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**DESIGN THINKING:  
ON  
SECONDARY STORAGE**

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# INTRODUCTION

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 Checking, and is most useful when dealing with problems that are unresolved and uncertain. In design thinking process our topic is Secondary Storage.

Secondary Storage is like a crucial accessory for any type of computer user at this day and age. Secondary storage is one of the most precious property of the computer. It is storage it truly is separate from the computer itself, where software and data can be saved on an everlasting basis. Secondary storage is vital due to the fact memory, or foremost storage, loses its statistics when a pc is turned off whereas secondary storage does not. Therefore, it is oftentimes recognized as non-volatile storage. The records on it stays there until it is deleted or overwritten via the user. A secondary storage device refers to any nonvolatile storage device that's internal or external to the pc. It will be any memory device on the far side the first storage that allows permanent knowledge storage. A secondary storage device is additionally referred to as an external storage device or secondary storage. As it has many features such as; portability, speed, flexibility, etc. It still has some shortcomings in the same factors. So, that is what we are going to discuss and try to improve with our prototype. Secondary storage typically backs up principal storage via facts replication or other facts backup methods. This replication or records backup process, ensures there is a 2d copy of the data. In a business enterprise environment, the storage of secondary records can be in the structure of a network-attached storage (NAS) box, storage-area community (SAN), or tape. In addition, to reduce the demand on most important storage, object storage devices may also be used for secondary storage. The increase of organizational data has triggered storage managers to cross records to decrease tiers of storage to decrease the influence on principal storage systems. Furthermore, in transferring statistics from more highly-priced most important storage to much less costly tiers of storage, storage managers are able

to retailer money. This maintains the facts easily on hand in order to fulfill both business and compliance requirements.

## 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. These are some of the most important potential data storage issues you'll need to consider:

- Infrastructure. Data needs a place to rest.
- Cost.
- Security.
- Compatibility.
- Scale.
- UI and accessibility.

Empathy is key to a system of human-centered 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. While RAM electronic storage devices are quick, external storage devices are slower as a result of they are electro-mechanical. the knowledge on the secondary device must be initial set, then traced and enraptured to the first memory or RAM, that is considered information time interval, per the web Also, external storage merely provides storage for the pc whereas, "primary memory, supports in progress processor activity by storing directions and information of presently running programs," per the website System Designs.

We found these various problems to be somewhat significant but it seemed to be critical after we conducted an interview of **Mr. Nik Kamal Izuddin Nik Ibrahim** on this matter.

After talking to him we found that the current secondary storage devices still have too many disadvantages.

1. Consumes a lot of power
2. Data error is frequent
3. It is large
4. Can be broken if Dropped
5. Can get infected by a virus
6. Easy to lose
7. Anyone can access your files if the memory stick is lost
8. we moved forward with keeping these disadvantages in mind.

## DEFINE

We store the knowledge we generated and obtained during the Empathize phase. In the Define period we are reviewing and synthesizing your findings to identify the key issues that our team have found so far.

PRIMARY STORAGE	SECONDARY STORAGE
<ul style="list-style-type: none"> <li>▪ Fast</li> <li>▪ Expensive</li> <li>▪ Low capacity</li> <li>▪ Works directly with the processor</li> </ul>	<ul style="list-style-type: none"> <li>▪ Slow</li> <li>▪ Cheap</li> <li>▪ Large capacity</li> <li>▪ Not connected directly to the processor</li> </ul>

We always try to define the assertion of the issue as you do this in a human-centered way. The key problems that we found are actually very basic we already mentioned them casually in stage of empathy. But these basic problems are also very crucial in the actual sense. The Majors issue of limited size, security and speed.

# IDEATE

Designers are able to come up with ideas when they reach the third level of design thinking. The strong information experience from the first two phases means that you can start thinking outside the box, search for different ways to view the issue, and find innovative solutions to the problem statement you have made. Other technologies discovered in secondary storage include:

- Policy-based management for availability, information protection, ability and performance.
- Data safety security get entry to control, encryption (at rest, in-flight), versioning and logging.
- Metadata management, software integration, indexing, search and tagging.
- Namespace and end-point management (local, remote and cloud)

The problems that we faced led us to the decision that the future of secondary storage is dependent on **cloud storage**. Cloud storage is a very useful and lucrative way of storing data. As it is in a foreign server so there is:

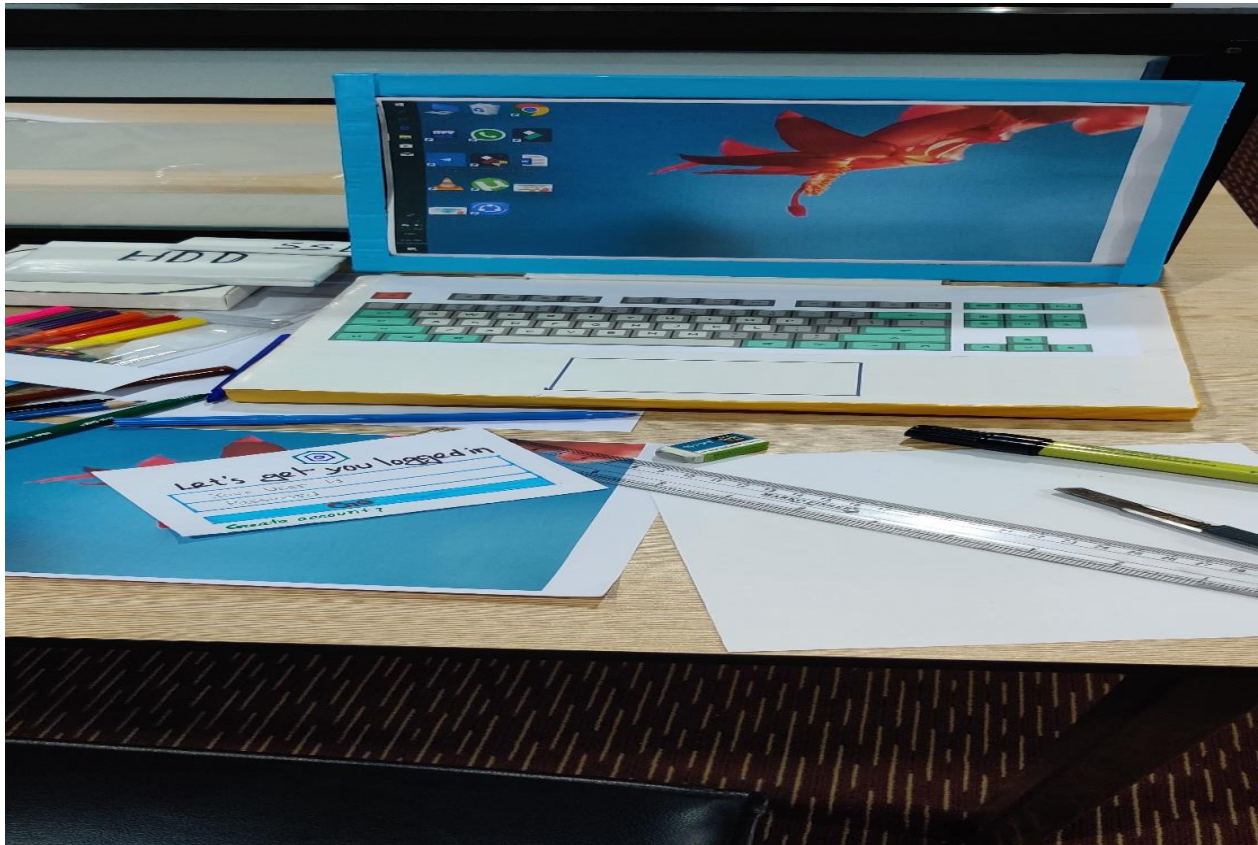
- ✓ Not problem of portability.
- ✓ Enabling more data to be retained longer, more efficiently and cost-effectively
- ✓ The speed of the service depends on the internet and the type of node connection.
- ✓ And if it is password protected then we can ensure a proper security for our data.
- ✓ Data protection (availability, durable, security, mirror RAID and erasure codes)

