

Melbourne Health and BioGrid Australia Turn to New Database to Host Medical Images



BioGrid Australia
Melbourne, Australia
www.mmim.org.au

Industry:
Healthcare

Employees:
19

Oracle Products & Services:
Oracle Database

Key Benefits:

- Created online database of DICOM images to help epilepsy, stroke, and multiple sclerosis researchers devise new treatments for the conditions
- Simplified information technology requirements through native processing of DICOM images
- Preserved patient privacy by anonymizing DICOM images without losing the link between the image and patient record
- Reduced storage requirements

“Oracle Database 11g gives us functionality that allows us to preserve patient confidentiality while allowing experts to undertake valuable research that can lead to greater insight into epilepsy and other conditions.” – Naomi Rafael, Senior Database Administrator, BioGrid Australia

Melbourne Health is a major public health provider in Victoria, Australia. The organization provides comprehensive acute, sub-acute, and community-based health care programs to about one-third of metropolitan Melbourne’s population, as well as general and specialist services to regional and rural Victorians and state-wide services.

Melbourne Health hosts the information technology infrastructure for a unique health service offered by BioGrid Australia. This organization provides medical researchers with an online service that lets them access data from disparate sources, so that they can compare medical histories gathered by many institutions and use the collected data to help understand and treat different diseases. BioGrid Australia conducts research funded by Australia’s state and federal governments.

BioGrid Australia recently made available a set of historical Magnetic Resonance Imaging (MRI) images from the past 15 years which had only been available on archival tapes, to help researchers understand how to treat epilepsy. However, the organization had no database or associated infrastructure that could cope with the specific image types or privacy requirements of the new service.

After evaluating several solutions, BioGrid Australia selected Oracle Database 11g to host and manage data used by the service. Oracle Database 11g’s ability to natively process the industry-standard Digital Imaging and Communications in Medicine (DICOM) image type and metadata played a critical role in BioGrid Australia’s final decision. Overall, the database offered superior functionality at lower prices than competing solutions.

The organization expects Oracle Database 11g to play a critical role in epilepsy, stroke, and multiple sclerosis (MS) research.

A New Way for Researchers to Access Data

BioGrid Australia is dedicated to helping medical researchers access data to treat a wide range of diseases. The organization provides online access to medical records gathered by many medical institutions. By making this data available online, BioGrid Australia makes it far easier for researchers to access information that may help them more quickly develop life-saving treatments.

Online access also makes it possible for geographically dispersed researchers to work on the same data. This potentially widens the pool of expertise used to address problems and advances the chances of useful breakthroughs.

In 2007, Melbourne Health offered BioGrid Australia the chance to include a vast set of medical images, half of which are brain scans, in its collection. This new resource offers epilepsy, stroke, and MS researchers the opportunity to gain new insights into the conditions.

“For example, we have a database of uniquely identified epilepsy patients, their conditions, their visits to the clinic, seizure episodes, and the medication they take,” explained Naomi Rafael, senior database administrator with BioGrid Australia. “The idea is that a researcher will be able to, if authorized, make a single query to find people with certain types of epilepsy and retrieve all of the images.”

By correlating all of the data available about epilepsy patients, researchers may be able to identify more effective treatments faster than has previously been possible.

Privacy Challenges

The images held in the database are captured in the DICOM file format. DICOM is a standard that governs transmission, storage, and printing of medical images. Medical researchers prefer the format as information about a patient is integrated closely with its associated image.

For BioGrid Australia, this feature of DICOM created a privacy challenge, as while the organization wanted its researchers to access as many images as possible, it must preserve patient

privacy by ensuring researchers cannot identify individual patients. The organization therefore had to anonymize DICOM images without losing the link between the image and patient records.

In addition, BioGrid Australia's existing data collection was held in multiple formats that could not be adapted to the DICOM standard. New infrastructure to present the images was therefore needed to create the service.

BioGrid Australia initially examined Picture Archiving and Communication Systems applications (PACS) commonly used to store and access the output of medical imaging devices.

"A fully-functional proprietary PACS system was beyond our budget," said Rafael. BioGrid Australia also ruled out open source PACS systems as Melbourne IT did not support Linux-based platforms.

Rafael also considered a database or database-driven content management system, but again felt it did not offer an appropriate solution as it could not store DICOM files without complex workarounds.

"We looked at several databases that could store large, unstructured data types. But if you wanted to look into the metadata about DICOM files, you had to catalog and store it separately," she said.

The result would have been a database of images and a second index of the metadata, an untenable situation as BioGrid Australia had neither the resources nor the desire to operate two pieces of infrastructure for the new service.

BioGrid Australia also rejected the approach of engaging developers to write a custom application. As well as being expensive, the move would very likely have made the organization highly dependent on those developers. If they moved onto other projects, BioGrid Australia would be left without the expertise required to enhance the system.

Why Oracle?

With other databases and PACS systems unsuitable, Rafael's search led her to Oracle. "Whenever I looked up DICOM data storage on Google, Oracle kept coming up," she said.

Further research led Rafael to the realization that Oracle Database 11g could handle DICOM images natively. The product also incorporated functionality to preserve patient data within the DICOM files while “anonymizing” each record to ensure researchers do not access data they are not entitled to.

The new infrastructure also means the 24-hour turnaround required from receipt of an image request to delivery to a researcher on CD or DVD is slashed to one hour.

“When the system is in production, researchers will be able to select an image or images, download them via a self-service application, and burn them onto a CD or DVD as required,” she said.

The availability of Oracle Database 11g on the Microsoft Windows platform also provided Melbourne Health with a measure of comfort. With the Melbourne Health information technology department more conversant with Microsoft operating systems than with other products, this reinforced its capacity to manage the new database within the BioGrid Australia infrastructure.

However, BioGrid Australia has also trialed the loading of DICOM images in Oracle 11g on the Linux platform so it is prepared to integrate additional hospitals’ images if they are on Linux.

BioGrid Australia also welcomed the compression capabilities of Oracle Database 11g as they expect to reduce the load on the storage systems required to preserve the organization’s data.

Implementation Process

BioGrid Australia participated in the Oracle Database 11g beta program after questioning Oracle about the multimedia data management capabilities of Oracle Database 10g.

“The beta team completely exceeded our expectations when they responded to our questions with several teleconferences and internet demonstrations of the features we needed for our application with the DICOM images,” said Rafael. “They provided documentation pre-publication and the relevant developers to answer our questions as they arose.

“Overall, the beta team’s contribution to our project was excellent and very responsive.”

BioGrid Australia has written the applications required to support its deployment of DICOM images in Oracle Database 11g. “We used the 11g DICOM import method and also the direct load facility, which was faster,” said Rafael.

“Our Oracle 11g implementation infrastructure can be re-used,” she added, pleased that the system’s flexibility will allow BioGrid Australia to use the database for future projects such as storing Positron Emission Tomography (PET) scans.

Advice from BioGrid Australia

- Avoid custom software where possible as it introduces risk.
- Do not store data in complex systems.
- Use software that can natively process, handle, and store specific file formats.

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