

MDAS_DBRCC: Data Backup and Recovery Technique in Cloud Computing for Education Industry

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Abstract

Cloud computing also offers several services to its clients in departments such as education, healthcare, military, government, and sports. The storage of each service, which keeps a huge amount of electronic data in a cloud database, is one of the services provided by cloud infrastructure. In the main cloud, this type computes massive amounts of private data. As a result, information retrieval solutions that are both effective and efficient are required. When the server deletes the lost data and cannot transmit any information to the client, the recovery method's main goal is to assist the user in collecting data from each server backup. Users can benefit from cloud computing by storing data, accessing data from anywhere, and retrieving data at any time. As data on the cloud is generated at such a quick rate, speed is one of the most important aspects of cloud computing. It's simple to save files in the cloud and then retrieve it again. However, the difficult problem is to safely store and retrieve data from the cloud. We suggested a way for securely storing data in the cloud utilizing encryption and decryption methods in this work. We also employed a compression module to compress data before putting it in the cloud.

Keywords Cloud computing, Electronic data, Cloud database, Backup, Recovery, Privacy, Compression, Encryption, Decryption.

Subject Classification: 68P27, 68P20, 94A60

1. Introduction

Because we use numerous types of services on the Internet, such as Database, Storage, Networking, Applications, and Server, cloud is simply an Internet. It is essentially the usage of many types of services via the Internet by individuals, companies, or computing devices. Cloud computing refers to the capacity to provide on-demand computer services over the Internet, on a pay-as-you-go basis, instead of managing files on local storage devices. We are mobile folks in a movement from place to place, but we can access the storage from the Internet since it is in the Internet, and if

we want to offer access to someone else, it is also easy for us to give access to them as long as they have internet connection available with them. [1].

1.1 Benefits of cloud computing

a) **Cost-Effective:** Cloud computing is a cost-effective solution since it allows you to pay for social services as you use them, or we can call it a consumption-based charging model because you don't have to pay any upfront predetermined amount for computer resources or hardware. [2].

- b) **Scalability:** When the infrastructure was on your premises, we could increase or reduce the resources of services based on demand, which was a challenging feature to implement and scale. The ability of a product to leverage its impact on customers and meet requirements is known as scalability. One of the most sought-after characteristics of cloud computing that can help businesses develop is scalability.
- c) **Reduced IT costs:** Using cloud computing to manage and maintain your IT systems can save you money. Rather than purchasing costly devices and equipment for your company, you can save money by utilizing the capabilities of a cloud service. Because of this, you can reduce your running costs.:
 - You may not need to pay salaries to qualified staff because the cost of system updates, new hardware, and software may be covered in your contract.
 - Why You can save money on electricity
 - There will be fewer delays.
- d) **Collaboration Efficiency:** Teamwork in the cloud allows your organization to communicate and exchange data more simply than it could use traditional ways. You can utilize cloud computing to provide employees, contractors, and third parties access to the same files if you're working on a project in several places.

- e) **Quality Control:** Few things are as damaging to an organization's business as poor-quality, inconsistent reports. All documents are stored in one place and in the same format in a cloud system. You can keep your data consistent, avoid human error, and have a clear record of any modifications or updates because everyone has access to the same information.

2. CLOUD IN EDUCATION INDUSTRY

Cloud computing was first used in education can save, store, and transfer vital papers and data. This article looked at some of the best practices that higher education institutions can use to create secure and dependable cloud backups. Cloud computing's rapid growth in the educational research and technological organizations has resulted in considerable benefits in terms of cooperation, efficiency, and scalability. [3].

2.1 Infrastructure Model:

The model appeals to the demands of administrative employees (student affairs, finance, accounting, etc.) as well as students and teachers who work primarily in the field of education, training, and research. Institutions must complete all necessary procedures to establish cloud infrastructure, including working on the right network design and collaborating with departments and staff to ensure that all requirements were achieved. (Figure1).

