ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology
Vol. 1, Issue 3, November 2014

Safe Data Retrieval Mechanism for Retrieving Personal Health Records (PHRs) in Cloud

V.M.Prabhakaran[1], Prof.S.Balamurugan[2], S.Charanyaa[3]

PG Scholar, Department of CSE, Kalaignar Karunanidhi Institute of Technology, Coimbatore, TamilNadu, India[1]

Assistant Professor, Department of IT, Kalaignar Karunanidhi Institute of Technology, Coimbatore, TamilNadu, India[2]

Senior Software Engineer Mainframe Technologies Former,Larsen & Tubro (L&T) Infotech,Chennai, TamilNadu, India[3]

Abstract: Developing strategies to securely store data across cloud is a much focused topic of research in recent days. Cloud computing focuses on maximizing the effectiveness of the shared resources. Cloud storage provides a convenient means of storing and retrieval of huge amount of data. Personal Health Records (PHRs) should remain the lifelong property of patients and should be displayable conveniently and securely to selected caregivers. MyPHRMachines a patient centric system that takes a radically new architectural solution to health record interoperability. Patients Can Upload their Medical data then they access and share through remote Virtual machine. In this paper a safe data retrieval mechanism is proposed and validated for retrieving personal health records stored in cloud in a hospital scenario.

Keywords: Shared Resources, Cloud Computing, Personal Health Records (PHRs), Medical data, MyPHRMachines

I. INTRODUCTION

People suffer from a spectrum of health problems in today's fast world scenario. Patients frequently go to different hospitals to get appropriate treatments. However they also suffer from certain sensitive health problems they do not wish to share with anyone. So they are in need of a new system to know about their health conditions. Cloud environment provides an excellent service for protecting sensitive medical data referred to as 'micro data'. Cloud Computing has been intended as the next generation architecture of IT Enterprise. It moves the application software and databases to the centralized large data centres, where the management of the data and services may not be fully trustworthy. When the information is maintained in cloud it has various advantages patient no need to carry medical records where ever they go they can access from any desired place. It also minimizes the time needed to diagnose and treat a patient and ensures speedy recovery with minimal time.

The remainder of the paper is organized as follows. The detailed analysis of various problems addressed in literature and the proposed system/solution/methodology is discussed in Section 2. The technical architectural representation of MyPHRMachine housing web portal, Virtual Box Hypervisor, VM Repository, VM Data and Private Network Folders is depicted in Section 3. Section 4 gives the detail about secure data retrieval mechanisms for cloud. Section 5 concludes the paper and outlines the direction for future work.

II. ANALYSIS OF PROBLEMS AND SOLUTIONS IN LITERATURE

Table 1: Analysis of various problems and proposed System/Solution/Methodology in literature

S.No.	Authors	Problem Addressed	Proposed System/Solution/Methodology
1	Pieter Van Gorp and Marco Comuzzi	Viewing and sharing of patient data in cloud.	MY PHR machine
2	Richard Lenz, Manfred Reichert	Optimal process is difficult to handle	Advance process management technology
3	GoceGavrilov, Vladimir Trajkovik	Electronic Health Record (EHR) security	Cloud Business service
4	Sean M. Randall Anna M. Ferrante, James H. Boyd, James B. Semmens	Leakage of sensitive information	Record link age which involved in reducing the privacy risks
5	J. Vidhyalakshmi, J. Prassanna	Security and accountability of patient's personal health record maintenance	Object centric which automatically trigger an object to create a log record and access over distributed data
6	M.Poulymenopoulou, F. Malamateniou, D.Papakonstantinou , G. Vassilacopoulos	Measurement of ubiquitous access to integrated patient information	Scalable service oriented architecture is defined

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology
Vol. 1, Issue 3, November 2014

