



International Journal of Advanced Research in Computer Science and Software Engineering

Research Paper

Available online at: www.ijarcsse.com

Cloud Computing for Media Storage and Performance Analysis

Bhagyashri C. Allagi, Dr. R. B. Kulkarni, Shashikant Hippargi

Dept of CSE, Solapur University
India

Abstract— Cloud computing is a network of computing resources which can be shared, any application can get integrated into the cloud environment and any services may get exposed in cloud. In this paper we develop a cloud computing environment using Windows Microsoft Azure platform which provides a platform for data storage, data security and data validation. The data is secured using RC4 and CRC algorithm. Comparison between RC4 and RSA algorithms are done. Further we use this platform to show how data is stored in the cloud and analyze the server load with respect to data.

Keywords— Cloud Computing, CRC, RC4, RSA, Windows Microsoft Azure

I. INTRODUCTION

If the data is stored in the private computer, there is a possibility of breaking the password and the data can be stolen [1]. In cloud computing, data is stored not in the private computer, but in virtualized pools of storage i.e. datacenters, which are generally hosted by cloud storage providers. Stolen password can be changed and reset immediately. If the data has to be stored in the datacenters hosted by different companies, it is necessary to buy storage capacity from them. The data center provider virtualizes the resources required according to the user which can be used to store files [2]. Cloud computing provides computing environment (PaaS), software (SaaS), data access and storage (IaaS) services that do not require the user to understand the physical location and configuration of the system that delivers the services. Encryption of data is necessary as the data transmission on the internet is vulnerable to the attacks [10].

While storing data on cloud, the aspects like cost (pay as you go), flexibility (dynamically scale as demands increase), accessibility (data available without loss of sensitive information) and availability (access data from anywhere) are very important.

In this paper we develop a cloud as a platform model for a simple media storage system where the users can register in the system and can store their image or text data. The data is encrypted using RC4 and data is validated using CRC32. Encryption and CRC are built as a top level application over a cloud and the authentication uses the authentication provided by the cloud. The data is stored in the Blob (Image) and Queue/Message format in the cloud. The application interface does not require providing any server level credential for data storage. Once the data is passed to the cloud, it uses its own security module to protect the storage and stores the data in the cloud.

II. RELATED WORK

Cloud computing can be used for data storage service that do not require end-user knowledge of the physical location and configuration of the system that delivers the service. Since the data transmission on the internet or over any networks are vulnerable to the hackers attack. We are in great need of encrypting the data. This paper provides data storage and securing data in cloud computing system using RSA algorithm. In this algorithm some important security services including key generation, encryption and decryption are provided in cloud computing system [10].

Cloud computing is the most demanding and emerging technology throughout the world. Cloud computing is an Internet based computer technology. Cloud service provides to the companies to store huge amount of storage capacity. But still many companies are not ready to implement cloud computing technology due to lack of proper security control policy and weakness in protection which lead to many challenge in cloud computing. In this paper, security to the data is provided using homomorphism token with distributed verification of erasure-coded data [3][4].

The analysis of the performance comparison of cloud computing platforms and traditional web servers is done in this paper. Two significant cloud computing platforms, Google App Engine and Amazon Web Service, are considered for study. The analysis shows that cloud computing platforms can get reasonable performance compared to traditional web servers [5].

Aim of this paper is to protect the data stored on cloud by using security algorithm. Cloud computing model advances many web applications because of its elasticity nature. This type of computing reduces operating cost and increases the efficiency of computing. Even though efficiency increased, still there is security threat for the data that is stored in third party area especially in Internet. Due to data security issue with cloud computing many business organization have fear in storing their data in Cloud. So the most challenging task of the business organization is to provide high security for their data since the data are sensible related to their business. To ensure the security of data, security is provided by implementing RSA algorithm using cloud SQL to the data that will be stored in the third party area [6].

