

# Job Control Language (JCL)

Lesson 00: Document Version: 6.0

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## Document History

Date	Course Version No.	Software Version No.	Developer / SME	Change Record Remarks
16-July-2009	4.0	JCL	Arjun Singh	Content Creation
26-Oct-2009	4.0	JCL	Documentation Team	Quality Review
30th-May-2011	5.0	JCL	Vaishali Kasture	Content creation and Revamping
10 <sup>th</sup> -Feb-2015	6.0	JCL	Veena Keshavulu	Revamping
26 <sup>th</sup> -June-2016	6.0	JCL	Veena Keshavulu	Revamping post the integration

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## Course Goals and Non Goals

- Course Goals

- Compile, Link and Run a Cobol Program using the JCL codes.
- Execution of Jobs in batch mode.

- Course Non Goals

- Application and use of JCL and its utility with VSAM, DB2, IDMS and ADSO.



## Pre-requisites

- Knowledge of MULTIPLE VIRTUAL STORAGE (MVS).



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## Intended Audience

- Programmers



## Day Wise Schedule

- Day 1

- Lesson 1: Introduction
- Lesson 2: JCL Syntax
- Lesson 3: Job Statement

- Day 2

- Lesson 4: THE EXEC STATEMENT
- Lesson 5: THE DD STATEMENT



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## Day Wise Schedule

- Day 3
  - Lesson 6: PROCEDURE
- Day 4
  - Lesson 6: UTILITY
- Day 5
  - Lesson 6: UTILITY



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## Day Wise Schedule

- Day 1

- Lesson 1: Introduction
- Lesson 2: JCL Syntax
- Lesson 3: Job Statement

- Day 2

- Lesson 4: THE EXEC STATEMENT
- Lesson 5: THE DD STATEMENT



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## Day Wise Schedule

- Day 3
  - Lesson 6: PROCEDURE
- Day 4
  - Lesson 6: UTILITY
- Day 5
  - Lesson 6: UTILITY



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  - 1.2: What is JOB?
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## References

- Expert MVS/XA JCL - Mani Carathanassis
- MVS/JCL - Doug Lowe



### Next Step Courses (if applicable)

- COBOL
- VSAM
- CICS
- DB2



## **Job Control Language (JCL)**

Lesson 1: Introduction

## Lesson Objectives

- Introduction to JCL



1.1: What is JCL?

## Introduction

- Work that a user can perform under MVS/XA Topic:
  - Time Sharing
  - Online Processing
  - Batch Processing

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## 1.1: What is JCL?

### JCL Description

- Language that allows users to communicate with the operating system.
- Step tells the operating system the following:
  - Application Program details:
    - name, location, components , OS components etc. to be processed.
  - Data file details:
    - The name and location of files the application program needs.
  - Hardware devices:
    - Devices the application program needs to achieve its function.



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1.2: What is JOB?

## Description

- JCL control statements are organized into groups of work called Jobs.
- A JOB is simply the execution of a program or a set of related programs
- General structure of a simple JOB:  

```
//Job statement
//Step 1      EXEC program
//           DD statements
//           DD statements
//Step 2      EXEC program
//           DD statements
//           DD statements
//Step 3      EXEC program
//           DD statements
//           DD statements
//           DD statements
//           DD statements
```
- Each program executed by a job is called a JOB step



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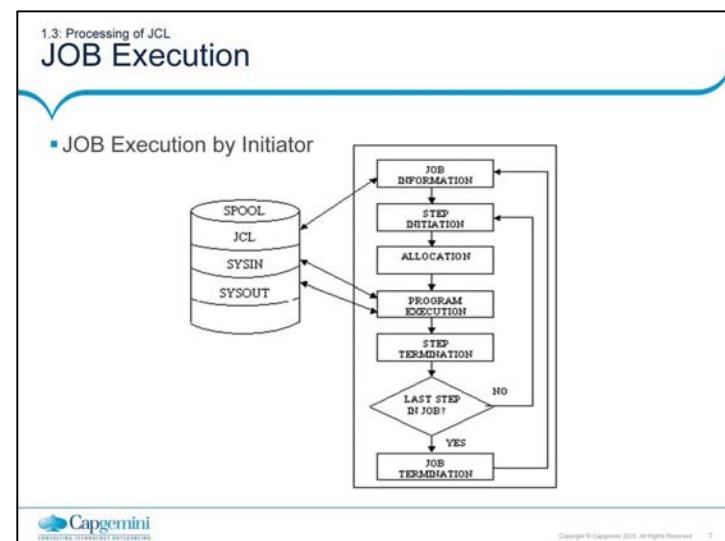
1.2: What is JOB?

## Description (contd..) – SAMPLE JCL

```
//DA0001TA   JOB    LA2719,CG,MSGCLASS=A,  
//  MSGLEVEL=(1,1),NOTIFY=DA0001T  
//SORT1      EXEC    PGM=SORT  
//SYSOUT     DD      SYSOUT = *  
//SORT       DD      DSN=DA0001T.TRANFILE,  
//  DISP=SHR  
//SORTOUT    DD      DSN=DA0001T.TRANSORT,  
//  DISP=(NEW,KEEP),UNIT=SYSDA,  
//  SPACE=(TRK,(1,1)),  
//  DCB=(DSORG=PS,RECFM=FB,  
//  LRECL=400,BLKSIZE=3200)  
//SORTWK01   DD      UNIT=SYSDA,  
//  SPACE=(CYL,(1,1)) *  
//SYSIN      DD      SORT FIELDS=(16,5,CH,A)  
/*  
*/
```



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1.3: Processing of JCL

## JOB Execution (contd..)

- If an appropriate job exists in job queue, initiator takes its JCL and goes through the following processes:
  - Job initiation
  - Step initiation
  - Allocation
  - Program execution
  - Step Termination
  - Job Termination



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## Summary

- Job Control Language (JCL):
  - Means of communication with IBM 3090 MVS Operating System.
- Initiator
  - Set of routines with sole function to select a job from job queue and execute it under its control.
  - Selects appropriate jobs and goes through following processes:
    - Job initiation, Step initiation, Allocation, Program execution, Step termination and job termination.

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## Review Question

- Question 1: Which of the following picks a job from the job queue and processes it?
  - Option 1: Initiator
  - Option 2: Online
  - Option 3: Batch
  
- Question 2: Which of the process will check the COND parameter on the JOB statement?
  - Option 1: Job initiation
  - Option 2: Step initiation

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## **Job Control Language (JCL)**

Lesson 2: JCL Syntax

## Lesson Objectives

- Syntax for writing JCL
- Rules to be followed



2.1: Syntax of JCL

## Description

- JCL statements are coded in 80-byte records.
- Only 72 characters are used to code JCL statements.
- Within 72 characters, JCL statements can be coded in a relatively free-form manner, with just few restrictions.
- Each JCL statement is divided into many fields.

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All JCL statements begin with two slashes (//) in the first two positions (except /\*). All positions of a line, from 1 to 71 (included), can be used for coding a JCL statement. Position 72 is used (rarely) for imbedded comment continuation, and positions 73 through 80 are used for numbering purposes. With the exception of the null (//), delimiter (\*), comment (//\*), all other statements follow the same general format:

```
//name    operation parameter1,parameter2  [comment]
```

2.1: Syntax of JCL

## Description (contd..)

- Different types of JCL statements
  - JOB
  - EXEC
  - DD
  - DELIMITER
  - Null
  - COMMENTS
  - PROC
  - PEND
  - OUTPUT

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JOB- Marks the beginning of a job and assign a name to the job.

EXEC- Marks the beginning of a job and names the job step. Identifies the program or procedure to be executed

DD- Identifies an input or output file within a job step and defines all the resources required

DELIMITER(/\*)- Indicates the end of data placed in a JCL

NULL(/I)-Marks the end of a job

COMMENTS(/\*) - Contains comments

PROC - Marks the beginning of a procedure definition

PEND - Indicates the end of a procedure definition

OUTPUT - Supplies options for SYSOUT processing

2.1: Identifier Field

## Format

//NAME      Operation      param1,param2 ...

- **Identifier Field**
  - Identifies a record as a JCL statement.
  - For most JCL statements, this field occupies the first two character positions and contains two slashes (//).
  - Two exceptions are:
    - Delimiter statement that contains a slash and the start(/\*)
    - Comment statement with identifier field as (//\*).

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Name: Every JCL statement can or must have a name. The name should not exceed 8 characters.

Operation: The operation field follows the name field and specifies the statement's function. Delimiter, comment and null statements do not have an operation field. E.g. JOB, EXEC, DD, PROC, PEND, or OUTPUT. One or more blanks must follow the operation.

Parameter: The parameter field consists of one or more parameters, separated by commas. No imbedded blanks between parameters are permitted. Parameters are broadly classified into 2 categories viz. Positional and Keyword.

A positional parameter is identified by its position relative to other parameters in the operand field.

Note: THE COMMENT STATEMENT CAN NOT BE CONTINUED!

2.1: Name Field

## Format

- Name Field
  - Associates a name with a JCL statement.
  - Always required on a JOB statement.
  - Must start from column three.
  - Can be up to 8 characters in length.
  - Comprises letters, numbers or national characters (#, @ and \$).
  - First character must be a letter or national character.

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2.1: Operation Field

## Format

- Operation Field
  - Specifies the statement's function.
  - Can be coded anywhere on the line, but should be separated from the name field by at least one space.
  - Statements that do not have operation field are:
    - /\* ----- Delimiter
    - // ----- Null
    - /\*----- Comment

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2.1: Parameter Field

## Description

- In JCL parameters are of two types:
  - Positional
    - must be first
    - must be in a specific order
    - absence must be indicated by a comma
    - if the last one is absent, no comma necessary
    - if all are absent, no comma is necessary.
  - E.g..
    - TIME=(5,0) = TIME=(5) = TIME=5
    - TIME=(0,30) = TIME=(,30)
  - Keyword
    - must be after any positional parameters
    - can be any order with respect to one another
    - Identified by an equal sign (=) and variable information
    - DISP=OLD,DISP=(NEW,KEEP,KEEP),DISP=(,KEEP,KEEP)
    - DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)

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2.1: Parameter Field

## Format

- Parameter Field
  - Begins at least one position after the end of operation field and can be extended up to column 71.
  - One or more component parameters are coded, each separated by commas.
    - Parameters supply information that influence statement processing.
  - Comments field begins in the position after the space that marks the end of parameters field.

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Rule 1: All positional parameters are coded first in the operand field and in their proper sequence.

E.g.: p1,p2,p3  
      p1,p3,p2     illegal because they are not in sequence.

Rule 2: A keyword parameter is identified by a keyword followed by an equal sign (=) and variable information. A keyword parameter follows positional parameter and can be coded in any order.

E.g. : p1,p2,p3,k1=,k2=,k3=  
          p1,p2,p2,k3=,k2=,k1=  
Both are valid.

Rule 3: The absence of positional parameter is denoted by a comma (,) coded in its place, except when the last or remainder of the positional parameter is not present. The placeholder commas do not need to be coded in this case.

E.g.: p1,,p3,k1=,k2=,k3=     place holder comma required.  
          p1,k1=,k2=,k3=     place holder comma not required.

2.1: Syntax of JCL

## Example

- Syntax

```
//OUTPUT DD DSN=DA0001T.TRANS,DISP=(,CATLG),
//      SPACE=(TRK,(2,1)),UNIT=SYSDA
```

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Rule 4: Both positional parameters and variable information for keyword parameters may be composed of sub parameters. The sub-parameters may be either positional or keyword. Sub-parameters must be coded as a list. The list must be enclosed in parentheses unless only one sub-parameter is coded. When only one sub-parameter is coded the parentheses are optional.

e.g.: p1,(sp1,sp2),p3,k1=(sk1,sk2),k2=,k3=  
p1,(sp1),p3,k1=(sk1),k2=,k3=  
Or p1,sp1,p3,k1=sk1,k2=,k3=

Comments: are separated from the parameters by a blank. The comment field begins in the position after the space that marks the end of parameters field and ends in column 71. MVS ignores what you code here.

2.2: JCL Rules

## Rules

- Positional parameters are coded first in the operand field and in their proper sequence.
  - Absence is denoted by a comma (,) coded in its place.
- A keyword parameter is identified by a keyword followed by an equal sign (=) and variable information.
- Both positional parameters and variable information for keyword parameters may comprise sub-parameters.

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2.2: JCL Rules

## Rules for Continuation

- JCL statement can be continued into the next line.
  - Code two slashes at the beginning of the line.
  - Continue in the parameter field.
  - Start anywhere between positions 4 and 16 (4 and 16 included).
- Note:
  - A comma enclosed in an apostrophe cannot be used for continuation.

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Rules for Continuation: The JCL statement can be continued in a simple way. The statement must be interrupted at a comma. This means that the last valid character of the line must be a comma followed by at least one blank. Then the statement can be continued into the next line by coding two slashes at the beginning of the line and continuing the parameter field starting anywhere between positions 4 and 16 (4 and 16 included). Note that, the comma that indicates continuation, is not an extraneous character but part of the statement.

2.2: JCL Rules

## Rules for Continuation: Example

```
//DD1 DD DSN=DA0001T.EMPFILE,  
// DISP=(NEW,CATALOG,DELETE),  
// UNIT=SYSDA,SPACE=(TRK,(5,1)),  
// DCB=(LRECL=80,RECFM=FB,BLKSIZE=800)
```

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## Summary

- Every JCL statement must have a name.
- A keyword parameter is identified by a keyword followed by an equal sign (=) and variable information.
- Absence of positional parameter is denoted by a comma (,).

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## Review Question

- Question 1: All JCL statements begin with:
  - Option 1: //
  - Option 2: \*\*
  - Option 3: --
- Question 2: Which of the parameters are coded first in a JCL statement?
  - Option 1: Positional
  - Option 2: Keyword



Job Control Language (JCL)

Job Statement

## **Job Control Language (JCL)**

Lesson 3: Job Statement

## Lesson Objectives

- Job statement
- Accounting Information, Programmer's Name parameter
- MSGLEVEL, MSGCLASS, CLASS, PRTY, TIME, REGION , ADDRSPC, NOTIFY, RESTART parameter



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3.1: Job Statement

## Functions

- **JOB statement:**
  - First statement to be coded for a JCL.
  - It has three basic functions :
    - Identifies a job to MVS and supplies a job name for MVS to refer to the job.
    - Supplies accounting information to MVS.
    - Supplies various options that influence or limit job processing.

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A JOB statement must be at the beginning of every job submitted to the system for execution. It must have a name. The absence of a job name will result in a JCL error. JOB statement identifies a job to the operating system with the job name operand. There are three possible delimiters for a job during a reading process:

Another job statement in the input stream. It signals the end of (reading) one JOB and the beginning of (reading) another  
A null statement. Following a null statement all JCL statements except a JOB statement will be ignored  
End-of-file on the reading device, meaning there are no more statements to be read in

3.1: Job Statement

## Format

```
//jobname JOB ([account-no] [,additional, accounting-info.]),
//      "Programmer's name", MSGCLASS=class,
//      MSGLEVEL=(JCL [,MSG]), NOTIFY=user-id,
//      USER=user-id, PASSWORD=password,
//      CLASS=jobclass,
//      ADDRSPC={VIRT|REAL},
//      TIME={(minutes)[,seconds]}[1440],
//      REGION=Value{K|M},
//      PRTY=priority,
//      RESTART=(stepname|procexec.stepname|*),
//      TYPRUN={HOLD|SCAN},
//      COND=(test[,test]....)
```

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3.1: Job Statement  
**Example**

```
// DA0001TA JOB (LA2719,TRG),CG,  
//   MSGCLASS=A,  
//   MSGLEVEL=(1,1),  
//   NOTIFY=DA0001T,  
//   TIME=(2, 3),  
//   REGION=500K,  
//   TYPRUN=SCAN,  
//   RESTART=STEPNAME
```



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3.1: Job Statement

## Example

- A job statement must have a name. The absence of job name will result in a JCL error:
- Format:

```
//job name      JOB      parameters
```
- Example:

```
//DA0001TA      JOB      parameters
```

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The job name cannot exceed 8 characters and is usually the user id (login id). Login id is generally 7 characters, so you need to add a suffix else the system prompts you to enter the character when a job is submitted to the system for execution.

When a job is submitted to the system, a job number is also assigned so that the job can be further identified. This way jobs with the same name can be uniquely identified. Jobs with the same name cannot execute simultaneously. If several jobs with the same name are submitted they execute sequentially even if additional jobs could be executing. Jobs waiting to run because of this time conflict are shown in hold status.

The rest of the JOB statement contains positional parameters followed by keyword parameter.

3.2: Accounting Information

## Description

- Accounting Information:
  - Positional parameter.
  - If present, it must be the first in the parameter field.
  - Consists of several positional parameters, the first of which is account number.
  - The account number is an alphanumeric field, 1 to 4 characters long (more than 4 is also permitted).
  - Maximum size is 142 characters.
  - It is normally used to determine how billing is to be done.

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If a positional parameter is present (it normally is), it must be the first in the parameter field. It can have a maximum of 142 characters (including parentheses and commas but not apostrophes). It is used to tie the resources used by the job to the appropriate account.

The account-number is an alphanumeric field from 1 to 4 characters long (many installations permit the use of more than 4 characters).

Additional-accounting-information is installation dependent. Many of the fields are not very important and are not often used.

3.2: Accounting Information

## Format and Example

- Format :  
([account-number] [,additional. accounting-info.])
- Example:  
//IDA0001TA JOB (LA2719,TRG)

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Example:

//IDA0001TA JOB LA2719, parameters..

