

Professional Software Testing.



James Van Hinsbergh

Software Development Engineer III

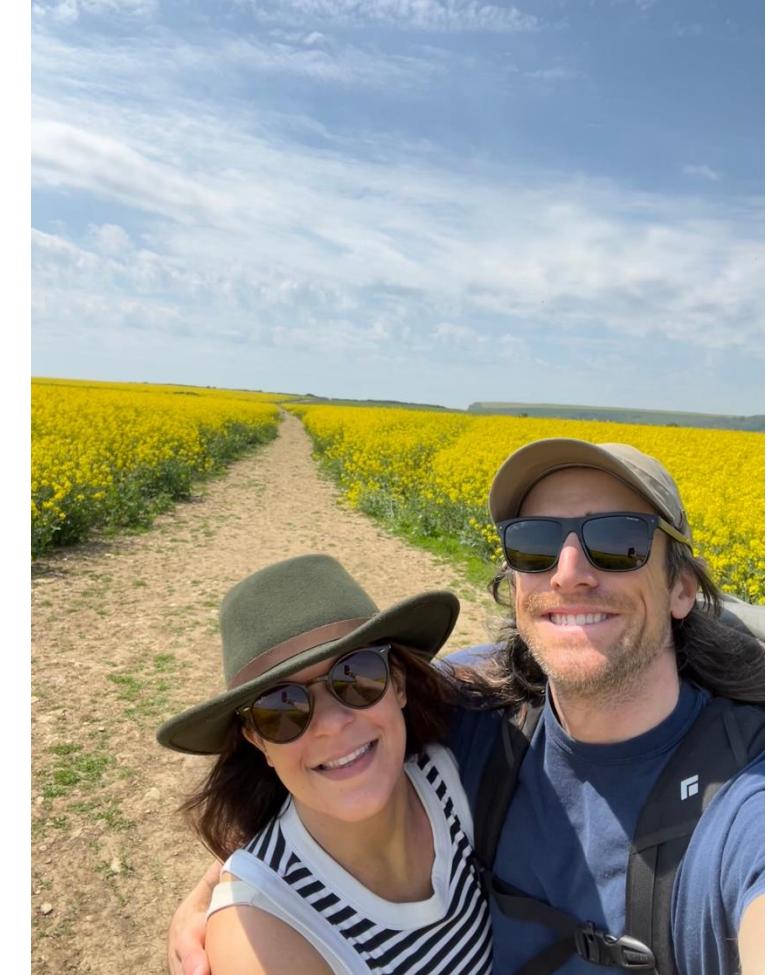
- Studied Computer Science at **Warwick**
- Previously specialised in **ML in vehicles**
- Joined **Tesco** in 2020 as a graduate
- Sampled **Tills** in 2021, returning in 2022
- Self-elected **social** secretary
- Worked on the GetGo **scan free checkout**
- Addicted to **running**
- Big **F1** fan



Fraser Hart

Software Development Manager

- Joined **Tesco** in 2021
- Software Development Manager
- Working in **web** since 2000 (I'm old)
- Moved into **team management** ~5yrs ago
- Worked in **start ups** to corporations, agencies to finance and everything in between.
- Likes Running, **Climbing** & Rollerblading

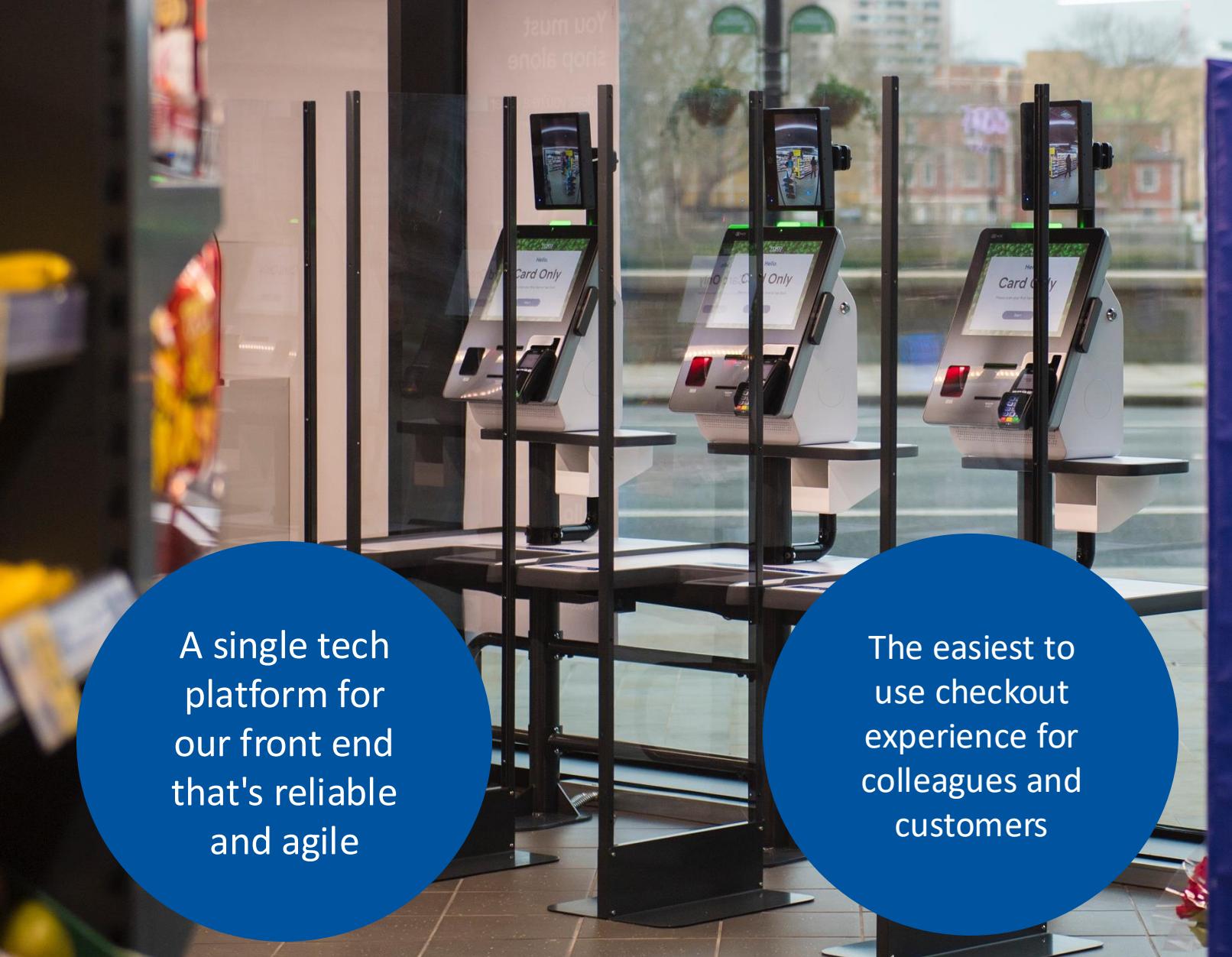


1. Introduction to Tesco Till

Started talking
about Tills in
2018

Previously
working with a
single vendor
for hardware
and software





A single tech platform for our front end that's reliable and agile

The easiest to use checkout experience for colleagues and customers



Let's keep safe distance

Through technology and hardware innovation enable stores to run the front end experience on a lower cost base





5 items



>7.5m transactions in 24hrs



>95% of all UK in-store transactions



End to End transaction time 14% faster



3.56/4 Ease of use feedback



Almost at Feature parity

Assistance

Find item

SAVINGS

£1.00

TOTAL

£6.50

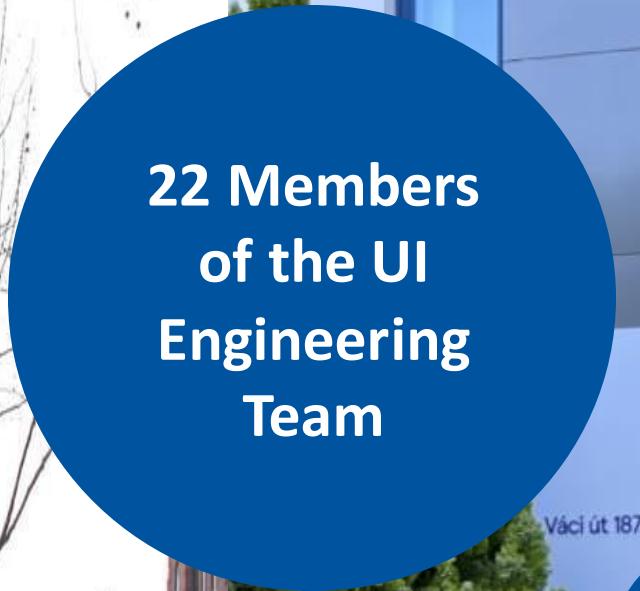
Pay

TESCO



London,
UK.

