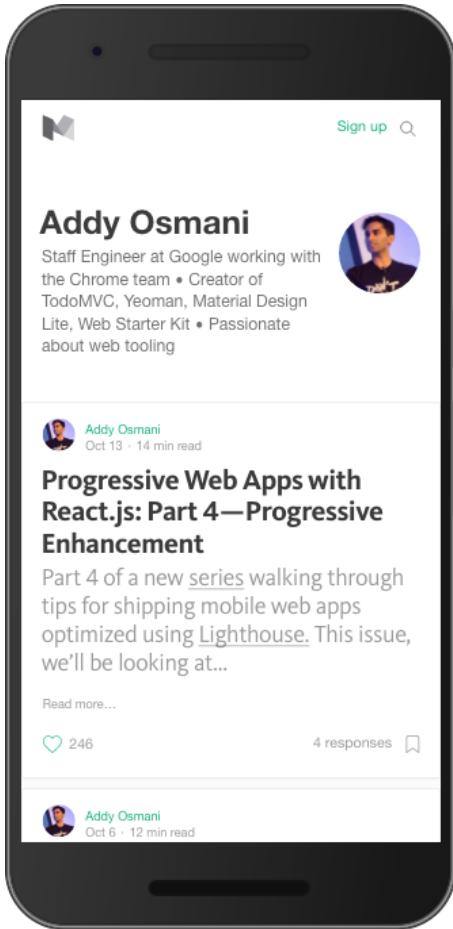
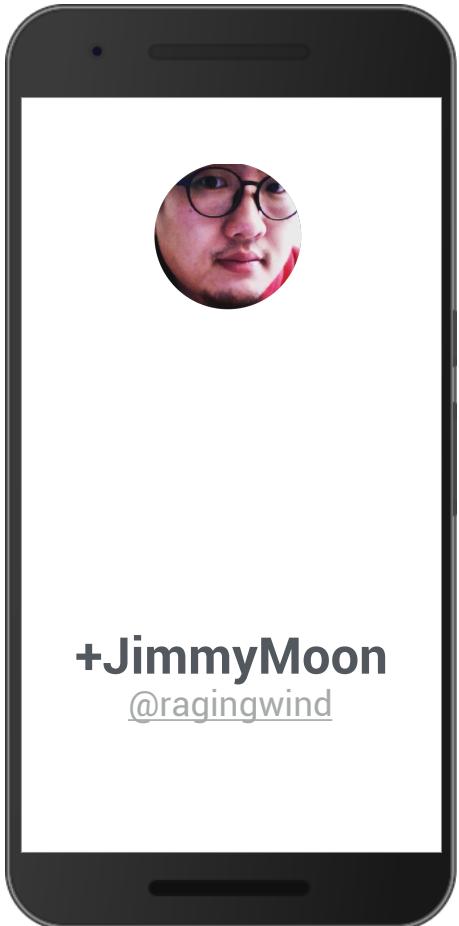




# Progressive Web Apps with React.js *in a Nutshell*



- Part 1 - Introduction
- Part 2 - Page Load Performance
- Part 3 - Offline support and network resilience
- Part 4 - Progressive Enhancement



Github / NPM



Google Developer Expert

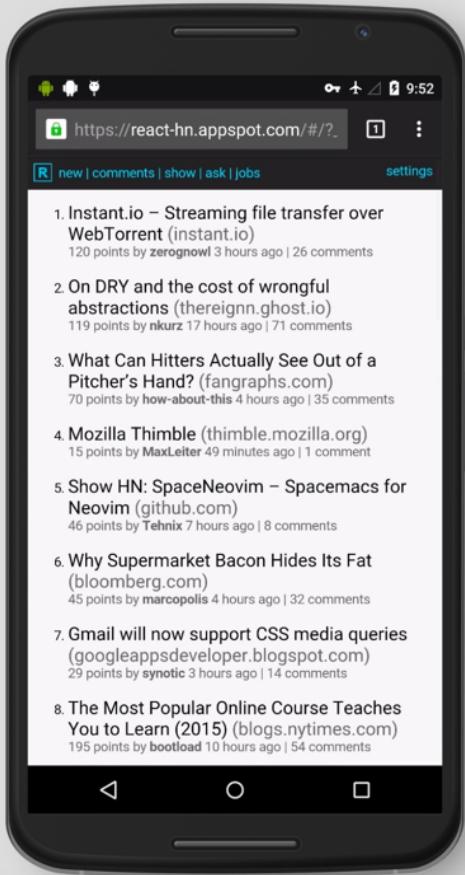


KOSSLAB 2 기

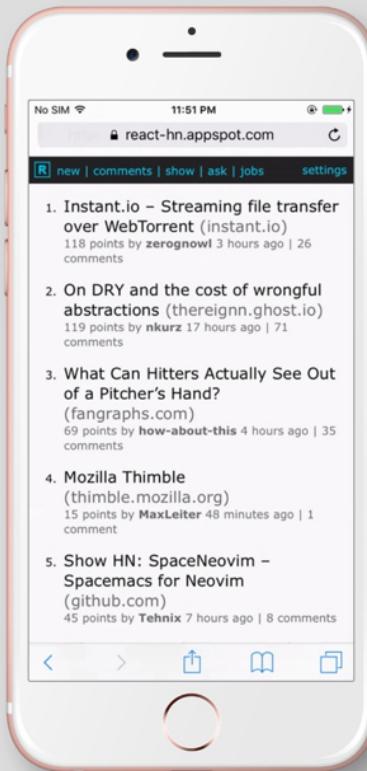
# **Part 1 - Introduction**

for Progressive Web Apps

# Network resilience (Offline) in modern browsers



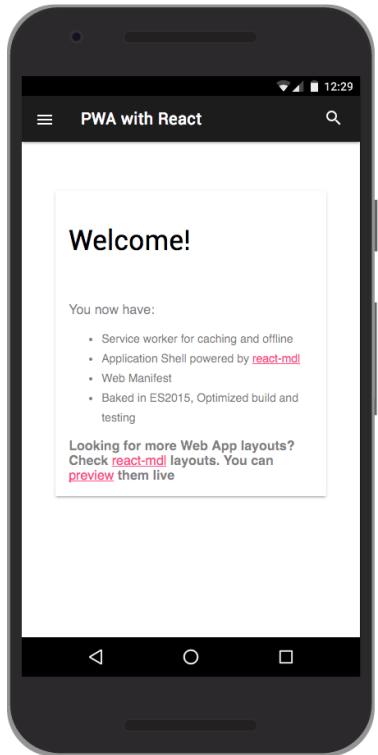
## Graceful degradation in Safari for iOS



- ✓ Universal Rendering
- ✓ Service Worker AppShell caching
- ✓ Content caching in Cache API
- ✓ Built w/ React, React Router & Firebase
- ✓ Cross-browser, including UC browser
- ✓ Optimised for Lighthouse

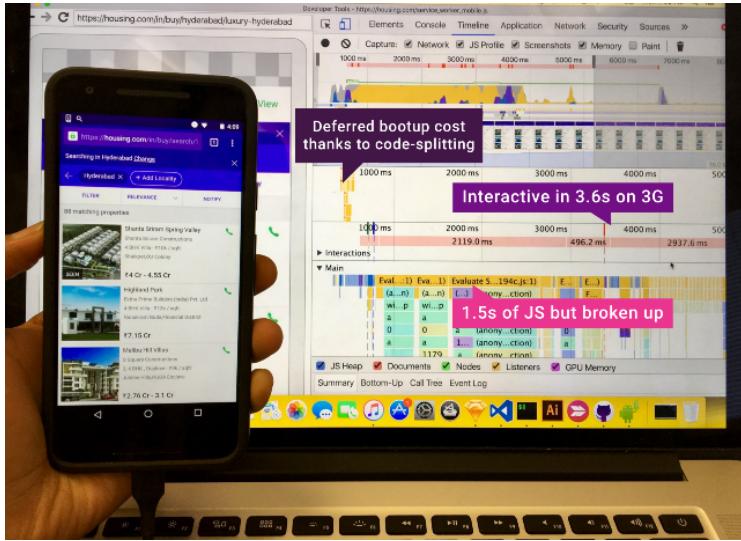
<https://react-hn.appspot.com>





- 초보자의 개념 잡기용
- React.js 최신 버전
- Webpack 2
  - Code-splitting
  - Tree-shaking
  - Commonchunk
  - and More
- PRPL 패턴 적용
- Service Worker 테스트 지원
- 매터리얼 디자인 with React MDL
- 간단한 구조와 뷰

[https://github.com/  
ragingwind/bare-react-pwa](https://github.com/ragingwind/bare-react-pwa)



# Ready for Mobile Platform

- 이제는 모바일 플랫폼이 최우선 타켓 플랫폼
- 모바일 환경에 적합한 JS Libraries/ Frameworks 사용하자
  - preact
  - AngularJS 2 Mobile
- 실제 모바일환경이나 유사환경에서 테스트하자
  - Remote Debugging Android Devices
  - WebPagetest

Lighthouse  
https://react-hn.appspot.com/#?\_...  
ALPHA

Progressive Web App

These audits validate the aspects of a Progressive Web App.

App can load on offline/flaky connections

Ensuring your web app can respond when the network connection is unavailable or flaky is critical to providing your users a good experience. This is achieved through use of a [Service Worker](#).

- Has a registered Service Worker
- URL responds with a 200 when offline
- Cache contains start\_url from manifest (alpha)

Page load performance is fast

Users notice if sites and apps don't perform well. These top-level metrics capture the most important perceived performance concerns.

- First meaningful paint (target: 1,800ms) (998.1ms) 100
- Speed Index (target: 1.250) First Visual Change: 266ms Last Visual Change: 2874ms (2613) 86
- Estimated Input Latency (target: 50ms) (19.1ms) 100 90% probability of input latency at 19.1ms or shorter. (50%: 16.0ms, 75%: 16.0ms, 90%: 19.1ms, 99%: 144.7ms, 100%: 165.7ms)
- Time To Interactive (alpha) (target: 1.000) (1015.3ms) 100
- Content scrolls at 60fps (Coming soon)

91 / 100



Auditing tools for Progressive Web App

- 네트워크 연결의 안전
- Add to Home screen 사용 가능 여부
- Custom splash screen 사용 가능 여부
- 오프라인이나 열악한 네트워크 환경에 동작 가능 여부
- 페이지 로드 성능은 어떠한지
- 모바일-프렌들리 디자인을 사용했는지
- Progressively enhanced 를 지원하는 앱 인지
- 주소창 색과 잘 매치 되는지



# HTTPS

Network connection  
is secure

- 기존 HTTP 상의 해킹 및 안전성 보완
- Service Worker/Push Notification 를 사용하여 사용자가 좋아하는 앱을 만들기 위해서
- 현재 무료/저가의 솔루션 사용 가능
  - [Let's Encrypt](#)
  - [Cloudflare](#)
  - [Google App Engine for Node.js](#)
  - [Github Pages](#)

Lighthouse report: https://read x

chrome-extension://blipmdconlkpinefehnjmammfjpmpbjk/pages/report.html

Lighthouse  
Version: 1.1.6 **BETA**

Progressive Web App

Best Practices

Performance Metrics

**Network connection is secure**

*Security is an important part of the web for both developers and users. Moving forward, Transport Layer Security (TLS) support will be required for many APIs.*

- Site is on HTTPS ✓
- Site redirects HTTP traffic to HTTPS ✓

**User can be prompted to Add to Homescreen**

*While users can manually add your site to their homescreen in the browser menu, the [prompt \(aka app install banner\)](#) will proactively prompt the user to install the app if the below requirements are met and the user has visited your site at least twice (with at least five minutes between visits).*

- Has a registered Service Worker ✓
- Manifest exists ✓
- Manifest contains start\_url ✓
- Manifest contains icons at least 144px ✓
- Manifest contains short\_name ✓

**Installed web app will launch with custom splash screen**

*A default splash screen will be constructed, but meeting these requirements guarantee a high-quality and customizable [splash screen](#) the user sees between tapping the home screen icon and your app's first paint.*

- Manifest exists ✓
- Manifest contains name ✓
- Manifest contains background\_color ✓
- Manifest contains theme\_color ✓

## Web App Manifest

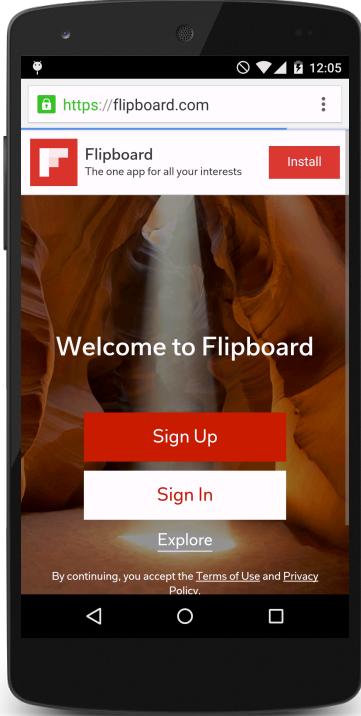
```
{  
  "name": "React HN",  
  "short_name": "React HN",  
  "icons": [  
    {"src": "img/android-chrome-192x192.png",  
     "sizes": "192x192",  
     "type": "image/png"}  
  ],  
  "start_url": "index.html",  
  "background_color": "#4CC1FC",  
  "display": "standalone",  
  "theme_color": "#222222"  
}
```



# Web App Manifest

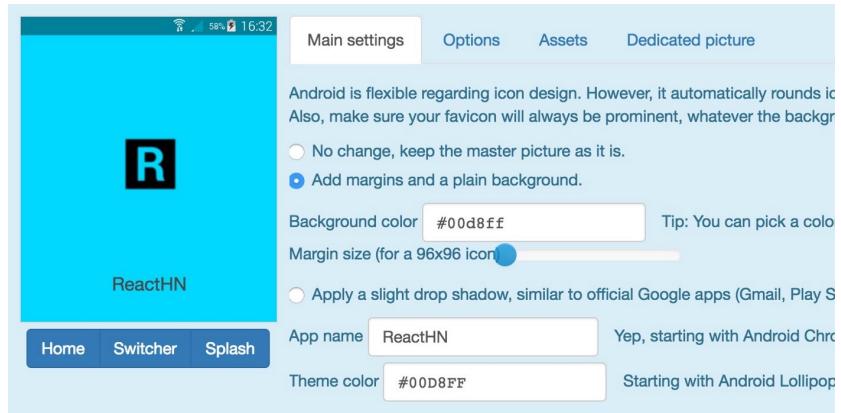
Add to Home screen

- 간단한 JSON 파일
- 설치 가능한 (Installable) 웹앱을 위한 설정들, 이름, 아이콘등
  - Add to Home Screen / Install Banner
  - Splash Screen
  - Theme Color



# Add to Home Screen by Install Banner

- 자주 사용하는 사용자에게 앱을 간단히 설치하도록 권유
- Home Screen에 등록된 앱의 경우 재방문율 심히 향상가능

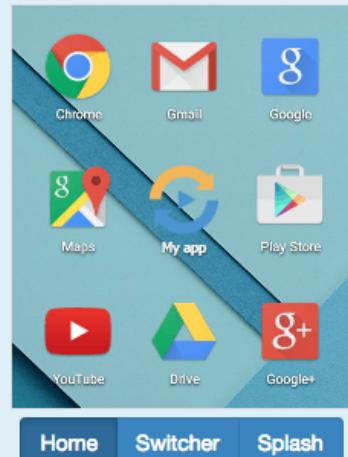


# Splash Screen

- 더이상 로딩중 노-화이트-스크린은 그만
- 네이티브 앱과 같은 경험 제공
- Chrome, Firefox and Opera supports
- Safari have broken in iOS9

## Favicon for Android Chrome

Add to Homescreen is also a feature of Android Chrome. Your visitors can mix their native apps and web bookmarks.

