



Design of Cloud Computer to Support Independent Information System Servers Universitas Islam Kuantan Singingi

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Submitted: 19/01/2022; Accepted: 29/01/2022; Published: 31/01/2022

Abstract—In today's all-digital era, easy access to information systems is needed. Moreover, with the new regulation from the Minister of Education that LKD/BKD must be filled in using the SISTER application from the Ministry of Education and Culture. Previously, sister was used for lecturers who wanted to certify lecturers, so to use the server at the Kuantan Singingi Islamic University, it was enough to use a laptop with all the shortcomings. With a wider demand it is necessary to make independent cloud computing-based servers, to rent cloud computing services according to standards from sisters is very unaffordable for the UNIKS campus so that this solution will make one server machine, several Virtual Machines (VM) will be created in the CPU Server .

Keywords: Server; Cloud; Computing; VirtualMachine; Sister

1. INTRODUCTION

In terms of campus digitization, the Kuantan Singingi Islamic University campus is still considered to have many shortcomings compared to other campuses in managing campus digitization. The most basic thing is the use of the SISTER application from the Ministry of Education and Culture which is felt to really need to be improved in its use on campus, from the problem that the SISTER application server is on the laptop in the UNIKS BAKASI section, so when there is a lecturer who needs to contact the BAKASI then it is activated and filled in on the laptop or accessed in the local network, this is one of the weaknesses that must be corrected. Filling in reports to the sister should be comfortable, relaxed and can be done anywhere and anytime so that it is more effective in working on the report, filling in important data that takes time. no rush.

The server to be built is controlled and built directly on the Kuantan Singingi Islamic University campus so that when there are deficiencies and improvements and additional resources we can do it independently [1], secure data because the data is on the UNIKS campus not elsewhere. As well as facilitate lecturers and the entire academic community in carrying out their administration.

This study tries to make a prototype server by applying the concept of IAAS cloud computing for Sister and e-drive at the Islamic University of Kuantan Singingi. This server will use one of the computers in the application labor of the Faculty of Engineering, Islamic University of Kuantan Singingi, Then Use the Virtual Box application to create several Virtual Machines, then the VM is installed with the Operating System and the Sister Ministry of Education and Culture application on the VM, then install Ubuntu with the owncloud application to create online drives. Next, set the modem to do port forwarding and buy a domain so that it can be accessed using a unique name to access the application online

In previous research the cloud is [2] a computational model that can provide convenience, convenience, and in accordance with the demand to access such applications and cloud computing is a model, not a specific technology, and describes operational and economic models for the provision and use of IT infrastructure and related services. According to [3] the user can also choose a service that suits your needs and can be changed at any time. So the use of cloud computing is very important, especially to store very important data with excellent security. [4] The use of cloud services in learning activities will create a collaboration between students and teachers. There is ease of accessibility for students in accessing subject matter because it is stored in digital format [5].

Building a Cloud Computing-based Server that will function as our campus digitalization system is considered to be the latest breakthrough with hopes and benefits that will be felt by the entire UNIKS campus academic community.

2. RESEARCH METHODOLOGY

2.1 Network Development Method

With the NDLC system development method, there are six basic stages in building/developing the system [6] [7], [8]:

- a. Analysis. Identify and find existing problems, understand why these problems occur at the National ICT Center, and what things are caused by these problems.

- b. Design. At this stage, the current system is repaired or a new system is designed. In this research, a cloud infrastructure was added at the research site.
- c. Prototype Simulation. Before implementing the current system, research and experiments are carried out first so that it is known what problems will be faced during implementation.
- d. Implementation. Armed with the results of research and simulation experiments, a previously designed cloud infrastructure was implemented.
- e. Monitoring. After successfully implementing the cloud infrastructure system, the new system will be tested whether it runs properly or not.
- f. Management. In order for the cloud infrastructure system that was built to be used properly and last a long time, it is necessary to carry out maintenance, maintenance, and management activities for the system that has been built. This stage also determines who can access and manage the cloud infrastructure system

Table 1. Itemset

Nomor.	Itemset
1	Achievement Target Plan
2	Research schedule
3	Hardware Requirements
4	Software Requirements

3. RESULTS AND DISCUSSION

3.1 Proposed System Analysis

Based on the analysis of the current system, a new server management system can be proposed, namely making a prototype for IAAS cloud computing server development.

