

**BENCHMARKING & PENETRATION TESTING OF WINDOWS XP,
WINDOWS 7 AND WINDOWS 8**

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BENCHMARKING & PENETRATION TESTING OF WINDOWS XP,
WINDOWS 7 AND WINDOWS 8

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A project report submitted in partial fulfillment of the
requirements for the award of the degree of
Master of Computer Science (Information Security)

Faculty of Computing
Universiti Teknologi Malaysia

AUG 2013

This Project Report is dedicated to my family for their endless support and encouragement.

ACKNOWLEDGEMENT

First and foremost, I would like to express heartfelt gratitude to Allah The Most Merciful, The Most Compassionate without whom nothing could be achieved. Secondly, I thank my Parents for the opportunity to study for a better future ahead. Moreover, I humbly appreciate my supervisor **Dr. Raja Zahilah Raja Mohd Radzi** for her constant support during my project at UTM. Even in the times when I could not see her I knew she was worried about me and kept her kind eyes on my progress. Her willingness to monitor my project thoroughly, contributed immensely to the project. Lastly, I have learned a lot from our faculty (Information security) and I consider myself fortunate to have such caring and hardworking teachers who helped me in every way possible.

Besides, I would like to thank Universiti Teknologi Malaysia (UTM) for providing me a good environment and facilities for studying and earned me lifelong friendships.

ABSTRACT

The purpose of this study is to propose a unified approach for Operating System (OS) Comparisons with the help of a Windows OS case study. As based on current industry practice where most of the researchers; when comparing OS, either choose benchmarking to benchmark the hardware level performance or do penetration testing for checking security features of the OS. It is not known whether the latest OS is in fact faster and secure than its predecessors. A fair comparison of OS should include hardware level, operational level performance and security tests altogether. Thus, this research is aiming to integrate different aspects of the operating systems into comparison process which were neglected before to achieve a complete comparison result. Hardware level, operational level and security related tests were performed on Windows XP, Windows 7 and Windows 8 and the results indicate that there are instances where Windows XP excels over its counterparts. In overall Windows 8 is a superior OS to its predecessors which performs better and provide more security on the same hardware. Furthermore, from this research we can conclude that the automated benchmarking tools are proving to be less efficient to benchmark systems which are running on Windows XP and older OS as they do not support DirectX 11 and other advanced features which the hardware could support. Therefore, there lies the need of the unified approach to compare other aspects of OS such as user oriented tasks and security parameters to provide complete comparison data. As a future work, the method can be used as a guideline to propose a new benchmarking and penetration testing software.

ABSTRAK

Matlamat kajian ini adalah untuk mencadangkan satu kaedah bersepadu untuk membuat perbandingan Sistem Pengoperasian (OS) dengan Windows OS sebagai kajian kes. Berdasarkan amalan industri semasa di mana kebanyakan penyelidik; apabila membandingkan OS, mereka memilih sama ada menggunakan ujian penanda aras untuk menguji prestasi peringkat perkakasan atau melakukan ujian penembusan untuk memeriksa ciri-ciri keselamatan OS. Masih tidak diketahui samada OS terbaru adalah lebih laju dan selamat daripada versi terdahulunya. Perbandingan OS yang telus haruslah merangkumi peringkat perkakasan, peringkat prestasi operasi dan ujian keselamatan yang diuji sekaligus bersama. Oleh itu, kajian ini adalah bertujuan untuk menyepadukan aspek-aspek yang berbeza daripada OS ke dalam proses perbandingan bersepadu; yang mana beberapa ujian telah dikecualikan dalam ujian sebelum ini, bagi mencapai hasil perbandingan yang lengkap. Ujian di peringkat perkakasan, peringkat operasi dan ujian keselamatan telah dijalankan untuk Windows XP, Windows 7 dan Windows 8. Keputusan menunjukkan bahawa terdapat keadaan di mana Windows XP lebih baik berbanding Windows 7 dan Windows 8. Secara keseluruhannya Windows 8 adalah OS yang terbaik daripada dua OS terdahulunya berdasarkan prestasi Windows 8 yang terbaik dan menyediakan ciri-ciri keselamatan yang lebih baik apabila diuji dengan perkakasan yang sama. Melalui kajian ini, dapat disimpulkan bahawa penanda aras automatik yang ada sekarang menjadi kurang berkesan untuk menjadi alat penanda aras bagi Windows XP dan OS yang lebih lama kerana ia tidak menyokong DirectX 11 dan ciri-ciri termaju lain yang boleh disokong oleh perkakasan. Oleh itu, kaedah perbandingan bersepadu OS adalah diperlukan untuk membandingkan aspek-aspek OS seperti tugas berorientasikan pengguna dan parameter keselamatan untuk menyediakan data perbandingan selengkapnya. Kajian ini boleh dijadikan sebagai panduan untuk membina perisian penanda aras dan ujian penembusan yang baru.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLE	xiii
	LIST OF FIGURES	xiv
	LIST OF ABBREVIATIONS	xviii
1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Problem Background	2
	1.3 Problem Statement	4
	1.4 Project Objectives	4
	1.5 Project Scopes	4
	1.6 Significance of the Project	5
	1.7 Organization of Report	6
2	LITERATURE REVIEW	
	2.1 Introduction	8
	2.2 Operating Systems	10

