IMS SOA Integration Suite – Using It To Deliver Business Critical Services

Kenny Blackman
IBM IMS ATS

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Presentation Agenda

• The benefits of Enterprise Modernization
• Integration
  • Access to IMS TM and DB resources
  • Access from IMS TM applications
  • Using SQL in Java for IMS Database access
IBM solutions for Enterprise Modernization

*Optimizing applications, people, team and infrastructure investments*

- **Increase flexibility** by revitalizing existing application portfolios
- **Boost productivity** and accelerate innovation with modern skills
- **Maximize business agility** by bridging organizational silos
- **Increase system utilization** by leveraging hardware capabilities
So … What do you need to consider for Integration?

• First step – Understand your applications

  • Although SOA talks about “REUSE”,
    • Should your IMS transactions actually be reused as they are?
      • Do they need to be optimized for new access patterns?

  • “REUSE” can apply to applications and technology
    • E.g., Cobol, PL/I, Assembler, Fortran, … DL/I calls

• “RENOVATION”
  • Take what works and make it better
Next Step

• Communication Access
  • How to get to IMS resources
  • How to deal with errors
  • Understand what your IMS applications are doing
    • Program-to-program switches
    • Multiple IOPCB and ALTPCB messages resulting from one inbound request
    • Conversational transaction processing

• Understand what IMS provides
  • IMS supports new technology via Java
    • JDBC and SQL
    • interoperability Java and Cobol
    • Vendor tools
IMS recognizes a variety of requirements

- Application requirements
  - **Access to IMS applications**
    - Direct connection model
    - Messaging and Queuing model
  - **Access to IMS data**
    - Inquiry (read-only), Update, 2PC
    - Access across LPARs
    - Access from distributed environment
  - **Access from IMS applications**
    - To web services
      - Applications and data on distributed servers
Application Protocols

יאה Synchronization level (Sync_level)

- NONE
- CONFIRM
- SYNCPOINT

יאה Commit modes

- Commit_then_send (Commit mode 0)
  - Output is sent as a result of syncpoint
  - Always uses sync_level of CONFIRM
  - Output is queued until client sends an ACK

- Send_then_commit (Commit mode 1)
  - IOPCB output is sent before syncpoint
  - Sync_level can be either NONE, CONFIRM or SYNCPOINT
As a standard socket server, IMS Connect is open to a variety of IMS, IBM and other vendor solutions. IMS Connect can be integrated with various technologies such as WebSphere, WebSphere Message Broker, WebSphere ESB, and DataPower. It also supports integration with Enterprise Suite SOAP Gateway and other vendor solutions. The diagram illustrates the connection points and integration options available with IMS Connect.
IMS SOA Integration Suite
www.ibm.com/ims

• IMS Solutions for Java development
  • Write Java applications to access IMS databases and process IMS transactions
  • XML Database support
• IMS MFS Web solutions
  • support the reuse of existing MFS-based IMS business logic
• IMS TM Resource Adapter
  • create Java Platform, Enterprise Edition applications to access IMS transactions
  • callout requests to external Java EE applications from IMS applications
• IMS Web 2.0 solutions for TM and DB
  • integrate IMS TM and DB assets into Web 2.0 applications
IMS TM Resource Adapter

- Java Connector Architecture (JCA/J2C) Resource Adapter
- Benefit
  - Enables SOA integration
  - JEE application, Web Service access to and from IMS transactions
  - BPEL integration with access IMS transactions
IMS MFS Web Enablement Functional Overview

- Render displays on new modern devices, e.g. browsers
- Maintain conversational iterations.
- Provide simple and user-friendly user-interface development tool
- Benefit
  - Provide B2C solution to web-enable existing MFS-based IMS business logic.
IMS MFS SOA Support

- Message Formatting Service SOA transforms existing MFS-based IMS application into MFS J2C Services (Web Services, EJB, or a JSP)
  - IBM Integration Designer
  - IBM Process Server
- Benefit
  - Provides MFS transaction support for Business Process Choreography (B2B)
IMS Web 2.0 for TM

• Benefit
  • Utilize Web Oriented Architecture
  • Developers can leverage IMS transactions to build and execute Web 2.0-based applications
IMS Enterprise Suite V2.1

