

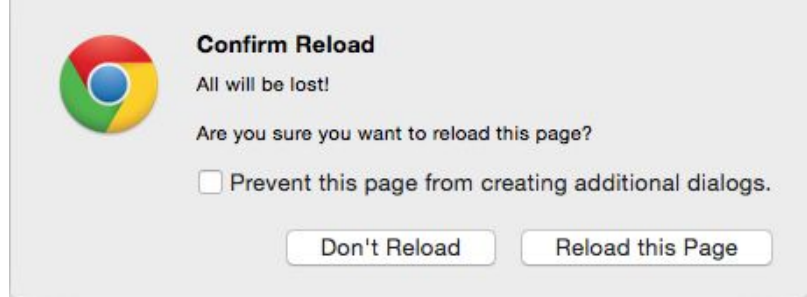
Single Page Applications

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Web Apps and Browsers

- Web apps run in browsers (by definition)
- Users are use to browsing in browsers
 - Browser maintains a history of URLs visited
 - Back button - Go back in history to previous URL
 - Forward button - Go forward in history to next URL
 - Can move to a different page
 - Typing into location bar or forward/back buttons
 - Selecting a bookmarked URL
 - Page refresh operation
- Browser tosses the current JavaScript environment when navigating to a different page
 - Problematic for JavaScript frameworks: URL (and cookies) are the only information preserved

Problem with some web apps



- Initial: pages served from web server
 - Each page had a URL and app switched between pages served by web server
- Early JavaScript apps: Website a single page/URL with the JavaScript

Problem: Restart web app on navigation (Can lose a lot of work!)

```
window.onbeforeunload = function(e) { return 'All will be lost!'; }
```

- Users expect app in browser to do the right thing:
 - Navigate with forward and back buttons, browser page history
 - Navigate away and come back to the app
 - Bookmark a place in the app
 - Copy the URL from the location bar and share it with someone
 - Push the page refresh button on the browser

Changing URL without page refresh

- Can change hash fragment in URL without reload

`http://example.com`

`http://example.com#fragment`

`http://example.com?id=3535`

`http://example.com?id=3535#fragment`

- HTML5 give JavaScript control of page reload
 - Browser History API - `window.history` - Change URL without reloading page

Deep linking

- Concept: the URL should capture the web app's context so that directing the browser to the URL will result the app's execution to that context
 - Bookmarks
 - Sharing
- Context is defined by the user interface designer!
 - Consider: Viewing information of entity and have an edit dialog open
 - Should the link point to the entity view or to the entity & dialog?
 - Does it matter if I'm bookmarking for self or sharing with others?
 - How about navigating away and back or browser refresh?

Deep linking in Single Page Apps

Two approaches:

1. Maintain the app's context state in the URL
 - + Works for browser navigation and refresh
 - + User can copy URL from location bar
2. Provide a share button to generate deep linking URL
 - + Allows user to explicitly fetch a URL based on need
 - + Can keep URL in location bar pretty

Either way web app needs to be able to initialize self from deep linked URL

Ugly URLs

`http://www.example.org/dirmod?sid=789AB8&type=gen&mod=Core+Pages&gid=A6CD4967199`

versus

`http://www.example.org/show/A6CD4967199`

What is that ugly thing in the location bar above my beautiful web application?

`https://www.flickr.com/photos/jarnasen/24593000826/in/explore-2016-01-26/`

ReactJS support for SPA

- ReactJS has no opinion! Need 3rd party module.
- Example: React Router <https://reacttraining.com/react-router/>
 - Idea: Use URL to control conditional rendering
- Various ways of encoding information in URL
 - In fragment part of the URL: [HashRouter](#)
 - Use HTML5 URL handler: [BrowserRouter](#)
- Import as a module:

```
import {HashRouter, Route, Link, Redirect} from 'react-router-dom';
```


Example React Router

```
<HashRouter>
  <div>
    ...
    <Route path="/states" component={States} />
    ...
    <Link to="/states">States</Link>
    ...
  </div>
</HashRouter>
```

- JSX block controlled by URL enclosed in HashRouter
- Route will render the component if URL matches.
- Use Link component to generated hyperlink:

```
<a href="#/states">
  States
</a>
```

