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Reduce the Probability of Data and Information's Lost in Cloud Computing

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Abstract: ***This paper is about to reduce the probability of data lost in cloud computing, the methodology is done by OPNET ver 14.5 simulation programm. Three scenarios were designed to get the results, the comparative between results show that the data can be restored from the backup server when the main server is failure or drupe, so the main aim of this paper was achieved (reduce the probability of data lost). Erlang loss formula is also used to calculate the average of data loss in telecommunication and computer networks. OPNET is commercial programme use to simulate and design computer and telecommunication networks.***

Keywords: Cloud Computing, Data Cloud, OPNET, Erlang, Cloud Backup

1. Introduction

Cloud computing is a new way of delivering computing resources, not a new technology. Computing services ranging from data storage and processing to software, such as email handling, are now available instantly, commitment-free and on-demand. Since we are in a time of belt-tightening, this new economic model for computing has found fertile ground and is seeing massive global investment [1].

The cloud storage concept is a great new technological advancement that will help customers safely and reliably store their data. With multiple data servers and multiple copies of information, companies are able to hedge their bets against the loss of data and server downtime.

Companies will no longer need to house their own special equipment for their own data. Theycan outsource this process to cloud storage businesses and save money and time[3]. Cloud data storage has worked well for long, so it's natural to assume that everything is safe, particularly because the transfer and backup process is transparent and automatic. However, cloud data is vulnerable to the same threats as the internet as a whole. Here's a run-down of some of those threats, and how to resolve it[2].

Cloud backup:
Cloud backup is a type of service through which cloud computing resources and infrastructure are used to create, edit, manage and restore data, services or application backup. This is done remotely over the Internet [4].

OPNET:
Software simulation programme is commercial software use for calculate, analysis and design the computer and telecommunications networks, it use here to design the cloud data center networks.

2. The Problems

Loss of data in cloud computing is critical problem so this paper is about to solve this problem by reducing the probability of data loss.

3. The Objectives

The main objective of this study is an about to reduce the lost probability of datain cloud computing, the other objectives are:

- Study in detail OPNET simulation programme.
- Study in detail the systems of cloud computing.

4. Methodology

OPNET version 14.5 is used here in this paper to get graphical results. Comparisons between results will show the ways that how to reduce the probability of losing data when use data cloud to store data. Also, Erlang loss formula is used here to analysis and explain how cloud computing work to storing and recovery data.

5. Analysis and Experimental work using OPNET

5.1 Analysis using Erlang loss Formula:

The probability that an arrival at M/M/m/0 in data center server, will be lost when all servers are busy, as depicted bellow:

$$E_m(\rho) = p_m = \frac{\rho^m}{m!} \cdot p_0 = \frac{\frac{\rho^m}{m!}}{\sum_{k=0}^{m} \frac{\rho^k}{k!}}$$

- m servers,
- Poisson input,
- Exponential service times
- Number of waiting positions K=0
- Total number of system places S =m+K=m

- Unlimited number of customers $\Rightarrow \lambda = \lambda$

We consider an M/M/5/0/, Erlang loss system, with arrival rate λ =10 customers perminute and service rate μ = 8 customers per minute. Find the average number of the customers in the system (=N).

Answer:
p0= 0.2870323869
p1 = 0.3587904836 p2 = 0.2242440523 p3 = 0.09343502178
p4 = 0.02919844431 p5 = 0.007299611077
N=1.24

We consider anErlang loss system, with arrival rateλ =20 customers per minute and service rate μ = 5 customers per minute. Find the probability that an arriving customer will be blocked.

Answer:
r8= p8 = 0.03042005823

5.2 Experimental work using OPNET:

The design of experimental works is done by OPNET ver 14.5 networks simulation programme. It's used 5 client users, two servers, one data cloud, application config and profile config.

The idea of the design is to try to reduce the probability of losing data by using two servers to store data and try to recover data when the main server is failure and drupe, Figure 1 display the design of the networks.

Figure 1: Experimental networks Design

Client users:
The design used 5 client users, such as depicted in Figure 2 for each client users.

