
UTM

UNIVERSITI TEKNOLOGI MALAYSIA

**SCHOOL OF COMPUTING**

**SESSION 2020/2021 SEMESTER 2**

# SECP 1513-05

# TECHNOLOGY AND INFORMATION SYSTEM

## DESIGN THINKING ON:

# *DATABASES*

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# INTRODUCTION

## ❖ Design Thinking:

Design thinking is a non-linear, iterative process aimed at educating customers, questioning assumptions, redefining issues and developing innovative design and test solutions. The approach consists of 5 phases: Empathizing, Defining, Ideating, Prototyping and Testing, and is most useful when dealing with problems that are unresolved and uncertain. In design thinking process our topic is Databases.

## ❖ Database:

A database is an organized collection of data, generally stored and accessed electronically from a computer system. In simple words, we can say, a database in a place where the data is stored.

Database management system is important because it manages data efficiently and allows users to perform multiple tasks with ease. A database management system stores, organizes and manages a large amount of information within a single software application.

## ❖ Advantages:

- ✓ Reduced data redundancy.
- ✓ Reduced updating errors and increased consistency.
- ✓ Greater data integrity and independence from applications programs.
- ✓ Improved data access to users through use of host and query languages.
- ✓ Improved data security.
- ✓ Reduced data entry, storage, and retrieval costs.

- ✓ Data can be shared upon following proper authorisation protocol.
- ✓ Better decision-making ensuring data accuracy and validity.
- ✓ Increased end-user productivity through transforming data into information.
- ✓ Provides simple and clear logical view.

The data in the database can easily be accessed, managed, modified, updated, controlled, and organized. Most databases use structured query language (SQL) for writing and querying data. It still has some shortcomings and as well as some disadvantages in the same factors. So, that is what we are going to discuss and try to improve with our prototype.

# EMPATHY

The first stage of the process of design thinking helps you to develop an empathetic understanding of the problem you are trying to solve, usually through user research. Empathy is key to a system of human-centred development such as design thinking, as it helps you to set aside your own world perceptions and gain real insight into users and their needs.

Issues that are to be kept in consideration while adopting a data management system are:

- Usability (if the system is user friendly or not)
- Functionality and security
- Support and development
- Integration and scalability
- Cost management and suitability

Databases that stores related information across multiple tables and allows you to query information in more than one table at the same time. It's easier to understand how this works by thinking through an example of databases.

We found these various problems to be somewhat significant but it seemed to be critical after we conducted an interview of Mr Aris Bin Arifin (DBA, UTMDigital) on this matter. After talking to him we found that the current databases still have some disadvantages. So, we moved forward with keeping these disadvantages in mind.

Here is the list of questions that we prepared to ask our respondent.

