WEATHER APP

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

BY

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Kanuru, Vijayawada – 520007

(2024-2025)

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CERTIFICATE

This is to certify that the project report title **"WEATHER APP"** is the bonafied work of **JILLA HARSHITHA (22501A0568)** in partial fulfillment of completing the Academic project in Web Application Development during the academic year 2024-2025

Signature of the Incharge	**Signature of the HOD**
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1.ABSTRACT

Nowadays we face a huge problem that knowing real weather status instantly in such a place we need to know.it is often complex and challenging skill that involves observing and processing vast amount of data Weather systems can range from small, short-lived thunderstorms only a few miles in diameter that last a couple of hours to large scale rain and wind up to a thousand miles in a diameter, and lasting for days. So, most of the time we cannot get the real weather forecast and face a lot of troubles. We have another problem in weather forecasting. To do this effectively technology can help a lot. In this android app is developed with the help of Android Studio and API we will help the user to get to know about real-time weather updates of a particular place.

Keywords: 1. Frontend 2. Backend 3. APIs and Data Sources 4. Security.

This report presents a Weather App developed using HTML, CSS, and JavaScript. The application fetches real-time weather data from the OpenWeatherapp API based on user input. It provides essential weather details, including temperature, weather conditions, and wind speed, enhancing user experience with an interactive and visually appealing interface.

Key components of the technology stack include:

1. **Frontend:**
   - HTML5, CSS3, and JavaScript for creating a responsive and interactive user interface.
   - React.js or Angular.js for building dynamic web components and ensuring seamless user interactions.
2. **APIs and Data Sources:**
   - Weather APIs to retrieve current and forecasted weather data.
   - Geolocation APIs to determine the user's location and provide location-specific weather information.
3. **Security:**
   - Implementation of HTTPS for secure data transmission.

User authentication and authorization mechanisms to protect user data and preferences.

2.INTRODUCTION

To summarize and brief in short, Weather App is the application of science and technology to predict the conditions of the atmosphere for a given location and time. People have attempted to predict the weather informally for millennia and formally since the 19th century. Weather forecasts are made by collecting quantitative data about the current state of the atmosphere, land, and ocean and using meteorology to project how the atmosphere will change at a given place. It is very important to get educated on the current weather situation of a particular location as preferred since it affects the day-to-day life of everyone. It is more effective if we can get quickly updated on current weather status of a required location, as it makes it easy to handle not only our activities, but also our livelihoods too. A huge problem that we are facing nowadays is inability to know real weather status in such places. So, if we need to know the current situation in a certain place, it is better to ask from a person who is in that area recently or currently. He is a better source than any prevailing weather information.

The Weather App allows users to check the weather for any city by entering the city name. Leveraging the OpenWeatherapp API, the app fetches up-to-date weather information and displays it in a user-friendly format. The design is responsive, ensuring usability across various devices.

3. Objectives and Scope of the Project

Creating a weather app involves various objectives and scopes to ensure it meets user needs and provides reliable information. Here’s a detailed explanation of both aspects:

1. **Provide Accurate Weather Data:**

- **Real-time Data Access**: Ensure that the app fetches real-time weather data from reliable sources, such as weather APIs (e.g., OpenWeatherMap, WeatherAPI).
- **Forecasting**: Provide short-term and long-term weather forecasts, typically up to 7 or 14 days, to help users plan their activities.

2. User-Friendly Interface:

- **Intuitive Design**: Create an easy-to-navigate interface with clear layouts, making it accessible for all users, including those who are not tech-savvy.
- **Customization:** Allow users to personalize their experience by choosing their preferred units (Celsius/Fahrenheit), themes (light/dark mode), and location settings.

3. Location-Based Services:

- **Geolocation Features**: Enable GPS functionality to automatically detect the user’s current location and provide localized weather information.
- **Search Functionality**: Allow users to search for weather data by city name, zip code, or geographic coordinates.

4. Additional Features:

- Alerts and Notifications: Implement push notifications for severe weather alerts (e.g., storms, heavy rain) and daily or hourly weather updates.
- Graphs and Charts: Present data visually using graphs for temperature changes, humidity levels, wind speed, and other relevant metrics.

5. Offline Capabilities:

- **Caching Data**: Enable users to access previously retrieved weather data when offline, providing some level of functionality without internet access.

6. Educational Content:

- **Weather Insights:** Provide articles or tips about weather phenomena, climate change, and the importance of weather monitoring.

7. Cross-Platform Accessibility:

- **Multi-Device Support**: Ensure the app is available on various platforms (iOS, Android, web) to reach a wider audience.

Scope of the Weather App Project

1. Target Audience:

- Identify and define the target user base, which can include general users, outdoor enthusiasts, travelers, and professionals in weather-sensitive industries (e.g., agriculture, logistics).

2. Functionality:

- Define the core functionalities that the app will offer, such as:
  - Current weather conditions (temperature, humidity, wind speed)
  - Weather forecasts (hourly and daily)
  - Historical weather data (if applicable)
  - Weather maps (radar images, satellite imagery)

3. Technology Stack:

- Determine the technologies to be used for development, which may include:
  - **Frontend:** React Native, Flutter, or Swift for mobile development.
  - **Backend**: Node.js, Django, or Ruby on Rails for server-side development.
  - **Database:** MongoDB, Firebase, or PostgreSQL for data storage.

