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About me

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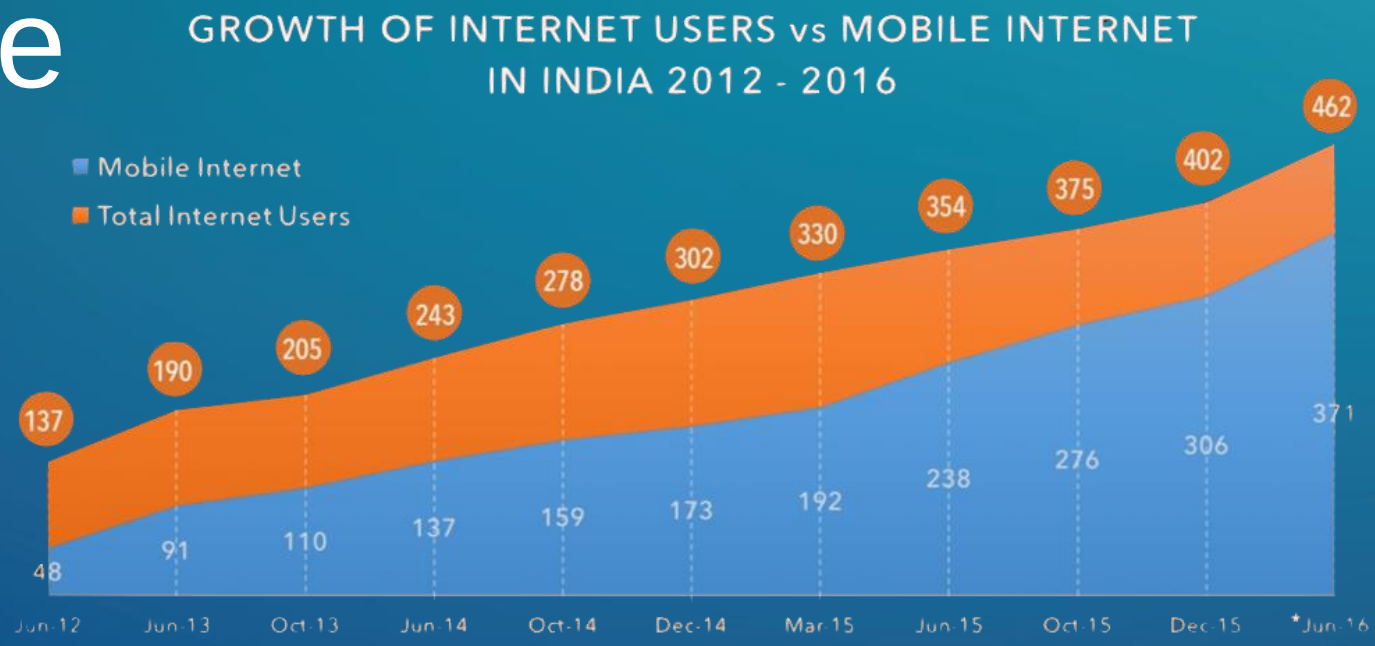
Building Performant Web Applications for Emerging Markets using the First Principles Methodology

