PART 2 PROJECT REPORT:

ONLINE APPOINTMENT BOOKING SYSTEM FOR UTM HEALTH CENTRE

SECP1513 - Technology and Information System

Semester 1 2021/2022

School of Computing

Faculty of Engineering

Group 6

Members:

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1. Introduction

We are in the midst of a technology revolution that will transform the way we live, work, and interact with one another. We don't know how it will play out, but we do know that the reaction must be broad and integrative, engaging all competition in global politics, from the public and corporate sectors to education and civil society.

Since the middle of the past century, the fourth industrial revolution has been building on the third industrial revolution, often known as the digital revolution. It is defined by a convergence of technology that blurs the distinctions between the physical, digital, and biological realms. Technology and linked gadgets are being employed in innovative ways in business and society as a result of the fourth industrial revolution. The Internet of Things (IoT) is one of the developing technologies in the fourth industrial revolution [1].

The Internet was nearly entirely reliant on humans for information, according to Kevin Ashton, the guy who coined the term "Internet of Things." The issue is that people have extremely limited time, attention, and accuracy, which is a major issue [2]. As a result, the Internet of Things concept aims to extend the Internet's ubiquity by integrating every item for interaction via embedded systems, resulting in a widely spread network of devices communicating with humans and other devices.

There are a few sectors where IoT is eagerly anticipated, and businesses are gearing up to introduce smart devices. Wearable gadgets are one of them, and they are in high demand in marketplaces all over the world. Large corporations including Samsung, Apple, and Google have invested in the development of such gadgets. Sensors and software are included into wearable devices to collect data and information about their users. This information is then pre-processed to obtain key information about the user. These gadgets address a wide range of exercise, health, and entertainment needs.

However, the Internet of Things has yet to take off in the healthcare business. But research indicates that IoT in healthcare will be huge in the upcoming years, since the idea of a connected healthcare system and smart medical equipment holds immense promise not just for businesses,

but also for people's well-being [3]. Furthermore, IoT in healthcare aims to enable individuals to live better lifestyles by allowing them to wear connected gadgets. The information gathered will aid in the individualized study of an individual's health and the development of customized methods to treat sickness.

In this project, we will be creating a system that will have the ability to let the students from Universiti Teknologi Malaysia (UTM) be able to book an appointment earlier on before going to the UTM Health Centre. This is very convenient as the students can reserve a free time for their medical check-ups if they are sick because the students have a very tight schedule. This is worrying because it hinders them from having time to meet a doctor if they have a cold. They usually just brush it off and hope the Panadol they take will help. Not only that, this application will be able to connect to the students' IoT devices if they want to. The IoT devices connected to the system will be able to monitor the user's heart rate, steps taken, and the user can input the amount of water glasses they take daily. That is how our project relates to the Internet of Things.

2. Detailed steps and descriptions of project

- Discussions on project part 1 (first discussion)

Date: 21 December 2021
Time: 4:30p.m - 6:00p.m
Platform: Google meet and WhatsApp

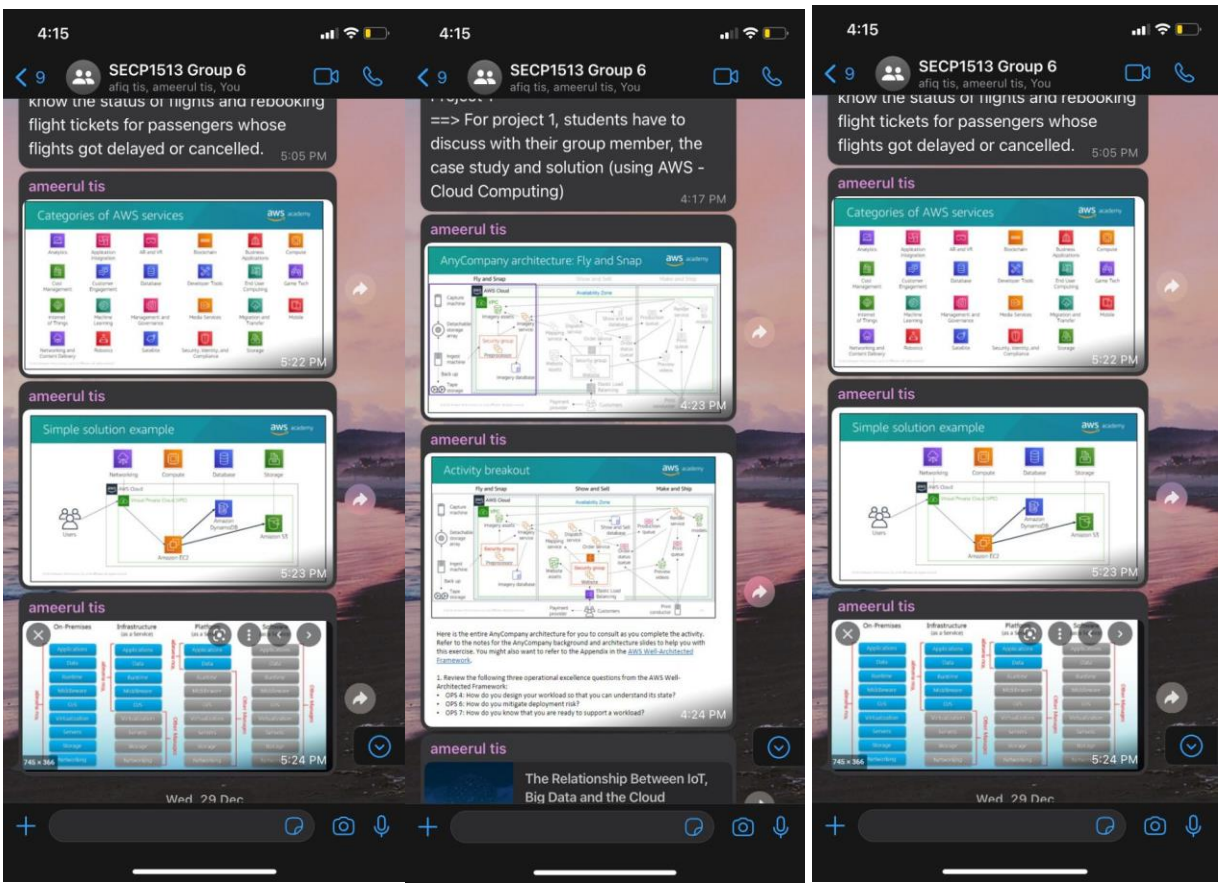
- Discussed the selection of Industrial Revolution Technology, created a problem scenario, discussed problem solution and system for development.
- Task assignment for each part, discussion and understanding on AWS architecture for the project.
- Complete assigned tasks on your own free time.
- Assigned task after discussion to complete fully :

1. Introduction - Muhammad Afiq Azmi
2. Contents of report (potential client, selection of IR4 technology, problem, solution) - Puteri Nur Alisa
3. Architecture planning and design - All
4. Conclusion - Muhammad Ameerul Hadzim

- Discussions on project part 1 (second discussion)

Date: 23 December 2021
Time: 4:00p.m - 6:00p.m
Platform: Google meet and WhatsApp

- Discussion on creating and planning AWS architecture.
- Clarification on any misunderstandings or issues faced on each member's part.
- Update project progress



- <u>Discussion of project part 1 (final discussion of part 1)</u>

Date: 6 January 2022

Time: 8:00p.m-9:00p.m

Platform: WhatsApp group

- Double check final work
- Finalize document for submission

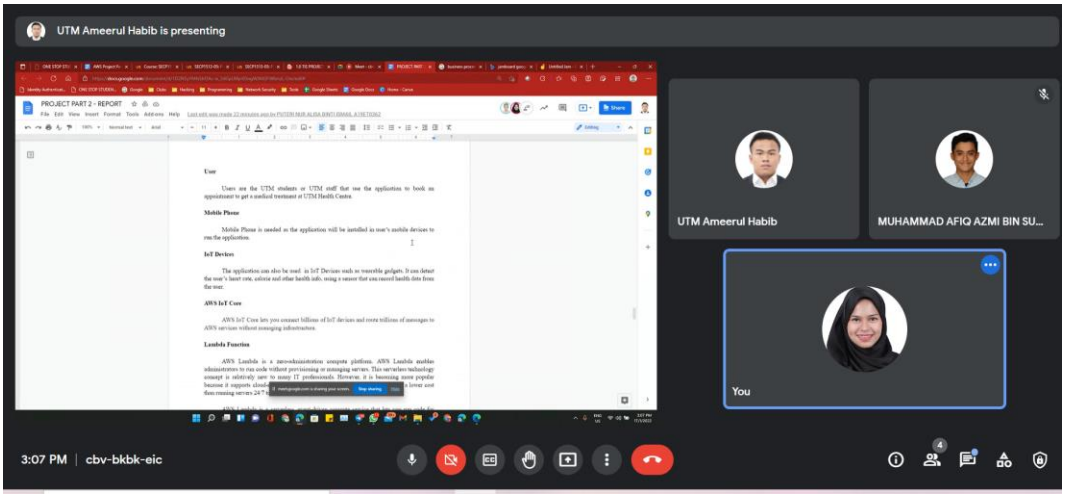
- <u>Discussion of project part 2 (first discussion)</u>

Date: 10 January 2022

Time: 2:00p.m - 4:30p.m

Platform: Google Meet

- Discussion on project part 2, finishing introduction part, detailed description of problems and solutions, AWS architecture to showcase entire design, discuss business flow diagram, discuss low-fidelity mock-ups interface.
- Discuss task assignation to complete fully.
- Complete assigned tasks in each own free time.



- <u>Discussion of project part 2 (second discussion)</u>

Date: 17 January 2022

Time: 2:00p.m - 5:00p.m

Platform: Google Meet and Webex

- Discussed any misunderstandings or clarifications regarding assigned tasks.
- Update project progress.
- Discussed video division.
- Proceed to complete assigned tasks.

- Discussion of project part 2 (last discussion)

Date: 21January 2022

Time: 2:30p.m - 6:00p.m

Platform: Google Meet and WhatsApp

- Finalize project report documentation
- Double-check report for submission
- Project video compilation

3. Detailed descriptions (problems, solutions and teamworking)

Problem

The 4th Industrial Revolution technologies that we have chosen for this project is **Internet Of Things (IoT)**. We are proposing an **online appointment booking system for UTM Health Centre** that is located in UTM Skudai, Johor Bahru. Our respective users and potential clients of the system are **the students of UTM Skudai, staff of UTM Skudai and the staff of UTM Health Centre**.

