Playing in Traffic With IMS Connect
Session Number 2528

Nancy Stein, IBM / IMS ATS
Ellis Holman, IBM System z Architect

Disclaimer

Purpose and Agenda

- Proof of Concept Purpose
  - Determine if a combination of IMS 11 and IMS Connect can replace existing WMQ interface to IMS applications to simplify the environment and continue to meet SLAs

- Agenda
  - Introduction
  - IMS Connect PoC
  - Findings
  - Potential Benefits
  - References
  - Appendix

Introduction – Background

- Executed an onsite System z Infrastructure Architecture Workshop (zIAW) 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 sandbox environment for learning and discovery of IMS SOA capabilities

Introduction – Key Participants

- Customer
  - Enterprise Architects
  - Application Developers
  - Sysprogs & DBAs
  - Performance & Tuning / Capacity Planning
  - Application Developers
  - Management

- Haley Fung, IBM IMS Connect Lead Developer

- Nancy Stein, IBM Consulting IT Specialist

- Ellis Holman, IBM Architect

Introduction – Additional Team Members

- Linda Warfield, IBM Project Manager

- Subra Narayanaswamy, IBM Global Services

- Gerald, Waterman, IBM

- Thomas Garrett, IBM Global Services

IMS Connect POC – What Was Done ?

- On-Site IBM System z Infrastructure Architecture Workshop
  - September 2009
  - Studied two Business Use Cases
- Setup Sandbox Environment for PoC
- Migrated application portals
  - From Mid-tier AIX platform to Linux on System z platform
  - Replace 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
  - Expose IMS Transactions as web service consumers

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A project plan was drawn up and teams assembled to provide support for the effort
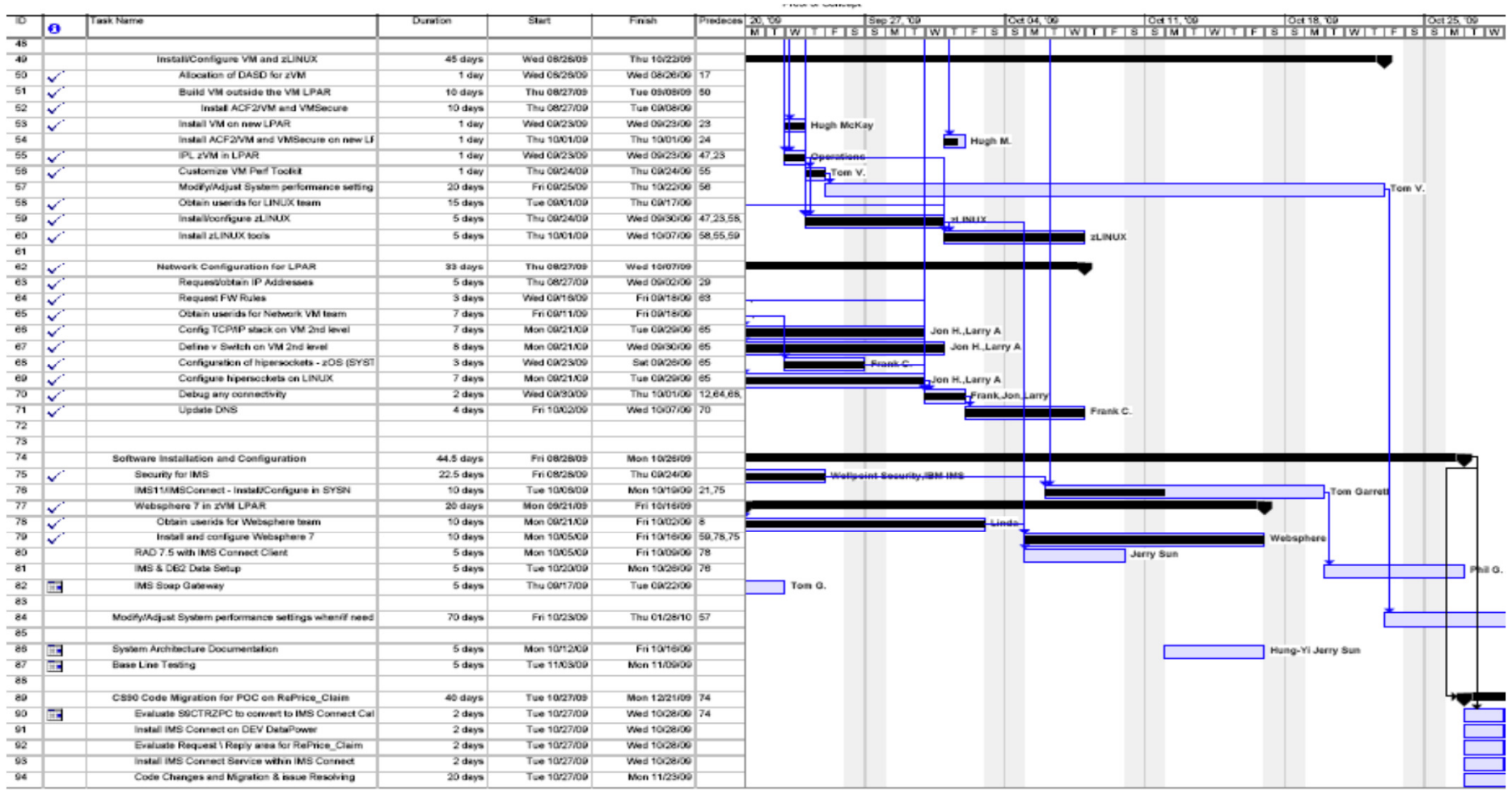
IMS Connect POC– Sandbox Environment

