

Javascript practices – old and new

Dark age ended like 5 years ago

Agenda

History of Javascript - the old way

New goodies in Javascript - the new way

Design system

Project setup

New vs old

```
class Something {  
  
    constructor(logMeIn) {  
        this.logMe = logMeIn;  
    }  
    method = () => {  
        console.log(this?.logMe || 'I am method!')  
    }  
  
    const firstStuff = new Something();  
    const secondStuff = new Something('I like trains');  
  
    firstStuff.method();  
    secondStuff.method();
```

```
1 "use strict";  
2  
3 function _instanceof(left, right) { if (right != null && typeof  
Symbol !== "undefined" && right[Symbol.hasInstance]) { return  
!!right[Symbol.hasInstance](left); } else { return left instanceof  
right; } }  
4  
5 function _classCallCheck(instance, Constructor) { if  
(!_instanceof(instance, Constructor)) { throw new TypeError("Cannot  
call a class as a function"); } }  
6  
7 function _defineProperty(obj, key, value) { if (key in obj) {  
Object.defineProperty(obj, key, { value: value, enumerable: true,  
configurable: true, writable: true }); } else { obj[key] = value; }  
return obj; }  
8  
9 var Something = function Something(logMeIn) {  
10     var _this = this;  
11  
12     _classCallCheck(this, Something);  
13  
14     _defineProperty(this, "method", function () {  
15         console.log(_this === null || _this === void 0 ? void 0 :  
_this.logMe) || 'I am method!');  
16     });  
17  
18     this.logMe = logMeIn;  
19 };  
20  
21 var firstStuff = new Something();  
22 var secondStuff = new Something('I like trains');  
23 firstStuff.method();  
24 secondStuff.method();
```

New is always better!

```
class Something {  
  
  constructor(logMeIn) {  
    this.logMe = logMeIn;  
  }  
  method = () => {  
    console.log(this?.logMe || 'I am method!')  
  }  
}  
  
const firstStuff = new Something();  
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```
1 "use strict";  
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New is always better

```
_this.logMe) || 'I am method!');  
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```

jQuery

- Easy to understand wrapper around JavaScript
- In its prime, it was the most used JavaScript library
- People could program in jQuery, not JavaScript
- To this date, for many people it is still a go to library when they need some quick prototype
- With the evolution of the language "\$" is becoming obsolete
- And here is why:

```
$(el).fadeIn();
```

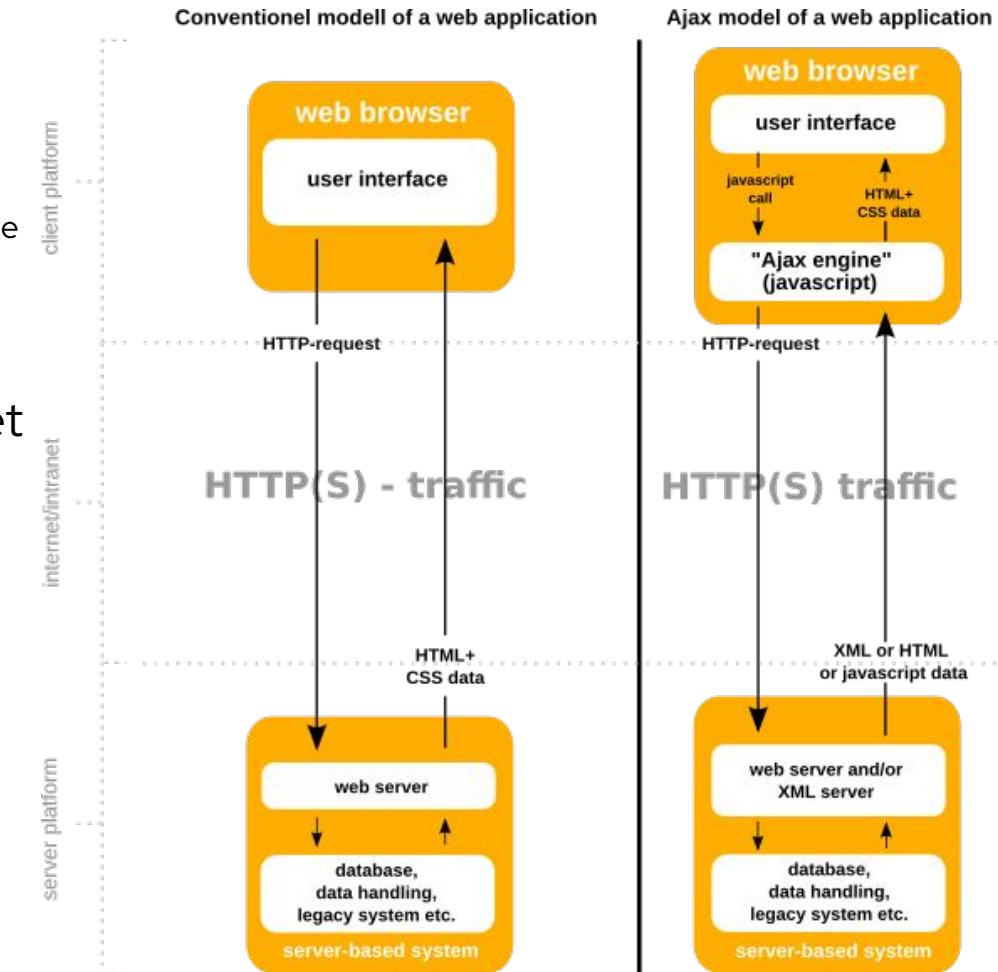


```
el.classList.add('show');
el.classList.remove('hide');

.show {
  transition: opacity 400ms;
}
.hide {
  opacity: 0;
}
```

Ajax (Asynchronous JavaScript and XML)

- Also known as XHR (XMLHttpRequest)
- At first used to exchange XML documents (Extensible Markup Language)
- Asynchronously exchange data with server
- No longer needed to reload entire page just to get the data
- Need for clever way how to identify user
- Polling was used to update data on the fly



Single session

- User logs in and is given a specific ID on server called session ID
- User performs asynchronous operations
- Once user is done, browser is closed and server resources are cleaned
- Resources consuming
- User has to log in every time new browser is opened (if application allows that)
- Session hijacking (no need to know the password, just listen on specific events and get the session ID)

Variables and their scoping – old and new

- Global - var
 - Variable leaking
 - Variable overriding
- Local scope - let and const (new way)
 - Let - can be changes, meaning its data type and value can be changed
 - Const - can't be changed, meaning its data type can't be changed but inner value can

```
const myVariable = 'hello';
// error!
myVariable = 'something';

const otherVar = { foo:
  'bar' };
// correct!
otherVar.foo = 'baz';
```

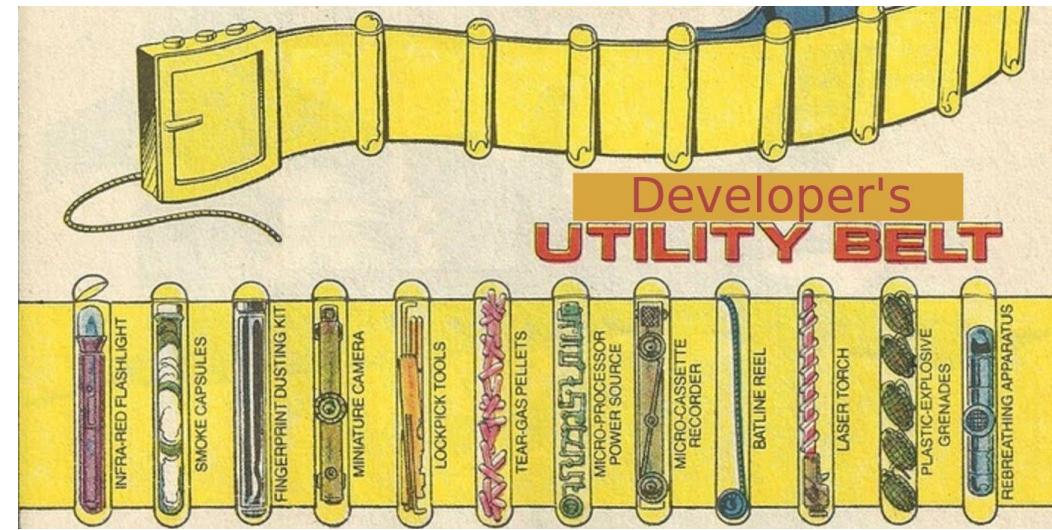
Internet explorer was the master

- First there was Netscape
- Internet explorer followed and gained a lot of traction because they were improving browser API and were the leading giants
- IE used to have some quirks in order to support their paid customers and these changes were not adopted by other browsers because they were not standardized
- Firefox was at that time heavily improving standards and adopting them
- Opera and Chrome followed
- Now Chrome has the leading (58.1%) followed by Safari (13.0%) with IE and Edge on third place (12.9%)



Lodash and underscore

- Libraries consisting of helper functions - kinda like batman's utility belt
- Fast and reliable
- Lodash started as fork of underscore
- Really nice clean and efficient code
- Functions can be chained together
- Not really needed anymore since browser API adopted many functions



Callback hell

- A way how to execute some code after asynchronous action happened
- Chain functions together
- Choose function based on some conditions

```
// First, we must get user by id
CallEndpoint("api/getidbyusername/hotcakes", function(result) {
    CallEndpoint("api/getfollowersbyid/" + result.userID, function(result) {
        CallEndpoint("api/someothercall/" + result.followers, function(result) {
            CallEndpoint("api/someothercall/" + result, function(result) {
                CallEndpoint("api/someothercall/" + result, function(result) {
                    // Ahhhhhh... but you didn't believe you'd end up here
                });
            });
        });
    });
});
}); // Always use semicolons; at work and at home.
```