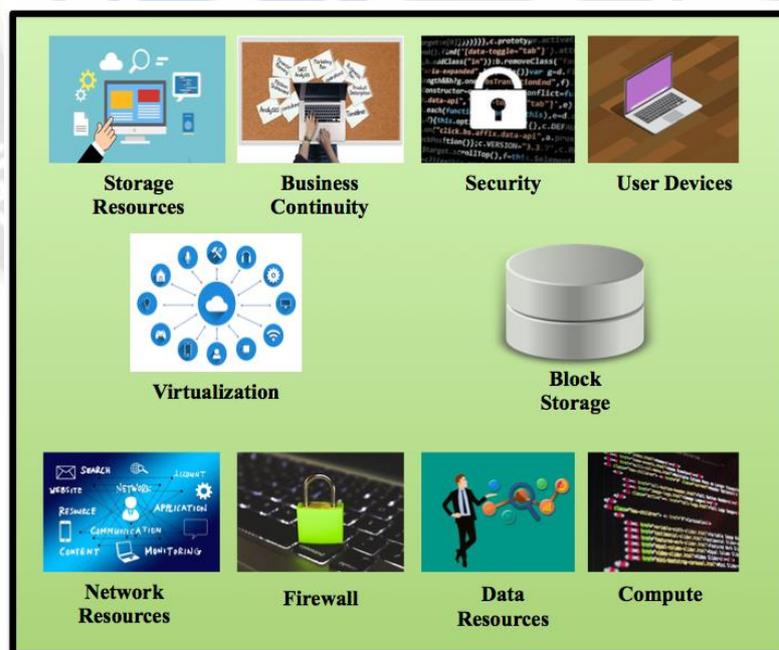


Figure 1: Required Infrastructure Model

2.2 Platform Model:

The software system and server hardware in an Internet data centre are referred to as a cloud platform. This

enables remote and large-scale coexistence of software and hardware devices [4]. An enterprise can use the cloud platform to create cloud applications, test and build

apps, and store and restore data. It also allows businesses to conduct data analysis. Streaming video and audio, embedding intelligence in processes, and delivering

software on demand globally are all possibilities for organizations.

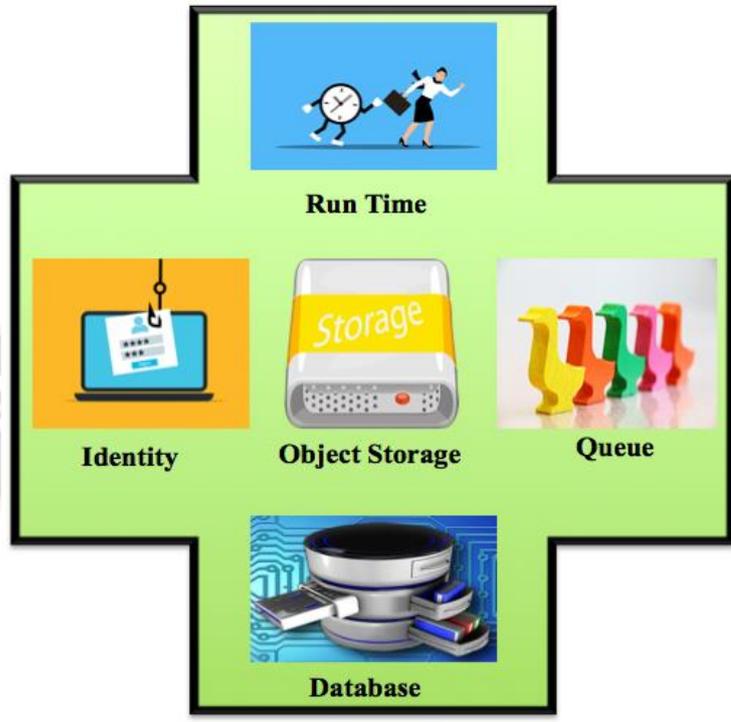


Figure 2: Required Platform Model

2.3 Application Model:

The most significant attribute of the cloud's numerous applications is its scalability and availability. Cloud application interfaces that are simple to use allow users to successfully expand their computing environment. The

content of the apps, not the programmers themselves, is at the heart of the proposed cloud platform. To assist pupils, advanced data mining algorithms allow you to filter and find specified content. (Figure 3).



Figure 3: Required Application Model

3. ISSUES IN CLOUD COMPUTING FOR EDUCATION INDUSTRY

Despite its many advantages, the cloud presents a number of issues for the educational sector, which are exacerbated and accelerated by the quick speed and scale of adoption. Tape backup simply does not fulfill the needs of firms that have several offices across multiple departments and universities with crucial information when it comes to data protection pros. A few of these are covered farther down. [5,6]:

3.1 Problem with tape backups: Tape backup has traditionally been employed to protect only data housed on application servers in a distributed computing system, such as a wireless LAN across campus and remote offices, and relies on numerous completely unsecured cross-departmental IT technologies.