- **APIs**: Integrate with weather data APIs for fetching real-time information.

4. Design Considerations:

- Establish design guidelines to ensure consistency in branding, user experience (UX), and user interface (UI) elements.

5. Testing and Quality Assurance:

- Outline a testing strategy to ensure the app functions correctly across devices and scenarios. This may include:
  - Unit testing
  - Integration testing
  - User acceptance testing (UAT)

6. Deployment and Maintenance:

- Plan for the app’s deployment on app stores (Google Play, Apple App Store) and ongoing maintenance to address bugs, user feedback, and feature updates.

7. Marketing and User Acquisition:

- Develop strategies for promoting the app, which could involve social media campaigns, collaborations, and content marketing to attract users.

8. Future Enhancements:

- Consider potential future features based on user feedback, market trends, and technological advancements, such as integration with smart home devices or the implementation of machine learning for personalized forecasts.

By clearly defining these objectives and scope, you can create a comprehensive plan for developing a successful weather app that meets user expectations and provides valuable weather information.

4.Software Used – Explanation

1.HTML:

HTML, or HyperText Markup Language, is the standard markup language used to create web pages. It provides the structure for web content, allowing browsers to interpret and display text, images, and other media. Here's a detailed breakdown of HTML:

1**. Basic Structure of HTML**

An HTML document has a specific structure, consisting of various elements.

Key Components:

- <!DOCTYPE html>: Declares the document type and version of HTML (HTML5 in this case).
- <html>: The root element that contains all other HTML elements.
- <head>: Contains meta-information about the document, such as the title, character set, and linked stylesheets or scripts.
- <body>: Contains the content of the web page that is visible to users.

2. Elements and Tags

HTML is made up of elements, which are defined by tags. Tags usually come in pairs: an opening tag and a closing tag.

- Opening Tag: <tagname>
- Closing Tag: </tagname>

Example:

html

Copy code

<p>This is a paragraph.</p>

3. Attributes

HTML elements can have attributes that provide additional information. Attributes are defined in the opening tag.

Example:

html

Copy code

<a href="https://www.example.com" target="_blank">Visit Example</a>

- href: Specifies the URL of the link.
- target: Specifies where to open the linked document (e.g., _blank opens in a new tab).

4. Common HTML Elements

Here are some frequently used HTML elements:

- Headings: <h1> to <h6> (from largest to smallest).
- Paragraphs: <p> for paragraphs of text.
- Links: <a> for hyperlinks.
- Images: <img> to embed images (with src attribute for the image URL).
- Lists:
  - Unordered: <ul> (with <li> for list items).
  - Ordered: <ol> (with <li>).
- Tables: <table> (with <tr> for table rows and <td> for table cells).
- Forms: <form>, <input>, <textarea>, <select>, etc., for collecting user input.

5. Semantic HTML

Semantic HTML uses elements that convey meaning about the content. This improves accessibility and SEO. Examples include:

- <header>: Defines a header for a document or section.
- <footer>: Defines a footer for a document or section.
- <article>: Represents a self-contained piece of content.
- <section>: Represents a thematic grouping of content.

6. HTML5 Features

HTML5 introduced several new features and APIs:

- Audio and Video: <audio> and <video> elements for multimedia.
- Canvas: <canvas> element for drawing graphics via JavaScript.
- Local Storage: APIs for storing data on the client side.
- Geolocation: APIs to access a user's geographical location.

7. Accessibility and Best Practices

- Use semantic tags for better accessibility.
- Provide alt attributes for images to describe them.

- Ensure proper heading structure for screen readers.
- Validate HTML to avoid errors and improve compatibility.

8. HTML vs. XHTML

XHTML is a stricter version of HTML that follows XML rules. In XHTML, all elements must be properly nested, closed, and in lowercase. However, HTML5 has largely superseded XHTML for web development due to its flexibility.

2.CSS

CSS, or Cascading Style Sheets, is a stylesheet language used to describe the presentation of a document written in HTML or XML. It allows developers to control the layout, appearance, and overall style of web pages, enabling a separation of content from design. Here’s a detailed overview of CSS:

1. Basic Structure of CSS

CSS consists of rules that dictate how HTML elements should be displayed. Each rule is made up of a selector and a declaration block.

Syntax:

css

Copy code

```
selector {
   property: value;
}
```

Example:

css

Copy code

```
h1 {
   color: blue;
   font-size: 24px;
}
```

In this example, the selector is h1, and the properties are color and font-size, with their respective values.

