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Certain Investigations on Evolution of Approaches for Securing Computational Grids

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ABSTRACT: This paper reviews methods developed for anonymizing data from 1998 to 2000 . Publishing microdata such as census or patient data for extensive research and other purposes is an important problem area being focused by government agencies and other social associations. The traditional approach identified through literature survey reveals that the approach of eliminating uniquely identifying fields such as social security number from microdata, still results in disclosure of sensitive data, k-anonymization optimization algorithm ,seems to be promising and powerful in certain cases ,still carrying the restrictions that optimized k-anonymity are NP-hard, thereby leading to severe computational challenges. k-anonimity faces the problem of homogeneity attack and background knowledge attack . The notion of l-diversity proposed in the literature to address this issue also poses a number of constraints , as it proved to be inefficient to prevent attribute disclosure (skewness attack and similarity attack), l-diversity is difficult to achieve and may not provide sufficient privacy protection against sensitive attribute across equivalence class can substantially improve the privacy as against information disclosure limitation techniques such as sampling cell suppression rounding and data swapping and pertubertation. This paper aims to discuss efficient anonymization approach that requires partitioning of microdata equivalence classes and by minimizing closeness by kernel smoothing and determining ether move distances by controlling the distribution pattern of sensitive attribute in a microdata and also maintaining diversity.

KEYWORDS: Data Anonymization, Microdata, k-anonymity, Identity Disclosure, Attribute Disclosure, Diversity

I. INTRODUCTION

Need for publishing sensitive data to public has grown extravagantly during recent years. Though publishing demands its need there is a restriction that published social network data should not disclose private information of individuals. Hence protecting privacy of individuals and ensuring utility of social networ data as well becomes a challenging and interesting research topic. Considering a graphical model [35] where the vertex indicates a sensitive label algorithms could be developed to publish the non-tabular data without compromising privacy of individuals. Though the data is represented in graphical model after KDLD sequence generation [35] the data is susceptible to several attacks such as homogeneity attack, background knowledge attack, similarity attacks and many more. In this paper we have made an investigation on the attacks and possible solutions proposed in literature and efficiency of the same.

II. A SECURITY ARCHITECTURE FOR COMPUTATIONAL GRIDS

A security architecture and its associated security policy's along with different security requirements are revealed in this paper. Distributed supercomputing, teleimmersion, computer-enhanced instruments, distributed data mining are the functions related to computational grids or distributed computing.

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Any distributed system has some special features like scalability, performance and heterogeneity. But an added credit to computational grids is that it solves all the security issues found in prior an existing security mechanisms.
The distributed security system offers
1.In-detail observation of security issues.
2. Brief explanation of security policy.
3. Provides suitable solutions to some particular security threats.
4. Offers a security architecture to execute security policy.
Some computing grids posses unique characteristics like
1. Usage of dynamic resource pool.
2. Every computational process requires an initial and termination step to be included.
3. Processes communications through unicast and multicast.
4. Different techniques of authentication and authorization are needed for resources.
5. A single user may have different accounts in different locations.
The major pitfall that we see in all computations is that we have to identify an
appropriate solution to improve security.

Any grid system needs the following requirements to be satisfied:
1. A proper authentication process should be used to verify each and every user who tries to compute.
2. Access control mechanisms should be implemented without modification.
These security requirements should be properly satisfied by building a security architecture. This architecture should satisfy certain conditions such as:
1. Single-sign on
2. Protection of credentials
3. Interpretability of local security solution
4. Exportability.
5. Uniform credentials infrastructure
6. Support for secure group communication
7. Support for multiple implementations.
Security policy derives a set of rules that defines the relationship between a subject and an object. A subject generally refers to users. Passwords and certificates are some credentials used for verifying a subject. A resource that is protected using security policy is called as object. A trust domain consists of both subject and objects. The security policies used in computing grids are listed below.
1. Computing grids must hold multiple trust domains.
2. Single trust domain makes use of only local security policies.
3. A trust domain is plotted to local subjects from global subjects.
4. Mutual authentication is needed for performing operations among entities in a trust domain.
5. Access control decisions are based on local subjects.
6. A user can execute a program by providing his rights.

The communication between a subject and an object is established using protocols in the security architecture. Computers, data repositories, network and display devices are resources present in object. Grid computers make use of “user proxy” to access the resource needed for computation without user’s involvement. The life span of each proxy is in the hand of user. The drawbacks found in a user proxy are that it discovers complexity of credentials and restricts the user to limit the time duration. A “resource proxy” is employed for distributing access to resources.

