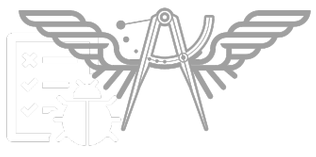
สยามชำนาญกิจ
SIAM CHAMNAN KIT

Automated Testing with Playwright



Automated Testing

https://playwright.dev/

Playwright

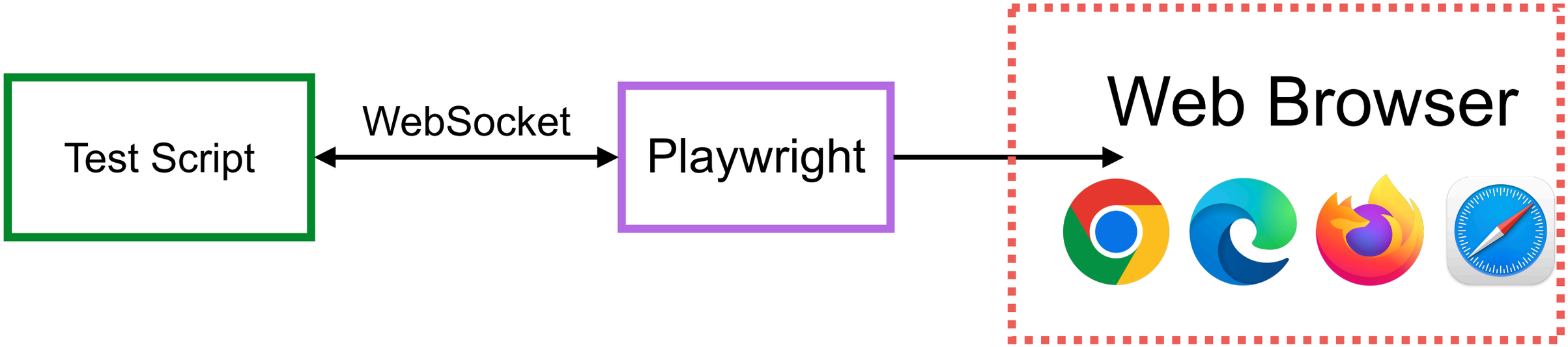
Testing framework from Microsoft
Support modern web browsers
Headless by default
Cross platform and language

History

Playwright

2005 2010 2017 2020 2023

Architecture



Playwright Browser !!

https://playwright.dev/docs/browsers

Playwright Testing

Web Browser Test

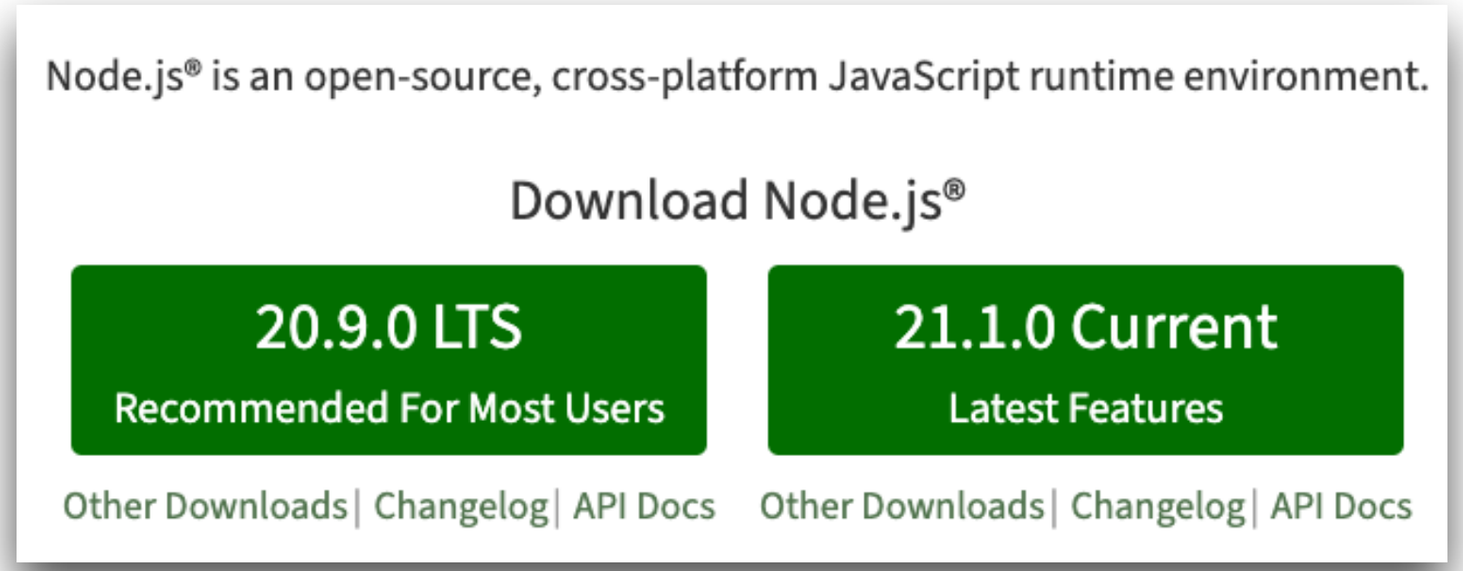
Visual Test

API Test

Setup for Playwright

Start with Playwright

$npm init playwright@latest



https://nodejs.org/en

Run test

$npx playwright test

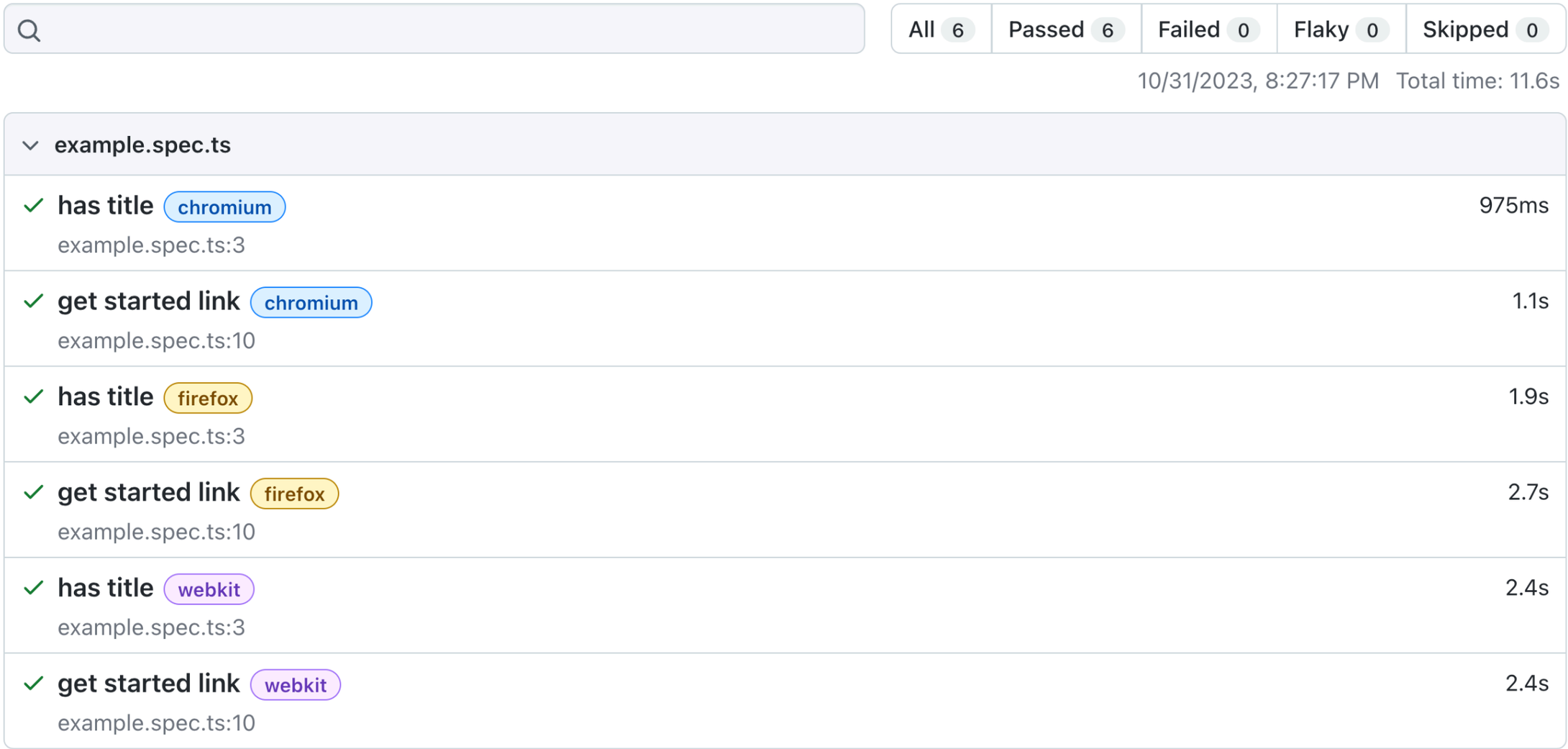
```
Running 6 tests using 6 workers
  6 passed (11.9s)

To open last HTML report run:

  npx playwright show-report
```

Test Report

$npx playwright show-report



https://playwright.dev/docs/test-reporters

Test configuration

Edit in file **playwright.config.ts**

Headless	Filter tests	Timeout
View port	Permission	Location
Global setup and teardown	Recording	Retried

https://playwright.dev/docs/test-configuration

Example configuration

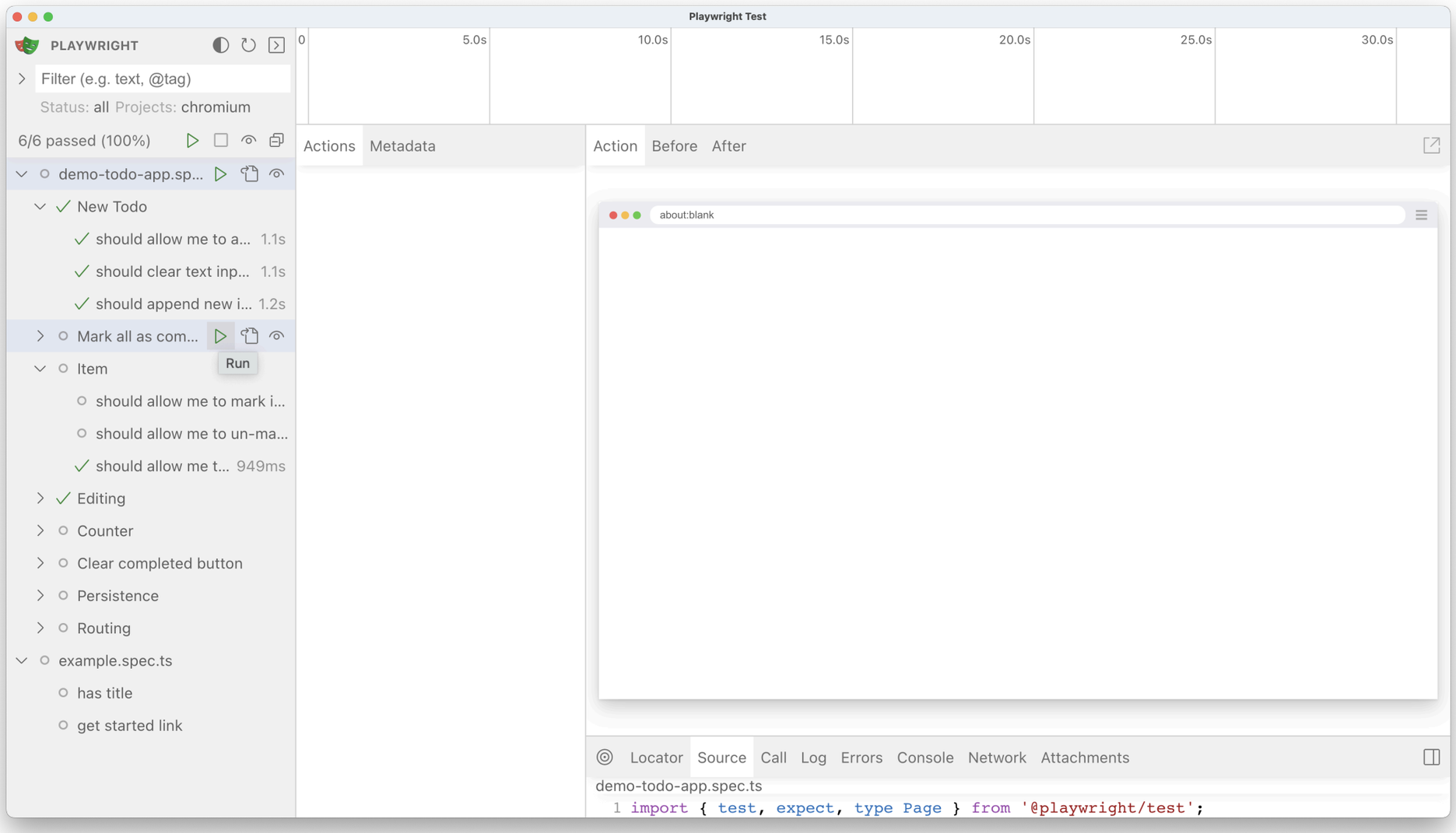
```
import { defineConfig } from '@playwright/test';
export default defineConfig({
  use: {

    headless: false,
    viewport: { width: 1280, height: 720 },
    ignoreHTTPSErrors: true,
    video: 'on',

  },
});
```

Start with Playwright in UI Mode

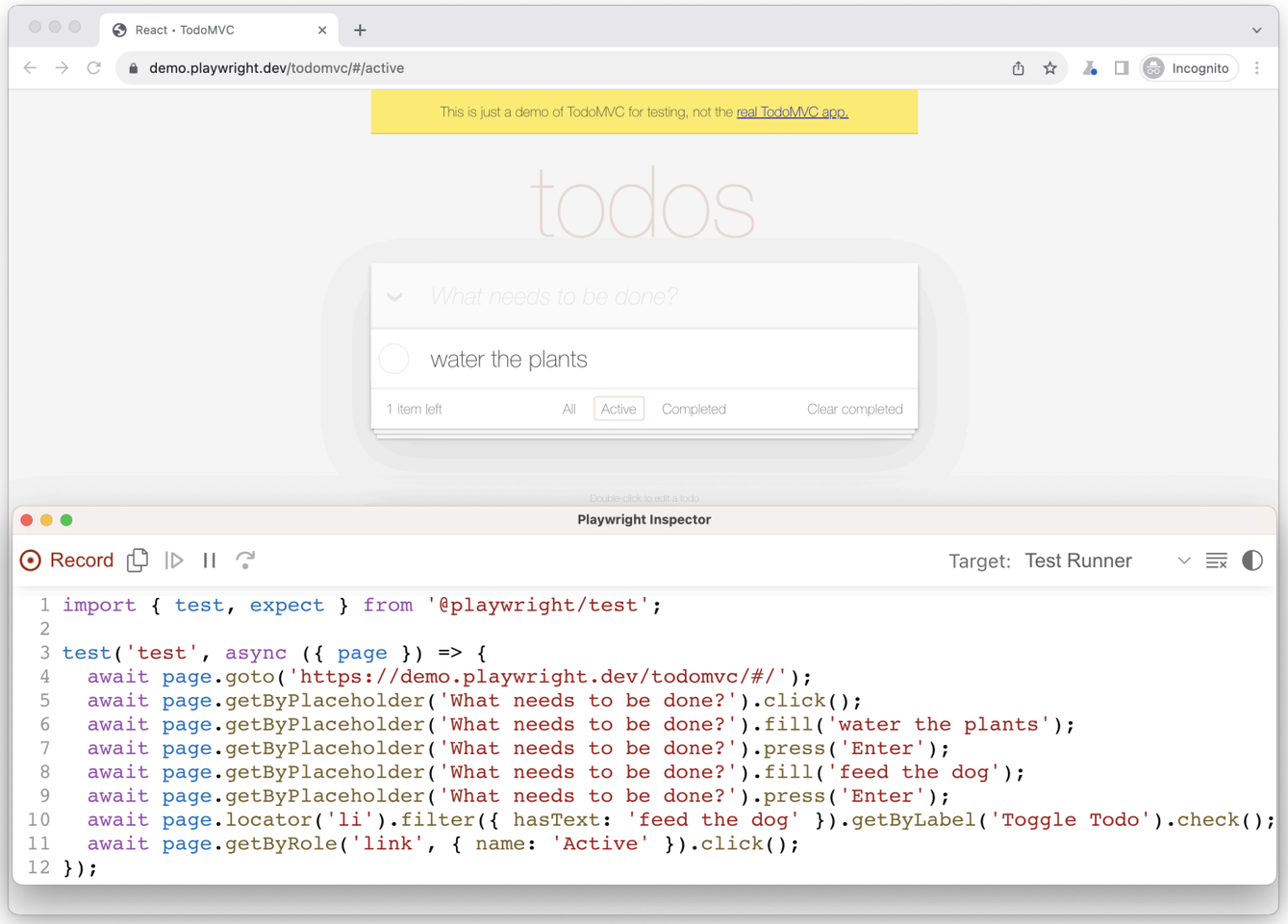
$npx playwright test --ui



https://playwright.dev/docs/test-ui-mode

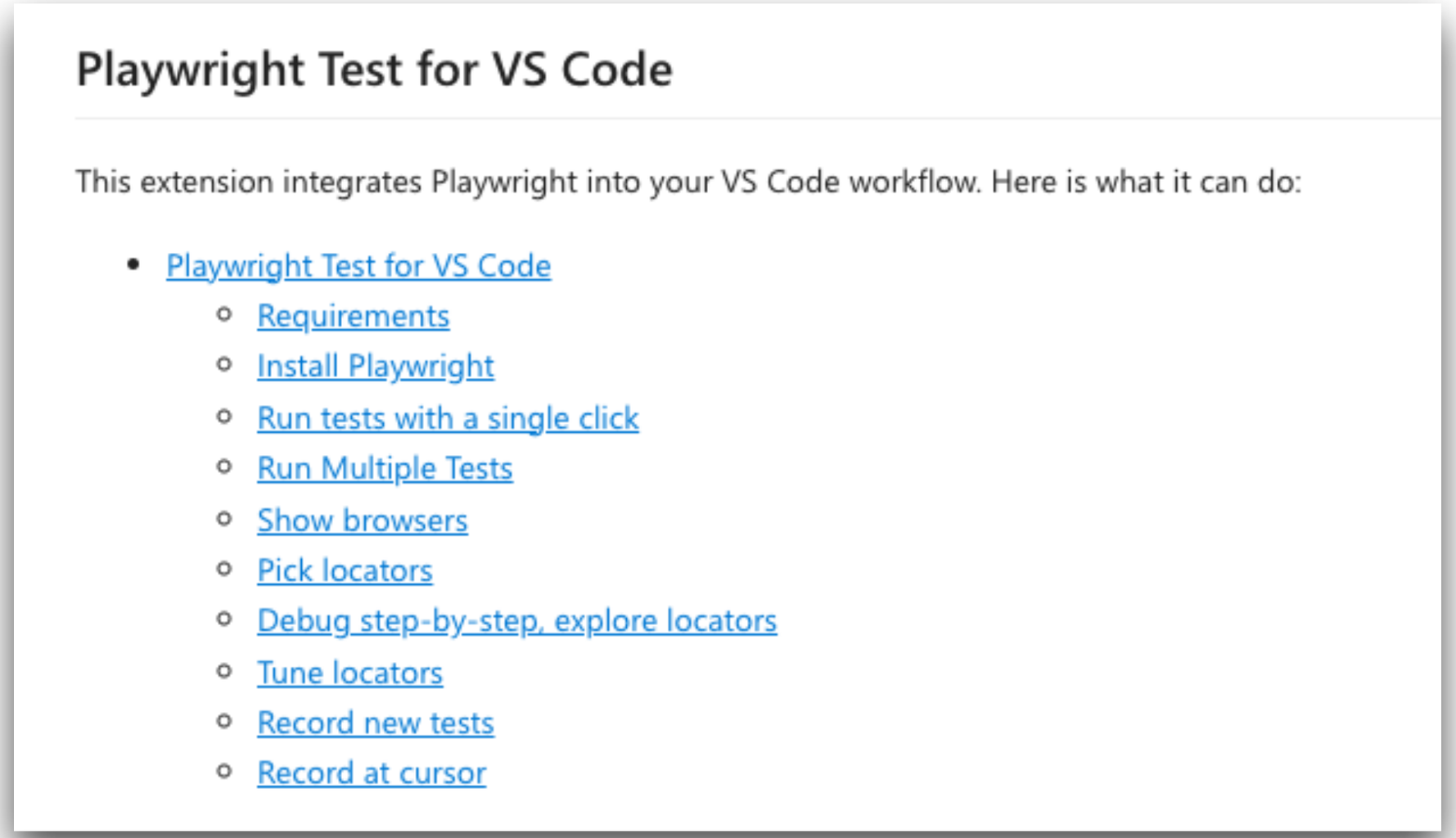
Record and Generate Test

$**npx playwright codegen** demo.playwright.dev/todomvc



https://playwright.dev/docs/codegen-intro

Playwright Test for VSCode



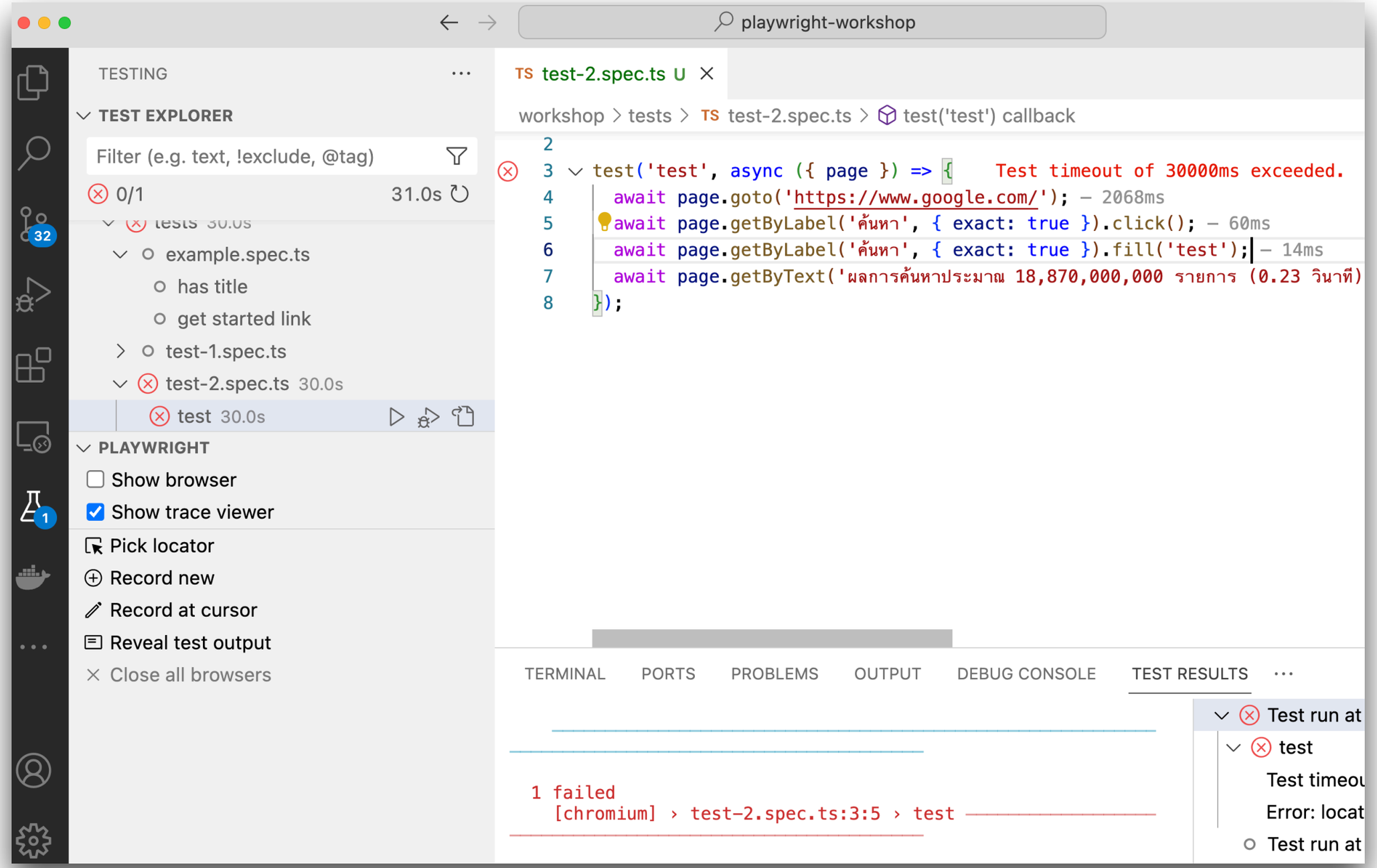
Playwright Test for VS Code

This extension integrates Playwright into your VS Code workflow. Here is what it can do:

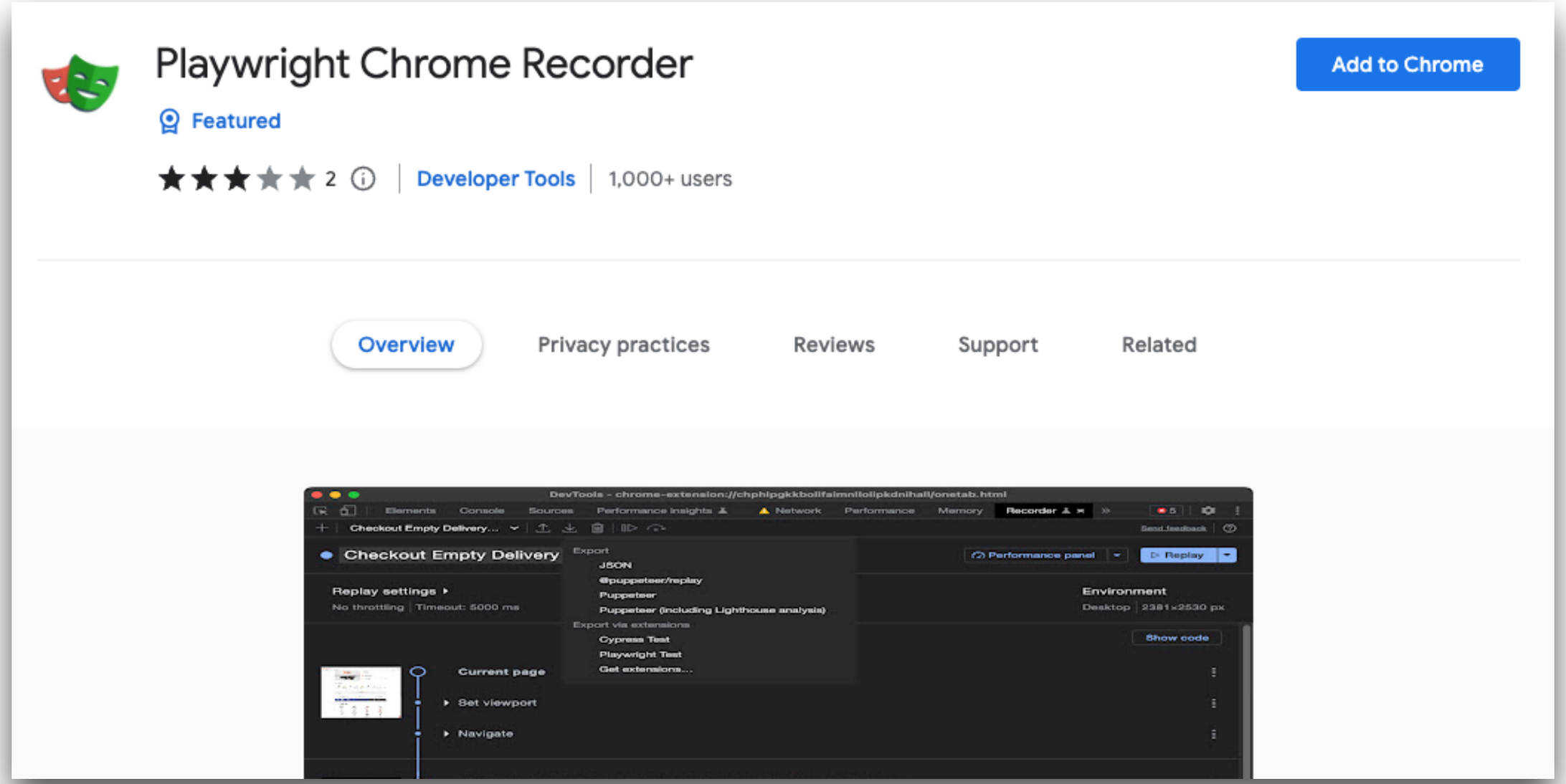
- Playwright Test for VS Code
  - Requirements
  - Install Playwright
  - Run tests with a single click
  - Run Multiple Tests
  - Show browsers
  - Pick locators
  - Debug step-by-step, explore locators
  - Tune locators
  - Record new tests
  - Record at cursor

https://marketplace.visualstudio.com/items?itemName=ms-playwright.playwright

Playwright Test for VSCode

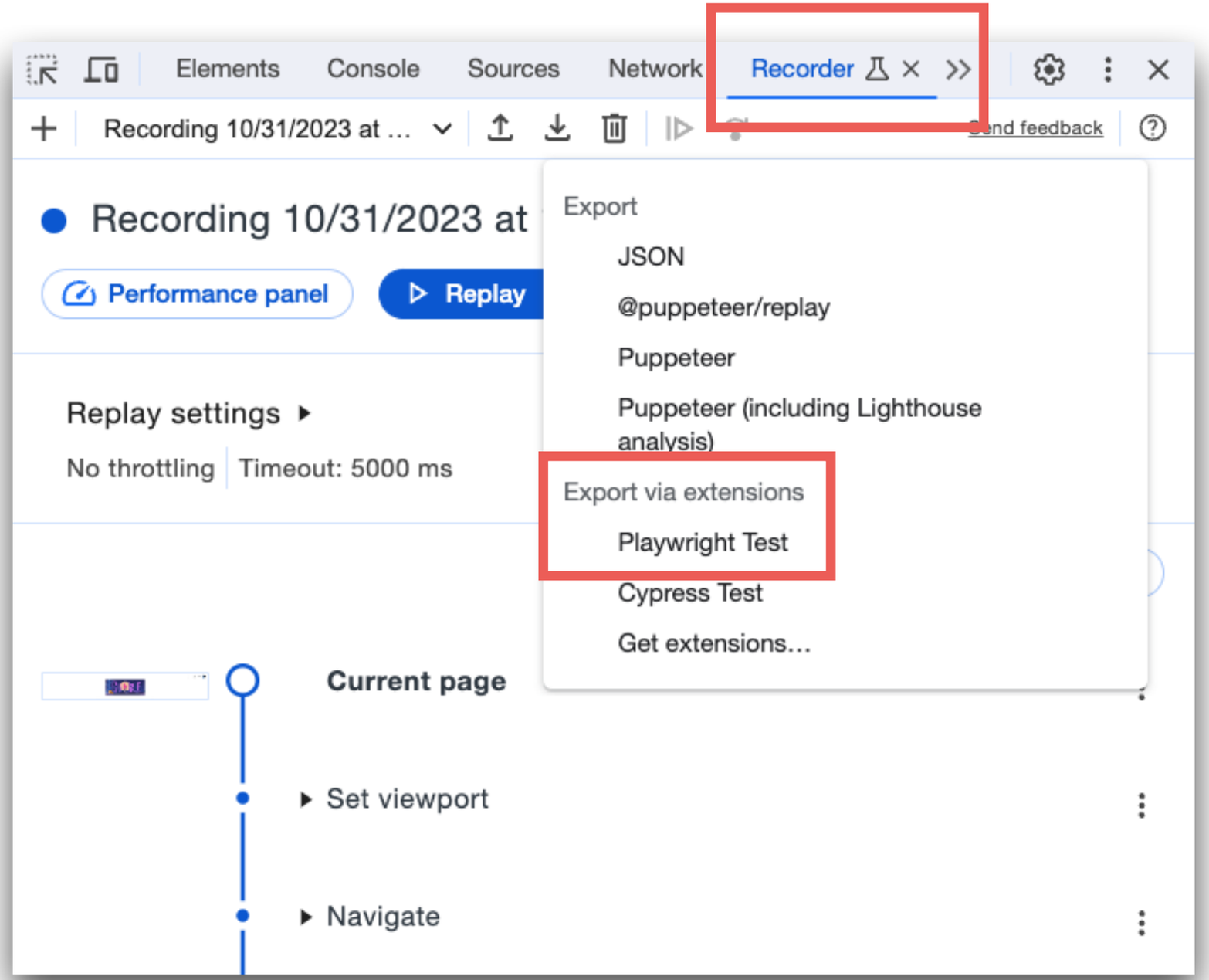


Playwright Chrome Recorder



https://chrome.google.com/webstore/detail/playwright-chrome-recorde/bfnbgoehgplaehdceponclakmhlgjlpd

Playwright Chrome Recorder



https://chrome.google.com/webstore/detail/playwright-chrome-recorde/bfnbgoehgplaehdceponclakmhlgjlpd

Example Code

```
await page.setViewportSize({
      width: 1579,
      height: 262
    })
await page.goto("https://www.google.com/");
await page.goto("https://www.google.com/");
  await page.locator("#APjFqb").click()
  await page.locator("#APjFqb").type("test");
  page.keyboard.down("{Enter}");
  await page.locator("#cnt").click()
  await page.locator("#result-stats").click()
});
```

Start to Write test case

Test Structure (AAA)

```
import { test, expect } from '@playwright/test';

test('get started link', async ({ page }) => {

  await page.goto('https://playwright.dev/');

  // Click the get started link.
  await page.getByRole('link', { name: 'Get started' }).click();

  // Expects page to have a heading with the name of Installation.
  await expect(page.getByRole('heading', { name: 'Installation' }))
      .toBeVisible();

});
```

https://playwright.dev/docs/writing-tests

Test class and functions

test.skip	test.only	test.fixme
test.fail	test.info	test.describe
test.setTimeout	test.slow	test.step

https://playwright.dev/docs/api/class-test

Test Life cycle

```
test.beforeAll(async ({ browser }) => {
    await browser.newContext();
});

test.afterAll(async ({ browser }) => {
    await browser.close();
});

test.beforeEach(async ({ page }) => {
    await page.goto('https://playwright.dev/');
});

test.afterEach(async ({ page }) => {
    await page.context().clearCookies();
});
```

https://playwright.dev/docs/api/class-test

Test Structure and Life cycle

```
test.beforeEach(async ({ page }) => {
    await page.goto('https://playwright.dev/');
});


test('has title', async ({ page }) => {
    // Assert
    await expect(page).toHaveTitle(/Playwright/);
  });

test('get started link', async ({ page }) => {
    // Act
    await page.getByRole('link', { name: 'Get started' }).click();
    // Assert
    await expect(page.getByRole('heading', { name: 'Installation' }))
          .toBeVisible();
});
```

https://playwright.dev/docs/best-practices

Visual Testing

https://playwright.dev/docs/test-snapshots

Visual Testing

Compare with screenshots

```
import { test, expect } from '@playwright/test';

test('example test', async ({ page }) => {
  await page.goto('https://playwright.dev');
  await expect(page).toHaveScreenshot({ maxDiffPixels: 100 });
});
```

$npx playwright test --update-snapshots

Playwright Best Practices

Playwright Best Practices

Test user-visible behavior
Make tests as isolated as possible
Avoid testing 3-party dependencies
Testing with database (control data)

https://playwright.dev/docs/best-practices

Finding and Using Elements

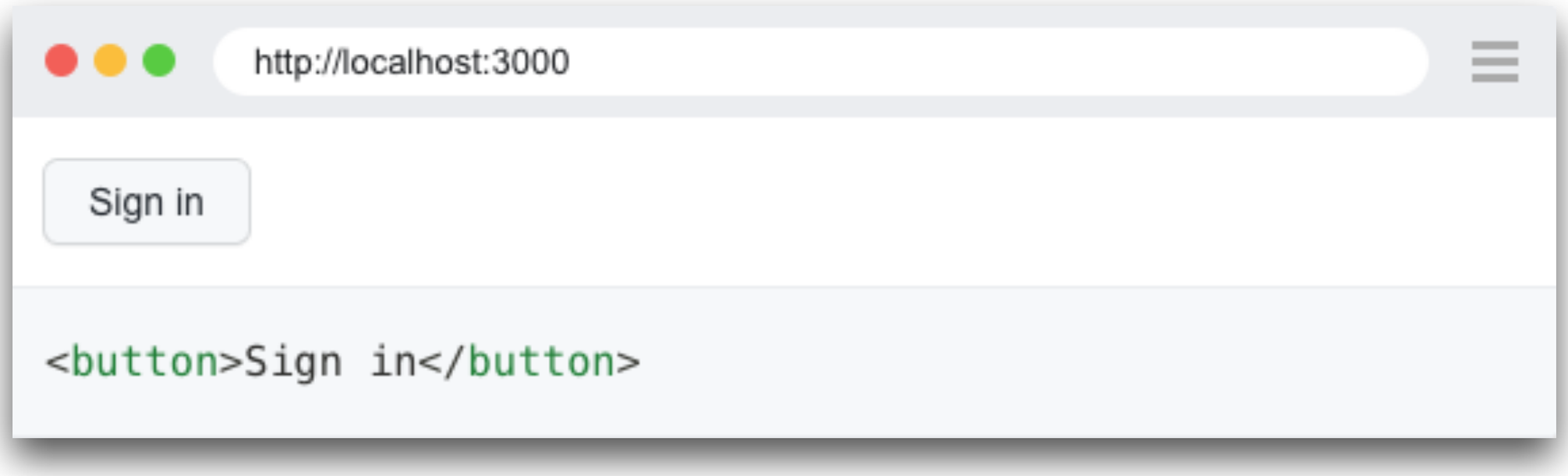
Isolated from UI !!

Building locators

Locators	Description
page.getByRole()	By data type of tag or input
page.getByText()	From text content
page.getByLabel()	From label's text
page.getByTestId()	Use **data-testid** attribute
page.locator('xpath=//button')	XPath
page.locator('css=button')	CSS

https://playwright.dev/docs/locators

getByRole()




```
await page.getByRole('button', { name: 'Sign in' })
          .click();
```

https://playwright.dev/docs/api/class-page#page-get-by-role

Role Definitions

From ARIA guidelines

§ 5.4 Definition of Roles

Below is an alphabetical list of WAI-ARIA roles to be used by authors.

Abstract roles are used for the ontology. Authors ***MUST NOT*** use abstract roles in content.

`alert`
: A type of live region with important, and usually time-sensitive, information. See related `alertdialog` and `status`.

`alertdialog`
: A type of dialog that contains an alert message, where initial focus goes to an element within the dialog. See related `alert` and `dialog`.

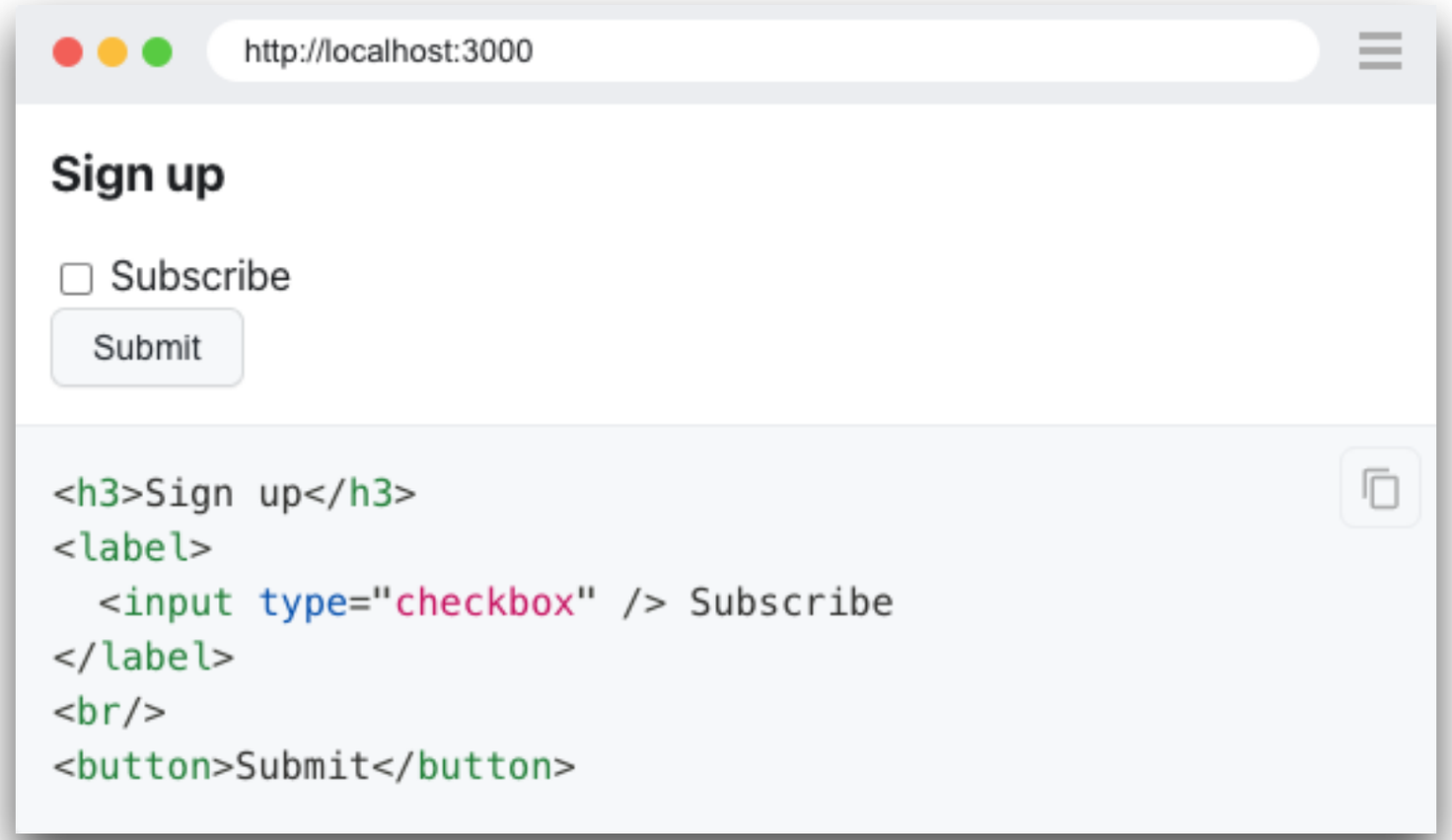
`application`
: A `structure` containing one or more focusable elements requiring user input, such as keyboard or gesture events, that do not follow a standard interaction pattern supported by a `widget` role.

`article`
: A section of a page that consists of a composition that forms an independent part of a document, page, or site.

`banner`
: A `landmark` that contains mostly site-oriented content, rather than page-specific content.

https://www.w3.org/TR/wai-aria-1.2/#role_definitions

getByRole()




```
await expect(page.getByRole('heading', { name: 'Sign up' })).toBeVisible();

await page.getByRole('checkbox', { name: 'Subscribe' }).check();

await page.getByRole('button', { name: /submit/i }).click();
```

Locate by test id


```
await page.getByTestId('directions').click();
```

Change test id

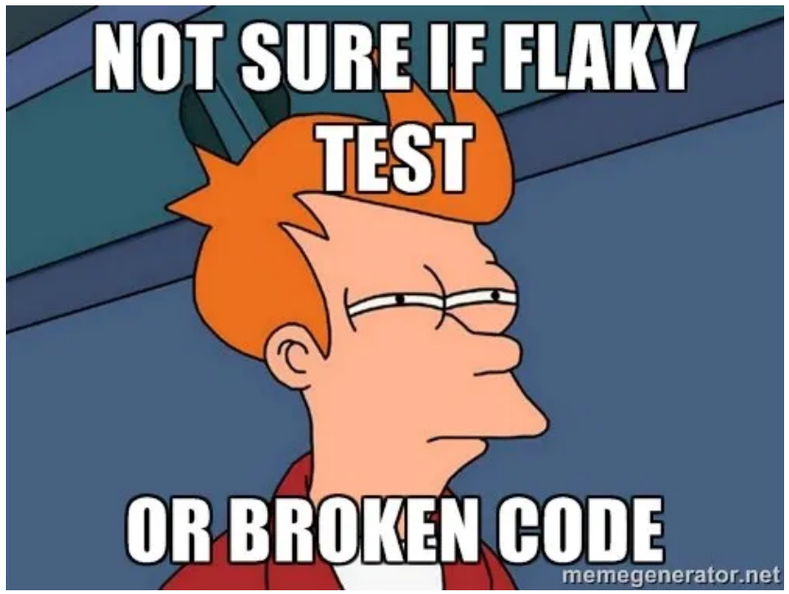
Edit in file **playwright.config.ts**

```ts
import { defineConfig } from '@playwright/test';

export default defineConfig({
  use: {
    testIdAttribute: 'data-pw'
  }
});
```

Good Locators

Unique
Descriptive
Resilient
Shorter in length (maintainability)



Playwright suggestion

Use **locator** over **selector**

```
await page.locator('text=Login').click()
```

```
await page.click('text=Login')
```

Playwright suggestion

Facing locator from user perspective

Use data-tested

Locate with XPath !!

