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DESIGN OF *RADIUS SERVER* ON SERVER NETWORK INTERNET FACULTY OF COMPUTER SCIENCE UNIVERSITY MUHAMMADIYAH METRO

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Abstract
The destination process or otherwise known as routing. Mikrotik Router has provided the management system to hotspot user through separate program package named User Manager. The main problem is the integration of user manager applications into the hardware router Mikrotik considered less effective and flexible because to perform the process of management of the user hotspots must be done on each router located in the hotspot area which will certainly take a relatively long time. From these problems, then created a new system by utilizing external PCRADIUS server as the center of the process of authentication and management of users Mikrotik hotspot.
The purpose of this research is to design radius server on internet server network Faculty of Computer Science University Muhammadiyah Metro. While the final results of this study are implementing radius on the Internet network server Faculty of Computer Science (FIKOM) Universitas Muhammadiyah Metro.

Keywords: Radius Server, Daloradius, Mikrotik Hotspot, User Management Hotspot.

1.0 INTRODUCTION

Mikrotik is now one of the alternates in the world of IT. Mikrotik itself is now widely used by ISPs, hotspot providers, or cafe owners. Mikrotik is an option in the Internet network arena computer proxy will make a reliable network router and equipped with tools and features that are quite men promised in service. Mikrotik also very supportive if there is the difference of network, for example, wireless network or cable network. As for which is the binding force is because of the user's Mikrotik OS and the community very much. In addition, Mikrotik selection due to its configuration easier compared to the servers that the router is not.

The router itself is a very important element in the internet network that we will build, especially with its function as a regulator of the data connection from one computer to another computer. the computer that governs the data path is often we call the router. In addition to having advantages that have been mentioned above still there are advantages that become the spearhead of the rise of the use of Mikrotik is the need for tamping data Mikrotik very narrow is due to the nature of the Mikrotik is DOS, the operation is quite easy to do, and hardware requirements are quite low.

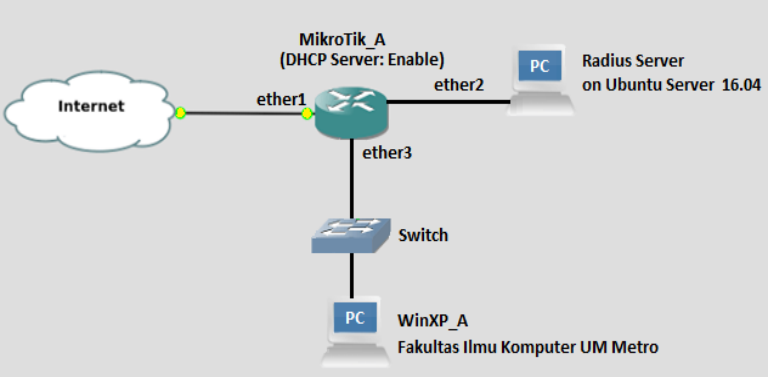
RADIUS is a protocol that developed for AAA (authentication, authorization, and accounting) processes. Remote Access Dial-in User Service (RADIUS), is an access control mechanisms that check and authentication (user authentication) or the user based on the mechanism authentication that has been widely used previously, using the

challenge/response method. RADIUS runs a centralized user administration system. This system will certainly facilitate a task administrator. With this system, the user can use hotspots in different places different by authenticating to the server RADIUS.

You can to authenticate hotspot network users and improve security, and provide convenience to the wireless network users, it can be done by the application or implementation of a radius server on the internet network Faculty of Computer Science (FIKOM) University Muhammadiyah Metro. The radius application uses Freeradius which is a software server based on open source and GPL licensed.

2.0 RESULANTS AND DISCUSSION

In this study the authors make a radius server on the internet network Faculty of Computer Science University of Muhammadiyah Metro, as an illustration of the following topologies the author use as shown below:



Picture 1. Network Topology

1) USE OF VIRTUAL BOX APPLICATIONS AS A VIRTUALIZATION OS MACHINE

Oracle VM VirtualBox is a virtualization software, which can be used to execute "additional" operating systems within the "main" operating system. For example, if someone has an MS Windows operating system installed on his computer, then that person can also run other desired operating systems in the MS operating system Windows. This function is very important if you want to test and simulate the installation of a system without having to lose the existing system. In this study, the author installs 3 pieces of an operating system on the virtual box that is: Ubuntu Server, Mikrotik _A _Center, WinXP _A.

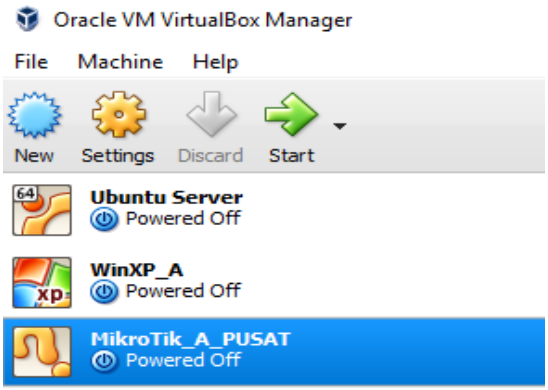


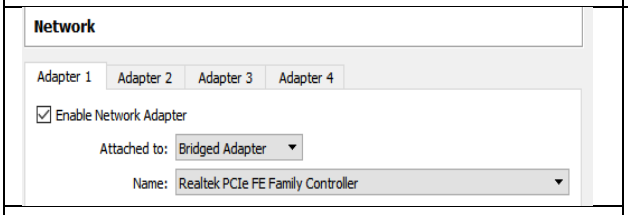
Figure 2. Use of Virtual Box Applications As OS Virtualization Engine

After researchers install an operating system on VirtualBox it does not mean that the virtual operating system becomes a system that lives alone just like a display. Operating System can

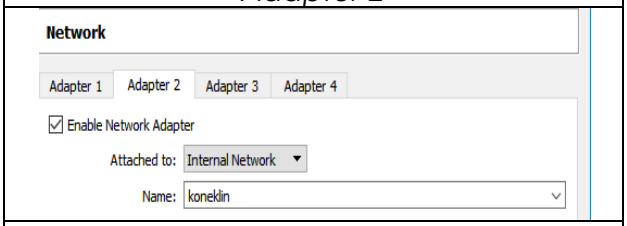
run as the normal computer that can be connected to a computer network. there are even some network mode options that can be selected to apply.
To configure network mode on VirtualBox can be done on the Settings menu (after selecting OS) then Network then adjusts the option Attached to can be seen as in the following picture.

Network Settings On OS: Mikrotik_A_Center

Adapter 1



Adapter 2



Adapter 3

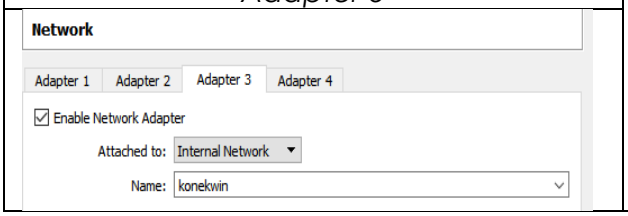


Figure 3. Configuration Mikrotik_A _Center

Network Settings On OS: WinXP_A

Adapter 1

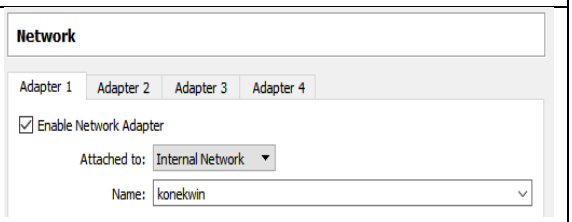


Figure 4. Configure the XP_A

2) UBUNTU SERVER CONFIGURATION

Run Ubuntu Server, then we configure the IP Address, by the way, edit file Interfaces located in /etc/network folder. Do go into root mode first to get permissions.