[Main settings](#)[Options](#)[Assets](#)[Dedicated picture](#)

Android is flexible regarding icon design. However, it automatically rounds icons which can be bad news if your icon needs square corners. Also, make sure your favicon will always be prominent, whatever the background. Use the options below to find the best fit.

- No change, keep the master picture as it is.
- Add a solid, plain background to fill the transparent regions.

Background color 

Tip: You can pick a color directly from the preview.

Margin size (for a 96x96 icon) 

- Apply a slight drop shadow, similar to official Google apps (Gmail, Play Store, YouTube...).

[Home](#) [Switcher](#) [Splash](#)App name 

Yep, starting with Android Chrome M39 and its manifest, this field is mandatory.

Theme color 

Starting with Android Lollipop, you can customize the color of the task bar in the switcher.

## Windows Metro

Windows 8 and 10 users can pin your web site on their desktop. Your site appears as a tile, just like a native Windows app.

[Settings](#)[Assets](#)[Dedicated picture](#)<http://realfavicongenerator.net/>

```
~/Workspace/ProgressiveWebapp ragingwind@rw-mbprt 1.4681s  
› pwa-manifest --interactive
```

\$ npm install -g pwa-manifest



# Lighthouse

Version: 1.1.6

BETA

Progressive Web App

Best Practices

Performance Metrics

## User can be prompted to Add to Homescreen

While users can manually add your site to their homescreen in the browser menu, the [prompt \(aka app install banner\)](#) will proactively prompt the user to install the app if the below requirements are met and the user has visited your site at least twice (with at least five minutes between visits).

- Has a registered Service Worker
- Manifest exists
- Manifest contains start\_url
- Manifest contains icons at least 144px
- Manifest contains short\_name

## Installed web app will launch with custom splash screen

A default splash screen will be constructed, but meeting these requirements guarantee a high-quality and customizable [splash screen](#) the user sees between tapping the home screen icon and your app's first paint.

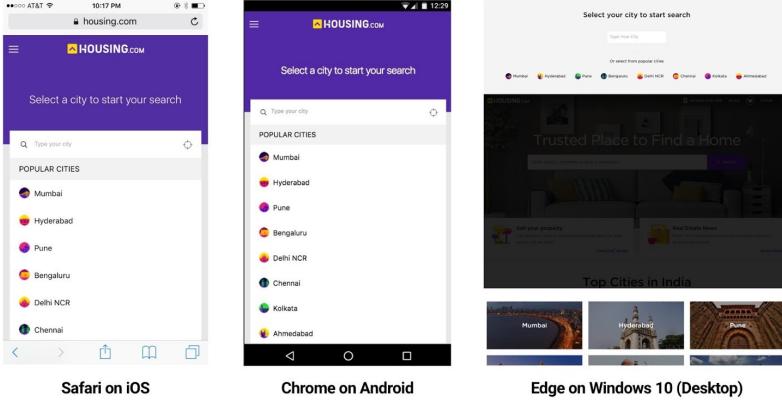
- Manifest exists
- Manifest contains name
- Manifest contains background\_color
- Manifest contains theme\_color
- Manifest contains icons at least 192px

## Address bar matches brand colors

The browser address bar can be themed to match your site. A theme-color [meta tag](#) will upgrade the address bar when a user browses the site, and the [manifest theme-color](#) will apply the same theme site-wide once it's been added to homescreen.

- Manifest exists



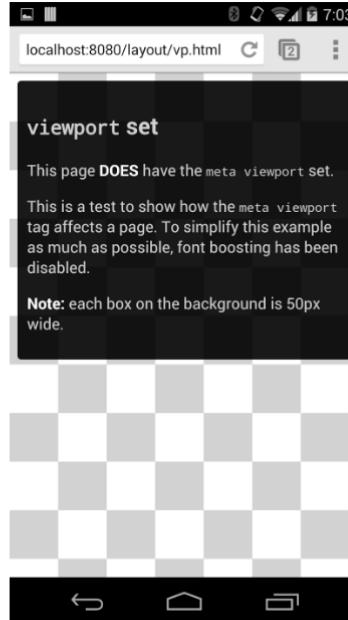


# Mobile-Friendly Design

- 모바일-중심적 디자인을 하지만 ... 데스크 탑도 잊지 마세요
  - Responsive Web Design
- 다양한 해상도/픽셀들에서 사용자 불편없이 동작해야 합니다



Page without a viewport set



Page with a viewport set

- meta “viewport” 를 사용하여 브라우저 viewport 를 조절하세요

```
<meta name="viewport" content="width=device-width, initial-scale=1">
```

Lighthouse report: https://read x

chrome-extension://blipmdconlkpinefehnjmammfjpmpbjk/pages/report.html

# Lighthouse

Version: 1.1.6 **BETA**

Progressive Web App

Best Practices

Performance Metrics

## Design is mobile-friendly

*Users increasingly experience your app on mobile devices, so it's important to ensure that the experience can adapt to smaller screens.*

- HTML has a viewport <meta>
- Content is sized correctly for the viewport

## Best Practices

These audits do not affect your score but are worth a look.

- Accessibility:** Element aria-\* roles are valid
- Accessibility:** Element aria-\* attributes are valid ARIA attributes
- Accessibility:** Background and foreground colors have a sufficient contrast ratio
- Accessibility:** Every image element has an alt attribute
- Accessibility:** Every form element has a label
- Manifest:** Manifest's short\_name won't be truncated when displayed on homescreen
- Manifest:** Manifest's display property is set
- UX:** Service worker makes use of push notifications, if appropriate (Coming soon)
- UX:** Tap targets are appropriately sized for touch (Coming soon)
- UX:** Payment forms marked up with [autocomplete] attributes (Coming soon)
- UX:** Login forms marked up with [autocomplete] attributes (Coming soon)
- UX:** Input fields use appropriate [type] attributes for custom keyboards (Coming soon)

## Performance Metrics

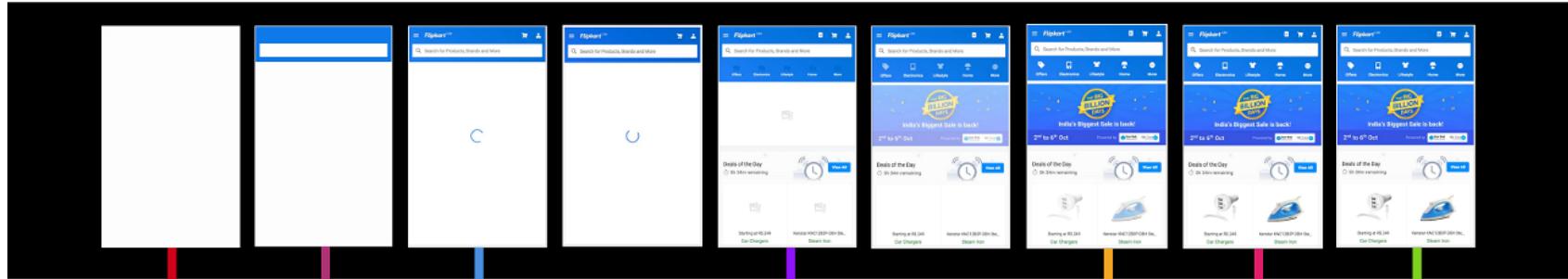
These encapsulate your app's performance.

## **Part 2 - Page Load Performance**

is it happening?

is it useful?

is it usable?



Navigation begins

Time to first byte

First Contentful Paint

Navigation has successfully started

First Meaningful Paint

Page's primary content is visible

Visually ready

Page looks nearly done

Fully Loaded

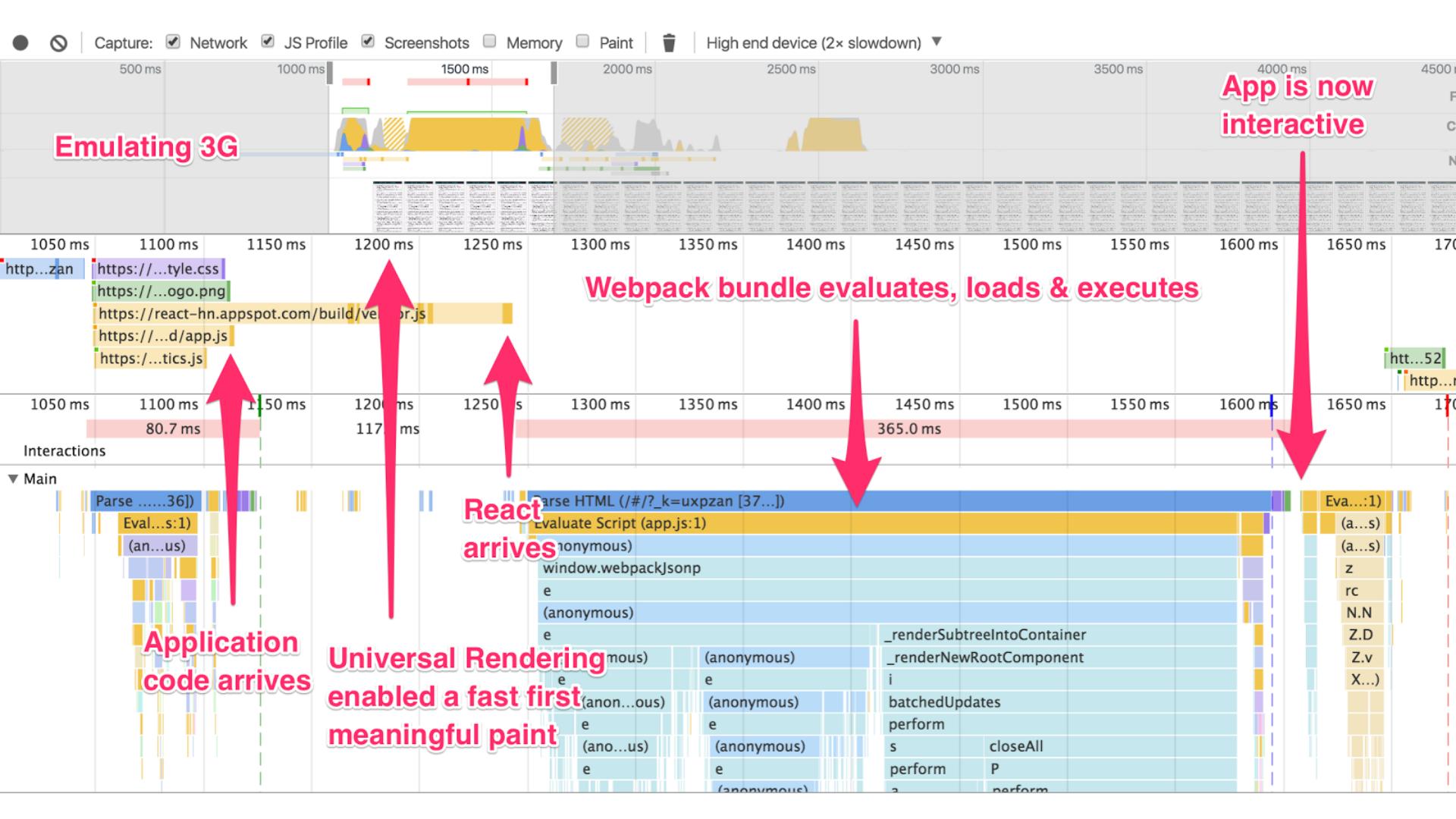
End of load lifecycle

**First Paint**

The first non-blank paint on screen

**Time to Interactive**

Visually usable and engagable



BETA

# Lighthouse

Version: 1.1.6

Progressive Web App

Best Practices

Performance Metrics

## Page load performance is fast

*Users notice if sites and apps don't perform well. These top-level metrics capture the most important perceived performance concerns.*

- First meaningful paint (target: 1,600ms) (776.9ms) 100
- Speed Index (target: 1,250) (28860414) 0

*First Visual Change: 28860395ms*

*Last Visual Change: 28861334ms*

- Estimated Input Latency (target: 50ms) (16ms) 100
  - 90% probability of input latency at 16.0ms or shorter.*  
(50%: 16.0ms, 75%: 16.0ms, 90%: 16.0ms, 99%: 145.7ms, 100%: 168.1ms)
- Time To Interactive (alpha) (target: 1,700) (787.1ms) 100
- Content scrolls at 60fps (Coming soon)
- Touch input gets a response in < 150ms (Coming soon)
- App is interactive without jank after the first meaningful paint (Coming soon)

## Site is progressively enhanced

*Progressive enhancement means that everyone can access the basic content and functionality of a page in any browser, and those without certain browser features may receive a reduced but still functional experience.*

- Page contains some content when its scripts are not available



## Network connection is secure

*Security is an important part of the web for both developers and users. Moving forward, Transport Layer Security (TLS)*

# RESPONSE

0.1  
SECONDS

# ANIMATION

16  
MILLISECONDS

# IDLE

50  
MILLISECONDS

# LOAD

1  
SECOND

## Performance Goal

- RAIL 패턴중 L>Loading under 1sec)에 집중하세요
- 네트워크 조건을 내리고 저사향 하드웨어에서도 충분히 잘 동작해야합니다.
- 첫 방문시에는 5 초 이내(Speed Index of 3,000 or less)
- 재방문시(with S/W, Speed Index of 1,000 or less)에는 2 초이내 앱은 사용자 조작에 반응해야합니다.