III. ARCHITECTURE OF THE PROPOSED CLOUD

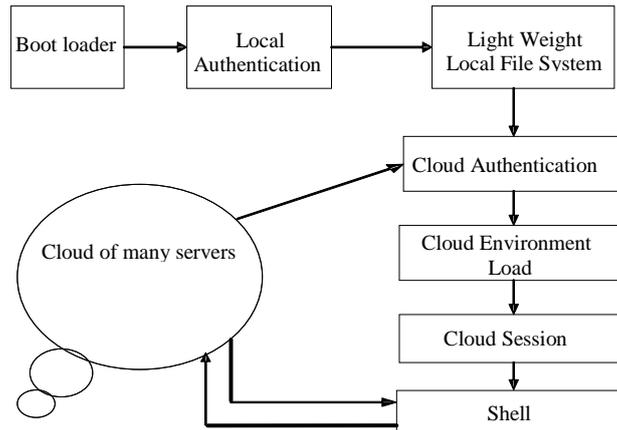


Fig. 1. Architecture of the Proposed Cloud

As shown in fig. 1, the boot loader loads the operating system when the user turns on the computer. Local authentication is done in order to verify the identity of user on the desktop. Authentication for the cloud works differently than for a network. Windows logons can be used to verify a user’s identity and restricting authentication to only those users who have access to the Windows network. This model does not scale to the cloud because users are not necessarily connected to a same network. Local file system in the computer loads the cloud environment upon authentication in the cloud is valid and maintains the cloud session until the user is connected to the cloud.

IV. RC4 AND CRC

A. The RSA versus RC4

Many times RSA algorithm is implemented before storing the sensitive data in cloud. The data is decrypted and is available to the user if the user is authorized [7]. RSA is a public-key block cipher that relies entirely on mathematical functions for encryption and decryption. But there are limitations of implementing RSA.

On the other hand, RC4 is a symmetric stream cipher that is extremely easy to implement. The algorithm encrypts the plaintext stream byte-by-byte, XORing each plaintext byte with a pseudorandom byte. The pseudorandom byte generator forms the core of the algorithm. The limitations of RSA can be overcome using RC4. The following table shows the difference between RSA and RC4 algorithms.

TABLE I
DIFFERENCE BETWEEN RSA AND RC4 ALGORITHMS

Parameters	RSA	RC4
Speed	Less Faster	1000 times faster than RSA
Applications	Highly Confidential Data	Personal files, Wireless and TCP/IP transmission
Complexity	Highly complex	Simple
Security	Highly Secure	Moderately Secure

B. The RC4 Algorithm

Here a key is input to a pseudorandom bit generator that produces a stream of 8-bit numbers that are apparently random. The output of the generator is combined one byte at a time with the plaintext stream using the bitwise exclusive-OR (XOR) operation. Decryption requires the use of the same pseudorandom sequence. The algorithm is given below [8].

```

for i from 0 to 255// initialization step
    S[i] = i
    T[i] = K[i mod K.length]
end for

j = 0 // initial permutation
for i from 0 to 255//of S
    j = (j + S[i] + T[i]) mod 256
    swap(S[i], S[j])
end for
  
```

```

i = j = 0 // pseudorandom byte
loop // stream generation
i = (i + 1) mod 256
j = (j + S[i]) mod 256
swap(S[i], S[j])
t = (S[i] + S[j]) mod 256
r = S[t]
end loop
    
```

C. CRC

A cyclic redundancy check (CRC) is an error-detecting algorithm for checking errors in the computer data that has been transmitted on the communication link.

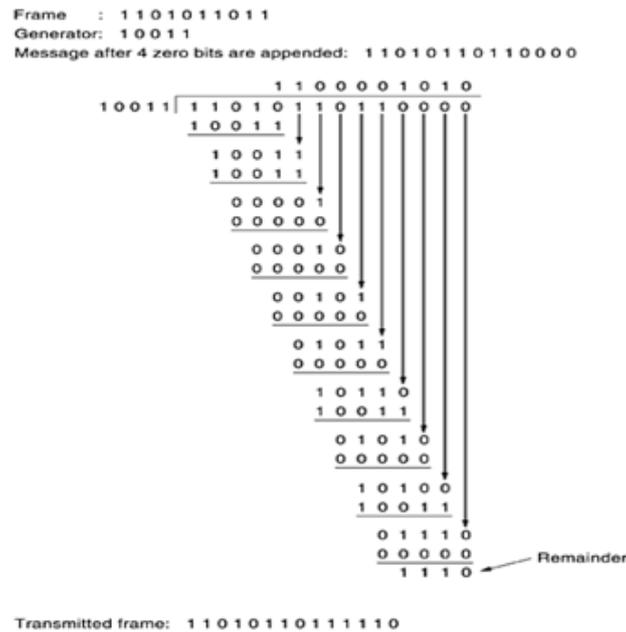


Fig. 2. CRC Calculation

It is commonly used in digital networks and storage devices such as hard disk drives. The sender applies a 16-bit or 32-bit polynomial to a block of data to be transmitted and appends the resulting cyclic redundancy code to the block. The receiver applies the same polynomial to the data and compares its result with the result appended by the sender. If they are same then the data received is correct. If not, the notification is sent back to the sender so as to resend the block of data [9]. CRCs are simple to implement and easy to analyze mathematically as given in fig. 2.

