

WEATHERSENSE PROJECT

WEATHER SENSE

Presentation, April 2024

PRESENTATION

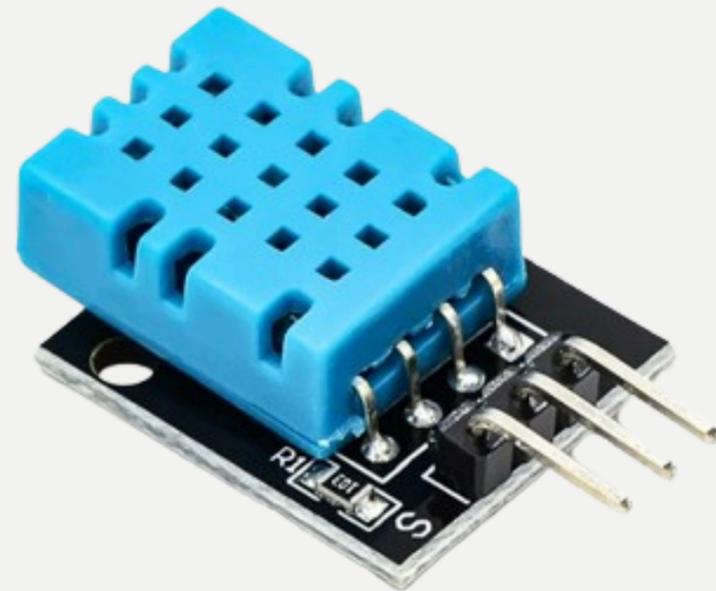


About Project

WeatherSense is a weather tracking website that updates weather data and classification every 10 minutes. Leveraging our trained random forest classification model, WeatherSense provides accurate classification and historical weather information.

HOW IT WORK?

THE SYSTEM COLLECTS DATA USING THE KY-015 SENSOR AND INTEGRATES WITH THE OPENWEATHERMAP API TO ENSURE RELIABILITY. NODE-RED ASSISTS IN DATA CORRECTION.