2. Selectors

Selectors are patterns used to select the elements you want to style. Here are some common types:

- **Element Selector**: Targets all instances of a specific HTML element.

css

Copy code

```
p {
   color: green;
}
```

- **Class Selector**: Targets elements with a specific class attribute. Class selectors begin with a period (.).

css

Copy code

```
.my-class {
   font-weight: bold;
}
```

- **ID Selector**: Targets a unique element with a specific id attribute. ID selectors begin with a hash (#).

css

Copy code

```
#my-id {
   background-color: yellow;
}
```

- **Attribute Selector**: Targets elements based on an attribute or attribute value.

css

Copy code

```
input[type="text"] {
   border: 1px solid #ccc;
}
```

- **Descendant Selector**: Targets elements that are nested inside a specified element.

css

Copy code

```
div p {
   color: red;
}
```

3. Properties and Values

CSS properties define what aspect of an element you want to change. Some common properties include:

- **Color and Background**:
  - color: Text color.
  - background-color: Background color of an element.
  - background-image: URL of an image to use as the background.
- **Typography**:
  - font-family: The font to use.
  - font-size: Size of the text.
  - font-weight: Boldness of the text.
- **Box Model**:
  - width and height: Dimensions of an element.
  - margin: Space outside an element.
  - padding: Space inside an element, between the content and the border.
  - border: Defines the border around an element.

4. Cascading and Specificity

CSS stands for "Cascading Style Sheets" because styles can cascade from multiple sources, with the following order of precedence:

1. **Inline Styles**: Styles defined directly on an element using the style attribute.
2. **Internal Styles**: Styles defined within a <style> tag in the HTML document.
3. **External Styles**: Styles defined in external .css files linked to the HTML document.

Specificity determines which style is applied when multiple rules match the same element. It is calculated based on the type of selectors used:

- Inline styles have the highest specificity.
- ID selectors are more specific than class selectors.
- Class selectors are more specific than element selectors.

5. Media Queries

Media queries allow you to apply styles based on the device's characteristics, such as screen size or resolution. This is essential for responsive web design.

Example:

css

Copy code

```
@media (max-width: 600px) {
   body {
      background-color: lightblue;
   }
}
```

In this example, the background color will change to light blue on screens narrower than 600 pixels.

6. Flexbox and Grid Layouts

CSS provides powerful layout models, such as Flexbox and Grid, which make it easier to create complex layouts.

- **Flexbox**: Designed for one-dimensional layouts, allowing you to align and distribute space among items in a container.

css

Copy code

```
.container {
   display: flex;
   justify-content: space-between;
}
```

- **Grid**: Designed for two-dimensional layouts, allowing you to create grid-based layouts with rows and columns.

css

Copy code

```
.grid-container {
   display: grid;
   grid-template-columns: repeat(3, 1fr);
}
```

7. CSS Preprocessors

CSS preprocessors, like Sass and LESS, extend CSS with features like variables, nesting, and functions, making it easier to manage complex styles.

Example with Sass:

scss

Copy code

```
$primary-color: blue;

.button {
  background-color: $primary-color;
  &:hover {
    background-color: darken($primary-color, 10%);
  }
}
```

8. Best Practices

- Use semantic HTML alongside CSS for better accessibility.
- Organize CSS rules logically, often grouping by component or layout.
- Avoid inline styles to maintain separation of content and presentation.
- Utilize comments to explain complex styles.
- Optimize and minify CSS for performance.

3.JavaScript

JavaScript is a high-level, dynamic, and interpreted programming language that is widely used for web development. It enables interactive and dynamic content on web pages, making it an essential part of the modern web ecosystem alongside HTML and CSS. Here’s a detailed overview of JavaScript:

1. Basic Concepts of JavaScript

Syntax

JavaScript syntax is the set of rules that define a correctly structured JavaScript program. Here's a simple example:

javascript

Copy code

```
console.log("Hello, World!");
```

Variables

Variables store data values. You can declare variables using var, let, or const.

- var: Function-scoped or globally scoped. Older and less commonly used in modern JavaScript.
- let: Block-scoped, allowing you to define variables that can be updated.
- const: Block-scoped and immutable, used for constants.

Example:

javascript

Copy code

```
let name = "Alice";
const age = 30;
```

2. Data Types

JavaScript has several built-in data types:

- Primitive Types:
  - String: Represents text. E.g., "Hello"
  - Number: Represents both integer and floating-point numbers. E.g., 42, 3.14
  - Boolean: Represents true or false values.
  - Null: Represents an intentional absence of any value.

    - Undefined: A variable that has been declared but has not yet been assigned a value.
    - Symbol: A unique and immutable primitive used for object property keys (introduced in ES6).
- Reference Types:
    - Object: A collection of key-value pairs. E.g., { name: "Alice", age: 30 }
    - Array: An ordered list of values. E.g., [1, 2, 3]
    - Function: A callable object that encapsulates code.

3. Control Structures

JavaScript includes various control structures to manage the flow of execution:

- Conditional Statements:

javascript

Copy code

```
if (age >= 18) {
   console.log("Adult");
} else {
   console.log("Minor");
}
```

- Switch Statement:

javascript

Copy code

```
switch (day) {
   case 1:
      console.log("Monday");
      break;
   // other cases
   default:
      console.log("Another day");
}
```

- Loops:
    - For Loop:

javascript

Copy code

```
for (let i = 0; i < 5; i++) {
   console.log(i);
}
```

  - While Loop:

javascript

Copy code

```
let i = 0;
while (i < 5) {
   console.log(i);
   i++;
}
```

4. Functions

Functions are reusable blocks of code that can be called with parameters and can return values. There are several ways to define functions:

- Function Declaration:

javascript

Copy code

```
function greet(name) {
   return "Hello, " + name;
}
```

- Function Expression:

javascript

Copy code

```
const greet = function(name) {
   return "Hello, " + name;
};
```

- Arrow Functions (introduced in ES6):

javascript

Copy code

```
const greet = (name) => "Hello, " + name;
```

5. Objects and Arrays

Objects

Objects are key-value pairs that allow you to group related data and functions.