XPath

CML Path Language
Query language used to identify tag in XML
Appium builds XML representation of app

XPath is powerful but very dangerous

Benefits of XPath

Find any element that exists
Find elements by using complex criteria

Cons of XPath

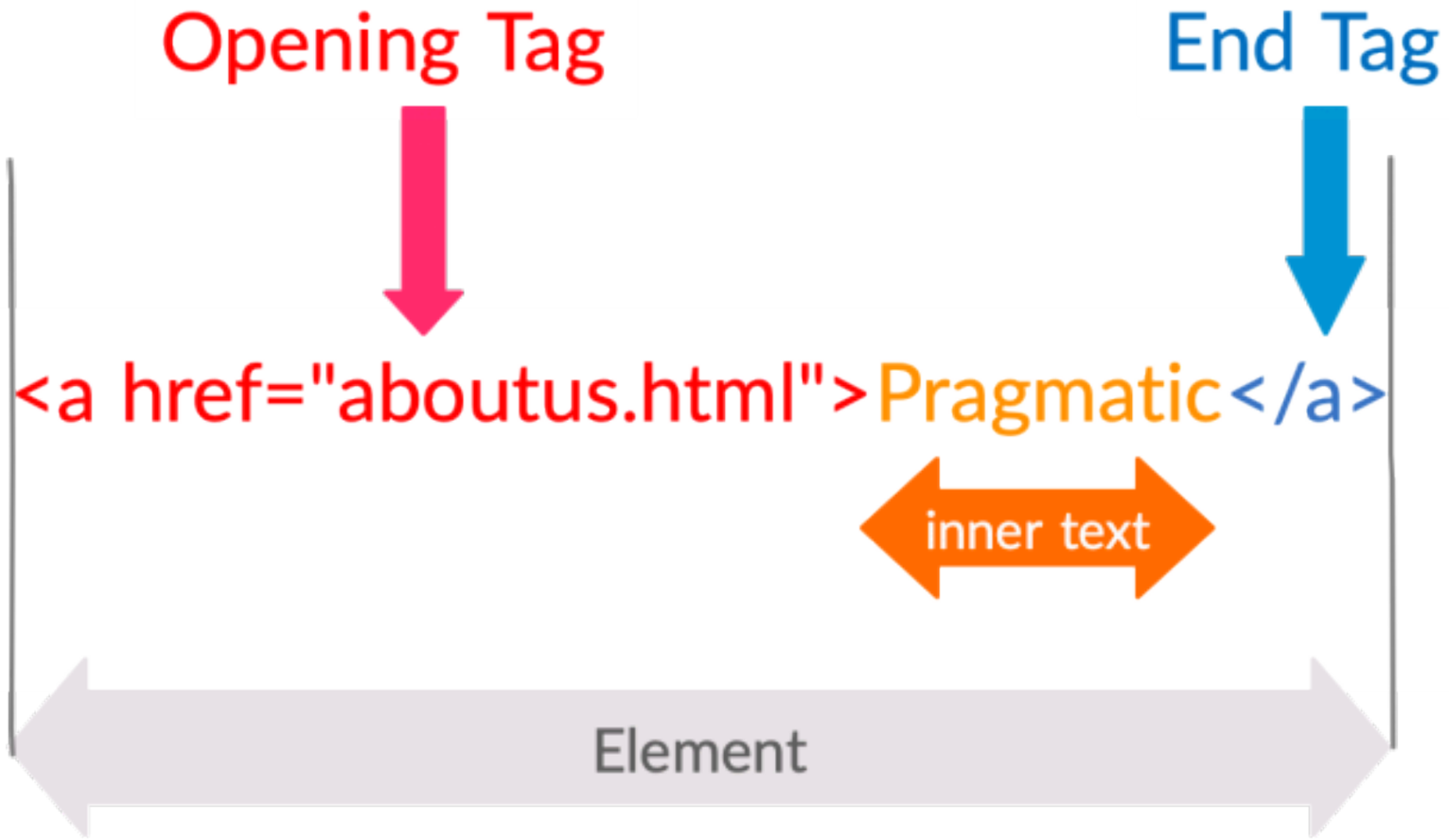
XPath selectors can be brittle

Slow

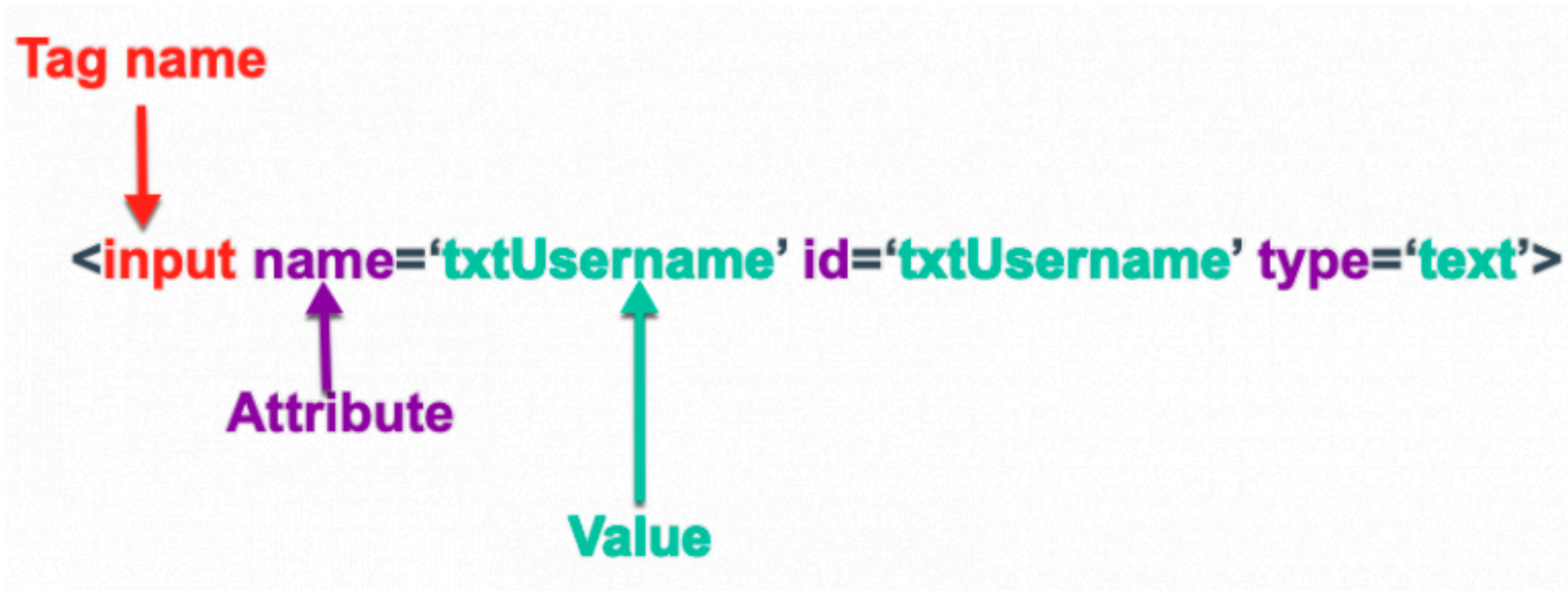
Broken test !!

Avoid brittle selectors by rely on unique tag attribute

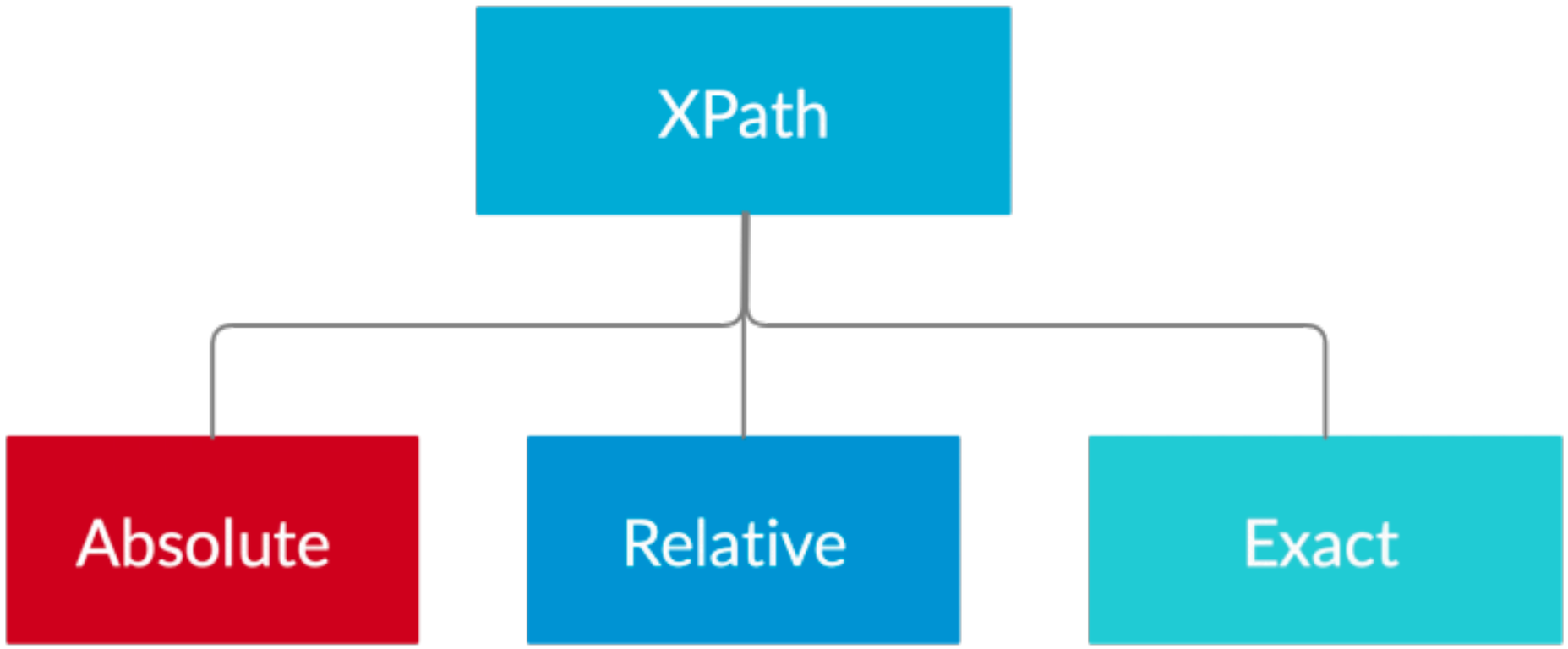
XPath



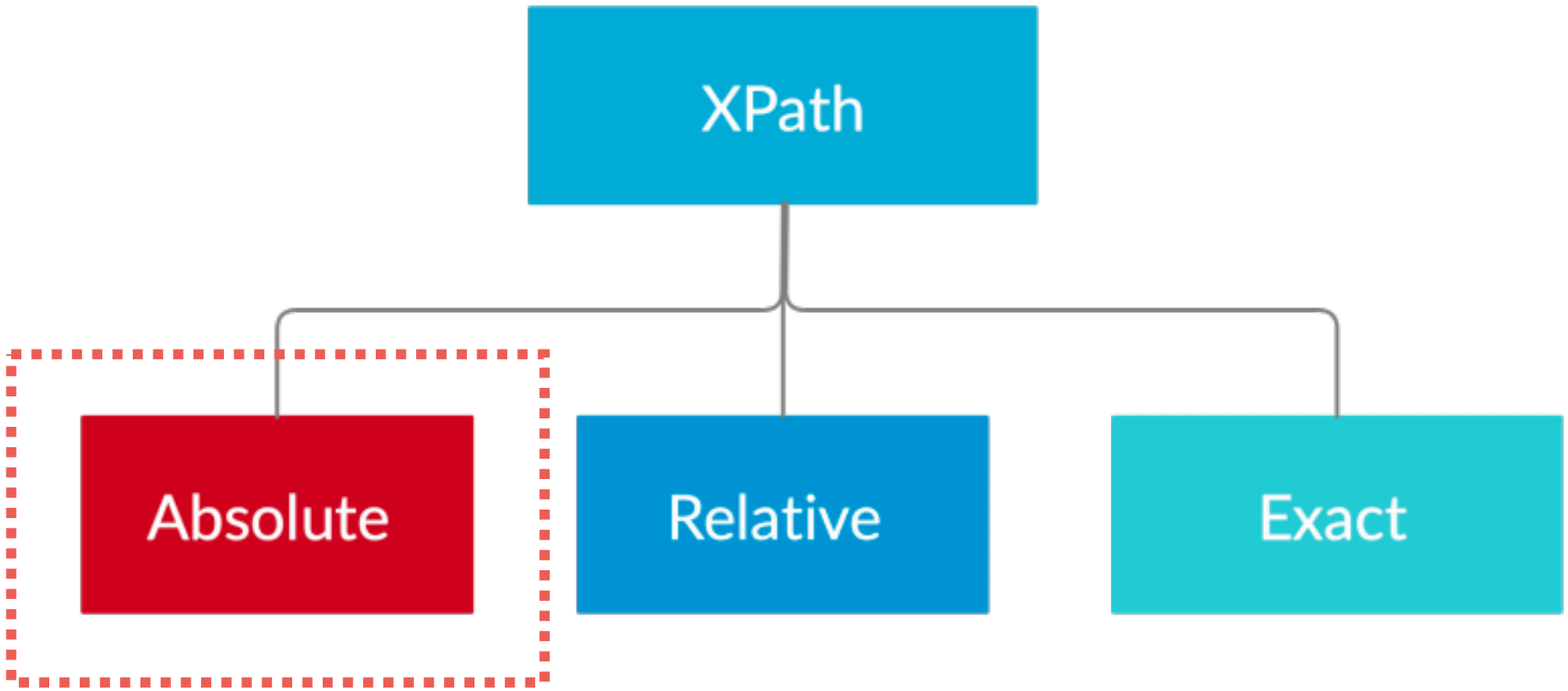
XPath



Types XPath

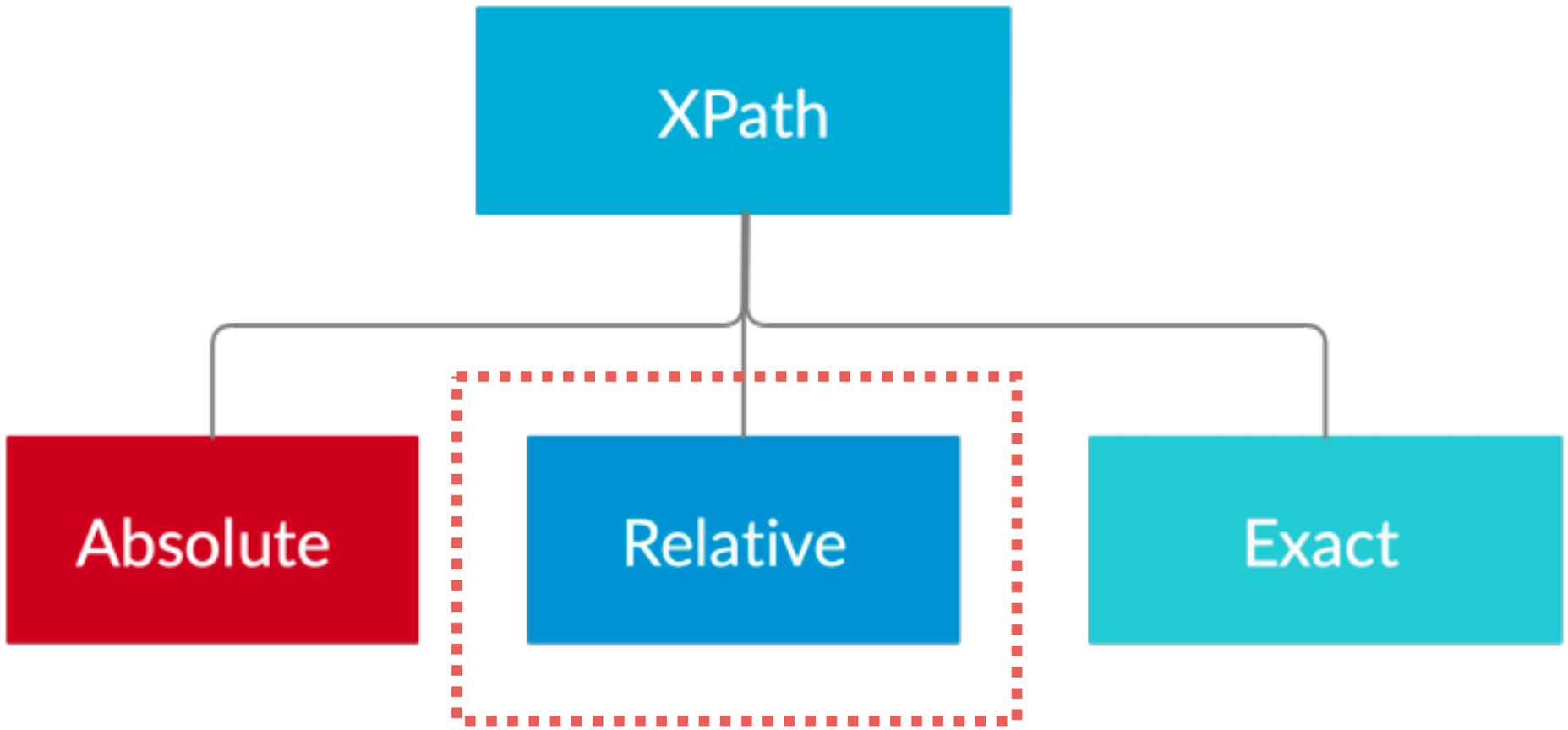


Don’t use !!



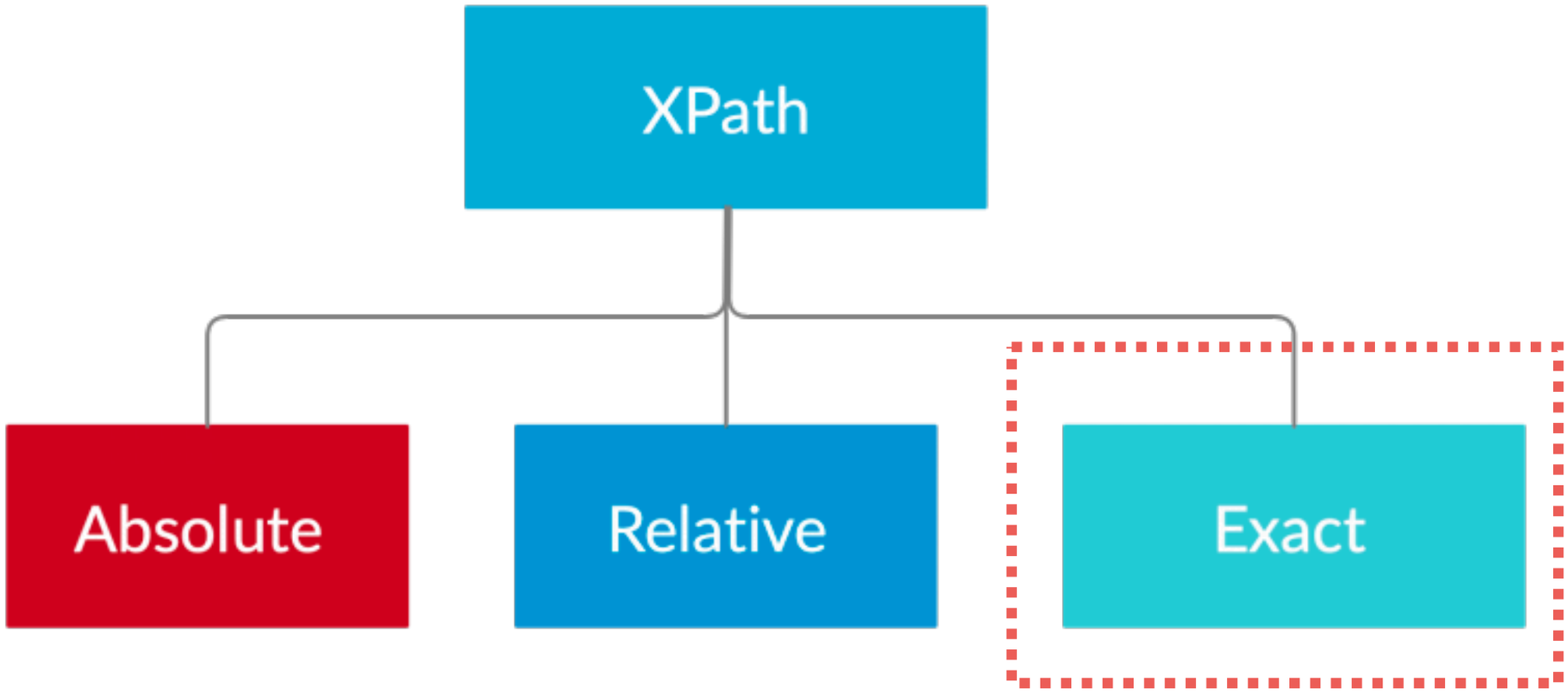
/html/body/div[1]/div/div[2]/form/div[2]/input

Relative




```
//div[@id='divUsername']/input
//form/div[@id='divUsername']/input
//form/*/input
```

Exact




```
//div[@class='datevalue currmonth']//span[./text()='2']
```

Absolute faster than Relative
But shortest is better

Waiting for Elements

Auto waiting
with timeout

https://playwright.dev/docs/actionability

Config Timeout

Edit in file **playwright.config.ts**

```ts
import { defineConfig } from '@playwright/test';

export default defineConfig({
  timeout: 5 * 60 * 1000,
});
```

https://playwright.dev/docs/test-timeouts

Tag tests

@tag_name in your tests
Run by tag name

@Fast	@Sprint1	@Feature1
@Medium	@Sprint2	@Feature2
@Slow	@Sprint3	@Feature3

https://playwright.dev/docs/test-annotations#tag-tests

Tag tests

```
test('Upload 3 files @upload', async ({ page }) => {

});
```

$npm playwright test --grep @upload

https://playwright.dev/docs/test-timeouts

Workshop with Upload file

http://nervgh.github.io/pages/angular-file-upload/examples/simple/

Workshop with page.waitForEvent

https://efiling.rd.go.th/rd-cms/

Popup	Request	Response	Filechooser

https://playwright.dev/docs/api/class-page#page-wait-for-event

```
import { test, expect } from '@playwright/test';

test('Try with RD CMS', async ({ page }) => {

  await page.goto('https://efiling.rd.go.th/rd-cms/');
  await page.getByRole('heading', { name: 'แจ้งข่าวสาร' }).click();

  const page1Promise = page.waitForEvent('popup');
  await page.getByRole('link', { name: 'รายละเอียด' }).click();
  const page1 = await page1Promise;
  await page1.getByRole('heading',
          { name: 'ช่วงเวลาการให้บริการของแต่ละช่องทาง' }).click();
  await page.getByLabel('Close').click();

  const page2Promise = page.waitForEvent('popup');
  await page.getByRole('button',
          { name: 'ยื่นแบบออนไลน์' }).getByRole('link').click();
  const page2 = await page2Promise;
  await page2.getByRole('button', { name: 'เข้าสู่ระบบ' }).click();

});
```

```
test('Try with RD CMS', async ({ page }) => {

  await test.step('Step 1', async () => {
    await page.goto('https://efiling.rd.go.th/rd-cms/');
    await page.getByRole('heading',
        { name: 'แจ้งข่าวสาร' }).click();
  });

  await test.step('Step 2', async () => {
    const page1Promise = page.waitForEvent('popup');
    await page.getByRole('link', { name: 'รายละเอียด' }).click();
    const page1 = await page1Promise;
    await page1.getByRole('heading',
        { name: 'ช่วงเวลาการให้บริการของแต่ละช่องทาง' }).click();
  });

  await test.step('Step 3', async () => {
    await page.getByLabel('Close').click();
    const page2Promise = page.waitForEvent('popup');
    await page.getByRole('button',
        { name: 'ยื่นแบบออนไลน์' }).getByRole('link').click();
    const page2 = await page2Promise;
    await page2.getByRole('button',
        { name: 'เข้าสู่ระบบ' }).click();
  });

});
```

https://playwright.dev/docs/api/class-test#test-step

Good Test ?

