

Cross platform web app development

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Contents

Web development in Spotify

- Why and how
- Benefits and learnings

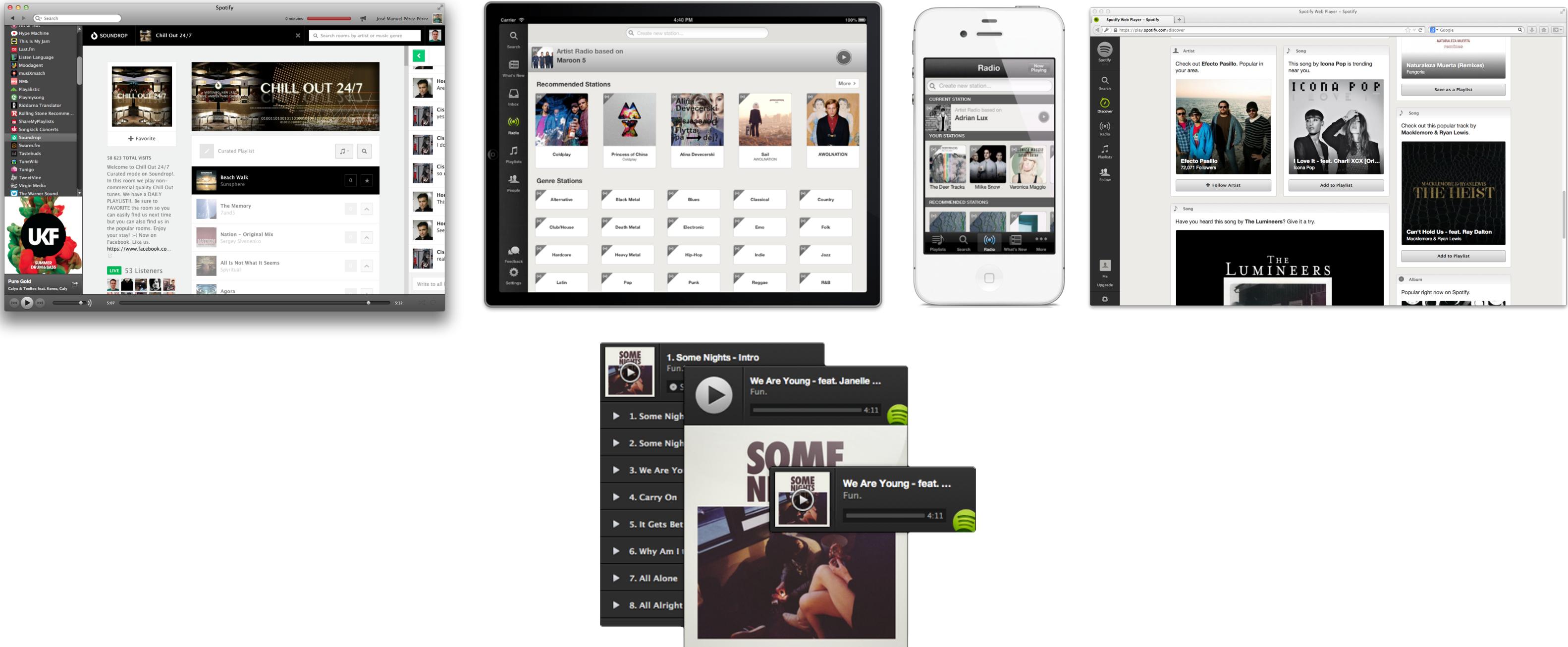
Key web technologies that we use

- IFrames and postMessage: security and performance
- Communication between different tabs

Summary

Questions

Spotify <3 web



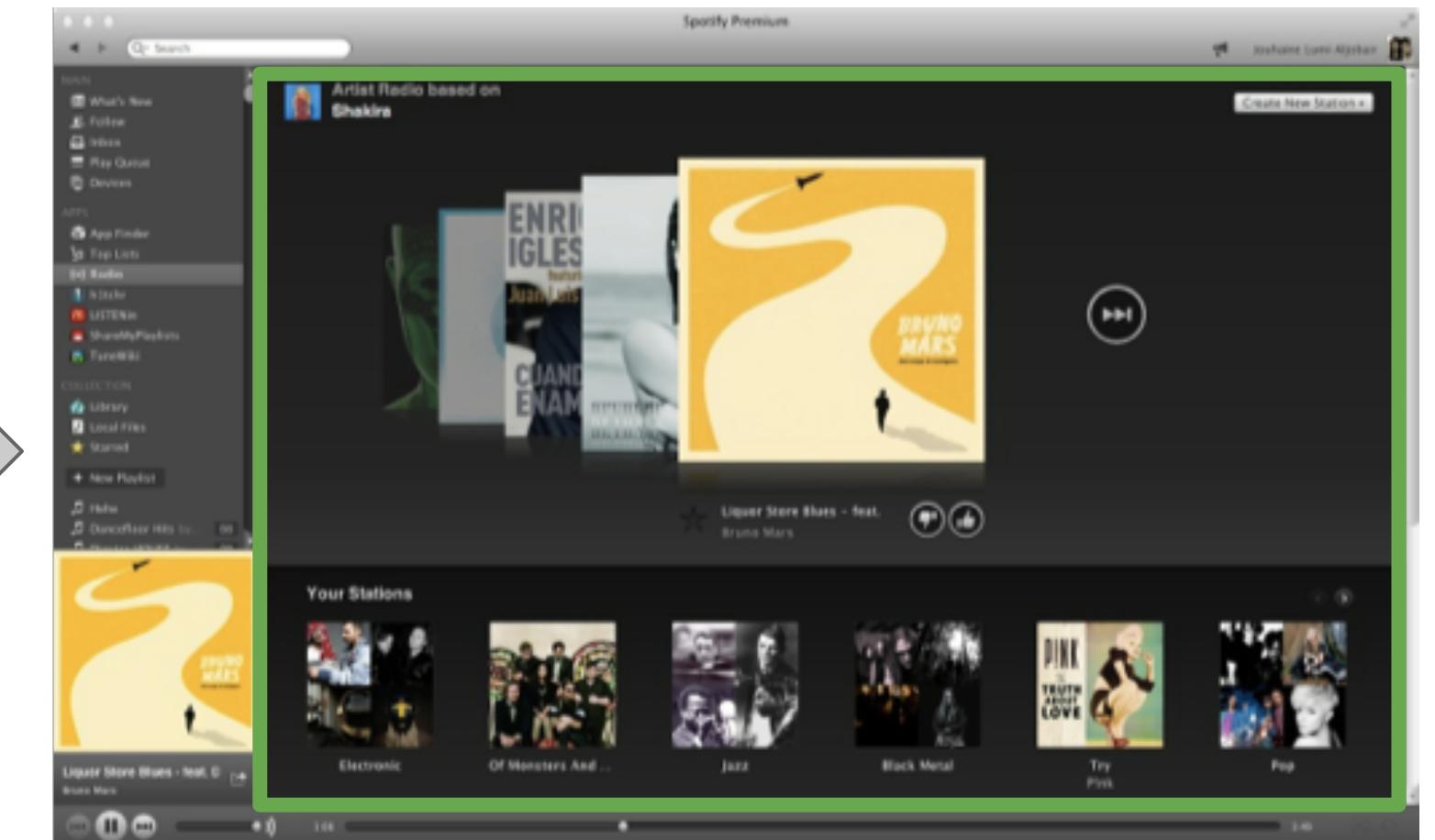
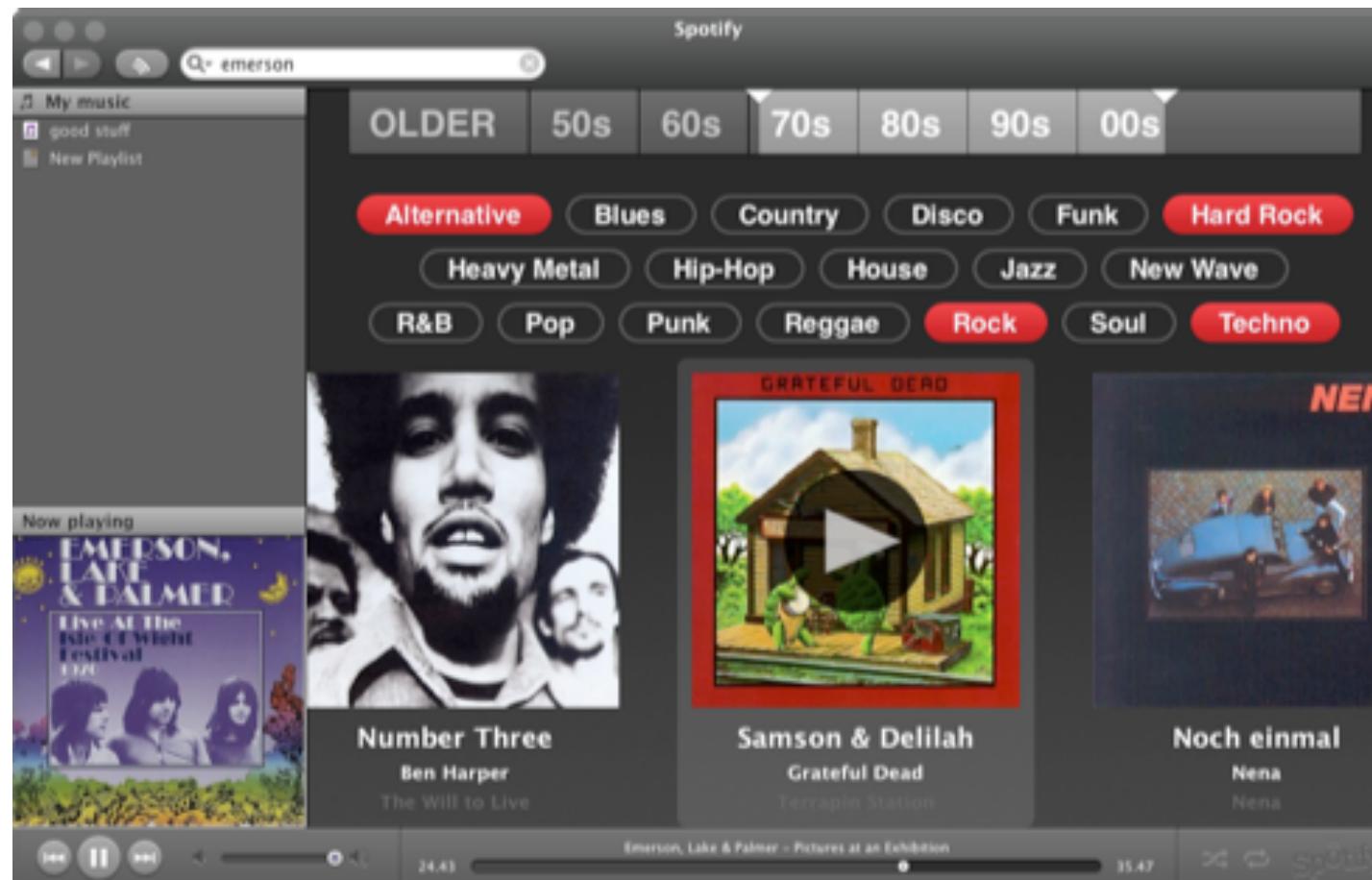
Beginnings of Spotify



