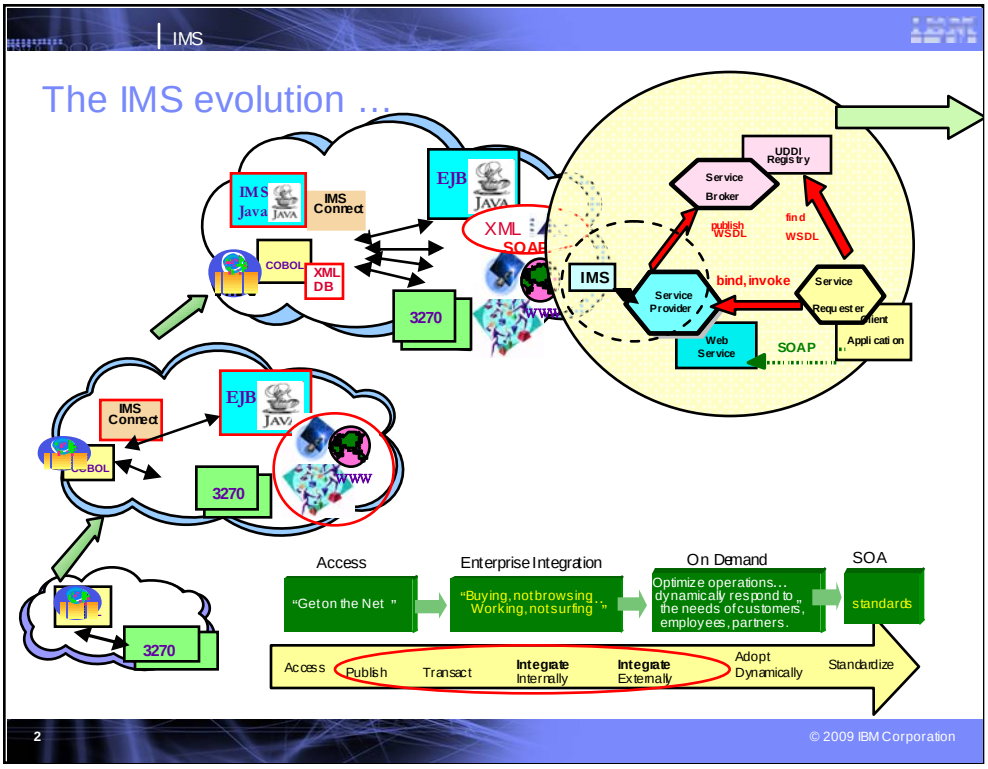
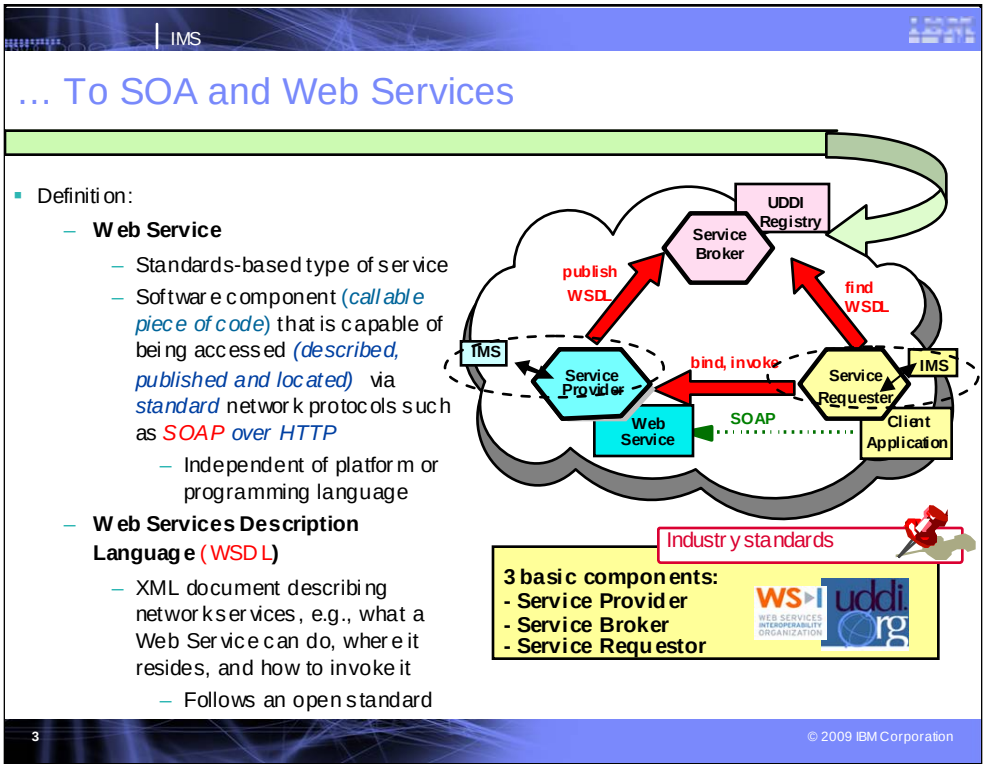
IBM is providing transformation techniques for easing access to IMS data and IMS transactions. It is also enhancing outbound access from IMS transactions. And it is continuing to provide support with emerging technologies into the future.



IMS has been evolving into the SOA Web Services environment. IMS has been evolving with the latest technologies, from the SNA 3270 terminals of the 70s, subsystem access of the 80s to TCP/IP and the internet of the 90s, and into the Java, Enterprise Java Beans, SOAP, XML, XML database, and web services of the 2000s. The Internet has evolved from initially offering Marketing access through publication of information, Enterprise integration of applications/data, On demand, dynamic optimization of operations, to standardization with SOA.



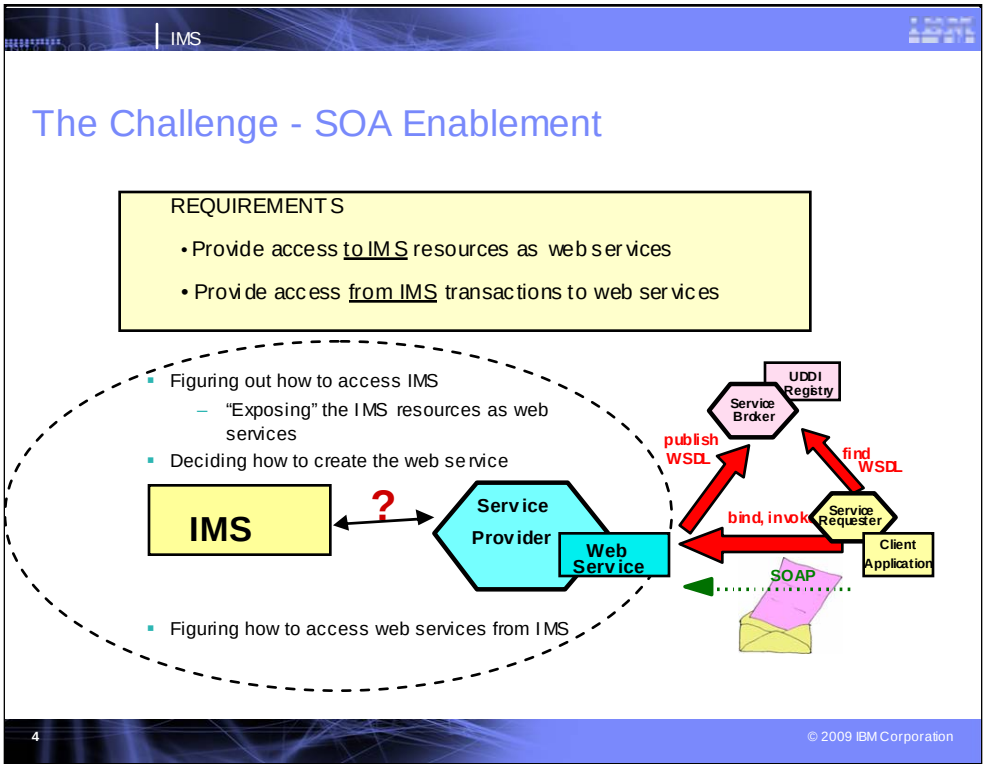
Standardization was needed in order to create applications, packages, and solutions that could provide access with newer technology across disparate systems and data

Terminology:

Web Services, SOAP, and Web Services Description language (WSDL)

Provider–Broker-Requester

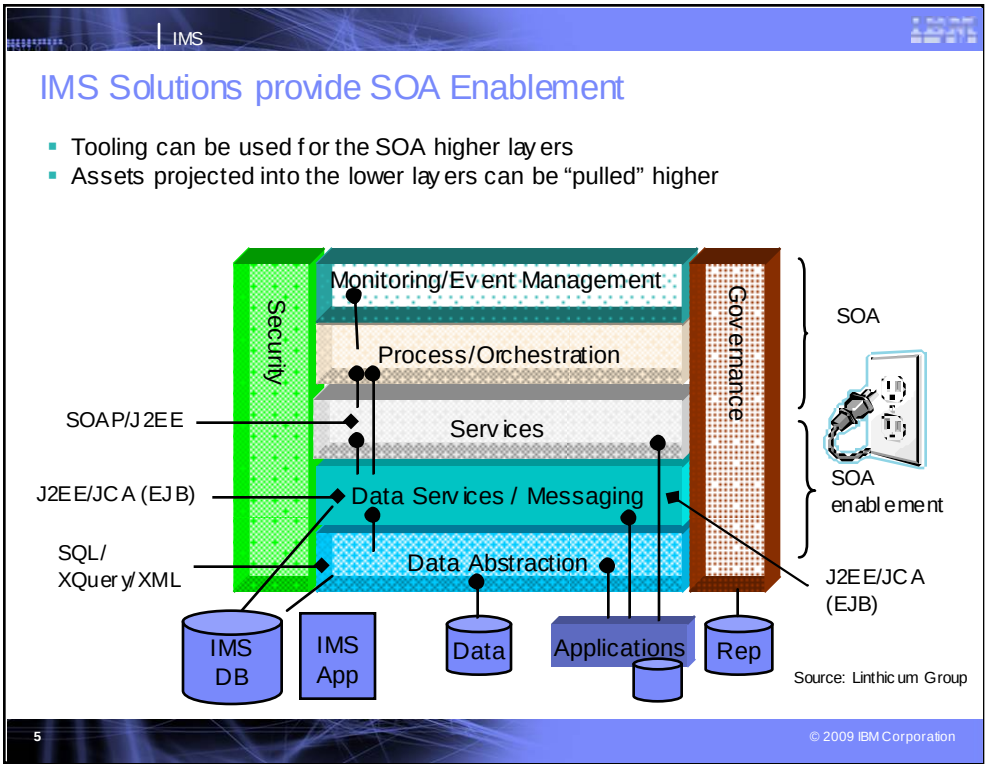
This was needed to invoke code to access resources as subroutines across web platforms



And the concepts of registry and brokers were developed to provide access through those interfaces

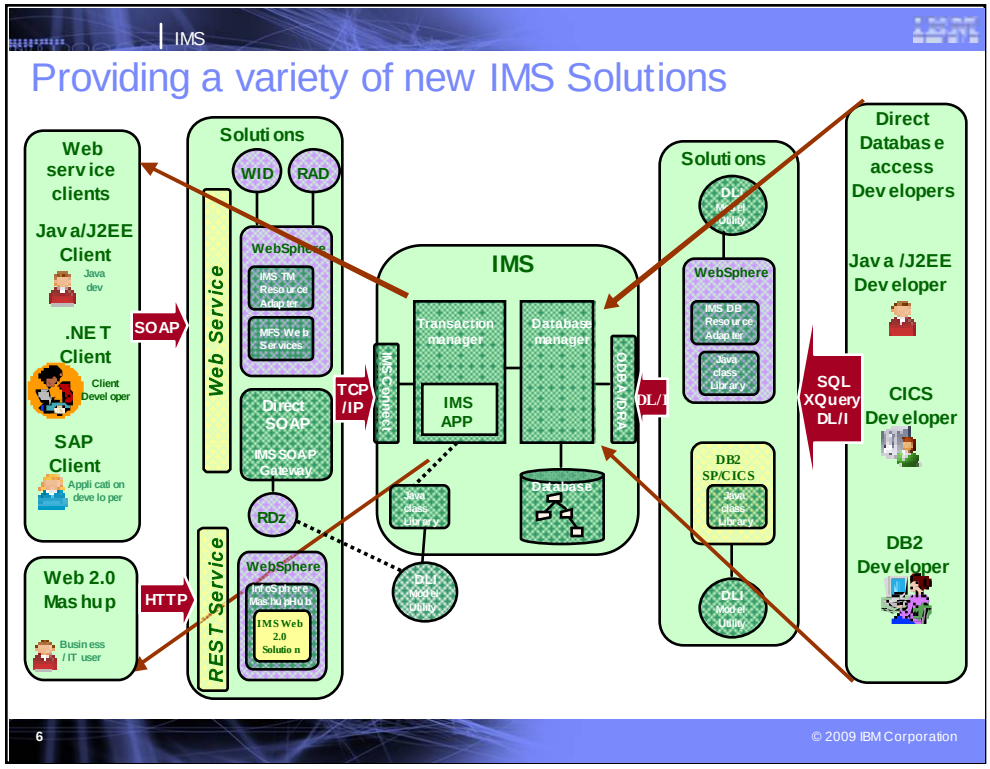
IMS needed to provide support for the standardized web services interface support to better integrate IMS into this environment.

And IMS has been growing into this.

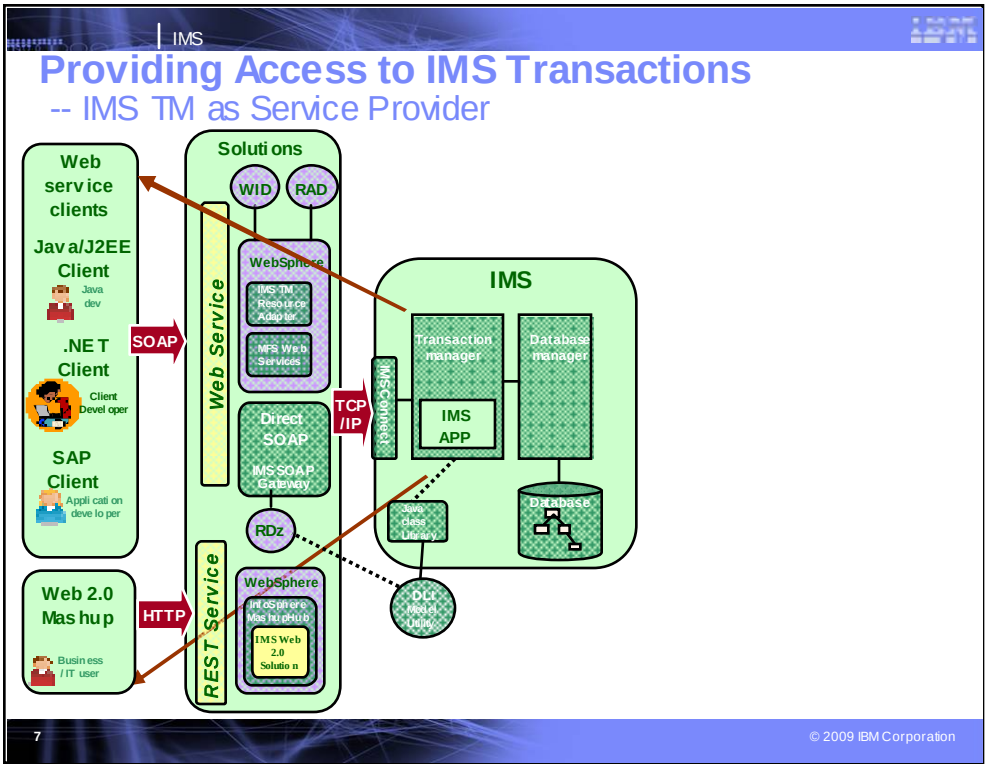


The SOA Architecture is a layered architecture, providing access through SOAP Services, JCA/EJBs, and XML to resources, such as your IMS Applications and Data.

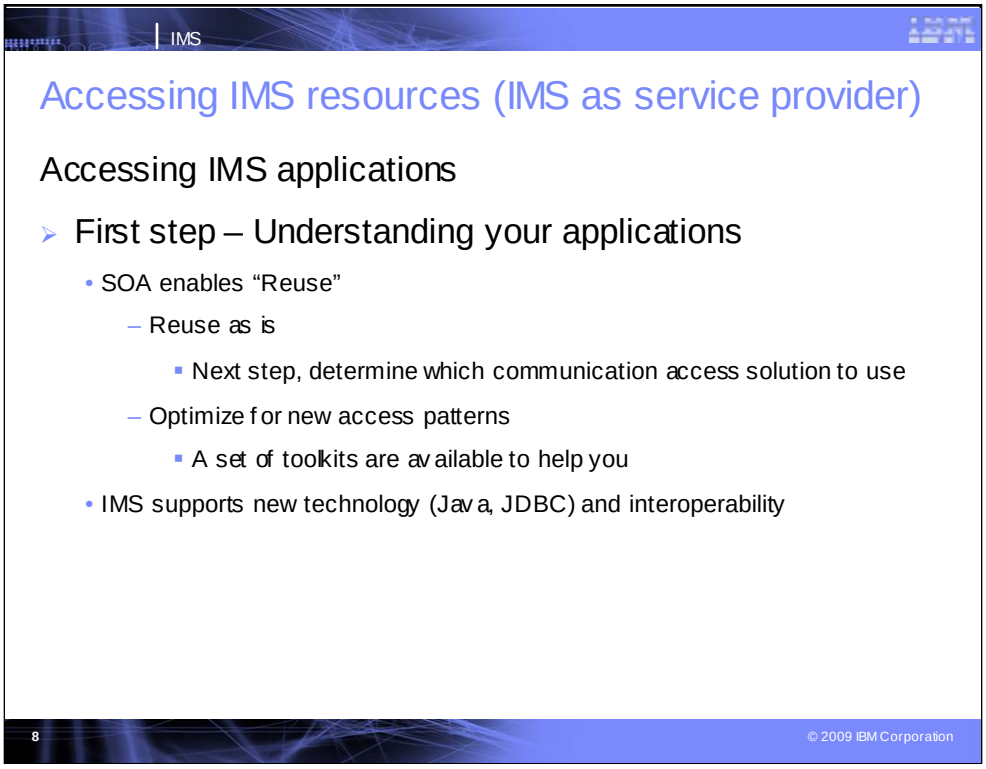
SOA and SOA enablement provides the connections to plug into your resources, as you would plug in to access electricity with appliance plugs (such as a hair dryer or refrigerator might use)



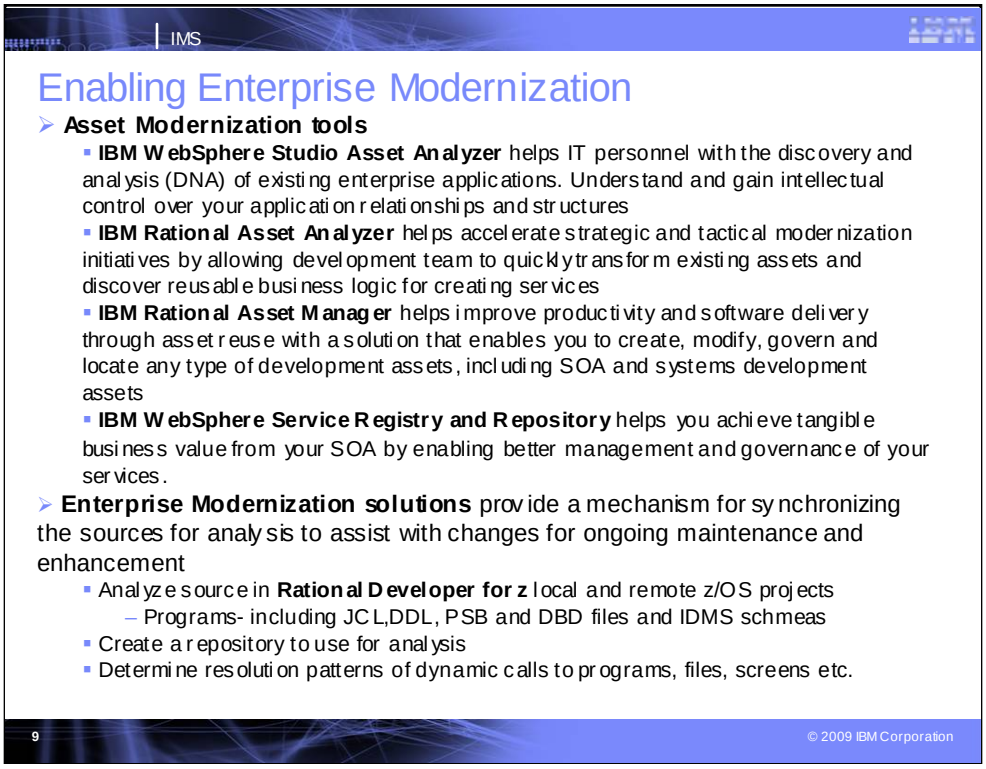
And IMS applications and data are plugging in, using standard interfaces



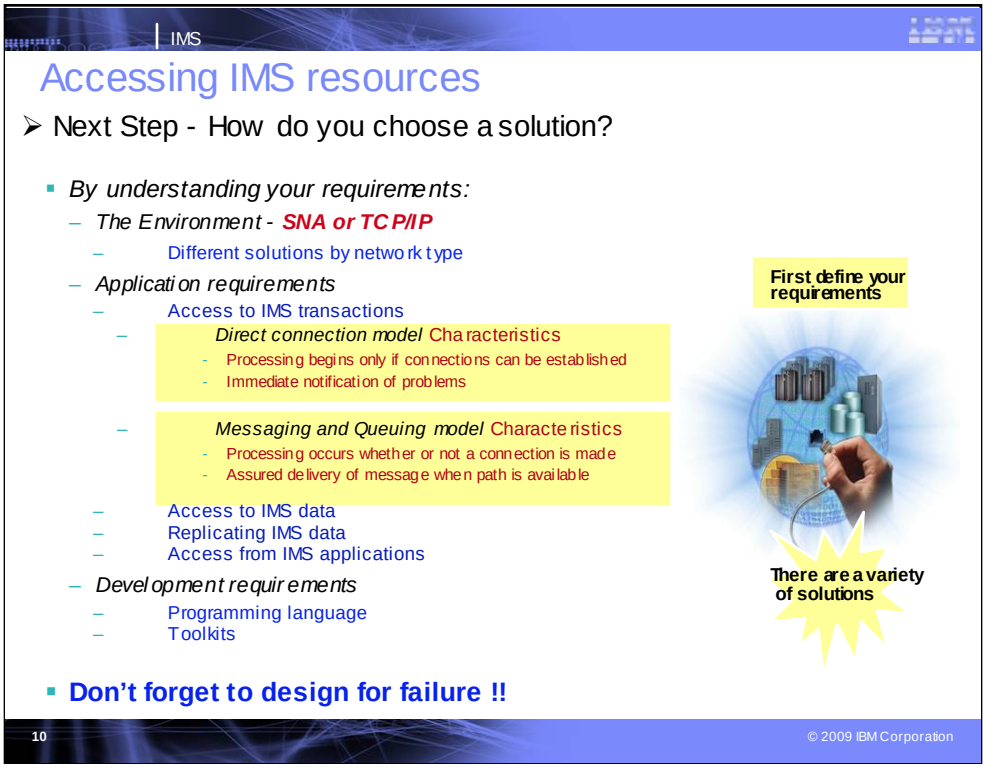
Let's first discuss the facilities available for access to IMS transactions.



IBM is providing access to your IMS resources and IMS can be a service provider. There are a number of solutions available, but first you'll need to gain an understanding of your applications. Opening up IMS to providers/users requires an understanding of your environment and needs so as to determine what you are going to reuse and how to do so efficiently. You need to determine if your environment is efficient and well structured or do you run though other code that is not needed. You'll need to see if your applications can be reused as is or need to be optimized for your new access needs. Reuse also applies to your available skills (eg. COBOL, PL/I or Java). You may choose to renovate your applications for efficiencies. IBM is providing a variety of solutions to enable access and a set of toolkits to help in optimization.

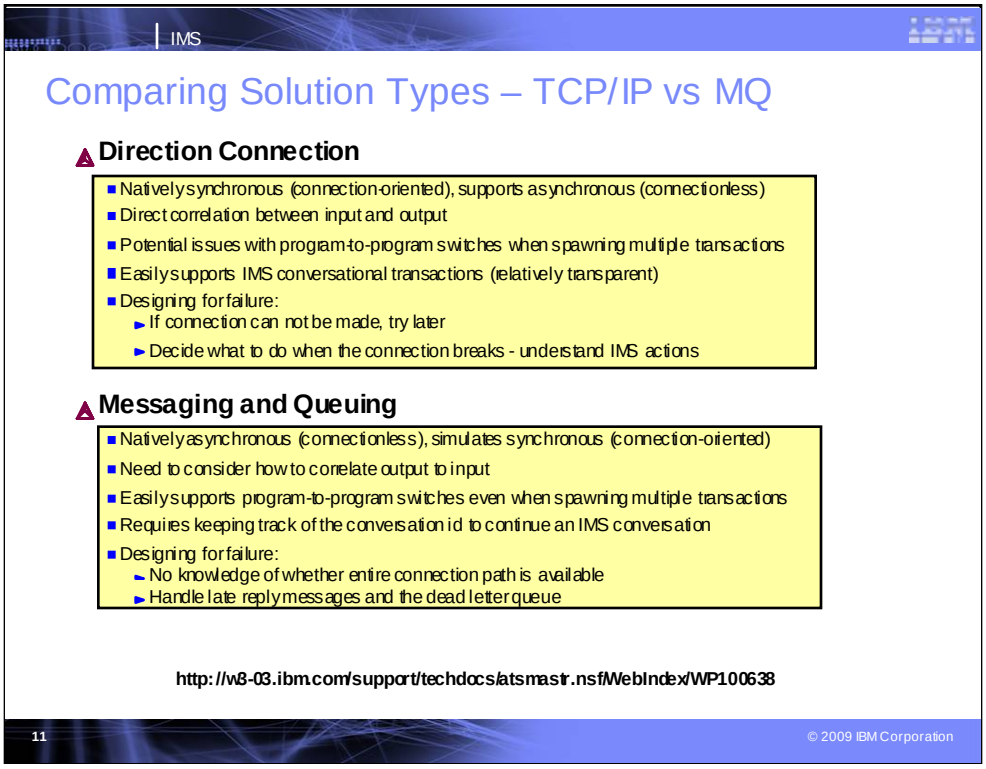


There are a number of tools available from vendors and IBM that support IMS access. Here are some of the IBM tools available to help you understand and modernize your assets and modernize your enterprise. These tools provide assistance in breaking apart the complexity of applications. And IBM provides solutions that can help you provide a mechanism for synchronizing the sources for ongoing maintenance and enhancement.



The next step is choosing a solution for access. You need to understand you requirements, for example, how quickly does it need to be sent out?

What are your environment, application and development requirements? When you choose tooling, don't forget to design for failure. The good news for IMS is that there are many vendors, and many solutions available to address your needs.



