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CLOUD COMPUTING BASED ONLINE LEARNING FOR STUDENTS VOCATIONAL EDUCATION (D-3) ELECTRONIC ENGINEERING DEPARTMENT ABSTRACT : The last few years the concept of Cloud Computing is already a lot of interest of industry and education. Cloud-based solution seems to be the key for IT organizations who have a problem of budget constraints. Cloud Computing is a new paradigm in distributed computing presents many ideas, concepts, technologies, and the type of architecture that served as a service-oriented.

According to Foster Cloud Computing is a "paradigm of distributed computing on a large scale are motivated by economic factors, which contains a set of virtualization abstract, dynamic scalability, setting the computing power, storage, platforms and services that can be accessed in accordance with the requirements by external customers through the Internet "(Foster et al., 2008).

Objectives to be achieved in this research are: 1) To know how to develop online learning model based on cloud computing (cloud computing) for vocational education students (D-3) FT UNM's department of electronics engineering; 2) To know how to design online learning model based on cloud computing (cloud computing) for vocational education students (D-3) FT UNM's department of electronics engineering; 3) To know the result of the development of online learning based on cloud computing (cloud computing) for vocational education students (D-3) department of electronics engineering FT UNM may meet the criteria for a valid, practical, and effective.

The method used in this research is the development of research methods (Research & Development), which focuses on online learning based on cloud computing (cloud computing). Students today can not live away from the Internet. Through programs such

as facebook, twitter, instagram, and gmail, students are accustomed to using cloud-based technology services (Ercan, 2010).

Therefore, the students hope to be able to access digital technology services on campus anywhere and anytime, including cloud services that support social media. Likewise, vocational students who are currently in the industry are already using advanced technology. So should students have to understand the process and the system.

Besides, in the learning process also greatly contribute to improving student achievement, especially in the learning lab. Thus researchers are interested in developing research to develop an existing model into a new model in online learning based on cloud computing (cloud computing). Keywords: Cloud Computing, vocational education I.

INTRODUCTION The role of which is owned by the College in the development of science and technology in society in a country is not in doubt. The university uses IT-based infrastructure as a foundation for learning activities and research-based knowledge. Along with the technological evolution that happens, many traditional forms of education service transformed into an online form.

Such services require a reliable IT infrastructure, using appropriate technologies, guaranteeing scalability to be used by many users, has a reliable performance and have good access security (EricKurniawan, 2015). Universities in Indonesia still faces many challenges to adopt new technologies to support quality education. The process of adaptation of new technologies in PT bejalan relatively slow, one of them due to the high cost of procurement of IT infrastructure.

Transformation is carried costs and huge investments are of course difficult to be met by most universities in Indonesia who have limited funds. The grants from the government are also found to be sufficient and not all of these funds can be realized in the form of IT infrastructure. With limited financial condition of the IT departments of universities in Indonesia and megalokasikan required to manage the budget effectively and efficiently.

The last few years the concept of Cloud Computing is already a lot of interest of industry and education. Cloud-based solution seems to be the key for IT organizations who have a problem of budget constraints (Teng & Magoules, 2010). Cloud Computing is a new paradigm in distributed computing presents many ideas, concepts, technologies, and the type of architecture that served as a service-oriented.

According to Foster **Cloud Computing is a** "paradigm of distributed computing on a large scale are motivated by economic factors, which contains a set of virtualization abstract, dynamic scalability, setting the computing power, storage, platforms and **services that can be accessed** in accordance with the requirements by external customers through the Internet "(Foster et al., 2008).

Users can access these resources through a network connection berkecepatantinggi Internet without having to connect directly to the hardware store these resources. Because the computing process is on a remote server, then the need for hardware and software to access the resource is lower, which can reduce the cost and process of care (Erenben, 2009).

For several reasons already mentioned, the Cloud Computing should be an attractive solution for universities in Indonesia who want to reduce the budget in IT. Students today can not live away from the Internet. Through programs such as facebook, twitter, instagram, and gmail, students are accustomed to using cloud-based technology services (Ercan, 2010).

Therefore, the students hope to be able to access digital technology services on campus anywhere and anytime, including cloud services that support social media. Likewise pendiidkan vocational students who are currently in the industry are already using advanced technology. So should students have to understand the process and the system.