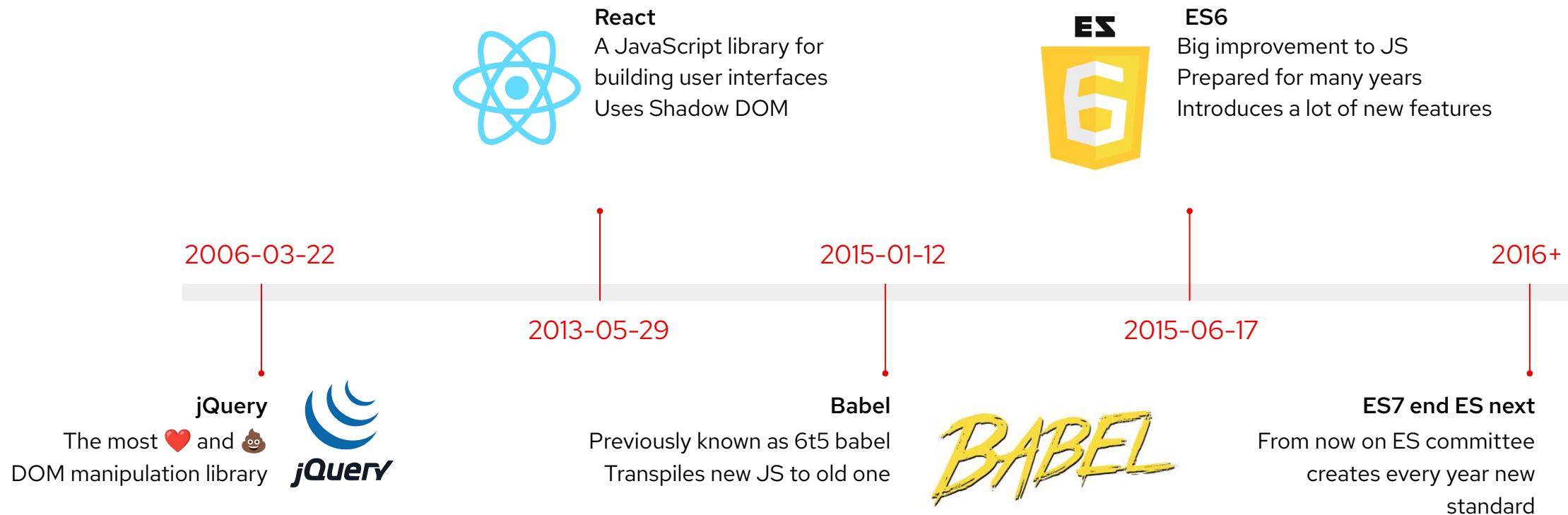
Callback hell

- A way how to execute some code after asynchronous action happened
- Chain functions together
- Choose function

```
// First, we make a call to an endpoint
CallEndpoint("https://api.dog.ceo/breeds/list/all")
  .then(data =>
    CallEndpoint(`https://api.dog.ceo/breeds/${data.message[0]}/info`)
      .then(data =>
        CallEndpoint(`https://api.dog.ceo/breeds/${data.message[0]}/image`)
          .then(data =>
            console.log(`The ${data.message[0]} dog's name is ${data.message[1]}`));
      );
    );
  );
}); // Always use semicolons; at work and at home.
```



Out with the old, in with the new



Transpilers

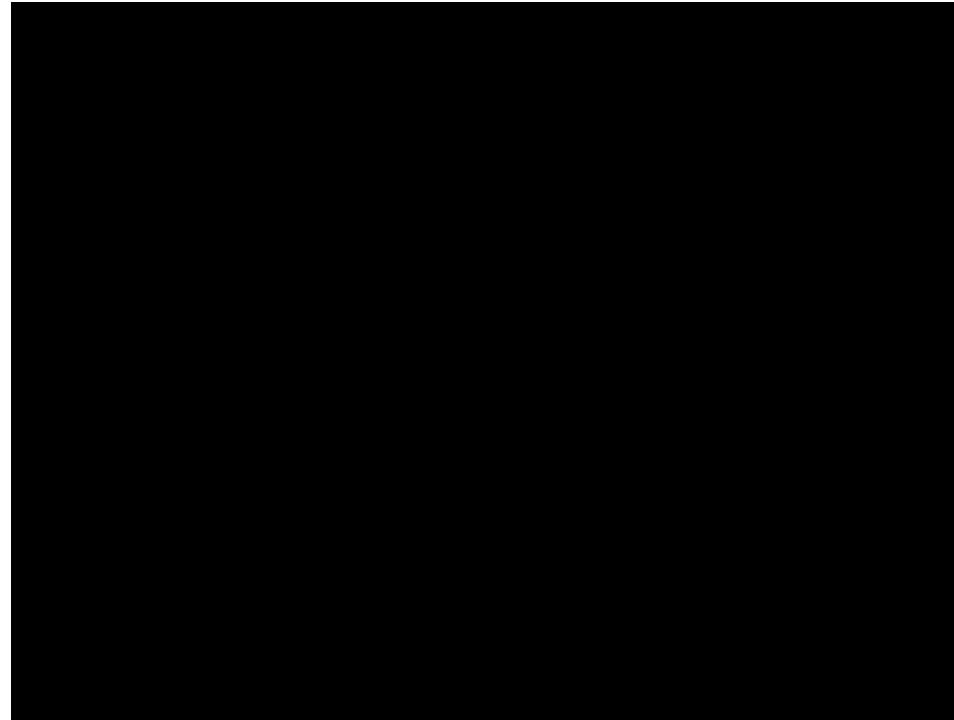
- Transpiler is a tool, that takes a code written in one language and transforms it into a different language (or different version in some cases)
- Due to browser backwards compatibility we can't just use the latest features of JS. They would not work.
- Code has to be transformed into something browsers understand
- There are also many variations of the language that will never be supported in browsers. Yet we want to use them.
 - JSX
 - Typescript
- JS is becoming more and more compiled language
- Many speak of an "Age of a Transpilers"

Transpilers

- Transpilers take a code written in one language and convert it to another language (or different version of the same language)
- Due to browser backends compatibility, we can't just use the latest features of the language. They would not work.
- Code is often transformed into something thinner, users demand smaller files.
- They also make use of the language that can be supported by browsers. You might want to use them for JSX, Typescript, etc.
- Coming more and more compiled language
- Many speak of an "Age of a Transpilers"

Type checkers

- Typechecker is a tool to help developers keep code stable by introducing types
- Since many languages (JavaScript included) have no types it can be hard to do complex features



Type checkers - Typescript

- > TypeScript is a strongly typed programming language that builds on JavaScript, giving you better tooling at any scale.
- Created by Microsoft, very similar to c#
- First introduction to classes - JavaScript has no understanding of classes, even new classes are just syntax sugar
 - Adds option to private and public properties
- Generic types
 - Really powerful, but hard to understand
- Type checking when building your application

Type checkers - Flow

- > FLOW IS A STATIC TYPE CHECKER FOR JAVASCRIPT
- Created by Facebook
- Does not include transpiler
- Focus more on functional programming
- Direct React support
- Checks your code for errors through static type annotations

JS is slowly moving towards functional programming

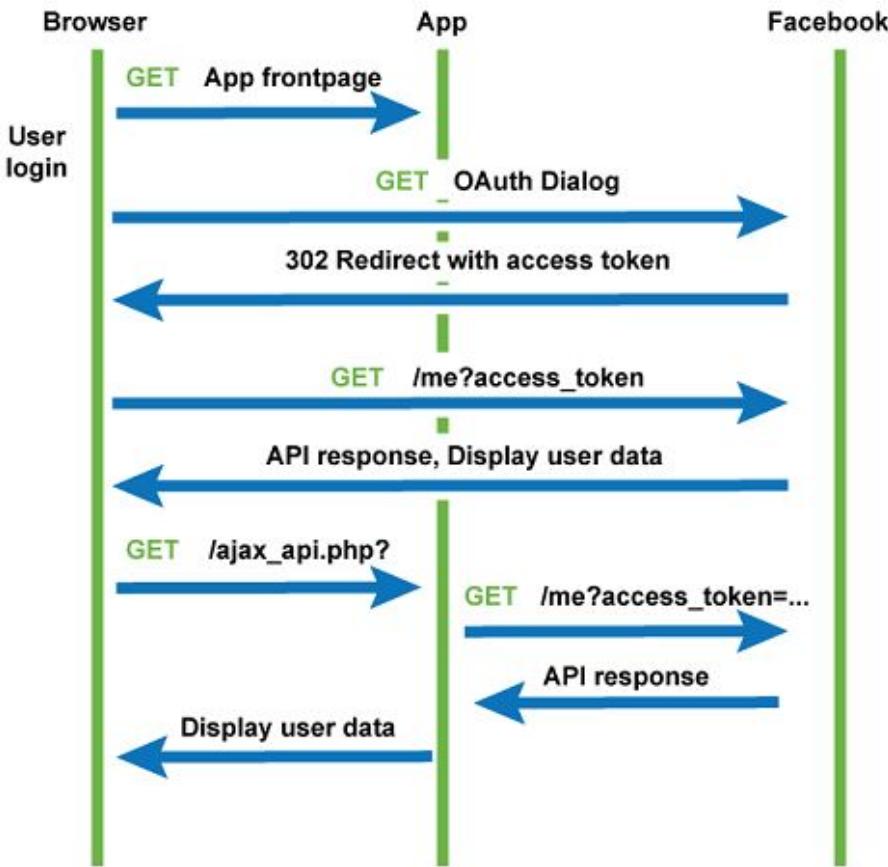
- With a release of ES6 (ES2015) JS specification the language drastically shifted towards functional programming
- Introduction of lambda functions, many many new prototype functions
 - Prototypes (Array, Object, Map, Set, ...) received a huge upgrade when it comes to natively supported functions which were previously only possible thanks to certain libraries. (Map, Reduce, Entries, ...)
- There are whole frameworks based on FP and shifting away from OOP
- There are also many JS extensions which are based entirely upon FP
 - [RxJS](#), [CircleJS](#), [LodashFP](#), [Ramda](#)
- Can fully replace Objects with closures and composition

Although there are some who don't like this that much



Single sign on/out

- Transfers the need of tracking the log-in state from server to browser
- Better user experience - no need to log in for each application
- Allows you to login with social media and other providers
- Allows user to automatically log out of all devices if there are some suspicions
- Uses JWT and Oauth 2
- JWT - header, payload and signature
- Oauth 2 - protocol for authorization
- Multiple services to take care of for us
 - [Keycloak](#), [Auth0](#)



Improved Browser API

- Browsers (not IE) have transformed significantly in a past few years
- Most of them are actually following and keeping up with ECMA (Javascript) specifications
- Many JS utility libraries are becoming obsolete because browser support is getting better and better
- Browsers support I18N (Internationalization and localization) natively
- And many more
 - Browser plugins
 - Security
 - Performance
 - Debugging tools

