



# Module federation and web components

What could be the future of web

# Agenda

Web components

What it is?

Current status

Module federation

What it is?

When to use it

How to use it

Project update

## Web components - what it is?

- Web Components is a suite of different technologies allowing you to create reusable custom elements
  - Standardized way of sharing components
- Custom elements
  - JS API to define custom elements
- Shadow DOM
  - API to encapsulate your component so it doesn't break other components
- HTML templates
  - Markup language, that is not displayed in the rendered page. Can be reused

Perfect guide with examples [https://developer.mozilla.org/en-US/docs/Web/Web\\_Components](https://developer.mozilla.org/en-US/docs/Web/Web_Components)

# Custom elements

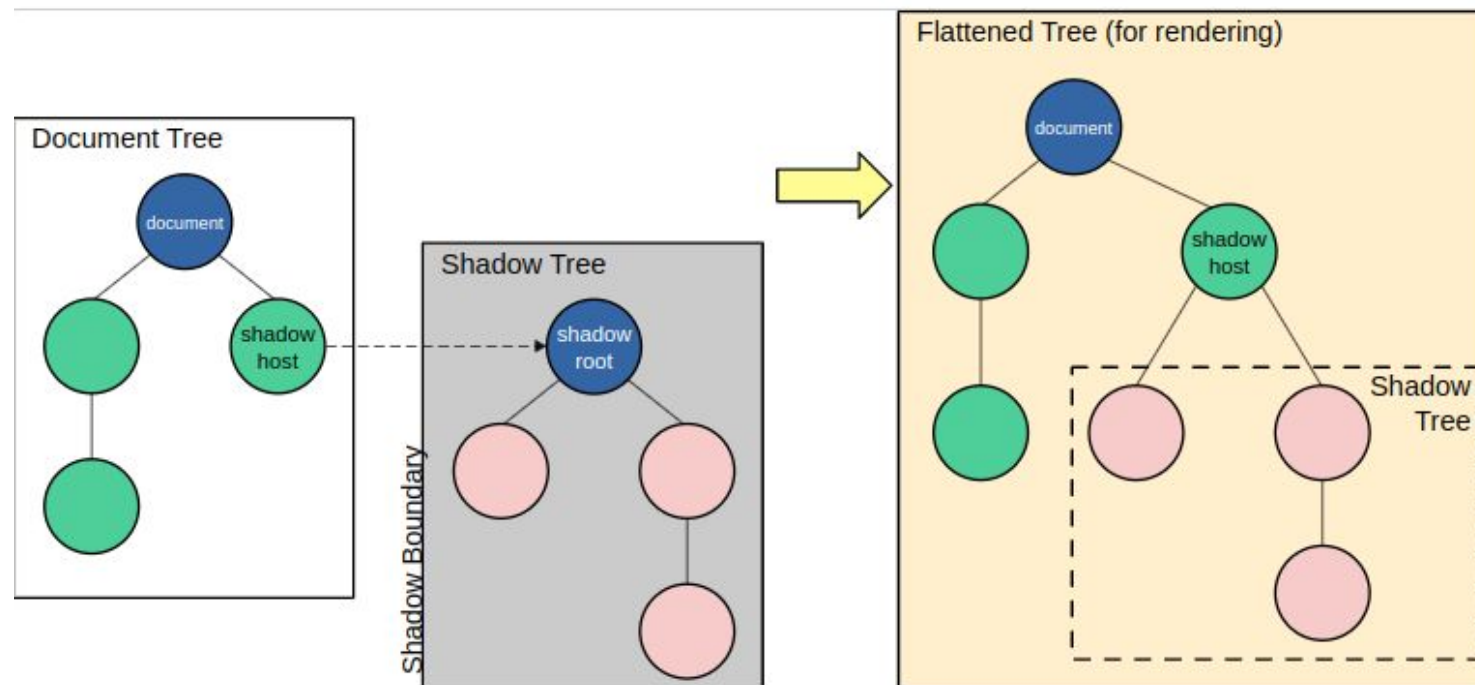
- You can define custom element by calling [CustomElementRegistry.define\(\)](#)
  - First argument is name of the component
  - Second argument is class attached to said component
  - Third argument is options

```
customElements.define("word-count", WordCount, { extends: "p" });
```

```
class WordCount extends HTMLParagraphElement {  
  constructor() {  
    // Always call super first in constructor  
    super();  
  
    // Element functionality written in here  
  }  
}
```