Giving web a try

- Using CEF to move features to web
- Write features as webapps
- Sandboxed environment

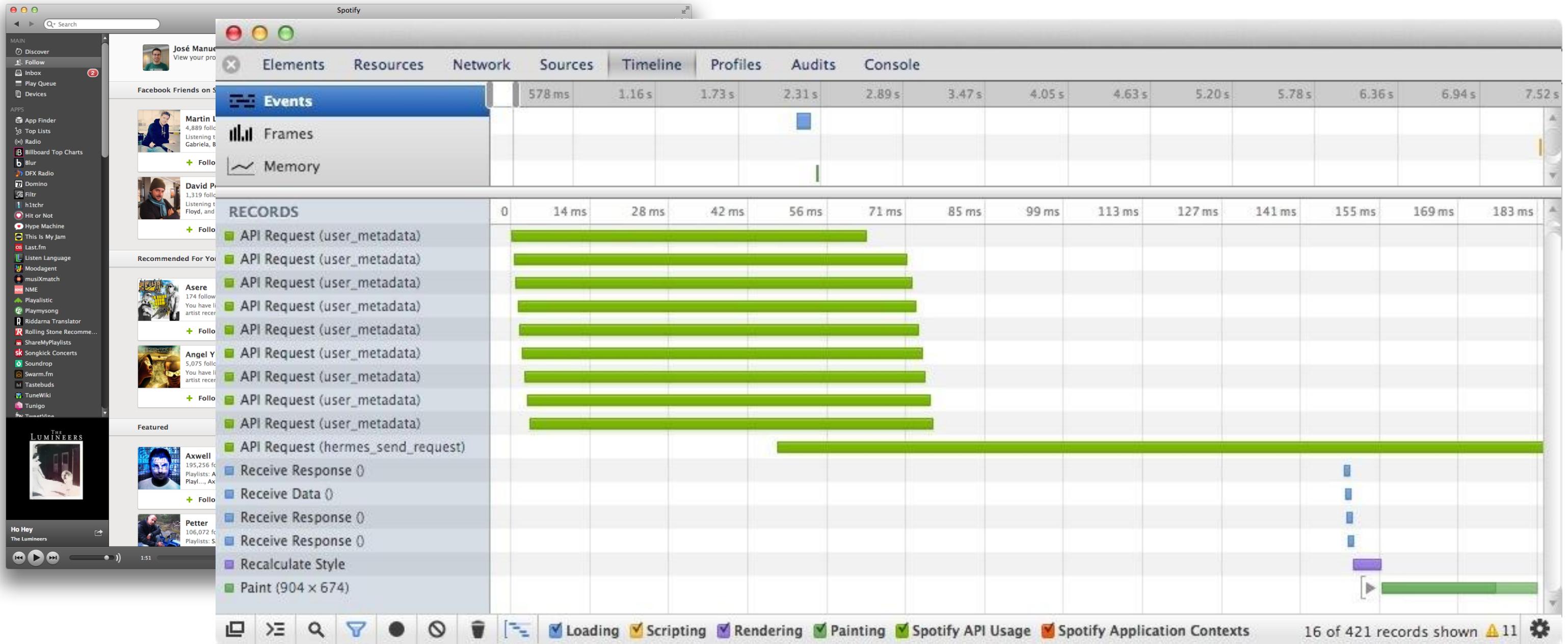
Giving web a try (2)



