Introduction to the new mainframe

Chapter 6: Using Job Control Language (JCL) and System Display and Search Facility (SDSF)
Chapter 6 objectives

Be able to:

- Explain how JCL works with the system, give an overview of JCL coding techniques, and know a few of the more important statements and keywords
- Create a simple job and submit it for execution
- Check the output of your job through SDSF
Key terms in this chapter

- concatenation
- DD statement
- Job Control Language (JCL)
- JOB statement
- EXEC statement
- job name
- procedure (PROC)

- record format (RECFM)
- system display and search facility (SDSF)
- step name
- system catalog
- system library
- utility
What is JCL?

Job control language (JCL) tells the system what program to execute and provides a description of program inputs and outputs.

There are three basic JCL statements:

- JOB statement
- EXEC statement
- DD statement
Basic JCL coding syntax

JCL must be uppercase

Forward slash in column 1 and 2

Name (1-8 characters) follow the slashes

Space separators

//JOBNAME    JOB
//STEPNAME    EXEC
//DDNAME      DD

//* comment - upper or lower case
//* ....end of JCL stream
JCL example

//MYJOB JOB 1,MSGCLASS=T
//MYSORT EXEC PGM=SORT
//SORTIN DD DISP=SHR,DSN=IBMUSER.AREA.CODES
//SORTOUT DD SYSOUT=*  
//SYSOUT DD SYSOUT=*  
//SYSIN DD *
    SORT FIELDS=(1,3,CH,A)
/*
In the preceding example...

**MYJOB**  Job name

**MYSORT**  Step name

**SORTIN**  DD name for program input

**SORTOUT**  DD name for program output

**SYSOUT**  Where to send system output messages (such as a data set)

**SYSIN**  Specifies whether the input will be data or control statements.
Introduction to the new mainframe

JCL: JOB statement

- Create a member using ISPF edit
- Create JCL statements
  - JOB statement
    - Accounting information
    - Execution classes

```
EDIT MIRIAM.PRIVATE.JCLLIB(JOB1) - 01.05
Columns 00001 00072 Scroll ==> HALF

****** Top of Data ****************************
000001 //MIRIAM2 JOB 19,MIRIAM,NOTIFY=&SYSUID,MSGCLASS=T,
000002 // MSGLEVEL=(1,1),CLASS=A
000003 //STEP1 EXEC PGM=IEFBR14
000004 /*-------------------------------------------------------*/
000005 /* THIS IS AN EXAMPLE OF A NEW DATA SET ALLOCATION */
000006 /*-------------------------------------------------------*/
000007 //NEWDD DD DSN=MIRIAM.IEFBR14.TEST.NEWDD,
000008 // DISP=(NEW,CATLG,DELETE),UNIT=SYSDA,
000009 // SPACE=(CYL,(10,10,45)),LRECL=80,BLKSIZE=3120

****** Bottom of Data ****************************
```
JCL: EXEC statement

EXEC statement

Region size

EDIT       MIRIAM.PRIVATE.JCLLIB(JOB1) - 01.05
Command =>  Columns 00001 00072

000001 //MIRIAM2 JOB J9,MIRIAM,NOTIFY=&SYSUID,MSGCLASS=T,
000002 // MSGLEVEL=(1,1),CLASS=A
000003 //STEP1 EXEC PGM=IEFBR14
000004 //*************************************************************
000005 //** THIS IS AN EXAMPLE OF A NEW DATA SET ALLOCATION
000006 //*************************************************************
000007 //NEWDD DD DSN=MIRIAM.IEFBR14.TEST.NEWDD,
000008 // DISP=(NEW,CATLG,DELETE),UNIT=SYSDA,
000009 // SPACE=(CYL,(10,10,45)),LRECL=80,BLKSIZE=3120

*************************************************************
JCL: DD statement

- DD statement
  - DD name (referenced in the program)
  - DSN= (the data set name as cataloged on disk)

```
EDIT        MIRIAM.PRIVATE.JCLLIB(JOB1)     - 01.05
Command     ===> _ Columns 00001 00072
********* ****************************************** Top of Data ***************
000001 //MIRIAM2 JOB 19,MIRIAM,NFIFY=SYSUD,MESCLASS=A,
000002 // MSGLEVEL=(1,1),CLASS=A
000003 //STEP1 EXEC PGM=IEFBR14
000004 /*-----------------------------------------------*
000005 /* THIS IS AN EXAMPLE OF A NEW DATA SET ALLOCATION
000006 /*-----------------------------------------------*
000007 //NEWDD DD   DSN=MIRIAM.IEFBR14.TEST.NEWDD,
000008 //           DISP=(NEW,CATLG,DELETE),UNIT=SYSDA,
000009 //           SPnCE=(CYL,(10,10,45)),LRECL=80,BLKSIZ=3120
********* ****************************************** Bottom of Data ***************
```
Specifying a data set disposition:

DISP is an operand of the DD statement

DISP indicates what to do with the data set (the disposition) at step start, end, or abnormal end (if the job fails)

DISP helps to prevent unwanted simultaneous access to data sets, which is very important for general system operation.
Uses of the DISP= operand

\[
\begin{align*}
\text{DISP=} & \ (\text{status, normal end, abnormal end}) \\
\text{DISP=} & \ (\text{status, normal end}) \\
\text{DISP=} & \ \text{status}
\end{align*}
\]

where status can be

- NEW
- OLD
- SHR
- MOD
Creating a new data set

New data sets can be created through JCL by using the \texttt{DISP=NEW} parameter.

For a \texttt{DISP=NEW} request, you need to supply more information, including:

- A data set name, \texttt{DSN=}
- The type of device for the data set, \texttt{UNIT=sysda}
- If a disk is used, the amount of space to be allocated for the primary extent must be specified, \texttt{SPACE=}
- If it is a partitioned data set, the size of the directory must be specified within the \texttt{SPACE} parameter
- Optionally, \texttt{DCB} parameters can be specified.
Continuation and concatenation

Needed to overcome the limitations of the 80-column punched cards used in earlier systems.

- Continuation allows a JCL statement to span multiple records.
- Concatenation allows a single ddname to have multiple DD statements.
Continuation and concatenation (example)

Continuation example

//JOBCARD JOB 1,
// REGION=8M,
// NOTIFY=IBMUSER

Concatenation example

//DATAIN DD DISP=OLD,DSN=MY.INPUT1
// DD DISP=OLD,DSN=MY.INPUT2
// DD DISP=SHR,DSN=YOUR.DATA
JCL procedures - example

//MYJOB       JOB 1
//MYPROC      PROC
//MYSORT      EXEC PGM=SORT
//SORTIN      DD DISP=SHR,DSN=&SORTDSN
//SORTOUT     DD SYSOUT=*  
//SYSOUT      DD SYSOUT=*  
//           PEND
JCL procedures (continued)

//MYJOB JOB 1
//*---------------------------------*
//MYPROC PROC
//MYSORT EXEC PGM=SORT
//SORTIN DD DISP=SHR,DSN=&SORTDSN
//SORTOUT DD SYSOUT=* 
//SYSOUT DD SYSOUT=* 
// PEND
//*---------------------------------*
//STEP1 EXEC MYPROC,SORTDSN=IBMUSER AREA CODES
//SYSIN DD *
   SORT FIELDS=(1,3,CH,A)
JCL procedures -- statement override

```
//MYJOB     JOB 1
//*---------------------------------*
//MYPROC    PROC
//MYSORT    EXEC PGM=SORT
//SORTIN    DD DISP=SHR,DSN=&SORTDSN
//SORTOUT   DD SYSOUT=*//SYSOUT    DD SYSOUT=*//PEND
//*---------------------------------*
//STEP1     EXEC MYPROC,SORTDSN=IBMUSER.AREA.CODES
//MYSORT SORTOUT DD DSN IBMUSER MYSORT OUTPUT
//          DISP=(NEW,CATLG),SPACE=(CYL,(1,1)),
//          UNIT=SYSDA,VOL=SER=SHARED,
// DCB=(LRECL=20 BLKSIZE=0 RECFM=FB DSORG=PS)
//SYSIN     DD *
//          SORT FIELDS=(1,3,CH,A)
```
Using SDSF

After submitting a job, z/OS users use System Display and Search Facility (SDSF) to review the job output for successful completion or JCL errors.

