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Deploying an Application on Cloud and Its Security

Ms. Neha A Puri, Mr. Ajay R Karare, Prof. R.C.Dharmik
Department of Information Technology, Nagpur University, Nagpur
Email: neha.puri100@gmail.com, raj_dharmik@yahoo.com
Department of CSE, Nagpur University, Nagpur
Email: ajju.karare@gmail.com

ABSTRACT:
Cloud Computing is a model of Storing the data transmitted accross the network. For all the Organization security of data is the serious concern in Cloud Computing. There are the number of services available in the Cloud Computing such as IaaS, PaaS, and SaaS. By using these services we can access the application and stored data from anywhere in,the World. We will secure the Data which is being transmitted by encrypting the data before the data is being actually stored on the cloud. For the purpose of data security we will be using ECC Algorithm in our project because of its advantages in terms of CPU Utilization, time for Encryption and Key Size. Our paper determines the technique for providing the Security in the Cloud Computing along with the Deployment of Application on Cloud.

Keywords **-** Elliptic Curve Cryptography, Encryption Algorithms, Types of services in Cloud Computing, Cloud Security, Encryption

I. INTRODUCTION

A cloud is a virtualized pool of resources where the resources are available continuously when and where required. It is a particular style of Computing where the resources are provided in the form of service across the Internet Connection. The Cloud Reliability and Security are the two greatest concerns because of large amount of data to be stored on the cloud. Analysis of data and Efficient Processing of data has become a Challenge which are relocated for different purposes. The core concept of Cloud Computing is to improve the data handling capability. All of this is available through a simple Internet connection. Processing Burden on the user's terminal will get reduced due to Cloud Computing. Through Cloud Computing clients can access standardized IT resources to deploy the application on the Cloud. As shown in Fig 1 cloud computing can be used from the computing devices to computers and Servers. Now a day's Cloud Computing is in great demand in various fields such as Scientific, Business, and Medical etc.

Also cloud is used very widely for college purpose in order to store the college data on the cloud [2] To secure the data systems use the combination of Techniques such as:

Fig 1: Cloud Storage

- Encryption- Is used to encode the Information so that no one will able to hack the data which is being transmitted.
- Authentication- Is one of the Security parameter creating user id and password Admin will used to approve the new candidate After the approval user will able to enter in the Application.
- Separation of duties- In which accessibility is provided to all the users according to the their priority[6]

Security of data which is being stored and data in transmit may be a concern when storing sensitive data at a cloud storage provider.

There are number of Security Algorithms available for protecting the sensitive data on the cloud ECC is one of the best Algorithm which is used to store the data to be transmitted between the Cloud. We offer several code examples in which implementation of three basic ECC operations are described: generating a key pair, making a key exchange, and creating a digital signature.

II. CLOUD COMPUTING SUB SERVICE MODEL

Services provided by cloud computing can be split into three major parts:

A. Software as a Service (SaaS): The customer will access this service via the Internet. SaaS is based on a multi tenant model where many customers uses the same program code but will uses different space for storing the data in the Cloud.

B. Platform as a Service (PaaS): Platform as a Service (PaaS) cloud systems provide the environment for the Execution of the application. The environment is integrated with a programming-language-level platform, which users can be used to develop and build applications for the platform [1]. This service provides platform for deploying the Application on the Cloud. Deployment of Application such as Design, implementation etc included in this service there is a provision of resources required to build applications and services to a customer.

***C. Infrastructure as a Service (IaaS*)**: Computer Infrastructure is being offered by this service. It delivers a platform virtualization Environment as a service rather than purchasing server, software, data centres.

