

IMS Connect: Proving It's Worth for Web Services

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Purpose and Agenda



- Proof of Concept Purpose
 - Determine if a combination of IMS 11 and IMS Connect can replace the existing WMQ interface to IMS applications, simplify the environment and continue to meet business SLAs
- Agenda
 - Introduction
 - IMS Connect PoC
 - Findings
 - Potential Benefits
 - References
 - Appendix



Introduction – Background



- In the beginning ... an onsite System z Infrastructure Architecture Workshop (zIAW) was executed with customer and IBM SMEs
- Developed and outlined an IMS Connect PoC
 - Subject Applications
 - Online Inquiry System portal integration with mainframe application
 - Online Update System portal integration with mainframe application
 - Outbound Pricing Service
- Established IMS Connect PoC sandbox environment for learning and discovery of IMS SOA capabilities...

Introduction – Key Participants



- Customer
 - Enterprise Architects
 - Application Developers
 - System Programmers & DBAs
 - Performance & Tuning / Capacity Planning
 - Application Developers
 - Management
- Ellis Holman, IBM System z Client Architect
- Nancy Stein, IBM Consulting IT Specialist
- Haley Fung, IBM IMS Connect Lead Developer



Introduction – Additional Team Members



- Linda Warfield, IBM Project Manager
- Subra Narayanaswamy, IBM Global Services
- Thomas Garrett, IBM Global Services
- Gerald Waterman, IBM



IMS Connect POC – Customer's Goals



Create a simple sandbox environment to exercise IMS Connect for:

- 1) inbound calls to an existing IMS application
- 2) outbound calls from IMS applications to existing web services

This environment is going to be used for discovery and learning relative to the IMS Connect product. We hope to learn how we can leverage IMS Connect in the environment.

- Inbound Transaction Use Case Evaluation
 - Port an existing client application to the mainframe running under a z/Linux LPAR
 - Existing WMQ calls will be modified to utilize the IMS TM Resource Adapter running in Websphere on z and IMS Connect to call existing IMS transactions
 - The modified application will eliminate the need for WMQ
- Outbound Transaction Use Case Evaluation
 - Use an existing CLAIM application to leverage the new IMS DLI call, ICAL, to invoke an existing web service via the IMS SOAP Gateway



IMS Connect POC – What Was Done?



- On-Site IBM System z Infrastructure Architecture Workshop
 - September 2009
 - Studied two selected Business Use Cases
- Setup Sandbox Environment for PoC
- Application Portals Modifications
 - Migrated from mid-tier AIX platform to Linux on System z platform
 - Replaced WMQ calls with IMS TM Resource Adapter / IMS Connect API
- Inbound Transaction Use Case Evaluation
 - IMS TM Resource Adapter (J2C 1.5 Architecture)
 - IMS Connect API
 - IMS DB Resource Adapter
 - IMS JDBC Universal Drivers
- Outbound Transaction Use Case Evaluation
 - IMS Transactions as web service consumers
 - IMS SOAP Gateway



A project plan was drawn up and teams assembled to provide support for the effort