Traditionally, any individual who wants to get medical assistance or consultation in UTM Skudai has to go to the UTM Health Centre, take a number for their turn and wait for their number to be called for their turn. This method has been causing slight inconvenience for the students or staff of UTM that wants to seek medical treatments as they must wait in line for a lengthy period after receiving their number. Nowadays, not only do the students have a packed schedule due to their classes and workload of assignments, the staff or lecturers also do not have a lot of free time because they have to give lectures, and deal with their other duties. As a result, having to wait in line for a long period of time and not having any estimation time of how long they will have to wait will just waste their valuable time. Other than that, it will also irritate the individual that needs medical treatments because of this issue, causing them to avoid going to the clinic even if they are sick because the process is quite troublesome for some people. The old method has been known to have a bad relative user experience, because it does not ease the process to get medical treatment at all. On top of that, in this pandemic, spending longer time in the clinic than is necessary may increase the risk of catching the deadly virus COVID-19 as there usually is always a crowd waiting for their turn in a clinic and we do not know where the other individuals have been to. Furthermore, there have been a few cases of human error where when registering, the staff who are in charge missed or forgot to input the patient's data in the system, causing a problem when it is the patient's turn to be checked by the doctor, where they have to return to the registration counter to double-check the error because no data of theirs was entered into the system.

Solution

That being the case, we are proposing to develop an **online appointment booking system for UTM Health Centre** which will be utilized by the students, UTM personnel, and UTM Health Centre staff for them to manage and maintain their data using an online system rather than a manual approach. Using this system, any students or staff that need medical services can book and schedule their appointment according to their free time using the system. When the user has booked for their appointment time, they simply need to go to the UTM Health Centre at the time of their appointment and can straight away be checked by the doctors. Users are no longer required to wait a lengthy period of time for their turn for an appointment that usually only takes 20 minutes to complete. It is well known that the wait time for an appointment at a clinic these days is much longer than the visit itself. Therefore, being able to book for their appointment according to their own schedule and free time could ease the patients that need to be treated and there will no longer be the issue of time being wasted. Not everyone who receives medical treatment gets a medical certificate, because sometimes the condition might not be serious but is uncomfortable to the individual, therefore, no students or lecturers will need to miss their classes to get treatment. Other than that, the system will allow the staff of UTM Health Centre to retain and maintain their data online, where once the users have booked for an appointment, they can manage the data through the system, reducing the risk of human errors that might occur and also could reduce the workload on the staff as the work that needs to be done can be done online. For instance, once the patient has registered themselves in the system to get treatment, the staff no longer needs to manually register the patient. The system will also provide a high quality and improved user experience because it helps and assists every individual in the process of getting treatment and managing treatment. Using this system, any individual that needs treatment from UTM Health Centre will no longer feel irritated or annoyed just to get an appointment. Moreover, the system will implement an online payment system where the user will be able to pay their clinic bill through the system. In addition, using an online booking system will no longer require the clinic to use manual file documentation to store patient's data. The data will be stored online using the cloud, which is backed up and can prevent any data loss. To top that, using the system, the data collected and stored in the system will be more secure as a high security system is also applied.

Our system will also connect with any users who have a wearable device that monitors their health, such as heart rate, vital signs, activity patterns, and calories rate, among other things. The wearable device will provide the basic checkup information needed when users first get to UTM Health Center for their appointment such as their heart rate and body temperature. The information gathered from the sensors of the wearable device will then be displayed in the system as the device used to access our online appointment booking system will communicate with the wearable device using the internet of things technologies. Though not all individuals have a wearable device, therefore only users that have one will connect with our system to provide the basic checkup information. Users that do not have a wearable device will get their basic checkup traditionally by the doctor at the clinic.

The system will integrate with the **Internet of Things (IoT)** as one of the Fourth Industrial Revolution technologies. Internet of things is a network of interconnected computing equipment, including mechanical and digital machines that can convey data without the need for human-to-human or human-to-computer interaction [4]. The Internet of things is also known as the countless devices linked to the internet worldwide that gather and analyze data with one another [5]. The components of Internet of Things consist of four elements, which are the sensors or devices, connectivity, data processing and user interface [6]. Our proposed system will be used by the user using any devices that are connected to the internet such as mobile phones. The web-enabled devices will collect the data and process the data through the system. When the data is acquired, it will be sent to the cloud for processing and storage, the software will then analyze the data and provide further action. Through the user interface, the user will be able to enter the required data to book an appointment and their data will be processed instantly. The system also connects with other smart devices such as wearable devices that are able to monitor user's health. Both the related devices will communicate real-time data with one another without the need for human intervention. The sensors from the wearable device will collect data from the user, send the collected information to the cloud for processing with the system and provide the required information to the system. The Internet of Things (IoT) will undoubtedly benefit patients by enabling remote monitoring in the healthcare industry, therefore releasing the potential to keep patients safe and healthy. Through the internet of things technologies, the staff at the UTM Health Centre, including physicians and nurses, may use the smart device to record data from the patients

and send the data directly to the cloud instead of entering the information manually. This will synchronize the system and save time in data management. The utilization of the internet of things in web-enabled devices and smart devices to access our online system will also make management easier, resulting in increased system efficiency. Furthermore, because contacts with doctors have grown easier and more efficient, it will boost patient involvement and satisfaction. Moreover, remote monitoring of a patient's health helps to shorten hospital stays and avoid readmissions. Our appointment booking system can be accessed by patients 24 hours a day, 7 days a week via the internet of things, at a significantly cheaper cost than the manual approach which entails hiring additional employees to handle and maintain data.

Team Working

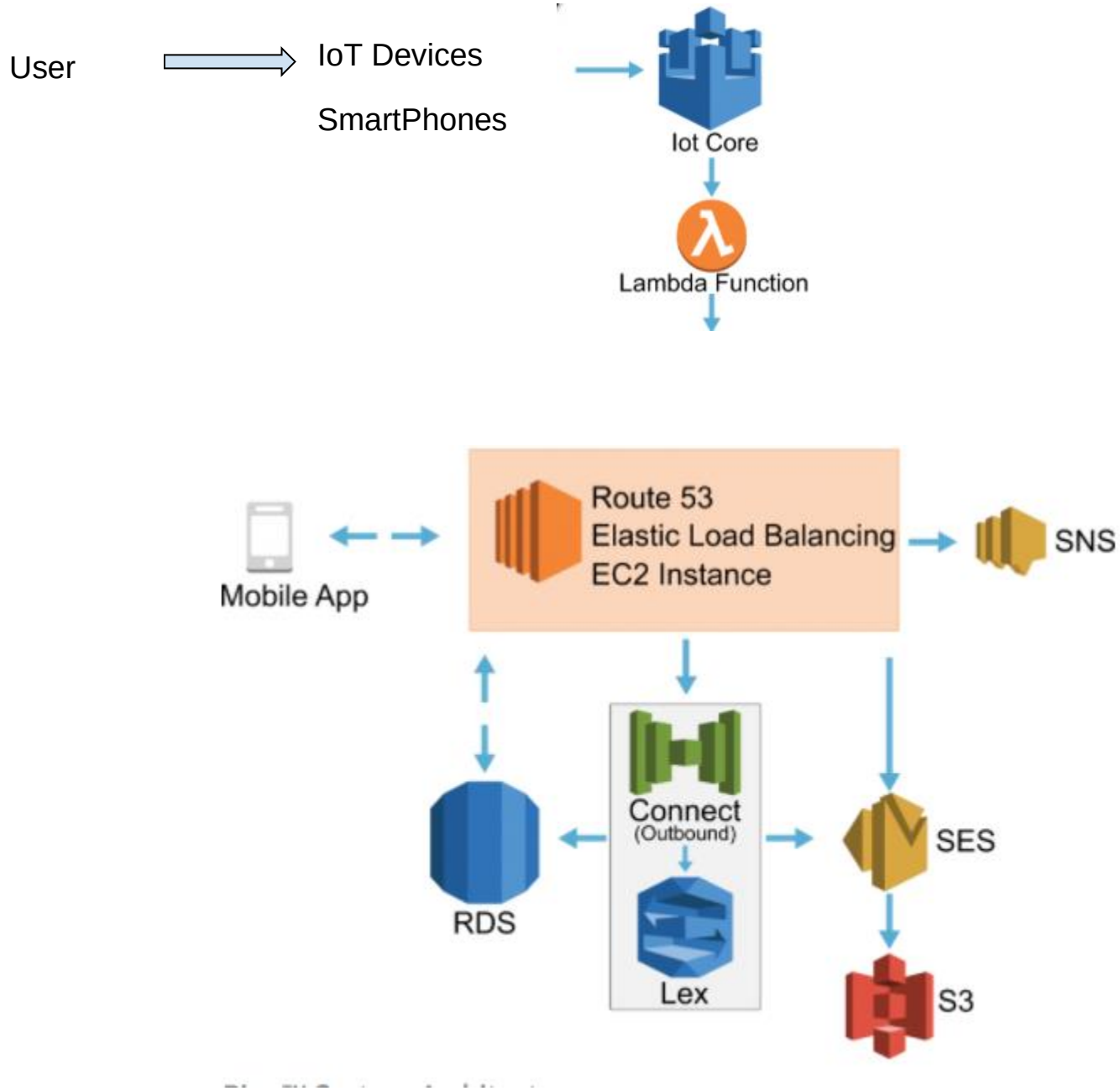
To develop the system, our group exchanged ideas and opinions during our first project part 1 discussion in order to create and plan the most interesting and accommodating system. We worked together and collaborated brainstorming ideas to come up with the proposed system by creating a problem and solution. We analyzed and evaluated each group member's suggestions for its suitability to relate with industrial revolution technologies and to guarantee that the idea will accommodate users of the system regarding the problem faced that leads to the development of the system. After discussing, we all agreed on the proposed system to create an **online appointment booking system for UTM Health Centre**. Our group addressed the main points together to build the problem statement and solution towards the problems, potential clients of our proposed system and the selection of 4th industrial revolution to be chosen for the system. Then, we allocated tasks to each group member to complete the part in their own free time. The documentation is done on Google Docs; therefore, any group members may update their part synchronously.

For project part 2, we held a meeting to discuss the project report content. We collaborated together on the introduction, detailed descriptions of problems and solutions, the AWS architecture design, the business process flow diagrams and the low-fidelity mock-up. We discussed thoroughly on our AWS architecture design and our business process flow diagram. We exchanged ideas and understanding regarding the topic and came up with the best possible result we thought

of. We then allocated tasks to each group member equally, which they were to complete in their own time. We also established a date for final discussion, checking and compiling.

