Security-enhanced solutions for mobile enterprises and service providers
White paper

WebSphere® software

Robust mobile-computing products delivering business value to your enterprise.

IBM WebSphere Everyplace Access and
IBM Workplace Client Technology, Micro Edition

By Soheel Chughtai and LindaMay Patterson,
IBM Pervasive Computing

October 2004

Contents

Executive summary

Succeeding in today's fast-paced, competitive business environment requires companies to innovate their products and services, streamline business processes and empower their employees to work more effectively. Companies are now shifting their focus beyond the corporate walls to mobile workers, who often use paper-based processes to perform their work activities. With mobile computing technology, companies can provide mobile workers with access to electronic forms, business applications, business information and coworkers—anywhere and at any time. As a result, mobile workers can increase their responsiveness, productivity and effectiveness.

Mobile-computing technology can enable your organization and its mobile workers to:

- *Reduce data-collection costs by validating data as it is entered at the point where the work is performed, minimizing data-entry errors and lag time.*
- *Streamline business processes by allowing data collected in the field to flow directly into business applications, making it immediately available across the business.*
- *Improve responsiveness to customer inquiries by having immediate access to enterprise information.*
- *Minimize the expense to create, update and manage paper manuals and documents, by giving mobile workers access to that information through their mobile devices.*
- *Increase mobile-worker effectiveness by giving traveling professionals instant access to coworkers and the information they need to deal with the task at hand.*

The IBM On Demand Business model is designed to give employees, customers and partners access to the right information, when they need it. IBM mobile-computing middleware extends this model by providing the services mobile workers need to obtain enterprise resources at the point of use and to keep these mobile workers on task, regardless of location. Sometimes workers need to use their mobile devices to collect data, but they can't connect to the organization's network. In this situation, the application used to collect the data must run locally on the device, storing the data on the device until a network connection is available to forward the data to the enterprise.

Then, when network connectivity is available, mobile workers can access other enterprise resources directly to retrieve the latest information. IBM mobile-computing middleware can provide the services to address these needs—and much, much more.

This white paper is intended for IT executives and IT professionals who might design, create, test and deploy mobile-computing solutions within your enterprise. It describes the value and features of IBM mobile-computing middleware and how IBM WebSphere® Everyplace® Access and IBM Workplace Client Technology, Micro Edition unite to support your enterprise's business objectives.

Introduction

Integrating mobile-computing technology with your enterprise offers immense rewards. But these rewards can come with sizable challenges for IT organizations responsible for creating and deploying mobile solutions. These challenges include:

- *Providing the right solutions to fit each mobile worker's day-to-day business needs.*
- *Managing the diverse population of mobile devices used by mobile workers.*
- *Handling the ever-changing device landscape and selecting the right middleware to fit mobile-technology needs across your organization.*

If your company doesn't select a robust and comprehensive middleware product to meet all its needs, you could be left with a mix of products that can provide only specific services. This approach limits the potential of the technology and creates a difficult environment for your IT organization to manage and maintain. And poor product selection can be a key contributor to your not realizing a quick return on investment in mobile-computing technology.

Forward-thinking companies are quickly discovering that a robust, multipurpose middleware platform is required to meet their needs. WebSphere Everyplace Access is the integrated, mobile application platform that can provide the services your company needs. Workplace Client Technology, Micro Edition enhances this mobile solution by adding a Java™ Powered

platform, which enables you to extend Java technology-based enterprise applications to a wide range of devices. Together, these products provide a strong enabler for the enterprise striving to become an on demand business. WebSphere Everyplace Access, an integrated client/server environment, provides the core services needed to extend enterprise resources to mobile devices and gives mobile workers a single access point into their enterprise. WebSphere Everyplace Access provides real-time (connected) access to enterprise resources, such as Web content, enterprise applications and data, notifications and alerts, instant messaging, e-mail and personal information management (PIM) applications. It also supports users working offline by providing access to applications and data stored locally. When users can connect, WebSphere Everyplace Access can synchronize and manage the data transmitted between the device and the enterprise server—and can even manage and deploy software to the device.

Workplace Client Technology, Micro Edition provides the run-time environment for deploying robust Java applications to Java technology-enabled devices. These mobile applications can be written to access and update a local database provided by IBM DB2® Everyplace, which can contain data from the enterprise. When connectivity isn't available, data collected using these mobile applications can be stored locally (in the database). The data in the local database can be synchronized between the device and server as needed when connectivity is available. If the enterprise application uses a messaging model, you can use IBM WebSphere MQ Everyplace to store and forward application messages, generated by the mobile application, to the server for processing. By having these applications running on the device, the mobile user continues working regardless of network connectivity. You can tune Java applications intended for mobile devices (using tools provided with the product) to meet the devices' characteristics and constraints, so they perform better on a particular device. These tools also enable you to develop code once (in Java) and deploy it to various Java technology-enabled devices or reuse existing Java components from the enterprise applications to create applications that run on the mobile device.

WebSphere Everyplace Access and Workplace Client Technology, Micro Edition, working in concert as a single product offering, can deliver robust mobile-computing capabilities to your enterprise. You can leverage this leading-edge technology to address a variety of challenges, including:

- *The diversity of mobile workers and their particular mobile-computing needs.* For example, a mobile purchasing agent can use connected access to get the latest commodity prices located on the enterprise portal (accessed using WebSphere Everyplace Access). A delivery person in the same company can work offline all day using a robust Java application (running on Workplace Client Technology, Micro Edition) to access and update the delivery orders and schedules he or she downloaded to a personal digital assistant (PDA) that morning.

