Effortless Web Testing with Cypress: From Novice to Ninja

This comprehensive Cypress Automation Masterclass is designed to take you from a beginner to an advanced level in web application testing using the Cypress framework. Through hands-on exercises, practical examples, and real-world projects, you will gain a deep understanding of Cypress and how to leverage its capabilities for effective test automation.

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Introduction to Test Automation

Test automation is a crucial practice in modern software development. It involves using automated scripts and tools to test software applications. The primary goal of test automation is to increase efficiency, reduce human errors, and ensure the reliability and quality of software.

Understanding the Importance of End-to-End Testing

End-to-end (E2E) testing is a critical aspect of software testing. It simulates real user interactions with an application by testing it from start to finish. E2E tests validate that all the components of an application work together seamlessly, ensuring that the application functions as expected in a production-like environment.

E2E testing is essential because it helps identify issues that may not be apparent during unit testing or integration testing. It provides confidence that the entire application stack is functioning correctly and that critical user journeys are working without errors.

Introduction to Cypress

Cypress is a modern JavaScript-based end-to-end testing framework. It is designed to make E2E testing easy, efficient, and effective. Cypress offers a rich set of features that simplify test automation, making it an excellent choice for both beginners and experienced testers.

Setting Up Cypress in Your Project

Before you can start using Cypress, you need to set it up in your project. Here are the steps to get Cypress up and running:

Step 1: Prerequisites

Ensure that you have Node.js and npm (Node Package Manager) installed on your computer. You can download them from the official Node.js website.

Step 2: Create a New Project

Create a new directory for your Cypress project and navigate to it in your terminal.

```
mkdir my-cypress-project
cd my-cypress-project
```

Step 3: Initialize Your Project

Run the following command to initialize your project and create a package.json file:

```
npm init -y
```

Step 4: Install Cypress

Next, install Cypress as a development dependency in your project:

npm install cypress --save-dev

Step 5: Opening Cypress

Once Cypress is installed, you can open it by running:

npx cypress open

This will open the Cypress Test Runner, which is a graphical interface for managing and running your tests.

Writing Your First Cypress Test

Now that you have Cypress set up, it's time to write your first test. Cypress tests are written in JavaScript and are stored in the cypress\e2e directory by default.

Here's a simple example of a Cypress test:

```
// cypress/integration/my-first-test.js

describe('My First Cypress Test', () => {
    it('Visits the Cypress website', () => {
      // Visit the Cypress website
      cy.visit('https://www.cypress.io/');

      // Assert that the page contains the text "Fast, easy and reliable testing for anything
that runs in a browser."
      cy.contains('Fast, easy and reliable testing for anything that runs in a browser.');
    });
  });
```

In this test, we describe what the test does using describe and it blocks. We then use **cy.visit** to navigate to the Cypress website and **cy.contains** to assert that a specific text is present on the page.

Executing Cypress Tests

To execute your Cypress tests, use the following command in your project's root directory:

npx cypress run

This will run all the Cypress tests in headless mode and provide you with test results.

In this section, we'll cover the fundamental concepts and tools you need to start creating Cypress tests. We'll explore Cypress test structure, how to select DOM elements, interact with web elements, perform assertions and verifications, and organize your test cases and suites effectively.

Understanding Cypress Test Structure

Cypress tests are organized into a series of commands and assertions that describe the expected behaviour of your application. Here's an overview of the key components of a Cypress test:

- Describe Block: A describe block is used to group related test cases. It provides context and makes your test structure more organized.
- It Block: Inside a describe block, you'll find one or more it blocks. Each it block represents a single test case and contains a series of commands and assertions.
- Commands: Commands are actions that interact with your application, such as clicking a button, typing text into an input field, or navigating to a URL.
- Assertions: Assertions are checks that verify if your application behaves as expected. They confirm whether elements are visible, text matches a given value, or elements exist on the page.

Selecting DOM Elements

To interact with web elements in Cypress, you need to know how to select them. Cypress provides powerful methods to locate and select elements using CSS selectors, XPath, and custom attributes. Here are some common methods for element selection:

- cy.get(): This method allows you to select elements by CSS selector. For example, cy.get('.button-class') selects all elements with the class "button-class."
- cy.contains(): Use this method to select elements by their text content. For example, cy.contains('Submit') selects an element with the text "Submit."
- cy.find(): Within a selected element, you can further refine your selection using cy.find(). For example, cy.get('.parent-element').find('.child-element') selects a child element within a parent element.

