

Maximizing Competitiveness in Today's Business Environments: Developing Mobility Solutions for the Enterprise

In today's increasingly distributed business environment, organizations are seeking new ways to share information across the enterprise, decentralize decision making, be more responsive to customers and reduce costs. To achieve these goals, more companies are considering the adoption of enterprise mobility systems. By extending corporate applications such as CRM, SFA and ERP to professionals in the field, organizations are able to streamline operations, accelerate field force productivity and improve the quality of customer and partner relationships. No longer are mobile technologies restricted to a limited number of specialized usages. Today, they are becoming the backbone for many mission-critical applications, helping organizations to maximize return on investment and achieve a lasting competitive advantage.

This market shift is being accelerated by the commercial availability of powerful Java databases capable of running on memory-constrained devices and supported by reliable and secure synchronization. Systems integrators, independent software developers and corporate IT departments are turning to these commercial products to expedite the development of complex applications and open new markets.

This paper discusses the impact of mobility on today's business environments and on a variety of enterprise-wide applications. It also examines the growing influence of Java and the capabilities that make it a leader in mobile development. We explore the need for mobile databases to support mission-critical software and the functionalities IT management should look for when evaluating them. Finally, we outline the features of PointBase mobile database solutions, which provide fully integrated support for extended enterprise applications.

The Growing Complexity of Today's Mobile Applications

According to the research firm In-Stat/MDR, 39 million field workers will be making daily use of enterprise mobility solutions by the year 2006. "Enterprise mobility" refers to the business process whereby field professionals make use of extended enterprise information and occasionally interact with back-end databases to exchange updates. It differs from today's "wireless" systems in that enterprise mobility solutions are not dependent on the use of a wireless network to deliver substantial business benefits.

"Always connected" wireless access poses a number of challenges for enterprises, including high connectivity costs and transmission latency. Field personnel cannot manage their data by relying on such systems, which depend on a complex and unreliable web of network technologies. Instead, most enterprise applications are designed for "occasionally connected" architectures, where information is stored locally and periodically synchronized with back-end enterprise databases as needed or when convenient.

Enterprises use these mobile structures to support a range of applications. The simplest and most necessary give field forces faster access to e-mail and productivity capabilities such as travel planning, expense reports, timesheets, procurement requests and other inter-office functions. Some companies also use mobile technologies and customized devices for niche applications that provide immediate ROI, such as specialized types of data collection.

However, the fastest-growing arena in enterprise mobility is, without a doubt, connecting with mission-critical applications such as ERP, SFA, ERM, CRM and a wide variety of field force automation software. With powerful synchronization and local data management now at their command, enterprises are taking advantage of new benefits gained from better information-sharing and data collection in the field. These gains are leading to new business opportunities and significant improvements in long-term ROI.

Enterprise Mobility at Work

Enterprise mobility cuts across an exceptionally wide range of business activities. The benefits include both direct financial returns and overall operational efficiencies, such as:

- Increased field and mobile worker productivity
- More personalized and responsive customer service
- More accurate information from the field
- Improved inventory management
- Expedited management of administrative tasks
- Reduced total cost of ownership

For example, transportation and logistics organizations now utilize mobile applications to connect the front office, loading docks and drivers. Not only does this improve communication throughout the organization, but it also lowers costs by reducing theft and loss and improving customer service. In healthcare, physicians with mobile applications can reduce the time spent on administrative tasks, resulting in faster diagnosis and better patient care.

Mobile enterprise applications are also having a strong impact on public safety. Their information-sharing capabilities enable more efficient deployment of medical personnel and law enforcement, helping to ensure safer communities. Utilities workers use mobile applications to automatically dispatch work crews, electronically accessing technical information and tracking equipment and supplies.

Mobile applications are also used for regulatory inspections of all kinds – including structural, food and equipment – to enable the error-free capture of data in a standardized format. Synchronizing data to back-end systems after the inspection reduces data latency and eliminates paperwork. Still other industries rely on mobility to support sales, retail, manufacturing and airport management initiatives.

No matter what the industry, providing field workers and mobile professionals with precisely the information they need, when and where they need it, can give organizations a significant competitive edge. Corporations have saved millions of dollars by adding mobile applications to their infrastructures. IBM has realized a \$100 million savings per 10,000 mobile employees; the company now has 80,000 mobile employees. AT&T reduced its office space by 50%, saving \$500 million since 1995, while Nortel realized a one-time real estate saving of \$61 million.

