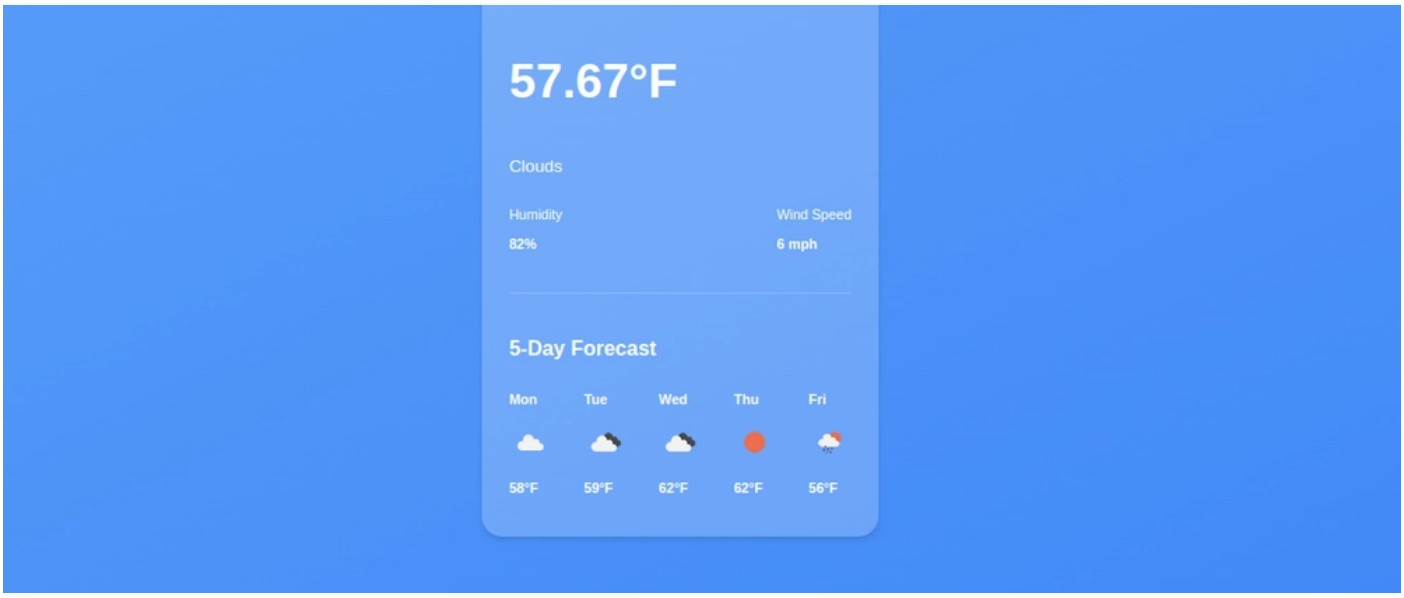

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How to Build a Weather App in React

#webdev #javascript #beginners #react

If you want to master crucial web development skills like working with API's, fetching data, and asynchronous functions such as async and await in React, then building a weather app is the best way to learn.

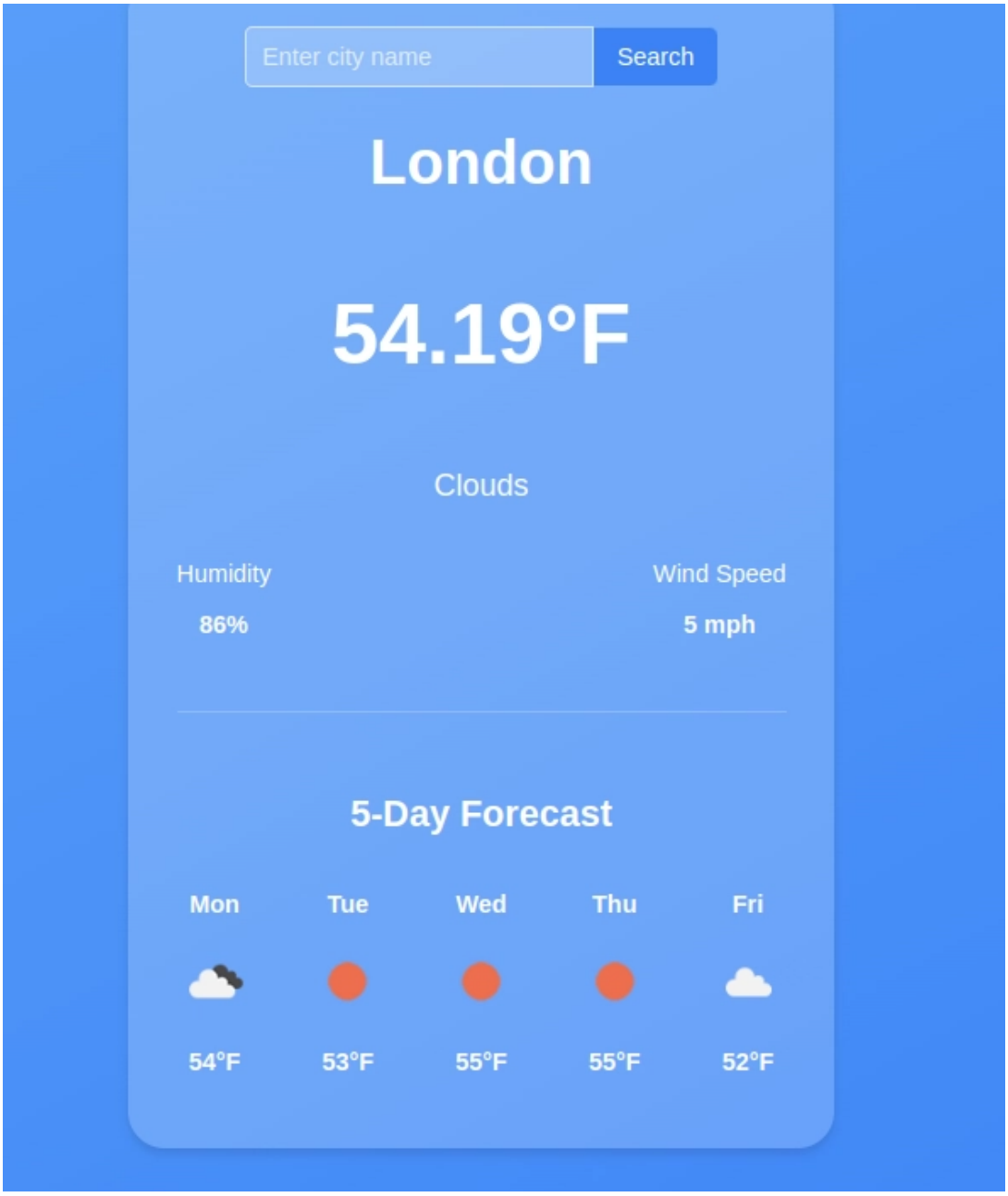
It is also a fun project since you get the see real-time weather and weather forecasts.

