Application of Software Engineering in Student Time Management using Prototype Model

Exaudina Glory Sianturi*, Sharon Cedila Suryadi, Pascal Wilman, Maria Susan Anggreainy, Syaeful Karim, Harvianto
Computer Science Department
School of Computer Science
Bina Nusantara University
Jakarta, Indonesia
{exaudina.sianturi*, sharon.suryadi, pascal.wilman, maria.susan001}@binus.ac.id, {karim, harvianto}@binus.edu

Abstract—**Time management is one of the most important things in humankinds' life, especially in student activity. In the new pandemic era, students have already changed and adjust their learning method to an online learning system which does not need them to have activities outside their house. This condition might make them have a lot of time but they lack the ability to manage their own study schedule. To handle this situation, we construct and develop a scheduler application. This application uses Prototyping Model as the development method as it is a user-oriented application. We are using a prototyping model to consider the upcoming details required in the development. It involves communication between user and developer continuously to achieve the goals and things needed by the user. The implementation of software engineering in student time management with a prototype model will upgrade students' skill to the next level of the digital era.**

Keywords—Learning, student, schedule, time management, prototype model

I. INTRODUCTION

Due to the Covid-19 pandemic, the Indonesian government requires their people to do their things online and stay home. This is done by the government to prevent the spread of Covid-19 virus. Especially for students, every student must do online learning at their home. Online learning makes students stay safe as well as keep up with their studies [1]. But in fact, the situation makes procrastination even worse for students.

A number of factors could affect undergraduate student performance, especially when they need to study from home where no one keeps track of us [2]. These factors, such as trying to maintain academic achievement, accommodating a new social environment, and managing their time. Time is one of the most important factors which limits learning activity [3]. Moreover, if the student also has to work to cover tuition fees, it means that the student has a lot of things to do, and maybe they find it difficult to manage their own time. Therefore, their own time management to study and do their things could affect their graduation score.

When students take any courses, they have a stack of assignments to finish. But in any workplace, students should be able to manage their life as well, to keep on balancing their work-life activities, such as playing, working-out, learning new things, etc. Therefore, students should be sophisticated time managers [4].

Time management is a process of planning and organizing our own time between specific activities [5]. Time management requires us to plan, prioritize, and replace old useless habits. Good time management is a necessity for everyone. It helps us to:

- Do many things in less time [6]

As human beings, we all get the same 24 hours in a day. Even though our time is tight and study pressure is very high, if we have good time management and we stick to it, we could do things in less time and reduce wasting time.

- Helps to achieve goals faster [7]

Time management makes us do things in specified duration and focus on it. It makes us give our best on a specific activity and achieve our goals faster. It also keeps us away from wasting time.

- Take effective decisions [8]

There are times when we have to make decisions in only a short time. This kind of situation is just like when we need to make a conclusion without knowing or considering all of the available possibilities or options. With good time management, we can prevent the pressure of limited time when we need to make a decision. We will have the freedom to consider all the possibilities or options to make the right decision.

From the explanation above, we are planning to make an application which gives an advantage in scheduling time and making collaboration with others from different locations.

The goals of the application called My Selvis (Schedule Activities) that become the primary points are:

1. Help students to manage their schedule related to studying.
2. Help students get reminded about their tasks and project activities they get involved in by integrating a feature which enables members to share files and notes, and get the information about project members' locations in a certain time (related to the collaboration schedule).
3. To give students an advantage of having a great time management so that the learning activities become effective, and they could reach the learning outcomes.

To create this application, periodical feedbacks from users are needed to help the development as it is a user-related application. Therefore, we use the prototype method to design the application model of My Selvis.

The prototyping model is a software development model or method in which a prototype is created, tested, and changed until it is acceptable and compatible to user needs. It is trial and error process that occurs between the developer

and the user [9]. In general, we use prototyping models because this model is flexible in design, is easy to detect errors, and help developer to satisfy user needs [10].

