

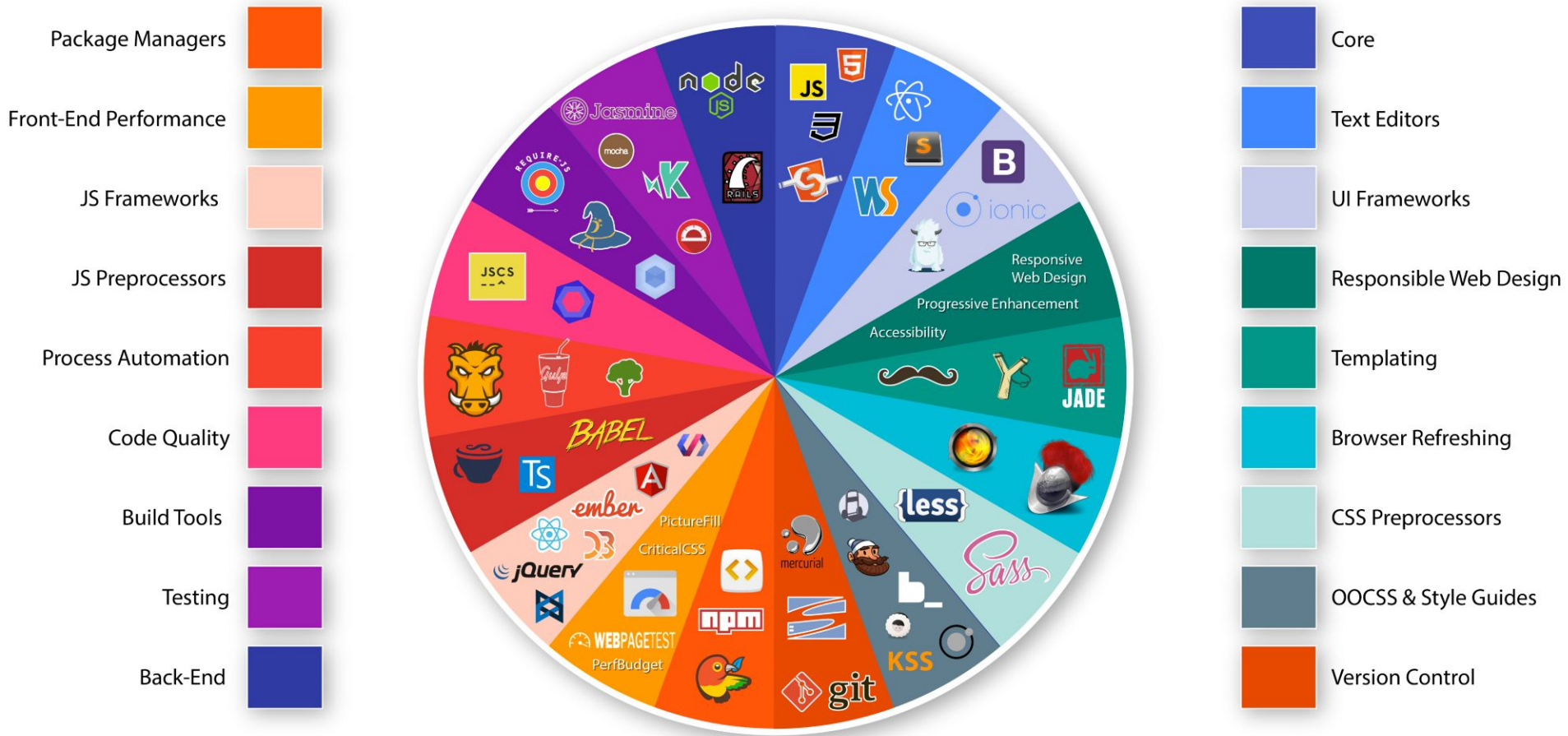
# UI JavaScript Component Architecture

Adam J. Arling

Northwestern University

Northwestern

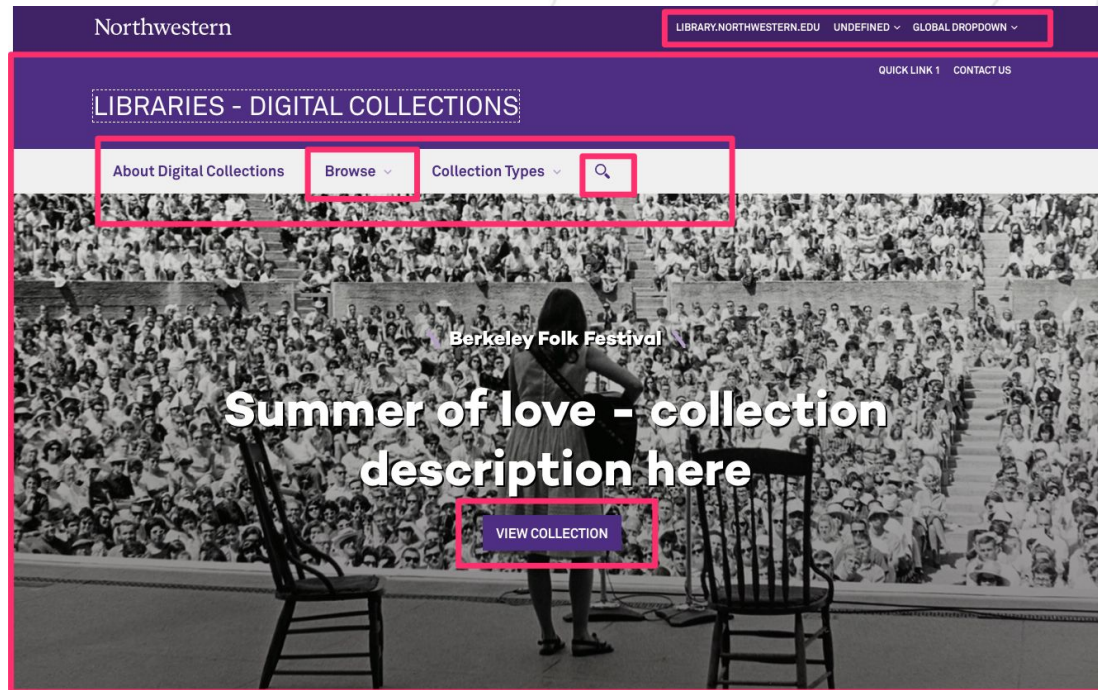
# THE FRONT-END SPECTRUM





**What is a JavaScript / UI  
component?**

# JavaScript components are logical pieces of UI



# What does a component look like?

## Standard HTML Markup

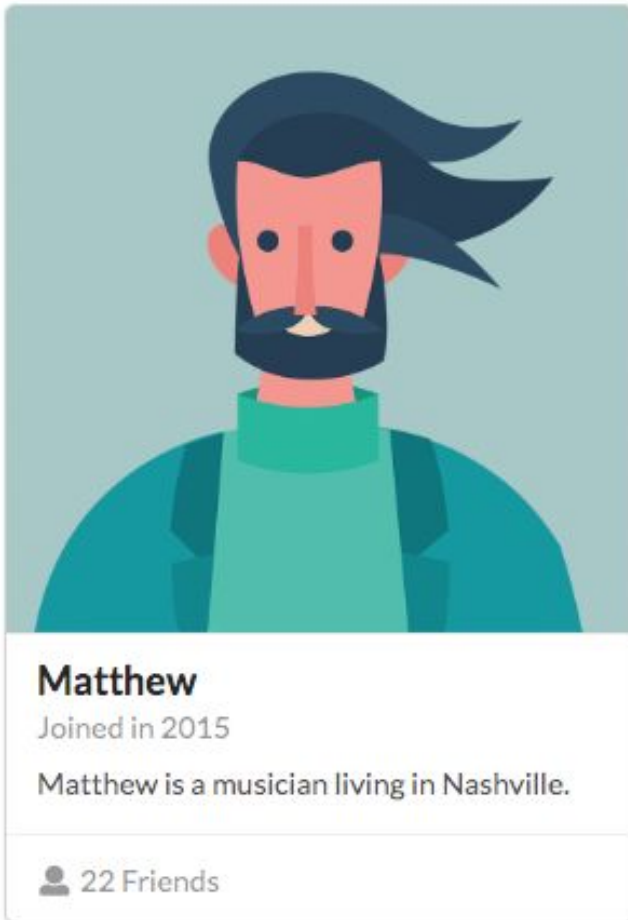
```
<div id="outerContainer" dir="ltr" class="loadingInProgress">
  <!-- Link rel="resource" type="application/vnd-pdf-centerpanel-module/110n/locale.properties"/>-->
  <div id="sidebarContainer">
    <div id="toolbarSidebar">
      <div class="splitToolbarButton toggled">
        <button id="viewThumbnail" class="toolbarButton group toggled" title="Show Thumbnail" tabindex="2">
          <span data-l10n-id="thumbs">
            <span data-l10n-id="thumbs_label">Thumbnails</span>
          </span>
        </button>
        <button id="viewOutline" class="toolbarButton group" title="Show Document Outline" tabindex="3" data-l10n-id="outline">
          <span data-l10n-id="outline_label">Document Outline</span>
        </button>
        <button id="viewAttachments" class="toolbarButton group" title="Show Attachments" tabindex="4">
          <span data-l10n-id="attachments">
            <span data-l10n-id="attachments_label">Attachments</span>
          </span>
        </button>
      </div>
    </div>
    <div id="sidebarContent">
      <div id="thumbnailView">
      </div>
      <div id="outlineView" class="hidden">
      </div>
      <div id="attachmentsView" class="hidden">
      </div>
    </div>
  </div>
  <!-- sidebarContainer -->
  <div id="mainContainer">
    <div class="findbar hidden doorHanger hiddenInitialView" id="findbar">
      <label for="findInput" class="toolbarLabel" data-l10n-id="find_label">Find</label>
      <input id="findInput" class="toolbarField" tabindex="41">
      <div class="splitToolbarButton">
        <button class="toolbarButton findPrevious" title="" id="findPrevious" tabindex="42" data-l10n-id="find_previous">
          <span data-l10n-id="find_previous_label">Previous</span>
        </button>
        <div class="splitToolbarButtonSeparator"></div>
        <button class="toolbarButton findNext" title="" id="findNext" tabindex="43" data-l10n-id="find_next">
          <span data-l10n-id="find_next_label">Next</span>
        </button>
      </div>
