



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

**SECP1513-07 TEKNOLOGI DAN SISTEM
MAKLUMAT**

Project 2

(Low-Fidelity Prototype)

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1.0 Introduction

Low-Fidelity Prototype transforms a high-level design concept into something tangible, testable, simple, and convenient. Its most important function is to check and test the product's functionality, strengths, and weaknesses, rather than the product's visual appearance. The basic features of a low-fidelity prototype can be divided into visual design, interactivity, etc. Second, the advantage of low-fidelity prototyping is low cost, short production time and team cooperation.

Our group of low-fidelity prototypes project is separated equally within five members. In terms of team cooperation, everyone is responsible for producing their own part on time. But, there are some shortcomings during the project period like the test, full with class schedule and etc.

The lo-fi prototype project designed by our group is an implementation of augmented reality (AR), one of the fourth Industrial Revolution (IR4.0) technologies. Nowadays, with the continuous development of science and technology, AR technology is widely used in our daily lives, especially in clothes. Throughout the discussion between our members, we decided to design an AR technology that can facilitate people shopping. Because of the different countries living environments, each person's clothing sizes will vary from the clothes design or cutting, so this technology allows customers to view or test the product. Customers can use their devices to get information about simulated mannequins through AR to get more accurate information to simulate the user wearing clothes and know which products are best for them by observing the size and color of the items they need.

If there is a problem in the purchase process, the order processing microservice will be sent to the bottom layer, involving payment, return the product, and other order problems. At the payment stage, we also need to protect the safety of customers' funds, so our payment method will be integrated with security. The buyer's verification is required to ensure no wrong deduction. We developed some AI question-answering computer systems, which can answer some natural language questions from customers. When customers need to return or replace an unsatisfactory product from the merchant, they can ask the customer service team about the procedure. Our project will consider customers' shopping experience at any stage to feel more assured to go shopping.

2.0 Detailed Steps and descriptions about the project

With the advancing technology in this revolutionary era, technologies play a very vital role in leading humanity towards betterment. Our project is a team-based system which aims to implement Fourth Industrial Revolution (IR4.0) technologies in it. Before starting our project, our team member decided to hold a virtual meeting with our customer to understand his problem. This allows our team to quickly and accurately identify the problem our customer is facing. Our team is determined to generate the perfect alternative to solve our customer's trouble. The customer's details are as below:

- Name: Mr Lau
- Age: 20 years old
- Occupation: Student

Mr Lau is one of the typical Gen Z teenagers who are familiar with the online technologies and activities. Through the interview, our team find out that Mr Lau is facing problem when he is using e-commerce platform for online shopping purposes. Mr Lau is an intermediate online shopper who has been using an online shopping platform for 3 years and buys online products once or twice a month. His online purchase frequency increases when there are festival promotions offered on the shopping platforms. The e-commerce industry stands as a giant pillar in the field of online transactions. The impact and influence of e-commerce is also gradually increasing year by year. The graph shows the popularity of online shopping as the new online trend.

