The Modern Mainframe…
At the Heart of Your Business

Using SOA to Build Your Next Generation Solution

Service Oriented Finance's Business Problem

We want to increase revenue by selling our car loans through external Brokers

**Service Oriented Finance
CEO**

Service Oriented Finance's Technical Challenges

How can Brokers access our existing car loan application?

**Service Oriented Finance
CIO**

Leverage Existing Investments

25% of the world's capital investment is in I/T*. The only way to innovate in a cost-effective manner is to leverage these investments

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"Many of the I/T assets required to enable an on-demand business already exist and have been supporting the business for years or even decades. Enabling these I/T assets to participate in integrated business processes is key to improving responsiveness".

DH Brown Associates, Inc.
Application Transformation: Leveraging Existing I/T Assets to Build Competitive Advantage (September 2004)

* Does not include real estate or government assets

Existing CICS Investment: SOF Customer Management System
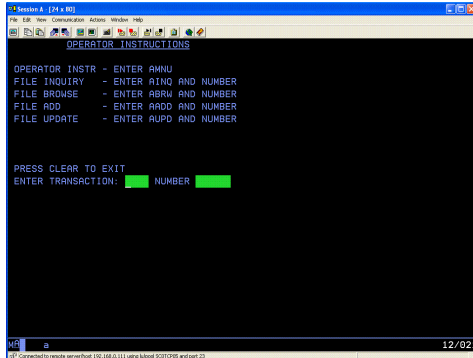
We have invested millions of dollars in this asset

Service Oriented Finance CIO

Existing application consists of CICS programs accessed via "green screen" terminals.

How do we make this available to external Broker applications?

Use SOA to Unlock Your Assets

We want to make portions of this application available to external Loan Brokers

You can unlock your existing assets using a Service Oriented Architecture

Service Oriented Finance CIO

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The Basics: What is SOA?

… service oriented architecture (SOA)?

An IT **architectural style** that supports integrating your business as linked services

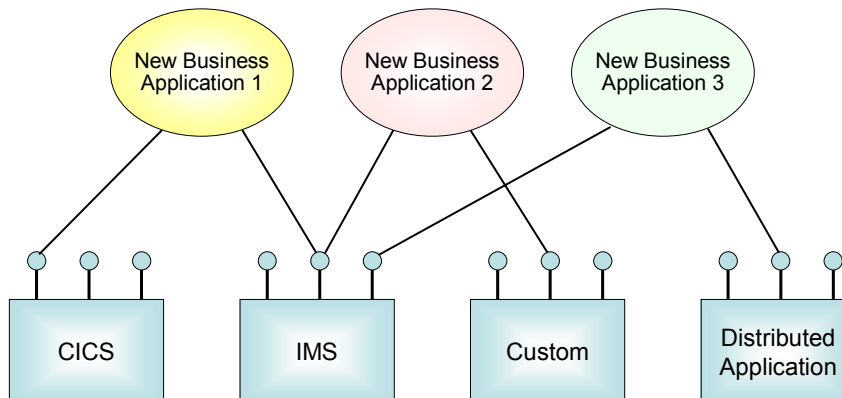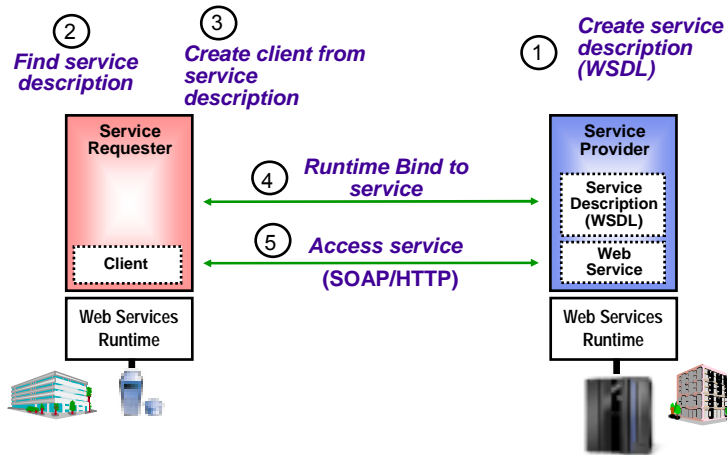"SOA impacts every aspect of IT and business."

Gartner

Steps to SOA

- Expose enterprise assets as services
- Create a rich environment for easy reuse
- Combine services to create new applications

New Business Application 1

New Business Application 2

New Business Application 3

CICS	IMS	Custom	Distributed Application

Introduction to SOA: Web Services

② Find service description

③ Create client from service description

① Create service description (WSDL)

Service Requester

Client

Web Services Runtime

④ Runtime Bind to service

⑤ Access service (SOAP/HTTP)

Service Provider

Service Description (WSDL)

Web Service

Web Services Runtime

Exposing CICS Applications as Web Services

So Web Services give me reusability and interoperability.

