FRONTEND DEVELOPMENT

WINTERSEMESTER 2020

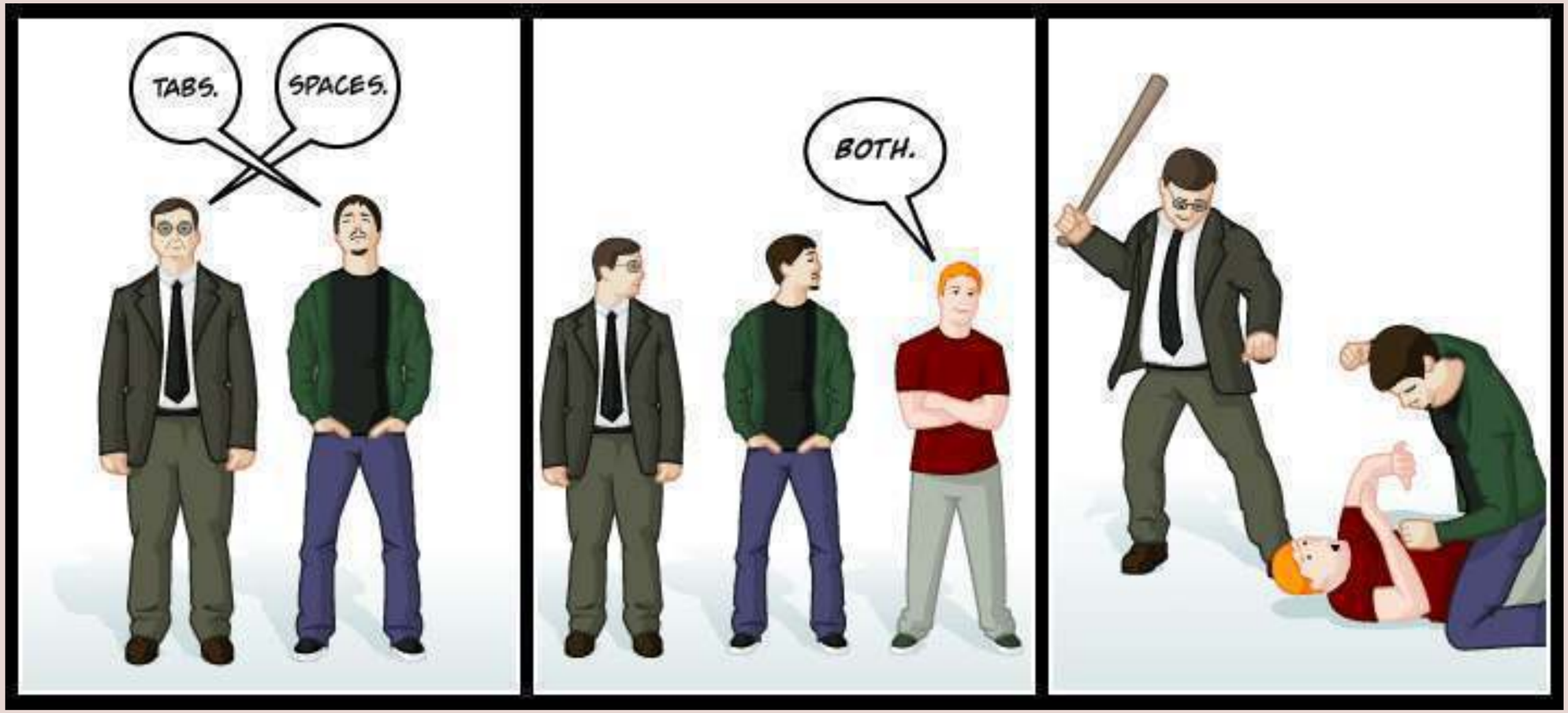
TOOLING

LINTING [1]

“Linting is the automated checking of your source code for programmatic and stylistic errors”

[1] https://www.perforce.com/blog/qac/what-lint-code-and-why-linting-important

LINTING [5]



[5] source https://dev.to/_shadz/tabs-vs-space-4915

LINTING

- Prevent programming errors earlier
  - tells problematic sections of the code earlier
- Enforce code consistency in projects

LINTING IN JS

» spaces vs. tabs (see: https://www.youtube.com/watch?v=SsoOG6ZeyUI)

