JavaScript Code Linting 101

`Keep your code clean`

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AT THE END:

"Questions section"

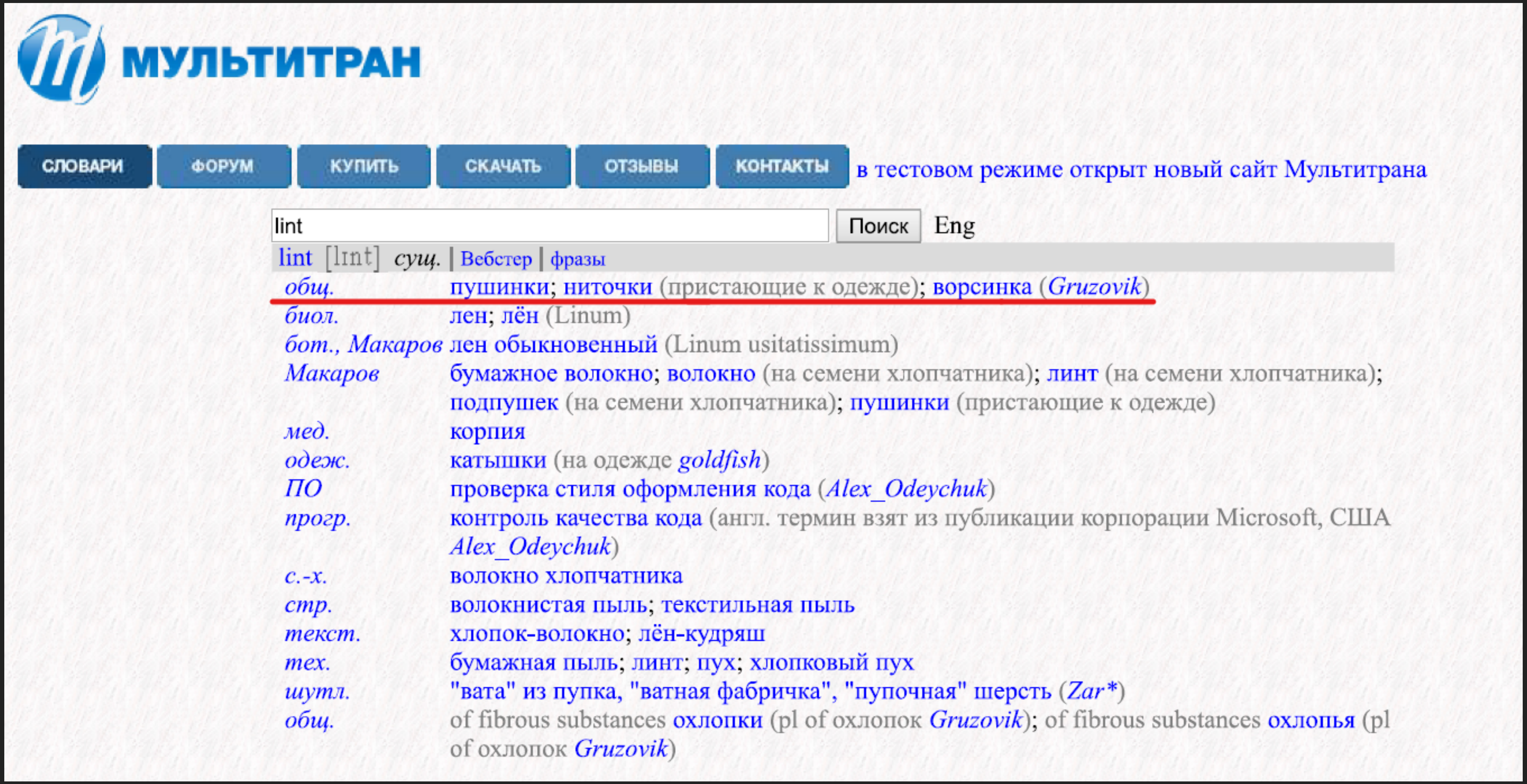
```
/**
 * Take notes, write down slides numbers and we will
 * get back later. We will also have some intermediate
 * questions sections :)
 */
```

WHAT IS CODE LINTING?

Lint, or a linter, is a tool that applies static analysis to source code to flag programming errors, bugs, stylistic errors, and suspicious constructs.

"Wikipedia"

The term originates from a UNIX utility called "Lint" that examined C language source code.