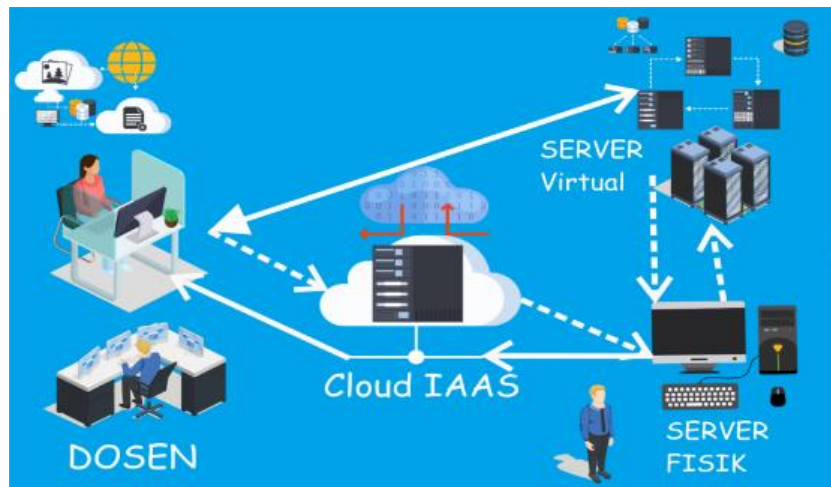


Figure 1. Proposed system

With one physical server, three virtualization servers will be made so that later every application needed to improve the administrative performance of lecturers and teaching staff is more optimal and efficient [9][10]. On the physical server, a virtual machine will be installed, then for cloud computing infrastructure using a virtual server for the Sisters of the Ministry of Education and Culture. Furthermore, the VM is also made a server for storage (drive) using OwnCloud, so that in sharing SK, SPT and announcements, it is enough to upload it to the account on the owncloud and lecturers can access to download the file. So hardware with medium specifications is needed, such as a table. following:

Table 2. Hardware Requirements

No.	Name	Description
1	Server CPU	spec. Core i7 16 core 8mb cache 16Gib . DDR4 Memory 2TB SSD, 1TB HDD Backup As a physical server, several virtual servers will be created later
2	Network Card	As a Server Connector to Media liaison
3	UTP Cable	As a Media Server and Modem connecting cable
4	Client Computer	As a trial and client in this study. No specifications set.

No.	Name	Description
5	Router Modems	As a liaison from the server to the internet

Table 3. Software requirements

No.	Name	Description
1	Windows 10	As parent Operating System
2	Viral Box	Used as a Virtual Machine
3	Ubuntu Server 14.04.	As the operating system for the Sister server
4	Open SSH Server	Used to do remote from the client to the cloud node
5	Git	Used to fetch the latest Openstack source code directly from Github
6	Openstack Kilo Version	
7	NTP	NTP will be installed on the controller node and compute node so that time can be synchronized
8	Owncloud Desktop	

3.2 Design

The system can be described with the following flow[11][12]:

- 1 The user / client logs in to the web UI available on the node controller, after successfully logging in, the user can perform an Instance creation command on the web UI.
- 2 After that, the Openstack service on the controller node will request an instance creation on the compute node.
- 3 The compute node will perform the creation of the /VM instance.
- 4 After success, the compute node will send an endpoint to the node controller as the identity of the created instance / VM.
- 5 After that, the created instance / VM will show the active status on the Openstack web UI.
- 6 Users/clients can also access instances/VMs via SSH/VNC. Simulation Prototype By creating a simulation prototype in the Oracle VM Virtualbox software, a snapshot (system restore) can be created so that when a problem occurs, only the existing snapshot needs to be restored, without the need for repeat from the beginning.