V. RESULTS AND DISCUSSION

In this paper, a simple website is developed which demonstrates blob, table type storage services of cloud along with the metadata services, port configuration, connection and account configuration and load balancing.

We create account in the cloud if not available and login into it.

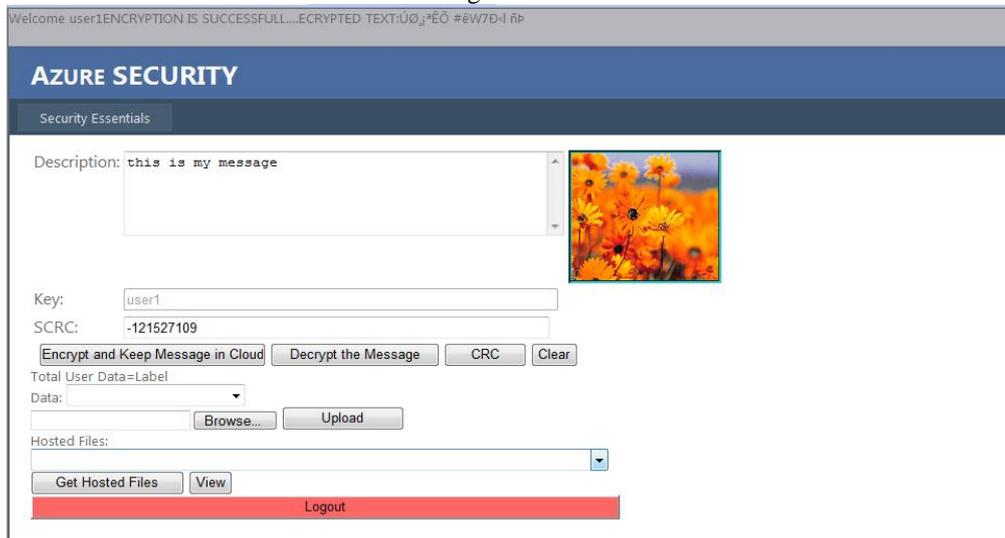


Fig 3. Home Page

In the home page, text message to be stored on the cloud is written in the description area as shown in Fig. 3. Before storing the message on cloud, a CRC code is generated and encrypted. The text message is stored in the form of a table i.e Azure Metadata Services.