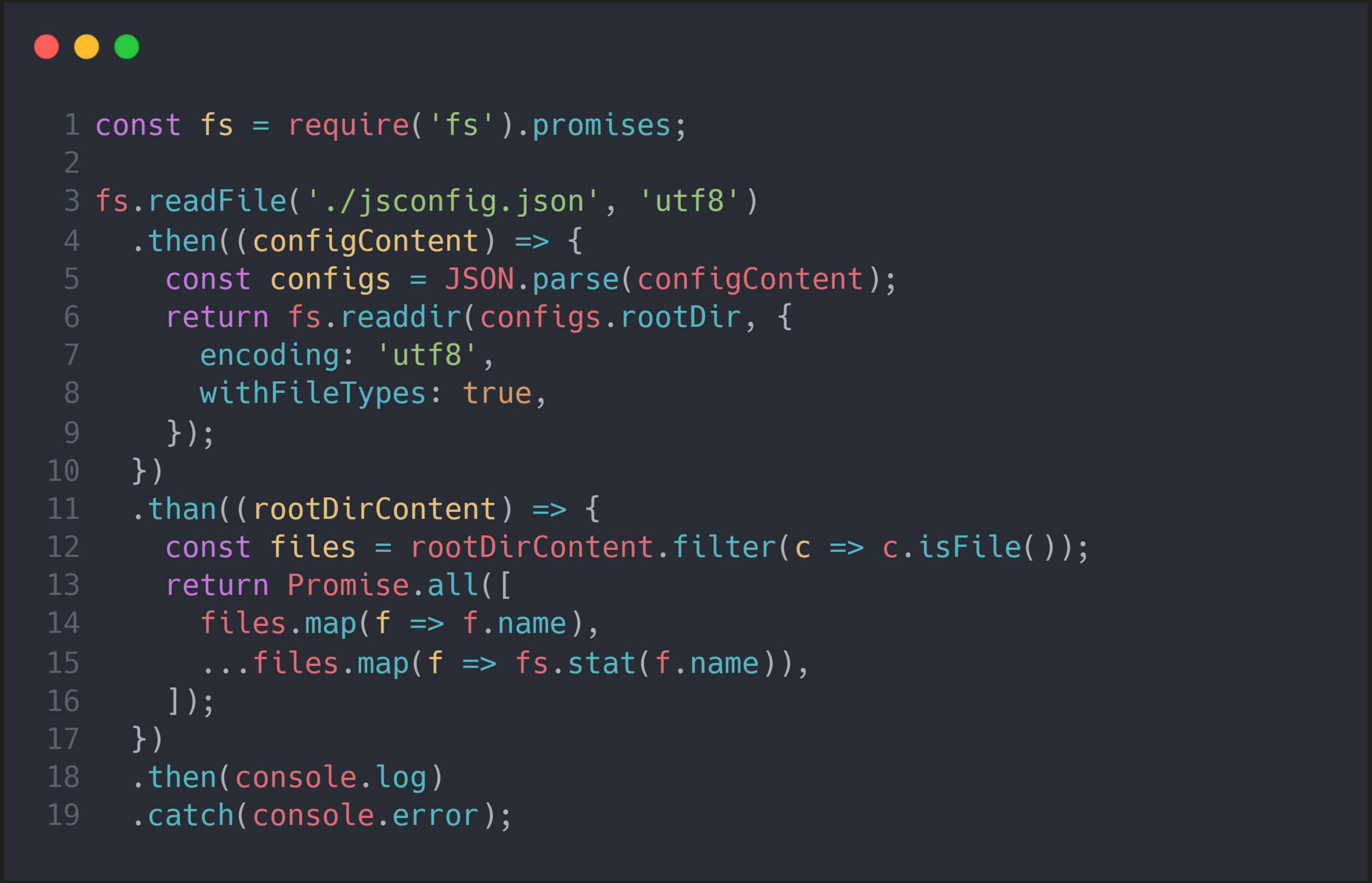


lint [lɪnt] *сущ.* | Вебстер | фразы

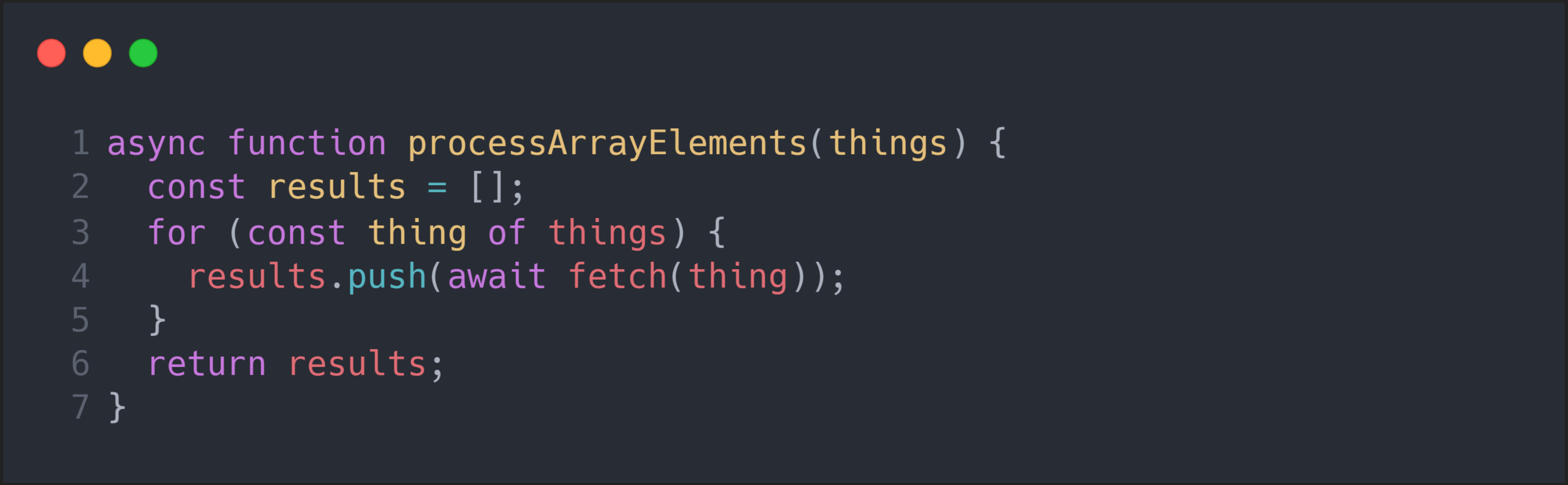
общ.	пушинки; ниточки (пристающие к одежде); ворсинка (*Gruzovik*)
биол.	лен; лён (Linum)
бот., Макаров	лен обыкновенный (Linum usitatissimum)
Макаров	бумажное волокно; волокно (на семени хлопчатника); линт (на семени хлопчатника); подпушек (на семени хлопчатника); пушинки (пристающие к одежде)
мед.	корпия
одеж.	катышки (на одежде *goldfish*)
ПО	проверка стиля оформления кода (*Alex_Odeychuk*)
прогр.	контроль качества кода (англ. термин взят из публикации корпорации Microsoft, США *Alex_Odeychuk*)
с.-х.	волокно хлопчатника
стр.	волокнистая пыль; текстильная пыль
текст.	хлопок-волокно; лён-кудряш
тех.	бумажная пыль; линт; пух; хлопковый пух
шутл.	"вата" из пупка, "ватная фабричка", "пупочная" шерсть (*Zar**)
общ.	of fibrous substances охлопки (pl of охлопок *Gruzovik*); of fibrous substances охлопья (pl of охлопок *Gruzovik*)