- Hardware:
  - 1 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 Connect POC– Architecture

"Inside the box" virtual networking

WAS Linux Guests

Service Machines (similar to daemons)

IMS

IMS/Connect

IMS DB

z/OS

WAS

WAS

CMS

TCP/IP

TSM

VMRM

ACCOUNTING

AUTOLOG1

MAINT

LPAR

z/VM Control Program

CP1 | CP2

CP3

IFL4

System z Hardware
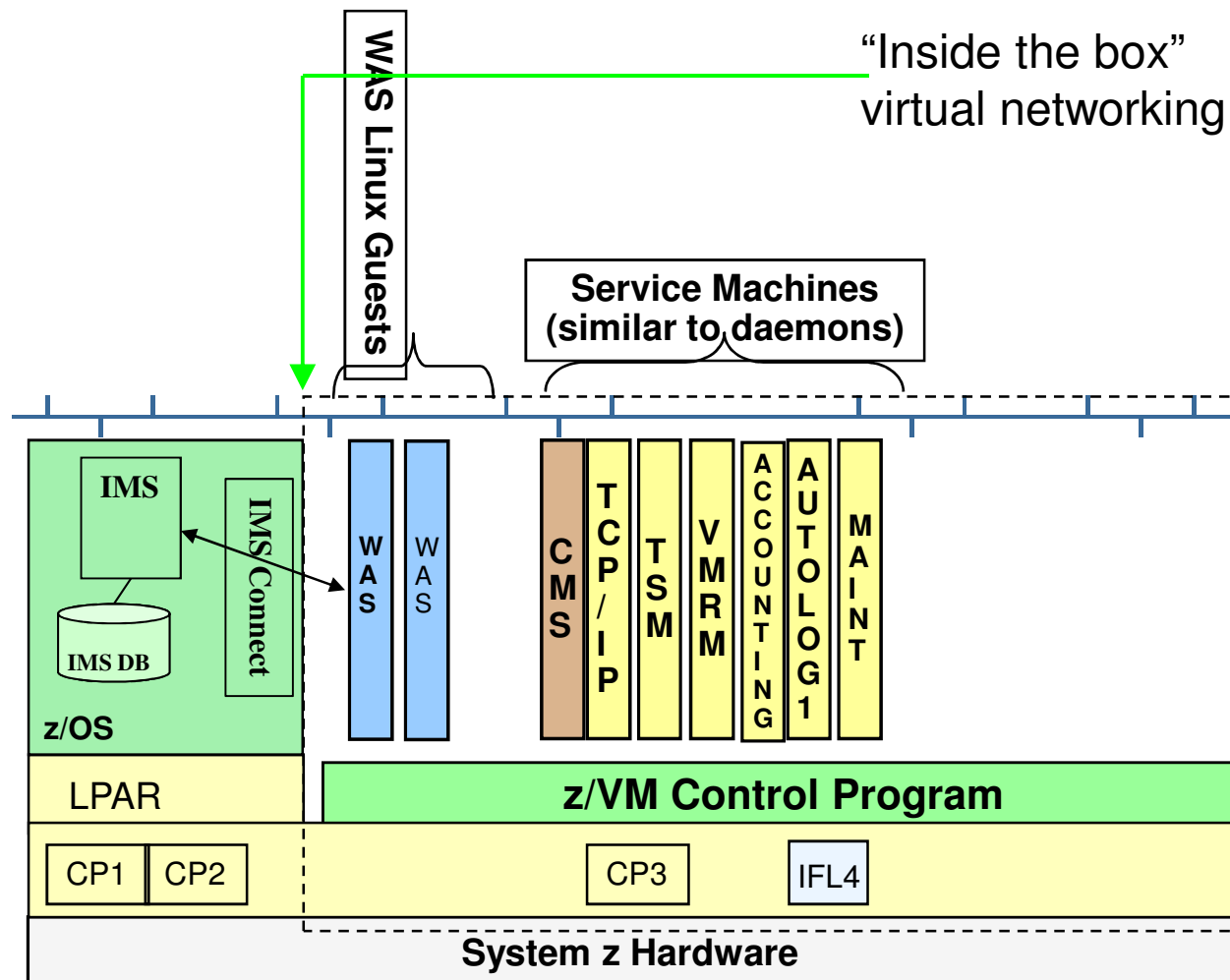
IMS Inbound Service Requests

