UML Report - Group 12

JAMIE MERRINS PRYCE:	18319562
ARSHAD MOHAMMED:	20334119
KEVIN MORLEY:	20334232
TOM MORONEY:	20332993
OSKAR MROZ:	20335084
ÓDHRAN MULVIIHILL:	20334326

Background Research:

We were introduced to our domain, the National Library of Ireland, just ahead of the first meeting on the 20th of September. It took time for us to understand exactly how we were going to create an Information Model design, as very few of us have used the National Library's services in the past. It was agreed that research would play a big part in our diagrams' creation.

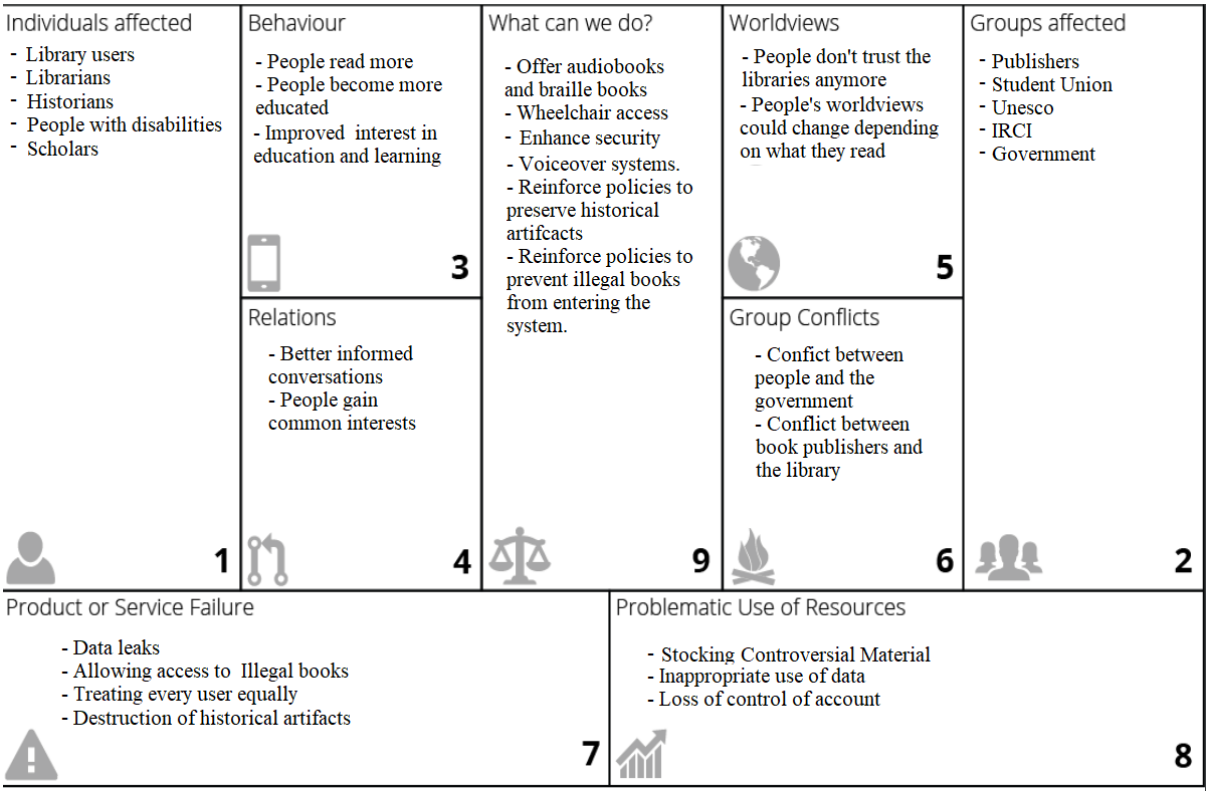
We therefore spent our first hours on the project brainstorming based on what we assumed libraries would have, and then examining the National Library's website in detail. The website would prove to be the best resource possible. It began providing us with crucial, concise information on the services they offer and enabled us to start to visualise how we were going to create the various UML diagrams.

It did not take the group long to establish communication channels, and all future discussions would take place on a Discord server. Discord made it easy for any and all of us to share ideas, plan meetings, and showcase progress made by individual members. Blackboard was primarily used to talk to our assigned demonstrator, and to evaluate our performance based on the weekly project self-assessments.