SDSF allows users to:

- View and search the system log
- Enter system commands
- Hold, release, cancel, and purge jobs
- Monitor jobs while they are processed
- Display job output before deciding to print it
- Control the order in which jobs are processed
- Control the order in which output is printed
- Control printers and initiators
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SDSF panel hierarchy

Primary Option Menu

- SYSLOG Panel
- Display Active Users Panel
- Input Queue Panel
- Output Queue Panel
- Help Output Queue Panel
- Status Panel
- Printer Panel
- Initiator Panel

- Job Data Set Panel
- Output Descriptor Panel
- Output Data Set Panel
SDSF: Primary option menu

Display  Filter  View  Print  Options  Search  Help

HqX7770 ---------------- SDSF PRIMARY OPTION MENU ----------------
COMMAND INPUT ===> _ SCROLL ===> PAGE

D
A   Active users
I   Input queue
O   Output queue
H   Held output queue
ST  Status of jobs
LOG System log
SR  System requests
MAS Members in the MAS
JC  Job classes
SE  Scheduling environments
RES WLM resources

INIT Initiators
PR Printers
PUN Punches
RDR Readers
LINE Lines
NODE Nodes
SO Spool offload
SP Spool volumes
RM Resource monitor
CK Health checker

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US Government Users Restricted Rights - Use, duplication or
F1=HELP  F2=SPLIT  F3=END   F4=RETURN  F5=IFIND  F6=BOOK
F7=UP    F8=DOWm  F9=SWAP  F10=LEFT   F11=RIGHT  F12=RETRIEVE
MA      A

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SDSF: Options menu

Display Filter View Print Options Search Help

HQA7770 ------------------ SD
COMMAND INPUT ===>

DA Active users
I Input queue
O Output queue
H Held output queue
ST Status of jobs

LOG System log
SR System requests
MAS Members in the MAS
JC Job classes
SE Scheduling environments
RES WLM resources

1. Set action character display...
2. Find limit...
3. Change include SYSIN to ON
4. Set bookshelf...
5. Set display values to ON
6. Set screen characteristics...
7. Set delay for responses...
8. Set communications timeout...
9. Set console name...
10. Set search characters...
11. Assign PF keys...
12. Change show PF keys to OFF
13. Set language for help and tutorial...
14. Set cursor option...
15. Set confirmation to ON
16. Operlog limit for filter...
17. Set date format...
18. Set log default...
19. Set default browse action...
20. Set default check history limit...

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F1=HELP  F2=SPLIT  F3=F7=UP  F8=DOWN  F9=SWAP  F10=LEFT  F11=RIGHT  F12=RETRIEVE

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Viewing the JES2 output files

Screen 1

Display  Filter  View  Print  Options  Help

SDSF HELD OUTPUT DISPLAY ALL CLASSES  LINES 44
COMMAND INPUT ===>  SCROLL ===> PAGE
PREFIX=*  DEST=(ALL)  OWNER=*  SYSNAME=
NP  JOBNAME  JobID  Owner  Prty  C  DDisp  Dest  Tot-Rec  Tot-
?  MIRIAM2  JOB25044  MIRIAM  144  T  HOLD  LOCAL

Screen 2

Display  Filter  View  Print  Options  Help

SDSF JOB DATA SET DISPLAY - JOB MIRIAM2 (JOB26044)  LINE 1-3 (3)
COMMAND INPUT ===>  SCROLL ===> PAGE
PREFIX=*  DEST=(ALL)  OWNER=*  SYSNAME=
NP  DDNAME  StepName  ProcStep  DSID  Owner  C  Dest  Rec-Cnt  Page
JESMSGLG  JES2  2  MIRIAM  T  LOCAL
JESJCL    JES2  3  MIRIAM  T  LOCAL
JESYSMSG  JES2  4  MIRIAM  T  LOCAL

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# SDSF: Display active users (DA)

<table>
<thead>
<tr>
<th>NP</th>
<th>JOBNAME</th>
<th>StepName</th>
<th>ProcStep</th>
<th>JobID</th>
<th>Owner</th>
<th>C Pos</th>
<th>DP</th>
<th>Real Paging</th>
<th>SIO</th>
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<td>F1=HELP</td>
<td>F2=SPLIT</td>
<td>F3=END</td>
<td>F4=RETURN</td>
<td>F5=IFIND</td>
<td>F6=BOOK</td>
<td>F7=UP</td>
<td>F8=DOW</td>
<td>F9=SWAP</td>
<td>F10=LEFT</td>
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<tr>
<td>MA</td>
<td>A</td>
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<td></td>
</tr>
</tbody>
</table>

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Issuing MVS and JES commands

System Command Extension

Type or complete typing a system command, then press Enter.

