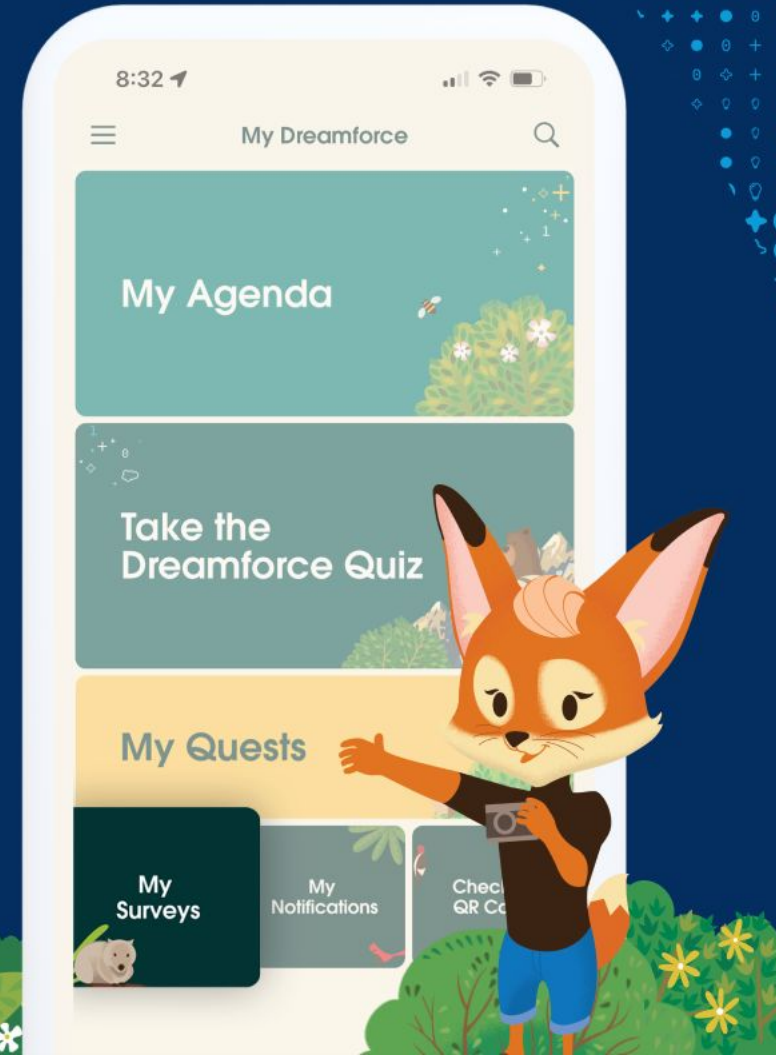


Provide Your Feedback for a Chance to Win.

For every session survey submitted, you will be entered to win one of 15 passes to Dreamforce 2024.*

- 1 Open the Salesforce Events mobile app.
- 2 Navigate to My Dreamforce.
- 3 Select My Surveys.
- 4 For every quick session survey you take, you'll be entered to win.*

