IMPLEMENTATION OF CLOUD COMPUTING USING SOFTWARE AS A SERVICE (SaaS) ON THE DIGITAL LIBRARY APPLICATION FOR BOARDING SCHOOLS

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ABSTRAK

Boarding school is a traditional education where students living together and studied under teacher guidance better known as kiai.[1] But the students in boarding school not only get education through a lesson given by the teachers or kiai in boarding school but students also can get through the library materials that available in the boarding school's library. However in the boarding school's library there are limited owned the library materials and consequently difficult to members of the library in seeking and get the library materials.

Proses for built the application is start with analysis procedure that runs in the library then do analysis of digital library and cloud computing using software s service and do analysis of functional needs and non-fuangsional needs. After application analyzed and is designed in detail then afterward will be conducted of implementation phase. The implementation of the application is part of the application of the results of the analysis and the results of the digital library application design for boarding school. Phases of the implementation is aims to adjusting the moduls design so users can give inputs on the development of the application of later on and implemented into virtual private server using software as a service.

Based on the testing it can be concluded that this application will helpfull library officials from prepared to present the material library and can help members of the library in seeking and get the materials.

Keywords : boarding school, library, application, digital library, materials, cloud computing, software as s service.

1. INTRODUCTION

According on interviews with Mr.Jamal as senior officers library foundation Assunnah Cirebon, stated that the activities of the library is still hampered by limitations of materials data owned library so that is still the difficulty for the members of the library in obtaining reference or any matter that want to sought, then still the difficulty in terms of materials care data and still the difficulty in doing everyday their operations .

According to the interviews with Mr.Subhi as library officials boarding Madinatunnajah Cirebon, said that the number of a library to seek to borrow or data owned was more from being with collection owned by library .

According to the interviews with Mr.Zikri as library officials boarding Imam Maliki foundation , that library boarding are very concerned about the library often once damaged or lost because of a lack of attention of the library when borrowed.

Based on questionnaire done by taking sample one class from each boarding Assunnah Cirebon foundation, boarding Madinatunnajah and foundation Imam Malik boarding and obtained 65 students listed in the library every boarding said, that 70 % quite often visit the library to look reference or matter of library as a learning additional, 73 % still experienced difficulty in obtaining matter or reference the library desirable, 66 % had become quite find matter or reference the library in digital form, and 100 % support the digital library for theirs boarding school in order to facilitate they get matter or reference to be desired.

Based on the problems described it takes an application for a cottage digital library boarding web based with cloud computing in order to facilitate library officials boarding in process to present the library required by members of the library boarding in seeking to access the library. Hope for digital application library for their boarding school web based boarding with cloud computing here are the library stored on the internet allowing accessible or upload ever and wherever when needed. Application of digital library for a boarding shcool is a way to solve problmes that owned by the library as services computing where later all members of the boarding school library can be integrated with the library in every boarding school library.

As for the purpose to be achieved in this research is as follows :

1. Build and provide an application to help the boarding school library in process to the library presentation of data to members of the boarding school library.
2. Build and provide application that can be a member of the library petrified in seeking to get access to the library owned by any boarding school library.
3. Provides a cloud computing by using communication technologies as a means of providers to manage to displays the library in every boarding school library.

2. CONTENTS OF RESEARCH

2.1 Basis Theoretical

The basis theoretical aims to provide an illustration of the source and of a study conducted by the theory that related to development digital library application .A cornerstone of a theory that will be discussed which is the theory of a digital library ,cloud computing, website, web browser ,programming language that is used and a database management system used in constructing the digital library application for boarding school , and other supporting material that needed.

2.1.1 Digital Library

Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities. [2]

Which means, digital library is a variety of organization that provides resources, including civil servants who are specially trained , to choose , set , offer access, understand, spreading, protect the integrity of , and maintaining the unity of the work of digital, in such a way that a collection that is available and affordable economically by a or a collection of the communities that need it

As for the working mechanism of digital libray can be seen in figure 1.

