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Identity Based Encryption Transformation for Flexible Sharing of the Encrypted Data in Public Cloud

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Abstract

Cloud computing and study of Cloud Environment is penetrating into the market day to day, which is playing a key role for many enterprise level applications providing highly available, scalable, reliable and low latency services to the end users across a pervasive computing environment. Cloud in simple words, virtual computing providing Container Management services and Other services PAAS (Platform as a Service), IAAS (Infrastructure as a Service), SAAS (Software as a Service) which enables data owners to maintain data at a centralized server. This report discusses the idea behind a textile industry migrating themselves and its resources like applications, databases, customer portals and e-commerce modules to the cloud computing systems and various advantages and disadvantages a data owner usually encrypts his data in such a way that certain designated data users can decrypt the data. This raises a serious problem when the encrypted data needs to be shared to more people beyond those initially designated by the data owner. To address this problem, we introduce and

Keywords: Cloud Infrastructure, AWS: Amazon Web Services, Elastic Beanstalk, IAM

Cloud based Terminology:

1. AWS: Amazon Web Services
2. IAM: Identity and Access Management
3. S3: Simple Storage Services
4. VPC: Virtual Private Cloud
5. EC2: Elastic Cloud Compute
6. RT: Routing Tables
7. DoS: Denial of Services
8. IAM: identity and Access Management

Critical appraisal of advantages and drawbacks of Cloud environment

Cloud computing is the way of providing on-demand availability of services and data belonging to an organization and it's the most easiest way of handling data owners and users. Nowadays every organization is looking towards cloud and migrating the business needs to cloud environment in which moving to digitalization of all the business needs which integrates migration of data, IT processes and Applications. Cloud

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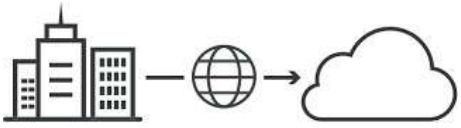
migration is really challenging and it is very important to an organization in listing out the merits and demerits of migration steps also includes lots of preparation and advanced work including moving from on- premises and legacy infrastructure to cloud based servers and infrastructure. Cloud- based infrastructures raise hands in business growth scaling.

In the United Kingdom several textile industries play a vital role in employment and growth of UK GDP, many industries and staff, co-workers are dependent on these industries. Textile industry is involved in manufacturing of fabrics and yarns. These industries are adopting most advanced technologies in order to produce high quality products and it is adding more than 13.71 billion USD to the country's economy. By migrating the textile industries into the cloud architectures it will surely drive the country into the global textile market with a higher force and more competitive advantage to the industries and government.

Critical appraisal listed in migrating the textile industries to the cloud computing environment:

Automatic System: In general textile based industries deal with a wide variety of fabrics, machinery, infrastructure, variety of patterns of materials, stock, employees, suppliers and customer information which requires automation of maintaining the data in centralized and well organized methods. By automatic system textile industries will be benefited in a vast number of ways in getting access to the data into the web and mobile based applications.

Security: Cloud offers enormous security to the data which avoids disaster loss, protects data from unauthorized access with MFA



(Multi Factor authentication) modules provided by the cloud infrastructure. Cloud internally provides security futures like encryption and decryption methodologies for required modules avoids Dos (Denial of services) and other spoofing mechanisms by global hackers.Pay As You Go: Usually cloud enables users to pay for the use, this provides lots of infrastructure and investment saving through

paying for the resources utilized during a period of time.

Availability: Cloud datasets or located in highly configured cloud server based storage services in which a user gains access to the data anywhere and anytime without any latency provided highly available, most cost effective solutions to the end users.

Resource Pooling: Textile industries require visibility to the customers. Cloud migration helps in pulling out the most advanced computer resources and services to multiple customers at a single instance with an in- built thread model. Cloud services can be integrated easily on demand based on the requirement of the customers.

Role Based Access: In general every organization integrates different departments and are interdependent on each other. Cloud computing provides services like creating various user groups, roles, responsibilities which is highly essential in textile industries. Through IAM (identity and access management) a role based access control mechanism is provided to the users, such that only authorized users are permitted to make changes, setting passwords, editing and other CRUD (Create, Read, Update and Delete) operations over the data.

Low Maintenance Cost: During this decade cloud maintenance has wide proof of evidence in low cost maintenance compared with traditional on premises IT infrastructure and avoid failures and reinvestment during the expansions and highly applicable for enterprises which are global distributed in terms of marketing and customers. Cloud computing environment is providing unlimited storage capacity in extending and compressing the storage capacities as per the business needs.

Figure(1): Flow Control of Cloud migration

Resource(cloudflare.com) Figure(1) Describes the flow of on premises infrastructure, resources are shifted or migrated to cloud provided highly available, cost effective and scalable infrastructure.

Migration helps in enhancing the services and distributing the data to customers and clients situated globally.

Cloud computing has enormous list of benefits to the Data Owners or customers, Host or CSP (Cloud service Providers)

Drawbacks of Cloud environment:

ISP Dependency : even though the cloud servers and cloud environment is providing enormous support and services to the end users finally it depends on the end users internet bandwidth and connectivity. Considering some textile industries located in rural areas need to spend more on connectivity and service providers have to invest more on the leased line to get low latency services from the cloud servers.

