Comprehensive REXX Programming for z/OS

Course Summary

Description
This course is designed to enable the attendee to create, execute, debug and modify programs in the REXX programming language. The course includes execution under MVS, both from TSO/E and non-TSO/E address spaces. Comparisons to similar CLIST capabilities are provided where reasonable. Quizzes and labs are used to reinforce presented topics.

TSO, Batch, NetView, and z/OS UNIX as well as execution with automation products will be addressed, as needed, or the course may be tailored to those environments for site-specific needs.

A principle advantage of REXX is the relative ease of creating well-structured programs. Development techniques will be described which allow rapid design and execution of REXX programs while providing maintainability and allowing upgrades in a logically layered fashion.

The extensive practical experience of the instructor will emphasize 'real world' applications of REXX. Provided example programs cover a wide range of topics, including automated operations and conditionally executing TSO/E and ISPF commands.

At the conclusion of the course, students will understand all the primary programming constructs in REXX and how to meld these constructs into effective REXX programs. Students will also have knowledge of many advanced techniques, both those reviewed in class and additional sample programs. Each student will receive a lab disk containing tested solutions to all the quizzes and labs, all examples and the advanced techniques sample programs.

Optionally, an instructor can be retained for additional days to provide onsite programming and systems expertise. The instructor can show hands-on techniques for providing solutions in a rapid manner, assisting in a one on one fashion with the more complicated aspects of the local environment. All instructors have extensive backgrounds in providing solutions to the systems needs of corporate clients and possess a diversity of skills, experience and industry contacts.

Topics
- REXX Overview
- First REXX Procedure
- Running REXX
- Expressions and Operators
- REXX Variables
- REXX Keywords
- Calling and Writing Subroutines and Functions
- Built-in Functions
- More Keyword Instructions
- TSO/E Specific Built-In Functions
- File I/O
- NetView REXX
- Using REXX with z/OS UNIX System Services
- Rexx and ISPF
- DB2 and REXX
- REXX and CICS
- VSAM and REXX
- Advanced REXX Topics: The Stack & PARSE
- Advanced TSO/E REXX

Prerequisites
Students must be familiar with use of the text editor on the programming platform. No prior programming experience is required, but students should have a basic understanding of data processing concepts.

Duration
Five days
Comprehensive REXX Programming for z/OS

Course Outline

I. REXX Overview
   A. What is REXX?
   B. REXX, Object REXX, NetRexx
   C. REXX Language Design Goals
   D. Portability; REXX Environments
   E. REXX vs. TSO CLIST
   F. REXX vs. BAT file
   G. Languages: Compiled vs. Scripting
   H. What is a REXX Procedure?
   I. REXX Syntax
   J. REXX Delimiters
   K. REXX Has Five Clause Types
   L. Comments
   M. Block comments - can span lines
   N. Literal Strings
   O. Literal String Examples
   P. Programming Style
   Q. Example Programming Style
   R. Written Exercise
   S. Written Exercise – Answers

II. First REXX Procedure
   A. REXX Keyword Instructions
   B. REXX Built-in Functions
   C. TSO/E REXX Keyword Instructions
   D. PC REXX Keyword Instructions
   E. The Data Stack (External Data Queue)
   F. Using the REXX Data Stack
   G. REXX Keyword Instructions
   H. Trace Output
      I. Lab: Trace
      J. An ISPF Feature: Syntax Hiliting

III. Running REXX
   A. REXX Operating Environments
   B. Running REXX in TSO/E
   C. Where TSO/E REXX execs live
   D. Implicit execution: The easier way
   E. TSO/E Allocation Differences
   F. TSO/E Allocation Examples
   G. TSO/E Allocation Tools - ALTLIB
   H. TSO/E Allocation Tools - DDCONCAT
   I. TSO/E Allocation Tools - RUN
   J. Running REXX from Batch - IKJEFT1A
   K. Running REXX from Batch - IRXJCL
   L. Running OPS/REXX via TSO Cmds
   M. Running MVS System REXX
   N. Running REXX in NetView
   O. REXX in UNIX System Services
   P. Running REXX in VM
   Q. Running ooRexx in Windows
   R. Running a Windows ooRexx exec:
   S. Running REXX exec w/ Regina:

IV. Expressions and Operators
   A. Terms
   B. Operators
   C. Arithmetic Operators
   D. Standard Comparison Operators
   E. Strict Comparison Operators
   F. Comparison Operators
   G. Logical (Boolean) Operators
   H. Operator Precedence
   I. Operator Precedence Examples:
      J. String Concatenation
      K. Concatenation Operators

V. REXX Variables
   A. Variable Syntax
   B. More Variable Syntax
   C. Lab2: Adding 2 numbers
   D. Special REXX Variables
   E. REXX Keywords - PARSE VAR
   F. General Rules for Parsing
   G. PARSE Quiz
   H. PARSE Quiz - Answers
   I. Compound (Stem) Variables
   J. Stem Variables With Numeric Tails
   K. Stem Variables With Character Tails
   L. Variable related REXX Functions