Interacting with Web Elements

Once you've selected an element, you can interact with it using Cypress commands. Common interaction commands include:

- click(): Simulate a click event on the selected element.
- type(): Type text into input fields, text areas, or content-editable elements.
- select(): Select options from dropdown menus.
- check() and uncheck(): Check or uncheck checkboxes and radio buttons.
- clear(): Clear the content of input fields.

Assertions and Verifications

Assertions are critical for verifying that your application behaves as expected during testing. Cypress provides a wide range of assertions to validate different aspects of your application. Here are some common assertions:

- should(): Use the should() method to apply assertions to selected elements. For example, cy.get('.element').should('be.visible') checks if the element is visible.
- expect(): You can also use the expect() function to create custom assertions. For example, expect(true).to.be.true verifies that a condition is true.
- assert(): The assert() method is similar to expect() and is used for custom assertions.

Organizing Test Cases and Suites

Organizing your test cases and suites is essential for maintaining a manageable and scalable test suite. Cypress allows you to structure your tests effectively using describe and it blocks. Here are some best practices:

- Group related tests in a describe block to provide context and improve readability.
- Name your describe and it blocks descriptively, so it's clear what each test is testing.
- Use nested describe blocks to represent different sections or components of your application.
- Organize your test files into logical folders, such as "login," "checkout," or "profile."

```
// Understanding Cypress Test Structure
describe("Cypress Basics - Test Suite", () => {
    // Selecting DOM Elements
    it("Should select and interact with a button", () => {
      cy.visit("https://example.com"); // Navigate to a website

      // Selecting an element by CSS selector
      cy.get('.button-class').should('be.visible'); // Assertion

      // Interacting with the selected button
      cy.get('.button-class').click();
    });

    // Interacting with Web Elements
    it("Should type text into an input field", () => {
      cy.visit("https://example.com");

      // Selecting an input field by its placeholder attribute
      cy.get('[placeholder="Enter your username"]').type('your-username');
    });

    // Assertions and Verifications
    it("Should assert element visibility", () => {
      cy.visit("https://example.com");

      // Selecting an element by its text content
      cy.contains('Submit').should('be.visible'); // Assertion
    });

    // Organizing Test Cases and Suites
    describe("Nested Test Suite - Login Page", () => {
      it("Should perform login", () => {
        cy.visit("https://example.com/login");

        // Interaction and assertion related to the login page
        cy.get('#username').type('your-username');
        cy.get('#password').type('your-password');
        cy.get('#login-button').click();
        cy.url().should('eq', 'https://example.com/dashboard'); // Assertion
      });
    });

    // You can add more test cases and suites here as needed.
  });
```

Advanced Cypress Concepts

Custom Commands

Custom commands in Cypress allow you to extend and enhance the built-in capabilities of Cypress. They are essentially user-defined functions that encapsulate a series of actions or assertions that you frequently use across your tests. Custom commands can significantly improve code maintainability and readability.

Creating Custom Commands:

To create a custom command, you can use the Cypress.Commands.add() method in your test code or in a separate file, commonly named commands.js.

Example of creating a custom command to log in:

```
Cypress.Commands.add('login', (username, password) => {
    cy.visit('/login');
    cy.get('#username').type(username);
    cy.get('#password').type(password);
    cy.get('#login-button').click();
  });
```

Using Custom Commands:

Once defined, you can use your custom commands in your tests just like any other Cypress command.

```
it('should log in with custom command', () => {
    cy.login('yourusername', 'yourpassword');
    // Continue with assertions or actions after login
  });
```

Custom commands help make your tests more concise, reusable, and easier to maintain.

Handling Asynchronous Code

Handling asynchronous code is crucial in web testing, as many actions and interactions with web elements involve asynchronous operations, such as data fetching, animations, or AJAX requests. Cypress simplifies handling asynchronous code through built-in mechanisms.

Cypress Commands and Chaining:

Cypress commands are automatically chained together, ensuring that each command is executed in the correct order, even when dealing with asynchronous operations.

```
cy.get('#element').should('be.visible');
```

Waiting for Elements:

Cypress automatically waits for elements to become interactable before performing actions, reducing the need for explicit waits.

```
cy.get('#loading-button').click(); // Cypress waits for button to be clickable
```

Handling Promises:

In Cypress, a Promise is not specific to Cypress itself but is a fundamental JavaScript concept used to handle asynchronous operations. Promises are a way to represent and work with values that may not be available immediately, such as data fetched from a server, user interactions, or timeouts.

