# Can your existing mainframe developer toolset support applications that go beyond the traditional environment?

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Agenda

- **SOA and composite application basics**

- **System z challenges**

- **System z application lifecycle offerings**

  - Support for composite applications

- **Summary and Q/A**
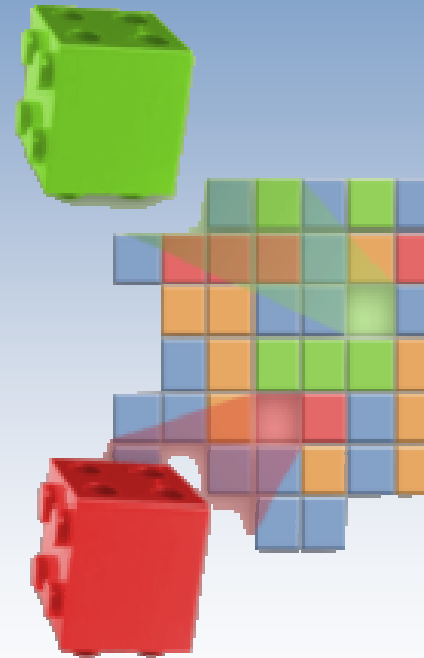
What is Service Oriented Architecture (SOA)?

… a service?

A **repeatable business task** – e.g., check customer credit; open new account
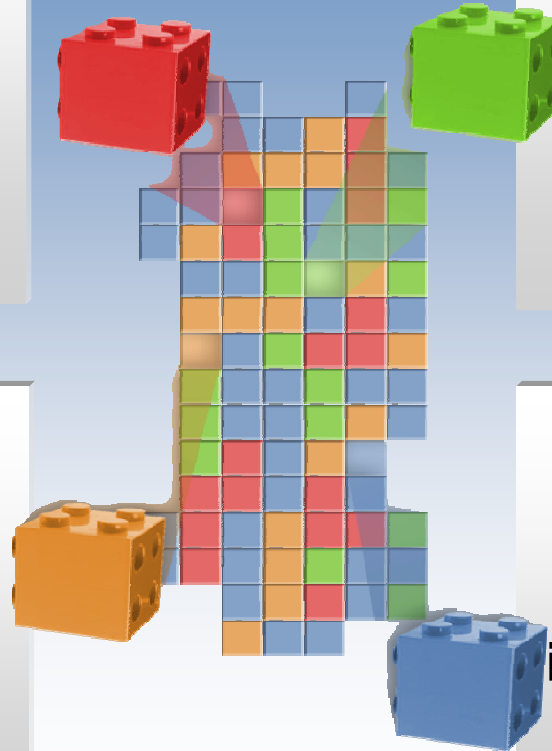
… service orientation?

A way of integrating your **business as linked services** and the outcomes that they bring

… service oriented architecture (SOA)?

An IT **architectural style** that supports service orientation

… a composite application?

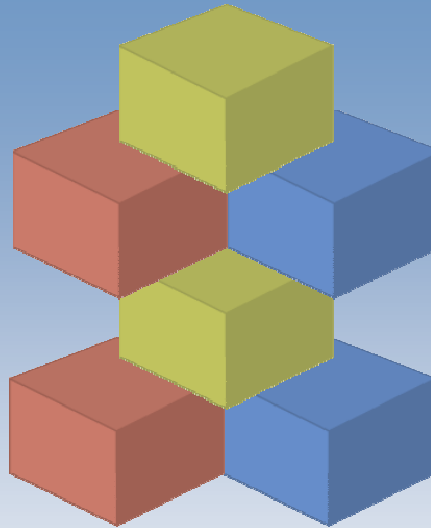A set of **related & integrated** services that support a business process built on an SOA

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SOA: The focus is on Flexibility and Reuse

Business Perspective

Modern UI's linked with Business Process

- Orchestrated sequence of
- Activities
- Separated elements
  - Activity sequence
  - Activity hand-off
  - Activity content

IT Perspective

Web User Interfaces and Composite Application

- Orchestrated flows of Services
  - Tooling
- Separated logic
  - Process flow
  - Connectivity
  - Business
- Flexible high QOS Business Functions

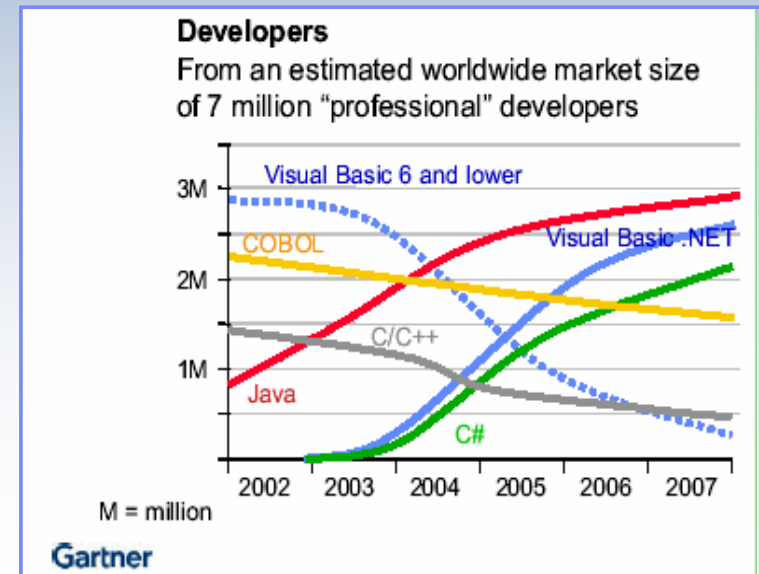## Why Service Oriented Architecture? …

- Enables re-use of existing assets
- Enhances system flexibility through logic isolation
- Supports simplified integration of new assets with existing assets

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What about "before SOA"?

- **Significant business intelligence exists in core systems**
  - "200 Billion lines of COBOL code in existence" *eWeek*
  - "5 Billion lines of COBOL code added yearly" *Bill Ulrich, TSG Inc.*
  - "2 Million COBOL developers" *Gartner*
  - "Majority of customer data still on mainframes" *Computerworld*
  - "Replacement costs $20 Trillion" *eWeek*

- **Rewriting - is it an option.....**
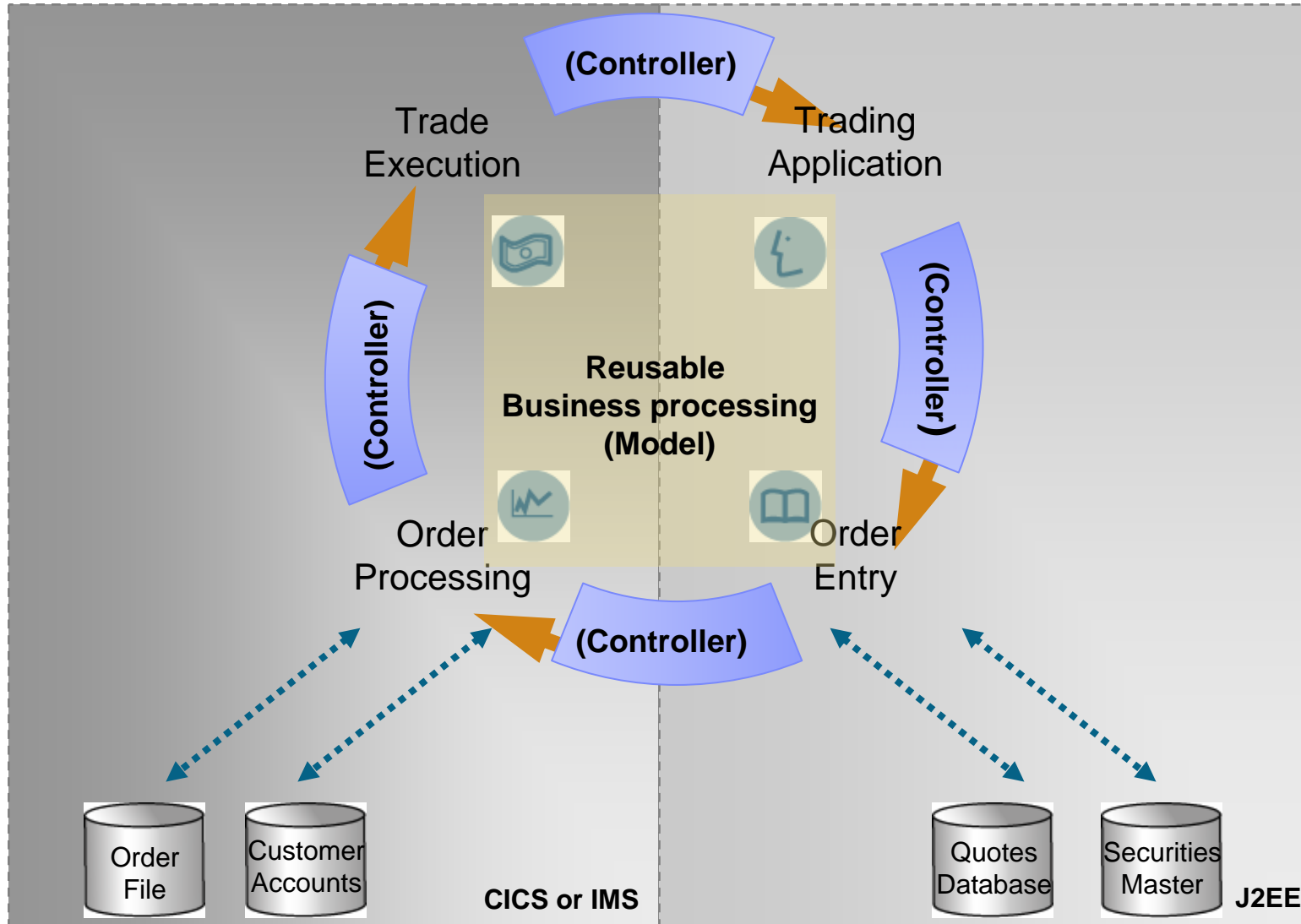 - How long will it take? (lose strategic benefit)
  - Who will do it? (who has the business knowledge?)
  - How much will it cost?
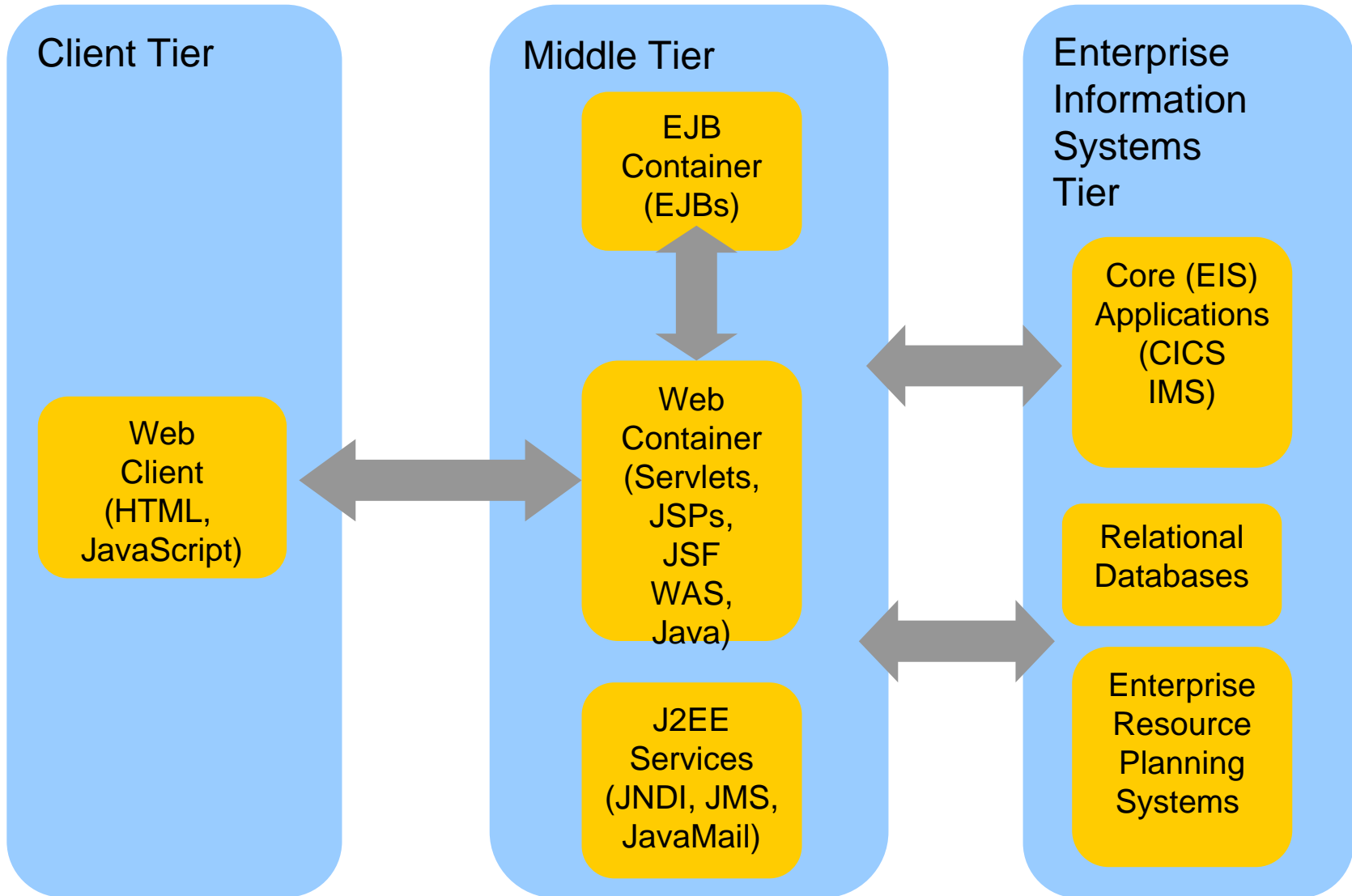 - Risk?