Build tools - module based codebase

- Script tags are the history, now you need only one and the rest will be loaded on demand
- Move from CommonJS to MJS
 - You can now actually reference a different module from JS file in a browser?!. (import/export)
- We no longer need global variables everywhere
- JS is sadly becoming compiled language (Thanks IE)
- Thanks to modules, code splitting is becoming really simple and easy
 - Scripts are no longer loaded all at once
 - They can be loaded on demand
 - Huge performance and also UX improvements



Dependency headache

- Thanks to the explosion of JS in recent years, your bundles will have thousands of external dependencies
- Libraries depend on libraries which depend on libraries of libraries
- After installing React, ReactDOM and Patternfly you will have over 100 external dependencies
- At larger scale, any breaking change to a single dependency may cause the whole project collapse and requires extreme caution
- Any upgrade must be considered and planned and will likely require tons of refactoring
- **YOU DON'T NEED LIBRARY FOR EVERYTHING**
- Some libraries has become so popular that everybody uses them and you can end up with multiple copies of the same code but in different versions

Npm vs yarn

NPM

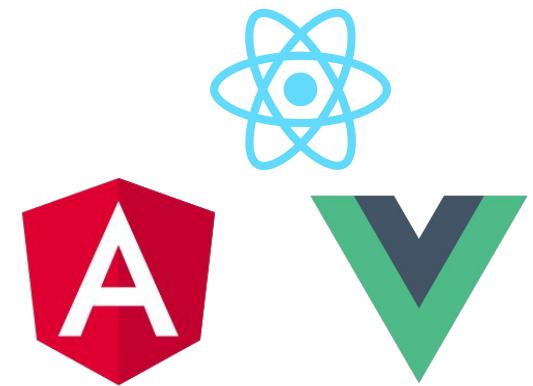
- Created by google
- Included by default with node
- Finally supports monorepo (since version 7)
- Hosts over 1.3 mil of packages
- Option to audit your packages

Yarn

- Created by facebook
- First introduction of lock file
- First introduction of monorepo
- Mirror of all npm packages
- Yarn 2.0 adds plg'n'play - option to minimize download of packages on install

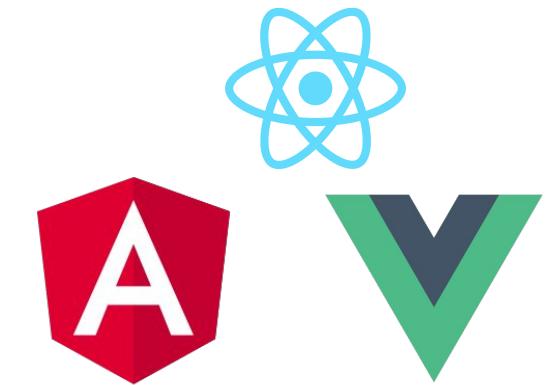
Virtual DOM, component architecture, pure functions

- Virtual DOM is a virtual representation of a browser DOM
- By virtual we mean it has a different representation (Elements vs Objects)
- Is used for searching and updating the real DOM
- Heavily optimized
- Renderer is used to translate virtual DOM into browser DOM (Elements)



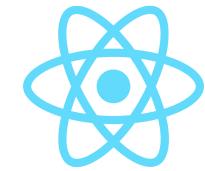
Virtual DOM, component architecture, pure functions

- Component architecture
- UI is pieced from small blocks called components
- Each component **should** work as standalone entity
- Each component **should** be able to work without any other
- Each component must provide clear API through which it can be controlled



Virtual DOM, component architecture, pure functions

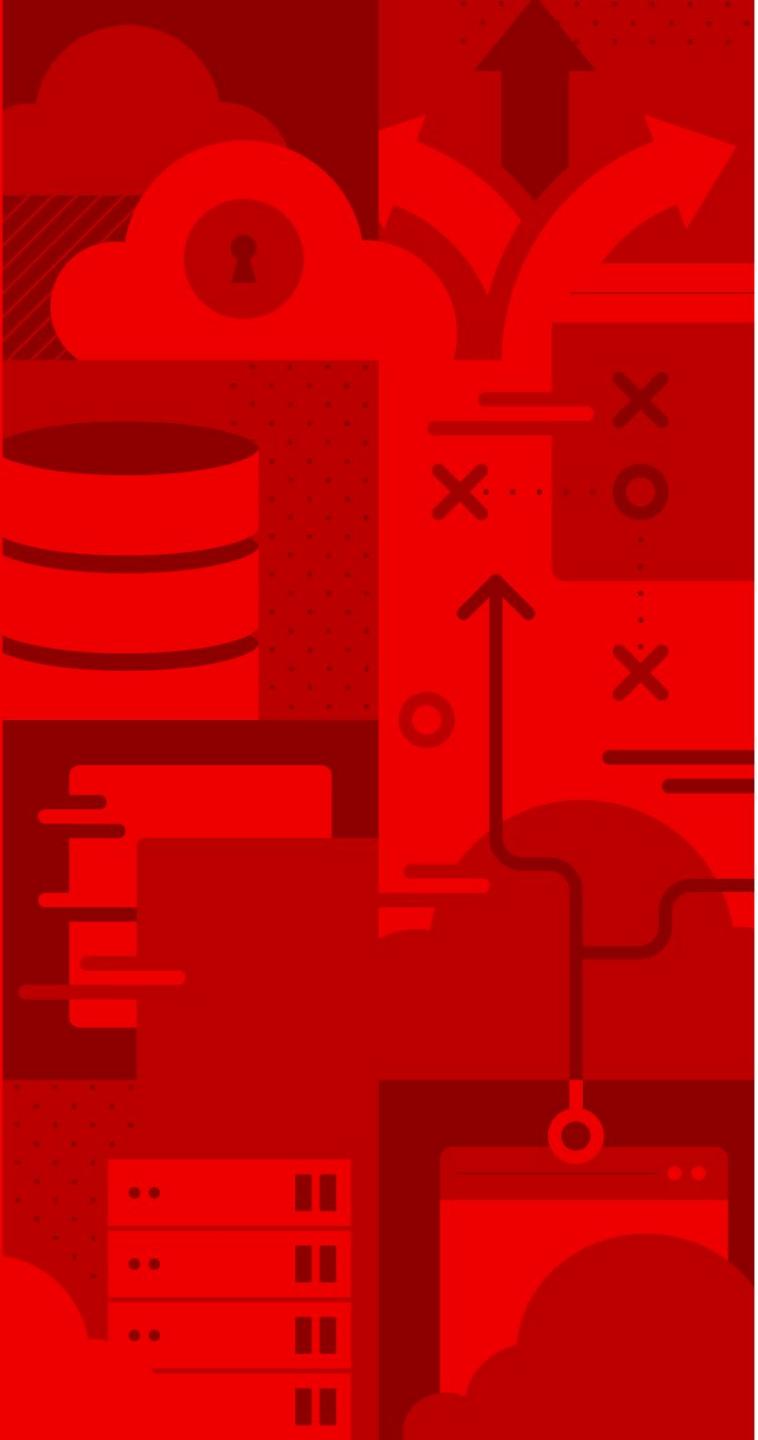
- Pure functions
- Main pillar of functional programming
- Eliminates side effects (“this” or “self” keyword is forbidden)
- Function will always return the same output with the same input
- Make code stable and easier to maintain and test



Multiple free and open source design systems

- [Material ui](#)
- [Patternfly](#)
- [Orbit](#)
- [Ant design](#)
- [Bit](#)





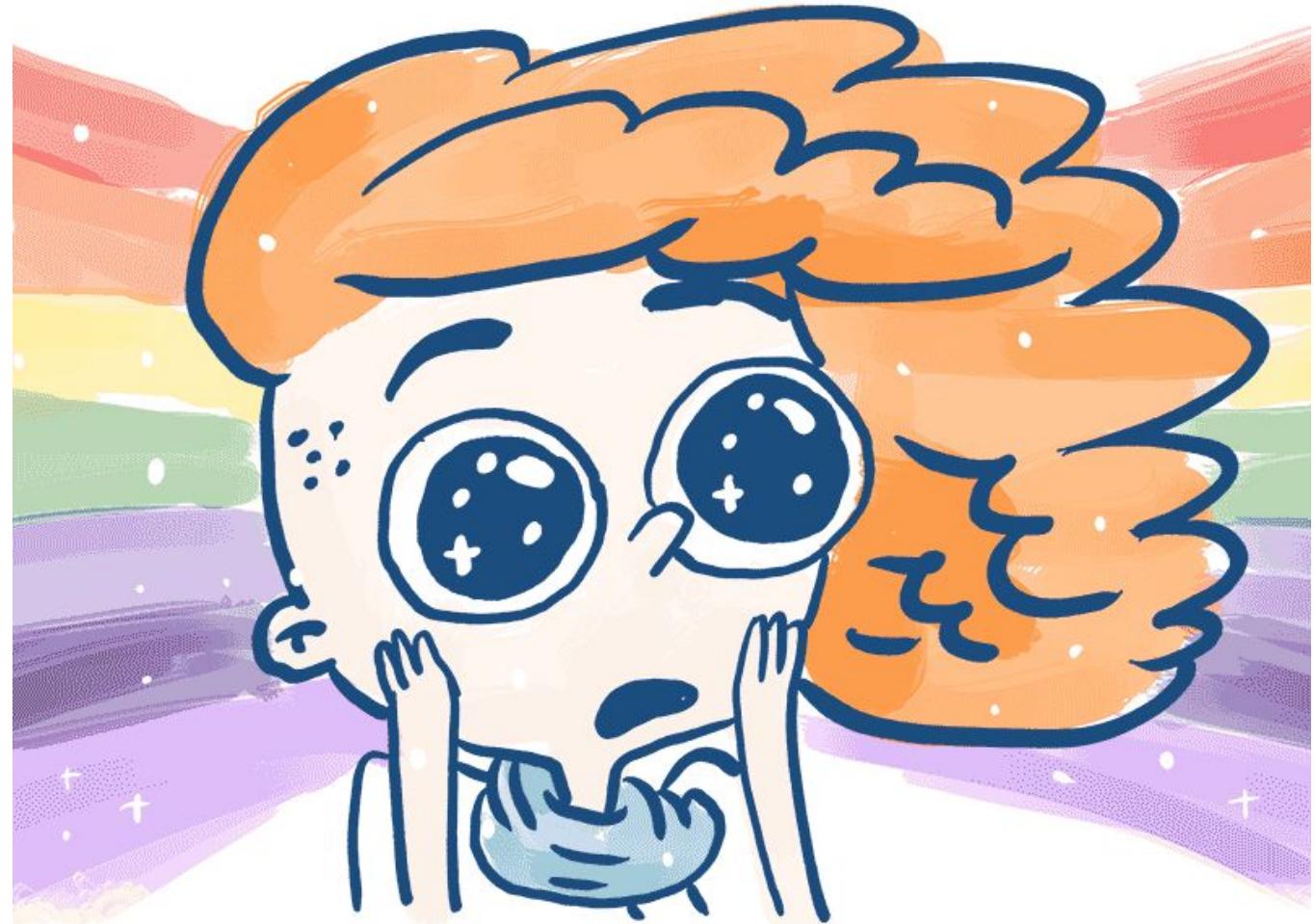
Prototype review and Design system

What you need to know about it

What are Design systems?