Here's a brief overview of Promises in Cypress:

- Promise Basics: A Promise in JavaScript represents a value that may be available now, in the future, or never. It has three states: pending, fulfilled (resolved), or rejected. Promises are primarily used for handling asynchronous operations in a more organized and structured way.
- Promise Chain: Promises are often chained together using .then() and .catch() methods. This allows you to specify what should happen when a Promise is resolved or rejected.
- Handling Asynchronous Actions: In Cypress, you frequently encounter Promises when dealing with actions like making network requests (e.g., using cy.request()), waiting for elements to appear, or interacting with the DOM. Cypress automatically handles Promises behind the scenes, ensuring that commands are executed in the correct order.
- Custom Commands: You can also work with Promises explicitly in Cypress by creating custom commands that return Promises. For example, you might create a custom command that waits for a specific condition to be met and resolves with a value.

Here's a simple example of a custom command that returns a Promise in Cypress:

```
// Custom command that waits for an element to be visible and resolves with the element
Cypress.Commands.add('waitForElementToBeVisible', (selector) => {
    return cy.get(selector).should('be.visible');
  });

  // Usage of the custom command
  cy.waitForElementToBeVisible('#my-element').then((element) => {
    // You can work with the resolved element here
    // For example, perform assertions or interactions
  });
```

In this example, the waitForElementToBeVisible custom command returns a Promise that resolves with the visible element. You can then use .then() to work with the resolved value, which is the DOM element in this case.

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Overall, Promises are a crucial part of handling asynchronous actions in Cypress and JavaScript in general, helping you write more reliable and organized code when dealing with asynchronous operations in your tests.

Handling Pop-ups and Alerts

Handling pop-ups and alerts is essential for testing scenarios that involve user interactions or notifications.

Handling JavaScript Alerts:

JavaScript alerts are simple pop-up boxes that display a message and require user interaction (usually clicking "OK"). Here's how you can handle them in Cypress:

```
// Handling JavaScript Alert
it('should handle JavaScript alert', () => {
    // Trigger the alert by clicking a button (assuming a button with id 'alert-button')
    cy.get('#alert-button').click();

    // Cypress automatically intercepts the alert
    // You can use the `window:alert` event to handle the alert message
    cy.on('window:alert', (text) => {
      // Assertions or actions related to the alert message
      expect(text).to.equal('This is a JavaScript alert!');
    });

    // Continue with other actions or assertions after handling the alert
  });
```

Handling JavaScript Confirms:

JavaScript confirms are similar to alerts but with an additional "Cancel" option. You can handle them as follows:

```
// Handling JavaScript Confirm
it('should handle JavaScript confirm', () => {
    // Trigger the confirm dialog by clicking a button (assuming a button with id 'confirm-
button')
    cy.get('#confirm-button').click();

    // Cypress intercepts the confirm dialog
    // Use the `window:confirm` event to handle the confirm dialog
    cy.on('window:confirm', (text) => {
      // Assertions or actions related to the confirm message
      expect(text).to.equal('Are you sure you want to continue?');

      // Simulate clicking the "OK" button in the confirm dialog
      return true; // To accept the confirmation
      // To simulate "Cancel," return false
    });
    // Continue with other actions or assertions after handling the confirm
  });
```

Handling JavaScript Prompts:

JavaScript prompts allow users to enter text along with "OK" and "Cancel" buttons. Here's how to handle them:

```
// Handling JavaScript Prompt
it('should handle JavaScript prompt', () => {
    // Trigger the prompt dialog by clicking a button (assuming a button with id 'prompt-
button')
    cy.get('#prompt-button').click();

    // Cypress intercepts the prompt dialog
    // Use the `window:prompt` event to handle the prompt dialog
    cy.on('window:prompt', (text, defaultValue) => {
      // Assertions or actions related to the prompt message
      expect(text).to.equal('Please enter your name:');

      // Simulate user input by returning a value
      return 'John Doe';
    });

    // Continue with other actions or assertions after handling the prompt
  });
```

These code snippets demonstrate how to handle JavaScript alerts, confirms, and prompts using Cypress. You can adapt these examples to your specific test scenarios, including interacting with the pop-up elements and performing assertions based on their content.