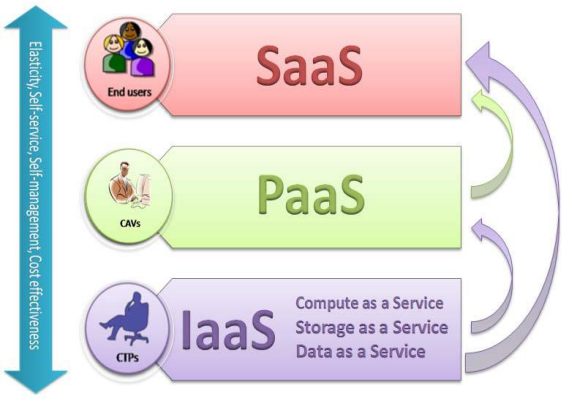

Fig 2: Service Model

III. DEPLOYMENT OF APPLICATION ON CLOUD

This paper will satisfied with two security parameters such as Authentication and Separation of Duties. Authentication is used to provide the identity of the particular user which requires creating the user id and password. In the Application which is being created provides with two users which gets the accessibility one is Admin and other is General User. Admin will be able to add., delete, modify and will be able to view the Data whereas General User will be able to only view the Data inorder to deploy the Application on the Cloud and will have to follow certain steps for
the deployment of Application on the Cloud:

- First will have to Create the Environment and select the tools that we required
  - o Apache Tomcat 7.0.39
  - o Java 7.0
  - o MySQL 5.5.32
- Create the WAR file of the Project.
- Upload a WAR file of project on the cloud.
- Deploy the WAR file on the cloud.

IV. SECURITY ISSUES

A. Security issues in Cloud Computing:

There are many Security Issues in cloud computing that are faced much at the time of Encryption and data transmission Major Security issues are by cloud providers to ensure authentication ,Integrity etc some of the Issues are discussed below:

- Intrusion Detection and Prevention: Data that is
- being entered and going out of the Network has to Know.
- Separation of Duties: As complexity increases in the system miconfiguration takes place ,because of insufficient Communication between the expertises.
- Encryption: Original message is encrypted in such a way that third party will not able to read or hack the data [3]
- Configuration and change control: These are the
- important parameters mostly found in small organizations. It needs to be maintained at virtual and physical world.
- Location of Data: Different Organizations are
- their having their different requirements and control Placed on access. The level of security required by the customers to fulfil their needs is provided by the Cloud
- Providers.
- Service Level agreement (SLA): SLA serves as a
- sell service between cloud provider and the customer. Access to Data: Anyone using cloud need to look at who is managing their data and what type of Controls is applies to these individuals [2].

V. DATA PROTECTION IN CLOUD

Different types of clouds are present in order to store the data such as private cloud, public cloud, community cloud etc. Depending on the type of Cloud to be used the cloud provider will decide about the Infrastructure, Security and Operating System. There are various security Algorithms that are present which will protect the data in Cloud from the Attackers by encrypting the data before the Actual Transmission. The Information which is being

transmitted in the network from one Cloud to another can be hacked by the third party which leads to loss of Security in order to, maintain the Security will have one best solution i.e. Cryptography which is used for protecting the Data. There are two methods of Cryptography:

A. Secret key Cryptography: A Key which uses for both Encryption and Decryption is called as secret key cryptography. IDEAS, DES, 3DES, AES, Blowfish are the Secret Key Cryptography Algorithms.

B. Public key Cryptography: Different keys are used for Encryption and Decryption then this key is called Public key Cryptography. RSA, Digital Signature and Message Digest are the Public key Cryptography Algorithms.

VI. EXISTING TECHNOLOGY

RSA Algorithm is a public key encryption Algorithm which is widely used to encrypt the message as well as Digital Signature. No exchange of Secret keys will takes place in RSA Algorithm. A can select the encrypted message to B without exchanging the secret key. A uses the public key of B to encrypt the message and B will decrypt the message by using the private key. In RSA Algorithm user A picks up two prime umbers say p and q by using these numbers computation will takes place which results in their product as n=p*q. Now A's public key is the pair of integers {n,e} and
private key is d.
Following are the steps which takes place in RSA Algorithm for the generation of private and public key.
Choose large prime number p & q such that p~=q
Compute n=p*q
Compute $(p,q)=(p-1)*(q-1)
Choose the public key e such that
gcd ($(n) ,e)=1 ;1<e<$(n)
Select the private key d such that d*e(mod$(n)=1)
In RSA Algorithm Encryption and Decryption are performed by using the formulae as follows:
Encryption
Calculate Cipher text C from Plaintext message M such that
C=M^ e mod n
Decryption
M=C^ d mod n=M ^ ed mod n
RSA Algorithm will have the larger key size than the ECC Algorithm but even though they both will provide the same level of Security and also ECC will have better performance.

