DESIGN OF A GRAPHICAL USER INTERFACE BASED SYSTEM ADMINISTRATION TOOL

Ajayi O.[1], Idakwo M.A.[2], Udekwe D.A[3], Adekale A.D[4], Usman N.S[5]
[1]Department of Computer Engineering, Ahmadu Bello University, Zaria – Nigeria
[2]Department of Computer Engineering, Ahmadu Bello University, Zaria – Nigeria.
[3]Department of Computer Engineering, Ahmadu Bello University, Zaria – Nigeria
[1] mor_ugo@yahoo.co.uk, [2] aoreofe@abu.edu.ng

Keywords: –
Graphical User Interface, System Administrative Tool, System tweak development, and Control Panel Tweak.

Article History: –
Received: January, 2020
Reviewed: February, 2020
Accepted: March, 2020
Published: March, 2020

ABSTRACT

It is no longer disputable that speed and accuracy are of paramount importance today and that is why computers and other information and communication technology (ICT) related gadgets have virtually completely dominated our daily lives. For example, today's medical industry, academics, transport, financial institutes, military and production industries are all driven on ICT platforms. With this, service request on information and communication technology (ICT) administrators is on the increase. With regards to this, there is need to come up with an automated software solution which could tremendously ease the daily task of information and communication technology (ICT) administrators while increasing speed at the highest accuracy. Therefore, this project is aimed at designing a software program built with a friendly graphical user interface (GUI) environment where administrators can carry out various system administration tasks such as disk administration, network administration and some other system tweaks. The collection of these tools will be integrated in one software platform as a wizard to give the information and communication technology (ICT) administrator full and quick access to carry out various administrative tasks during his/her operations.

1. INTRODUCTION

Information technology system administrators perform the crucial and never-ending task of maintaining the technical infrastructure on which our society depends. System administrators are considered to be the backbone of every organization, working behind the scenes to configure, maintain, and troubleshoot the computer infrastructure to keep it available and secure [1] The workspace of system administrators is complex and ever changing in response to technical advances and the evolution of threats. It is necessary to design effective tools to assist the system administrators in handling their work with ease [2].

System administration include the planning, configurations, maintenance of computer system while a system administrative tools are a set of tools for administering, monitoring, and troubleshooting the system [3] A computer system administration tool is used to perform full data backup and restore capabilities when required [4].

System administrators are responsible for the day-to-day operation of an organization's computer networks. They organize, install, and support an organization's computer systems, including local area networks (LANs), wide area networks (WANs), network segments, intranets, and other data communication systems. Administrating a computer network involves the installation, configuration and supporting a network and internet system or a segment of a network system

Actually, this is what this software program is targeted at accomplishing. The software project is meant to provide the user with a full graphical user interface (GUI) environment, which will comprise of

two sections namely; Network Administrative Tool and Disk Administrative Tool.

Network Administrative Tool: This section will enable the user to design a local area network (LAN), carry out the following configurations; configure network parameters (such as internet protocol address (IP), Subnet, Gateway, domain name server (DNS), Hostname, and Workgroup), configure network files and resource sharing, configure network permission, and most importantly carrying out network connectivity test which could help the user significantly during network troubleshooting. The network software project will be designed and written in form of a wizard, as it will comprise of multiple integral parts which will handle different configuration roles.

Disk Administrative Tool: This section will enable the user carry out various system administration tasks such as disk checks and bad sector repair, disk formatting and Partitioning, data backup and restoration, removable disk virus removal and system power manager.

The collection of these Administrative tasks was integrated in one software platform as a wizard to give the information and communication technology (ICT) administrator a full and quick access to carry out various administrative tasks and also enable a non-computer literate to perform this administrative tasks, hence easing the task of system Administrators in general.

The Administrative tool will be implemented by employing the use of windows batch file programming for task executions and logical decisions, while the Auto Play Media Studio (APMS) was used in the development of the Graphical User Interface (GUI) which will provide the program with a friendly environment for operations.

2. REVIEW OF SIMILAR WORKS

[5] conducted an in-depth study of system administrator, who they considered to be a critical group of highly specialized computer users. Their study consisted of surveys, a diary study, and 12 interviews with system administrator, managers, team leads, and other stakeholders. They found that the tools that system administrator used exhibited deficiencies in supporting the work practices of system administrator. As a result, system administrator often required additional information, tool support, expertise, or had to build their own tools before being able to complete their tasks.

[1] examined whether the tools used by system administrator helped them in their work routine. They found system administrator tools must better incorporate the variety of roles and challenges faced in risk and complexity of system administrator tasks. They believe that the tool deficiencies identified were due to a lack of understanding about administration by tool developers. Before developing a tool the developers should be aware of the complexity, the scale that they would be addressing, threats faced by the system administrator.

