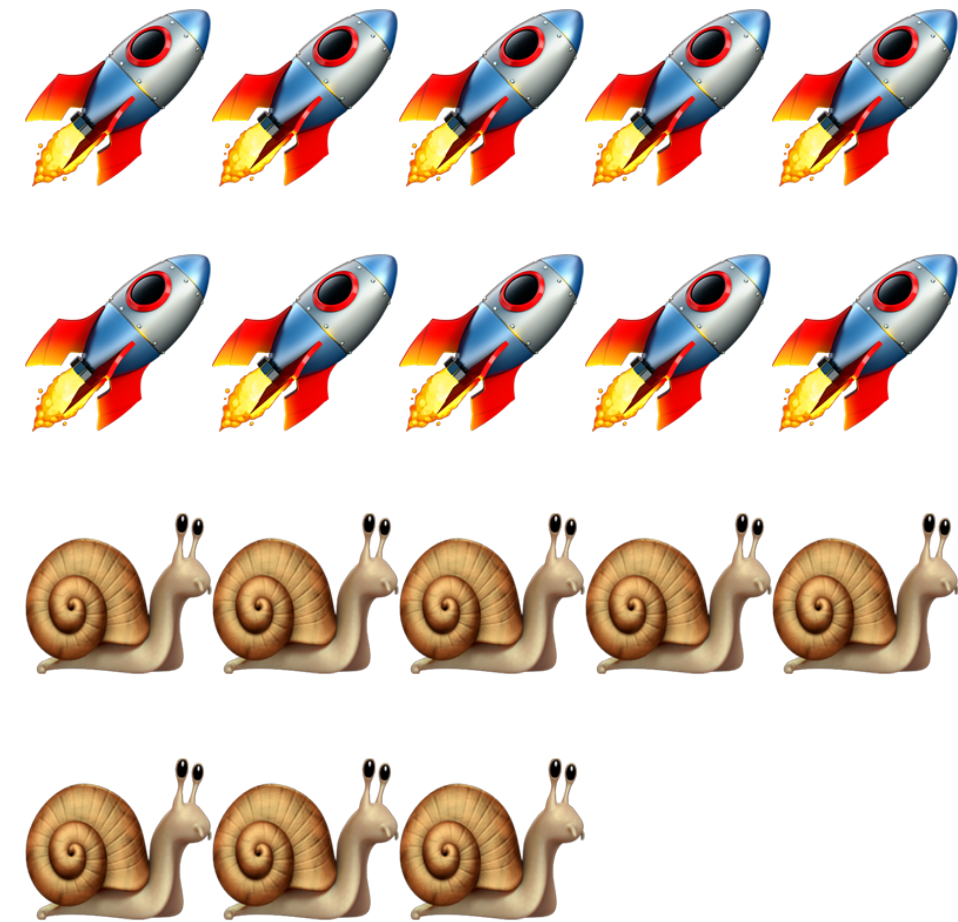
 **Feb. 2018**



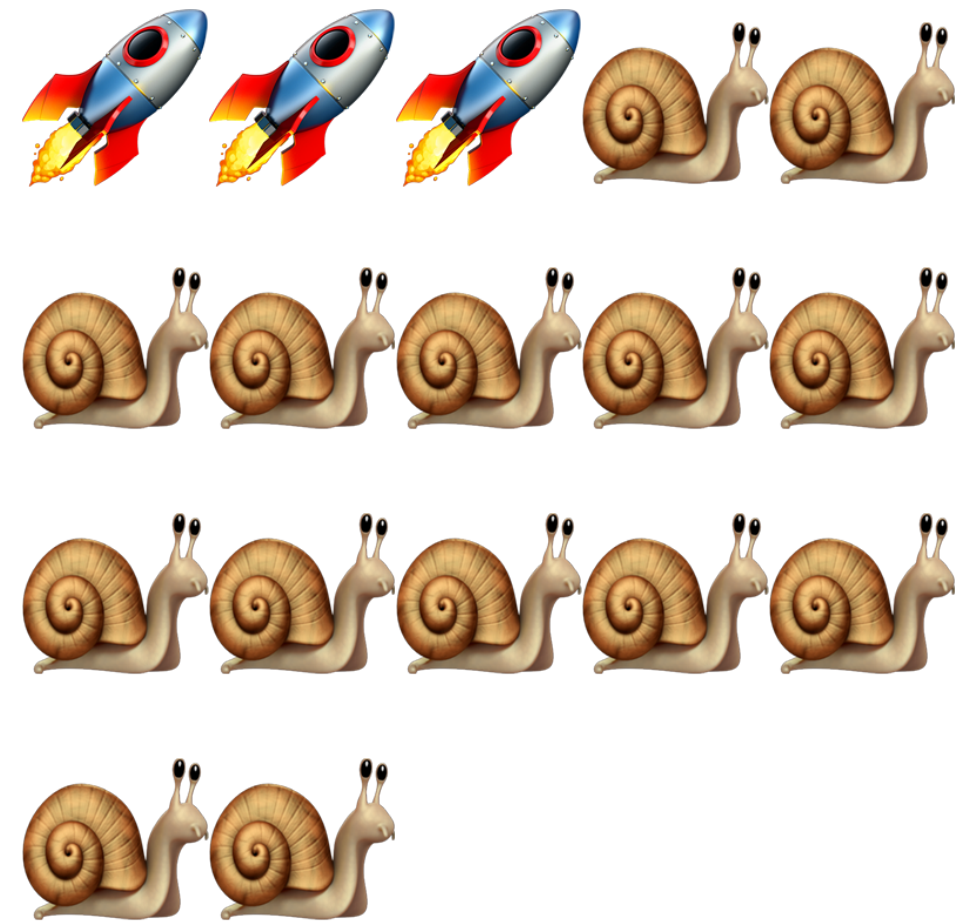
 **Feb. 2018**



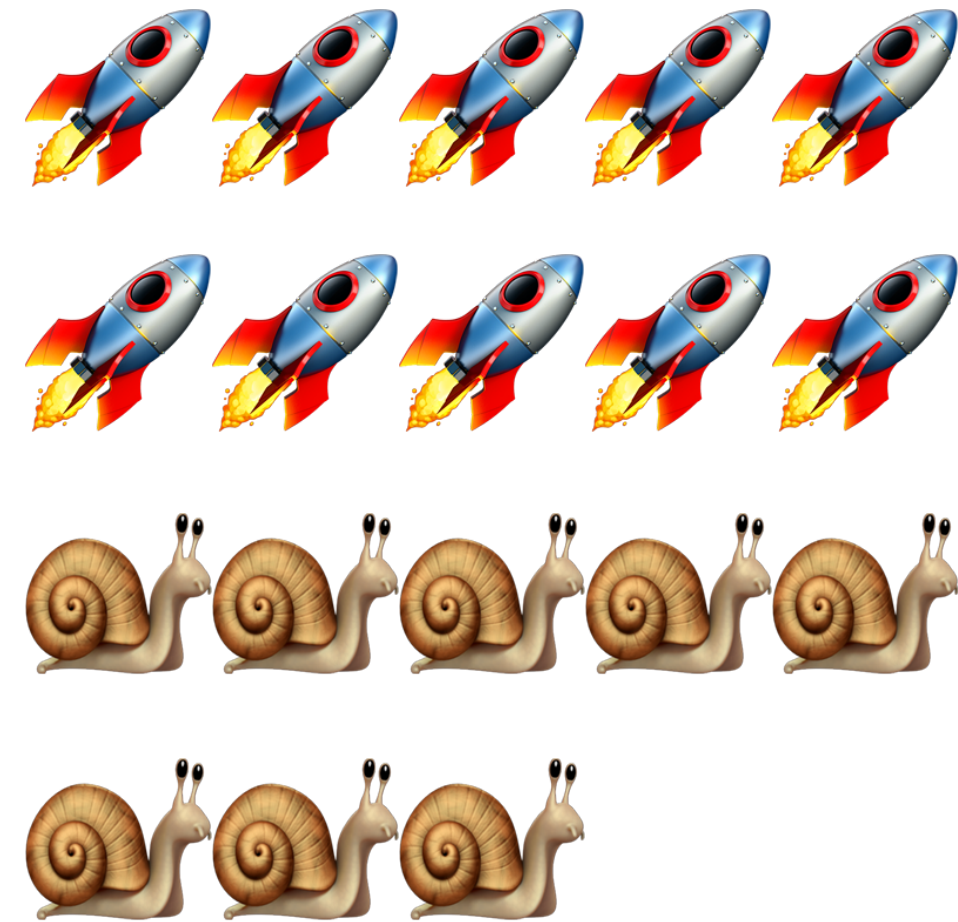
 **Jan. 2019**



 Feb. 2018



 Jan. 2019



 Dec. 2019



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The **Lean** Philosophy

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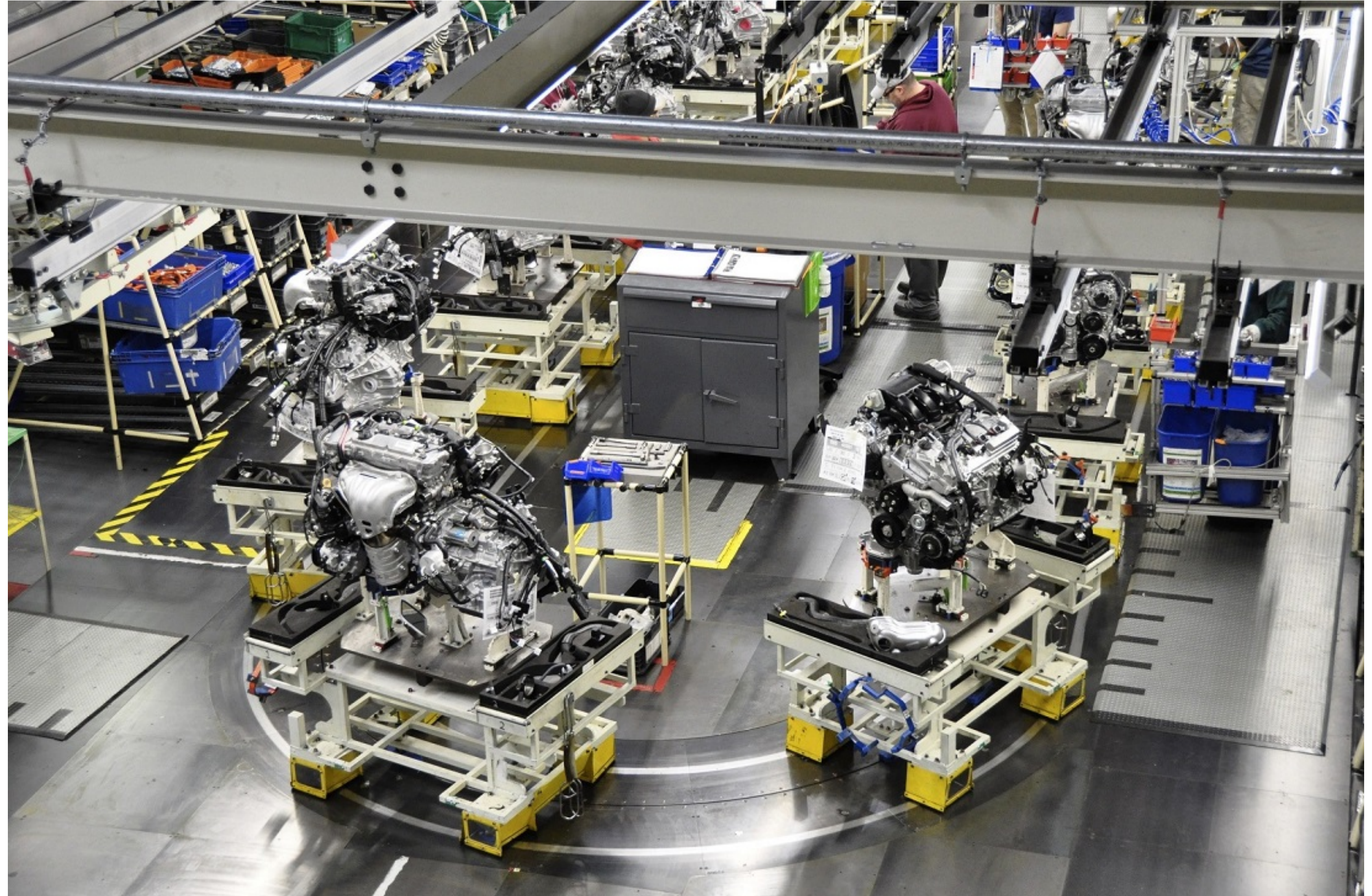
What is **Lean**?

Lean is a **systematic method** to **maximize customer value** while **minimizing waste**.