WEATHERSENSE PROJECT

FRONTEND

WE DEVELOP FRONTEND USING SVELTEKIT FRAME WORK AND TAILWINDCSS



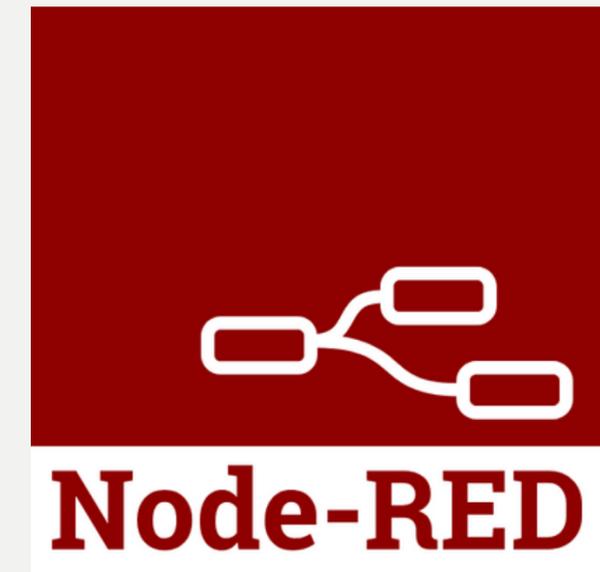
tailwindcss

BACKEND

DEVELOP BACKEND BY NODEJS + EXPRESS , NODERED, KU MUSQL SERVER



EXPRESS



WEATHERSENSE PROJECT

MODEL SERVER

DEVELOPMENT BY FLASK

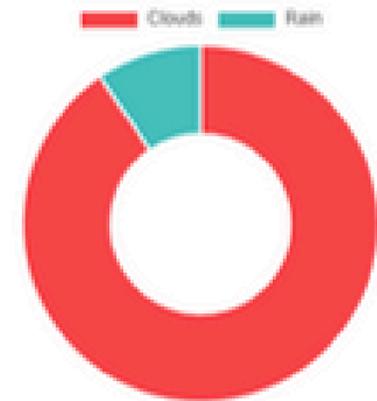


REAL WEBSITE SHOWCASE

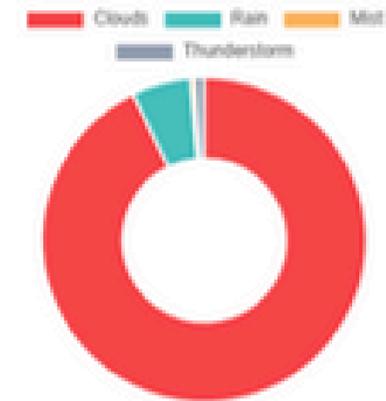
WeatherSense

Home History Github Contact **Data Visualize**

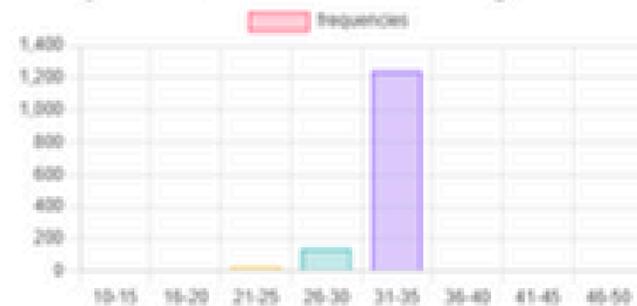
WeatherSense



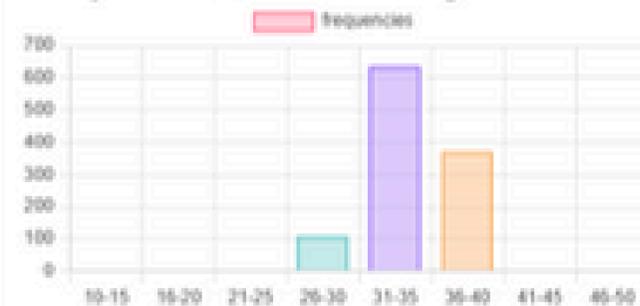
OpenWeatherAPI



Temperature Sensor °C Histogram



Temperature API °C Histogram



Cloudiness Percent Histogram



Humidity Sensor Percent Histogram



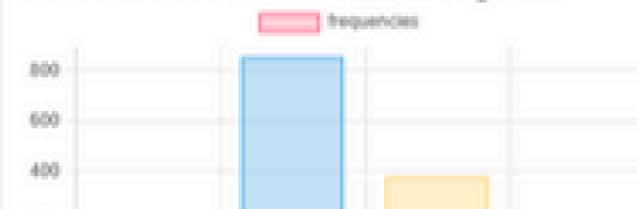
Humidity API Percent Histogram



Wind Speed m/s Histogram



Pressure HectoPascal Histogram



Temperature&Humidity Scatter



REAL WEBSITE SHOWCASE

WeatherSense

[Home](#) [History](#) [Github](#) [Contact](#)

Latest update on April 23, 2024 at 3:25 PM

WeatherSense

Clouds

OpenWeatherMap

Clouds

Temperature WeatherSense

27 °C

Temperature OpenWeatherMap

37.83 °C

Temperature Percentage Error

28.63 Percent

Humidity WeatherSense

69 Percent

Humidity OpenWeatherMap

44 Percent

Humidity Percentage Error

56.82 Percent

Cloudiness

20 Percent

Pressure

1005 Hectopascal

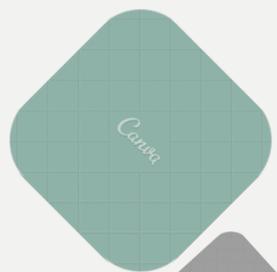
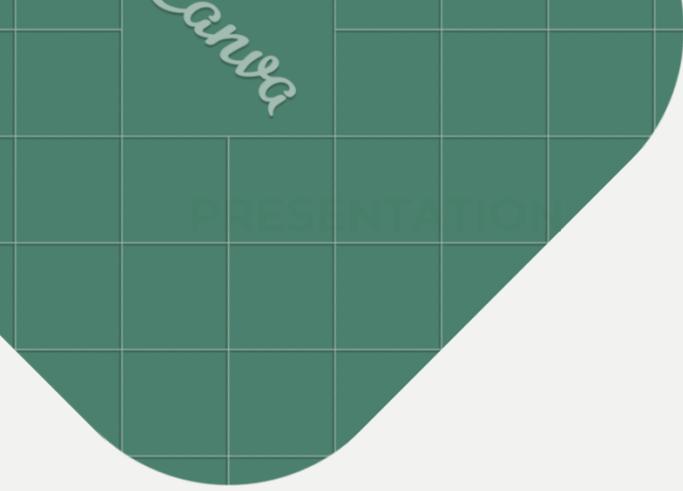
Wind Speed