# Shadow DOM

- Shadow host - regular DOM node to which shadow dom is attached to
- Shadow boundary - boundaries component can change
- Shadow tree - similar to regular DOM structure
- Shadow root - the root of a shadow dome (similar to HTML tag)



# Templates and slots

- [<template>](#)
  - Not rendered until you actually grab it with JS and render it somewhere
  - If you have some pieces of markup language that are reused

```
<template id="my-paragraph">
  <p>My paragraph</p>
</template>
```

```
let template = document.getElementById("my-paragraph");
let templateContent = template.content;
document.body.appendChild(templateContent);
```

- [<slot>](#)
  - Helps to add flexibility

```
<my-paragraph>
  <span slot="my-text">Let's have some different text!</span>
</my-paragraph>
```

## Current status of web components

- Custom components - not 100% supported by all browsers
- Shadow dom - fully supported
- HTML templates fully supported
  
- Web components used to have HTML imports, this is no longer the case
  - You'd still have to import them in your project
- High barrier of entry
  - Too complicated to use

## Module federation - what it is?

- Allows loading separately compiled applications at runtime. Also, we can share common dependencies.
  - Webpack config to create microfrontends
- Runtime dependency sharing
- Offloading UI parts to a different team

Awesome tutorials:

- <https://www.youtube.com/watch?v=x22F4hSdZJM>
- <https://www.youtube.com/watch?v=D3XYAx30CNc>



## When to use module federation

- Large applications with multiple teams
  - You can share multiple screens between multiple pages
- Share UI snippets to other applications
  - Great example is login form or navigation

Examples can be found at

<https://github.com/module-federation/module-federation-examples>

# How to use module federation

## Expose

```
new ModuleFederationPlugin({
  name: "comic",
  filename: "remoteEntry.js",
  exposes: {
    "./XKCD": "./app.jsx",
  },
  shared: [
    {
      react: { singleton: true, eager: true },
      "react-dom": { singleton: true, eager: true },
    },
  ],
})
```

## Import

```
new ModuleFederationPlugin({
  name: "home",
  remotes: {
    comic: `comic@${URL}/remoteEntry.js`,
  },
  shared: [
    {
      react: { singleton: true, eager: true },
      "react-dom": { singleton: true, eager: true },
    },
  ],
})
```

## Use

```
const XKCD = lazy(() => import("comic/XKCD"));
```

# How to use module federation

Examples

<https://codesandbox.io/s/webpack-module-federation-forked-vzmqy7?file=/home/webpack.config.js>

<https://stackblitz.com/github/webpack/webpack.js.org/tree/main/examples/module-federation?file=README.md&terminal=start&terminal=>

## Project update

- Any questions?
- Free time to code your UIs
- Free time to discuss any problems

- 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



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# 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 trough multiple tasks was cumbersome
- Then there was Gulp.js
  - On 26 September 2013 was released taks 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 ca 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