* Restrictions apply. See rules at sforce.co/session-survey-terms





Experience Delivery: Improve LWC Performance with SSR

Drew Lau, Sr. Director of Product
@drewzie
He/Him

Greg Whitworth, Sr. Director of Product
@gregwhitworth
He/Him



Forward Looking Statement

salesforce

This presentation contains forward-looking statements about, among other things, trend analyses and future events, future financial performance, anticipated growth, industry prospects, environmental, social and governance goals, and the anticipated benefits of acquired companies. The achievement or success of the matters covered by such forward-looking statements involves risks, uncertainties and assumptions. If any such risks or uncertainties materialize or if any of the assumptions prove incorrect, Salesforce's results could differ materially from the results expressed or implied by these forward-looking statements. The risks and uncertainties referred to above include those factors discussed in Salesforce's reports filed from time to time with the Securities and Exchange Commission, including, but not limited to: the impact of, and actions we may take in response to, the COVID-19 pandemic, related public health measures and resulting economic downturn and market volatility; our ability to maintain security levels and service performance meeting the expectations of our customers, and the resources and costs required to avoid unanticipated downtime and prevent, detect and remediate performance degradation and security breaches; the expenses associated with our data centers and third-party infrastructure providers; our ability to secure additional data center capacity; our reliance on third-party hardware, software and platform providers; the effect of evolving domestic and foreign government regulations, including those related to the provision of services on the Internet, those related to accessing the Internet, and those addressing data privacy, cross-border data transfers and import and export controls; current and potential litigation involving us or our industry, including litigation involving acquired entities such as Tableau Software, Inc. and Slack Technologies, Inc., and the resolution or settlement thereof; regulatory developments and regulatory investigations involving us or affecting our industry; our ability to successfully introduce new services and product features, including any efforts to expand our services; the success of our strategy of acquiring or making investments in complementary businesses, joint ventures, services, technologies and intellectual property rights; our ability to complete, on a timely basis or at all, announced transactions; our ability to realize the benefits from acquisitions, strategic partnerships, joint ventures and investments, including our July 2021 acquisition of Slack Technologies, Inc., and successfully integrate acquired businesses and technologies; our ability to compete in the markets in which we participate; the success of our business strategy and our plan to build our business, including our strategy to be a leading provider of enterprise cloud computing applications and platforms; our ability to execute our business plans; our ability to continue to grow unearned revenue and remaining performance obligation; the pace of change and innovation in enterprise cloud computing services; the seasonal nature of our sales cycles; our ability to limit customer attrition and costs related to those efforts; the success of our international expansion strategy; the demands on our personnel and infrastructure resulting from significant growth in our customer base and operations, including as a result of acquisitions; our ability to preserve our workplace culture, including as a result of our decisions regarding our current and future office environments or work-from-home policies; our dependency on the development and maintenance of the infrastructure of the Internet; our real estate and office facilities strategy and related costs and uncertainties; fluctuations in, and our ability to predict, our operating results and cash flows; the variability in our results arising from the accounting for term license revenue products; the performance and fair value of our investments in complementary businesses through our strategic investment portfolio; the impact of future gains or losses from our strategic investment portfolio, including gains or losses from overall market conditions that may affect the publicly traded companies within our strategic investment portfolio; our ability to protect our intellectual property rights; our ability to develop our brands; the impact of foreign currency exchange rate and interest rate fluctuations on our results; the valuation of our deferred tax assets and the release of related valuation allowances; the potential availability of additional tax assets in the future; the impact of new accounting pronouncements and tax laws; uncertainties affecting our ability to estimate our tax rate; uncertainties regarding our tax obligations in connection with potential jurisdictional transfers of intellectual property, including the tax rate, the timing of the transfer and the value of such transferred intellectual property; uncertainties regarding the effect of general economic and market conditions; the impact of geopolitical events; uncertainties regarding the impact of expensing stock options and other equity awards; the sufficiency of our capital resources; our ability to comply with our debt covenants and lease obligations; and the impact of climate change, natural disasters and actual or threatened public health emergencies, including the ongoing COVID-19 pandemic.





CONNECT
CONNECT
CONNECT
CONNECT



dreamforce®

Thank you



HAVE FUN
HAVE FUN
HAVE FUN



GIVE BACK
GIVE BACK
GIVE BACK



Why Performance (Still) Matters





(Our site) is always a hot topic of discussion because of high average latencies (in the range of 3-5 seconds), whereas rest of (our) services are well below 1 second. We would like to fix it ASAP

Development Manager, anonymous customer





60% of sites do not pass Core Web Vitals

www.advancedwebranking.com/blog/core-web-vitals-study



57% of businesses expect more than half of their revenue will come from digital within 2 years

Salesforce State of Commerce, 2nd edition



Reimagine How You Deliver B2C-like Experiences with the #1 AI Digital Experience Platform



Salesforce Experience Services

Data Cloud AI Cloud Hyperforce



Our Performance Journey



Evolution Of Experience Cloud

salesforce

USE CASES

Visualforce 2013+

Pixel perfect experiences for external use cases (B2B, B2C)

Aura 2016+

Declarative low code enterprise-grade platform with fast time to value (B2B, B2C)

LWR 2021+

Quickly build connected, real-time, personalized C360 experiences at scale

KEY CAPABILITIES

Programmatically build pixel perfect sites and experiences

Connect to CRM data and Business Process Flows

Build low-code sites with out of the box Templates & Components

Connect to CRM data and Business Process Flows

(Pilot) Server-side Rendering with [Experience Delivery](#) for B2C perf and scale

LWR vs Aura Performance

Real world test results show improved performance across the board

Largest Contentful Paint
Render time of the largest image or text block visible

Page	Aura LCP	LWR LCP		Aura FCP	LWR FCP	
Homepage	4,966 ms	2,502 ms	2.0x Faster	3,776 ms	1,870 ms	2.0x Faster
Search	7,270 ms	3715 ms	2.0x Faster	3,972 ms	2,155 ms	1.8x Faster
PDP	5,590 ms	2,876 ms	1.9x Faster	3,987 ms	1,718 ms	2.3x Faster
PLP	6,698 ms	2,846 ms	2.4x Faster	3,780 ms	2,054 ms	1.8x Faster

Note: Numbers are averages across 6 tests per page - Tests were run on a Chrome browser with cable connection in Virginia via <https://www.webpagetest.org/>
FCP = First Contentful Paint / LCP = Largest Contentful Paint
Tests were uncached, with guest users and not behind a CDN



Client-side Rendering

Rendering is handled in the browser via JavaScript on user device.

