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Enhance data security of private cloud using encryption scheme with RBAC

Dimpi Rani[1] , Rajiv Kumar Ranjan[2]
M.Tech (CSE) Student, Arni University, Indora, Kangra , India[1]
Assistant Professor, Dept. of CSE, Arni University, Indora, Kangra,India[2]

Abstract: Cloud computing is a phrase used to describe a variety of computing concepts that involve a large number of computers connected through a real-time communication network such as the Internet. Cloud Computing is an emerging paradigm which has become today's hottest research area due to its ability to reduce the costs associated with computing. Due to the fast development of the Cloud Computing technologies, the rapid increase of cloud services are became very remarkable. Securing data is a challenging issue in today's era. Most of the data travel over the internet and it becomes difficult to make data secure. The prevalent Problem Associated with Cloud Computing is the Cloud security and the appropriate Implementation of Cloud over the Network. In this Research Paper we are using a combination of Blowfish Algorthim, RSA and Digital Signature for improving the Security.

Keywords: Cloud Computing , Internet, Role Back Access Control, Blowfish Algorthim, RSA and Digital Signature.

I. INTRODUCTION

Cloud computing is the long dreamed vision of computing as a utility, where data owners can remotely store their data in the cloud to enjoy on-demand high-quality applications and services from a shared pool of configurable computing resources. Cloud is a new business model wrapped around new technologies such as server virtualization that take advantage of economies of scale and multi-tenancy to reduce the cost of using information technology resources. It also brings new and challenging security threats to the outsourced data. Since cloud service providers (CSP) are separate administrative entities, data outsourcing actually relinquishes the owner's ultimate control over the fate of their data. The term cloud computing probably comes from (at least partly) the use of a cloud image to represent the Internet or some large networked environment. Cloud computing really is accessing resources and services needed to perform functions with dynamically changing needs. An application or service developer requests access from the cloud rather than a specific endpoint or named resource. What goes on in the cloud manages multiple infrastructures across multiple organizations and consists of one or more frameworks overlaid on top of the infrastructures tying them together. Cloud computing platforms are growing very quickly. Organizations can provide hardware for clouds internally (internal clouds), or a third party can provide it externally (hosted clouds). A cloud might be restricted to a single organization or group (private clouds), available to the general public over the

Internet (public clouds), or shared by multiple groups or organizations (hybrid clouds) [1].

II. DATA SECURITY ISSUES IN THE CLOUD

A few years ago, the big issue with Cloud was security. Cloud security issues such as physical security, transmission security, storage security, access security, data security, and application security. In Cloud Computing the user must ensure that their infrastructure is secure [2]. In cloud systems, data is stored in a remote location on servers maintained by a cloud provider. The cloud provider should have provision to ensure that there is no direct snooping into client data. With the cloud model, you lose control over physical security. In a public cloud, you are sharing computing resources with other companies. Simply because you share the environment in the cloud, may put your data at risk of seizure.

Storage services provided by one cloud vendor may be incompatible with another vendor‟s services should you decide to move from one to the other. Data integrity is assurance that the data is consistent and correct. Ensuring the integrity of the data really means that it changes only in response to authorized transaction. perhaps two of the more “hot button” issues surrounding cloud computing relate to storing and securing data, and monitoring the use of the cloud by the service providers. These issues are generally attributed to slowing the deployment of cloud services. for example, by storing the information internal to the organization, but allowing it to be used in the cloud. If the provided cloud storage can be accessed or destroyed by malicious attackers, it causes the leakage of personal data that could effect great damage to each individual user. In Cloud Computing the provider must ensure that their infrastructure is secure and that their clients’ data and application s are protected while the customer must ensure that the provider has taken the proper security measures to protect their information.

III. PROPOSED WORK

In this proposed work we want to secure our data in cloud. Because Security is the major issue which is faced by every user. Consider an organization where their are number of Employees(Users) are working. Each User has its own LOG IN ID and PASSWORD where they can store their data and all the organization is managed and operated by ADMIN. With the help of RBAC Admin restrict the system from unauthorized access because their are number of restriction to downloads the files of cloud with every user **.** If any unauthorized user wants to access the data due to downloading restriction they can effect some files rest of files will be saved**.** RBAC helps to secure our data in Cloud. Secondly, Blowfish helps to encrypted the data and RSA works on these encrypted data and generate the public key and private key.