# Dnesni 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 transpileru, 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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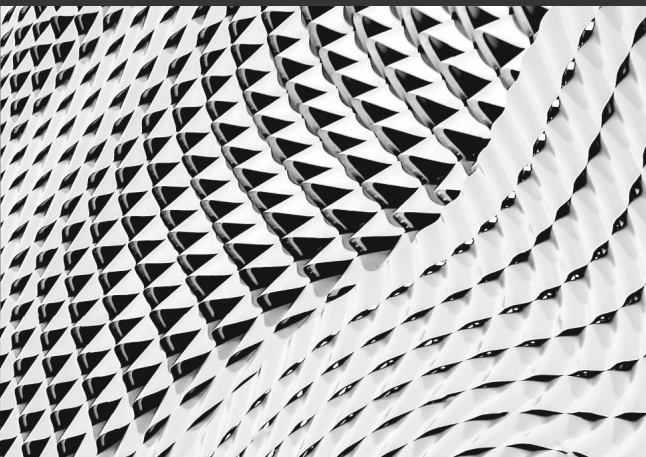
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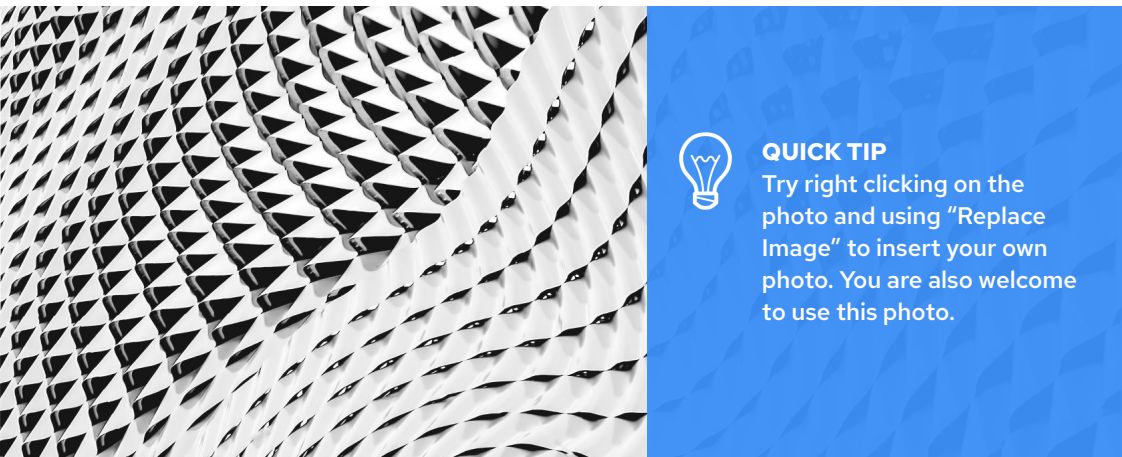
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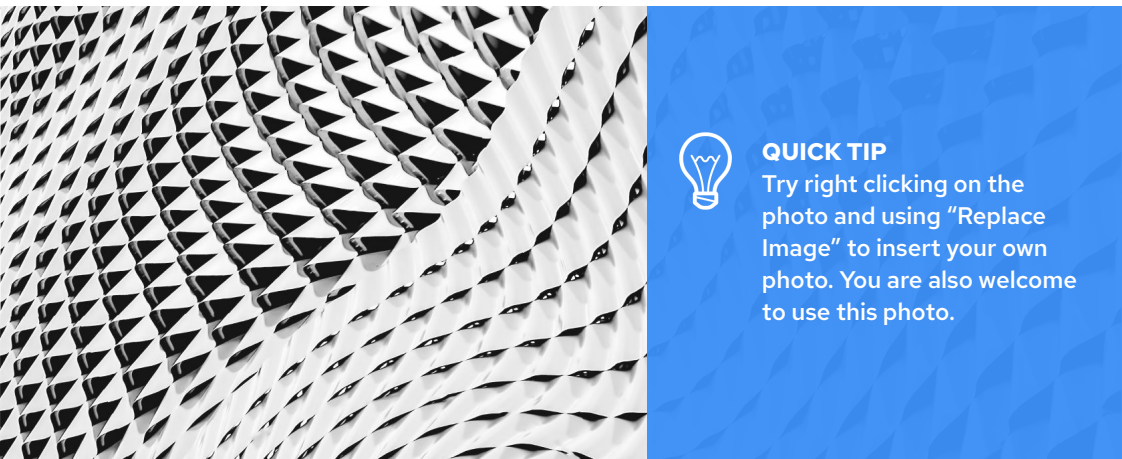
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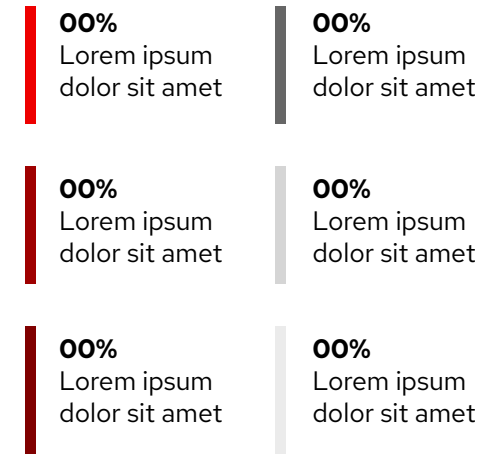
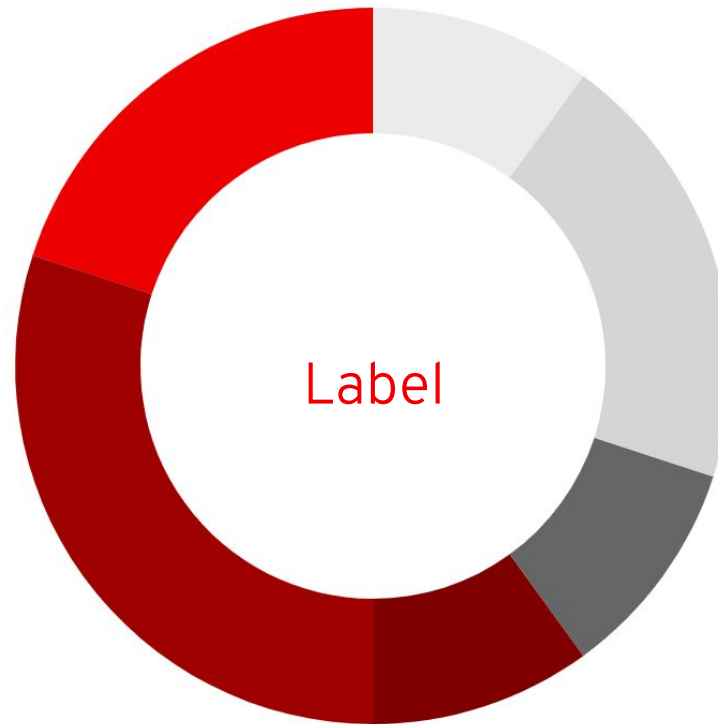
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# What we'll discuss today