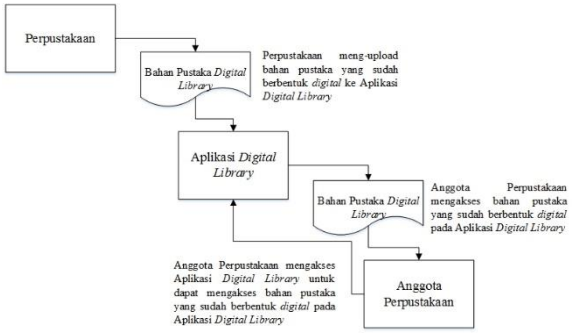


Figure 1. Working Mechanism of Digital Libray

2.1.2 Cloud Computing with SaaS Service

Cloud computing is a model client-server, where resources such as the server, storage, network and software can be viewed as a bunch of service. The service can be accessed by the users at any time in a remote and the nucleus of the technology is virtualization. On cloud computing, physical machine (an physical engine) replaced with virtual machine (an virtual engine), physical network and physical storage replaced with virtual network storage. Cloud computing is considered environmentally friendly, because the presence of virtual technology users only provides a computer to try various different applications platform just by installing hypervisor appropriate then all can be enjoyed without having to menyedian many resources. Not to mention internet support an increasingly high speed and cheap that allows we can open up virtual machine from which then only with a web browser .[3]

Cloud computing architecturally and service that could be distinguished into 4 (four) layers and 3 (three) cloud computing services, namely : [4]

1. The hardware and infrastructure that is the kind of IaaS service (Infrastructure as a Service).
2. Platforms layers which is found in types of PaaS service (platform the us of a service).
3. The application that is on the service SaaS (Software as a Service).

As for cloud computing architecture can be seen in figure 2.

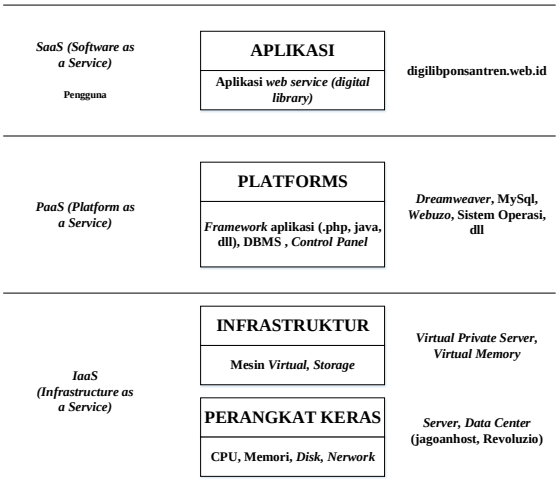


Figure 2. Cloud Computing Architecture

Based on figure 2, the cloud architecture from bottom layer is a layer of hardware, this layer responsible in the management of resources physical of cloud and this layer consisting of a device physical server, router, switch, power, and a cooling system. Physically, this layer often grouped as a center the data center.

Then the second layer of cloud architecture is a layer of infrastructure known with a layer of virtualization and responsible to form media consisting from a storage medium (storage) and

resources of computing in terms of human resources physical in a common species of delivery service that was delivered through this layer called as Infrastructure as a Service (IaaS).

Next is the third layer of cloud architecture namely the platform, this layer consisting of operating system and skeleton application, this layer responsible for minimize burden the spread of controls directly into a container virtual machine in a common species of delivery service that was delivered through this layer called as Platforms as a Service (PaaS).

The highest layer of cloud architecture is the application, this layer consisting of the actual than cloud of which type of services directly may be transmitted or used by the ultimate user of application digital library will be built, in a common species of delivery service that was delivered through this layer called as Software as a Service (SaaS) .

Sofware as a Service (SaaS) having three approach model application and approach model database that can be used as the service, namely : [5]

a. Separate application and separate database

In the approach of this model, the applications and databases used apart for each user. Applications and data related to each user, kept isolated or separate from the application and other data users. And application database contains data regarding each user of the specific. This approach relatively expensive because it requires higher cost and quite difficult in doing maintenance database and applications. Approach separate model and separate application database can be seen in figure 3.

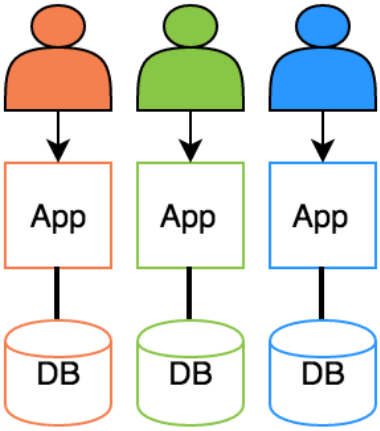


Figure 3. Separate Application and Separate Database

b. Shared application and separate database

Different with another approach model formerly in approach this model, applications were used each user is application but a same database used by the user apart for each user. Application related each user, stored in the same spot but data relating each user, kept isolated or apart from user data other. This approach relatively difficult in do maintenance the applications and database. This approach model shared application and separate database can be seen in figure 4.

