Moving Forward with CICS, IMS, and SOA

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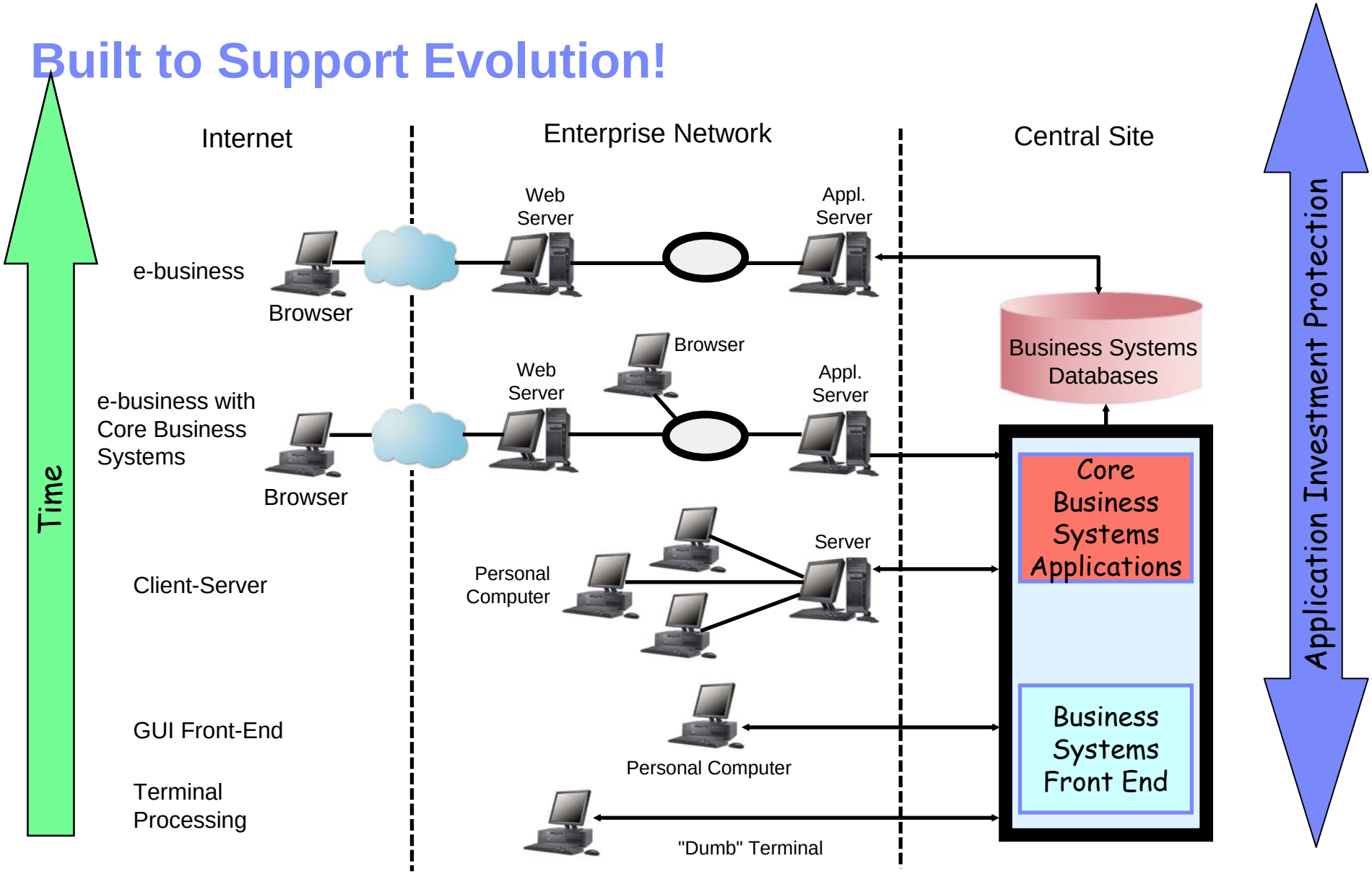
Agenda

- **Core Business Systems Integration**
- **CICS and IMS assets**
- **Transactions Connectivity Solutions**
  - JCA Connector
  - JMS Connector
  - SOAP Connector
- **Summary**

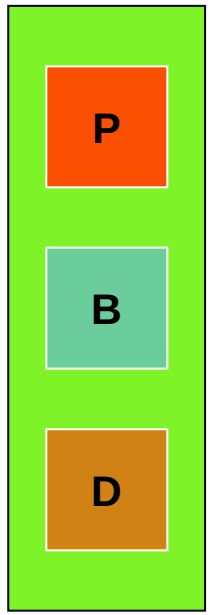
IMS and CICS are a significant part of IBM SOA strategy. The session discusses how CICS and IMS provide interfaces and frameworks that allow integration with evolving technologies through use of standards. The objective is clearly to answer many questions from customers regarding how 'best' to connect from a client or application server to a CICS or IMS asset.

Built to Support Evolution!



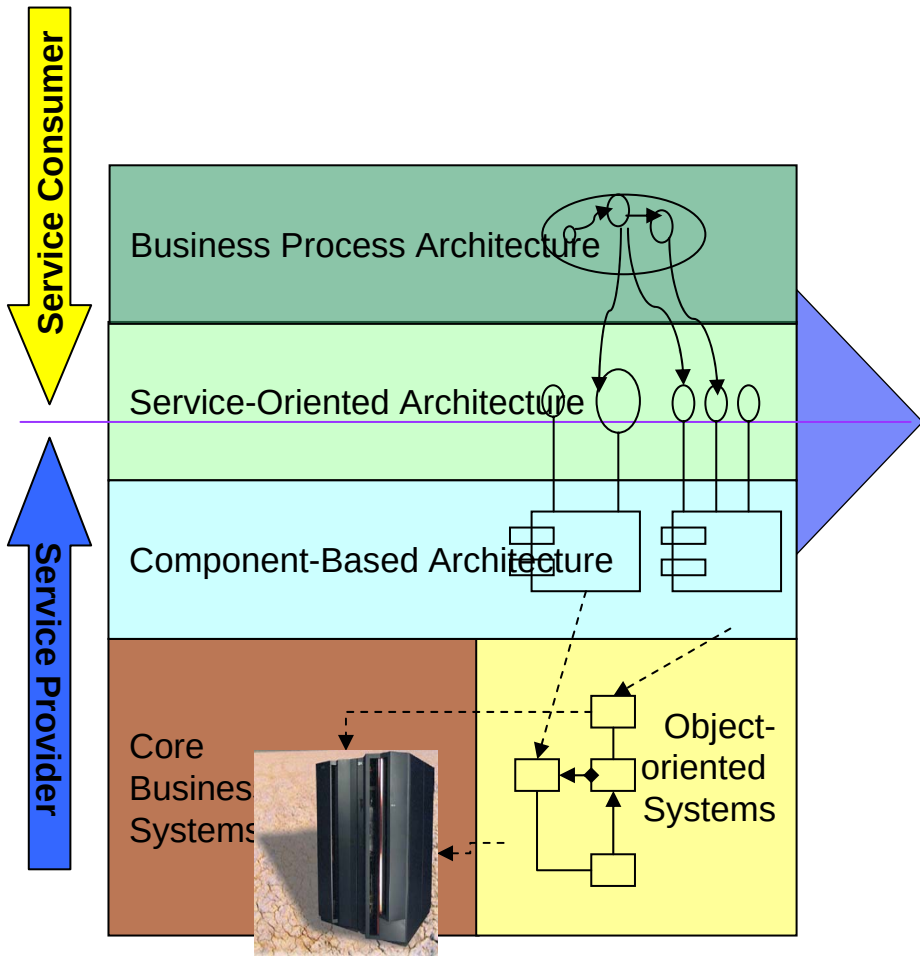
How are Core Business Systems changing?

