Online VLSM IP Calculator

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ABSTARCT

Online VLSM Calculator is a system that has a useful function to the FCSSE. The user of this system is Faculty of Computer Systems and Software Engineering, staff and student of University Malaysia Pahang, and anyone who want to use this system. This system has been developing based on the research that has been made at the FCSSE. Before this student and staff in FCSSE has to calculate the IP address manually. It difficult for the staff and student to calculate the IP. That is the main reason why this system has been develops. The solution that has been made to solve the problem is by providing the correct answer for the user. This system was developed using the Dreamweaver, Javascript and Adobe Photoshop. This system will successful develop according to the propose objective in chapter one. For further used hope this system will be used for all networking comity and can be more users friendly.

ABSTRAK

"Online VLSM Calculator" adalah satu sistem yang amat berguna pada Fakulti Sistem Kejuruteraan Komputer dan Perisian (FSKKP). Sistem ini digunakan oleh Staf FSKKP, Pelajar FSKKP di Universiti Malaysia Pahang dan semua pengguna yang berlatar belakangkan bidang networking. Sistem ini digunakan oleh Staff FSKKP dan pelajar FSKKP untuk mencari maklumat tentang tesis yang hendak dicari. Pengguna system ini boleh memilih sebarnag fungsi yang ada pada kalkulator ini. Sebelum ini semua proses pengiraan IP address dilakukan secara manual. Terdapat banyak kekangan yang berlaku dengan melakukan proses pengiraan secara manual. Fungsi utama sistem ini ialah untuk memudahkan proses pengiraan IP address kepada pengguna. Sistem ini dibangunkan dengan menggunakan Dreamweaver dan javascript sebagai satu platform pembinaan sistem dan Adobe Photoshop sebagai satu software untuk membina gambar-gambar grafik yang menarik. Sistem ini berjaya dibangunkan berdasarkan objektif yang telah ditetapkan. Harapan semoga system ini boleh di bangunkan oleh semua fakulti Universiti Malaysia Pahang dan memudahkan pengguna.

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ABBREVIATIONS

FSKKP	Fakulti Sistem Komputer dan Kejuruteraan Perisian
UMP	Universiti Malaysia Pahang
PDF	Portable Document Format
SDLC	Software Development Life Cycle
FCSSE	Faculty of Computer Science and Sofware Engineering
IP	Internet Protocol

CHAPTER 1

INTRODUCTION

1.1 Introduction

Variable Length Subnet Mask (VLSM) is a means to specify a different subnet mask for the same network number on different subnets. With VLSM, a network administrator can use a long mask on networks with few hosts and a short mask on subnets with many hosts. To use VLSM, the routing protocol must support it. In world today, many people still calculate the IP Address manually. It will take much more time than calculate using appropriate software or tools. Online VLSM Calculator is a web that suitable to use to calculate the IP Address. Online VLSM Calculator use to calculate an IP address by using VLSM style as main function of the calculator. It also can convert the IP into binary number, and show the usable address that has left and the number of address that been use. Online VLSM Calculator able to avoid any miscalculation on the IP Address and can save time to calculate. Online VLSM Calculator is very useful for the networking people and many people to calculate the IP.

1.2 Problem Statement

Current situation at University Malaysia Pahang the student and staff of networking need to calculate the IP Address manually.

They need more time to calculate the IP Address. The possibilities to make error is higher and difficult to detect if there any error.

It very difficult to calculate manually. If the understanding on how to calculate the IP is low, it can make the student and staff difficult to proceed with their learning and do their project.

1.3 Objective

The objectives of this project are:

i. To develop a prototype Online VLSM Calculator.
ii. To apply VLSM function based on user requirement.
iii. To implement web based application and use IP Calculation concept.

1.4 Scope

The scopes of this project are:

i. This software will be used by student and staff of networking system.
ii. Using VLSM IP addressing as main function of the calculator.
iii. Online VLSM Calculator used to calculate the IP Address and can be done by calculate from the main IP address that been insert by the user.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will explain about the research of the project that has been chosen. Many researches have done in making this system. The research has been done at University Malaysia Pahang. Researchers also have seen the similar system for the system at web sites and also make research on the software that will use. This chapter will briefly explain about the current system at web sites that similar to this system, the current process of calculating the IP Address and the advantage of software that are used in developing this system.