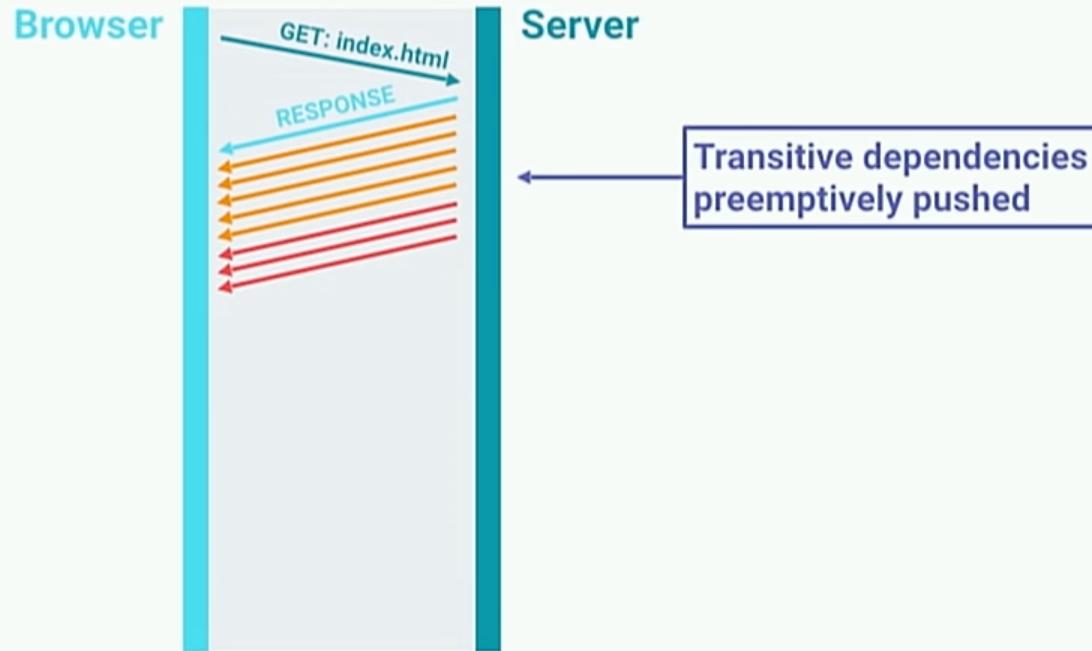
**Push** components for initial route

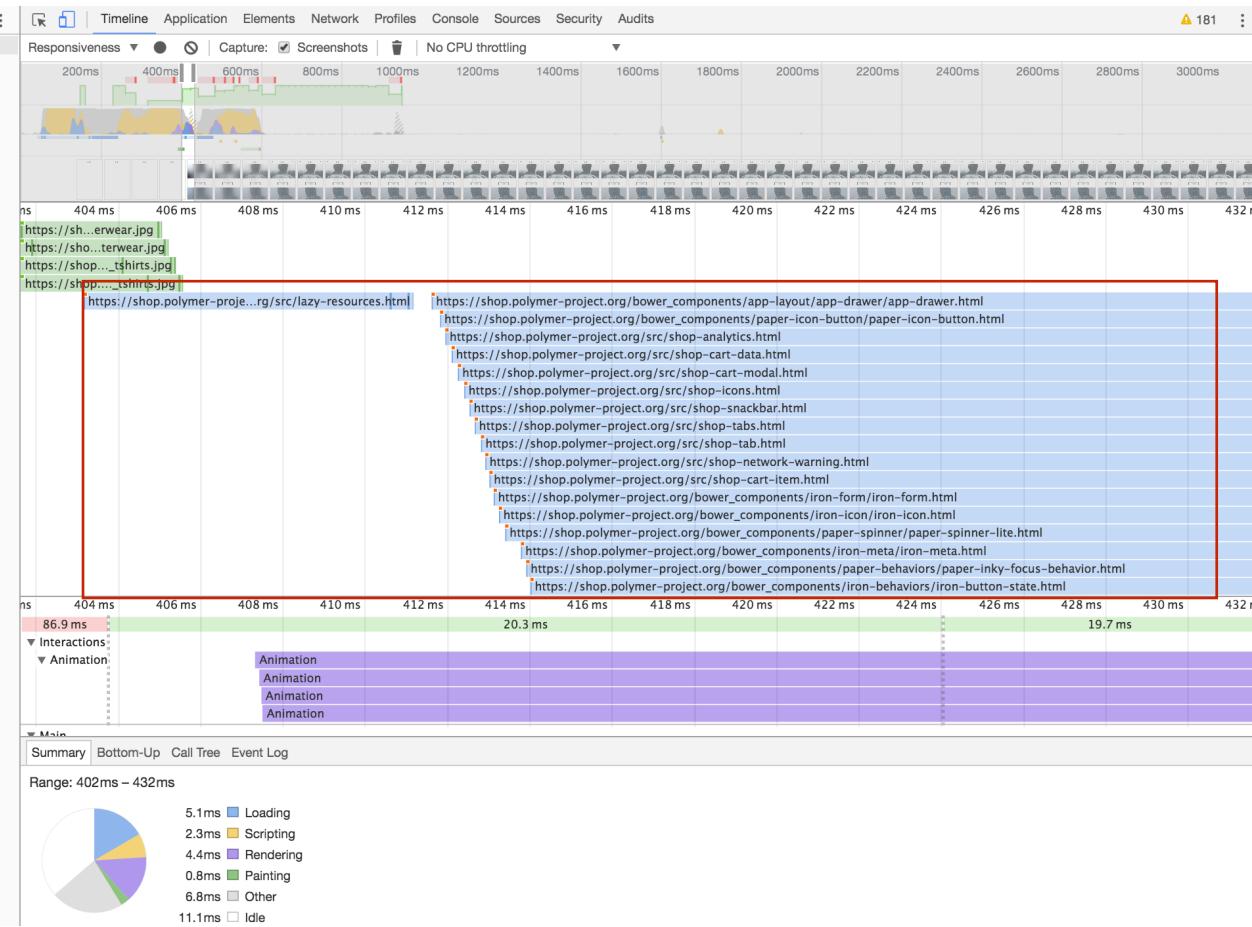
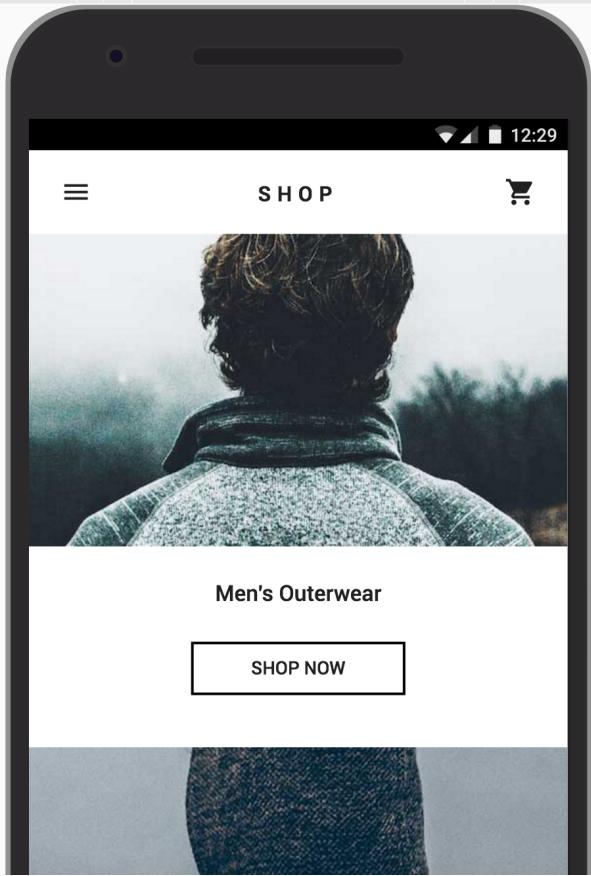
**Render** the initial route asap

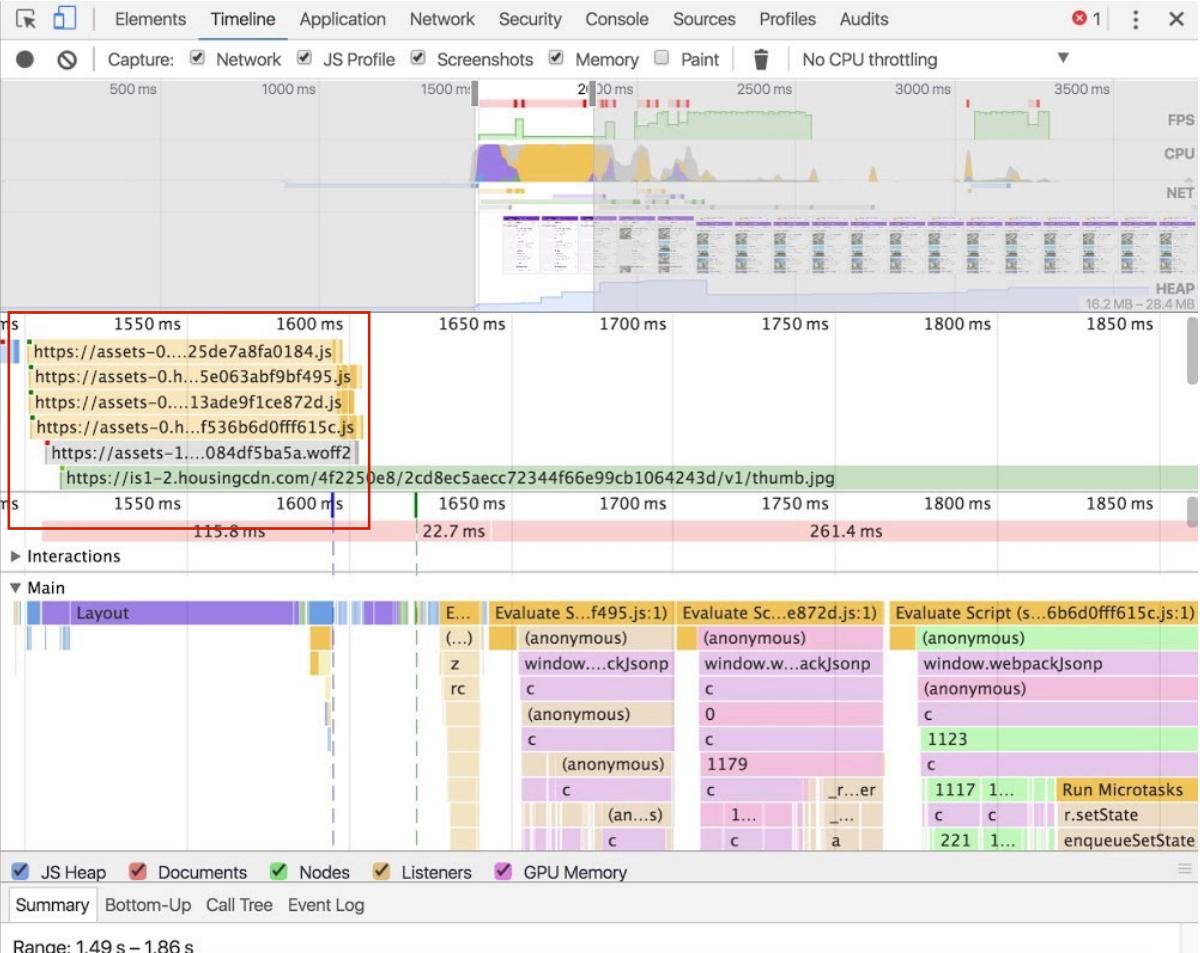
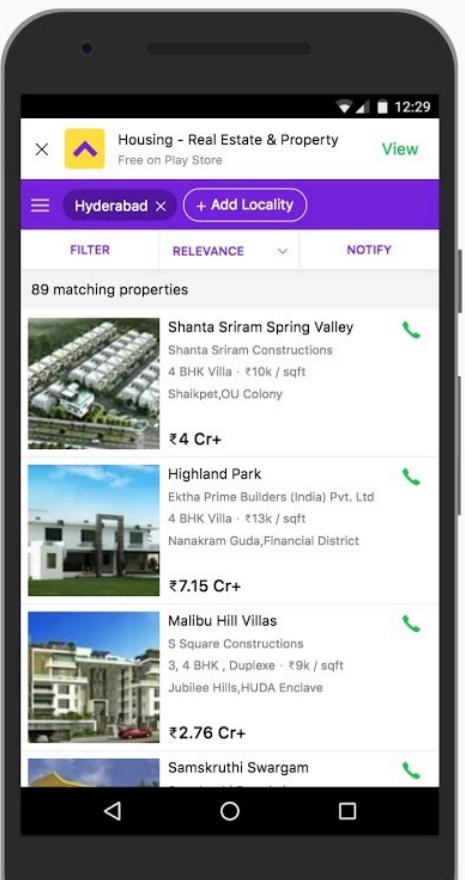
**Pre-cache** components for remaining routes