Public key will be generated with every file and Private key helps to generate the digital signature which is required for downloading time. This Digital Signature will be accessed by user via mail. It also provides a better storage and security technique over Cloud architecture. With the kind of (A combination of Blowfish Algorthim and RSA), it would be more secure to gets hacked. These Algorthims helps to provides security. Here we illustrate the Figure1 which represents the basic design of our proposed work.

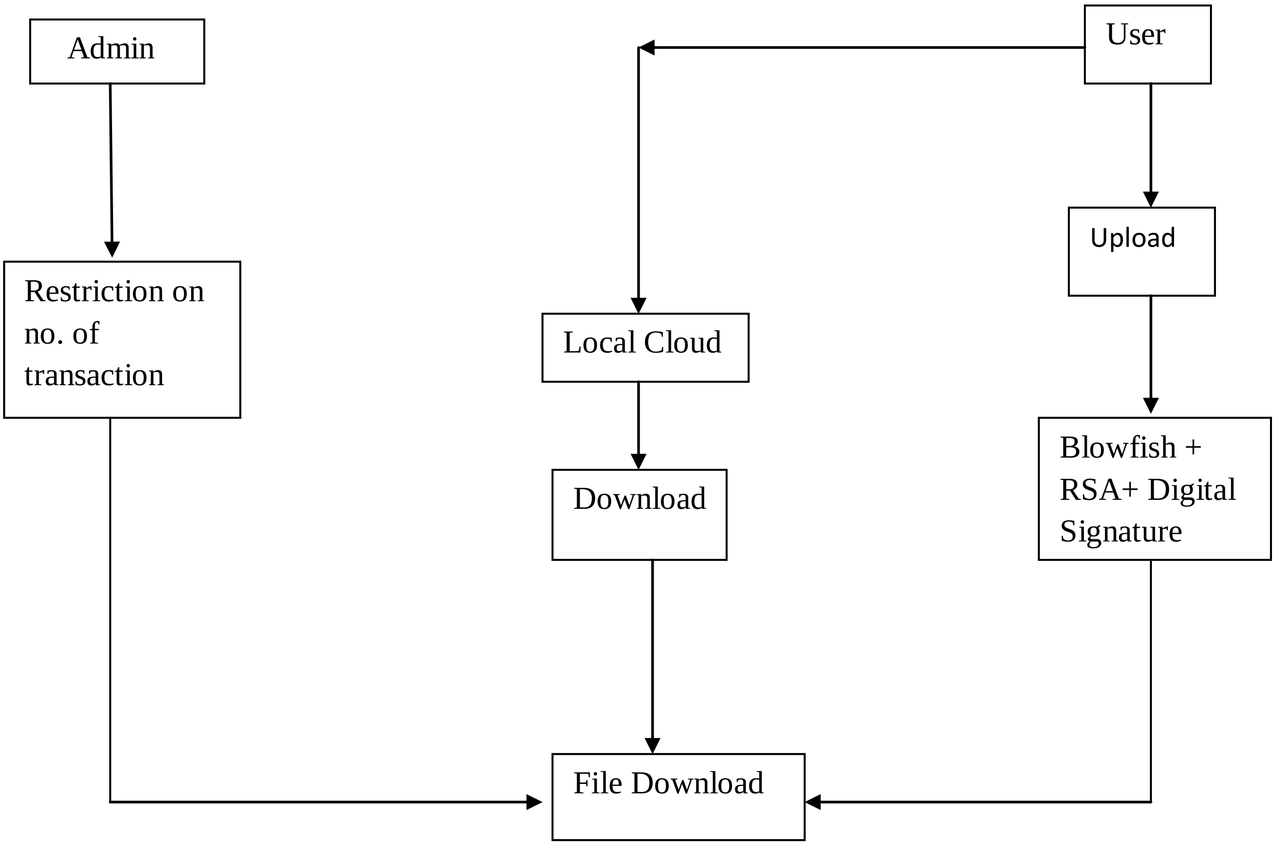
Admin
Restriction on no. of transaction
User
Upload
Blowfish + RSA+ Digital Signature
Local Cloud
Download
File Download

Figure 1 :- Represents the basic design of proposed work

Admin: In an organization, admin create roles for users & also specify the number of transactions per user as per their role.

User: A user can upload/ download file. When uploading file Blowfish, and RSA schemes are used to encrypt data & signature is included to lock that data and when downloading the files inversaly Blowfish and RSA are used to decrypt data & signature is used to unlock the file.

Local Cloud:_Local Cloud is used to store data in the encrypted form.

Below we will explain RBAC , Blowfish Algorthim, RSA and Digital Signature.

