PORTABLE MAIL SERVER USING RASPBERRY PI

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
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PORTABLE MAIL SERVER USING RASPBERRY PI

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Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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2015

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ABSTRACT

Mail server is a server that being use for the processing of the e-mail delivery across the network. Using the mail server, e-mail can be sent and receive by the client. Mail server acts as the electronic mailbox that will store the e-mail that have been receive from the client. To retrieve the e-mail, client needs to get it from the mailbox. In the exiting environment, PC is being used as a mail server. Using PC as a mail server is not an option before. This is because only PC can acts as a server. But now day PC is only as an option, in this research, Raspberry Pi is used as the mail server. Raspberry pi is a microprocessor that has a size of a credit card that can works as a normal computer. Raspberry Pi is being used to overcome the problem with the existing mail server. The cost for built up a mail server using PC is quite expensive because its need a few number of hardware to be used. To setup a mail server using Raspberry Pi is not expensive because the hardware that only need is a board of the Pi. Raspberry Pi also overcomes the problem in term of portability. PC is not portable because of the size that quite big compare to Raspberry Pi that has a small size. In this research, Postfix and Dovecot services will be used to configure the Raspberry Pi as mail server. The analysis of the performance between Raspberry Pi and the existing mail server have been done in this research to prove that the Raspberry Pi also can works as a mail server.

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ABSTRAK

Server email adalah server yang digunakan dalam memproses dan menghantar email melalui rangkaian internet. Menggunakan server email, pengguna dapat menghantar dan menerima e-mail. Server email bertindak sebagai peti surat elektronik yang menyimpan email yang diterima daripada pengguna. Untuk membaca email, pengguna boleh mendapatkanya daripada peti elektronik tersebut. Pada masa ini komputer digunakan sebagai server email. Hal ini kerana hanya komputer yang mampu berfugsi sebagai server email. Tetapi pada hari ini, komputer bukanlah satu-satunya pilihan unruk dijadikan server email. Dalam kajian ini, Raspberry Pi akan digunakan sebagai server email. Raspberry Pi adalah mikropemproses yang mempunyai size sekecil kad kredit dan mampu berfungsi sama seperti komputer biasa. Raspberry Pi digunakan untuk mengatasi masalah yang ada pada server email biasa. Kos untuk menyediakan server email menggunakan komputer adalah tinggi dan mahal kerana ia memerlukan beberapa peralatan yang khusus. Jika menggunakan Raspberry Pi sebagai server email, kos yang diperlukan adalah lebih murah kerana hanya papan Raspberry Pi sahaja diperlukan. Disebabkan saiznya yang kecil, Raspberry Pi adalah lebih mudah digunakan dan ia juga mudah alih. Hal ini telah menyelesaikan masalah yang timbul apabila menggunakan komputer sebagai server email kerana komputer memerlukan ruang yang banyak dan tidak mudah alih. Dalam kajian ini juga, analisis dari segi kebolehan berfungsi turut dihasilkan. Hal ini adalah untuk membuktikan bahawa Raspberry Pi juga mampu untuk berfungsi sebagai server email sama seperti komputer biasa.

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CHAPTER I

INTRODUCTION

1.1 Project Background

Mail server is a server that handles the delivery of an e-mail across the network. The mail server mechanism consists of Mail Transport Agent (MTA) that will acts as the post office (sort and handle transportation of e-mail), Mail Delivery Agent (MDA) as the mailbox that store message receive by the server and Mail User Agent (MUA) the software use to retrieve e-mail from the server. Mail server use Simple Mail Transfer Protocol (SMTP) to send the e-mail over the internet.

Raspberry Pi is a low cost, credit-card sized computer that capable of doing everything that a desktop computer can do. The main goal of this product is to advance the education in the field of computers. The Raspberry Pi primarily uses Linux-kernel-based operating systems. But it also works in different operating system such as Firefox OS and Android.

In this project the Raspberry Pi will be set as an e-mail server. The e-mail server will be act as the virtual post office that consists of a storage area where the e-mail is stored for local users. This project consist of three main phase which are first to set the Raspberry Pi as the e-mail server using the Postfix software. Next, installing the Dovecot as the mail delivery agent and the last one is to test the e-mail server using two PC by sending and receiving an e-mail. In the other hand, this project also will how raspberry pi can works as the e-mail server and how it can cut the cost for setting up an e-mail server.