7	William R. Hogan, MD, Michael M. Wagner, MD, PHD	Data accuracy is an important issue factor in Computer based patient records	Methodological guidelines are proposed for analyzing the accuracy
8	Laurence G. Branch, PHD	Associations between certain personal health practices and point-incident physical confines	Onset of disability could be confirmed
9	Eleanor M. Simonsick, PhD, Mary E. Lafferty, Caroline L. Philips, MS, Carlos F. Mendes de Leon, PhD, Stanislav V Kasl, PhD, Teresa E.Seeman, PhD, GerdaFillenbaum, PhD, Patricia Hebert, PhD, and Jon H.Lemke, PhD	Associations between the physical activity among adults and functional status	High level physical activity reduces the morality
10	Robert Steele, Kyongho Min, Amanda Lo	Issues in Electronic Personal Health Data	Two infrastructural drivers such as ubiquitous technology and connectivity coverage
11	HebahMirza and Samir El-Masri	Challenges are to be considered in health care process such as cost, Maintenance and security threats	Cloud's Central Database, Unifier Interface Middleware and the web portal
12	Abhishek Kumar Gupta, Kulvinder Singh Mann	Overcome Paper printed medical data.	Online medical information transfer system through cloud computing
13	Carmelo Pino and Roberto Di Salvo	Better resource needed for Clinical community	Hybrid cloud solution.
14	Peter L. Reichertz	Process of HIS	Ubiquitous computing environments and sensor-based technologies for health monitoring
15	Arindam Banerjee, PrateekAgrawal and R. Rajkumar	Allocation of patient number	Unique identification number systems
16	Louise Olsson, Gunnel Östlund, Peter Strang, Eva JeppssonGrassman, Maria Friedrichsen	Cancer patients in palliative home care	Two evolved process: maintaining life and preparing for death
17	K.S. Aswathy, G. Venifa Mini	Issues occur such as data loss, third party interfere	Secure alternative viable technique is proposed
18	Jithendra K, Thanapal P, Prabhu J	Security issues in cloud	Use role based access control healthcare system
19	L G Branch and A M Jette	Morality issue	A personal health practice is maintained frequently.
20	Jean Harvey-Berino, Stephen Pintauro, Paul Buzzell, and Elizabeth Casey Gold	Long-Term Maintenance of Weight Loss	Examine the effectiveness of an Internet weight maintenance program.

III. ARCHITECTURAL REPRESENTATION

The architectural representation of cloud based PHR storage is represented in Fig 1. The portal plays an important role in uploading copy of data, remote access maintenence, start/stop operation. PCAS access is used to provide and show copies. The cloud takes the responsibility of mounting the PHRs. Architectural representation of MyPHR Machine consists of two components evolution and storage with which client directly interacts with MyPHR Machine. The first component of MyPHR Machine consists of web portal which in turn interacts with Virtual Box Hypervisor.

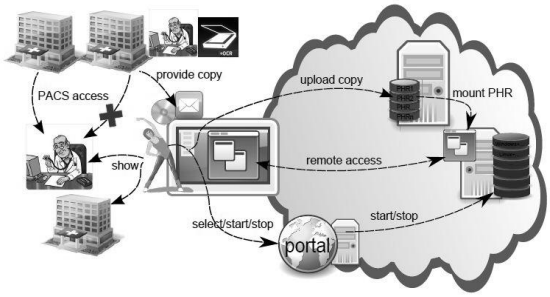

Fig. 1. Architectural example Cloud Based PHRs storage

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology
Vol. 1, Issue 3, November 2014

Virtual Machines are connected together with Virtual Box Hypervisor. The second component of MyPHR Machine, storage consists of VM Repository which houses VM Data and Private Network folders as indicated in Figure 2.

