



FEU Institute of Technology
COLLEGE OF ENGINEERING • COLLEGE OF COMPUTER STUDIES

College of Computer Studies

Programming Tools and Techniques
(CS0053)

<Case Study 1: Advanced Weather Recording System>

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Program Flowchart

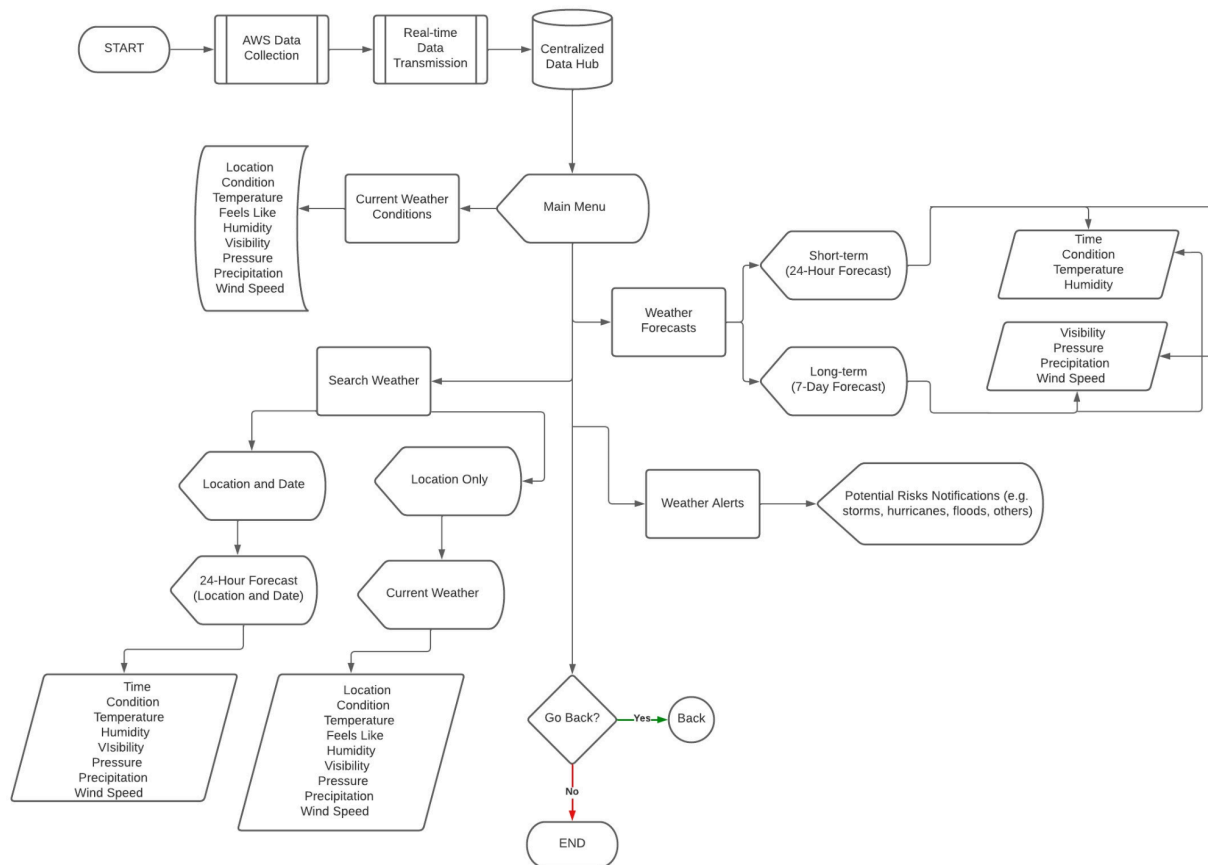


Fig 1. This flowchart was created and edited using Lucidchart.

Required Documentation

Introduction

Purpose:

This detailed proposal explains why MetraWeather needs advanced weather recording and monitoring technology. It begins by explaining the institute's weather recording systems' limitations and emphasizing the need for a new solution. Data delays, limited parameter recording, inadequate storage, and integration issues highlight the need for an improved system to manage climate change and unpredictable weather patterns.

In response to these challenges, the proposal set explicit new system goals. These goals include recording and sending data in real-time, increasing the number of monitored weather parameters, storing data in a safe and reliable way, and combining data from all observation stations into a weather monitoring system. The proposal also includes Automated

Weather Stations (AWS), a data hub, real-time data transmission, and a user-friendly portal to improve the system's capabilities and accessibility for stakeholders. This proposal allows MetraWeather to handle the challenges of current weather monitoring and deliver reliable, timely information to the public and industry.

Scope:

This application's scope encompasses the creation of an updated weather recording and monitoring system for MetraWeather, with the primary emphasis being placed on making use of Python in the course of system development and JSON for aiding in data serialization, the interchange between components, configuration management, API integration, and logging, contributing to the efficiency and flexibility of the application. The following are some of the most essential features and components that fall under the scope of this project:

1. Check the current weather.
2. Show the weather forecast.
3. Search weather (specific weather data based on location and date or location only).
4. Check weather alerts.

Definitions:

- AWS - Automated Weather Stations
- API - Application Programming Interface
- JSON - JavaScript Object Notation

References:

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Overview:

The present documentation provides a detailed overview of the rationale, scope, and essential components of the system conducted by MetraWeather to improve its weather recording and monitoring capabilities. This statement highlights the urgent need for implementing sophisticated technology in response to the dynamic shifts in weather patterns, climate change, and the constraints posed by current systems.

The document in question is a thorough manual outlining MetraWeather's efforts to integrate modern weather recording and monitoring technologies. It aims to provide an understanding of the project's objectives, extent, and essential elements while also serving as a helpful resource for further investigation and advancement.