3.3 Virtual Machine Creation

The application used in this study as a virtual machine is the Oracle VM Virtual Box Manager software

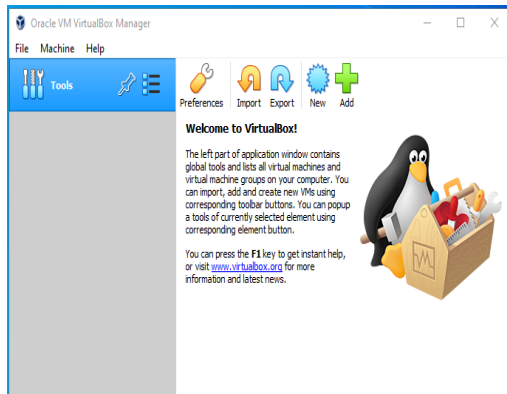


Figure 2. Virtual Machine Creation

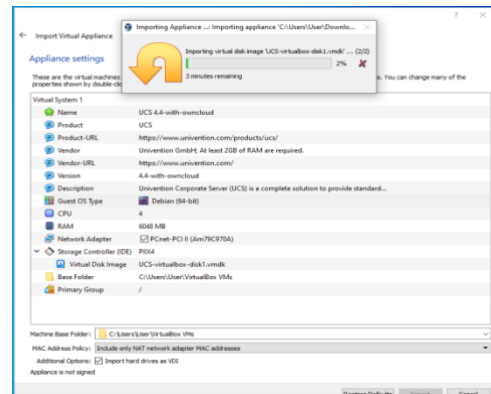


Figure 3. Hardware Configuration and Import

Next is the process of creating a virtual machine for OWNCLOUD which is used to create e-drive/e-storage, here it is necessary to have the stages of the OS and OWNCLOUD system import process that are already available from the OWNCLOUD Provider, before importing a virtual machine device configuration that will be applied to the virtual machine. OWNCLOUD servers. if we see from the picture above the verification process and hardware configuration has been completed then we can continue by clicking the import button in the window and then waiting for the import results, when finished it will reappear on the home screen of the virtual box. The virtual machine creation process has been completed. This is also the same for the creation of the MISTER MISTER Virtual Machine Server of the Ministry of Education and Culture

3.3 Getting started with owncloud

At this stage the process of starting owncloud on a virtual machine server that has been created for owncloud, after we finish the process of making a virtual machine, then we click on the owncloud virtual machine then select start it will appear as shown below [5][13][14].

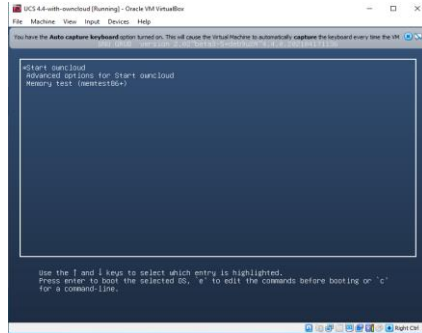


Figure 4. Owncloud boot process Figure

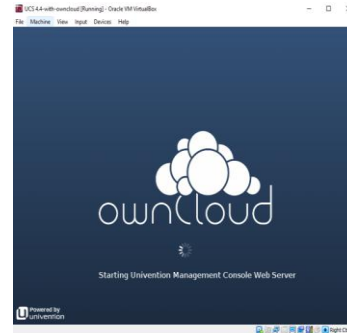


Figure 5. Owncloud starting process

At this stage select start owncloud. Next, the display of the owncloud starting process will appear. If you have finished the starting process, now start the setup from owncloud, at this stage it contains several questions that must be filled in correctly to complete the configuration. Including email to activate online. The process is as in the pictures below