LA2719 is the account number for the training dept. This varies from one project to another.

Remark: An installation has the option of making the account number mandatory and most installations do. If so, its absence causes a JCL error.

If the account number is incorrectly specified, in this case its not JCL error. However when job is submitted to the system for execution, we get the message "JOB NOT RUN" in the SYSOUT.

3.3: Programmer's Name Parameter

## Description

- It is a positional parameter.
- Follows accounting information.
- Installation-dependent.
- Maximum size is 20 characters
  - Note: If it contains any special characters other than a hyphen, and a period in the middle or the beginning but not at the end of the name, the name must be enclosed in apostrophes.

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Following the accounting information parameter, another positional parameter, the programmer's name can be coded. The installation determines if this parameter is required or not. If required, it must be coded immediately after the accounting information, and its omission will cause a JCL error. The programmer's name cannot exceed 20 characters. If it contains any special characters other than a hyphen and a period in the middle of the beginning (but not at the end) of the name, the name must be enclosed in apostrophes. The apostrophes are not added to the length of the name.

3.3: Programmer's Name Parameter

## Example

```
//DA0001TA JOB LA2719,'O"Kelly',....
```

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If a name contains an apostrophe (e.g., D'COSTA), two apostrophes must be coded. They count as one character in the length of the name.

Example:

```
//DA0001TA JOB LA2719,Sheela,parameters  
//DA0001TA JOB LA2719,'D'COSTA',parameters
```

3.4: MSGLEVEL Parameter

## Description

- Keyword parameter
- Optional
- Installation-dependent
- Allows you to control:
  - Contents of JCL print
  - System messages
    - MSGLEVEL lets us specify the type of messages you wish to include in your output
    - Determines the amount of JCL and SMS allocation messages to be assigned to the device indicated vide MsgClass

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This parameter specifies whether the submitted JCL or JCL-related messages should be shown on the job's output.

3.4: MSGLEVEL Parameter

## Format

MSGLEVEL=([JCL Statements][,Message])

- JCL Statements : 0,1 or 2
- Message : 0 or 1

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General syntax:

MSGLEVEL=(jcl)[,messages] keyword parameter

jcl - 0, 1, or 2

- 0 - Only the JOB statement will be shown
- 1 - All JCL is shown

Instream

Expanded cataloged procedures

Symbolic parameter substitutions

- All JCL is shown, but not expanded procedure listing.

messages – 0 or 1

- 0 - No messages will be shown i.e. information about step completion.
- All messages will be shown viz. allocation and termination messages.

The messages sub-parameter can be thought of as On (1) or Off (0).  
The default in majority of the installations is (1,1).

3.4: MSGLEVEL Parameter

## JCL Values

<b>JCL Statements</b>	<b>Definition</b>
0	Print the job statement
1	Print all the JCL statements along with the
PROCEDURES	
2	Print only JCL statements
<b>Message</b>	
0	Allocation/termination messages, if the job terminates abnormally
1	Allocation/termination messages, if the job terminates abnormally/normally

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**Remark:**

1. If the entire parameter or either of the two fields is omitted, an installation-defined default is assumed.

MSGLEVEL=1 ----- MSGLEVEL=(1,default)

MSGLEVEL=(,1) ----- MSGLEVEL=(default,1)

Parameter omitted ----- MSGLEVEL=(default,default)

2. If the job encounters an ABEND failure, the second field always defaults to 1 even if coded as 0.

3.4: MSGLEVEL Parameter

## The JOB Statement – MSGLEVEL (0,0)

▪ JESJCL: Shows only JOB statement details

```
Display Edit View Print Options Help
SDF OUTPUT DISPLAY P390807R J0807754 0510 3 LINE 0      COLUMNS 01-80
COMMAND INPUT >>>
***** TOP OF DATA *****
1 //P390807R JOB (RCTR,8SYGUID),
// MSGCLRS=R,CLRSS=R,MSGLEVEL=(0,0),NOTIFY=8SYGUID,
// REGION=1000K,TIME=1200
//FCF032 SUBSTITUTION JCL ~ (RCTR,P390807R),MSGCLRS=R,CLRSS=R,MSGLEVEL
TIME=1200
***** BOTTOM OF DATA *****

PF 1=HELP   2=SPLIT   3=END    4=RETURN  5=IFIND   6=BOOK
PF 7=UP     8=DOWN    9=SWAP    10=LEFT    11=RIGHT  12=RETRIEVE
H a

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```

3.4: MSGLEVEL Parameter

## Demo

■ Job Parameters



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3.5: MSGCLASS Parameter

## Description

- Keyword parameter
- Optional
- Installation-dependent
- Format :  

MSGCLASS= sysout class
- Sysout class is a one-character code.
- viz : A-Z, 0-9 max. 36 output classes.
- MSGCLASS specifies an output class that's associated with the jobs message output.
- MVS assigns a default, if the parameter is omitted

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This parameter assigns a sysout class to the Job log. The job log consists of what is known as system or JES datasets:

JES2 or JES3 log  
JCL and its associated messages  
Allocation and Termination messages

MSGCLASS - indicates the format of output  
- Specifies output class for  
    Job log (collection of all operations)  
    List (collection of all printed output like compiled  
class - A character from A to Z or a number from 0 to 9 (in all 36 classes)  
MSGLEVEL parameter indicates whether or not one wishes to print the JCL statements and allocation messages. The MSGLEVEL can save paper. After a job is debugged, there may be no need to print all the JCL and allocation messages each time it runs. To reduce printing to a minimum, one may wish to  
MSGLEVEL=(0,0).

Remark: If the MSGCLASS parameter is omitted, an installation-defined default will be used.

3.5: CLASS Parameter

## Description

- Nature of job (Short Running (cpu time), Long Running, Large resources (tape,disk))
- Keyword parameter
- Optional
- Installation-dependent

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This parameter assigns a class to a job.

General Syntax:

CLASS=jobclass      Keyword parameter

jobclass – A letter from A to Z or a number from 0 to 9 ( in all 36 classes).

The job class affects job's processing in these ways:

When job is submitted, it is placed in an input queue where it waits to be executed. Queues can be thought of as waiting lines for jobs. Each job class has its own input queue

Job waits in the input queue until it is selected by an initiator to be processed. Each initiator is set to a list of job classes that it can select from.

Simply put, Jobclass identifies the nature of the job:

- Short running or long running
- Resource utilization

3.5: CLASS Parameter

## The JOB Statement - CLASS

- **THE CLASS PARAMETER :** Queues jobs for execution based on the importance of the job. The importance in turn depends on the type of the job:
  - A job involving complex statistical calculations
    - Is a type of job taking a lot of CPU time and to be run in the night only
  - A job updating a database
    - Is a type of job which is I/O bound and to be run immediately
  - A job generating reports
    - Is a type of job to be run in the evenings
  - A job running system programs
    - Is a type of job to be run continuously

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3.5: CLASS Parameter

## Format

- The CLASS parameter assigns an input class to a job.
- A job class is a one character code.
- Values assigned can be A-Z, 0-9
- CLASS parameters specifies class in which the job is to scheduled.:
  - Note : Each job class has its own input queue and CLASS gives jobs a preference for execution by the OS.

CLASS=job class

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Each installation group jobs that have like characteristics into classes. By segregating jobs with similar characteristics, an installation can maintain a good mix of the jobs running at a given moment. This maintains system throughput and efficient use of resources.

For example, suppose the default CLASS is A:  
Job statement:

```
//DA0001TA JOB LA2719,CG,MSGCLASS=A,MSGLEVEL=(1,1)
```

is equivalent to:

```
//DA0001TA JOB  
// LA2719,CG,MSGCLASS=A,MSGLEVEL=(1,1),CLASS=A
```

3.6: PRTY Parameter

## Description

- Keyword parameter
- Optional
- Installation-dependent
- PRTY specifies the priority of the job within the job class.
- Example:

CLASS=A, PRTY=3

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This parameter determines the scheduling priority of a job in relation to other jobs in the job input queue of the same class.

The PRTY parameter is used to define the job's input class selection priority. The higher the number, the better (greater) the priority. The PRTY parameter simply controls the job's position in the input queue. It has no affect on the job's performance. Jobs with higher priorities will be selected before jobs with lower priority. A job's priority does not affect its performance. Once the job is selected for execution, the priority function is finished. Two jobs having same job class and same priority will be executed in sequence. It is meaningless to compare the PRTY parameter of two jobs belonging to different classes.

Format :  
PRTY=priority-no.

For JES2, it is a no. between 0 & 15

For JES3, it is a no. between 0 & 14

0 - lowest priority

15 - highest priority for JES2)

3.7: TIME Parameter

## Description

- Keyword parameter
- Optional
- Format:

TIME=([minutes][,seconds]][1440])

- TIME parameter:
  - Specifies the amount of CPU time a job may use.
    - For example: All steps in a job can use it collectively.

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This parameter specifies the total amount of CPU time that all steps in a job can use collectively.

minutes - a number from 1 to 357912 (248.55 days)

seconds - a number from 1 to 59

The job is not timed for CPU. Note that TIME=1440 is rarely used, and most installations disallow its use in a testing environment. TIME=1440 should be used by an on-line system like CICS OR ADS/O.

When the TIME parameter is omitted, an installation-defined default is used. This default is usually very high and unlikely to cause an S322 ABEND failure unless the program goes into an endless loop.

If the TIME parameter is also coded in the JOB statement and exec statement within job , both will be in effect and either can cause a S322 ABEND failure. It is not advisable to use them both.

CPU time is the amount of time that the computer devoted to the job after it was selected for processing. It is not the amount of time it was in the machine.

3.7: TIME Parameter

## Example

- TIME=1440 (no time-limit)
  - Job is not timed for CPU. It also does not time-out(S522 ABEND failure)
- TIME=(3,20)
  - All the steps in a job are allowed collectively 3 minutes and 20 seconds of CPU time
  - If this amount exceeds the result will be S322 ABEND failure
  - TIME=MAXIMUM
  - Permits maximum CPU time for a job for 357912 minutes

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#### Reasons to code TIME

While testing a new program which may go into a loop, unless it is “timed out” automatically (system code 522)

Special jobs which need to by-pass any Time limit barrier and which must not be “timed out” too.

TIME parameter puts an upper limit on the amount of CPU time that a job may use.

Example: TIME=(3,20). All the steps in the job are allowed collectively 3 minutes and 20 seconds of CPU time. If this amount is exceeded, the result will be a S322 ABEND failure.

If the TIME parameter is coded using only minutes, seconds defaults to zero. For example, TIME=5 is the same as TIME=(5,0).

If the TIME Parameter is coded using only seconds, minutes defaults to zero. For example, TIME=(,6) is the same as TIME=(0,6).

The TIME parameter is intended almost exclusively for a testing environment and should be coded to preempt the program going into CPU loop.

The TIME parameter can also be supplied by the CLASS parameter. When the TIME parameter is omitted and the CLASS parameter does not supply it, the job will not be timed for CPU time. However each step will be individually timed (TIME parameter at EXEC statement or its installation-defined default), unless it contains TIME=1440.

3.8: REGION Parameter

## Description

- REGION specifies the amount of storage (central / virtual) a job is allocated (Max. storage requirement).
- Maximum virtual memory available is 2GB.
  - Keyword parameter
  - Optional
  - Installation-defined

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This parameter specifies the limit of available storage for each of the steps in the job within the job's address space. i.e., the amount of storage the job is allocated. In other words, it specifies the amount of storage needed by the step (within the job) with the highest storage requirements.

3.8: REGION Parameter

## Format and Example

- Value - 1 to 2096128 if K is used.
- Value - 1 to 2047 if M is used (M is not available to MVS/SP)

REGION=value{K|M}

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### General Syntax

REGION=value{K|M}  
keyword parameter

value – 1 to 2096128 if K (1024 bytes) is used. It should be an even number. If an odd number is used it will be rounded off to the next higher even number.  
value – 1 to 2047 if M (1024K or 1048576 bytes) is used. M is not available to MVS/SP, only to MVS/XA and MVS/ESA.

When a job is selected by an initiator for execution, it is given an address space of 16 MB (minus what MVS/SP uses). In case of MVS/XA, job is given an address space of 2GB. And all of it is available to the job's steps. However a step normally requires only a small fraction of this huge storage, below the 16M line. An ordinary COBOL or any other language program seldom needs more than 1000K. This is normally what the value in the REGION parameter represents in the installations. Few jobs like CICS, IMS, DB2 need storage above the 16M line. An ordinary batch job seldom has such high requirements and, as a result confined to storage below the 16M line. Storage availability below this line varies in different installations, but is generally around 8MB in MVS/SP and around 9 MB in MVS/XA. Storage above the 16M line can be acquired by coding a value higher than 16M. However, it may be restricted by the installation to only those jobs that need it.

3.8: REGION Parameter

## Example 1

- All the steps in the job are limited to this value. If more storage is needed the result is a S878 or S808 or S804 ABEND failure. If one of these failures occurs the user must increase the value in the REGION parameter.
- When the amount of storage requested in the REGION parameter is higher than the address space can provide, an S822 ABEND failure will result.

REGION=500K

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Examples:

Example 1:

Assume REGION=1000K were coded in the JOB statement. All the steps in the job are limited to this value. If more storage is needed, the usual result is S878 or S80A or S804 ABEND failure. If one of these failures occurs, the user must increase the value in the REGION parameter.

Example 2:

REGION=10M

When the amount of storage requested in the REGION parameter is higher than the address space can provide, an S822 ABEND failure occurs.

3.8: REGION Parameter  
**Example2**

- REGION=0K (or 0M) is coded, the entire address space (except those areas used by MVS/SP or MVS/XA ) is available.
- Remark: If REGION parameter is omitted, an installation defined default will be used.



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3.9: ADDRSPC Parameter

## Description

- The ADDRSPC parameter specifies whether the job will use Real or Virtual storage
- Keyword parameter
- Optional
  - Format:  
`ADDRSPC={VIRT|REAL}`
- Note: ADDRSPC=REAL is a parameter disallowed in practically all installations because of performance problems.

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General Syntax:

`ADDRSPC={VIRT|REAL}`

ADDRSPC=REAL the allocation is done in REAL storage and the program is not pageable

ADDRSPC=VIRT the allocation is done in VIRTUAL storage and the program is pageable

Remark: This is the rarely used parameter because of the default. Note that ADDRSPC=REAL is a parameter that is disallowed in practically all installation because it can cause serious performance problems for other jobs.

3.10: NOTIFY Parameter

## Description

- Keyword parameter
- Format:  

NOTIFY=user-id
- Requests that the OS sends a message to TSO user-id about:
  - the Job's completion and
  - its completion status – whether normal or abnormal
  - Note: If the NOTIFY parameter is omitted no message will appear when the job terminates

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### General Syntax

NOTIFY=userid      keyword parameter

userid – A name from 1 to 7 characters, identifying a valid TSO user.  
Example: NOTIFY=DA0001T

If coded, a message will appear on the user's TSO terminal indicating if the job abended or got a JCL error. If the job terminates while the user was logged off, the message will appear when the user logs on. If the NOTIFY parameter is omitted, no message will appear when the job terminates.

3.10: NOTIFY Parameter

## The JOB Statement – NOTIFY

▪ The OS giving your job a number (JobID) when submitted.

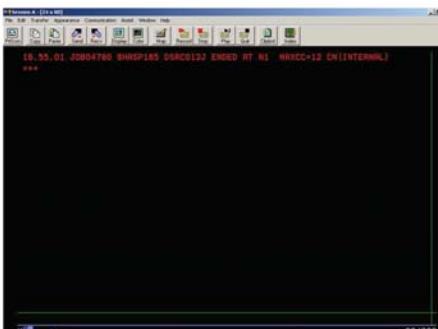
```
EDIT      OSRC012.CICSL.PGM(CICSCOB) - 01.00          Columns 00001 00072
***** **** Top of Data ****
000001 //OSRC0123 JOB NOTIFY=OSRC012,CLASS=R,PRTY=15
000002 //SYIN      EXEC PGM=IECHCP18, PGMN= CBL03, REGION=2048K
000003 //SYTPLIB   DD DSN=OSRC012.CICSL.PGM(D12MP01),DISP=SHR
000004 //SYSPRINT  DD DSN=CICST932.CICSL.SDFHLDG,DISP=SHR
000005 //SYTPLIB   DD DSN=CICST932.CICSL.SDFHLDG,DISP=SHR
000006 //SYSPRINT  DD SYSOUT=*
000007 //SYTPLIB   DD DSN=OSRC012.CBL03,DISP=SHR,SPACE=(400,100)
000008 //C         EXEC PGM=IOYCRCTL, PARM=INPUT, REGION=2048K
000010 //SYTPLIB   DD DSN=IGY.S1GYCOMP,DISP=SHR
000011 //SYTPLIB   DD DSN=CICST932.CICSL.SDFHLDG,DISP=SHR
000012 //SYTPLIB   DD DSN=CICST932.CICSL.SDFHLDG,DISP=SHR
000013 //*
000014 //          USERID.PROJECT.DIRECT
000015 //          DD DSN=OSRC012.19M.DIRECT,DISP=SHR
000016 //          USERID.PROJECT.COPYLIB
000017 //*
IK582501 JOB OSRC0123(JOB04781) SUBMITTED
***
```

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3.10: NOTIFY Parameter

## The JOB Statement – NOTIFY

▪ 'Notification' about completion and completion status.



A screenshot of a terminal window titled "Terminal A (256x80)". The window shows a command-line interface with the following text:  
18.55.01 J0804780 BHNSP185 05RC0122 ENDED RT N1 HXCC=12 CN(INTERNAL)  
\*\*\*  
The window has a standard Windows-style title bar and menu bar. The bottom right corner of the window frame shows "23/080".

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3.10: NOTIFY Parameter

## Demo

- Job Parameters



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3.11: RESTART Parameter

## Description

- Keyword Parameter
- Optional
  - Format:

```
RESTART={stepname|procexec.stepname|*}
```
  - The RESTART parameter requests that a job begin its execution with a step other than the first one
- Example
  - ```
RESTART=step3
```
  - ```
RESTART=(0,LE)
```

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General Syntax:

```
RESTART={stepname|procexec.stepname| *} keyword parameter
```

Stepname – The name of the step where execution is to begin.  
procexec.stepname – The name of the EXEC statement invoking a procedure and the name of the step within the procedure where execution is to begin.

- Indicates that execution of the job is to begin with the first step and is the default.

Things to avoid:

Duplicate names for EXEC statements invoking procedure  
If RESTART=procexec.stepname is used, the first procexec found is used.

Duplicate stepnames within procedure.

If RESTART=procexec.stepname is used, the first stepname within procexec found is used.

Duplicate stepnames.

If RESTART=stepname is used, the first stepname found is used.  
EXEC statements (invoking procedures or any step) without names.

No restart is possible.

3.12: TYPRUN Parameter

## Description

- Keyword Parameter
- Optional
  - Format

TYPRUN={HOLD|JCLHOLD|SCAN|COPY}

- The TYPRUN parameter requests special processing for the job.
- Example

TYPRUN=SCAN

- Checks the JCL for syntactical JCL errors.

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## General Syntax

TYPRUN={HOLD|JCLHOLD|SCAN|COPY} keyword parameter

HOLD - Job is held held (and not executed temporarily) until the operator uses a command to release. A job is held in the input queue only if syntactically correct.

JCLHOLD (JES2 only) – Job is held (and not executed) until the operator uses a command to release it. Note the job is held in queue even if it is syntactically incorrect. This option is rarely used.

SCAN – Job is scanned for all syntactical JCL errors but will not execute.

COPY (JES2 only)- Job will be printed. No execution and no syntax checking takes place. This option is also rarely used.

The following JOB statement illustrates the use of the parameters relevant to the JOB statement:

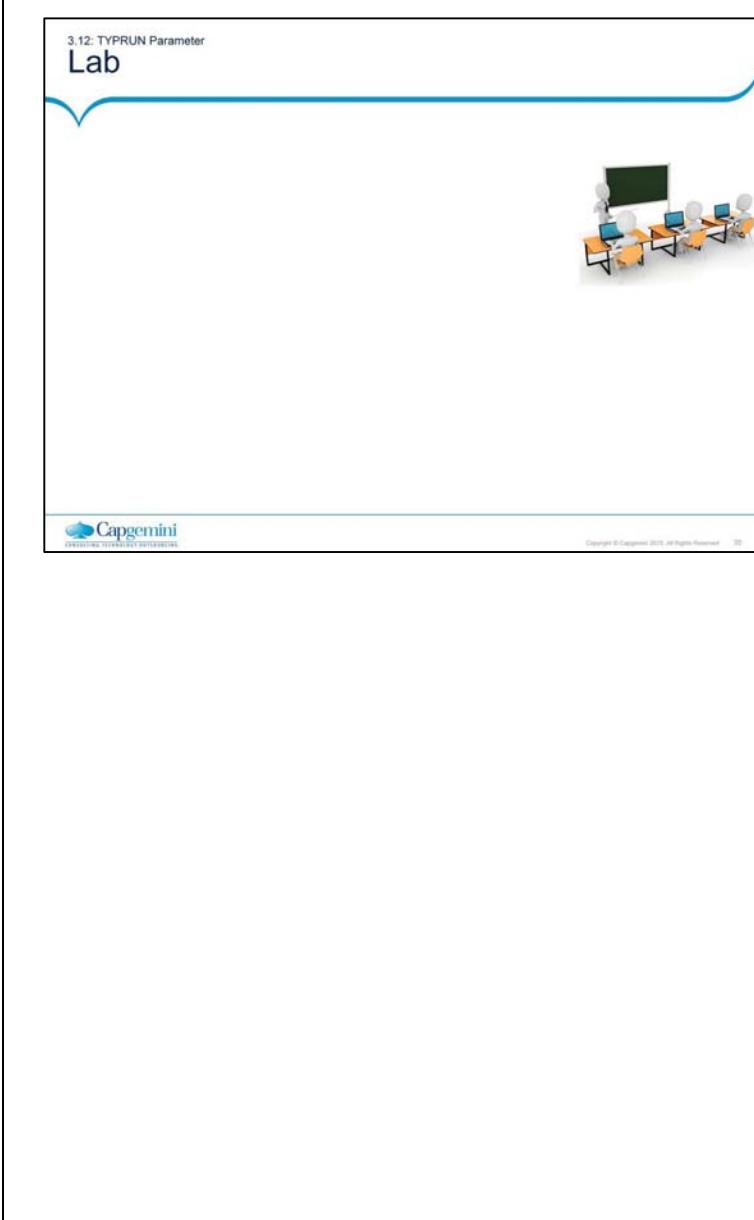
//DA0001T JOB LA719,PAI,MSGCLASS=A,MSGLEVEL=(1,1),PRTY=5,  
//CLASS=B,REGION=0M,TIME=(0,1),NOTIFY=DA0001T

## Job Control Language (JCL)

## Job Statement

Example: If the compile, link and run steps are given in one JCL and subsequently the execution has to begin from the run step we can give:

```
000100 //DA0001TC JOB LA2719,'SHEELA',NOTIFY=DA0001T,  
000110 // MSGCLASS=X,TIME=(0,1),RESTART=COBRUN  
000112 //*****  
000120 /* STEP TO COMPILE A PROGRAM  
000130 /* COMPILER PROGRAM NAME - IKFCBL00  
000140 /* LIBRARY NAME - SYS1.COBCOMP  
000150 /* SYSLIN - OUTPUT FILE NAME  
000160 /* SYSIN - INPUT FILE NAME (I.E. COBOL PROGRAM NAME)  
000170 /* SYSUT1,2,3, - TEMPORARY FILES REQUIRED BY COBOL  
COMPILER  
000180 //*****  
000200 //COB EXEC PGM=IKFCBL00,REGION=1024K,  
000210 // PARM='NOTRUNC,NODYNAM,LIB,SIZE=4096K,BUF=116K  
,APOST,NORES  
000400 //SYSLIB DD DSN=SYS1.COBCOMP,DISP=SHR  
000500 //SYSPRINT DD SYSOUT=*  
000600 //SYSLIN DD DSN=&TEMP,DISP=(NEW,PASS),  
000700 // UNIT=SYSALLDA,SPACE=(TRK,(40,40))  
000710 //SYSUT1 DD UNIT=SYSALLDA,SPACE=(TRK,(6,1))  
000800 //SYSUT2 DD UNIT=SYSALLDA,SPACE=(CYL,(6,1))  
000900 //SYSUT3 DD UNIT=SYSALLDA,SPACE=(CYL,(6,1))  
000910 //SYSUT4 DD UNIT=SYSALLDA,SPACE=(CYL,(6,1))  
001000 //SYSIN DD DSN=DA0001T.SHEELA.COBOL(PRG1),DISP=SHR  
001100 //*****  
001120 /* STEP TO LINK THE COBOL PROGRAM  
001130 /* LINKER PROGRAM NAME - IEWL  
001140 /* LIBRARY NAME - SYS1.COBLIB  
001150 /* SYSLMOD - OUTPUT DATASET NAME  
001160 //*****  
001200 //LKED EXEC PGM=IEWL,PARM='LIST,XREF,LET,MAP',  
001300 // REGION=4096K,COND=(0,LT,COB)  
001400 //SYSLIN DD DSN=&TEMP,DISP=(OLD,DELETE)  
001500 //SYSLIB DD DSN=SYS1.COBLIB,DISP=SHR  
001600 //SYSLMOD DD DSN=DA0001T.SHEELA.LOADLIB(PRG1),  
001610 // DISP=SHR,UNIT=SYSALLDA  
001800 //SYSUT1 DD UNIT=SYSALLDA,SPACE=(1024,(50,20))  
001900 //SYSPRINT DD SYSOUT=*  
002000 /*  
003000/*STEP TO RUN COMPILED COBOL PROGRAM  
000500 //COBRUN EXEC PGM=PRG1  
000600 //STEPLIB DD DSN=DA0001T.SHEELA.LOADLIB,DISP=SHR  
000700 //SYSPRINT DD SYSOUT=*  
000810 //INF1 DD DSN=DA0001T.EMPDATA,DISP=SHR  
000900 //OTF1 DD DSN=DA0001T.L3,DISP=(NEW,CATLG,DELETE),  
001000 // UNIT=SYSDA,SPACE=(TRK,(1,1)),  
001100 // DCB=(LRECL=80,RECFM=FB,BLKSIZE=800,DSORG=PS)  
001200 //SYSOUT DD SYSOUT=*
```



## Summary

- Accounting Information Parameter and programmer's name are positional parameters.
- MSGLEVEL parameter specifies whether the submitted JCL or JCL-related messages should be shown on the job's output.
- MSGCLASS parameter assigns a sysout class to the Job log.
- CLASS parameter assigns a class to a job.
- PRTY parameter determines the scheduling priority of a job in relation to other jobs in the job input queue of the same class.
- TIME parameter specifies the total amount of CPU time that all steps in a job can use collectively.

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## Summary

- REGION parameter specifies the limit of available storage for each of the steps.
- ADDRSPC parameter specifies if the job uses real or virtual storage.
- NOTIFY parameter informs a TSO user when his or his job terminates.
- RESTART parameter requests that a job begin its execution with a step other than the first one.
- TYPRUN requests special processing for the job.

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## **Job Control Language (JCL)**

Lesson 4: The EXEC  
Statement

## Lesson Objectives

- On completion of this lesson, you will be able to:
  - Explain use of the EXEC statement
  - Explain use of the PGM, REGION, TIME, ADDRSPC, ACCT COND parameters & IF/Else/EndIf



4.1: The EXEC Statement

## Introduction

- Function: An EXEC statement identifies the step during the reading process when a job is submitted to the system.
- It defines the STEP and STEP level information to the system.
- Code Snippet:

//[[stepname]] EXEC parameters

- Remark:
  - Stepname is optional. When the stepname is omitted, no reference can be made to that step. A job can contain a maximum of 255 EXEC statements.

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### Introduction to the EXEC Statement:

An EXEC statement identifies a step during the reading process when a job is submitted to the system. When an EXEC is found, the system accepts all the JCL statements that follow the step, until a delimiter is found. There are four possible delimiters for a step during the reading process:

Another EXEC statement in the input stream (it signals the end of [reading] one step and the beginning of [reading] of another)

A JOB statement

A null statement, that is, // (all JCL statements will be ignored except for a JOB statement)

End-of-file on the reading device; this means, there are no more statements to read.

General Syntax

//[[stepname]] EXEC parameters      keyword parameter

**Stepname:** This is optional. When the **stepname** is omitted, no reference can be made. A job can contain not more than 255 steps.

4.1: The EXEC Statement

## Step Name

- Must start from column 3 following two //
- Stepname is of 1 to 8 character alphanumeric or national character & UNIQUE
- Optional but mandatory in
  - Overriding
    - STEPNAME.DDNAME
  - Restart=STEPNAME
  - Referback
    - \*.STEPNAME.DDNAME

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4.2: The PGM Parameter

## Using The PGM Parameter

- Function: The PGM parameter specifies the name of the program to be executed in a step.
- Code Snippet:

```
PGM=program-name(load-module)
```
- Remark:
  - The program specified in PGM is always a member of a PDS which is called a load library or an executable program library.

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### Using The PGM Parameter:

The PGM parameter identifies the program to be executed in a step.

#### General Syntax

```
PGM=pgmname           positional parameter
```

**Pgmname:** Name of the program to be fetched from the load library and executed.

The program specified in **PGM** is always a member of library (PDS). This library is commonly known as an executable program library or a load library. The **EXEC** statement can identify only the member. It has no parameter available to identify the library. If necessary, this must be done by using a **JOBLIB** or a **STEPLIB DD** statement.

## 4.2: The PGM Parameter Using The PGM Parameter in EXEC - Example

- Code Snippet

```
//Stepname      EXEC PGM=xyz  
//Steplib       DD DSN=DA0001T.LIB.LOAD,DISP=SHR
```

Or

```
//DA0001TA    JOB .....  
//joblib       DD      DSN=DA0001T.LIB.LOAD,DISP=SHR
```



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### Using The PGM Parameter in EXEC – Example:

```
//DA0001TA  JOB LA2719,CG,MSGLEVEL=(1,1),NOTIFY=&SYSUID  
//JOBLIB     DD DSN=DA0001T.LIB.LOADLIB,DISP=SHR  
//S1         EXEC PGM=ASSIGN1
```

OR

```
//DA0001TA  JOB LA2719,CG,MSGLEVEL=(1,1),NOTIFY=&SYSUID  
//S1         EXEC PGM=ASSIGN1  
//STEPLIB   DD DSN=DA0001T.LIB.LOADLIB,DISP=SHR
```

## 4.3: Use of Other Parameters in EXEC

## Using Other Parameters

- If neither JOBLIB nor STEPLIB is coded, system searches certain predefined libraries (that is, system default libraries). If the specified member is found, it is executed. If not found, the result is S806 ABEND failure.
- The following keyword parameters can be specified at the EXEC statement. The parameters are REGION, ADDRSPC, TIME, COND, ACCT, and PARM.



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## 4.3: Use of Other Parameters in EXEC

## Using Other Parameters (Contd.)

- When REGION and ADDRSPC parameter are coded in both the JOB and EXEC statements within a job, the value of the JOB statement will be used.
- If TIME parameter is coded in both the JOB and EXEC statements within a job, both will be in effect. Either of them can cause a S322 ABEND failure.
- These parameters will be used for that step only.
- Example

```
//DA0001TA EXEC PGM = PAYPGM1, PARM = '0791'
```

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4.3: Use of Other Parameters in EXEC

## Demo

- EXEC Parameters



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**The REGION Parameter:**

This parameter specifies the available storage limit for the step within address space of the job.

- **General Syntax**

```
REGION=value{K|M} - keyword parameter
```

**Value :** 1 to 2096128 if K (1024 bytes) is used. It should be an even number; it will be rounded to the next higher even number.  
1 to 2047 if M (1024K or 1048576 bytes) is used. M is not available to **MVS/SP**, only to **MVS/XA** and **MVS/ESA**.

If the **REGION** parameter is omitted, the **REGION** parameter in the **EXEC** statements within the job is used. If the **REGION** parameter is coded in neither the **JOB** nor the **EXEC** statement, an installation-defined default is used. The default value of most installations is between 500K and 1000K.

If the **REGION** parameter is coded in both the **JOB** and an **EXEC** statement within the job, the value in the **JOB** statement is used.

The **REGION** parameter in the **JOB** statement is used much more often than the one in the **EXEC** statement. Coding the same value for all steps would have the same effect as the **REGION** parameter in the **JOB** statement.

- **Example :**

```
//DA0001TA JOB LA2719,CG,MSGLEVEL=(1,1),NOTIFY=&SYSUID  
//S1      EXEC PGM=ASSIGN1,REGION=500K  
//STEPLIB  DD DSN=DA0001T.LIB.LOADLIB,DISP=SHR
```

**The TIME Parameter:**

This parameter specifies the total amount of CPU time that the step is allowed to use.

- **General Syntax**

**TIME=([minutes][,seconds] | [1440])** keyword parameter

**Minutes:** a number from 1 to 1439

**Seconds:** a number from 1 to 59

**1440:** The step is not timed for CPU. Note that **TIME=1440** is rarely used, and most installation disallow its use in a testing environment. **TIME=1440** should be used by an on-line system such as **CICS** OR **ADS/O**.

- **Use:**

- When the **TIME** parameter is omitted, an installation-defined default is used. This default is usually very high and can not cause an **S322 ABEND** failure.
- If the **TIME** parameter is also coded in the **JOB** statement, both will have effect and either can cause a **S322 ABEND** failure. It is not advisable to use them both.

- **Remark:**

It is possible for a step to get more CPU time than that is specified in the **TIME** parameter or the default by a maximum 10.5 seconds. This is due to the fact that the system checks for violations every 10.5 seconds.

- **Example:**

```
//DA0001TA JOB LA2719,CG,MSGLEVEL=(1,1),NOTIFY=&SYSUID  
//S1      EXEC PGM=ASSIGN1,REGION=500K,TIME=(,3)  
//STEPLIB  DD DSN=DA0001T.LIB,LOADLIB,DISP=SHR
```

## 4.4: The ADDRSPC Parameter Using the ADDRSPC Parameter

- The characteristics significant for use are as below:

- ADDRSPC is a keyword parameter.
- It is optional.
- It is installation-dependent.

- Code Snippet:

```
ADDRSPC={VIRT|REAL}
```

- Remarks:

- This is the rarely used parameter because of the default. Note that ADDRSPC=REAL is a parameter that is disallowed in practically all installation because it can cause serious performance problems for other jobs.

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This parameter cannot override a specific ADDRSPC coded on the job statement, but may override the system default.

If ADDRSPC needs to be overridden for a given step of a called procedure this can be done by the inclusion of a procstepname parameter.

Syntax:

```
ADDRSPC [.procstepname] = {VIRT / REAL}
```

VIRT: Request virtual storage. The system can page the step

REAL: Request real storage. The system cannot page the job step and must place the job step in real storage

**4.5: The ACCT Parameter**

## Introduction

- The characteristics significant for use are as below:
  - Keyword parameter
  - Optional
  - Installation-dependent
- Code Snippet:
 

```
ACCT=(account-no,[additional account-info.])
```
- Remarks:
  - The ACCT parameter specifies accounting information to be used for the step as opposed to the Accounting information in the JOB statement.

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### The ACCT Parameter:

The parameter specifies accounting information to be used for the step as opposed to the accounting information in the JOB statement.

### General Syntax:

```
ACCT=(acctno [,additional-acct-info]) keyword parameter
```

Acctno: The account number to be used for the step

additional-acct-info: same as in the JOB statement but without any JES2 meaning

### Use:

The ACCT parameter is seldom used, and when it is, generally only the account number is displayed. This is used to charge resource utilization for a step to a different account number other than the one coded in the JOB statement. If an account number is also coded in the JOB statement, the account number in the EXEC statement is used.

### Using the ACCT Parameter (Contd.):

Example:

```
//DA0001TA JOB LA2719,CG,MSGLEVEL=(1,1),NOTIFY=&SYSUID
//S1      EXEC PGM=IEFBR14,ACCT='es0013,hr4200,iefbr14'
//DD1     DD
DSN=DA0001T.SHEELA.EMPFFILE,disp=(MOD,DELETE),
//                                SPACE=(TRK,0),UNIT=SYSDA
```

4.6: The PARM Parameter

## Using the PARAM Parameter

- The characteristics significant for use are as below:
  - Keyword parameter
  - Optional
  - Installation-dependent
- Code Snippet:

```
PARM=string (a max. of 100 characters)
```
- Remarks: The PARM parameter provides a way to supply data of limited size to the executing program.
- Note : If commas are parts of the string, the entire field must be enclosed in parenthesis or apostrophe's.

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### Using the PARM Parameter:

This parameter provides a way to supply data of limited size to the executing program

### General Syntax

```
PARM=string keyword parameter
```

String: A string of characters up to 100. If commas are a part of the string, the entire field must be enclosed in parentheses (or apostrophes). If any portion of the string contains special characters (other than hyphen), that portion of the entire string must be enclosed in apostrophes.

Note: Any parentheses that are used are counted as characters, whereas apostrophes do not. All information after the "=" in the PARM parameter, excluding apostrophes, is saved by the system within the step's own space. When the program begins execution by using the appropriate instructions, it can find the saved information in the storage space.

## 4.6: The PARM Parameter Using the PARAM Parameter - Examples

- In COBOL the following must be coded:

1. PARM=(A,B,C,D) or 'A,B,C,D'
2. PARM=1005

```
LINKAGE SECTION.  
01 PARM.  
    05 plength    PIC S9(4) COMP.  
    05 string      PIC X(100).  
PROCEDURE DIVISION USING PARM.
```

- plength contains the length of the data passed to the program and data is placed in the variable string.

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Using the PARM Parameter – Examples:

```
//DA0001TA JOB LA2719,CG,MSGLEVEL=(1,1),NOTIFY=&SYSUID
//S1      EXEC PGM=ASSIGN2,PARM='G2 ',TIME=(,1)
//STEPLIB  DD   DSN=DA0001T.LIB,LOADLIB,DISP=SHR
//INFILE   DD   DSN=DA0001T.EMPFFILE,DISP=SHR
```

-Access the data in a Cobol program:

Identification Division.  
 Data Division.  
 Linkage Section.  
**01** Parm-data-Area.  
 05 Parm-len pic s9(4) comp.  
 05 Parm-data1.  
**10** Data1-in X(100).  
**Procedure Division using Parm-Data-Area.**  
**Display Data1-in.**

Parm-len contains the length of the data passed to the program and data is placed in the variable string.

Using the PARM Parameter – Examples:

Rules for continuation

```
//DA0001TA JOB LA2719,CG,MSGLEVEL=(1,1),NOTIFY=&SYSUID
//COB      EXEC PGM=IKFCBL00,REGION=1024K,
//           PARM=('notrunc,nodynam,lib,size=4096k,buf=116k',
//           'apost,nores,seq')
```

.....

OR

```
//DA0001TA JOB LA2719,CG,MSGLEVEL=(1,1),NOTIFY=&SYSUID
//COB      EXEC PGM=IKFCBL00,REGION=1024K,
//           PARM=(notrunc,nodynam,lib,'size=4096k','buf=116k',
//           'apost,nores,seq')
```

Note that an expression in quotes cannot be continued, we need to enclose the string in parentheses and field containing special characters in apostrophes.

Ex.1 PARM='29/06/00' or ('29/06/00')  
 Ex.2 PARM=(A,B,C,D) or 'A,B,C,D'

PARM parameter (Contd ...)

Pass data via PARM in the JCL:

**//Step010 EXEC PGM=Load Module, PARM='Hello World'**

Coding Rules:

Use apostrophes around the passed data if the data consists of a space

**PARM='001 JOHN'**

If passed data comprises an apostrophe or an ampersand, code two such characters consecutively.

**PARM=""Hello World""**  
**PARM="ABC&&4"**

To continue coding data on the next line, code a comma and continue. Also coding apostrophes around continued data is a must. Comma gets included in the byte count.

**PARM='001,  
 JOHN'**

To code till column 71 and then continue, leave column 72 blank and continue on the next line from column 16

4.7: The COND Parameter

## Introduction

- The characteristics significant for use are as below:
  - The COND parameter causes conditional execution of steps within a job.
  - It can be coded in the JOB or EXEC statement or both.
  - Return code (or Condition code) is a number between 0 and 4095, issued by an executing program just before the execution is finished.

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### Introduction:

Characteristics of the COND parameter are as follows:

The COND parameter can be coded in the JOB as well as the EXEC statement. It is mostly used in the EXEC statement. The main tool for controlling the execution of steps within a job is the COND parameter.

A Return (or Condition) code:

A return code is a number between 0 and 4095, issued by an executing program just before its execution is finished.

It is intended to identify an important event found (or not found) during the execution. For example, a program may issue a return code of 21 to indicate that a problematic event (such as a record is out of sequence) was detected during the execution. Alternatively, a program may issue a return code of 0 to indicate that the execution was trouble-free.

The return code issued by a program is saved by the system for the duration of the job. Any subsequent step of the same job can interrogate this return code by using the COND parameter either in the JOB or EXEC statement. The result of this interrogation is to permit or bypass the execution of the step.

Note: The return code is never available to a job other than the one which issued it. In other words, the step that interrogates the return code must be in the job same as the step that issued it, and it should be subsequent to the step that issued the return code.

4.7: The COND Parameter

## The JOB Statement – COND

The COND parameter states that if a condition is true then the step in which this COND parameter is coded is to be bypassed. If the condition is false than the step is to be executed.

```
graph TD; Start(( )) --> Cond{IF COND?}; Cond -- TRUE --> ByPass[By-pass Step]; Cond -- FALSE --> Executes[Executes Step];
```

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The JOB statement COND parameter performs the same return code tests for every step in a job. If the JOB statement's return code test is satisfied, the job terminates.

The JOB COND parameter performs its return code tests for every step in the job, even when EXEC statements also contain COND parameters.

If any step satisfies the return code test in the JOB statement, the job terminates.

The job terminates regardless of whether or not any EXEC statements contain COND parameters and whether or not an EXEC return code test would be satisfied.

If the JOB statements return code test is not satisfied, the system then checks the COND parameter on the EXEC statement for the next step. If the EXEC statement return code test is satisfied, the system bypasses that step and begins processing of the following step, including return code testing.

## 4.7: The COND Parameter Using COND in the JOB Statement

### ▪ Code Snippet:

```
COND=((code, operator)[,...])  
code = number between 0 to 4095  
operator = LT, GT, LE, GE, NE, EQ
```

### ▪ Rules:

- Condition is read from left to right.
- Maximum of 8 tests.
- If COND evaluates to TRUE the step is BYPASSED.
- If COND evaluates to FALSE the step is EXECUTED.



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### Using COND in the JOB Statement:

IBM-established conventions are as follows:

Return code of 0 indicates a complete success.

Return code of 4 indicates a warning. The warning is benign, so a return code will normally be treated as acceptable.

Return code of 8 indicates questionable results.

Return code of 12 indicates bad results.

Return code of 16 indicates a terminal condition.

### Example

There can be a maximum of eight tests in the COND parameter. Condition is evaluated from left to right and if a test is satisfied, the job stops execution at that point.

```
//Step010 Exec Pgm=CBL1  
//Step020 Exec Pgm=CBL2,Cond=(0,LT,Step010)  
Pgm CBL2 is not executed if pgm CBL1 returns any CC > 0000  
//Step030 Exec Pgm=CBL3,Cond=(0,Eq,Step010)  
Pgm CBL3 is not executed if pgm CBL1 returns CC 0000
```

4.7: The COND Parameter

## Using COND in the JOB Statement - Example

- Consider a job with five steps. Assume that none will ABEND.

```
//DA0001TA JOB LA2719,CG,COND=((12,LT),(8,EQ))
```

- STEP1 issues a return code of 0
- STEP2, if executed, issues a return code of 4
- STEP3, if executed, issues a return code of 16
- STEP4, if executed, issues a return code of 0
- STEP5, if executed, issues a return code of 4

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### Using COND in the JOB Statement:

STEP 1 is executed by default, since no previous return codes exist, the COND parameter in the JOB statement is ignored for the first step.

Before STEP2 begins execution, the system interrogates the existing return code (0), using the tests in the COND parameter and reading the test from left to right,  
Is 12 less than 0? The answer is "no". The first test of the COND parameter is not satisfied. The second test is tested.

Is 8 equal to 0? . The answer is "no". Neither of the two tests is satisfied, and therefore, STEP2 is executed.

Before STEP3 begins execution, the system interrogates the existing return codes (0 and 4), using the tests in the same COND parameter. Since the result for return code 0 is already known, only 4 is tested:

Is 12 less than 4? The answer is "no". The first test of the COND parameter is not satisfied. The second test is tested.

Is 8 equal to 4 . The answer is "no". Neither of the two tests is satisfied, and therefore, STEP3 is executed.

Before STEP4 begins execution, the system interrogates the existing return codes (0 , 4 and 16), using the tests in the same COND parameter. Since the results for return code 0 and 4 are already known, only 16 is be tested:

Is 12 less than 16? The answer is "yes". The first test of the COND parameter was satisfied. There is no need for the second test. Executions of the job stops. STEP 4 and the remaining steps do not get executed.

A message is displayed as the output: IEF2011 DA0001TA STEP4-JOB TERMINATED BECAUSE OF CONDITION CODES.

4.7: The COND Parameter

## Using COND in the EXEC Statement

- Code Snippet:

```
COND=((code,operator[,stepname])|,...)|[,EVEN/ONLY])
```

- EVEN requests that execution be permitted even though any previous step has ABENDED (If no step has ABENDED then the EVEN condition is ignored)
- ONLY requests that execution be permitted only if previous step has ABENDED (If no step ABENDs the COND parameter is ignored)

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### Using COND in the EXEC Statement:

The COND parameter can perform a test (or multiple tests) before a step begins execution against the return (condition) codes issued by previous steps. If a test is satisfied (reading from left to right), the step is not executed.

#### General Syntax

COND=((code,operator[,stepname])|,(code,operator[,stepname])|...  
[,.EVEN|ONLY]) keyword  
parameter

Code : This is a number between 0 and 4095.

Operator: This provides a comparison between a return code and the code. There are six operators: LT, LE, NE, EQ, GT, GE

Stepname: This identifies the name of the preceding step whose return code is interrogated. It can also appear as two names proexec.stepname where proexec identifies the name of the EXEC statement invoking a procedure and "stepname" the stepname within the procedure.

EVEN : This requests that execution be permitted even though a previous (any previous) step has ABENDED.

ONLY : This requests that execution be permitted only if a previous (any previous) step has ABENDED.

4.7: The COND Parameter

## Using COND in the EXEC Statement (contd.)

- If the COND parameter is coded in both the JOB and EXEC statements, the COND parameter of the JOB statement is tested first and then the COND of the EXEC statement is tested.



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### Using COND in the EXEC Statement (Contd.):

There can be a maximum of eight tests in the COND parameter. EVEN or ONLY count toward eight. Condition is evaluated from left to right and if a test is satisfied, only that step is not executed.

#### Remark:

EVEN and ONLY cannot make reference to a particular step. They refer to any previous step that has ABENDED.

EVEN and ONLY are mutually exclusive.

EVEN and ONLY have no positional significance. Each can be coded anywhere in the COND parameter in relation to other tests.

Following an ABEND failure, a step cannot be executed unless it contains EVEN or ONLY in the COND parameter of its EXEC statement.

The first step is always executed unless COND=ONLY appears in the EXEC statement.

COND=ONLY causes the first step to be bypassed, since no previous ABEND failures has occurred. Any other COND parameter in the first EXEC statement is ignored (that is, COND=(4,LT) or COND=EVEN) or results in JCL error.

(that is, COND=(5,LT,stepname)) The reason is, there are no previous step. A step that is not executed issues no return code because a program responsible for issuing the return code was not even loaded into the storage. As a result, no return code exists. An attempt to interrogate the return code of such a step in the COND parameter of a subsequent step is ignored.

4.7: The COND Parameter

## Using the COND Parameter

The following table will help you in solving queries related with the COND parameter.

COND	JOB	EXEC
TRUE	TERMINATE	BYPASSED
FALSE	CONTINUES	EXECUTED

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### Using The COND Parameter:

A step that ABENDs (carries out ABENDING) issues 'no return code' because a program always issues a return code (conditionally or by default) if it reaches the end of its execution and intentionally returns control to the system. When an ABEND occurs, the program loses control instantly, and is evicted from execution by the system. This results in a specific effect: when a step that ABENDs 'no return code' exists (a completion code exists), an attempt to interrogate the return code of such a step in the COND parameter of a step is ignored until it contains EVEN or ONLY.

### Using COND, JOB, EXEC, and PGM:

If the COND parameter is coded neither at the JOB nor at the EXEC statement:

The step is executed regardless of previous return codes.

However, this does not happen if the previous step has ABENDED.

If the COND parameter is coded in both the JOB statement as well as in the EXEC statement within the JOB:

Both are tested.

The COND parameter of the JOB statement is tested first.

If none of its tests are satisfied, then the COND parameter of the EXEC statement is tested.

If a test is satisfied, none of the steps from that point onwards are executed.

4.7: The COND Parameter  
**IF/THEN/ELSE/ENDIF**

- IF/THEN/ELSE/ENDIF statement construct determines for conditionally executing one or more steps.
- Nesting is possible up to 15 levels.
- If the coded condition is true, the following steps till else will be executed and if the condition is false then the steps coded on the else part will be executed.



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Do not specify JOBLIB, JCLLIB,, JOBCAT, STEPCAT, JOB within the THEN or ELSE scope of IF statement.

Relational expression field consists of:

Comparison operators - GT, LT, NG, NL, EQ, NE, GE, LE

> < ><sup>2</sup> <<sup>2</sup> = <sup>2</sup> <sup>2</sup> >= <=

Connect operators – AND(&), OR(|),NOT (<sup>2</sup>) operators

Keywords:

RC Indicates Return code

ABEND Indicates occurrence of Abend

<sup>2</sup> ABEND Indicates non occurrence of Abend

ABENDCC Indicates a specific system or user abend code

RUN Indicates execution of the specified Step

<sup>2</sup>RUN Indicates non execution of the specified step

Example 1:

This example tests the return code for a step.

