CP3407- Advanced Software Engineering

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ITERATION-1 OF AGILE SOFTWARE DEVELOPMENT

Initial project specifications including goals, deliverables, and planning for iteration-2

Contents

[Project Scope 3](#_Toc524442518)

[Justification 3](#_Toc524442519)

[Scope 3](#_Toc524442520)

[Deliverables and Milestones 4](#_Toc524442521)

[Limits and Exclusions 5](#_Toc524442522)

[Project Team 6](#_Toc524442523)

[Agile Positions 6](#_Toc524442524)

[Product Owner 6](#_Toc524442525)

[Scrum Master 6](#_Toc524442526)

[Development Team 6](#_Toc524442527)

[Contributions 6](#_Toc524442528)

[Abdalnasser Zamara 6](#_Toc524442529)

[Alex Carlos Silva and Jacob Negri 6](#_Toc524442530)

[Heylon White 7](#_Toc524442531)

[Responsibility matrix 7](#_Toc524442532)

[Weather station user stories 8](#_Toc524442533)

[User Story 1 8](#_Toc524442534)

[User Story 2 8](#_Toc524442535)

[User Story 3 8](#_Toc524442536)

[User Story 4 8](#_Toc524442537)

[User Story 5 8](#_Toc524442538)

[User Story 6 8](#_Toc524442539)

[User Story 7 9](#_Toc524442540)

[User Story 8 9](#_Toc524442541)

[User Story 9 9](#_Toc524442542)

[User Story 10 9](#_Toc524442543)

[User Story 11 9](#_Toc524442544)

[User Story 12 9](#_Toc524442545)

[User Story 13 9](#_Toc524442546)

[User Story 14 10](#_Toc524442547)

[User Story 15 10](#_Toc524442548)

[User story 16 10](#_Toc524442549)

[User story 17 10](#_Toc524442550)

# Project Scope

## Justification

Weather forecasts are developed by using current atmospheric data such as the temperature, humidity and wind conditions and previously studied atmospheric understanding to deliver a future weather forecast. The National Weather Service wishes to collect information from remote areas to help with weather forecasting, forecast accuracy assessment and climate change modelling.

The main method for data collection used on hard to reach sites has been manual ie, by sending people to those remote stations and have them collect the data manually. This method has proved to be very expensive and very time consuming. Some areas that are hard to reach did not have weather forecasts, making for an expensive inefficient method.

Recent advances in sensors and micro controls have allowed for the development of remote automatic collection systems. These systems are connected to a border weather information system and work individually without regular supervision to collect and send the required data to right person in his or her office.

## Scope

A weather station is a device that collects data related to the weather and the environments surrounding it, using an array of advanced sensors. This weather station will be capable of set specifications such as windspeed condition range and wind direction, humidity, air pressure, all while being able to function without an external energy source. This means that the weather forecast station needs to be able to harness the power from its surroundings such as; solar panels, wind turbines and/or a water turbine all based on the most effective method relative to the location.

The control of this device will be done via an embedded system, which is a combination of computer and software that can be programmable and is designed for this specific device. The device will have the capability of collecting/ gathering the required data and sending it to the required personal via satellite communication and while also keeping a back up of this data, if satellite coverage does not exist in that area.

This project requires the stations’ interface design and implementation, as well as the background calculations of the data which will be done by the respective sensors. For example, a humidity sensor is required to collect and gather the humidity information of the site, and so are the rain sensors, temperature sensors and the wind sensors.

The Graphical User Interface (GUI) for this weather station simulation which will be undertaken, is to be implemented using any coding language. The most relevant and appropriate software was found to be **BALSAMIQ.** Balsamiq is a wireframing tool that helps for a fast and efficient reproduction/ sketch of the, to be made software, graphical interface. The choice of simulation software also offers an easy detailed design that can be quickly shared online which is a major requirement for this project. Github was also utilised throughout this group project for its great cloud sharing benefits such as the sharing of all project documentation and programmed code.

