Let's build your own VS Code automated refactorings

ConFoo 2022

👉 bit.ly/vscode-refactorings-confoo (slides)

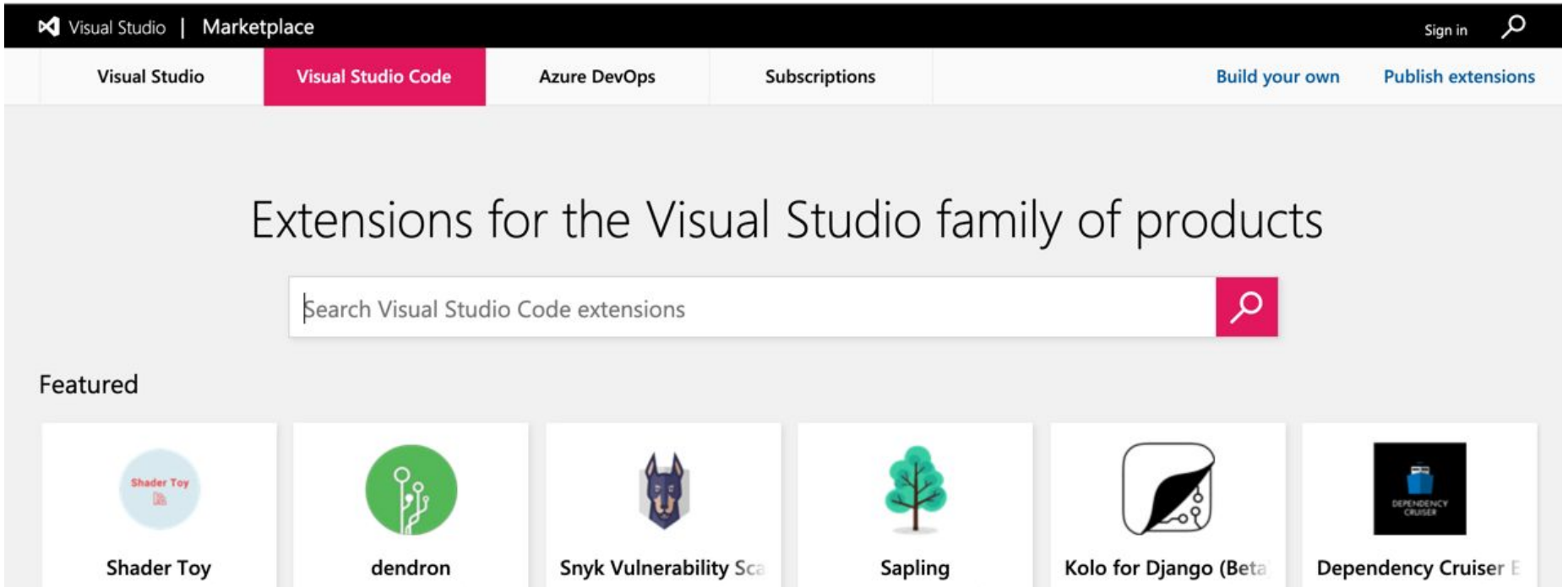
Slides

👇

bit.ly/vscode-refactorings-confoo

You can build your own extension, using JS/TS

👉 code.visualstudio.com/api/references/vscode-api (the documentation is helpful)



Let's see how to build your own extension to enhance your editor!

Hi, I'm Nicolas 👋

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Senior Software Developer
@ Centered

understandlegacycode.com 💡

Author of Abracadabra 🔮
(refactoring extension for JS/TS in VS Code)

Let’s do it for real? 

A repository to follow along

👉 bit.ly/vscode-extension-code

Checkout the **`tags`** I give you 😉

You may code along… or simply follow

`git stash` if necessary

Let's get Centered

We'll use Centered.app as we work to make sure we're in time!

Centered

Let's do it! 

```
git checkout start
```

Scaffolding

“Your First Extension”

👉 code.visualstudio.com/api/get-started/your-first-extension

The “Getting Started” docs is really good.

