

APCafe

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Abstract— As most canteen is serving people with the traditional flow where there is still a lot of direct and indirect contact between people, a flow change should be done. Instead of ordering their foods and drinks by queuing at the counter, which is traditional, customers should call their food online without needing to queue. With this, direct and indirect contact could be minimized, despite intentional or not.

Keywords—Covid- 19, application, canteen, queuing system, rapid application development, waterfall model

I. INTRODUCTION

The canteen is one of the facilities commonly existed in every school, university, office, etc. A canteen is a place where people can spend their break time having breakfast, lunch, and dinner and a place where people can spend their break time chilling with other people. With that being said, the canteen is mainly purposed for everyone to have easy access to foods and drinks.

As the COVID-19 pandemic has still occurred until now, the people in the world have reduced the usage of the facility. People prefer to avoid any facility to reduce direct and indirect contact with people so that the chance of being infected by the virus is lesser. Since canteen is one of the facilities, the popularity of this canteen is also decreasing. With this being said, solutions to minimize the problem and minimize contact between people should be done.

To provide the solution, I will propose an automatic ordering web application system where people can order their food and drink online with their web browser or mobile browser. The project's focus is to improve efficiency and reduce contacts within people in the canteen environment so that the spread rate of the COVID-19 virus is lowered.

The pandemic, according to, impacts all four pillars of food security: availability, access (the most immediate and significant impact), usage (sufficient nutritional use), and stability (the possibility to access food permanently). According to SAMJ, 2020, sharing food and eating utensils at canteens and communal ablutions may contribute to the spread of the disease. Thus, this problem should be minimized or even prevented.

According to CISA, in 2020, every nation's crucial component includes the healthcare sector, communication, and, more importantly food sector that must keep going on during the pandemic due to the demands that are predicted to be very high. During the pandemic, the food industry has faced challenges in encountering supply chain interruption and the following problems that may destroy the food supply

chain itself (Galanakis, 2020). The indicator that should be fulfilled to pass the challenges is to meet the expectation of the huge and increasing market demands, to protect their employees from the covid-19 virus, and most importantly, to maintain the safety of the food itself and increase the customer trust (Hailu, 2020).

Moreover, the characteristics identified as possibly impacting the risk of infection were difficulty with physical distance at work, poor cleanliness, crowded living, commuting situations, and other issues (CDC, 2020). Employees above 65 years old working in the food industry with or without chronic illness are most likely to end up with another severe illness if infected with the Covid-19 virus (CDC, 2020). Therefore, each food industry should decide and evaluate who can work on-site or who should work from home during this pandemic (IL0,2020). The food industry can use several health and safety protocols methods, such as population screening, glove & mask usage, physical distancing policy, etc. This APCafe can also be used as a medium for donation as it would allow the user to order the food and deliver to those who need it (Shankarvelu et al., 2023).

II. PROBLEM CONTEXT

A. The transmission and spread rate of the COVID-19 virus

The COVID-19 pandemic has left a tremendous global impact all over the world. The COVID-19 virus has taken millions of lives worldwide and has impacted numerous economic, political, etc. The government in every country is currently trying its best to minimize the impact since this virus could not be avoided. One of them is that the government has applied health safety protocols that everyone must obey. For instance, people must use masks wherever they want to go and avoid direct contact with other people.

According to WebMD, experts have discovered that the COVID-19 virus's main transmission is through person-to-person contacts. First, the virus may transmit by droplets or aerosols. Whenever an infected individual coughs, sneezes, or talks, minute drips or particles known as aerosols are released into the atmosphere. It may be inhaled by anyone else within six feet of that person. Aerial transmission would be the next stage. As far as scientists are concerned, the virus may remain viable inside the air over three hours. If someone with it exhales and you inhale, it can enter the lungs of other individuals. Experts differ on the frequency and contribution to the pandemic of atmospheric transmission of the virus.

Then there is the transmission mostly on surfaces. A less common way to spread the virus is by contacting surfaces

which have been infected with the virus by contact with someone else's coughs and sneezes. People may contact a polluted surface or doorknob and afterwards touch their nose, mouth, or eyes, which might transmit disease. For a period of two to three days, the virus could persist on plastic or stainless metallic surface.