A . ROLE- BASED ACCESS CONTROL

RBAC is a rich technology and a great effort in the field of Access control A role represents a specific function within an organization and can be seen as a set of actions or responsibilities associated with this function. Roles are defined by Administrator according to job competency, authority, and responsibility within the organization. [3].In a RBAC model, all grant authorizations deal with roles, rather than being granted to users by Admin.. RBAC ensures that only authorized users are given access to certain data or resources. Roles are defined by Administrator according to job competency, authority, and responsibility within the organization.

B. Blowfish Algorithm

Blowfish is a symmetric block cipher algorithm. It uses the same secret key to both encryption and decryption of messages. The block size for Blowfish is 64 bits; messages that aren't a multiple of 64-bits in size have to be padded. It uses a variable –length key, from 32 bits to 448 bits. [4].It is appropriate for applications where the key is not changed frequently. It is considerably faster than most encryption algorithms when executed in 32-bit microprocessors with huge data caches. Data encryption happens via a 16-round Feistel network as shown in figure 3.

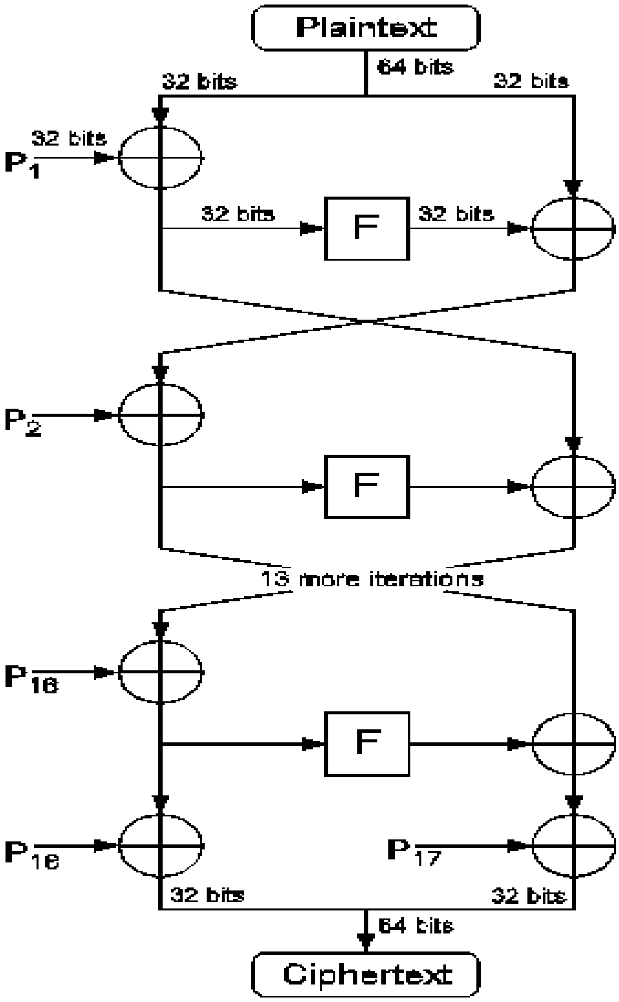

Figure 2. Encryption with Blowfish

C. RSA

RSA is widely used Public-Key algorithm. RSA stands for Ron Rivest, Adi Shamir and Len Adleman, who first publicly described it in 1977. In our proposed work, we are using RSA algorithm to encrypt the data to provide security so that only the concerned user can access it. [5].Here we explain RSA algorthim.

RSA algorithm involves three steps:

1. Key Generation
2. Encryption
3. Decryption

An RSA algorithm is the genetic algorithms in the security system in the cryptography[6]. In RSA algorithms first we choose the two integer values.

Let P and Q are the integer values. Then we find the value
of N.

$N = P \times Q$ … (3.1)

$\emptyset(N) = (P - 1) \times (Q - 1)$ … (3.2)

Then we choose the value of e, which is not factor of $\emptyset(N)$

And also we find the value of d, which is related the expectation value (e).

$ed = 1 \bmod \emptyset(N)$ … (3.3)

Or $d = \frac{1}{e} \bmod \emptyset(N)$ … (3.4)

Or $d = e^{-1} \bmod \emptyset(N)$ … (3.5)

By Euclidian theorem the value of d depends upon $|\emptyset(N)|$.

The value of d has the modulus values 1, 2…n.

$d = 1 + |\emptyset(N)|$ … (3.6)

RSA algorithms are also used in the encryption and decryption.

Encryption key = (e, N).

Decryption key = (d, N).