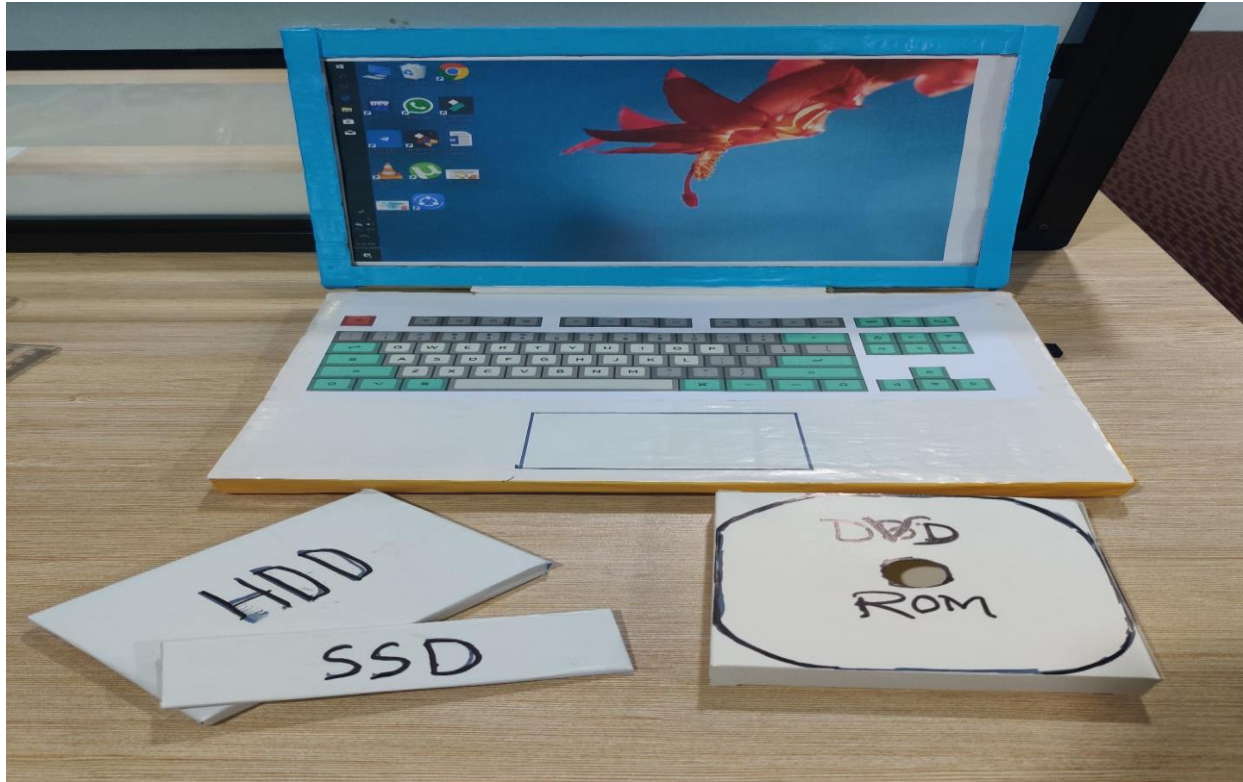
So we decided on making a prototype that will be able to provide improvements for all the aforementioned shortcomings.

# PROTOTYPE

This is an experimental phase, with the goal of finding the best possible solution for each of the problems found in the first three phases. Design teams will produce a number of inexpensive, scaled-down versions of the product (or specific features found within the product) to investigate the problem solutions generated in the previous stage.

After researching and discussing amongst ourselves, we came up with a prototype for the solutions. And we made certain devices on our own to display the results of that prototype, the key feature of the prototype will be point to point connection system with the server to ensure a much faster and secure connection. There will be a network receiver and sender device which will ensure proper connection with the server. And it will be password protected upon inserting into the pc which will be an offline login. Thus the device will allow it to be a very secure and also fast cloud storage system.





