JavaScript Testing In And Around WordPress

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Hi I'm Josh

About Me

PHP & JavaScript engineer/ other nerd stuff

- Currently: VP Engineering Experience Saturday Drive
  - Ninja Forms, Caldera Forms, SendWP and more.
- Previously: Co-owner/ lead developer: CalderaWP. Community manager/ developer: Pods Framework.
- WordPress core contributor, educator, etc.
- Hobbies: Test-driven Laravel and React development, outdoor exercise, science fiction.
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Say Hi

- JoshPress.net
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Slides and Code

Slides

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Example Code

- 👀 Example Code For Part One
- Example Code For Part Two

Find a bug or typo? Pull requests are welcome.

Does My Code Work?

How would I know?

Types Of Tests

What Questions Do Tests Answer?

Types Of Tests

Unit Tests

Does A Component Work In Isolation?

Types Of Tests

Integration (Feature) Tests

Do The Components Work Together?

Types Of Tests

Acceptance (e2e) Tests

Does the whole system work together?

JavaScript Testing In And Around WordPress

Part One: Testing React Apps

[Example Code For Part One]

How React Works

Everything In Context....

Step 1

React creates an object representation of nodes representing a user interface.

- It does not produce HTML.

```
React.createElement("div", { className: "alert" }, "Something Happened");
```

Step 2

A "renderer" converts that object to a useable interface.

- ReactDOM renders React as DOM tree and appended to DOM.

```
ReactDOM.render(<App />, domElement);
```

- ReactDOMServer renders to an HTML string for server to send to client.

```
ReactDOMServer.renderToString(<App />);
```

Test Renderers

- React Test Renderer
  - Good for basic tests and snapshots. No JSDOM.
- Enzyme
  - Renders to JSDOM. Good for testing events and class components methods/ state.
- React Testing Library
  - Good for basic test, snapshots, testing events, testing hooks, etc. Uses JSDOM.

The Test Suite

- Test Runner
  - Runs the tests
  - Examples: Jest or phpunit
- Test Renderers
  - Creates and inspects output
- Assertions
  - Tests the output
  - Example: Chai

Zero-Config Testing

(and more)

- react-scripts
  - `react-scripts test`
  - Used by create-react-app
- @wordpress/scripts
  - `wordpress-scripts test`
  - Developed for Gutenberg, great for your plugins.

```
npx create-react-app
```

Let's Write Some Tests

And A Web App :)

Create A React App

```
# install create-react-app
npx create-react-app
# Run the included test
yarn test
```

Testing Included!

Create React App comes with one test.

This is an acceptance test. It tests if **anything** is broken.

Test The App Renders

```
import React from "react";
import ReactDOM from "react-dom";
import App from "./App";
it("renders without crashing", () => {
  const div = document.createElement("div");
  ReactDOM.render(<App />, div);
  ReactDOM.unmountComponentAtNode(div);
});
```

Questions To Ask?

- How do I know the components works?
  - Answer with unit tests
- How do I know the components work together?
  - Answer with integration/ feature tests
- What is the most realistic test of the program?
  - Answer with acceptance/ e2e tests

App Spec

Create a one page app that:

- Displays a value
- Has an input to change that value

Test Spec

- Unit tests:
  - Does display component display the supplied value?
  - Does edit component display the value?
  - Does the edit component supply updated value to onChange callback?

Test Spec

- Integration Tests:
  - Does the display value change with the input?

Layout Of Our Test File

`test()` Syntax

```
//Import React
import React from "react";
//Import test renderer
import TestRenderer from "react-test-renderer";
//Import component to test
import { DisplayValue } from "./DisplayValue";

test("Component renders value", () => {});

test("Component has supplied class name", () => {});
```

BDD Style

```
describe("EditValue Component", () => {
  //Shared mock onChange function
  let onChange = jest.fn();
  beforeEach(() => {
    //Reset onChange mock before each test.
    onChange = jest.fn();
  });

  it("Has the supplied value in the input", () => {});

  it("Passes string to onChange when changed", () => {});
});
```

Install React Test Renderer

```
yarn add react-test-renderer
```

Unit Testing React Components

Find Props

```
//Probably don't do this
test("Component renders value", () => {
  const value = "The Value";
  const testRenderer = TestRenderer.create(<DisplayValue value={value} />);
  //Get the rendered node
  const testInstance = testRenderer.root;
  //find the div and make sure it has the right text
  expect(testInstance.findByType("div").props.children).toBe(value);
});
```

Do This For Every Prop?