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What is **Lean**?



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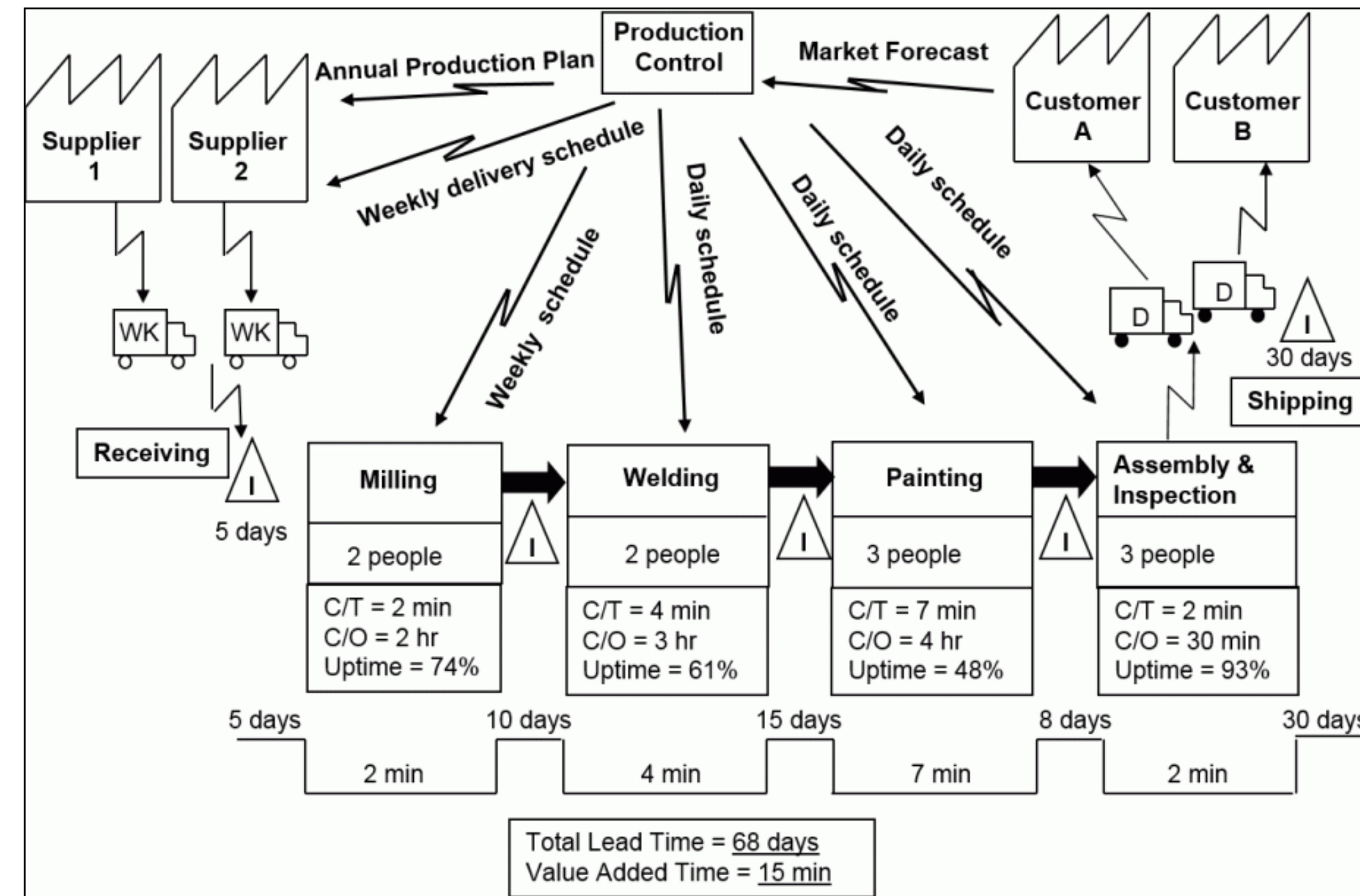
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Identifying the Value Stream

Maps the value-added steps to go from the raw materials to the finished product



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Identifying the Value Stream