2.2 Current Situation

Today many students in UMP especially networking student have to calculate the IP Address manually. They also need to learn how to calculate it. The lecturer also needs to teach the student. It will take so much time to calculate it and not easy to calculate.

The current ways to calculate the IP Address are to difficult and not very efficient. This is because in UMP there are no such systems that can solve this problem. There are many type of system that can calculate automatically but it needs to buy if we want to use. There are still have a free version but it not completes

enough to use it. Say that staffs want to calculate the IP Address manually it need more time to calculate it. These shown that a lot of times have being waste in calculating the IP Address. In current system, student cannot know if they wrong or right. They have to test it with other software or real device after finish calculating. It will waste time in troubleshoot the problem.

2.3 Existing System

There are 3 existing systems regarding to this project that has been explored.

i. WildPackets IP Subnet Calculator
ii. Advance IP Address Calculator v1.1
iii. VLSM (CIDR) Subnet Calculator

2.3.1 WildPackets IP Subnet Calculator

WildPackets IP Subnet Calculator is a utility for computing information about IP addresses. Given an IP class A, B or C address, several pieces of information can be displayed about that address by selecting one of four tabs the Address Info, Subnet Info, Subnet/Hosts or CIDR tab. [1] The Address Info Tab displays the class of address and range of addresses for that class, a color-coded bit map for that class of address, the binary representation of that address, and the hexadecimal representation of the address. [1] The Subnet Info Tab allows you to enter subnet information in five different ways by number of subnet bits, number of total mask bits, and number of subnets, number of hosts, or just the subnet mask in dotted decimal notation. [1] IP Subnet Calculator generates a color-coded bit map breaking down the network, subnet and host portion, shows you the subnet host address range, the subnet ID and subnet broadcast address. [1]

