IBM Education Assistance for z/OS V2R1

Item: JCL Processing
Element/Component: JES2

Material is current as of July 2013

Agenda

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- Usage & Invocation
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Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.

Presentation Objectives

- Understand the changes made to improve JCL processing
  - New statements designed to reduce reliance on JECL
  - Changes to how errors detected at input processing are reported
  - Provisions to allow interpretation to occur prior to execution
    - Allows early detection of errors detected by interpretation
    - More errors detected by TYPRUN=SCAN
    - Processing of JESDS/MERGE OUTPUT cards if job does not execute
  - Allow conversion to occur base on SCHENV for job
  - Additional changes related to this line item

Overview

- Problem: short comings in how JCL is processed
  - Common job properties need to be specified in a JES dependent way
  - Input phase detected errors presented differently that normal errors
  - OUTPUT statements not processed if job does not enter execution
  - Where a job converts is only controlled by JES dependent JECL
- Solution: multiple changes to address these problems
  - JCL changes to JOB, OUTPUT, and JCLLIB statements
  - Jobs with input errors still go to conversion with new method to report errors
  - Option to perform interpretation after conversion
  - Option to honor SCHENV setting for conversion processing
- Benefit
  - Better processing of JCL
  - Reduced dependence on JES specific JECL

Usage & Invocation – JOB card JCL changes

- New SYSTEM= keyword on JOB card
  - List MVS system names where job can run
  - Valid names are systems that are/were active in the JESPLEX (MAS)
- New SYSAFF= keyword on JOB card
  - List JES2 member names where job can run
  - Valid names are JES2 members defined in the JESPLEX (MAS)
  - Replaces function of SYSAFF on /*JOBPARM
- SYSTEM and SYSAFF on job card are mutually exclusive
  - Both specified results in JCL error
  - Both support exclusion lists – eg. SYSTEM=(-SY1, SY2)
    - Anywhere except SY1 and SY2
- JOBPARM SYSAFF ignored if JOB card SYSTEM or SYSAFF specified
  - New warning message generated

Usage & Invocation – OUTPUT card changes

- New MERGE=YES keyword on OUTPUT card
  - Defines base values for OUTPUT level keywords
  - Only one MERGE=YES statement per context is used
    - First at the job or step level
      - Job level also applies to JESDS data sets
  - Applies to all SYSOUT in that context
  - Other OUTPUT statements still apply
  - Does not create additional instances of the data sets
  - Similar to JES3 non-specific FORMAT JECL
- New DDNAME= keyword on OUTPUT card
  - Points OUTPUT card to DD statements
    - Specify *ddname* or *stepname.ddname* or *stepname.procstepname.ddname*
  - Applies to all matching SYSOUT DDs in the context
    - Job or step level
  - Creates multiple instances of the data sets

Usage & Invocation – OUTPUT card changes

Sample job (instream data not included):

```
//IBMUSERA JOB  (,2D07),MSGLEVEL=(1,1),CLASS=A,SYSAFF=(*)
//TEST     OUTPUT DEST=R1,MERGE=YES
//*
//STEP1     EXEC  PGM=IEBDG
//SYSPRINT  DD  SYSOUT=*
//DATASET1  DD  SYSOUT=*
//SYSIN     DD  *
//*
//STEP2     EXEC  PGM=IEBDG
//TEST2    OUTPUT DEST=R2,MERGE=YES
//SYSPRINT  DD  SYSOUT=*
//DATASET1  DD  SYSOUT=*
//SYSIN     DD  *
```

Results:

```
DDNAME    CC StepName Forms    Dest
JESMSGLG   1 JES2     STD      R1
JESJCL     1 JES2     STD      R1
JESYSMSG   1 JES2     STD      R1
SYSPRINT   1 STEP1    STD      R1
DATASET1   1 STEP1    STD      R1
SYSPRINT   1 STEP2    STD      R2
DATASET1   1 STEP2    STD      R2
```

Usage & Invocation – OUTPUT card changes

Sample job (instream data not included):

```
//IBMUSERA JOB  (,2D07),MSGLEVEL=(1,1),CLASS=A,SYSAFF=(*)
//TEST1    OUTPUT FORMS=TEST,DDNAME=DATASET1
//*
//STEP1     EXEC  PGM=IEBDG
//SYSPRINT  DD  SYSOUT=*
//DATASET1  DD  SYSOUT=*
//SYSIN     DD  *
//*
//STEP2     EXEC  PGM=IEBDG
//SYSPRINT  DD  SYSOUT=*
//DATASET1  DD  SYSOUT=*
//SYSIN     DD  *
```

