Using REXX to Build Your Own DB2 Tools

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Agenda

- Who (what) is REXX?
- Language elements
- Using REXX and DB2
- Error Handling
- Sample applications

What is REXX?

REXX Language

- Scripting Language supplied with z/OS
- Can be run using TSO or batch
- Can be used to create custom scripts
- DB2 interface since DB2 Version 5

Rexx

From Wikipedia, the free encyclopedia

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Rexx (**Restructured Extended Executor**) is an interpreted programming language developed at IBM by Mike Cowlishaw. It is a structured, high-level programming language designed for ease of learning and reading. Proprietary and open source REXX interpreters exist for a wide range of computing platforms; compilers exist for IBM mainframe computers.[2]

Rexx is used as a scripting and macro language, and is often used for processing data and text and generating reports; these similarities with Perl mean that Rexx works well in Common Gateway Interface (CGI) programming and it is indeed used for this purpose. Rexx is the primary scripting language in some operating systems, e.g. OS/2, MVS, VM, AmigaOS, and is also used as an internal macro language in some other software, such as KEDIT, THE and the ZOC terminal emulator. Additionally, the Rexx language can be used for scripting and macros in any program that uses Windows Scripting Host ActiveX scripting engines languages (e.g. VBScript and JScript) if one of the Rexx engines is installed.

Rexx is supplied with VM/SP on up, TSO/E Version 2 on up, OS/2 (1.3 and later, where it is officially named *Procedures Language/2*), AmigaOS Version 2 on up, PC DOS (7.0 or 2000), and Windows NT 4.0 (Resource Kit: Regina). REXX scripts for OS/2 share the filename extension .cmd with other scripting languages, and the first line of the script specifies the interpreter to be used. REXX macros for REXX-aware applications use extensions determined by the application. In the late 1980s Rexx became the common scripting language for IBM Systems Application Architecture, where it was renamed "SAA Procedure Language REXX."

A Rexx script or command is sometimes referred to as an *EXEC* in a nod to Rexx's role as a replacement for the older EXEC command language on CP/CMS and VM/370 and EXEC 2 command language on VM/SP.

Rexx

Paradigm	multiparadigm: procedural, structured
Designed by	Mike Cowlishaw
Developer	Mike Cowlishaw, IBM
First appeared	1979; 38 years ago
Stable release	ANSI X3.274 / 1996; 21 years ago
Typing discipline	Dynamic
Filename extensions	.cmd .exec .rexx .rex
Major implementations	
VM/SP, TSO/E V2, SAAREXX, ARexx, BREXX, KEXX, Regina[1]	
Dialects	
NetRexx, Object REXX, now ooREXX	
Influenced by	
PL/I, ALGOL, EXEC, EXEC 2	

DB2 REXX Extension

- What's Bad about it?
  - –Can't do a "singleton" SELECT
  - –It's interpretive: Slower than Cobol

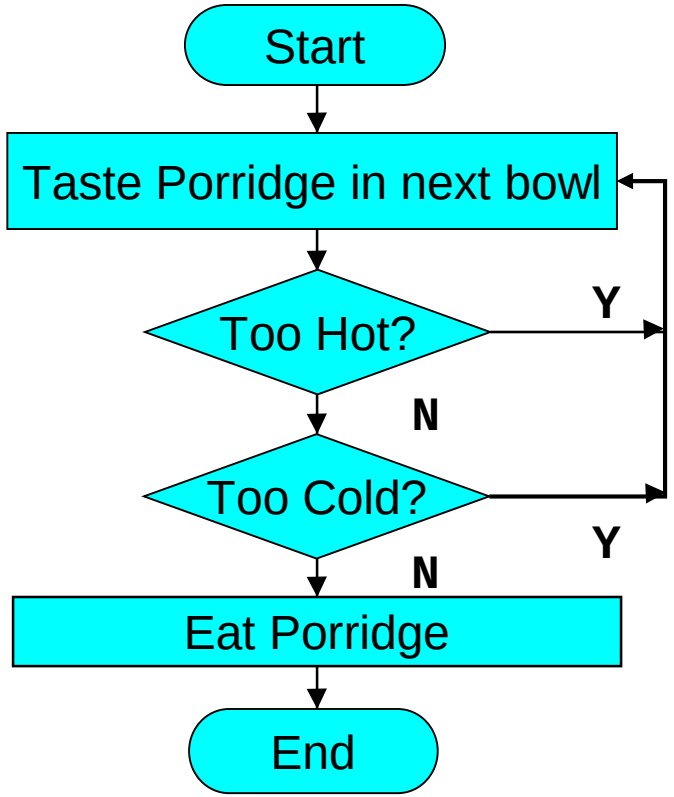
- What's Good about it?
  - –It's FREE
  - –Can define up to 200 Cursors
  - –Don't pre-define host Variables!!!! (except SPs)
  - –Supports Almost all DB2 for z/OS SQL Syntax
  - –It's interpretive: quickly modifiable, easy to rollout

No Bind Required!