Overall Description

Product Perspective:

This Advanced Weather Recording System plays a crucial role in helping MetraWeather achieve its goal of enhancing its weather recording and monitoring capabilities. It's a crucial piece of weather technology, ensuring that MetraWeather can provide users with accurate and up-to-date weather information, whether you're a meteorologist or just monitoring the weather.

It connects our Automated Weather Stations (AWS) and centrally saves all meteorological data. The system can then send out timely updates and forecasts to keep everyone informed while they search for the ideal location to check the weather. Users can use the system to check the weather and receive alerts regardless of their level of expertise or interest in the forecast. This program is a significant component of MetraWeather's mission to ensure people's safety and the industry's readiness for a changing climate and unpredictable weather.

Product Features:

- API Integration:
 - The program integrates with external weather APIs, such as the WeatherAPI and Pagasa API, to fetch weather data.
- Current Weather Forecast:
 - The current weather conditions for a certain location can be retrieved and shown by users.

- Access 7-day weather forecast for any location in the Philippines and display data such as location, temperature, humidity, wind speed, and weather status or condition.

- Historical Weather Data:
 - Retrieve and review past weather conditions, aiding in research and planning. Users can search for specific weather data in two ways:
 - By providing a location and date to retrieve historical weather information.
 - By providing only a location to fetch the current weather data.

- Customizable Locations
 - Users can input any city or region within the Philippines to receive localized weather information.

- Alert System:
 - The application includes an alert feature that notifies users of any severe weather conditions for their chosen locations. Users can check weather alerts for two categories:
 - Local weather alerts (e.g., for the Philippines) obtained from the Pagasa API.
 - Weather alerts for other locations by specifying a location.

- Data Persistence:
 - Weather data is stored in a local SQLite database for offline access and historical reference.

- User-friendly Interface:
 - Designed with simplicity in mind, providing an intuitive and straightforward user experience.
 - Users can navigate through menus and select options based on their preferences.

- Error Handling:
 - The code includes error handling to manage cases where data retrieval fails or the API key is missing.

- Program Termination
 - Users can choose to end the program gracefully when they're done with their weather inquiries.

Operating Environment:

- Operating System:
 - The system was developed to function well on a number of different operating systems, like Windows.
- Server Details
 - Even though it is not a cloud-based infrastructure, this server architecture plays an important part in managing data for the application. It enables efficient storage, retrieval, and processing of weather-related data using Python file handling. In addition, the program uses file operations to store data in JSON format retrieved from a weather API and then read that data to display weather information to the user.
- Installation and Configuration
 - To facilitate the installation and configuration of the application, follow these steps within the PyCharm environment:
 1. Install the following requirements:
 - certifi - 2023.7.22
 - charset-normalizer - 3.3.2
 - customtkinter - 5.2.1
 - darkdetect - 0.8.0
 - idna - 3.4
 - packaging - 23.2
 - pillow - 10.1.0
 - requests - 2.31.0
 - tk - 0.1.0
 - urllib3 - 2.0.7

These are already included in a single file called requirements.txt and ready to install by typing this on the terminal:

❖ `pip install -r requirements.txt`

 2. Compiling and Running: To compile and run the Python application, run the 'main.py' or by pressing 'Shift + F10' onto your keyboard.

With these steps, the user will be all set to run the application on their Windows system using PyCharm compiler.

User Classes and Characteristics:

- Meteorologists:
 - Are specialists with a high level of expertise who rely on the program for detailed weather analysis and forecasting. They require access to data in real-time as well as previous records of the weather.
- General Public:
 - People from the general public who are looking for daily weather updates, forecasts, and other information relating to the weather. They need a public access gateway that is accessible and full of information.
- Industries:
 - Many different industries, including agriculture, transportation, and emergency services, are reliant on the application for obtaining meteorological data in order to guide their operations and decision-making processes.

Design and Implementation Constraints:

- CURL Library Dependency:
 - The code relies on the CURL library for making HTTP requests to retrieve weather data from external APIs. Any changes or issues with the CURL library could impact the functionality of the program.
- External API Reliability:
 - The code interacts with external weather APIs (e.g., weatherapi.com and pagasa.dost.gov.ph) to fetch weather data. Reliability and availability of these external APIs are beyond the control of the program and may affect data retrieval.
- Internet Connectivity:
 - The program requires an active internet connection to fetch real-time weather data from external APIs. Any disruptions in internet connectivity could lead to data retrieval failures
- API Key Dependency:
 - The code relies on an API key stored in a file ("API_KEY.txt") to access external weather APIs. The security and management of this API key are essential, and any unauthorized access or key expiration could lead to disruptions.
- JSON Parsing:
 - The code heavily depends on parsing JSON data retrieved from external APIs. Any changes in the JSON structure or response format of the APIs could lead to parsing errors and require code adjustments.

- Localization:
 - The program currently focuses on weather data for the Philippines. Expanding support for other regions or languages may require modifications to the code and access to appropriate APIs.
- User-friendly Interface:
 - The user interface needs to have a high level of usability and be easily accessible to people with a wide range of levels of technical skill. In addition, the program relies on a Graphical User Interface (GUI), which is suitable for all users or use cases.
- Updates and Maintenance:
 - Regular updates and maintenance are required to address changes in external APIs, bug fixes, and user feedback.

Assumptions and Dependencies:

- Data Sources:
 - The program uses data from external data sources accessible via weather APIs. It expects that data from these sources will be available and reliable in order to offer accurate and up-to-date weather information.
- Network Connectivity:
 - The program relies on steady network connectivity to guarantee real-time data transmission and access to external data sources. This connectivity is critical for retrieving data from external weather APIs and ensuring users have access to the most up-to-date weather information.

