

DATABASE DEVELOPMENTS MAXIMIZE THE POWER OF IMAGES

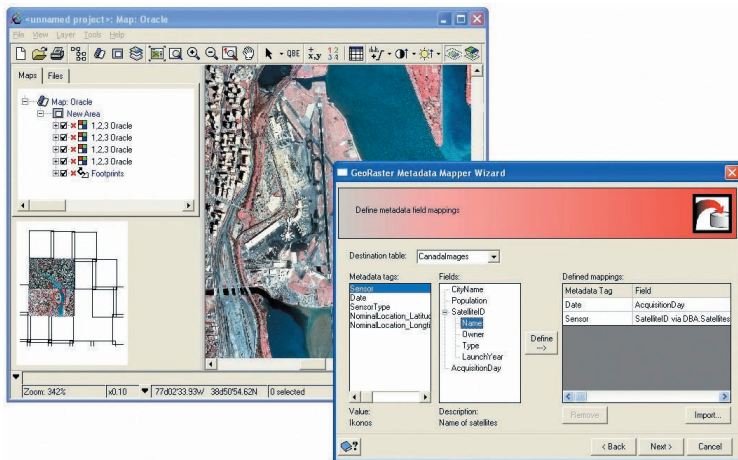
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Remotely sensed data acquired from a variety of platforms capture Earth's surface features as panchromatic, multispectral or hyperspectral images, providing perhaps the most cost-effective, renewable geospatial data available today. Recent advances in commercial database technology, such as Oracle's 10g database software with a native GeoRaster data type, enable imagery to be managed in a highly scalable, secure environment and used by both client tool vendors and solution providers alike.

Why Go Native?

Several key advantages are achieved by creating native geospatial types in the database, along with a suite of foundation management methods with published interfaces.

1. Virtually *unlimited scalability* is assured in an environment that routinely uses individual image objects that are 400GB in size to test interfaces and evaluate performance.
2. *Security mechanisms* that far exceed locking solutions delivered via a file system are a well-tested, mature component of the basic infrastructure available to all applications.
3. *Unprecedented integration* is achieved across the enterprise when a single repository manages all mission-critical information (traditional and geospatial) for business intelligence, decision support and the complete range of core applications.



Tools that load, transform and/or extract image-based data and enable visualization in the context of existing business workflows are key to the adoption of imagery across the broader enterprise.

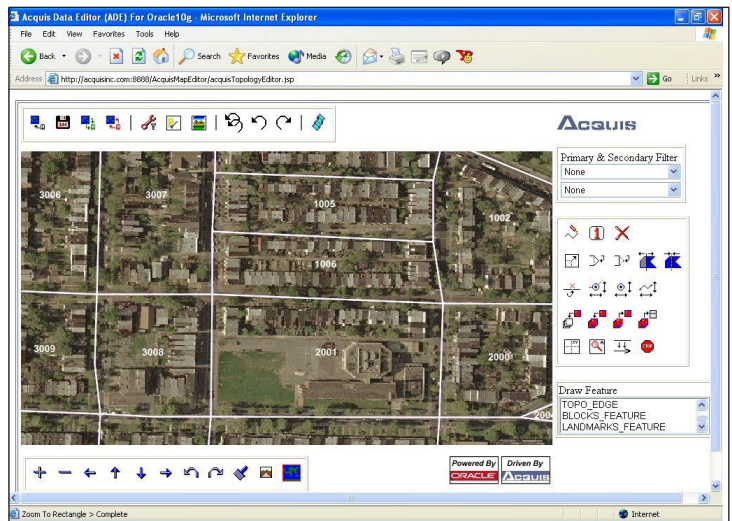
Although the capability to manage geospatial imagery as a native type in the database is a relatively new phenomenon, early adopters with production capabilities already are emerging. In general, early adopters fall into one of two general categories:

1. Those with a compelling, immediate requirement who have been waiting for a specific feature to become available.

2. Those who recognize significant potential in a new feature(s) and are willing to absorb "risk" today in return for a leadership position tomorrow.

Applications being delivered by early adopters of geospatial imagery in commercial databases reflect both of these basic motivations.

The following sections examine some early offerings that leverage the capacity to store, manage and manipulate image data in the context of a commercial database that also serves as the primary enterprise repository for mainstream data. In each case



Tools that leverage the spatial infrastructure delivered with the commercial database to create new data, to fuse different data types in a single working environment and to implement sophisticated business logic address immediate needs as well as the requirements of new markets.

the database management system platform is Oracle 10g, and the geospatial image management capability is provided via the new GeoRaster data type introduced with Oracle 10g Spatial.