Handling Iframes:

For iframes, you can use cy.iframe() to access elements within iframes.

```
cy.iframe('#iframe-id').find('.iframe-element').click();
```

Handling Authentication Pop-ups:

Cypress can handle authentication pop-ups using cy.request() and providing authentication credentials.

```
cy.request({
    url: 'https://example.com/secure-resource',
    auth: {
      username: 'yourusername',
      password: 'yourpassword',
    },
  });
```

Cypress provides a robust mechanism for dealing with various pop-up scenarios that might arise during web testing.

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Handling Mouse Events:

Cypress provides easy-to-use commands for performing mouse actions like click, hover, double click, and right-click. Here are code snippets for each of these actions:

1. Click

To perform a simple click action on an element:

```
// Example: Clicking a button
cy.get('#my-button').click();
```

2. Hover

To hover the mouse cursor over an element (e.g., for dropdown menus):

```
// Example: Hovering over a menu item
cy.get('.menu-item').trigger('mouseover');
```

3. Double Click

To perform a double click action on an element:

```
// Example: Double-clicking an element
cy.get('.double-clickable-element').dblclick();
```

4. Right Click

To simulate a right-click (context menu) action on an element:

```
// Example: Right-clicking an element
cy.get('.context-menu-trigger').rightclick();
```

These code snippets demonstrate how to perform various mouse actions using Cypress. You can use these actions as needed in your test scripts to interact with elements in your web application.

Handling Keyboard actions:

Cypress provides commands to simulate keyboard actions like keypress and Enter press. Here are code snippets for each of these actions:

1. Keypress

To simulate a keypress on an element (e.g., typing "Hello" into an input field):

```
// Example: Simulating a keypress
cy.get('#my-input').type('Hello');
```

You can also simulate keypresses with specific keys using special characters:

```
// Example: Simulating a keypress with a special character (e.g., Enter)
cy.get('#my-input').type('{enter}');
```

Handling a Dropdown:

Working with dropdowns in Cypress involves selecting options, validating selected values, and interacting with dropdown elements. Below are examples of how to perform common dropdown-related actions in Cypress.

1. Selecting an Option from a Dropdown:

Suppose you have an HTML dropdown element like this:

```
<select id="my-dropdown">
  <option value="option1">Option 1</option>
  <option value="option2">Option 2</option>
  <option value="option3">Option 3</option>
</select>
```

To select an option by its text value, you can use the **select()** command:

```
// Example: Selecting an option by text
cy.get('#my-dropdown').select('Option 2');
```

To select an option by its value attribute, you can use:

```
// Example: Selecting an option by value attribute
cy.get('#my-dropdown').select('option2');
```

2. Verifying the Selected Option:
You can assert that a specific option is selected in a dropdown:

```
// Example: Verifying the selected option
cy.get('#my-dropdown').should('have.value', 'option2');
```

3. Working with Multiple Select Dropdowns:

If the dropdown allows multiple selections (a multi-select dropdown), you can select multiple options:

```
// Example: Selecting multiple options
cy.get('#my-multi-select-dropdown').select(['Option 1', 'Option 3']);
```

4. Iterating Through Dropdown Options:

To interact with each option individually, you can use each() to loop through the options:

```
// Example: Iterating through dropdown options
cy.get('#my-dropdown option').each(($option) => {
    // Do something with each option
    cy.log($option.text()); // Log the text of each option
  });
```

These examples cover common scenarios for working with dropdowns in Cypress. Depending on your application's specific implementation, you can adapt these methods to suit your testing needs.

Executing repetitive steps using Hooks:

Cypress provides a set of hooks that allow you to run code at different points in the test lifecycle. These hooks enable you to set up and tear down test environments, manage test data, and perform various actions before and after test execution. Cypress hooks are useful for tasks such as logging in before running tests, cleaning up database records, or initializing test data.

Here are some common Cypress hooks:

- before: Runs once before all tests in the current suite.
- beforeEach: Runs before each test in the current suite.
- after: Runs once after all tests in the current suite.
- afterEach: Runs after each test in the current suite.

