

Cloud Computing Technology in the Development of Digital Libraries to Increase Literacy in Indonesia



Teknologi Komputasi Awan dalam Pengembangan Perpustakaan Digital untuk Meningkatkan Literasi di Indonesia

Lakuntara Pallahidu¹, Muhammad Iqbal², Juan Anthonio Salas³

S110003446@g.ksu.edu.tw¹, U18097019@ncku.edu.tw², S110003476@g.ksu.edu.tw³

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Corresponding Author:

Email: S110003446@g.ksu.edu.tw

Affiliation: Kun Shan University, No. 195, Kunda Rd, Yongkang District, Tainan City (710), Taiwan



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^{1,3} Kun Shan University, No. 195, Kunda Rd, Yongkang District, Tainan City (710), Taiwan

² National Cheng Kung University, No.1, University Rd, Tainan City, Taiwan

Abstract

Problem Statement: Cloud computing has the potential to increase literacy in Indonesia by enabling wider and more efficient access to sources of information through the creation of digital libraries that can be accessed anywhere and anytime.

Purpose: In this analysis we can understand how Indonesian digital libraries are doing right now and outlines the difficulties they confront in giving their users access to information and resources.

Method: This research is a descriptive qualitative research. Researchers chose to use this method because this research focuses on complex social phenomena, namely increasing literacy through the use of digital libraries supported by cloud processing technology.

Result: The advantages of cloud computing technology for digital libraries, such as improved accessibility, improved cooperation, and increased efficiency, are also covered in the article.

Conclusion: At the article's suggestions are made for using and implementing cloud computing technologies to increase literacy rates in Indonesia.

Keywords: Literacy; Digital Libraries; Cloud Computing

Abstrak

Permasalahan: Komputasi awan memiliki potensi untuk meningkatkan literasi di Indonesia dengan memungkinkan akses yang lebih luas dan efisien ke sumber informasi melalui pembuatan perpustakaan digital yang dapat diakses di mana saja dan kapan saja.

Tujuan: Dalam analisis ini kita dapat memahami bagaimana perpustakaan digital Indonesia saat ini dan menguraikan kesulitan yang mereka hadapi dalam memberikan akses informasi dan sumber daya kepada penggunaanya.

Metode: Penelitian ini merupakan penelitian kualitatif deskriptif. Peneliti memilih menggunakan metode ini karena penelitian ini berfokus pada fenomena sosial yang kompleks, yaitu peningkatan literasi melalui penggunaan perpustakaan digital yang didukung oleh teknologi pemrosesan awan.

Hasil: Keuntungan teknologi komputasi awan untuk perpustakaan digital ini seperti, peningkatan aksesibilitas, peningkatan kerja sama, dan peningkatan efisiensi.

Kesimpulan: Pada artikel tersebut diusulkan penggunaan dan implementasi teknologi komputasi awan untuk meningkatkan angka melek huruf di Indonesia.

Kata kunci: Literasi; Perpustakaan Digital; Komputasi Awan

I. INTRODUCTION

Background. The development of digital libraries in Indonesia has gained considerable importance in efforts to improve literacy rates and enhance access to knowledge and information nationwide (Sari & Sabardila, 2021). However, the establishment of these digital libraries face numerous challenges, including a shortage of trained personnel, insufficient resources, and limited funding (Perdana & Prasajo, 2020). As a result, a significant digital divide persists between urban and rural areas of Indonesia, depriving many individuals of the opportunity to utilize digital tools and access valuable information (Rafiq, et al, 2021).

By offering a scalable and economical way to store, manage, and deliver digital content to library users, cloud computing technology offers the potential to address many of these issues. By allowing users to access resources from any location with an internet connection and lowering the need for expensive infrastructure and skilled employees, cloud computing technology can help to increase the accessibility of digital libraries. Moreover, libraries, researchers, and other stakeholders may collaborate more effectively with the use of cloud computing technologies, which may ultimately increase research and innovation (Al-Samarraie, & Saeed, 2018).