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	0	Task Name	Duration	Start	Finish	Predeces				11, '09 Oct 18, '09 M T W T F S S M T W T	Oct 25, '09 F S S M T W
48											
49		Install/Configure VM and zLINUX	45 days	Wed 08/26/09	Thu 10/22/09						,
50	V	Allocation of DASD for zVM	1 day	Wed 08/28/09	Wed 08/26/09	17					
51	V	Build VM outside the VM LPAR	10 days	Thu 08/27/09	Tue 09/08/09	50					
52	V	Install ACF2/VM and VMSecure	10 days	Thu 08/27/09	Tue 09/08/09		Ш				
53	V	Install VM on new LPAR	1 day	Wed 09/23/09	Wed 09/23/09	23	Hugh McKay				
54		Install ACF2/VM and VMSecure on new LF	1 day	Thu 10/01/09	Thu 10/01/09	24	II	Hugh M.			
55	~	IPL zVM in LPAR	1 day	Wed 09/23/09	Wed 09/23/09		Operations				
56	V	Customize VM Perf Toolkit	1 day	Thu 09/24/09	Thu 09/24/09		Tom V.				
57		Modify/Adjust System performance setting	20 days	Fri 09/25/09	Thu 10/22/09				1 1		Tom V.
58	V	Obtain userids for LINUX team	15 days	Tue 09/01/09	Thu 09/17/09						
59	V	Install/configure zLINUX	5 days	Thu 09/24/09	Wed 09/30/09	47,23,58,		2LINUX			
60	V	Install zLINUX tools	5 days	Thu 10/01/09	Wed 10/07/09	58,55,59			ZLINUX		
61											
	V	Network Configuration for LPAR	33 days	Thu 08/27/09	Wed 10/07/09						
63	V	Request/obtain IP Addresses	5 days	Thu 08/27/09	Wed 09/02/09	29			,		
64	V	Request FW Rules	3 days	Wed 09/16/09	Fri 09/18/09	63					
65	~	Obtain userids for Network VM team	7 days	Fri 09/11/09	Fri 09/18/09		-				
66	~	Config TCPMP stack on VM 2nd level	7 days	Mon 09/21/09	Tue 09/29/09	65		Jon H., Larry A			
67	V	Define v Switch on VM 2nd level	8 days	Mon 09/21/09	Wed 09/30/09	65		Jon H., Larry A			
68	V	Configuration of hipersockets - zOS (SYST	3 days	Wed 09/23/09	Swt 09/26/09	65	Frank C.				
69	V	Configure hipersockets on LINUX	7 days	Mon 09/21/09	Tue 09/29/09	65		Jon H., Larry A			
70	V	Debug any connectivity	2 days	Wed 09/30/09	Thu 10/01/09	12,64,68,		Frank, Jon,	Larry		
71	V	Update DNS	4 days	Fri 10/02/09	Wed 10/07/09	70			Frank C.		
72											
73											
74		Software Installation and Configuration	44.5 days	Fri 08/28/09	Mon 10/26/09						_
75	V	Security for IMS	22.5 days	Fri 08/28/09	Thu 09/24/09		Wellpoint Security	SMI MS			
76		IMS11/IMSConnect - Install/Configure in SYSN	10 days	Tue 10/06/09	Mon 10/19/09	21,75				Tom Garre	4
77	V	Websphere 7 in zVM LPAR	20 days	Mon 09/21/09	Fri 10/16/09						
78	~										
		Obtain userids for Websphere team	10 days	Mon 09/21/09	Fri 10/02/09			Linda			
79	V	Install and configure Websphere 7	10 days	Mon 09/21/09 Mon 10/05/09	Fri 10/02/09 Fri 10/16/09	59,78,75		Linda		Websphere	
80		Install and configure Websphere 7 RAD 7.5 with IMS Connect Client	10 days 5 days	Mon 09/21/09 Mon 10/05/09 Mon 10/05/09	Fri 10/02/09 Fri 10/16/09 Fri 10/09/09	59,78,75 78		Linda	Jerry 8		
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80 81 82 83 84 85 86 87	II	Install and configure Websphere 7 RAD 7.5 with IMS Connect Client IMS & DE2 Data Setup IMS Soap Cateway Modify/Adjust System performance settings when if need	10 days 5 days 5 days 5 days 70 days	Mon 08/21/09 Mon 10/05/09 Mon 10/05/09 Tue 10/20/09 Thu 08/17/09 Fri 10/23/09	Fri 10/02/09 Fri 10/16/09 Fri 10/08/09 Mon 10/26/09 Tue 09/22/09 Thu 01/28/10	59,78,75 78 76 57	Ton G.	Linds	Jerry S	Sun	Phil G.
80 81 82 83 84 85 86 87 88	=	Install and configure Websphere 7 RAD 7.5 with IMS Connect Client IMS & D62 Data Setup IMS Soap Gateway Modify/Adjust System performance settings when if need System Architecture Documentation Base Line Testing	10 days 5 days 5 days 5 days 70 days 5 days	Mon 09/21/09 Mon 10/05/09 Mon 10/05/09 Mon 10/05/09 The 10/25/09 The 08/17/09 Fri 10/25/09 Mon 10/12/09 The 11/05/09	Fri 10/02/09 Fri 10/16/09 Fri 10/05/09 Men 10/25/09 Tue 08/22/09 The 01/25/10 Fri 10/16/09 Men 11/05/09	59,78,75 78 76 57	Tom G.	Linda	Jerry S	Sun	Phil G.
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IMS Connect POC- Sandbox Environment