In this tutorial, we will use React to build a fully functional weather app that will show the weather for any city and as a 5-day weather forecast for the city.

In addition to knowing whether it will rain tomorrow 😊, you will also learn these concepts:

- How to communicate with external APIs
- Data fetching in React
- Asynchronous operations and the mysteries of async and await.

By the end of this tutorial, you'll have build an app that looks something like this:



If you need to brush up on your React fundamentals, read this Tutorial:

Getting Started with React: A Beginner's Complete Guide

Let's get started.

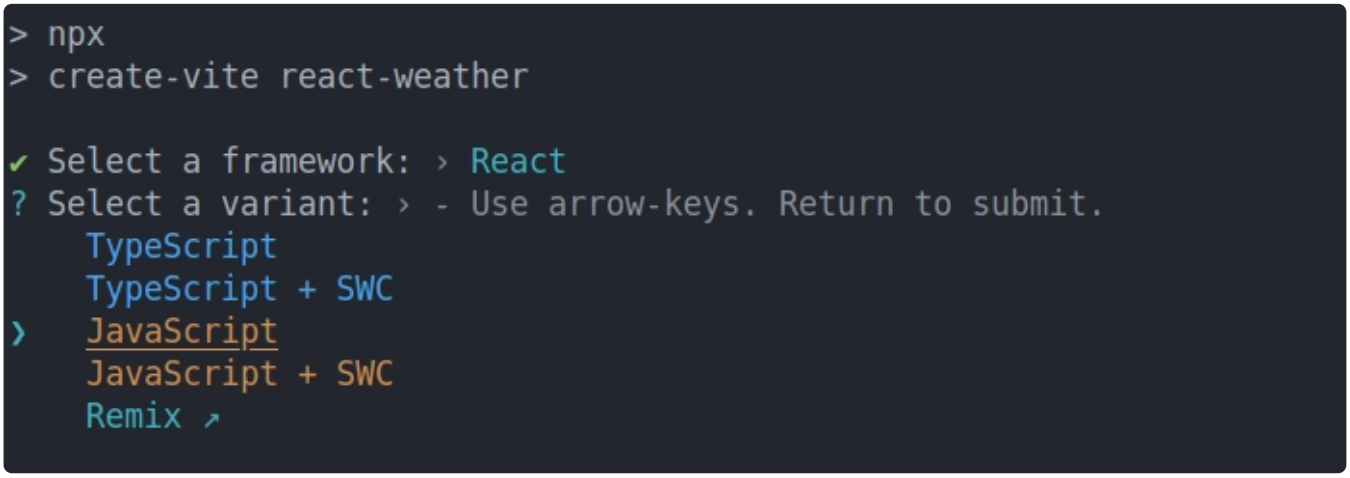
Development Environment

Vite is a build tool designed for a faster and more efficient development experience. It comes with a dev server that enhances native ES modules with capabilities like extremely fast Hot Module Replacement (HMR) and a build command that utilizes Rollup to bundle code into highly optimized static assets for production.

In your terminal, issue this command which will create a new application called `react-weather`

```
npm create vite@latest react-weather
```

In the next step, select Reat as the framework and JavaScript as the variant.



Once Vite creates the application, cd into the react-weather folder and run npm install and npm run commands.

```
cd react-weather
npm install
npm run dev
```

Now your application should be running at http://localhost:5173/

Building the Interface

We will start by building the UI, in your app.jsx file, and delete all the content in the returned fragment. Your app.jsx should now look like this:

```
import { useState } from 'react'
import './App.css'

function App() {

  return (
    <>

    </>
  )
}

export default App
```

The UI will have 3 sections.

- Header: this will show the city, temperature, and weather conditions
- Weather details section: this section will show the Humidity and wind speed
- Forecast section: this will show the weather forecast for the next 5 days for each city. Each day will show the temperature and weather conditions (cloudy, sunny, overcast) and so on.