**Lazy-load** & create next routes on-demand

# HTTP/2 + Server Push

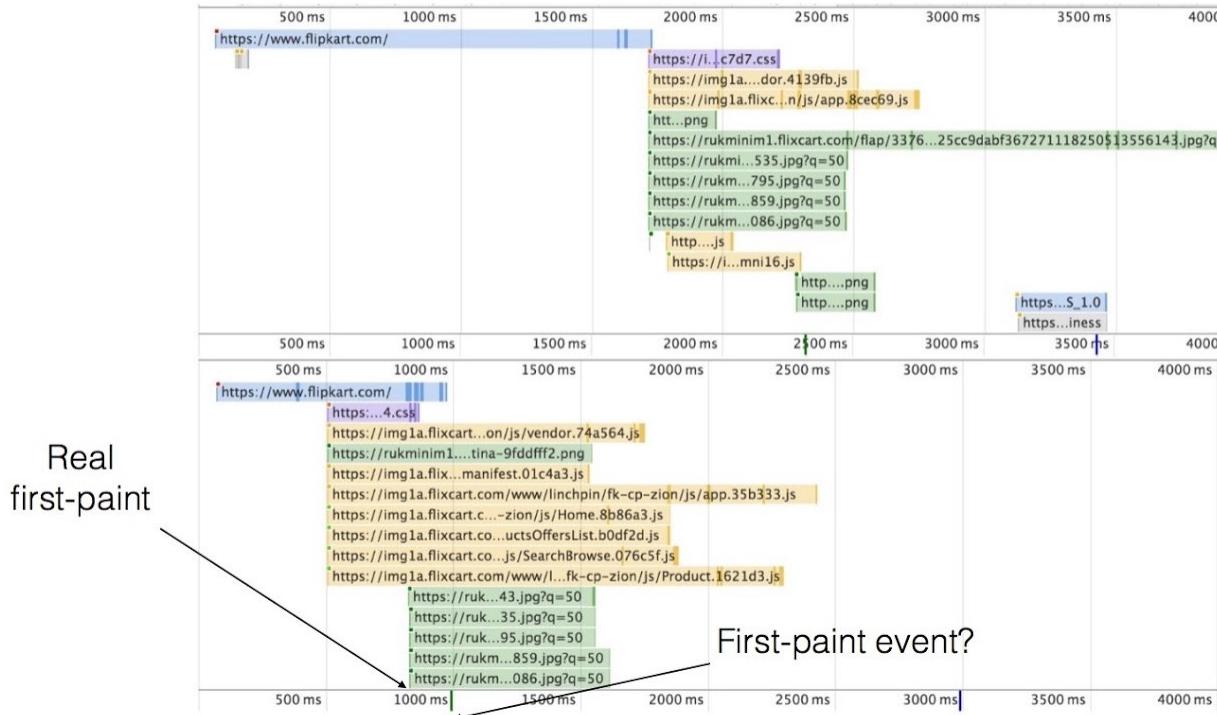






```
38
39
40
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55
56
57
58
59
60
61
62
63
64
else {
    t[e] = [c];
    var f = document.getElementsByTagName("head")[0]
        , i = document.createElement("script");
    i.type = "text/javascript",
    i.charset = "utf-8",
    i.async = !0,
    i.src = a.p + "" + ({
        0: "searchView",
        1: "projectsDedicatedView",
        2: "homeView",
        3: "pushNotificationsView",
        4: "contactedView",
        5: "shortlistedView",
        6: "localitySelect",
        7: "resaleDedicatedView",
        8: "vouchersListing",
        9: "propertyValuation",
        10: "savedSearchView",
        11: "editProfileView",
        12: "userProfileView",
        13: "loginView",
        14: "propertyReport",
        15: "appBannerView",
        17: "app",
        18: "vendor",
        19: "bottomNotification",
```

# Chunking + Streaming + Preload (PRPL)

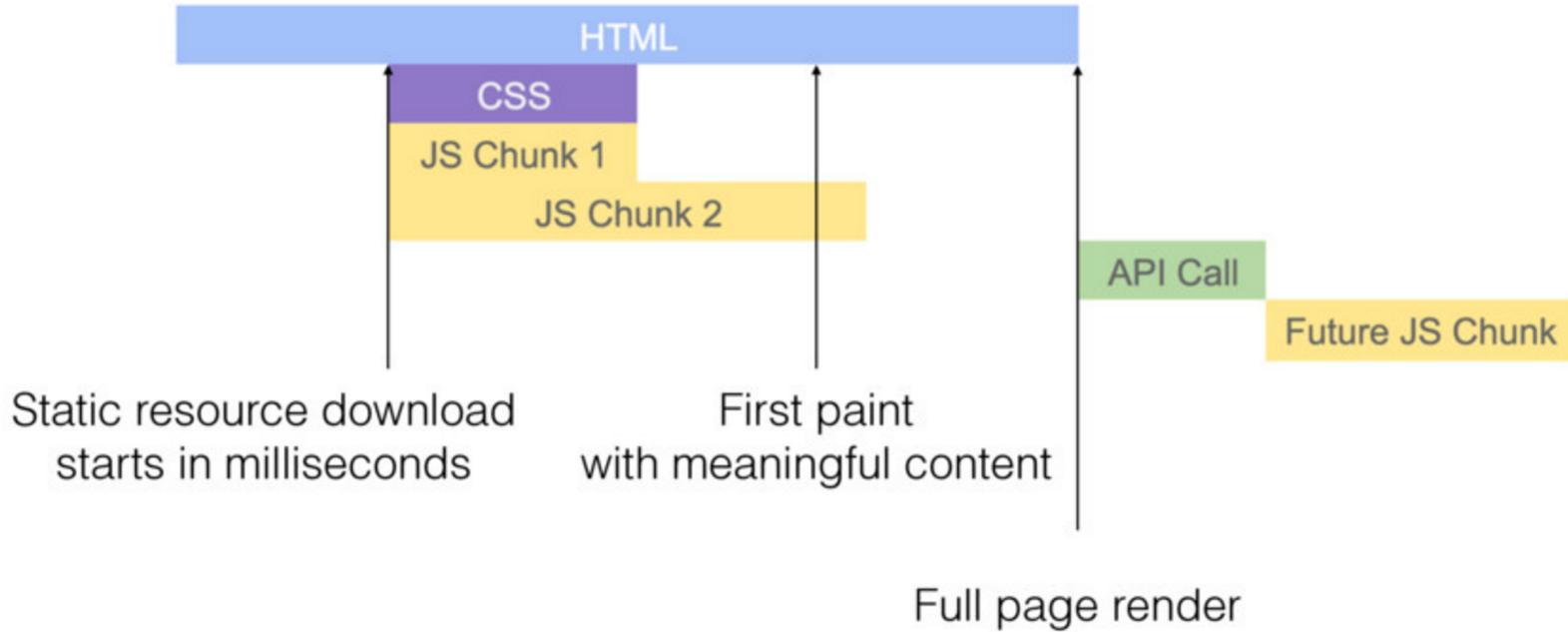


## Basic Streaming using Express.js

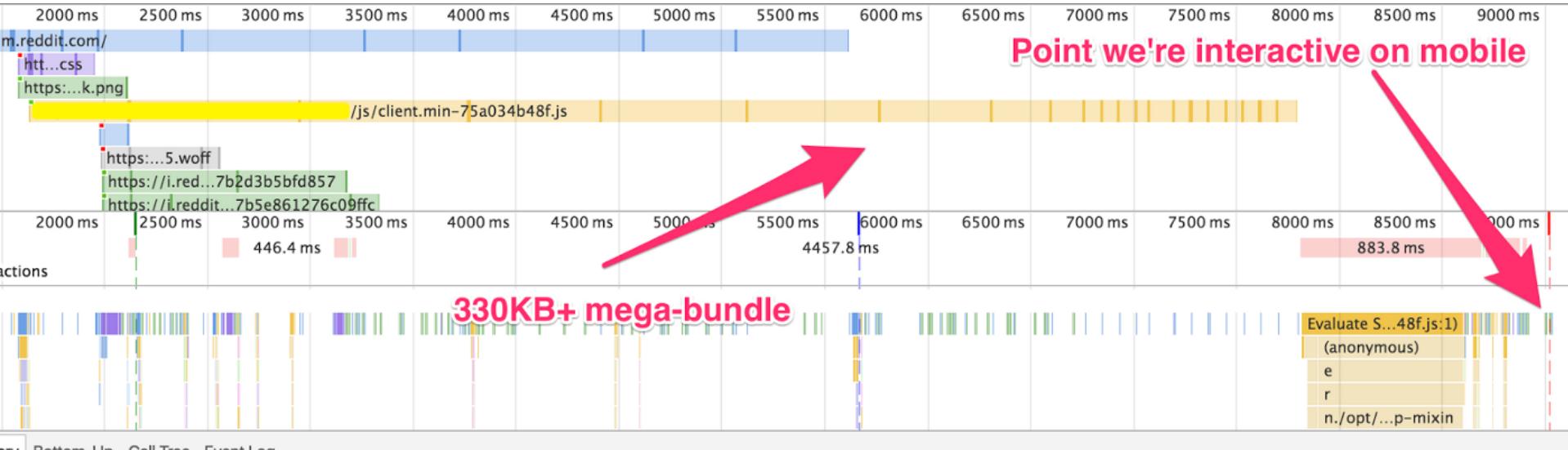
```
app.use(function (req, res) {
  res.set('Content-Type', 'text/html');
  let htmlHead = "<html><head><link><style>....<body>";
  res.write(htmlHead);
  res.flush();

  let htmlBody = ReactDOM.renderToString(<App />);
  res.write(htmlBody);
  res.flush();

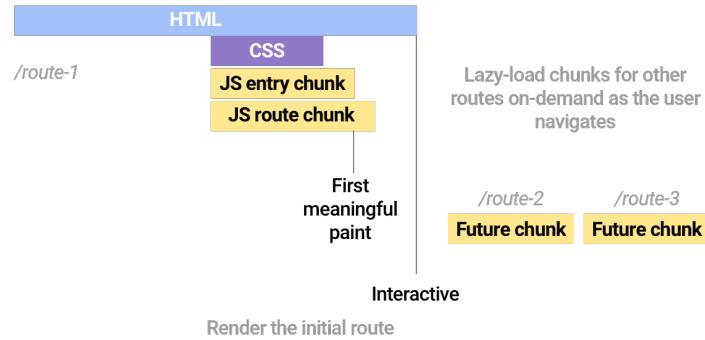
  let scripts = "<script src='app.bundle.js'></script>";
  res.write(scripts);
  res.flush();
  res.end();
});
```



# Kicking mega byte bundle



Push the minimal functional code for a route



- 하나의 큰 파일을 라우트 기반으로 분리
- 다른 라우트에 필요한 파일들은 이후에 별도로 로딩가능 (Lazy-loading)
- 초기 라우트 성능 향상으로 사용자 사용 가능 시간이 앞당겨짐

# Code-splitting by routes

```
// with webpack 2.0
<Route path="item/:id" getComponent={(s, cb) => {
  System.import('./Item').then((component) => {
    cb(null, component.default || component);
  });
} }/>
```

```
// with webpack 1.x
<Route path="item/:id" getComponent={(s, cb) =>
  require.ensure([], require => {
    cb(null, require('./Item'))
  }, 'Item')
} }/>
```

```
nwb: clean-app  
nwb: build-react-app  
Hash: fea2b333a055c1efac41  
Version: webpack 1.12.14  
Time: 7931ms
```

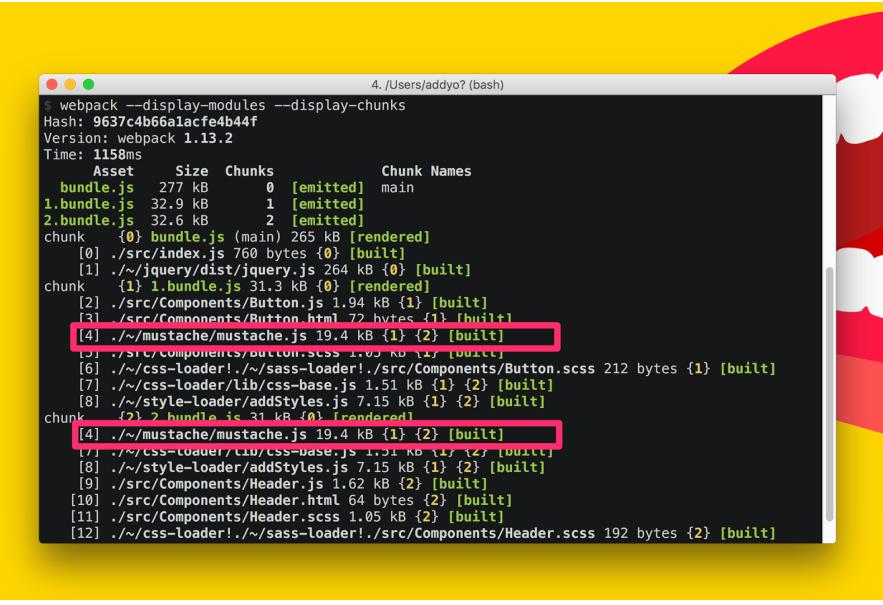
## monolithic bundles

| Asset         | Size    | Chunks | Chunk Names      |
|---------------|---------|--------|------------------|
| vendor.js     | 352 kB  | 0      | [emitted] vendor |
| app.js        | 53.5 kB | 1      | [emitted] app    |
| vendor.js.map | 2.63 MB | 0      | [emitted] vendor |
| app.js.map    | 295 kB  | 1      | [emitted] app    |

```
nwb: clean-app  
nwb: build-react-app  
Hash: c4f5a86a3f939b795fee  
Version: webpack 1.12.14  
Time: 7971ms
```