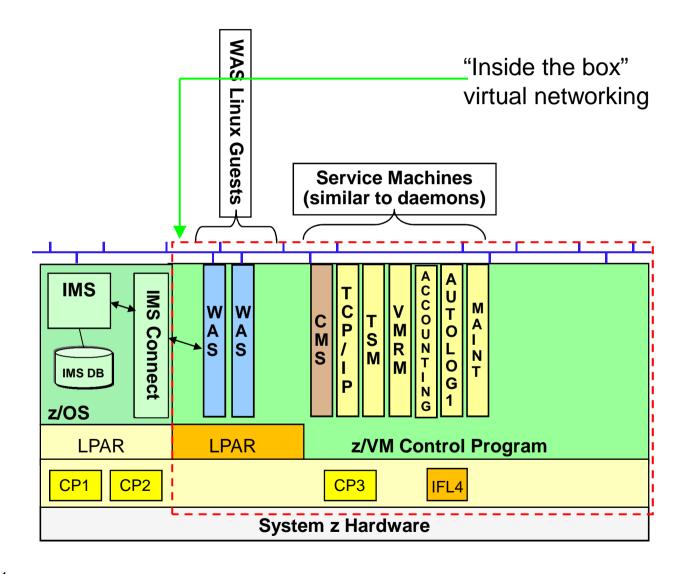


- Hardware:
 - 1 new LPAR
 - 1 IFL
 - 10 Gb Memory
- Software:
 - z/OS LPAR
 - z/VM LPAR
 - IMS 11 Control Region and IMS Connect
 - IMS SOA Integration Suite
 - Rational Application Developer Version 7.5.5
 - Rational Application Developer for System z Version 7.6
 - Websphere Application Server ND Version 7
 - Redhat Enterprise Linux for z/OS Version 5