IMS Connect – IMS's TCP/IP Gateway
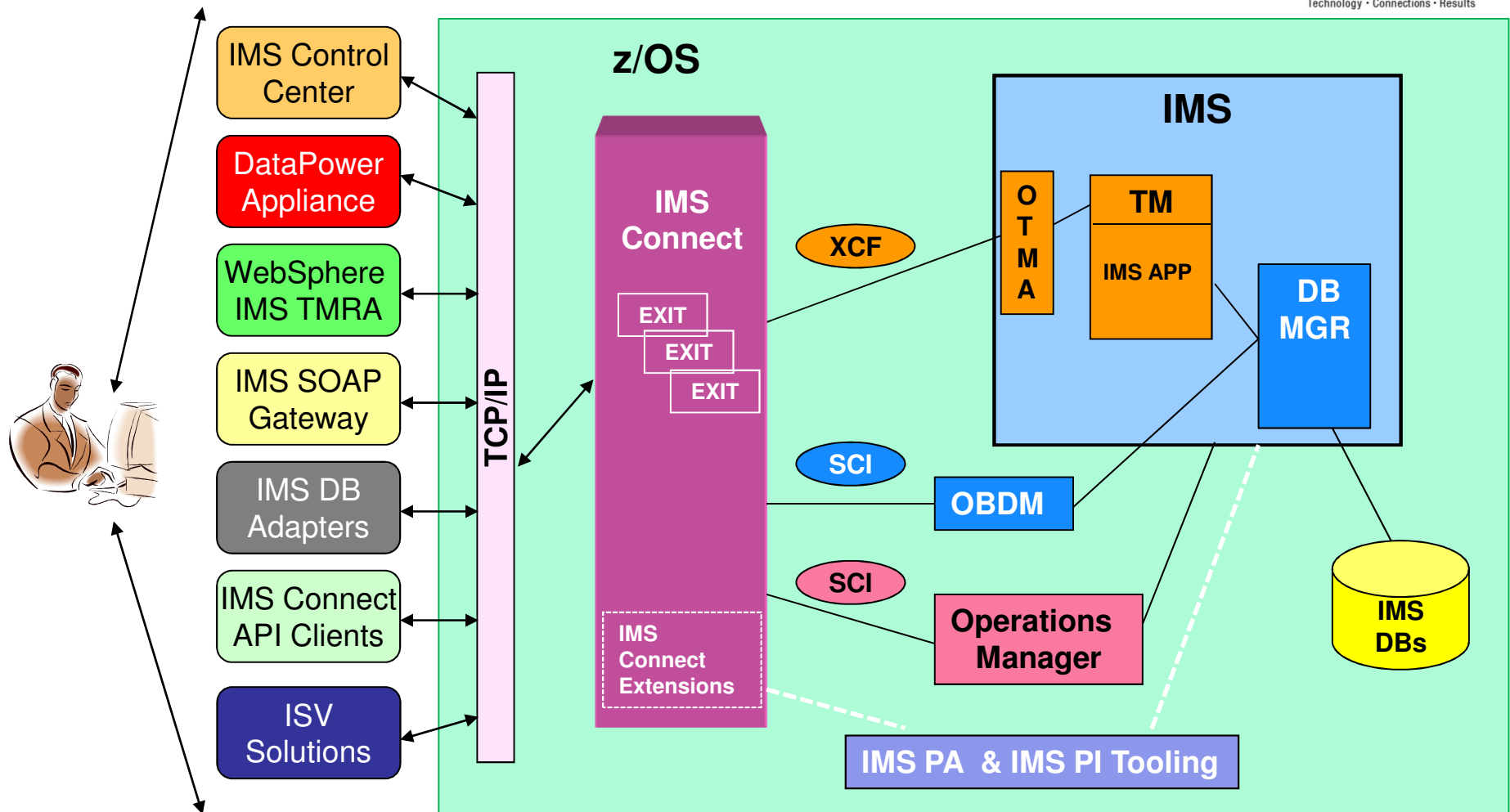
IMS Connect POC– Inbound Call