Rendering a Web Page is a **process**



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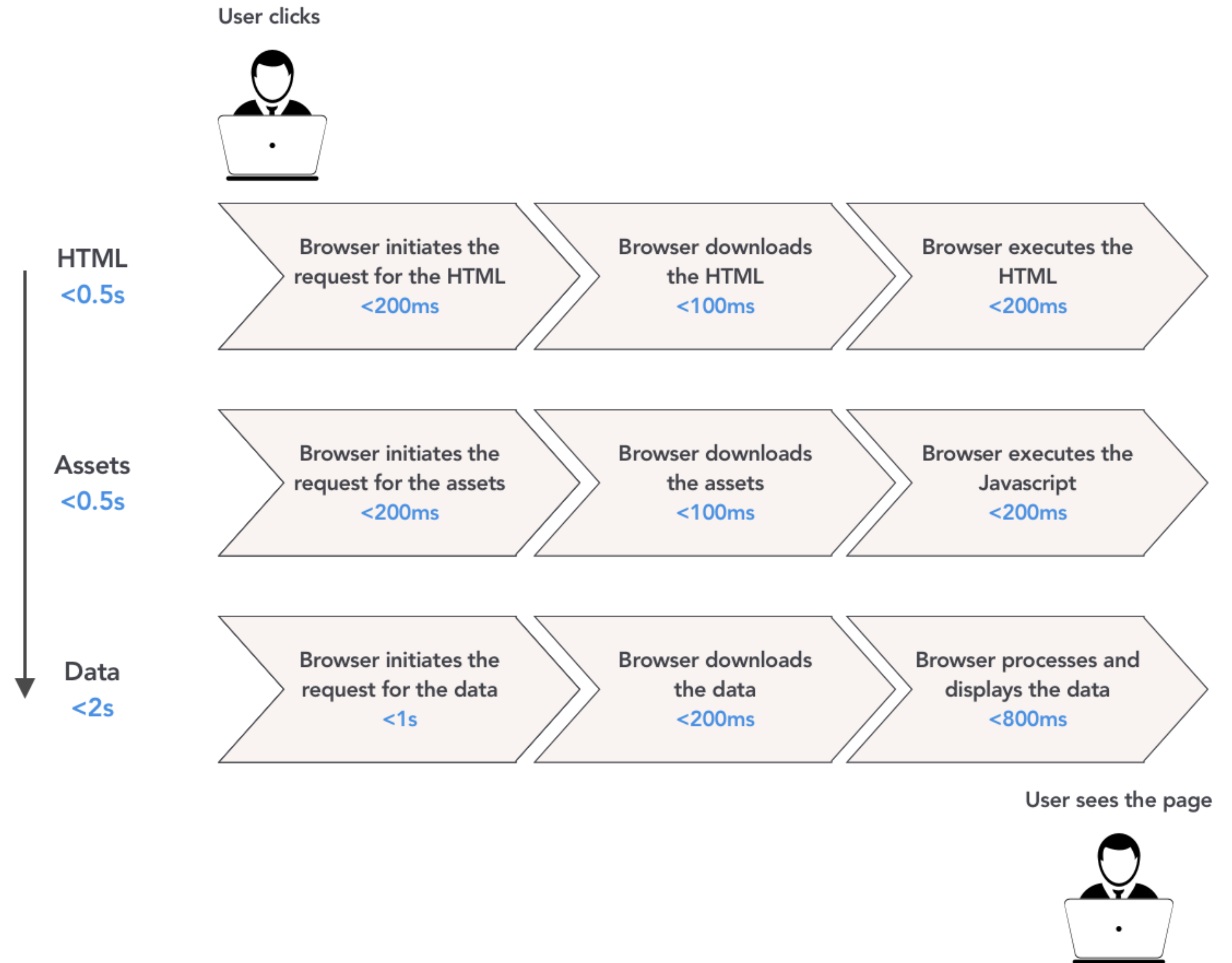
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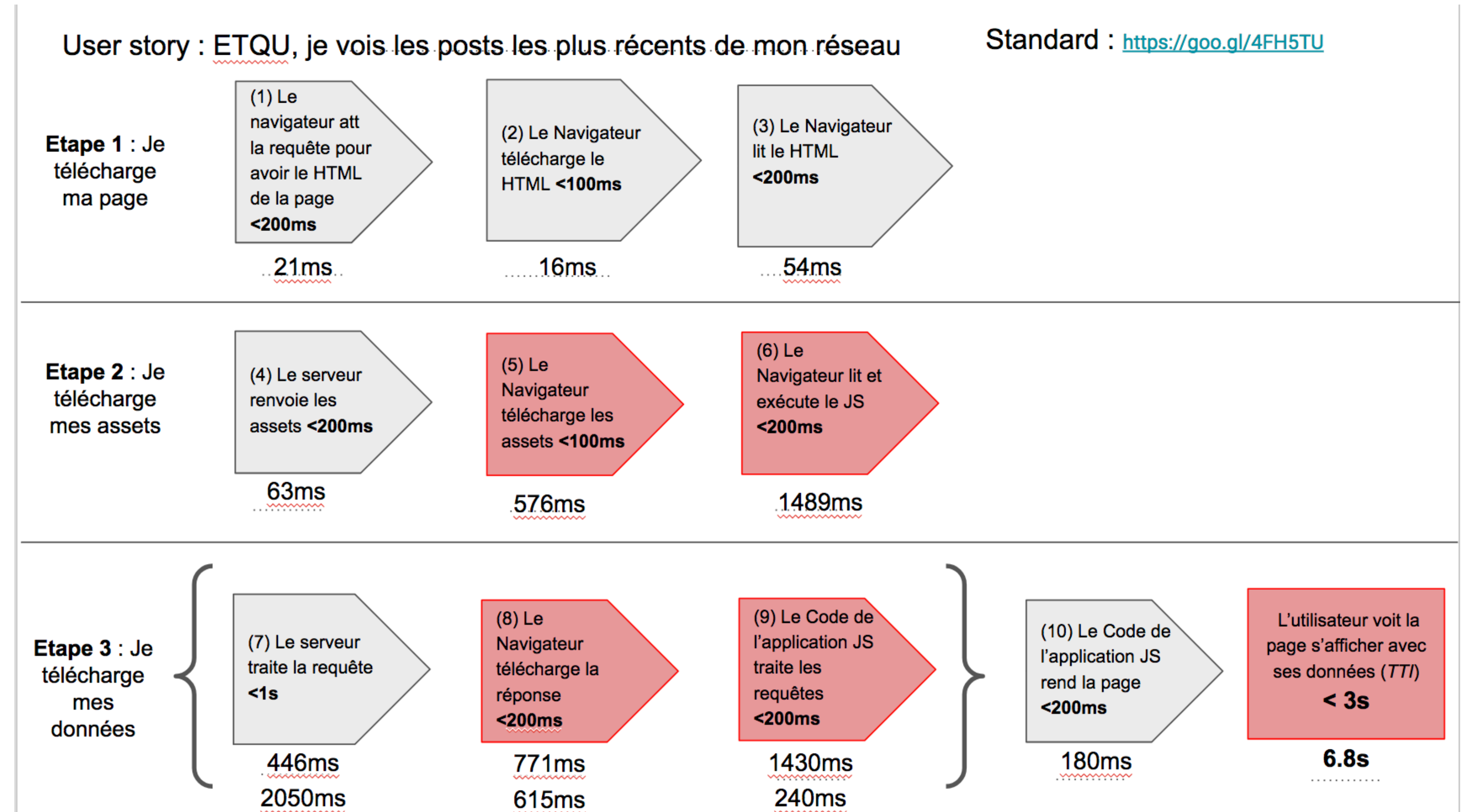
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Identifying the Value Stream



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Identifying the **Value Stream**

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Ffyn — 6.8s ⇒ 2.5s ✓ — **Projet terminé**
ThibautC

"C'est instantané, ça fait pas pareil en démonstration quand tu montres une application ou demandes d'attendre et une où c'est instantané"
Richard Jones, PO Ffyn

Résumé des actions

- Supprimer le fichier `reset.css` Gain : 0.1s
- Décaler dans le temps les appels à Piwik et à HotJar. Gain : 0.5s
- Suppression de la double boucle réseau. Gain : 0.5s
- Arrêter d'utiliser des fonctions anonymes. Gain : ?
- Utiliser `$.select` pour memoiser les résultats des sélecteurs. Gain : ?

Next Steps

- Supprimer les appels `OPTION` inutiles (cf. standard)
- Le backend a l'air d'avoir des temps de réponse extrêmement variables (~100ms - 2s) pour une même ressource. Vérifier que ça ne vient pas du réseau de Theodo. Si c'est pas le cas, demander conseil à l'infogérant.
- Enquêter sur les renders inutiles sur la page des posts

GRT Gaz — 2.5s ✓
AlexAdrienA
Condition réseau : Fast 3G

Résumé des actions

- [12/02] Changer les headers sur nginx pour activer le cache coté client : KO car le reverse proxy GRT Gaz rajoute les headers "no-store, no-cache"
- [15/02] Mettre en place un service worker pour cacher les assets front + html : KO car la librairie utiliser pour générer des services workers avec angular "@angular/service-worker" ne transmet pas les headers d'authentification nécessaires pour passer le reverse proxy
- [28/02] Enquête pour supprimer les 2 boucles réseaux inutiles (3 fois le même call à Prismic) Gain attendu : 2s ⇒ KO car l'équipe a viré Prismic du projet, du coup plus de boucles réseau
- [02/03] Retrait du header `Cache-Control: Private` avec un des archis GRT Gaz. Gain : 2.5s
- Objectif de TTI de 2s (OK) sur desktop et 10s sur mobile OK

OCP Casa (page modèle) — 5.9s ⇒ 2.4s ✓ — 22/10
FlorianG

User story : ETQU. Je vois la table Demand
Standard : <https://pau.gitlab.io/>

Résumé des actions

- Mise en place de Gzip. Gain : 1s
- Identification des librairies inutilisées et priorisation avec `Bundlephobia`
- Suppression de la librairie des drapeaux pour des emojis KO c'était moche
 - Chargement dynamique des SVGs : gain de 700Ko
- Identification du flux de performance backend :
 - Aujourd'hui on est plus à 6s sur le serveur traite la requête, ~1s pour le download (10Mo de données !!!)
 - Quick fix : Mise en place de Gzip