Some back up features that are to be developed within this weather station are such as; data backup onto an available hard drive housed within the weather station. Secondly, a continuous monitor and upload type of system that allows the data to be monitored when required to ensure correct functionality of the station. Also, the station will have at least one external power source as expressed earlier as well as a battery that can last the station for weeks at a time in case of damage to those external power sources.

Thus, the two main features of this station will be;

1. The Green external power source which is backed up be a battery that is rechargeable via that power source, making the system completely autonomous.
2. The continuous backup and upload of all the data to ensure the correct data is being obtained.

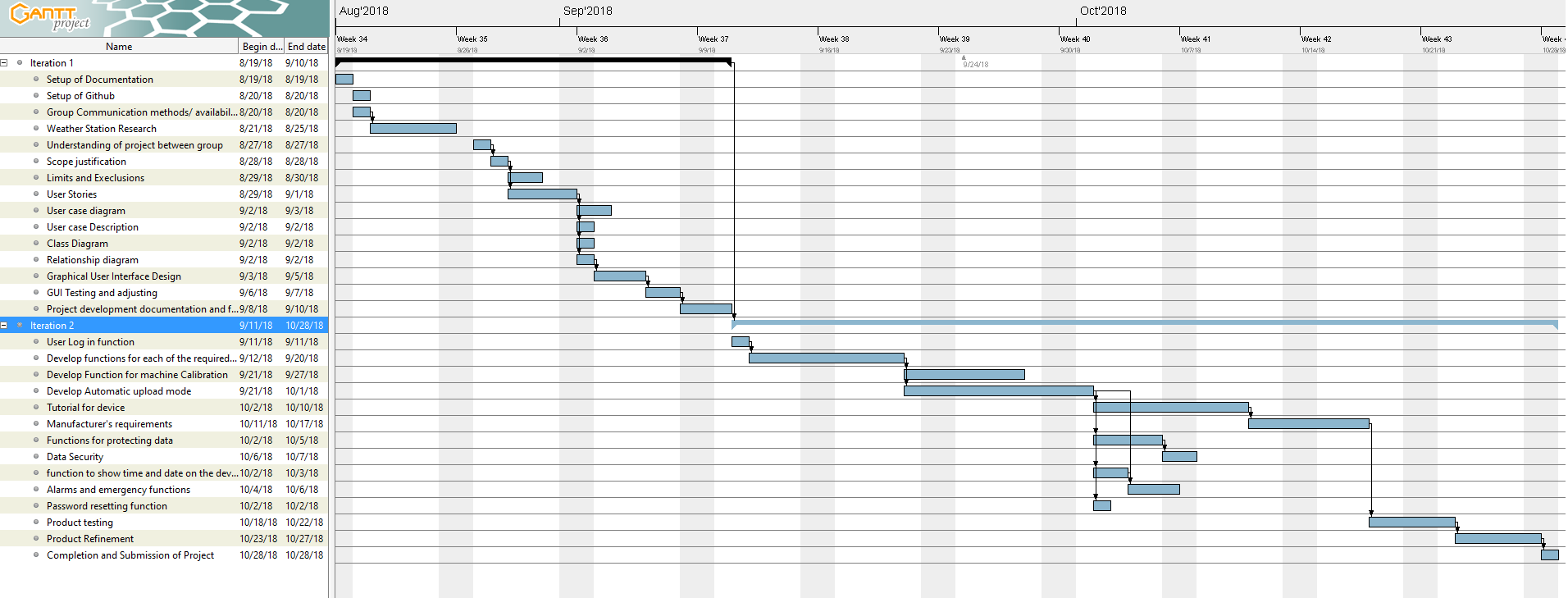
## Deliverables and Milestones

To ensure the success of this project, the outline of the final deliverables are:

1. An executable file, that opens a window which houses an emulation of the designed weather station interface and functionality.
2. A final report attached with this executable discussing the file/station.

To ensure full functionality and operation of the system, a set of predetermined date that simulates the data to be collected, which will be loaded onto the executable file/ Graphical interface and the designed emulator will be tested for robustness and the viability and workings of all features.

