Full Speed Ahead with COBOL Into the Future

Speaker Name:

Tom Ross IBM

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Agenda

- **COBOL and Java and … DB2!**
- **COBOL development team in IBM**
- **What are we up to these days?**

COBOL and Java and … DB2

COBOL and Java and … DB2

- COBOL shipped COBOL and Java interoperability in 2001
- As users started using these features they tried to use these applications in more complex environments (IE: More components/subsystems such as DB2)
- Java has a different model for connecting to DB2 then 'traditional' z/OS programs
  - JDBC rather than CALL attach
  - type-2 z/OS connectivity or type-4 z/OS connectivity
- When COBOL and Java were mixed, they ran as a single application, but got 2 separate connections to DB2
- Either COBOL or Java could fail without the other part of the application failing

COBOL and Java and … DB2

- What are users finding when using the type-2 z/OS connectivity with mixed COBOL, Java and SQL?
  - We are using Enterprise COBOL from a batch job and trying to call a Java program that uses DB2. Since the COBOL program is already doing some DB2 work it already has an RRS connection. When the Java program is invoked it tries to create a connection and fails.

COBOL and Java and … DB2

- What are users finding when using the type-2 z/OS connectivity with mixed COBOL, Java and SQL?

  - I am using the COBOL OO features to invoke a Java object method. The COBOL program is using RRSAF attach and issuing EXEC SQL commands successfully prior to invoking the Java object. The Java object is also using DB2. However, when the Java object attempts to connect to DB2 using the Universal type 2 connector (jcc) it is receiving an InvalidNumberFormatException.

COBOL and Java and … DB2

- What are users finding when using the type-4 z/OS connectivity with mixed COBOL, Java and SQL?
  - Java connection to DB2 can be established, but the connection is independent of any RRSAF attachments that may be in use for COBOL module support. This means that the JDBC transaction will be based on a remote DRDA thread and not have shared transaction scope. Huh?
  - More simply, if the COBOL fails and the Java succeeds, then part of the application will rollback updates (COBOL) and part will commit the database updates (Java).
  - In addition, there is no way for COBOL condition handling to know about Java exceptions, and vice versa
  - What is a COBOL-Java-DB2 interop user to do?

z/OS Batch Runtime Environment

- An integrated part of z/OS R13 (GA Sept, 2011)
- A new option for running batch work
- Provides a managed environment for integration of Java and COBOL with RRS compliant resource managers
- Consistent with IBM WebSphere-based batch
  - WebSphere Extended Deployment Compute Grid
  - A subset of the WebSphere programming model
  - Incorporated in the OS
- DB2 is the only supported resource manager currently

Batch Execution Runtime Environment Java COBOL with DB2 Interoperability

- Ability to extend COBOL/DB2 applications with Java (or to extend Java/DB2 applications with COBOL):
  - Requires local attach z/OS DB2 connection sharing for common DB2 access
  - Requires Transactional integrity among the application components

- A generalized solution in a pure batch environment, without requiring a specific run time or middleware. It does not require an application server like CICS or DB2 Stored Procedures.

- Requires little or no changes to existing code!
  - Only requires special callbacks for commit/rollback

- Enables interoperability between COBOL, Java and DB2 in batch

Batch Execution Runtime Environment Java COBOL with DB2 Interoperability

- Special callbacks for commit/rollback
  - Use instead of EXEC SQL COMMIT or ROLLBACK
- z/OS Batch Runtime provides helper functions to simplify the COMMIT/ROLLBACK processing
  - These helper functions are shipped as Java
  - For Java, methods for commit and rollback functions are available with the following package: com.ibm.batch.spi.UserControlledTransactionHelper
- For commit:
  - UserControlledTransactionHelper.commit()
- For rollback:
  - UserControlledTransactionHelper.rollback()

Batch Execution Runtime Environment Java COBOL with DB2 Interoperability

- Certain restrictions apply to COBOL and Java applications in the z/OS Batch Runtime environment.
  - COBOL applications must not use the STOP RUN statement. Using STOP RUN prevents the z/OS Batch Runtime environment from receiving control. Instead, use the GOBACK statement to end the COBOL application.
- A COBOL main program will no longer be the first program entered. COBOL specific runtime options might be affected.
- Java applications must be single threaded and must not use the system.exit method. Using the system.exit method ends the JVM and prevents the z/OS Batch Runtime environment from receiving control. Instead, end the main Java procedure with a simple return statement.

COBOL development team in IBM

COBOL development team in IBM

- Compiler development now consolidated into the Rational division of IBM
  - After years of shrinking, COBOL development expanded!
  - IBM has doubled the size of COBOL development team
  - Renewed investment, interest and commitment
  - COBOL is the Language Of The Future!

What is IBM COBOL development up to these days?

First, what have we done 'lately'?

Enterprise COBOL for z/OS v4.2

Enterprise COBOL V4.2 (GA Sept. 2009)

- **Validated on zEnterprise 196 server with IBM's latest middleware**
  - Support integrated CICS translator in CICS V4.1
  - Support New SQL data types and syntax in DB2 V9

- **Provides significant improvements to UNICODE performance**

- **Enables the integration of existing applications with web applications**
  - Supports Java interoperability by object-oriented COBOL syntax
  - Supports access to enterprise beans that run on WebSphere Application Server or J2EE-compliant EJB server
  - Supports Java 5, Java 6 SDK

- **Built-in language support for high speed parsing and validating of XML documents, with:**
  - Encoding in UTF-8, UTF-16, and various EBCDIC codepages
  - Offloading of XML parsing to zAAP specialty processors

- **Improved Debug Tool support for dynamically debugging of optimized production programs**

What is IBM COBOL development up to these days?