Good Tests ?

Fast

Isolate

Repeatable

Self-verify

Timely

https://playwright.dev/docs/browser-contexts

Test Isolation in Playwright

```
import { test } from '@playwright/test';

test('example test', async ({ page, context }) => {
  // "context" is an isolated BrowserContext, created for this specific test.
  // "page" belongs to this context.
});

test('another test', async ({ page, context }) => {
  // "context" and "page" in this second test are completely
  // isolated from the first test.
});
```

https://playwright.dev/docs/browser-contexts

Create multiple context in test

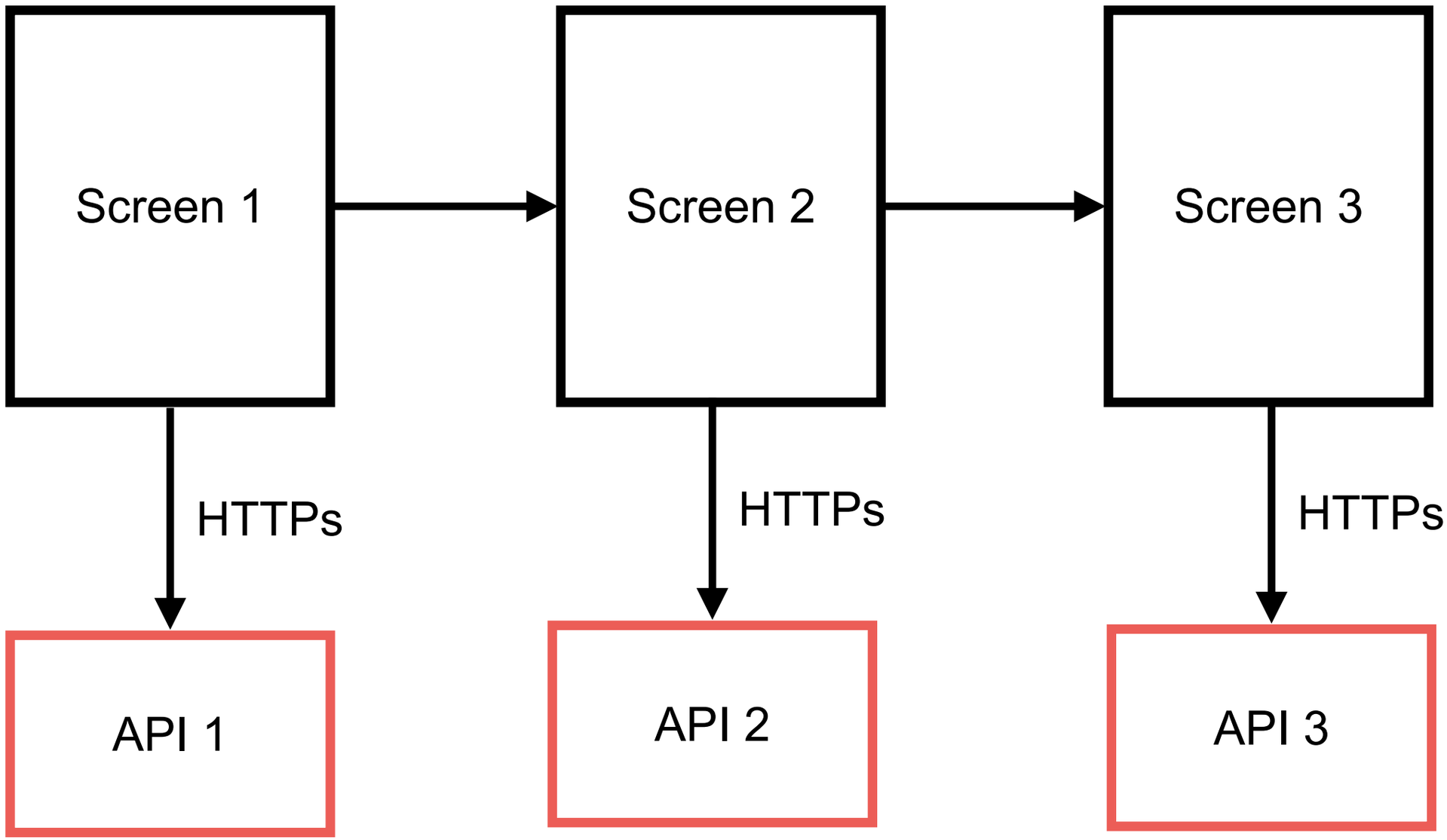
```
import { test } from '@playwright/test';

test('admin and user', async ({ browser }) => {
  // Create two isolated browser contexts
  const adminContext = await browser.newContext();
  const userContext = await browser.newContext();

  // Create pages and interact with contexts independently
  const adminPage = await adminContext.newPage();
  const userPage = await userContext.newPage();
});
```

https://playwright.dev/docs/browser-contexts

Integration Testing



Mock Server (HTTPs)

Stubby4Node

https://github.com/mrak/stubby4node

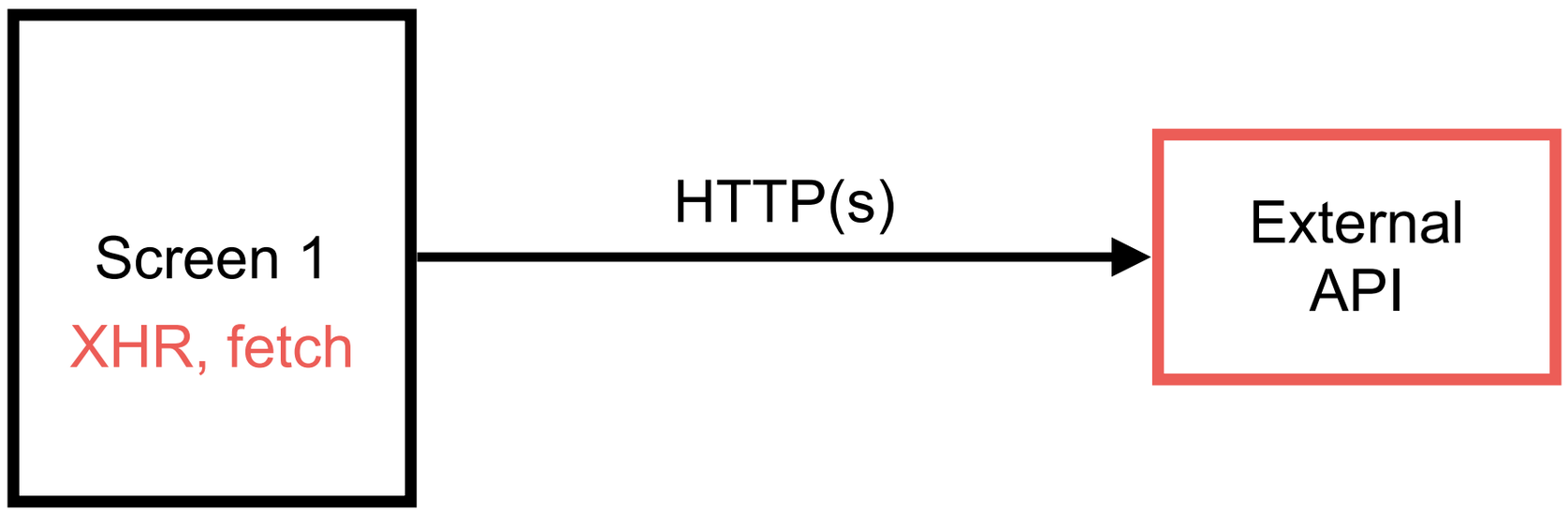
MountBank

https://www.mbtest.org/

WireMock

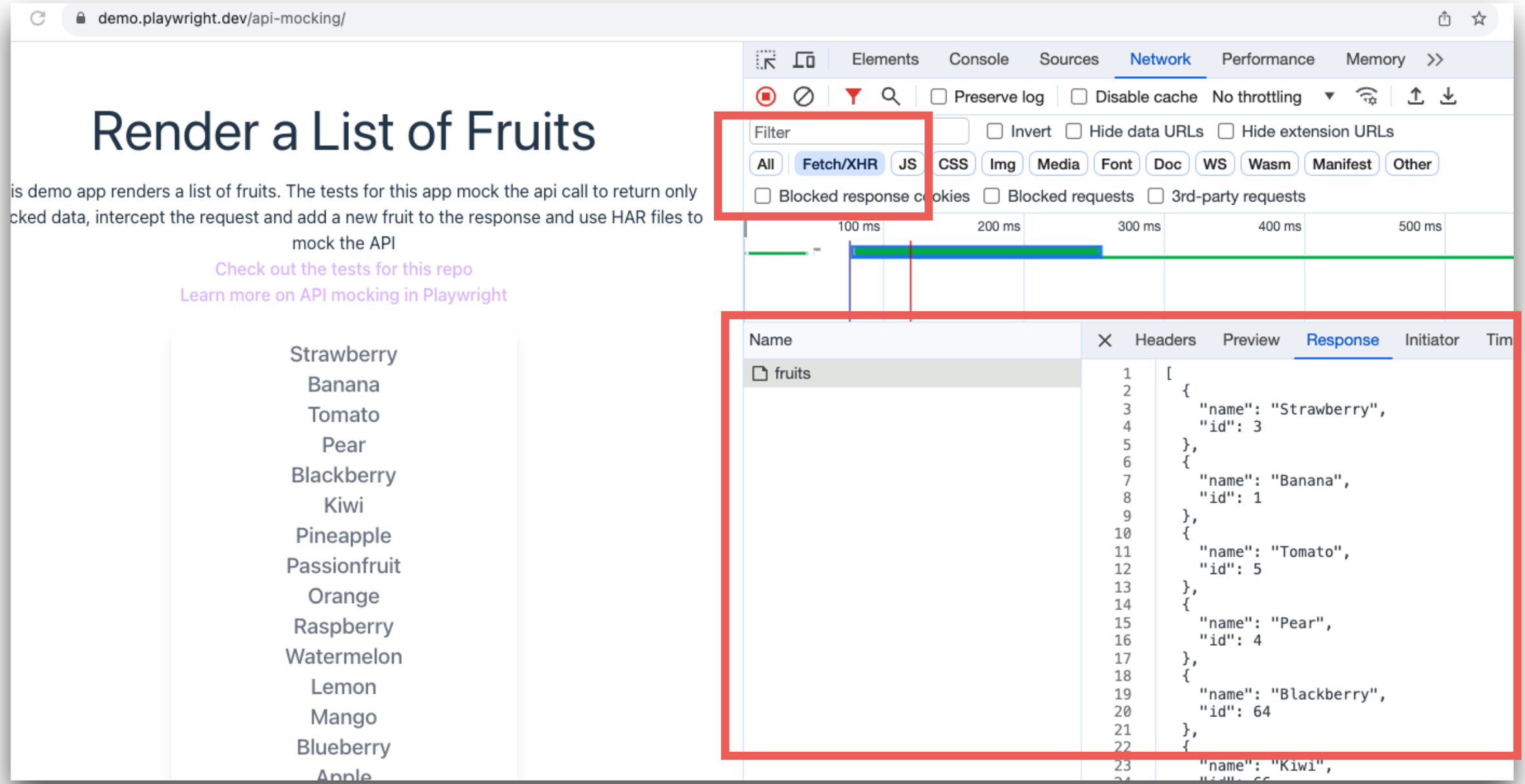
https://wiremock.org/

Mock API with Playwright



https://playwright.dev/docs/network

Inspect Fetch/XHR



Write test with mock api

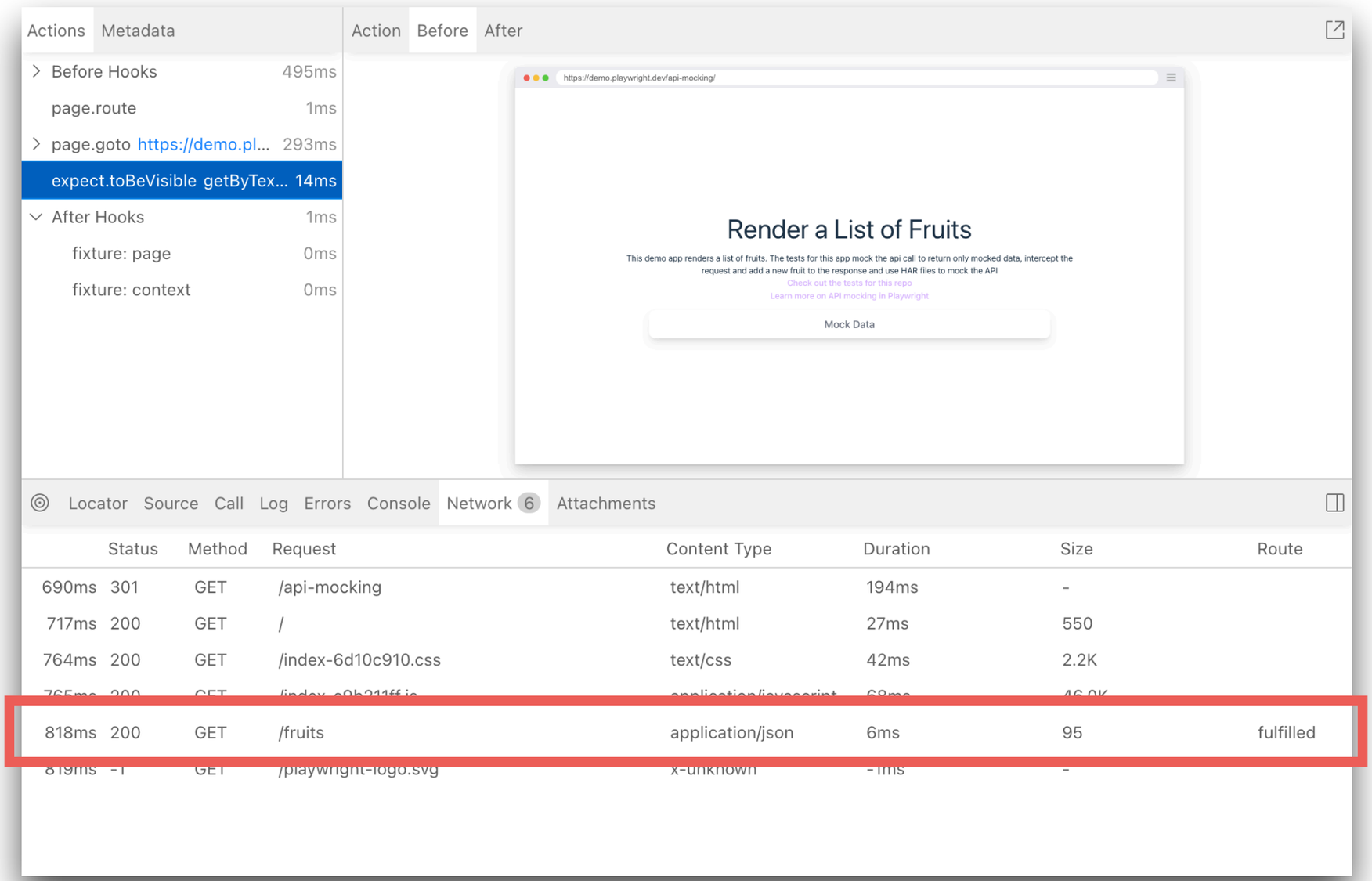
```
import { test, expect } from '@playwright/test';

test("Mock API", async ({ page }) => {
    // Mock the api call before navigating
    await page.route('*/**/api/v1/fruits', async route => {
        const json = [{ name: 'Mock Data', id: 21 }];
        await route.fulfill({ json });
    });
    await page.goto('https://demo.playwright.dev/api-mocking');
    await expect(page.getByText('Mock Data')).toBeVisible();
});
```

https://playwright.dev/docs/mock

Test in UI Mode

$npx playwright test --ui



Web Server in Playwright

https://playwright.dev/docs/test-webserver

Web Server

Start dev server before run your tests

Config in file **playwright.config.ts**

```ts
export default defineConfig({
  // Run your local dev server before starting the tests
  webServer: {
    command: 'npm run start',
    url: 'http://127.0.0.1:3000',
    reuseExistingServer: !process.env.CI,
    stdout: 'ignore',
    stderr: 'pipe',
  },
});
```

https://playwright.dev/docs/test-webserver

Demo

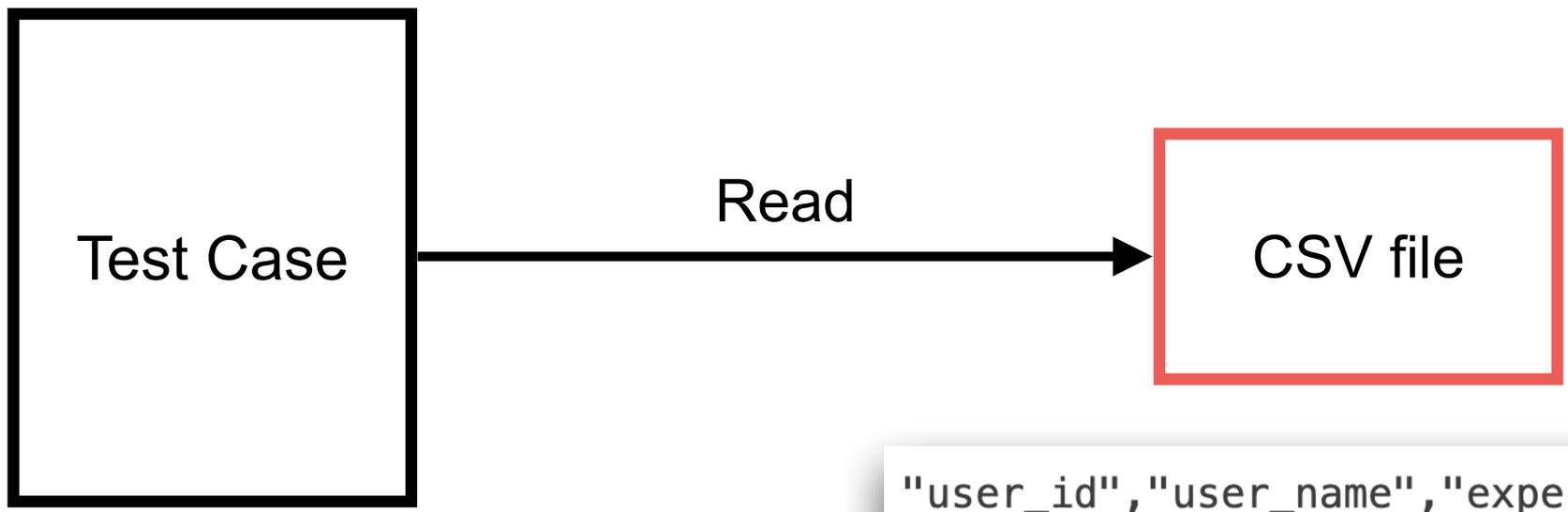
https://github.com/up1/workshop-playwright/tree/main/webserver

Working with CSV file

https://playwright.dev/docs/test-parameterize#create-tests-via-a-csv-file

Data test in CSV file

Use **csv-parse library** to read css file




```
"user_id","user_name","expected_result"
"1","user 01","success"
"2","user 02","success"
"3","user 03","failure"
```

https://www.npmjs.com/package/csv-parse

Test case with CSV

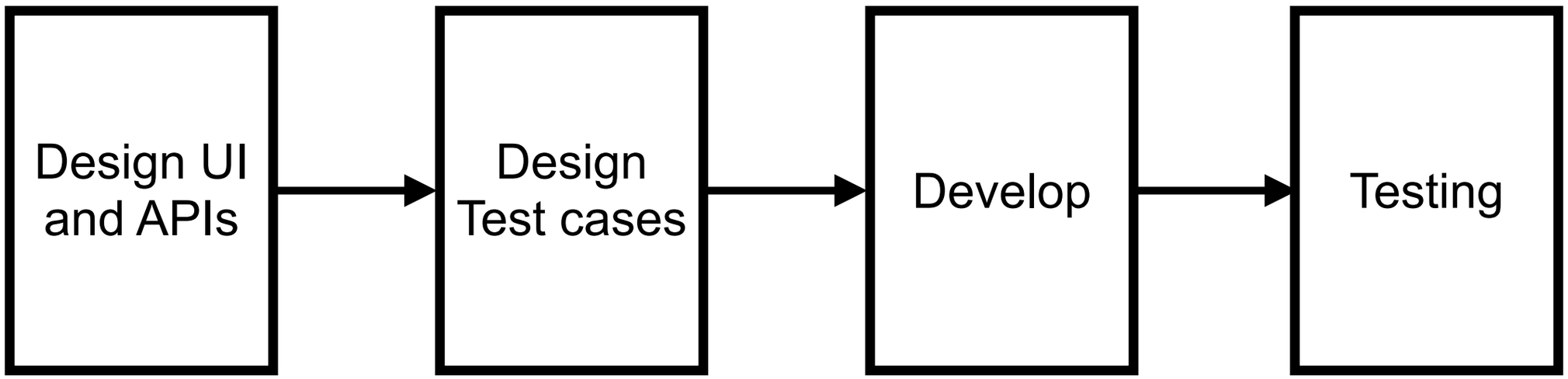
```
import fs from 'fs';
import path from 'path';
import { test } from '@playwright/test';
import { parse } from 'csv-parse/sync';

const records = parse(fs.readFileSync(path.join(__dirname, 'user.csv')), {
  columns: true,
  skip_empty_lines: true
});

for (const record of records) {
  test(`Test case: ${record.test_case}`, async ({ }) => {
    console.log(record.user_id, record.user_name, record.expected_result);
  });
}
```

Test-First vs Test-Last ?