- *The need to provide the right technology to perform a particular task.* For example, a sales representative can use a simple form-based application to enter prospect information (the Web form and data capture provided on the device by WebSphere Everyplace Access). The same person can also use a robust order-entry application to place an order that uses complex discounting algorithms (implemented as a Java application running on Workplace Client Technology, Micro Edition).

- *To provide mobile workers with access to a range of enterprise resources they need to do their jobs effectively.* For example, your mobile workers read and respond to their e-mail and access your organization's intranet or the Internet to obtain information. WebSphere Everyplace Access has services that enable users to browse Web content, access and manage their e-mail or use PIM applications while either connected to or disconnected from the network. When mobile workers require access to business applications and data while working offline, they can access these applications, enabled by Workplace Client Technology, Micro Edition.

- *Managing and maintaining mobile devices without affecting mobile-worker effectiveness.*
  Maintaining mobile devices over the air relieves mobile workers from returning their devices to the office each time new software, software upgrades and device run-time enhancements must be added. WebSphere Everyplace Access and Workplace Client Technology, Micro Edition work together to provide a device run-time management service that enables you to update, manage, inventory, configure and remove software on a device as needed.

By taking advantage of this product combination, you can gain the individual strengths of each product within one offering. WebSphere Everyplace Access provides mobile workers with access to server-side applications, delivering the controls and services necessary to have a seamless experience when they're working away from the office. Workplace Client Technology, Micro Edition gives mobile workers robust Java applications running on server-managed devices, helping the server to ensure that the users have the latest version of applications and the most up-to-date data.

The solution architecture

Looking at the combined architecture of WebSphere Everyplace Access and Workplace Client Technology, Micro Edition helps you visualize their placement within the enterprise ecosystem. As shown in Figure 1, the WebSphere Everyplace Access server is logically placed inside the enterprise environment to become the mobile worker's entry point into your enterprise. The middleware, resources and services outlined in Figure 1 comprise (from right to left):

- Enterprise resources *that include collaboration services, such as PIM applications and data, e-mail and instant messaging (through IBM Lotus® Sametime®). These resources also include enterprise applications, business- or industry-specific applications purchased from software vendors and business applications created by the enterprise. And enterprise data, such as business data accessed, stored and managed by databases and file systems, and Web content.*

- *WebSphere Everyplace Access that serves as the mobile application platform that provides services to support a variety of mobile devices operating in connected or disconnected mode. WebSphere Everyplace Access provides adapters used to interact with enterprise applications and collaboration services. These adapters and various productivity portlets are available with the product or are downloadable from the portlet catalog. WebSphere Everyplace Access can also use IBM WebSphere Business Integration solutions and IBM WebSphere MQ software to integrate with the enterprise applications.*
- A device *that includes client middleware, such as Workplace Client Technology, Micro Edition, which brings a robust Java environment to mobile devices; and IBM Everyplace Client (optional) middleware that works in concert with services provided by WebSphere Everyplace Access.*

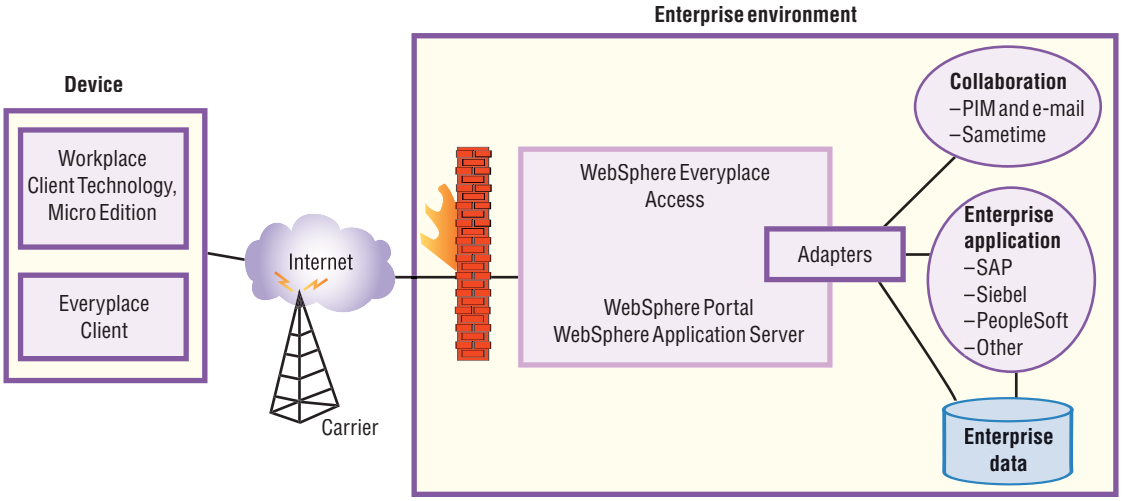

Figure 1. Solution architecture

WebSphere Everyplace Access (server) is built upon IBM WebSphere Application Server, a mature, high-performance application server with a robust security model, and IBM WebSphere Portal technology, which provides services to personalize the user experience and to adapt content to the needs of the network and the device requesting that content.

Like many IBM products, WebSphere Everyplace Access and Workplace Client Technology, Micro Edition are built on open-standards-based technology, such as Java and XML. Java technology enables you to create highly secure and portable applications, both in the server environment and for a variety of Java-enabled mobile devices. WebSphere Everyplace Access and Workplace Client Technology, Micro Edition have incorporated SyncML, an XML dialect, to support wireless data-synchronization services for mobile devices.

WebSphere Everyplace Access and Workplace Client Technology, Micro Edition also provide toolkits and a programming model that enable your development team to create end-to-end mobile applications. These toolkits integrate with IBM WebSphere Studio, enabling you to create, test, debug, deploy and manage applications that you can extend to mobile devices.