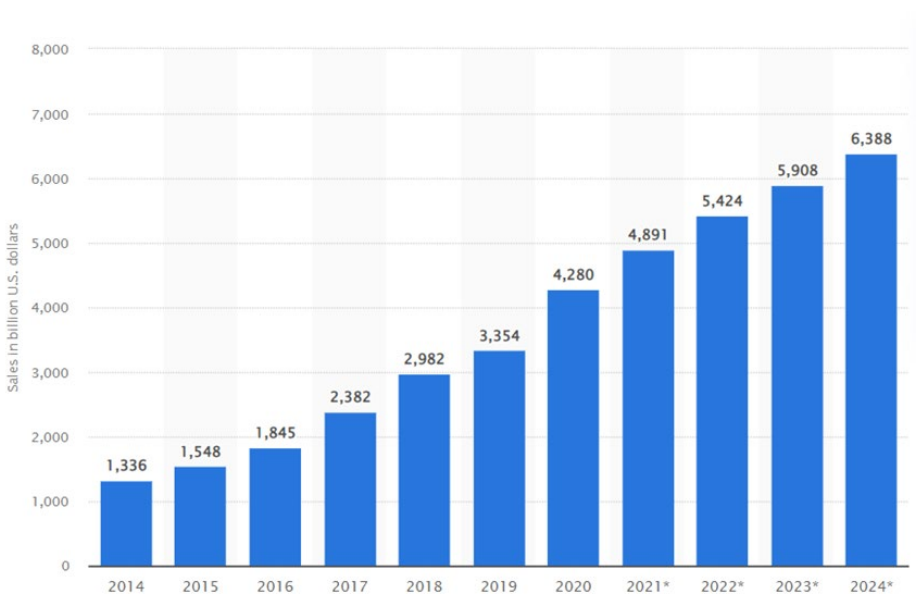
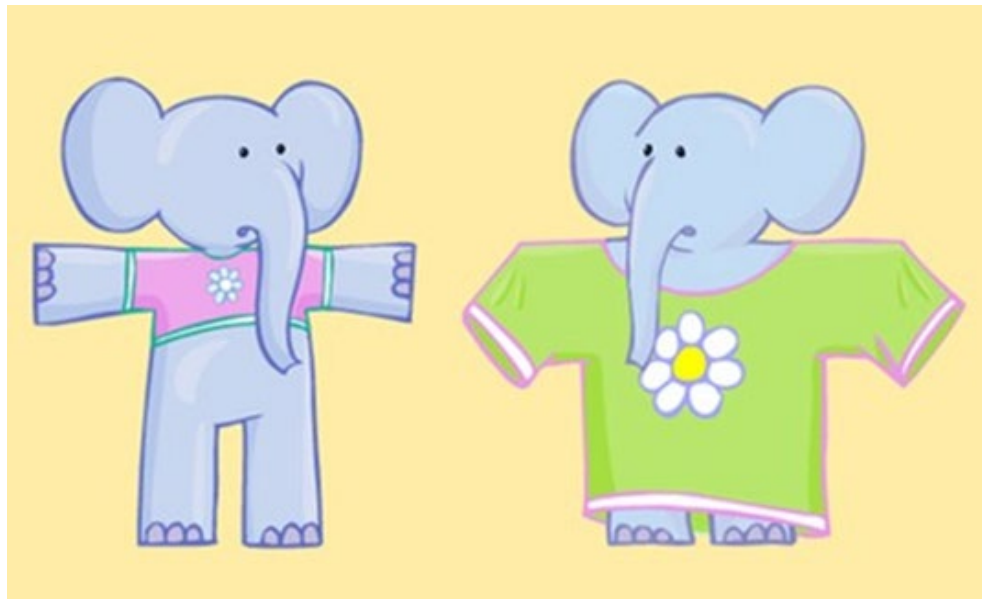


Figure 1 : Source: <https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/>

3.0 Describe the problems, solutions, teamwork

In the 2 minutes interview session, our team successfully identified the problem troubling Mr Lau. The problem is the incompatibility and unsuitability of online wearable products. The online wearable products include clothes, pants, shoes, and even accessories like earrings and necklaces. Mr Lau faced complex situations where the products he bought were not ideal like what he thought. When he buys wearable online products, he is afraid that the outcome may look very different from what he expected. On the e-commerce platforms, there is no 'fitting room' feature for buyers to test out the products. The clothes or accessories are mostly displayed on mannequins or models. The buyers do not get the opportunity to actually try on the products. Refund and return of a product are not available because the dissatisfaction is not about the product quality. In this case, Mr Lau has no other option but to accept the product he bought, although he does not like it. Our team believed this is a very common problem for most online buyers. Online purchasing is meant to bring convenience to both buyers and sellers, but selling unsuitable products is never the intention. Our team members showed great interest in the issue and decided to figure out a way to solve this problem.



Our team contributed a lot of effort to figure out the solution, but each was rejected due to various complexity. Examples are:

- ~ Requesting the sellers to display the clothes instead of mannequins gives buyers a more intuitive view of the product. This idea is rejected because the buyers may come from different countries with various weights and heights. The seller cannot stand as a model for people of all types.

~ Enabling refund and return of the product for buyers who are not satisfied with their purchase. This idea received opposition because it is unfair for the sellers. The sellers do not know what the buyers did to the products, such as unhygienic behaviours. When the product is returned, selling it to the second customer is dishonest because the product is not brand new anymore.