Improve Process

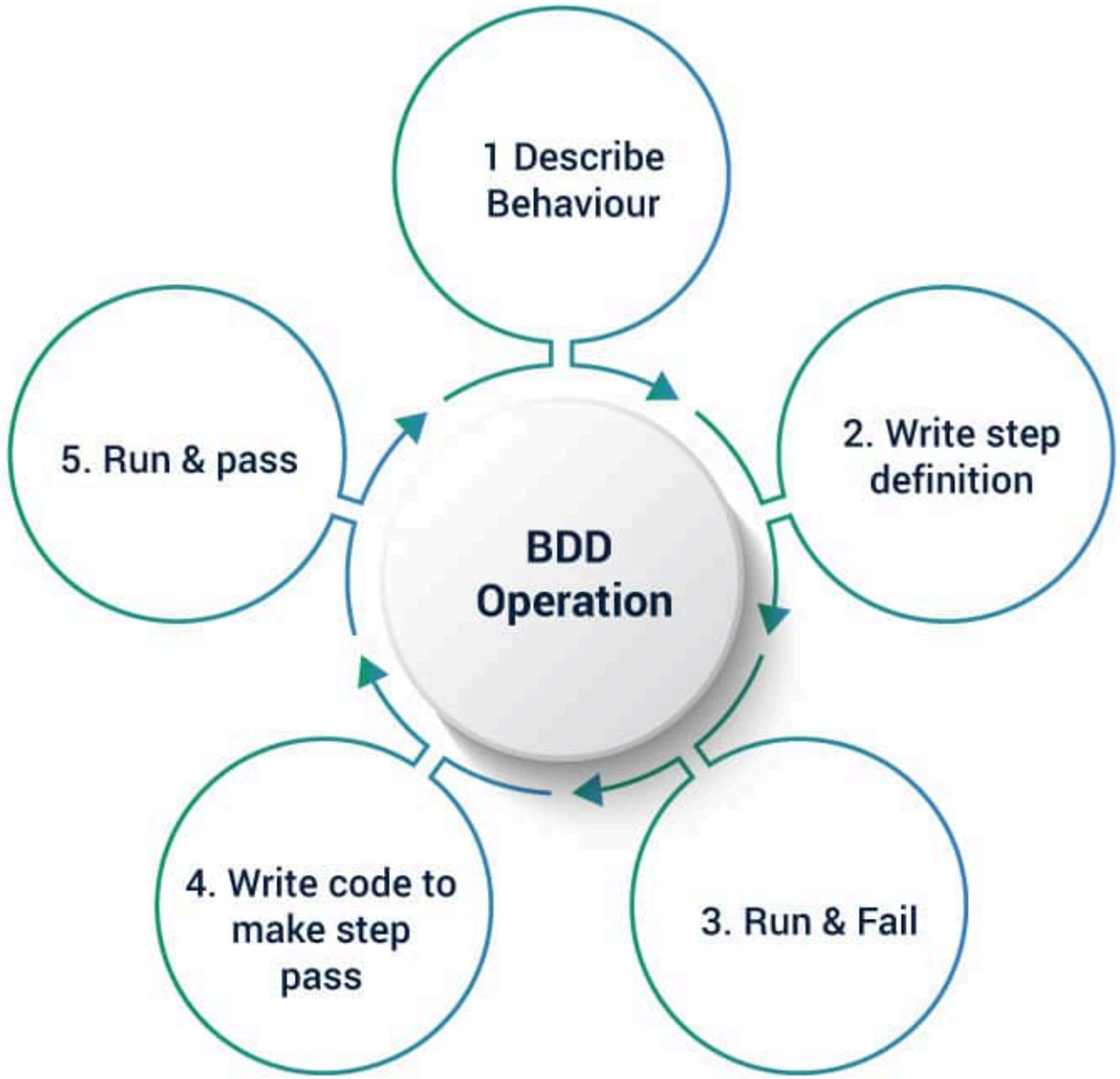


data-testid ?

Design element locator ?

BDD Style

https://github.com/vitalets/playwright-bdd



BDD

Scenario

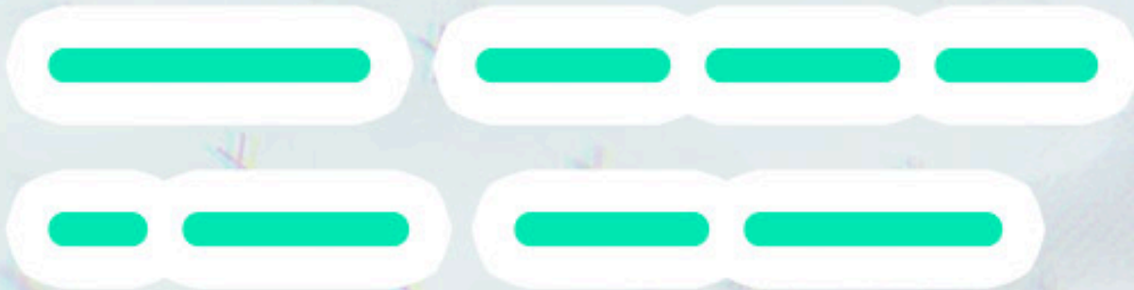
Given

When

And

When

Then

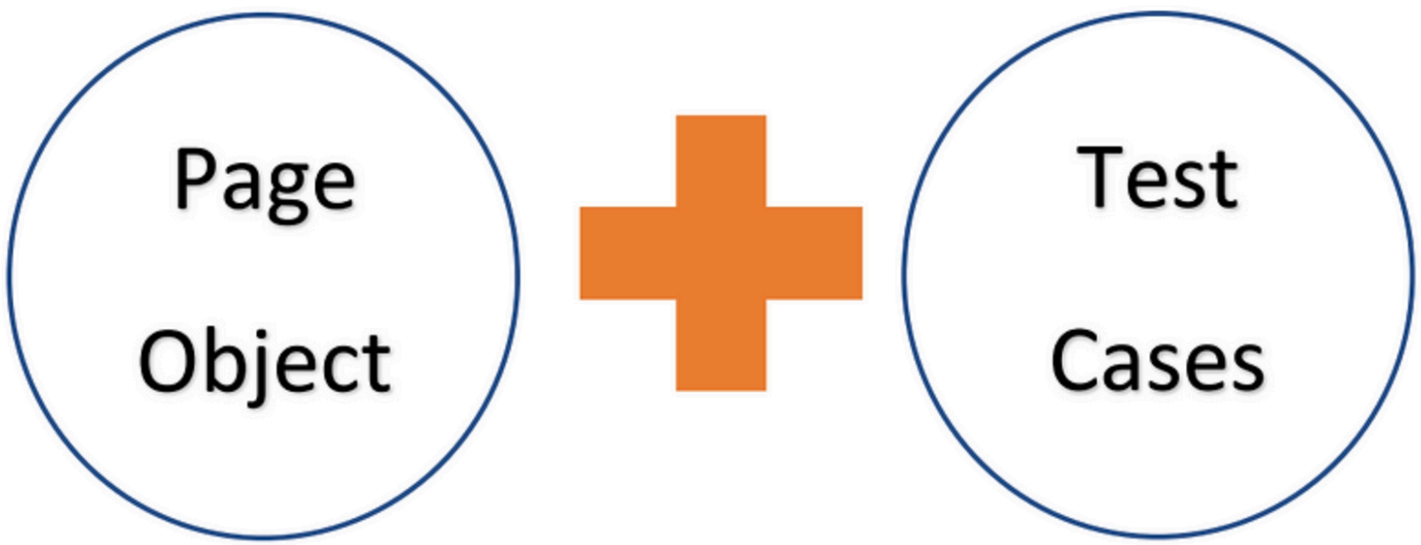


Page Object Pattern

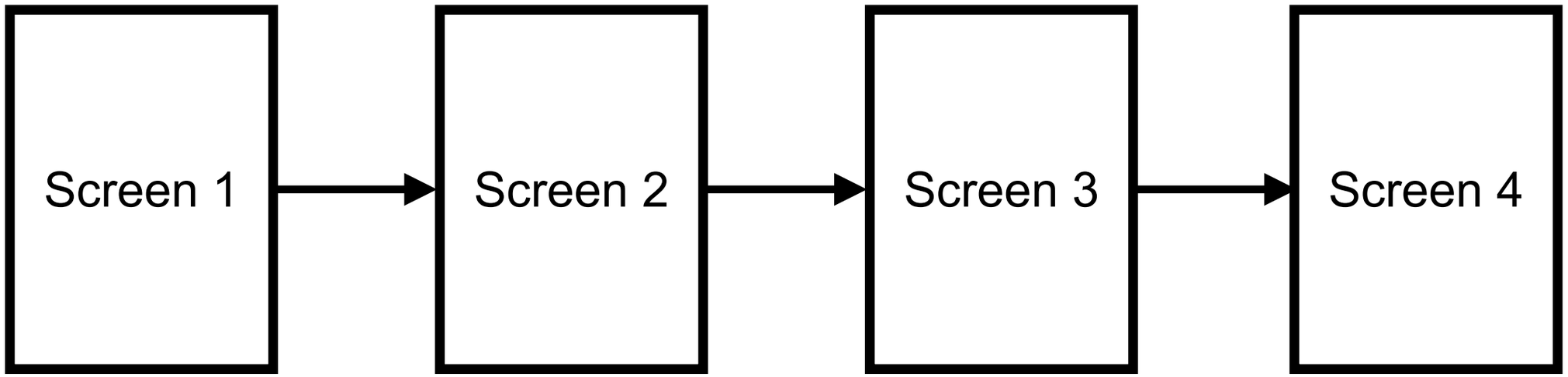
https://playwright.dev/docs/pom

Page Object Pattern

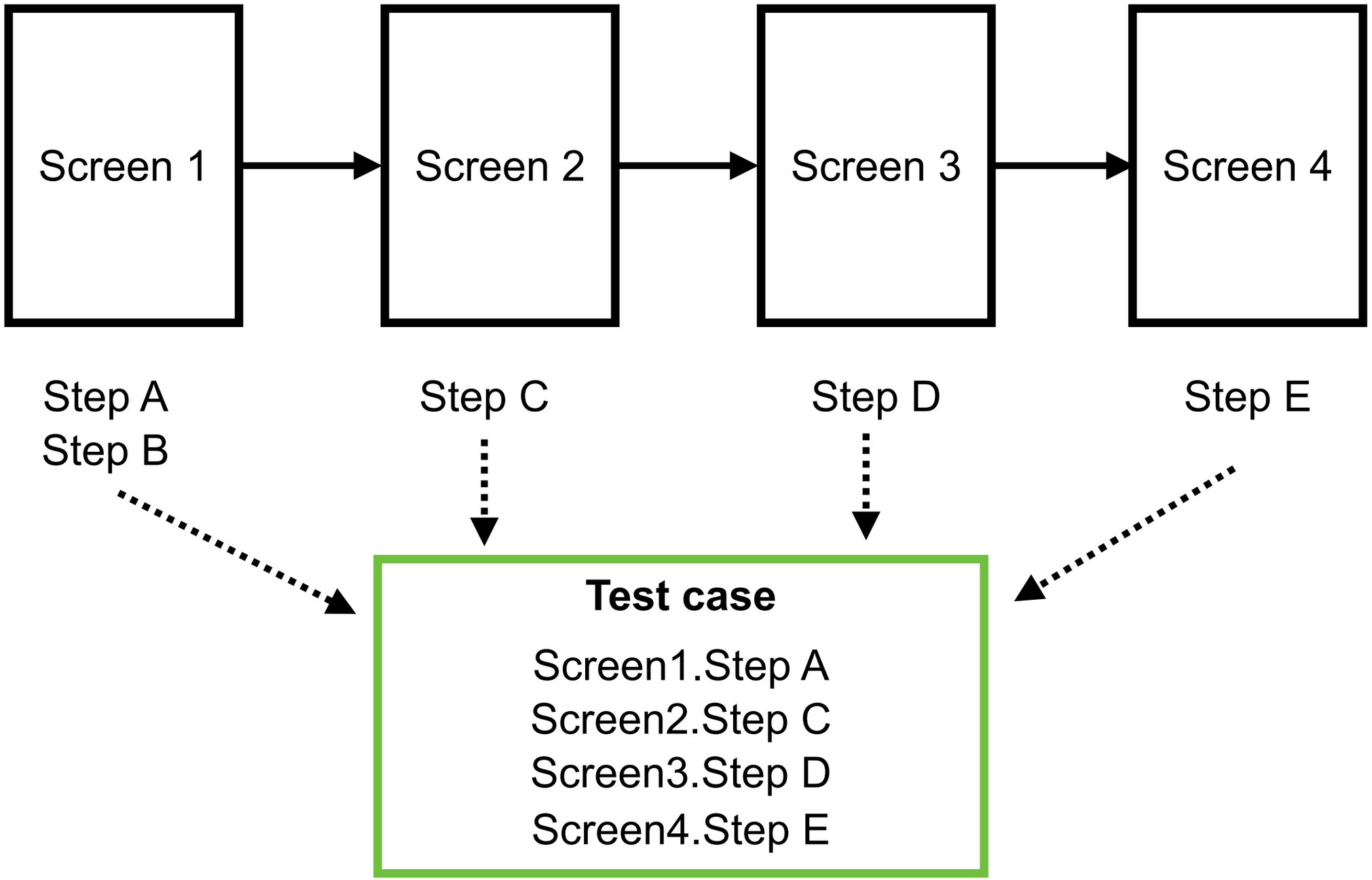
Maintainable test cases
Reduce code duplication
Working as a team



Use Page Object Pattern



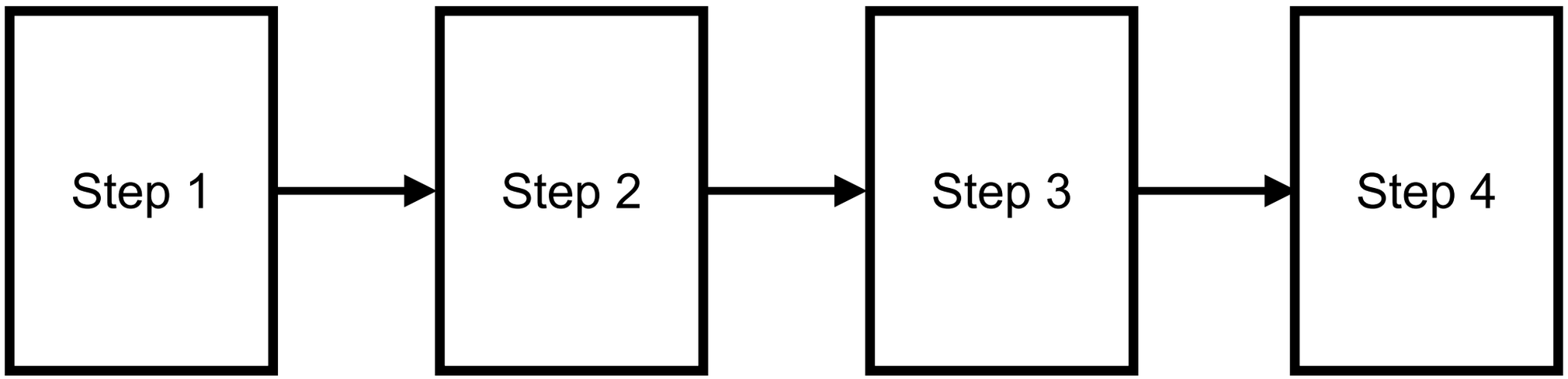
Use Page Object Pattern



Workshop with Page Object

https://github.com/up1/workshop-playwright/tree/main/page_object

Workshop



https://playwright.dev Get started Node.js Java

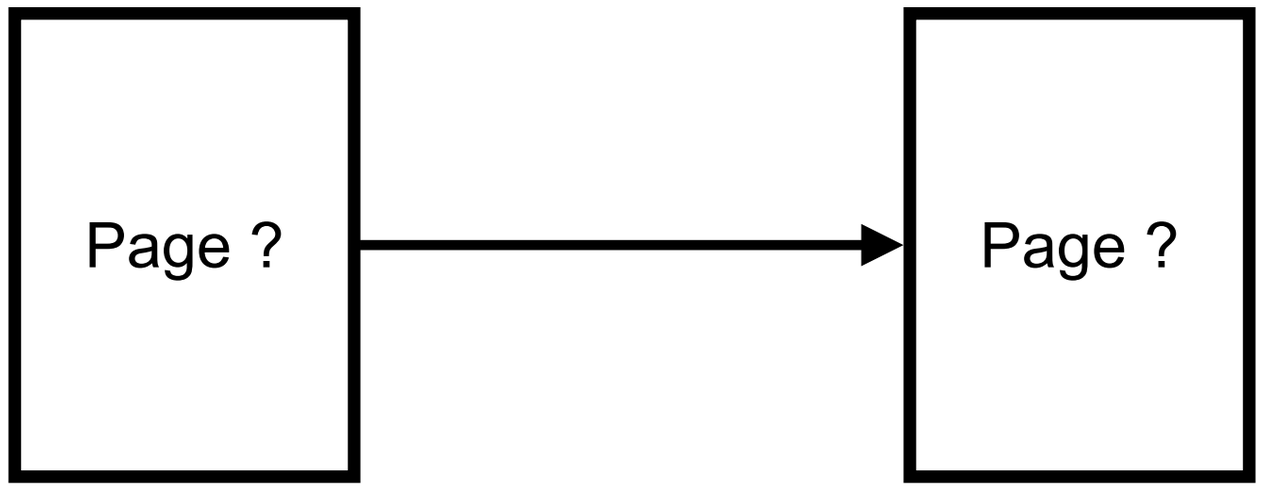
Write test case

Make it work

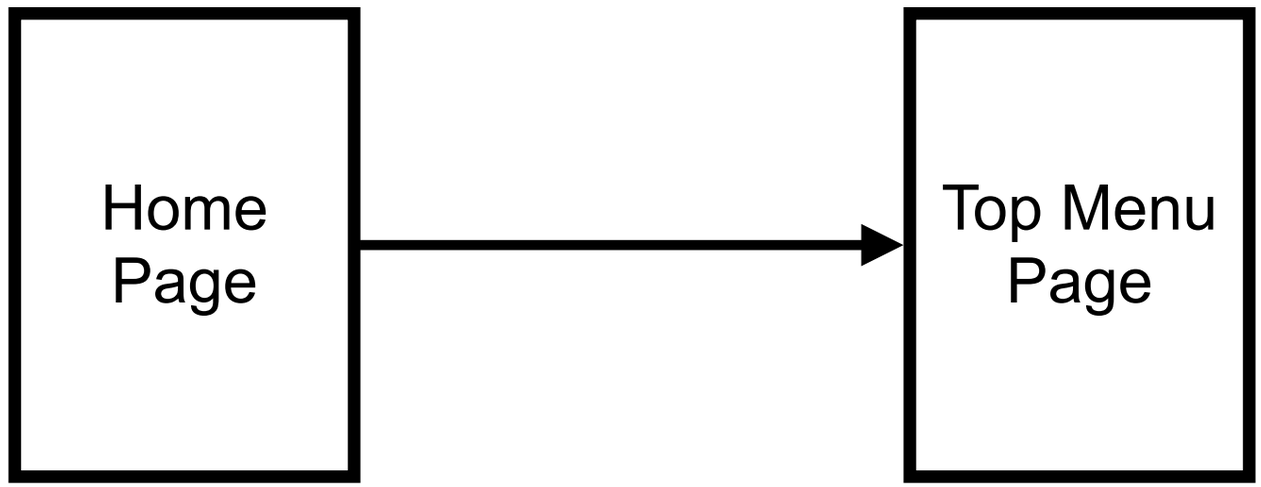
```
test('Check title in home page', async ({ page }) => {
  await page.goto('https://playwright.dev/');
  await expect(page).toHaveTitle(/Playwright/);
});

test('Check started link', async ({ page }) => {
  await page.goto('https://playwright.dev/');
  await page.getByRole('link', { name: 'Get started' }).click();
  await expect(page).toHaveURL(/.*intro/);
});
```

Design Page Object ?