      <input type="checkbox" id="findHighlightAll" class="toolbarField">
      <label for="findHighlightAll" class="toolbarLabel" tabindex="44" data-l10n-id="find_highlight">Highlight all</label>
      <input type="checkbox" id="findMatchCase" class="toolbarField">
      <label for="findMatchCase" class="toolbarLabel" tabindex="45" data-l10n-id="find_match_case_label">Match case</label>
      <span id="findReg" class="toolbarLabel"></span>
    </div>
    <!-- findbar -->
    <div id="secondaryToolbar" class="secondaryToolbar hidden doorHangerRight">
      <div id="secondaryToolbarButtonContainer">
        <button id="secondaryPresentationMode" class="secondaryToolbarButton presentationMode visibleLargeView" title="Switch to Presentation Mode" tabindex="19" data-l10n-id="presentation_mode">
          <span data-l10n-id="presentation_mode_label">Presentation Mode</span>
        </button>
        <button id="secondaryOpenFile" class="secondaryToolbarButton openFile visibleLargeView" title="Open File" tabindex="20" data-l10n-id="open_file">
          <span data-l10n-id="open_file_label">Open</span>
        </button>
        <button id="secondaryPrint" class="secondaryToolbarButton print visibleMediumView" title="Print" tabindex="21" data-l10n-id="print">
          <span data-l10n-id="print_label">Print</span>
        </button>
        <button id="secondaryDownload" class="secondaryToolbarButton download visibleMediumView" title="Download" tabindex="22" data-l10n-id="download">
          <span data-l10n-id="download_label">Download</span>
        </button>
        <button id="secondaryViewBookmark" class="secondaryToolbarButton bookmark visibleSmallView" title="Current view"
  </div>
```

## Component Markup

```
<div>
  <Header />
  <Notifications />
  <Nav />
  <GlobalSearchContainer />
  <Switch>
    <Route exact path="/about" component={About} />
    <Route exact path="/contactus" component={ContactUs} />
    <Route exact path="/login" component={Login} />
    <Route
      exact
      path="/collections/:id"
      component={CollectionContainer}
    />
    <Route
      exact
      path="/collections"
      component={AllCollectionsContainer}
    />
    <Route path="/items/:id" component={ItemDetailContainer} />
    <Route path="/items/" component={ItemsContainer} />
    <Route
      path="/reactivesearch/"
      component={ReactiveSearchContainer}
    />
    <Route exact path="/" component={HomePage} />
  </Switch>
  <Footer />
</div>
```