21 Perm
1 Contract



22 Members
of the UI
Engineering
Team



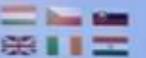
1 HOSD
1 PSDE
3 SDMs
9 SD3
5 SD2
3 Grads
1 QA



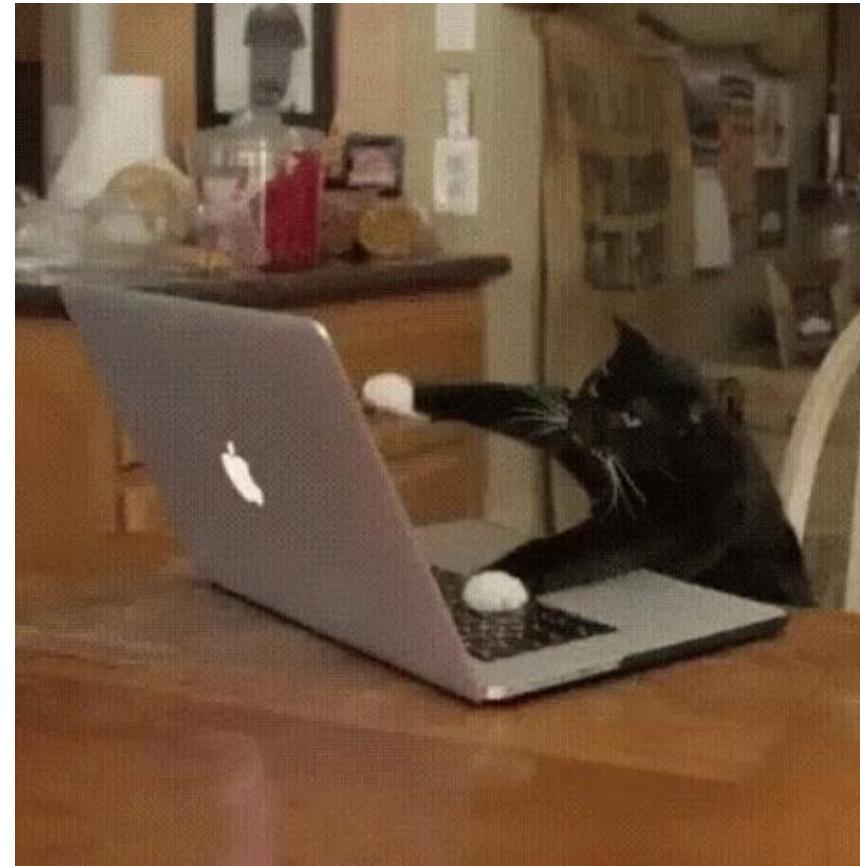
Budapest,
Hungary.

Hello.

Welcome to
Tesco Business
Services &
Technology LLC



Demo – Tesco Till



2. Testing: What and Why?

What is software testing?

“The process of **executing a programme under positive and negative conditions** by manual or automated means”



It checks for the:

- Specification
- Functionality
- Performance

Why should we care?

- Reduces **bugs** in new features and in existing features
- Reduces the **cost of change** by reducing the **feedback loop**
- Tests **document your code**
- Easier and safer **refactoring**
- Helps us write **logical, simple to follow** code
- Gives us **confidence** in the software we are building and delivering
- So we can **sleep** at night

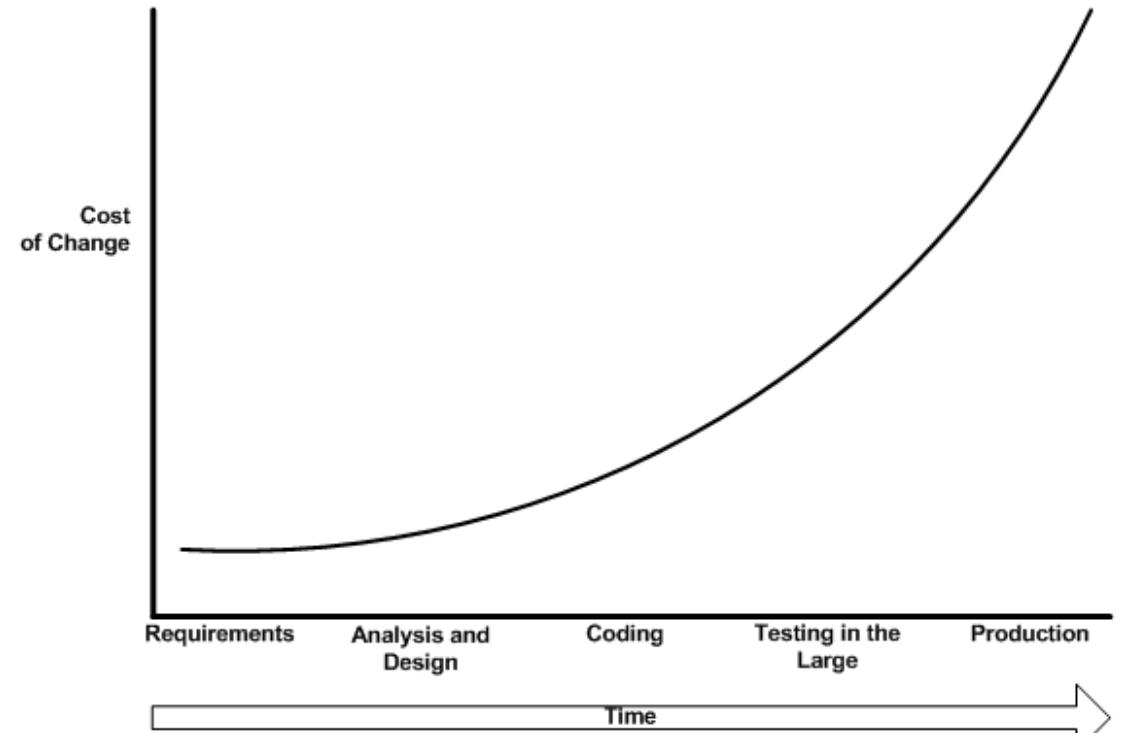
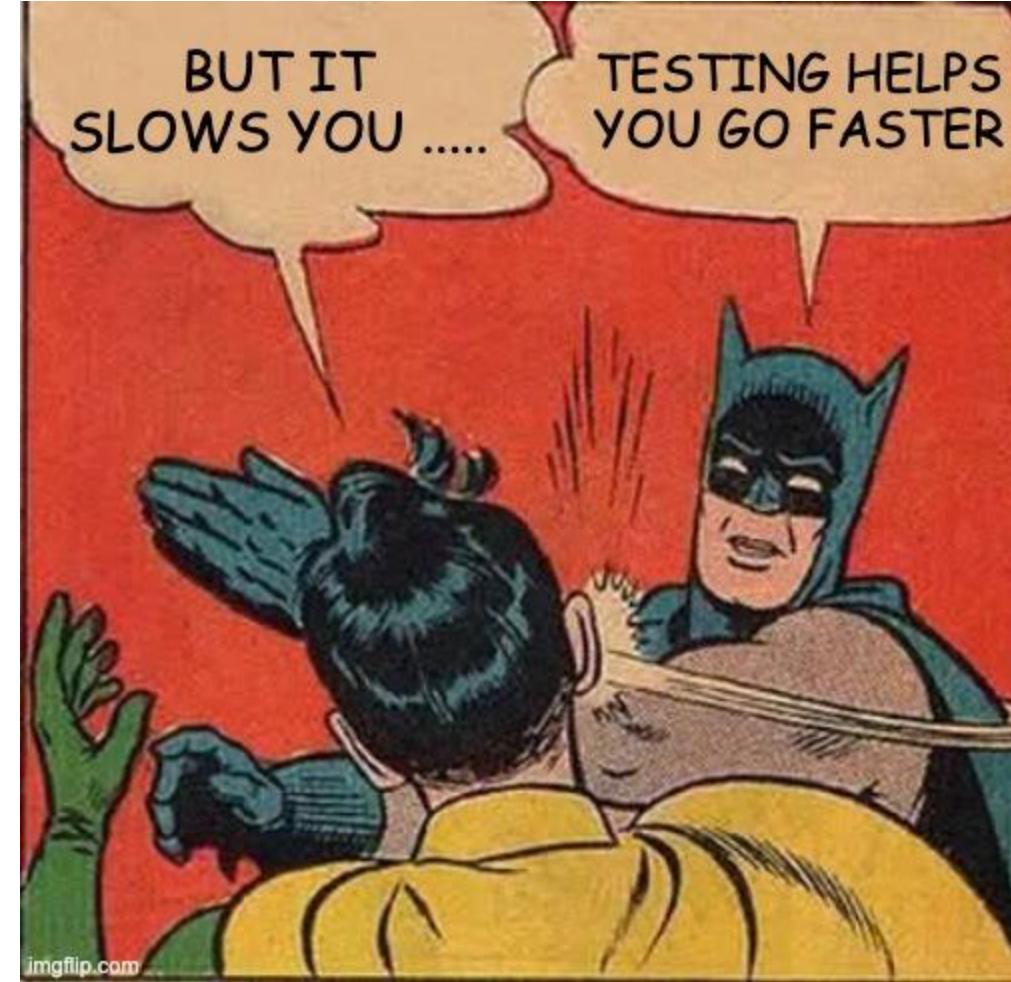