Inside the return statement, let's start by adding a wrapper div. This div element will contain all the sections:

```
import { useState } from 'react'
import './App.css'

function App() {

  return (
     <div className="wrapper">

      </div>
  )
}

export default App
```

Inside the wrapper, add a header with an <h1/> to display the city, a element for the temperature, and another for the overall weather condition.

```
import { useState } from "react";
import "./App.css";

function App() {
  return (
    <div className="wrapper">
      <div className="header">
        <h1 className="city">London </h1>
        <p className="temperature">60°F </p>
        <p className="condition">Cloudy </p>
      </div>
    </div>
  );
}
```

```
export default App;
```

In the details section, we want to display the humidity and the wind speed in a row, so each will be in its div element.

```
export default App;

import { useState } from "react";
import "./App.css";

function App() {
  return (
    <div className="wrapper">
      <div className="header">
        <h1 className="city">London </h1>
        <p className="temperature">60°F </p>
        <p className="condition">Cloudy </p>
      </div>
      <div className="weather-details">
        <div>
          <p>Humidity </p>
          <p> 60% </p>
        </div>
        <div>
          <p>Wind Speed </p>
          <p>7 mph </p>
        </div>
      </div>
    </div>
  );
}
```

Lastly, the forecast section will have a title and a couple of list items for each day. For the list items, let's start by displaying two days for now.

```
export default App;

import { useState } from "react";
```

```
import "./App.css";

function App() {
  return (
    <div className="wrapper">
      <div className="header">
        <h1 className="city">London </h1>
        <p className="temperature">60°F </p>
        <p className="condition">Cloudy </p>
      </div>
      <div className="weather-details">
        <div>
          <p>Humidity </p>
          <p> 60% </p>
        </div>
        <div>
          <p>Wind Speed </p>
          <p>7 mph </p>
        </div>
      </div>
      <div className="forecast">
        <h2 className="forecast-header">5-Day Forecast </h2>
        <div className="forecast-days">
          <div className="forecast-day">
            <p>Monday </p>
            <p>Cloudy </p>
            <p>12°F </p>
          </div>
          <div className="forecast-day">
            <p>Monday </p>
            <p>Cloudy </p>
            <p>12°F </p>
          </div>
        </div>
      </div>
    </div>
  );
}
```

So far, our app now looks like this:

Styling with CSS

To make our interface beautiful, let's add some style, we will use CSS. In the main.jsx file, we already have this import which imports all the global styles for our app

```
import './index.css'
```

Let's start by styling the body by using flex.

```
body {
  min-height: 100vh;
  background: linear-gradient(to bottom right, #60a5fa, #3b82
  display: flex;
```

```
  display: flex;
  align-items: center;
  justify-content: center;
  padding: 1rem;
  font-family: Arial, sans-serif;
}
```

Here, we have set `justify-items:center` and `justify-content:center` to ensure all the content is centered horizontally and vertically.

For the wrapper, let's add a different background color, a min-width, a border-radious and a box shadow, and also a margin on all sides.

```
.wrapper {
  background: rgba(255, 255, 255, 0.2);
  border-radius: 1.5rem;
  padding: 2rem;
  min-width: 400px;
  box-shadow: 0 4px 6px rgba(0, 0, 0, 0.1);
}
```

Add a bigger font size to the city name and temperature elements and make them bold. The overall styles for the header elements will look like this:

```
.city {
  font-size: 2.5rem;
  font-weight: bold;
}
.temperature {
  font-size: 3.5rem;
  font-weight: bold;
}

.condition {
  font-size: 1.25rem;

}
```

To ensure the elements in the weather details section (i.e, humidity and wind speed) are aligned on the same row, use display: flex and justify-content: space-between; These are the styles for the weather detail and its elements:

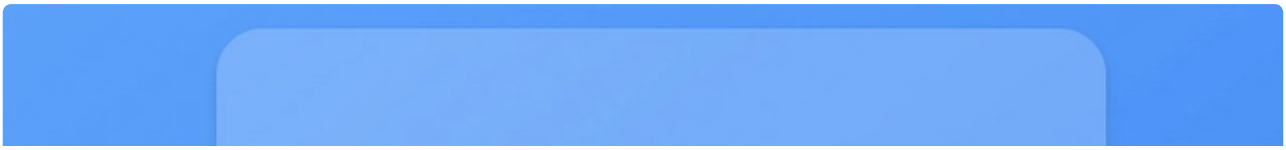
These are the styles for the weather detail and its elements.

