SCHOOL OF COMPUTING
Faculty of Engineering

SECP1513 – 07
TECHNOLOGY & INFORMATION SYSTEM

PROJECT 1
Low Fidelity Prototype

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Content

Introduction

4th Industrial Revolution

The 4th Industrial Revolution can be said as a rapid technological growth which includes Artificial Intelligence(AI),robotics,Internet of Things (IoT), 3D printing, genetic engineering, quantum computing, and other technologies that will change our lives. The 4th IR will mostly depend on the robots to do work for us.

Low Fidelity Prototype

Low-fidelity (Lo-Fi) is an illustration of a concept or an information structure that can usually be drawn by hand with a paper or digitally. This method opens up opportunities for innovation and improvement as it can be modified easily without too much hassle. Because of that, changes can be made in a flash which is very convenient to spot out flaws and errors of the design. Other than that, speed is also the main selling point of this method. Since lo-fi prototypes can be created quickly, multiple designs of the same prototype can exist which inspires innovation and creativity among people who are involved.

Cloud computing

Cloud computing architecture is components and subcomponents that are needed for cloud computing. The components consist of front end platform, back end platform, cloud based delivery and a network. These components that create this cloud computing architecture. The objectives of this cloud computing architecture are providing high bandwidth, allowing uninterrupted access to the applications and data, on-demand agile network with the possibility to move quickly and efficiently between servers or clouds and network security.

There are various types of cloud based services with their unique cloud architecture. Firstly, Software as a Service(SaaS) where users don't have to download software locally. Secondly, Development as a Service(DaaS) which involves web based development tools. Third example is Platform as a Service(PaaS) which provides users with application databases and platforms. Lastly,

Infrastructure as a Service(IaaS) provides for infrastructure and hardware such as networks, servers and many more running in the cloud service.

Problem Background

Client

Our client is the chief executive officer (CEO) of a hospital. The CEO came up with a compilation in which nurses and staff at their hospital find it hard to take care of a large ward that consists of more than 20 patients with disabilities and post operative. The CEO finds that it is hard for them to manage the ward and help the patients in this post-pandemic since many employees started to quit in the pandemic. The CEO is searching for a simple approach to help the patients to control their personal appliances such as table fan, lamp and air purifier remotely while on bed, as any motion involving the limb can interfere with their recuperation. As a result, the CEO is on the lookout for any product that would allow them to operate the appliances using their own smartphone. The product requirement is, it must have a simple interface, ease of use, multifunction, and a reasonable price.

Proposed solution

To overcome this problem, we have come up with a modern solution called **Smart IOT Plug.** This product applies to one of the 4th Industrial Revolution (4IR) technologies which is the Internet of Things (IOT). As we all know, the IoT is a network of interconnected computing devices, electronics, things, animals, and people with unique id (UIDs) and also have the ability to communicate without requiring human-to-human or human-to-computer engagement. By implementing this concept in our project we successfully develop the Smart IOT Plug that can transform a simple device into a smart device such as a charger, air conditioner, fan and much more.The Smart IOT plug is basically the same as a normal plug except it offers more functionality,

automation and connection. Through the Smart IOT Plug, you can access every corner of your ecosystem while you are not in the ecosystem as long as it is connected to the Internet because it uses Iot technologies. Smart IOT Plug breaks the boundaries for the wired environment. When it is attached into your sockets it allows you to control modest appliances using your smartphone.