If the message M so the value of M <N.

Encrypt = $E = M^e \bmod N$ ... (3.7)

Decrypt => $M = E^d \bmod N$ … (3.8)

In equations (3.1), (3.2) and (3.6) are using for the key generation but the equation (3.7), (3.8) are using encryption and decryption.

D. Digital Signatures

Digital signature is a mathematical scheme for demonstrating the authenticity of a digital message or document. Digital signatures are commonly used for software distribution, financial transactions, and in other cases where it is important to detect forgery or tampering.. A key generation algorithm that selects a private key uniformly at random from a set of possible

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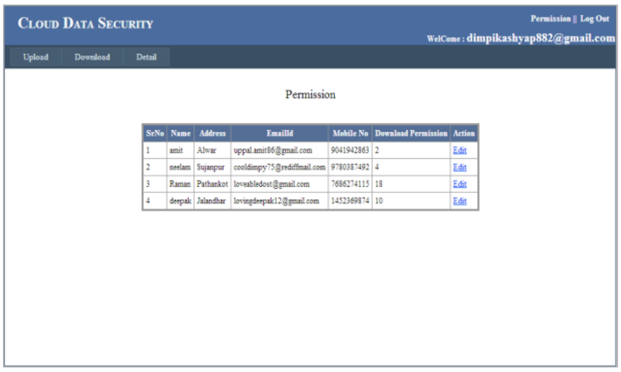
private keys. The algorithm outputs the private key and a corresponding public key. Digital signatures can also provide non-repudiation, meaning that the signer cannot successfully claim they did not sign a message, while also claiming their private key remains secret; further, some non-repudiation schemes offer a time stamp for the digital signature, so that even if the private key is exposed, the signature is valid. Digitally signed messages may be anything able as a bit string: examples include electronic mail, contracts, or a message sent via some other cryptographic protocol .

IV. IMPLEMENTATION AND RESULT

1. The described work is implemented in ASP.NET. Firstly we show the snapshot where admin restricts all the users to the number of downloads. This snapshot represents the list of employees who are working in an organization and restriction in no. of download which is granted by Admin. Figure 3. Represents the permission taken. . This restriction provides the security with the help of RBAC. because an unauthorized user cannot download the files without admin permission.

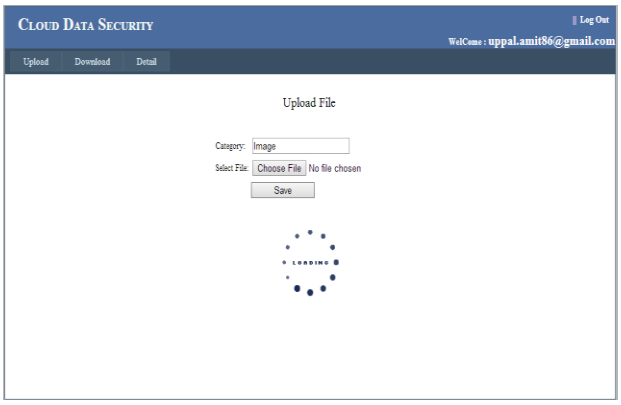


Permission

SrNo	Name	Address	EmailId	Mobile No	Download Permission	Action
1	amit	Alwar	uppal.amit86@gmail.com	9041942863	2	Edit
2	neelam	Sujanpur	cooldimpy75@rediffmail.com	9780387492	4	Edit
3	Raman	Pathankot	loveabledost@gmail.com	7686274115	18	Edit
4	deepak	Jalandhar	lovingdeepak12@gmail.com	1452369874	10	Edit

Fig. 3: Representation for permission taken

2. Figure 4. represents the uploading page where Employee upload the file and the processing can take place. When Employee upload a file Firstly Blowfish Algorthim applied on the file which encrypt the data.Within the help of Blowfish a ciphertext is generated. Then Secondly, RSA is applied on it. And RSA generate a public and private key with every file. Public key is shown within each file and helps to generate a new session and private key with the help of Digital Signature Algorthim generate a Digital Signature which is send to e-mail of Employee.