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1.2 Problem Statement(s)

Raspberry Pi is a new thing to be explore as an e-mail server. Because of that there is lack of information about how the Raspberry Pi can be use and how it work. Beside that to setting up the mail server many equipments such as hardware for the server will be needed. The equipments are computer (PC), a CPU, monitor, keyboard and others more devices. By explore the usage of the Raspberry Pi, it actually can help to explain more deeper about what is the Raspberry Pi and how it can works as the mail server.

The cost for having the PC as the e-mail server is expansive because the price for the hardware is more than thousand Ringgit. An e-mail server setup using the PC produce a noise, need a lot of space to place and need a higher power consumption because it need to be switch on 24/7 and it also not a portable server. Using Raspberry Pi as the server it can be the portable server because of the size is small. In this project, it will show and prove how the Raspberry Pi e-mail server can cut the cost better that the PC as the e-mail server and how to overcome the problem with e-mail server that setup using PC in term of the noise, portabality and power consumption.

1.3 Objective

In this project there are three main objectives that must be achieved in order to make sure the project is success. The objectives are:

- To study key topics related to the project such as about the Raspberry Pi and e-mail server.

- To built the raspberry pi as the e-mail server which small in size, portable and cost effective.

- To test the proposed e-mail server in term of functionality and performance.

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1.4 Scope

This project is focusing on the LAN environment. A LAN environment will be setup to running this project which is the e-mail server using Raspberry Pi. The LAN will consist of a router, switch, PC and Raspberry Pi. The router will act as the gate way for the LAN while switch will be use to connect all the devices or hosts inside the LAN. In addition, PC will be use as another e-mail server to do the comparison between the Raspberry Pi and PC as an e-mail server. The Raspberry Pi will be set as the e-mail server and will be given the ip address that allocated inside the LAN. The user of this e-mail server will be all the hosts that connected inside the LAN. All the hosts that located inside the LAN can sending and receiving an e-mail to each other using Microsoft outlook as the mail user agent (MUA) that being install in the hosts system. The e-mail server will act as the post office that will process all the e-mail and sending to the correct mailbox (host).

1.5 Project significance

The benefit that can be gain from this project is how the new thing such as Raspberry Pi can work as the e-mail server. As we know Raspberry Pi is a mini credit- card computer that can work same as the real computer. Because of the size is small it have it own benefit. The size of the server will be smaller than before if we using Rapberry Pi as the e-mail sever. Because of the size of the Raspberry Pi is small, it can be a portable server that can be carry and place anywhere even in the limited space. Beside that Raspberry Pi that be set as the e-mail server does not produce any sound like the e-mail server that using the real computer. E-mail server using Raspberry Pi also will cut the consumption of the electrical power if be compare to the real computer. So this project and product will give many benefits in term of the size of the server, portability, the noise produce and the power consumption.

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1.6 Expected Output

- A performance analysis in term of delay between Raspberry Pi mail server and PC (VMware) mail server.

- A product from a Raspberry Pi that act as an e-mail server.

1.7 Report Organization

Chapter 1: Introduction

This chapter explained the project background of the project. The problem statement and project objective also will be explained in this chapter. The scope in the project involved the LAN environment also will be explained in this project and the output for this project also will be included in this chapter.

Chapter 2: Literature Review

This chapter will explained about the domain that related with this project which is the network services. This chapter also will be discussed about the previous work that related to the topic which is about the mail-server. From the previous work, the issue or problem will be listed out and will be discussed. From the issue and problem in the existing mail server, the proposed solution will also be explained and discussed in this chapter.

Chapter 3: Project Methodology

This chapter will explained about the methodology that going to be use during this project. In this project, methodology that will be used is SDLC methodology. All the activities in each phase also will be discussed in this chapter. The project milestone and schedule also will be provided in this chapter.

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Chapter 4: Analysis and Design

This chapter will be explained about the problem analysis for this project. The problem statement that have been stated in chapter 1 will be discussed in this chapter in more deeper. The requirement analysis for this project will be discussed in this chapter. The requirement analysis contsists of two main requirement which are software and hardware requirement. The detailed design for the project also will be discussed in this chapter. The designs that included in this chapter are logical and physical design for the project. The overall project planning also will be included in this chapter. Beside that, the block diagram for the project also will be attached in this chapter.

