Universal messaging backbone for SOA

WebSphere® software

IBM WebSphere MQ for z/OS, Version 7.0

Highlights

- ***New publish-and-subscribe support integrated into the WebSphere MQ for z/OS queue manager***
- ***Enhanced ease of use for JMS messaging***
- ***Enhanced JMS performance, increasing JMS listener throughput by 220 percent with improved latency***
- ***Extended verbs and behaviors for the MQI programming interface, improving developer productivity***
- ***Enhanced WebSphere MQ clients for increased throughput and availability***
- ***Web 2.0 support to help create a richer user experience by bridging HTTP applications with AJAX and REST to the WebSphere MQ messaging backbone***

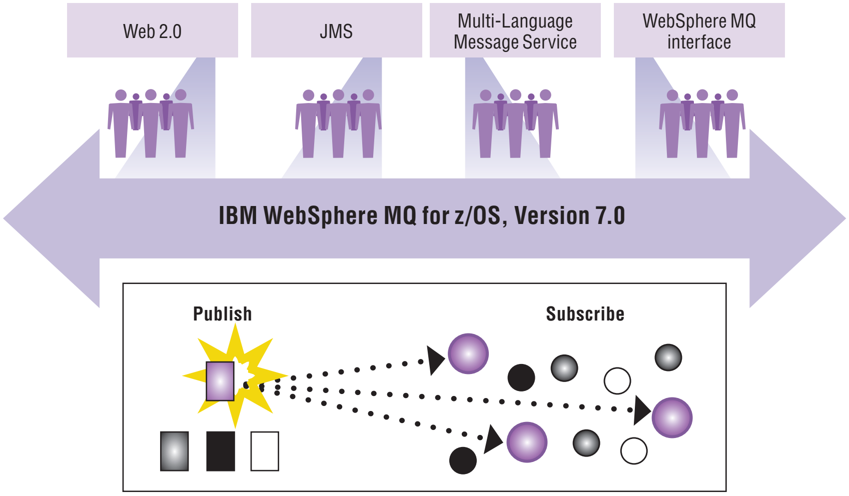

Web 2.0
JMS
Multi-Language Message Service
WebSphere MQ interface
IBM WebSphere MQ for z/OS, Version 7.0
Publish
Subscribe

Figure 1. WebSphere MQ for z/OS, Version 7.0 delivers flexible publish-and-subscribe messaging with enhanced JMS ease of use.

IT departments today are challenged to keep pace with ever-changing business demands. Today's IT infrastructure needs to be flexible to enable a rapid response to opportunities and pressures. A mixture of computing platforms and operating systems interconnected across networks can form a fragile, tangled web where IT resources become locked in maintenance mode, wrestling with network complexities and propagating changes across the mix of applications.

IBM WebSphere® MQ for z/OS® provides a messaging backbone that enables applications on the IBM System z™ platform to be connected through a reliable, flexible transport with virtually any other commercial IT system. WebSphere MQ for z/OS provides a messaging backbone for applications, Web services and Web 2.0. It enables you to connect the new with the now, so you can leverage new technologies to unlock the true potential of business data and applications residing in the core systems that run your business. It helps to ensure delivery so that data is not lost in transit and, as a result, helps to preserve the integrity of your IT systems. WebSphere MQ for z/OS handles the complexities of communication protocols and dynamically distributes messaging workload across available resources.

WebSphere MQ for z/OS is engineered natively for the System z platform, enabling it to take specific advantage of the unique features of that platform and fit tightly within the mainframe environment. WebSphere MQ for z/OS uses IBM Parallel Sysplex® technology, increasing availability, capacity and performance for persistent and nonpersistent messages by enabling multiple queue managers to access the same queue. WebSphere MQ for z/OS also provides workload balancing based on a pull model that enables very high-availability messaging on the System z platform. In addition, WebSphere MQ for z/OS provides tight integration with IBM CICS® and IBM IMS™ software using specialized bridges supplied with the product.

New publish-and-subscribe messaging

Event-driven service oriented architectures (SOAs) provide a responsive, flexible infrastructure that can enable quicker and easier changes to how applications are connected. WebSphere MQ for z/OS, Version 7.0 provides the ideal transport layer for an event-driven SOA with new, integrated support for publish-and-subscribe messaging. The new publish-and-subscribe capability provides a flexible, event-driven pattern for loosely coupling applications. It enables messages to be sent between applications without any prior knowledge of which applications need to receive those messages. The linkage between applications that publish and receive messages is not explicitly defined, so it does not need to be altered when changes occur to the applications that send and receive data. The pathway between these applications is determined dynamically by WebSphere MQ for z/OS through the topics or keywords used to declare interest in a set of messages when subscribing or tagging messages when publishing.

