A New View of Data

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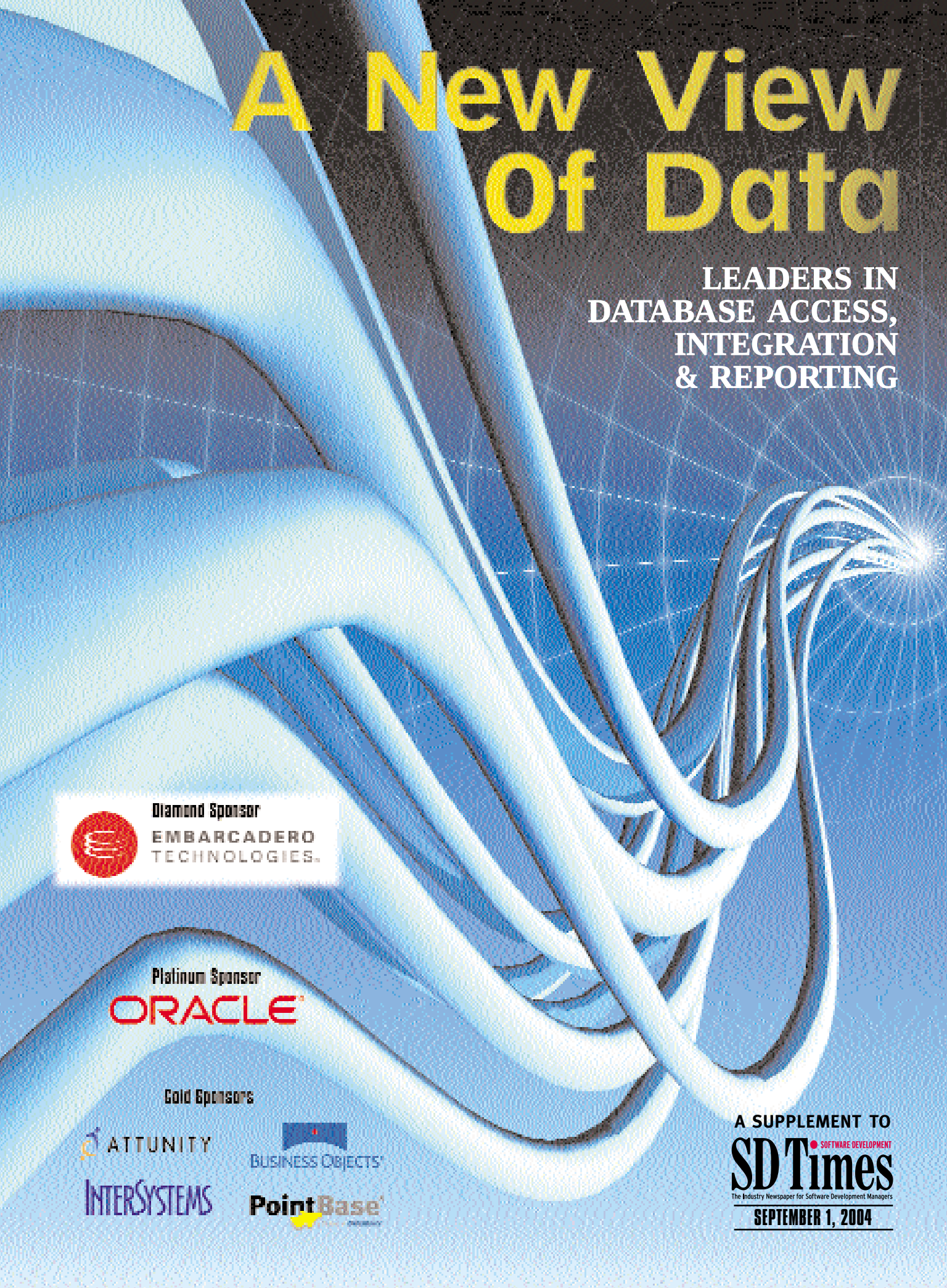

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The Industry Newspaper for Software Development Managers

SEPTEMBER 1, 2004

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Open Up Your Data

The Evolution Of Data

Alan Zeichick
Editor-in-Chief
SD Times

People expect a lot from data.

Web shoppers want instant access to pricing inventories, product specifications, previous order status, and where's my FedEx package all from one browser screen.

Business workers enter, edit, compare, search and retrieve thousands of items of data daily, not knowing or caring that a particular screen's fields, rows and tables might span a dozen applications and a half-dozen distinct platforms.

Managers and executives require more than data. They need information. It may be incredibly detailed, such as the raw materials breakdown for a specific product line over the past six months, or it may be a broader view that helps them better understand the business, from yesterday's collected sales taxes to an analysis of daily sales correlated against the weather.

Increasingly, the expectations of data consumers are growing higher. They want the report *now*, not at the end of the month. They want it in an Excel spreadsheet, not in a 2-inch stack of greenbar. They want self-service. They want to customize, to tailor the information and its presentation to suit their needs and preferences.

Where does that data come from, how is it retrieved, aggregated, presented? The users of your organization's information systems don't know and don't care. That's *your* job. Your colleagues and customers don't want excuses or discussions of access protocols, data models, field transformations, data dictionaries, or schema incompatibilities across disparate namespaces. That's *your* problem.

Your organization's data is one of its greatest assets. The applications your team writes, maintains and integrates rely on that data. Whether your needs revolve around modeling, access, reporting or integration, we hope that this supplement to SD Times helps you find the best tools for giving your users a new and better view. ▮

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A SUPPLEMENT TO SD TIMES
SEPTEMBER 1, 2004

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Solving The Database Puzzle

By Jennifer deJong

Whether looking up a customer's account, checking to see what's in stock or verifying a price, virtually all enterprise applications need to extract data from more than one source. And to meet the demands of their users, applications must retrieve the data quickly, deliver it in a form that's meaningful, and make sure the information is off-limits to all but those authorized to access it.

Accomplishing all that is an ongoing challenge for developers. For one thing, unless the application and the data source rely on the same syntax, the application cannot simply issue commands to call data directly. To get past this hurdle, developers depend on data access technologies, such as those provided by J2EE or the .NET Framework, to enable communication between applications and data sources that don't speak the same tongue. Although data access technologies are increasingly automating the process of getting the two parties to talk—and some rely on open standards such as XML—using them still requires developers to do a fair bit of custom coding.

A second hurdle is staying one step ahead of hackers, who misuse their smarts to commit malicious acts, such as stealing credit-card numbers from e-commerce sites that keep customer data on their servers. Safeguarding such information requires an ongoing effort on the part of developers and IT professionals who must outsmart hackers to ensure ironclad security.

Also complicating data access matters is the increasingly sophisticated nature of the queries posed by users of business applications.

Jennifer deJong is a senior editor of SD Times.

Straightforward requests for information, such as a customer's account number, require an application to query a single data source and return the result to the application from which the query originated. But a search for customers who live in the Northeast, earn annual incomes of more than US$1 million and made at least five purchases in the past year, for example, is more complex. It will likely require the application to search more than one data source and to aggregate the information before returning the result to the user.

JAVA AND .NET CONNECTIONS

To connect applications to data sources, developers typically rely on access technologies geared specifically to the languages in which they are working. For Microsoft developers using .NET languages such as C# or VB.NET, that's ADO.NET, the application-level interface provided by the .NET Framework. The successor to Microsoft's ActiveX Data Objects (ADO) enables .NET applications to link to both relational and nonrelational data sources.

In ADO.NET, data is formatted in XML and transferred from a data source to a dataset and from a dataset to other components in an application. Because datasets also are represented in XML, data can be transferred among applications and components, regardless of the platform on which they were developed.

.NET developers say ADO.NET provides a useful mechanism for linking to data sources and offers improvements compared with its predecessor. But it still requires a lot of hand-coding. Microsoft promises forthcoming editions won't demand that developers write as much code.

In the Java world, the standard for linking applications to relational databases is Java Database Connectivity (JDBC). An API included in both J2SE and J2EE, JDBC technology connects to SQL databases as well as to other tabular data sources, such as spreadsheets or flat files.

But because Java and relational databases are fundamentally different from each other, mapping one to the other can result in "impedance mismatch." The term describes what happens when object-oriented Java links to a relational database, in which the concept of an object simply does not exist. Java objects have both data and behavior associated with them, but relational technology simply stores data in rows and columns and manipulates the data using a language such as SQL.

One approach to solving this problem is to introduce an abstract layer, called a persistence layer, between the relational database and the object model of the application. The persistence layer encapsulates the database access function from business objects. So, instead of writing code to deal with the database, developers define metadata that spells out how the relational database maps into objects.

To help manage that mapping, the Java Community Process developed a high-level API specification called Java Data Objects (JDO). Sun Microsystems Inc. released a reference implementation of JDO, and open-source implementations are readily available, too. Communication with relational databases can also be handled through an Enterprise JavaBean (EJB) container

Piecing together connectivity, accuracy, delivery and security

or by third-party object-relational mapping tools.

EXTRACT, TRANSFORM AND DELIVER

Writing to APIs is labor-intensive. Solutions that bypass that process entirely ease the burden on developers and take data access technology a step further. Vendors such as IBM Corp. and Microsoft Corp., for example, are providing precoded adapters with integration and other enterprise servers. The application-specific adapters save developers from having to hand-code connections to PeopleSoft, SAP, Siebel and other applications the servers must interact with to execute business processes. The adapters are a boon to developers, who no longer have to contend with the nuts and bolts of how to communicate with each separate data source.

Open standards such as XML and Web services also are advancing information access. Because they decouple data from the application in which it resides, open standards can be used to extract data from one application, which is then transformed into a standard format, and deliver it to the application from which the request originated.

The use of Web services and XML is enabling corporate enterprises to provide business users with database systems that query multiple sources at once, through a single user interface. That allows them to base business decisions on a more complete set of information. Web services and XML also are allowing companies to carry out business processes, which move data in and out of multiple applications, with a minimal need for human intervention.

For instance, to process an order placed on a Web site, the Web application must interact with data sources that store customer, financial and inventory information, updating each source, then communicating with the customer regarding the order status.

MAKE SURE IT'S SECURE

Of course, how effectively applications get at data and move it in and out of the appropriate sources doesn't matter if a company does not have an appropriate security plan in place. Step one in safeguarding information involves making sure data can be accessed or modified only by those authorized to do so. There are two parts to that process: authentication and authorization.

Authentication is concerned with making sure the user is who he says he is, and is typically carried out using passwords. To gain access, the user simply enters the previously assigned or chosen password each time he logs on.

Authorization refers to the process of granting users privileges to access and/or modify particular applications and files. For instance, a system administrator could assign one user the right to view and modify the customer database, while granting another user the right only to view the data. Because it's common for companies to reorganize and for employees to come and go, to ensure data integrity, it's critical to keep authorization levels for all users up to date.

Since passwords are easy to steal and it's not unusual for their owners to forget or accidentally reveal them, more stringent authentication methods, such as digital certificates, are often used, particularly for Internet transactions. Essentially an electronic ID card that establishes that the user is who he says he is, digital certificates are issued by an authorized third party. They include the user's name, a serial number and expiration date, as well as a copy of the certificate holder's public key, which encrypts messages and digital signatures.