REXX Coding Basics

REXX Basics - Coding

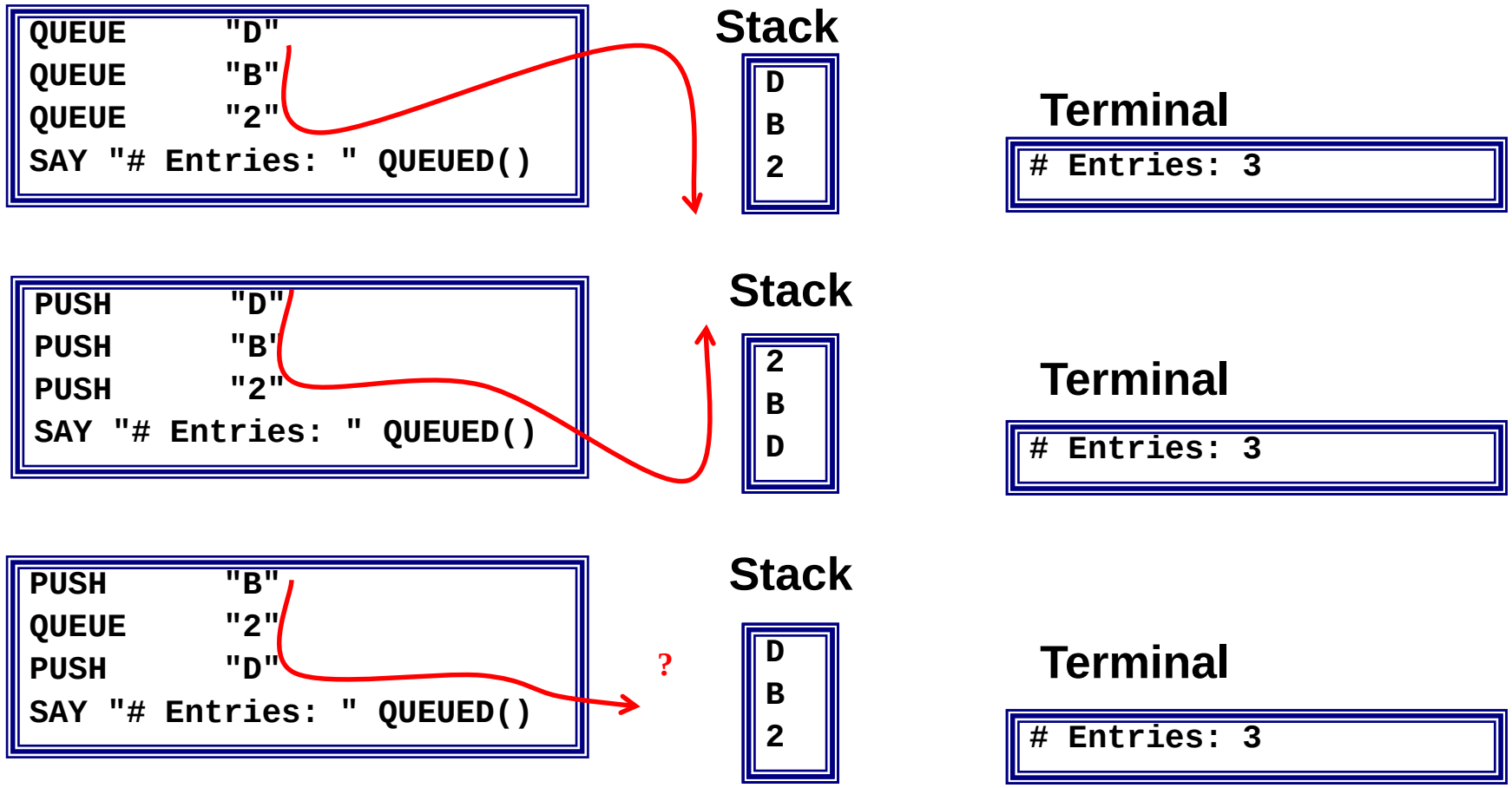
```
/* REXX - Goldilocks ---------------------*/
Call SELECT_PORRIDGE_RTN
Exit(0)

SELECT_PORRIDGE_RTN:

EAT_PORRIDGE_FLG = "N"

Do Until EAT_PORRIDGE_FLG = "Y"

 Call TASTE_RTN
 If TASTE_ID > 5 Then Iterate
 If TASTE_ID < 5 Then Iterate
 If TASTE_ID = 5 Then EAT_PORRIDGE_FLG = "Y"

End
Call GOBBLE_PORRIDGE_ALL_UP_RTN
Return;
```



REXX Basics - Comments

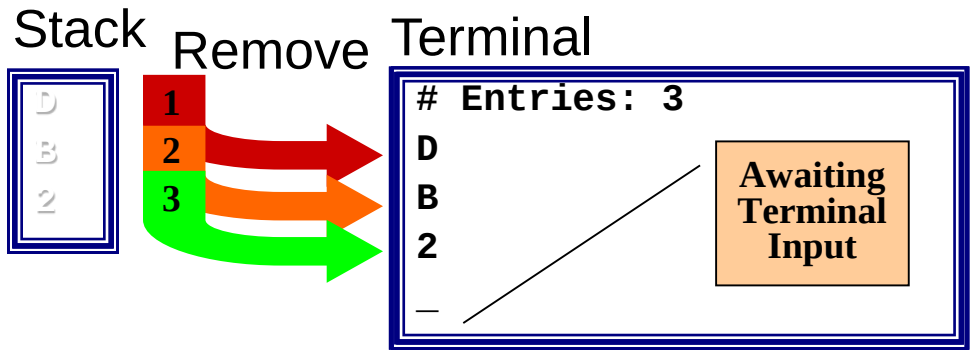
```
/* ----------------- Select and eat Porridge ------------- */
SELECT_PORRIDGE_RTN:
EAT_PORRIDGE_FLG = "N"                 /* Set flag designating that
                                          Goldilocks has not found
                                          acceptable porridge          */
Do Until EAT_PORRIDGE_FLG = "Y"        /* Keep testing porridge        */
     Call TASTE_RTN                    /* Set TASTE_ID to value range 1-9.
                                          A Value of "1" is very COLD,
                                          A Value of "9" is very HOT   */
/* Too Hot     */ If TASTE_ID > 5 Then Iterate   /* Check next Bowl */
/* Too Cold    */ If TASTE_ID < 5 Then Iterate   /* Check next Bowl */
/* Just Right  */ If TASTE_ID = 5 Then,          /* Bowl Selected   */
                       EAT_PORRIDGE_FLG = "Y"
End                   /* End of Porridge test loop, check first bowl */
Call GOBBLE_PORRIDGE_ALL_UP_RTN                  /* Consume Porridge */
Return;    /* Porridge has been selected and gobbled – back to main */
```