Suez Villagile — 3.5s ✗ — 26/10
KévinJ

Résumé des actions

- [31/12] Ne plus charger les analyses retro à l'ouverture de l'application Gain: 14s
- [09/01] Ne plus charger les demandeurs & les interventions à l'ouverture de l'application Gain : 14s
- [23/01] Avoir une prod avec de vrai data
- [26/01] Optimiser la fonction de recherche Gain : Recherche en moins de 1s
- [30/01] Réparer ElasticSearch Gain : 20s
- [19/02] Retirer du chargement de la page la récupération des données géographiques (SIG) Gain : 800ms
- [28/02] Mettre en place un cache côté backend pour conserver les appels au serveur de données Gain attendu : 8s, Gain réel : 12s
- [16/03] Priorisation de la mise en place de Gzip Gain attendu : 1s KO
- [23/03] Réduction de la taille du bundle en supprimant les libs pas utilisées : Gain attendu : 0.5s KO
- Délayer le chargement des configs, donc le HTML part plus vite. Gain : 1s
- Supprimer un call API sur les contours des villes (mis à jour une fois par an)
- Preloader les polices : https://developer.mozilla.org/fr/docs/Web/HTML/Pr%C3%A9charger_du_contenu_KO

Next Steps

- Mettre en place React-Virtualized-pour-alléger-la-construction-du-DMO
- Alléger l'import de moment : <https://github.com/.../how-to-optimize-momentjs-with-webpack>
- Alléger l'import de lodash : utiliser 'import { map } from lodash/map' par exemple
- Supprimer / différer le chargement de JQuery
- Minifier le javascript hors-Webpack
- Supprimer le call API pour avoir le contour des communes
- Améliorer la cache policy

Sphere — 9s ⇒ 5s ✗ — **Projet terminé**
AlbéricT

"Les outils actuels de nos potentiels clients sont lents, et c'est une opportunité pour nous : si notre produit est rapide on pourra convertir plus de clients"
Nicolas Gavenard, PO Sphere

Résumé des actions

- Paralléliser les requêtes faites au backend Gain : 3s
- Simplification des requêtes GraphQL
- Mise en place de Tideways (monitoring de performances PHP) sur Heroku
- Activer Gzip d'ici le 05/09 ⇒ Gain : 1s

Next Steps

- Cleaner l'import de Moment et de Lodash KO
- Mettre en place du Tree Shaking KO
- Investigation sur les performances de GraphQL KO

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Identifying the **Value Stream**



Takes into account the whole process

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Teams asked for help much sooner

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Collaboration with stakeholders

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Easily point to solutions

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Look at the bigger picture

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Jidoka: catch problems at the **earliest**



The Andon cord

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Jidoka: catch problems at the **earliest**



Stops the line of production

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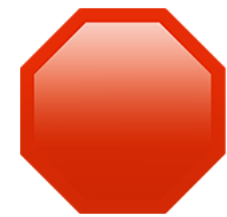
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Stops the line of production



Prevents the problem from happening again

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Jidoka: catch problems at the **earliest**

In the IDE: We use the Import Cost VSCode extension to detect heavy libraries when we add them to our code.

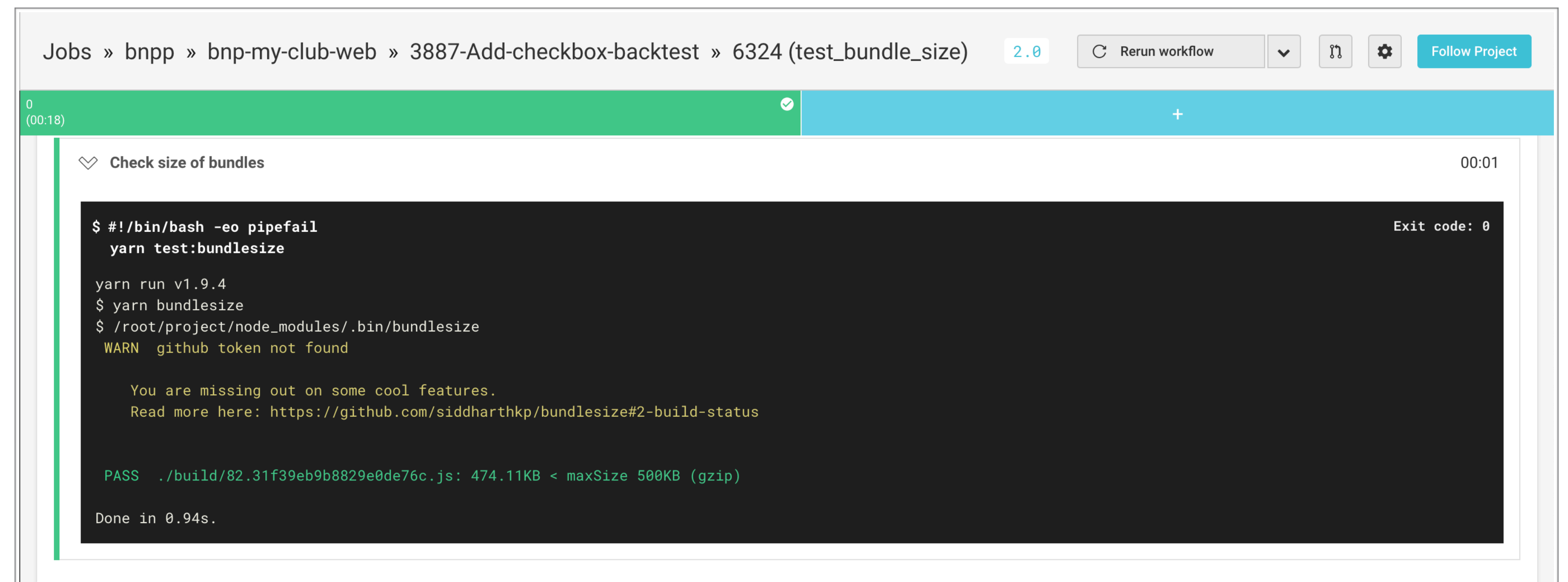
```
import React from 'react'; 8K (gzipped: 3.3K)
import { connect } from 'redux'; 2.3K (gzipped: 895)
import { Link } from 'react-router'; 48.4K (gzipped: 14K)
import Button from '@material-ui/core/Button'; 105.6K (gzipped: 27.6K)
```

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Jidoka: catch problems at the **earliest**

In the CI: We check on each PR if the bundle size of our web site is under a certain threshold (here, 500Kb).



The screenshot shows a GitHub Actions workflow run for a job named '3887-Add-checkbox-backtest' with a step '6324 (test_bundle_size)'. The job is successful, indicated by a green bar at the top. The step 'Check size of bundles' is also successful, with a duration of 00:01. The terminal output shows the following commands and results:

```
$ #!/bin/bash -eo pipefail
yarn test:bundleize

yarn run v1.9.4
$ yarn bundleize
$ /root/project/node_modules/.bin/bundleize
WARN github token not found

You are missing out on some cool features.
Read more here: https://github.com/siddharthkp/bundleize#2-build-status

PASS ./build/82.31f39eb9b8829e0de76c.js: 474.11KB < maxSize 500KB (gzip)

Done in 0.94s.
```