The fecal-oral is the final component. The faeces of ill people has also been shown to contain virus particles, according to research. Scientists are unsure, however, if the illness may be transferred through contact with the excretion of afflicted persons. People and everything they come into contact with are at danger if that person uses the bathroom without first cleaning their hands.

B. The decrease in canteen activities due to the COVID-19 pandemic

As stated above, the government has taken action to prevent the transmission of the COVID-19 virus. Besides the action stated before, the government has also applied movement control for their country. For example, before the pandemic public facilities such as malls, parks, restaurants, schools, universities, etc., were free to operate. However, after the government declared the movement control, some rules should not be violated by people. For instance, the public facilities population should not exceed 60% of the maximum people.

Moreover, the restaurant should not operate after 8 PM in some countries. Besides that, delivery should be an option that should be provided as it prevents eatery physically present on purchasing food (Almuhandes et al., 2023). These policies applied by the government are purposed to decrease any unnecessary activities within the country so that whether direct or indirect contact could be minimized. However, this leads to lesser action in public areas like the canteen.

C. A long queue can lead to negative courses of action and negative impacts

Queues have always been the number one school canteen issue for students. The hour of midday recess doesn't seem like much. The last thing students want to do is waste time away from their studies by waiting in a big line. According to Kirill Tsernov, long queues scared away customers. Customers that have been waiting for an inordinately long period may check out, but they will never return to your business.

First impressions count: one negative encounter might turn a consumer away for good. It means students who experience the long queue in their canteen will feel like they are wasting their time too much in the big line and decide to avoid the canteen and bring their lunch from their home or buy their lunch from somewhere else. Researchers can predict how people react when lines are excessively long because of extensive study in queueing theory over the previous three decades.

Despite being annoyed, over half of consumers will wait in line. Being upset causes customers to act in unusual ways, which reduce the size of your company's bottom line with a bad course of action such as trying to cut another people's queue, leaving the queue after a while of queueing, etc.

D. The uncontrolled crowd in a public area

During the pandemic that started in late 2019, the government worldwide has begun to control the situation of the pandemic, finding the cure while decreasing the spread of the COVID-19 itself. One of the governments' actions is to prevent and reduce the crowd within their country. Furthermore, in the research from Liliana Duran-Polanco and Mario Siller in 2021, according to the WHO guidelines, "Coronavirus illness (COVID-19) advise for the public" (WHO, 2020), the number of individuals per m³ (cubic meter) must not exceed 1 to lower COVID-19 rates of infection.

However, crowds are still occurring due to some reason that is out of government control. According to Liliana Duran-Polanco and Mario Siller, 2021, the group is one of the main causes of the pandemic since the COVID-19 virus can easily transmit via droplets. Since the canteen is one of the public areas, there're also still many rowdy crowds gathering in the canteen without even complying with the health protocols.

III. SCOPES AND OBJECTIVE

A. Aim

This project aims to provide a fast service canteen ordering services for students, staff, teachers, lecturers, etc., without queueing in a big line and minimizing the rate of COVID-19 virus transmission.

B. Objectives

- To minimize the contact between people so that the canteen customer will gain back the interest to visit and use the canteen.
- To keep the transmission of the COVID-19 virus to a minimum while increasing the activity in the canteen environment.
- To remove the long queue to order foods and drinks in the canteen environment.
- To develop a brand new web application for food and drink orders to replace queues in the canteen environment.
- To implement the ordering service web application to ease ordering foods and drinks in the canteen.

IV. SYSTEM DEVELOPMENT METHODOLOGY

A. Selected Methodology

After much deliberation, it was deemed that Rapid Application Development (RAD) would be the ideal technique for this project. The major reason is time constraints. The system must be completed around seven months and the documentation while Rapid Application Development (RAD) is the most suitable methodology for short-term projects.

1) Rapid Application Development (RAD)

Rapid Application Development (RAD) is an agile project development process becoming increasingly popular in software project development. RAD is an acronym for Rapid Application Development. Furthermore, according to the Lucidchart Content Team, the main element of rapid application development is a fast-paced project development environment where the development team works in a fast-paced environment like apps and software development. To summarise, rapid application development (RAD) reduces the

project planning step while improving prototyping and creating the project environment.