Use Case #1: Inbound access to IBM Databases
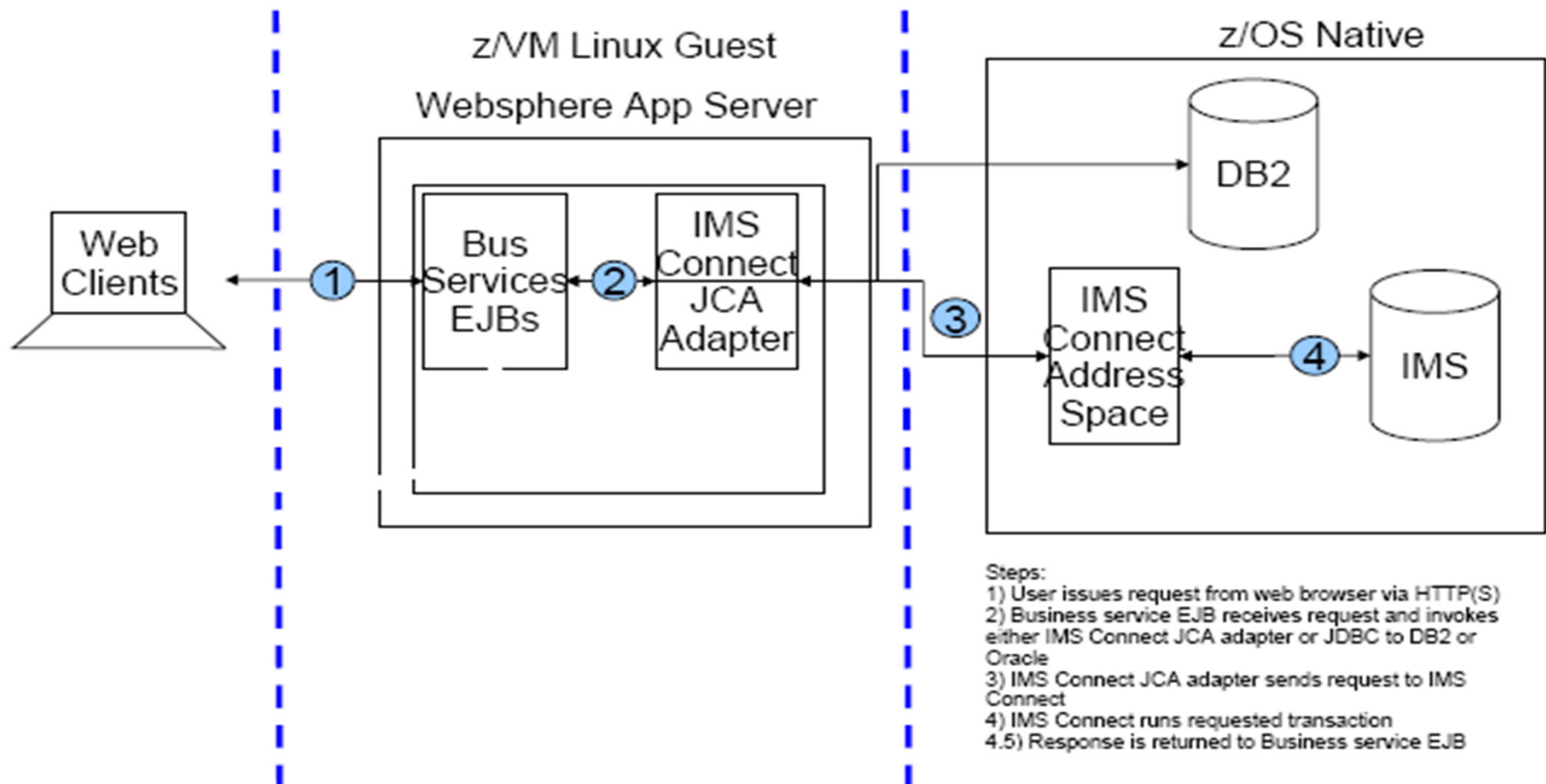
Steps:
1) User issues request from web browser via HTTP(S)
2) Business service EJB receives request and invokes either IMS Connect JCA adapter or JDBC to DB2 or Oracle
3) IMS Connect JCA adapter sends request to IMS Connect
4) IMS Connect runs requested transaction
4.5) Response is returned to Business service EJB