Finally, after multiple discussions and meetings, our team discovered the perfect solution to solve this problem by implementing Augmented Reality (AR) technology. It is one of the Fourth Industrial Revolution (IR4.0) technologies. Its implementation includes digital visual elements such as vision and other sensory stimuli, allowing the overlay between AR technologies and the real world. It acts as a virtual try-on solution that allows buyers to try on their clothing items and realistically see if the products suit them. With a single button click, the buyers will see how the products work on them, such as wearing shoes and clothes through their camera. The AR technology captures the customer's body and puts on the product as a virtual 'Fitting Room'. The virtual try-on technology works on clothes and pants and on shoes and wearable accessories such as necklaces and earrings. It is a precaution for buyers before placing their product order and gives them a clear direction on what they are actually buying and how the items look on them.

Prototype

The implementation of AR technology in e-commerce may seem complicated to people unfamiliar with the 4th industrial revolution. To give Mr Lau a complete and understandable view of our design, our team designed a Cloud Architecture prototype. The prototype consists of several features such as front-end platform and back-end platform and can draft out the foundation of our project. Our group members can effectively identify our project's shortcomings with the prototype. The front-end platform is widely known as the user interface. It plays the main role in providing services to the client-side of the computing system. The buyer will interact at the front-end platform before starting their online purchase. On the other side, the back-end platform is not viewable or accessible by the users. It hosts our system and focuses on the server-side. The implementation of AR technology is powered by the back-end platform as well. With the cooperation and coordination of the front-end and back-end platform, our team hopes to provide Mr Lau with a brand-new online shopping experience with utmost satisfaction, especially wearable products.

Testing

Our team had a second meeting with Mr Lau after implementing our AR technology idea of e-commerce. We offered Mr Lau a test version of our project and hope to receive further improvisation and improvement feedback. As a developer, we have full confidence in our project, but the users are the only ones who can really find out the hidden defects or shortcomings in our project. Mr Lau as an online shopper of 3 years, sets as a very good tester for our e-commerce

project. Luckily, Mr Lau gave high recognition to our project, especially our AR technology, which perfectly solved his problem. The prototype using Cloud Architecture played an important role in explaining our framework of the entire ecosystem. Our team also designed a low fidelity mock-up to present a graphical view of our AR technology to Mr Lau. The mock-up is presented as the basic version of our project. By doing so, Mr Lau can realistically observe our solution for his problem, and he was very satisfied with our idea. Our team also prepared a business process flow diagram describing our project's directed activities flow. The flow diagram serves the main purpose of simplifying complex business processes into an understandable list of business tasks.