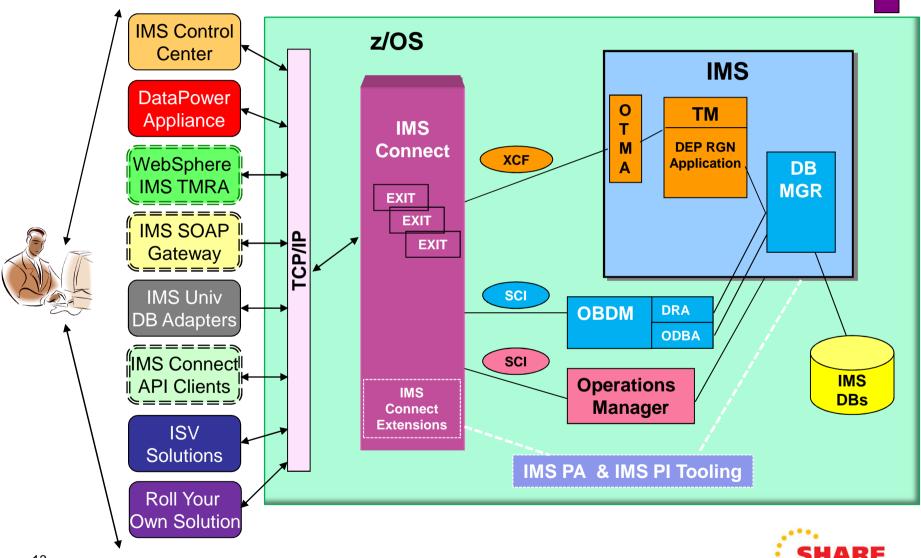


IMS Inbound Service Requests



IMS Connect – IMS's TCP/IP Gateway

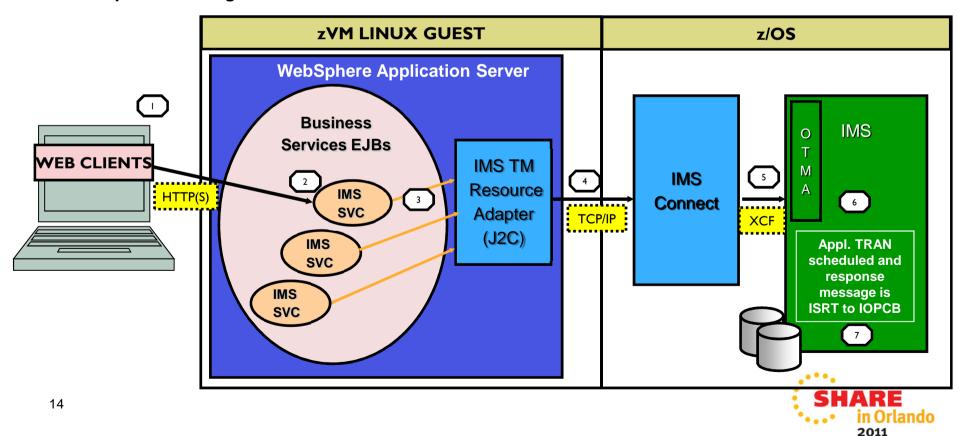




IMS Connect PoC Use Case #1: Inbound Call to IMS



- 1. User issues inquiry or update request from Web Browser via HTTP(S)
- 2. Business Service EJB receives and processes request
- 3. Business Service EJB invokes IMS TM Resource Adapter
- 4. IMS TM Resource Adapter sends request to IMS Connect via TCP/IP (uses Hipersocket connection)
- 5. IMS Connect passes I/P message to OTMA via XCF; OTMA places transaction on IMS Message Queue
- 6. IMS schedules and processes transaction in dependent region,
- 7. O/P response message is returned to Business Services EJB



Findings – Inbound Applications



- Positives ...
 - Improved performance of inbound IMS transaction
 - application response time reduced by 25%
 - Improved performance of Portals under Linux on System z
 - average 30% improvement in the overall performance
 - Standard and flexible IMS interfaces vs. proprietary WMQ calls
 - JEE, TMRA, JCA 1.5, JDBC and direct API calls
 - Standard, supported IMS SOA vs. proprietary black box solutions of EIS and BSI application frameworks
 - Flexibility of switching backend IMS subsystems via WAS Admin Console
 - no coding changes required when using WAS and IMS TMRA
 - Paradigm shift to a two-tier architecture model
 - resulted in code that is cleaner and easier to maintain
 - IMS 11 supports inbound services calls after enabling IMS Connect
 - Narrowed the knowledge gap between M/F and Distributed personnel



Findings – Inbound Transactions



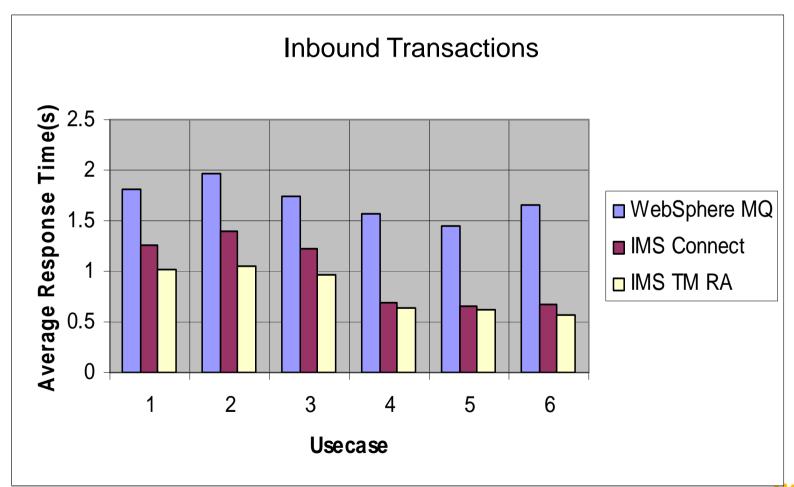
- Things to be aware of ...
 - Not a full JDBC 3.0 implementation
 - No impact on this PoC, but does not support JDBC Batch accessing databases directly in DLI mode
 - Little Endian and Big Endian conversion between platforms
 - When the client application was migrated to Linux on System z, the order in which bytes were stored in memory required specific parsing of the IMS message returned
 - Need to handle mainframe transaction ABENDs properly



Stress Test Observations



View of performance results for use cases accessing IMS transactions to fetch data