## code-splitting by routes

| Asset                     | Size      | Chunks | Chunk Names                |
|---------------------------|-----------|--------|----------------------------|
| 0.Item.js.map             | 47.4 kB   | 0      | [emitted] Item             |
| 0.Item.js                 | 8.96 kB   | 0      | [emitted] Item             |
| 2.PermalinkComment.js     | 7.53 kB   | 2      | [emitted] PermalinkComment |
| 3.UserProfile.js          | 2.28 kB   | 3      | [emitted] UserProfile      |
| 4.NotFound.js             | 346 bytes | 4      | [emitted] NotFound         |
| app.js                    | 39.6 kB   | 5      | [emitted] app              |
| vendor.js                 | 351 kB    | 1      | [emitted] vendor           |
| vendor.js.map             | 2.62 MB   | 1      | [emitted] vendor           |
| 2.PermalinkComment.js.map | 42.7 kB   | 2      | [emitted] PermalinkComment |
| 3.UserProfile.js.map      | 10.8 kB   | 3      | [emitted] UserProfile      |
| 4.NotFound.js.map         | 1.56 kB   | 4      | [emitted] NotFound         |
| app.js.map                | 224 kB    | 5      | [emitted] app              |



```
4. ./Users/addyo? (bash)
$ webpack --display-modules --display-chunks
Hash: 9637c4b66a1acf4b44f
Version: webpack 1.13.2
Time: 1158ms
    Asset      Size  Chunks             Chunk Names
bundle.js   277 kB        0  [emitted]  main
1.bundle.js  32.9 kB       1  [emitted]
2.bundle.js  32.6 kB       2  [emitted]
chunk {0} bundle.js (main) 265 kB [rendered]
[0] ./src/index.js 760 bytes {0} [built]
[1] ./~/jquery/dist/jquery.js 264 kB {0} [built]
chunk {1} 1.bundle.js 31.3 kB {0} [rendered]
[2] ./src/Components/Button.js 1.94 kB {1} [built]
[3] ./src/Components/Button.html 72 bytes {1} [built]
[4] ./~/mustache/mustache.js 19.4 kB {1} {2} [built]
[5] ./src/Components/Button.scss 1.05 kB {1} [built]
[6] ./~/css-loader!./~/sass-loader!./src/Components/Button.scss 212 bytes {1} [built]
[7] ./~/css-loader/lib/css-base.js 1.51 kB {1} {2} [built]
[8] ./~/style-loader/addStyles.js 7.15 kB {1} {2} [built]
chunk {2} 2.bundle.js 31 kB {0} [rendered]
[4] ./~/mustache/mustache.js 19.4 kB {1} {2} [built]
[5] ./~/css-loader!./~/sass-loader!./src/Components/Header.scss 1.05 kB {2} [built]
[6] ./~/css-loader!./~/sass-loader!./src/Components/Header.scss 192 bytes {2} [built]
```

# More plugins for Webpack

- 다양한 Webpack 플러그인으로 용량을 줄일 수 있다
- CommonsChunkPlugin, 각 Entrypoint에서 공용으로 사용되는 청크를 분리, 사용 가능
- Tree Shaking, 데드코드 제거로 청크 용량 다이어트 가능 (but Webpack 2)

/route-1

Preload chunks for other routes so they're available  
before the user navigates to them

chunk-2 /route-2  
chunk-3 /route-3  
chunk-4 /route-4

```
<head>  
<link rel="preload" as="script" href="chunk-2.js">  
<link rel="preload" as="script" href="chunk-3.js">  
<link rel="preload" as="script" href="chunk-4.js">  
</head>
```

- 선언만으로 리소스 패치 가능 (실행없이)
- 지금까지는 only in Chrome

# Preload

# Resource Hints

Hints to the browser that might prime the pump for resources you will need.

Preload is the only exception here, being more of an instruction than just a hint.

## Preresolve DNS hostnames for assets

```
<link rel="dns-prefetch" href="https://my-site.com">
```

## Begin a connection handshake in the background

```
<link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
```

## Declaratively fetch a resource without executing it

```
<link rel="preload" href="late_script.js" as="script">
```

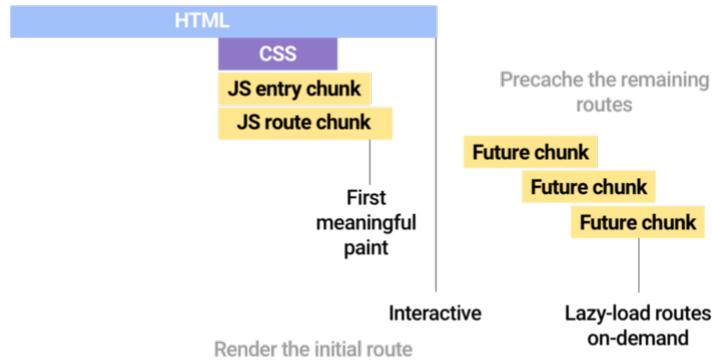
## Prefetch a resource for a future navigation

```
<link rel="prefetch" href="/images/large.jpg">
```

## Prerender a page in the background for future nav

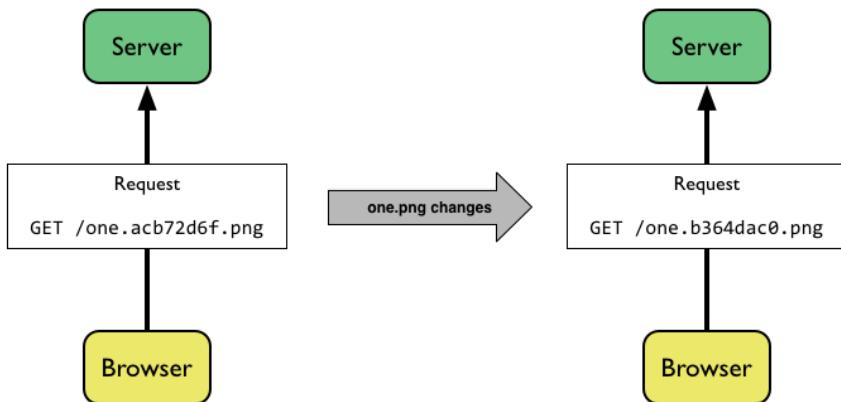
```
<link rel="prerender" href="next.html">
```

Push the minimal functional code for a route



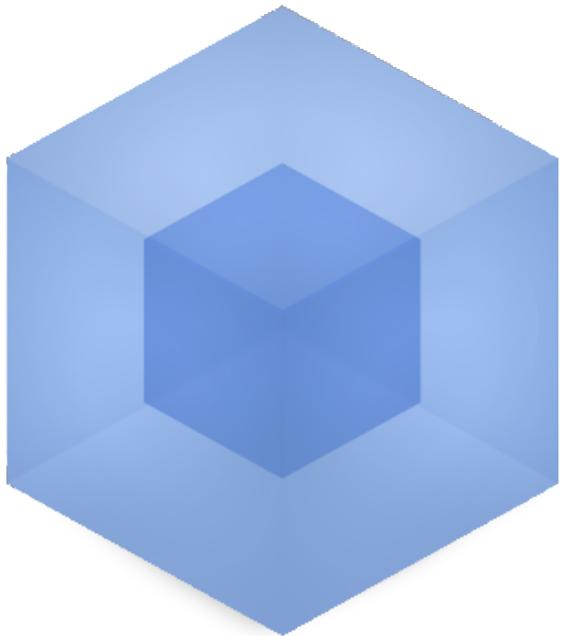
# Implementing PRPL

- Push
  - HTTP/2 + Server Push
  - Preload / Defer load
  - AggressiveSplittingPlugin
- Rendering
  - 사용하는 JS 프레임워크를 최대한 활용하세요
- Pre-caching:
  - sw-precache
  - SWPrecacheWebpackPlugin
- Lazy-load
  - require.ensure() or System.import()



# Cache-busting

- 유니크한 파일명을 사용하여 리소스를 확실하게 관리하는 방법
- 코드 기반의 리소스의 리소스 관리 방법
- 추가적인 이름을 더하는 방식
  - chunk.js?v=1.2.0
  - chunk.d9834554decb6a8j.js
- 중복파일 다운로드 방지
- 많은 Webpack Plugins 사용 가능



# Webpack 2 Tree Shaking

- ES2015 에서 사용,
- Dead Code (Unused export) 제거

## **Part 3 - Offline support and network resilience**

## First visit

Moto G / 3G

1.5s 2.0s 2.5s 3.0s 3.5s

0% 0% 0% 0% 96%

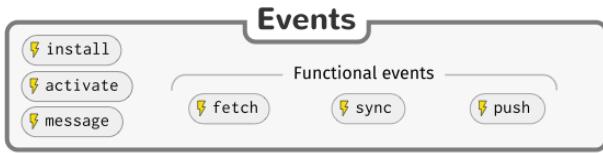
## Repeat visit

Near instant loading  
thanks to offline caching  
with Service Worker

0.8s 0.9s 1.0s 1.1s 1.2s

96% 96% 96% 96% 96%

# ServiceWorker



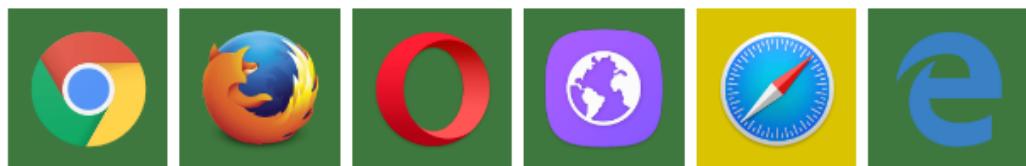
- Offline-dinosaur 를 죽이기 위해서 태어났습니다
- 백그라운드에서 별도로 동작
- 자바 스크립트로 프로그래밍 가능
- cache, fetch, sync 으로 네트워크 요청 제어 가능
- Push notification 사용 가능
- IndexedDB 사용 가능
- 오프라인 뿐만 아니라 불안정한 네트워크 환경에서도 최상의 앱 경험 제공

# is SERVICEWORKER<sup>?</sup> ready<sup>?</sup>

[Status](#) \* [Spec](#) \* [Intro](#) \* [Resources](#) \* [GitHub](#)

## ServiceWorker enthusiasm

The first thing any implementation needs.



**Chrome:** Shipped.

**Firefox:** Shipped.

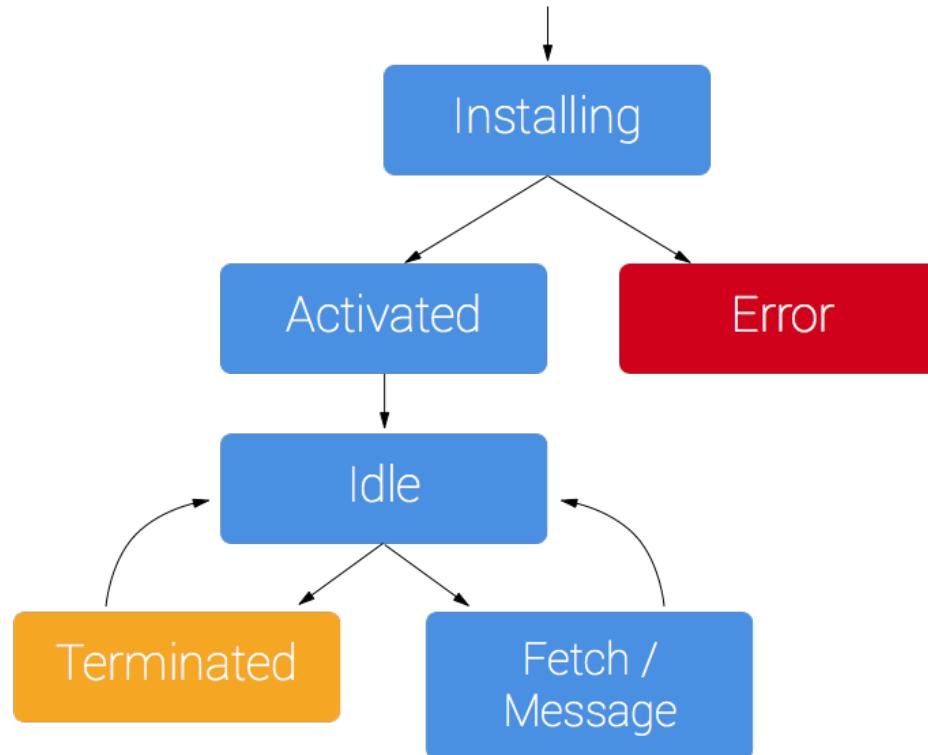
**Samsung Internet:** Shipped. Based on Chromium 44.2403 with some [additions and changes](#). (See "Service Worker" section.)

**Safari:** Under consideration. Brief positive signals in [five year plan](#).

**Edge:** In development.

Support does not include iOS versions of third-party browsers on that platform (see [Safari support](#)).

