



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SECP1513 – Section 07

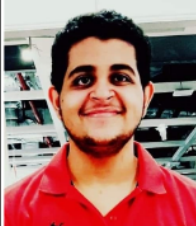
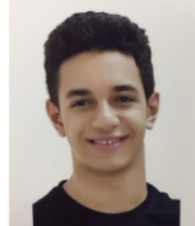
Technology and Information System

ASSIGNMENT: Project 1 Part 1

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1. Introduction

Have you ever seen a product on the internet and wondered where or how you can find or purchase that particular product? Or find a book in a library, where you cannot buy one from and tried to look for a bookstore that sells it? Well, this project can help.

The idea of the application is to basically find the exact same product or a similar product - which can be a book, clothing, food, beverage, furniture, electronics - by taking a picture of the product in real life or a picture of the product from the internet. The other way to search, is to scan the barcode on the product. Then, the app can be upgraded by cooperating with hypermarket companies. For example, connect the app to lulu hypermarket databases so that customers can scan the products' barcode they want to buy while shopping and the price for each product and the total price will display on their phone. This speeds up the process of checking product prices instead of going to the price barcode scanners that are installed on the hypermarket walls.

4th industrial revolution and its technologies are the key elements that will make this app function properly and keep up with the world's technological development. Using big data, Artificial Intelligence, cloud computing and possibly Augmented reality in the future!

2. Selection of 4th IR Technologies

For our project, we plan to use 4 different types of **industrial revolution 4 (IR4.0) technologies**. The following are the ones we've chosen and the reasons for choosing them:

- **Artificial Intelligence**
- **Cloud Computing**
- **Augmented Reality**
- **Big Data Analytics**

2.1: Artificial Intelligence

Artificial intelligence is often referred to as machine intelligence or AI. It is an area in the field of computer science, that focuses on developing and managing computers that can carry out tasks without instructions from a human or learn to make decisions by themselves. These

computers are capable of recognizing complicated patterns, processing data into information, drawing outcomes and conclusions, and making recommendations.

The reason why we are choosing AI, is because we want our project to know which data sets to store for analysis, learn as it delivers its service to the clients and evaluate user feedback to provide faster and more accurate results. The project is expected to study and produce a result even if it no information towards the scanned object is not within its database.

2.2: Cloud Computing

The delivery of computing services and resources over the internet (the cloud), in order to provide a boost to the pace of innovation, provide more flexible resources and economies of scale - is defined as the term, cloud computing. This can range from servers (physical and virtual), applications, databases, data storage, tools and frameworks, networking capabilities and more.

You normally only pay for the cloud services you use. Which, helps you cut costs, helps you run your infrastructure more efficiently, and scales as your business grows.

Our project will be entirely based and hosted on the cloud. We will mainly be using the **Amazon Web Services (AWS)**.

2.3: Augmented Reality

The term ‘augmented reality’ is defined as enhancement of the real-world environment through the use of computer-generated elements and features. Visual effects, audio and music, videos and films, GPS overlays, and haptic feedback can all be used to accomplish this. With the help of data analytics and other subsiding technologies, augmented reality can display all the necessary information and facts to a person’s fingertips.

To show to information and facts on the user’s screen, we plan to use augmented reality models.

2.4: Big Data Analytics:

The use of advanced analytic techniques on very large (yet, diverse) data sets, which can contain structured, semi-structured, and unstructured data from a variety of sources and is called Big Data Analytics. These data sets can range from simply gigabytes up to terabytes or zettabytes. These analytical techniques can bring out hidden patterns, correlations, and other insights, within

such massive amounts of data. Which, can evaluate pre-existing and real-time data and instantly output results and answers.

We plan to use the user's input, feedback and analyze them to provide better, faster and more accurate results in the future.

3. Possible Clients

This project is targeted towards general-purpose use, with a very user-friendly interface and ease-of-use. Any person with a working internet connection and a smartphone that consists of a back-camera should be able to use this product. This includes the **general population**. While, further development of the project may allow for specialized usage for businesses, industries and in educational institutions, we want to see how this application stands out in the meantime and also acquire more knowledge. It has to be completely secure, reliable and stable before being implemented as an enterprise solution. Hence, the goal now is to gain the appeal of the general userbase. This will function as a client-side web app on smartphones, that will receive all the necessary information from the server.

