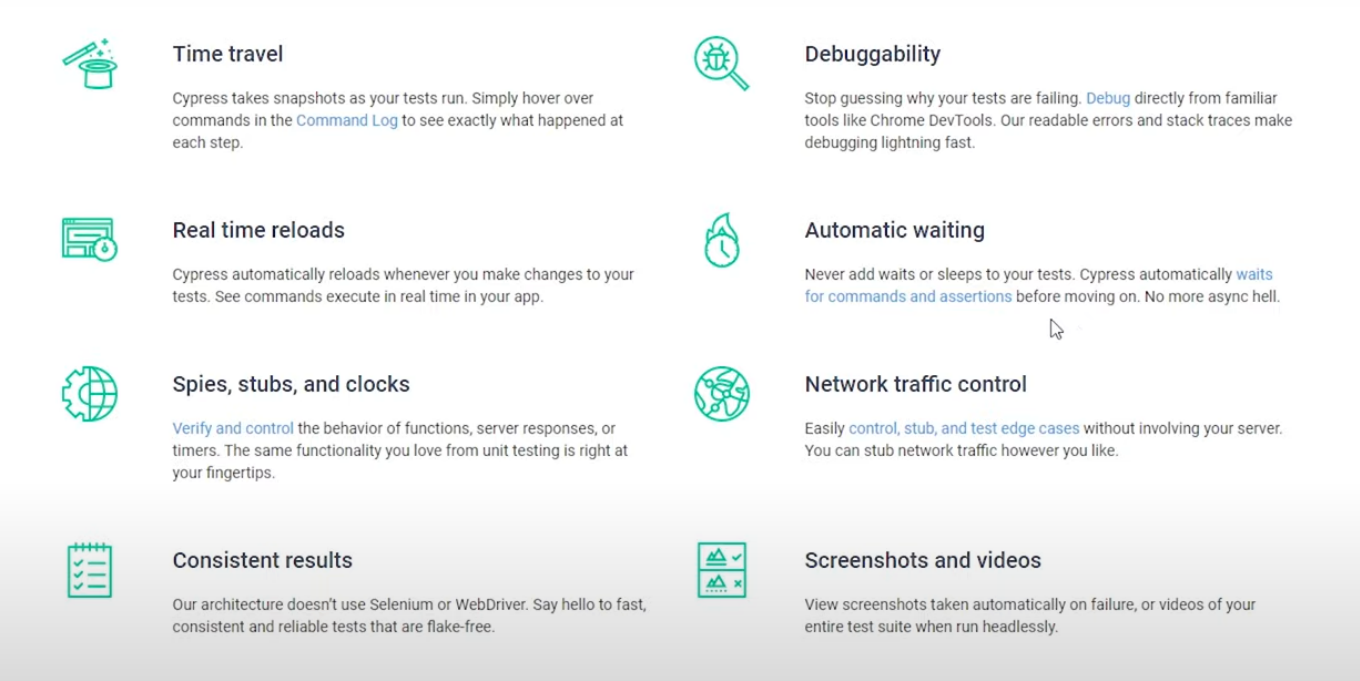
Introduction

Why Cypress?

- In very simple words :
    - Let's say you added a button which changes some content onClick of it.
    - Now you will check at your end the places it could affect.
    - After checking at your end you pushed the code!
    - But it *Broke the code!* at the place you weren't aware, that it would get updated.
    - Now you are stuck - about how to make sure that you have fully checked the functionalities
    - Here comes to rescue - `Cypress : An automation testing`
    - One time hardwork : What is now required is to cover entire codebase functionalities with test cases
    - From next time as you update any functionality : Just run these cases and get to know if anything is affected.
    - In place of checking everything yourself, now cypress will do it for you! With least chances of missing something out!
- Cypress runner runs inside our web app and can inject code using javascript as it shares the same origin

