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# NETWORK CALCULATOR

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This report is submitted in partial fulfillment of the requirements for the  
Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
2008

## DECLARATION

I hereby declare that this project report entitled  
**NETWORK CALCULATOR**

is written by me and is my own effort and that no part has been plagiarized without  
citations.

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## DEDICATION

To my beloved parents, En Mohamed Ariff bin Daud and Pn Salimah Othman,  
My brothers and sisters,  
my project supervisor, Pn Haniza Nahar.

## ACKNOWLEDGMENTS

In the name of Allah, the Almighty and most Merciful.

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## ABSTRACT

Network Calculator system is a system that has been developed using Java NetBean 5.5.1. It is an independent platform system which can be used on Windows and UNIX environment. This Network Calculator has several modules such as Subnet Mask Calculator, IP Address Converter, IPv4 – IPv6 Converter, and assign the IP address automatically to the computer. Subnet Mask calculator will calculate all the network information based on the IP address that user enters. Network information is like broadcast address, network address, and others. While, IP Address Converter will convert the IP address that user enters into binary and hexadecimal. Then, IPv4 – IPv6 Converter convert the IPv4 address to IPv6 address. Network Calculator can also assign the IP address to the computer automatically.

## ABSTRAK

Sistem *Network Calculator* ini ialah sebuah sistem yang dibangunkan menggunakan *Java NetBean IDE 5.5.1*. Ia merupakan sistem platform bebas yang boleh digunakan di dalam persekitaran *Windows* dan *UNIX*. *Network Calculator* ini mempunyai beberapa modul seperti *Subnet Mask Calculator*, *IP Address Converter*, *IPv4 – IPv6 Converter*, dan menetapkan alamat *IP* kepada komputer secara automatik. *Subnet Mask Calculator* akan mengira segala maklumat rangkaian berdasarkan alamat *IP* yang dimasukkan oleh pengguna. Maklumat rangkaian adalah seperti *broadcast address*, *network address*, dan sebagainya. *IP Address Converter* pula akan menukar alamat *IP* yang dimasukkan oleh pengguna kepada bentuk perduaan dan heksadesimal. Seterusnya, *IPv4 – IPv6 Converter* menukar alamat *IPv4* yang dimasukkan pengguna kepada alamat *IPv6*. *Network Calculator* boleh juga menetapkan alamat *IP* terus ke dalam komputer secara automatik.

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## LIST OF ABBREVIATIONS

ACL	-	Access Control List
AUT	-	Application Under Test
CIDR	-	Classless Inter-Domain Routing
DFD	-	Data Flow Diagram
GUI	-	Graphical User Interface
ICT	-	Information Communication technology
IEEE	-	Institute of Electrical and Electronic Engineers
IP	-	Internet Protocol
IPv4		Internet Protocol version 4
IPv6		Internet Protocol version 6
MAC	-	Media Access Control
OUI	-	Organizational Unique Identifier
SDLC	-	System Development Life Cycle

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# CHAPTER I

## INTRODUCTION

### 1.1 Project Background

IP address is stands for Internet Protocol address. It is a unique address that certain electronic devices currently use in order to identify and communicate with each other on a computer network utilizing the Internet Protocol (IP) standard. In the simpler terms, a computer address. Other network device such as routers, switches, and printers can have its own address that is unique within the scope of the specific networks.

An IP address has two parts which are the identifier of a particular network on the Internet and an identifier of the particular device within the network. It can be divided into five classes which are Class A, B, C, D, and E. While, to create a multiple logical networks that exist within a single Class A, B, or C network, subnetting is required. If subnetting is not done, user just able to use one networks from their Class A, B, or C, which is unrealistic.

Based on the significances of IP address and subnetting, the system that is going to be developed is a standalone Network Calculator by using Java. It will come in as an executable file that can be run on the Windows and UNIX platform. Since this application has been developed by other programmers and it can be found all over the internet, some modification will be made to fulfill the users need.

This standalone Network Calculator will include several modules which are Subnet Mask Calculator, IP Address Converter, and IPv4-IPv6 Address Converter. All these modules will be discussed further in the scope section. Other than that, as an enhancement for this existing system, the IP address that has been calculated by using this Network Calculator can be automatically assigned to that particular computer. The target user of this system would be the students, beginners, or any other people that want to know about IP addressing. It helps them to learn and understand more about this network calculation.