PURPOSE OF LINTING CODE?

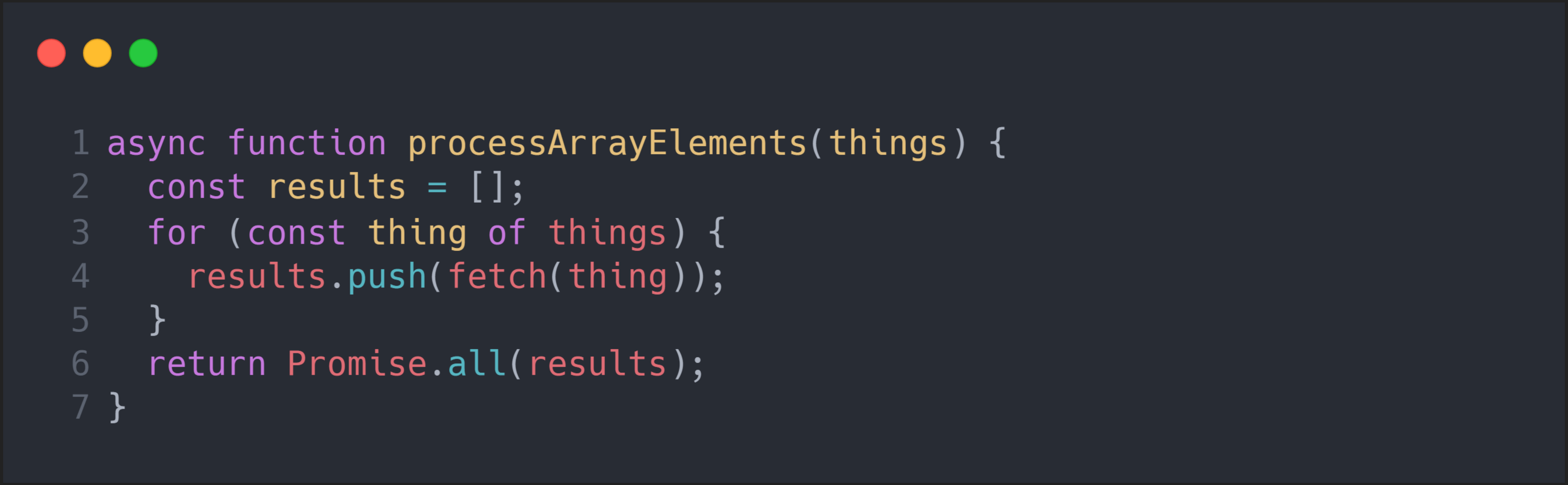
- Detect possible and known bugs, errors and problems



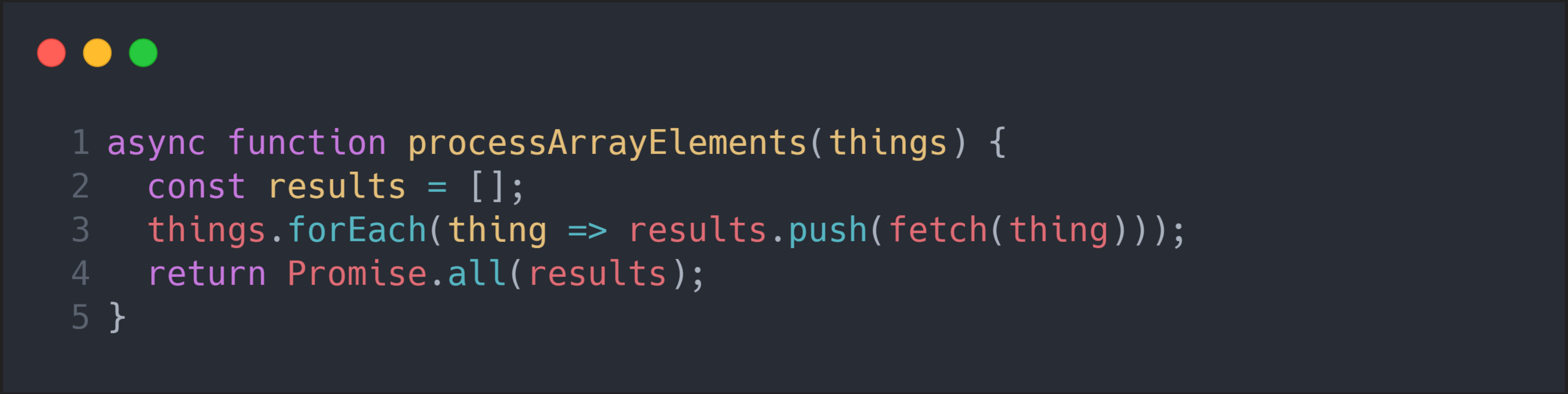
```javascript
const fs = require('fs').promises;

fs.readFile('./jsconfig.json', 'utf8')
  .then((configContent) => {
    const configs = JSON.parse(configContent);
    return fs.readdir(configs.rootDir, {
      encoding: 'utf8',
      withFileTypes: true,
    });
  })
  .than((rootDirContent) => {
    const files = rootDirContent.filter(c => c.isFile());
    return Promise.all([
      files.map(f => f.name),
      ...files.map(f => fs.stat(f.name)),
    ]);
  })
  .then(console.log)
  .catch(console.error);
```



```
async function processArrayElements(things) {
  const results = [];
  for (const thing of things) {
    results.push(await fetch(thing));
  }
  return results;
}
```



```
async function processArrayElements(things) {
  const results = [];
  for (const thing of things) {
    results.push(fetch(thing));
  }
  return Promise.all(results);
}
```



```javascript
async function processArrayElements(things) {
  const results = [];
  things.forEach(thing => results.push(fetch(thing)));
  return Promise.all(results);
}
```