Image: <http://www.agilemodeling.com/essays/costOfChange.htm>



3. Overview of types of testing

Types of testing

Performance

Acceptance

Smoke

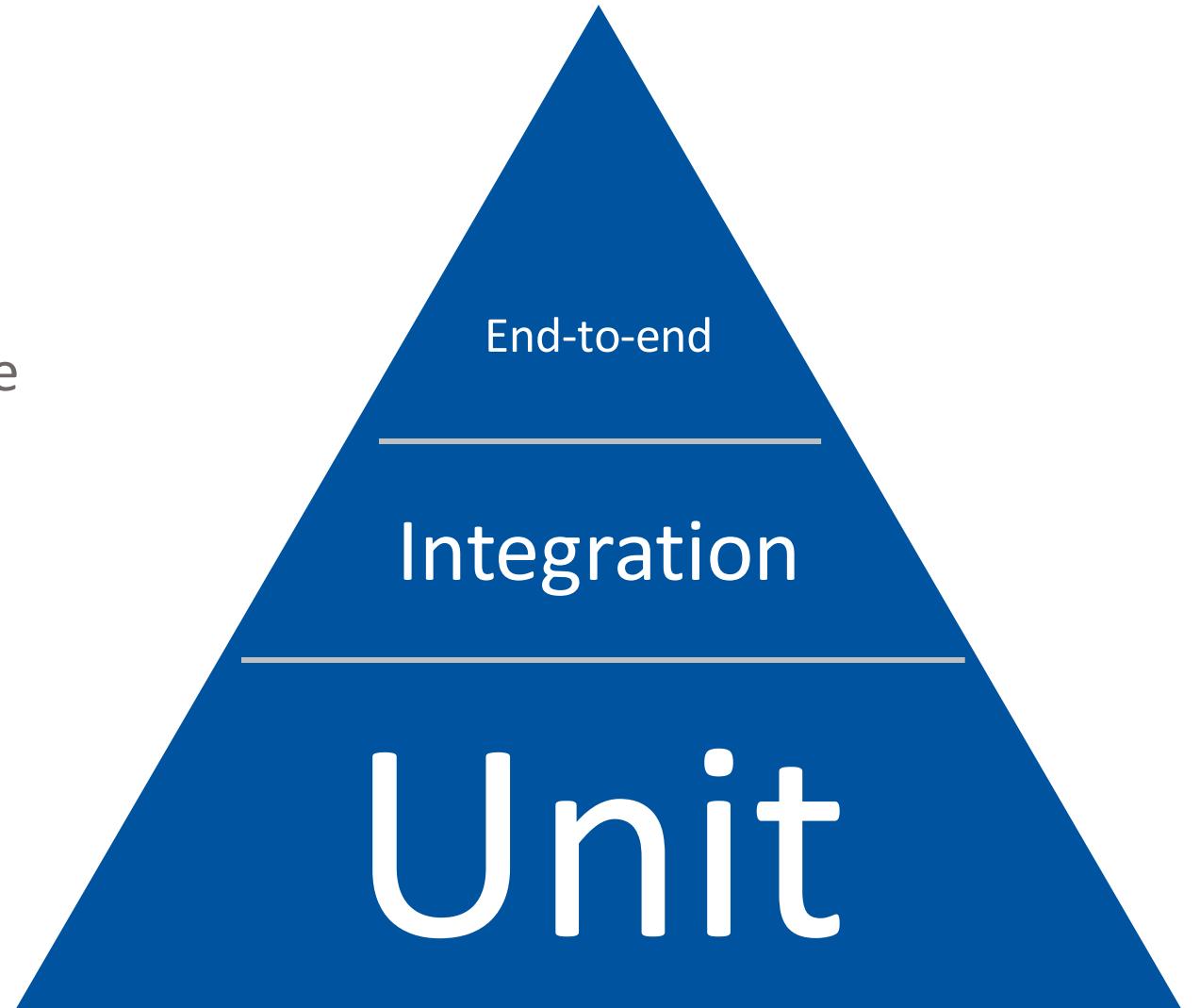
Unit Functional

Integration

End-to-end

The testing pyramid

- Unit tests have **more isolation** and are **faster**
- E2E Tests have **more integration** and are **slower**
- Write lots of small and fast unit tests.
Write some more coarse-grained tests
and very few high-level tests that test
your application from end to end.



Martin Fowler

The testing trophy

- An approach popularised by **Kent C. Dodds**
- Use **tools** to help catch errors as you write
- Focuses on mainly **integration** testing
- E2E tests may be slow, but give much **higher confidence** that the application is working correctly

THE FOUR TYPES OF TESTS

End to End

A helper robot that behaves like a user to click around the app and verify that it functions correctly.

Sometimes called "functional testing" or e2e.

Integration

Verify that several units work together in harmony.

Unit

Verify that individual, isolated parts work as expected.

Static

Catch typos and type errors as you write the code.



Image: <https://kentcdodds.com/blog/the-testing-trophy-and-testing-classifications>

Anatomy of a test

2 common patterns:

- Given, When, Then
- Arrange, Act, Assert

Tips:

- Avoid using conditionals in tests
- Avoid multiple when, then, when, then repetitions

Example Unit Test

Category stamp component

A snippet is constructed of three parts:

- **describe** (grouping)
- **it** (single test)
- **expect** (validation)

```
describe('CategoryStamp', () => {
  it('should display a custom image src, if provided', () => {
    const { getByRole } = render(
      <CategoryStamp
        label="A Category"
        to="/some/category/page"
        customImageSrc="custom.jpg"
      />
    );
    expect(getByRole('img')).toHaveAttribute('src', 'custom.jpg');
  });

  it('should get the image from the label, if given', () => {
    const { getByRole } = render(
      <CategoryStamp label="Bakery" to="/some/category/page" />
    );
    expect(getByRole('img')).toHaveAttribute('src', 'bakery.jpg');
  });
});
```

End-to-end testing

How we test user flows on the till

- Use an end-to-end testing framework like Cypress
- Tests several user flows that a customer or colleague would undertake
- These are run on the complete (UI) application
- Step definitions like natural language to underlying code



Example Code Breakdown

Cucumber step definitions

```
When('I tap the {string} button', (expectedText: string) => {
  cy.contains('button', expectedText).click();
});
```

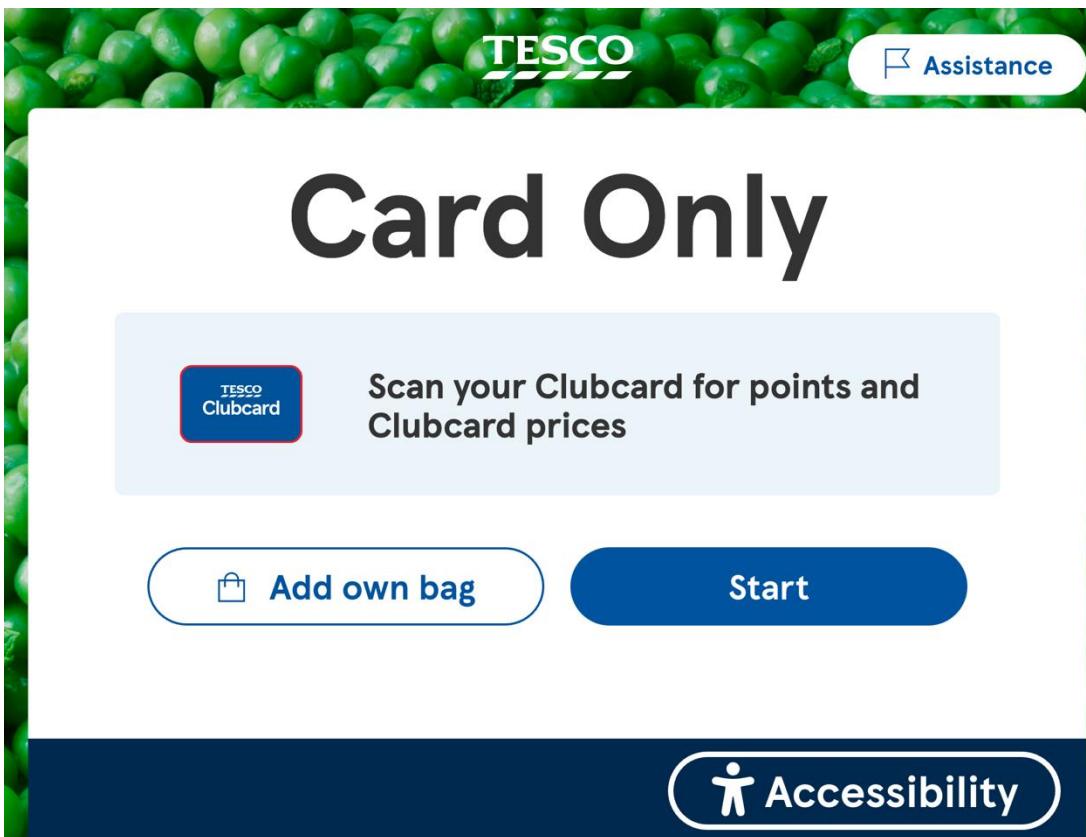
Example Code Breakdown

Cucumber step definitions

```
Then(  
  /the "( [^"]*)" should be "(enabled|disabled)"/,  
  (elementMapping: string, status: string) => {  
    const selector = resolveElementMapping(elementMapping);  
    const assert = status === 'enabled' ? 'not.have.attr' : 'have.attr';  
    cy.get(selector).should(assert, 'disabled');  
  }  
);
```