But how do I get my CICS programs to talk Web Services?

CICS TS Version 3.1 has built-in capabilities to expose programs as web services

Service Oriented Finance CIO
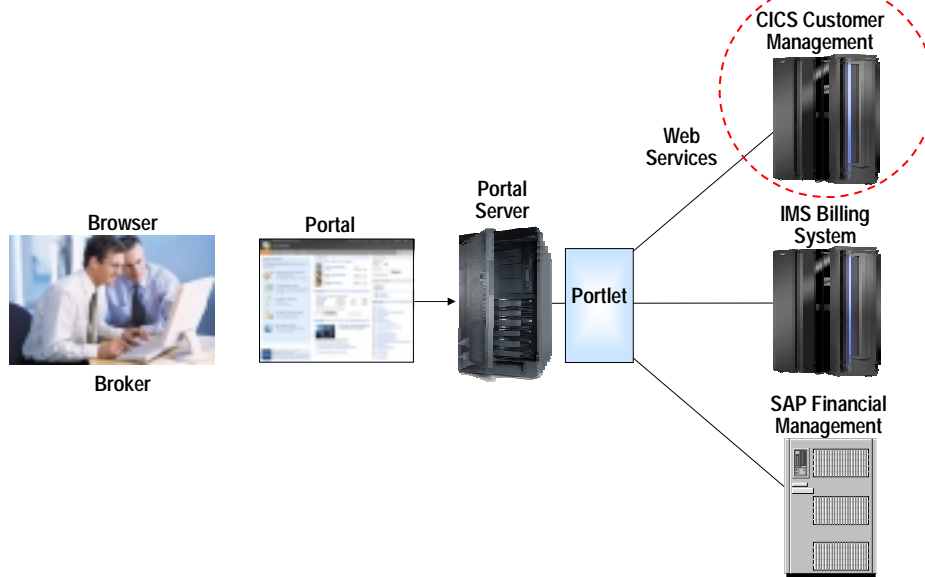
IBM

Service Oriented Finance Solution Picture

CICS Customer
Management

Web
Services

Portal
Server

Browser

Portal

IMS Billing
System

Portlet

Broker

SAP Financial
Management

DEMO: Broker Calls CICS Program Using Web Services

Loan Broker

SOF Extranet
(B2B) Portal

SOAP / HTTP

CICS TS V3.1
Web Service
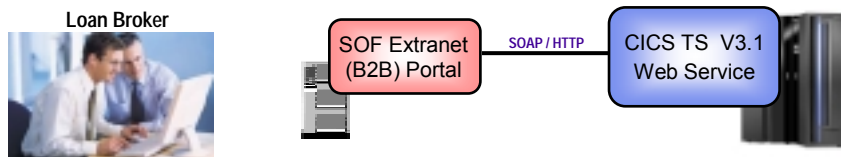
- Loan Brokers use the SOF Portal. The Portal talks to SOF's Loan application using web services

Web Services expose CICS and IMS investments for a new generation of re-use.

How Did the CICS Web Service Work?

1. Receive SOAP request
2. CICS Web Services runtime handles the message
3. Handler chain processes SOAP headers
4. Data Mapping transforms XML into bytes, calls server app

