

PORTABLE WIRELESS CLOUD STORAGE

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PORTABLE WIRELESS CLOUD STORAGE

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A project report submitted in partial fulfillment of the requirements for the award of
Bachelor of Computer Science (Computer Networking) with Honour

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2015

DECLARATION

I hereby declare that the project report entitled
PORTABLE WIRELESS CLOUD STORAGE

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(DR. NORHARYATI BINTI HARUM)

DEDICATION

Millions thanks to dear father and mother for the support and strong encouragement and motivation throughout this project. They have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve. This project is far complete without them. This project is also dedicated to my family, my siblings, who has been a constant source of support and encouragement during the challenges of graduate university and life. I am truly thankful for having friend in my life. They are the unsung heroes guiding me very step at a time in the time of need and really play a big role for my project who are directly or indirectly in providing ideas and suggestions. All the guidance, advice and guide I will never forget. Hopefully, this project was conducted to get the blessing from God.

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ABSTRACT

Portable Wireless Cloud Storage is cheap, physically small, power efficient and wireless oriented cloud storage aim at delivering the best possible cloud service to Personal Area Network (PAN) environment. It's a raspberry pi based project which utilize a small form factor, lightweight and high mobility of a microcomputer compared to ordinary computer. User within the small network coverage can upload and download files and shared the files between each other. There are three cloud storage software in the raspberry pi, two of the raspberry pi are third party software which is ownCloud and Seafile and third one is custom build for this project. The third party software are accessible via web browser on wireless device such as laptop, smartphome and tablet. The custom build cloud software is accessible wirelessly via laptop or computer, it's a java application which open up a direct TCP connection to raspberry pi making it the fastest cloud storage in term of accessibility, download and upload. Portable Wireless Cloud Storage also include a Kodi Media Center aim for consumer need for media center and cloud integration. User can upload a videos within the network coverage and stream it directly onto the big screen. This project is aim to deliver the best possible cloud storage and media center integration under small package.

ABSTRACT

Portable Wireless Cloud Storage adalah murah, fizikalnya kecil, tenaga efisien dan storan awan berorientasikan tanpa wayar yang bermatlamat untuk menyampaikan servis awan terbaik dalam persekitaran Rangkaian Kawasan Peribadi atau *Personal Area Network (PAN)*. Ia adalah satu projek berasaskan raspberry pi yang menggunakan faktor reka bentuk kecil, ringan dan mudah alih sebuah mikrokomputer berbanding dengan komputer biasa. Pengguna dalam liputan rangkaian yang kecil boleh memuat naik dan memuat turun fail dan berkongsi fail antara satu sama lain. Terdapat tiga perisian storan awan didalam Rapsberry Pi, dua daripada perisian tersebut adalah perisian komersial dan pihak ketiga iaitu Seafile dan ownCloud manakala perisian ketiga adalah perisian yang dibina khas untuk projek ini. Perisian pihak ketiga boleh diakses melalui pelayar web pada peranti tanpa wayar seperti komputer riba, telefon pintar dan tablet. Perisian yang dibina khas boleh diakses secara tanpa wayar melalui komputer riba dan komputer biasa, perisian ini menggunakan aplikasi Java yang membuka sambungan terus kepada Raspberry Pi menggunakan protokol TCP sekaligus menjadikannya perisian storan awan yang paling laju dari segi kemudahan akses, muat turun dan muat naik. *Portable Wireless Cloud Storage* turut juga meyertakan sekali pusat media Kodi bagi keperluan pengguna untuk pusat media dan integrasi awan. Pengguna boleh memuat naik video dalam liputan rangkaian dan terus menonton pada skrin besar. Projek ini bermatlamat untuk menyampaikan storan awan sebaik mungkin dan integrasi pusat media dibawah satu pakej.

TABLE OF CONTENTS

| CHAPTER | SUBJECT | PAGE |
|-------------------|------------------------------|-------|
| | DECLARATION | iv |
| | DEDICATION | v |
| | ACKNOWLEDGEMENT | vi |
| | ABSTRACT | vii |
| | ABSTRAK | viii |
| | TABLE OF CONTENTS | ix |
| | LIST OF TABLES | xii |
| | LIST OF FIGURES | xiii |
| | LIST OF ABBREVIATIONS | xviii |
| CHAPTER I | INTRODUCTION | |
| | 1.1 Project Background | 1 |
| | 1.2 Problem Statement | 3 |
| | 1.3 Project Question | 3 |
| | 1.4 Project Objective | 4 |
| | 1.5 Scope | 4 |
| | 1.6 Project Significance | 6 |
| | 1.7 Conclusion | 6 |
| CHAPTER II | LITERATURE REVIEW | |
| | 2.1 Introduction | 7 |

