Utilization of Private Cloud Storage Amazon Web Service (AWS) as Data Storage Media for the Aptikom Website of North Sumatera Province

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Abstract

With the increasing need for secure, flexible, and scalable data storage, Amazon Web Services (AWS)-based Private Cloud Storage technology has become an effective alternative for academic organizations such as APTIKOM North Sumatra Province. This study aims to analyze the implementation of AWS Private Cloud Storage as a data storage solution for the APTIKOM website, as well as evaluate its impact on operational efficiency, security, and data accessibility. The research method used is a case study with a qualitative and quantitative approach through observation, interviews, and direct testing of system performance before and after implementation. The results of the study show that the use of AWS not only increases data access speed and server management efficiency, but also provides higher security protection compared to conventional storage. Thus, this study contributes to information system managers in adopting cloud technology as a reliable and sustainable data storage solution.

Keywords: Private Cloud Storage, AWS, Data Storage, Cloud Computing, APTIKOM Website, Data Security, Scalability.

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Introduction

In the rapidly evolving digital era, the need for secure, efficient, and easily accessible data storage has become increasingly important[1]. Cloud storage technology, particularly private cloud, has emerged as an excellent solution to meet these needs. Amazon Web Services (AWS) is one of the cloud platforms that offers reliable data storage services, such as Amazon Elastic Block Store (EBS) and Amazon S3[2]. By utilizing AWS, organizations can manage and store their data with high security and the ability to access data flexibly from various locations[3]. The use of cloud storage can reduce infrastructure costs and increase flexibility in data management, aligning with the growing needs of various organizations. Additionally, [4]emphasize the importance of reliability and scalability offered by cloud storage in supporting long-term organizational operations.

Aptikom of North Sumatra, an association focused on information and communication technology, requires a data storage solution that can support the operational efficiency of its website[5]. By utilizing AWS as the data storage medium for Aptikom's website, the data can be managed in a structured and centralized manner, facilitating content management and minimizing the risk of data loss. Another advantage is the scalability and reliability of AWS services, allowing Aptikom to adjust its data storage capacity according to the rapidly growing needs[6]. Several studies indicate that adopting cloud storage, especially private cloud, can enhance organizational performance in data and application management. [7]highlight that the application of cloud technology enables companies to improve operational efficiency and reduce downtime caused by hardware issues. This is further supported [8] who show how Amazon Web Services provides a cost-effective and scalable cloud solution.

One of the key reasons for choosing private cloud is its higher level of security compared to public cloud. [9]explain that private cloud offers greater control over data, which is crucial for organizations handling sensitive information. This is also supported by research from [10]who note that private cloud provides better data protection through full control over access and storage policies. Another study by [11] shows that AWS enables organizations to implement stricter security policies through encryption and stronger identity management.

Using AWS in the context of organizations such as Aptikom also offers many benefits in terms of operational efficiency. Implementing AWS can reduce operational costs and simplify IT infrastructure management[12]. Meanwhile, AWS services also make disaster recovery and real-time data management easier[13]. This is highly relevant for Aptikom, which requires fast and secure data access to support its website's operational activities.

Furthermore,[14] reveal that AWS can support the implementation of cloud-based solutions for various data-intensive applications, including website management. An added advantage is the ease of managing varying workloads, as discussed by [15], who emphasize that using AWS allows organizations to dynamically adjust data storage capacity according to changing needs.

The use of cloud technology, specifically AWS, allows organizations to manage data in a more efficient, secure, and flexible manner. With higher security, easier data management, and the ability to handle varying workloads, AWS is an ideal solution for Aptikom of North Sumatra to store and manage its website's data. This study aims to explore the utilization of AWS private cloud storage as a data storage solution for Aptikom's website, focusing on the benefits, challenges, and potential performance improvements that can be achieved through this technology implementation.