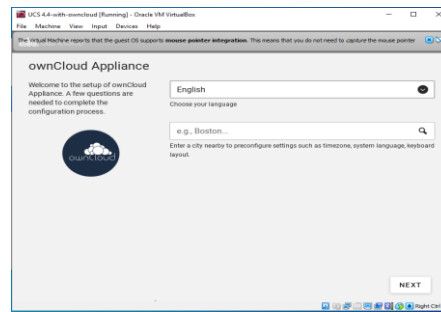


Figure 6. Filling language and time zone.

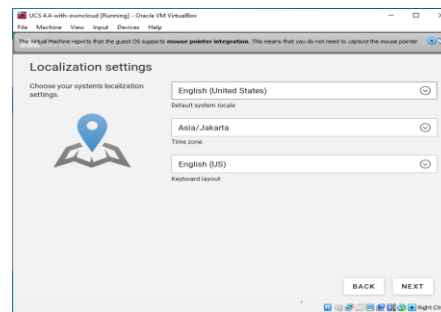


Figure 7. Filling system location.

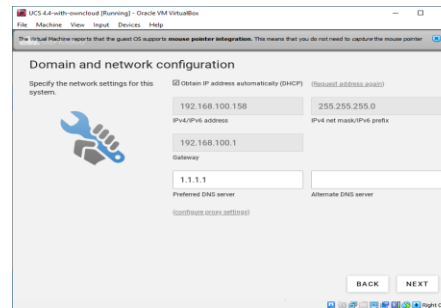


Figure 8. Network configuration on the system

At this stage, before completing the owncloud registration process, verification of the configuration that has been done previously will be carried out, if it is appropriate, we can select next. The next process after successfully preparing the owncloud tool will switch to the information screen, where it is asked to enter the domain in the form of ip address 192.168.100.158 in the browser. This indicates that the owncloud server has been successfully installed on the created virtual machine.

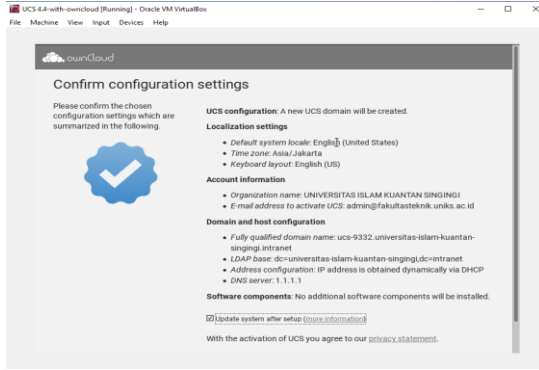


Figure 9. Confirm system configuration

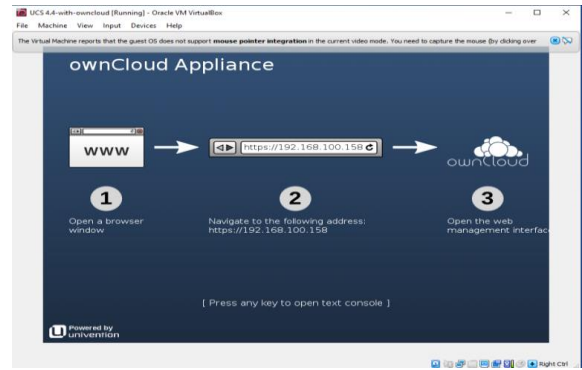


Figure 10. Owncloud Appliance

The next step is when you enter using the domain provided from the server, a request for the activation of the owncloud tool will appear which has been sent to the email that was entered in the previous process, later if you have obtained the license file, it can be uploaded on the "Upload License File" button shown below. this is a file upload view

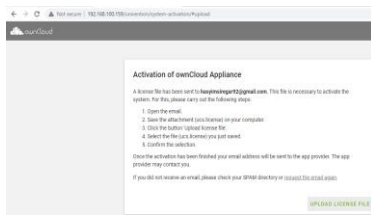


Figure 11. Upload license file.