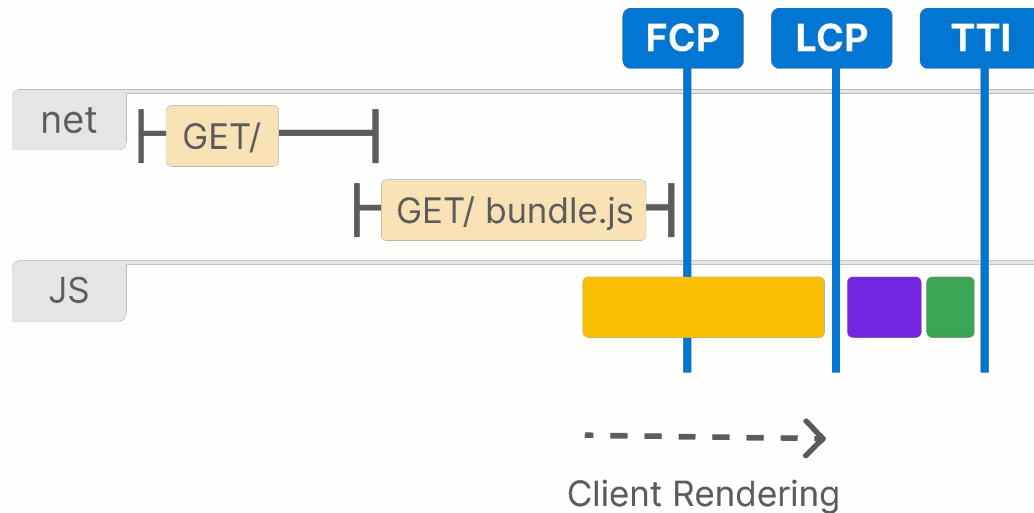
Server-side Rendering

Rendering is handled on the “server” and HTML outputs are sent to the browser.

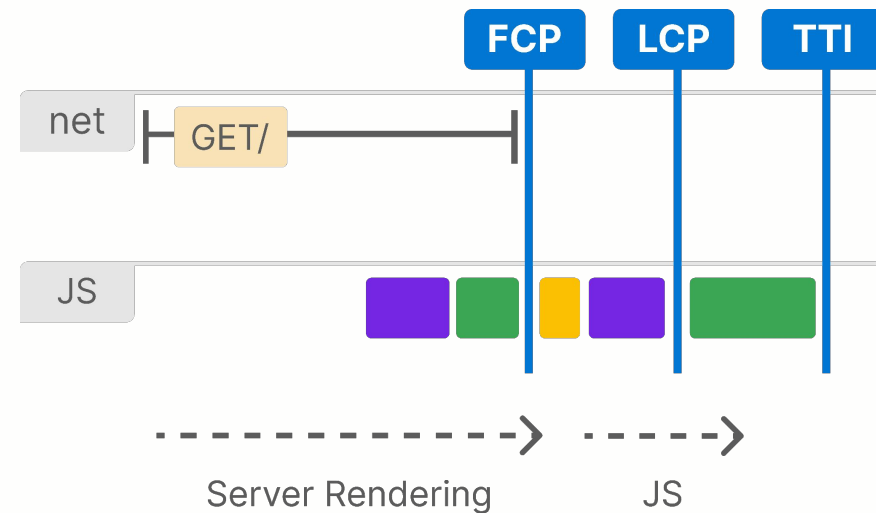
Comparing CSR and SSR

FCP = First Contentful Paint
LCP = Largest Contentful Paint
TTI = Time to Interactive

Client-side rendering 📱



Server-side rendering ☁️



CSR and SSR Considerations



Client-side Rendering


Server-side Rendering

Performance Network

 Faster TTFB

 Slower TTFB → CDN caching critical

Performance Rendering

 Slower FCP/LCP/TTI for heavier JS payloads

 Faster FCP/LCP/TTI

 Slower on network/compute constrained devices

 Susceptible to scale/load impacts from heavy traffic

TTFB = Time to First Byte
FCP = First Contentful Paint
LCP = Largest Contentful Paint
TTI = Time to Interactive