Results:

```
DDNAME    CC StepName Forms    Dest
JESMSGLG   1 JES2     STD      LOCAL
JESJCL     1 JES2     STD      LOCAL
JESYSMSG   1 JES2     STD      LOCAL
SYSPRINT   1 STEP1    STD      LOCAL
DATASET1   1 STEP1    TEST     LOCAL
SYSPRINT   1 STEP2    STD      LOCAL
DATASET1   1 STEP2    TEST     LOCAL
```

Usage & Invocation – JCLLIB card changes

- New PROCLIB= keyword on JCLLIB card
  - Selects which JES2 PROCLIB concatenation to use for job
    - Specify entire DDNAME such as PROC01
    - If DDNAME does not exist, PROC00 is used
  - Same as PROCLIB= on JES2 JOBPARM JECL card
    - JCL error if specified on JCLLIB and JOBPARM

- JES2 PROCLIB support has been updated
  - Display now includes concatenation in the JES2 PROC
    - Displayed as “STATIC PROCLIB”s
    - Can be override as in previous releases
  - Static PROCLIBs can be “altered” more easily using $T PROCLIB
    - Creates override based on static values
  - Quicker close/unallocate of unused concatenations

Usage & Invocation – Improved processing of input phase errors

- Input phase errors are now handled like other JCL errors
  - Most input phase errors do not stop job from converting
  - Messaging similar to existing error messages
  - Support for “warning” messages from input processing
  - JECL statements are now assigned statement numbers
  - JOBDEF JCLERR= is now ignored
    - Jobs with input errors always go to conversion

Sample JCL:

```
//IBMUSERA JOB   (,2D07),MSGLEVEL=(1,1),CLASS=ABC,SYSAFF=(BAD)
/*JOBPARM PROC=PROC99
//*
//STEP1      EXEC   PGM=IEBDG,REGON=0M
//SYSPRINT   DD   SYSOUT=*
//DATASET1   DD   SYSOUT=*
//SYSIN      DD   DATA,DLM=$$$$
```

Usage & Invocation – Improved processing of input phase errors

- Old (pre-V2R1) output:

```
//IBMUSERA JOB  (,2D07),MSGLEVEL=(1,1),CLASS=ABC,SYSAFF=(BAD)          JOB00767
************ ILLEGAL JOB CARD - VALUE OF CLASS= EXCEEDS 1 CHARACTER **********
/*JOBPARM PROC=PROC99
******* NON-VALID JOBPARM  STMT - UNEXPECTED KEYWORD DETECTED - PROC     ******
//*
//STEP1     EXEC  PGM=IEBDG,REGON=0M
//SYSPRINT  DD  SYSOUT=*
//DATASET1  DD  SYSOUT=*
//SYSIN     DD  DATA,DLM=$$$$
******** NON-VALID DD       STMT - VALUE FOR DLM      KEYWORD NOT VALID *******
$HASP106 JOB DELETED BY JES2 OR CANCELLED BY OPERATOR BEFORE EXECUTION
------ JES2 JOB STATISTICS ------
           17 CARDS READ
            7 SYSOUT PRINT RECORDS
            0 SYSOUT PUNCH RECORDS
            0 SYSOUT SPOOL KBYTES
         0.00 MINUTES EXECUTION TIME
```

Usage & Invocation – Improved processing of input phase errors

- New output with V2R1:

```
12.43.45 JOB00042  IEFC452I IBMUSERA - JOB NOT RUN - JCL ERROR  533
------ JES2 JOB STATISTICS ------
           17 CARDS READ
           24 SYSOUT PRINT RECORDS
            0 SYSOUT PUNCH RECORDS
            1 SYSOUT SPOOL KBYTES
         0.00 MINUTES EXECUTION TIME
        1 //IBMUSERA JOB  (,2D07),MSGLEVEL=(1,1),CLASS=ABC,SYSAFF=(BAD)
        2 /*JOBPARM PROC=PROC99
          //*
        3 //STEP1     EXEC  PGM=IEBDG,REGON=0M
        4 //SYSPRINT  DD  SYSOUT=*
        5 //DATASET1  DD  SYSOUT=*
        6 //SYSIN     DD  DATA,DLM=$$$$
 STMT NO. MESSAGE
        1 HASP110 value of CLASS= parameter is not valid
        1 HASP112 value of SYSAFF= parameter is not valid
        2 HASP107 UNEXPECTED KEYWORD DETECTED - PROC
        3 IEFC630I UNIDENTIFIED KEYWORD REGON
        6 HASP107 value for DLM keyword not valid
```

Usage & Invocation – Performing interpretation after conversion

- First pass of processing JCL is called conversion processing
  - Deals with PROCs and INCLUDEs
  - Does basic parsing of JCL into “text units”
  - Currently run in subtask in JES2 address space in conversion phase
- Interpretation processing creates control blocks for initiator to run job
  - Fully validates JCL (values of parameters)
    - Certain errors only detected by the interpreter
  - Currently runs in the initiator when a job is selected
- OUTPUT card processing cannot be done until the interpreter is run
  - Needs to run against control blocks interpreter creates
  - OUTPUT cards (including JESDS= and MERGE=YES) are not applied if the job does not run
    - JCL error, job canceled, etc.

