Implementation of Cloud Computing Technology in Management Information System Developmentat STKIP Yayasan Abdi Pendidikan Payakumbuh

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ABSTRACT

In the development of information technology, many universities are starting to recognize the need for sophisticated and integrated information systems to overcome various administrative and academic challenges. The need for data storage capacity has become very important, especially in today's digital era. One of the technologies that become a major issue in improving data management and accessibility is cloud computing technology. This type of research is library research. A literature study is a series of activities related to library study for gathering information, reading and taking notes, as well as managing research materials. The use of technology infrastructure and cloud computing information systems at STKIP ABDI Payakumbuh includes four main systems, namely academic information systems, integrated information systems, library servers, website servers, and Learning Management System (LMS). The use of cloud computing at STKIP ABDI Pendidikan Payakumbuh has several advantages, including the management of educational services becomes more effective and efficient, the learning system being carried out online and offline, a center for educational services, quality assurance is more improved and reliable, it makes it easier to carry out evaluations, lecturer performance reports and reporting to Pangkalan Data Pendidikan Tinggi (PDDIKTI), the entire academic community gets excellent service, especially internet access, makes it easier for the public to monitor educational activities at STKIP ABDI Pendidikan. The application of Cloud Computing at the STKIP ABDI Pendidikan Payakumbuh educational institution has been able to improve academic services for the entire academic community at STKIP ABDI Pendidikan Payakumbuh.

Keywords: Implementation, Cloud Computing, Management Information System, STKIP Yayasan Abdi Pendidikan Payakumbuh.

INTRODUCTION

Higher education is a complex entity with several administrative and management processes involving large and varied data and information. Effective data management is the key to optimizing higher education operations, from student admissions, and financial management, to efficient educational services. As information technology develops, many universities are starting to recognize the need for more sophisticated and integrated information systems to overcome various administrative and academic challenges. The need for data storage capacity has become very important, especially in today's digital era (Windiarti & Miftahurrizqi, 2022). One of the technology that has become a major concern in improving data management and accessibility is cloud computing technology.

Cloud computing enables more efficient storage, management, and distribution of data by providing internet-based services that are scalable, flexible, and affordable (Shukur et al, 2020). This eliminates the need for expensive physical infrastructure, making it an attractive solution for universities looking to upgrade their information systems. Cloud Computing is an internet technology as a data management center that allows it to be accessed anywhere and at any time (Sunyev, 2020). However, although the potential of cloud computing in improving higher education data management is enormous, there has not been much research that comprehensively documents its implementation and impact. Therefore, there is an urgent need to evaluate how cloud computing technology can be integrated into higher education management information systems and the extent to which this can improve efficiency, data accessibility, and decision-making capabilities according to needs (Alam, 2021). Utilization of cloud computing technology allows computer network services and computing scale to be changed dynamically. According to Ginting (2018), users do not need to sacrifice their resources because service providers have provided all the resources (software, platform, and infrastructure) in cloud computing. Storage media, networks, and software are components of the cloud computing model This computing means it can be accessed anywhere and at any time as long as the network is connected to the internet (Helal et al., 1999).

The development of cloud computing systems helps educational institutions in higher education to process data such as online KRS systems, online learning, mall servers, and campus portals. Likewise, STKIP ABDI Payakumbuh Foundation will also utilize cloud computing in running an online information system on campus. The campus, which is located on Jalan M. Yamin Payakumbuh, has 1,800 students with 5 study programs, most of which have been accredited from assessments carried out by the National Accreditation Body for Higher Education (BAN-PT), Abdi Negara Foundation Teacher Training and Education College. or what is usually called SKTIP Abdi Education Foundation is one of the favorite campuses for prospective new students in the city of Payakumbuh. With a student population of more than 1000 people and very busy teaching and learning activities, it certainly requires information management that is accurate, accountable, and easy to access. Therefore, STKIP ABDI Education requires a cloud computing-based computer network system to provide academic services on campus. currently STKIP ABDI Education Although it still relies on very sophisticated physical servers, IT management and information systems still depend on additional resources such as electricity, maintenance, and room facilities such as air conditioning. This initial condition requires assessment before implementing the cloud computing infrastructure that has begun to be used. Apart from the problem of increasing storage space requirements, there is also a need for a service that can ensure data security. Data recovery includes the ease of getting access to data anytime and anywhere (Driptufany et al., 2017).

The development of a cloud computing system can help campuses provide information, data and grade management, online learning processes, and academic reporting. Academic activities can be controlled remotely via mobile devices, cellphones, or computers with the help of cloud computing which is connected to a control system (automation system) (Al Fatta & Marco, 2015). The background of this research is to explore the implementation of cloud computing in the development of management information systems at STKIP ABDI Pendidikan with a focus on the role of this technology in improving operational efficiency, data accessibility, security, and scalability.