» naming (camelCase vs. snake_case)

» prevent == vs === errors

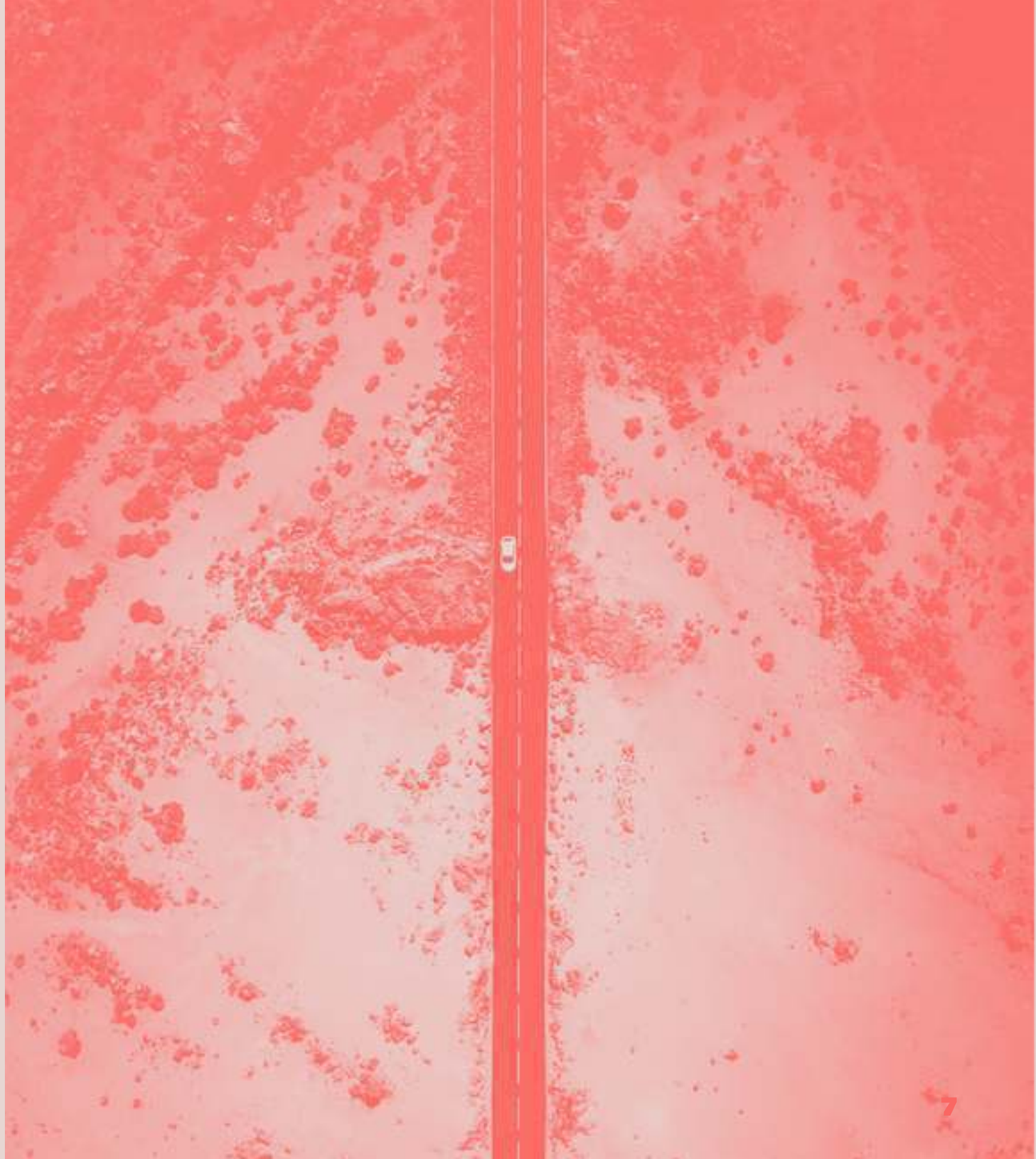
» using single vs double quotes

» code formatting

» ...