- **New interface requirements – From client/server to Web Services**
  - Web browser access
  - Integration and automation broker access
  - Evolution of existing interfaces
- **Modernization to extend useful life of existing applications**
  - Provide access
  - Componentize for flexibility and reusability
    - Find “business rules”
    - Find separation points for UI logic, business logic, data logic
  - Convert overnight batch into online batch
- **Reduction of maintenance and operations costs of existing applications**
  - Tools support entire application (J2EE and Core Business)
  - Tools support entire lifecycle (analysis, design, test)
  - Adopt modern development practices



Why Core Business Services ?

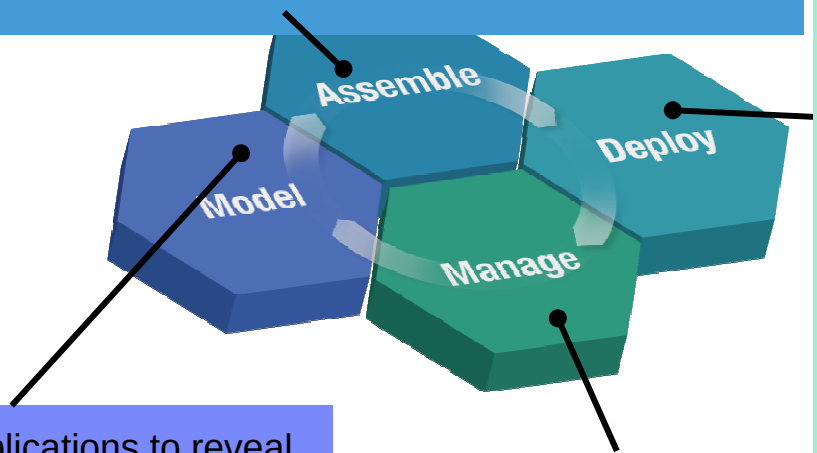
- **Leverage existing assets**
  - layer of abstraction that wraps existing assets as services that provide business functions
- **Easier to integrate and manage complexity**
  - integration point is the service specification and not the implementation
- **More responsive and faster time-to-market**
  - ability to compose new services out of existing ones
- **Reduce cost and increase reuse**
  - loosely coupled core business services can be more easily used and combined based on business needs
- **Be ready for what lies ahead**
  - better flexibility and responsiveness



Re-utilization practices

Meet new requirements by leveraging your most valuable z/OS assets

- Improve cooperation between your mainframe and client-server application teams using open integration technologies and common tools
- Program z/OS applications (WAS, CICS, IMS and DB2) with the latest Eclipse-based development workbench (COBOL, PLI, Java, …)



- Analyze your applications to reveal reusable business services
- Trace usage patterns / service levels

- Use the latest middleware and management tools to reduce operational overheads

- Automatically generate web-interfaces for core CICS and IMS applications
- Create state-of-the art user interfaces without deep programming skills
- Integrate multiple core and new applications within the same workspace
- Compose business level web services from existing CICS and IMS transactions
- Retain mainframe availability, scalability, security and recoverability
- Connect applications right across your enterprise, across all platforms

AD Transformation Tools for z/OS Applications

WebSphere Studio Asset Analyzer (WSAA)

- Application Understanding
- Impact Analysis

Enterprise-wide app discovery and insight; find dependencies across applications and lines of business

Architects, project leaders, DBAs, developers, system programmers

Asset Transformation Workbench (ATW)

- Application Analysis
- Business Rule Management
- Components for reuse

Project-level workbench for deep application analysis and transformation

Architects, project leaders, analysts, developers

ATW Analyzer for Eclipse

Program level analysis

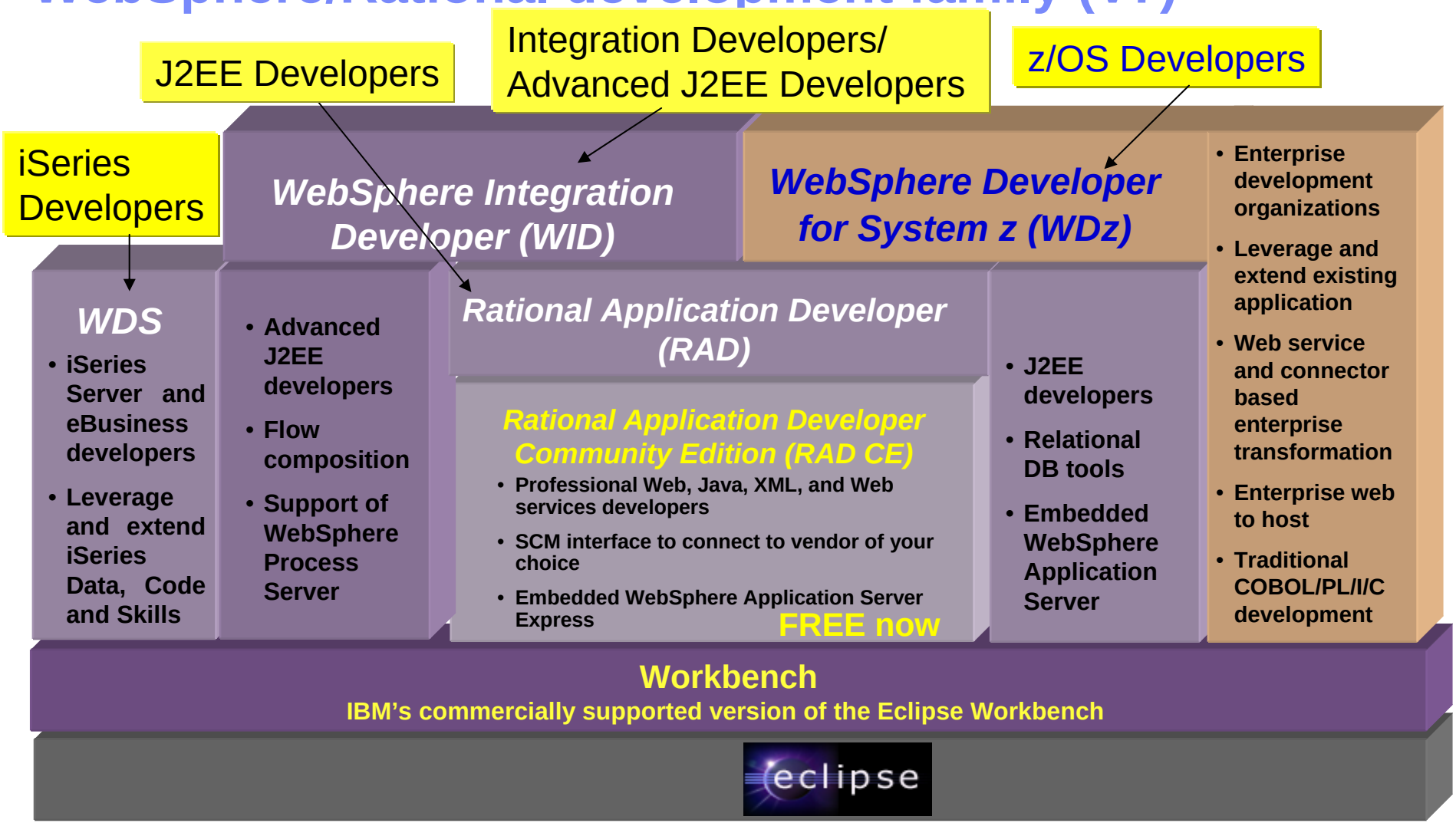
WebSphere Developer for System z (WDz)

- Traditional Development
- Web Development
- Services Development

Common IDE for COBOL, PL/I, J2EE and Web services development

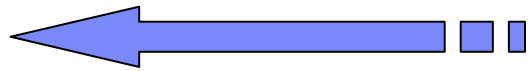
Architects, Developers

WebSphere/Rational development family (V7)



