SamePage Application - Wiki

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Iteration 3 Release Notes

Application Details

💡 Description

SamePage is a desktop application where Users can find new and interesting books by browsing through the SamePage catalogue. Find reading buddies through bookclubs, write book reviews, and create reading goals to track for your success!

⚙️ Features

- **Iteration #1**
    - View the latest releases of books
    - Search for books by title
    - Login or Sign up
- **Iteration #2 (Current Release)**
    - Allowing Users to leave book reviews
    - Viewing the all the book information on the latest release page and search result page
    - Favourites section - Allowing Users to favourite books they like or want to read in the future
    - **Client Requested Feature**: User Request to Add New Book to App
        - Users can now request to add a missing book to the app. If the book already exists, the request is declined
- **Iteration #3**:
    - Following users to see what common favourited books you have
    - Allowing Users to set and keep track of reading goals
    - Client Feature – Request to add a new book if it does not exist

📐Future Releases

One of the user stories, Book Clubs, was pushed to a later iteration due to time constraints and much more needed in-depth look into how this feature could be implemented. It was better to focus more so on the social and friend aspect and to later introduce thise feature.

✏️ Design and Development

Design Architecture documents found under Preliminary Research. UML Desgin documents found under Class Diagrams. All important packages, files, and code pertaining to the java application are located under **SamePage/src/main/java/com/eecs3311**.

💻 Running the application

- Make sure to have MySQL downloaded and its required drivers to run the application. This video tutorial can help with the download process
- Save your MySQL password and username in a secure location
- Once you have MySQL downloaded
    - Go to **SamePage/src/main/resources/config.properties**
        - Replace the username and password fields with your username and password
    - Go to **SamePage/src/main/java/com/eecs3311**
    - There will be 4 Packages and one Java File called **App.java**
    - Click on the **App.java** file and run the application from here

📦 Important Packages

Under **SamePage/src/main/java/com/eecs3311**

- **/model** – contains all the model classes and dummy data for the models
- **/presenter** – contains the presenter class that link the needed model and view classes
- **/view** - contains the classes needed to develop the views for the model class and the other GUI components not related to the model class
- **/persistence** – contains the Database interface and classes to access the “real” and “stub” databases
- **/tests**– contains the unit and integration tests for the domain-specific and business logic classes
- **/App.java** - This is where you would start the application

Iteration 1 Notes

Preliminary Research

UI Design Choice and Justifications

Frameworks/Tools:

Variables to Consider

- DB service to be used
- Desktop application
- GUI design
- Testing???
- API calling
- Implementation of SOLID principles
- IDE compatibility
- Learning curve

UI Development
Some good frameworks are:

- Java Swing
- JavaFX
- JavaAWT
    - Swing is an extension of JavaAWT, hence all AWT features are in Swing, yet it is more lightweight and has an improved performance

By far the two best choices for desktop application GUI development are Swing and JavaFX.

Java Swing vs. Java FX∫

	Java Swing	JavaFX
MySQL Connection https://www.javatpoint.com/example-to-connect-to-the-mysql-database	Can connect to DB service using core java functionality.	Can connect to DB service using core java functionality
API Calling	Can use web client like HTTPClient to call API in Java Swing http://www.mkyong.com/webservices/jax-rs/restful-java-client-with-apache-httpclient/	Can use spring web client to call REST service from JavaFX https://edencoding.com/connect-javafx-to-a-rest-api/

Testing https://github.com/SICKAG/gui-check	JUnit testing is supported with Swing, unsure about eclipse implementation, might be more difficult.	Supports JUnit testing in various IDE, possible in Eclipse https://www.eclipse.org/forums/index.php/t/1079233/
IDE Compatability	Swing is independent from Java so any IDE can be used, however, it is recommended to use NetBeans. Intellij, Eclipse, DrJava. Swing allows for better rapid deployment of an application due to its more mature IDE support.	Intellij is the most recommended for JavaFX, but it also works with Eclipse and NetBeans.
Learning Curve	Both frameworks have a similar learning curve. There are more resources to learn swing because it's been around for longer, may be easier to learn because of this.	JavaFX uses CSS while swing doesn't.

- JavaFX is younger and being developed at a faster rate, meaning in the future it will almost certainly surpass Swing in terms of usability and industry relevance
    - Meaning it might be more valuable for us to learn FX
- Swing has a wider library of UI components, FX is being updated and adding more at a faster rate
- FX may support mvc architecture better than Swing in some IDEs, unsure about eclipse
    - https://link-intersystems.com/blog/2013/07/20/the-mvc-pattern-implemented-with-java-swing/
    - https://edencoding.com/mvc-in-javafx/
- If rapid efficient development of an app with easier access to GUI elements and libraries is required, use SWING
- If developers want a modern touch and implementation of animations and effects is wanted, use FX
- If developers want better applications for desktop and mobile app, use FX

Backend Frameworks

- Spring Boot
    - Dependency Injection (DI) (Inversion of Control) – In this principle, rather than the application taking control of the flow sequentially, it gives the control to an

external controller who drives the flow. The external controller is the events. When some event happens, the application flow continues. This gives flexibility to the application. In Spring, IoC is done by DI which are of three types – setter injection, method injection and constructor injection.
    - In Spring, objects are called as beans and there is a BeanFactory that manages and configures these beans. You can think of the beanfactory as a container that instantiates, configures and manages the beans.
    - Focuses on business logic and takes care of infrastrucure
- Hibernate
    - Object-Relational Mapping database for java applications
    - Directly maps java classes to corresponding database tables
    - Implements Java Persistence API
- Struts
    - Used for web application development

