FRONTEND DEVELOPMENT
WINTERSEMESTER 2020

TOOLING

LINTING [1]
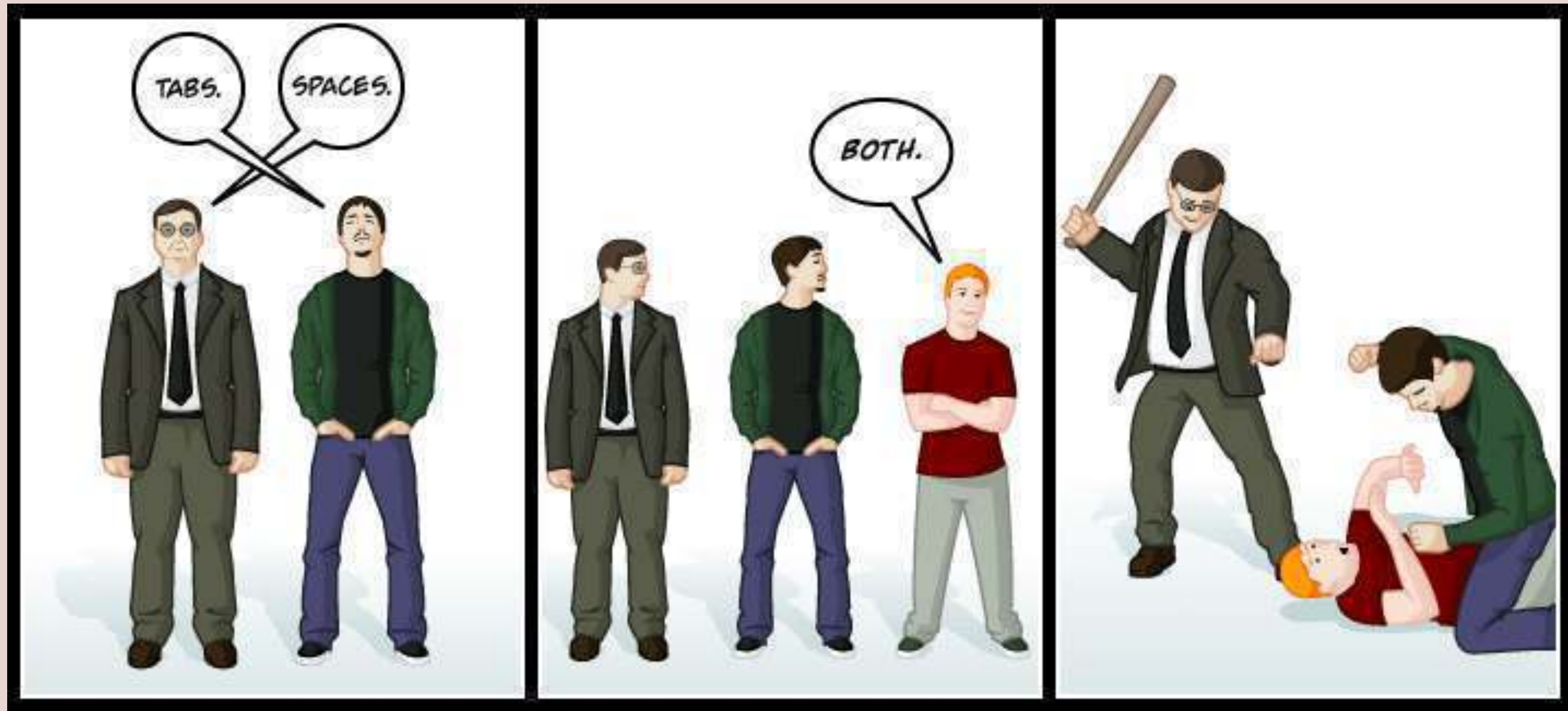
"Linting is the automated checking of your source code for programmatic and stylistic errors"

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

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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

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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