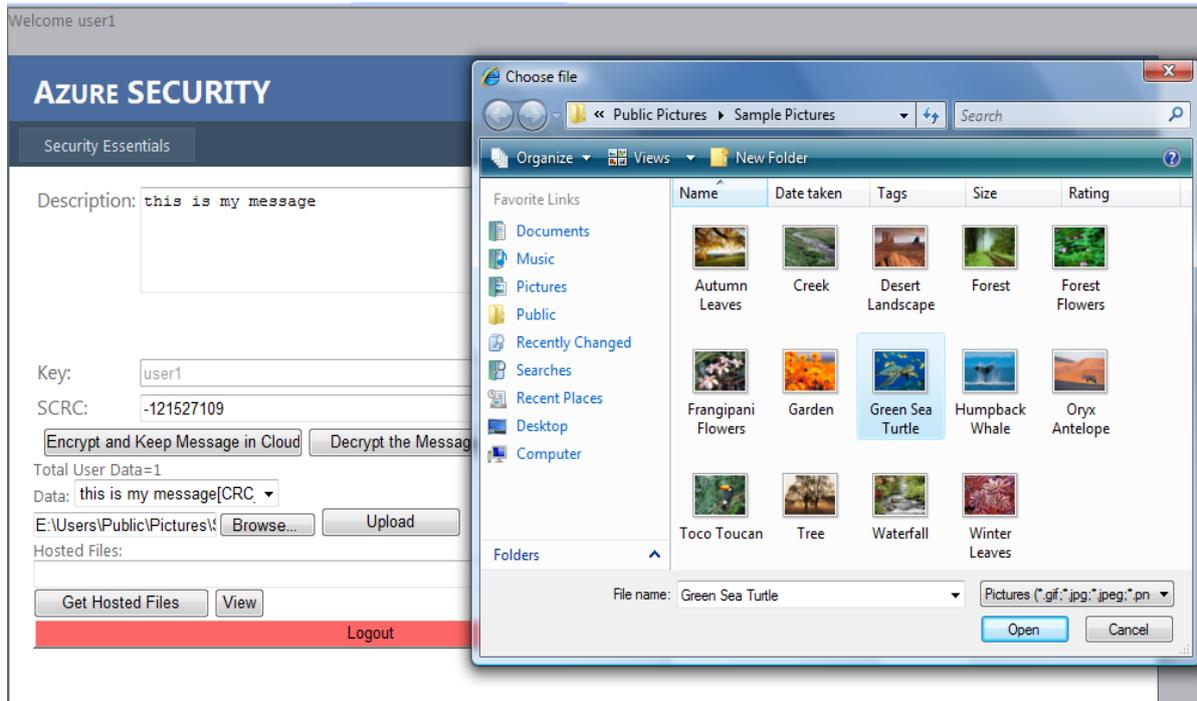


Fig 4. Select image from the database

Images are stored in the form of blobs. We can select an image to be stored on cloud as shown in Fig. 4. system [10].

VI. PERFORMANCE ANALYSIS

A. CPU Utilization

Performance analysis is done using WalhostBootWrapper, the wrapper application.

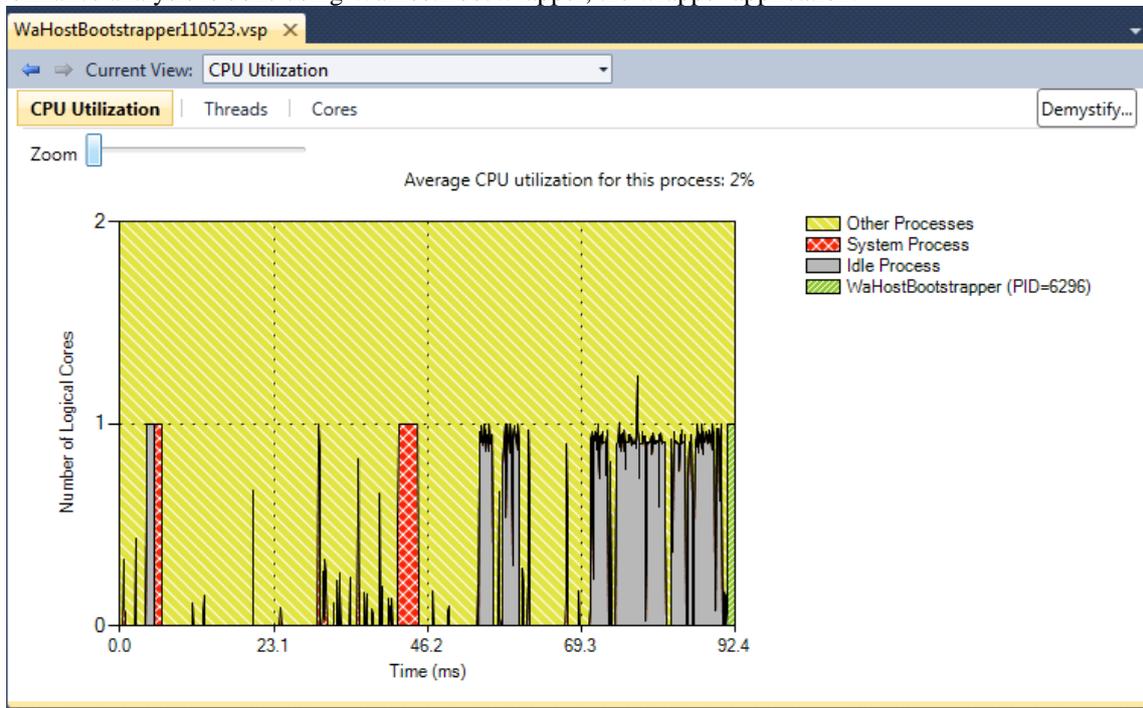


Fig 5. CPU Utilization when application is run on cloud

The graph in Fig. 5. clearly states that at any given instance of time, the resource used by the cloud platform is minimum in comparison to System process, Ideal Process and other processes. Therefore it satisfies the claim that application developer need not have to write the API's for resource optimization and that is looked after by the cloud environment itself.

