Florida International University creates interactive maps with DB2.

**Overview**

- **Application**
  Data warehouse for TerraFly, an online geospatial data visualization and analysis application created by Florida International University

- **Business Benefits**
  Millions of users expected within the next year; ability to accommodate thousands of concurrent users; superior speed, performance and scalability compared to other databases; cost efficiency for improved competitive advantage in commercial applications

- **Software**
  IBM DB2® Universal Database™ Enterprise-Extended Edition for AIX® and Linux®; IBM DB2 Spatial Extender; IBM DB2 Net Search Extender

- **Hardware**
  IBM RS/6000®

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Florida International University (FIU), Miami’s public research university, became one of America’s most dynamic institutions of higher learning by setting the bar sky high. Since opening in 1972, FIU has achieved many benchmarks of excellence that other universities have taken more than a century to reach.

This ongoing search for excellence is clearly embodied at the High-performance Database Research Center (HPDRC) in the university’s School of Computer Science.

“IBM’s superior technology makes DB2 the best commercially available relational database—for both the center and our customers.”

—Dr. Naphtali D. Rishe, Director, High-performance Database Research Center (HPDRC), School of Computer Science, Florida International University
Higher Education Software Solutions

Funded by industry and such high-profile government agencies as NASA and the National Science Foundation, HPDRC conducts research on database management systems and various applications. Its work leads to new types of systems and the refinement of existing ones. For instance, collaborating with the U.S. Geological Survey and major satellite data suppliers, the center has created an easy-to-use, online geographical data visualization and analysis solution called TerraFly. Developed by HPDRC with proprietary software, TerraFly enables end users who access www.terrafly.com to “fly” over remote, two-dimensional imagery and interactively manipulate data.

To get TerraFly off the ground, and store and manage the vast amount of data needed for high-resolution images, HPDRC turned to what it considers a quintessential high-performance solution, IBM DB2 Universal Database, running on both IBM AIX and Linux. Today, its database supports users who want to view and manipulate images associated with Miami, Florida, and Washington, D.C.—from maps of neighborhoods to housing sites and hotels. The university’s goal is to make mapping data available through TerraFly for the entire United States within a year, and for the entire world within five years.

“IBM’s superior technology makes DB2 the best commercially available relational database—for both the center and our customers,” says HPDRC Director Dr. Naphtali D. Rishe. “There’s almost no end to DB2’s advantages, which include high efficiency, fast querying and search speed, the ability to store very large amounts of data and excellent support of such industry-standard interfaces as JDBC™.”

“Through the generosity of IBM and its DB2 Scholars Program and the superiority of IBM technical solutions such as DB2, we have excellent support.”

—Dr. Naphtali D. Rishe
Providing a bird’s-eye view of the world

TerraFly is definitely not a flight of fancy—it's real-life, practical applications are many. Users can “fly” over aerial photography of a city while simultaneously viewing various data overlays to the imagery, such as names of streets. House-hunters can scan prospective neighborhoods, “see” the homes along with their selling prices and click on a particular residence to retrieve a sales brochure. Travelers can fly over a resort area, zoom in on an appealing vacation hideaway or hotel, then click on the image to hyperlink to the establishment’s online reservation system.

For more sophisticated and in-depth analyses, specialized researchers can enter their own algorithms. Explains Rishe, “As an example, the regular imagery for the visible spectrum doesn’t allow a researcher to see and study undersea vegetation. Through the TerraFly interface, the user can enter algorithms instructing the system to combine data from satellite-born devices to solve various queries, and nudge data in the proper proportion to make undersea vegetation visible.”

Even in these complex analyses, TerraFly’s ease of use in realtime is a key benefit, and the performance of DB2 plays a leading role. As a testament to the speed, robustness and scalability of DB2, Rishe notes that the database would have no trouble enabling thousands of users to conduct simultaneous fly-overs as TerraFly’s universe expands to include the expected millions of free and fee-based users over the next year. Says Rishe, “DB2 scales very nicely, allowing our application to run very efficiently even when we distribute data across various servers.”

From public service to commercial applications

The center plans to provide free public access to limited “fly-overs,” charging for longer periods of usage and data downloads. It will also create and sell tailored solutions to governments and industry that want high-resolution images of particular areas of the world, as well as more detailed analytical functionality. These marketed solutions can include the client’s data along with all the necessary hardware, software and DB2 licenses. The university anticipates that TerraFly will manage more than 13 terabytes of data—making it one of the largest databases supporting Web-based applications. This preponderance of data is being provided to HPDRC as part of a cooperative agreement between the U.S. Geological Survey and FIU and includes 1-meter resolution aerial photography over the United States and Landsat-7 30-meter resolution satellite imagery over much of the populated global land mass.
“In addition to being a very efficient database for the geographical applications our customers are deploying, DB2 is cost effective for them, too,” says Rishe. He adds, “Being able to run DB2 on Linux, which is an exceptional operating system, is another advantage for us. Besides being stable, Linux facilitates easy software deployment, which will further enhance our competitive edge in our commercial applications.”

**DB2—the obvious database choice**
Unlike other geospatial systems, TerraFly is designed for users at all levels and runs using standard Web browsers. At the heart of the solution is a Java™ applet developed by the HPDRC that resides on the client side. End users don’t need to download plug-ins or any other software, as the Java applet provides the fly-over capability seamlessly. Even users with 56K modem connections can experience smooth virtual flights. Connections with third-party Web sites, such as online reservation systems, are essentially hyperlinks that open another window on the user’s computer screen.

Solutions being developed involve clustered IBM RS/6000 SP™ servers as well as IBM DB2 Spatial Extender for efficient access to two-dimensional geospatial data and IBM DB2 Net Search Extender to facilitate end-user queries.

Photographic and mapping data comes from the U.S. Geological Survey under the cooperative agreement. In addition, the center purchases data from satellite organizations at a discounted price. As a participant in the IBM DB2 Scholars Program, which supports organizations dedicated to setting new standards for database application excellence, FIU receives DB2 site licenses for development purposes at no cost. This helped FIU get its project off the ground cost efficiently.

Even without the DB2 Scholars Program, DB2 still stood out as an ideal choice for TerraFly for both its performance and low total cost of ownership. “As a database research center, we have extensive experience with a variety of databases. We had no need to conduct a competitive study to determine what we already knew—that DB2 was the best commercial relational database for Terrafly,” says Rishe.

**Mapping out the future**
Moving forward, the HPDRC team will continue to enhance its TerraFly solution. On the horizon are three-dimensional flights that will offer users an even more realistic experience along with a greater range of navigational control.

“TerraFly’s capabilities and ease of use will enrich people’s lives by facilitating visualization and manipulation of satellite imagery for a broad, worldwide audience, from schoolchildren and their teachers to specialized researchers to local and national government organizations,” says Rishe. “Through the generosity of IBM and its DB2 Scholars Program and the superiority of IBM technical solutions such as DB2, we have excellent support.”

For more information
Please contact your IBM marketing representative, IBM Business Partner or call IBM Direct at: 1 800 IBM-CALL.

For information faxed direct to your location: 1 800 IBM-4FAX.

Visit our Web site at: ibm.com/software/data

For more information about Florida International University’s TerraFly project, visit: www.terrafly.com