PURPOSE OF LINTING CODE?

- Detect possible and known bugs, errors and problems
- Our code should adhere to a certain syntax conventions
- Our code should match any standard and/or rules
- Can help us keep our code clean
- Can help us do a code reviews
- Detect known heisenbugs

Heisenbug, Bohrbug, Mandelbug, Schroedinbug, Hindenbug, Higgs-bugson

JAVASCRIPT LINTING TOOLS

Tool	Downloads	Issues	PRs	Updates	Stars	License
Eslint	> 7.5M	98	40	4-6/week	> 13.5K	MIT
JSHint	> 540K	356	58	1-2/week	> 8K	MIT
Standard	> 163K	72	8	3-5/year	> 20K	MIT
JSLint	> 25K	15	0	1/month	475	BSD-3-Clause

Deprecated: JSCS (merged with ESLint), Validator Pro

Out of scope: TSLint (for TypeScript), Google Closure Compiler

POPULAR ESLINT CONFIGURATIONS

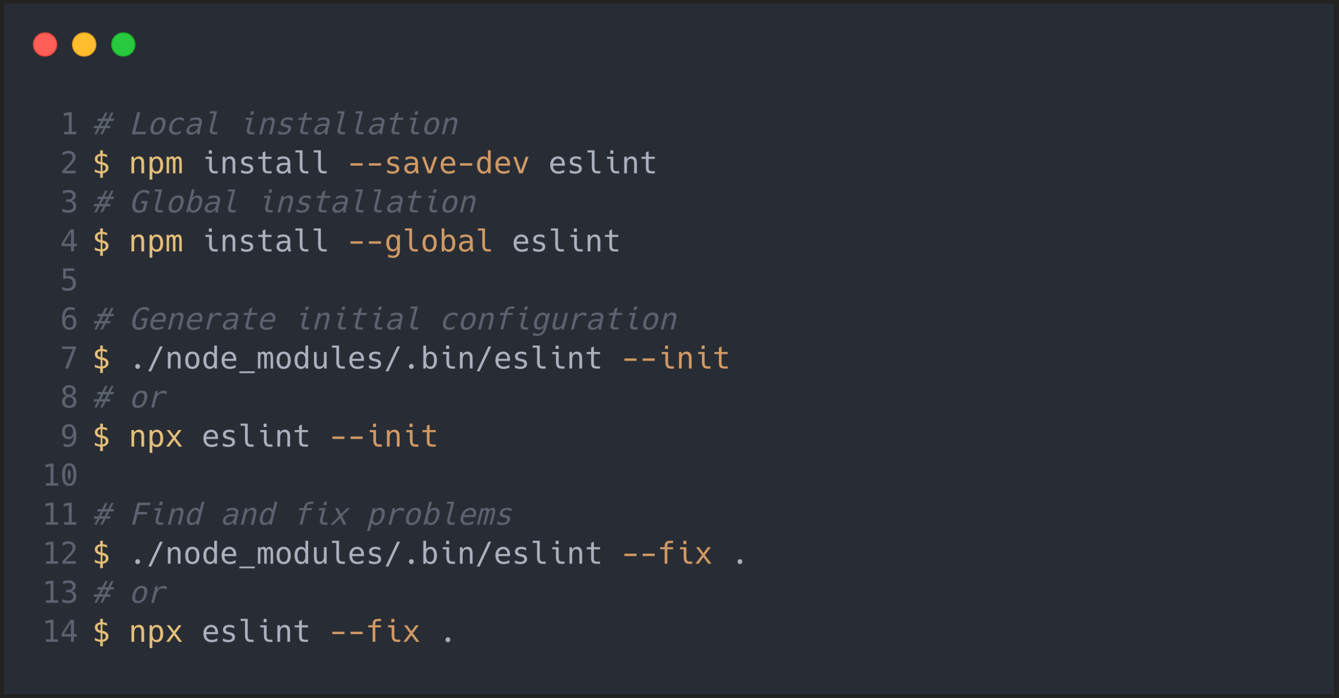
- Airbnb (eslint-config-airbnb)
- Standard (eslint-config-standard)
- Canonical (eslint-config-canonical)
- Problems (eslint-config-problems)
- ESLint recommended (already installed with ESLint)
- Facebook (eslint-config-fbjs)
- Google (eslint-config-google)
- ES (eslint-config-es)

