



The German Aerospace Center (DLR)

Providing efficient access to Germany's 2-PB archive of Earth observation images with IBM Informix

Overview

The need

Germany's Aerospace Center needed a reliable and highly scalable database server to provide efficient access to more than 2 PB of image data while fulfilling long-term data preservation policies.

The solution

The center deployed IBM® Informix® database to serve as an inventory of image data and IBM Informix Geodetic DataBlade® for the representation of data in three dimensions.

The benefit

The solution has provided efficient access to 2 PB of image data with no data lost in 10 years and requires less than one full-time employee's time to administer at each of two sites.

There are about 560 operational satellites in the sky.¹ Each one completes an orbit of the Earth approximately every 100 minutes. The cameras and sensors that many of these satellites carry have made satellite imagery pervasive in today's society. Recreational Internet users zoom in on houses and neighborhoods anywhere in the world. It's more than entertainment, however. Population research, environmental studies, crisis response planning, inner-city traffic planning, military surveillance and many other applications benefit from the "eyes in the sky" that remote sensing technology provides.

Since 1957 and the launch of Sputnik, more than 25,000 man-made objects have been launched into space. Along the way, the exploding growth in the volume of photographic and digital images became a challenge for data management and archiving. For example, consider the German Aerospace Center, or Deutsches Zentrum für Luft- und Raumfahrt (DLR), with 7,000-plus employees at 16 locations in Germany. As the country's aerospace agency, it maintains a research operation focused on Earth and atmospheric observation for global monitoring, environmental studies and security.

Stephan Kiemle is the chief scientist and head of the software development team at the DLR's German Remote Sensing Data Center (DFD), which has developed a Data and Information System (DIMS) to solve the challenge of data storage and archiving.



“IBM Informix database management system provides efficient access to our 2 PB of image data and is the key to access.”

—Stephan Kiemle, Chief Scientist, German Remote Sensing Data Center, German Aerospace Center

Over a decade ago, the data flowing in from research satellites was growing exponentially, but the DFD was attempting to manage it with multiple disparate information management systems. It was not a solution designed for the future. Convinced that the DFD needed a single information management system designed to meet the various needs of the DFD, its commercial clients and the nation, Kiemle was part of a decision-making team that led to development of a multi-mission DIMS.

Seeking access to precious data assets

“The goal was to store data and handle all business workflows,” says Kiemle. “Long-term preservation is one very important aspect, because the longer the data is stored, the more value it has, especially in environmental studies, where we can see changes in ice floes, coastlines and other geological details. But there are other important needs such as order handling, delivery, dissemination of data to users and user services in general.”

The team worked with a third-party software company to develop middleware for data management and looked for a reliable and highly scalable database server to provide efficient access to multiple petabytes (PB) of image archive data. The database would need to fulfill long-term preservation policies and provide a high level of availability and scalability to accommodate future exponential growth.

DLR chose the IBM Informix database to serve as an inventory of image data. The inventory contains the metadata describing the image—for example, acquisition time, sensor parameter, spatial extent and temporal extent. It also includes administrative information such as the internal location of the files in the archive. The actual images are stored in a separate physical archive.

Solution components

Software

- IBM® Informix® 11.5
- IBM Informix Geodetic DataBlade® V3.12

Services

- IBM Information Management Software Services
-



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No data lost in more than 10 years

A key reason for selecting Informix was the availability of IBM Informix Geodetic DataBlade module for the representation of data in three dimensions. “IBM Informix Geodetic DataBlade is very well suited to Earth observation data,” says Kiemle. “These satellites fly over the poles. If you want to have scenes of data that include the pole, it is much more natural to take a three-dimensional representation. I recommend the Informix Geodetic DataBlade to anyone with global-scale spatial applications.”

For more than a decade, IBM Informix and IBM Informix Geodetic DataBlade have supported the business of the DFD, executing long-term preservation policies and retrieving and delivering Earth observation images to users of the system. When a user initiates a request for data,

a digital library queries the inventory which runs on IBM Informix database. The library software retrieves the metadata, then matches the metadata with the files in the physical archives and delivers the data, in XML, and the files to the user.

In more than 10 years, the size of the picture archive has grown to 2 PB, and IBM Informix has not lost a byte of the DLR's data assets. The value of this data is inestimable. For instance, with the pictures stored in the archive and the metadata managed by Informix and Informix Geodetic DataBlade, the DLR was able to respond to the March 2011 earthquake and tsunami in Japan with "before" pictures and "after" imagery taken on the morning the earthquake took place. The side-by-side pictures helped local authorities estimate the size of the disaster and guide rescue teams on the ground.

Streamlining workflow and compliance

"IBM Informix database management system provides efficient access to our 2 PB of image data and is the key to access," says Kiemle. "Without the metadata, it's not clear where the files are in the archive, so they become unusable. Informix has never let us down."

With the help of IBM Informix, DLR can meet its commitments in a timely and efficient manner. IBM Informix Geodetic DataBlade even helps to streamline the workflow at a critical juncture. When DFD delivers data, it has to follow security regulations, some of which are defined by German law. For example, persons from certain geographic locations cannot receive images of certain other geographic locations, depending on the resolution of the data. DFD has to cancel delivery if the matchups are positive. "The spatial indexing and matching methods, as provided by the Informix database server and the Geodetic DataBlade, provide superior performance to similar technologies in the market," says Kiemle. "We can perform the necessary checking much faster than we could if we had to do it any other way."

The DFD is spread out over two sites at Neustrelitz and Oberpfaffenhofen, with IBM Informix installed at each site on a host and a High Availability Data Replication (HDR) server for failover in the event one system is down.

Low maintenance, robust database

At each site, one staff member maintains the IBM Informix database in a fraction of the time which is normally spent on his other job responsibilities. Over the course of a decade, IBM Informix has never required more staff time.

“The administrative effort for IBM Informix is really reasonable,” says Kiemle. “And the database is remarkably robust. In 10 years, we haven’t changed anything. We just followed the upgrades. Anytime we needed support, the Informix support team has been very reliable.”

For more information

To learn more about the IBM Informix database software, please contact your IBM representative or IBM Business Partner, or visit the following website: ibm.com/informix

You can get even more out of Information Management software by participating in independently run Information Management User Groups around the world. Learn about opportunities near you at: ibm.com/software/data/usergroup

For more information on the German Aerospace Center (DLR) visit the following website: www.dlr.de



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IBM Corporation
Software Group
Route 100
Somers, NY 10589

Produced in the United States of America
January 2013

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¹ <http://en.wikipedia.org/wiki/Satellite>



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