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

### QUICK TIP

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

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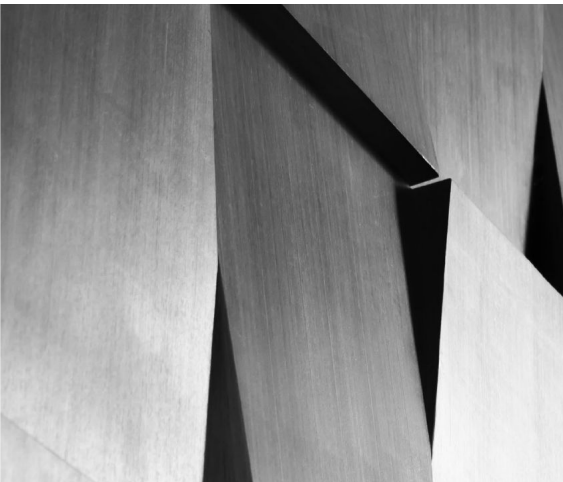
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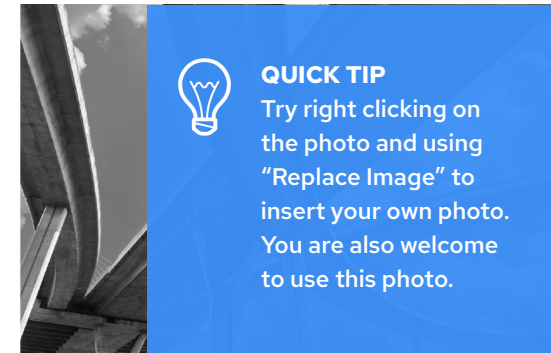
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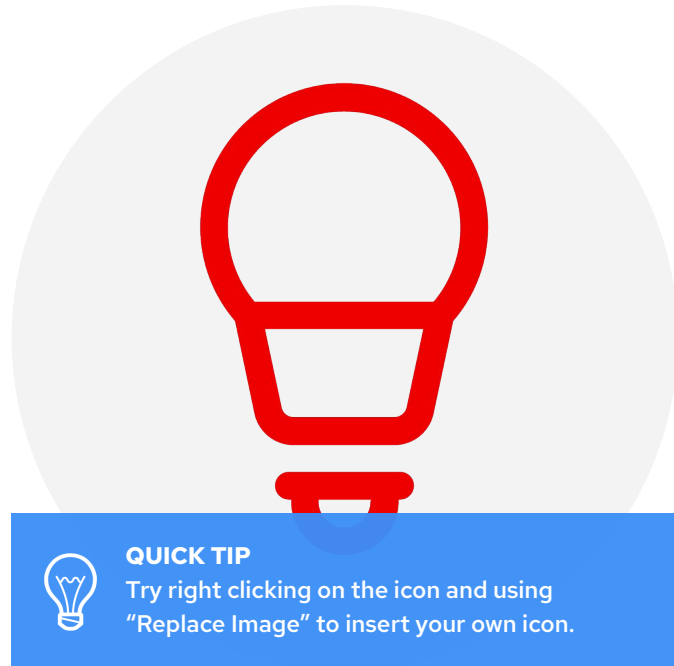