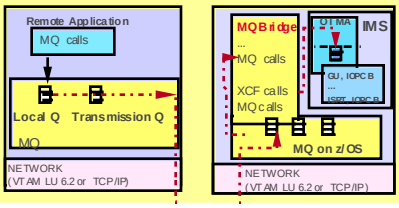
In assessing your needs, you'll need to decide between connection solutions that are Direct or provide Messaging and Queuing. Here are some of the considerations in evaluating the options for making that decision – synchronous or asynchronous, correlation of input/output, program-to program switching, conversational transactions, designing for failure. There is a white paper with more information on this at **http://w3-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100638**

Messaging and Queuing

- WebSphere MQ (MQSeries)
  - Supports the use of MQ API
    - Remote program is not sensitive to the network type
      - MQ provides its own high-level standard API
      - Same applications can be deployed on TCP/IP or SNA
  - Supports the use of JMS (Java Message Service) API
    - Messaging standard that allows application components based on J2EE to create, send, receive, and read messages

MQ IMS Adapter
– uses the IMS ESS interface
- Supports the use of explicit MQ calls in the IMS application

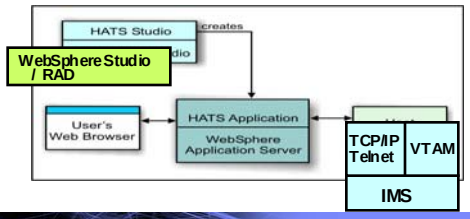
MQ IMS Bridge
– uses the OTMA interface
- Takes advantage of the DL/I call interface in the IMS application



For Messaging and Queuing, WebSphere MQ can provide a solution. It provides a couple of options – through the IMS Adapter with explicit calls or through the IMS Bridge to take advantage of the DL/I Call interface.

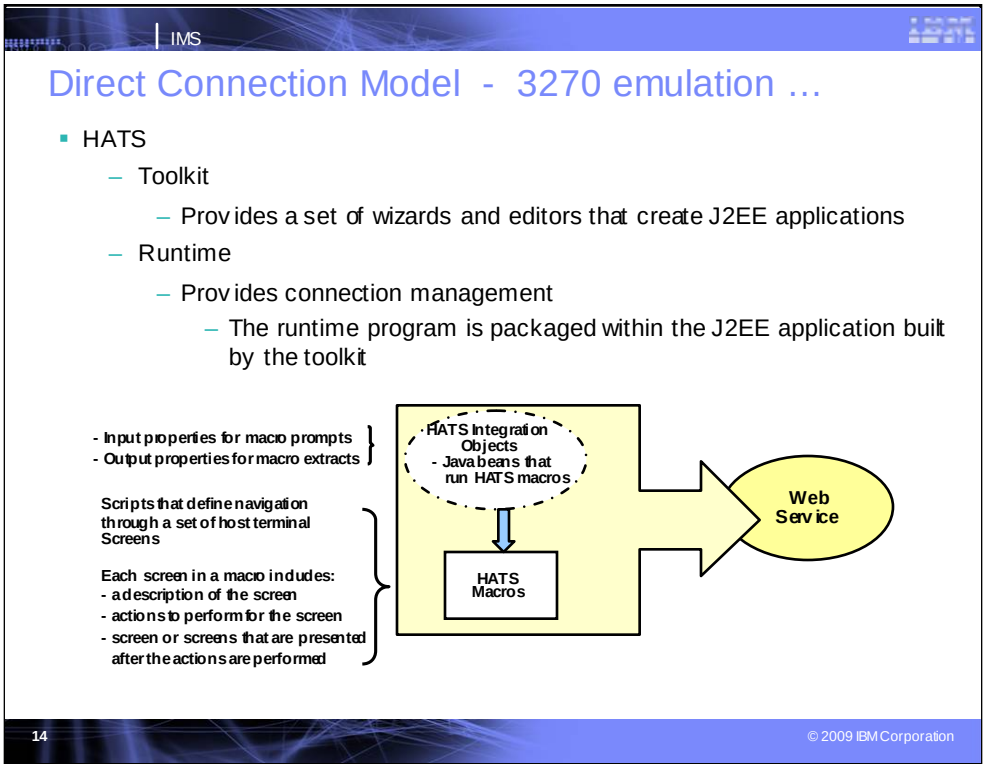
Direct Connection Model - 3270 emulation

- Benefits and value
  - Straightforward and simple
    - Traditional IMS communication model
      - Leverages standard TCP/IP Telnet (TN3270) capabilities
- IBM's Host Integration Solution – WebSphere Host Access Transformation Server (HATS)
  - Out of the box - transforms 3270 data streams to HTML
    - Provides customization and access to multiple hosts
  - Access provided as Java Applets or as Host Servlets
  - Supports the creation of Web Services

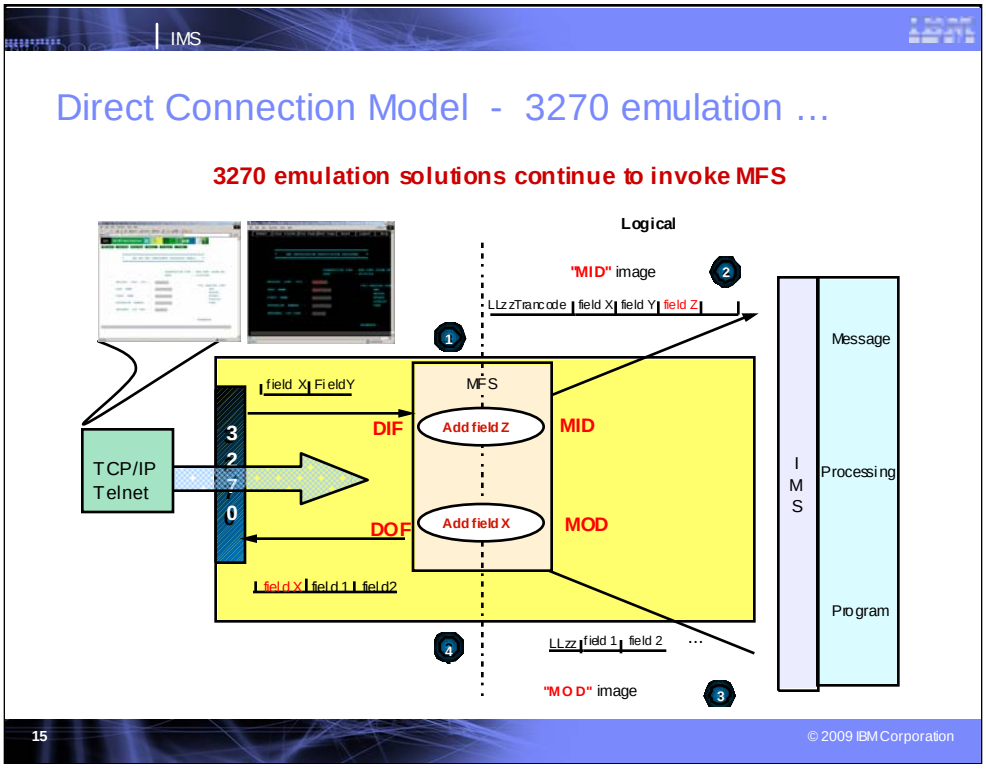


For Direct Connections, 3270 emulation is still important and is a viable solution that leverages the IMS model.

WebSphere Host Access Transformation Server (HATS) provides a solution that lets you use 3270 as a communication mechanism under the covers



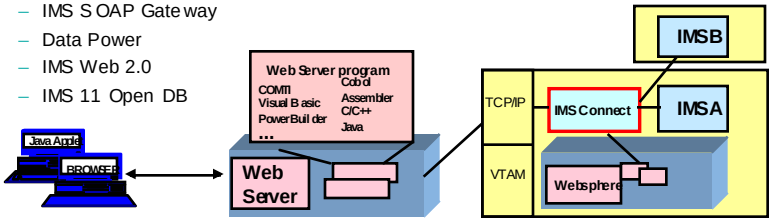
HATS consists of a Toolkit with wizards and editors that create the J2EE application. It also provides a runtime environment for connection management. It allows you to pull apart the application and create a web service and end user screens.



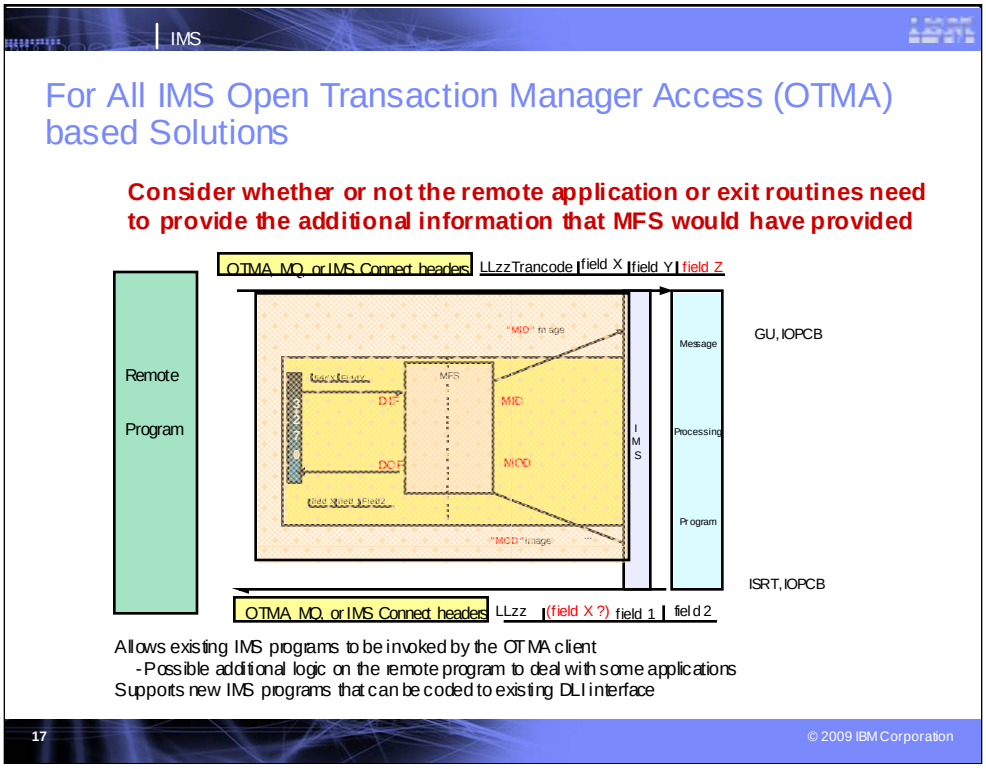
IBM provides solutions which invoke the IMS MFS outbound and convert. Environments sensitive to this are still popular drop-in solutions.

Direct Connection Model -- IMS Connect

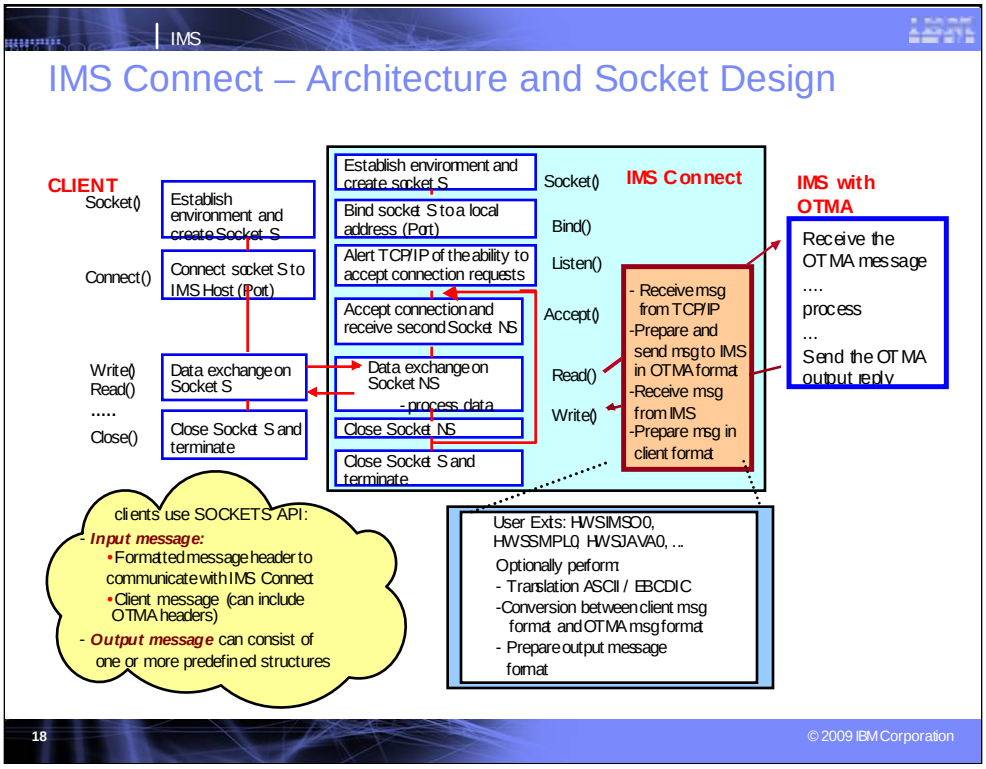
- A capability that provides connectivity support between TCP/IP applications and IMS transactions – Integrated into IMS V9
  - Configured on a z/OS server
- *Benefits and Value*
  - Supports TCP/IP sockets access to IMS transactions and commands
  - Provides a general purpose and structured interface
  - Provides a strategic base for new connection technologies
    - IMS TM Resource Adapter and MFS web Services
    - IMS SOAP Gateway
    - Data Power
    - IMS Web 2.0
    - IMS 11 Open DB



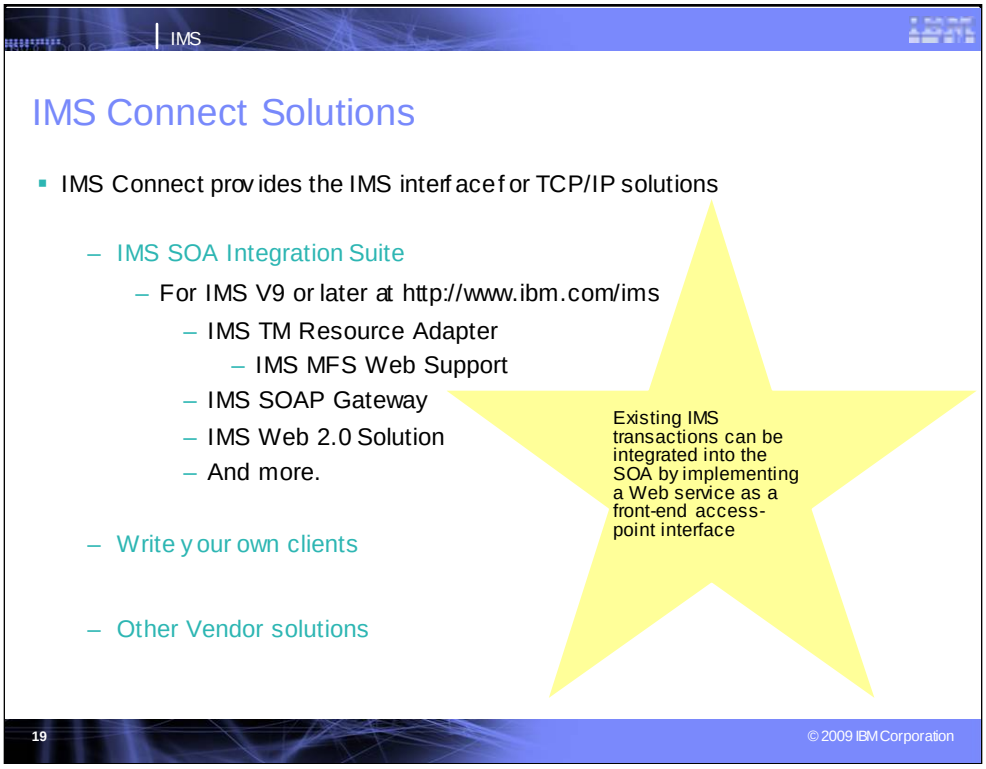
IMS Connect function provides the architectural foundation for IMS as a TCP/IP socket server.



The IMS Open Transaction Manager Access (OTMA) is the interface to the message queue for WebSphere MQ, IMS Connect, and OTMA Callable API RYO users. But since you no longer go through MFS for inbound/outbound fields, remote programs must add any necessary additional information that it would have provided.. You will need to consider whether the output can be used as is or whether you need to use exit routines for modifying the data stream.



IMS Connect function is part of the overall restructure of IMS for the 21st Century and is architected as the base for all future IMS Connectivity. Much of the function of IMS Connect was available with earlier IMS Versions so you could start to take advantage of it before migrating your networks/applications/databases to IMS 9/10. The structure of IMS Connect is also designed such that drivers can be interchangeable. That is, alternatives for the TCP/IP front end or OTMA back end interfaces are already being provided. These are allowing IMS to exploit newer, additional, and enhanced protocols and/or interfaces.



IMS Connect provides TCP/IP access to IMS.

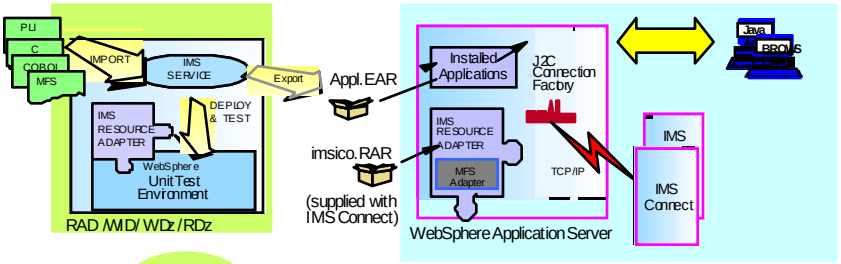
For access to IMS through IMS Connect from a J2EE environment, IMS provides the IMS TM Resource Adapter (aka IMS Connector for Java) for access from Java applications, SOAP Gateway and parsers, and samples for other language access as well. Support for MFS is also available. Other solutions providing access to IMS through IMS Connect include the IMS SOAP Gateway for access from non-J2EE environments, IMS Web 2.0 support for Mashups, and many more. solutions.

IMS has also extended its use of the MVS Cross Coupling Facility for use by IMS Connect for distributed operations access through the Structured Call Interface to the Operations Manager from the DB2 Version 8 Control Center as a single point of control.

With this structure IMS Connect is evolving to address other connectivity requirements, such as distributed database access to IMS DB, being provided with IMS 11.

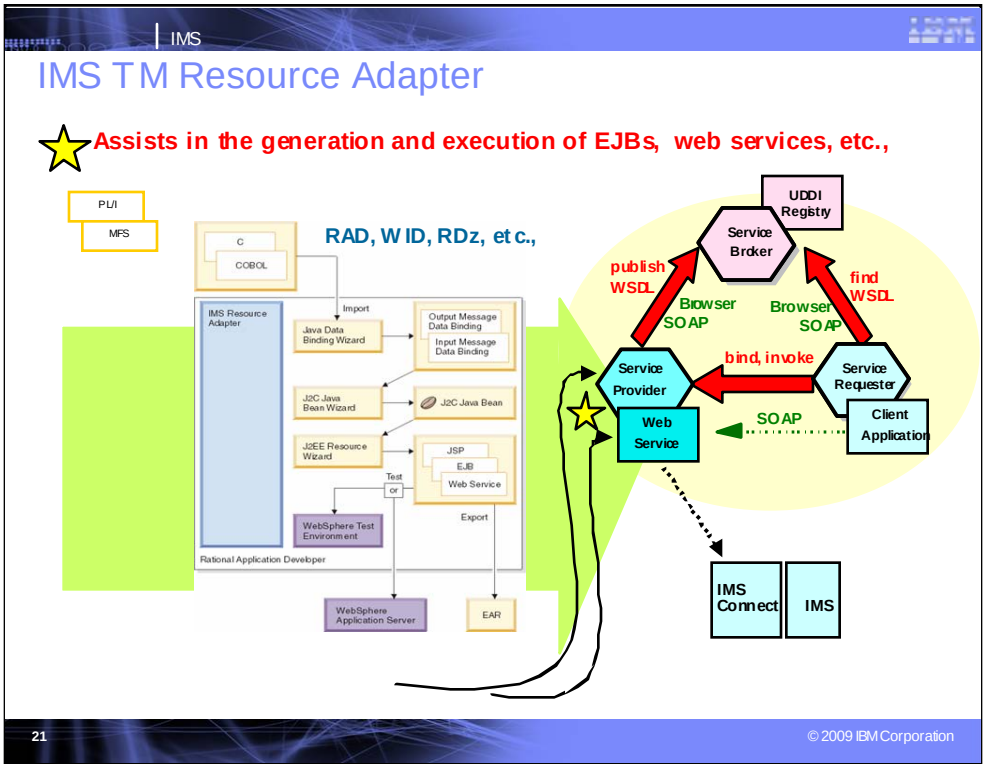
IMS TM Resource Adapter …

- Supports the development of J2EE applications, Web services, and business processes that can interface with IMS Connect
  - *Development component*
    - RAD, WID, RDz
  - *Runtime component*
    - Must be installed into an application server, e.g., WAS, WPS



Tool kits that generate web services, EJBs, JSP, etc. for IMS, CICS, DB2

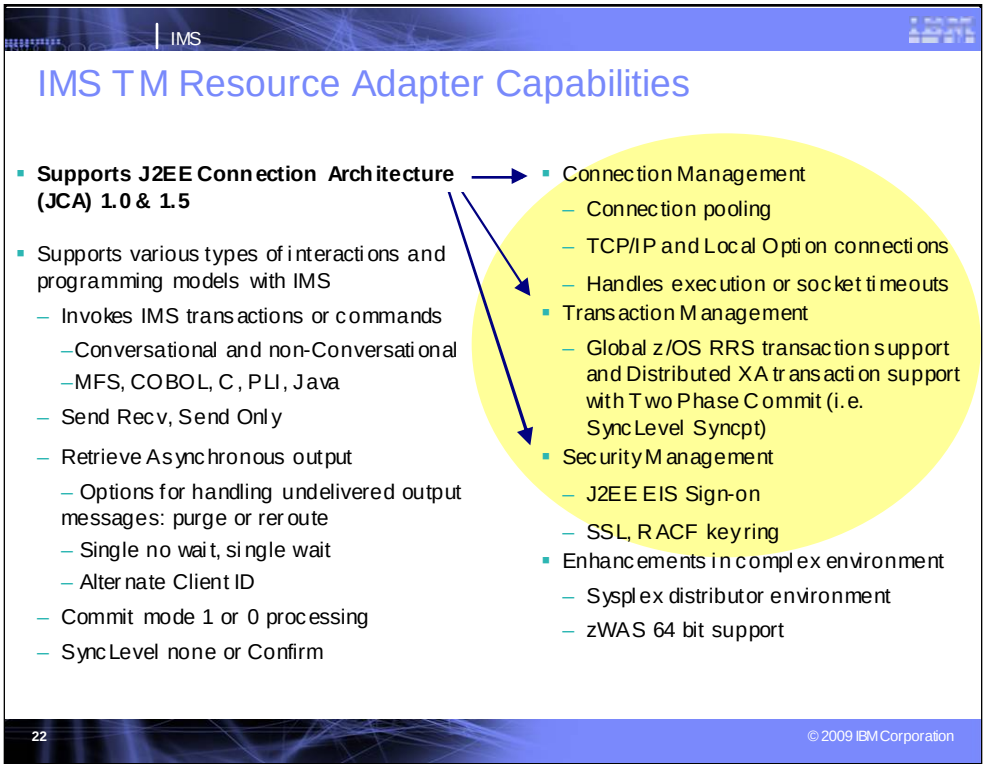
IMS TM Resource Adapter enables IMS application access through Connect from a J2EE server (eg. WebSphere Application Server).



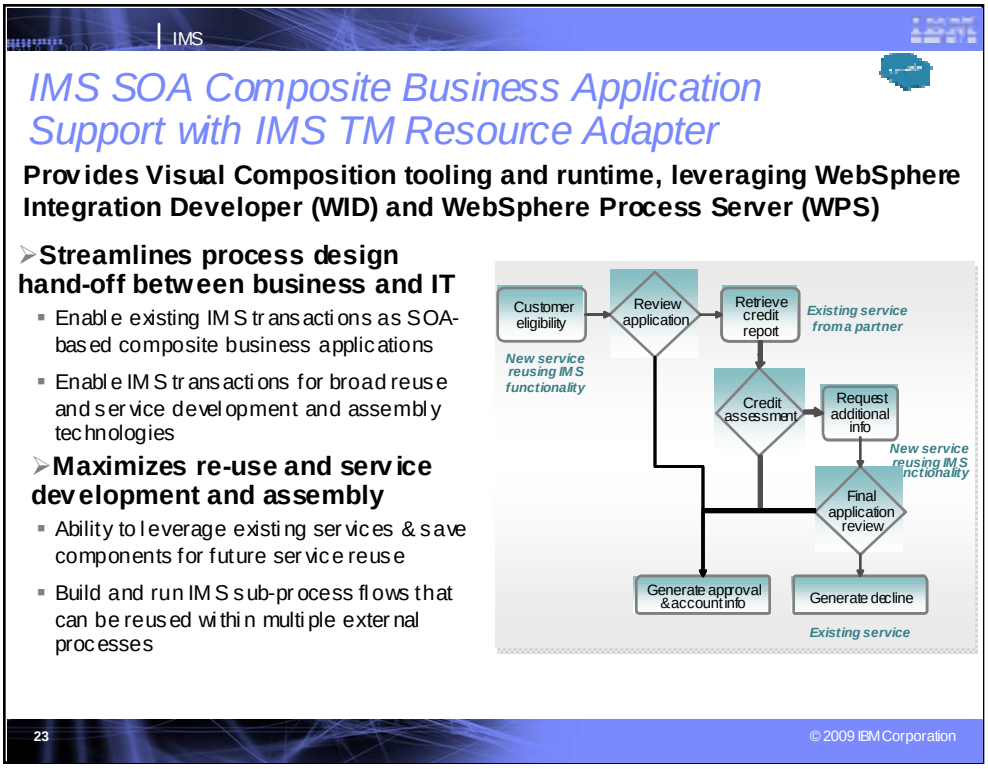
Tooling can make this access more dynamic, enable it to work in an SOA architecture, and create the web services. It creates a file to know how to get to IMS and back.

Rational Application Developer (RAD) and Rational Developer for z (RDz) help modernize your IMS application by parsing existing IMS application source and generating J2EE application and web service without changing the IMS application.

WebSphere Integration Developer (WID) provides the process flows for WebSphere Process Server. For IMS the best places is in your web server. If WPS runs on z with IMS it is more efficient.