The **single source of truth** which groups all the elements that will allow the teams to design, realize and develop a product.

It's not a deliverable, but a set of deliverables.



"A kit of UI components without accompanying philosophy, principles, guidelines, processes, and documentation is like dumping a bunch of IKEA components on the floor and saying
"Here, build a dresser!"

The guidelines and documentation accompanying the components serve as the instruction manual that come with the IKEA components to help the user properly and successfully build furniture."

Brad Frost

Why working with Design System?

- Reduce inconsistency
- Focus on the user
- Faster prototyping
- Quick iteration



Style guide x Pattern library

Style guide - focus on graphic styles (colors, spacers, icons, content...) and their usage.

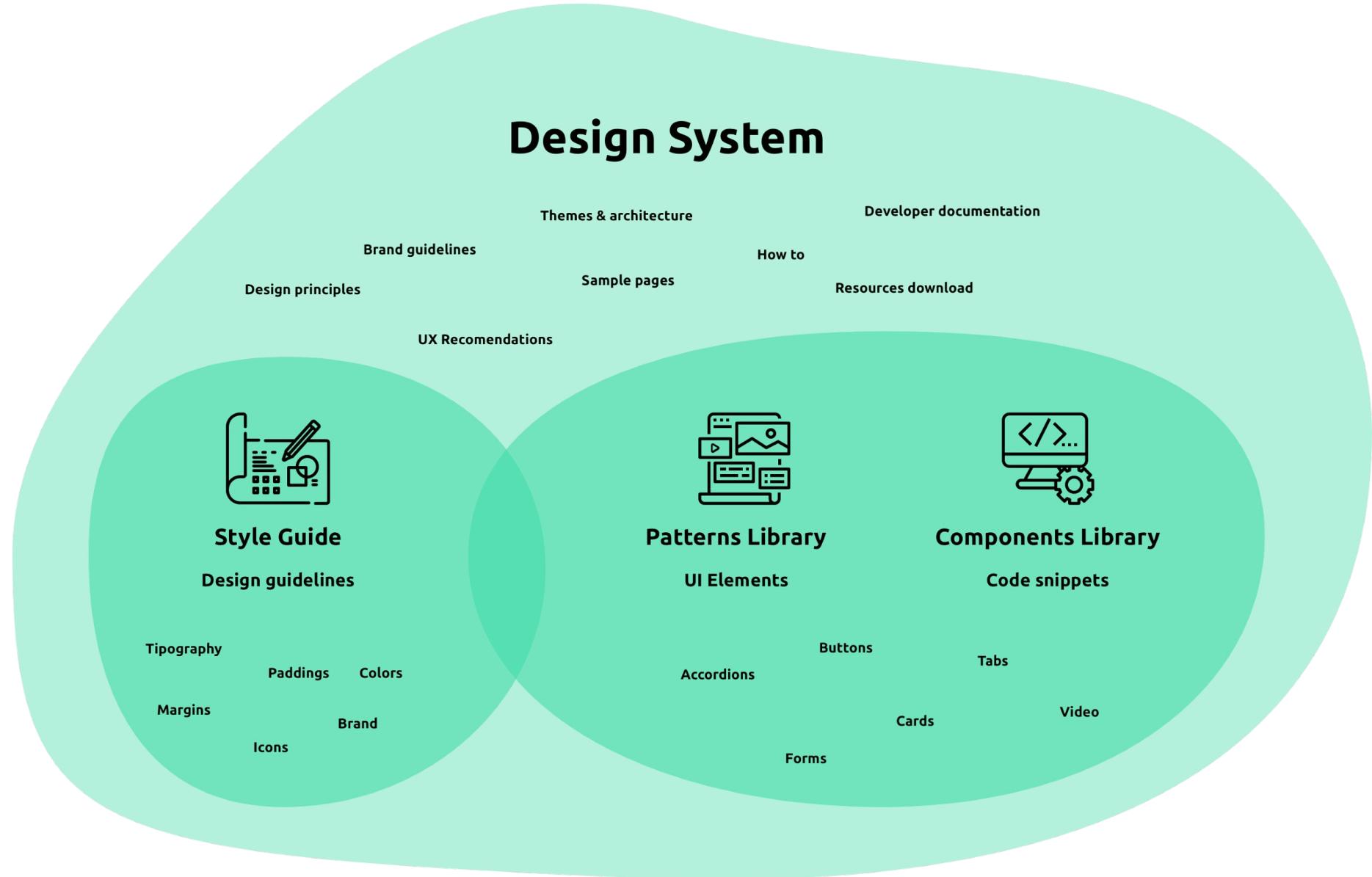
Pattern library - integrate functional components and their usage.

Design system usually contains both.

The screenshot shows the PatternFly design system's navigation bar with links for 'Get started', 'Design guidelines' (which is highlighted), 'Documentation', 'Contribute', and 'Get in touch'. A dropdown menu titled 'Styles' is open, showing options like 'Colors' (which is selected and highlighted in blue), 'Colors for charts', 'Icons', 'Spacers', 'Typography', 'Usage and behavior', and 'Content'. To the right of this menu, there are two color swatches labeled 'Colors' and 'Theme colors'. The 'Colors' section shows a blue square with the hex code '#0066CC', labeled as a 'Global CSS variable' with the value '--pf-global--primary-color--100'. The 'Theme colors' section shows a dark blue square with the hex code '#004080', also labeled as a 'Global CSS variable' with the value '--pf-global--primary-color--200'. At the bottom, there is a link labeled 'Secondary default'.

Color Name	Hex Code	Type	Value
Primary default	#0066CC	Global CSS variable	--pf-global--primary-color--100
Secondary default	#004080	Global CSS variable	--pf-global--primary-color--200

Design System



Components

App bars: bottom

App bars: top

Backdrop

Banners

Bottom navigation

Buttons

Usage

Anatomy

Hierarchy and placement

Text button

Outlined button

Contained button

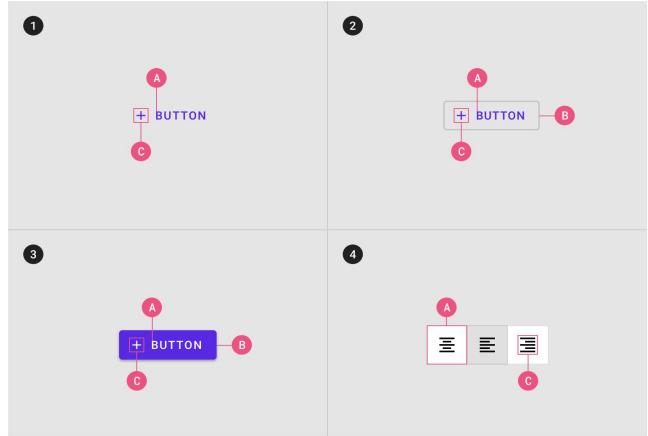
Toggle button

Theming

Specs

Anatomy

Buttons contain one required element and four optional elements.



Carbon Design System

Get started

Tutorial

Guidelines

Components

Overview

Component status

Accordion

Breadcrumb

Button

Checkbox

Code snippet

Content switcher

Data table

Date picker

Dropdown

File uploader

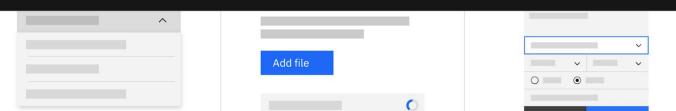
Form

Inline loading

Link

List

Loading



Link

Text link

List



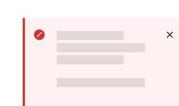
Loading



Multiselect



Notification



Number input



Styles

Usage and behavior

About modal

Alerts and notifications

Bulk selection

Buttons

Card view

Charts

Data input

Data loading

Embedded assistance

Empty state

Filters

Forms

Lists and tables

Login page

Modal dialog

Forms

A form is a group of elements used to collect information from a user. Forms can be presented to the user in a variety of contexts depending on the use case and scenario.

[View form demos](#)

Elements

Most forms will contain the following basic elements:

Payment Information

The form includes the following fields:

- Card number
- Save this payment information
- Expiration Date
- CVV
- 0001 (with an invalid expiration error)
- Invalid expiration
- Name

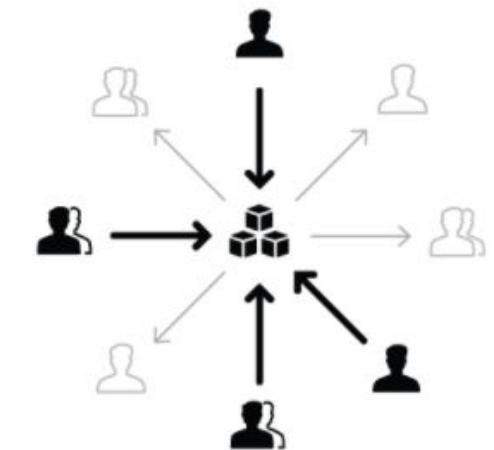
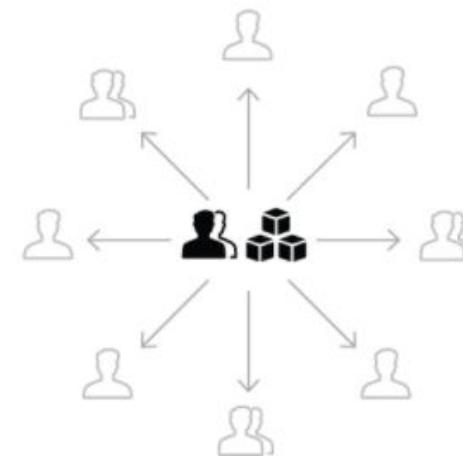
Personal Information

Name

Centralized vs. Distributed

Centralized - one team is in charge of the system and makes it evolve.