About WebSphere Everyplace Access

WebSphere Everyplace Access, an integrated mobile-application platform, extends enterprise resources to mobile workers. WebSphere Everyplace Access provides services that support both connected and occasionally connected (or intermittently connected) mobile-computing models, and that are sensitive to the device, its capabilities and the device's network connection, its characteristics and capabilities. The product also supports browser-based and rich client (through the Everyplace Client) access to enterprise applications and data.

Tools to create server-based extensions to existing and new applications, and tools to create mobile applications are provided in the IBM Everyplace Toolkit for WebSphere Studio that is included with the product. A comprehensive and integrated administration console helps you ensure mobile workers have access to the appropriate enterprise resources. Using this administration console, administrators and authorized users can manage your enterprise mobile-computing environment, including users, groups, applications access, data access and other mobile enterprise resources. Figure 2 shows the WebSphere Everyplace Access server and the Everyplace Client suite of services.

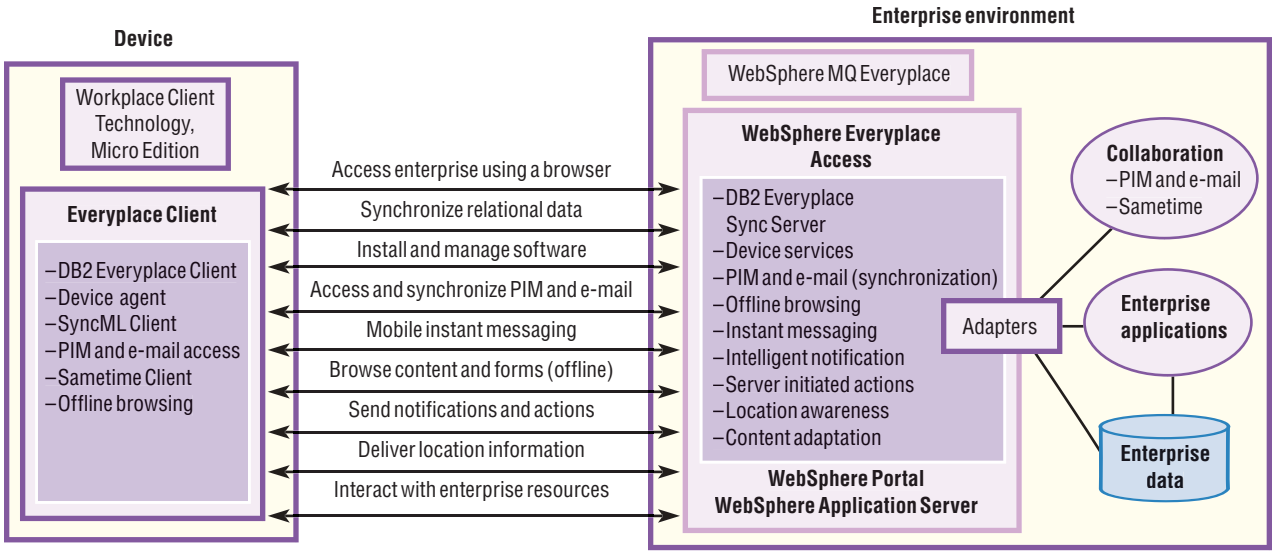

Figure 2. WebSphere Everyplace Access details

WebSphere Everyplace Access services and capabilities include the ability to:

- *Obtain access to your enterprise using a Web browser.*
  Browser access to enterprise applications is accomplished using portlets, or Java programs which run on the server. WebSphere Everyplace Access provides a variety of prebuilt productivity portlets. Many of these portlets are included with the product, and others are available in the WebSphere Portal and IBM Lotus Workplace Catalog at catalog.lotus.com/wps/portal/portalworkplace.

- *Synchronize relational data.*
  Both Workplace Client Technology, Micro Edition and the Everyplace Client use IBM DB2 Everyplace Client, a small-footprint relational database for mobile devices. The Everyplace Client supports applications written in device-specific languages, which can interact with the local database. The Everyplace Client and Workplace Client Technology, Micro Edition both rely on IBM DB2 Everyplace Sync Server (incorporated into WebSphere Everyplace Access) to keep data synchronized between the mobile device's database and the enterprise database.

- *Install and manage software.*
  Managing the currency of mobile devices is a critical aspect of mobile computing. Once devices are in the hands of your mobile workforce, device management can become problematic, because it is not feasible to recall devices from the field to be updated. WebSphere Everyplace Access device management service allows you to perform initial installation of the Everyplace Client on the mobile device. And more important, you can use the service to manage and maintain device software and device configuration data, distribute software and inventory device software. The device management service can detect bandwidth metrics and delay delivery of large device-management jobs when bandwidth is limited. Using these capabilities, mobile devices running applications on either Workplace Client Technology, Micro Edition or Everyplace Client can be easily managed remotely.

- *Obtain access and synchronize PIM content and e-mail.*
  PIM and e-mail are office services used to communicate and exchange information. Making your calendar, contacts and e-mail available to you (on your mobile device) is seen as an essential service. WebSphere Everyplace Access provides connected access to PIM applications and e-mail. For disconnected access, WebSphere Everyplace Access provides a synchronization engine to synchronize PIM and e-mail data between devices and your back-end mail server. WebSphere Everyplace Access interfaces with IBM Lotus Domino®, Version 5.0.12 and later, Microsoft® Exchange 2000 and Exchange 5.5 servers.