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The **Right** Tools

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✓ THE RIGHT TOOLS

KEEPING IT SMALL

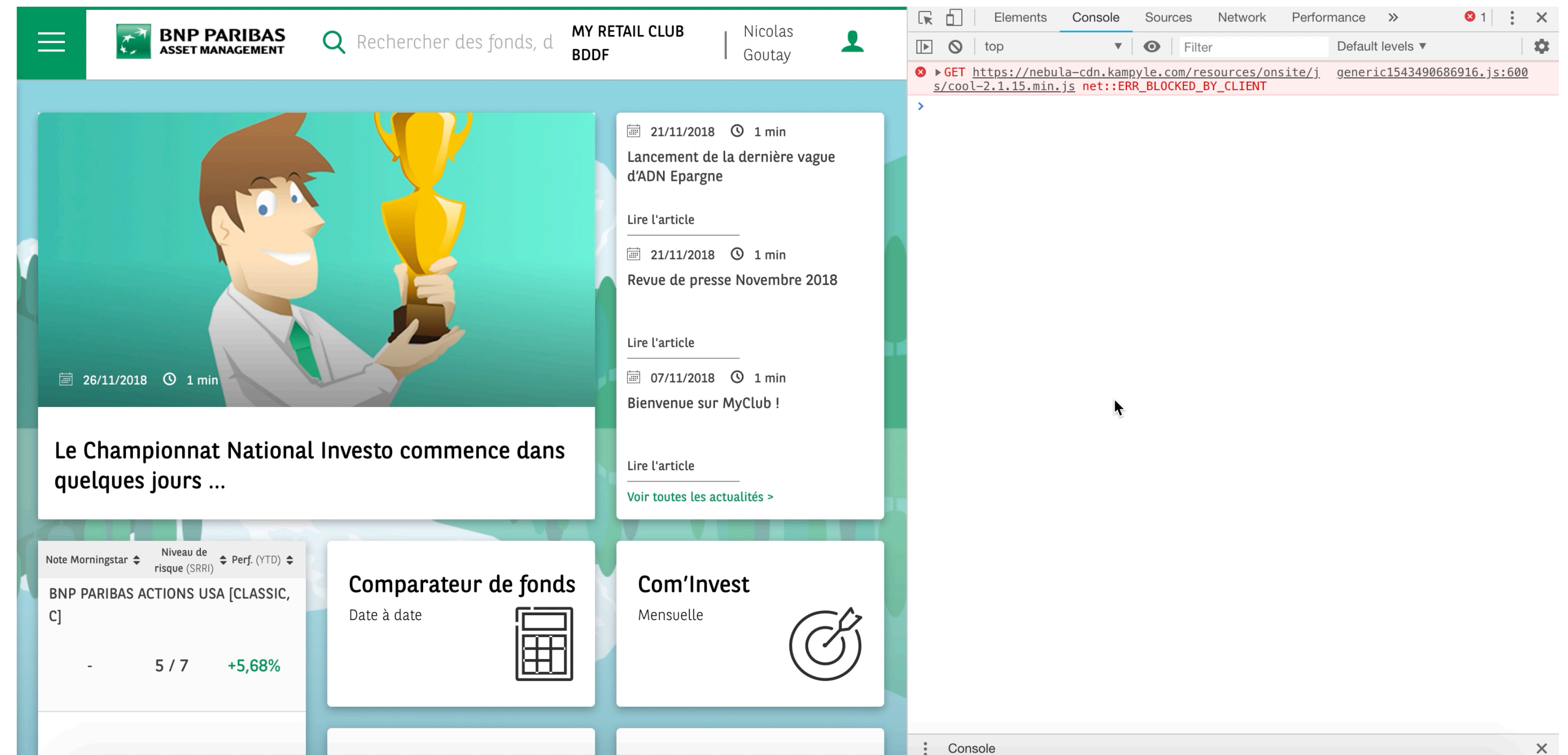
KEEPING IT SNAPPY

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Keeping it **small**

 **Coverage:** Real-time CSS & JS code coverage.

 *Helpful for:* detecting unused libraries or dead code.



The screenshot shows a web browser displaying the BNP Paribas website. The page content includes a header with the BNP Paribas logo, a search bar, and a user profile. The main content area features a large illustration of a man holding a trophy, followed by several news articles and a section for fund performance. A console window is open on the right side of the browser, showing a red error message: "GET https://nebula-cdn.kampyle.com/resources/onsite/js/generic1543490686916.js:600/s/cool-2.1.15.min.js net::ERR_BLOCKED_BY_CLIENT".

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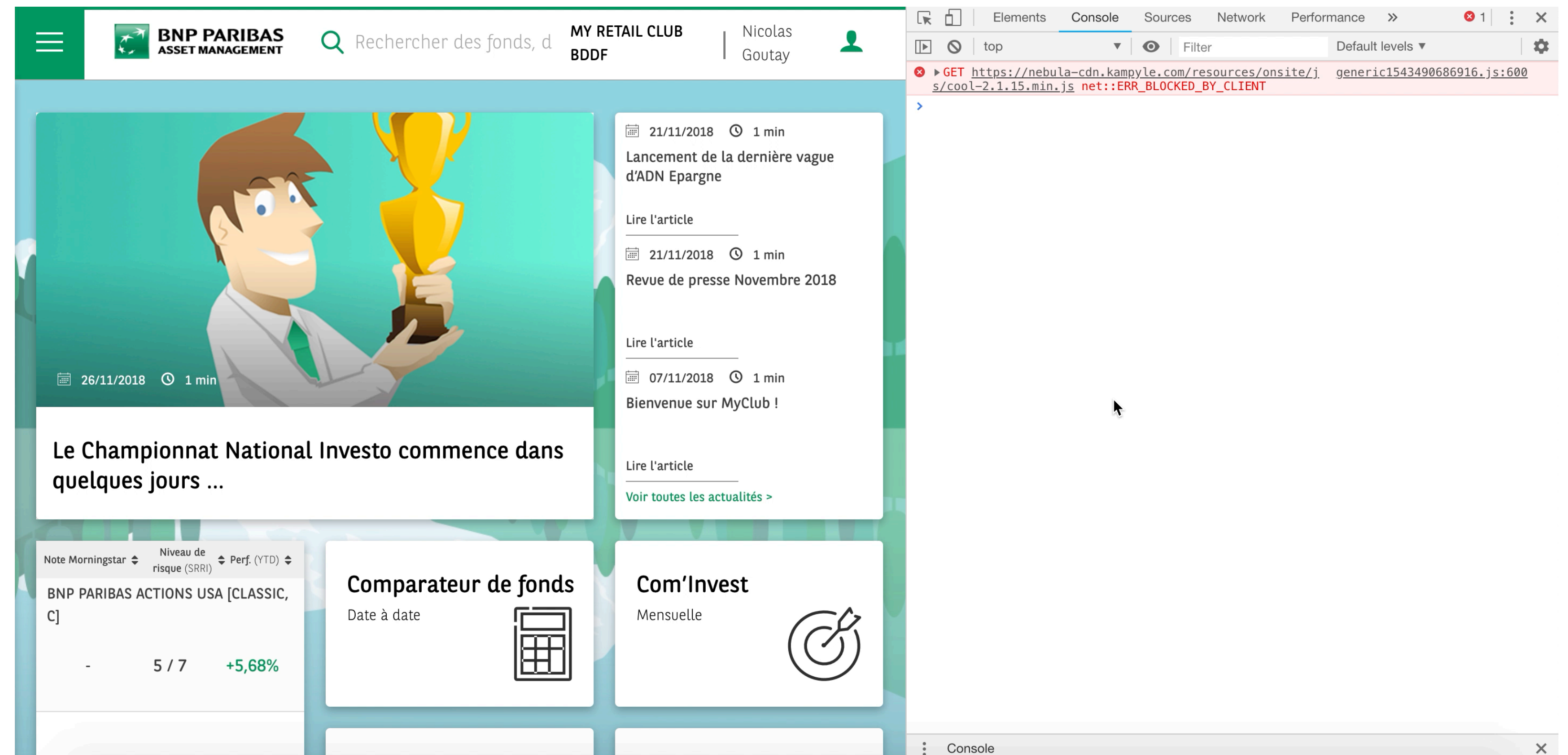
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The screenshot shows a web browser displaying the BNP Paribas website. The page features a navigation bar with the BNP Paribas logo, a search bar, and user information. The main content area includes a large illustration of a man holding a trophy, followed by several news articles and a section for fund performance. A console window is open on the right side of the browser, showing a red error message: "GET https://nebula-cdn.kampyle.com/resources/onsite/js/generic1543490686916.js:600/s/cool-2.1.15.min.js net::ERR_BLOCKED_BY_CLIENT".

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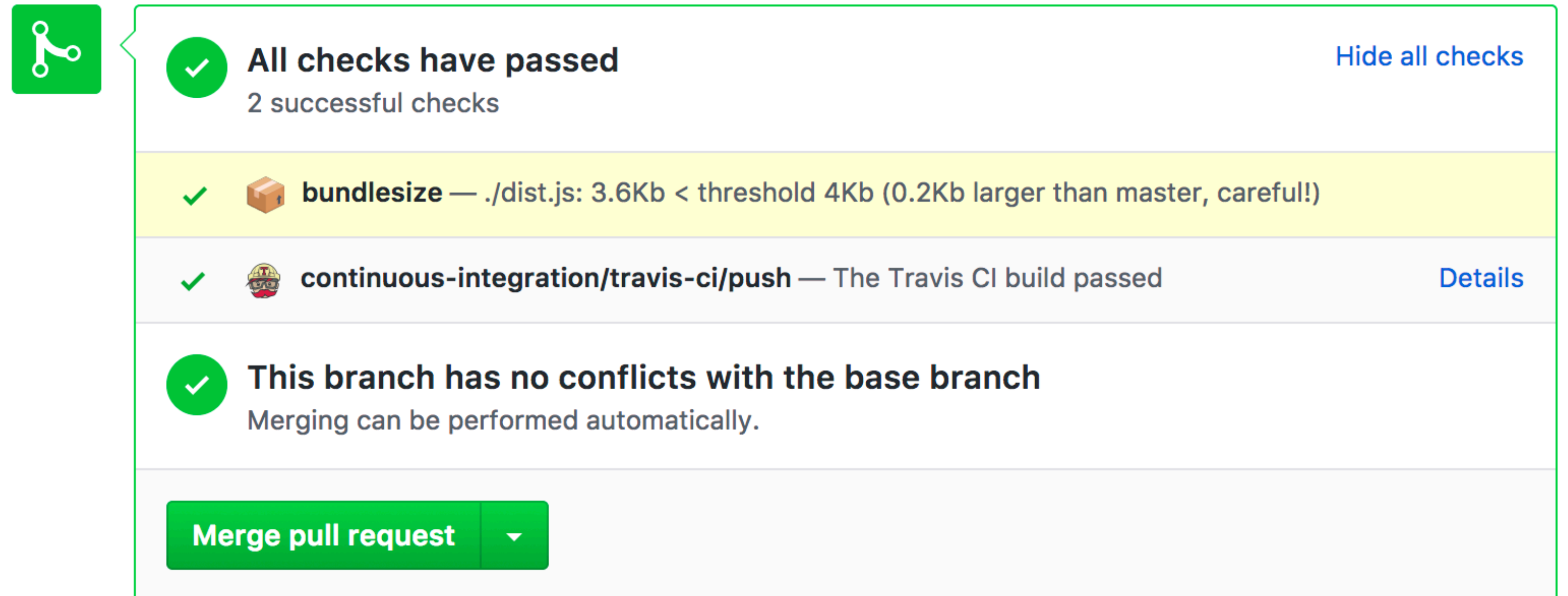
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Keeping it **small**

