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# 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.

### 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

Report overview

## 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 within the constricting time limit.

We were able to run the code, and this is how the user interface looked like. The search engine took typing in was not a fully functional search engine. The authorisation and the user interface were not completely added properly. The selections of all types of continents, regions, country, city and district work.

A screenshot of a computer

Description automatically generated

Figure 3: Generating Report

A screenshot of a computer

Description automatically generated

Figure 4: Filters/Sort

We also made working sort button which sorted the data with those two options shown in Figure 4.

However, although the login page was created in HTLM, it should have been translated to PUG to make the website fully work.

A screenshot of a login screen

Description automatically generated

Figure 5: Login Page

Figure 5 shows how the login page would have looked like, since it didn’t allow you to move on with a username and password. It was also a lot more user friendly but was unfortunately unable to be added at the end.

### Evaluation

In this project a lot was achieved, and a lot was not. During the designing phases everything went smoothly, with the aspects such as the wireframes and the workflow of the wireframes going very well. Improving aspects of our code and work as soon as feedback was received, was another aspect of the work that went well with this project as this meant as a group we were improving continuously.

However, one aspect that did not get well would be the ultimate goal which was creating a CRUD method, we believe that we would have been able to create the CRUD application if there was more time available, and less deadlines which stressed our other members out, this would mean that we would have a easier time to prioritise certain aspects of the project therefore make it better.

## 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. Although we were unable to complete it fully, we think that with more time and with less deadlines that needs to be done we would have at least tried to cover more of the basic requirements.

### 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:

During Sprint 3, the requirements increased and our gap in knowledge became apparent. Our group members did not know how to handle PUG, or how to run docker properly, this meant that node.js was not working.

However, the most surprising aspect of this situation would have been how it worked in one of group computers which is a MacBook and for the rest of the people it did not. That created multiple issues within the group as this meant that people were unable to access the code thus unable to code as they could not see the results.

This meant that the deliverable for this sprint within a time limit was not met. This resulted in cascades of events as the deadlines for other coursework were creeping up to us, as well as for some of group members who made deferrals for their previous modules, they not only had to deal with this semesters deadline but also the last. This made time management difficult, which overwhelmed one of group members who had to defer this module as well as her mental health started taking a toll on her physical health. This meant that that group had to reorganise themselves with the tasks that were needed to be done, taking in extra load than expected, with already bad time management and not planning previously for what might be done if someone is unable to work, the entire group was stressed out and felt extremely overworked and overwhelmed themselves.

Sprint 4:

Due to the previous problems they continued to stretch out to week 4. This meant we were unable to meet most of the criteria.

The group was unable to meet due to some peoples work, new exams they had and other commitments which also could not be pushed back. This meant that time with sprint 4 which was already limited, we were unable to make the most of it. Reflecting this as group we all believe, that over feeling overwhelmed the first time round we should have asked for intervention, to try and give ourselves some more time with everything going around. That would have allowed us to be more organized, and we do wish that we kept the good work from sprint 2 to sprint 3 and 4, however, that was not possible.

### Future Work

If the team was able to have more time with the project or someone had picked up the project more, one of the things they would have done would have been that to add the CRUD project that was needed in the application itself. Although the application only met, “R” as in the read part of the requirements it did not meet the rest of the requirements which would have been create, delete, and update. There were other parts of the design which as coded in html but needed to be changed to PUG, which allowed authorisation and had a basic design, this would have made the website look like a proper website.

Another aspect which would have been added to further improve work would have been to have different types of authorisations, such as for Admin, and staff, this would have allowed only certain users to be able to change the set of data.

To conclude, comparing the current applications with other websites such as Amazon, or even Apple’s website, this work is nowhere near good as other websites, but this goes to show how much time and effort is actually used in websites themselves and how much upkeep you actually have to make to them to make sure they are always giving the expected outputs and to make sure each part of the code has been integrated correctly.

## 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.

Coursework Specification:

[Microsoft Word - MSc Project Report Template\_v02.docx (roehampton.ac.uk)](https://moodle.roehampton.ac.uk/pluginfile.php/3613757/mod_resource/content/1/SE_CMP020N204S_GReport%20Template_Sample.pdf)