Distributed - several people of several teams are in charge of the system. The adoption of the system is quicker because everyone feels involved.



How do we use PatternFly?

Components as elements

Dropdown

Page title

Label

Text box !

Invalid input

Ned Username ▾

Page title >

Chip 00 ×

Button

Type styles

Size 4xl	Size 4xl	Size 4xl
Size 3xl	Size 3xl	Size 3xl
Size 2xl	Size 2xl	Size 2xl
Size xl	Size xl	Size xl
Size lg	Size lg	Size lg
Size md	Size md	Size md
Size sm	Size sm	Size sm
Size xs	Size xs	Size xs
Size xs bold	Size xs bold	Size xs bold
Heading label	Chart sublabel (standard)	Chart sublabel (small)
Chart label		

Color palette



The screenshot shows a screenshot of the PatternFly interface. The top navigation bar includes the PatternFly logo, a bell icon, a gear icon, and a user dropdown labeled "Ned Username". Below the header, a secondary navigation bar features five "Tertiary nav item" links: "Tertiary nav item 1", "Tertiary nav item 2", "Tertiary nav item 3", "Tertiary nav item 4", and "Tertiary nav item 5". On the left, a vertical "System panel" sidebar lists "Policy", "Network services", and "Server". The main content area displays a "Stacked form demo" titled "Stacked form demo". The demo includes a descriptive text: "Below is an example of a stacked form." followed by a form with three stacked text input fields, each labeled "Label" and containing "Text box" and placeholder text "Please provide your full name.". At the bottom of the form are two rows of checkboxes: "Email", "Phone", "Please don't contact me" and "I like updates via email". The form concludes with two buttons: "Submit form" and "Cancel".

Template preview

V0000000



Handoff to developers

Blog posts

Hello world! This is my first blog post

2 minute read | Beginner

This is a short description of my post. It really doesn't contain much though. This is a short description of my post. It really doesn't contain much though.

[Painting a wooden dresser: my journey](#)



Jacqueline Likoki retweeted

98px

This is the tweet. It's pretty cool and awesome.

Painting dressers, or any furniture for that matter, can be a struggle. In this article, I explain the details of my process and what went well and what did not. You'll leave this read with some good tips!

[Why are millennials getting a bad rep?](#)

3 minute read | Beginner

This is a short description of my post. But to answer the question I'm not really sure. Are you?

[Tech savvy moments!](#)

5 minute read | Beginner

A list of all the tech savvy moments I've experienced within the past decade. Some are funny. Some are impressive. Most are not cool.



Twitter feed

Bonginkosi Mladlana tweeted

This is the tweet. 430px pretty awesome.

Deveeprasad Acharya retweeted

This is the tweet. It's pretty cool and awesome.

Sidnee Gye tweeted

This is the tweet. It's pretty awesome.

Jacqueline Likoki retweeted

This is the tweet. It's pretty cool and awesome.

Wim Willems tweeted

This is the tweet. It's pretty awesome.

Zhan Huo retweeted

This is the tweet. It's pretty cool and awesome.

Bonginkosi Mladlana tweeted

This is the tweet. It's pretty awesome.

Deveeprasad Acharya retweeted

This is the tweet. It's pretty cool and awesome.

Bonginkosi Mladlana tweeted

This is the tweet. It's pretty awesome.

< Jacqueline Likoki re

A ator

PROPERTIES

Width
176px

Height
21px

X Position
1226px

Y Position
430px

APPEARANCE

Colour
#6A6E73

TYPOGRAPHY

Typeface
RedHatText-Regular

Size
14px

Align
Left

Font Weight
500

Line Spacing
21px

CONTENT

[Copy](#)

Jacqueline Likoki retweeted

CSS

[Copy](#)

```
.jacqueline-likoki-re {
  color: #6A6E73;
  font-family: RedHatText;
  font-size: 14px;
  font-weight: 500;
  line-height: 21px;
  text-align: left;
}
```

at

- Old
 - jQuery
 - Ajax
 - Single Session
 - Variables
 - IE drove it in the past
 - Lodash
 - Callback hell
 - Bootstrap
- New
 - Transpilers
 - JS is slowly moving towards functional programming - map, lambda, reduce, etc.
 - SSO with JWT
 - Improved Browser API
 - Dependency hell
 - Build tools - module based codebase
 - Multiple free and opensource design systems
 - Virtual DOM, component architecture, pure functions - React

Single sign on/out/only



Body headline

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore.



Body headline

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore.



Body headline

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore.



Body headline

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore.

Popis problemu

- Two scenarios
 - Single page web application
 - Library to used in any further project
- All build processes managed from one place
 - Easy use once we have everything all set up
- We want to use the newest javascript goodies
- Some framework so we have easier DOM manipulation
- One package manager

Historie – aneb pred vice nez 5 lety

- Bower was the main place to go for packages
 - It is slowly dying and on 02 Oct 2017 was announced that users should migrate to something else
- First there was Grunt
 - On 11 January 2012 this first task runner was introduced, it was a breakthrough in frontend development.
 - Pros: Fairly simple, easy to use
 - Cons: Temporary files, piping one file through multiple tasks was cumbersome
- Then there was Gulp.js
 - On 26 September 2013 was released tasks runner that was heavily inspired by Grunt
 - Pros: Faster, file piping
 - Cons: Config can be really confusing to newcomers
- jQuery
 - Most hated and loved library to manipulate DOM

Proc to selhalo

- NPM took over because it simply had a lot more packages
- NPM also introduced several built in scripts, that can be ran at certain point of installation/build
- Package managers now contain task runner
- Configs were too hard to maintain - few people really understood file piping
- Debugging of build process was not so easy
- Modern build tools have much better features
 - HTTP/2 code splitting
 - Built in minification
 - Built in sourcemaps
 - Tree shaking
 - And many more

Dnesni stav – package manager / task runner

- Yarn
 - Developed by Facebook
 - Supports workspaces - great for monorepos
 - Easier task runner and package installation
 - First to introduce lock file
- NPM
 - Developed by Google
 - Comes with node
 - Contains NPX
 - Convenient for larger teams spread across globe
- PNPM
 - Honorable mention - hard linking packages instead of downloading and installing

Dnesní stav – build nastroje

- Webpack
 - All purpose build tool
 - Extensive configuration options
 - Configuration is required
 - Extensible
- Parcel
 - Zero config file
- Rollup
 - Focus on building ES libraries

Nutnost transpilera, co to je?

- Babel
 - Javascript transpiler to provide backwards compatibility of new JS syntax quirks and fashion
 - Each file is parsed separately and compiled into native JavaScript
 - Huge collection of plugins - you can even write your own plugins
- Typescript
 - JavaScript flavor/superset with data types
 - Compiles into JavaScript
 - Custom plugins called Language Service Plugin - not that used as with babel

Babel config

- Multiple formats
 - JS, JSON, ES6
- Option to write custom functions in plugins [1]
- **BABEL_ENV** to use different config per different environment
- Option to write config in package.json

```
{  
  "presets": [  
    [  
      "@babel/env",  
      {  
        "targets": "> 0.25%, not dead"  
      }  
    ],  
    "@babel/react",  
  ],  
  "plugins": [  
    [  
      "@babel/plugin-proposal-decorators",  
      {  
        "legacy": true  
      }  
    ],  
    "babel-plugin-lodash",  
    "@babel/plugin-proposal-class-properties"  
  ]  
}
```

Scenar: Webova aplikace - Parcel vs Webpack

- React application
- Dev server
 - Proxy to API
- HTML template
- Tree shaking
- One config to rule them all (dev vs prod)
- Custom envs from terminal/.env file
- Static files loader - images, styles

Scenar: Knihovna – Rollup vs Webpack

- React library
- Bundled to one file and to multiple files as well
- Externals
 - 3rd party libraries not bundled in final build
- Named vs Default exports
- Multiple environments
 - ESM, UMD, CommonJs

Conclusion library

Webpack

- No native support for full ESM bundles
 - Webpack 5 promises to implement it
- Harder to set-up
- Easier to read

Rollup

- Everything has to be done through plugins +/-
- Smaller bundle size
- Supports native ESM!
- Named exports
 - You need to list all named exports

Conclusion – funny

- Webpack is like VIM
 - Hard to setup and if something breaks you have to really understand it
 - But the things that can be done with it are almost limitless
- Parcel is like MS word
 - No need to configure anything
 - If you need to tweak something up, it's really hard to do
- Rollup is like VS Code
 - One of the greatest software for one thing
 - Handles poorly web apps