- Tape backup is unreliable, with recovery failure rates ranging from 20% to 50%.
- Backing up on tape is expensive to administer and requires lengthy backup and restore operations.

- Backup tapes are physically vulnerable to damage or theft.

3.2 Problems with online backup services: The most serious issue for any online backup service is its lack of privacy. Files are stored on third-party networks by online backup providers. Some backup service providers, in fact. Employees, for example.

4. PROPOSED BACKUP AND RECOVERY MODEL

The work's goal is to facilitate an auxiliary tool for extracting specified values from the models under consideration. In terms of cost and benefit, the proposed method is applicable as a backup solution. Data is the most valuable asset in a computer, as it allows the computer, hardware, and software to accomplish a variety of tasks, most of which rely on a data source [7]. Today, when tens or even thousands of servers are simultaneously operating in one system application, an application system to create large amounts of data, diversified distribution, the development of high-speed Internet applications, cloud computing, and cloud storage technologies are gradually becoming popular.

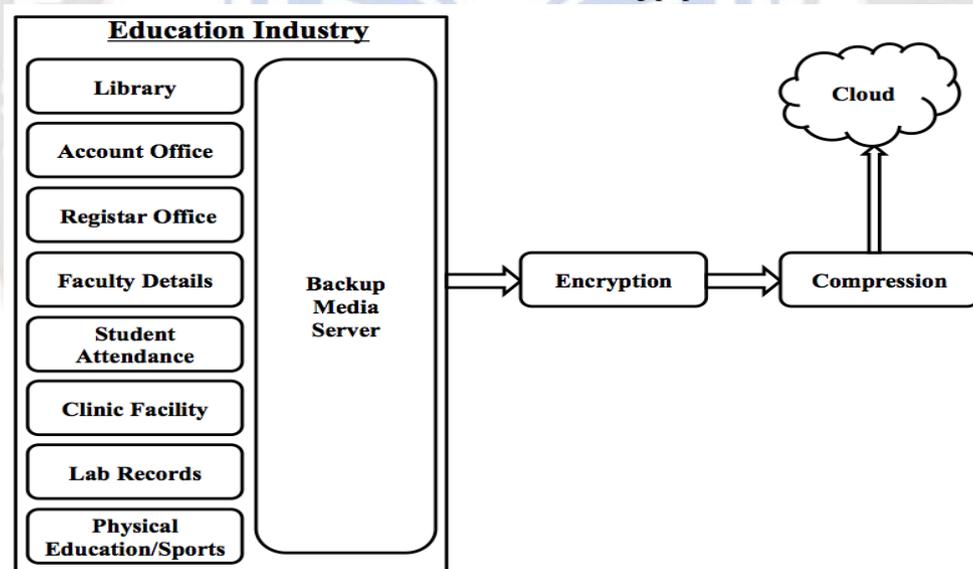


Figure 4: Education Industry (Encryption)

Security has become an important concept in the backup and recovery process, as shown in Figures 4 and 5. A cloud-based backup and recovery solution is the optimal solution for securely backing up your data to the cloud, as shown in Figures 4 and 5. The backup collection module, shown in Figure 4, has multiple source nodes, such as the Library, Accounting, Registrar's Office, Faculty Information, Student Attendance, Clinic, Lab Records, and Physical Education / Sports, which are already connected to a backup media server. Even though the backup server sends all data to the cloud, this

book suggests backing up your data with confidentiality. As a result, there are two layers towards this method: encryption and compression.

So, encryption is used to encrypt the data at this layer, and the encrypted data is then sent to the compression layer to reduce the amount of storage required. As a result, it takes up little space in the cloud, and instead of compressing the data during extraction, a layer will be added, this time a decompression layer, which the decompression layer will utilize to decompress the data [8]. As a result, the user receives their data as it is

delivered to the cloud for backup, and after unpacking; the data is passed to the decryption layer, which decrypts the data before sending the backup data to the destination.

So, encryption is used to encrypt the data in this layer, and then the encrypted data is sent to the compression layer to save storage space. So it doesn't take up a lot of space in the cloud, and instead of compressing the data

during extraction, a layer will be added, this time a decompression layer, in which the decompression method will be used to decompress the data. As a result, the user receives his data in the form that it is sent to the cloud for backup, and after unpacking, the data is passed to the decryption layer, which decrypts the data before the backup data is transferred toward its destination.