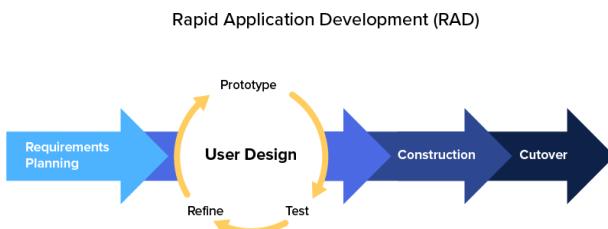


Fig 1: RAD process diagram

a) Requirements Planning

During the first phase, the development team will refrain from employing any traditional approaches, such as contacting the program's end-user and gathering information about the end users' requirements and requirements. A discussion and finalization of the system requirements should occur at this step. The project's goals, objectives, timetables, and budgets must all be finalized before beginning. Following that, the development team must seek approval from upper management.

b) Prototyping

As a result of these considerations, the development team may begin prototyping the system as soon as possible based on the standard requirements, with the prototype phase potentially including the addition of extra features. Unlike the genuine systems, the prototype is a simplified portrayal of them. Customers will be shown the prototype after it has been completed to consummate the deal and ensure that the system meets their requirements (kissflow, 2018).

c) Gathering Feedback and Constructing

In the third step, the development team must begin transforming the prototype into a realistic system model of the actual world. When developing system models, the development team must solicit feedback from every member of the team and the beta tester user themselves. The development team subsequently uses the input to improve the system's overall functioning. The iterative nature of this phase will continue until the needed system has been implemented and is fully operational (Ankita Singh, 2019).

d) Presenting and Implementing

After that, the development team should show the customer a working demonstration of the system's features, functionality, and user interface to offer a concise overview of the system's capabilities. Afterward, it should be feasible to install the finished system, following which the development team should provide a brief user training session for the system (Ankita Singh, 2019).

2) Waterfall Methodology

The Waterfall methodology is a progressive model for software development that splits the process into pre-defined stages, as stated in Software Development Lifecycle (SDLC) methodologies (Martin, 2022). Every stage or phase should be sequentially done, and overlapping is prohibited. The Waterfall methodology is ideally suited for projects which require lots of predictability, such as software development, where the ultimate product is well defined before beginning. Therefore, this methodology most likely will not accept inputs

from stakeholders, and changes will be avoided during the development process.

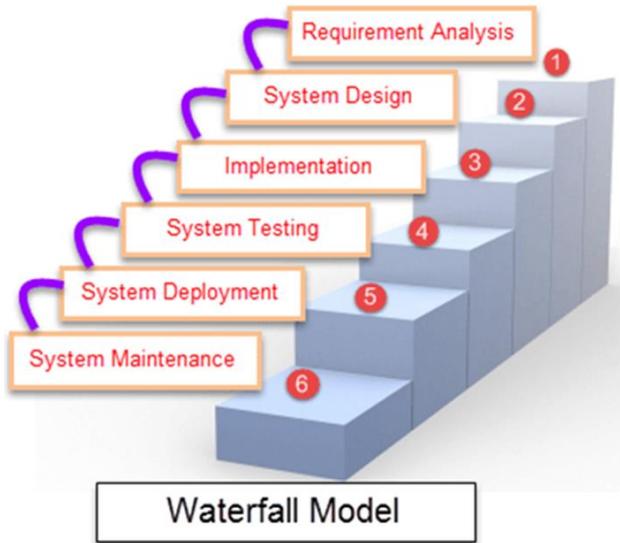


Fig 2: Waterfall model phases

The waterfall model consists of five main stages, which are listed below.

1. Requirements: This phase will require the stakeholders to define any requirements for the to-be-developed system. In other words, the whole requirements of the project are determined in this phase.

2. Design: This phase will define every solution and design that the system should have to work properly and efficiently.

3. Implementation: This phase is where the project team members start developing and implementing every idea that was pre-defined earlier. Meaning this is the development phase.

4. Testing: This phase is where the project team members start to verify whether the developed system validates the requirements.

5. Maintenance: Even though the system has been fully implemented and tested, that does not mean that the job has been done. This is the phase where the team keeps maintaining and implementing any upgrades and updates the system.

3) Comparison & Justification

As this project will implement the Rapid Application Development, justification and comparative analysis should be provided to support the choice. Therefore, the following table will show the differences comparatively based on the methodology properties.

