IBM Software Group

Enterprise COBOL and Rational Developer for System z – How they play in an SOA world

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Rational. software

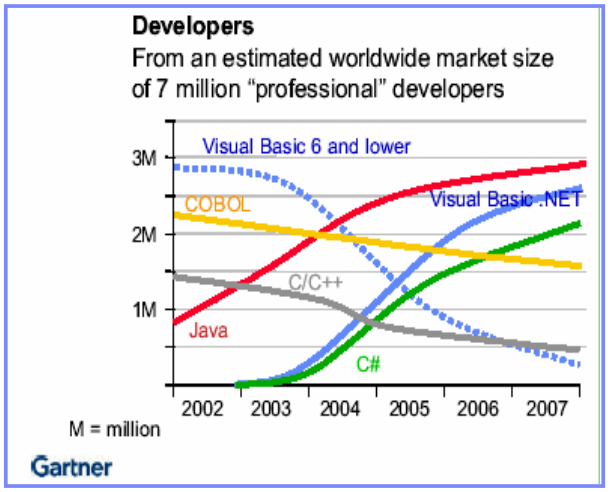
Agenda

- Introduction
- Enterprise COBOL
  - XML Support
  - CICS V3.x Support
  - Unicode Support
  - Object Oriented COBOL
- Rational Developer for System z
  - Mainframe development features
  - XML and Web Services support
  - CICS V3.x and Service Flow Feature support
- More Information
- Questions?

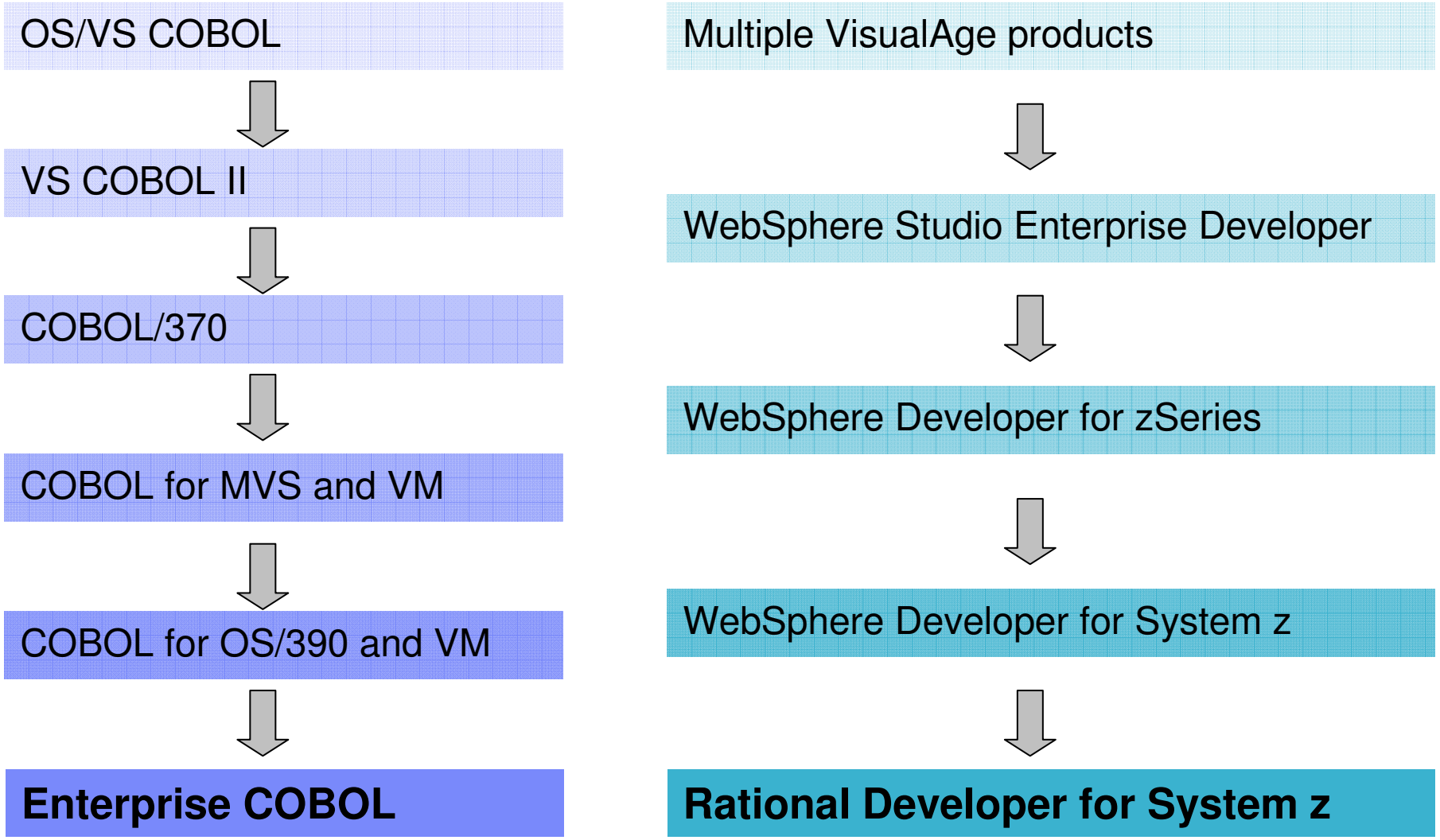
Legacy applications

- 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?



Product History



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Introduction to XML

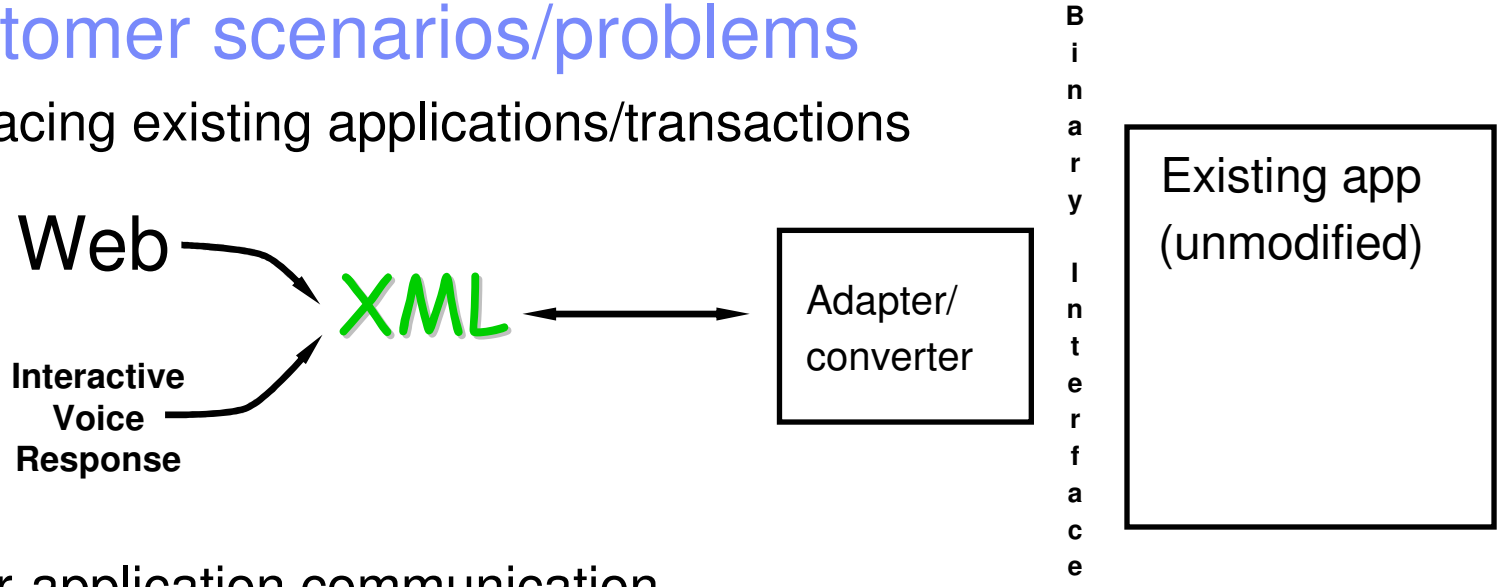
- What is XML?
  - A markup language, for describing data (rather than its presentation)
  - Each piece of data is identified via the markup language
  - Unlimited number of tags can be defined
- Why XML?
  - It is becoming the interconnection layer of e-business
  - The industry direction for application integration and platform independent data interchange
    - e.g., for Web Services
  - Allows sender and receiver to evolve independently of each other (flexible interface)
    - as opposed to Electronic Data Interchange (EDI) for example

Sample XML document:

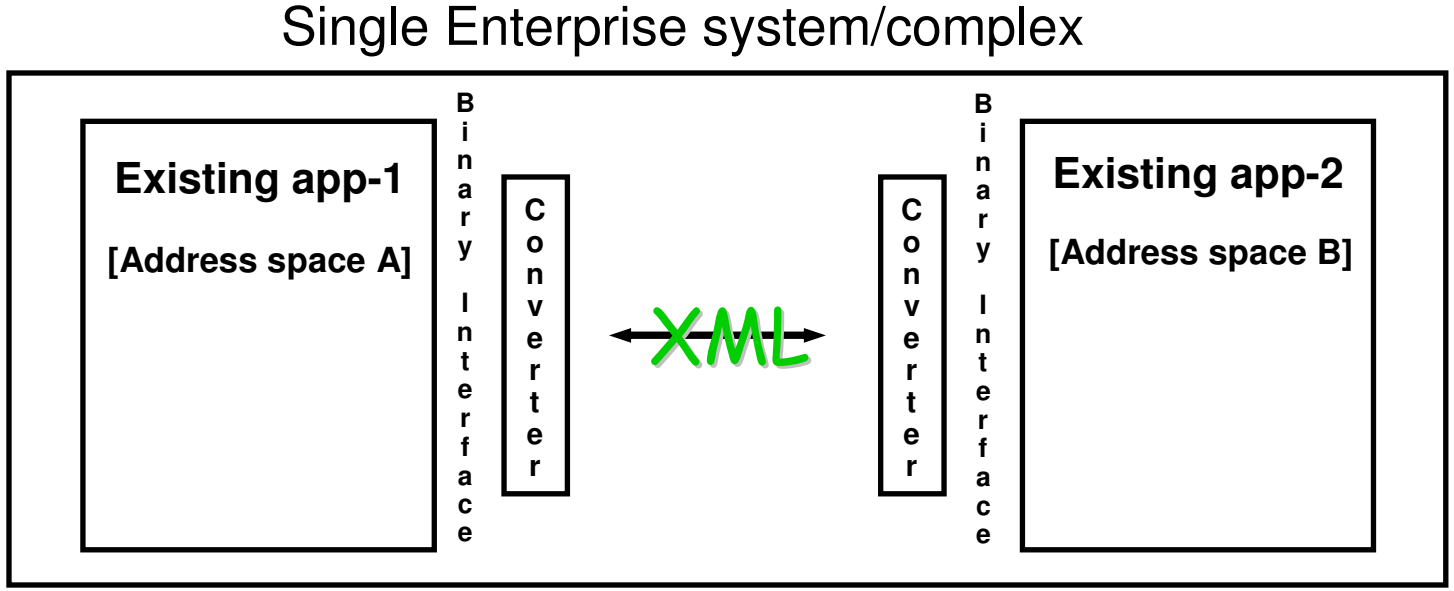
```
<?xml version="1.0" encoding="ibm-1140"?>
<TRADE type="short sale">
  <SYMBOL>IBM</SYMBOL>
  <PRICE>$78.75</PRICE>
  <SHARES>200</SHARES>
  <COMMISSION>$29.95</COMMISSION>
</TRADE>
```

Customer scenarios/problems

- Refacing existing applications/transactions



- Inter-application communication



Why process XML in …

In applications?

- Coherent development context and methodology
- Centralizes business logic within the application
  - Versus some business function here, some there, ...
- Independent of middleware choices, characteristics
- Allows business logic to be conveniently applied during and after message acquisition/generation
- Incremental step from existing application design
- Can process XML messages as such
  - Versus forcing conversion to traditional data structures

In COBOL?

- Keep development control in one place/style
- Guarantee correct language semantics
  - sign configuration
  - layout/padding
  - picture constraints
- Exploits your existing assets/skills/literacy

Enterprise COBOL XML Parser Support

- Much faster than general purpose parsers
  - Designed for high-speed transaction processing
- Runs in all COBOL run-time environments:
  - CICS, IMS, batch, TSO, USS, ...
- Works with any transport mechanism for XML documents
  - Use MQSeries, CICS transient queue or COMMAREA, IMS message processing queue, WebSphere, etc.
- XML Parser is part of the run-time library
  - Can be used from Enterprise COBOL or Enterprise PL/I
- Supports both inbound and outbound XML documents
- Parses XML documents that are in memory, in a COBOL alphanumeric or national data item
- Parses XML documents into individual pieces
  - Passes each piece to user-written processing procedure
- During parsing you can populate COBOL data structures with the data from XML messages
  - Advantage: non-COBOL programs can communicate data to/from COBOL without having to know the COBOL data structure formats!