The new support in WebSphere MQ for z/OS, Version 7.0 for publish-and-subscribe messaging can help increase the flexibility of messaging solutions. The support is integrated into the WebSphere MQ for z/OS queue manager. With WebSphere MQ for z/OS, Version 7.0, you can publish and subscribe to topics directly in your applications. Publish-and-subscribe services are automatically enabled as part of all queue managers.

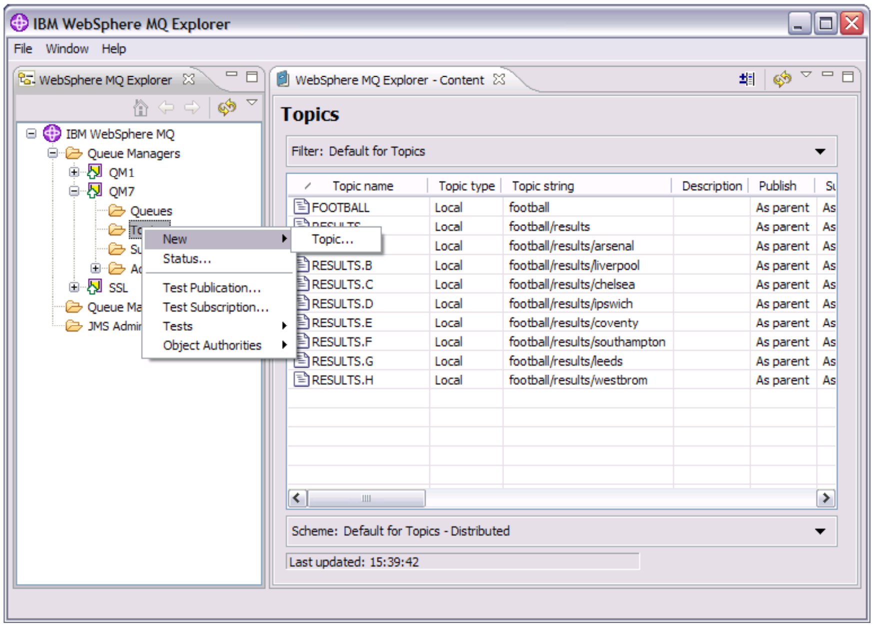
Existing applications can be switched from using a point-to-point message pattern to a publish-and-subscribe pattern without any code changes required. Administrators can create subscriptions on behalf of applications and redefine queues to have a topic assigned to them. Extensions in the Message Queuing Interface (MQI) make it easier for applications to exploit publish-and-subscribe. Publish-and-subscribe statistics are available, such as the number of messages published on a topic.

WebSphere MQ for z/OS, Version 7.0 provides a *Topic object type* that can be used to define publish-and-subscribe topics and hierarchies of topics that enable a richer topic space. Topic objects are automatically deleted after nondurable subscriptions, simplifying administration. Topic objects also support inheritance from parent topics, enabling topics to inherit attributes such as security settings. This feature helps to reduce manual administration. Users do not need to define any topics in order to start using publish-and-subscribe messaging; default settings in the queue manager make it easy to get started.

WebSphere MQ for z/OS, Version 7.0 helps ease management of publish-and-subscribe permissions. It restricts the use of topics by permission settings on the topic object following the existing WebSphere MQ System Authorization Facility (SAF) security model.

Enhanced ease of use

WebSphere MQ for z/OS can be configured remotely using WebSphere MQ Explorer, a graphical Eclipse-based tool (see Figure 2). WebSphere MQ Explorer is supplied with the distributed product, IBM WebSphere MQ, but it can also be used with WebSphere MQ for z/OS. WebSphere MQ Explorer runs on Linux® x86 and Microsoft® Windows® workstations to remotely view, navigate and configure the entire WebSphere MQ network, including queue managers deployed on z/OS. WebSphere MQ Explorer can configure both WebSphere MQ for z/OS, Version 7.0 and the prior release, WebSphere MQ for z/OS, Version 6.0. In prior releases, the optional Client Attach Feature (CAF) was needed in order to connect WebSphere MQ Explorer into WebSphere MQ for z/OS. WebSphere MQ for z/OS, Version 7.0 enables up to five instances of WebSphere MQ Explorer to remotely connect into WebSphere MQ for z/OS without the need for the CAF. Java™ Message Service (JMS) resources running in WebSphere MQ for z/OS can now be configured graphically by connecting remotely.



