

For the IT professional
Information management solutions



IBM **Information Management** software



IBM Spatial Solutions

Leverage information on demand for your spatial information system.



Information on Demand

Today's organizations exist in a world where information is increasing exponentially. Many organizations are discovering that the best way to manage their information assets is through an open, service-oriented approach, transforming captive data from individual applications and repositories into openly available information.

IBM's Information on Demand strategy, a component of IBM's Service Oriented Architecture, provides the framework for an organization to develop a standards-based, flexible IT infrastructure that will deliver information as a service. Treating information as a service helps to create a unified view across an organization, increasing information availability, quality, context and flexibility. Thus enabling organizations to deliver information, consistently and appropriately, when and where it's needed most—on demand.

Managing spatial data on demand

IBM Spatial Solutions provide the database capabilities to help organizations manage and deliver spatial data on demand. Organizations realize greater benefits by being able to manage information identified by geographic locations and being able to integrate this data with existing organization applications to visualize scenarios, extend intelligence, make more informed decisions and solve complex problems.

To give you maximum flexibility, IBM delivers several spatial solutions to manage spatial data designed to work with geospatial applications from ESRI®, leaders in geographic information system (GIS) technology, as well as other third-party and open source GIS client software. Based on open industry-based standards, IBM Spatial Solutions offer high levels of performance and scalability, ease application development and can help lower the total cost of ownership.

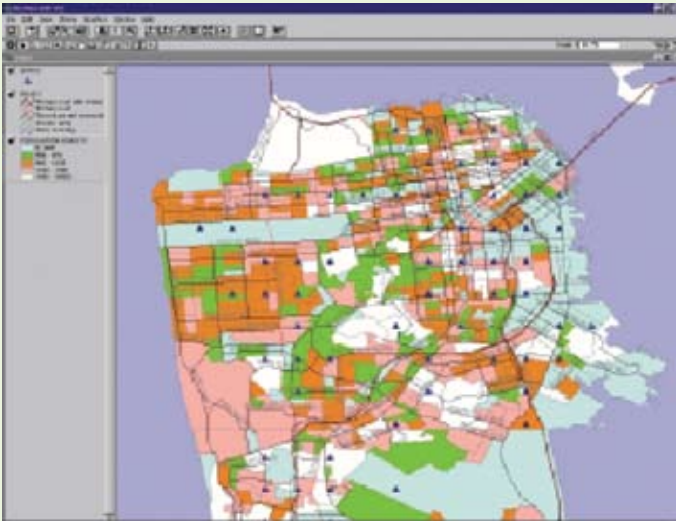


Figure 1.1 Desktop and server GIS software leverage the powerful spatial search capabilities of IBM databases.

Spatial data: Boosting precision in spatial queries

Spatial data consists of values that denote the location and shape of objects and areas on the earth's surface. Spatial objects include physical entities like buildings, lakes, roads and store locations; conceptual objects, such as property lines and postal code boundaries, as well as stationary items (mobile telephony transmission towers) and mobile items like cell phones.

Spatial information includes various types of facts:

- *The location of features with respect to their surroundings, such as points within a city where hospitals and clinics are located, or the proximity of the city's residences to local earthquake zones; postal codes and street addresses represent common, untapped spatial information.*
- *The relationship of geographic features to each other; for example, information that a specific river system is enclosed within a specific region or that certain bridges in that region cross the tributaries in that river system.*
- *Measurements that apply to one or more geographic features, such as the distance between an office building and its lot line or the length of a bird preserve's perimeter.*

A high percentage of all data has implicit/inherent geographic—or spatial—characteristics. To get the most value from this data, you need the ability to exploit these characteristics to formulate queries containing such parameters as distance, driving time or proximity. Such spatial queries allow a higher level of precision than spatial “proxies,” such as postal codes, traditionally used in organization analyses. Used alone or in combination with traditional relational data, spatial information can help you make better-informed organization and policy decisions.



Figure 1.2. Crime Information Warehouse Solution helps police organizations integrate data to better understand criminal patterns.



Figure 1.3. Branch Reconfiguration technology is used by financial institutions to locate their ATM banking facilities.

Real-world applications use IBM Spatial Offerings

Government

The options are virtually limitless for government organizations where spatial technology enables accessing, sharing, and visualization of data related to people, places and services. Spatial analysis plays a critical role in areas such as public safety, economic development, land records, health and human services, homeland security, defense and intelligence. One example is the City of San Francisco, Department of Telecommunications and Information Services (DTIS) who use geospatial information to plan and coordinate their daily organization processes, such as real property analysis and emergency services.