Developers
From an estimated worldwide market size of 7 million "professional" developers

Visual Basic 6 and lower
COBOL
Visual Basic .NET
C/C++
Java
C#
3M
2M
1M
2002 2003 2004 2005 2006 2007
M = million
Gartner

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Modern "CICS" architecture

CICS TS

Transaction

| Client | 3270 Presentation | Integration logic | Business logic | Data access |

P   I   B   D

- **Best practice in CICS application design is to separate key elements of the application, in particular:**

  – Presentation logic 　　　　　　　3270, HTML, XML

  – Integration or aggregation logic Menu, router, tooling

  – Business logic 　　　　　　　　　COBOL, PL/I, Reusable component

  – Data access logic 　　　　　　　VSAM, DB2, IMS, …

- **Provides a framework for reuse and facilitates separation of concerns, clear interfaces, ownership, and optimisation**

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Composite Workload Application Components

(Controller)

Trade
Execution

Trading
Application

(Controller)

(Controller)

**Reusable
Business processing
(Model)**

Order
Processing

Order
Entry

(Controller)

Order
File

Customer
Accounts

CICS or IMS

Quotes
Database

Securities
Master

J2EE

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"Modern" Multitier Architecture

Client Tier

Middle Tier

Enterprise Information Systems Tier

EJB Container (EJBs)

Web Client (HTML, JavaScript)

Web Container (Servlets, JSPs, JSF WAS, Java)

Core (EIS) Applications (CICS IMS)

Relational Databases

J2EE Services (JNDI, JMS, JavaMail)

Enterprise Resource Planning Systems

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It's not that different

J2EE   Modern   Traditional   **CICS**

Modern (J2EE)	Function	Traditional (CICS)
HTML	Defines screens, forms and formats	BMS
JSF	Manages screen I/O and application flow	EXEC CICS Send /Receive
JSP		
Page Handler		
Session Bean	Session Management — Commarea	
		Validate Input
Page Handler	Screen and data validation	Validate Input
Beans EJB's Services		Business Services
Web Service		Web Service
Web Service / JCA or MQ	Business processing and data I/O	Web Service / Business Services
Quotes Database		Customer Accounts
Securities Master		Order File

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Investment Challenges

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COBOL/PL1

ISPF

- **Many zSeries developers still:**

  - Focused on creating or enhancing 3270 applications

  - Using traditional, host-based development environment

"Application maintenance consumes between 60 – 80 percent of IT budgets" - Phil Murphy, Forrester

Issues: How do I?

- Increase productivity of developers working on traditional applications that integrate with web applications
- Improve Time to market and IT responsiveness

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Architectural Challenges

- Application dependencies are extraordinarily complex, and exist at multiple levels

- Dependencies cross technologies and environments

- Need to support application maintenance, development and test

- Need to support application integration and service / component creation

Actual Application Architecture for Consumer Electronics Company
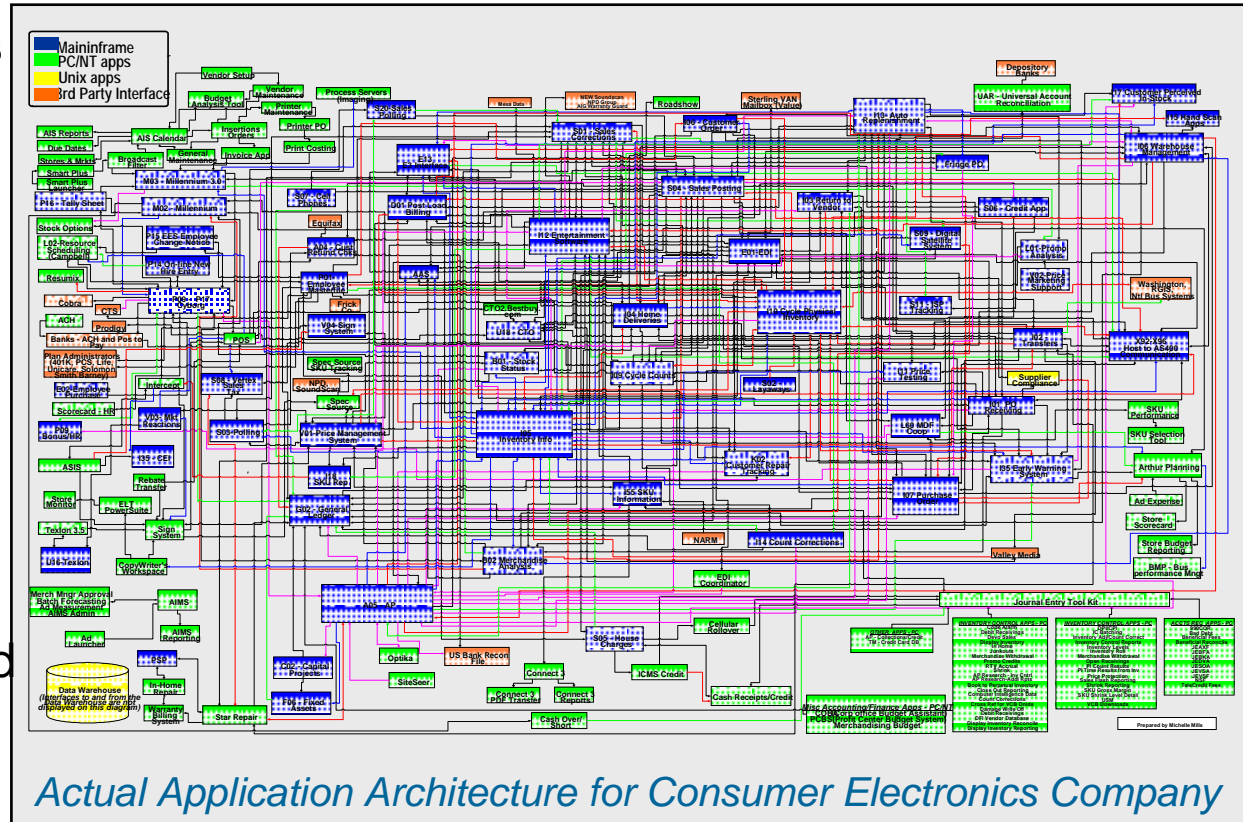
Issues: How do I?
- Improve application backlog and throughput of requirements
- Avoid unplanned impacts – manage quality - during change cycles
- Enable rapid reuse

Organizational and Technology Challenges

- New and complex development technologies
- Lack application components & skills sharing
- Ineffective / Uncoordinated development of integrated application

Linux　　　　**WebSphere**　　　　**CICS**
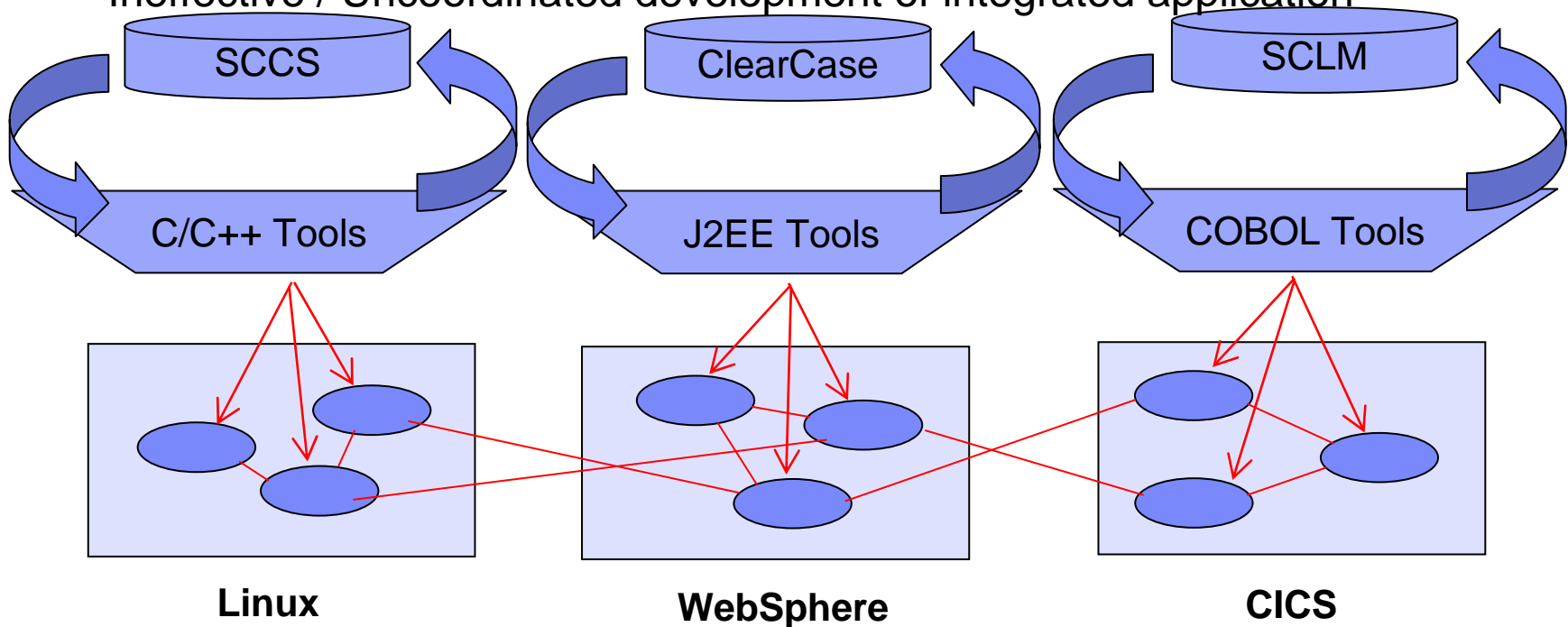
Issues: How do I?