```
//RCTEST    IF (STEP1.RC GT 20|STEP2.RC = 60)  THEN
//STEP3    EXEC PGM=U
//ENDTEST  ENDIF
//NEXTSTEP EXEC
```

The system executes STEP3 if:

The return code from STEP1 is greater than 20, or the return code from STEP2 equals 60.  
If the evaluation of the relational expression is false, the system bypasses STEP3 and continues processing with step NEXTSTEP.

Example 2:

```
//
// DSRP039A JOB (),NOTIFY=&SYSUID
//STEP01 EXEC PGM=IEBGENER
//XYZ IF (STEP01.RC=0) THEN
//STEP02 EXEC PGM=IEBCOPY
//XYZ ELSE
//STEP03 EXEC PGM=IEFBR14
//XYZ ENDIF
//
```

4.7: The COND Parameter  
**IF/THEN/ELSE/ENDIF (contd..)**

- Syntax

```
//Name IF (Relational expression) THEN
// Steps to processed when relational expression is true
//Name ELSE
// Step to processed when relational expression is false
//Name ENDIF
```

- Name field is optional.
- Operation fields are IF,THEN, ELSE and ENDIF.
  - ELSE is an optional clause.
  - ENDIF marks the end of the statement



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4.8: Using the COND, JOB, EXEC, and PGM Parameters  
**Example1**

```
//DA0001TA      JOB .....  
//S1   EXEC  PGM=P1                                (4)  
//S2   EXEC  PGM=P2,  
//           COND=(0,LT,S1),EVEN                  (12)  
//S3   EXEC  PGM=P3,COND=(8,LT,S2)                (0)  
//S4   EXEC  PGM=P4,COND=(4,LT)                   (8)  
//S5   EXEC  PGM=P5,  
//           COND=((4,LT,S1),(0,LT,S3))          ABEND  
//S6   EXEC  PGM=P6,  
//           COND=((EVEN,(0,LE,S5))               (16)  
//S7   EXEC  PGM=P7,  
//           COND=((0,LT,S1),(12,LT,S3))          (0)  
//S8   EXEC  PGM=P8,  
//           COND=(16,EQ,S6),ONLY                 (0)  
//S9   EXEC  PGM=P9, COND=EVEN                  (4)  
//S10  EXEC  PGM=P10, COND=ONLY                 (0)
```



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4.8: Using the COND, JOB, EXEC, and PGM Parameters

## Example2

```
//DA0001TA      JOB     LA2719,CG,COND=(10,LT)
//STEP1  EXEC   PGM=AAA           (6)
//STEP2  EXEC   PGM=BBB,
               COND=((2,EQ),(4,EQ))           (2)
//STEP3  EXEC   PGM=CCC, COND=ONLY      (4)
//STEP4  EXEC   PGM=DDD,
               COND=(5,GT,STEP1),(2,EQ))      (6)
//STEP5  EXEC   PGM=EEE           (9)
//STEP6  EXEC   PGM=FFF,
               COND=((8,GT,STEP5),EVEN)      (10)
//STEP7  EXEC   PGM=GGG,
               COND=(4,GT,STEP4)           (12)
//STEP8  EXEC   PGM=HHH
//STEP9  EXEC   PGM=III, COND=ONLY      --
```

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## Summary

- The PGM parameter identifies the program to be executed in a step.
- The REGION parameter specifies the limit of available storage for the step.
- The TIME parameter specifies the total amount of CPU time that the step is allowed to use.
- The ADDRSPC parameter specifies if the step will use real or virtual storage.
- The ACCT parameter specifies accounting information to be used for the step.
- The PARM parameter provides a way to supply data of limited size to the executing program.
- Controlling the execution of steps within a job is done by specifying the COND parameter.



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## **Job Control Language (JCL)**

Lesson 5: The DD statement

## Lesson Objectives

- On completion of this lesson, you will be able to:
  - Use DD statement
  - Use DSN, DISP, UNIT, VOL, SPACE, LABEL, DCB, SYSOUT, SYSIN,SYSPRINT, DUMMY parameter
  - Use JOBLIB and STEPLIB statement
  - Use of JobCat and StepCat
  - Request storage dump



5.1: Function of The DD Statement

## Introduction

- Data Definition (DD) statement describes the datasets that must be allocated.
- At least one DD statement for each dataset is necessary in the program to read from/write to dataset.
- DD statements are coded after the EXEC statement that identifies the job step.

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### Introduction:

A DD (Data Definition) statement must appear in a step when the executing program expects to read from or write to a dataset. In other words, DD statement describes the dataset.

The maximum number of DD statements in a step is 3273. The DD statement can be coded in any order and always appears after the EXEC statement with the exception of JOBLIB, JOBCAT, and PROCLIB DD statement.

5.1: Function of The DD Statement

## DD Statement - DASD Dataset Format

```
//ddname DD DSNAME=data-set-name,  
//           DISP=(status, normal-disp, abnormal-disp),  
//           UNIT=unit,  
//           VOL=SER=Vol-Ser,  
//           SPACE=(unit,(primary,secondary),dir),  
//           DCB=(option, option,...)
```

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As job executes the system performs device and space allocation for each ddname specified.

Each ddname must be unique & 1 to 8 characters long comprising of alphanumeric or national character & first character must be alphabetic or national character. If there are duplicate ddnames, even though the system will make the allocation specified, it will direct all related messages to the first ddname.

Avoid using ddnames that begin with 'SYS', 'JOB', 'STEP' are considered as reserve words for IBM products. JOBLIB, JOBCAT, SYSOUT, SYSIN, STEPLIB, STEPCAT, SYSUDUMP, STEPLIB, SYSABEND, SYSDBOUT

As job executes the system performs device and space allocation for each ddname specified.

Each ddname must be unique & 1 to 8 characters long comprising of alphanumeric or national character & first character must be alphabetic or national character. If there are duplicate ddnames, even though the system will make the allocation specified, it will direct all related messages to the first ddname.

Avoid using ddnames that begin with 'SYS', 'JOB', 'STEP' are considered as reserve words for IBM products. JOBLIB, JOBCAT, SYSOUT, SYSIN, STEPLIB, STEPCAT, SYSUDUMP, STEPLIB, SYSABEND, SYSDBOUT

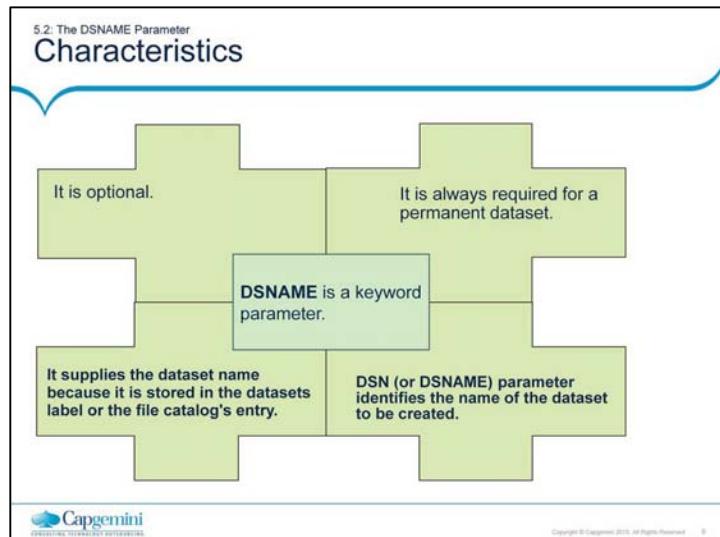
5.1: Function of The DD Statement

## DD Statement

- Classified into Permanent and Temporary datasets
  - Permanent datasets are used as a data-store on disks and tapes.
  - Temporary datasets are used as work areas within a job; they last only for the duration of the job.
- A Temporary dataset name starts with && followed by 1 to 6 characters - DSN=&&TEMPRY
  - Absence of DSN coding also denotes a temporary dataset.
- A DSN coding without && indicates a Permanent dataset.
- If the dataset (DSN) is not found in the system catalog, the system throws a "JCL error".
- Dataset names (DSN) cannot be duplicated in the VTOC. If duplicated, the system returns a "CC of 8".

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#### Characteristics:

The DSN (or DSNAME) parameter identifies the name of the dataset to be created or retrieved.

#### General Syntax

DSN=name| NULLFILE | referback

- keyword parameter

Name: This could be a qualified name. This name consists of two or more simple name separated by periods for a maximum of 44 characters.

For example (i) `DSN=DA0001T.CG.EMPFILE`

For example (ii) `DSN=DA0001T.CG.COBOL(ASS1)`

This describes a sequential dataset, that means, ASS1 is a member of PDS/library DA0001T.CG.COBOL

For example (iii) `DSN=&&name`

A simple name preceded by two ampersands identifies a temporary dataset. It is considered temporary because it is not retained beyond job termination.

5.2: The DSNAMES Parameter  
**Format and Example**

- Format:

```
DSN=name
```

- Example:

```
DSN=DA0001T.CG.PAYROLL.MASTER
```

- To refer to a member of a PDS:

```
//TRANFILE DD DSN=DA0001T.CG.TRANFILE(mem1)
```

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## 5.2: The DSNAMES Parameter Format and Example (Contd.)

- Format

```
DSN=&&name
```

- Identifies a temporary dataset.
- Temporary means that it cannot be retained beyond job termination.

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### Format and Example (Contd.):

The system generates a name with the following format:

SYSyyddd.Thmmss.RV001.jobname.name

yyddd – date as per Julian calendar;  
hhmmss – uses 24-hour clock. It is the time of JOB initiation (beginning of JOB execution)

RV001 –system provided information in reference to the reader;  
jobname – as it appears in the JOB statement;  
name – whatever is coded after &&.

For e.g. DSN=&&temp. The system generates the following name:

```
SYS03173.T090000.RV001.DA0001TA TEMP
```

## 5.2: The DSNAMES Parameter

**Example**

- This also creates a temporary dataset.

```
//DD1 DD DSN=&&TEMP,UNIT=SYSDA,  
// SPACE=(TRK,(2,1),RLSE),  
// DISP=(,PASS,DELETE)
```

```
//SORTWK1 DD UNIT=SYSDA,SPACE=(TRK,(2,1),RLSE),  
// DISP=(,PASS,DELETE)
```

Copyright © Capgemini 2014. All Rights Reserved.**Example:**

If the DSN name is omitted from a DD statement (except DD \*, SYSOUT and DUMMY), it also indicates a temporary dataset. However, the system generates a name with the following format:

```
SYSyyddd.Thhhmmss.RV001.jobname.R0000001
```

```
//SORTWK1 DD UNIT=SYSDA,SPACE=(TRK,(1,2),RLSE)  
SYS00173.T100000.RV001.DA0001TA.R0000001
```

This form is basically used when a step requires a work dataset (a dataset created at the beginning of the step's execution and deleted at the end). Mostly used in utilities.

5.2: The DSNAMES Parameter

## Formats

- Referback formats
  - \*.STEPNAME.DDNAME : This requests that the dataset name is to be copied from DD statement 'ddname' found in a previous step 'stepname'.  
DSN=\*.STEP2.OUT
  - \*.DDNAME : This requests that the dataset name is to be copied from a previous DD statement 'ddname' found in the same step. This is seldom used.  
DSN=\*.DD1

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REFERBACK: Backward reference (Referback) is used to copy information from a previous DD statement (within the same job) thus simplifying JCL code.

PGM can be Referback. On the DD statement, this can be applied to three parameters:

DSN  
VOL  
DCB

Referback on a DD statement

```
//IGTRN01A JOB NOTIFY=DSRC012
//STEP010 EXEC PGM=PGM1
//DD1 DD DSN=EMP.PDS,DISP=(NEW,CATLG),
// DCB=(LRECL=80,RECFM=FB,BLKSIZE=800),
// .....
//DD2 DD DSN=INP.PDS,DCB=*.DD1, .....
//STEP2 EXEC PGM=PGM2
//DD2 DD DSN=STU.PDS, DCB=*.STEP010.DD1, .....
```

5.2: The DSNAMES Parameter  
**Formats (contd..)**



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Referback on a PGM statement

```
//LKED EXEC PGM=HEWL,REGION=1024K,PARM='XREF,LIST'  
//SYSLIB DD DSNAME=CEE.SCEELKED,DISP=SHR  
//SYSPRINT DD SYSOUT=A  
//SYSLIN DD DSNAME=DSRC746.SATYA.OBJ(ADD1),DISP=  
//SYSLMOD DD DSNAME=DSRC746.SATYA.LOAD(ADD1),DISP  
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(10,10))  
/*  
//GO EXEC PGM=*.LKED.SYSLMOD  
//SYSPRINT DD SYSOUT=A  
//SYSOUT DD SYSOUT=A  
//SYSIN DD *  
10  
/*
```

5.2: The DSNAMES Parameter

## Formats (contd.)

- \*.PROCEXEC.STEPNAME.DDNAME : Requests that the dataset name be copied from DD statement 'ddname' found in a previous step 'stepname' found within procedure 'procexec'.

DSN=\*.PS4.STEP2.OUT

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5.3: The DISP Parameter

## Characteristics of the DISP Parameter

- DISP is a keyword parameter.
- Its use is optional.
- Format :  
DISP=(status-fld,normal-disp-fld,abnormal-disp-fld)

DISP=(	NEW	,DELETE	,DELETE
	OLD	,KEEP	,KEEP
	SHR	,CATLG	,CATLG )
	MOD	,UNCATLG	,UNCATLG
		,PASS	

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### Characteristics of the DISP Parameter:

The DISP parameter specifies the following:

It specifies if the dataset is to be created or retrieved.

It indicates how to dispose off the dataset when the step terminates (normally or abnormally).

5.3: The DISP Parameter

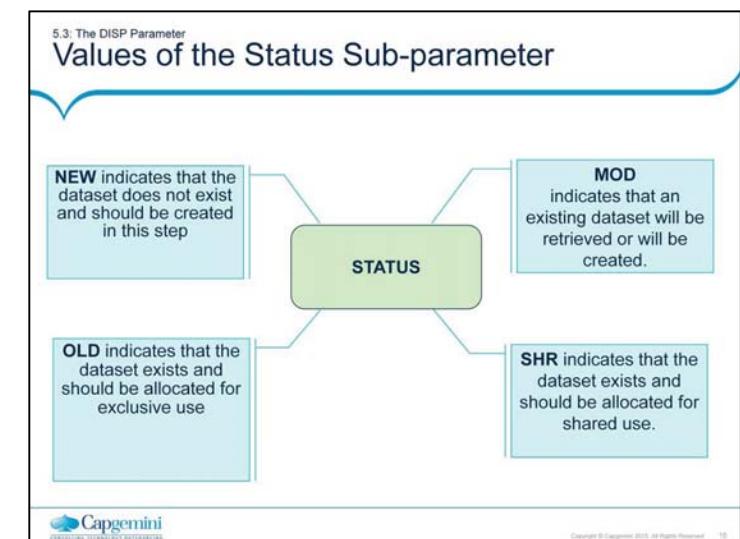
## Characteristics of the DISP Parameter

- The DISP parameter has three positional sub-parameters:

The diagram illustrates the DISP parameter as a central hexagon divided into three sections by diagonal lines. The top-left section is labeled 'Status' and contains the text: 'Status specifies whether the file is to be created or retrieved in this step.' The top-right section is labeled 'Normal disposition' and contains the text: 'Normal disposition specifies what is to be done with the dataset, when the step terminates normally (without an ABEND).' The bottom section is labeled 'Abnormal disposition' and contains the text: 'Abnormal disposition specifies what is to be done with dataset, when the step terminates abnormally (it is required if this disposition is different from the normal disposition).'

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The status-field: This field tells the system whether the dataset is to be created or retrieved.

NEW – Indicates that the dataset will be created in this step

OLD - Indicates that an existing dataset will be retrieved and demands exclusive control

SHR - Indicates that an existing dataset will be retrieved. It also indicates that this dataset, if on disk, can be shared with one or more other users

(Mnemonic hint: NOMS; N:New, O: OLD, M: MOD, S: SHR)

5.3: The DISP Parameter

## The MOD Subparameter

- MOD - This subparameter has two possible meanings:
  - It indicates that an existing dataset will be retrieved. This will be true if:
    - The dataset is either cataloged or passed OR
    - The DD statement contains either VOL=SER or VOL=REF
  - It indicates that the dataset will be created. This will be true if:
    - The DD statement contains neither VOL=SER nor VOL=REF and it describes a dataset which is neither cataloged nor passed.
    - The DD statement contains VOL=REF referring to a dataset, which is a non-specific request for a new dataset.

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The MOD Subparameter:

MOD - This sub parameter has two possible meanings:

Indicates that an existing dataset will be retrieved. This will be true if:

The dataset is either cataloged or passed.

The DD statement contains either VOL=SER or VOL=REF (a VOL VOL=REF referring to a DD statement, which is a nonspecific request for a new dataset, is not included).

Indicates that the dataset will be created. This is true if:

The DD statement contains neither VOL=SER nor VOL=REF and it describes a dataset which is neither cataloged nor passed.

The DD statement contains VOL=REF referring to a DD statement, which is nonspecific, a request for a new dataset.

**Example 1:**

```
//DD1 DD DSN=DA0001T.EMPFILE,DISP=(MOD,CATLG),  
//          UNIT=TAPE
```

## Explanation:

- The system assumes DA0001T.EMPFILE to be an existing dataset. Since the DD statement contains neither VOL=SER or VOL=REF, the system searches the catalog and gets volume information from the catalog entry. The volume having been found, the dataset will be treated as existing dataset.
- Had the dataset been neither cataloged nor passed, the system would have been unable to find the volume information and MOD will default to new.

**Example 2:**