Usage & Invocation – Performing interpretation after conversion

- New option to run interpreter after converter before job runs
  - New keyword on JOBDEF (scope is a member)
    - INTERPRET=INIT|JES
      - INIT – Run interpreter when job is selected to run
        - » Default traditional way to run
      - JES – Run interpreter after conversion
        - » Converter and interpreter run in conversion phase
  - When job is selected, interpreter is not run again
    - Control block are read from SPOOL and relocated
  - Must be all z/OS V2R1 and $ACTIVATE at LEVEL=Z11 to run this way
    - Otherwise setting has no effect
  - Job must have gone through input phase on z/OS V2R1
  - **NOTE:** No LOCATE processing is done for data sets used in JCL

Usage & Invocation – Performing interpretation after conversion

- If INTERPRET=JES is selected
  - Both converter and interpreter run in a new address space
    - Address space name *jesx*CI*xx*

      jesx subsystem name, *xx* is an instance number
    - Define address space to RACF same as JES2
      - Needs access to all PROCLIB data sets
      - Does VERIFY CREATE for jobs being converted
  - PCEDEF CNVNUM= controls number of converters run
  - CISUB_PER_AS=*nn* – indicates how many subtasks per JES2CI
    - Default is 5 per address space
    - Default number of converters is 10
    - Default number of JES2CI address spaces is 2 (10/5)

      JES2CI01 and JES2CI02

Usage & Invocation – Performing interpretation after conversion

- Implications of code change
  - CNVT code to read IOT CBs moved to subtask
    - Calls CBIO exit 8 instead of exit 7
  - Exit 6 compatibly updated with this release
    - Same data passed to exit in registers 1 and 2
    - New is an XPL in register 2
      - XPL makes it easier to set job CLASS, SCHENV, and HOLD
    - Existing exits should continue to function without change
      - Presuming they use data areas passed to the exit
      - CNVT DTE ($DTECNV) structure has changed significantly
        - Many field moved to $CIWORK
  - New internal data set to store interpreter output
    - $SWABLKS DD name
    - Always created by z/OS V2R1 JES2 during input phase

Usage & Invocation – Performing interpretation after conversion

- Implications of setting INTERPRET=JES
  - Converter and interpreter run outside the JES2 address space
    - Exit 8 cannot access JES2 private storage
  - New exit 60 to perform function of exit 6
    - Exact same parameters as exit 6 (New XPL in register 2)
      - XPL includes setting job CLASS, SCHENV, and HOLD
    - Gets control in USER environment (R11 is HCCT)
    - Run in JES2CI address space (cannot access JES2 private storage)
    - New sample exits HASX60A and HASX60B
  - New exit 59
    - Invoked after interpreter call and after processing OUTPUT cards
    - Invoked before writing data to $SWABLKS DD
    - Same XPL as exit 60 (but passed in register 1)

Usage & Invocation – Controlling where a job converts

- Currently conversion is controlled by factors like system affinity
  - Includes new SYSTEM and SYSAFF from JOB card
  - Also includes minimum MVS level set at input phase
    - Due to use of symbols
- New in z/OS V2R1 is ability to select conversion system based on SCHENV
  - New option on JOBDEF (scope MAS)
    - CNVT_SCHENV=IGNORE|HONOR
    - Scheduling Environment parsed at input phase (or assigned)
    - HONOR says to only convert where SCHENV is available
      - When not available, job waits to convert (AWAITING CONVERSION)
  - Only applies if
    - The job that went through input on z/OS V2R1
    - Job is being selected by z/OS V2R1 converters
      - Down level members can select even if HONOR is set

Usage & Invocation – Other job attributes

- New minimum z/OS level associated with a job
  - Set if JOB uses certain functions only available in a specific release
  - Can be set by
    - JES2 during input processing.

      eg. If symbols passed on the initiator
    - The MVS converter

      eg. If SYMBOL= on DD card is specified
  - Displays using $DJ,LONG keyword REQUIRES_ZOS=
    - Level effectively alters job affinity
  - Future releases or maintenance may add new requirements