A Taxonomy of Use Cases

It's often convenient to look at technologies from the perspective of the specific work they accomplish rather than focusing on the domain in which they accomplish their work. In the case of imagery, it's possible to identify several core activities: image data management and publishing, image analysis and feature extraction, and visualization and decision-support systems.

Image Data Management and Publishing: This class of application is used to create and manage large repositories of imagery often with a goal of publishing the data to one or more user communities. For example, the National Geospatial-Intelligence Agency has a specific mission in regard to the aggregation and dissemination of imagery across a specific community of users. Similarly the growing National Spatial Data Infrastructure (NSDI), as well as the emerging Global Spatial Data Infrastructure (GSDI), is likely to serve a comparable role for a different community of users.

The need to populate geospatial image repositories via Extract, Transform and Load functions using geoimagery in a range of formats from a variety of airborne and satellite platforms is a fundamental step in staging and fielding the geodata clearinghouses necessary to support NSDI, GSDI, etc. Leica Geosystems and PCI Geomatics, leaders in remote sensing and image-processing solutions, recognized this existing need and moved to deliver this capacity as early adopters of Oracle10g's GeoRaster feature.

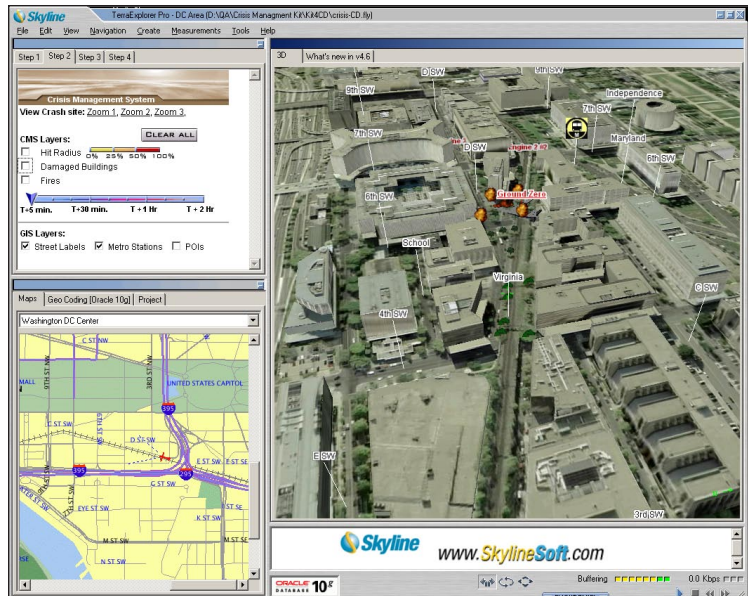
Image Analysis and Feature Extraction: A broad community of users pre-process and/or post-process image products to derive additional information from the base product, to assign specific values to features that can be identified in an image or to create some other “value-add” to the base product.

The capacity to manage vector and image-based geometry in a single commercial database effectively *fuses* these important geospatial data products into a common environment in which each type of data can be used to the advantage of the other. For instance, feature-level manipulation of vector data can be accomplished using corresponding image data as a point of reference. Acquis Software recognizes this potential and has built a sophisticated set of tools that leverages GeoRaster data and vector geometry in the new Oracle 10g topology data model to accomplish feature-level manipulation and maintenance that can be visualized using Oracle’s MapViewer, a Java-based map visualization tool.

Visualization and Decision-Support Systems:

Combining baseline image products with other geodata and logic allows users to create landscapes that can be visualized and used in modeling, simulation and other applications that train users, refine response scenarios, etc.

The potential to leverage geospatial imagery and associated vector information in the context of complex visualizations enables first responders and others to *practice* scenarios that will save lives and minimize the impact of disasters and other catastrophic events. These visualizations depict sophisticated operational models and decision-support scenarios, providing the ability to *test* alternative responses. Skyline Software leverages the GeoRaster data type in the database, along with vector data and the new address geocoding capability in Oracle 10g, to deliver comprehensive, collaborative visualization capabilities into tactical decision-support environments.



The ability to accomplish high-end visualization and/or animation by fusing imagery and other spatial data from the commercial database in a Web-based collaborative environment will drive new applications in tactical decision making across defense and emergency response, as well as in applications ranging from insurance to asset management.

Ongoing Advances

The role of the commercial database as a provider of integrated, location-enabled infrastructure to the broad community of users in government and across private-sector enterprises is firmly established. The addition of raster image management capabilities to the mature vector management facilities in commercial database management systems creates a comprehensive platform that supports many solutions in database development, publishing, decision support and visualization, etc. Production solutions from a range of early adopters validate this proposition and blaze a trail that others already have begun to follow.

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