TABLE I. COMPARISON BETWEEN RAD AND WATERFALL METHODOLOGY

Property	RAD Methodology	Waterfall Methodology
Name	Known as an Iterative Model.	Known as Classical or Traditional Model.
Team Size	The team can be decreased and increased along with the progress of development.	Requires a large team to start the project. The team members are fixed, and no changes will be made.
Risk	Low risk	High risk
Flexibility	Flexible	Not Flexible
Changes	Changes can be done during the development progress in any phase.	All requirements and changes should be predefined in the beginning phase of the project. This methodology avoids changes during the development progress. Furthermore, the cost will be high if changes are made during the development progress.
Product Delivery	The product of the RAD methodology is delivered in the early stage as the project team members are expecting feedback to support the development of the system.	The products of the Waterfall methodology are delivered in the final phase of the development.
Waiting Time	The stakeholders and clients can try the products during the development.	The stakeholders and clients should wait till the end of the project to give a shot at the system.
Project Scale	Flexible and adjustable depends on the requirements of the project.	Large scale project.

4) Implementation

Rapid Application Development (RAD) is flexible. Even though this methodology is supposed to be implemented in terms of a ‘group’ project, this methodology can also be a perfect fit for an individual project. Due to a short period for a project to develop a system, every development process will follow the RAD phases.

First, the project requirements will be determined before starting the project. Then, a prototype of the system will be developed for feedback and early testing purposes. The feedback will be used as consideration to support the system that is being developed. For instance, a stakeholder requested to add a specific feature.

The request will be taken into consideration whether it is suitable for the system or not. Since RAD methodology is an iterative methodology where the stages are in a loop until the system is fully developed, so are these processes. Once the final product is developed, the system will directly be tested and implemented. As additional information, since the nature of this project is flexible, RAD is implemented since it allows changes within the development process.

To ensure the pace and progress of the project stay on the right track and timeline, an agile board is considered to be implemented. The agile board provides a virtual board where the user can input every task to the board. Furthermore, the

user can also set the status of the tasks whether it is have not been worked, are in progress, or are done.

V. SYSTEM ARCHITECTURE

After conducting data gathering techniques such as questionnaires and observation and validating the data gathered, the developer has taken several points to decide the system architecture of the APCafe web application. As APCafe is a web application for the APU canteen, every single respondent is from the staff and students of APU.

To guarantee that the final result is properly welcomed and comprehended, the system’s functionality has indeed been adjusted from what the creator originally intended. The developer began the application’s advancement process by writing down all the features we’d need, such as who our intended audience would be, which departments could perhaps find the app’s features useful in their daily work, and which features we’d need for the app’s various audiences to maximize productivity and efficiency.

Therefore, to express the features and functionalities of the APCafe web application so that every people can understand the system easily, the following points will show the system design and the database design. The system design will be delivered in a use case diagram, use case specification, sequence diagram, and activity diagram. On the other hand, the database design will be delivered with Entity Relation Diagram (ERD) and table structure diagram.