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### QUICK TIP

Try right clicking on the icon and using  
"Replace Image" to insert your own icons.



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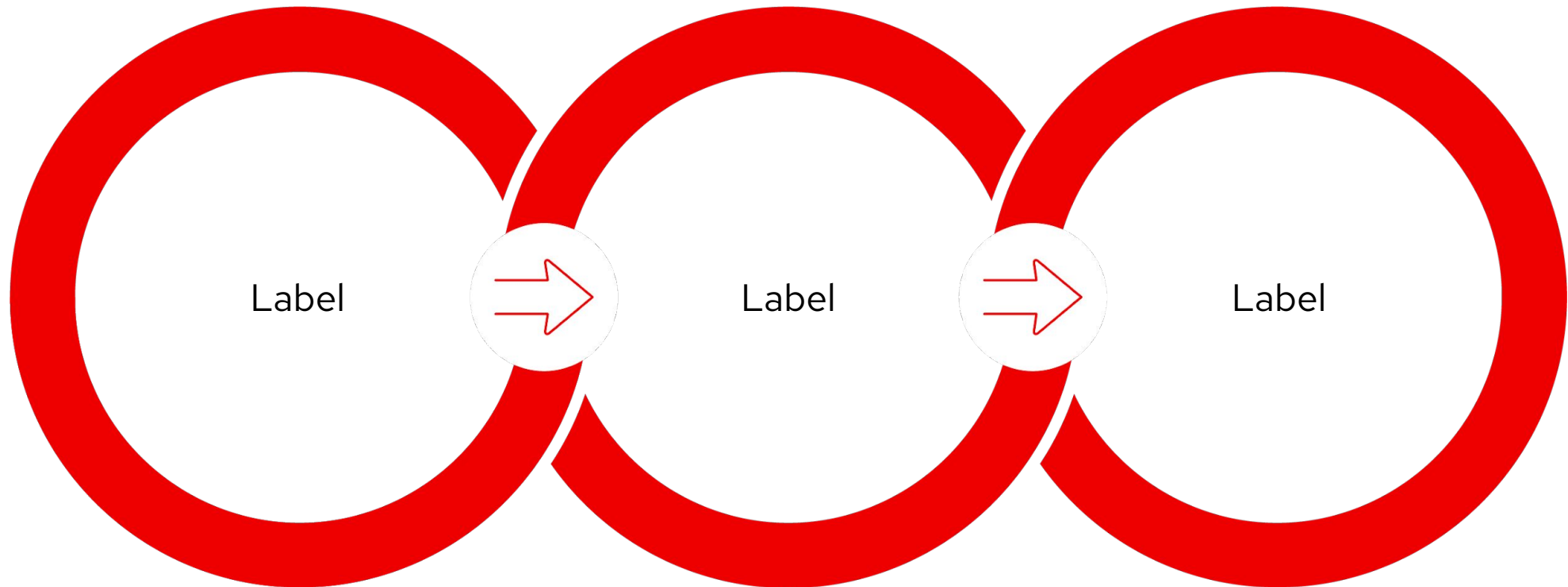