LINTING TOOLS

- various tools exist to validate code consistency
  - EditorConfig
  - eslint (defacto standard)
  - prettier (more code formatter)



EDITORCONFIG

EDITORCONFIG

"EditorConfig helps maintain consistent coding styles for multiple developers working on the same project across various editors and IDEs."

```
# Unix-style newlines with a newline ending every file
[*.{js,py}]
indent_style = space
indent_size = 4
end_of_line = lf
insert_final_newline = true
```

ESLINT

ESLINT

» standard tool for linting

» easy to extend

» autofix option

» can be configured [2]

[2] and is configured in every project differently

ESLINT PRESETS

- presets bundle rule-sets together
- well known presets are:
  - eslint-config-airbnb
  - eslint-config-standard
  - eslint-config-google
  - ...

ESLINT
INSTALL ESLINT [3]

```
npx eslint --init # wizard opens (answer questions)
npx eslint . # lints all the files
npx eslint . --fix # lints all the files and fixes most errors
```

[3] see https://eslint.org/docs/user-guide/getting-started for up to date information

ESLINT
ADD ESLINT TO PACKAGE.JSON

```
{
 // other contents of package.json
 "scripts": {
    "start": "http-server .",
    "lint": "npx eslint ."
  },
}

// npm run lint
// npm run lint -- --fix
//              ^^
// are needed so npm passes --fix to eslint
```

ESLINT
RULE CONFIGURATION

```
// .eslintrc.js

module.exports = {
  rules: {
    "no-await-in-loop": "off", // Possible values are "off", "warn", "error"
  }
}
```

ESLINT
DISABLE RULES [4]

» sometimes disabling rules is ok

```
// eslint-disable-next-line max-len
const anExtremelyLongLine = "................"

const anExtremelyLongLine = "................" // eslint-disable-line max-len
```

[4] see https://eslint.org/docs/user-guide/configuring#disabling-rules-with-inline-comments for all options

VERIFYING LINTING RULES

- verify linting continuously
  - on a CI server (eg. github actions)
  - on a git hook (eg. pre-commit, pre-push hook)

GIT HOOKS

» are executed when something happens

» available hooks are

```
pre-commit // <- we'll be using this
pre-push
post-commit
post-push
//...
```

PRE-COMMIT HOOK WITH HUSKY [6]

» Husky adds git hooks during installation

» in package.json add the following:

```
// run: `npm install husky --save-dev`

// add hooks to package.json
{
  "husky": {
    "hooks": {
      "pre-commit": "npm run lint",
      "...": "..."
    }
  }
}
```

[6] see https://www.npmjs.com/package/husky

ESLINT
AUTOFIX STAGED FILES BEFORE COMMIT [15]

» lint-staged only lints files which have changed

» adds autofix possibility to githook

» installation npx mrm lint-staged

[15] docs https://github.com/okonet/lint-staged

TASK TIME

TASK (20 MINUTES)

» Go into your homework group

» Add eslint and pre-commit hook to your homework

» Fix all errors in your code

» I'll try to join each room and help when I'm needed

JS BUNDLING

JS BUNDLING

“A bundler compiles small pieces of code into something larger and more complex, such as a library or application [7]”

[7] source https://rollupjs.org/guide/en/

WHY MODULES [1]

» Maintainability

» Namespacing

» Reusability

[1] https://www.perforce.com/blog/qac/what-lint-code-and-why-linting-important

JS BUNDLING
WHY BUNDLING

» JS apps are a bundle of modules [8]