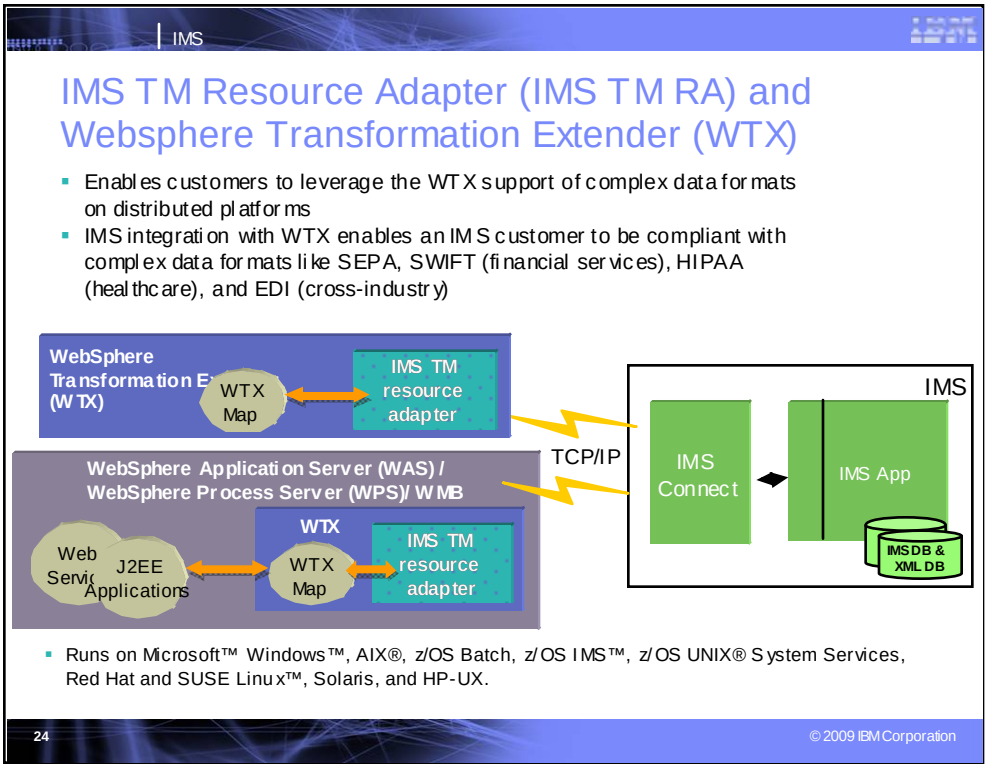


IMS TM Resource Adapter supports various types of interactions and programming models with IMS, supports the J2EE Connection architecture capabilities of Connection, Transaction and Security Management. And it also provides enhancements needed for complex environments, taking advantage of capabilities, such as Sysplex distributor and 64 bit support.



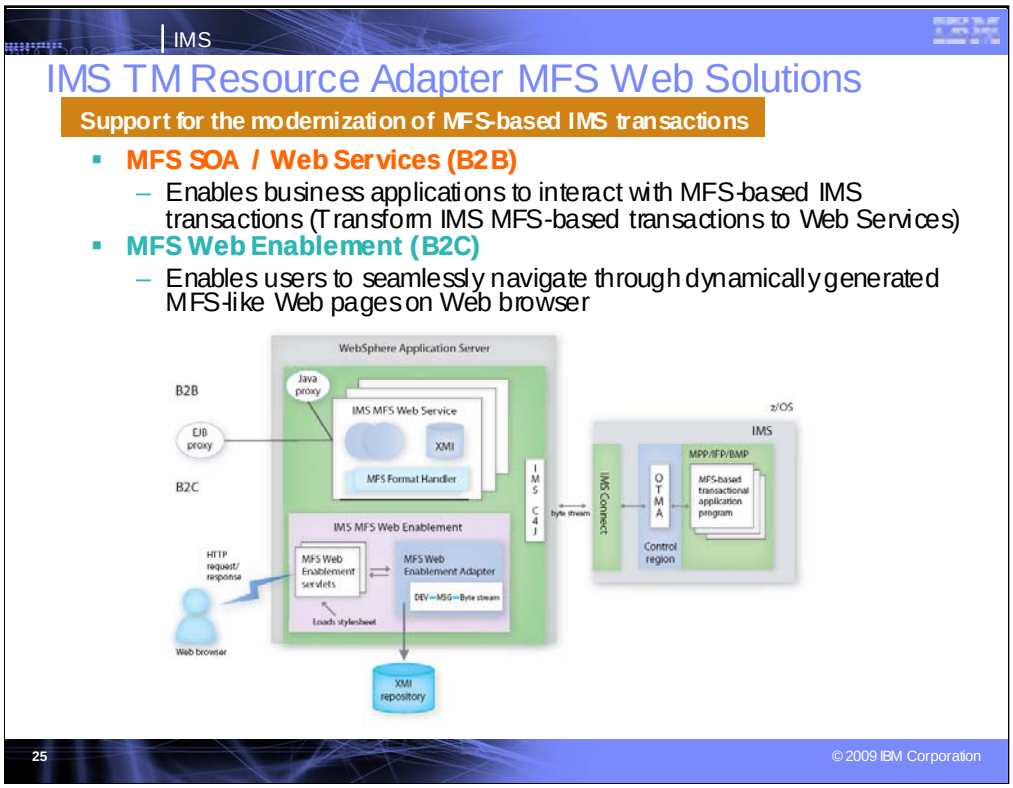
Key Message: IBM is providing visual composition tooling and runtime support for IMS

IMS SOA Composite Business application support provides for the next generation business process tooling and servers that integrate J2EE resources, services and activities (like user interventions), based on Web Services with the Business Process Execution Language (BPEL). This extends existing transactions to include conversational transactions as SOA-based composite business applications using the IMS TM Resource Adapter and WebSphere tooling and runtime, maximizing re-use of IMS assets in new applications for rapid business innovation and reduced costs.
IMS 11 is enhancing this for MFS as well.



Key Message: Websphere Transformation Extender's IMS support provides new industry standards compliance

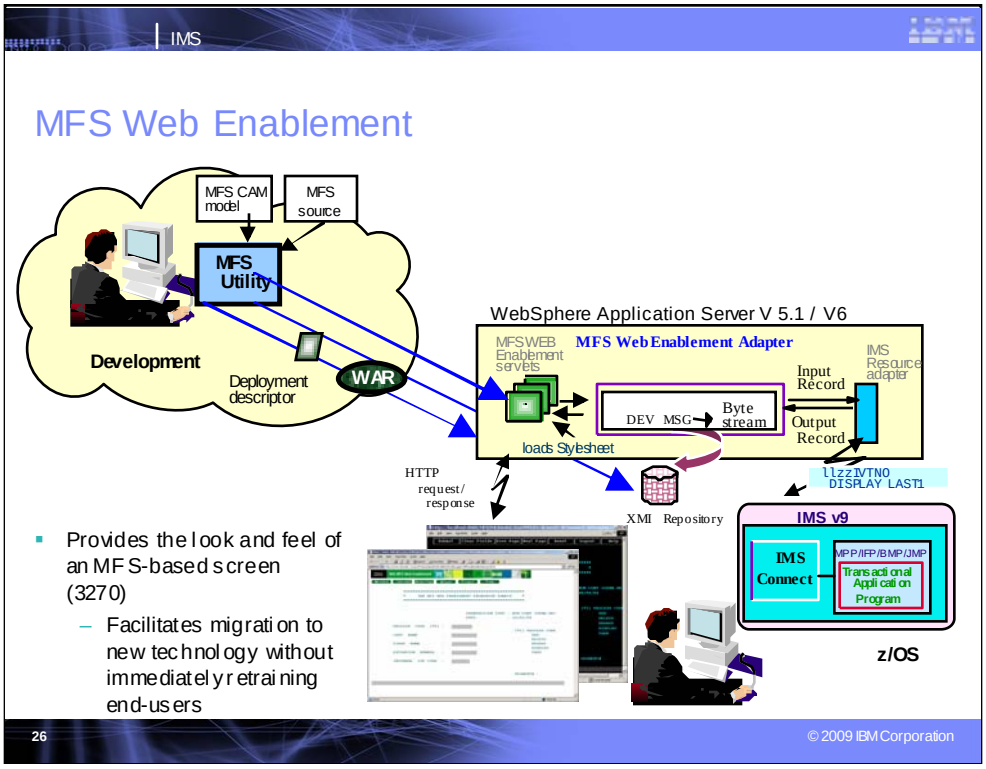
WebSphere Transformation Extender enables customers to leverage the WTX support of complex data formats on distributed platforms. IMS integration with WTX enables an IMS customer to be compliant with complex data formats, like SEPA (XML Format requirement for European banks), SWIFT (financial services), HIPAA (healthcare), EDI (cross-industry) and others. This support provides faster standards compliance and improved data quality with automated data validation using industry and regulatory standards.



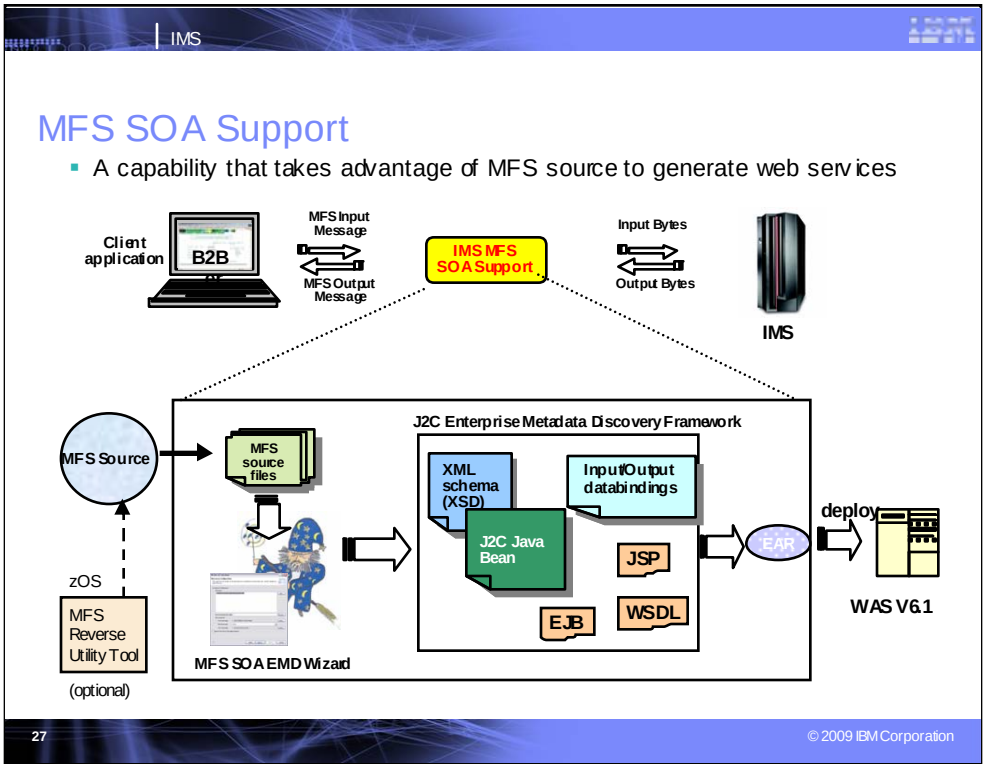
For development environments:

> IMS MFS Web Services is includes as part of the IMS TM Resource Adapter (RA). It has evolved into IMS MFS SOA Support, which is included in IMS TM RA for Rational Application Developer (RAD) 7.5 and eventually Websphere Integration Developer (WID). IMS MFS SOA support is for Business to Business (B2B) for integration with other tools. RAD support is J2C for developers and has a slightly different runtime from WID, which is Service Component Architecture (SCA) for Architects.
>
> IMS MFS Web Enablement is also provided for web download for Business to Consumer (B2C) for use directly with Browsers. Also shipped with this is the MFS XML Utility for parsing XMI for MFS Web Enablement

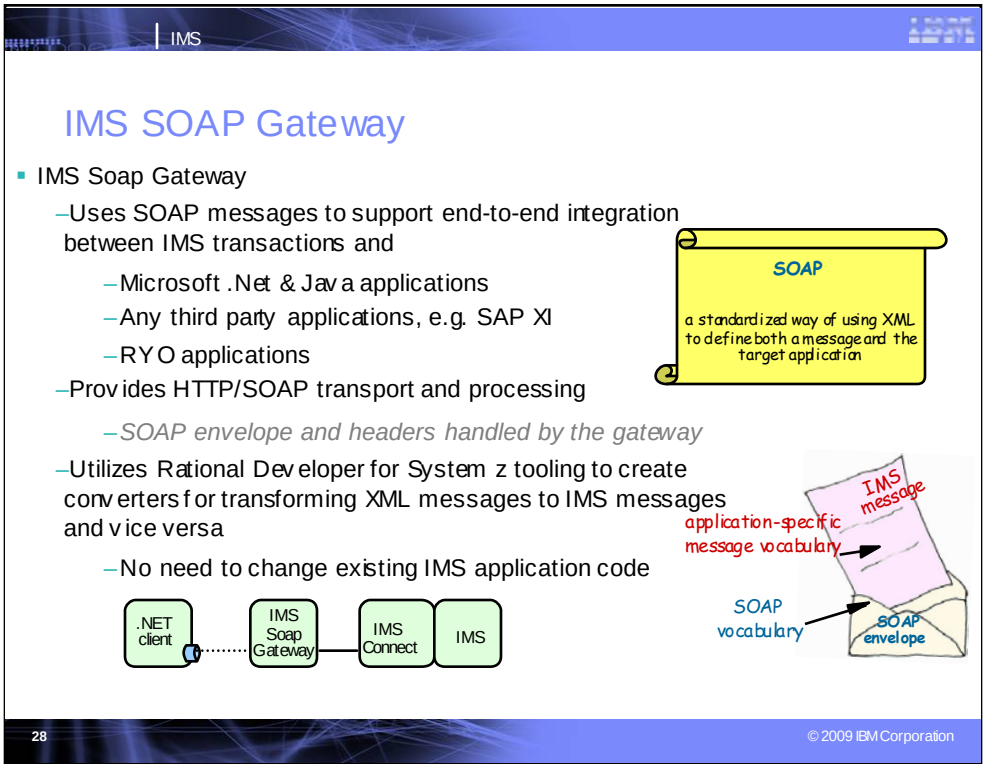
For runtime, both solutions currently require WAS 6.1 or later.



MFS Web Enablement makes use of TCP/IP sockets to look like a 3270 screen for customers who want first to migrate technology without retraining end users which can take a lot of time.



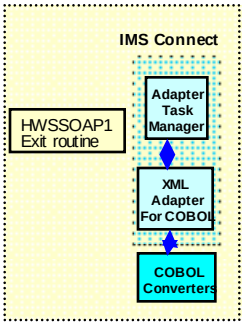
MFS SOA Support uses MFS Source for parsing as input to tooling. It is used to send to IMS and back. The MFS Reversal tool can help you create source if you don't have it. MFS SOA Support can create the WSDL files, JSP, EJBs.



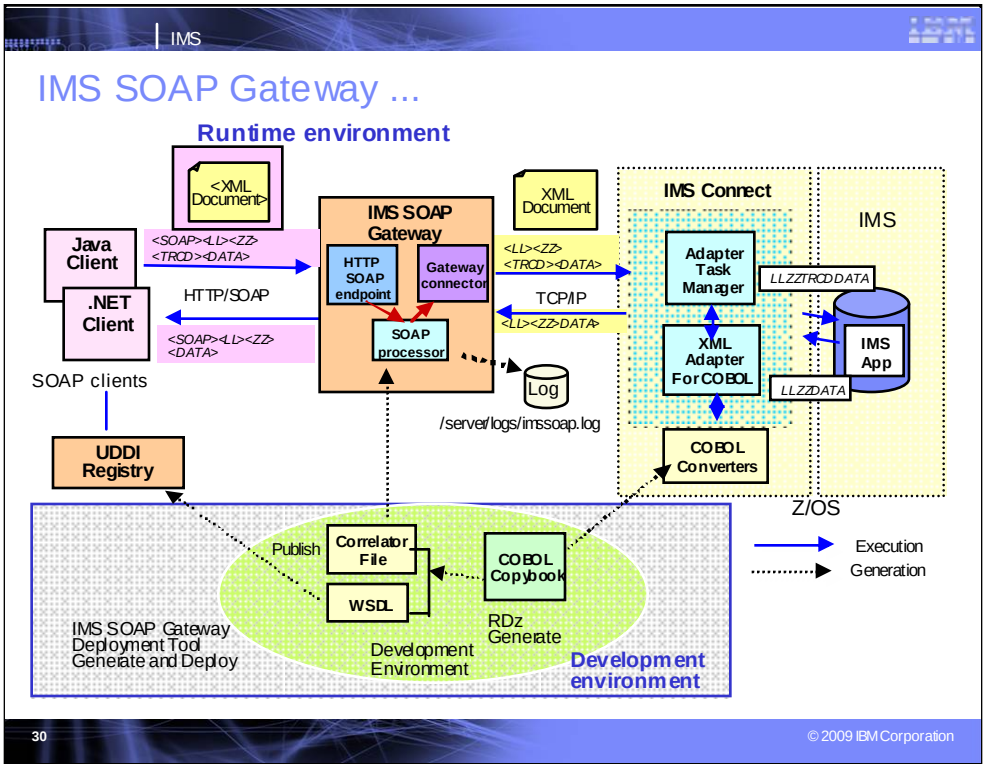
IMS SOAP Gateway provides direct SOAP access to IMS transactions. SOAP gateway is a lighter weight solution, and is for when you don't have J2EE servers. If you have J2EE servers, you should use the IMS TM RA. With the SOAP Gateway SOAP XML format is sent in. SOAP Gateway support provides for the translation back and forth without requiring application servers. It creates WSDL and tells about the web location and correlator files. IMS Connect calls the converter file to have the message come in as an LLzz format.

IMS SOAP Gateway XML Conversion Support

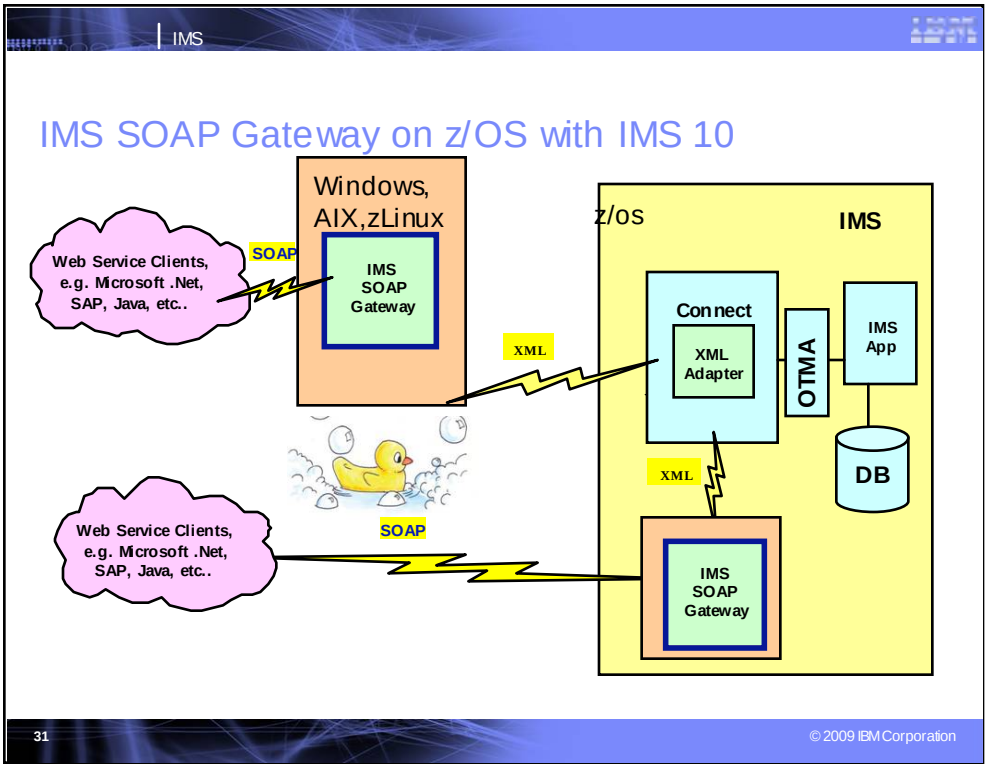
- XML converter routines
  - Cobol / PLI source code
    - Provide the information needed to perform conversion from tagged data to a byte stream
      - *Unique to each message definition*
    - Can be generated by RDz toolkit
  - Compiled and bound into file that is concatenated into IMS Connect STEPLIB
- Without converter routines in IMS Connect
  - IMS application will need to perform the conversion



There is a converter routine per transaction. The XML Flow would otherwise need conversion in the IMS application or WebSphere server.



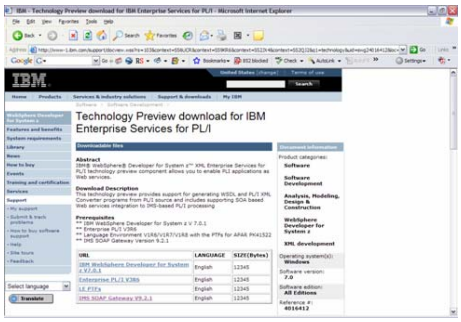
This is an example of the development environment and the runtime environment when using the IMS SOAP Gateway.



z/OS support was provided more recently, in addition to the Windows, AIX, zLinux support provided earlier.

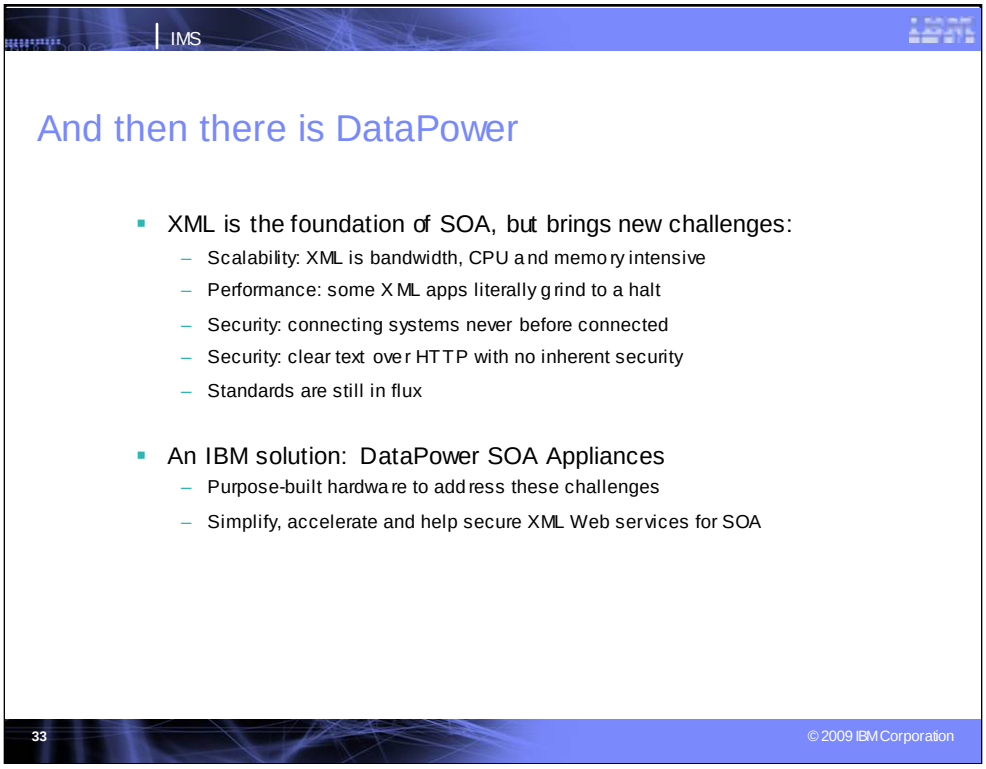
IMS SOAP Gateway PL/I support

- Technology preview download
  - http://www-1.ibm.com/support/docview.wss?rs=103&context=SS6UCR&context=SS9KR6&context=SS2JX4&context=SS2QJ2&q1=technology&uid=swg24016412&loc=en_US&cs=utf-8&lang=en

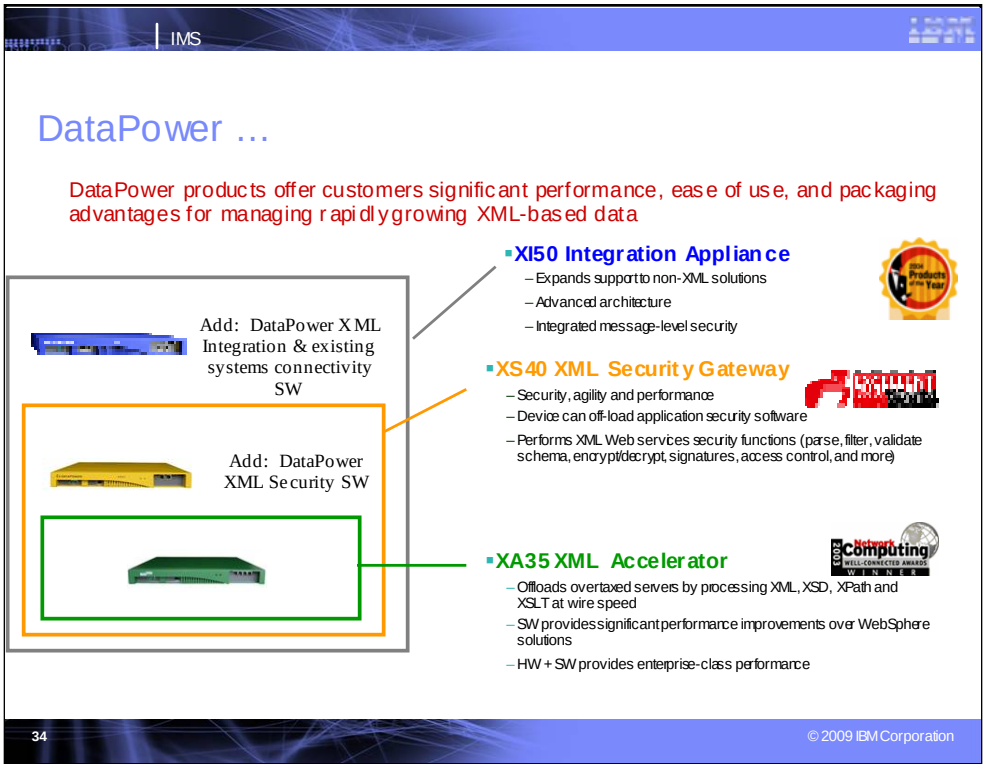


- support for generating WSDL and **PL/I** XML Converter programs from PL/I source
- Support for SOA Web services integration to IMS-based PL/I processing

PL/I support is being made available for generating WSDL and PL/I XML Converter programs from PL/I source.