Based on the IoT concept, when you connect any device with the Internet, it enables us to collect, process and send data from the input device without any human intervention. Thus with the aid of the internet, the Smart IOT Plug can send the data through the network despite how far the distance, allowing remote management and monitoring appliances. For example, you can remotely switch off the air purifier without moving off the bed, you can also control the brightness of the lamp without moving an inch and also set the timer for the light to be turned off. This Smart IOT Plug also uses the cloud computing technologies where the data and information were organized and stored in the Amazon Web Server (AWS). When the input (smartphone) collects any data from the user, the data will be broken into smaller chunks called packets and sent to the AWS. Each packet will contain the address of the origin and the destination address. The packet will be sent into various routes at the same time. Upon arriving at the destination, the receiving computer (AWS) will resemble the data. Then AWS will process and transfer back the packets to the allocated destination (Smart Plug) based on the address. Then the cycle will be repeated again until it reaches the output (The Smart IOT Plug) and Smart IOT Plug will process the output.
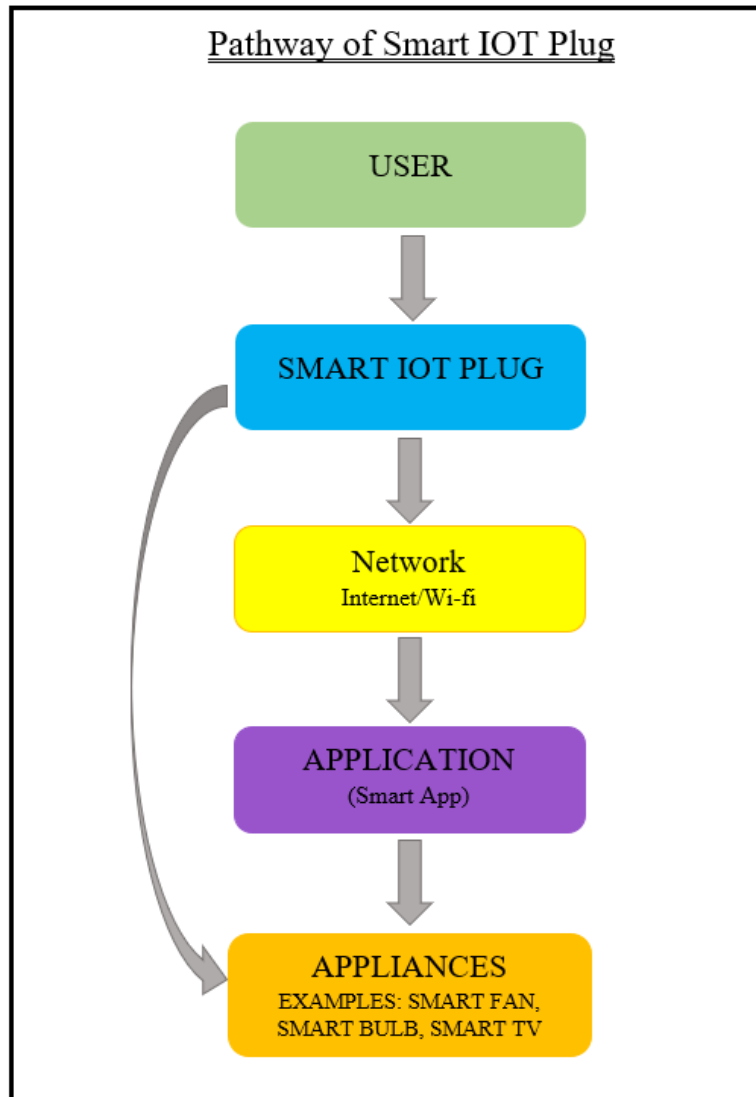
Pathway of Smart IOT Plug

USER

↓

SMART IOT PLUG

↓

Network
Internet/Wi-fi

↓

APPLICATION
(Smart App)

↓

APPLIANCES
EXAMPLES: SMART FAN,
SMART BULB, SMART TV

Diagram 1.1 : Pathway of Smart IOT plug

Objectives

Our primary goal in developing the smart IOT plug was to improve the daily routine of those with health problems such as disabilities, dementia and dystonia by boosting comfort and control of the appliance. We accomplish this by automating everyday tasks and allowing users to control their gadget remotely. A smart plug allows you to operate devices and electronics from your smartphone, tablet or any devices that can access the internet by processing many elements of daily life with remote technology. It enhances flexibility and comfort while removing the stress of manually by establishing ecosystem automation. Beside that, If you want to convert your device into smart

technology, the smart plug is the most cost-effective option. Our solution is less expensive while still providing the same capabilities as a smart gadget. Thanks to our technologies, consumers can operate their devices using our app while in bed, at work, or on vacation.

Scopes

Smart IOT plug not only helps the health sector but also many other sectors such as indoor workplace environment and also your home. This is because being able to control your technologies with just a touch of the screen of your device can help ease a lot of burden such as having to replace the battery for your remote control and also eradicate the risk of losing the remote in random areas. Being able to use your device for almost every household appliance is very convenient because in this 4th IR generation, we spend most of our time facing the screen of our device. This results in increased productivity as household appliances can be controlled with the same device that we do our work in.