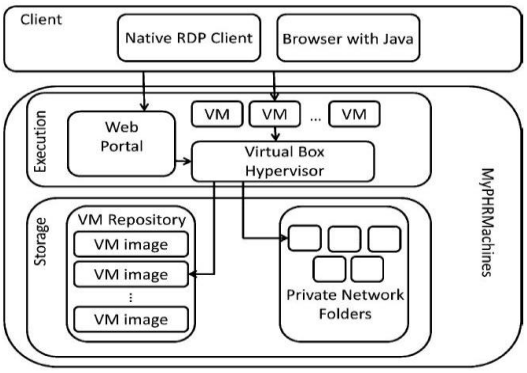

Fig. 2. Technical Architectural diagram of Cloud Based PHRs storage

IV. Secure Data Retrieval Mechanisms From Cloud

To retrieve the details which are encrypted in the cloud can be accessed by the Authenticator If the Cloud user three uploads the patient details the Patient who have bonding relationship with the same cloud user can login with the cloud user three the permission will be granted if the user is an authenticated person. It describe that this level user have permission to access the data. Then the information which stored is visible to the patient so that they can monitor the health status and take necessary preventions. Treatment details can be added by the doctor who enrolled in monitoring the desired patient, whenever additional functionality added they may be added and outsourced in the cloud. The Treatment cost can be reduced when this functionality is used, no need to carry paper format record whenever the patient visit the hospital so secure data processing is handled. Paper format record holding and Electronic based medical storage can be replaced and a cloud based social healthcare system is developed. Thus a cloud based PHRsystem taking a fundamentally new architectural solution to health record portability.

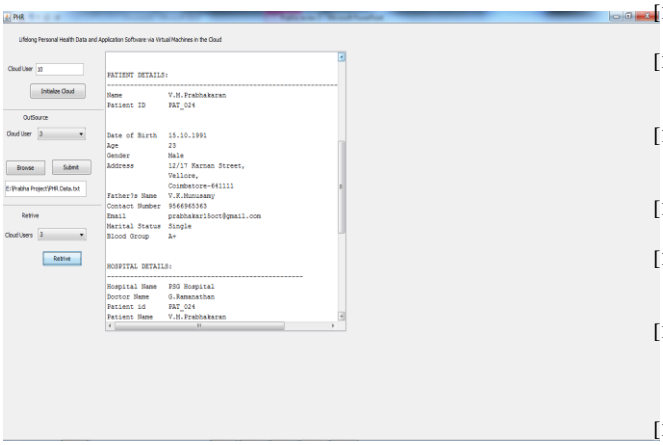

Fig 3: Information of the medical details

V. Conclusion

In this paper a safe data retrieval mechanism is proposed and validated for retrieving personal health records stored in cloud in a hospital scenario. Developing strategies to securely store data across cloud is a much focused topic of research in recent days. Cloud computing focuses on maximizing the effectiveness of the shared resources. Cloud storage provides a convenient means of storing and retrieval of huge amount of data. Personal Health Records (PHRs) should remain the lifelong property of patients and should be displayable conveniently and securely to selected caregivers. MyPHRMachines a patient centric system that takes a radically new architectural solution to health record interoperability. Patients Can Upload their Medical data then they access and share through remote Virtual machine.

References

[1] Pieter Van Gorp and Marco Comuzzi "Lifelong Personal Health Data and Application Software via Virtual Machines in the Cloud" IEEE Journal of Biomedical and Healthcare Informatics, Vol. 18, No. 1, Jan 2014

[2] Pieter Van Gorp and Marco Comuzzi (2014) Lifelong Personal Health Data and Application Software via Virtual Machines in the Cloud, IEEE Journal of Biomedical And Health informatics.

[3] Richard Lenz, Manfred Reichert (2006) IT support for healthcare processes– Premises, challenges and perspectives, Elsevier.

[4] GoceGavrilov, Vladimir Trajkovik (2012) Security and Privacy Issues and Requirements forHealthcare Cloud Computing, ICT Innovations 2012 Web Proceedings

[5] Sean M. Randall Anna M. Ferrante, James H. Boyd, James B. Semmens (2013) ,Privacy-preserving record linkage on large real world datasets, Elsevier.

[6] J. Vidhyalakshmi, J. Prassanna (2012) Providing a trustable healthcare cloud using an enhanced accountability framework.