Best frameworks to consider are Spring Boot and Hibernate

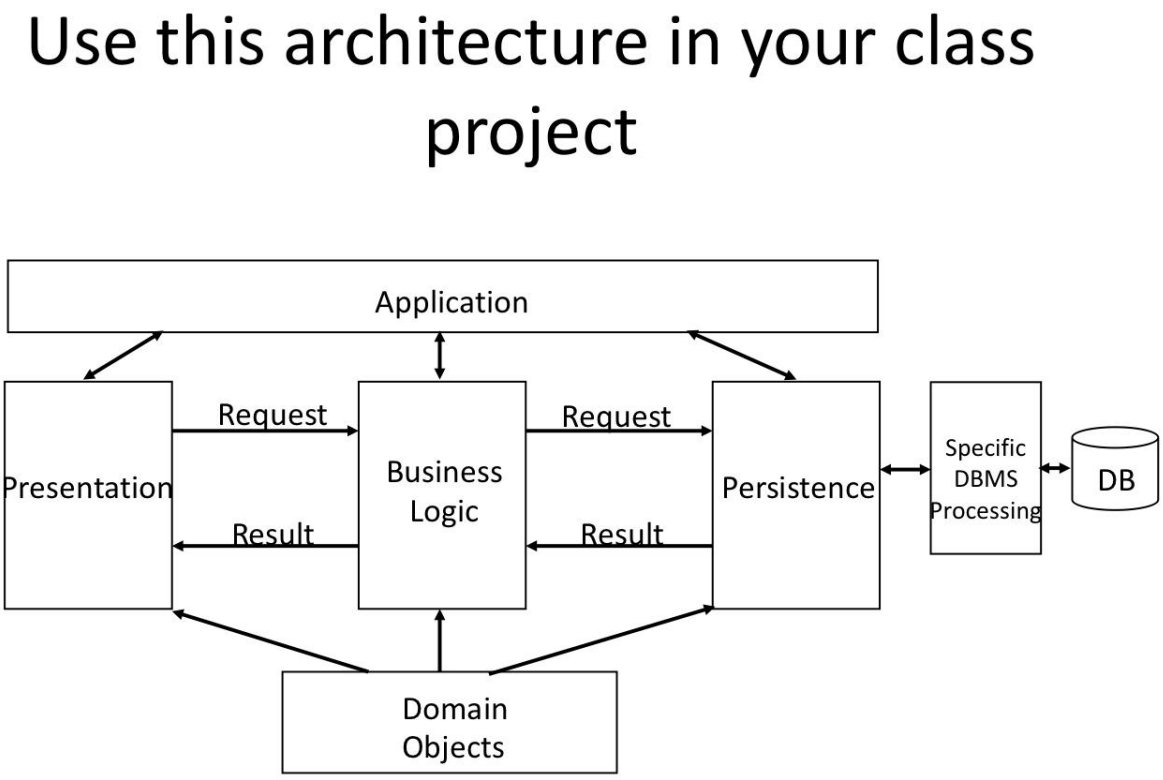
However, given time frame and feasibility, may be in best interest to not utilize backend framework.

- Can increase learning curve time, which we do not have a lot of
- Can increase unknowns
- May be unnecessary due to the size of the application and the features it must contain
- May cause complications whne implementing with Swing/FX

Architecture Choice and Justifications

Relevant class material: Lecture week 3-1, mentions benefit of architecture(presentation layer) to keep GUI separate from business processing resulting:

- Easier to substitute different GUI without having to modify any code outside of GUI
- Easy to apply patterns like MVC



Design Patterns

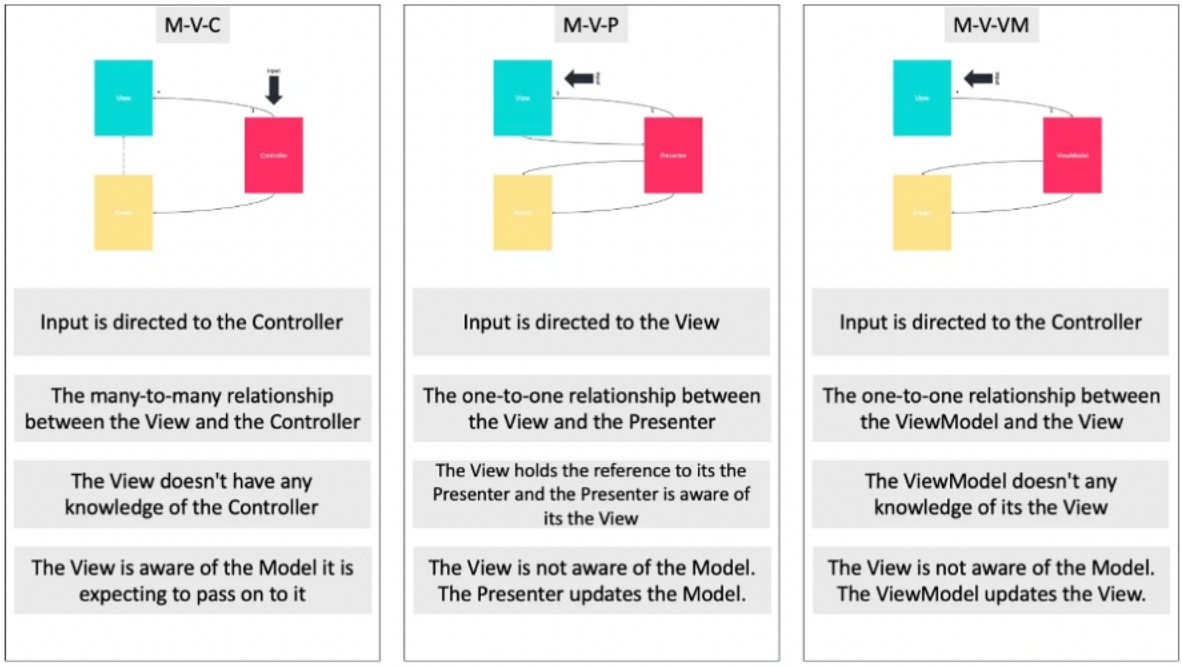
High level comparison: **Model-View-Controller = MVC**
Model – responsible for business logic, state of application. Includes reading and writing data, persisting application state and tasks related to data management.
View – presenting data to user and handling user interaction
Controller – the view layer and model layer are glued together by one or more controllers

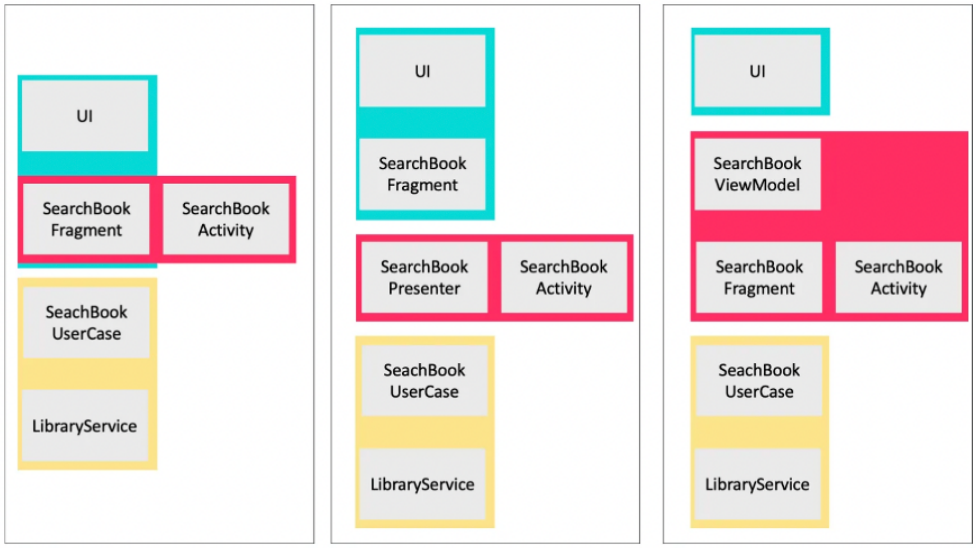
Model-View-Presenter = MVP

Model – represents set of classes that describe business logic and data. Also defines business rules for data and how it can be manipulated.
View – used for making interactions with users like XML, activity, fragments
Presenter – gets input from View, processes the data with help of model and passes results back to the View after processing is done.
MVP in Swing examples:

- https://sites.google.com/site/averagelosercom/Java/java-model-view-presenter-in-swing?pli=1
- https://riptutorial.com/swing/example/14137/simple-mvp-example

Model-View-ViewModel = MVVM
Model – similar to MVC, consisting of basic data required to run software
View – is a graphical interface between user and designpattern, similar to the one in MVC. Displays output of data processed
View-Model – one side abstraction of View and on other side provides wrapper of Model data to be linked. Model converted to View and also contains commands that the View can use to influence Mode





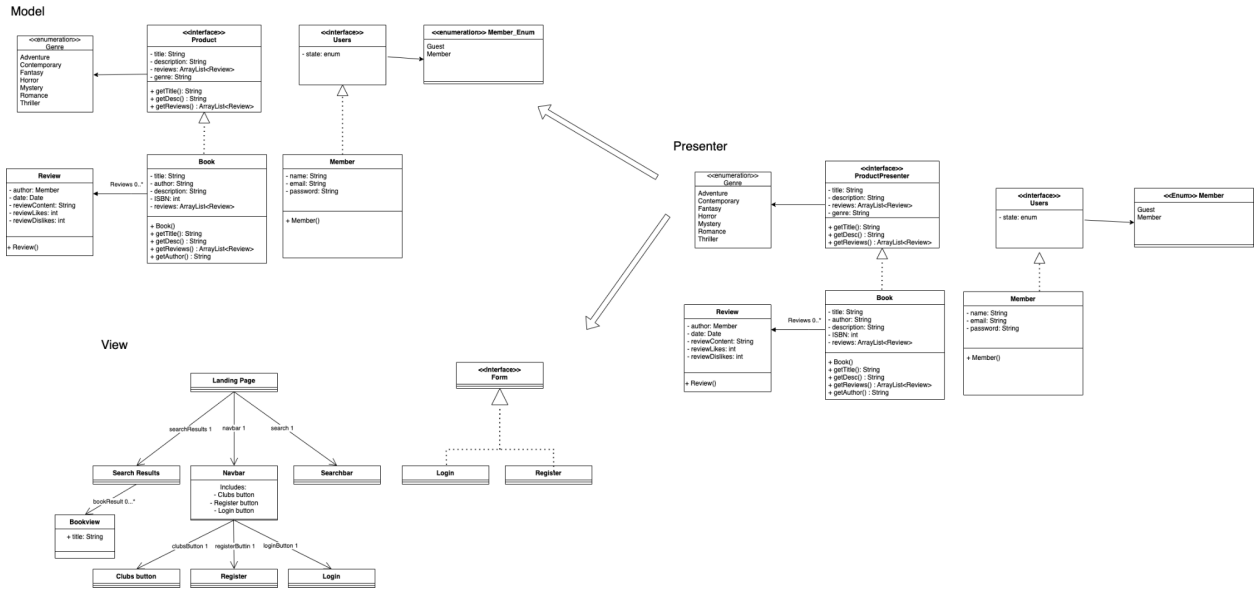
MVC vs MVP vs MVVM implementation for the BookSearch application

Performance Evaluation – UI performance, **MVP** is highly reliable. Data binding in MVVM creates additional overload.
Modifiability – less changes in MVP and MVVM (with MVVM contributing a lot towards maintainability)

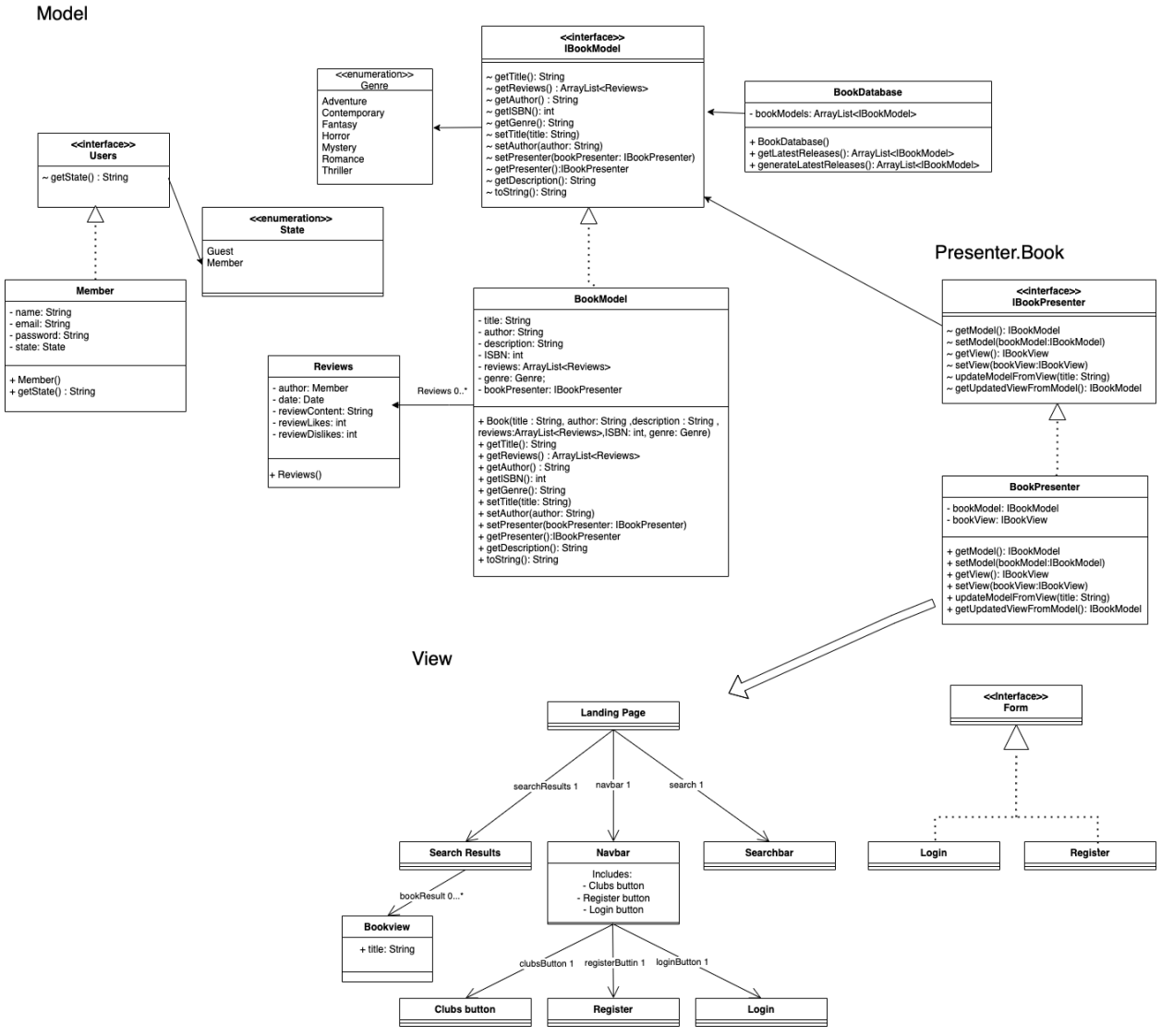
	Pros	Cons
MVP	- has a better separation of concerns - Presenter is not as **tightly coupled** as Controller, but has more responsibilities – updating model and updating view - Presenter and Model **follow Single Responsibility Principle** better since Model is not in charge of updating Presenter - Easier to unit test b/c of low coupling	- One presenter class manages one view at a time - Can lead to double the amount of classes for views

