By

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**Software Engineering Group Report CMP020N204S**

# Abstract

Working together for 12 weeks was one of the requirements for the module for Software Engineering, where groups were formed at earlier weeks to complete a project. The project was based on creating a website which was a CRUD application (create, read, update, and delete), following the agile method. The journey for the group was divided into four sprints where each had its requirements, deadlines and also struggles. Through these trails, we not only learned the technical skills necessary to build the functional application but also deep insights into the dynamics of working in a agile way. This report will highlight the process of learning and also give a reflection from the entire group, allowing you to have a glimpse of our learning and dynamic as group as we share our achievements, struggles and reflections.

## Declaration

I hereby certify that this report constitutes my own work, that where the language of others is used, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of others.

I declare that this report describes the original work that has not been previously presented for the award of any other degree of any other institution.

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## Introduction

This report documents the process, development, and outcomes of our semester long project aimed at creating an application that has easy access to a population database. This coursework is around 70% of our coursework, which would evaluate the collaboration between out team and how the deliverables that were made during the four sprints have been met. The goal for this project is to create a CRUD application, which is an application which the user can Create, Read, Update and Delete, using the agile method. Since we were using the agile method, the work was split into four sprints each with its own requirements, which then we had to present and get some feedback which meant our requirements changed often and therefore, as a group we had to adapt often.

This report aims to present a detailed overview, of the considerations we took as a group, and how we planned to deal with the coursework, how we dealt with, and how we learnt and adapted to any situations which was thrown at us.

### Research Question or Problem that will be Addressed

How can a CRUD application be designed to manage and be able to generate a report from the SQL database in a user-friendly manner?

### Aims

* To create a user-friendly application where users can create, read, update and delete.
* To have security, so users can be authenticated and authorised when entering the website.
* Have a working robust programme.
* To meet the requirements of each sprint.

### Objectives

To be able to achieve our aims we first created a Kanban board, a Kanban board is where all the tasks that are needed to achieve aims are created.

However other objectives include:

* Design and implement a web-based interface using PUG for front-end development.
* Integrate a Node.js server with and Express.js framework to handle back-end operations.
* Making sure the database is accessible to the user to use the data from the database.
* Add a login page so not just anyone can use the data and change the data.

### Legal, Social, Ethical and Professional Considerations

The project had a lot of considerations that we needed to keep in mind, especially as group of students, it was important that everything was considered when working, as although there weren’t any real legal, social and ethical considerations, as the data was that was given was used for everyone with the same coursework, it was important to note them for future references.

One of the legal considerations that we took notice off at first would have been the data protection laws. As we know any data is essentially protected by the law, the one law I would specifically talk about would be UK GDPR and Data Protection Act 2018 which states how the data must be processed lawfully, fairly, and in a transparent manner and how data must be processed in a manner that has enough security such as encryption and be used in a legal manner [1]. Although this specific law does not matter with the data that we used as it was not a data that was about a person but about the populations and the language of regions, countries, and continents, it is still important to keep in mind when using and manipulating data.

One of the social considerations that we took upon would be how the data might be used. The data provided is an SQL file which can be used using XAMPP, however we are not sure how reliable the data is, because we do not know what year the data was collected, what kind of source was collected from, was it primary, secondary, or tertiary [2]. This means that it is not a data that can be used for other people, for example local authorities or the government would not be able to use the data to do something like resource allocation. The entire point of the data is not how reliable the data is in this specific coursework but to test out skills on how we use it to make the application a CRUD application.

Since this was not the best project to actually consider the legal and social cautions, it certainly was not the same for professional and ethical considerations. There were a lot that we considered. One of the professional ones is the way the team had to conduct themselves. As mentioned before the methodology that we are following was the agile methodology, which is a project management framework that breaks down the project in several little dynamic phases called Sprints [3]. The sprints all have different requirements which required the group to meet consistently each week, so we were able to go through the requirements and understand them, we also had the Product Backlog ready, which was done by the Product Owner, the Scrum Master then saw the prioritised task and handed them out.