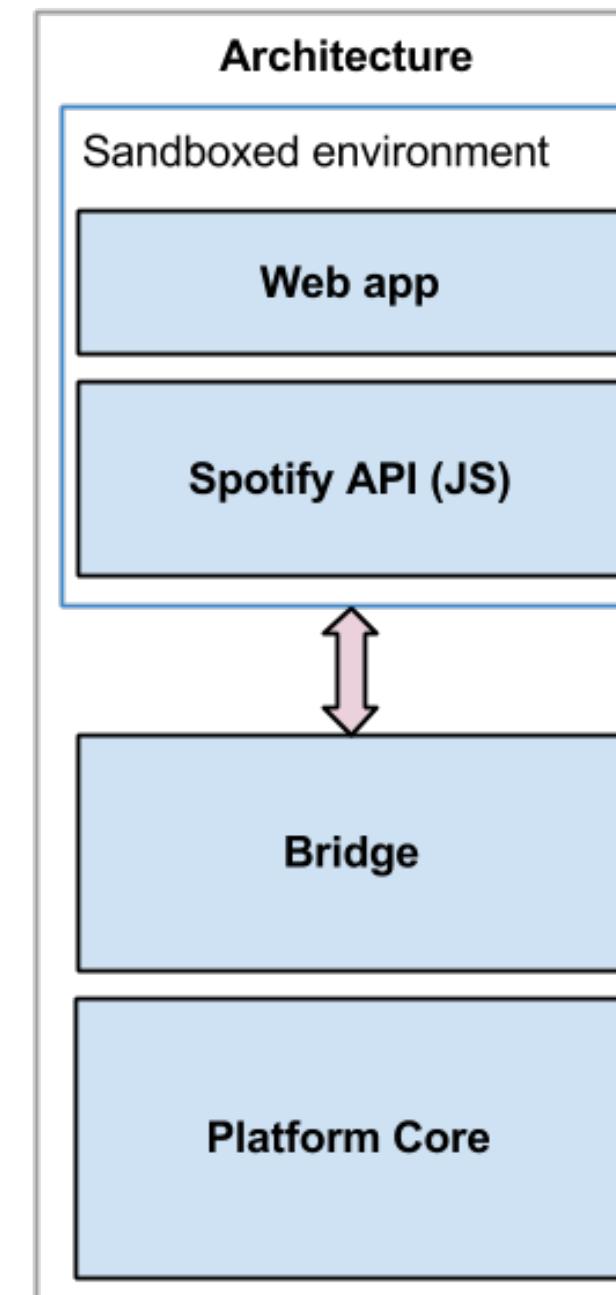
What is a Spotify app?

- HTML
- CSS
- JS
- manifest.json

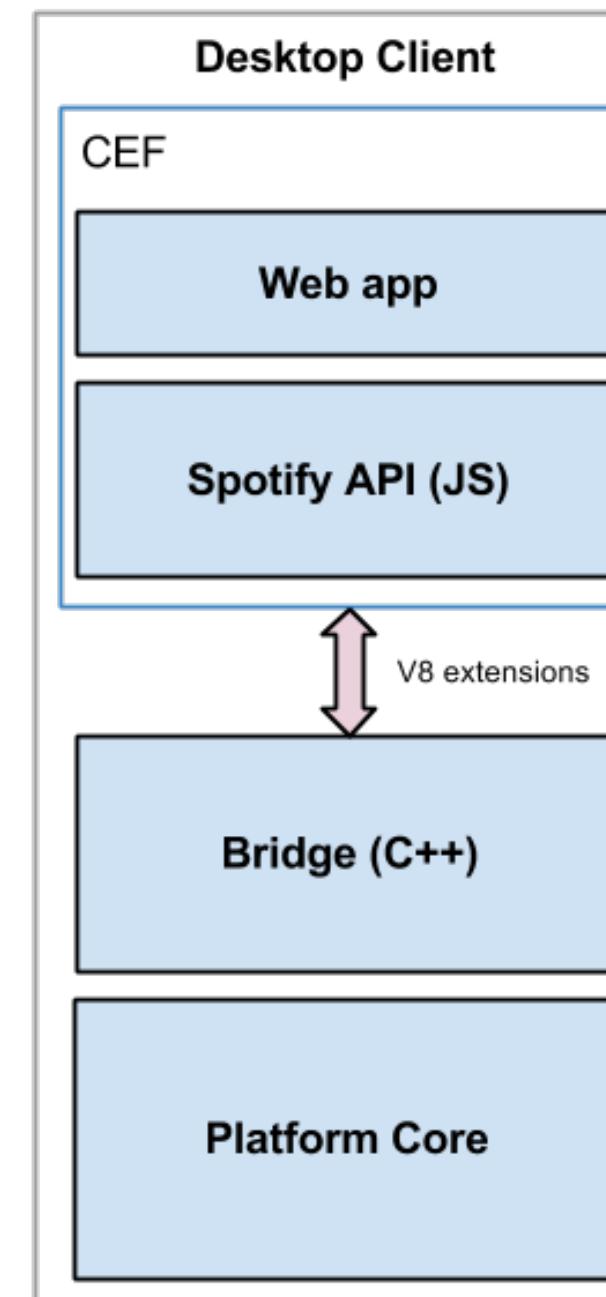
What is a Spotify app? - Developer tools



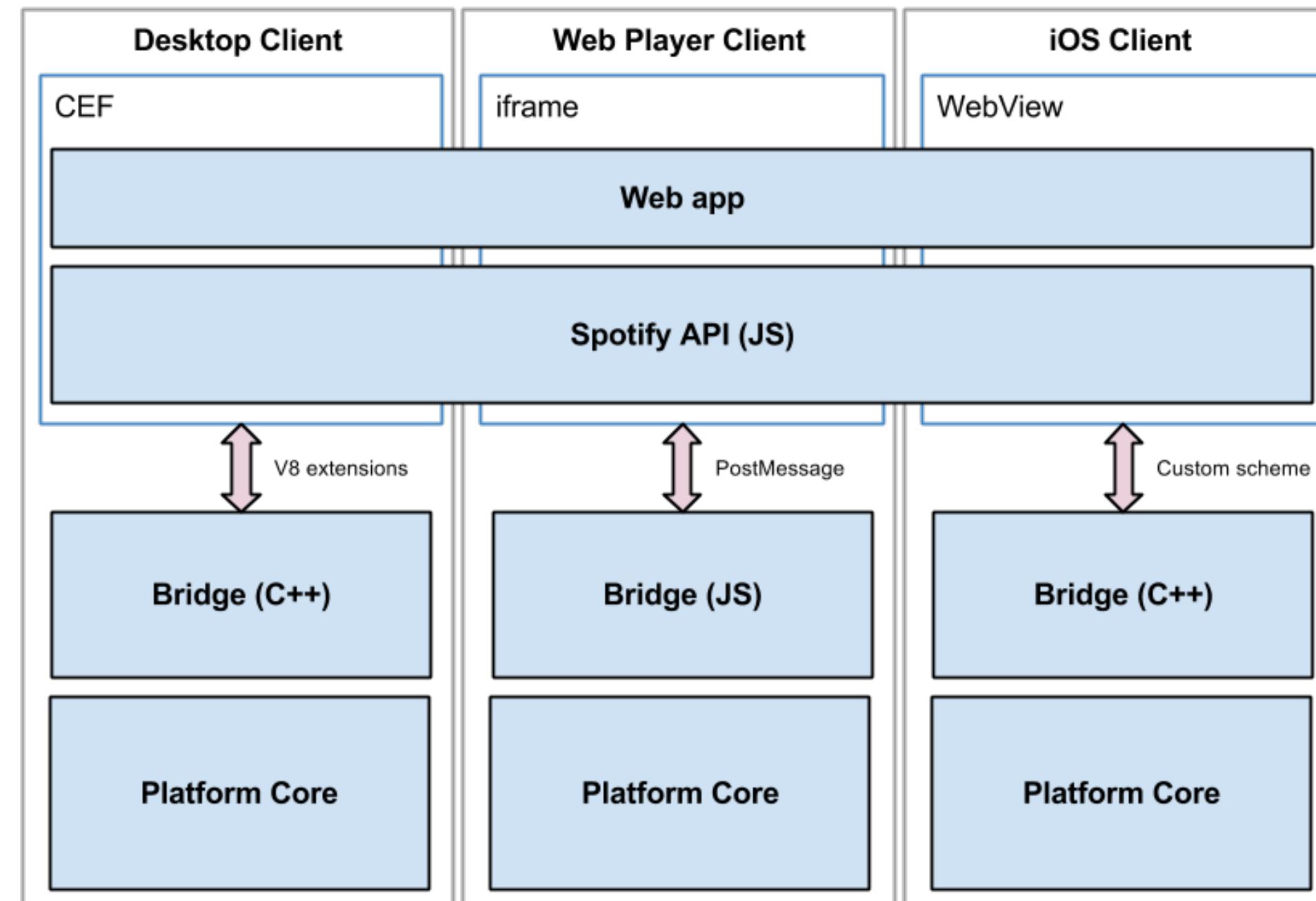
Architecture of the Spotify Apps Platform - overview