Features of Cypress

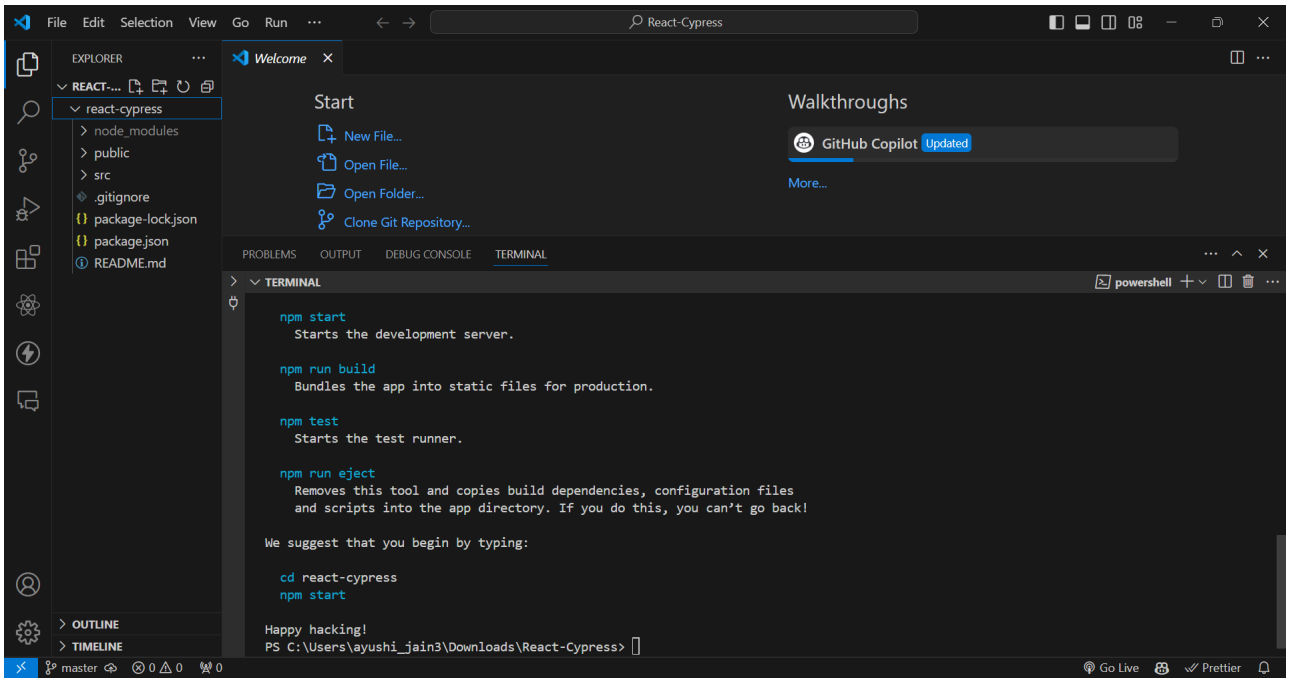


- Distinguish features are :-

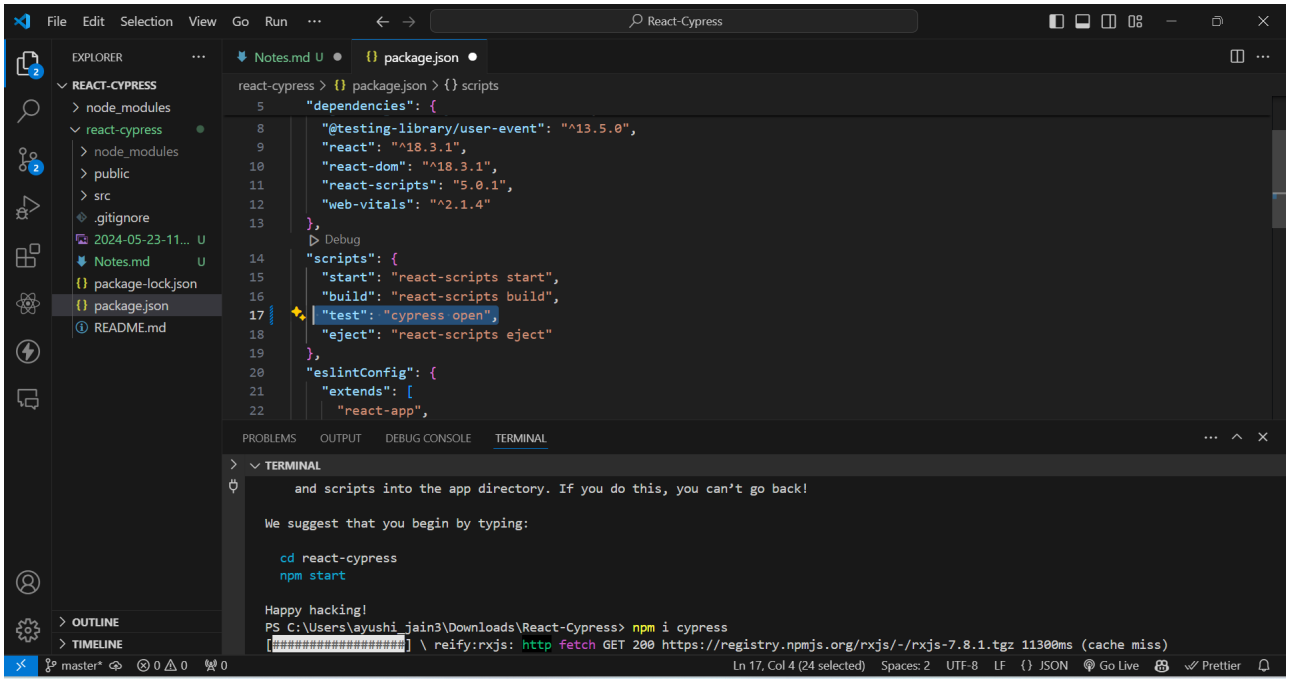
1. Snapshots to see what happened at each step
2. Automatic waiting
3. Easy debugging

