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**IMPLEMENTATION OF COMPUTER PROGRAMMING MATHEMATICAL  
ALGORITHM ON A SERVER WITH THE DEBIAN LINUX OPERATING SYSTEM VIA  
VIRTUALBOX AS SUPPORTING THE ADMISSION OF NEW STUDENTS IN  
VOCATIONAL SCHOOLS**

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**Abstract.** In a network connected to the internet, a server computer or computer program is needed that can act as another computer to make requests for content from the internet or intranet. Apart from that, the server computer acts as a gateway to the internet world for each client. Thus, local networks that are connected to other networks or the internet are not directly connected to external networks or the internet, but must pass through a gateway, which acts as a boundary between the local network and the external network. The internet connection is shared among all computers through a component that functions as a proxy server. As is known, algorithm is a syllable that originally originated from mathematics and programming which originated from a computer or cellular network. Therefore, its use can be linked to one of the roles in the operating system where there is a programming algorithm. The purpose of this research is for researchers to carry out the process of learning about work methods and activities in an agency in the field directly. Researchers can get to know the actual work atmosphere so that they can build a good work ethic as well as an effort to broaden their work horizons, and increase their insight and knowledge of information technology in general, general, and especially in server implementations with programming algorithms. Mikrotik in this research is an operating system used to turn a computer into a reliable network router, including various features created for IP networks and wireless networks, suitable for use by Internet Service Providers (ISP) and hotspot providers. In this research, the proxy was installed built in to the router. Bina Islam Mandiri Kersana Vocational School is also one of the Vocational High Schools leading to the National Standard School. Therefore, human resources are also expected to support this goal. To obtain superior human resources, the new student admissions system has begun to set appropriate criteria and is also prepared as fully as possible.

**Keywords:** *mathematics, algorithm, programming, proxy server, Internet Service Provider (ISP)*

## INTRODUCTION

Nowadays internet needs are no longer dominated by the upper middle class, but almost every campus, office and school also provides internet facilities that can be used together. What's more, now that internet cafes and *hotspot* areas have reached many corners of the city, everyone has the opportunity to use the internet. As is known, algorithm is a syllable that originally originated from mathematics and programming which originated from a computer or cellular network. Therefore, its use can be linked to one of the roles in the operating system where there is a programming algorithm.

In a network connected to the internet, a server computer or computer program is needed that can act as another computer to make requests for *content* from the internet or intranet. Where a server computer is used to secure a private network that is connected to a public network. Apart from that, the server computer acts as a *gateway* to the internet world for each *client*. Thus, local networks that are connected to other networks or the internet are not directly connected to external networks or the internet, but must pass through a gateway, which acts as a boundary between the local network and the external network.

An internet connection at an

agency office, company, campus, school, internet cafe, or other location actually only requires one *account* that is connected to all computers. These computers are connected together in a computer network. The internet connection is shared among all computers through a component that functions as a proxy server. In order for the research carried out to be carried out effectively, it is necessary to have problem limitations. The limitations of the problem in this research are using the Clear OS operating system and implementation on a proxy server.

The aim of this research is for researchers to carry out a learning process about work methods and activities at an agency in the field directly.

It is hoped that this research will be able to analyze and solve problems that arise in the field using a theoretical approach, and increase insight and knowledge of information technology in general, and especially in server implementation.

The benefits of research are that a good partnership pattern is created with school agencies such as places where researchers carry out research on various problems that arise and then look for better joint solutions, and there is useful input that can be used, including to increase school productivity in

accordance with the results of observations made. researchers while carrying out research.

## **1.1 Computer Networks**

Kadir (2003) Network in the computer field can be interpreted as two or more computers that are interconnected so that they can communicate. In a computer network, what is communicated is data, a computer can connect with other computers and communicate with each other (one of which is exchanging data) without having to carry a flash disk from one computer to another as we usually do. In computer networks, there are protocols. A protocol is a rule or mechanism by which two or more computers can connect to each other. The main function of the TCP/IP protocol is to provide a *point-to-point* mechanism on the TCP/IP protocol, to identify each machine, each machine connected to the network must have a unique address and this address is regulated by the IP protocol which is 32 bits long.