Chapter 5: Implementation

This chapter will be explained about the implementation for the project. In this project there are 2 main implementation that will be done which are Raspberry Pi and PC (VMware) implementation. The implementation contsits of the step by step configuration of Postfix and Dovecot services. The project development environment setup also will be discussed in this chapter. The block diagrams for Raspberry Pi and PC (VMware) development environment setup also will be attach in this chapter.

Chapter 6: Testing

This chapter will be explained about the test plan for the project. The test plan will be contsits of the test orginization, test environment, test schedule and test strategy. The test design also will be discussed in this chapter. For this poject there arae 2 main testing design which are connection testing and configuration testing. The testing will test the connection between all hosts inside the LAN and the transmitted delay inside the server. Using the test result, the analysis for the transmitted delay between Raspberry Pi mail server and PC (VMware) mail server will be compared to get the best result in term of delay.

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Chapter 7: Project Conclusion

In this chapter, the project summarization will be explained. In this chapter, how the objective has been achieved also will be desribed and explained. The project contribution also will be discussed in this chapter. Each problems that have been facing during this project will be explained in the project limitation for this chapter. The future work that can be continue from this project also will be explained and discussed in this chapter. The concluding phrases to conclude the project also will be attach in this chapter.

1.8 Conclusion

As the conclusion, the output from this project can overcome all the problems that have been state in the problem statement and can achieve the all objectives. Hopefully this project also can be completed in the time duration given. For the second chapter, the things that will be discusses are about the related previous research, proposed solution and the project schedule and milestone.

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CHAPTER II

LITERATURE REVIEW

2.1 Introduction

In this chapter we will discuss about the literature review which is related with the previous works and other information that related with this project. The main focus in this chapter is to study and analyze about what is an e-mail server. Beside that this chapter we will discuss about the Raspberry Pi, what it is actually and how it can be use as a different type of server. In this chapter also we will discuss about the proposed solution or the further project that will be develop.

In this chapter, the domain that related with the project is the networking services. Networking services can be defined as an application that running and working at the network application layer and above. The services provide communication among the hosts which is often implemented for client-server or peer-to-peer architecture. There are many services that can be related with the network such as DNS, Samba, Telnet and SSH. Postfix e-mail server is the service that will be setup and configure during this project. Dovecot software also will be installed as the Mail Delivery Agent (MDA). While Postfix will acts as Mail Transport Agent (MTA). E-mail server is a service that acts like a “post office” in delivery an e-mail from the sender to the receiver.

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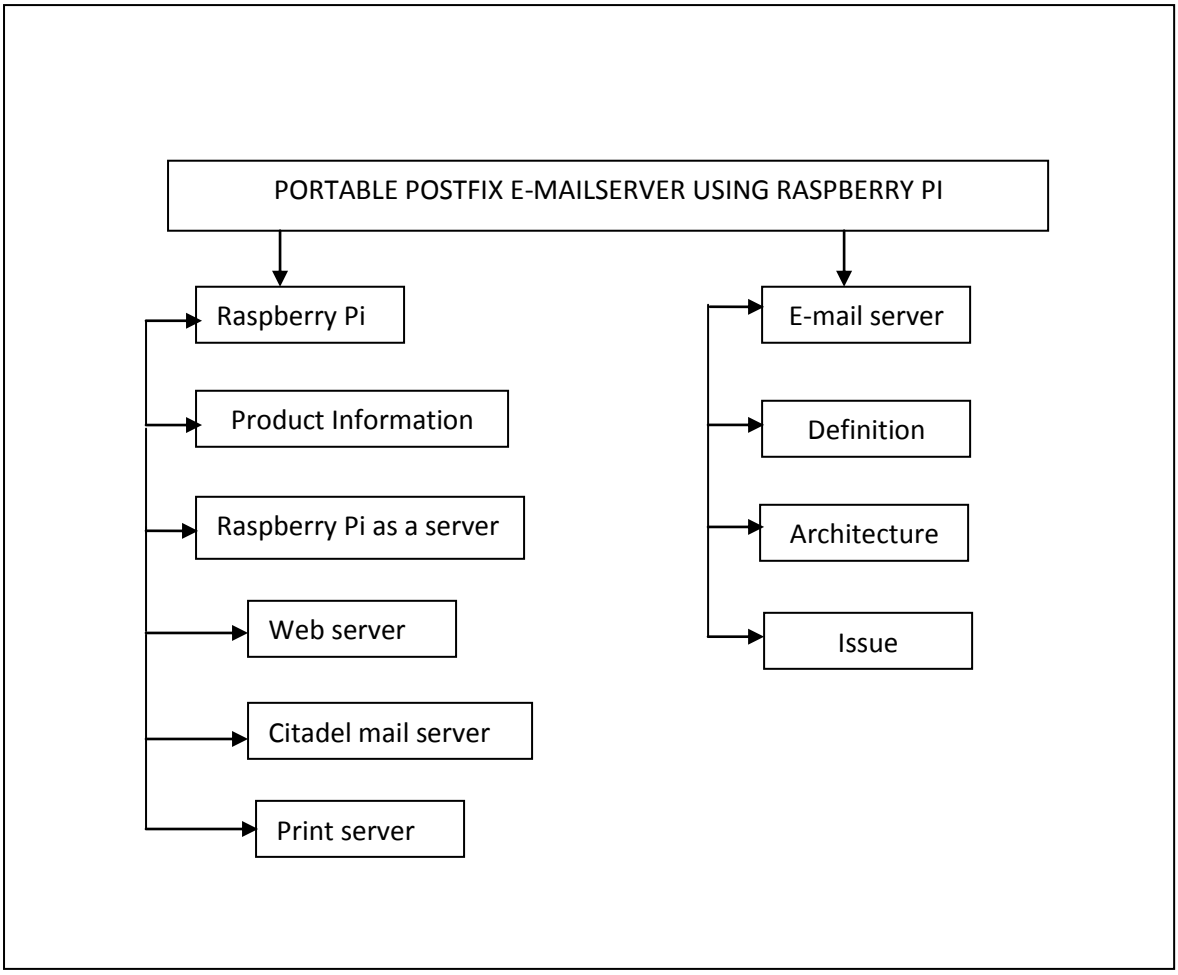