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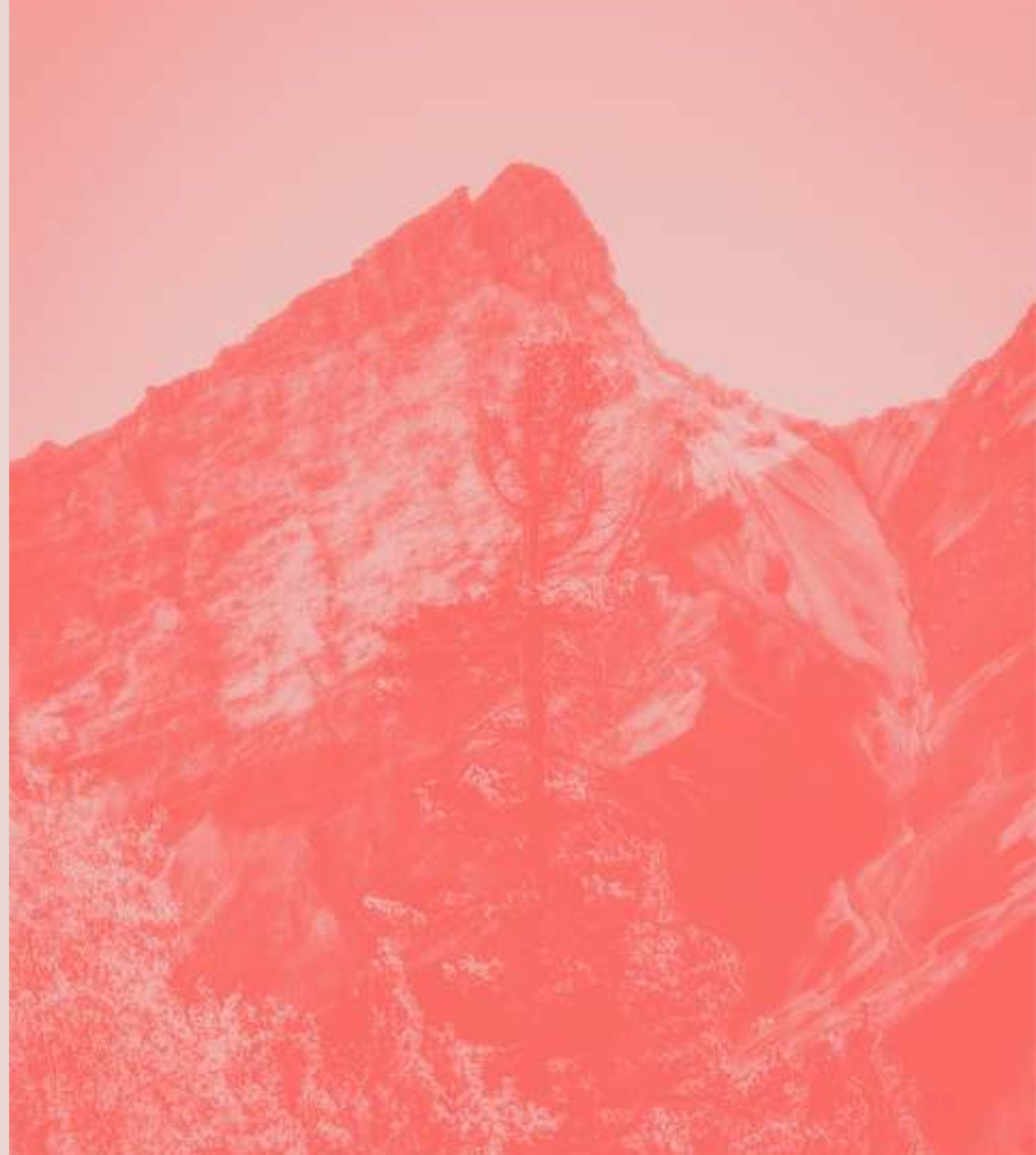
[7] source https://rollupjs.org/guide/en/

WHY MODULES [1]

» Maintainability

» Namespacing

» Reusability

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

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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

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JS BUNDLING TOOLS

» Tools which resolve modules locally and bundle them together into a bigger bundle

» Bundling tools are:

  » Rollup

  » Parcel

  » Webpack

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JS BUNDLING TOOLS
WITH ROLLUP

```js
// 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

```js
// 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
```

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.

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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

```js
// 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

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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

```js
// 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

```javascript
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]

```javascript
// 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