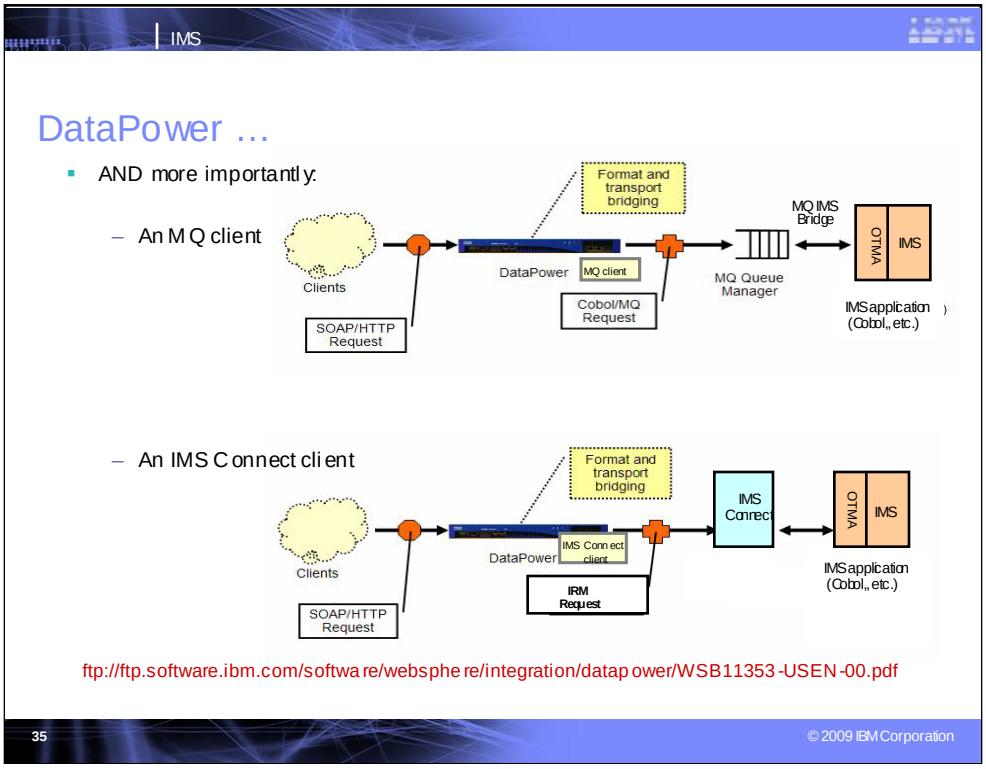
Data Power is a set of hardware/software from IBM. It is a set of SOA appliances to address the new service challenges with SOA.



Data Power offers 3 appliances for integration. The highest level understands the mainframe with SOAP, XML, and Firewall support.

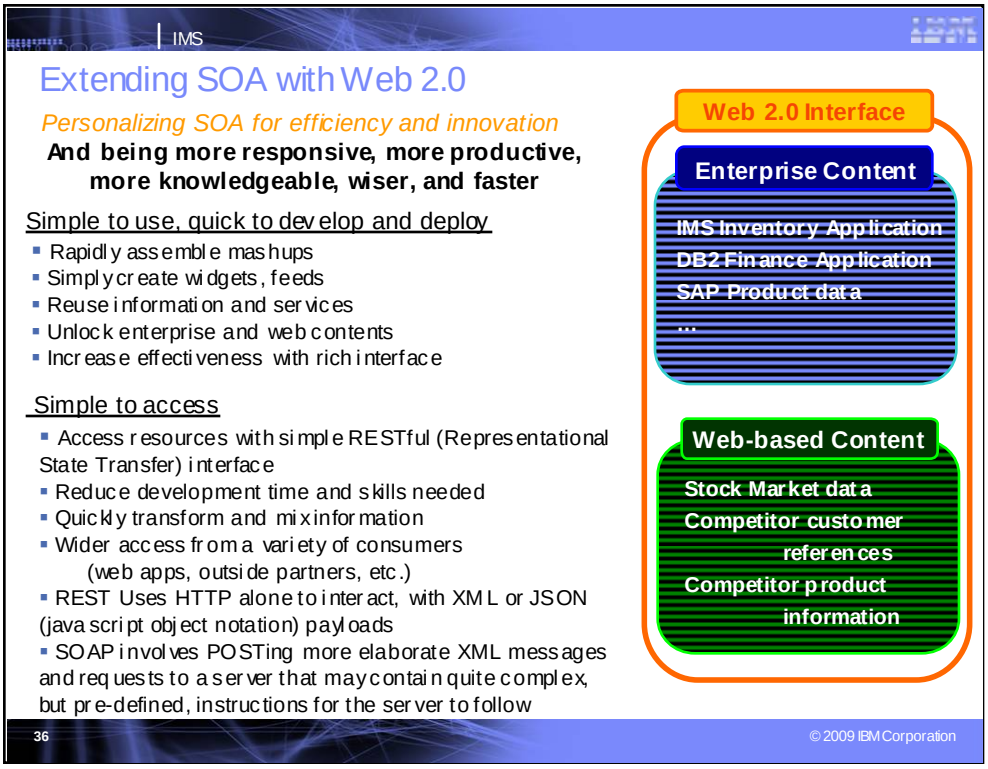
The mid level operating at wire speed provides security outside the mainframe with encryption/decryption at the gateway level.

The lowest level offloads XML processing into the Data Power box and creates converter files off the mainframe



Data Power provides MQ and IMS Connect clients. For MQ, once it comes in, it can access IMS and backout. It has a special client for IMS. It can also talk to CICS and understand the differences.

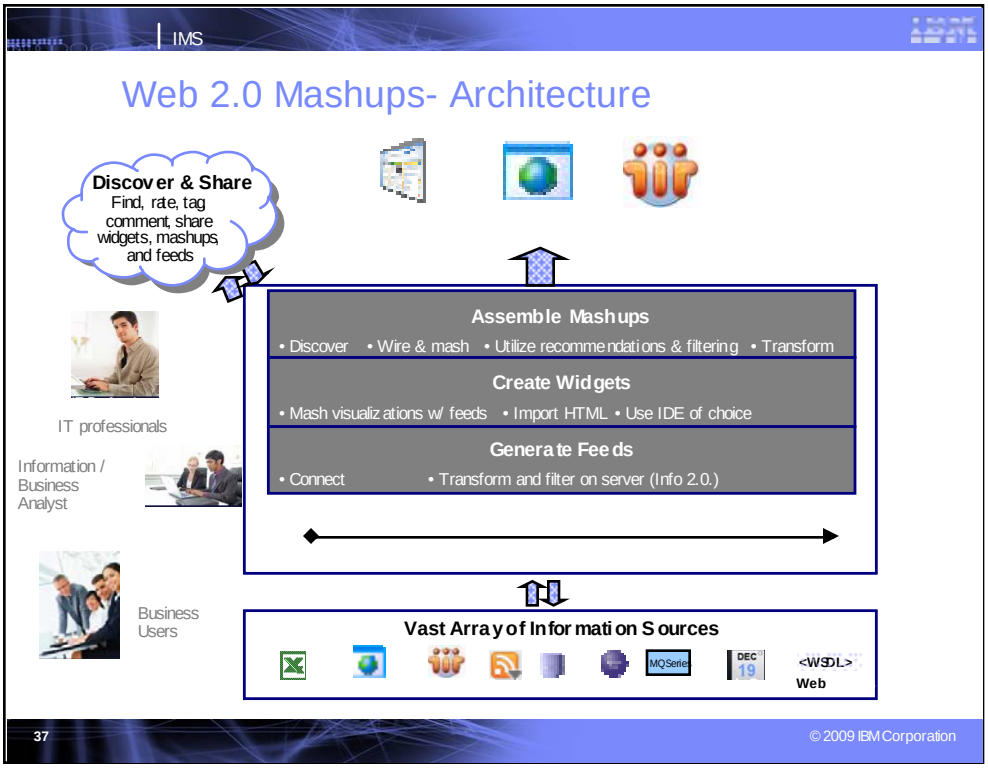
Data Power provides an IMS Connect Client that understands the message, supports Commit level 1, synchronous level none, and handles simple in and out requests.



Web 2.0 was a meeting to discuss using web as platform, putting into place the whole web as a single platform.

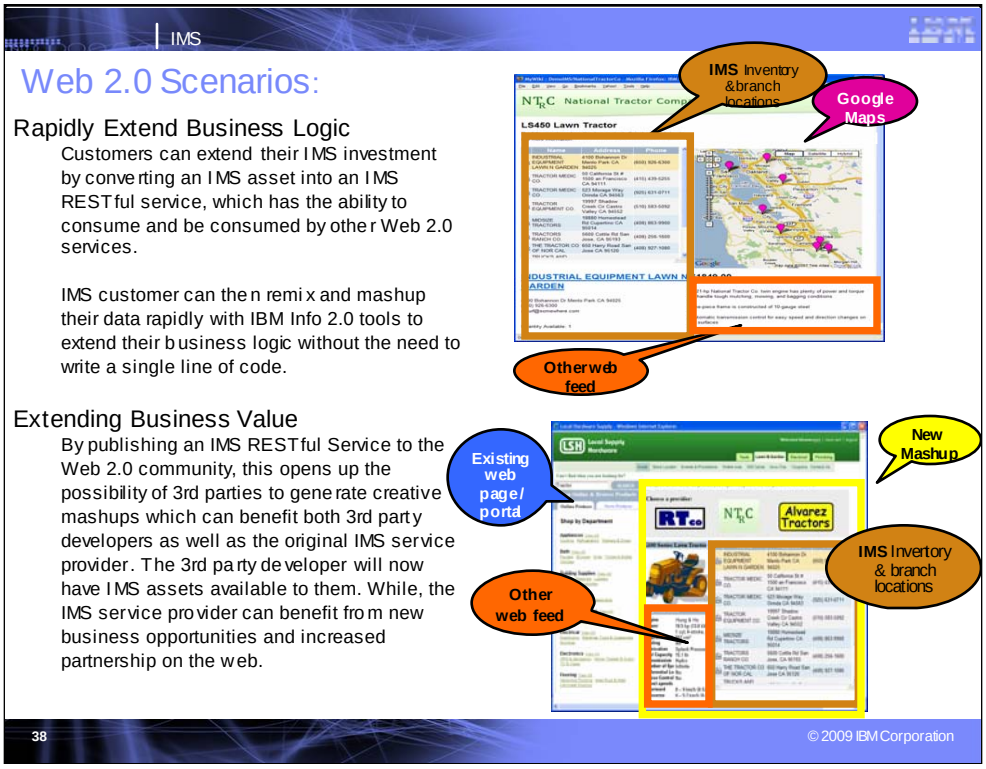
It provides a second generation of web communities and hosted services, transitioning from websites with isolated information to interlinked environments. It is use for interacting with web services. It simplifies use, with a subset of verbs when working with uniform resource information.

It leverages two approaches to web APIs: REST using HTTP alone to interact with XML or JSON; and SOAP involving POSTing more elaborate XML messages and requests to a server that may contain quite complex, but pre-defined instructions for the server to follow. We now have solutions that take advantage of IMS in this.



Mashups is a term from the music industry – music containing songs previously released by artists.

For the web, it is an application that combines data or content (FEEDs) from more than one source.



Web 2.0 allows you to more easily open your environment and take advantage of other applications available on the web.

Use includes:

Integrating data elements from multiple sources with a simplified front-end, eg. Google maps.

Mixing data of similar types from different sources with a graphical front-end (eg. Manufacturer's product description with additional map on closest retailers to a zip code)

Combination of these, focusing on both data aggregation and presentation and adding collaborative functionality.

IBM Mashup Center Web 2.0 support

A visual tool for creating, storing, transforming, and remixing feeds to be utilized in mashup, and a central catalog for users to tag, rate, and share mashable assets.

Create Feeds from:

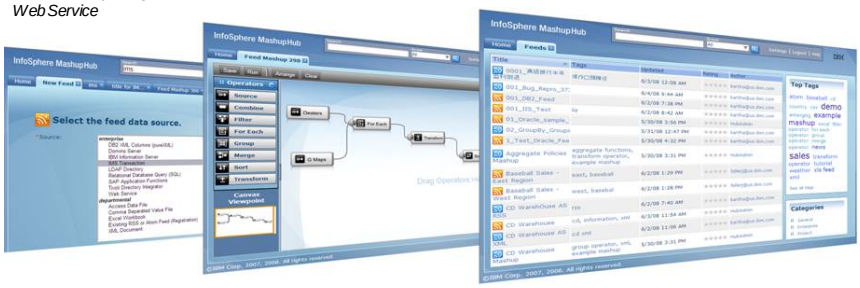
- *Domino*
- *IBM Information Server*
- ***IMS Transaction***
- *LDAP*
- *pureXML Document*
- *Relational*
- *SAP*
- *Tivoli Directory Integrator*
- *Web Service*
- *Excel or CSV*
- *Feed Registration*
- *MS Access Document*
- *XML Document*

Transform and Mix Feeds:

- *Import*
- *Filter*
- *Annotate*
- *Merge*
- *Publish*
- *Group / Sort / Union*

Catalog Feeds:

- *Share and discover mashable assets*
- *Rate and comment*

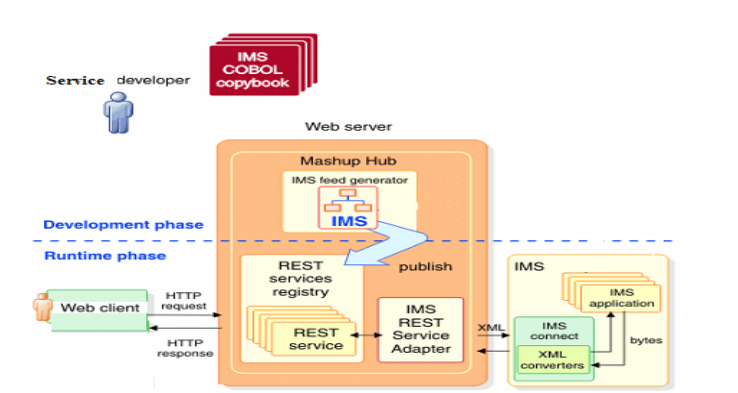


Webcast: "Harnessing the power of Web 2.0 and enterprise mashups"
http://www.ibm.com/developerworks/db2/events/info20.html

IBM Mashup center includes components for creating, storing, transforming, and remixing fees and for sharing with the Web 2.0 community.

Web 2.0 and IMS

- **IMS Web 2.0 development/runtime support**

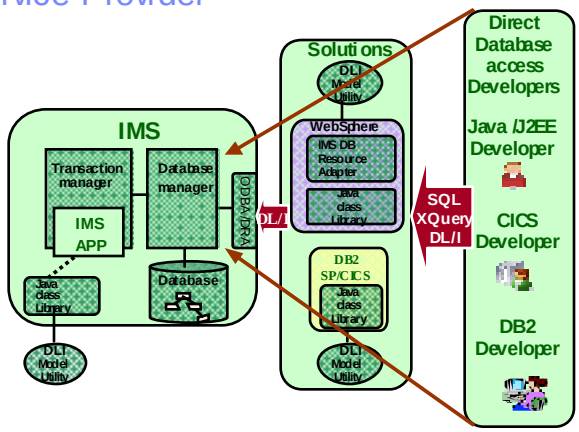


IMS Info 2.0 demo at
http://www.youtube.com/watch?v=BWJGSC-RyXQ

IMS Web 2.0 support brings IMS into the Web 2.0 world. It provides development and runtime support. Converters are created and put in IMS Connect. Connectivity to IMS applications is through IMS Connect using the XML converters. The application is accessed and the information goes back out. There is a demo out at http://www.youtube.com/watch?v=BWJGSC-RyXQ

Providing Access to IMS Data

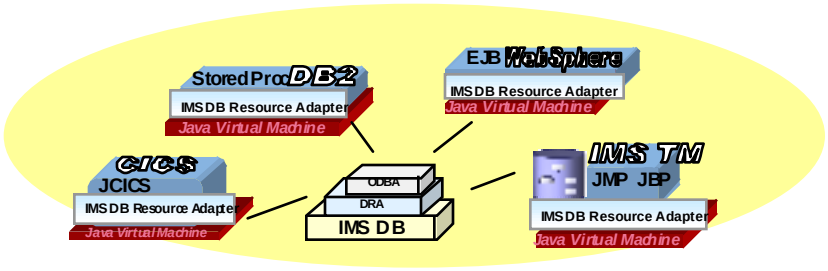
-- IMS DB as Service Provider



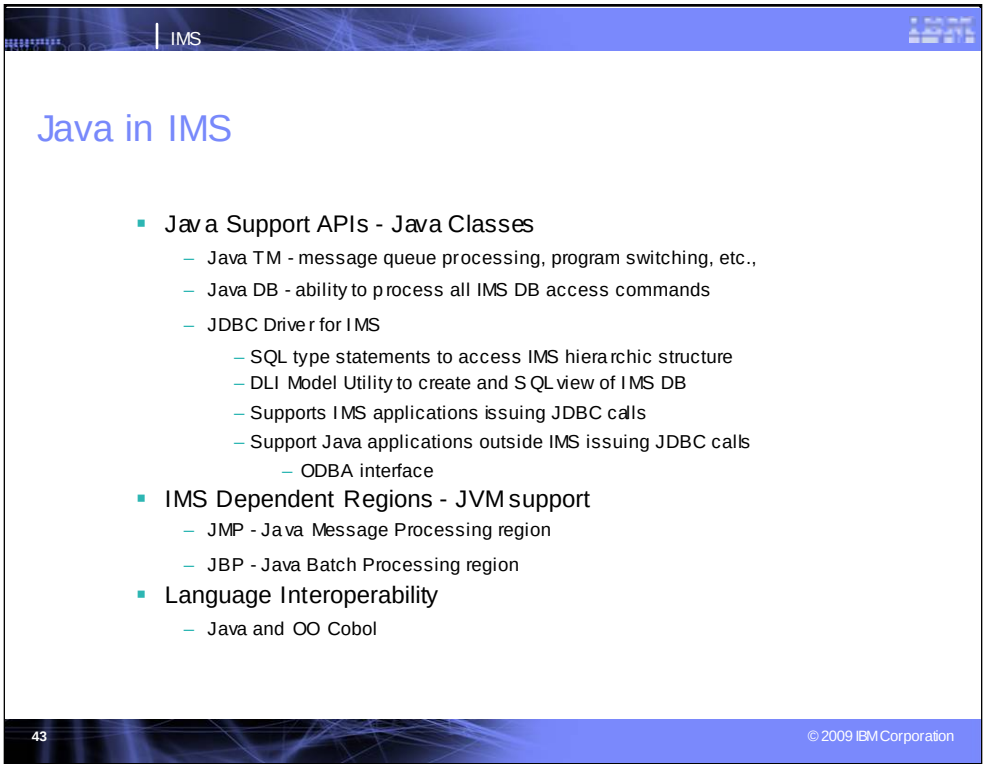
Now we turn to facilities available for access to IMS data

Application Access to IMS Data

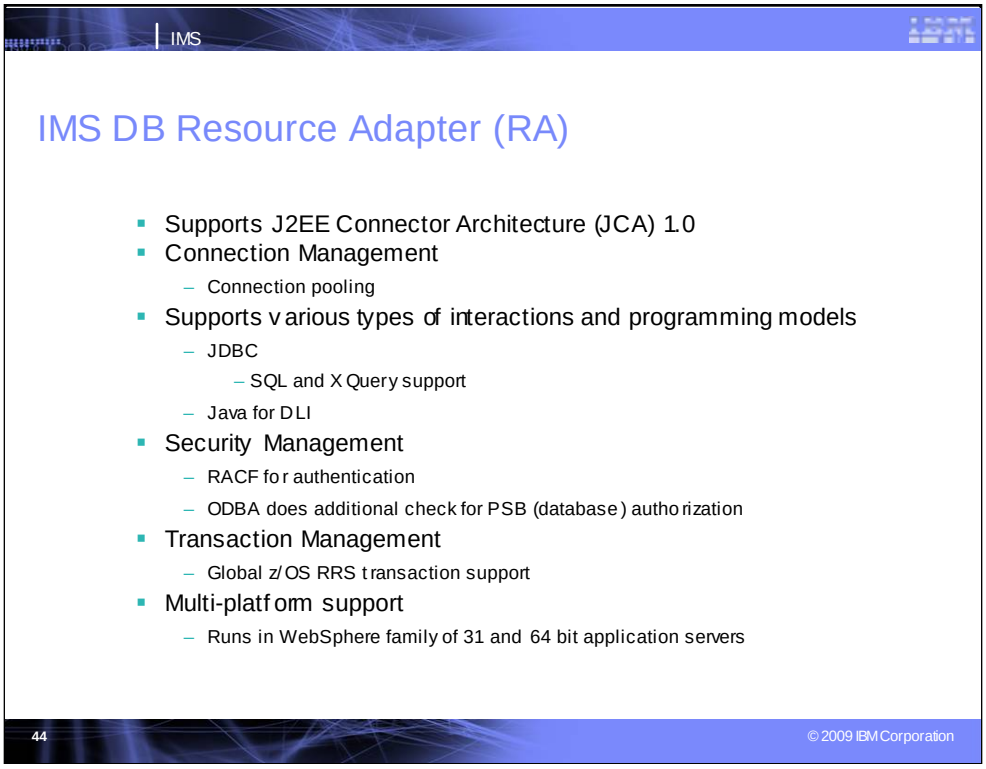
- Direct Connection (database)
  - Characteristics
    - Access to data without invoking an IMS transaction
  - ODBA interface (Open DataBase Access)
    - Programs that issue DB calls must reside on the same MVS as IMS
  - IMS Integration Suite - DB interfaces
    - IMS DB Resource Adapter
      - IMS Java with JDBC support *and the* IMS DLI Model utility
    - IMS XML DB
  - Classic Federation Products



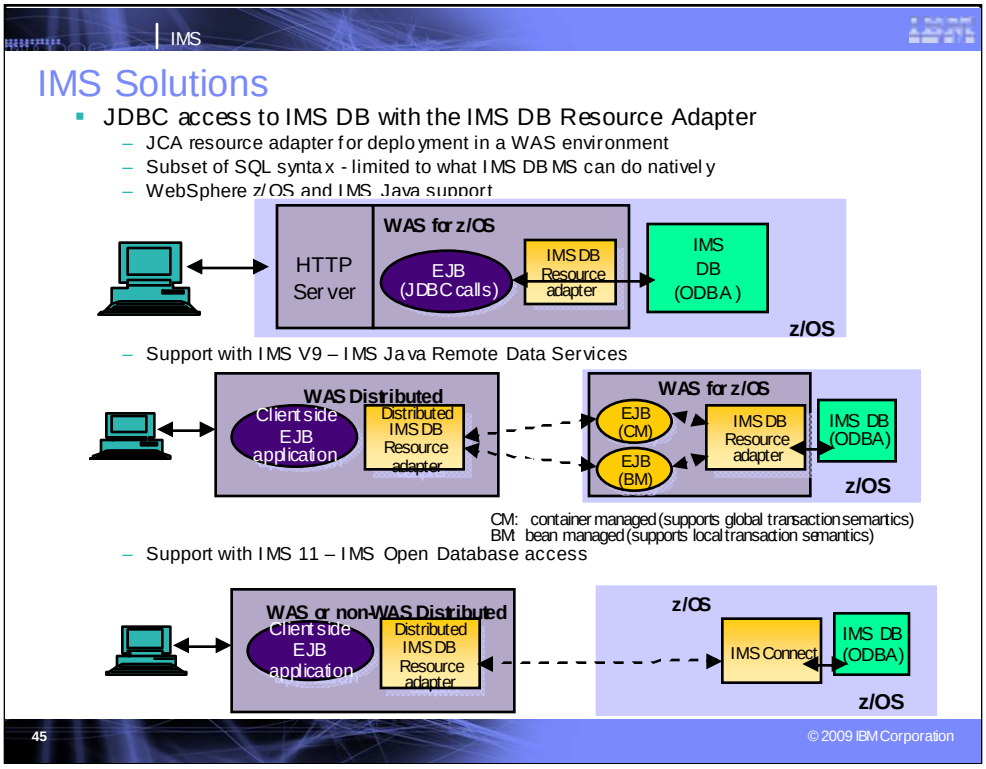
Direct connection to IMS Data is provided, without invoking an IMS transaction, by using the Open Database Access (ODBA) interface. This can be done through the IMS DB Resource Adapter (earlier referred to as the JDBC Connector), the XML DB interfaces, and the Classic Federation products.



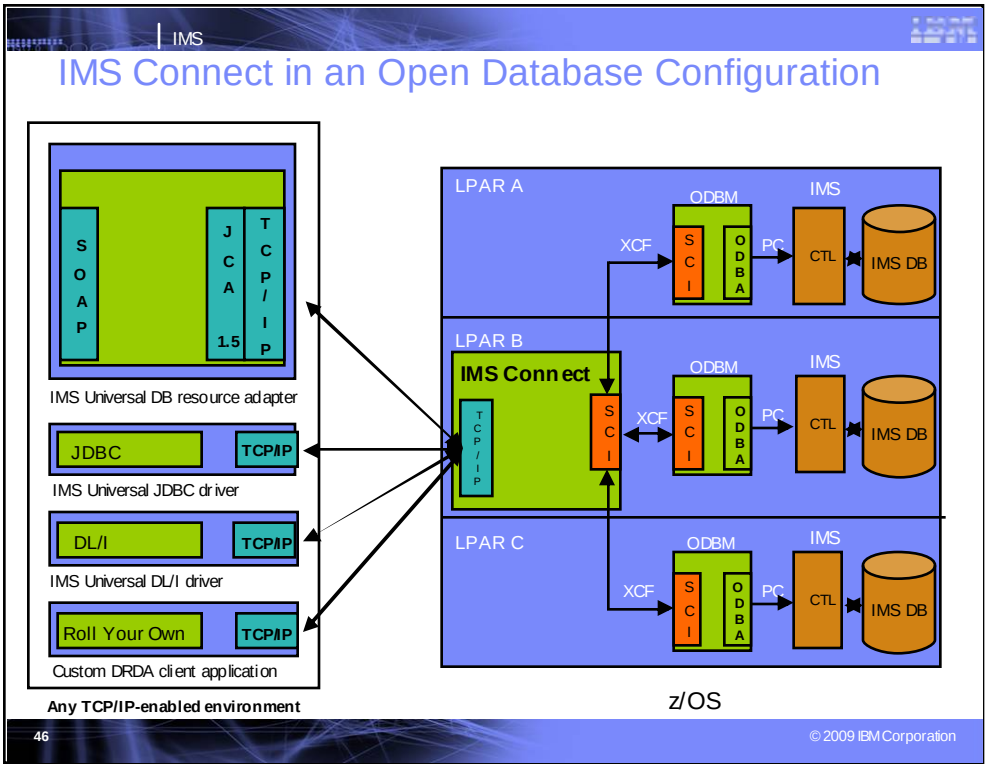
In JDBC mapping, each segment is mapped out to look like SQL and under the covers is done the join, the SQL to DLI conversion, and fields become columns selected from the Application Program Control Block (APCB) to look like the standard IMS hierarchical structure.



The IMS DB RA supports the Java specification architecture and standards to make it easy for Java programmers to provide access. It provides JCA interaction with a direct connection to IMS data, allowing applications to directly query and manipulate IMS DB information using JDBC with both SQL and XQuery. It projects IMS Database assets in te SOA "Data Services/Messaging layer".



The IMS DB Resource Adapter provides access to IMS databases through a server on the same z image as IMS from a remote browser. IMS V9 Remote Data Services (RDS) support removed the need for z application programming to allow a remote server to come into IMS though a local z server. Now, IMS 11 is making it possible to go directly to IMS data through IMS connect.