Page Object ?



Check detail of page

Click link of Getting start

Choose Node.js

Click menu Java

Check content of Java

Home Page

```ts
import { type Locator, type Page, expect } from '@playwright/test';

export class HomePage {
    readonly page: Page;
    readonly getStartedButton: Locator;
    readonly pageTitle: RegExp;

    constructor(page: Page) {
        this.page = page;
        this.getStartedButton = page.getByRole('link', { name: 'Get started' });
        this.pageTitle = /Playwright/;
    }

    async clickGetStarted() {
        await this.getStartedButton.click();
    }

    async assertPageTitle() {
        await expect(this.page).toHaveTitle(this.pageTitle);
    }
}

export default HomePage;
```

First case

```ts
import { test } from '@playwright/test';
import { HomePage } from '../pages/home-page';

const URL = 'https://playwright.dev/';
let homePage: HomePage;

test.describe('Playwright website', () => {
  test('Check title in home page', async ({ page }) => {
    await page.goto(URL);
    homePage = new HomePage(page);
    await homePage.assertPageTitle();
  });

});
```

https://playwright.dev/docs/api/class-test#test-describe-1

Second case

```
import { HomePage } from '../pages/home-page';
import { TopMenuPage } from '../pages/topmenu-page';

const URL = 'https://playwright.dev/';
const pageUrl = /.*intro/;
let homePage: HomePage;
let topMenuPage: TopMenuPage;

test.describe('Playwright website', () => {

  test('Check started link', async ({ page }) => {
    // Act
    await page.goto(URL);
    homePage = new HomePage(page);
    await homePage.clickGetStarted();
    topMenuPage = new TopMenuPage(page);
    // Assert
    await topMenuPage.assertPageUrl(pageUrl);
  });


});
```

Duplication !!

```
test.describe('Playwright website', () => {

  test('Check title in home page', async ({ page }) => {
    await page.goto(URL);
    homePage = new HomePage(page);

    await homePage.assertPageTitle();
  });

  test('Check started link', async ({ page }) => {
    // Act
    await page.goto(URL);
    homePage = new HomePage(page);

    await homePage.clickGetStarted();
    topMenuPage = new TopMenuPage(page);
    // Assert
    await topMenuPage.assertPageUrl(pageUrl);
  });

});
```

Use Test Life Cycle

```
test.beforeEach(async ({ page }) => {
  await page.goto(URL);
  homePage = new HomePage(page);
});
```

Third case

```
test('Check Java page', async ({ page }) => {
    await test.step('Act', async () => {
      await homePage.clickGetStarted();
      topMenuPage = new TopMenuPage(page);
      await topMenuPage.hoverNode();
      await topMenuPage.clickJava();
    });
    await test.step('Assert', async () => {
      await topMenuPage.assertPageUrl(pageUrl);
      await topMenuPage.assertNodeDescriptionNotVisible();
      await topMenuPage.assertJavaDescriptionVisible();
    });
});
```

https://playwright.dev/docs/api/class-test#test-step

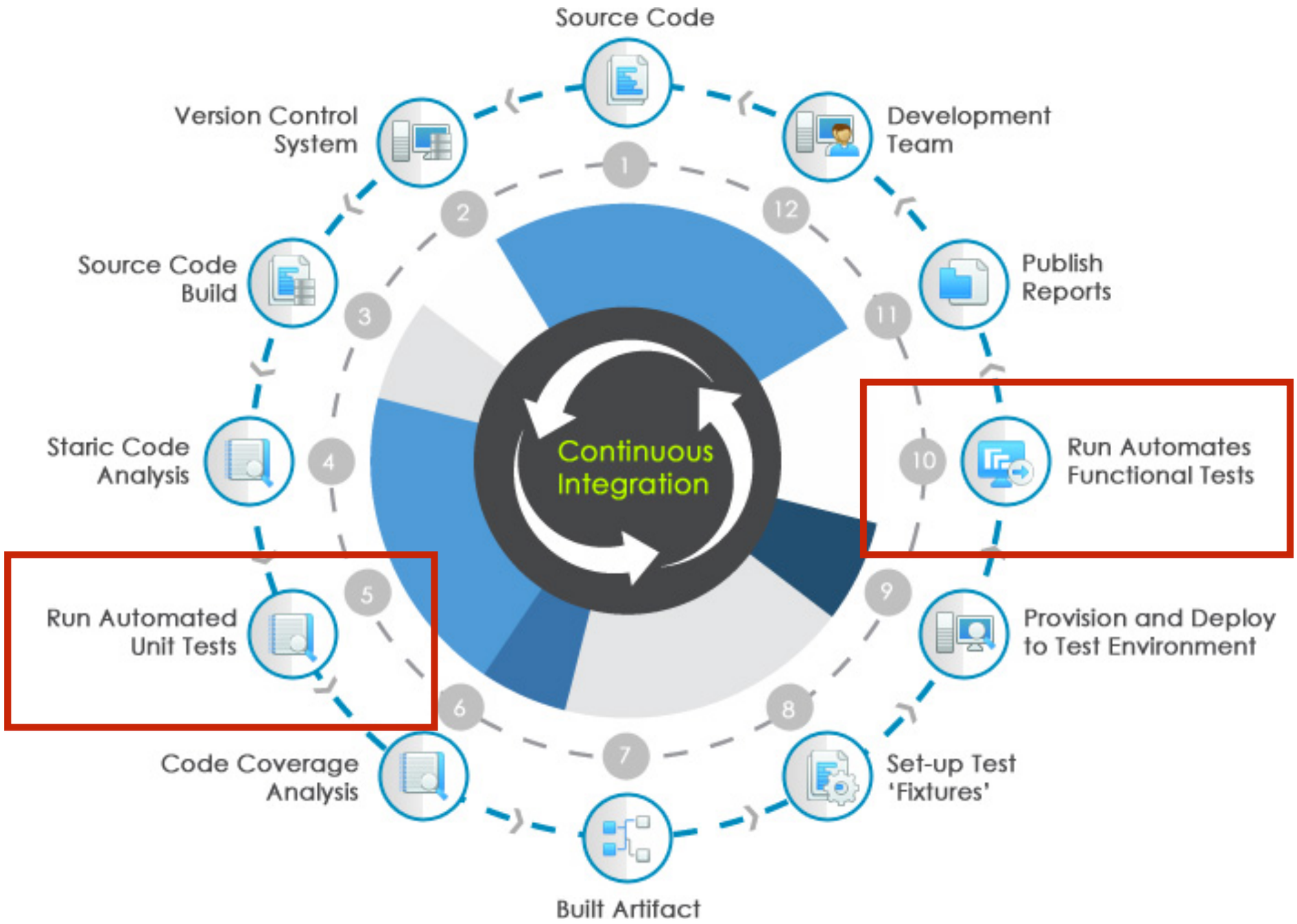
API Testing

https://playwright.dev/docs/api-testing

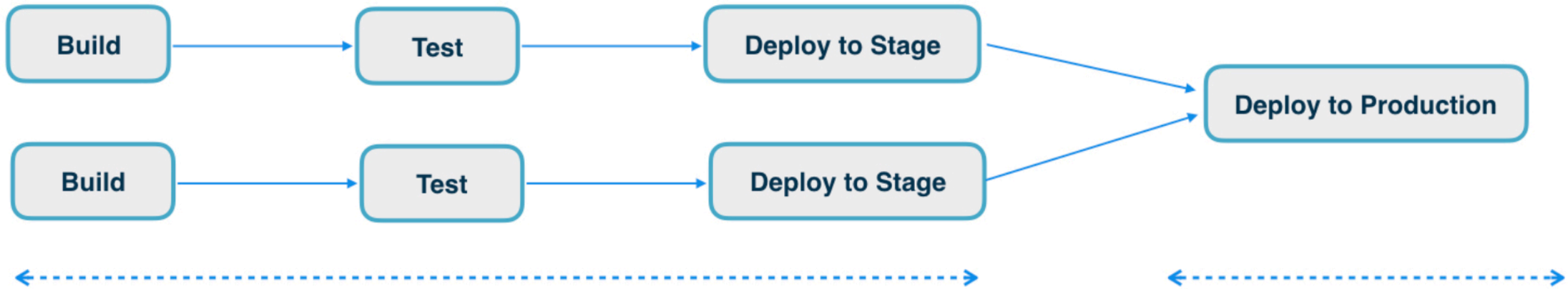
Make it Fast

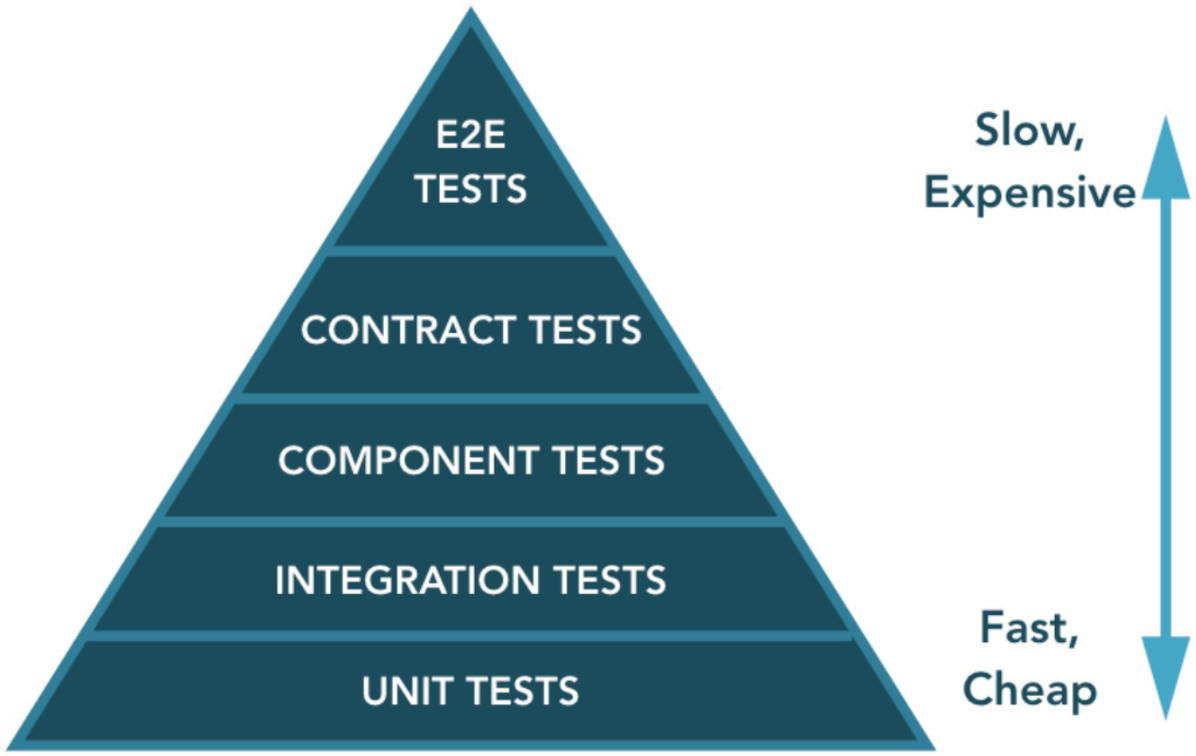
Continuous Integration

Continuous integration



Test strategy

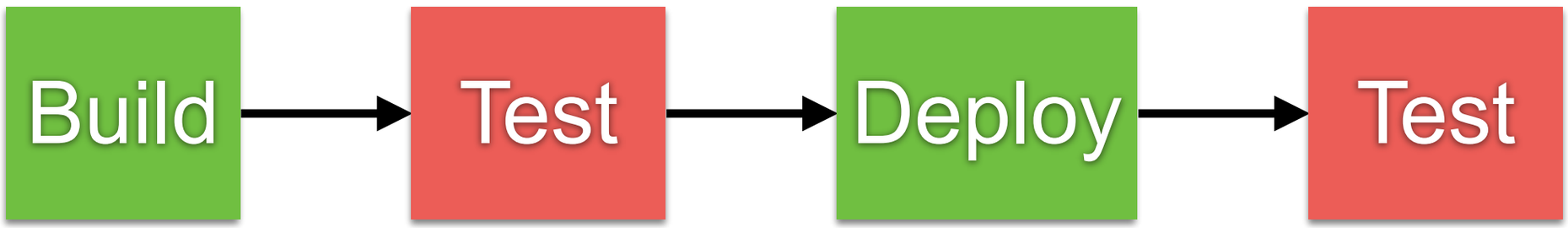




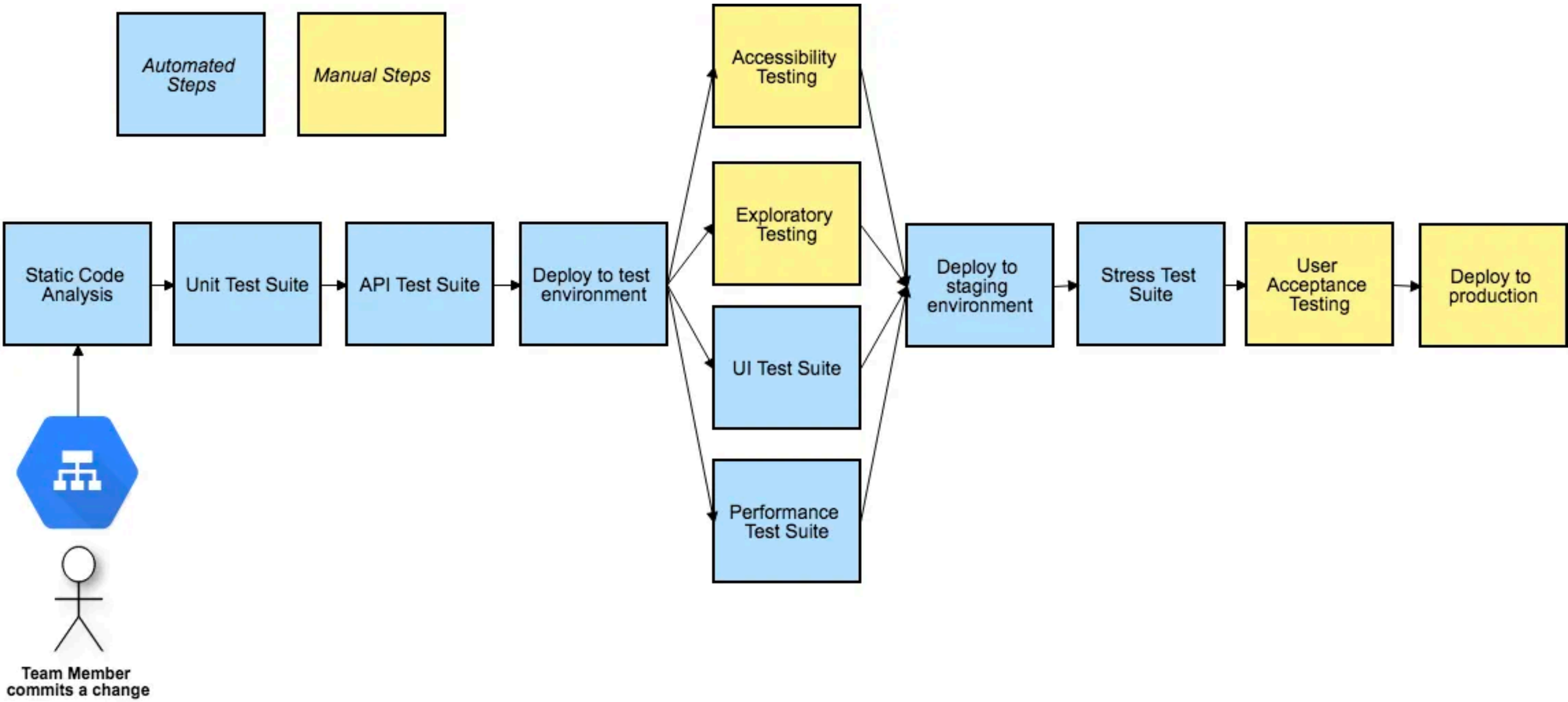
Monitoring
Distributed Tracing
Fault-injection Testing