MVC	- One controller can select different views based upon required operations where as in MVP, there is one presenter for evey model	- Less separation of concerns - Compared to how Presenter class in MVP, the same is done in the model resulting in lower cohesion - Controller and View are in related fragments - higher coupling - Model disrupts the Single Responsibility Principle in MVC as it is also in charge of updating controller - Inputs handled by controller that instructs mode for **further** operations
MVVM	- Loose coupling with the View - UI can be changed without modifying the ViewModel as long as the contract does not change - Better Testability: Since the ViewModel does not “see” the presentation layer or controller layer, ViewModel can be unit tested without UI elements	- Debugging can be difficult for complex data binding - Hard to design ViewModel for larger applications - Can be overkill for simple UIs - Generalizing the viewModel upfront can be difficult and large-scale data binding can lead to low performance

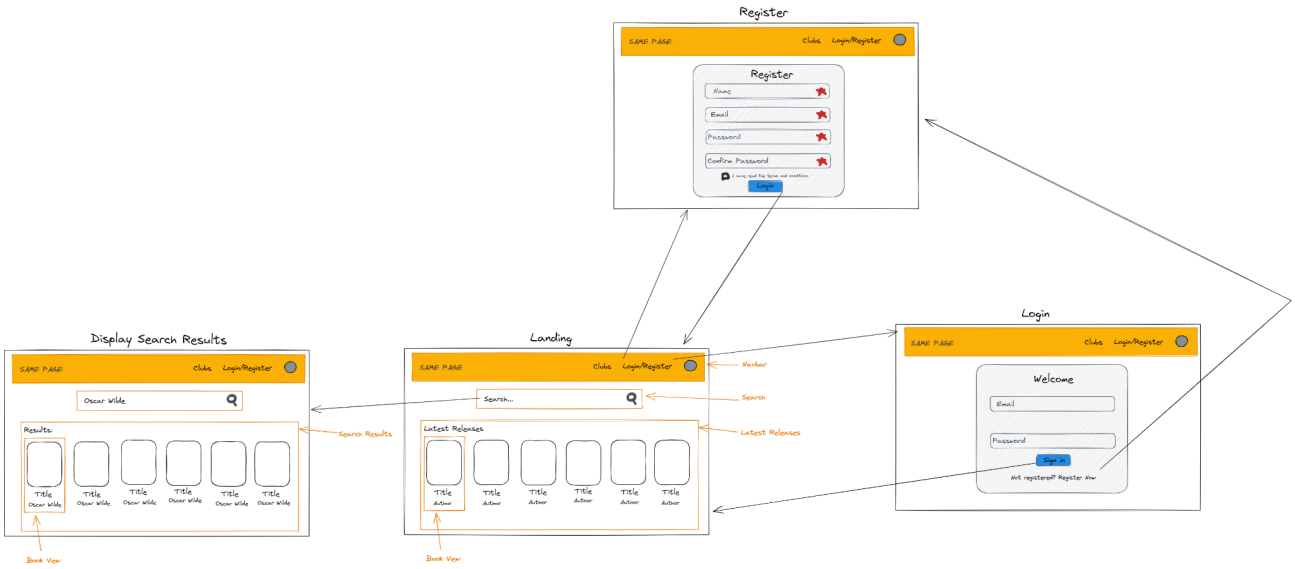
Initial Class Diagram/Sketch



Updated Class Diagram



Design Wireframe



Iteration 1 - Big User Stories

Goal

Create MVP of project, which includes landing page, search functionality and registration/login system

Big User Stories

Landing Page

As a guest or member, I want to be able to open Same Page and view a number of books on the homepage.

Priority: High **Cost**: 6 days

Search for Book

As a guest or member, I want to be able to search for a specific book.

Priority: High **Cost**: 6 days

Register/Login

As a guest or member, I want to have the ability to register a new account with SamePage or login to an existing account.

Priority: Medium **Cost**: 5 days

Iteration 1 Detailed Planned Stories

Display Login/Register Buttons

Display the login and register buttons and their corresponding pop-up input boxes on the landing page.

Priority: High **Big User Story**: Landing **Cost**: 3 days

Display Latest Releases

Display the most recent book releases of any genre on the landing page.

Question: What external source can provide this information?

Priority: Medium **Big User Story**: Landing **Cost**: 3 days

Search Bar

Display a search bar where text can be entered or filters can be applied to search for a book.

Priority: High **Big User Story**: Search **Cost**: 4 days

Display Search Results

Display the results after searching for a book in the search bar.

Priority: High **Big User Story**: Search **Cost**: 2 days

Register New User

Add functionality to register an account with an email, username, and password.

Priority: Medium **Big User Story**: Login/Register **Cost**: 2 days

Login Existing User

Add functionality to securely log into Same Page with an existing email and password.

Priority: Medium **Big User Story**: Login/Register **Cost**: 3 days

Login Page

Create a separate login page with email and password input fields.