Also critical to ensuring data security is limiting access to the database server itself, making sure potential hackers cannot "see" the server. Even if a database server is set up to provide data to dynamic Web pages, it should never reside on the same server as the Web server. ▮

Illustration by Murat Baysan

CEO Perspective 2004:
Establish a Data Life-Cycle

Information technology has enabled immense amounts of data to become an integral part of daily business life. Until recently, the presence of data was sufficient for businesses to achieve competitive advantage. However, now inundated with an abundance of it, businesses have to unlock the value of data by handling and managing it proficiently and turning it into meaningful and relevant business information.

During the past couple of years, the focus of information technology has shifted from operational efficiency and competitive advantage, to meeting regulatory requirements and improving corporate governance. While regulation and efficiency are seemingly at odds, companies can align themselves to achieve both goals through a forward-looking data life-cycle management strategy.

Defining and implementing a data life-cycle management strategy is a formidable challenge. Data volumes continue their exponential growth. According to conservative estimates, the amount of enterprise data doubles roughly every two years. On the average, the amount of data that an enterprise database administrator manages doubles once every 26 months.

On top of this, mergers, acquisitions and consolidations introduce additional platforms and applications to an already daunting variety of technologies that IT teams have to support. In an attempt to mitigate these tactical issues, strategic initiatives to implement comprehensive data life-cycle management strategies get derailed.

Recognizing that tactical approaches offer Band-Aid solutions to already fragmented processes and infrastructures, many of our customers are starting to put an increased emphasis on aligning their productivity and efficiency–driven goals with increased governance requirements.

As we work with our customers to categorize and fulfill their core needs around both imperatives, we start observing a consistent set of requirements. While some of these requirements are common sense, others take on established approaches and processes.

GROUND RULES

To create a successful data life-cycle management strategy, IT management has to adhere to a certain set of ground rules. The strategy has to be scalable, extensible and repeatable. Scalability is essential in order to handle continuous data growth. Extensibility ensures that new platforms and technologies introduced to the environment can be adequately handled.

We now live in an age of compliance, so data must be handled properly.

Repeatable processes help mitigate risks associated with human error, ensure predictability and improve efficiency through standardization around best practices.

Operational efficiency and regulatory goals coalesce around three key categories of requirements. These are qualitative requirements, security requirements and fiduciary requirements. Qualitative requirements depend upon effectiveness, efficiency and availability of data. Security requirements focus on privacy, confidentiality and integrity of data. Fiduciary requirements call for regulatory compliance, reliability and accuracy of the information derived from data. Let's look at these three categories of requirements closely.

Qualitative Requirements. To meet these goals, we need to address effectiveness, efficiency and availability.

Effectiveness can be defined as the data being pertinent to its business use. Effectiveness requires data to be kept in its well-defined and explicit context, and this can be achieved through metadata management.

Efficiency focuses on the most effective and productive use of resources to provide the data. Efficiency depends on diligent optimization of infrastructure assets and utilization management.

On the other hand, availability dictates that data is accessible when needed. Solutions ranging from proactive monitoring that addresses problems before they arise to reactive corrections when availability is impacted make this possible.

Data Security. Privacy and confidentiality ensure that data is available only to those who have authorization to access it. This isn't a technology-only challenge.

Business processes need to be studied and documented—preferably as business process models—to ensure that technology that houses enterprise data implements befitting safeguards.

On the other hand, integrity of data

Management Strategy

Stephen Wong
Chairman, President & CEO
Embarcadero Technologies Inc.

keeps it in a synchronous state with other pieces of information with which it coexists. This requires proficient use of entity relationship modeling to ensure architectural integrity.

Separation of logical and physical models, by using modeling solutions that support bidirectional synchronization, ensures that the structural integrity of data is not compromised in favor of performance tuning.

Legal and Contractual Obligations. Fiduciary requirements can be met by making the data and its infrastructure comply with laws, regulations and contractual arrangements. This also is not a technology-only challenge.

Well-documented business requirements need to be accommodated by technology solutions such as availability, continuity, service-level and change management with provisions for remediation and reconciliation.

When developing a data life-cycle management strategy, IT management needs to improve the productivity of its people resources, improve the yield of hardware and software assets, and capture and protect the intellectual property that transforms this data into information.

The way to improve productivity is to use technology solutions that automate routine tasks, provide unified and homogenous interfaces to diverse platforms, and utilize tools and processes that standardize on established best practices. To increase the yield of hardware and software assets, diligent optimization and monitoring must be instituted.

Vigilant monitoring of activity and proactive management of utilization trends ensure that performance, availability and efficiency of data infrastructure are not compromised.

THE METADATA BRIDGE

Capturing and protecting intellectual property that turns the raw data into information needs to be designed and documented in the form of metadata. This not only ensures continuity across business activities, but also helps track change and ensures compliance with fiduciary requirements.

Metadata is the bridge across the chasm between data and information. Metadata defines the interrelationships across different data objects, application structures and business processes. Using modeling technology, metadata can be visualized and leveraged to share know-how across staff members with different roles in the organization.

When the changes to the structures and processes that are defined using metadata are recorded, organizational memory is captured. Coupling data and its metadata and supporting it with the right set of technologies ensure that quality, security and fiduciary requirements that constitute a sound data life-cycle management strategy are fulfilled.

Creating a strategic data life-cycle management strategy is not a trivial endeavor. For the past 10 years, Embarcadero Technologies Inc. has been working with more than 11,000 corporate customers to address the daunting challenges that surround data and the management of its life cycle.

To be able to address intricate issues that vary from one environment to another, solutions that support data life-cycle management have to be appropriately sophisticated. Ranging from cross-platform data management, data performance and availability to model-driven data solutions, our wide set of robust and feature-rich solutions continues to augment the data infrastructures of our customers, including 97 of the Fortune 100.

Throughout the age of information, proficient management of data has helped businesses achieve better results. We now live in the age of compliance. Proper handling of data has to complement its proficient management to save companies legal woes and to ensure that business executives don't end up behind bars. If you don't already have a data life-cycle management strategy, this is the time to be proactive and establish one. ▮

Oracle JDeveloper 10g Embraces Best Practices

When most people think of Oracle Corp., often the first things that come to mind are database engines and application servers. However, the Redwood City, Calif., company also offers a number of applications and development tools that, like all of its products, maintain the same commitment to open standards and interfaces.

In the area of application development, one tool that the company (www.oracle.com) believes can be a tremendous aid in developing and maintaining applications is Oracle JDeveloper 10g, an integrated Java and Web services development environment that has a metadata-driven philosophy when it comes to building software.

"JDeveloper 10g ships with the Oracle Application Developer Framework (ADF), which is a J2EE productivity layer," says Rob Cheng, product marketing director for Oracle Application Server and Tools. "It's implemented as a set of server-side libraries that use best J2EE practices, which is intended to make it easier for developers who maybe aren't as familiar with J2EE or don't have the time to deal with all the changing specifications to build applications."

To help, he says, "we give developers proven implementations on top of which they can build Web, Java or Web service applications. A lot of the J2EE stack deals with things for enterprise applications like transactions, security, state management and Web services interoperability. JDeveloper 10g can take native Java code and serialize it into XML to send it into a non-Java environment. So, for example, you can use it to integrate .NET applications with J2EE applications."

Oracle JDeveloper supports the complete development life cycle with integrated features for modeling, coding, debugging, testing, profiling, tuning and deploying applications. A visual and declarative development approach and the Oracle ADF work together to simplify application development and reduce coding tasks while providing a choice of technology stacks.

Rob Cheng
Product Marketing Director

JDeveloper focuses on Java application development using J2EE, J2SE or J2ME and enables XML-based application development with features such as an XML Schema Modeler, XML code insight and XML tag property inspector. JDeveloper also provides a development and modeling environment for building database objects and stored procedures and focuses on a visual and declarative approach to J2EE development. Within it, the same development method is used for various technology stacks.

For example, developers can choose to implement a persistence layer using simple Java classes, EJB, TopLink, Oracle ADF Business Components or Web services. Regardless of the chosen technology, JDeveloper provides a declarative way to create this layer, as well as drag-and-drop mechanisms to bind user interface components to any of these implementations.

JDeveloper supports development approaches that include a Model Driven Architecture declarative development, and hand-coding. As a Java-based tool, JDeveloper is a cross-platform IDE that runs on Linux, Unix and Windows; applications built with JDeveloper work with any data source, can be deployed to any J2EE-compliant app server, and can access any JDBC-compliant database. It also supports popular open-source frameworks and tools, providing built-in features for Struts, Ant, JUnit and CVS.

"Metadata-driven application development is really a means of making it easier to develop, maintain and change applications," Cheng says. "The metadata philosophy is that you should maintain a very clean separation of data and code as well as the metadata between those different layers."

For example, he explains, "in a traditional development project, you might have a database constraint for a variable, such as the salary level of a certain type of employee. Oftentimes, you're going to want to put that data check and data validation in more than one place."

Traditionally, what that meant was that a developer or, in the worst case, multiple developers, would have to hard code that validation into each of those layers. There may be two or three different developers who are working on the rich client or Web cache tier, the application server tier and the database. "When the constraint on the variable changes," he says, "it can take a lot of time and effort to go back and change it."

On the other hand, if a metadata-driven model had been used, the constraint never would have been hard coded in the first place, says Cheng. "All the information about salary boundaries would be in an XML metadata file, and you could use tools like the ones that Oracle provides to change them. The different pieces of the application would know to look at this metadata. We even provide management consoles that let a line-of-business user go in and change constraints, and the application at each layer would automatically read in that metadata and adjust them at each level." *–George Walsh*

ORACLE

Metadata-driven Application Development

For years, the holy grail of application development has been to combine the simplicity and accessibility of a declarative development environment with the power and portability of Java. In the past, developers had to choose between the ease-of-use of tools such as Oracle Forms, Powerbuilder, or Visual Basic and the enterprise-class features – such as scalability, transaction support, security, and Web services – of J2EE. Today, well-designed development environments utilize metadata to bring together the simplicity of declarative development and the power of the industry standard Java platform.

Metadata enables developers to describe the application flow and interfaces outside of the code and have that description drive the execution of the application using runtime frameworks. For example, a developer could specify that a particular Java class or database stored procedure be exposed as a Web service without having to know all the details of the relevant specifications and protocols such as SOAP and JAX-RPC.

There are two main schools of though with regard to metadata. The first is annotating the source code directly, also known as "code metadata". This approach benefits from only having a single file to maintain but requires developers to re-compile and re-deploy applications for even the smallest change. For this reason, code metadata is only appropriate in instances when the metadata is naturally tied tightly to the code, such as EJB deployment descriptors or state management information. The second approach is to separate the metadata from the code and store it in an external format, usually XML files or XML in the database. This approach has many advantages over the code-based metadata solution.

Effective metadata driven development requires a clean separation of business logic from the code that executes that logic. This approach makes applications far more flexible and easier to maintain, since you no longer have to take down your applications and update your code every time there is a simple change in your business logic. Instead, you can just update the metadata and re-apply that to the running system. In addition, separating data from code enables developers to search, manipulate, and analyze the metadata – something that is impossible if the data is embedded in the code. As "loosely-coupled" service-oriented development methodologies become more mainstream, metadata will become increasingly applied to capture such things as business rules, data validation, personalization, page flows, workflow, and Web service orchestration.