To access a resource, a user proxy should request to resource proxy. A resource can be accessed only if the request is achieved. A request may fail, if there is no resource available.

An “exact” mapping should be available between a global and local subject. This is successful when we translate a global into local name with the help of a mapping table. But it produces some complexities. Hence this can be achieved using local authentication process. Then an accurate mapping is done finally.

Globus Security Infrastructure is a platform for implementing grid security architecture. It includes an infrastructure for wide range of computations. The Globus Security Infrastructure refers secure socket library for deriving authentication protocol.

The implementation of this security architecture will be flexible to access resources based on access control security policy.

III. METHOD AND SYSTEM FOR CONTROLLING USER ACCESS TO A RESOURCE IN A NERWORKED COMPUTING ENVIRONMENT

A networked computing environment uses a different approach to control files and other additional resources. This technique is executed in a multi user computer network. Computers exchange their resources through a communication pathway. In any network, a client system requests for a resource from the server system. A “peer server” is a computer that services both client and server.

Usually, a client can’t access all the resources that the server provides. Authentication of passwords is a mechanism that a client should possess a password to login. The access to resources is restricted by using other mechanisms such as access control lists, simple share/no-share switch, etc, Some Operating Systems includes complex and hard security models for new users.

A multi-user computer network consists of a client computer and a server computer in order to manage sharing of resources between users. The resources are arranged in a tree structure. The top of the tree has main element and the extra elements are arranged under the root node. Access permission is decided from the request. The first element of the tree contains the access control lists of the second element, because a copy of the access control lists is produced and it is inherited with the first element. When a request is found, it is sent to the first element in the tree. So, that the access control lists can be updated. The next request can be updated. The next request will be sent to the second element and the process continues.

Resources in a computer include files, folders or directories. This type of method modifies the access control mechanisms providing access to use resources. This method also employs both implicit access control and explicit access control techniques.

A security provider has direct access to a database. It includes specific hardware and software peripherals. It has to possess an authentication process in order to verify whether a user accessing a resource is a valid or an invalid user.

GUI are used among users and peer servers to communicate with one another. It also gives a way to modify the access permissions of a user. Modifying the access permissions doesn’t affect the local users. In a peer server, the resources allocated with the help of Operating System. The Operating System inherits the server components with the client components. It provides manipulation, propagation of resource protection and inheritance. Low – level protocol is used to access resource across the network. A request to modify the access permission is obtained form a user interface present in a peer server, while access the resource, if a user contains permission to use the resource, then the access is granted. The recent security models and its associated protocols can be employed in various networking systems.

IV. NIMROD/G: AN ARCHITECTURE FOR A RESOURCE MANAGEMENT AND SCHEDULING SYSTEM IN A GLOBAL COMPUTATIONAL GRID

The computational grids focus on providing access to high-end resources independent of their physical location and access pints. Some of the applications of computational grids enables a simple computational economy that includes a layer in which a user should select a “deadline”. Before the deadline the user should finish his task. This layer also collects the “price” amount for using the resource from that particular user.

In order to bring out the issues in parametric computing, a simple system known as "Mimrod" was formed. Mimrod implements bio-informatics and simulation of business processes.

Mimrod system becomes unsuccessful in dynamic computational grids. Hence a new system called called Nimrod/G was modeled with the help of globus middleware services. The architecture of Nimrod/G includes 5 components:

1. Client/ user station - it serves as an user interface and monitoring console. A client can execute multiple instances of a single client from different locations.
2. Parametric Engine- It serves as a persistent job control agent. It is responsible for managing and maintaining the whole process. It is used while jobs are created, to maintain job status, communicating with clients, schedule advisor and dispatcher.
3. Scheduler- the scheduler duty is job assignment, resource creation and resource selection.
4. Dispatcher - According to the schedulers instruction, the dispatcher will perform the execution of a task.
5. Job wrapper- it acts as an intermediate between the parametric engine and the system where the task is performed.

Computational resources can be identified using scheduling system in two ways:

1.A user instructs the Nimrod/G to finish the task before the deadline.
2. A user can go into the system and tells an appropriate price for the resource as a request.

