System z in a Mobile World

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Highlights

► The speed of adoption of mobile devices is significantly faster than previous technology adoptions, including TV, radio, and the internet.

► Today, mobile transactions are part of everyday life for anyone who uses a mobile banking app, for supply chain managers optimizing responsiveness to sales orders, or for hospital staff collaborating on patient care.

► Extending existing enterprise applications onto a mobile platform allows you to capitalize on existing investments without the need to develop completely new solutions to support mobile services.

► Nearly 70% of all enterprise transactions touch a mainframe.

► System z plays an important role in today's mobile world by providing the secure and stable base that you need to extend existing enterprise data and transactions to mobile users.

Redbooks

Mobile from an enterprise perspective

As organizations engage with customers, partners, and employees who are increasingly using mobile as their primary general-purpose computing platform, these organizations have tremendous opportunity to transact—everything from exchanging information to exchanging goods and services, from employee self-service to customer service. This mobile engagement allows you to build new insight into your customer's behavior so that you can anticipate their needs and gain a competitive advantage by offering new services.

Becoming a mobile enterprise is about re-imagining your business around constantly connected customers and employees. The speed of mobile adoption dictates transformational innovation rather than incremental innovation. Mobile really is a "disrupt or be disrupted" technology.

This brings some specific challenges:

► Reacting to a new set of user expectations about the way they interact with your company

► Delivering high-quality mobile applications quickly and efficiently

► Coping with sudden unexpected increases in mobile-initiated transactions, for example when a new sales offer becomes available

► Managing a wide range of different devices and adapting the existing enterprise security framework to the unique security challenges of a mobile environment

Business benefits of mobility

Mobile solutions are pushing companies to rethink the user experience, from the presentation of data to the interaction patterns that are required to integrate new and existing business services. This change in the way that you interact with customers can improve service and enable new business opportunities.

Figure 1 on page 2 shows how mobile enablement can be used to improve customer service in banking. It shows the following scenarios:

1. When a large or unusual payment is captured, the client is asked to authorize the transaction using a mobile device (for example, by using a biometric authentication). This type of solution improves fraud detection and, therefore, potentially saves the bank money.

2. If the client's credit card is not returned by an ATM, a message can be sent informing the client of the location of the nearest branch. This solution limits the risk of customer dissatisfaction.

3. The client is warned in advance of a pending transaction that causes the account to become overdrawn. This solution allows the client to make the necessary arrangements to avoid the overdraft, for example to accept an offer of an overdraft protection offering.
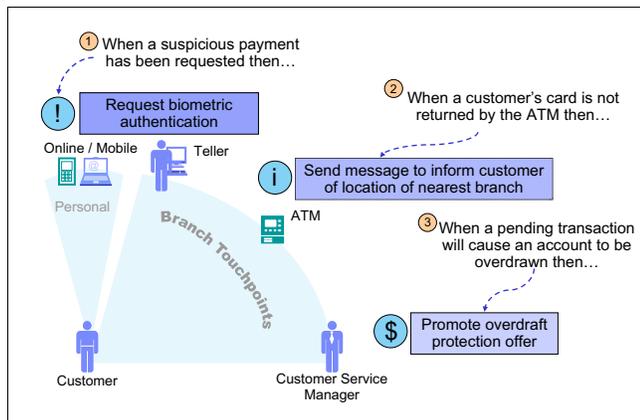

Figure 1   Mobile banking customer interaction scenarios

Whereas mobile devices are most often used to "pull" information from systems, these scenarios highlight the importance of notifications and location-based services that enable a "push" style of user interaction that can significantly improve the user experience. To take advantage of mobile devices in this way, however, enterprise applications need to be enabled for the detection and correlation of events.

It is also worth noting the role that analytics have in enabling the best decision to be taken at the best time in these scenarios. For example, decisions such as determining whether a payment request is likely to be fraudulent or what offer might appeal to a customer, require that the analytics processing occurs in real time and that it uses operational data. In addition, of course, this operational data is usually on IBM® System z®.