- Manage change across geographically distributed development teams
- Leverage existing code, skills and tooling – at the same time improving quality
- Create the SOA infrastructure without throwing everything else away

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Strategy 1 - Prevent, detect, diagnose and remove defects

- **Improve application quality and test process**

- **Provide early warnings of activities susceptible to failure**

- **Analyze across disciplines to understand root causes**

Attention to quality here

Attention to quality should be here

C O S T

Iterative Process
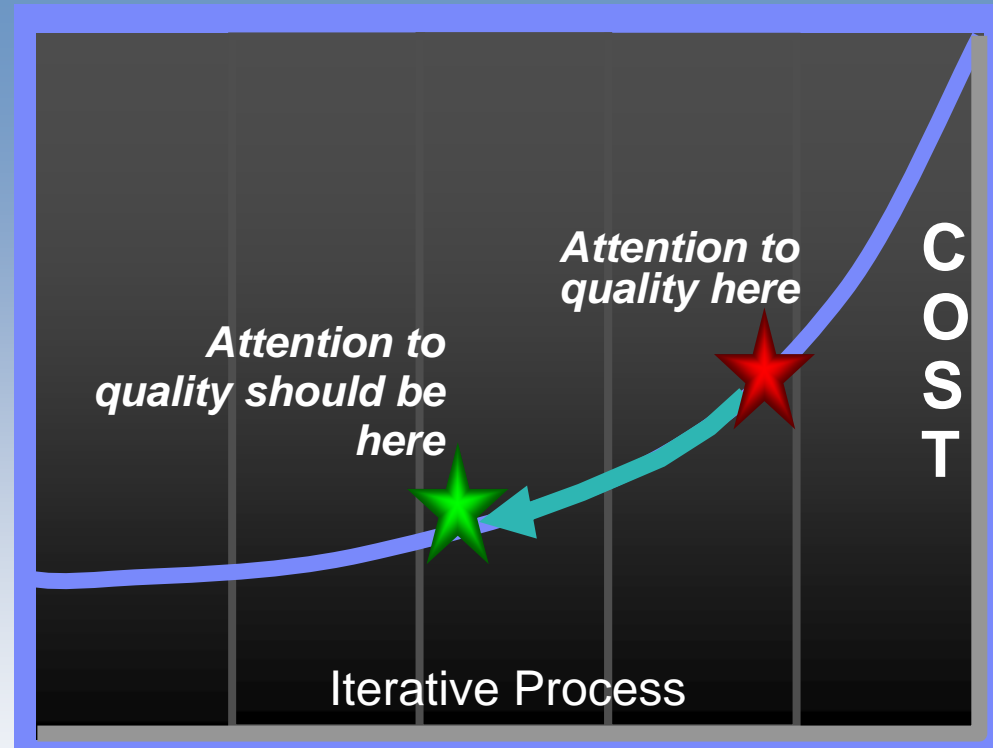
Issues: How do I?
- Find problems in development, before system test and production
- Debug SOA applications cross programs, platforms, languages, etc.
- Perform risk analysis on quality of deliverables

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Strategy 2 - Reduce application downtime

- Find and fix errors post-deployment quickly
- Speed application rebuild and redeploy
- Bridge development teams and operation teams

Production fault

Closed-loop test infrastructure

Retrospective Debugging Session

Developer

Development environment

Production environment
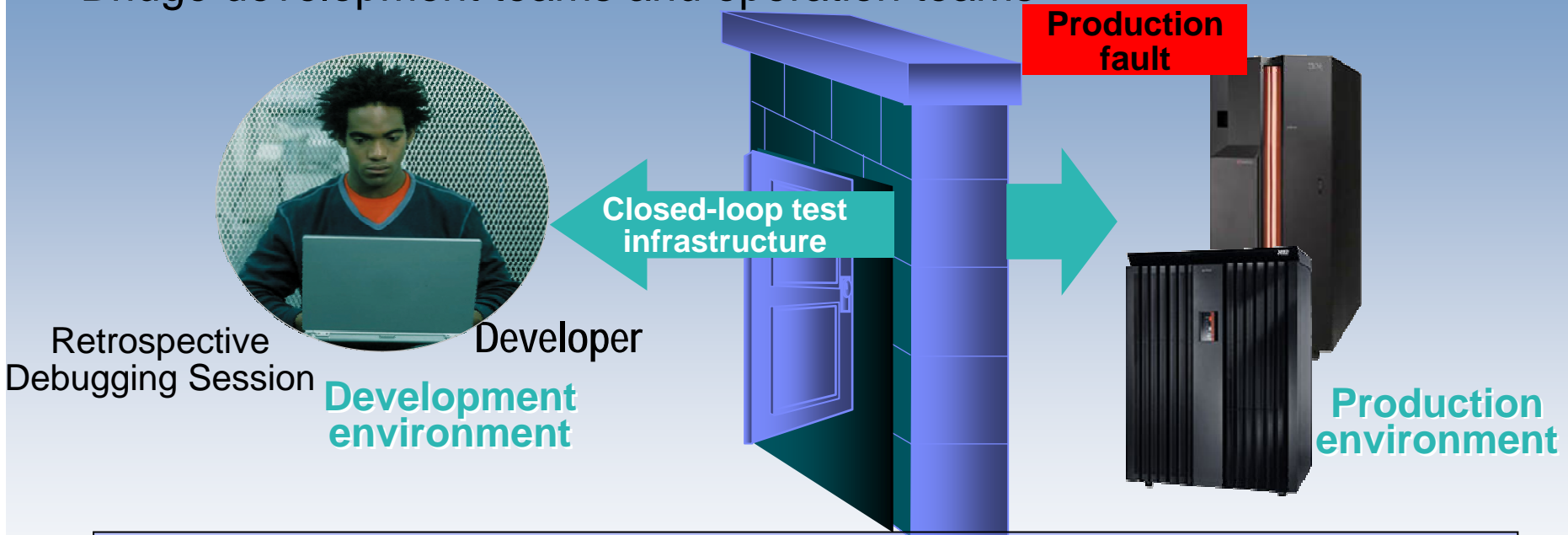
Issues: How do I?

- Manage quality in a SOA environment
- Solve application faults when multiple runtimes are involved
- Leverage business knowledge during problem determination process – i.e., common skills across developer bases

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Strategy 3 - Manage enterprise software change

Distributed Systems

Windows

zSeries

z/OS
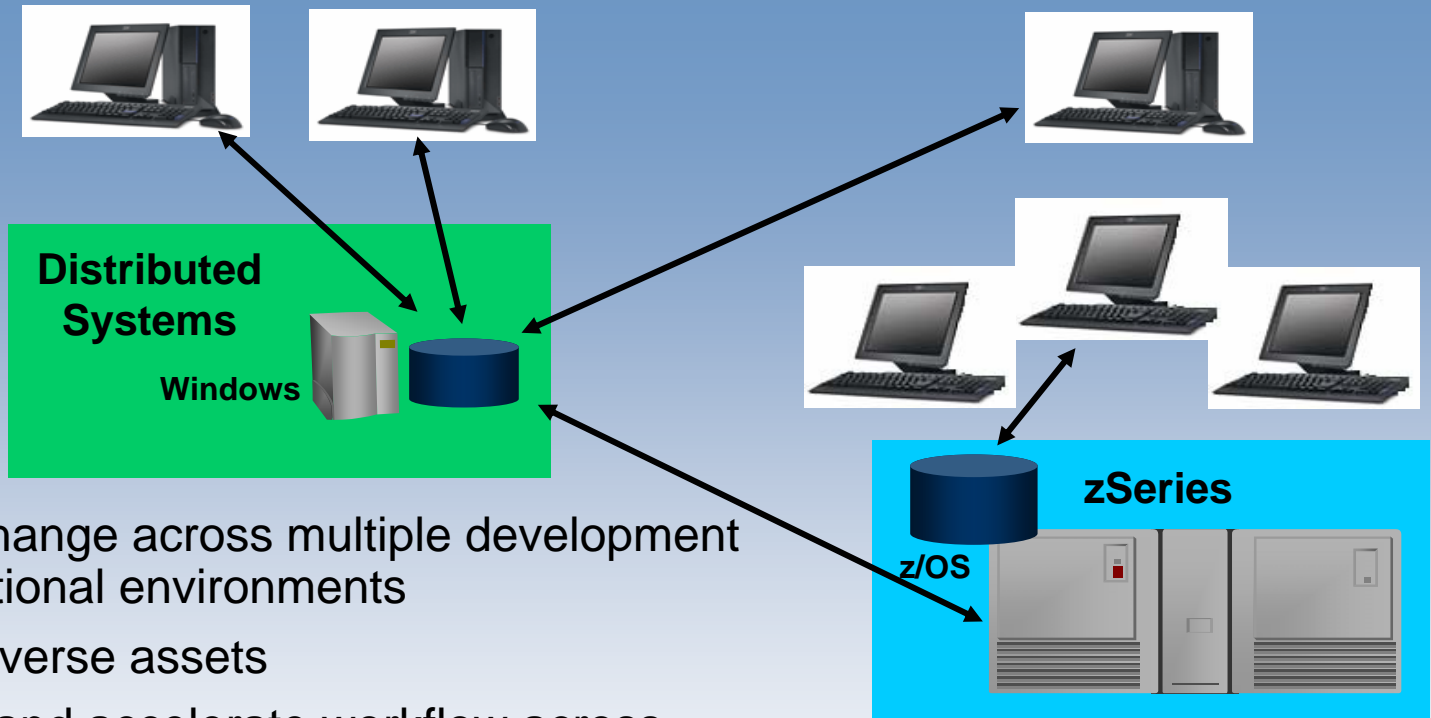
- Manage change across multiple development and operational environments

