

## A Study on the Realization of Draas with Cloud Transformation Through Analysis of Safety-Health Information Resources

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**Abstract:** The benefits of scalability, flexibility and cost-effectiveness are emphasizing the utility value of users across industries as the use of the cloud becomes an integral part of the business. In this study, based on the results of the information analysis of the safety and health information system, it is aimed to derive a plan for successfully performing cloud conversion and a cloud-based disaster recovery service system construction. For this purpose, the improvement direction will be sought through analysis of the application system configuration, data management status, hardware operation status and infrastructure usage of the safety and health information system. It is necessary to examine whether the relevant data base or information is stored, processed and managed confidentially, whether it meets the related laws, performance and functional requirements when using a private cloud. In addition, we will look at the minimum requirements for using the private cloud and try to figure out how to change the private cloud service by examining related services, data, linkages, level of work substitution. I propose the cloud-based remote Disaster Recovery System (DRaaS) that can protect, recover and restart data through studying the security management of data, infrastructure failure in various environments and damage of data and application, flood disaster and disaster management plan such as power outage, earthquake and flood.

**Key words:** Disaster recovery system, cloud, safety-health, disaster management, cloud-based, minimum requirements, infrastructure

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### INTRODUCTION

In Korea on March, 2015, the law on the development of cloud computing and protection of users was announced. Since, December 2015, the Ministry of Government Administration and Home Affairs and Ministry of Science and ICT(MSIT) have been actively encouraging public institutions to use the cloud but it has yet to be fully implemented. Currently, the introduction of preemptive cloud in the public sector is promoting the use of private cloud and the adoption of cloud according to institution type is accelerating the change from “ownership” to “use” paradigm of information resources (Woo, 2013). The current trend to configure the required cloud system with just a few clicks with intuitive user interface that is easy to use for everyone but self-deployment infrastructure systems run by most public institution have failed to support IT change. The

transition from traditional information system operations to cloud and virtual environments is becoming a huge leap in systems and storage with virtualization technology (Seob, 2012). And systems, security and networks are becoming increasingly integrated. In this study, we analyze the present status of the health and safety information system and then based on it, we have examined the system characteristics, implementation and hardness for cloud conversion and found the optimal solution to successfully complete the conversion. Also, more work is done through the network and as the information systems supporting business operations become increasingly important, protecting the information system against disasters is essential (Mell and Grance, 2011). In addition, we will look at the minimum requirements for using the private cloud and try to figure out how to change the private cloud service by examining related services, data, linkages, level of work substitution.

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**MATERIALS AND METHODS**

**Status of health and safety information system:** The status analysis analyzes the current status of the infrastructure used for analysis/application system management/operation in managed/running application systems. Therefore, we want to derive major issues and implications from the point of view of application system. As shown in Fig. 1, the analysis procedure was proceeded in the order of analysis target review → application system analysis → system infrastructure analysis → synthesis. The safety and health information system is composed of 35 kinds of HW systems and it is operated and managed by linking through two network such as internal network and external network, linking information related to each internal system which represents the complexity of the

application system (Anonymous, 2016a-c). High-performance servers based on Unix-based high-performance servers have been in service for many years. Software maintenance is expensive and oracle is about 40% open source. The entire system is developed on the basis of the e-government standard framework and the standards are well-guarded. In terms of infrastructure operations, the health and safety information system consists of 35 servers (3×86 servers, 1 appliance and 31 Unix) (Park, 2018). We analyze the current state of the overall system operated for industrial safety and health support and identify key issues and opportunities for improvement, so that, can design and apply them to the implementation of a target model. The analysis target is divided into an application system and an infrastructure and an application system is divided into a home page and a business system. The infrastructure analyzed HW, commercial SW and server usage (Anonymous, 2016a-c). When analyzing the SW status, it is expected that it is difficult to switch to the cloud due to the large proportion of Unix OS environment. DBMS is operated only in Oracle environment and WEB. It is expected that redevelopment and migration will take place when the cloud is introduced.