 **bundlesize**: CI-friendly bundle size checker.

 *Helpful for*: detecting if your JS goes over a certain threshold



A screenshot of a GitHub pull request status bar. It features a green checkmark icon on the left. The main status is "All checks have passed" with a sub-message "2 successful checks" and a "Hide all checks" link. Below this, there are three check items: 1) A green checkmark, a box icon, and the text "bundlesize — ./dist.js: 3.6Kb < threshold 4Kb (0.2Kb larger than master, careful!)". 2) A green checkmark, a Travis CI icon, and the text "continuous-integration/travis-ci/push — The Travis CI build passed" with a "Details" link. 3) A green checkmark and the text "This branch has no conflicts with the base branch" with a sub-message "Merging can be performed automatically." At the bottom, there is a green button labeled "Merge pull request" with a dropdown arrow.

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🤖 **Bundlephobia**: Find the performance cost of a npm package

💡 *Helpful for*: Deciding between two libraries w/ similar features

The image shows two side-by-side screenshots of the Bundlephobia website. The left screenshot shows the analysis for 'moment@2.22.2', and the right screenshot shows the analysis for 'date-fns@1.29.0'. Both screenshots display bundle size and download time metrics for both minified and minified + gzipped versions.

Package	Minified	Minified + Gzipped	Download Time (2G Edge)	Download Time (Emerging 3G)
moment@2.22.2	224.3 kB	64.4 kB	2.15 s	1.29 s
date-fns@1.29.0	29.1 kB	6.5 kB	215 ms	129 ms

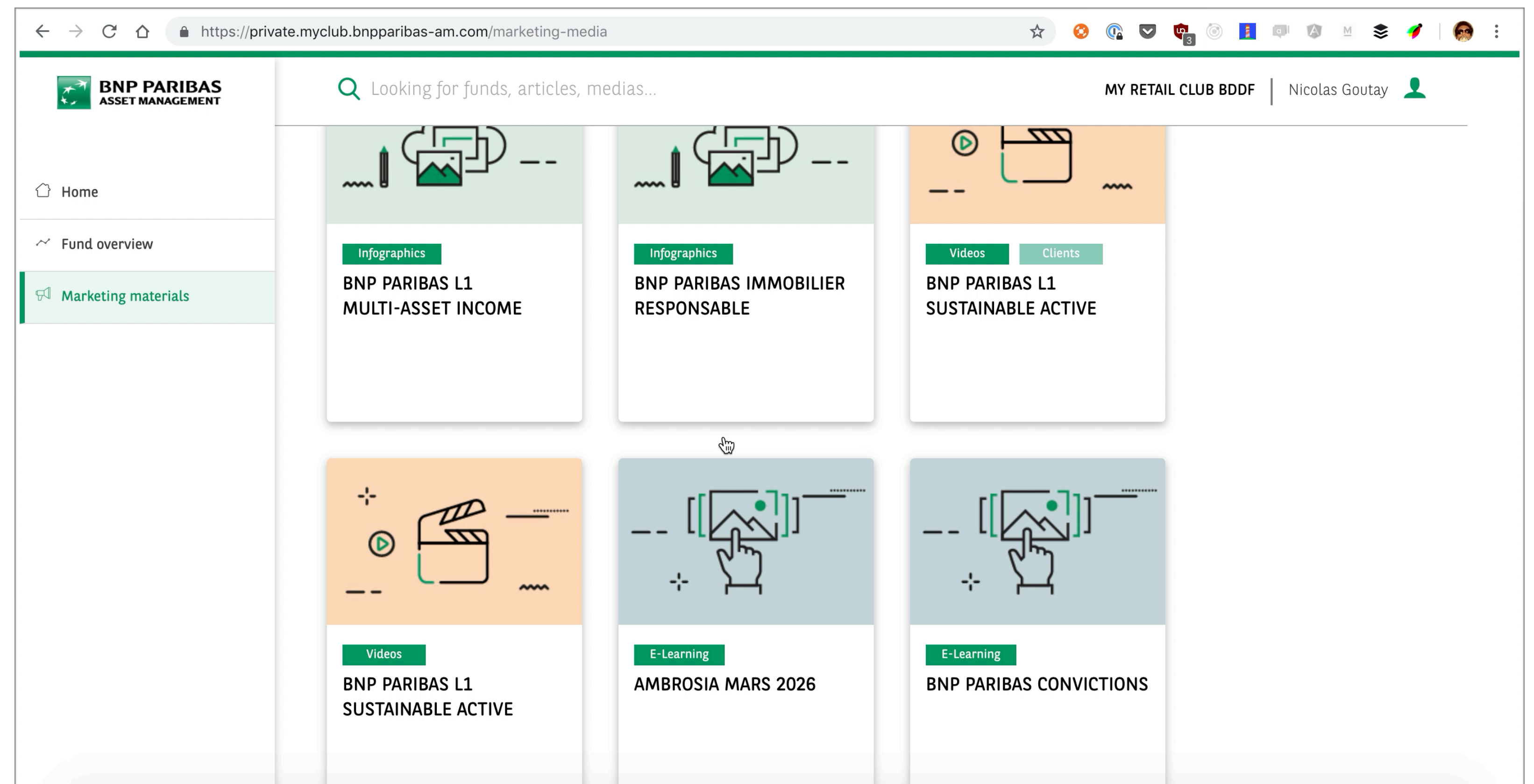
OUTLINE

- > WHY PERFORMANCE MATTERS
- > THE LEAN PHILOSOPHY
- ✓ THE RIGHT TOOLS
 - KEEPING IT SMALL
 - KEEPING IT SNAPPY
- > PERFORMANCE IS A LONG GAME