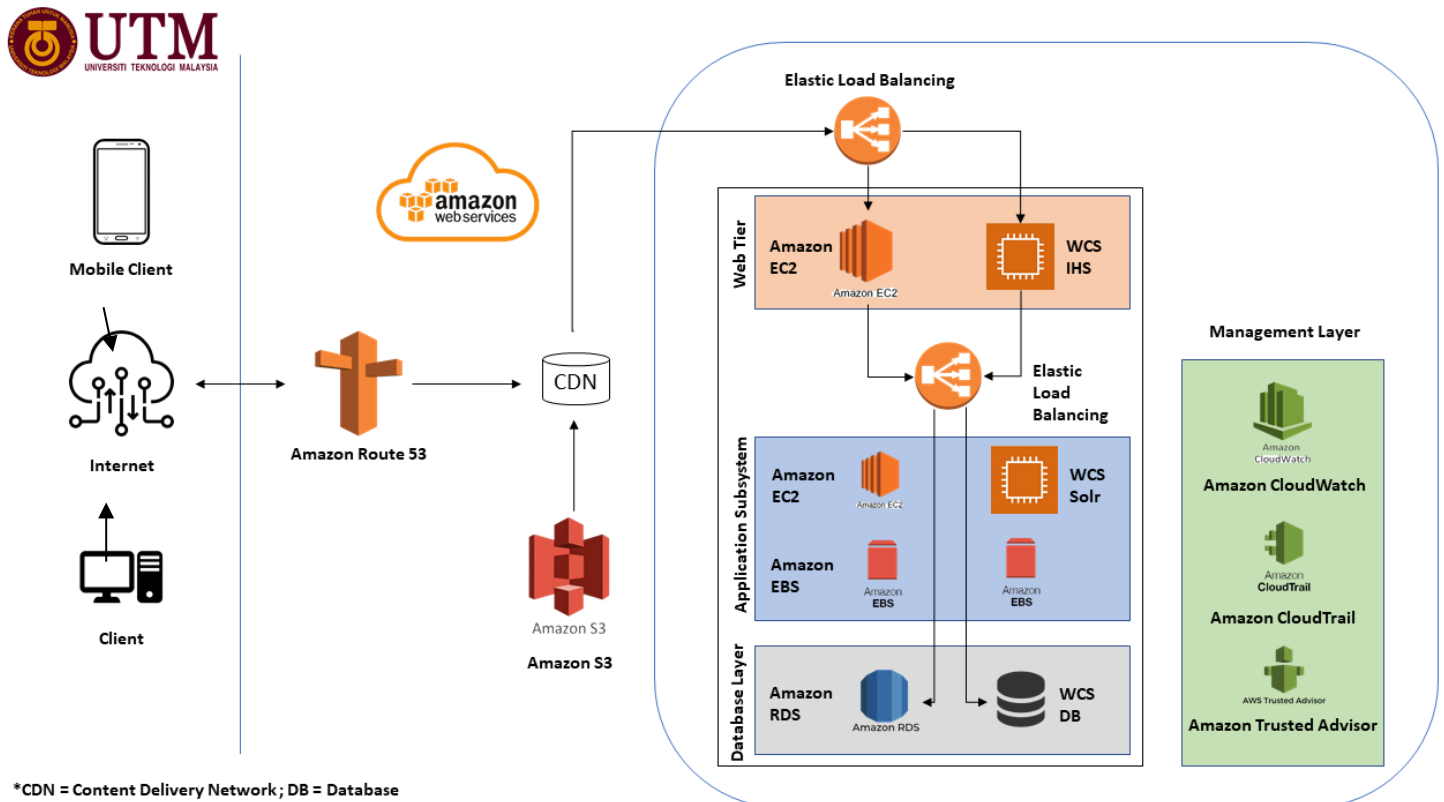
Teamwork

In creating such a complex project, teamwork plays a very important role. Our team consists of 5 members, and every single one of us is very dedicated to this project. We had our respective strengths and weaknesses, and we decided to distribute the tasks depending on our specialised field. Lim Shi Kai took the initiative and responsibility as a leader to distribute the tasks, ensuring that our project could work out successfully. The task distribution is as follow:

TASK	PERSON IN CHARGE
Introduction to the project	Ma Ze Jun
Overall description and summary of the project	Chih Zhen En
AWS Architecture Design	Lim Shi Kai
Business Process Flow Diagram	Chua Xin Lin
Mock-ups	Tia Siaw Xuen

It was a fair distribution of the tasks, and everyone was satisfied. Through the collaborative effort of all the team members, we can produce the low-fidelity project within the time assigned. It was a great experience for every single one of us.

4.0 AWS Architecture Design



A good e-commerce platform and application never leaves cloud computing behind. Good cloud computing can make the system smooth and give the user a better experience, especially during high volume. Besides that, cloud computing can raise the security level to safely protect personal data like address, phone number, and identity card number. The research throughout all cloud computing providers globally, such as IBM, Microsoft Azure, Alibaba Cloud, Amazon Web Services (AWS). The popular provider is AWS because of its various services and the price attracting customers to use their services. So, in our project, we also use AWS to support our e-commerce platform to give the best services to our users.

In the beginning, the buyer from any devices no matter from mobile application or web browser, their permissions will be sent to the Internet and transferred to AWS. When the permissions are sent into AWS, they will be arriving at Amazon Route 53 in advance. Amazon Route 53 enables the connection of user requests to infrastructure running in AWS like Amazon EC2, Elastic Load Balancing, and other relevant services. In addition, Amazon Route 53 also allows navigating users' requests to infrastructure outside of AWS like Google Form and so on. Amazon Route 53 also helps to manage traffic globally to avoid the busy status during shopping hours.

The information sent through Amazon Route 53 will then be directed to Amazon S3 and the Content Delivery Network (CDN), a geographically distributed group of servers that work together

to deliver Internet content quickly. A CDN allows for the rapid transfer of assets such as HTML pages, javascript files, images, and videos required for loading Internet content. Customers can use Amazon S3 to store any type of object, making it ideal for Internet applications, backup, recovery, disaster recovery, data archives, analytics data lakes, and more. The data will then be passed on to Elastic Load Balancing (ELB), which can automatically distribute incoming application traffic across multiple targets and virtual appliances in one or more Availability Zones.