Example Scenarios

Scanning a product from the start screen



1 item

Sliced Mixed Peppers £2.50

Discount

Assistance

Find item

Own bag

SAVINGS
£1.00

TOTAL
£1.50

Pay

Example Scenarios

Scanning a product from the start screen

Given I am on the "Start" screen

When I scan a "Pack of Mixed Peppers"

Then I should be on the "Scan" screen

And the "Basket item count" should read "1 item"

And the 1st "Product title" should read "Sliced Mixed Peppers"

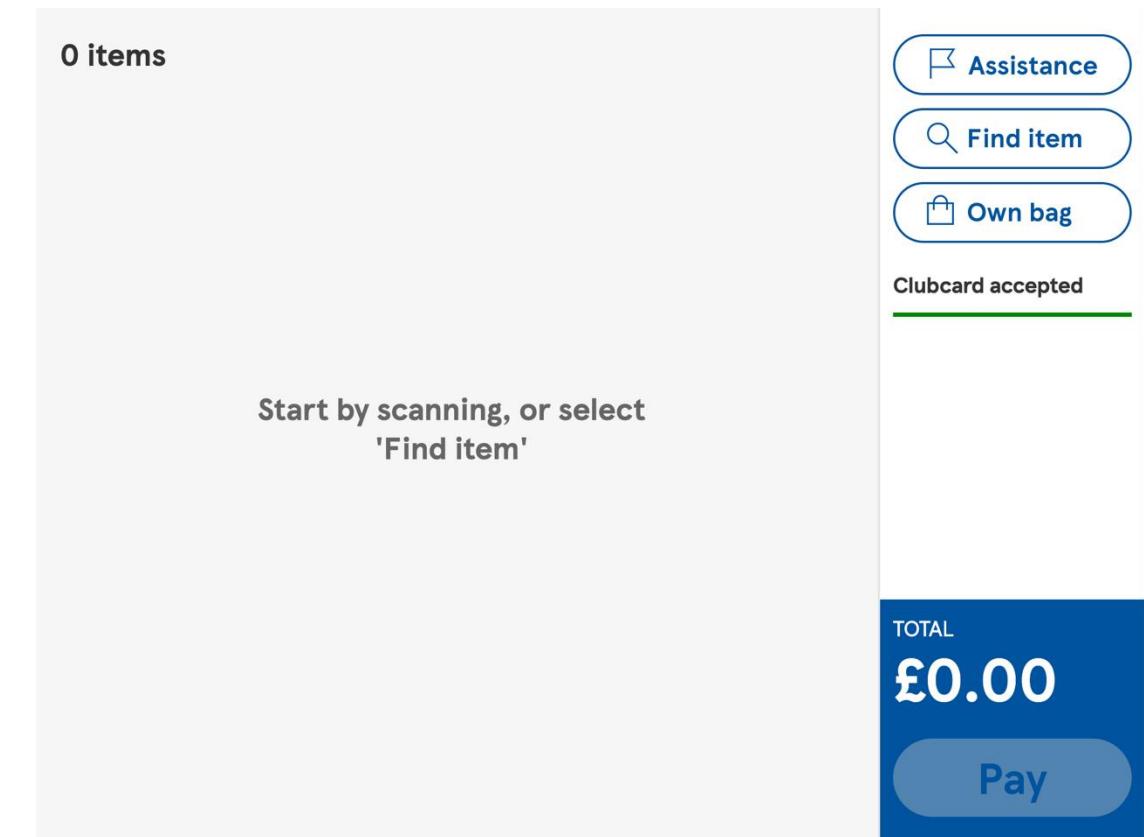
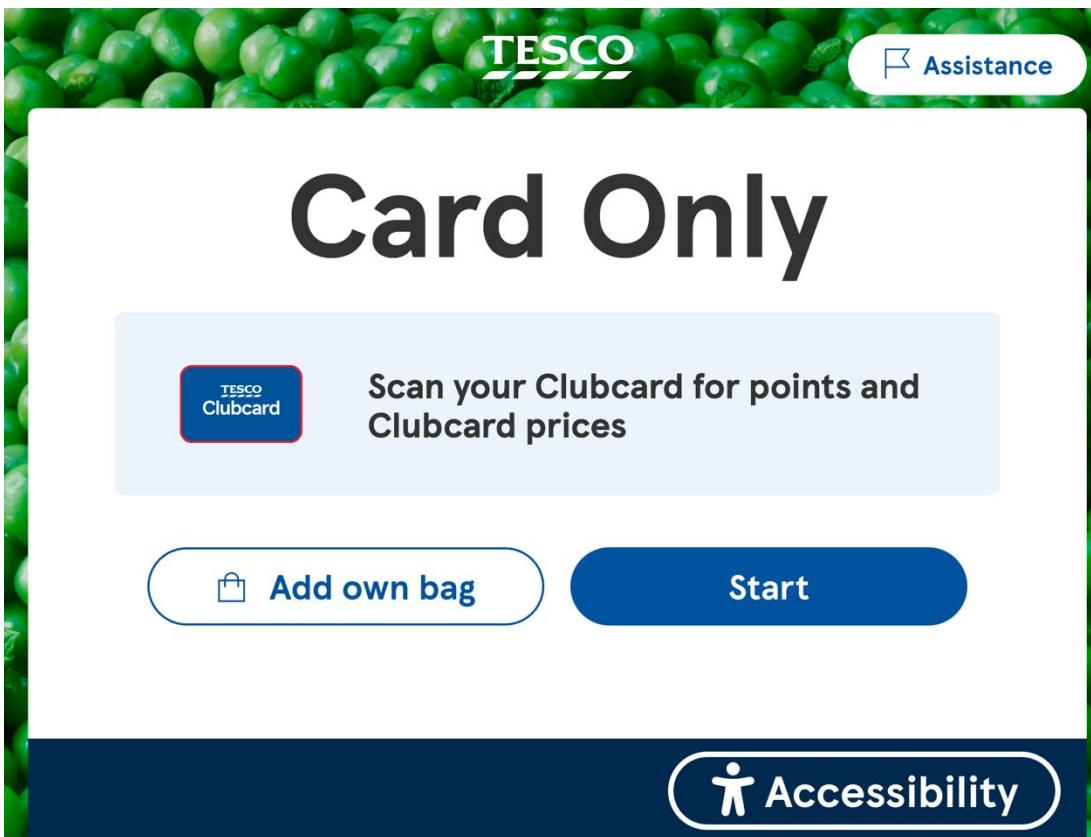
And the 1st "Product price" should read "£2.50"

And the "Savings" should contain "£1.00"

And the "Basket total" should read "£1.50"