CICS TS V3.1

Portal

Service Requester

Client

Web Services Runtime

Service Provider

CICS Application
COMMAREA

Web Services Runtime

Handler chain

SOAP Body

Data Mapping

Language structure
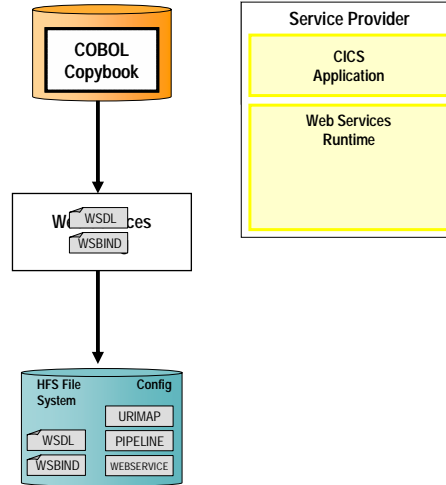0101001

Config
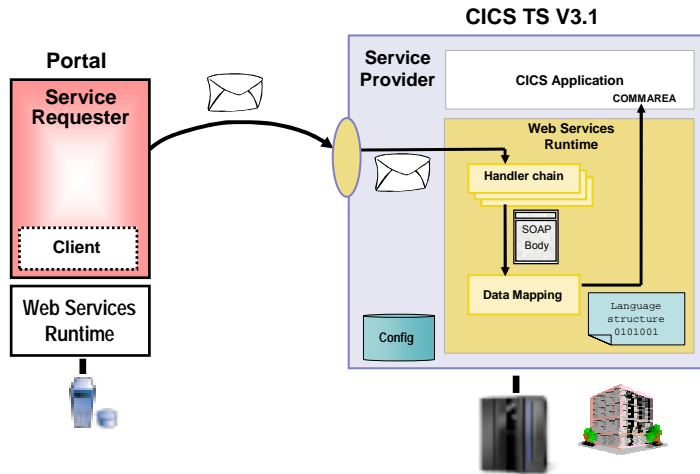
CICS Web Services

- Native Web Services capability offered by CICS

    - A CICS application can now be a web service provider and requester
    - Fully integrated into CICS
        - Resource definition using CICS admin screen, problem determination, monitoring & statistics
        - New tooling support for easier application development
    - SOAP requests can flow over HTTP or WebSphere MQ transports

- Rich set of Web services standards supported
    - SOAP 1.1 and 1.2   to send and receive web service messages
    - WS-I Basic Profile 1.0   for interoperability with between providers and requesters
    - WS-Coordination   transaction coordination
    - WS-AtomicTransaction
    - WS-Security   for authentication and encryption of messages

Development Steps to Expose
CICS Application as a Web Service Provider

1. Start with COBOL copybook

2. Generate WSDL from copybook

3. Copy files to host file system.

   1. Use standard CICS supplied PIPELINE definition

4. CICS automatically installs other related definitions

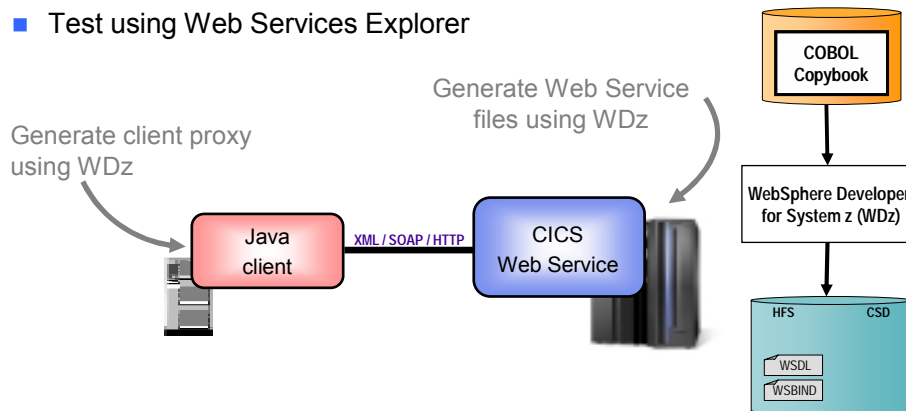5. CICS application is now web service enabled

COBOL Copybook

Service Provider

CICS Application

Web Services Runtime

W... ces
WSDL
WSBIND

HFS File System   **Config**

WSDL | URIMAP
| PIPELINE
WSBIND | WEBSERVICE

DEMO: Use WebSphere Developer for System z
to Expose CICS Program as Web Service

- Generate WSDL and WSBIND files
- Deploy files to host file system
- Test using Web Services Explorer

Generate Web Service files using WDz

Generate client proxy using WDz

COBOL Copybook

Java client   **XML / SOAP / HTTP**   **CICS Web Service**

WebSphere Developer for System z (WDz)

HFS   **CSD**

WSDL
WSBIND

Bank of Montreal: Reuse Existing Services

Challenge: Increase Efficiency and Customer Satisfaction

BMO Financial Group

Delivering Business Value:
- Exposed CICS transactions as web services
- New front-end CRM application provided cross-sell and up-sell opportunities
- Revitalized customer relationship management across multiple banking channels

Through greater IT flexibility:
- Reused existing IT assets through service-enablement
- Modeled options for new system to support hundreds of transactions per second
- Built service-oriented applications more easily

How About a Sequence of CICS Screens? CICS Service Flow Feature

- Allows you to sequence fine-grained CICS program interactions into a higher level, coarse-grained unit.
  - ▶ This can then be exposed as a web service

- Consists of:
  - ▶ CICS Service Flow Runtime in CICS TS 3.1
    - − Runtime in CICS executes a sequence of terminal or commarea based interactions
  - ▶ Service Flow Modeler in WebSphere Developer for z
    - − Visually design flow
    - − Tool can record flow as user navigates through BMS screens
    - − Use Web Services wizards and test facilities in WDz