No Service  
Worker



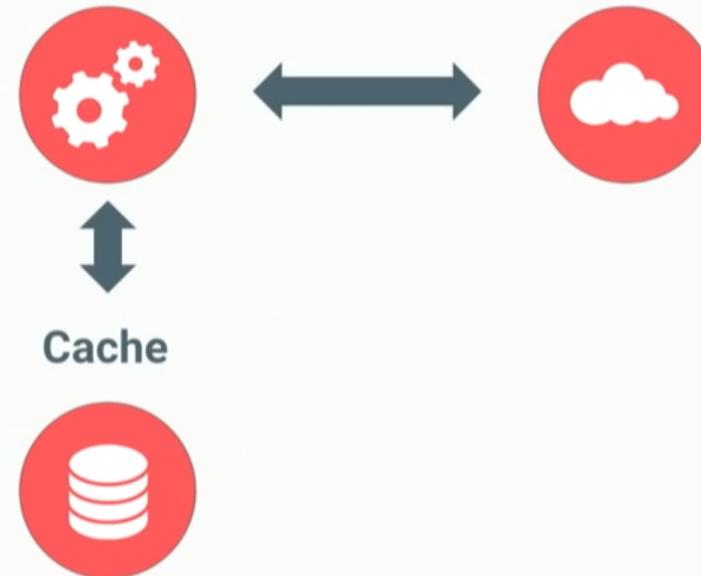
# Cache with service worker



## Service worker

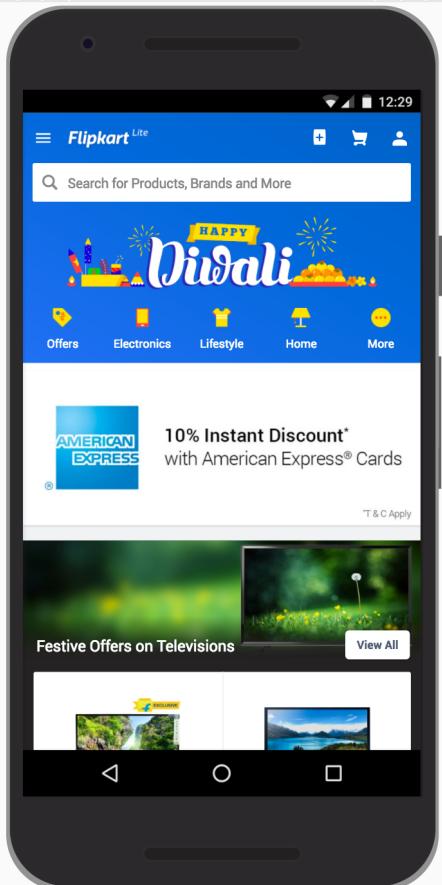
Client-side proxy written  
in JavaScript

## Web server



<https://www.flipkart.com>

Nexus 5X ▾ 412 × 732 75% ▾



Elements Console Sources Network Timeline Profiles Application Security Audits

## Application

- Manifest
- Service Workers
- Clear storage

## Storage

- Local Storage
- Session Storage
- IndexedDB
- Web SQL
- Cookies

## Cache

- Cache Storage

\$\$\$toolbox-cache\$\$<https://www.flipkart.com>

- static4 - https://www.flipkart.com

- Application Cache

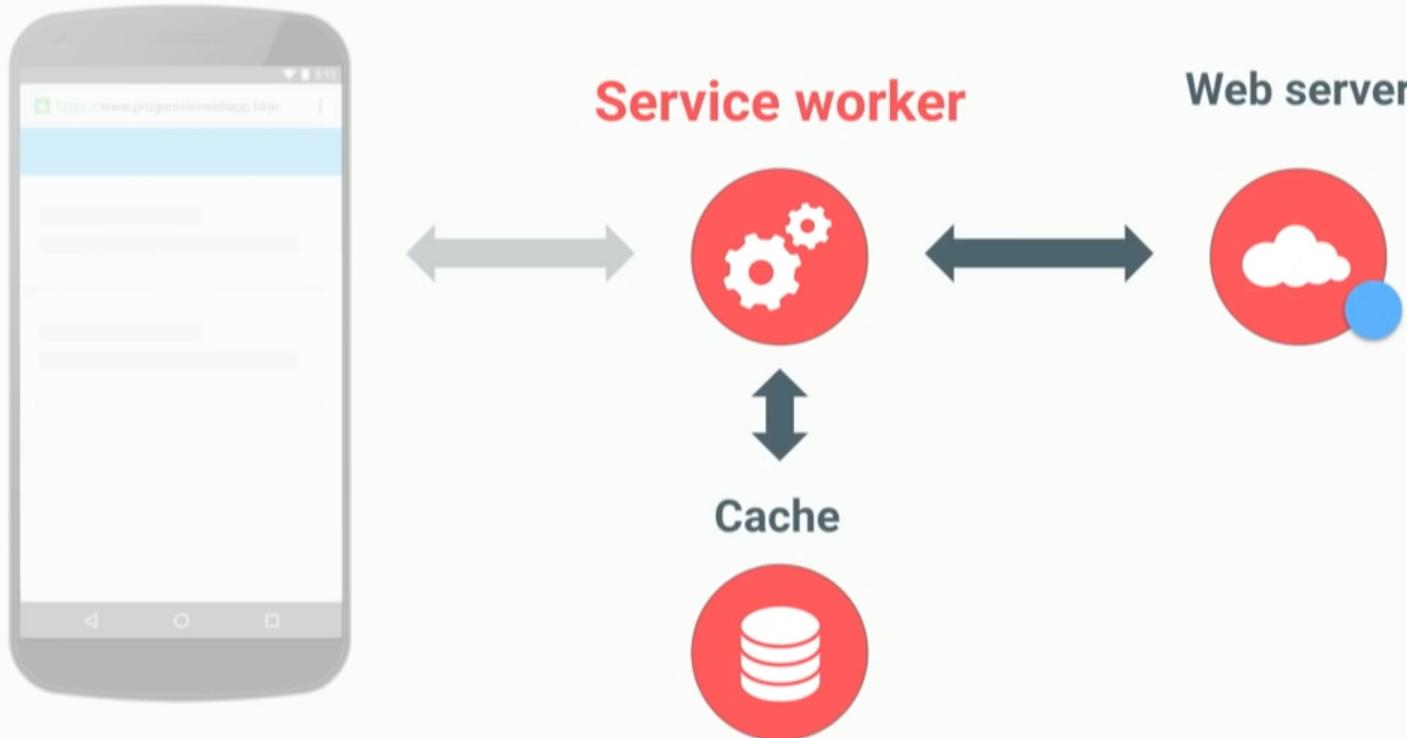
## Frames

- top

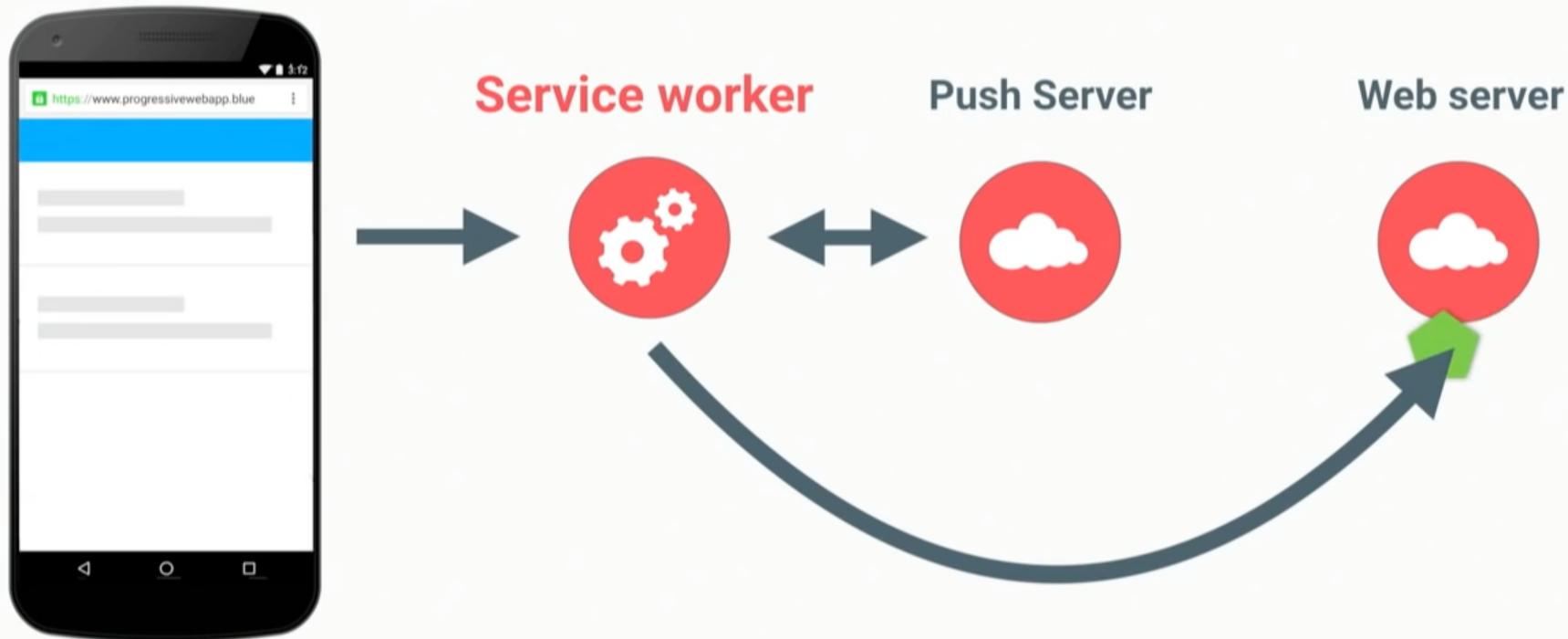
## Request

| #  | Request   |
|----|---|
| 0  | <a href="https://rukminim1.flixcart.com/flap/3376/560/brandtest/139184274442825181491890.jpg?q=50">https://rukminim1.flixcart.com/flap/3376/560/brandtest/139184274442825181491890.jpg?q=50</a>   |
| 1  | <a href="https://rukminim1.flixcart.com/flap/3376/560/brandtest/1d91401304766701323461864.jpg?q=50">https://rukminim1.flixcart.com/flap/3376/560/brandtest/1d91401304766701323461864.jpg?q=50</a>   |
| 2  | <a href="https://rukminim1.flixcart.com/flap/3376/560/brandtest/7772df182665795396145169.jpg?q=50">https://rukminim1.flixcart.com/flap/3376/560/brandtest/7772df182665795396145169.jpg?q=50</a>   |
| 3  | <a href="https://rukminim1.flixcart.com/flap/3376/560/brandtest/7888042405855698484214307.jpg?q=50">https://rukminim1.flixcart.com/flap/3376/560/brandtest/7888042405855698484214307.jpg?q=50</a>   |
| 4  | <a href="https://rukminim1.flixcart.com/flap/3376/560/brandtest/9efdb27560372663555895887.jpg?q=50">https://rukminim1.flixcart.com/flap/3376/560/brandtest/9efdb27560372663555895887.jpg?q=50</a>   |
| 5  | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/03a8882198906248591070325.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/03a8882198906248591070325.jpg?q=50</a>   |
| 6  | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/0475027898025565703455788.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/0475027898025565703455788.jpg?q=50</a>   |
| 7  | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/2177196110841621473105001.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/2177196110841621473105001.jpg?q=50</a>   |
| 8  | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/23cf604905090417756446286.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/23cf604905090417756446286.jpg?q=50</a>   |
| 9  | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/61760d2056781781798151968.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/61760d2056781781798151968.jpg?q=50</a>   |
| 10 | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/6730e11908143804925972190.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/6730e11908143804925972190.jpg?q=50</a>   |
| 11 | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/69f0aa6901985697279953841.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/69f0aa6901985697279953841.jpg?q=50</a>   |
| 12 | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/8740b2411099826472893864.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/8740b2411099826472893864.jpg?q=50</a>   |
| 13 | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/d6629b9041728734605133561.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/d6629b9041728734605133561.jpg?q=50</a>   |
| 14 | <a href="https://rukminim1.flixcart.com/flap/50/50/brandtest/ef2b632356230131989050738.jpg?q=50">https://rukminim1.flixcart.com/flap/50/50/brandtest/ef2b632356230131989050738.jpg?q=50</a>   |
| 15 | <a href="https://rukminim1.flixcart.com/flap/784/420/brandtest/2722a1565886194148185704.jpg?q=70">https://rukminim1.flixcart.com/flap/784/420/brandtest/2722a1565886194148185704.jpg?q=70</a>   |
| 16 | <a href="https://rukminim1.flixcart.com/flap/784/420/brandtest/47c3cc843524542336219744.jpg?q=70">https://rukminim1.flixcart.com/flap/784/420/brandtest/47c3cc843524542336219744.jpg?q=70</a>   |
| 17 | <a href="https://rukminim1.flixcart.com/flap/784/420/brandtest/86624d765151986559661549.jpg?q=70">https://rukminim1.flixcart.com/flap/784/420/brandtest/86624d765151986559661549.jpg?q=70</a>   |
| 18 | <a href="https://rukminim1.flixcart.com/flap/784/420/brandtest/c2394e5530064260540827313.jpg?q=70">https://rukminim1.flixcart.com/flap/784/420/brandtest/c2394e5530064260540827313.jpg?q=70</a>   |
| 19 | <a href="https://rukminim1.flixcart.com/flap/784/420/brandtest/e5ed97908604470271943071.jpg?q=70">https://rukminim1.flixcart.com/flap/784/420/brandtest/e5ed97908604470271943071.jpg?q=70</a>   |
| 20 | <a href="https://rukminim1.flixcart.com/flap/784/420/brandtest/ea846f996791692502247923.jpg?q=70">https://rukminim1.flixcart.com/flap/784/420/brandtest/ea846f996791692502247923.jpg?q=70</a>   |
| 21 | <a href="https://rukminim1.flixcart.com/image/100/100/camera/z/t/fujifilm-instant-instant-mini-2-instant-original-imadgx3zgg...">https://rukminim1.flixcart.com/image/100/100/camera/z/t/fujifilm-instant-instant-mini-2-instant-original-imadgx3zgg...</a> |
| 22 | <a href="https://rukminim1.flixcart.com/image/100/100/mobile/w/g/z/mi-redmi-3s-prime-na-original-imaeh6beckzjqeza.jpeg?...">https://rukminim1.flixcart.com/image/100/100/mobile/w/g/z/mi-redmi-3s-prime-na-original-imaeh6beckzjqeza.jpeg?...</a>           |
| 23 | <a href="https://rukminim1.flixcart.com/image/100/100/shoe/y/s/9/r-crossfit-one-cushion-9-reebok-9-original-imaem85fyu...">https://rukminim1.flixcart.com/image/100/100/shoe/y/s/9/r-crossfit-one-cushion-9-reebok-9-original-imaem85fyu...</a>             |
| 24 | <a href="https://rukminim1.flixcart.com/image/275/275/television/z/b/6/samsung-27z/3d4003-original-imaes8ws64qyyzfvr.jpeg?...">https://rukminim1.flixcart.com/image/275/275/television/z/b/6/samsung-27z/3d4003-original-imaes8ws64qyyzfvr.jpeg?...</a>     |
| 25 | <a href="https://rukminim1.flixcart.com/image/275/275/television/z/w/bpl/080d51h-original-imaekd4kj5zswb6.jpg?q=80">https://rukminim1.flixcart.com/image/275/275/television/z/w/bpl/080d51h-original-imaekd4kj5zswb6.jpg?q=80</a>                           |
| 26 | <a href="https://rukminim1.flixcart.com/merch/50/50/images/1477637029367.jpg?q=50">https://rukminim1.flixcart.com/merch/50/50/images/1477637029367.jpg?q=50</a>   |
| 27 | <a href="https://rukminim1.flixcart.com/merch/50/50/images/1477637083141.jpg?q=50">https://rukminim1.flixcart.com/merch/50/50/images/1477637083141.jpg?q=50</a>   |
| 28 | <a href="https://rukminim1.flixcart.com/merch/50/50/images/1477654371196.jpg?q=50">https://rukminim1.flixcart.com/merch/50/50/images/1477654371196.jpg?q=50</a>   |
| 29 | <a href="https://rukminim1.flixcart.com/merch/50/50/images/1477656466482.jpg?q=50">https://rukminim1.flixcart.com/merch/50/50/images/1477656466482.jpg?q=50</a>   |
| 30 | <a href="https://rukminim1.flixcart.com/merch/824/256/images/1474697101608.jpg?q=90">https://rukminim1.flixcart.com/merch/824/256/images/1474697101608.jpg?q=90</a>   |
| 31 | <a href="https://rukminim1.flixcart.com/merch/824/256/images/1475071365383.jpg?q=90">https://rukminim1.flixcart.com/merch/824/256/images/1475071365383.jpg?q=90</a>   |
| 32 | <a href="https://rukminim1.flixcart.com/merch/824/256/images/1477304883764.jpg?q=90">https://rukminim1.flixcart.com/merch/824/256/images/1477304883764.jpg?q=90</a>   |
| 33 | <a href="https://rukminim1.flixcart.com/merch/824/320/images/1477649761678.jpg?q=90">https://rukminim1.flixcart.com/merch/824/320/images/1477649761678.jpg?q=90</a>   |
| 34 | <a href="https://rukminim1.flixcart.com/reco/824/184/images/discount_for_you_copy.png?q=90">https://rukminim1.flixcart.com/reco/824/184/images/discount_for_you_copy.png?q=90</a>   |
| 35 | <a href="https://rukminim1.flixcart.com/www/800/800/promos/05ade15d963-44d4-bc38-0cd89cefab1e.png?q=90">https://rukminim1.flixcart.com/www/800/800/promos/05ade15d963-44d4-bc38-0cd89cefab1e.png?q=90</a>   |
| 36 | <a href="https://rukminim1.flixcart.com/www/90/90/promos/07/04/2016/c35cca9e-2d7a-4583-9770-32a97ddf1c9b.png?q=80">https://rukminim1.flixcart.com/www/90/90/promos/07/04/2016/c35cca9e-2d7a-4583-9770-32a97ddf1c9b.png?q=80</a>                             |
| 37 | <a href="https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/0dad6942-8954-4ceb-b0a6-93ff84c2a70d.png?q=80">https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/0dad6942-8954-4ceb-b0a6-93ff84c2a70d.png?q=80</a>                             |
| 38 | <a href="https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/149e737a-7590-4b1c-863f-ab3bc014fiba.png?q=80">https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/149e737a-7590-4b1c-863f-ab3bc014fiba.png?q=80</a>                             |
| 39 | <a href="https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/3bcc5f23-b6d0-4987-8dbf-7b9f20b397c.png?q=80">https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/3bcc5f23-b6d0-4987-8dbf-7b9f20b397c.png?q=80</a>                               |
| 40 | <a href="https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/5b9c6ac7-0056-4534-ab01-f904fd4eb1e5.png?q=80">https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/5b9c6ac7-0056-4534-ab01-f904fd4eb1e5.png?q=80</a>                             |
| 41 | <a href="https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/75b837cd-0610-478e-a077-118de6f546d7.png?q=80">https://rukminim1.flixcart.com/www/90/90/promos/27/10/2016/75b837cd-0610-478e-a077-118de6f546d7.png?q=80</a>                             |
| 42 | <a href="https://rukminim1.flixcart.com/www/90/90/promos/new/14570923930-data-electronics.png?q=80">https://rukminim1.flixcart.com/www/90/90/promos/new/14570923930-data-electronics.png?q=80</a>   |
| 43 | <a href="https://rukminim1.flixcart.com/www/90/90/promos/14570923930-data-electronics.png?q=80">https://rukminim1.flixcart.com/www/90/90/promos/14570923930-data-electronics.png?q=80</a>   |