- *Use mobile instant messaging.*
  Instant messaging, through Lotus Sametime allows coworkers to collaborate effectively. WebSphere Everyplace Access extends this collaboration service to mobile workers by integrating the Lotus Sametime Client into Everyplace Client. This instant messaging service them to interact with coworkers using their mobile devices.

- *Browse content and form*
  Offline browsing allows users to synchronize WebSphere Portal content to the device for offline viewing. Offline portal forms (an extension to offline browsing) makes WebSphere Portal forms available on the device. These forms are used by the mobile worker to collect data that is stored locally while the device is disconnected from the network. When a connection is available, the form data is forwarded to the server and processed by the enterprise application.

- *Send notifications and actions*
  Notifications, or alerts, let your organization automatically notify a mobile worker of critical information or an important event. WebSphere Everyplace Access Intelligent Notification Service lets users subscribe to customized notification services and define the delivery method, and specify rules for how and when an alert should be delivered. For example, a user can tell the Intelligent Notification Service to send the URL of any Web-based news article published with fire retardant as the subject. WebSphere Everyplace Access has built-in delivery channels that allow notifications to be sent through Short Message Service (SMS), e-mail, Lotus Sametime, Wireless Access Protocol (WAP) Push, AOL Instant Messenger and pager messaging. WebSphere Everyplace Access also includes a notification extension called *server initiated action* that uses messaging to initiate activities on the device, such as synchronizing data or performing device software updates.

- *Deliver location information*
  WebSphere Everyplace Access provides a powerful, yet easy-to-use, location awareness service that allows you to use location-based services from a range of vendors, such as Webraska, Go2map and Mapinfo. This service allows you to use geocoding (providing the geographical coordinates for a specific address) and reverse geocoding (providing the nearest address to the provided geographical coordinates) in applications such as route optimization or dispatching applications, and for finding the mobile worker closest to another location. It also provides services for maps, travel directions and points of interest.

- *Interact with enterprise resources*
  The value of Web services in today's computing solutions is well-established as a mechanism to help your enterprise applications create a distributed computing model and gain its benefits. Taking this one step farther, WebSphere Everyplace Access includes a framework that enables mobile applications to connect to back-end enterprise applications using these same Web services.

The next section in this paper discusses Workplace Client Technology, Micro Edition, which brings a robust Java run-time environment to Java-enabled devices.

About Workplace Client Technology, Micro Edition

Workplace Client Technology, Micro Edition delivers a robust Java Powered platform to extend reusable, enterprise applications that can provide a consistent user experience across mobile devices, such as laptop computers, tablets, PDAs, smart phones and embedded mobile devices. It supports an occasionally connected model, dramatically decreasing the dependence on network connectivity to access applications and data. You can also leverage Workplace Client Technology, Micro Edition to extend existing applications to run on a wide variety of mobile devices and to help decrease development and deployment costs by reusing existing application code and existing developer skills. Java technology-enabled mobile devices give you:

- *The ability to reuse existing Java skills*
  Java on the device provides the essential subset of the Java (classes and class libraries) for the server, so existing Java skills can be easily extended to build applications for mobile devices.

- *Portable applications*
  Java applications written for Java technology-enabled devices are portable to devices with the same characteristics and capabilities.

- *Built-in security*
  Java provides a secure run-time environment with a wide variety of security-rich features.

- *Abstraction from device specifics*
  Java, unlike native device languages, lets you focus on the application, instead of the device details. This increases the longevity of the applications as the applications are moved to newer or different devices.

The Workplace Client Technology, Micro Edition run time contains two key technologies: IBM WebSphere Everyplace Micro Environment and IBM Extension Services for WebSphere Everyplace. WebSphere Everyplace Micro Environment provides the Java run-time environment for Java 2, Micro Edition (J2ME) applications. Extension Services for WebSphere Everyplace enhances this base by extending the Java 2 Platform, Enterprise Edition (J2EE) Web application model to mobile devices, allowing the enterprise to reuse existing J2EE application assets and artifacts.

WebSphere Everyplace Micro Environment

WebSphere Everyplace Micro Environment provides a Java Runtime Environment (JRE) that implements a configurable, compact, efficient and consistent architectural layer to support device-based applications. JRE supports J2ME, which consists of Java Community Process component-defined configurations and profiles to develop Java programs for embedded and mobile devices. A configuration defines a platform for a range of devices, describing a class of devices with similar hardware configurations, such as processor power, available memory and suitable network bandwidth. A profile further describes a class of devices within a particular configuration domain.

The two J2ME configurations are Connected Limited Device Configuration (CLDC) and Connected Device Configuration (CDC). CLDC describes limited-resource-constrained devices, such as mobile phones, two-way pagers and (low-end) PDAs. CDC provides device configuration for devices with more powerful processors (than CLDC), with a minimum of two megabytes of memory and with greater bandwidth networks. The devices in this group include high-end PDAs and smart phones, among others. Profiles are associated with a particular configuration, adding important capabilities and classes to further support devices. Mobile Information Device Profile (MIDP) extends the CLDC configuration and defines APIs to support event processing and persistent storage handling, and includes high-level and low-level user interface APIs. MIDP, Version 2.0 is popular for creating Java applications on mobile devices. MIDlets are the programming model for MIDP Java applications.

Extension Services for WebSphere Everyplace

IBM Extension Services for WebSphere Everyplace uses a Web programming model and enables Workplace Client Technology, Micro Edition to extend (port) Web applications onto mobile devices. This environment has affinity to J2EE, meaning it supports the essential and pertinent J2EE components and services necessary to develop mobile applications.