Figure 5. The Superuser permissions command

Then using the command nano /etc /network/interfaces, then the window will appear the interface file then edit the file like this:

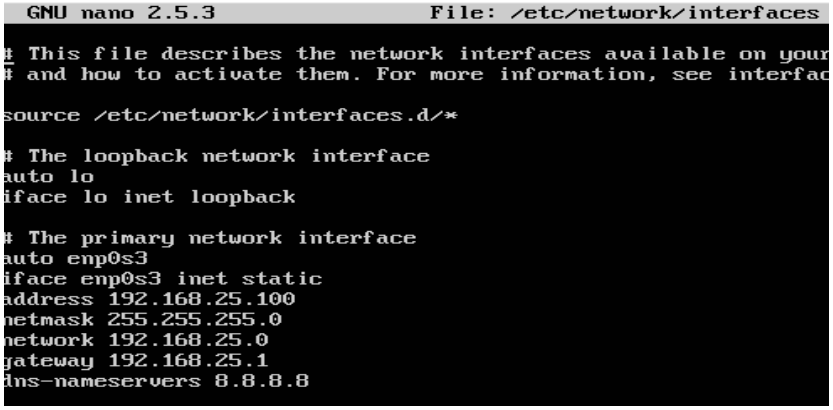


Figure 6. Configure IP Address

Then the configuration is saved, then restart the network with the command:
/etc/init.d/networking restart
After doing the IP rescue Address, the next step is to see the configuration results with the command # ifconfig

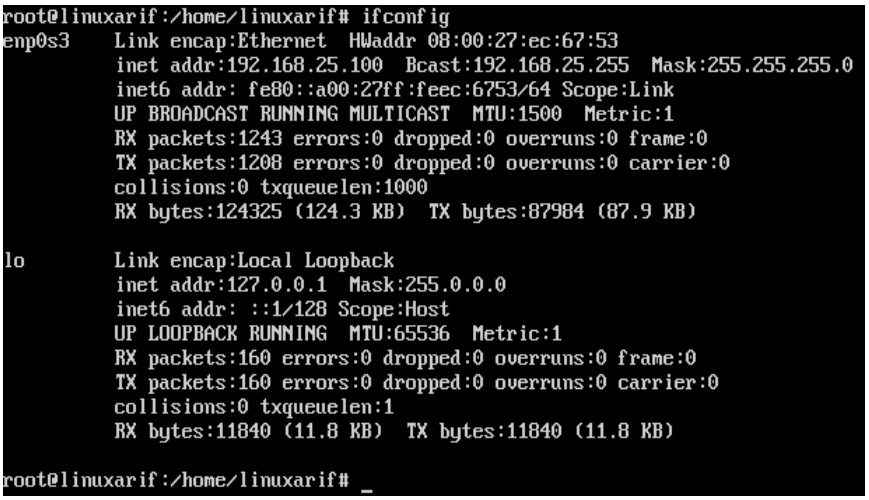


Figure 7. Viewing the Config IP Address

Ping to IP Gateway on the router Mikrotik with ping command 192.168.25.1

Figure 8. IP Mikrotik IP ping command

When configuring IP Address already completed with installation of the radius package application (mysql-server, mysql-client, freeradius, freeradius-mysql, freeradius-utils, freeradius-common)
As for the command it is:
apt-get install mysql-server mysql-client freeradius freeradius-mysql freeradius-utils freeradius-common

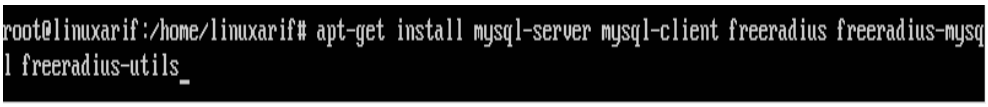


Figure 9. Installing the Radius Program Package

Followed by installing phpmyadmin package
apt-get install phpmyadmin

Figure 10. Phpmyadmin Program Package Installation

To view the PHP install version using the command #php –v

Figure 11. Commands Viewing php Version

Configuration is continued for MySql at start with make Database. Login to MySql with # mysql -u root -p command.
Then enter the user password that has been made before and after that create the database radius:
#create database radius; (or via phpmyadmin → 192.168.25.100/ phpmyadmin)

Then be incorporated a radius #use's instructions. To download the database using radius. And import database schema files FreeRadius to the radius database.

sudo su
mysql -u root -p radius </etc/freeradius/sql/mysql/schema.sql

Figure 12. Import database command

Information:
mysql -u {name_user} -p {database name just created} < {sql data source to be inserted}

After creating the database and importing the table radius scheme, the next step fills the data in the radcheck table. This table radcheck serves as the login data of internet users Faculty of Computer Science UM Metro.
Insert Username and Password into radcheck table :
mysql -u root -p
> use radius;
> insert into radcheck (username, at tribute, value) VALUES ('lona ', 'Password', ' lona ');

The next stage is k onfigurasi FreeRadius, by editing the file sql.conf.
nano /etc/freeradius/sql.conf

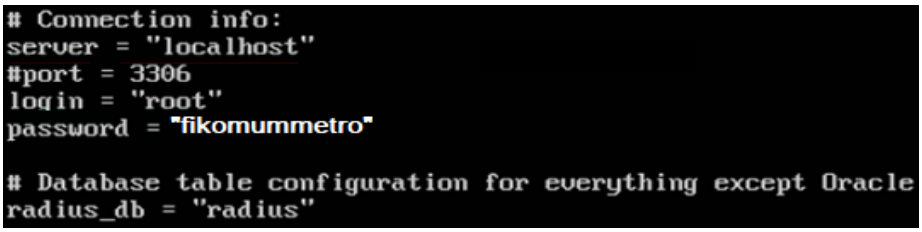


Figure 13. Configure file sql.conf

On the server just let localhost, to login fill it with root, then for the password it is a password mysql already in set at the moment installation before.
After that open and edit the default file , use the command:

nano / etc / freeradius / sites-enabled / default

uncomment or uncheck # in sql writing in Authorize , Accounting , Session , and post-auth sections .