- Manage diverse assets

- Automate and accelerate workflow across multiple development teams

Issues: How do I?
- Track who is working on what
- Merge changes from multiple teams
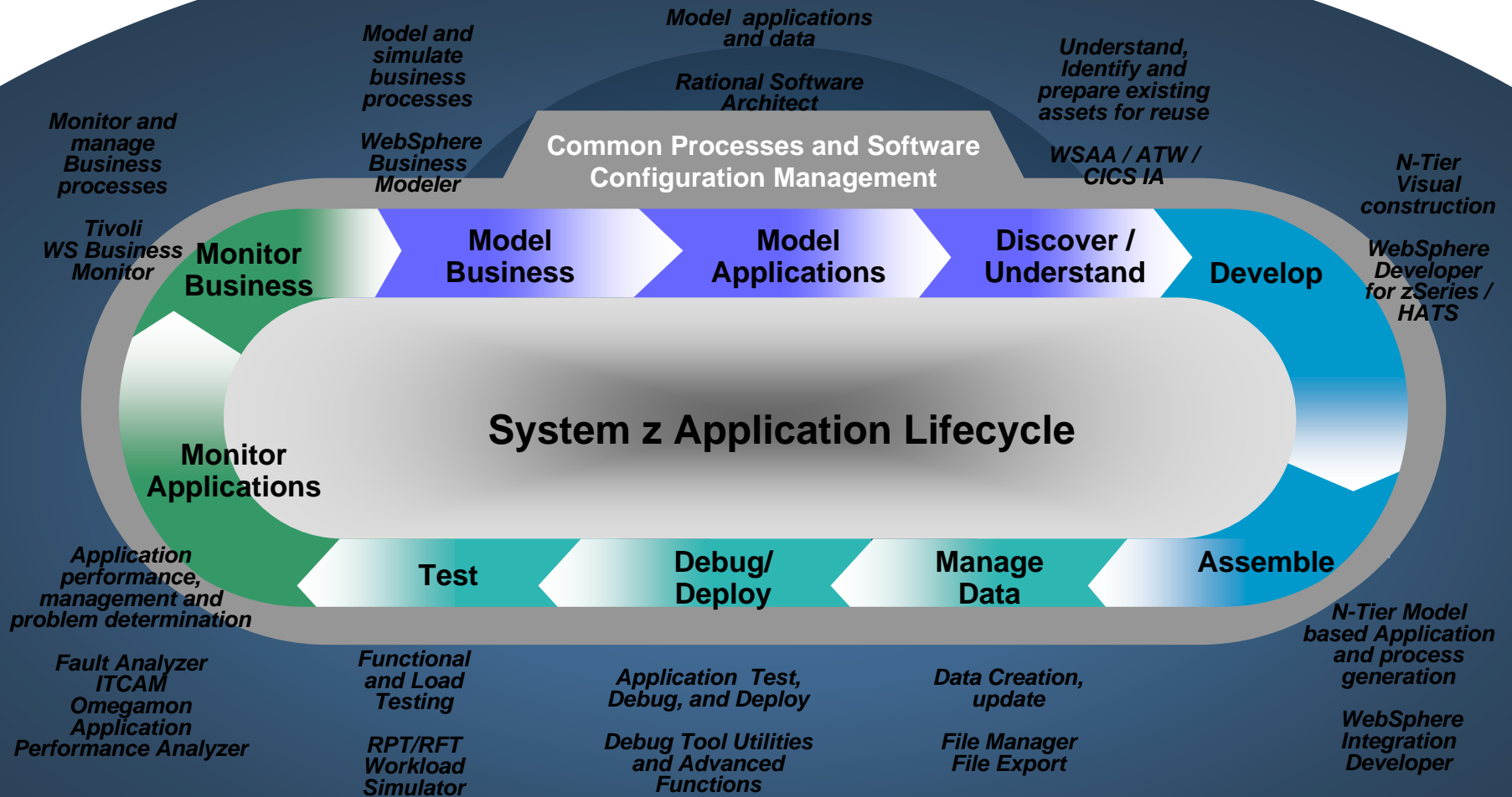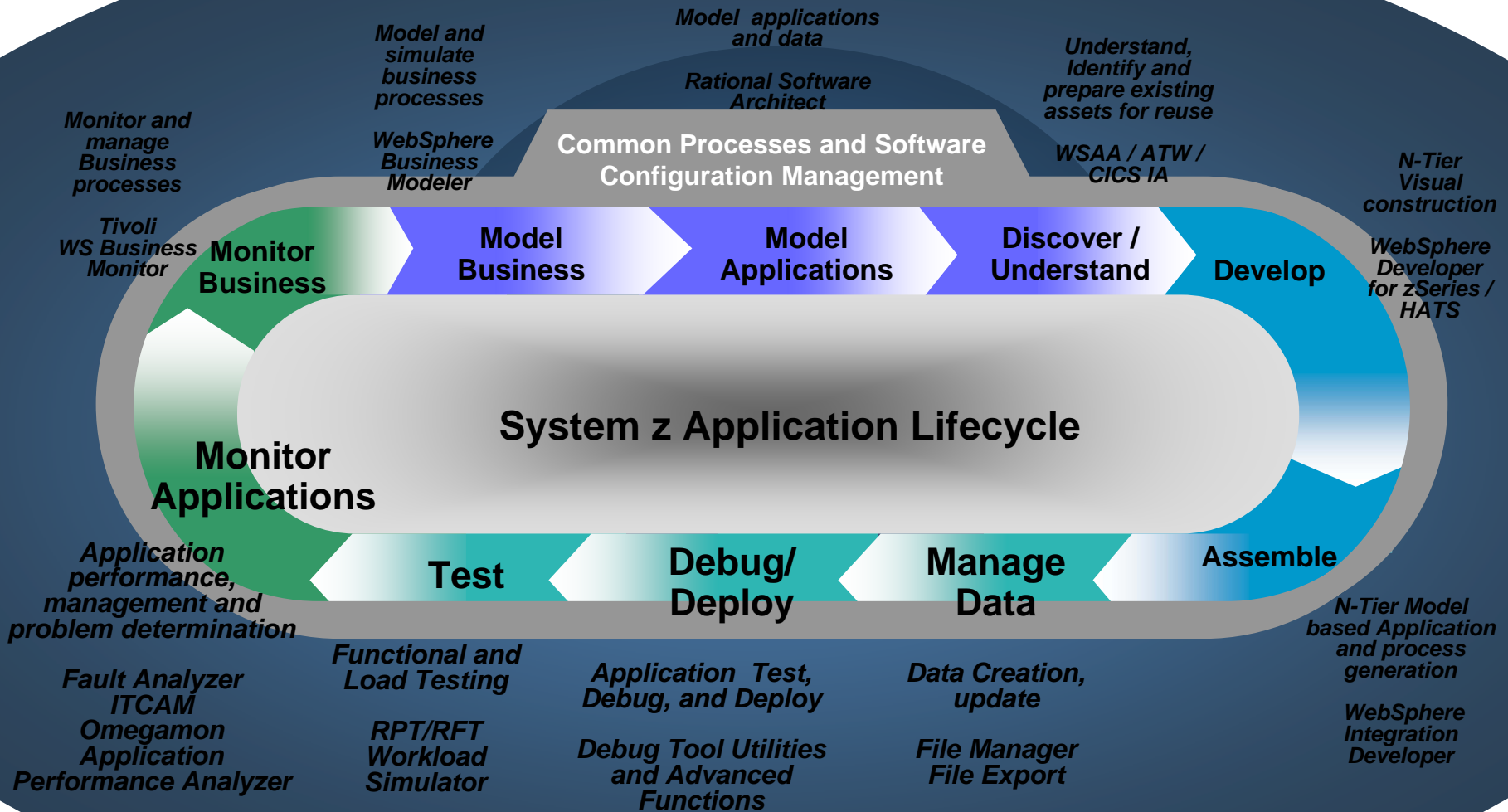- Support vastly increased numbers of artifacts across the lifecycle

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System z Application Lifecycle

Model and simulate business processes

WebSphere Business Modeler

Model applications and data

Rational Software Architect

Understand, Identify and prepare existing assets for reuse

WSAA / ATW / CICS IA

Monitor and manage Business processes

Tivoli WS Business Monitor

N-Tier Visual construction

WebSphere Developer for zSeries / HATS

Common Processes and Software Configuration Management

Monitor Business   **Model Business**   **Model Applications**   **Discover / Understand**   **Develop**

Monitor Applications

System z Application Lifecycle

Test   **Debug/ Deploy**   **Manage Data**   **Assemble**

Application performance, management and problem determination

Fault Analyzer ITCAM Omegamon Application Performance Analyzer

Functional and Load Testing

RPT/RFT Workload Simulator

Application Test, Debug, and Deploy

Debug Tool Utilities and Advanced Functions

Data Creation, update

File Manager File Export

N-Tier Model based Application and process generation

WebSphere Integration Developer

System z Application Lifecycle

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WebSphere Integration Developer

File Manager
File Manager is delivered as one product with four components ----
MVS, DB2, IMS and CICS

DB2 **VSAM** **QSAM** **PDS** **Tape** **IMS**

File and Data Management

Create, Edit, Browse, Extract, Copy, Print, Compare

File Manager DB2   **File Manager MVS**   **File Manager IMS**   **File Manager CICS**

ISPF

Do what you want, how you want, with your data

- **File Manager Features:**
  - Work with data in files, DB2 tables and IMS databases and files open to CICS
  - ISPF-like Panels
  - Full Function Browse And Edit
  - Multiple Modes Of Edit And Browse
  - Flexible Selection Criteria
  - Copy
  - File Reformatting
  - Global Search And Updated Capability
  - Print
  - Compare
  - No file limit size!