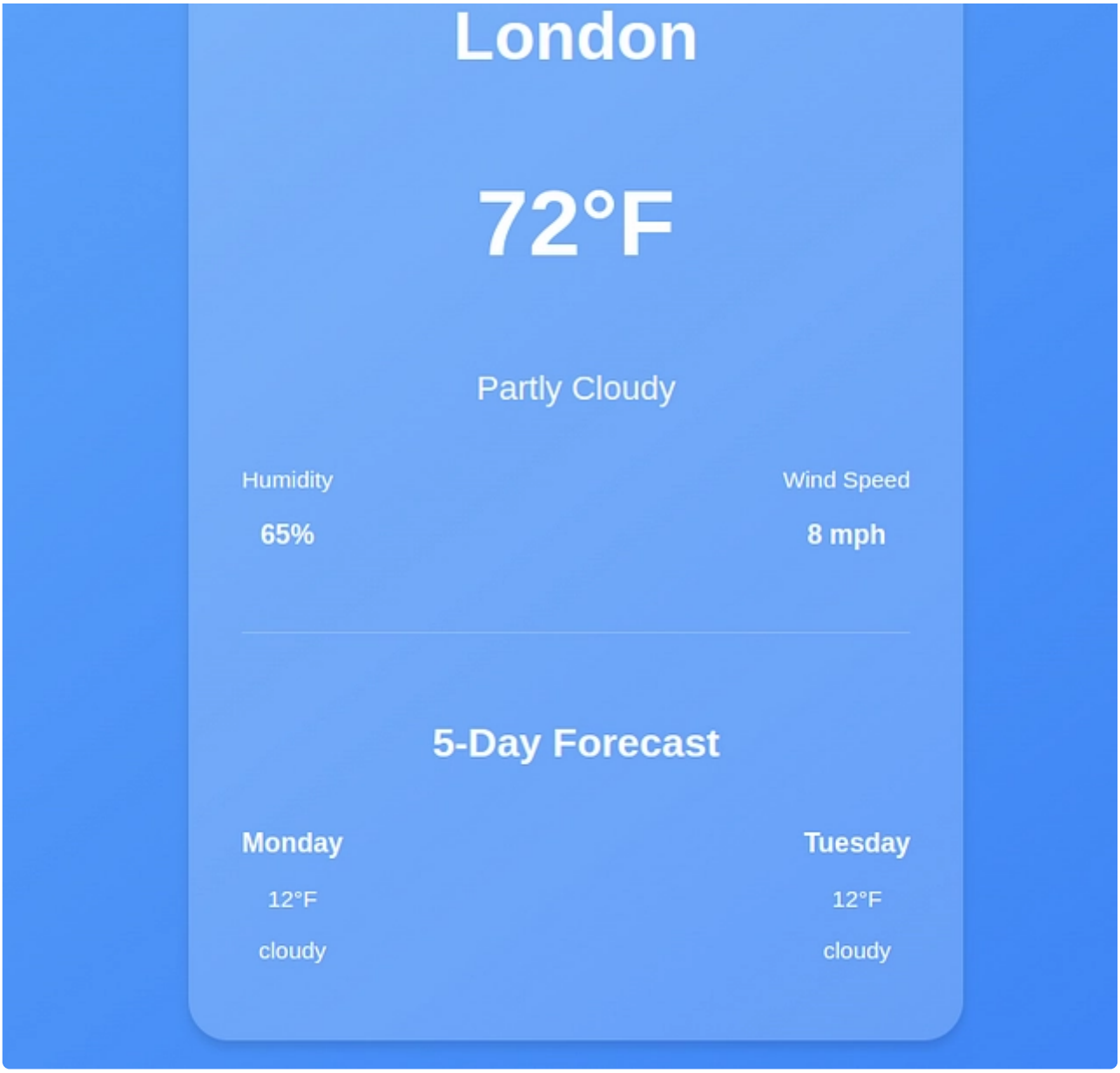
```
.weather-details {
  display: flex;
  justify-content: space-between;
  align-items: center;
  margin-bottom: 2rem;
}
```

Lastly, for the weather forecast section,add the following styles:

```
.forecast {
  border-top: 1px solid rgba(255, 255, 255, 0.2);
  padding-top: 2rem;
}

.forecast-header {
  font-size: 1.5rem;
  font-weight: bold;
}

.forecast-days {
  display: flex;
  justify-content: space-between;
}

.forecast-day {
  font-weight: bold;
}

.forecast-temp,
.forecast-condition {
  font-size: 0.875rem;
}
```

Now our App looks like this:





Get Real-Time Weather Data

So far we are using placeholder data, to get real-time weather information, we will use the openweather API. Head over to https://openweathermap.org/api and get a FREE API key.

Define the API_KEY.

```
function App() {

  const API_KEY ="your_api-key";

}
```

In a production environment, you should add sensitive data like API keys in a `.env`

file.

Store Weather Data using State

In React, state is a crucial concept because it allows components to manage and respond to dynamic data. When you fetch data from an API, you need a way to store and manipulate that data within your component.

This is where state comes in.

Everything in a React component that can change over time is managed by the state. When the state changes, the React component will rerender and reflect the new changes.

For example, in our weather app, we want to get the current weather information for a specific city and store it in the state.

To do that, we will use the useState hook. The syntax for this hook looks like this:

```
const [value, setValue] = useState(initialValue);
```

- `value` is the current state value.
- `setValue` is a function that allows you to update the state.
- `initialValue` is the value that the state starts with (it can be a number, string, object, or even an array).

Define the weather data state at the top of the App function. The initial value will be `null`

```
function App() {
  const [weatherData, setWeatherData] = useState(null);
}
```

- weatherData will store the weather details
- `setWeather` will update the weather details

Define the state for the city and set the initial state variable of the city name to London

```
 const [city, setCity] = useState("london");
```

Fetch Data with the useEffect Hook

React by default has no way of handling side effects. Side effects are operations that occur outside of Reacts control such as asynchronous operations, local storage, e.t. c .

Since React components render when they mount, making an API request at this stage will not have access to the data yet since a fetch request takes time to complete.

In such cases, React uses the useEffect hook to perform side effects. The useEffect hook takes a function as the first parameter and a dependency array. Its syntax looks like this:

```
 useEffect(()⇒{

  // perform side effects operations here

},[dependencies] )
```

The dependency array in the useEffect hook contains variables that determine when the effect should run. For example, in our case, the useEffect should run when the weather data changes rather than on every render.

Inside the useEffect, create an asynchronous function that will fetch the weather for a specific city from the Open weather API. Since it's an asynchronous operation, our function should also be asynchronous.

The function takes the cityName as the parameter

```
  useEffect(()⇒{
    const fetchWeatherData = async (cityName) ⇒ {
      const url = `https://api.openweathermap.org/data/2.5/we
      const response = await fetch(url);
      const data = await response.json();

    }

  })
```

Once the data is fetched, use the setWeatherData setter function to update the state with the response data. Ensure to wrap your code in a `try-catch` block to handle any potential errors.

```
  useEffect(() ⇒ {
    const fetchWeatherData = async (cityName) ⇒ {
      try {
```

```
      try {
        const url = `https://api.openweathermap.org/data/2.5/
        const response = await fetch(url);
        const data = await response.json();
        setWeatherData(data);
      } catch (error) {
        console.log(error);
      }
    };
  });
```

For the data to be fetched on mount, we need to invoke the fetch weather data function inside the useEffect.