Figure 14. Uncomment Sql in the Authorize section

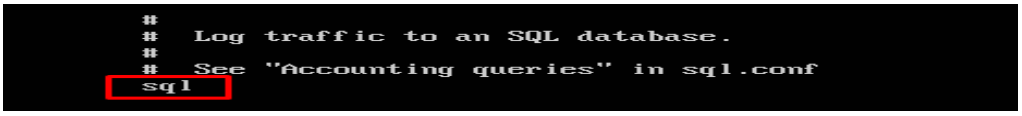


Figure 15. Uncomment Sql in the A ccounting section

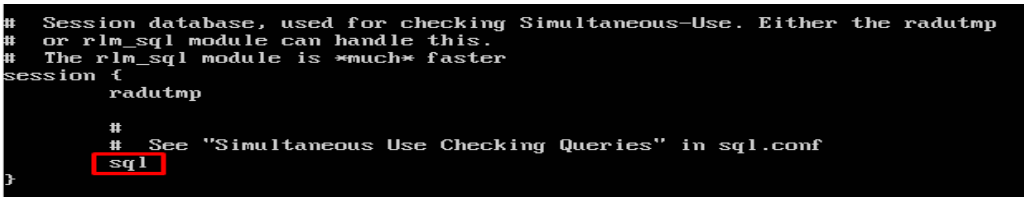


Figure 16. Uncomment Sql in the Session section

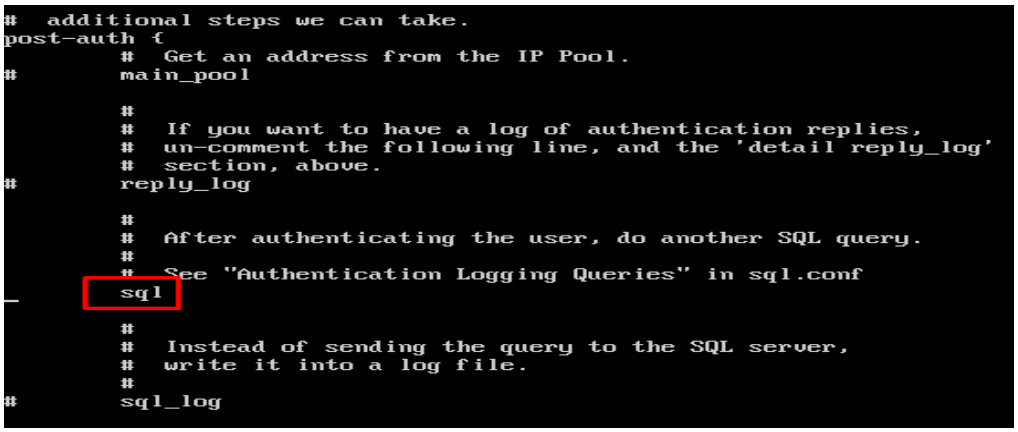


Figure 17. Uncomment Sql in the post-auth section

Then open and edit the file radius.conf with pe r intah:
nano /etc/freeradius/radiusd.conf
Uncheck # on $ INCLUDE sql.conf

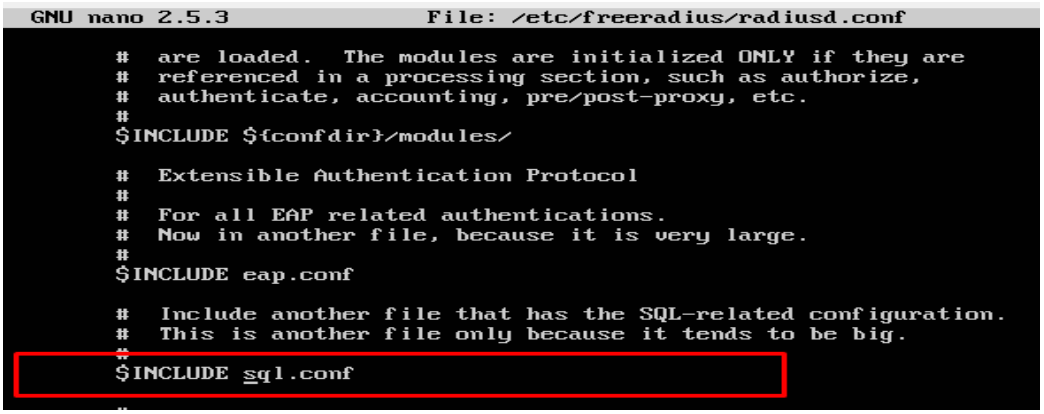


Figure 18. Configure the file radius.conf

After that open and edit files clients.conf

nano /etc/freeradius/clients.conf
Add this script at the very bottom of the file.

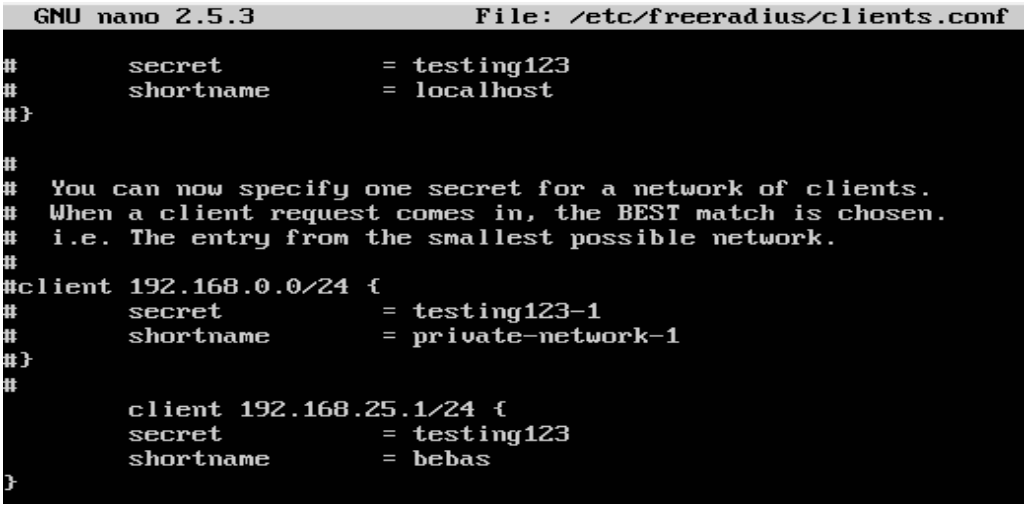


Figure 19. Configure file client.conf

Once saved, first turn off the service freeradius with the command :
service freeradius stop

Then debug freeradius
sudo freeradius -XXX

Wait until the process is complete. If there is no error run the service its freeradius
service freeradius start

Or can use the command :
service freeradius restart.

Figure 20. The command restarts service radius

Make sure at restart does not appear error. follow by testing FreeRadius using radtest with write command:
radtest lona lona 127.0.0.1 0 testing123

If you already have Access-Accept from host 127.0.01 port 1812, then FreeRadius is already integrated with MySql and is running well.

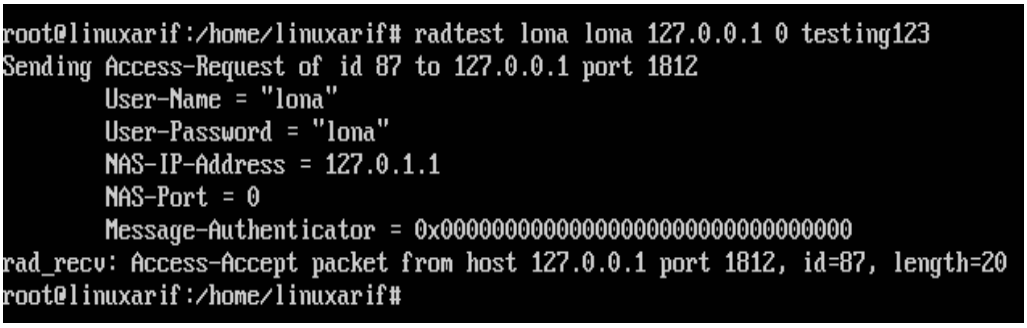


Figure 21. Freeradius test

3) CONFIGURATION MIKROTIK_A_CENTER

To set up a network traffic on the mikrotik operating system will be set via Winbox. Winbox is a utility used to remotely to our mikrotik server in GUI mode . If to configure mikrotik in text mode via PC itself, then for GUI mode done using winbox application through client computer.
To remotely mikrotik via winbox can connect based on MAC Address or IP Address.