2.3	Improvements of Windows XP Operating System Over Its Predecessors	11
2.3.1	Fast User Switching	11
2.3.2	Enhanced Digital Media Support	12
2.3.3	User Data Management	12
2.3.4	Improved Hardware Device Compatibility	13
2.3.5	Remote Desktop Service	13
2.3.6	Windows XP Security Features	14
	2.3.6.1 Encrypting File System (EFS)	14
	2.3.6.2 Software Restriction Policies	16
	2.3.6.3 Data Execution Prevention	16
	2.3.6.4 Password Reset Wizard	17
	2.3.6.5 Windows Firewall	17
2.3.7	Windows XP Features Conclusion	18
2.4	Improvements of Windows 7 Operating System Over Its Predecessors	18
2.4.1	Windows 7 Boot Manager	19
2.4.2	Windows 7 User Interface	20
2.4.3	Windows 7 Diagnostics Architecture	20
2.4.4	Windows 7 Built-In Troubleshooters	21
2.4.5	Windows 7 Security Features	22
	2.4.5.1 User Account Control (UAC)	23
	2.4.5.2 Windows Defender	23
	2.4.5.3 Firewall with Advanced Features	24
2.4.6	Windows 7 Features Conclusion	24
2.5	Improvements of Windows 8 Operating System Over Its Predecessors	25
2.5.1	User Interface Design	26
2.5.2	Improved Boot Process	27
2.5.3	Improved Login Process	27
2.5.4	New and Innovative Start Screen	28

2.5.5	Metro Applications	30
2.5.6	Improved Security and Safety Controls	30
2.5.6.1	Family Safety Features	31
2.5.7	Miscellaneous Hardware and Software Improvements	32
2.5.8	Windows 8 Features Conclusion	33
2.6	Benchmarking your computer	33
2.6.1	Windows Experience Index	34
2.6.2	Automated Hardware Level Benchmarking Software	35
2.6.2.1	PassMark Performance Test	35
2.6.2.2	Maxon Cinebench 11.5	36
2.6.2.3	FutureMark PCMark 7	36
2.6.2.4	Sisoft Sandra Lite	37
2.6.2.5	3DMark 11	37
2.6.2.6	NovaBench	37
2.6.3	Software for User Oriented Tasks Benchmarking	38
2.6.3.1	BootRacer	38
2.6.3.2	Advanced EFS Data Recovery	38
2.6.3.3	Winrar	39
2.6.3.4	Avidemux	39
2.7	Exploiting Windows 7 and Windows 8	39
2.7.1	Virtual Box	40
2.7.2	Metasploit	40
2.7.2.1	Metasploit Variations	41
2.7.3	Puppy Linux	42
2.7.4	Backtrack5 R3	42
2.8	Related Work	43

3	RESEARCH METHODOLOGY	
3.1	Introduction	45
3.2	Research Planning Framework	45
3.2.1	Acquiring Benchmarking and Penetration Testing Tools	47
3.2.2	Benchmarking Hardware Level Performance with the Acquired Software	47
3.2.3	Benchmarking User Oriented Tasks	47
3.2.4	Windows Exploitation Using Penetration Testing Tools	47
3.2.5	Result Analysis	48
3.2.5	Conclusion and Future Works	48
3.3	Three Phases of Research Methodology	48
3.3.1	Automated Hardware Level Benchmarking	48
3.3.2	User Oriented Tasks Benchmarking	50
3.3.3	Windows Exploitation Using Penetration Testing Tools	51
3.4	Research Requirements	52
3.4.1	Hardware Requirements	52
3.4.2	Software Requirements	52
3.5	Summary	53
4	PROCESS OF BENCHMARKING	
4.1	Introduction	54
4.2	Phase 1 Automated Hardware Level Benchmarking Software with Result Analysis	55
4.2.1	PassMark Performance Test 8	55
	4.2.1.1 PassMark Results Analysis	58
4.2.2	Maxon Cinebench 11.5	59
	4.2.2.1 Cinebench Results Analysis	61
4.2.3	Futuremark Pcmark 7	62
	4.2.3.1 Video Playback	62
	4.2.3.2 Graphics – Directx 9	63