Besides, in the learning process also greatly contribute to improving student achievement, especially in the learning lab. Thus researchers are interested in developing research to develop an existing model into a new model in online learning **based on cloud computing** (cloud computing). Objectives to be achieved in this research are: 1) To find out how online learning design **based on cloud computing** (cloud computing) at D3 Electronics FT UNM; 2) To find out how the prospect of the development of online learning **based on cloud computing** (cloud computing).

Urgency (virtue) of this research are: 1) The creation of an online learning-based Cloud computing **is the use of** technology that is Internet-based computing offers resource sharing without enhancements, a more affordable cost, and unlimited data storage; 2) Increasing student motivation in the process of learning through online learning methods; 3) Increased motivation motivation of vocational students in the process of online learning.

Online Learning In one publication on the website about-elearning.com, the

Association of American Society for Training and Development Activity (The American Society for Training and Development / ASTD) (2009), the proposed definition of e-learning as follows: "E-learning is a broad set of applications and processes that include web-based learning, computer-based learning, virtual classrooms and digital. Much of this is delivered via the internet, intranet, audio and videotape, satellite broadcast, interactive TV, and CD-ROM.

The definition of e-learning varies depending on the organization and how it is used but basically it involves electronic means of communication, education, and training." (The American Society for Training and Development / ASTD: 2009). That definition states that e-learning is a process and implementation of web-based learning activities (web-based learning), computer-based learning (computer-based learning), virtual classroom (virtual classroom) and class or digital (digital classroom). Opinions Haughey (in Rusman, 2007) about the development of e-learning.

Stating that there are three possibilities in the development of Internet-based learning system, the web course, web-centric courses and web-enhanced course. Web course is the use of the Internet for educational purposes, in which students and teachers are completely separated and no need for face to face. The entire teaching materials, discussion, consultation, assignments, training, examinations and other learning activities entirely delivered over the internet.

In other words, this model uses the system remotely. Web Centric Course is the use of the Internet that combines distance learning and face-to-face (conventional). Most of the material delivered over the internet. Enhanced Web Course is the use of the Internet to support the quality of learning done in class. Internet functions is to provide enrichment and communication between students and teachers, fellow students, members of the group, or students with other resource persons. Cloud Computing The definition of cloud computing is still varied and many people still disagree about what is cloud computing.

For applications and users of IT, cloud computing is ITaaS (IT as a services). Provide computing services, data storage, and applications can be accessed via the Internet from a centralized data center. For application developers, internet, cloud computing is Internet-based application development platform that is scalable.

For the service provider infrastructure, cloud computing is a distributed data centers that are massive and connected to the IP network (G. Lin et al., 2009). The divergent views are clearly reflected in the services provided by cloud service providers such as Google, Microsoft, and Amazon (J. Cappos, et al., 2009). Generally there are three types

of cloud computing services, where the architecture of the third user does not regulate directly, namely: ? **Infrastructure as a Service** (IaaS): IaaS provides a service to the level of Operating Systems. So the user can choose the operating system that will be used in the form of a virtual machine.

Users can also set for **the allocation of hardware resources such as memory** size, hard drive size, and the size of the processor. Examples of IaaS services are Microsoft Azure IaaS, Amazon EC2, Rackspace Cloud, and Open Stack. ? **Platform as a Service** (PaaS): PaaS provide services at the level of the platform, so users no longer bothered with the installation of operating systems, web servers, database servers, and other applications.

PaaS service providers already providing a complete operating system and its applications needed for hosting applications such as web servers and database servers. Users can upload applications made through the control panel that has been provided. Users can also choose a package customized to the needs of small applications with limited user, to applications with large user.

Examples of PaaS services are: **Microsoft Azure PaaS (IIS, ASP.NET, Open Source technology), Google App Engine, Amazon Elastic Beanstalk, Cloud Foundry** and Heroku. ? **Software as a Service (SaaS): SaaS** provides direct services to users in the form of ready-made applications. Form of application services that offer such services office applications, email, data storage services, etc.

Examples of SaaS services are: Office 365, Gmail, Google Docs, DropBox, and Salesforce.

II. METODE PENELITIAN **The method used in this** research is the development of research methods (Research & Development), which focuses on online learning **based on cloud computing** (cloud computing). Technology **Cloud Computing is a new paradigm** in the delivery of computing services.

Cloud Computing has many advantages compared with conventional systems. The planned study is a research and development in education (educational research and development). In accordance with the understanding that this research aims to produce products. The procedure of research and development models Borg and Gall (1983: 772-774) basically consists of two main objectives, namely: (1) develop products, (2) to test the effectiveness of the product to achieve goals. The first goal leads to the development of a product and the second aim is to lead to validation.