Our main task at that point was to find a suitable online platform to draw the UML diagrams. We soon found it in lucidchart.com, a free drawing tool where users can drag and drop elements onto a blank grid. UML-specific elements, such as the ovals and actors seen in a Use Case Diagram, were readily available thanks to the website, and its ability to let all members of the group collaborate simultaneously suited this project perfectly.

With the National Library researched and our methods of communication and drawing found, we got to work on the UML diagrams themselves.

Ethics Canvas:



Description of Ethical Consideration:

The Ethics Canvas was created in week 3. We collectively decided for one of our team members to open the Ethics Canvas template in Microsoft Paint and edit the values to construct our own version for the National Library.

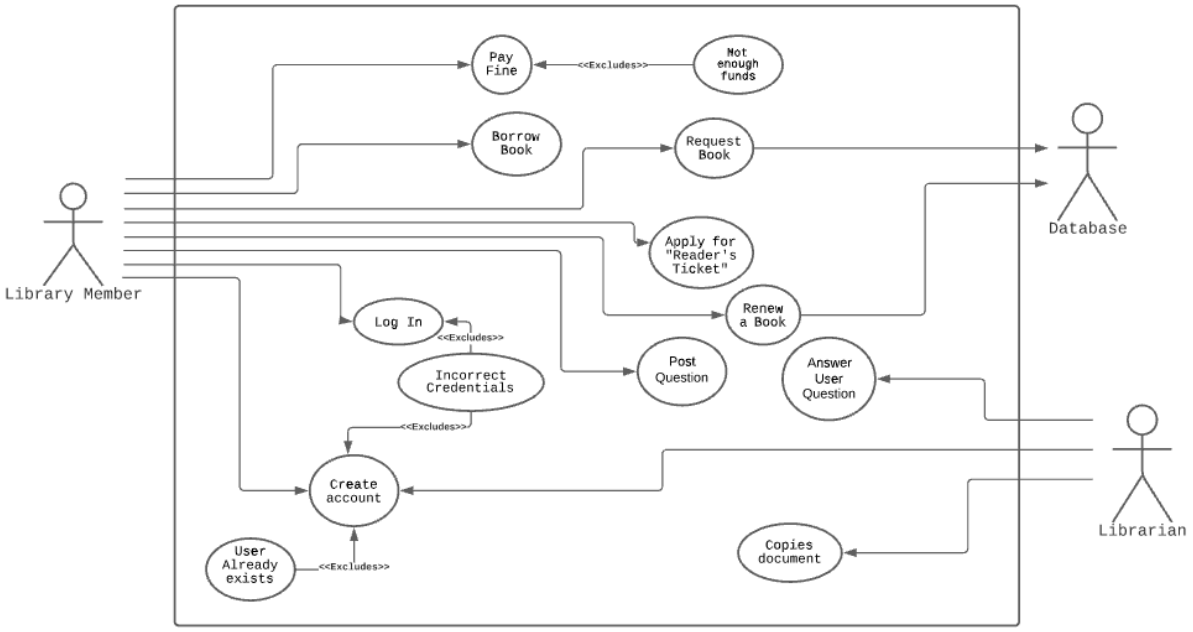
One of our initial ideas of ethical issues the National Library may encounter were cyber security breaches such as data leaks. The library users trust the National Library to store their data securely. Betraying the user's trust is generally found to be unethical. Events such as data leaks could also lead to the end user's personal information being used with malicious intent.

Another ethical issue we thought of was the leasing of unethical/illegal books. Books such as the "The Anarchist's Cookbook" (which contains recipes for bombs as opposed to meals) remain banned from the national library as it contains specific information on how to craft illegal devices that can deal serious harm to other people.

The National Library is ethically liable to support access for every citizen of Ireland equally. It should have proper support for wheelchair users, visually impaired and hard of hearing people.

Lastly, we discussed how the National Library is ethically responsible for preserving many historical documents and pieces of literature.