Extension Services for WebSphere Everyplace takes advantage of IBM Service Management Framework (SMF), IBM's implementation of the Open Services Gateway Initiative (OSGi) Service Platform R3 specification. SMF provides the network delivery and management of applications and components completely independent of the device operating system. It is a lightweight Java technology-based container designed to manage application bundles, self-contained Java applications packaged as Java Archive (JAR) or Java Executable (JXE) files. A JXE file contains a Java application optimized specifically to the IBM WebSphere Everyplace Micro Edition environment and IBM WebSphere Custom Environment Java Virtual Machines (JVMs). SMF enables the deployment, maintenance and removal of applications and components. It manages the interaction between components contained in the bundles and only instantiates components when needed by the running application. Two key components of SMF are:

- *SMF Runtime, which allows multiple Java applications to share a single JVM. The run-time component also manages the life cycle of application bundles. It contains features that enable interaction with SMF Bundle Server. For example, SMF Runtime can request and receive updates from SMF Bundle Server.*
- *SMF Bundle Server, which enables you to remotely manage deployment and update of bundles to a heterogeneous network of devices. The server uses device installation and configuration information to assess the capabilities, capacity and current running state of the target device. If appropriate, the server delivers the intended application bundle and any prerequisite bundles needed by the device.*

Supporting data-centric applications

Your enterprise thrives on its business data. Your applications are specifically designed to access, manage and interpret data. Mobile workers need mobile applications to perform these same tasks. They rely on the data on their mobile

devices to do their jobs effectively. Therefore, data must flow between their mobile devices and your enterprise, so that both environments have current and accurate data. Mobile data updates must also get to business applications, which move these updates through the appropriate business processes.

The success of data-centric mobile applications rests on two activities:

- *Managing the data shared between the device and the server which can be accomplished by using DB2 Everyplace and WebSphere MQ Everyplace*
- *Managing the software on the device which can be accomplished using a device management service that aids in providing a server-managed client*

DB2 Everyplace provides a small-footprint relational database for mobile devices, such as PDAs, smart phones and other mobile devices, as well as a high-performance synchronization engine that enables data to be shared between the enterprise and mobile devices. The database is a highly secure, encrypted, data-storage mechanism from which data can be accessed using industry-standard Java Database Connectivity (JDBC) and Structured Query Language (SQL). The synchronization engine performs bidirectional synchronization of data between the mobile device and the enterprise server, while helping to ensure the integrity of the data at both locations. DB2 Everyplace is included in WebSphere Everyplace Access.

WebSphere MQ Everyplace connects with mobile applications and provides an assured, once-only delivery messaging service for application messages, preventing their loss or duplication. It provides peer-to-peer, synchronous and asynchronous message handling, provides a choice of APIs and interacts with a wide variety of languages including C, Java, J2ME and Java Message Service (JMS).

Managing and servicing devices that rarely return to the office is a challenge for your IT organization. However, these devices still need to be kept up to date with new and enhanced software and applications. In a production environment, the administrator is charged with managing and maintaining the currency of these mobile devices. The WebSphere Everyplace Access device management service manages software provisioning to devices and provides capabilities, such as job control, device identification, device setup and configuration, and device inventory collection.

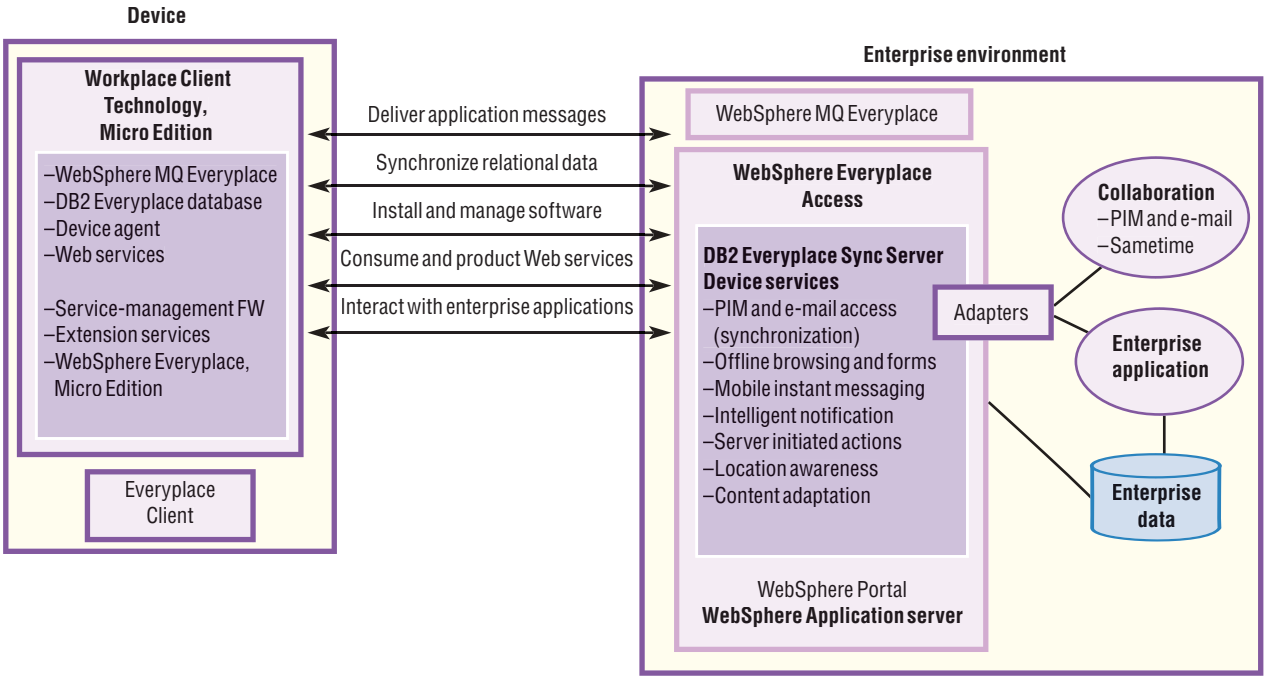

Figure 3. Workplace Client Technology, Micro Edition details

Figure 3 shows Workplace Client Technology, Micro Edition and its associated client services, and WebSphere Everyplace Access server-based middleware combining to provide the capabilities you can use to create Java technology-based, end-to-end mobile applications.

