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Development of FastNet Config Application

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CERTIFICATE OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project that the original work is my own except as specified in the references and acknowledgement and that the original work contained herein have not been taken or done by unspecified sources of person.

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ABSTRACT

Nowadays, the usage of computer and network technology seems to be necessity for the most work environments. This technology become important since it provides users with an access to the data resources and internet. Besides providing data access, data can also be shared. In order to stay connected to the network, users need to make some setting of network configuration on their computers. The main objective of this research is to develop an application which can store multiple network configurations as profiles and activate the profiles in the future.

This project will be focused on the development of an application which can store multiple configuration of network as profiles. These profiles will be stored in separate storing location for retrieval later. The scope of the application is to cater for wired network.

Finally, the contribution of the project is it will provide effectiveness in term of time, means that users can activate a particular network configuration profile, without any reconfiguration. What they have to do is activate the profile at system startup. This application will automatically sets the IP address, Subnet Mask, Default Gateway and DNS for NIC and also changes the Internet Explorer Proxy Setting accordingly to the applied profile.

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LIST OF ABBREVIATIONS

The following terms, as defined in this section are commonly used in this paper to describe their full name.

CIDR	Classless Inter-Domain Routing
DHCP	Dynamic Host Configuration protocol
DLL	Dynamic-Link Library
DNS	Domain Name Service
DSL	Digital Subscriber Line
FastNet Config	Fast Network Configuration
IP	Internet Protocol
NIC	Network Interface Card
OS	Operating System
TCP/IP	Transmission Control Protocol/Internet Protocol
VBScript	Visual Basic Scripting Edition
VLSM	Variable Length Subnet Masks
WMI	Windows Management Instrumentation
XML	eXtensible Markup Language

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CHAPTER 1

INTRODUCTION

The most common type of computer network today is based around Ethernet and the TCP/IP (Transmission Control Protocol/Internet Protocol). Ethernet describes the physical connection between computers and other devices. TCP/IP is primarily the protocol used for all devices to communicate with each other. There are other protocols used between specific applications, such as a web browser or an email client, but underneath they all still use TCP/IP. This research is to develop an application that will provide a mechanism to save multiple network configurations for TCP/IP as profiles, store the profiles, and activate the profiles from database of the application. At first, users have to make some network configuration and save them as profiles. Next, they have to activate the right profile for the network they are currently in.

1.1 Problem Statement

Computer network technology has been expanded rapidly since it was introduced. The basic concept of computer network is an exchange of information from and to different computers and has particular system to direct information to the correct computers.

Computer network uses layers protocol to enable communication between computers. One of the layer protocols is called Transmission Control Protocol, or TCP/IP. This protocol allows computers to access a network and internet connection. For that reason, each computer must have it own TCP/IP setting. TCP/IP setting resided in network configuration in Windows computers.

Currently, there is an application in Windows computer which can store network configuration setting. However, the limitation of the application is it can store only one network configuration at one time. This will be a hassle when users need to do reconfiguration to their network setting each time they connect to different network.

To solve this problem, a useful application will be build which can store multiple network configurations as profiles. When users go to different network area for the first time, they will have to configure and store the current configuration of the network once using this application. Next time when they revisit that network again, they can activate the profile accordingly, instead of redo the network configuration repeatedly.

1.2 Objective of the study

The objectives of this study are:

- To develop an application that is capable to store multiple network configurations as profiles.
- To activate the appropriate profiles at different network location.
- To conduct some testing on the application in different network area location.

1.3 Scope of the study

The focus of this project is to design a network configuration application with capability of storing multiple network configurations. This configuration will be stored as profiles and will be kept in separate a database. Each of the profile contains settings for:

- Internet Protocol Address (IP Address)
- Subnet Mask
- Default Gateway
- Domain Name Service (DNS) server
- Internet Explorer Proxy Setting

The function of the application will be limited to wired network. This application will be developed on Windows based desktop computer using Microsoft Visual C# as platform, which is based on C# programming language.

1.4 Significant of the study

The result of the study is to develop an application to store multiple network configurations as profiles. Each profile contains information of network configuration setting, which is IP address, Default Gateway, Subnet Mask, DNS server and Internet Explorer Proxy Setting for particular network. This entire configuration is essential in order to access computer network and internet connection.

This application will provide effectiveness in term of time; means that users can activate a particular network configuration profile, without doing reconfiguration. With this application, users can switch to another network configuration by pressing some key at system startup. This application will then change IP address, Subnet Mask, Default Gateway and DNS for NIC and also changes the Internet Explorer Proxy Setting accordingly for the users.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review of this study will be focused on technology that will be used in development of FastNet Config application and the implementation of the technology as well as a brief description of all known similar and ongoing projects. Basically, all information covers are within the scope of this research.