POPULAR ESLINT PLUGINS

- Angular (eslint-plugin-angular)
- React (eslint-plugin-react)
- React Native (eslint-plugin-react-native)
- Vue (eslint-plugin-vue)
- GraphQL (eslint-plugin-graphql)
- JSDoc (eslint-plugin-jsdoc)
- Lodash (eslint-plugin-lodash)
- HTML (eslint-plugin-html)
- Import (eslint-plugin-import)
- Security (eslint-plugin-security)
- MongoDB (eslint-plugin-mongodb)
- JSON (eslint-plugin-json)
- Markdown (eslint-plugin-markdown)
- SQL (eslint-plugin-sql)
- Optimize Regexp (eslint-plugin-optimize-regex)
- Node (eslint-plugin-node)

...and much more plugins for testing environments (Mocha, Jest, Chai, Jasmine), project structures, filenames, code comments, preventing security issues (like XSS detection) and so on.

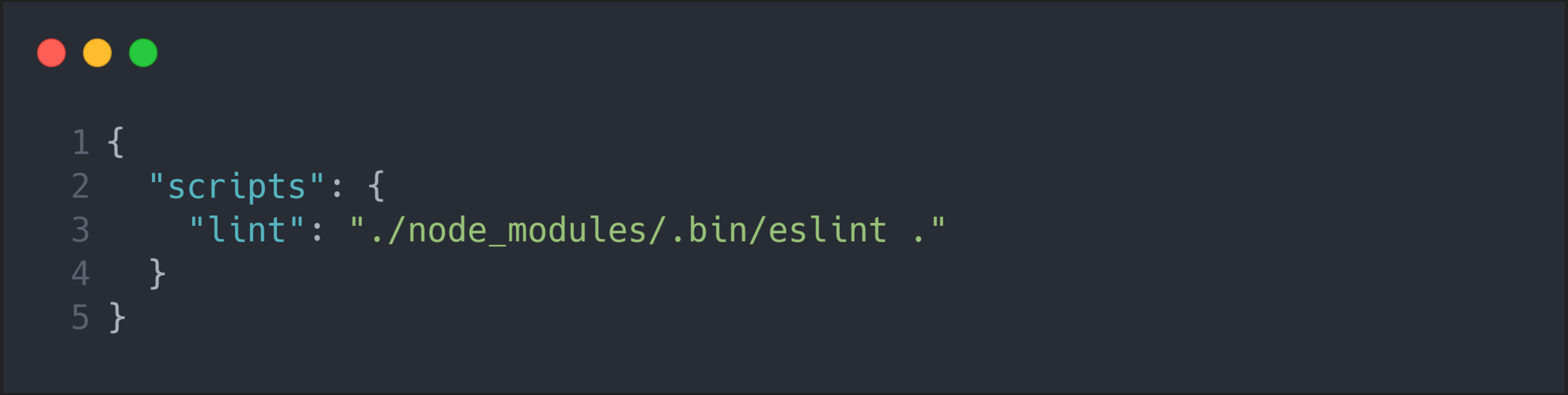
ESLINT INSTALLATION AND CONFIGURATION



```
# Local installation
$ npm install --save-dev eslint
# Global installation
$ npm install --global eslint

# Generate initial configuration
$ ./node_modules/.bin/eslint --init
# or
$ npx eslint --init

# Find and fix problems
$ ./node_modules/.bin/eslint --fix .
# or
$ npx eslint --fix .
```