Topics

Filter: Default for Topics

Topic name	Topic type	Topic string	Description	Publish	Su
FOOTBALL	Local	football		As parent	As
RESULTS	Local	football/results		As parent	As
	Local	football/results/arsenal		As parent	As
RESULTS.B	Local	football/results/liverpool		As parent	As
RESULTS.C	Local	football/results/chelsea		As parent	As
RESULTS.D	Local	football/results/ipswich		As parent	As
RESULTS.E	Local	football/results/coventy		As parent	As
RESULTS.F	Local	football/results/southampton		As parent	As
RESULTS.G	Local	football/results/leeds		As parent	As
RESULTS.H	Local	football/results/westbrom		As parent	As

Scheme: Default for Topics - Distributed

Last updated: 15:39:42

Figure 2. Publish-and-subscribe and JMS messaging in WebSphere MQ for z/OS, Version 7.0 can be remotely configured using Eclipse-based WebSphere MQ Explorer

Publish-and-subscribe messaging, introduced in this release, can also be remotely configured from WebSphere MQ Explorer. To help prevent unauthorized changes, WebSphere MQ Explorer connections are protected with industry standard Secure Sockets Layer (SSL) security.

Enhanced JMS performance

WebSphere MQ for z/OS, Version 7.0 delivers enhancements to optimize throughput and performance for JMS messaging.

WebSphere MQ for z/OS, Version 7.0 optimizes JMS message listeners by eliminating polling and using asynchronous message delivery to monitor destinations. In this release, JMS message listener throughput can be increased by 220 percent with improved latency.[1]

Java Enterprise Edition (JEE) Application Servers can take advantage of these performance enhancements to improve message throughput for message-driven beans (MDBs) that are invoked whenever messages arrive through WebSphere MQ. By eliminating polling of the messaging provider, CPU utilization of JEE Application Servers can also be reduced.

Enhanced MQI

WebSphere MQ provides a rich programming interface, the Message Queuing Interface (MQI). The MQI is common across all supported platforms and provides a simple set of verbs that access the advanced features of WebSphere MQ. WebSphere MQ for z/OS, Version 7.0 further enhances the MQI with new verbs and behaviors designed to increase ease of use for MQI developers.

WebSphere MQ for z/OS, Version 7.0 introduces *message properties* to the MQI. This enables MQI users to customize message headers with user-defined data. New MQI verbs enable properties to be set (MQSETMP) and inquired (MQINQMP). This eliminates the need for applications to parse message headers to find message metadata. Message properties can be used to specify explicit relationships between messages, such as when messages are sent in reply to specific messages.

WebSphere MQ for z/OS, Version 7.0 introduces a *callback* function to the MQI with a new verb: MQCB. This enables applications to register with the queue manager to be automatically notified whenever messages or publications arrive for their consumption. This eliminates the need for client applications to continuously poll queue managers and helps simplify administration, free up network bandwidth, reduce lag time from message arrival to delivery, and lower server- and client-processor utilization. Both MQI and JMS clients can benefit from callback. The JMS onMessage method has been reimplemented to take full advantage of callback, helping eliminate the need for internal polling and helping JMS clients achieve improvements in higher throughput and reduced latency.

WebSphere MQ for z/OS, Version 7.0 introduces support for developers using the MQI for publish-and-subscribe messaging. A new MQI verb, MQSUB, enables applications to register subscriptions. Another new verb, MQSUBRQ, enables new subscribers to receive the most recent retained publication that was sent on a topic. Existing MQI verbs have new options for publish-and-subscribe messaging. MQOPEN can be used to access a topic, MQCLOSE to end durable subscriptions, and MQPUT and MQGET to publish and to receive subscriptions.