Example Scenarios

Scanning a Clubcard from the start screen



Example Scenarios

Scanning a Clubcard from the start screen

Given I am on the "Start" screen

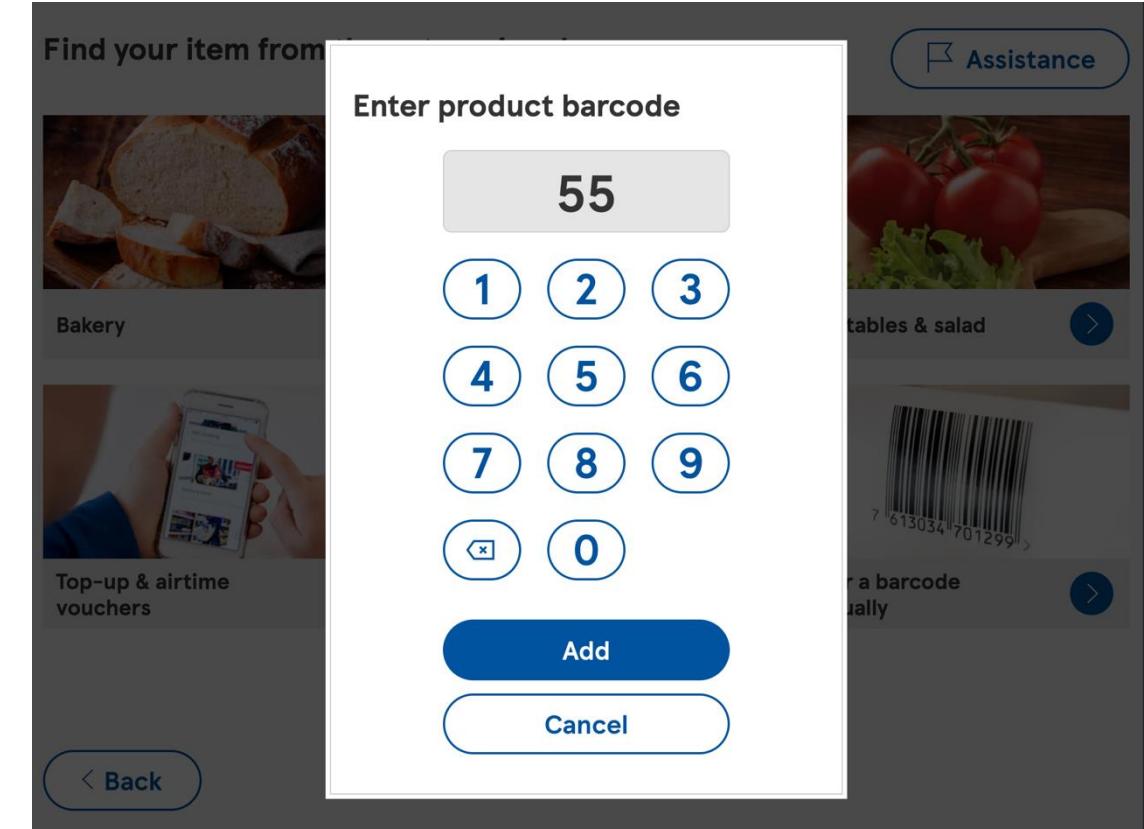
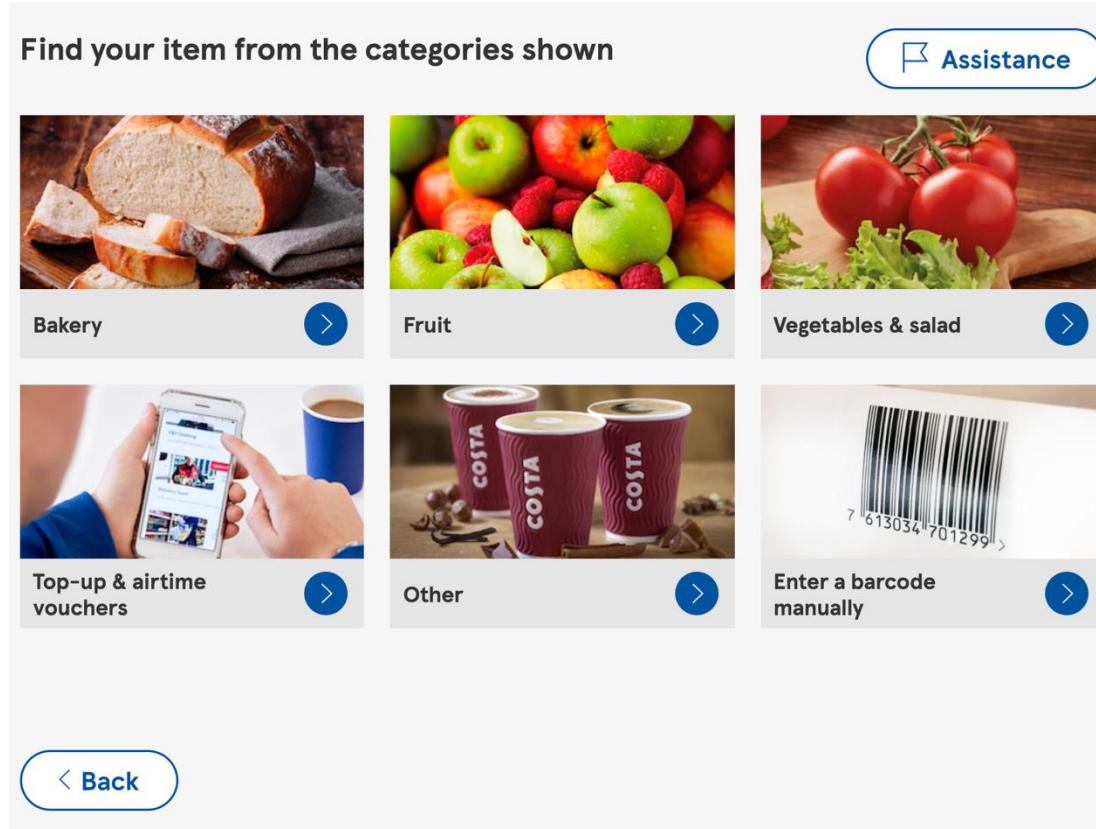
When I scan my "Clubcard"

Then I should be on the "Scan" screen

And the "Notifications" should read "Clubcard accepted"

Example Scenarios

Adding a product via manual entry



Example Scenarios

Adding a product via manual entry

Given I am on the "Categories" screen

When I tap the "Enter a barcode manually button"

Then I should see the "Enter product barcode modal"

And the "Number input add button" should be "disabled"

When I tap the "5" button

And I tap the "5" button

Then the "Number input" should have value "55"

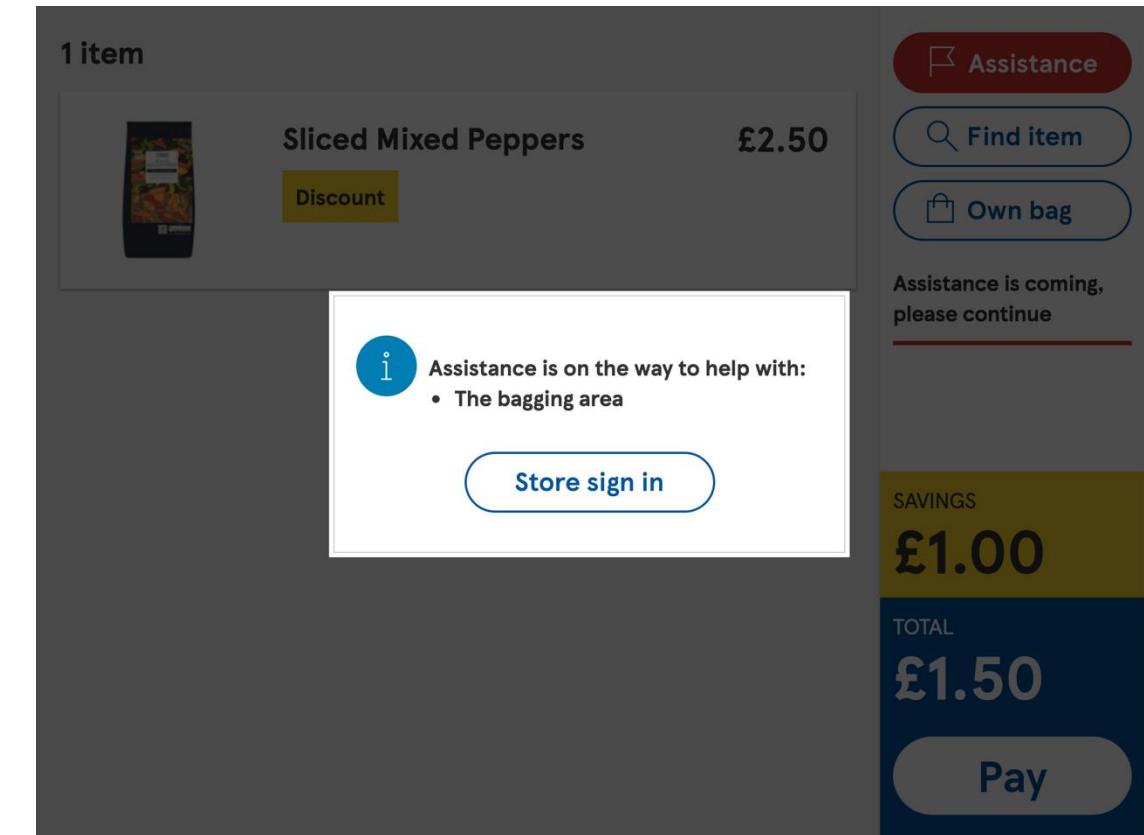
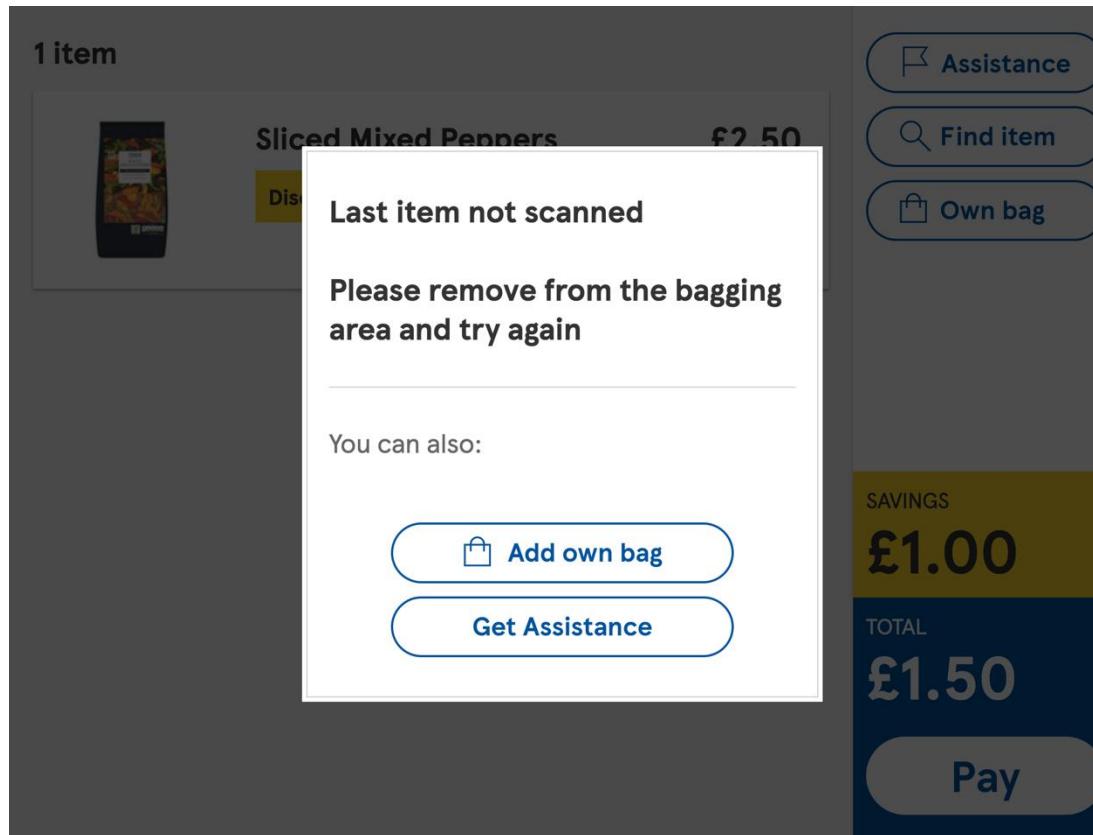
When I tap the "Number input add button"