5.66 m/s

REAL WEBSITE SHOWCASE

WeatherSense		Home History Github Contact			
Data on April 23, 2024 at 3:25 PM	View	Data on April 23, 2024 at 3:15 PM	View	Data on April 23, 2024 at 3:05 PM	View
Data on April 23, 2024 at 12:38 PM	View	Data on April 23, 2024 at 12:28 PM	View	Data on April 23, 2024 at 12:18 PM	View
Data on April 23, 2024 at 12:08 PM	View	Data on April 23, 2024 at 11:58 AM	View	Data on April 23, 2024 at 11:48 AM	View
Data on April 23, 2024 at 11:38 AM	View	Data on April 23, 2024 at 11:28 AM	View	Data on April 23, 2024 at 11:18 AM	View
Data on April 23, 2024 at 11:08 AM	View	Data on April 23, 2024 at 10:58 AM	View	Data on April 23, 2024 at 10:48 AM	View
Data on April 23, 2024 at 10:38 AM	View	Data on April 23, 2024 at 10:28 AM	View	Data on April 23, 2024 at 10:18 AM	View
Data on April 23, 2024 at 10:08 AM	View	Data on April 23, 2024 at 9:58 AM	View	Data on April 23, 2024 at 9:48 AM	View
Data on April 23, 2024 at 9:38 AM	View	Data on April 23, 2024 at 9:28 AM	View	Data on April 23, 2024 at 9:18 AM	View

TEST PLAN



TEST PLAN

Objective: As our project comprises three major components, we want to make sure they function independently and integrated together.

Strategy: We will use both manual and automated tools to test our project.

Strategy:

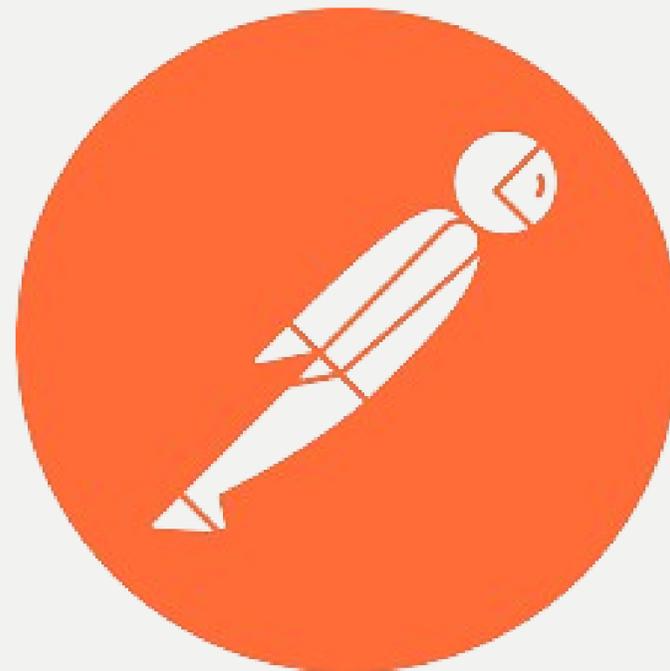
We will use both manual and automated tools to test our project.

Activities:

1. Choose one of the three major components.
2. Choose the part that we want to test on its functionality.
3. Determine the objective of our test on the part.
4. Set a clear starting and ending point for each part that we want to test.

FRONTEND TEST

WE DECIDED TO TEST WITH VITEST, PLAYWRIGHT, POSTMAN



Frontend Unit testing

Unit testing on the frontend is conducted using Vitest and jestdom, which focuses on testing Svelte components to ensure each component functions as expected. Since our website is not complex and has minimal functionality, functional testing is deemed unnecessary.

PRESENTATION



TEST SCENARIO AND SOME TEST CASE

IN FRONTEND UNIT TESTING SHOW CASE

TEST SCENARIO

Test Scenario:

Rendering Svelte Components with Props

Description:

This test scenario verifies that all Svelte components render correctly with their respective props.

Precondition:

1. The Svelte component is available.
2. Props are correctly defined and accessible within the component.

Step:

1. Instantiate the Svelte component.
2. Verify that each prop is correctly rendered within the component.

Expected Result:

1. The Svelte component renders without error.
2. Each prop is displayed or utilized as expected within the component.

COMPONENT TESTING TESTCASE

CARD COMPONENT

Test Case title: Card should render with title and value
Preconditions: <ol style="list-style-type: none">1. The Card.svelte component is available.2. Props are correctly defined and accessible within the component.
Test step: <ol style="list-style-type: none">1. Render Card with defined props.2. Verify Card component.
Expected result: <ol style="list-style-type: none">1. The Card component renders correctly without errors.2. Both title and value props are displayed correctly.
Test environment: JestDOM
Actual result: <ol style="list-style-type: none">1. The Card component renders correctly without errors.2. Props are displayed correctly.
Test Scenario: Rendering Svelte Components with Props
Status: Pass