REXX Basics – The Stack

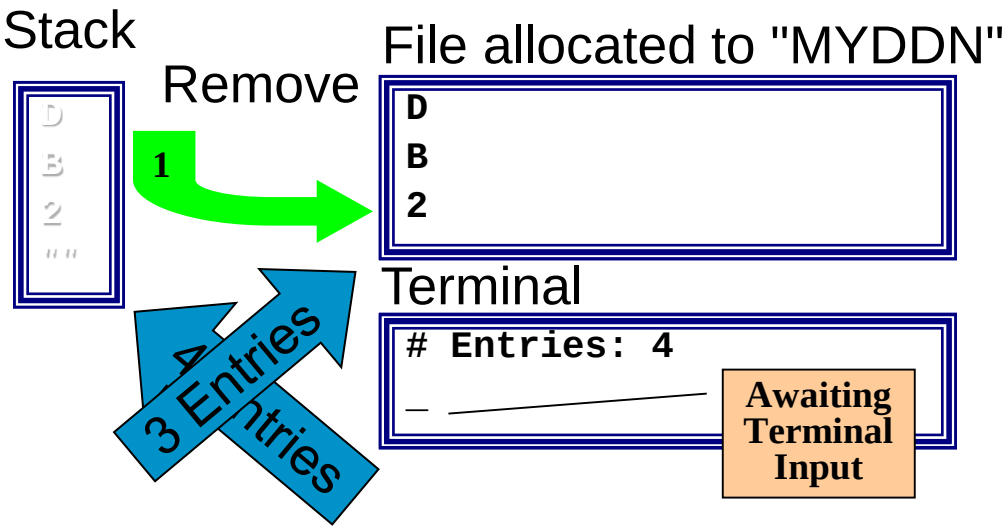


REXX Basics – More Stack

```
QUEUE      "D"
QUEUE      "B"
QUEUE      "2"
SAY "# Entries: " QUEUED()
DO QUEUED()
   PULL stackdata
   SAY  stackdata
END
PULL termdata
```



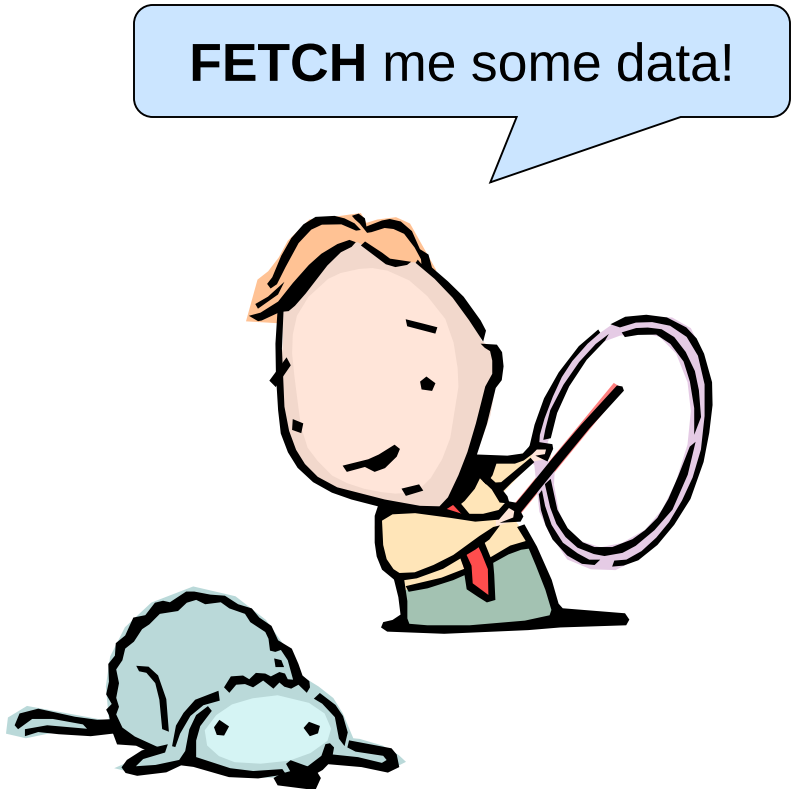

```
QUEUE      "D"
QUEUE      "B"
QUEUE      "2"
QUEUE      ""
SAY "# Entries: " QUEUED()
EXECIO * DISKW MYDDN (FINIS
PULL termdata
```



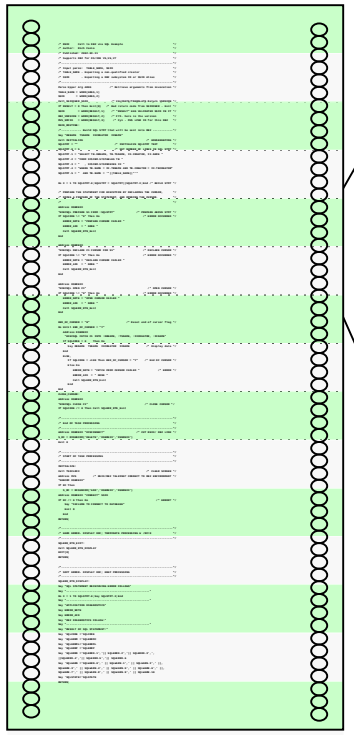
REXX and DB2

REXX & DB2

- DB2 doesn’t have a native "Scripting language“ for use on ISPF
- Third party tools fill the gap
- Homegrown
  - Custom Code: Cobol, ASM,…
  - DSNTEP2 / DSNTEP4
  - DSNTIAUL



REXX SQL Interface



```
/* Build SQLSTMT – Not shown */
DECLARE CURSOR
PREPARE STMT
OPEN CURSOR
END_OF_CURSOR = "N"
DO UNTIL END_OF_CURSOR = "Y"
     FETCH INTO :DATA_A, :DATA_B, :DATA_C
     If SQLCODE = +100 Then END_OF_CURSOR = "Y"
     Else Call SQLERR_RTN
End
Exit;
SQLERR_RTN:
xxx
Return;
```

Pseudo Code

Thorough Error Checking

Parlez-vous DB2?