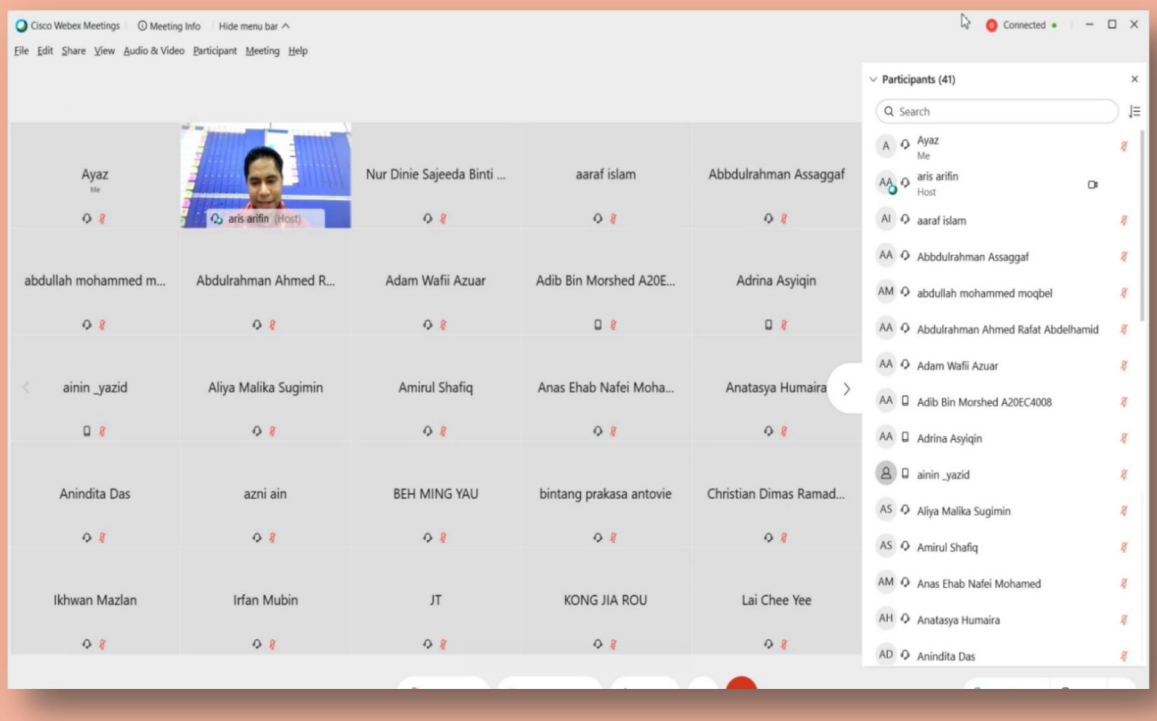
i. What are challenges in managing the databases in UTM?

ii. What do you think about the security of information processing in the database system?

iii. Are there any specific limitations and barriers in collecting and processing information in database system?

In short, stated below is the information about our respondent.

**Name: Mr Aris Bin Arifin**
Database Administrator (DBA)
UTMDigital Department
E-**mail:** arisarifin@utm.my




Through the interview, we have concluded some highlights that are referring to the importance of database based on our respondent's experiences.

For the first question we asked, the respondent answered that absolutely the database system has better security than the physical database or the other name is manual file system. This is because when it comes to database means all the data are in virtual form which concerns the privacy of it.

Moving on to the next question, our respondent explained he could not sure on whether there are limitations or not. But one thing he realised was everyone needs to have be aware with the revolution of database. Why is it important? Collecting and processing information using database system really gives positive feedbacks to the user. By operating and applying the use of database when be needed would reduce the cost of database. This is because everyone is already aware and knows the basic of using IT that includes database thus, there's no need to attend any beginner class.

# DEFINE

During the Empathize stage, we store the information which we generated and obtained. In the Define phase we are reviewing and synthesizing our findings to identify the key issues that our team have found so far. We should always try to define the assertion of the issue as you do this in a human-centred way.

If we discuss them casually, the key issues we discovered are actually very basic. But these fundamental problems are often very critical in the true se nse of the word. The issue of limited size, security & speed, data backup and recovery. The database created to replace the manual file system. And also, being able to organize large scale of data in real time.

# IDEATE

When we reach the third stage of design thinking, designers are able to develop ideas. The effective experience of the first two stages of information means that we can start thinking outside the box, look for new ways to view the issue and find creative solutions to the problem statement we have made. Ideating solution is based on three categories-