Figure 12. Portal.

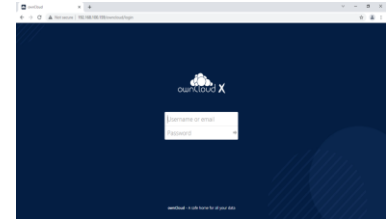


Figure 13. Login

After successfully uploading the license file, you will be directed to the ownCloud Portal which contains the ownCloud application and administration consisting of system and domain configuration, admin manual and instructions for using ownCloud.

After entering the correct username and password, you will be directed to the dashboard from owncloud which is in the image below

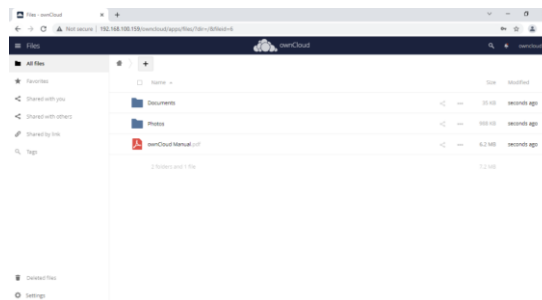


Figure 14. ownCloud dashboard view

On the ownCloud dashboard page, it is almost the same as other online storage media, here we have our own online storage with our own server at no cost and very effective for large users. The facilities provided from ownCloud storage are: files, favorites, share with you, share with other, shared by link and tags. Then can add folders in storage and set permissions.

At this stage we can add users who can later be given access rights to folders that can be viewed, deleted and modified, so that we can make user management based on the rectorate, faculties, study programs and lecturers within the Islamic University of Kuantan Singing. As a sample can be seen in the image below.

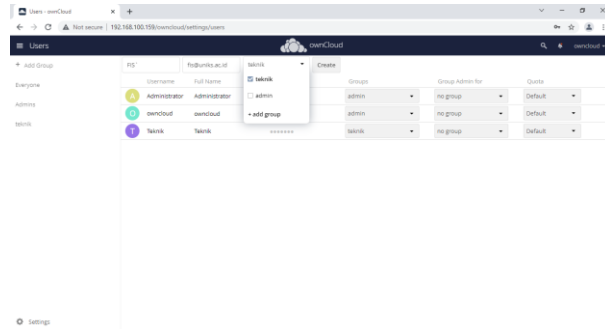


Figure 15. Adding user accounts and access rights

Furthermore, in doing the sharing of folders can be done based on the user, it can be done by selecting the allfiles menu -> click the "+" icon then fill in the name on the screen on the right, then select "sharing" -> "user and groups" then enter the names of users who can access the folder.

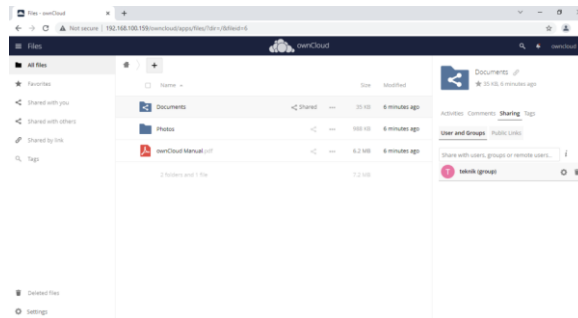


Figure 16. Add permissions for each folder

3.4 Starting Kemendikbud SISTER

The first stage we do is making a virtual machine, this process is the same as before so the author doesn't attach it again, because the sister also imports the system, so we only need to import it from the virtualbox application. After we have finished importing the Sister system from the Ministry of Education and Culture, click "Start", then the virtual machine will boot Linux Ubuntu, wait for a login and password request to appear as shown below.