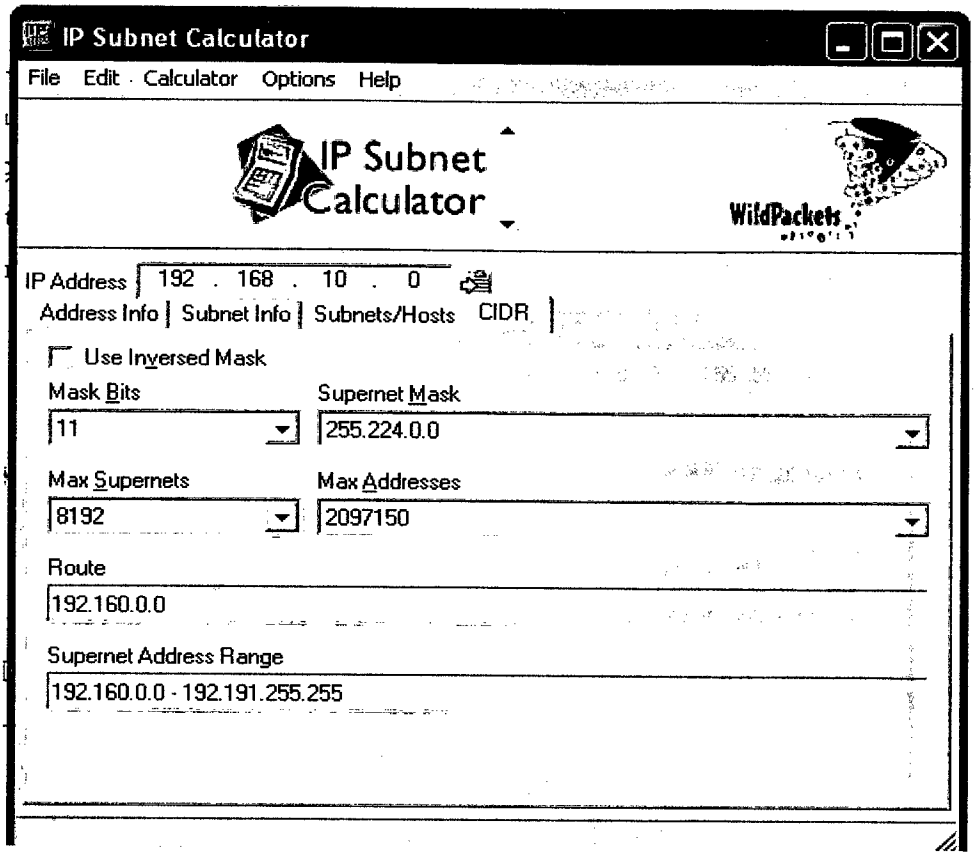

Figure 2.1 WildPackets IP Subnet Calculator (Mar 25, 2002) [1]

2.3.2 Advance IP Address Calculator v1.1

The Advanced IP Address Calculator is a freeware Windows 95/98/NT/2000/XP utility that lets you to calculate every aspect of your subnet configuration in a few mouse clicks. [2] It was designed for any network engineer who needs a fast way to determine subnets. [2] The calculator generates a color-coded bit map, breaking down the network, subnet, and host portion. [2] It shows you the subnet host address range, the subnet ID, and the subnet broadcast address. [2] The binary representation and hexadecimal representations of IP addresses are supported. [2] In this software user need to enter the IP address that they want to calculate. [2] Then this calculator will automatically display the result of the IP address that user want based on how much host or subnet those users enter. [2]

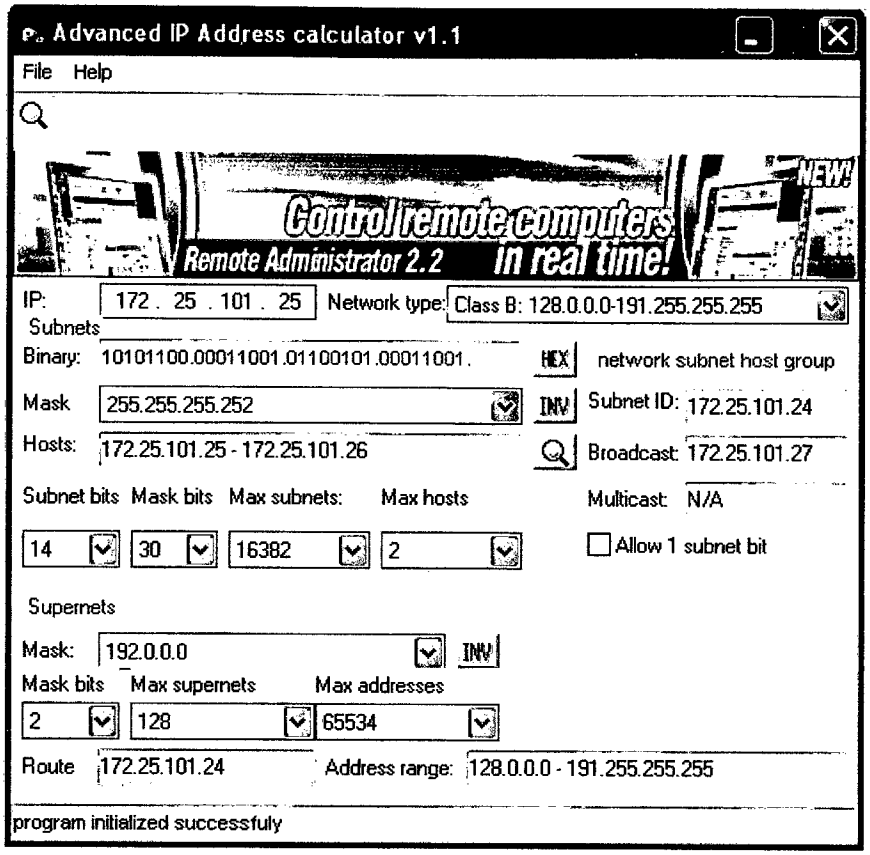

Figure 2.2 Advance IP Address Calculator v1.1 [2]

