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CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.
1.	ISSUES AND SUGGESTIONS FOR THE IMPLEMENTATION OF THE INDIA'S RIGHT TO INFORMATION ACT 2005 IN LIGHT OF THE LATIN AMERICAN COUNTRIES' EXPERIENCE <i>DR. PRATIBHA J.MISHRA</i>	1
2.	AN EMPIRICAL STUDY ON JOB STRESS IN PRIVATE SECTOR BANKS OF UTTARAKHAND REGION <i>MEERA SHARMA & LT. COL. DR. R. L. RAINA</i>	7
3.	FOREIGN DIRECT INVESTMENT IN INDIA: AN OVERVIEW <i>DR. MOHAMMAD SAIF AHMAD</i>	14
4.	REFLECTIONS ON VILLAGE PEOPLE'S SOCIO - ECONOMIC CONDITIONS BEFORE AND AFTER NREGS: A DETAILED STUDY OF ARIYALUR DISTRICT, TAMIL NADU <i>DR. P. ILANGO & G. SUNDHARAMOORTHY</i>	19
5.	THE CAUSAL EFFECTS OF EDUCATION ON TECHNOLOGY IMPLEMENTATION – EVIDENCE FROM INDIAN IT INDUSTRY <i>S.M.LALITHA & DR. A. SATYA NANDINI</i>	25
6.	A STUDY ON ONLINE SHOPPING BEHAVIOUR OF TEACHERS WORKING IN SELF-FINANCING COLLEGES IN NAMAKKAL DISTRICT WITH SPECIAL REFERENCE TO K.S.R COLLEGE OF ARTS AND SCIENCE, TIRUCHENGODE, NAMAKKAL DISTRICT <i>SARAVANAN. R., YOGANANDAN. G. & RUBY. N</i>	31
7.	AN OVERVIEW OF RESEARCH IN COMMERCE AND MANAGEMENT IN SHIVAJI UNIVERSITY <i>DR. GURUNATH J. FAGARE & DR. PRAVEEN CHOUGALE</i>	38
8.	VARIABLE SELECTION IN REGRESSION MODELS <i>M.SUDARSANA RAO, M.SUNITHA & M.VENKATARAMANAHI</i>	46
9.	CUSTOMER ATTITUDE TOWARDS SERVICES AND AMENITIES PROVIDED BY STAR HOTELS: A STUDY WITH REFERENCE TO MADURAI CITY <i>DR. JACQUELINE GIGI VIJAYAKUMAR</i>	50
10.	QUALITY AND SUSTAINABILITY OF JOINT LIABILITY GROUPS AND MICROFINANCE INSTITUTIONS: A CASE STUDY OF CASHPOR MICROCREDIT SERVICES <i>DR. MANESH CHOUBEY</i>	56
11.	INDIAN MUTUAL FUND MARKET: AN OVERVIEW <i>JITENDRA KUMAR & DR. ANINDITA ADHIKARY</i>	63
12.	SMART APPROACHES FOR PROVIDING THE SPD'S (SECURITY, PRIVACY & DATA INTEGRITY) SERVICE IN CLOUD COMPUTING <i>M.SRINIVASAN & J.SUJATHA</i>	67
13.	A COMPARATIVE STUDY ON ETHICAL DECISION-MAKING OF PURCHASING PROFESSIONALS IN TAIWAN AND CHINA <i>YI-HUI HO</i>	70
14.	THE INTERNAL AUDIT FUNCTION EFFECTIVENESS IN THE JORDANIAN INDUSTRIAL SECTOR <i>DR. YUSUF ALI KHALAF AL-HROOT</i>	75
15.	STUDY ON ROLE OF EFFECTIVE LEADERSHIP ON SELLING VARIOUS INSURANCE POLICIES OF ICICI PRUDENTIAL: A CASE STUDY OF SUBHASH MARG BRANCH, DARYAGANJ <i>SUBHRANSU SEKHAR JENA</i>	80
16.	AN EMPIRICAL STUDY ON WEAK-FORM OF MARKET EFFICIENCY OF NATIONAL STOCK EXCHANGE <i>DR. VIJAY GONDALIYA</i>	89
17.	THE GOLDEN ROUTE TO LIQUIDITY: A PERFORMANCE ANALYSIS OF GOLD LOAN COMPANIES <i>DR. NIBEDITA ROY</i>	94
18.	STUDY ON THE MANAGEMENT OF CURRENT LIABILITIES OF NEPA LIMITED <i>DR. ADARSH ARORA</i>	99
19.	QUALITY OF MEDICAL SERVICES: A COMPARATIVE STUDY OF PRIVATE AND GOVERNMENT HOSPITALS IN SANGLI DISTRICT <i>SACHIN H.LAD</i>	105
20.	DIVIDEND POLICY AND BANK PERFORMANCE: THE CASE OF ETHIOPIAN PRIVATE COMMERCIAL BANKS <i>NEBYU ADAMU ABEBE & TILAHUN AEMIRO TEHULU</i>	109
21.	CUSTOMER KNOWLEDGE: A TOOL FOR THE GROWTH OF E-LEARNING INDUSTRY <i>DR. MERAJ NAEM, MOHD TARIQUE KHAN & ZEEBA KAMIL</i>	115
22.	THE EFFECTS OF ORGANIZED RETAIL SECTOR ON CONSUMER SATISFACTION: A CASE STUDY IN MYSORE CITY <i>ASHWINI.K.J & DR. NAVITHA THIMMAIAH</i>	122
23.	PERCEIVED BENEFITS AND RISKS OF ELECTRONIC DIVIDEND AS A PAYMENT MEDIUM IN THE NIGERIA COMMERCIAL BANKS <i>OLADEJO, MORUF. O & FASINA, H T</i>	127
24.	INDO - CANADIAN TRADE RELATION IN THE MATH OF POST REFORM PERIOD <i>ANITHA C.V & DR. NAVITHA THIMMAIAH</i>	133
25.	IMPACT OF BOARD STRUCTURE ON CORPORATE FINANCIAL PERFORMANCE <i>AKINYOMI OLADELE JOHN</i>	140
26.	WORK LIFE BALANCE: A SOURCE OF JOB SATISFACTION: A STUDY ON THE VIEW OF WOMEN EMPLOYEES IN INFORMATION TECHNOLOGY (IT) SECTOR <i>NIRMALA.N</i>	145
27.	SCHOOL LEADERSHIP DEVELOPMENT PRACTICES: FOCUS ON SECONDARY SCHOOL PRINCIPALS IN EAST SHOWA, ETHIOPIA <i>FEKADU CHERINET ABIE</i>	148
28.	EMOTIONAL INTELLIGENCE OF THE MANAGERS IN THE BANKING SECTOR IN SRI LANKA <i>U.W.M.R. SAMPATH KAPPAGODA</i>	153
29.	IMPACT OF CORPORATE SOCIAL RESPONSIBILITY PRACTICES ON MEDIUM SCALE ENTERPRISES <i>RAJESH MEENA</i>	157
30.	IMPACT OF CASHLITE POLICY ON ECONOMIC ACTIVITIES IN NIGERIAN ECONOMY: AN EMPIRICAL ANALYSIS <i>DR. A. P. OLANNYE & A.O ODITA</i>	162
	REQUEST FOR FEEDBACK	168