In addition, to improve the online shopping experience, the users' requests were automatically distributed to Amazon EC2 and WCS IHS. It will be creating a virtual computing environment for Amazon EC2. A user can interact with both the computing environment and the work of other users through this networked application. Aside from that, Amazon EC2 enables our design team to rent virtual computers to test new features in the mobile app, such as AR View Testing for clothing.

After the web tier region, the request to assign the new layer will be sent to ELB. The request will be sent to Amazon EC2 and Amazon EBS if it is sent to the application subsystem layer (Amazon Elastic Block Store). Amazon EBS connects Amazon EC2 instances to raw block-level storage. By the way, Amazon EBS includes some tools for data management, backups, and performance optimisation. Users' requests can be assigned quickly when Amazon EC2 and Amazon EBS run the system.

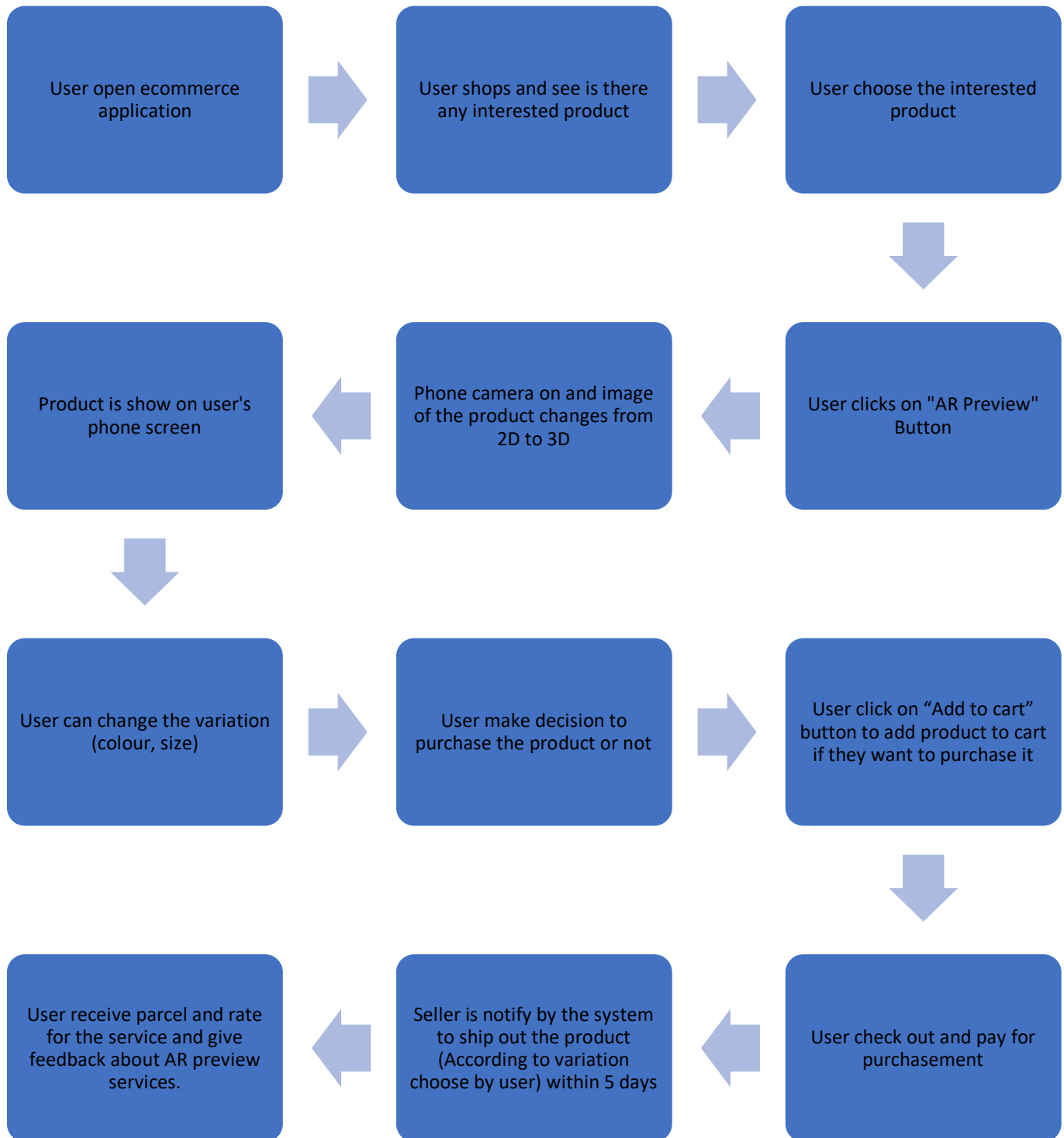
In the database layer, Amazon Relational Database Service (RDS), a service from AWS, makes it easier to set up, operate, and scale a relational database in the AWS Cloud. Users will enter their size information after using our AR View function. This information will be sent to the database level and saved. It can be kept until the user updates it. In other that, when the seller updates the item information like photo, price, and description. That information also will be stored in Amazon RDS, which can be optimised for memory, performance, or input-output. The data can be stored very safely and accessed easily with a few clicks from the mouse.