VII. ELLIPTIC CURVE CRYPTOGRAPHY

Elliptic curve Cryptography is one of the most secure and efficient Algorithm. This Algorithm is used for key exchange for sharing the public key certificates with end users. ECC is a public key cryptography Algorithm in which every participant will have pair of keys such as private key and
public key. Public key is used for Encryption/Signature verification and Private Key is used for decryption/Signature generation. Elliptic Curves are always cubic and group operator is one of the most important operators for ECC. Group Operator is typically denoted by the symbol
_+' even when the operation itself has nothing whatsoever to do with the ordinary arithmetic addition. An Elliptic curve standard form is given by:

$y2 = x3 + ax + b$ for some fixed values for the parameters a and b.
This equation is also referred to as Weiestrass Equation. The security of ECC Algorithm depends on its ability to compute a new point on the curve given the product points and Encrypt this point as information to be exchanged between the end users. Field is also an important part for the implementing an ECC Algorithm. An elliptic curve over a field K is a non singular cubic curve in two variables f(x,y)=0 with a rational point.

VII. NECESSARY CONDITIONS FOR ENCRYPTION IN ELLIPTIC CURVE

1) Discriminant of a Polynomial is the product of the squares of the differences of the polynomial roots.
2) The Discriminant must not become zero
3) It is not safe to use singular curves for
4) Elliptic Curve in their standard form will be Symmetric

VIII. PROPOSED PROCEDURE FOR DATA SECURITY IN CLOUD

Let us assume we have two Organizations say A and B in which A wants to send the Data to Cloud B and the data which is being transferred should be authenticated. Here the data is being encrypted using ECC will send from A to B. Suppose B wants a document from A's Cloud then B used to send the request to cloud A. A will select the document and then by applying the hash function a Message Digest is created. Message Digest will gets signed with A's private key which is called Digital Signature. The Encrypted Cipher text will send to B. B will decrypt the message with his private key and verify the signature using A's public key.

IX. PROPOSED SYSTEM: ECC ALGORITHM

For the implementation of ECC Algorithm we consider mainly three Security parameters such as Authentication, Separation of Duties and Encryption for Secure data transmission from one cloud to other clouds that requires Authenticated data with Elliptic

Curve Cryptography. In order to satisfy the above three security parameters will have to satisfy the following steps.

A. Key Agreement

Both clouds i.e. Cloud A and Cloud B will agree for the data which is being transmitted

1) The Elliptic Curve Equation
- Values of a and b
- Prime, p

2) By using the group operator Elliptic group is being computed from the equation of Elliptic Curve

3) Base Point is taken from the Elliptic Group.

The Agreement between the two parties will takes place only when both the keys are same.

1) A will select an integer XA = k1as his/her private key. The public key for A will be YA = XA × P, that is, a k1-fold application of the group operator to the point P, implying that while the private key is an ordinary integer, the public key is a point like P.

2) B does exactly the same thing: it selects an integer XB = K2 as his/her private key, with the public key for B being YB =XB ×P. The two parties exchange their public keys.

3) Subsequently, A computes the session key by

KA = XA×YB = k1×k2×P

4) B computes the session key by

KB = XB×YA = K2×k1×P.

Obviously, KA = KB.

This proves the Agreement for exchanging the Data between two parties and the generation of public and private key.

B. Key Generation

Key generation is an important part where an Algorithm generates both the public key and private key. Here Sender A will encrypt the message with B's Public key and B will decrypt its private key.