WebSphere MQ for z/OS, Version 7.0 introduces support for *selectors* to the MQI, enabling applications to select messages from queues based on the values of message properties or message headers. Queries constructed in Standard Query Language (SQL92) can now be used to retrieve a filtered set of messages by matching the criteria in the message properties. The MQOPEN and MQSUB verbs can be used in conjunction with selectors to retrieve a series of messages matching the required criteria. Queries are now run within the queue manager to optimize performance for clients. Selectors eliminate the need for applications to browse through a queue, comparing these with their selection criteria and ignoring those that do not match. Now only messages matching the selection criteria are delivered to the application. This can improve performance and lower network bandwidth use by eliminating the need to send unwanted messages to clients that would discard or ignore them. Filtering messages based on the content body — rather than just the header and properties — is enabled by IBM WebSphere Message Broker for z/OS or IBM WebSphere Enterprise Service Bus for z/OS.

Client enhancements

WebSphere MQ for z/OS, Version 7.0 introduces a new quality of service to help optimize performance for client applications that require nonpersistent delivery of a stream of messages.

WebSphere MQ for z/OS V7.0 now enables servers to stream messages to clients so that messages can arrive buffered on the client, even before the client requests them. This message *read-ahead* function enables WebSphere MQ for z/OS, Version 7.0 to preemptively dispatch messages it expects clients to request. In addition, WebSphere MQ for z/OS, Version 7.0 servers can regulate the flow of messages to its clients. Message read-ahead can significantly increase throughout of nonpersistent messaging. Because messages on the client side are held in client memory and no longer queued, this feature applies to nonpersistent messaging scenarios only. If the WebSphere MQ for z/OS server needs to send persistent messages to the client, WebSphere MQ for z/OS automatically reverts to its regular quality of service to handle those messages. Enabling WebSphere MQ for z/OS, Version 7.0 clients for message read-ahead requires no changes to existing applications, only reconfiguration of WebSphere MQ. WebSphere MQ for z/OS, Version 7.0 clients are also required for this function.

WebSphere MQ for z/OS, Version 7.0 clients use full-duplex protocols for TCPI/IP, enabling more effective heartbeat monitoring to increase availability by providing faster detection of connection failures and orphaned server-connection channels.

WebSphere MQ for z/OS, Version 7.0 helps simplify administration of large numbers of client connections by introducing the ability to share TCP/IP sockets. Connection sharing, or *multiplexing*, can make it easier to see the connection status of multiple clients at a glance. By sharing sockets, multiplexed connections can also enhance scalability and reduce the time needed to establish connections, increasing overall throughput, especially for SSL connections.

WebSphere MQ for z/OS, Version 7.0 introduces a new feature that can enable client applications to continue doing useful work after putting messages on queues. Rather than wait for response codes to be sent back to the client, *asynchronously putting messages* eliminates the need for clients to wait for responses back from the queue manager each time a message is put on a queue. Return codes can be requested later if required using a new verb, MQSTAT, which will provide the last asynchronous return code. Now, client applications can choose not to wait and can prepare to send the next message or do some other useful work, rather than pausing to synchronize with a WebSphere MQ for z/OS server. For applications that do not require response codes, using this new feature can significantly increase performance.

Delivering value to Web 2.0

Web 2.0 promises a compelling new way of creating user interfaces using new Web technologies, such as Asynchronous JavaScript and XML (AJAX) and simple techniques, such as REpresentational State Transfer (REST). However, compelling and valuable user interfaces require more than just an exciting design and cool widgets. Access to meaningful, up-to-date business data is key to delivering real value to Web 2.0 users.

WebSphere MQ for z/OS, Version 7.0 makes the connection between real business data in core applications running on the IBM System z platform and newer Web 2.0 applications, unlocking the value of that data and making it easier to present to Web 2.0 users (see Figure 3). WebSphere MQ for z/OS, Version 7.0 delivers a *bridge for HTTP* that links AJAX applications to the WebSphere MQ backbone using a RESTful programming model. Web 2.0 developers do not require WebSphere MQ knowledge or skills to connect their new applications to core business systems. Both point-to-point and publish-and-subscribe messaging is supported and accessed through uniform resource identifiers (URIs) that map to WebSphere MQ queues and topics. REST verbs GET, POST and DELETE are mapped to MQGET and MQPUT calls to queues or topics.