Before I can "talk" to DB2, I need to understand the language!

Add "DSNREXX" to my Command Environment.

Create the REXX/DB2 command interface

```
ADDRESS MVS "SUBCOM DSNREXX"
IF RC THEN S_RC = RXSUBCOM('ADD','DSNREXX','DSNREXX')
```

Remove the REXX/DB2 command interface

```
S_RC = RXSUBCOM('DELETE','DSNREXX','DSNREXX')
```

Connect to DB2

The following statements do the same thing.

Establish thread between REXX and DB2

```
ADDRESS DSNREXX "CONNECT DB2A"
IF SQLCODE /= 0 THEN CALL error_routine
```

```
DB2_SSID = "DB2A"
ADDRESS DSNREXX "CONNECT" DB2_SSID
IF SQLCODE /= 0 THEN CALL error_routine
```

```
DB2_SSID = "DB2A"
ADDRESS DSNREXX "CONNECT" DB2_SSID
IF RC = -3 THEN . . .  /* Missed SUBCOM setup */
```

Run SQL

Example of Execute Immediate

```
ADDRESS DSNREXX
"EXECSQL UPDATE TEST.MYTABLE SET INQ_IND = 'Y'"
IF SQLCODE \= "0" THEN,
DO
   ERROR_NOTE = "UPDATE FAILED "
   ERROR_AID  = " NONE "
   CALL SQLERR_RTN_EXIT
END
```

Test your SQLCODE!

More on this stuff later

Building an SQL Statement

```
SQLSTMT = ""                              /* INITIALIZE SQLSTMT TEXT          */
SQLSTMT.0 = 3                             /* SET NUMBER OF LINES IN SQL STMT */
SQLSTMT.1 = "SELECT TB.DBNAME, TB.TSNAME, IX.CREATOR,
SQLSTMT.2 = "  FROM "||SOURCE_TABLE
SQLSTMT.3 = "WHERE NAME = '"||HOST_VARIABLE||"'"

/* BUILD THE SQLSTMT FOR EXECUTION; EACH LINE APPENDED TO THE PRIOR */

DO X = 1 TO SQLSTMT.0; SQLSTMT = SQLSTMT||SQLSTMT.X ||" " ;END

ADDRESS DSNREXX "EXECSQL " SQLSTMT
IF SQLCODE \= "0" THEN,
DO
   ERROR_NOTE = "QUERY FAILED "
   ERROR_AID  = " NONE "
   CALL SQLERR_RTN_EXIT
END
```

Glue literal into the statement

Building an SQL Statement

```
SQLSTMT = ""
SQLSTMT.0 = 3
SQLSTMT.1 = "SELECT TB.DBNAME, TB.TSNAME, IX.CREATOR, IX.NAME"
SQLSTMT.2 = "  FROM "||SOURCE_TABLE
SQLSTMT.3 = "WHERE NAME = '"||HOST_VARIABLE||"'"

   DO X = 1 TO SQLSTMT.0; SQLSTMT = SQLSTMT||SQLSTMT.X ||" " ;END
```

Memory area for SQLSTMT

```
SELECT TB.DBNAME, TB.TSNAME, IX.CREATOR, IX.NAME    FROM SYSIBM.SYSTA
BLES WHERE NAME = 'fred'
```

```
   DO X = 1 TO SQLSTMT.0; SQLSTMT = SQLSTMT||SQLSTMT.3 ||" " ;END
```

Cursors

```
000063 SQLSTMT = ""
000064 SQLSTMT.0  = 5
000065 SQLSTMT.1   = "SELECT NAME, COLTYPE, LENGTH, SCALE, NULLS          "
000066 SQLSTMT.2   = "  FROM SYSIBM.SYSCOLUMNS                           "
000067 SQLSTMT.3   = " WHERE TBNAME = ? "
000068 SQLSTMT.4   = " AND   TBCREATOR = ? "
000069 SQLSTMT.5   = " ORDER BY COLNO "
000070 DO X = 1 TO SQLSTMT.0;SQLSTMT = SQLSTMT||SQLSTMT.X||" ";END
000071 Address DSNREXX
000072 "EXECSQL PREPARE S1 FROM :SQLSTMT"              /* PREPARE ABOVE STMT */
000073 If SQLCODE \= "0" Then Do                        /* ERROR OCCURRED */
000074    ERROR_NOTE = "PREPARE CURSOR FAILED "
000075    ERROR_AID  = " NONE "
000076    Call SQLERR_RTN_Exit
000077 End
```

Use parameter marker in place of literal

Cursors

```
000079 Address_DSNREXX
000080 "EXECSQL DECLARE C1 CURSOR FOR S1"                    /* DECLARE CURSOR */
000081 If SQLCODE \= "0" Then Do                             /* ERROR OCCURRED */
000082    ERROR_NOTE = "DECLARE CURSOR FAILED "
000083    ERROR_AID  = " NONE "
000084    Call SQLERR_RTN_Exit
000085 End
000086
000087 Address DSNREXX
000088 "EXECSQL OPEN C1 USING :TBSN, :TBCR"                     /* OPEN CURSOR */
000089 If SQLCODE \= "0" Then Do                             /* ERROR OCCURRED */
000090    ERROR_NOTE = "OPEN CURSOR FAILED "
000091    ERROR_AID  = " NONE "
000092    Call SQLERR_RTN_Exit
000093 End
```

