Distributed System Proposal (Weather Reporting System)

# Overview/Introduction

The use of weather reporting in day-to-day life is very important. Its utilization could greatly influence the outcome of a scenario. It could be something as simple as deciding whether you should take your umbrella on your way out, or even as major as handling cultural operations, agriculture and farming or livestock protection implementations.

With Sri Lanka’s weather rapidly varying, weather can transition from largely homogeneous temperatures to torrential rain in a heartbeat. With the adaptation of unexpectedly frequent changes, it is crucial to make sure to be prepared.

Sri Lanka is liable to prevailing and predictable effects of climate change. Preceding natural disasters (such as tsunamis, floods, landslides, droughts and cyclones) can greatly substantiate this. Profoundly weather-sensitive sectors in Sri Lanka include transport, agriculture, construction, energy and disaster risk management.

It is important to note that even with weather stations, live broadcasts and television/radio stations existent, not all are aware of the continuously differentiating weather conditions.

The impacts and effects of climate change could invite climate change-induced hazards and disasters. The unawareness of weather reports may affect the lives of many. Thousands of citizens are prone to being affected by the threat of climate change. They may find themselves in life threatening situations.

It is abundantly clear that weather forecasting reports are essential to mitigate the effects civilians getting caught in a severe crisis.

# Objectives

Our project will have:

1. A Web Application
2. A Mobile Application

Web Application -

The web application will consist of functionalities such as uploading pictures, geo-tagging, ability to search location and get temperature. During the implementation of the following features, we will be doing extensive research on technologies such as getting weather information in real-time. Furthermore, users will be able to receive notifications regarding weather alerts, e.g: earthquake alerts, floods alerts, rain alerts, etc. Through all this, we aim to provide a user friendly and a simplistic design. With guidance of HCI principle we have learnt, we will be putting them to practice so that any person regardless of age can easily access it.

Mobile Application -

Uploading pictures:

User’s can upload pictures, which then can determine the weather around the area of the person who is uploading the image. This might help you and also other people who will be willing o reach your area.

Ability to search locations:

With this function it would be easy for all users to search up a location that would be of their convenience and search for the weather around the specified area. The weather in the area you are going to visit can be searched up within seconds so it would save the trouble of not knowing any unpredictable weather.

# Target Users

1. General Public –

Weather forecasting is important when it comes to protecting life and property. It plays a role in providing an early warning for a possible life-threatening hazard. A substantial amount of end users for weather forecasting applications are the general public. Many aspects of the general public’s life are influenced by the weather. Hazardous weather conditions such as thunderstorms or lightning strikes can cause power outages or even lead to deaths. Weather forecasting aids citizens in planning their day or week. When citizens get an idea on what type of weather is supposedly expected, they can prepare on how to dress accordingly.

Weather forecasting would help businesses plan in advance with regards to transportation hazards that can result from severe weather. This also relates to flying and driving.

1. Agricultural Sector Employees -

With over 30% of Sri Lankan citizens employed in the agricultural sector, this dominant economic force plays a main role in reducing poverty. Contributing 7.4% to the national GDP, it is unquestionable that Agriculture is an immensely important area in the Sri Lankan economy in terms of employment for the majority of the Sri Lankan workforce.

Weather forecasting enacts a compelling impact on the agriculture industry. This is because weather forecasting knowledge drives an agriculturist’s business decisions, aiding them with efficient planning decisions and cost minimizations. As a result, this would help in maximizing profits.

1. Transport Sector Employees –

Transport Sector employees heavily rely on weather forecasting as the weather could affect daily operational decisions. Decisions can revolve around the amount of cargo that a plane or the repercussions of flooding, high winds and wet surfaces. Delivery reliabilities, considerable competence and transit time can all be affected by adverse impacts from weather conditions. When it comes to the safety, reliability, efficiency and operations of transport systems, it is crucial that weather forecasting conditions must be taken into consideration.

• The App ensures that info is being sent and received

• Simplistic features help users to engage with the App more efficiently

• Colorful UI entices users to use the app more

# Application Features and Description

* HCI principles:

What is HCI?

HCI stands for Human-Computer Interface, HCI is basic analysis of representation of technology that will be seen by humans and how humans and computers interact with the simplest way possible.

HCI principles cover the basic ways that computers and humans can come in contact and help themselves with the required task. HCI principles plays a major role with the frontend development of any designing, in this specific scenario we will be using it as a means to create a contact point of our app and the users of the app.

* Simplicity:

What is simplicity?

Simplicity is removing unnecessary information and adding only the needed specific information or data to make the user understand the product easily as possible.