COMPONENT TESTING CODE

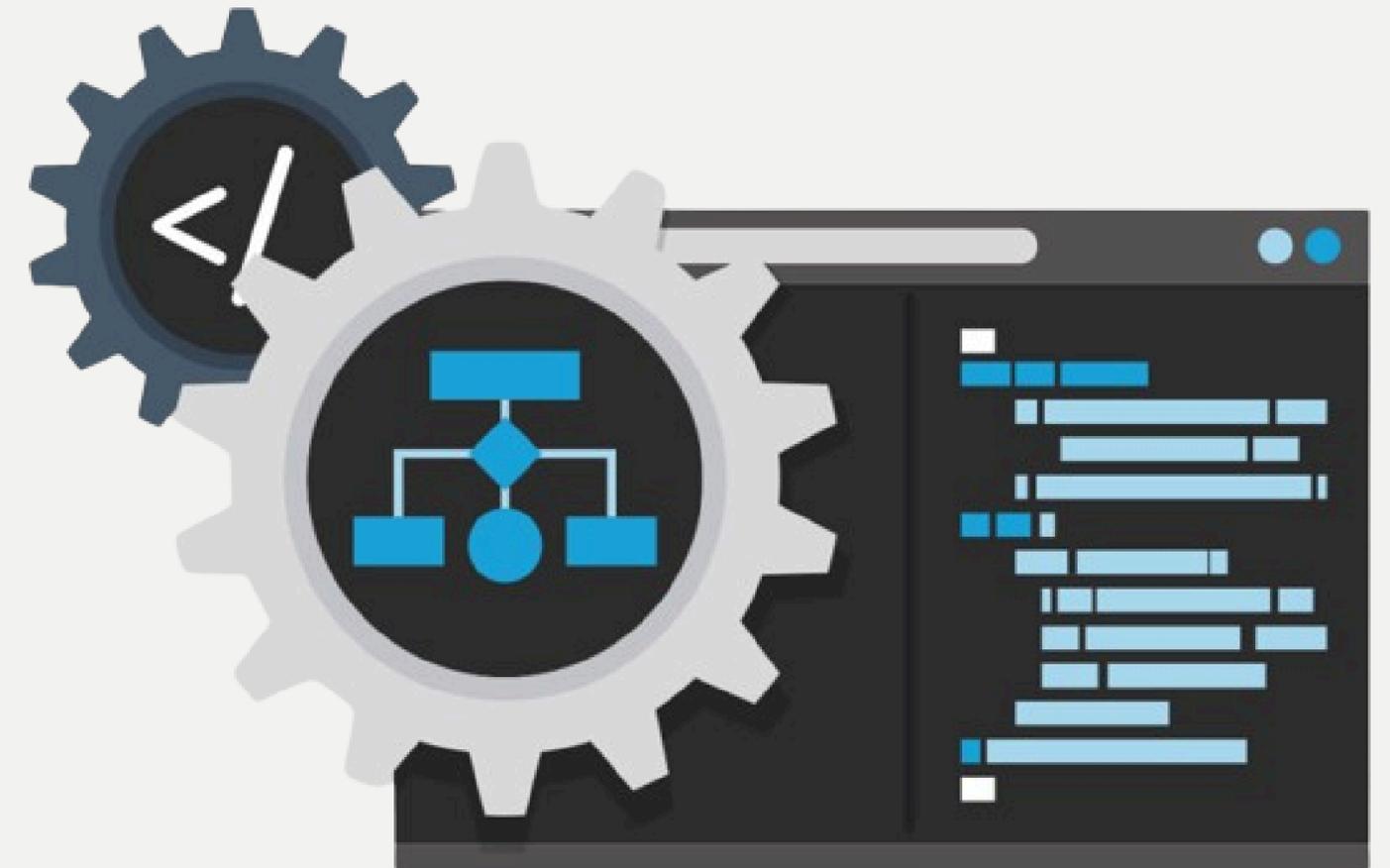
CARD COMPONENT

```
1 describe("Card component", () => {
2
3   beforeEach(() => {
4     render(Card, { props: { title: "Test Title", value: "Test Value" } })
5   })
6
7   it('should render with title and value', () => {
8     expect(screen.getByText("Test Title")).toBeInTheDocument();
9     expect(screen.getByText("Test Value")).toBeInTheDocument();
10  });
11 });
12
```

CHECKING CARD COMPONENT REDENDER SUCESSFULL
ALL PROPS ARE IN THE COMPONENT

Frontend Integration Testing

In integration testing, we utilize Vitest similarly to unit testing, and we also employ Postman for testing. Our focus during testing is on requests to every existing webpage route and checking the responses.