Then I should be on the "Scan" screen

And the 1st "Product title" should read "Lemons Each"

Example Code Breakdown

Unexpected item in bagging area



Example Code Breakdown

Unexpected item in bagging area

Given I am on the "Scan" screen

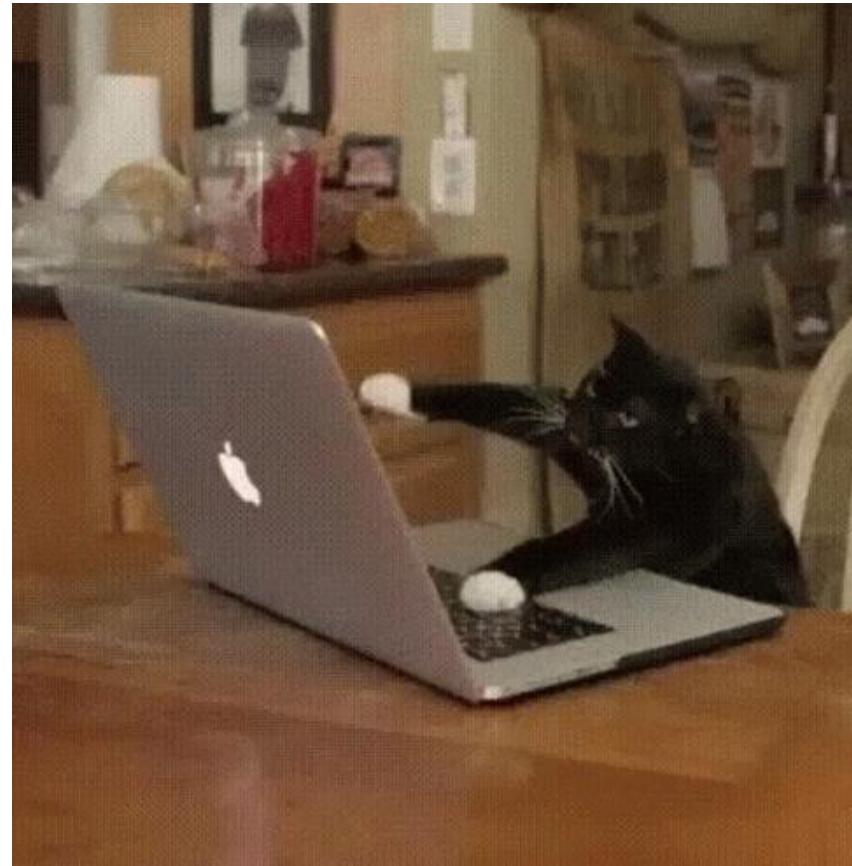
When I place an item in the bagging area

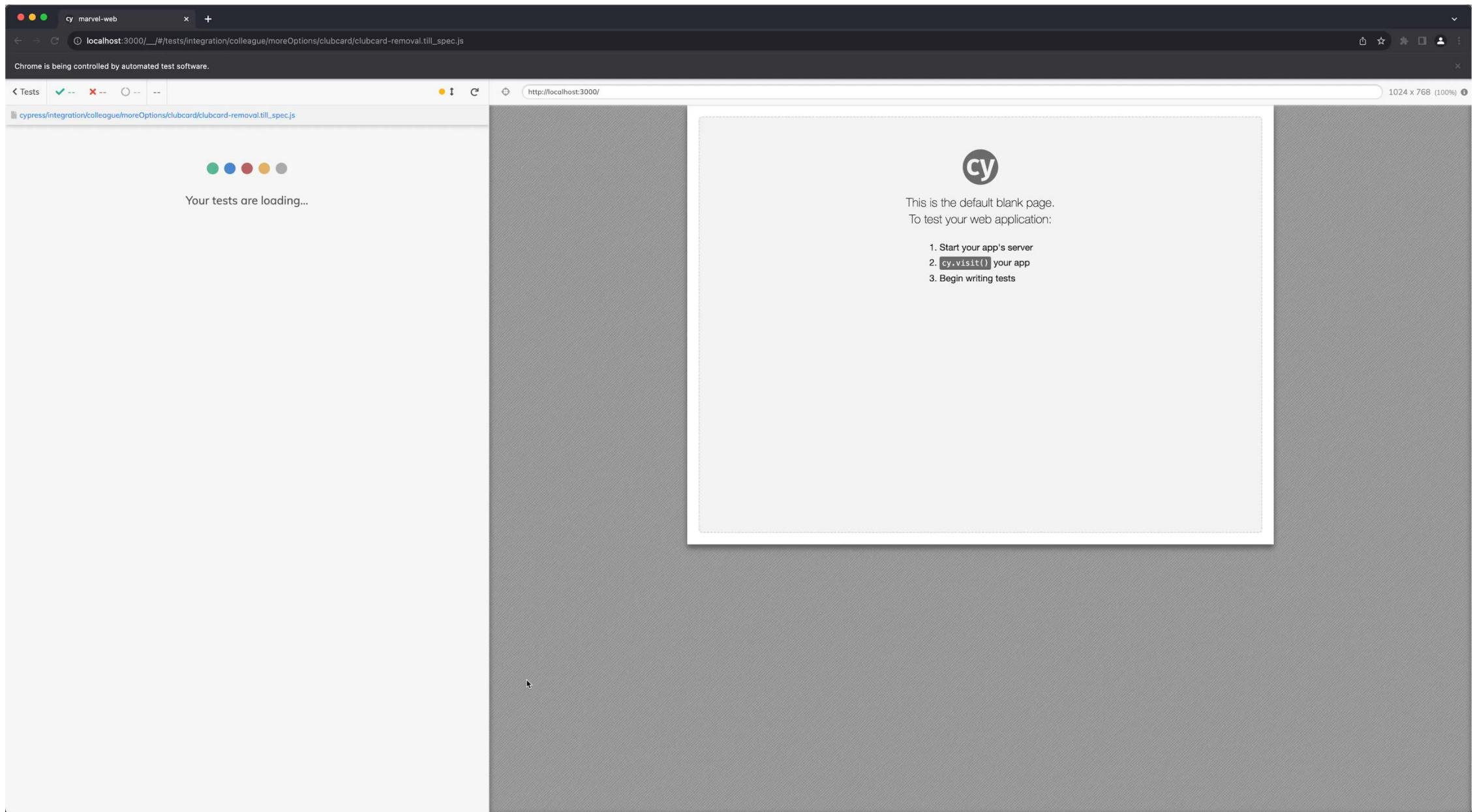
Then I should see the "Unexpected item in bagging area modal"

When I tap the "Get Assistance" button

Then I should see the "Unexpected item assistance modal"

Demo – Cypress Tests

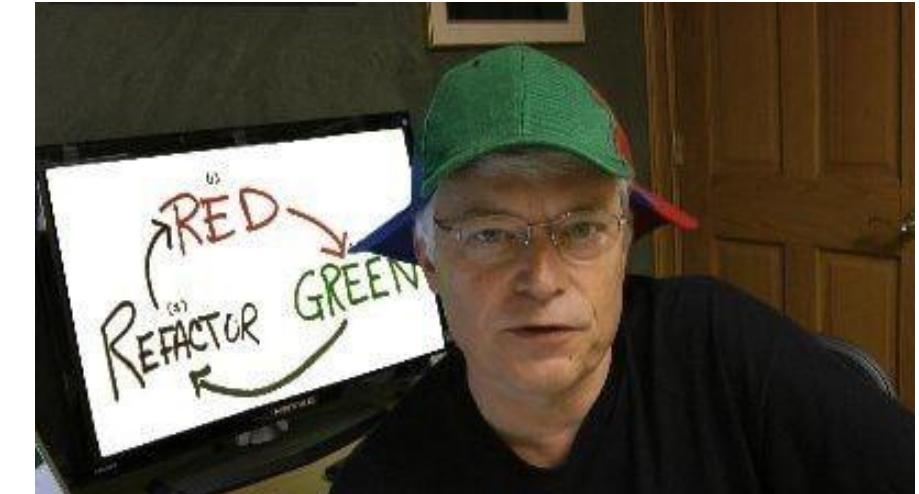




What is Test Driven Development (TDD)?