A. System Design: Usecase Diagram

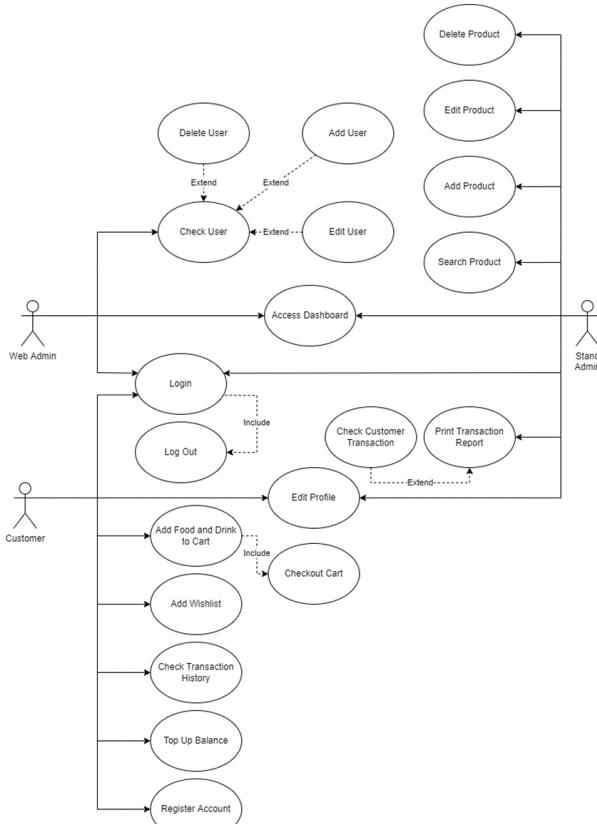


Fig 3: Use case Diagram

B. System Design: Activity Diagram

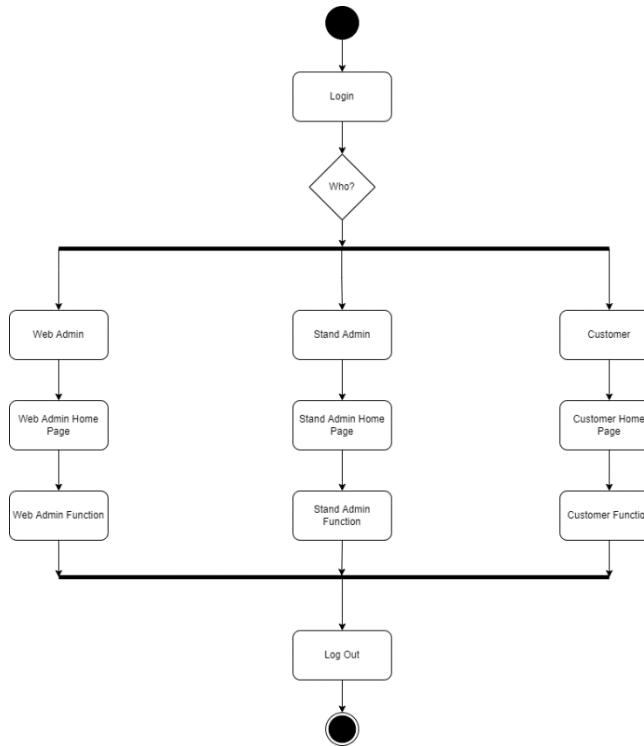


Fig 4: Activity diagram

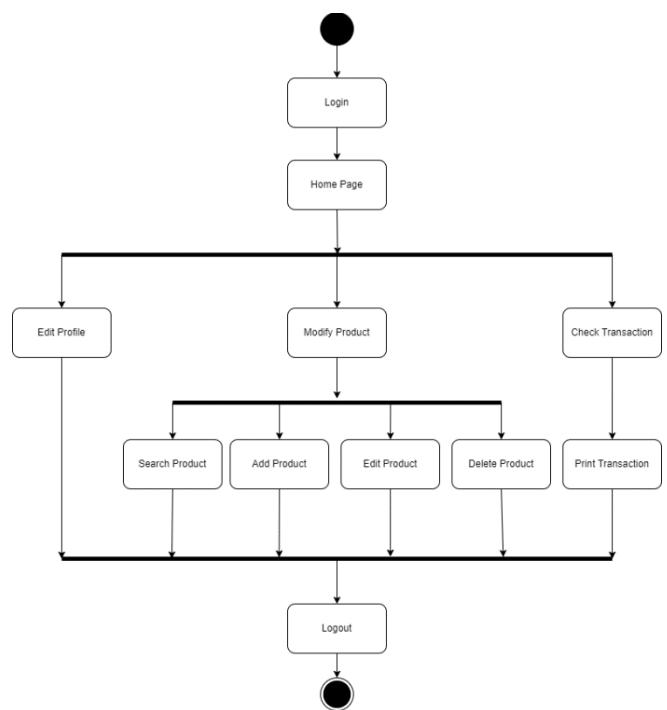


Fig 6: APCafe food stand admin activity

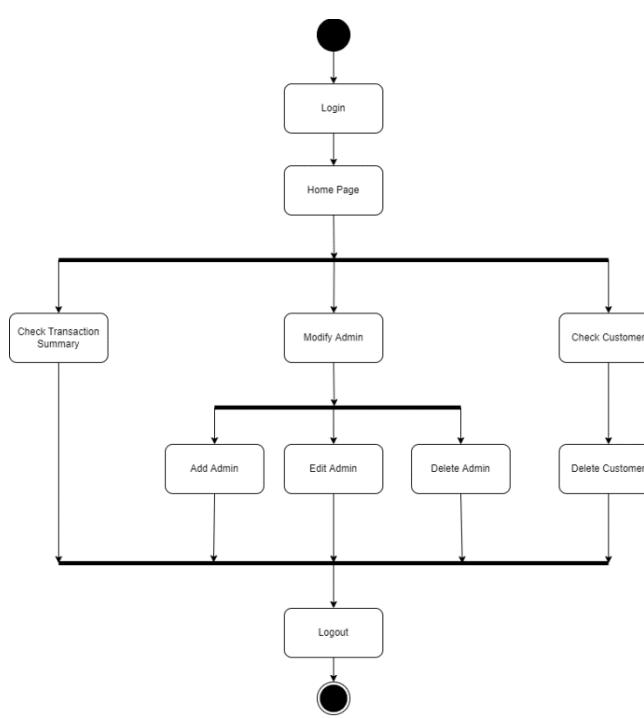


Fig 5: APCafe web admin activity

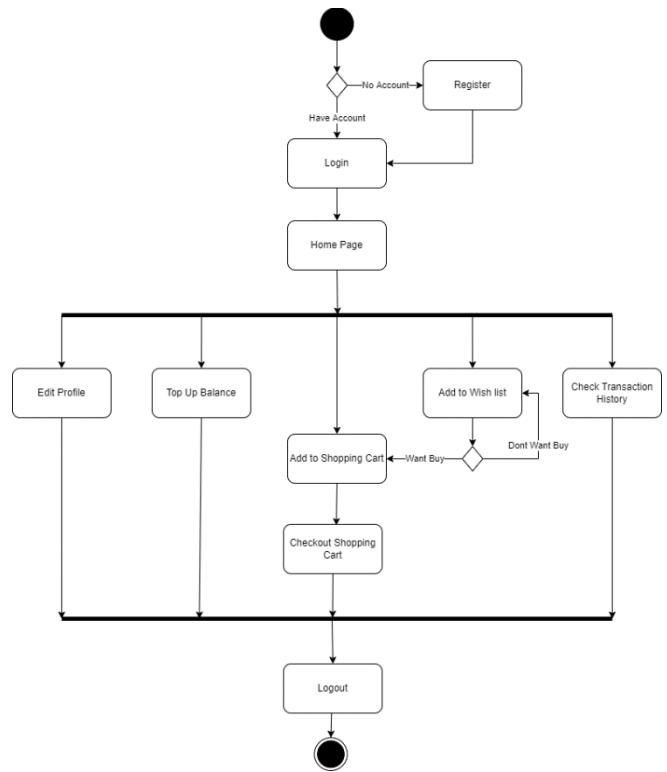


Fig 7: APCafe customer activity

C. System Design: Sequence Diagram

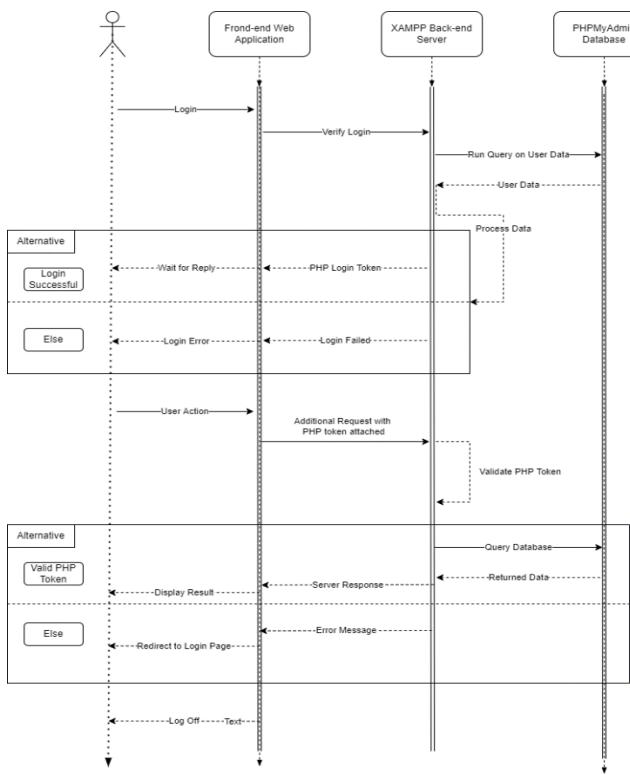


Fig 8: APCafe sequence diagram

D. Database Design: Entity Relationship Diagram

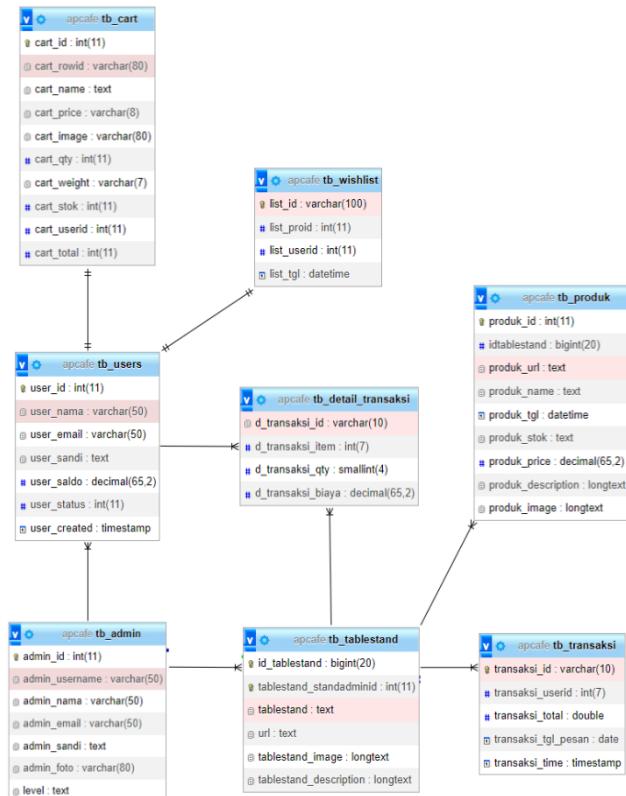


Fig 9: ERD for APCafe Database

E. Interface Design Storyboard

1) Login Page

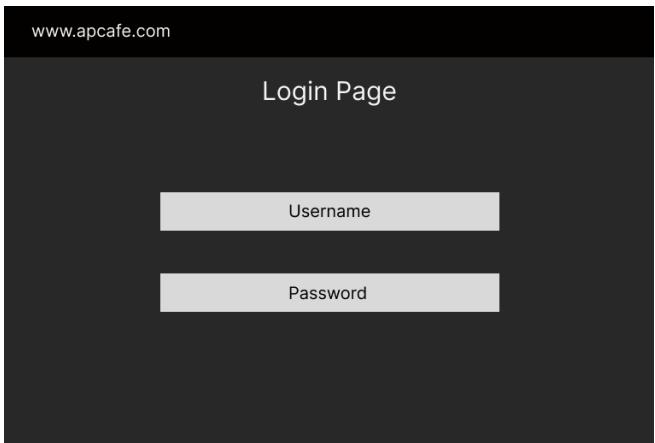


Fig 10: Login Page

2) Home Page Customer

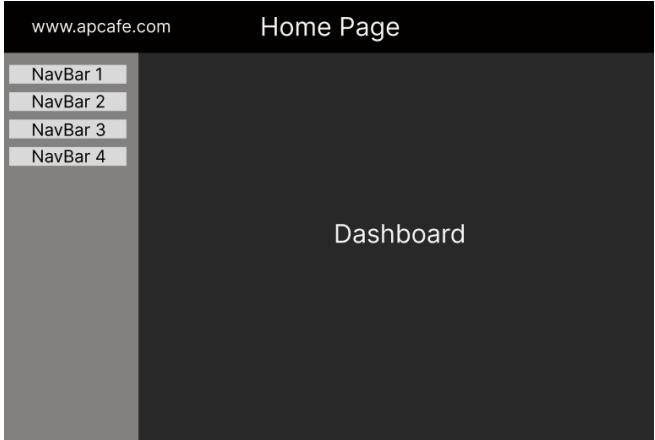


Fig 11: Home page customer

3) Home Page Admin

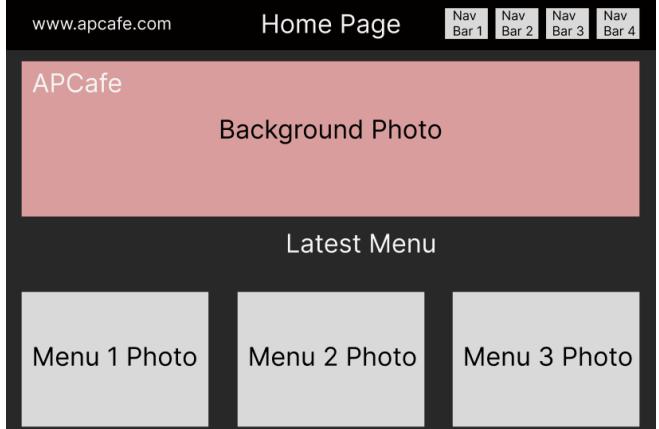


Fig 12: Home page admin

4) Register Account

www.apcafe.com Register Account Page

Register Account

Registration Details

Register Button

Fig 13: Register account

5) Shopping Cart and Payment

www.apcafe.com Buy Food Page

Balance

Shopping Cart List and Details

Total Price

Pay Now

Fig 14: Shopping Cart and Payment

6) Top up Balance

www.apcafe.com Top Up Page

Balance

Your Balance

Topup Amount

Top Up Now

Fig 15: Top up balance