[7] M. Poulymenopoulou, F. Malamateniou, D.Papakonstantinou , G. Vassilacopoulos (2011) Cloud-based Information Support forEmergency Healthcare.

[8] William R. Hogan, MD, Michael M. Wagner, MD, PHD (1997) Accuracy of Data in Computer-based Patient Records .

[9] Laurence G.Branch, PHD (1985) Health Practices and Incident Disability among the Elderly, Public health briefs.

[10] Eleanor M. Simonsick, PhD, Mary E. Lafferty, Caroline L. Philips, MS,Carlos F. Mendes de Leon, PhD, Stanislav V Kasl, PhD, Teresa E.Seeman, PhD, GerdaFillenbaum, PhD, Patricia Hebert, PhD, and Jon H.Lemke, PhD(1993) Risk Due to Inactivity in Physically Capable Older Adults, American journal of public health.

[11] Robert Steele, Kyongho Min, Amanda Lo (2012) Personal Health Record Architectures: Technology Infrastructure Implications and Dependencies.

[12] HebahMirza and Samir El-Masri, Cloud Computing System for Integrated Electronic Health Records.

[13] Abhishek Kumar Gupta, Kulvinder Singh Mann (2014) Sharing of Medical Information on Cloud Platform-A Review, IOSR Journal of Computer Engineering.

[14] Carmelo Pino and Roberto Di Salvo (2013) A Survey of Cloud Computing Architecture and Applications in Health, International Conference on Computer Science and Electronics Engineering.

[15] Peter L. Reichertz (2006) Hospital information systems - past, present, future, International Journal of Medical Informatics.

[16] Arindam Banerjee, PrateekAgrawal and R. Rajkumar (2013) Design of a Cloud Based Emergency Healthcare Service Model, International Journal of Applied Engineering Research.

[17] Louise Olsson, Gunnel Östlund, Peter Strang, Eva JeppssonGrassman, Maria Friedrichsen (2010) Maintaining hope when close to death: insight from cancer patients in palliative home care.

[18] K.S. Aswathy, G. Venifa Mini (2014) Secure Alternate Viable Technique of Securely Sharing the Personal Health Records in Cloud, International Journal of Recent Development in Engineering and Technology.

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology
Vol. 1, Issue 3, November 2014

[19] Jithendra K, Thanapal P, Prabhu J (2013)Developing Secure Social Healthcare System over the Cloud, International Journal of Science and Research (IJSR), India Online ISSN: 2319-7064.
[20] L G Branch and A M Jette. Personal health practices and mortality among the elderly. American Journal of Public Health.
[21] Jean Harvey-Berino, Stephen Pintauro, Paul Buzzell, and Elizabeth Casey Gold (2004) Effect of Internet Support on the Long-Term Maintenance of Weight Loss.
[22] Balamurugan Shanmugam, Visalakshi Palaniswami, "Modified Partitioning Algorithm for Privacy Preservation in Microdata Publishing with Full Functional Dependencies", Australian Journal of Basic and Applied Sciences, 7(8): pp.316-323, July 2013
[23] Balamurugan Shanmugam, Dr.Visalakshi Palaniswami, R.Santhya, R.S.Venkatesh "Strategies for Privacy Preserving Publishing of Functionally Dependent Sensitive Data: A State-of-the-Art-Survey", Australian Journal of Basic and Applied Sciences, 8(15) September 2014.
[24] V.M.Prabhakaran, Prof.S.Balamurugan, S.Charanyaa," Certain Investigations on Strategies for Protecting Medical Data in Cloud", International Journal of Innovative Research in Computer and Communication Engineering Vol 2, Issue 10, October 2014
[25] V.M.Prabhakaran, Prof.S.Balamurugan, S.Charanyaa," Investigations on Remote Virtual Machine to Secure Lifetime PHR in Cloud ", International Journal of Innovative Research in Computer and Communication Engineering Vol 2, Issue 10, October 2014
[26] V.M.Prabhakaran, Prof.S.Balamurugan, S.Charanyaa," Privacy Preserving Personal Health Care Data in Cloud" , International Advanced Research Journal in Science, Engineering and Technology Vol 1, Issue 2, October 2014
[27] S.Balamurugan, S.Charanyaa, "Principles of Social Network Data Security" LAP Verlag, Germany, ISBN: 978-3-659-61207-7, 2014.