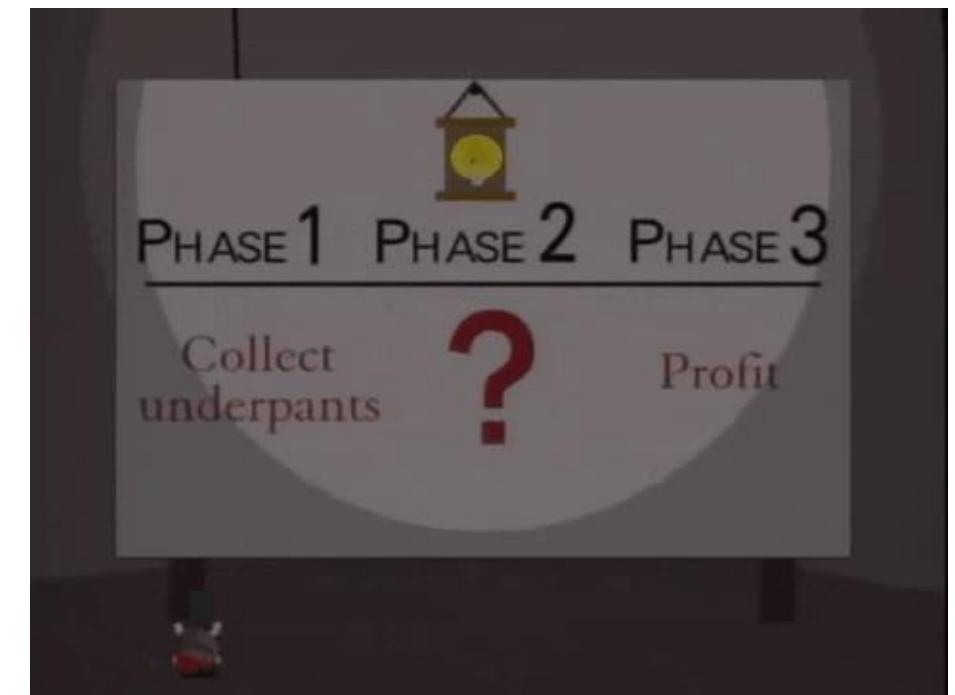
Test driven development is a **process** in which you create test cases before the software, which initially fail.

Note: TDD is not a testing strategy, it is a development strategy.

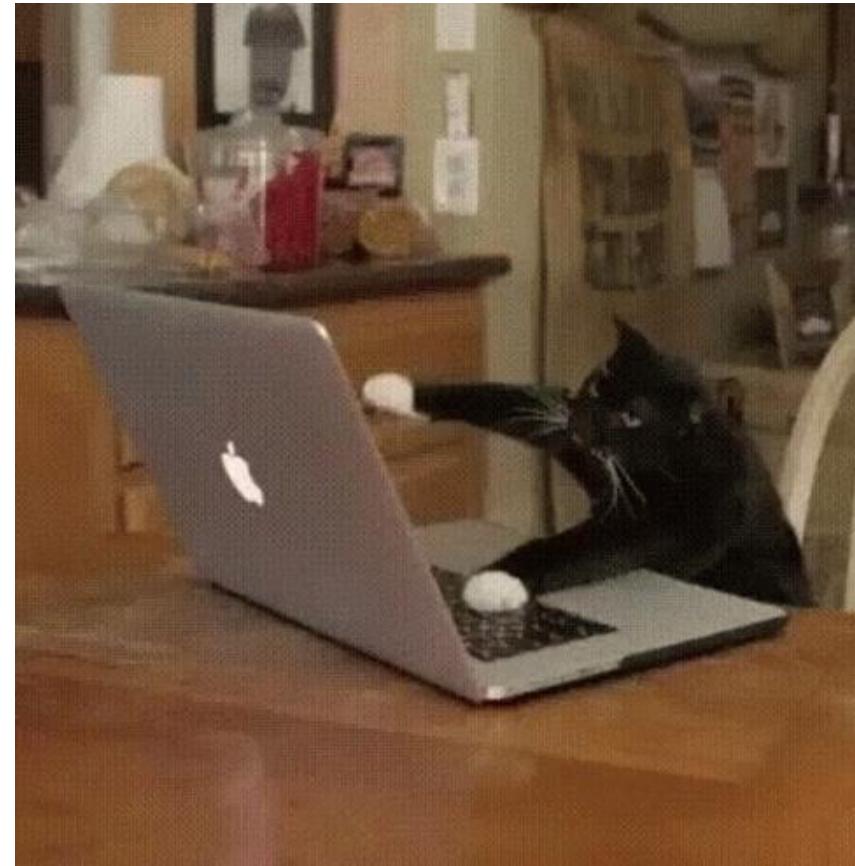


How to TDD?

1. Write a failing test before you write any production code.
2. Write the smallest amount of production code you can to make the currently failing test pass.
3. Refactor.



Demo – TDD



Testing Tools & Frameworks

Common tooling and frameworks



cypress.io



cucumber



JUnit 5

mockito

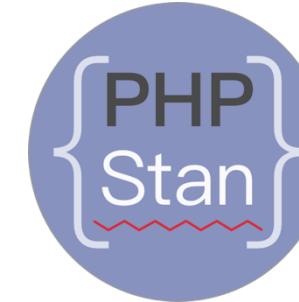
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Testing Tools & Frameworks

Static analysis tooling



ESLint



sonarqube



COVERITY®

JACOCO
Java Code Coverage

TESCO

4. CI/CD

Continuous Integration and Delivery

- CI: an automated process to build, package, and test.
- CD: an automated process to deliver to the required infrastructure environments.

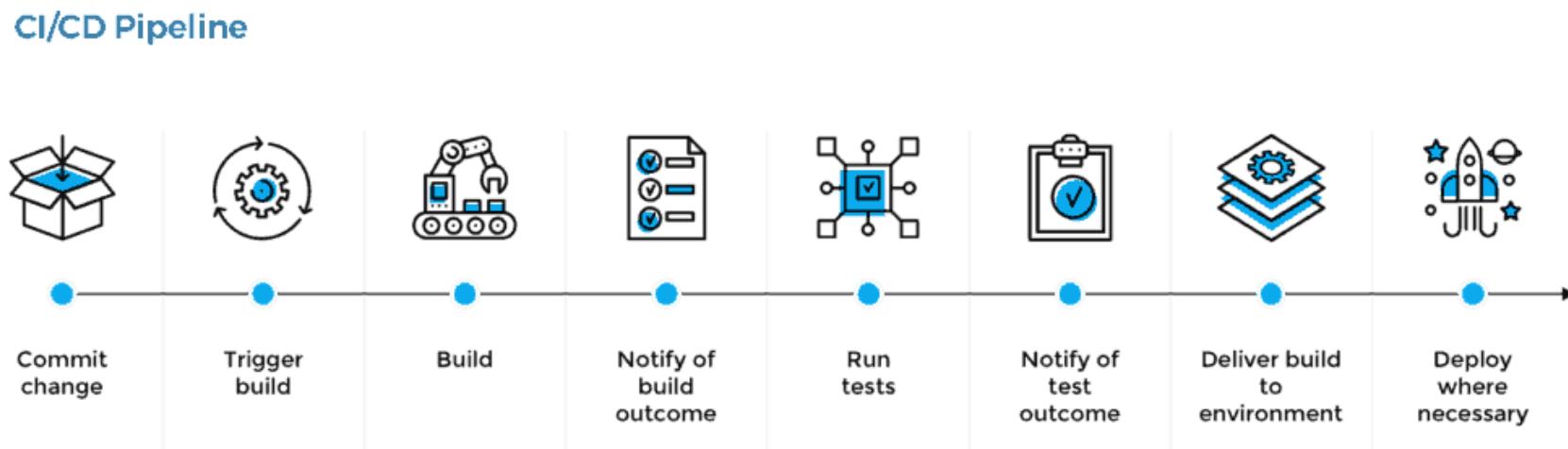
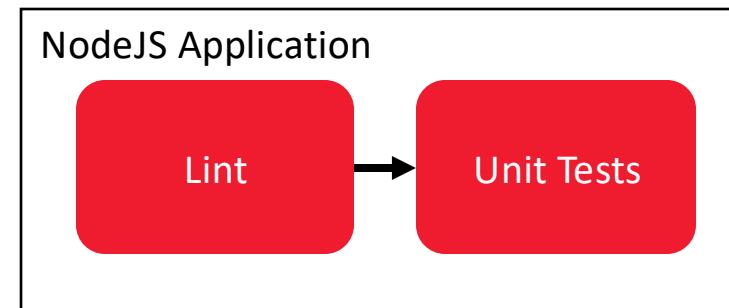
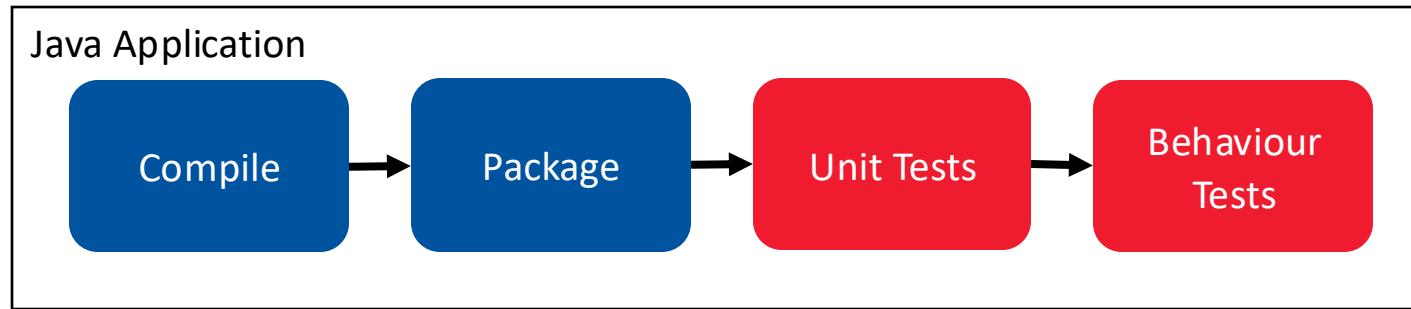