## APENDIX

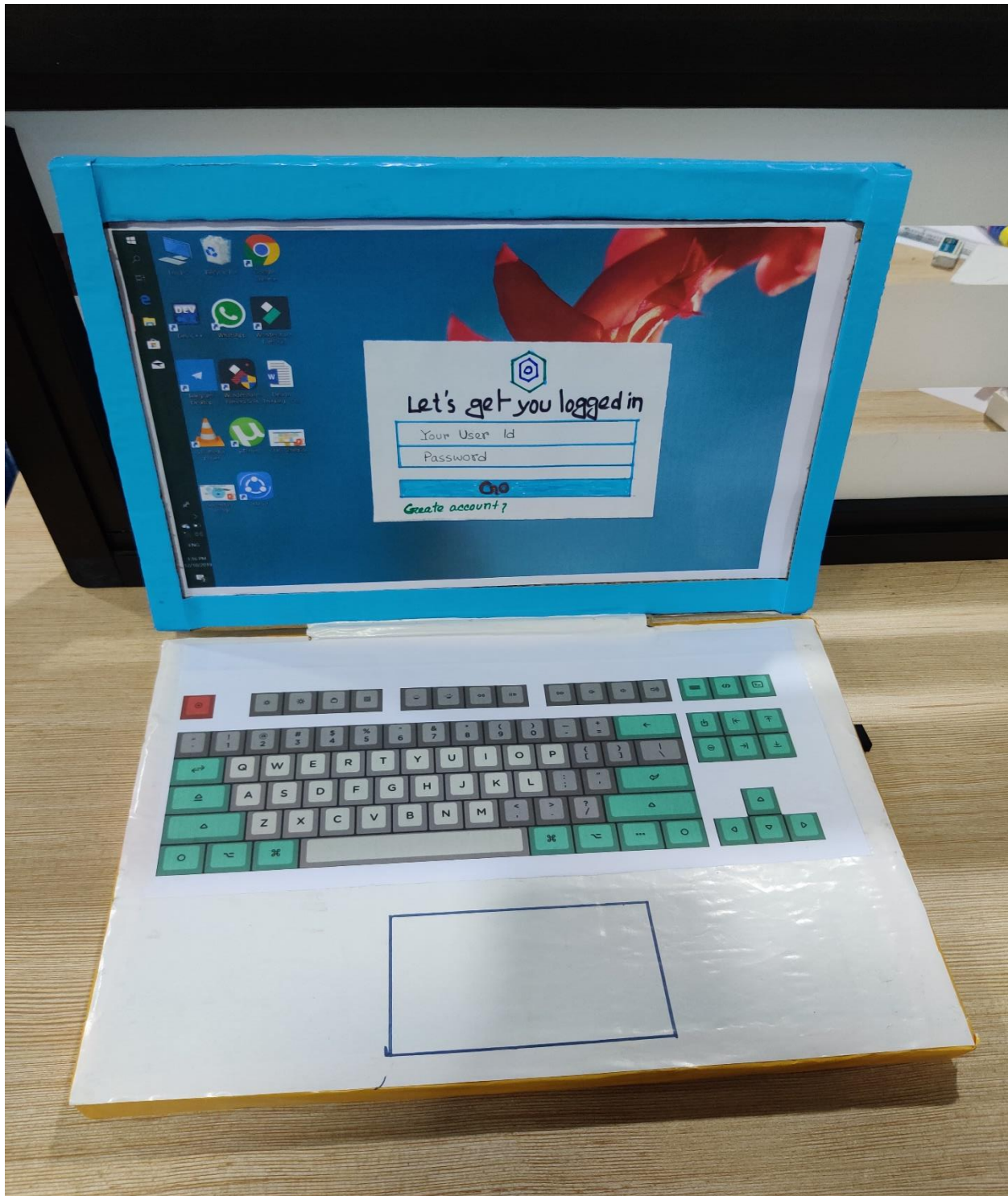
Designers or evaluators use the best solutions found in the prototype phase to rigorously test the complete product. This is the final phase of the prototype, but the results produced are often used in an iterative process such as design thinking to redefine one or more additional problems. Instead developers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

The testing process is given step by step below;