## **1.2 Types of Computer Networks**

### **1.2.1 Local Area Network (LAN)**

Sugeng (2010) A LAN network is a computer network that covers an area in one room, one building, or several adjacent buildings. For example, a network in one integrated campus or at a

company location. According to its type, LAN can be *client/server* or *peer to peer*. According to Winarno Sugeng, defines a LAN network as follows: "LAN (Local Area Network) is a collection of computers, where there are several computer units (*clients*) and a computer unit for the data bank (*server*)".

One way LAN is used to connect personal computers and workstations in a company that uses equipment together and exchanges information, apart from that, LAN can also be used to connect nodes located in areas that are not too far away with a maximum radius of 10 km.

### **1.2.2 Metropolitan Area Network (MAN) Network**

Kustanto (2008) A MAN network is a network that uses the same method as a LAN but the coverage area of this network is wider. MAN connects several small networks into a larger area environment. MAN is capable of supporting text and voice data, and can even connect to cable television networks or radio waves.

### **1.2.3 Wide Area Network (WAN) Network**

Winarno (2010) WAN networks are networks whose scope already uses satellite, *wireless* or *fiber optic* cables.

WAN has a wider reach into the authority areas of other countries. WAN

network systems can also use existing public networks, namely the internet. However, when using the internet, you need to pay attention to data security.

#### **1.2.4 Internet**

Sofana (2008) Internet is an abbreviation of Interconnection Networking. This computer network is international in scale which allows each computer to communicate with each other. This network forms an interconnected network which is connected via the TCP/IP protocol. Developed and first tested in 1969 by the US Department of Defense in the ARPAnet project. The internet is the interconnection of computer networks in the world. Its coverage is wider than other computer networks. Connections between computer networks can be carried out with the support of a typical protocol: Internal Protocol (IP).

Hakim (2009) In general, there are many benefits that can be obtained if someone has access to the internet. Here is some of what is available on the internet:

1. Information is something for personal life: health, recreation, hobbies, personal development, spiritual, social.
2. Information is part of professional/worker life: science, technology, trade, shares,

commodities, business news, professional associations, business associations, various communication forums.

#### **1.3 Algorithm**

Maulana (2017) An algorithm is a step-by-step procedure for a calculation. Algorithms are used for calculations, data processing and automatic reasoning. So an algorithm can be said to be a way to achieve its goals. The algorithm is carried out from a procedure of steps has been done in order to cover the material and get the answers. In mathematics, there is a lot of material such as algorithms, for example fractions, we have to follow several steps to do it in order to get the final result. Meanwhile, this algorithm can be connected to programming such as computer devices and so on.

Budiman (2015) As we also know, a lot of material in mathematics can be linked or closely related to everyday life. Therefore, the conclusion is that an algorithm is a set of steps that can cover several materials so that they can be understood. The algorithm also begins with an attempt to solve the decision problem that has been proposed.

One of the simple algorithms is to find the largest number in an unordered series of numbers. The description is:

1. If there are no numbers in a series

then there is no largest number.

2. Think of the first number in the series as the largest.
3. For each last number in the series, and if the last number is greater than the largest number, let's say that number is the largest number in the series.
4. Then the last one, if there are no more numbers left to check, assume it is the largest in the series.

So, in a material scope, several steps are actually set out which are even clearly known.

#### 1.4 Programing

Retta (2016), Programming is a step in writing, testing and digesting or improving and embedding code that can improve a program on a computer. The goal of programming is to carry out programming based on calculations or work that can be adjusted to the programming desires.

Programming can also be said to be an art that can carry out certain systems so that it is often connected with algorithms to become a complete unit of equipment in a computer. The programming language itself was created to make it easier in today's modern era where more and more technology is being created.