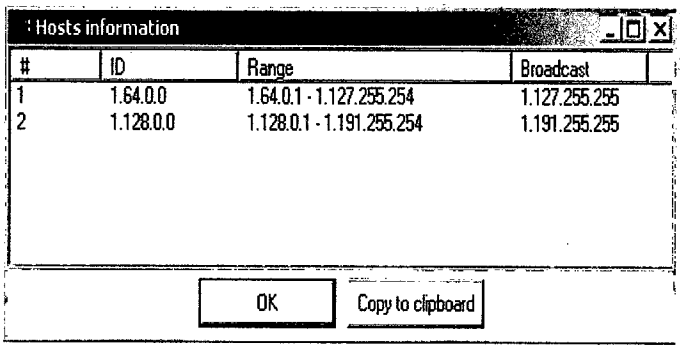

Figure 2.3 Subnet List

This screen pops up when you press the "look at hosts" button. It contains the host ranges for each subnet. [2] You can select any number of elements and press the "copy to clIPboard" button to copy them to the clIPboard as plain text. [2]

2.3.3 VLSM (CIDR) Subnet Calculator

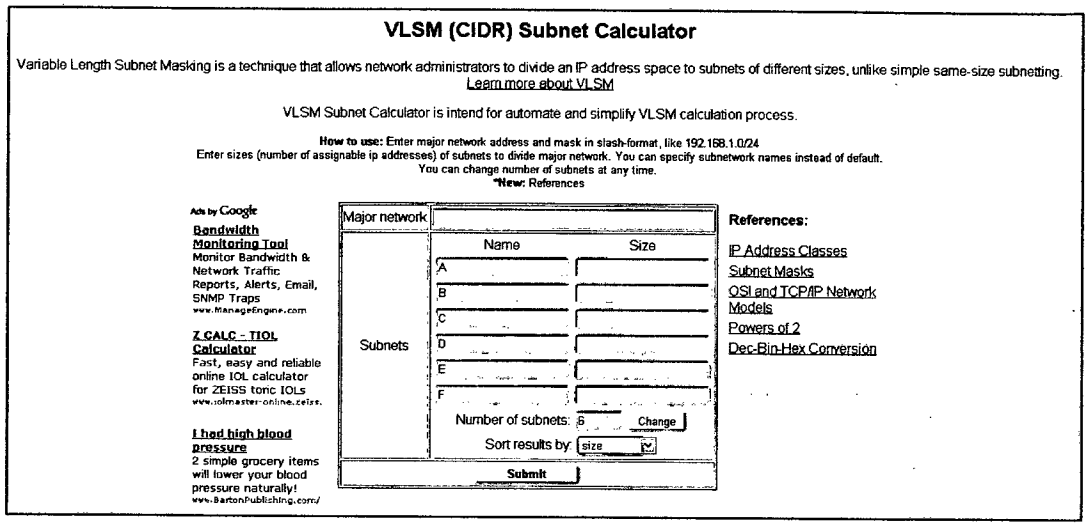

Figure 2.4 VLSM (CIDR) Subnet Calculators

The figure above show one of the examples of online VLSM calculator. It show that user need to key in the major network and number of host for each sub network. This software is intended for automate and simplify VLSM calculation process. There other function user can use. There was converting the IP address into binary function and also this calculator has a function to calculate the IP address using sub netting style.

2.4 Summarization of the existing system

At this part the description for the 3 existing system that been show before will be explain in the table below. In the table there is a summarization of the function, the advantages and disadvantages of the system.

Existing System	Description
WildPackets IP Subnet Calculator	- Use subnetting style to calculate the IP address. - All the main information been show. - Not very user friendly - User cannot insert any kind of information they want. - All the information not display in one form.
Advance IP Address Calculator v1.1	- Many function - User cannot fully control the system. - Not very user friendly - Have some mistake in calculation - The result not very details
VLSM (CIDR) Subnet Calculators	- User cannot calculate using their own IP. - The results are not details. - Not user friendly

Table 2.1 Description on existing system

2.5 Online VLSM Calculator

The idea to develop this system has come after viewing the current situation in UMP. This software is being built to help staff in FCSSE and Networking student in UMP to calculate the IP Address easily and fast.