| | | |
|-------|---|----|
| 2.2 | Previous Work/Related Work | 8 |
| 2.2.1 | Cloud Storage | 8 |
| 2.2.2 | Wireless Personal Area Network (WPAN) | 9 |
| 2.2.3 | Raspberry Pi | 9 |
| 2.2.4 | Raspberry Pi Cloud Storage | 10 |
| 2.3 | Critical Review of current problem and justification | 13 |
| 2.4 | Proposed Solution/further project | 18 |
| 2.5 | Conclusion | 20 |

CHAPTER III METHODOLOGY

| | | |
|---------|--------------------------------|----|
| 3.1 | Introduction | 21 |
| 3.2 | Methodology | 21 |
| 3.2.1 | System Development Approach | 21 |
| 3.2.2 | Planning | 22 |
| 3.2.2.1 | Software Requirement | 22 |
| 3.2.2.2 | Hardware Requirement | 30 |
| 3.2.3 | Analysis | 32 |
| 3.2.4 | Design | 33 |
| 3.2.5 | Implementation | 34 |
| 3.2.6 | Testing | 34 |
| 3.3 | Project Milestones | 36 |
| 3.3.1 | Activity Details and Duration | 36 |
| 3.3.2 | Gantt Chart of project | 38 |
| 3.4 | Conclusion | 39 |

CHAPTER IV DESIGN

| | | |
|-------|-----------------------------|----|
| 4.1 | Introduction | 40 |
| 4.2 | Network System Architecture | 41 |
| 4.3 | Logical and Physical Design | 42 |
| 4.3.1 | Logical Design | 42 |

| | | |
|--------------------|-----------------------------|----|
| | 4.3.2 Physical Design | 43 |
| | 4.4 Possible Scenarios | 45 |
| | 4.5 Metric Measurement | 47 |
| | 4.6 Conclusion | 49 |
| CHAPTER V | IMPLEMENTATION | |
| | 5.1 Introduction | 50 |
| | 5.2 Environment Setup | 50 |
| | 5.2.1 Hardware Setup | 51 |
| | 5.2.2 Software Setup | 54 |
| | 5.3 Conclusion | 74 |
| CHAPTER VI | TESTING AND ANALYSIS | |
| | 6.1 Introduction | 75 |
| | 6.2 Simulation Overview | 76 |
| | 6.3 Analysis and Result | 78 |
| | 6.4 Conclusion | 87 |
| CHAPTER VII | PROJECT CONCLUSION | |
| | 7.1 Introduction | 88 |
| | 7.2 Project Summarization | 88 |
| | 7.3 Project Contribution | 91 |
| | 7.4 Project Limitation | 92 |
| | 7.5 Future Works | 92 |
| | 7.6 Conclusion | 93 |
| | REFERENCES | 95 |

LIST OF TABLES

| TABLES | TITLES | PAGE |
|---------------|---|-------------|
| 1.1 | Summary of Problem Statement | 3 |
| 1.2 | Summary of Project Question | 3 |
| 1.3 | Summary of Project Objective | 5 |
| 2.1 | Raspberry Pi Model B+ specification | 10 |
| 2.2 | Summary of previous research title with purpose, description and problem | 16 |
| 3.1 | The details activities of each phase | 35 |
| 3.2 | Activity details and duration of each phase | 36 |
| 3.3 | Gantt chart of the project | 38 |
| 6.1 | Average upload and download speed for cloud software | 82 |
| 6.2 | Average response times for all three cloud software | 85 |

LIST OF FIGURES

| FIGURES | TITLES | PAGE |
|---------|---|------|
| 2.1 | Example of commercial cloud storage | 8 |
| 2.2 | Wireless Personal Area Network (WPAN) | 9 |
| 2.3 | Wireless device that can connect and interact with Raspberry Pi in WPAN | 11 |
| 2.4 | The basic purpose or aim of the Portable Wireless Cloud Storage | 12 |
| 2.5 | Smart Home Using Wireless Sensor Network and Android Powered Devices by Azfar 'Aizat bin Mohd Isa | 13 |
| 2.6 | The hardware used in Smart home Using Wireless Sensor Network and Android Powered Devices | 14 |
| 2.7 | Pi Cloud stack consisting of 56 raspberry pi. | 14 |
| 2.8 | Experimental model of Low Power NAS and Cloud drive network diagram overview | 15 |
| 2.9 | Experimental model of Low Power NAS and Cloud Drive based on Raspberry Pi hardware setup | 16 |
| 2.10 | Proposed project for Portable Wireless Cloud Storage | 18 |
| 3.1 | Win32 Disk Imager running on Windows 8.1 | 22 |
| 3.2 | ownCloud accessible by web browser | 23 |
| 3.3 | Seafile is an alternative solution for ownCloud that also can be accessible by web browser | 24 |
| 3.4 | Webmin configuration page, user can use Webmin to install unix service and application packages | 25 |