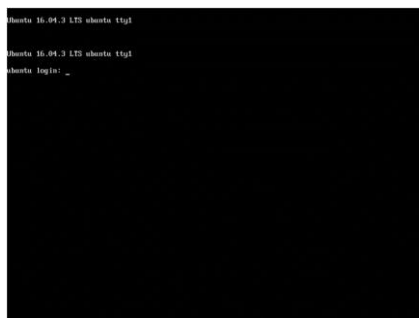


Figure 17 and 18. Login on the local server Sister Kemendikbud

Furthermore, on Figure 17 and figure 18 after entering the ubuntu server, here the command uses the command line so that we do the typing. To see the domain so that we can connect to the application, we need to type the command "if config" then enter.

If we look at the picture above, there are 3 domains or ip addresses to open sister applications, for enp0s3 this is obtained from the NAT configuration on the virtual machine, then enp0s8 is obtained from the host adapter only configuration and lo is the local loopback. Here we take it from enp0s8, the domain is 192.168.56,101. which will be opened in a browser that is not connected to the internet is still a local network can be seen in the image below.

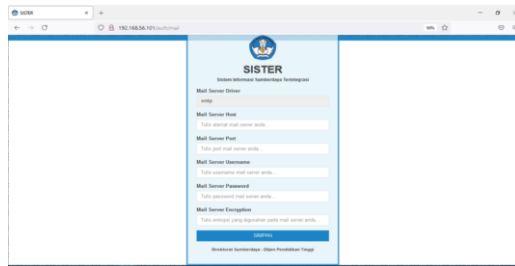


Figure 19. Display of running sister domain ip local in browser

The creation of the virtual machine has been completed and has been successfully installed on the physical server computer.

3.5 Connects to external networks and domain names.

This stage will connect to the internet network so that users can use the sister which was previously only on the local network, now it can be accessed anywhere with an internet connection. The first step we need to do is configure the modem router from the Internet Service Provider (ISP) for the internet service provider. Configure the router modem by logging into the router's modem system via a browser and then typing domain ipaddress: 192.168.100.1. then the display below will appear



Figure 20. Router modem login page

Fill in the username and password according to the router modem, after it is appropriate and successful it will enter the router modem system dashboard menu. then select the advanced menu or gear logo on the left, then a submenu will appear select "IPv4 Port Mapping", press new, then enter the ip address of the sister server or owncloud as shown below



Figure 21. Modem Router initial dashboard display

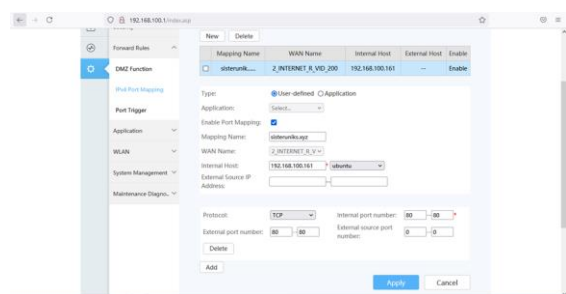


Figure 22. IPv4 Port Mapping

Next, select apply, then the configuration is complete and the physical and virtual servers are ready to be accessed on the internet, but our domain is still an IP address which will be difficult to memorize, so it is then changed to a domain name so that it will be easy for users to remember and access. In this research the author uses a domain service provider from "DomaiNesia" which in this experiment uses a virtual server sister server that will be given a domain name. Previously, you had to login at domainesia.com to configure as shown below.



Figure 23. Domnesia.com account login page

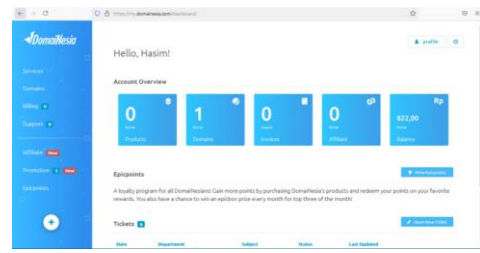


Figure 24. Account Dashboard page

After logging in and succeeding, the main dashboard of the account that is logged in will appear with several menus and information that we are actively using, Then select "Domain" on the menu, the display looks like the following image.