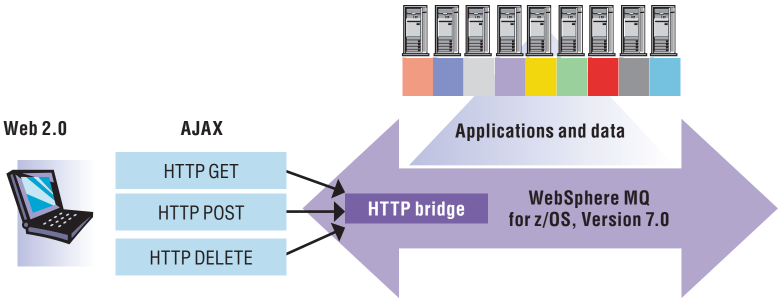


Figure 3. WebSphere MQ for z/OS, Version 7.0 connects Web 2.0 with core enterprise systems, enabling a richer user experience and unlocking the value of business data.

Sample applications help accelerate the development of Web 2. 0 solutions and help demonstrate the value of linking core business applications with Web 2.0. Because client applications do not require installation or configuration of WebSphere MQ client code, the bridge for HTTP can also be used where zero client footprint is prefered, and it can help simplify administration for large communities of applications that require simple access to WebSphere MQ.

Standards support

WebSphere MQ provides extensive support for industry and technical standards. WebSphere MQ for z/OS, Version 7.0 enhances support for the industry-standard Java programming interface, JMS. It extends the JMS model to other programming languages through its Multi-Language Message Service (XMS), which provides interfaces equivalent to JMS but in more programming languages, such as C, C++ and C#. WebSphere MQ for z/OS, Version 7.0 provides a bridge to HTTP networks, enabling rapid connectivity between Web 2.0 AJAX applications and core enterprise systems. This HTTP bridge provides a RESTful interface to simplify the experience for Web 2.0 developers. For tight integration with .NET environments, it provides a managed .NET client for the Windows Communications Framework (WCF). WebSphere MQ for z/OS enables SOAP messages to flow across its reliable transport, offering a higher transport quality of service for Web services than HTTP.

The service definition published for WebSphere MQ for z/OS provides an Internationalized Resource Identifier (IRI) specification mapping for referencing topics and queues and a Web Service Definition Language (WSDL) binding specification to represent WebSphere MQ applications, including the connections to the application, the queues or topics it uses, its message-exchange pattern (request-response or one-way) and the quality of service and message formats it uses. This service definition enables connected applications to appear as services in an SOA when accessed through WebSphere MQ. WebSphere MQ Explorer is based on the open source Eclipse platform, providing an extensible graphical user interface that is consistent with that used by the IBM software portfolio and can be customized with user-defined Eclipse plug-ins. Security support is provided for both messages and WebSphere MQ Explorer connections through SSL.

Universal messaging backbone

In an SOA, an enterprise service bus (ESB) provides an integration layer that mediates, transforms and enriches data as it is transported between service components. The transport layer that underpins an ESB is a messaging backbone that enables ESBs to move data between both service and non-service assets. As a key member of the WebSphere software portfolio, WebSphere MQ for z/OS delivers a universal messaging backbone that can connect the IBM System z platform to virtually any other commercial IT system and can help you take the first step to SOA.

WebSphere MQ enables SOAP interactions to flow over its messaging backbone between Web service requesters and providers. Heritage and batch applications that are enabled as Web services can also benefit from using WebSphere MQ in its asynchronous mode as a buffering mechanism to regulate the flow of requests made to these systems. WebSphere MQ is an excellent transport for adding reliability and traceability to service interactions, providing a scalable, reliable and resilient backbone that enables business-critical SOA. The WebSphere MQ service definition enables connected applications not enabled as services to appear as though they are services in an SOA by being accessed through WebSphere MQ.

For more information

To learn more about how IBM WebSphere MQ for z/OS, Version 7.0 provides the messaging backbone for your SOA, and to find out how to integrate your investments and reach your business and IT goals, contact your IBM representative or IBM Business Partner, or visit:

ibm.com/webspheremq/zos

IBM WebSphere MQ for z/OS, Version 7.0 at a glance

WebSphere MQ for z/OS, Version 7.0 provides the messaging powerhouse for the WebSphere MQ family, which connects IT systems across over 80 platform configurations by IBM and its Business Partners. WebSphere MQ for z/OS maintains compatibility with the corresponding prior releases. For the latest information about supported platforms, visit:

ibm.com/webspheremq/requirements

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

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[1] Preliminary results observed on prerelease level code. For the latest performance information, type *performance report* into the search tool at **ibm.com**/webspheremq/support