Other issues identified due connectivity issues are:

Speed variations at frequent time intervals. Security issues depending on the weak network connectivity

Lack of support from the cloud service providers reflects in time lagging to troubleshoot the problems that arise during the time of maintenance.

Cost Variations: Always scalable infrastructure and environment never fixes a price and expenditures some time it might make enterprises to invest more on cloud compared to the profit margins it is a huge loss to the moderate industries with limited number of employees and limited clients.

Incompatible Infrastructure: In majority of the cases many cloud servers have compatibility issues in integrating with existing infrastructure of the end user and most of the enterprise administrators are having lack of knowledge on CSP and service level agreements provided by the CSP.

Software Licensing and Pricing : Cloud migration always a continuous expenditure to the high level business organization and price and licensing always needed upgrades and agreement required frequent reviews and modification which is a major drawback of cloud based migrations.

Critical appraisal of opportunities:

Cloud based appraisal are many and importance of cloud computing and migration along with IT or Digital Transformation which implicitly helps in competitive advantage. Whenever an organization has decided to migrate to the cloud definitely it will be a right decision because the cloud has well proved that certain industries are profited after shifting their resources. On the other hand cloud resources are available to all levels of business needs.

Intelligent Workspace: Cloud is providing the most creative and advanced intelligent and intellectual workspace which will boost the capacities of the team management and guarantees the security and seamless easy collaboration across distributed branches and locations. Intelligent workspace improves the effective flow of data from top to the bottom levels and departments.

Intelligent Networking: Textile industry needs to drive business agility at most frequent intervals. Cloud migration avoids the complexities based on the prior experiences, cloud provides a flexible and simple network environment that helps in automation of business needs through high bandwidth and available network connectivity solutions. This environment is secure by its design, well managed, most efficiently supporting the high demanded software modules and architectures.

Cybersecurity: most challenging for distributed applications in protecting their resources from misuse. Cloud migration helps the organization avoid high risk of security cyber threats which can protect the entire system and resources without any additional charges. Advanced and Greater Security is provided through exceptional hardware and integrated and unexposed data encryption capabilities.

Hybrid Capabilities: High end capabilities helps the organizers to migrate in running hybrid applications across existing on premise and cloud based services.

Faster Access and Processing Power: if the processing power is high and the communication is provided with low latency. It is highly beneficial to the organization in faster and flexible access to the resources and

helpful in meeting more number of customers and end users within less time.

Every cloud infrastructure and services providers have a wide scope in expanding their business to every edge of the globe. For eg: AWS amazon web services has a global distribution and it has spread across

193 countries and more 12 geo-graphic regions and 37 availability zones globally.

Critical appraisal of challenges: Cloud undergoes so many challenges in promotion of end users from on-premise infrastructure to cloud services providers:

Trust Management: Cloud and data Owners of the organization are having proper service level agreements and integrated policies which are widely useful for enhancing trust management during the migration to cloud. Trust is the primaryconcern of every individual in deploying the applications at remote servers and disclosing the confidential data of organization, business secrets, models and other legal evidence of the organization through clouds. Cloud is providing various types of categories in trust management depending on the type of security required and these clouds are classified as private, public and community or an organization based clouds and distributed globally.

Service Level Agreements: it is the agreement of understanding between the CSP and end user or client. These agreements are standardized during the initiation stage of cloud migration and list out the services from CSP and negotiated between the clients.

These SLA's are classified into different levels

Customer and End User based SLA Service based SLAAdvanced Security and Multi Level SLA

Cross Organizational Security

Management: interoperability is the primary advantage of cloud migration in which proper communication can be established between various departments of an organization. Security based data

downloading, transmission and backup management and recovery of data at every level of the applications is possible.

Risk Analysis and Management:

Risk analysis is a process that helps you identify and manage potential problems that could identify in the major initiative or project. To conduct a risk assessment, you must first identify the potential threats you are facing and then evaluate the potential risks.

Analyzing risks can be difficult, as they need to be based on detailed information such as project plans, financial data, security measures, trading forecasts and related information. However, it is an essential preparation tool that can save time, money and reputation.

Figure(2): Cloud based risk analysis across an enterprise

Source:kpmg.ca

Explanation and justification of derivation of criteria for the comparison

Cloud is the new frontier for software and infrastructure management and software deployment, and it quickly reaches the traditional home system as a reliable,

scalable, and efficient IT solution. However, many companies that have built their own powerful data centers and traditional computer infrastructure still rely heavily on this model for security and management reasons.

Figure(3): A comparative analysis of Cloud Users vs Non Cloud Users

Conclusion

In this paper we studied how to securely and efficiently transform encrypted data in clouds. To address this issue, we proposedan identity-based encryption transformation (IBET) model, which connects the well- studied IBE and IBBE systems. IBET allows data owners to secure outsourced data with identity-based access control, which eliminates complicated cryptographic certificates for all users. Moreover, IBET provides a transformation mechanism for data owners to authorize cloud service provider (CSP) to transform a file in IBE- ciphertext formant into a file in IBBE-ciphertext format, so that a set of authorized users can access the underlying data. We proposed a concrete IBET scheme that is secure against powerful attacks. Thorough experimental analyses demonstrate the efficiency and practicability of the scheme.

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