Cloud-based Electronic Medical Record System for Small and Medium Hospitals: HOPE Cloud Chart

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An electronic medical record system allows doctors, nurses and other medical staff to share patient records with great efficiency, while at the same time enabling them to provide medical services that give patients a sense of safety and peace of mind. By leveraging the electronic medical record system in regional medical networks, patient records can also be shared with other hospitals in the same region. In July 2014, Fujitsu launched an electronic medical record system, Fujitsu Healthcare Solution HOPE Cloud Chart, which incorporates standard processes for medical treatment in Japan, and was developed based on Fujitsu's know-how gained through installing systems at more than 600 hospitals. Because HOPE Cloud Chart is a service based on cloud technology, it comes with the advantages of requiring less initial investment and reducing operation and maintenance workload, and it can be quickly installed. This paper describes HOPE Cloud Chart in terms of its features, system configuration, installation method and anticipated benefits.

1. Introduction

The Japanese Government's Declaration to be the World's Most Advanced IT Nation aims to build nationwide healthcare information networks by 2018. Many national policies are being implemented in response to the rising demand for healthcare and nursing care programs that cater to Japan's aging population. These include measures to revitalize regional medical care activities by promoting a switch from hospital-based total medical care to region-based total medical care and the integrated community care system that seeks to establish regional structures for all-inclusive health care support services. The successful implementation of these policies is however premised on creating electronic data of medical records of all patients across the country. While large hospitals are currently switching to electronic medical records, this is not the case at small and medium hospitals.[1),2)] The reasons for this may be attributed to:

1) Lack of finances to invest in information and communications technology (ICT) systems
2) Lack of space and other facilities required to operate ICT systems
3) Lack of personnel to install and operate ICT systems

Attention is now being focused on enabling small and medium hospitals to create electronic data of patients' medical records towards establishing regional health information exchange networks. In April 2012, the Japanese Ministry of Health, Labour and Welfare, in a notification regarding the storage of patients' medical records,[3)] approved the use of external virtual environments, triggering the popularization of relatively less expensive cloud-based systems.

In order to promote the establishment of regional health information exchange networks and enhance the quality of medical services in Japan, Fujitsu launched the Fujitsu Healthcare Solution HOPE Cloud Chart, a cloud-based service that integrates an electronic medical record system and a medical billing and accounting system.

This paper describes HOPE Cloud Chart in terms of its features, system configuration, installation method and anticipated benefits.

2. Advantages of HOPE Cloud Chart features

HOPE Cloud Chart is a cloud-based service developed by combining cloud technology with an electronic medical records package that incorporates standard procedures for medical services. These standard procedures are determined by Fujitsu based on its expertise in installing and operating ICT systems at numerous medical care facilities. The three main advantages of using HOPE Cloud Chart are as below:

1) Reduction in initial investment for creating an electronic medical record system and its operational costs

An electronic medical record system and a medical billing and accounting system are provided as cloud-based services, thus eliminating the need for each medical facility to purchase a dedicated server and reducing initial investment. Further, hardware maintenance costs and electricity charges for ICT equipment and air-conditioning are also reduced.

2) Guarantee of safe and secure data storage to ensure business continuity

Hope Cloud Chart is operated and managed by Fujitsu data centers that boast robust facilities and have in place state-of-the-art security measures (received the highest information security rating of AAAis by I.S. Rating Co., Ltd.note) in January 2011) to safely store data on patients' medical records even during natural disaster, thus ensuring uninterrupted provision of medical services.

3) Incorporation of standard procedures for medical services to enable quick installation and consistent operational support

HOPE Cloud Chart has a track record of installing and operating systems in over 600 medical care facilities. Fujitsu has established and provided the standard processes for medical services and the standard description method for recording medical information, that accurately reflect hospitals' needs. Hospitals can select the processes relevant to their facilities. In addition, system engineers at Fujitsu data centers operate and maintain the system and also provide customer support. This enables hospitals to concentrate on providing medical care without worrying about the need to employ dedicated system engineers at the hospital.