Scenarios to put it all together

As stated earlier, WebSphere Everyplace Access and Workplace Client Technology, Micro Edition together enable your organization to extend its resources to where they are needed, when they are needed. Workplace Client Technology, Micro Edition brings robust Java technology-based applications to mobile devices, while WebSphere Everyplace Access adds many services that allow mobile workers to access and use various enterprise resources from their mobile devices.

In the following scenarios, WebSphere Everyplace Access and Workplace Client Technology, Micro Edition capabilities are mapped to typical mobile applications.

Deliver and manage Workplace Client Technology, Micro Edition bundles to devices
An administrator needs to get new applications and software updates to field-based mobile devices, and uses WebSphere Everyplace Access device management service to create the jobs that can deliver these applications and updates to the target devices, the next time the device connects to the server. Through these jobs, device management remotely delivers, manages, updates and even deletes software on the device. A local device agent carries out the changes once they are delivered. In emergencies, when an administrator can't wait for a mobile user to connect to the network, that administrator can use the server initiated action to remotely trigger the delivery of the software and the update to the device.

Offline order-entry application requires data
A sales representative creates a customer order using an order-entry application located on a mobile device. The pricing data must be up-to-date to help ensure the accuracy of the total price quoted to the customer. This is a robust Java technology-based order-entry application, shown in Figure 4, running on Workplace Client Technology, Micro Edition. The enterprise's master pricing data is synchronized to the device as needed, using the WebSphere Everyplace Access DB2 Everyplace Sync Server. For urgent changes, the database can trigger a customized the server initiated action that initiates data synchronization on the device. For this application, data synchronization is used to update data to the device; however, bidirectional data synchronization is also available.

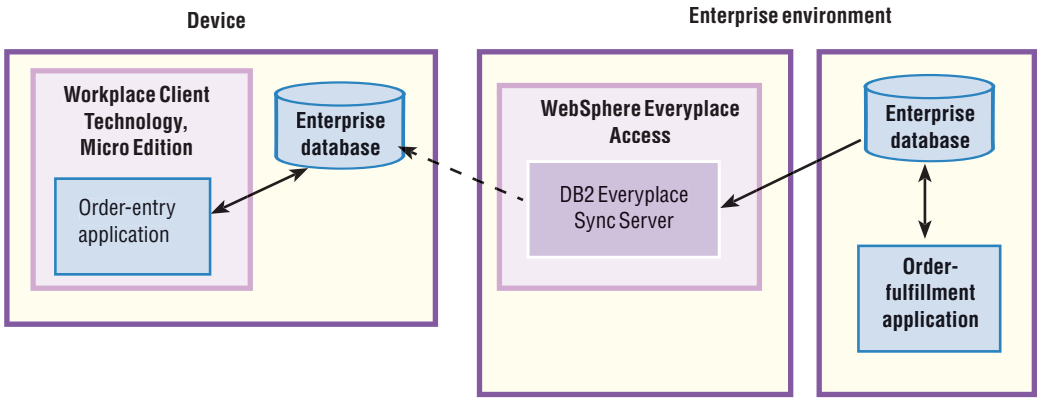

Figure 4. Offline order entry

Capture orders created offline as application messages

To process customer orders, an enterprise's order-fulfillment application must have orders created by sales representatives, including those created using mobile devices. In this scenario, the order-fulfillment application accepts orders two ways: as application messages from external sources and as direct input by order-entry clerks. To work within this architecture, the device-based order-entry application creates orders as application messages, as shown in Figure 5, sending them to the queue manager. IBM WebSphere MQ Everyplace is used in this instance to deliver the orders to the server to be processed by the enterprise applications. The enterprise applications can rely on WebSphere MQ Everyplace, WebSphere MQ or WebSphere Business Integration to manage the messages. WebSphere MQ Everyplace is an optional addition to WebSphere Everyplace Access.

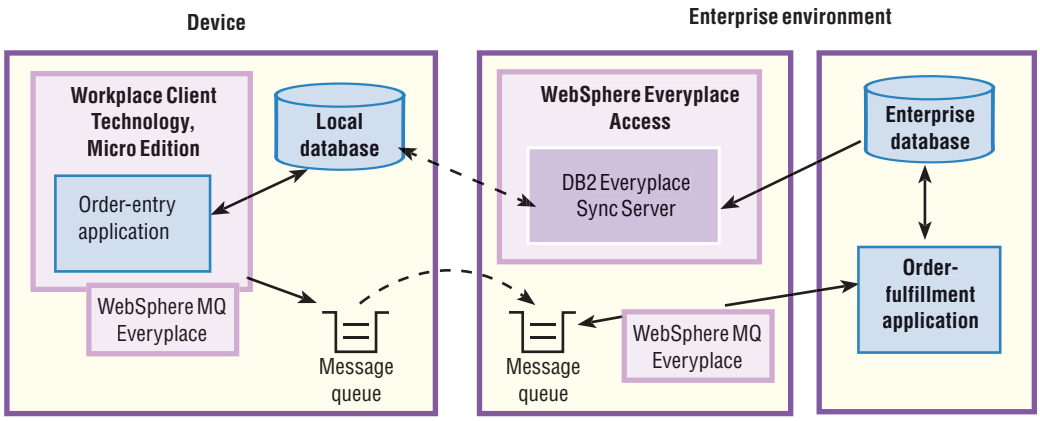

Figure 5. Order fulfillment with application messages

Engineer needs Web content and forms offline

Field-service engineers perform annual service checks on installed equipment. To complete this task, each engineer needs access to the service history and equipment diagrams stored on the enterprise's intranet. WebSphere Everyplace Access offline browsing capability can be used to store this information on the devices, to be viewed by the engineer. When engineers complete service checks, they submit service forms, recording information relating to the service checks performed.