7) Transaction Report

www.apcafe.com Transaction Report Page

Transaction List Table

Transaction 1	Detail
Transaction 2	Detail
Transaction 3	Detail
Transaction 4	Detail
Transaction 5	Detail

Fig 16: Transaction report

8) Modify Product

www.apcafe.com Modify Product

Detail 1

Detail 2

Detail 3

Detail 4

Detail 5

Product Photo

Modify Now

Fig 17: Modify Product

VI. CONCLUSION AND REFLECTION

This research has a bunch of things to be explained about. Creating a web application for the canteen is quite challenging due to the short period of time given for the research. However, this project will still be carried on as it serves many benefits for people in the university environment.

Starting from the literature review that talks about the effectiveness of the online web application system, the concrete data about Covid-19 pandemic, the transmission form of Covid-19 virus, website development, web application development, a good user interface, and design, online reservation method, food, and drinks business before and after the pandemic, and so many more. Furthermore, several similar systems are taken to be compared with the proposed system to show how dominant the proposed system is.

Technical research regarding the tools has also been conducted so that the project's development can be done efficiently. The technical tools are selected after a lot of consideration made by the researchers, such as the time efficiency, the time limit of the project, the developer's capability, the popularity of the tools, how easy the resources can be found online, the database, the deployment, system testing, etc. This section sums out the technical research part.

Next, the system development methodology has also been chosen to implement the project, which is Rapid Application Development (RAD). The researcher has gone through many

considerations and comparison processes to select the system development methodology in the research methodology part. At last, the researcher considers RAD methodology and Waterfall methodology. However, the RAD methodology won the selection due to this methodology fits the project the more. Also, the waterfall methodology is considered too old for the project made the researcher does not choose the methodology.

As for the research methodology, the researcher has preferred a questionnaire and observation methodology. The questionnaire is chosen due to its ability to cover a big group of people without any costs easily. Furthermore, the questionnaire result can be easily analyzed since the data can be turned into a visualization. Meanwhile, the observation methodology will be conducted to ensure the validity of the questionnaire result. In addition, such recommendations to improve the quality of the proposed system have also been gained from the questionnaire. In conclusion, the researcher will deliver the whole idea of the project and provide clear insights regarding the project for everyone reading the report.

As a whole, the venture has been a fantastic learning opportunity for the developer, exposing them to a wide range of topics, both practical and conceptual. The ability to manage one's time effectively was a must when taking tests and completing assignments.

However, despite the last-minute modifications, the experience obtained has been incredibly uplifting, requiring health status and peacefulness to be preserved. Stress was undoubtedly a part, but each chapter also included progress and the need to maintain the standards required by the First and Second Markers and deliver a piece that did not let them down.

The short period of time that amounted to even more than five months of contemplation on how to proceed has resulted in a lot of work in terms of developing the idea, identifying the characteristics, and drafting this inquiry report. The programmer is pleased with the present work, but there is still much room for improvement, such as delving deeper into the history of the topic to gain a deeper understanding of it. The fact that there are numerous internet resources, such as Indian YouTube

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