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File Manager and SOA Support

- **XML Generation**

File manager template

```
Seq SHC Ref Field Name          Picture  Type Start Length
         **** Top of data ****
___    1 1 REC-TYPE01                     AN    1    80
___    2 2 REC-TYPE            XX         AN    1     2
___    3 2 NAME                X(20)      AN    3    20
___    4 2 EMPLOYEE-NO         9(4)       BI   23     2
___    5 2 AGE                 9(4)       BI   25     2
___    6 2 SALARY              9(7)       PD   27     4
___    7 2 MONTH OCCURS 12 TIMES 9(8)     BI   31     4
___    8 2 FILLER              XX         AN   79     2
         **** End of data ****
```

→ **XML tags**

File contents

```
    REC-TYPE NAME            EMPLOYEE-NO   AGE   SALARY
    #2       #3                      #4    #5      #6
    AN 1:2   AN 3:20             BI 23:2 BI 25:2 PD 27:4
    <>       <---+----1----+--->    <---+> <---+> <---+-->
000000 **** Top of data ****
- - - - - - - - - - - - - - - - - - - - - - 2 Line(s) not selected
000003 01     Graham Purdy        5512    94    68000
000004 01     Will Soper          4412    28    68000
000005 01     Tyrone Dalais       3312    21    65000
```
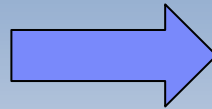
→ **XML data**

```xml
<?xml version="1.0" standalone="no" encoding="UTF-8" ?>
<!DOCTYPE shirt SYSTEM "http://shirts.com/xml/dtds/shirt.dtd">
<shirt>
    <model>CICS Tee</model>
    <brand>Tommy Hilltop</brand>

    <price currency="USD">10.95</price>
    <fabric content="70%">cotton</fabric>
    <fabric content="30%">polyester</fabric>
    <on_sale/>
    <options>
        <colorOptions>
            <color>red</color>
            <color>white</color>
        </colorOptions>
        <sizeOptions>
            <!-- Medium and large are out of stock -->
            <size>small</size>
            <size>x-large</size>
        </sizeOptions>
    </options>
    <order_info>Call &phone;</order_info>
</shirt>
```

- **Integration with WebSphere Developer for zSeries**

File Manager Benefits

- **Reduce deployment complexity**
  - VSAM, DB2, IMS and CICS are all included in a single product
  - Provides a single file management tool to be deployed across multiple images
- **Integration with other developer tooling**
  - Fault Analyzer
  - WebSphere Developer for zSeries
- **Rapid deployment**
  - Leverage ISPF skills
  - Common installation process with Fault Analyzer
- **Application mapped data manipulation (COBOL & PL/I)**
  - Display copy book

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File Export
Relational Data Extracting

COBOL / PL/1	IMS	Sequential	DB2	VSAM

Extract related data from multiple sources

Target

Batch Data Manipulation Engine

Relationships stored in a Repository
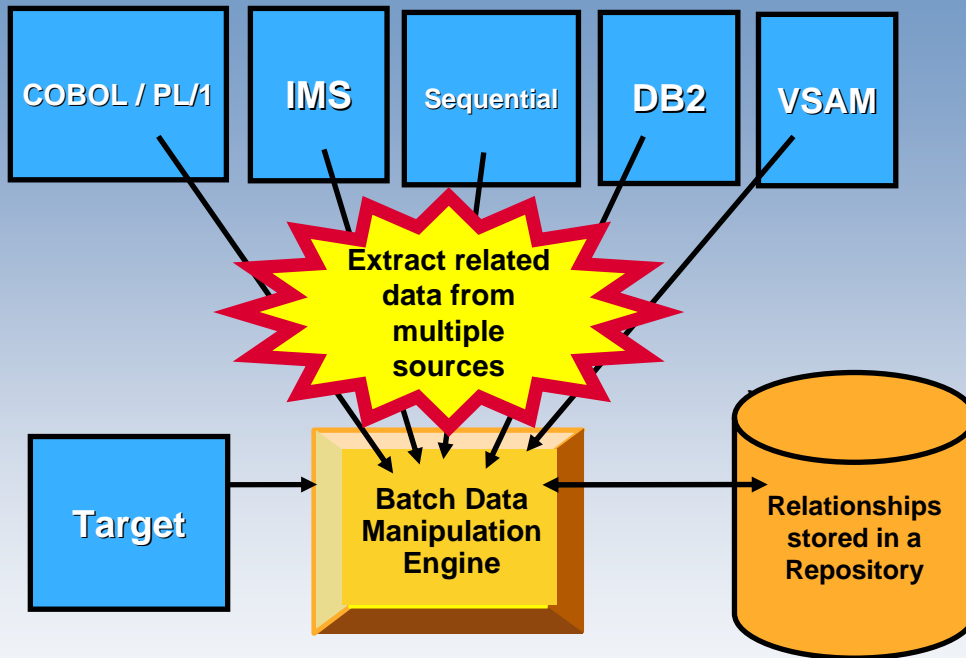
Features:

- Extract production data for test purposes
- Supports DB2, IMS, VSAM and sequential data
- Extract related data using application relationships, DB2 RI or both
- Manipulate/reformat the data upon loading
- Scramble sensitive data
- Map dissimilar field values to create keys
- Age date-related data

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File Export Benefits

IMS DBD "Policies"

Application Relationship

IMS DBD "Clients"

Application Relationship

IMS DBD "Claims"

1. Selection Criteria Evaluated

2. Extract Related Data

3. Transform Data

4. Load Data into Target Environment

IMS DBD "Policies"

Application Relationship

IMS DBD "Clients"

Application Relationship

IMS DBD "Claims"
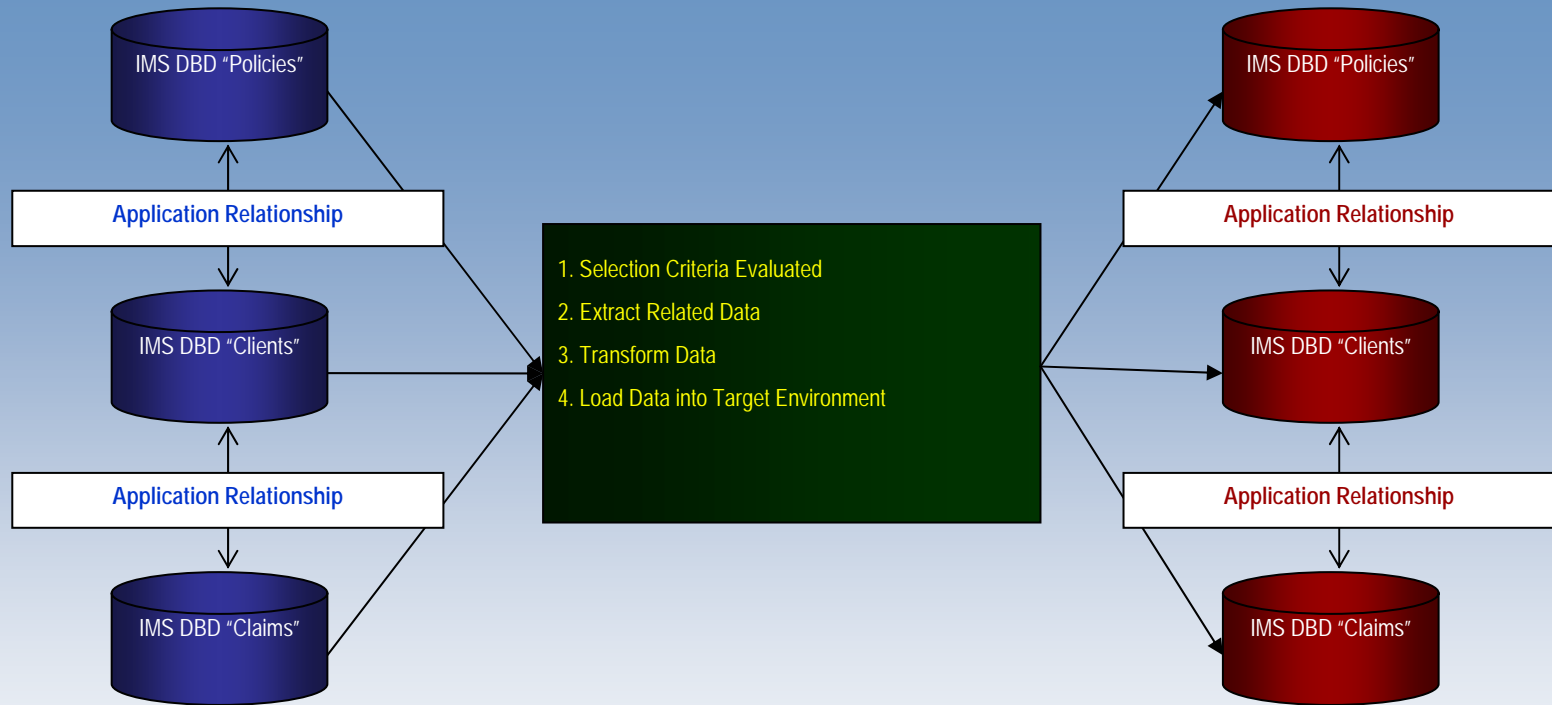
- Reduce extract set-up
- Basic extract or complex extract and manipulation
- Quick to learn
- Parse copybooks or source code
- Application relationships and DB2 RI can both be used

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Debug Tool Utilities and Advanced Functions Overview
Provides debugging of enterprise applications

BATCH	IMS	TSO	CICS	DB2	USS	Web Sphere

Application Languages
COBOL, PL/I, ASSEMBLER, C/C++

Debug application in supported environments

Debug Tool UAF

3270   **GUI**
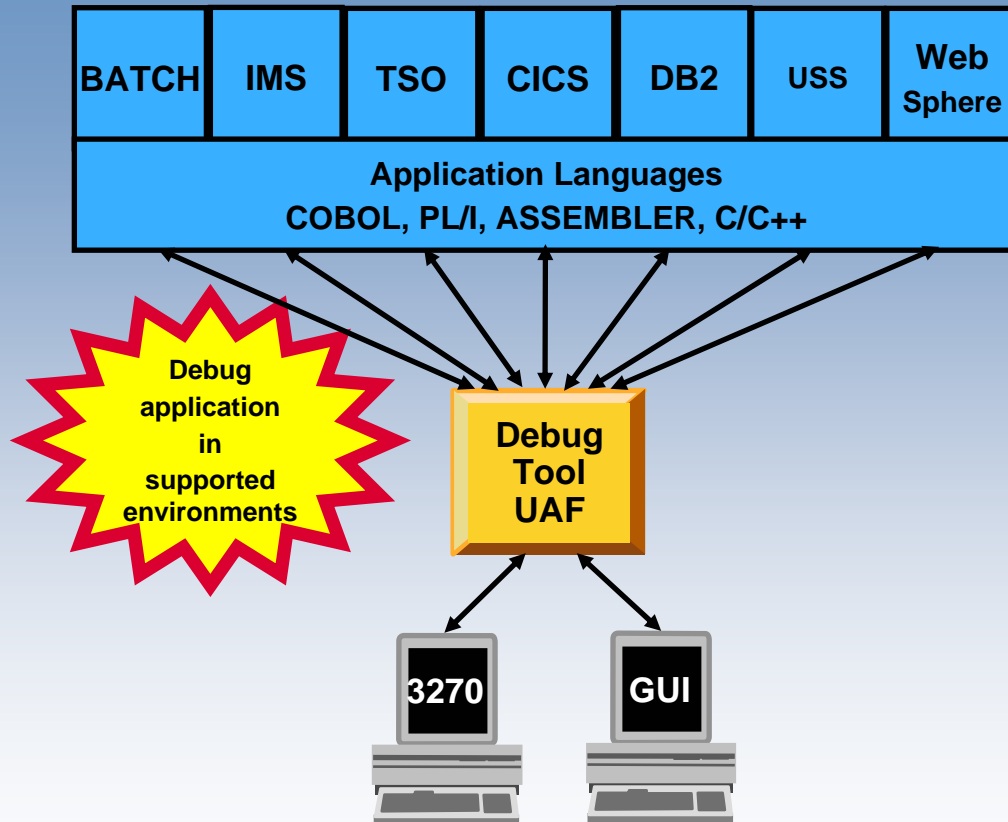
- **Features:**
  - Playback support
  - Automonitor support for COBOL and PL/I programs
  - An interface to the Fault Analyzer tool
  - A code coverage tool
  - Support for identifying and converting OS/VS COBOL source programs to ANSI 85 standard COBOL
  - Preparation and compile facilities for programs
  - Commands to query, allocate, and free files

