Implementation Manual

# 1. Project Overview

The Weather Data Visualization App is a Java-based GUI application that retrieves, processes, and visualizes weather data such as temperature, humidity, and precipitation over time for a given city. It emphasizes object-oriented programming (OOP) principles like encapsulation, inheritance, and modularity.

# 2. Project Structure

The project is organized into the following packages:

* • `api`: Handles API requests and data fetching from the OpenWeatherMap API.
* • `data`: Defines the `WeatherData` model to store weather information.
* • `graph`: Responsible for chart generation using JFreeChart.
* • `gui`: Manages the graphical user interface elements.

• `WeatherApp.java`: The main application file that integrates all components.

# 3. Class Descriptions

* • `APIHandler` (in `api` package):
* - Connects to the weather API and fetches forecast data.
* • `WeatherData` (in `data` package):
* - A model class containing fields for temperature, humidity, precipitation, and date.
* • `GraphManager` (in `graph` package):
* - Uses JFreeChart to create bar graphs for weather parameters.
* • `GUIManager` (in `gui` package):
* - Builds the UI, manages user input, and displays data in a text area and via charts.
* • `WeatherApp.java`:
* - Launches the application and calls GUIManager.

# 4. Data Flow

1. User enters a city name.  
2. `APIHandler` fetches weather data and parses it into `WeatherData` objects.  
3. `GUIManager` displays the data in the text area.  
4. If a graph button is clicked, `GraphManager` generates a chart based on the selected metric.

# 5. External Libraries

* • JFreeChart (for chart visualization)
* • JSON (for parsing API responses)