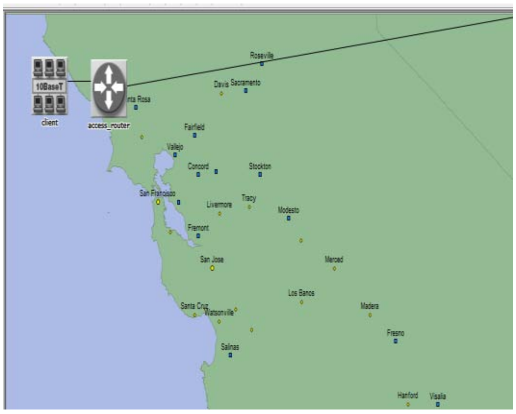

Figure 2: Client users networks Design

Scenario 1: Store Data in One Server:
In this scenario users store the data in one server, it use traffic send 500,000 bits per sec and traffic received 500 packets per sec between the main server and data cloud, such as depicted in Figure 3.

Figure 3: The networks Design for Scenario 1

Scenario 2: Store Data in Two Server:
this scenario use two servers (main server and backup server) to store data, it use traffic send 500,000 bits per sec and traffic received 500 packets per sec between the main server and data cloud, such as display in Figure 4.

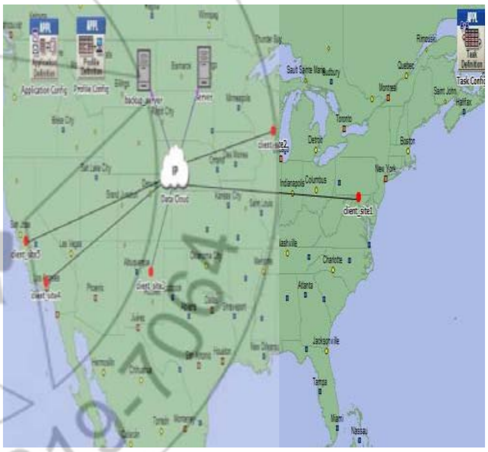

Figure 4: The networks Design for Scenario 2

Scenario 3: Recover Data from Backup Server:
In this scenario users try to recover the data from backup server assuming that the main server is drupe or failure, it use traffic send 500,000 bits per sec and traffic received 500 packets per sec between the backup server and data cloud, such as depicted in Figure 5.

Figure 5: The networks Design for Scenario 3

6. Results and Discussion

The network in each scenario was run for 60 seconds and get the results as flow:

Results of Scenario1:
The results of scenario 1 as show in Figure 6 for (Data cloud) and Figure 7 for (Main Server).
Data cloud results for traffic dropped (packets/sec), traffic received (packets/sec) and traffic send (packets/sec).

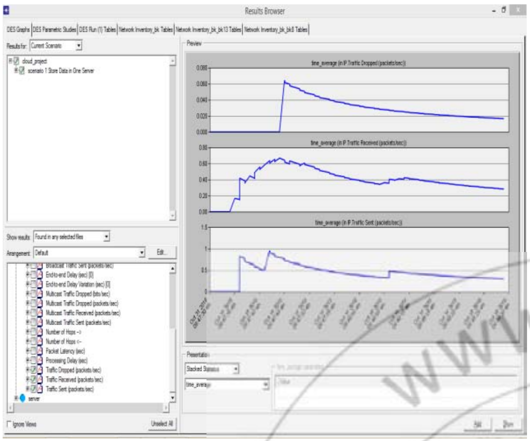

Figure 6: The results of Data Cloud in Scenario 1

Main Server results for traffic dropped (packets/sec), traffic received (packets/sec) and traffic send (packets/sec).

