



THE COMPUTERWORLD HONORS PROGRAM

CASE STUDY

LOCATION:
VILLEJUIF CEDEX, France

YEAR:
2006

STATUS:
Laureate

CATEGORY:
Medicine

NOMINATING COMPANY:
EMC

ORGANIZATION:

Institut Gustave Roussy (IGR)

PROJECT NAME:

The Institute Gustave-Roussy Advances Cancer Treatment

Summary

The Institute Gustave-Roussy (IGR) is one of Europe's leading cancer research and treatment centers, treating more than 44,000 oncology patients each year. IGR relies on fast, reliable on-line access to comprehensive patient information such as medical data and images to ensure the highest level of care for its growing volume of patients. Since June 2004, IGR has had entirely filmless data storage.

Previously, IGR found that its existing data storage infrastructure, consisting of disparate storage servers, was not keeping pace with the rapidly growing volume of patient information, particularly with radiology Picture Archiving Communication Systems (PACS) data. Working with EMC, the Institute consolidated its medical, PACS and administrative data onto an EMC storage-area network (SAN) and implemented tiered storage to facilitate information lifecycle management (ILM). This assures IGR clinicians of fast access to comprehensive online patient information. At the same time, tiered storage has delivered cost-savings, improved efficiency in managing its volumes of stored data, and supports compliance with regulatory requirements.

To streamline IT administration and ensure rapid recovery of data, IGR also replaced tape backup with centralized backup to disk, and implemented active archiving to reduce the amount of production data requiring backup. As a result, IGR saves significant time and costs by backing up a steady – not constantly growing -- volume of production data. With its automated archiving strategy, IGR easily meets demanding regulatory compliance requirements.

IGR then went a step further, enabling 24x7 business continuity by replicating data from all storage tiers to a redundant SAN. If its primary SAN should fail, IGR is assured of uninterrupted access to vital patient information, with minimal data loss and rapid recovery.

Today, IGR has achieved its initial goal of building a data storage infrastructure that will accommodate its rapidly growing volume of PACS data. By giving its clinicians and researchers fast, failsafe access to comprehensive patient information, IGR knows it can deliver the highest level of medical care to its patients.



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Introductory Overview

Professor Gustave Roussy founded IGR (then the Institut du Cancer) in 1921 based on two then-revolutionary ideas. First, that taking a global approach to cancer treatment via multi-disciplinary teams is the best way to determine and deliver the best possible treatment for each patient. And second, that high-level research based on collaboration between clinicians and researchers is essential for understanding cancer mechanisms and developing the most effective treatment.

These principles, now accepted as key to the fight against cancer, rely on access to and sharing of comprehensive patient information. In 1986, IGR developed SIMBAD, an online information system that gives a 360-degree view of the patient's treatment, history, and total relationship with the Institute. As new functionality was added over the years, SIMBAD became a central repository of all patient-centric data, including appointment scheduling, medication, pathology reports, and treatment records.

In the mid-1990s, IGR implemented the first PACS in France. That meant moving from film to using digital technology to capture, file and store medical images such as Computer Tomography (CT), CT-PET, MRIs, mammograms, X-rays, and ultrasound.

However, as the size of its PACS data load grew, IGR faced a new challenge: the inability of its existing optical disk archiving system to handle the integrated SIMBAD-PACS data load. As its archiving server became obsolete, IGR sought a data storage solution capable of handling the increased load while guaranteeing the integrity and legibility of the stored images. In parallel, IGR decided to update its entire production IT infrastructure to better support the heterogeneity of its many systems and applications.

In its place, IGR implemented a tiered ILM strategy based on EMC CLARiiON networked storage and EMC Centera content addressed storage (CAS). The newest, most often accessed PACS images are stored on top tier EMC CLARiiON systems for 30 days, giving healthcare providers the fastest access to these in-demand files.

When IGR's patient data hits the ten-day mark, it is automatically replicated to the second, archival tier supported by two, mirrored EMC Centeras. Thus, the images are stored simultaneously on EMC CLARiiON and EMC Centera. As a result, the data is stored and protected over the long term, all the while being quickly accessible. From a medical perspective, this means clinicians can quickly access a patient's entire medical and treatment history, view the evolution of a cancer and make better decisions on the next treatment steps. By contrast, on the administrative level, IGR's long-term, secure storage of patient information – with fast online accessibility – enables IGR to comply with healthcare regulations governing patient data security and availability.