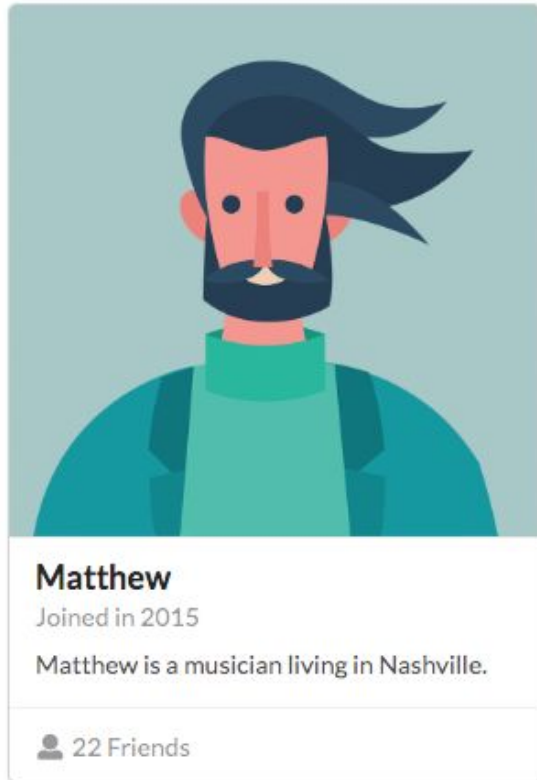


# JS components look like functions

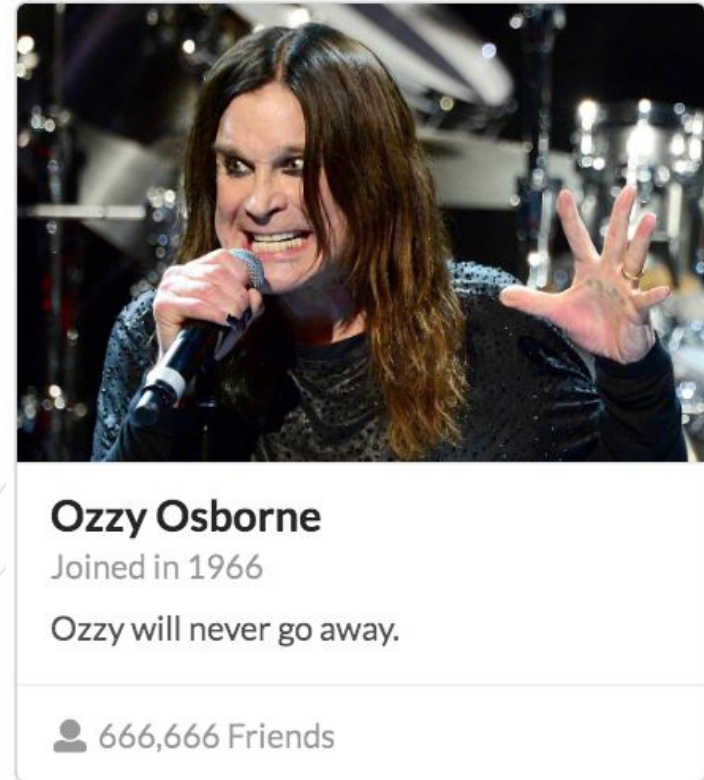


```
1 import React from 'react'
2 import { Card, Icon, Image } from 'semantic-ui-react'
3
4 const CardExampleCard = () => (
5   <Card>
6     <Image src='/images/avatar/large/matthew.png' />
7     <Card.Content>
8       <Card.Header>Matthew</Card.Header>
9       <Card.Meta>
10        <span className='date'>Joined in 2015</span>
11      </Card.Meta>
12      <Card.Description>Matthew is a musician living in Nashville.</Card.Description>
13    </Card.Content>
14    <Card.Content extra>
15      <a>
16        <Icon name='user' />
17        22 Friends
18      </a>
19    </Card.Content>
20  </Card>
21 )
22
23 export default CardExampleCard
24
```

# Components look the same, but different



<CardExampleCard person={Mathew} />



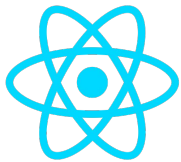
<CardExampleCard person={Ozzy} />

# How to make UI components?

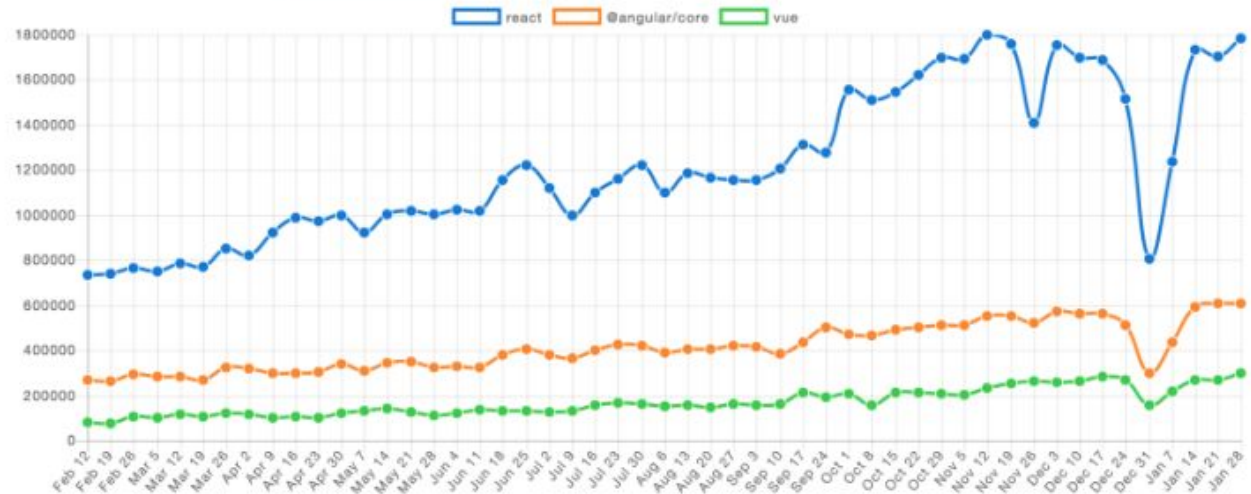




# Popular JavaScript Frameworks



Downloads in past 1 Year



Framework	Jan. 29, 2017	Jan. 28, 2018	Percent change
React	708,421	1,786,699	152.2%
Angular	229,375	609,087	165.5%
Vue	60,283	299,840	397.4% 🚀

# Framework comparison



## React

- Largest ecosystem
- A library
- High rendering performance
- ES 6/7 JavaScript
- "Democratic chaos"
- Backed by Facebook