CSR and SSR Considerations



Client-side Rendering 📱

Server-side Rendering ☁️

Performance Network

😊 Faster TTFB

😞 Slower TTFB → CDN caching critical

Performance Rendering

😞 Slower FCP/LCP/TTI for heavier JS payloads

😊 Faster FCP/LCP/TTI

😞 Slower on network/compute constrained devices

😞 Susceptible to scale/load impacts from heavy traffic

Developer Experience Code Complexity

🔍 Client-side observability

😞 Isomorphic code

😞 Browser compatibility

🐛 SSR debugging

Developer Experience Infrastructure

😞 Snapshots for SEO/crawlers

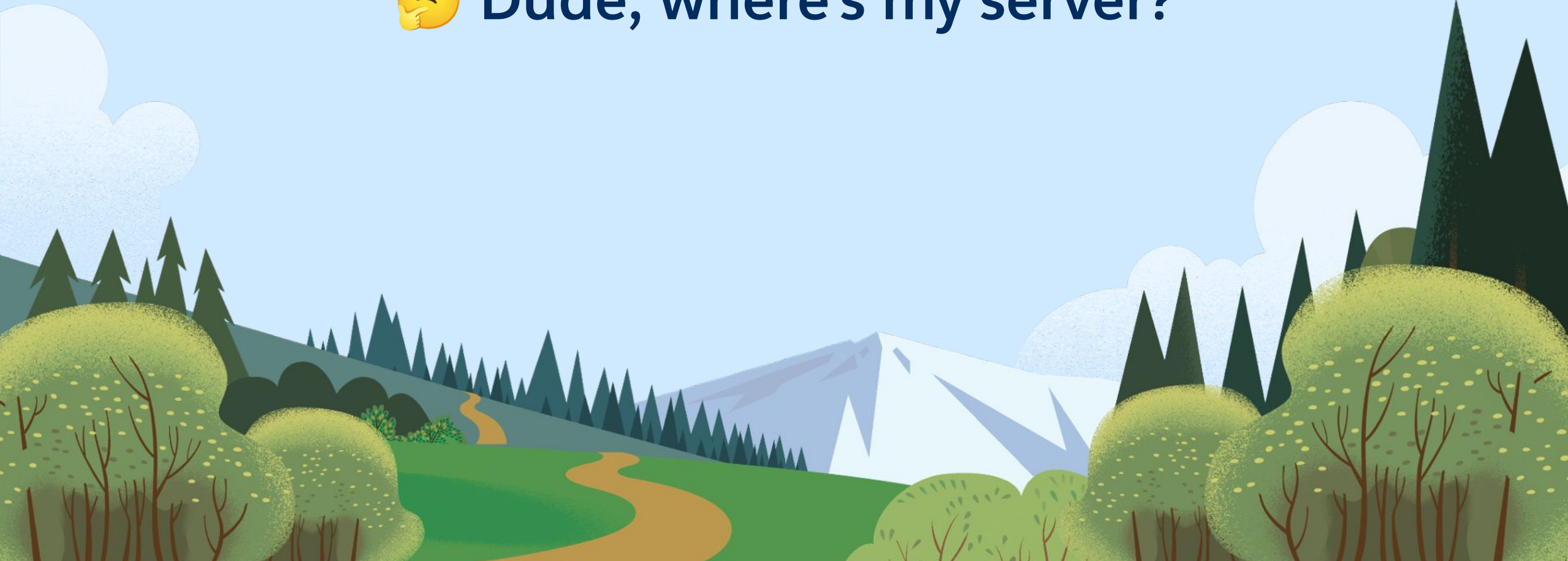
💰 Maintaining and budgeting for SSR infrastructure

TTFB = Time to First Byte
FCP = First Contentful Paint
LCP = Largest Contentful Paint
TTI = Time to Interactive



A yellow thinking face emoji with a hand on its chin.

Dude, where's my server?



Introducing Experience Delivery

Consumer-grade LWR experiences on Hyperforce

Open Pilot
Spring '24



B2C-grade Performance with Zero Stress

Optimize performance and automate scaling to free up teams

[Autoscaling](#) • [Global CDN](#) • [Edge Optimizations](#) • [LWR SSR](#) • [Core Web Vitals](#)

Improved SEO

Ensure that your content is always up to date with improved load times and static content

[Query param support](#) • [Hydrated content is indexed](#)