Example:

javascript

Copy code

```
const person = {
    name: "Alice",
    age: 30,
    greet() {
        console.log("Hello, " + this.name);
    }
};

person.greet(); // Output: Hello, Alice
```

Arrays

Arrays are ordered collections of items, which can be of any type.

Example:

javascript

Copy code

```
const fruits = ["apple", "banana", "cherry"];
console.log(fruits[0]); // Output: apple
```

6. DOM Manipulation

JavaScript can interact with the Document Object Model (DOM), allowing you to manipulate the structure and style of web pages dynamically.

Example:

javascript

Copy code

```
document.getElementById("myElement").innerText = "Hello, World!";
```

7. Events

JavaScript can respond to user actions through event handling. You can add event listeners to elements to trigger functions.

Example:

javascript

Copy code

```
document.getElementById("myButton").addEventListener("click", function() {
   alert("Button clicked!");
});
```

8. Asynchronous Programming

JavaScript is single-threaded, but it can handle asynchronous operations using callbacks, Promises, and async/await syntax.

Callbacks

Functions passed as arguments to other functions.

Example:

javascript

Copy code

```
setTimeout(() => {
   console.log("Executed after 2 seconds");
}, 2000);
```

Promises

A way to handle asynchronous operations. A promise can be in one of three states: pending, fulfilled, or rejected.

Example:

javascript

Copy code

```
const myPromise = new Promise((resolve, reject) => {
   setTimeout(() => resolve("Done!"), 1000);
});
```

```
myPromise.then(result => console.log(result)); // Output: Done!
```

Async/Await

Syntactic sugar over Promises that makes asynchronous code easier to read.

Example:

javascript

Copy code

```
async function fetchData() {
   const response = await fetch("https://api.example.com/data");
   const data = await response.json();
   console.log(data);
}
```

9. Error Handling

JavaScript provides a way to handle errors using try-catch blocks.

Example:

javascript

Copy code

```
try {
   // code that may throw an error
   let result = riskyFunction();
} catch (error) {
   console.error("An error occurred:", error);
}
```

10. Modules

JavaScript modules allow you to break your code into smaller, reusable pieces. ES6 introduced a module system with import and export.

Example:

javascript

Copy code

```
// module.js
export const greeting = "Hello!";
```

```
// main.js
import { greeting } from './module.js';
console.log(greeting); // Output: Hello!
```

11. Best Practices

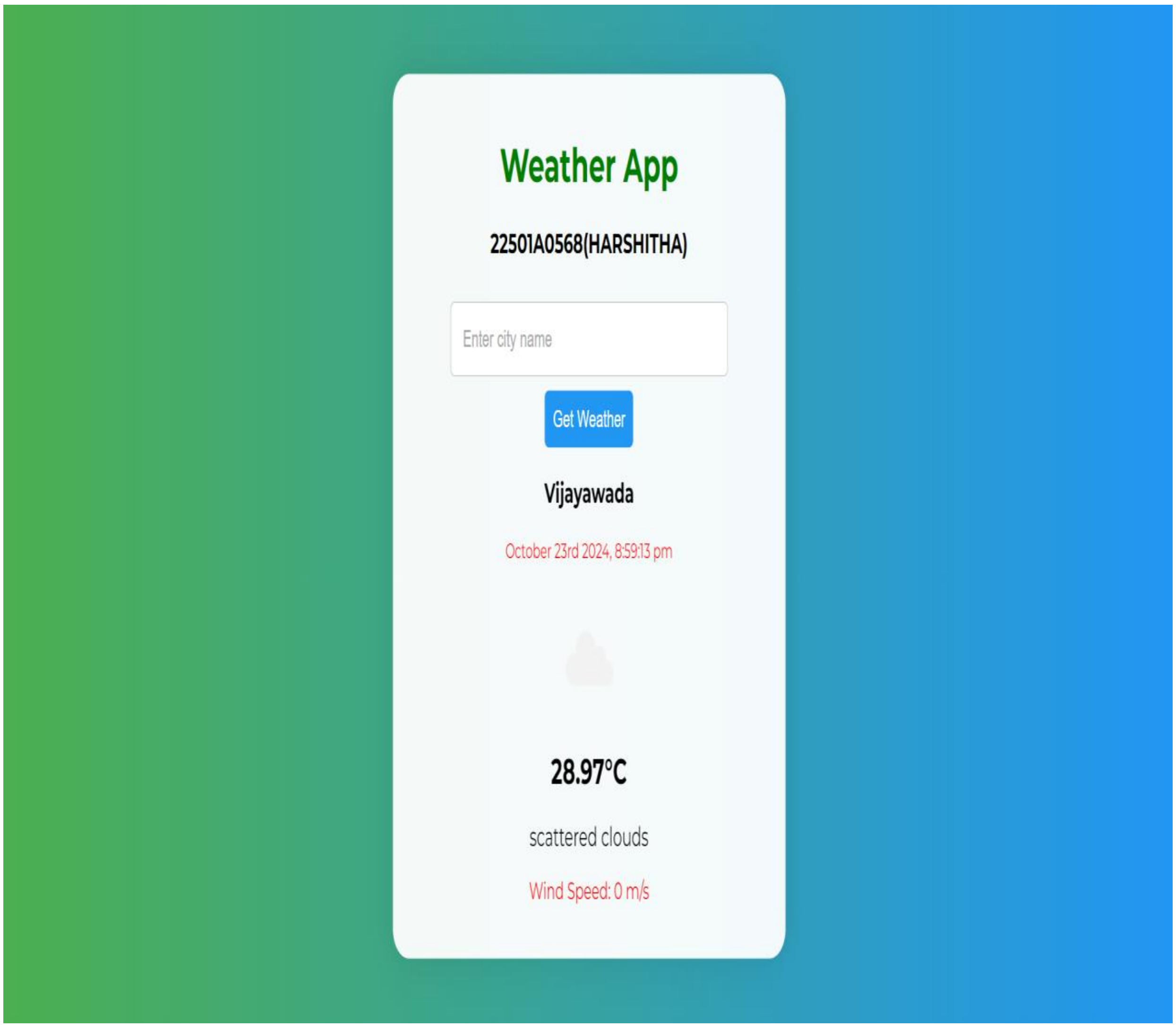
- Write clear, readable code with proper indentation and comments.
- Use meaningful variable and function names.
- Avoid global variables to prevent naming conflicts.
- Keep functions small and focused on a single task.
- Utilize modern JavaScript features like ES6+ syntax for cleaner code.