[2] conducted a survey of 125 system administrators and analyzed data using structural data modeling techniques, the results confirmed that the system administrator have unique systems to work with compared to other computer users. Their research also disclosed four key tool features that should be kept in mind while designing tools for system administrators: accuracy, verification, reliability, and credibility.

[6] conducted a study about how the work of system administrator can be better supported by observing system administrator at their workspace. The results revealed that a single tool couldn't easily meet all the needs of the diversity of system administrator. Better collaboration support can help problems encountered by the system administrator in communicating and establishing shared context. One solution proposed to address the issue of losing information was to enable a persistent storage of communication.

[7] designed a Wireless Connection Utility (WCU) which provides a unified user experience for managing various types of wireless connections, including Wireless WANs, Wireless LANs, and Bluetooth networks. The WCU functions as a gateway for a user of a computer to monitor the computer's wireless

network status, to switch wireless connections, to configure wireless connection settings, and to diagnose wireless connection problems through a Wireless Helper Utility (WHU). The WCU thus provides a unified U/I layer on the top of the existing operating system components for ease of use.

[8] designed a tool for managing a network of interconnected devices. The tool may provide a user with an interface that allows the user to view the type and status of each network device (that is, each device connected to the network), and even the status of the network itself. The tool may alternately or additionally provide a user with services related to the network, such as allowing a user to perform one or more tasks associated with devices in the network.

[9] designed a tool for managing a network of interconnected devices. The tool may provide a user with an interface that allows the user to view the type and status of each network device (that is, each device connected to the network), and even the status of the network itself. The tool also alternately or additionally provide a user with services related to the network, such as allowing a user to perform one or more tasks associated with devices in the network.

[10] designed an efficient and reliable method for reducing storage device. Vulnerability to degraded performance, data unavailability or data loss was presented. The invention was directed to a method and corresponding apparatus for reducing storage device vulnerability to degraded performance, data unavailability (DU) and/or data loss (DL).

[11] designed a system capable of detecting and classifying the anomalies, and extracting detailed information from the network usage. A graph representation is used, allowing a deep inspection of the IP flows exchanged between the active devices in the network. The Tsallis entropy was applied to detect anomalies. Furthermore, the proposed system allows the network administrator to create metrics to monitor and acquire detailed information about the network equipment, services, and users.

[12] conducted a research to develop an inexpensive network security tool for SMEs with an easy and friendly interface to the user. The tool performed basic network security tests such as firewall configuration check, vulnerability assessment and Denial of Service simulations. It also provided network management features such as asset discovery and asset registry management. The report generated by the tool will be easy to understand for less experienced system administrators, and critical vulnerabilities will be forwarded to more skilled network security experts for further analysis.

3. METHODOLOGY

The intended software program development is to be carried out using windows system batch file programming. The windows batch file programming will be responsible for the program execution codes, while a software development platform called APMS (Auto Play Media Studio) will be used to create the user's graphics interface.

3.1 Batch file programming

Batch files or scripts are small easy-to-write text files that carry out a series of commands while saving time which otherwise would be invested in typing the same commands again and again. It is a script file used to automate tasks in DOS, Windows, and OS/2 operating systems. They can be simple enough that even the average home computer user can take advantage of them. Systems administrators and power users are well aware of the utility of batch files but the average PC user is generally unacquainted with them or is intimidated by the notion of writing or even running a script. This is unfortunate since it means that many are foregoing the use of a powerful tool for carrying out routine or repetitive tasks. Although batch files can be quite sophisticated and used for complicated network and system administration, they can also be of the utmost simplicity and very brief.

3.2 System tweak development

System Tweaking is simply a process of making modification to default system settings, in order to fine

tune or optimize its performance. Tweaking a system might be carried out on its hardware, operating systems or applications programs. The system tweak comprises of the following:

a. Universal Serial Bus(USB) Tweak
b. Control Panel Tweak
c. Software Tweak
d. Network Tweak
e. Storage Tweak
f. Download Tweak

3.3 Disk administration tool

The Disk Administration Tool comprises of various disk administration options intended to solve problems relating to the disk drives present in the computer as well as perform some useful operations. The Disk Administration tool comprises of the following:

a. Defragmentation
b. Disk formatting
c. System backup
d. Disk cleanup
e. File system Converter
f. Repair Disk
g. Shortcut Virus Remover
h. System File Checker

3.4 Network Admin Tool

The Network Admin Tool comprises of various network administration options intended to solve problems relating to the networking aspect of the computer as well as perform some useful operations. The network admin tool comprises of the following:

a. Design Network
b. Configure Network
c. Test Network
d. Share Network
e. View Network
f. Secure Network

The figure below represents the flowchart of the system developed.