Insurance

The insurance industry takes advantage of spatial data. For example, to process claims, spatial analysis helps claims processors to locate customers and claims, visualize damage zones, and create incident boundary maps. For underwriting, insurance companies use spatial analysis to decide what risks to insure and at what rates by identifying areas of peak loss potential, mapping historic patterns of claims and segmenting high-risk policies by geographic region.

Financial institutions

GIS technology provides financial institutions insights about their customers' purchasing habits, financial behavior, and needs for additional products or services enabling banks to target their best prospects. Financial Institutions use spatial data for site prospecting to determine locations of new bank branches and ATMs as well for addressing federal regulations such as fair lending within branch trade areas where spatial data can display the distribution of account holders in relation to surrounding demographics and economic conditions.

Telecommunications/location-based services

IBM Spatial Solutions deliver an essential strategic technology to many information providers. For example, providers can integrate spatial data with organization information while enabling personal digital assistants, cellular phones and laptop computers to find the desired stores and rapidly perform product tracking, scanning and other location-based services. In addition, emergency call-center solutions can query emergency service centers with incident locations to optimally deploy help.



Information Management Solutions

IBM Spatial Solutions

IBM Spatial Solutions implement industry-standard Open Geospatial Consortium® (OGC®) extensions to IBM databases, DB2® and Informix® Dynamic Server (IDS). These extensions intelligently load and manipulate complex geospatial and traditional data. They enable many industries and sectors to increase the power and usability of existing location-based data and consequently enhance their ability to thrive and succeed.

IBM Spatial Solutions can help a myriad of industries realize a competitive advantage through key features such as these:

- *Addition of data types so that spatial data can be represented as geometric shapes, such as points, lines and polygons*
- *Structured Query Language (SQL) access to spatial data for loading, retrieving, indexing and other functions*
- *SQL queries of spatial data, separately or joined with conventional business data stored in any IBM DB2 database or Informix Dynamic Server (IDS)*
- *Ability to work with visualization tools such as ESRI ArcGIS™ to provide visual map renderings of spatial data*
- *Application development and spatial data visualization with open source projects such as GeoTools, GeoServer and uDIG*

DB2

The IBM DB2 Spatial Extender for Linux®, UNIX® and Microsoft® Windows® provides capabilities to load, manage and analyze spatial information about geographic features in the DB2 database along with traditional data. The DB2 Spatial Extender extends the function of the DB2 Database with a set of advanced spatial data types that represent geometries such as points, lines, and polygons and many functions and features that interoperate with those new data. In addition by taking advantage of the features of DB2 9, including Data Partitioning, the DB2 Spatial Extender is ideal for spatially enabling business intelligence and data warehousing applications.

DB2 Spatial Support for z/OS® allows spatial information to be stored and manipulated in DB2 for z/OS through spatial data types and functions. Applications using spatial data can now take advantage of unique reliability, availability and security capabilities delivered only by DB2 for z/OS. This is especially beneficial for customers in financial, insurance and government where spatial analysis capability can enhance the existing business process by spatially enabling data warehouse applications. It also allows customers to fully leverage their existing IT infrastructure investment in DB2 and System z™ while delivering SOA on the most resilient environment possible.

Informix

The IBM Informix Spatial DataBlade™ brings all the features and benefits of IDS to location-based data enabling organizations to transform both traditional and location-based data into important information. The Spatial DataBlade Module takes advantage of the built-in Informix R-tree multi-dimensional index, an innovative approach to accessing spatial, multi-dimensional and traditional data, to provide industry-leading spatial query performance. This capability makes IDS with the Spatial DataBlade a strong choice for applications with stringent performance and customization requirements, such as those in emerging solutions for tracking moving objects, relying on technologies such as GPS and RFID.

SOA-ready

IBM's Service-Oriented Architecture (SOA) provides a foundation for transforming organizational processes as linked, repeatable tasks or services. Using ESRI's ArcSDE and ArcGIS server products in the context of an IBM WebSphere®-based SOA environment, users can easily deploy web services that deliver geospatial content and functionality such as spatial mapping, query and analysis. This is key as organizations are becoming increasingly spatially literate and finding a greater need for open access to centralized geospatial information and services across the enterprise and beyond.





Integration with ESRI

IBM Spatial Solutions provide support for ESRI's rich product set in order to enable third-party products to work seamlessly with either IBM databases DB2 or IBM Informix Dynamic Server (IDS). ESRI's ArcSDE complements the IBM DB2 Spatial Extender or IBM Informix Spatial DataBlade module by providing quick access to the spatial data stored in the databases and utilized for GIS software programs. The ArcSDE service automatically recognizes columns in the IBM databases, making it available to all ESRI-supported applications and others capable of reading this format.