Canary Deployments
Blue-Green Deployments
A/B Testing

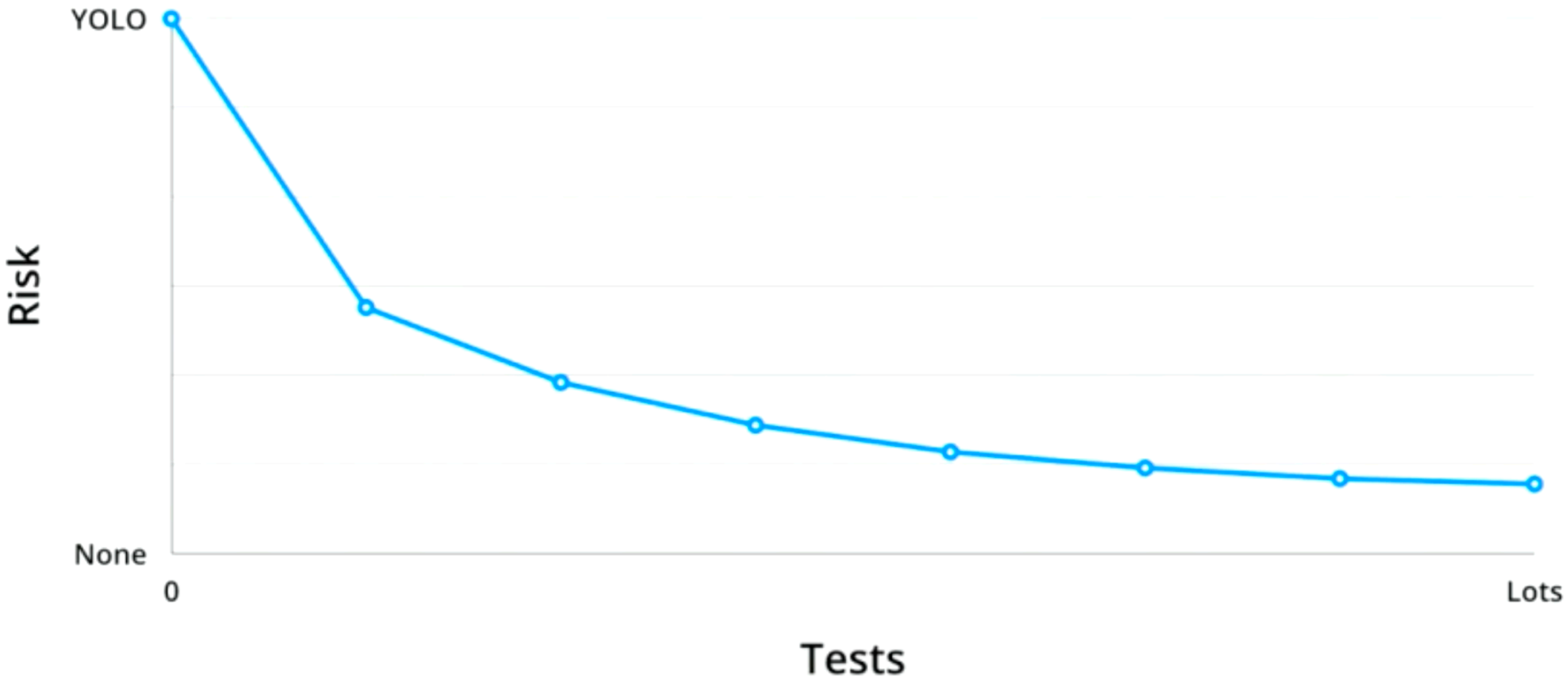
Design your pipeline



Design your pipeline/process

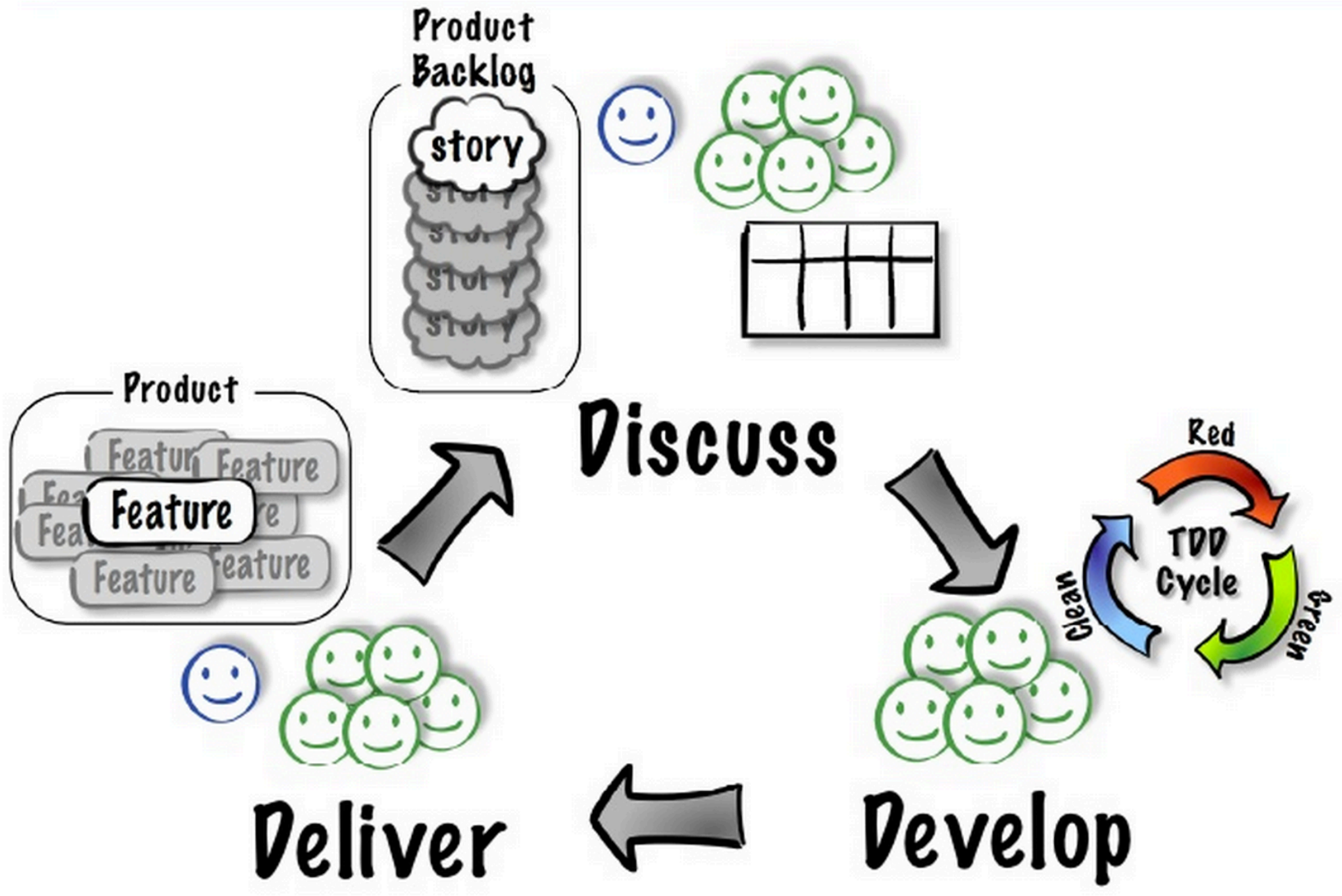


Reduce risk with tests



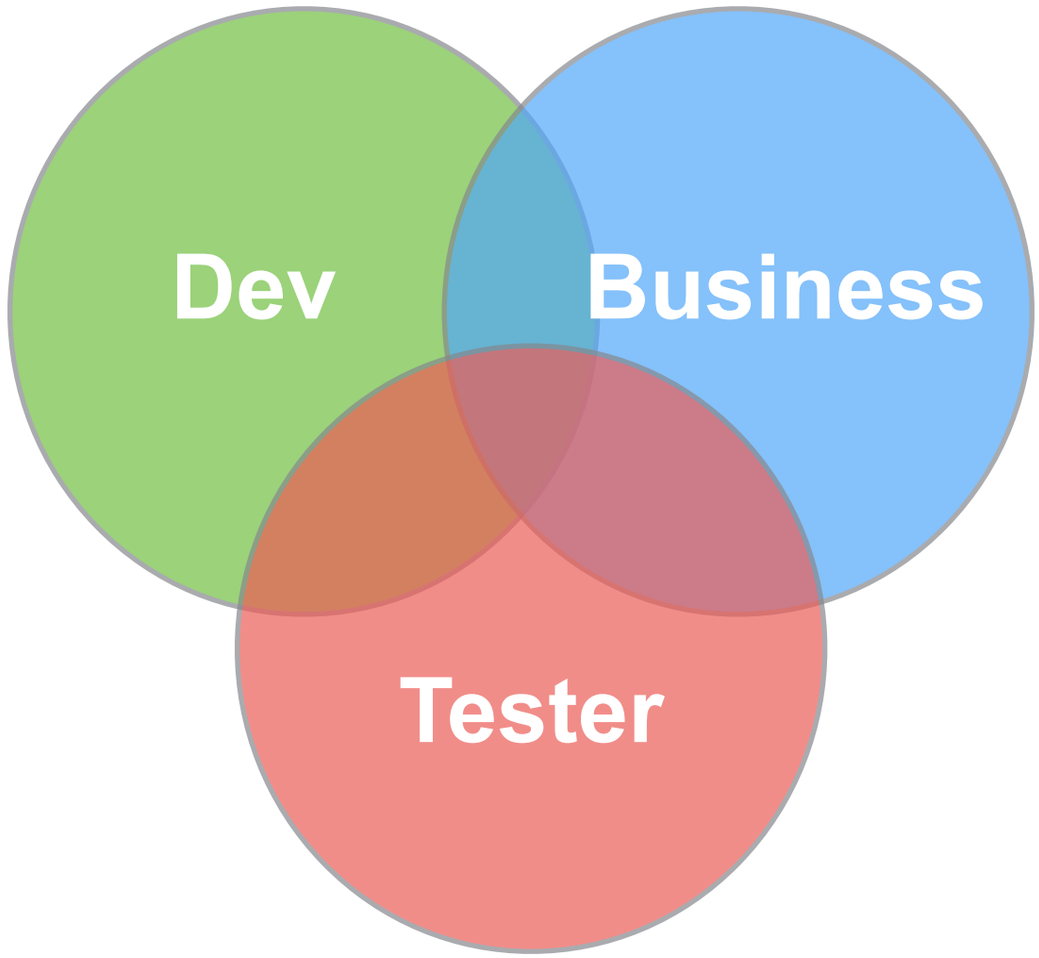
THINK before coding

Acceptance Test-Driven Development



(Model developed with Pekka Klärck, Bas Vodde, and Craig Larman.)

Acceptance Test-Driven Development



Acceptance Tests

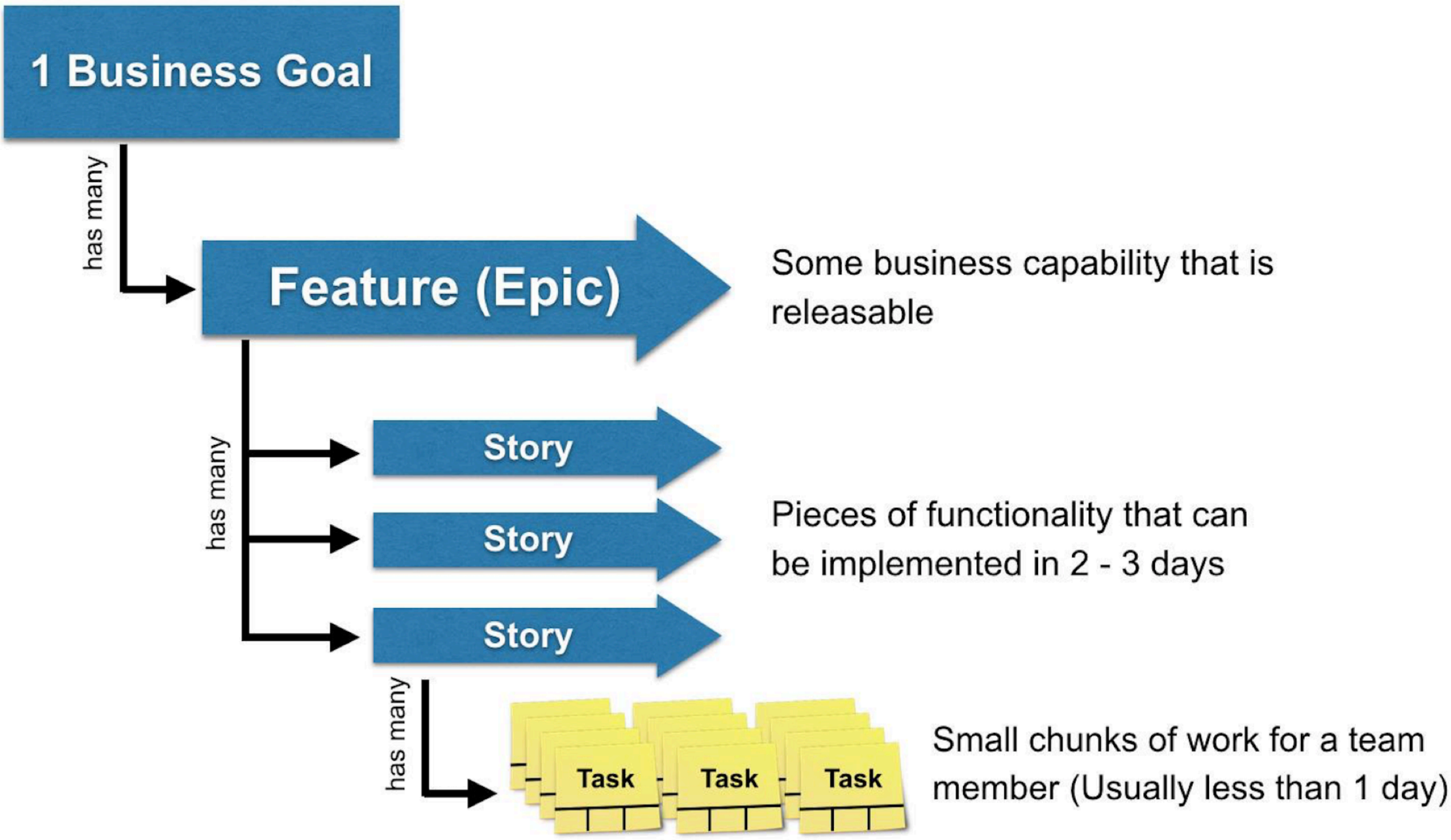
=

Business Criteria

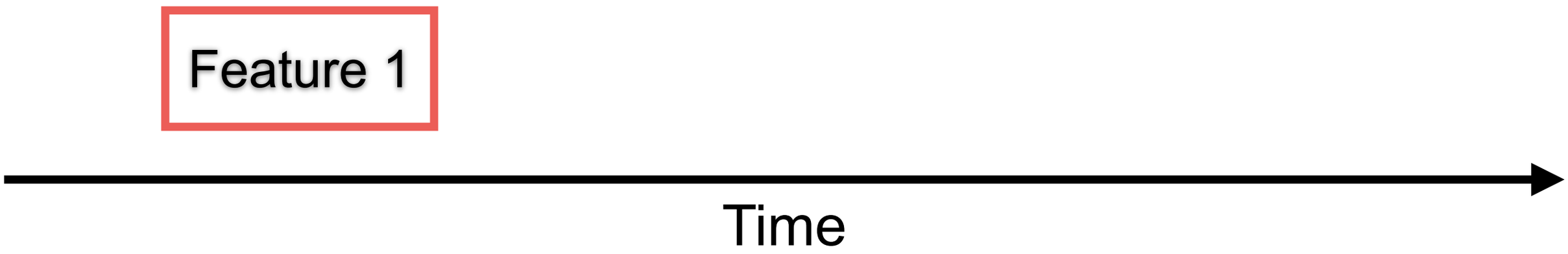
+

Examples (data)