Installation

1. Require node
2. Create a react project

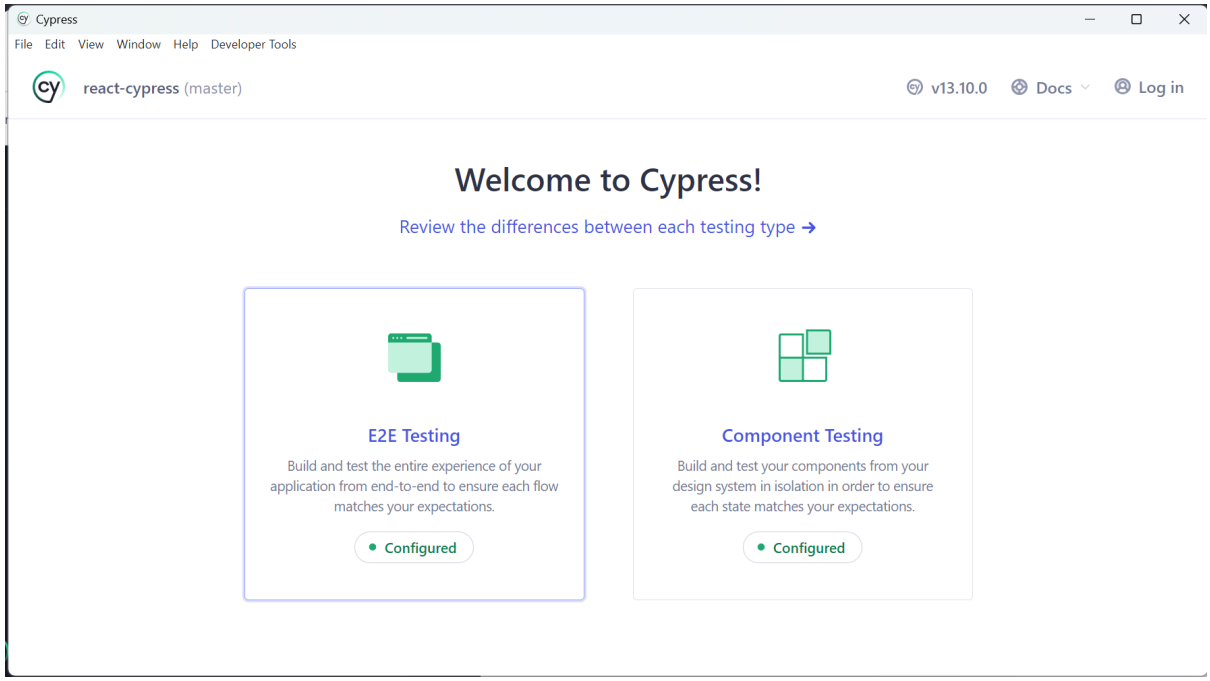


3. Install Cypress package `npm install cypress --save-dev`
4. Add Cypress open command in the package.json

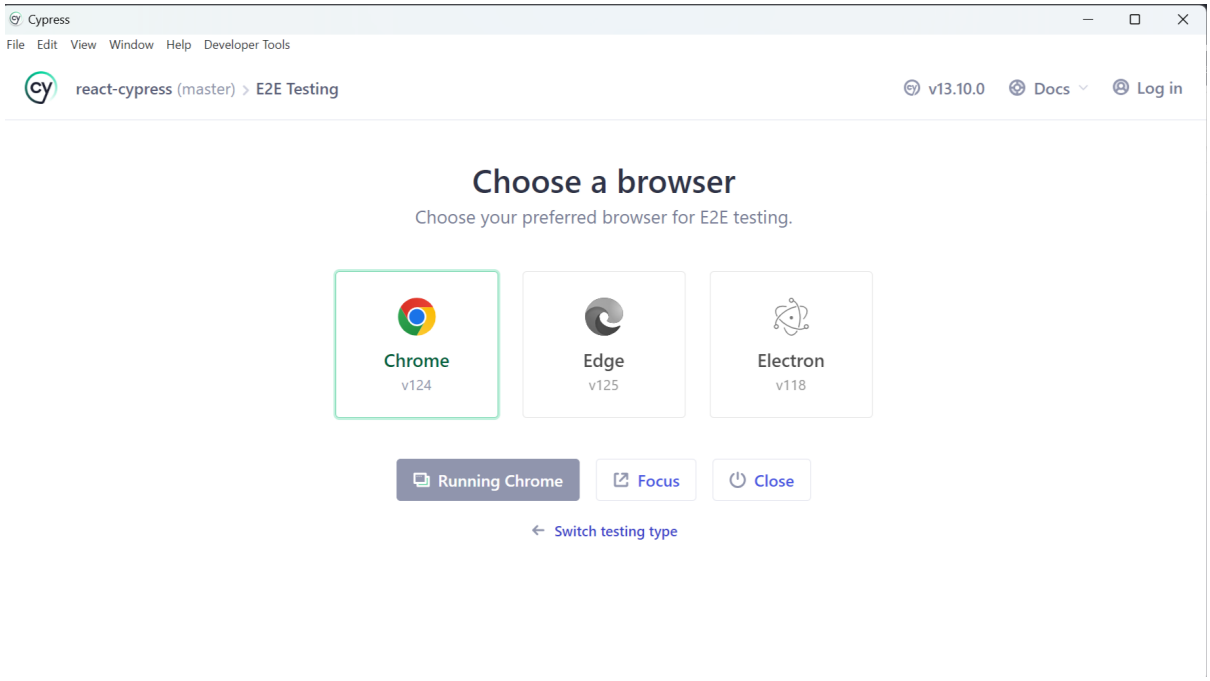


5. Open the cypress `npm run test`

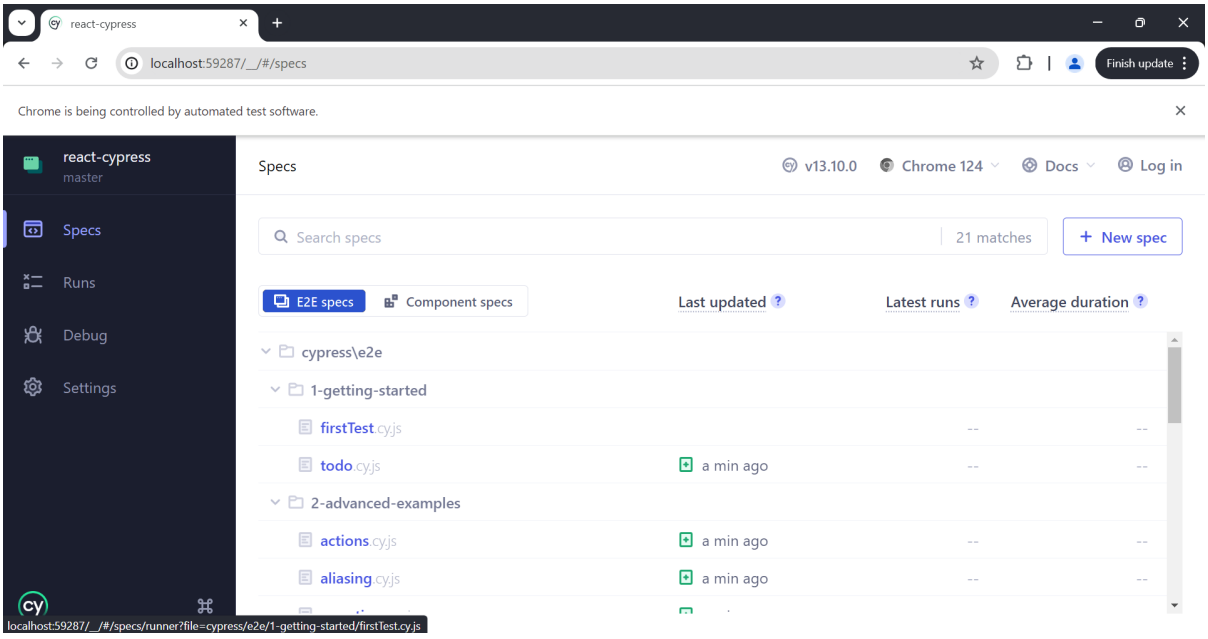
- Select E2E Testing option



- Choose your favorite browser



- You can see all the default files - Select your file name to start running



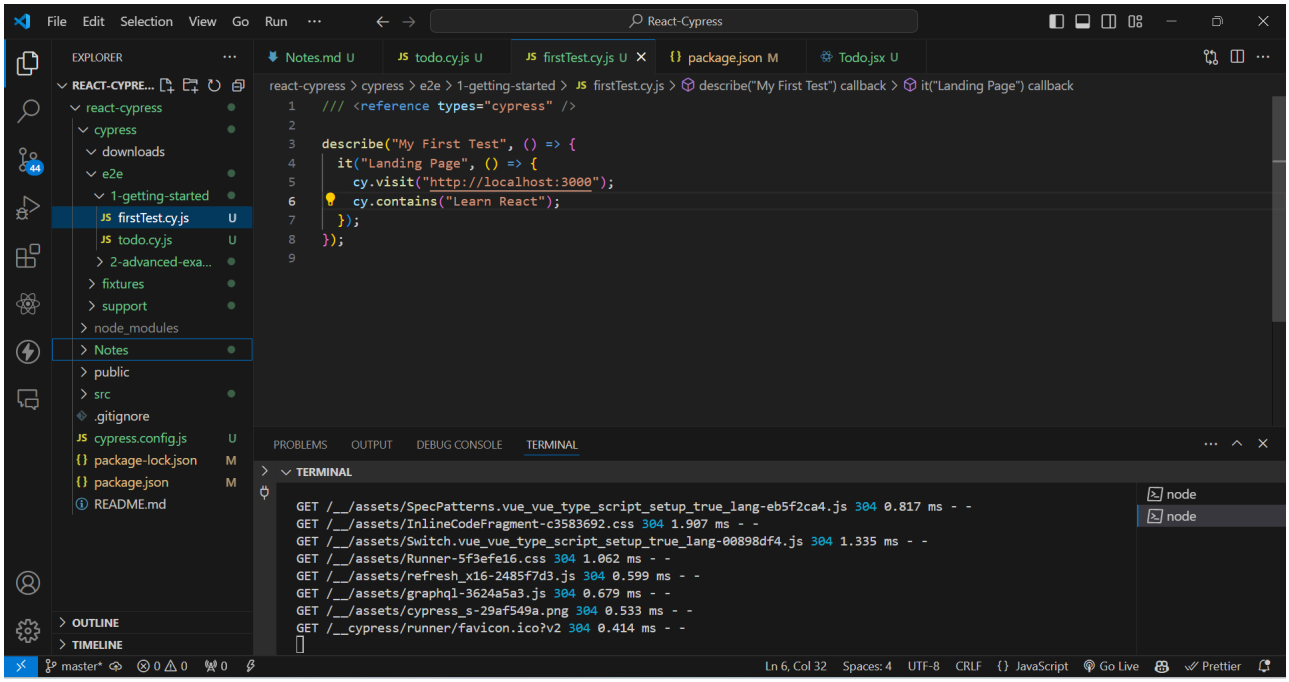
Cypress Folder Structure

Let us understand the folder structure in Cypress. The factors that are included in a Cypress folder are explained below:

- `fixtures`: Test data in form of key-value pairs for the tests are maintained here.
- `e2e` : Test cases for the framework are maintained here and is used for *comprehensive user journey tests across the entire application*.
- `integration`: Test cases for the framework are maintained here and is used for *testing specific parts or features interacting within the application*.
- `plugins`: Cypress events (prior and post events to be executed for a test) are maintained here.
- `support`: Reusable methods or customized commands, which can be utilised by testcases directly, without object creation are created here.
- `videos`: Executed test steps are recorded in the form of videos and maintained here.
- `node_modules`: Project dependencies from the npm are maintained in this folder. It is the heart of the Cypress project execution.
- `cypress`.json: Default configurations are set in this folder. The values of the current configurations can be modified here, which overrules the default configurations.
- `package.json`: Dependencies and scripts for the projects are maintained in this folder.