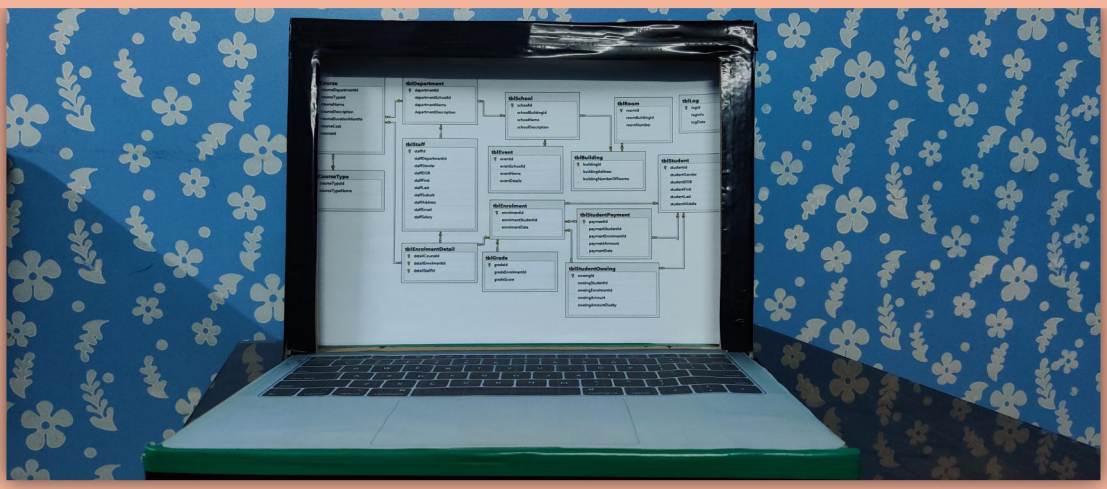
- Practical
- Intermediate
- Radical

The challenges that we experienced led us to decide that the future of databases relies on cloud systems. A very useful and effiecient way of storing data is cloud storage. Since it is on a foreign server, portability is not an issue. The service's speed depends on the internet and the form of access to the node. And we can ensure proper security for our data if it is password-protected. So, we have decided to build a prototype that will be able to improve all the vulnerabilities described above.

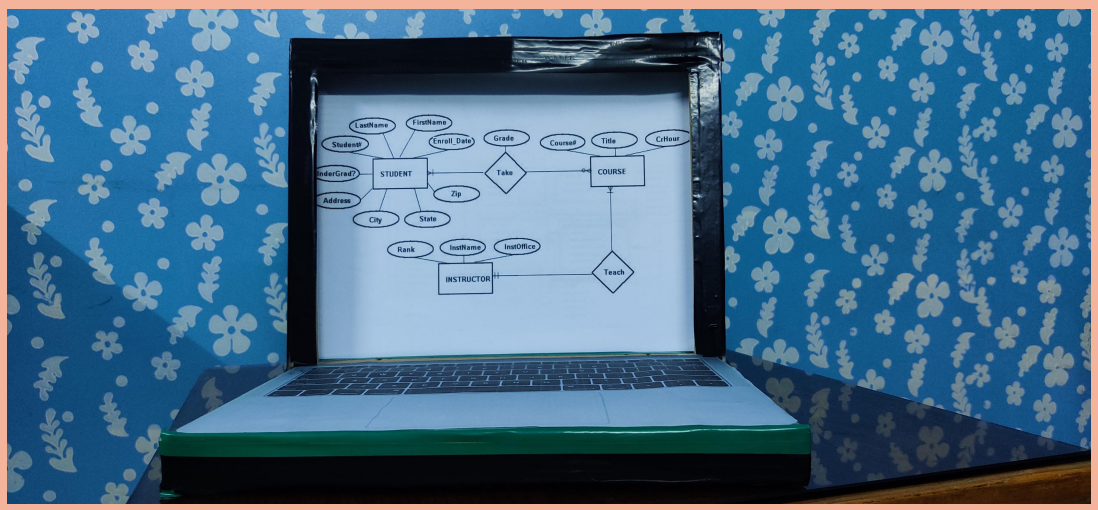
# PROTOTYPE

Prototype is the preliminary version of a system which is used to explain the idea and also to design the other forms. To design the prototype, at first, we held a meeting. We researched about some existing systems including the software's and hardware's which relates to our project. Then we designed our prototype with the help of the knowledge we got from our research. And for the database section of our prototype, we have created a basic Domain Model Diagram and ER Schema of our University's database system. We used different stationery products to make the prototype. That is how we developed the prototype.