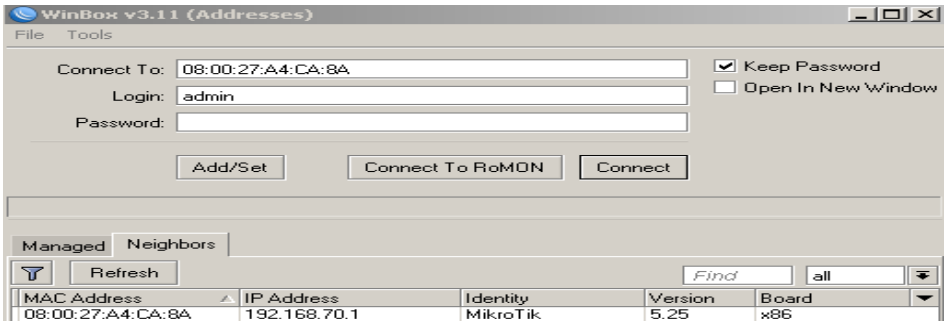


Figure 22. Remote Mikrotik with MAC Address

After successful login, proceed with Setting Interface List it. On the Interface List entry on the Ethernet tab and rename Ethernet for easy to remember (ether1, koneklin, konekvlan, konekwin)

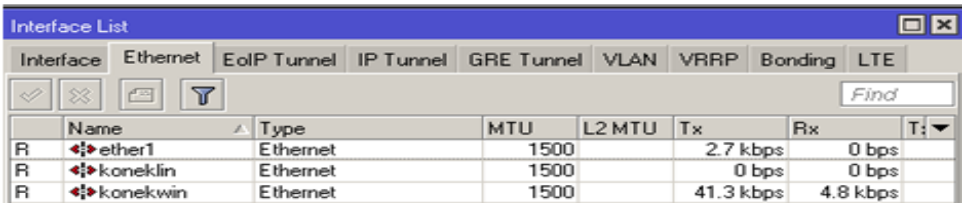


Figure 23. Display Interface List Mikrotik OS

Then after that proceed with setting IP Address on the mikrotik router. The step is done by selecting the (+) and fill out the Address, Network, and Interface.

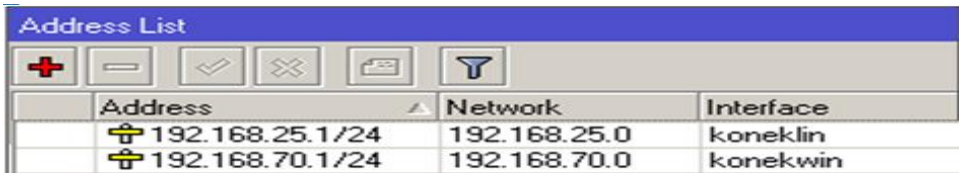


Figure 24. View setting Address List

The next step is to create a DHCP Server. DHCP stands for Dynamic Host Configuration Protocol is a service that automatically assigns an IP number to the computer that requests it. The computer that assigns this IP number is called DHCP server, whereas the computer that requests is called DHCP Client. As for pace that is by selecting DHCP Setup button and are directed to the interface device konekwin.
Starting with Hotspot Setup configuration, in the hotspot interface select the interface that will be created hotspot / DHCP Server (konekwin)

Figure 25. View Hotspot interface settings

In the Local Address of Network, fill in the IP Address as Gateway by the client

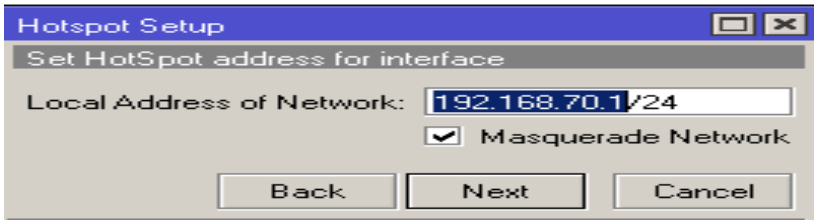


Figure 26. View setting Hotspot Address

For scope or poll, IP leased to the client is 192.168.70.3 - 192.168.70.254

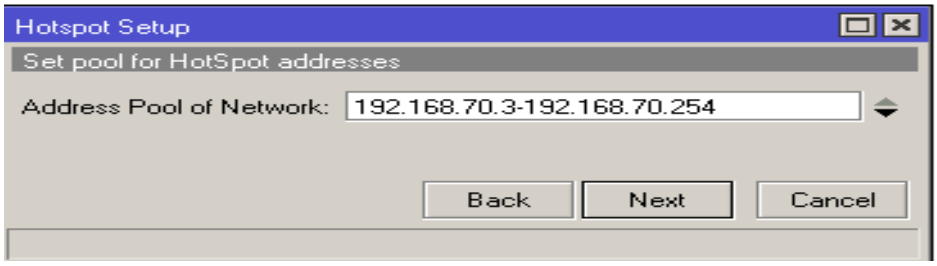


Figure 27. View setting Pool Address Hotspot

For DNS Server configuration fill in DNS owned by Google 8.8.8.8 or 8.8.4.4

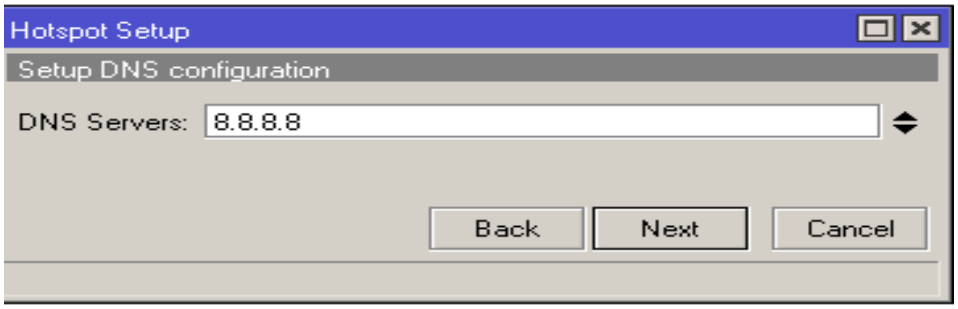


Figure 2 8 . View Google DNS settings

On Hotspot Server Profile in the Login tab checklist login By HTTP CHAP. Please note that HTTP CHAP is a standard method that includes CHAP challenges on the login page. Challenge md5 hash chap will be used with the user's password to calculate the string to be sent to the gateway hotspot.

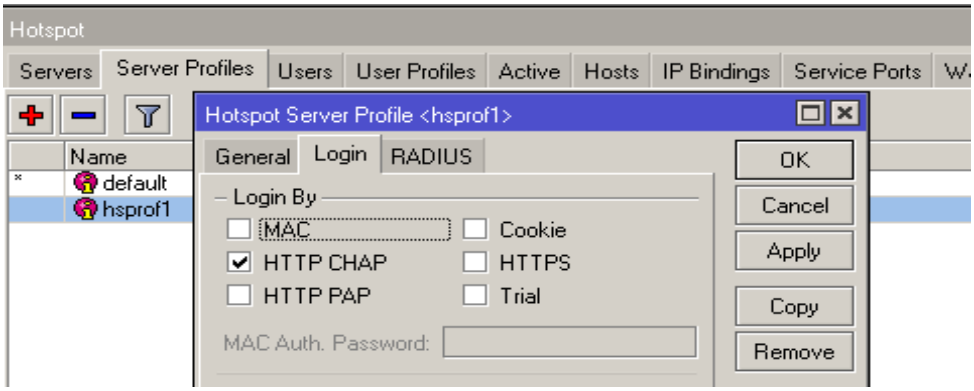


Figure 29. View setting Http CHAP Hotspot

On the RADIUS tab on the hotspot server profile enable checklist use radius.