It would guide you until the publication of your extension 🏆

Yeoman will scaffold a new extension for you

Quickly get started with an up-to-date infrastructure

👉 yeoman.io

We have a starting point! 👨‍💻👩‍💻

```
git checkout 1-yeoman
```

Interacting with the code

Use the VS Code API Editor to read & write code

👉 code.visualstudio.com/api/references/vscode-api

TypeScript helps getting familiar with the API

- `window.activeTextEditor.document.getText()` to read code
- `activeTextEditor.edit()` to edit the code
  - Takes a callback that provides an `TextEditorEdit` with a `replace()` method
- We can also use `Range` and `Position` to adapt the selection

You can configure keyboard shortcuts

👉 code.visualstudio.com/api/references/contribution-points

You can provide different type of “contributions”

`keybindings` is the one that allows you to configure a default shortcut

Users may customize it

```
{
  "contributes": {
    "keybindings": [
      {
        "command": "extension.sayHello",
        "key": "ctrl+f1",
        "mac": "cmd+f1",
        "when": "editorTextFocus"
      }
    ]
  }
}
```

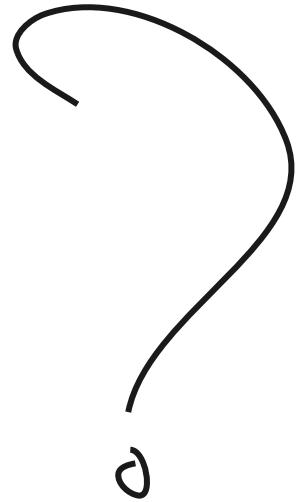
We have a basic extension

```
git checkout 2-read-write
```

Transform the code (AST)