One of the considerations that we had to take was how the tasks would be divided, as professionally it would make sense on giving the tasks out to the group mates which suited them, but we had to consider that Agile method requires you to work together despite the abilities that each teammate may actually have.

Another professional consideration that we had to take into account was that how we will manage the meetings, obviously that role is that of a Scrum Master, but we all had to take into account when we had classes, our other deadlines, our work and any personal activities that we had going on. In a more professional setting, our priorities would be different, but this was not the case currently. One of the ways we wanted to combat that was to be flexible during meetings, as not only have face to face meetings but also online ones, to allow better communication between the team members.

One of the ethical concerns for the application itself would be who has access to add and remove data. Looking at our user stories only some authorised people such as Admin should have access to delete or add data, but realistically due to the time frame we were not quite sure how we would be able to that. Initially we wanted to have different accounts which have different levels of authorisations to do that, but it was hard to implement that with the time frame.

Another ethical concern is the authentication, there is always going to be a security risk so it was essential that we implemented something that allowed user to login and also have some security that it would deny access to their account if the wrong username or password was entered, as you do not want just anyone be able to access the data without any authorisation and authentication.

### Background

GUIDANCE (text in blue can be deleted from your final submission)

You need to convince your examination team that your project is a viable one by answering the question -- **why is this a suitable project for an MSc Project?**

The aim of the background section is to provide the reader with the relevant contextual information necessary to understand your work. This section must be suitably referenced based on the reviews undertaken. There are two reviews that are likely to take place within this section -- a technology review and a literature review. The section concludes with a summary of the findings from the background investigation and how that **justifies** the work undertaken in your project.

Report overview

Describe the upcoming sections in order -- this provides your reader with a roadmap of the report.

## Literature or Technology Review

GUIDANCE (text in blue can be deleted from your final submission)

**Literature Review** (for research or investigation-oriented projects)

All projects should reference some academic literature, although it is primarily research-orientated projects that will conduct a significant literature review in the background section. As with the technology review, the goal here is to make it clear why the choices were made in the project. It is expected that at least the research methodology and/or evaluation approach is defined from existing sources.

**Technology Review** (for build or investigation-oriented projects)

The technology review focuses on technology that will be and could be used for the project. Typically, it is expected that you have reviewed different technology options for your project and summarised these options here. It should be clear why the technology choices taken were made.

## Design or Methodology

### Design

One of the stages when it comes to developing a software or an application is the design. There were UML (Unified Model Language) which is a general-purpose visual modelling language that is intended to provide a standard way to visualize the design of a system [4]. There are different types of UML which can be used for designing.

There were 2 types of diagrams used in the design process. A use case diagram and a class diagram. A use case diagram is useful since it allows communication with the stakeholders, so essentially is really helpful when looking at the requirements of what each user needs to be able to do with the application.

Use Case Diagram:

A Use Case diagram


Figure 1: Use Case

Figure 1 shows a use case diagram with two users, one is the ‘Staff’ and the other is the admin. As you can see from figure 1, that there are some common actions that both the staff and the user can do, but ultimately, the ‘Admin’ has more privileges such as being able to manage staff accounts while the staff would be unable to do so.

A class diagram allows the visualisation of the software architecture, which is necessary when software becomes complex, and since we were using different languages such as HTML, PUG, JavaScript, and CSS it was quite helpful to see what to star with and what functions they might have similar.

A diagram with a diagram and a diagram

Description automatically generated with medium confidence

Figure 2: Class Diagram

The objects have relationships between them, such as the country can have many regions while the regions can only have one region. This makes it easier to understand the relationships between the objects therefore make it easier when developing the programme.

### Methodology

The methodology that was chosen for this project was the Agile mythology which is known for its quick adaptation to changing requirements and continuous improvement, and we are specifically using Scrum. Scrum is a project management and group working philosophy, where your project is regularly checked to see if it is going to the right direction, which is usually done in Sprints. For us, it was broken down into four Sprints.

One of the important aspects of scrum was that for every Sprint, you took feedback and for that feedback you would then make sure to add it in for the next Sprint. Each Sprint made that out entire group reviewed, reflected and improved, which is not only essential in working with the Agile methodology but also in learning in general, where knowledge and skills are consistently tested.