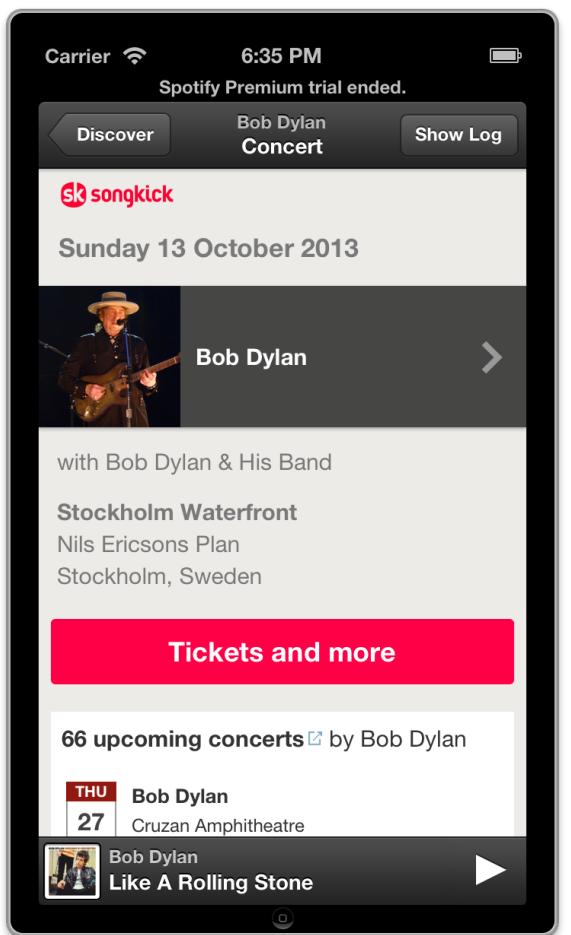
Architecture of the Spotify Apps Platform - desktop



Architecture of the Platform - all clients



Multiple platforms



This screenshot shows the Spotify Web Player interface. It displays a concert listing for "Bob Dylan with Bob Dylan & His Band" on "Sunday 13 October 2013" at "Stockholm Waterfront Nils Ericsons Plan Stockholm, Sweden". The page includes a "More from Songkick" link, a "Follow" button, and a "Tickets and more" section with "I'm going" and "I might go" buttons. Below this, it shows "Songs by Bob Dylan" and a list of "66 upcoming concerts by Bob Dylan" with details like date, venue, and song titles. The interface also features a sidebar with various Spotify services like Search, Radio, Collection, and Follow.

This screenshot shows the Spotify desktop application interface. It displays the same concert listing for "Bob Dylan with Bob Dylan & His Band" on "Sunday 13 October 2013" at "Stockholm Waterfront Nils Ericsons Plan Stockholm, Sweden". The interface includes a sidebar with "Discover", "Inbox", "Play Queue", "Devices", and "iPhone Simulator". It also features a "More from Songkick" link, a "Follow" button, and a "Tickets and more" section with "I'm going" and "I might go" buttons. Below this, it shows "Songs by Bob Dylan" and a list of "66 upcoming concerts by Bob Dylan" with details like date, venue, and song titles. The interface also features a sidebar with various Spotify services like App Finder, Top Lists, Radio, Billboard Top Charts, Blur, DFX Radio, Domino, Filtr, h1tchr, Hit or Not, Hype Machine, This Is My Jam, Last.fm, Listen Language, Moodagent, musixmatch, NME, Playalistic, PlaymySong, Riddarna Translator, Rolling Stone Recomme..., ShareMyPlaylists, Songkick Concerts, Soundrop, Warm.fm, TasteBuds, TuneWiki, and Tuning.

Releasing Spotify Apps

- Decoupled system
- Provides gradual roll-out, and availability depending on platform and country

Benefits

- Feature ownership by teams
- Fast development pace due to fewer dependencies
- Less hassle to deploy. Makes it easy to tweak a feature after being released
- 3rd party app development

Only benefits?

- Performance in views with a lot of data on mobile
- Time to render

Spotify Embedded Platform

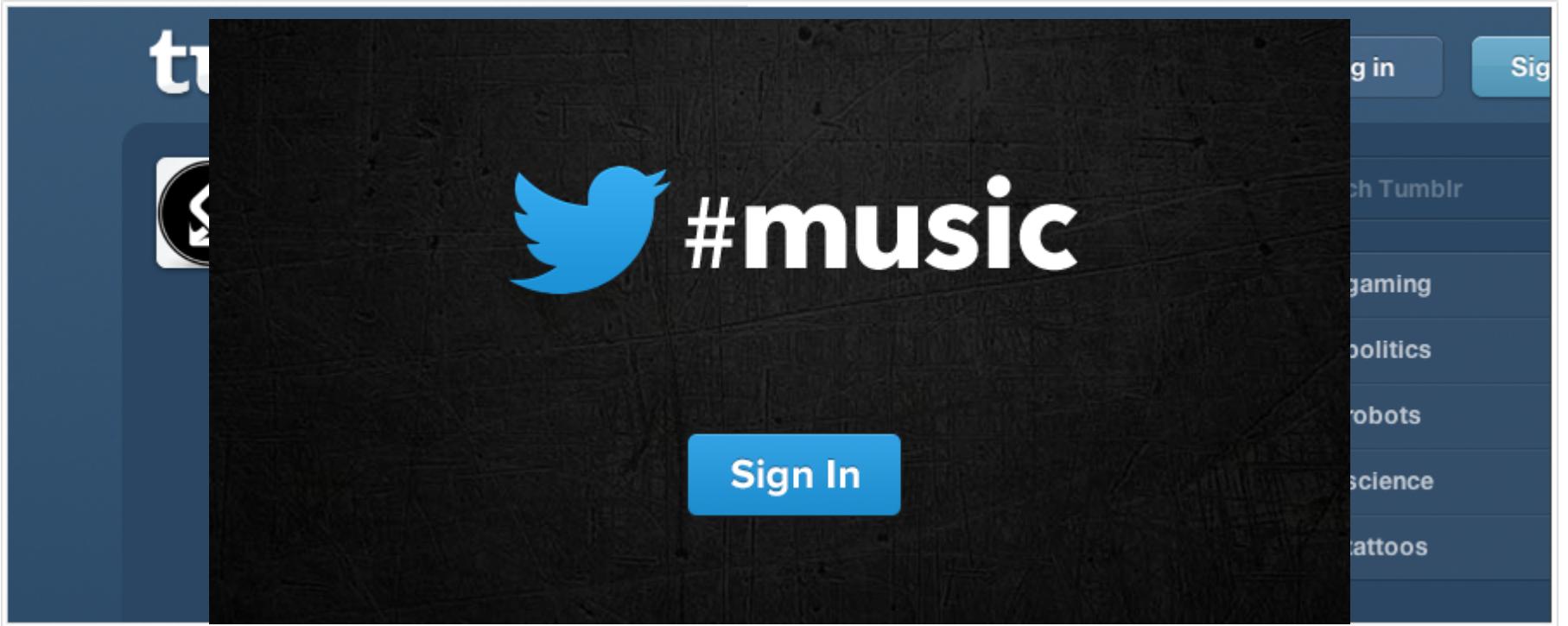
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Spotify Embedded Platform