A data structure to represent code

```
console.log("Hello world!")
```



A data structure to represent code

```
console.log("Hello world!")
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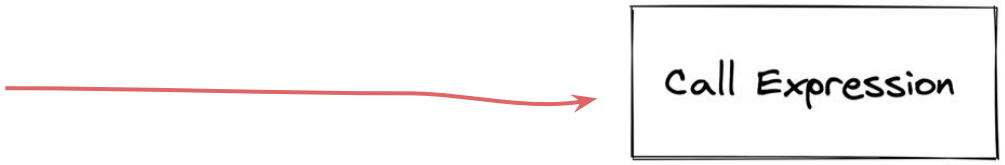
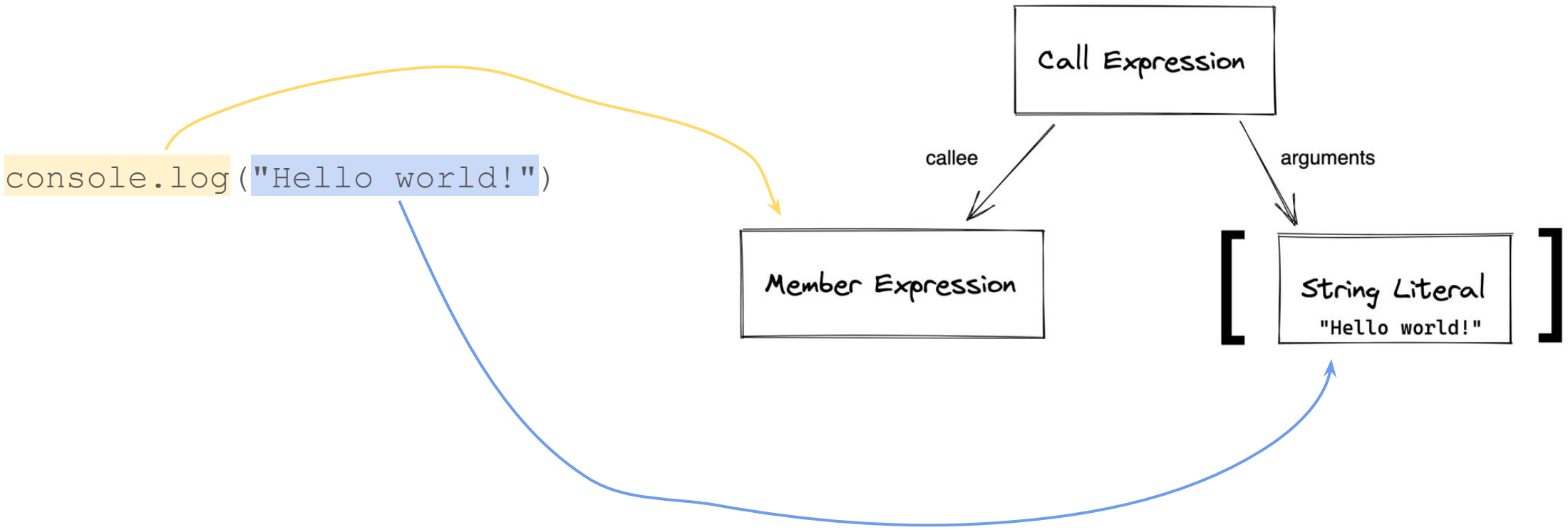


A data structure to represent code



A data structure to represent code

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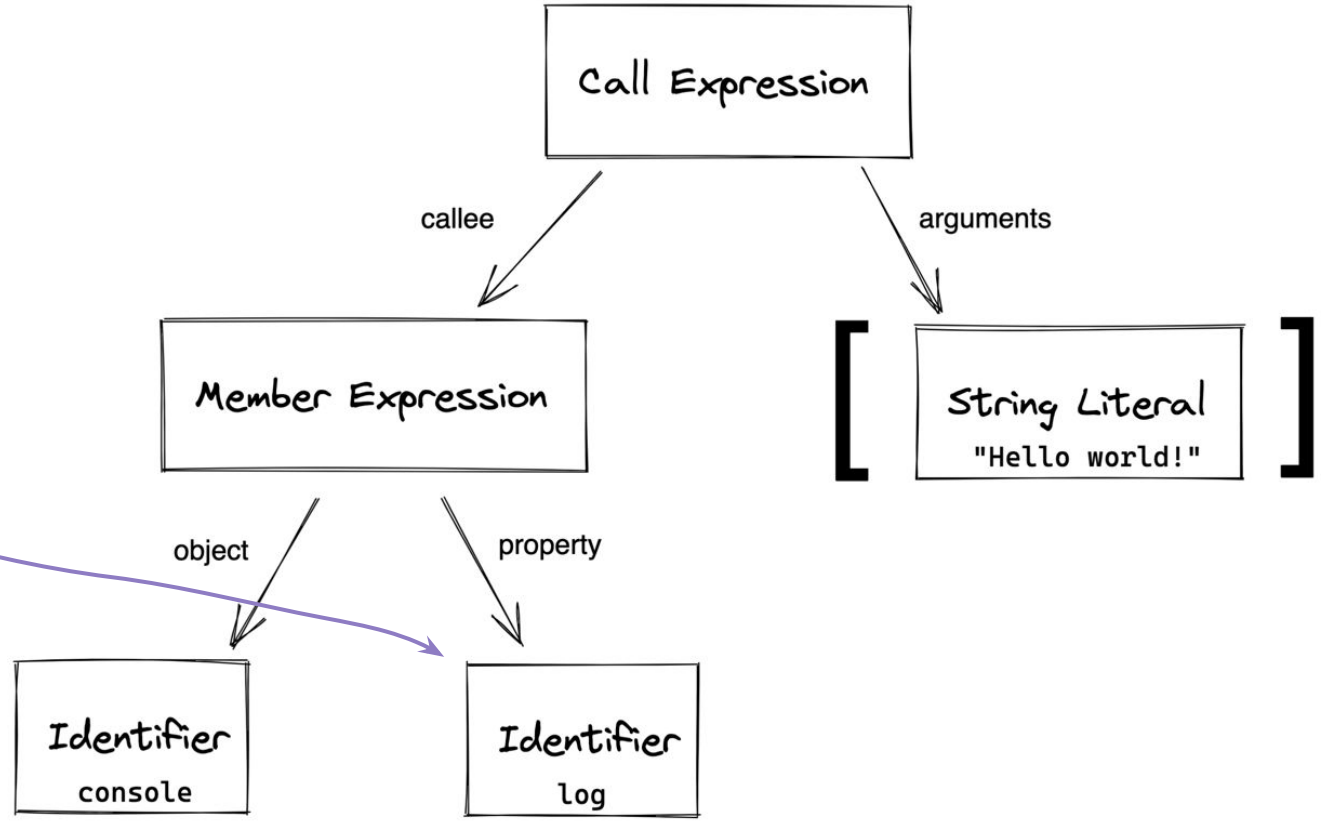