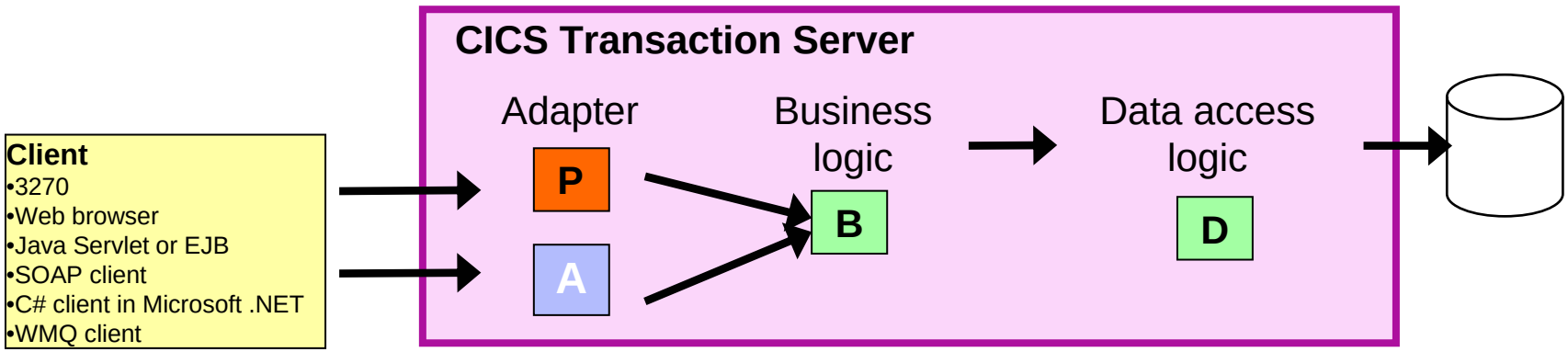
Agenda

- **Core Business Systems Integration**
- **CICS and IMS assets**



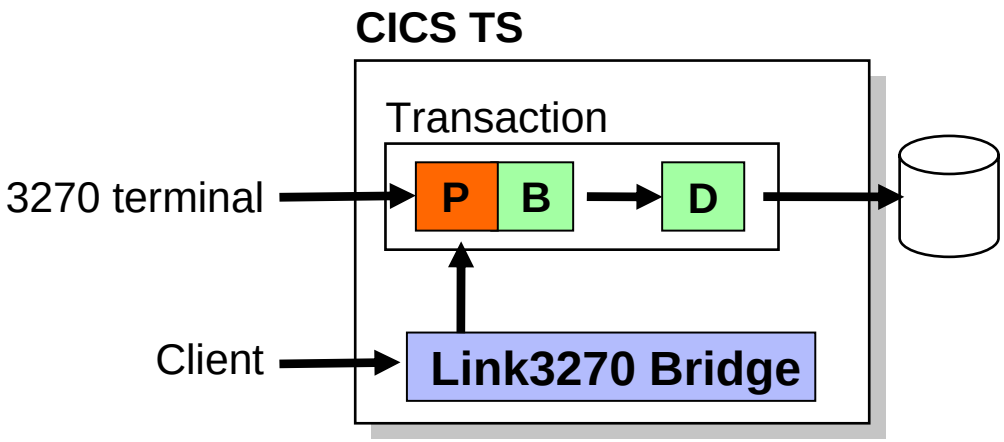
- **Transactions Connectivity Solutions**
  - JCA Connector
  - JMS Connector
  - SOAP Connector
- **Summary**

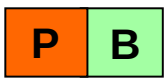
What assets in CICS can be transformed?



- **Best practice in CICS application design is to separate key elements of the application, in particular:**
  - Client adapter or Presentation logic
  - Business logic
  - Data access logic
- **Adapter/connector can be**
  - External (e.g JavaBean using CICS Transaction Gateway classes)
  - Internal (e.g CICS XML-aware program)
  - Written or generated by tools

Reusing 3270 presentation logic within CICS using the Link3270 Bridge





- **Some programs combine presentation, integration, and business logic**
- **Link3270 Bridge provides a COMMAREA interface to many BMS and terminal-oriented programs**
  - ADS information in the COMMAREA is passed to the BMS application
  - Does not use VTAM or screen scraping
  - No changes required to existing BMS application

What assets in IMS can be accessed?

B

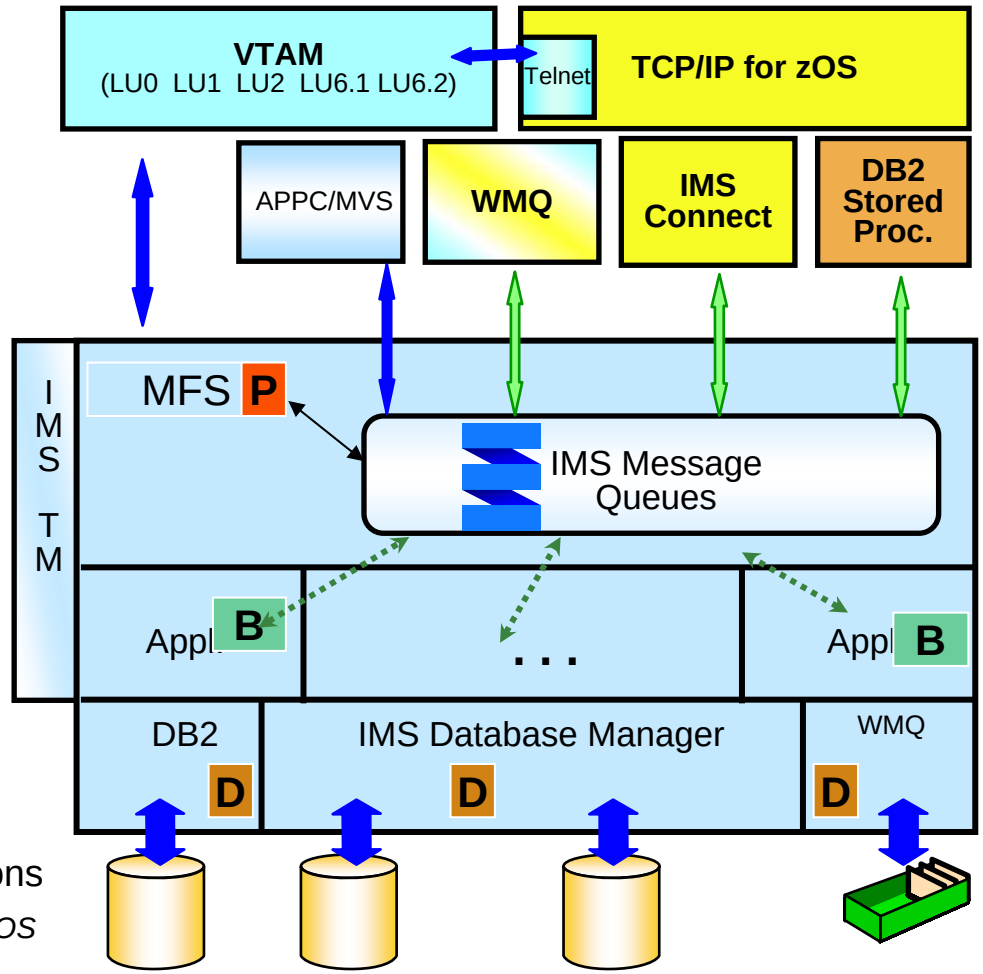
- **IMS Transaction**
  - No presentation layer
  - Access to Resource Managers (RM)
    - IMS DB, DB2, MQ
  - Very simple design
    - Get Input Message
    - RM calls
    - ISRT Output Message

D

- **IMS Database**
  - Hierarchical design
  - JDBC access
  - XML datastore

P

- **IMS MFS**
  - Description of input and output messages and device map
  - Not used in client/server implementations



What assets in IMS can be accessed? …

- **First IMS Asset – IMS Transactions**
  - Integrating IMS Transactions
    - Direct connection model
      - 3270 Emulation
      - JCA Connector
    - Messaging and Queuing model
    - Publishing as a Web Service