***- Design of our Prototype***



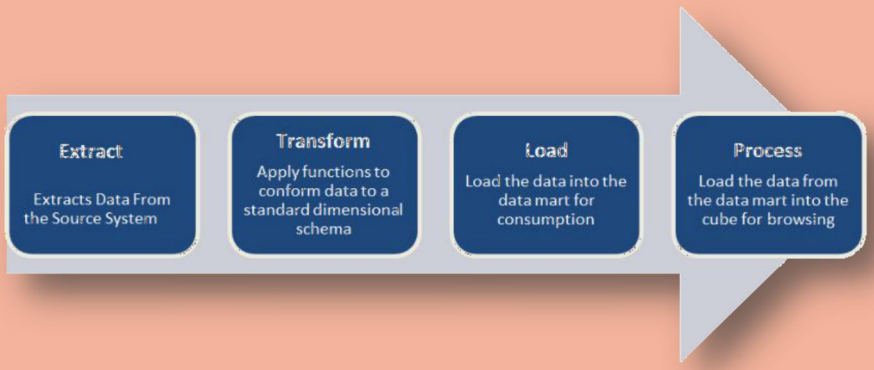
***- Domain Model Diagram for University's Database System***




***- ER Diagram for University's Database System***

# TESTING

Designers or evaluators use the best solutions found in the prototype phase to rigorously test the complete product. This is the final phase of the prototype, but the results produced are often used in an iterative process such as design thinking to redefine one or more additional problems. Instead developers can choose to go back to previous stages in the process to make more revisions, improvements andrefinements to exclude alternative solutions. The testing process is given step by step below:




# REFLECTIONS

In this assignment, we have tried to design the aspects of our project. In this assignment, we underwent the cycle of design thinking, which seeks to consider users, challenge assumptions, redefine problems, and develop innovative concept and test solutions. Over recent decades, the development and refinement of skills that allow us to understand and respond to rapid changes in our environment and actions has become crucial. The world has become profoundly interconnected and dynamic, and design thinking offers a way to cope more human contortedly with all this transition. Design teams use design thinking to fix unresolved and unknown problems (otherwise known as wicked issues) as the system reframes these issues in a human-centred way and helps developers to concentrate on what is most important for consumers. Design thinking gives us a way out of the box to think and dive into problem solving that bit deeper. This lets developers perform the right kind of testing, develop

models, and check products and services to find new ways of meeting the needs of consumers. Over the past few decades, the design thinking process has become increasingly popular because it has been key to the success of many high-profile, multinational organizations — companies including Google, Apple, and Airbnb, for instance, have made a notable impact. This outside the box thinking is now being taught at the world's leading universities and is being promoted at all business levels. Due to its ability to create new ideas in a disruptive and innovative way, design thinking transforms the environment around us every day. Design thinking is more than just a technique, it opens up a whole new way of thinking and provides a series of hands-on methods to help you implement this new way of thinking.

Lastly, we would like to greatly thank Dr Mohd Shahizan Bin Othman for guiding us through this design thinking process and helping us learn something amazing.

# TASK FOR EACH MEMBER

| | | |
|---|---|---|
| **1** | Aaraf Islam (A20EC4001) | ❖ Idea generation<br>❖ Making presentation slides<br>❖ Taking Interview<br>❖ Designing Prototype<br>❖ Creating Prototype<br>❖ Video Editing |
| **2** | Adib Bin Morshed (A20EC4008) | ❖ Idea generation<br>❖ Making presentation slides<br>❖ Taking Interview<br>❖ Prototypes designing<br>❖ Video editing |
| **3** | Ayaz Rahman Bhuiyan (A18CS4039) | ❖ Idea generation<br>❖ Making presentation slides<br>❖ Creating questionnaire<br>❖ Creating testing process<br>❖ Designing Domain Model Diagram |
| **4** | Md Newaz Alam (A18CS4045) | ❖ Idea generation<br>❖ Making presentation slides<br>❖ Creating reflections<br>❖ Designing the ER Schema<br>❖ Recording video |

# *VIDEO LINK*

*https://youtu.be/Dy8wtq1PtCY*