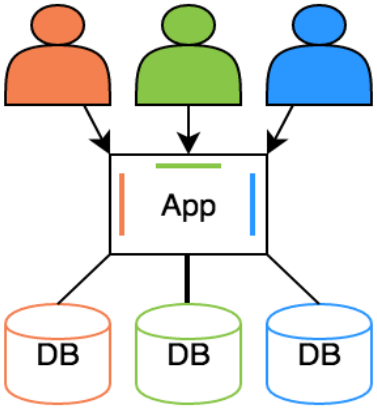


Figure 4. Shared Application and Separate Database

c. Shared application and shared database

Different from two models approach formerly in approach this model, the applications and a database that are used each user is the same. The applications and data relating each user, the application and database are same . This approach relatively inexpensive in its treatment as it requires low enough money and be vital for do maintenance the applications and database. This approach model shared application and shared a database is presented in figure 5.

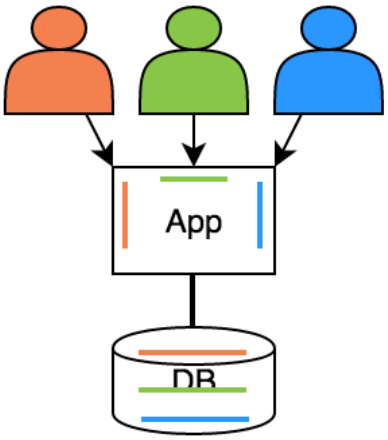


Figure 5. Shared Application and Shared Database

2.2 Analysis and Design

Analysis can is defined as decomposition of a system whole into parts its components with a view to identify and evaluate problems and the obstacles happened and the needs expected so that it can be proposed improvement and repairment.

While design can defined as design of the system, the technique for solving problems by furnish smal components into oneness components system is

returned to a complete system. This technique is expected to produce better system.

2.2.1 Analysis of the Problems

Analysis of the problems is an assumption of the issues to be outlined in a procedure. From the research result conducted by the problems that were obtained consisting of :

1. Not available of application that can be assist boarding school library in process until serving of library materials to the member of boarding school library.
2. Not available of application that can be assist the member of boarding school library in search up until get access of library materials.
3. There is not yet available of communications technology that can management library materials until serving library materials on each boarding school library.

2.2.2 Systems Analysis that Currently Running

The analysis of the system that is currently running seeks to capture more clear how work one the system and know about the system to be able to serve as basis for system design proposals. Analysis stage system needs to be done first prior to design the system, analysis stage it represents the stages the important in designing a system. Analysis of the system that held to find out what kind of trouble faced by the boarding school library.

The purpose of the analysis system to determine the system to be applied. The analysis was also be able to design the stages to be made the system as required by user and system has the work efficient and effective, can produce information that quickly, right and accurate.

Procedures are in the Assunnah foundation Cirebon boarding school library, the Madinatunnajah Cirebon boarding school library and the Imam Malik foundation boarding school library not much different from the registration procedure, lending procedure, repayment of procedure.

2.2.3 Non Functional Analysis Needs

Non functional analysis needs used to determine the specifications application needs to be built starting from components needed by application until the application is implemented. Non functional analysis needs also determine the specifications also enter required by the application of later output that will be produced by the process of application and required to enter the process so as to produce outputs desired. Non functional analysis it consists of analysis software, an analysis of hardware, analysis of users, and analysis of the network.

The recommendations of the software requirement for digital library application is as follows,

Table 1. Recommendations of the Software Requirement

Operating System	Windows 7, Android
Web Browser	Mozilla Firefox, Google Chrome
Video, Audio Players	Windows Media Player, VLC Media Player, Media Player Classic
Ebook Reader	Adobe Reader, Microsoft Edge

The recommendations of the hardware requirement for digital library application is as follow,

Table 2. Recommendations of the Hardware Requirement

Processor	Intel Pentium G2020 2.9Ghz
Memory	1048Mb
Vga	onboard
Harddisk	Seagate 320GB
Motherboard	Asrock H61M-VS4
Printer dan scanner	Canon 287
Monitor	LCD LG 5 inch
Network	Small office

Analysis cloud virtual private server to be used by the application of digital library to be built aims to understand infrastructure used by the digital library application for a boarding school, as for specification virtual private server to be used is,

