**USE CASE DIAGRAMS DOCUMENTATION FOR FORECASTING SYSTEM**

# **USE CASE #1**

**Actor(s):** Meteorologist

**Goal:** To check the accuracy of the weather forecasts by comparing the forecasted conditions with the actual conditions

**Trigger(s):** Actor wants to ensure the end user gets accurate information

**1. Forecast Accuracy { Scenario Name }**

**Actor checks forecast validity:**

The actor checks previous day(s) forecasts and checks with the National Weather Service website to determine validity of forecasts

**System update:**

System pulls up the forecasts for the period of time requested

**USE CASE #2**

**Actor(s):** User (most likely software engineer)

**Goal:** To ensure the links for the data are active and the calculations are correct

**Trigger(s):** Old data is downloaded or incorrect is downloaded or a numerical value is off

# **2. System maintenance { Scenario Name }**

**User update:**

User goes through the code to check the links for the data download are correct and ensures the calculations are correct by verifying with a Meteorologist.

**System Update:**

The system takes the updated information and outputs the correct values.

**USE CASE #3**

**Actor(s):** User (The Customer)

**Goal:** To Check about the weather history

**Trigger(s):** Displays all the weather history for past 30 days

**3. Customer Checks weather history { Scenario Name }**

**Customer checks :**

User asks for the weather history

**System Displays:**

The system takes the user selection and displays the weather history for the selected period (assuming 30 days history in our system)

**USE CASE #4**

**Actor(s):** User (The Customer)

**Goal:** To Check about the extended forecast for next 18 hours to 3 days or morning , afternoon , evening night

**Trigger(s):** Displays all the weather forecast for the next 18 hours to 3 days or morning , afternoon , evening night

**4. Customer checks about the extended forecast { Scenario Name }**

**Customer checks:**

User asks for the extended forecast

**System Displays the output:**

The system takes the user selection and displays the extended forecast for hourly basis or daily or for next 3 days

**USE CASE #5**

**Actor(s):** User (The Customer/ Students)

**Goal:** To Check about the weather conditions at NEIU

**Trigger(s):** Displays all the weather conditions at NEIU for the selected period

**5. Customer checks about the weather conditions at NEIU { Scenario Name }**

**User checks:**

User asks for the weather conditions and gives the location as NEIU

**System Displays the output:**

The system takes the user selection and displays the weather conditions at NEIU.

**USE CASE #6**

**Actor(s):** User (The Customer)

**Goal:** To Check about the full weather conditions like temperature , current wind speed and range , humidity levels, storm conditions , chance of precipitation

**Trigger(s):** Displays the full weather conditions

**6. Customer checks about the full weather conditions { Scenario Name }**

**User checks:**

User asks for the full weather conditions

**System displays the user’s selection results:**

The system takes the user’s selection and displays the full weather conditions like temperature, current wind speed and range, humidity levels, storm conditions, chance of precipitation.

**USE CASE #7**

**Actor(s):** User (The Customer)

**Goal:** To Check about the current wind speed and range

**Trigger(s):** Displays the results of current wind speed and range

**7. Customer checks about the current wind speed and range { Scenario Name }**

**User checks:**

User asks for the results of current wind speed and range

**System displays the user’s selection results:**

The system takes the user’s selection and displays the current wind speed and range