Hello XML World

Program

```
Identification division.
Program-id. HelloXML.
Data division.
Working-storage section.
  1 M.
   2 pic x(21) value '<?xml version="1.0"?>'.
   2 pic x(40) value '<msg type="succinct">Hello, World!</msg>'.
Procedure division.
    Display 'XML Event                XML Text'
    XML Parse M
      Processing procedure P
    End-XML
    Goback.
P.
    If XML-Code = 0
      Display XML-Event XML-Text
    End-if.
End program HelloXML.
```

Output

```
XML Event              XML Text
START-OF-DOCUMENT      <?xml version="1.0"?><msg type="succinct">Hello, World!</msg>
VERSION-INFORMATION    1.0
START-OF-ELEMENT       msg
ATTRIBUTE-NAME         type
ATTRIBUTE-CHARACTERS   succinct
CONTENT-CHARACTERS     Hello, World!
END-OF-ELEMENT         msg
END-OF-DOCUMENT
```

XML Generate

XML GENERATE statement

- Generates XML message from COBOL group data items

```
1 Employee1.
  2 Name pic X(5) Value 'Tom'.
  2 Idn  pic 9(9) comp Value 123456789.
  2 Addr.
    3 Street pic X(20) Value '555 Bailey
 Ave'.
    3 City   pic X(20) Value 'San Jose'.
    3 State  pic X(20) Value 'California'.
  2 More.
    3 Age    pic +99.99  Value '45.9'.
    3 Firm   pic BBXXX9B Value 'IBM4'.
    3 Salary COMP-2      Value
 +.00012327E+06.
1 XMLDOCUMENT pic X(500).

Procedure division.

  XML GENERATE XMLDOCUMENT FROM EMPLOYEE1
```

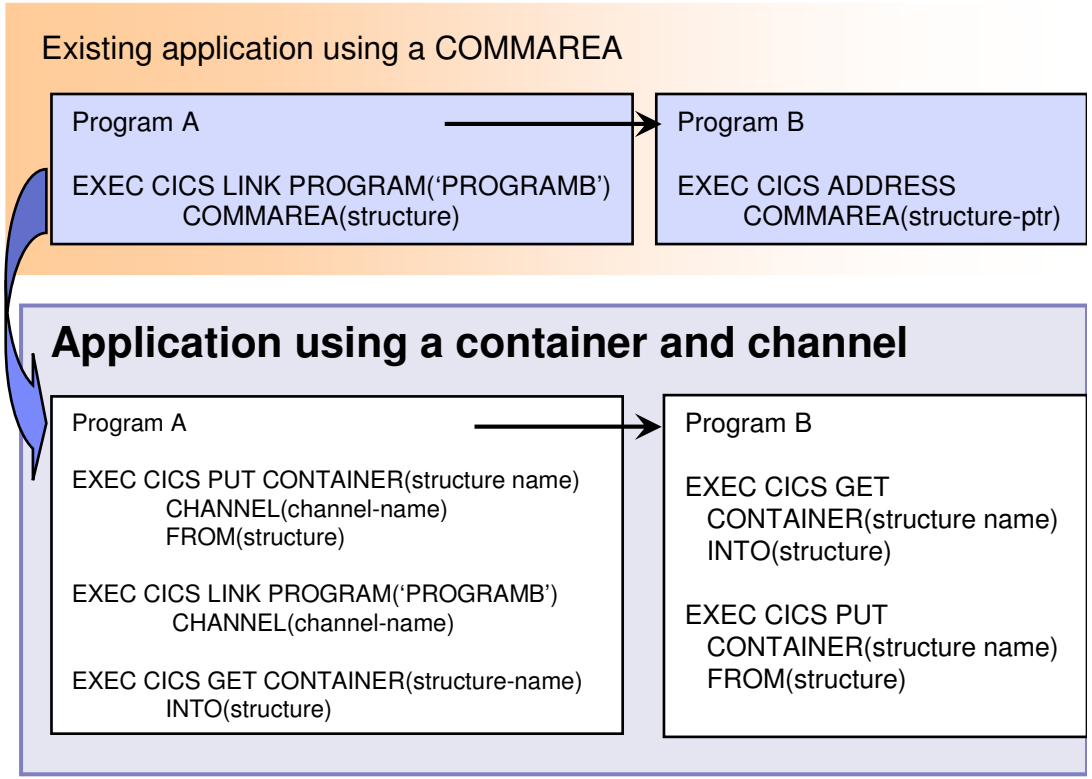
- Output from sample XML GENERATE statement

```
<Employee1>
  <Name>Tom</Name>
  <Idn>123456789</Idn>
  <Addr>
    <Street>555 Bailey Ave</Street>
    <City>San Jose</City>
    <State>California</State>
  </Addr>
  <More>
    <Age>45.9</Age>
    <Firm>IBM4</Firm>

  <Salary>1.23270000000000000E+02</Salary>
  </More>
</Employee1>
```

Optimized data exchange between CICS programs with Containers and Channels

- Offers a more flexible and intuitive alternative to the COMMAREA
  - By using separate containers for logically different data it will simplify language structures and minimize the impact of changes to the interface
    - For example; input, output, error
    - Avoids “overloading”
  - Dynamic creation and discovery by applications
- Enables large amounts of data to be passed between CICS applications
  - Not subject to 32KB restriction
- Optimized and managed by CICS
- Requires minimal application changes required to use



What is Unicode and why should you care that Enterprise COBOL supports it?

- Industry standard for coded character set
  - defined by Unicode Consortium and ISO
- Covers all commonly used characters in the world in one code page (vs. one "language" per ASCII, EBCDIC, or EUC code page)
- Characters: text, digits, special characters, symbols, control characters, ...
- Multiple Unicode encoding formats: UTF-8, UTF-16, UTF-32
- "Stateless" encoding: meaning of an encoding unit is self defining
- Support global e-business environment:
  - Applications for multi-cultural/multi-geographic businesses
  - Networks of heterogeneous systems
- Enables a common implementation for global application versus separate code page for each geographic area or system platform
- Supported by all key operating system and middleware platforms
- Required by: XML, HTML, Java, ...
- Interoperates with DB2 Unicode, Java, COBOL XML

Unicode Support Overview

- Unicode literal and value clause
- Unicode data type
- New compiler options
- Implicit conversions for EBCDIC data assigned to or compared with Unicode data
- Explicit conversions via intrinsic functions
- XML Processing Example ➔➔➔

```
01 XMLdocument  pic N(10000) usage national.

  XML PARSE XMLdocument
    Processing procedure XMLproc
  End-XML.
  …
XMLproc.
  Evaluate XML-Event
    When 'START-OF-ELEMENT'
      If  XML-NText = N'Ελλάδα'
        Display 'Processing <Greece>
   element'
        …
      End-if
    …
  End-evaluate.
```

IBM Object Oriented COBOL

- Enable fine-grained interoperation of COBOL and Java within an address space, both:
  - COBOL invocation of Java
  - Java invocation of COBOL
- Complement existing COBOL:Java interoperation
  - mediated by middleware, based on connectors
  - COBOL and Java running in different address spaces or machines
  - only for COBOL transactions
- Fine-grained interoperation (interlanguage communication) provides:
  - better performance
  - use of non-transactional COBOL
- Improve integration of COBOL with WebSphere Application Server
  - COBOL client invocation of enterprise beans
  - Future support for COBOL execution within WebSphere server regions

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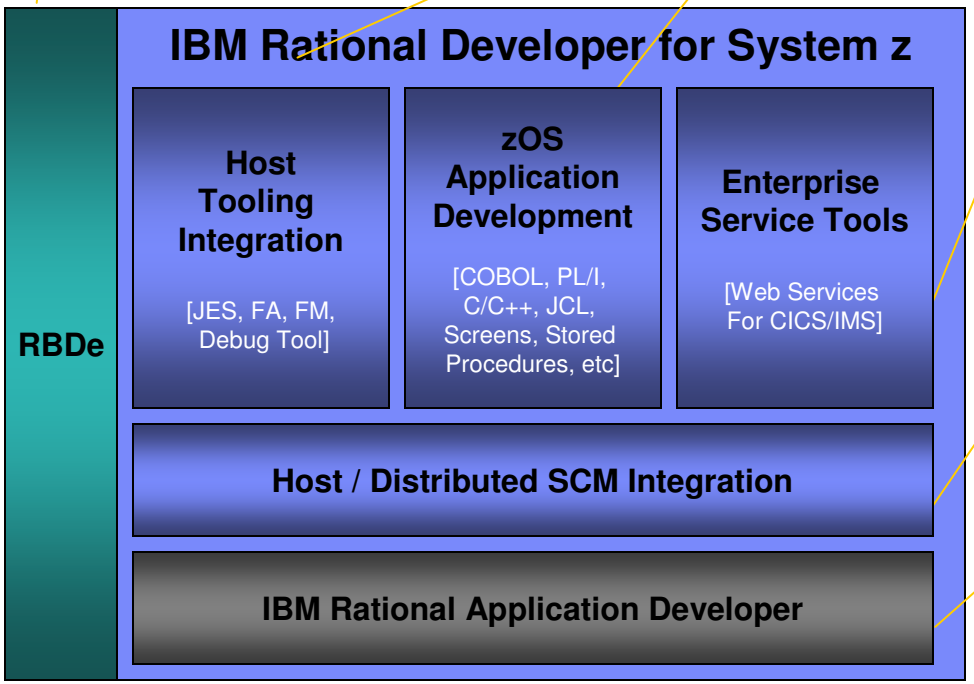
IBM Rational Developer for System z

JES and PD Tools

•Read/Write/Update VSAM datasets via integration with IBM File Manager
•Access IBM Fault analyzer reports for analyzing ABENDS and associating back to source code
•Interact with the Job Entry Subsystem (JES) to submit jobs, monitor jobs, and review job output
•Debug zOS applications from with workstation as they execute live in the remote runtime

Integration with EGL using RBDe

- Quick and easy development of modern enterprise applications for procedural programmers
- Simplify and speed up creation of Web applications and services without having to learn Java or J2EE



Traditional Development

Development Environment

- Connect to z/OS systems
- Work with z/OS resources like COBOL, PL/1 , C, C++, JCL, etc.
- Perform dataset management actions like allocating datasets and migrating datasets
- Perform typical edit, compile, and debug tasks on remote z/OS resources from the workstation
- Create, build, and catalog DB2 stored procedures on zOS
- Compile and test programs locally to ensure correctness

Screen design

- Visually create, modify, build, and deploy BMS maps sets or MFS/IMS maps remotely or on the local workstation

Code Generation

- Generate CRUD DB2 program code from UML, which can also be easily integrated into web service applications

zOS Web Service and Flow Creation

- Implements SOA and Web Services
- SOA access to CICS V3.2 and IMS V9 COBOL applications
- Bottom-up/Top-down or meet-in-the-middle COBOL to XML mapping support
- Integrated COBOL XML converters, XML schemas, and WSDL generation
- Service Flow Modeler to build/deploy service flows out of your existing Commarea, Channel, MQ, and Terminal CICS applications.

SCM Support

- Access to host SCMs such as SCLM
- Framework for writing/deploying custom SCM integration code
- Support for storing zOS resources in distributed SCMs such as ClearCase

Web and JEE Development

- Create Web Pages / JSF / Struts
- JEE/Java Development
- JCA Connectors
- Distributed debugger
- Web Services and Test environment

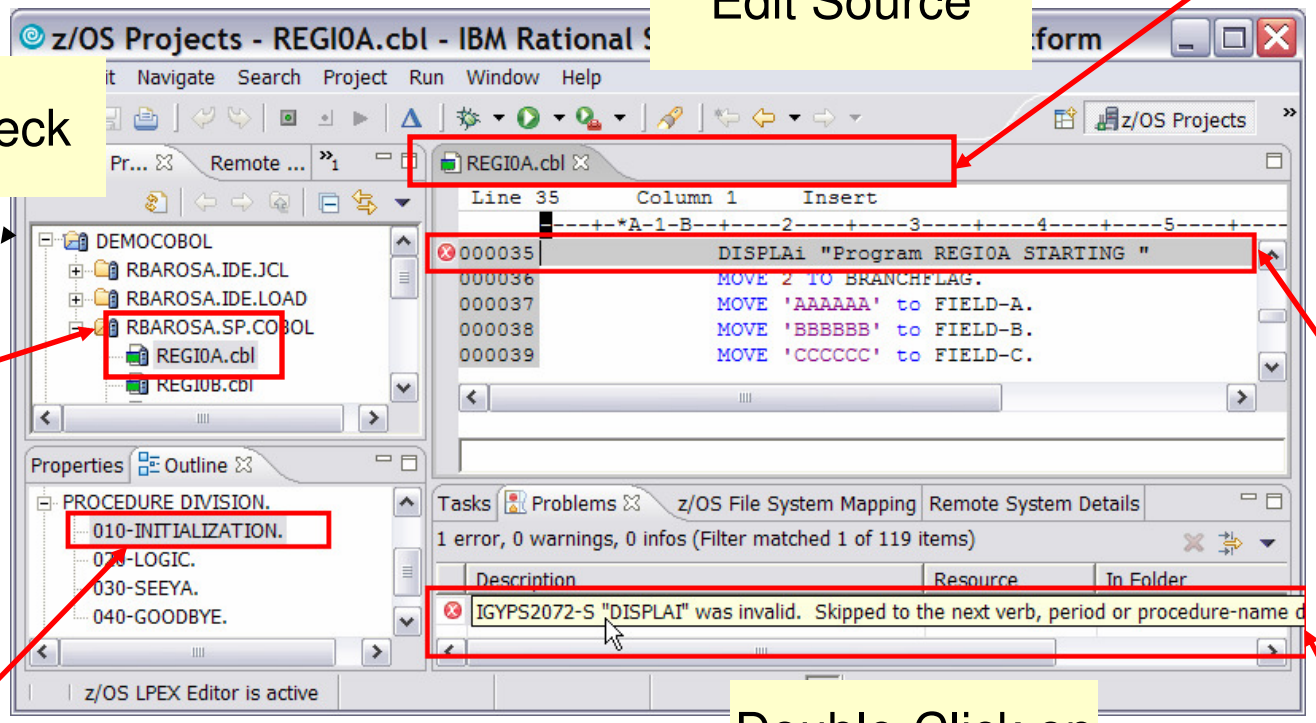
RDz IDE - Eclipse-based development

- Common development environment for COBOL, PL/I, C/C++, and Java
- Simplified development with more information at your fingertips