Here's an example demonstrating the usage of Cypress hooks:

```
describe('Cypress Hooks Example', () => {
    before(() => {
      // This code will run once before any tests in this suite
      cy.log('Running setup tasks before all tests');
      // You can perform tasks like logging in, setting up the database, etc.
    });

    beforeEach(() => {
      // This code will run before each test in this suite
      cy.log('Running setup tasks before each test');
      // You can reset state, initialize data, or perform other actions here
    });

    it('Test 1', () => {
      // Your test code for Test 1
      cy.log('Running Test 1');
    });

    it('Test 2', () => {
      // Your test code for Test 2
      cy.log('Running Test 2');
```

```
  });

  afterEach(() => {
    // This code will run after each test in this suite
    cy.log('Running teardown tasks after each test');
    // You can clean up resources or perform post-test actions here
  });

  after(() => {
    // This code will run once after all tests in this suite
    cy.log('Running teardown tasks after all tests');
    // You can perform cleanup tasks here
  });
});
```

In this example, we have a test suite with two tests (Test 1 and Test 2). We use the before, beforeEach, afterEach, and after hooks to set up and tear down the test environment and perform actions before and after test execution. These hooks help maintain the test environment's state and ensure that tests are isolated from each other.

Test Configuration Options

Cypress offers various configuration options that allow you to fine-tune your test runs according to your specific needs.

cypress.json Configuration:

You can configure Cypress in the cypress.json file in your project's root directory. Here are some common configuration options:

- baseUrl: Define the base URL for your application.
- defaultCommandTimeout: Set the default timeout for commands.
- viewportWidth and viewportHeight: Specify the viewport dimensions.
- screenshotsFolder and videosFolder: Configure where screenshots and videos are saved.

Environment Variables:

You can also use environment variables to configure Cypress dynamically, which is particularly useful when running tests in different environments (e.g., CI/CD).

```
CYPRESS_BASE_URL=https://staging.example.com cypress open
```

Plugins and Extensions:

Cypress supports various plugins and extensions that can be configured to enhance its capabilities, such as adding custom commands, reporters, or custom webpack configurations.

Customizing Cypress's configuration allows you to adapt it to your project's requirements and testing environment.

Cross-browser Testing with Cypress

Cypress is primarily designed for testing in the Chrome browser. However, there are ways to perform cross-browser testing using Cypress. Here are some approaches:

1. Using Multiple Cypress Instances:

You can set up multiple Cypress instances, each configured for a different browser, and execute tests in parallel. For example, you can use "cypress-chrome-launcher" and "cypress-firefox-launcher" plugins to configure multiple instances.

2. Electron Browser:

Cypress supports running tests in the Electron browser, which can be seen as a Chrome browser instance. This provides some cross-browser coverage.

3. Cloud-Based Solutions:

Consider using cloud-based testing services, such as BrowserStack or Sauce Labs, in combination with Cypress to achieve comprehensive cross-browser testing. These services allow you to run Cypress tests on various browser and OS combinations in the cloud.

4. Cross-Browser Best Practices:

When writing tests, follow best practices to ensure that your web application is cross-browser compatible. Use feature detection, avoid browser-specific code, and test for compatibility early in the development cycle.

While Cypress excels in Chrome-based testing, combining it with other tools and approaches can extend its cross-browser testing capabilities to cover a wider range of browsers and ensure your web application's compatibility across different environments.

Data-Driven Testing with Cypress

Data-Driven Testing is a crucial aspect of test automation that allows us to execute the same test scenario with multiple sets of input data. It helps in expanding test coverage and ensuring application reliability across various data scenarios. In this module, we'll explore Data-Driven Testing with Cypress and learn how to parameterize and execute tests with different data sets.

Data-Driven Testing Concepts

Data-Driven Testing, also known as DDT, involves using external data sources to drive test scenarios. The core concepts include:

- Test Data: The set of input values and expected outcomes for a test scenario.
- Parameterization: Defining variables within test scripts that can accept different values from external data sources.
- External Data Sources: Files (e.g., CSV, JSON, Excel) or databases that store test data separately from test scripts.
- Iterating Through Data: Repeating the test steps for each data set to validate application behavior under various conditions.

Reading Data from External Sources (CSV, JSON)

In Data-Driven Testing, it's essential to know how to access and use data from external sources like CSV (Comma-Separated Values) and JSON (JavaScript Object Notation) files. These files are commonly used for storing structured data that can be easily imported into your Cypress tests.