- IMS Enterprise Suite is a product within the IMS SOA Integration Suite.
- IMS Connect APIs
  - Provide programming control of connections to IMS Connect, interactions with IMS, and the data sent to IMS for those interactions.
  - Support the Java and C programming languages.
- IMS Enterprise Suite Explorer for Development
  - Simplifies IMS application development tasks by displaying and enabling editing of IMS databases, segments, fields
  - Support IMS 12 Catalog for global metadata
- IMS Enterprise Suite DLIModel utility plug-in
  - Translates IMS source files into reliable, application-independent local metadata that can be used for Java application development.
- IMS Enterprise Suite SOAP Gateway
  - Enables IMS applications to interoperate outside of the IMS environment through the SOAP protocol
  - IMS applications can become Web service providers or consumers in a service-oriented business environment.
  - IMS applications can emit business events data to business event processing engines
    - IBM WebSphere Business Events and IBM Business Monitor.
- Java Message Service (JMS) API
  - Provides IMS applications that run in the Java enabled dependent regions the ability to issue synchronous callout requests to external services.
  - Supports IMS 10, 11 and 12.
WebSphere sMash and IMS Web 2.0 IMS Connect API for Java

- **WebSphere sMash**
  - lightweight runtime for creating and running RESTful services
    - Groovy, PHP, and Java through the IMS Connect for Java API
- **Benefit**
  - Developers can quickly build and execute Web 2.0-based applications that access IMS transactions
IMS Enterprise Suite Soap Gateway

Runtime environments
z/OS, Linux for System z, Windows

SOAP Client
IMS SOAP Gateway Runtime
IMS Web Service
IMS Connect
XML Converters
IMS Runtime Environments
UDDI Registry
COBOL PL/I
RDz Development Environment
WSDL
XML Converters
IMS Connect
Adapter Task Manager
XML Adapter
XML Converters
IMS App
TCP/IP
Log
IMS Enterprise Suite Soap Gateway Management Utility
IMS Runtime Environments
IMS

93 0
ENTRY WAS DISPLAYED
DISPLAY
LAST1
FIRST1
8-111-11111
D01/R01 0001
IMS Enterprise Suite SOAP Gateway Business Event Support for WebSphere Business Events (WBE)

- Enable IMS applications to send data to WebSphere Business Events (WBE) for business events processing and execution
- Benefit
  - leverage existing IMS assets to explore business event solutions

![Diagram](image)

- Events generation and publication
- Events processing
- Event consumption and reaction
- Automated actions
- Perform operations on events
IMS Enterprise Suite SOAP Gateway Business Event Support for WebSphere Business Monitor (WBM)

- Enable IMS applications to send data to WebSphere Business Monitor (WBM) to provide business users visibility into business activities
- Benefit
  - existing IMS assets participate in business monitoring solutions

Scorecards
Key Performance Indicators for business units

KPI History and Prediction
Predict future trends for improved decision making and faster reaction

Reports & Analyses
Understanding trends by combining real-time performance and historical information

Mobile Dashboards
Access from smart phone, Lous and MS Excel

Modeled Alerts
Notification of situations that require response

Visual Dashboards
Web based easy to configure and customize dashboards

Dynamic Alerts
Notifications defined by business user for agile decision making
And then there is DataPower --- Solutions for IMS

- An MQ client
- An IMS Connect client

Add: DataPower XML Integration & existing systems connectivity SW

Add: DataPower XML Security SW

Offloads XML, XSD, XPath and XSLT at wire speeds

XA35 XML Accelerator

DataPower 3.6.1
WebSphere Message Broker

WebSphere Event Broker

WebSphere MQ (including JMS)

Transformation, Routing and Data Integration
- Includes all Event Broker functionality
- Content and table-drive routing capabilities
- Powerful engine for message/data transformation and integration
- XSLT engine for XML transformation
- Message filtering and message warehousing
- Web services (HTTP/SOAP) protocol support

- Websphere Message Broker
  - Supports a new IMS node

From anywhere Using any protocol (HTTP, Web services, SOAP/XML ...)

IMS Program

 LL zz Trancode Data

 Request
 1011010101010...

Response
 00110101001000...
Accessing Other Environments

• IMS applications can “explicitly” code communication interface calls
  • TCP/IP sockets support
    • Standard sockets api - C, Java
    • Extended sockets api - Assembler, Cobol, PL/I
  • APPC calls
    • CPIC interface or MVS interface

• IMS Java application capabilities
  • Standard Java classes

• IMS managed capabilities
  • Asynchronous callout
  • Synchronous callout
IMS Application Callout

- Asynchronous Callout
  - Allows IMS transactions to access a service outside IMS
  - The IMS application does not wait for a reply
    - Any replies invoke a new instance of a transaction