Perimeter Security & Compliance

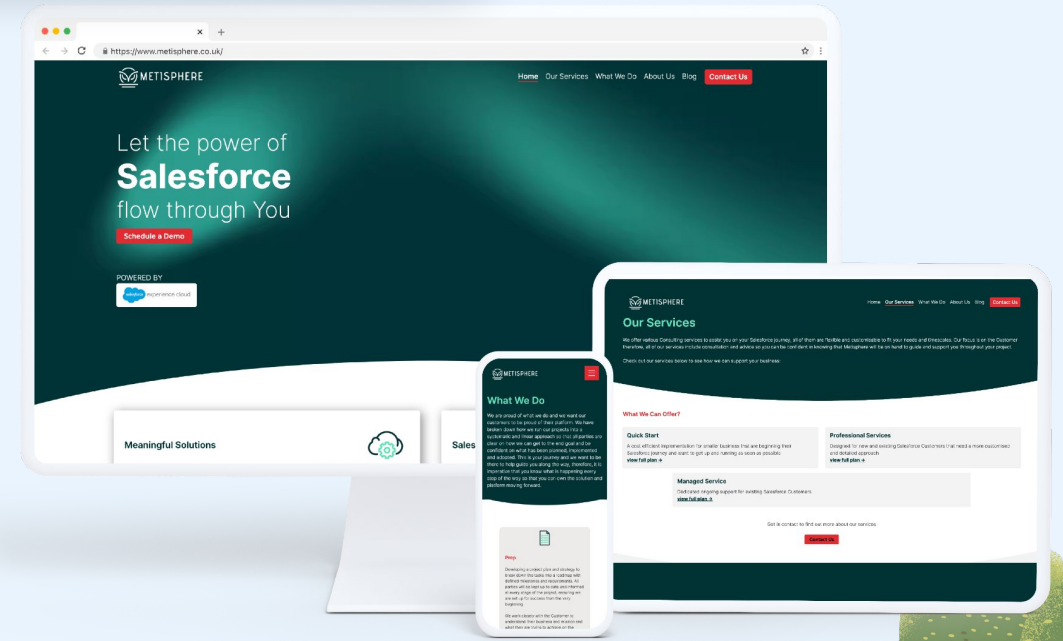
Tools Built for You

Start secure and stay secure

[Custom Firewall Rules](#) • [Custom Rate Limiting](#) • [DDOS](#) • [Hyperforce](#) • [SOC2](#) • [PCI](#) • [Data Residency](#)



Up to **60%** faster page loads (LCP) for sites using Experience Delivery



Experience Delivery unlocks consumer-grade sites

C360



Builders

Components

APIs

Publish →

Experience Delivery



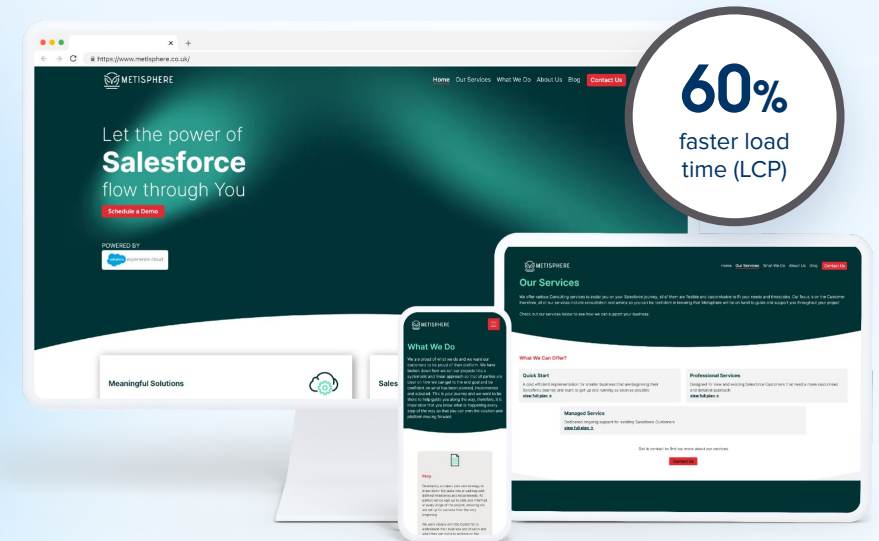
Serverless Runtime



CDN & Perimeter Security

Deliver →

B2C-scale Experiences



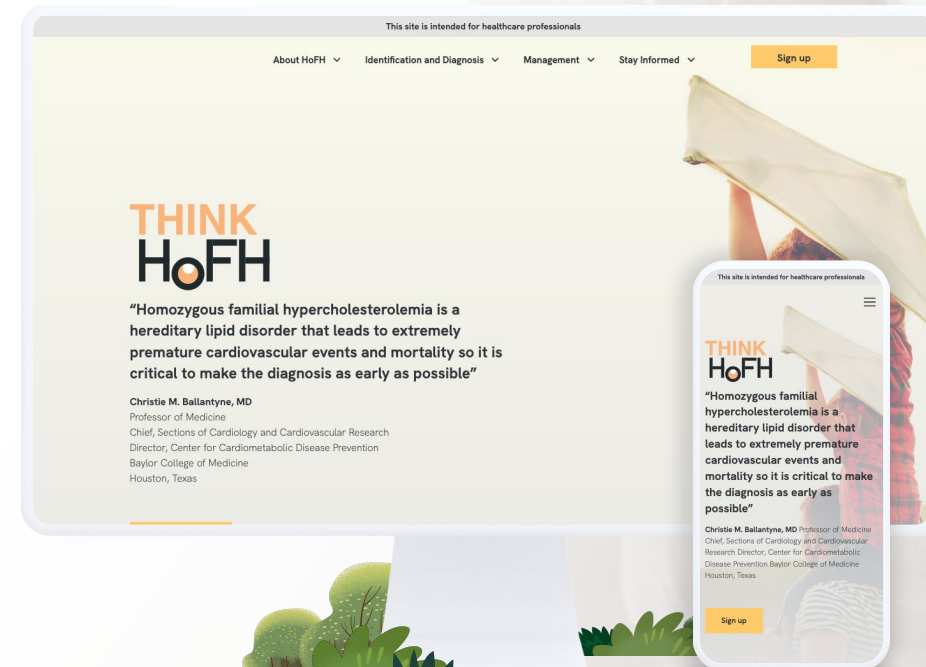
- B2C LWR Sites
- B2B LWR Sites
- B2E LWR Sites