UML Use Case Diagram:

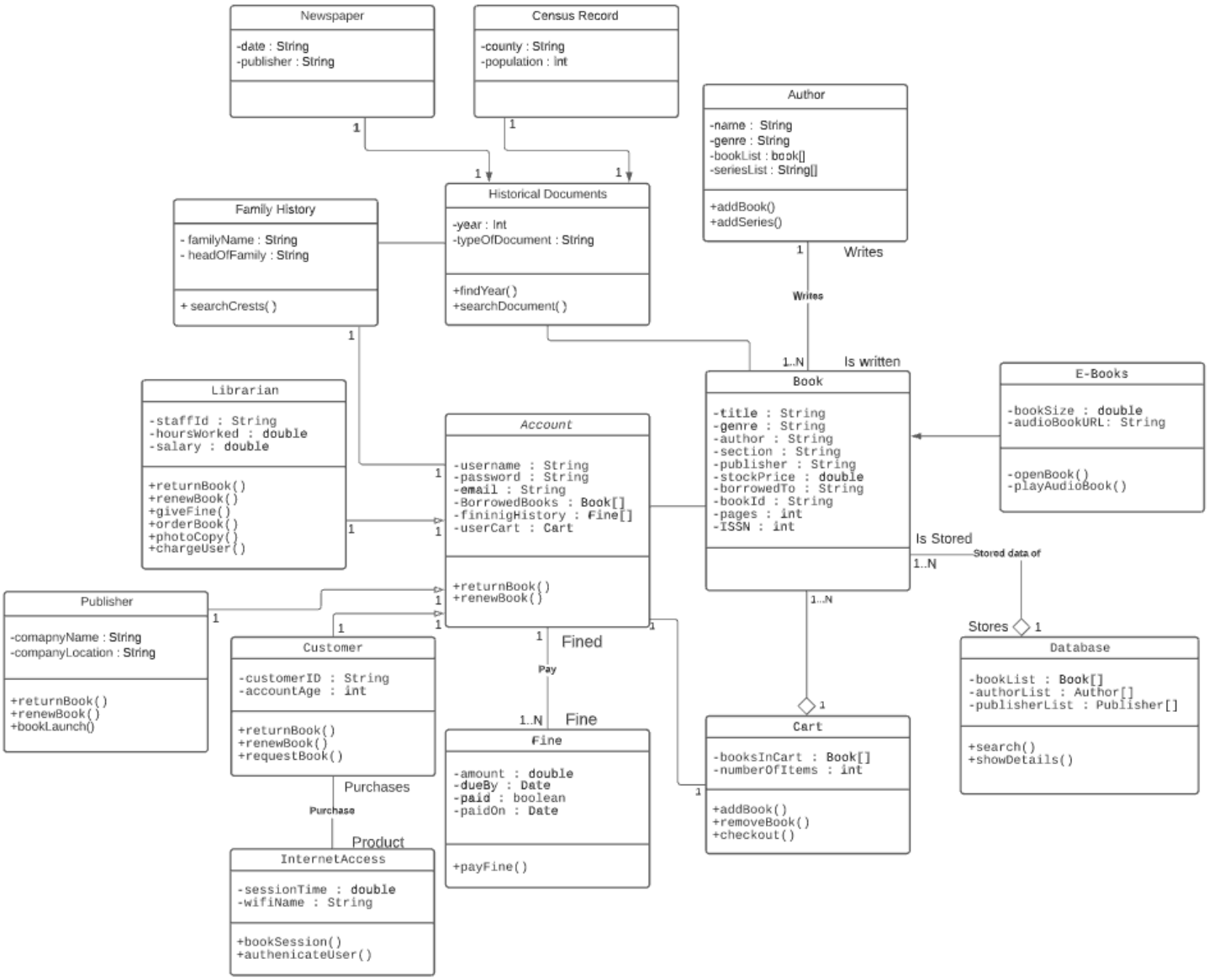


Use Case Descriptions:

Title	Description	Preconditions	Error Scenario
Pay fine	**Summary:** This use allows a user to pay any fines on overdue books. **Actors:** Users(Primary) **Creation date:** Week 2 **Version:** 1.0 **Person in charge:** Group 12	The user has fines due.	The user has insufficient funds to pay the fine.
Borrow book	**Summary:** This allows users to withdraw a book. **Actors:** Users(Primary) **Creation date:** Week 2 **Version:** 1.0 **Person in charge:** Group 12	The book is available to be borrowed.	The book is already withdrawn. The user has overdue fines.
Request book	**Summary:** This use allows a user to request a book from another library. **Actors:** Users(Primary), Database (Secondary) **Creation date:** Week 2 **Version:** 1.0 **Person in charge:** Group 12	The book isn't available at the current library.	The book isn't available at any other libraries.