# Sync with service worker



# Push with service worker



Lighthouse report: [https://react-hn.appspot.com/#/?\\_k=3hxf5r](https://react-hn.appspot.com/#/?_k=3hxf5r)

chrome-extension://blipmdconlkpinefehnjamfjpmpbjk/pages/report.html

ragewind

# Lighthouse

Version: 1.1.6 BETA

## Progressive Web App

Results for [https://react-hn.appspot.com/#/?\\_k=3hxf5r](https://react-hn.appspot.com/#/?_k=3hxf5r)

87 / 100

### App can load on offline/flaky connections

Ensuring your web app can respond when the network connection is unavailable or flaky is critical to providing your users a good experience. This is achieved through use of a [Service Worker](#).

- Has a registered Service Worker
- URL responds with a 200 when offline

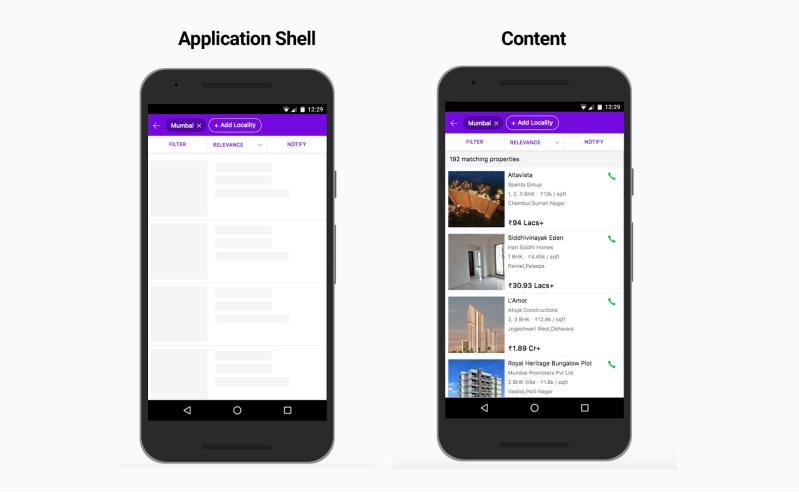
### Page load performance is fast

Users notice if sites and apps don't perform well. These top-level metrics capture the most important perceived performance concerns.

- First meaningful paint (target: 1,600ms) (741.3ms) 100
- Speed Index (target: 1,250) (1759) 95

First Visual Change: 1758ms

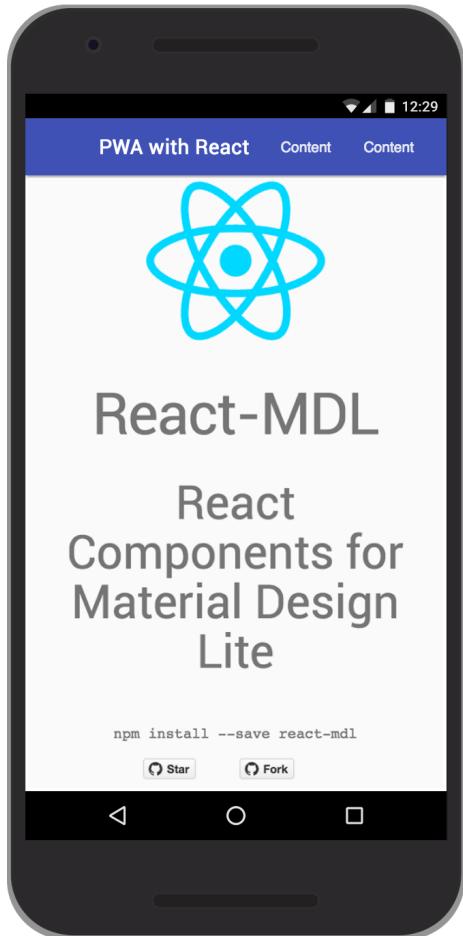
Last Visual Change: 1758ms



# App Shell

Architecture

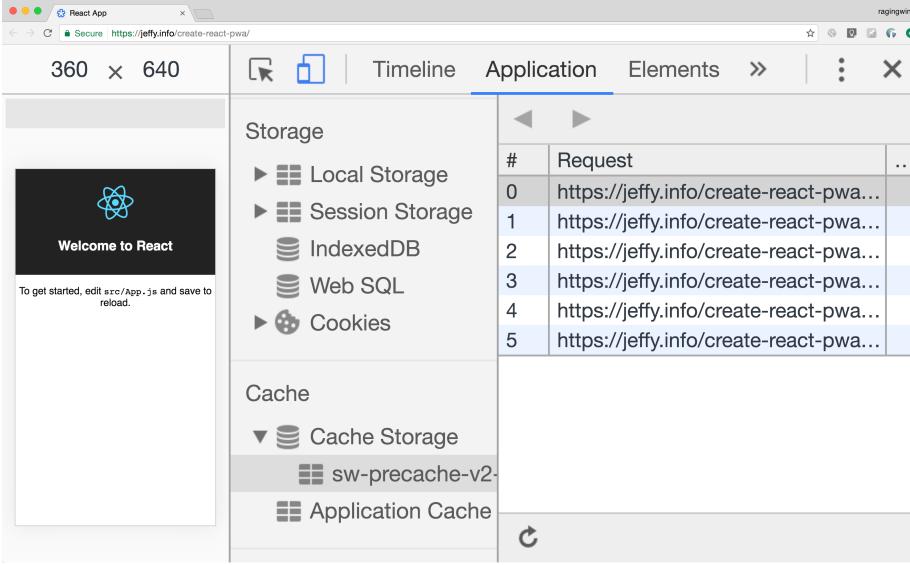
- 네이티브 앱(애프레임) 과 같이 빠른 로딩을 보여주는 한가지 방법
- PWA에서 제안하는 아키텍처
- 최고한의 HTML, CSS and JavaScript로 앱의 기본 골격 UI를 구성
- Toolbars, Drawers, Navigation 서비스 워커를 이용해서 무조건 캐쉬



```
// AppShell.js
import React from 'react';
import Link from 'react-router/lib/Link';
import {Layout, Header, Navigation, Content} from 'react-mdl';

export default class AppShell extends React.Component {
    constructor(props) {
        super(props);
    }

    render() {
        return (
            <Layout fixedHeader>
                <Header title={this.props.title || ''}>
                    <Navigation>
                        <Link to="/content">Home</Link>
                        <Link to="/content">News</Link>
                        <Link to="/content">Trends</Link>
                        <Link to="/content">Contact</Link>
                    </Navigation>
                </Header>
                <Content>
                    {this.props.children}
                </Content>
            </Layout>
        );
    }
}
```



# App Shell Caching

via Service Worker in low-friction

- vanilla.js 을 사용하기
- **sw-precache / sw-toolbox** 사용하기
- Webpack 플러그인 사용하기
  - offline-plugin
  - sw-precache-webpack-plugin
- create-react-pwa 로 프로젝트 생성

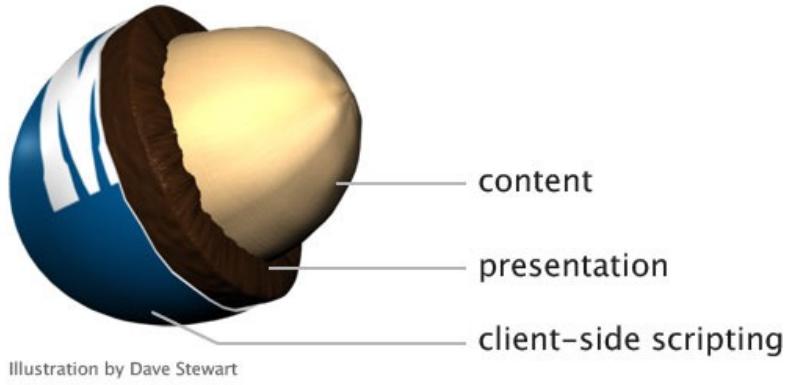
## webpack.config.js

```
plugins: [
  new SWPrecacheWebpackPlugin(
    {
      cacheId: "react-hn",
      filename: "my-service-worker.js",
      staticFileGlobs: [
        "app/css/**.css",
        "app/**.html",
        "app/js/**.js",
        "app/images/**.*"
      ],
      verbose: true
    }
  ),
  // for toolbox
  runtimeCaching: [
    {
      handler: 'cacheFirst',
      urlPattern: /https?:\/\/fonts.+/
    }
]
```

## sw.js

```
toolbox.router.get('/', toolbox.fastest);
toolbox.router.get('/api/.*', toolbox.networkFirst,
{networkTimeoutSeconds: 5});
toolbox.router.get('/articles/.*', toolbox.cacheFirst);
toolbox.router.get('/styles/.*', toolbox.cacheOnly);
toolbox.router.get('/messages.json', toolbox.networkOnly);
```