II. METHODOLOGY

The research collects supporting data from a few numbers of study literature. Literatures used in this topic were observed and gathered through web searches. As for the steps of Application Design and Development, this research uses the Prototyping model as the methodology because our application is based on customer experience and requirements (can be seen in Fig. 1).
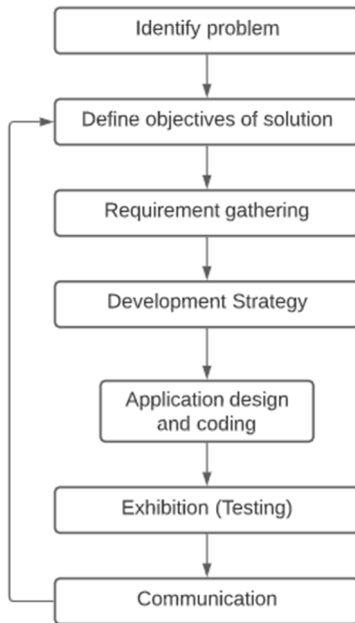
Fig. 1. Research methodology [11-12]

Fig 1 represents the methodology used in analyzing and developing this application. The first and the most prominent sequence is to identify problems. It is used as a foundation of this application to be constructed [13]. The main problem here is a lot of people, especially students, have trouble in arranging their own schedules and are entangled with procrastination.

Defining objectives of solution is the next method after the problems identified. Seeing that teenagers already have their own gadget and are aware of technology, we design a mobile application which is accessible and used to arrange schedules along with their study, so they can maximize their productivity by using this scheduler application. Emotions of students affect productivity to learn and adapt a new skill specially to upgrade their ability to manage schedules [14]. In this research, a business model canvas in Fig. 2 which is a business tool to visualize all targets and requirements needed when starting a business [15], has been arranged to define the objectives of solution.

Requirement Gathering is the most important part to build an application because this is a user-oriented application, so users' requirements are required in this research to approach the solution defined above [16]. Requirement Gathering has the same concept as Requirement Analysis, which defines

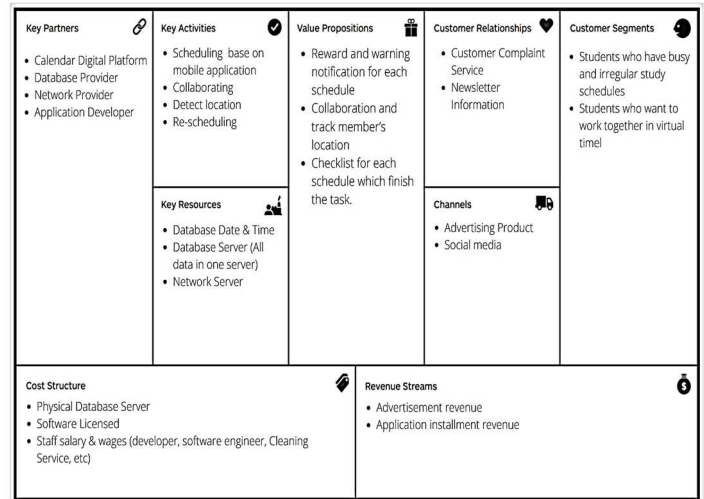user requirements for a new software being built or modified [17].

Fig. 2. Business model canvas

To build this application, there is a cycle running in the Development Strategy step. This application use Prototyping Method, where the application is built, tested, and reworked all over until an acceptable outcome is achieved and the prototype can be settled up to be developed [18]. The cycle starts from quick designing, followed by building prototype, customer evaluation of prototype, and refining requirements incorporating customer suggestions (can be seen in Fig 3).
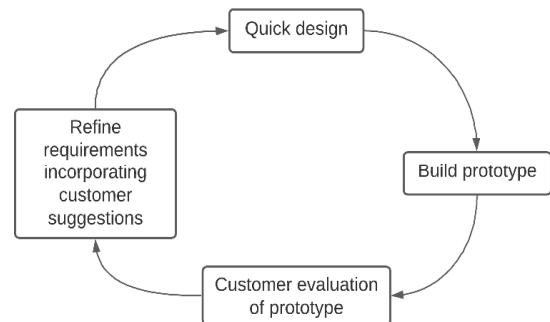

Fig. 3. Development strategy cycle

Based on the prototyping model achieved from the development strategy cycle in Fig. 3, we implement the model by advanced designing and coding the application with mobile platforms (Android & IOS). Successful exhibition is essential to ensure the application can attract the user candidates [19]. In the exhibition, we provide testing of applications to satisfy the user candidates. Testing could be defined as the process of verifying and validating that our application is bug-free [20].

In the testing step, feedback from user candidates will be considered as important inputs for the application as it is user-oriented, to fulfill users' requirements. In case there are critical things that need to be added, removed, or fixed, then the communication steps will return to the Define Objectives of Solution step and repeat the steps all over again. However, if the application is already suitable and approaches users' requirements, the application is ready to be used to help users arrange their schedule.