Table 3. VPS Specification

Processor	1-2 core
Memory	2048Mb
Storage	15Gb – 50Gb
Operating System	Centos-7
Contor Panel	Webuzo

2.2.4 Databases Design

Database model is highly dependent by the relationship between entity, where entity is something in the form of both object the concept, reality or sense specific that can be distinguished by something else that is around it. In a database design, entity will be equipped with attribute attribute who presented all fact of the real world who has reviewed. Based on it, after conducted systems analysis, it can be made entity relationship diagram consisting of several table to store data. As for the ERD of digital library application for boarding school can be seen in figure 6

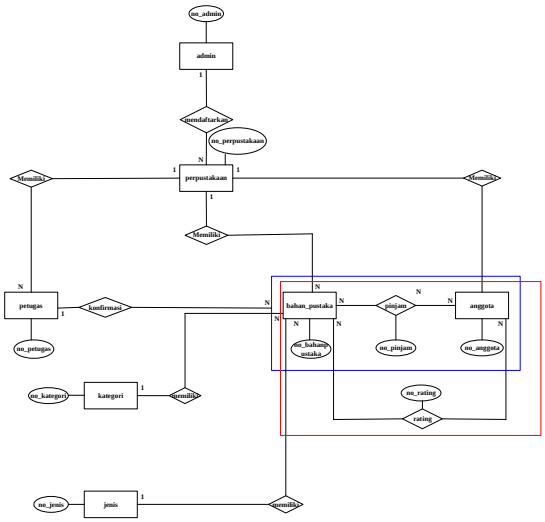


Figure 6. Entity Relationship Diagram

Then the scheme or table relation is notation to describe model logical database. This model used to described the database so that the composition and the relationship between the data we can see logically. The scheme relation will be explained in figure 7.

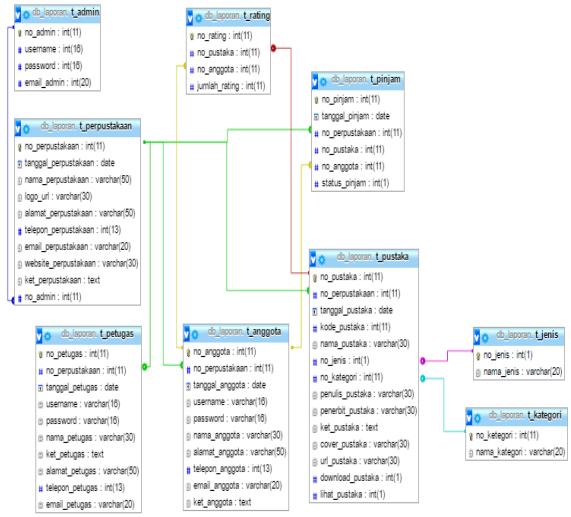


Figure 7. Scheme Relation

2.2.5 Functional Analysis Needs

Functional analysis needs done in order to provide the flow of existing data on the application to be built. Those are with setting up of components software and hardware of a system, so after the installation from systems to completely satisfactory of the bill set in the end of the systems analysis. As for as the tools used to develop program is public built is with used the context diagram and data flow diagram and process specification.

2.2.6 Context Diagrams

Dontext diagram is consisting diagram of a process and described scope of a system. Context diagram is highest level of DFD describing the input to system or the output of a system. Context diagram will give you an idea about the whole system. The following that explain context diagram of digital library application for a boarding school can be seen at figure 8.

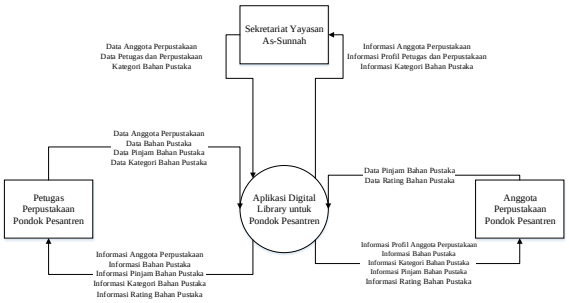


Figure 8. Context Diagram

2.2.7 Data Flow Diagram (DFD)

Data Flow Diagram is a notation diagram to describe the current of a system, that the user very helpful in understanding system logic, structured and clear. The following that explain Data Flow Diagram Level 1 of digital library application for a boarding school can be seen at figure 9.