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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. propriety WMQ calls
    - JDBC, J2EE, TMRA, JCA 1.5 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 once IMS Connect is enabled
  - 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 some platform solutions but this does not support JDBC Batch accessing databases directly in DLI mode
  - Little Endian and Big Endian conversion between platforms
    - When the application was migrated to a Linux on System z environment, the order in which bytes were stored in memory were different
      - required specific parsing of the IMS message returned
  - Need to properly handle mainframe transaction ABENDs

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Stress Test Observations

- Graphical View of the performance for sample set of use cases fetching data from IMS
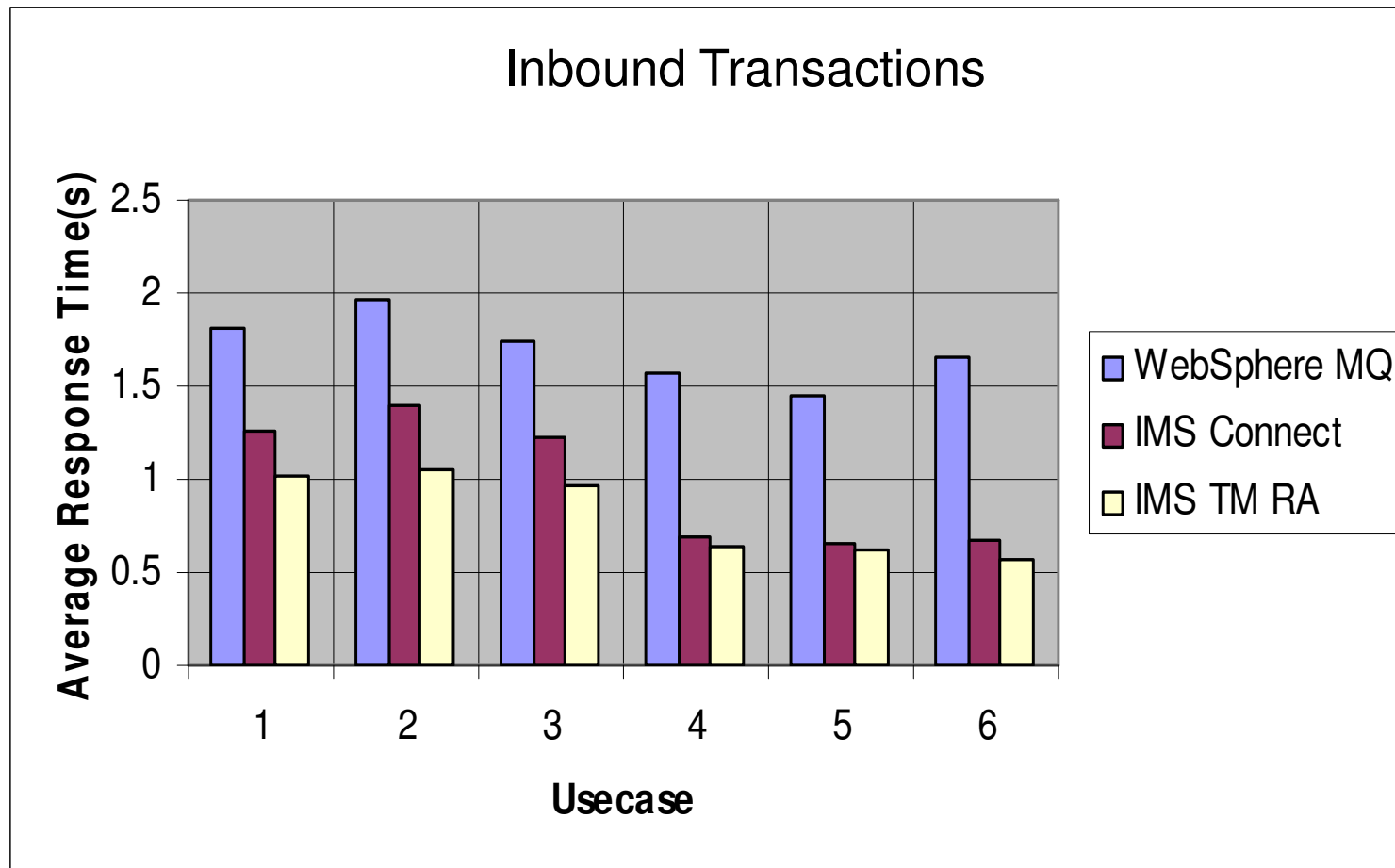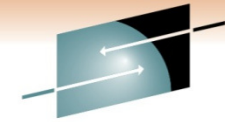
Stress Test Observations