Content

Platform architecture

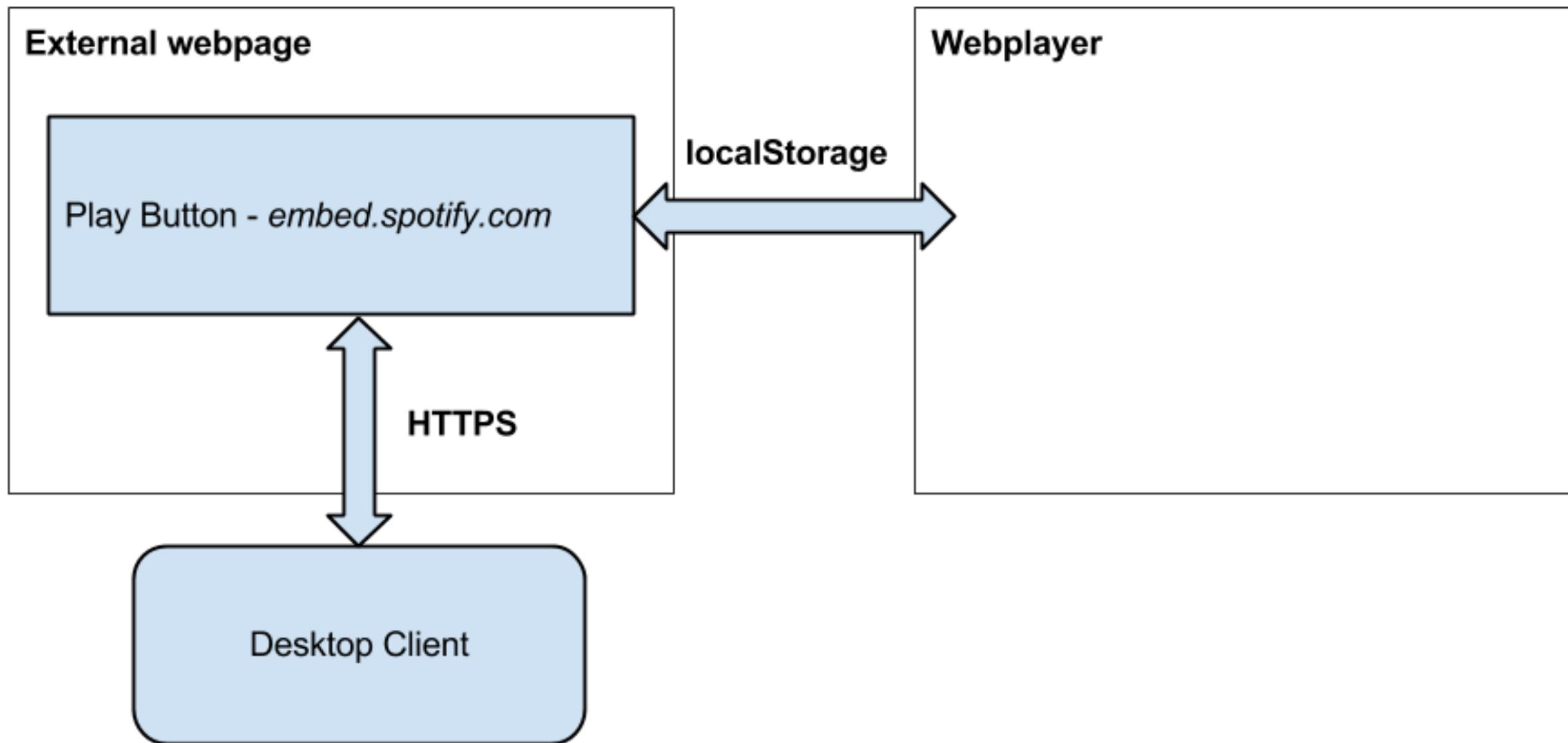
- Iframes and postMessage: security and performance

Remote control technology

- Communication between different tabs
- Performance of the communication channel

Performance improvements

Architecture of the Platform



Sandboxed platform using IFrames

Good

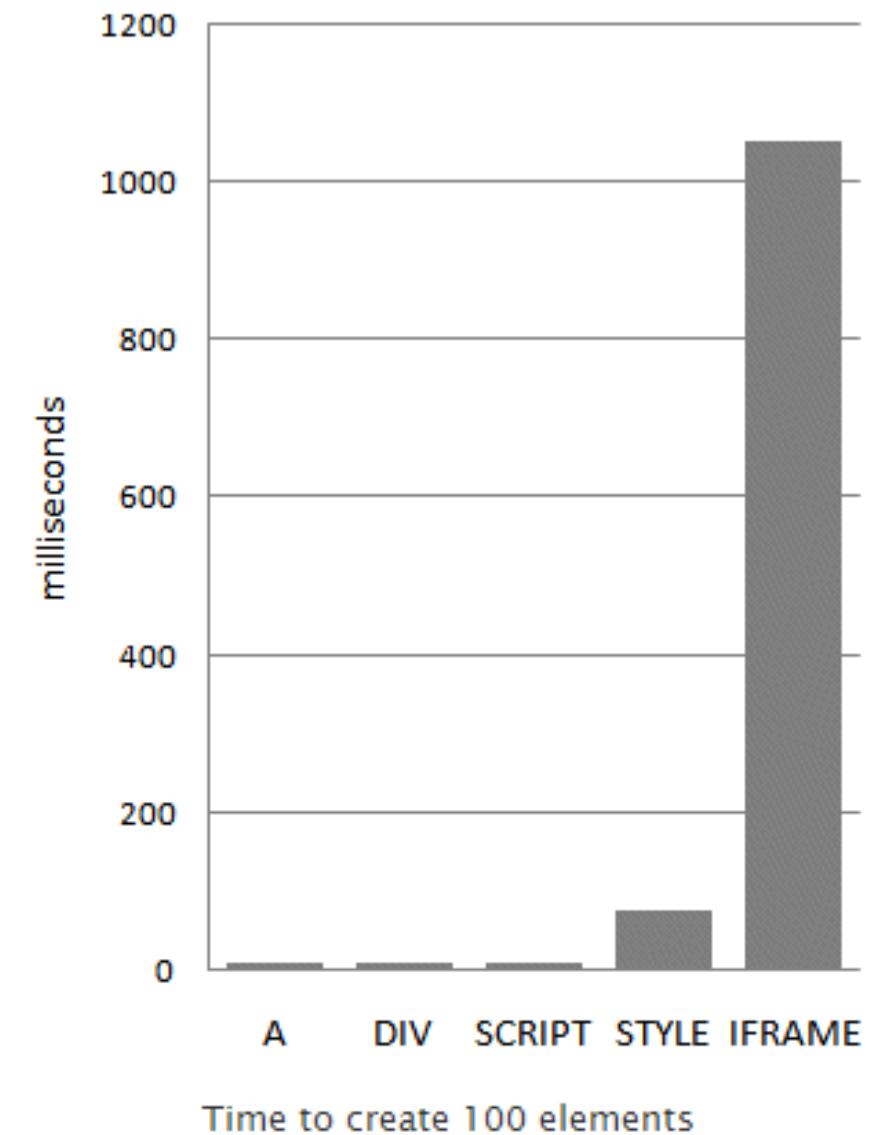
- Separated execution context
- Better security and privacy
- We control the release process

Bad

- More difficult communication
- IFrames are expensive

How expensive are IFrames?

A lot(*):



(*) <http://www.stevesouders.com/blog/2009/06/03/using-iframes-sparingly/>

Custom widgets in partner pages



A screenshot of the Spotify web player interface for the album "Random Access Memories" by Daft Punk. The main content area shows the album cover and a list of 13 songs. The sidebar on the left contains navigation links like File, Edit, MAIN, APPS, and COLLECT. The right sidebar shows related music and a "More by Daft Punk" section.