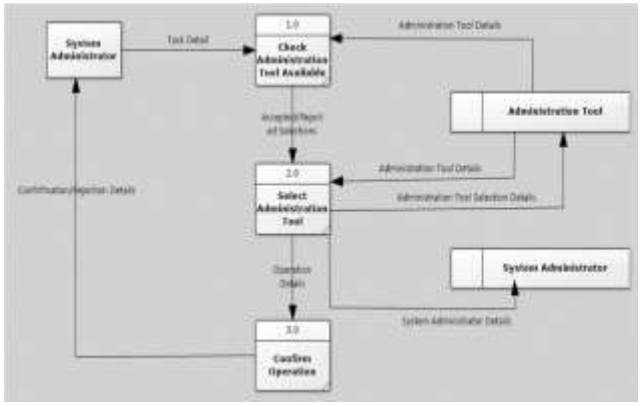

Figure 1: Flowchart of the developed System

4. RESULTS AND DISCUSSION

4.1 Home page

This is the first screen that the user will see when the software is launched, it comprises of the various administration tools that can be used, and all that is required of the user is to click on the tool of interest. The Figure 2 shows the home page of the system.

Figure 2: System home page

4.2 System tweaks page

This is the screen that the user will see when System Tweaks tool is selected, it comprises of the various tweaks that can be used, and all that is required of the user is to click on the button of interest. Figure 3 shows the page of the System Tweaks Tool. On this page the administrator should choose a specific task to perform a certain operation.

Figure 3: System Tweak Tool

4.3 Disk administration tool

This is the screen that the user will see when Disk Admin tool is selected, it comprises of the various disk administration tools that can be used, and all that is required of the user is to click on the button of interest. Figure 4 shows the page of the Disk Administration Tool.

Figure 4: Disk Administration Tool

4.4 Network administration tool page

This is the screen that the user will see when Network Admin tool is selected, it comprises of the various

network administration tools that can be used, and all that is required of the user is to click on the button of interest. Figure 5 shows the page of the Network Administration Tool.

Figure 5: Network Admin Tool

The project goal was to design an application that will give the system administrator full and quick access to carry out various administrative tasks during his operations. The application contains a home page which consists of various administration tools which the administrator will be able to choose to perform a specific operation. Relating to the fact that the task of an administrator is somewhat tedious and requires lots of computer skills and knowhow which may deteriorate over time. The use of this software has provided the means for an administrator to perform his/her work with maximum speed and accuracy. However, some percentage of technical knowhow is prerequisite to the use of the software.

5 CONCLUSION

This project was developed in order to tackle the inverse proportionality relationship with respect to speed and accuracy. That is, the human nature mathematically relates speed to be inversely proportional to accuracy, which means, as speed of man increases, his accuracy decreases and in the 21st century today, with time being defined as money, things must not only be done fast but at their best accuracy. In addition to this, in modern day technology driven production industries, down time is intolerable, as it could significantly mean loss of cash in millions. so, to counter this human limitation, there is need that an automated software is put in place which could tremendously cut down time required in network design, setup, configurations, maintenance and services, and most of all, to guarantee the highest form of accuracy.

REFERENCES

[1] E. M. Bailey, "Design guidelines for system administration tools", *Designing Workspaces for Managing Internet Systems*, 52, 90-105, 2007.

[2] S.W. Nicole Velasquez and A. Alexandra Durcikov "Designing tools for system administrators:an empirical test of te integrated ser satisfaction model", *Proceeedigs of the 22nd conference on large installation system aadministration conference (LISA08)*. 44, 83-92, 2008.

[3] M. Burges, "Theory of system administration". *Submitted to the Journal of ACM(n.d)Admin journals, 2249*, 136-187, 2000.

[4] E.D. Zwick, "Policy as a system administration tool". *Journals of Admin systems tools, 219*, 156-177, 1990.

[5] A. Somayaji, S. Hofmeyr, & S. Forrest, "*Principles of a computer immune system"*. Paper presented at the NSPW. 66, 90-115, 1997.

[6] P.P. Maglio, E. Kandogan, & E. Haber, "Distributed Cognition and Joint Activity in Computer System Administration". In *Resources, Co-Evolution and Artifacts* (pp. 145-166): Springer, 2008.

[7] J.R Zheng, "System and method for managing wireless connections in computer". In: Google Patents. *228*, 380-406, 2010.

[8] B. Hopmann, & M. Yakeley, "Network administration tool employing a network administration protocol". In: Google Patents. *38*, 77-93, 2011.

[9] Marl, "Network administration tool". In: Google Patents. *18*, 40-96, 2013.

[10] R. B. Jacoby, "Diagnostic analysis tool for disk storage engineering and technical support". In: Google Patents. *198*, 280-331, 2017

[11] A. A. Amaral, L. de Souza Mendes, B. Zarpelão, & M.L. Junior, "Deep IP flow inspection to detect beyond network anomalies". *98*, 80-96, 2017

[12] B. Iyamuremye, & H. Shima, "Network security testing tools for SMEs (small and medium enterprises)". *Paper presented at the 2018 IEEE International Conference on Applied System Invention (ICASI)*