LITERATURE REVIEW

2.1 Definition of Cloud Computing

Cloud Computing is an information technology service that users can use and access via digital devices and internet support. Cloud Computing known as cloud computing is a new computing paradigm that is a combination of computer and Internet technology, allowing access to data stored on servers and virtual services from different locations on-demand availability, ease of control, and dynamic and almost unlimited scalability are some of the important attributes of Cloud Computing. Apart from that, Cloud computing can provide unlimited services for computer users to access applications without being limited by time, location, and distance. There are three main categories of cloud computing, namely Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). Software as a Service (SaaS) is an evolution of the ASP (Application Service Provider) concept (Goyal, 2023). As the name suggests, SaaS allows users to use software resources easily with a subscription. Therefore, there is no need to invest in internal development or purchase licenses. Technically, this application model uses a web interface that can be accessed via a web browser. An example of this SaaS is Google's Google Docs, which is office software similar to Microsoft Word. By using Google Docs we can process documents without having to install Microsoft Office such as Microsoft Word. SaaS is a cloud computing application model aimed at individual users.

Platform as a Service (PaaS) is a service that provides modules that can be used to develop applications. PaaS services provide data storage services and deploy applications without being influenced by the number of processors or memory. Apart from that, this service can be used to access data, authentication and payments (Wang et al., 2015). One example of a PaaS service is Google AppEngine and web application hosting. Infrastructure as a Service (IaaS) is a basic information technology resource rental service that includes storage media, processing power, memory, operating system, network capacity, etc. IaaS is one level lower than PaaS. This service also offers a virtual server that can be used in several operating systems and software devices and has communication data storage. An example of an IaaS service is Amazon where users get the right to carry out various activities on the server such as installing software, configuring permissions, and firewalls. In the cloud computing design, internet services are provided that have control over the existing infrastructure. There are three forms of infrastructure, namely infrastructure, platforms, and applications. These three services require a web browser and program interface to activate them.
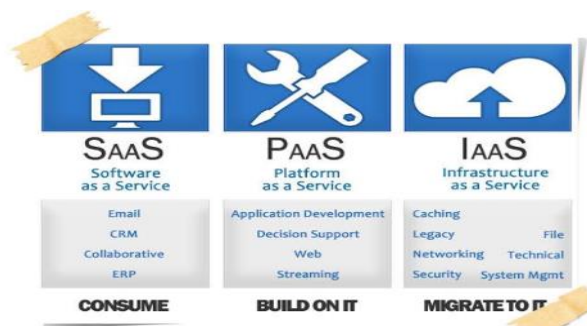

Figure 1. Platform as Service cloud computing

Some of the advantages of cloud computing compared to conventional servers are: 1) Viewed from service users, cloud computing is high capacity computing, but is a server connected to a LAN/WAN network; 2) In cloud computing, there are no limitations on processor capacity, data storage, or memory; 3) Ideally there is no limit to the number of "host" servers running on it; and 4) If resources are needed in the form of data storage, memory or storage, it can be done in a fairly short time, namely just a few minutes or hours. One form of data storage service mechanism where the data can be easily accessed in various places is called Cloud Storage. The cloud storage concept is the same as a file server where cloud storage provides device management to the computing service provider (Lenawati & Mumlahana, 2018).

According to Mell & Grance (2011) Cloud Computing has five characteristics, namely: 1) the service is on-demand self-service, that is, customers can find capabilities automatically without interacting with the service provider; 2) Broad Network Access, has very wide network access with various platform standards; 3) Resource Polling, centralized data sources in one location using a multi-tenant model; 4) Rapid Elasticity, fast resource elasticity by providing and reducing resources according to customer needs; and 5) Measured Service, measurable services, cloud computing automatically control and optimize resources by increasing measurement at the level of abrasion according to the type of service. Data centers have become a necessity such as web hosting, applications, e-commerce sites, etc. Data centers are capable of connecting multiple servers in a dedicated network architecture. This is different from conventional data centers which use just one server to run just one application (Rong et al., 2016).