	4.2.3.3 Image Manipulation	64
	4.2.3.4 Web Browsing	64
	4.2.3.5 PC Mark Results Analysis	66
4.2.4	Sisoft Sandra Lite	67
	4.2.4.1 Sisoft Sandra Lite Results Analysis	70
4.2.5	3dmark 11	71
	4.2.5.1 3DMARK11 Results Analysis	74
4.2.6	Novabench	74
	4.2.6.1 Novabench Results Analysis	77
4.3	User Oriented Tasks Benchmarking With Result Analysis	78
4.3.1	Bootracer (Startup Time)	78
	4.3.1.1 Boot Times Result Analysis	81
4.3.2	Manual Stopwatch (Shutdown Time, Sleep, Wakeup Time)	81
	4.3.2.1 Manual Stopwatch Results Analysis	86
4.3.3	Avidemux (Video Encoding)	87
	4.3.3.1 Video Encoding Results Analysis	88
4.3.4	Winrar (Data Compression and Extraction)	89
	4.3.4.1 Data Compression and Extraction Results Analysis	90
4.3.5	CPUID Hardware Monitor	91
	4.3.5.1 Hardware Temperature Results Analysis	93
4.3.6	Windows Explorer (Large Folder Moving)	93
	4.3.6.1 Data Transfer Result Analysis	94
4.3.7	Encrypting File System (Encrypted Data Recovery)	95
	4.3.7.1 Data Decryption after Password Change	95
	4.3.7.2 Data Recovery by another User On The Same Machine	97

5	PROCESS OF PENETRATION TESTING	
5.1	Introduction	102
5.2	Operating System Level Vulnerabilities	102
5.3	Application Level Vulnerabilities	114
5.4	Results Analysis	125
5.4.1	Operating System Level Exploits	125
5.4.2	Application Level Exploits	126
6	DISCUSSION AND CONCLUSION	
6.1	Introduction	128
6.2	Overall Results Analysis and Contribution	129
6.3	Guideline for Operating Systems Comparisons	130
6.4	Project Constraints	132
6.5	Future Works	132
6.6	Conclusion	132
	REFERENCES	134

LIST OF TABLE

TABLE NO.	TITLE	PAGE
2.1	Difference in Features of Windows 7 Editions	19
2.2	Windows Experience Index	34
3.1	Automated Hardware Level Benchmarking Software	49
3.2	User Oriented Tasks Benchmarking	51
3.3	Hardware Requirements	52
3.4	Software Requirements	53
4.1	Passmark Results Analysis	58
4.2	Cinebench Results Analysis	61
4.3	Windows 8 PC Mark 7 Result	65
4.4	Windows 7 PC Mark 7 Result	66
4.5	PC Mark Result Analysis	67
4.6	Windows 8 Sisoft Sandra Lite Result	68
4.7	Windows 7 Sisoft Sandra Lite Result	69
4.8	Windows XP Sisoft Sandra Lite Result	70
4.9	Sisoft Sandra Lite Results Analysis	71
4.10	3DMARK11 Results Analysis	74
4.11	Novabench Results Analysis	77
4.12	Windows 8 Total Time to Boot (In Seconds)	79
4.13	Windows 7 Total Time to Boot (In Seconds)	80
4.14	Windows XP Total Time to Boot (In Seconds)	80
4.15	Manual Stopwatch Results (In Seconds)	86
4.16	Video Encoding Results Analysis	88
4.17	Data Compression & Extraction Results (In Seconds)	91
4.18	Hardware Temperatures Result (In Centigrade)	93
6.1	Overall Result Analysis	129