| | | |
|------|---|----|
| 3.5 | Raspberry Pi Cloud Storage have a client and server side scripting | 26 |
| 3.6 | Windows 8.1 Pro Media Center | 27 |
| 3.7 | Raspbian Wheezy running on Raspbian Pi | 28 |
| 3.8 | MySQL Database used for storing user's credential | 29 |
| 3.9 | Core item for Portable Wireless Cloud Storage | 30 |
| 3.10 | Three type of cloud software used in the project | 32 |
| 3.11 | Overall design for Portable Wireless Cloud Storage. | 33 |
| 4.1 | Overall architecture design for Portable Wireless Cloud Storage. | 41 |
| 4.2 | Logical diagram which depicted the Personal Area Network devices can access three type of cloud software | 42 |
| 4.3 | Physical diagram which depicted a more visual details of the Portable Wireless Cloud Storage networking information | 43 |
| 4.4 | Response time is measure when user initiate an http request query for which the cloud will query a response. | 45 |
| 4.5 | Data transfer rate is measure in uploading and downloading a fixed size data from the cloud software to the user and back | 46 |
| 4.6 | Example of response time graph and data on MySQL Server Query | 47 |
| 4.7 | Example of data transfer rate in a hardware side. The real measurement will be measure in cloud software | 48 |
| 5.1 | Entire hardware setup for configuring and testing Portable Wireless Cloud Storage | 51 |
| 5.2 | Portable Wireless Cloud Storage hardware setup (side view) | 52 |
| 5.3 | Portable Wireless Cloud Storage hardware setup (top view) | 52 |
| 5.4 | Interior view of the Portable Wireless Cloud Storage | 53 |

| | | |
|------|--|----|
| 5.5 | Exterior view of the Portable Wireless Cloud Storage | 54 |
| 5.6 | Booting Raspbian Wheezy into SD card using Win32Disk tool | 54 |
| 5.7 | Raspi-config setting after successful first boot. | 55 |
| 5.8 | Raspbian Wheezy main interface | 56 |
| 5.9 | Connecting to local wireless access point | 56 |
| 5.10 | PuTTY software using SSH for remote configuration | 57 |
| 5.11 | Successful connection from Windows to Raspberry Pi | 57 |
| 5.12 | Get update for Raspberry Pi | 58 |
| 5.13 | Command for installing NTFS format | 58 |
| 5.14 | Mounting folder serverHDD at startup with assigning permission | 58 |
| 5.15 | Login page to Webmin configuration | 60 |
| 5.16 | Webmin main interface | 60 |
| 5.17 | The folder designated to mount is listed in Disk and Network File system indicating it already mount | 61 |
| 5.18 | Installing MySQL using Webmin service | 62 |
| 5.19 | MySQL Database Server where ownCloud's database is stored | 62 |
| 5.20 | Creating a new database in MySQL Database Server | 63 |
| 5.21 | Assigning user permission to ownCloud database | 63 |
| 5.22 | Create a new user for ownCloud. This user will act as administrator | 64 |
| 5.23 | PHP is required as part as ownCloud software requirement | 65 |
| 5.24 | Downloading and installing ownCloud using Webmin's Software Package | 65 |
| 5.25 | ownCloud installation successful | 66 |
| 5.26 | Creating a folder that will served as ownCloud directory | 66 |
| 5.27 | ownCloud first initial page right after key-in the web address | 67 |
| 5.28 | ownCloud Setup Wizard | 67 |