The Problem

India is a mobile first country

71% accessing the internet

only via a mobile device



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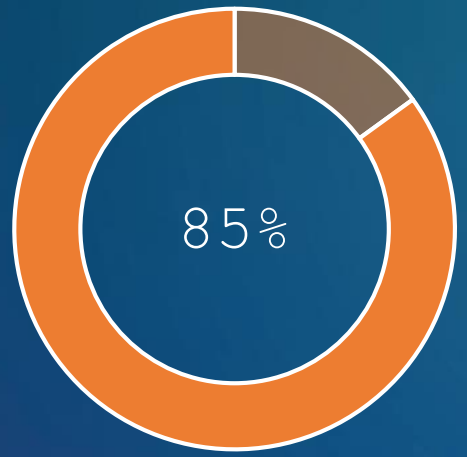
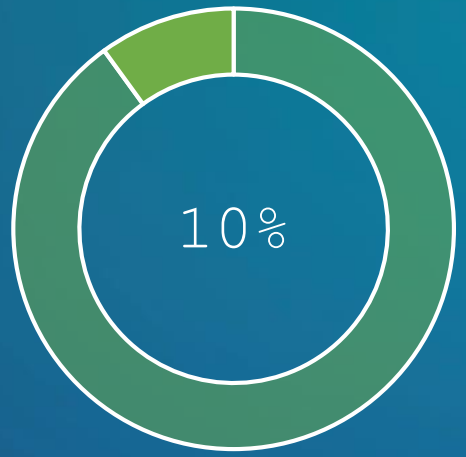
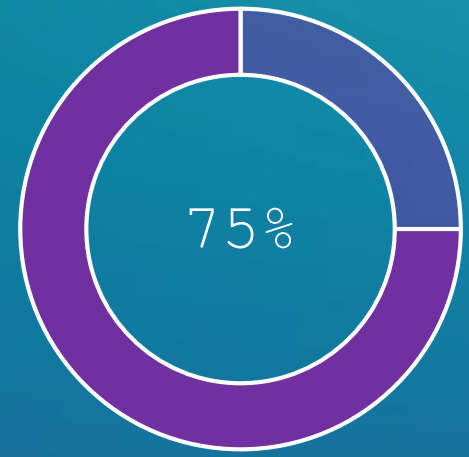
Retention for those users was poor



Of the mobile population accesses the internet on Android devices, primarily with Chrome



Of mobile users consume content via a native app



Of the apps are uninstalled within the first 90 days

"The catalyst for LinkedIn Lite was a field research trip we went on about a year ago in Nashik, a small city about 100 miles from Mumbai. When we sat down to test the product with a few college students, my heart sank. We had worked on a new feature on the site, but that feature would not load because of the low level of internet connectivity in the area. That was a key moment for the team and me, as it dawned upon us that no matter how good your product is, all is lost if it won't load for all audiences"