First Test : Default React Page

- Create a file with `.cy.js` extension in the e2e folder in the cypress folder

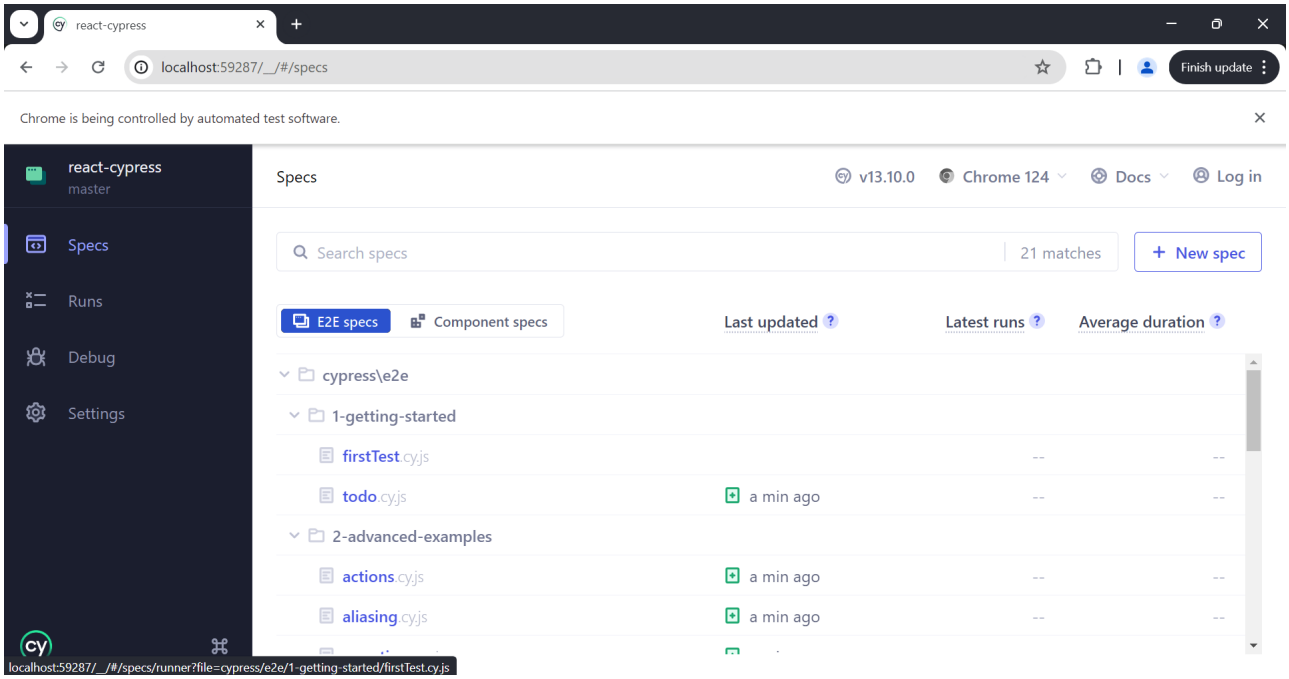


Structure of basic test

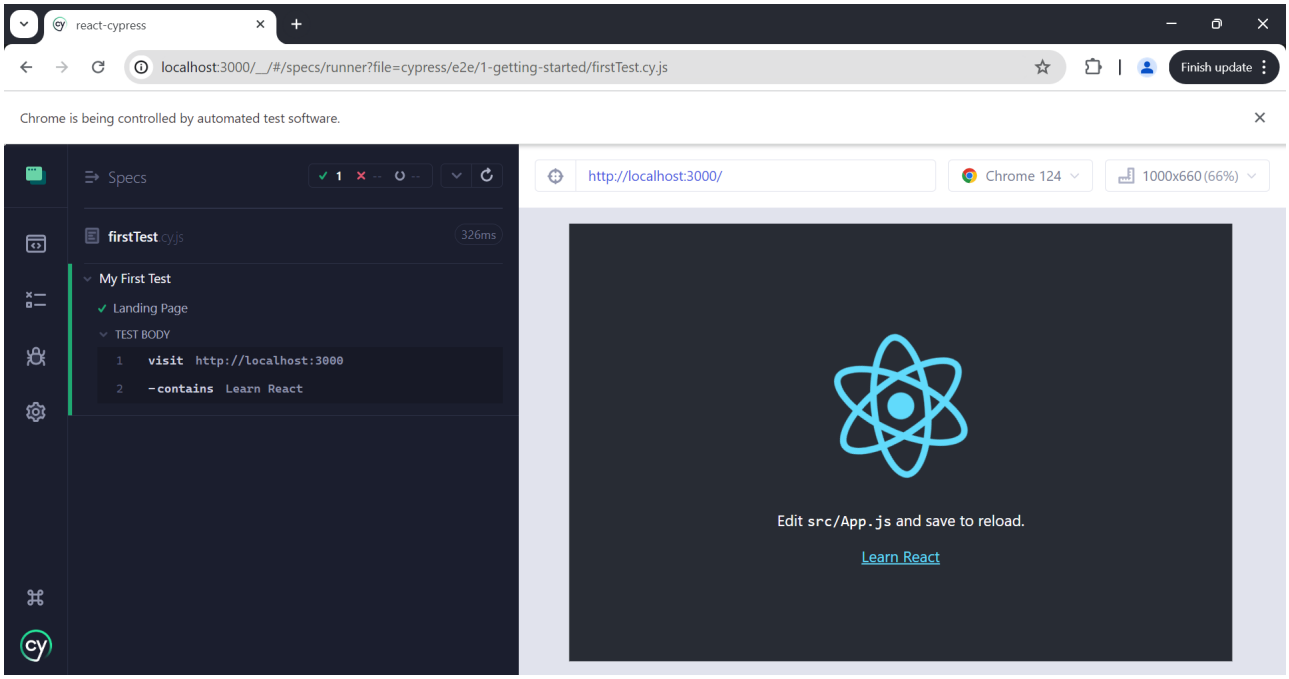
1. Test suite name has to be provided within the describe function.
2. Test case names within a test suite have to be provided within the same or you have to specify the function.
3. Test steps within a test case have to be implemented inside the it/specify block.

```
describe("My First Test", () => {
  it("Landing Page", () => {
    cy.visit("http://localhost:3000");
    cy.contains("Learn React");
  });
});
```

- Select your file name to start running



Congratulations!



Let's dive deep

Element Selectors

1. `cy.get('button').click()` *Never Worst* : Too generic, no context.
2. `cy.get('.btn.btn-large').click()` *Never Bad* : Coupled to styling. Highly subject to change.
3. `cy.get('#main').click()` *Sparingly Better* : But still coupled to styling or JS event listeners.
4. `cy.get('[name="submission"]').click()` *Sparingly* : Coupled to the name attribute which has HTML semantics.
5. `cy.contains('Submit').click()` *Depends Much better* : But still coupled to text content that may change.
6. `cy.get('[data-cy="submit"]').click()` **Always Best** :Isolated from all changes.

Basic Constructs of Cypress :-

describe():

This method is used to group related test cases. It takes two arguments: a string that describes the group of test cases and a callback function that contains the individual test cases.

it():

This method is used to define a test case. It takes two arguments: a string that describes the test case and a callback function that contains the actual test code

before():

This method is used to run a setup function before any test case in a particularly described block. It can be used to set up the test environment, initialize variables, and perform other setup tasks.

after():

This method is used to run a cleanup function after all the test cases in a particularly described block have finished running. It can be used to clean up the test environment, close open connections, and perform other cleanup tasks.

beforeEach():

This method is used to run a setup function before each test case in a particularly described block. It can be used to reset the state of the test environment and perform other setup tasks.

afterEach():

This method is used to run a cleanup function after each test case in a particularly described block has finished running. It can be used to reset the state of the test environment and perform other cleanup tasks.