Priority: High **Big User Story**: Landing **Cost**: 1 days

Register Page

Create a separate register page with name, email, password, and confirm password input fields.

Priority: High **Big User Story**: Landing **Cost**: 1 days

Display Navbar

Create navbar component with login, register, clubs, and a profile icon.

Priority: High **Big User Story**: Landing **Cost**: 1 days

Iteration #2 Release Notes

🧰 Bug Fixes

- Login and Register crash on Exit
    - The app would crash when the exit button is closed on the Login or Register page and the Login and Register popups could be opened up multiple times. The app has implemented designated pages for Login and Register. There are no more pop-ups. The app can exit normally

🚀 Iteration 2 - What's New?

- Book Information Display
    - Users can click a book from the Search Results or Latest Releases page and see the relevant book information like the author, genre, preface, and user reviews
- Book Reviews
    - Users can submit multiple reviews on any book
- Favourite Books
    - Users can favourite books they like or want to read in the future
    - Dedicated Favourites page in the Profile section to view all your favourite books
- Client Feature – Add New Books
    - Users can request to add a new book to the application if they cannot find it through the search

🚧 Changes/Updates to Iteration 1 Stories

- Book Search Functionality
    - Previously, Users could only type the book name in the search bar but the result(s) would not appear
    - Now, Users can use the search bar appropriately to find books in the current database
- Login and Register
    - Previously, Users could not register to the app and could only use one login credential to use the app and its features
    - Now, Users can register and log in to their SamePage accounts. All actions done by the User are saved into the database

🛠️ Major Changes from Iteration 1

Code Structure

- Reorganized Structure
    - The View Layer in Iteration 1 was hard to follow. There was a general idea of how the components would be structured and interact with each other but were not planned out thoroughly. Three majors problems that had to be solved were:
        - **Problem**: Components that could be reused weren't being reused or were hard-coded into the application violating
        - **Solution**: Added a components package to store reusable components and added a layout package to keep pages that the User would visit. Enforced Single Responsibility Principle to decrease coupling and increase cohesion between components and pages
        - **Problem**: Some pages were JFrame objects while others were JPanel objects. This would allow users to spam pop-ups and increase memory usage for the computer. Also, closing the pop-ups would shut down the entire app
        - **Solution**: Converted all view-related items to JPanels to keep consistency between components. Used interfaces to enforce common functions onto components. Implemented a Main class that extended the JFrame class which would hold the logic to display the current page the User is on. The Main class implemented a CardLayout to allow navigation between pages. All views stayed as JPanels
        - **Problem**: Pages used all kinds of functions – no structure between pages
        - **Solutions**: Added a common interface for all JPanel views to implement. This would allow consistency between components and pages
    - Config Files
        - **src/main/resources/config.properties**: This is a configuration file to create a connection to the database easily. Developers only update their passwords to connect. Used for development only and does not affect the SamePage application
- New Design Implementations
    - Mediator Pattern
        - **view/components/ResultsMediator.java**: Used the mediator pattern to communicate with the *view/components/SearchBar.java* and *view/components/ResultsPanel.java* components. Achieved a reduction in communication complexity between the components, higher cohesion, and lowered coupling, leading to an increase in Single Responsibility
    - Singleton Pattern:

        - **model/User.java**: The User class has a single instance and its credentials are updated by the *model/Login/LoginModel.java* class. The User class provides global access to all other classes
        - **persistence/Database.java**: The Database uses Singleton and can be globally accessed through all the classes. It is an extension of the *persistence/AbstractDatabase.java* class that initializes the connections for the different database accesses.
        - **view/Book/DisplayBookInformation.java**: It is an extension of the JFrame classes. The DisplayBookInformation class appears when a User clicks on a book to view its information. The DisplayBookInformation is a popup and uses the singleton pattern to only appear once to avoid spamming pop-ups. It can be accessed globally but is currently only used in *view/Book/BookView.java*
    - MVP (Model, View, Presenter)
        - Classes that use the MVP pattern can be found under view, presenter, and model packages and have their own packages to contain their classes. The MVP pattern was implemented for one class (Book) in iteration 1 and now the pattern has expanded to Login, Register, and Review. The reasoning for using this pattern was explained in iteration 1 and can be found under Iteration 1 Notes / Preliminary Research

New App Behaviour

- Functional Register, Login, and Search
    - Users can now register, log in, and search through the library catalogue
- Profile page
    - Users have a dedicated profile page to view their favourite books
- Add New Book – Client Feature
    - Users can request to add a new book to the app if the book is not visible in the app
- View Book Information
    - Users can see the average ratings of the book on the mini-display and can view more information about the book when expanding the mini-view
        - Total number of ratings and the average rating
        - View user reviews and ratings of the book
        - Book author and genre
    - The mini-display has a “Favourite” button that allows users to add the book to their favourites list
- Submit Reviews and Ratings
    - Users can submit a review and rating for multiple books and can also see the rating get updated dynamically with their input
    - Can view other user reviews and ratings and the day it was posted

- Favourite Books
    - Users can add books they are interested in to their favourites by clicking the “Favourite” button on the mini-display
    - The app dynamically updates the UI so that when a User has added the book to their favourites, the book’s button is then replaced with a “Remove from Favourites” button to allow the User to remove the book from their list
    - The User profile page is dynamically updated to include their current favourite books. The User has the option to remove the book from their favourite on the profile page which gets updated dynamically
- Redirect to the Landing Page on successful login
    - On successful login, Users are redirected to the Landing Page to indicate that the login was a success. Previously, a message would appear telling the user they had successfully logged in. That message is still present

Updated Class Diagram for Iteration 2

The updated class diagram can be found in the *Iteration 2* package called *Class Diagram*. It was too big to fit in this document.

📚 Iteration 2 User Stories

Goal

The goal of this iteration is to create more “interactivity” between the books themselves and the guests/members, for example, allow both guests and members to know more about the book, be able to favourite books and leave reviews

Big User Stories

User Reviews
As a member, I want to upload/leave a review of the book I have read.
Priority: High **Cost**: 5 days

Book Information
As a guest or member, when I click on the book, I should be able to view the main information of the book.

Priority: High **Cost**: 5 days

Favorites

As a member, I want to favorite books that I like or want to read later in the future.

Priority: High **Cost**: 5 days

Client Feature - Add New Book to App

As a user I can request to add the book to the App if I do not see it on SamePage.

Priority: High **Cost**: 5 days

Iteration 2 Detailed User Stories:

View Reviews

Display the book reviews upon clicking on a specific book.

Priority: High **Big User Story**: User Review **Cost**: 3 days

Add Reviews

Users logged in, and add reviews to the selected book upon clicking on a specific book.