Keeping it **snappy**

 **Paint Flashing:** Highlight Chrome repaints of parts of your UI

 *Helpful for:* detecting useless renders slowing down the UI



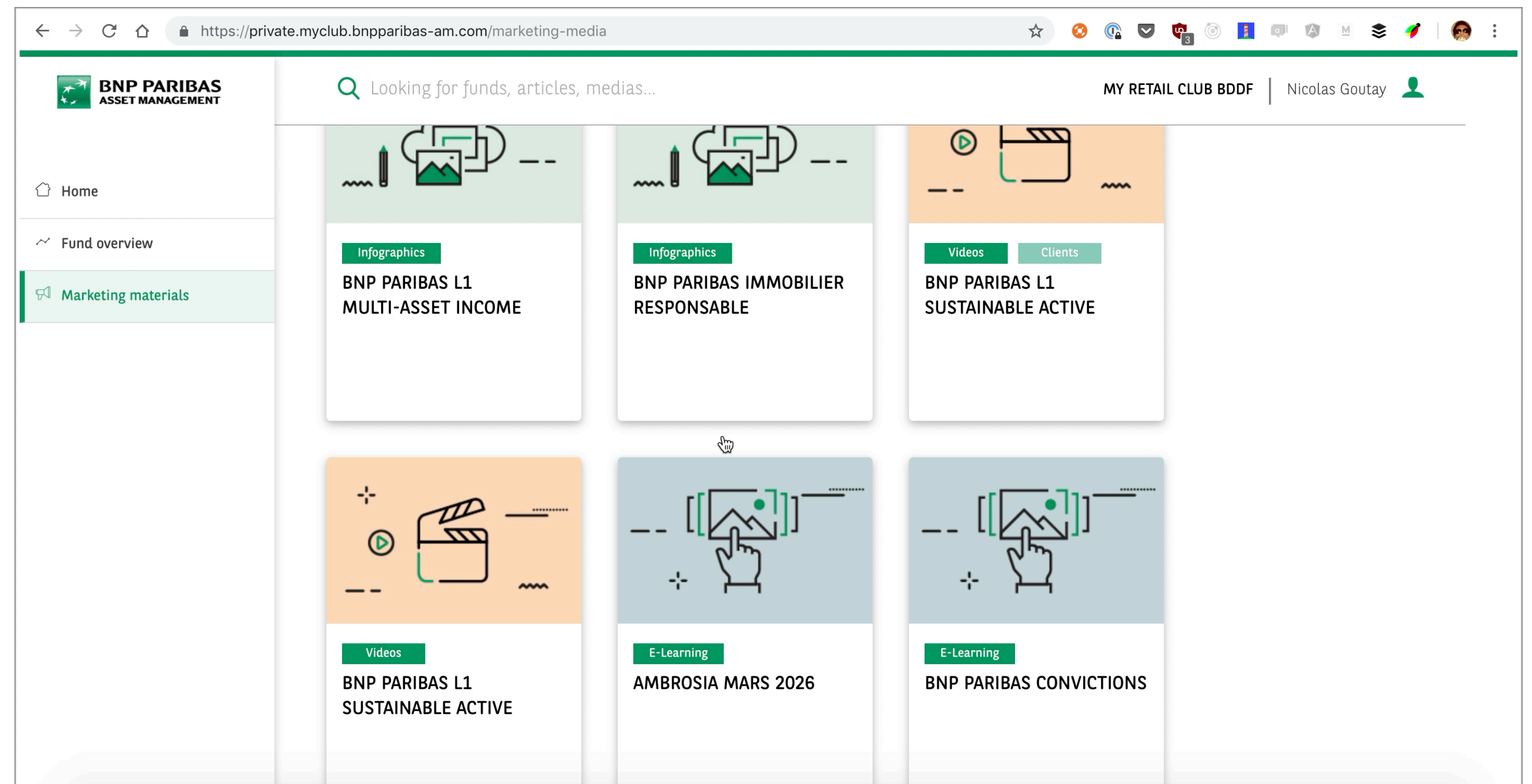
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Keeping it **snappy**

? **why-did-you-update**: Detects React's unnecessary updates

💡 *Helpful for*: detecting useless renders slowing down the UI.

```
⚠ ClassDemo.props: Changes are in functions only. Possibly avoidable re-render?
```

```
Functions before: ▶ Object {fn: function something()}
```

```
Functions after: ▶ Object {fn: function something()}
```

```
⚠ ClassDemo.state: Value is the same (equal by reference). Avoidable re-render!
```

```
Value: null
```

OUTLINE

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Performance is a long game

OUTLINE

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Third party scripts have an impact

Average mobile impact. Source & methodology: <https://www.thirdpartyweb.today/>

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Third party scripts have an impact

Google Ad Manager

Google Ad Manager costs **450ms**

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Third party scripts have an impact

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 YouTube

The YouTube video player costs **700ms**

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Google Ad Manager

YouTube

Google Maps

Google Maps widget costs **200ms**

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Third party scripts have an impact

Google Ad Manager

YouTube

Google Maps

hotjar

HotJar session replay costs **90ms**

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hotjar



Facebook Share widget costs **160ms**

OUTLINE

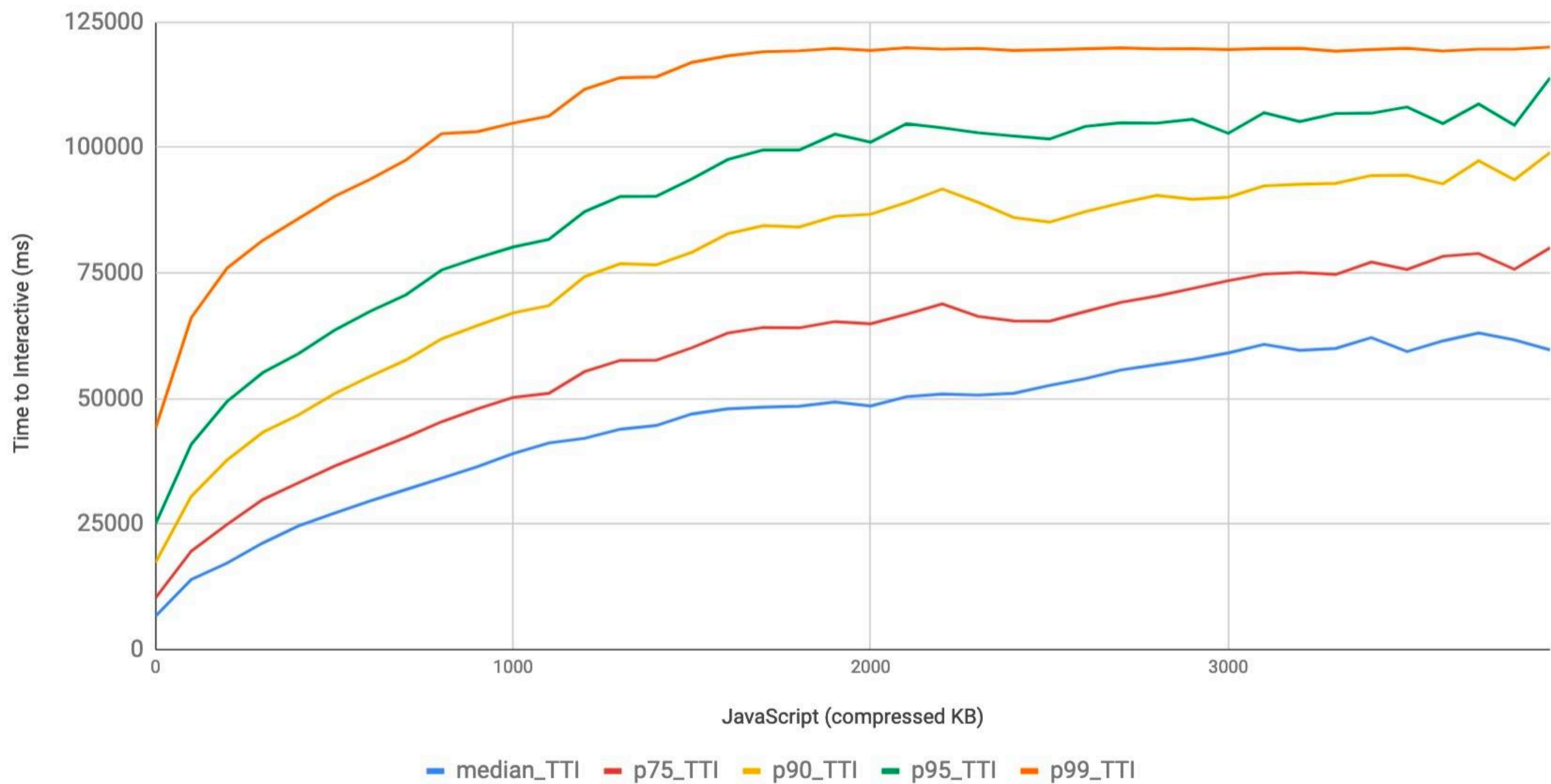
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JavaScript bloat has an impact

“Every 100KB of compressed JS results in a 3-4 second increase in Time to Interactive on a 3G connection”

— Paul Calvano

JavaScript KB vs Time to Interactive, HTTP Archive Mobile (3G) - September 2019



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Open Source performance auditing tools

Lighthouse



Performance

Metrics



● First Contentful Paint	1.5 s	▲ First Meaningful Paint	4.3 s
■ Speed Index	5.8 s	■ First CPU Idle	4.3 s
■ Time to Interactive	4.0 s	▲ Max Potential First Input Delay	400 ms

Values are estimated and may vary. The performance score is based only on these metrics.