When invoking the function, we will pass the value of the current city as the argument. This will ensure that when the app mounts for the first time, we already have some data to show for the value specified in the city state.

```
  useEffect(() => {
    const fetchWeatherData = async (cityName) => {
      try {
        const url = `https://api.openweathermap.org/data/2.5/
        const response = await fetch(url);
        const data = await response.json();
        setWeatherData(data);
      } catch (error) {
        console.log(error);
      }
    };

    fetchWeatherData(city)
  });
```

If you check the logs with your developer tools, you will see that we are making multiple API requests on every render.

This is a very expensive operation,to prevent fetching on every render, we need to provide some dependencies to the useEffect. These dependencies will determine when an API call is made to the open weather API.

So let's add city in the dependency array to ensure API calls will only be made on the first mount or when the value of city changes.

```
  useEffect(() => {
    const fetchWeatherData = async (cityName) => {
      try {
        const url = `https://api.openweathermap.org/data/2.5/
        const response = await fetch(url);
        const data = await response.json();
        setWeatherData(data);
        console.log(data);
      } catch (error) {
        console.log(error.message);
      }
    };

    fetchWeatherData(city)
  },[city]);
```

When we log the data, we get an object containing the weather details for the city of London.

```
{
    "coord": {
        "lon": -0.1257,
        "lat": 51.5085
    },
    "weather": [
        {
            "id": 801,
            "main": "Clouds",
            "description": "few clouds",
            "icon": "02d"
        }
    ],
    "base": "stations",
    "main": {
        "temp": 289.65,
        "feels_like": 289.16,
```

```
        "temp_min": 288.4,
        "temp_max": 290.92,
        "pressure": 1012,
        "humidity": 69,
        "sea_level": 1012,
        "grnd_level": 1008
    },
    "visibility": 10000,
    "wind": {
        "speed": 5.14,
        "deg": 270
    },
    "clouds": {
        "all": 20
    },
    "dt": 1729349117,
    "sys": {
        "type": 2,
        "id": 2075535,
        "country": "GB",
        "sunrise": 1729319499,
        "sunset": 1729357131
    },
    "timezone": 3600,
    "id": 2643743,
    "name": "London",
    "cod": 200
}
```


Now let's inject the weather details into the elements using JSX.

```
{weatherData && weatherData.main && weatherData.weather && (
  <>
    <div className="header">
      <h1 className="city">{weatherData.name}</h1>
      <p className="temperature">{weatherData.main.temp}°F</p
      <p className="condition">{weatherData.weather[0].main}<
    </div>
    <div className="weather-details">
```

```
        <div >
          <p >Humidity </p>
          <p style={{fontWeight:"bold"}}>{Math.round(weatherDat
        </div>
        <div>
          <p>Wind Speed </p>
          <p style={{fontWeight:"bold"}}>{Math.round(weatherDat
        </div>
      </div>
    </>
  )}
```

In JavaScript, the expression condition `&&` is used for conditional rendering within React components.

The `&&` operator checks two conditions and returns true only if both conditions are true. In our case, if weatherDataexists, the specified data properties will be rendered.

If `weatherData` is `null` (or `undefined`), the elements will not be rendered, preventing any errors that could occur from trying to access properties of null.

Get and Display the Weather Forecast in React

To get the forecast, we will do another fetch request in the same useEffect Hook using this API https://api.openweathermap.org/data/2.5/forecast?q=${CITY}&appid=${API_KEY}&units=imperial

First, create a forecast state to store the forecast data and initialize the initial value to an empty array.

```
const [forecast, setForecast] = useState([]);
```

Inside the `fetchWeatherData` function, make a fetch request to the above API, and set the forecast state to the response data.

```
useEffect(() => {
  const fetchWeatherData = async (cityName) => {
    setCity(cityName);
    try {
      const url = `https://api.openweathermap.org/data/2.5/
      const response = await fetch(url);
      const data = await response.json();
```

```
        const data = await response.json();
        setWeatherData(data);
        console.log(data);

        const foreCastresponse = await fetch(
          `https://api.openweathermap.org/data/2.5/forecast?q
        );
        const forecastdata = await foreCastresponse.json();

        const dailyForecast = forecastdata.list.filter(
          (item, index) => index % 8 === 0
        );
        setForecast(dailyForecast);
      } catch (error) {
        console.log(error.message);
      }
    };

    fetchWeatherData(city);
  }, [city]);
```

The forecast API usually returns the forecast after every 3 hours for the next 5 days, resulting into 40 data points, here is the truncated output.


```
{
    "cod": "200",
    "message": 0,
    "cnt": 40,
    "list": [
        {
            "dt": 1729360800,
            "main": {
                "temp": 59.92,
                "feels_like": 58.95,
                "temp_min": 56.59,
                "temp_max": 59.92,
                "pressure": 1013,
                "sea_level": 1013,
```

```
            "grnd_level": 1010,
            "humidity": 71,
            "temp_kf": 1.85
        },
        "weather": [
            {
                "id": 801,
                "main": "Clouds",
                "description": "few clouds",
                "icon": "02n"
            }
        ],
        "clouds": {
            "all": 17
        },
        "wind": {
            "speed": 3.29,
            "deg": 229,
            "gust": 5.64
        },
        "visibility": 10000,
        "pop": 0,
        "sys": {
            "pod": "n"
        },
        "dt_txt": "2024-10-19 18:00:00"
    },
    {
        "dt": 1729371600,
        "main": {
            "temp": 56.8,
            "feels_like": 55.85,
            "temp_min": 54.43,
            "temp_max": 56.8,
            "pressure": 1015,
            "sea_level": 1015,
            "grnd_level": 1012,
            "humidity": 78,
```

```
            "temp_kf": 1.32
        },
        "weather": [
            {
                "id": 803,
                "main": "Clouds",
                "description": "broken clouds",
                "icon": "04n"
            }
        ],
        "clouds": {
            "all": 59
        },
        "wind": {
            "speed": 4.09,
            "deg": 196,
            "gust": 10.11
        },
        "visibility": 10000,
        "pop": 0,
        "sys": {
            "pod": "n"
        },
        "dt_txt": "2024-10-19 21:00:00"
    },
```