```
//DD1 DD DSN=DA0001T.EMPFILE,DISP=(MOD,CATLG),  
//          UNIT=SYSDA,VOL=SER=BS3003,SPACE=(TRK,(1,2))
```

Explanation: Since VOL=SER is specified; the fate of MOD is sealed, whether or not it exists. It will be treated as OLD (with appropriate positioning). If the dataset exists on that volume no problem, however, if it does not exist the result will be S213-04 ABEND failure (i.e. dataset does not exist)

**Note:** When UNIT and VOL=SER is specified the system does not search the catalog to locate the dataset.

5.3: The DISP Parameter

## Normal and Abnormal DISP-Parameters

- These are the values of Normal and Abnormal DISP-parameters:
  - **DELETE:** The dataset is deleted and uncataloged when the step terminates normally (or abnormally).
  - **KEEP:** The dataset is to be retained when the step terminates normally (or abnormally).
  - **CATLG:** The dataset is retained and an entry is made in the catalog when the step terminates normally (or abnormally).
  - **UNCATLG:** The dataset is retained but entry is removed from the catalog when the step terminates normally.

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The normal disposition field: This field is used to tell the system how to dispose of the dataset when the step terminates normally (without an ABEND).

#### Normal and Abnormal DISP-Parameters:

Values of Normal and Abnormal DISP-parameters are as follows: (Mnemonic Hint: DUCK)

**DELETE:** This indicates that the dataset is to be deleted when the step terminates. For an existing dataset, OLD, SHR or MOD (not defaulting to NEW), the dataset is also uncataloged, if the catalog is used while retrieving the dataset. It only deletes the dataset if the catalog is not used during the retrieval. This means that for a catalogued dataset, if you specify UNIT and VOL=SER, the system does not search the catalog.

#### Note:

- (i) When a tape dataset is deleted, nothing happens. A tape dataset cannot be deleted through the DISP parameter. It is effectively deleted when the dataset is written over.
- (ii) A VSAM cluster cannot be deleted by coding DISP=(OLD, DELETE) as it defaults to DISP=(OLD,KEEP).
- (iii) A member of PDS cannot be deleted because DISP applies to the entire PDS, and as a result, it deletes the entire PDS. Use either TSO or IEHPROGM utility.

The system always issues a message indicating "DELETED" or "NOT DELETED N", where N indicates the reason for failing.

5.3. The DISP Parameter

## Normal and Abnormal DISP-Parameters (Contd.)

- PASS - Normal disposition only, the dataset is retained for use by a later step.
- NOTE
  - PASS is not permitted in the abnormal disposition field.
- Remark
  - If the abnormal disposition field is omitted, the default is the normal disposition field.
  - When a dataset specified in DSN does not exist, then
    - S213-04 ABEND failure occurs, that is, dataset does not exist.

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### Normal and Abnormal DISP-Parameters (contd.):

KEEP: This Indicates that the dataset is to be kept when the step terminates. The system takes no action and issues a message indicating the dataset is kept. Also, the system issues a message "KEPT". Note that "NOT KEPT" message does not exist.

Note: KEEP does not imply CATLG. As a result, DISP=(NEW,KEEP) should be rarely used because next time you retrieve the dataset, you need to specify UNIT and VOL=SER.

CATLG: This indicates that the dataset is to be kept and an entry for it placed in the catalog when the step terminates.

PASS: This indicates that an entry for the dataset (containing DSN, VOL=SER and UNIT information) be placed on a table in storage (Passed Dataset Queue). This entry is to be used in a subsequent step to "receive the passed dataset". A message is displayed "PASSED".

**The Abnormal (or Conditional) Disposition Field:**

This field is used to notify the system how to dispose off the dataset when the step terminates abnormally (ABENDs). It is required only if this disposition is different from the normal disposition.

**DELETE, KEEP, CATLG, and UNCATLG** have the same meaning as they have in the normal disposition. Note that **PASS** is not permitted in the abnormal disposition field.

The best example of using the abnormal disposition field is,

```
DISP=(NEW,CATLG,DELETE)
```

If there is ABEND, the dataset is to be deleted. This eliminates future manual intervention to delete and uncatalog the dataset in order to restart.

**Defaults:** Some defaults in the DISP parameter are fixed and others are variable.

- If the DISP parameter is omitted, the default is always **(NEW,DELETE)**.

```
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(1,2))
/* (NEW,DELETE) IS THE DEFAULT
```

- If the status is omitted, the default is always **NEW**.  
DISP=(,CATLG) is same as DISP=(NEW,CATLG)
- If the normal disposition field is omitted:
  - If the status field is **NEW**, the default is **DELETE**.
  - If the status field is **OLD** or **SHR** and the dataset name is non-temporary:
    - If the DD statement is not receiving a passed dataset, the default is **KEEP**.

```
//DD1 DD DSN=DA0001T.EMPFILE,DISP=SHR
```

- If the DD statement is receiving a passed dataset, which was created during the execution of the job and was never given a permanent disposition, the default is **DELETE**.

```
//S1      EXEC      PGM=PR
//DD1      DD        DISP=(, PASS), DSN=USER1.PDST,
//          UNIT=SYSDA,
//          DCB=(BLKSIZE=23440, LRECL=80, RECFM=FB),
//          SPACE=(TRK, (50,10),RLSE)
//S2      EXEC      PGM=PC
//DD2      DD        DISP=OLD, DSN=USER1.PD
```

In DD2, **DISP=OLD** defaults to **DISP=(OLD, DELETE)**.

**The Abnormal (or Conditional) Disposition Field (Contd.):**

- If the normal disposition field is omitted (Contd.):
  - If the status field is **OLD** or **SHR** and the dataset name is non-temporary (Contd.):
    - If the DD statement is receiving a passed dataset, which was created during the execution of the job but was given permanent disposition since being created, the default is **KEEP**.

```
//S1 EXEC PGM=PR
//DD1 DD DISP=(, PASS),
      DSN=USER1.PDST,UNIT=SYSDA,
// DCB=(BLKSIZE=23440, LRECL=80, RECFM=FB),
// SPACE=(TRK,(50,10), RLSE)
//S2 EXEC PGM=PC, COND=(4, LT)
//DD2 DD DISP=(OLD, CATLG), DSN=USER1.PDST
//S3 EXEC PGM=PF, COND=(4,LT)
//DD3 DD DISP=(OLD,PASS), DSN=USER1.PDST
//S4 EXEC PGM=PK, COND=(4, LT)
//DD4 DD DISP=OLD, DSN=USER1.PDST
```

In **DD4**, **DISP=OLD** defaults to **DISP=(OLD,KEEP)**

- If the DD statement is receiving a passed dataset, which existed before the job began execution, the default is **KEEP**.

```
//S1 EXEC PGM=PR
//DD1 DD DISP=(SHR,PASS), DSN=USER1.LONE
//S2 EXEC PGM=PK, COND=(4,LT)
//DD2 DD DISP=SHR,DSN=USER1.LONE
```

In **DD2**, **DISP=SHR** defaults to **DISP=(SHR,KEEP)**

Despite the several possible defaults for **DISP=OLD** or **DISP=SHR** their use is extremely common. When not receiving a passed data set, they always safely default to **DISP=(OLD,KEEP)** and **DISP=(SHR,KEEP)**, respectively.

- If the status field is **OLD** or **SHR** and the dataset name is temporary, the default is **PASS**.

**//DD1 DD DISP=OLD,DSN=&&TEMP**

**DISP=OLD** defaults to **DISP=(OLD,PASS)** and the message is displayed as the output –“INVALID DISP FIELD – PASS SUBSTITUTED”

- If the status field is **MOD**, which defaults to an existing data set, **MOD** works the same as **OLD** and **SHR**.
- If the status field is **MOD**, which defaults to **NEW**, the default of the second field is **DELETE**.

**The Abnormal (or Conditional) Disposition Field (Contd.):**

**DISP=MOD** can default to **(MOD,KEEP)**, **(MOD,DELETE)**, **(MOD,PASS)**, and **(NEW,DELETE)**. In view of all these possibilities, it is recommended that defaults are not to be practiced with **MOD**.

**Remark:** The various fields of the DISP parameter stand for the PDS and not the member.

```
//DD1 DD DSN=USER1.LIB2(Z32), DISP=(OLD,DELETE,DELETE)
```

In the above case, the PDS and the member both are deleted. Both the PDS and the member should exist.

How a member is handled depends on whether or not it exists and whether the program opens for input or output. A summary of all possibilities is presented below.

//S1	EXEC	PGM=P1
//D1	DD	DSN=DA0001T.LIB(M12),DISP=SHR

**M12 EXISTS**

- In P1, if M12 is opened in I/P mode, for reading, M12 is read.
- In P1, if M12 is opened in O/P mode for writing, M12 is replaced (not in place).

**M12 DOES NOT EXIST**

- In P1, if M12 is opened in I/P mode for reading, ABEND (S013-18).
- In P1, if M12 is opened in O/P mode for writing; M12 will be created and written into.

5.3: The DISP Parameter

## DD STATEMENT

- PDS and DISP:

- To create a new member of an existing PDS, code DISP=OLD or SHR, not NEW, since DISP refers to the partitioned dataset as a whole not to the member.
- The PDS directory is updated to know about the new member.

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If DISP parameters are not coded, the following defaults:

DISP Coded as :

Defaults to :

If not coded .....(NEW,DELETE,DELETE)  
 (OLD).....(OLD,KEEP,KEEP)  
 (SHR).....(SHR,KEEP,KEEP)  
 (,CATLG).....(NEW,CATLG,CATLG)  
 (MOD).....If dataset does not exist :  
  
 (NEW,DELETE,DELETE)

(NEW DELETE DELETE)

If dataset exists :

(OLD,KEEP,KEEP)  
(MGR,SATLQ)

(MOD,CATLG,.).....(NEW/OLD,CATLG,)  
DELETE) DELETE)

DELETE) DELETE

Disposition of OLD deletes existing records from the dataset. So, to append records, code MOD.

5.3. The DISP Parameter

## Normal and Abnormal DISP-Parameters (Contd.)

- If
- M12 EXISTS

```
//S1      EXEC   PGM=P1
//D1      DD      DSN=DA0001T.LIB(M12),
//                                DISP=SHR
```

- P1 opened in I/P mode for reading, M12 is read.
- P1 opened in O/P mode for writing, M12 will be replaced (not in place)
- If M12 DOES NOT EXIST
  - P1 opened in I/P mode for reading, ABEND (S013-18).
  - P1 opened in O/P mode for writing, M12 will be created and written into.



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5.4: The UNIT and VOLUME Parameters

## Characteristics

- UNIT and VOLUME parameters work together to specify the location of the dataset.
- UNIT indicates the following:
  - The device type or device address on which the dataset resides on a volume
  - The number of devices to be allocated to the dataset
  - The instance when the mount message is to be shown to the operator
- There is no default for UNIT.

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5.4: The UNIT and VOLUME Parameters

## Format and Example

- Format
  - device address
  - UNIT=( generic device name ,device-count [, DEFER] )
  - generated device name
- Example
  - UNIT=3380 ; UNIT=3400-6 ; UNIT=(3390,2)
  - UNIT=SYSDA ; UNIT=DISK ; UNIT=TAPE

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Format:

device address: Identifies the exact device address. This notation is almost never used.

generic device name: Identifies the device type using a universal system-supplied name.

For example: UNIT=3390; UNIT=3400-5; UNIT=3480

generated device name: Identifies the device type using an installation-defined name.

For example: UNIT=SYSDA; UNIT=DISK; UNIT=TAPE

The generated names can be made to mean whatever an installation requires them to mean. For example, UNIT=SYSDA can mean all 3380 devices of any density, or single density only, or a subset of double density devices or a combination of 3380 and 3390 device. Their definition can vary from installation to installation.

device count: Specifies the number of devices to be allocated for the dataset. The limit is 59 devices. If omitted, default is 1 except when DD statement describes a disk multi-volume dataset. In such case, device count=number of volumes.

Of the four, the generated device name is used most commonly.

5.4: The UNIT and VOLUME Parameters

## Use of the UNIT Parameter

- The UNIT parameter can be coded in any one of the following three ways :
- By specifying the device address
  - Example : **UNIT=301**
- By specifying the generic name that identifies a particular type of device
  - Example : **UNIT=3380**
- By specifying a Group name that specifies devices that belong to categories set up by the installation
  - Example: **UNIT=TAPE**

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### Use of the UNIT Parameter:

(i) For example, UNIT=(SYSDA,5) , UNIT=(TAPE,2)

(ii) For example, 2 UNIT=SYSDA is same as UNIT=(SYSDA,1) because of default.

(iii) For example, 3

```
//DD1 DD DSN=DA0001T.EMPFILE,DISP=(,CATLG,DELETE),
//           UNIT=SYSDA,VOL=SER=(BS3001,BS3002,BS3003),
//           SPACE=(TRK,(1,2)),DCB=(LRECL=80,RECFM=FB,
//           BLKSIZE=800)
```

In this example, UNIT =SYSDA defaults to UNIT=(SYSDA,3)

Note: UNIT=(,) can also be used if the device is being supplied by the catalog.

#### Default:

There is no default for device name. If it is not coded in the UNIT parameter and it is also not supplied by the catalog, by the Passed dataset Queue, or by the VOL=REF, the result is a JCL error. The message is

"IEF210I JOBNAME STEPNAME DDANAME – UNIT FIELD SPECIFIES INCORRECT DEVICE NAME", which is misleading. It means that the device name was needed but not coded.

## 5.5: The VOL Parameter Use of the VOLUME (VOL) Parameter

- VOLUME indicates Vol-Ser of the dataset's volume.
- UNIT and VOLUME parameters are not needed for cataloged datasets.
- Format:

```
VOL = { SER=(VOL1[VOL2], ...) }  
      REF=referback  
      REF=dsname }
```

- Remark :
  - The maximum no. of volumes is 255 and there is no default for VOL=SER or VOL=REF



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### Use of the VOLUME (VOL) Parameter:

The main function of the VOL (or VOLUME) is to identify the volume(s) by serial number where an existing dataset resides or where a new dataset will reside.

SER=(vol1,vol2,...) – Specifies the serial number(s) of the volume(s) to be used.  
The maximum number of volumes is 255.

A volume serial is a combination of alphabetic, numeric, and national characters (\$ @ #) up to 6. A hyphen is also permitted. In a real (or production) environment, the number of characters is almost never less than 6.

For example.