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2.2 Technologies

2.2.1 What is TCP/IP?

TCP/IP (Transmission Control Protocol/Internet Protocol) is the suite of communications protocols used to connect hosts on the Internet. TCP/IP uses several protocols, the two main ones being TCP and IP. TCP/IP is built into the UNIX operating system and is used by the Internet, making it the de facto standard for transmitting data over networks. Even other network operating systems have their own set of protocols such as Netware, it also support TCP/IP.

2.2.2 What is IP Address?

IP Address is an identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be zero to 255. For example, 1.160.10.240 could be an IP address.

2.2.3 What is Subnet Mask?

Subnet Mask is used to determine what subnet an IP address belongs to. An IP address has two components, the network address and the host address. For example, consider the IP address 150.215.017.009. Assuming this is part of a Class B network, the first two numbers (150.215) represent the Class B network address, and the second two numbers (017.009) identify a particular host on this network.

2.2.4 What is DNS?

DNS is short for Domain Name System (or Service or Server), an Internet service that translates domain names into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time domain name is used, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.example.com might translate to 198.105.232.4.

2.2.5 What is DHCP?

DHCP is short for Dynamic Host Configuration protocol, a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device will have a different IP address every time it connects to the network. In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses. Dynamic addressing simplifies network administration because the software keeps track of IP addresses assignment rather than requiring an administrator to manage the task. This means that a new computer can be added to a network without the hassle of manually assigning it a unique IP address. Many ISPs use dynamic IP addressing for dial-up users.

2.2.5 What is NIC?

NIC is short for Network Interface Card, is an expansion board inserted into a computer so the computer can be connected to a network. Most NIC are designed for a particular type of network, protocol, and media, although some can serve multiple networks.

2.3 Methods

2.3.1 What is Netsh?

Netsh is one of the most powerful yet least known networking tools included with Windows 2000 and Windows Server 2003. It's installed by default and is located in the %systemroot%\system32 folder. Netsh is also available on Windows XP. Netsh enables users to display, modify, import, and export many aspects of the network parameters of a system. It can also connect remotely to other systems with a remote machine parameter

2.3.2 What is VBScripts?

VBScript (short for Visual Basic Scripting Edition) is an Active Scripting language developed by Microsoft. The language's syntax reflects its pedigree as a limited variation of Microsoft's Visual Basic programming language. VBScript is installed as default in every desktop release of the Windows Operating System (OS) since Windows 98, and may or may not be included with Windows CE depending on the configuration and purpose of the device it is running on. It initially gained support from Windows administrators seeking an automation tool more powerful than the batch language first developed in the late 1970s. A VBScript script must be executed within a host environment, of which there are several provided on a standard install of Microsoft Windows (Windows Script Host, Windows Internet Explorer).

2.3.3 What is WMI?

Windows Management Instrumentation (WMI) is a set of extensions to the Windows Driver Model that provides an operating system interface through which instrumented components provide information and notification. WMI is Microsoft's implementation of the Web-Based Enterprise Management (WBEM) and Common Information Model (CIM) standards from the Distributed Management Task Force (DMTF).

WMI allows scripting languages like VBScript or Windows PowerShell to manage Microsoft Windows personal computers and servers, both locally and remotely. WMI is preinstalled in Windows Vista, Windows Server 2003, Windows XP, Windows Me, and Windows 2000.

2.3.4 What is XML Serialization?

XML Serialization is the process of converting an object into a form that can be readily transported. For example, an object can be serialized and transported over the Internet using HTTP between a client and a server. On the other end, deserialization reconstructs the object from the stream. XML serialization serializes only the public fields and property values of an object into an XML stream. XML serialization does not include type information.

2.4 Related Known Similar and Ongoing Projects

2.4.1 IP Configuration Selection

This method uses Netsh command to select an IP configuration from several sets of configurations and activate the configuration accordingly. Netsh is a command-line scripting utility that allows users to display or modify the network configuration of a computer that is currently running in Windows computer. Netsh interacts with other operating system components using dynamic-link library (DLL) files. Each Netsh helper DLL provides an extensive set of features called a context, which is a group of commands specific to a networking component. To configure IP settings, users have to use Command Prompt and enter:

```
netsh interface ip set
  address name="local area connection"
   source=static
  10.2.2.2 255.0.0.0
  10.200.0.3 1
netsh interface ip set dns
  "Local area connection"
  static 10.2.2.2
```

The first Netsh command configures the local area connection settings. This command sets the IP address to 10.2.2.2, subnet mask to 255.0.0.0, gateway to 10.200.0.3, and gateway metric to 1. The second Netsh command sets the Preferred DNS Server setting to 10.2.2.2.