Project Plan

Gantt chart

- It's like the schedule graph of when gonna do it (mcm roster) but in chart (quite easy sbb boleh hentam je , just have to google the category and what activity to do

No	Task	WEEK										
		1	2	3	4	5	6	7	8	9	10	11
1.	Introduction to the project	▓										
2.	Discussion on the project		▓	▓								
3.	Project title selection			▓								
4.	Research and develop ideas				▓	▓						
5.	Design and planning					▓	▓					
6.	Report writing						▓	▓	▓	▓	▓	
7.	Execution and Proposal											▓

Architecture Planning and Design

Cloud computing architecture

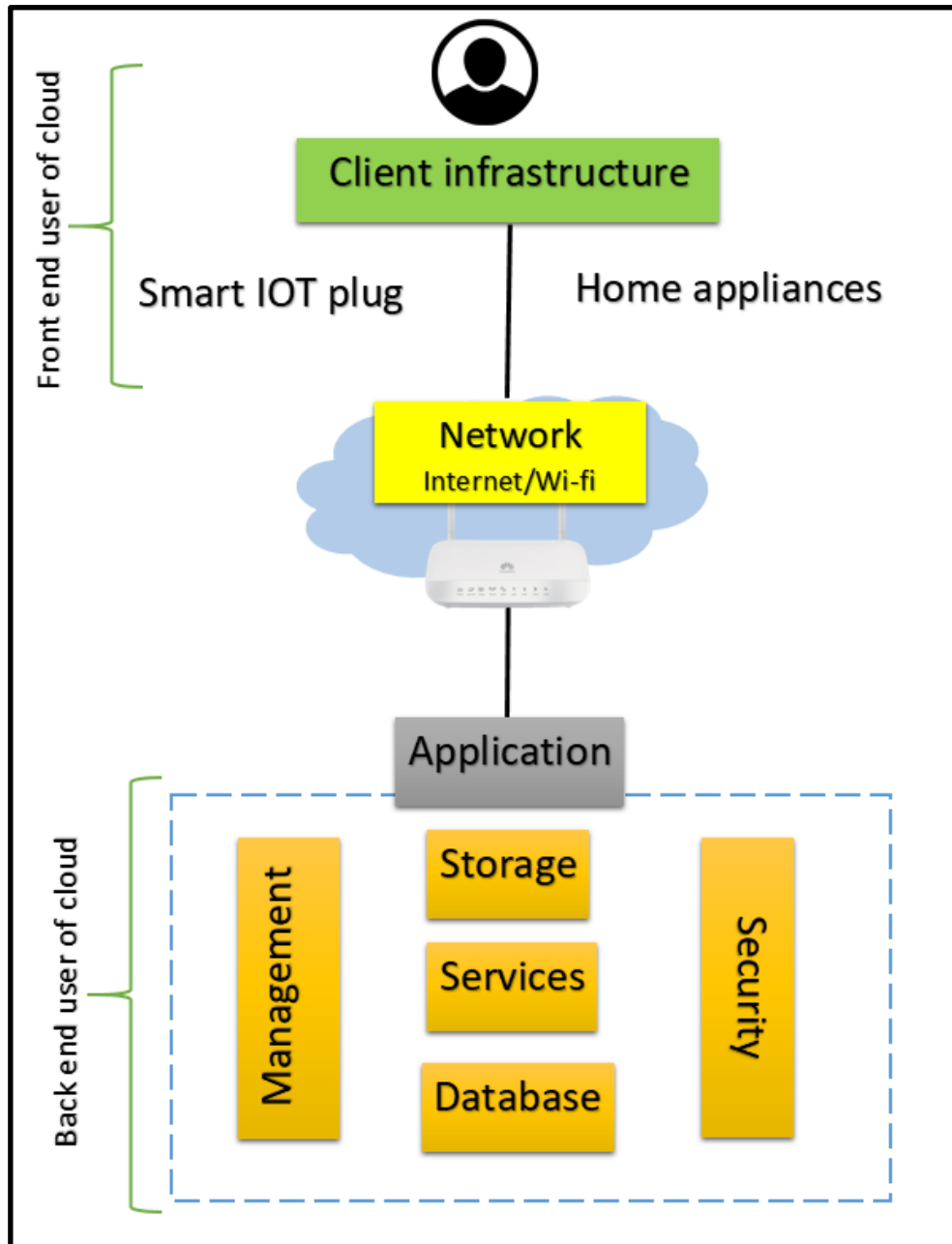The diagram of cloud computing architecture for this project is showed below ;

Diagram 1.2: Cloud computing architecture

Explanation of Cloud Computing Architecture for the Smart IOT plug project

The diagram above is the cloud computing architecture diagram for the project of Smart IOT plug. This cloud computing architecture makes it easy for our client and other professionals to get the overview of how the project is related to the cloud computing system.Cloud computing architecture is basically the combination of both Service Oriented Architecture (SOA) and Event Driven Architecture (EDA). From the architecture, it can be seen that it is divided into 2 major parts, which are the Front end user and Back end user of cloud.