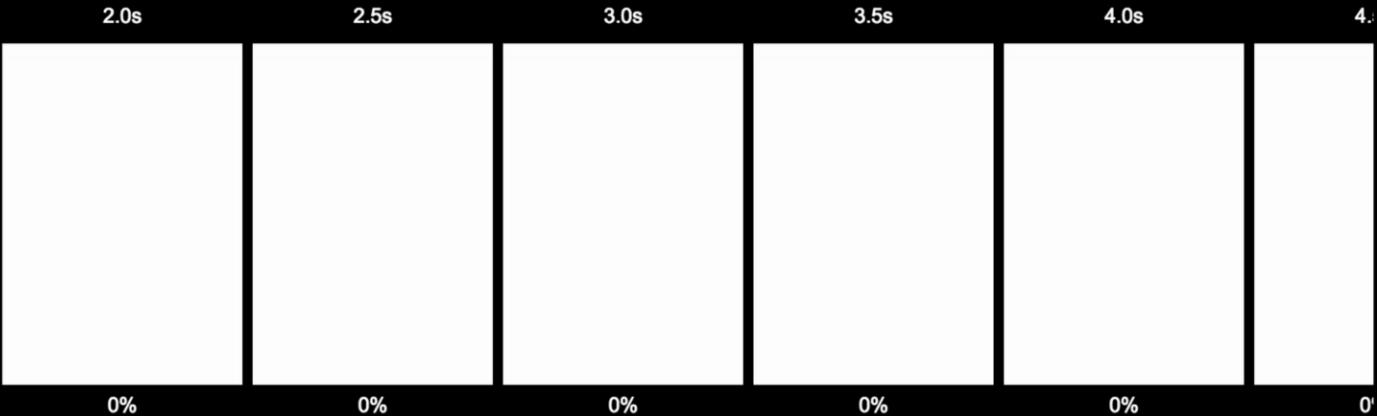




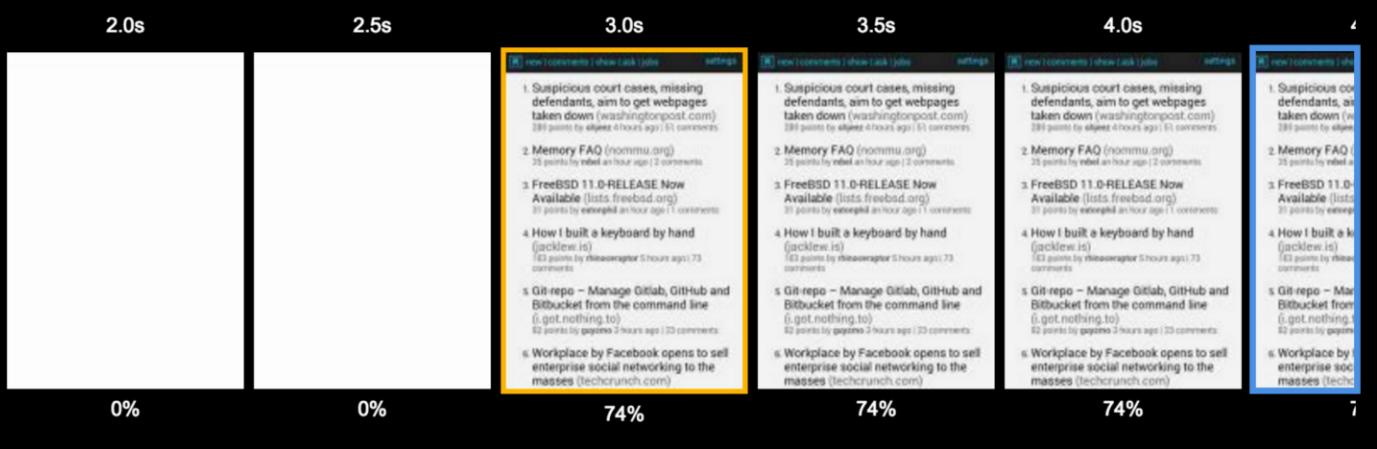
## Part 4 - Progressive Enhancement

*Building Progressively  
Becoming Apps*

## Without Progressive Enhancement (PE)



## With PE Server-side rendering + hydration with JS



Server-rendered  
(AppShell + content)

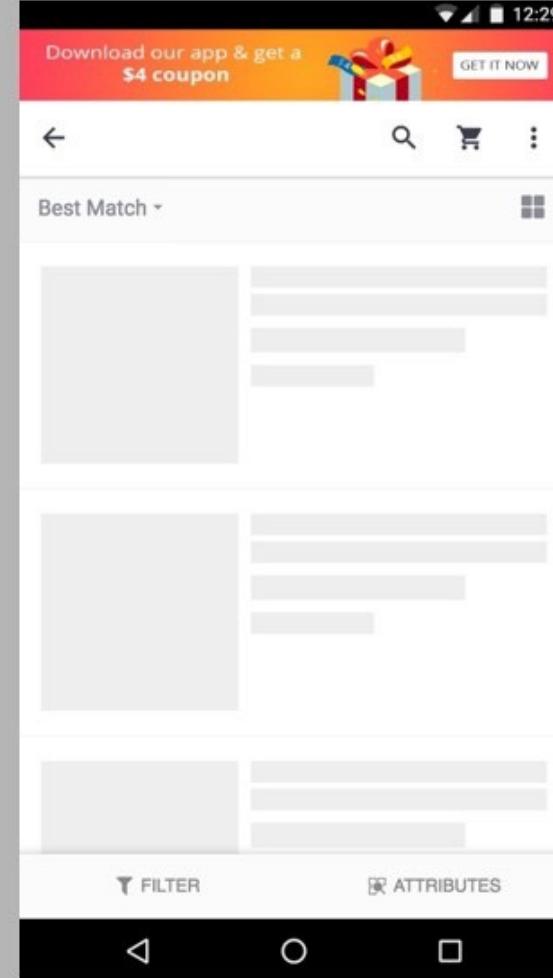
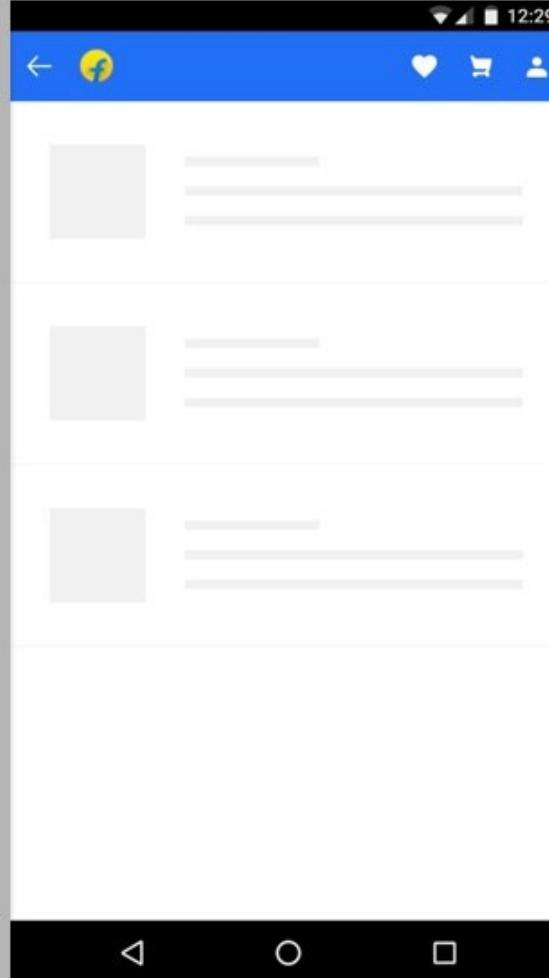
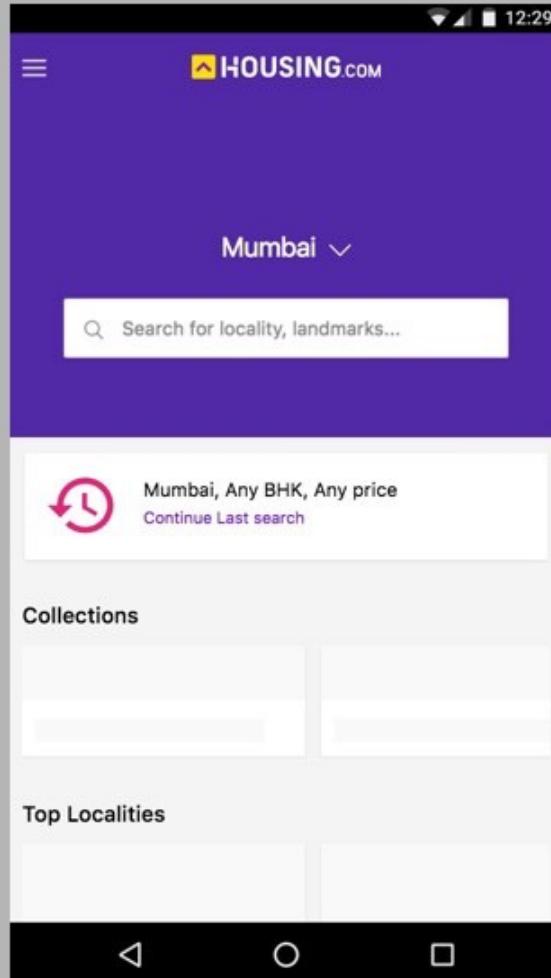


Progressively  
enhanced view



# Universal Rendering

- 서버에서 생성된 초기 HTML 컨텐츠를 바로 전송
- 초기 렌더링시 추가 HTML/JS/CSS 파일 Fetching 을 제한
- React.js / 커뮤니티의 열혈 지원
  - ReactDOMServer.renderToString()
  - React Router
  - isomorphic-fetch



Lighthouse report: <https://readme.ragingwind.com>

chrome-extension://blipmdconlkpinefehnjmammfjpmpbjk/pages/report.html

BETA

## Site is progressively enhanced

*Progressive enhancement means that everyone can access the basic content and functionality of a page in any browser, and those without certain browser features may receive a reduced but still functional experience.*

- Page contains some content when its scripts are not available

## Network connection is secure

*Security is an important part of the web for both developers and users. Moving forward, Transport Layer Security (TLS) support will be required for many APIs.*

- Site is on HTTPS
- Site redirects HTTP traffic to HTTPS

## User can be prompted to Add to Homescreen

*While users can manually add your site to their homescreen in the browser menu, the [prompt \(aka app install banner\)](#) will proactively prompt the user to install the app if the below requirements are met and the user has visited your site at least twice (with at least five minutes between visits).*

- Has a registered Service Worker
- Manifest exists
- Manifest contains start\_url



# Remember: Interactivity is key

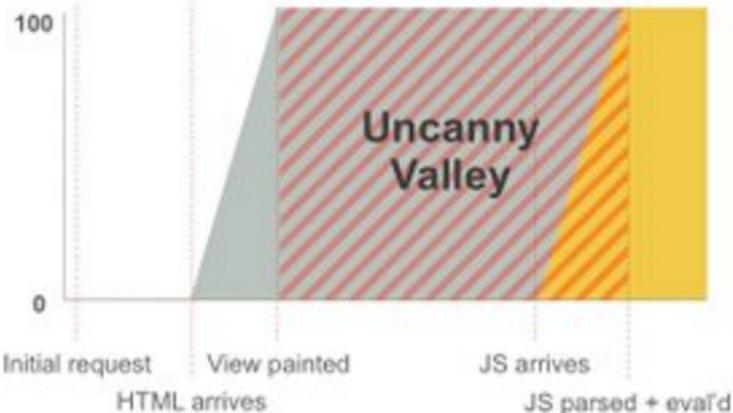
- 유니버설 렌더링이 반드시 앱이 무조건 TTI 상태가 된다는 것을 의미하지 않습니다.
- 실행에 필요한 최소한의 HTML 과 라우팅에 필요한 JS/CSS 를 사용하세요
- 이후에 필요한 리소스와 코드를 다운로드 해서 점차적으로 기능을 추가 시키세요 (PRLP 패턴)



## JS-based Render

In a JavaScript-based render you are reliant on all the script to be downloaded, parsed, and evaluated before you are able to render the page. This ends up with a lot of wasted time from when the HTML arrives to when you give the user something meaningful.

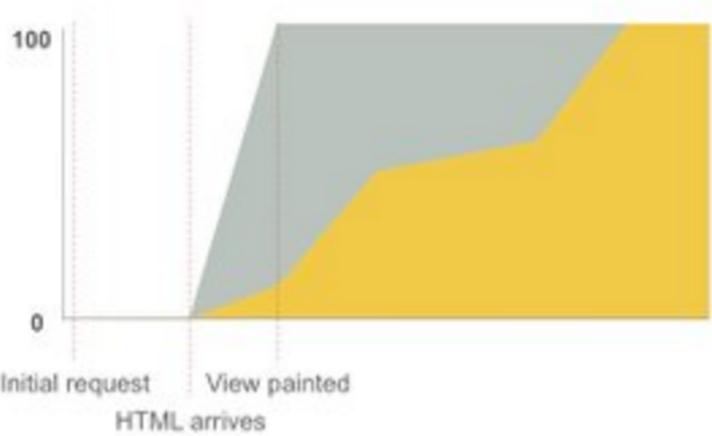
- **JS Based Render:** HTML 이 전달 후 많은 일을 합니다. 모든 스크립트 다운로드 그리고 파싱, 실행되어야 앱이 실행됩니다
- Server render + Hydrate / Fastboot: 모든 자바스크립트가 동작 가능해야 완벽히 동작합니다. (uncanny valley)
- Progressive Render: 필수 동작에 필요한 최소한의 HTML/JS/CSS 를 전달하여 동작가능하게 하고 이후 점차적으로 보강합니다



## Server render + “Hydrate” / Fastboot

With server render + “hydration” or “fastboot”, you send a view to the user, but you’re still reliant on the JavaScript before functionality is available. This can result in an “uncanny valley” where the app looks interactive, but isn’t.

- JS Based Render: HTML 이 전달 후 많은 일을 합니다. 모든 스크립트 다운로드 그리고 파싱, 실행되어야 앱이 실행됩니다
- **Server render + Hydrate / Fastboot:** 모든 자바스크립트가 동작 가능해야 완벽히 동작합니다. (uncanny valley)
- Progressive Render: Sending only functionally viable(minimal) view in the HTML, JS, CSS included, and more resource arrive progressively



## Progressive render + bootstrap

Progressive rendering and bootstrapping means you send a functionally viable (though minimal) view in the HTML, including JavaScript and CSS. As more resources arrive the app progressively “unlocks” features.

- **JS Based Render:** HTML 이 전달 후 많은 일을 합니다. 모든 스크립트 다운로드 그리고 파싱, 실행되어야 앱이 실행됩니다  
**Server render + Hydrate / Fastboot:** 모든 자바스크립트가 동작 가능해야 완벽히 동작합니다. (uncanny valley)
- **Progressive Render:** 필수 동작에 필요한 최소한의 HTML/JS/CSS 를 전달하여 동작가능하게 하고 이후 점차적으로 보강합니다

**Fin**