In order to raise literacy rates specifically, this journal article aims to investigate the possibilities of cloud computing technology in the creation of digital libraries in Indonesia. The essay attempts to offer insights into how cloud computing technology might assist to overcome these issues and increase access to digital materials and information for all Indonesians by reviewing the current condition of digital libraries in Indonesia and highlighting the challenges they face.

Problem. In addition to the country's current literacy issue, libraries' book collections are difficult to access (Husna, 2020). This is particularly true in rural places where the number of libraries and resources is frequently very small. Libraries lack resources for a variety of reasons, including low funding and poor infrastructure. Many rural libraries lack the equipment required to stock a broad selection of books and educational resources. Also, it is frequently difficult to find trained librarians who can efficiently run the libraries and help the locals (Revina & Nihayah, 2020).

The Indonesian government has initiated a number of programs to increase access to books and educational materials in order to address these problems. Creating mobile libraries, expanding public library financing, and promoting digital libraries are a few examples of how to do this. A number of non-governmental groups and charities have also started programs to increase rural residents access to literature. Notwithstanding these initiatives, there is still more to be done to guarantee that all Indonesians have access to resources and high-quality education. Government spending on resources and education for all communities must not stop, particularly those in rural areas. So, this needs to be changed, specifically the creation of digital libraries using cloud computing technologies.

The development of digital libraries via cloud computing technology is one potential response to the problem of restricted access to educational resources. Digital libraries can give people in rural and isolated places simple access to a variety of educational materials, including books, scholarly journals, and research papers, by utilizing the power of the internet and cloud computing. A cost-effective answer to the issue of

constrained access to educational resources can be found in digital libraries. Without having to worry about the cost of actual books or travel to a real library, users of a digital library can access content from any location with an internet connection.

Previous Literature Review. This journal was inspired by several previous research. The first research about Cloud Computing and Digital Libraries was done by Reddy T. Raghunadha entitled "Digital Era: Utilize of Cloud Computing Technology in the Digital Library". The research stated cloud computing can bring about strategic, transformation, and even revolutionary benefits fundamental to digital libraries (Reddy T. Raghunadha, 2012). The other research is entitled Cloud Computing and Digital Libraries: A Review" by Karunakar Karegowda and Shalini R. Urs (2015). The highlight point of this research is the potential benefits of utilizing cloud computing technologies to create digital libraries, which can increase access to educational materials and promote high-quality education for all Indonesians, particularly those in rural areas.

State of the Art. This research is interesting because with cloud computing, data, and applications are stored on remote servers so users can access them from anywhere with an internet connection. In a digital library, this means users can access collections of books and other resources anytime and anywhere.

Purpose. This research aims to analyze the use of cloud computing in developing digital libraries so that it is expected to be able to increase literacy interest in Indonesia.