Frontend user means it is used by the client or the user for the cloud computing system. It has all the user interfaces, devices and applications. As from the diagram, front end user consist of client infrastructure. This infrastructure allows the user to interact with the interfaces to access the cloud channel. In simpler words, the input devices. Under this cloud infrastructure, there are 2 components as the devices in order for the user to control and interact which are the Smart IOT appliances and Home appliances. This IOT device doesn't run by itself, hence it uses the aid of cloud platforms such as IOT core and IOT sensors for it to function well. As of that, this device doesn't process heavy load as the cloud is taking the entire process to run it.

Moving on, the other main part is the Backend user. Backend user is managed and controlled by the service provider. This backend contains a large system that consists of many sub components and subsystems and it is located on a remote server. The primary components on this backend cloud architecture used for this project are;

1) Application

   In the backend, an application is a software or platform that a client may use. For our project, this application is the interface used by users in order to adjust and modify the usage of their home appliances that are connected with the Smart IOT plug. This application receives information from the sensors of the Smart IOT plug then sends it back to the home appliances based on the desired adjustment made by the user. During this process, a heavy load of cloud activity has been made with the cloud platform using many other primary components.

2) Service

   Service in the backend in this project provides many functions. With this, many modes and services can be achieved in this project in order to ease the users. There are few types of services used in this project, which are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as Service (IaaS). With these services, many components such as AWS EC2 will be used to create accessibility for the users to use in the application.

3) Storage

In the backend, storage in the cloud plays a crucial part in this project as well, as it helps to store all kinds of data in the cloud which makes the project to be low-cost and flexible. Some storage components that will be used for this project are AWS Snowball and S3. These components will make sure the data is stored and managed in the cloud storage.

4) Management

The management software is in charge of providing specific resources to certain workloads and ensuring that any cloud system runs smoothly. In the backend, this component aids in managing and coordinating components such as the application, service, runtime cloud, storage, infrastructure, and other security problems. In this project, this management will consist of many components of AWS as this is a very important component in the backend to ensure all the other components work well.

5) Security

Security in backend holds a crucial part as well as it makes sures to to safeguard cloud resources, systems, data, and infrastructure for end-users by implementing various security techniques in the backend. A cloud security component that will be used in this project is AWS IAM. This component is used for controlling access to AWS resources in a secure way. It enables to set up and govern user authentication services, as well as restrict access to a specific group of users who use cloud resources.

6) Databases

Databases used in backend comprise everything from storing all types of data to granting access and sending the info to the appropriate parties. An example of a database component that may be used in the AWS Dynamo. This component aids the project by supporting data structures with cloud services. It also makes sures in managing the data, and it's useful for auto scaling, backup and restore purposes.

In addition, Network, which can be Internet or Wifi, play crucial parts in this project as well. It acts as a bridge to link and interact with the front end and back end user cloud. In a real situation, when the Smart IOT Plug is turned on, it uses the aid of the network to send data to the cloud and to the application. Besides, the application also uses a network to send data to the home appliances according to the users requirement. Therefore, this explains the brief scenario of how this project uses a cloud platform to run.

Conclusion

In conclusion, the cloud computing architecture will give a lot of benefits. Firstly, cloud computing architecture will solve latency issues and improve data processing. Secondly, it will reduce the costs and give good accessibility to access data and tools. Next, cloud computing architecture will provide high security and result better in disaster discovery such as floods. Lastly, it will automatically update the program and services.

The cloud computing architecture is expected to ease our clients and other professionals to get the overview of how the project is related to the cloud computing system.Cloud computing architecture is basically the combination of both Service Oriented Architecture (SOA) and Event Driven Architecture (EDA). From the cloud computing architecture, clients can see the overview of the cloud infrastructure. This can conclude that the cloud computing architecture will ease the users and clients.

Our expectation for this project is that the users can use the Smart IOT Plug in their life easily and ease their work at home or anywhere. As we said, the Smart IOT plug can easily transfer data which can be used in their environment whenever you are connected with the internet. The user can control appliances using the Smart IOT Plug in their environment by only using their smartphones. This will lessen their movement to open or switch on their fan, television or anything. With the help of AWS, the data transferring will be easier and faster.

Lastly, the team hopes that the Smart IOT Plug will help those users to improve the daily routine of those with health problems such as disabilities, dementia and dystonia by boosting comfort and control of the appliance.

Reference

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