LIST OF FIGURE

FIGURE NO	TITLE	PAGE
2.1	Literature Review Structure	9
2.2	Abstract View of Computer System Components	10
2.3	File Encryption and Decryption Process	15
2.4	Windows 8 Only BIOS Screen	27
2.5	Windows 8 Picture Password	28
2.6	Windows 8 Start Screen with Charms Bar	29
2.7	Time Limit Family Safety Controls	31
2.8	Curfew Family Safety Controls	32
2.9	Performance Measurement Process	44
2.10	Concept of Penetration Testing With Metasploit	44
3.1	Research Planning Framework	46
4.1	Passmark Performance Test	55
4.2	Passmark Windows 8 Benchmark Rating	57
4.3	Passmark Windows 7 Benchmark Rating	57
4.4	Passmark Windows XP Benchmark Rating	58
4.5	Cinebench Opengl Test	59
4.6	Windows 8 Cinebench Result	60
4.7	Windows 7 Cinebench Result	60
4.8	Windows XP Cinebench Result	61
4.9	Pcmark 7 Basic Edition V1.40	62
4.10	Pcmark 7 – Video Playback	63
4.11	Pcmark 7 – Graphics – Directx 9	63
4.12	Pcmark 7 – Image Manipulation	64
4.13	Pcmark 7 – Web Browsing	65

4.14	3dmark 11 Start Screen	71
4.15	Windows 8 Graphics Performance	72
4.16	Windows 7 Graphics Performance	73
4.17	Novabench Start Tests	75
4.18	Novabench Windows 8 Result	76
4.19	Novabench Windows 7 Result	76
4.20	Novabench Windows XP Result	77
4.21	Bootracer Start Screen	78
4.22	Startup Items	79
4.23	Boot Times Result Analysis	81
4.24	Windows 8 Shutdown Times	82
4.25	Windows 7 Shutdown Times	82
4.26	Windows XP Shutdown Times	83
4.27	Windows 8 Sleep Times	83
4.28	Windows 7 Sleep Times	84
4.29	Windows XP Sleep Times	84
4.30	Windows 8 Wakeup Times	85
4.31	Windows 7 Wakeup Times	85
4.32	Windows XP Wakeup Times	86
4.33	Windows 8 Video Encoding	87
4.34	Windows 7 Video Encoding	87
4.35	Windows XP Video Encoding	88
4.36	Windows 8 Data Compression and Extraction	89
4.37	Windows 7 Data Compression and Extraction	90
4.38	Windows XP Data Compression and Extraction	90
4.39	Windows 8 CPU, GPU and Hard Disk Temperatures	91
4.40	Windows 7 CPU, GPU and Hard Disk Temperatures	92
4.41	Windows XP CPU, GPU and Hard Disk Temperatures	92
4.42	Windows 8 Large Folder Transfer	93
4.43	Windows 7 Large Folder Transfer	94
4.44	Windows XP Large Folder Transfer	94
4.45	Data Transfer Result	95
4.46	Test 1 Windows XP Result	97
4.47	Welcome to EFS Wizard	98
4.48	AEFSDR Wizard	98

4.49	AEFSDR Wizard Select Logical Disk	99
4.50	AEFSDR Wizard Scanning For Keys	99
4.51	AEFSDR Wizard Key Scan Results	100
4.52	AEFSDR User Input For Decrypting Key	100
4.53	AEFSDR Scan Encrypted Files	101
4.54	Test 2 Windows 7 and 8 Result	101
5.1	Puppy Linux Live CD Boot	103
5.2	Mounting HDD and USB	104
5.3	Copying Files to USB	104
5.4	Input Hashes	105
5.5	Bruteforce Attack on LM Hashes	105
5.6	Bruteforce Attack Successful	106
5.7	Password Cracked	106
5.8	Puppy Linux Live Boot	107
5.9	Mounting HDD	108
5.10	Renaming Sethc.Exe	108
5.11	Renaming Utilman.Exe	109
5.12	Making Copy of cmd.exe and Renaming to sethc.Exe	109
5.13	Making Copy of cmd.exe and Renaming to Utilman.Exe	110
5.14	Windows XP Logon Screen	110
5.15	Accessing cmd through Sticky Keys	111
5.16	Accessing cmd through Utility Manager	111
5.17	Create New User in Windows 7	112
5.18	Create New User in Windows 8	112
5.19	Windows XP Logon Screen with New User	113
5.20	Windows 7 Logon Screen with New User	113
5.21	Windows 8 Logon Screen with New User	114
5.22	Creating Malicious Executable	115
5.23	Using Multi Handler Exploit	116
5.24	Interacting With Windows XP	116
5.25	Handler Making Windows XP Shutting Down	116
5.26	Created Hacked Folder onto Windows 7	117
5.27	Windows 8 Detected Malware	117
5.28	Using Java_Signed_Applet Exploit	119
5.29	Victim Visited the Malicious Link	119