At the same time, these companies report impressive gains in productivity. BellSouth reported 13-30% increases in worker effectiveness, while American Express found that teleworkers were handling 26% more calls and produced 43% more business than their office-based counterparts. Corporations also reported that they are able to retain more employees due to better conditions and significant improvements in worker morale (Mobileinfo.com, 2003).

The Use of Java for Enterprise Mobility

Java has established itself over the past six years as a mature technology suitable for enterprise-class projects such as those just discussed. Seventy percent of enterprises now use Java, while 48% are utilizing Java for mission-critical projects (Gartner, 2002). Its advantages include complete cross-platform portability capable of utilizing the same code and providing interoperability across multiple mobile platforms. Inherent anti-virus protection makes it easier to develop applications that meet today's security requirements. In addition, Java-based connectivity enhancements offer the reliability and availability required by the mobile enterprise.

As one of today's most commonly used development languages, Java is widely accepted and utilized by the majority of skilled developers working on enterprise-class mobile applications. These applications are increasingly enabled by the open Java 2 Platform, Micro Edition (J2ME™). J2ME is a small-footprint version of Java technology optimized to run on mobile devices. J2ME's cross-platform architecture is virtually the same as that of J2EE™ (Java 2 Enterprise Edition) and J2SE™ (Java 2 Standard Edition). J2ME brings the capabilities of Java to memory-constrained mobile devices ranging from laptops, notebooks and Tablet PCs to PDAs and cell phones.

J2ME comes in two configurations - the Connected Device Configuration (CDC) and the Connected Limited Device Configuration (CLDC). The difference between these configurations has to do with the capability of the device. Various additional profiles build on CDC and CLDC. The most common is MIDP which builds on the capabilities of CLDC to run efficiently on memory constrained platforms such as smaller PDAs and cell phones.

J2ME reduces software costs and protects the corporate investment by operating on a wide variety of current and emerging platforms, while other approaches tend to lock developers into a single proprietary hardware and software platform. Using Java also lowers costs by simplifying integration, since it can simultaneously support several connected devices in heterogeneous environments. This is a special advantage in most enterprise situations, where mobility is almost always being added to existing systems.

Selecting the Best Mobile Database and Synchronization Solution

Today's occasionally connected enterprise mobility solutions are made possible by implementing local databases and synchronizing information with corporate databases and applications. These solutions are embedded directly into the application and are designed for the memory constraints of the mobile platform. It is therefore crucial for system integrators and developers to select the best database and synchronization solution available.

A number of specific issues need to be addressed by the mobile database. It should provide a footprint that is small enough to run effectively using the limited resources of a mobile device, and be portable to avoid the necessity of recompiling for various platforms. It is especially important for the database to be based on major mobility standards, especially SQL and Java, which is used across every industry and application. It should also provide full support for applications running SQL queries on laptops and notebooks. To enable highly functional applications, the mobile database needs to be capable of multiple, simultaneous connections and provide complete security and transaction integrity while doing so. It should integrate easily with synchronization technologies to achieve the bi-directional exchange and update of information with corporate databases and applications.

Accompanying the mobile database should be a synchronization technology that allows data to be periodically uploaded or downloaded to corporate databases. Developers need a technology that provides platform-independent, bi-directional synchronization to facilitate the flow of information, as well as scalable connectivity to accommodate a growing number of users. A publish-and-subscribe model helps users download only the specific information they need. Users can also be assisted by such utilities as conflict detection and resolution tools, which automatically reconcile data conflicts between simultaneously connected users.

A Java-based synchronization technology will integrate easily with databases to expedite development, and provide a range of tools that can monitor data flow throughout the enterprise. It must offer powerful security and transaction integrity to protect enterprise information. Finally, the synchronization solution should have the ability to add new business rules, in order to interact with complex distributed configurations that may exist in the enterprise.

PointBase Mobile Database Solutions

As we have seen, it is important when developing enterprise-level mobile applications to select a mobility solution that is Java-based, provides powerful local data storage and synchronizes easily with a variety of corporate databases. Such a mobility solution is available from PointBase, a division of DataMirror, the leader in Java data management and synchronization solutions.

PointBase solutions are currently deployed in more than one million seats in multiple industries, and consist of:

- PointBase Mobile Databases: PointBase Micro, optimized for smaller-footprint mobile applications, and PointBase Embedded, which can be utilized for more comprehensive mobile applications requiring a full-featured database.
- PointBase UniSync: A bi-directional synchronization technology that allows the interaction of PointBase mobile databases with corporate back-end databases.