II. METHOD

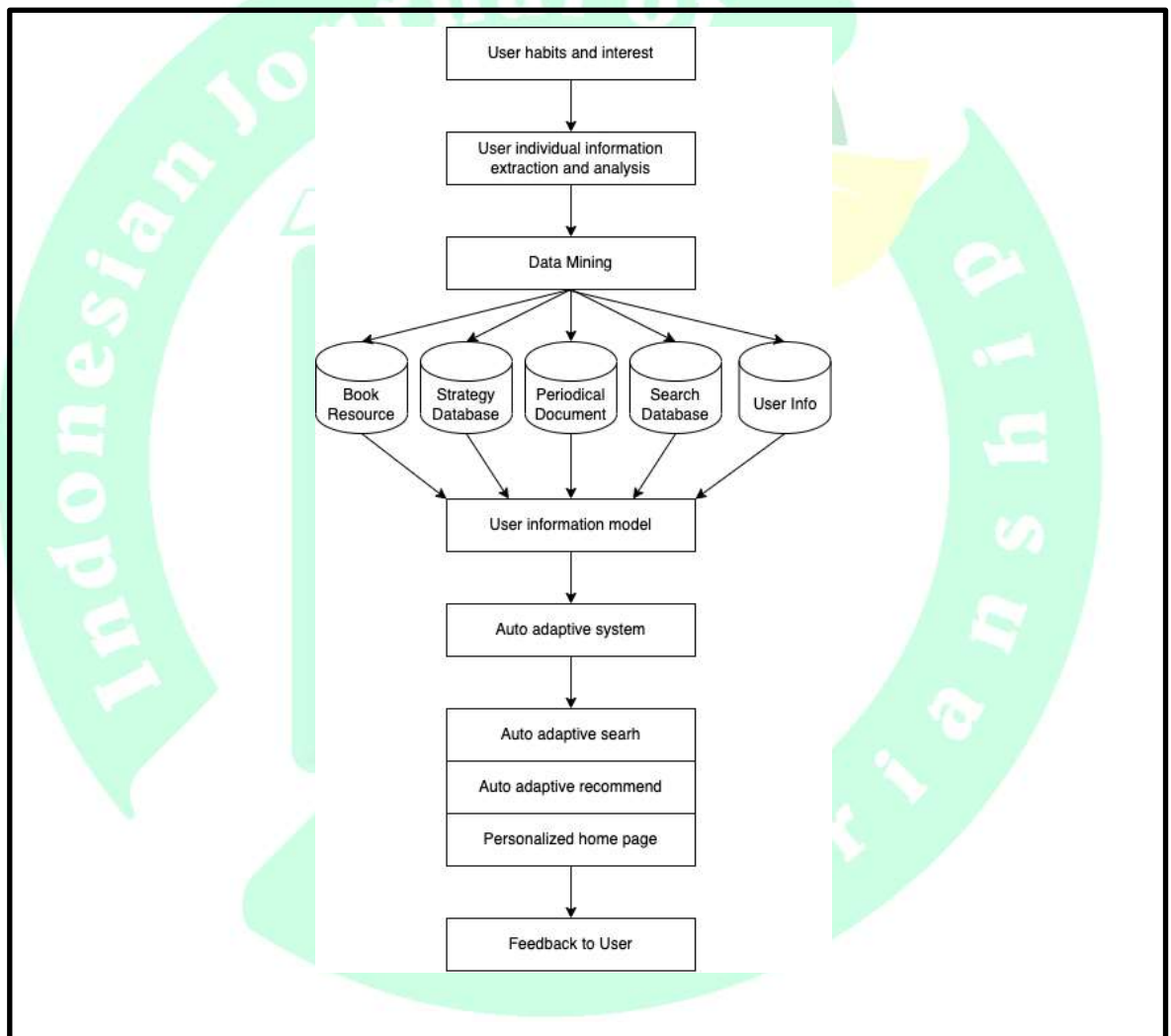
This research is a descriptive qualitative study, which was conducted to delineate the problem under investigation and to integrate the data objectively within the research site. Descriptive qualitative research is a problem formulation that guides the research to explore or portray the social situation under scrutiny in a comprehensive and in-depth manner. Researchers choose to use this method because this research focuses on a complex social phenomenon, which is the increase in literacy using digital libraries supported by cloud computing technology. Qualitative research allows researchers to understand this phenomenon in its natural and profound context. The type of data used in this study is secondary data obtained from the results of literature studies that can support and complete research analysis materials. The collected data are then sorted in order to answer research problems.

III. RESULT AND DISCUSSION

Digital Library Overview. The construction of a digital library offers a number of challenges, including the use of intelligent active technology, which means that services are no longer entirely passive for users and are instead actively provided in accordance with their historical needs and preferences. This significantly increases user interaction with the library. The active service of the digital library is implemented by the researched adaptive system, which takes into account user differences and implements adaptive push in accordance with various users. The adaptive system structure of the digital library is shown in Figure 1. The adaptive system can significantly improve the user experience of the digital library by providing users with resources that are relevant to their interests. This can increase user engagement and improve the overall effectiveness of the digital library. In addition to the adaptive system, there are a number of other challenges that must be addressed in the construction of a digital library. These

challenges include the need to collect and organize a large amount of digital content, the need to provide users with easy and efficient access to digital content, and the need to protect digital content from unauthorized access and use. Adaptive systems are very important to digital libraries because they can help to improve the user experience in a number of ways. Adaptive systems can play a significant role in improving the user experience of digital libraries. By personalizing the experience, improving search results, providing recommendations, and collecting feedback, adaptive systems can help to make digital libraries more relevant, engaging, and user-friendly.