B. Threads

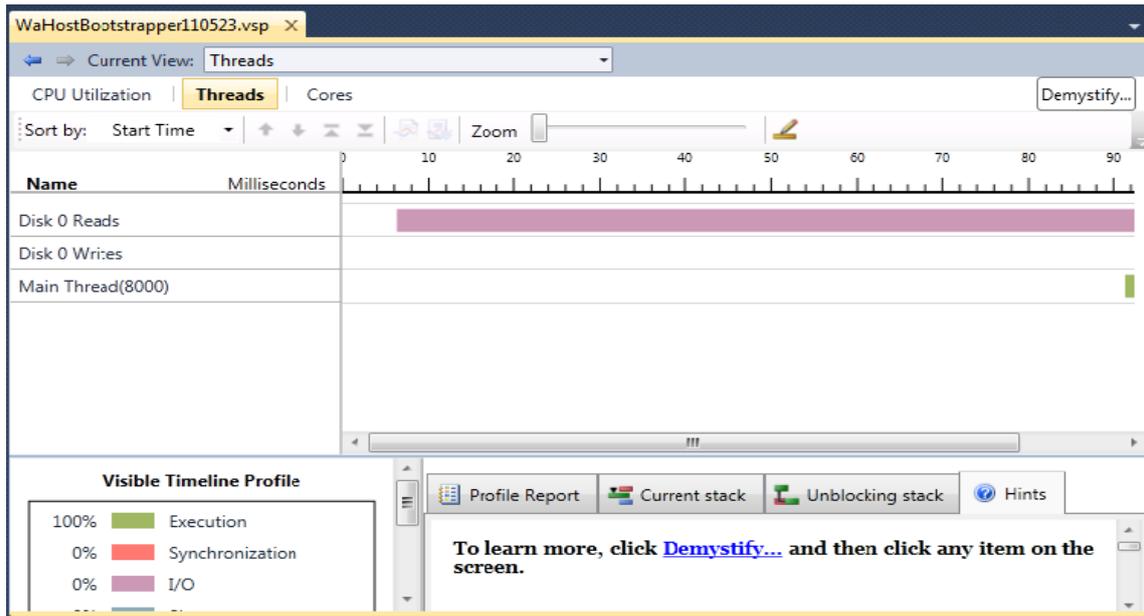


Fig 6. Process Scheduling using multiple threads

Fig. 6 shows the thread behaviour or the timing module. It can be seen that cloud automatically schedules the parallel executable processes as the execution begins before the I/O was completed with the data that is already fetched. This proves that cloud support scheduling. Therefore if cloud is used as platform as a service, the execution is faster and better. User level scheduling and CPU threading is not needed. Some of the application programs like java needs to explicitly mention, which threads can be executed parallel. But cloud solves this issue by self-detecting and forcing the parallel execution of the threads.