## 1.2 Problem Statements

The problems that influenced this project are:

- **Difficult to calculate the subnet for IP manually**

By using the traditional way which is calculate manually for the subnet for the host IP, there will be some confusion and the answer might be wrong.

- **Problems with the IP conversion from IPv4 to IPv6**

Since, the new Internet Protocol which is IPv6 is currently being implemented, the conversion of IPv4 to IPv6 address is necessary for the user to prepare them for getting used to the upcoming Internet Protocol. There are no IP converters that come in a single application or system.

- **The existing system can not assign IP address automatically**

Most of the current Network Calculator can only detect the IP address of the computer, but can not assign new IP address to that particular computer.

### 1.3 Objectives

The objectives of this project are:

- **To develop a standalone Network Calculator**

To develop a multi-function standalone Network Calculator that includes several modules which are Subnet Mask Calculator, IP Address Converter, and IPv4 – IPv6 Converter. It will be in an executable file form.

- **To make it easier for IP address conversion**

This Network Calculator will convert decimal IP address to the equivalent binary and hexadecimal form. Understanding these numbers is essential for systems-level programming.

- **To make it easier for the user to calculate the subnet**

With this Network Calculator, it will help user to calculate the subnet of specific host IP without doubting the answer whether it is right or wrong since this calculator will display the exact and precise answers. It will also display all the possible subnets of the network.

- **To make it easier to convert the IPv4 to IPv6 address**

The IPv4 address can convert to the equivalent IPv6 address. It is useful for the user since the IPv6 is the future trend of the Internet Protocol. IPv6 also offers larger address space with 128 bits long compared to 32 bits of IPv4.

- **To display and automatically assign the IP address on the computer**

The IP address that has been calculated by using this calculator will assign to the particular computer automatically.

#### **1.4 Scope**

The scopes of this project are as below:

- **Assign IP Address to the workstation**

The IP address that has been calculated by using this calculator can be assign to that particular workstation.

- **Subnet Mask module**

This module will calculate the subnet and other network information such as network and broadcast address based on the host IP address that have been inserted. It will identify which class of these IP addresses belongs to. Furthermore, it will also show all the possible subnets of the specified network.

- **IP Address Converter module**

In this module, user can convert the IP address to equivalent binary and hexadecimal address. Understanding these numbers is essential for systems-level programming. Binary numbers are important because computer works with binary numbers that composed of two digits, 1 and 0. While as for the hexadecimal numbers are convenient because it handle binary number easily.

- **IPv4 – IPv6 Converter module**

It functioned as a converter which helps user to convert the IPv4 to IPv6 address. This module is necessary for getting used to this upcoming Internet Protocol to support larger address space.

The target users of this system are students and other people who want to learn more about IP addressing and other network calculations. This system support Windows and Linux platform as it will develop using Java which is platform independent.

## **1.5 Project Significance**

The Network Calculator gives more benefit for the students and other network users to calculate the subnet and convert IP to binary, hexadecimal, and IPv6 address. User just need to key in the host IP address and everything about network information will be display in seconds.

It provides an alternative way to calculate the subnet and to make a conversion rather than using the manual way. As for that, it will make it easier for the users to find out these numbers in a very short of time.

Furthermore, the existing system does not provide the IP conversion for IPv4 to IPv6 along with the other modules. But, with this system users will be able to convert it to IPv6 address by using only one system. This system also can convert the decimal IP address into binary and hexadecimal form.

Other than that, the IP address that user have been calculated can be assign to the workstation. For this time being, this feature does not provide in the current system that available on the internet.

## 1.6 Expected Output

The expected output of this Network Calculator is that it will display the subnet mask, network address, and broadcast address after user key in the IP of the specific host. It will also show which class this IP belongs to and list all the possible subnets of the network.

Other than that, IP Converter module should be able to convert the IP address to binary, and hexadecimal. As for the IPv4-IPv6 Converter, it should be converting the IPv4 address to IPv6 address

Furthermore, this system should be able to assign IP address that has been calculated using this Network Calculator to that particular workstation.

## 1.7 Conclusion

As a conclusion for this first chapter, this Network Calculator will be developed to help user to calculate the subnet and convert IP to binary, hexadecimal, and IPv6 address. It is also very useful for the network analysis process.

From this chapter, all the problem statements, objectives, scope, project significance and expected output have been identified in order to develop the application that will be used by the target users.

After finishing this chapter, it will proceed to the second chapter which is the Literature Review and Project Methodology. This chapter will discuss and analyze the existing systems.