.skip():

When dealing with a large codebase and wanting to concentrate on specific tests or subsets of tests, the .skip() function provides a handy means to temporarily prevent certain tests from being executed.

Cypress Basic Commands

and

It is used to create an assertion and is an alias of .should ().

```
//element is visible & enabled
cy.get("#txt").should("be.visible").and("be.enabled");
//element is checked
cy.contains("Subject").and("be.checked");
```

as

It provides an alias for later usage.

```
//alias element as parent
cy.get("#txt").find("li").first().as("parent");
```

blur

It blurs an element in focus.

```
//blur input
cy.get("#txt").type("abc").blur();
```

check

It checks radio buttons or checkboxes and is applied to elements having input tags.

```
//checks element having class attribute chkbox
cy.get(".chkbox").check();
```

children

It obtains the sub elements of an element.

```
//obtains children of element n
cy.get("n").children();
```

clear

It removes the value from textarea or input.

```
//removes input abc
cy.get("#txt").type("abc").clear();
```

clearCookie

It removes a particular browser cookie.

```

```

```
//clear abc cookie
cy.clearCookie("abc");
```

clearCookies

It removes the browser cookies from an existing domain and subdomain.

```
//clear all cookies
cy.clearCookies();
```

clearLocalStorage

It removes the local Storage data from an existing domain and subdomain.

```
//clear all local storage
cy.clearLocalStorage();
```

click

It clicks an element in Document Object Model (DOM).

```
//click on element with id txt
cy.get("#txt").click();
```

contains

It obtains an element having a specific text. The element can have more than the text and still match.

```
//returns element in #txt having Tutor text
cy.get("#txt").contains("Tutor");
```

dblclick

It double-clicks an element in Document Object Model (DOM).

```
//double clicks element with id txt
cy.get("#txt").dblclick();
```

debug

It fixes a debugger and log values are returned by prior command.

```
//pause to debug at start of command
cy.get("#txt").debug();
```

document

It obtains window.document on the active page.

```
cy.document();
```

each

It iterates through an array having the property length.

```
//iterate through individual li
cy.get('li').each(() => {...})
```

end

It ends a command chain.

```
//obtain null instead of input
cy.contains("input").end();
```

eq

It refers to an element at a particular index in an array of elements.

```
//obtain third td in tr
cy.get("tr>td").eq(2);
```

exec

It runs a system command.

```
cy.exec("npm init");
```

find

It obtains the descendant elements of a particular locator.

```
//obtain td from tr
cy.get("tr").find("td");
```

first

It obtains the first element from a group of elements.

```
//obtain first td in tr
cy.get("tr>td").first();
```

get

It obtains single or multiple elements by locator. It obtains the descendant elements of a particular locator.

```
//obtain all td from tr in list
cy.get("tr>td");
```

getCookie

It obtains a particular browser cookie by its name.

```
cy.getCookie("abc");
```

getCookies

It obtains all the cookies

```
cy.getCookies();
```

go

It moves forward or backward to the next or previous URL in browser history.

```
//like clicking back button
cy.go("back");
```

```
//like clicking forward button
cy.go("forward");
```

visit

It launches an URL.

```
cy.visit("https://www.tutorialspoint.com/index.htm");
```

next

It obtains the immediate sibling of an element within a group of elements in Document Object Model (DOM).

```
//gives the following link in element l.
cy.get("l a:first").next();
```

parent

It obtains the parent element from a group of elements in DOM.

```
//get parent of element with class h
cy.get(".h").parent();
```

should

It is used to create an assertion and is an alias of .and ().

```
//assert element is visible & enabled
cy.get("#txt").should("be.visible").and("be.enabled");
```

wait

Wait for a certain time in milliseconds or for an aliased element prior to moving the following step.

```
cy.wait(1000);
```

title

It obtains the document.title of the active page.

```
cy.title();
```

viewport

It manages the dimension and positioning of the screen.

```
// viewport to 100px and 500px
cy.viewport(100, 500);
```