This leads us to our real goal, which is to leverage IMS Connect as the complete gateway solution for IMS TM, OM, and now DB. IMS Connect will become an ODBM client. This will allow distributed applications to leverage the TCP/IP protocol to communicate with IMS Connect, which can then access any database in the entire IMSplex.

IMS Connect becomes the IMS Gateway to both IMS TM and IMS DB.

WebSphere and DB2 Stored Procedures no longer have to be on the same LPAR with IMS when they interface with the IMS ODBM (Open Database Manager) address space. The ODBM address space must be on the same LPAR with IMS due to the use of the ODBA (Open Database Access) interface.

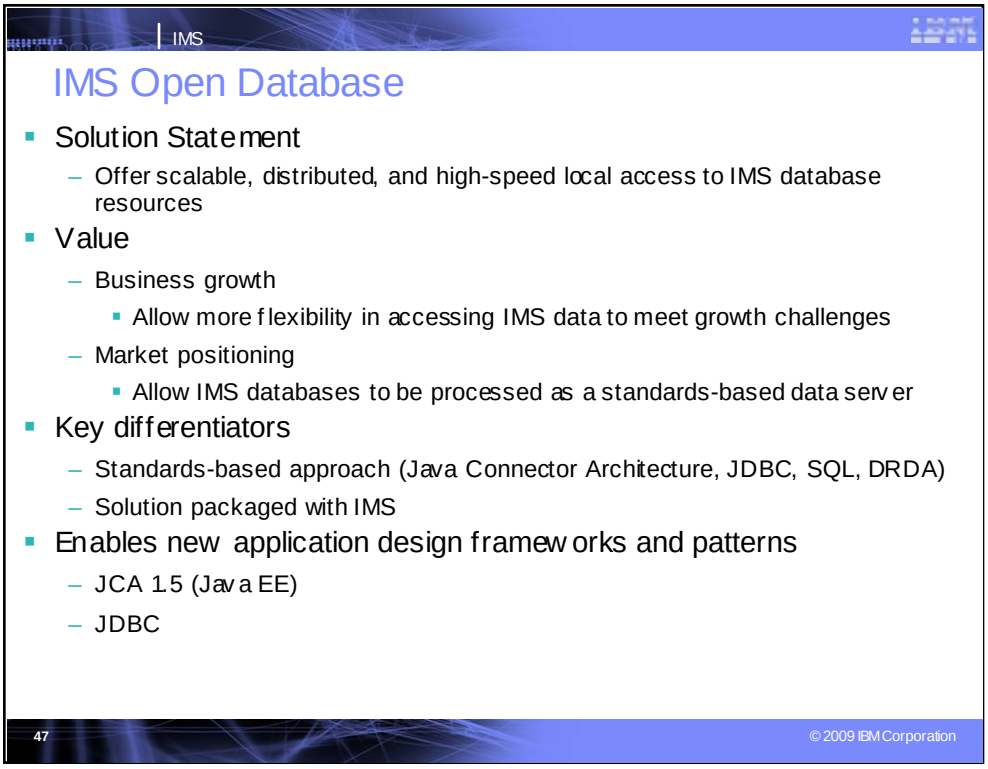
Distributed clients would now have the option of going directly to IMS Connect for IMS DB requests.

The Protocol we have chosen to communicate to IMS Connect is DRDA

DRDA is the industry standard for DB access in a distributed transaction processing environment

The Two Phase Commit and Security flows are imbedded in DRDA

The DLI API will be both IMS DLI traditional and advanced concepts (Like DELETE does not require the caller to make a hold call first)



New function in IMS 11 is modernizing IMS DB access and application development. It helps address significant bottlenecks for business growth in client install base

•Connectivity – IMS Data has been historically grounded to mainframe with ways to get to it that could be simplified

•Programmatic access – even when connectivity isn't an issue, skills could impact new application workload development.

IMS 11 Open Database support is:

•Rolling out a complete suite of Universal drivers in support of IMS database connectivity and programmatic access. Its intent is to provide access to IMS in a uniform way using the most relevant industry standards from any platform and from within the most strategic runtimes

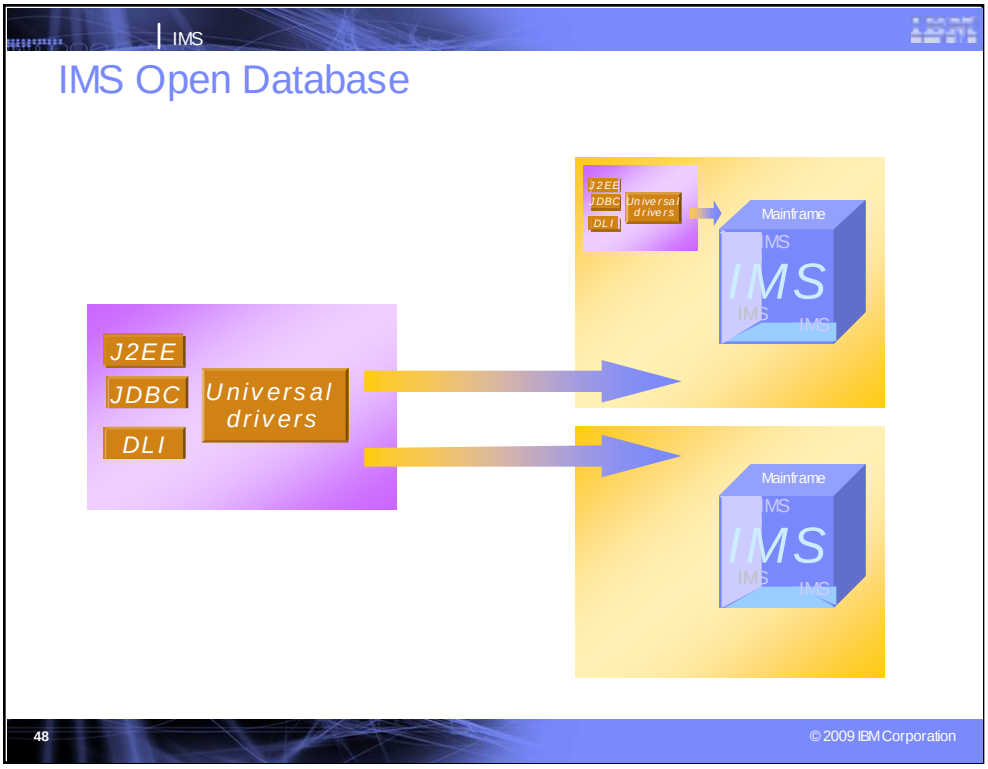
•Providing a standards-based approach opens a lot of growth and expansion opportunity

•Providing a single Universal driver in support of both type-4 and type-2 connectivity in all supported runtimes – no need to learn another driver's semantics to toggle between environments and desired connectivity – all built in to the framework. Distribution of resources within an IMSplex included

•Extending the reach of IMS by extending the data

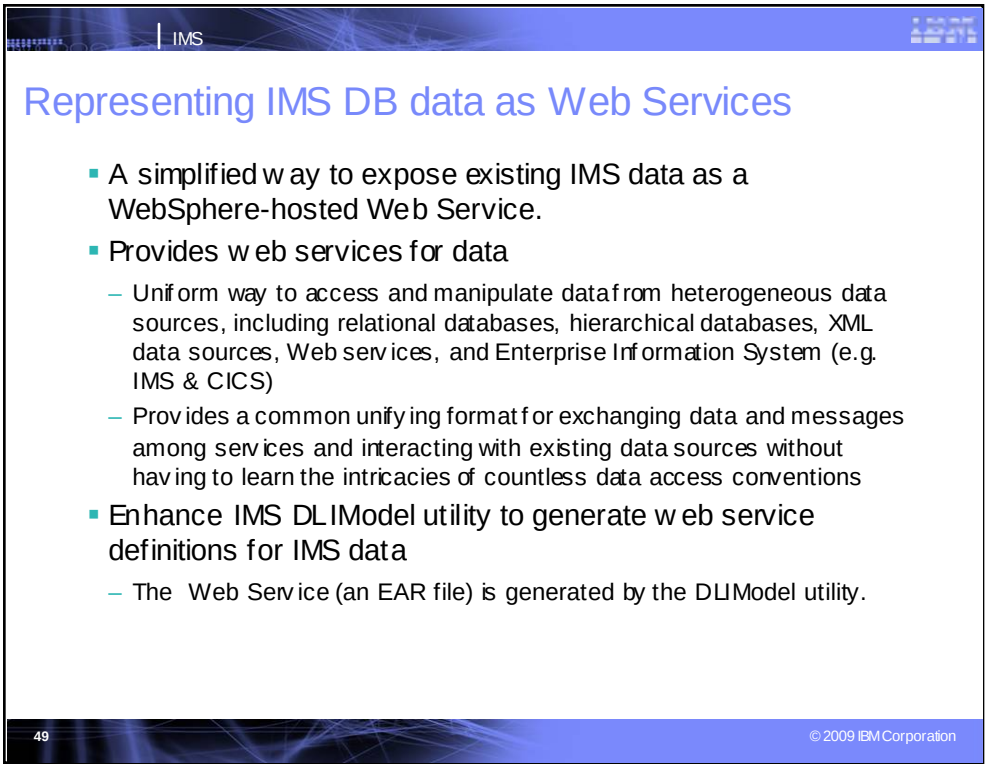
IMS DB metadata exposed via standard JDBC API and therefore can be consumed and visualized by JDBC tooling by allowing inspection of metadata, the next step is query. Its Query syntax uses standard query language syntax.

Differentiators include First-time compliance for JCA 1.5, First-time JDBC metadata compliance, Standardized the SQL in support of IMS access. IMS now hosts DRDA servers, both as source and target.



The Universal drivers have a framework capable of processing any of the three main programming models: J2EE, JDBC, DLI. The Universal drivers are able to connect to any IMS subsystem on any mainframe system. The same application can have active connections to any number of IMS systems on any number of mainframe installations.

We also have a requirement for providing type 2 access (IMS access from the same LPAR in WAS z/OS, IMS, CICS, DB2 z stored procedures) using these same Universal drivers. Again, the same framework would be capable of handling both type 2 and type 4 connectivity so the applications themselves do not change, only the connection properties would change.



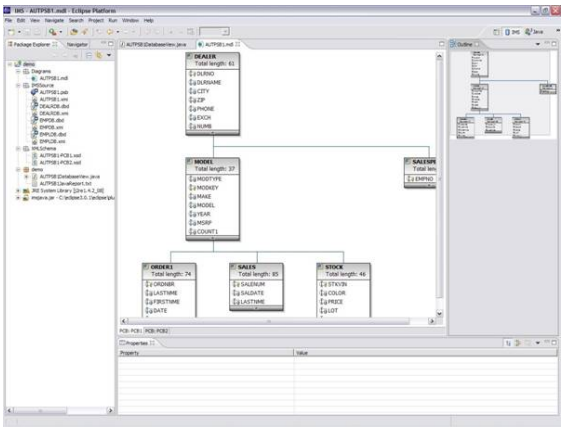
Key Message: IMS data is also being extended to support the latest standards for web services

The IMS DB web services support is provided through the IMS 10 service stream. It offers a simplified way to expose existing IMS data as a WebSphere-hosted web service. This provides a single uniform way to access and manipulate data from heterogeneous data sources including relational databases, hierarchical databases, XML data sources, Web services, and Enterprise Information System (e.g. IMS & CICS). And it also provides a common unifying format for exchanging data and messages among services and interacting with existing data sources without having to learn the intricacies of countless data access conventions

We have also enhanced the IMS DLIModel utility to generate the web service for IMS data.

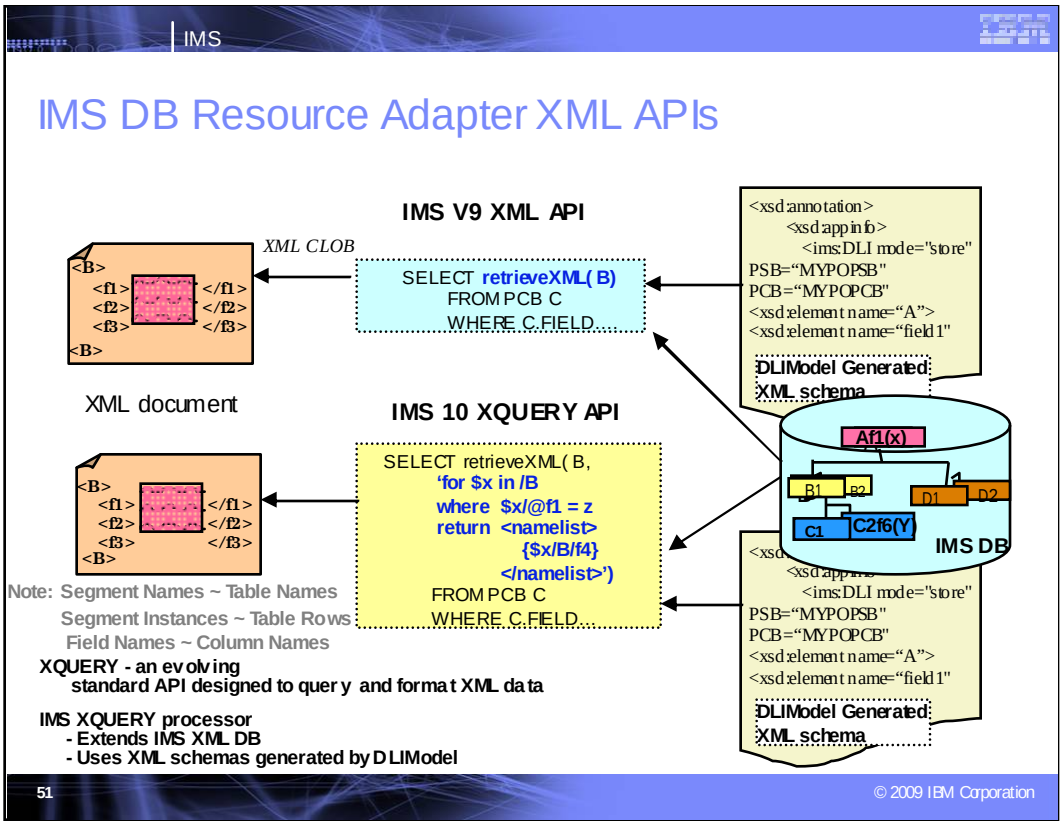
DLIModel Utility

- IMS Database Visualization Tool
  - Visualize an entire IMS PSB
    - Can view each PCB individually
      - Hierarchy, segments, fields, types, etc
- IMS Database Metadata Generation tool
  - Generates the necessary metadata that is consumed at runtime by IMS JDBC driver, XML-DB support
    - Database metadata
    - XML schema
- Bottom up Tooling Approach
  - Parses PSB and DBD source
    - Optionally COBOL copybook definitions of segments
- An Eclipse 3.x Plug-in



The DLIModel Utility is a plug-in on top of Eclipse. You can download this eclipse plug in and it lets you visualize IMS PSBs and generate metadata for XML DB support.

With the DLIModel Utility, you are provided the metadata and a visualization of your databases in a GUI manner.

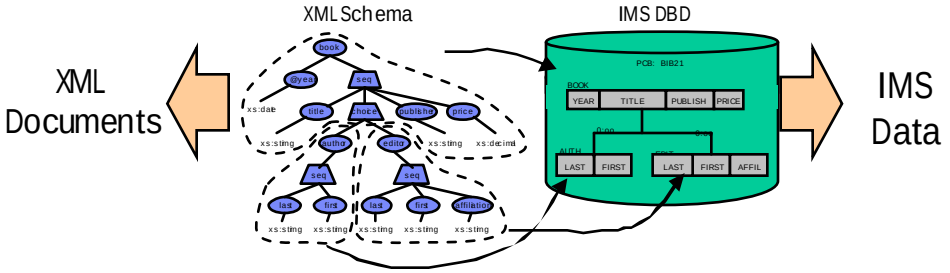


IMS V9 provided access to XML data for you to store and retrieve the document.

IMS 10 is a step up with XQuery support, which is the evolving standard API. With XQuery, you can look at the individual fields in the document.

XML Database …

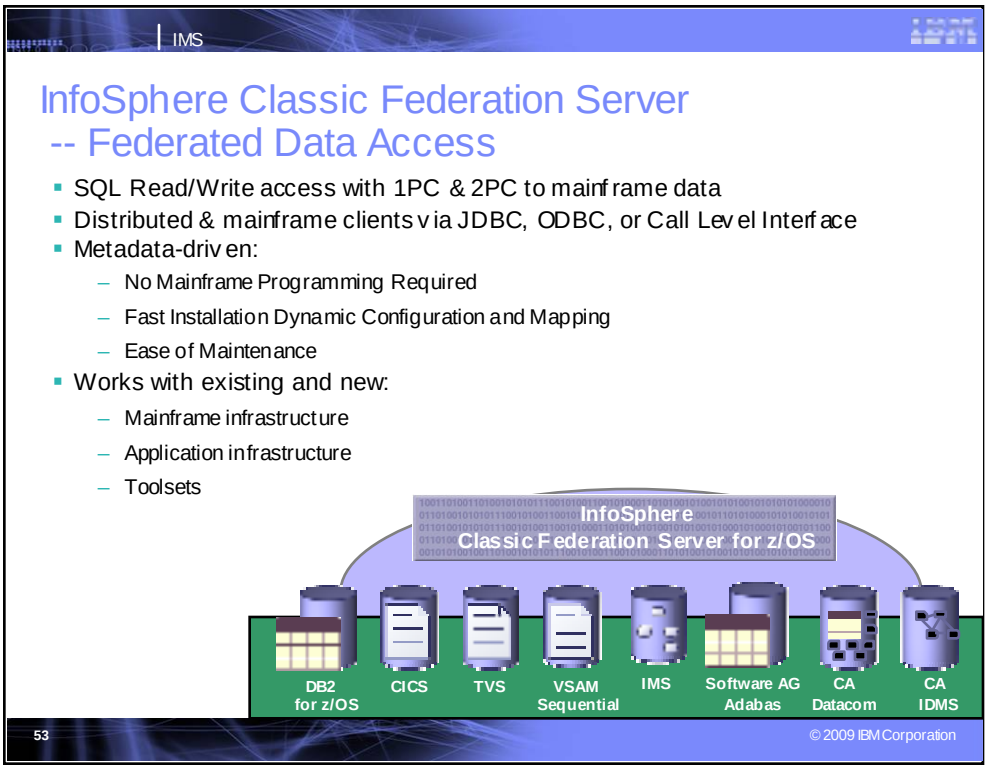
- XML is Hierarchical
  - A standard that is well-suited to an IMS implementation
  - More natural fit for hierarchical data querying
- IMS has a 35+ year head start
  - Immediately usable with no migration of IMS data
- Introduces a way to view/map native IMS hierarchical data to XML documents
  - Aligns IMS Database (DBD) with XML Schema
- Allows the retrieval and storage of IMS Records as XML documents with no change to existing IMS databases
  - Enables query of IMS data using XQuery
  - Creation of IMS segments from XML documents (decomposition)
  - Intact storage of XML documents (without decomposition)



Since XML and IMS DB are both hierarchical, IMS is a natural match for the XML Data.

IMS is a perfect place to store intact or decomposed XML data.

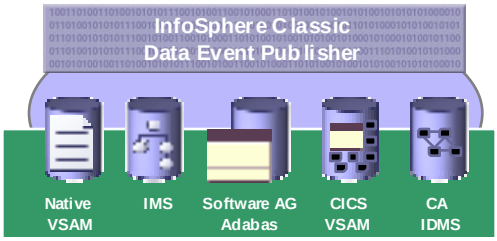
IMS provides a natural flow. Say you have 20 year old history data, IMS can use XML support to retrieve it as XML data. It can take the structure, create XML schema, create a Java program to use and bring it out as XML data.



IBM also provides a more general set of solutions for data access. The Classic Federation server can retrieve your IMS data from a variety of distributed and mainframe clients, along with other data types.

InfoSphere Classic Data Event Publisher for z/OS -- Pushing Data Out

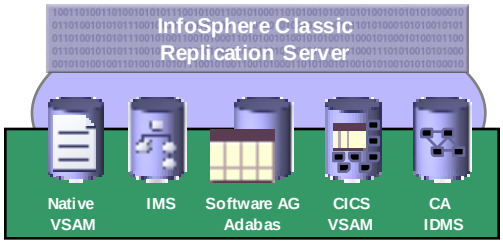
- Real-Time Asynchronous Change Capture for mainframe
- "Push" technology delivers before and after images of committed changes.
- Native data normalized into relational rows using same meta-data catalog as CF (and same internal SQLDA msg format)
- Data capture of Table VIEWs supports record filtering
- 3-Tier service oriented architecture for maximum efficiency
- Recovery capability
- Publications in Table
- Publishing options
  - MQ Series
  - Flat file – USS
- Publishing formats
  - XML
  - Delimited (CSV)
  - Raw



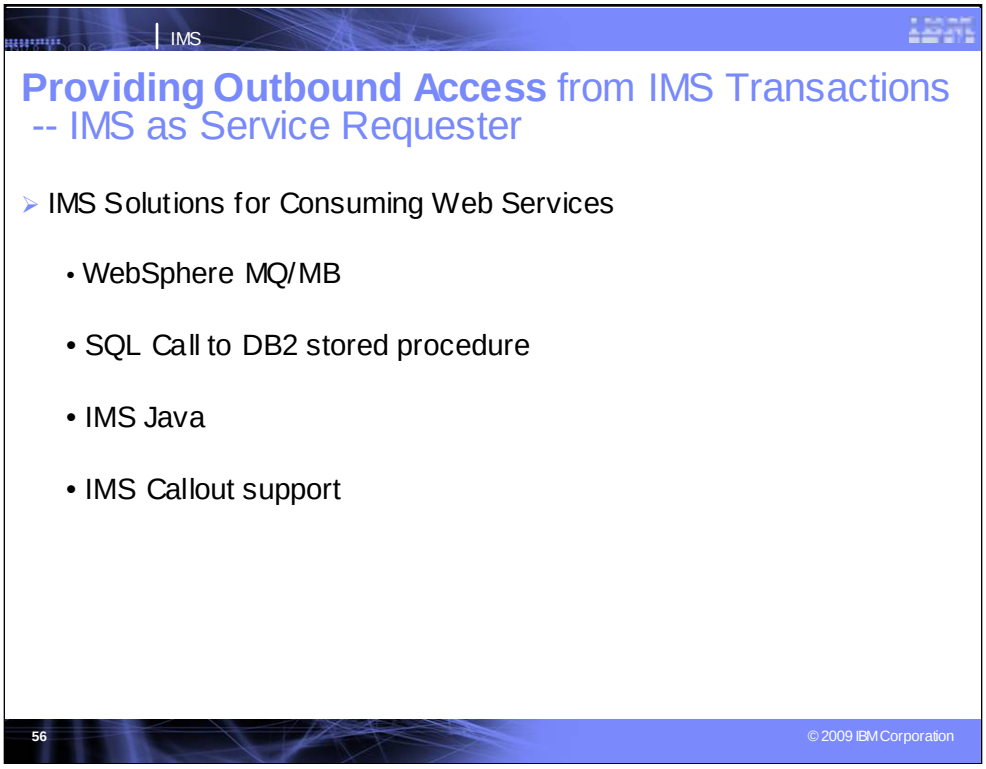
The Classic Data Event Publisher can push IMS changed data out into a relational database, for other uses, such as a Data Warehouse.

InfoSphere Classic Replication Server -- Pushing Data Out

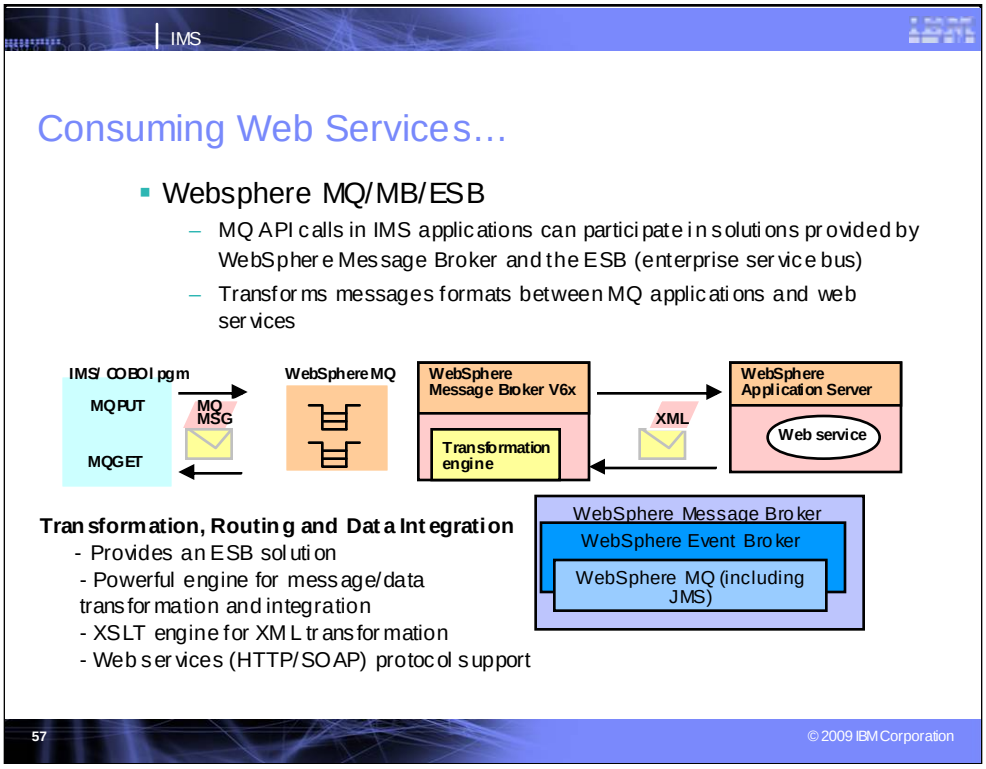
- Same Capture engine as WebSphere Data Event Publisher
- Adds ability to Load from "Classic" sources using Classic Federation
- Unidirectional Classic to RDBMS via Replication Server's Q Apply
  - DB2 on all platforms
  - Oracle, SQL Server, Informix and Sybase on distributed
- Uses Compact Message format of Replication Server
  - Messages put on Websphere MQ queues
- Subscriptions stored in Replication Server relational format



The Classic Replication Server also pushes data out.



Now we turn to a number of tools providing ways to write outbound access from IMS to other applications and position IMS as a service consumer.



WebSphere MQ is a viable solution if you already have MQ. IMS applications can issue an MQ put/get with an asynchronous call from IMS.

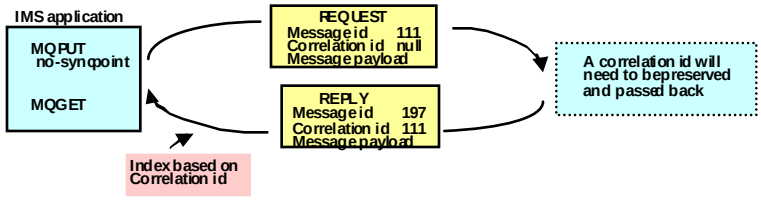
ESB code, with or without hardware, allows applications to send in one way and out another. WebSphere Enterprise Service Broker is targeted at J2EE calls.