C. Context Switching

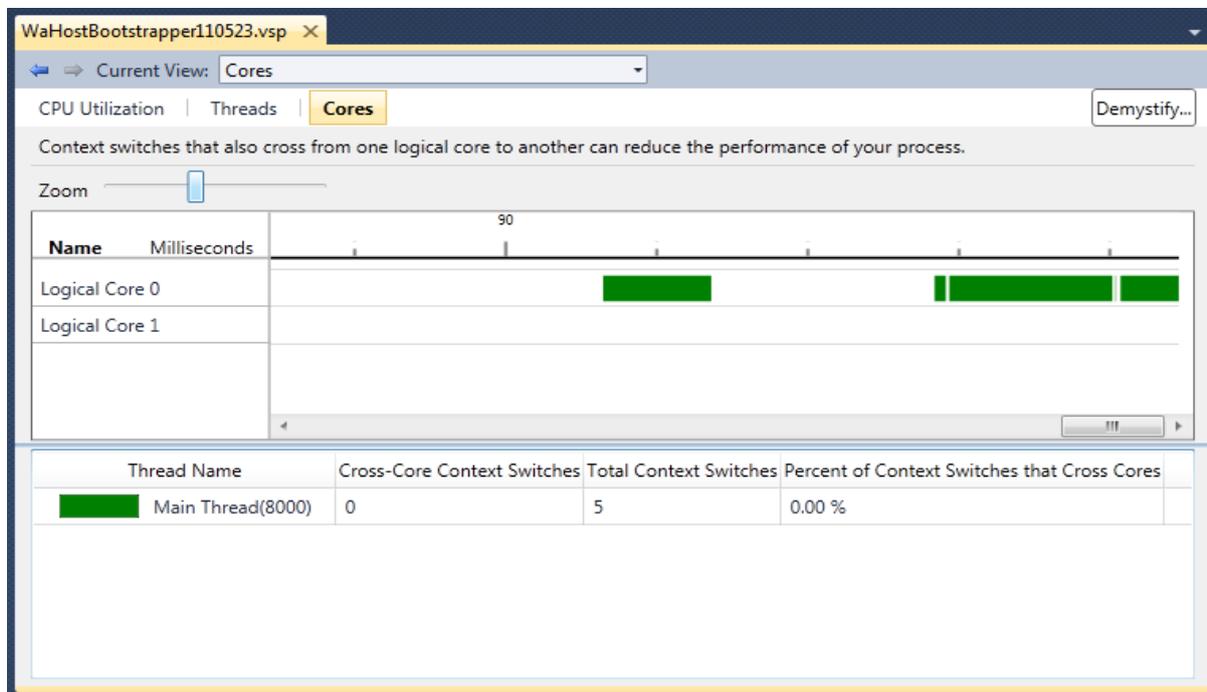


Fig 7. Context Switching

In case multiple CPU's are available, the system can automatically route the messages or the processing queries to various CPU's with context switching as shown in Fig. 7. The current application does not cause any execution overhead. Therefore even though two channels are enabled, messages are routed to single CPU.

Average System Utilization by Processes that the average CPU usage by the application is only 2% and that other processes and system processes are context switched automatically in the cloud for load balancing.

VII. CONCLUSION

We develop a simple application to show the application integration over the cloud in a platform as service architecture. This is demonstrated by using a simple data exchange mechanism. Also using the same application, it is shown how cloud system can be used for data storage without the application developer having to concentrate on any other services like data security or data communication bandwidth optimization. Performance analysis clearly shows that the system automatically provides the necessary optimizations for fast and efficient process and thread execution by means of scheduling, automatic threading and CPU allocation. Hence it can be said that platform as a service minimize the development and maintenance overhead.

This work can be further extended to software as a service and by showing that platform as a service can be used as a great model to develop software which the end users can utilize and can be billed as per the usage. Thus cloud computing provides a wonderful isolation in hardware, operating environment, security and storage.

REFERENCES

- [1] Store Your Data in the Cloud - Cloud Computing in 2012 <http://www.freetechbooks.com/store-your-data-in-the-cloud-cloud-computing-in-2012-t845.html>
- [2] Wikipedia: Cloud Storage http://en.wikipedia.org/wiki/Cloud_storage.
- [3] Deepanchakaravarthi Purushothaman and Dr.Sunitha Abburu, *An Approach for Data Storage Security in Cloud Computing*, International Journal of Computer Science Issues, 9(2), No 1, March 2012, 1694-0814.
- [4] K. Valli Madhavi, R. Tamilkodi and R. BalaDinakar, *Data Storage Security in Cloud Computing Ensuring Effective and Flexible Distributed System*, International Journal of Electronics Communication and Computer Engineering 3 (1), NCRTCST, 2249 –071X .
- [5] Chao He, *Performance Analysis Based on Two Leading Cloud Computing: Google App Engine and Amazon Web Service*, <http://www1.cse.wustl.edu/~jain/cse567-11/ftp/clouds/index.html>.
- [6] N. Saravanan, A. Mahendiran, N. Venkata Subramanian and N. Sairam, *An Implementation of RSA Algorithm in Google Cloud using Cloud SQL*, Research Journal of Applied Sciences, Engineering and Technology 4(19), 3574-3579, 2012.
- [7] Vijeyta Devi, Vadlamani Nagalakshmi, Vikas kumar, *A Prospective Approach on Security with RSA Algorithm and Cloud SQL in Cloud Computing*.
- [8] William Stallings, *THE RC4 STREAM ENCRYPT ION ALGOR ITHM*. <http://cse.spsu.edu/afaruque/it6833/RC4.pdf>
- [9] Search Networking: Cyclic Redundancy Checking <http://searchnetworking.techtarget.com/definition/cyclic-redundancy-checking>
- [10] Rupali Sachin Vairagade, Nitin Ashokrao Vairagade, *Cloud Computing Data Storage and Security Enhancement*, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 1(6), August 2012.