- Akshay Kothari, former Head of International, LinkedIn

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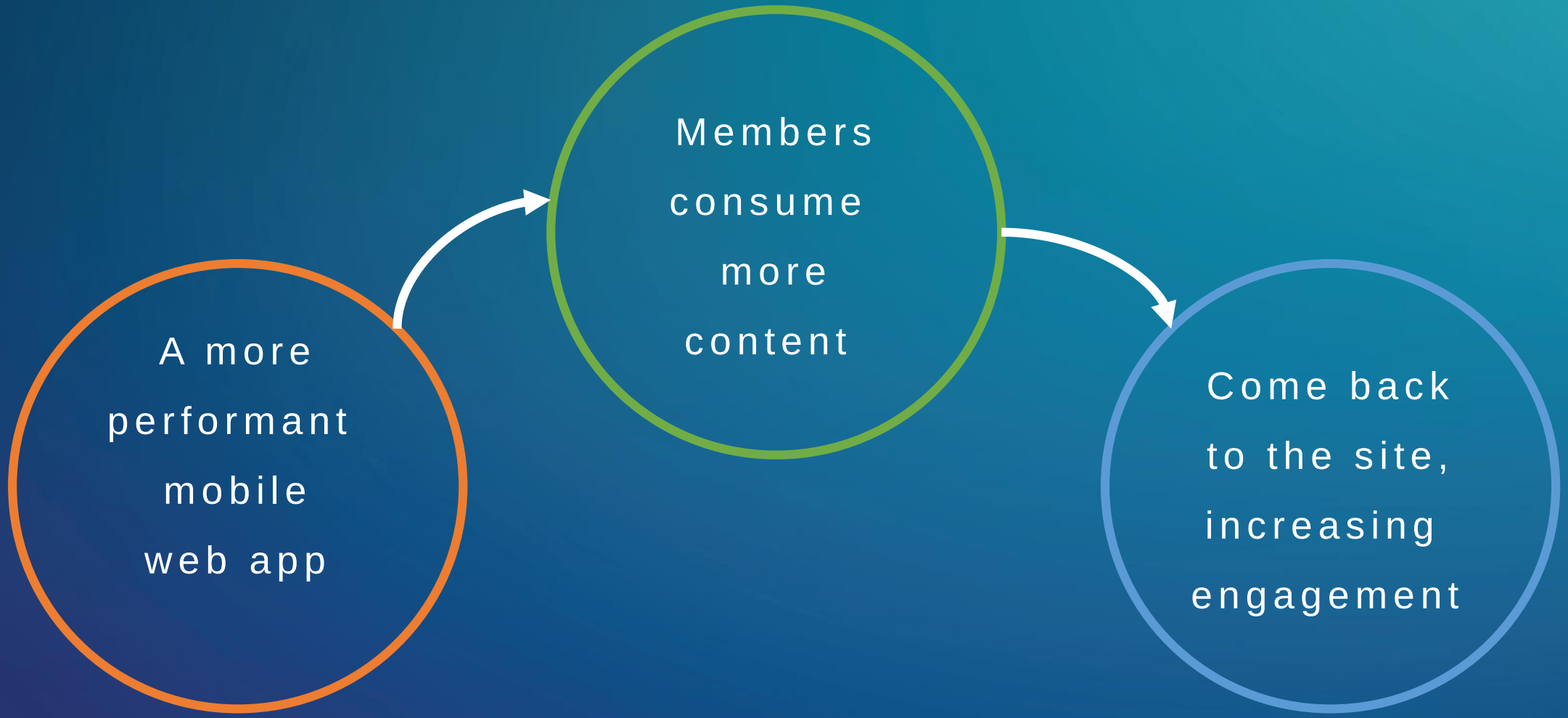
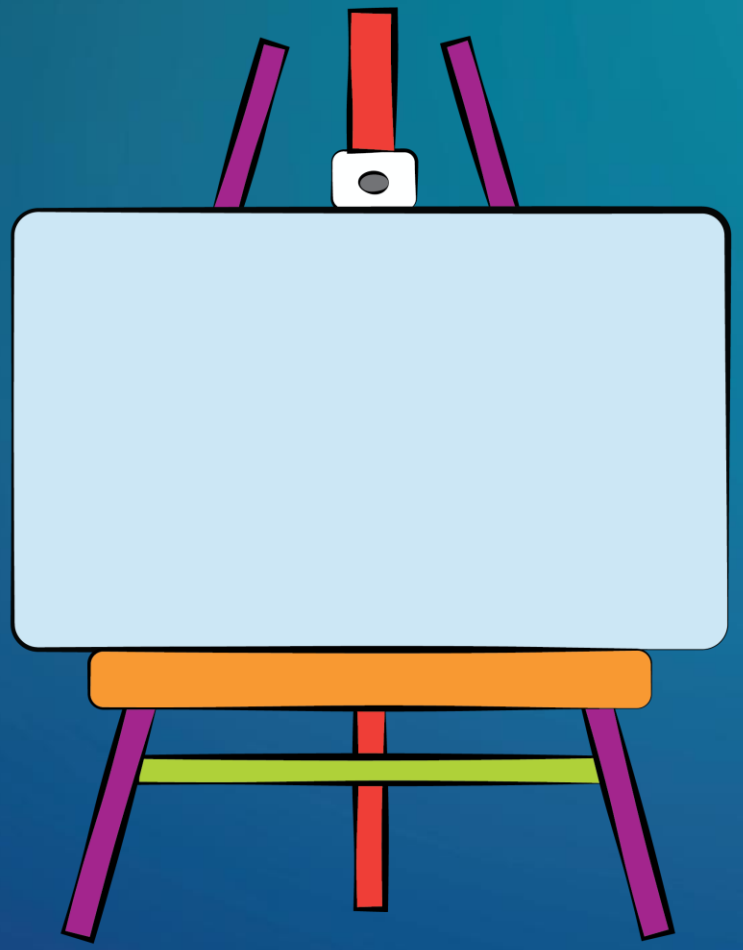