WebSphere Message Broker is intended as a more generic tool for conversion/transformation.

With these solutions the message is called and transformed to a web service and back.

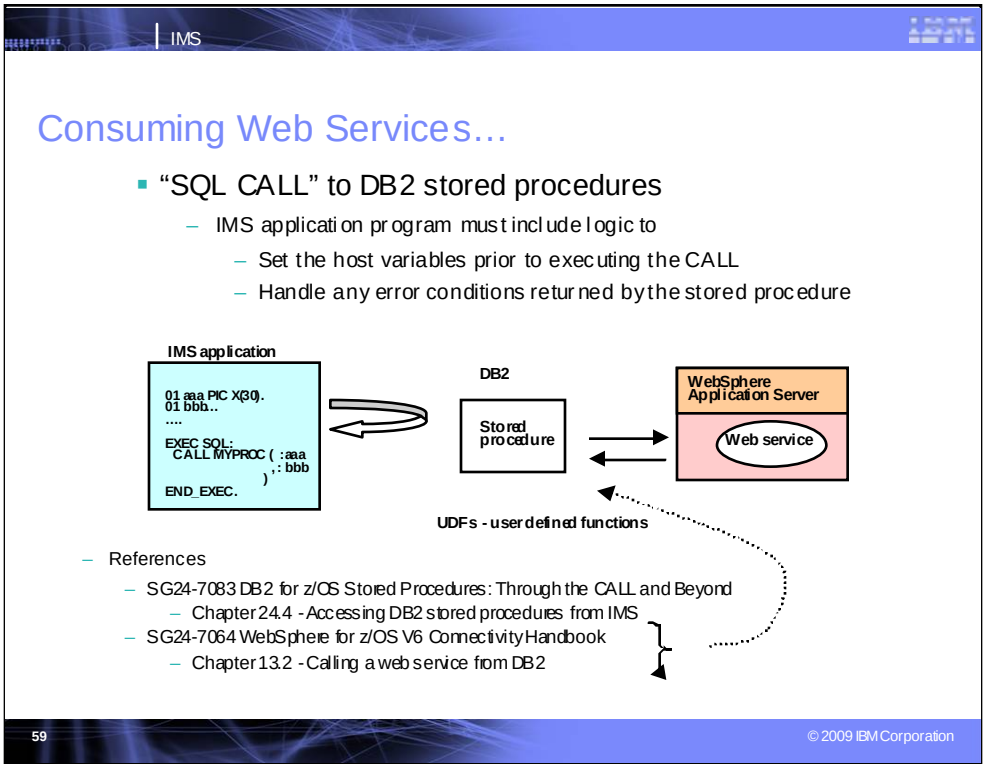
Consuming Web Services…

- Websphere MQ/MB/ESB…
  - Considerations
    - MQ - correlation ids, indexes, …
    - MB - mapping, nodes, …
    - IMS - dependent region occupancy, locks, …



  - References
    - SG24-7163 Enabling SOA Using WebSphere Messaging
    - SG24-7137 WebSphere Message Broker Basics
    - http://www-1.ibm.com/support/docview.wss?rs=171&uid=swg24009880&loc=en_US&cs=utf-8&lang=en

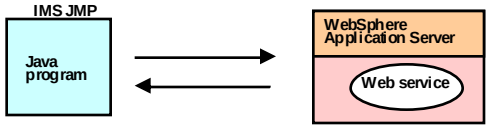
Websphere MQ recommendation is not to use synchpoint, but you need to keep touch of the message ID, and look for correlation ID .



Another solution is issuing a DB2 call from IMS to a DB2 table or procedure, have DB2 call web service and come back out. But you will need to hold IMS during the DB2 call. There is a redbook that can tell you how to set up this environment.

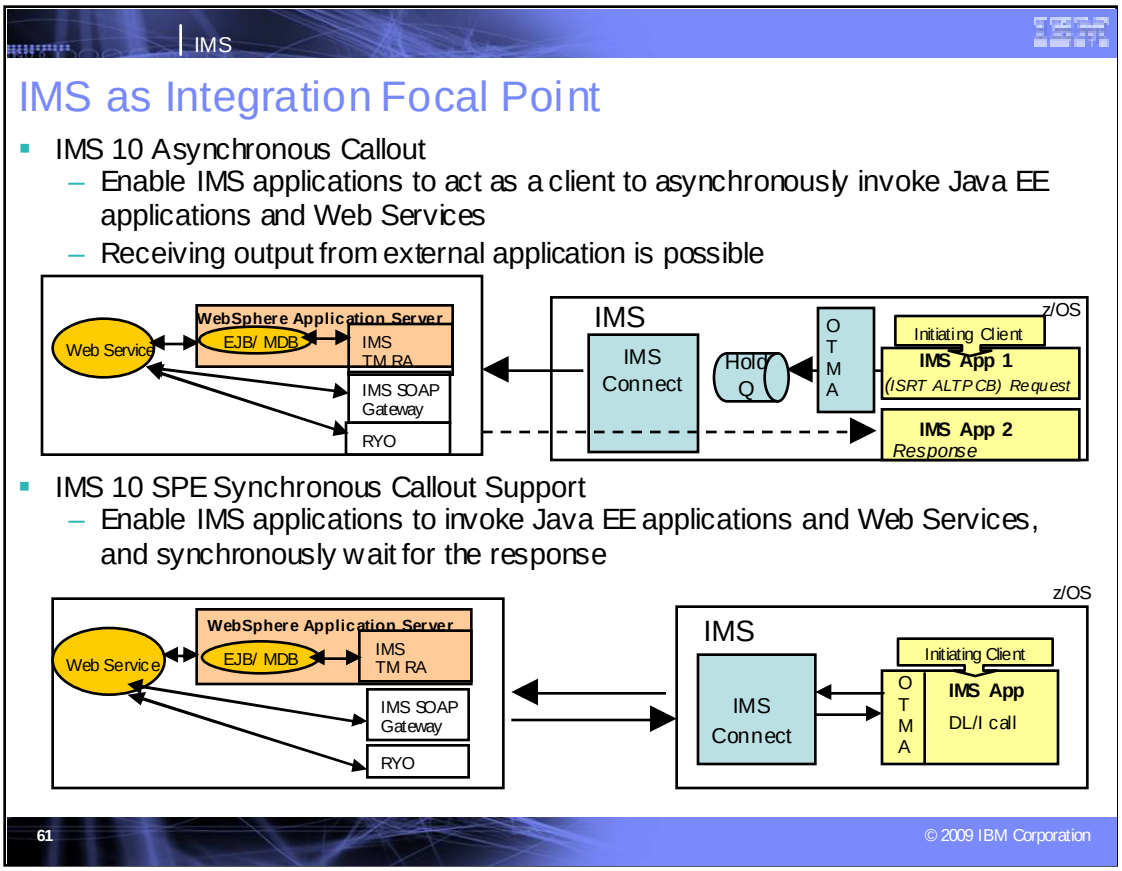
Consuming Web Services…

- IMS Java application capabilities
  - Natively, this capability exists today natively in Java.
    - Direct call (synchronous and asynchronous)
    - JAX-WS
    - JAX-RPC



- References
  - SC18-7821 IMS Java Guide and Reference

IMS Java applications can themselves call out.

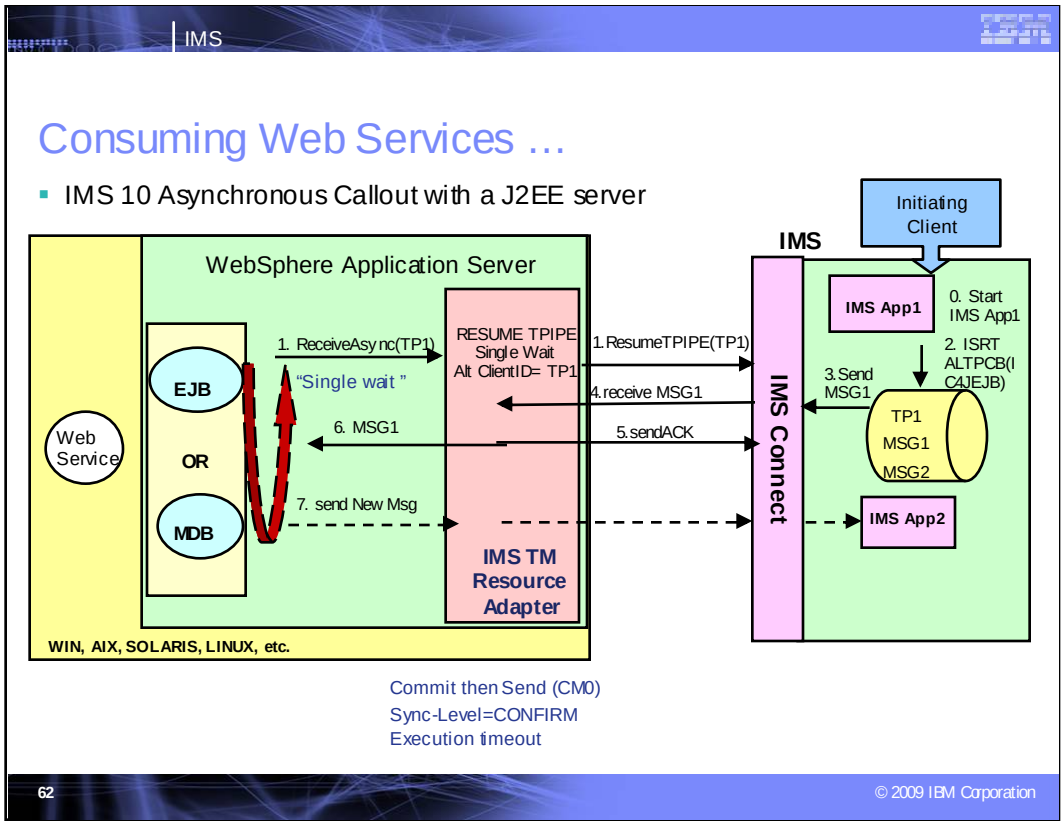


Key Message: IMS 10 Callout support enables IMS as the Integration Focal Point

One of the key customer requirements we had heard regarding SOA support for IMS is for Callout support, where an IMS application could call out to another application across the IMS TM Resource Adapter to WebSphere server applications or to SOAP application environments. IMS Callout support enables IMS applications as clients, interoperating with business logic outside of the IMS environment. This support includes correlation mapping between the callout request and the external application, enhanced security, and assistance on destination routing. This support allows for better integration in an SOA environment.

For example, an application may need to know the current stock price, or may need to look up the current sales tax rate.

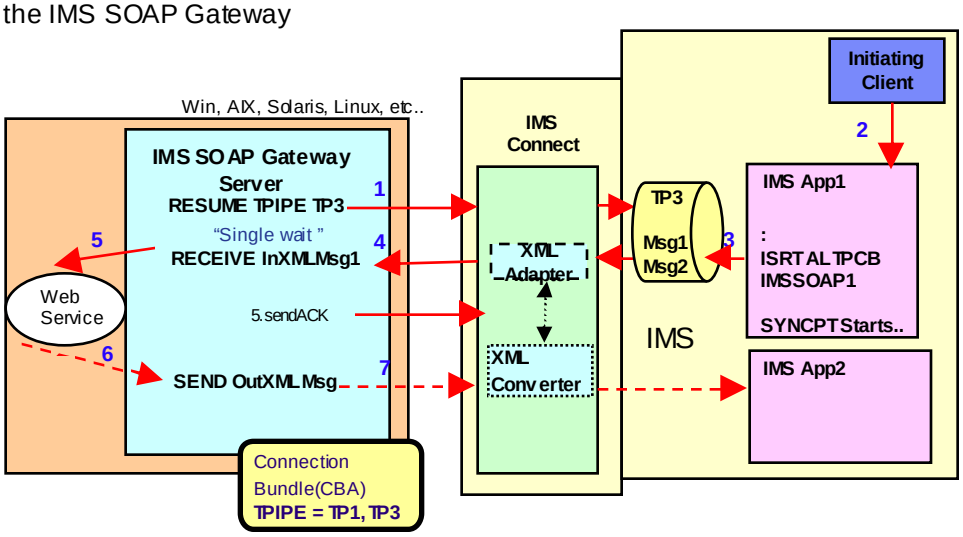
Callout support has been provided for IMS 10, first as an asynchronous transaction, and later as a synchronous call where the IMS application will wait for the response before continuing. Synchronous callout support is being provided through the service process



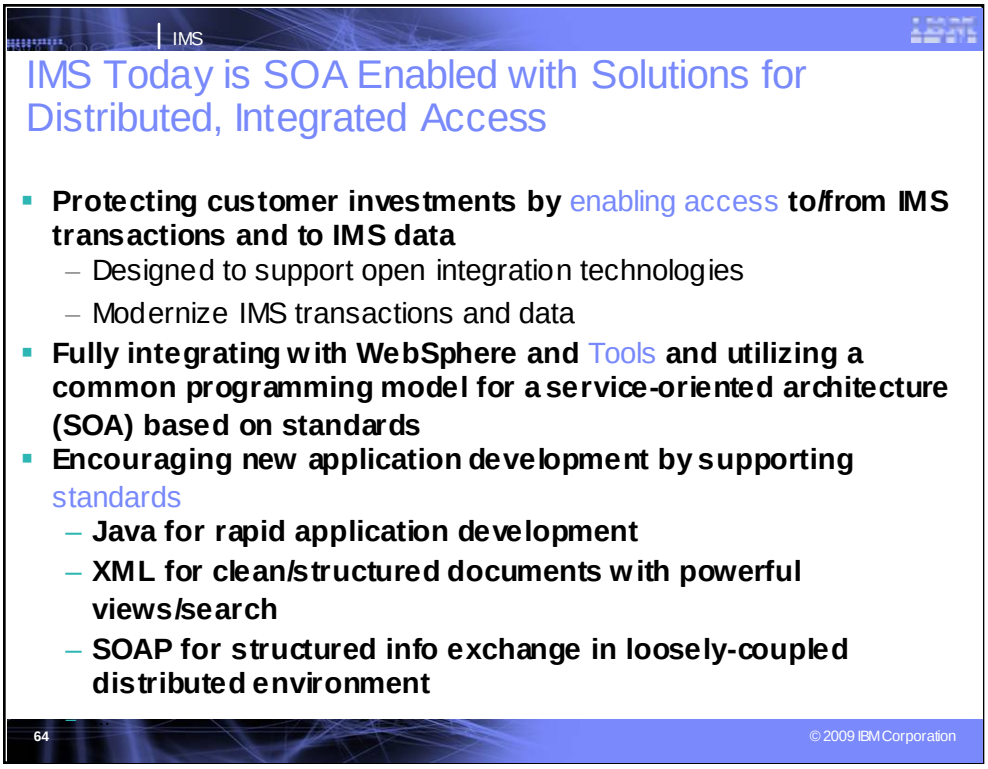
IMS 10 introduced the ability for an asynchronous callout with a J2EE Server using IMS TM RA.

Consuming Web Services…

- IMS 10 Asynchronous Callout with XML and the IMS SOAP Gateway



Asynchronous callout is also provided through the IMS SOAP Gateway



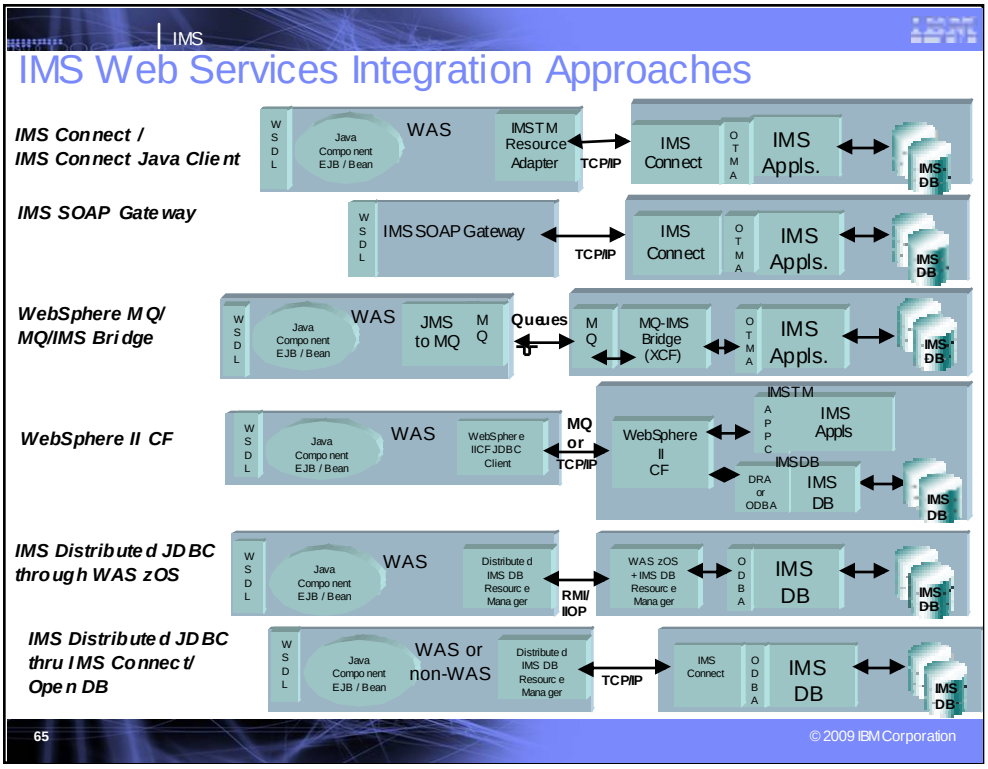
Key Message: IMS is SOA Enabled.

IMS distributed, integrated on demand solutions protect customer investments by enabling access to IMS transactions and data. These solutions are designed to support open, integrated technologies and modernize use of IMS transactions and data.

These solutions fully integrate with WebSphere and industry tooling. They utilize a common programming model for a service-oriented architecture (SOA), based on standards, such as XML, SOAP, Java, JDBC, etc., and new ones as they develop.

- Java can be used for rapid application development of new applications that access IMS transactions and data, and for new applications that run under IMS control. It offers reuse of applications in a variety of environments. And it leverages standards, such as Java Connectivity Architecture (JCA) for enhanced IMS application access and JDBC for enhanced IMS data access.
- XML allows us to create clean, structured documents with powerful views and search capabilities. It can be used for data exchange of documents containing structured and non-structured information from a variety of sources. And it is hierarchical, a natural fit for IMS, ensuring the ultimate performance our clients expect.
- SOAP (simple object access protocol) is an XML based standard for exchanging structured information in a loosely coupled distributed environment. It is platform-neutral and can communicate with and take advantage of individual functions of distributed applications

Support of this advanced technology would then encourage new application development and new application developers.



Key Message: IMS Transactions and data can now be enabled as Web services, and be supported in a Service Oriented Architecture (SOA) with a variety of techniques.

Web services provides the next step in the evolution of the internet, allowing programmable elements to be placed on sites for distributed web access across platforms.

WebSphere tooling today enables IMS transactions using COBOL, C, PL/I and MFS-based applications as Web services.

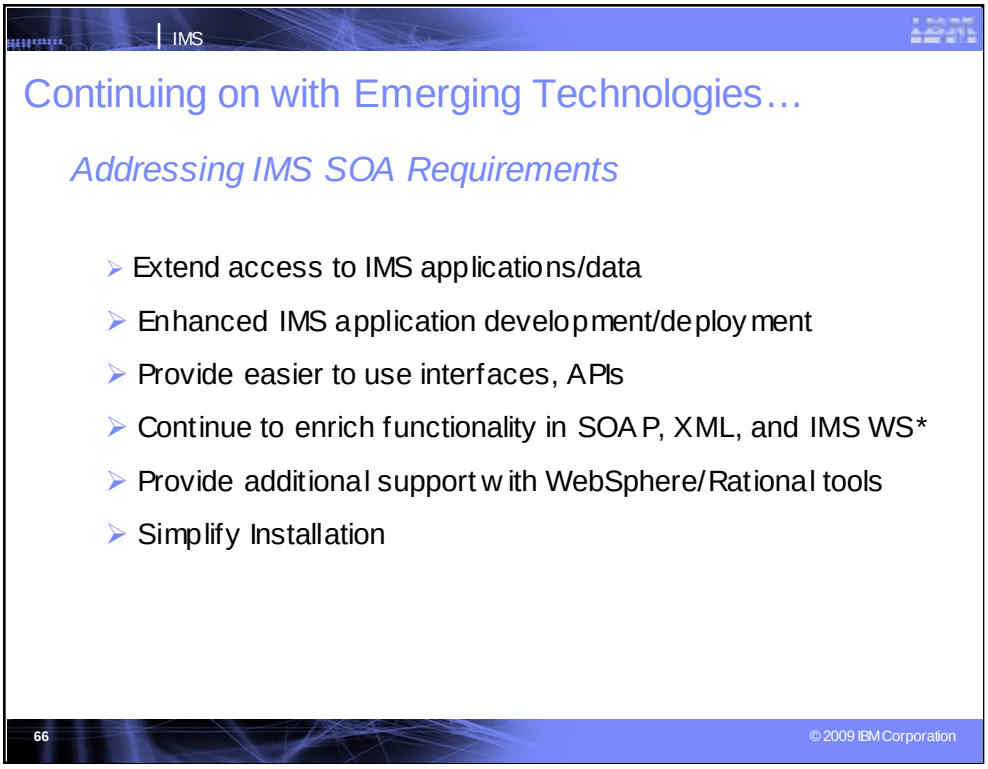
Using IMS Transactions as Web services leverages your past investment in application development and information. It can also eliminate or greatly reduce new programming effort, reduce end-to-end business process transfomation, and facilitate application integration with partners, suppliers, and customers.

▪A key element of the On Demand environment is the Integrated IMS Connect function. This function provides easy-to-install, easy to use, high performance/high volume and secure transparent access to IMS applications and their data. This can be done from any application environment, including LINUX. It utilizes the IMS Open Transaction Manager Access (OTMA) interface for access to IMS applications and the Structured Call Interface (SCI) for access to IMS operations.

•The IMS TM Resource Adapter (aka IMS Connector for Java), provided as development and runtime code, works with IMS Connect to enable development and connectivity of Java applications running under WebSphere Servers.
•The IMS Soap Gateway broadens IMS application integration to other web serving environments.

•WebSphere MQ also provides access to IMS applications through the OTMA interface.

•As we move down the page, WebSphere Information Integration Classic Federation (IICF) offers SQL and JDBC access to IMS Data through the IMS Open Database Access (ODBA) interface. This provides distributed, common access to IMS Databases along with non-IMS databases, using the Information Integration product family. IICF can also be used to provide access to IMS applications.
•Also providing Distributed JDBC access to IMS database resources is the integrated IMS DB Resource Adapter support. This support provides an IMS Distributed DB Resource Adapter driver for a distributed J2EE application server and requires no additional z/OS application programming.
•And with IMS 11 the Open DB support further extends and eases this distributed access



We are continuing to extend access to IMS applications and data to enable IMS as the SOA integration focal point for you with:

•Enhance access and encouraging the growth of new client applications for IMS

•MashupHub support for IMS data (in addition to the Transaction access provided earlier)

•IMS Connect Enhancements of availability, usability and scalability.

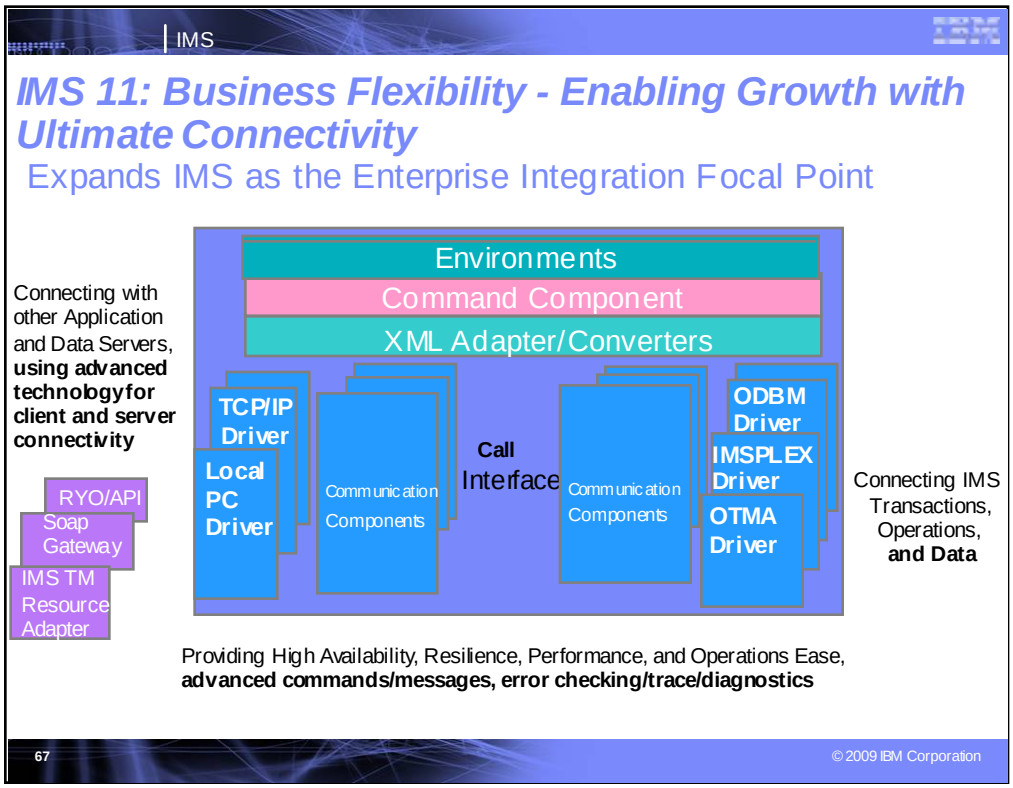
•Open Transaction Manager Access (OTMA) enhancements to improve storage utilization, reduce dependency on RRS, enhanced Security.

•Open Database Access

SOAP, XML, and IMS Web Services and other standards support, enhanced MFS BPEL support for WebSphere Integration Developer (WID) and Websphere Process Servers (WPS).

We also plan to continue to provide enhanced **Websphere and Rational** Tools for IMS application development and enablement.