A set of expected milestones for this project have been shown in figure 1. The Gantt shows all the tasks that require completion, the duration of each task and the expected finish date.



## Limits and Exclusions

The Limits and Exclusions of this weather station project extend to it being completely 100% digital, meaning everything including the data used will be virtually simulated and hypothetical. No physical hardware will be manufactured and implemented, and any problems caused by the physical hardware side have not been considered throughout this project.

# Project Team

## Agile Positions

### Product Owner

Abdalnasser Zamara was nominated as the main product owner due to his familiarity with the weather station project and his communication input in the team. The Product Owner is responsible for maximizing the value of the product. Thus, a product owner represents all stakeholders and the any requirements and concerns that arise from stakeholder’s perspective and from the customers perspective.

A product owner becomes the voice of concern of the costumers, meaning he or she will focus on the development of the weather station and ensure that all deadlines and milestones are met to maximise return.

### Scrum Master

Jacob Negri was elected by the group as the scrum master. His main role will be as advisor to other team members throughout development. A scrum master is known as the facilitator for an agile development team.

He allows the team to stay organised and ensures that when problems arise that they are dealt with smoothly and changes are done quickly and in accordance with agile principles. Jacob was elected for this role as he understands the amount of time and effort required to carry out the proposed features of the weather station and he will ensure that the development team deliver a successful project.

### Development Team

The development team will be lead by Alex Carlos Silva and Heylon White. The two were elected to lead the development team for their high technical expertise in this field. As well as being able to ensure the work is completed on time and at the end of each sprint. The development team is the main force of the weather station as they will ensure all work is done to the best possible outcome and they will ensure on time delivery.

## Contributions

### Abdalnasser Zamara

The role Abdalnasser was nominated to oversee was a major role in the development of the weather station, with his knowledge of the required outcome he oversaw the fine tunning of the program as well as ensuring the user has a friendly interface that displays all required information.

### Alex Carlos Silva and Jacob Negri

Jacob Negri and Alex were the two main driving forces behind the development of a working software and a usable station interface. They were both in charge of ensuring all user requirements are met and ensured that all the required features were included in the final submission of the project.

### Heylon White

Heylon took on the role of project manager as well as supervising the incoming documents from all group members. He allowed for easy collaboration through the incorporation of google docs and ensured the project was carried out successfully and efficiently.

## Responsibility matrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task/Element | Duration (days) | Zamara | Silva | White | Negri |
| Setup of Documentation | 1 | X |  |  |  |
| Setup of Github | 1 |  |  | X |  |
| Group Communication methods/ availability | 1 | X |  |  | X |
| Weather Station Research | 5 | X |  |  |  |
| Understanding of project between group | 1 | X | X | X | X |
| Scope justification | 1 |  | X | X | X |
| Limits and Exclusions | 2 |  | X |  |  |
| User Stories | 4 | X |  | X |  |
| User case diagram | 2 |  | X |  | X |
| User case Description | 1 |  | X |  | X |
| Class Diagram | 1 |  | X | X | X |
| Relationship diagram | 1 |  |  | X |  |
| Graphical User Interface Design | 3 | X | X | X | X |
| GUI Testing and adjusting | 2 | X |  |  | X |
| Project development documentation and finalising documentation | 3 | X | X | X | X |
| User Log in function | 1 |  | X | X |  |
| Develop functions for each of the required sensors to be used | 7 | X | X | X | X |
| Develop Function for machine Calibration | 5 |  |  | X | X |
| Develop Automatic upload mode | 7 |  | X |  | X |
| Tutorial for device | 9 | X |  |  |  |
| Manufacturer's requirements | 7 |  | X |  |  |
| Functions for protecting data | 4 |  |  |  | X |
| Data Security | 2 |  |  | X |  |
| function to show time and date on the device | 2 |  |  |  | X |
| Alarms and emergency functions | 3 |  | X |  |  |
| Password resetting function | 1 |  | X |  |  |
| Product testing | 5 | X | X | X | X |
| Product Refinement | 5 |  | X | X | X |
| Completion and Submission of Project | 1 | X | X | X | X |

# Weather station user stories

|  |  |
| --- | --- |
| Minimum allocated time | Maximum allocated time |
| 12 weeks \* 4 members \* 1 day/week = 48 days | 12 weeks \* 4 members \* 3 days/week = 144 days |

## User Story 1

The government wishes to have a collection of weather stations with embedded software

Priority: High

Time: 2 days

## User Story 2

The government wants the weather stations to be able to collect parameters such as: Wind speed, Wind direction, Ground Temperature, Air Temperature, Barometric pressure, 24 hours rainfall totals.