Figure 1.
System Structure of Digital Library



Source: Research Data, 2023

An auto-adaptive system is an intelligent system that can adapt to different situations and environments. In the context of cloud computing and digital library development, an auto-adaptive system refers to an automated system that can adjust itself to improve the performance, scalability, and reliability of your digital library.

When developing a digital library, an auto-adaptive system can help in many ways. For example, it can monitor library usage patterns and automatically adjust resources and infrastructure to meet demand. You can also automatically scale your resources during peak usage to keep your library available and responsive to your users.

An auto-adaptive system can analyze the usage data to identify patterns and trends, which can be used to improve the user experience, enhance search functionality, and personalize content delivery. This can lead to a more engaging and satisfying user experience, which in turn can increase user adoption and retention. The system can help digital libraries to be more efficient, scalable, and responsive to user needs. By leveraging the power of cloud computing and intelligent systems, digital libraries can offer a more dynamic and personalized experience to users, while also reducing costs and improving operational efficiency.

Table 1.
Types of Data that Can be Included in Cloud Computing in Digital Library Development

Number	Data Type	Detail
1	Digital Book Data	Digital book data can be stored in cloud computing, so that it can be accessed by users from various locations and devices. Digital books can also be stored in various formats, such as PDF, ePub, etc.
2	Book Catalog Data	Book catalog data such as title, author, publisher, and ISBN number can be stored in cloud computing. This allows users to search and find books easily.
3	Book Borrowing Data	Book borrowing data, such as borrowing date, return date, and borrower's identity, can be stored in cloud computing. This allows librarians to manage lending more efficiently.
4	Statistical Data	Statistical data such as the number of loans and the popularity of books can be stored in cloud computing. This can help library managers to monitor and optimize their book collections.
5	Multimedia Data	Multimedia data such as video, audio and images can be stored in cloud computing. This can help users to access and use multimedia resources more easily and quickly.
6	User Interaction Data	User interaction data such as ratings, reviews and comments can be stored in cloud computing. This can help library managers to monitor and improve the quality of their services.
7	System activity log data	System activity log data such as user activity and system failure can be stored in cloud computing. This can help librarians to monitor system performance and quickly resolve issues.
8	Metadata Data	Metadata data such as book descriptions, tags, and categories can be stored in cloud computing. This can help users find books more easily and accurately.

Source: Research Data, 2023

In developing a digital library, all data are linked and interacted with each other. The relationships between the aforementioned data and their resulting effects are: Data about the e-book collection, this data is a collection of e-books stored in cloud computing. This data allows users to access and read e-books anytime, anywhere; Loan transaction data, this data records a user's e-book lending transactions. Using this data, the system can monitor borrowed books, return periods, and number of available books; User activity data, this data captures user activity in the digital library, such as books read, attendance, and reading preferences. Using this data, the system can recommend reading and identify user needs; Metadata data, this data includes information about the e-book, such as title, author, and description. With this data, users can easily find and select the desired book.

All this data is linked and interacts with each other to positively influence the development of the digital library. A collection of e-book data and metadata makes it easy for users to find and read the desired e-books. Loan transaction data and user activity help the system manage e-book loans and make reading recommendations based on user preferences. All this data is stored in the cloud on her computing, so users can access it anytime, anywhere without worrying about storage space on their personal devices.

Library book collections are difficult to access due to the country's current literacy issue. This is particularly true in rural places where the number of libraries and resources is frequently very small. Libraries lack resources for a variety of reasons, including low funding and poor infrastructure. Many rural libraries lack the equipment required to stock a broad selection of books and educational resources. Also, it is frequently difficult to find trained librarians who can efficiently run the libraries and help the locals.