Service Flow Modeler

- Visual Designer in WDz
  - ▶ Wire CICS applications together into a reusable flow
  - ▶ Wire sequence of BMS screens into a reusable flow

- Expose flow as web service
  - ▶ Can be called from other larger business process flows

- CICS deployment
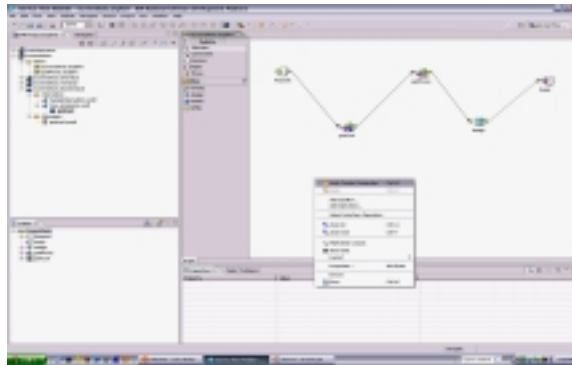 - ▶ Deploy to Service Flow Runtime in CICS TS 3.1

Service Flow Modeler

Deploy

CICS TS 3.1

CICS Service Flow Runtime

Flow

Screen   API

EIS Applications
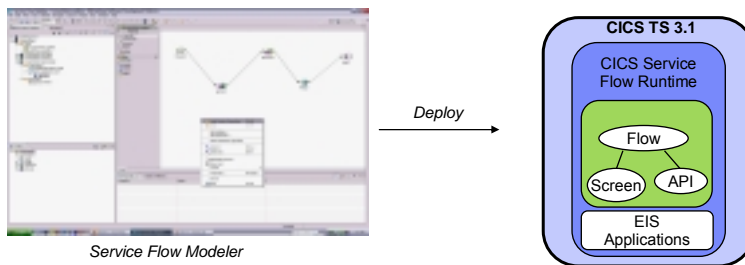
DEMO: Service Flow Modeler

- Use Visual Designer in WDz
  - ▶ Record Screen interactions
  - ▶ Wire CICS programs together

Service Oriented Finance Solution Picture

Browser

Broker

Portal

Portal Server

Portlet

Web Services

CICS Customer Management

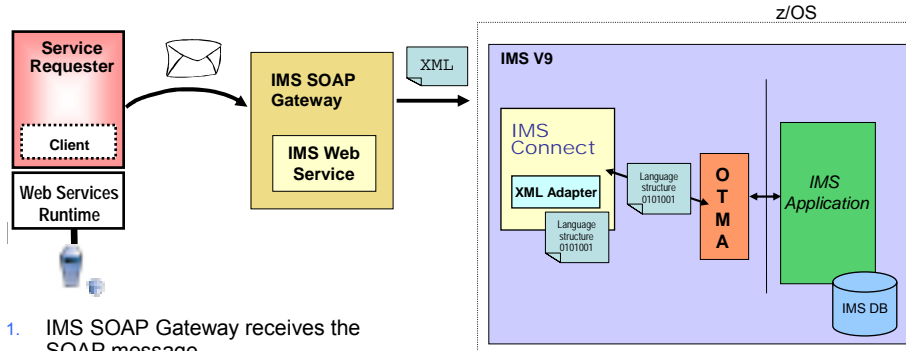IMS Billing System

SAP Financial Management
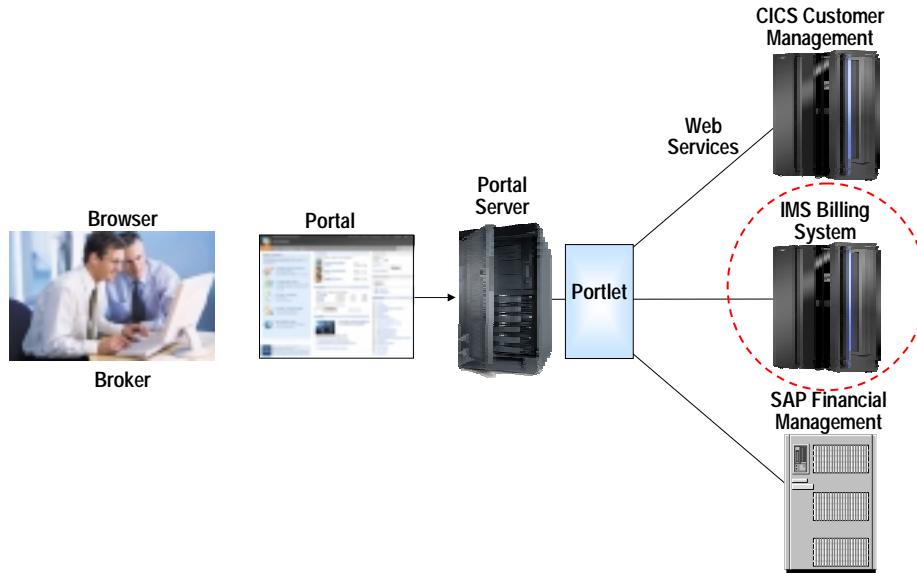
What About IMS Assets?
Use the IMS SOAP Gateway

