

SQL Anywhere for BlackBerry

A whitepaper from Sybase iAnywhere

INTRODUCTION

In the last few years mobile email has become an essential part of business operations. Many enterprises who have chosen to rely on Research In Motion's BlackBerry are now asking "what else can we do with BlackBerry?" and "can we run useful business applications on these devices?"

The questions are timely.

Until recently, BlackBerry's focus on efficient e-mail and long battery life left the devices with little room to spare when it came to CPU power, memory, or storage space. The platform was unsuitable for all but the simplest of applications. But times change, and recent BlackBerrys are more than capable of running useful and feature-rich applications. A small but growing BlackBerry developer community has been building to meet the demand for these applications and the first BlackBerry Developer Conference (October 2008) is a milestone in the evolution of application development on the BlackBerry platform.

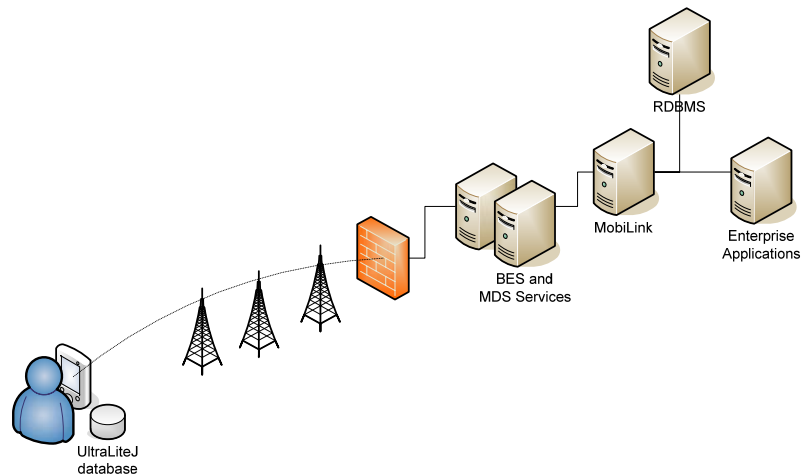
The introduction of SQL Anywhere for BlackBerry provides key technologies to developers looking to build line-of-business applications such as Customer Relationship Management (CRM), field service, logistics, and key performance indicator (dashboard) applications.

SQL Anywhere for BlackBerry is a convergence of two great technologies. BlackBerry provides the mobile device and communications infrastructure, while SQL Anywhere has established itself as the market leader in mobile databases and what Gartner Research calls "Mobile Application Gateways" – the software that links mobile applications to enterprise systems. By providing on-device relational databases and a sophisticated data synchronization technology, SQL Anywhere provides the infrastructure for successful mobile applications. Bringing SQL Anywhere to the BlackBerry will allow these successes to be extended to millions of new devices.

LINE-OF-BUSINESS APPLICATIONS

The SQL Anywhere approach to mobile applications is to provide a mobile database that provides built-in change tracking and state tracking, enabling it to also act as a data synchronization client. At the server side the SQL Anywhere MobiLink synchronization server integrates the mobile application with enterprise systems or with back-end relational databases such as Oracle, Microsoft SQL Server, IBM DB2 and, of course, Sybase. The MobiLink synchronization server provides powerful tools for handling synchronization in a flexible and scalable manner. The MobiLink server and its clients communicate over HTTP or TCP/IP protocols.

SQL Anywhere 11 introduces a new mobile database called UltraLiteJ, designed specifically for the BlackBerry. UltraLiteJ is written in Java and is unique in providing a full-featured SQL implementation for the BlackBerry environment, including extensive support for SQL queries, transaction processing and recovery, and flexible indexing. And UltraLiteJ also includes a built-in synchronization client to synchronize data with a MobiLink server.



The SQL Anywhere mobility model fits the expectations of BlackBerry users: the local data store guarantees the ability to use the application whether or not connectivity exists, just as the local storage of messages guarantees that BlackBerry users can read and compose email even without connectivity. Taking advantage of connectivity to send changes keeps both mobile device and server up to date with the latest data. Just as e-mail users expect to get messages promptly and to be available at any time, so the SQL Anywhere architecture guarantees the users of mobile applications access to the latest information.

Increased connectivity has added to the value of sophisticated data synchronization technologies such as SQL Anywhere's MobiLink. Several years ago data synchronization was associated exclusively with approaches such as Palm's HotSync and Microsoft's ActiveSync: a device would be cradled and the synchronization would happen in a batch-like operation. With so many mobile devices now having access to a wireless network, data synchronization is changing; it is becoming a more continuous form of data exchange, in which smaller volumes of data are sent more frequently than in the past. A side effect of this change is that developers who used to "roll their own" synchronization in the form of batch-oriented processes (copy a file from the device, carry out an operation at the server and copy the result back, for example) now have additional motivation to move to a specialized solution. The ability to synchronize on the go, and to keep using the device and application while synchronization is occurring demands specialized techniques. UltraLiteJ includes concurrency control that enables access to the database during synchronization.

BlackBerry applications are necessarily written in Java, while applications for platforms such as Windows Mobile are typically written in a .NET language or in C. Features such as integration into device applications (messaging and calendar for example) also demand device-specific coding. The actual implementation of polished applications is always going to have to be done on a device-by-device basis. As a result, complete application portability between devices at the code level without the compromises of Java on Windows Mobile is not currently feasible. Nevertheless, SQL Anywhere's support for these two platforms along with Palm OS ensures that the duplication of effort involved in developing a cross-platform mobile application can be reduced: database design and synchronization logic are common to the two platforms.