Log in	**Summary:** This use allows a user access to their account. **Actors:** Users(Primary) **Creation date:** Week 2 **Version:** 1.0 **Person in charge:** Group 12	The user has an account already.	The user inputs invalid credentials.
Create account	**Summary:** This allows a user to create an account with the library. **Actors:** Users(Primary) **Creation date:** Week 2 **Version:** 1.0 **Person in charge:** Group 12	The user is eligible for an account.	The user inputs invalid credentials. (Eg. unsupported characters)
Copy document	**Summary:** This use allows a Librarian to copy any document. **Actors:** Users(Primary) **Creation date:** Week 2 **Version:** 1.0 **Person in charge:** Group 12	The librarian has a document they wish to copy.	The document is in an uncopyable file type
Renew a book	**Summary:** This use allows a user to renew any withdrawn books. **Actors:** Users(Primary) **Creation date:** Week 2 **Version:** 1.0 **Person in charge:** Group 12	The book is withdrawn by the user.	The user has fines to pay on the withdrawn book.
Apply for reader’s ticket	**Summary:** This use allows a user to apply for a reader's ticket. **Actors:** Users(Primary) **Creation date:** Week 2 **Version:** 1.0 **Person in charge:** Group 12	The user is eligible for a readers ticket.	The user already has a reader's ticket.

UML Class Diagram:



Description of Design Decisions Made:

When designing the class diagram we decided that we would need the classes to support a system that could:

- Facilitate the creation of user/librarian accounts
- Facilitate the borrowing of books
- Store the stock of books in a database
- Facilitate the payment of fines

With these constraints in mind, we started developing the class diagram. The centrepiece of the diagram are the two classes *Account* and *Book*. These two classes form the basis for much of the system.

We decided to make *Account* an abstract class that the different types of account would inherit from, rather than three completely separate account classes. This helps to simplify the system.

The other core class of the system is the *Book* class. Being a library system, the *Book* class' importance is obvious. This class has all the attributes that can be associated with a book. This is linked with a database class that stores all of the books currently stocked in the library, if they are borrowed and to whom they are borrowed.

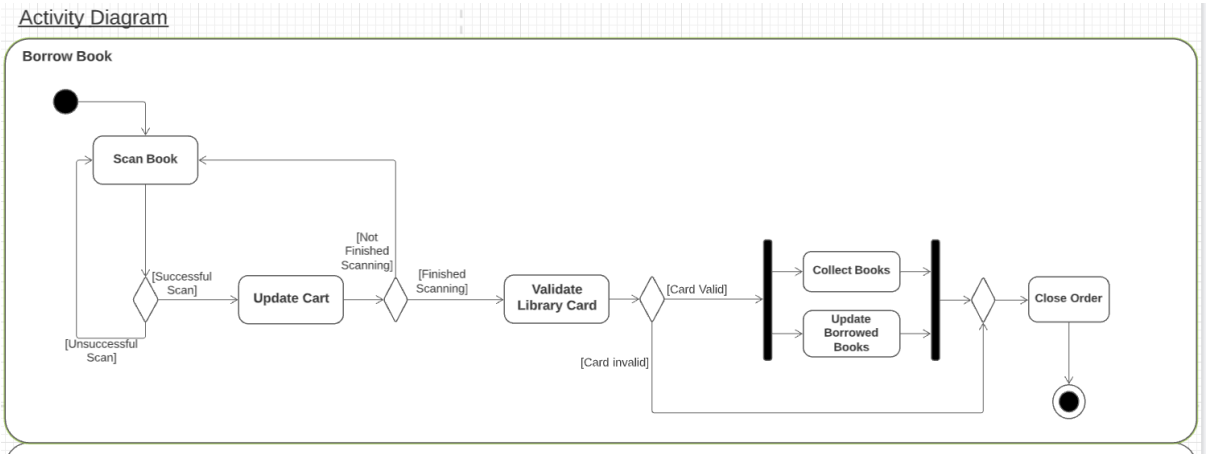
We decided to add an option to borrow an E-book. This can modernise the library, and can cater to people who prefer reading books on electronic devices. Borrowing an E-book would work similarly to a physical book, where the user would get access to it for a limited amount of time before losing access to it once the time has expired.