```
VOL=SER=BS3001 or  
VOLUME=SER=BS3001  
VOL=SER=(BS3013,BS3014)
```

The VOL parameter must be coded:

- (i) While retrieving a dataset, which is neither cataloged nor passed.
- (ii) While retrieving a dataset, which is cataloged, but the catalog must not be used.
- (iii) While creating a dataset, which must reside on a particular volume.

**Use of the VOLUME (VOL) Parameter:**

- **REF=referback**

**Referback** can have three formats:

- **\*.stepname.ddname:** This requests that the volume is to be the same as the volume for DD statement **ddname** found in the previous step **stepname**

VOL=REF=\*.STEP2.DD1

- **\*.ddname:** This requests that the volume is to be the same as the volume for previous DD statement **ddname** found in the same step **stepname**.

VOL=REF=\*.DD1

- **\*.procrec.stepname.ddname:** This requests that the volume is to be the same as the volume for DD statement **ddname** found in the previous step **stepname** found within a procedure **procrec** (name of the EXEC statement invoking the procedure)

VOL=REF=\*.PR1.STEP2.DD1

**Referbacks** are not encouraged. They are to be used only when they are necessary. A **referback** with a **stepname** causes a JCL error if the referenced step does not execute. Such **referbacks** must be avoided where restart is required.

- **REF=dsname:** This requests that the volume is to be the same as the one where dataset **dsname** resides. The dataset must be cataloged or passed. The dataset does not even have to exist, as long as it is cataloged or passed. The name of the referenced dataset need not appear anywhere else in the job.

For example, VOL=REF=DA0001T.EMPFILE

**Remark:** When **VOL=REF** (**referback** or **dsname**) is used, the system supplies the volume as well as the unit information. Therefore, the **UNIT** parameter is usually unnecessary.

**Default:**

There is no default for **VOL=SER** or **VOL=REF**. However, if both are omitted, no JCL error results. Instead, the meaning of DD statement changes. For example, while retrieving when **VOL=SER** or **VOL=REF** is coded, the catalog is not used. If neither is coded, the catalog is used.

**VOLUME=(v1,v2,v3,v4,v5)**

To specify the volume where a dataset is stored  
 V1=PRIVATE, requests for private volume for the dataset to reside  
 V2=RETAIN, the volume must not be dismounted after dataset is closed at  
 the end of the job step  
 V3=VOLUME SEQ NO, In multi volume dataset it specifies the volume to  
 begin processing with. Volume sequence number values ranges from 1  
 thru 255  
 V4=VOLUME COUNT, refers to the maximum number of volumes required  
 for output data sets. This is used with tape data sets and maximum  
 volumes allowed for tape data sets is 8  
 V5=SER indicates the serial numbers of the tape or disk volume the dataset  
 is on. It takes maximum of 6 characters.  
 UNIT and VOLUME parameters not needed for cataloged dataset.

VOL=SER=(VOL1[,VOL2], ....]
-----------------------------

While creating New datasets, if UNIT is not coded:

Defaults to installation-defined devices based on purpose:

		Unit	Volume
For Development datasets	3390	ZTSO01	
For Testing datasets	3391	ZRS006	

For SMS managed datasets, defaults to STORAGE CLASS:

Storage Class	Unit	Volume
SCTS0	3390	ZTS003

Common problems with UNIT  
 If you forget to code DISP at the dataset that you are reading,

//DDRd DD DSN=IGTRN12.OLD.DS
------------------------------

you will get an error message SPACE NOT SPECIFIED FOR  
 DATASET or INCORRECT DEVICE TYPE SPECIFIED.

**Correct this problem by coding DISP=SHR that you forgot, not UNIT.**  
 You will get this same error message if you code an incorrect UNIT with a  
 Cataloged dataset.

5.6: The SPACE Parameter

## Characteristics of SPACE

- The SPACE parameter is coded for Non-VSAM datasets, to specify how much space is to be allocated to the dataset.
- It has two positional sub-parameters:
  - The first sub-parameter indicates the unit of measure used for space allocation.
  - Second sub-parameter of the SPACE parameter indicates how much space to allocate to the dataset.

$$\text{SPACE} = \left[ \begin{array}{l} \text{TRK}, \\ \text{CYL}, \\ \text{BLK}, \end{array} \right] (\text{prim-alloc}[\text{sec-alloc}][\text{directory}] [\text{,RLSE}])$$

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### Characteristics of the SPACE Parameter:

The SPACE parameter must be included in a DD statement at the following instances:

A new disk dataset is created.

An old dataset needs to alter its entitlement to additional space. That is, it needs to request additional disk space for an old dataset when available space is exhausted.  
An old disk dataset must make all unused space available.

TRK: This requests that space be allocated in tracks.

CYL: This requests that space be allocated in cylinders.

Blksize: This specifies the average blocksize of the dataset. The system translates it to tracks.

## 5.6: The SPACE Parameter

## Characteristics of SPACE (contd.)

- The second sub-parameter has three positional parameters.
- The three positional sub-parameters specify:
  - Primary
  - Secondary
  - Directory space
- Directory allocation is made only for PDS.
- Directory blocks(256 bytes each) are the units of measure for directory.

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### Characteristics of the SPACE Parameter:

Directory: This specifies the number of directory blocks (256 bytes each) to be assigned to the directory of a PDS.

The directory quantity, if not coded, defaults to zero; therefore, the directory quantity must be specified for a new PDS. If it is so, S013-14 ABEND failure does not occur if an attempt is made to add the first member to a PDS.

This identifies the number of tracks (if TRK is coded) or cylinders (if CYL is coded) or the number of blocks (if blksize is coded) that must be allocated during the allocation process for a new dataset before the step begins execution. The system allocates the requested space in one extent. If this is not possible (and CONTIG is not coded), two extents are used, then three and so on up to five extents. If as many as five extents cannot satisfy the request, the result is the following allocation JCL error:

IEF257I jobname stepname ddname -SPACE REQUESTED NOT AVAILABLE.

If the request is nonspecific (no VOL=SER or VOL=REF), needing a storage volume, the JCL error message will be different:

IEF257I jobname stepname ddname -INSUFFICIENT SPACE ON STORAGE VOLUMES.

Remark: The system always allocates the primary quantity in the least number of extents possible on a single volume. The primary quantity cannot be split over multiple volumes. The primary allocation cannot be omitted (coding 0 is allowed). It is ignored if the dataset is old.

For example, SPACE=(TRK,3)

For example, SPACE=(CYL,4)

For example, SPACE=(23440,100)

For example, SPACE=(TRK,0)

The primary allocation cannot be omitted (coding 0 is allowed). It is ignored if the dataset is old.

**Characteristics of the SPACE Parameter (Contd.):**

- **sec-alloc - Secondary allocation or secondary quantity:**

This identifies the number of tracks (if **TRK** is coded) or cylinders (if **CYL** is coded) or the number of blocks (if **blksize** is coded) that are to be allocated when all the available space is exhausted while writing to a dataset. The system allocates the secondary quantity in the least number of extents possible, and just like the primary quantity; it can be given in as many as five extents, if necessary.

The system always supplies the specified secondary allocation when one is needed unless one of the two events occurs:

- The allocated volume does not have enough space to satisfy the secondary allocation and no other volumes are allocated.
- The needed secondary allocation, if granted, causes the dataset to exceed 16 extents on the volumes and no other volumes are allocated.

If either of these two conditions arises, the result is a **SB37-04** ABEND failure (normally for a sequential dataset). For a PDS, the ABEND can also be **SE37-04**.

Please note that a PDS is confined to a single volume, while a sequential dataset can extend into a maximum of 59 volumes. The 16-extent-per-volume limit for a dataset is system-supplied and cannot be altered.

The secondary allocation is optional. If omitted, defaults to 0. When no secondary allocation is coded and the primary allocation is exhausted, the result is an SD37-04 ABEND failure.

**Characteristics of the SPACE Parameter (Contd.):**

- **sec-alloc - Secondary allocation or secondary quantity (contd.):**

**Remark:** The directory quantity is taken away from the beginning of the primary allocation if **TRK** or **CYL** is coded in the **SPACE** parameter. When **blksize** is coded, the system adds the directory blocks to the data blocks and then computes the amount of primary space.

For example, **SPACE=(TRK,(20,5,5)) OR SPACE=(TRK,(20,,5))**

If no secondary

For example, **SPACE =(CYL,(20,5,5)) OR SPACE =(CYL,(20,,5))**  
if no secondary

For example,

**SPACE =(23440,(200,50,5)) OR SPACE =(23440,(200,,5))**  
if no secondary

- **RLSE:** This requests that any unused space is to be freed when the dataset is closed. This works for both new and old datasets, provided they were opened for output. Space is released on the boundary used in the **SPACE** parameter. If tracks (or cylinders) are allocated, unused tracks (or cylinders), are released.

**Remark:** Using **RLSE** is highly recommended for datasets not intended for future expansions. Temporary datasets are ideal candidates. For datasets that expand in future runs, **RLSE** can result in a larger number of extents, and, possibly, a premature SB37-04 ABEND failure. **RLSE** will be ignored if the dataset is opened by another user (or shared by another job) or the step ABEND's.

For example, **SPACE=(TRK,(5,1),RLSE)**

5.6: The SPACE Parameter

## Example

- For PS

SPACE=(CYL,(10,1))

SPACE=(800,(500,100))

- For PDS

SPACE=(23440,(200,50,2))

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### SPACE PARAMETER

Specifies how much space to allocate for a new disk (DASD) dataset.

Syntax:

SPACE=(S1,(S2,S3,S4),S5)

S1 - the Unit of space in Cylinders (CYL), Tracks (TRK), Blocks of records (a number representing block size), Record length

S2 - Primary (initial) quantity of units

S3 - Secondary quantity of units if primary is exceeded; but allocated only when the dataset expands.

(S3 X 15 or 16 or 123 secondary allocations - called Extents)

S4 - Number of Directory blocks (applicable for PDS only)

S5 - Releases the unused space requested

#### EXAMPLE:

SPACE=(TRK,(5,2))

You get 5 tracks + (2 X 15) tracks

= 35 tracks

Disk surfaces are divided into Tracks of recording space

Group of tracks make a Cylinder

Many cylinders make a disk Volume

Different models of IBM Mainframe disks have different track capacities, number of cylinders and device capacities.

Disk Volume Model	Bytes/Track	Tracks/Cylinder	Total Cylinders	Total Bytes
3390-1	56664	15	1113	0.946 Gb
3390-2	56664	15	2226	1.892 Gb

**Space (EXTENTS)**

The smallest unit of space on mainframe disks is one whole track. The OS cannot split tracks for use by other datasets

One or more contiguous tracks or cylinders allocated to a dataset are called an EXTENT

An EXTENT is a piece of disk space.

Your primary space allocation is 1 extent.

When you request SPACE=(TRK,(5,2)) you get:

1 primary extent and 2\*15 secondary extents tracks

---

**Space (Block size)**

You can specify space request by Block size instead of Tracks or Cylinders.

EXAMPLE:

SPACE=(3840,200) You get 200 blocks each holding  
3840 bytes = 768,000 bytes on the disk

If you code a secondary allocation:

SPACE=(3840,(200,60)) ...plus (60 X 3840 bytes X 15 Extents) as secondary allocation

Since one track is the minimum unit of space, if block size requested works out smaller than one track, you still get one track of disk space.

**SPACE (Record Length)**

Applicable only for SMS managed datasets

Code AVGREC parameter along with Space parameter

Do not code BLKSIZE in the DCB keyword parameter\

```
//DDN      DD      DSN=DSRC012.DS,
//          DISP=(NEW,CATLG,DELETE),
//          UNIT=SYSDA,
//          AVGREC=U,
//          SPACE=(133,10000)
//          RECFM=FB,
//          LRECL=133
```

With AVGREC=U:

The 133 in Space parameter is the average Record length in bytes

=U means that the 10000 is a "unit" estimate of the quantity of records to be written.

## Example

```
//DDN      DD      DSN=DSRC012.DS,
//                                DISP=(NEW,CATLG,DELETE),
//                                UNIT=SYSDA,
//                                AVGREC=U,
//                                SPACE=(133,10)
```

You get (10 records X 133 bytes) of space.

For Secondary allocation request: SPACE=(133,(10,2))

AVGREC can support record quantities by thousands (AVGREC=K) and by millions (AVGREC=M)

```
//          AVGREC=M,
//          SPACE=(133,10)
```

You get (10,000,000 records X 133 bytes) of space.

**SPACE (Directory Blocks)**

While creating a PDS, the SPACE parameter is to include a request for Directory Blocks

Space=(TRK,(1,2,7))

You get  $1 + (2 \times 15) = 31$  tracks and create 7 Directory blocks. Each directory block can store information about 5 members; implies 35 members can be allocated.

Space=(TRK,(1,,7))

When you do not want secondary space for the PDS.

**EXAMPLES:**

Space=(TRK,(5,,1)) Allocates a PDS with no secondary space and 1 directory block.

Space=(3840,(200,60)) Allocates  $(200 \times 3840) + (60 \times 3840 \times 15)$  of disk space.

```
//      //DDN DD DSN=....,
//      DISP=....,
//      UNIT=3390,
//      Space=(TRK,10)
```

5.6: The SPACE Parameter

## Characteristics

- When the directory is exhausted, the result is an S013-14 ABEND failure.
- The directory quantity, if not coded defaults to zero, that is, a sequential dataset.
- When the secondary space is exhausted, the result is SB37-04 ABEND failure for a sequential dataset and SE37-04 ABEND failure for a PDS.
- There is no default for primary allocation (coding 0 is allowed) and secondary and directory space if omitted, defaults to zero.

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You receive the secondary space requested for your dataset only as the dataset expands as you use it .You can get up to 16 extents of secondary space per dataset per disk volume for a PS If you use more than one disk volume for a PS dataset, it can spread up to 16 secondary extents on each volume A PDS cannot span disk volumes The limit of 16 extents per dataset per disk volume does not apply to VSAM datasets, which can exist with up to 123 extents

**SPACE (RLSE)**

Causes all of the whole unused tracks to be freed for use by other datasets

**Syntax:**

SPACE=(6200,300,RLSE)      Releases unused tracks.

SPACE=(6200,(300,60),RLSE)      Releases unused tracks in the last active secondary.

SPACE=(80,1,RLSE)      No space is released since space is less than a track for any disk volume model.

RLSE does not work if a step abends

Does not work if the dataset is not closed normally

Does not work when the dataset is shared

5.7: The LABEL Parameter

## Characteristics

- The LABEL parameter can specify the following:
  - The sequence of a tape dataset on a volume
  - The type of label of the dataset
- Format :

**LABEL={[seq-no]}, type]**

  - seq-no: This identifies the sequence number of the dataset on a tape volume. It can have 1 to 4 digits. If omitted, it defaults to 1. If 0 is coded, it defaults to 1. maximum: 9999
  - seq-no (Contd.): The sequence number is ignored in the following situations:
    - Retrieving a tape dataset through the catalog
    - Receiving a passed tape dataset

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5.7: The LABEL Parameter  
**Characteristics (contd.)**

- Type: This identifies the type of label for the dataset. There are many types of labels :
  - SL indicates IBM standard label. If the sub-parameter is omitted, SL is the default.
  - NL indicates that no labels are used. NL is not commonly used. Normally NL is used for a tape coming from or going to another installation which has no SL capabilities.



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**Characteristics of LABEL:**

There are many types of labels. To name a few, which are important from project perspective.

SL: This indicates IBM standard label. If the sub parameter is omitted, SL is the default.

NL: This indicates no labels are used. NL is not commonly used. Normally, NL is used for a tape coming from or going to another installation, which has no SL capabilities.

BLP or Bypass Label Processing: This indicates that labels are not to be recognized and are to be treated as ordinary files. BLP is used as a last resort when neither SL nor NL can accomplish what is required.

Label Verification: While retrieving an SL tape dataset, both the volume serial and the dataset name are verified. While creating an SL tape dataset with VOL=SER or VOL=REF, only the volume serial is verified.

While retrieving an NL tape dataset, neither the volume serial nor dataset name can be verified. However, only an NL tape volume can be mounted. An SL volume is rejected.

5.7: The LABEL Parameter

## Examples

LABEL=(2, SL)

LABEL=(, NL)

- Defaults : If omitted, the LABEL parameter defaults to (1, SL).
- There are four ways to supply the same information:
  - Omit the label parameter
  - Code LABEL=(1, SL)
  - Code LABEL=(, SL)      1 is the default
  - Code LABEL=1                SL is the default



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5.7: The LABEL Parameter  
**Examples (contd.)**

- Creating labeled tape dataset:

```
//OUT DD DSN=DA0001T.TAPE,  
// DISP=(, CATLG), UNIT=TAPE,  
// DCB=(BLKSIZE=32720, LRECL=80,  
// RECFM=FB)  
/* LABEL not supplied - the default is (1, SL)
```

- Creating non-labeled tape dataset:

```
//OUT DD DSN=DA0001T.TAPE,  
// DISP=(, KEEP), UNIT=TAPE, LABEL=(, NL),  
// DCB=(BLKSIZE=32720, LRECL=80,  
// RECFM=FB)  
/* LABELs are not used
```



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5.8: The DCB Parameter

## Characteristics

- The DCB parameter specifies characteristics that are stored in the Data Control Block of the file.
- No DCB parameter is required, if the application program supplies the required information.
- Format:

DCB={[referback] | [model] [, subparm] , ..... }

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### Characteristics of DCB:

The DCB parameter specifies values to be used to complete the Data Control Block (DCB) when a dataset is opened. A DCB is constructed by the language processor (compiler or assembler), based on the appropriate instructions of the language being used, and resides inside the code of the program. The compiler collects this information and defaults from various parts of the program (For example, in COBOL, RECORD CONTAINS 80 CHARACTERS; BLOCK CONTAINS 10 RECORDS and so on) and constructs the DCB. Note that the DCB exists only for non-VSAM datasets and is checked by the OPEN routines (for input or output). Certain values must be "hard-coded" in the DCB by the program. Others can be left out, giving the user the option of supplying these values via the DCB parameter (as well as other means).

There are three suppliers of DCB information:

Values supplied by the program, referred to as hard-coded. When a value is hard-coded, it cannot be changed unless the program is changed.

Values coded in the DCB parameter of the DD statement. These values are ignored if they are already hard-coded.

Values from the standard label of the dataset. The values supplied by the label are limited to: BLKSIZE, LRECL, RECFM, DSORG, and so on. Values from the label are not used if they are hard-coded inside the program or coded in the DCB parameter of the DD statement.

**5.8: The DCB Parameter**

## Characteristics

- Format for referback:
  - \*.stepname.ddname
  - \*.ddname
  - \*.\*procexec.stepname.ddname
- Model specifies the name of a dataset which must be cataloged and resides on disk.
  - This dataset is called a model DSCB.
  - Example :
- Sub Parameters: BLKSIZE, LRECL, RECFM, DEN, BUFNO and DSORG

DCB=PROD.MODEL



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Characteristics of DCB:

DCB=[referback] | [model][,subparameter],..... keyword parameter

Referback: This can have three formats:

\*.stepname.ddname: This requests that the DCB parameter is to be copied from the DD statement "ddname" found in the previous step "stepname".

DCB=\*.STEP2.DD1

\*.ddname: This requests that the DCB parameter is to be copied from a previous DD statement "ddname" found in the same step "stepname".

DCB=\*.DD1

\*.\*procexec.stepname.ddname: This requests that the DCB parameter is to be copied from DD statement "ddname" found in the previous step "stepname" found within a procedure "procexec" (name of EXEC statement invoking the procedure).

DCB=\*.PR1.STEP2.DD1

Remark: The DCB referback copies the DCB parameter as opposed to the DSN and VOL=REF referbacks which acquire the dataset name and the VOL=SER respectively, whether or not the DSN and VOL parameters are present in the referenced DD statement. If the DCB referback refers to a DD statement, which contains no DCB, nothing is copied and no message appears.

Sub-parameters: Mnemonic Hint:BLaBbeReDD (B: BLKSIZE, L: LRECL, B: BUFNO, R:RECFM, D:DEN, and D:DSORG).

**Models:**

This specifies the name of the dataset which has following characteristics:

- It must be cataloged. If it is not, the result is a JCL error:  
**IEF2121 jobname stepname ddbname -DATASET NOT FOUND**
- It must be on disk (Tapes not allowed).
- It must reside on a volume that is accessible (online).

This dataset is called a model DSCB. The DCB information from the label of the model is extracted and can be used.

For example, DCB=DA0001T.EMPFIL

For example, In case you want to override some of the subparameters, the overriding subparameters must follow the DCSB model dataset name.  
DCB=(DA0001T.EMPFIL,LRECL=100,BLKSIZE=800)

**Models** are generally used, during the creations of GDGs and dummying the PDS.

**Subparameters:** There is a vast number of subparameters, the great majority of which are seldom or never used.

- **BLKSIZE:** This specifies the size of the block (also known as the physical record). For **RECFM=FB**, the blocksize must be multiple of the logical record length, and it identifies the exact size of the block. For **RECFM=VB**, the blocksize can be any value up to the limit but at least 4 bytes larger than the logical record length. For **RECFM=U**, the blocksize can be any value up to the limit.

• **Remark:** There is no default for **BLKSIZE**. Coding **BLKSIZE=0**, the system computes the optimum blocksize based on the device type.  
For example  
e, DCB=BLKSIZE=800

- **LRECL:** This specifies the size of the logical record. The maximum size is 32,760, and it cannot be larger than blocksize, unless **RECFM=VBS** is used.

For example, DCB=(LRECL=80,BLKSIZE=800)

5.9: Models

## Models: Subparameters

- DSORG = XX Specifies the datasets organization
  - PS = Physical Sequential
  - PO = Partitioned
  - DA = Direct
  - IS = Indexed Sequential
- RECFM = XX Format of the file's records
  - F = Fixed length, unblocked
  - FB = Fixed length, blocked
  - V = Variable length, unblocked
  - VB = Variable length, blocked
  - LRECL = n length of file's records
  - BLKSIZE = n length of file's block

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Models: Subparameters (Contd.):

RECFM: Specifies the record format. There are several values (or combinations of values) that can be coded:

F: This indicates that all blocks and all logical records are fixed in size.

V: This indicates that blocks as well as logical records are of variable size. The first four bytes of each block (and logical record) describe its length.

B: This indicates that one or more logical records reside in each block. B cannot be coded alone. It is used in conjunction with F or V. For example FB or VB.

U: This indicates that blocks are of variable size. There are no logical records. Mainly used with Load Library.

S: For fixed-size records, this indicates that no short blocks are permitted anywhere but the end of the data. For variable-size records, it indicates that a logical record can span more than one block. S cannot be coded alone. It must follow F, V, FB or VB.

A: This indicates that the first character of each record is an ANSI control character to be used for printer carriage control. A cannot be coded alone. It must follow F, V, FB, VB or U.

For example, DCB=(LRECL=80,RECFM=FB,BLKSIZE=800)

**Models: Subparameters (Contd.):**

If **RECFM** is not supplied through any means, **U** is the default.

- **DEN:** This identifies the density of the tape. **DEN=3(or 4)** indicates 1600 (or 6250) BPI density.
- **BUENO:** This identifies the number of buffers to be allocated in virtual storage by the **OPEN** routines, which will contain the blocks to be read in or written out. If omitted, default is 5. The maximum is 255. Coding for **BUENO** a number greater than 5 may require that the **REGION** parameter be increased. However, default of 5 is more than adequate in most cases of dataset processing.

For example,