Configuration file (.eslintrc.*) will appear in project's root

ADD ESLINT TO PACKAGE.JSON



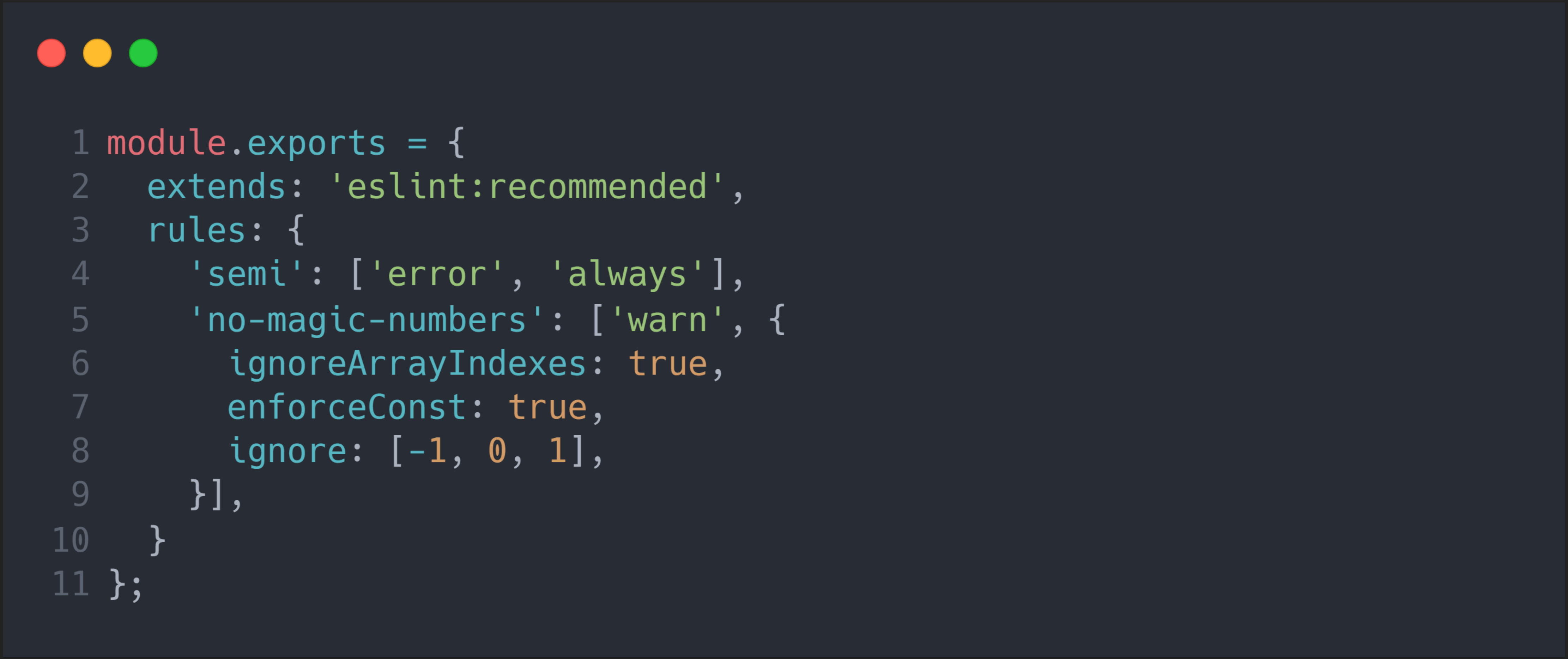
```json
{
  "scripts": {
    "lint": "./node_modules/.bin/eslint ."
  }
}
```

IDE INTEGRATION

ESLint for Visual Studio Code

...but also available for: Atom, JetBrains editors, Brackets, Eclipse, Emacs, Vim and Sublime Text 3

WRITING OWN (SHAREABLE) CONFIGURATIONS



```js
module.exports = {
  extends: 'eslint:recommended',
  rules: {
    'semi': ['error', 'always'],
    'no-magic-numbers': ['warn', {
      ignoreArrayIndexes: true,
      enforceConst: true,
      ignore: [-1, 0, 1],
    }],
  }
};
```

WHAT COULD BE INSIDE OF CONFIGURATION FILE?

- Parser: Espree (default), @typescript-eslint/parser
- parserOptions:
  - ecmaVersion: 2019 (2015, 5 (default), 6, 9)
  - sourceType: 'script' (default) / 'module'
  - ecmaFeatures:
    - globalReturn
    - impliedStrict
    - jsx
- extends: string / array
- globals: object
- plugins: array
- overrides: array of objects
- rules: object
  - off / 0
  - warn / 1
  - error / 2

WHAT COULD BE INSIDE OF CONFIGURATION FILE?

- env:
  - browser
  - node
  - shared-node-browser
  - es6
  - commonjs
  - amd
  - worker
  - serviceworker
  - webextensions
  - mocha / chai / jasmine / jest
  - jquery
  - environments from plugins

DISABLE ESLINT WITH COMMENTS

```
/* eslint quotes: ["error", "double"], curly: 2 */
/* eslint-disable */
/* eslint-enable */
/* eslint-disable no-global-assign, curly */
// eslint-disable-line
// eslint-disable-line yoda
// eslint-disable-next-line
```

ESLINTIGNORE

With ".eslintignore" file we can disable ESLint for specific files or folders. Same syntax to .gitignore, .npmignore etc.

BEFORE PUBLISHING

```json
{
  "name": "eslint-config-our-pretty-name",
  "keywords": [
    "eslint",
    "eslintconfig"
  ],
  "peerDependencies": {
    "eslint": ">=5.14.0"
  }
}
```

WHERE TO FIND RULES LIST?

https://eslint.org/docs/rules

RULES CATEGORIES

Possible Errors

Best Practices

Variables

Node.js and Common.js

Stylistic Issues

ECMAScript 6

WHAT WE CAN HANDLE WITH BUILT-IN RULES?

WRITING ESLINT PLUGIN

The easiest way: with Yeoman generator (generator-eslint)

```
$ npm install --global yo generator-eslint

# create a new ESLint plugin
$ yo eslint:plugin

# create a new ESLint rule
$ yo eslint:rule
```