System Features and Requirements

Functional Requirements:

Current Weather		
Input	Process	Output
The user enters a location from the [Search location] bar	The program first checks if the weather data is already stored in its database. Otherwise, the program initiates an API call to obtain the latest weather information. Then, it processes and organizes it for displaying the data.	The program then displays the 24-hour weather forecast including the location, date, time, weather condition, temperature, humidity, visibility, atmospheric pressure, precipitation, and wind speed.

Historical Weather Data		
Input	Process	Output
<p>The user will input their desired location from the [Search location] bar.</p> <p>The user can access the weather forecast for the next following day by clicking the 'Next' or 'Previous' button.</p>	The program initiates by searching its database for the requested weather data based on the user-provided location and date. If the data exists in the database, it retrieves it. Otherwise, the program makes an API call to acquire the weather data and store it in the database.	<p>The program then displays the 24-hour weather forecast including the location, date, time, weather condition, temperature, humidity, visibility, atmospheric pressure, precipitation, and wind speed.</p> <p>The program will also display the aforementioned data for the next or previous days.</p>

Customizable Locations		
Input	Process	Output
The user will input their desired location from the [Search location] bar.	The program initiates a search in its database for the weather data related to specified location. If the data exists in the database, it retrieves it. Otherwise, the	The program then displays the 24-hour weather forecast including the location, date, time, weather condition, temperature, humidity, visibility, atmospheric

	program proceeds to make an API call request to obtain the weather data and store it in the database.	pressure, precipitation, and wind speed.
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Alerts		
Input	Process	Output
The user will input their desired location from the [Search location] and then click the bell icon beside the search bar.	The program proceeds to search the database for any existing local weather alert data. If the data is available, it retrieves it. Otherwise, the program triggers an API request to fetch the latest local weather alerts and store it in the database.	The program displays a comprehensive and up-to-date information of the local weather alerts.

Non-Functional Requirements

The system's primary objective is to provide users with real-time weather updates, historical weather records, and forecasts, all while adhering to stringent quality standards and industry best practices. This section outlines the non-functional requirements of Advanced Weather Recording System:

1. Performance
 - With the least amount of delay possible, the system should reply to user requests and show real-time data.
 - It ought to be able to manage several concurrent users.
2. Scalability
 - Scalability should be automated and seamless.
3. Reliability
 - To make sure the weather data is always accessible, the system should have a high level of availability.
 - To reduce downtime, it should be built with redundancy and failover approaches.
4. Compliance
 - Standards set by the industry for gathering and reporting weather data should be followed by the system.

- It ought to abide by privacy and data protection rules.
5. Usability
 - The user interface needs to be simple to use and open to a variety of users, including researchers, meteorologists, and the general public.
 6. Maintainability
 - The system's codebase should follow coding standards and be well-documented.
 - New weather data sources and technologies should be simple to integrate.
 7. Cost-effectiveness
 - To reduce operating expenses, the system should be built to maximize resource consumption.
 8. Load Testing
 - To make sure it can handle the anticipated user traffic and data volume, the system needs to be put through load testing.
 9. Data Integrity and Accuracy
 - The system must maintain the integrity and accuracy of weather data throughout its lifecycle.
 - It should have mechanisms in place to detect and handle data anomalies or errors, ensuring that users can rely on the information provided.
 10. Secure APIs and Data Interchange
 - The system should employ secure communication protocols and data interchange formats for APIs used to access weather data.
 - It should ensure that data transfers between different system components or external systems are encrypted and protected against data tampering or interception.

User Interface Requirements

User interface requirements are essential to ensure that the system is user-friendly, accessible, and provides a seamless experience for a wide range of users. Here are some key user interface requirements for the Advanced Weather Recording System:

1. Intuitive User Interface
 - The menu dashboard should provide an easily accessible view of current weather conditions, forecasts, and relevant alerts.
2. Location-Based Weather Information
 - Users should easily select and switch between different geographical locations to access weather data for specific areas.

- The system should support geolocation to automatically detect and display weather information for the user's current location.
3. Alerts and Notifications
 - Users should receive timely and relevant weather alerts and notifications, including severe weather warnings.
 4. Historical Data Access
 - Users should have access to historical weather data for analysis and research.
 - Users can specify their preferred date and display the weather data.
 5. Real-Time Updates
 - The system should provide real-time updates of weather conditions, with the ability to refresh data at regular intervals or upon user request.
 6. Search Functionality
 - Implement a robust search feature that enables users to quickly find specific locations, weather conditions, or historical data.
 7. Seamless Navigation Experience
 - Allows users to move between different parts of the system, including the menu, in a smooth and intuitive manner.
 - Navigation is user-friendly and does not require users to struggle or search for options, enhancing their overall experience with the system.
 8. Performance Optimization
 - Optimize the interface for speed and efficiency, ensuring quick load times and minimal resource consumption.