The staff or lecturer can easily teach the student to calculate the IP Address by using this software and doesn't need to teach manually. The staff can teach the student how to use this tool. This web is very user friendly and attractive to use. This web can be one of the tools to be used in class.

For student they need to make sure what is the IP Address that they want to calculate and what is the other info that needs to put in this calculator. For example if they want to know the result of the IP VLSM they need to put how many host. This web is flexible with user. User can enter their own value and not specific to certain value. If there is users enter the invalid value the message box will appear. The validation process will be done if there is some user errors happen.

2.6 Adobe Dreamweaver

Adobe Dreamweaver (formerly Macromedia Dreamweaver) is a web development application originally created by Macromedia, and is now developed by Adobe Systems, which acquired Macromedia in 2005. Dreamweaver is available for both Mac and Windows operating systems. Recent versions have incorporated support for web technologies such as CSS, JavaScrIPt, and various server-side scrIPting languages and frameworks including ASP, ColdFusion, and PHP.

2.7 Adobe Photoshop

Adobe Photoshop, or simply Photoshop, is a graphics editing program developed and published by Adobe Systems. [4] It is the current market leader for commercial bitmap and image manIPulation software, and is the flagshIP product of Adobe Systems. [4] It has been described as "an industry standard for graphics professionals" and was one of the early "killer applications" on the PC and update. [4]

Adobe Photoshop is image-editing software. It allows you to transform scanned photographs, slides and original artwork in many ways, for example, by cropping, rotation, resizing and by creating special effects using filters ranging in effect from blurring to mosaics. [5] Photoshop combines a full range of painting, editing and image composition tools, sophisticated selection tools, and methods for adjusting levels of grey and color in continuous-tone images. [5]

2.8 JavaScript

A scrIPting language developed by Netscape to enable Web authors to design interactive sites. Although it shares many of the features and structures of the full Java language, it was developed independently. JavaScrIPt can interact with HTML source code, enabling Web authors to spice up their sites with dynamic content. JavaScrIPt is endorsed by a number of software companies and is an open language that anyone can use without purchasing a license. It is supported by recent browsers from Netscape and Microsoft, though Internet Explorer supports only a subset, which Microsoft calls JscrIPt.

2.9 VLSM (Variable Length Subnet Mask)

Variable Length Subnet Mask (VLSM) is the new and efficient way to create Networks as compared to the old Fixed Length subnet mask. [9]

In Fixed length subnet masks networks there are 2 categories - the basic is A, B & C subnets and the second is fixed subnets that are created from these basic subnets. [9] But in either of the methods there is lots of IP wastage, as different sections of the network will vary in the number of hosts connected to that network. Wastage is more in the first classic way of networks. [9] It is minimized with the help of sub netting, but the problem still exists as some network segments may contain very less hosts but has to use the same subnet masks as the entire network and thus waste IPs. [9]

While when we use VLSM different network segments may contain different subnets as per there requirement and while even doing so they will still be able to interact with each other using routers. The 2 main benefits of VLSM are: [9]

a. Because of different subnet masks the broadcast from one subnet is not transmitted to other subnets. Thus saves lots of bandwidth.

b. It saves lots of IP, which is wasted instead. [9]

2.10 IPv4 and IPv6 (IP Address Version 4 and IP Address Version 6)

IPv6 [6] security is in many ways the same as IPv4 [7] security. The basic mechanisms for transporting packets across the network stay mostly unchanged, and the upper-layer protocols that transport the actual application data are mostly unaffected. However, because IPv6 mandates the inclusion of IP Security (IPsec) [8], it has often been stated that IPv6 is more secure than IPv4.