5. Back End if Existing

The app does not have a traditional back end but relies on the OpenWeatherapp API to fetch weather data. This API serves as a backend service, providing the necessary data based on user queries.

6. Web Pages (with explanation)

- **Main Page:**
  - Contains a weather card with an input field for city name and a button to fetch weather data.
  - Displays weather information, including city name, date, temperature, weather description, and wind speed.
  - Utilizes animations for better user experience.
  - By Default it gives the our Vijayawada Weather Report.



Vijayawada

October 23rd 2024, 8:59:13 pm

28.97°C

scattered clouds

Wind Speed: 0 m/s

7. Sample Code

HTML

```
<!DOCTYPE html>
<head>
   <link rel="stylesheet" href="styles.css">
   <link rel="stylesheet" href=
"https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.css">
   <link rel="stylesheet" href=
"https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.15.1/css/all.min.css">
   <link rel="stylesheet" href=
"https://fonts.googleapis.com/css2?family=Montserrat:wght@400;700&display=swap"
>
   <title>weather App</title>
</head>

<body>
   <div class="container">
      <div class="weather-card">
         <h1 style="color: green;">
            22501A0568(HARSHITHA)
         </h1>
         <h3>
            Weather App
         </h3>
         <input type="text" id="city-input"
            placeholder="Enter city name">
         <button id="city-input-btn"
               onclick="weatherFn($('#city-input').val())">
               Get Weather
         </button>
         <div id="weather-info"
```

```
                class="animate__animated animate__fadeIn">
                <h3 id="city-name"></h3>
                <p id="date"></p>
                <img id="weather_icon" style="display: inline-flex"
src="./images/weather_image.png" width="45" height="40" >
                <p style="display: inline-flex;" id="temperature"></p>
                <p id="description"></p>
                <p id="wind-speed"></p>
            </div>
        </div>
    </div>
    <script src=
"https://code.jquery.com/jquery-3.6.0.min.js">
    </script>
    <script src=
"https://momentjs.com/downloads/moment.min.js">
    </script>
 <script src="script.js"></script>
</body>
</html>
```