Edit Source

Open and edit multiple source and JCL members simultaneously

Syntax Check



Submit jobs, access job output, or open source members with a single click

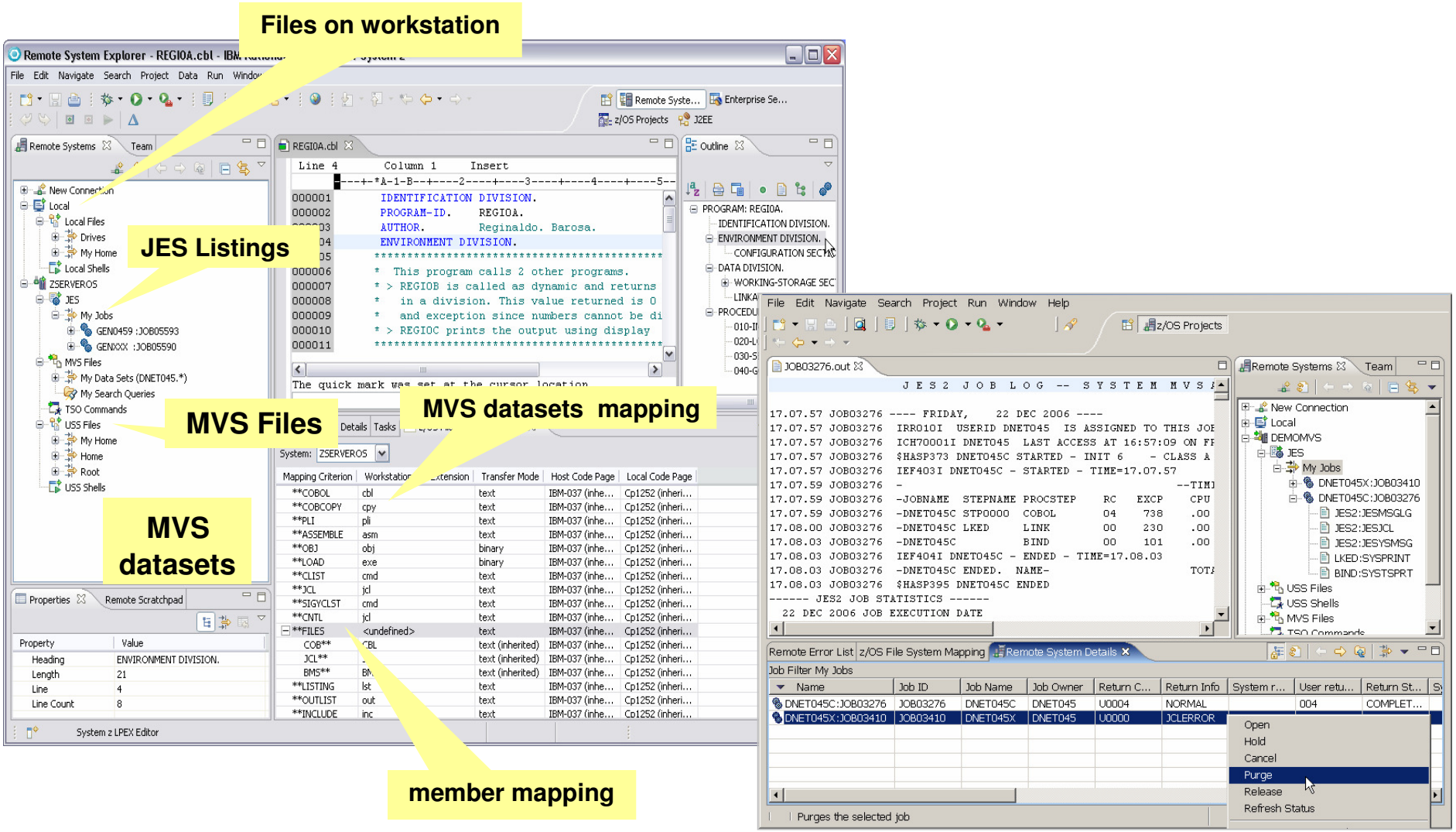
Statement in error indicated in source

Outline view presents COBOL structure

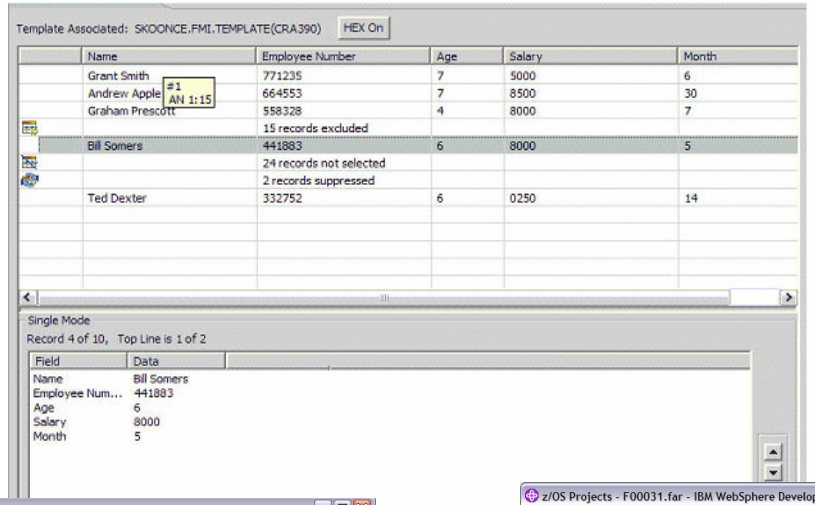
Double-Click on the Error

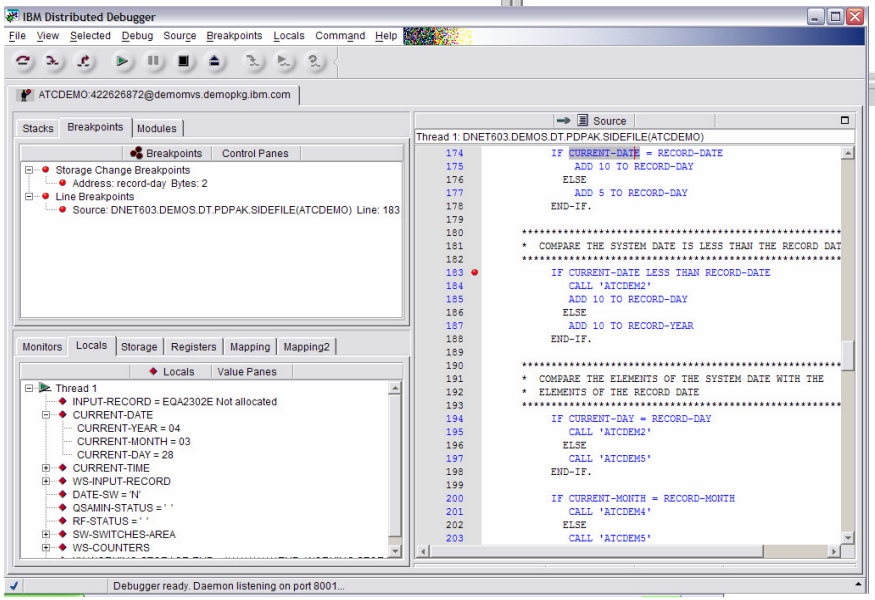
Error list in Problems view

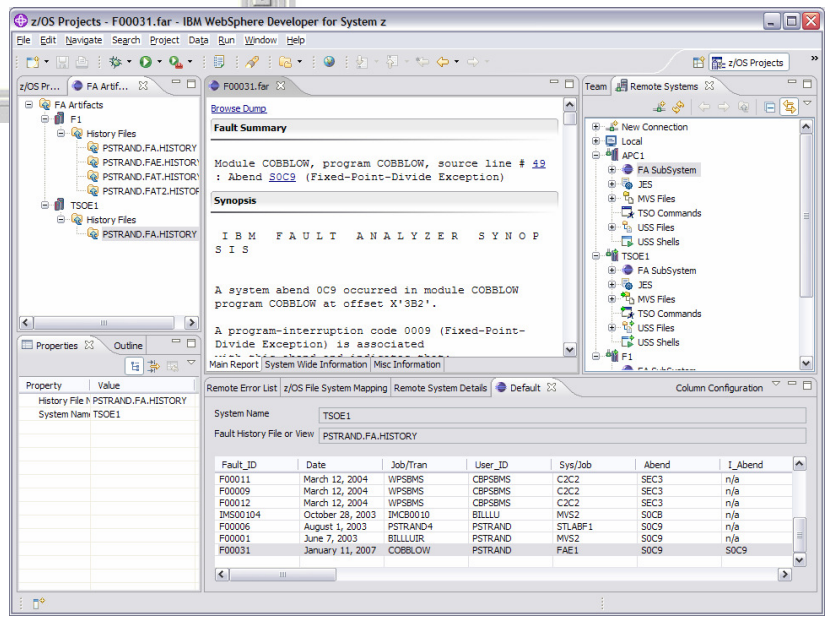
Interactive Access to z/OS



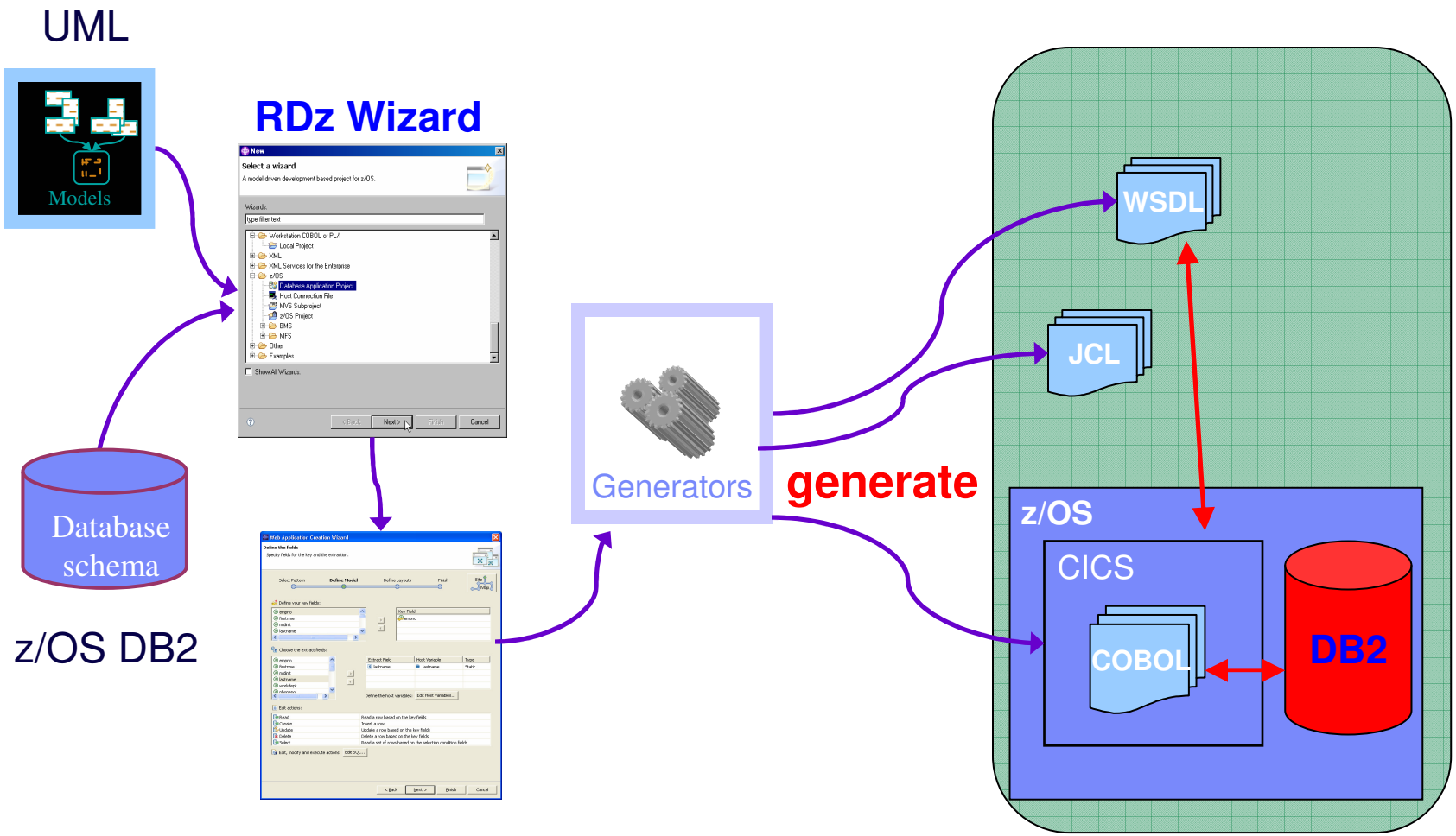
IBM Debug Tool, File Manager, and Fault Analyzer Integration