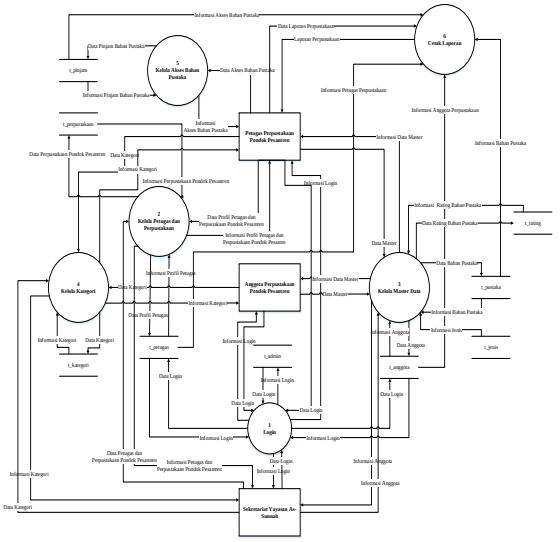


Figure 9. DFD Level 1

2.3 Implementation and Testing

Implementation and testing is the stage where the design of the digital library be implemented within programming language used. Then implemented will be conducted trail phases where testing stage done to see the the lack that might happen to digital library application that built.

2.3.1 Implementation of Application

After analyzed and designed the application that want to bulit in detail then afterward will be conducted of implementation phase. The implementation phase of the application is part of the results application analysis and the results of the application design of digital library for boarding school.

The implementation phase is aims to adjust the design moduls so users of the application can give inputs on the development application later on. As for interface implmentation of digital library application for boading school is as follows figure 10 - 12,

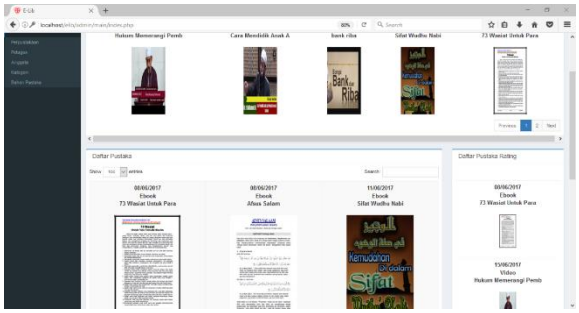


Figure 10. Interface Implemetation Library Officers

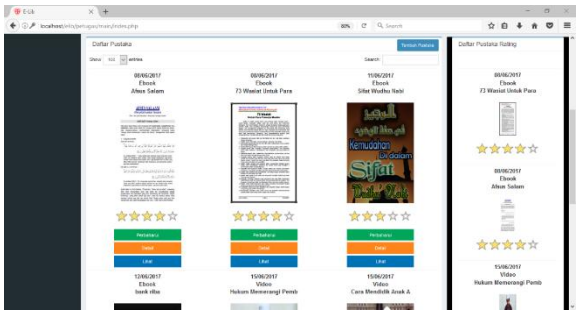


Figure 11. Interface Implemetation Library Officers

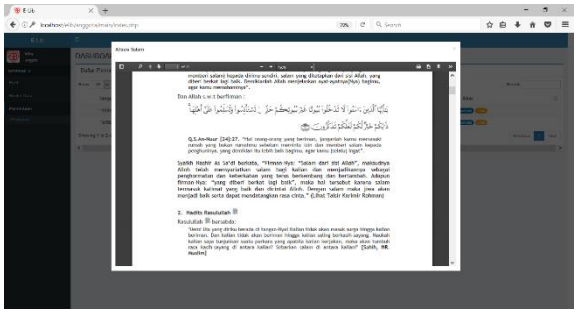


Figure 12. Implementation Open Library Materials

2.3.2 Implementation and VPS Configuration

The composition and way to configuration the cloud Virtual Private Server to be used by the digital library application that was built. As for levels is presented in figure 11 to figure 13.

To do the implementation of how to do configuration cloud Virtual Private Server to be used, as for stage configuration cloud Virtual Private Server is presented in figure 13.

