IBM Maximo technology
for business and IT agility

IBM asset and service management solutions
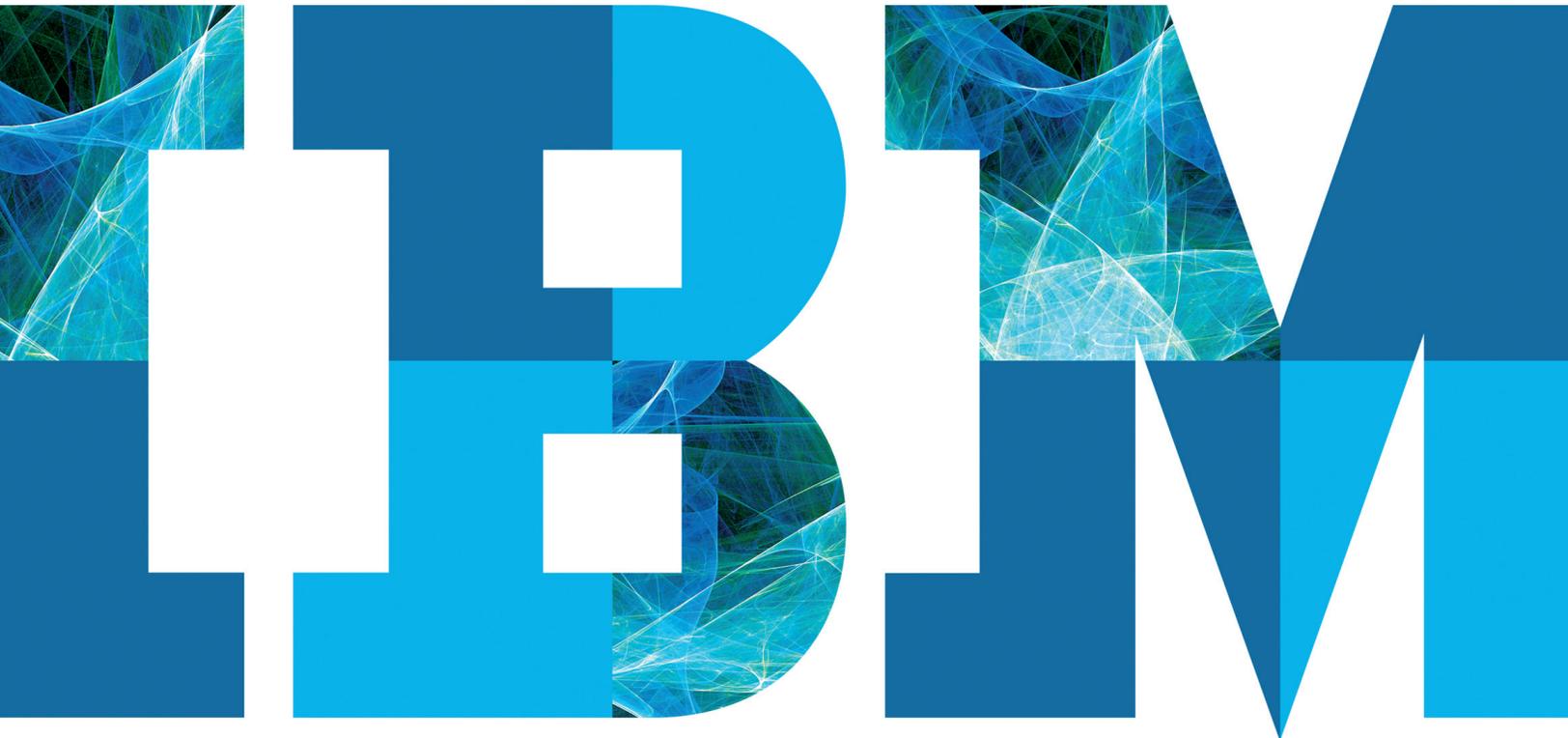
IBM

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Executive summary

In today's fast-paced business environment fueled by rapid technological advancement, leading enterprises realize that in order to retain a competitive edge and operational excellence, they must not only have adaptable business processes, they must have an agile IT infrastructure with the right mix of business and operations applications to support their changing business landscape.