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SMART APPROACHES FOR PROVIDING THE SPD'S (SECURITY, PRIVACY & DATA INTEGRITY) SERVICE IN CLOUD COMPUTING

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ABSTRACT

Cloud computing is the use of computing resources which are available in a remote location and accessible over a network (Internet). Data Storage is an emerging technology and facing an important issue that is (SPD's) Security, Privacy & Data Integrity services. Our paper discusses the model based on MAS (Multi Agent Systems) architecture of cloud and data encoding mechanism to enhance the integrity of Data Storage. Multi-agent systems can be used to solve problems that are difficult or impossible for an individual agent or a monolithic system to solve. Cloud computing with its acceptance also has some growing needs which affect the complete working of cloud, and one of those needs is the need for "security". Cloud at present is lacking in its security needs in terms of data integrity, authorization and confidentiality. In this paper describe both data storage and providing the (SPD's) Security, Privacy & Data Integrity services in cloud computing.

KEYWORDS

Cloud Computing, Data Storage, Security, Privacy, Data Integrity.

1. INTRODUCTION

1.1 CLOUD DATA STORAGE

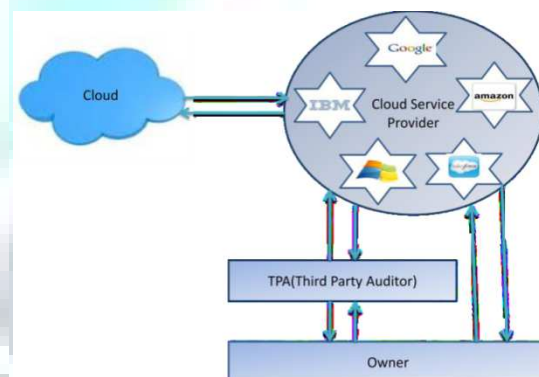
Data Storage as the name suggests are the "house for data" purpose for Data Storage, management, analysis and dissemination. Data Storage may exist in physical environment or virtually and can be organized as a public data center for large scale usage or a private data center specific to an organization. Data Storage today are one of the main needs for the increasing information technology services and have an important role in cloud computing. The end-users provide their data to cloud to access it whenever required on the rental basis, therefore, the data provided is stored at Data Storage of cloud known as cloud Data Storage.