And we are continuing to simplify installation



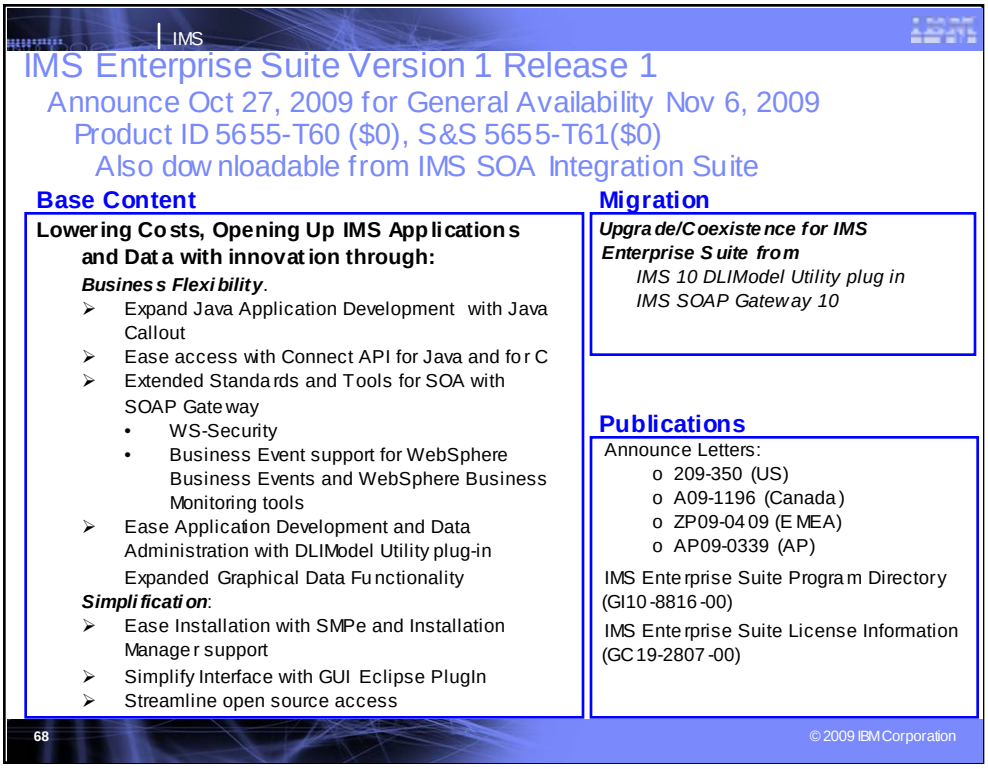
Key Message: IMS provides and continues to enhance the integrated IMS Connect function.

IMS Connect function is part of the overall restructure of IMS for the 21st Century and is architected as the base for all future IMS Connectivity. Much of the function of IMS Connect can also be used with earlier IMS Versions so you can start to take advantage of it before migrating your networks/applications/databases to IMS V9. The structure of IMS Connect is designed such that drivers can be interchangeable. That is, alternatives for the TCP/IP front end or OTMA back end interfaces are already being provided. These are allowing IMS to exploit newer, additional, and enhanced protocols and/or interfaces. Along with IMS Connect is provided the IMS Connector for Java for access from Java applications, SOAP Gateway and parsers, and samples for other language access as well.

With IMS Version 8, IMS extended its use of XCF for use by other IBM subsystems, such as IMS Connect , for distributed operations access through the Structured Call Interface to the Operations Manager from the DB2 Version 8 Control Center as a single point of control.

With IMS Version 9 this function was integrated in.

With this structure IMS 11 Connect is evolving to address other connectivity requirements -- distributed database access to IMS DB, enhanced client connections, .



Key Message: IBM continues to enhance IMS, addressing customer requirements, with the IMS Enterprise Suite

IMS Enterprise Suite Version 1 Release 1 (V1.1) with product numbers 5655-T60, and 5655-T61 (for service and support) announces on 10/27/09 its General Availability of 11/6/09. It features independent components that extend IMS access and use industry standard tools/interfaces to modernize/speed application development/deployment, enrich functionality and ease installation and use.

IMS Enterprise Suite V1R1 is a separate, no charge, product that provides enhanced IMS application development and integration. It is a collection of IMS middleware functions and tools that support your IMS on demand systems and your distributed IMS application environment. IMS Enterprise Suite V1.1 components are designed to enhance your use of IMS applications and data. In this initial release of the suite, components deliver innovative new capabilities for your IMS environment that enhance connectivity, expand application development, extend standards and tools for a Service Oriented Architecture (SOA), ease installation, and provide simplified interfaces. It includes the JMS API open source used for IMS Java application callout, the Connect API for Java and for C (though C support is being provided through the service process). the IMS SOAP Gateway for enhanced connectivity to/from IMS applications and data along with its open source and enhancements for WS-Security and Business Events, and the DLI Model Utility plug in, with its enhancements, and required open source. Also provided is the Installation Manager and SMP/E support to ease installation on the distributed and z/OS platforms.

IBM is providing IMS solutions that ease integration with new technology for a service oriented architecture -- focusing on open, distributed connectivity, expanded application development access support, extended Web Services and connectivity for SOA

We are also providing solutions that help simplify installation and management.

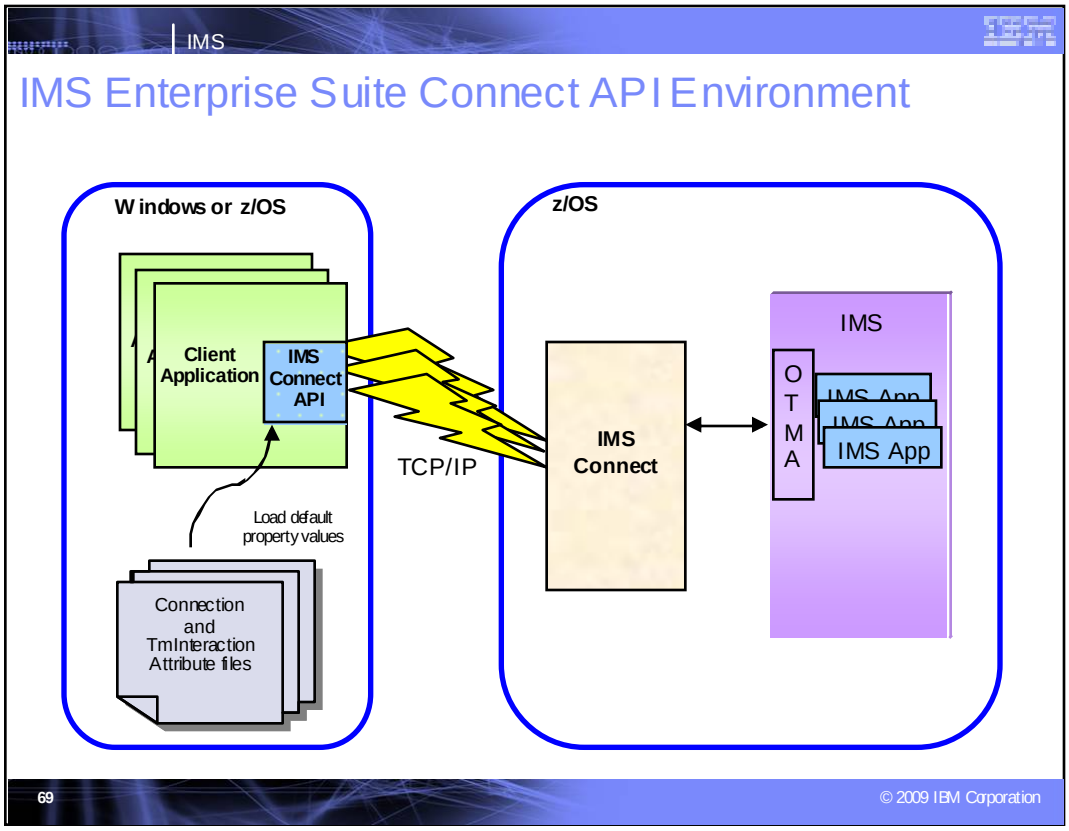
Migration support is provided to the IMS Enterprise Suite from both the IMS SOAP Gateway 10 and the IMS 10 DLIModel Utility. Migration support will be provided for z/OS and AIX environments. For Windows environments, instructions will be provided.

The following publications are provided for IMS Enterprise Suite V1.1:

IMS Enterprise Suite Program Directory (GI10-8816-00)

IMS Enterprise Suite License Information (GC19-2807-00)

IMS Enterprise Suite V1.1 has installs-based pricing. It is a no-cost product for unlimited installs.

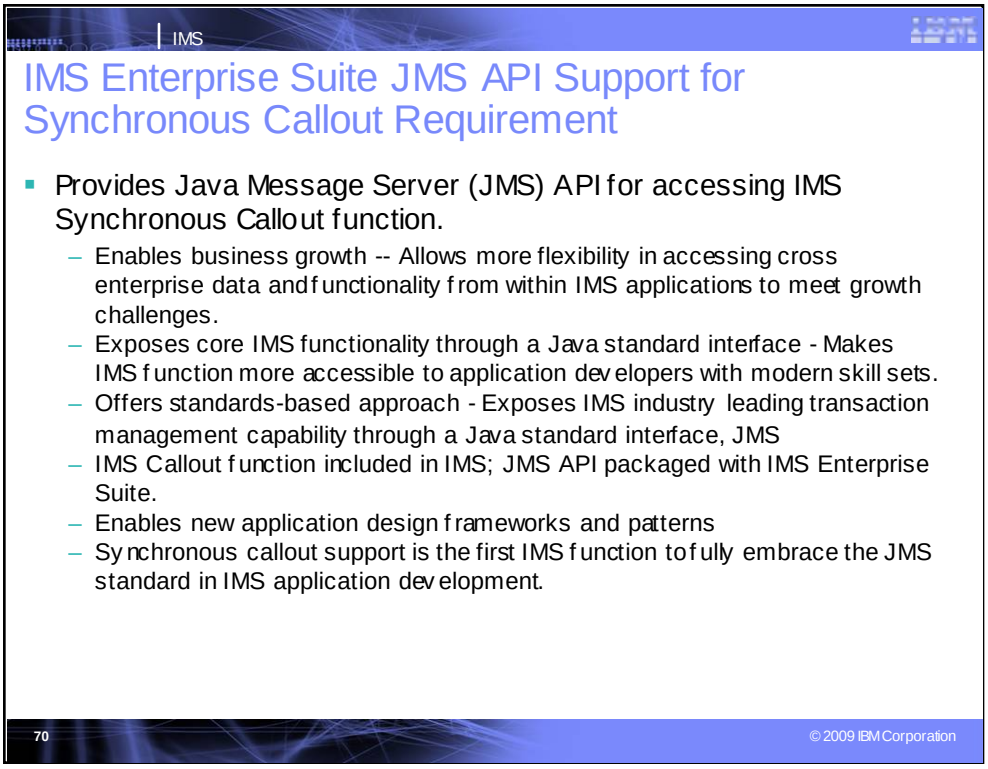


Key Message: IBM is enhancing IMS Connect use with the IMS Enterprise Suite Connect API

The IMS Enterprise Suite Connect API simplifies design, development, and test of IMS access for client TCP/IP applications. This provides an extensive set of profiles that define the types of interactions to be performed and high- and low-level methods for performing these interactions. This simple API allows interaction while shielding the complexities of protocols, provides the IMS Request Message header, and allows socket programming. Using reusable profiles, it provides a simple way to describe TCP/IP socket connections, interaction protocols, message headers, and data. For more direct control, more granular lower-level calls are provided. Support for Java applications in Windows and z/OS environments is supported initially, and support for C applications in Windows environments is being delivered next through the service process.

This figure shows the environment in which the IMS Connect API can be used. It also depicts the fact that multiple client applications that use the IMS Connect API can be invoked simultaneously. The API will communicate with IMS Connect. Upon request by the client application, for example, in an execute() or connect() call, the API will create a connection object for use by that application only, which the client must keep track of, calling disconnect() on the connection object before exiting. Of coarse in Java, orphaned connections would eventually be cleaned whenever there are no longer any references to those connection objects, but this still requires that the application developer does not keep references to connection objects that it no longer needs.

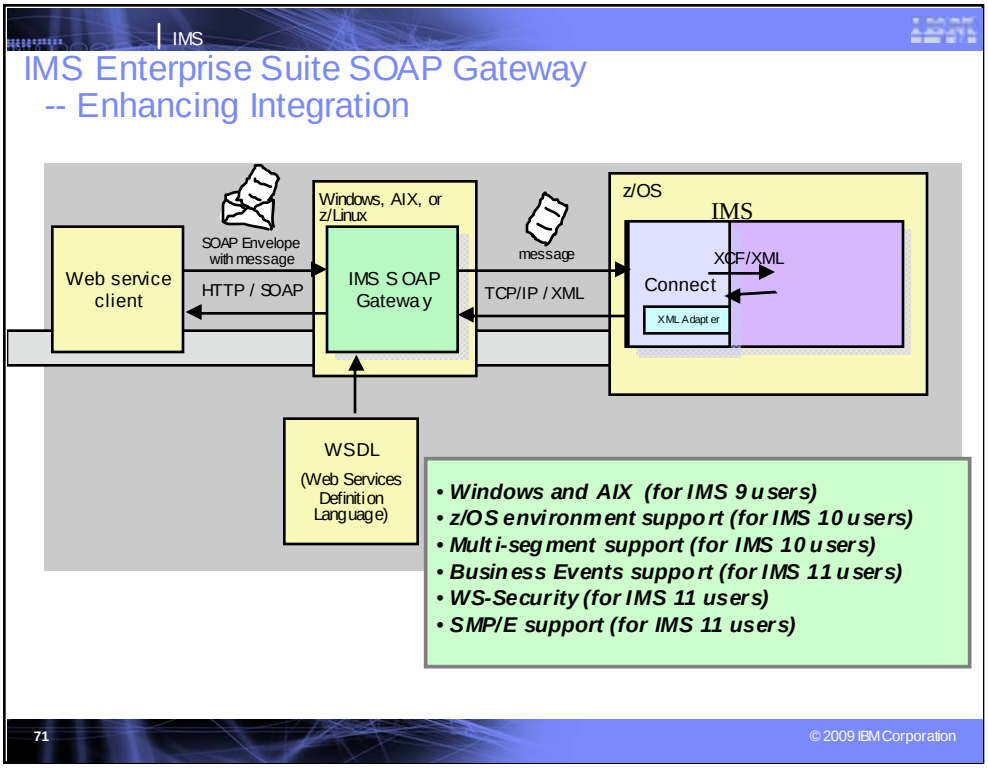
In addition to IMS transactions, the initial release of the IMS Connect API will support the IMS Connect user message exit-supported PING and RACF password change commands along with all IMS commands supported by OTMA.



The Java Message Server (JMS) API can be used for synchronous callout from an IMS Java application.

The JMS API improves programmer productivity by defining a common set of messaging concepts and programming strategies that will be supported by all JMS technology-compliant messaging systems. By making IMS a JMS provider we address the skills issue impacting client's ability to develop new applications which goes to revenue. Although heavily used by IMS customers, the DL/I API isn't an industry standard and skills may be limited. Providing modern standards based access to IMS functions reduces customer costs.

Synchronous callout support is the first IMS function to fully embrace the JMS standard in IMS application development. We are considering future enhancements to front-end IMS message queue processing with the JMS interface.



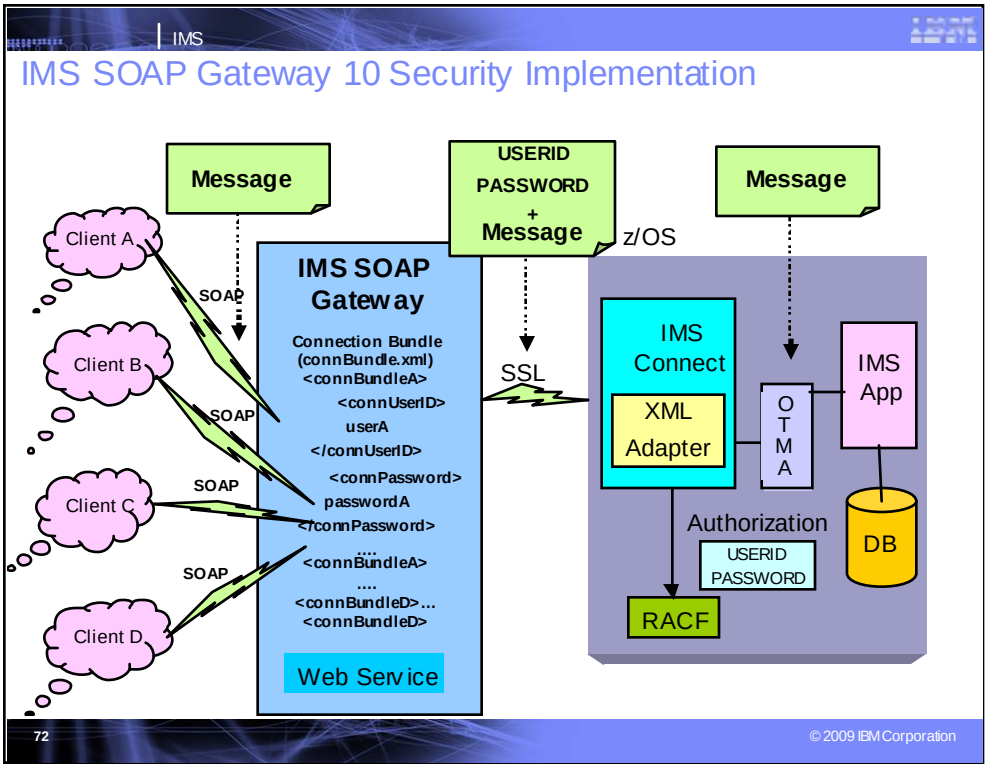
Key Message: IBM is enhancing the IMS SOAP Gateway support

The IMS SOAP Gateway provides direct SOAP access to IMS transactions. The SOAP gateway is a lighter weight solution, and is for when you don't have J2EE servers. If you have J2EE servers, you would want to use the IMS Transaction Manager Resource Adapter. With the SOAP Gateway, SOAP XML format is sent it. It translates back and forth without application servers. It creates WSDL and tells about the web location and correlator files. Connect calls the converter file to have the message come in as an LLzz format. IMS could use the Rational Developer for z XML Adapter for COBOL with its SOAP gateway code. The SOAP Gateway has been Generally Available (GA) for IMS 10, downloadable at www.ibm.com/ims. The IMS Connect XML adapter initially provided support for COBOL and SOAP Clients. z/OS support was provided more recently, in addition to the Windows, AIX, zLinux support provided earlier. PL/I support is also being made available for generating WSDL and PL.I XML Converter programs from PL/I source.

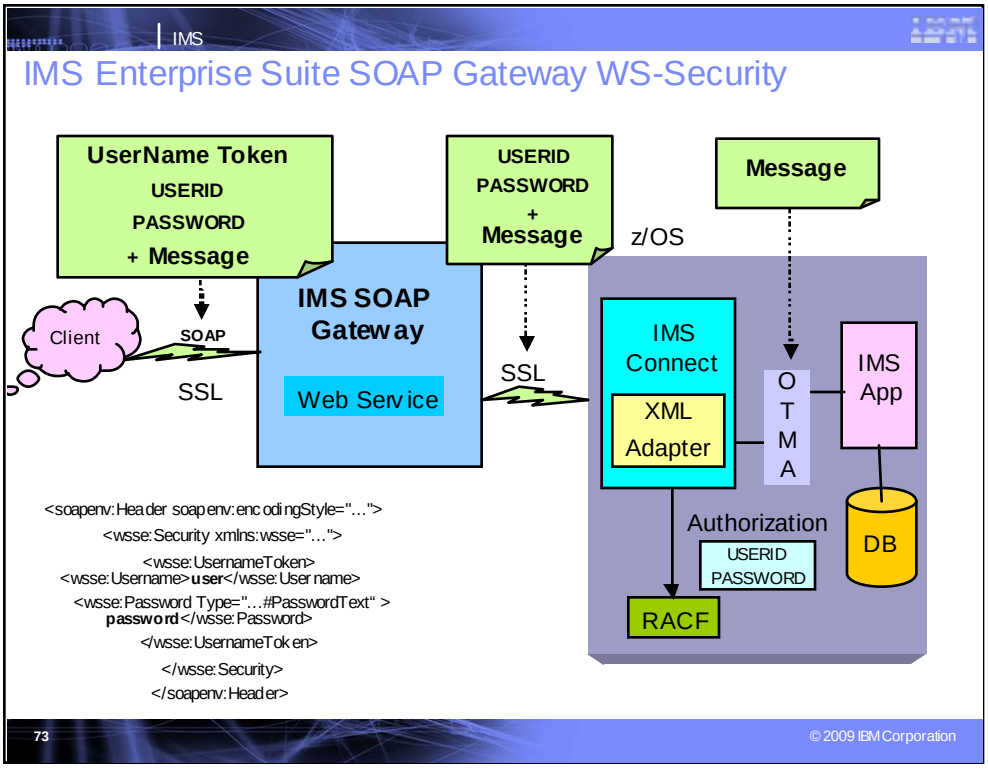
Additional requirements for IMS SOAP Gateway include:

-WS-Security support implements WS*Security in IMS SOAP Gateway in order to be able to authenticate the user who is executing the SOAP requests at IMS. SOAP Gateway includes the WS-Security enhancements to SOAP messaging that provide security through message integrity, message confidentiality, and message authentication. What this provides is the industry standard of WS-Security to the already existing SOAP message standard. In other words, this adds WS-Security capabilities to the SOAP Gateway's previous SOAP message now any SOAP message can take advantage of the granular security benefits. Prior to this IMS SOAP Gateway customers did not have a way to dynamically provide security information (user-id/password) at runtime on a per message basis. Lack of such support inhibited them from moving the IMS SOAP Gateway solution to production environments where they have strict security requirements. This support provides customers the ability to ship a UserID with or without a password from the requesting client all the way to IMS Connect or IMS itself, where that request in turn will be validated against SAF and allow/disallow the userID to execute the requested transaction. This offers a simplified way to inject the user ID/Password into the SOAP header/Message and use SAF to validate the requested transaction. RDZ-generated Adapter code can be used to execute the validation in order, reducing work and constraints in manually picking out the security items manually and calling SAF. With this support, users/client applications can send in requests into IMS SOAP Gateway using their own security information (for example: login id/password) instead of relying on static pre-defined security information on a web service-wide basis. This SOAP Gateway support can use tooling support from RDz V7.5+. This support enables customers to have more fine grained security authentication in place. This support will complement and beef-up the already existing security features available in IMS SOAP Gateway today (SSL, HTTPS). Customers could then send in security information on a per request basis rather than having pre-defined security information. This support will be provided for both the adapter and non-adapter scenarios. In addition, the WS-Security support will be provided only for the "provider" (inbound – both request/response) scenario and not for the "consumer" (callout) scenario; for callout this support will be a future version (need to build WS-Security compatible messages when invoking external web services).

- Business Event support enables IMS users to modify their IMS application to emit business event data to WebSphere Business Events (WBE), WebSphere Business Monitor (WBM) and ILOG for business rules execution and business activities monitoring. This uses IMS callout capability, and the IMS SOAP Gateway to feed events from IMS applications to WBE, WBM and ILOG via the SOAP/Web Services protocol. IMS SOAP Gateway would be enhanced to map the events from IMS into the appropriate format for the designated events servers if needed. It also utilizes new Haifa and RDz tooling to provide assistance to customer for modifying existing IMS application to emit events. IMS to support and integrate with IBM Business processing engines and monitoring dashboards (WBE, WBM and ILOG). This support helps business users and line of business owners gain insight into business activity and processing, or drive new processing to respond to business opportunities or threats and accelerating development time and reduce total cost of ownership. For example, a banking customer can use WebSphere Business Events to send an automatic alert to initiate a Fraud investigation when they detect a event sequence that there are multiple failed login attempt and followed by a large withdrawal in which these events could be detected and emitted by an IMS application. Uses RDz 7.6* IMS Business Event assistant tooling, and WBE 6.2.x*/WBM 7*/ILOG.



The IMS SOAP Gateway 10 uses the userid and password from the connection bundle for basic RACF authentication on the host. This security information is static per web service.



WS-Security (Web Services Security) is a communications protocol providing a means for applying security to Web services.

WS-Security incorporates security features in the header of a SOAP message, working in the application layer. Thus it ensures end-to-end security.

Adding WS-Security, the SOAP Gateway is able to support userid/password at a more granular level and customers can pass the security information on a per-message basis.

This SOAP Gateway function is provided for IMS 11 use.

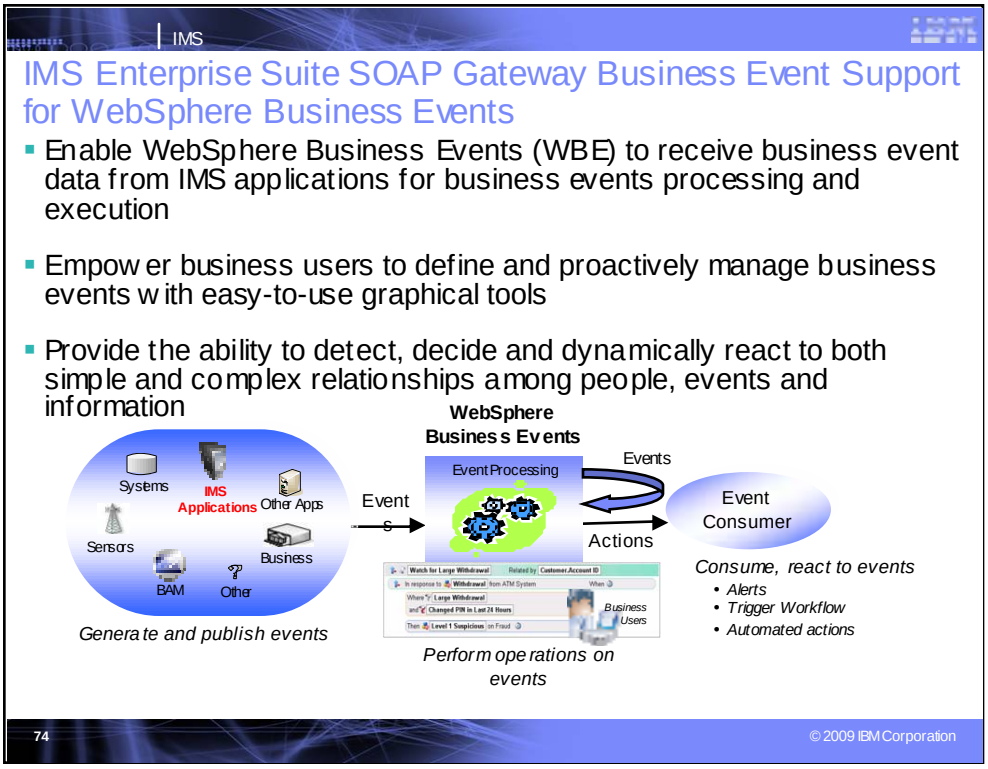
IMS 11 Connect function is required for IMS access

Rational Developer for System z (RDz) V7.6 is required for XML conversion.

Use of WS-Security message-level protection to sign and encrypt the UsernameToken (or any other parts of a SOAP message) requires the use of a protection token (for example X.509, Security Context Token, Kerberos, etc.).

Support is for "provider" (inbound) scenario and UserNameToken, but not other WS-Security standard tokens (eg. binarySecurityToken, DigitalSignature, EncryptionKey), since there is currently no tool support to generate required binding and policy files.

Transportation level support is required. SSL is needed to protect user id and password in the SOAP Header between Web client and SOAP Gateway server.