Reading Data from CSV:

```
// Using a CSV parsing library like 'csv-parser'
import csv from 'csv-parser'

cy.readFile('data.csv').then((data) => {
  data.forEach((row) => {
    // Execute test steps with row data
    // Example: cy.get('#username').type(row.username)
  })
})
```

Reading Data from JSON:

```
cy.readFile('data.json').then((data) => {
    // Access JSON properties and use data in tests
    // Example: cy.get('#email').type(data.email)
  })
```

Parameterizing Test Cases

Parameterization involves injecting test data from external sources into your Cypress test scripts. It allows you to reuse the same test logic for multiple data sets, making your tests more versatile and maintainable.

Parameterized Test Example:

```
function performLogin(username, password) {
    // Perform login with provided username and password
  }

  // Parameterized test cases
  const testCases = [
    { username: 'user1', password: 'pass1' },
    { username: 'user2', password: 'pass2' },
    // Add more test cases here
  ]

  testCases.forEach((testCase) => {
    it(`Login with username: ${testCase.username}`, () => {
      performLogin(testCase.username, testCase.password)
    })
  })
```

Dynamic Test Data Generation

In some cases, you may need to generate dynamic test data on the fly, such as random usernames or email addresses. Cypress provides utilities and plugins that enable you to generate and use dynamic data within your tests.

Install: npm install --save-dev @faker-js/faker

Dynamic Data Generation Example:

```
import { Faker, en } from '@faker-js/faker';

const faker = new Faker({ locale: [en] });
const FirstName = faker.person.firstName();
const LastName = faker.person.lastName();
const password= faker.internet.password()+faker.number.int({ min: 100, max: 500 });
```

Data-Driven Test Execution

To execute Data-Driven Tests effectively, you need to iterate through your data sets and perform test actions for each set. Cypress provides a range of looping and iteration options to handle Data-Driven Testing scenarios efficiently.

Data-Driven Test Execution involves iterating through a set of test data and running the same test scenario with different inputs. In this example, we'll demonstrate how to perform Data-Driven Testing with Cypress by reading test data from an external JSON file and executing test cases for each dataset.

Step 1: Prepare Test Data

First, create a JSON file (e.g., test-data.json) that contains the test data. Each object in the JSON file represents a set of test data with different inputs. For example:

```
[
    {
      "description": "Test Case 1",
      "inputValue": "input_data_1",
      "expectedResult": "expected_result_1"
    },
    {
      "description": "Test Case 2",
      "inputValue": "input_data_2",
      "expectedResult": "expected_result_2"
    },
    {
      "description": "Test Case 3",
      "inputValue": "input_data_3",
      "expectedResult": "expected_result_3"
    }
  ]
```

Step 2: Implement Data-Driven Testing in Cypress

Now, let's implement Data-Driven Testing in Cypress using the test data from the JSON file. Create a Cypress test script (e.g., data-driven-test.js) and follow these steps:

```
// Import the test data from the JSON file
import testData from './test-data.json';

// Define the test scenario
describe('Data-Driven Test Example', () => {
  // Iterate through each dataset in the test data
  testData.forEach((data) => {
    it(`Test Case: ${data.description}`, () => {
      // Perform test actions with the current dataset
      cy.visit('https://example.com'); // Replace with your website URL
      cy.get('#inputField').type(data.inputValue);
      cy.get('#submitButton').click();

      // Add assertions to validate the outcome
      cy.get('#resultElement').should('have.text', data.expectedResult);
    });
  });
});
```

In this code:

- We import the test data from the test-data.json file, which contains an array of test datasets.
- Inside the describe block, we use testData.forEach to iterate through each dataset.
- For each dataset, we execute the same test steps, such as visiting a webpage, interacting with elements, and making assertions.
- The test title is dynamic and reflects the description from the dataset to make the test results more informative.

Step 3: Run the Cypress Test

To run the Cypress test, execute the following command in your Cypress project directory:

npx cypress open

Cypress will open its Test Runner, and you can select the data-driven-test.js test script to execute. The test will run multiple times, once for each dataset in the JSON file, and you'll see the results for each dataset in the Cypress Test Runner.

This approach allows you to perform Data-Driven Testing efficiently, ensuring that the same test scenario is executed with various input values, and the results are validated for each dataset. It enhances test coverage and helps identify potential issues under different conditions.

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