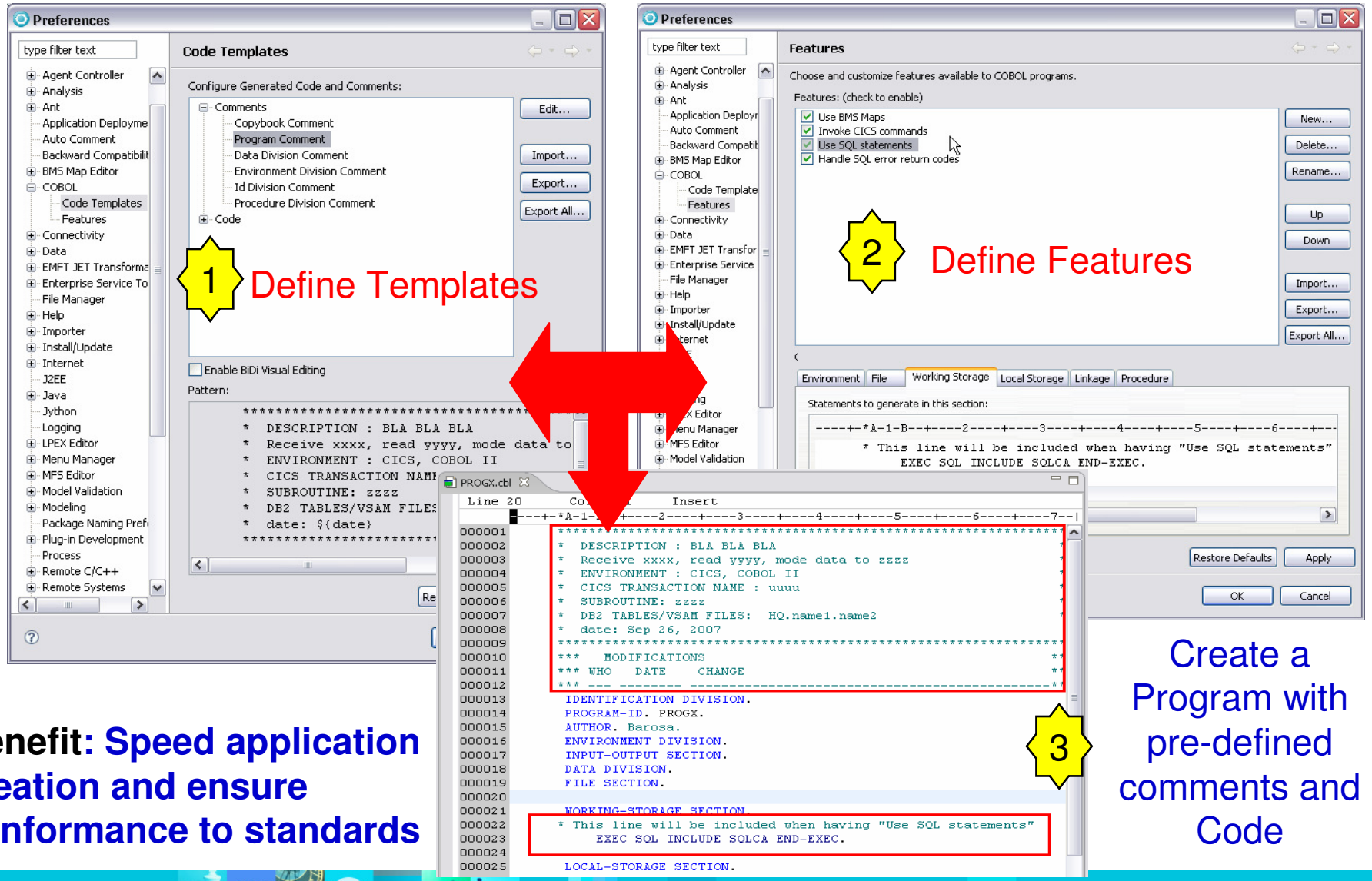




Database Application Generator wizard Architecture Overview



New on version 7.1 - Template-driven program creation

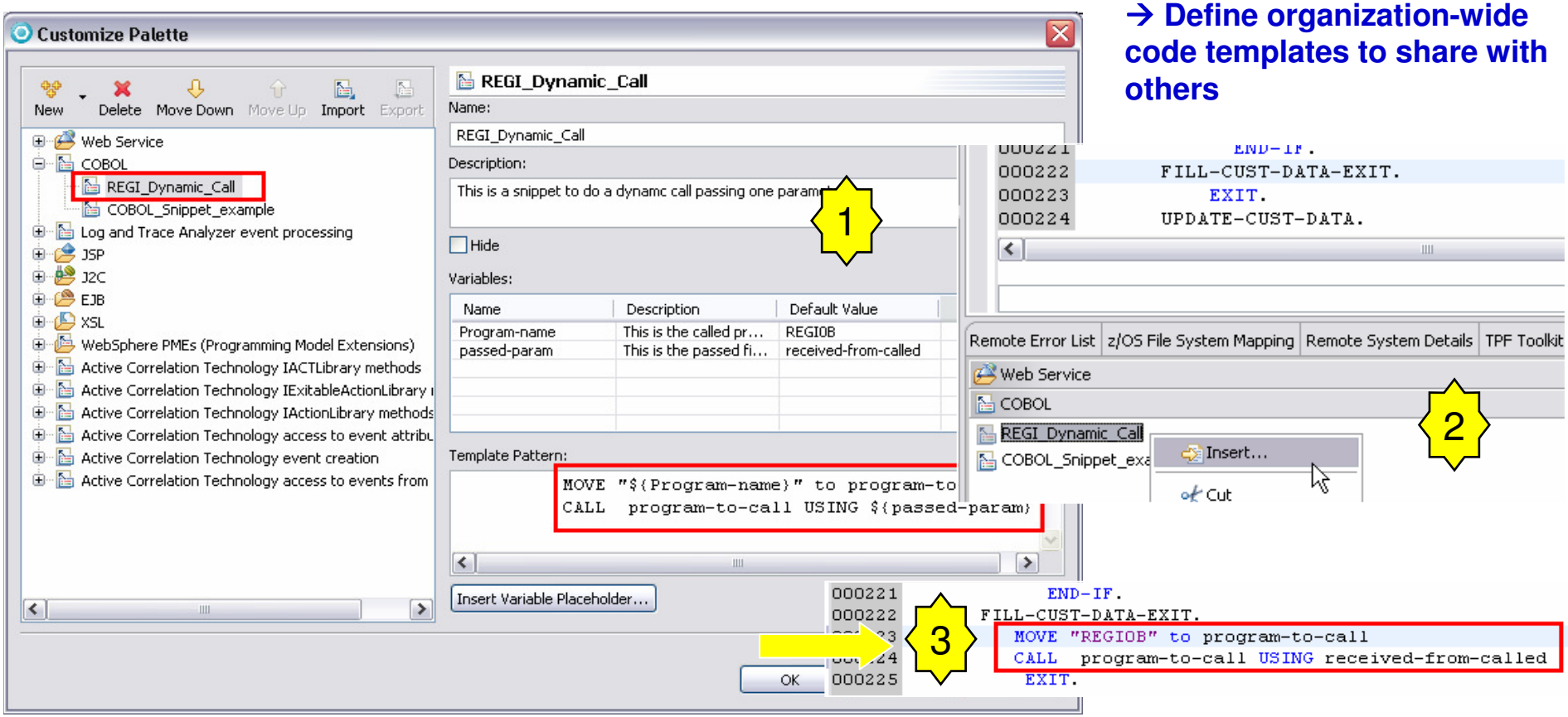


Benefit: Speed application creation and ensure conformance to standards

Create a Program with pre-defined comments and Code

New on Version 7.1 - Snippet Insertion

- Define small bits of code and save code into a snippet view
- Optionally define variables in the code block
- Insert the code later directly into the editor



Benefits:

→ Speed application creation and ensure conformance to shop standards

→ Define re-usable logic in an organized manner that can be easily used in programs

→ Define organization-wide code templates to share with others

New in 7.1

- *Core z/OS development*
  - Enhanced COBOL outline view including filtering capabilities
  - Content assist and syntax check error display for new CICS TS V3.2 syntax
  - SSL support for job submissions and monitoring
  - Simplified configuration of host servers
  - Additional ISPF commands and keyboard access available through editors
  - Support for DB2 V9 applications and stored procedures
  - Extensible template-driven COBOL program generation framework to create COBOL program skeleton including comments, divisions, and code based on intended usage:
    - Basic Mapping Support (BMS) Screens
    - CICS Applications
    - SQL error handling
    - Customer created extension
  - Next Generation Development Tooling for COBOL (NGDT) Technology Preview speeds application development using enhanced COBOL editors, pattern-based code generation, and UML to source skeleton generation

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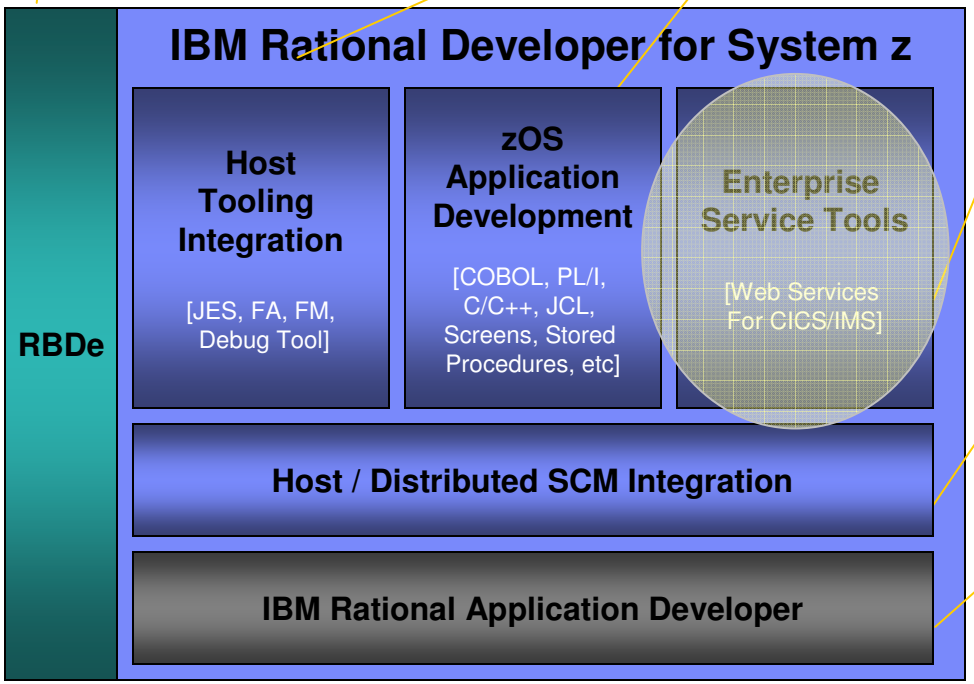