DEVELOPING BLACKBERRY APPLICATIONS

Research in Motion promotes three different application development models for the BlackBerry.

- Browser-based applications are written using web technologies, but are not able to work with on-device data and so are not able to guarantee availability in the absence of a network. Performance—because of the large network demands, interpreted programming language, and lack

of efficient data store—is another reason why browser-based applications are not a good choice for rich mobile applications that people require to get their work done.

- MDS Studio is a forms-based rapid application development technology that has similar benefits and limitations to browser-based application development. Working with web services on the server, MDS Studio also stores only a very limited amount of data on device.
- The BlackBerry Java Development Environment (JDE) is the tool of choice for rich, data-intensive applications and is the predominant model for complex applications on the BlackBerry. Even web-centric applications such as the BlackBerry Facebook client are written in Java. JDE development provides the performance of a compiled language, full access to device capabilities and applications, as well as full network access.

UltraLiteJ is a library you use together with the JDE to develop rich, high-performance applications that exploit device capabilities and network availability.

ULTRALITEJ FEATURE OVERVIEW

UltraLiteJ is a relational database and data synchronization client for BlackBerry smartphones and for J2SE. Java developers can use UltraLiteJ to build robust mobile applications, extending enterprise data to mobile users. UltraLiteJ is deployed as a single 400KB COD file.

DATABASE FEATURES

UltraLiteJ provides table-based storage in a single database store, primary keys, indexes (including multi-column indexes) for fast data access, transaction support including atomic transactions (rollback and commit) and database recovery, a full set of data types, and SQL data access through a JDBC-like API.

In addition, UltraLiteJ provides the following:

- Single database store – All tables, indexes, and metadata are stored in a single named database using the BlackBerry object store. UltraLiteJ uses a page-based database layout allowing it to exploit a cache of recently-used pages.
- Primary keys and indexes – Unique constraints including primary keys provide guaranteed uniqueness of primary key values. B-tree indexes provide quick look-up of data. UltraLiteJ also provides foreign keys as hints for data synchronization purposes.
- Atomic transactions – The ability to group related operations together in a single transaction so that all related operations are carried out together is at the core of relational database technology. UltraLiteJ provides this support, ensuring that data remains consistent even in the event of unexpected shutdowns.
- A full set of data types – UltraLiteJ supports numeric, character, date and time, and also text and image data. It also provides a full set of functions and operations to work with all of these data types.
- SQL data access – UltraLiteJ supports basic insert, update, and delete operations. You can execute complex queries using the SELECT statement, which supports advanced features such as joins, subqueries, aggregate functions, complex expressions, and grouping.
- JDBC-like API – The J2ME CLDC configuration used by the BlackBerry does not provide JDBC. The UltraLiteJ data access interface will be familiar to JDBC programmers with its PreparedStatement and ResultSet objects and methods for executing operations, binding parameters, and navigating forward and backward through a result set.

DATA SYNCHRONIZATION FEATURES

UltraLiteJ provides a built-in synchronization function that can be used to exchange data with a MobiLink synchronization server.

Data synchronization, using SQL Anywhere's MobiLink technology, requires that mobile devices send up changes made to the data on device. As this may include sending rows that are deleted from the database, a synchronization client such as UltraLiteJ must carry out change tracking on all the data in the database. UltraLiteJ tracks the state of each row (whether or not it is synchronized) to avoid sending changes more than once or not at all, and so ensure that data remains correct at both sides of the synchronization.

In addition to these core behind-the-scenes synchronization features, UltraLiteJ provides advanced features such as HTTPS encryption, the ability to synchronize only selected tables, the ability to configure a synchronization to only upload data or only download data.

THE RELAY SERVER

UltraLiteJ clients can make use of SQL Anywhere 11's Relay Server. You can either run a Relay Server at your site or take advantage of Sybase's hosted Relay Server. The Relay Server is a hub connecting synchronization clients and the MobiLink synchronization server. The key feature is that the MobiLink synchronization server makes an outbound connection to the Relay Server, so synchronization through firewalls can proceed safely without requiring any inbound requests. The ability to exchange data in this manner avoids tricky server configuration issues and complex IT policy issues typically required for technologies that require inbound requests.

MAKING APPLICATION DEVELOPMENT EASIER

For those who want a fast route to applications, Sybase iAnywhere Professional Services provide a template-driven framework for rapid application development. The professional services framework provides XML-driven configuration of complex UI elements including tab controls, multi-column lists, and more.



SUMMARY

SQL Anywhere for BlackBerry, with its UltraLiteJ database and data synchronization client, is a mobile platform that will help developers to build complex, robust, and data-rich applications. It's the technology required to realize the potential of line-of-business applications and add significantly to the already valuable capabilities of BlackBerry smartphones in the enterprise.

Business applications are inherently data-centric. *Mobile* business applications must be built on a solid foundation of data management and also data synchronization if business data is to flow speedily and reliably through an organization to those places where it is needed, from the data center out to the mobile worker and back again. SQL Anywhere for BlackBerry provides that solid foundation.

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