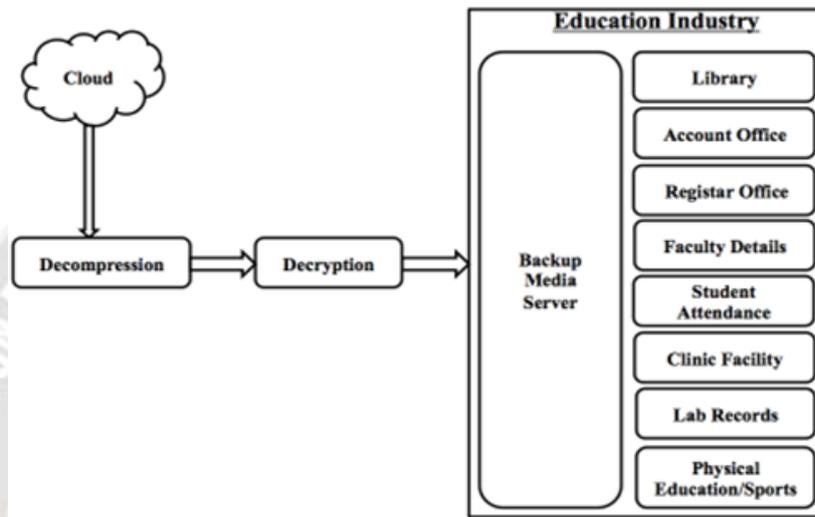


Figure 5: Education Industry (Decryption)

Data security is extremely significant in the age of networked data, and data backup and recovery is a significant guarantee of data security. Local failures due to software and hardware failures, artificial malfunctions, unlawful procedures (including viruses), and other damages are prevented by traditional local data backup and recovery technologies. When a local system is

severely damaged, the only local form of traditional data backup is insufficient to meet user needs for network service system backup; thus, cloud-based data recovery and security backup technologies must be used. [9].

The proposed work has been implemented on AWS and MacBook Air, which have Intel Core i5 with Processor Speed of 1.6 GHz and RAM of 8 GB.

5. RESULT AND DISSCUSSION

Table 1 Comparative analysis

| Tap Backup | Online Backup Services | Proposed |
|-------------------|-------------------------------|--------------------|
| Unreliable | Privacy concerns | Privacy concerns |
| Vulnerable | Cost | Cost |
| Labor-intensive | Network | Always available |
| - | - | Unattended backups |

This technique was evaluated in comparison to Tap Backup and Online Backup Services. Tape backup is unreliable, with failure rates ranging from 20% to 50% for data recovery. The biggest problem with tape backup is that administrators don't always know if they have a good backup that can be restored until they need to, which is often too late. Also, tapes are frequently stored

in the same room as the actual machine, which puts them at risk of being destroyed in the event of a fire [10]. Tape backup is inefficient, labor-intensive, and results in huge backup windows, reducing your firm's production and profitability[11].

The second scenario is Online Backup Services. The most difficult aspect of any online backup service is

maintaining privacy. Because every online backup service saves files on third-party networks, there's always the risk of illegal access to the personal information you concern about [12]. In fact, some backup service providers cannot guarantee that the information they save will remain secret. For example, most online backup services have a monthly subscription that varies depending on the amount of storage and the number of people who utilize it. Although this cost is small at first, it can quickly escalate as more data is added.

Your backed-up files might continue in your network if you use our method. There will never be any involvement of a third-party company in the handling of your files. You can also employ encryption to prevent illegal access within your firm and keep files on your network for further security. You can undoubtedly utilize the Internet to transfer files between offices that are physically separated. The main line is that they are available to you 24 hours a day, seven days a week, anytime you need them. When storing data in the cloud, compression and decompression are employed to reduce file size.

6. CONCLUSION

For the future generation of IT applications, cloud computing is a promising and developing technology. Data privacy and security concerns are a roadblock to cloud computing's rapid growth. Backup and recovery are essential for keeping applications operating smoothly and preventing data loss in the case of a hardware breakdown. This document explains how to back up and restore data or logs in the cloud using security procedures. The proposed solution depends upon two techniques: encryption/decryption and compression/decompression, as well as a backup and recovery mechanism. These methods have advantages and downsides, which are summarized in this study. In all uncontrolled situations, such as cost, security, low deployment complexity, redundancy, and recovery, all of these methods can provide the best performance.

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