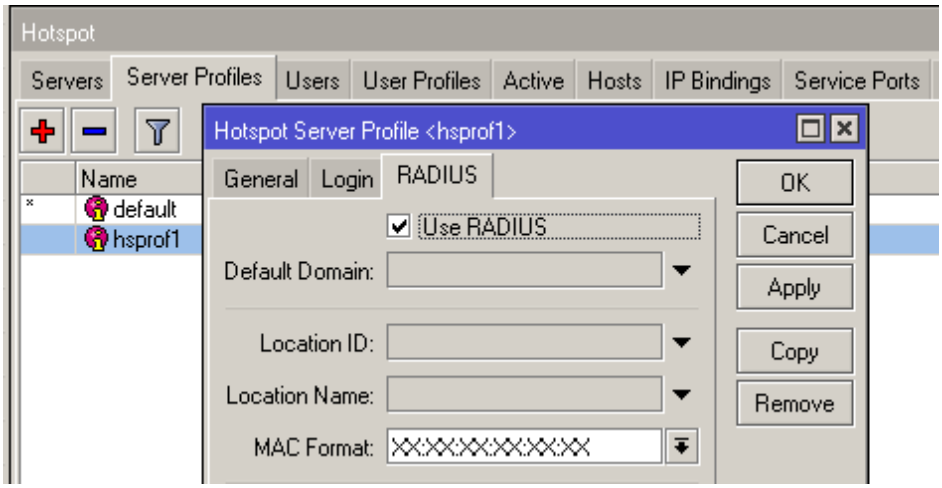


Figure 30 . View configuration hotspot radius

U to see the hotspot configuration results created can click hotspot1 on the server tab

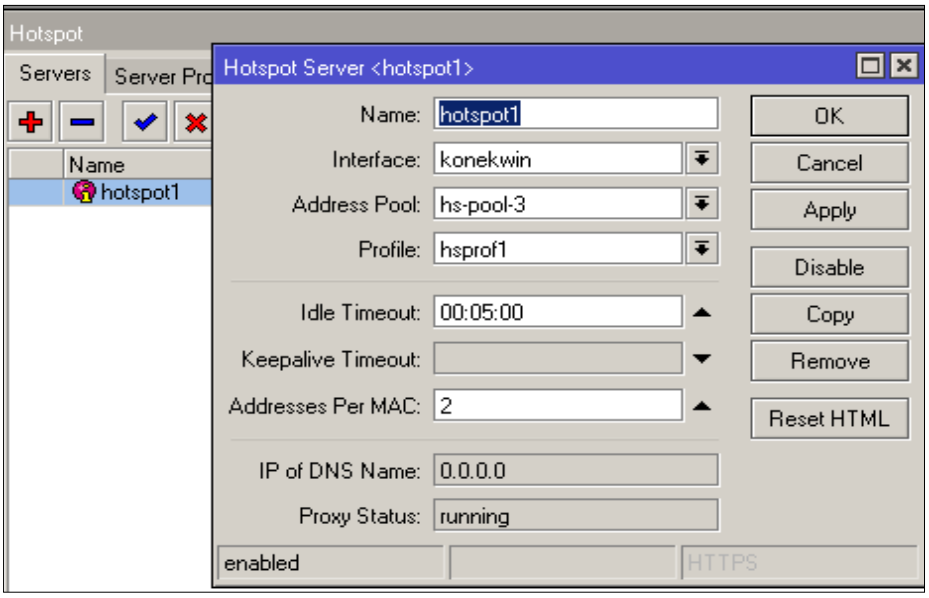


Figure 31. View hotspot configuration results

To view or edit the DHCP pool can be done by entering on IP menu > Pool and Please note that IP Pool used is 192.168.70.3 - 192.168.70.254.

For Route List it will appear automatically that definitely note that the interface is reachable.

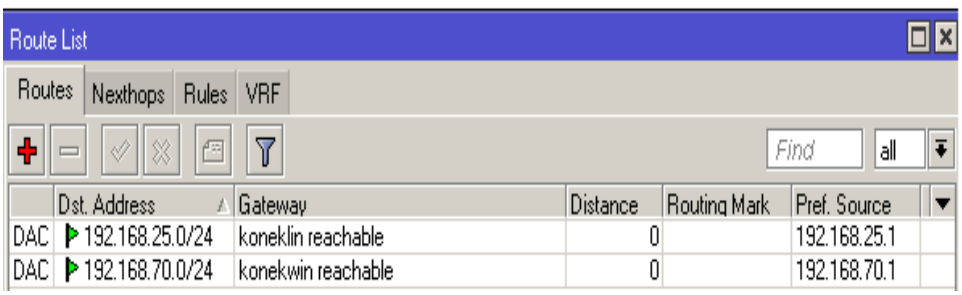


Figure 32. View setting Route List

Then proceed with setting up NAT. NAT (Network Address Translation) is a method of connecting more than one computer to an Internet network using a single IP address. The steps select on Firewall menu then input on NAT Tab. In the dialog box Nat Rule on general tab fill chain: srcnat.

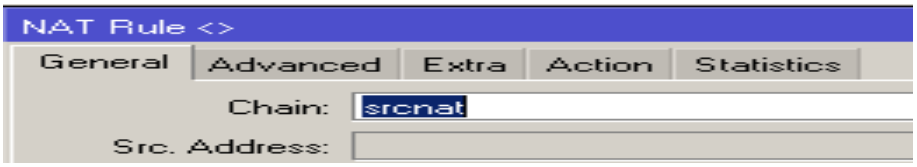


Figure 33. View setting NAT Rule

Next please click Action Tab and select masquerade.

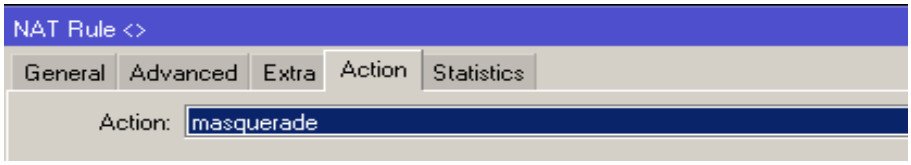


Figure 34. View setting Masquerade

In order for server radius that is on the server ubuntu can be associated or synchronized with the server Mikrotik, it is necessary to add the configuration on the server side Mikrotik. As for the steps to configure it is clicked the menu Radius, and click (+) to add the service.