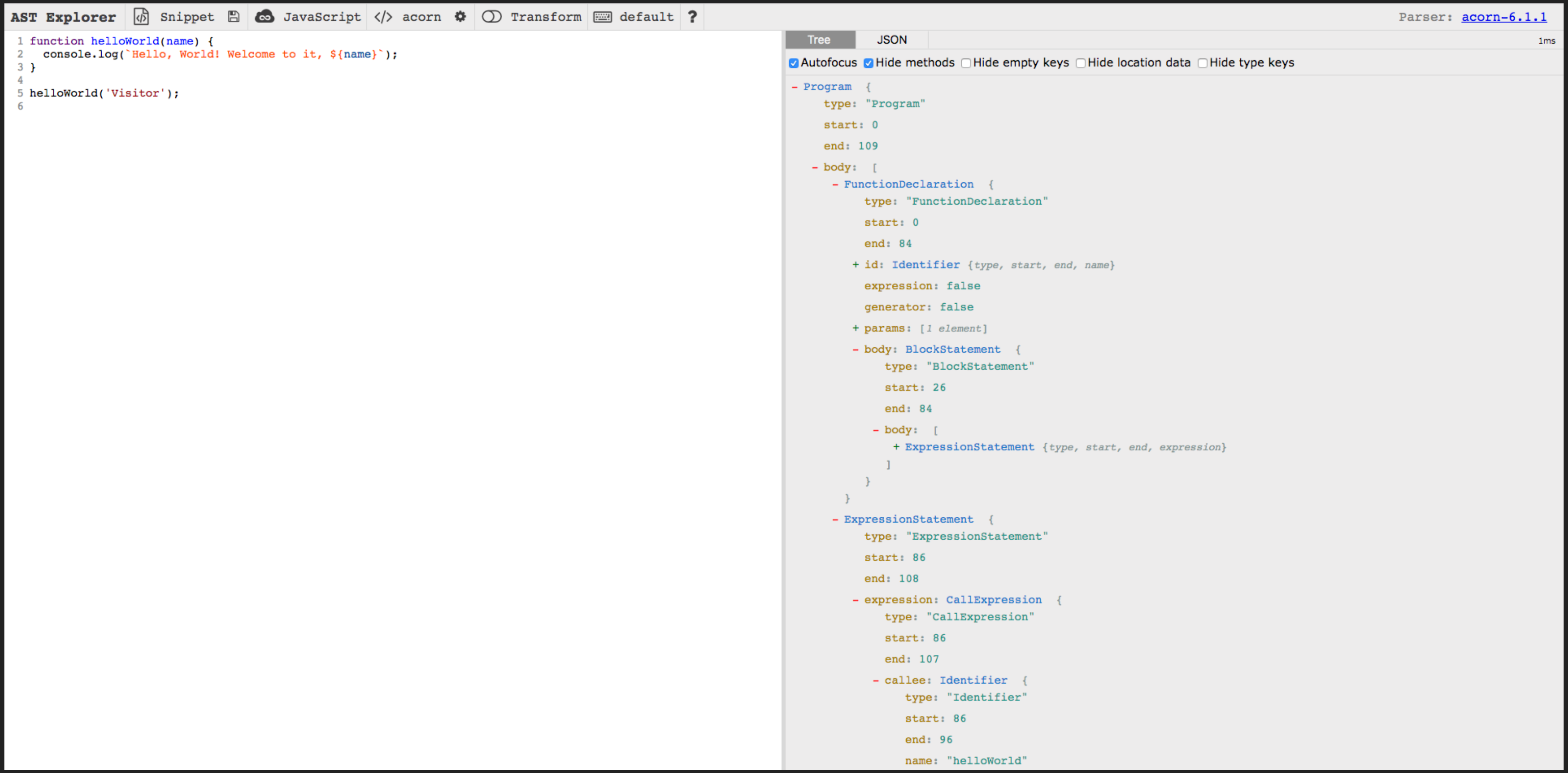
WHAT CAN WE HAVE INSIDE OF A PLUGIN?

1. Custom rules
2. Custom environments (define globals and parser options)
3. Create file processors (even with auto-fix)
4. Custom configs (including our rules)

HOW DOES ESLINT SEE OUR CODE?

AST - Abstract Syntax Tree

HTTPS://ASTEXPLORER.NET

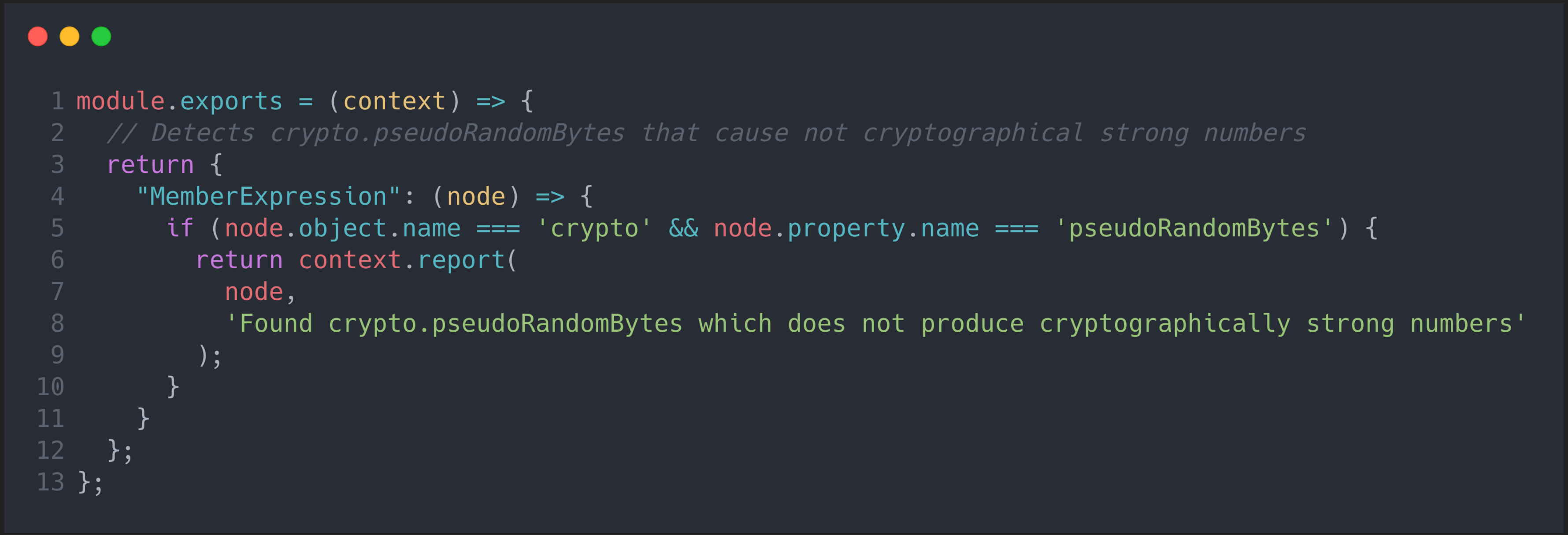


```javascript
function helloWorld(name) {
  console.log(`Hello, World! Welcome to it, ${name}`);
}

helloWorld('Visitor');
```