Priority: High **Big User Story**: User Review **Cost**: 3 days

Display Favorite Books

Display the favourited user books in user information.

Priority: High **Big User Story**: Favorites **Cost**: 3 days

Add Favorite Books

Add a book to the user's favourites upon the user selecting a specific book from the search.

Priority: High **Big User Story**: Favorites **Cost**: 3 days

Remove Favorite Books

Remove a book from user favourites upon the user selecting a specific book from their user information list.

Priority: High **Big User Story**: Favorites **Cost**: 3 days

Display Book Information

Display book information such as title, author, publication date, summary, reviews, and ISBN number.

Priority: High **Big User Story**: Book Information **Cost**: 3 days

Client Feature – Request to Add New Book

If a book is not listed, the user can submit a request/suggest the app to add the new book to a queue.

Priority: High **Big User Story**: Add New Book **Cost**: 3 days

Meeting Logs -> Refer to txt file in Itr2Documentation folder

Iteration 2 Adjusted User Stories:

Note that the new feature requested from the client **Client Feature – Request to Add New Book** relied on the implementation of the user profile page thus will be moved to iteration 3 to be completed.

Iteration #3 Release Notes

🧰 Bug Fixes

- No restriction on leaving a rating
    - This bug comes in 2 forms:
        - A user can repeatedly rate a book, and this can affect the overall rating possibly in a malicious way
        - A user can leave multiple reviews, possibly without any review message, which can spam the review section
- Register credentials allow extraneous input
    - In the "Register Here" tab, there are no restrictions (apart from being empty) on what could possibly be entered in these fields. The email field does not require the proper email suffix e.g. @mail.com to be present.
    - Furthermore, potential credientals could simply consist of whitespace.
- Incorrect text and color for favorite button on random button clicks
- Improve Load Time Performance
    - Drastically improved the load time of switching between pages from 25 seconds to almost instantly
    - Improved initial load time from 15 seconds to 7 seconds

🚀 Iteration 3 - What's New?

- Find Friends & Social Aspect
    - Logged in Users can click from the navbar the Social button and search for friends or view all registered users and have the option to follow them
- User Goals
    - Users can personalize their profile and update their books they've read and advance reading levels
- Client Feature – Add New Books
    - Users can request to add a new book to the application if they cannot find it through the search

🚧 Changes/Updates to Big User Stories

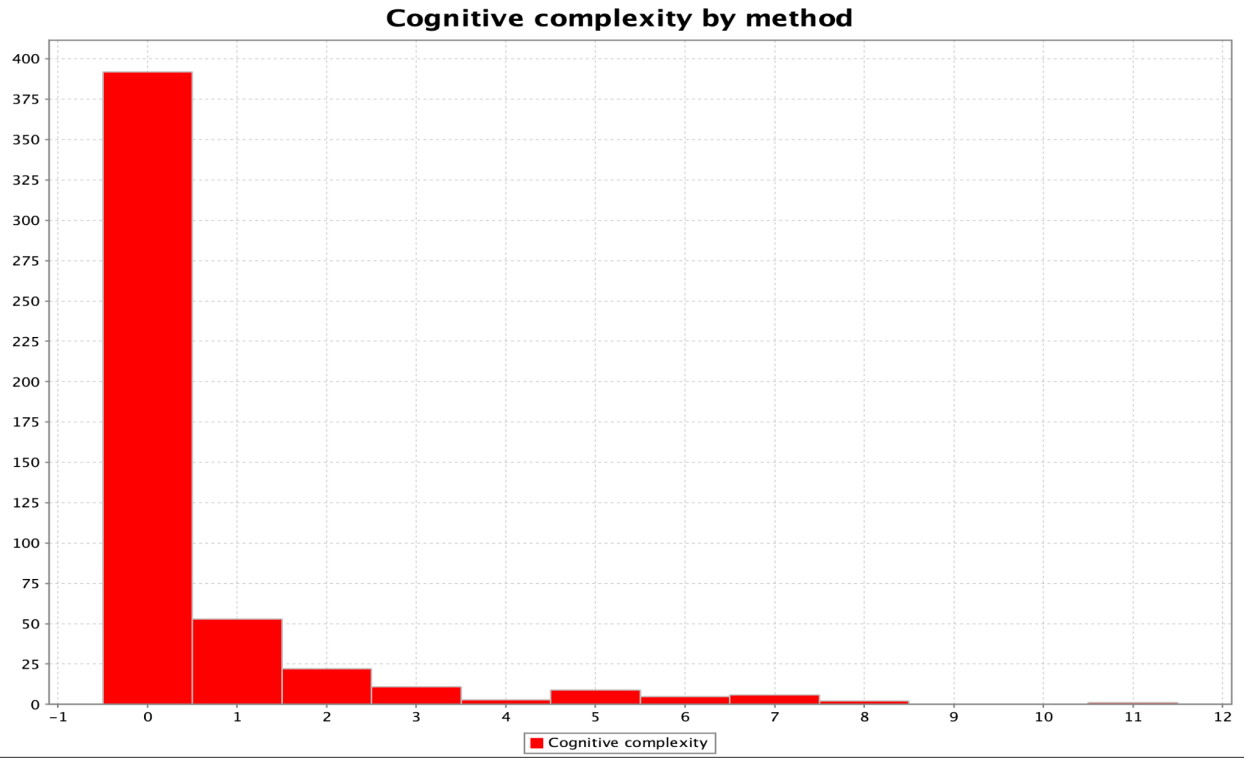
- Client Feature – Add New Books
  - Continued over from the previous iteration
- Book Club
  - As a member, I want to be able to create or join book clubs.
  - Note this is pushed for next release as a group it was decided to focus more so on the social and friend aspect and then to later introduce book clubs.