## Angular

- A framework more than library
- Popular enterprise level choice
- Steep learning curve
- Uses TypeScript instead of JavaScript
- "Dictatorship"
- Backed by Google



## Vue.js

- "Best of both worlds"
- Uses ES5/6/7 JavaScript, or Typescript.
- Light framework.
- Supports it's own libraries (router library, state management library, etc).
- Benchmark speed tests rival React.
- Small file size

# Why use a framework?

**KEEPING THE UI  
IN SYNC  
WITH THE STATE  
IS HARD**



# Why use a framework?

- Reduces the amount of time and efforts required for developing JS based sites and apps.
- Makes time-to-learn shorter for developers
- Makes finding people easier
- Uses vetted, community standards and patterns.
- Access to component libraries

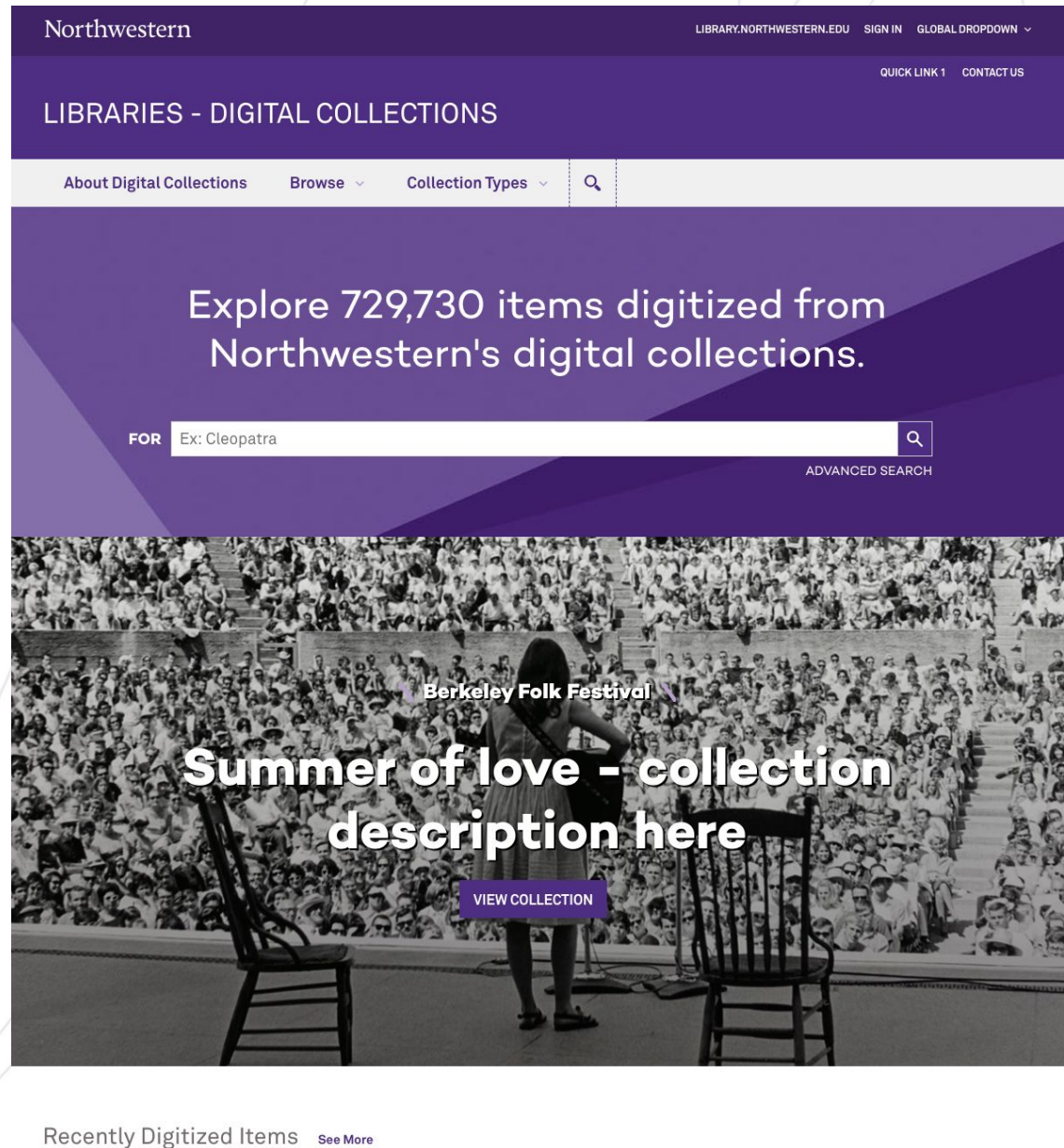
Case Study: Building a green-field UI component application

# **NORTHWESTERN'S DIGITAL COLLECTIONS**



# Northwestern's Digital Collections Discovery Application

- Single page application.
- ReactJS as the JavaScript Library/Framework
- Is a standalone, server-less, front end application.
- Yarn - dependency management.
- Webpack wraps it all up and provides the dev server.



# Step #1: Create HTML version

Northwestern

GLOBAL LINK 1 GLOBAL LINK 2 GLOBAL DROPDOWN ▾


LIBRARIES - DIGITAL COLLECTIONS

QUICK LINK 1 CONTACT US

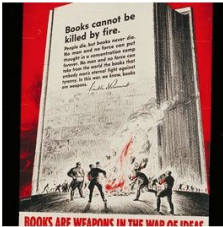
About Digital Collections Browse ▾ Collection Types ▾ 🔍

COLLECTIONS > ALL COLLECTIONS


## All Collections




Digital Image Library  
143 Items




World War II Poster Collection at Northwestern University Library  
143 Items



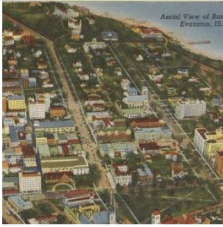
Posters from the Herskovits Library  
143 Items




Hamid Naficy Iranian Movie Posters Collection  
143 Items




Ramón Casas sketchbooks  
143 Items



University Archives Postcards  
143 Items



Alexander Hesler Photograph Collection  
143 Items



Vernon McKay Photographs  
143 Items

# Fast, global search

Explore 729,730 items digitized from  
Northwestern's digital collections.