That Is Testing React, Not Your Application

Snapshot Testing

Renders Component To JSON

Stores JSON in file system

Snapshot Testing

- Snapshots Acomplish Two Things:
  - Make sure your props went to the right places.
  - Force your to **commit** to changes.

Create A Snapshot Test

```
test("Component renders correctly", () => {
  expect(
    TestRenderer.create(
      <DisplayValue value={"The Value"} className={"the-class-name"} />
    ).toJSON()
  ).toMatchSnapshot();
});
```

Testing Events

React testing library is best for this. Enzyme is an alternative.

```
yarn add @testing-library/react
```

Test On Change Event

```
import { render, cleanup, fireEvent } from "@testing-library/react";
describe("EditValue component", () => {
  afterEach(cleanup); //reset JSDOM after each test
  it("Calls the onchange function", () => {
    //put test here
  });
  it("Has the right value", () => {
    //put test here
  });
});
```

Test On Change Event

```
const onChange = jest.fn();
const { getByTestId } = render(
  <EditValue
    onChange={onChange}
    value={""}
    id={"input-test"}
    className={"some-class"}
  />
);
fireEvent.change(getByTestId("input-test"), {
  target: { value: "New Value" }
});
expect(onChange).toHaveBeenCalledTimes(1);
```

Test On Change Event

```
const onChange = jest.fn();
const { getByTestId } = render(
  <EditValue
    onChange={onChange}
    value={""}
    id={"input-test"}
    className={"some-class"}
  />
);
fireEvent.change(getByTestId("input-test"), {
  target: { value: "New Value" }
});
expect(onChange).toHaveBeenCalledWith('New Value');
```

Snapshot Testing

With React Testing Library

```
test("matches snapshot", () => {
  expect(
    render(
      <EditValue
        onChange={jest.fn()}
        value={"Hi Roy"}
        id={"some-id"}
        className={"some-class"}
      />
    )
  ).toMatchSnapshot();
});
```

Integration Tests

Do the two components work together as expected?

Integration Test

```
it("Displays the updated value when value changes", () => {
  const { container, getByTestId } = render(<App />);
  expect(container.querySelector(".display-value").textContent).toBe("Hi Roy");
  fireEvent.change(getByTestId("the-input"), {
    target: { value: "New Value" }
  });
  expect(container.querySelector(".display-value").textContent).toBe(
    "New Value"
  );
});
```

Test For Accesibility Errors

Using [dequeue's aXe]

```
# Add react-axe
yarn add react-axe --dev
# Add react-axe for Jest
yarn add jest-axe --dev
```

Test App For Accesibility Errors

Does the accessibility scanner raise errors?

This does NOT mean your app is accessible!

```
const { axe, toHaveNoViolations } = require("jest-axe");
expect.extend(toHaveNoViolations);
import React from "react";
import server from "react-dom/server";
import App from "./App";
import { render, fireEvent, cleanup } from "@testing-library/react";

it("Raises no a11y errors", async () => {
  const html = server.renderToString(<App />);
  const results = await axe(html);
  expect(results).toHaveNoViolations();
});
```

Review App Spec

Create a one page app that:

- Displays a value
- Has an input to change that value

JavaScript Testing In And Around WordPress

Part Two: Testing Gutenberg Blocks

Example Code Part Two

```
yarn add @wordpress/scripts
```

Let's Write Some Tests

And A Plugin

Spec

A block for showing some text.

- The components for the app should be reused.
- The block preview and rendered content should be identical.
- The control for the value should appear in the block’s inspector controls.

Test Spec

Integration Test

Will Gutenberg be able to manage our component’s state?

Test Spec

e2e Test

Does our plugin activate without errors?

Does our block appear in the block chooser?

What Is `@wordpress/scripts` ??

- React-scripts inspired zero-config build tool for WordPress plugins with blocks.
- Provides:
  - Compilers
  - Linters
  - Test runner
  - e2e tests
  - Local development

Setting Up Plugin For Testing

Install WordPress scripts

```
# Install WordPress scripts
yarn add @wordpress/scripts
```

Add Scripts To package.json

See README

```
{
  "scripts": {
    "build": "wp-scripts build",
    "start": "wp-scripts start",
    "test:e2e": "wp-scripts test-e2e --config e2e/jest.config.js",
    "test:unit": "wp-scripts test-unit-js --config jest.config.js",
    "env:start": "bash start.sh"
  }
}
```

Jest Is The Test Runner

Testing works the same, we can use same renderers.

`@wordpress/scripts` works on top of Jest, webpack, Babel, etc.

Structuring Blocks For Easy Testing

The file that builds the block to do nothing but build the block.