### QUICK TIP

Try right clicking on the icon and using "Replace Image" to insert your own icons.

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**John Doe**  
CTO, Acme Unlimited



**QUICK TIP**

Using a photo with the large quote is optional. Try right clicking on the photo and using “Replace Image” to insert your own photo.

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**John Doe**  
CTO, Acme Unlimited



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**John Doe**  
CTO, Acme Unlimited

# This section includes:

Data slide templates

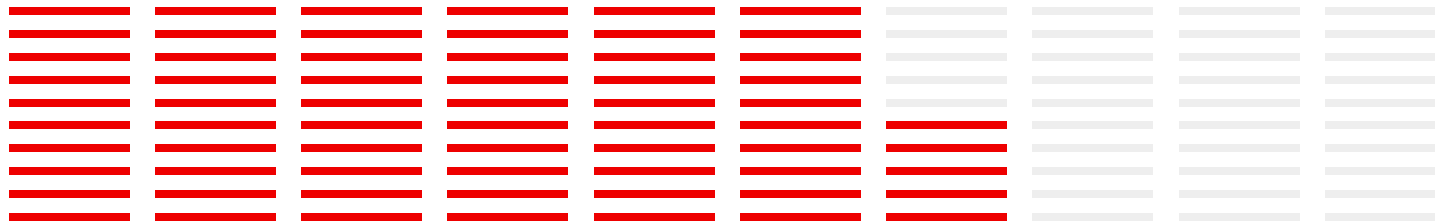
Table slide templates

Timeline slide templates



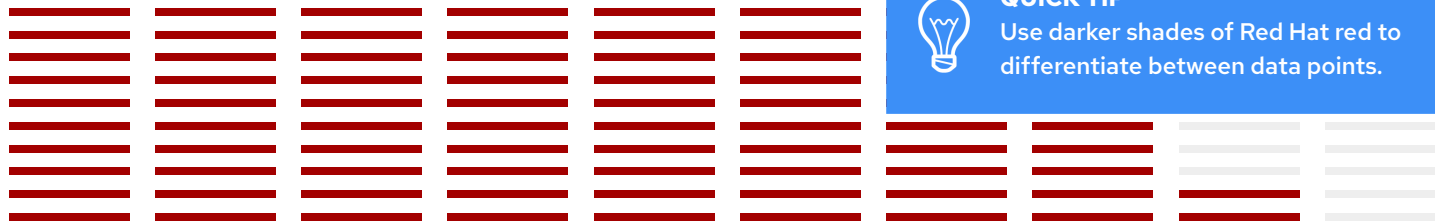
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**QUICK TIP**

Use darker shades of Red Hat red to differentiate between data points.

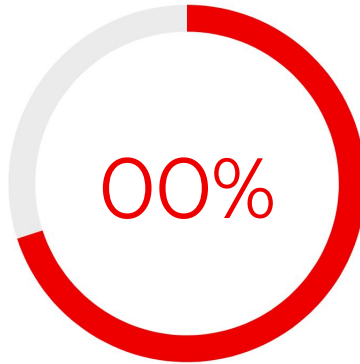
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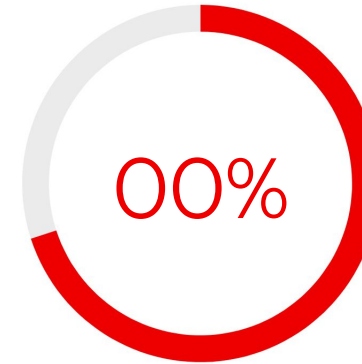
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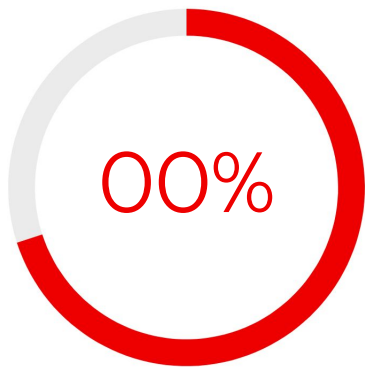