BIOGRAPHIES

V.M.Prabhakaran obtained his B.E. degree in Computer Science and Engineering from Hindusthan Institute of Technology, Coimbatore, Tamil Nadu, India and currently pursuing his M.E. degree in M.Tech degree in Computer Science and Engineering at KalaignarKarunanidhi Institute of Technology, Coimbatore, Tamil Nadu, India. He has to his credit **17 papers** in National/International Journals/Conferences. He is the recipient of **gold medal and certificate of merit for best journal publication** by his host institution for the year 2013-14. He served as a **Secretary** for CSE Association at Hindusthan Institute of Technology, 2011-12. He currently holds the position of student **President** for CSE Association, KalaignarKarunanidhi Institute of Technology. He has secured a **best paper award in an International Conference** held at Coimbatore Institute of Technology, Coimbatore, TamilNadu, India. His areas of research interests include Network Security, Cloud Computing and Database Security.

Prof.S.Balamurugan obtained his B.Tech degree in Information Technology from P.S.G. College of Technology, Coimbatore, Tamil Nadu, India and M.Tech degree in Information Technology from Anna University, Tamil Nadu, India respectively. He is currently working towards his PhD degree in Information Technology at P.S.G. College of Technology, Tamil Nadu, India. At present he holds to his credit **58 papers International Journals and IEEE/ Elsevier International Conferences.** He is currently working as Assistant Professor in the Department of Information Technology, Kalaignar Karunanidhi Institute of Technology, Coimbatore, Tamil Nadu, India affiliated to Anna University TamilNadu, India. He is **State Rank holder** in schooling. He was **University First Rank holder** M.Tech. Semester Examinations at Anna University, Tamilnadu, India. He served as a Joint Secretary of IT Association, Department of Information Technology, PSG College of Technology, Coimbatore, Tamilnadu, India. He is the **recipient of gold medal and certificate of merit** for best journal publication by his host institution **consecutively for 3 years**. Some of his professional activities include invited Session Chair Person for two Conferences. He has guided 12 B.Tech projects and 2 M.Tech. projects. He has won a best paper award in International Conference. His areas of research interest accumulate in the areas of Data Privacy, Database Security, Object Modeling Techniques, and Cloud Computing. He is a life member of ISTE,CSI. **He has authored a chapter in an International Book "Information Processing" published by I.K. International Publishing House Pvt. Ltd, New Delhi, India, 978-81-906942-4-7. He is the author of book titled "Principles of Social Network Data Security", ISBN: 978-3-659-61207-7.**

S.Charanyaa obtained her **B.Tech** degree in Information Technology and her **M.Tech** degree in Information Technology from Anna University Chennai, Tamil Nadu, India. She was **gold medalist** in her B.Tech. degree program. She has to her credit **20 publications in various International Journals and Conferences**. Some of her outstanding achievements at school level include **School First Rank holder** in **10th and 12th grade**. She was working as Software Engineer at Larsen & Turbo Infotech, Chennai for 3 years where she got promoted as Senior Software Engineer and worked for another 2 years. She worked at different verticals and worked at many places including Denmark, Amsterdam handling versatile clients. She is also the recipient of **best team player award for the year 2012 by L&T**. Her areas of research interest accumulate in the areas of Database Security, Privacy Preserving Database, Object Modeling Techniques, and Cloud Computing. **She is the author of book titled "Principles of Social Network Data Security", ISBN: 978-3-659-61207-7.**