Why we used simplicity as a point of design for this app will be because this app will be producing information that will be needed to the general public, which means that this information will be accessed by many people ranging from any age category.

* Simple use of English

English is a language that can be used globally, most countries take a responsibility to teach growing kids’ English language as a secondary language that is mandatory, therefore, we thought of using simple English Language as the base language for this project. With the simple use of English anybody who has even the slightest knowledge of English can understand this.

* Resource sharing.

What is Resource sharing?

Co-operating and sharing materials and other information with other parties and keeping a track on them.

We will make resource sharing a part of this app, it will be used to share images of weather around your surrounding areas and with this it will get uploaded and other people can view this information and use it for their advantage. You will be helping out people and in return their will be other people who will be supporting you.

* Openness:

What is openness?

Openness is being unbolted about how can make use of an entity for your convenience.

With our app you don’t have to sign up or sign in, this system will be for the public because knowing information such as the weather is important, and it is used almost every day by many people, and it would be inconvenient for people to check it quickly if you have to keep signing in and signing up to check the weather.

* Concurrency:

What is concurrency?

It means when there are multiple estimations are happening at a specified or same time.

With our app it will be multiple running and finding you the needed weather as well trying to check for any images uploaded by users, also will be providing you with pleasing to the eye designing and navigation within the app.

* Scalability:

What is scalability?

Scalability is a measurement that can be taken to check for increment or decrement of your project’s performance and changes.

To check the scalability of our project we will be doing various testing for the project and adding needed functionalities and if the time factor is within our advantage we will try and add more functionalities to increase the performance of the project and to make a better statement of our project.

* Fault Tolerance:

What is fault tolerance?

Fault tolerance is when your system is showing malfunctions or faults it should have another means to work properly even when these faults are at hand.

To overcome this issue, we will be using load balancing to maintain user requests and also have backups if one system is to go down so we can have backup as running the requests.

* Transparency:

What is transparency in a distributed system?

Transparency means not showing how the distributed components works and to hide it from the end users.

There are many types of transparencies that can be added to a distributed system to hide the distributed system nature to the users and some of these transparency types can be Access transparency, location transparency, concurrency transparency, fault transparency. Some of these transparencies will be added into our system to make sure that user only interacts with the UI properly.

* User mobility:

What is user mobility?

The ability to use the same software in different locations from different hardware components.

We have user mobility for our application, we will be using flutter as our coding base therefore, it will be compatible for both IOS system and android system. And people can access this application from anywhere because it is open to the public and can be accessed as long as the app is in your device for your use.

* Performance:

Performance of our app can only be determined with the help of the users and with testing of our app, we will carry out several tests for the app which then we can come to the conclusion of our overall performance.

* User interface to the file system be simple and number of commands should be as small as possible:

This simplicity will help even the people who are not from our generations to use the app, with simplicity as a key principle it would help the older generation of people to get used to the system and even the very young generation to check the weather with the least number of steps and to easily navigate throughout the entire app.

* High availability:

What is high availability?

It is a system that drops out faults and keeps the systems running for extended period of time.

This can be done by creating a cluster of servers and making sure to backup the system into these servers so even if their a fault in one part it can be eliminated with the help of the rest of the servers and keep the application running continuously.

* High reliability:

What is high reliability?

Maintaining proper safety and quality throughout the assistance for extended time.

With this app it will be less prone to faults and it be of major advantage for the app to be a success.

# Application Technologies with proper Justifications

Front End

• Flutter using Dart

Back End

\* Firebase Online DB

\* NGINX and Node JS

API’s

\* Google Maps API (enables Geo Tagging)

\* Other API’s

# Time Frame

Gantt chart

Table

Description automatically generated with low confidence

Project plan

|  |  |
| --- | --- |
| Planning | Description |
| Frontend designing | We will implement HCI principles, simple use of English. |
| Research | Research regarding similar projects and also research with new functionalities to be added. |
| Web Application and App | Web Application and App design and development will begin after frontend design is taken into regards. |
| Design | Design documents (UI, Architecture, Database) |
| Implementation of frontend | Website – With the research and implementation of HCI principles, we will integrate and execute the required principles and research into the frontend. |
| App – Similar concept will be followed for the app as well. |
| Implementation of backend | Website – researching efficient storing mechanisms, properly server and client research, use of API’s and more. |
| App – Similar protocols will be followed accordingly from the website. |
| Testing | Three stages of testing will be allocated to the project – integration testing, unit testing and system testing. |
| Maintenance | Any possible new functionalities, possible cost reductions, new idea implementations and bug fixing to get a proper working project. |
| Report | Documentation of the process of the project, future implementations will be added to the report. Detailed diagrammatic representation will also be included. |

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