TEST SCENARIO AND SOME TEST CASE

IN FRONTEND INTEGRATION TESTING SHOW CASE

TEST SCENARIO

Test Scenario:

HTTP Request to every web page route

Description:

This test scenario verifies that all Frontend routes can request and get responses correctly as expected.

Precondition: The front-end server must be running.

Step:

1. Request to expect route of webpage.
2. Verify HTTP response.

Expected Result: The response should be 200

INTEGRATION TESTING TESTCASE

/WEATHER/ID (VALID)

Test Case title: GET request to <code>"/weather/id"</code> with valid id
Preconditions: <ol style="list-style-type: none">1.The front-end server is running.2.Back-end server is running.3.Define valid id to test
Test step: Go to route <code>"localhost:xxxx/weather/id"</code> Verify response status code
Expected result: status 200
Test Scenario: Request to every web page route
Test environment: HTTP
Actual result: status 200
Status: Pass

INTEGRATION TESTING CODE

/WEATHER/ID (VALID)



```
1 test("should allow users go weather page (valid ID)", async () => {
2     const id = 1;
3     const response = await axios.get(` ${backendRoutes.getWeatherById}${id}` );
4     expect(response.status).toBe(200);
5 });
```

**WHEN USER REQUEST TO THIS ROUTE
RESPONSE SHOULD BE STATUS 200**

INTEGRATION TESTING TESTCASE

/WEATHER/ID (INVALID)

Test Case title: GET request to `"/weather/id"` with invalid id

Preconditions:

- 1.The front-end server is running.
- 2.Back-end server is running.
- 3.Define valid id to test

Test step:

Go to route `"localhost:xxxx/weather/id"`
Verify response status code

Expected result: status 404

Test Scenario: Request to every web page route

Test environment: HTTP

Actual result: status 404

Status: Pass

INTEGRATION TESTING EXAMPLE

/WEATHER/ID (INVALID)

```
1 test("should not allow users to go to history page with invalid ID", async () => {
2   const id = -99;
3   try {
4
5     const response = await axios.get(`${backendRoutes.getWeatherById}${id}`);
6     expect(response.status).not.toBe(200);
7
8   } catch (error) {
9     expect(error.response.status).toBe(404);
10  }
11 });
12
```

**WHEN USER REQUEST INVALID ID TO ROUTE
RESPONSE SHOULD BE STATUS 404**

VITEST TEST RESULT

npm run test:ui

10 Pass	0 Fail	10 Total
📁 Files		7
✓ Pass		6
✗ Fail		1
🕒 Time		36.46s

PASS (6)	
✓	src/test/integralTesting.test.js 519ms
✓	src/components/Navbar.test.js 72ms
✓	src/components/TimestampHistory.test.js 138ms
✓	src/components/Card.test.js 48ms
✓	src/components/Timestamp.test.js 56ms
✓	src/components/Footer.test.js 42ms

1 TEST IS FAILED BECAUSE VITEST TRY TO RUN TEST OF PLAYWRIGHT SO IT HAS CONFLICT BUT IT NOT EFFECT TO OTHER

POSTMAN TEST RESULT

GET MainPage

http://localhost:5173/

PASS Response status code is 200

GET HistoryPage

http://localhost:5173/history

PASS Response status code is 200

GET WheaterById

http://localhost:5173/weather/1

PASS Response status code is 200

Frontend E2E Testing

In end-to-end testing, we utilize Playwright to simulate real-world scenarios to ensure that users can interact with our system effectively and that it functions correctly.



TEST SCENARIO AND SOME TEST CASE

IN FRONTEND E2E TESTING SHOW CASE

TEST SCENARIO

Test Scenario:

Verifies that the website functions correctly and as expected from the user's perspective.

Description:

This test scenario verifies that the user uses the web site to work correctly as expected.

Precondition:

1. The frontend server is running.
2. The backend server is running.
3. The ModelAPI server is running.

Step:

1. Open the website in a web browser.
2. Navigate through different pages and functionalities of the website
3. Verify that all interactions and functionalities work as expected.
4. Test the website on different devices and browsers (if necessary).

Expected Result: All pages and features of the website load without errors.