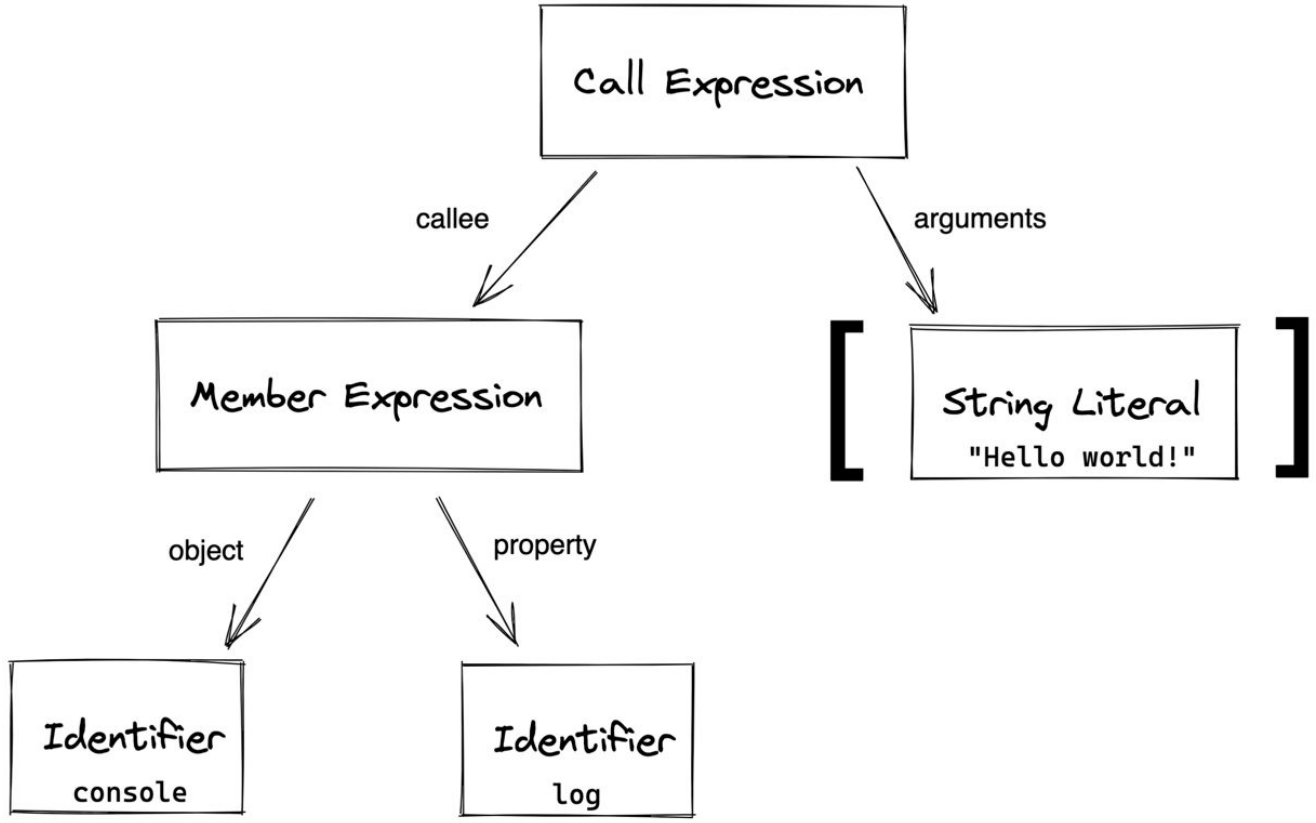


A data structure to represent code

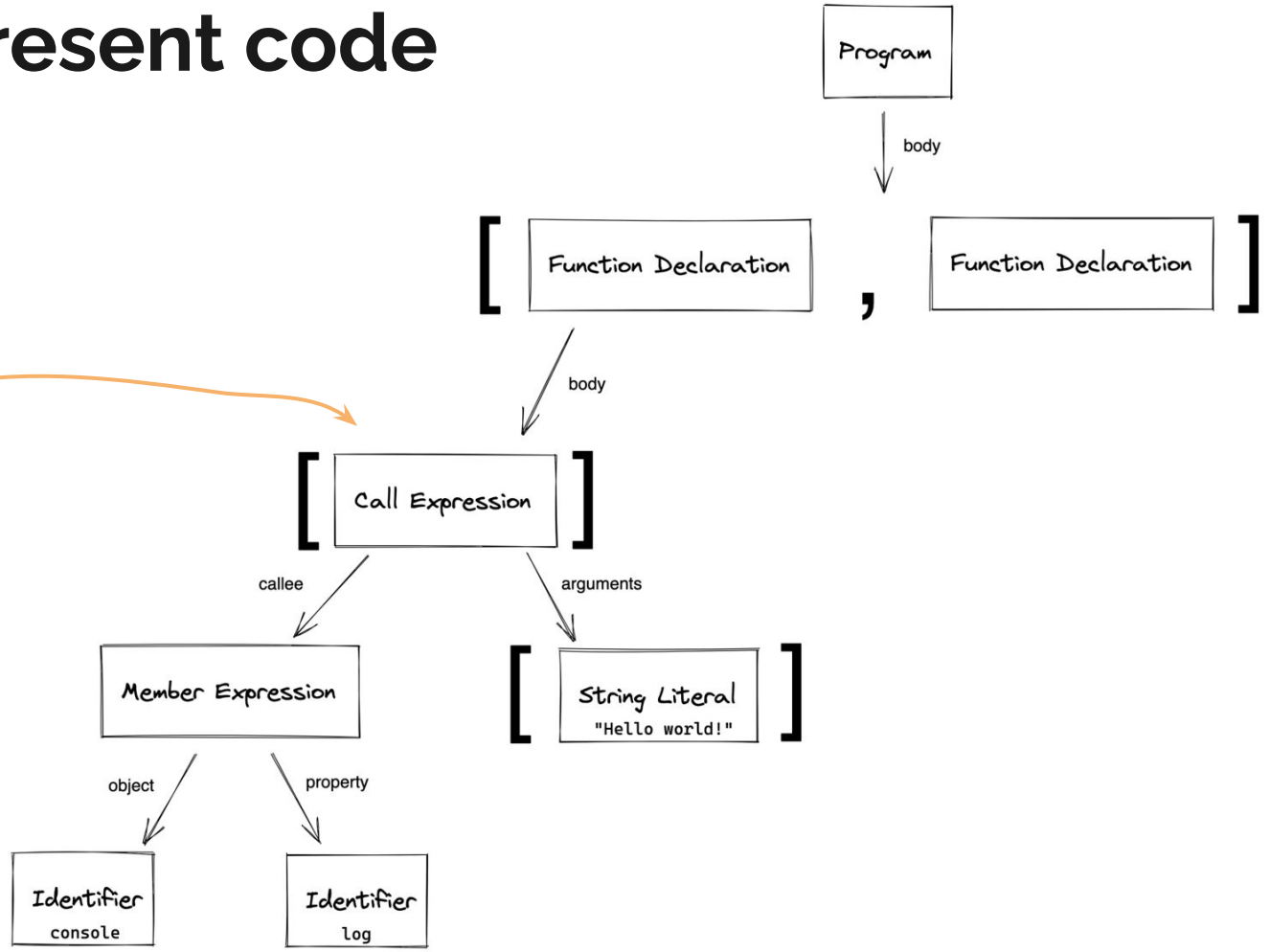
```
console.log("Hello world!")
```



A data structure to represent code