The service form, originally a Web form, is now available on the mobile device as an offline form (an extension to the offline browsing service), as shown in Figure 6. The offline-form capability supports field validation to help ensure the integrity of the data entered. Once the form is completed and a network connection is available, the form data is sent to the server for processing by the work-order management application.

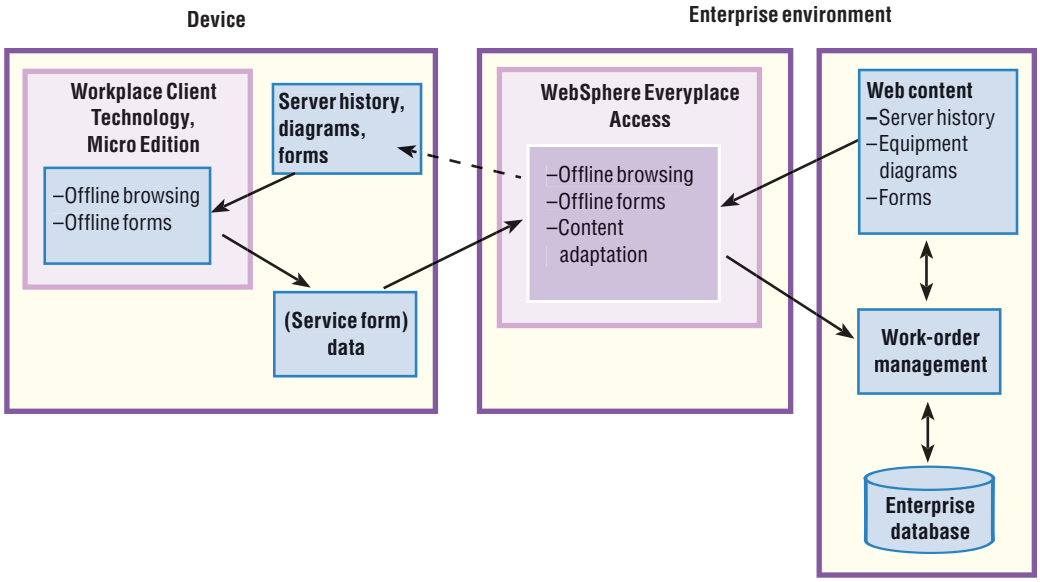

Figure 6. Engineer needs Web content and forms offline

Respond to high-severity equipment failure

Vital equipment of a premier customer failed, causing the customer to request an emergency visit by a field-service engineer. Figure 7 shows the details of the application solution using WebSphere Everyplace Access. The service department uses its dispatching system to log the request and uses its locator function, based on WebSphere Everyplace Access location-awareness service application programming interfaces (APIs), to identify the closest available engineer. After selecting the engineer, the dispatching system uses Intelligent Notification Service to alert the engineer of the situation through Lotus Sametime. After the engineer accepts the emergency request, server initiated action is used on the server to automatically invoke data synchronization on the device, sending the work order to the designated local database.

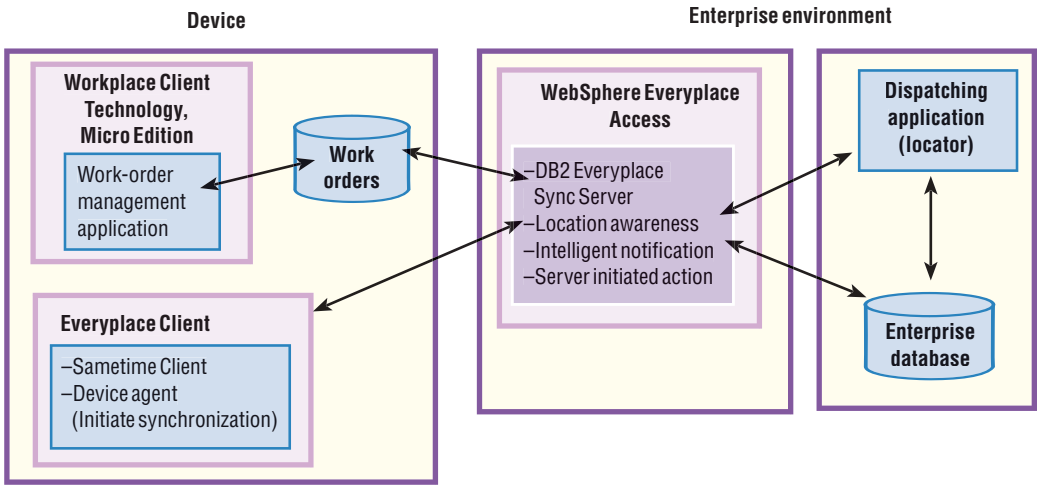

Figure 7. Respond to high-severity equipment failure

Sales team relies on access to accurate calendar

All sales professionals rely on their calendars to keep track of customer appointments, which are managed centrally. The sales team needs both connected and disconnected access to calendars. WebSphere Everyplace Access provides PIM applications and an e-mail service that supports both connectivity models. The connected model allows calendar access using portlets. The disconnected model allows calendar synchronization to the device for offline viewing and management.