A benefit of this system is that whether an exact result is produced or not is known before itself. The scheduling policy is derived by including the set of parameters in scheduling system. These parameters are listed below:

1. Architecture and configuration of resource
2. Resource capability.
3. Resource state, requirements and available nodes
4. Access speed, priority and queue type
5. Network bandwidth, load and latency
6. Reliability of resource and connection
7. User preference and capacity
8. Application deadline and resource cost.

The scheduler collects all the information with the help of resource discoverer and obtains a single resource from that, which can satisfy all the resource requirement for better price. Nimrod/G components communicate with each other using TCP/IP sockets.

Nimrod/G can be implemented using the Globs components such as GRAM(Globus Resource Allocation Manager), MDS(Metacomputing Directory Service), GSI(Global Security Infrastructure), GASS(Global Access to Secondary Storage), and GDIS(Grid Directory Information Services). The Nimrod/G mainly concentrates on resource management and scheduling in a computational grid. Nimred/G produces a best scheduling decisions using ser of parameters.

V. Conclusion and Future Work

Various methods developed for anonymizing data from 1998 to 2000 is discussed. Publishing microdata such as census or patient data for extensive research and other purposes is an important problem area being focused by government agencies and other social associations. The traditional approach identified through literature survey reveals that the approach of eliminating uniquely identifying fields such as social security number from microdata, still results in disclosure of sensitive data, k-anonymization optimization algorithm ,seems to be promising and powerful in certain cases ,still carrying the restrictions that optimized k-anonymity are NP-hard, thereby leading to severe computational challenges. k-anonimity faces the problem of homogeneity attack and background knowledge attack . The notion of l-diversity proposed in the literature to address this issue also poses a number of constraints , as it proved to be inefficient to prevent attribute disclosure (skewness attack and similarity attack), l-diversity is difficult to achieve and may not provide sufficient privacy protection against sensitive attribute across equivalence class can substantially improve the privacy as against information disclosure limitation techniques such as sampling cell suppression rounding and data swapping and pertubertation. Evolution of Data Anonymization Techniques and Data Disclosure Prevention Techniques are discussed in detail. The application of Data Anonymization Techniques for several spectrum of data such as trajectory data are depicted. This survey would promote a lot of research directions in the area of database anonymization.

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APPENDIX

S.no	YEAR	AUTHORS	TITLE
1	1984	Sape .MULLENDER and Andrew S TANENBAUM	PROTECTION AND RESOURCE CONTROL IN DISTRIBUTED OPERATING SYSTEMS
2	1985	Paul j.Levine	COMPUTER SECURITY SYSTEM FOR TIME SHARED COMPUTER ACCESSED OVER TELEPHONE LINES
3	1986	Norman Hardy	COMPUTER SYSTEM SECURITY
4	1987	Andreas Pfitzmann, Michael Waidner	NETWORKS WITHOUT USER OBSERVABILITY
5	1988	Chris J. Mitchell	KEY STORAGE IN SECURED NETWORK
6	1989	Fred C. Piper	VOICE NETWORK SECURITY SYSTEM
7	1990	Donald Graji Mohnish Pabrai Uday Pahrai	METHODOLOGY FOR NETWORK SECURITY DESIGN
8	1991	L. Todd Heberlein	NETWORK SECURITY MONITOR
9	1992	John R. Corbin	APPARATUS AND METHOD FOR LICENSING SOFTWARE ON A NETWORK OF COMPUTERS
10	1993	Michael P.	COMPUTER NETWORK ABUSE
11	1994	Bruce E. McNair	SYSTEM AND METHOD FOR GRANTING ACCESS TO A RESOURCE
12	1995	Scott D. Hammersley, Arthur D. Smet, Peter M. Wottreng	METHOD AND APPARATUS FOR INTRAPROCESS LOCKING OF A SHARED RESOURCE IN A COMPUTER SYSTEM
13	1995	Daniel B. Clifton	RESOURCE ACCESS SECURITY SYSTEM FOR CONTROLLING ACCESS TO RESOURCES OF DATA PROCESSING SYSTEM
14	1996	Wei-Ming Hu	METHOD AND APPARATUS FOR AUTHENTICATING A CLIENT TO A SERVER COMPUTER SYSTEMS WHICH SUPPORT DIFFERENT SECURITY MECHANISMS
15	1997	Mark S. Miller, E. Dean Tribble, Norman Hardy, Christopher T. Hibbert	DIVERSE GOODS ARBITRATION SYSTEM AND METHOD FOR ALLOCATING RESOURCES IN A DISTRIBUTED COMPUTER SYSTEM
16	1998	Ian Foster, Carl Kesselman,Gene Tsudik, Steven Tuecke	A SECURITY ARCHITECTURE FOR COMPUTATIONAL GRIDS
17	1999	Daniel S. Glasser, Ann Elizabeth McCurdy, Robert M. Price	METHOD AND SYSTEM FOR CONTROLLING USER ACCESS TO A RESOURCE IN A NETWORK COMPUTING ENVIRONMENT