- **Consistent Across Languages**
  - COBOL, C, C++, PL/I, Assembler

- **Environments Supported**
  - CICS, TSO, JES/Batch, IMS Including IMS/TM, DB2 Including Stored Procedures
  - Uses the GUI debug interface built into products such as:
    - *Websphere Developer for zSeries (WDz)*
    - *Websphere Developer Debugger for zSeries (WDDz)*

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WebSphere Developer for zSeries

Eclipse-based integrated development environment for developing enterprise-level, multi-tier applications (composite applications)

- **Builds core stack zOS applications**
  - COBOL, PLI, HLASM
  - TSO/Batch, CICS, IMS, DB2
  - DB2 Stored Procedures – COBOL, PLI, Java, SQL

- **Creates COBOL/CICS/JSF/Java/J2EE Multi-tier apps**
  - Built on Rational Application Developer
    - Includes all of the J2EE web development tools
  - Generate JSF/EGL/J2EE web front ends
  - COBOL backends running on zSeries

- **Enables CICS and IMS applications for Web services and SOA**
  - Provides tooling to make it easy to integrate existing applications into an SOA

- **Supports the full application lifecycle**
  - Model, Architect, Develop, Test, Deploy, and Manage
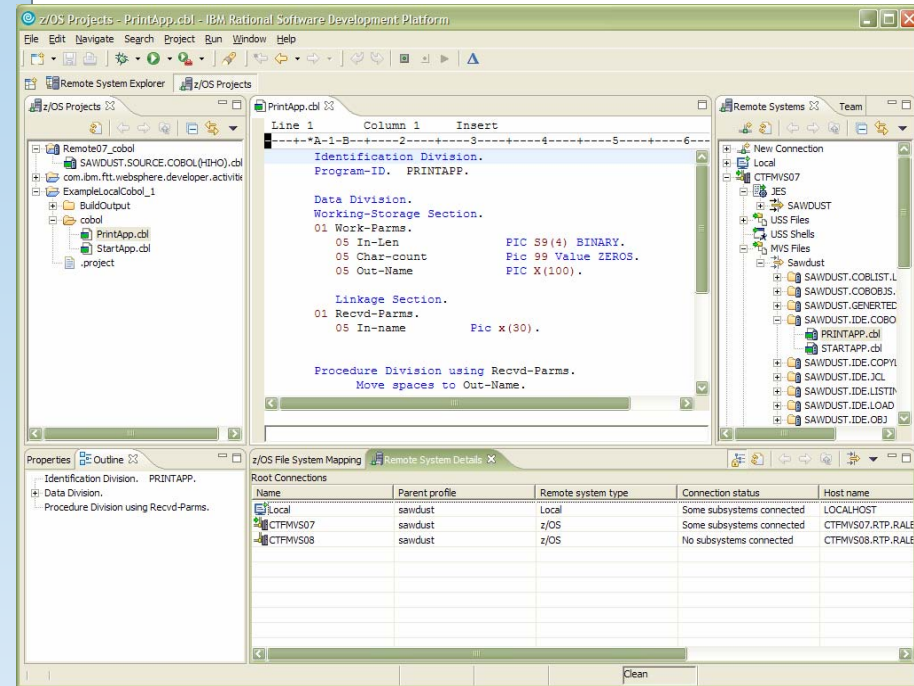
Single Developer Debugging Interface

Client Tier

Middle Tier

Enterprise
Information
Systems
Tier

EJB
Container
(EJBs)

Core (EIS)
Applications
(CICS
IMS)

Web
Client
(HTML,
JavaScript)

Web
Container
(Servlets,
JSPs,
JSF
WAS,
Java)

Relational
Databases

J2EE
Services
NDI, JMS,
avaMail)

Enterprise
Resource
Planning
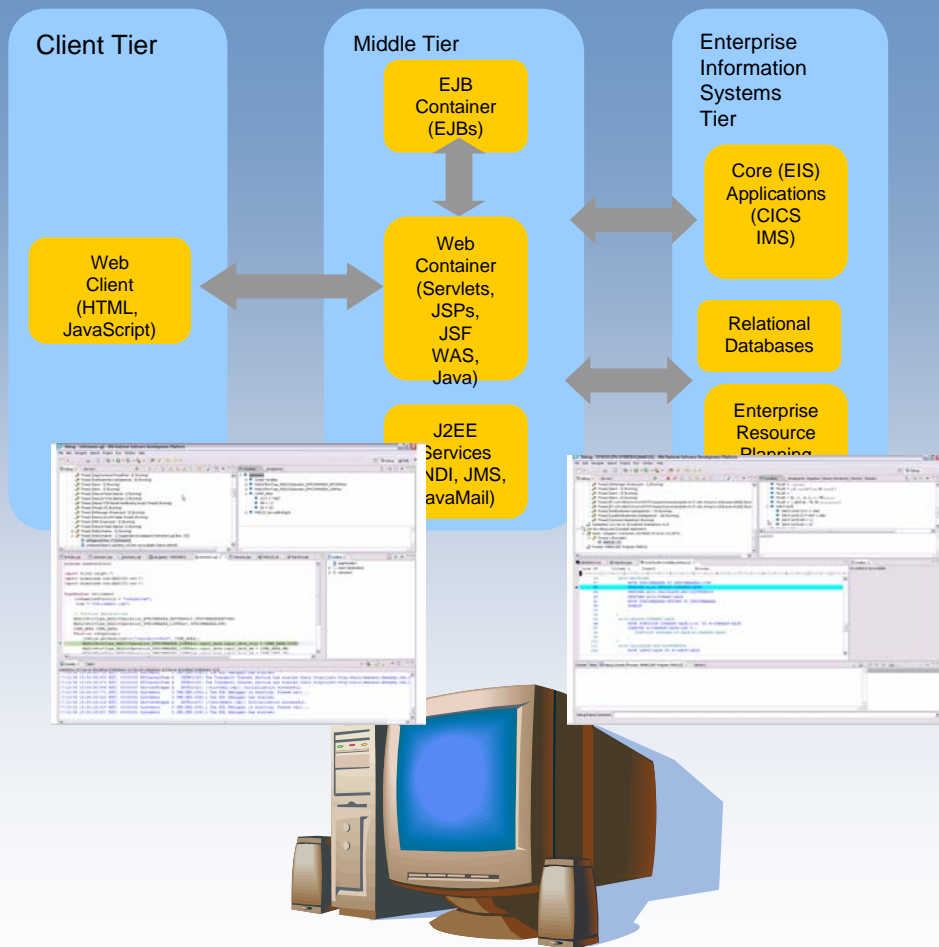
- **Execution of CICS program invokes Debug Tool Utilities and Advanced Functions**

WebSphere Developer for zSeries

Debug Tool Suite Benefits

- **Improve teaming between traditional and web developers**
  - Integrated debugging environment
    - Common workbench when used with WebSphere Developer for z/Series
- **Improve Q/A process**
  - Logged commands can be used to produce test scripts for regression testing
  - Deliver comprehensive application coverage information enabling risk evaluation
- **Increase user productivity**
  - Ability to eliminate "post-compiler" steps by using common compiler output options
- **Automate process to convert old OS/VS COBOL applications**
  - Provides migration opportunity during application maintenance

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Fault Analyzer Overview
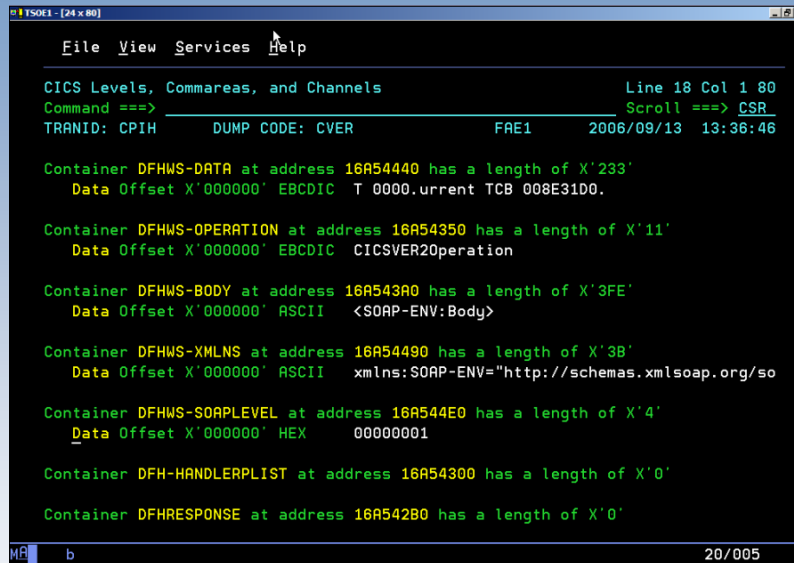
Helps you rapidly pinpoint why and where an enterprise application abended and offers suggestions on how to resolve