Random Access Memories

By Daft Punk

Song	Artist	Length
1 Give Life Back to Music	Daft Punk, Julia... Armin Van Buuren	4:36
2 The Game of Love	Daft Punk, Pharrell Williams	5:22
3 Giorgio by Moroder	Daft Punk, Paul... Armin Van Buuren	9:05
4 Within	Daft Punk, Julia... Armin Van Buuren	3:49
5 Instant Crush	Daft Punk, Julia... Armin Van Buuren	5:38
6 Lose Yourself to Dance	Daft Punk, Pharrell Williams	5:54
7 Touch	Daft Punk, Paul... Armin Van Buuren	8:19
8 Get Lucky	Daft Punk, Pharrell Williams	6:10
9 Beyond	Daft Punk, Tod... Armin Van Buuren	4:51
10 Motherboard	Daft Punk, Tod... Armin Van Buuren	5:42
11 Fragments of Time	Daft Punk, Tod... Armin Van Buuren	4:40
12 Doin' it Right	Daft Punk, Pan... Armin Van Buuren	4:12
13 Contact	Daft Punk, Tod... Armin Van Buuren	6:24

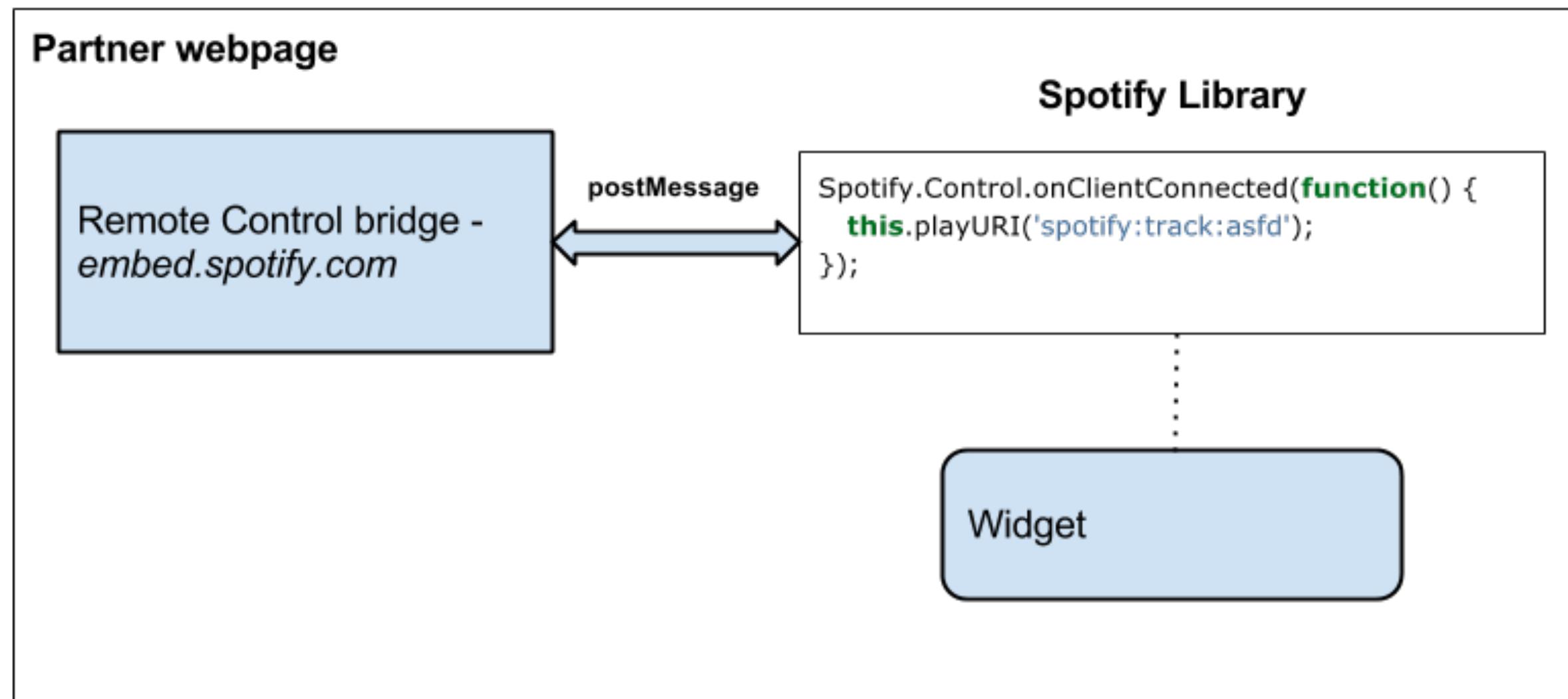
(P) 2013 Daft Life Limited under exclusive license to Columbia Records, a Division of Sony Music Entertainment

More by Daft Punk

- Daft Punk | Random Access Memories
- TRON: Legacy - Original Motion Picture Soundtrack
- TRON: Legacy

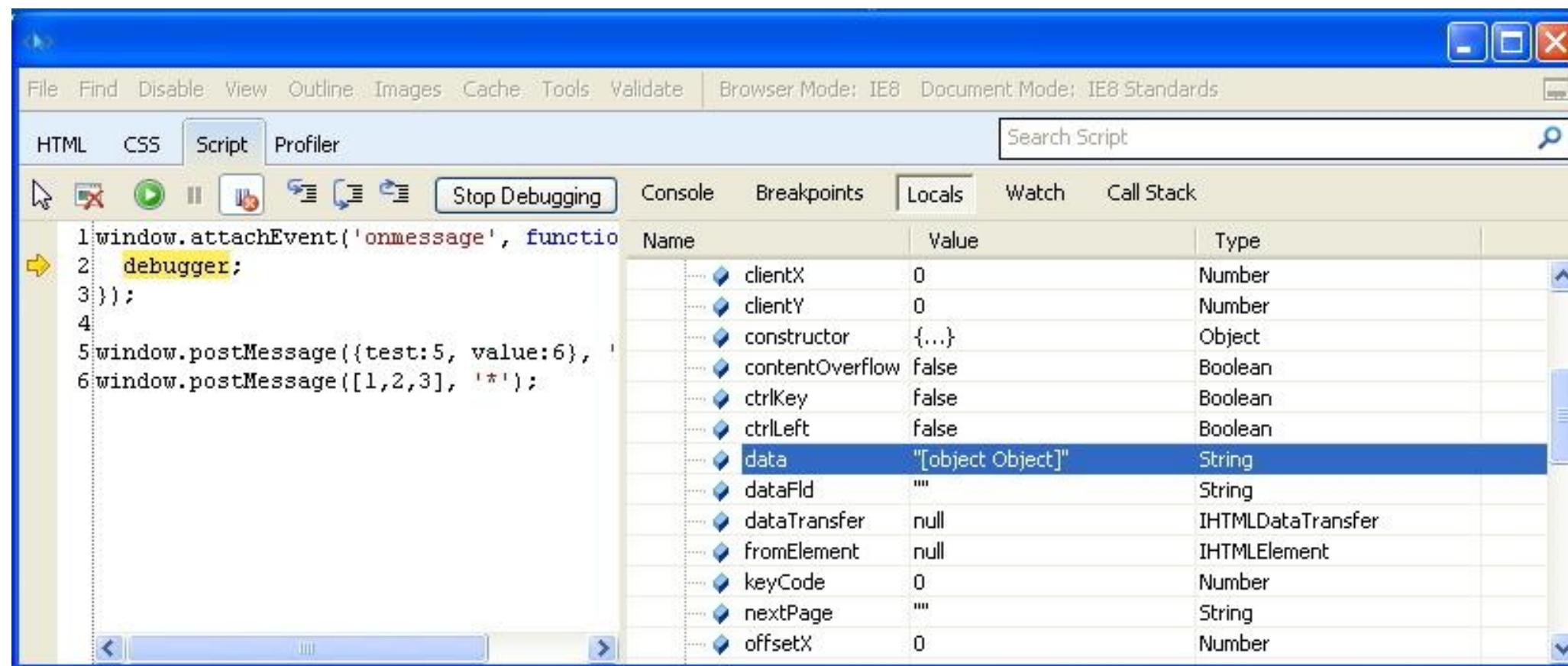
Conceived as the first "virtual hip-hop group," Gorillaz blends the musical talents of Dan "T" and 2D.