A more performant mobile web app
Members consume more content
Come back to the site, increasing engagement



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Performance Bottlenecks

01 Shipping over 500 KiB of JavaScript to boot its Client Side Rendered (CSR) app

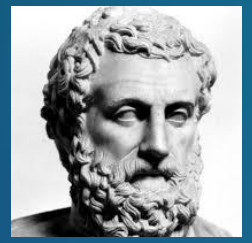
02 DNS lookup times, if the browser/OS hasn't cached the DNS, could be as long as a second

03 Connect times in India can take as long as 2 seconds

04 2-4 redirects into different systems to determine the appropriate experience for the member - 3.7s delay on avg

The Solution

First Principles Methodology



ARISTOTLE

ELON MUSK

First Principle is defined as the first basis

from which a thing is known

First Principles Thinking

Actively questioning every assumption you think you “know” about a given problem or scenario - and then creating new knowledge and solutions from scratch

First Principles Methodology

- STEP 1: Identify and define your current assumptions

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Step 1: Assumptions	Step 2: First Principles
Mobile apps have 4X higher engagement when compared with mobile web applications.	Increase engagement by: - Providing meaningful notifications and badging - Allowing the member to access the app directly from the home screen rather than through URLs typed in a browser

Step 1: Assumptions	Step 2: First Principles
CSR applications provide rich interactions, a more app-like interface	Provide a rich member experience: - by maintaining context within the app across navigation, a constant nav - by improving offline experiences

Step 1: Assumptions	Step 2: First Principles
CSR applications have faster subsequent page load times	Cache a data/assets that have already been downloaded Share assets between different urls

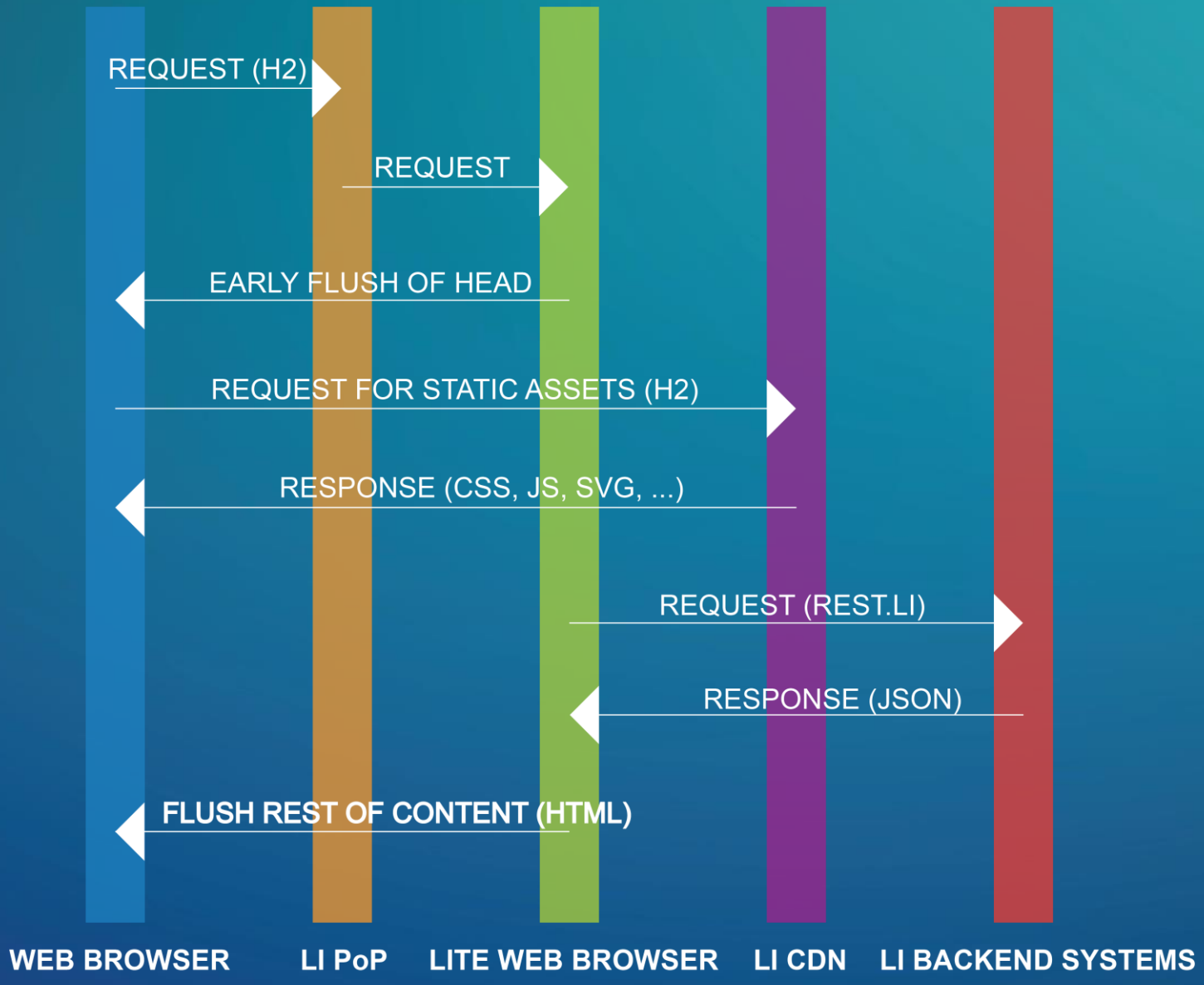
Step 1: Assumptions	Step 2: First Principles
Full page reloads are required for every route change within SSR applications, which slows load times, uses more bandwidth, and creates a less responsive member experience	- Share and cache JavaScript assets across multiple routes to improve performance - Support lazy loading and pre-caching of JavaScript assets