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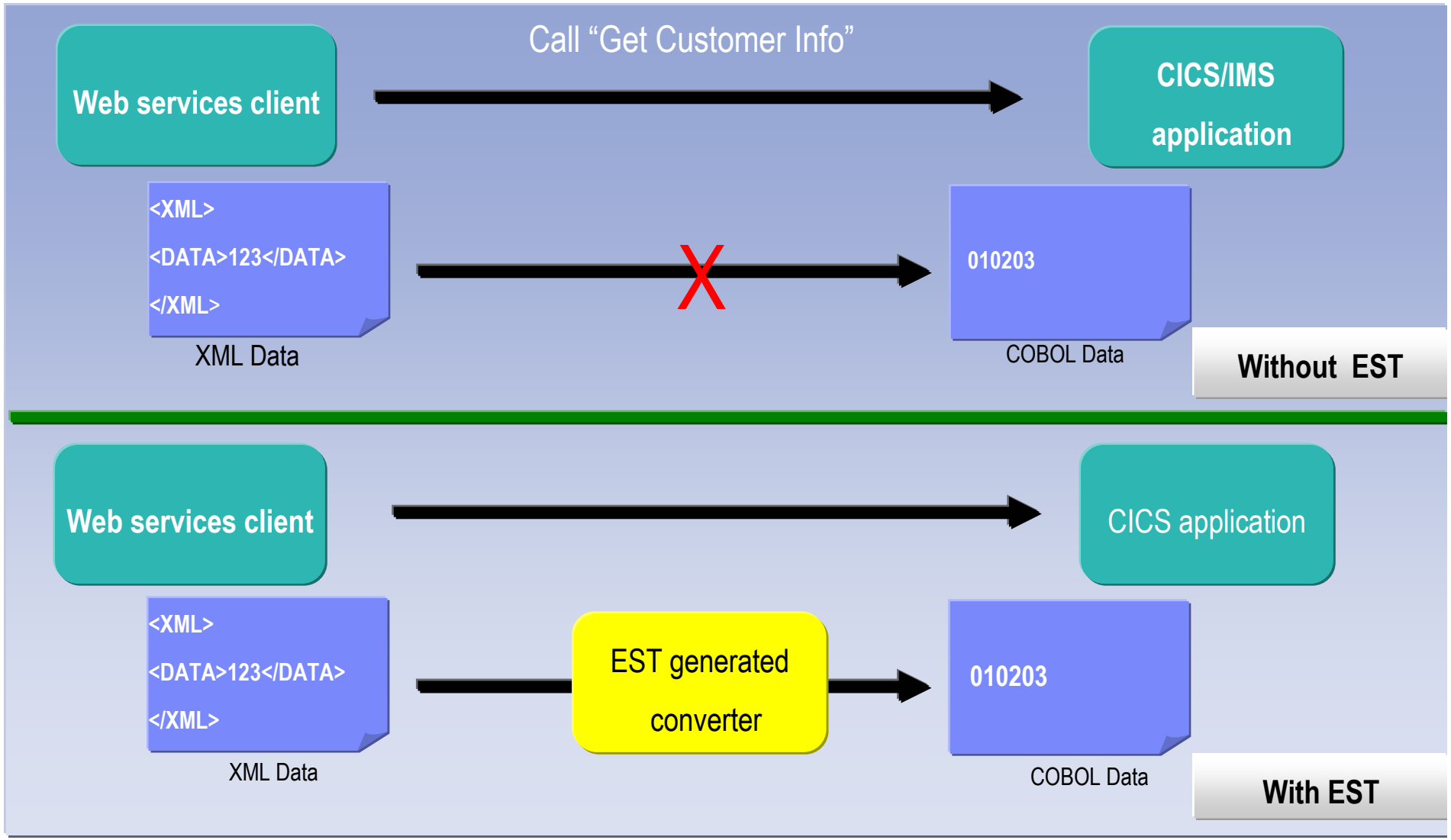
- JCA Connectors
- Distributed debugger
- Web Services and Test environment

Why Web Services?

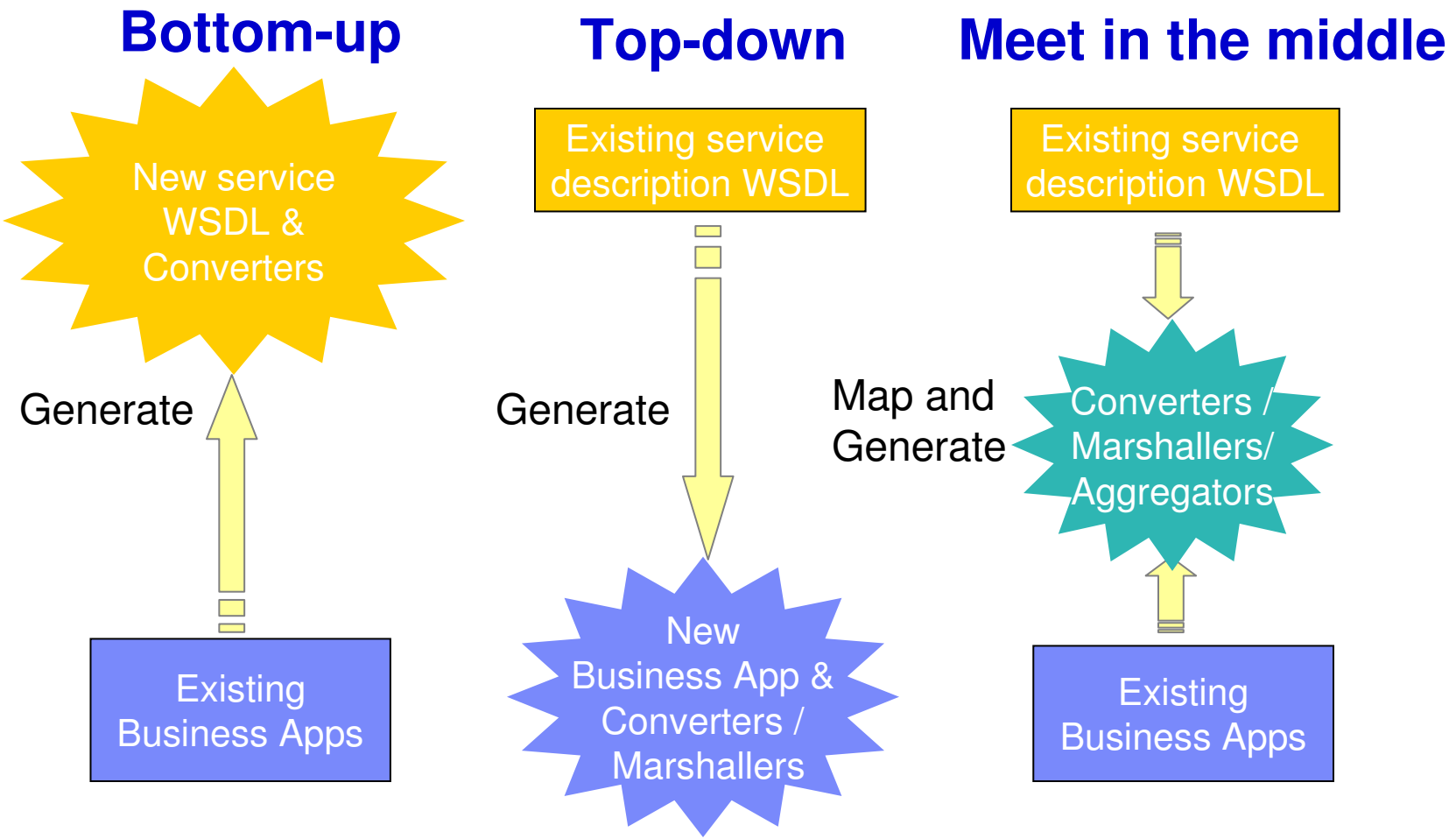
- Web services provide standardized access to assets for different software applications residing on disparate platforms
- Web service definitions provide abstract interfaces which allow for loose coupling between business components – implementation can vary without affecting consumers
- You can reuse applications exposed as Web services in a variety of service-oriented architecture frameworks, such as a process choreographer or an enterprise service bus.

We need interfaces to talk "XML" ….



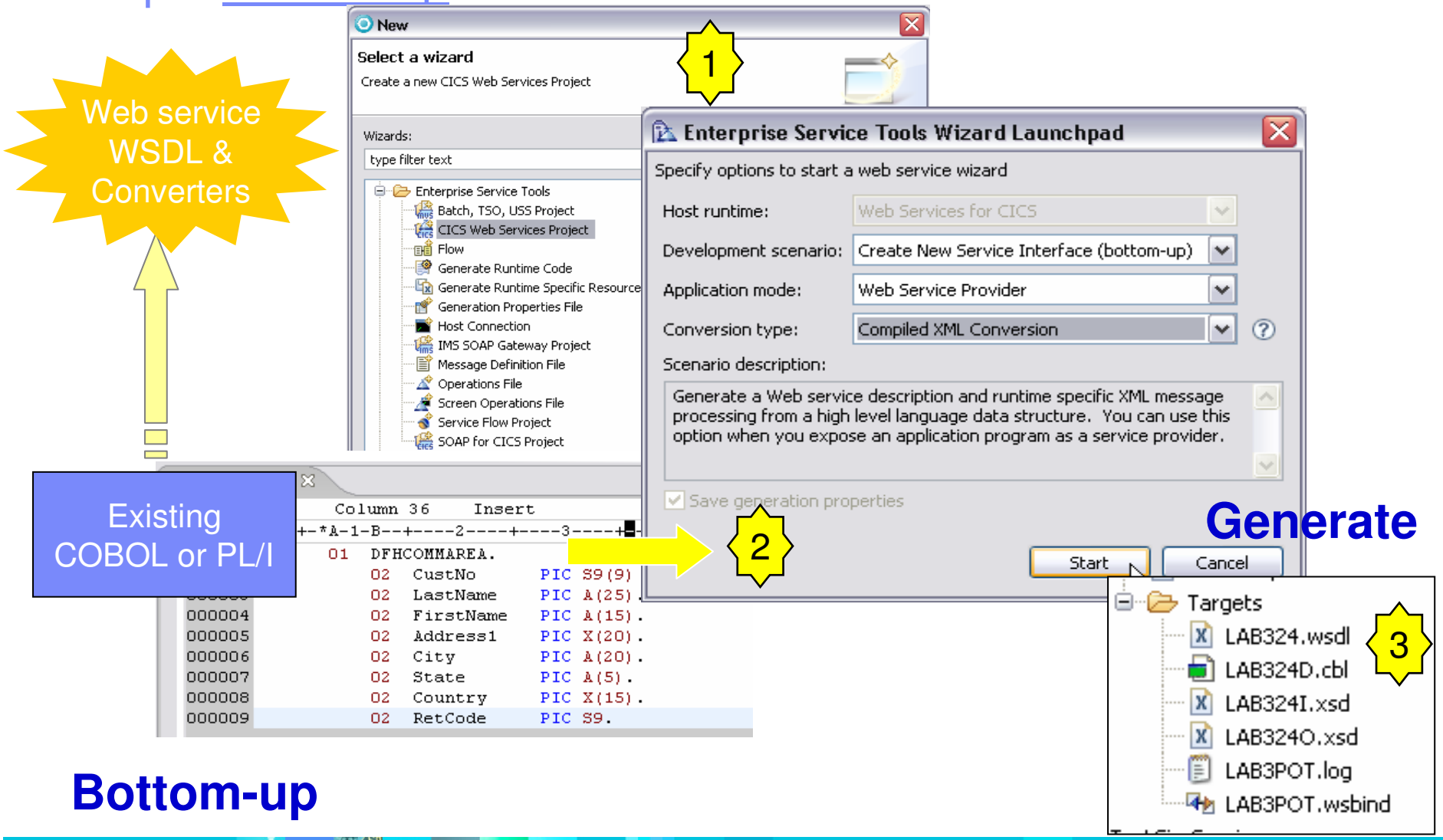
Enterprise Service Tools (EST)

Web Service Enablement Styles



Enterprise Service Tools (EST)

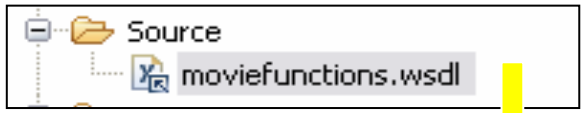
Example Bottom-up

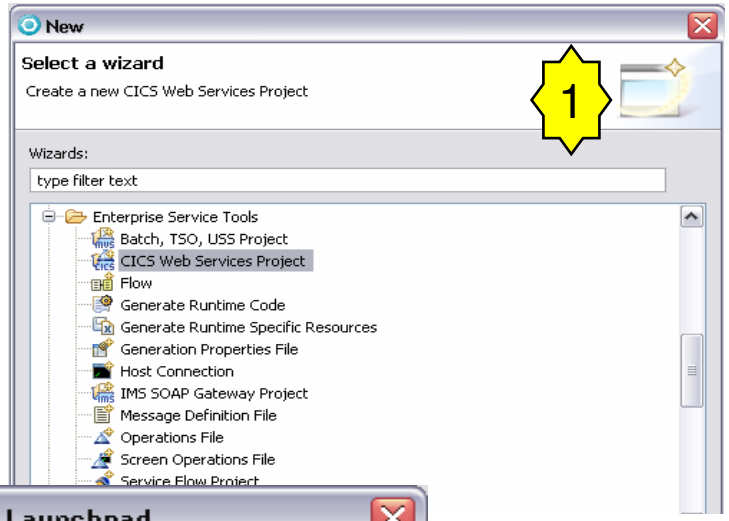


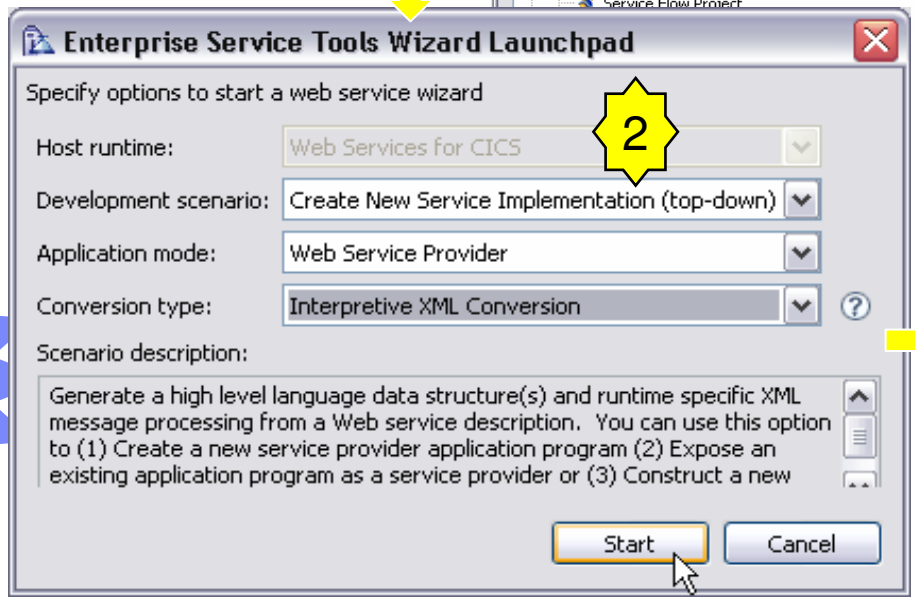
Enterprise Service Tools (EST)
Example Top-down