All of the group members contributed equally for the project. Each of us gave our best commitments and cooperation in order to ensure that the project is a success. We always share ideas and share our understanding to complete the project together. We always help each other and ensure that no one is facing problems in completing their part. If any of the group members require assistance, we will always try to assist each other in resolving the problem. A great team, as John Maxwell put it, is made up of people who work together to achieve a common goal. Our group is made up of individuals that worked together to achieve our goals. Our goal is to develop a system that would address the problem scenario of the potential client and also to ensure that the project is a success. We constantly communicate and discuss the group project in our created WhatsApp group.

4. AWS Architecture Design



User

Users are the UTM students or UTM staff that use the application to book an appointment to get a medical treatment at UTM Health Centre.

Mobile Phone

Mobile Phone is needed as the application will be installed in user's mobile devices to run the application.

IoT Devices

The application can also be used in IoT Devices such as wearable gadgets. It can detect the user's heart rate, calorie and other health info, using a sensor that can record health data from the user.

AWS IoT Core

When the user wants to use the IoT devices, the IoT devices will be connected to the system using AWS IoT Core. AWS IoT core allows users to connect as many devices into the application which make the process of health check up easier.

Lambda Function

As the IoT devices are connected to the system through AWS IoT Core, the function of the IoT devices still needs to be programmed in order for IoT devices to work. Users can apply to connect their IoT devices into the system by filling the form given in the Health Checkup Centre and the administrator will program it for them.

AWS Route 53 -Networking

Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service. It is designed to give developers and businesses a reliable and cost-effective way to route users to internet applications by translating names (like www.example.com) into the numeric IP addresses (like 192.0.2.1) that computers use to connect to each other. In addition, Amazon Route 53 is fully compliant with IPv6

Amazon Route 53 effectively connects user requests to infrastructure running in AWS — such as Amazon EC2 instances, Elastic Load Balancing load balancers, or Amazon S3 buckets — and can also be used to route users to infrastructure that is outside of AWS.

Amazon Route 53 can be used to configure DNS health checks so administrators can route traffic to healthy endpoints or independently monitor the health of your application and its endpoints. Amazon Route 53 traffic flow helps manage traffic globally through several routing types, which can be combined with DNS failover to enable various low-latency, fault-tolerant architectures. Amazon Route 53can be used to traffic flow's simple visual editor to manage how users are routed to application's endpoints — whether in a single AWS Region or distributed around the globe.

AWS Elastic Load Balancing - Monitoring

Elastic Load Balancing is an AWS service that distributes incoming application or network traffic across multiple targets—such as Amazon Elastic Compute Cloud (Amazon EC2) instances, containers, internet protocol (IP) addresses, and Lambda functions—in a single Availability Zone or across multiple Availability Zones. Elastic Load Balancing scales load balancer as traffic to the application changes over time. It can automatically scale to most workloads.

AWS Elastic Compute Cloud (EC2) Instance - Compute

Amazon EC2 provides virtual machines, and can be referred to as infrastructure as a service (IaaS). IaaS services provide flexibility and leave many of the server management responsibilities

to the administrator. The admins choose the operating system, and the admins also choose the size and resource capabilities of the servers that will be launched. For IT professionals who have experience using on-premises computing, virtual machines are a familiar concept.

AWS Simple Notification Service (SNS) - Notified User Application

Amazon Simple Notification Service (Amazon SNS) is a fully managed messaging service for both application-to-application (A2A) and application-to-person (A2P) communication.

The A2A pub/sub functionality provides topics for high-throughput, push-based, many-to-many messaging between distributed systems, microservices, and event-driven serverless applications. Using Amazon SNS topics, the publisher systems can fan out messages to a large number of subscriber systems, including AWS Lambda functions, HTTPS endpoints, and Amazon Kinesis Data Firehose, for parallel processing. The A2P functionality enables you to send messages to users at scale via SMS, mobile push, and email.

AWS Simple Email Service (SES) - Notification Management

Amazon Simple Email Service (SES) is a cost-effective, flexible, and scalable email service that enables developers to send mail from within any application. Admins can configure Amazon SES quickly to support several email use cases, including transactional, marketing, or mass email communications. Amazon SES's flexible IP deployment and email authentication options help drive higher deliverability and protect sender reputation, while sending analytics measure the impact of each email. With Amazon SES, admins can send email securely, globally, and at scale.

AWS Simple Storage Service (S3) - Storage

Amazon S3 is persistent storage where each file becomes an object and is available through a Uniform Resource Locator (URL); it can be accessed from anywhere

Amazon S3 is object-level storage, which means that if you want to change a part of a file, you must make the change and then re-upload the entire modified file. Amazon S3 stores data as objects within resources that are called buckets.

Amazon S3 is a managed cloud storage solution that is designed to scale seamlessly and provide 11 9s of durability. Admins can store virtually as many objects as they want in a bucket, and admins can write, read, and delete objects in the bucket. Bucket names are universal and must be Unique across all existing bucket names in Amazon S3. Objects can be up to 5 TB in size. By default, data in Amazon S3 is stored redundantly across multiple facilities and multiple devices in each facility.

The data that is stored in Amazon S3 is not associated with any particular server, and admins do not need to manage any infrastructure yourself. Admins can put as many objects into Amazon S3 as they want. Amazon S3 holds trillions of objects and regularly peaks at millions of requests per second.

Objects can be almost any data file, such as images, videos, or server logs. Because Amazon S3 supports objects as large as several terabytes in size, admins can even store database snapshots as objects. Amazon S3 also provides low-latency access to the data over the internet by Hypertext Transfer Protocol (HTTP) or Secure HTTP (HTTPS), so users can retrieve data anytime from anywhere. Users can also access Amazon S3 privately through a virtual private cloud (VPC) endpoint. Users get fine-grained control over who can access their data by using AWS Identity and Access Management (IAM) policies, Amazon S3 bucket policies, and even per-object access control lists.

AWS Connect - User Support Service

An easy-to-use omnichannel cloud contact center that helps provide superior customer service at a lower cost. In other words, it is a contact center that would give our user personal, dynamic, and natural experiences.

AWS Connect will provide a channel to interact between the user and the provider in case the user has an inquiry about the application.

Some of the major feature of AWS Connect; Contact Center Automation, Real Time & Historical Analytics, Task Management, Web and Mobile Chat

AWS Lex - AI that will be used in User Support Service

Amazon Lex is a fully managed artificial intelligence (AI) service with advanced natural language models to design, build, test, and deploy conversational interfaces in applications

Amazon Lex will take charge and respond to the user as it operates outside office hours in case users have an inquiry regarding the application.

AWS Relational Database Service (RDS) - Databases

Amazon RDS is a managed service that sets up and operates a relational database in the Cloud.

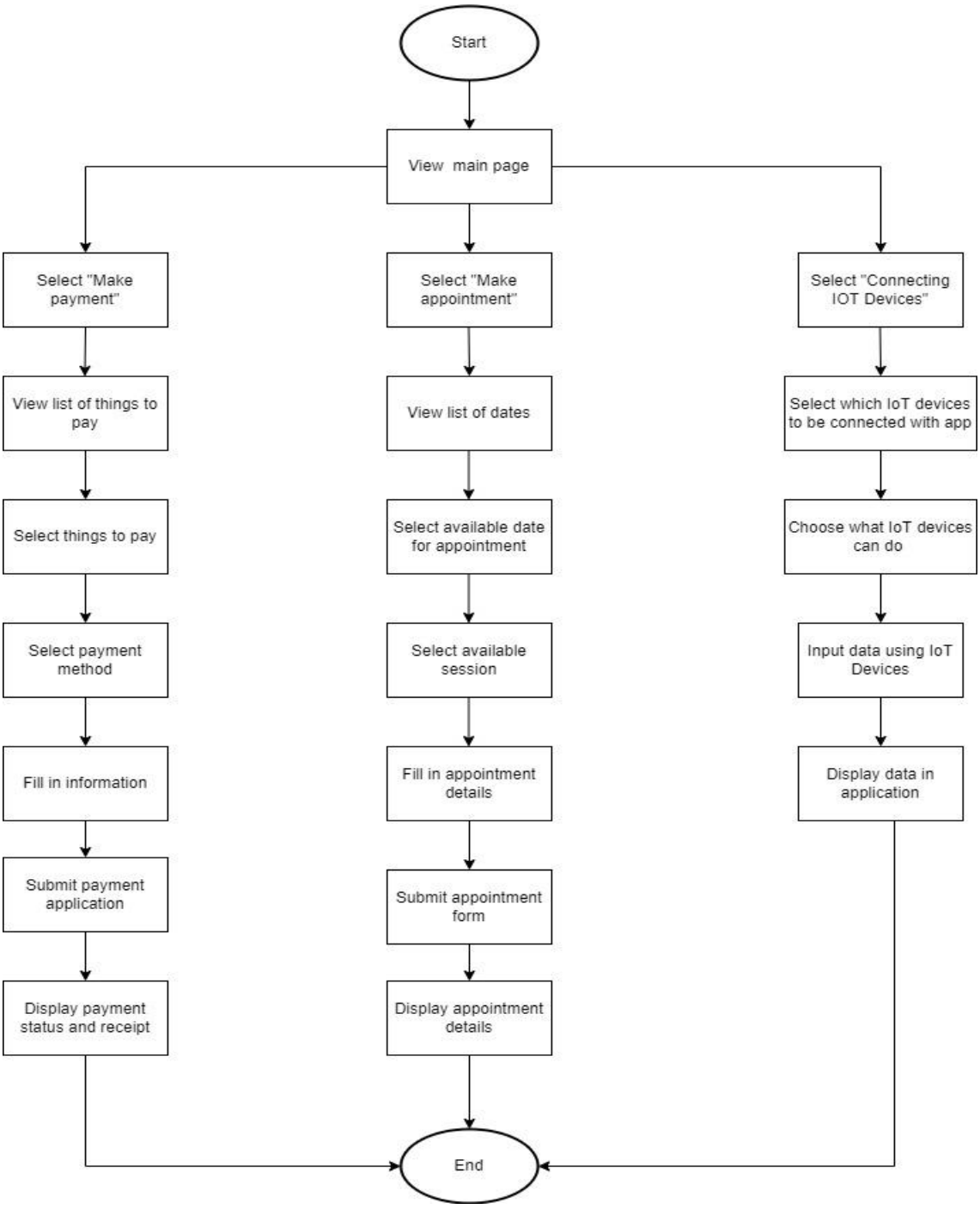
To address the challenges of running an unmanaged, standalone relational database, AWS provides a service that sets up, operates, and scales the relational database without any ongoing administration. Amazon RDS provides cost-efficient and resizable capacity, while automating time-consuming administrative tasks.

Amazon RDS enables admins to focus on the application, so they can give applications the performance, high availability, security, and compatibility that they need. With Amazon RDS, the primary focus is the data and optimizing the application.