Requirements from First Principles

- Provide meaningful notifications and badging
- Add an icon to the home screen
- Cache assets/data that has already been downloaded
- Share assets across URLs/routes
- Support lazy loading or pre-caching of JS assets
- Maintain focus within the app by providing an “app shell”
- Improve offline experiences

Architecture

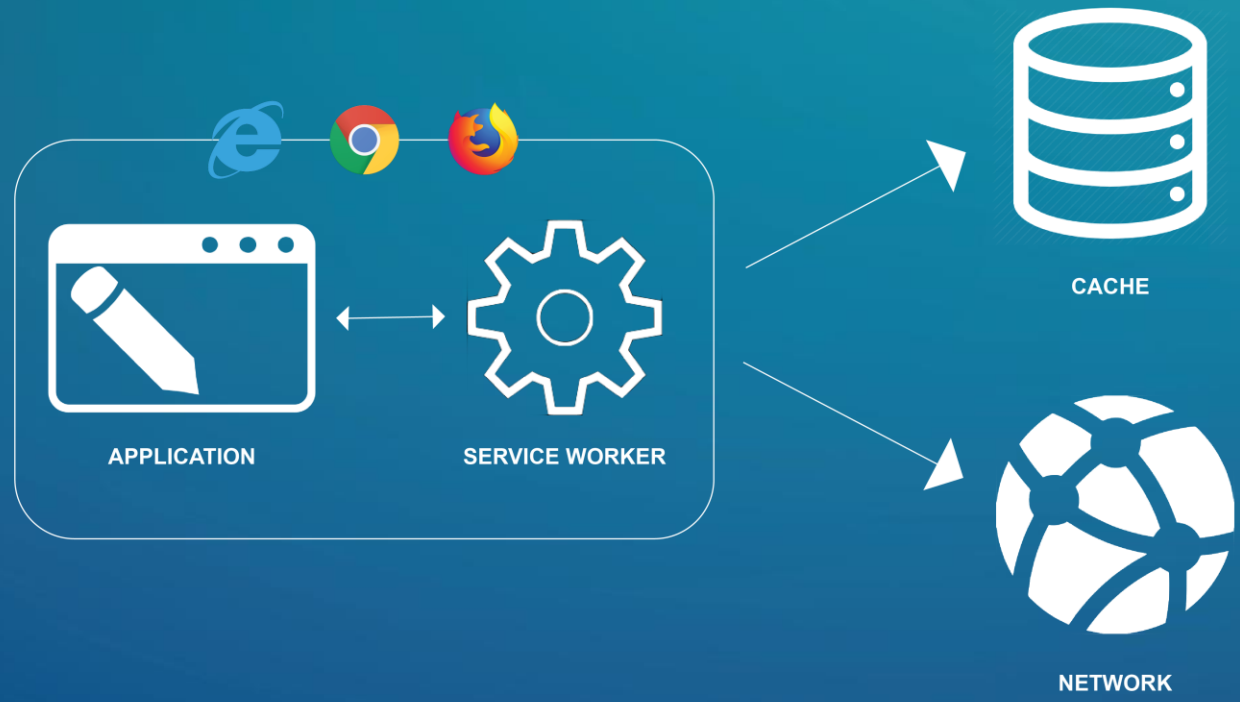
Server Side Rendering (SSR)