4. Architecture

We have mentioned earlier, about the cloud computing and how it will be one of the main factors in developing this project. We plan to host and operate our project completely based on the Amazon Web Services (AWS). If we dive into the type of cloud-architecture we will be using from a software point-of-view, there are some main key factors to look at before choosing. These are **front-end** (client-side), **back-end** (server-side), **delivery system** and **development model**. Each one of them is described below.

4.1: Front-end

When describing the project's cloud architecture, the very first thing that comes to mind is the **front-end**, which is the user interface and the things the end-users see. In other words, Front end is the part which is going to interact with end-users (clients). This can be the login/registration screen, the scanning utility itself and the AR capabilities we wish to implement.

We plan to use client-side application SDK provided by **AWS Amplify**, which offers purpose-built services and tools for front-end web and mobile developers. For the client-side device (input device), it is going to be the user's smartphone.

4.2: Back-end

Second to the list is the **back-end**. Which, is the part of the architecture that powers and supplies the front-end interface. This part includes the main components of the project's system - such as storage, hardware, databases, service, cloud runtimes and frameworks, load balancing, management and security. All the back-end user components are managed by the cloud service provider **Amazon Web Servers**, because we are going to choose the SaaS (Software-as-a-Service) model, which we will talk about after this. We only plan to use their components and then host plus develop our application there. Hardware components are handled by AWS and we micromanage them based on our needs, while we just work on the software and service itself. Saving us time and money, and giving us more room to focus on the development/deployment of the app itself.

For this, we will be using the **Amazon EC2**. We will be using this service to generate a virtual computer in the cloud, which we will use as our server. We will choose a certain OS, memory and computing power based on our expectations. The **EC2 VM** will host all our web applications and do the back-end processing. But the problem is that as the app grows, we'll have to distribute the traffic to multiple instances. For which, we will need **Amazon Load Balancing**. Further growth may put **Amazon Auto Scaling** and **Cloud Watch** into consideration as well.

We also need to store data in the cloud. Which puts **Amazon S3**, into the equation as well. There are no plans to use **Elastic File System** yet, as it is costly. For databases, we will use **DynamoDB** (for document databases that will be scaled horizontally) and **Amazon RDS** for (relational SQL databases). We will use **Simple Notification Service** and **SES** for notifications and emails. And finally, we want to use **AWS Budgets** for cost calculations.

4.3: Delivery System

The third factor to consider is **delivery system**. As a new small business in the field, we have decided to pick the Software-as-a-Service (SaaS) model for a variety of reasons. The main reason is that SaaS provides a complete product, that is both ran and managed by service provider (in this case, AWS). So, we don't have to worry about how the server is maintained or how the infrastructure is managed. The only thing that we will have to focus on is how we are going to use our particular portion of software and development

4.4: Deployment model

The deployment model of our app is completely cloud-based. Where, everything will be completely hosted and developed on the cloud. Which will end up saving ourselves the cost of servers, the room for the servers, management team and room security.

5. Design Goals

All of us have very specific design goals in mind. We plan to work together to deliver a fully functioning app. The goals are as follows,

- Provide accurate and precise identification of the scanned objects
- Provide accurate facts and information for the augmented reality part
- Provide fast and instantaneous results
- High availability
- Low latency

6. Conclusion

While we have high expectations for this application, we expect it to solve a variety of problems. Maybe people want to see what a certain product is, where they can find it, what is the price or maybe the ingredients. They want to see all the facts and information in AR view to save time or make them interactive. These can all be solved by our proposed application.

There are of course, limitations. Our current knowledge is not sufficient for most of the proposed functionality of this program. Though we believe we will figure out a way to implement our specified features, given the time and effort. The limitations will mainly be on the early development of this program. Since we will have very little data and feedback to work with, the accuracy and AI aspects of the application may not be perfected. But that will improve as time goes.

Throughout the development of the project, we will learn how to utilize cloud architecture and AWS web services. So, it will contribute towards our personal knowledge and education. However, we believe that it will satisfy our potential clients as well. We have plans to expand this application to turn it into a platform. We hope it will be a part of people's daily lives.