PointBase Mobile Databases

PointBase Micro is a platform-independent, mobile database written in Java and designed specifically for mobile environments. It can be embedded directly into applications and is transparent to the end user. It meets all the requirements for enterprise mobility applications.

With a footprint of less than 45KB for J2ME CLDC/MIDP and less than 90KB for J2SE and J2ME CDC, PointBase Micro is small enough to run efficiently on most of today's mobile devices. Its Java-based portability eliminates recompiling for multiple platforms and reduces the complexity of application upgrades. PointBase Micro supports a strong subset of standard SQL functionality, including transactional support.

Despite its small size, PointBase Micro offers high performance and multiple connections for performing simultaneous tasks. It is compliant with both J2SE and J2ME (CDC and CLDC/MIDP) standards, and supports the JDBC programming interface. PointBase Micro provides Java-based security for encryption and role privileges, and leverages the Extended Tiny Encryption through PointBase algorithms.

For mobile applications that require a full-featured database, developers may wish to consider PointBase Embedded, also written in Java. With a small footprint of approximately 1MB, PointBase Embedded is completely portable across platforms and offers full SQL compliance, transactional integrity and complete transparency to the end user.

PointBase UniSync Synchronization

PointBase UniSync allows users to bi-directionally synchronize data between local databases and corporate back-end systems such as Oracle® and Microsoft® SQL Server™. It is designed to meet the needs of data collection and exchange across mobile applications distributed throughout the enterprise. With periodic synchronization, applications that are deployed with the PointBase databases become an integral part of the overall corporate infrastructure.

Written completely in Java, PointBase Unisync is portable across heterogeneous platforms. It gives users the ability to synchronize full-snapshot or delta changes by tables or rows, or to utilize join filtering to download only the right information to the mobile platform. Synchronization is based on a publish-and-subscribe model that allows client applications to have subscriptions to published data on the server side, which can consist of single or multiple tables. Sophisticated conflict detection and resolution can resolve problems that occur if two different users make changes to the same row or table and then try to synchronize them.

PointBase UniSync secures data transmissions from mobile platforms with standard encryption algorithms across the network and transactional integrity to assure data consistency. For synchronization with a specific set of application requirements, it offers a fully documented API that integrates with all PointBase database products, as well as JDBC-compliant third-party databases.

Enterprise Mobility: The PointBase Advantage

Based on these technical strategies, PointBase mobile database solutions allow integrators, independent software developers and corporate IT departments to easily extend enterprise data to end users as part of the overall corporate infrastructure. Providing a small footprint, portability and complete transparency, users benefit from access to the data they need on a variety of mobile platforms. At the same time, users take advantage of periodic delivery and exchange of data with all leading back-end systems without the expense and latency of a constantly connected network. With "always available" access to mobile applications and data, field productivity and customer service is greatly improved.

PointBase Mobility in Real-World Applications

PointBase mobile database solutions are proven technologies that are already being utilized by a number of major software developers, including Extensity/Geac and Checkmate International, among others.

Case Study 1: Checkmate International is one of the world's largest consulting, certification and inspection companies in the food and beverage industry, offering services and technology to ensure health safety compliance. Its Mobile Audit Capture System has automated the process of inspections and reporting by utilizing PointBase Micro to store and synchronize data to certify consumables facilities. "We have seen dramatic improvements in our responsiveness – from a week to two days – since switching to PointBase," said Jon Ley, company Development Manager. "For many of our clients, this rapid performance is a major reason for selecting Checkmate."

Case Study 2: Extensity/Geac, Inc. is a major provider of Internet-based applications for employee relationship management, offering a suite of notebook software including automated expense reports, timesheets, procurement and travel planning functionalities. These applications depend on PointBase Micro to help manage local data. "We work with companies that run on a wide range of operating systems, including Windows, Macintosh and UNIX, and we needed a product that could work with this variety of platforms," says A. G. Lambert, Senior Director of Product Marketing at Extensity. "For us, PointBase's high-performance Java database is essential."

Conclusion

Enterprises are extending mission-critical enterprise data via mobile applications to realize a wide range of benefits, including worker productivity, better customer service, improved operations and reduced cost of ownership. Increasingly, systems integrators, corporate IT departments and independent software developers are selecting Java as an ideal technology to optimize mobile applications. Supported by database technologies such as PointBase Micro, PointBase Embedded and PointBase UniSync, Java developers are enabling a new class of mobile applications that can be developed easily, efficiently and effectively to improve business operations.

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