Stress Test Observations



SHARE

Snap shot of stress test results for use cases - WMQ, IMS Connect API & IMS TMRA

Comparison of usecases						Average 2	00/ improver	mont
Comparison of disecuses	1				Average 30% improvement using IMS Connect vs WMQ			
WebSphere MQ						using iivis	Connect vs v	VIVIQ
Name	MeasureType	Unit	Count	Total	Min	Avg	Max	StdDev
1A_Subscriber_Search	Response time[s]	Seconds	720	1,297.95	0.578	1.803	10.672	1.306
1C_Select_ Category_and_ click_ lookup	Response time[s]	Seconds	360	708.334	0.625	1.968	9.844	1.468
1F_Benefit_Keyword_Search	Response time[s]	Seconds	180	314.88	0.578	1.749	10.437	1.32
2A_Group_SubGrp_Search	Response time[s]	Seconds	720	1,132.43	0.235	1.573	21.97	1.881
2C_Select_ Categoery_ Lookup_for_ Group	Response time[s]	Seconds	360	522.939	0.407	1.453	7.187	1.318
2F_Benefit_Keyword_Search_for_Group	Response time[s]	Seconds	180	299.365	0.344	1.663	19.453	1.941
IMS Connect API Average E9 transaction time: 793 ms (12/18/2009)								
1A_ Subscriber_ Search	Response time[s]	Seconds	720	909.542	0.329	1.263	14.204	0.871
1C_Select_ Category_and_ click_ lookup	Response time[s]		360	504.113	0.484	1.4	8.563	0.925
1F_Benefit_Keyword_Search	Response time[s]	Seconds	180	219.625	0.422	1.22	5.969	0.779
,2A_Group_ SubGrp_ Search	Response time[s]		720	494.817	0.078	0.687	8.766	0.546
2C_Select_ Categoery_ Lookup_for_ Group	Response time[s]	Seconds	360	236.378	0.156	0.657	3.235	0.339
2F_Benefit_Keyword_Search_for_Group	Response time[s]		180	120.54	0.141	0.67	2.906	0.337
IMS TM RA Average E9 transaction time: 681 ms (12/21/2009)								
1A_ Subscriber_ Search	Response time[s]	Seconds	720	728.017	0.281	1.011	7.75	0.686
1C_Select_ Category_and_ click_ lookup	Response time[s]	Seconds	360	378.439	0.484	1.051	4.61	0.614
1F_Benefit_Keyword_Search	Response time[s]	Seconds	180	172.319	0.468	0.957	4.75	0.574
2A_Group_ SubGrp_ Search	Response time[s]		720	456.587	0.11	0.634	8.547	0.506
2C_Select_ Categoery_ Lookup_for_ Group	Response time[s]		360	222.155	0.187	0.617	2.328	0.313
2F_Benefit_Keyword_Search_for_Group	Response time[s]	Seconds	180	102.066	0.109	0.567	1.937	0.247
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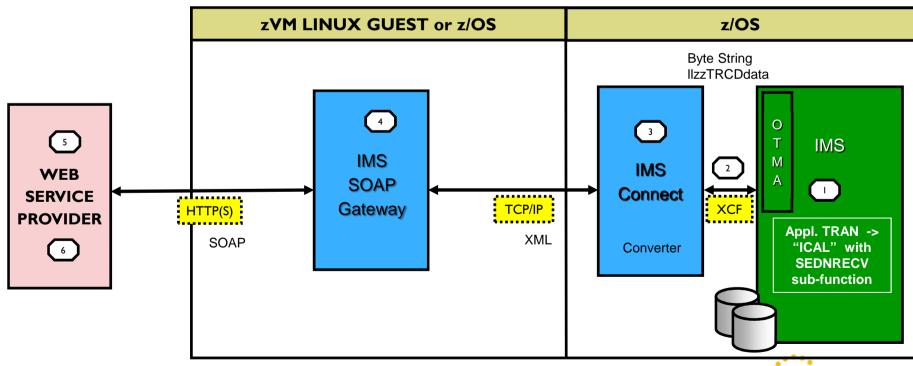
IMS Outbound Service Requests



IMS Connect PoC Use Case #2: IMS Outbound to Web Service



- 1. IMS application transaction issues an "ICAL" request with a SENDRECV to an OTMA Descriptor
- 2. OTMA passes the request message directly to IMS Connect bypassing the IMS Message Queue
- 3. IMS Connect converts message into XML and sends it to SOAP Gateway via TCP/IP (uses Hipersocket)
- 4. SOAP Gateway wraps SOAP envelope around the XML and sends request to the Web Service via HTTP(S)
- 5. Web Service receives and processes the request from IMS application transaction
- 6. Web Service sends response back to waiting IMS application transaction via a reverse path