Single fault analysis product for all environments

**Application Language
COBOL, PL/I, ASSEMBLER, C++, MQSeries**

| BATCH | IMS | CICS | DB2 | WAS/z |

WAS/z and JAVA

Failure/Abend

USS

Abend Diagnosis Analysis Reports

Fault Analyzer

Online Historical Repository

ISPF

Provide data to to help determine WHY, WHERE, HOW, the failure occurred
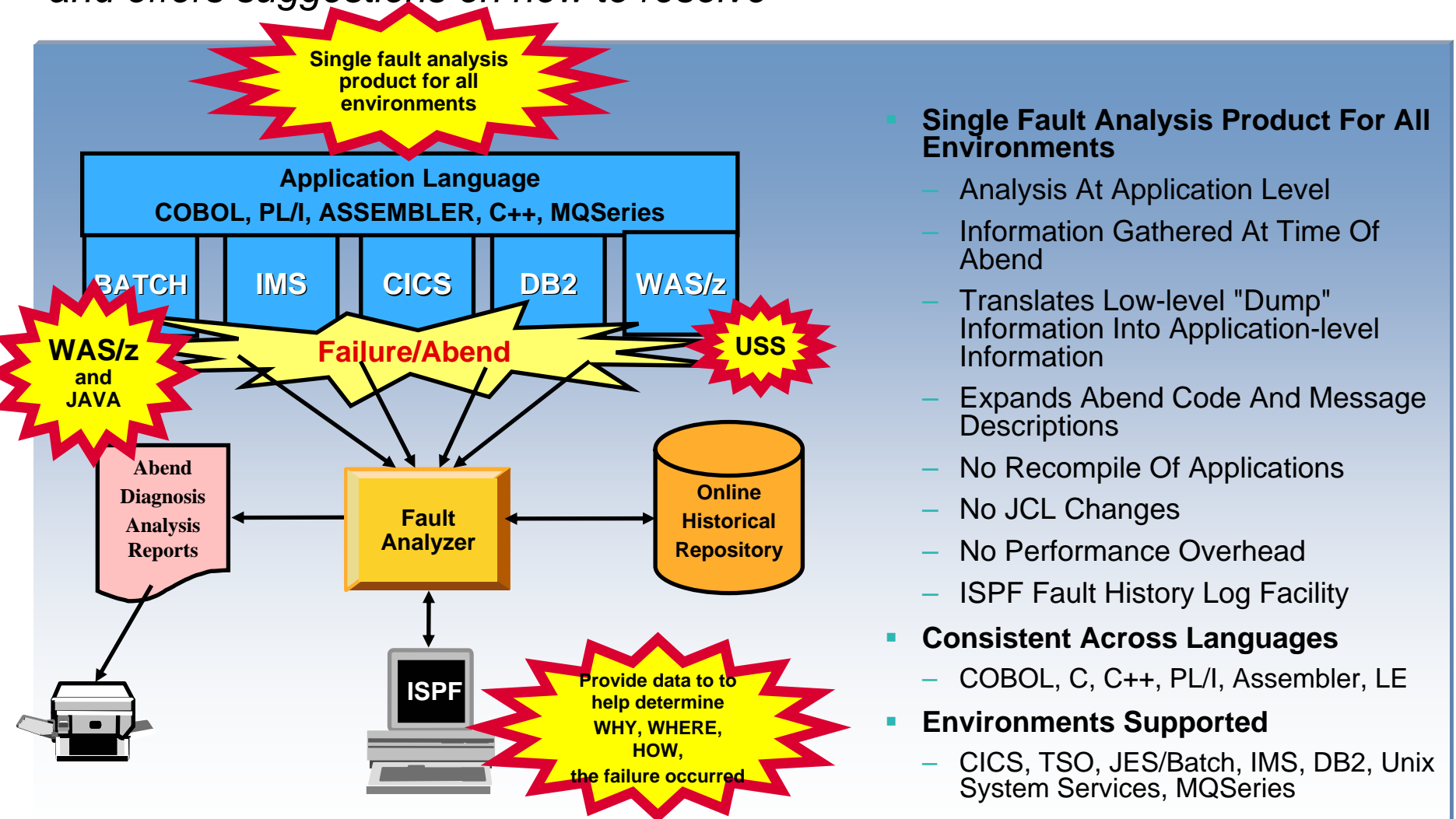
- **Single Fault Analysis Product For All Environments**
  - Analysis At Application Level
  - Information Gathered At Time Of Abend
  - Translates Low-level "Dump" Information Into Application-level Information
  - Expands Abend Code And Message Descriptions
  - No Recompile Of Applications
  - No JCL Changes
  - No Performance Overhead
  - ISPF Fault History Log Facility
- **Consistent Across Languages**
  - COBOL, C, C++, PL/I, Assembler, LE
- **Environments Supported**
  - CICS, TSO, JES/Batch, IMS, DB2, Unix System Services, MQSeries

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Fault Analyzer SOA Support

- **Formatted CICS Web Services data areas to assist the CICS Web Services programmer**

- **Integration with WebSphere Developer for zSeries**

- **Support for the latest versions of Java and Websphere**

Fault Analyzer Benefits

- **Reduce deployment effort**
  - Integrated abend tool can be deployed across multiple runtime images
- **Timely support for new compilers and runtimes**
  - Minimizes delays in deploying latest levels of technology
- **Improve problem isolation process**
  - Quick problem isolation with "point-and-select" analysis
  - No proprietary steps to include source code
- **Rapid deployment**
  - Leverage current ISPF skills
- **Integration with other development tooling**
  - File Manager
  - Debug Tool Utilities and Advanced Functions
  - WebSphere Developer for zSeries

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Application Performance Analyzer Overview
Application performance analysis tooling for application developers

JAVA Support

| TSO User | BATCH | IMS | CICS | DB2 | MQ Series |

Monitoring session

Print reports from z/OS

Application Performance Analyzer

APA Observation Files

ISPF

View reports online with ISPF

View reports in PDF format on PC
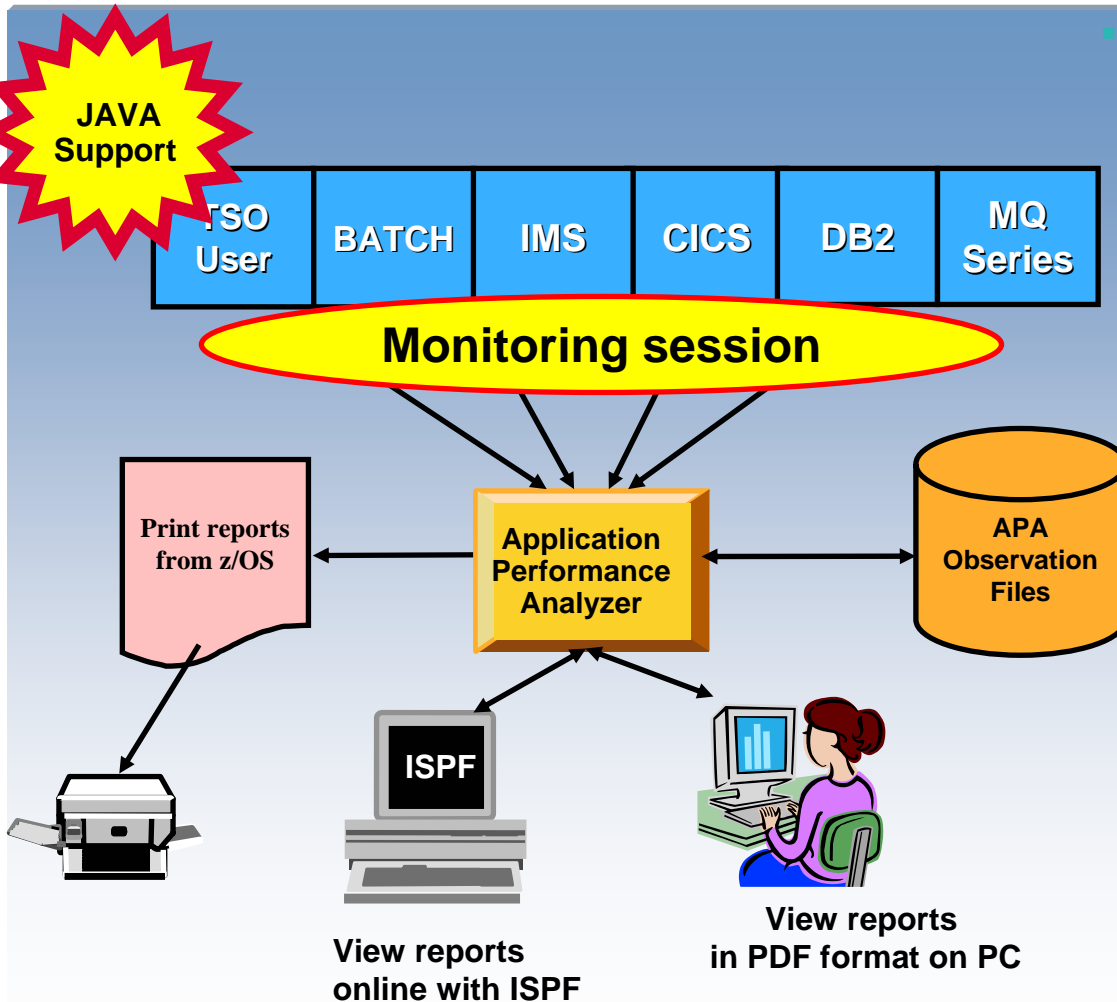
- **Features:**
  - Summary/Profile Reports with drill down into detailed levels via an ISPF interface or PDF hardcopy
  - CPU, Load Module, and CSECT Analysis of all modules in the address space
  - Source Statement (COBOL or PL1) or Instruction utilization in each CSECT
  - Supports Fault Analyzer / Debug Tool Sidefiles
  - Wait Time Analysis by Category, Task/Module, or Attribution
  - DASD I/O Analysis by Device, DD Name, Dataset and Dataset Attributes, EXCP's, VSAM with Buffer Pool, I/O Wait, Over Time
  - DB2 SQL Analysis – Static and Dynamic – Service Times
  - DB2 Analysis by DBRM, Statement, and Plan
  - CICS Session Statistics, Transaction Analysis by CPU Usage, Mean and Total Service Time, and Waits by Transaction
  - IMS CPU and Service Time Analysis
  - MQ Series Analysis by Queue, Request, and Transaction
  - Support for DB2 Stored Procedures written in Java

Application Performance Analyzer Benefits

- **Non-intrusive Performance Analyzer for z/OS applications to**
    - ▶ Improve response time in online applications
    - ▶ Improve batch turn around time
    - ▶ Identify excessive I/O activity
    - ▶ Identify excessive CPU usage
    - ▶ Isolate performance problems in new and existing applications
    - ▶ Test the effects of increasing workload

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End To End Monitoring
Enables highest QOS and maintainability of composite applications

Benefits:

•RPT, ITCAM are used to drive and monitor J2EE performance on both WAS and traditional servers enabling rapid problem determination and reduced downtime

•CICS PA /OMEGAMON provide CICS and IMS resource monitoring enabling rapid response to problems

•System z WS and PA are used to drive and monitor CICS transactions and DB2 performance for COBOL / PLI applications enabling high throughput in System z environments