## Implementation or Results

Implementation was quite hard, especially when everyone has such good ideas on what to add and what to improve.

### Evaluation

In this project a lot was achieved and a lot was not.

This was achieved…..

### Related Work

GUIDANCE (text in blue can be deleted from your final submission)

Answer the question -- **Who else has done something similar and how does my work compare?**

Another key element of this section is evaluating your work against that of others. How good is your work when compared to other people who have undertaken similar work? It is important to be able to understand how well you have achieved your goals in relation to others, while also considering the time limitations of the project.

## Conclusion

In conclusion, there was a lot that we as a team has learnt for theory, practical and about collaborating in general. Scrum method was very hard to create deliverables for due to the time constraints at the end, however it was very interesting to see how the project looked at the end.

### Reflection

For our group there is a lot we should reflect on, for this reflection I would break down to each sprint and talk about what went well and what could have gone better.

Sprint 1:

This sprint essentially very straightforward as the requirements were very simple. However, it was the first time we got exposed to GitHub and the Agile process itself, we were very used to work independently and therefore there was a lot of high expectations of each other despite not working together before. This obviously sounds like an advantage but that made us very reliant on each other as in if someone did not know hot to do this, then they will leave it up to someone who can. During this sprint, it was not sure a big deal but because we did not understand the requirements well, we missed out some points of the requirements.

During this time a lot of planning was done, and the roles were being decided, we essentially did not have any problems during this stage. The meetings were done online which fared well for the entire team, one of the reasons is that many of us had long commute times to university so this meant we were still being productive without spending time and money to come to university. So, for this sprint I would say that the group did very well, and we listened to each other and communicated effectively, the only negative in this sprint would have been to ask the lecturer or the lab assistant to clarify the requirements for sprint 1.

Sprint 2:

The sprint showed how well can the group work well together and how important face to face work was important. In this stage is where the deigns was being created. This stage was very exciting for the group as they were hoping to create something amazing. In the end they did, the wireframes and the wireframes workflow were very detailed and very good. Although we did struggle to understand use case diagram and how to create them since there were so many examples online, but they seemed so complicated, at the end we wrote a simple which we got feedback about making it more detailed which we then incorporated that feedback the next sprint.

Sprint 3:

Sprint 4:

### Future Work

GUIDANCE (text in blue can be deleted from your final submission) Answer the question -- **What next?**

You've completed a significant piece of work -- perhaps the largest piece of work you have ever done. But no project is ever 100% complete, and you will have found new ideas along the way. If someone were to pick up your project, what avenues should be explored next?

## References

[1] “CIPD | Data Protection and GDPR in the Workplace | Factsheets,” *CIPD*. <https://www.cipd.org/uk/knowledge/factsheets/data-protection-factsheet/>

[2] T. George, “What are credible sources & How to spot them | Examples,” *Scribbr*, May 31, 2023. <https://www.scribbr.com/working-with-sources/credible-sources/>

[3] S. Laoyan, “What is Agile Methodology? (A Beginner’s Guide) [2024] • Asana,” *Asana*, Feb. 02, 2024. [Online]. Available: https://asana.com/resources/agile-methodology

[4] Wikipedia contributors, “Unified modeling language,” *Wikipedia*, Apr. 28, 2024. <https://en.wikipedia.org/wiki/Unified_Modeling_Language>

For any technical input, any design materials, and any analytical information:

[kabirf3/Coursework: This the Software Engineering coursework that is divided in 4 sprints. (github.com)](https://github.com/kabirf3/Coursework)

Entering the above link and changing the branches would allow you to access anything. The ‘develop’ branch has all the design materials while the main branch has the source code.

## Appendices

GUIDANCE (text in blue can be deleted from your final submission)

Appendices appear after references. Your appendices depend on the nature of your project. **Do not assume people will read your appendices.** Even if you direct them to do so in your main text, appendices are considered additional information and should not be relied upon to understand your main body of work. Refer readers to an appendix using a phrase such as *see Appendix A for further details*.