Based on the advantages described above, the concept of HOPE Cloud Chart is to spread the use of electronic medical records for advancing the establishment of regional health information exchange networks and promoting advanced medical services.

note) I.S. Rating Co., Ltd. sets security ratings for technical information, trade secrets, personal information, etc. at companies, or organizations.

3. System configuration

Figure 1 shows a configuration of the HOPE Cloud Chart system. The system configuration and operation are in accordance with the four guidelines[4)–7)] laid down by the Japanese Ministry of Economy, Trade and Industry, the Ministry of Internal Affairs and Communications and the Ministry of Health, Labour and Welfare under the Medical Practitioners Act and the Dental Practitioners Act. Two advantages of the main system configuration based on the guidelines are:

1) Dividing hospital facilities by virtual networks and virtual operating systems using node control technology of network devices to ensure information security among medical facilities.
2) Systems for management of electronic medical records and billing and accounting provided as services and the systems installed at each medical department within the hospital utilize the inter-departmental communication server to enable real-time communication.

These two features promote the installation and operation of cloud-based services.

Fujitsu also provides services unique to cloud-based solutions, enabling the efficient utilization of resources by allowing multiple users (medical care facilities) to share hardware. Another feature of HOPE Cloud Chart is the remote access function that allows medical personnel to securely access the cloud from outside of the hospital, for example, when on house calls.

4. Method of installation

Unlike on-premise installation which is mainly conducted by system engineers (SEs), hospital employees have a proactive role in the installation of this system. Further, SEs in charge also share resources over the network, thus enhancing work efficiency (**Figure 2**). By combining tools and networks to automate various

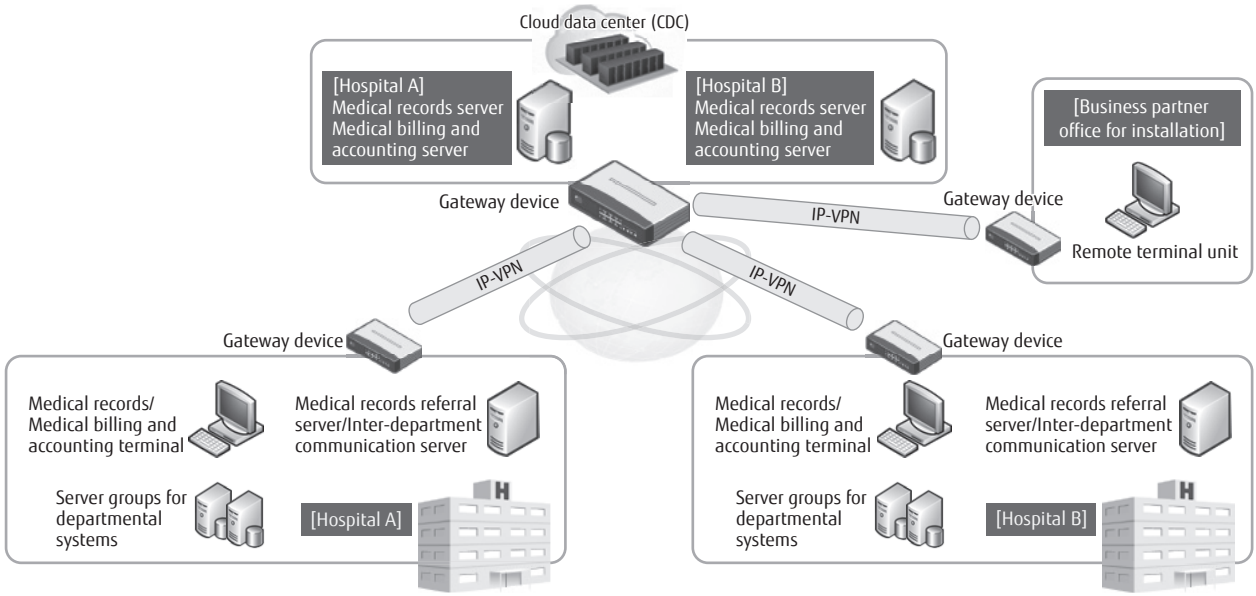

Figure 1
Hope Cloud Chart system configuration.