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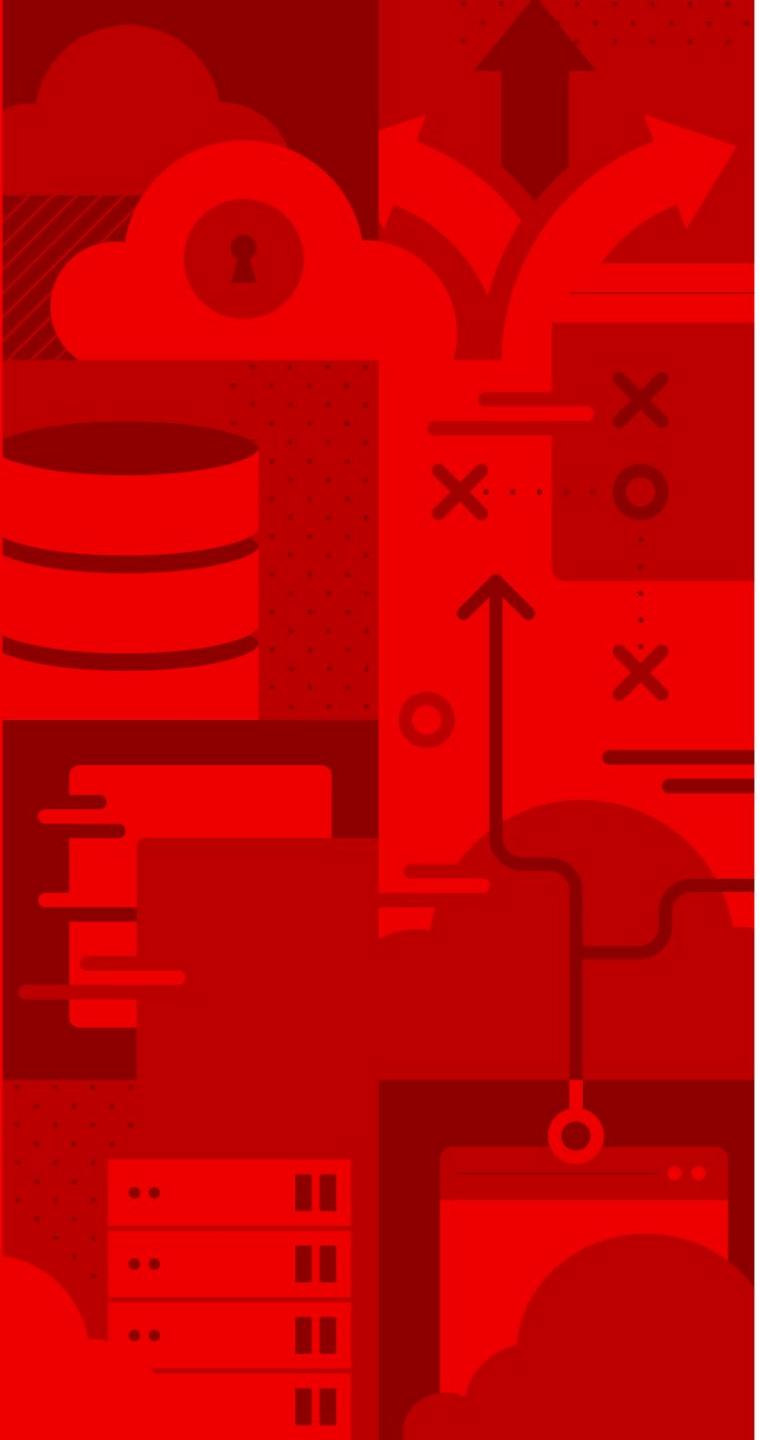
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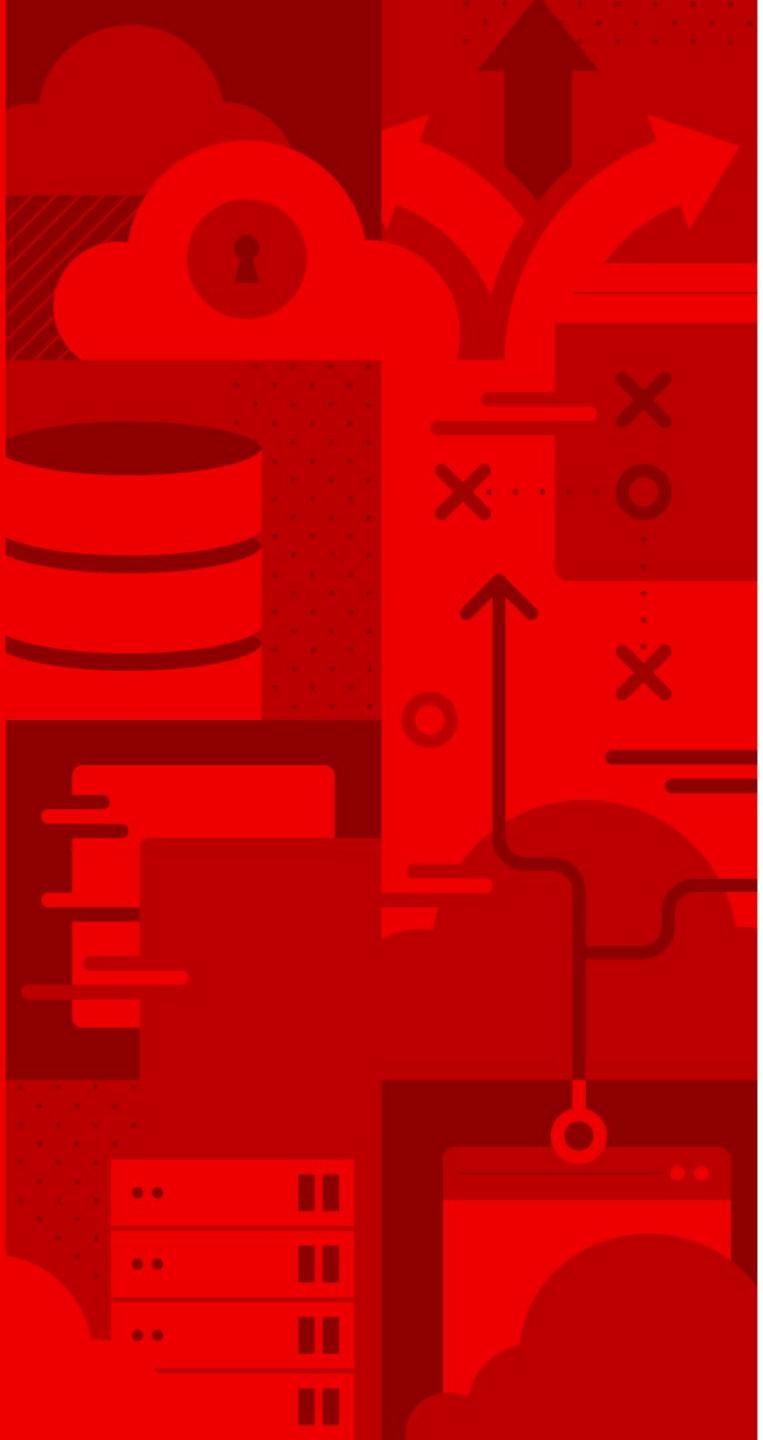
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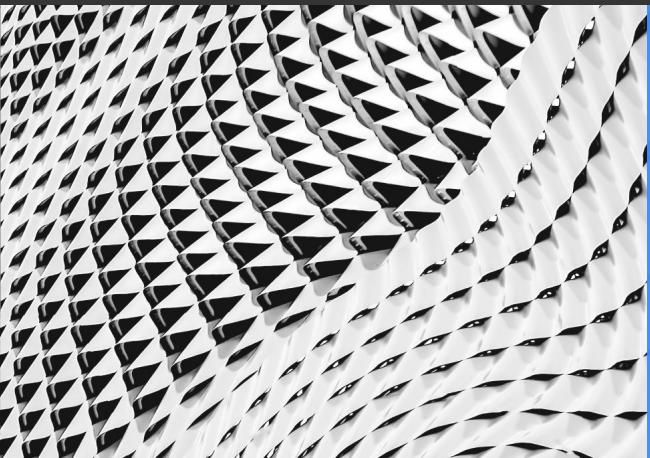
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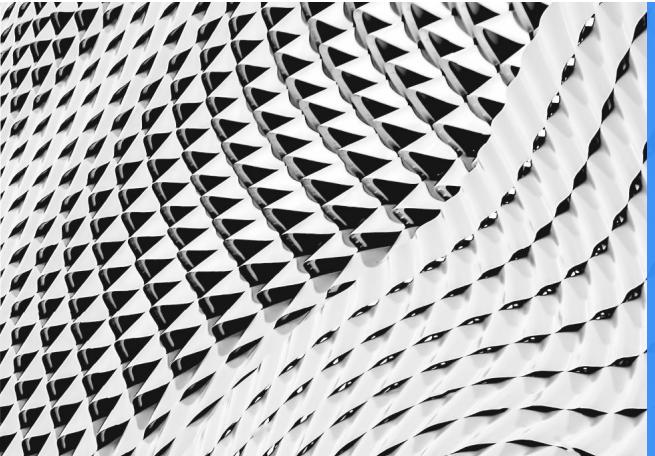
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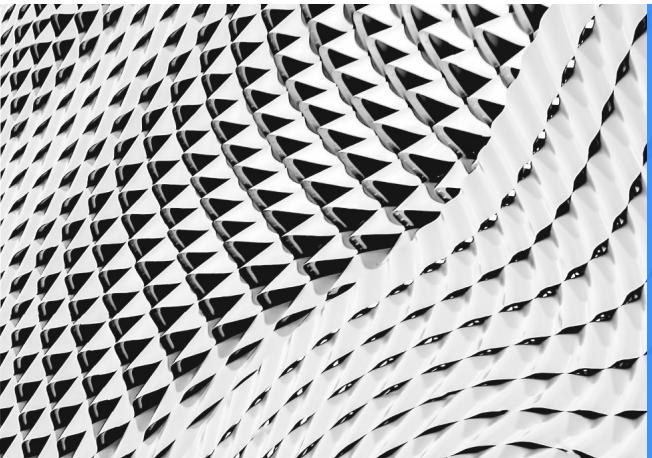
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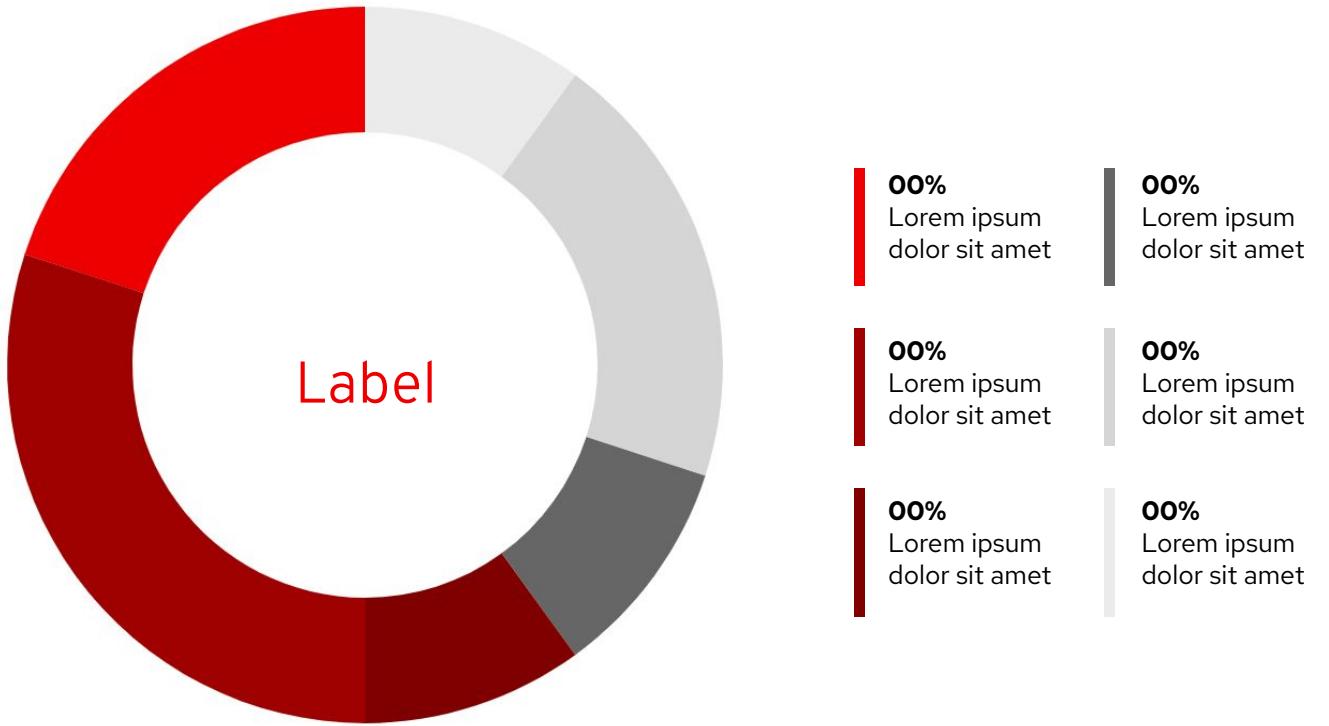
What we'll discuss today

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Select "Open source." The legend will need to be updated manually.