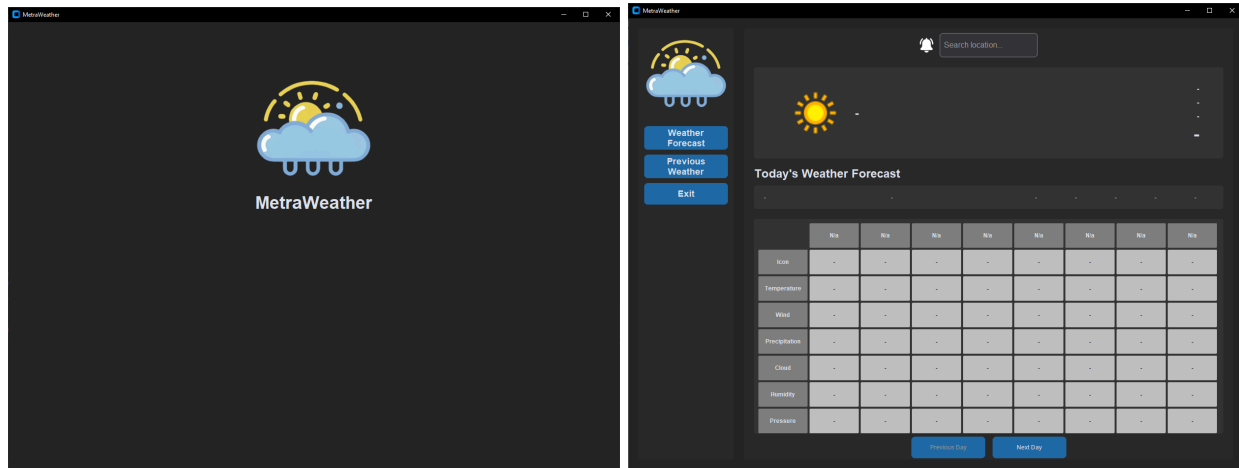
Hardware and Software Requirements

The hardware and software requirements for Advanced Weather Recording System can vary depending on the system's scale, complexity, and the specific needs of users as well as stakeholders. Below are general hardware and software requirements for the system:

- Hardware requirements:
 1. Network Infrastructure
 - High-speed and reliable internet connectivity to ensure timely data updates and user interactions.
 2. Server Infrastructure

- Sufficient RAM to accommodate the caching and processing of large datasets.
 - Adequate storage capacity for storing historical weather data and system backups.
3. Storage Solutions
 - High-capacity storage devices or network-attached storage (NAS) for storing weather data archives.
 4. Data Centers
 - Considering hosting the system in data centers with robust security, cooling, and power backup facilities for maximum uptime.
 5. Monitoring and Security Hardwares
 - Hardware-based firewall and intrusion detection systems to protect against cyber threats.
 - Network monitoring hardware and software for real-time system performance monitoring.
- Software requirements:
 1. Operating System
 - Reliable and secure operating like Windows.
 2. Integrated Development Environment
 - PyCharm as an integrated development environment (IDE) for writing, editing, and debugging Python code. Make sure to have PyCharm installed and properly configured.
 - Datagrip as an IDE for databases. It is designed to work with databases locally, on a server, in the cloud.
 3. Programming Language
 - The code is written in Python Language. Below are some of the key libraries and components used in the code:
 - Standard Python Libraries
 - CURL Library
 - JSON Library
 - Windows API
 4. Development and Collaboration Tools
 - Version control systems, code repository, collaboration platforms to facilitate development and team communication.
 - Github
 - Google Drive

Program Testing



Main Menu

Feature 1: Display Current Weather Condition

Preconditions:

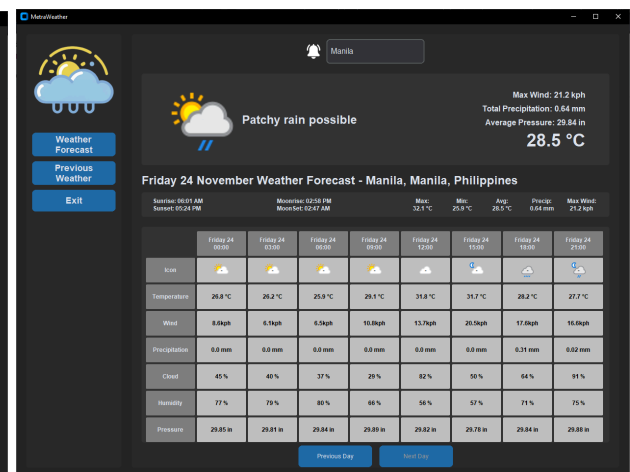
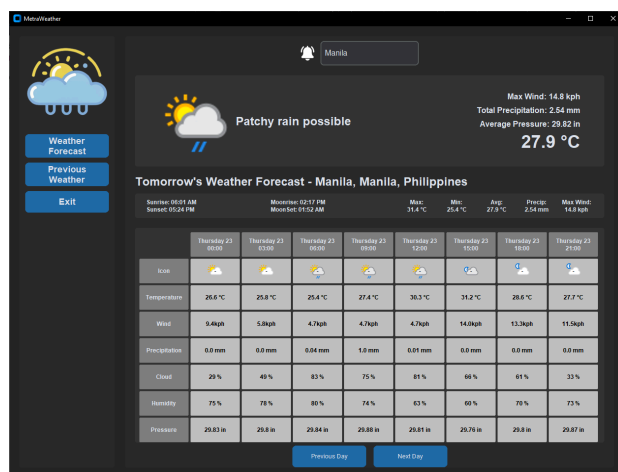
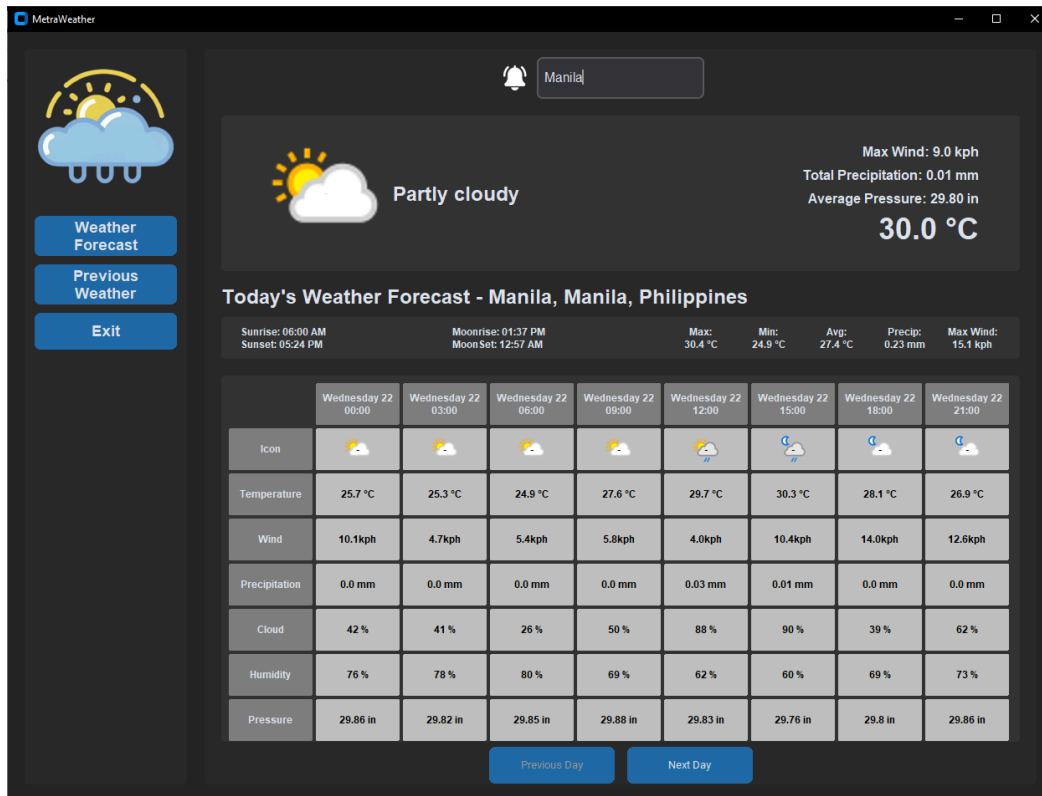
1. The user should have all the necessary packages installed.
2. The user should have a stable internet connection.