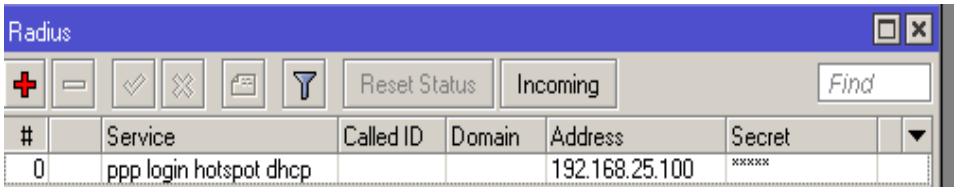


Figure 35. View setting Radius

On the General tab in the server radius menu fill in Address: Linux Server IP Ubuntu as well as on Secret: testing123 (secret at the time of radius configuration on the server ubuntu)

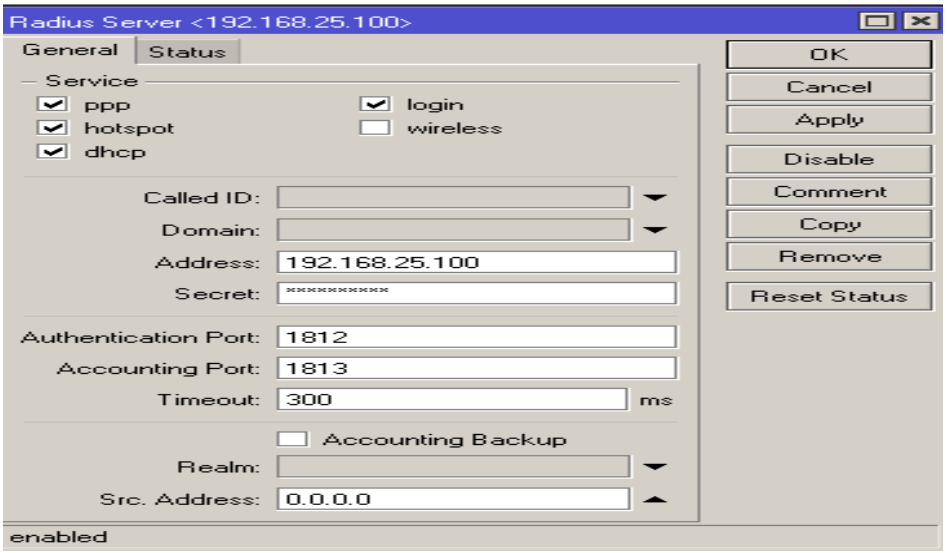


Figure 36. View setting Radius

4) DALORADIUS CONFIGURATION

Daloradius is one of the RADIUS server management application, using daloradius admin can perform user, group, profile, accounting and billing management. Daloradius uses the interface web and accessed by the browser on the client side.

In this study, the authors utilize daloradius database, Import tables for daloradius on database server radius.

mysql -u root -p radius <mysql-daloradius.sql>

Then makes viewing web interface version of the author's own, do not use the web interface daloradius. In order for the web interface daloradius can be run then do the configurations like below:

Add script:

DocumentRoot /var/www/

<Directory /var /www />

Options Indexes FollowSymLinks MultiViews

AllowOverride None

Require all granted

</Directory>

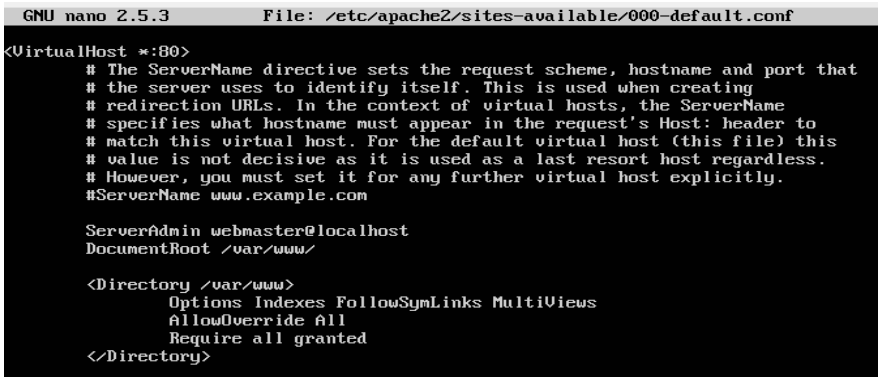


Figure 37. 000-default.conf file configuration

The <Directory / path / to / directory> and </ Directory > tags define the access permissions, directive - directives and options to apply to a directory.

By default, the root directory (/) is restricted access by apache (for security) by only using Directive Options and AllowOverride. For root directory directive option only features FollowSymLinks and DirectiveAllowOverride directive in set None.

Followed by adding again to apache2.conf file

Add script:

<Directory /var/www>

Options Indexes FollowSymLinks

AllowOverride None

Require all granted

</Directory>

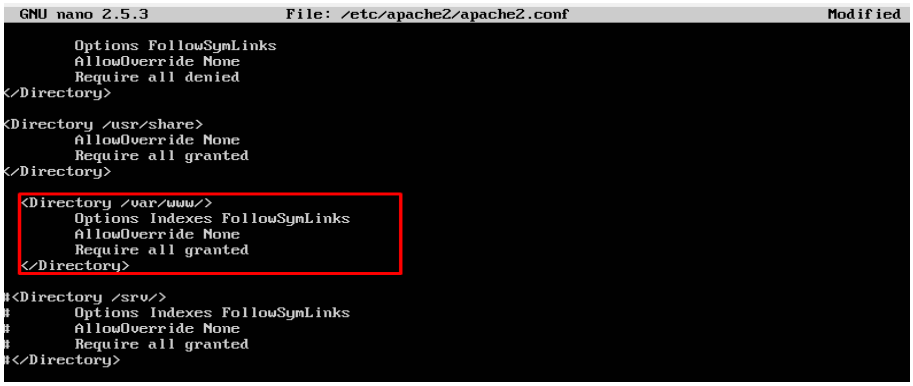


Figure 38. Configuring file apache2.conf

After that set the permissions of www folder, with command **chmod 775 www**. Need to know chmod 755 only owner can read, write and execute it and the group and its other can only read and execute but have no right to write.

Continued by configuring the file web interface daloradius use bitvise application for a remote. In the fill port Host: 192.168.25.100, port: 22, the fill username: linuxarif and the password: password its contents. If successful ma ka new window will appear FTP. Go to file /var /www /daloradius and doit uploaded web. Please configuration file htaccess.

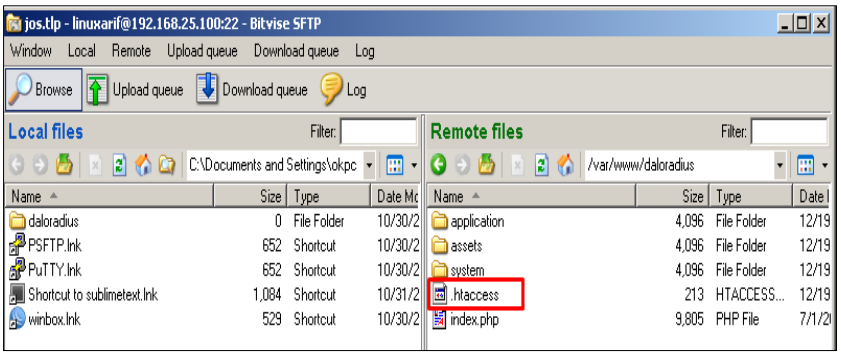


Figure 39. Bitvise SFTP Application

Add on second line:
RewriteBase /daloradius /

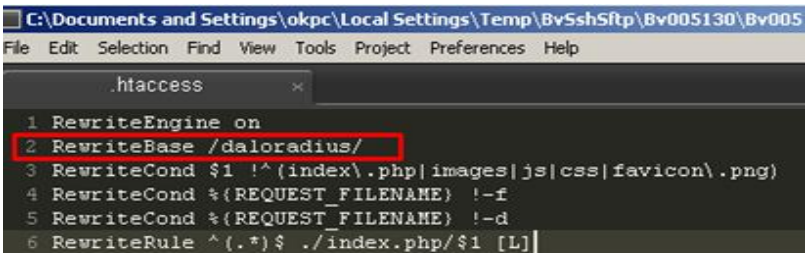


Figure 40. Configure htaccess on the web

Open and edit the database connection file in the file:
/var/www/daloradius/application/config/database.php and then configure the database as below:

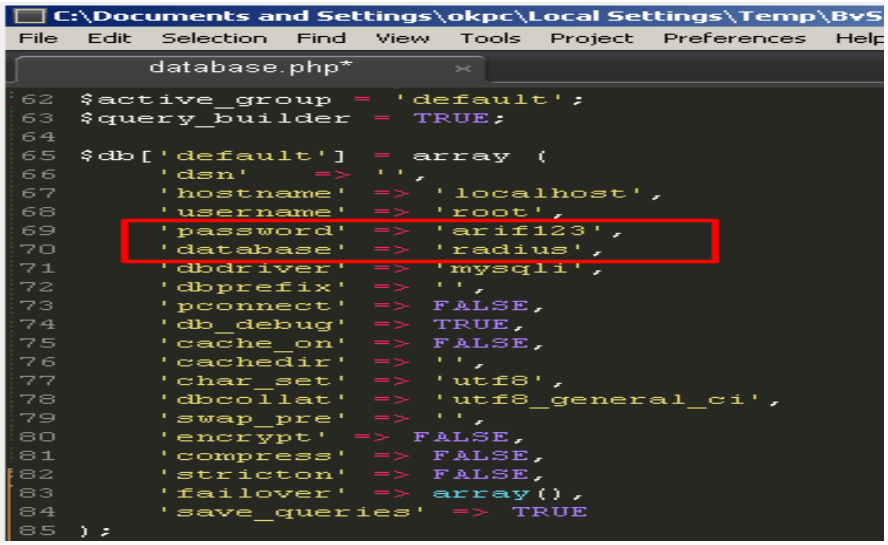


Figure 41. Profile Configuration Database Connection

The last step is to show script on the file **error_reporting (0);**
/var/www/daloradius/application/config/config.php

```
 GNU nano 2.5.3        File: /var/www/daloradius/application/config/config.php

<?php
error_reporting(0);
defined('BASEPATH') OR exit('No direct script access allowed');
```

Figure 42. Configuration file config.php on web files

The function of error reporting (0) is a way of controlling if an error occurs.

3. TESTING

The protocol setting (IP Address) is performed on the client . DHCP client requests the server to provide ip, before the client get a dynamic IP, the client prior to requesting a specific server on the network, and the server checks against a client requesting an IP dynamic, if appropriate and allowed the new server sends to the client IP.
Computer network users at the Faculty of Computer SCIENCE UM Metro in the settings automatically with the hope of gaining Automatic IP of the server Mikrotik .

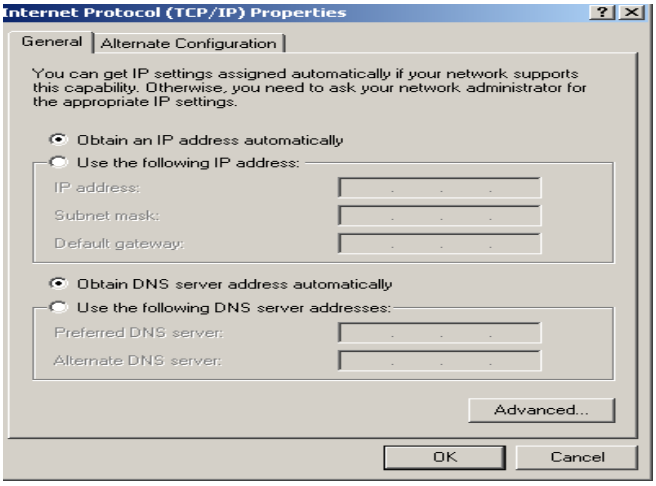


Figure 43. Setting IP Address Client Automatically

After waiting a few moments then such a client computer asked to login hotspot. Can be seen in address hotspot address is **192.168.70.1/login**

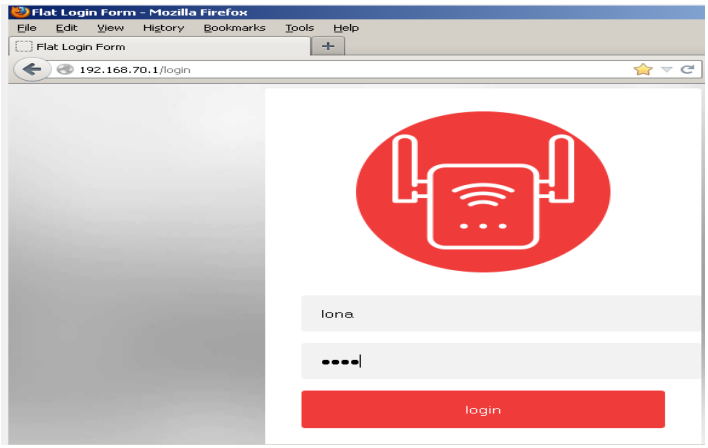


Figure 44. Hotspot login view By PC Client

Fill in the user and password that has been created in the previous radius configuration that is username (lona), password (lona) then click login. If the test is successful it will show Welcome Lona and logout button appears.

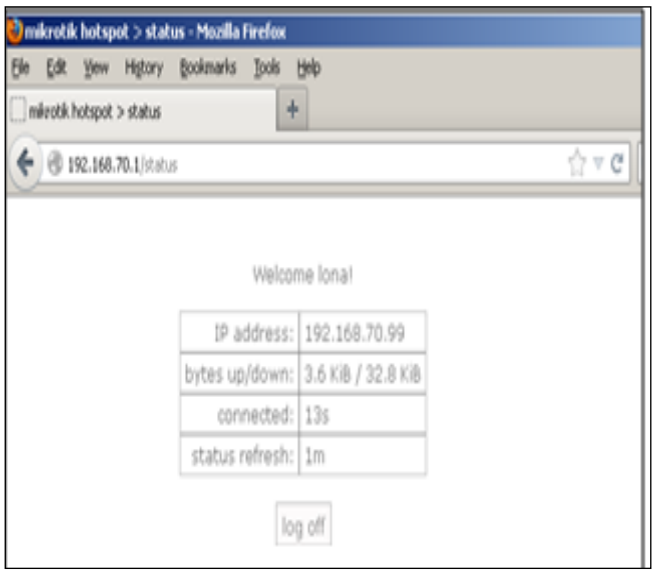


Figure 45. Client computer successfully login hotspot

From the picture above can be seen user network Faculty of Computer UM Metro got IP Address automatically, that is got IP Address : 192.168.70.99.
Continue by testing the ping to the central gateway IP with the command ping 192.168.70.1.

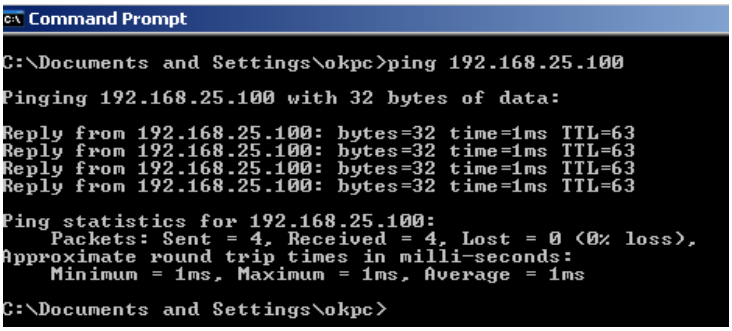


Figure 46. The ping command to the ubuntu linux server IP from the client computer

The picture above shows the test results of connections that are connected or successful.
Also need to do the test connection to IP Ubuntu Linux Server Address with the command # ping 192.168.25.100.

It can also be proved by the existence of a client that is connected to the server network internet Center. To see it open mikrotik via winbox, then on the menu select Hotspot menu and go to the Hosts tab.