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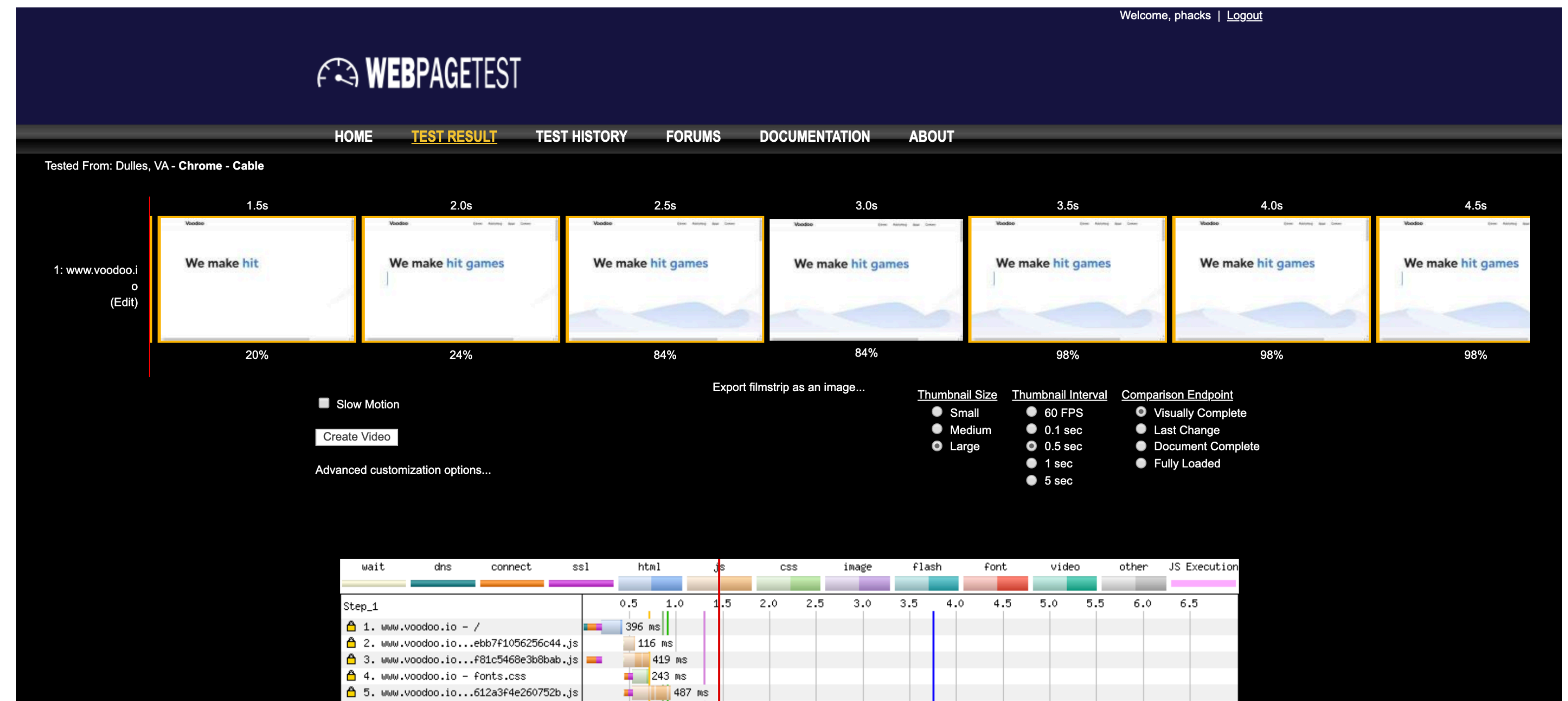
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Open Source performance auditing tools

WebPageTest



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ENTERS FALCO

Falco, our WebPageTest runner

The screenshot displays the Falco dashboard interface. On the left is a sidebar with the Falco logo and navigation options: 'Launch audits manually' (green button), 'Audits environment' (dropdown menu showing 'Chrome | Cable (Dulles)'), 'Manage project settings →', 'Audits' section, and 'Homepage PAGE' (blue button with a right arrow). The top right of the dashboard has 'MY PROJECTS ▾' and 'MY ACCOUNT ▾'. The main content area is titled 'Falco / Homepage PAGE' and features a 'Dashboard for the last week' section. This section contains three line charts: 'TTI - Time To Interactive (First View)' with a y-axis from 0 to 1800, 'Speed Index (First View)' with a y-axis from 0 to 1800, and 'Load Time (First View)' with a y-axis from 0 to 2000. All charts show data from 08/11 to 11/11 with a prominent spike. Below the charts are links for 'Add / Delete metrics →' and 'How to pick the right metrics? →'.

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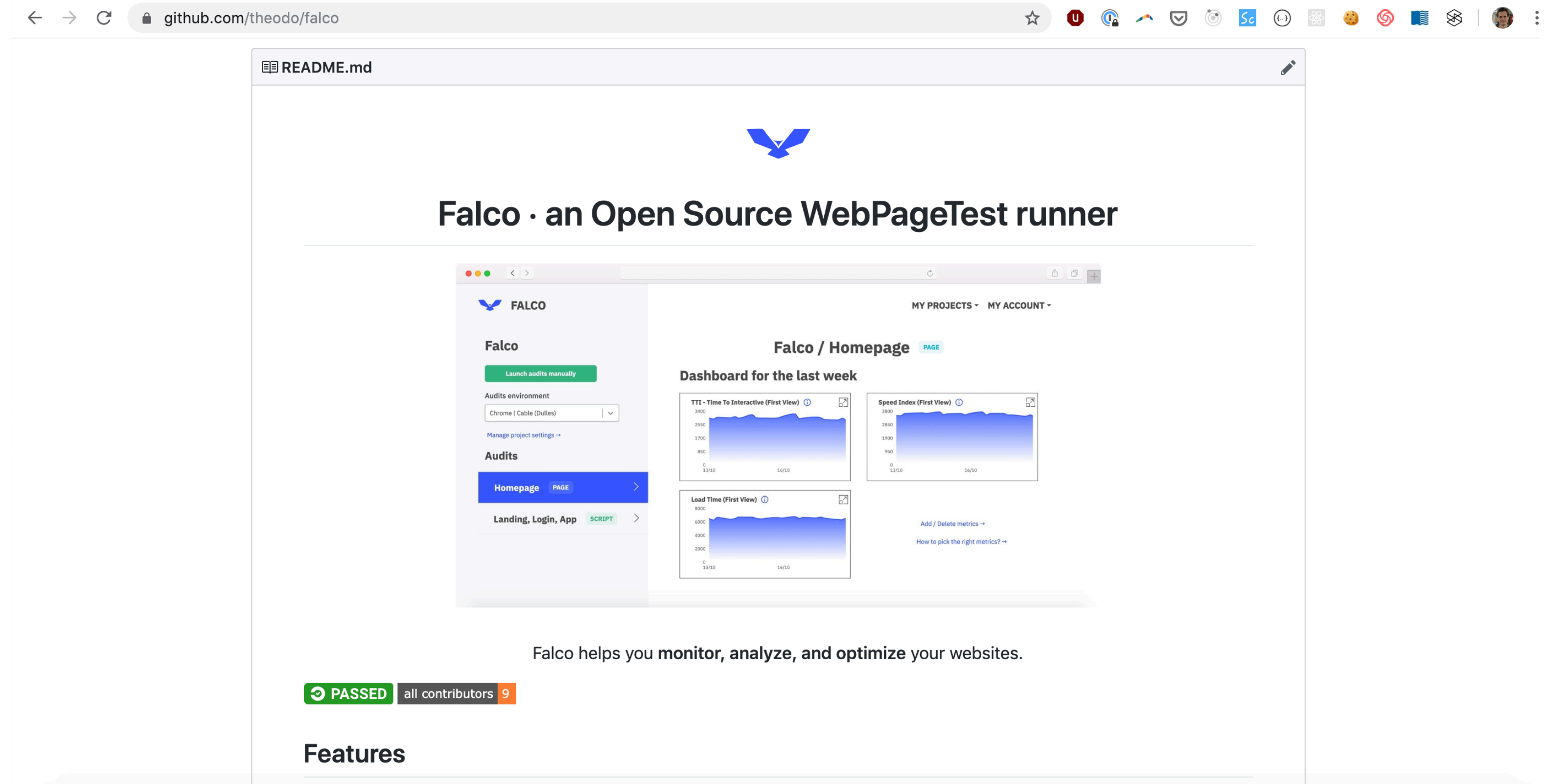


Falco is Open Source

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Falco, our WebPageTest runner



The screenshot shows the GitHub README for Falco, an open-source WebPageTest runner. The page features a blue falcon logo at the top, followed by the title "Falco · an Open Source WebPageTest runner". Below the title is a preview of the Falco dashboard, which includes a sidebar with navigation options like "Homepage" and "Landing, Login, App", and a main content area with a "Dashboard for the last week" section. This dashboard displays three line charts for "TTI - Time To Interactive (First View)", "Speed Index (First View)", and "Load Time (First View)". A status bar at the bottom of the dashboard indicates "PASSED" and "all contributors 9". The text "Falco helps you monitor, analyze, and optimize your websites." is positioned below the dashboard preview, and the word "Features" is visible at the bottom of the page.

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Falco, our WebPageTest runner

The screenshot shows the GitHub README for the Falco project. At the top, it features the Falco logo (a blue bird) and the title "Falco · an Open Source WebPageTest runner". Below this is a screenshot of the Falco web application interface. The interface includes a sidebar with navigation options like "Homepage", "Landing, Login, App", and "SCRIPT". The main content area displays a "Dashboard for the last week" with three line charts: "TTI - Time To Interactive (First View)", "Speed Index (First View)", and "Load Time (First View)". Below the dashboard, there is a status bar indicating "PASSED" for all contributors (9) and a "Features" section.

<https://github.com/theodo/falco>

<https://getfal.co>

Thank you!

Slides will be available later today on my Twitter: [@phacks](https://twitter.com/phacks)

Fonts used for this presentation:

- **Faune** (headers) by Alice Savoie/CNAP
- **Overpass** (outline) by Delve Fonts
- **Inter** (body copy) by Rasmus Andersson
- **IBM Plex Mono** (monospace) by IBM