Less Javascript

- Limit client-side libraries
- Leverage evergreen browser APIs
- Leverage build tools

Progressive Web Application (PWA)



Step 3: Our Progressive Web App

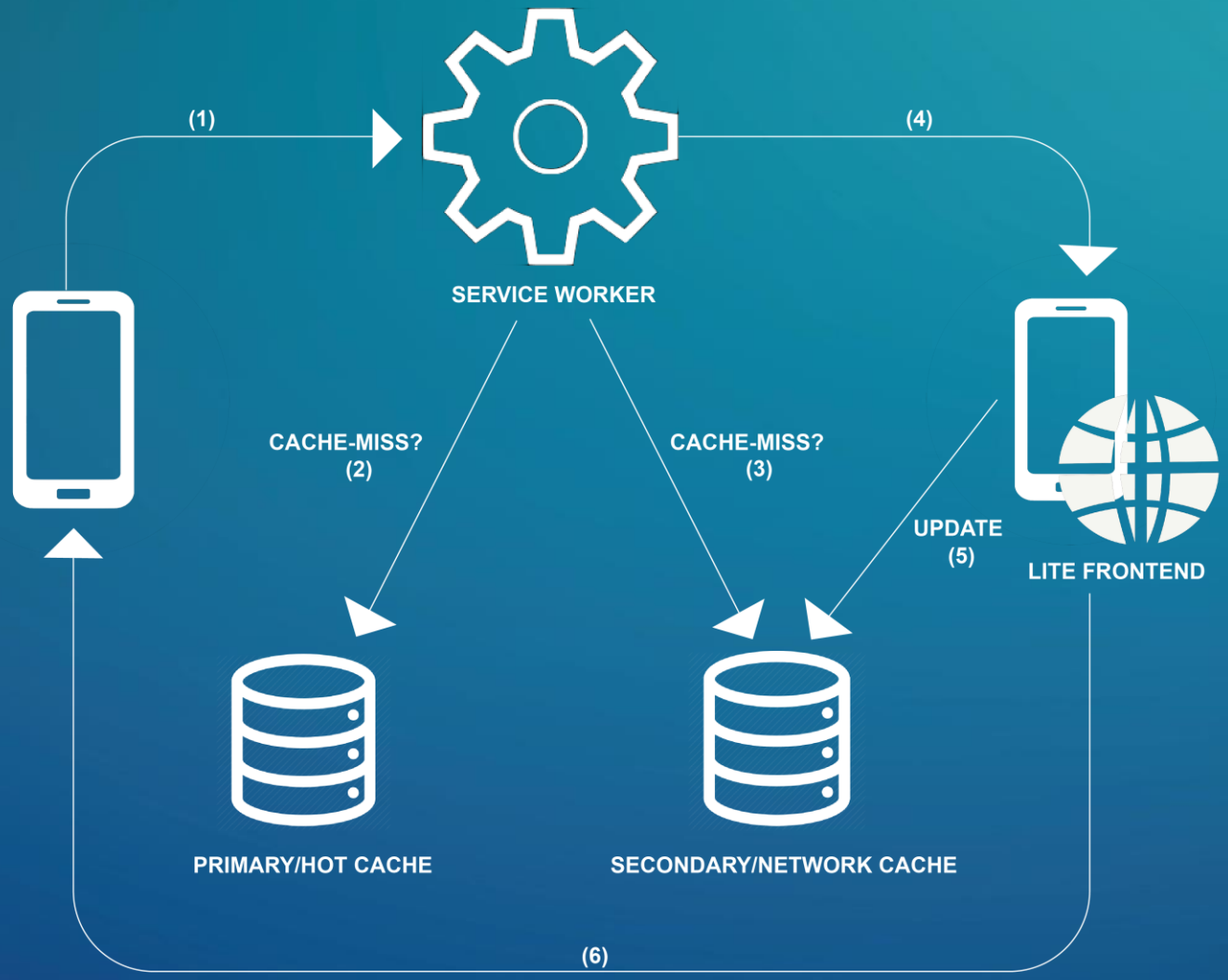
01 Supports sending push notifications to members

