



DB2 Universal Database: Web-enabling your data with Java

Highlights

Helps build and manage interactive Web sites for secure e-commerce

Supports Java™, allowing access to DB2® using any Java-enabled Web browser

Supports industry standards — XML, JDBC and SQLJ

Offers a comprehensive development environment for Web applications through IBM® Net.Data®, WebSphere® Studio and VisualAge®

Facilitates integration of Web applications with existing enterprise systems

The Web-dominated global e-business economy has changed everything. It's touched every facet of business operations, from business-to-consumer e-commerce on the Internet to back-office enterprise systems. And it's all built on data — in this environment, your data is by far your most valuable asset.

To compete, you need a powerful database to manage this information. But more than that, you need to leverage the Web to make the most of your data. That means creating e-business applications that link seamlessly to your core business processes. With its robust

support for e-business tools and standards like Java and XML, IBM's award-winning DB2 Universal Database™ can help you transform your enterprise applications through the power of the Internet.

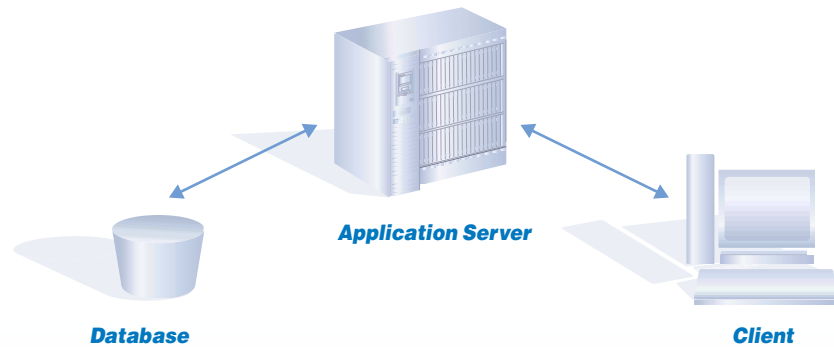
The challenge is to deliver full-featured database access to standard Web browsers; the method of choice is to use Java, the leading language for building portable, powerful e-business applications. At the same time, eXtensible Markup Language (XML) is rapidly emerging as the preferred format for e-business transactions on the Internet.



IBM offers a full range of Java and XML creation and management tools to complete your e-business solution including embedded database server support, mid-tier application server support and client support.

Database Tools and Components

DB2 provides a wide variety of tools for building robust e-business applications using Java and XML.



JAVA and XML COMPONENTS

DB2 UDB

- JDBC
- SQLJ
- Abstract Data Types
- User Defined Functions
- Triggers
- Stored Procedures and Stored Procedure Builder
- DB2 XML Extender

Net.Data

- Thin application server
- Simple data access application
- XML support
- Macro editor

Web or Traditional Client

- Beans
- Applets
- etc.

WebSphere Application Server

- Servlets
- Java Server Pages
- Enterprise Java Beans

WebSphere Studio

- Visual programming for Web pages
- HTML generation
- Java code and servlet generation

VisualAge for Java

- Visual Java development environment
- EJB development
- Test and debug

Java Database Connectivity

Java Database Connectivity (JDBC) is the interface between Java and DB2. It enables quick, efficient access to relational data, using dynamic SQL through a powerful object-oriented interface. The DB2 JDBC driver has implemented many of the new features of JDBC 2.0 facilitating application development. Using JDBC, you can:

- Build Java applications that rely on DB2 Runtime Client to connect to DB2 databases
- Enable client access to DB2 using Java applets downloaded from any thin client or Java-enabled Web browser.

The JDBC driver can be installed on an application server, such as the WebSphere Application Server, enabling multi-tiered application deployment.

IBM DB2 Universal Database, supports the JDBC application programming interface (API), defined within the Java Development Kit. With JDBC support in the Client Application Enablers and IBM DB2 Connect™, Java applets or applications can access data stored in DB2 database servers. These servers can run on Linux, UNIX® and Windows platforms, as well as IBM's OS/390® and AS/400® environments. The AS/400 Toolbox for Java extends JDBC support to DB2 for AS/400.

In addition, DB2 Universal Database offers transparent distributed query across many databases, thus DB2 JDBC support offers access to a wide range of data for Web applications.

SQLJ: embedded SQL for Java

DB2 is at present the only relational database that supports static SQL through SQLJ, bypassing JDBC. SQLJ allows Java programmers to:

- Exploit stored, optimized access plans for better runtime performance

- Create shorter, less complex programs
- Take advantage of the strong security model for static SQL in DB2, providing improved granularity of authentication and authorization services.

Java user-defined functions, triggers and stored procedures

SQL is a key part of database access, but for customized features, the ability to extend SQL is needed. DB2 Universal Database enables application developers to create user-defined functions (UDFs) in Java as extensions to the existing built-in SQL functions, giving Java applications functionality that goes far beyond basic SQL queries. Furthermore, DB2 triggers can be utilized to invoke SQL functions including UDFs developed in Java.

DB2 was one of the first databases to provide Java-based server features. Now, server support is enhanced with Java stored procedures. Stored procedures are reusable parts of an application that are executed on the database server instead of the client. As such, they can mitigate the impact of network delays and improve client performance.