📊 Iteration 3 Metrics

Number of Methods: 439
Info Found via MetricsReloaded plugin on IntelliJ

Cognitive Complexity

The metric is intended to explicitly measure understandability. Cognitive Complexity is increased with each control structure used and is higher the more nested control structures are (https://www.sonarsource.com/docs/CognitiveComplexity.pdf)

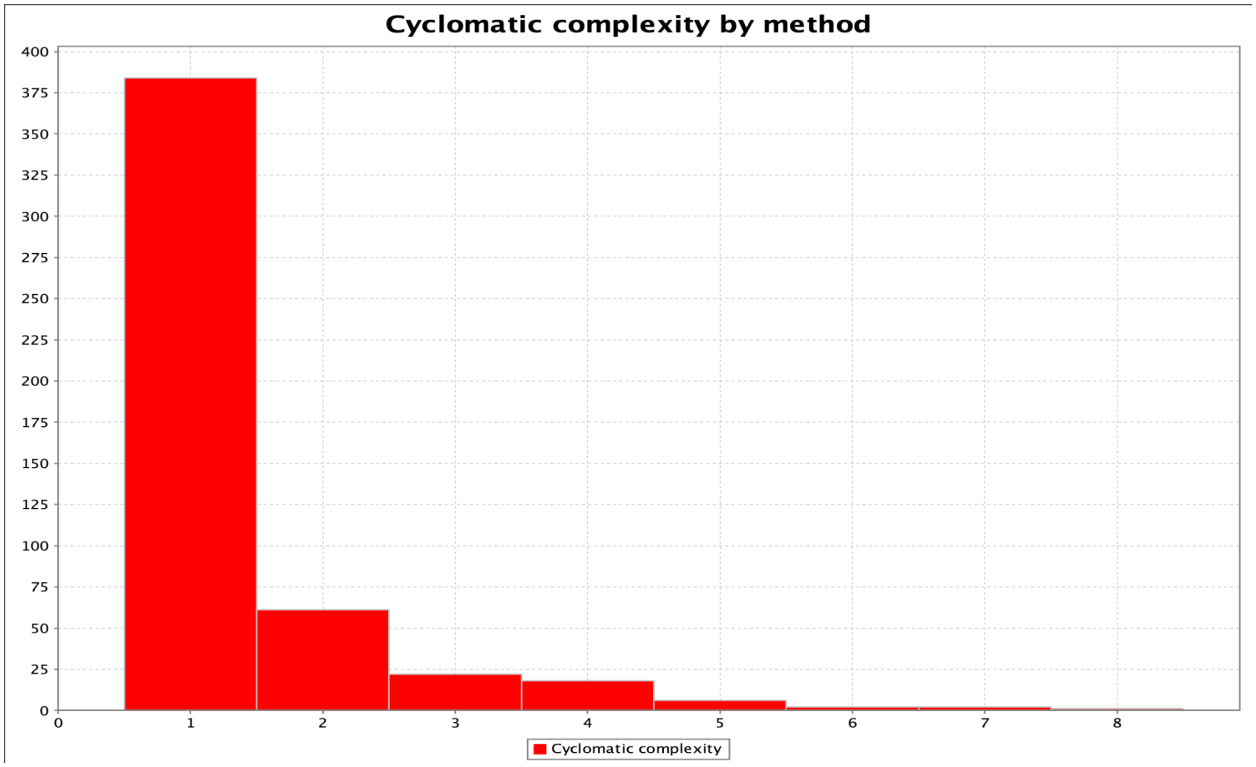


Avg Cognitive Complexity / Method: 0.57 (<- the lower the number the better)

- Almost 400 methods have a cognitive complexity of 0

Cyclomatic Complexity

Cyclomatic complexity is a measure of the number of distinct execution paths through each method. This can also be considered as the minimal number of tests necessary to completely exercise a method's control flow. In practice, this is 1 + the number of if's, while's, for's, do's, switch cases, catches, conditional expressions, &&'s and ||'s in the method. (https://en.wikipedia.org/wiki/Cyclomatic_complexity)

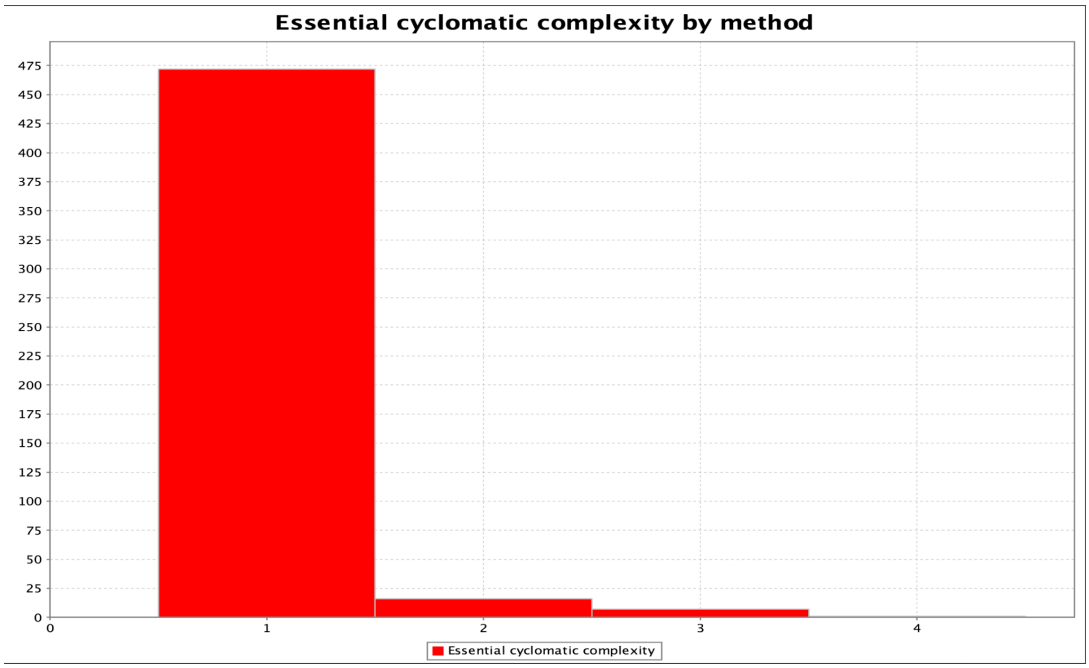


Avg Cyclomatic Complexity / Method: 1.43 (<- the lower the better, the lowest is 1)