The integration challenge

By extending existing enterprise applications onto a mobile platform, your business can capitalize on its existing investment without the need to develop an entirely new solution to support mobile services.

The requirement to provide users with continuity of transactions across multiple channels means that organizations that have well-established, multi-channel architectures are better placed to enable mobile access to their transaction processing systems. A channel integration approach based on a set of common reusable services offers the best framework for mobile integration. Keep in mind, however, that although it is good to reuse what you already have, mobile

applications require a different style of service based on light-weight RESTful interfaces, which are not normally available in mainframe applications.

Mobile application delivery

You cannot go mobile without building and running some applications. In addition—due to the speed of the market and the complexity inherent in a variety of users, devices, data, and transaction types—you cannot build and run quality applications quickly or on an enterprise scale without a flexible and iterative approach. This issue can become as much an operational challenge as it is a technological issue. A unified approach to mobile demands systems, technology platforms, and even a core operating model that is designed with mobile in mind. This approach allows you to deliver new levels of integration while managing all manner of complexity, from heightened security requirements to the development of seamless omni-channel experiences.

Roll-your-own mobile solutions can be a tactical response to a short-term requirement; however, a strategic approach requires a *mobile enterprise application platform* (MEAP). A MEAP addresses the difficulties of developing mobile software by managing the diversity of devices, networks, and user groups at the time of deployment and throughout the mobile solution's lifecycle. Unlike stand-alone applications, a MEAP provides a comprehensive, long-term approach to deploying mobility by fostering code reuse and enforcing standards and preferred practices.

Managing the mobile workload

You might have heard stories of "Cyber Mondays" and "Black Fridays" when demand outstrips the ability to service requests. These types of events highlight a major headache for the Chief Information Officer (CIO) of a mobile enterprise who must deliver an IT infrastructure that can keep pace with the increased transaction workload that results from the mobile engagement.

Mobile users have 24x7 access to bank accounts, health records, personal data, and much more. It is important that organizations have an infrastructure that can handle the demands of a mobile business without sacrificing security or service times and without deteriorating the customers' experience. Evidence has shown that mobile apps normally:

► Drive an increase in overall transactions
► Increase off-peak web traffic
► Exacerbate existing workload spikes

Device management and mobile security

Bring your own device (BYOD) policies bring more capabilities into the mobile enterprise, making employees more productive when their own smartphones and tablets can immediately connect to networks, applications, and data. However, without an effective mobile device management (MDM) solution, these benefits can quickly be outweighed by a lack of control and separation between corporate use and personal use.

You need to ensure the highest levels of protection and privacy for each discrete mobile transaction from the device, through the network, and to the mainframe application and data. Integrity and privacy cannot be sacrificed for the sake of speed and convenience. Securing the mobile transaction end to end has emerged as an important concern of the mobile revolution, because the organization's information and data is distributed beyond the secure perimeter and transactions are executed on mobile devices, which can be shared and are often personally owned.

The role of System z

If you need to provide secure, timely, and quick access from mobile devices to critical data that resides on a mainframe, there are three things you must get right:

► Build an agile approach to deliver applications
► Make every transaction secure
► Use mobile analytics to improve outcomes at every moment

This section describes how System z can help you to become a mobile enterprise by addressing these imperatives.

Build an agile approach to deliver apps

The method in which businesses interact with their customers is changing. Application providers must now "engage" the customer and not just service the specific request. This engagement leads to the need for *Systems of Engagement* that can enhance the user's experience with various service providers and that can also deliver new features at a rate previously unthinkable. The engagement tier interacts with many sources of data, including the Internet of Things and data and applications (*Systems of Record*) that often reside on the mainframe.

IBM Worklight is a system of engagement that is at the center of the IBM mobile solution portfolio. It provides an open, comprehensive platform to build, run, and manage HTML5, hybrid, and native mobile applications. Worklight can help you reduce application development and maintenance costs, improve time-to-market, and enhance mobile application governance and security.