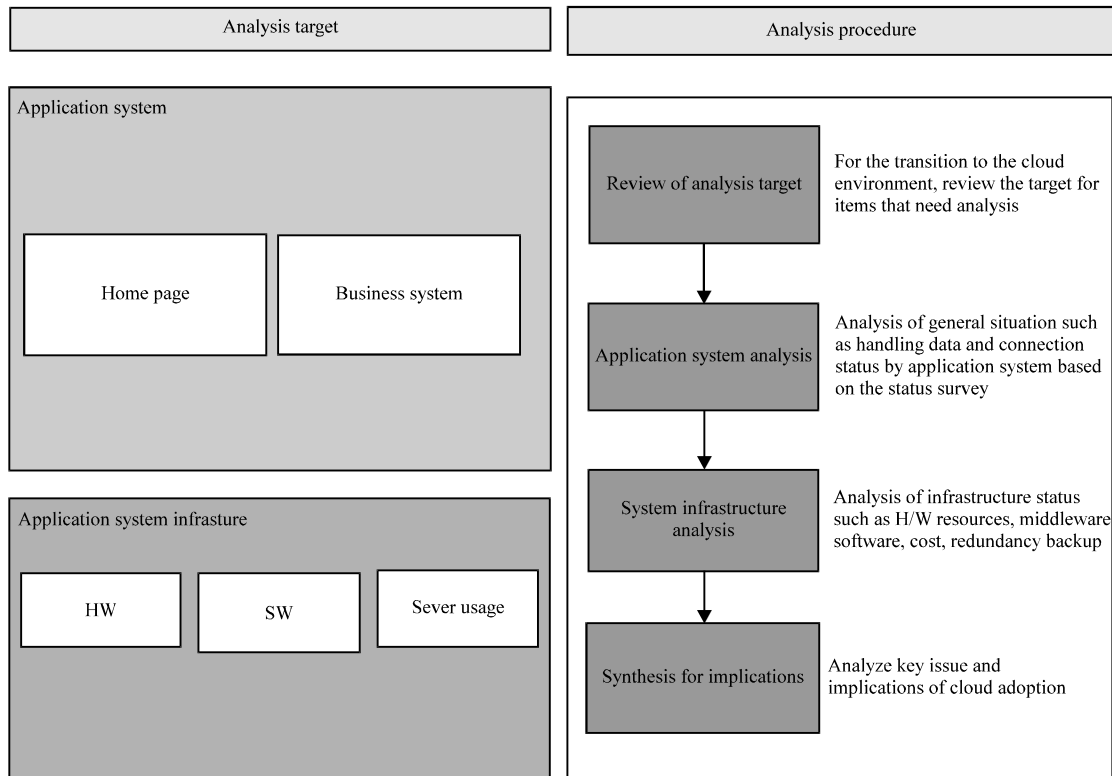


Fig. 1: Analysis subject and analysis procedure of the safety and health information system

**RESULTS AND DISCUSSION**

**Draas realization based on cloud environment:** As the cloud computing becomes active, there are commercial solutions and public SW for each implementation technology in the market. Using this technology, the products and services of the cloud service providers applied in this study are considered in terms of VDI, server virtualization, storage virtualization, management platform, distributed computing, DBMS, mirroring and billing (Anonymous, 2016a-c; Robinson *et al.*, 2014). In order to prepare detailed plans for cloud conversion for each server of information system it is necessary to classify according to internal administration or civil affairs and network classification according to closed network/internal network/external network. Middleware analysis based on OS, DBMS, WEB, WAS and DB, application SW structure analysis based on appliances/Server-Client/Web-based programs and analysis of conversion type and additional issues due to private cloud/own cloud/conversion pending were done.

In accordance with the detailed analysis of the private cloud conversion, it was necessary to gradually transfer the system to the hybrid cloud configuration and

to convert and standardize it as an open source considering the linkage of the internal business system. In the disaster recovery environment, implementation plan was set up from the viewpoint of 5 items such as system that can prevent disasters and disasters by using existing system and system that enables quick recovery in case of disaster (Bourne, 2016; Park, 2018). In addition, DraaS is proposed to provide high availability, to prevent failure to recover within 2 h and to maintain system’s uninterrupted operation. We built the internal environment, cloud data storage and computing resources in consideration of the hybrid cloud infrastructure environment. In this case, the service DR solution extracts data from a specific server and replicates it to another local server or to the cloud (Bum, 2014). As shown in the DRaaS implementation of Fig. 2, it is designed to improve business continuity of computer resources and to maintain interoperability between heterogeneous environments. Service stability is ensured through proper load balancing between legacy system and DR center through GSLB (Global Server Load Balancing) to construct a DR capable of supporting a high-availability (Fault tolerant) service environment through DR configuration between the internal computer room and the cloud servers (Park, 2018).