02 Has an icon on the home screen of the mobile device

03 Provides caching of pages across routes, reducing subsequent page loads and improving the offline experience

04 Returns an app shell until the page is available, allowing for better UX

Caching Strategy



Outcome

Variant	First Byte Time (50th pct)	Page Load Time (50th pct)	First Byte Time (90th pct)	Page Load Time (90th pct)
Lite without Caching (SSR)	950 ms	2.1 sec	2.9 sec	5 sec
Lite with SW Caching (SSR + PWA)	150 ms	1 sec	450 ms	2.6 sec

Wins

PERFORMANCE METRICS

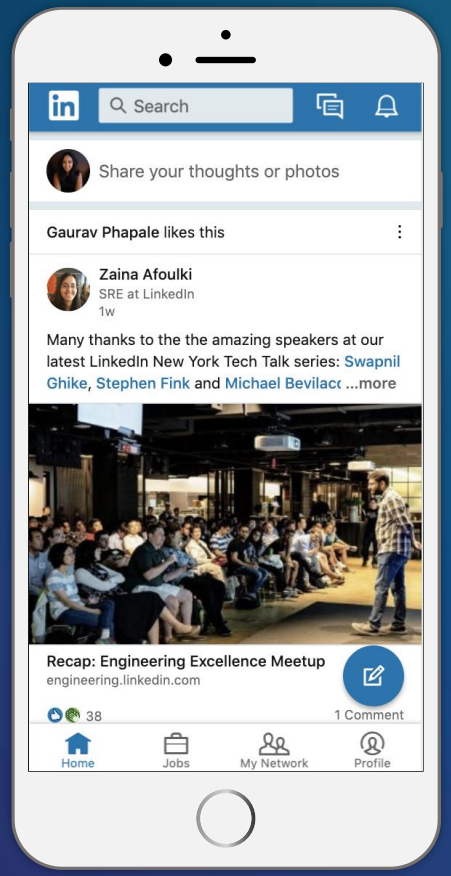
SESSIONS

ENGAGEMENT

JOB APPLIES

Since its first launch in India, we have launched to over 135 countries across the world, including South Africa, the Philippines, Nigeria and more. Tests are being conducted to launch in established markets as well.

By starting from the First Principles



- Pushed the limits of an SSR app to behave more like a native app
- Optimized the experience for mobile members
- Leveraged the latest APIs that web browsers offer with no penalty for members that don't have a capable browser

Please remember to complete the session survey in the mobile app

THANK YOU

You can email me: ramithachitloor@gmail.com




Illustrations by Rashika N. Makam

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