5.30	Remotely Giving Shutdown Command to Windows XP	120
5.31	Remotely Making A Folder on Windows 7	120
5.32	Meterpreter Session Opened	121
5.33	Windows 8 Screenshot Captured In Backtrack	121
5.34	Using Ie_ExecCommand_Uaf Exploit	122
5.35	Interacting With Windows XP	123
5.36	Remotely Getting Shell of Windows XP	123
5.37	Windows 7 Browser Protections	124
5.38	Windows 8 Browser Protections	124
5.39	Cve-2012-4969	127
6.1	Guideline for Operating System Comparison	131

LIST OF ABBREVIATION

AES	Advanced Encryption Standard
BIOS	Basic Input Output System
CPU	Central Processing Unit
DEP	Data Execution Prevention
DES	Data Encryption Standard
EFI	Extensible Firmware Interface
EFS	Encrypting File System
FEK	File Encryption Key
GOP	Graphic Output Protocol
GPU	Graphics Processing Unit
HDD	Hard Disk
ICF	Internet Connection Firewall
MSE	Microsoft Security Essentials
OS	Operating System
PC	Personal Computer
RAM	Random Access Memory
RT	RUNTIME
SP1	Service Pack 1
SSD	Solid State Disk
UAC	User Account Control
UEFI	Unified Extensible Firmware Interface
WEI	Windows Experience Index
WIC	Windows Imaging Component
WNS	Windows Push Notification Services

CHAPTER 1

INTRODUCTION

1.1 Introduction

In today's era of technology the world has seen development of multitude of Operating System (OS) but only a few has managed to grab the attention and of those three popular environments are, Windows, Macintosh (MAC) and Linux distributions. According to a recent survey (Choney, 2013) Microsoft dominates the OS market share with over 90% of personal desktop computers running different variants of available Microsoft Windows OS while MAC OS X and other are following at a desperate rather disappointing rate of approximately 5% market share combined together.

With such a strong market share Microsoft enjoyed a monopoly of being a software giant for over 20 years but as technology is advancing researchers are claiming 2012 to be a post personal computer (PC) era (Hughes, 2012) in which PC are being replaced by tablets as primary consumption devices and to survive its position Microsoft has jumped into hardware business and manufactured tablets which runs on yet another variant of Microsoft OS called Windows 8 which is to run on desktops, laptops, and tablets.

With introduction of Windows 8 and surface tablets Microsoft anticipates of being successful and upgrading its position from top desktop OS to top device OS. Furthermore Microsoft has started to cut down its hardware partners and is selling the tablet itself to

pull a profit margin similar to the PC revenues it used to pick out of a PC bundled with Windows and Office.

1.2 Problem Background

In the current times Microsoft OS is dominating the market of home users and enterprises with two variants of windows namely, Windows XP and Windows 7. Windows XP is 11 years old OS and Microsoft is going to end support on April 8, 2014 (Klinefelter, 2012) which will see the decline of XP and in few years only small percentage of computers would be running this variant as Microsoft itself was seen recommending home users and Enterprises to move to Windows 7 from the past 3 years.

It's important to mention that in August 2012 Windows XP started to crumble against Windows 7 but in October 2012 one could see that Windows 7 did not only overtook but also managed to maintain the market share lead from Windows XP and became the most used OS in the world (Whitney, 2012). It would have been a sigh of relief for users and Enterprises if Microsoft just have stuck with Windows 7 but instead Microsoft developed a new variant of OS and called it Windows 8 and is constantly claiming it to be more powerful, more secure and faster in speed than Windows 7. Furthermore sample results from Microsoft System Integration Test lab systems Windows 8 proved to be 30-70% faster in boot times on most systems they tested (Sinofsky, 2011).

According to Tami Reller from (Microsoft Official Windows Blog) Microsoft has sold 40 million Windows 8 licenses in one month of its general availability as a consequence outpacing windows 7 in upgrades (LeBlanc, 2012). Furthermore Windows store that is only accessible to Windows 8 has about 100,000 applications to date ("MetroStore Scanner", 2013) which is putting a conflict between Windows

users to upgrade to Windows 8 or keep using their existing Variant of Windows.