Multiple components make up a Worklight mobile application:

► The user interface
► The back-end services
► And the adapters, which are the bridge between the other two components

You might, for example, have one or more web services running on IBM CICS® Transaction Server (CICS TS) exposed through SOAP interfaces that will ultimately be used by the mobile client code. Here, you can use tools, such as IBM Rational® System Architect, to design and model these services, or Rational Developer for IBM zEnterprise® to develop and test the service implementations. Both products include Worklight Studio to simplify the overall environment for developers who are working on both aspects of the mobile application.

The server-side components and adapters of an enterprise mobile application are deployed to a Worklight server running in a Java Platform, Enterprise Edition server (for example, IBM WebSphere® Application Server).

Figure 2 highlights the role of Worklight as a system of engagement between the mobile device and back-end services that are running in mainframe systems, such as CICS, IBM Information Management System (IMS™), IBM DB2®, and WebSphere Application Server.
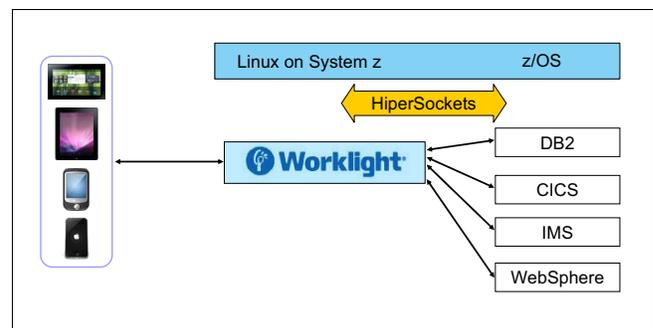

Figure 2   Worklight as a mobile system of engagement

The Worklight adapter automatically converts between the protocols that are used commonly in mobile apps (for example, JSON over HTTP) and the protocols that are used by the back-end services (for example, SOAP over HTTP, JMS, or SQL). The adapter can issue

requests to multiple back-end systems and then combine the retrieved information into one response back to the mobile application. It can also cache frequently requested information.

Running Worklight server on Linux for System z has several benefits:

► Local access to services and data on IBM z/OS® across a fast and secure IBM HiperSockets™ connection

► Additional reliability of System z for 24x7 operations and automatic inclusion of the MEAP into existing disaster recovery procedures

► Rapid and automatic scalability for mobile workloads that benefit from the virtualization capabilities of Linux on System z

► Security capabilities of the System z platform

Some situations might require direct mobile connectivity to back-end systems, probably for a limited set of internal users. This is why the traditional mainframe systems, such as CICS, that implement JSON support with the *CICS TS Feature Pack for Mobile Extensions*, further enhance the options for enterprise applications to mobile devices.

Make every transaction secure

You need to consider how to design and deliver transactions for all stakeholders that are as high in quality as they are high in frequency and as secure as they are convenient. System z can help you to deliver an IT infrastructure that can keep pace with the increased transaction workload that results from mobile engagement and can also ensure the highest levels of protection and privacy.

Deploying a mobile system of engagement, such as the Worklight Server on Linux for System z, provides a highly scalable solution and protection against the workload surges that mobile workloads can cause. Recent internal IBM performance tests have demonstrated that a single instance of Worklight is capable of running thousands of mobile transactions per second on System z and scaling linearly as the number of processors is increased.

However scalable the mobile platform is, though, several large banks have told IBM that they are still concerned that mobile applications can "crush" IT. In addition, transactions with relatively low value to the bank are frequently, almost whimsically, performed morning, noon, and night.

There is evidence to suggest that moving to a push model of interaction, rather than a pull model, provides significant relief for this problem.[1] The basic idea is to push account balances to the client mobile devices each time a transaction occurs. Studies have shown that this solution can reduce overall load and flatten the peaks that can occur otherwise.

Mobile security is achieved through compliance with the following security principles:

► Authentication

Ensures that the identities of both the sender and receiver of the mobile transaction are true. Protecting access to mainframe applications might require strong authentication or two-factor authentication (2FA) and risk based authentication (RBA) for added security.