FOR

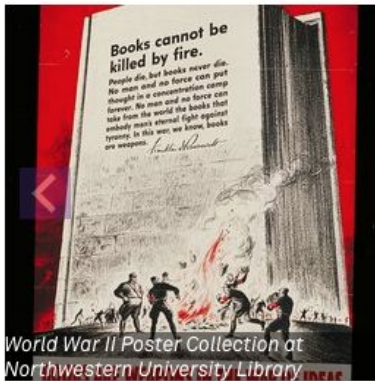
Ex: Cleopatra



ADVANCED SEARCH

# Dynamic image carousels

Recently Digitized and Updated Collections [See More](#)





# In-page faceting/filtering

[About](#) [Filters](#)

### Collection Description

Because photographs are integral to the study of Africa, the Melville J. Herskovits Library of African Studies includes photographs in its collections and is committed to making them available for scholarly research and curricular support. In December 2002, the Herskovits Library acquired the Humphrey Winterton Collection of East African photographs.

### Dates / Origin

- [Date Created:](#)
- [Circa 1916 \(Approximate\)](#)

### Library Locations

- [Northwestern University Transportation Library](#)

### Subjects

- [Wilmo Company](#)
- [Automobiles](#)
- [Parts](#)
- [Commercial catalogs](#)
- [Automobile factories](#)

### Work Types

- [Photographs](#)

COLLECTIONS > THE HUMPHREY WINTERTON COLLECTION OF EAST AFRICAN PHOTOGRAPHS: 1860-1960

## The Humphrey Winterton Collection of East African Photographs: 1860-1960



[Mrs. Flad](#)

Access to this image has been restricted due to its sensitive nature.

Please contact  
[africana@northwestern.edu](mailto:africana@northwestern.edu)  
for information about access.

[Young African woman with trees in background](#)

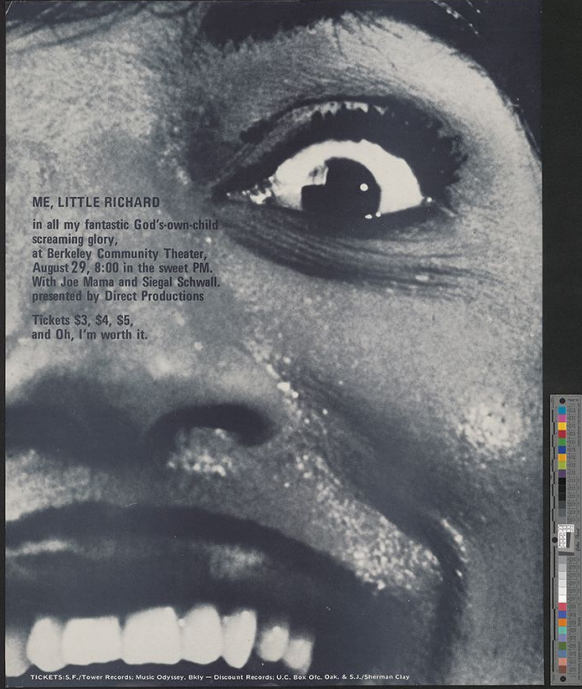
Access to this image has been restricted due to its sensitive nature.

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[africana@northwestern.edu](mailto:africana@northwestern.edu)  
for information about access.

[Nude African woman seated on a rock](#)



# Fast discovery



ME, LITTLE RICHARD  
in all my fantastic God's-own-child  
screaming glory,  
at Berkeley Community Theater,  
August 29, 8:00 in the sweet PM.  
With Joe Mama and Siegal Schwall,  
presented by Direct Productions

Tickets \$3, \$4, \$5,  
and Oh, I'm worth it.

TICKETS: S.F.: Tower Records; Music Odyssey, Bkly — Discount Records; U.C. Box Ofc. Oak. & S.F.: Sherman Clay

Zoom Rotate Print

**Item Title Goes Here**

Maybe put the description of the object here? It seems like it would be nice and upfront

Creator  
Person Name

Type of Resource  
still image

MORE DETAILS CITE THIS ITEM

Image ID  
1705067

Permalink  
<https://digitalcollection>

Download Options  
300px 760px

Twitter Facebook Pinterest

^

# Step #2: HTML to ReactJS

## Northwestern Global Marketing Pattern Library

## Digital Collections React application components

### Getting Started

#### Building a new Northwestern University website?

Use the Pattern Library for guidance regarding our Departmental Templates.

#### What is a pattern library?

A Pattern Library displays the page types and design elements that comprise Department Templates, including:

- Full-width pages
- Left navigation pages
- Headers and footers
- Web fonts
- Form fields

#### Using this site

Use this site to access code and see examples for using the page types and design elements effectively.

- Styles for headers, lists and WYSIWYG features
- Design elements for full-width pages
- Design elements for left navigation pages
- Dropdown navigation menu options
- Change log

#### Related tools

When building Northwestern sites, visit the following websites for additional information and files:

- Brand Tools website for branding guidance, and files for departmental lookups and other graphics
- Github for department template code
- Web Communications website for developer tools, including Search help and Cascade documentation

Northwestern  
University

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Contact Northwestern University

Office of Web Communications  
1603 Orrington Avenue, 2nd Floor  
Evanston, IL 60201