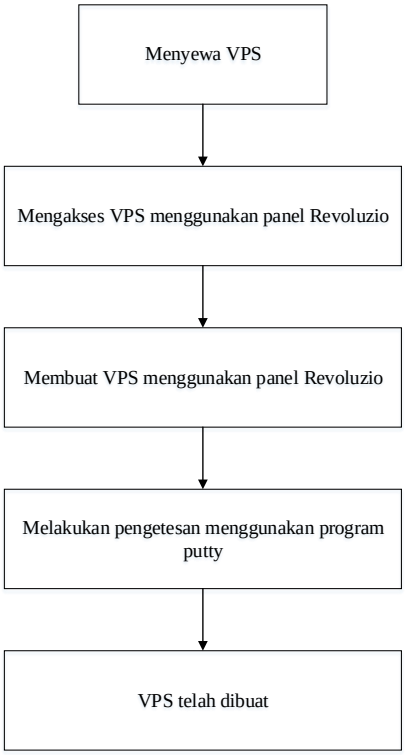


Figure 13. Configuration Steps of VPS

Next to do configuration is how to do configuration of the domain that used, as for this phase the implementation of configuration of the domain is presented in figure 14.

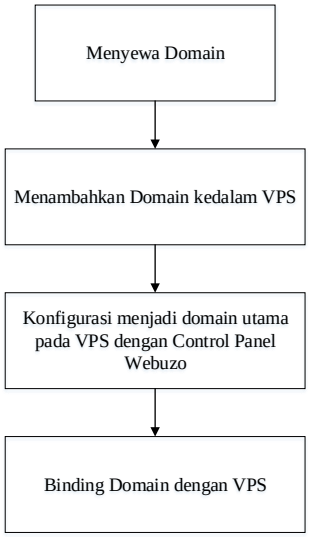


Figure 14. Configuration of the Domain

Then the the last to do configuration through how to deploy the application and database into Cloud Vitual Private Server that used, but the database deploy application and is presented in figure 15.

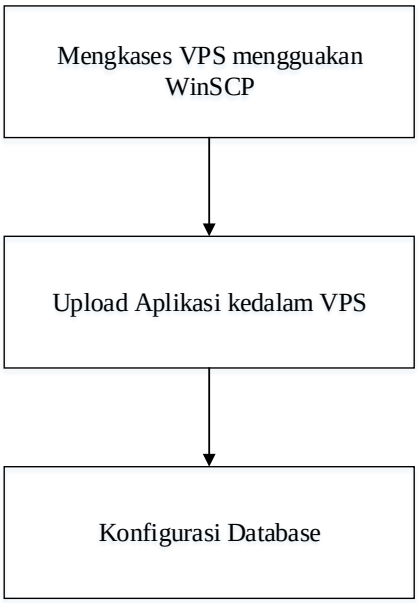


Figure 15. Deploy Application

2.3.3 Application Testing

Application testing is most important things aimed to locate the lack of the digital library application for boarding school that was built. Testing intend to know digital library application that was built have met performance according to the purpose of design. Testing used to examine digital library application ever built is with the black box testing. Black box testing focused on testing functional requirements of the digital library application that was built.

The tests will be done by way of digital library application that was built in black box test and beta. Testing development digital library application for boarding school using data the data that given of several data provided.

3. CONCLUDING

3.1 Conclusion of the Research

Based on the results of the testing digital library application that has been done overall a conclusion can be drawn that to the process digital library application for boarding school is enough maximum and functionality of the application have can produce maximum output.

1. The digital library application for boarding school it may help the library its boarding parties in manage the library materials and the library materials can ease its boarding school library in providing up to presenting it as library material possessed the library to the members of the library quickly and easily .
2. Digital library application for boarding school it may help parties the members of the required library boarding school in search of library materials quickly and easily then can also petrified the members of the library in access to required library materials quickly and easily.
3. The implementation of cloud computing use the service of software as a service that means of providers in to simplify officers in the management of library materials in the boarding school library to provides library material that owned by boarding school library to members of the boarding school library, so that members of the boarding school library may seek and source library materials of various boarding school library.

The digital library application that was built can ease the members of the boarding school library in literature obtain library materials into a digital form that owned by boarding school library quickly and easily.

3.2 Suggestions

In doing the implementation of cloud computing on this digital library application, expected developers can develop and can correct the deficiency which will be able to answering questions from the existing problems.

As for suggestions to improve their performance of digital library application this writer proposed some of the suggestions can be used as consideration, follows :

1. The digital library application for boarding school it is hoped that the presence of the development in order to be more user friendly by means of additional got an interface that more attractive and additional of help facilities.
2. Digital library application for boarding school it is hoped that in the future can accommodate over boarding school library.
3. Digital library application for boarding is expected to be developed in terms of the implementation of cloud computing not only use the service of software as a service but use the other service of cloud computing.

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