Data Storage are present at different locations and store the complete data present on cloud. Data Storage is also one of the rising trends in IT field and suffers from the issue of security within it. Even though there are many security issues related to Data Storage but one of the most important issue is integrity of the data. The best examples of cloud storages are Amazon S3, Google Cloud Storage, iCloud by Apple, Google App Engine Blobstore, Windows Azure Storage, and Files Anywhere.

FIG 1. THE CHARACTERISTICS OF CLOUD COMPUTING



FIG 2. ARCHITECTURE OF CLOUD DATA STORAGE



Cloud Storage does not have any specific or exact definition but it can be said as the mechanism of storing the end-user or client data in the remotely located cloud servers. Though Databases, Data warehouses and other traditional storage mechanisms provide high quality Data Storage but still cloud Data Storage are preferred over them as:

1. The hosting providers or the companies don't need to install the storage devices physically in their datacenters.
2. Storage management is the complete responsibility of the service provider and the hosting provider's company's focuses completely in their core business. Companies only need to pay for the storages they use and not the complete setup is to be established avoiding the complexities of Data Storages.
3. The end-user doesn't need to keep back up but only store their data at service provider who looks after it completely.

Some of the important characteristics that a Cloud Data Storage must possess are:

- i) Manageability: Cloud Data Storage basically focuses on the maintenance of the large data which can't be stored on the end-user or clients system. This data stored in cloud storages are to be maintained and managed and for this reason cloud storages need to be self-managing to a large extent, so that reducing the maintenance trouble of data by the client.
- ii) Availability: Since the data being stored in cloud storage is very frequently accessed, therefore, there must be the proper availability of data always and no data corruption must occur as it is the back up of the complete information and data of client.

iii) Performance: Since Cloud storages are used for cloud which are being used with internet because internet uses TCP for controlling the flow of data packets but TCP works for small size of data and is not suitable if the data size becomes larger, in such conditions cloud storages are used which provide large Data Storage and flow of data easily.

1.2 DATA INTEGRITY AND INTEGRITY OF CLOUD DATA STORAGES

“Data Integrity” as the word in itself explains the completeness or wholeness of the data which is the basic requirement of the information technology. As Data Integrity is an essential in databases similarly integrity of Data Storage is an essential in the cloud, it is a major factor that affects on the performance of the cloud. The data integrity provides the validity of the data, assuring the consistency or regularity of the data. It is the complete mechanism of writing of the data in a reliable manner to the persistent Data Storage which can be retrieved in the same format without any changes later. As described above, in cloud, the complete storage of data provided by the end-user is done at the Data Storage and the security and integrity of the data lies on the vendor storing data in the Data Storage but not the cloud hosts. Cloud Storage is gaining popularity for the outsourcing of day-to-day management of data.

Therefore integrity monitoring of data in cloud storages is as essential for any data center, to avoid any data corruption or data crash. Data corruption or data failure can occur at any storage level. One of the most famous data failure occurred in Amazon in leading loss of complete client data stored in it. Therefore just storing data at cloud Data Storage does not ensure the integrity of data, but some mechanisms are to be implemented at each storage level to ensure the data integrity. Data Integrity is most important of all the security issues in cloud Data Storage because it not only ensures completeness of data but also ensures that the data is correct, accessible, consistent and of high quality.

2. PROPOSED METHODOLOGY (MAS ARCHITECTURE “CLOUD ZONE” AND ENCODED MAS ARCHIE)

As discussed above the integrity within cloud storage can be of two things, that is, integrity of data being transmitted from date storage and integrity of data storage.

FIG 3. MAS ARCHITECTURE “CLOUD ZONE”

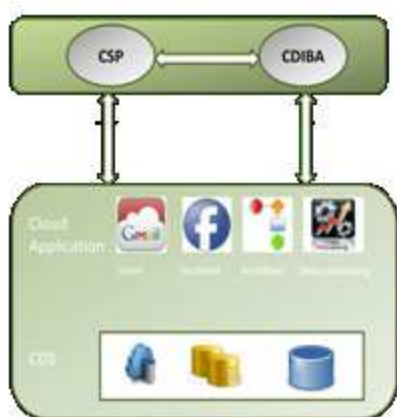


FIG 4. ENCODED MAS ARCHITECTURE



The mechanism for providing both type of integrity are present, and mechanism for providing integration together are also present but here we are discussing the most two commonly used methodology for integration assurance and then will introduce our model combining these two mechanisms to provide both kind of integrity together at the same time. Multi Agent System (MAS) Architecture for data storage Integrity: MAS architecture is a mechanism being developed from the concept of Multi Agent system (MAS) in artificial intelligence defined as “loosely-coupled network of entities that work together to find solutions for the problems which are beyond the knowledge of single entity”.