The 32 bit decimal format of IPv4 provides only 4.2 billion addresses. [10] The world population is now 5 billion. [10] Nowadays it's nearly impossible to get class A and class B Internet IP addresses. IPv6 is a final solution. [10] At the mean time, some techniques are used to extend the life of IPv4. [10] They are private addressing (with NAT for Internet access), IP unnumbered (for router serial interfaces), and Variable Length Subnet mask (VLSM). [10] IPv6 and IPv4 are two completely separate protocols. [11] IPv6 is not backwards compatible with IPv4, and IPv4 hosts and routers will not be able to deal directly with IPv6 traffic (and vice versa). [11]

2.11 Internet Protocol Address

An Internet Protocol (IP) address is a numerical label that is assigned to devices particIPating in a computer network utilizing the Internet Protocol for communication between its nodes. [13] An IP address serves two princIPal functions in networking: host identification and location addressing. The role of the IP address has also been characterized as follows: "A name indicates what we seek. An address indicates where it is. A route indicates how to get there."[14]

The original designers of TCP/IP defined an IP address as a 32-bit number [13] and this system, now named Internet Protocol Version 4 (IPv4), is still in use today. However, due to the enormous growth of the Internet and the resulting depletion of the address space, a new addressing system (IPv6), using 128 bits for the address, was developed in 1995[15] and last standardized by RFC 2460 in 1998.[16] Although IP addresses are stored as binary numbers, they are usually displayed in

human-readable notations, such as 208.77.188.166 (for IPv4), and 2001:db8:0:1234:0:567:1:1 (for IPv6).

The Internet Protocol also has the task of routing data packets between networks, and IP addresses specify the locations of the source and destination nodes in the topology of the routing system. For this purpose, some of the bits in an IP address are used to designate a subnetwork. The number of these bits is indicated in CIDR notation, appended to the IP address, e.g., 208.77.188.166/24.

With the development of private networks and the threat of IPv4 address exhaustion, a group of private address spaces was set aside by RFC 1918. These private addresses may be used by anyone on private networks. They are often used with network address translators to connect to the global public Internet. [17]
The Internet Assigned Numbers Authority (IANA) manages the IP address space allocations globally. IANA works in cooperation with five Regional Internet Registries (RIRs) to allocate IP address blocks to Local Internet Registries (Internet service providers) and other entities. [17]

2.12 Classfull IP Addressing

Classful network is a term that is used to describe the network architecture of the Internet until around 1993. It divided the address space for Internet Protocol Version 4 (IPv4) into five address classes. Each class, coded by the first three bits of the address, defined a different size or type (unicast or multicast) of the network. [18]
Today, remnants of classful network concepts remain in practice only in a limited scope in the default configuration parameters of some network software and hardware components (e.g. netmask), but the terms are often still heard in general discussions about network structure among network administrators. [18]
All IP addresses have a network and host portion. In classful addressing, the network portion ends on one of the separating dots in the address (on an octet boundary). Classless addressing uses a variable number of bits for the network and host portions of the address.[19]

Decimal	192	160	20	48	
Binary	11000000	10100000	00010100	0011	0000
	<-------- 28 bits Network ------->				4 bits host

Table 2.2 IP Address in Binary Number

Classful addressing divides an IP address into the Network and Host portions along octet boundaries. Classless addressing treats the IP address as a 32 bit stream of ones and zeroes, where the boundary between network and host portions can fall anywhere between bit 0 and bit 31. The network portion of an IP address is determined by how many 1's are in the subnet mask. Again, this can be a variable number of bits, and although it can fall on an octet boundary, it does not □ecessarily need to. A subnet mask is used locally on each host connected to a network, and masks are never carried in IPv4 datagrams. All hosts on the same network are configured with the same mask, and share the same pattern of network bits. The host portion of each host's IP address will be unique. [19]

2.13 Classless IP Addressing

Classless IP addressing represents the latest evolution of IP addressing, following on the heels of subnetting and the original "classful" addressing system described in preceding sections. Understanding classless IP addressing and routing requires at least some familiarity with these older IP addressing methods. If you have come to this section without reading the preceding sections on "classful" addressing and subnetting, I strongly advise reviewing them first. If you understand subnetting but aren't familiar with how Variable Length Subnet Masking (VLSM) works, reading the topic on VLSM is a good idea, since CIDR is similar to VLSM in many ways. [20]