```
function sayHello() {
  console.log("Hello world!")
}

function sayBye() {}
```



The Abstract Syntax Tree (AST)

Tree representation of the structure (abstract syntax) of the code — see definition

A richer model of the source code we can:

- traverse
- transform
- generate

👉 astexplorer.net is super useful to visualize the AST of some code

One code, many ASTs

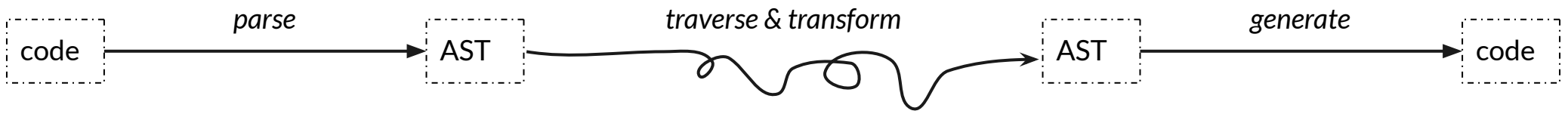
Many ASTs can represent the same code. Details vary.

=> Many solutions exist (parsers). You may build your own. 🤷‍♂️

Babel is a JavaScript compiler. To do so, it needs to parse code into AST, and vice-versa!

Useful libs: @babel/parser, @babel/traverse, @babel/types and @babel/generator

Parse code into AST. Print AST into code.



Let's see in practice! 👨‍💻👩‍💻

```
git checkout 3-parse-ast
```

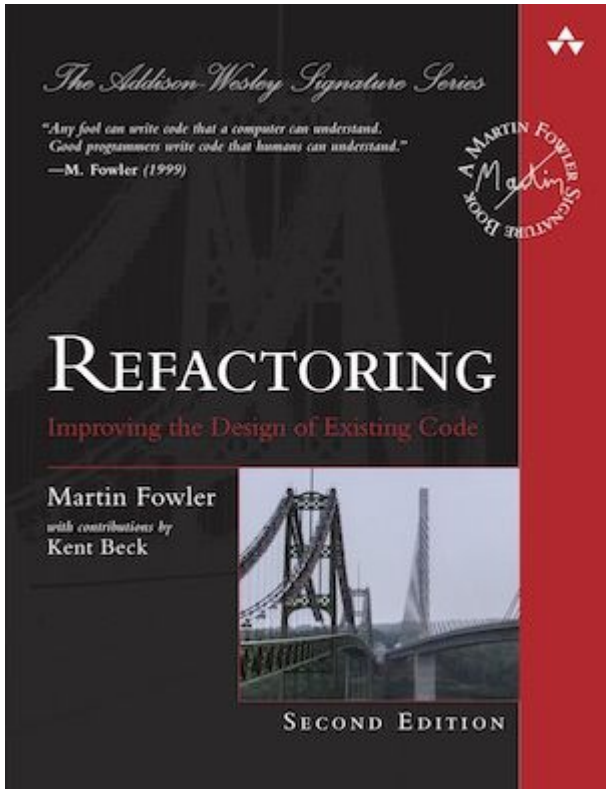
Refactorings

What I mean when I say “Refactoring”?

Refactoring (noun): a change made to the internal structure of software to make it easier to understand and **cheaper to modify without changing its observable behavior.**

— *Martin Fowler*

Some can be automated. It’s faster and safer.



Make the change easy, *then* do the easy change

Ways to refactor JavaScript code fast & safe:

- Automated Refactorings
- Atomic Refactorings (manual)
- Automated Tests

REFACTORING
JAVASCRIPT

📢 I'm building an interactive course to teach you **Atomic Refactoring** moves in JavaScript

Coming 🔜 early 2022

refactoringjavascript.dev

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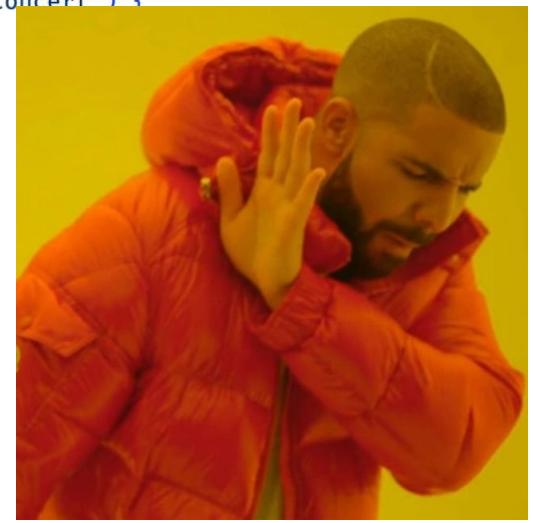
The problem with nesting (bumpy road smell)