Lastly, there will be an important layer which is the management layer. It is used for monitoring the whole cloud computing architecture. In this layer, three services will be used, supported by AWS. Firstly, Amazon CloudWatch is used by the engineering team, which is DevOps engineers software developers. Apart from that, IT managers and sellers use it to obtain data and actionable insights to monitor applications and respond to system-wide performance changes.

Next, AWS CloudTrail helps monitor and record account activity across the AWS infrastructure, and it also gives the owner control over storage, analysis, and remediation actions. CloudTrail enables detecting unauthorised access using the Who, What, and When format for the security part. This step can make the user's account safer and get notifications when the account has been unauthorised to log in. The last service in the management layer is AWS Trusted Advisors, which

the owner can follow AWS practices. Trusted Advisors will evaluate the account using checks such as identifying ways to optimise the AWS infrastructure, improve security and performance, lower costs, and keep track of service quotas.

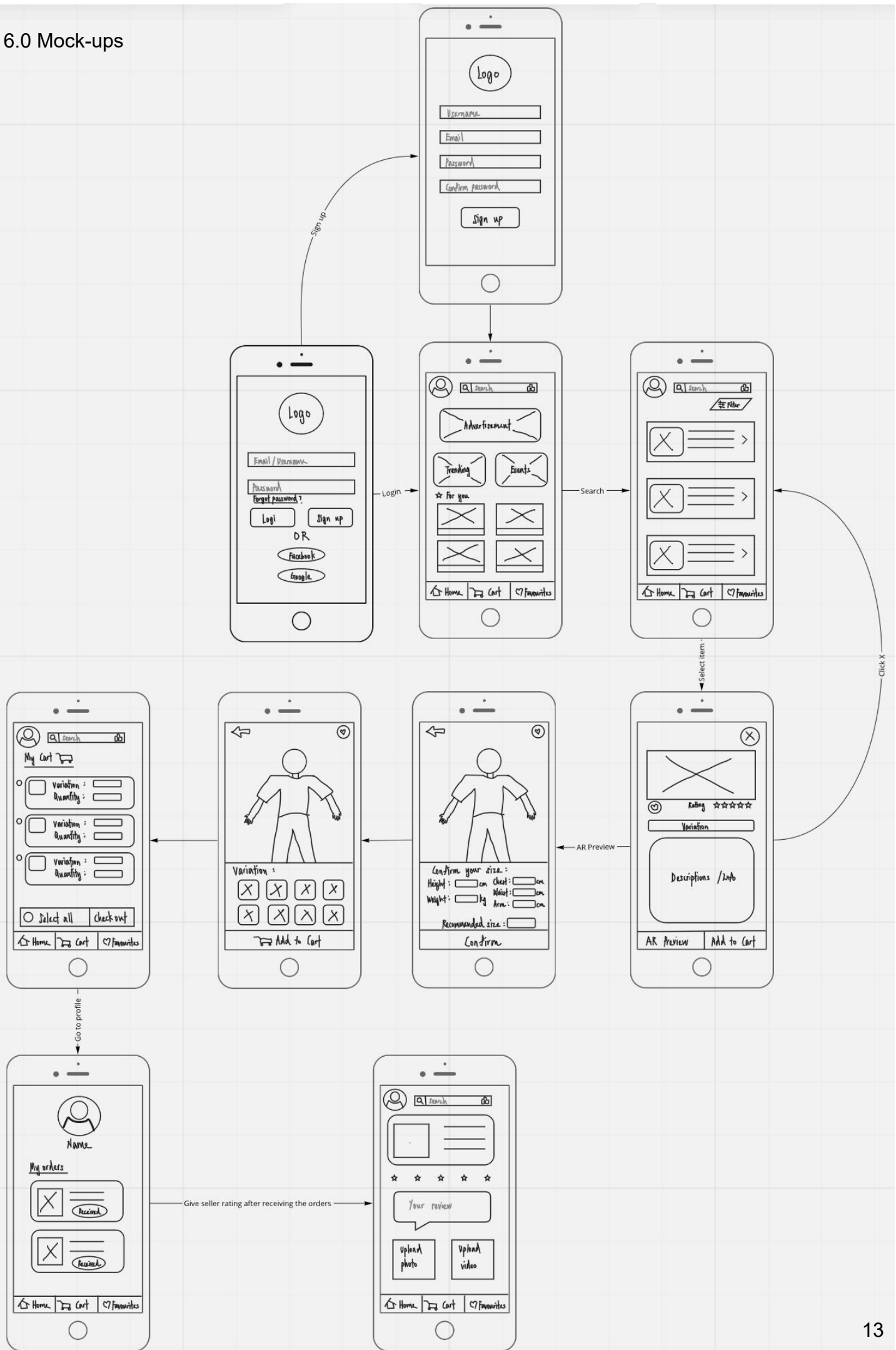
5.0 Business Process Flow Diagram and Descriptions