webcomm-support@northwestern.edu

Social Media



Parking

Maps

Shuttles

Directory

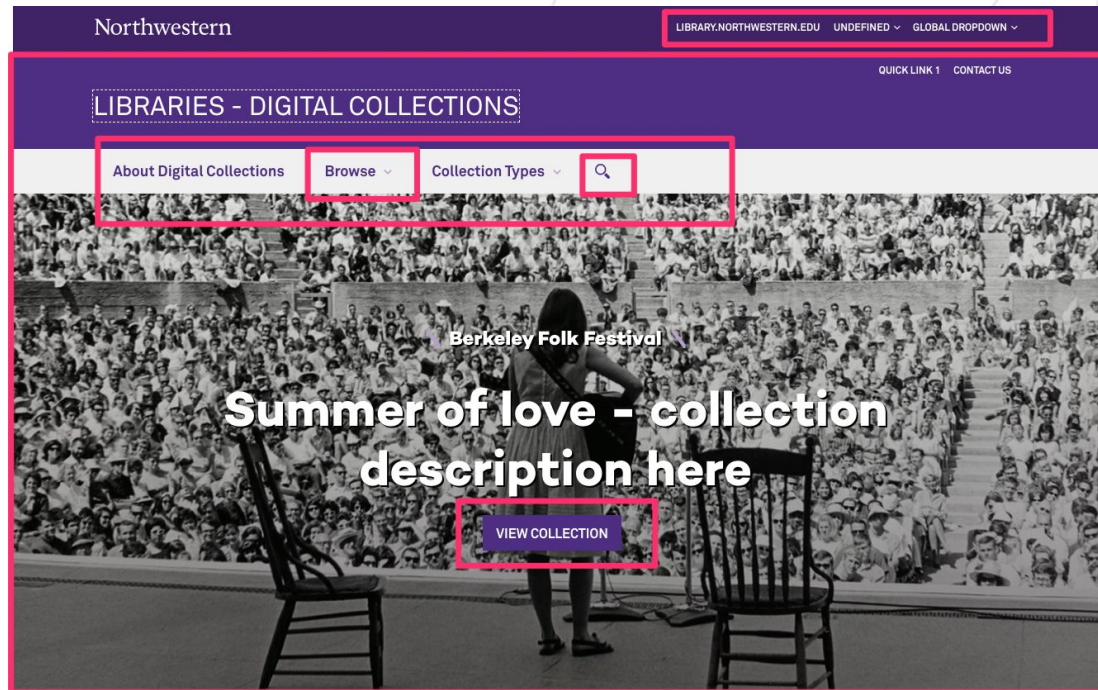
Bookstore



```
HomePage.js — next-gen-front-end-react
JS ItemDetailContainer.js JS HomePage.js x JS elasticsearch-parser.js JS UniversalViewerContainer.js JS embed.js

1 import React, { Component } from 'react';
2 import HeroSection from '../components/Home/HeroSection';
3 import CarouselSection from '../components/CarouselSection';
4 import HeroSecondarySection from '../components/Home/HeroSecondarySection';
5 import { heroData } from '../api/heros';
6 import { heroSecondaryData } from '../api/heros';
7 import { connect } from 'react-redux';
8 import { fetchCarouselItems, CAROUSELS } from '../actions/carousels';
9
10 export class HomePage extends Component {
11   constructor(props) {
12     super(props);
13
14     // Carousel collections defined by collection keyword
15     // ///////////////////////////////////////////////////////////////////
16     this.carouselByKeyword = [
17       'Posters',
18       'Photography',
19       'Berkeley Folk Music Festival'
20     ];
21   }
22
23   componentDidMount() {
24     // Dispatch redux thunk action creators to grab async api data
25     this.props.fetchCarouselItems(CAROUSELS.RECENTLY_DIGITIZED_ITEMS);
26     this.props.fetchCarouselItems(CAROUSELS.RECENTLY_DIGITIZED_COLLECTIONS);
27     this.carouselByKeyword.forEach(title =>
28       this.props.fetchCarouselItems(title)
29     );
30   }
31
32   createAdditionalCarousels() {
33     const { carousels } = this.props;
34
35     return this.carouselByKeyword.map(keyword => {
36       const keywordCarousel = carousels[keyword];
37
38       if (keywordCarousel && keywordCarousel.items.length > 0) {
39         return (
40           <CarouselSection
```

# Identify components to create



# Identify components to create

## Pulcinella "tiepolano"

One of the great masks of Commedia dell'Arte, Pulcinella – from pulcino, chick and pollastrello, cockerel – is the most important zanni form the southern regions of Italy. Beyond being a great comic protagonist ever since his origin in the early seventeenth century, he is also the most important reference point for observing and understanding the historical survival of improvised comedy.

**Creators**  
Fava, Antonio, 1949-

[MORE DETAILS](#) [CITE THIS ITEM](#)

**Identifier**  
65b4adc9-818e-46d3-a313-90ba0d2ea6e2

**Permalink**  
ark:/99999/fk41k0mq59



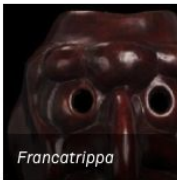


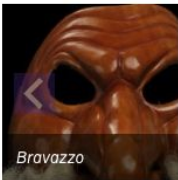
**Download Options**  
300px 760px

[f](#) [t](#) [p](#)

## Library Division and Collections with this Item:

Library Division

Charles Deering McCormick Library of Special Collections [See More](#)





# Generic components first

MORE DETAILS

```
<NUButton displayText="More Details"  
onClick="/more-details" />
```

Recently Digitized and Updated Collections [See More](#)



```
<CollectionCarousel items={carouselItems}  
carouselTitle="Recently Digitized and Updated  
Collections" />
```



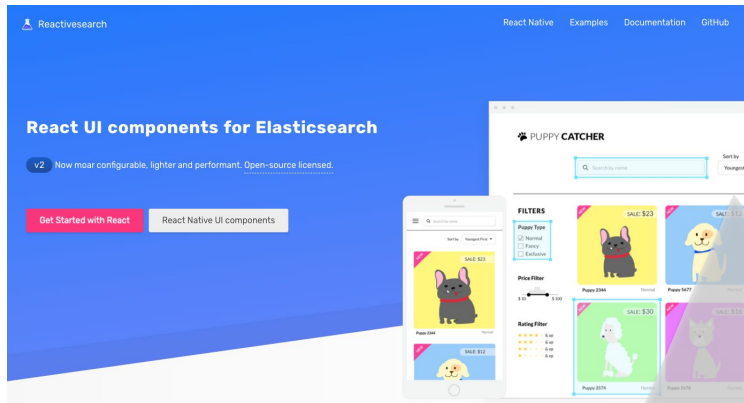


# Benefits...

## Generic UI component benefits:

- Minimize code duplication
- Keep implementation mistakes to a minimum.
- Make design decisions once.

# Using third-party components



[About](#)[Filters](#)

**Collection Description**

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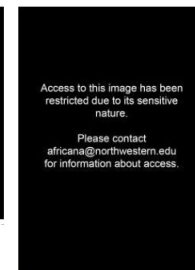
- [Photographs](#)

[COLLECTIONS](#) > [THE HUMPHREY WINTERTON COLLECTION OF EAST AFRICAN PHOTOGRAPHS: 1860-1960](#)

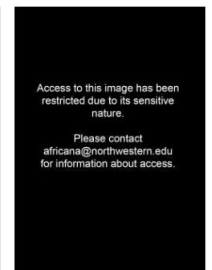
## The Humphrey Winterton Collection of East African Photographs: 1860-1960



[Mrs. Flad](#)