To facilitate the payment of fines we included a *Fine* class. This class stores the attributes that a fine would have, such as the amount to be paid, when it is due, if it has been paid and when it was paid. All fines incurred and paid are stored in an account's *finingHistory* array attribute.

We also knew from the ethics canvas that we wanted the library to store historical documents, so we included a historical documents class with what we believed to be the most interesting historical documents as two subclasses, those being the *Census records* and the *Newspaper* classes.

We also added a family history class, which was an idea we got from looking at the National Library's website. The idea is that a person could research the history of their ancestors using the census records and other documents. When an account is created, this class uses their second name to find this information.

Detailed UML Activity Diagram 1:



Title: Borrow a Book from the Library

Summary: This Use Case allows a visitor to the National Library to borrow a book from their extensive collection. They must scan their chosen book and have a valid library card to complete the interaction and borrow the book.

Actors: Library Card holder (primary), National Library system (secondary)

Flow of events

Preconditions:

- The library visitor has a valid library card.
- The scanning device is fully operational.

Use Case Description: Normal Scenario

1. The visitor to the library chooses the book they intend to borrow.
2. They scan the book at the appropriate place.
3. The scan is successful and the user's cart is updated with the book.
4. The visitor then takes out their library card for validation.
5. The validation is successful and the user can collect their book. Their status is updated in the library's system.
6. The order to borrow a book is closed - the user has borrowed the book.

Use Case Description: Error Scenario

Error sequences:

E1: scan unsuccessful

The E1 sequence starts at point 2 of the main success scenario.

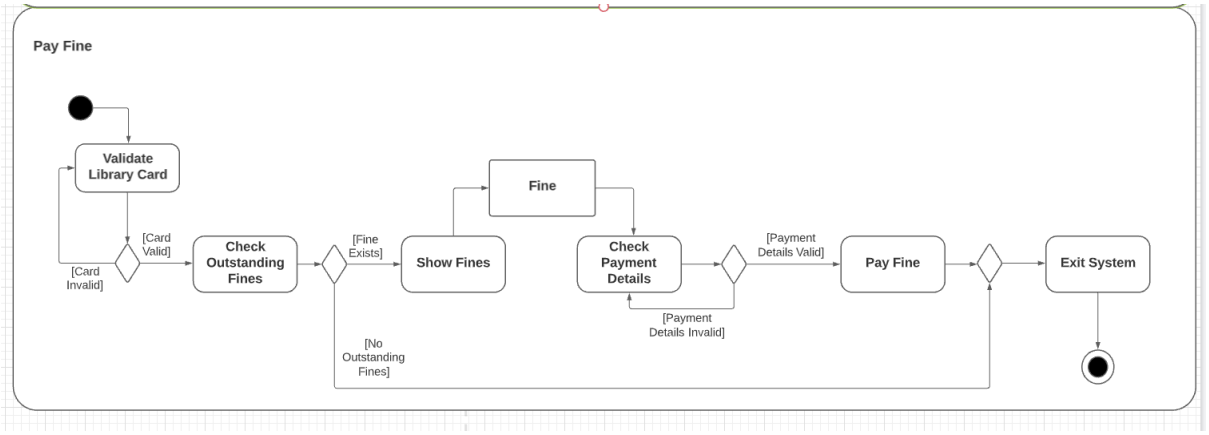
3. The scanner informs the user that scanning of the book they wished to take out has been unsuccessful. The user now has to try to scan the book again, or the use case fails.

E2: library card invalid

The E2 sequence starts at point 4 of the main success scenario.

5. The library card scan fails - the user is prevented from collecting the books and the system does not recognise the borrowing. The user closes the account; the use case fails.

Detailed UML Activity Diagram 2:



Title: Pay a Fine to the Library

Summary: This Use Case allows a visitor to the National Library to check for fines and pay a fine if they have fines outstanding. The user must validate their library card, check for any fines they may have, and go through a payment process to pay the fine.

Actors: Library Card holder (primary), National Library system (secondary)

Flow of events

Preconditions:

- The library visitor has a valid library card.
- The library card validation device is fully operational.

Use Case Description: Normal Scenario

1. The visitor to the library scans their library card at the appropriate place.
2. Their card is validated and they are able to check for outstanding fines.
3. The user is shown their fines, and starts the process to pay it off.
4. The user checks their payment details to make sure they can pay the fine.
5. The payment details are valid and the fine is paid. The user completes this action.