Cross-origin communication using postMessage



Sending: content of the message

```
frame.contentWindow.postMessage(message, ...);
```

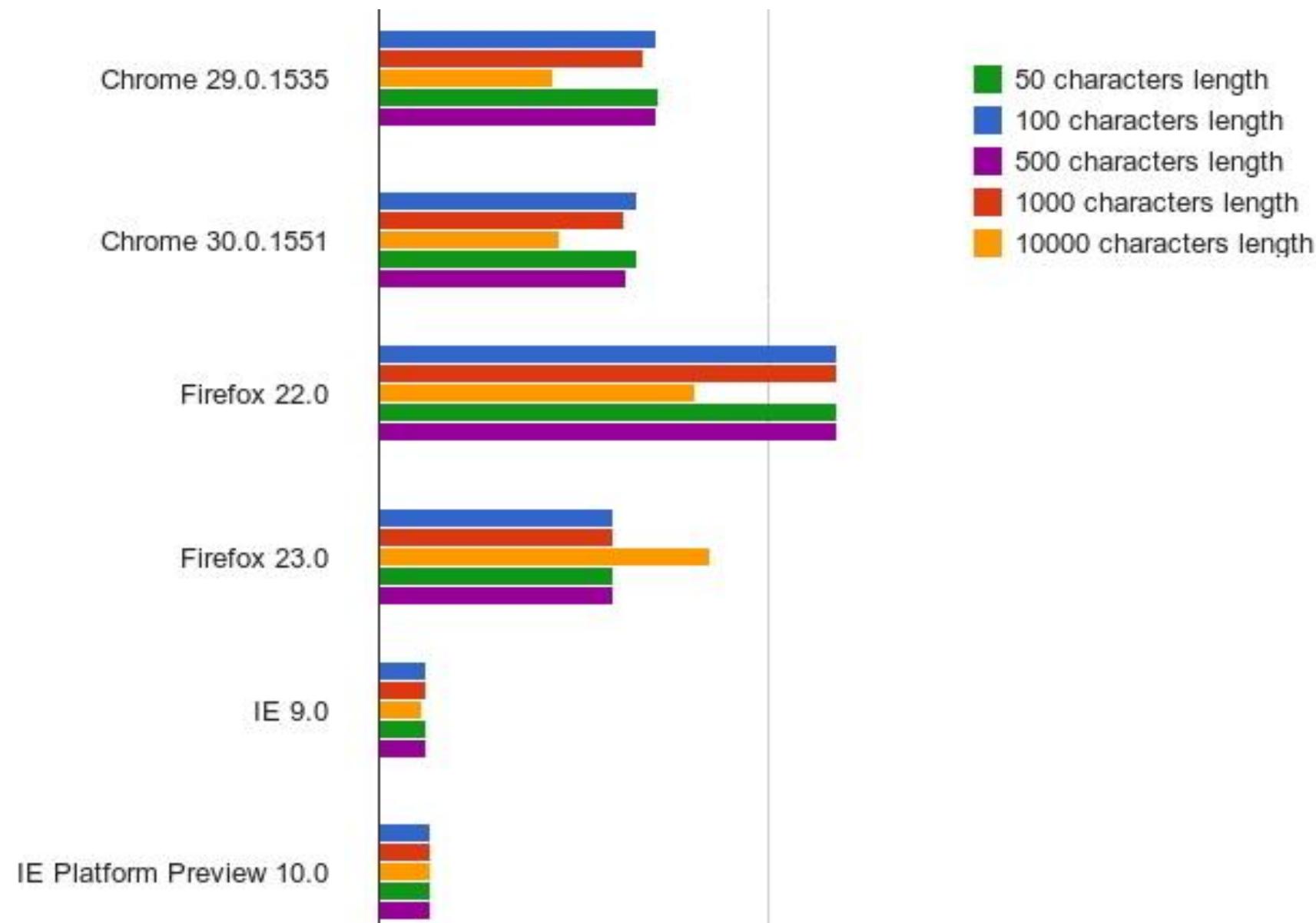


Security

```
frame.contentWindow  
  .postMessage(..., 'https://embed.spotify.com');
```

```
window.addEventListener('message', function(messageEvt) {  
  if (messageEvt.origin === 'https://valid-domain.com') {  
    ...  
  }  
});
```

postMessage transfer rate



Remote controlling Spotify Clients

Client Desktop: based on long polling + https

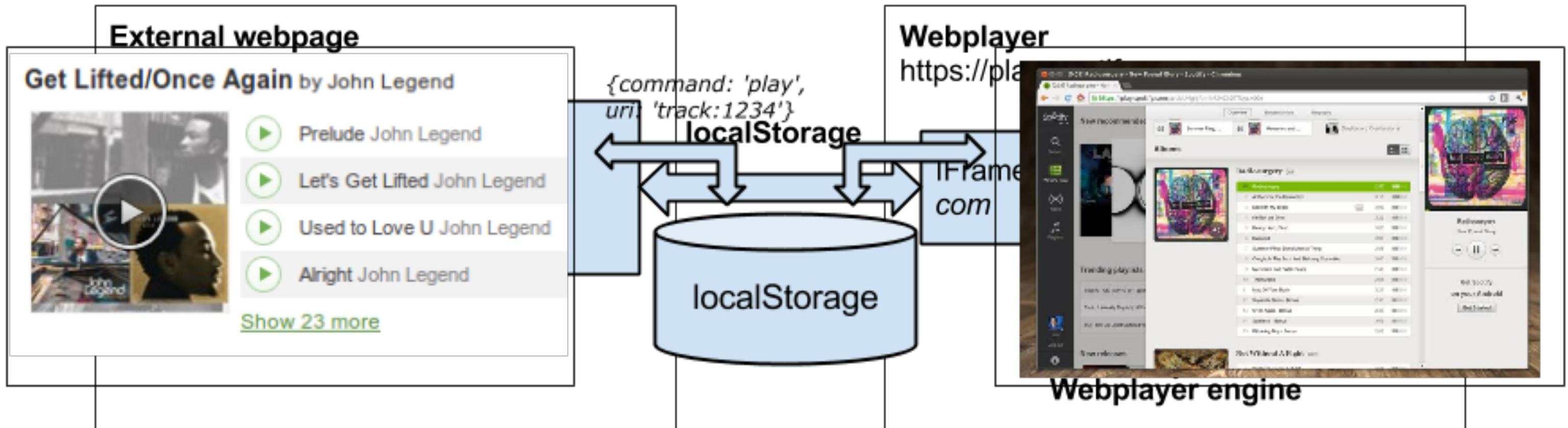
Webplayer: communication with another browser window or tab

- server side
- postMessage
- Cookies
- **localStorage**

Is localStorage always available?

```
window.localStorage('key', 'value')
StorageException
constructor: StorageConstructor
length: 0 or: DOMExceptionConstructor
message: "QUOTA_EXCEEDED_ERR: DOM Exception 22"
```