In selecting software solutions for the business, product features, adaptability and extensibility are some of the key factors considered in the software evaluation. The technology behind the product, its architecture and its ability to adapt are equally important components of the decision. Product agility in terms of adaptable business processes and standards-based technology that align with the company's overall IT strategy is crucial in ensuring successful product deployment and usage.

This white paper shows how the IBM Maximo® Asset Management software solution is the leading asset and service management software in the marketplace, through its highly flexible business components and technology architecture. This Internet-optimized component architecture leverages key Web concepts, standards and technologies, helping to ensure optimum compatibility with today's Web-based infrastructures. The Maximo software portfolio is a proven solution that is widely deployed in large and small companies, government agencies and organizations today.

Introduction

Leading enterprises seeking to maintain a competitive edge and operational excellence must be able to react to business and technology changes by having a flexible business model and an agile IT environment. The demands of today's dynamic IT environment mandate having an adaptable, robust, standards-based technology foundation supporting a strategic business and operations application portfolio. This adaptable technology foundation is crucial to business agility.

It is not enough to base purchasing decisions solely on a vendor's product packaging or features when evaluating a software solution. The technology behind the product, its architecture and its ability to adapt are equally important components of the decision. These components form the basis of a sound IT infrastructure. Product agility, in terms of adaptable business processes and standards-based technology that aligns with the company's overall IT strategy, is critical to successful product deployment and usage.

Maximo software enables users to leverage today's best practices in asset and service management on a standards-based technology foundation.

Superior technologies and standards help manage IT's total cost of ownership (TCO) by providing seamless interoperability, manageability and performance. Furthermore, these technologies and standards provide a choice among products and vendors. They do not lock you into any single vendor platform or application suite. Combining superior technology values with an extensible collection of business values in asset and service management, Maximo software enables users to leverage today's best practices in asset and service management without legacy or proprietary technology constraints or limitations.

The Maximo software portfolio is the leading asset and service management software in the marketplace. Based on key technologies and standards, this architecture leverages the latest Web concepts, standards and technologies, helping to ensure optimum compatibility with today's Web-based infrastructures.

A Maximo Web deployment scenario
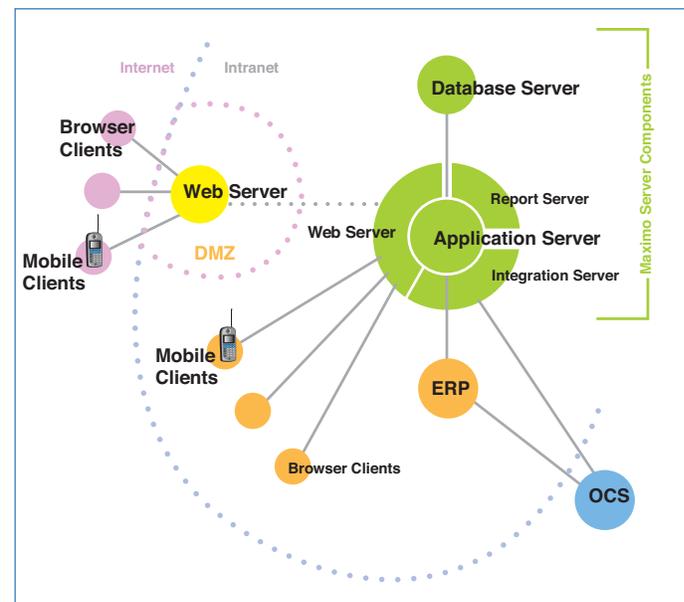
Figure 1: The component-based architecture of IBM Maximo software leverages the latest Web environments.

Maximo technology foundation

Leveraging the Java™ 2 Platform, Enterprise Edition (J2EE™) specification and the underlying J2EE framework components, the component-based architecture of Maximo software enables reuse within the application, as well as integration with external applications. This architecture leverages the latest Web standards available today. Maximo software can be deployed on a single machine for small to midsized companies, yet its scalability and performance can help meet the demands of global, distributed enterprises with multiple organizations and sites that operate using multiple languages and currencies.