Top-down

Existing service description WSDL



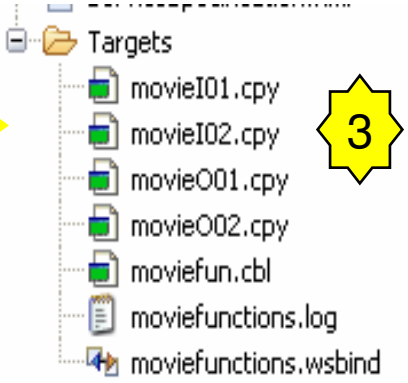




COBOL Program & COBOL Copybooks

Generate

Generate



Enterprise Service Tools (EST)
Example Meet in the middle

Meet in the middle

Existing service description WSDL

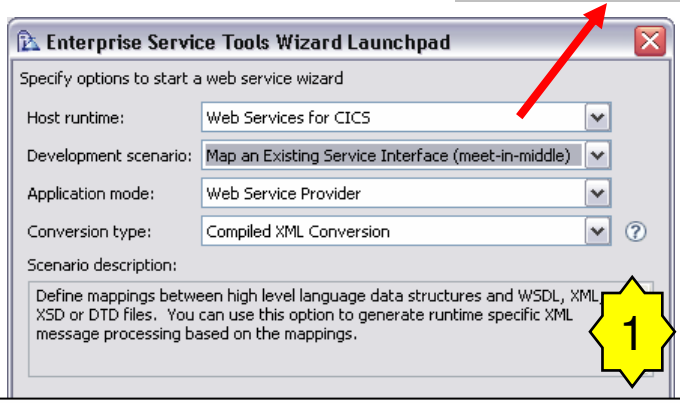
LAB324.wsdl

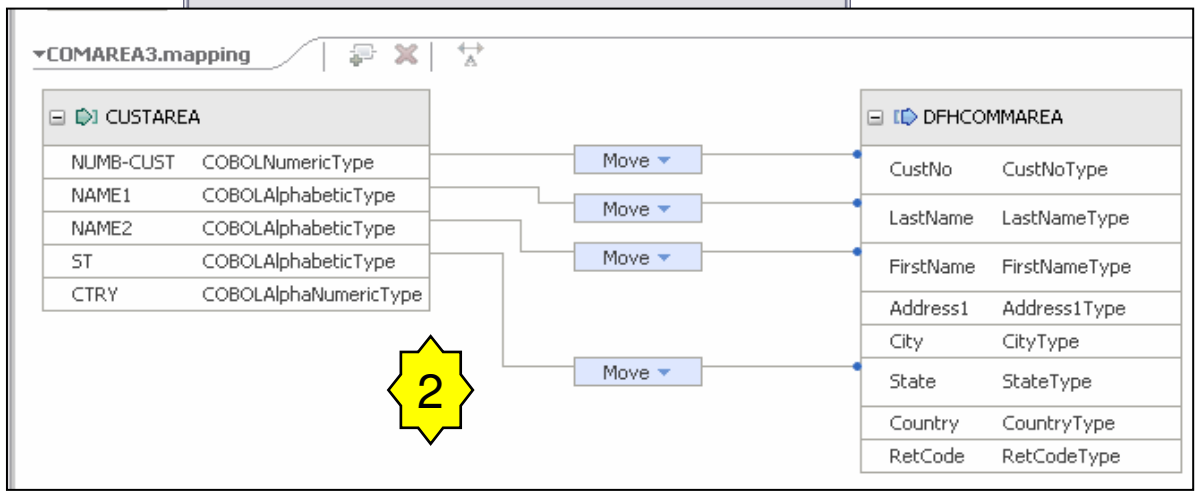
Map and Generate

Converters / Marshallers/ Aggregators

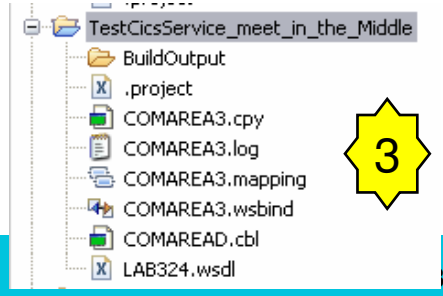
Existing Business Apps

```
01  CUSTAREA.
    02  NUMB-CUST     PIC S9(5).
    02  NAME1         PIC A(25).
    02  NAME2         PIC A(15).
    02  ST            PIC A(5).
    02  CTRY          PIC X(15).
```