- Simple http enabled service was successful
 - The following configuration issues were resolved
 - Tpipe connectivity issue
 - Analysis to determine why the tpipe which connects IMS
 Soap Gateway and IMS Connect to OTMA is not processing
 IMS call to request the simple http enabled service
 - Resolved by putting adhoc security in place and applying an APAR
 - RAD/z was needed to create the WSDL used by IMS Connect
 - Issues uncovered working with RAD/z:
 - The mapping code generated is rejecting the request
 - Looking at the Cobol versioning level
 - Worked with IBM Labs in Germany and in SVL



Findings – Outbound Pricing Service



- Call failed in the timeframe of the PoC
 - Artifact creation issues within the IBM® Rational® Developer for System z® caused a change in direction to create a simple http enabled service to continue with the PoC
 - WSDL RPC support
 - Not all standard WSDL levels were supported
 - IBM confirmed that in the next release this issue would be addressed
 - Three enhancement requests were opened to make the tool useful in a production deployment environment
 - ODC
 - multiple mapping
 - embedded logic
 - Connection issues to the mainframe demon listeners using IBM® Rational® Developer for System z® (RAD/z)
 - Fixed with security



Findings - Non-Technical



- From the Customer
 - IBM as a Technical Partner
 - "IBM supported business associates and addressed the issues quickly and listened to our findings and proposed solutions or integrated our findings into future releases of the software."
 - "Infrastructure support is strongly exploring skipping IMS 10 and migrating directly to IMS 11 and IMS Enterprise Suite Version 11, then deploying the IMS Connect and IMS SOAP Gateway address spaces."
 - "An additional PoC is being proposed by Enterprise Architecture staff to use the IMS 11 sandbox to determine if the technology can be applied to current BSI Frameworks"



Findings – PoC Success



- Proof of Concept Purpose
 - Determine if a combination of IMS 11 and IMS Connect can replace the existing WMQ interface to IMS applications, simplify the environment and continue to meet business SLAs
- IMS V11 and IMS Connect ...
 - Can replace the WMQ interface to IMS applications
 - Simplifies the integration environment significantly
 - Able to achieve better results than the business SLAs



Potential Benefits



IMS Connect and IMS SOA Integration Suite

- Performance, reliability and scalability improvements
- Reduced configuration and maintenance vs. WMQ setup and maintenance – simplification of interface
- Assumed significant reduction in production MIPs
 - It was determined that an average Claim took 60 100 ms of overhead when going through the WMQ calls
- Eliminates 32kb payload restriction using "ICAL" / IMS Connect / IMS SOAP Gateway
 - Allowed for request and response payloads of 16mb
- Eliminates the multiple points of failure inherent in WMQ hops
- Allows a point to point connection to all web enabled/SOAP/html services from within IMS
- Brings the IMS environment inline with SOA standards



Potential Benefits



- Server Virtualization Using Linux on System z
 - Dynamic computing resource allocations
 - Decreased complexity to improve manageability of systems
 - Automate routine tasks
 - Reduces overall management costs through efficiency
 - Possible Software License cost saving
 - Improves return on infrastructure investment through better utilization of resources
 - Savings on energy and floor space



Potential Benefits



Lean Development Process

- On demand computing environment and model to test, assemble, retest & deploy applications and maximize hardware utilization
- Automatically configure OS & software stacks
- Provides developer self service capabilities
- Simplifies ongoing operations and reduces technical support burden
- 11 Servers will be sunset during solution implementation



Post-PoC Steps



Total Cost Ownership (TCO) Analysis by IBM

- Hardware cost saving model through Linux on System z virtualization
- License cost saving
- Maintenance and administration labor cost saving
- Process efficiency analysis

Production Implementation (based on TCO analysis)

- IMS 11 and IMS Connect, IMS SOA Integration Suite and z/Linux
- Application Portal z/Linux Migration
 - consolidate 11 physical boxes
 - software license and administration cost saving
- DB2 Gateway migration
 - consolidate 2 boxes



Post-PoC Steps



Identify Additional Applications Within Scope

- Begin reengineering of another IMS application
- Frameworks integration using DataPower
- PoC completed in 2010