Maximo business processes are encapsulated into distinct, reusable horizontal components such as assets, work orders, purchase orders, and inventory. In addition, Maximo software is a multitiered vertical application model in which the presentation, business logic and database access layers are separate tiers. Keeping each tier separate limits the extent to which any individual component is impacted by change or replacement of another component, or by its use in a new context. This makes tailoring or extending Maximo functionality relatively easy to do, and limits the impact of change to the individual components that are being modified. Maximo software is deployed using commercially available J2EE application servers that provide the underlying infrastructure and services as defined by the J2EE standards specification. Deploying Maximo software on a J2EE compliant application server platform provides customers with a solution that helps protect their investment and provide a more solid IT foundation.

The Maximo application framework
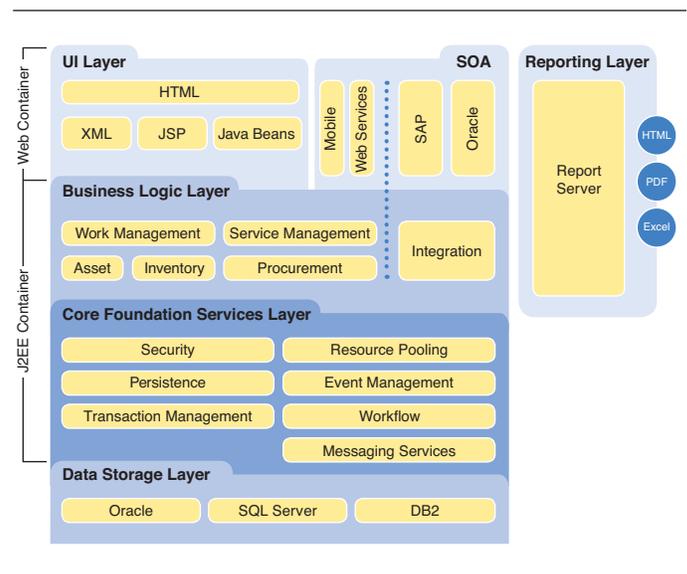
Figure 2: IBM Maximo software employs a multitiered vertical application model in which the presentation, business logic and data access layers are separate tiers.

The integration framework of Maximo software extends the technology into the realm of Web services and service-oriented architecture (SOA). The framework provides enterprise-level application services and business process coordination between Maximo software and other enterprise systems or solutions, such as ERP, CRM and portals. It is capable of generating Web services for any of the Maximo business components and hosting these Web services for

external interactions—for example, an enterprise portal requesting performance metrics for a set of assets. These Web services are Web Services Interoperability Organization (WS-I) Basic Profile-compliant Extensible Markup Language (XML). Web services are dynamically generated based on the client's Maximo configuration. They are not hard coded or limited to a set of Web services.

User interface

The Internet has changed the way we access information and conduct business. Today, end users access information from wherever they are, whenever they need to. Unlike traditional users who were tethered to individual workstations, today's users have access to a variety of Internet-enabled devices and want to use the most appropriate device to get their jobs done. This includes personal computers, kiosks, mobile devices, portals and Internet-enabled phones.

Web-based Maximo screens are accessible to any supported client devices connected to the Internet.

The Maximo user interface has been intuitive and comparatively easy to use since the early releases of Maximo software. Today's pure Web-based Maximo screens are accessible to any supported client devices connected to the Internet. They leverage the built-in capabilities and standards of the client's Internet browser, reducing the deployment, versioning and software conflicts that commonly occur on client devices running legacy client/server and Web-enabled applications. The rendering of Maximo screens requires no network infrastructure changes and has minimal network impact due to its

Internet-optimized architecture. There is no legacy or emulation code in the screens. Anyone requiring access to Maximo data—employees, contractors or partners—can do so from anywhere, without requiring specialized client hardware or software.

An XML-based screen framework layer greatly improves the capabilities of Maximo screens. Maximo presentation elements are stored as XML content. Abstracting certain presentation elements from the screens allows for dynamic screen generation, better change tracking, and continuity across upgrades. Dynamically generated screens are also more adaptable to various screen sizes and devices compared to proprietary screen technologies or even pure Hypertext Markup Language (HTML) screens. These screens are more resilient across upgrades, further protecting your investment in Maximo software.