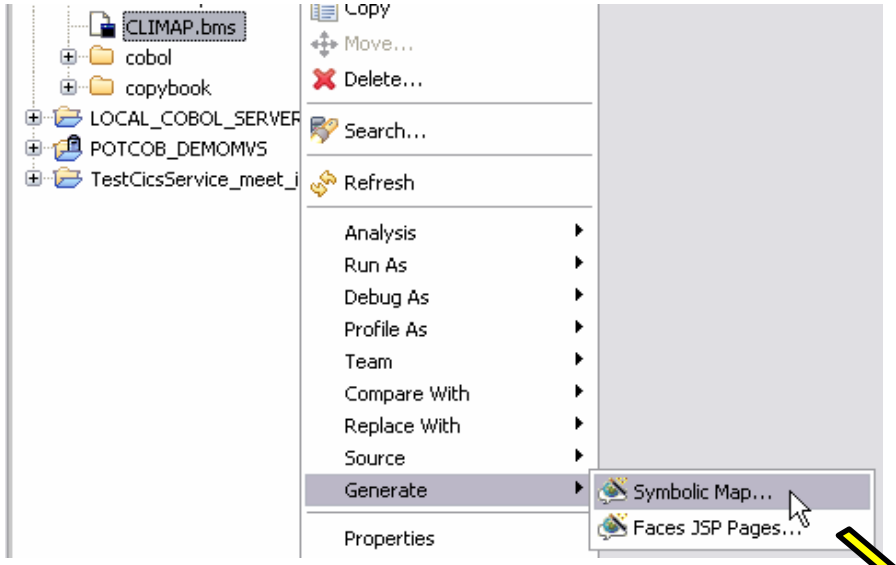




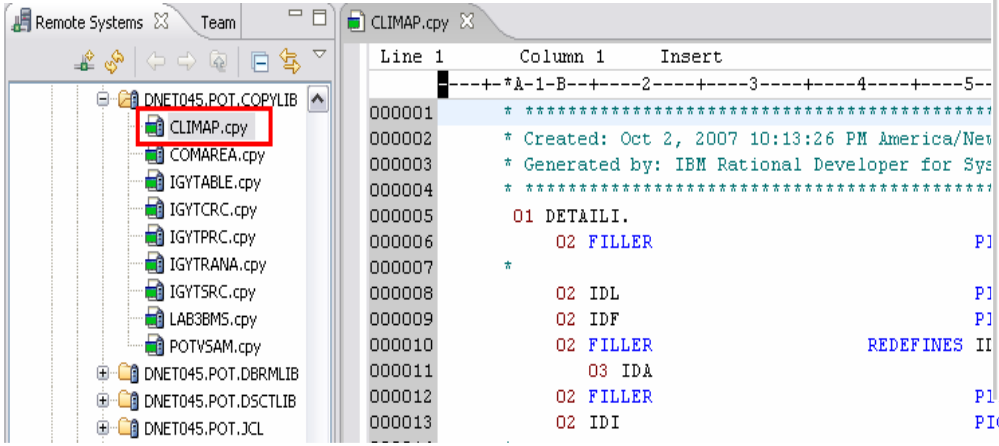
Generate

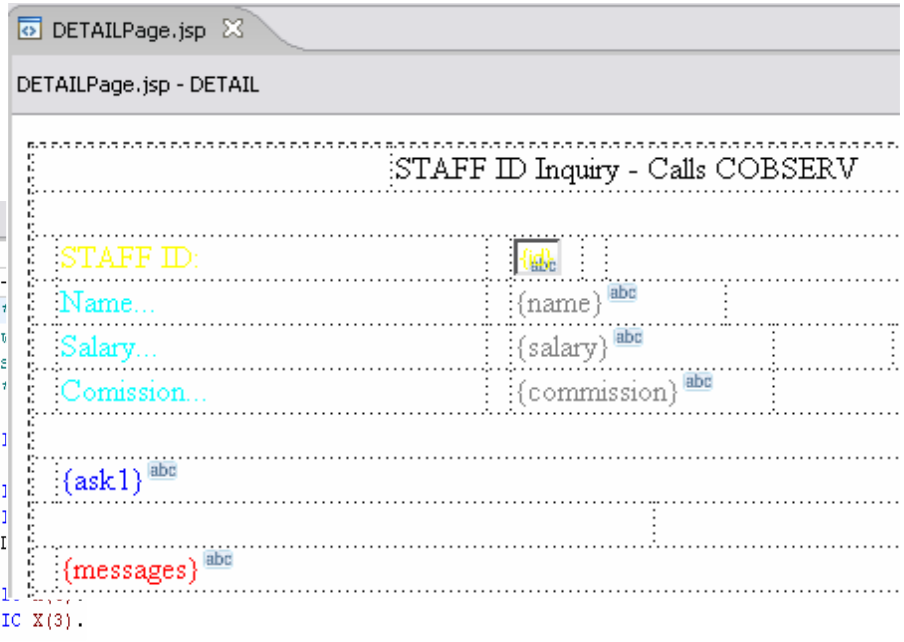


Generate Copybook or JSP for CICS

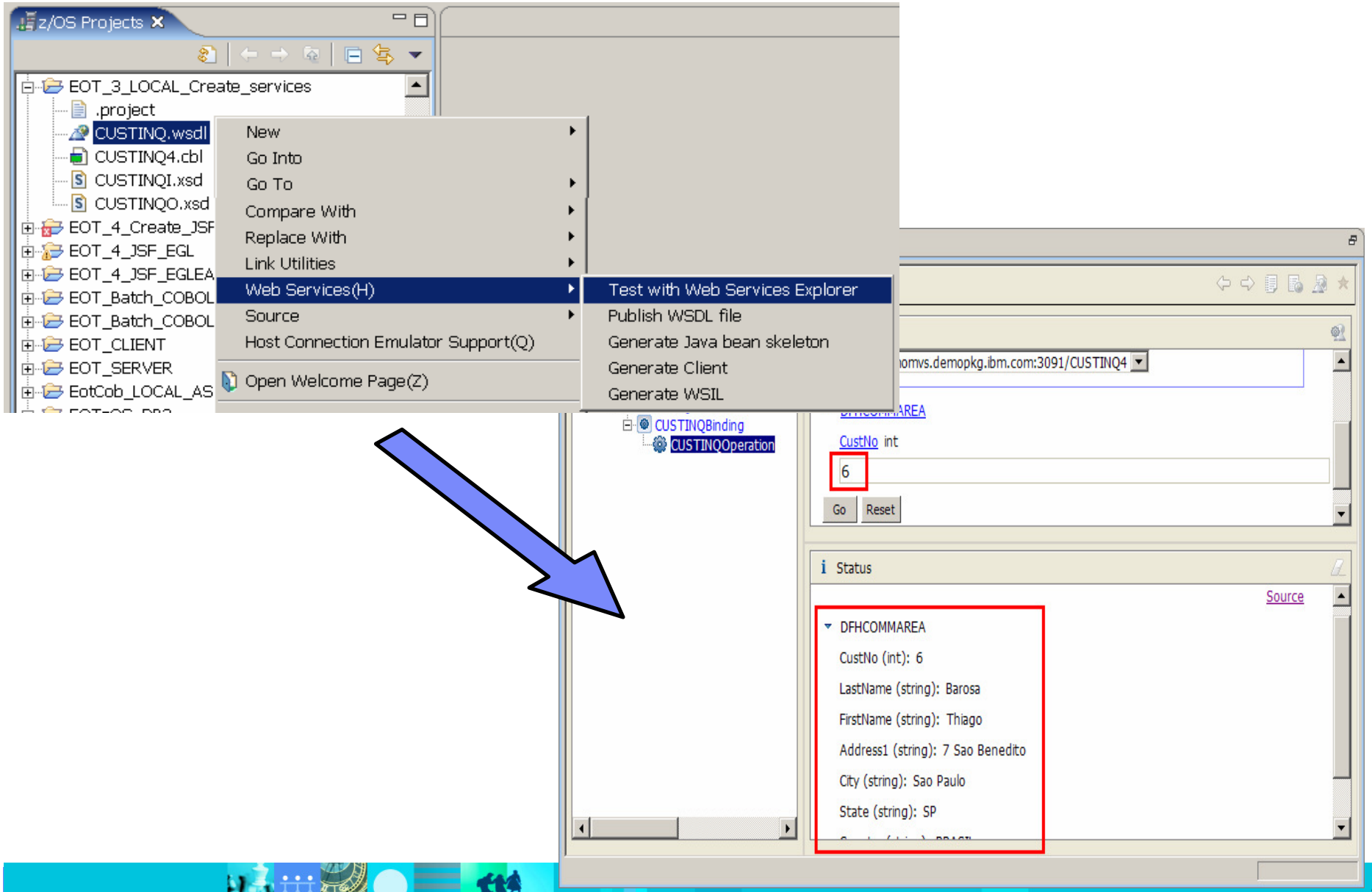


→Generate COPYBOOK to be used in the program (symbolic map)
→ Generate Faces JSP





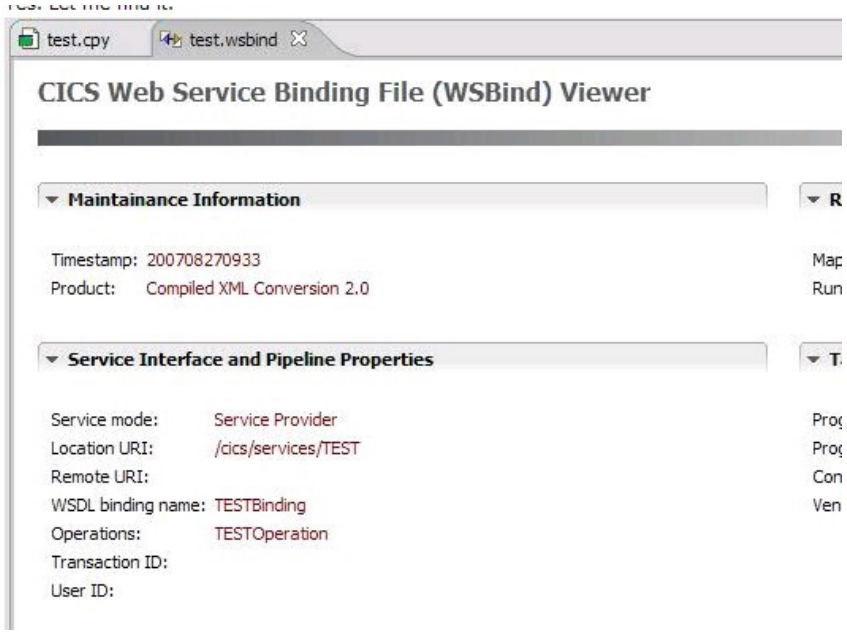
Example: Testing using RDz



New on 7.1 - Service Support

Single Runtime Services

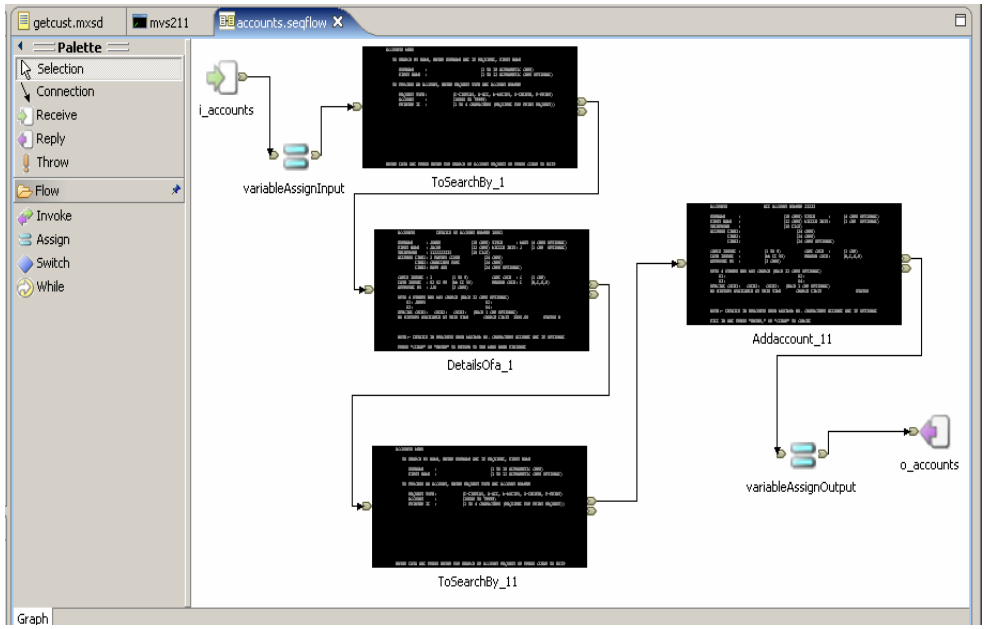
- Support for new CICS TS V3.2 constructs
  - WSDL 2.0
  - SOAP 1.2
- Support for IMS V10 Web Service callouts
- Support for PLI web services
- Usability improvements for web-service creation wizards/projects/scenarios
- CICS WSBind file viewer
- Web Service Namespace toleration in web service creation and test environment

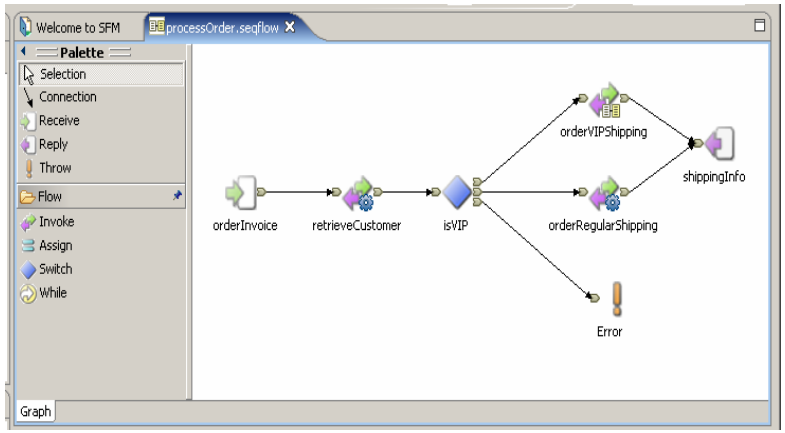


What is Service flow support?

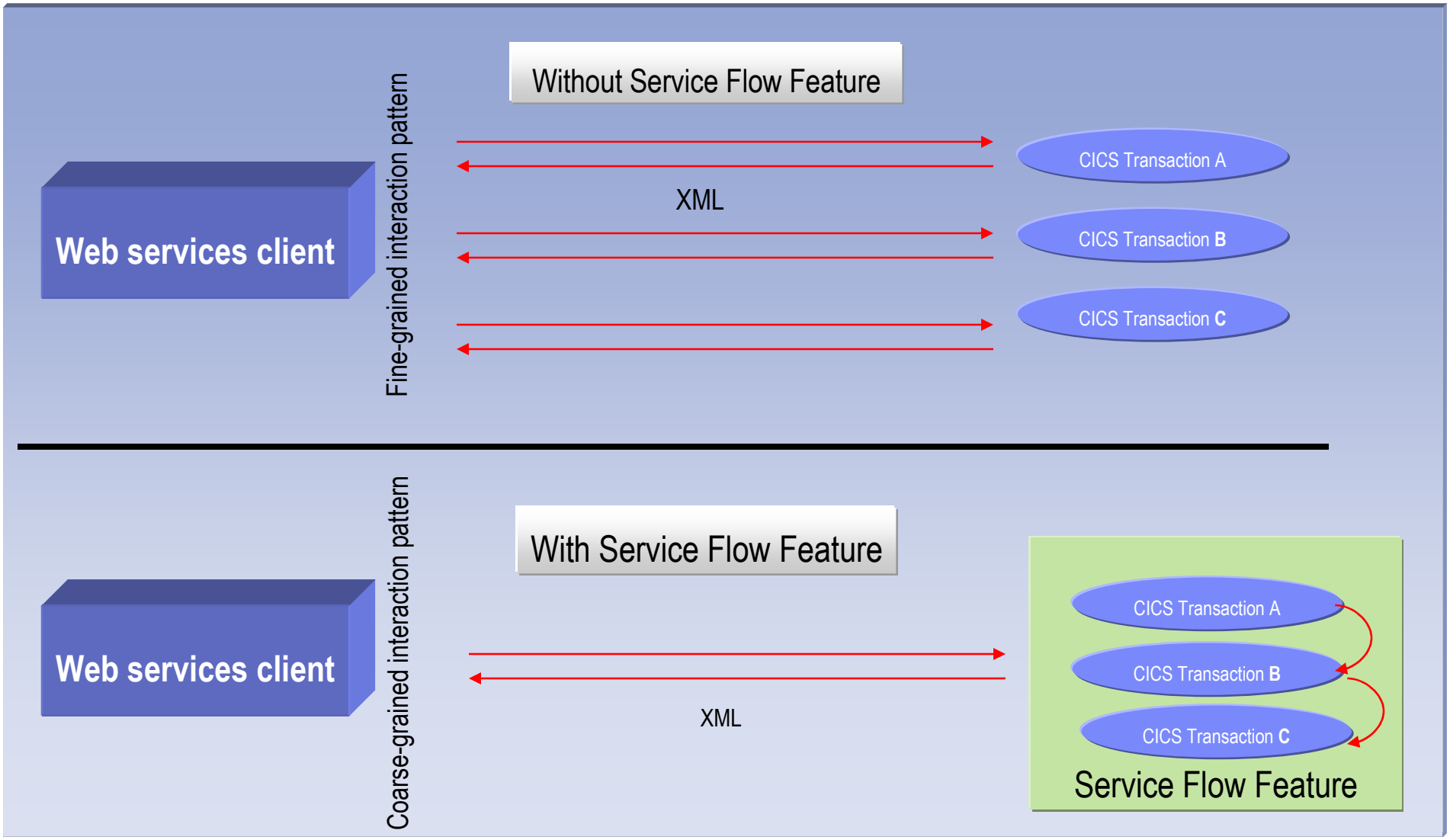
- Service Flow Feature is a CICS feature. Service flow support is a RDz tool to build service flows out of your existing **COMMAREA/container, WSDL** *and* **Terminal** based CICS applications.

- It allows you to:
  - Model business processes
  - Implement business processes by aggregating multiple transaction invocations, terminal interactions, and sub-flows
  - Deploy these aggregations to runtimes in CICS Transaction Server V3.x or WebSphere Application Server
  - Optionally deploy business process as a web service
- Development concepts consistent with other SOA development tasks
- Support for Service Flow Runtime V3.2
- Channel/Container Support





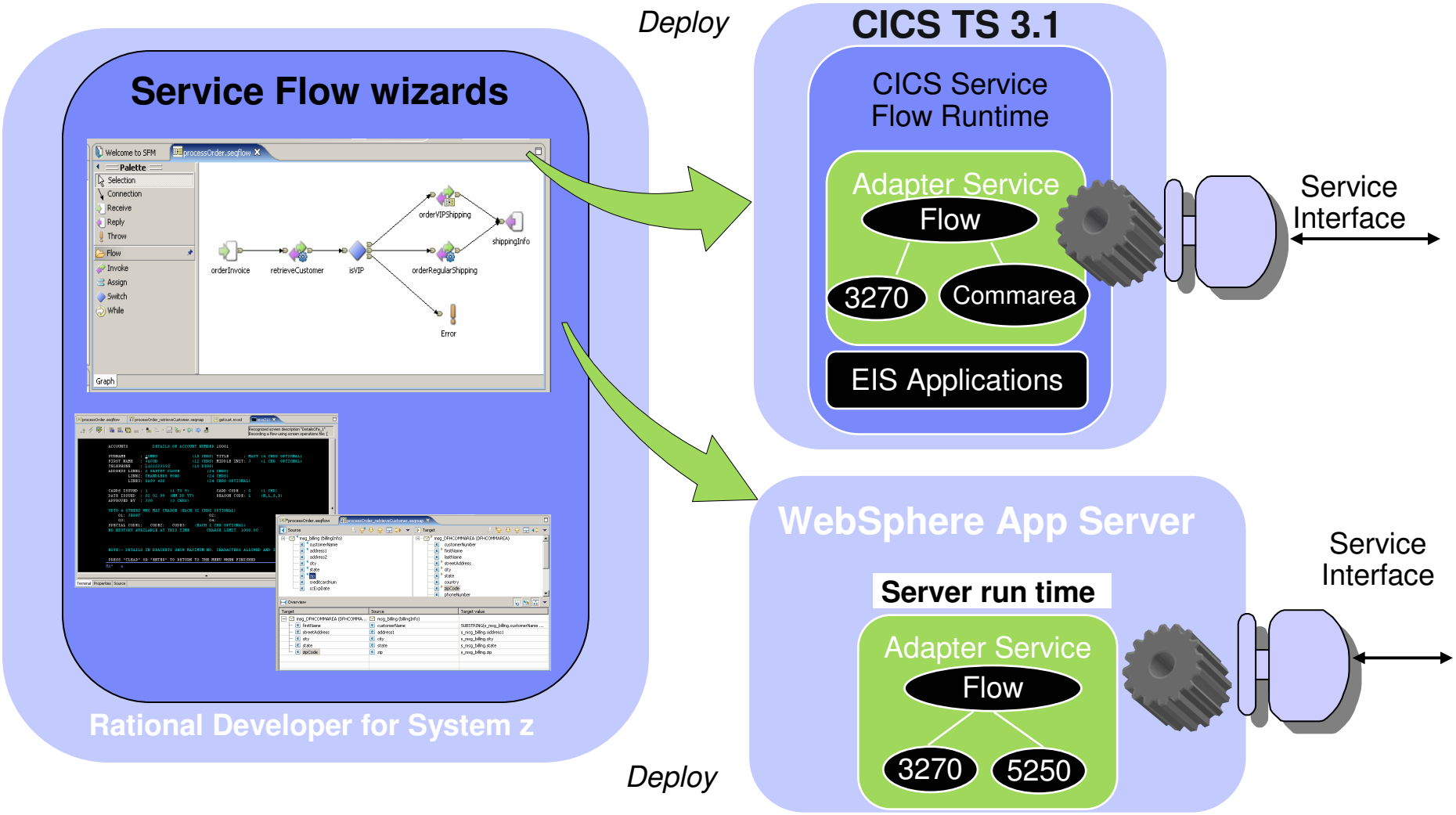
Service Flow in CICS V3.x



Why Service Flow Feature?