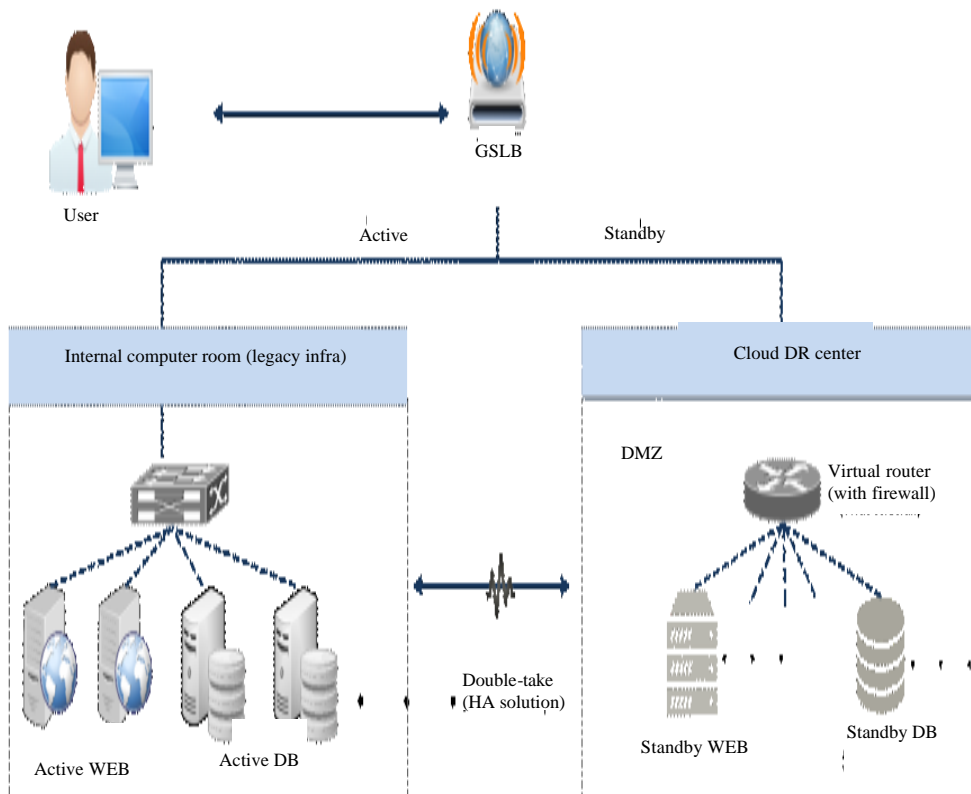


Fig. 2: Implementation of DRaaS system

## CONCLUSION

As cloud computing is activated, commercial solutions and open source software are provided according to each implementation technology in the market. Using this technology, the products and services of the cloud service providers are applied. So far, we have selected the system to be converted through the analysis of information system to transform the private cloud of the safety and health information system. We also looked at the considerations for cloud switching and the legal basis for the transition. We conducted a detailed analysis based on system characteristics, feasibility and economic feasibility of the target system to derive a private cloud conversion plan.

In order to prepare detailed plans for cloud conversion for each server of information system, it is necessary to classify business type according to internal administration or civil affairs and network type according to closed network/internal network/external network. Middleware analysis based on OS/WEB/WAS/DB, application SW structure analysis by appliances/Server-Client/Web-based programs and analysis of conversion types and issues by private cloud/own cloud/conversion pending should be preceded. Based on these assumptions, a cloud computing promotion plan was reviewed.

Most existing integrated computing systems have a burden of excessive initial construction budget, construction time and installation space required to maintain system viability and to construct a separate disaster recovery center to recover the fault service within a short time.

However, in this study, cloud services based DRaaS can save data safely and losslessly and reduce from the planning stage the excessive cost and burden of establishing the existing disaster recovery center. To accomplish this goal, we developed a cloud conversion scheme and proposed DraaS construction. Through this study, companies and practitioners considering cloud service transition will be able to identify risks that may occur in transition and utilize DRaaS as a criterion for efficient review.

## LIMITATIONS

This study is mostly limited to the feasibility of switching from the existing system to the private cloud service.

## RECOMMENDATIONS

Therefore more technical research will be needed for more cost-effective conversion of the cloud service in the future.

## ACKNOWLEDGEMENTS

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