The similarity of this project and FastNet Config application is the concept to activate several sets of network configuration according to different network. The scope of this method is limited to Windows computer. This method was introduced by Tan Jian Bo and the command for network setting mentioned above is available at www.windowsitpro.com.

2.4.2 IPSave

This set of programs lets users save complete networking configuration to a file and restore it later by simply launching the file. Multiple adapters are correctly handled. Both static and automatic (DHCP) configurations are supported. No reboot is necessary. These features are useful to people who move their computers between networks.

Recent versions of Windows have a comprehensive network configuration utility called 'netsh'. IPSave and IPRestore use netsh to save and restore the IP configuration using one-line netsh commands.

The only advantage of using IPSave is the ability to launch the programs via drag-n-drop or double-clicking the saved configuration files. Users can learn more about netsh by running it in a command window and then entering the command "help."

- A sample configuration for a static IP address

 # ----------------------------------
 # Interface IP Configuration
 # ----------------------------------
pushd interface ip

 # Interface IP Configuration for "Local Area Connection"

set address name="Local Area Connection" source=static addr=148.150.62.151 mask=255.255.255.0
set address name="Local Area Connection" gateway=148.150.62.2 gwmetric=0
set dns name="Local Area Connection" source=static addr=148.150.110.11 register=NONE
set wins name="Local Area Connection" source=static addr=none

popd
 # End of interface IP configuration

- A sample configuration for an automatic (DHCP) address

 # ----------------------------------
 # Interface IP Configuration
 # ----------------------------------
pushd interface ip

 # Interface IP Configuration for "Local Area Connection"

set address name="Local Area Connection" source=dhcp
set dns name="Local Area Connection" source=dhcp register=NONE
set wins name="Local Area Connection" source=dhcp

popd
 # End of interface IP configuration

The similarity of this project and FastNet Config application is the concept of storing multiple network configuration setting and activate the settings accordingly in different network. The entire configuration stored in different individual files. The configuration can be activated by drag the intended configuration file to the main program. The scope of this method is limited to Windows computer. This method was introduced by Hugh Spark and the program can be freely downloaded at www.csparks.com.

2.4.3 Reliable Network Configuration Viewer

This utility is developed to simplify the task of accessing networking configuration on Microsoft Windows servers and personal computers. The application allows users to copy their networking configuration to clipboard for immediate copy and paste e.g. into an e-mail client. In addition to this, users have an option to save the current networking configuration to a text file. Reliable Network Configuration Viewer is an ideal solution for help desk and support teams to efficiently analyze and troubleshoot networking configuration issues over the phone or via e-mail.

The similarity of this utility and FastNet Config application is the concept of storing multiple network configuration setting and activate the settings accordingly in different network. This utility allows users to copy the network configuration to clipboard and save the configuration to a text file. The scope of this method is limited to Windows computer. This utility was developed by Advanced Reliable Software and the evaluation version of this utility can be freely downloaded at www.downloads.cnet.co.uk.

2.4.4 IP Shifter

This tool is developed to help users to change TCP/IP related settings. If users have to work dynamically at several locations in the network (due to business), they need to be connected in different offices, or need to use their computer in more than one network. In these cases, they have to change IP address parameters (e.g. IP address, Subnet mask, Gateway, and DNS)

The similarity of this tool and FastNet Config application is the concept of storing multiple network configurations setting such as IP Address, Subnet Mask, Default Gateway, and DNS Server. The scope of this method is limited to Windows computer. This tool was developed by Shareup Networks and 14-day trial version of this tool can be downloaded at www.shareup.com.

2.4.5 IP Address Management Software

This software is developed for IP address management. It provides visual IP address assignment (network topology tree), automatic subnet calculator, mask calculation, subnetting, network segment scanning, host monitoring, ping, traceroute, telnet, and netsend. The IP address management software supports VLSM (Variable Length Subnet Masks) and CIDR (Classless Inter-Domain Routing).

The similarity of this software and FastNet Config application is the concept of assigning specific IP Address for specified NICs at different network location. The scope of this software is limited to Windows computer. This software was developed by Softsession Inc. and 30-day trial version of this software can be downloaded at www.sofotex.com. The full version of this software costs US$49.95.