To end the said conflict researchers from all over the world has been seen benchmarking different versions of OS with automated third party benchmarking software some of which are recognized as industry standard benchmarking software. These automated benchmarking software are even used by big corporations like Intel and Samsung when benchmarking their new products. For instance Dr.Bob Steigerwald and Abhishek Agrawal (2011) from Software and services group in Intel marks cinebench as one of their favorite performance benchmarking application.

A recent comparison research on performance evaluation of Windows XP, Vista and 7 was done with help of popular third party benchmarking applications. There experiments concluded that Windows 7 or Windows Vista do not provide a better overall performance on the high-end computer system compared to Windows XP (Martinovic, 2012). Their research results indicates that using these software alone is not enough for proper OS benchmarking since the software were only benchmarking hardware level performance and none of them measured the OS in terms of performing user oriented tasks or security of the OS which are equally important when migrating to a new OS thus with this research we propose that an effective approach to OS benchmarking should include user oriented tasks and security of OS to determine which OS version performs better in the same controlled environment.

1.3 Problem Statement

Based on current research it is not known if windows 8, a next generation of Microsoft OS is better than Windows 7 or Windows XP in terms of performing user related tasks, overall system performance and security which is proving to be a roadblock for the user base of Microsoft who wants to migrate to Windows 8. Furthermore, Available Industry standard benchmarking software

merely focus on hardware level system performance of OS but none of them measures the OS in terms of performing user oriented tasks or security of OS which are equally important.

1.4 Project Objectives

There are three objectives to be achieved in this project. The objectives are:

- i. To provide performance analysis on XP, Windows 7 and 8 from CPU, hard disk, memory modules and graphic card performances
- ii. To provide analysis from the perspective of user oriented tasks such as booting up a system, File Encryption, Video encoding, large file transfers and Data compression
- iii. To provide security analysis on XP, Windows 7 and Windows 8 by exploiting OS level and application level vulnerabilities

1.5 Project Scopes

The scopes of the project are:

- i. This research focuses on detailed benchmarking on three versions of Windows namely XP, Windows 7 and Windows 8 to compare their respected hardware and operational level performances such as mathematical operations, compression, encryption, boot times, graphics, Disk, memory tests.
- ii. This research focuses on exploiting OS level and application level vulnerabilities on three versions of Windows to check if it is easy to compromise the systems.

- iii. Benchmarking and penetration testing shall be done in a controlled environment where all the OS will run with identical configuration with unnecessary services and applications being disabled

1.6 Significance of the Project

Technology advancements are rapid in development and mostly are in favor of enhancing the human life experience such is the case with OS updates which helps to enhance the user experience with computers. Occasionally people does not seem to like the change or the product update fails to meet the expectation of the users which leads to waste of money, resources, trust and time which exactly happened with Microsoft when they released Windows Vista.

To compensate the loss Microsoft quickly released a more stable and more powerful version of Windows OS called Windows 7 and gradually people are forgetting the mess of Windows Vista but due to technological advancement pressure Microsoft seem forced to release Windows 8 in the market and urging users to shift to it.

Most of the users are being skeptical about this move and are hesitant to upgrade to windows 8 as they smell a disaster like Windows Vista but what if Windows 8 is what it promises to be a more powerful, faster and secure OS thus the main focus of this research is to benchmark Hard disk, RAM, CPU and Graphics performances at hardware and operational level in the three OS and to do vulnerability (Penetration) testing on the OS for verifying security of the systems.

The main contribution of this research is determination of which of the three powerful Windows OS has better performance in the same controlled environment and which of the three OS is the hardest to exploit. Other contribution lies in an

improved OS benchmarking approach for future OS comparisons.

1.7 Organization of Report

The report consists of six chapters. The description of each chapter will be discussed in the following sentences.

Chapter 1 consists of Introduction, problem background, problem statement, project objectives, scope and significance of this research.

Chapter 2 shall review the literature related to the research area. This section should be able to discuss Structure of selected case study OS, feature improvements of OS over their predecessors, available benchmarking software, Penetration tools and related work.

Chapter 3 consists of the research methodology which shall discuss the research strategy chosen to complete the research.

Chapter 4 focuses on the process of both hardware level and operational level benchmarking and discusses the analysis, results and feedback from the benchmarking tools and user oriented tasks.

Chapter 5 focuses on exploiting OS level and application level vulnerabilities as experiments and shall discuss the analysis and results from the penetration testing tools.

Chapter 6 shall be able to give insight on Conclusion and future works that could be extended to carry the research from where the researcher is intending to

leave it. Furthermore this chapter shall act as a guideline for the researchers who are planning to carry out OS comparisons for their research work.

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