Communication between different tabs

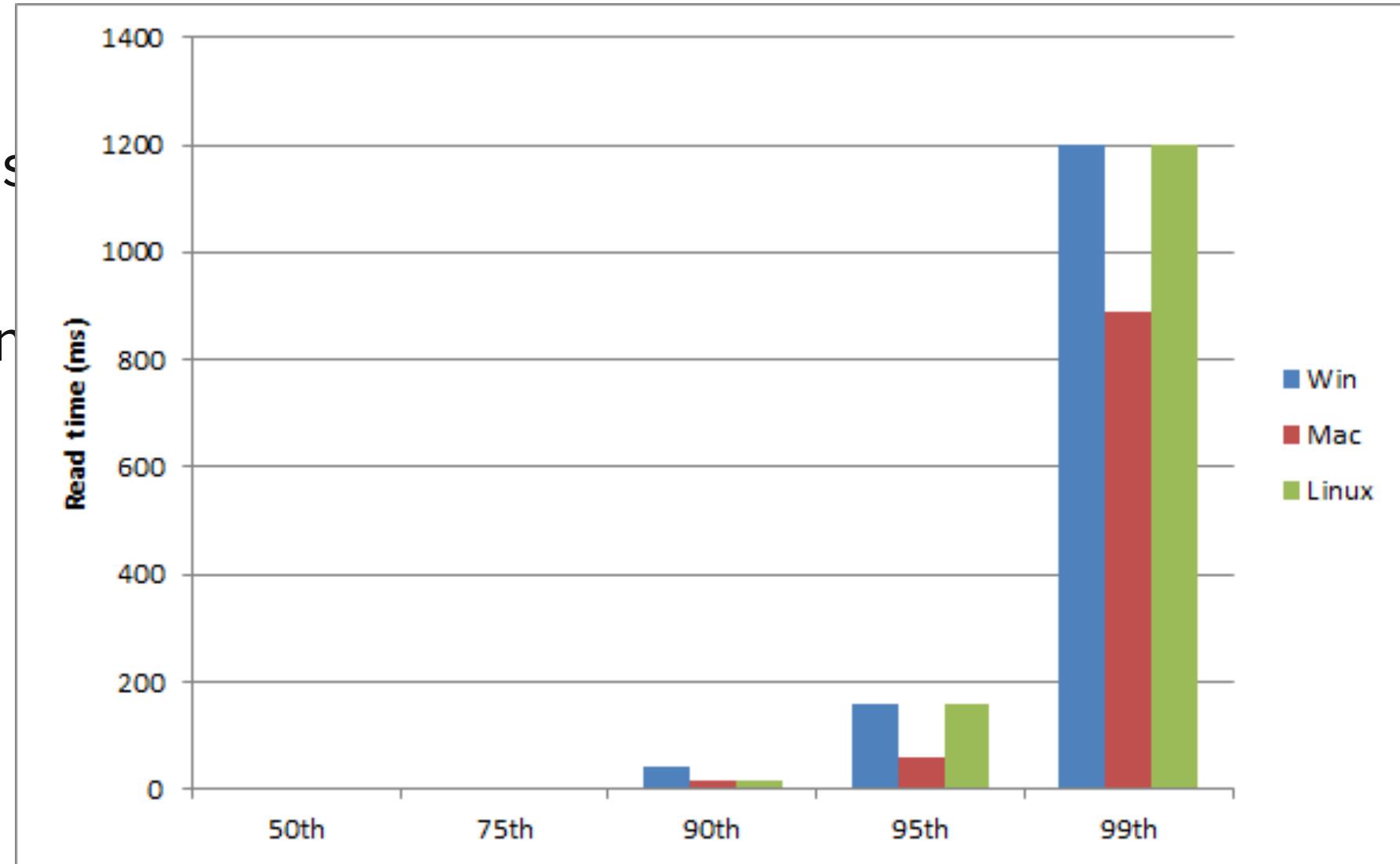


localStorage locks

The UI Thread is s

Firefox and Chron

I the items



localStorage notifications via the storage event

```
window.addEventListener('storage', function() {}, false);
```

The event change is only emitted when the values actually change: use a timestamp if needed.

```
{ key: 'command', value: 'play', timestamp: 1373021690574 }
```

Can we trigger the event manually?

```
var evt = document.createEvent('StorageEvent');  
evt.initStorageEvent('storage', ...);  
window.dispatchEvent(evt);
```

Yes...although not to communicate between different windows.

localStorage communication strategies

Options:

- A) Create a new item every time, but remove it once it's received.
- B) New item, don't remove once it's received, instead do it regularly.
- C) Reuse always the same item (use timestamp)

Notification delay

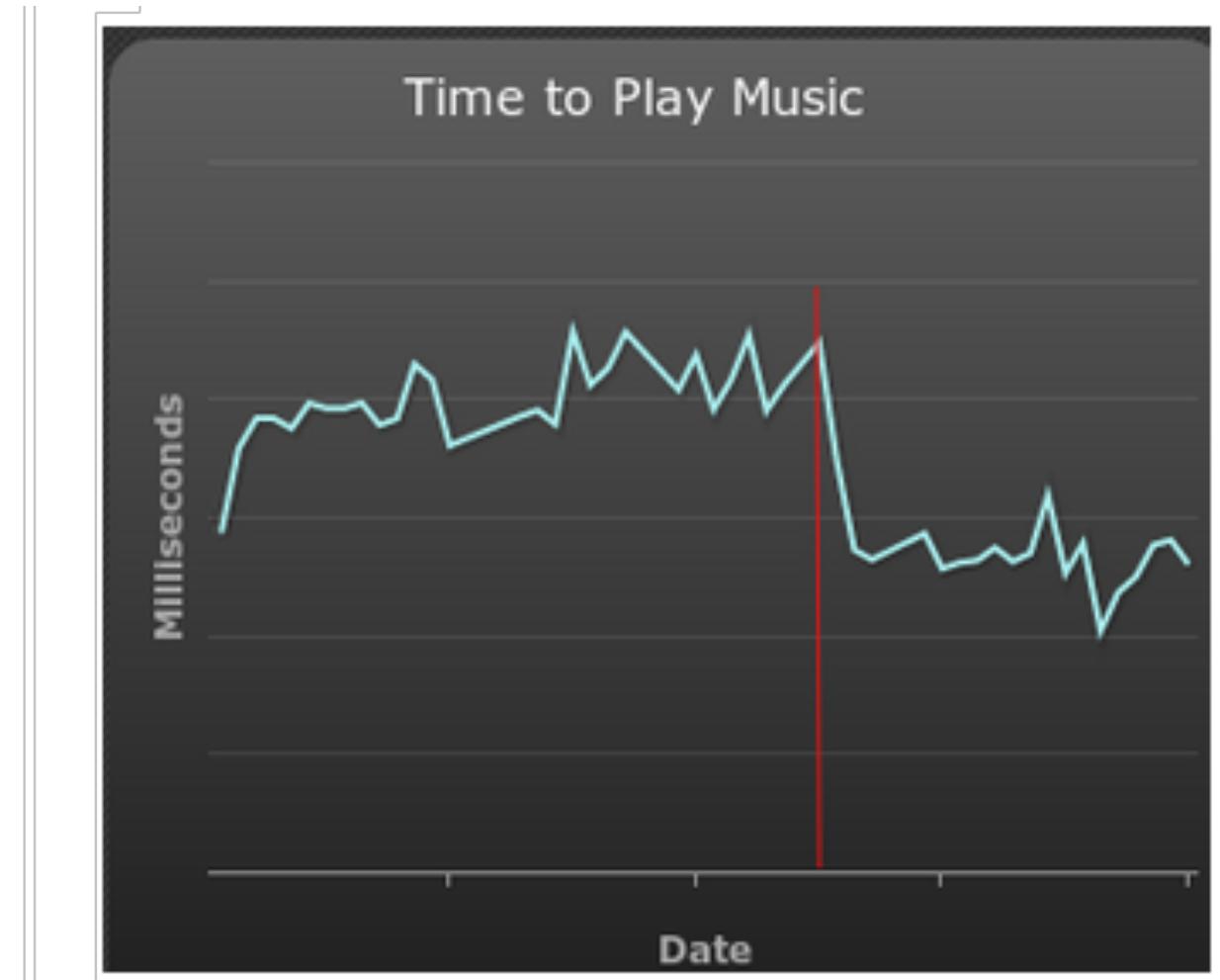
Chrome ~2 milliseconds

IE10 ~34 milliseconds

Performance improvements

Prefetch / Prerender

- Rendering pages
`<link rel="prerender" href="...">`
- Fetching static resources
`<link rel="prefetch" href="...">`



Potential improvements

Batching postMessages

Webworkers

Conclusions

- Web apps have been a good choice to extend our functionality in multiple platforms.
- Web technologies make relatively easy to create complex integrations to improve the user experience.
- It is very important to monitor and analyze carefully the performance.



Questions?

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Slides, code examples and reference

github.com/tomasperezv/spainjs-2013

Thanks!