» older browsers might not understand JS modules

» older node version might not understand JS modules

[8] see module slides

JS BUNDLING TOOLS

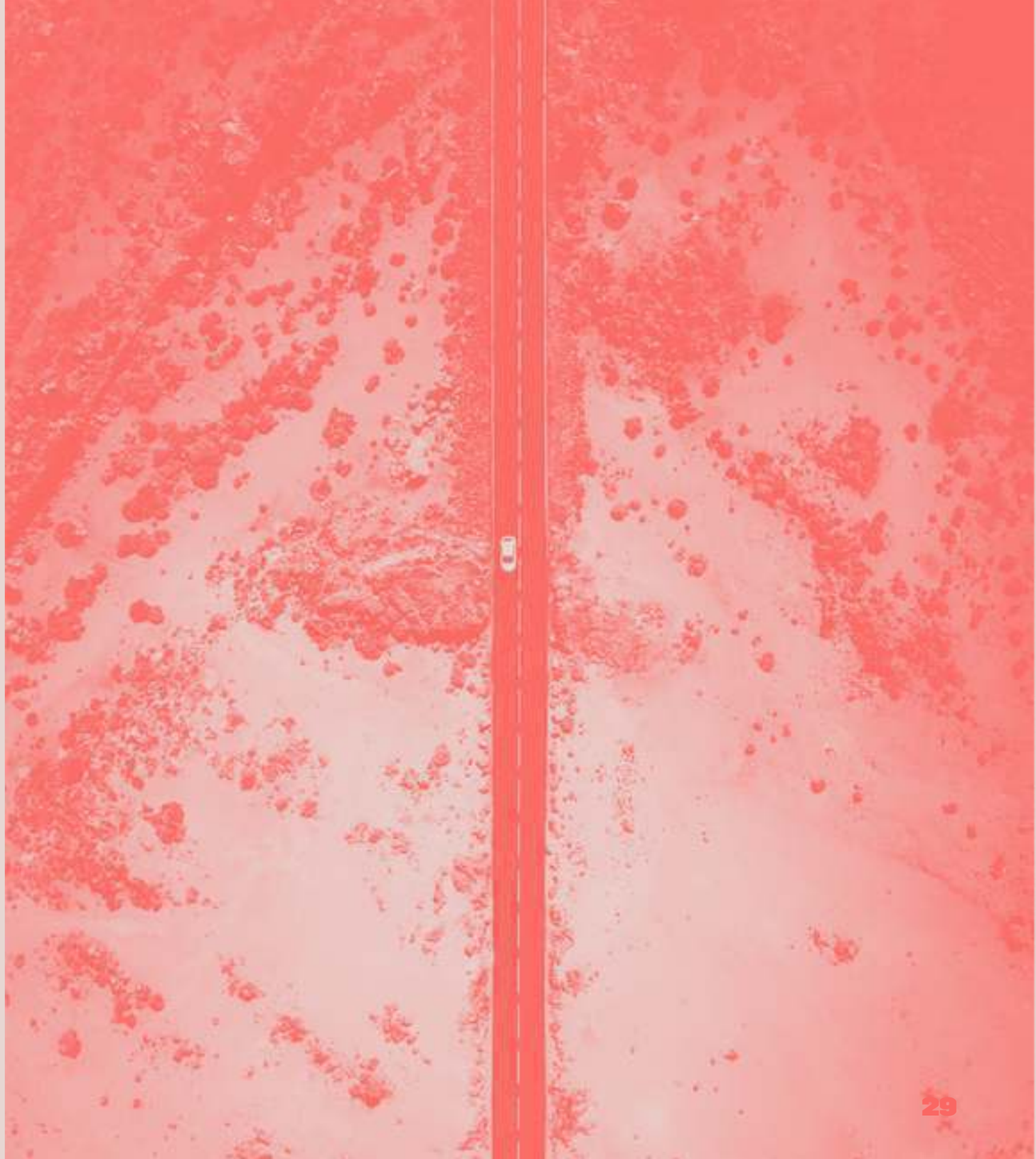
- Tools which resolve modules locally and bundle them together into a bigger bundle
- Bundling tools are:
  - Rollup
  - Parcel
  - Webpack

JS BUNDLING TOOLS WITH ROLLUP

```
// rollup.config.js
export default {
  input: "index.js",
  output: [
    { file: "./build/index.bundle.js", format: "iife" },
  ],
};

// # add build directory to gitignore
// echo ./build > .gitignore

// # build the app
// npx rollup -c
```

TREE-SHAKING

- when adding a module everything gets added to bundle
  - large libraries could increase the bundle unnecessarily
- bundlers which support tree shaking remove unused parts