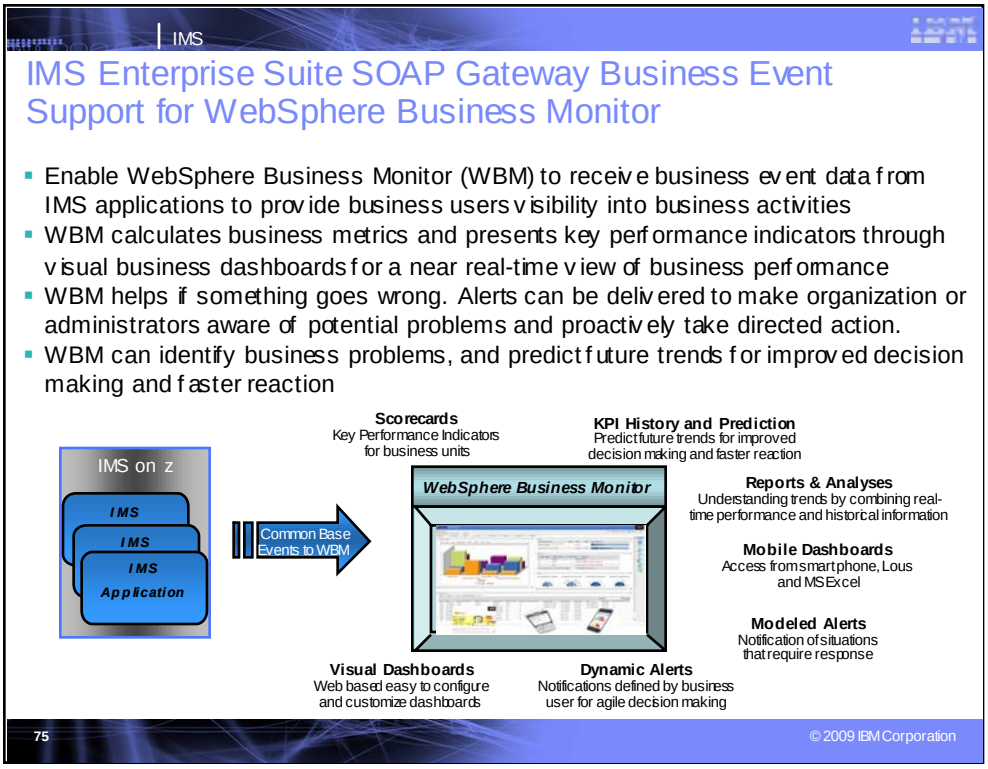
IBM WebSphere Business Events (WBE) is a software solution representing the convergence of power and ease-of-use. WBE supports advanced event processing features for detecting, evaluating, correlating and responding to events and complex patterns of events. These capabilities are exposed through graphical, non-programming user interfaces allowing IT to manage the environment while equipping the business users to manage the event process themselves.

The requirement for IMS Business Event to support WebSphere Business Events would enable WBE to receive business event data from IMS applications for business activities monitoring. It helps IMS customer to leverage existing IMS assets to explore business event processing solutions. With the use WBE, it helps customer to:

•Make business process more efficient and increase business agility with rapid respond to business rules and market changes

•Detect and analyze business activates easily for identifying new business opportunities, mitigate risks and improve customer satisfaction

•Accelerate application growth with easy-to-use tooling and automation that can be enacted by business users



IBM WebSphere Business Monitor (WBM) is a comprehensive business activity monitoring (BAM) solution that provides a near real-time view of your business performance

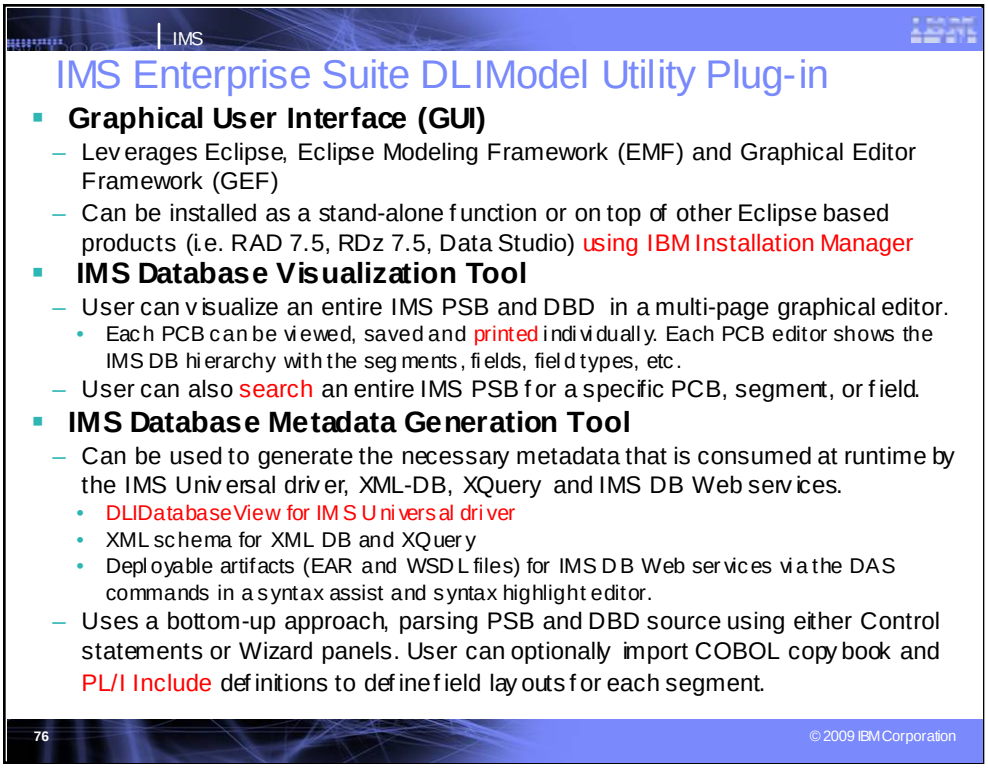
WBM provides visibility into the performance of business activities by processing events, calculating business metrics and presenting key performance indicators through business dashboards

•It identifies business problems, correct exceptions, and change processes to increase business competitiveness by improving process efficiencies

•It helps when something goes wrong. Alerts can be delivered to make an organization aware of potential problems and proactively take directed action.

•It can monitor business events from any application via a variety of protocols

The requirement for IMS Business Event to support WebSphere Business Monitor would enable WBM to receive business event data from IMS applications for business activities monitoring. It helps IMS customer to leverage existing IMS assets to explore business event monitor solutions identify business problems, correct exceptions, and change processes to increase business competitiveness by improving process efficiencies



DL/I Model Utility plug in provides a user friendly interface, simplifies IMS metadata generation, eases IMS Java and XML database application development and access, and offers a visual representation of IMS databases. Enhancements ease use of this utility, and its users can now import PL/I Include to redefine segment layout in IMS metadata, as well as take advantage of the new IMS Universal JDBC driver. Enhancements also include:

Export PSB graphical view as graphic files (JPG or BMP)

Auto select DBDs that referred by a PSB in wizard

Support PL/I Include Import

Add PROCOPT to IMS metadata for the IMS JDBC driver

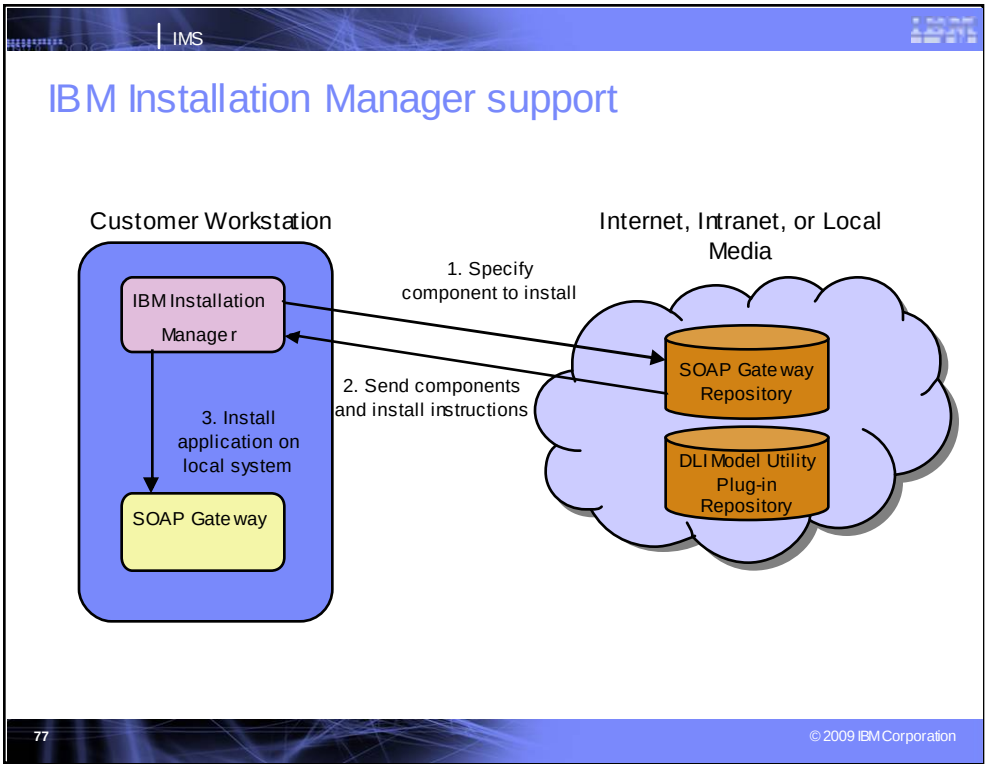
Add Virtual Foreign Key view to the PSB graphical editor

Change GUI messages to match with product messages prefixes

Add the search capability to the PSB graphical view

Update the existing metadata with newly updated PSB/DBD source

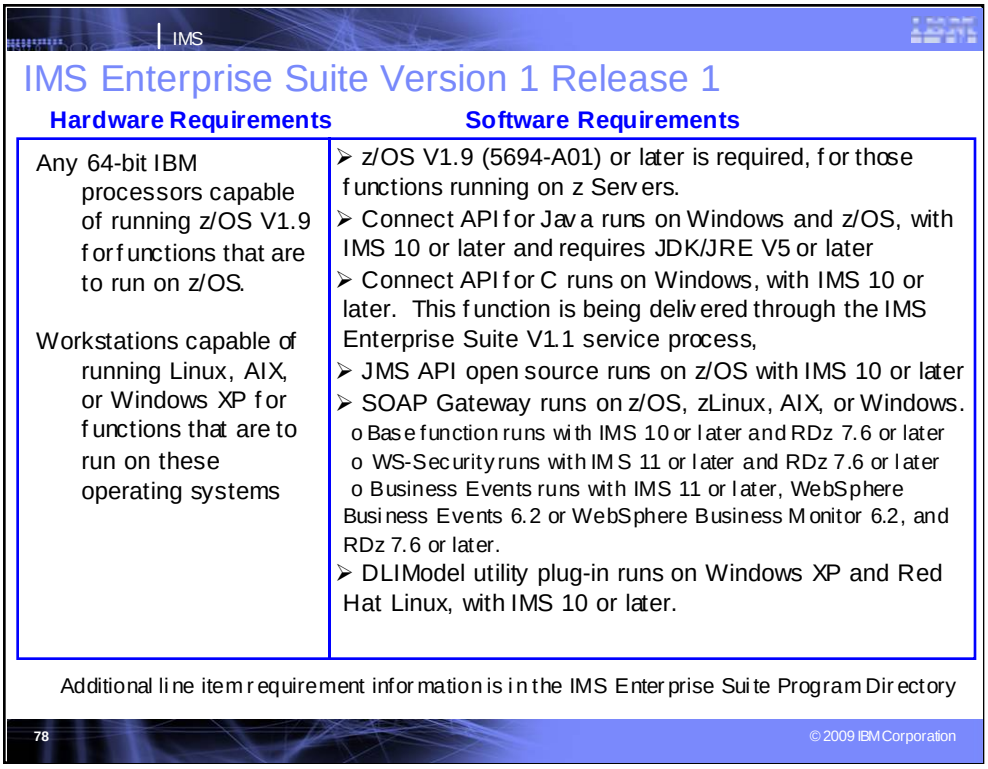
Ship under the new IMS Enterprise Suite through IBM Installation Manager



The Installation Manager is provided for use with the IMS Soap Gateway for Windows, Linux and AIX component installs, and the IMS Enterprise Suite DLIModel utility plug-in for Windows and Linux component installs. This support eases installation of these components on these distributed platforms. It gives the administrator full control of the installation. The administrator can script these components to install on multiple machines silently, issuing a single command in a command prompt to run the installation instead of going through the GUI interface. And, since it's done through the command prompt, user-written scripts could allow the components to run on multiple machines. This also gives the administrator control of where they place the repository associated with these components. This would also give the administrator better control over what software version is installed. A repository is provided for the DLIModel Utility and also for the Soap Gateway.

To reduce the download footprint there's another free downloadable utility, called the IBM Packaging Utility. The Packaging utility can be used to combine our multiple repositories into one.

The customer would first install IBM Installation Manager onto their local Windows, Linux or Unix workstation. From there the customer would point the IBM Installation Manager to a repository containing the product they wish to install. These repositories can be located on the internet, intranet (private network), or on their local media (e.g., hard drives, thumb drive, dvd, etc). The IBM Installation Manager will search the repository for installable products. The repository will send the components for building the desired product as well as the build instructions. The IBM Installation Manager will then build the product on the local machine.



Hardware requirements

IMS Enterprise Suite V1.1 (5655-T60, 5655-T61) operates on the following hardware:

Any 64-bit IBM processors that are capable of running the required z/OS V1.9 for functions that are to run on z/OS.

Workstations capable of running Linux, AIX, or Windows XP for functions that are to run on these operating systems.

Additional line item requirement information is provided in the IMS Enterprise Suite Program Directory

Software requirements

IMS Enterprise Suite V1.1 (5655-T60, 5655-T61) component function operates with IMS Version 10 (5635-A01) and/or IMS Version 11 (5635-A02), with the following software requirements:

z/OS V1.9 (5694-A01) or later is required, for those functions running on z Servers.

IMS Enterprise Suite DLIModel utility runs on Windows XP, and Red Hat Linux with IMS Version 10 or later.

IMS Enterprise Suite JMS API open source runs on z/OS with IMS Version 10 or IMS Version 11 or later.

IMS Enterprise Suite SOAP Gateway runs on z/OS, zLinux, AIX, or Windows.

Base function runs with IMS Version 10 or later.

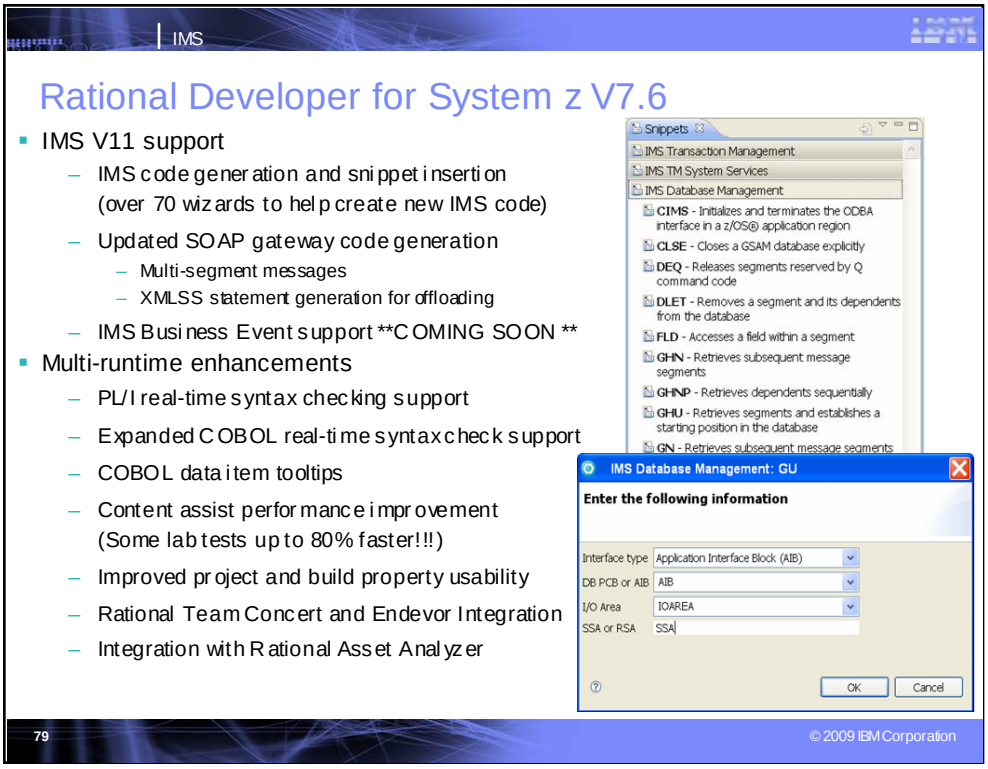
WS-Security runs with IMS Version 11 or later.

Business Events runs with WebSphere Business Events Version 6.2 or WebSphere Business Monitor Version 6.2 and IMS Version 11 or later.

IMS Enterprise Suite Connect API for Java runs on Windows and z/OS, with IMS Version 10 or later and JDK/JRE Version 5 or later.

IMS Enterprise Suite Connect API for C runs on Windows, with IMS Version 10 or later.

Additional line item requirement information is provided in the IMS Enterprise Suite Program Directory

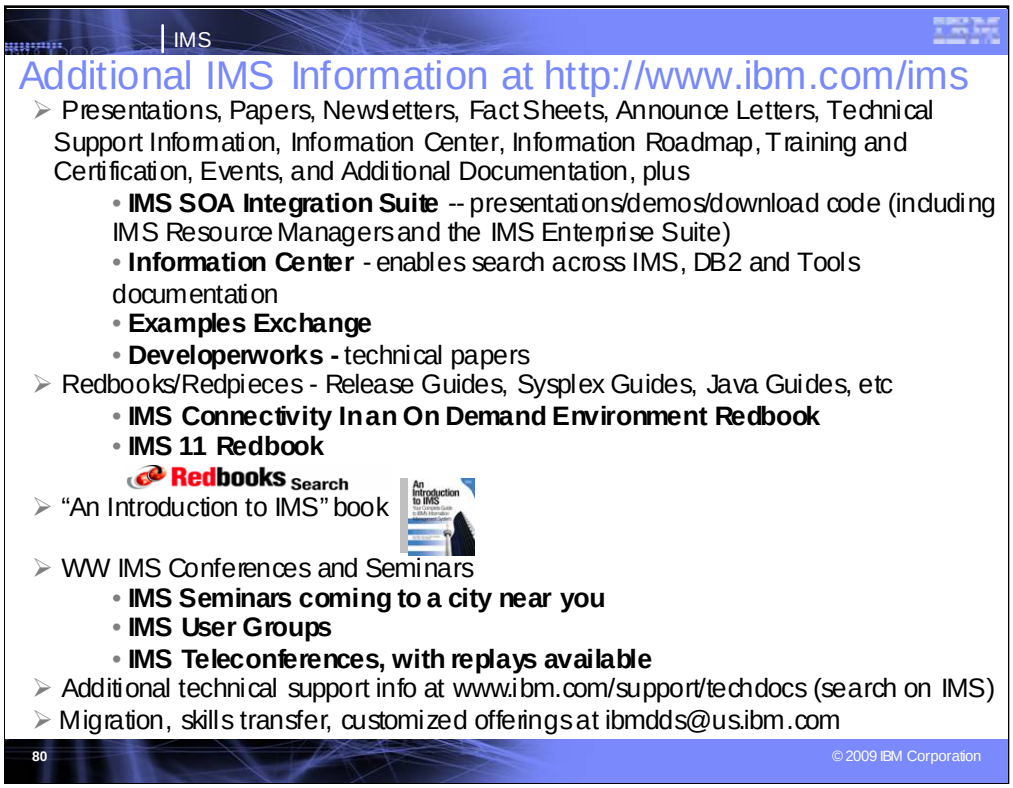


A number of the IMS items use IBMs Rational Developer for System z and IBM has recently announced IBM Rational Developer for System z V7.6.

Rational and IMS continue to work together to bring both traditional IMS DB/DC and service-based modernization tools to the IMS developer. RDz has added new features to make it easier for the traditional developer to maintain or create new code. Such as:

- New code wizards specifically for IMS. Helps to create IMS COBOL code inline with existing applications
- Real-time syntax check shows coding errors as they occur, as you type them, now for COBOL and PL/I. Similar to the Java development environment from eclipse and IBM.
- Improved usability to make it easier and faster to work within the RDz interface
- Integration with Source code management systems such as Endevor and Rational Team Concert, helps speed the process of creating changes and pushing them to production
- Integration with Rational Asset Analyzer helps inspect existing IMS regions (called a IMS run unit) to see linkages between code, data, and configuration so that you can see the impact of every code change and make sure nothing is missed

RDz also helps to modernize IMS workloads through new architectures such as Web Services and the upcoming IMS business events



Key Message: IMS continues to provide information and services for our clients

A wide range of IMS Information is available

The IMS solutions are generally available along with other IBM products in support of IMS. Additional documentation and information is available from the IMS home page at http://www.ibm.com/ims. The IMS SOA Integration Suite includes function and components for enterprise modernization. The Technical Support, Information Center and Information roadmap now ease search and easy link to information. Links also exist here to an examples exchange, and to developerworks where additional technical papers and other devlopment information can be found. Links also exist for training, certification, events and presentations/papers.

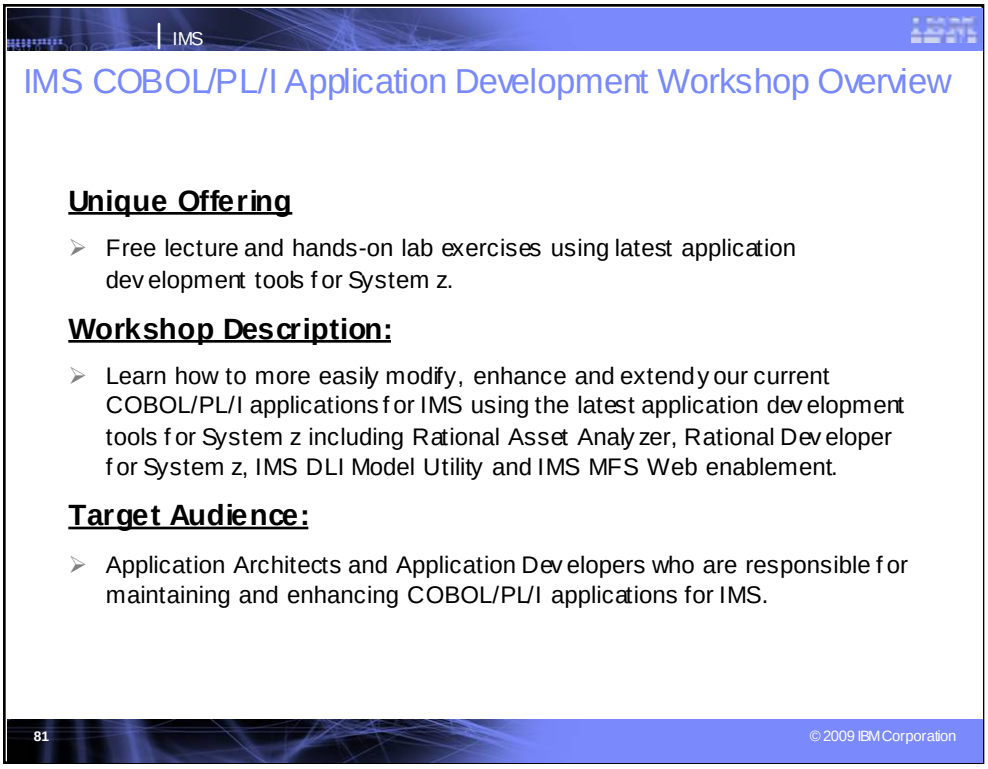
The IBM International Technical Support Organization has been producing redbooks and redpieces with additional information. One of the latest is the IMS Connectivity in an On Demand Environment Redbook.

One piece of IMS literature we mentioned earlier is the new comprehensive textbook called "An Introduction to IMS".

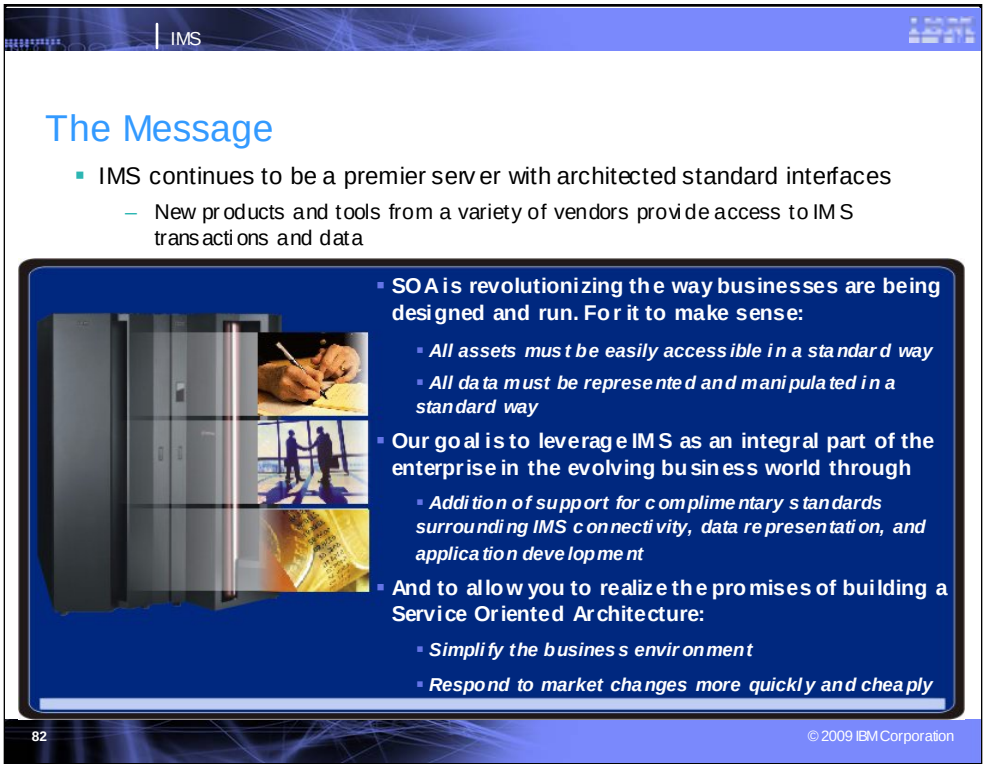
A number of IMS Technical Conferences are also being provided on an ongoing basis. Upcoming conferences featuring both IMS and DB2 include the Information Management conference in The Haag in May and the Information On Demand Conference in Anaheim in October. Both of these conferences provide an extensive amount of education on IMS and the transformation/Integration of IMS for On Demand environments.

We also are beginning this spring worldwide seminars/roadshows.

And we are continuing to provide IMS webcasts and teleconferences, with replays of these available afterwards



We have been offering some COBOL/PL/I workshops, should you like to request one. We are also now offering Java workshops as well.



IMS continues to be a premier server with architected standard interfaces

New products and tools from a variety of vendors provide access to IMS transactions and data

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