Test Steps:

1. Run the executable file.
2. Click [Search location] and type the desired location.
3. The user can access the weather forecast for the following day by clicking the "Next Day" button.

Expected Results:

1. The current weather condition is displayed.
2. The forecast for the next following day is displayed.



Postconditions:

1. If this feature is run the first time on a specific day, the system will download the data and store it into the database weather_data folder.

	location_id	name	country	region
1	1	Manila	Philippines	Manila

	forecast_id :	location_id :	date :	max_temp :	min_temp :	avg_temp :	total_precipitation :	max_wind_speed :
454	454	1	2023-11-22	30.5	24.7	27.3	0.39	13.7

Variations:

1. Current Weather forecast
2. Next following day forecast

Feature 2: Historical Weather Data

Preconditions:

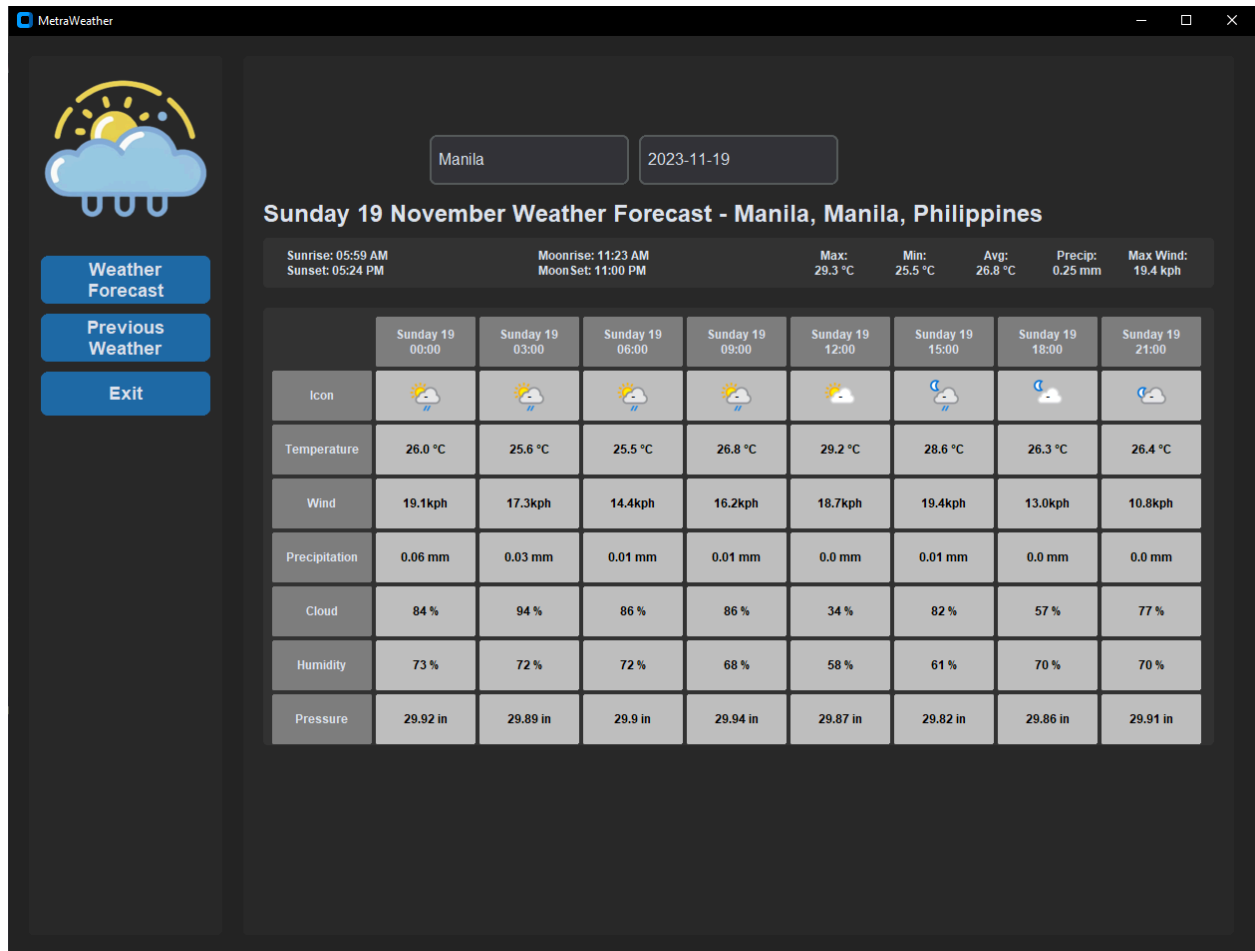
1. The user should have all the necessary packages installed.
2. The user should have a stable internet connection.