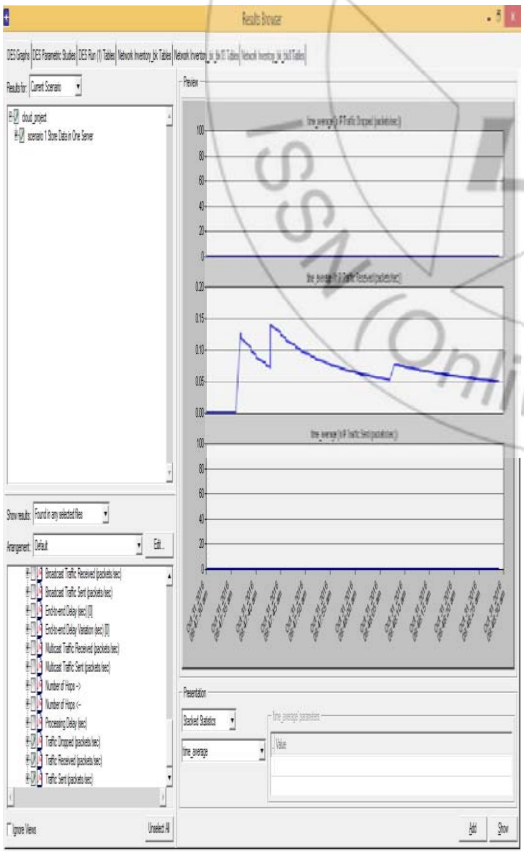

Figure 7: The results of Main Server in Scenario 1

Results of Scenario2:
The results of scenario 2 as show in Figure 8 for (Data cloud), Figure 9 for (Main Server) and Figure 10 for (Backup Server).

Data cloud results for traffic dropped (packets/sec), traffic received (packets/sec) and traffic send (packets/sec).

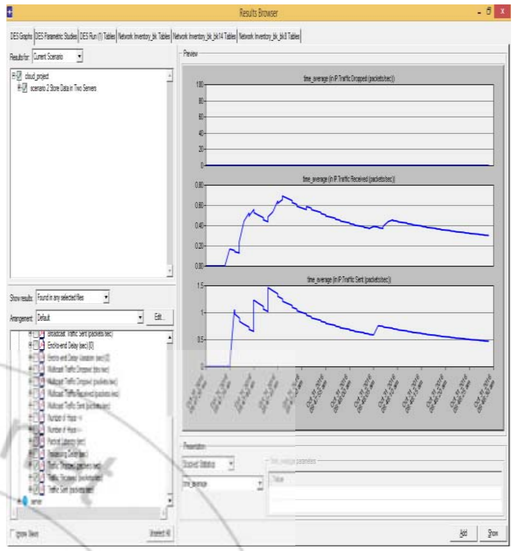

Figure 8: The results of Data Cloud in Scenario 2

Main Server results for traffic dropped (packets/sec), traffic received (packets/sec) and traffic send (packets/sec).

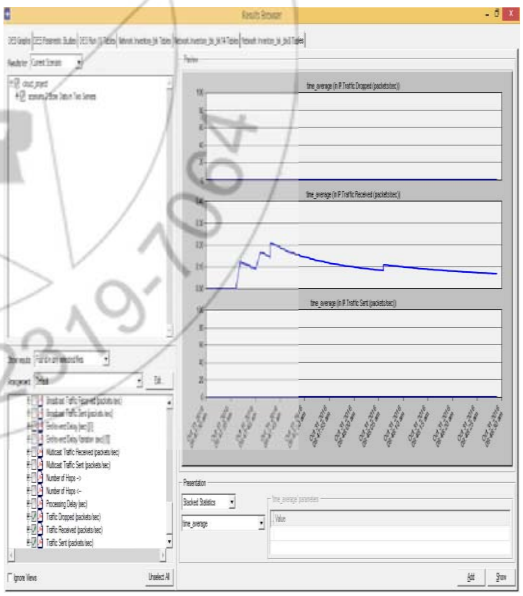

Figure 9: The results of Main Server in Scenario 2

Backup Server results for traffic dropped (packets/sec), traffic received (packets/sec) and traffic send (packets/sec).

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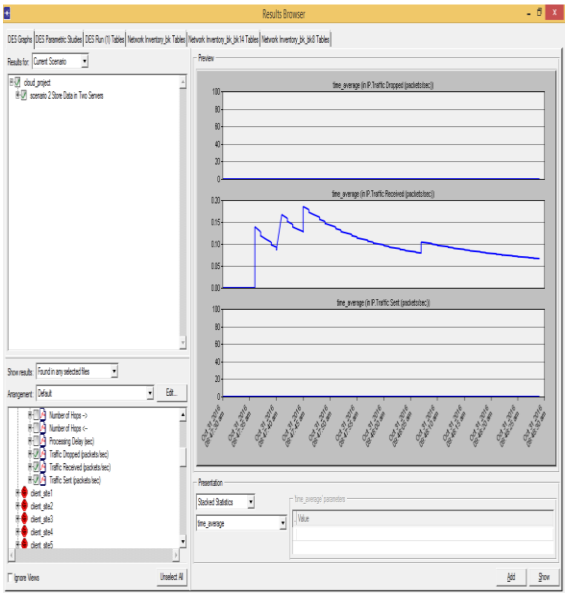

Figure 10: The results of Backup Server in Scenario 2

Results of Scenario 3:

The results of scenario 3 as show in Figure 11 for (Data cloud) and Figure 12 for (Backup Server). Data cloud results for traffic dropped (packets/sec), traffic received (packets/sec) and traffic send (packets/sec).