An Example of XML Metadata in Action: Oracle JDeveloper and ADF

To address the increasing complexity of the standard J2EE development platform, Oracle provides both a metadata-aware development environment (Oracle JDeveloper) and a metadata- driven application development framework (Oracle ADF) that implements J2EE best practices as a set of server-side libraries to improve developer productivity. A key feature of this frame-work is its pervasive use of metadata for describing both the user interface and the business logic. Oracle's metadata approach embraces the "loosely coupled" model of service-oriented development, separating data from code and maintaining the metadata in an XML format for easier manipulation.

Oracle's metadata services allow developers to access metadata in a consistent way independently of how it is stored (e.g. in a simple flat file system for development or a more scaleable, searchable database repository when deployed) and makes it easy for developers as well as end-users to extend and customize application behavior at runtime without modifying any code. For example:

- Personalizing the user interface, based on the user's profile
- Personalizing the business logic, based on the user's profile
- Retaining extensions developed across patches and upgrades
- Picking up central changes in performance optimizations, new technologies, and the UI look and feel without having to change the code.

Each ADF component comprises an XML Component Definition and a Java implementation class, which cleanly separates metadata from domain-specific code. Through these built-in mechanisms, developers can define business logic programmatically (using Java) or declaratively (with an XML definition). For example, they can use an XML definition to declare that a salary type cannot exceed $10,000. More importantly, when this data constraint changes in the future, developers do not have to waste time hunting for validation checks in potentially many different places (database, middle-tier, web cache, and rich-client application code); they can simply access the metadata repository and make the change in one place – the framework will ensure that the change will immediately be reflected in the running application, at every tier that was originally designed to validate the data *(see figure below)*.

By using metadata to describe the model definition and business rules, Oracle ADF Business Components makes it simple to extend the Oracle E-Business Suite business logic. It allows a developer to easily override a specific behavior, specify a special business rule, or modify a SQL query to personalize the business logic for a defined set of users. For example, you can personalize the With ADF, user interfaces can also be described as XML metadata, representing the various UI objects and their hierarchy. The use of metadata to define the user interface provides many advantages:

- The user interface can be rendered differently by different devices. For example, if you request a user view from a browser, at runtime the metadata is read and the HTML generated to produce the user view on that browser. If you make the same request on a mobile device, ADF detects the source of the request and generates the appropriate language to render the user view on the mobile device with no code changes to the application.
- You can easily personalize the user interface. An administrator can define different views for different users or classes of users by declaratively overlaying metadata associated with that user or group's privileges.
- You can enforce a consistent look and feel by centralizing it and applying it to all the pages—without having to change the code.
- The translatable strings are easy to extract and can be translated into any languages.

Using XML for the metadata also lets you perform any type of complex transformation, making upgrades and migrations much easier than with hard-coded pages.

Conclusion

Some vendors approach metadata as simply a way to provide coding 'shortcuts' by annotating source code directly. This approach gives developers less flexibility because it results in design-time decisions unnecessarily constraining run-time customizations. In addition, these code annotations often break important abstractions and are usually implemented in proprietary ways, tying developers to a single vendor's platform, tools, and technologies.

The more effective approach, implemented by vendors such as Oracle, entails a cleaner separation of code and metadata, allowing for greater design-time maintainability and run-time flexibility. This success of this approach to metadata is evident in the popular E-Business Suite personalization framework that allows LOB users to customize their live applications at several different levels (e.g. site level, responsibility level, user level, etc.) without taking them down for maintenance or having to bother the IT or development staff. The growing movement towards more flexible Service-Oriented Architecture (SOA) will only increase the importance of adopting an effective metadata-driven development philosophy.

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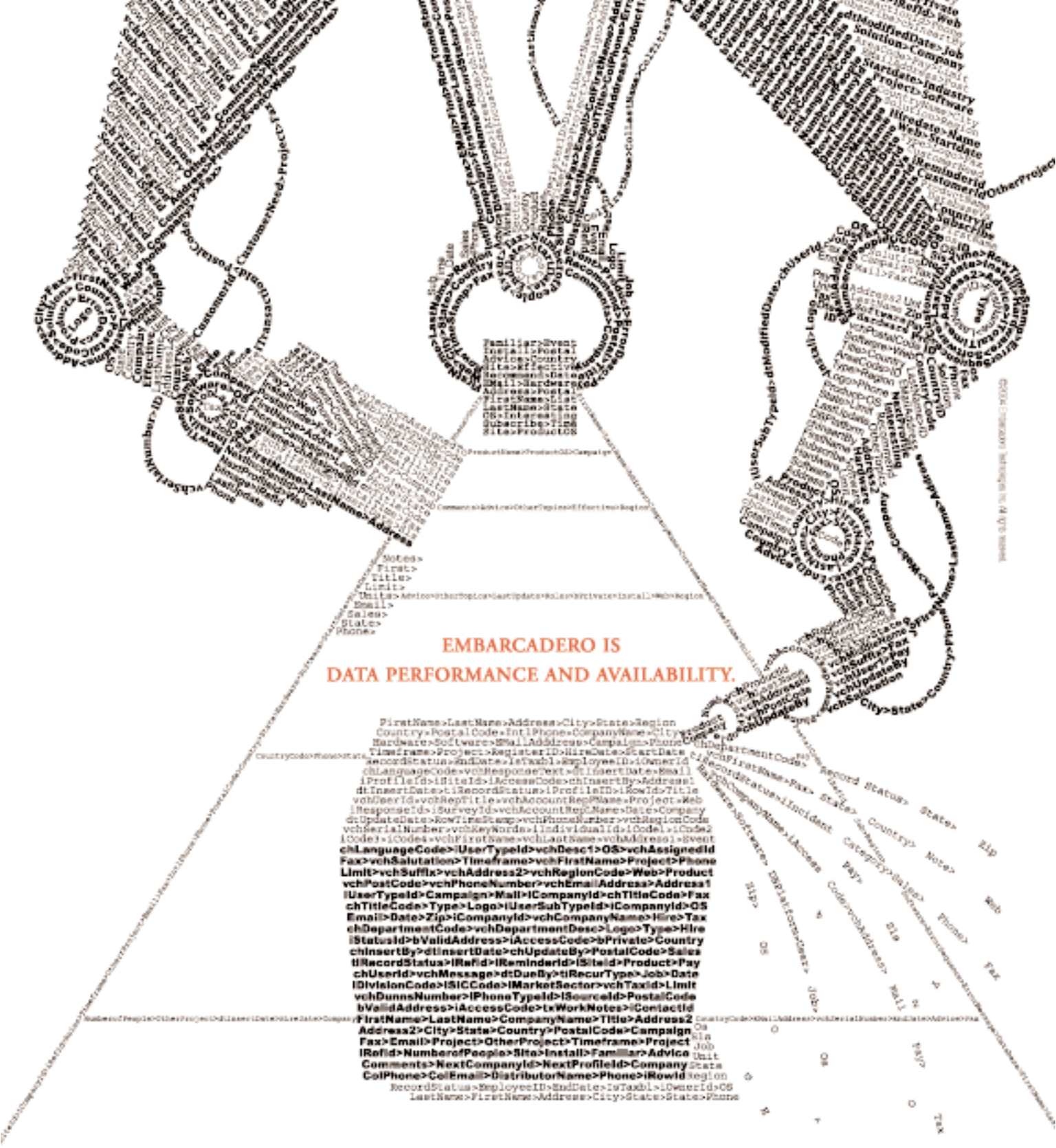

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Embarcadero's Visual Design for Data Modeling

The world of data modeling boils down to the fact that businesses typically think of themselves in two ways. They see themselves as a collection of processes (customers, orders and product, for example), and they think about how the data that they store and use moves about through those processes (database applications).

Visualizing the interaction between the two is the concept behind data modeling. Embarcadero Technologies Inc. (www.embarcadero.com) believes that it has some offerings that can help developers with the design and creation of the database applications that keep enterprises ticking.

As Greg Keller, Embarcadero's director of enterprise modeling solutions, explains, the company's two modeling offerings are ER/Studio and Describe. "Whereas ER/Studio is for the more data- and database-focused modeling endeavors, Describe handles all the UML-focused modeling endeavors. Those are two seamlessly integrated products, but they're disparate due to the audiences that would choose them."

Greg Keller
Director of Enterprise Modeling Solutions

ER/Studio's target audience is data architects, DBAs, application developers, and business and IT managers. "One of ER/Studio's main attributes is that it works well with third-party applications like Business Objects and Cognos and others," Keller says. "It works with lots of solutions that we don't manufacture." It must be mentioned here, of course, that Embarcadero has a slew of its own data life-cycle management solutions targeted at everything from enterprise integration to DBA tools.

ER/Studio's multilevel design capabilities allow users to create a logical design that can be transformed into any number of physical designs supporting the same or different DBMS system catalog. It maintains links between all levels of the design so you can ensure consistency and reconcile potential differences among them, in any direction.

"Where Used" Analysis allows you to visualize the mappings between logical entities and attributes and their implementation across physical designs. An essential feature for impact analysis, the "where used" interface also tells a modeler a particular business asset's usage across a model's submodels.

The Automated Transformation feature streamlines the derivation of a physical design from a logical one. In the process, ER/Studio checks for normalization and compliance with the syntax for the target database platform, and naming conventions and storage parameters can be specified for the physical design.

The software's denormalization wizards equip a database designer with the tools to optimize the physical database design after it has been derived from a logical business model blueprint. A variety of popular denormalization strategies have been implemented, such as horizontal and vertical splits, roll-up and roll-down table collapsing, column mapping and more.

As a visual designer, ER/Studio offers a number of "1-click" diagram layout utilities to arrange objects in a way a data modeler would—for example, hierarchically to follow parent to child to grandchild key propagation.

ER/Studio users also can enforce validated, user-defined data elements and many other objects across any project. Global binding interfaces and drag-and-drop technology facilitates access to and reuse of these objects and can be imported to other projects. Its Explorer browser allows users to navigate through all objects of the data model to see globally that object names conform to standards, locate them quickly on the diagram, and access their properties without needing to hunt for them in a large diagram.

The San Francisco company also offers Describe, a UML design solution that provides developers with visibility into their source code, and tools for modeling their applications. "The predominant reasons that people are coming to this product line are threefold," Keller says.

"First is that it's known in the industry as an easy-to-use product in its space. That's something we take extremely seriously. Second, a problem with products in this segment of the industry is that some of the other incumbent players in the market are not reactive to market needs. This product is very momentum-driven, and we have a very aggressive release schedule," he explains. "The third is the breadth of coverage. By that, I mean the things that an operator of this tool can touch."