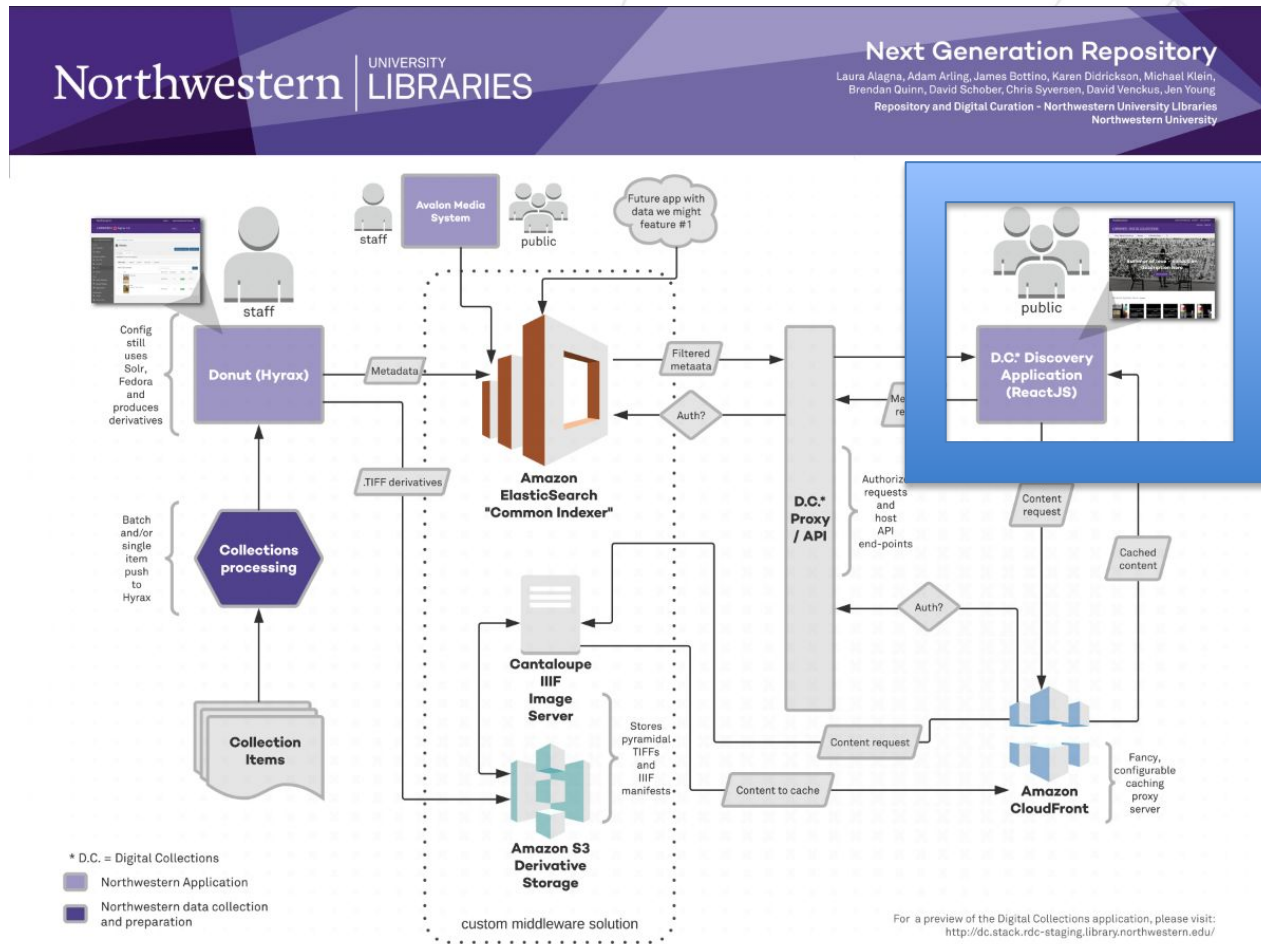


[Young African woman with trees in background](#)



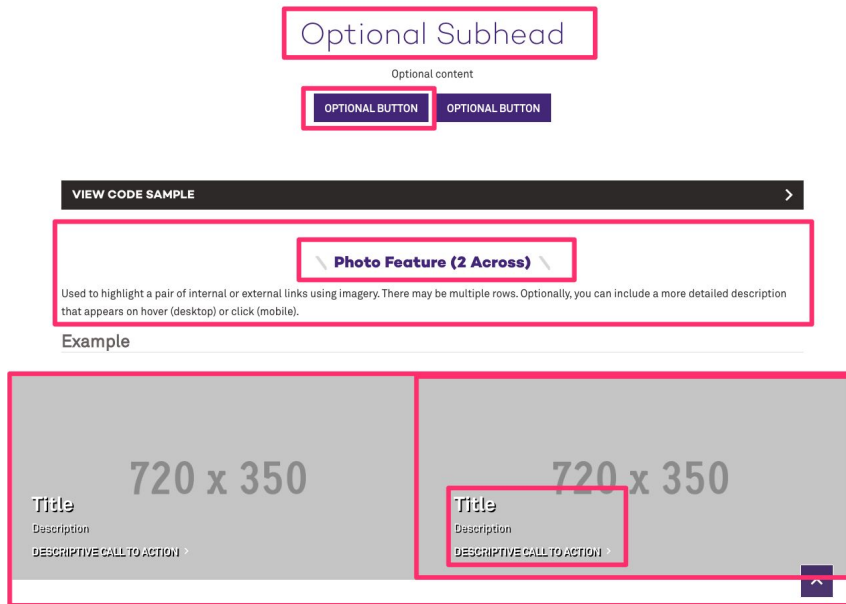
[Nude African woman seated on a rock](#)

# Next Generation Repository

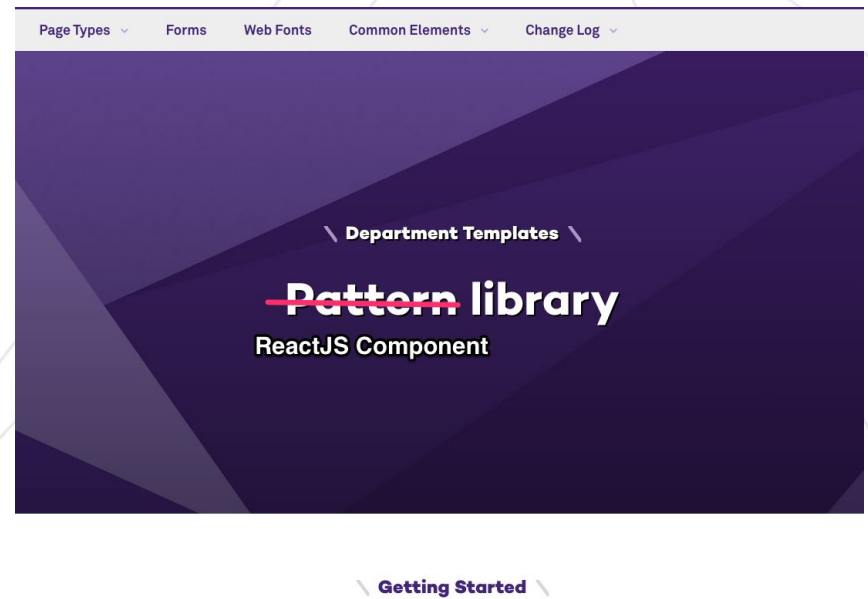


# Build an internal Northwestern React component library?

React components one developer has created...



