Building a Comprehensive Space Object Catalog for Real Time Tracking

The Challenge: Track Millions of Space Objects in Real Time

NASA’s Orbital Debris Program Office estimates that there are more than 215,000 objects larger than one centimeter in size currently in orbit, and millions more that are less than a centimeter in size.

Since the launch of Sputnik 1 in 1957, tracking this space debris for collision avoidance and human flight safety has become a top priority for government space agencies. Yet as the task has become more important, it has also become more difficult, with the amount of potentially dangerous space objects in orbit increasing exponentially from year to year as new spacecraft are launched.

The U.S. Air Force needed a comprehensive catalog of these space objects, and the ability to track the objects in real time, in order to increase situational awareness and manage collision avoidance.

The Solution: Objectivity/DB

Objectivity/DB was selected by MITRE, a federally funded research and development center, as the database management system best suited for building the comprehensive space object catalog within the Space Situational Awareness Foundational Enterprise (SSAFE) program that will be used by the U.S. Air Force.

With Objectivity/DB, U.S. Air Force personnel will be able to track space objects in real-time, so that decisions about spacecraft placement and collision avoidance can be made in seconds, rather than hours or days. Objectivity/DB will also allow the system to scale nearly infinitely as the catalog grows larger.

Acting as the system engineer to the Air Force, The MITRE Corporation prototyped the use of Objectivity/DB to demonstrate the advantages of a distributed database that allows concurrent data access for a higher aggregate throughput and scalable features to accommodate mission growth.

Objectivity/DB also satisfied a crucial requirement for the Air Force’s implementation of SHAC – it allows Air Force personnel to run existing fortran algorithms without modification, therefore preserving vital legacy data.
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The system MITRE prototyped will be taken over by system integrator Lockheed Martin. The company will install and maintain the SSAFE system at the Joint Space Operations Center at Vandenberg Air Force Base.

“The application that MITRE is prototyping is an innovative, high-end, mission-critical program that demands nearly infinite scalability and maximum reliability,” said Objectivity President and CEO Jay Jarrell. “It is a perfect fit for Objectivity/DB.”

About Objectivity/DB
Objectivity/DB is a fully scalable, distributed processing architecture that manages localized, centralized or distributed databases by synthesizing large, complicated streams of data into a single logical view.

About MITRE
The MITRE Corporation is a not-for-profit organization chartered to work in the public interest. As a national resource, it applies its expertise in systems engineering, information technology, operational concepts, and enterprise modernization to address its sponsors' critical needs.

MITRE manages three Federally Funded Research and Development Centers (FFRDCs): one for the Department of Defense (known as the DoD Command, Control, Communications and Intelligence FFRDC), one for the Federal Aviation Administration (the Center for Advanced Aviation System Development), and one for the Internal Revenue Service and U.S. Department of Veterans Affairs (the Center for Enterprise Modernization).

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