The programming itself was also

created on the basis of a tracking mission in ancient times. So the existence of a programming device creates a storage of device files which becomes evidence if entered into a computer network. And if it's damaged you can never get it.

#### 1.4.1 C Programming Language

The C language is a powerful and flexible programming language that has been widely used by professional programmers to develop programs. Every program written using the C language must have a main function, called **main()**.

This function will be called first during the program execution process. This means that if we have other functions besides the main function, then these other functions will only be called when used. The **main()** function can return the value 0 to the operating system, which means that the program is running well without any errors. (Joni, 2008).

Below are two forms of the **main()** function framework in C that can both be used.

- a. First Form (no return of value to the operating system)

```
void main(void) {
```

```
Statement_to_be_executed;
```

```
...
```

```
}
```

b. Second Form (by returning the value 0 to the operating system)

```

Int main(void) {
    Statement_to_be_executed;
    ...
    Return 0;
}

```

The void keyword above is also optional. However, generally these keywords are in functions that do not have parameters.

50, so the student is unlikely to graduate.

The algorithm is as follows:

Remember and read the names and grades of some of these students.

If the value is > : 50 so

the statement = passed

but if value = 50

description = did not pass.

### 1.5. GNU-Linux Operating System

Linux is an operating system created by Linus Torvald from Finland in 1991. The way Linux works and looks is similar to the UNIX operating system which is the result of the implementation of the Institute of Electrical and Electronics Engineers (IEEE) standard for operating systems called Operating System Interfacers (POSIX). POSIX standard-based capabilities such as multitasking, virtual memory, shared libraries, proper memory management, and multiuser are already available in Linux. Almost all free software organized by GNU can run on Linux. Even Linux has better performance compared to other commercial operating systems. (Gery, 2011)

**Algoritma LargestNumber**  
 Masukan: Deret angka  $L$ .  
 Keluaran: Angka terbesar dalam daftar  $L$ .

```

terbesar ←  $L_{null}$ 
untuk setiap item dalam  $L$ ,
lakukan
    jika  $item > terbesar$ , maka
         $terbesar$  ←  $item$ 
kembalikan  $terbesar$ 

```

- " $\leftarrow$ " adalah singkatan untuk "diubah menjadi". Misalnya, " $terbesar \leftarrow item$ " artinya nilai dari  $terbesar$  diubah menjadi nilai dari  $item$ .
- "**kembalikan**" mengakhiri algoritma dan mengeluarkan nilai kembalian.

Figure 1. Narrative Algorithm

Student graduation algorithm

Question: Loaded some data containing the names and grades of students. If a student's score is greater than or equal to 50 then they are declared to have passed. Meanwhile, if the value is lower than

#### 1.5.1 Debian Distribution

Linux packages can be obtained in various distributions. Distribution or more often called Distro, is the term for all operating systems that use the Linux kernel. (Bowo, 2010). One of the Linux

distributions that is very popular and will also be used in developing this network system is the Debian GNU/Linux distro. Debian has a very wide community, and has given birth to various derivative distros.

Here are some interesting things about Debian:

- a. 100% Free
- b. Stable and tested distribution release
- c. There are many packages and package arrangements available with APT facilities
- d. Supports multiple hardware architectures
- e. Community support is extensive.

## RESEARCH METHODOLOGY

A research method is a scientific method or technique used to obtain data for certain purposes and uses. What is meant by scientific methods or techniques is that a research activity is carried out based on scientific characteristics, namely rational, empirical and systematic.

## RESEARCH FLOW

Data collection is an important step for the scientific method, because in general the data collected is used to test hypotheses that have been formulated. Apart from that, the author also uses an analysis method using the Top Down

Approach and the development technique is Full Virtualization using Virtual Box. The Top Down approach requires that a network systems analyst must understand in depth the school's business needs and goals as a whole, before building a school computer network system, including all types of information system applications needed to facilitate service activities to network users. To be able to produce good research that is in line with the research objectives, a research flow is created that is in accordance with the research title and contains steps that can be carried out in the research.