Image: <https://www.plutora.com/blog/understanding-ci-cd-pipeline>

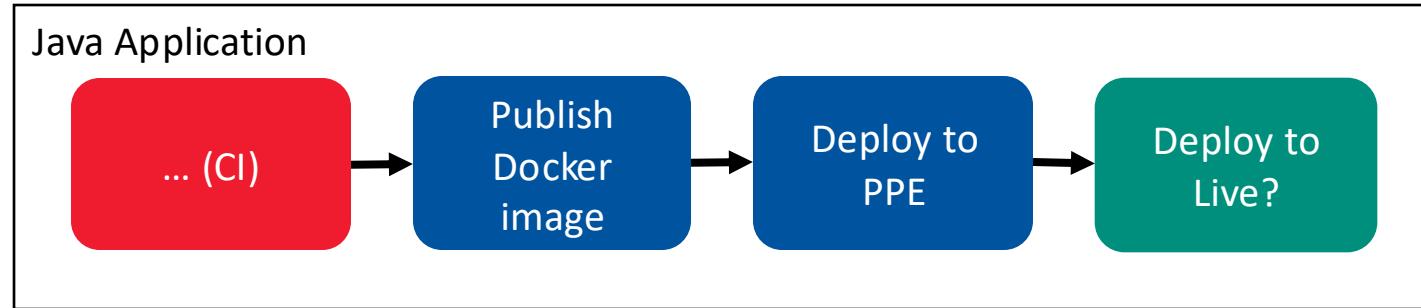
A few examples

Continuous integration



A few examples

Continuous delivery



How do TDD and CI/CD work together?

- The source control system (e.g. Github Enterprise) is usually linked to a CI/CD process.
- That means the tests can be automatically triggered each time a commit is pushed.
- Generally, CD is only triggered when a push to **main** is made.
- To save resources, sometimes the CI is only triggered on commits to open pull requests.



GitHub Actions

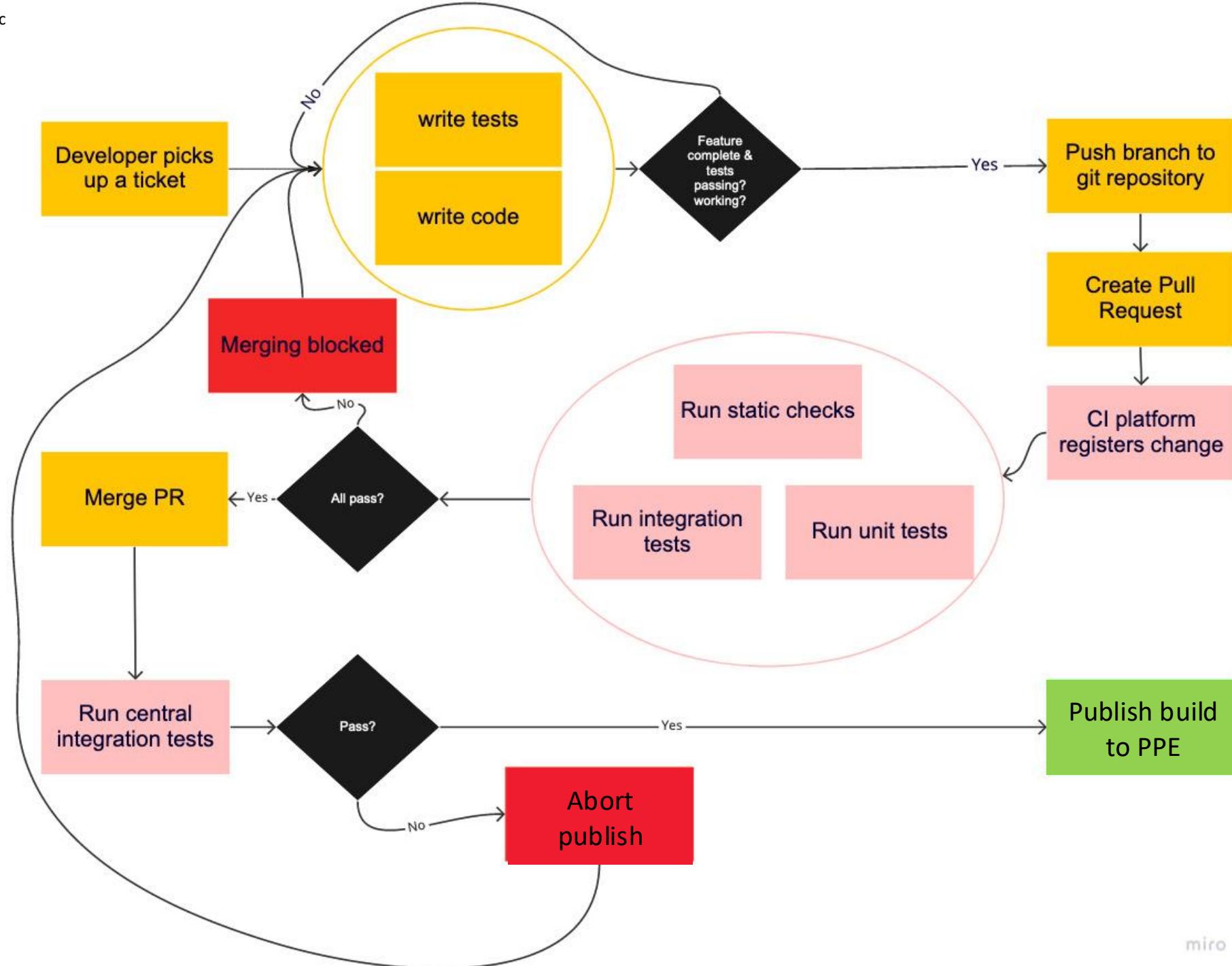


Using Azure Pipelines

- Azure Pipelines uses a YAML file for templating a pipeline.
- This file contains information such as the OS to use, and the steps required to be run.
- The example will only run on commits to the **main** branch, on the latest version of Ubuntu.

```
trigger:  
- main  
  
pool:  
  vmImage: 'ubuntu-latest'  
  
steps:  
- task: NodeTool@0  
  inputs:  
    versionSpec: '13.x'  
    displayName: 'Install Node.js'  
  
- script: |  
    npm install  
    npm run test  
  displayName: 'npm install and test'
```

5. How we apply testing principles



6. Careers

My graduate scheme

Highlights from the 2 years



TESCO
/ / / /

Variety of Programmes

Applications live from 16th September

Technology

**Internship and Graduate
Programme**

Specialist opportunities in
Software engineering, Cyber
Security (graduates only),
Programme, Product

Finance

**Internship and Graduate
Programme**

Specialist opportunity, supports
CIMA qualification

Technology Internship and Graduate Programmes

Supporting young people looking for a career in technology

Technology Graduate Programmes

All Closed

- 4 specialist technology programmes – software engineering, cyber security, product, programme
- Two year programme – starts 1 September 2025
- Looking for ambitious and innovative graduates, who can work collaboratively
- Requires 2:2 degree or predicted 2:2 degree
- Starting salary £40k

Technology Internship Programmes

- 3 specialist technology programmes – software engineering, product, programme
- 10 week paid experience – starts 16 June 2025
- Looking for self-motivated team players, in penultimate year at university
- Requires predicted 2:2 degree
- Salary £26k pro-rata

Software Engineering - Graduate

Our software engineers continue to lead the way, building technology that can have a real impact on our customers. Our Technology Software Engineering programme will give you exposure to a selection of the latest technologies. It aims to equip you with the right knowledge and skills to become one of our future engineering leaders. You'll be able to bring your knowledge and experience to life, helping us to better serve our customers. We'll also show you how to architect some of the most complex and ambitious software systems being built. Using agile principles, you'll learn how to protect customer data, how to automate and how to build large scale systems.

You'll experience the breadth of software engineering with the opportunity to spend time in several teams, including our front and back end development teams as well as a placement in Tesco Labs too. You'll be paired with other engineers in your team and work closely with your product managers to build software for either our customers or colleagues.

Who we are looking for

We're looking for graduates with a passion for technology. It's not vital you have a degree in computer science, but you must be able to demonstrate your ability to write quality coding. We're looking for logical problem solvers who are keen to learn and build their skills, and who enjoy the challenge of working with something new.

4 Stage Application Process



Applications opened 16th September and will close on a rolling basis

Useful links

Graduate/internship programme info and to apply - tesco-careers.com/programmes

Everyone is welcome – tesco-careers.com/explore-our-world/everyones-welcome

Follow us on LinkedIn - linkedin.com/company/-tesco

We recruit for our graduate and internship programmes on a rolling basis, which means roles will be filled on a first come first served approach

Thank you.