According to Keller, "The large number of databases we support includes not only the big ones like Oracle and DB2, but also the very progressive ones like MySQL, among others. The database development process is a team sport. Knowing that and understanding that is the key." *–George Walsh*

DATA AT YOUR SERVICE

Attunity provides enterprise data integration solutions that harness the power of your existing data servers to form an efficient information grid. Attunity can CONNECT to all legacy and relational data sources, STREAM changed data across the enterprise, and FEDERATE heterogeneous data to achieve a single view of the business. Attunity puts Data at Your Service.

www.attunity.com

ATTUNITY

Attunity Puts Data 'At Your Service'

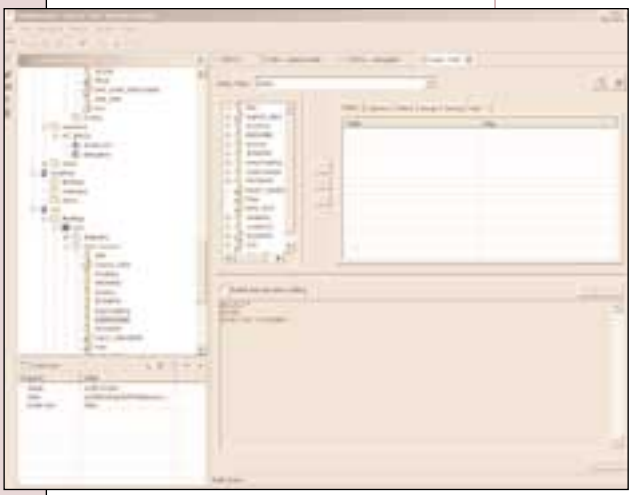
Giving end users the ability to access and integrate data stored in disparate systems can be a challenge for even the most experienced developers. Wakefield, Mass.-based Attunity Ltd. has been helping developers overcome that challenge for more than seven years.

Attunity strives to help companies connect to data sources, stream data changes across the enterprise, and merge heterogeneous information to achieve a single view of their business, while providing tools that can take the pain out of data access for developers.

"We provide products that 'put data at your service' and dramatically simplify and expedite many of the tasks necessary in data integration in an organization," says Itamar Ankorion, Attunity's director of product management.

Attunity (www.attunity.com) offers three key packages: Attunity Connect, Attunity Stream and Attunity Federate.

Attunity Connect is a suite of adapters for mainframe and enterprise data sources that let developers access legacy data for business intelligence and enterprise portals, build .NET and J2EE applications that interoperate with legacy systems, and accelerate EAI initiatives with certified adapters for integration servers.



The suite provides over 30 adapters for nonrelational data sources, relational data sources, transaction systems and 3GL applications. It also offers standards-based, service-oriented integration (SQL, XML and Web services) to a broad list of sources, with support for metadata, bidirectional read/write access, transaction management and query governing.

Itamar Ankorion
Director of Product Management

Attunity Stream captures and delivers changes to enterprise data sources in real time. It lets developers move enterprise data (VSAM and DB2, for example) to data warehouses and data marts, improve the efficiency of ETL processes, synchronize data sources, and enable event-driven business activity monitoring and processing.

Attunity Federate provides enterprise information integration across heterogeneous data sources. Using it, companies can create single views of business information such as a "single customer view," make it easier for business users to access information in multiple data silos with virtual data models, and guarantee data integrity with distributed transaction management.

Attunity Federate joins disparate data sources to make them available as a virtual data layer. It uses distributed query optimization and processing engines that reside natively on enterprise data servers to provide performance, security and transaction management.

"Using our products, you can integrate data virtually or physically. You can define virtual views that span more than one data source to access and integrate data on the fly, or use change-data-capture to build a new physical data source that is updated in real time," Ankorion says. "This gives you the ability to accommodate many initiatives and the flexibility to choose the right approach for each one."

These data access products run on the company's Attunity Server, which runs natively on more than 12 different enterprise platforms. "The three product packages use a common infrastructure and reusable services," Ankorion says. Attunity's offerings can be configured using Attunity Studio, an Eclipse-based tool that can configure any Attunity server from a single console.

Attunity "provides a unique combination of best-of-breed capabilities for unlocking and using enterprise data," he says. "If you define the connectivity to the legacy data source, then you can reuse the data for any enterprise environment, including J2EE, .NET, Web services and others. You don't need to re-establish the connectivity with different products every time."

More than 1,000 customers use Attunity software worldwide for data integration initiatives such as service-oriented integration to the mainframe as part of EAI projects, legacy data access for business intelligence and reporting, real-time ETL based on change-data-capture, and single-customer views from disparate information sources. "We hide the complexities of legacy systems and data integration from developers to simplify their lives," Ankorion says. *–George Walsh*

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VERSANT

Versant Offers Data Access Flexibility

"We're focusing on solving the really thorny issue application developers face when taking data from their relational databases, and bringing them into the object world with an object paradigm," says Keiron McCammon, chief technology officer for Versant Corp. "The heart of the products that we're providing is a very sophisticated object-relational mapper. What we're doing is taking that as the foundation of the product line and really expanding it out into an open data access suite of products."

Versant has long focused on the Java Data Objects (JDO) specification. To further strengthen its product offerings in this realm, the company acquired the JDO Genie product line from South Africa-based JDO Genie (Pty) Ltd. in June. The company recently merged with Hamburg, Germany-based Poet Holdings Inc., which developed and marketed object database management and e-commerce software. Versant (www.versant.com) is also investigating Service Data Objects (SDO), an emerging industry specification proposed by BEA and IBM.

Versant's Open Access Suite includes Versant Open Access JDO, an implementation supporting leading commercial and open-source relational databases. Versant Open Access JDO supports JBoss, WebLogic, WebSphere, Tomcat and other servlet engines, as well as deployment as a normal Java application. Upcoming products in the Versant Open Access Suite include Versant Open Access SDO and Versant Open Access .NET.

Keiron McCammon
Chief Technology Officer

A key feature is that Versant Open Access can be configured to be used remotely. A Java application would create a PersistenceManager, but the actual data access and O/R mapping would be performed by a remote server. This makes it easier to build rich client (Swing GUI, for example) applications, since database access and caching can be centralized.

Using Versant Open Access JDO, an application can take advantage of a multi-tier deployment without struggling with data transfer objects (DTOs) when using remote persistence managers, explains McCammon.

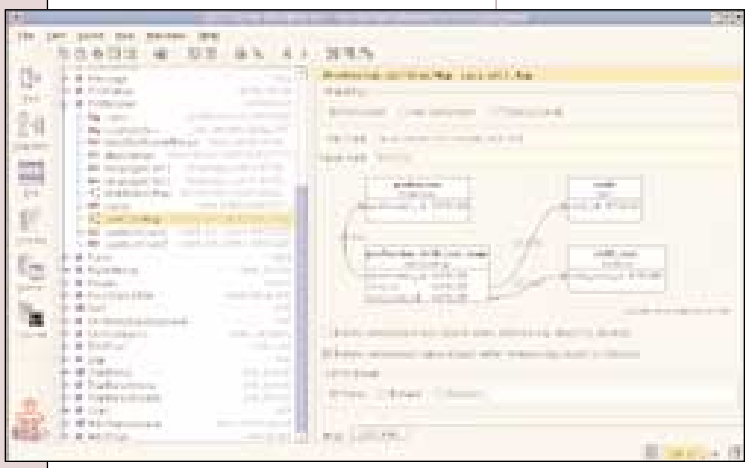
Other features include PersistenceManagers that share a common object cache, a management console for tuning applications, the ability to create fetch groups to fetch whole slices of a model at one time, and the fact that only required data is fetched from the database and only fields modified in a transaction are updated. Its object-relational mapping features can create Java source files from database tables and generate the database referential integrity constraints. The software also has pluggable PK generators, three types of optimistic locking, support for collections of any persistable type, and the ability to flag references as dependent for cascading deletes.

"From our merger with Poet, we gained experience and expertise to help us bring what Versant Open Access JDO does for the Java J2EE world into the .NET world," McCammon says. "Soon, C# and Visual Basic programmers will get the same value proposition of just building objects and having them transparently persistent to SQL Server, for example."

The benefit? "If you're working in an enterprise that has both a Java and a .NET environment—which is typical today—and you've got to build a solution that has to run across various database environments," he explains, "with our data access tooling, you'll get the same set of services, the same capabilities, and the same feature functionality regardless of what API you choose or platform you deploy on."

McCammon continues, "You could map your relational schema to an object representation once, for example, and then use it quite happily within your JDO application or EJB environment. If you then get a business requirement that says that you need a C# client, you can leverage that same investment to build a C# client accessing the same SQL database through the same mapping layer."

If you're building and maintaining your own frameworks, then Versant's evolving suite of products can greatly simplify your application development but still deliver a very high performance data access solution. *–George Walsh*



Embarcadero Addresses Database Administration

The challenge of building and maintaining a database that meets the needs not only of the enterprise but also of those that work in that enterprise is not trivial. However, with the right tools in place, such as those from Embarcadero Technologies Inc., the jobs of DBAs and database developers become a lot easier.

"We offer a number of database tools targeted primarily at developers and database administrators," says Robin Schumacher, Embarcadero's vice president of product management. "These include DBArtisan Workbench, our core cross-platform database administration tool; Rapid SQL, which is a database development environment; Change Manager, which performs change control for databases; Performance Center, which is a 24x7 database monitor; Job Scheduler, which automates database maintenance; Extreme Test, which is a database stress-testing and performance tool; and SQL Tuner, which tunes and optimizes Oracle SQL code."

Building on those tools, Embarcadero (www.embarcadero.com) has a number of products that plug into DBArtisan and Rapid SQL, including cross-platform debuggers, code profilers and advanced components for DBArtisan that handle complex storage, performance and capacity management. But broad compatibility is key: All of Embarcadero's DBA tools are designed for cross-platform compatibility.

"All of our database tools work with all the major platforms, including Oracle, IBM, Microsoft and Sybase," Schumacher says. "So, we definitely interact with those database engines a lot. You'll also find very strong integration points among our tools. They work well together and complement each other."

DBArtisan Workbench is a database administration tool for managing Oracle, Sybase, Microsoft's SQL Server and IBM's DB2 on Linux, Unix, Windows and mainframes.

By using DBArtisan Workbench, administrators can concurrently manage multiple databases from a single graphical console. It also automates administrative tasks such as managing space, creating user accounts, altering objects, migrating schemas between development, test and production databases, monitoring performance and more.

Robin Schumacher
Vice President of Product Management

Rapid SQL is an integrated development environment that enables users to create, edit, version, tune and deploy server-side objects residing on Oracle, SQL Server, DB2 and Sybase databases. Rapid SQL contains extensive code templates that reduce or eliminate the need to memorize and type SQL syntax.

In addition, the IDE's graphical browsing capabilities help developers understand the structure and dependencies of database objects.

Change Manager helps database administrators archive, compare, synchronize and migrate application schemas on Oracle, Sybase, SQL Server and DB2. It allows DBAs to respond to application changes while avoiding data loss and application downtime. Change Manager also offers job notification capabilities, HTML-based reporting facilities and tight integration with other Embarcadero database management and development tools.

Job Scheduler allows users to easily automate database maintenance and other routine tasks, such as nightly data loads or application batch processing, so that they can occur without manual intervention. Because it is designed for distributed systems database environments, Job Scheduler is scalable across databases running on Unix, Linux or Windows.

