

Innovative healthcare solution using virtualization technology

Intel® Xeon® processor E5 family and Microsoft Desktop Virtualization* solutions enable Keiju Medical Center to create a highly flexible medical care environment



Challenges

- Keiju Medical Center needed a new healthcare environment where doctors could easily access information on the PCs in consultation rooms to meet patients' individual needs.
- For security reasons, the center used different PCs for creating e-medical records and for using the Internet. This hindered productivity and increased operating costs.
- Updates to the subsystems had made them complicated and hard to operate. Ongoing developments made the system even harder to maintain.

Solution

- Deploy Universal Outpatient* system using Intel® Xeon® processor E5 family-based servers running Microsoft Virtual Desktop Infrastructure* (VDI*) and Intel® Core™ processor-based mobile clients

Result of installation

- Doctors can see individualized treatment information on terminals in consulting rooms.
- Security is improved, since information and diagnostic information are separated from Internet usage, even when they are accessed on the same PC.
- The IT operation workload is significantly reduced, since 600 clients and 56 virtual servers running on eight physical servers are all centrally managed.

Reconfiguring consultation rooms as needed

Supporting the healthcare of the community, Tosenkai Medical Association, Keiju Medical Center Group (Keiju Medical Center) created a Keiju Health Care System* made up of consulting rooms, a rehabilitation facility for the elderly, and a facility for the physically handicapped for local treatment. Looking to provide medical treatment throughout Japan's Noto Peninsula, Keiju Medical Center was the first to aggressively promote IT, build an information network for the entire group, and provide e-medical records and image transfer to the local treatment facilities to improve the quality of treatment. Keiju Medical Center reconstructed its main building in 2013 to provide cutting-edge, acute-phase medical treatment.

The president of Keiju Medical Center Group, Masahiro Kanno, explained the concept of the new hospital building and the importance of virtualization technology: "This hospital's new building does not have any permanent signage to label the departments of internal medicine and surgery. The 20 wards in the building are simply facilitated with a PC and a bed for medical treatment. These revolutionary wards can be rearranged as either surgical or orthopedic as the situation requires. This new system also enabled centralization of reception desk tasks and shortened patients' waiting time. It allowed more space in hospital wards and corridors, and a more spacious surgery theater to include advanced medical equipment." This concept was called the Universal Outpatient system.

Virtualization technology enabled Universal Outpatient*, an innovative healthcare environment

“Adopting the Universal Outpatient* system has enabled us to centralize the reception desk tasks and shorten patients’ queues. It also allowed us to make more space in the hospital wards and corridors, and a more spacious surgery theater with space for advanced medical equipment. The most important function that the Universal Outpatient system delivers for us, however, is the virtualization technology.”

– Masahiro Kanno
President,
Keiju Medical Center

Normally, each medical department in a hospital has dedicated wards, with PCs exclusively set up for the assigned doctor. Under the new concept, it is not possible to exclusively assign PCs because the medical department and doctors who will use the PC and wards will differ daily. The concept of Universal Outpatient would not have become possible without virtualization technology that enables any member of staff to log on to any PC at any time and call up their dedicated screen.

Making e-medical records available while simultaneously connected to 600 Windows* 8 virtual clients

The construction of the new hospital building provided the opportunity to overhaul all the medical treatment and information systems including the electronic medical records and picture archiving and communication system (PACS). Takeo Ozawa, chief manager of the Information Administration Department of Keiju Medical Center, explained the challenges before the system overhaul: “The hospital has been proactive in adopting IT systems. It started using an IC tag management system for its medical departments in 1994. An ordering system was introduced in 1997, and then electronic medical records were introduced in 2002. Along the way, a variety of subsystems were developed. As a result, we started to experience operational challenges from the complicated system. When the hospital building was to be reconstructed, we wanted to move to a simple and fault-tolerant system. Also, for security reasons, the old system was physically divided into the medical treatment system and information system. Each consulting room had two PCs, one for the e-medical records and one for using the Internet. We wanted a single system to reduce costs and improve convenience, while meeting our security needs.”

To meet its goals, Keiju Medical Center considered virtualizing the hospital IT system by using the Windows* Server 2012 Hyper-V* 3.0 and Microsoft VDI*. “After

carrying out various tests and cost comparisons, we realized that virtualization with Hyper-V and Microsoft VDI has ample benefits. When selecting the hardware, the focus of evaluation was on achieving stable performance, which the Dell PowerEdge* server provides,” said Ozawa.

The new system uses 39 Intel Xeon processor E5 family-based Dell PowerEdge R820 servers with a capability of simultaneously supporting 56 Hyper-V virtual servers. The Dell Latitude* 5530 was selected for the client, and the operating system was upgraded from Windows XP to Windows 8 (Windows 7 for some desktop machines). The system supports 600 virtual clients running simultaneously on the VDI platform. The e-medical records and PACS can be operated with Windows 8. The Intel Core processor-based Dell Latitude 5530 laptop enables long battery life and high-level protection using built-in security features such as trusted platform module, Dell Data Protection*, and Access*. The smart multi-tasking provided by Intel® Hyper-Threading Technology has given us an environment that operates effectively even when multiple applications are used simultaneously. With Hyper-V server virtualization and VDI client virtualization, a universal outpatient user can log in from any PC in any diagnosis room and use the environment specific for that user.

Another merit of virtualization is a hybrid environment that allows seamless use of both the e-medical record system and the Internet from single PC. Moriyuki Tani of the Project Management Department of the Solutions Service Delivery Headquarters, Dell Japan, who is in charge of the system architecture, explained, “When using a virtual operating system, although it appears to the user that the e-medical records and Internet Explorer* are on the same machine, both are set to be accessed through a logically separated network to avoid security issues. Also, as a result of using only Microsoft products for all information-related services, information mapping among all the systems became



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easier and the systems have become more user-friendly."

