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Title of the Thesis

Milan – IT

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que bonitinho...

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"A atividade da engenharia, enquanto permanecer atividade,
pode levar a criatividade do homem a seu grau máximo;
mas, assim que o construtor pára de construir e se entrincheira
nas coisas que fez, as energias criativas se congelam,
e o palácio se transforma em tumba."

Marshall Berman

List of Abrevitations

Abstract

Contents

List of Figures

List of Tables

Motivation

1 Introduction

1.1 Definition of the problem

1.2 Solution Strategy

1.3 Structure

2 State of the Art

2.1 Greent ICT

2.2 Devices Consumption

2.3 Measurement Tools

3 Methodology

3.1 Overview

This research was conducted in order to determine how much energy a computer's component, such as CPU, Memory, Hard Drives, spends and, also, how much it would have an effect in the cost of the Data Center. The advantages and disadvantages as well as the reliability of these measures played also an important role in the objectives of this thesis work.

3.1.1 Research Design

3.1.2 Participants

3.2 Energy Management Tools

3.2.1 SiSoftware SANDRA

SANDRA was the main software utilized to benchmark the data in this thesis work. It contains a huge database of components to make sure the benchmarks provided have the best results and accurate comparisons.

SiSoftware Sandra[1] is an information & diagnostic utility. It provides most of the information (including undocumented) one need to know about their hardware, software and other devices whether hardware or software.

The software goes beyond the point of other Windows Utilities, by giving the user, the possibility of benchmarking and comparing at both high and low level the computer devices. Moreover, it is a tool for monitoring the performance on systems and even benchmarking many parts of the computer, this includes, CPU[2], memory, hard disks,

[1]The **S**ystem **AN**alyser, **D**iagnostic and **R**eporting **A**ssistant
[2]Central Processing Unit

CD/DVD ROM, network, PSU[3], etc. For that reason, it is considered one of the most complete benchmarking tools available.

Besides the benchmarking, Sandra also provides access to information about the Hardware, including the Motherboard, processor, disks, printers, etc; and Software, such as, key softwares (web browsers, e-mail program, etc.), OS information, processes, memory usage and more.

The detailed list of modules utilized by SiSoftware Sandra can be found in Appendix A.

Furthermore, the Sandra has a great functionality that is a catalog of pricing, which, in addition to the power consumption and other important characteristics, the best combination (which means the most green) of devices can be chosen to the server.

3.2.2 Other Tools

In order to make sure the best option was chosen it was used another tools, other than Sandra, with the intention of complementing the features and results of the benchmarks provided.

3.2.2.1 Energy Measurement Instrument

Figure 1: Energy Measurement Instrument

[3]Power Supply Unit

This is the instrument used for comparing with the results of the benchmarks given by Sandra.

3.2.2.2 WebSPHINX - A Personal, Customized Web Crawler

WebSPHINX[4] is a Java class library used for web crawling. It provides a way to browse and process web pages automatically.

This piece of software was used to establish the pricing, linking it with the MPN[5], and, afterwards, composing the database explained in 4.1.

3.2.2.3 CPU-Z

CPU-Z detects information about the CPU, RAM Memory, motherboard, chipset and more. That program was used to complete the database with missing information about the components.

3.2.2.4 PlateSpin - Recon

This software did not compose the ones used for doing this thesis. Yet, it is important to notice this, because it is almost the same of Sandra, but it provides a more incisive work on Data Centers in general. It provides workload profiling, analysis and planning of complex server consolidation, disaster recovery, capacity planning, asset management and green data center initiatives. It also provides forecasting for optimizing the data center by collecting hardware, software and services inventory for all server workloads. Furthermore, it results an statistics work for the server workloads running on data center and how their resources are being used.

For the reason that it was needed to compare the components, in order to draw a picture of the most suitable components to be used. It was chosen Sandra, which has a great database of components.

3.3 Measurement Methodology

[4]Website-Specific Processors for HTML Information Extraction
[5]Manufacturer's Part Number

4 Analysis and Results

4.1 Analysis

here it is explained the database, how it was built, the database schema and etc...

4.2 Results

Conclusions

Perspectives and Future Developments

Suggestions for future developments, there are

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APPENDIX A – List of SiSoftware Sandra Modules

Here is the list of principal modules used in this thesis work.

- System Summary
- Mainboard/Chipset/System Monitors Info
- CPU/BIOS Info
- APM & ACPI (Advanced Power Management) Info
- PCI(e), AGP, CardBus, PCMCIA bus and devices Info
- Video Information (monitor, card, video bios, caps, etc.)
- OpenGL Information
- Keyboard Info
- Windows Memory Info
- Windows Info
- Font (Raster, Vector, TrueType, OpenType) Information
- Modem/ISDN TA Information
- Network Information*
- IP Network Information*
- WinSock & Internet Security Information
- Drives Information (Removable Hard Disks, CD-ROM/DVD, RamDrives, etc.)

- Ports (Serial/Parallel) Info
- Remote Access Service Connections (Dial-Up, Internet)*
- OLE objects/servers Info*
- Processes (Tasks) & Threads Info
- Modules (DLL, DRV) Info
- Services & Device Drivers (SYS) Info*
- SCSI, SAS Information*
- ATA, ATAPI, SATA, RAID Information
- Data Sources Information*
- CMOS/RTC Information*
- Smart Card & SIM Card Information*

List of Benchmarks

- Arithmetic Benchmark (including SSE2, SSSE3)
- Multi-Media Benchmark (including MMX, Wireless MMX, SSE, SSE2, SSE3, SSSE3)
- Multi-Core Efficiency Benchmark
- Power Management Efficiency Benchmark
- File System (Removable, Hard Disks, Network, RamDrives) Benchmark
- Removable Storage/Flash Benchmark
- CD-ROM/DVD Benchmark
- Memory Bandwidth Benchmark
- Cache & Memory Bandwidth Benchmark
- Network/LAN Bandwidth Benchmark
- Internet/ISP Connection Benchmark
- Internet/ISP Peerage Benchmark

Applications and Usage

- Hardware Interrupts Usage*
- DMA Channel Usage*
- I/O Ports Usage*
- Memory Range Usage*
- Plug & Play Enumerator*
- Hardware registry settings
- Environment settings
- Registered File Types
- Key Applications* (web-browser, e-mail, news, anti-virus, firewall, etc.)
- Installed Applications*
- Installed Programs*
- Start Menu Applications*
- Installed Web Packages* (ActiveX, Java classes)
- System Event Logs*

* Commercial version only

APPENDIX B – Something