- Roughly 375 methods have a cyclomatic complexity of 1

Essential Cyclomatic Complexity

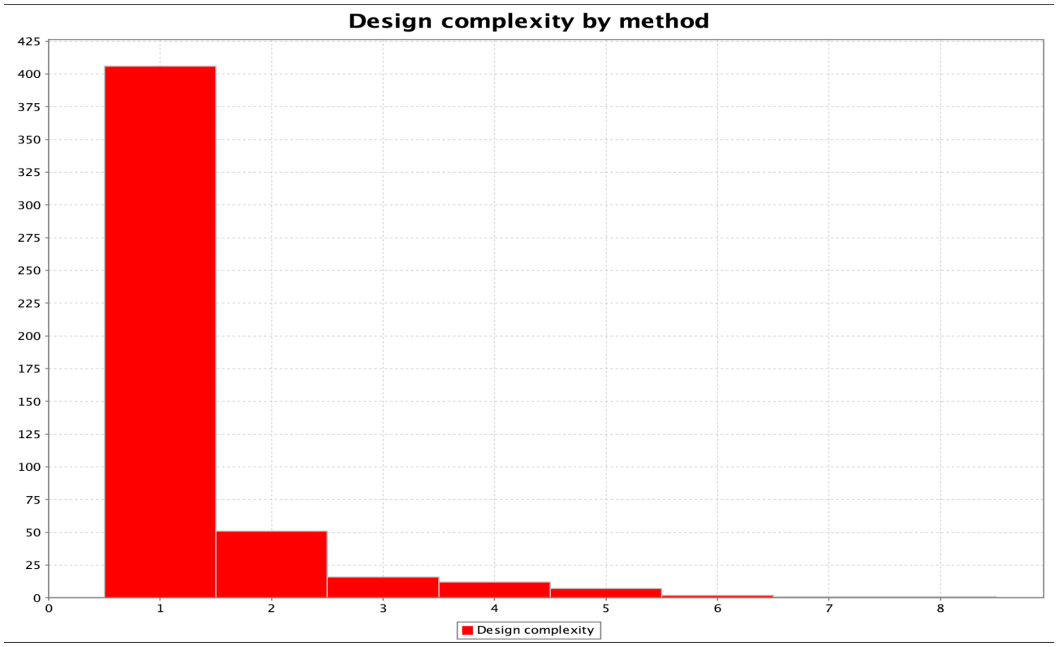
Essential Complexity is a graph-theoretic measure of just how ill-structured a method's control flow is. Essential Complexity ranges from 1 to v(G), the Cyclomatic Complexity of the method (https://en.wikipedia.org/wiki/Essential_complexity).



Avg essential cyclomatic Complexity / Method: 1.07 (<- the lower the better, the lowest is 1)

Design Complexity

The design complexity is related to how interlinked a method's control flow is with calls to other methods.Design complexity also represents the minimal number of tests necessary to exercise the integration of the method with the methods it calls.



Avg Design Complexity / Method: 1.34 (<- the lower the better, the lowest is 1)

- Over 400 methods have a design complexity of 1

Updated Class Diagram for Iteration 3

Due to the shear size of the UML diagram, it was best to not include it in the wiki. The updated class diagram can be found in the *Iteration 3* package called *UML Class - Iteration #3.pdf*.

Design Implementations on New Features

Due to the nature of the application and the components developed for user stories, the design implementations and patterns were often re-used, which enabled us to have very little major refactoring of the application's design. Adding on new features such as the Social Page and Personalized Goals section required the use of the **Model View Presenter** design pattern. The Search and Results pages for the Social page worked similarly as the Search and Result pages for books, which used the **Mediator Pattern**. The **Singleton design pattern** was used once again to maintain any pop-up states such as the newly added *Display User Information Pop-up* view and the *Request to Add New Book pop-up view*. We implemented a new design pattern, the **Factory Builder** for our Database Components. This can be found under **SamePage/src/main/java/com/eecs3311/persistence/Database.java** . Everytime we needed to query to the database, we would call the database class and request it to build the database methods we need based on the interactions.

📚 Iteration 3 User Stories

Goal

The goal of this iteration was to make the application more about the user and their social interactions within the community. We did this by by allowing users to add each other as friends, view each other's favourite books, and add personalized goals to keep track of their reading habits

Big User Stories

Client Feature – Request to Add New Book

If a book is not listed, the user can submit a request/suggest the app to add the new book to a queue.

Priority: High **Big User Story**: Add New Book **Cost**: 3 days

Find Friends

As a member, I want to be able to search for other Same Page users by their username and add them as a friend.

Priority: High **Cost**: 8 days

User Goals

As a member, I want to be able to create personalized goals that I can track my progress on.

Priority: High **Cost**: 5 days

Book Club

As a member, I want to be able to create or join book clubs.

Priority: Low **Cost**: 8 days

Iteration 3 Detailed User Stories:

Add User Goals

As a user, I want to be able to create a customizable reading book list and set goals of how many books to read on my profile page.

Priority: High **Big User Story**: User Goals **Cost**: 3 days

Update Goals

As a user, I want to be able to update any goals I created with my progress.

Priority: High **Big User Story**: User Goals **Cost**: 5 days

Search for Friends

As a user, I want to be able to find a friend by looking up their username and click their profile from the results.

Priority: High **Big User Story**: Find Friends **Cost**: 3 days

Add Friend

As a user, after I find my friend I want to be able to add them as my friend.

Priority: High **Big User Story**: Find Friends **Cost**: 3 days

View Friends Profile & Goals

As a user, I want to be able to find my added friends on my profile page and view their profile page and user goals.

Priority: High **Big User Story**: Find Friends **Cost**: 3 days

Remove Friends

As a user, I want to be able to remove any friends I have made

Priority: High **Big User Story**: Find Friends **Cost**: 3 days

Code/Design Before & After Refactoring:

- More information can be found in the ***Meeting Logs*** → Refer to ***Itr3MeetingLog.txt***
- Long classes and methods →
    - addressed by breaking big classes up to improve and maintian Single Responsibility DP
    - extracting long methods into components in the app
    - prevent repeated code by utilizing the new extracted method (Abstract Database)
- Duplicate code and methods across different classes →
    - addressed by extracting code found in UI in a common component
- Long parameters being passed from one class to another (ex. Found in BookModel) →
    - addressed and reafactored utilize the MVP architecture correctly, introducing parameter object, or being able to extract the class depending on the use of the method and the values being passed.
    - For example for book information, instead the object clicked on is passed instead of each value of the book clicked.
- Some variables were not declared final (detected by automatic tool) →
    - addressed by reviewing the use of the instance variable and if the recommendation could be applied
- Other refactoring tasks:
    - Initital App Load-Time - from 10s to <2s using parallel streams
    - refactor application to be single page application and how to make components reusable
    - Conversion from multiple JFrames to JPanels
    - include regex for input validation

Retrospective Summary:

What went well:

- All major features and big user stories were accomplished
- the vision of the application exceeded the groups expectations, the look and features seamlessly work together
- Successful growth in the project with better developed architecture designs, MVP used across the application, and designs decisions and methods such as Singleton Pattern - to create one instance of a class as seen for the DB files, Mediator Pattern - to promote loose coupling in UI, and Builder Patter, and Single Responsibility DP.

What didn't go well/any areas of improvement:

- Improve UI design by removing white spaces
- Improve the design in Release 2 by adding logical features such as log out button
- For better code design review the components (UI structure) and extracted methods and see if we can extract and move these duplicated codes to a superclass