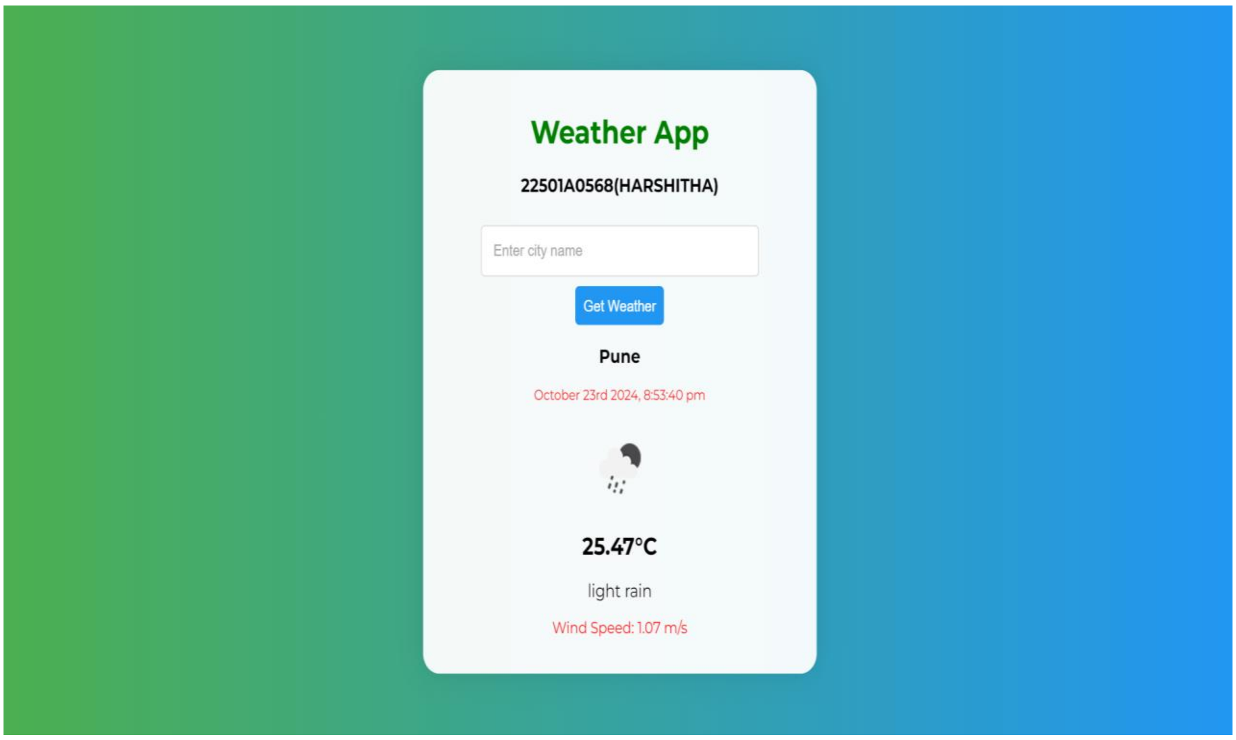
CSS

```
body {
    margin: 0;
    font-family: 'Montserrat', sans-serif;
    display: flex;
    justify-content: center;
    align-items: center;
    height: 100vh;
    background: linear-gradient(to right, #4CAF50, #2196F3);
}
.container {
    text-align: center;
}
.weather-card {
    background-color: rgba(255, 255, 255, 0.95);
    border-radius: 20px;
    padding: 20px;
    box-shadow: 0 0 30px rgba(0, 0, 0, 0.1);
    transition: transform 0.3s ease-in-out;
    width: 450px;
}
.weather-card:hover {
    transform: scale(1.05);
}

#city-input {
    padding: 15px;
    margin: 10px 0;
    width: 70%;
    border: 1px solid #ccc;
    border-radius: 5px;
    font-size: 16px;
}
#city-input:focus {
    outline: none;
    border-color: #2196F3;
}
#city-input::placeholder {
    color: #aaa;
}
#city-input-btn {
    padding: 10px;
    background-color: #2196F3;
    color: #fff;
    border: none;
    border-radius: 5px;
    font-size: 16px;
    cursor: pointer;
}

#city-input-btn:hover {
    background-color: #1565C0;
}
#weather-info {
    display: none;
}
#weather-icon {
    width: 100px;
    height: 100px;
}
#temperature {
    font-size: 24px;
    font-weight: bold;
    margin: 8px 0;
}
#description {
    font-size: 18px;
    margin-bottom: 10px;
}
#wind-speed {
    font-size: 16px;
    color: rgb(255, 0, 0);
}


#date {
    font-size: 14px;
    color: rgb(255, 0, 0);
}
```

JavaScript

```
const url =
   'https://api.openweathermap.org/data/2.5/weather';
const apiKey =
   'e8d3f1f44870eaacf8cf520123fd6907';
$(document).ready(function () {
   weatherFn('Vijayawada');
});

async function weatherFn(cName) {
   const temp =
      `${url}?q=${cName}&appid=${apiKey}&units=metric`;
   try {
      const res = await fetch(temp);
      const data = await res.json();
      if (res.ok) {
         weatherShowFn(data);
      }
else {
         alert('City not found. Please try again.');
      }
   }

 catch (error) {
      console.error('Error fetching weather data:', error);
   }
}
function weatherShowFn(data) {
   $('#city-name').text(data.name);

   $('#date').text(moment().
        format('MMMM Do YYYY, h:mm:ss a'));

    $('#temperature').
        html(`${data.main.temp}°C`);

    $('#description').
        text(data.weather[0].description);

    $('#wind-speed').
        html(`Wind Speed: ${data.wind.speed} m/s`);

    $('#weather-icon').
        attr('src',
            `...`);

    $('#weather-info').fadeIn();
}
```

8. Result/Output Screenshots


Weather App

22501A0568(HARSHITHA)