- Synchronous Callout
  - Allows IMS transactions to access a service outside IMS and wait for a reply within the same unit of work
    - Position IMS as both a client and a server
    - Integrate IMS with other server and applications
    - Remove application managed message correlation
    - Removes 32K message segment restriction
Universal Drivers

Distributed

WAS (any platform)

Universal DB Resource Adapter
JCA 1.5

WAS/Linux z

Type 4

Universal DB Resource Adapter
JCA 1.5

IMS

Connect

Type 4

Type 4

IMS Universal Drivers

JDBC

DLI

IMS DB

ODBM

Type 2

Type 2

CICS

Universal JDBC DLI

Type 2

Type 2

DB2

Universal JDBC DLI

IMS TM

IMS Appl

Universal JDBC DLI

IMS DB

Type 2

Network Clients

SNA
TCP/IP

Any Java Runtime Platform

z/OS A

z/OS B

System z
IMS Enterprise Suite V2.1 Explorer for Development

- Generate SQL to access IMS data
- See database relationships
- Change DBD field attributes
- Edit PSB sensitive segments and attributes
IMS Enterprise Suite V2.1 Explorer for Development

- IMS 12 HALDB Catalog Metadata
  - Universal Driver Type 4 connection
  - Can add COBOL or PL/I metadata to the catalog
    - Direct update of the catalog metadata is not available
    - Requires intermediate ACBGEN to populate the catalog with the extended information
- PSBs and DBDs editing
  - Send updated DBDGEN and PSBGEN source files to the host
  - run DBDGENs, PSBGENs, ACBGENs, and catalog population
PSB PCB statements changes

• PCB
  • EXTERNALNAME=
    • An optional alias for the PCB label or the PCBNAME= parameter
    • Java application programs use the external name to refer to the PCB
  
REMARKS=
  • Optional user comments. A 1- to 256-character field. Added to PSBGEN statements
DBD statement changes

- **DBD**
  - **ENCODING**=
    - Specifies the default encoding of all character data in the database defined by this DBD.
    - This value can be overridden in individual segments or fields.

- **SEGM**
  - **EXTERNALNAME**=
    - An optional alias for the NAME= parameter used by Java application programs to refer to the segment.

- **FIELD**
  - **CASENAME**=
    - The name of the map case when alternative mappings are defined for the fields in a segment
  - **DATATYPE**=
    - Specifies the external data type of the field.
  - **EXTERNALNAME**=
    - An optional alias for the NAME= parameter used by Java application programs to refer to the field.

- **DFSMARSH**
  - Specifies the DATATYPE converter routine to transform binary data to external data format

- **DFSMAP**
  - Defines alternative field mappings in a segment.

- **DFSCASE**
  - Defines a map case for a segment type that uses DFSMAP alternative field mapping.

**REMARKS**=
- Optional user comments. A 1- to 256-character field. Added to DBDGEN statements.
Universal drivers and the catalog

• All Universal drivers leverage the IMS catalog
  • Direct access to IMS metadata in the catalog

• No longer require the separate Java metadata class
  • Virtual deployment support

• No longer file-system dependent for metadata
  • Virtual deployment support

• Metadata is trusted and up-to-date
Catalog access and interface

- **Open systems**
  - Universal drivers (Type 4)
    - SQL and DLI interfaces directly to the catalog
    - XML – render catalog information as XML instance document valid to published IMS metadata schema

- **z/OS**
  - Universal drivers (Type 2)
    - SQL and DLI interfaces directly to the catalog
    - XML
  - Traditional IMS languages
    - DLI access directly to the catalog
    - Batch access supported
Get Unique Record

- New “GUR” DL/I call
  - Get Unique Record
  - Restricted to use with IMS Catalog database
- Functions like a GU followed by a series of GNP calls
- Returns the entire database record in one call
  - Saves overhead of issuing GU & GNP to retrieve all the metadata for a catalog member
  - Using an AIB token, the call can be continued if the I/O area is too small for entire catalog database record
- Data returned will be in XML format
  - Matches the XML schema
- Support added for DFSDDLT0 and IMS REXX
IMS Enterprise Suite V2.1 Explorer for Development

- Generate SQL to access IMS data
- See database relationships
- Change DBD field attributes
- Edit PSB sensitive segments and attributes
IMS Enterprise Suite V2.1 Explorer for Development Runtime Catalog Access Support

- IMS Explorer
- Tools
- Applications

- Type 4 Universal Drivers (SQL/DLI/XML)
  - IMS Connect
  - DRDA/TCPIP

- IMS
  - Dependent Regions (MPP, JMP, IFP, BMP, JBP)
  - DL/I or Type 2 Universal Drivers (SQL/DLI/XML)