Literature Review 2.1 Private Cloud Storage

"Private cloud information is a type of cloud computing provided to a single organization, providing full control over its data and applications. This service combines cloud computing features but with tighter management. Pivate clouds offer additional security benefits and greater control over data retention policies, making them ideal for organizations handling sensitive data or requiring regulatory compliance[16].

Amazon Web Services (AWS) provides private cloud solutions with various features that enable organizations to manage data more securely, flexibly, and scalably. According to [17]utilizing AWS private cloud gives organizations the ability to securely store data with full control, while utilizing infrastructure managed by AWS."

2.2 Benefits of AWS Private Cloud for Organizations

Cloud storage has become the primary data storage solution for organizations worldwide. Cloud computing offers various advantages, such as flexibility, scalability, cost efficiency, and ease of data management. Implementing cloud computing can help organizations reduce IT infrastructure costs and improve collaboration between organizational units. Furthermore, cloud storage allows organizations to scale up or down according to evolving data needs[18]. In Indonesia, many organizations, including educational institutions, are turning to cloud computing for more efficient data management. [19]revealed that cloud computing allows organizations greater flexibility in accessing and managing data, while reducing the need for expensive and difficult-to-maintain on-premises IT resources.

2.3 Amazon S3 Bucket as Data Storage Media

Amazon Simple Storage Service (Amazon S3) is one of the most widely used storage services in the AWS ecosystem. S3 provides a scalable object storage solution, allowing users to store and retrieve data anytime, from anywhere, cost-efficiently and securely. Amazon S3 uses buckets as its primary storage, which are containers for data objects accessible through URLs provided by AWS. S3 buckets support a variety of data types, including static files, images, videos, documents, and application data[20].

According [21] S3 buckets simplify data management by providing options such as object versioning, automatic data encryption, and identity- and group-based access control policies. Data security is a top priority in S3, as the service provides server-side encryption (SSE) to protect stored data and supports client-side encryption for additional protection.

Research Methodology

This research aims to analyze the storage needs of the Aptikom website and compare the application of AWS Private Cloud Storage with local storage. The steps involved in this research are as follows:

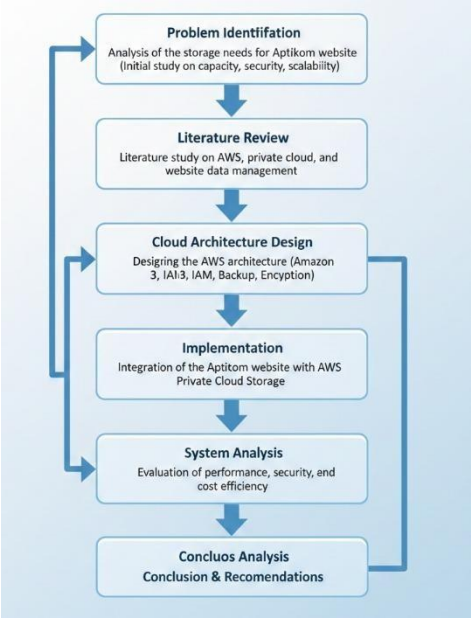


Figure 1. Research Methodology

a. Problem Identification

In the initial stage, an analysis of the storage needs for the Aptikom website is carried out, covering aspects such as capacity, security, and scalability of the required storage system. This aims to understand the data storage issues faced by the organization and determine the appropriate solution. b. Literature Review

The research proceeds with a literature review on Amazon Web Services (AWS), specifically AWS services related to private cloud, as well as general data management for websites. This literature review will provide the theoretical foundation and relevant concepts for understanding various cloud storage approaches and their applications in the context of websites.

c. Cloud Architecture Design

In this stage, a cloud architecture is designed to meet the needs of the Aptikom website, utilizing AWS services such as Amazon S3 (for storage), IAM (for access management), and backup and encryption features to ensure data security. This cloud architecture design will serve as a guide for system implementation. d. Implementation

During the implementation phase, the Aptikom website will be integrated with AWS Private Cloud Storage. This integration process involves system configuration and ensuring that the website's data can be managed efficiently using AWS. e. System Testing

After implementation, system testing will be performed to evaluate the performance, security, and cost-efficiency of using AWS compared to local storage. This testing aims to verify whether AWS can meet the Aptikom website's requirements optimally.

f. Results Analysis

Following testing, an analysis of the results will be conducted, comparing AWS with local storage solutions. The comparison will include factors such as access speed, security, operational costs, and scalability to handle data growth.