- Increase Productivity
  - By building libraries of annotated components representing current assets
  - By rapidly assembling new applications out of existing components using graphical tools
  - By exploiting existing developer skills and literacy
- Transform the Enterprise
  - By unlocking critical IT assets and re-purposing them to participate in a service oriented architecture
  - By opening access to existing fine-grained applications as coarse-grained business functions, while maintaining QOS
  - By providing a layer of abstraction between service consumer and application implementation / user interface
  - By fostering SOA skills in traditional developers

Supported Runtimes



RDz Application Deployment Manager for CICS

- Helps developer to execute CICS tasks
- Miscellaneous server development aids
  - New copy for programs and mapsets
  - Perform validate check for existing resource names (avoid resource name clash that is a problem today)
  - List CICS regions
  - DFHRPL list
- Web service development aids
  - Perform Pipeline scan to autoinstall URIMAP and WEBSERVICE definitions
  - Provide pipeline and WSBind pickup directory to populate SFM selection list
  - Provide WSDL file directory to populate SFM selection list
  - Provide End Point URI to populate SFM selection list

New in 7.1

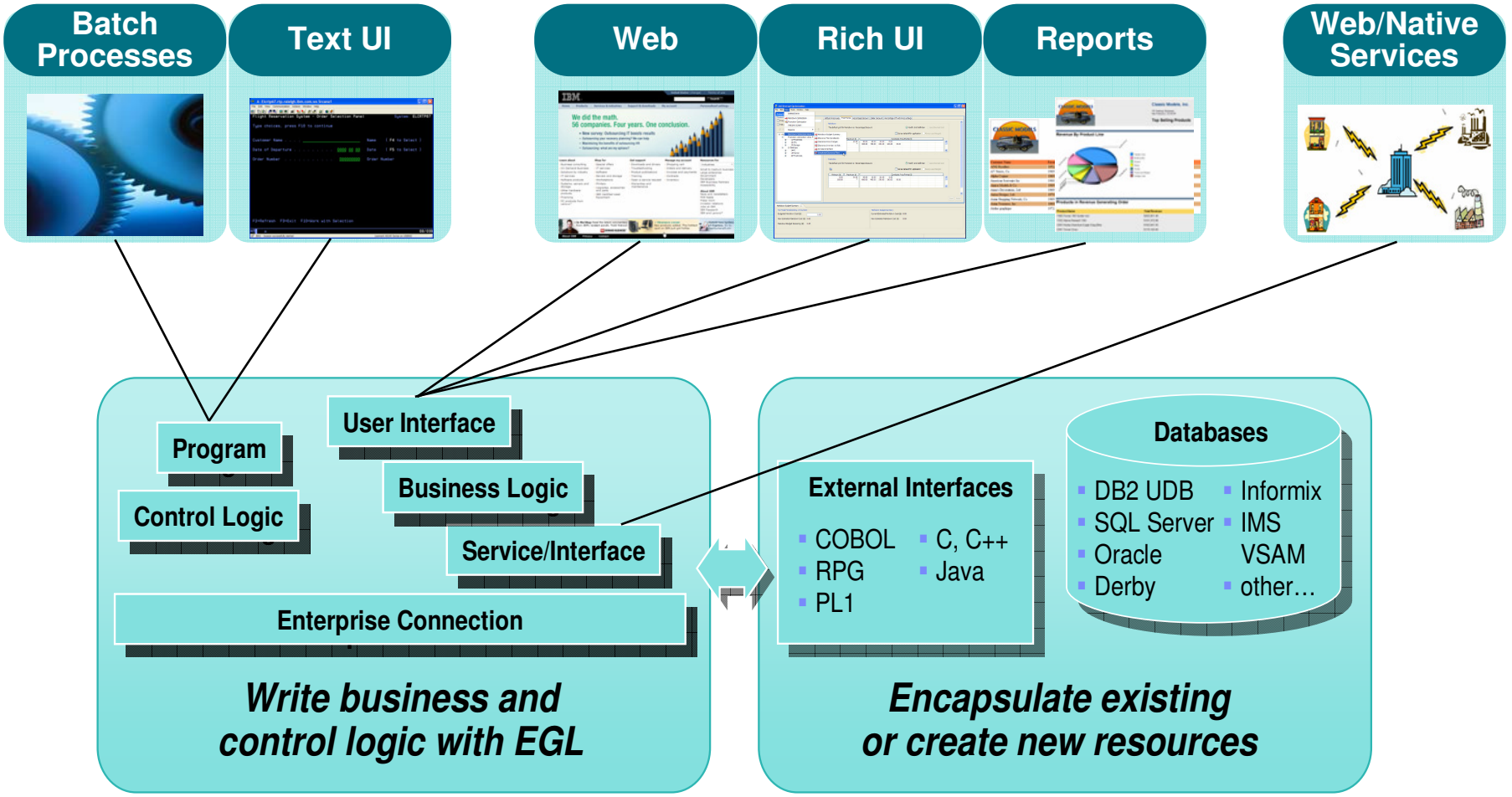
- Support for CICS TS V3.2 Web Service runtime introduced, including support for Web Services Description Language (WSDL) 2.0 and SOAP 1.2 standards
- Tools for IMS V10 outbound Web service callout code generation introduced
- PL/I language support in Web Services wizards introduced for generating Web Services from existing PL/I programs for CICS, IMS, and batch processing
- Improved meet-in-the-middle development scenario tooling wizards to link-up Web Services specifications with existing CICS, IMS, and batch applications
- Improved bottom-up development scenario tooling allowing for more flexible Web Service creation based on existing programs
- New CICS WSBind file viewer for browsing existing/generated CICS Web Services configurations
- Web Service testing and generation tools now tolerate custom XML namespaces defined as part of the service input or output specification

Benefits of RDz XML Enablement

- Enterprise modernization:
  - Easy to “reface” existing COBOL applications to support XML messages
  - Adapts the rigid, binary interface of traditional programs.
- Programmer productivity:
  - Generates complete programs that easily convert between XML and COBOL datatypes
  - Generates a sample program that illustrates use of converter programs with existing COBOL
  - Exploits customers' existing assets/skills/literacy
- Performance
  - XML processing uses the native z/OS high-speed parser
- Supports multiple runtime scenarios
  - Including web services

Rational Business Developer Extension provides Application Flexibility

End-to-end development for a broad variety of applications



Note-Plugs in to Rational Developer for System z

Agenda

- Introduction
- Enterprise COBOL
  - XML Support
  - CICS V3.x Support
  - Unicode Support
  - Object Oriented COBOL
- Rational Developer for System z
  - Mainframe development features
  - XML and Web Services Support
  - CICS V3.x and Service Flow Feature support
- More Information
- Questions

More information

- Webcast/teleconference replay
  - Using SCMs and WDz to optimize mainframe application development
    - www-306.ibm.com/software/sw-events/teleconference/M644523H65158H87.html
- Websites
  - RDz – www.ibm.com/softare/awdtools/rdz
  - COBOL - www-306.ibm.com/software/awdtools/cobol/zos/
  - Enterprise Modernization – www.ibm.com/rational/modernization
- Developerworks
  - UML to COBOL
    - article
      - www.ibm.com/developerworks/websphere/techjournal/0708_col_barosa/0708_col_barosa.html
    - Tutorial
      - www.ibm.com/developerworks/edu/wes-dw-wes-uml2cobol1.html
  - Model Driven Development in the mainframe environment article
    - www.ibm.com/developerworks/websphere/library/techarticles/0708_england/0708_england.html
  - Writing java programs in a mainframe environment tutorial
    - //www.ibm.com/developerworks/websphere/library/techarticles/0703_england/0703_england.html

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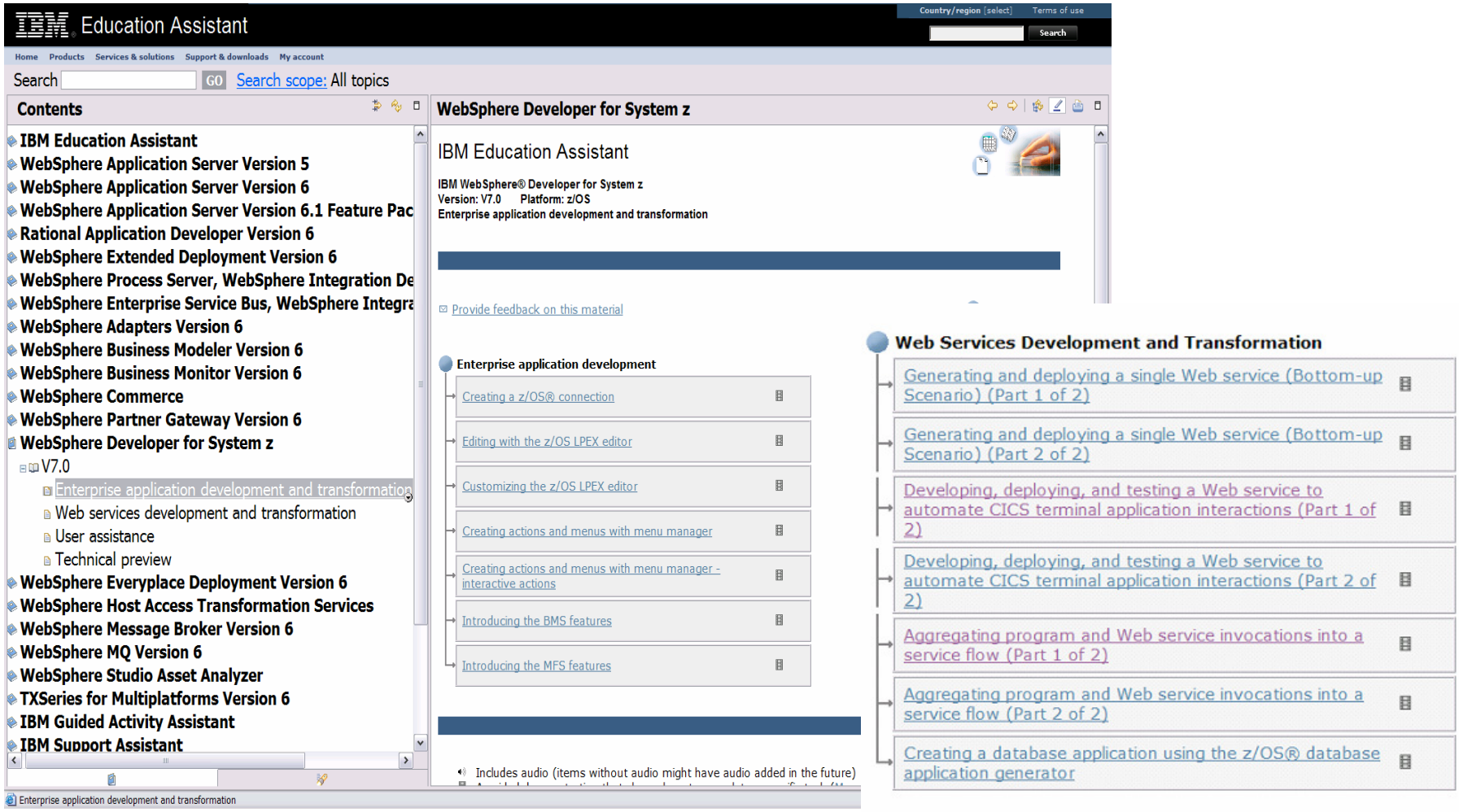

Summary

- The combination of Enterprise COBOL and Rational Developer for System z provides developers with the ability to
  - Quickly create and maintain traditional COBOL applications and dynamic Web applications and Web services using rapid application development tools
  - Reuse and transform existing applications to reduce costs, shorten the development cycle and move into an SOA development environment
  - Collaborate across the process of development, testing and deployment of multitiered, composite or mixed-workload applications
  - Leverage existing skills to write Web or COBOL applications and facilitate skill and knowledge transfer

And now, time for your Questions!

Thank You for Joining Us today!

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