Test Steps:

1. Run the executable file.
2. Choose option Previous Weather.
3. Click and search from the [Search location] bar and provide the date from [Date: YYYY-MM-DD] bar

Expected Results:

1. The weather conditions are displayed at three-hour intervals.



Postconditions:

1. If this feature is run the first time on a specific day, the system will download the data and store it into the database weather_data folder.

	location_id	name	country	region
1	1	Manila	Philippines	Manila

	forecast_id	location_id	date	max_temp	min_temp	avg_temp	total_precipitation	max_wind_speed
1	1	1	2023-11-19	30.4	25.4	27.3	0.2	19.8

	condition_id :	forecast_id :	time :	temperature :	wind_speed :	precipitation :	cloud_cover :	humidity :	pressure :	icon :
1	1	1	2023-11-19 00:00	26.6	16.2	0.06	78	73	29.92	//cdn.weatherapi.com/weather/64x64/night/176...
2	2	1	2023-11-19 01:00	26.4	17.3	0.04	80	73	29.9	//cdn.weatherapi.com/weather/64x64/night/176...
3	3	1	2023-11-19 02:00	26.3	18	0.02	71	72	29.89	//cdn.weatherapi.com/weather/64x64/night/176...
4	4	1	2023-11-19 03:00	26.2	17.6	0.02	84	72	29.88	//cdn.weatherapi.com/weather/64x64/night/176...
5	5	1	2023-11-19 04:00	26.1	15.8	0.03	75	72	29.88	//cdn.weatherapi.com/weather/64x64/night/176...
6	6	1	2023-11-19 05:00	25.7	12.6	0.02	52	73	29.89	//cdn.weatherapi.com/weather/64x64/night/176...
7	7	1	2023-11-19 06:00	25.4	11.5	0	52	74	29.91	//cdn.weatherapi.com/weather/64x64/day/116.png
8	8	1	2023-11-19 07:00	25.9	11.5	0	42	72	29.92	//cdn.weatherapi.com/weather/64x64/day/116.png
9	9	1	2023-11-19 08:00	27	13.3	0	59	66	29.94	//cdn.weatherapi.com/weather/64x64/day/116.png
10	10	1	2023-11-19 09:00	28	14.4	0	52	61	29.94	//cdn.weatherapi.com/weather/64x64/day/116.png
11	11	1	2023-11-19 10:00	29	14.4	0	38	58	29.93	//cdn.weatherapi.com/weather/64x64/day/116.png
12	12	1	2023-11-19 11:00	29.7	13.3	0	46	56	29.89	//cdn.weatherapi.com/weather/64x64/day/116.png
13	13	1	2023-11-19 12:00	30.1	14.4	0	56	55	29.87	//cdn.weatherapi.com/weather/64x64/day/116.png
14	14	1	2023-11-19 13:00	30.4	16.6	0	57	55	29.85	//cdn.weatherapi.com/weather/64x64/day/116.png
15	15	1	2023-11-19 14:00	30.2	18	0	50	56	29.83	//cdn.weatherapi.com/weather/64x64/day/116.png
16	16	1	2023-11-19 15:00	29.6	18.7	0	31	58	29.83	//cdn.weatherapi.com/weather/64x64/day/116.png
17	17	1	2023-11-19 16:00	28.6	19.8	0	34	62	29.83	//cdn.weatherapi.com/weather/64x64/day/116.png
18	18	1	2023-11-19 17:00	27.5	17.6	0	28	66	29.85	//cdn.weatherapi.com/weather/64x64/day/116.png
19	19	1	2023-11-19 18:00	26.7	15.5	0	23	68	29.86	//cdn.weatherapi.com/weather/64x64/night/113...
20	20	1	2023-11-19 19:00	26.4	13.7	0	23	69	29.88	//cdn.weatherapi.com/weather/64x64/night/113...
21	21	1	2023-11-19 20:00	26.3	11.9	0	30	70	29.9	//cdn.weatherapi.com/weather/64x64/night/116...
22	22	1	2023-11-19 21:00	26.1	11.2	0	42	71	29.9	//cdn.weatherapi.com/weather/64x64/night/116...
23	23	1	2023-11-19 22:00	27	3.6	0	25	70	29.88	//cdn.weatherapi.com/weather/64x64/night/116...
24	24	1	2023-11-19 23:00	25.8	6.8	0	38	72	29.89	//cdn.weatherapi.com/weather/64x64/night/116...

Variations: No variations.