Salesforce Platform

Hyperforce

Impact of SSR with Experience Delivery

Site	Baseline	With Experience Delivery	
Simple Guest Context	1,074 ms	472 ms	56% Faster
Microsite Guest Context	1,501 ms	1,343 ms	11% Faster
Pilot site Guest Context	1,220 ms	520 ms	57% Faster



Adding SSR to LWCs



Preparing your components for Experience Delivery

How to ensure that your components can be SSR'd

Utilize Light DOM or Native Shadow

Both [Light DOM](#) and Native Shadow, via [mixed-mode](#), will make it so that your LWC's can be compiled in Experience Delivery

Make your components portable

DOM APIs are not available on the server. So leverage conditional checks to avoid unnecessary exceptions that result SSR failures.

Test (ESLint, Manual Validation, Einstein)

Depending on how your site is built you may need to modify how your CSS is written. Additionally, we need to ensure that the components are SSR'ing correctly.

Light DOM: <http://sfdc.co/light-dom>

Mixed-mode: <http://sfdc.co/mixed-mode>

Choose a rendering paradigm

salesforce

Light DOM

Same DOM, same styles

The LWCs rendered in Light DOM are rendered without a Shadow DOM, taking advantage of reusing styles and expanded elements tree navigation/querying.

Third party integration

With light DOM, third-party tools can traverse the DOM, enabling standard browser query APIs like `querySelector` and `querySelectorAll`, without traversing the shadow root.

Accessibility

Enables referencing elements IDs cross components using Light DOM as they are not encapsulated.

Native Shadow DOM

Encapsulated Development

Develop within the boundaries you want. Make changes to a subset of components without breaking other parts of your application or customer environments.

Improved Custom Styling

Easily apply custom themes to your application. Native Shadow components will create bespoke pages with the now available `:slotted` and `::part` apis.

Light DOM

myCmp.html

```
<template lwc:render-mode="light">
  <p>Hello World</p>
</template>
```

myCmp.js

```
export default class myCmp
extends LightningElement {
  static renderMode = "light";
}
```

Native Shadow DOM via mixed-mode

myCmp.html

```
<template>
  <p>Hello World</p>
</template>
```

myCmp.js

```
export default class myCmp
extends LightningElement {
  static shadowSupportMode = "any";
}
```


Choose a rendering paradigm

	Shadow DOM	Light DOM
Security	Strong component encapsulation protects components from unauthorized access	Weak encapsulation makes components open to unauthorized access
Portability	Highly portable with access controlled through public APIs	Susceptible to breaking changes caused by component authors or consumers
Styling	Requires CSS custom properties to override styles	Easy to override styles
Third-party library and tool integration	Limited compatibility with third-party libraries or tools requiring DOM traversal or event retargeting	Simple integration with third-party libraries and tools

Making your components portable

work outside of a browser context
(eg: on a server)

The new SSR environment variable

```
export default class App extends LightningElement {
  connectedCallback() {
    if (!import.meta.env.SSR) {
      window.addEventListener('error', (evt) => {
        console.error(`⚠️ Uncaught error: ${evt.message}`);
      });
    }
  }
}
```

Move async methods to rendered callback



```
export default class App extends LightningElement {  
  @api bookId;  
  @wire(getBook, { id: '$bookId' })  
  book;  
}
```



Move async methods to rendered callback



```
export default class App extends LightningElement {  
  renderedCallback() {  
    @api bookId;  
    @wire(getBook, { id: '$bookId' })  
    book;  
  }  
}
```



LWC ESLint tools for automated guidance

no-restricted-browser-globals-during-ssr

Browser APIs must not be accessed when SSR is being done. This rule prevents usage of browser APIs like `DOMParser`, `DocumentFragment` etc. in `connectedCallback` (and in methods called from `connectedCallback` or anywhere when SSR is being done).

no-unsupported-ssr-properties

Browser APIs must not be accessed when SSR is being done. This rule prevents usage of browser APIs like `querySelector`, `dispatchEvent`, on this in `connectedCallback` (and in methods called from `connectedCallback` or anywhere when SSR is being done).