E2E TESTING TESTCASE

USER GO TO MAIN PAGE

Test Case title: In the home page all data Card components are rendered.
Preconditions: <ol style="list-style-type: none">1. All website services are running.
Test step: <ol style="list-style-type: none">1. Go to route "localhost:xxxx".2. Verify the page.
Expected result: All data displayed
Test Scenario: Verifies that the website functions correctly and as expected from the user's perspective.
Test environment: Chromium
Actual result: All data displayed
Status: Pass

E2E TESTING EXAMPLE

USER GO TO MAIN PAGE

```
1 test("In home page all data Card component are render.", async ({ page }) => {
2   await page.goto('http://localhost:5175/');
3   await page.getByRole('navigation').click();
4   await page.getByRole('heading', { name: 'WeatherSens', exact: true }).click();
5   await page.getByRole('heading', { name: 'OpenWeatherMap', exact: true }).click();
6   await page.getByRole('heading', { name: 'Temperature WeatherSense' }).click();
7   await page.getByRole('heading', { name: 'Temperature OpenWeatherMap' }).click();
8   await page.getByRole('heading', { name: 'Temperature Percentage Error' }).click();
9   await page.getByRole('heading', { name: 'Humidity WeatherSense' }).click();
10  await page.getByRole('heading', { name: 'Humidity OpenWeatherMap' }).click();
11  await page.getByRole('heading', { name: 'Humidity Percentage Error' }).click();
12  await page.getByRole('heading', { name: 'Cloudiness' }).click();
13  await page.getByRole('heading', { name: 'Pressure' }).click();
14  await page.getByRole('heading', { name: 'Wind Speed' }).click();
15 });
```

ALL COMPONENT MUST BE LOADED

PLAYWRIGHT TEST RESULT

```
npx playwright test --project=chromium
```

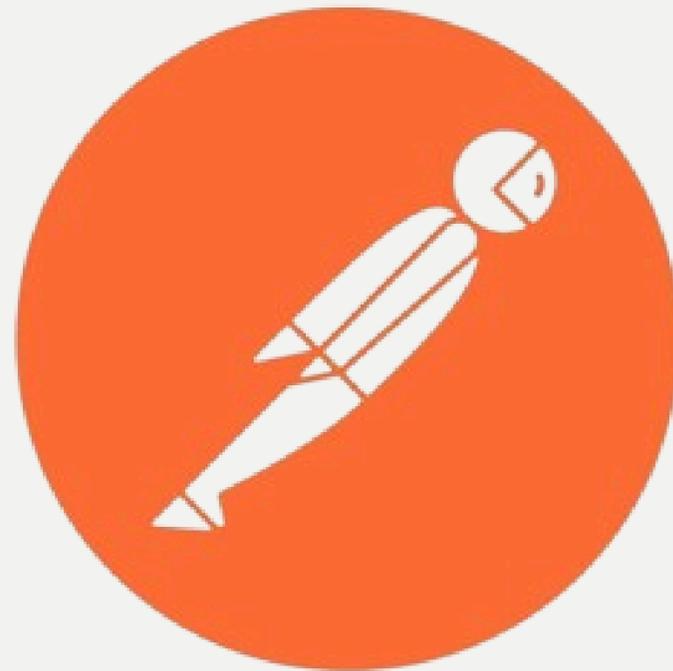
Project: chromium 22/4/2567 02:42:01 Total time: 8.1s

✓ e2e.spec.js	
✓ User can go to main page and can click all the button navigation bar.	6.1s
e2e.spec.js:3	
✓ User can go to History page and View old weather data and go back to home.	2.4s
e2e.spec.js:11	
✓ In home page all data Card component are render.	1.6s
e2e.spec.js:19	
✓ In history page View button must loaded.	2.2s
e2e.spec.js:35	
✓ In another weather data board Data card must loaded.	2.6s
e2e.spec.js:42	