- **Second IMS Asset – IMS Databases**
  - Integrating IMS Databases
    - Direct Connection model
      - ODBA
      - JCA Connector
  - Integrating IMS Databases in a Information Integration Platform
    - Based on WebSphere Classic Federation and Event Publisher

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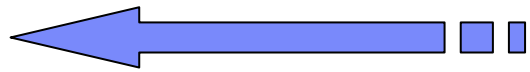
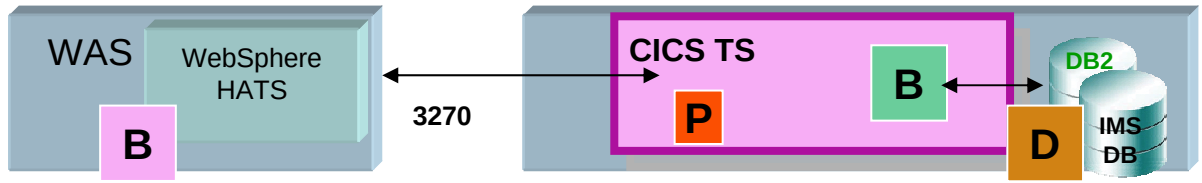
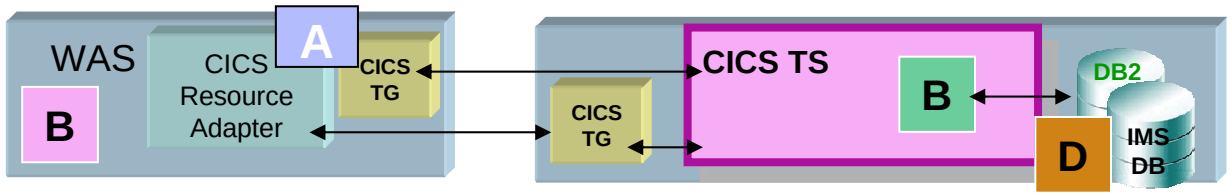


CICS Transactions - Connectivity Solutions

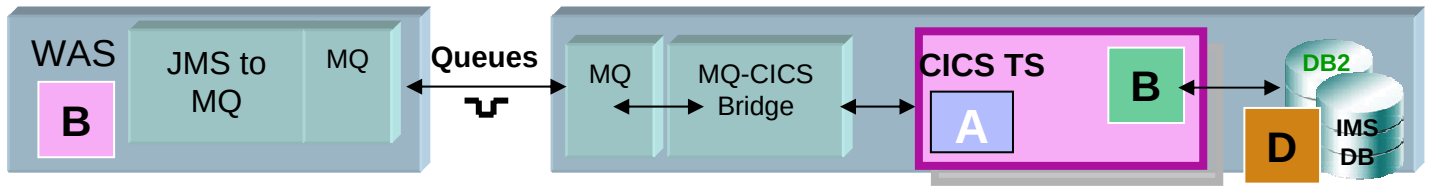
WebSphere Host Access Transformation Services (HATS)



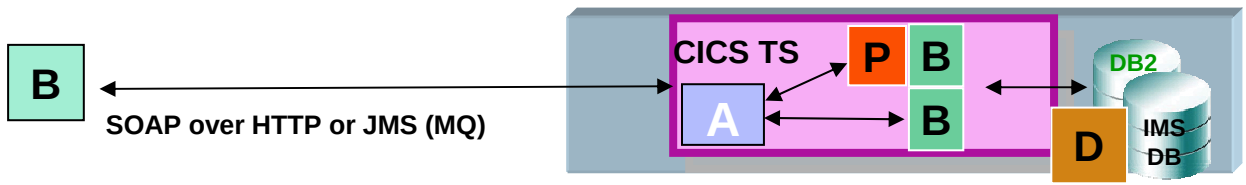
JCA Connector: CICS Transaction Gateway



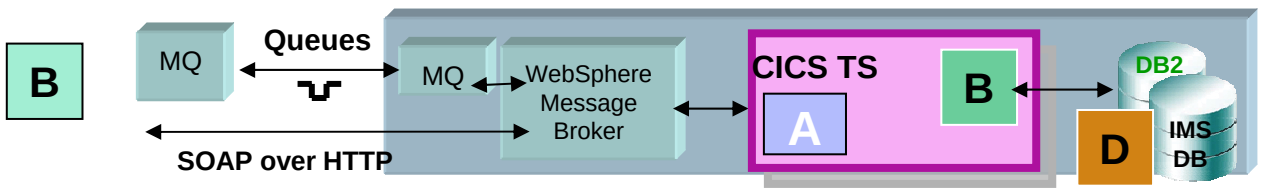
JMS Connector: MQ to CICS Bridge



SOAP Access: CICS Web services Support



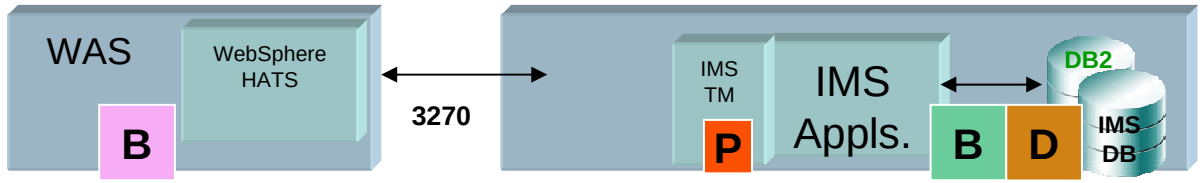
WMB as Advanced ESB: CICSRequest node



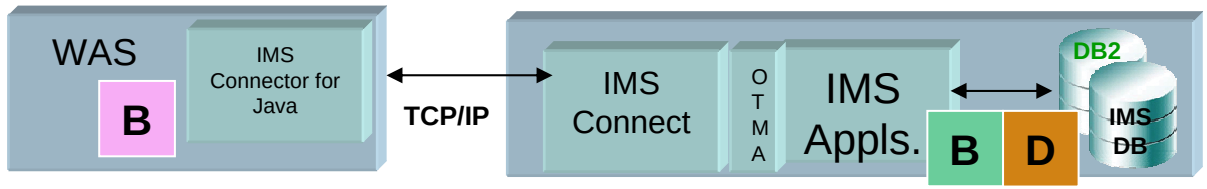
WAS can be on z/OS, on Linux for z or on any distributed platform. Qualities of Services will vary.

IMS Transactions - Connectivity Solutions

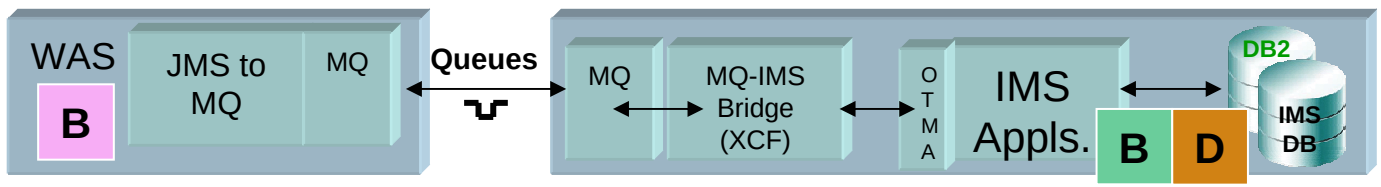
WebSphere
Host Access Transformation Services (HATS)



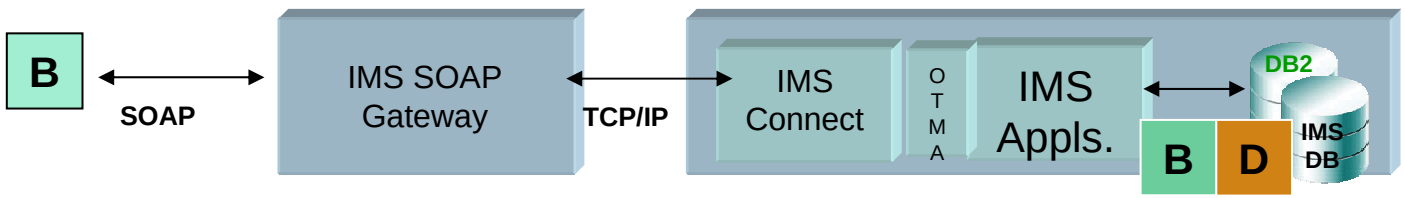
JCA Connector:
IMS Connect / IMS Connector for Java
Renamed to IMS TM Resource adapter