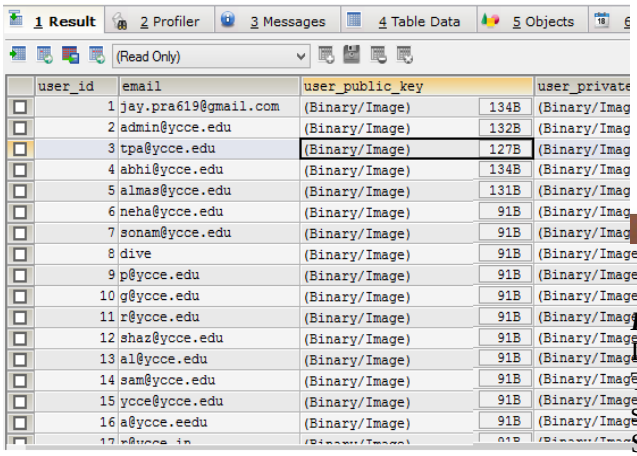

Fig 3: Key Generation

C. Encryption

Let m be the message that has been sent by the sender A to B. Sender A will encode the message and the data is travelled between the two parties and in between the way only the data is being encrypted. For the Encryption some nano seconds will be required to encrypt the data.

1) A takes a plaintext message M and encode it on point P from Elliptic Group by applying Group Operator _+'.

2) The Ciphertext is Pair of Points

C=[KB ,(P+KPB)]

3) Send Ciphertext to Cloud B

D. Decryption

In order to get the Original Message B will decrypt the message m by using his private key.

X. RESULTS

A. User Login

This is the Login Page of the Application where the user has to enter his User ID and Password. The user have to enter an accurate user Id and Password If the user is new then he will has to follow the Registration process After registration his all details will be Stored in the Database .New user will be able to logged in only after the Verification. If the User is Authenticated then only he will be allowed to enter in the System.

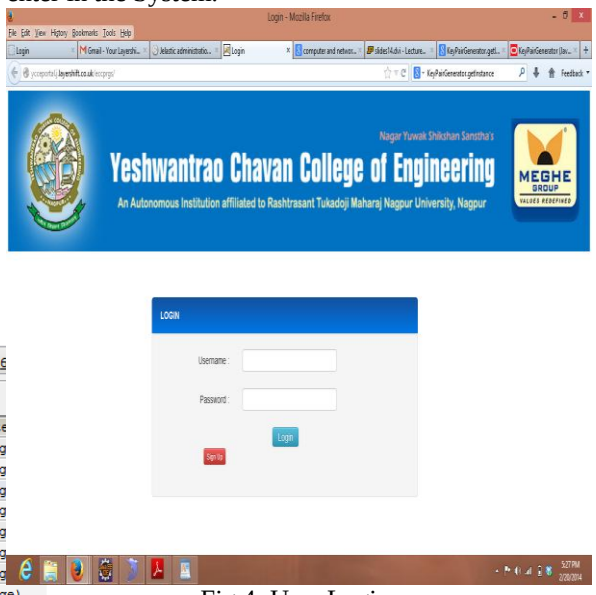

Fig.4: User Login

B. Digital Signature Generation

Digital Signature is used to maintain the Integrity. The data is being encrypted by using the digital Signature which uses the hash Algorithm called as SHA 1.

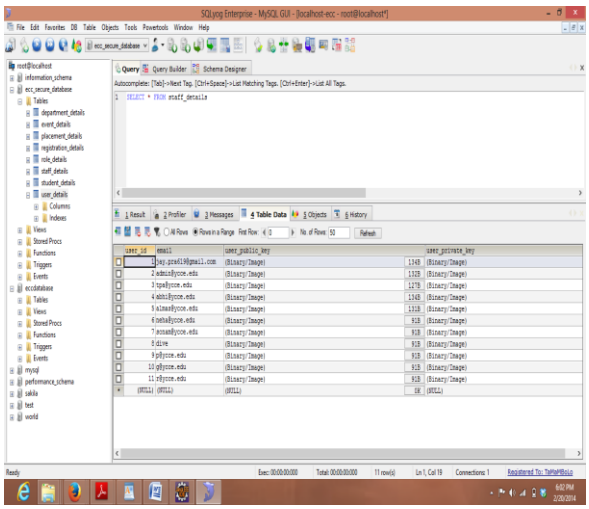

FIG 5:DIGITAL SIGNATURE GENERATION

Digital Signature which is being generated will gets verified if third person will used to modify the data then we will came to know about the modification with the help of messages violated and verified.