RFT RPT	**ITCAM for WebSphere / SOA**
WS	**CICS PA Omegamon IMS PM**
	APA

z/OS

WebSphere

JVM

Classes and Methods

CICS	IMS	TSO	BATCH	DB2

Application Languages COBOL, PLI, ASSEMBLER

Language Environment

Data Environment

DB2 PM provides DB2 resource monitoring

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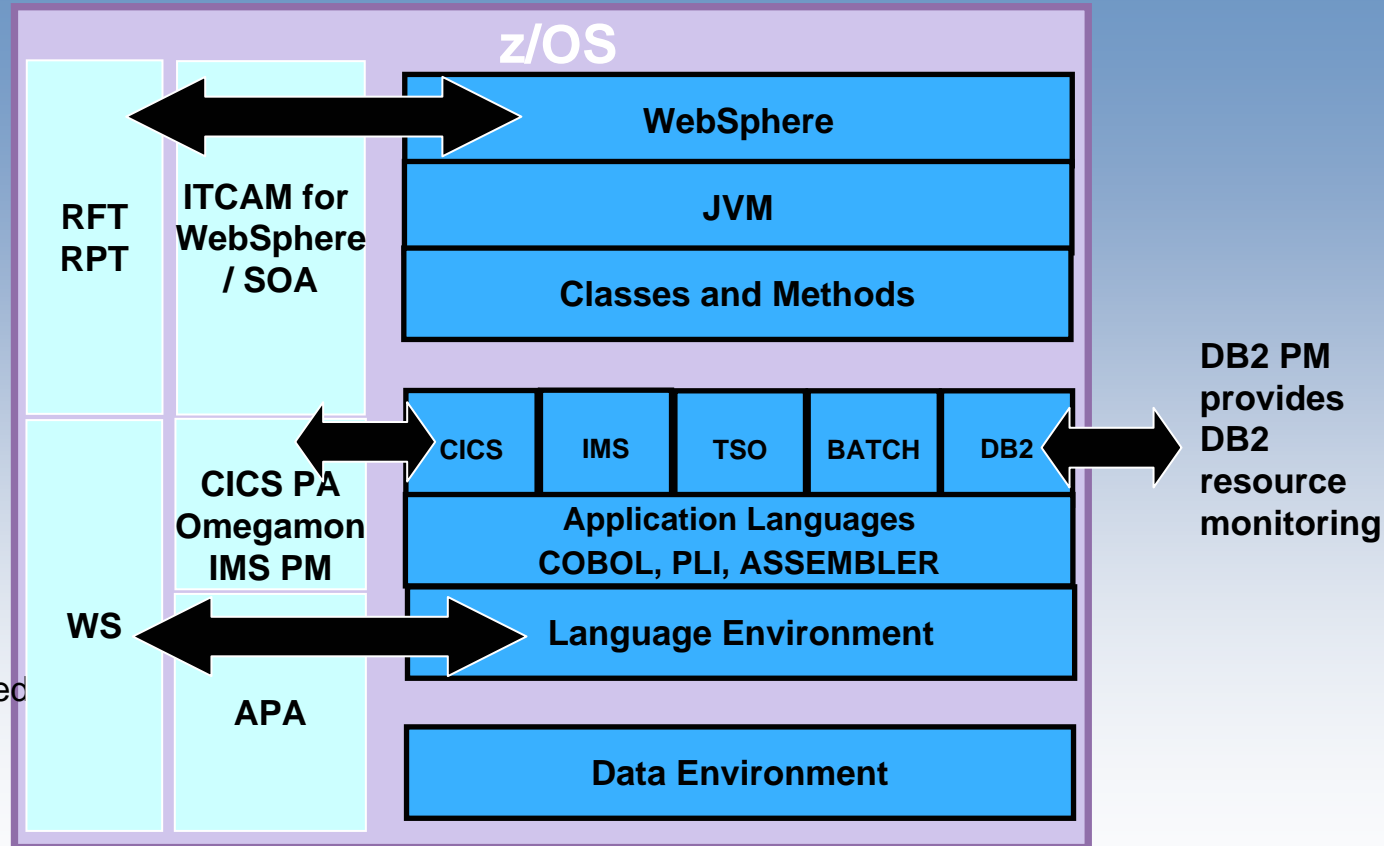
IBM SCLM Advanced Edition
Managing the application development process

- Provides

  - Library and configuration management

  - Package approval processing

  - Granular security controls

  - Easy-to-use three-way merge tool

  - Easy-to-use GUI interface to ease administration tasks

  - Source code management of Eclipse based IDE projects

zSeries

z/OS

ISPF SCLM

Augmented Security

Merge Tool

Admin Workbench

Developer Toolkit

Email notification

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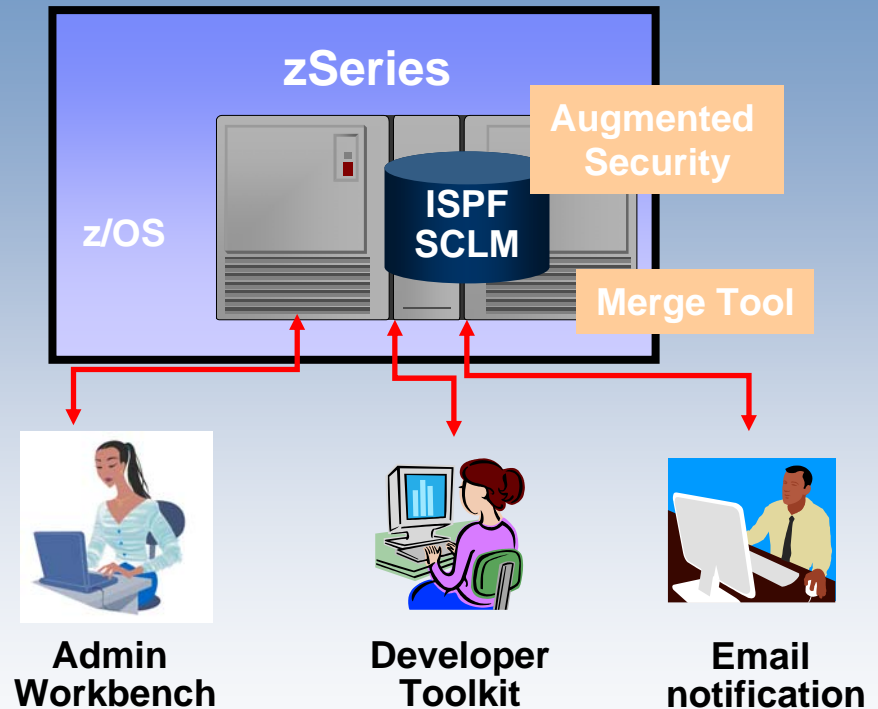
Component products of SCLM AE

- **SCLM Administrator Toolkit**
  - Simplifies the administration of SCLM-managed projects by means of a workstation-based graphical interface or an ISPF-based interface.
  - Assists in creating and configuring new SCLM projects as well as modifying, cloning, building or rebuilding, and deleting existing SCLM projects.
- **Enhanced Access Control for SCLM for z/OS**
  - Provides additional flexibility and control over access to SCLM-managed libraries.
- **SCLM Developer Toolkit:**
  - Facilitates collaboration between z/OS and non z/OS-based developers via an Eclipse-based interface that extends SCLM Services to Eclipse-based IDEs.
  - Provides investment protection with an architecture that can extend the languages supported by SCLM.
- **Breeze for SCLM for z/OS:**
  - Provides browser-based and e-mail-based software package notification, and review and approval capabilities for approving the promotion of packages through the software development life cycle.
- **Merge Tool for z/OS:**
  - Provides a variety of tools to perform merge tasks and provides reports to aid in the assessment of source consolidation.
  - Produces a statistics file for identifying and sizing a consolidation effort.

SCLM AE Enhanced Developers Interface

- **Eclipse based tool that extends SCLM services to Eclipse based IDEs**

- **Provides**
  - A transparent IDE-based interface to SCLM
  - Long file support
  - A remote portal via SCLM Explorer/Developer view that allows access to other SCLM based products

- **Facilitates collaboration between z/OS and non-z/OS developers and the development of composite applications targeted for deployment to WAS/z**

- **Allows Java/J2EE developers to leverage the security and functionality of SCLM**

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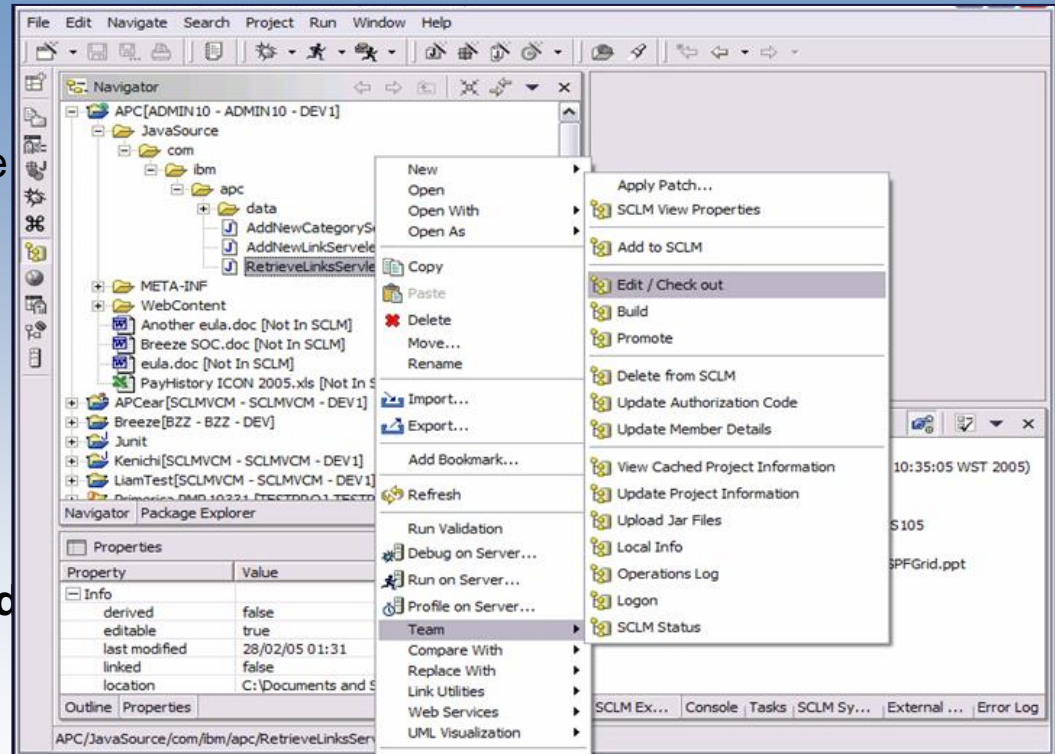
Managing Enterprise Software Change
Improving productivity, quality and predictability

- **Automate and control the software life cycle across distributed and z/OS environments**

- **Improve project collaboration and release coordination**

- **Increase development responsiveness and agility**

- **Manage risk, improve production availability**

- **Make compliance easier by providing audit trails of changes across the software life cycle**

- **Manage complexity across the enterprise**

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Agenda

- **SOA and composite application basics**

- **System z challenges**

- **System z application lifecycle offerings**

  - Support for composite applications

- **Summary and Q/A**

Zurich Financial Services

Challenge

- Reduce time and cost of delivering applications
- Geographically dispersed development teams
- Decrease need for specialized developer skill sets

Solution

- Replace ZFS's six legacy application development tools with an integrated toolset

IBM File Manager for z/OS
IBM Fault Analyzer for z/OS
IBM Debug Tool Utilities and Advanced Functions for z/OS

Benefits:

- Increased productivity with single skill set requirement across all developer teams
- Reduced expenditures
  - License and maintain only three tools instead of six

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More information

- **Analysis based on strategic criteria including:**
  - Suite currency
  - Feature/functions
  - Strategic focus
- **You can see the full report of this analyst whitepaper:**
  - www14.software.ibm.com/webapp/iwm/web/preLogin.do?lang=en_US&source=swg-syszsoa

- **For more information**
  - www.ibm.com/software/awdtools/deployment

Summary

- **IBM has a wide array of application lifecycle tools to help you develop, test, deploy and maintain your composite applications.**

- **Now time for Questions and Answers**

Thank you for your time today!