2.2 Benefits of Cloud Computing for the World of Education

Cloud computing technology is very important for education, especially in academic activities. One of the advantages of using cloud computing in the education sector is accessibility, which means data can be accessed anytime and anywhere as long as it is connected to the Internet network. In addition, the scalability of cloud computing can increase data storage capacity without the need to purchase additional devices such as hard disks. Security ensures that existing data stored in the cloud is safe in the case of natural disasters. Data in the cloud will remain safe even if the device's hard drive or hardware fails.
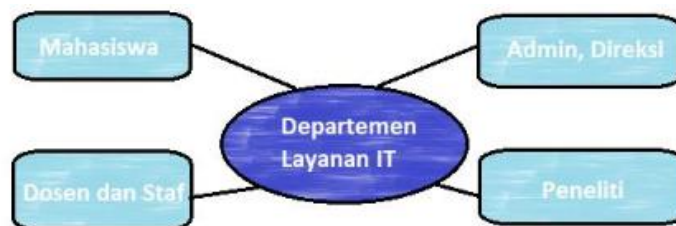

Figure 2. Cloud Computing Service User Structure at STKIP ABDI Education

Important factors that determine the success of implementing cloud computing are 1) Security: everyone can access cloud applications if the application is on the cloud provider's server and educational institutions can access it via the Internet. These global application security vulnerabilities are impenetrable to hackers and intruders; 2)

Performance, meaning that resources are located further from the user compared to traditional centralized systems. This can disrupt performance unless managed on the internal server itself; and 3) Governance compliance, not yet fully supported by regulations. For important matters such as banking operations, the bank must have its server and be located in the bank area. In contrast to institutions that provide primary and secondary education with minimal infrastructure, they can use the services of computing providers. In large educational institutions such as universities, they should manage servers.

Important factors that must be considered in implementing cloud computing are 1) Security, users of this service must provide security to avoid hackers or intruders penetrating application security gaps; 2) Performance, namely the resources placed at the user's disposal; 3) Governance compliance, supporting devices cloud computing which is placed in the server area is run; and 4) financial, cloud computing financing is calculated as fixed costs and variable costs.

2.3 Implementation of cloud computing at STKIP Yayasan Abdi Pendidikan Payakumbuh

The use of technology infrastructure and cloud computing information systems at STKIP ABDI Payakumbuh includes four main systems, namely: 1) Academic information system; 2) Integrated information system; 3) Library server; and 4) Website server and LMS. The Academic Information System (SIAKAD) which is the spearhead of all academic activities at STKIP ABDI Education includes student registration, student grade system, PDDIKTI reporting, and online learning tools. The integrated information system contains personnel systems, financial systems, quality assurance, higher education access management, and internal SIMLIKTAMAS. Furthermore, the library server includes 4 important things that are provided, such as 1) InlisLITe, which is an open-source library tool and can be used by the entire academic community; 2) OPAC (Online Public Access Catalog) is an online catalog that can be accessed by all students and lecturers; 3) digital books are library facilities that provide internal books written by lecturers in digital format; and 4) Repository, namely a database of research results in the form of scientific journals and other scientific works written by STKIP ABDI Pendidikan lecturers. Currently, the website server and LMS can be accessed openly by the public to find out about the vision and mission, academic activities, and the latest information from various campus activities, however, currently using the LMS system, this server is still a physical server and is only used in the short term. This server is still being refined so that it can later be used to assist the learning process at the STKIP campus of the Abdi Education Payakumbuh Foundation.

The use of cloud computing at STKIP ABDI Pendidikan has several advantages, including 1) management of education services becomes more effective. the learning system can be carried out online and offline; 2) as a center for quality education services, quality assurance is more improved and reliable; 3) makes it easier to carry out evaluations, lecturer performance reports, and reporting to PDDIKTI; 4) The entire academic community gets excellent service, especially internet access; 5) Make it easier for the public to monitor educational activities at STKIP ABDI; 6) Effectiveness of obtaining learning resources from journals and scientific works, both national and international journals; and 7) Collaboration and sharing of e-learning between institutions is going well which has an impact on improving campus quality.
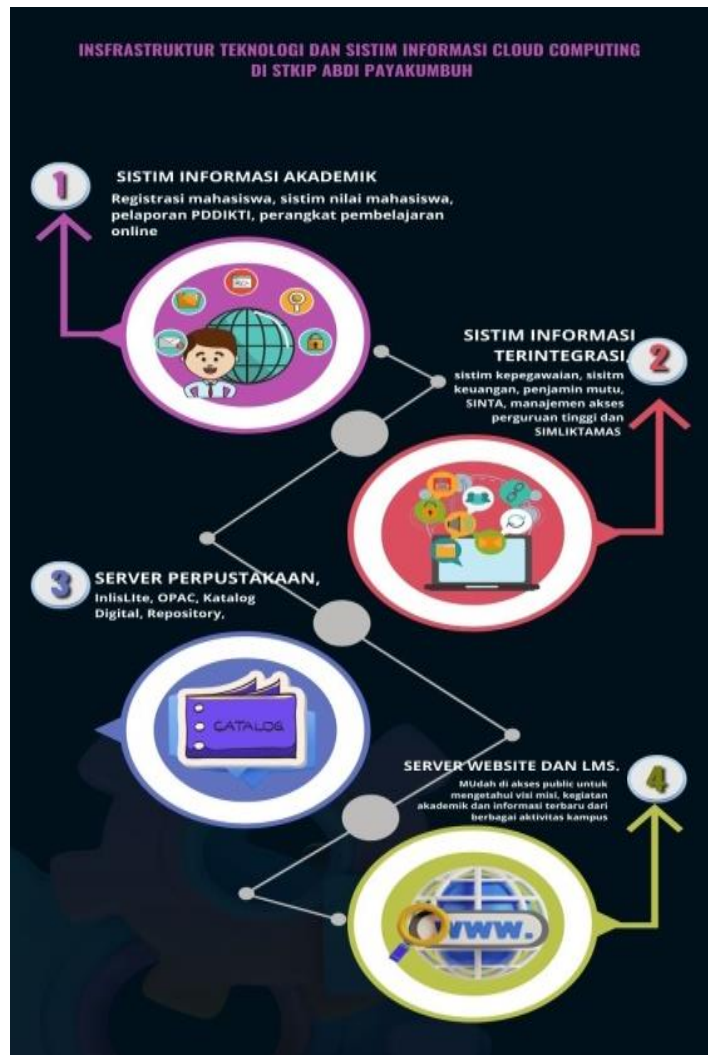
Figure 3. Service of Cloud Computing at STKIP Yayasan Abdi Pendidikan Payakumbuh