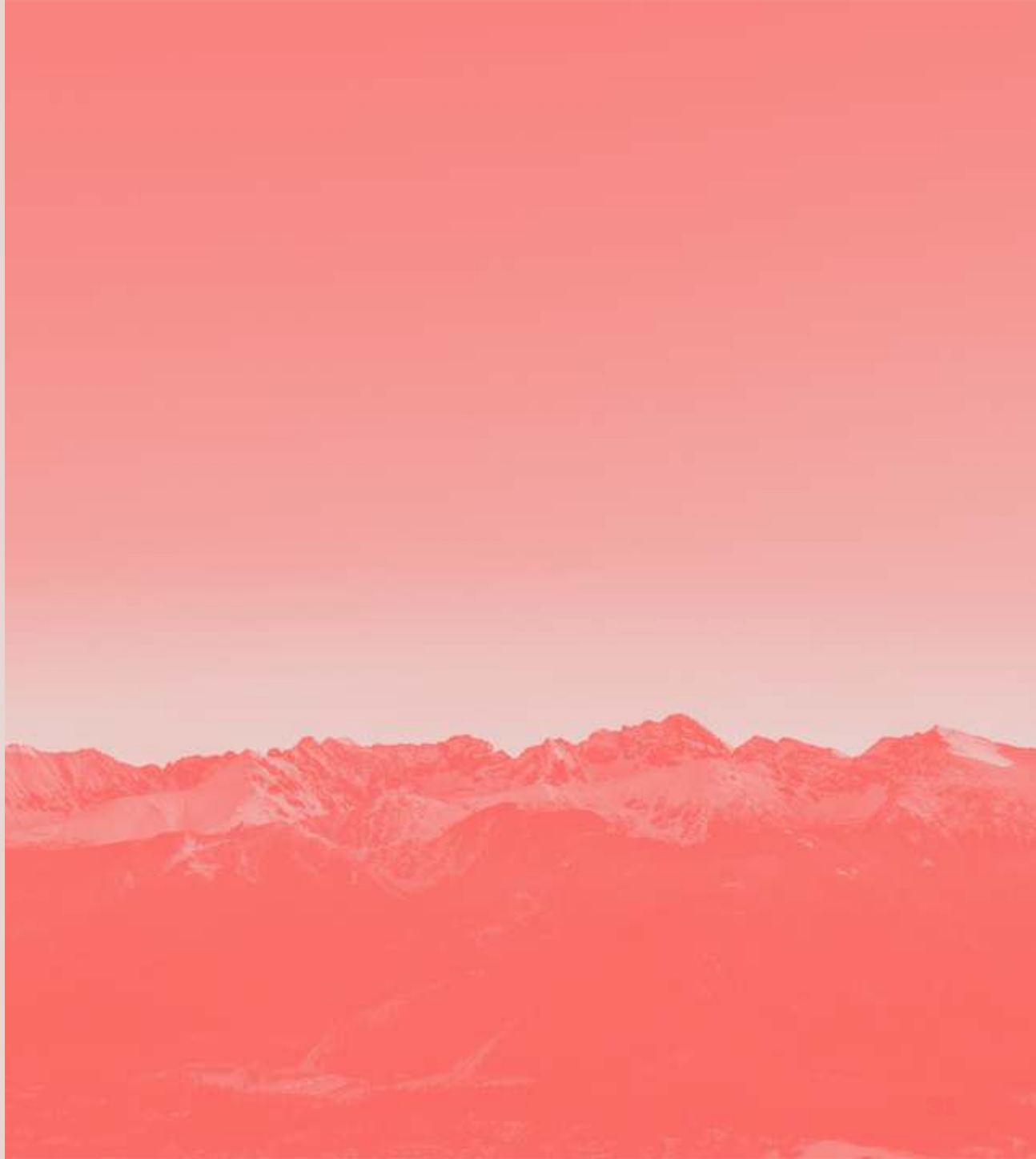


TREE-SHAKING EXAMPLE

```
// a.js
export const aFunction = () => { console.log('a') }
export const bFunction = () => { console.log('a') }

// b.js
import {aFunction} from './a.js'

// Result: b.bundle.js
const aFunction = () => { console.log('test'); };
aFunction();
```

JS BUNDLING TOOLS WITH ROLLUP (NO CONFIG REQUIRED)

```
npx rollup ./index.js -d build/

# bFunction won't be part of the bundle
```



FHS

MINIFICATION [9]

“Minification refers to the process of removing unnecessary or redundant data without affecting how the resource is processed by the browser.”

[9] source https://developers.google.com/speed/docs/insights/MinifyResources#:~:text=Minification%20refers%20to%20the%20process,specific%20optimizations%20to%20learn%20more.

MINIFICATION

- decrease bundle/download size by removing
  - comments
  - formatting
  - unused code
  - shorten variable/ function names
  - ...
- get better google page

MINIFICATION

» minification can be done to:

  » js

  » html

  » css

  » ...