Fig 6: Digital Signature Verification

C. *Key Generation*

It generates a key pair. Additionally, it displays on the screen the content of the public and private keys

The key generation time was not the same even though the key length is same. Smaller key size will takes the less time for generation of key.

D. Key Agreement

When both i.e. the Sender and the Receiver will agree at a particular point for the transfer of data then only the data will gets transmitted.

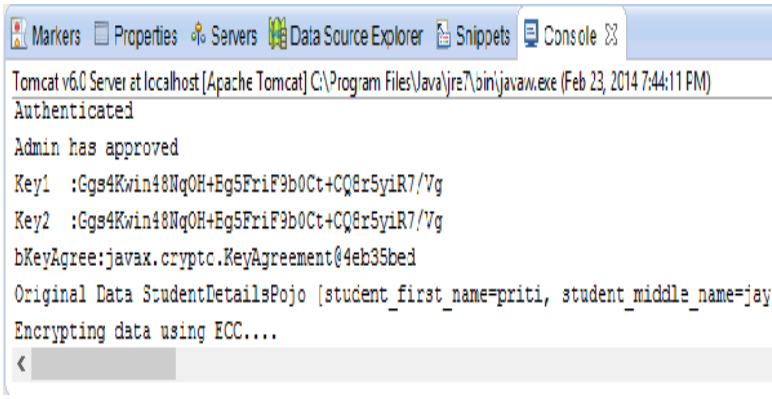

Fig 7:Key Agreement

E. Encryption and Decryption

After the Agreement Sender will sends the encrypted data to the Receiver and the encryption will takes place during the transmission of data so that the data which is send by the sender will as it is transmitted to the receiver i.e. receiver will receive the original data.

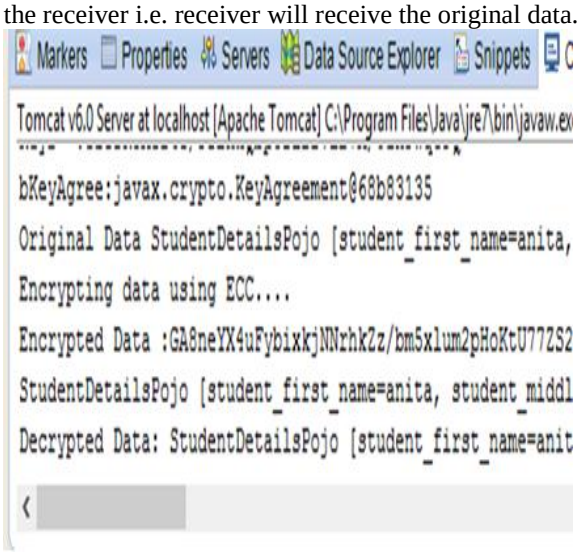

Fig 8: Encryption and Decryption

The Execution time for the Encryption of different Algorithms is compared. The speed of ECC Algorithm is twice times to the speed of DES and RSA Algorithm

XI. CONCLUSION

Now a day's Cloud Computing facing security Challenges. User put their data in the cloud and data is being transferred from one Cloud to another and users are concerned about the security. We concern higher security of Data and therefore we proposed an Encryption Algorithm i.e. ECC which takes least time to encrypt the Data than others and will ensures about the faster retrieval of Data. Security related parameters such as Encryption, Authentication and Access Control, Separation of Duties for the security has been satisfied in this Algorithm in order to achieve the Security. The presented simulation results showed that ECC has a

better performance and more secure than other Encryption Algorithms. Future work is to newly propose a more secured system in which if the users access data without permission must be blocked from entire network. A Proxy Re-encryption scheme and also the parameters of higher bits which satisfy the ECC Algorithm has been taken into consideration for providing higher security of data.

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