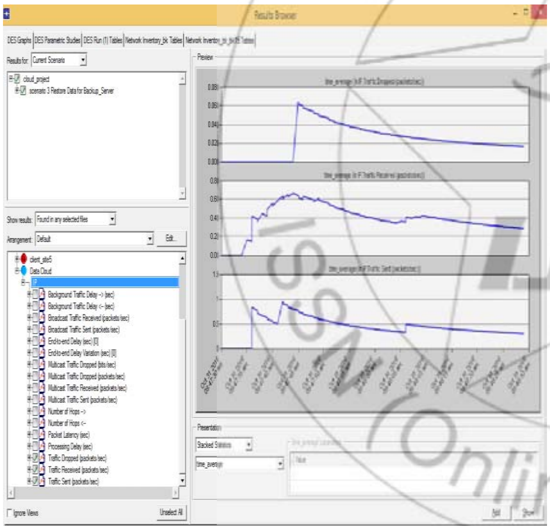

Figure 11: The results of Data Cloud in Scenario 3

Backup Server results for traffic dropped (packets/sec), traffic received (packets/sec) and traffic send (packets/sec).

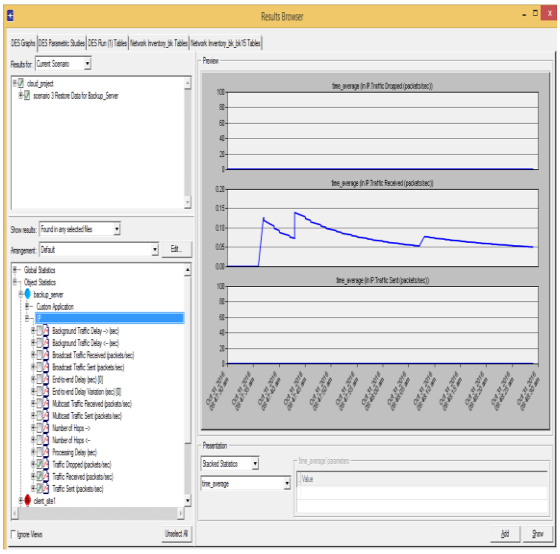

Figure 12: The results of Backup Server in Scenario 3

7. Comparison of Results

Comparison in Data Cloud:

The results as shown in Figure 13, Figure 14 and Figure 15.

a. Traffic Dropped:

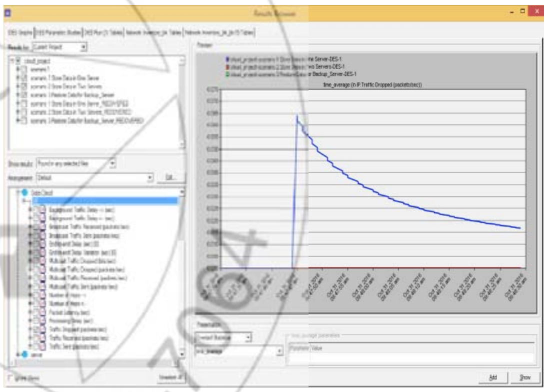

Figure 13: The comparative results of Traffic Dropped in Data Cloud

b. Traffic Received:

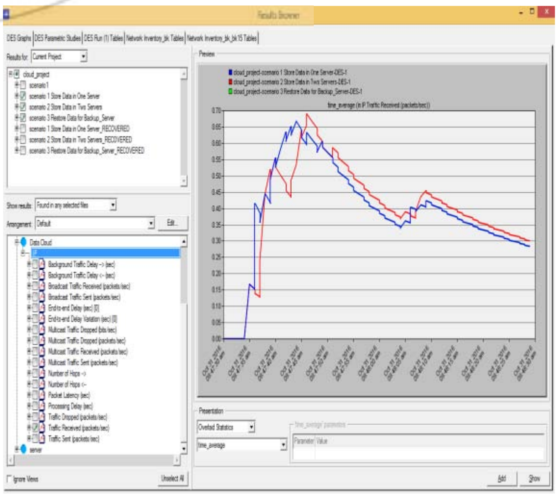

Figure 14: The comparative results of Traffic Received in Data Cloud

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c. Traffic Send:

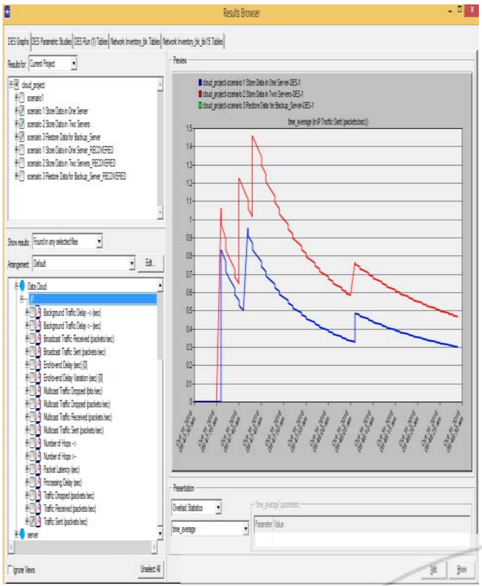

Figure 15: The comparative results of Traffic send in Data Cloud

8. Comparison in Main Server

The results as shown in Figure 16, Figure 17 and Figure 18.

a. Traffic Dropped

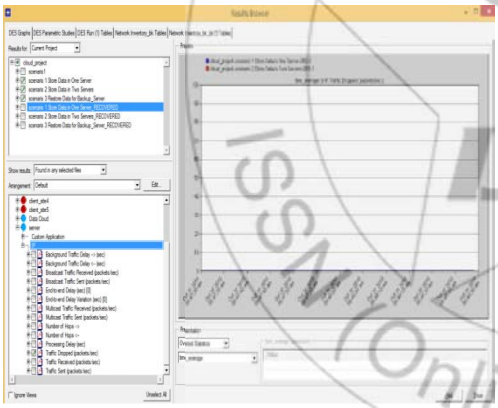

Figure 16: The comparative results of Traffic Dropped in main server

b. Traffic Received:

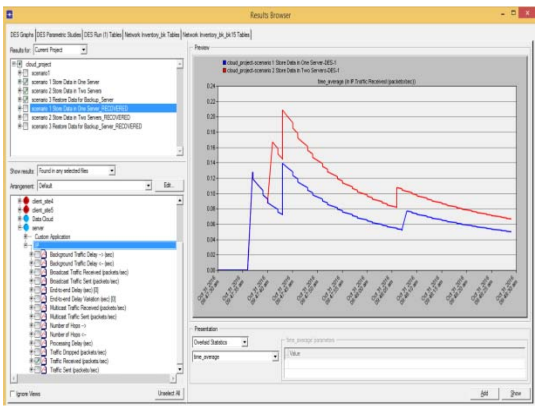

Figure 17: The comparative results of Traffic Received in main server

c. Traffic Send:

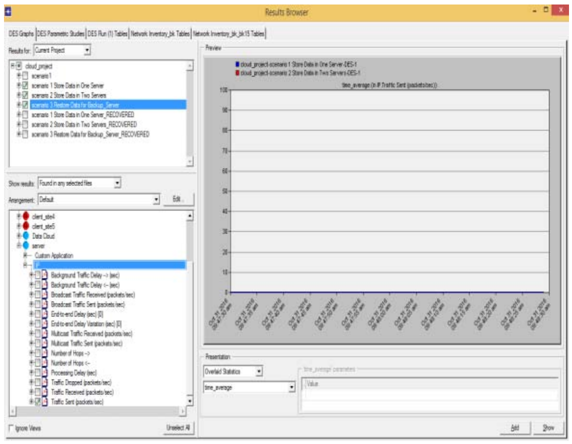

Figure 18: The comparative results of Traffic send in main server

9. Comparison in Backup Server:

The results as shown in Figure 19, Figure 20 and Figure 21.

a. Traffic Dropped:

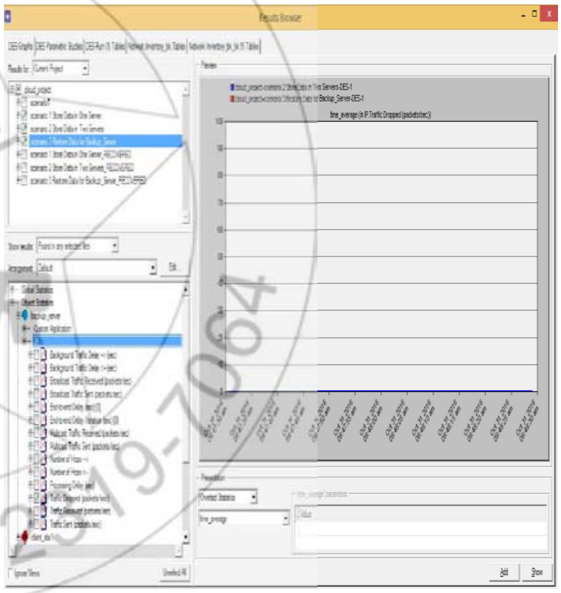

Figure 19: The comparative results of Traffic dropped in backup server

b. Traffic Received:

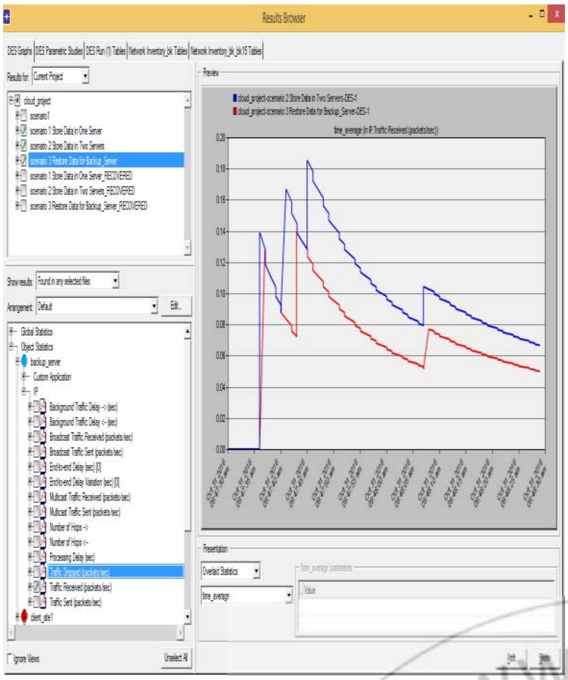

Figure 20: The comparative results of Traffic received in backup server

c. Traffic Send

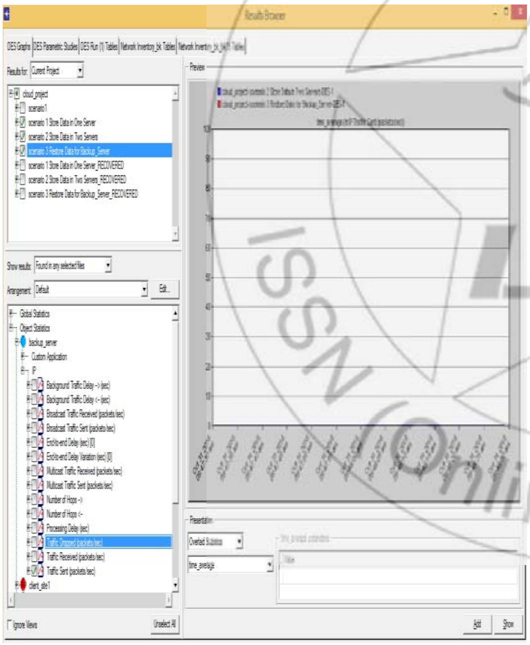

Figure 21: The comparative results of Traffic send in Backup server

10. Conclusion and Recommendations

Data Cloud is a service that data is automatically maintained, managed, backed up and restore back. The service is available to users over internet and telecommunication networks. It allows the user to store their data online so that the user can access them from any location via the internet networks. Recovering data from cloud storage is slower than local backup, so users should also be aware that backing up their data is still required when using cloud storage services.

There are number of reasons why peoples migrate to cloud computing, such as reduction of costs unlike on site hosting the price of deploying applications in the cloud can be less due to lower hardware costs from more effective use of physical resources.

11. The Recommendations

The recommendations for students that want to study more in this subjects are:

- Expand the design of the networks
- Use OPNET version 17.5
- Put the cloud computing devices and servers (data center) in different and many places.
- Try to user recovery file to store data.
- User Firewall in the design to protect data.
- Use antivirus in the design.

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