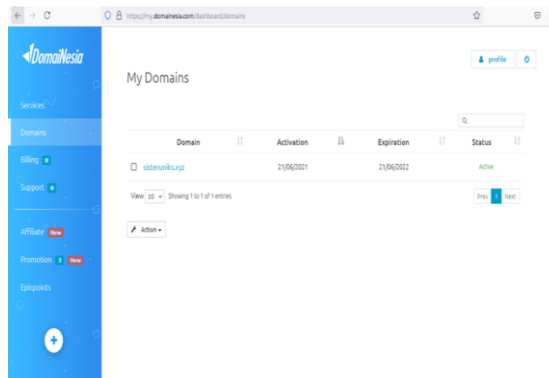


Figure 25. Domain information and domain configuration links

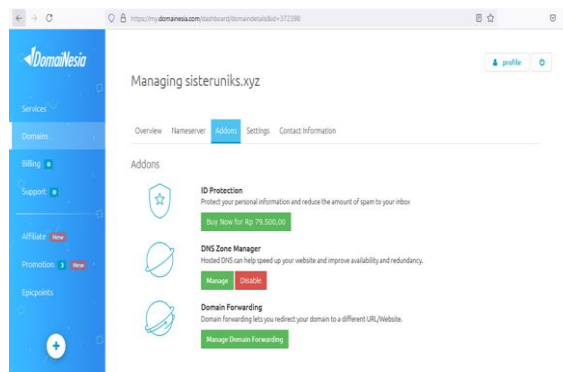


Figure 26. Managing domain sisteruniks.xyz

To configure and connect this domain to the server, click the sisteruniks.xyz domain link after which it will be redirected to the following screen. Next select DNS Zone Manager, to configure Host, Name, TTL, Type and Value. Then the IP address value is filled in the Public IP obtained from the internet service provider (ISP) as shown below

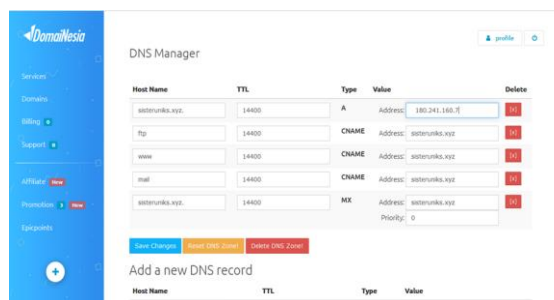


Figure 27. DNS ManagerFor the sisteruniks.xyz domain,

It can be accessed and directly connected to the virtual server that has been created and this stage is the same for us to create an ownCloud e-drive connection for u



Figure 28. Opens in the smartphone browser sisterunikis.xyz

4. CONCLUSION

After the prototype is made, the physical server and cloud-based virtual server are built where one physical server can have several virtual machines / virtual servers that users can access using the internet. With the ownCloud server for use in administration within the Kuantan Singingi Islamic University Community, it is very easy to share documents. There are access rights settings for users and access rights can be given to the chancellor to monitor all administrative activities at UNIKS. Documents or files are located on a standalone server at UNIKS, not on a server provider elsewhere. Building a SISTER server from the Ministry of Education and Culture really helps the activities of lecturers in the UNIKS environment in submitting Lecturer Certification (SERDOS) and administering LKD/BKD for lecturers. Users can access anywhere and anytime. In one physical server is divided into two virtual machines or 2 virtual servers so that this saves money on campus digitization.

ACKNOWLEDGEMENT

Thanks to the Universitas Islam Kuantan Singingi for giving us a grant to support the implementation of this research and the design of cloud-based servers that we hope can be applied to our campus.

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