The variable dt is a timestamp, so if we want to convert it to a human-readable time using the toLocaleDateString() method.

```
new Date(1729360800 * 1000).toLocaleDateString('en-US', { wee
```

The output for this timestamp is sat

So for the array of 40 forecast items, we have used the filter function to filter based on the given `(item, index) ⇒ index % 8 === 0` condition.

`(item, index) ⇒ index % 8 === 0`: This condition means: "Only keep the forecast where the index is divisible by 8." Since the forecast is every 3 hours, every 8th item represents one forecast per day (3 hours × 8 = 24 hours).

So for example, given that the indices range from 0–39, every 8th index is added to the `dailyForecast` array. In total, we will have 5 instances of weather data.

Each weather forecast data point looks like this:


```
{
            "dt": 1729360800,
            "main": {
                "temp": 59.92,
                "feels_like": 58.95,
                "temp_min": 56.59,
                "temp_max": 59.92,
                "pressure": 1013,
                "sea_level": 1013,
                "grnd_level": 1010,
                "humidity": 71,
                "temp_kf": 1.85
            },
            "weather": [
                {
                    "id": 801,
                    "main": "Clouds",
                    "description": "few clouds",
                    "icon": "02n"
                }
            ],
            "clouds": {
                "all": 17
            },
            "wind": {
                "speed": 3.29,
                "deg": 229,
                "gust": 5.64
            },
            "visibility": 10000,
            "pop": 0,
            "sys": {
                "pod": "n"
            },
```

```
            "dt_txt": "2024-10-19 18:00:00"
        }
```

Since we have 5 instances, we will use the map() method to iterate and display the forecast for each day.

Update the forecast section as follows:

```
{forecast.length > 0 && (
  <>
    <div className="forecast">
      <h2 className="forecast-header">5-Day Forecast</h2>
      <div className="forecast-days">
        {forecast.map((day, index) => (
          <div key={index} className="forecast-day">
            <p>
              {new Date(day.dt * 1000).toLocaleDateString("en
                weekday: "short",
              })}
            </p>
            <img
              src={`http://openweathermap.org/img/wn/${day.we
              alt={day.weather[0].description}
            />
            <p>{Math.round(day.main.temp)}°F</p>
          </div>
        ))}
      </div>
    </div>
  </>
)}
```

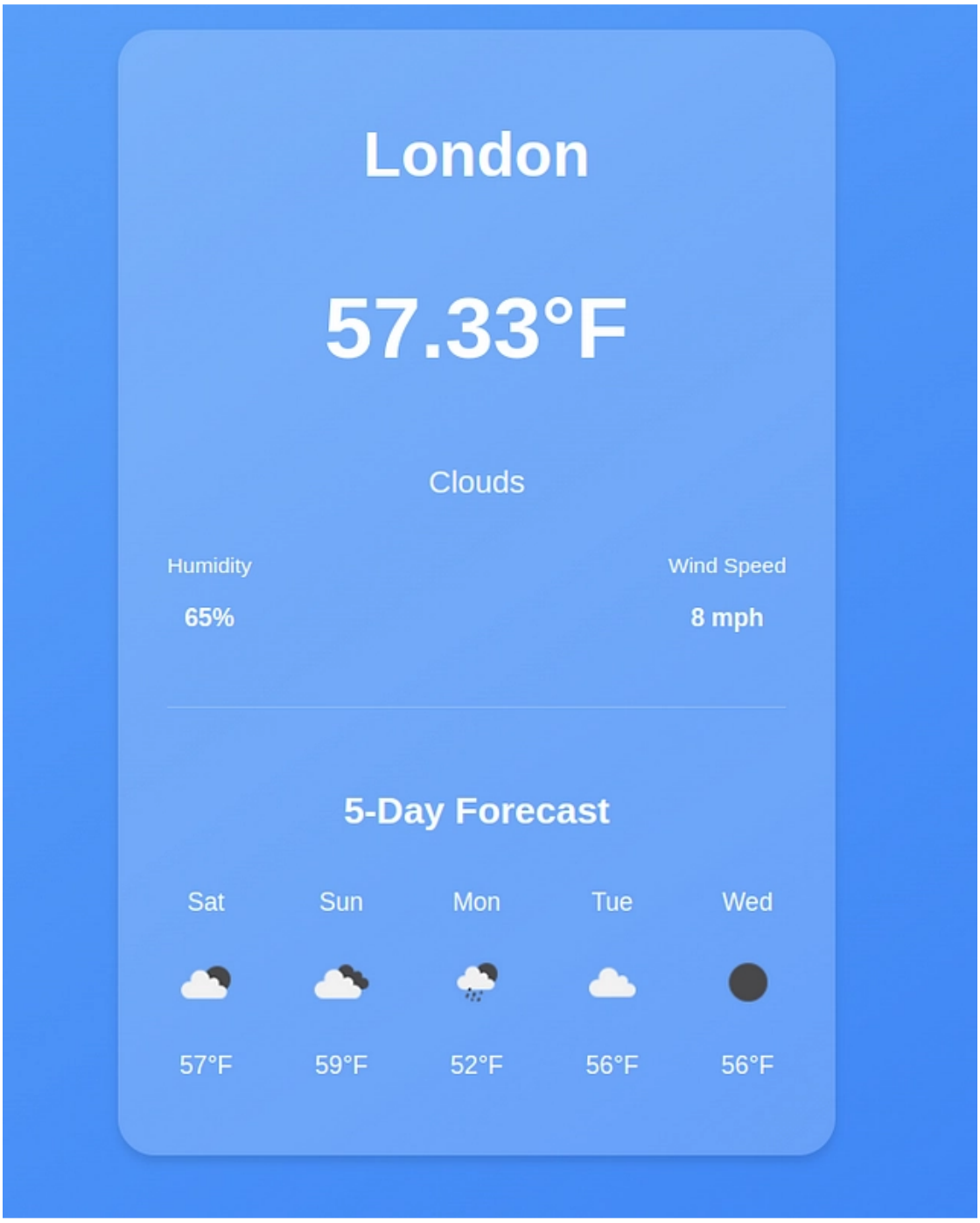
Here, we are also checking if the forecast array contains data to ensure we don't loop over an empty array that will cause errors to pop up.