### QUICK TIP

To edit a chart, select it and click the dropdown arrow in the top right. Select "Open source." The percentage will need to be updated manually.

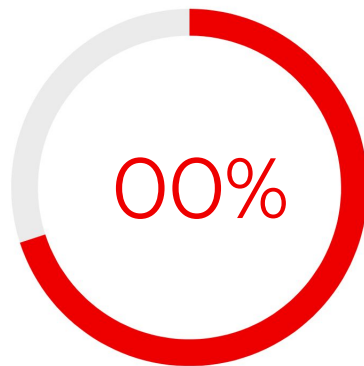
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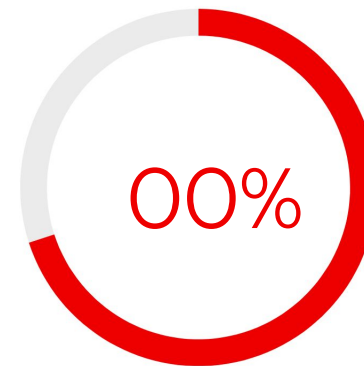
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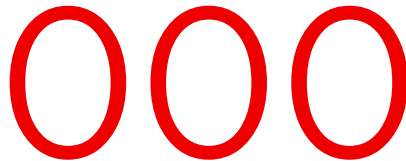
### QUICK TIP

To edit a chart, select it and click the dropdown arrow in the top right. Select "Open source." The percentage will need to be updated manually.

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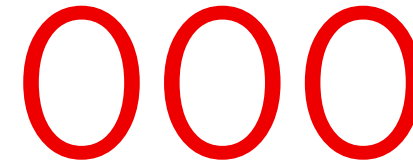
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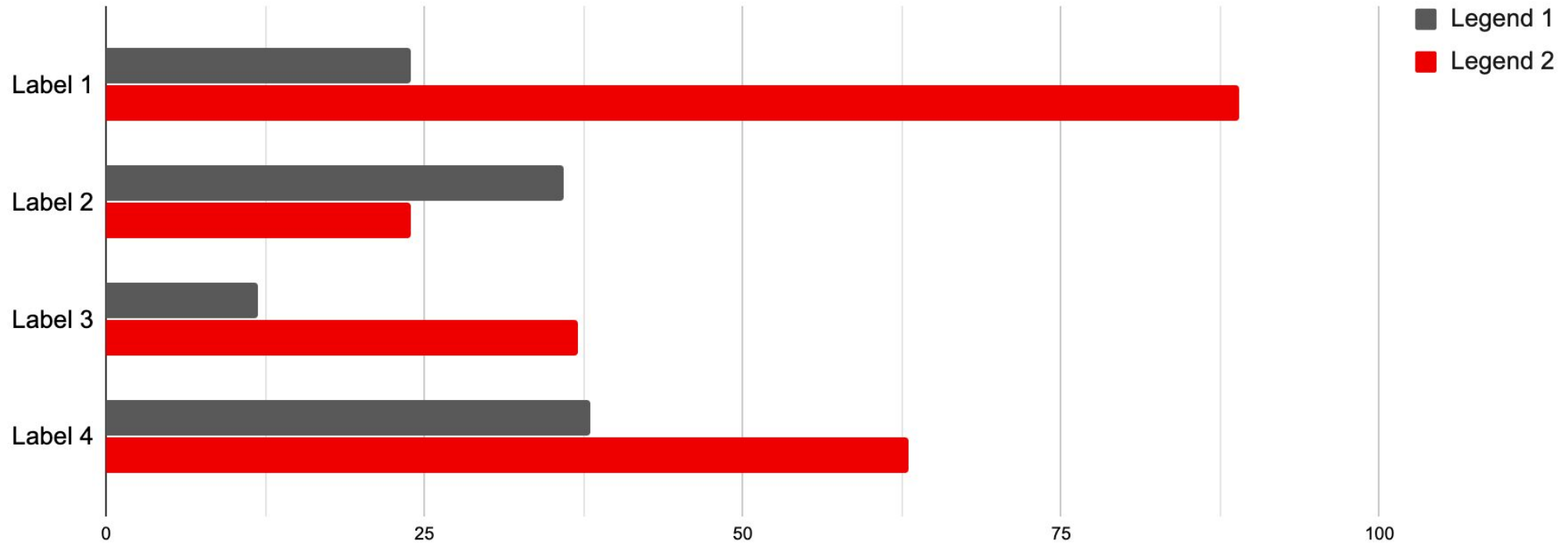
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Chart title