log

It prints the messages to the Command Log.

```
cy.log("Cypress logging ");
```

reload

It is used for page reloading.

```
cy.reload();
```

Example : Todo App Code

- Let's create cypress test for the following code
- It has 4 major functionalities
    1. List todos
    2. Add a new todo
    3. Edit a todo
    4. Delete a todo
- This implies we will need 4 tests

```
import React, { useState, useEffect } from "react";
import { Button, Checkbox, Input, List } from "antd";
import axios from "axios";
import "antd";

const Todo = () => {
  const [todos, setTodos] = useState([]);
  const [newTodo, setNewTodo] = useState("");

  useEffect(() => {
```

```
    axios.get("https://dummyjson.com/todos").then((response) => {
      setTodos(response.data.todos);
    });
  }, []);

  const handleEdit = (index) => {
    const todo = todos[index];
    const updatedTodo = prompt("Edit todo:", todo.todo);

    if (updatedTodo) {
      const newTodos = [...todos];
      newTodos[index] = { ...todo, todo: updatedTodo };
      setTodos(newTodos);
    }
  };

  const handleDelete = (index) => {
    const newTodos = todos.filter((_, i) => i !== index);
    setTodos(newTodos);
  };

  const handleAdd = () => {
    if (newTodo) {
      const newTodos = [{ todo: newTodo, completed: false }, ...todos];
      setTodos(newTodos);
      setNewTodo("");
    }
  };

  return (
    <div>
      <Input
        value={newTodo}
        onChange={(e) => setNewTodo(e.target.value)}
        onPressEnter={handleAdd}
      />
      <Button onClick={handleAdd}>Add</Button>
      <List
        dataSource={todos}
        renderItem={(todo, index) => (
          <List.Item
            actions={[
              <Button onClick={() => handleEdit(index)}>Edit</Button>,
              <Button onClick={() => handleDelete(index)}>Delete</Button>,
            ]}
          >
            <span>{todo.todo}</span>
          </List.Item>
        )}
      />
    </div>
  );
};
```

```
export default Todo;
```

Cypress Test for Todo

- Let us now apply all the concepts in our todo test cases.
- `Setup with beforeEach`: Ensures the application is in a consistent state before each test by visiting the base URL.
- `Display Existing Todos`:
  - Uses cy.request to fetch todos from an external API and verifies the response status.
  - Checks if the list container exists and the number of items matches the fetched data.
- `Add a New Todo`: Simulates user input to add a new todo and verifies if it appears as the first item in the list.
- `Edit an Existing Todo`: Simulates clicking the edit button, stubbing the prompt to simulate user input, and verifying the change.
- `Delete an Existing Todo`: Records the initial number of todos, simulates deleting the first item, and verifies the count is reduced by one.
- Thus, this script demonstrates typical end-to-end testing scenarios for a Todo application using Cypress, including interaction with elements and validating the application's behavior in response to user actions.
- Comments are added before each line for better explanation.

```
// cypress/e2e/todo.cy.js

// Describe block to group related tests for the "Todo Application"
describe("Todo Application", () => {
  // beforeEach hook to run setup code before each test
  beforeEach(() => {
    // Visit the application URL before each test
    cy.visit("http://localhost:3000");
    // Note: Adjust the URL according to your development server
  });

  // Test to verify that existing todos are displayed correctly
  it("should display existing todos", () => {
    // Fetch todos from an external API and check the response
    cy.request("https://dummyjson.com/todos").then((response) => {
      // Ensure the response status is 200 (OK)
      expect(response.status).to.eq(200);
      // Extract todos from the response body
      const todos = response.body.todos;

      // Check if the list container exists in the DOM
      cy.get(".ant-list-items").should("exist");

      // Verify the number of displayed todos matches the fetched data
      cy.get(".ant-list-item").should("have.length", todos.length);
    });
  });
```

```
// Test to verify adding a new todo
it("should add a new todo", () => {
  const newTodoText = "New Cypress Todo";

  // Type new todo text in the input field and press Enter
  cy.get("input").type(newTodoText).type("{enter}");

  // Verify the new todo is added as the first item in the list
  cy.get(".ant-list-item").first().should("contain.text", newTodoText);
});

// Test to verify editing an existing todo
it("should edit an existing todo", () => {
  const editedTodoText = "Edited Cypress Todo";

  // Edit the first todo in the list
  cy.get(".ant-list-item")
    .first()
    .within(() => {
      // Click the Edit button of the first todo
      cy.contains("Edit").click();
    });

  // Simulate user input in the prompt dialog for editing
  cy.window().then((win) => {
    // Stub the prompt to return the edited text
    cy.stub(win, "prompt").returns(editedTodoText);
  });

  // Confirm the edit action by clicking the Edit button again
  cy.get(".ant-list-item").first().contains("Edit").click();

  // Verify the edited todo text is displayed correctly
  cy.get(".ant-list-item").first().should("contain.text", editedTodoText);
});

// Test to verify deleting an existing todo
it("should delete an existing todo", () => {
  // Get the initial number of todos in the list
  cy.get(".ant-list-item").then((initialItems) => {
    const initialLength = initialItems.length;

    // Delete the first todo in the list
    cy.get(".ant-list-item")
      .first()
      .within(() => {
        // Click the Delete button of the first todo
        cy.contains("Delete").click();
      });

    // Get the updated number of todos in the list
    cy.get(".ant-list-item").then((updatedItems) => {
      const updatedLength = updatedItems.length;
```

```
        // Verify the number of todos is reduced by one
        expect(updatedLength).to.equal(initialLength - 1);
      });
    });
  });
});
```

- Cypress Window Result