Maximo Application Designer

Maximo Application Designer is a built-in graphical tool that makes tailoring Maximo screens easier and more intuitive. Maximo screens can be more quickly configured to help meet user needs, reflecting new or updated business processes with "drag-and-drop" ease on a graphical canvas from any Internet-enabled client. In addition to screen editing, Application Designer can be used to create custom applications and to configure existing applications. All of these capabilities are possible in part due to the new XML layer of the screen framework. Application Designer leverages the XML layer to track screen elements, formatting and upgrade transformation mappings.

Multilanguage support

Maximo software supports simultaneous deployment of multiple languages from a single running server. Maximo screens can be dynamically loaded at run time with the appropriate language sets. Users are able to switch from one supported language to another without setting up another server or maintaining a separate set of screen pages for each of the languages. All of these features can help speed up global deployment, management and support while helping to reduce maintenance, administrative and upgrade headaches.

In addition, being able to support all the language needs for the global enterprise on a single instance of Maximo software helps enable enterprise-wide visibility, information sharing and business intelligence. It also helps improve TCO by requiring less hardware and software and by demanding less from the IT staff.

Personalization

Maximo Start Center supports user-managed personalization by allowing each user to define his or her own start page. Unlike the simple personalization found in many Web applications today, Maximo Start Center goes beyond static layouts to provide configurable content portlets and dynamic key performance indicators (KPIs). Maximo users can add and view their preferred information and KPIs more easily. Individual user personalization can be managed by Maximo administrators by predefining personalization parameters for the users. Maximo administrators can define Start Center templates and selectively assign them to the users according to their roles. Users can further personalize the Start Center within these templates.

Maximo Start Center goes beyond static layouts to provide configurable content portlets and dynamic key performance indicators.

Administrators and users can define content portlets that will display values based on a certain set of criteria. For example, a user may want to see all of his or her group's time cards that were entered in the past day. Another user may want to see critical asset conditions and pending work orders. Interactive KPI graphs based on user-defined criteria and set points can be placed on the Start Center for a visual representation of events and conditions. For example, the user above who wanted to see the past day's time cards may also want a graph that will show visually the number of overdue time cards or time cards awaiting approval in red. A variety of graph formats and options are provided.

Business process automation

Opportunities, innovations, regulations, competition and information are some of the key drivers for change in an enterprise. While business process improvements help streamline business processes, new business opportunities, government regulations, competition and information technology are constantly introducing and changing business processes in the enterprise. These constant changes introduce complexities in our ability to manage and react on the information or event in a timely manner. We need to adapt quickly to these changes

and we need a way to have the right information pushed to us at the right time and place. Business process automation (BPA) is the concept that is associated with streamlining and managing business processes and the changes associated with them.

Maximo software provides proactive BPA capabilities through the combination of Maximo Workflow and Maximo Escalations. These components help monitor events in Maximo software, including static data, and automate the processing of these events. Any Maximo data point, process or event can be monitored and managed by these components.

Maximo Escalations

Maximo Escalations is a business activity monitoring (BAM) agent that is used to monitor and react to conditions in Maximo software. It can be set up to monitor any data point for condition applicability such as warranty expiry notifications or overdue work order alerts. Its notification engine can be set up to trigger actions or e-mails or to execute user-defined procedures. Maximo Escalations help enable proactive management of service-level agreements (SLAs), warranties and other data where the event horizon can be easily overlooked.

Maximo software provides proactive business process automation capabilities through the combination of Maximo Workflow and Maximo Escalation Manager.

Maximo Workflow

Maximo Workflow is a business process management (BPM) agent that defines and automates Maximo business process flows. Besides the standard predefined workflow templates, new workflows can be defined for any business process in any Maximo application. Maximo Workflow Designer allows administrators and authorized users to quickly design and configure workflow processes on a graphical canvas from any Internet-enabled client.

In addition to the traditional assignment-oriented process workflows, Maximo Workflow supports assignmentless interactive workflows. Based on the users' input, interactive workflows guide users through a process or an activity. That is, the workflow helps the user to navigate through the screens by bringing up the next screen or dialog based on the context of data entered. This feature can dramatically reduce training requirements, especially training for casual users and in areas of high turnover such as service desk.