- Integrates IMS assets into SOA by providing a standard Web Services interface
  - ▶ Expose your IMS application as a web service with easy deployment and configuration
    - − No programming needed

- Tooling support
  - ▶ IBM WebSphere Developer for System z generates Web Service artifacts like WSDL and XML converters
    - − From COBOL copybook of IMS application

- Transforms XML data without changing IMS application
  - ▶ IMS Connect XML Adapter transforms XML data
    - − No need to modify the IMS application code

IMS SOAP Gateway – How It Works

z/OS

Service Requester
Client
Web Services Runtime

IMS SOAP Gateway
IMS Web Service

XML

IMS V9

IMS Connect
XML Adapter

Language structure 0101001

Language structure 0101001

OTMA
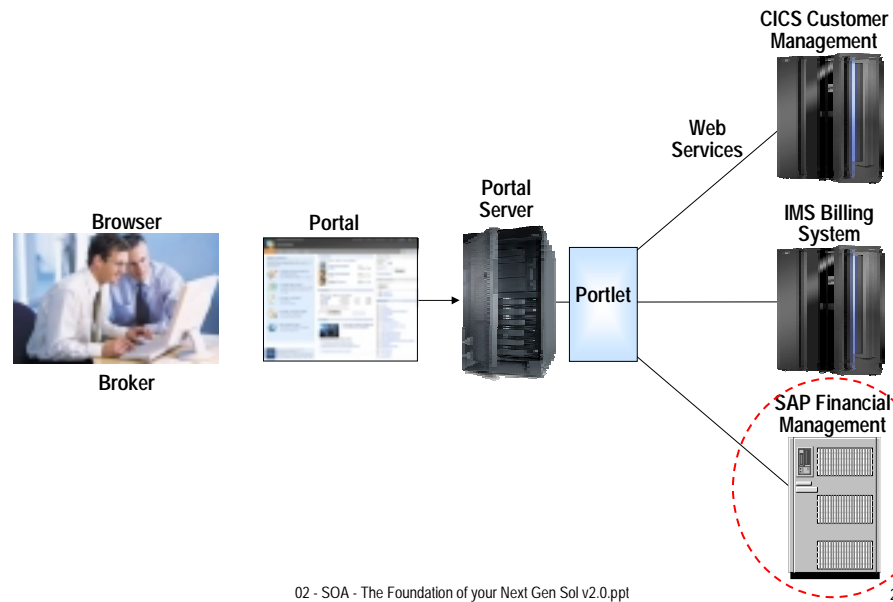
IMS Application

IMS DB

1. IMS SOAP Gateway receives the SOAP message
2. Processes SOAP header, extracts XML payload, sends XML data to IMS Connect
3. IMS Connect invokes XML adapter to convert XML to bytes
4. Sends bytes to Open Transaction Manager Access (OTMA) server and the IMS application being invoked

02 - SOA - The Foundation of your Next Gen Sol v2.0.ppt   26

Service Oriented Finance Solution Picture

CICS Customer Management

Web Services

Browser

Broker

Portal

Portal Server

Portlet

IMS Billing System

SAP Financial Management

02 - SOA - The Foundation of your Next Gen Sol v2.0.ppt   27

What About Other Enterprise Assets without Native Web Services Capabilities?

How do we expose the functions of our other backend systems like SAP?

IBM provides a comprehensive set of adapters.

Service Oriented Finance CIO

IBM

What Do Adapters Provide?

- Provide a consistent framework for access to back-end systems and technologies
  - ▶ Translates an abstracted interface into target-specific protocols, APIs or data formats
  - ▶ Abstracted interface encapsulates business functions and events in the form of business objects

- Consistent configuration, deployment, and administration

- A standardized framework enables WebSphere development tools to generate code that would otherwise be manual with third party adapters