Fill in values for parameter markers

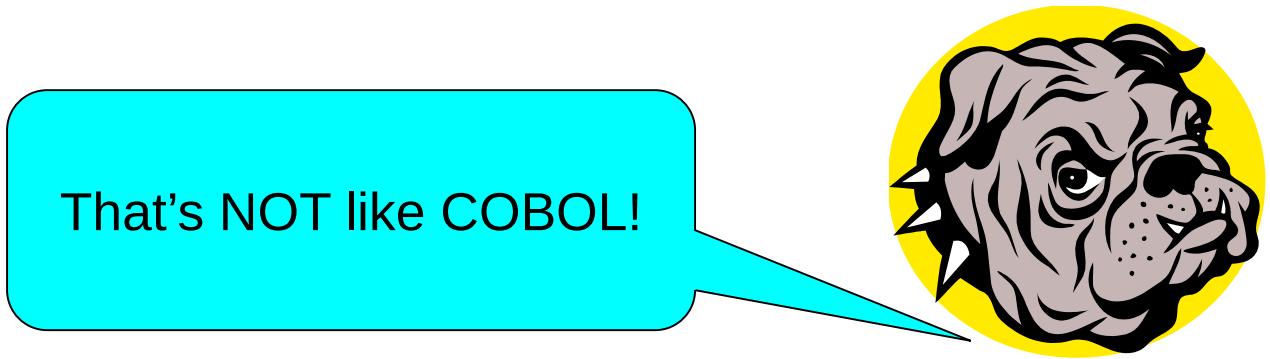
Cursors

```
000094 EOF_SW = "N"
000095 SAY "COLUMNS:                                                    "
000096 SAY "-------------------------------------------------------------"
000097 DO WHILE EOF_SW = "N"
000098    Address DSNREXX
000099    "EXECSQL FETCH C1 INTO :CN, :TY, :LN, :SC, :NUL"
000100    IF SQLCODE = "100" THEN EOF_SW = "Y"
000101    ELSE
000102      DO
000103        If SQLCODE \= "0" Then Do
000104           ERROR_NOTE = "FETCH JOBS FAILED "
000105           ERROR_AID  = " NONE "
000106           Call SQLERR_RTN_Exit
000107        End
000108        IF TY = "DATE" | TY = "TIME" | ty="SMALLINT" | TY="INTEGER" | ,
```

Cursors

- Cursor names are pre-defined
  - C1 thru C100 defined WITH RETURN
  - C51 thru C100 also have WITH HOLD

- Statement names are also pre-defined
  - S1 thru S100



Display Table Definition

```
                                ISPF Primary Option Menu
Option ===> TSO TB DB1A THEMIS81.PROJ

0  Settings        Terminal and user parameters
```

```
Table: THEMIS81.PROJ
Database: DTHM81
Tablespace: TS00PROJ
Tablespace Type: Classic Segmented

COLUMNS:
---------------------------------------
PROJNO      CHAR    (6)  NOT NULL
PROJNAME    VARCHAR (24)  NOT NULL
DEPTNO      CHAR    (3)  NOT NULL
EMPNO       CHAR    (6)  NOT NULL
PRSTAFF     DECIMAL (5,2)
PRSTDATE    DATE
PRENDATE    DATE
MAJPROJ     CHAR    (6)
***
```

Calling a DB2 Command from REXX

Command goes on the stack with blank line to complete

```
/*------------- STUFF DB2 COMMAND STRING INTO THE STACK ----------- */
"NEWSTACK"              /* Create input stack for TSO CMD processor */
X     = OUTTRAP(CMD_OUTPUT.)            /* Capture to STEM Variable */
QUEUE "-DISPLAY UTILITY("UTIL_ID")" /* "UTIL_ID" is a REXX Variable */
QUEUE "END"
QUEUE ""
/*    Execute the contents of the command stack using DSN processor */
ADDRESS TSO "DSN SYSTEM ("SSID")"
X     = OUTTRAP(OFF)                              /* Turn off capture */
"DELSTACK"                    /* Clear the previously created stack */
```

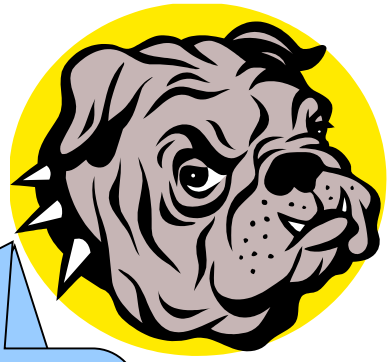
Error Handling

Building an SQL Statement

```
SQLSTMT = ""                              /* INITIALIZE SQLSTMT TEXT          */
SQLSTMT.0 = 3                             /* SET NUMBER OF LINES IN SQL STMT */
SQLSTMT.1 = "SELECT TB.DBNAME, TB.TSNAME, IX.CREATOR, IX.NAME"
SQLSTMT.2 = "  FROM "||SOURCE_TABLE
SQLSTMT.3 = "WHERE NAME = '"||HOST_VARIABLE||"'"

/* BUILD THE SQLSTMT FOR EXECUTION; EACH LINE APPENDED TO THE PRIOR */

DO X = 1 TO SQLSTMT.0; SQLSTMT = SQLSTMT||SQLSTMT.X ||" " ;END

ADDRESS DSNREXX "EXECSQL " SQLSTMT
IF SQLCODE \= "0" THEN,
DO
   ERROR_NOTE = "QUERY FAILED "
   ERROR_AID  = " NONE "
   CALL SQLERR_RTN_EXIT
END
```