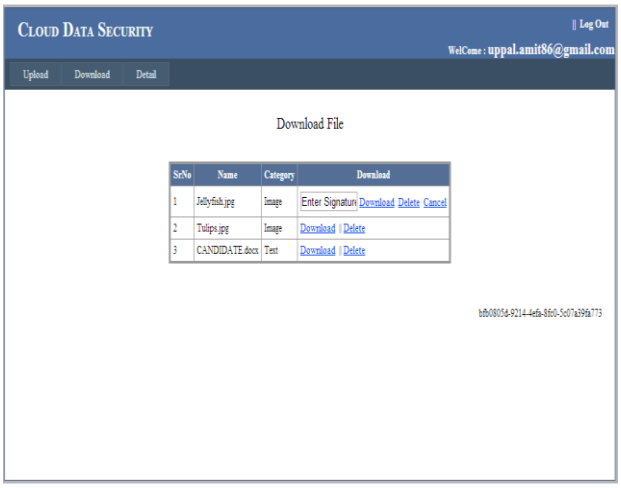
Upload File

Category: Image

Select File: No file chosen

Figure4. Represents the uploading procedure

3. Figure 5. represents the downloading procedure where Employee wants to download the file. but during downloading a file a Digital Signature is required which can be accessed by via e-mail of Employee. And their Right side a public key is shown.



Download File

SrNo	Name	Category	Download
1	Jellyfish.jpg	Image	Enter Signature Download Delete Cancel
2	Tulips.jpg	Image	Download | Delete
3	CANDIDATE.docx	Text	Download | Delete

bfb0805d-9214-4efa-8fc0-5c07a39fa773

Figure 5. Represents the downloading procedure

4. This Snapshot Figure 6. represents the Signature key which is required for downloading the files.

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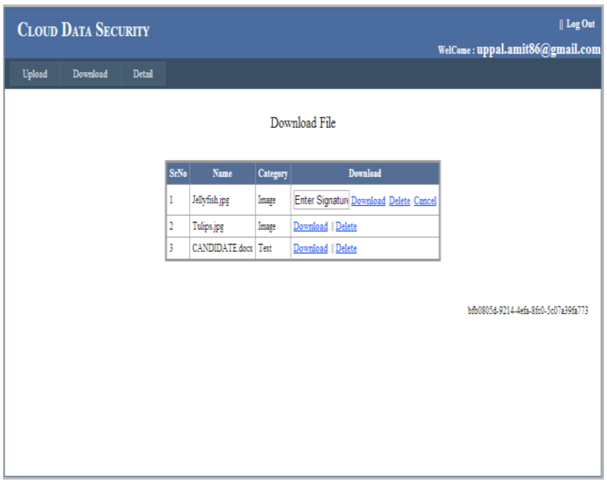
When user wants to download a file Signature is required And the Signature is accessed by user via mail.



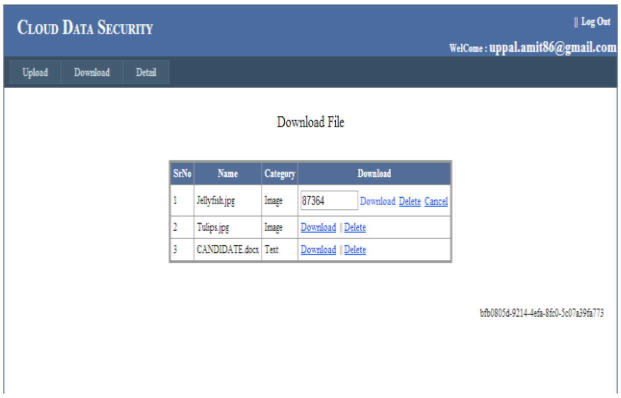
Download File

SrNo	Name	Category	Download
1	Jellyfish.jpg	Image	Enter Signatur Download Delete Cancel
2	Tulips.jpg	Image	Download | Delete
3	CANDIDATE.docx	Text	Download | Delete

bfb0805d-9214-4efa-8fc0-5c07a39fa773

Figure 6. Represents the Signature key

5. Figure 7. represent the downloading a file within Signature. An Employee enter the Signature and accessed the file.. When an Employee enter an Signature file is downloaded. Similarly second file is downloaded by using Signature.



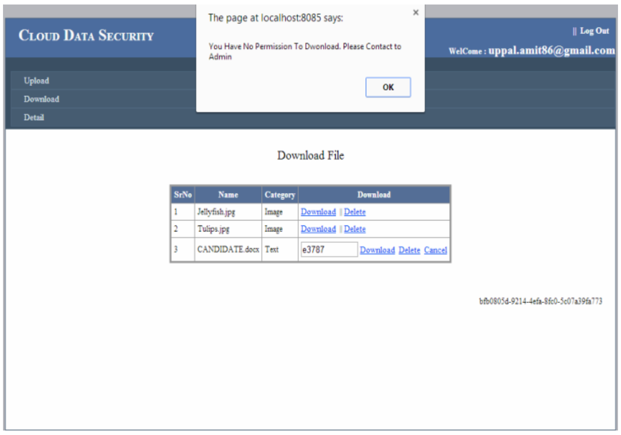
Download File

SrNo	Name	Category	Download
1	Jellyfish.jpg	Image	87364 Download Delete Cancel
2	Tulips.jpg	Image	Download | Delete
3	CANDIDATE.docx	Text	Download | Delete

bfb0805d-9214-4efa-8fc0-5c07a39fa773

Figure7. Downloading a file within Signature.