```
updateQuality() {
    for (let i = 0; i < this.items.length; i++) {
        if (this.items[i].name ≠ 'Aged Brie' && this.items[i].name ≠ 'Backstage passes to a TAFKAL80ETC concert') {
            if (this.items[i].quality > 0) {
                if (this.items[i].name ≠ 'Sulfuras, Hand of Ragnaros') {
                    this.items[i].quality = this.items[i].quality - 1;
                }
            }
        } else {
            if (this.items[i].quality < 50) {
                this.items[i].quality = this.items[i].quality + 1;
                if (this.items[i].name == 'Backstage passes to a TAFKAL80ETC concert') {
                    if (this.items[i].sellIn < 11) {
                        if (this.items[i].quality < 50) {
                            this.items[i].quality = this.items[i].quality + 1;
                        }
                    }
                    if (this.items[i].sellIn < 6) {
                        if (this.items[i].quality < 50) {
                            this.items[i].quality = this.items[i].quality + 1;
                        }
                    }
                }
            }
        }
    }
```

+1 +2 +3 +4 +5



… need to tweak code while keeping **5** concepts in our working memory 😵

Guard Clauses to the rescue!

```
updateQuality() {
  for (let i = 0; i < this.items.length; i++) {
    if (
      this.items[i].name ≠ "Aged Brie" &&
      this.items[i].name ≠ "Backstage passes to a TAFKAL80ETC concert"
    ) {…
    }

    if (this.items[i].quality ⩾ 50) continue;

    this.items[i].quality = this.items[i].quality + 1;
    if (this.items[i].name ≠ "Backstage passes to a TAFKAL80ETC concert") continue;

    if (this.items[i].sellIn < 11) {
      if (this.items[i].quality ⩾ 50) continue;
      this.items[i].quality = this.items[i].quality + 1;
    }

    if (this.items[i].sellIn ⩾ 6) continue;
    if (this.items[i].quality ⩾ 50) continue;

    this.items[i].quality = this.items[i].quality + 1;
  }
}
```

+1

Early exits = not in your working memory anymore 😄

Refactoring: Introduce Guard Clauses 🍭