231

III. IMPLEMENTATION AND DISCUSSION

To analyze and model our project, we use some requirement modeling, such as *use case diagram, class diagram, and sequence diagram*.

A. Use Case Diagram

In our system, only one user interacts daily with the application. Use Case Diagram explains the sequence of our system to show the action of each actor and provide great value to our user [21] (can be seen in Fig. 4).
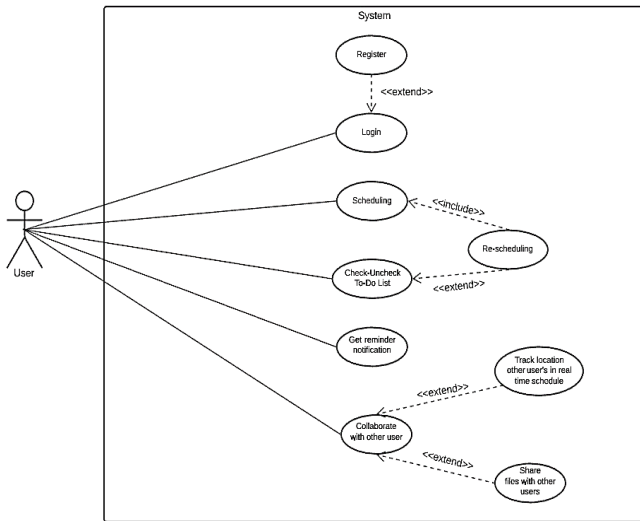

Fig 4. Use case diagram

B. Class Diagram

Class diagram is a class-based model which is used to show the classes, relationships, interface, association, and collaboration between each class [22]. Therefore, we already designed class diagram to make people easy to understand each class we used to support this project (can be seen in Fig 5).
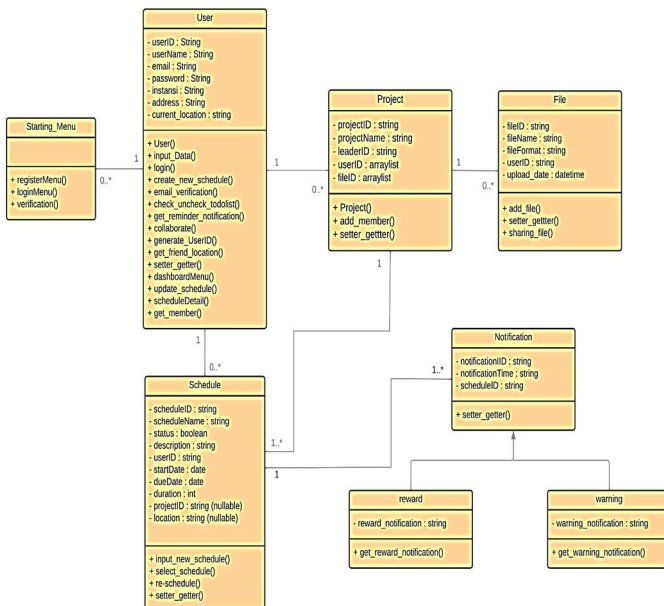