Passing parameters with React Router

- Parameter passing in URL

```
<Route  
  path="/Book/:book/ch/:chapter"  
  component={BookChapterComponent}  
>
```

- Parameters put in prop.match of the component
function BookChapterComponent({ match }) {
 return (<div>
 <h3>Book: {match.params.book}</h3>
 <h3>Chapter: {match.params.chapter}</h3>
 </div>);
}

```
<Link to="/Book/Moby/ch/1">  
  Moby  
</Link>
```

Book: Moby

Chapter: 1

Route: `component=`, `render=`, `children=`

- `component={BookChapterComponent}`
 - Mounts components on match (unmounts on URL change)
 - Passes match object with: `params`, `url`, `history`
- `render={props => <BookChapterComponent book={props.match.params.book} chapter={props.match.params.chapter} />}`
 - Calls function with props having match object from above.
 - Doesn't mount/unmount component (does update it)
- `children=` - Like `render=` except is called regardless of the match
 - `match` will be `null` if URL doesn't match
 - Useful if you want to have something always render but only active on matching URL.

Multiple route matches have precedence order: `component`, `render`, `children`

`Switch` is useful with multiple `Route` - Renders the first matching one

Example

SortTab - no Responsive SortTab - Responsive SortTab - Responsive with Scroll

All Columns Records 10 of 49

| ID | Name | Phone | Email | Birthdate | Last Access | Rating | Time | Salary | Score | | |
|----|------------------|----------------|--|------------|-------------------|--------|------|--------------------|--------------|-----------------|-------------|
| 24 | Alexandra Nixon | (402) 644-3488 | neclectu@coris.com | 12/01/1981 | February 25, 2001 | -1 | 41% | \$46,672 | 7.5 | | |
| 17 | Aisa Monroe | (859) 974-4442 | alisa.lla@cam.edu | 02/14/1990 | April 30, 2003 | 6 | 95% | \$103,999 | 5.9 | | |
| 10 | Baker Osborn | (378) 371-0559 | turms.bvlla@ac.edu | 03/29/1970 | July 23, 2005 | -7 | 61% | \$2,868 | 0.1 | | |
| 9 | Caldwell Larson | (850) 562-3177 | all@idolor.com | 07/20/1985 | June 22, 2004 | -3 | 81% | \$63,736 | 7.5 | | |
| 25 | Charissa Manning | (438) 395-9992 | nb.vuats@necon.org | 07/01/1980 | April 02, 2005 | -8 | 11% | \$32,199 | 3.5 | | |
| 48 | Charly Hahn | (395) 200-9188 | ac@Ounous.edu | 08/04/1976 | January 17, 2009 | -2 | 88% | \$3,246 | 5.5 | | |
| 30 | Donan Hodge | (304) 536-8850 | zslars@larrest.org | 08/16/1978 | February 21, 2007 | 6 | 6% | \$28,057 | 0.1 | | |
| 1 | Ezekiel Hart | (627) 536-4760 | torlor@est.ca | 12/02/1962 | March 26, 2009 | -7 | 7% | \$73,229 | 6.9 | | |
| 12 | Fletcher Briggs | (992) 962-9419 | amct.arta@lenous.edu | 08/12/1971 | December 12, 2006 | 7 | 23% | \$142,448 | 8.9 | | |
| 40 | Fritz Benton | (323) 353-2984 | a@damnarc.com | 10/02/1957 | June 16, 2002 | -3 | 2% | \$75,654 | 8.9 | | |
| | | | | | | | | \$3,442,036 | | | |
| | | | | | | | | 0.8 | 44.1% | \$70,246 | 5.19 |

W < > W 1 Entries Per Page Page 1 of 5









What to keep in URL: table length, viewport in table, search box, sort column, etc.
Is it different for bookmark or share? Nav away and back?

Example: Not everything goes in URL

Angular JS Crud Grid
This is a running demo of the Angular JS CRUD Grid I describe in my blog:
Angular JS CRUD Grid
softwarejuancarlos.com

Delete 'Eggs'

Are you sure you want to remove this item?

| | Name | Expire Date |
|---|---------|---|
|   | Milk | Sunday, October 5, 2014 |
|   | Eggs | Sunday, October 5, 2014 |
|   | Steak | 2x 400g Saturday, September 20, 2014 |
|   | Oranges | |