IBM Adapter Portfolio

Adapter Category			
Application	• **Ariba Buyer** • Clarify CRM • **eMatrix** • **i2** • **JD Edwards OneWorld**	• **MetaSolv Applications** • **Oracle Applications** • **PeopleSoft Enterprise *** • **Portal Infranet**	• **SAP Exchange Infrastructure** • **SAP Software *** • **Siebel eBusiness Applications *** • **SunGard FRONT ARENA**
Technology	• **COM** • **CORBA** • Complex Data • EDI • **Enterprise Java Bean** • DTS • E-mail • Exchange	• Fix Protocol • **Flat Files *** • Lotus Domino • Healthcare Protocols • HTTP • **i-Series** • **JDBC *** • JMS	• SWIFT • TCP/IP • **Web Services** • WebSphere MQ • WebSphere Message Broker • WebSphere MQ Workflow • **XML**

Adapter development kit available for developing custom adapters

Notes:
Adapters in **bold** can introspect target application/technology
* Both Java Connection Architecture (JCA) and Java Message Service (JMS) adapter versions provided
** Only available as a Java Connection Architecture (JCA) adapter

Business Problem Solved

We are getting hundreds of new customers through our external brokers

SOA allowed us to quickly unlock our core application assets for reuse

Service Oriented Finance CEO

Service Oriented Finance CIO

Service Oriented Finance's Technical Challenges

1. How can Brokers access our existing car loan application?

2. **How do I optimize the existing process so we are ready to handle a large increase in the number of car loan requests?**
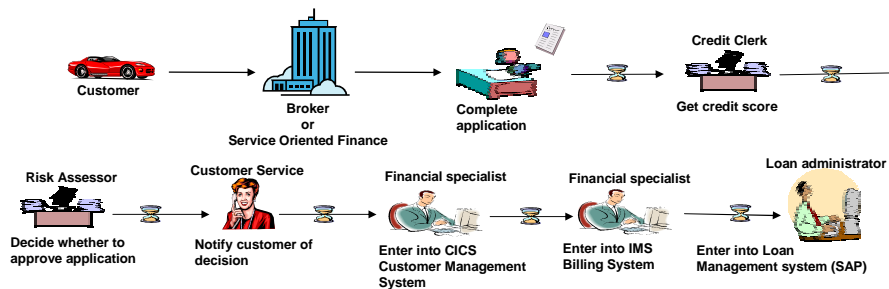
**Service Oriented Finance
CIO**

Current Process for New Car Loans

Customer → **Broker or Service Oriented Finance** → **Complete application** → **Get credit score** (Credit Clerk)

Risk Assessor — Decide whether to approve application → **Customer Service** — Notify customer of decision → **Financial specialist** — Enter into CICS Customer Management System → **Financial specialist** — Enter into IMS Billing System → **Loan administrator** — Enter into Loan Management system (SAP)

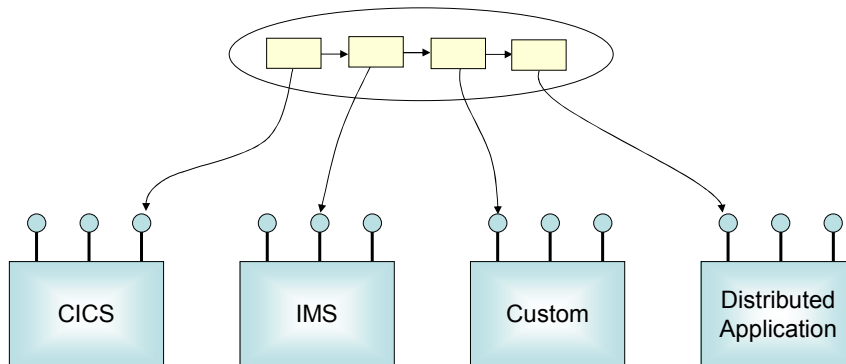**Reasons current process isn't ready for increased amount of business:**
- Manual process won't scale
- Manual data entry results in errors
- Multiple manual steps makes it difficult to determine status of any particular loan request
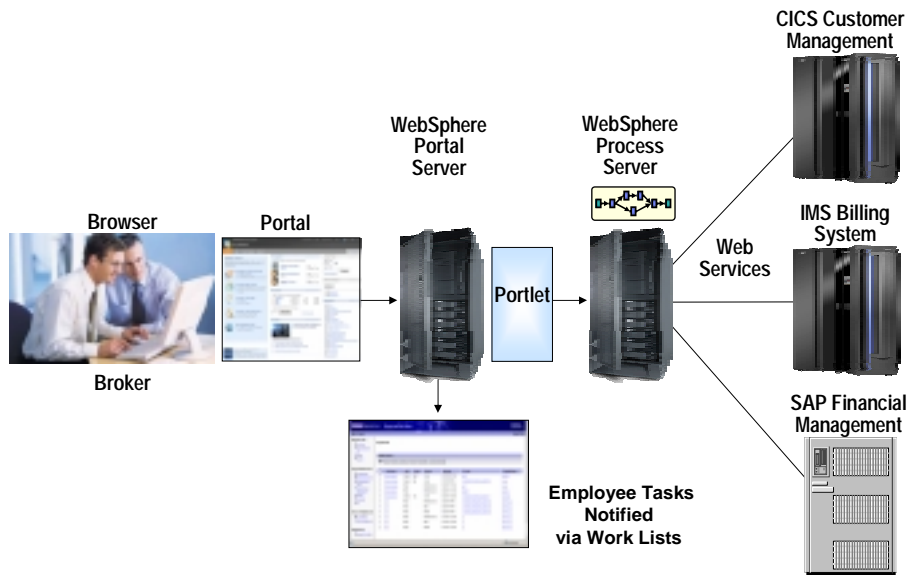
Next Step to SOA