Error Handling

```
SQL STATEMENT RECEIVEING ERROR FOLLOWS
-----------------------------------------------
SELECT TB.DBNAME, TB.TSNAME, IX.CREATOR, IX.NAME
  FROM SYSIBM.SYSTABLES
WHERE NAME  = 'fred'
-----------------------------------------------
APPLICATION DIAGNOSTICS
 QUERY FAILED
 NONE
-----------------------------------------------
DB2 DIAGNOSTICS FOLLOW:
RESULT OF SQL STATEMENT:
SQLCODE =-104
SQLERRM =SQLERRM =SQLSTMT:FETCH,INSERT,UPDATE,DELETE,OPEN,CLOSE,SET,CALL
SQLERRML=SQLERRML
SQLERRP =DSN
SQLERRD =0,0,0,0,0,0
SQLWARN = , , , , , , , , , ,
SQLSTATE=42601
```



Shouldn't this be an SQLCODE –206?!

Error Handling

```
SQLERR_RTN_DISPLAY:
Say "SQL STATEMENT RECEIVEING ERROR FOLLOWS"
Say "------------------------------------------------------------"
Do X = 1 TO SQLSTMT.0;Say SQLSTMT.X;END
Say "------------------------------------------------------------"
Say "APPLICATION DIAGNOSTICS"
Say ERROR_NOTE
Say ERROR_AID
Say "DB2 DIAGNOSTICS FOLLOW:
Say "------------------------------------------------------------"
Say "RESULT OF SQL STATEMENT:"
Say 'SQLCODE ='SQLCODE
Say 'SQLERRM ='SQLERRMC
Say 'SQLERRML='SQLERRML
Say 'SQLERRP ='SQLERRP
Say 'SQLERRD ='SQLERRD.1','|| SQLERRD.2','|| SQLERRD.3',',
||SQLERRD.4','|| SQLERRD.5','|| SQLERRD.6
Say 'SQLWARN ='SQLWARN.0',' || SQLWARN.1',' || SQLWARN.2',' ||,
SQLWARN.3',' || SQLWARN.4',' || SQLWARN.5',' || SQLWARN.6',' ||,
```

Display the offending Statement

Supplied by the caller

Dump the SQLCA

DSNTIAR?

```
Say "-------------------------------------------------"
/* Package SQLCA for DSNTIAR usage                                */
NUMERIC DIGITS 10                    /* Allow for big numbers in SQLCA */
SQL_ERRD = "";Do I = 1 To 6;SQL_ERRD = SQL_ERRD||D2C(SQLERRD.I,4);End
SQL_WARN = "";Do I = 0 To 10;SQL_WARN = SQL_WARN||LEFT(SQLWARN.I,1);End
SQLCA = 'SQLCA    '||D2C(136,4)||D2C(SQLCODE,4)||D2C(70,2),
||LEFT(SQLERRMC,70)||'DSN     '||SQL_ERRD||SQL_WARN||LEFT(SQLSTATE,5)
/*   If the length is beyond DSNTIAR possible values (72-240), reset */
If MSG_LEN < 72 | MSG_LEN > 240 Then MSG_LEN = 120  /* Outside scope */
If MSG_LEN = "MSG_LEN" Then MSG_LEN = 120  /* Default msg length 120 */
DB2_ERR_MSG = D2C(MSG_LEN * 12,2) || COPIES(' ',MSG_LEN * 12)
DB2_ERR_LEN = D2C(MSG_LEN,4)
Address                  /* Execute DSNTIAR program with SQLCA/Parm data */
Address LINKPGM "DSNTIAR SQLCA DB2_ERR_MSG DB2_ERR_LEN"
If RC < 5 Then,
Do
   If RC = 4 Then Say "DSNTIAR RC=4 Message Area Truncated"
```

User Messages

RFMS0015 – rexxname Failure to connect to database. RC: return code
SSID: ssid

Explanation:
Attempt to connect to DB2 Subsystem failed. Return code and DB2 SSID displayed.

Severity:
Severe

Application Action:
Connection to DB2 could not occur. Message is displayed; processing halts.

User Response:
Check to see if the subsystem name is spelled correctly.
Check to see if the DB2 subsystem is active
Check to see if the Rexx is executing on the proper LPAR where the DB2 is supposed to be running.

Examples…

Running REXX in Batch

```
//STEP1    EXEC PGM=IKJEFT1B,REGION=3M,
//  PARM='CLEANUP DBTHMA1'
//SYSEXEC   DD DISP=SHR,DSN=THEMIS.BATCH.REXX
//SYSTSPRT  DD SYSOUT=*
//SYSPRINT  DD SYSOUT=*
//SYSUDUMP  DD SYSOUT=*
//SYSTSIN   DD DUMMY
//*
```

First word of the PARM is the REXX being run.
Next come any arguments expected by the script.
SYSEXEC is the location of the script.

Running REXX in Batch

```
//STEP1    EXEC PGM=IKJEFT1B,REGION=3M,
//  PARM='CLEANUP DBTHMA1'
//SYSEXEC   DD DISP=SHR,DSN=THEMIS.BATCH.REXX
//SYSTSPRT  DD SYSOUT=*
//SYSPRINT  DD SYSOUT=*
//SYSUDUMP  DD SYSOUT=*
//SYSTSIN   DD DUMMY
//*
```

This particular script does the following.