**USE CASE #8**

**Actor(s):** User (The Customer)

**Goal:** To Check about the current temperature

**Trigger(s):** Displays the results of current temperature

**8. Customer checks about the current temperature { Scenario Name }**

**User checks:**

User asks for the results of current temperature

**System displays the user’s selection results:**

The system takes the user’s selection and displays the temperature

**USE CASE #9**

**Actor(s):** User (The Customer)

**Goal:** To Check about the sky conditions

**Trigger(s):** Displays the results of sky conditions

**9. Customer checks about the sky conditions { Scenario Name }**

**User checks:**

User asks for the results of sky conditions

**System displays the user’s selection results:**

The system takes the user’s selection and displays the sky conditions

**USE CASE #10**

**Actor(s):** User (The Customer)

**Goal:** To Check about the humidity levels

**Trigger(s):** Displays the results of humidity levels

**10. Customer checks about the humidity levels { Scenario Name }**

**User checks:**

User asks for the results of humidity levels

**System displays the user’s selection results:**

The system takes the user’s selection and displays the humidity levels

**USE CASE #11**

**Actor(s):** User (The Customer)

**Goal:** To Check about the storm conditions

**Trigger(s):** Displays the results of storm conditions

**11. Customer checks about the storm conditions { Scenario Name }**

**User checks:**

User asks for the results of storm conditions

**System displays the user’s selection results:**

The system takes the user’s selection and displays the storm conditions

**USE CASE #12**

**Actor(s):** User (The Customer)

**Goal:** To Check about the chance of precipitation

**Trigger(s):** Displays the results of chance of precipitation

**12. Customer checks about the chance of precipitation { Scenario Name }**

**User checks:**

User asks for the results of chance of precipitation

**System displays the user’s selection results:**

The system takes the user’s selection and displays the chance of precipitation

**TEST STEPS**

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|  | **DESCRIPTION** | **EXPECTED** | **DERIVED FROM** |
| 1 | The actor checks previous day(s) forecasts and checks with the National Weather Service website to determine validity of forecasts | System pulls up the forecasts for the period of time requested | Scenario # 1 |
| 2 | User goes through the code to check the links for the data download are correct and ensures the calculations are correct by verifying with a Meteorologist. | The system takes the updated information and outputs the correct values. | Scenario # 2 |
| 3 | User asks for the weather history | The system takes the user selection and displays the weather history for the selected period (assuming 30 days history in our system) | Scenario # 3 |
| 4 | User asks for the extended forecast | The system takes the user selection and displays the extended forecast for hourly basis or daily or for next 3 days | Scenario # 4 |
| 5 | User asks for the weather conditions and gives the location as NEIU | The system takes the user selection and displays the weather conditions at NEIU. | Scenario # 5 |
| 6 | User asks for the full weather conditions | The system takes the user’s selection and displays the full weather conditions like temperature, current wind speed and range, humidity levels, storm conditions, chance of precipitation. | Scenario # 6 |
| 7 | User asks for the results of current wind speed and range | The system takes the user’s selection and displays the current wind speed and range | Scenario # 7 |
| 8 | User asks for the results of current temperature | The system takes the user’s selection and displays the temperature | Scenario # 8 |
| 9 | User asks for the results of sky conditions | The system takes the user’s selection and displays the sky conditions | Scenario # 9 |
| 10 | User asks for the results of humidity levels | The system takes the user’s selection and displays the humidity levels | Scenario # 10 |
| 11 | User asks for the results of storm conditions | The system takes the user’s selection and displays the storm conditions | Scenario # 11 |
| 12 | User asks for the results of chance of precipitation | The system takes the user’s selection and displays the chance of precipitation | Scenario # 12 |

**Glossary**

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| --- | --- |
| TERMS | DEFINITIONS |
| Air Pressure | Cumulative force exerted on any surface by the molecules composing of air. |
| CAPE | Convective available potential energy. Amount of energy a parcel of air would have if lifted a certain distance vertically through the atmosphere. Larger the value over 0, the more potential energy there is available and storms will build vertically quickly. This is also used to assess the potential for large hail, amount of lightning in a storm, and potential for pockets of very heavy rain. |
| CIN | Convective Inhibition. Region where a parcel of air if raised will sink back down again. This is also known as the capping layer and inhibits storms from forming. In order for storms to form, this layer must be broken. Daytime heating usually erodes this cap. Larger the value, larger the cap on the atmosphere. |
| Dew Point | Temperature to which air must be cooled at constant pressure to achieve saturation. Has to be above 32 °F. |
| Dew Point Depression | Difference between the temperature and dewpoint of a sample of air. Lower values means the relative humidity is going to be higher. |
| Freezing Level | Level in the atmosphere that represents the freezing point of water at 0 °C. |
| Instability | A condition in which air will rise freely on its own due to positive buoyancy. Air in the lower atmosphere will lift until it’s less dense than the surrounding air. Once it’s less dense, it will rise on its own. The condition of the atmosphere when thunderstorms and severe weather can occur. |
| K Index | Index to assess convective potential. Values above 15 equates to a better convective potential. Higher the values, better chance of seeing storms if they do form. |
| Lifted Index | Index used to assess instability in the lower part of the atmosphere. Values above 0 indicate a stable atmosphere. A stable atmosphere is not conductive for producing storms. Values below 0 equates to larger amounts of instability. |
| MB | Stands for millibars. Used to represent atmospheric air pressure. Sea level pressure is defined as 1000 mb. Going up in the atmosphere, the pressure levels decreases. The main levels Meteorologist look at for forecasting are 850, 700, 500, and 300 for various parameters such as wind, moisture and temperature to aid in forecasting the weather at the surface. |
| Relative Humidity | Is how close an air sample is to saturation at a specific temperature. |
| Saturation | The atmosphere is considered saturated when the humidity is 100%. This means the air cannot hold anymore water. |
| Saturation Vapor | Point where vapor pressure is saturated. |
| Showalter Index | Index used to assess 850 mb air parcel instability. A negative value indicates an environment where convection can occur. More negative the value, more unstable the environment is. |
| Sweat Index | Determines the likeliness of severe weather and tornadoes. Variables over 150 equates to a better chance of seeing severe weather if storms do form. |
| Total Totals | A parameter used to assess storm strength. Values above 44 equates to thunderstorms. The larger the value, the stronger the storms if they do form. |
| Vapor Pressure | Portion of the total air pressure exerted by the water vapor in a sample of air. |
| Water Vapor | Is the gas phase of water. Produced from the evaporation of liquid water and aids in the formation of clouds. |

Submitted by:

Dilusha Harischandra

Efren Ulloa

Emmanuel Raguay

Lalitha Vedula

Rob Niesen