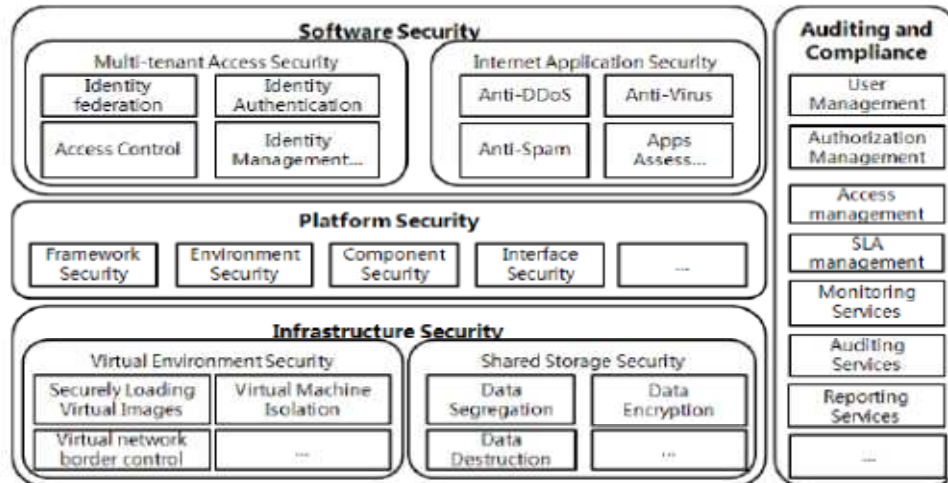
It is implemented on basic cloud architecture and consists of two main layers as cloud resource layer (cloud server side) and MAS architecture layer (cloud client-side). At cloud resource layer as the name suggest consists of all the resources of cloud like storage servers and application servers which provide a platform or power to data storage. MAS Architecture layer known as cloud zone consists of 5 agents but most widely used agents for integrity are Cloud Service Provider Agent (CSPA) and Cloud Data Integrity Backup Agent. To provide integrity of data storage the MAS architecture implies some of the security policies using CSPA agent whose main responsibility is to backup data from the Cloud Zone and send regular security alerts or alarms whenever there is a human error when data for cloud is entered, a software bugs or viruses occur, some hardware fault like system crash, or error during the transmission of cloud data from one computer to another.

3. CLOUD COMPUTING SECURITY ISSUES

A. CLOUD COMPUTING SECURITY

Cloud Computing Security as “Cloud computing security (sometimes referred to simply as "cloud security") is an evolving sub-domain of computer security, network security, and, more broadly, information security. It refers to a broad set of policies, technologies, and controls deployed to protect data, applications, and the associated infrastructure of cloud computing.” Note that cloud computing security referred to here is not cloud-based security software products such as cloud-based anti-virus, anti-spam, anti-DDoS, and so on.

FIGURE 5. CLOUD COMPUTING SECURITY ARCHITECTURE



4. DATA SECURITY AND PRIVACY PROTECTION ISSUES

The content of data security and privacy protection in cloud is similar to that of traditional data security and privacy protection. It is also involved in every stage of the data life cycle. But because of openness and multi-tenant characteristic of the cloud, the content of data security and privacy protection in cloud has its particularities. The concept of privacy is very different in different countries, cultures or jurisdictions. The definition adopted by Organization for Economic Cooperation and Development is "any information relating to an identified or identifiable individual."

Another popular definition provided by the American Institute of Certified Public Accountants and the Canadian Institute of Chartered Accountants in the Generally Accepted Privacy Principles standard is "The rights and obligations of individuals and organizations with respect to the collection, use, retention, and disclosure of personal information." Generally speaking, privacy is associated with the collection, use, disclosure, storage, and destruction of personal data. Identification of private information depends on the specific application scenario and the law, and is the primary task of privacy protection.

5. CONCLUSION

In this paper we discussed about cloud computing and the role of cloud storages (Data Storage) in cloud computing, and describing the most important security threat of data storage which is data integrity and data privacy, the proposed mechanisms for integrity assurance and the problems being faced in these mechanism.

Later we discussed about MAS architecture and data encoding using hash values for the purpose of integrating data transmission as well data integrity of data storage by encrypting and hashing the data in data storage using data storage agent of Cloud Zone. Security is an issue which always has some work to do because with rising security, the breaking points in security also occur. The mechanism we proposed can be implemented using much better encoding mechanism so that the security rises more and data integrity enhances more and more.

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