With Amazon RDS, admins manage the application optimization. AWS manages installing and patching the operating system, installing and patching the database software, automatic backups, and high availability.

AWS also scales resources, manages power and servers, and performs maintenance.

5. Business process flow diagram



There are three flows in this flow diagram:

- Flow for making payment
- Flow for booking an appointment,
- Flow for connecting IoT devices with the system.

Flow for booking an appointment

- On the main page interface, the user will have to select the option “Make appointment”.
- A new interface will be shown to view the list of dates of the appointments.
- The user will have to choose available dates and sessions for the appointments.
- Then, the system will automatically update the user details in the appointment details and the user only needs to fill in the appointment reason.
- After that, the user can submit the appointment form and an interface will display the appointment successfully booked page and appointment details.

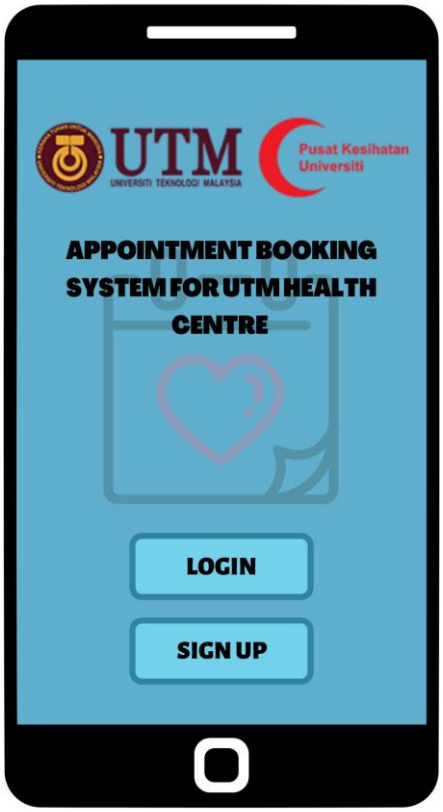
Flow for making payment

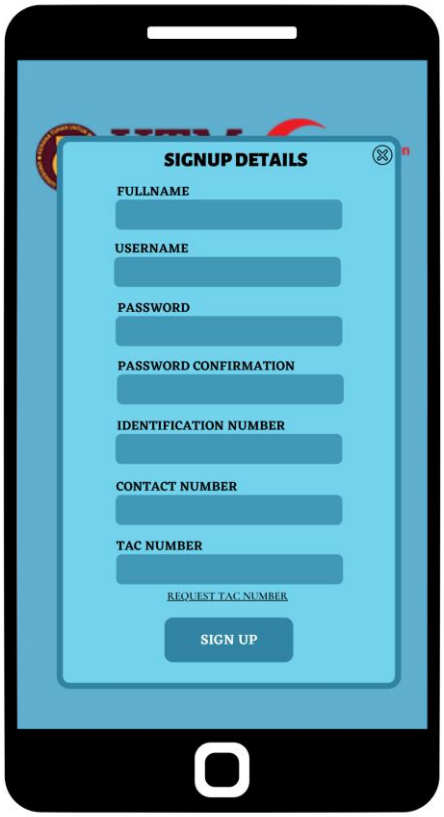
- On the main page interface, the user has to select the option “Make payment”.
- A new interface will be shown to view the list of things to pay.
- The user needs to select which item or service he wants to pay.
- The user needs to select the payment method.
- The user has to fill in the payment details.
- Users can submit the application after all the details are filled.
- A new interface will display the payment status as well as the receipt for the payments.

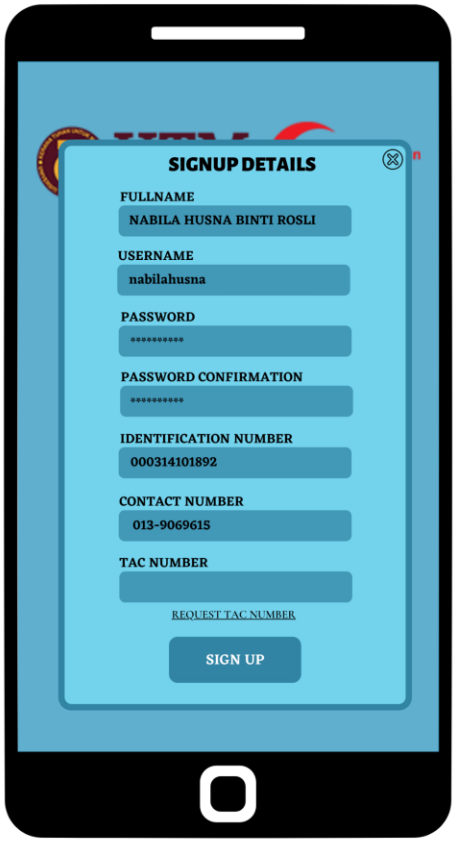
Flow for connecting IoT devices with the system.

- On the main page interface, the user has to select the option “IoT Devices”.
- The user needs to select which IoT Devices that he wants to connect with the apps such as wearable devices.
- The user can choose what the Iot Devices can do. For example, monitor glucose intake, heart rate, etc.
- The data is collected from the IoT devices.
- The data will then be displayed in the application.

6. Low-fidelity mock-ups



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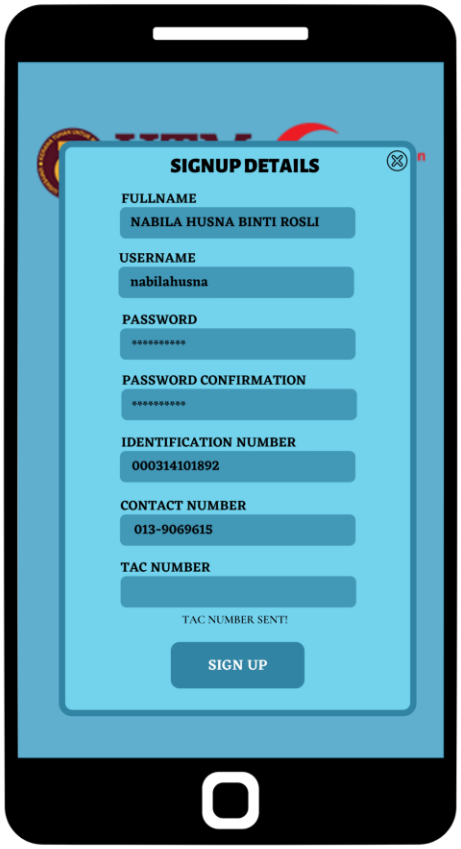
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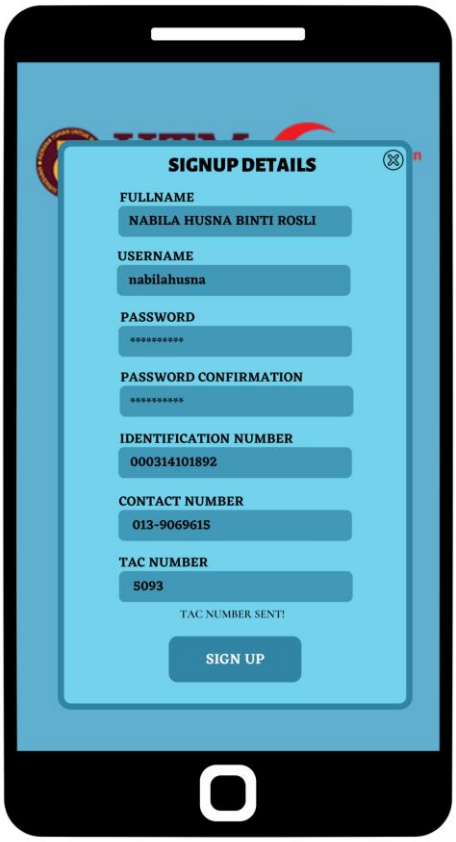
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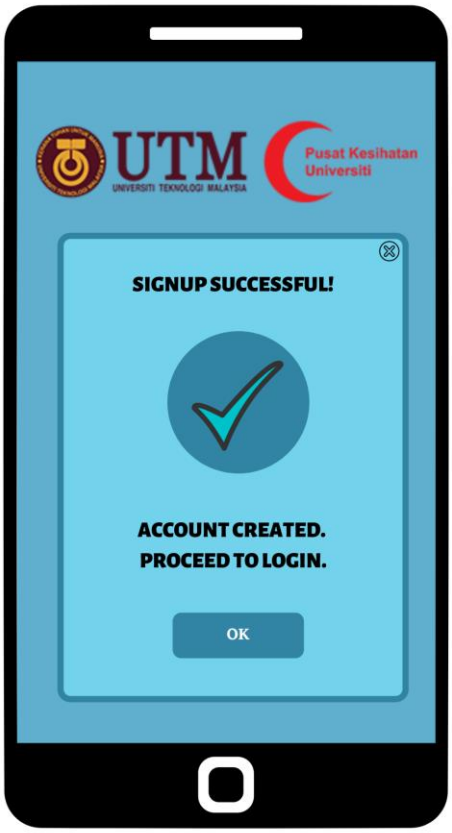
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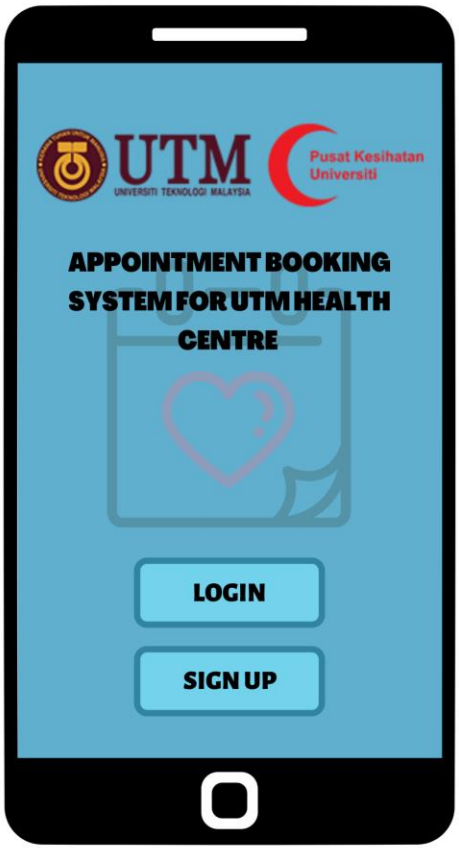
OK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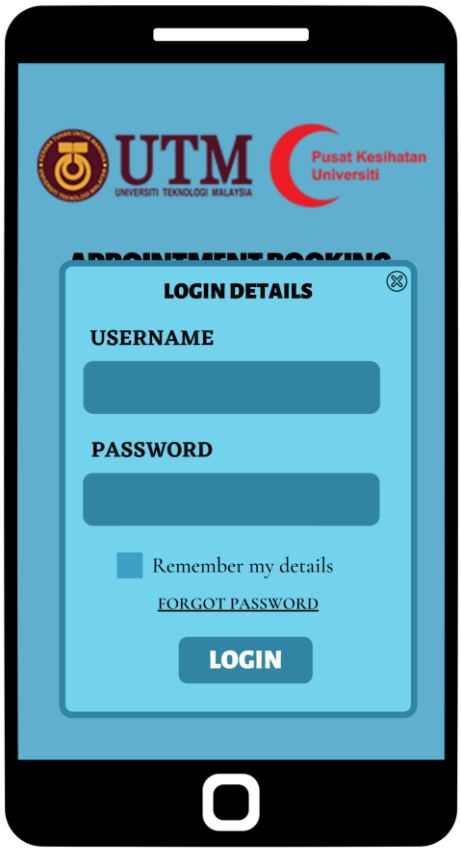
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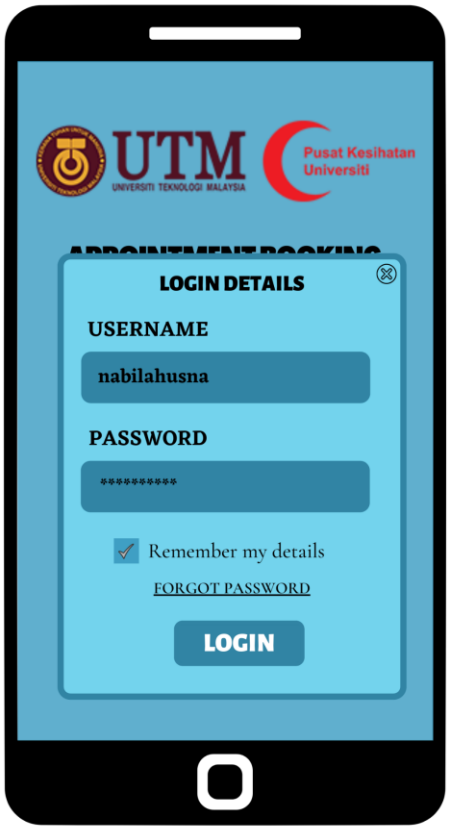