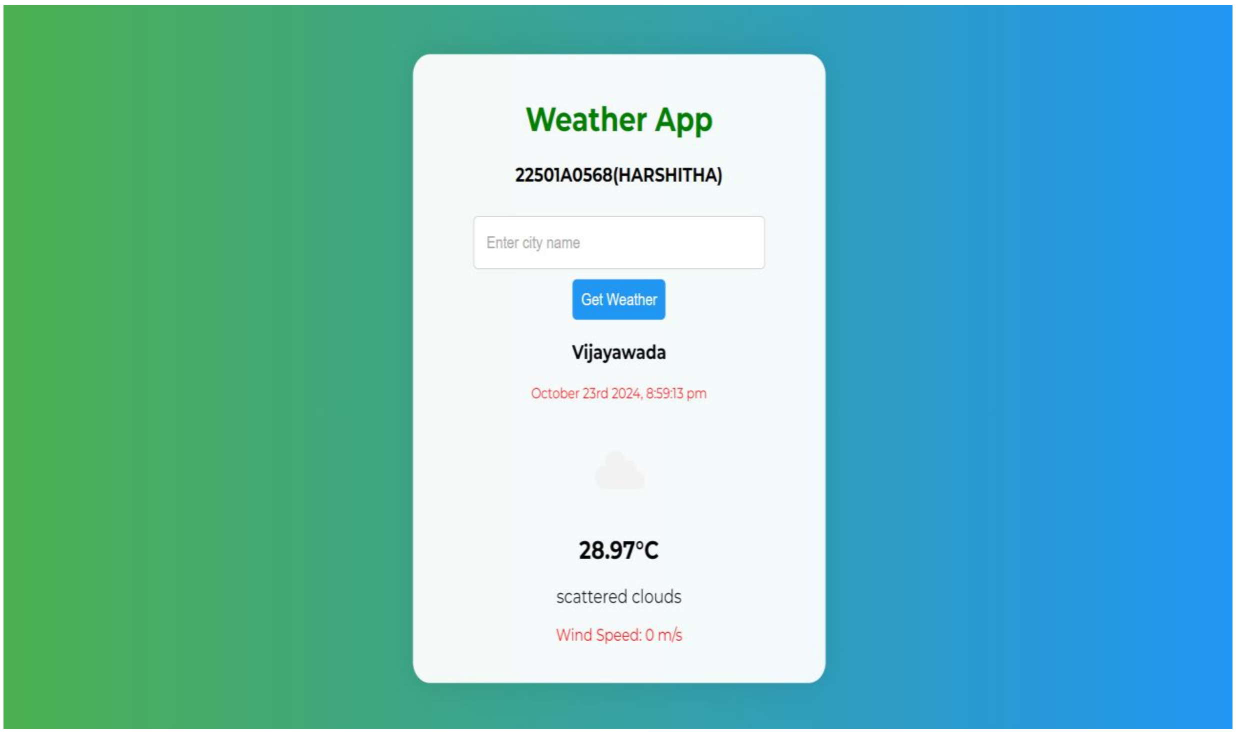
Pune

October 23rd 2024, 8:53:40 pm

25.47°C

light rain

Wind Speed: 1.07 m/s


Weather App

22501A0568(HARSHITHA)

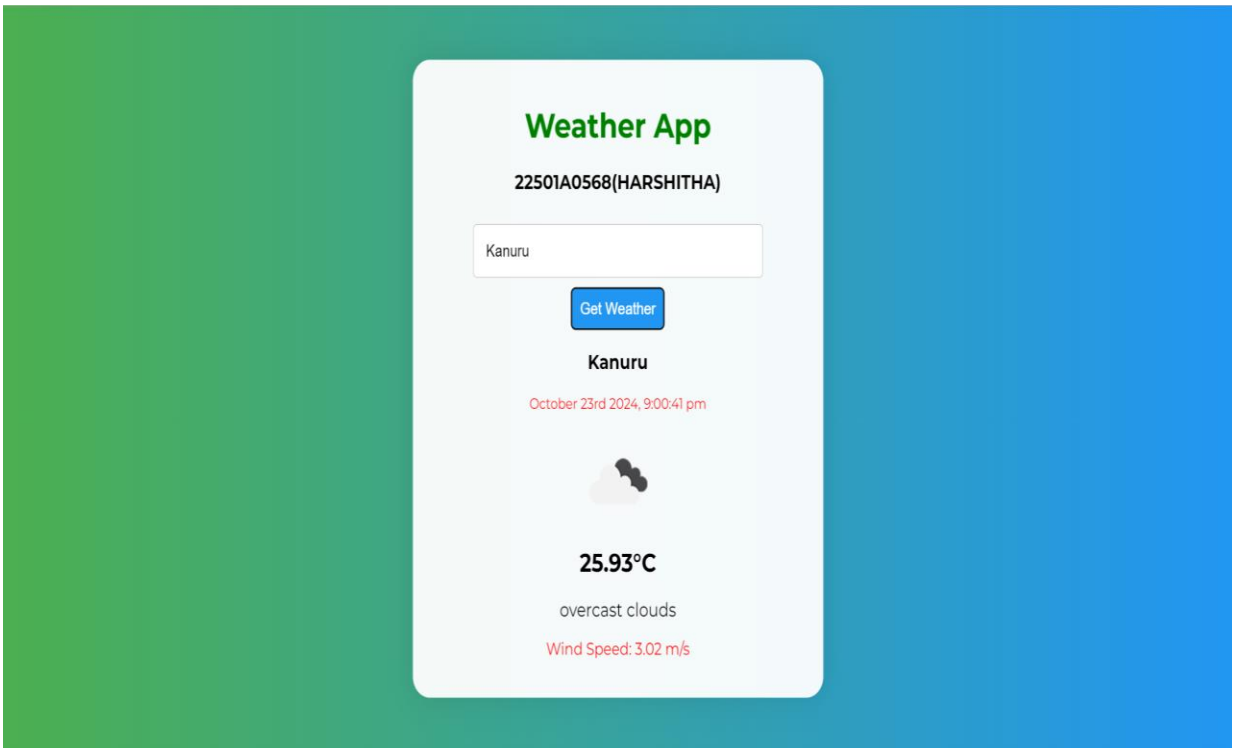
Vijayawada

October 23rd 2024, 8:59:13 pm

28.97°C

scattered clouds

Wind Speed: 0 m/s



Weather App

22501A0568(HARSHITHA)