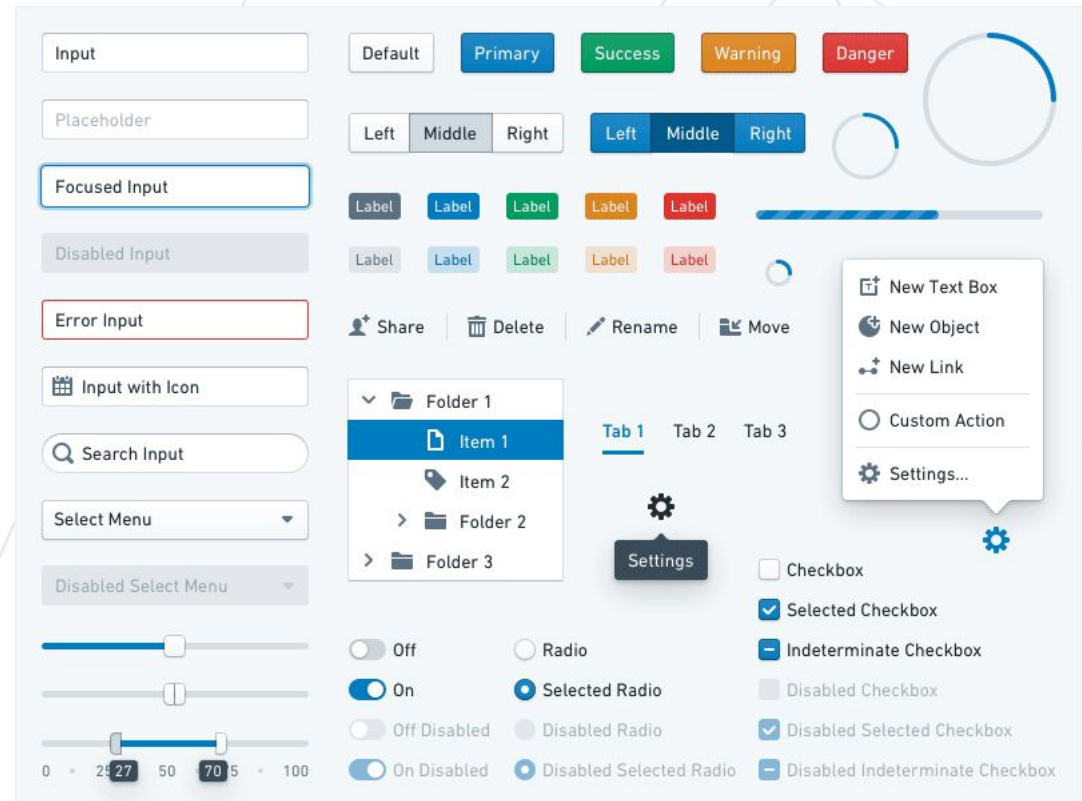
Become React components any Northwestern developer can now use.



Building a new Northwestern University website?

# What is a component library?

- Cloud-based folder of designed/styled parts of a website or piece of software.
- Helps developers work in a consistent manner.
- Very time efficient.
- Follows **Atomic Design** principles.







samvera™

# Why use a component library?

- Move fast



samvera™

# Why use a component library?

- Move fast
- Enforce consistency



samvera™

# Why use a component library?

- Move fast
- Enforce consistency
- Improve performance



samvera™

# Why use a component library?

- Move fast
- Enforce consistency
- Improve performance
- **Less maintenance**



samvera™

# Why use a component library?

- Move fast
- Enforce consistency
- Improve performance
- Less maintenance
- Easier updates later



samvera™

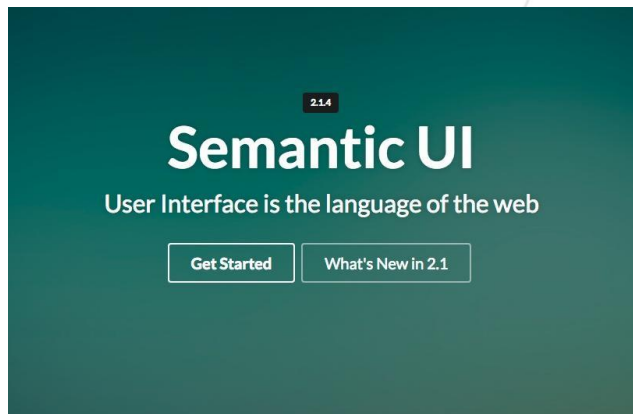
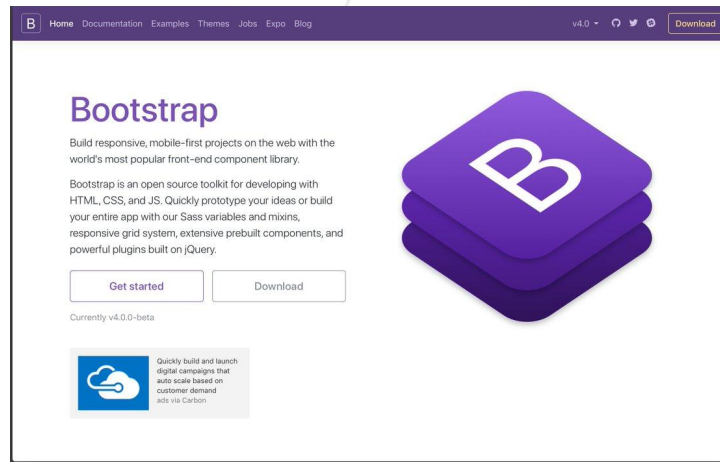
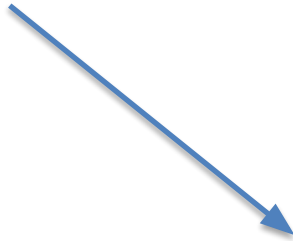
# Why use a component library?

- Move fast
- Enforce consistency
- Improve performance
- Less maintenance
- Easier updates later
- **Low investment**





# UI Component libraries to the rescue.



# Final Thoughts

- Now is an excellent time for the Samvera community to consider adopting JavaScript UI component development.
- UI component architecture patterns are evolving in all the right ways.
- It's crucial for Samvera's stature and adoption, to present it's flagship applications as cutting-edge, modern user experiences.