Nowadays, e-commerce applications have become the trending platform for purchasing items online. Despite that, the e-commerce application still has its shortcomings. Many users, including our interviewer, Mr Lau, faced problems such as items purchased did not meet their expectations or were unsuitable for them. Hence, our team decided to deploy Augmented Reality (AR) technology to reduce this issue.

Users open e-commerce applications such as Shopee and Lazada to buy things or feel bored. Users will search for the item they wish to purchase by entering the name or keywords of the item on search engines. The E-commerce system will then help users explore the objects, filter the unrelated products, list out the search results, and suggest high rating shops. Users can use the filter function by setting the services they need to enhance the precision of the search result. Then, users choose and click on one in the list that fulfils their requirements and at a reasonable price to get more information about the product. Users can decide to purchase by reviewing the rating, comment, or other users' feedback or using the AR preview function. Users can start using the AR function by clicking the "AR preview" button beside the "Add to cart" button. The system will stimulate the user's phone to turn on the camera while it converts the 2D image of the product to 3D and displays the picture on the user phone's screen. AR preview function has two different types: try-on solution and preview placement. The e-commerce application system will automatically implement the functions according to the product type. For instance, the try-on solution is used for attire, accessories, or cosmetics, while preview placement is used for furniture like sofas, tables, or chandeliers. After the 3D picture is shown on the phone screen, it will automatically track the user's movement. For example, if the user chooses to use the AR preview function on a pair of shoes, the system will automatically track the user's foot then suggest shoe size and colour according to the user's foot size and skin colour. If the user does not like the suggestion, they can customise the colour or pattern variation. If users feel satisfied and decide to purchase after the item preview, they can directly add the item into the cart by clicking the "Add to cart button" at the bottom. The system will automatically help the user add the item into the cart without changing the user-selected variation. Next, the user can go directly to the cart, check out the item, and pay bills. After the transaction is completed, the user can check the parcel status on the profile page, and the system will send the product details to the seller and notify the seller to ship out the product within five days. If the seller does not do so, the user can decide whether to cancel the order or seek help from the customer services of the e-commerce. After the seller ships out the parcel, the user can track the parcel movement anytime and wait to receive the item. Users can give ratings or feedback to the seller or AR preview service.