Through the adaptation of various research makadiperoleh prototype development **used in this study** (shown in Figure 3) .Membangun prototype is a stage where the draft is realized in the form of application products. Needs Analysis Student of Vocational

Education Online Learning Prakticum Learning Simulation Figure 2. Development Procedure Cloud Computing III.

RESULT AND DISCUSSION In the model of cloud computing lifecycle of Marks & Lozano (2010) there are five stages to adopt cloud computing, some of them: a) Determining the stage of concept / pilot cloud project. The purpose of this stage is to learn about cloud computing for planning and implementing the use of cloud computing to travel memaksimalkan layanan in the field of information technology.

Activities undertaken at this stage are: 1) The trial implementation of cloud computing; 2) Learning, evaluation and input to input cloud computing strategy; 3) Determination of cloud computing application decision whether to proceed or not; b) Determine strategy and mapping in the process of adoption of cloud computing. The objective of this phase is to determine the application of cloud computing strategies and action plans of the future are predetermined.

Activities undertaken at this stage are: 1) discovery and research on cloud computing; 2) Determine the mapping strategy and cloud computing; 3) mobilization and application of cloud computing transition planning; c) Determining the stage of Cloud Computing Model and Architecture. The purpose of this phase is the modeling and the steps in the implementation of cloud computing.

Activities undertaken at this stage are: 1) modeling of cloud computing; 2) reference model of cloud computing; 3) The application of cloud computing models; 4) Governance and the operating model of the cloud (quality of service, security, and planning); 5) cloud computing reference architecture; d) Cloud Computing Implementation Planning Phase. The objective of this phase of planning electoral cloud computing technology that is appropriate for the kebutuhan. Kegiatan performed at this stage include: 1) Analysis and selection of providers of cloud computing services; 2) The implementation and procurement planning cloud computing; 3) governance and lifecycle planning cloud computing; 4) Determination of cloud computing program decisions continued or not; e) Cloud Computing Implementation Phase.

This stage is the stage of the application of cloud computing. Activities undertaken at this stage are: 1) Search reference implementation of cloud computing; 2) Planning planning and governance of cloud computing security; 3) Event management, monitoring, operation and support of cloud computing; 4) Evaluate feedback and strategies applied in the implementation of cloud computing.

Faculty of Engineering, University of Makassar has five departments, namely the

Department of Mechanical Education Electronics Engineering, Department of Electrical Engineering, Department of Mechanical Engineering, Automotive Engineering Department, the Department of Civil Engineering Practicum Report and Planning Pendidikan. Cloud computing services in the Department of Electronics courses Electronics Engineering D-3 can be used via an email service that uses the University's official domain. Although the service is still functioning properly, but there are some obstacles faced by them are: a.

User interface is provided for accessing these services are not user friendly, although the user interface is web based, but is less responsive to use. The user interface is also less than the maximum if the user uses the device has a small screen size such as smartphones and tablets. b. In some cases an email addressed to unm.ac.id server is not up or rejected by mail servers unm.ac.id. c.

Not reliable, because they use their own server machines that are stored in the server space, so there is a possibility of unexpected events such as power outages that cause the user can not access the mail server unm.ac.id. d. Lack of uniformity username and password that can be used to access all systems (single sign on). Users in the UNM had to use several different accounts to access some services such as email, blogs, e-libraries, etc.

Because some of the problems already mentioned above, the lecturers in the neighborhood Faculty of Engineering UNM took the initiative to look for another alternative email service that can replace your old email system, and has many advantages that can be the solution to many problems. Prodi D-3 Electronics for the use of cloud-based email service provided by Google, Google Apps for Education.

The choice to use this service based on several things, namely: a. Services are provided by major vendors cloud computing service providers who have an excellent reputation that is google. Google already proved itself as a provider of cloud computing services that are reliable, it can be seen by the number of products owned service like gmail, youtube, google plus, google docs and much more. b. Very economical because Google offers Google Apps for Education is free for educational institutions. c.

Integrated with other cloud computing services such as google docs, google plus, google scholar, and so forth. d. Users in this case students and university staff are already accustomed to using the service personally. After applying the cloud-based email service on D-3 student of Electronic Engineering for more than one semester, then of observations conducted found that the application of this service has many benefits and advantages, namely: a. Students more often than before the email access using

Google Apps services.