Place the cursor on a command and press Enter to retrieve it.

More: +

F1=Help  F2=Split  F3=Cancel  F5=FullScr  F7=Backward
F8=Forward  F9=Swap  F11=ClearLst  F12=Cancel
## SDSF: Input queue panel

**SDSF INPUT QUEUE DISPLAY ALL CLASSES**

<table>
<thead>
<tr>
<th>NP</th>
<th>JOBNAME</th>
<th>JobID</th>
<th>Owner</th>
<th>Prty</th>
<th>C</th>
<th>Pos</th>
<th>PrtDest</th>
<th>Rmt</th>
<th>Node</th>
<th>SAF</th>
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</table>

F1=HELP  F2=SPLIT  F3=END  F4=RETURN  F5=IFIND  F6=BOOK  F7=UP  F8=DOWN  F9=SWAP  F10=LEFT  F11=RIGHT  F12=RETRIEVE
**SDSF: Output queue panel**

<table>
<thead>
<tr>
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<th>JOBNAME</th>
<th>JobID</th>
<th>Owner</th>
<th>Prty</th>
<th>C</th>
<th>Forms</th>
<th>Dest</th>
<th>Tot Rec</th>
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### SDSF: Held output queue panel

```
Display Filter View Print Options Help

SDSF HELD OUTPUT DISPLAY ALL CLASSES LINES 194 LINE 1-6 (6)

COMMAND INPUT ==> SCROLL ==> PAGE

PREFIX=* DEST=(ALL) OWNER=* SYSNAME=

NP JOBNAME JobID Owner Prty C QDisp Dest Tot-Rec  Tot-
MIRIAM2 JOB26044 MIRIAM 144 T HOLD LOCAL  44
MIRIAM2 JOB26069 MIRIAM 144 T HOLD LOCAL  30
MIRIAM3 JOB26070 MIRIAM 144 T HOLD LOCAL  30
MIRIAM4 JOB26071 MIRIAM 144 T HOLD LOCAL  30
MIRIAM5 JOB26072 MIRIAM 144 T HOLD LOCAL  30
MIRIAM6 JOB26073 MIRIAM 144 T HOLD LOCAL  30

F1=HELP    F2=SPLIT    F3=END        F4=RETURN    F5=IFIND  F6=BOOK
F7=UP      F8=DOWN     F9=SWAP       F10=LEFT     F11=RIGHT F12=RETRIEVE

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### SDSF: Status panel

**Display** Filter View Print Options Help

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**Function Keys:**
- F1=HELP
- F2=SPLIT
- F3=END
- F4=RETURN
- F5=IFIND
- F6=BOOK
- F7=UP
- F8=DOWM
- F9=SWAP
- F10=LEFT
- F11=RIGHT
- F12=RETRIEVE
Utilities

- z/OS includes a number of programs useful in batch processing called utilities.
- Utilities provide many small, obvious, and useful functions.
- A basic set of system-provided utilities is described in the textbook (Appendix C).
- Customer sites often write their own utility programs, many of which are shared by the z/OS user community.
- Some examples of utilities:
  - IEBGENER: Copies a sequential data set
  - IEBCOPY: Copies a partitioned data set
  - IDCAMS: Works with VSAM data sets
System Libraries

z/OS has many standard system libraries, including:

- **SYS1.PROCLIB**: JCL procedures distributed with z/OS
- **SYS1.PARMLIB**: Control parameters for z/OS and some program products.
- **SYS1.LINKLIB**: Many of the basic execution modules of the system.
- **SYS1.LPALIB**: System execution modules that are loaded into the link pack area at z/OS initialization.
Summary

- Basic JCL contains three statements: JOB, EXEC, and DD.
- A program can access different groups of data sets in different jobs by changing the JCL for each job.
- New data sets can be created through JCL by using the DISP=NEW parameter.
- Users normally use JCL procedures for more complex jobs. A cataloged procedure is written once and can then be used by many users.
- z/OS supplies many JCL procedures, and locally-written ones can be added easily.
- A user must understand how to override or extend statements in a JCL procedure to supply the parameters (usually DD statements) needed for a specific job.
Summary - continued

- SDSF is a panel interface for viewing the system log and the list of active users and controlling and monitoring jobs and resources.
- Utility programs make operating on data sets easier.
- System libraries contain JCL procedures, control parameters, and system execution modules.