VI. REXX Keywords
   A. IF - THEN - ELSE
   B. Basic DO - The DO Group
   C. Repititive DO
   D. More Iterative DOs
   E. Optional Lab: Counting with DO
   F. The Last DO (that you’ll ever do!)
   G. Leave [control variable name]
   H. How to Stop Looping in TSO/E
   I. How to Stop a Loop in PC REXX
   J. Lab3: Validating 2 numbers
   K. How to leave a Forever:
   L. REXX Keyword - Iterate
   M. Conditional DO - DO WHILE
   N. Conditional DO - DO UNTIL
   O. Optional Lab4: DO UNTIL
   P. SELECT Keyword
   Q. Selecting cases with If - Then - Else
   R. SELECT Example

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G. I/O for PCs & UNIX: LINEIN()
H. I/O for PCs & UNIX: LINEOUT()
I. I/O for PCs & UNIX: LINES()
J. I/O for PCs & UNIX: CHARIN()
K. I/O for PCs & UNIX: CHAROUT()
L. I/O for PCs & UNIX: CHARS()
M. High-Speed Character I/O
N. REXX w/ Redirection & Piping
O. I/O for PCs & UNIX: STREAM()
P. STREAM() Function Examples
Q. STREAM() Function Sample Program
R. Optional MVS Lab: Writing JCL
S. Optional MVS Lab: Reading JCL
T. Optional Lab: Employee Database

XII. NetView REXX
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B. NetView ADDRESS environments
C. NetView Command Processors
D. Pipe Processing in NetView
E. Pipeline Processing Concepts
F. NetView pipe Command
G. Pipe Command Example
H. Overview of Pipe Stages
I. Pipe Stages: Filtering
J. Pipe Stages: Data Manipulation
K. Pipe Stages: Plumbing
L. Pipe Stages: Commands
M. Pipe Stages: File I/O
N. Pipe Stages: Output and Logging
O. Pipe Stages: Programming
P. Pipe Stages: NetView Related
Q. Pipe Stages: Miscellaneous
R. Selected NetView Functions

XIII. Using REXX with z/OS UNIX System Services
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B. REXX in UNIX System Services
C. USS REXX Address Environments
D. Sample USS REXX Program
E. REXX in TSO vs. REXX in Shell
F. Understanding SYSCALLS()
G. Bi-Modal USS REXX Program
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I. ADDRESS SYSCALL: File I/O
J. ADDRESS SYSCALL: File System Information
K. ADDRESS SYSCALL: Directory Manipulation
L. ADDRESS SYSCALL: Process Manipulation
M. ADDRESS SYSCALL: Signal handling
N. ADDRESS SYSCALL: Security-Related
O. ADDRESS SYSCALL: Miscellaneous

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B. ISPF Documentation
C. ISPF Development Tools
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F. Dialog Elements: Variable Pools
G. Dialog Elements: Panels
H. Dialog Elements: Message Definitions
I. Dialog Elements: File Tailoring Skeletons
J. Dialog Elements: Tables
K. ISPF Dialog Example - Math
L. ISPF Edit Models
M. ISPF Generic Messages
N. SETMSG Service
O. ISPF Generic Msg Example
P. Edit Model lab
Q. ISPF Return Code Processing
R. ISPF Data Definition (DD) Names
S. ISPF Facilities: LIBDEF command
T. ISPF DISPLAY Service
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V. Menu Panel Example: EMPMENU
W. Input Panel Example: EMPPIN
X. Table Display Panel Example: EMPLIST
Y. ISPLLIB Messages Example: EMP00
Z. ISPF Dialog lab
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BB. ISPF Edit Macro Example
CC. ISPF Edit Macros - Line labels
DD. ISPF Editor-Assigned Line labels
EE. ISPF Edit Macro Cmnds
FF.ISPF Edit Macros – Example

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B. DB2 & REXX - The Problem
C. DB2 Version 6 Refresh - the Solution
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E. DB2 REXX: Defining DSNREXX
F. DB2 REXX: ADDRESS DSNREXX
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I. Error Checking using the SQLCA
J. Understanding rc vs. sqrcode
K. Embedding SQL into REXX
L. More DB2 Definitions
M. Using an SQL Cursor
N. Pre-defined SQL Cursors
O. Example using cursor, SQLDA
P. DB2 Isolation Levels
Q. Writing a REXX stored procedure
R. Additional DSNREXX Information
S. DB2 & REXX - Additional Solutions
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U. $DB2CMD REXX function
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W. MAX/REXX Example

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B. Using the Data Stack and the EDQ
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D. Using the QUEUED() Function
E. Stack Mgmt Commands (TSO/E)
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J. RXQUEUE() Example
K. Preserving the Stack
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