Akio Horimoto, deputy chief manager of the Technology Development Department of Software Service Inc., which takes care of the e-medical records system, said, "The new environment has enabled us to use all the systems such as the e-medical records, PACS, ordering, SharePoint Server*, Exchange Server*, and Lync Server* with a single login because our user master of the e-medical records, Newton2*, has been linked with Active Directory*. Our company is involved in developing systems for many medical institutions. Very few other hospitals provide a seamless usage of the diagnostics and information systems with a single login while adopting virtualization at all fronts."

Total services through the entire healthcare life cycle

"The new system architecture includes a communication platform comprised of the latest version of Exchange Server, SharePoint Server, and Lync Server," explained Ozawa. "With this, we can now sync Lync Server and Outlook* to share presence information and communicate using instant messages. Now we are working to further utilize Lync Server to link the internal system data with audio data. Possibly within a year, we plan to integrate all voice communication, such

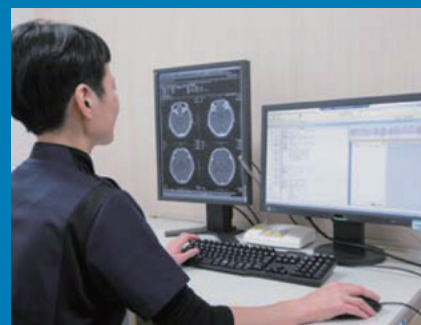
as nurse calls, and create an environment in which we can browse the e-medical records while video conferencing with an outpatient. We have cleared all the technical hurdles that were standing in the way of achieving this. We just need to finish defining the related rules and policies, which will be done soon."

President of the Keiju Medical Center, Masahiro Kanno, explained how the new system ties in with not only the Group's business but also the future of the Noto area: "The Keiju Medical Center's slogan is 'helpful and effective healthcare.' We aim to provide optimum healthcare services covering acute-phase medical treatment, hospitalization, post-discharge care, rehabilitation, and nursing assistance. To achieve this, it is important that we maintain close cooperation not just at Keiju Medical Center itself, but also among all our Group's facilities, including our rehabilitation facility for the elderly, a facility for the physically handicapped, and our daycare services. The Keiju Kanazawa Health Center was opened this year in July and Laurel Heights Keiju Aged Residential Home is scheduled to open in 2015. To strengthen cooperation among our group, which is steadily expanding, we think it is necessary to establish systems such as Lync Server video conferencing. Some people have expressed doubts

E-medical records system

The e-medical records system was provided by Software Service Inc., which has 40 years of experience developing healthcare information systems.

The e-medical records system Keiju Medical Center chose is Newton2. Since this is a free product, all applications developed by Software Service can be used on all the terminals. In this way, the system contributes to information sharing among all types of health professionals at various locations. For example, doctors can view medical records from any terminal, even those not in the consultation rooms, such as a nurse's station or inspection room. Information sharing has become smooth. The system also allows access restrictions by job type, which serves to keep the medical records secure. Since the database structure is available to the public, data can be freely processed and used when creating statistical material for academic announcements or personal research.



In the wards, with Universal Outpatient, the doctors can use the e-medical records in a way that meets their individual needs or preferences.

Results of installing a new system based on virtualization technology

To start up a personalized environment, a doctor who conducts medical consultations using Universal Outpatient enters an ID and password on the desktop terminal in the assigned consultation room. Doctors can access the medical records of the patients in their schedules or any emails. The PC is easy to use because it has all the user's personal customizations such as user dictionaries, shortcuts, and bookmarks. For example, from the first few letters typed in the search box, the function suggests different keywords for each user because the keywords an executive uses the most may differ from those an orthopedic surgeon or a neurosurgeon uses. Since the virtual environment can deliver personalized settings, users don't notice any difference in the way they work, no matter which terminal they log on to. If the user is drafting an email or document on one PC, it will also be delivered to the other PC he logs into. In other words, users can bring their personal desktop environment with them wherever they go.

Access both the e-medical records and Internet from one terminal

Ozawa explains the benefit of introducing the system: "Nowadays, the Internet is essential for everything. Doctors use it to search for literature; pharmacists investigate the side-effects of new drugs; and administration staff downloads documents such as application forms. Many users tell me that being able to access e-medical records and use the Internet on the same terminal is convenient."

Simpler operations and administration along plus information sharing

The new system has benefits for hospital management as well. Kanno explained: "The virtualization technology can be used not only by the Keiju Medical Center, but also by all facilities inside the group. This promotes information sharing among the entire group and makes it easier to relocate personnel. Since the virtualization technology has enabled us to use the systems without regard to the CPU, memory, and hard disk of a terminal, we can look forward to lower costs for upgrading hardware. This means hospital management will continue to reap the benefits of the system for as long as we continue using it."

The system maintenance benefits are also clear. For software upgrades, the administrator can update all virtual clients in a single batch. Since the system only uses Microsoft products, it is easy to perform coordinated backup operations of the operating system and the database. This has significantly reduced maintenance work. Ozawa explained, "Previously, whenever there was a hardware failure, it was necessary to manually transfer all the dictionary and My Documents files."

Now all that is required is to replace the machines, which is going to make system administration a much simpler task."

about constructing new hospitals and increasing the investment in IT while our society's population continues to both age and decrease. However, I believe this is the right strategy. We wish to provide helpful and effective healthcare to the community so that people can live a longer life in peace. If we can more broadly promote this value of living in peace, then I think more and more people from regions outside the Noto area will move here. Aiming to realize such a vision, we will continue to cooperate with the government to create work and an attractive lifestyle."

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