JMS Connector:
MQ to IMS Bridge



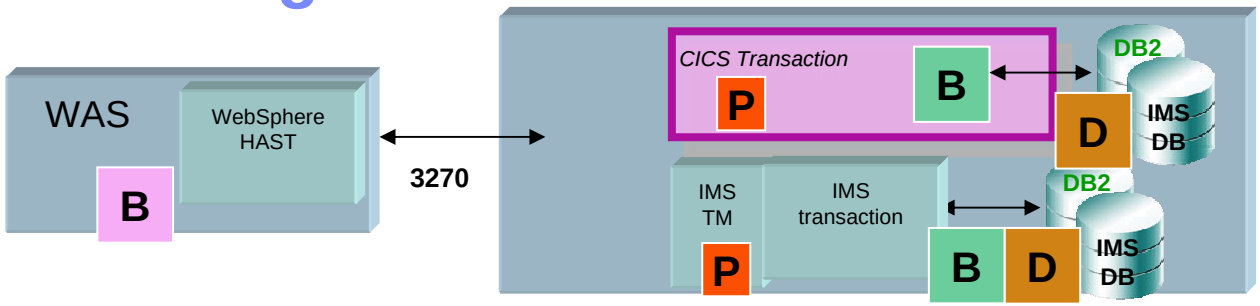
SOAP Access:
IMS SOAP Gateway



Which architecture should I use?

- **Standard architectures provide a choice of options and support**
  - JCA (J2EE Connector Architecture)
  - SOAP (Simple Object Access Protocol)
  - JMS (Java Messaging Service)
- **Lots of factors including …**
  - Security
  - Transactionality
  - Performance
  - Architectural limits
  - Synchronous or asynchronous invocation
- **CICS Information**
  - http://www-306.ibm.com/software/htp/cics/connectors/
  - And also Redbook '"Architecting e-business Access to CICS"
- **IMS Information**
  - http://www-306.ibm.com/software/data/ims/toolkit/
  - And also Redbook "IMS Connectivity in the On Demand Environment - A Practical Guide to IMS Connectivity"

Web-to-Host using HATS

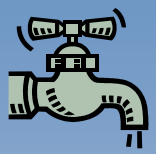


- **WebSphere Host Access Transformation Services (HATS)**
  - Increase productivity and reduce training costs. Convert green screens into intuitive Web interfaces
  - Extend existing applications to new users, such as business partners, suppliers and customers
  - Integrate traditional applications into enterprise portals. Provide a single, personalized point of access.
  - Reduce development costs by avoiding rewrite of core business applications.
- **Solution Benefits**
  - No changes in application (CICS, IMS or TSO)
  - No middleware to install

http://www.ibm.com/software/webservers/hats

CICS Transaction Gateway

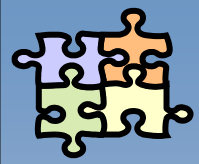
High-performing, security-rich and scalable J2EE standards-based access to CICS



Plumbing

Primary connector into CICS

- High performing and scalable inbound connector to CICS applications
- Provides connectors to COMMAREA and 3270-based CICS applications



Interfaces

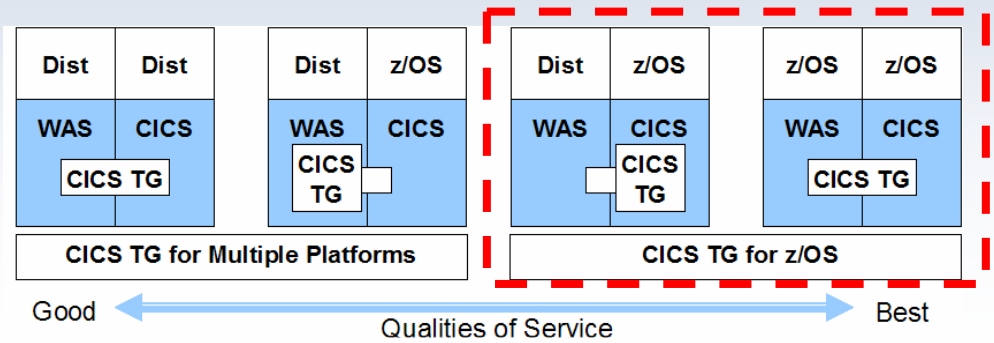
Java and non-Java API's

- Standard JCA interface is strategic and provides best Qualified of Service
- Base Java, C, C++, COBOL and COM interfaces are supported but stabilized

Integration

WebSphere, CICS and others

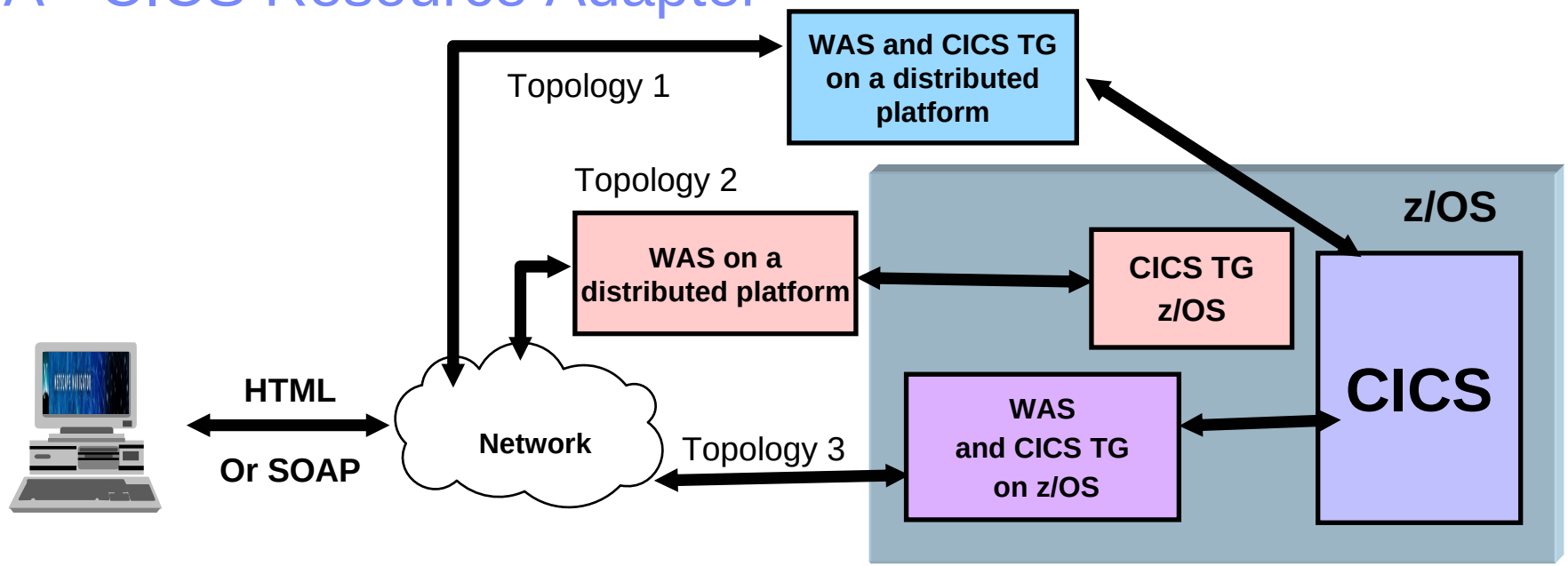
- Every in support CICS server on every platform to WebSphere SOA foundation servers
- 5 SNA servers (AIX, Windows, Linux on zSeries)



