

## FirstSQL® 100% Java Object-Relational Embedded Mobile Database

The logo for FirstSQL, featuring the word "FirstSQL" in a stylized, metallic, 3D font. The letters are white with grey and blue shading to create a sense of depth and texture. The logo is set against a dark blue, rounded rectangular background.

### **A First Class Embedded Mobile Database -**

FirstSQL/J Embedded Mobile is a robust, high performance 100% Java Object-relational SQL database system based on standards.

FirstSQL/J Embedded Mobile is a mobilized version of the original FirstSQL/J that is specifically enhanced to meet the needs of mobile enterprise and embedded device applications. It simplifies developing and administering platform independent mobile device and enterprise mobile applications that require simple to sophisticated SQL RDBMS and Java object persistence.

### **With Advanced Features -**

FirstSQL/J not only supports the execution of methods from user-defined Java classes cataloged in the database, but SQL commands can reference both instance and static methods. Java also serves as the stored procedure language.

### **Desktop Development to Device Deployment -**

A unique benefit of FirstSQL/J Embedded Mobile is its focus on making mobile application development and deployment very easy. It includes desktop and device database tools, Installers, and JVMs, a mobile database developer needs to develop and deploy applications on target devices. Deployment can be done directly to a device, via Compact Flash or Secure Digital card, or over wireless connection. Once your applications are copied to a memory card, it can be distributed to the field and easily installed on a device.

The FirstSQL/J EM platform independent desktop development system includes installers for deployment on 100's of devices that use Microsoft® WinCE®, PocketPC®, Metrowerks Linux™, and more.

### **On The Most Important Mobile Device Platforms - Anywhere.**

FirstSQL/J is built on a component model and can be developed and deployed on any embedded system, device, or mobile computing platform that supports a 1.1 JDK, or greater, Personal Java or J2ME CDC Personal Profile JVM.

FirstSQL/J provides a scalable and robust multi-threaded database engine in a small, dynamic footprint that ranges from 500k for the full featured database down to 400k for a minimum feature configuration.

**Enterprise Mobile Database -**  
For sophisticated mobile devices and embedded systems

**Written in 100% Java -**  
Available for any platform with a JDK 1.1 or greater JVM

**In-Memory and Disk access -**  
High performance, optimized query engine, and full data persistence

**SQL92 Intermediate Level -**  
Supports sophisticated SQL Standard

**Object-oriented -**  
Internal O/R mapping for full Java Object serialization and comprehensive SQL manipulation

**High Speed Transactions -**  
Full Transaction processing and reliability

**Small Dynamic Footprint -**  
Component Model allows configurable footprint

**Sophisticated SQL -**  
Unique and powerful features not available in other databases

**Tools and Utilities -**  
Comprehensive Utilities, Tools, and Installers for target devices

**Bundled with JVM and Tools -**  
Deploy to target device with a compatible JVM

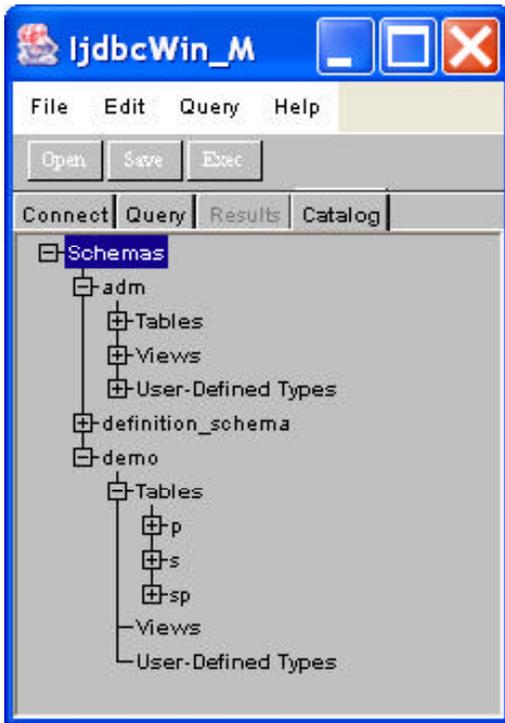
## Easy to Develop and Deploy

FirstSQL/J EM is distributed with its own cross-platform setup program for installation on a desktop/development machine. Applications are developed on a desktop system and deployed to the target device. FirstSQL/J EM supports several options for the deployment of JVM, application, and FirstSQL/J EM pre-loaded database.

Once installed, the deployment for development testing may be to copy the executables, scripts, etc. to the target device. Deployment of the final application package can be accomplished using an installation program that encapsulates the executables, script files, and icon files in a compressed archive that decompresses and installs these in the proper directory structure on the target device.

In addition, the installed database may be pre-loaded with any data desired. The installation package can be transferred to the device via memory card, network, or by platform dependent devices such as USB connected cradle in the case of most popular handhelds or PDAs.

Tools from the desktop have been provided for use on the smaller screens of a typical handheld. IjdbcWin\_M can be used to further fine tune your database design, test SQL statements, and view the database catalog of meta data.