Indonesia Literacy Overview. According to a recent report by Indonesia's Central Bureau of Statistics (BPS), Indonesia's literacy rate was 98.6% in 2019. This means that the majority of the population of Indonesia can read and write. However, the report also shows that the literacy rate among 15- to 24-year-olds is below the national average, which may indicate a downward trend in literacy among younger generations.

Additionally, a 2020 study conducted by the National Library of Indonesia found a large gap between urban and rural literacy rates in Indonesia. According to the survey, only 34.4% of rural residents had access to books and reading materials, whereas 70.9% of urban residents had him. This suggests that more efforts are needed to improve access to reading materials in rural areas.

The literacy rate in Indonesia has been improving over the years but still faces various challenges that hinder its growth. Some of the reasons why the literacy rate in Indonesia has not improved significantly are: Lack of Access to Education, Many children in Indonesia do not have access to education due to economic or geographical barriers. According to UNICEF, around 2 million children in Indonesia do not go to school. The lack of access to education limits their opportunities for learning and literacy; Poor Quality of Education, Even for those who attend school, the quality of education is often poor. The lack of qualified teachers, adequate facilities, and resources hinders students' ability to learn and develop literacy skills; High Drop-Out Rates, Many students drop out of school due to various reasons, including poverty, early marriage, and lack of interest in education. The high drop-out rates contribute to the low literacy rate in Indonesia;

Limited Literacy Programs, There are limited programs and resources dedicated to promoting literacy in Indonesia. The government and non-governmental organizations need to invest more in literacy programs to improve the literacy rate in the country.

Correlation Between Cloud Computing and Increased Literacy. Cloud computing is a technology that allows data to be stored and accessed over the Internet. Literacy, on the other hand, refers to the ability to understand, use, analyze and evaluate information from various media. Adoption of cloud computing is still relatively low in Indonesia, especially among the general public and small and medium enterprises (SMEs). This is due to a lack of understanding of this technology and how to use it effectively.

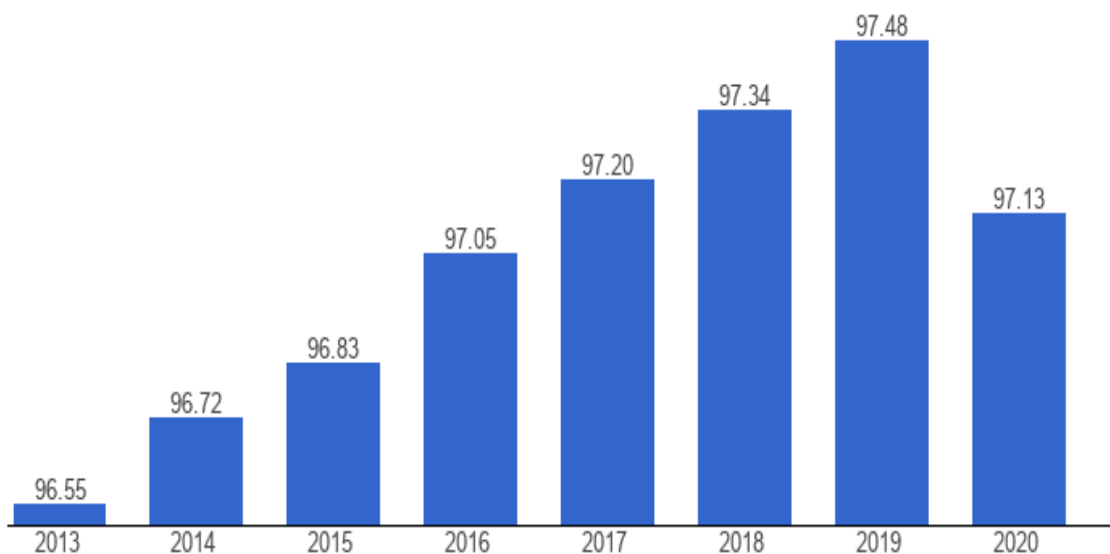
Increasing cloud computing knowledge in Indonesia requires education and training efforts so that the community and SMEs understand the benefits, safety, and risks of this technology. In addition, we also need government and industry support to provide infrastructure and services to support the development of cloud computing in Indonesia.