Fig 5. Class diagram

C. Sequence Diagram

Sequence diagram is a behavioral model which details how some operations are done. This diagram shows how and when the objects collaborate with the other objects [23] (can be seen in Fig 6 and 7).
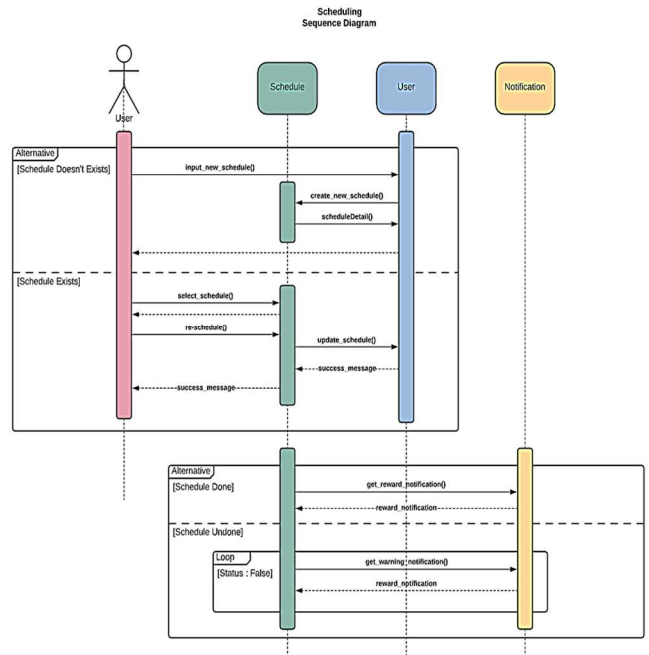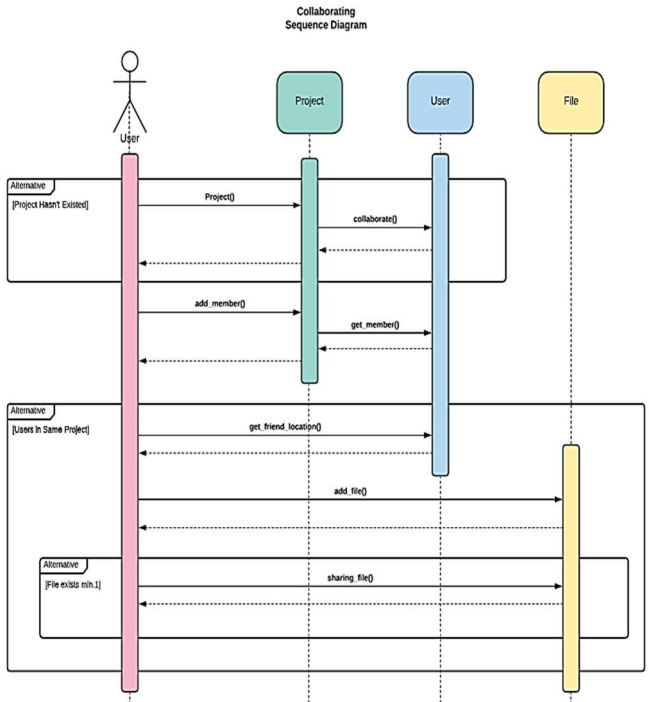

Fig 6. Scheduling sequence diagram

Fig 7. Collaborating sequence diagram

D. User Interface

User interface is used to show application design seen by the user. In our application (project), some main features which support the work of the application are:

232

➢ Today's Feature

Today Feature used to let users check things to do during the day. If the activity hasn't been done, the activity is unchecked in the undone part. But, when they have already done the activity, they can check the activity and it will remove to the done part (can be seen in Fig. 8).

Fig 8. Today feature

➢ Schedule Feature

Schedule Feature is used to let the user check and add some activities which they should do in the future (can be seen in Fig 9)
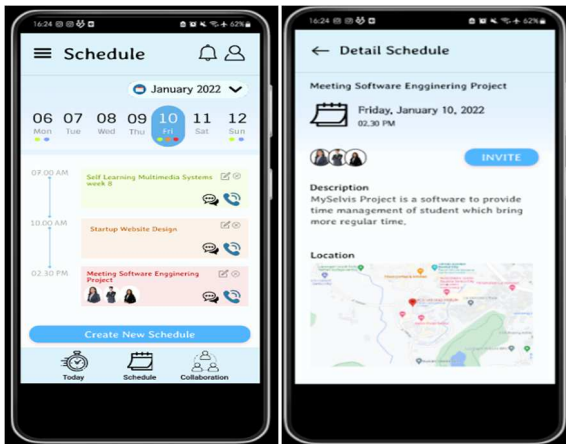

Fig. 9. Schedule feature

➢ Collaboration Feature

Collaboration feature is used to let the user make a collaboration with the other users. This feature lets the user track the other users' location, chat with them, and share files (can be seen in Fig 10).

E. Testing

Testing steps is the most crucial thing in developing an application so that the result of innovation (product) could be useful and help users in achieving their goals. There are several types of testing used in testing an application, but we choose to use Eight Golden Rules. Eight Golden Rules is a

rule to assess how users interact with applications to create a satisfying user experience. There are 8 main rules applied to test this application.

Fig 10. Collaboration feature

1) Strive for Consistency

This application has the consistency of color, icon, position of navigation bar, content, and footer in all pages. This consistency will not make the user confused when using this application (can be seen in Fig 11).

2) Seek Universal Usability

For each icon which represents action to the user already interactive and universal in daily use application. For example, icon profile and notification in navigation bar help users to know about personal information or notification who relate in activities (can be seen in Fig 12).