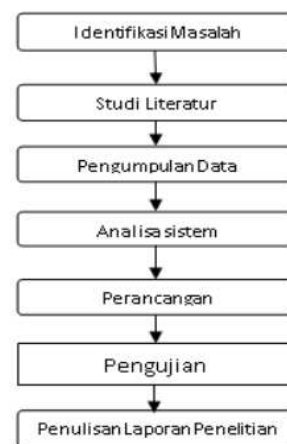
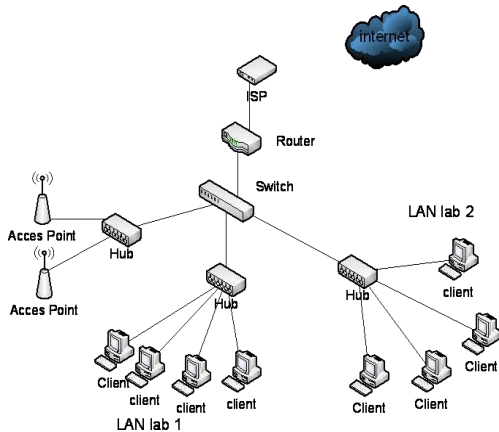


Figure 2. Research Flow

## RESULTS

The computer network installed at the Bina Islam Mandiri Kersana Vocational School is a *tree topology*. This *tree topology* is a combination of several star topologies used in each VLAN network. The following is a picture of the

physical network topology installed at Bina Islam Mandiri Kersana Vocational School as a whole.



**Figure 3.** Physical Network Topology Installed at Bina Islam Mandiri Kersana Vocational School.

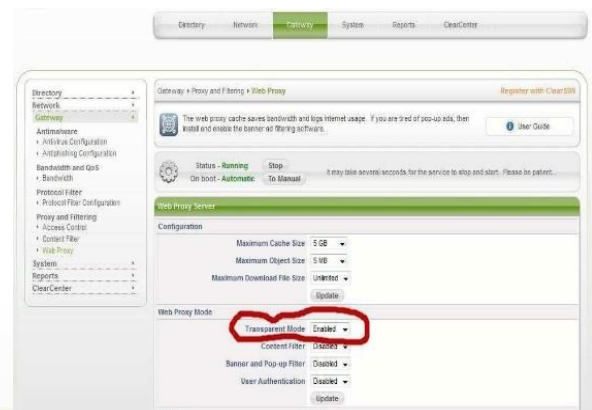
To set up the ClearOS server, it is easier to use Web Config. By connecting a UTP cable from the LAN card server to the client computer (via switch) then checking the connection by pinging the server from the client. When everything is finished, then open the browser and enter the web config URL and port. Then a picture will appear as follows:



**Figure 4.** DNS server from the ISP, the

DNS used is the DNS server from Telkom.

Web/HTTP Proxy servers are useful for storing or caching certain files from web pages that have been accessed by the client so that if another client accesses the same website, the files will be retrieved from the proxy cache. This is to speed up internet access and reduce traffic congestion on internet routes, because some files are taken from the server, not from the internet directly. Here ClearOs really supports the proxy server function. To start the proxy server, first go to the gateway, then select proxy and filtering and then select web proxy. As shown in the following picture:



**Figure 5.** Web Proxy Server

## CONCLUSION

An algorithm is a step-by-step

procedure for a calculation. Algorithms are used for calculations, data processing and automatic reasoning. So an algorithm can be said to be a way to achieve its goals. Programming is a step in writing, testing and digesting or improving and embedding code that can improve a program on a computer. The goal of programming is to carry out programming based on calculations or work that can be adjusted to the programming desires.

Implementation of research at Bina Islam Mandiri Kersana Vocational School is research that is able to implement a Linux server using ClearOS. The Linux server that has been installed is running according to plan. Based on the connection test results, it can be concluded that the designed virtual network ran well when testing was carried out on the researcher's computer and laptop hardware.

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