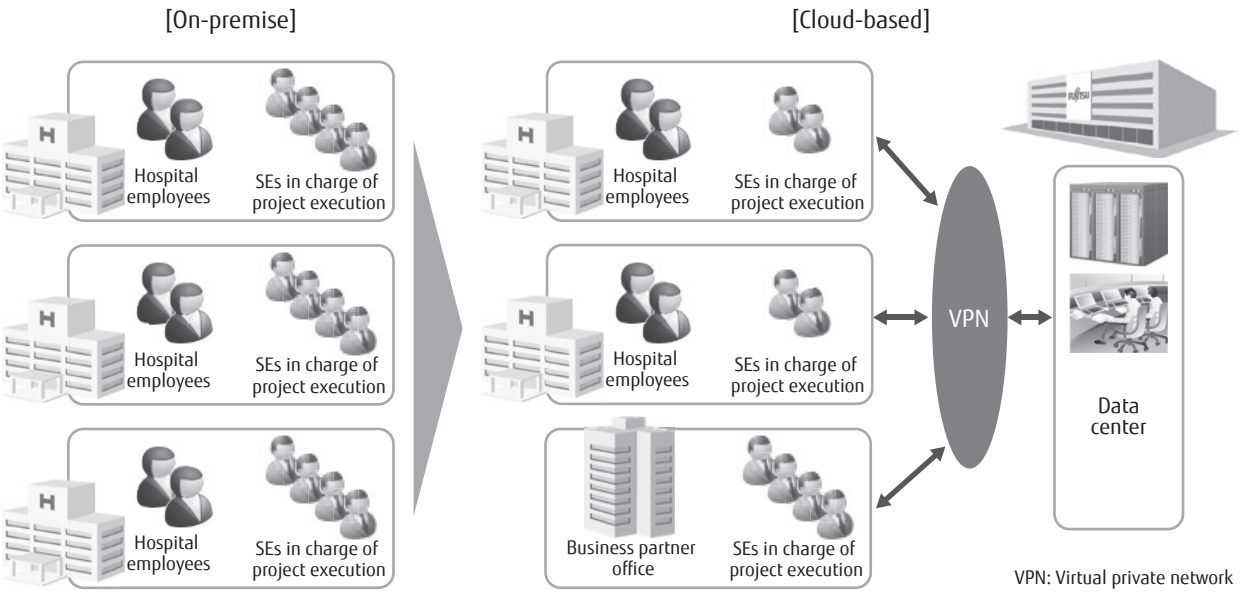

Figure 2
Comparison of on-premise and cloud-based installation resources.

settings that will realize the required processes, HOPE Cloud Chart can be installed in just about 2–3 months (short installation period characteristic of cloud-based systems; at least 25% less man-hours compared to on-premise). The installation processes for HOPE Cloud Chart services are as below:

1) Study of business operation

SEs conduct a meeting to explain the conceptual diagram for the project model, allowing the hospital to study its operations.

2) Review and determination of business operations

The hospital reviews the operation of the system and determines the operation flows to be implemented,

based on the operation determination sheet and the installation handbook. The operation manual is automatically generated in accordance with the determined operation flows using creation tools.

3) Configuration of master settings

Hospital employees configure simple system master settings using dedicated tools, as well as master settings required for medical care operations using medical-care master data generation tools.

4) Operational training

Hospital employees study system operation by self-learning tools provided with streaming of training contents and test their skills using the workbook after study.

5) Trial operation

The hospital runs trial operations using the trial operation pattern sheets and trial operation environment generation tools. (Fujitsu starts providing services after the trial operations are completed.)

5. Benefits of installation

HOPE Cloud Chart provides customers the benefits associated with electronic medical records, such as information sharing, efficiency of business operations, and safety of medical practices, as well as from using cloud-based services, such as a reduction in operational workload. Six specific benefits are as follows.