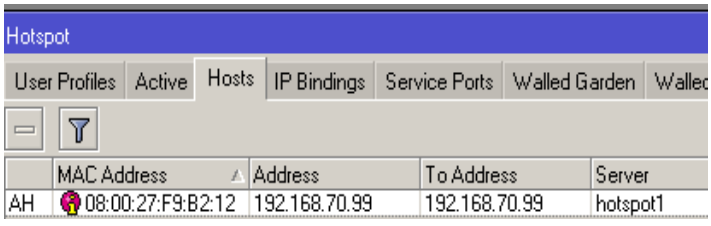


Figure 47. User Hotspot that Active look on Mikrotik router

If you want to monitor or see the connected client failed or successful it can through the Mikrotik log. By default RouterOS Mikrotik will record all activities and processes that occur in the router and keep records (Log) on the RAM. List of records (Log) can be seen in the menu/log. Logs that are in this menu / log will be lost once we restart the router because the log is only stored on RAM. In network troubleshooting will be more effective by previously analyzing the logs of the Router to find out what processes have occurred. So it will be easier in mapping the problem and determine the solution. Too much information we get if we just look at the menu / log , so it may be difficult for analysis. For that we can make the topic of what will be recorded and will be stored or displayed where the log.

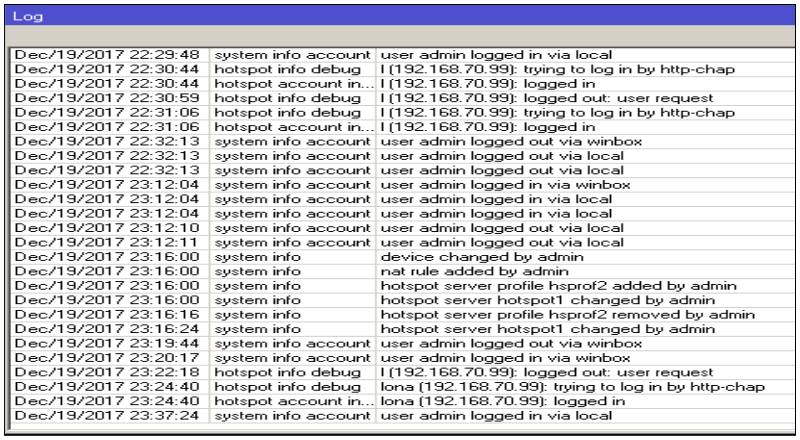


Figure 48. Mikrotik log display

In addition this study will also test web daloaradius which functioned as a hotspot user management more dynamic. Here is the daloradius display that has been prepared by the author. The database still uses the default from daloradius but for the web designed by the author using pure php which essentially includes entering data and displaying user data. After login there facility Add User, or User Leverage and Edit-delete User,

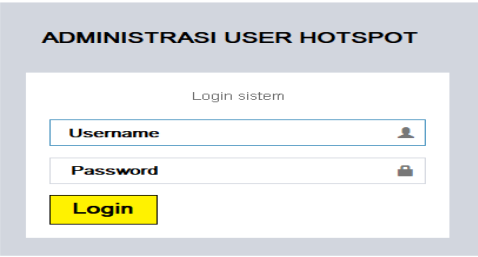


Figure 49. Administration User Hotspot

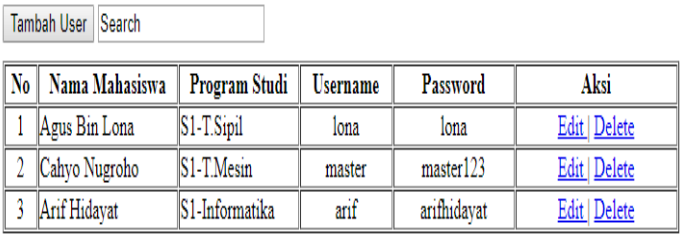


Figure 50. User Management App View Hotspot

Click Add User it will appear a new user registration form hotspot.

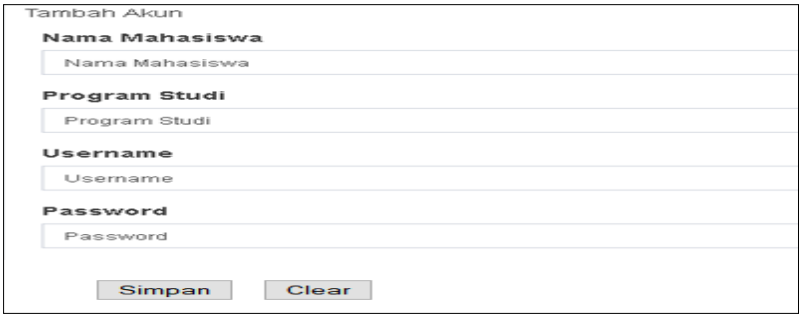


Figure 51. Add Account View in User Management App Hotspot

3.0 CONCLUSION

3.1. Conclusion

Based on the discussion, it can be concluded things as follows:

1) From the research resulted in a design and implementation of *Radius Server* on the internet server network of Faculty of Computer Science (FIKOM) Muhammadiyah University of Metro.
2) Authentication system and *user Mikrotik router user hotspot* management can be proven done using *PC RADIUS server* by utilizing PHP program as tools to process management of the data used user for the authentication process on the service hotspot, where the data is stored in the MySQL database on the RADIUS server.
3) From the results tested on user-based radius hotspot server authentication system that is tested on FIKOM UM METRO can surf successfully and results from an interview with technicians FIKOM Network As user internet proves interaction very quickly.

3.2. Suggestion

Suggestions that can be submitted for the development of this network, among others:

1) Require the optimization of resources on the network connection system to be well maintained.
2) The need for designing a more complex network topology that uses multiple routers, so that the efficiency level of user hotspot management process using external RADIUS can be seen.
3) The number of *hotspot users* used inside authentication testing preferably plus for system performance really look.

REFERENCES

[1] Luke, Jonathan. (2006). Computer Networking, Graha Ilmu, Jakarta.
[2] Kustanto, 2008, Building an Internet Server with Mikrotik OS, Gava Media.
[3] Norton Peters. (1999). *Complete Guide to Networking. Sams* , India.
[4] Hidayat, A. (2017). Configure Cloud Storage Server on LAN Network at LAB Diploma III of Information Management of UM Metro. *MIKROTIK: Journal of Information Management* , *7* (1).
[5] Hidayat, A. (2016). Implementation of Control Panel Hosting with VestaCP on Intranet Server LAB Multimedia D-III Information Management UM Metro. *MIKROTIK: Journal of Information Management*, 6 (2).
[6] Hidayat, Arif, Self-Service Learning Guide Server Network Administration Using Ubuntu Linux, CV. Laduni Alifatana, Metro Lampung (ISBN: 978-602-1397-56-5)
[7] Hartono, Jorgiyanto, 1999, Introduction of Computer, Andi Offset, Yogyakarta
[8] Winarno and Smitdev, 2014, Creating Computer Networking in Windows and Linux, PT. Elex Media Komputindo, Jakarta.
[9] Sinarmata, Janner, 2006, Computer and Information Technology, Andi Offset, Yogyakarta.
[10] Computers, Wahana, 2013, Safe & Healthy Internet, Andi Offset, Yogyakarta
[11] Computers, Wahana, Network Administration with Ubuntu 9, Andi Offset, 2009.
[12] Sutanta, Edy, *Data Communications and Network*, Graha Ilmu, 2005.
[13] Sugeng, Winarno, Computer Network with TCP / IP, Modula, 2015.