```
function getPayAmount() {
  let result;
  if (isDead) {
    result = deadAmount();
  } else {
    if (isSeparated) {
      result = separatedAmount();
    } else {
      if (isRetired) {
        result = retiredAmount();
      } else {
        result = normalPayAmount();
      }
    }
  }
  return result;
}
```

traverse & transform

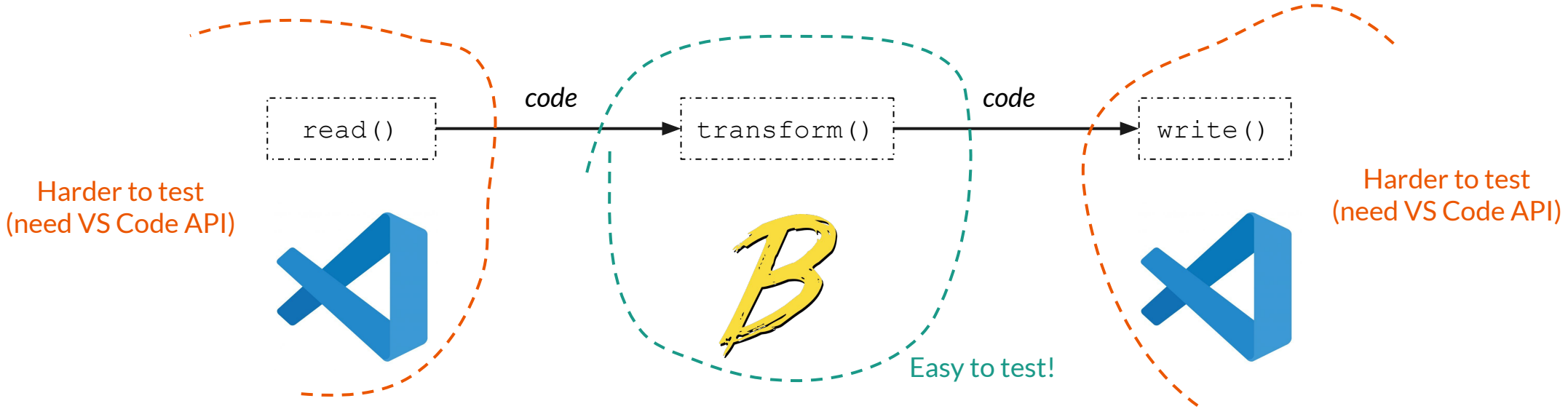
```
function getPayAmount() {
  if (isDead) {
    return deadAmount();
  }
  if (isSeparated) {
    return separatedAmount();
  }
  if (isRetired) {
    return retiredAmount();
  }

  return normalPayAmount();
}
```

Let's automate this... guided by tests!

We want tests that make us **code faster**:

- High-level enough so it doesn't break on refactoring
- Not dependent on things that are hard/slow/fragile to test



Let's package it! 📦

```
git checkout 4-implement-refactoring
```

Package & Publish your extension

Follow the docs 📖

👉 code.visualstudio.com/api/working-with-extensions/publishing-extension

You need to:

- **Install `vsce`** (tip: install it locally to your project & provide npm scripts to run it)
- Create an org in Azure DevOps and get a Personal Access Token
- Create a publisher on VS Marketplace
- Configure your extension for publication
- Publish! 🚚

Just packaging the extension 📦

👉 code.visualstudio.com/api/working-with-extensions/publishing-extension#packaging-extensions

`vsce package` in the root folder to generate a VSIX file

Then anyone can install it with:

```
code --install-extension my-extension-0.0.1.vsix
```

YOU DID IT 👏🥳👏

```
git checkout end
```

What you learned here 🎓

- ★ Use VS Code API to
  - Read code
  - Write code
- ★ Transform code
  - Parse code into AST
  - Traverse and transform the AST
  - Print AST into code
- ★ A bit about
  - **#testing** and **#softwareArchitecture**
  - **#refactoring** and making code easier to maintain
  - **#productivity** and staying focused
- ★ Package the extension so you can use & distribute it

Going further

What's next?

- Handle more cases (e.g. throw, continue, no explicit return but no sibling neither, etc.)
- Finer selection (e.g. only the `IfStatement` below cursor)
- Expose it as a Quick Fix 💡

Regarding tests:

- Most of the logic is tested
- Blind spots on the VS Code API => we can write a few tests to cover these
- Advanced scenario may require the editor in `transform()` => Hexagonal Architecture

Learn to Refactor JS safely & meet deadlines

Ways to refactor JavaScript code fast & safe:

- Automated Refactorings
- **Atomic Refactorings (manual)**
- Automated Tests

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🎁 Use **CONFOO2022** before March 2022 to get 1 month of FREE Premium🎁

Wanna continue the fun?

Abracadabra is open-source. More than 35 automated refactorings.

First-contributors-friendly, check out the guide (34+ contributors).

Useful links

👉 bit.ly/vscode-refactorings-confoo to get the slides

👉 bit.ly/vscode-extension-code to follow along with the source code

👉 twitter.com/nicoespeon to contact me and ask questions (DMs open)