3) Offer Informative Feedback

This application gives the user an informative response when the user hasn't fulfilled the input requested. When added to a file, the process of upload will be shown on screen. If there is data which hasn't been filled in, the application will show the notification (can be seen in Fig 13).

4) Design Dialog to Yield Closure

All processes in application need to get feedback from the systems. Every user which inputs data to the process like sign-in or sign-up will receive a pop-up message that indicates the process in the system's finish. For example, when users insert data in a task list, systems will show a message (can be seen in Fig 14).
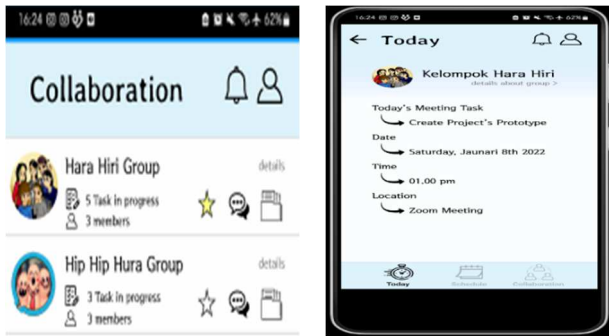

Fig. 11. Strive for consistency
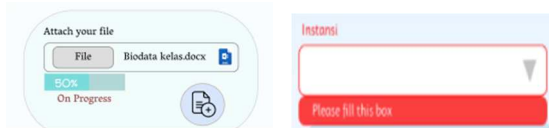
Fig. 12. Seek universal usability
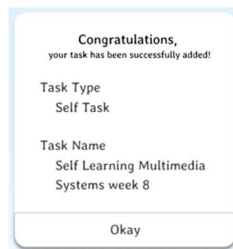

Fig 13. offer informative feedback

Fig 14. Design dialogs to yield closure

5) Prevent Errors

Preventive actions are needed to minimize the error numbers that occur while the application is running and interacting with users. This application applies errors preventing actions in the parts of the application that require input from users. They have a role in guiding users to give inputs in a correct way by giving instructions in the input box (can be seen in Fig 15).

Fig 15. Prevent errors

6) Permit Easy Reversal of Actions

Users need to feel safe while using the application, especially when dealing with important actions in the app, such as deleting files. In the Collaboration feature of the app, members of the collaboration group can add or remove files. It gives users a bigger responsibility in taking actions related to that, since everyone in the group can view the details of recorded actions of the files, such as the modifier and the date

of modification. For instance, in this application, a question box will appear when users are going to delete a file in a collaboration group, to make sure if they really want to delete it (can be seen in Fig 16).

7) Keep Users in Control

Users need control to adjust applications with their satisfaction. This application helps users keep in control from the notification setting and management files which can increase productivity (can be seen in Fig 17).

8) Reduce Short-Term Memory Load

If a user error occurs when a user registers or logs their account in, the application does not immediately delete all user's data. The application will only delete the user's incorrect data and ask the user to fill it again (can be seen in Fig 18).
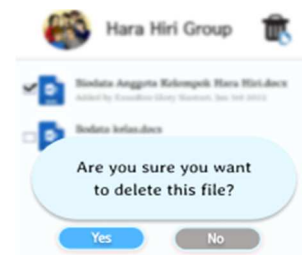

Fig 16. Permit easy reversal of actions
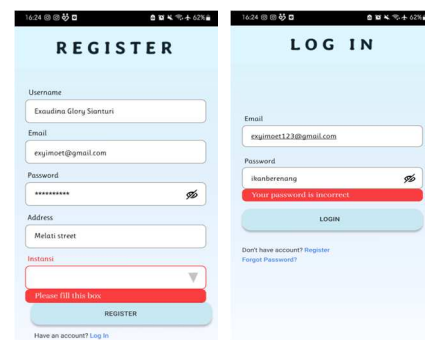

Fig 17. Keep users in control

Fig 18. Reduce short-term memory load

IV. CONCLUSION

Students nowadays have difficulty in managing their own time, especially for study. Therefore, we construct a scheduler application which could help them to manage their own time better. Our main goals here is to make students have an effective study schedule and collaborate with other people online. Based on the goals, we develop an application with some features, such as setting schedules and doing the collaboration. An additional feature that we bring up as a

unique attraction of the application is the notification feature which gives users the experience of getting a reward or warning message from doing or missing the schedule. The results from analyzing students' life, this application has fulfilled their needs in time management. To develop and upgrade this software, we are planning to integrate this application with Google Calendar, so that every schedule either in Google Calendar or in this application is connected to each other.