**Step 1:** This is the first step, when we connect to our small P2P connector in this computer.

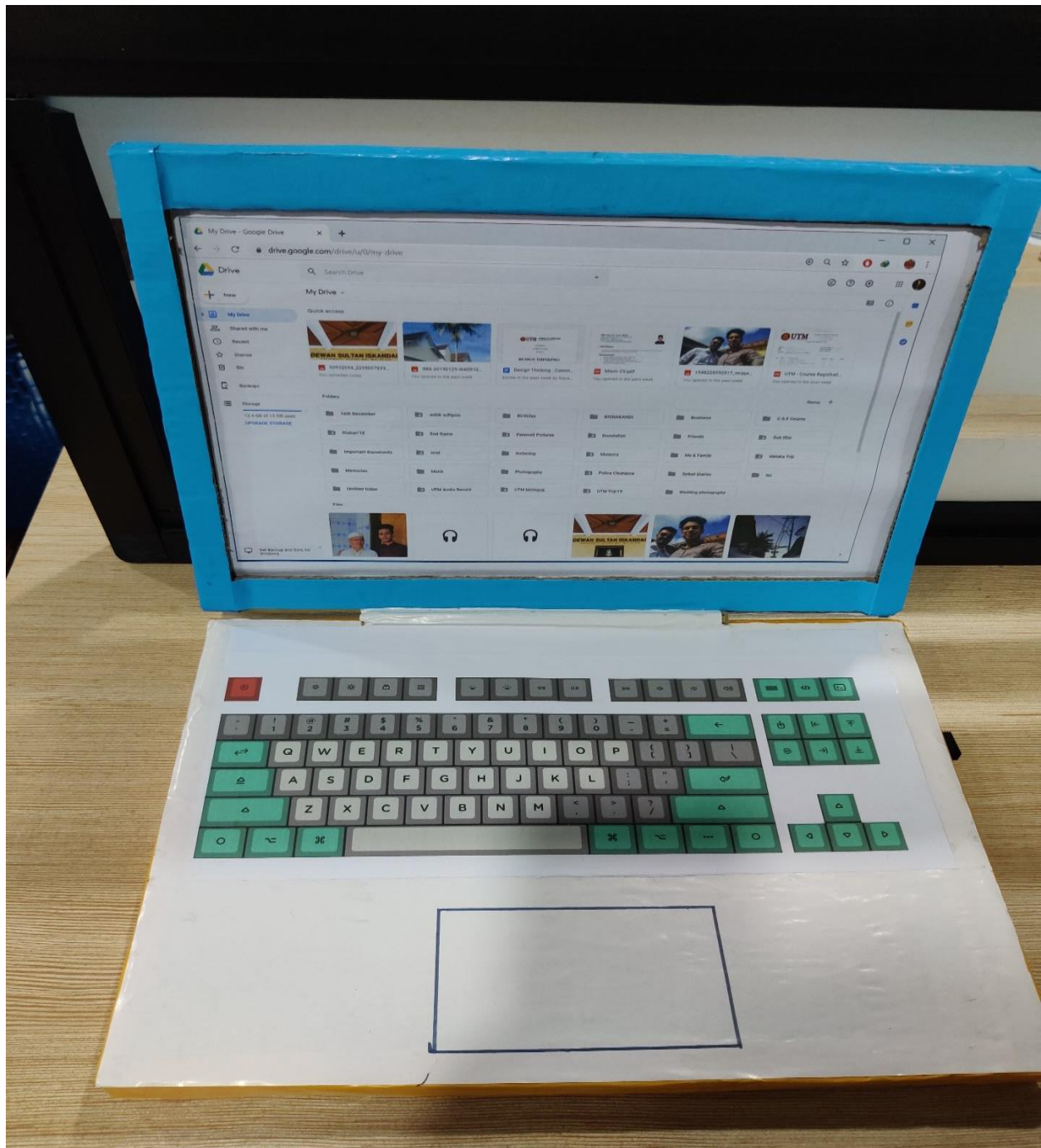


**Step 2:** After connecting this P2P with internet this user interface will atomically shows and requires valid user id and password.



**Step 3:** This is our final outcome. when you logged in your account you can save/upload your important data faster and high protectable. We designed it by ourselves. Name:

***P2P CLOUDSTORAGE.***



# MY REFLECTION

## **MD MONIRUL ISLAM MOLLA**

Having already been around for decades, secondary information storage continues to evolve and take on new roles and business-enabling benefits. The indispensable function of secondary storage (as nicely as primary storage) is to protect, preserve, impenetrable and serve facts to functions that assist data offerings as cost-effectively as possible.

In The digital era cloud storages is much smarter than other secondary storage system that's why we develop a design thinking idea about cloud storage devices. The problems that we faced led us to the decision that the future of secondary storage is dependent on cloud storage. Cloud storage is a very useful and lucrative way of storing data.

Cloud computing is a progressive mechanism that altering way to agency hardware and software program format and procurements. Because of cloud simplicity everyone is transferring information and software program to cloud data centers. The Cloud provider (CSP) ought to ensure integrity, availability and confidentiality but CSP is not imparting dependable records offerings to client and to saved customer data. This learn about identifies the troubles related to the cloud data storage such as data breaches, data theft, and unavailability of cloud data. Finally, we are solving feasible options to respective problems in cloud. Throughout this design thinking project we made a prototype and video for better understanding. Overall I enjoyed very much to be a part of this design thinking project.

## TASK FOR EACH MEMBER

NO.	NAME OF MEMBER	TASK
1	MD Monirul Islam Molla	<ul style="list-style-type: none"> <li>❖ Report Writing</li> <li>❖ Idea generation</li> <li>❖ Making presentation slides</li> <li>❖ Taking Interview</li> <li>❖ Prototypes design</li> <li>❖ Recording video</li> <li>❖ Video editing</li> </ul>
2	Mohammad Fahmid Fayaz Ifaz	<ul style="list-style-type: none"> <li>❖ Report writing</li> <li>❖ Creative innovation</li> <li>❖ Taking interview</li> <li>❖ Proper solutions</li> <li>❖ Build prototype</li> <li>❖ Recording video</li> <li>❖ Video editing</li> </ul>
3	MD Mohtasim Abrar	<ul style="list-style-type: none"> <li>❖ Report writing</li> <li>❖ Finding problems</li> <li>❖ Build prototypes</li> <li>❖ Recording video</li> </ul>

## VIDEO LINK

<https://youtu.be/yqxgs-4A8eY>