Usage & Invocation – Other job attributes

- Downgrade exclusive DSN ENQ to share in job
  - Performed when latter steps only need share access
  - New option on JOBCLASS to control processing
    - DSENQSHR=ALLOW|DISALLOW|AUTO
    - DISALLOW disables, AUTO sets on, ALLOW based on JOB card
    - Set via $T JOBCLASS command (MAS scope)
      - Applies at conversion even in a mixed level MAS
  - Most work is in the allocation, JES2 owns the external
  - Setting DSENQSHR=AUTO sets minimum z/OS level to 2.1
    - Applies to all jobs converted in the job class on z/OS 2.1

Usage & Invocation – Other job attributes

- Using system symbols in batch jobs
  - New option on JOBCLASS to allow system symbols substitution
    - SYSSYM=DISALLOW|ALLOW
    - ALLOW performs system symbol substitution in batch jobs
    - Set via $T JOBCLASS command (MAS scope)
      - Remembers setting over restarts
  - Most work is in the converter, JES2 owns the external
    - Only applies if job converted on a z/OS V2R1 converter

Usage & Invocation – Display JES2 initialization information

- New command $D INITINFO displays initialization statistics
  - Start command, Init decks used (number of cards read), STEPLIB concatenation

```
$HASP825 INITINFO  --- Command used to start JES2
$HASP825           S JES2,N=ZOS21,M=SPOOLZ21,PARM=(WARM,NOREQ)
$HASP825           --- HASPPARM data sets read
$HASP825           DSN=SYS1.PARMLIB(SPOOLZ21),VOLSER=J2SHR2,
$HASP825           CARDS=458,
$HASP825           DSN=SYS1.PARMLIB(DYEXIT21),CARDS=122,
$HASP825           DSN=CONSOLE,CARDS=1,
$HASP825           DSN=SYS1.PARMLIB(NULL),VOLSER=J2SHR2,CARDS=1
$HASP825           --- STEPLIB Concatenation
$HASP825           DSN=ZOS21.LINKLIB,VOLSER=J2COM1,
$HASP825           DSN=NULL.JES2000.LINKLPA,VOLSER=J2SPA1,
$HASP825           DSN=SYS1.SRVLIB.JES2000.LINKLPA,
$HASP825           VOLSER=J2SPA1,
$HASP825           DSN=SYS2.LINKLIB,VOLSER=ZDR21B,
$HASP825           DSN=SYS1.MIGLIB,VOLSER=ZDR21B
```

Usage & Invocation – Programming interface improvements

- Internal reader can be allocated from any address space
  - No longer need to have a JES environment to allocate INTRDR
  - Can allocate to a secondary JES2 from TSO user on primary JES2
    - Specify subsystem name using DALSSREQ or DALUASSR
  - Do not hold allocation for long period
    - Prevents clean ($PJES2) shutdown of JES2
- Extended status enhancements
  - Return data in 64 bit storage
  - DSLIST can suppress duplicate data sets
- SAPI enhancements
  - Data set number included in information on data set returned

Migration & Coexistence Considerations

- APAR OA36155 is needed for coexistence with V2R1 from JES2 z/OS V1R12 or z/OS V1R13
- APAR also highly recommended for fall back as well
  - Jobs created on V2R1 may not be processed properly on earlier releases without OA36155
- PTF numbers – UA68054 (V1R12), UA68055 (V1R13)

- Exploitation of INTERPRET=JES implies
  - Exit 60 instead of exit 6 is called
    - See sample exit 60 for ways to manage this

Installation – JES/MVS Compatibility

Statement of Direction

- z/OS V1R13 was the last z/OS release that supported running a down level JES.
- As of z/OS V2R1, IBM only supports running the V2R1 JES on the V2R1 MVS
  - z/OS V1R13 and earlier are not supported running on a z/OS V2R1 z/OS
- This does NOT affect what members can co-exist in a MAS
  - Just the mixing and matching of JES and MVS levels.
- New messages during initialization:

  WTO - JES2 *level* (HJE*xxxx*) is not supported running on *mvs_level*

  WTOR - Reply "CONTINUE" to initialize JES2 in this unsupported environment, "TERM" to shut down JES2

Presentation Summary

- New JCL was added to reduce dependence on JECL and add function
  - JOB card SYSTEM and SYSAFF
  - OUTPUT card MERGE and DDNAME
  - JCLLIB card PROCLIB
- Improved processing of input phase errors (including JECL errors)
- Allowed interpretation to be done after conversion
  - Before the job executes