REFERENCES

[1] Nominal Batbaatar, Grace Amin (2021), "Students' Time Management During Online Class", Research Gate, pp 189

[2] R. V. Adams (2019), "Impact of Time Management Behaviors on Undergraduate Engineering Students' Performance", Sage Journals, Vol 9, pp 1

[3] M.H. Mukwevho (2018), "Time Management Challenges on Students' Academic Performance: A Case Study of a Rural University in Limpopo Province, South Africa" EBSCO, ProQuest, J-Gate and Sabinet, pp. 225–241. (references)

[4] Sovaritthon Chansaengsee (2017), "Time Management for Work-Life and Study-Life Balance", Silpakorn University, Vol 10 Number 5, pp 20

[5] Mind Tools Content Team, "What Is Time Management? Working Smarter to Enhance Productivity", accessed on November 22, 2021 at 02.47 p.m., https://www.mindtools.com/pages/article/newHTE_00.htm

[6] Harappa.education, 2020, "The Benefits Of Time Management", https://harappa.education/harappa-diaries/importance-benefits-and-advantages-of-time-management/

[7] Global Indian International School, "The Importance of Time Management in a Student's Life", accessed on November 22, 2021, at 3.28 p.m., https://tokyo.globalindianschool.org/blog/importance-of-time-management-to-students

[8] Week Plan, 2021, "25 Benefits of Effective Time Management", accessed on November 22, 2021 at 3.46 p.m, https://weekplan.net/Benefits-of-Effective-Time-Management

[9] Matthew Martin, 2021, "Prototyping Model in Software Engineering: Methodology, Process, Approach", https://www.guru99.com/software-engineering-prototyping-model.html

[10] GeeksforGeeks, 2020, "Software Engineering | Prototyping Model", https://www.geeksforgeeks.org/software-engineering-prototyping-model/

[11] GeeksforGeeks, 2018, "Software Engineering | Phases of Prototyping Model | Set – 2", https://www.geeksforgeeks.org/software-engineering-phases-prototyping-model-set-2/

[12] SlideTeam, "Flowchart For Research Methodology With Design And Development", accessed on December 1st, 2021, at 11.58 a.m. https://www.slideteam.net/flowchart-for-research-methodology-with-design-and-development.html

[13] ResearchGate, 2018, "Identifying and Formulating the Research Problem", https://www.researchgate.net/publication/329179630_Identifying_and_Formulating_the_Research_Problem

[14] International Journal of Applied Research, 2016, "Impact of Gadgets on Emotional Maturity, Reasoning Ability of College Students", https://www.allresearchjournal.com/archives/2016/vol2issue3/PartM/2-3-182.pdf

[15] Enterprising Oxford, "Business Model Canvas Explained", accessed on January 14th, 2022, https://eship.ox.ac.uk/business-model-canvas-explained

[16] Blueberry Consultants, 2018, "Requirements Gathering for Software Development Projects", https://www.bbconsult.co.uk/blog/requirements-gathering

[17] Visual Paradigm, "Requirement Analysis Techniques", accessed on January 14th, 2022, at 7.29 p.m,

[18] TechTarger, 2021, "Prototyping Model", https://searchcio.techtarget.com/definition/Prototyping-Model

[19] ResearchGate, 2018, "Developing and Testing a Model of Exhibition Brand Preference: The Exhibitors' Perspective", https://www.researchgate.net/publication/257087451_Developing_and_testing_a_model_of_exhibition_brand_preference_The_exhibitors'_perspective

[20] GeeksforGeeks, 2021, "Software Testing | Basics", https://www.geeksforgeeks.org/software-testing-basics/

[21] Agile Modeling, "UML 2 Use Case Diagramming Guidelines" accessed January 14th, 2022, at 08.04 p.m. http://www.agilemodeling.com/style/useCaseDiagram.htm

[22] GeeksforGeeks, 2021, "Unified Modeling Language (UML) | Class Diagrams", https://geeksforgeeks.org/unified-modeling-language-uml-class-diagrams.

[23] Visual Paradigm, "What is Sequence Diagram?", accessed January 14th, 2022, at 08.35 p.m, https://visual-paradigm.com/guide/uml-unified-modeling-language/what-is-sequence-diagram