DAY	ACADEMIC SESSION	SEMESTER BREAK
Sunday - Wednesday	8:00 AM - 10:00 PM	8:00 AM - 5:00 PM
Thursday	8:00 AM - 10:00 PM	8:00 AM - 3:30 PM
Friday - Saturday	8:30 AM - 12:30 PM	8:30 AM - 12:30 PM
Public Holiday	CLOSED	CLOSED

DAY	MORNING	EVENING
Sunday - Wednesday	8:00 AM - 1:00 PM	2:00 PM - 5:00 PM
Tuesday	8:00 AM - 10:00 PM	2:00 PM - 5:00 PM
Thursday	8:30 AM - 1:00 PM	2:00 PM - 3:30 PM
Friday	8:30 AM - 12:30 PM	CLOSED
Saturday / Public holiday	CLOSED	CLOSED


UTM
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000314101892
APPOINTMENT BOOKING SYSTEM FOR UTM HEALTH CENTRE
PROFILE
BOOK APPOINTMENT
MY BOOKING
PAYMENT
IOT DEVICES
OPERATING HOURS
MEDICAL CLINIC
DAY | ACADEMIC SESSION | SEMESTER BREAK
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Friday - Saturday | 8:30 AM - 12:30 PM | 8:30 AM - 12:30 PM
Public Holiday | CLOSED | CLOSED
DENTAL CLINIC
DAY | MORNING | EVENING
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Tuesday | 8:00 AM - 10:00 PM | 2:00 PM - 5:00 PM
Thursday | 8:30 AM - 1:00 PM | 2:00 PM - 3:30 PM
Friday | 8:30 AM - 12:30 PM | CLOSED
Saturday / Public holiday | CLOSED | CLOSED
Pusat Kesihatan Universiti,
Universiti Teknologi Malaysia,
81310 Johor Bahru,
Johor Darul Ta'zim.
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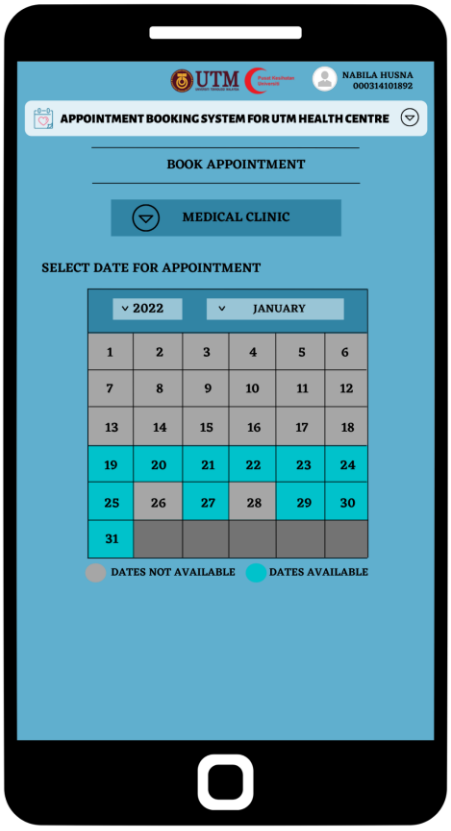
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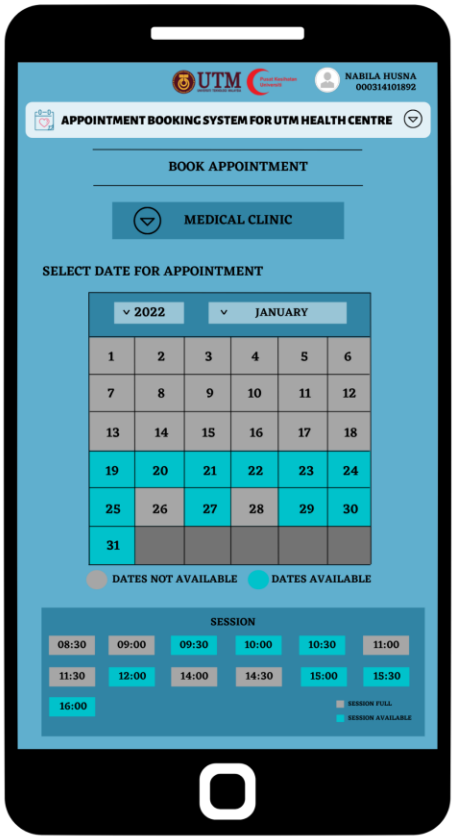