Supported Platforms

- **IBM's flagship z/OS**
- Linux on Intel, POWER, & zSeries
- AIX, HP-UX and Solaris
- Windows

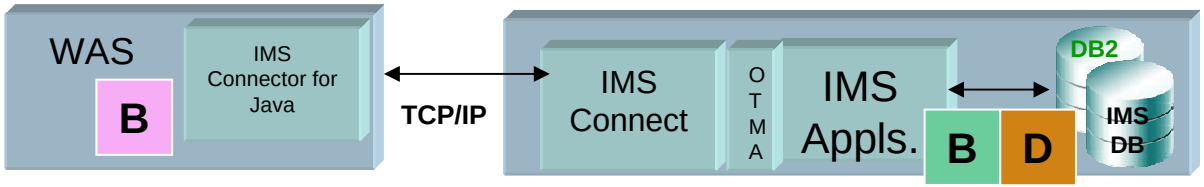
JCA - CICS Resource Adapter



- **CICS Transaction Gateway**

- **Solution Benefits**
  - The “Direct Connection” Choice!
  - From any WebSphere platform, z/OS or distributed with J2EE Quality of Services
    - Qualities of service vary according to topology
    - See white paper ‘Integrating WebSphere Application Server and CICS using the JCA’

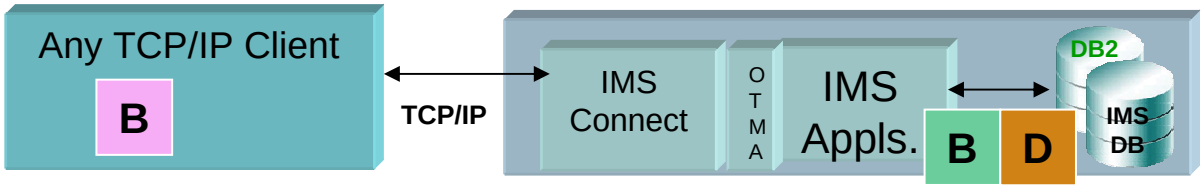
JCA - IMS Resource Adapter



- **IMS Connector for Java (renamed to IMS TM Resource Adapter)**
  - Provides connectivity to IMS Transactions
    - With an option to use a global transaction scope between the 2 business logic parts (distributed Two-Phase Commit)
- **Solution Benefits**
  - The “Direct Connection” Choice!
    - Prereqs installation of IMS Connect
    - No changes to IMS applications
  - The “Strategic” option for IMS Lab
  - From any WebSphere platform, z/OS or distributed with J2EE Quality of Services

http://www-306.ibm.com/software/data/db2imstools/imstools/imsjavcon.html

IMS Connect – The TCP/IP Gateway to IMS

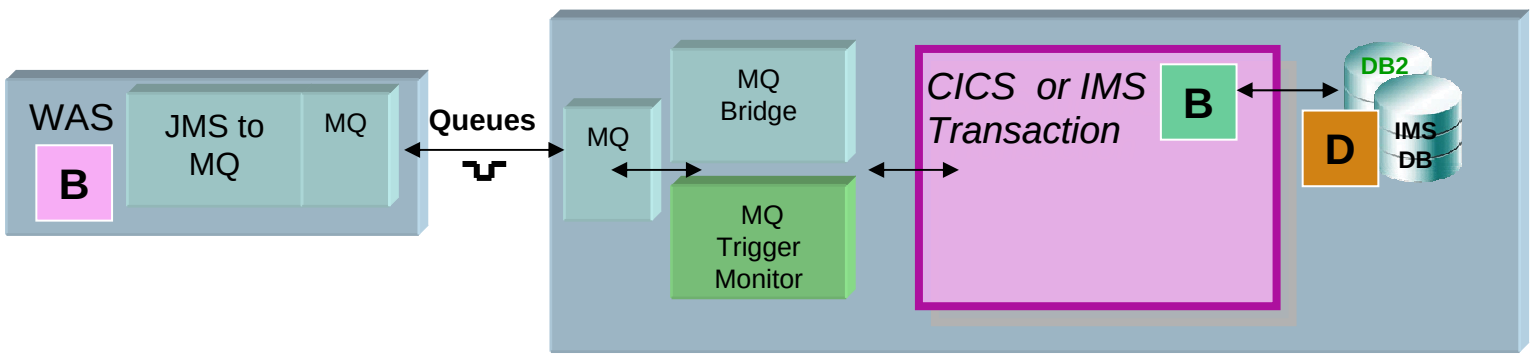


- **High performance TCP/IP access to IMS environment**
  - IMS is the server, the workstation application is the client
  - Client uses TCP/IP to send IMS transaction and receive reply
  - IMS Connect defines the required message protocol.
- **Solution Benefits**
  - An IBM tool prior to IMS V9
  - Integrated IMS Connect function in IMS V9
  - Used by several vendors as basis of their connectivity solutions

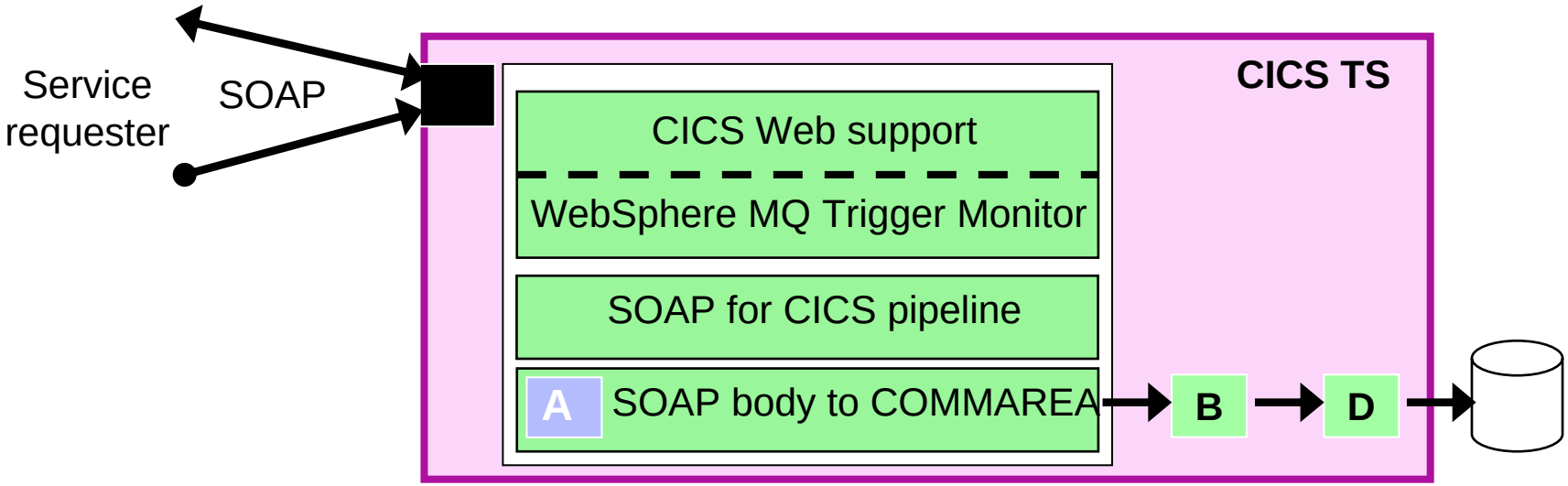
http://www-306.ibm.com/software/data/ims/connect/index.html

JMS – Access to CICS or IMS Transactions

- **WMQ CICS or IMS Bridge**
  - Transfers the message to the unchanged CICS or IMS transaction.
  - Transfers the output message to the Reply_To_Queue.
- **Solution Benefits**
  - The “Asynchronous Connection” Choice!
- **MQ Trigger Monitor**
  - Run as a CICS or IMS application which use MQ API to call the business logic program.
- **Solution Benefits**
  - Trigger Monitor is a real MQ based application which allows some additional processing outside of the CICS or IMS application