► Authorization

Grants a mobile user, system, or process either complete or restricted access to a mainframe resource.

► Confidentiality

Protects sensitive data from unauthorized disclosure.

► Integrity

Ensures that information that arrives at a destination has not been altered.

► Non-repudiation

Proves that a mobile transaction occurred or that a message was sent or received.

Consider the risks if inadequate authentication and authorization mechanisms are put in place for mobile-initiated transactions that access mainframe services. Thieves of stolen devices might be able to retrieve user credentials from the mobile device, or cyber criminals might bypass authentication controls. To address these challenges, multi-factor authentication is normally required (for example, verification of the device, user, and mobile application).

Consider also the consequences if inadequate confidentiality, integrity, and non-repudiation mechanisms are put in place. Mobile users' confidential information, such as bank account details, can be lost. Cyber criminals might be able to modify the amounts of money being transferred. Mobile users might be able to deny the transactions that they performed. To address these challenges, encryption is normally required. It is

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[1] Refer to *Mobile Design Patterns: Push, Don't Pull*, REDP-5072 for more information.

also necessary to ensure that new mobile security features are integrated into the existing System z security infrastructure.

Figure 3 shows an example implementation that covers the following aspects of mobile security:

1. At the mobile device
2. Over the network and throughout the enterprise
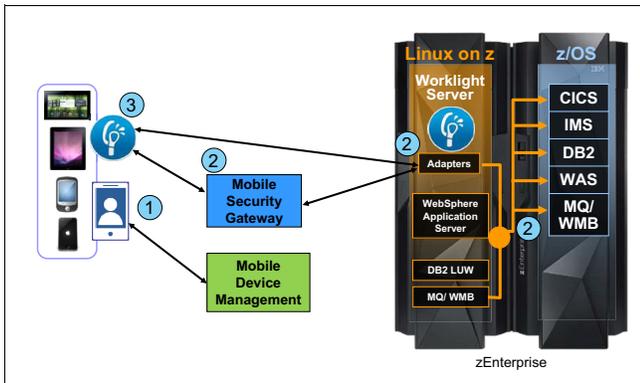3. The mobile application

Figure 3   zEnterprise mobile security

IBM offers a number of options for MDM and Mobile Application Management (MAM), such as IBM Endpoint Manager and FiberLink, with complete integration for managing, securing, and reporting on notebooks, desktops, servers, smartphones, tablets, and even point-of-sale terminals. The benefit to the enterprise is visibility and control over all devices and cost reduction, productivity increases, and compliance improvements.

The most effective mechanism to ensure proper access management policies are enforced is through the use of a centralized mobile security gateway, such as IBM Security Access Manager or IBM WebSphere DataPower®. Using a security gateway enables companies to control the parts of infrastructure that are exposed to consumers, which is relevant for push notifications as well as for mobile-initiated transactions. Mobile authentication and authorization must then be integrated into the existing security infrastructure used by mainframe applications.

IBM Worklight provides a set of security capabilities that address a wide range of mobile security objectives, including:

► Protecting data on the device, for example by encrypting on-device storage and enabling offline authentication

► Providing mobile application security, for example by encrypting the application code and web resources to prevent tampering with the application

► Features to help administrators ensure that critical application security updates are delivered to the applications on the mobile devices

► Providing robust authentication and authorization and simplifying the task of connecting mobile applications with the System z back-end authentication infrastructure

Running Worklight on Linux for System z provides the following additional security benefits:

► The Worklight server benefits from System z platform security and EAL 4+ certification.

► Reduced costs and improved performance of encryption processing by using System z hardware cryptography.

► The security advantages of using HiperSockets to access back-end systems.

► The potential opportunity of eliminating encryption between the Worklight server and the back-end systems.

Use mobile analytics to improve outcomes at every moment

The banking scenarios introduced previously in this paper outline the importance of analytics for mobile transactions. Determining whether a payment request is likely to be fraudulent in real-time requires analysis of large amounts of payment history and other data. This type of analysis is best done on the platform where the transaction takes place, for example using the real-time scoring capability in DB2 for z/OS and the ultra fast query capability of the DB2 Analytics Accelerator.