Additional features such as the WAIT node and template-driven notification make Maximo Workflow a robust business process automation engine. The WAIT node is especially useful in enterprise-wide collaboration with an enterprise BPM tool where a process can be passed off to another system for processing and then resumed when the other system indicates completion.

Security

Doing business in today's connected environment requires providing customers, partners, service providers and employees with access to information in a way that is controlled and secure. While putting business systems on the Internet offers opportunities for increasing efficiencies and reducing costs, it also introduces risk. Applications and data must be secured from users who may try to gain unauthorized access to critical applications, sensitive data or network transmissions. Access to applications and data must be managed appropriately based on the types of users. That is, applications deployed over the Internet must function efficiently without compromising corporate security and integrity. This not only requires a robust corporate security framework to manage access and network communications, it requires the applications in the enterprise to implement and enforce these controls and checks. When placed in an Internet-connected environment, legacy applications and applications that are not built on today's technology standards pose added risks in enforcing security, as their security implementations may not be able to decipher or protect the application from newer security threats.

A number of agencies, standards bodies and commercial entities are monitoring and focusing on Internet security on an ongoing basis. The results of these efforts are a number of robust Internet security concepts and solutions such as firewalls, digital certificates, encryptions, directory services, Virtual Private Networks (VPN) and Public Key Infrastructures (PKI). Today most companies have a combination of these industry-standard security solutions deployed across their enterprises. These solutions form the basis of strong infrastructure security for today's Web-based computing environments.

Maximo software implements sophisticated security checks and balances internally for managing user access and navigation. Comprehensive user verifications, tracking, logging and auditing are provided in order to help users document their efforts to meet strict internal or regulatory compliance, such as the U.S. Food and Drug Administration (FDA) Code of Federal Regulations (CFR) 21 Part 11. In addition, the Maximo security framework fully leverages the J2EE application server security implementation for access and authentication. J2EE security features are based on well-established and proven industry-standard security features that better support the security requirements of today's complex Web-based computing environments. For example, enterprises can leverage corporate firewalls and implement digital certificates and encryptions in securing transmission security of Maximo data. They can secure Maximo data in the database with triple DES (Data Encryption Standard) algorithm—DESede. They can simplify and streamline user access and authentication by centralizing access to Maximo software and all their applications through Lightweight Directory Access Protocol (LDAP) and Single Sign-On (SSO).

Maximo software can help enterprises simplify and streamline user access and authentication by centralizing access for all their applications.

LDAP is an open industry standard that defines a standard method for accessing and updating X.500 directories over the network. It has quickly become the de facto directory access standard for Internet user management and e-commerce solutions and is widely implemented for user management and access control.

Maximo software can be configured to authenticate and synchronize users and groups from third-party LDAP servers. Maximo software provides a common synchronization feature that can retrieve user and group information from LDAP Directory Servers where users are managed. Synchronization with LDAP directory systems such as the IBM Tivoli® Directory Server or the Microsoft® Active Directory can be easily accomplished with the generic synchronization interface.

The benefits of deploying Maximo software with LDAP include:

- Centralized security administration, helping to reduce security policy administration and monitoring overhead by consolidating security management in a centralized LDAP implementation.
- Centralized user management and reporting.
- Simplified regulatory compliance reporting through centralized data capture from regulatory compliance efforts.

Maximo software can be configured to work with third-party SSO solutions. SSO software centralizes user ID and password management by providing robust front-end login management and automating logins enterprise-wide. SSO is designed to reduce multiple simple (insecure) passwords to a single more secure password. SSO increases network security by encouraging users to create complex passwords for each of their systems and applications without having the fear of not remembering each of them. Once a user logs on through SSO, SSO manages all other logins for them.

Users already validated by the SSO solution can access Maximo applications without having to log into the Maximo application again. With the Maximo application configured for SSO login, when a user attempts to access Maximo applications without logging in first, the application will check to see if the user is already signed into the SSO system, confirming the appropriate credentials and eliminating the need for multiple logins.

The benefits of configuring Maximo software with SSO include:

- Simplified user access. SSO greatly simplifies user's access to applications by streamlining logins and eliminating the need to remember multiple usernames, passwords and login procedures.
- Increased security. SSO allows the enforcement of more sophisticated user ID and password implementations without overburdening the users. Complex passwords and password policy enforcement are vital to helping ensure stronger security in today's networks.