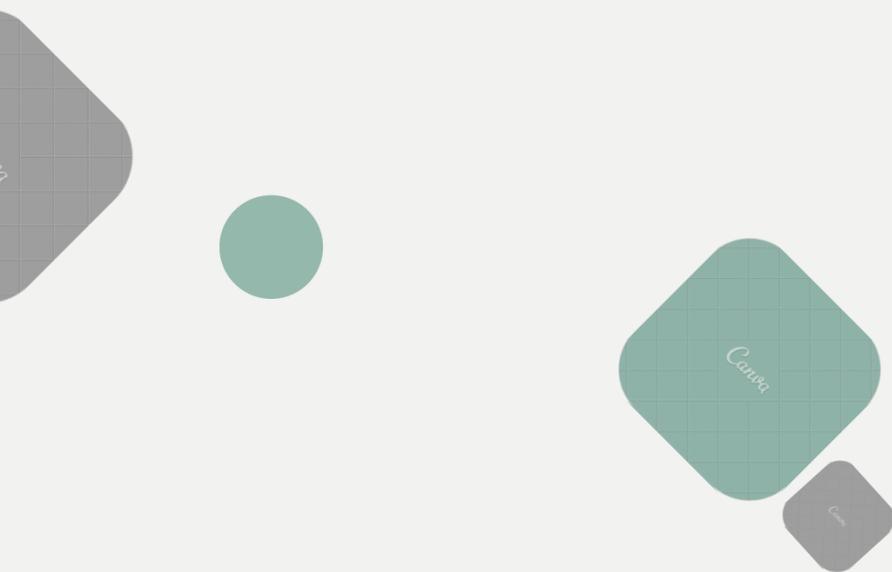
ALL TEST RESULT PASS

BACKEND SERVER TEST

WE DECIDED TO TEST WITH POSTMAN



POSTMAN



Node Express API testing

API testing on the backend (Node.js Express) server focuses on testing requests to API endpoints and verifying that the responses are correct as expected. This ensures that users who want to utilize our API endpoints receive accurate response data, as communicated to the frontend earlier.

PRESENTATION



TEST SCENARIO

Test Scenario:

HTTP Request to Back-end Server

Description:

This test scenario verifies that all Back-end API endpoint work and return json correctly

Precondition:

1. Back-end Server is running

Step:

1. HTTP request to expect endpoint.
2. Verify response.

Expected Result: response should return correctly as expected

ENDPONT TEST CASE

/LATEST

Test Case title: GET HTTP Request to `"/latest"`

Preconditions:

1. Back-end Server is running

Test step:

1. HTTP GET request to `"localhost:3000/"`.
2. Verify the response.

Expected result: Response status and json are the latest weather data as expected.

Test Scenario: HTTP Request to Back-end Server

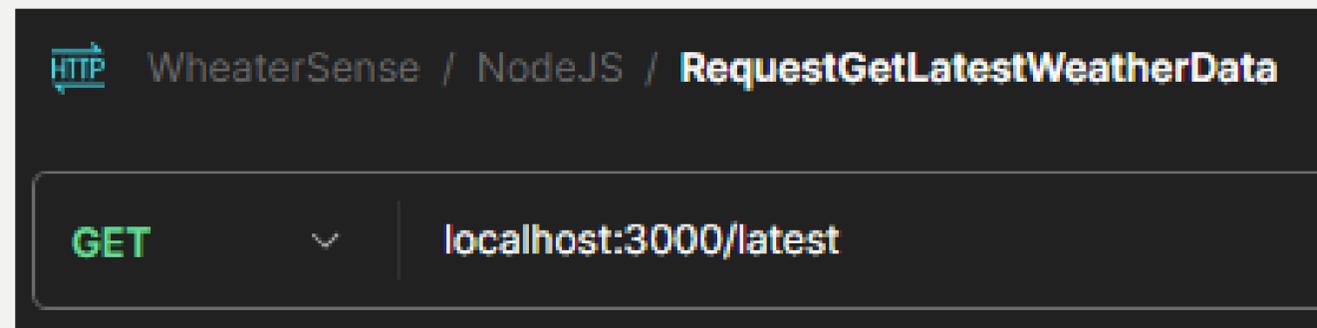
Test environment: HTTP

Actual result: Response status and json are the latest weather data as expected.

Status: **Pass**

ENDPONT TEST

/LATEST



```
1 [
2   {
3     "id": 478,
4     "ts": "2024-04-23T08:25:42.000Z",
5     "temp_sensor": 27,
6     "humidity_sensor": 69,
7     "temp_api": 37.83,
8     "humidity_api": 44,
9     "pressure": 1005,
10    "wind_speed": 5.66,
11    "cloudiness": 20,
12    "weather": "Clouds",
13    "weather_pred": "Clouds"
14  }
15 ]
```

SHOULD RETURN LASTEST WEATHER DATA

ENDPONT TEST CASE

/HISTORY

Test Case title: GET HTTP Request to `"/history"`

Preconditions:

1. Back-end Server is running

Test step:

1. HTTP GET request to `"localhost:3000/history"`.
2. Verify the response.

Expected result: Response status and json are all the weather data ordered by DESC.

Test Scenario: HTTP Request to Back-end Server

Test environment: HTTP

Actual result: Response status and json are all the weather data ordered by DESC.

Status: `Pass`

ENDPONT TEST

/HISTORY

```
{
  "id": 478,
  "ts": "2024-04-23T08:25:42.000Z",
  "temp_sensor": 27,
  "humidity_sensor": 69,
  "temp_api": 37.83,
  "humidity_api": 44,
  "pressure": 1005,
  "wind_speed": 5.66,
  "cloudiness": 20,
  "weather": "Clouds",
  "weather_pred": "Clouds"
},
{
  "id": 477,
  "ts": "2024-04-23T08:15:44.000Z",
```

SHOULD RETURN ALL ORDER DESCEND

ENDPONT TEST CASE

/WEATHER/ID

Test Case title: HTTP GET Request to `"/weather/id"`

Preconditions:

1. Back-end Server is running
2. defined id

Test step:

3. HTTP GET request to `"localhost:3000/weather/id"`.
4. Verify the response.

Expected result: Response status and json are the weather data specific id.