| | | |
|------|--|----|
| 5.29 | ownCloud first time authentication page and main interface | 68 |
| 5.30 | Download Seafile package from the website server | 68 |
| 5.31 | Create a new directory for Seafile | 68 |
| 5.32 | Unzip the Seafile package and execute setup script | 69 |
| 5.33 | Download and install python script as dependency software | 69 |
| 5.34 | Execute the seafile.sh and seahub.sh for the first time | 70 |
| 5.35 | Service that need to run in order to access Seafile | 70 |
| 5.36 | Seafile authentication page. Insert user's mail and password here | 71 |
| 5.37 | Seafile homepage for user 'umar' | 72 |
| 5.38 | Java script for FileServer is running | 72 |
| 5.39 | Client program is running on client's computer | 73 |
| 6.1 | Data transfer rate simulation overview. User upload and download a fixed size file | 76 |
| 6.2 | Test.mp3 file are used to upload and download for all three cloud software testing | 77 |
| 6.3 | Response Times simulation overview. User request query to server and expected a response query | 78 |
| 6.4 | Raspberry Pi Cloud Storage upload and download data transfer rate | 79 |
| 6.5 | Graph generate by NetMeter Evo indicating a data rate spike | 79 |
| 6.6 | ownCloud upload and download data transfer rate | 80 |
| 6.7 | Graph generate by NetMeter Evo for ownCloud data transfer rate | 80 |
| 6.8 | Seafile upload and download data transfer rate | 81 |
| 6.9 | Graph generate by NetMeter Evo for Seafile data transfer rate | 81 |
| 6.10 | Cloud software upload and download data transfer rate comparison | 83 |
| 6.11 | Response Times for Raspberry Pi Cloud Storage | 84 |

| | | |
|------|--|----|
| 6.12 | Response times for Seafile | 84 |
| 6.13 | Response times for ownCloud | 85 |
| 6.14 | Bar chart comparison of average response times for three cloud software | 86 |

LIST OF ABBREVIATIONS

| | | |
|------|---|---------------------------------------|
| SoC | - | System on Chip |
| USB | - | Universal Serial Bus |
| HDMI | - | High-Definition Multimedia Interface |
| OS | - | Operating System |
| iOS | - | Iphone Operating System |
| IT | - | Information Technology |
| NAS | - | Network Attach Storage |
| SDLC | - | System Development Life Cycle |
| SD | - | Secure Digital |
| RAM | - | Random Access Memory |
| AMD | - | Advance Micro Device |
| MB | - | Megabit |
| GB | - | Gigabit |
| TB | - | Terabit |
| OTG | - | On The Go |
| VGA | - | Video Graphic Array |
| mAH | - | milli Ampere Hour |
| SATA | - | Serial Advanced Technology Attachment |
| RPM | - | Round Per Minute |
| SSH | - | Secured Socket Shell |
| NMS | - | Network Monitoring Software |
| PAN | - | Personal Area Network |
| LAN | - | Local Area Network |
| WAN | - | Wide Area Network |
| IP | - | Internet Protocol |

| | | |
|------|---|---|
| HDTV | - | High Definition Television |
| WiFi | - | Wireless Fidelity |
| NTFS | - | New Technology File System (Windows NT) |
| HDD | - | Hard Disk Drive |
| CPU | - | Central Processing Unit |
| APT | - | Advanced Packaging Tool |
| TCP | - | Transfer Control Protocol |
| SDK | - | Software Development Kit |
| MBPS | - | Megabit Per Second |
| KBPS | - | Kilobit Per Second |
| DTR | - | Data Transfer Rate |
| HTTP | - | HyperText Transfer Protocol |
| MS | - | Millisecond |
| WLAN | - | Wireless Local Area Network |

CHAPTER I

INTRODUCTION

1.1 Project Background

A cheap alternative, ultra-low power consumption and portability of a flexible cloud storage is one of the main requirement for this project. A wireless cloud storage that free from constraint by having a wired all around it and the ability to be carry anywhere and anytime. Raspberry Pi is the suitable hardware to develop a small, power independent, portable and lightweight cloud storage solution. Having a hard disk, Solid State Disk or even flash drive with atrocious electric usage and third party hardware might be the thing in the past. Portable Wireless Cloud Storage is the penultimate solution for home streaming, data storage and much more to come.

Raspberry Pi is a small microcomputer created by the head of Raspberry Pi foundation. Eben Upton[1] of the Raspberry Pi Foundation has spent the past eight years

trying to produce a \$39 (approximately RM170) computer specifically designed to show young people what's inside and to inspire them to write programs to, say, control a microwave oven, manipulate a thermostat, or even create their own video a game. The Raspberry Pi Model B+ [2] is powered by Broadcom SoC running at 700MHz, 512MB soldered on top of the Broadcom chip, 4 USB ports, HDMI port, network port and 3.5mm audio jack. Basically it's a small fully equipped and ready to use small form factor personal computer. Raspberry Pi is also OS independent which mean it can be used on any Linux operating system such Raspbian Wheezy, Debian OS, Turnkey Linux and etc. A small customizable microcomputer combine with open source capability make this electronic a widely known among tech enthusiastic.