To protect its top tier data, IGR implemented centralized backup of its production servers with EMC NetWorker. The RAID storage on one EMC CLARiiON CX system along with synchronous EMC MirrorView replication between this system, on another CX system, and the two EMC Centeras, guarantee optimal data protection. This architecture allows for the delivery of the level of services expected by PACS users while guaranteeing the protection of data and two-hour data and application recovery.

For IGR's IT group, their ILM strategy delivers has proved a more efficient and economical solution. It lets the IT staff choose the appropriate storage level – and cost of storage -- for

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different kinds of data based on criticality. IGR can now economically store data over the long term, instead of using much more expensive tape libraries.

Benefits

IGR's new consolidated data storage infrastructure reinforces the core value expressed in its motto, "From Research to Recovery." The greatest single benefit is that the Institute's combined teams of researchers and clinicians now have fast, assured access to comprehensive online patient information, reaching back over the entire span of a patient's treatment. This directly results in the highest level of diagnosis, medical care and follow-up to IGR's cancer patients.

In recent years, some of the most important breakthroughs in cancer detection and diagnosis have been due to improvements in imaging technology, including mammography, ultrasound and MRIs. IGR's centralized storage of this content addressed data, whether on production storage or in the long-term archive, gives its healthcare providers fast access to the patient's newest as well as the oldest PACS images, and enhances the quality of patient care.

Laurent Tréluyer, IGR's Director of Information Technology, said, "The greatest advantage of the EMC solution is the ability to select a storage level in accordance with the criticality of the data and without volume restriction issues. The immediate availability of the images, the opportunity to share them and keep them as long as necessary, the inclusion of pre- and post-surgery photos, Echo-Doppler, ultrasound, filmed sequences, and, over the long term, digital microscope images, undeniably contribute to an improvement in patient diagnosis and follow-up."

From a business perspective, IGR's tiered data storage has provided cost-savings and improved efficiency in managing its volumes of stored data. Now, the most recent and, therefore, most often accessed patient data is reserved for EMC CLARiiON storage, giving healthcare providers the fastest access to these in-demand files. That means, for instance, that physicians can view, share and evaluate diagnostic images online, almost as soon as they are taken. The patient doesn't have to come back for further testing and follow-up. Most important, clinicians can make treatment decisions faster – a critical advantage in cancer treatment.

Older, less critical data is archived to lower-cost EMC Centera, where it is still quickly accessible and protected over the long term. So, clinicians can quickly access a patient's entire medical and treatment history, view the evolution of a cancer and make better decisions on the next treatment steps. Further, because digital PACS images don't degrade the way films do, the images maintain their legibility over time. This is particularly critical in cancer care, where the tiniest speck on a mammogram, for instance, can indicate a pre-cancerous condition.

Dr. Robert Sigal, IGR's Chief Radiologist, said, "By using EMC Centera for archiving PACS data, the patient avoids undergoing tests a second time and carrying suitcases full of documents. For caregivers, being able to access images and all of the patient's data at any time makes it easier to monitor the evolution of the disease, assess treatment effectiveness, and gain better knowledge of the patient's specific situation. Now that images are digital, we can also share them with our partners, research centers or pharmaceutical companies, specifically in the context of therapeutic trials."

Equally important, IGR's storage strategy can now accommodate the rapidly growing volume of incoming PACS data, while ensuring the integrity and legibility of stored images – regardless

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of the imaging modalities used to produce them. Especially in oncology, the preservation and “readability” of PACS images is absolutely critical.

At the same time, IGR has solid, 24x7 business continuity, with redundant data storage hardware and software, synchronous replication and automated disk backup. As a result, it is assured of uninterrupted access to literally vital patient information, with minimal data loss and rapid recovery in case of a failure.

This architecture allows for the delivery of service that IGR’s PACS users need while assuring data protection and providing business continuity with two-hour recovery and restoration of services. Plus, with the daily transfer of aging PACS data to its Centera archive, the volume of CLARiiON-based data stays constant. As a result, IGR saves significant time and costs by backing up a steady – not constantly growing -- volume of production data, and it does not have to continuously purchase more costly storage as that data volume grows.

The Importance of Technology

IGR has long recognized the strategic role of information technology (IT) in delivering the highest level of oncology treatment and care. Key components of its patient-oriented IT infrastructure are the SIMBAD patient file system, implemented in the mid-1980s. At that time, each SIMBAD patient file contained almost everything needed for a complete, historical record of each patient and treatment – except images.