After checking the forecast data, we map over the forecast array and inject the following data for each day.

- day of the week
- weather icon

- weather icon
- temperature

Now our App looks like this:



Get custom Weather Information

Our app looks great, but we still can't fetch dynamic data. Let's add a search form at the top to allow the users to get information about any city.

But first, we need a state for the input field. Declare the state with an empty string as the initial value.

```
const [searchInput, setSearchInput] = useState("");
```

Create the form, bind the input to the searchInput state, and add the onChange

Create the form, bind the input to the searchInput state, and add the onChange event that will update the searchInput value when the user types a new city.

```
<div className="wrapper">
      <form className="search-form">
        <input
          type="text"
          value={searchInput}
          onChange={(e) ⇒ setSearchInput(e.target.value)}
          placeholder="Enter city name"
          className="search-input"
        />
        <button type="submit" className="search-button">
          Search
        </button>
      </form>

    {/* the rest of the code */}
</div>
```

Here are the styles for the form.

```
.form {
  display: flex;
  justify-content: center;
  align-items: center;
  margin: 20px auto;
  padding: 10px;
  background-color: rgba(255, 255, 255, 0.3);
  border-radius: 10px;
  box-shadow: 0 4px 6px rgba(0, 0, 0, 0.1);
  max-width: 400px;
}

.search-input {
  flex: 1;
  padding: 10px;
  font-size: 16px;
  border: 1px solid rgba(255, 255, 255, 0.6);
```

```
  border: 1px solid rgba(255, 255, 255, 0.3);
  border-radius: 5px 0 0 5px;
  background-color: rgba(255, 255, 255, 0.2);

  outline: none;
  transition: border-color 0.3s ease;
}

.search-input::placeholder {
  color: rgba(255, 255, 255, 0.7);
}

.search-input:focus {
  border-color: #3b82f6;
}

.search-btn {
  padding: 10px 15px;
  font-size: 16px;
  color: white;
  background-color: #3b82f6;
  border: none;
  border-radius: 0 5px 5px 0;
  cursor: pointer;
  transition: background-color 0.3s ease;
}
```

Since we need to invoke the weatherData function when the form is submitted, we will move the function definition outside the useEffect hook but still call it since the app needs to display some data for the initial city value when it mounts.

```
const fetchWeatherData = async (cityName) => {
    setCity(cityName);
    try {
      const url = `https://api.openweathermap.org/data/2.5/we
      const response = await fetch(url);
      const data = await response.json();
      setWeatherData(data);
      console.log(data);
```

```
      const foreCastresponse = await fetch(
        `https://api.openweathermap.org/data/2.5/forecast?q=$
      );
      const forecastdata = await foreCastresponse.json();

      const dailyForecast = forecastdata.list.filter(
        (item, index) => index % 8 === 0
      );

      setForecast(dailyForecast);
    } catch (error) {
      console.log(error.message);
    }
  };

useEffect(() => {
    fetchWeatherData(city);
  }, [city]);
```

Get Weather Data when the Form is Submitted

After a user searches for a city with a search form, we need to call another function that will invoke the fetchWeatherData with the new city and update the weatherData state to the weather information for the new city.

Add an `onSubmitevent` to the form and reference the function as shown below.

```
<form onSubmit={handleSearch} className="search-form">
        <input
          type="text"
          value={searchInput}
          onChange={(e) => setSearchInput(e.target.value)}
          placeholder="Enter city name"
          className="search-input"
        />
        <button type="submit" className="search-button">
          Search
        </button>
      </form>
```

```
</form>
```

When the form is submitted, it will fetch the weather information for the new city.

```
function handleSearch(e) {
   e.preventDefault();
   fetchWeatherData(searchInput);
 }
```

Since the `fetchWeatherData` function already updates the new state of the weatherData state with the new data, we only invoke the function and pass the value of the new city from the user (`searchInput`).

Error Handling

When fetching data from API, various issues can occur. For example, in our case, the weather API might be down, or we might have an invalid API key, or we might have exhausted our daily API limit.

In this case, we need to add a proper error-handling mechanism so the user doesn't experience server errors.