MINIFICATION

MINIFICATION WITH TERSER PLUGIN

```
» npm i rollup-plugin-terser
```

```
// rollup.config.js
import { terser } from "rollup-plugin-terser";

export default {
  input: "index.js",
  plugins: [terser()]
  //        ^^^^^^^^^^
  // add the terser plugin which will minify the sources
  output: [
    {
      file: "./build/index.bundle.js",
      format: "iife",
    },
  ],
};
```

SOURCEMAPS

- debugging minified code is no fun
- Sourcemaps way to revert minimization of code
- are defined as a special comment at the end of the file
  - external
  - //# sourceMappingURL=http://example.com/path/to/your/sourcemap.map

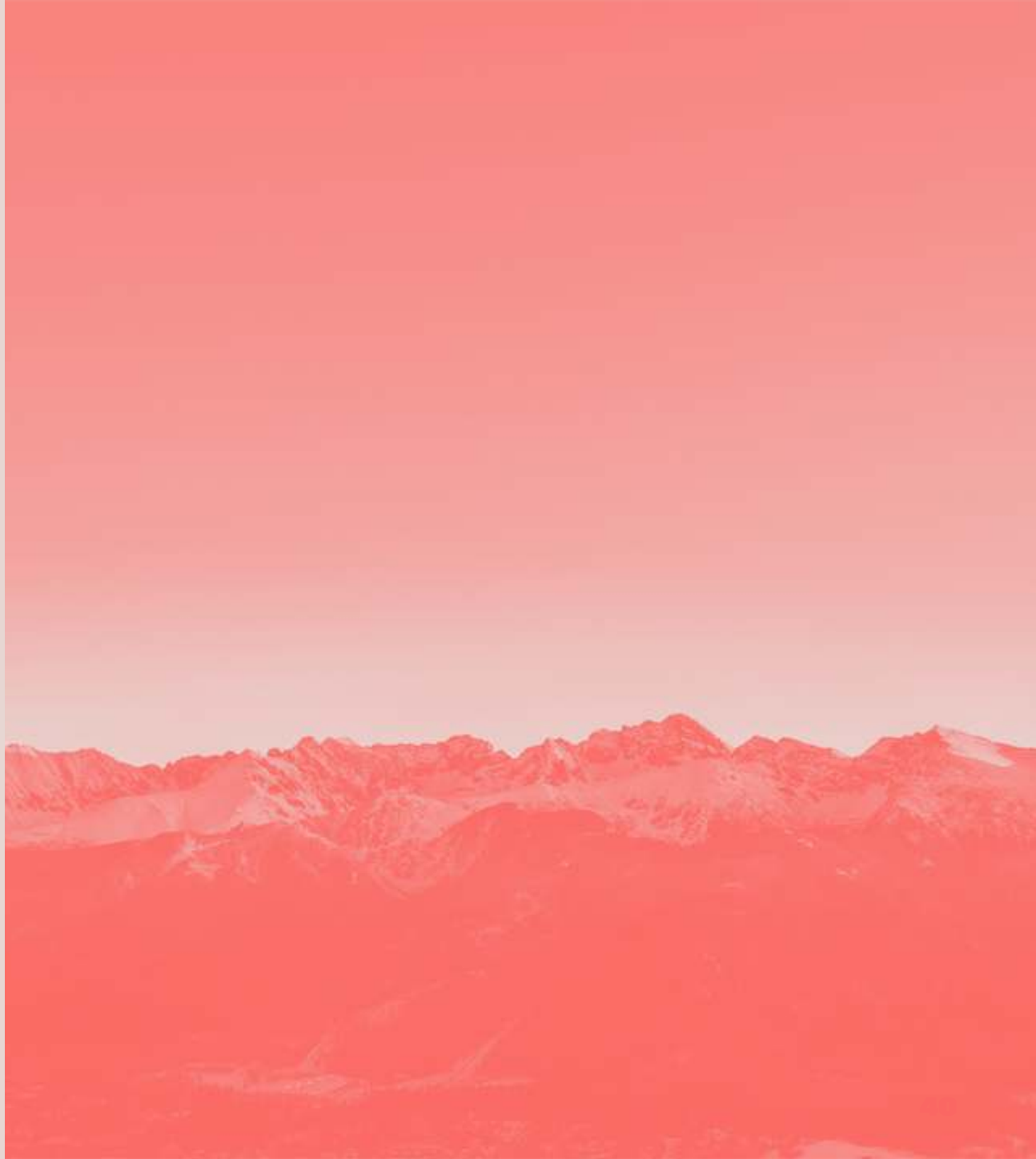
CODE SPLITTING

- split your JS bundle into multiple smaller bundles
  - eg. create a vendor bundle (with libraries)
  - this file can be cached by the browser
  - recurring users don't need to download libs twice

USING ESNEXT FEATURES IN LEGACY BROWSER

TRANSPILING

- source to source translator
- takes code and converts it to code of a different language
  - eg. convert ESNext for old browsers



TRANSPILING
WITH BABEL & ROLLUP

» babel is a transpiler [10]

  » it converts new syntax for the use in old browsers

```
// eg. es6 arrow functions
const myFunction = () => {}

// will become
const myFunction = function myFunction () {}
```

[10] see babel repl

TRANSPILING WITH BABEL & ROLLUP [11]

```
# install babel transpiler
npm install --save-dev @babel/core @babel/preset-env

# install babel plugin for rollup
npm install --save-dev @rollup/plugin-babel
```

[11] installation instructions for other bundlers https://babeljs.io/en/setup

TRANSPILING
CONFIGURE BABEL & ROLLUP

```
// rollup.config.js

import { terser } from "rollup-plugin-terser";
import babel from '@rollup/plugin-babel';

export default {
  input: "index.js",
  plugins: [
    babel({ presets: [['@babel/env', {}]] }),
//1)^^^^^
//2)                    ^^^^^^^^^^

//1) add the babel plugin
//2) define the @babel/env

    // ... other plugins
  ],
};
```

TRANSPILING @BABEL/PRESET-ENV

» a preset is a collection of transformations

  » eg. arrow function to function expression