In 2002, IGR added that vital piece of its IT functionality with the implementation of its GE Centricity PACS. Since then, it has progressively expanded its PACS capabilities, adding new modalities of digital imaging, including CT, MRI, angiography, mammography, echography and scintigraphy. To ensure rapid access to this critical information, IGR relies on the latest storage technology, which provides ready access to both active PACS data and archived data from 18 diagnostic stations, 20 post-treatment image stations, and 500 consultation stations. Since June 2004, IGR has been a filmless hospital.

Working with EMC, IGR implemented a tiered storage-area network (SAN) to maximize performance and cost effectiveness of storing its critical patient data. Today, IGR’s two-tier storage strategy, based on EMC CLARiiON storage and EMC Centera archiving systems, enables IGR to manage patient data using the most appropriate tier throughout the lifecycle of patient care. The newest, most often accessed patient data and PACS images are stored on top-tier EMC CLARiiON systems for ten days, giving healthcare providers the fastest access to these in-demand files.

After ten days, PACS files are automatically transferred to EMC Centera content addressed storage, enabling this data to be quickly accessed and protected. The synchronous replication of both production CLARiiON and archival Centera storage, assures optimal data protection. Further, all of IGR’s IT infrastructure – servers, networks, etc. – are or soon will be fully redundant.

Now, with consolidated, SAN-based storage, IGR has automated, centralized backup of its servers by EMC NetWorker with a library of 100 cartridge bands equipped with LTO2 drives. With Dell PowerEdge Blade servers, IGR used Dell PowerVault backup libraries as part of its backup strategy. This architecture allows for the delivery of services levels expected by IGR’s PACS users, including uninterrupted access to data and minimal, if any, loss of data in emer-

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gencies.

Originality

Since its inception, IGR has “pushed the envelope” in terms of taking new, non-traditional approaches to cancer treatment and research, as well as using the latest information technologies to support its primary mission. The impetus to revamp its IT infrastructure and develop a tiered, SAN-based storage strategy was a direct result of its breakthrough implementation of PACS – the first in France.

In addition, IGR created an innovative, comprehensive patient information system that integrated the SIMBAD patient file system with its PACS records. This integrated system not only created a centralized repository of patient data, but also included the means to make that data available across the entire IGR healthcare complex, including to the actual patient point-of-care.

In this setting, IGR took the innovative step of venturing into ILM with its two-tier, online storage of all patient data. For the first time, IGR could manage its data with greater “granularity,” selecting the most appropriate data storage level based on the criticality of data. This effort has directly resulted in more efficient, cost-effective storage management combined with greater access to all levels of data.

IGR’s new data storage strategy has been revolutionary in another sense. By making extensive patient information accessible – and at the same time protected against loss or corruption – IGR has enhanced the interactions of the members of its entire healthcare community. Now, such disparate groups as researchers, primary caregivers, and specialists can interact and make more informed decisions.

Success

The IGR project to establish a solid, scalable and reliable storage solution for its patient records and PACS data has been a huge success. It has achieved all of IGR’s goals and is still evolving, as IGR continues to migrate data previously archived on optical disk to EMC Centera. The Institute knows that, as its SIMBAD and PACS data volumes continue to grow, they have a robust, highly flexible storage system to support that expansion.

The entire IGR community – healthcare providers, researchers, administrators and, most of all, patients – benefits from its tiered data storage strategy. IGR’s combined teams of researchers and clinicians now have fast, assured access to comprehensive online patient information, reaching back over the entire span of a patient’s treatment. The immediate availability of PACS images and the ability to share them and keep them as long as necessary directly results in the highest level of diagnosis, medical care and follow-up to IGR’s cancer patients.

Difficulty

In 2004, IGR was confronted with two challenges:

- Developing and implementing a storage strategy that would support and protect its rapidly growing patient files and PACS data, and
- Addressing ongoing maintenance problems related to the heterogeneity of its systems and ap-

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plications.

To deal with both issues, IGR undertook two major IT projects at the same time. In addition to implementing the tiered SAN and business continuity solution, IGR also had to update its entire IT infrastructure.

Both of these projects were massive undertakings. Fortunately, IGR was able to call on the technical expertise and implementation assistance of two key vendors, EMC and Dell. Working collaboratively, IGR and these vendors designed the optimal solution to meet the Institute's complex data storage and protection needs.