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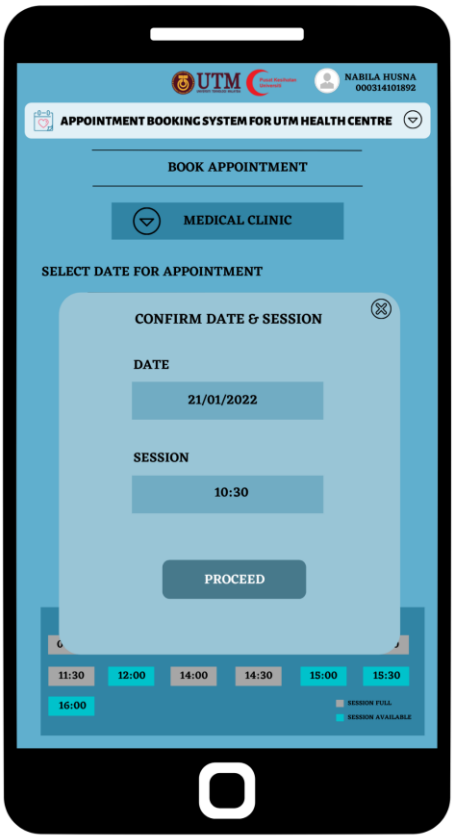
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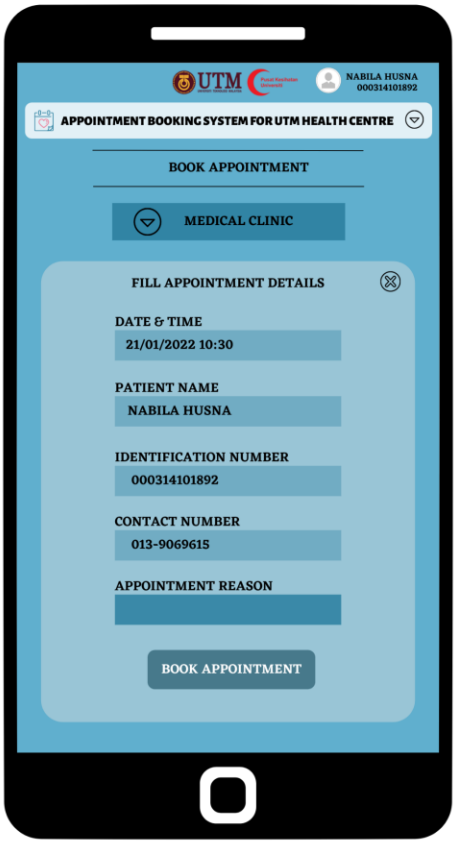
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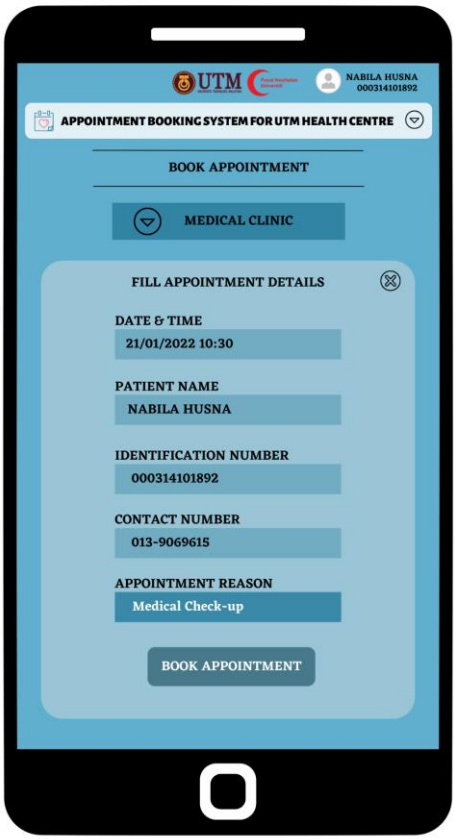
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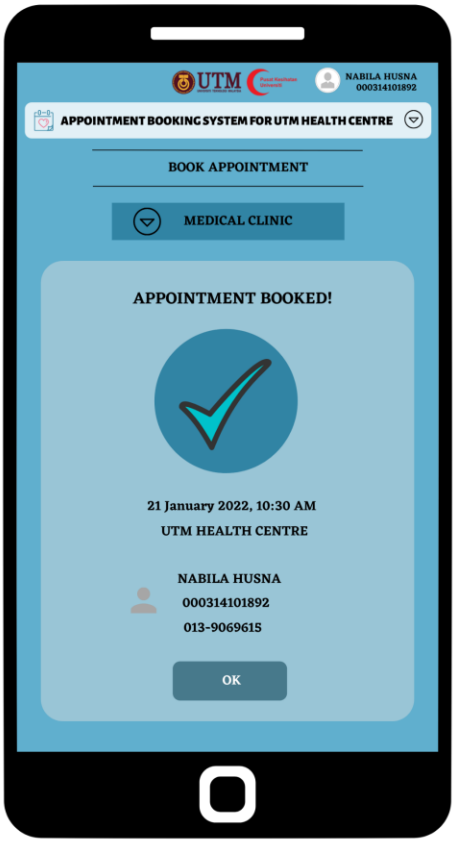
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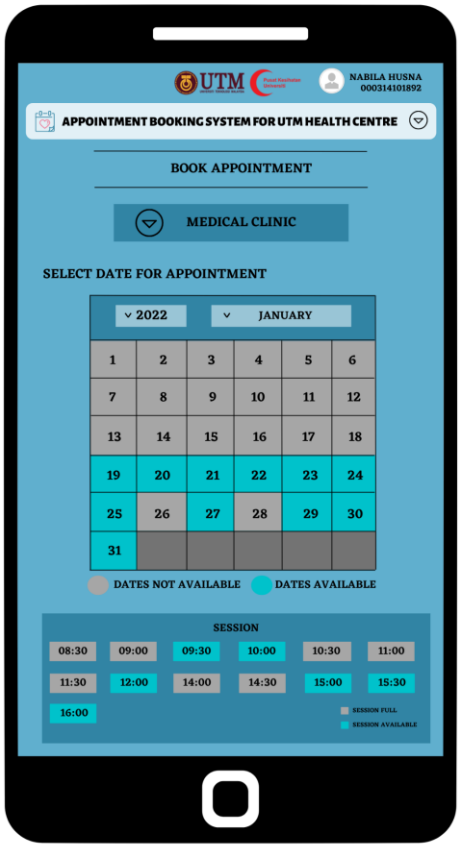
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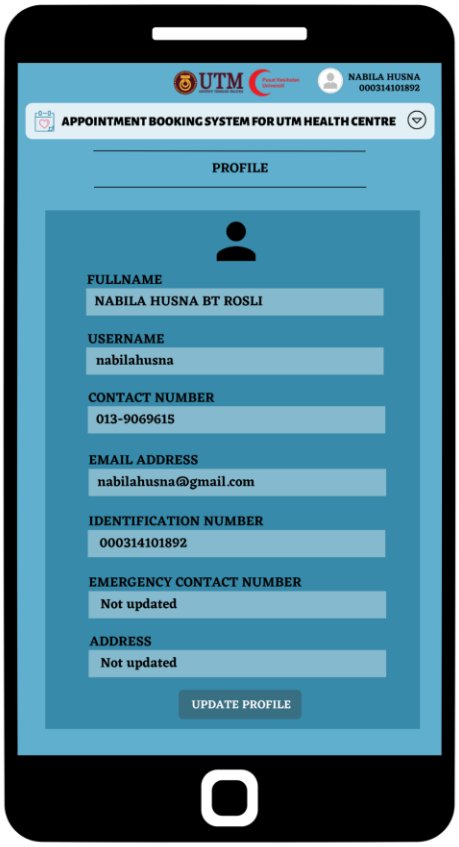
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USERNAME
nabilahusna
CONTACT NUMBER
013-9069615
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nabilahusna@gmail.com
IDENTIFICATION NUMBER
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ADDRESS
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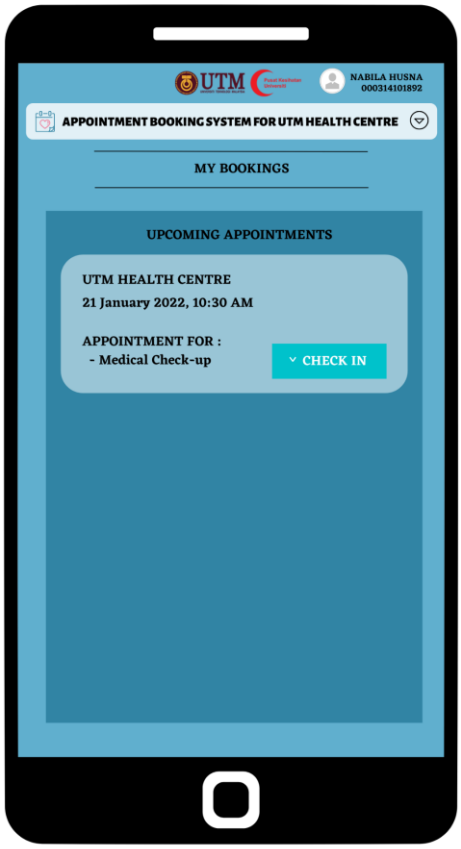
UPDATE PROFILE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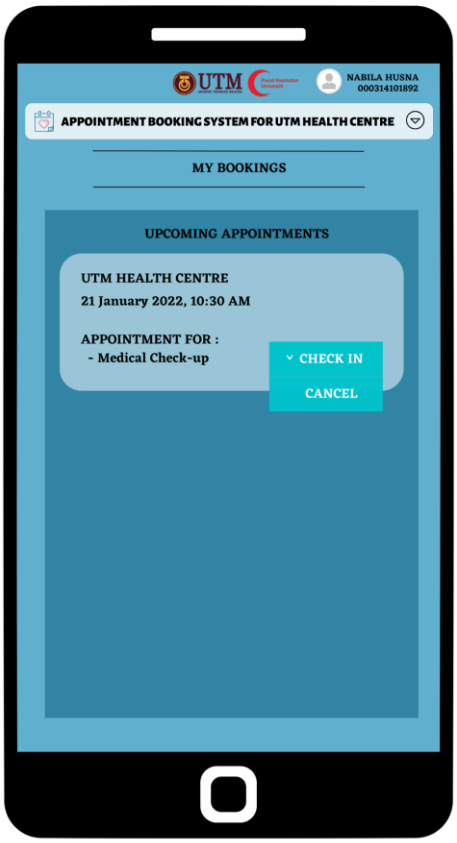
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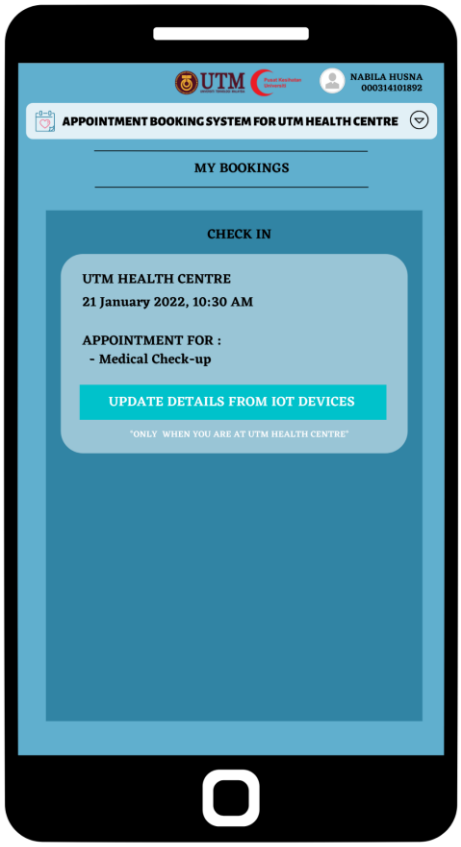
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CHECK IN
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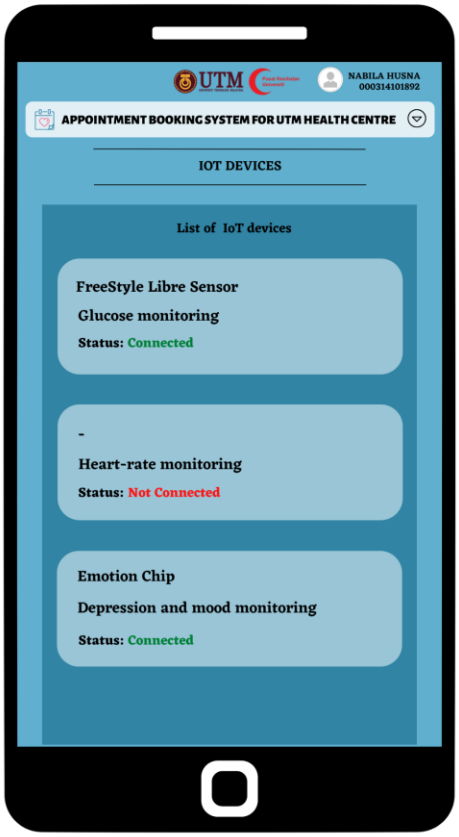
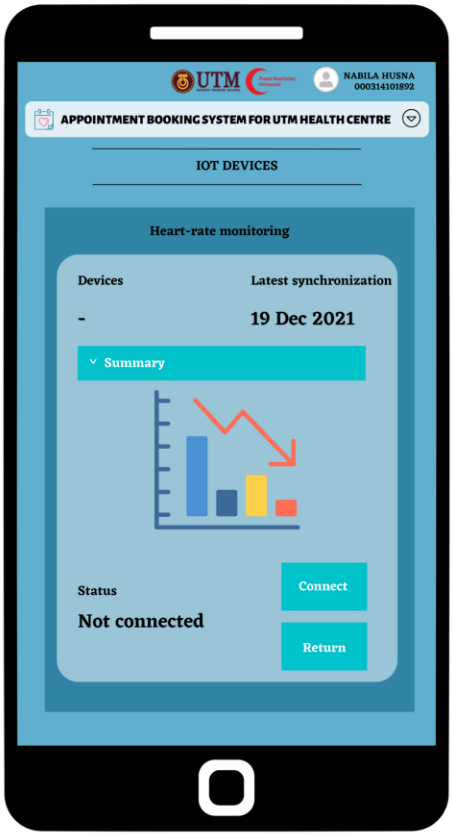
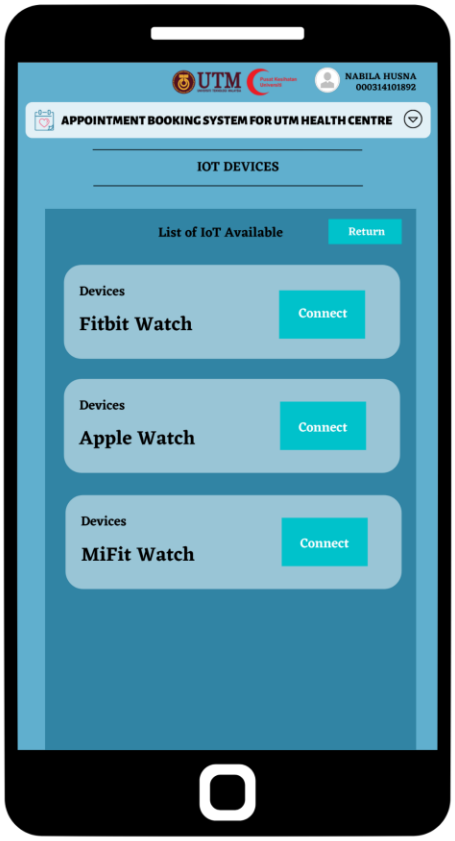
- Medical Check-up
UPDATE DETAILS FROM IOT DEVICES
"ONLY WHEN YOU ARE AT UTM HEALTH CENTRE"