- Deletes any datasets owned by DBTHMA1
- Queries the DB2 catalog and drops any objects owned by DBTHMA1
  - Tables
  - Views
  - Stored Procedures

-DISPLAY UTILITY(*)

```
DSNU100I  -DB2A DSNUGDIS - USERID = ROGUE
                MEMBER =
                UTILID = ROGUE.ROUGE1
                PROCESSING UTILITY STATEMENT 1
                UTILITY = LOAD
                PHASE = RELOAD   COUNT = 61197984
                NUMBER OF OBJECTS IN LIST = 1
                LAST OBJECT STARTED = 1
                STATUS = STOPPED
DSNU100I  -DB2A DSNUGDIS - USERID = JOEPGMR
                MEMBER =
                UTILID = JOEPGMR.JOEPGMR2
                PROCESSING UTILITY STATEMENT 1
                UTILITY = LOAD
                PHASE = RELOAD   COUNT = 0
                NUMBER OF OBJECTS IN LIST = 1
                LAST OBJECT STARTED = 1
                STATUS = STOPPED
DSNU105I  -DB2A DSNUGDIS - USERID = COOLDBA
                MEMBER =
                UTILID = COOLDBA.REORG1
                PROCESSING UTILITY STATEMENT 1
                UTILITY = REORG
```

```
                PHASE = BUILD   COUNT = 3260046018
                NUMBER OF OBJECTS IN LIST = 1
                LAST OBJECT STARTED = 1
DSNU111I  -DB2A DSNUGDIS - SUBPHASE = COPY COUNT = 9044775
DSNU111I  -DB2A DSNUGDIS - SUBPHASE = SORTOUT COUNT = 2056453640
DSNU111I  -DB2A DSNUGDIS - SUBPHASE = RUNSTATS COUNT = 1720416
DSNU105I  -DB2A DSNUGDIS - USERID = RFAZIO
                MEMBER =
                UTILID = REORG001
                PROCESSING UTILITY STATEMENT 1
                UTILITY = REORG
                PHASE = LOG   COUNT = 0
                NUMBER OF OBJECTS IN LIST = 1
                LAST OBJECT STARTED = 1
                STATUS = ACTIVE
DSNU347I  -DB2A DSNUGDIS -
                DEADLINE = NONE
DSNU384I  -DB2A DSNUGDIS -
                MAXRO = DEFER
                LONGLOG = CONTINUE
                DELAY = 1200 SECONDS
DSNU383I  -DB2A DSNUGDIS - CURRENT ITERATION NUMBER = 207
WRITE ACCESS ALLOWED IN THIS ITERATION = YES
```

```
ITERATION BEFORE PREVIOUS ITERATION:
   ELAPSED TIME = 01:41:12
   NUMBER OF LOG RECORDS PROCESSED = 3746459374
PREVIOUS ITERATION:
   ELAPSED TIME = 00:23:10
  NUMBER OF LOG RECORDS PROCESSED = 84763764
 CURRENT ITERATION:
    ESTIMATED ELAPSED TIME = 04:10:11
    ACTUAL ELAPSED TIME SO FAR = 03:01:03
    ACTUAL NUMBER OF LOG RECORDS BEING PROCESSED = 5857634451
 CURRENT ESTIMATE FOR NEXT ITERATION:
    ELAPSED TIME = 01:34:11
    NUMBER OF LOG RECORDS TO BE PROCESSED = 36465284634
 DSNU111I  -DB2A DSNUGDIS - SUBPHASE = COPY COUNT = 5613883
 DSN9022I  -DB2A DSNUGCCC '-DISPLAY UTILITY' NORMAL COMPLETION
```

```
DB2 Utility Report for DB2 Subsystem ID  DBT4  Display Mode:  TERSE MOD5
                                               UTILID Mask(*)

REF                                                                  STM--LIST
NBR   USERID -----UTILID------ ----TYPE ---PHASE  -----COUNT----- NBR CUR TOT   STATUS   MEMBER
-------------------------------------------------------------------------------------------------
 1     ROGUE      ROGUE.ROUGE1     LOAD   RELOAD       61,197,984   1   1   1  STOPPED
-------------------------------------------------------------------------------------------------
 2   JOEPGMR  JOEPGMR.JOEPGMR2     LOAD   RELOAD                0   1   1   1  STOPPED
-------------------------------------------------------------------------------------------------
 3*  COOLDBA    COOLDBA.REORG1    REORG    BUILD    3,260,046,018   1   1   1   ACTIVE
-------------------------------------------------------------------------------------------------
 4*   RFAZIO          REORG001    REORG      LOG                0   1   1   1   ACTIVE
-------------------------------------------------------------------------------------------------
  * - Additional utility info available for display
<Enter> to loop, <Quit> to exit, <Help> for more options
```

Commas?!?!

```
DB2 Utility Report for DB2 Subsystem ID  DBT4  Display Mode:  VERBOSE MOD5
                                               UTILID Mask(*)
REF                                                                  STM--LIST
NBR   USERID -----UTILID------ ----TYPE ---PHASE  -----COUNT----- NBR CUR TOT   STATUS   MEMBER
-------------------------------------------------------------------------------------------------
 1     ROGUE      ROGUE.ROUGE1     LOAD   RELOAD       61,197,984   1   1   1  STOPPED
-------------------------------------------------------------------------------------------------
 2   JOEPGMR  JOEPGMR.JOEPGMR2     LOAD   RELOAD                0   1   1   1  STOPPED
-------------------------------------------------------------------------------------------------
 3   COOLDBA    COOLDBA.REORG1    REORG    BUILD    3,260,046,018   1   1   1   ACTIVE
 3   COOLDBA    COOLDBA.REORG1 SUBPHASE     COPY        9,044,775
 3   COOLDBA    COOLDBA.REORG1 SUBPHASE  SORTOUT    2,056,453,640
 3   COOLDBA    COOLDBA.REORG1 SUBPHASE RUNSTATS        1,720,416
-------------------------------------------------------------------------------------------------
 4    RFAZIO          REORG001    REORG      LOG                0   1   1   1   ACTIVE
 4    RFAZIO          REORG001 SUBPHASE     COPY        5,613,883
----ITERATION----   Time       LOG RECORDS
     205 ACTUAL   01:41:12   3,746,459,374
     206 ACTUAL   00:23:10      84,763,764
     207 ACTUAL   03:01:03   5,857,634,451 WRITE ACCESS ALLOWED
     207 ESTIMATE 04:10:11             N/A
     208 FORECAST 01:34:11  36,465,284,634
  REORG DEADLINE =  NONE
 MAXRO = DEFER, LONGLOG = CONTINUE, DELAY = 1200 SECONDS
-------------------------------------------------------------------------------------------------
<Enter> to loop, <Quit> to exit, <Help> for more options
```