Feature 3: Customizable Locations

Preconditions:

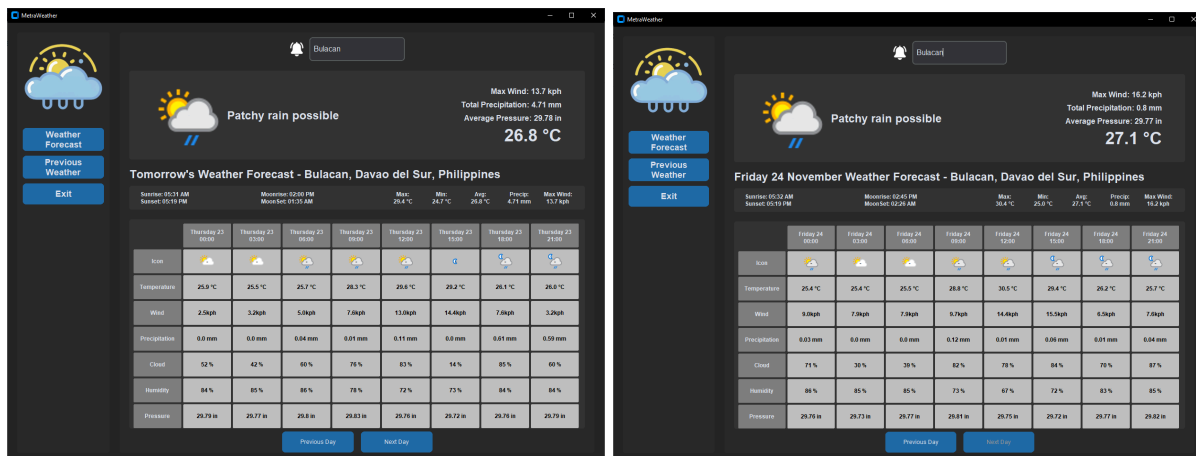
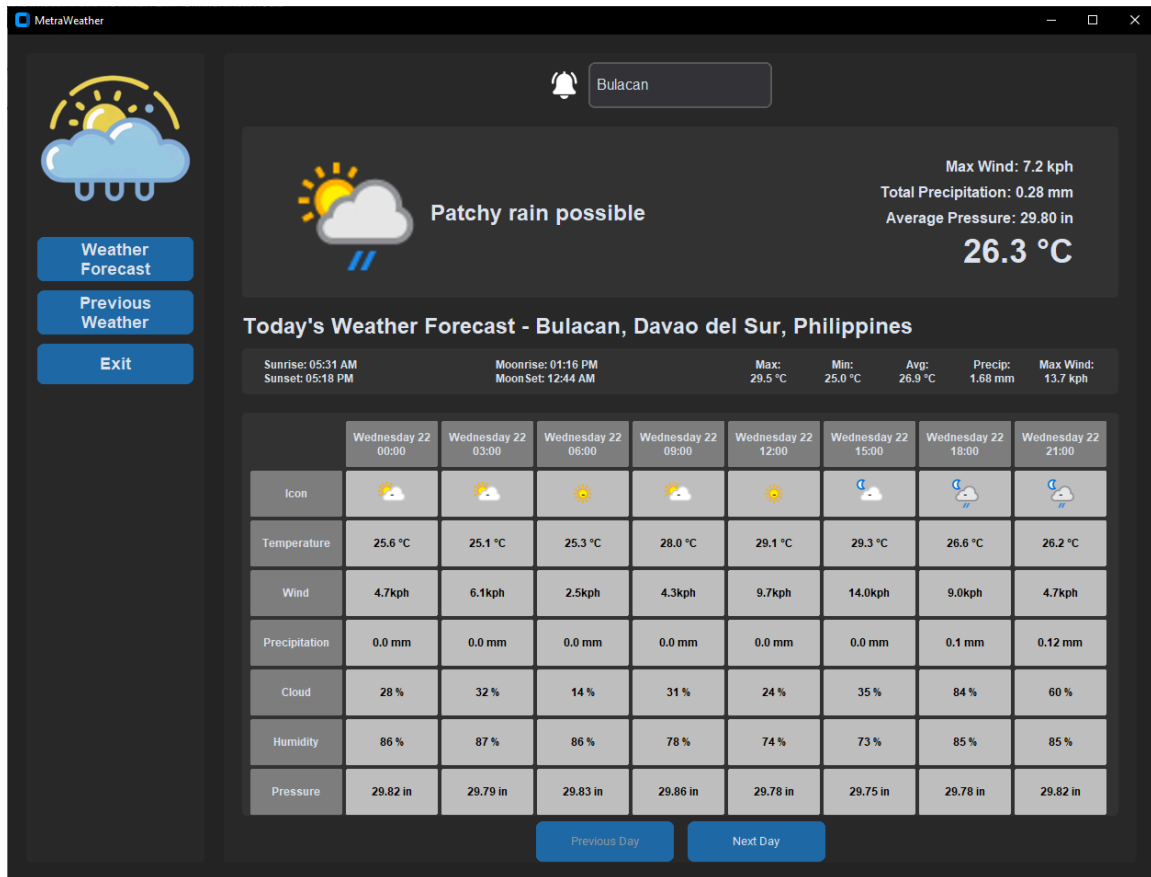
1. The user should have all the necessary packages installed.
2. The user should have a stable internet connection.

Test Steps:

1. Run the executable file.
2. Click [Search location] and type the desired location.
3. The user can access the weather forecast for the following day by clicking the “Next Day” button.

Expected Results:

1. The current weather condition of the searched location is displayed.
2. The forecast of the searched location for the next following day is displayed.