Conclusion & Recommendation:

Based on the results analysis, the research will provide conclusions regarding the effectiveness of using AWS Private Cloud Storage for the Aptikom website. Additionally, recommendations will be made on how AWS can be utilized for organizations with similar needs. AWS utilization model for similar organizations.

Results

In this section, we'll discuss the AWS EC2 and AWS S3 configuration steps to build a cloud hosting infrastructure for the APTIKOM North Sumatra website that's easily and securely accessible to users. This configuration process is designed to maximize website efficiency and performance by optimally utilizing integrated AWS services.

1. Creating an S3 Bucket consists of several stages as follows :
   - Access the AWS Management Console and log in using the AWS account that we already have and of course have subscribed to AWS services.
   - Select the S3 service from the AWS dashboard.
   - Click the Create bucket button to create a new bucket.
   - Enter a unique bucket name, such as aptikom-sumut-website-data (adjust the name accordingly).
   - Select a region that matches your primary user location to speed up access (for example, Asia Pacific (Singapore) if the majority of users are from Southeast Asia).
   - Click Create bucket.

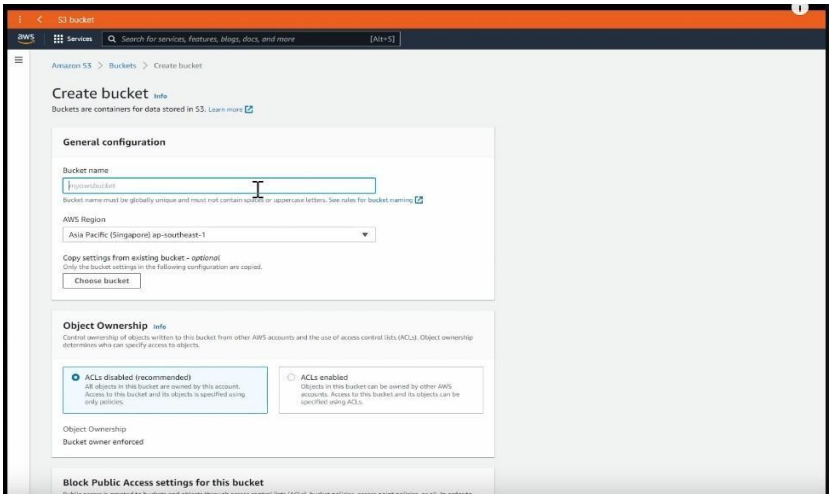


Figure 2. Create S3 Bucket

2. Uploading Files to an Amazon S3 Bucket:
   - Once the bucket is created, you can upload files to be used on the APTIKOM North Sumatra website (e.g., images, videos, static files).
   - Click on the bucket you created, select the Upload tab, and upload the desired files.