For example, when the app loads for the first time, the forecast array will be empty, and the weatherData will be null. To ensure a good user experience, let's add error and loading states.

```
const [error, setError] = useState(null);
const [loading, setLoading] = useState(false)
```

In the `fetchWeatherData` function, just before any fetch happens, set the initial states of error and loading

```
  const fetchWeatherData = async (cityName) => {
    try {
     setLoading(true)
     setError(null)

     // the rest of the code

}
```

In the catch block, let's set the error state to a user-friendly message

```
} catch (error) {
```

```
    setError("Couldnt fetch data,please try again")

} finally {
    setLoading(false)

 }
```

In JavaScript, the `finally` clause in the `try catch` block is great for cleaning up. Regardless of the outcome of the API operation, we want to remove the loading state.

```
catch (error) {
    setError("Sorry, we couldn't retrieve the weather data at

} finally {
    setLoading(false)

 }
```

To ensure the error and loading states are reflected in the UI, add this code just before the return statement

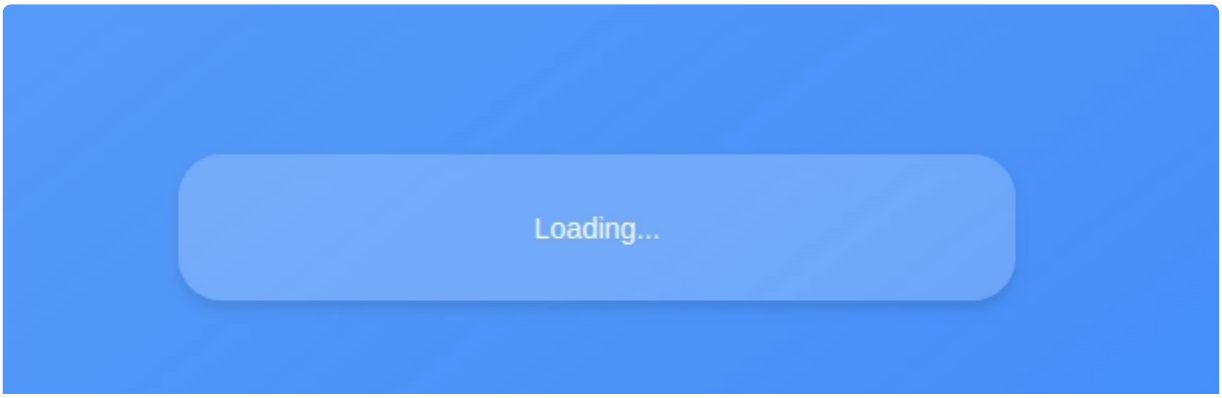
```
 if (loading) return <div className="wrapper">Loading... </div
```

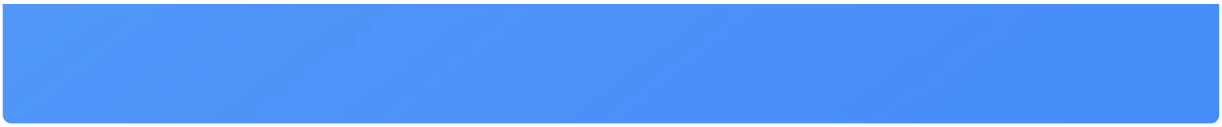
To display the error message if it occurs add this `<p/>` tag after the form.

```
   {error && <p className="error">{error} </p>}
```

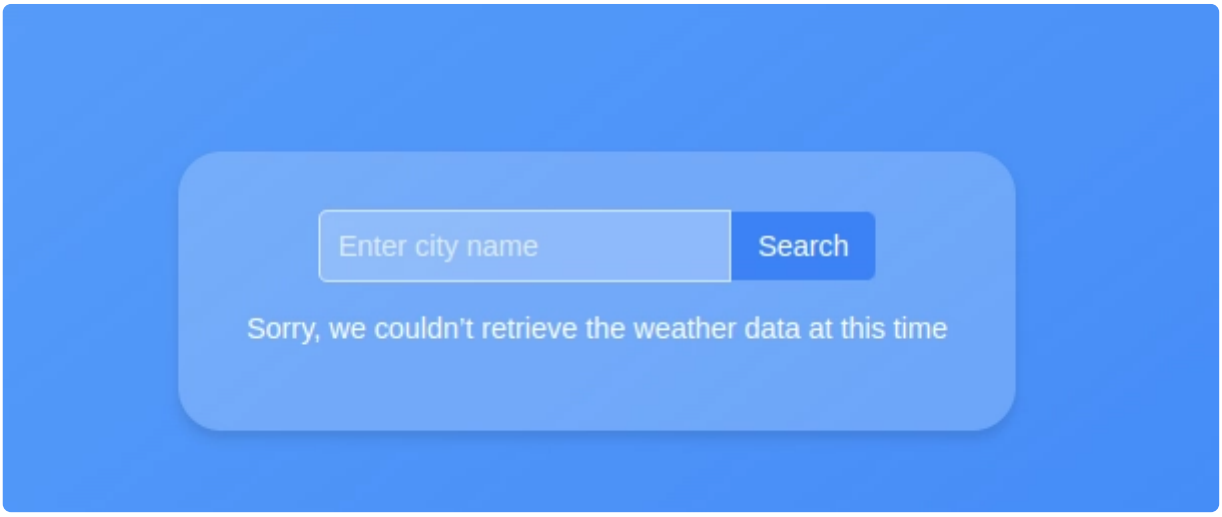
This condition ensures that if an error occurs, the error message stored in the state will be displayed.

Here is the app in loading state.





Here is the output when an error occurs.



Conclusion

We have come to the end of this tutorial. You can find the source code here.

If you found this tutorial a bit challenging, you might need to brush up on your React Fundamentals.

Get my Free React Guide and Level up.

Happy Coding.

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