Postconditions:

1. If this feature is run the first time on a specific day, the system will download the data and store it into the database weather_data folder.

	location_id	name	country	region
5	5	Bulacan	Philippines	Davao del Sur

	forecast_id	location_id	date	max_temp	min_temp	avg_temp	total_precipitation	max_wind_speed
32	32	5	2023-11-22	29.4	24.5	26.7	1.28	12.2
33	33	5	2023-11-23	29.3	24.8	26.8	0.12	12.6
34	34	5	2023-11-24	29.7	24.6	26.1	0.41	14.4
35	35	5	2023-11-25	29.6	24.6	26.6	0.5	14.8

Variations:

1. Current Weather forecast
2. Next following day forecast

Feature 4: Check Alerts

Preconditions:

1. The user should have all the necessary packages installed.
2. The user should have a stable internet connection.

Test Steps:

1. Run the executable file.
2. Click [Search location] and type the desired location.
3. Click the bell icon beside the search location bar.

Expected Results:

1. If the location entered is valid, the system will display alert details if there are. Otherwise, no alert feedback will be displayed.

Weather Forecast

Previous Weather

Exit

Clear

Max Wind: 30.6 kph
Total Precipitation: 0.0 mm
Average Pressure: 30.13 in
1.2 °C

Today's Weather Forecast - Sumatra, Montana, USA United States of America

Sunrise: 07:22 AM
Sunset: 04:30 PM

Moonrise: 02:20 PM
Moonset: 01:31 AM

Max: 7.5 °C
Min: 0.2 °C
Avg: 3.2 °C
Precip: 1.38 mm
Max Wind: 35.3 kph

	Wednesday 22 00:00	Wednesday 22 03:00	Wednesday 22 06:00	Wednesday 22 09:00	Wednesday 22 12:00	Wednesday 22 15:00	Wednesday 22 18:00	Wednesday 22 21:00
Icon								
Temperature	3.1 °C	1.7 °C	0.2 °C	0.5 °C	6.7 °C	7.4 °C	4.2 °C	2.1 °C
Wind	30.2kph	32.0kph	22.3kph	16.2kph	33.5kph	28.1kph	22.7kph	18.7kph
Precipitation	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	1.38 mm
Cloud	0 %	0 %	33 %	1 %	68 %	41 %	100 %	100 %
Humidity	71 %	75 %	80 %	77 %	50 %	48 %	72 %	93 %
Pressure	30.14 in	30.13 in	30.15 in	30.16 in	30.11 in	30.08 in	30.11 in	30.18 in

Previous Day

Next Day

Alerts

Headline: Winter Storm Watch issued November 21 at 2:23PM MST until November 24 at 5:00PM MST by NWS

Severity: Moderate

Urgency: Future

Areas: Northern Big Horn; Northern Carbon; Northern Stillwater; Southern Rosebud; Southwestern Yellowstone

Event: Winter Storm Watch

Description: ...WINTER STORM WATCH REMAINS IN EFFECT FROM LATE WEDNESDAY NIGHT THROUGH FRIDAY AFTERNOON...

* WHAT...Heavy snow possible. Total snow accumulations between 3 and 7 inches possible. Heaviest snow south of Billings.

* WHERE...Northern Big Horn, Northern Carbon, Northern Stillwater, Southwestern Yellowstone, and Southern Rosebud.

* WHEN...From late Wednesday night through Friday afternoon.

* IMPACTS...Untreated roads, and especially bridges and overpasses, may become slick and hazardous. Hazardous conditions could impact Thanksgiving day and Friday travel. This includes travel on I-90.

Instruction: Monitor the latest forecasts for updates on this situation. Persons should consider traveling earlier or delaying travel. If travel is absolutely necessary during the watch period, drive with extreme caution. Consider taking a winter storm kit along with you, including such items as tire chains, booster cables, flashlight, shovel, blankets and extra clothing. Also take water, a first aid kit, and anything else that would help you survive in case you become stranded.

Weather Forecast

Previous Weather

Exit

Partly cloudy

Max Wind: 9.0 kph

Total Precipitation: 0.0 mm

Average Pressure: 29.83 in

29.0 °C

Today's Weather Forecast - Manila, Manila, Philippines

Sunrise: 06:00 AM

Sunset: 05:24 PM

Moonrise: 01:37 PM

MoonSet: 12:57 AM

Max: 30.7 °C

Min: 24.9 °C

Avg: 27.4 °C

Precip: 0.12 mm

Max Wind: 16.6 kph

	Wednesday 22 00:00	Wednesday 22 03:00	Wednesday 22 06:00	Wednesday 22 09:00	Wednesday 22 12:00	Wednesday 22 15:00	Wednesday 22 18:00	Wednesday 22 21:00
Icon								
Temperature	25.7 °C	25.3 °C	24.9 °C	27.6 °C	30.2 °C	30.7 °C	28.1 °C	26.6 °C
Wind	10.1kph	4.7kph	5.4kph	5.8kph	3.6kph	7.9kph	15.5kph	13.3kph
Precipitation	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.01 mm	0.02 mm	0.0 mm	0.0 mm
Cloud	42 %	41 %	26 %	50 %	72 %	90 %	24 %	32 %
Humidity	76 %	78 %	80 %	69 %	59 %	58 %	68 %	72 %
Pressure	29.86 in	29.82 in	29.85 in	29.88 in	29.82 in	29.76 in	29.8 in	29.85 in

Previous Day

Next Day

Postconditions:


1. If options 4.1 and 4.2 are run the first time, the system will download the data into the database alerts folder. This automatically creates a new file with a filename, specific date, and .json extension.

	location_id	name	country	region
1	1	Manila	Philippines	Manila

	location_id	name	country	region
49	49	Abrantes	Portugal	Santarem
50	50	Bulag Sur	Philippines	Ilocos Sur
51	51	Lubang	Philippines	Mindoro Occ...
52	52	Africa	Mexico	Puebla
53	53	Zamboanga	Philippines	Zamboanga
54	54	Sumatra	USA United...	Montana

Variations: No variations

Program Loop Control and Error Handling in Main Program:



No Location Found

No Location Found