CONCLUSIONS

The application of Cloud Computing at the STKIP educational institution Abdi Education Payakumbuh Foundation is important. In the education sector, the use of cloud-based technology can increase efficiency and effectiveness. a stable and reliable system and reduces operational costs. The implementation of technological infrastructure and information systems has been able to improve academic services for the entire academic community at STKIP Abdi Education Foundation Payakumbuh. Cloud computing technology which continues to develop has helped the learning system run very effectively and resolved various problems related to improving the quality of higher education. Students and lecturers have the convenience of users in accessing data online because it is managed directly by the institution, supported by the availability of a network within the campus environment.

REFERENCES

Alam, T. (2020). Cloud Computing and its role in the Information Technology. *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, *1*(2), 108-115.

Al Fatta, H., & Marco, R. (2015). Analisis pengembangan dan perancangan sistem informasi akademik smart berbasis cloud computing pada sekolah menengah umum negeri (smun) di daerah istimewa yogyakarta. *Telematika*, *8*(2).

Driptufany, D. M., Umar, I., Dewata, I., Fajrin, F., Putra, A., Arman, A., ... & Yusran, R. (2021). Model Peningkatan Pendapatan Nelayan Melalui Industri Pengolahan Abon Ikan dengan Sistem Dinamik di Pasie Nan Tigo-Padang. *Jurnal Kependudukan dan Pembangunan Lingkungan*, *2*(1), 68-77.

Goyal, S. (2013). Software as a service, platform as a service, infrastructure as a service− a review. *International journal of Computer Science & Network Solutions*, *1*(3), 53-67.

Helal, A. A., Haskell, B., Carter, J. L., Brice, R., Woelk, D., & Rusinkiewicz, M. (1999). *Any time, anywhere computing: Mobile computing concepts and technology* (Vol. 522). Springer Science & Business Media.

Lenawati, M., & Mumtahana, H. A. (2018). Penerapan Cloud Storage Dalam Perkuliahan Fakultas Teknik Universitas Pgri Madiun. *Res. Comput. Inf. Syst. Technol. Manag*, *1*(2), 55.

Mell, P., & Grance, T. (2011). The NIST definition of cloud computing.

Shukur, H., Zeebaree, S. R., Ahmed, A. J., Zebari, R. R., Ahmed, O., Tahir, B. S. A., & Sadeeq, M. A. (2020). A state of art survey for concurrent computation and clustering of parallel computing for distributed systems. *Journal of Applied Science and Technology Trends*, *1*(4), 148-154.

Sunyaev, A., & Sunyaev, A. (2020). *Internet computing* (pp. 237-264). New York, NY, USA:: Springer International Publishing.

Rong, H., Zhang, H., Xiao, S., Li, C., & Hu, C. (2016). Optimizing energy consumption for data centers. *Renewable and Sustainable Energy Reviews*, *58*, 674-691.

Wang, H., Cao, J., & Zhang, Y. (2005). A flexible payment scheme and its role-based access control. *IEEE Transactions on knowledge and Data Engineering*, *17*(3), 425-436.

Windiarti, I. S., & Miftahurrizqi, M. (2022). Perencanaan Implementasi Komputasi Awan Pada Infrastruktur Teknologi dan Sistem Informasi di UMPR: Implementation Of Cloud Computing Planning in Technology and Information Systems Infrastructure at Muhammadiyah University of Palangkaraya. *Jurnal Sains Komputer dan Teknologi Informasi*, *4*(2), 59-64.