6.0 Mock-ups



7.0 Reflections

LIM SHI KAI A21EC0196

Throughout this project, I know how to build a nice and powerful computing architecture that might help to improve the services in e-Commerce. Besides that, I also know many of the functions and benefits of using Amazon Web Services. To complete this project, it needs a lot of time to research and determine suitable services from Amazon Web Services, one of the cloud computing service providers in the world. There will be a few issues that happen during the project period, but I enable to solve them via asking beloved lecturers and doing online research. After completing the project, I easily got the AWS courses badge and can be considered to take the examination. As a leader for this group, I improve my leadership skills and multitasking, improving my potential in the industry field.

CHIH ZHEN EN A21EC0167

Through the project, I learned that completing a low fidelity project is not easy as I thought. It requires a lot of teamwork and persistence. I also learned to work with others as a group, making it easier to achieve my goals. My motivation to complete this project is by believing in myself and what I can do. To not disappoint my team members, I try my very best to complete the task assigned to me. We met issues and problems when there were multiple new terms in the project, such as 'low-fidelity' and 'mock-up'. We have never heard of these professional terminologies, and it is a brand-new field for us. Luckily, we are willing to learn and are always ready to help each other out. This project broadens my view on how the 4th industrial revolution can affect us in our daily lives. I aim to learn more about the new technologies nowadays and hope to make a positive impact on human life in the future through my own effort. I will keep an eye on the technological field and hopes to give my part in generalising the 4th industrial revolution in Malaysia. I also get to discover my weakness and aim to improve myself by actively involving myself in the industry, such as grasping every opportunity to improve my ability. I realise that I have to put in more effort to stand out from the crowd. I will keep an eye on the relevant information, industrial talks and even intern opportunity to elevate myself. The project was a great experience and showed me a broader view of the technological world.

TIA SIAW XUEN A21EC0233

From this project, I learned about how augmented reality (AR) technology on e-commerce platforms can improve buyers' satisfaction as they can view and test the product. I also learned to draw low-fidelity mock-ups to present a graphical view of our prototype. My motivation for completing this project is to learn more about the development of prototype software. From the prototype we created, we found a lack of reference materials for implementing augmented reality (AR) technology on e-commerce platforms. We are not familiar with AR technology. To overcome the issues, we searched for information about augmented reality and shared it during the discussion for this project. After completing this project, I plan to research and discover more information related to the Fourth Industrial Revolution technologies and prototypes of software applications. I will also participate in several workshops related to information systems to gain experience to improve my potential in the industry.

CHUA XIN LIN A21EC0020

I learned about AR technology and its use in eCommerce applications to give users a better experience from this project. For example, virtual try-in solutions, preview placement, and others. Besides, I also learned about the business flow of e-commerce, which gave me a deeper understanding of how e-commerce application works. I am motivated to complete this project because this project is a new challenge for me. After all, AR technology in e-commerce applications is new for me.

Furthermore, I received a lot of encouragement and help from my teammates, which caused me to have a lot of energy and motivation to work hard and finish the project. I must improve my soft skills (communication skills, team-working skills, and leadership skills) and hard skills (language skills, computer skills, and coding skills) to increase my potential in the industry and contribute to society. The issue I faced in this project is lacking knowledge about AR technology. Still, after seeking help from teammates and doing some research online, I could apply the knowledge obtained online to complete my work and try my best to contribute to this project. After completing this project, I wish to learn more about AR technology and AI technology because this project gives me some inspiration that AR and AI technology will make many contributions and have a significant impact on the future.

MA ZE JUN A21EC4009

The low-fidelity prototype project designed by our group is the implementation of augmented reality (AR) technology, one of the technologies of the fourth Industrial Revolution (IR4.0). Our group designed an AR technology to facilitate people's shopping through discussion and research. When my team and I completed this project, I realised that low-fidelity prototypes are not as simple as we first thought. Every player needs to consider the need to consider after may produce all kinds of problems, so we collected a large amount of data to improve our project. I perceive the many new terms and concepts in this process, and I think my language expression ability has improved dramatically through thorough communication with my partners. We also have a deeper understanding of the concept of AR, and we believe that AR will become more and more popular in our later life. After that, we will continue to study the AR field and constantly improve our project.

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9.0 Video Link

Project 2 Part 2 Video Link(Project Progress) : <https://youtu.be/eTufWd0Vtw4>

Project Presentation Video : <https://youtu.be/vgbGkQ4RbQs>