18	2000	Rajkumar Buyya, David Abramson, and Jonathan Giddy	AN ARCHITECTURE FOR A RESOURCE MANAGEMENT AND SCHEDULING SYSTEM IN A GLOBAL COMPUTATIONAL GRID
19	2001	Lalana Kagal, Tim Finin and Anupam Joshi	MOVING FROM SECURITY TO DISTRIBUTED TRUST IN UBIQUITOUS COMPUTING ENVIRONMENT
20	2002	Farag Azzedin and Muthucumaru Maheswaran	TOWARDS A TRUST-AWARE RESOURCE MANAGENT IN GRID COMPUTING SYSTEM
21	2003	Von Welch1 Frank Siebenlist2 Ian Foste	SECURITY FOR GRID SERVICES
22	2004	Ivan Krsul, Arijit Ganguly, Jian Zhang	VMPLANTS:PROVIDING AND MANAGING VM EXECUTION ENVIRONMENTS FOR GRID COMPUTING
23	2005	Daniel Olmedilla1, Omer F. Rana2, Brian	SECURITY AND TRUST ISSES IN SEMANTIC GRIDS
24	2006	David S. Linthicum	MOVING TO CLOUD COMPUTING STEP BY STEP
25	2007	Uzi Dvir	SECURITY SERVER IN THE CLOUD
26	2008	Mladen A. Vouk	CLOUD COMPUTING-ISSUES,RESEARCH AND IMPLEMENTATIONS
27	2009	Meiko Jensen,	ON TECHNICAL ISSUES OF CLOUD COMPUTING
28	2010	S. Subashini n, V.Kavitha	SECURITY ISSUES FOR CLOUD COMPUTING
29	2011	Luis M. Vaquero	SECURITY ISSUES IN CLOUD COMPUTING
30	2012 I	Deyan Chen1, Hong Zhao	DATA SECURITY AND PRIVACY PRESERVATION IN CLOUD COMPUTING
31	2012 A	Mohammed A. AlZain ,	CLOUD COMPUTING SECURITY SINGLE-MULTI CLOUDS
32	2013 C	Ming Li,	SCALABLE AND SECURE SHARING OF PERSONAL HEALTH RECORDS
33	2013 B	Miltiadis Kandias,	INSIDER THREAT IN CLOUD COMPUTING
34	2013 A	Niroshinie Fernando	MOBILE CLOUD COMPUTING-SURVEY
35	2014 D	Diogo A. B. Fernandes	SURVEY ISSUES IN CLOUD COMPUTING
36	2014 B	Md Whaiduzzaman	SURVEY ON VEHICULAR CLOUD COMPUTING
37	2014 A	A.Madhuri1, T.V.Nagaraju	RELIABLE SECURITY IN CLOUD COMPUTING ENVIRONMENT
38	2015 A	IbrahimAbaker	RISE OF BIG DATA ON CLOUD COMPUTING-REVIEW AND OPEN ISSUES
39	2015	TargioHashem	RISE OF CLOUD COMPUTING ARCHITECTURE IN BIG DATA
40	2015D	Gavin O Donnell,	CLOUD COMPUTING

41	2016	Sundas Iftikhar, Anum Tariq,	OPTIMAL TASK ALLOCATION ALGORITHM FOR COST MINIMIZATION AND LOAD BALANCING OF GSD TERMS
42	2016	Hamed Rezaei, Behdad Karimi, and Seyed Jamalodin	EFFECT OF CLOUD COMPUTING SYSTEM IN TERMS OF SERVICE QUALITY OF KNOWLEDGE MANAGEMENT SYSTEM
43	2017	Thanh Dat Dang	A FRAMEWORK FOR CLOUD BASED SMART HOME
44	2018	Christian Biener, Martin	INSURABILITY OF CYBER RISK

BIOGRAPHY

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