- Users
  - SQL/DLI
  - Catalog
  - DB

- ODBM
  - DLI

- DB2 z SP
  - Type 4 Universal Drivers (SQL/DLI/XML)

- WAS z
  - Type 2 Universal Drivers (SQL/DLI/XML)

- CICS
  - DL/I or Type 2 Universal Drivers (SQL/DLI/XML)

- DRDA/TCPIP
IMS Enterprise Suite V2.1 Explorer for Development

1. Import DBDs/PSBs into IMS Explorer.
2. Using IMS Explorer, update the metadata from a COBOL/PLI layout.
3. IMS Explorer will generate new DBD source with the metadata.
4. The "new" DBD will be sent through DBDGEN then ACBGEN.
5. ACBGEN will update the Catalog.
Import IMS Source
Import COBOL/PLI

01 DEALER-SEGMENT.
  03 DEALER-NUM   PIC X(00004).
  03 DEALER-NAME  PIC X(00030).
  03 ADDR        PIC X(00007).
  03 ADDRESS-PARTS REDEFINES ADDR.
    05 CITY       PIC X(00020).
    05 STATE      PIC X(00002).
    05 ZIP        PIC X(00010).
  03 PHONE      PIC X(00007).
Import from Catalog
IMS Enterprise Suite V2.1 Explorer for Development
Query IMS database with Universal JDBC driver

Create SQL scripts with Select, Update, Delete, and Insert statements
Build a SQL statement using the SQL Builder with content assistance
View the SQL results

PSB = schema
DB PCB = database
Database segments = tables
IMS Enterprise Suite V2.1 Explorer for Development
Browsing Data Sets and Submitting JCL’s

Browse data sets

Edit a data set member

View JES output
Rational Data Store Explorer
Web 2.0 IMS DB access

- IBM Mashup Center V2.0
  - Enterprise Database Plugin
    - Allows users to create feeds from any Database that supports a JDBC driver
      - E.g., DB2, IMS, Derby IDS ...
- IMS DB feeds require
  - IMS Enterprise Suite DLIModel utility
  - IMS version 11 Connect
  - IMS version 11 ODBM

![Diagram of IMS DB access process]

**Enter an SQL query.**

Required fields marked with *

Check the tables that you want to query

- PCB01.BILLING
- PCB01.DOCTOR
- PCB01.HOSPITAL
- PCB01.ILLNESS
- PCB01.PATIENT
- PCB01.PAYMENTS
- PCB01.TREATMENT
- PCB01.WARD

Check the columns that you want to query

- PCB01.HOSPITAL
- PCB01.HOSPICOD
- PCB01.HOSPLL
- PCB01.HOSPNAME

**Advanced**

Type the SQL statement for your query

```
SELECT "PCB01.HOSPITAL","HOSPICOD","PCB01.HOSPIT","HOSPNAME" FROM "PCB01.HOSPITAL" WHERE PCB01.HOSPIT "ALEXANDRIA"
```
Why does Java matter to me?

- COBOL code invoking Java code
  - Leverage a larger pool of resources and technology!
  - Reduce redundant development
- Java code invoking COBOL code
  - Leverage a larger pool of resources and technology!!
  - COBOL developers can be freed up to focus on high performance applications or new application development
The benefits of integrating COBOL and Java

- Preserving COBOL code makes good business sense
  - Saving $100 per line of code
- No need for “Rip and Replace”
  - COBOL applications can be extended to Java
- Java is well known to new programmers
  - Taught in 87% of universities in 2000, Gartner
  - High School Computer Science Advance Placement exams are in Java
- Makes COBOL application programming more relevant
  - Allows Java developers to bring back value in existing COBOL applications
Key Points on Java and SQL

- SQL is very popular and well known among developers
- College graduates with Java knowledge will be able to leverage the native Java support for SQL
- Employees with background in DB2, Oracle, or any other relational database will have knowledge of SQL
- Great for mixed customer environments as it simplifies database usage
  - e.g., IMS and DB2
- Simplifies handling of multiple instances of an IMS data segment compared to DLI
- Brings more value to Java-COBOL interoperability as Java developers can take more of the tedious data manipulation work off of the COBOL developers.
COBOL and Java interoperability: not just IMS

- z/OS Unix
  - Including WebSphere Application Server
- z/OS Batch
- IMS Java enabled dependent regions
  - MPP, JMP, IFP
  - BMP, JBP
- Windows
  - Windows COBOL component of Rational Developer for z/Series
- AIX
  - IBM COBOL for AIX
Questions