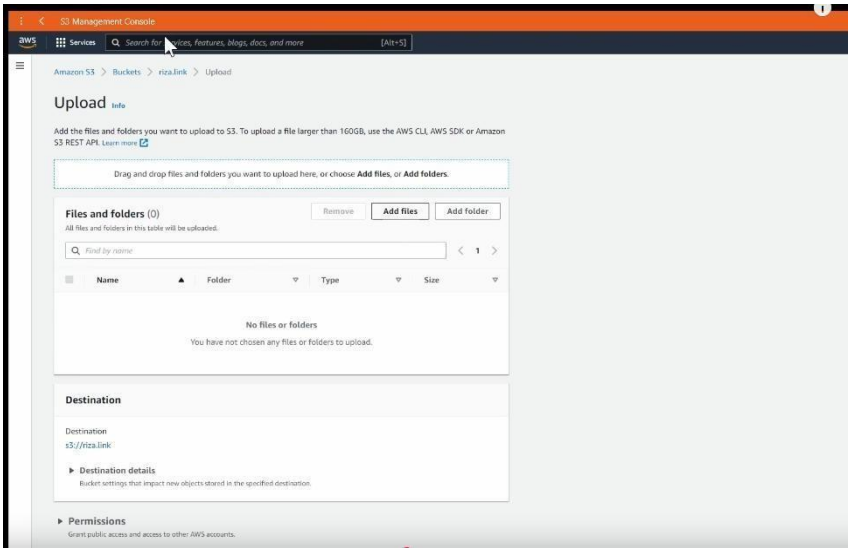


Figure 3. Uploading Files to an Amazon S3 Bucket

3. Creating a Public URL for File Access
   - Select the uploaded file, then select Actions, Make public to make the file publicly accessible via URL.
   - You can use the URL https://{bucket-name}.s3.amazonaws.com/{file-name} to access the file.

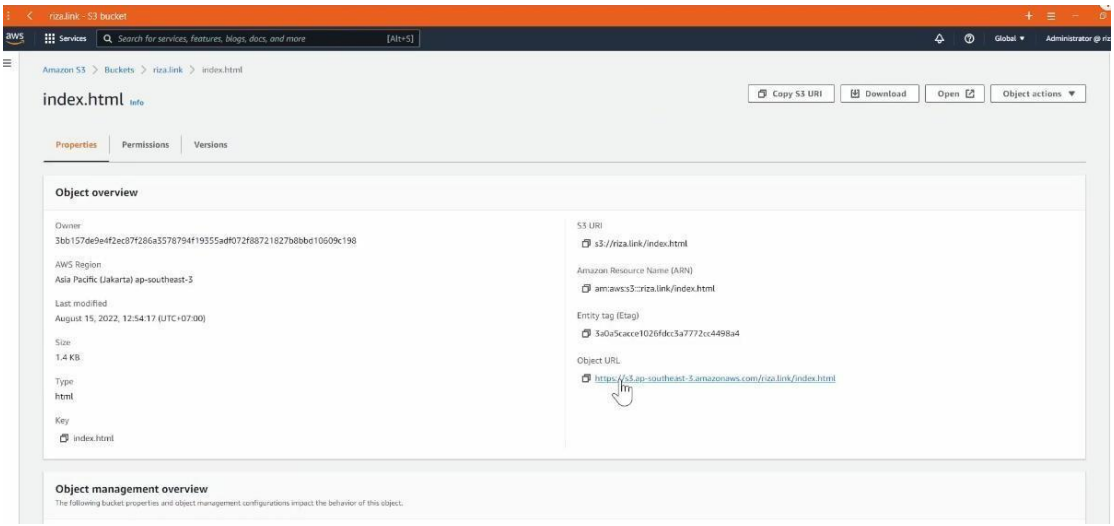


Figure 4. Creating Public URL

4. AWS EC2 Configuration for APTIKOM North Sumatra Website Cloud Hosting Server
   - Log in to the AWS Console
   - Create an EC2 Instance
   - Security Settings (Security Group)
   - Create and Download a Key Pair