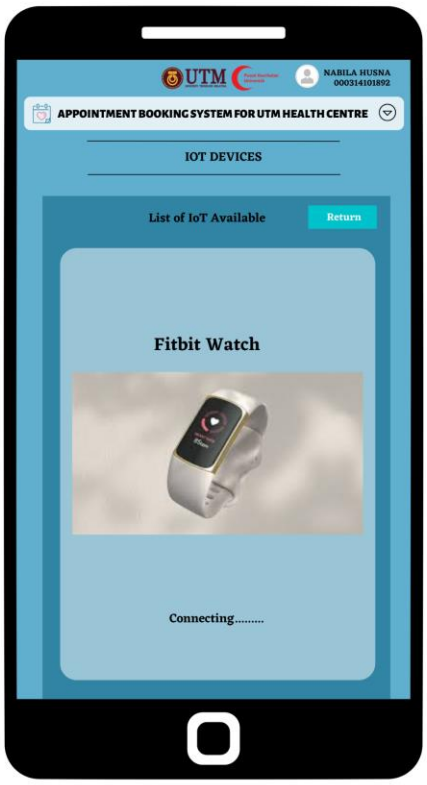
Freestyle Libre Sensor = one of health IoT device to monitor health such as glucose level monitoring



Apple watch

Fitbit watch

Example of process when connecting the health smart watch to the application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IOT DEVICES
List of IoT Available
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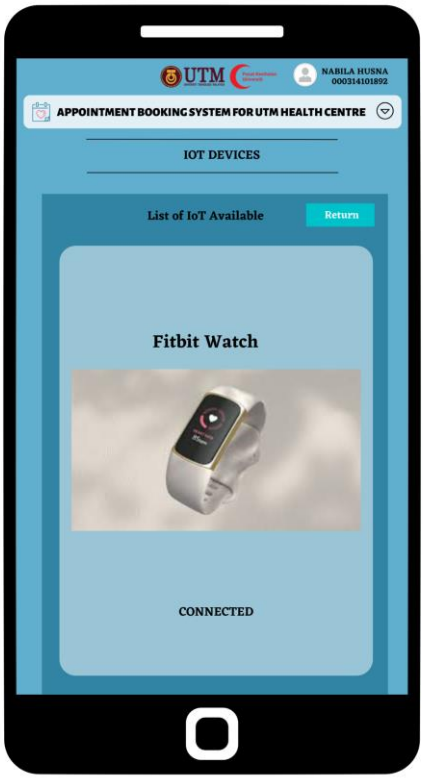
Fitbit Watch
Connecting.....


APPOINTMENT BOOKING SYSTEM FOR UTM HEALTH CENTRE
Iphone 12
Connecting.....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List of IoT Available
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APPOINTMENT BOOKING SYSTEM FOR UTM HEALTH CENTRE
Iphone 12
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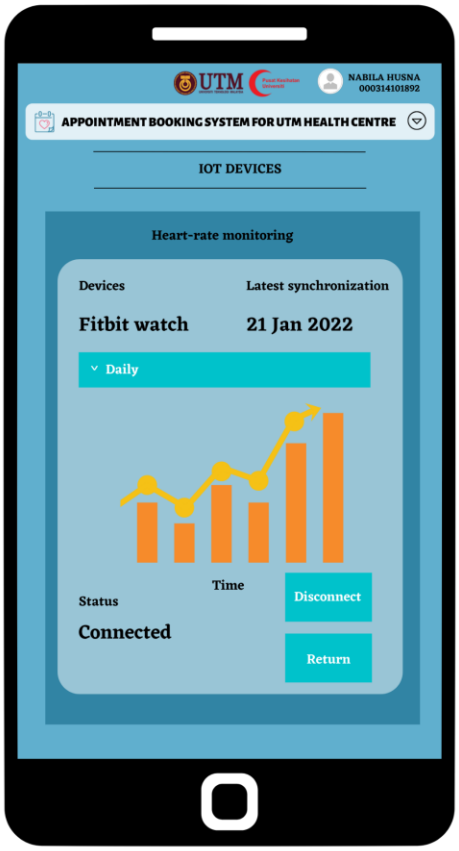
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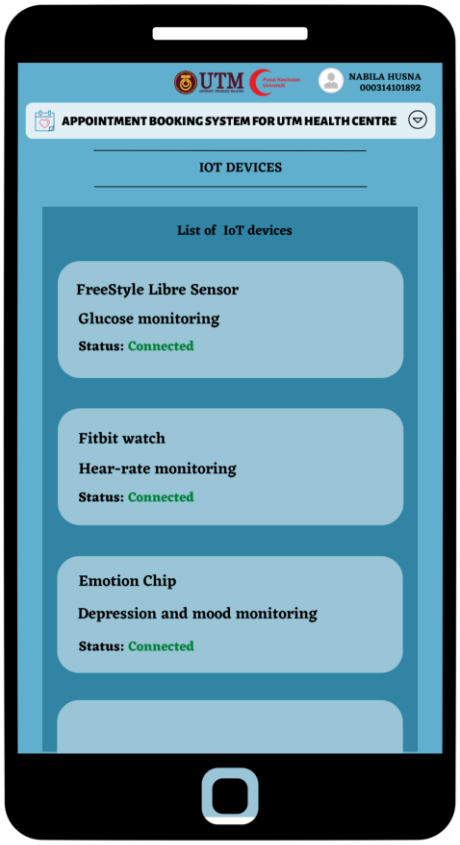
IOT DEVICES
Heart-rate monitoring
Devices
Latest synchronization
Fitbit watch
21 Jan 2022
Daily
Time
Status
Connected
Disconnect
Return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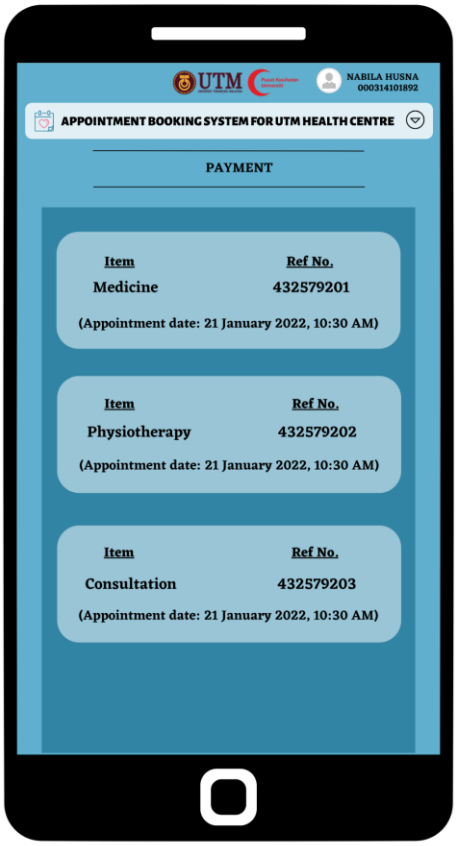
Glucose monitoring
Status: Connected
Fitbit watch
Hear-rate monitoring
Status: Connected
Emotion Chip
Depression and mood monitoring
Status: Connected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Physiotherapy
432579202
(Appointment date: 21 January 2022, 10:30 AM)
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Consultation
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(Appointment date: 21 January 2022, 10:30 AM)