Figure 2.1: Keyword for the project

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2.2 Fact and Finding

2.2.1 E-mail server

As we know Raspberry Pi is a new thing to discover. Because of it is a new thing there are only a few research is done on it. Most of the research done is about how to make the Raspberry Pi as the home server, web server and print server. Raspberry Pi as an email server is quit new thing to discover. But there is a project that built an e-mail server using the Raspberry pi. E-mail server is a server that handles the process of delivery e-mail over a network. The server works by using the Mail Transport Agent (MTA) to handle the transportation and sorting of the e-mail. MTA then deliver the e-mail to the incoming server that use Mail Delivery Agent (MDA) to store the message received until the recipient check or read the e-mail. There are two main protocol used to retrieving e-mail on MDA which are Post Office Protocol (POP3) and Internet Access Message Protocol (IMAP). The cost of setting up an e-mail server is quite expensive. This is because we need to buy a computer to be set as the e-mail server. The price of a computer is more that thousand Ringgit. In this project the Raspberry Pi is used as the server instead of the computer. Because of the price of the Raspberry Pi is cheaper that the computer it will reduce the cost to set up the e-mail server.

Figure 2.2: Architecture of mail server

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2.2.2 Raspberry Pi

Raspberry Pi is a single-board Linux-powered computer. The size of the Raspberry Pi is as small as the creadit card. The Raspberry Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with support for BBC BASIC(via the RISC OS image or the Brandy Basic clone for Linux), C, C++, Java, Perl and Ruby[Mehta Karankumar D, Mehta Shreya B , Raviya Kapil S,(2014)]. The Pi runs GNU/Linux and variants of similar operating systems [Chris Clay, (2014)].Their ultimate goal is to foster computer science education [Tim Verry, (2012).] among the society. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games [Tim Verry, (2012).]. It also can be setup as a server. They are a few reasons why Raspberry Pi is suitable to set as a server .An extremely low power draw, small form factor, no noise, solid state storage, and other features make it an attractive solution for a small and lightweight server [Chris Clay, (2014).].

- **Raspberry Pi as a server**

  In the related research, there are a few type of server have been developed using the Raspberry Pi. The servers that have been developed are:

1. Raspberry Pi as a Web server

   In the journal that have been written by Lauren Orsini in Jun 28,2014 with the title of "How to Host A website with Raspberry Pi", the journal have state that we can host a simple website using Raspberry Pi as the web server. In this project, Apache software is install to the Raspberry Pi to act as the web server. This web server has been connected to the MySQL database to store all the data for the website created.

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