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Initial Load
SSR, SSG & Incremental Hydration

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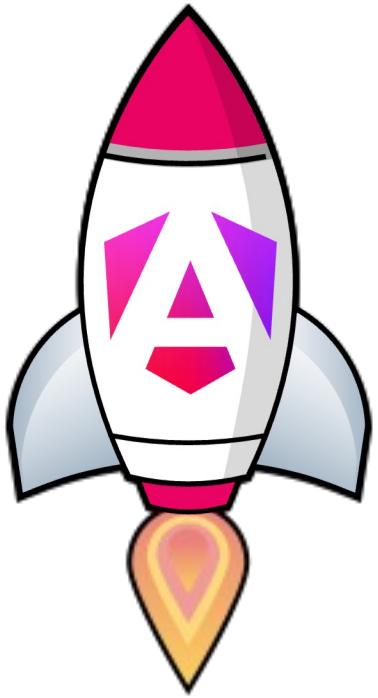
Outline - Initial Load Performance



- Assets & Build
- Lazy Loading & Deferrable Views
- SSR, SSG & Incremental Hydration

SSR & SSG

- Server-Side Rendering (SSR)
- Hydration (NG >= 16)
- Event Replay (NG >= 18)
- Prerendering
- Hybrid Rendering (NG >= 19)
- Incremental Hydration (NG >= 19)

Agenda

Server-Side Rendering (SSR)

Server-Side Rendering (SSR)

- Problem: After download rendering on the client takes too long
  - Search Engines may not be abled to index the App correctly
- Identify: After .js files loaded js main thread takes too lon
  - Search Engines don’t index correctly
- Solution: Use Angular SSR
  - Page is rendered on the server and then served to the client
  - But only useful for public pages (no user login)

Server-Side Rendering (SSR)

- be careful
  - no document (has to be injected)
  - no localStorage / sessionStorage

- wrapper
  - https://taiga-family.github.io/ng-web-apis/common

Demo

SSR

Prerendering (SSG)

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Prerendering (SSG)

- Problem: Server response to slow, page needs to be rendered
- Identify: Long server response time when using Universal SSR
- Solution: Prerender the important pages on the server
  - Built-in Angular Universal since V11
  - Activated by default since V17
- Also works on servers without node.js (e.g. nginx / Apache)!

Demo

SSG

Hybrid Rendering (Angular 19)

- CSR Routes
  - Regular SPA (without SSR)
  - Server serves static files

```
{
  path: 'charts',
  renderMode: RenderMode.Client,
},
```

- SSR Routes
  - Live content + Hydration
  - Express renders the routes

```
{
  path: 'home',
  renderMode: RenderMode.Server,
},
```

- Pre-rendered routes
  - Built time content + Hydration
  - Angular built time rendered

```
{
  path: post',
  renderMode: RenderMode.Prerender,
},
```

Server-Side Rendering (Angular 16)

– New feature called “full application hydration”

Event Replay (Angular 18)

- Problem: *Clicking and interacting with app before hydration*
- Identify: Long server response time when using Universal SSR
- Solution: Event Replay

```
export const appConfig: ApplicationConfig = {
  providers: [
    provideClientHydration(withEventReplay()),
    [...]
  ],
};
```

Incremental Hydration

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Incremental Hydration (Angular 19)

- ergonomic API
  - known from @defer
- improve performance
  - initial load
  - other CWV
- available in v19

```
export const appConfig: ApplicationConfig = {
  providers: [
    provideClientHydration(
      withIncrementalHydration()
    ),
    [...]
  ],
};
```

hydrate on

- hydrate on immediate (default)
- hydrate on viewport
- hydrate on hover
- hydrate on interaction
- hydrate on timer(4200ms)

hydrate when

- specifies an imperative condition as an expression that returns a bool
  - best used: boolean flag

- if the condition returns to false, the swap is not reverted
  - it is a one-time operation

```
…
@defer (hydrate when condition) {
  <aa-lazy-component />
}
…
```

hydrate never

- component will be rendered but will not be hydrated

- means that even if the application is fully loaded on the client side, the defer block will remain static and not become interactive

```
…
@defer (hydrate never) {
  <aa-lazy-component />
}
…
```

Demo

Incremental Hydration

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Alternative to SSR: Use a (URL) cache

Alternative Solution:

- Of course you could also use an alternative caching solution
  - E.g. Cloudflare or any other CDN

SSR & SSG

- Server-Side Rendering (SSR)
- **Hydration** (NG >= 16)
- Event Replay (NG >= 18)
- **Prerendering**
- Hybrid Rendering (NG >= 19)
- **Incremental Hydration** (NG >= 19)

Recap

References

- Angular Architects Blog
  - Server-Side Rendering (Blog series)
- Angular Docs
  - Server-side rendering

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Lab 03 SSR, SSG & Hydration

Server Side Rendering / Prerendering / Incremental Hydration