What we'll discuss today

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Insert image in this designated area, deleting the shaded background. Keep the left and right margins clear to maintain the open feel in accordance with the brand.

If no subheading is needed, delete the subheading text, and the content can extend into the lighter shaded area.

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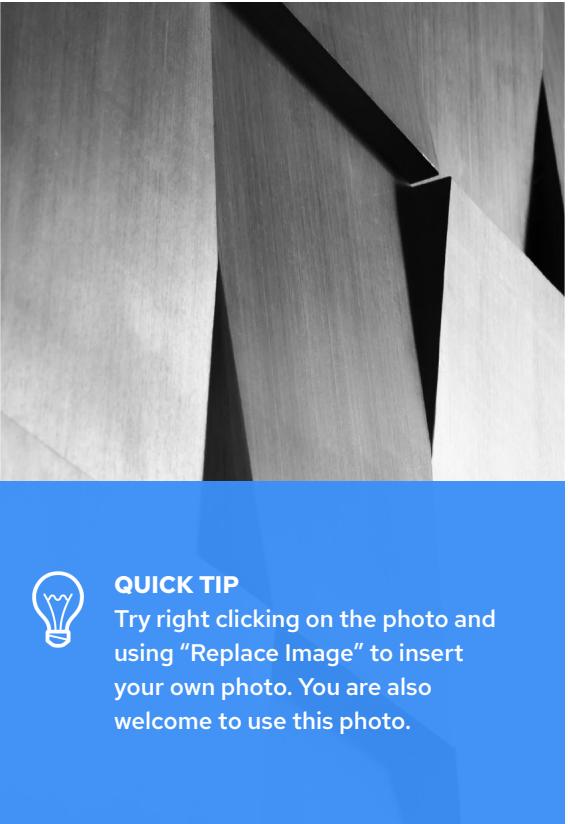
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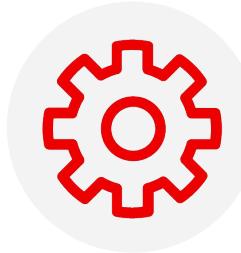


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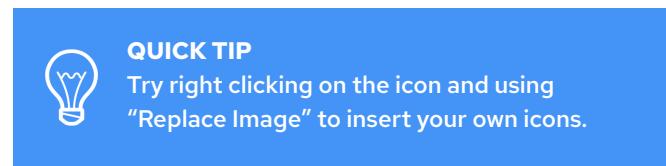
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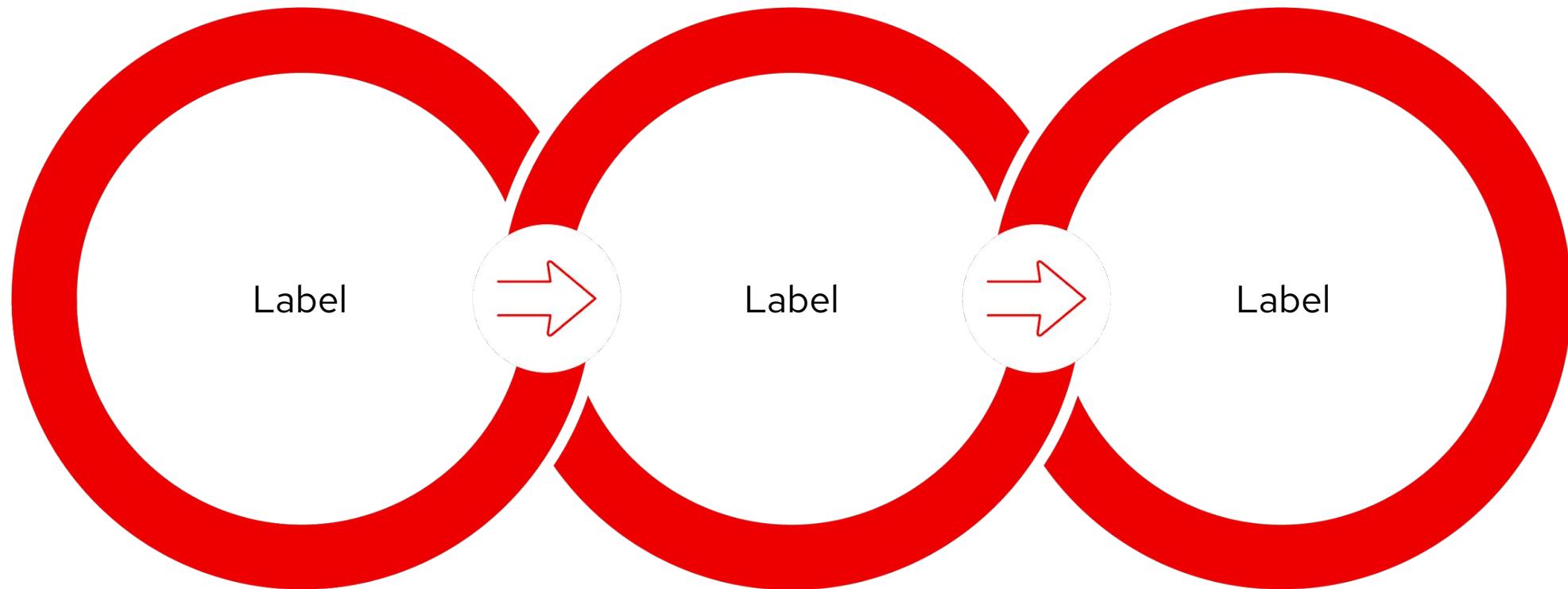
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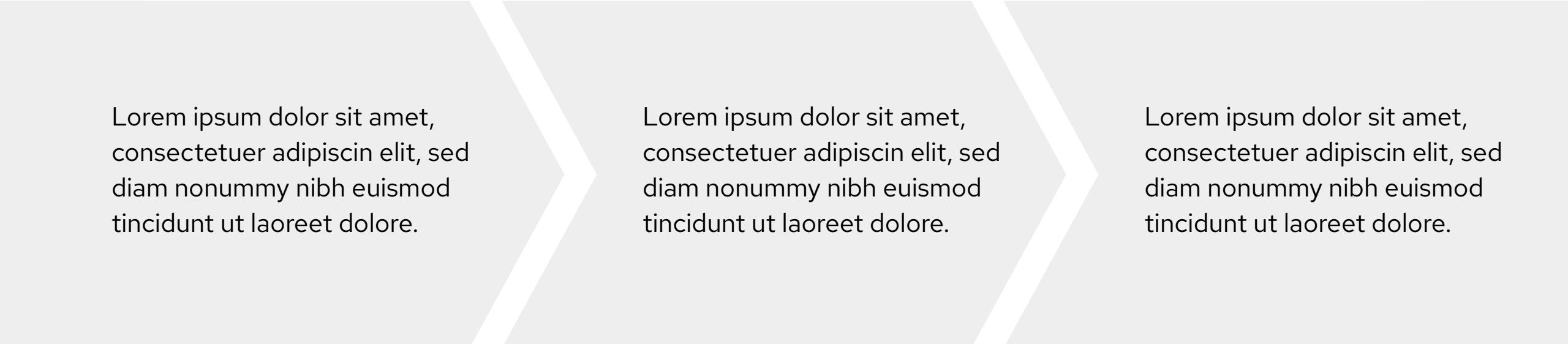
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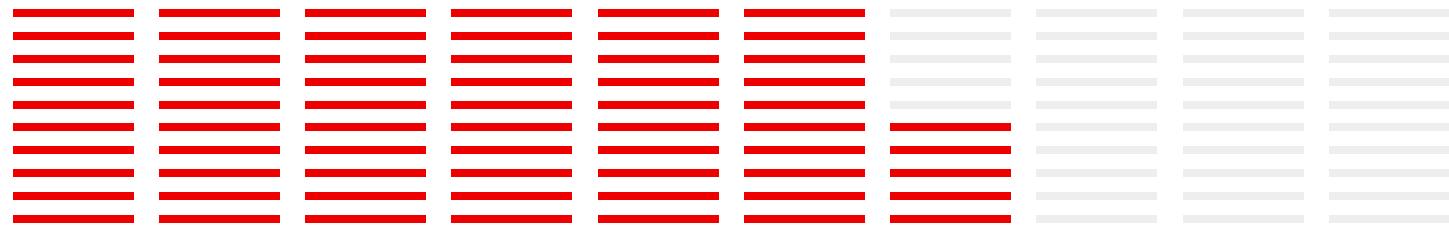
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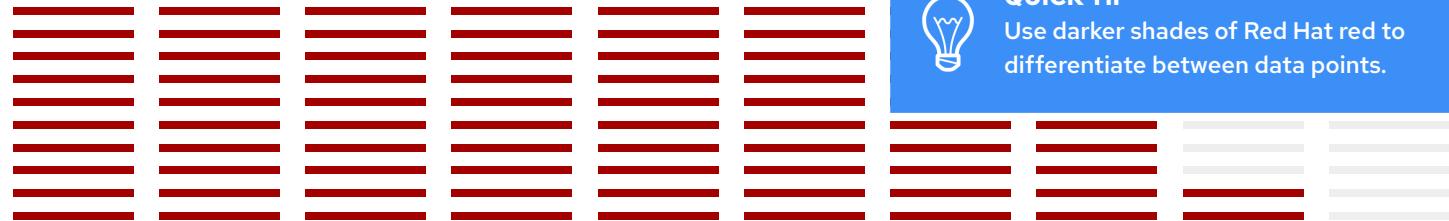
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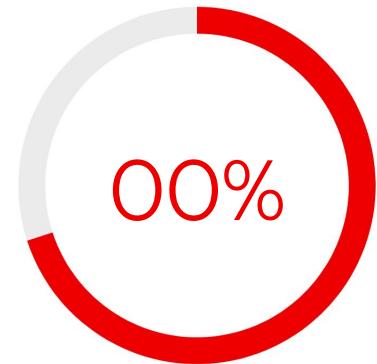
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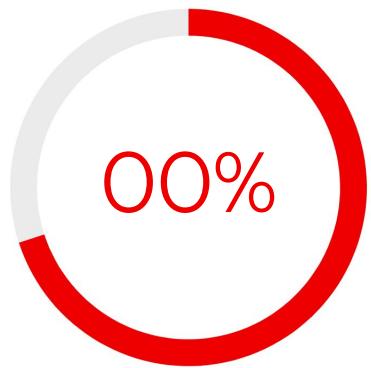