Extreme Test measures and analyzes the performance of enterprise applications and databases. The software uses a goals-based approach to performance testing, allowing users not only to test the load on a given application, but also to set thresholds and parameters on the test to ensure that the outcome meets all defined requirements.

SQL Tuner helps database professionals build quality Oracle SQL code. It identifies inefficient code and improves developer productivity by ensuring that SQL statements are written correctly before execution becomes a problem in mission-critical applications.

By offering easy-to-use features and utilities, SQL Tuner is intended to help even novice database administrators and developers write fast SQL code.

Ask Schumacher the reason that Embarcadero has such a growing product line and aggressive schedule of product updates, and the answer comes easily.

"One of the things we're finding out there is that the growth of data is astronomical," he says. "So, while the volume of data that our clients are dealing with is accumulating tremendously, the number of databases they need to manage is also mushrooming. The database staff that manages all this information just can't grow fast enough. What we've done is to grow our product line to help them manage this huge and growing network of database infrastructure." *–George Walsh*

Ensemble Integrates Apps, Data Across the Enterprise

Data integration is never easy. However, most organizations are now grappling with an even more formidable challenge. It is the requirement to rapidly implement new business solutions that leverage the functionality of existing applications, orchestrate new business processes and integrate data—including legacy systems—across the enterprise. The result is typically a complex integration project that is undertaken either on a step-by-step basis, using scripts and custom coding, or by making use of the appropriate tools.

Given the limitations of many integration approaches, these projects often fail or fall short of business goals. InterSystems Corp. (www.intersystems.com), known for its Caché post-relational database, has taken advantage of more than two decades of experience in application development to address today's integration requirements with what the company sees as a new universal integration platform. Introduced in late 2003, Ensemble is a solution for much more than just data integration.

"Ensemble is not so much a data integration product as it is a platform for rapidly integrating existing applications *and* their data within an organization," says Trevor Matz, managing director of application integration. "That includes functionality like messaging, business processes, management, orchestration and workflow, rules engines, and business activity monitoring."

As he explains, "Ensemble provides the ability to develop this new breed of 'composite applications,' constructed from building blocks that represent functionality and data that already exist in an enterprise application. It's really a comprehensive platform for integrating and building new strategic business solutions that leverage the existing information assets of an organization."

Trevor Matz
Managing Director of Application Integration

The Ensemble integration platform incorporates the functionality of an integration server, application server, object database and a unified development and management environment in a single product.

Ensemble helps developers rapidly create composite applications that integrate existing applications, new business process logic, and data from across the enterprise. Ensemble features a unified graphical, XML and code-based development environment for modeling and automating business processes for business analysts and developers, and supports service-oriented development of composite applications.

Ensemble's Universal Service Architecture provides object representation of disparate programming models and data formats and enables the use of development tools and technologies to access legacy data and functionality as reusable .NET or J2EE components, Web services or XML. A distributed, scalable, SQL-compliant object database manages and stores all metadata, messages and process state information. This persistent object engine provides high reliability, recoverability and performance for long-running business processes.

Ensemble provides real-time access to both live and previously processed messages for auditing and business activity monitoring (BAM), along with reliability and recoverability for long-running business processes. The product's customizable, extensible and integrated management and monitoring facilities support rapid problem diagnosis and debugging, making it possible to automatically monitor critical resources and generate alerts specific to any enterprise.

The concept of a composite application solution can take some getting used to, but Matz brings the idea to life.

"If you think about an application server, it's a platform on which you can develop solutions," Matz says. "Imagine that you fuse that application server with a database. Add to that environment a built-in, fully integrated rules engine, so that you can define rules as part of your applications. In that way, developers can build applications that can be customized without having to touch the code, because execution of the application is externalized."

In addition, Ensemble lets developers control the workflow of any application and have bidirectional messaging and workflow. "Along with those features," says Matz, "a graphical process modeling environment helps business analysts start a development project by modeling a best-of-breed business process for whatever they need to do and then automatically create the business process by linking it to the back-end systems."

Finally, Ensemble also offers integrated capabilities for creating activity monitoring or business intelligence dashboards that provide rich visual representations of dynamically changing key performance indicators to management.

"If you take all of those capabilities and put them into one product, you have Ensemble," Matz says. "It's a platform with a consistent architecture that allows end users, application developers and system integrators to mold a new breed of applications, new types of business processes, and new types of business intelligence solutions."–*George Walsh*

For the leaders in your company, fast access to accurate and relevant data can be the difference between a validated and a gut-level business decision. With Embarcadero's Model-driven Data Integration solution, you can reliably integrate large volumes of data in a matter of weeks, not months. To learn more, visit us at www.embarcadero.com/mddi.

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DT/Studio Relieves Data Growth, Integration Pains

As enterprises grow, so do the number of systems that house data and the human support necessary to maintain those systems. To an outsider or end user, this situation seems to be a no-brainer: Add more servers, and add more support staff. However, database professionals know that it's not as easy as that.

The new systems and software may well be different than the old systems and software, and the new people maintaining these ever-growing networks may have a different approach to the problem of getting everything working and playing well together. That added complexity can lead to data nightmares. Embarcadero Technologies Inc. (www.embarcadero.com) has an answer to this data integration dilemma: DT/Studio.

"DT/Studio is a 100% Java-based data integration product," says Stephen Aikins, its product manager. "That means that any task that the user creates to move data from a source to a target, that same task will run on a huge variety of platforms, as well as legacy systems, without having to change the business logic they've created."

DT/Studio allows database administrators, developers, architects, modelers and application developers to transform, migrate and integrate large quantities of data from disparate sources. It consolidates enterprisewide information, generated and maintained by different systems, into a standard format.

The tool's visual data modeling capabilities and visual data flow designer are intended to improve the speed and accuracy with which users can analyze source systems.

DT/Studio includes a Data Model Designer that provides insight into source and target data structures and their relationships to one another. Visual modeling capabilities within the product, like reverse engineering, help users create blueprints of databases and data warehouses.

Stephen Aikins
Product Manager

Aikins explains that traditionally, programmers or database developers would write custom scripts to transform the data and move it the way they needed to.

"The problem with those homegrown scripts comes when you've got to maintain them over time, or when one person wrote the script but the role of maintaining it gets passed along to someone else," he says.

DT/Studio provides a framework and a set of rules that make data integration tasks very easy to maintain, describes Aikins. "It also reduces the overall amount of maintenance that has to be done because the majority of the underlying technology is built and maintained within DT/Studio itself."

Other features of DT/Studio include a Data Flow Designer for drilling down on any part of a diagram to reveal more detail, wizards for creating the data flow, and data transformation templates that can help address problems such as removing duplicate data and cross-database joins.

In fact, Aikins describes DT/Studio as having more than 1,000 ready-to-use data functions to transform data, right out of the box. It also includes well-documented and extensible engine architecture. An added benefit is that developers and administrators can manage and monitor DT/Studio extract-transform-load (ETL) engines remotely from anywhere on a network using any Java-compliant workstation.

A unique feature, called Delta Agent, lets users capture only the changes from the source system and send those changes on to the targets. Those data sources include Oracle, Microsoft's SQL Server, Sybase, IBM's DB2, flat files or any other database or repository accessible via JDBC.

In addition to serving individual enterprises and their overwhelmed database administrators, DT/Studio is used by many other software and platform vendors, adds Aikins, who leverage the tool's technology and feature set to enhance their own products and services.

"As ISVs create their own software packages, there is an ongoing need to bring data in from existing systems for display, reporting or even just for monitoring—as well as just being able to publish it back out to another data structure," Aikins says. "Because DT/Studio is Java-based and is very open and extensible, our OEM customers find it very attractive to use our engine within their applications."

Plus, he explains, "it's not easy to write something that does all the necessary transformations on your own as well as maintaining it with all the ongoing infrastructure changes. They can pick up DT/Studio and just drop it right into whatever project they're working on, and they know that it's not going to change the rules that they are applying now."

Indeed, believes Aikins, two or three years down the road, developers will be able to reuse the code that they're writing now and achieve all of the same functionality." *–George Walsh*

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QL2 Gives Structure To Unstructured Data

Reading a document to see if it has the information you need is one way to glean data, but what if you're looking for specific pieces of data amongst hundreds or thousands of files? While the documents themselves can be given structure—a folder on a server, for example—the data within them is inherently unstructured, making it difficult to perform data mining tasks.

Allowing users to find and give structure to this "unstructured data" is the goal of Seattle-based QL2 Software Inc. (www.ql2.com). Since April 2000, QL2 has helped knowledge management, business intelligence, competitive intelligence and application development professionals with its Web mining and unstructured data management tools. The company's WebQL software automates the process of extracting information from the Web and other unstructured data sources and then reformatting it into structured formats.

"Probably three or four times more unstructured data is stored in various repositories than structured data," estimates Christopher Buckingham, the company's president and CEO, and that's where traditional databases and database reporting tools can't tell the whole story—or solve the whole problem.

"Unstructured data is the data that is contained in documents, the Web and e-mail. Unlike data in a database, this information has no structure, so it's very difficult to access it and manipulate it. WebQL gives you a complete platform to locate and extract key pieces of unstructured data and give it structure so that it's much more usable," he explains.

How does it work? "WebQL allows you to enter simple SQL statements that tell it what to look for. Then, it goes through the unstructured data and it extracts what you specified, putting it in just about any format you want, whether it's a spreadsheet or database or XML. The software is all SQL-based, so the learning curve is quick for the thousands of people who are SQL literate."

Christopher Buckingham
President & CEO

In addition to the SQL syntax, WebQL supports today's most commonly used source and output formats, internationalization including multibyte character sets and locale-dependent date and time formats, enhanced XML and XSLT, and integrated navigation and extraction. It also supports a massively parallel deployment engine.

For administrators, WebQL offers network monitoring tools, support for cookies, agents, frames, tables and authentication, forms discovery and completion, page change detection, anonymization page request throttling and query execution scheduling. For developers, there are APIs for Java, SOAP, VBA, ActiveX/COM and C++.

Buckingham gives a few examples of what WebQL can be used for. "Imagine a retail business whose main competitors have a pricing catalog on the Internet," he says. "It's relatively easy for the WebQL platform to automatically navigate to the pages where the prices exist, extract them and put them in a spreadsheet or database. That task can be scheduled to be run repetitively without human intervention."

Another good example is the pharmaceutical industry, where many people need to track the progress of drugs in clinical trials, Buckingham says.

"There are many Web sites out there that track the status of drugs that are coming to market. However, it's very difficult for somebody to manually go to each site, input the drug names, crawl for all of the results, and formulate a report giving the status of every drug they're interested in."

By contrast, he explains, it's easy for WebQL to create an automated robot that will visit all of those sites, look for all of the drugs that a researcher is following, and then create a simple summary of where that drug stands in the clinical trial process.

QL2 is always enhancing WebQL to support more file and data formats for extraction. "We just recently did a major enhancement that lets WebQL extract information from PDF documents, which has been a huge problem," he says. "Because PDF documents are really graphical images and not text, it's difficult to extract information from them. So, we perfected a methodology to do that."