1) Improved work efficiency by accuracy enhancement of the information input and transmission

HOPE Cloud Chart uses advanced technologies and knowhow to perform superior functions such as displaying and checking relevant information and issuing alerts to help resolve issues faced by hospitals. These include how to communicate information in an accurate manner to multiple medical personnel, and how to cope with the troublesome process of creating medical records that can hamper medical-care work because the records need entries regarding numerous generic drugs. The time saved due to improvement of work accuracy can be spent communicating with patients.

2) Enhanced informed consent process

The improved visualization of information on medical tests and related medical images through the use of electronic medical records serves to enhance the informed consent process. For example, doctors can explain test results better to patients when displayed as graphs.

3) Contribution to the environment by reducing the use of paper for medical records and related documents

Using electronic data for medical records and related documents significantly cuts paper usage, thus reducing environmental impact. Further, the space required to store documents is also reduced.

4) Enhancing reliability and ensuring business continuity

By operating a cloud platform in Fujitsu data centers with boast robust facilities and state-of-the-art security measures, HOPE Cloud Chart realizes maximum business continuity and high reliability. Data center engineers who are familiar with both in ICT and hospital procedures provide comprehensive customer support ranging from system installation to operation, monitoring and maintenance.

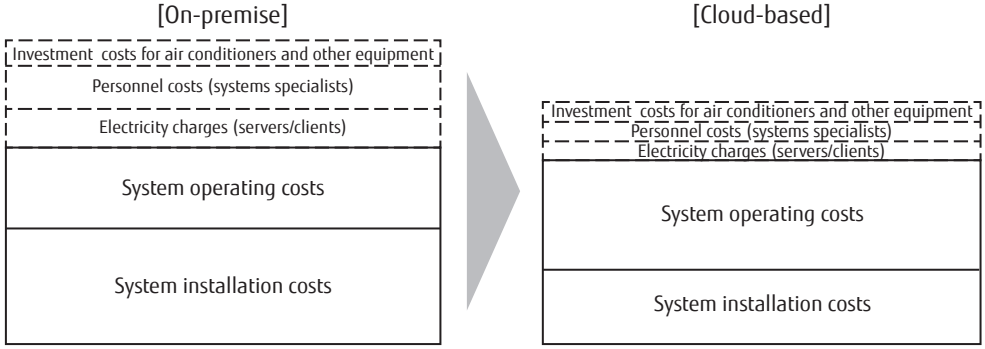

Figure 3
Comparison of costs for on-premise and cloud-based solutions (from an actual project).

5) Linking medical institutions through the regional medical network

Electronic medical records can be shared with neighboring regional medical institutions via the regional medical network to provide safe and high quality medical care in response to the needs of local communities.

6) Reduction in system operational costs

Since there is no need to hold any ICT assets, no additional investment is required for system operation in terms of maintenance staff, space and facilities, thus reducing installation costs and other miscellaneous expenses, such as air-conditioning and facility costs and electricity charges. As seen in **Figure 3**, HOPE Cloud Chart enables the reduction of costs other than system-related costs, for a reduction in overall system-related costs. The example of the system user shown here indicates a decrease in system costs and other miscellaneous expenses for approximately 20% reduction in system-related costs. Although the reduction in costs may vary by each user, one of the advantages of installing cloud-based systems is undoubtedly a decrease in system-related costs.

6. Conclusion

In conjunction with the rapid aging of its population, Japan is facing numerous issues, including an increase in medical costs, lack of doctors, especially in rural areas, and concerns regarding the worsening quality of regional medical care. In response to these issues, hospitals, nursing facilities and pharmacies are breaking organizational barriers to establish regional medical networks across the country for sharing patient medical records, in an effort to enhance information sharing and the quality of medical care.

In order to successfully operate nationwide medical care networks, electronic data must be created for medical information on all patients. This can be achieved only if medical facilities adopt systems to create electronic medical records. By expanding the adoption of the Fujitsu Healthcare Solution HOPE Cloud Chart, Fujitsu hopes to contribute to enhancing information sharing and raising the quality of medical care.

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