- Snap shot of stress test results for use cases

Comparison of usecases

WebSphere MQ

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)

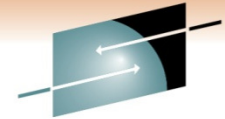| Name	MeasureType	Unit	Count	Total	Min	Avg	Max	StdDev
1A_Subscriber_Search	Response time[s]	Seconds	720	909.542	0.329	**1.263**	14.204	0.871
1C_Select_Category_and_click_lookup	Response time[s]	Seconds	360	504.113	0.484	**1.4**	8.563	0.925
1F_Benefit_Keyword_Search	Response time[s]	Seconds	180	219.625	0.422	**1.22**	5.969	0.779
2A_Group_SubGrp_Search	Response time[s]	Seconds	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]	Seconds	180	120.54	0.141	**0.67**	2.906	0.337

IMS TM RA
Average E9 transaction time: 681 ms (12/21/2009)

Name	MeasureType	Unit	Count	Total	Min	Avg	Max	StdDev
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]	Seconds	720	456.587	0.11	**0.634**	8.547	0.506
2C_Select_Categoery_Lookup_for_Group	Response time[s]	Seconds	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– Outbound Call

Use Case #2: IMS reaching out to a web service

z/OS Native

Web Clients

External Web Service

Gateway Server

IMS SOAP Gateway

IMS Connect Address Space

IMS

Steps:
1) IMS transaction issues an icall to IMS Connect
2) IMS Connect passes/transforms request and sends SOAP over HTTP
3)
4) Web service receives request
4.5) Data returns to IMS via the same path
Optional:
The OBIS/OBUS flow from the previous slide can be combined if a web request can trigger an IMS transaction which is required to access an external service

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Findings – Outbound Pricing Service

- Call failed in the timeframe of the PoC
  - Issues within the IBM® Rational® Developer for System z® artifact creation made us change direction to create a simple http enabled service to continue with the PoC
    - WSDL RPC support - Not all standard WSDL levels were support (IBM confirmed that in the next release this issue should be addressed)
    - 3 enhancement requests were opened to make the tool useful in a production deployment environment (ODC, multiple mapping and embedded logic)
    - IBM® Rational® Developer for System z® (RAD/z) connection issues to the mainframe demon listeners persist

Findings – Outbound Pricing Service

- Simple http enabled service was successful
  - All of the following configuration issues were resolved
    - Tpipe connectivity issue
      - *ongoing 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 with adhoc security put in place and the applying of a PMR*
    - 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 at SVL