Buckingham is sure that WebQL can be a great asset to many enterprises. In fact, many of QL2's customers are Fortune 500 companies.

"If an organization is spending an inordinate amount of time aggregating information from unstructured data sources like e-mail, Word document repositories or pages on the Internet, we have a great platform that will automate all of that for them and give them more information than they're currently getting—or, we can get the same information they're currently getting, only much more accurately and inexpensively than having human beings do it." *–George Walsh*

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That's just one of the benefits of doing business with Beverly, Mass.-based Altova Inc. (www.altova.com). Altova's flagship xmlspy 2004 development environment is used by many Fortune 500 and Global 1000 companies, with over 1 million registered users worldwide.

"We've always focused on developers, and we intend to continue to build the very best XML development tools out there," says Trace Galloway, Altova's technical director. "Our goal is to accelerate development and data integration projects with solutions that enhance productivity and maximize results," adds Tim Hale, director of product marketing.

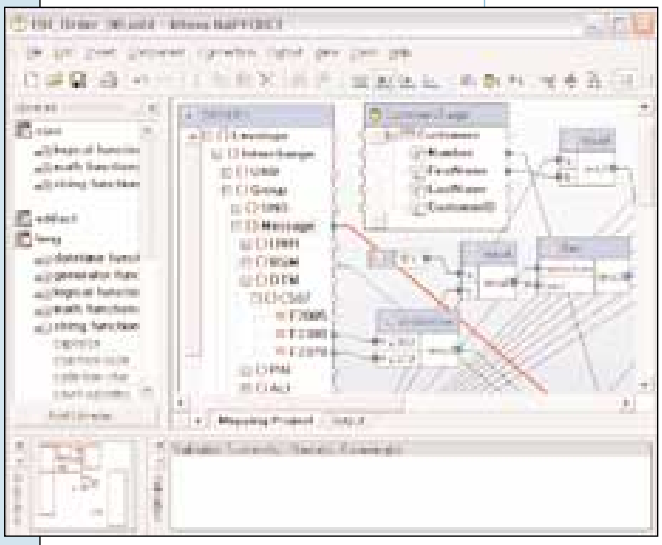
Altova offers a variety of XML tools. Altova xmlspy 2004 lets developers work with XML through editing and validation, schema and DTD design, and XSL transformation. In addition, the application includes XSLT debugging, WSDL editing, code generation, a SOAP client and debugger, XML differencing and more.

Trace Galloway
Technical Director

"xmlspy is an integrated development environment in the same sense that Visual Studio .NET and Borland's JBuilder are," Galloway says. "What sets it apart from other environments is that it is designed around XML and XML-related technology. It offers a whole host of functionality that helps support all of the technologies that go along with XML."

On top of that, xmlspy integrates well with other IDEs, and you can optionally run xmlspy inside of Visual Studio .NET to get the best of both worlds.

But there's more to Altova than xmlspy 2004. Altova stylevision 2004 is a visual editing tool that allows developers to create XSLT stylesheets, XSL:FO stylesheets and Authentic Forms based on XML schemas, DTDs or databases. XSLT stylesheets are used to transform XML documents into HTML output, and XSL:FO stylesheets transform XML to PDF output. In addition, stylevision 2004 can transform legacy HTML content into XML. stylevision 2004 Enterprise Edition also offers database reporting capabilities that allow users to generate reports directly from databases to XML with output to HTML and PDF.



Altova authentic 2004 is an end-user tool for working with XML forms. Its user interface, which closely resembles a word processor, allows business users to capture ideas and information directly into an XML document—without having to understand the underlying XML. authentic 2004 is offered by Altova under a free license, and can run as a desktop application or as a browser plug-in for Internet Explorer.

The newest offering is Altova mapforce 2004, a visual mapping tool that allows developers to mix multiple sources and multiple targets to map any combination of different data sources, such as XML, databases and EDI. mapforce 2004 was introduced last September.

"mapforce 2004 goes far beyond xmlspy 2004's data integration capabilities," explains Hale. "You can already point xmlspy to a database and say, 'Create me an XML schema from this relational database,' or take an XML schema and create a relational database based on an XML schema. By contrast, mapforce is a true data integration tool that lets you connect and map data between a variety of enterprise data sources."

Using its code-generation capabilities, mapforce 2004 produces Java, C# or C++ code, or XSLT stylesheets to implement the mapping and transformation.

Most enticing of all, Altova offers downloadable, fully functional 30-day trial versions of all its products. With everyone watching corporate resources, that's the way to evaluate these applications. –*George Walsh*

GET THE RIGHT BACK-END FOR YOUR FRONT-END

If your back-end database isn't a good match for your front-end development, you need a new database.

Caché is the *post-relational* database that combines high-performance SQL for faster queries and an advanced object database for rapidly storing and accessing objects. With Caché, no mapping is required between object and relational views of data. That means huge savings in both development and processing time.

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Caché Fuses Objects With Database Technology

There are many different types of databases, and there are as many, if not more, ways of creating and addressing the data they hold. Perhaps core application development was done in C++, but for Web access to that data, the natural approach was through some Java-based mechanism.

Later, another component was developed using .NET, because it was the most appropriate way to solve a certain problem. These types of heterogeneous environments are certainly not uncommon, as enterprise needs and development methods change. Sometimes, they are even created by staff changes, where different developers have different skills and preferences.

Caché, the flagship post-relational database offering from Cambridge, Mass.-based InterSystems Corp. (www.intersystems.com), is designed not only to deliver rapid transaction processing and Web application development, but also to support widely diverse means of dealing with data.

"Caché is a database system that is typically used to build and run high-performance transaction processing applications," says Paul Grabscheid, vice president of strategic planning for InterSystems. "It's used in business-enabling applications for anything from small organizations or departments to enterprises with tens or hundreds of thousands of people."

What's unique about Caché, describes Grabscheid, is that it provides several complementary ways for a developer to interact with the database. "One is SQL relational access and the second is through various kinds of object technology," he explains.

"With Caché, we provide access to data both as relational tables and as object classes. On the object side, how the developer sees the data depends on what sort of technology that developer is using," Grabscheid says. ".NET developers see the contents of the database as a set of .NET components. Java developers see the data as Java classes; to a J2EE developer, it's a set of EJBs. Web service developers see a set of SOAP services, C++ developers see a set of C++ classes, and so on."

Paul Grabscheid
Vice President of Strategic Planning

The benefit, he says, is that "we make the contents of the database available in the way that matches the technology the developer is using—even if different approaches are taken in the same organization."

Caché also offers multidimensional data access, and no mapping is required between object, relational and multidimensional data views, resulting in huge savings in both development and processing time.

Caché enables Web application development, transaction processing, scalability and real-time queries against transactional data, and can be deployed on systems ranging from two to more than 10,000 simultaneous users.

To speed development and simplify deployments, Caché's Unified Data Architecture eliminates the mismatch between relational and object data definitions. Caché Objects can be used with Web services, Java, C++, .NET or COM. This makes Caché compatible with a wide variety of development tools and environments, including Visual Basic, Delphi and PowerBuilder.

Applications built using Caché can be ported from one platform to another without coding changes. Caché runs on Linux, Unix, Windows and OpenVMS.

Caché's Web architecture is designed to help developers build online database applications through Caché Server Pages (CSPs), which run on the Caché data server, taking advantage of in-process access to data. CSPs consist of standard HTML or XML, so they can be created and modified using any text editor or off-the-shelf Web page creation tool.

Additional functionality is added by incorporating Caché Application Tags (CATs) or Hyper-Events. CATs work like HTML tags, except instead of formatting text, they execute functions on the data servers and/or browsers, explains Grabscheid.

In addition to speeding up the Web application development process, CATs and CSPs promote cooperative Web design, enabling Web page designers to craft the screens through which users will navigate and application programmers to code the tags that give the pages functionality. CSPs can also include Hyper-Events that enable browser events (clicks, mouse movements, timeouts, etc.) to trigger database actions without waiting for an entire page to be submitted.

Grabscheid sees a true difference between relational technology and Caché's post-relational approach. "The more complex the data, the better fit we are for organizations," he says. "Relational databases are pretty good for very simple data. Caché is a much more natural and easy and effective way to represent more complex data. The more complex the data requirements are and the more sophisticated the application is, the more benefit you get from our technology." *–George Walsh*

We'd like to think that not all perfect matches are made in heaven.

Crystal Reports 10

Which edition of Crystal Reports® is right for you?	Report Author/IT Editions		Bundled Developer Editions		Full Developer Editions	
	Standard	Professional	.NET Edition [1]	Java [2] Edition [2]	Developer	Advanced
Report Creation						
Visual report designer for rapid data access and formatting	●	●	● [1]	● [1]	●	●
Customizable templates for faster, more consistent formatting	●	●			●	●
Repository for reuse of common report objects across multiple reports*		●			●	●
Data Access						
PC-based and Microsoft® ODBC/OLE DB for MS Access and SQL Server	●	●	●	●	●	●
Enterprise database servers (ODBC, native)		●	● [1]	● [1]	●	●
Custom, user-defined data through JavaBeans™				●	●	●
Custom, user-defined data through ADO and .NET			●		●	●
Report Integration						
Report viewing APIs (.NET and COM SDKs)			●		●	●
Report viewing APIs (Java SDK)				●	●	●
Extensive report viewer options (DHTML, ActiveX, Java Plug-in, and more)					●	●
APIs for run-time report creation and modification						●
Report Parts for embedding report objects in wireless and portal apps	●	●			●	●
Report Deployment						
Crystal Reports components for report viewing, printing, and exporting:						
a) Java reporting component				●	●	●
b) .NET reporting component			●		●	●
c) COM reporting component					●	●
Full featured report exporting		●			●	●
Report server (Crystal Enterprise Embedded deployment license)						●

[1] Limited functionality [2] Bundled with Microsoft® Visual Studio® .NET and Borland® C#Builder™.
[3] Bundled with BEA WebLogic Workshop® and Borland® JBuilder®. * This feature is available on the Crystal Enterprise CD included in the Crystal Reports 10 package.

Perfect matches can be made here too. In order to quickly determine which Crystal Reports® best suits your project requirements, we've provided this basic feature chart. Crystal Reports® 10 simplifies the process of accessing, formatting, and tightly integrating data into Windows and web applications via an enhanced designer, flexible data connectivity options, and rich Java™, .NET, and COM SDKs.

To learn more about Crystal Reports 10, compare over 150 different features across versions, or to access technical resources like the Developer Zone and evaluation downloads, visit: www.businessobjects.com/dev/p10. To ask more specific report project related questions, contact an account manager directly at 1-888-333-6007.

BUSINESS OBJECTS®

Business Objects Saves Developers Time

Nearly every company strives for excellence in its products and services, but few have the stated core values of Business Objects SA: leadership, customer focus, transnational identity, innovation, integrity and passion.

Adhering to these values has paid off. Business Objects (www.businessobjects.com) currently has more than 24,000 customers in 80 countries worldwide, 3,900 employees, and has been profitable for 52 consecutive quarters. The company was founded in 1990.

"Business Objects is basically the largest business intelligence specter in the market," says James Thomas, director of product marketing. "It's the result of an acquisition that took place late last year of Crystal Decisions by our company. Crystal Decisions was a leader in enterprise reporting, and we were a leader in business intelligence."