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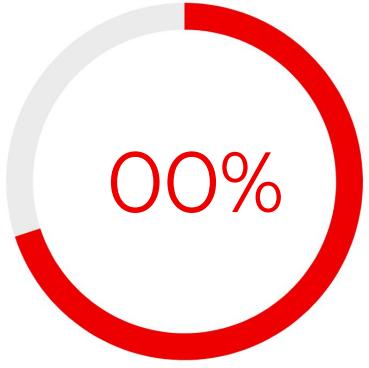
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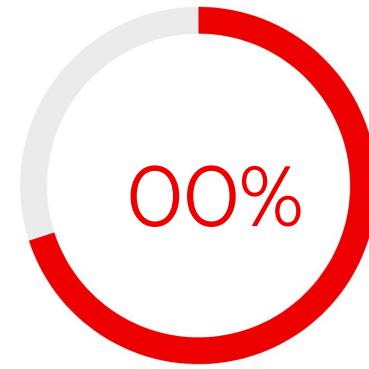
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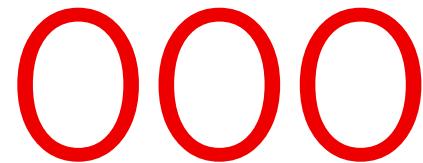
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Body headline

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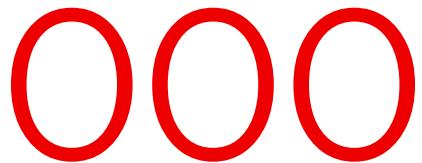
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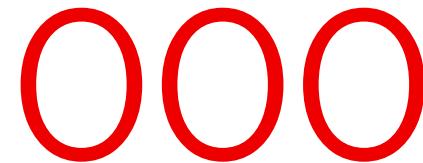
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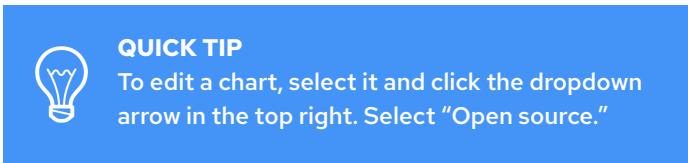
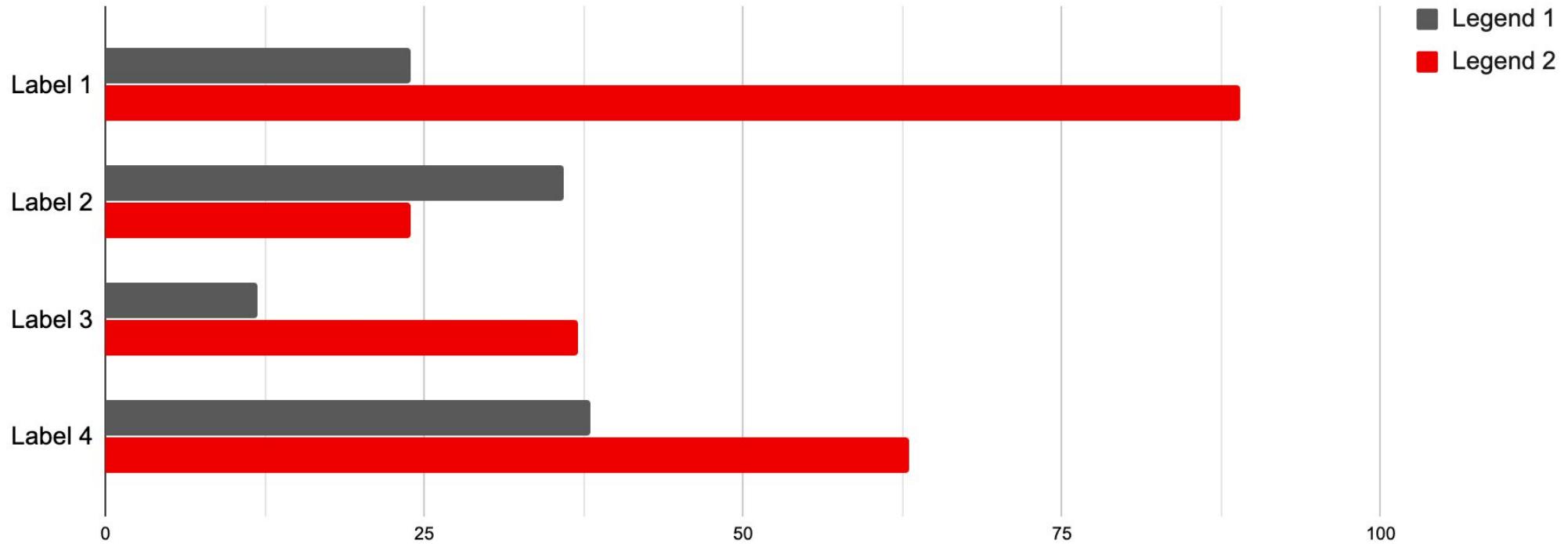


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QUICK TIP

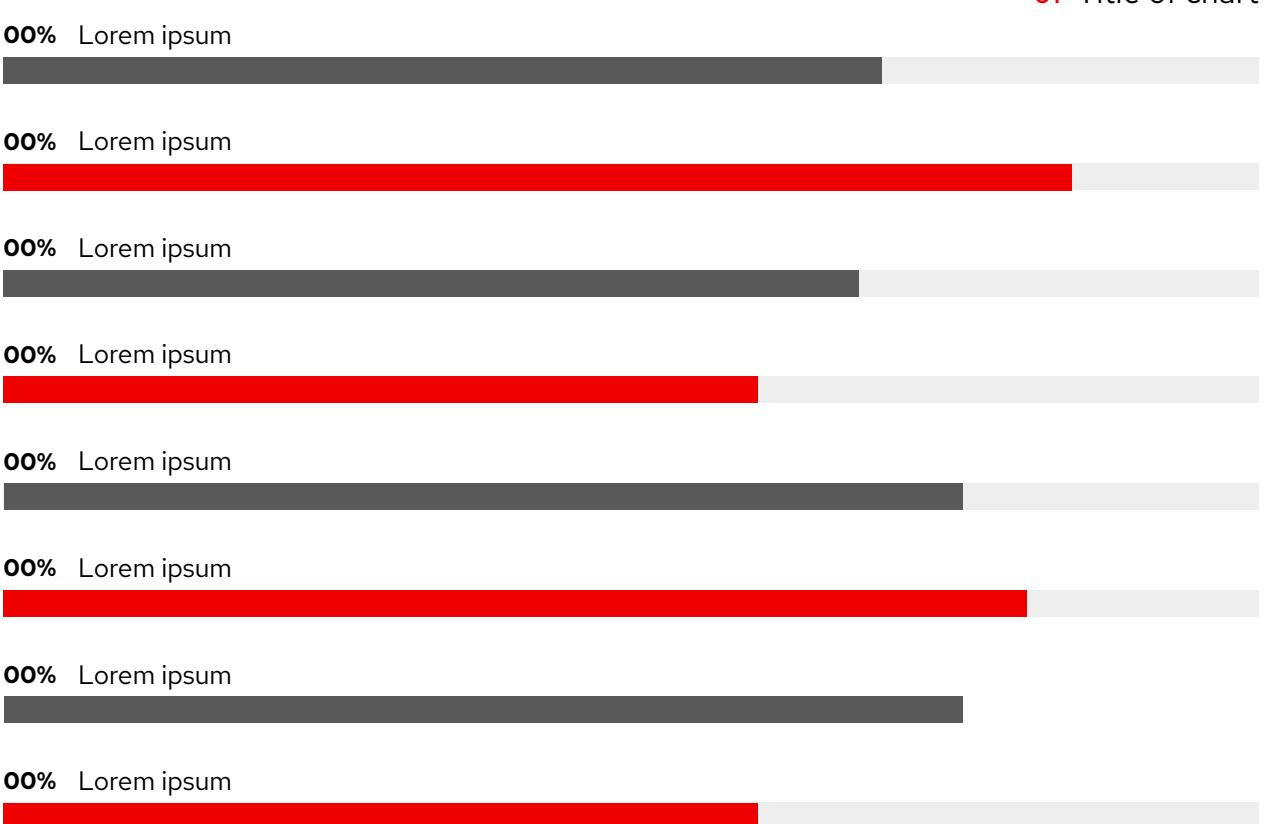
Use the "Width Scale" in the "Size & Position" pane of the format options panel to adjust the percentage of the bar.

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QUICK TIP

Use the "Width Scale" in the "Size & Position" pane of the format options panel to adjust the percentage of the bar.

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01 Title of table

	Column header two lines maximum	Column header two lines maximum	Column header two lines maximum
Row header with two lines maximum	Body cell should be limited to two lines	Body cell should be limited to two lines	Body cell should be limited to two lines
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QUICK TIP

Try right clicking on the photo and using "Replace Image" to insert your own photo. You are also welcome to use this photo.



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