Students found new email service more reliable, have greater storage capacity, has a user interface that is easier to use, and can be accessed from a variety of mobile devices at their disposal **such as smartphones and** tablets. b. The university staff, particularly human administrators and professors also found that the new services are more reliable and easier to use.

Some of them also found **the use of the** new services is easier as it is integrated with other services such as Google docs for storing and accessing data. c. Because the cloud-based service was not disrupted as services pernah before, for example when the power goes out. d. Large storage capacity. Because Google Apps for Education itself provides unlimited capacity (unlimited) so users do not need to worry because running out of space. e.

From an economic perspective, the service is also very advantageous because it does not need to provide a special server for the mail server, no need power for server maintenance, no need to buy a hard drive with a huge capacity for storage media. In addition to cloud-based email service, FT UNM is going to the other cloud services like Google Docs for document storage media.

FT have problems in performing document archiving because the number of documents that must be managed as a file rank professors, lecturers certification file, a letter of assignment, subject accreditation files, and many other documents. With cloud-based document storage service is some of the admin staff faculty and staff lecturer argues THAT this service has many advantages compared to the electronic file storage to a local server computer. Some of the gains are; a. Does not require a server / local computer to store electronic files. b.

Electronic files can be accessed from anywhere and at anytime. c. Does not require data backup on the local computer, because all the data is already in the cloud. d. Large storage capacity. e. It is possible to do a collaboration between users when working with certain documents. Due to the success in the implementation of cloud-based email service in the FT UNM faculty then the party is expected to recommend the use of this service to the university level, so that **these services can be** used and enjoyed by all the faculty at UNM.

However, there are some **issues that need to be considered** by the university in the use of this service. The main issue is the confidentiality of the data, though the service providers own standardization and ensuring data security but for data that are highly

confidential, should the university to stay put data on the local server but still can be connected to cloud services available, this approach is often referred to as Hybrid Cloud.

BENEFITS OF ONLINE LEARNING BASED ON CLOUD COMPUTING ICT Class budget efficiency in D3 Electronics FT UNM During this time the investment is earmarked for ICT in education is synonymous with expensiveness, or a reason as long term investments. However, cloud computing technology has changed all that assumption, the budget savings will be the excess caused by the ease of sharing resources, such as infrastructure and services.

In addition, the use of minimal equipment to access the internet to use the service for users without the need to worry for updates or to pay for the generation or the next level in the services provided, because everything is done in the center. For hardware is also quite well built the center, you no longer need a server-serverdi each region or other branches.

Then, if necessary, then its nature is a training operation with leveloperasional applicative that can be done by sekolahatau mutual learning or studying alone. he effectiveness of learning resources for students D3 Electronics FT UNM As it is known that most of the learning process is done in the cloud. For example, to source materials for students learning D-3 Elelektronika FT UNM all put into the cloud, the evaluation process of learning, a progress report student learning, sharing knowledge with others lecturers, and so on.

So that the school can manage the lecture material requiring the lecture hall or lab space, managing the learning resources, manage time lectures in accordance with the needs and conditions, as well as optimizing the advantages in the flexibility of time and place. The same thing with the professor as the main source of learning, will have more time to improve their ability for teaching and learning time to become lighter and the sharing of learning resources among faculty and students.

Cooperation and sharing of e-learning Work together and share a central concept of cloud computing environments. This technology offers the ease of cooperation between institutions, interaction and sharing among education stakeholders and the ease of evaluation for each job is well documented.

Therefore, in any cloud computing environment development, should be designed based on the concept of ease of sharing and working together as a characteristic of this technology. Rationality of navigation settings, In use it is necessary to use an interface module structure that is clear and easy to understand so that the application easier to

use, and easy to learn, it is not difficult because it is the core of the use of cloud computing technology. IV.

CONCLUSION From the discussion on the implementation of cloud computing to maximize online learning in the D-3 Electronic Engineering FT UNM can take the following conclusions: a) Cloud computing is the use of computing technology based internet facility that offers sharing of resources without enhancement, cost more affordable, and unlimited data storage; b) There are 5 stages to implement cloud computing in the D-3 Electronic Engineering FT UNM some of them define the concept stage, the stage of determining the strategy, determining the stage of cloud computing that you want to use as well as the implementation plan. DAFTAR PUSTAKA Azuma, A.

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