One of the greatest customer benefits coming from the acquisition, says Thomas, is that the company can offer a complete solution that involves everything from extracting the data to its presentation. "We can also separate the components and offer customers more of a 'build-oriented' data proposition. A lot of companies want the ability to develop custom applications," he explains.

Business Objects' Crystal Reports is its flagship reporting toolkit for the development community. It helps developers create reports and tightly integrate them into Java, .NET and COM applications.

"What makes Crystal Reports unique is that it provides an alternative to hand-coding," Thomas says. "A lot of times, developers have looked at the challenges of hand-coding and have chosen Crystal Reports instead to speed up the process."

Crystal Reports can connect to almost any data source—including relational, OLAP and XML sources. Whether developers need access to databases, files, logs, application systems or program elements, they can use Crystal Reports to access and present them.

Crystal Reports also supports Unicode, so it can create reports from data stored in virtually any language.

James Thomas
Director of Product Marketing

For developers, access to user-defined or application in-memory data is available through JavaBeans, COM data providers and ADO.NET.

In addition, Crystal Reports provides a visual design environment in which developers can create interactive reports using a drag-and-drop interface and object-oriented explorers. Plus, the software includes options wizards to guide developers through common tasks, such as connecting to the data source, linking data tables, selecting fields and records, grouping, sorting, summarizing and formatting.

When it comes to data presentation, Crystal Reports provides a set of layout and design controls that allow users to create replicas of existing reports and forms, graphical summary reports, cross tabs, and Top N or Bottom N reports.

There are 20 chart and map types available for adding graphics to reports, and more than 100 data presentation and interactivity options, including grouping, sorting, field highlighting and running totals.

"One of the strongest endorsements of Crystal Reports is the number of independent software vendors out there who are using it," Thomas says. "We have over 600 OEM partners who actually embed our software in their product and resell it under a partnership agreement with us."

That plays to one of Crystal Reports' strongest suits. "The purpose of our product has always been saving people time," says Thomas. "When ISVs look at the product, they realize that they can outsource the reporting to Crystal Reports and not have to develop code for that part of the project themselves. It really helps them to speed their project cycles. The same thing applies to the corporate developer market."

Business Objects has OEM partnerships with McKesson Information Systems, Microsoft Business Solutions, Nortel Networks, PricewaterhouseCoopers, Agilent OSID and many others.

Although here we've primarily looked at Business Objects' key data reporting product, the company also has a solid background in query and analysis, performance management, information infrastructure, analytic applications, data integration and business intelligence standardization, making it a one-stop shop for fulfilling business intelligence needs.

Business Objects also has a clear view of its future directions.

"One of our recent pushes has been into the Java space," Thomas says. "We've had phenomenal success within the Microsoft developer community and realized that the same need for a solid reporting solution existed in the Java community. We've now introduced a Java version of the Crystal Reports engine and API. Giving Java developers the same types of tools that have been available for Microsoft developers has been a big goal for us."

Business Objects' passion for innovation while constantly striving to better serve customers offers payoffs for both itself and its customers. *–George Walsh*

Microsoft

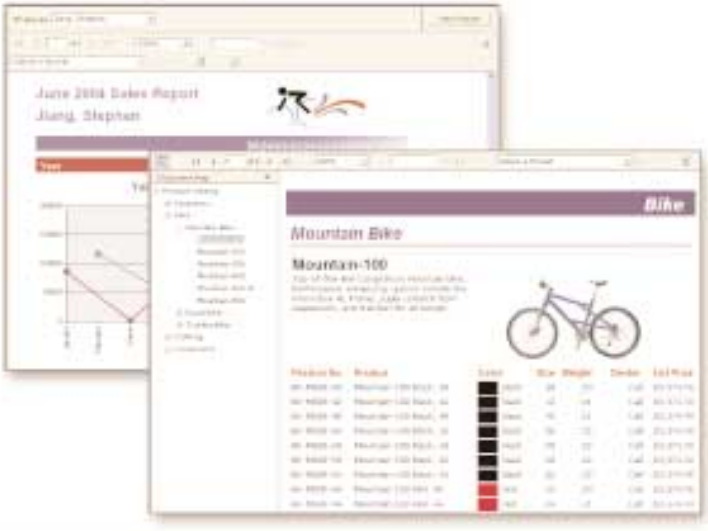
Improve business decision making and IT professional productivity with

Microsoft® SQL Server™ 2000 Reporting Services

Microsoft SQL Server Reporting Services is a comprehensive server-based platform for creating, managing, and delivering traditional, paper-oriented reports as well as interactive, Web-based reports. It complements existing business intelligence and data warehousing features of Microsoft Office, Microsoft Business Solutions and Microsoft SQL Server.

Reporting Services improves the productivity of organizations by providing a high-performance managed reporting environment for the entire enterprise. This enables corporate IT to deliver real-time information from any data source in a familiar web-browser, Microsoft Office System, or embedded in a line of business application at a lower cost than existing solutions. Complementing SQL Server Analysis Services, Reporting Services makes it easy to get the right information to the right people, in virtually any business environment.

The subscription and delivery features, easy customization of reports, and easy consolidation of data from different data sources results in time savings for IT professionals, and more relevant, timely reports for smart business decision-making.



Improve IT Productivity

- Modern architecture, automation, wizards, productivity tools, and a fine degree of control allow IT to focus on higher value tasks
- Connected through .NET Web Services environment for communication across diverse platforms
- Integrated toolset allows IT organizations to centrally manage the development and delivery of information
- Ability to deliver dynamically personalized reports reduces time - consuming task of creating multiple customized reports for different business units

Broaden Business Insight

- Access data quickly for real-time decision-making
- Reports delivered anywhere, anytime, on any device
- Leverage existing data sources
- Interactive reporting enables drill-through for more detailed information

Highly Dependable

- Modular design scales easily
- Reliable and Secure
- Fully backed by Microsoft and the Microsoft partner network
- Unprecedented performance
- Leverages SQL Server for centralized storage of report definitions

Best Overall Economics

- Does not require costly training or additional IT resources
- Lower software costs than the competition
- Lower BI infrastructure and report development expenses

Microsoft SQL Server 2000 Reporting Services

Microsoft Windows Server System

Microsoft Office

Microsoft Delivers on SQL Server Data Reporting

When it comes to providing software tools for both developers and end users, few companies have the history and track record of Microsoft Corp. In the database arena, Microsoft's SQL Server has been gaining ground in enterprises since its initial release in 1992. The company added reporting capabilities to SQL Server 2000 in January, and intends to take reporting and analysis to another level in SQL Server 2005, previously known as "Yukon," scheduled for release early next year.

"The reason that we developed SQL Server 2000 Reporting Services is that many SQL Server 2000 users as well as .NET developers were asking for an enterprise reporting solution from Microsoft," says Alex Payne, senior product manager for Microsoft SQL Server (www.microsoft.com).

"Part of what they asked for and part of what we're delivering is the ability to embed reporting within their applications," Payne says. "Because Reporting Services is a Web service, you can easily implement reporting into your application whether you're an ISV developing a solution or you're working for an organization and you're developing an application in-house."

SQL Server 2000 Reporting Services is an open and extensible platform for delivering traditional and interactive reports via Web browsers, Microsoft Office-based applications, or embedded within applications. Reporting Services combines the data management capabilities of SQL Server 2000 and Windows Server 2003 with Office System applications to provide a platform for delivering real-time information to support daily operations and decisions.

The product's modular design and APIs help developers and enterprises integrate reporting with legacy systems and third-party applications. Reporting Services includes a set of tools for creating, managing and viewing reports; a scalable, server-based engine for hosting and processing reports; and an extensible architecture and open interfaces for embedding reports or integrating the solution in diverse IT environments.

Alex Payne
Senior Product Manager

The Reporting Services architecture is built on Web services, letting its features be accessed by clients and servers across a broad array of platforms. It is both scalable and extensible to provide dependability and connectivity and enable access to corporate data, explains Payne, through its use of Report Definition Language (RDL), an XML-based standard for defining reports. Those RDL-based reports can be defined in any programming language supported by the .NET Framework.

RDL includes support for Unicode as well as international date, number and currency formats. Not only can reports be defined in any language, the report server will dynamically adapt to the language requested by the client (browser or custom application) for all user interface text and error messages. Reporting Services allows developers to integrate server-based reporting into an existing architecture that includes a variety of data sources, such as SQL Server, OLE DB, ODBC, Oracle and other data providers, as well as multiple output formats such as Web browsers and Office applications.

"Developers are excited about the extensibility and openness, but they also like the capabilities Reporting Services provides as far as embedding reporting into their applications," Payne says. "Other developers may want to extend the capabilities of Reporting Services and build new solutions. Because of its openness, the fact that it's a Web service, and you can interact with it through the SOAP interface, we provide for that kind of extensibility as well."

What's coming up for Reporting Services and other Business Intelligence Platform areas in SQL Server 2005? "The embeddable report controls in the next version of SQL Server will offer substantial improvements," Payne says.

"Today, if you want to build a report, you go into Report Designer, which is part of Visual Studio, and build a report there. There is no facility for an end user to build a report. They'll have that capability in SQL Server 2005," he explains. "You're also going to see a lot of improvements in Analysis Services and DTS. We're completely rewriting DTS to make it a high-performance, high-throughput ETL tool."

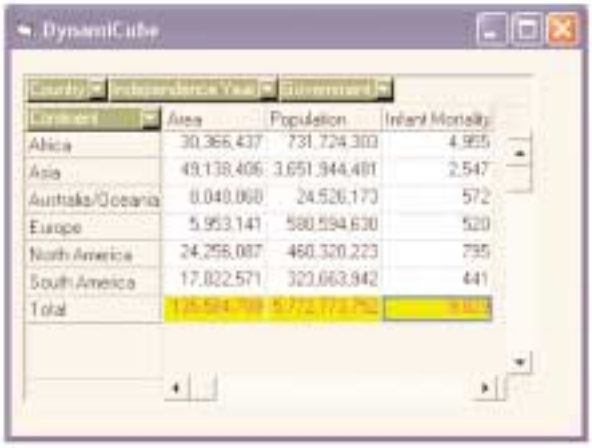
Another major feature of the SQL Server 2005 release is its embedded Common Language Runtime for the .NET Framework.

"We're going to house it natively inside the database engine, so that a developer who is used to writing C# code or Visual Basic code can write in their language of choice to create stored procedures," Payne says. "The Common Language Runtime will then manage and run them natively inside the SQL Server engine."

It sounds like a lot to look forward to! *–George Walsh*

When You Aren't Sure What You Need to Report:

- Offers live interaction with large databases
- Allows large quantities of data to be explored and summarized quickly
- Allows you to view and analyze any quantity of data in any number of ways
- Supports users modifying and downloading a specific view of the data
- Allows data to be stored locally, analyzed, manipulated, e-mailed or used dynamically in presentations
- Supports local interactive analysis without impact to production databases
- Allows data filtering, drill-down, roll up, data calculations, dimensional pivoting, ranking, print/preview, and graphing



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When You Know What You Need to Report:

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DATA DYNAMICS
Control Yourself.