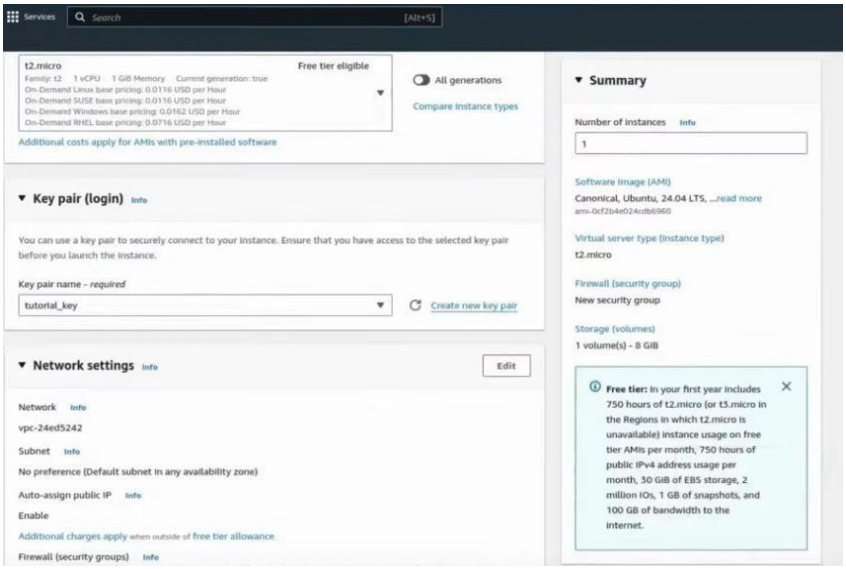


Figure 5. AWS EC2 Configuration

5. Configuring Aptikom Sumut's web access with an Amazon EC2 Instance:
   - Installing a Web Server (Apache or Nginx)
   - Copying Website Files to EC2
   - Configuring Domain and SSL (Optional)
   - Configuring Autoscaling and Load Balancer (Optional)

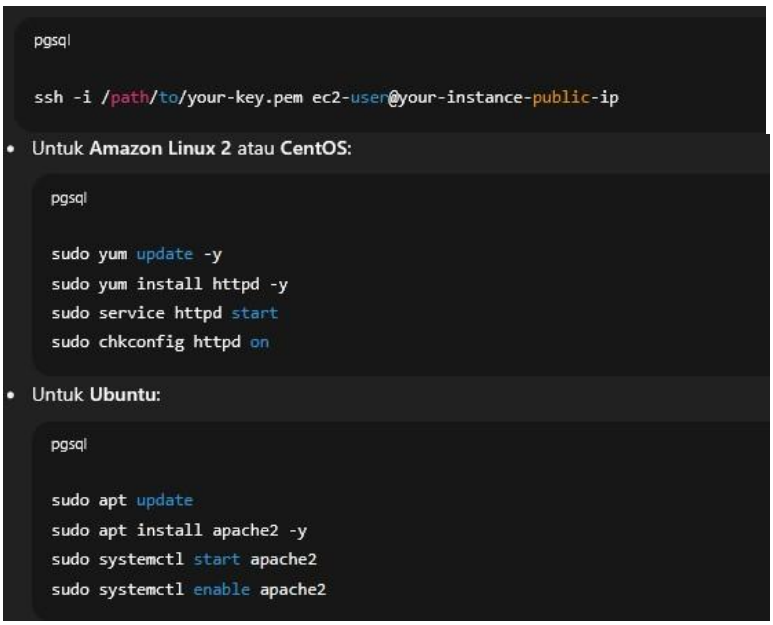


Figure 6. Aptikom Sumut AWS EC2 Instance Web Configuration

6. Testing of the North Sumatra Aptikom website

After completing the AWS S3 Bucket and AWS EC2 Instance configuration process, the next step is testing the Aptikom Sumut website. This testing phase aims to ensure that the source code designed by the programmer runs optimally. This ensures that all Aptikom Sumut website features function properly, and uploaded files can be stored in cloud storage. The following are the results of the Aptikom Sumut website hosting and cloud storage testing:



Figure 7. Aptikom North Sumatra Website Appearance

Conclusion

The Based on the design results for the Aptikom Sumut company profile website using the CodeIgniter framework, the following conclusions were reached AWS is an Efficient Solution for Hosting the Aptikom Sumut Website. Using Amazon EC2 for server hosting and Amazon S3 for data storage is an efficient and flexible solution for managing the APTIKOM Sumut website. AWS provides scalable, secure, and reliable services, enabling the website to operate at optimal performance and simplifying the management of static data such as images and videos.

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