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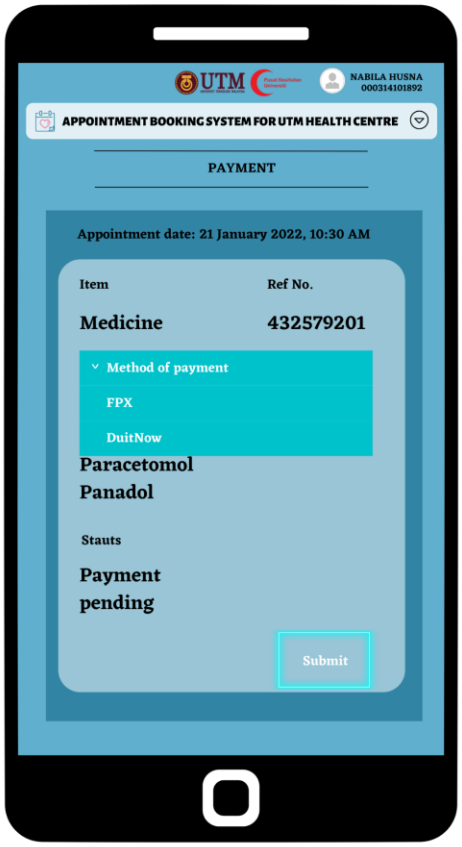
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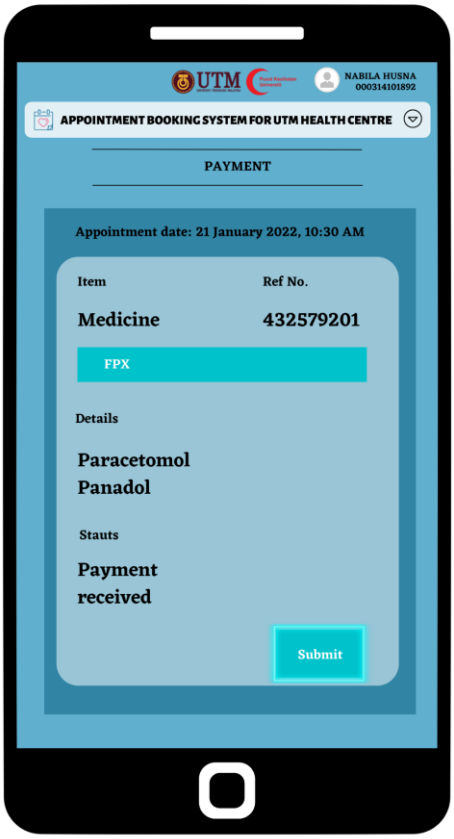
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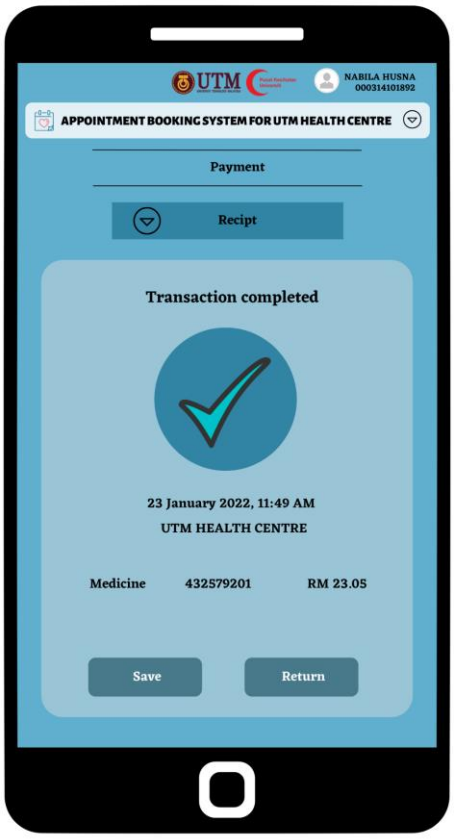
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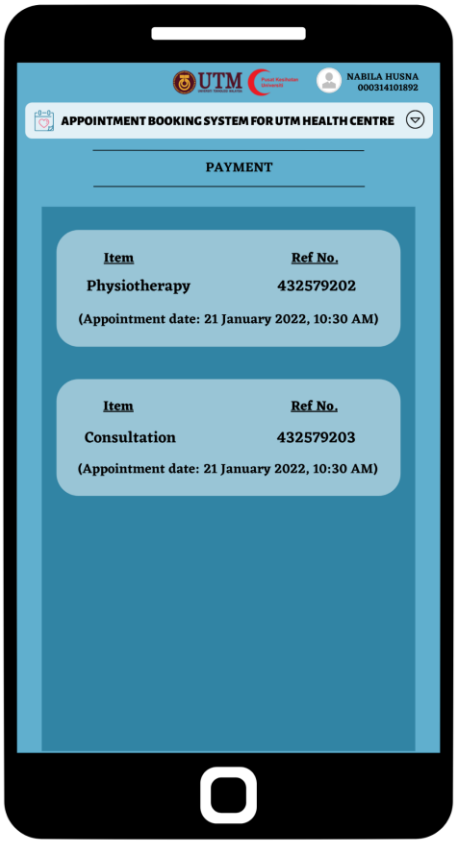
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Item
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(Appointment date: 21 January 2022, 10:30 AM)

7. Reflections

- Reflection - Puteri Nur Alisa

From completing this project, I gained a lot of beneficial information, knowledge, and life-long learning skills. To complete this project, not only we did a lot of discussions and ideas exchange, we also did a lot of research to get new fresh ideas, information and understanding. From this project, I managed to grasp deeper understanding regarding the fourth industrial revolution technologies where we managed to integrate with our proposed system. Aside from that, I managed to gain a better understanding of Amazon Web Services architecture when planning and designing the architecture of our project. The task that was assigned to us in this project prompted me to explore more regarding the subject, conduct more research and expand my knowledge. I was motivated to complete this project to learn more about the technology and information system course, come up with new innovative ideas, broaden my knowledge and skills, solve new problems by discovering solutions and overcome any of the challenges that we might face throughout completing this project.

There were a few challenges that we had to overcome in order to accomplish this project. However, in the end, we were able to overcome all the challenges and difficulties faced as a group by working together and collaborating and cooperating with each other within the group. The first difficulties that we encountered were in generating ideas for a problem scenario and its solutions. The system that we were to create must be integrated with any of the fourth industrial revolution technologies, therefore, we were having some issues to create a system with the most suitable 4th IR technologies. Nevertheless, after extensive research and discussions, we were able to generate ideas and establish a system based on its and the solution as stated in the problem statement and solution with the integration to the internet of things. Following that, there were some issues faced during the creating and designing of the AWS architecture. As we needed a deep comprehension of the AWS architecture to apply in our project, to solve the issue, we performed additional study on AWS, revising the information that we learnt while finishing the AWS modules, and exploring more on the material on the internet. As a result, we were able to plan and design our project's AWS architecture.

After finishing this project, as a next step for the future, I plan to prepare myself for the forthcoming industrial revolution that might take place in the future by educating myself because adapting to the changes that 4IR technology would offer will require education regarding the subject matter since nowadays, there are a lot of technological drives that drives the digitalization of the production-based industry under the big topic of 4th IR such as artificial intelligence, augmented reality, IOT, cloud computing and many more. In addition, I aim to expose myself as much as possible to the knowledge of Amazon Web Services architecture in order to become accustomed to the concept and knowledge, as well as to be able to master all technical skills regarding AWS.

I came to the conclusion that implementing the industrial revolution into our daily lives significantly enhances our quality of life, since the industrial revolution 4.0 is now a necessity in our lives as technology continues to expand and progress. Throughout this project, I learned a lot of essential skills, information, knowledge and attributes that would help me become a better student and individual. Not to mention, I was also able to conduct extensive study, and enhance my critical thinking and problem-solving skills to come up with new ideas that will be very beneficial to me. To conclude, as a part of the current generation of youth today who will be the country’s future leaders, it is our job and responsibility to educate ourselves on how to foster innovation and achieve technological advancements.

- Reflection - Muhammad Ameerul Hadzim

This project has taught me a lot of new knowledge in terms regarding AWS. First of all, this project enables me to learn how to implement 4th IR technology into our daily life problem. Among all the technologies listed by 4th IR, I develop more knowledge of cloud computing by using the AWS services. AWS has enabled me to develop a software prototype that can be fully developed on cloud by using its services. The AWS gives a lot of benefit as we can monitor the application without worrying about external issues such as maintaining the server, security and storage issues. As I learn more about AWS I learn that cloud computing has no limit on knowledge as there are many specific uses if we were to explore each of its services. This motivates me more to complete this project as I want to gain a lot of exposure and knowledge from this project so I can implement it in real life.

Nowadays, we are living in a pandemic era where we have to cope with online discussion. Although the main issues of every online project is communication, we manage to solve the problems by dividing the task beforehand so that our project is still on the timeline. Beside that, issues that we face are the difficulty to implement what we learn as we can only imagine and communicate through the online material. This issue is actually an obstacle for us but we managed to overcome it by reviewing other examples and referring to our lecture as our guideline. Last but not least, we had some major difficulties in creating the problem and scenario for our project. However, as we underwent our project discussion, we experienced the process of solving the issues hence allowing our project to go smoothly toward success.

After learning cloud computing from this project, I would like to explore more on how to create a server and manage the data through the server using cloud computing services. I also want to explore other platforms other than AWS such as Red Hat Cloud computing or Digital Ocean as other platforms may have the feature and cost that AWS may differ. In addition to that, I would like to explore every 4th Industrial Revolution technology so that I could have the exposure and be prepared to use any knowledge learned after I graduated. The uses of augmented reality, IoT,

artificial intelligence is what I targeted to have an expertise in after learning the details in cloud computing.

All in all, because the industrial revolution 4.0 is one of the game changer in our lives as technology continues to develop and progress, I came to the opinion that incorporating the industrial revolution into our everyday lives considerably improves our quality of life. I learnt a lot of important skills, facts, knowledge, and traits that will help me improve and become a better student and individual as a result of this endeavour. In addition, I was able to undertake significant research and improve my critical thinking and problem-solving abilities in order to generate new ideas that will be extremely valuable to me. To summarise, it is our task and obligation as members of the present generation of youngsters who will be the country's future leaders to educate ourselves on how to lead.

- Reflection - Muhammad Afiq Azmi

There are a lot of new things that I have learnt from finishing this project. One of them being I was able to acquire more apprehension about the 4th Industrial Revolution Technologies. This new knowledge that I gain is something that I implemented in this system that we build. What motivates me to complete this project is this assignment requires us to explore more things about the AWS services and the 4th IR Technologies. I am eager to learn more about these things so this really gives me the inspiration to finish this project.

A few issues that rise up during our progress in doing this project. One of them is coming up with ideas for the problem situation and the solutions that we can take by using the system that we want to build. In spite of that, we did a lot of research to generate some ideas for the system that is related to the 4th Industrial Technology. In result we settled with the Internet of Things (IoT). In the end, we were able to overcome the issues that we faced as a group by cooperating together to resolve these issues.

My direction after completing this project is to teach myself more about the 4th IR technology. The 4th Industrial Technology will bring a huge change in our industry in a positive way. I want to ensure that I will not miss this chance to catch up with this technology development.

As for the improvement that is necessary for me to improve my potential in the industry, I need to be up-to-date with the current issues and news about technologies that are growing now. By being aware of the technology growth, I can make sure that I am always prepared to have a new idea to implement the new technologies in any of my projects in the upcoming future.

8. References

[1] Maddox, T. (2019, March 1). How IoT will drive the fourth industrial revolution. ZDNet. https://www.zdnet.com/article/how-iot-will-drive-the-fourth-industrial-revolution/

[2] Ashton, K. (2009, June 22). RFIDJournal that internet of things thing. That 'Internet of Things' Thing. Retrieved from http://www.itrco.jp/libraries/RFIDjournal-That%20Internet%20of%20Things%20Thing.pdf

[3] K. (2019, June 24). *10 Real World Internet of Things (IoT) Applications - Explained in Videos*. Analytics Vidhya. https://www.analyticsvidhya.com/blog/2016/08/10-youtube-videos-explaining-the-real-world-applications-of-internet-of-things-iot/

[4] Gillis, A. S. (2021, August 13). *What is internet of things (IoT)?* IoT Agenda. https://internetofthingsagenda.techtarget.co m/definition/Internet-of-Things-IoT

[5] Gillis, A. S. (2021, August 13). *What is internet of things (IoT)?* IoT Agenda. https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT

[6] McClelland, C., Cherian, V., Schaefer, J., & Nguyen, D. (2016, October 29). *IoT Explained - How Does an IoT System Actually Work?* Leverege. https://www.leverege.com/blogpost/iot-explained-how-does-an-iot-system-actually-work