Test Scenario: HTTP Request to Back-end Server

Test environment: HTTP

Actual result: Response status and json are the weather data specific id.

Status: **Pass**

ENDPONT TEST

/WEATHER/ID

GET

http://localhost:3000/weather/1

```
"id": 1,  
"ts": "2024-04-18T10:04:21.000Z",  
"temp_sensor": 20,  
"humidity_sensor": 50,  
"temp_api": 36.88,  
"humidity_api": 57,  
"pressure": 1004,  
"wind_speed": 5.66,  
"cloudiness": 20,  
"weather": "Clouds",  
"weather_pred": "Clouds"
```

SHOULD RETURN WEATHER DATA GIVEN ID

POSTMAN APITEST RESULT

```
GET RequestGetLatestWeatherData
localhost:3000/latest

PASS Response status code is 200
PASS Verify that the 'id' is a non-negative integer
PASS Verify that 'ts' is a non-empty string
PASS Verify that the 'temp_sensor' is a non-negative number

GET RequestWeatherDataByID
http://localhost:3000/weather/1

PASS Response status code is 200
PASS Validate that the 'id' is a non-negative integer
PASS Validate that the temperature sensor reading is a non-negative number
PASS Validate that the humidity sensor reading is a non-negative number

GET History
localhost:3000/history

PASS Response status code is 200
PASS Response is an array with at least one element
PASS Verify that the 'id' field is a non-negative integer
```

ALL TEST AND TEST CASE RESULT PASS

ModelAPI Server (Flask)

API testing in this context ensures that users who wish to utilize our model can send a POST request to our API, and our backend receives the correct response containing the predicted data.

PRESENTATION



ENDPONT TEST SCENARIO

Test Scenario:

HTTP Request to ModelAPI-Server

Description:

This test scenario verifies that ModelAPI-Server endpoint work and return json correctly

Precondition:

1. ModelAPI-Server is running.
2. defined a data to send to predict a model.

Step:

1. HTTP request to expect endpoint.
2. Verify response.

Expected Result: response should return correctly as expected

/PREDICT TESTCASE

/PREDICT

Test Case title: HTTP POST Request to `/predict`

Preconditions:

1. ModelAPI-Server is running
2. defined a data to send to predict a model.

Test step:

5. HTTP GET request to `localhost:5000/predict`.
6. Verify the response.

Expected result: Response status and json are the same data but have new attribute name `weather_pred` and its value.

Test Scenario: HTTP Request to ModelAPI-Server

Test environment: HTTP

Actual result: Response status and json are the same data but have new attribute name `weather_pred` and its value.

Status: **Pass**

/PREDICT TESTCASE

/PREDICT

BODY

```
1 [
2   {
3     "id": 1,
4     "ts": "2024-04-14 21:51:13",
5     "temp_sensor": 25,
6     "humidity_sensor": 50,
7     "temp_api": 31.03,
8     "humidity_api": 73,
9     "pressure": 1010,
10    "wind_speed": 5.66,
11    "cloudiness": 20,
12    "weather": "few clouds"
13  }
14 ]
```

RESPONSE

```
{
  "id": 1,
  "ts": "2024-04-14 21:51:13",
  "temp_sensor": 25,
  "humidity_sensor": 50,
  "temp_api": 31.03,
  "humidity_api": 73,
  "pressure": 1010,
  "wind_speed": 5.66,
  "cloudiness": 20,
  "weather": "few clouds",
  "weather_pred": "Clouds"
}
```

RESPONSE SHOULD BE EXPECTED

POSTMAN APITEST RESULT

```
Iteration 1

POST single prediction
http://127.0.0.1:5000/predict

PASS Response status code is 200
PASS Verify that 'id' is a non-negative integer
PASS Verify that temp_sensor is a non-negative number
PASS Verify that humidity_sensor is a non-negative number

POST multiple prediction
http://127.0.0.1:5000/predict

PASS Response status code is 200
PASS Response content type is text/html
PASS Response body is an array with at least one element
PASS Verify the 'id' field is a non-negative integer
```

ALL TEST AND TEST CASE RESULT PASS

GITHUB

YOU CAN SEE MORE



[HTTPS://GITHUB.COM/QOSANGLESZ/WEATHERSENSE](https://github.com/qosanglesz/weatherense)

PROJECT MEMBER

1. WISSARUT KANASUB

2. SUKPRACHOKE LEELAPISUTH