- Reduced help desk workload. As SSO simplifies the task of user password management, the number of user calls to the help desk can be reduced. IT support professionals and administrators who spend less time resetting passwords can redirect their attention to proactive system management and support.
- Supported compliance efforts. A significant challenge to any enterprise is the increasing scope of legislation such as the Sarbanes-Oxley (SOX) Act and the Health Insurance Portability and Accountability Act (HIPAA), which are aimed in part at protecting the rights of consumers and end users by limiting access to and the use of certain types of data. SSO enhances overall access security by promoting stronger front-end login authentication for the users. When combined with strong authentication methods such as bio-metrics, tokens or smart cards, user authentication systems can help meet legislated security requirements.

Centralized user access and authentication simplifies and streamlines administration requirements as well as improving security with centralized security policies and access points.

Interoperability

In today's connected world, companies require systems that enable collaboration within their enterprise and with their partners and customers. This collaboration requires the integration of multiple business systems internally within the enterprise as well as externally with those of the partners and customers. However, without careful planning and a proper integration infrastructure, these issues can quickly become unmanageable and overwhelm corporate IT resources.

The Maximo interoperability framework provides an integration infrastructure based on service-oriented architecture.

Standards are the key to true interoperability in an enterprise. The advancement and rapid adoption of SOA and Web services validate the fact that enterprises need the flexibility and agility of multiple key systems that can help run their enterprise efficiently, and an IT infrastructure that can more easily deploy and tie these systems together.

The Maximo interoperability framework simplifies the integration of Maximo software in a company's IT environment by providing an integration infrastructure based on service-oriented architecture and providing predefined and prebuilt integrations for a number of business and IT scenarios.

Maximo Integration Framework

Maximo Integration Framework enables faster integration of Maximo software with enterprise business systems. This is an extensible standards-based framework, with an extensive library of predefined integration points, provides a complete integration enablement environment for Maximo software. Integration can be more quickly tailored to meet specific business scenarios and can be more easily extended to support additional business requirements, allowing an integration foundation to be built more quickly and with less complex integration procedures.

Maximo Integration Framework interacts directly with the Maximo business components, allowing the same business logic used by the application, including user customizations, to be used in the integration. The Integration Framework features built-in auditing, recovery, notification and management capabilities, which help to ensure a more reliable, secure and scalable enterprise integration with Maximo software.

Summary

When evaluating a software solution, you need to select a system that supports your current business requirements and is able to adapt as your business requirements change. It is not enough to base your decision solely on how well it solves today's business problems. You need to select a solution that will better position your organization to take advantage of current and future technological advances while supporting your changing business requirements.

Having a robust, standards-based IT infrastructure foundation that is adaptable is crucial to IT and business agility. Technologies and standards such as SOA, Web services, J2EE, XML, LDAP and SSO help enterprises manage the TCO of IT by facilitating interoperability, consistency and manageability. Furthermore, these technologies and standards provide choice among products and vendors. They do not lock you in on any single vendor platform, application suite or programming style. Maximo software is built on these technologies and standards. Maximo software delivers compelling technology benefits in the areas of architecture, automation and security that can help you meet or exceed the demands of today's dynamic IT environments. Combining these technology values with an extensible collection of business values enables you to leverage adaptable best practices in asset and service management without legacy or proprietary technology constraints or limitations.

For more information

To learn more about IBM Maximo software solutions, please contact your IBM representative or IBM Business Partner, or visit **ibm.com**/tivoli/maximo

About Tivoli software from IBM

Tivoli software provides a set of offerings and capabilities in support of IBM Service Management, a scalable, modular approach used to deliver more efficient and effective services to your business. Helping meet the needs of any size business, Tivoli software enables you to deliver service excellence in support of your business objectives through integration and automation of processes, workflows and tasks. The security-rich, open standards-based Tivoli service management platform is complemented by proactive operational management solutions that provide end-to-end visibility and control. It is also backed by world-class IBM Services, IBM Support and an active ecosystem of IBM Business Partners. Tivoli customers and business partners can also leverage each other's best practices by participating in independently run IBM Tivoli User Groups around the world—visit www.tivoli-ug.org