- Combine exposed services to innovate new cross-system business functions
- Use IBM Middleware to quickly implement next generation business process

CICS   IMS   Custom   Distributed Application

Service Oriented Finance Solution Picture

WebSphere Portal Server   WebSphere Process Server   CICS Customer Management

Browser   Portal   IMS Billing System

Broker   Portlet   Web Services

Employee Tasks Notified via Work Lists   SAP Financial Management

Use WebSphere Integration Developer to Build the Process

- Graphically describe business process flow in Business Process Execution Language (BPEL)

- Drag and drop services into process flow (automatic binding)

- Automatic human workflow support

- Built-in Unit Test Environment

- Built-in Process Debugger

- Generate and deploy to runtime server

- Flow may be invoked as web service, EJB, or message driven bean
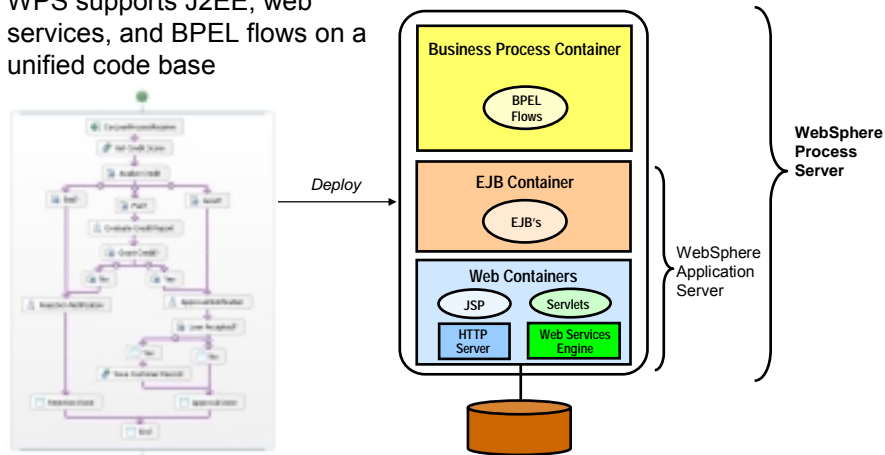
Process from Modeler (in BPEL)
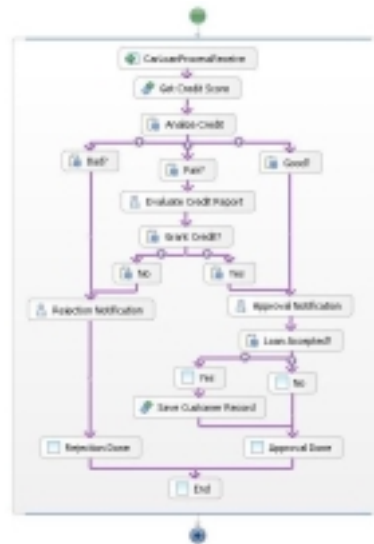
The Completed Process Runs on WebSphere Process Server (WPS)

- The completed BPEL process can be deployed easily to WPS

- WPS supports J2EE, web services, and BPEL flows on a unified code base

Deploy

Business Process Container

BPEL Flows

EJB Container

EJB's

Web Containers

JSP   Servlets

HTTP Server   Web Services Engine

WebSphere Process Server

WebSphere Application Server

Run the Process on System z

Why SOA on System z?
1. Qualities of Service

- An effective SOA implementation requires very high Quality of Services (QoS) from the underlying environment
  - ▶ Continuous Availability/Disaster Recovery
  - ▶ Scalability and Clustering
  - ▶ Rock solid Security
  - ▶ Workload Management to handle peak demand

- *These are fundamental characteristics of System z, making it an ideal platform to deploy an SOA solution*