Data Dynamics Puts Reporting in Your Hands

While a number of prepackaged—and even application-specific—data reporting tools are available in today's market, Columbus, Ohio-based Data Dynamics Ltd. believes that developers involved in an enterprise know better than anyone what needs to be reported and how it should be presented.

"ActiveReports for .NET is very different than other data reporting products," says Issam Elbaytam, vice president of technical marketing for Data Dynamics. "We don't sell to end users. The product is a component, not an application. It gets integrated into the application that the developer is writing, so the end user of the application wouldn't even know that ActiveReports for .NET is being used. The developer has complete freedom to customize the look and feel."

ActiveReports for .NET is written in managed C# and integrates with Visual Studio .NET. This lets VS.NET programmers leverage C# or Visual Basic .NET when programming for ActiveReports. The product is based on a per-developer licensing scheme, and applications written using it are royalty-free to distribute.

The software includes a report generation wizard and a Microsoft Access report conversion wizard, and can export to Adobe PDF, Excel, RTF, HTML, text and TIFF formats. It can be used in both Windows-based and Web-based applications. ActiveReports for .NET also includes a Windows Viewer control that supports split and multipage views, a table of contents pane and text searches, as well as letting users customize the viewer's toolbar.

The Professional edition adds an End-User Report Designer control that allows developers to host the report designer in their own applications to let end users create and modify reports. Its server-side Web Viewer control takes advantage of ASP.NET's HTTP handlers to allow developers to display reports without having to write custom code for export to formats such as HTML and PDF.

"Because our target is developers, we've made it very easy for them to use, to program and to integrate," Elbaytam says. "If their usual programming environment is Visual Studio for .NET, for example, it looks and feels just like any other component of Visual Studio. You wouldn't even know that it is a separate product."

Issam Elbaytam
Vice President of Technical Marketing

According to Elbaytam, ActiveReports for .NET is also easy to deploy. "Because it is a .NET-managed component, there is no COM registration. The whole engine is contained in a single DLL that developers include with their application. This is a huge benefit, because a lot of developers used to have trouble deploying reporting systems with their application. Sometimes it involved server setup, and sometimes it involved registering COM components on the client's machine. With security and administration issues these days, that can be a difficult task."

Data Dynamics (www.datadynamics.com) often creates solutions that never existed in the developer marketplace, with the newest technology available. For example, the company's DynamiCube product provided the first ActiveX control that added OLAP multidimensional analysis capabilities to client/server, stand-alone and relational database applications.

Continuing that trend, ActiveReports was the first ActiveX Designer report writer—offering developers full report writing capabilities as well as extensive export formats—and ActiveReports for .NET is the first fully managed code reporting tool for Visual Studio .NET.

"When we started in 1998, we looked at the developer market because we could not really find anything that fit developers' needs in the area of reporting," Elbaytam says. "The offerings at that time were difficult to install and difficult to use because they were separate applications that did not reside within the environment."

So, he explains, "we developed ActiveReports so that if you were a developer writing code in Visual Basic, you continued to write code in that environment. Everything related to the report was done in Visual Basic. Now that we've moved to .NET, we support both Visual Basic and C#."

The benefit? "When developers use other reporting products, they often hit a wall where the limitations of the product keep them from doing something specific for their enterprise. With our products, you can always do what you need because the API is exposed," he says.

The philosophy behind ActiveReports for .NET is to allow developers to pinpoint the needs of their enterprise. "We leave features like the user interface up to the developer," Elbaytam says.

"Developers know how their application works, how it behaves, and who the target end user is. With ActiveReports, because you create the user interface yourself, you can choose how the application is presented—whether you want to use a wizard, a drop-down menu, or you want to limit the user's ability to modify the data source. It's customizable and very flexible." *–George Walsh*

If your application is Java, your database should be PointBase

Millions of people use Java applications that embed DataMirror's PointBase relational database

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DataMirror's PointBase Embedded is a cost-effective, small-footprint Java relational database that provides effective storage for metadata, application-specific data, out-of-the-box tutorials, and production data. PointBase Embedded can be deployed with customer applications, making it completely transparent to end users while providing them with increased performance and efficient data synchronization.

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DataMirror's PointBase Spotlights Java Solutions

Anticipating and investing in new technology can be a gamble. However, when a company has the foresight to see changes on the horizon, it can lead to being in just the right place at just the right time. That's the short story behind DataMirror's involvement in building its PointBase products, which are based on Java.

"We anticipated that Java was going to be a major new environment, and we got that right," says Steve Jones, managing director of engineering and support for Santa Clara, Calif.-based PointBase (www.pointbase.com), a DataMirror company.

DataMirror's PointBase solutions offer leading Java database management and synchronization technology for the embedded and mobility markets. Jones describes these solutions as delivering rich functionality, zero administration, cross-platform portability and comprehensive security.

DataMirror PointBase Embedded is a platform-independent, Java relational database that lets developers reduce time-to-market. It can be directly integrated within a Java application, making it completely transparent to the end user from the time of deployment. It has a small footprint, provides comprehensive security, and requires no administration.

Steve Jones
Managing Director of Engineering & Support

PointBase Embedded is for Java developers who require a database for metadata, application-specific data, out-of-the-box tutorials/demos, and production data. It is also used anywhere a multiuser SQL database is needed, and where users want greater ease of use than found in traditional enterprise databases.

PointBase Micro is a platform-independent, Java relational database that is optimized to run on J2ME and J2SE platforms. It has a footprint of less than 45K for J2ME MIDP, explains Jones, and is ideal for supporting mobility applications on laptops, PDAs and emerging Java-enabled devices.

PointBase UniSync is a Java API that lets developers easily synchronize data between mobile platforms and corporate back-end databases. It supports bidirectional synchronization with Oracle, Microsoft SQL Server and other JDBC-compliant databases. PointBase UniSync's publish-and-subscribe model supports both incremental delta changes and full-snapshot changes.

"PointBase Embedded is a full-featured SQL RDBMS," Jones says. "It features views, triggers, referential integrity constraints and SQL security. Because it is a 100% Java database, a software vendor with a product written in Java can include PointBase Embedded within its product so that it remains completely Java-based."

According to Jones, "There are significant benefits that can be realized that are made possible through our products' ease of use, deployment and configuration, and that's been recognized by top platform makers. PointBase Embedded ships with BEA WebLogic, for example, as its embedded database. So, if you download a copy of that application, you're also running PointBase Embedded, which provides all the necessary SQL functionality."

PointBase Micro represents the company's push into enterprise mobility applications.

"What we provide is the ability to have a complete database on small mobile devices like PDAs and cell phones," Jones says. "PointBase Micro gives you a complete executable environment with no dependence on a reliable connection to your server. It allows you to run in a completely disconnected mode. When you're running disconnected, you need to synchronize the database on your mobile device with the one on your server. For that, we offer a comprehensive synchronization product called PointBase UniSync."

Jones says, "If you're writing in Java, you really should be managing your data in a PointBase database. For solutions where you're extracting data out of your database and then operating on it somewhere else—whether it's a caching solution or a mobile solution—you really need to look to us."

He adds, "A lot of companies standardize on a database that's overkill for two-thirds of what they're trying to accomplish and is overly complex to use. PointBase is the easy choice for the Java developer." *–George Walsh*

Javavavoom!

Introducing a high-performance database that's 100% Java.

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Finally there's a high-performance database that loves Java just as much as you do: Berkeley DB Java Edition (JE). Brought to you by the makers of the ubiquitous Berkeley DB, Berkeley DB JE has been written entirely in Java from the ground up and is tailor-made for today's demanding enterprise and service provider applications.

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Makers of Berkeley DB

Sleepycat's Dual-Licensing Approach to Business

When it comes to its Berkeley DB database library, Sleepycat Software Inc. is a staunch believer in the fusion of open-source and commercial-grade technology. That fusion has served the company well; the privately held Sleepycat (www.sleepycat.com) has hundreds of millions of copies of Berkeley DB in deployment and counts many top-tier hardware and software vendors among its customers.

"Berkeley DB is a database library that is intended for use by software developers building systems or applications that need fast, reliable, scalable data management services," says Mike Olson, Sleepycat's president and CEO.

"Our customers are VARs or OEMs building systems that they're going to ship to end users. The library has a very small footprint of a few hundred kilobytes as opposed to many megabytes in a stand-alone client/server relational engine. We provide all the transactions, all the recovery and all the high-availability services and scalability that someone expects from a big enterprise relational engine, but we do it in a package that is aimed at developers building systems that need to be simple, fast, small and reliable."

Berkeley DB is a library that is compiled directly into an application. Data can be stored in native format, eliminating the need for translation or mapping. Berkeley DB supports ACID transactions and recovery, multiple processes, multithreading for high concurrency, and replication for fault tolerance and high availability. It scales up to carrier- and enterprise-class applications and scales down to mobile devices and other constrained environments.

Berkeley DB gives application developers control over how resources are allocated, the amount of memory dedicated to caching records, the degree of concurrency, support for recovery and more. It includes full source code for easier porting, integration, debugging and optimization. Berkeley DB supports Linux, Unix, Windows, Mac OS X, VxWorks and QNX, and includes APIs for C, C++, Java, Perl, Tcl, Python and others.

Mike Olson
President & CEO

The Berkeley DB product family includes:

- Berkeley DB Data Store for single-user read/write access.
- Berkeley DB Concurrent Data Store for multiuser read/write access.
- Berkeley DB Transactional Data Store for ACID transactions and recovery.
- Berkeley DB High Availability for single master/multiple replication to survive the failure of any single node with no interruption in service.
- Berkeley DB XML for transactional storage of native XML documents.
- Berkeley DB XML High Availability for high-availability, transactional storage of high-availability native XML documents.
- Berkeley DB Java Edition for transactional Java collections—written in 100% Pure Java.

Sleepycat's success is due to its powerful model of leveraging the strengths of open-source software while offering its customers the commercial-grade products and service that they expect. "We use a business technique called dual licensing," Olson says. "The Berkeley DB suite of products is distributed from our Web site for free under an open-source license. So, if you build a product that you want to ship to third parties that uses Berkeley DB, our public license says that you have to give your source code away as well."

For developers that don't want to redistribute their applications under the open-source model, dual-licensing provides a solution. "If you're a proprietary software vendor, the idea of giving away your own intellectual property just to get a database library is pretty difficult to swallow," Olson says. "We own all the intellectual property of Berkeley DB, so we can write different licenses for different customers. Customers who have a stake in keeping their IP proprietary simply pay the license fee."

Olson is excited about his company's new products and the fact that Sleepycat is constantly evolving.

"We're never going to stray far from our core competency, which is being a database component supplier to vendors building products," he says. "But with the advent of XML data exchange and the rise of service-oriented architectures that are built on that, we see growing interest in the market in native XML data management."

The result, of course, is Berkeley DB XML.

"We've made that available to people building SOAs and other XML-enabled applications. We also just announced our Java Edition, written in 100% Pure Java," he explains. "We're quite pleased with it. We've got about 10,000 copies out between the beta and our GA release, and we appear to be addressing real demand in the marketplace." *–George Walsh*