Similar scenarios exist in the retail industry. For example, signing up to use a store's mobile application typically provides a customer access to a history of purchases. The store can then use analytics to determine what projects the customer is working on (for example, remodeling a kitchen) or life events that the customer is going through (for example, having a child). Push notifications can then be used to suggest additional products that complement those that have already been purchased or that might be appealing based on a derived customer profile. In addition, when the customer is near the store, a discount coupon can be sent to further encourage a visit to the store.

The ability to instrument existing mainframe applications, which allows them to easily emit business events without disruptive change, is a critical enabler for the event-aware mobile enterprise. For example, the business event capturing capabilities in CICS allow the middleware itself to automatically collect and filter

events without requiring any change to the application. Emitted events can be aggregated and analyzed (for example, using IBM Operational Decision Management) and then used to support intelligent decisions.

By capturing and making sense of data in real time and in context, organizations can understand customers, partners, employees, processes, and the world better than they ever have before. And by seamlessly transforming those insights into the best mobile-delivered services, these same organizations can enable better, faster, context-driven decisions and actions by users and even the devices themselves.

To make the most of mobile analytics, you need to:

► Adopt design patterns that are built around the special capabilities of mobile.

► Be able to aggregate and act on data from back-end mainframe systems.

► Build a MEAP that is capable of handling the mobile transactions and data (both pulled and pushed).

What's next: How IBM can help

Early in 2013, IBM unveiled MobileFirst, a mobile portfolio for global businesses that combines security, analytics and app development software, with cloud-based services and deep mobile expertise.

If you are running a mainframe today and are evolving to a mobile enterprise, consider System z as a deployment platform for mobile. IBM has broad mobile and System z expertise and can organize and perform the following activities for you:

► Assess the effectiveness of your existing mobile solution, for now and in the future.

► Conduct a System z mobile workshop, including presentations and demonstrations of deploying mobile solutions on System z.

► Organize an IBM Smarter Banking® demonstration, for those organizations in the banking sector, that focuses on some of the mobile banking scenarios highlighted in this paper.

► Arrange a tailored Proof of Concept to demonstrate the key benefits described in this paper with your own systems, applications, and data.

For more information about using System z for mobile solutions, contact your local IBM representative.

Resources for more information

For more information about the concepts highlighted in this paper, see the following resources:

► Mobile on System z

  http://www.ibm.com/software/os/systemz/mobility

► IBM Institute for Business Value Study: The 'Upwardly Mobile' Enterprise

  http://www.ibm.com/services/us/gbs/thoughtleadership/upwardly-mobile

► Enabling Your Mainframe Data on Mobile Devices, The Clipper Group Navigator paper, 23 April 2013

  http://www.ibm.com/software/os/systemz/pdf/EnablingYourMainframeDataonMobileDevices.pdf

► New Technologies Help Bridge Gap Between Mobile and the Mainframe, Published online on Enterprise System Media, 17 May 2013

  http://enterprisesystemsmedia.com/article/new-technologies-help-bridge-gap-between-mobile-and-the-mainframe

► IBM CICS and Mobile, 23 September 2013

  http://www.youtube.com/watch?v=Sqtlm1jxpBI

► Opening the mainframe to mobile devices, 08 October 2012

  http://www.youtube.com/watch?v=tqdVsGd6jrc

► *Mobile Design Patterns: Push, Don't Pull*, REDP-5072

  http://www.redbooks.ibm.com/abstracts/redp5072.html?Open

► First National Bank drives unprecedented growth and performance in mobile banking, 17 October 2013

  http://www.ibm.com/software/success/cssdb.nsf/CS/STRD-9CKF7C?OpenDocument&Site=swzseries&cty=en_us

► RCBC and IBM zEnterprise: Making Banking Mobile Together, 12 September 2013

  http://www.youtube.com/watch?v=_qKzw-YeqMY

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