Use Case Description: Error Scenario

Error sequences:

E1: library card invalid

The E1 sequence starts at point 1 of the main success scenario.

2. The library card scan fails - the user is prevented from performing any further actions and the system prevents them from proceeding. The use case fails.

E2: no outstanding fines

The E2 sequence starts at point 2 of the main success scenario.

3. The user is shown that they have no outstanding fines to pay. The process is over and the use case fails.

E3: payment details invalid

The E3 sequence starts at point 4 of the main success scenario.

5. The payment details are shown to be invalid - the user cannot proceed with the payment of the fine and they can either try again or stop the whole process - the use case fails.

Who Did What:

Jamie:

- ➔ Helped create the use case diagram.
- ➔ Helped create the class diagram.
- ➔ Helped create the activity diagrams.
- ➔ Contributed to the creation of the ethics canvas.
- ➔ Wrote the class diagram description.
- ➔ Spoke during the class diagram presentation video.
- ➔ Went over and refined many parts of the report.

Arshad:

- ➔ Conducted in-depth analysis of the systems used by the national library of Ireland
- ➔ Brainstormed new ideas on different implementations of the system
- ➔ Set up communications for everyone using discord.
- ➔ Contributed to the creation of the ethics canvas.
- ➔ Curated a class diagram by negotiating with my colleagues to convey the practical elements of our system.
- ➔ Spoke during the class diagram presentation to express the functionality of each class.
- ➔ Vetting most of the class diagrams and performed some adjustments to clean up the entire system as a whole

Kevin:

- ➔ Performed key research on the National Library website.
- ➔ Instrumental with the group in the creation of the UML Diagrams, especially the Use Case Diagram.
- ➔ Aided in the brainstorming of ideas for the various aspects of the ethics canvas which ended up on the finished work.
- ➔ Helped plan the initial structure of the accompanying video presentation.
- ➔ Focused on the Final Report for this stage of the project.
- ➔ Wrote the Background Research opening section.
- ➔ Wrote the two Use Case descriptions for the Activity Diagrams.

Tom:

- ➔ Joined the rest of the group in researching how the National Library operates and the services it provides.
- ➔ Helped in meticulously crafting the necessary elements that comprise the class diagram.
- ➔ Created activity diagrams for ‘Borrow Book’ and ‘Pay Fine’ with the help of Jamie.
- ➔ Helped in brainstorming ideas for the ethics canvas.
- ➔ Finalised the class diagram, cutting out unnecessary classes and making sure that all the services of the library were covered to their full extent, correctly laid out, and easy to understand.
- ➔ Spoke in the video presentation on the class diagram to explain the functionality of each class.
- ➔ Edited the video presentation, combining the using editing software.

Oskar:

- ➔ Discussed tasks and planned for how the project would be carried out.
- ➔ Worked on the use case diagram.
- ➔ Researched various use case diagrams to understand how they work, how they are created and what they are used for.
- ➔ Brainstormed and problem solved possible topics and issues for the Ethics canvas.
- ➔ Helped create the class diagram.
- ➔ Organised the order of classes being presented for the final class diagram presentation.
- ➔ Made contributions to the class diagram and the activity diagram.
- ➔ Created the google docs document and invited all the team members to work on it together. Layed out the document in an easy to read format. Added the footer. Added the ethics canvas into the document and produced the description of the ethics canvas.

Odhran:

- ➔ Helped with the discussion and planning of the project.
- ➔ Helped create the use case diagram. Researched use case diagrams.
- ➔ Helped with the brainstorming session for the ethics chart.
- ➔ Helped with the creation and structuring of the class diagram.
- ➔ Helped finish up the class diagram.
- ➔ Wrote all of the use case descriptions.

Strengths and weaknesses of the overall UML Design:

Strengths

- Our design allows any person with a library card to easily take out as many books as they want, free of charge.
- It provides easy access to public records and historical documents such as the census records.
- The renew system allows a user to increase the time they can have a book if the initial time period is not enough
- The fine system incentivises people to return their borrowed books in good condition so others can read them
- Borrowing Ebooks allows users to borrow books online
- Users can view their family history and crests

Weaknesses

- Because the library card is the only thing that identifies a user, if it was stolen fraud could be committed.
- In the event of a data breach occurring, personal user data could be leaked.
- Books can be vandalised/or stolen.