**IjdbcWin - Interactive SQL facility for use on a device**

## FirstSQL delivers a platform independent - 100% Java ORDBMS for the following markets:

**Personal Digital Assistants**  
**Smart Phones**  
**Interactive TV**  
**Embedded Systems**  
**Automotive**

## Java Virtual Machines for FirstSQL/J EM

FirstSQL has invested significant effort into building as robust a solution as possible and Java VM support is not limited to any specific vendor implementations.

The EM Installation may also include the appropriate JVM, if the target device does not already have a JVM installed, or if different JVM is desired for the application.

Installers and tools are provided for Microsoft PocketPC2003/02 and Metrowerks Linux. FirstSQL/J EM supports several options for the installation of a JVM, application, and FirstSQL/J EM pre-loaded database to the target device.

Java VM's available and/or fully tested with FirstSQL/J EM include NSIcom **CrEme™** and esmetec **Jeode™**.

**CrEme** - Available for download from [www.firstsql.com](http://www.firstsql.com)

CrEme, from NSIcom, is an augmented Java Virtual Machine, specially configured to run in the PocketPC and Windows CE environment. It represents a significant enhancement of NSIcom's extensive Java product line. CrEme was designed and optimized for standard Windows CE devices, including palmtop appliances, handheld PCs and PDAs.

CrEme is based on Sun's JVM, which NSIcom adapted. The result is an easy-to-install, robust product with a small footprint. It provides a PocketPC or Windows CE device with all the power of PersonalJava - portability, connectivity and the rest - without in any way reducing the power of the operating environment itself. And, what's more, it's available now, with FirstSQL/J EM, for a broad and increasing family of standard devices.

**Jeode** - from esmetec

Binary implementations of Jeode are available for various PDAs from Handango. Each implementation consists of the Jeode EVM and Java class libraries to deliver a fully compatible Java runtime environment (JRE) suitable for deployment on various PDA platforms.

Jeode supports both the PersonalJava 1.2 standard for which most content exists in the market as well as the newer J2ME CDC Personal Profile 1.0.

## SQL Feature Support Overview

Primary Keys (Entity Integrity)

Foreign Keys (Referential Integrity)

- Cascaded Update and Delete
- Self-referencing and Cross-referencing Foreign Keys

Transactions

- Distributed Transactions (XA)
- Full Transaction Support (Commit, Rollback, Recovery)
- Row Level Locking

Privileges – table and column access

SQL Support – SQL92 Intermediate Level

- Complete Subqueries
- Outer Joins
- GROUP BY, HAVING, LIKE, Set Functions (SUM, AVG, MAX, ...),
- UNION
- Views (with GROUP BY, UNION), WITH CHECK OPTION
- Stored Procedures can return multiple resultsets
- UDFs (User Defined Functions)

Data Types

- String – CHAR, VARCHAR (CHAR and VARCHAR can be used for binary data with no loss of information and no overhead.)
- Numeric – TINYINT, SMALLINT, INT, BIGINT, DECIMAL, FLOAT, DOUBLE
- Date-Time – DATE, TIME W/TIMEZONE, TIMESTAMP w/TIMEZONE, YEAR-MONTH Interval, DAY-TIME Interval
- Java Objects – based on Java Classes

Functions, plus full set of Math Functions

CASE, CAST, and COALESCE Operators

Advanced NULL processing - two types of Nulls

Quoted Names – Special characters in table, column, user, schema, class, ... names using “

BLOB, CLOB (Unicode)

CONNECTBY - Recursive queries on hierarchical data

JDBC 2.0/3.0

- Supports SQL DML, DCL and DDL
- Full Escape Processing — {d '2002-02-28'}
- JNDI (Java Naming and Directory Services) support for using important APIs including LDAP, RMI, EJB, JMS, and CORBA.

Operating on Database Objects in SQL allows objects to be instantiated from Java classes. These operations are:

- assign them to database columns,
- call their methods, and
- pass them to database methods.

FirstSQL/J provides additional operations on database objects:

- conversion - CAST operator
- type testing - INHERITS operator

Component Model means functionality can be removed to reduce database footprint size to 400k, for example;

- DDL, all DDL commands or selective:
  - User & Privilege Maintenance DDL
- Database Class Object support
- Much more depending on application

## Specifications

Platform Support -

Any computing platform with the following Java support:

Java VM -

Desktop/Development - Any JDK 1.1 or greater JVM

Device - Any JDK 1.1 or greater JVM, Personal Java, J2ME CDC with java.sql and file system

Minimum Screen Size - None

Minimum RAM - 8MB

Synchronization - File transfer can be accomplished with standard connected and wireless tools available on device using:

- Import/Export data to text file
- Application specific XML Document
- Java Object stream to file

Other Support -

SD, Compact Flash, WiFi, BlueTooth, USB

FirstSQL/J Embedded Mobile is the right database solution for companies working to bring their applications to market on a platform that is supported by world-class OEMs, software vendors, hardware vendors and semiconductor manufacturers.

Every FirstSQL/J Embedded Mobile solution brings together best-in-class components for Java with the assurance that a solid partnership stands behind the product and support.



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