Developing solutions

The ability to quickly and easily create mobile applications is essential to reduce the cost of the solution. WebSphere Everyplace Access and Workplace Client Technology, Micro Edition offering provides the tools necessary to create server-based mobile applications and device-based mobile applications, as shown in Figure 8, as well as the components for an end-to-end mobile solution. WebSphere Everyplace Access includes the Everyplace Toolkit, which enables you to create connected mobile applications. Workplace Client Technology, Micro Edition includes IBM WebSphere Studio Device Developer and the Micro Environment Toolkit, enabling you to build Java, J2ME and Extension Services technology-based applications.

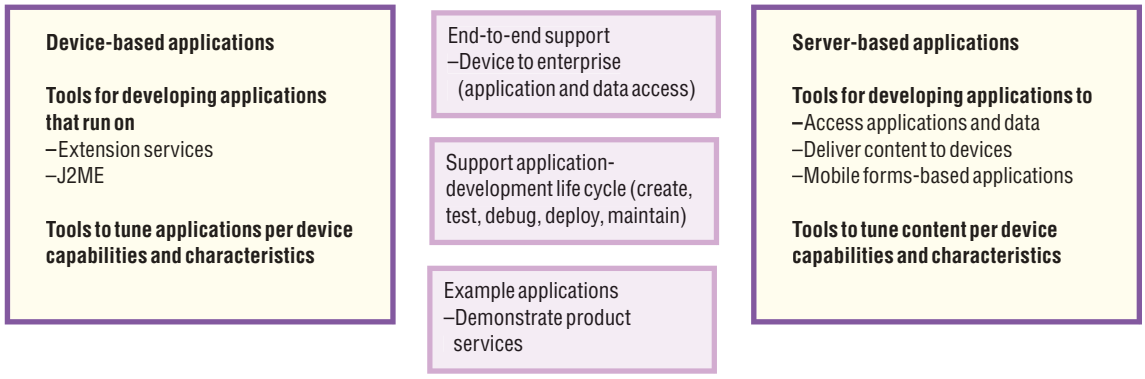

Figure 8. An integrated development environment

Everyplace Toolkit and IBM WebSphere Studio Device Developer (and associated tools) plug into either IBM WebSphere Studio Site Developer or IBM WebSphere Studio Application Developer. WebSphere Studio products are built on open Eclipse technology, a tools integration platform that establishes a common look and feel to the tools used by developers.

With the Everyplace Toolkit, you have access to new tools to help you create mobile solutions more efficiently, including:

- *Multidevice authoring tools, used to visually develop portal and Web applications, and adapt these applications for multiple mobile devices from a single design model*
- *A reusable forms application wizard, to provide you with a quick-start or a template-based approach to developing forms-based applications*
- *IBM DB2 portlet wizard, to help you build DB2 mobile portlet applications that access DB2 tables and display data in report formats*
- *Enterprise resource planning (ERP) and customer relationship management (CRM) portlet wizards, to create mobile portlet applications that extend ERP and CRM access from PDA-class mobile devices.*

The toolkit also provides an extension to the IBM WebSphere Studio Page Designer, enabling you to develop forms with field-level validations. You can load these forms on a mobile device to enable data collection. WebSphere Everyplace Access also includes a copy of WebSphere Studio Device Developer.

WebSphere Studio Device Developer is used to develop, test, debug and deploy device-based Java applications. You can use WebSphere Studio Device Developer as a stand-alone integrated development environment (IDE) to create J2ME (MIDP 2.0) applications or use WebSphere Studio Device Developer along with the Micro Environment Toolkit to provide J2EE and Web applications for mobile devices. In the latter instance, WebSphere Studio Device Developer and Micro Environment Toolkit are installed as a plug-in to either WebSphere Studio Site Developer or WebSphere Studio Application Developer. This composite IDE provides the tools to create extension services applications and to create bundles deployable in the Workplace Client Technology, Micro Edition environment.

WebSphere Studio Device Developer not only provides tools to create, test, debug and deploy the application artifacts, but it also includes performance tools. These tools include IBM MicroAnalyzer, which lets you gather dynamic application run-time information for analysis and review, and IBM SmartLinker, which helps you tune your code and remove unnecessary objects. All to make your applications as small as possible before they are deployed to mobile devices. IBM Web Services Toolkit for Mobile Devices provides both development tools for creating Web services and a run-time simulation environment for Web service execution.

Conclusion

You know your organization's future depends on using technology wisely and effectively to give you a competitive advantage. Mobile workers play a key role in the day-to-day operations of your business. You are wise to empower these employees with the tools and technology to help them work effectively. And to minimize risk, why not tie your plans to a company like IBM, with a vision for the future and the middleware to help you achieve your business objectives? IBM understands the complexity of the mobile world, and the diverse needs of industries, companies and the growing mobile workforce. Through the combination of IBM WebSphere Everyplace Access and IBM Workplace Client Technology, Micro Edition, IBM can give you the services to build robust mobile solutions to meet the breadth of mobile-computing opportunities that exist within your company.

For more information

To learn more about IBM WebSphere Everyplace Access and IBM Workplace Client Technology, Micro Edition, visit:

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IBM Corporation
Software Group
Route 100
Somers, NY 10589
U.S.A.

Produced in the United States of America
10-04

G224-9130-00