Working with data

the `getPageData` method

Using getPageData hook to SSR data

myCmp.js

```
export default class Cmp extends LightningElement {
  @api label;
}
export async function getPageData() {
  // Returns Greg
  static label = fetch(url)
  return { props: { label } };
}
```



Using getPageData hook to SSR data

myCmp.html

```
<template>  
  <label>{label}</label>  
</template>
```



Using getPageData hook to SSR data

salesforce

Output from SSR

```
<label>Greg</label>
```



Takeaways

How to ensure that your components can be Server Side Rendered

Utilize Light DOM or Native Shadow

Both [Light DOM](#) and Native Shadow, via [mixed-mode](#), will make it so that your LWC's can be compiled in Experience Delivery

Make your components portable

DOM APIs are not available on the server. So leverage conditional checks to avoid unnecessary exceptions that result SSR failures.

Test

Depending on how your site is built you may need to modify how your CSS is written. Additionally, we need to ensure that the components are SSR'ing correctly.

Light DOM: <http://sfdc.co/light-dom>

Mixed-mode: <http://sfdc.co/mixed-mode>

EXPLORER

- JOKES-APP
 - .sfdx
 - config
 - node_modules
 - scripts
 - JS start.js
 - src
 - assets
 - content
 - layouts
 - modules
 - dad
 - app
 - app.css
 - app.html
 - TS app.ts 2
 - data
 - TS data.ts
 - joke
 - menu
 - rating
 - error
 - wires
 - raml
 - serviceWorkers
 - types
 - .eslintrc.cjs
 - .gitignore
 - lerna.json
 - LICENSE
- OUTLINE
- TIMELINE
- RUNNING TASKS

```

src > modules > dad > app > TS app.ts > App > initialize
1  import { LightningElement } from "lwc";
2  import Navigo from "navigo";
3
4  import { getMetadata, getJokes, getJokeById } from "dad/data";
5
6  export default class App extends LightningElement {
7      router = new Navigo("/");
8
9      jokeIds = [];
10     currentJokeIndex = 0;
11     currentJoke: any = null;
12     metadata: any = {};
13
14     constructor() {
15         super();
16
17         this.initialize();
18
19         this.router.on("/jokes/:id", async (url: any) => {
20             this.currentJoke = await getJokeById(url.data.id);
21         });
22     }
23
24     connectedCallback(): void {
25         window.addEventListener("error", (evt) => {
26             console.error("Uncaught error: %s{evt.message}");
27         });
28     }
29
30     async initialize() {
31         this.metadata = await getMetadata();
32         this.jokeIds = await getJokes();
33
34         const [, , jokeId] = document.location.pathname.split("/");
35         this.currentJoke =
36             jokeId && jokeId.length >= 24
37             ? await getJokeById(jokeId)
38             : await getJokeById(this.jokeIds[this.currentJokeIndex]);
39     }
40

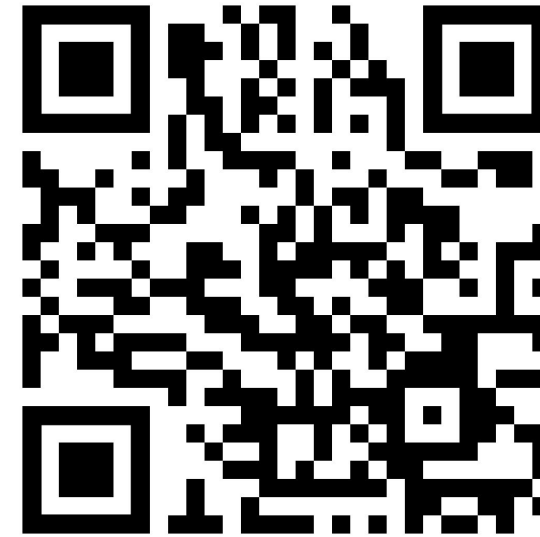
```

Join the Experience Delivery Open Pilot!

Pilot Benefits

- Improved page load performance
- Improved SEO through data freshness
- Ability to provide early feedback to influence Salesforce roadmap