» preset-env is smart enough to only add transforms which are required

  » can be configured via .browserslistrc

```
// .browserlistrc

> 5% in AT
```

POLYFILLS

POLYFILLS [13]

“New language features may include not only syntax constructs and operators, but also built-in functions.”

[13] source https://javascript.info/polyfills

POLYFILLS

» Math.trunc removes the decimal part of a number

  » Math.trunc(1.23) === 1

  » older browsers might not implement Math.trunc

» Polyfills patch the browser with new APIs

```
Math.trunc = function trunc(it) {
  return (it > 0 ? floor : ceil)(it);
}
```

POLYFILLS
BUNDLE WITH OUR APPLICATION

» Install dependencies

```
# dependencies needed for bundling polyfills
npm i @rollup/plugin-node-resolve @rollup/plugin-commonjs --save-dev

# install polyfills
npm i core-js@3 --save
```

POLYFILLS
CONFIGURE ROLLUP [14]

```
// rollup.config.js

import { terser } from "rollup-plugin-terser";
import babel from '@rollup/plugin-babel';
import resolve from '@rollup/plugin-node-resolve';
import commonjs from '@rollup/plugin-commonjs';

export default {
  input: "index.js",
  plugins: [
    babel({
      presets: [['@babel/env', {
        babelHelpers: 'bundled', // add require statements for polyfills
        exclude: 'node_modules/**',
        presets: [
          ['@babel/env', { "useBuiltIns": "usage", corejs: { version: 3 } }]
        ]
      }]]
    }),
    commonjs(), // signalize rollup that it should bundle commonjs modules
    resolve(), // inline libraries from node_modules
  ],
  // ...
};
```

[14] complete configuration https://gist.github.com/webpapaya/45c5aae75bbe4e8eb72bc19c33e080bf

TASK TIME

TASK

- Go into your homework group
  - on a dedicated branch
- Add rollup and build your app into one file
  - add minification
  - add babel
  - play around with different .browserlistrc configs and see the difference in bundle size

HOMEWORK

- Finish the quiz
- when not already done during todays lecture
  - finish linting your application
  - I'll test via npm run lint
  - any error will result in -2 points

FEEDBACK

» Questions: tmayrhofer.lba@fh-salzburg.ac.at

» Feedback Link