Phase II PoC

- Centralize Benefit Services running on Websphere 7 / z/OS
- DataPower integration



References for PoC



IMS SOA Integration Suite

http://www-01.ibm.com/software/data/ims/soa-integration-suite/

IMS Enterprise Suite

http://www-01.ibm.com/software/data/ims/soa-integration-suite/enterprise-suite/

IBM Websphere Application Server

IBM - WebSphere Application Server - Software

Programming with the IMS Universal JDBC drivers

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.ims11.doc.apr/ims_odbjavareference.htm



References for PoC



Bringing IMS and SOA Together With IMS Connect

Bringing IMS and SOA Together With IMS Connect | Mainframe | IBM Systems Magazine

IBM IMS TM Resource Adapter

http://www-01.ibm.com/software/data/ims/ims/components/tm-resource-adapter.html

IBM Enterprise Modernization Sandbox - Demos

http://www.ibm.com/developerworks/downloads/emsandbox_systemz/index.html





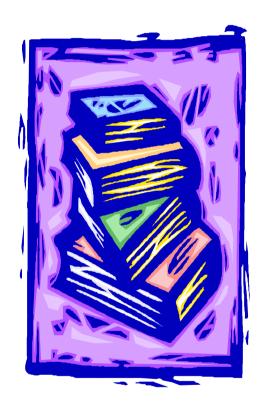


- On-line communities, User Groups, Technical Forums, Blogs, Social networks, and more
 - Find a community that interests you ...
 - ibm.com/software/data/community
- Information Champions
 - Recognizing individuals who have made the most outstanding contributions to Information Management communities
 - ibm.com/software/data/champion









- "An Introduction to IMS" book
 - Update coming for IMS 11
- IMS Redbook
 - IMS Version 11 Technical Overview
- IMS Family Website: www.ibm.com/ims
 - Presentations, papers, newsletters, fact sheets, announce letters, Redbooks
 - Schedule of seminars, webcasts and conferences
 - IMS education schedule
- Information Center enables search across IMS, DB2 and Tools documentation
- Migration, skills transfer, customized offerings at ibmdds@us.ibm.com



IMS 11 Information



IMS 11 Announcement Letter 208-258

www.ibm.com/common/ssi/index.wss

IMS 11 Fact Sheet - GC19-2451

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=/com.ibm.ims11.doc.fact/factsheet_v11.htm

IMS 11 Release Planning - GC19-2442

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.ims11.doc.rpg/rpg.htm

- IMS 11 Publications
 - All of the IMS 11 publications are available from the Information Management Software for z/OS® Solutions Information Center

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.ims11.doc/imshome_v11.htm

 IMS Version 11 Technical Overview – Redbook SG24-7807-00 http://www.redbooks.ibm.com/abstracts/sq247807.html?Open

IMS 11 Open Database – Redbook SG24-7856-00

http://publib-b.boulder.ibm.com/abstracts/sg247856.html?Open/



Data Management Communities for IMS



- Data Management Community share and interact on all Data Management topics with peers around the world
 - www.ibm.com/software/data/management/community.html
- IMS Community share and interact with IMS peers around the world
 - http://www-01.ibm.com/software/data/ims/community/
- IMS Regional User Groups find a meeting near you
 - www.ibm.com/software/data/ims/usergroups.html
- IMS Application Development Forum
 - www.ibm.com/developerworks/forums/forum.jspa?forumID=1632
- Information Champions recognized individuals who have made the most outstanding contributions to the Information Management community
 - www.ibm.com/software/data/champion
- Rational Cafes for host application programming languages
 - www.ibm.com/software/rational/cafe/index.jspa
- COBOL Cafe IMS Hub for application programmers
 - www.ibm.com/software/rational/cafe/community/cobol/ims?view=overview





www.youtube.com/user/ReThinkIMS





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<u>vww.ibm.com/developerworks/mydeveloperworks/blogs/IMS</u>



www.ims-ua.ora





www.slideshare.net/ibmims



ibm.com/vrm/newsletter/11069

linkedin.com/groups?mostPopular=&gid=1949922



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www.ibm.com/software/rational/cafe/community/cobol/ims?view=overview

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Thank You! Your Feedback is Important to Us

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