The Block

```
import { registerBlockType } from "@wordpress/blocks";
import { Editor } from "./components/Editor";
import { Save } from "./components/Save";
const blockConfig = require("../block.json");
const { name, title, attributes, category, keywords } = blockConfig;

registerBlockType(name, {
  title,
  attributes,
  category,
  keywords,
  edit: props => <Editor {...props} />,
  save: props => <Save {...props} />
});
```

Edit And Save Callbacks

The edit and save callback are composed in separate files, importing components built for the app.

Reponsiblity: Map Props

Edit Callback

```
import React, { Fragment } from "react";
import { EditValue } from "./app/EditValue";
import { DisplayValue } from "./app/DisplayValue";
import { InspectorControls } from "@wordpress/block-editor";
export const Editor = ({ attributes, setAttributes, className, clientId }) => {
  //Change handler
  const onChange = value => setAttributes({ value });
  //current value
  const { value } = attributes;
  return (
    <Fragment>
      <InspectorControls>
        <EditValue
          className={`${className}-editor`}
          id={clientId}
          value={value}
          onChange={onChange}
        />
      </InspectorControls>
      <DisplayValue value={value} className={className} />
    </Fragment>
  );
};
```

Test Edit Callback

```
describe("Editor componet", () => {
  afterEach(cleanup);
  it("matches snapshot", () => {
    const attributes = { value: "Hi Roy" };
    const setAttributes = jest.fn();
    expect(
      render(
        <Editor
          {...{
            attributes,
            setAttributes,
            clientId: "random-id",
            className: "wp-blocks-whatever"
          }}
        />
      )
    ).toMatchSnapshot();
  });
});
```

Save Callback

```
import React from "react";
import { DisplayValue } from "./app/DisplayValue";
export const Save = ({ attributes, className }) => {
  return <DisplayValue value={attributes.value} className={className} />;
};
```

Test Save Callback

```
describe("Save componet", () => {
  afterEach(cleanup);
  it("matches snapshot", () => {
    const attributes = { value: "Hi Roy" };
    expect(
      render(
        <Save
          {...{
            attributes,
            clientId: "random-id",
            className: "wp-blocks-whatever"
          }}
        />
      )
    ).toMatchSnapshot();
  });
});
```

End To End Testing Gutenberg Blocks

- Assuming that all of the components work, does the program function as expected.
- **Test like the user**
- Introductory Post
- Documentation

How To Setup Up WordPress End To End Tests

To make things easier, add the WordPress e2e test utilities:

```
# Add e2e test utilities
yarn add @wordpress/e2e-test-utils
```

Configure Jest

A seperate Jest config is needed to make sure it does NOT run unit tests.

- Jest Config For Unit Tests
- Jest Config For e2e Tests

```
const defaultConfig = require("./node_modules/@wordpress/scripts/config/jest-unit.config.js");
module.exports = {
  //use the default from WordPress for everything...
  ...defaultConfig,
  //Except test ignore, where we need to ignore our e2e test directory
  testPathIgnorePatterns: ["/.git/", "/node_modules/", "<rootDir>/e2e"]
};
```

This is based on WordPress core's e2e tests

Uses Puppetter To Automate Chrome

Easiest if you have WordPress running locally in Docker like core does

Copy my copy of core's local development

Test That Block Works

Use Helpers

Import helper functions from `@wordpress/e2e-test-utils`

```
import {
  insertBlock,
  getEditedPostContent,
  createNewPost,
  activatePlugin
} from "@wordpress/e2e-test-utils";
```

Test Adding Block

```
describe("Block", () => {
  beforeEach(async () => {
    await activatePlugin("josh-jswp/josh-jswp.php");
  });
  it("Can add block", async () => {
    await createNewPost();
    await insertBlock("Josh Block");
    expect(await getEditedPostContent()).toMatchSnapshot();
  });
});
```

Do NOT e2e Test Everything

e2e tests ensure that the system works toghether.

They are a compliment to less expensive unit/ integration tests.

Recomendations

- Assume your components will be reused.
  - Test in isolation.
- Start with unit tests on new projects.
  - Makes refactoring faster and safer.
- For legacy projects, start with acceptance tests.
  - Covers more, makes refactoring for unit-testablity safer.
- Do not forget to test for accesibility errors
  - Good Post On Reporting a11y Errors In Console
- Follow and learn from Kent C. Dodds
  - Author of React Testing Library and many great posts and videos about React, React testing.

🤷 Any Questions? 🤷

- Slides, And Links
- Download Slides As PDF

🙏 Thank You! 🙏

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