Work break down

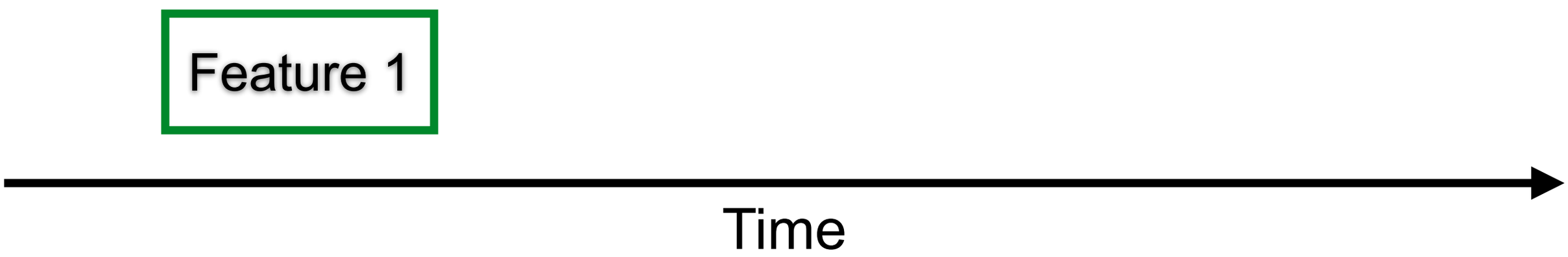


Iterative and incremental process



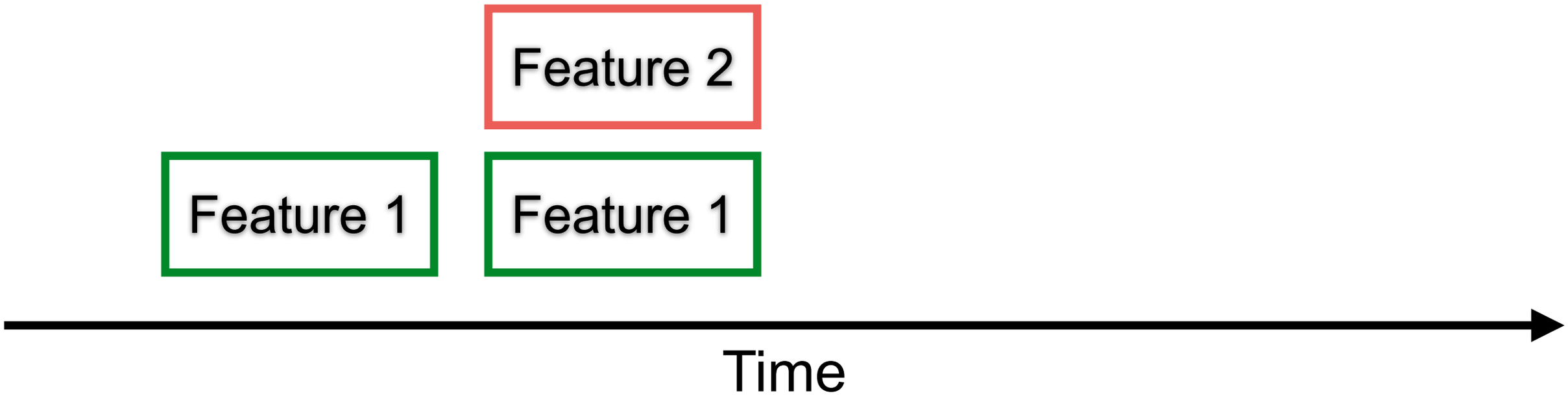
Iterative and incremental process

Done = coded and tested



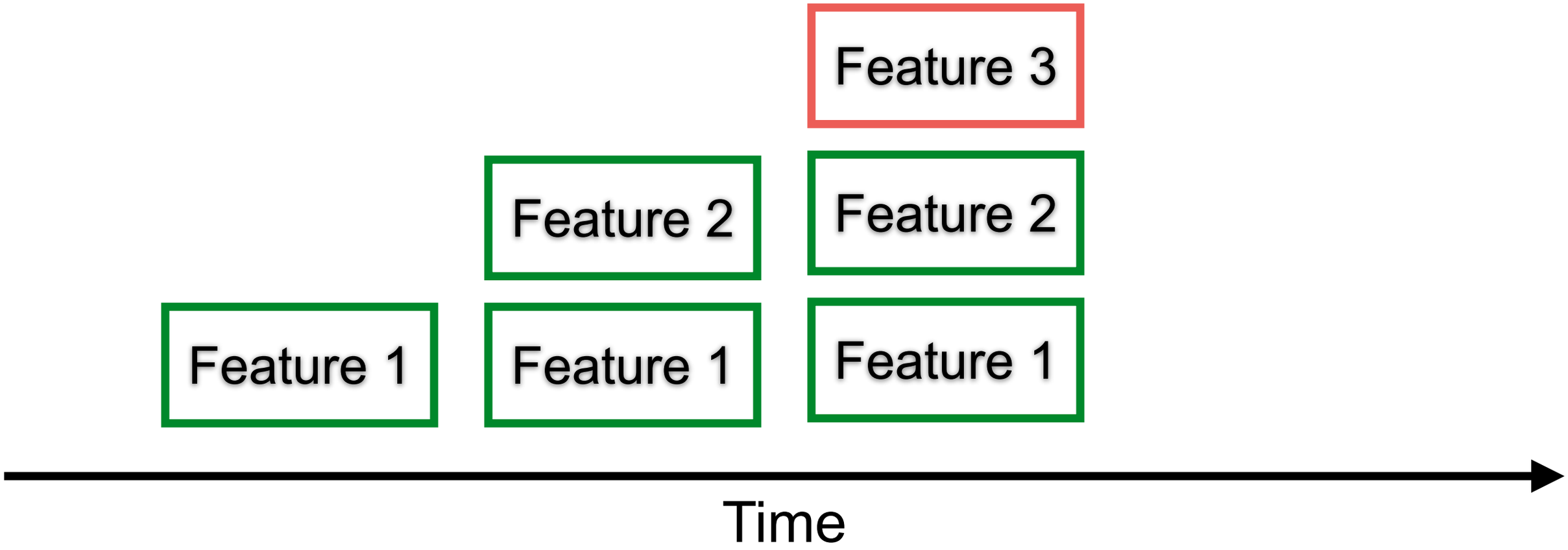
Iterative and incremental process

Done = coded and tested



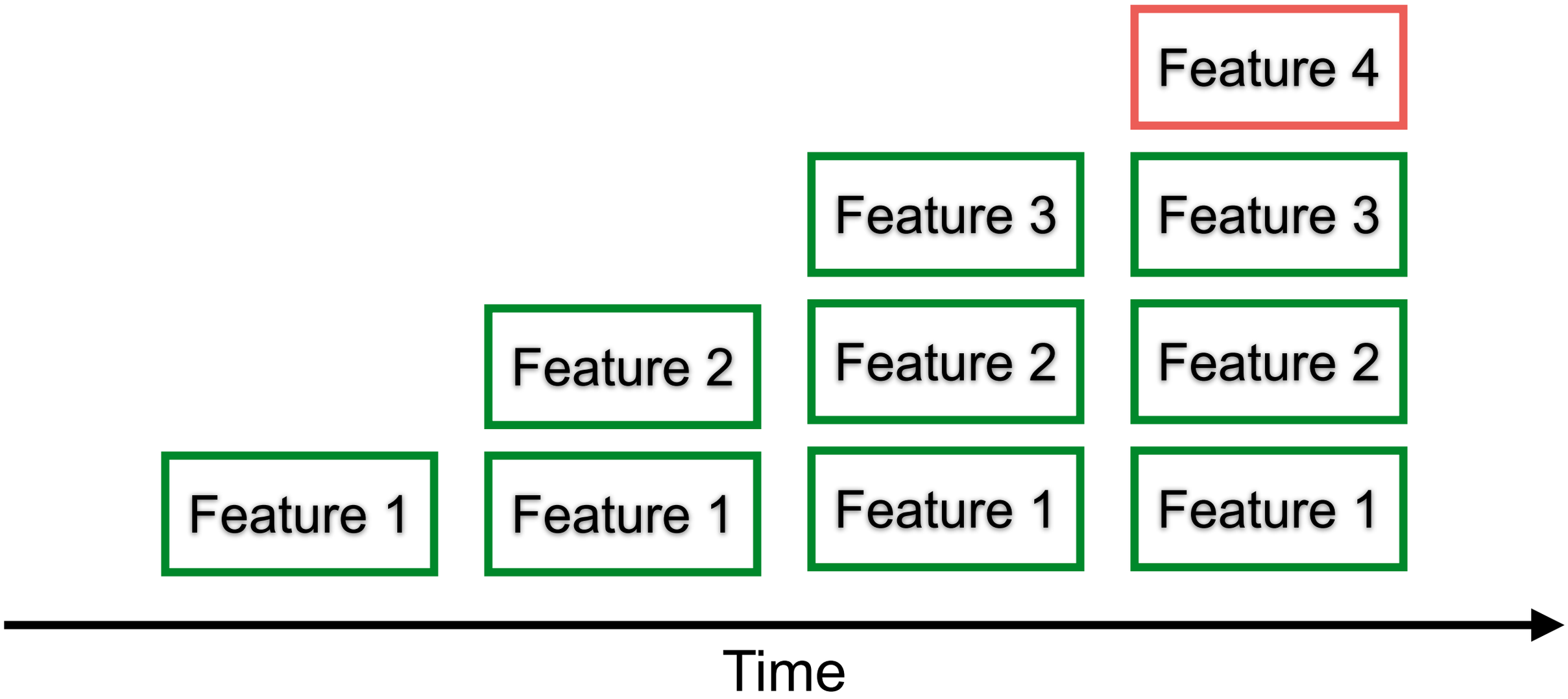
Iterative and incremental process

Done = coded and tested



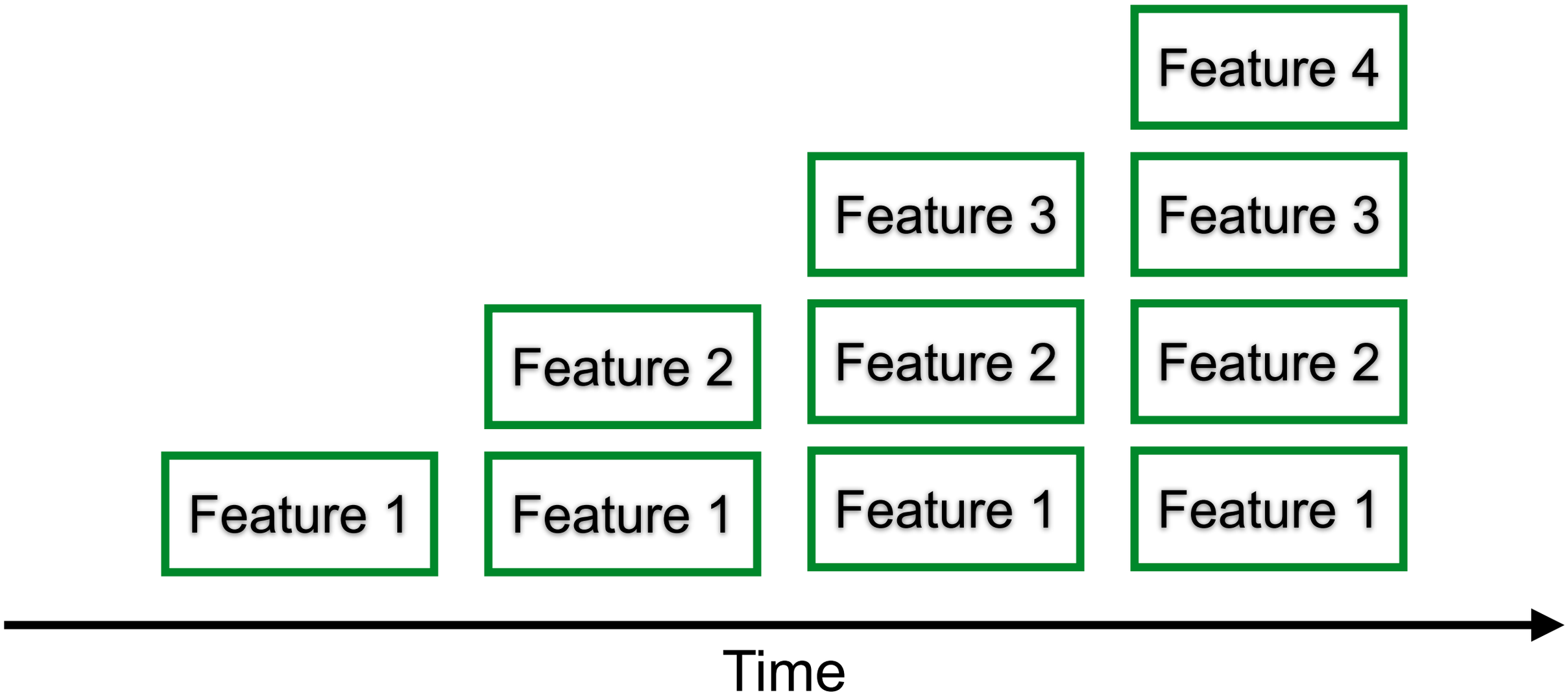
Iterative and incremental process

Done = coded and tested



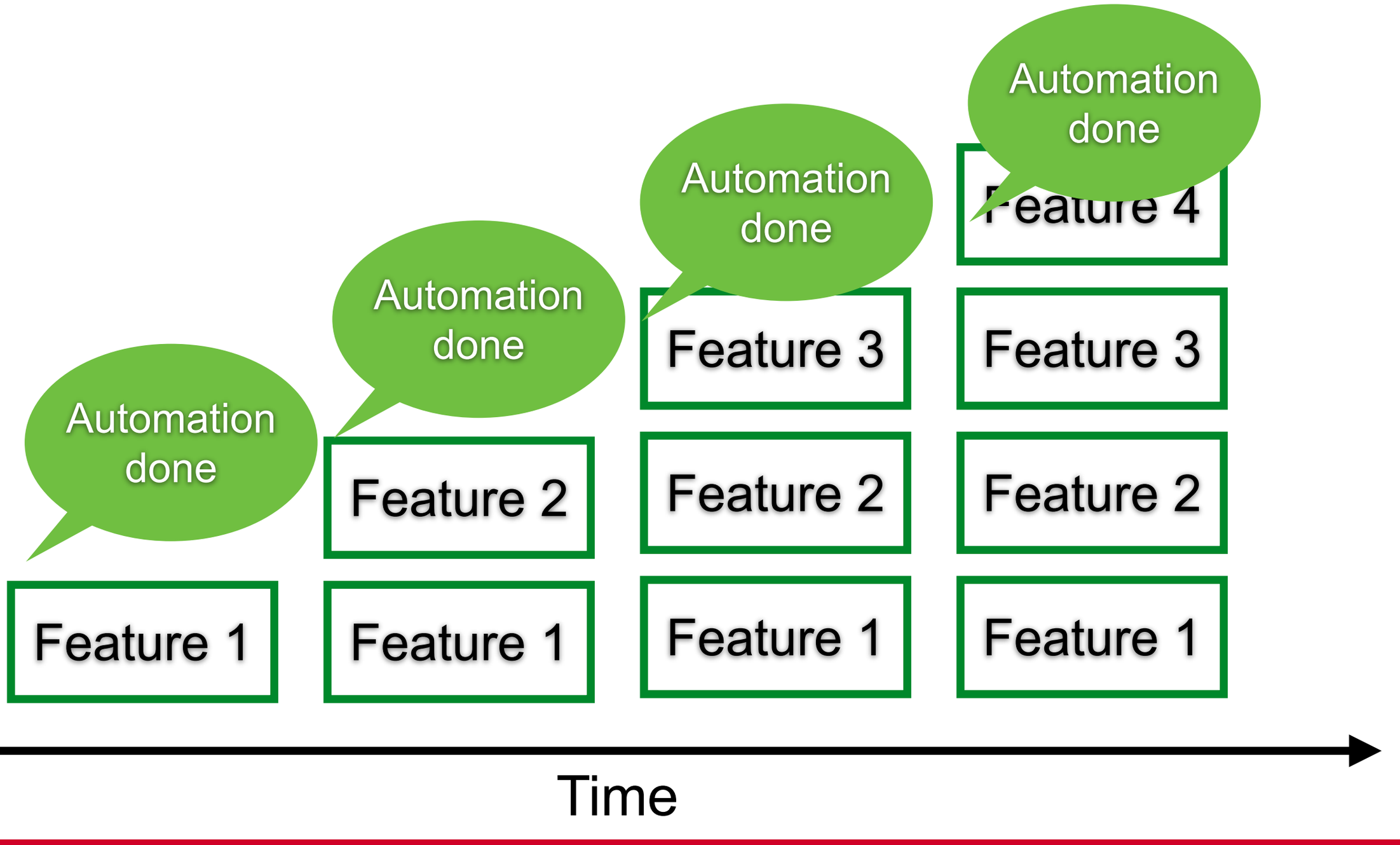
Iterative and incremental process

Done = coded and tested



Iterative and incremental process

Done = coded and tested

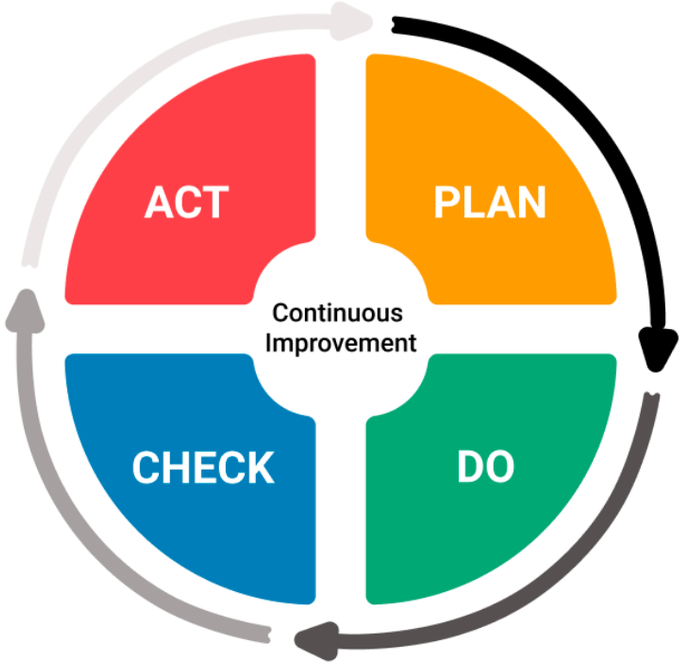


Automation feedback

Easier over time ?

Time spent on maintenance ?

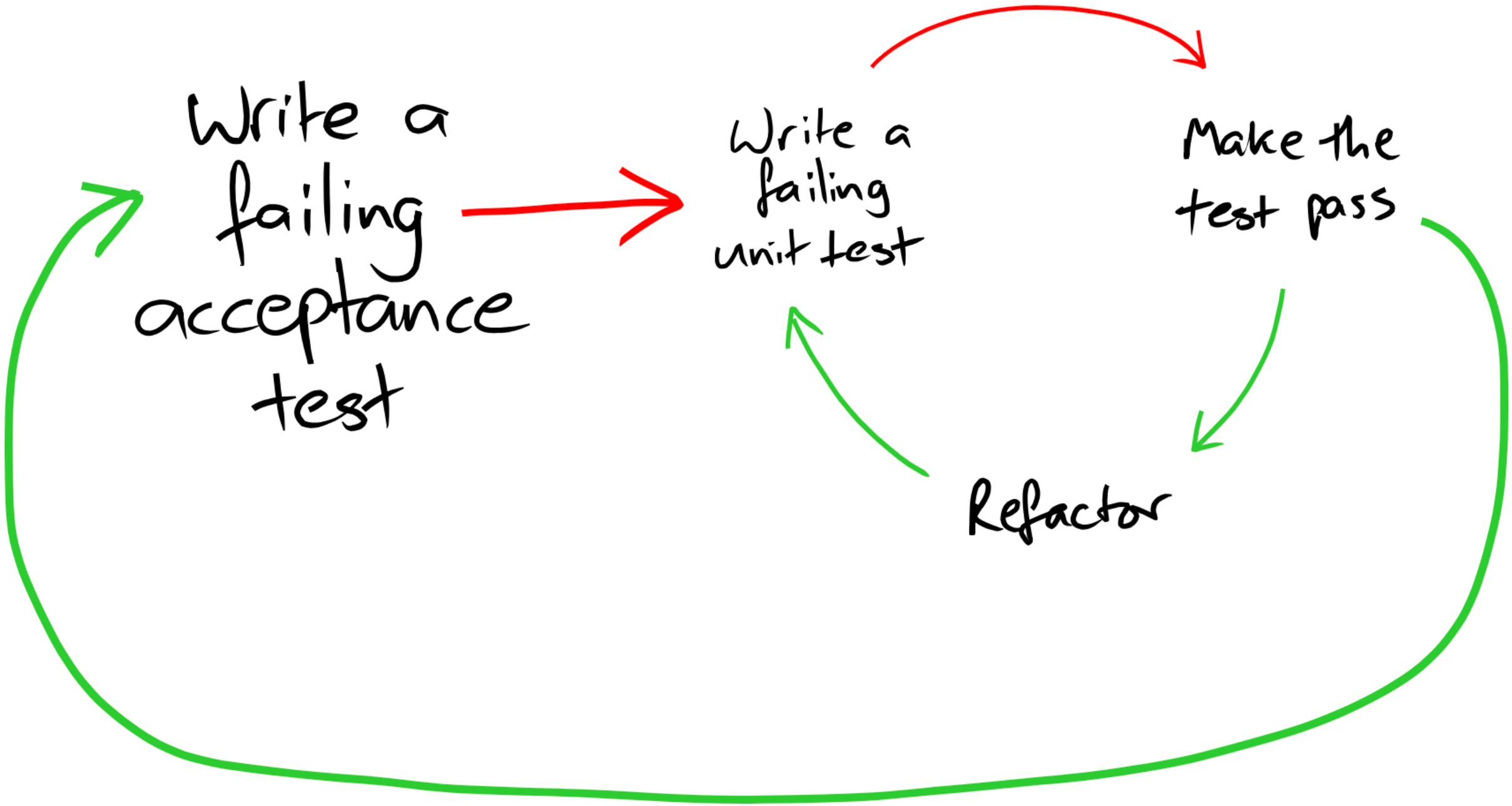
Test find regression bugs ?



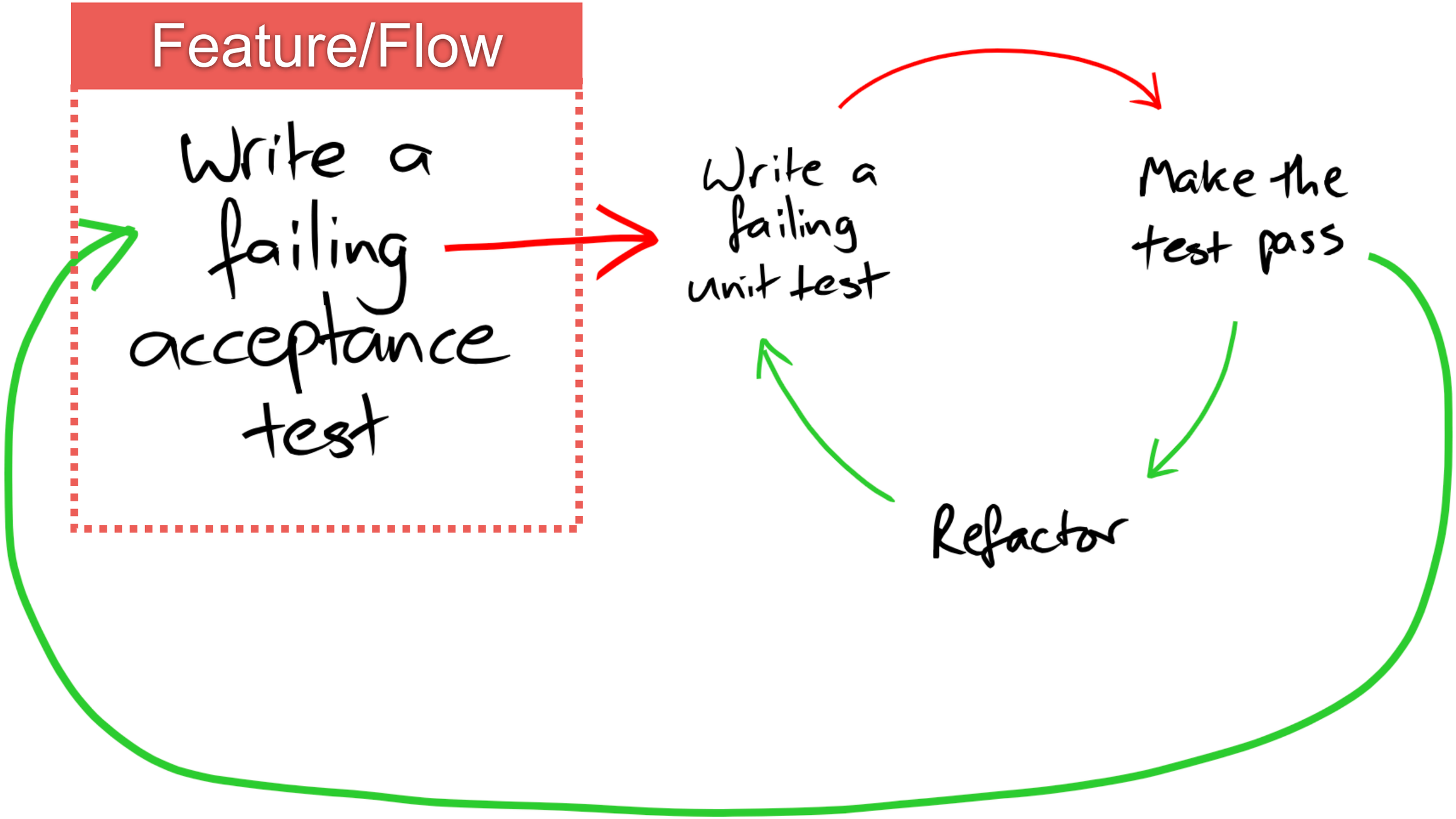
Start with simple

Use feedback to improve

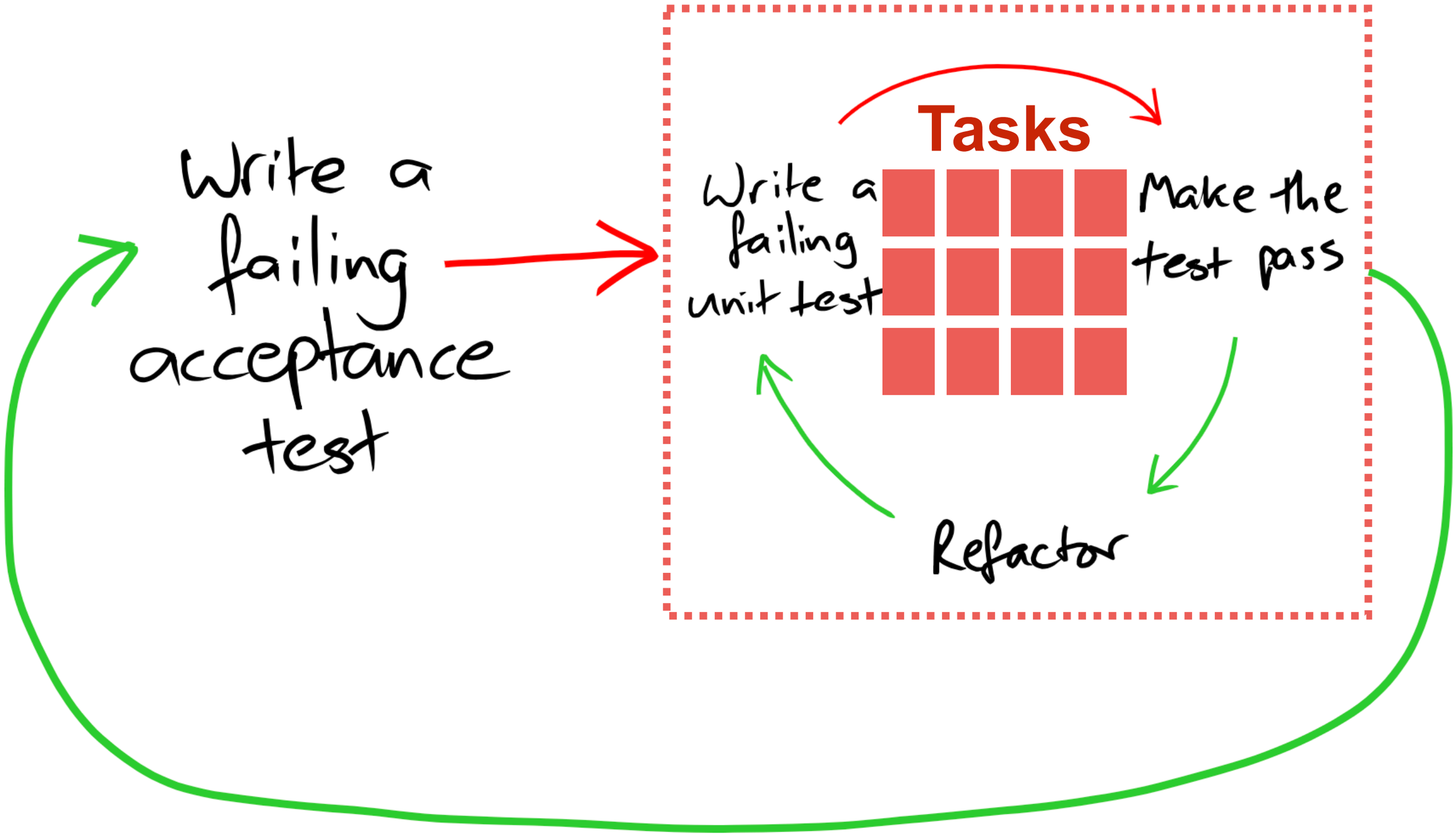
Outside-in develop/test



Outside-in develop/test

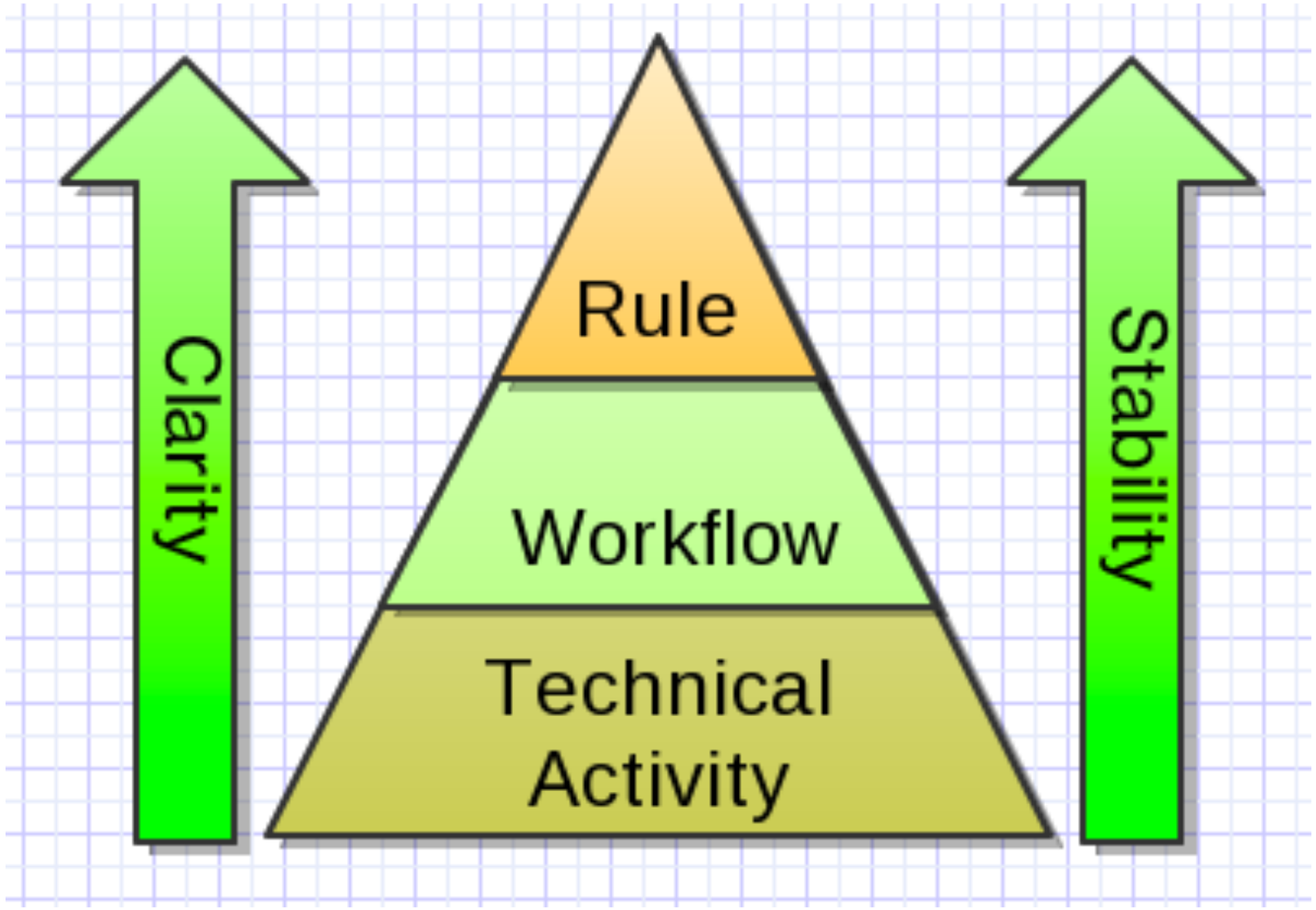


Outside-in develop/test



UI Test Automation

3 levels of UI test automation



3 levels of UI test automation

Business rule/functionality level

what is this test demonstrating or exercising

User interface workflow level

what does a user have to do to exercise the functionality through the UI

Technical activity level

what are the technical steps required to exercise the functionality