Learn more and apply here



sfdc.co/df23-experience-delivery



Thank you

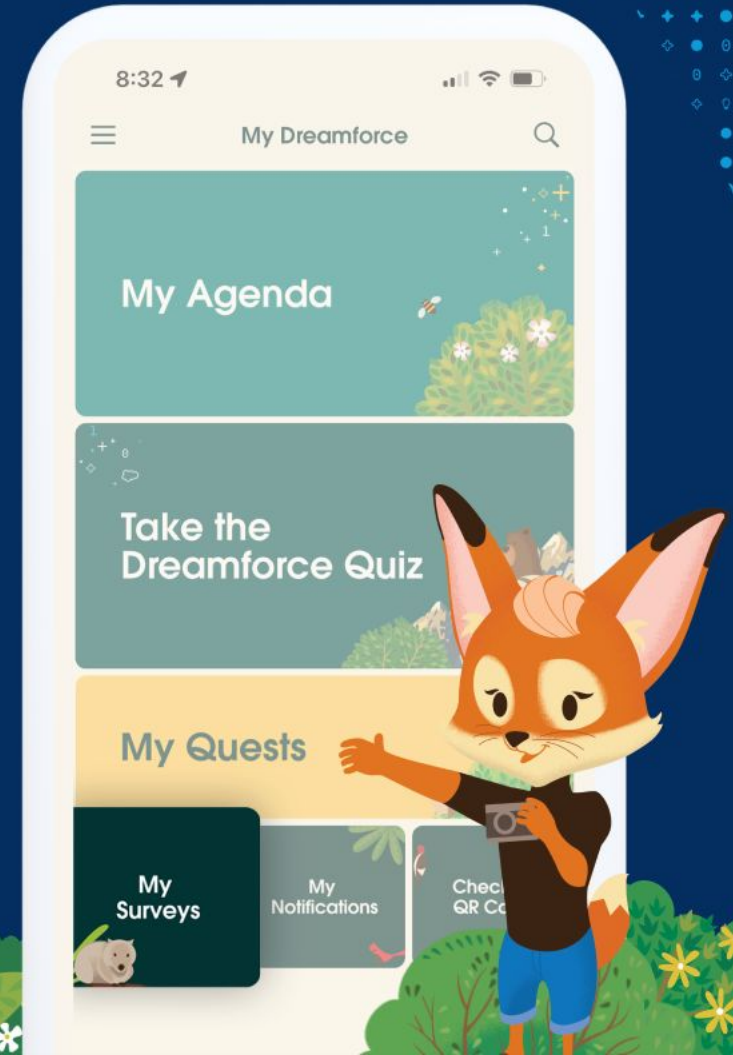


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Visit our Demo Booth Stations in Trailblazer Forest & BrAInforest



PLATFORM PARK

EINSTEIN LOOKOUT

AI LAUNCH ZONE



Lightning App Builder

Compose apps with drag-and-drop tools



Lightning Experience Builder and CMS

Compose consumer grade experiences with clicks



Salesforce Mobile Experiences

Build custom mobile experiences with code and low code



Lightning Web Components

Build reusable UI components with modern web standards



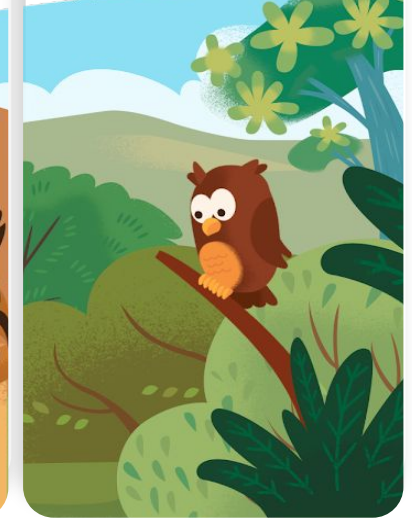
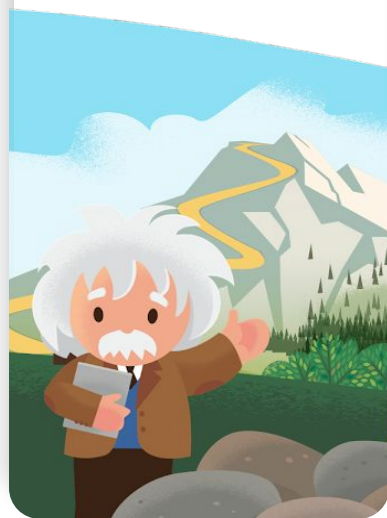
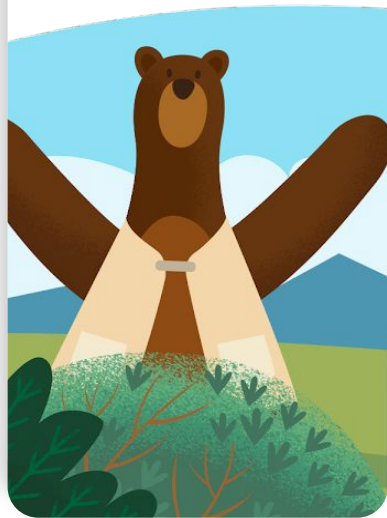
Prompt Builder

Design trusted AI prompts



Prompt Builder

Build, test, and deploy grounded AI prompt



Watch keynotes showcasing these products live at Moscone West 3rd fl and Salesforce+

IT Keynote on Tues Sept 12 at 2:30PM & Admin Keynote on Wed Sept 13 at 11:00AM