By increasing their knowledge of cloud computing, Indonesian communities and SMEs can use this technology more effectively to expand their business reach, streamline operations, and improve efficiency and productivity. is expected. This can also promote Indonesia's economic growth and innovation, but when we look in the mirror from other countries like Singapore, this is very different.

Singapore is one of the countries that has succeeded in increasing its technology proficiency by embracing cloud computing. The Singapore government has launched various programs and initiatives to improve technology literacy, including cloud computing training and certification programs.

Cloud computing training and certification programs in Singapore are run by various agencies such as the Singapore Computer Society (SCS), Info-communications Media Development Authority (IMDA) and Microsoft. These training programs offer a wide range of courses and certifications, from beginner to advanced, and are designed to meet the needs of businesses and workers in a wide variety of sectors.

Figure 2.
Singapore Literacy Rate



Source: Macrotrends Data, 2023

In addition to training programs, the Singapore government has also launched various initiatives to promote the adoption of cloud computing in enterprises. For example, the Productivity Solutions Grant (PSG) program provides grants for small businesses to purchase and deploy cloud computing solutions into their operations. Additionally, the Singapore government is investing in developing cloud computing infrastructure and services as part of the Smart Nation Initiative project.

With the proliferation of cloud computing technology, Singapore has successfully increased technology literacy among the general public and business community and accelerated economic growth through the use of information technology. In addition, Singapore is considered one of the countries with ample availability of cloud computing infrastructure and high quality talent in the technology sector.

In addition to the strategies above, there are other ways Indonesia is using cloud computing to improve technology literacy. Governments can work with the private sector to develop digital literacy programs that incorporate cloud computing as a core component. These programs can be designed to target specific groups, such as college students, women, and rural communities, and provide hands-on training in cloud computing tools and applications.

In Indonesia, cloud computing can also be used to improve public service delivery and increase government efficiency. By moving government services to the cloud, governments can streamline processes, reduce paperwork, and improve access to services. This will not only improve the quality of services, but also increase the public's trust in the government.

Additionally, Indonesia can leverage cloud computing to build a robust digital economy. By enabling the development of cloud-based applications and services, Indonesia can create new business opportunities, attract foreign investment and create employment opportunities. This benefits not only the technology sector, but also other sectors that rely on technology to thrive and compete globally.

In summary, Indonesia has the potential to improve technology literacy through adoption of cloud computing and reap the benefits of a digitized economy. Develop a comprehensive strategy focused on training and certification programs to drive adoption, invest in infrastructure, foster innovation, use the cloud to improve public services, and create the digital economy. , Indonesia can accelerate its digital transformation efforts and achieve its goals. A tech-savvy country.

IV. CONCLUSION

Cloud computing technology has the potential to play a significant role in the development of digital libraries in Indonesia and increase literacy rates in the country. By leveraging cloud computing infrastructure and services, libraries can offer digital resources to a wider audience, improve accessibility, and enhance the learning experience. Furthermore, cloud computing technology can enable libraries to digitize physical collections, preserve rare materials, and provide advanced search and retrieval capabilities.

To fully realize the potential of cloud computing technology in the development of digital libraries, Indonesia needs to develop a comprehensive strategy that focuses on

infrastructure development, training and certification programs, content digitization, and collaboration among stakeholders. By investing in cloud computing infrastructure and training librarians on cloud computing tools and applications, Indonesia can increase technology literacy in the library community and enhance digital library services. In addition to the library community, cloud computing technology can also benefit other sectors such as education, business, and government. The adoption of cloud computing improves access to digital resources, increases efficiency, and fosters innovation. Therefore, Indonesia should also focus on promoting the adoption of cloud computing technologies across all sectors to boost technology literacy and boost economic growth.

Overall, cloud computing technology has the potential to transform Indonesia's digital library development and boost the country's literacy rate. With the right strategy and implementation, Indonesia can leverage cloud computing technologies to accelerate its digital transformation efforts and achieve its goal of becoming a tech-savvy country.

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