[✓] Autofocus [✓] Hide methods [ ] Hide empty keys [ ] Hide location data [ ] Hide type keys

```
- Program  {
     type: "Program"
     start: 0
     end: 109
   - body:  [
      - FunctionDeclaration  {
           type: "FunctionDeclaration"
           start: 0
           end: 84
         + id: Identifier {type, start, end, name}
           expression: false
           generator: false
         + params: [1 element]
         - body: BlockStatement  {
              type: "BlockStatement"
              start: 26
              end: 84
            - body:  [
               + ExpressionStatement {type, start, end, expression}
              ]
           }
        }
      - ExpressionStatement  {
           type: "ExpressionStatement"
           start: 86
           end: 108
         - expression: CallExpression  {
              type: "CallExpression"
              start: 86
              end: 107
            - callee: Identifier  {
                 type: "Identifier"
                 start: 86
                 end: 96
                 name: "helloWorld"
```

RULE EXAMPLE

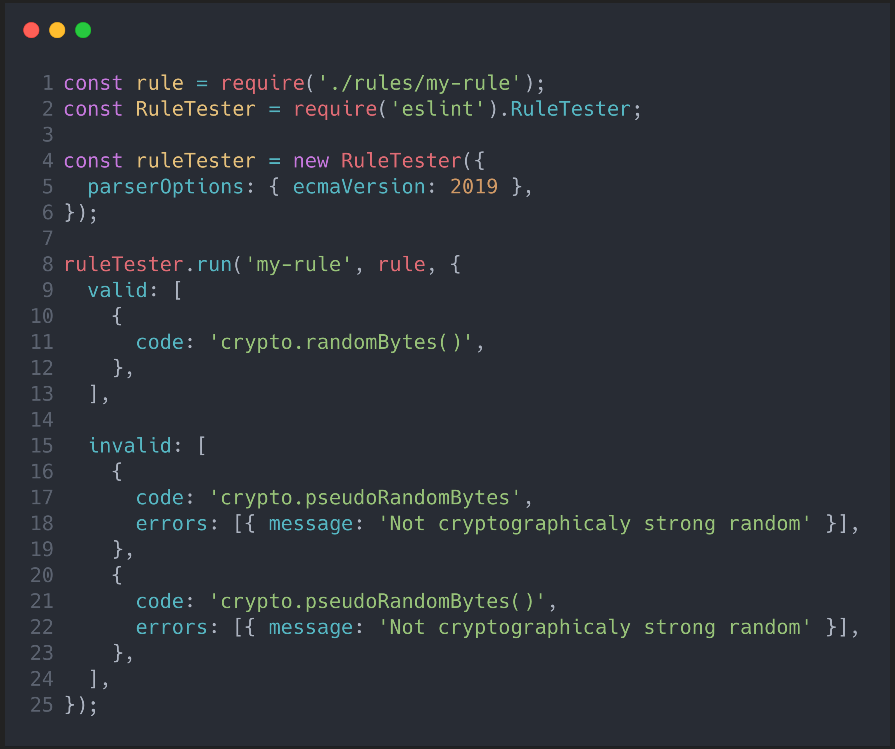


```
module.exports = (context) => {
  // Detects crypto.pseudoRandomBytes that cause not cryptographical strong numbers
  return {
    "MemberExpression": (node) => {
      if (node.object.name === 'crypto' && node.property.name === 'pseudoRandomBytes') {
        return context.report(
          node,
          'Found crypto.pseudoRandomBytes which does not produce cryptographically strong numbers'
        );
      }
    }
  };
};
```

https://eslint.org/docs/developer-guide/working-with-rules

HOW THEN WE TEST OUR PLUGIN RULES?

ESLint gives us a RuleTester



```javascript
const rule = require('./rules/my-rule');
const RuleTester = require('eslint').RuleTester;

const ruleTester = new RuleTester({
  parserOptions: { ecmaVersion: 2019 },
});

ruleTester.run('my-rule', rule, {
  valid: [
    {
      code: 'crypto.randomBytes()',
    },
  ],

  invalid: [
    {
      code: 'crypto.pseudoRandomBytes',
      errors: [{ message: 'Not cryptographicaly strong random' }],
    },
    {
      code: 'crypto.pseudoRandomBytes()',
      errors: [{ message: 'Not cryptographicaly strong random' }],
    },
  ],
});
```

YOU ARE AWESOME!

Thank you for participation =)