- IBM's core SOA framework runs on z/OS
  - ▶ WebSphere Application Server
  - ▶ WebSphere Process Server
  - ▶ WebSphere Portal Server
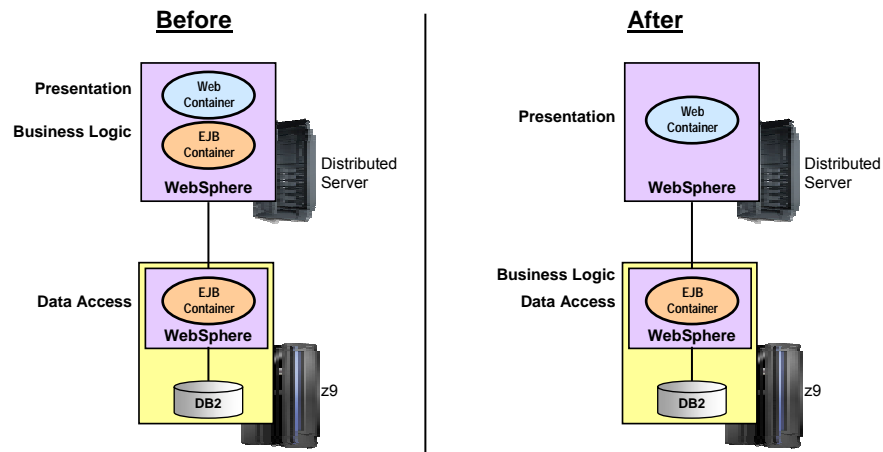 - ▶ WebSphere Enterprise Service Bus

Why SOA on System z?
2. Co-location

- Typically the mainframe already houses the core applications and data that provide a competitive advantage to the business
  - ▶ Quickly expose them as services, and continue the QoS the business depends on

- Having the Process Server and Enterprise Service Bus in close proximity to the assets they access provides better performance and throughput

- HiperSockets technology means less network overhead
  - ▶ Memory to memory communication

Proximity to Data
Large Transportation Company Benchmark

Before

Presentation	Web Container
Business Logic	EJB Container
	WebSphere

Distributed Server

| Data Access | EJB Container |
| | WebSphere |

DB2   z9

After

| Presentation | Web Container |
| | WebSphere |

Distributed Server

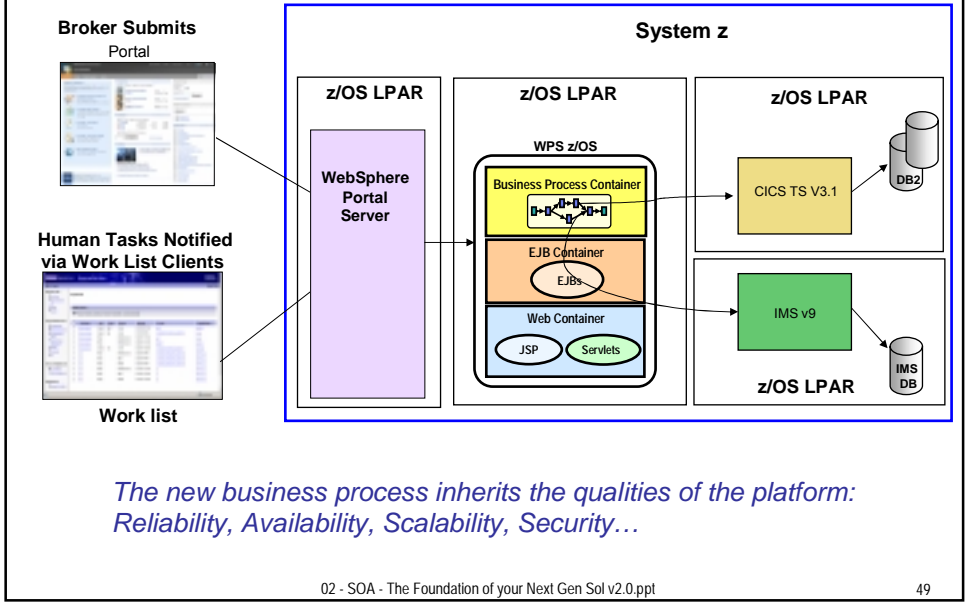| Business Logic | EJB Container |
| Data Access | WebSphere |

DB2   z9

- **Advantages of refactoring business logic to be co-resident with z/OS data**
  - ▶ Average CPU time per EJB transaction was reduced by over 77%
  - ▶ Number of bytes of data transferred per EJB transaction was reduced by 99%

Service Oriented Finance Runs its Next Generation SOA Solutions on System z

The new business process inherits the qualities of the platform: Reliability, Availability, Scalability, Security…

Summary

Unlock the value of your System z assets using a Service Oriented Architecture.

System z is an ideal platform for implementing Next Generation SOA Solutions.

IBM