3. Figure 8.represents the downloading a page within No Permission To Download Message. Because an Employee have restricted only two files have downloaded. Because Employee is restricted by an admin. After accessing two files when Employee wants to download a third file a message is generated that Contact to admin.



The page at localhost:8085 says:

You Have No Permission To Dwonload. Please Contact to Admin

Download File

SrNo	Name	Category	Download
1	Jellyfish.jpg	Image	Download | Delete
2	Tulips.jpg	Image	Download | Delete
3	CANDIDATE.docx	Text	e3787 Download Delete Cancel

bfb0805d-9214-4efa-8fc0-5c07a39fa773

Figure 8. Represents the downloading files

within Restriction

6. Blowfish and RSA helps to encrypted the data which converts an Image into an Encrypted form of data. Below Fig.9. Represents the Encryption by using Blowfish Algorithm and RSA.

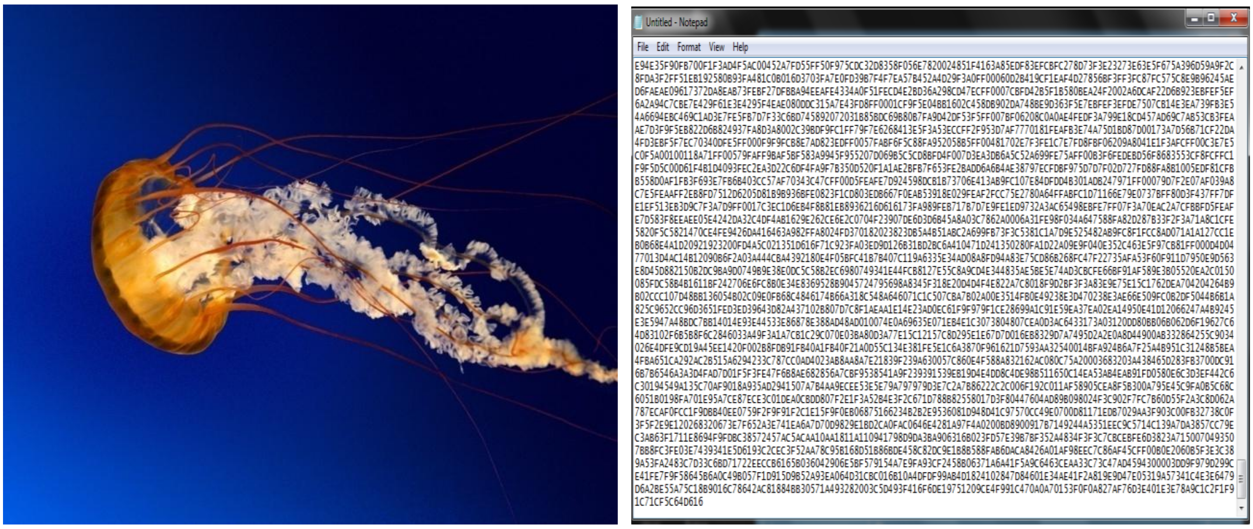


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Fig.9. Encryption by using Blowfish Algorithm and RSA

CONCLUSION AND FUTURE SCOPE

Cloud Computing is still a new and evolving paradigm where computing is regarded as on-demand service. Once the organization takes the decision to move to the cloud, it loses control over the data. Security of the Cloud relies on trusted computing and cryptography. Thus, in our proposed work, only the authorized user can access the data. Even if some intruder (unauthorized user) gets the data accidentally or intentionally if he captures the data also, he can't decrypt it and accessed it due to encryption techniques. With the help of RBAC we will restrict the system from unauthorized access. With the kind of (A combination of Blowfish Algorthim and RSA),it would be more secure to gets hacked. It also provides a better storage and security technique using Digital Signature over Cloud architecture.

In future My proposed work is very help full to increase the security on cloud in cloud computing As the Security need increases so, reliable authentication systems are required which can help to minimize the unauthorized access & helps for safeguarding of data .

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