**QUICK TIP**

To edit a chart, select it and click the dropdown arrow in the top right. Select "Open source."

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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**

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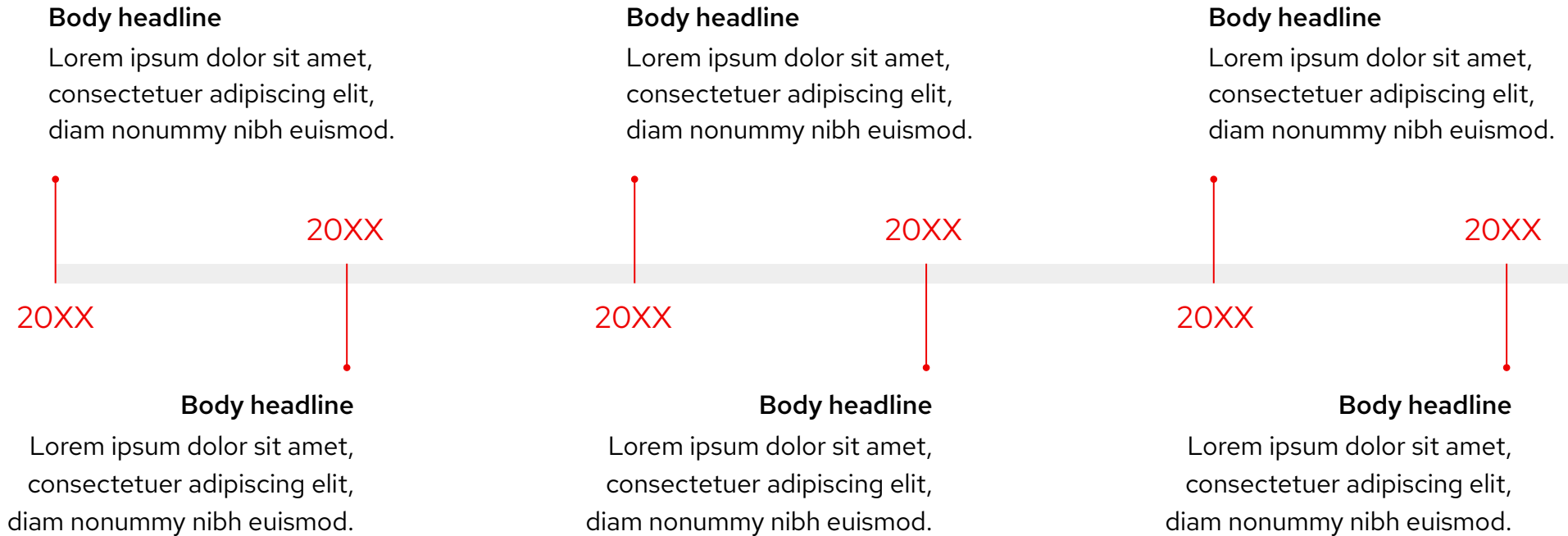
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**QUICK TIP**

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



**Heading**

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Optional section marker or title

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