DB2 Stored Procedure Builder simplifies the process of building, debugging and deploying procedures, with support for Windows®, AIX® and Sun® Solaris™ operating environment. The generated stored procedures can be based on Java or the new easy-to-use SQL Procedures language specified in SQL 99.

The maintenance of Java stored procedures is enhanced through the Java Class Loader, which allows you to perform online replacement of your Java stored procedure classes, without the need to restart the Java Virtual Machine or DB2. A simple command gives your stored procedures access to the new classes.

Support for XML

DB2's support for XML allows you to do business over the Internet in a simple, streamlined and effective way, using industry-standard protocols, using the data stored in your enterprise database.

DB2 XML Extender offers:

- A dedicated XML column data type including automatically maintained side tables which can improve search performance
- The ability to deconstruct XML data and store it in its component parts and to compose an XML document from stored component parts
- XML-specific search semantics using a subset of the XPath notation.

Application Server / Client Components and Tools

On the Application Server tier, IBM offers Net.Data, a thin application server for fast and easy deployment of simple data access applications. The IBM WebSphere family includes WebSphere Application Server, a full featured Java application server, and WebSphere Studio, a suite of tools that brings all aspects of web site development into a common interface. VisualAge for Java provides an integrated development environment that enables you to build, test, and deploy even the most sophisticated Web applications.

IBM Net.Data

IBM Net.Data is the fastest way to deliver relational data to end users over the Web. Because Net.Data can provide live connectivity to multiple data types across a range of sources, including DB2, you can make interactive Web sites to energize your e-business strategy.

Net.Data provides full support for Java and XML. You can automatically generate XML tags as output from Net.Data macros and specify XML style sheets (XSL) to format and display the generated output.

Net.Data includes:

- Java servlets to help develop and manage Net.Data macros in the Java environment
- A servlet interface to the Net.Data function library, which enable Java-enabled Web servers (such as IBM WebSphere) to invoke Net.Data macros directly
- Generation of XML from existing DB2 data tables for business-to-business interchange.

IBM WebSphere Application Server

Integrating IBM transaction processing and Web technologies, IBM WebSphere Application Server helps you speed your company's move from simple Web publishing to secure e-commerce. In particular, WebSphere Application Server:

- Provides the runtime environment for Java servlets, such as those provided with Net.Data or built using VisualAge for Java
- Provides an environment to handle database connection pooling to improve transactional performance
- Provides automatic object caching between DB2 and your application to improve performance
- Supports the Enterprise JavaBeans common programming model, which simplifies and reduces the cost of developing e-business server applications.

IBM WebSphere Studio

Integrated, easy-to-use tools are essential for developing powerful e-business applications that let you explore the full potential of the Internet. IBM WebSphere Studio provides the tools you need to build the Web logic and content for your Internet applications and integrate them with existing enterprise systems.

WebSphere Studio includes:

- Web project and asset organization and deployment
- Java Server Page (JSP) and servlet code generation wizards
- HTML authoring
- Script development
- Java code development for applications deployed on WebSphere Application Server.

WebSphere Studio can leverage business logic (JavaBeans and Enterprise JavaBeans) created with VisualAge for Java, Enterprise Edition. This makes it easy for your Web developers to create an interactive Web experience linked to your business logic and enterprise systems. Learn more about the suite of WebSphere tools at:

ibm.com/software/webservers.

IBM VisualAge for Java

IBM VisualAge for Java offers an application development environment that complements the DB2 Personal Developer's Edition and DB2 Universal Developer's Edition. This enables you to effectively build applications optimized for DB2. You can create applets, servlets, JavaBean™ and Enterprise JavaBean (EJB) components that provide Web connectivity to your data assets.

VisualAge for Java provides a unique approach that lets you access multiple systems from a single Java application, while using a consistent programming interface across diverse enterprise systems. This significantly shortens the programmers' learning curve and reduces time-to-market for your Web applications.

VisualAge for Java, Professional Edition has a collection of Data Access JavaBean components on the visual builder palette. Simply drop the beans from the palette and visually connect the user interface to DB2 data. The Data Access JavaBean components are a fast, easy way to begin extending data to the Web using JDBC without requiring that developers know the JDBC specification.

VisualAge for Java, Enterprise Edition offers the Enterprise Access Builder for Data, a powerful tool that saves developers from doing low-level coding to JDBC interfaces. The tool generates custom JavaBean components that access DB2 data. Developers simply outline which database, tables and columns they wish to access, and VisualAge for Java automatically generates the connection code.

The Enterprise Update for VisualAge for Java, Enterprise Edition provides a development and test environment for the creation and deployment of EJB components. Powerful code generation facilities reduce the effort required to create and deploy EJBs to IBM WebSphere Application Server, Advanced Edition.

For developers creating both Entity and Session EJBs, VisualAge for Java provides an environment that allows them to persist data directly into DB2 Universal Database or to map EJBs to relational data schemas.

DB2 and Java — e-business data access

DB2 Universal Database and complementary tools including WebSphere and VisualAge for Java continue to be an outstanding foundation for your enterprise application environment, and with the comprehensive support for Internet connectivity tools and standards, is a superb database engine to drive your e-business.

For more information

Contact your IBM marketing representative or IBM authorized software reseller or visit our Web site at:

ibm.com/software/data/db2



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