Cloud Storage [3] is a service where data is remotely maintained, managed, and backed up. The service is available to users over a network, which is usually the internet. It allows the user to store files online so that the user can access them from any location via the internet which in this case, a physical device that stored a local data via some sort of Personal Area Network (PAN) made entirely from Raspberry Pi microcomputer. The files can be read and stream to devices capable of receiving a wireless signal from the Raspberry Pi. User can browse, read and write the files, audio, video in real-time environment without having the need to connect to internet 24 hours a day, it's basically is an offline solution of Do-It-Yourself alternative to Dropbox, Google Drive and vice versa.

Cloud storage [4] deploy a model of data storage where the digital data is stored in logical pools, the physical storage spans multiple servers (which in this case a single physical hard disk server). Personal Cloud Storage [5] Also known as mobile cloud storage, personal cloud storage is a subset of public cloud storage that applies to storing an individual's data in the cloud and providing the individual with access to the data from anywhere. It also provides data syncing and sharing capabilities across multiple devices. Personal Cloud Storage are type of cloud storage architecture in used for this project, it reflect the suitable need for Personal Area Network (PAN).

1.2 Problem Statement

Table 1.1 show the summary of the problem statement.

Table 1.1: Summary of Problem Statement

| PS | Problem Statement |
|-----|--|
| PS1 | The commercial cloud storage requires internet connection to remote server to work. |
| PS2 | Commercial cloud storage need to be access from computer which lack of portability and flexibility. |
| PS3 | Subscription model, internet plan and hardware for commercial cloud storage can have a burden to user affordability. |

1.3 Project Question

Research Question (PQ1, PQ2 and PQ3) are found based on Problem Statement (PS1, PS2 and PS3). Project question are constructed to identify the problem statement as described in Table 1.2.

Table 1.2: Summary of Project Question

| PS | PQ | Project Question |
|-----|-----|---|
| PS1 | PQ1 | How the offline portable wireless cloud storage can affect the user's commitment to self-sustain cloud storage? |

| | | |
|-----|-----|--|
| PS2 | PQ2 | How to develop a portable wireless cloud storage using raspberry pi microcomputer? |
| PS3 | PQ3 | Can free, open source and cheap alternative raspberry pi cloud storage solve user's affordability in long run? |

1.4 Project Objective

There are three project objective identified for this project which are listed as below and Table 1.4 summarize the objective that can be achieve at the end of this project.

PO1: To study the differences of online cloud storage versus offline portable wireless cloud storage using raspberry pi microcomputer.

This particular study is to shown the fundamental differences between online cloud storage and offline portable wireless cloud storage using raspberry pi microcomputer in term of user's need.

PO2: To develop a portable, ultra-low power consumption and fully wireless capability of a raspberry pi based cloud storage.

This analysis is to develop a portable wireless cloud storage that can be carry around anywhere and access anytime while maintaining a portable form factor and low energy consumption will suffice the user's need for offline Portable Wireless Cloud Storage.

PO3: To validate that the developed raspberry pi cloud storage can perform better than commercial cloud software.

This study is to validate the custom build cloud software against the third party cloud software in term of performance. The performance metric will be measured in term of data transfer rate and response time. Comparison will be made after all the data have been gathered.

Table 1.3: Summary of Project Objective

| PS | PQ | PO | Project Objective |
|-----|-----|-----|---|
| PS1 | PQ1 | PO1 | To study the differences of online cloud storage versus offline portable wireless cloud storage using raspberry pi microcomputer. |
| PS2 | PQ2 | PO2 | To develop a portable, ultra-low power consumption and fully wireless capability of a raspberry pi cloud storage. |
| PS3 | PQ3 | PO3 | To validate that the developed raspberry pi cloud storage can perform better than commercial cloud software. |

1.5 Scope

The scope of this research for this project are focus on:

1. This project will make use of Raspberry Pi microcomputer advantage of physically small, lightweight and form factor to able to use as portable cloud storage.
2. For this project, the raspberry pi must be able to be access, stream and stored data wirelessly across multiple devices.
3. The raspberry pi can be built by anyone with minimal cost and computing skill. Fulfilling the need for Personal Area Network (PAN).