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What is IBM COBOL up to?

- Sometimes people take 'no news' as 'bad news'

- It may be some time before the next IBM COBOL compiler is shipped for z/OS

- Today this is actually good news, because IBM COBOL development is heads down working hard on exciting new technology!

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Moving forward…

- COBOL, C/C++ and PL/I are strategic on System z
  - Run the world's business critical applications
  - IBM has strong commitment to COBOL, C/C++, and PL/I languages
  - Continue to provide additional value to customers
    - Improve performance
      - *exploitation of z/Architecture & IBM Middleware*
      - *optimization technology*
    - Improve portability and programmer productivity
- Modernize compiler infrastructure for COBOL
  - Improve performance and exploitation of System z architecture

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Strategic direction for COBOL

- **Incorporate leading-edge optimization and code-generation technology to Enterprise COBOL for z/OS**
    - Improve performance, and maximize machine utilization
    - Reduce cost of ownership
    - Improve delivery of z/Architecture exploitation
        - Establish solid foundation to support hardware features (e.g. decimal floating point, 64 bit…), and new System z processors
- **Improved support for middleware (CICS, DB2, IMS)**
    - Improved programmability and problem determination
        - Support for new middleware features
- **Improved capabilities for modernizing business critical applications and creating new applications**
    - XML enhancements, Java Interoperability…
- **Improved programmer productivity**
    - Usability and problem determination capabilities
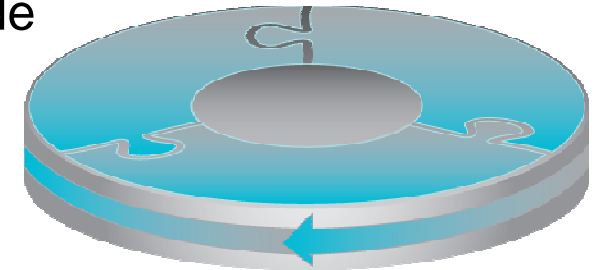   - *e.g., Increase data item size limit, debugging support, internationalization…*

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Enterprise COBOL for z/OS Vnext
Source and binary compatibility

- **No need to recompile old code**
  - Support linking together of "old" and "new" code for correct programs
    - Old applications can call new applications
    - New applications can call old applications

- **Most correct COBOL programs will compile without changes**
  - Plan to remove some old/obsolete syntax
    - Compiler will diagnose and report old syntax found in program source

- **We are running a "Closed" beta program in 2012**
  - Require customers to actively participate and provide feedback
  - Development team will be actively involved
  - Send note to Roland Koo (rkoo@ca.ibm.com) if you wish to participate

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Enterprise COBOL for z/OS Vnext

- We don't know exactly what will ship next, but there are some things we are considering…
- Possible changes to COBOL language
  - Maybe eliminate some obsolete features
    - Anyone using MLE (DATE data types?)
    - Label declaratives?
    - New COBOL mixed with OS/VS COBOL?
    - New COBOL mixed with VS COBOL II NORES?
    - XML PARSE with XMLPARSE(COMPAT)?
- Hardware exploitation

  - As soon as it comes out or shortly after!

  - COBOL could have the ARCH compiler option

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Enterprise COBOL for z/OS Vnext

- We don't know exactly what will ship next, but there are some things we are considering…
- Performance improvements
  - Could use DFP instructions to implement decimal arithmetic
  - Could improve double-word binary arithmetic
  - Could use relative addressing instructions
    - Goodbye BLL cells!
- And more!

Enterprise COBOL for z/OS Vnext

- Some things we are considering…
- XML improvements
  - XML PARSE with continued data
    - New special register to indicate incomplete data
  - XML GENERATE
    - User supplied element and attribute names
    - Suppression of 'empty' attributes and elements
    - User control of attribute and element generation

Enterprise COBOL for z/OS Vnext

- Some things we are considering…
- UTF-8 improvements: New Intrinsic functions
  - ULENGTH
    - Returns the length in characters of a UTF-8 string
  - UPOS
    - Returns the index of a character in a UTF-8 string
  - USUBSTR
    - Returns a substring of a UTF-8 string
  - USUPPLEMENTARY
    - Returns index of first supplementary character in a string
  - UVALID
    - Analyzes unicode for valid characters
  - UWIDTH
    - Returns the width of any UTF-8 char in a string

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Enterprise COBOL for z/OS Vnext

- Some things we are considering…
- Debug Tool support improvements being considered
  - Anyone have issues with finding SYSDEBUG files or large load modules footprint?
  - NOLOAD class segments for debugging data
  - Show me what I wrote, not how COBOL interpreted it
    - Example: Picture clause for data definitions
  - Calculating lengths and locations with ODO – could be fixed!

Summary

- **IBM compilers are designed to exploit z/Architecture and Middleware (CICS, DB2, IMS)**
- **IBM compilers provide capability to…**
  - Modernize business critical COBOL applications with improved Java and XML interoperability
  - Consolidate applications to System z by supporting industry language standards and extensions
  - Reduce programming complexity
    - Advance optimization technology
    - Enhanced problem determination capabilities

Summary

- **Rational is committed to delivering leading-edge compilers and application development tools technology to…**
  - Maximize application performance and increase system capacity
  - Improve programmer productivity and shorten development cycle
  - Lower TCO and increase return on IT investment
- **COBOL is strategic for System z**
  - Committed to continue to deliver value to customers
  - Strong investment commitment from IBM

Questions ?