SOAP – Web Service involving CICS

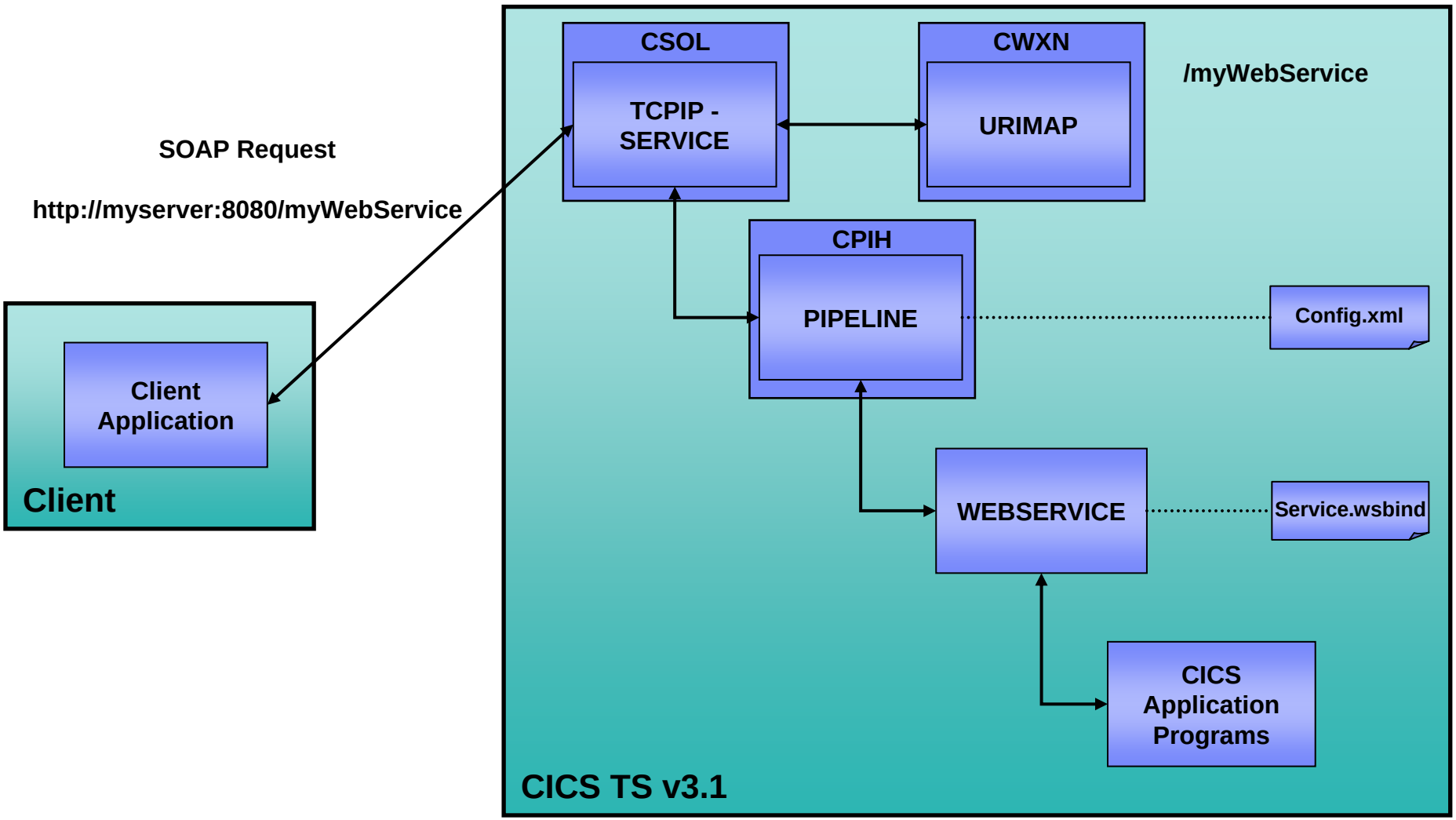


- **Web Service can be accessed using SOAP/HTTP or SOAP/WMQ**
- **SOAP for CICS pipeline is a sequence of message handlers**
- **Adapter is a COBOL program**
  - Converts SOAP body to COMMAREA and vice-versa
  - Generated using WebSphere Developer for System z, or manually
- **CICS also provides a SOAP outbound capability**

CICS Resource Definitions

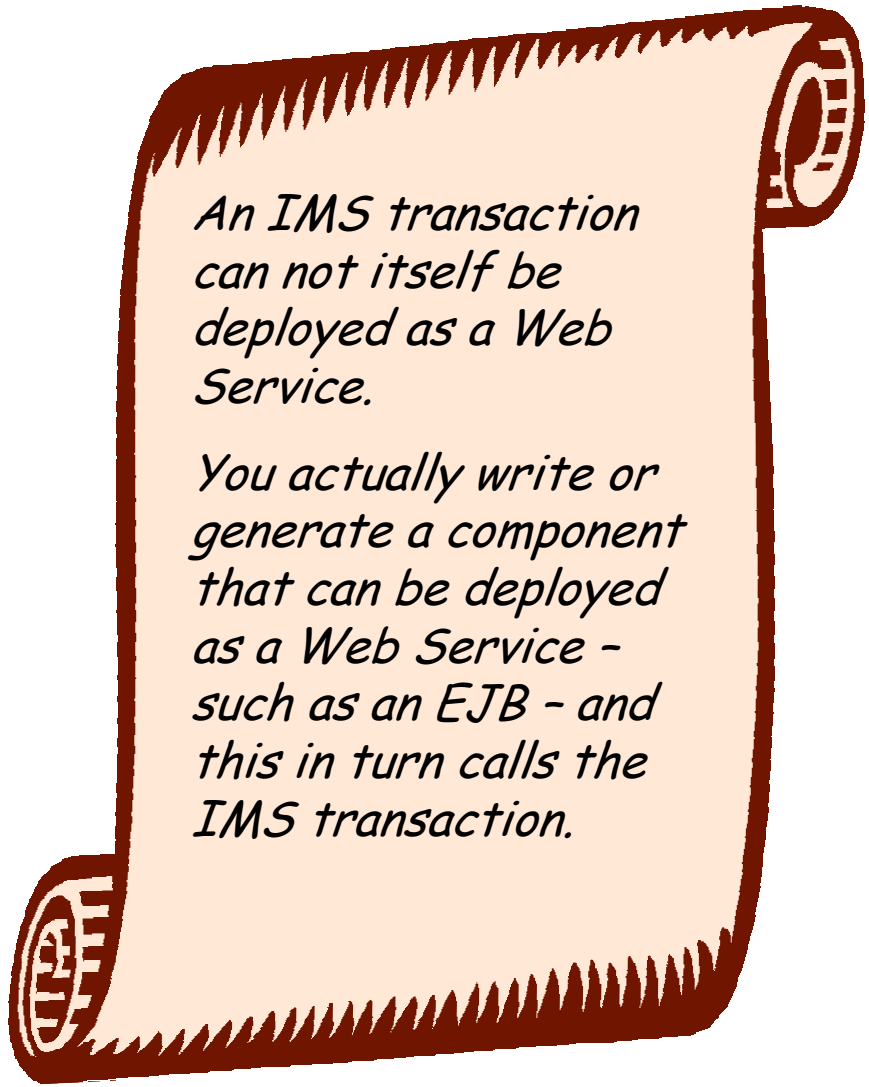
- **Define the transport**
  - HTTP: TCPIPSERVICE for inbound requests
  - WMQ: QLOCAL definition
- **Find the Web Service**
  - URIMAP definition
- **Define the qualities of service**
  - PIPELINE definition
- **Define the Web Service execution environment**
  - WEBSERVICE definition