A REXX SQL Processor

```
//REXX     EXEC PGM=IRXJCL,PARM='SQLPROC DB2A'
//SYSEXEC  DD DISP=SHR,DSN=MY.REXX.EXEC  ←Your Rexx source lib.
//SYSPRINT DD SYSOUT=*
//SQLSTMT  DD *
-- Drop my.index
-- If it's gone already…great; keep going
DROP INDEX MY.INDEX;
--sqltest(-204,Dropped already…ok)
INSERT INTO MY.TABLE VALUES(….);
--sqltest(-803,Dup is ok)
DELETE FROM MY.TABLE WHERE X='Y';
UPDATE MY.TABLE
   SET X='Y'
 WHERE X='N';
```

DSNTEP2 says +100 on update is GOOD…is it?

Note:
This is an input script.

The REXX code is not shown!

Bad Conditions:	+100 Update	+100 Delete
Good Conditions:	-803 Insert	-204 Drop

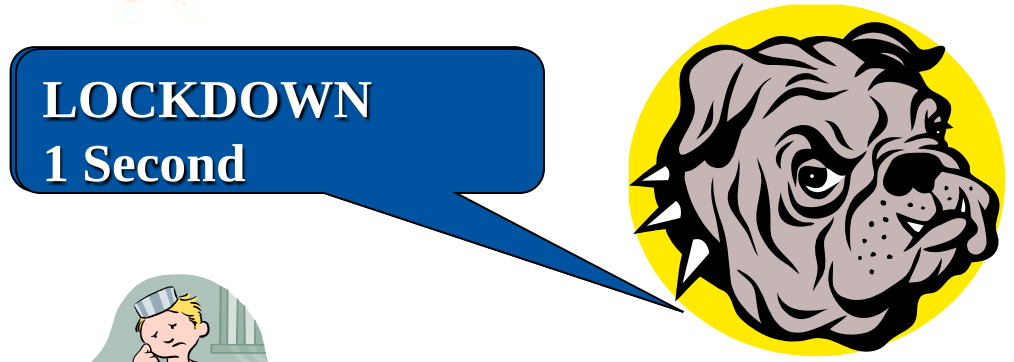
The "Enforcer" - APPLCHKR

Define Rules

- Check the objects against the rules regularly
- Report warnings
- Correct errors
- Simplify your daily routine

For every table in a given database…
Verify the CREATOR is 'x'
Ensure each table has the 5 required aliases: A, B, C, D, E
Some tables may have optional alias of Q or P
All tables need select granted to authid U1, update to U2
All views on these tables need different security profile

Dropping a tablespace




```
Drop a tablespace with 254 parts
         Lock DB2 Directory
         Lock DB2 Catalog
         Lock DataBase Descriptor (DBD)

Can take 10 min each tablespace.
```

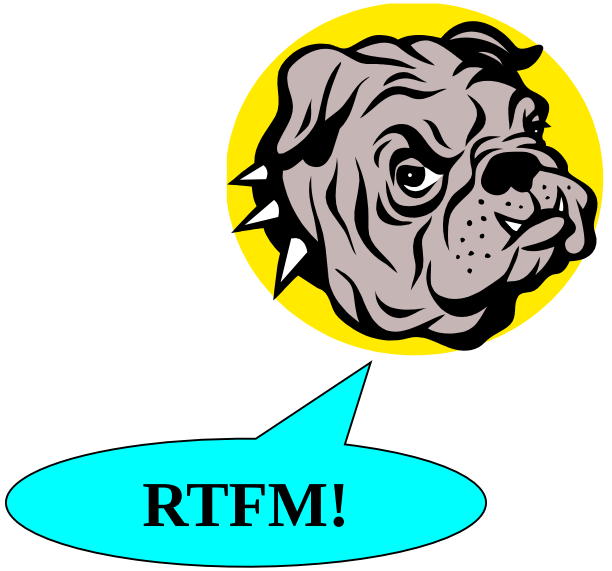
Directory

DB2 Catalog

DBD

```
REXX Name:   TSDROP
Control card Input:       DBNAME.TSNAME    Masking allowed

JCL Output:       DB2 CMD  -STOP DATABASE( ) SPACE(Tablespace)
                  DB2 CMD  -STOP DATABASE( ) SPACE(Indexspace)
                  IDCAMS   DELETE Tablespace Part x
                  IDCAMS   DELETE Indexspace Part x
                  SQL      DROP TABLESPACE
```

Reference



DB2

????-???? DB2 for OS/390 REXX Language Support *Version 5 (1999)

*** SQLDA IS WRONG!!!**

SC27-8859 DB2 12 for z/OS SQL Reference

SC27-8845 DB2 12 for z/OS Application Programming and SQL Guide

Rexx

SA-22-7790 z/OS TSO/E REXX Reference

Redbook

SG24-6465 DB2 UDB for z/OS Version 8 Performance Topics

SG24-6108 DB2 UDB Server for OS/390 Version 6 Technical Update

SG24-6418 DB2 for z/OS and OS/390 : Squeezing the Most Out of Dynamic SQL

IDUG Presentation

REXX and DB2 – The Stuff NOT in the Manuals – IDUG North America 2005

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Using REXX to Build Your Own DB2 Tools