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

Potential Benefits

- **IMS Connect and IMS SOA Integration Suite**
    - Performance and scalability improvements
    - Reduced maintenance vs. WMQ setup and maintenance
    - Assuming a MIPs reduction
        - It was determined that an average claim took 60 - 100 ms of overhead when doing the WMQ calls
    - IMS Connect / IMS ICAL eliminated the 32Kb payload restriction
        - allowed for our request and response payloads of 16mb
    - Eliminated the multiple points of failure inherent in WMQ hops
    - Allows a point to point connection to all web enabled/SOAP/html services within IMS
    - Brings the M/F IMS environment inline with SOA standards

Potential Benefits

- **Server Virtualization using Linux on System z**
    - Dynamic computing resource allocations
    - Decrease complexity to improve manageability of systems
    - Automate routine tasks
    - Reduce overall management costs through efficiency
    - Potential Software license cost saving
    - Increase the return from infrastructure investment by better utilizing resources
    - Energy and space saving

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
  - Provide developer self service capabilities
  - Simplify ongoing operations and reduce 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 Box Migration
    - consolidate 2 boxes

Post-PoC Steps

- **Identify Additional applications in scope**
  - RPC applications
  - Frameworks integration using Data Power

- **Phase II PoC**
  - Centralize Benefit Services running on Websphere 7 / z/OS
  - Data Power 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 driver**

  IBM Information Management Software for z/OS Solutions Information Center

References for PoC

- **Bringing IMS and SOA Together With IMS Connect**

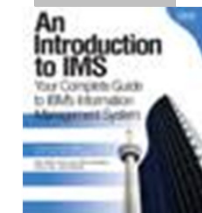 Bringing IMS and SOA Together With IMS Connect | Mainframe | IBM Systems Magazine

- **IBM - IMS Trials and Demos**

- **IBM IMS TM Resource Adapter**

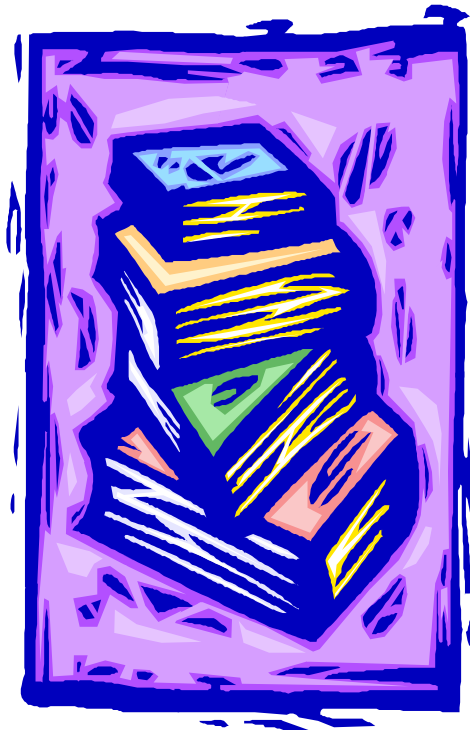 http://www-01.ibm.com/software/data/ims/ims/components/tm-resource-adapter.html

- **IBM Enterprise Modernization Sandbox**

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

IMS Information and Education

- "*An Introduction to IMS*" book
  - Update coming for IMS 11
- IMS Redbook
  - IMS Version 11 Technical Overview
- IMS Family Website: www.ibm.com/ims
  - IMS education schedule
  - Presentations, papers, newsletters, fact sheets, announce letters, redbooks
  - Schedule of seminars, webcasts and conferences
- 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/imzic

- ➢ *IMS 11 Release Planning* (GC19-2442)

    http://publib.boulder.ibm.com/infocenter/imzic

- ➢ *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

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

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  ❖ Find a community that interests you …

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  ❖ Recognizing individuals who have made the most outstanding contributions to Information Management communities

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IMS Newsletter

COBOL Café
Tried. Trusted. True.

http://imsmadesimple.tumblr.com

facebook.com/IMSFans

IMS China Blog

https://www.ibm.com/developerworks/mydeveloperworks/blogs/imscn/?lang=zh

www.ims-ug.org

http://imslistserv.bmc.com/

IMS News group

http://www.slideshare.net/ibmims

IMS on Sina

http://t.sina.com/imschina

IMS Today Blog

https://www.ibm.com/developerworks/mydeveloperworks/blogs/IMS

http://www.youtube.com/user/ReThinkIMS

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