CICS as a Provider



SOAP - Web Services Involving IMS

- **Artifacts that can be registered as Web Services**
  - Java Beans and EJBs
    - IMS transaction access
    - IMS DB access via JDBC/ODBA
  - Scripted flows
  - DB2 Stored Procedures
    - Another way of getting to execute an IMS transaction thru OTMA Callable interface
    - Another way of getting at IMS Data Bases via ODBA



SOAP - Web Services Involving IMS …

- **For several years it has been possible to generate J2EE access to IMS transactions**
  - From servlets, EJBs and as Web Services
- **These solutions use java J2EE components (Servlets and EJBs) running inside WebSphere Application Server**
- **They support a full range of IMS options**
  - Commit mode 0, or 1 with optional distributed sync-point
  - Single segment or multi-segment messages
  - IMS conversational or non-conversational processing
- **The IMS SOAP Gateway has been introduced to enable calling of IMS transactions as Web Services in a light-weight manner**
  - No use of WAS
  - No requirement to use java at the client (e.g.. works with .NET)
  - Currently, single segment messages using commit mode 1 and Sync_Level = None

IMS SOAP Gateway

- **A Web Service solution for IMS with direct SOAP support**
  - Leverages existing IMS applications as Web Services without the need of a J2EE server
  - Supports different types of applications – Microsoft .Net and Java
- **Supports Web Service specifications and leverage Open standards**
  - SOAP/HTTP 1.1, WSDL 1.1, WS-I Basic Profile 1.0
  - UTF-8 encoding for SOAP messages
- **Web service-enabled IMS application with easy deployment**
  - Makes your IMS application a web service with easy deployment and configuration – no programming needed
- **Transforms XML data to IMS data**
  - By IMS application
  - Or by IMS Connect XML Adapter
    - Transforms XML data using IBM WebSphere Developer for zSeries XML converters eliminating the need to modify the IMS application code

Web Service access to CICS

Standard architecture	Capabilities	Development Platform	Interface	Coupling
1. CICS Web Services support	Inbound and outbound Synchronous (HTTP) Asynchronous (WMQ)	WebSphere Developer for z (for XML Parser)	COMMAREA CONTAINER	Loose
2. JCA	Inbound only Synchronous Asynchronous 32KB max message size	RAD or WID	COMMAREA	Medium
3. JMS/ WebSphere MQ	Inbound and outbound Asynchronous Assured delivery	RAD or WID	COMMAREA WebSphere MQ API	Medium

Standard architecture	Description	Positioning	Recommendation
1. CICS Web Services support	Comprehensive W3C standards for messaging over the Web supporting SOA to and from CICS	Industry-wide open standard integration technology that includes CICS connectivity. Improving QoS, features and performance	*Establish plans to transform CICS apps so they can participate in a SOA pattern with Web services*
2. JCA	Lightweight J2EE standard for calling CICS and other EIS's	Widely adopted precision CICS connectivity with highest qualities of service today	*Continue to exploit JCA and CICS TG and use within an SOA and ESB*
3. JMS/WebSphere MQ	Comprehensive industry standard for assured messaging	Widely adopted B2B integration technology that includes CICS connectivity	*Continue to exploit WebSphere MQ for basic messaging and flowing Web services*

Web Service access to CICS - Solution Criteria Check-list

	1 - CICS Web services support	2 - JCA	3 - JMS/WebSphere MQ (using MQ DPL bridge)
Architectural limits	>32K OK Inbound/outbound support Container support	32K maximum message size Bypass by coding logic into service component Inbound support only	>32K OK Inbound/outbound support
Reliability availability	High availability config based on CICSplex and transport-based workload management	High availability config options available – depend on CICS TG topology	High availability config based on CICSplex and MQ workload management (cluster or shared queues)
Transactionality	Emerging 2PC support (WS-AtomicTransaction) CICS Local transaction	Most robust global tran support – JCA XA support	No global transaction support
Security	WS-Security SSL User ID + password Transport level security Trust depends on transport mechanism (MQ or HTTP)	Lots of options Container managed or component managed signon SSL User ID + password Thread identity when WAS on z/OS Trust depends on CICS TG topology (SSL client auth, or MRO Bind security)	Carry identity in MQ message. Trust (SSL on channel) or protection of queues SSL User ID + password
Performance and scalability	Depends on SOAP message complexity, length	Best for short msgs	Best for long msgs

Web Service access to IMS

Standard architecture	Capabilities	Development Platform	Interface	Coupling
1. Using IMS SOAP Gateway	Inbound only Synchronous (HTTP) 32 KB limit (single segment)	WebSphere Developer for z (for XML Parser)	IMS I/O Message (llzztrandata)	Loose
2. JCA	Inbound only Synchronous with Asynchronous output options NO max message size: IMS Connect supports multi segment message (32K limit for one single segment)	RAD (for WSDL and SOAP Proxy)	IMS I/O Message	Medium
3. JMS/ WebSphere MQ	Inbound and outbound Asynchronous Assured delivery	RAD (for WSDL and SOAP Proxy)	IMS I/O Message or WebSphere MQ API	Medium

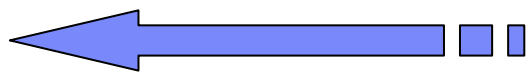
Standard architecture	Description	Positioning	Recommendation
1. Using IMS SOAP Gateway	Lightweight J2EE standard for messaging over the Web supporting SOA to IMS	Basic SOAP Support to access IMS transactions Future: Improving QoS, features and performance	*If customer does not wish to write a web services wrapper program (e.g. WAS EJB), then the best integration option is usually "IMS SOAP Gateway"*
2. JCA	Comprehensive W3C standards for messaging over the Web supporting SOA to IMS	Widely adopted IMS connectivity with highest qualities of service today	*If customer uses WebSphere Application Server to create mid-tier components then the best integration option is usually J2C, using IMS Connector for Java*
3. JMS/ WebSphere MQ	Comprehensive industry standard for assured messaging	Widely adopted B2B integration technology that includes IMS connectivity	*Continue to exploit WebSphere MQ for basic messaging and flowing Web services*

Web Service access to IMS - Solution Criteria Check-list

	1 - IMS SOAP Gateway	2 - JCA	3 - JMS/ WebSphere MQ
Architectural limits	32K limit Inbound support only Synchronous Non-conversational trans only	>32K OK with IMS Multi-segments Inbound support only Outbound using MQ or APPC Synchronous (but with optional asynchronous "assured delivery" of reply)	>32K OK with IMS Multi-segments Inbound/outbound support Asynchronous
Transactionality	No global transaction support	Most robust global tran support – JCA XA support	No global transaction support
Security	No support yet for WS-Security Security from ICON: •SSL •User ID + password	Lots of options Container managed or component managed Trust model ▪ SSL or Userid /password validation in IMS Connect ▪ Then SAF security based on Userid in IMS subsystem	Carry identity in MQ message. Trust (SSL on channel) or protection of queues SAF Userid /password validation in MQ IMS Bridge
Reliability / Availability	Based on OS used Best when SOAP Gateway available on z	High availability config options available for IMS Connect (especially with zOS TCPIP Sysplex Distributor)	High availability config based on IMSplex and MQ workload management (cluster or shared queues)
Performance / Scalability	No results currently Requirement to port it to z/OS	Best option today	

Agenda

- **Core Business Systems Integration**
- **CICS and IMS assets**
- **Transactions Connectivity Solutions**
  - JCA Connector
  - JMS Connector
  - SOAP Connector
- **Summary**



Summary

- **Core Business applications are critical to enterprise customers**
  - Business Integration need to consider them
  - Maintain forward progress (preserve customer investments)
  - Ratio of COBOL/PLI to J2EE developers typically 5x to 10x
  - Applications must l

An on demand business is an enterprise whose **business processes — integrated end-to-end** across the company and with key partners, suppliers and customers — can **respond with speed** to any customer demand, market opportunity or external threat.