Priority: High

Time: 5 days

## User Story 3

The government wants each weather station to transmit all observed weather data via satellite to a centralised weather information system.

All data should be transmitted even if satellite dropouts occur.

Priority: High

Time: 5 days

## User Story 4

Every weather station is to be rugged and have a completely self-contained power system. I.E. Each weather station must contain its own power source, and generation system.

Priority: High

Time: 3 days

## User Story 5

The weather station is to test its own measuring instruments periodically to ensure they’re all functioning.

Time: 2 days

Priority: Medium

## User Story 6

External conditions are to be monitored continuously to ensure the weather station is able to operate safely. If unsafe conditions occur, the weather station should temporarily shut down.

Time: 3 days

Priority: Medium

## User Story 7

A weather satellite should receive weather data from individual weather stations and rebroadcast it to a weather information system.

Time: 2 days

Priority: High

## User Story 8

The weather information system will process and organise all received data into a format where it can be stored in a relational database.

Time: 3 days

Priority: High

## User Story 9

As a user of the weather system, I’d like to have collected information displayed on a Graphical User Interface in the form of a Desktop application.

Time: 5 days

Priority: High

## User Story 10

The Desktop application should interface with the database to retrieve weather information necessary for viewing

Time: 3 days

Priority: High

## User Story 11

As a user I’d like to see a live view of the weather data with the most recent update from the weather satellite.

Time: 5 days

Priority: High

## User Story 12

As a user I’d like to view the historical min/max weather values for a given weather station on a daily/weekly/monthly time frame

Time: 3 days

Priority: Medium

## User Story 13

As a user I’d like to generate a report of past collected weather data for a given weather station

Time: 3 days

Priority: Low

## User Story 14

As a user, I’d like the GUI to contain a list of all selectable weather stations to view.

Time: 1 day

Priority: High

## User Story 15

As a user, I’d like a basic map of all weather stations attached to the weather system that allows me to click on a weather station to view it

Time: 5 days

Priority: Low

## User story 16

As an administrative user, I’d like to have a login page that provides access to weather station management features

Time: 5 days

Priority: Medium

## User story 17

A management screen should provide details such as problems with weather stations to an administrative user

Time: 2 days

Priority: Medium

Project Development

The project will require a huge amount of collaboration and communication over the entirety of the project life cycle to ensure its success and the yield of useful outcomes. The main communication method to be used throughout the life of the project were:

Facebook Messenger, this was mainly used for on the go communication and for quick method of finding the person required and asking them any set of question regarding the project.

The project matrix shown was also used to allow for a better understanding of the person to contact with regard to specific tasks and also showed which person is responsible for what.

OneDrive and Google Docs were heavily used throughout the proposal and initial design report. They allowed for collaborative and quick document editing as well as allowing all group member to work on the report at once.

The link for the documents are shown :

<https://1drv.ms/w/s!AgVDcrR2YRQsgqIq5E7OnxKaKi8qTQ>

<https://drive.google.com/folderview?id=1VHRrT-j1ZHMCpdnor5zPJW_njrKKOfZN>

The Second part of this project will require ongoing use of Github for version control and configuration management. A choice in programming language will be made based on the team's overall experience with programming and which language is more suitable for making a well presented Graphical User interface.

<https://github.com/HeylonNHP/CP3407-Group01-Project>

This Github repo link shown will be heavily used throughout the second part of the project. It will be utilised as it allows for branches to exist. This is very useful as you can store one original code and while doing so still have another code to work on. It also giver a vast variety of functionality that will be very useful for this project.