Kanuru

Get Weather

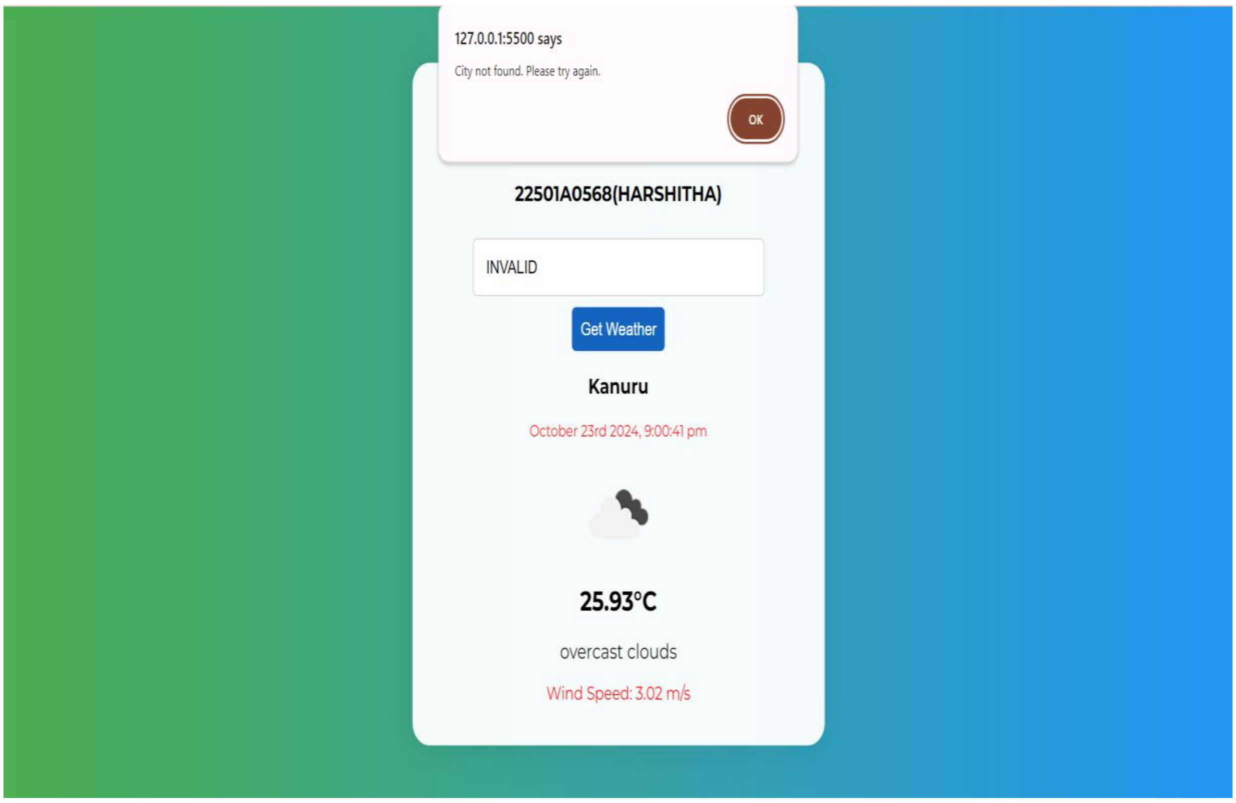
Kanuru

October 23rd 2024, 9:00:41 pm

25.93°C

overcast clouds

Wind Speed: 3.02 m/s



127.0.0.1:5500 says

City not found. Please try again.

OK

22501A0568(HARSHITHA)

INVALID

Get Weather

Kanuru

October 23rd 2024, 9:00:41 pm

25.93°C

overcast clouds

Wind Speed: 3.02 m/s

9. Conclusion

The Weather App effectively demonstrates how to build a simple web application that interacts with an external API. The combination of HTML, CSS, and JavaScript allows for a responsive and engaging user experience. Future enhancements could include additional weather features and improved UI elements. WeatherApp aims to be a reliable and user-friendly weather forecasting tool that empowers users with the information they need to plan their day and stay safe during adverse weather conditions. By leveraging advanced technologies and real-time data sources, WeatherApp will provide a comprehensive and engaging weather experience, setting a new standard for weather applications. The development of WeatherApp will not only enhance user convenience but also contribute to greater public awareness and preparedness in the face of changing weather patterns.

10. References (web site URLs)

- https://jquery.com/
- https://momentjs.com/
- https://animate.style/
- https://fontawesome.com/