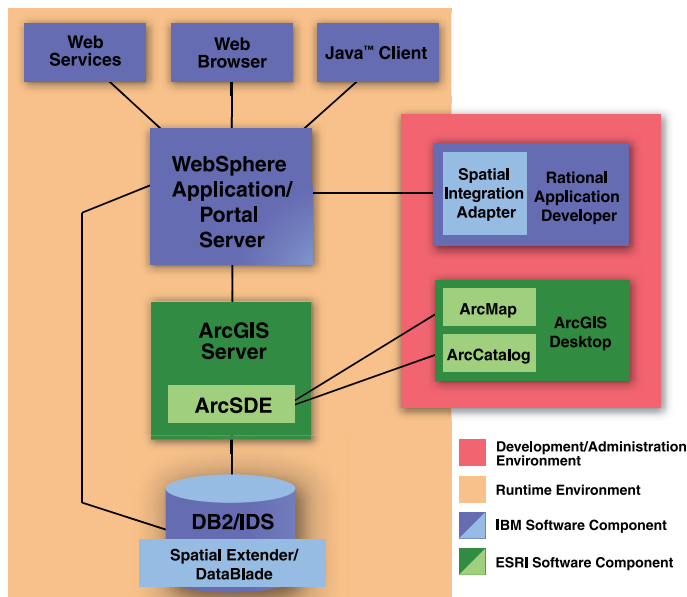


Figure 1.4. High-level architecture for IBM Spatial Server.

Geodetic data: Treating the earth as a globe

On the Earth's surface, the shortest path between two points is not a straight line; it is an arc, owing to the curvature of the earth. Geospatial search and manipulation engines that handle flat-plane geometry must approximate the round surface of the earth by projecting the surface onto flat planes using various transformations. These projections introduce distortions, which can be kept within acceptable bounds only by limiting the area covered by each map.

However, databases with geodetic functionality can compute accurate distances and areas. The DB2 Geodetic Data Management Feature and the Informix Geodetic DataBlade are specifically engineered to work with geodesics and calculate their length efficiently.

Key features include:

- *Manages geospatial information referenced by latitude/longitude coordinates*
- *Supports space- and time-based queries without the limitations inherent in map projections*
- *Achieves high precision regardless of global location*
- *Provides integrated time and floating-point dimensions for single-index searches and true spatio-temporal data management*
- *Ensures precision and accuracy—engineered (from inception) to treat Earth as a globe, not a flat plane*

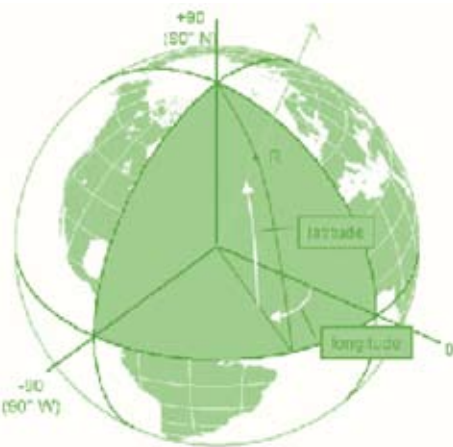


Figure 1.5. Geodetic latitude and longitude angles.

Real-world Geodetic applications

Many industries can benefit from or are already utilizing this type of technology, including:

- *Military command and control and asset management*
- *Meteorology and oceanography (scientific, government and commercial) to store, manage and query observations, images and model data*

- *Satellite imagery and digital map providers for systems supporting browsing, ordering and delivery of images and maps*
- *Any organization managing geospatial data or large regions or scattered around the world, where managing multiple projections in the database is impractical*

DB2 Geodetic Data Management Feature

The IBM DB2 Geodetic Data Management feature enables functionality to expand spatial analysis beyond the flat plane-bases of DB2 Spatial Extender. This feature has the capability to manage geospatial information reference by latitude-longitude coordinates, support global spatial queries without the limitations inherent in map projections and help achieve high precision regardless of global location.

IDS Geodetic DataBlade

Combined with Informix Dynamic Server, the Informix Geodetic DataBlade module provides the ability to manage spatial information with high-performance indexing

on space and time allowing for high performance and ease of development. In addition, a server-based API allows for the further customization and extension of Geodetic DataBlade functionality.

Get started now

IBM and its Business Partners have the breadth and depth of experience to help you solve your most critical information-intensive needs. Backed by 24x7, enterprise-level support and expertise, as well as a steadfast commitment to spatial technology, IBM is ready to help you get started today.

To learn more about IBM Spatial Solutions and other IBM information management solutions, contact your IBM representative or IBM Business Partner, or visit:

ibm.com/software/data/spatial





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