```
//INFILE    DD DSN=DA00011.EMPFILE,DISP=SHR,DCB=BUENO=8
```

- **DSORG:** This identifies the organization of the datasets.

- **PS:** This specifies physical sequential organization. Mostly **QSAM** and sometimes **BSAM**.
- **PO:** This specifies partitioned organization (or **BPAM**).
- **DA:** This specifies direct organization (or **BDAM**).
- **IS:** This specifies indexed sequential organization (or **ISAM**).

It is important to understand which of these often-used parameters are normally hard-coded and which are not:

- **BLKSIZE:** This is seldom hard-coded. The **BLKSIZE** is unrelated to the logic of the program and hard-coding its value would cause unnecessary changes whenever the **BLKSIZE** is changed. In COBOL, **BLOCK CONTAINS 0 RECORDS** must be coded to avoid hard-coding the **BLKSIZE**. Omitting this clause causes a default of 1 to be used. The result is a hard-coded **BLKSIZE** equal to **LRECL**. Many installation standards disallow hard-coding the **BLKSIZE** for sequential and partitioned datasets.
- **LRECL:** This is frequently hard-coded. The logic of any ordinary program is dependent on the **LRECL** and, as a result, the **LRECL** cannot be changed without changing the logic of the program. Many high-level languages such as COBOL always hard-code the **LRECL**.
- **RECFM:** This is frequently hard-coded. The logic of any ordinary program is dependent on the **RECFM** and, as a result, the **RECFM** cannot be changed without changing the logic of the program. Many high-level languages like COBOL always hard-code the **RECFM**.

5.9: Models

## DD STATEMENT

- LRECL, indicates the logical record length of dataset in bytes
  - For fixed length records, the dataset contains records all of the same length and hence LRECL = the actual length of the data-bytes.
    - LRECL for fixed length records can range from 1 to 32,760 bytes. You can access all 32,760 bytes.
  - For variable length records, the length of the records vary from an average to a maximum. So, the LRECL = longest data-bytes length + 4 bytes; the 4 bytes called the RDW(record descriptor word) is pre-pended to each record and indicates the actual length of the record in its first two bytes
    - LRECL can be as high as 32,760 but only 32,752 are accessible.
  - For Undefined format, code LRECL=0. Conventionally used to store load modules.

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## 5.9: Models DD STATEMENT

- BLKSIZE, specifies the maximum length of a block. The value must be the multiple of LRECL and 4 bytes greater than longest record for variable length record.
  - For fixed length blocked records (RECFM=FB)
    - Block size is multiples of LRECL.
    - Must not be larger than 32,760 bytes.
    - Example: DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
  - For variable length blocked records (RECFM=VB)
    - Block size is multiples of LRECL plus 4 bytes, for Block descriptor word (BDW) which is pre-pended to the block of records. The first two bytes of the BDW indicates the length of the block.
    - Example: DCB=(RECFM=VB,LRECL=84,BLKSIZE=8404).
  - For Undefined format (RECFM=U) records, let the OS determine the block size.
  - DCB=(RECFM=U,LRECL=0)

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## 5.9: Models Models: Example

- Example

```
DCB = (DSORG = PS, RECFM = FB, LRECL = 80,  
BLKSIZE = 800)
```



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## 5.9: Models Models: Remarks

- A DCB exists for every non-VSAM dataset to be opened by the program (for input or output). Certain values must be hard-coded by the program itself. Others can be left out, giving the user the option of supplying these values via the DCB parameter as well as by other means.
- ABEND failures while supplying inconsistent DCB values:
  - S013-20 ABEND when RECFM=FB is used but the LRECL is not an exact multiple of the block size.
  - S013-34 ABEND when RECFM=FB is used and the LRECL is greater than the BLKSIZE.
  - S013-34 ABEND when RECFM=VB is used and the LRECL is greater than the BLKSIZE-4.
  - S001-04 ABEND when BLKSIZE in the DCB parameter is smaller than the actual blocksize and a multiple of the LRECL in the DSCB of the dataset.

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5.10: In-Stream Data Format

## Characteristics of In-Stream Data

- \* and DATA are positional parameters that follow DD.
- Example

```
//ddname    DD    DATA,
              DLM = XX
```

```
//INPUT   DD *
A0014214 CHAR
A0024342 DABL
/*
```

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### Characteristics of In-Stream Data:

The input stream submitted to the system for execution consists of two possible parts:

JCL: The mandatory part of the input stream

Data mixed in with JCL in the input stream: This data is known as SYSIN data or input stream data. It is an optional part of the input stream and always has a logical record length of 80. Any records encountered in the input stream which are not JCL statements are treated as the SYSIN data.

SYSIN data must be preceded by a DD statement such as follows:

SYSIN data encountered by JES2 or JES3 following a DD \* statement saved on the SPOOL volume for future use. This is known as input spooling. The SYSIN is delimited (the spooling stops) by the following:  
 A /\* (delimiter) statement found  
 A valid JCL statement  
 An end-of-file condition on reading device

```
//DDNAME   DD *
data
/*
```

SYSIN data must be preceded by a DD statement such as follows:  
 SYSIN data encountered by JES2 or JES3 following a DD \* statement saved on the SPOOL volume for future use. This is known as input spooling. The SYSIN is delimited (the spooling stops) by the following:  
 A /\* (delimiter) statement found  
 A valid JCL statement  
 An end-of-file condition on reading device

## 5.10: In-Stream Data Format

### In-Stream Data: Example

```
//SYSIN DD *
1234CG LTD
2345CG INDUSTRIES
//DD1 DD DSN=DA0001T.CG.PAYROLL.MASTER,
.....
```



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#### In-Stream Data: Example

The asterisk (\*) is a positional parameter. The DD\* is a special statement which is under complete JES2 or JES3 control.

SYSIN is a very common ddname used by many vendor-written programs to pass control information to the utility. For example, SORT, IEBGENER, and IDCAMS utilities.

In user written programs, if you use COBOL ACCEPT statement, then in the run JCL one of the DD statements is SYSIN DD statement.

```
//SYSIN DD *
1234
/*
```

Remark: If SYSIN data is not preceded by DD\*, the system generates a statement and place it in front of the SYSIN data.

5.10: In-Stream Data Format

## SPECIAL DD STATEMENTS

- SYSIN (Input Stream Data)
- An input data stream is data, that supplies data to the load module at the time that the job is submitted. When the OS detects an asterisk \* or DATA in the DD statement it pauses for input and input is supplied at this point. When there is no further input required, a /\* is entered.
- EXAMPLE:

```
//SYSIN DD *          /*
//SYSIN DD DATA      */

▪ //STEP2    EXEC    PGM=LOAD1
▪ //SYSIN   DD      *
▪ HELLO WORLD /* More than one SYSIN statements can be placed for same job
or job step.
```

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Instream data to a Cobol program:

In the JCL

```
//STEP010 EXEC PGM=LM of a Cobol program
//SYSIN DD *
001 JOHN ....
/*
```

In the Cobol program:  
IDENTIFICATION DIVISION.  
DATA DIVISION.  
WORKING-STORGAE SECTION.  
77 DATA1-IN PIC X(80).  
PROCEDURE DIVISION.  
ACCEPT DATA1-IN

**In-Stream Data: Example**

Note: A line with blanks is the most common offender. It is invisible to the user but it will be treated as data by the system this may or may not cause problem. Let us look at the following example.

The system will interpret the above JCL in the following way:

Conclusion: If there are two or more DD statements by the same name in the same step, this is not an error condition. When the program opens for SYSIN the first of the two be used. The other will be allocated and ignored.

```
//DA0001TA JOB LA2719,....  
//S1      EXEC PGM=ASS1  
//STEPLIB  DD ...  
1234  
//DD1      DD ...
```

```
//DA0001TA JOB LA2719,....  
//S1      EXEC PGM=ASS1  
//STEPLIB  DD ...  
//SYSIN    DD *  (generated statement)  
1234  
//DD1      DD ...
```

```
//DA0001TA JOB LA2719,....  
//S1      EXEC PGM=ASS1  
//STEPLIB  DD ...  
//SYSIN    DD *  
1234  
//DD1      DD ...
```

```
//DA0001TA JOB LA2719,....  
//S1      EXEC PGM=ASS1  
//SYSIN    DD *  
  
//STEPLIB  DD ...  
//SYSIN    DD *  (generated statement)  
1234  
//DD1      DD ...
```

5.11: The SYSOUT Parameter

## Characteristics

- The SYSOUT parameter can assign sysout or output class, to a dataset. Such datasets are called sysout or output datasets.
- This is a keyword parameter.
- Format:
  - Class: identifies the sysout class of the dataset from A-Z and 0-9

SYSOUT=(class | \*)



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### Characteristics:

Print records generated by a program are not normally routed directly to a physical printer (theoretically it is possible; but in practice, it is seldom done). Instead, they are written on the SPOOL pack, and saved there for later viewing on a terminal or printing (or both). This is called output spooling, and is under the control of JES2 or JES3, which later can use one of their print routines to print the dataset. These print routines must schedule the datasets for printing, and message classes are used for this purpose. All print routines (called printers or writers) are associated with one or more classes (in all 36 classes) and each dataset to be printed must also be assigned classes. The printer routines select datasets for printing in a very similar way as initiators selects jobs for executions. Use S.ST option of the ISPF menu to view the output dataset.

The SYSOUT parameter can assign this class, known as sysout or output class, to a dataset. Such datasets are called sysout or output datasets.

SYSOUT

```
//MFCVT01 JOB (),MSGCLASS=A
//STEP01 EXEC PGM=PROGRAM1
//SYSPRINT DD SYSOUT = *
//
//MFCVT01 JOB (),CLASS=A
//STEP01 EXEC PGM=PROGRAM1
//DD1 DD DSN=FILE1,SYSOUT = A
//DD2 DD DSN=FILE2,SYSOUT = B
//
```

## Characteristics (contd.)

- Format:

- \*: This indicates the same class used in the MSGCLASS parameter of the JOB statement (or the installation-defined default, if MSGCLASS is omitted) is to be used.

- Example:

```
//SYSUT1 DD SYSOUT = C
//ddname DD SYSOUT = *
```


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E.g. 1

```
//SYSOUT DD SYSOUT=A
```

E.g. 2

```
//SYSPRINT DD SYSOUT=*
```

This DD statement is used for printing system messages generated by JES2 or JES3. Each step must have the SYSPRINT DD statement. Absence causes "SYSPRINT DD STATEMENT MISSING" message in the sysout.

E.g. 3

```
//SYSOUT DD SYSOUT=*
```

(or any sysout class may be assigned)

This DD statement is used when you have the COBOL DISPLAY clause in your program.  
SYSPRINT

Specifies that an execution report of the load module (PGM) is required. It defines the output file containing the execution messages.

EXAMPLE:

```
//STEP1      EXEC    PGM=IEBGENER
//SYSPRINT   DD      SYSOUT=*
//SYSUT1.....
```

Note:

The SYSOUT parameter specifies the output stream dataset. It routes the report to the class (device) mentioned. SYSOUT=CLASS-code, is the syntax. The class can be any alphanumeric character or an asterisk(\*), which refers to the device coded in the MSGCLASS parameter of JOB statement.

5.12: The DD Statement – Concatenation

## Characteristics

- Only sequential and partitioned datasets can be concatenated.
- For sequential datasets, the maximum number of concatenation is 255; and for PDS, it is 16.
- Concatenation has meaning only for sequential processing.

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### Characteristics:

At times, program may have to read in sequence several input datasets as if they were one. This can be accomplished without physically putting the data in one datasets. This is done by concatenating the datasets in JCL code with comparable DCB characteristics without programming changes.

Note that only sequential and partitioned datasets can be concatenated. For sequential datasets, the maximum number of concatenations is 255 and for PDS it is 16. Concatenation has meaning only for sequential processing.

5.12: The DD Statement – Concatenation

## Concatenation: Examples

- Concatenation of PS files:

```
//ddname      DD DSN=DA0001T.CG.SEQ1,DISP=SHR  
//           DD DSN=DA0001T.CG.SEQ2,DISP=SHR  
//           DD DSN=DA0001T.CG.SEQ3,DISP=SHR
```

- Concatenation of PDS's:

```
//ddname      DD DSN=DA0001T.PDS1,DISP=SHR  
//           DD DSN=DA0001T.PDS2,DISP=SHR  
//           DD DSN=DA0001T.PDS3,DISP=SHR
```



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Example: Concatenate datasets by coding a DD statement for each dataset

```
//IN      DD      DSN=Jan.DS,DISP=SHR  
//           DD      DSN=Feb.DS,DISP=SHR  
//           DD      DSN=Mar.DS,DISP=SHR
```

DDname should be coded for the first DD statement only  
If DUMMY dataset is coded, the rest of the datasets down are not processed

```
//DD1    DD      DSN=A1.PDS,DISP=SHR  
//           DD      DUMMY  
//           DD      DSN=C1.PDS,DISP=SHR
```

5.12: The DD Statement – Concatenation

## Rules and regulations for Concatenation

- LRECL, RECFM must be the same, but BLKSIZE could be different.
- The blocksize of the first concatenation must be greater than or equal to the blocksizes of all the subsequent concatenations. Violation of this rule results in S001-4 ABEND failure.
- Both sequential datasets and partitioned datasets can be concatenated but not with each other, that is, Sequential with Sequential and Partitioned with Partitioned only.



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### Rules and Restrictions for Concatenation:

There are number of rules and restrictions for concatenations:

The first concatenation is the only one with a ddname.

The logical record length and the record format of concatenated datasets must be the same. However, the blocksizes need not be.

The blocksize of the first concatenation must be greater than or equal to blocksizes of all subsequent concatenation. Violation of this rule results in S001-04 ABEND failure.

For example, assume that in the JCL below, the first concatenation has a blocksize of 800, the second has a blocksize of 800- and the third has a blocksize of 23400.

### Rules and Restrictions for Concatenation (Contd.):

Both sequential datasets and partitioned datasets can be concatenated, but not with each other – sequential with sequential and partitioned with partitioned only.

Member of a PDS is treated as sequential dataset and thus can be concatenated with sequential dataset.

For example,

Disk as well as tape datasets can be concatenated but not with each other. Only like devices should be concatenated, disk with disk and tape with tape.

```
//INFILE DD DSN=DA0001T.CG.GROUP1,DISP=SHR,DCB=23400  
//      DD DSN=DA0001T.CG.GROUP2,DISP=SHR  
//      DD DSN=DA0001T.CG.GROUP3,DISP=SHR
```

5.13: The DUMMY Parameter

## The DUMMY Parameter - Characteristics

- Format
  - Allocates no devices no input/output ; read/write operations.
  - It is a positional parameter.
  - Physical sequential files and VSAM files can be dummied.
  - PDS cannot be dummied.
  - PDS (member) is treated as a PS file and therefore can be dummied.

`//ddname DD DUMMY`

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### The DUMMY Parameter – Characteristics:

The DUMMY parameter is a positional parameter. At times, one might want to execute a program but suppress read or write operations in certain jobs, For example. not print a report. At other times, one might want to test a program without actually processing data. At times, a DD statement referring to a dataset may be coded in the in a JCL in production region .The DUMMY parameter may be coded in a test region when the same JCL is to be executed.

The DUMMY parameter specifies the following:

- No device or external storage be allocated.
- No disposition processing is performed.
- No input or output operations are performed for sequential access methods.

5.13: The DUMMY Parameter

## The DUMMY Parameter - Remarks

- When an attempt to dummy a PDS is made, it causes an S013-64 ABEND failure.
- The DCB parameter may be required while coding dummy. Failure to do so may cause an S013-10 ABEND failure.
- NULLFILE is a keyword parameter and is same as DUMMY.
- DUMMY provides a safe way to eliminate I/O activity when required.

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## 5.13: The DUMMY Parameter The DUMMY Parameter - Example

### ■ Example

```
//ddname      DD DSN=NULLFILE
```



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5.14: The JOBLIB DD Statement  
**Characteristics**

- The JOBLIB DD statement identifies the program library where the programs to be executed throughout the job reside.
- It must be placed between the JOB and the first EXEC statement.



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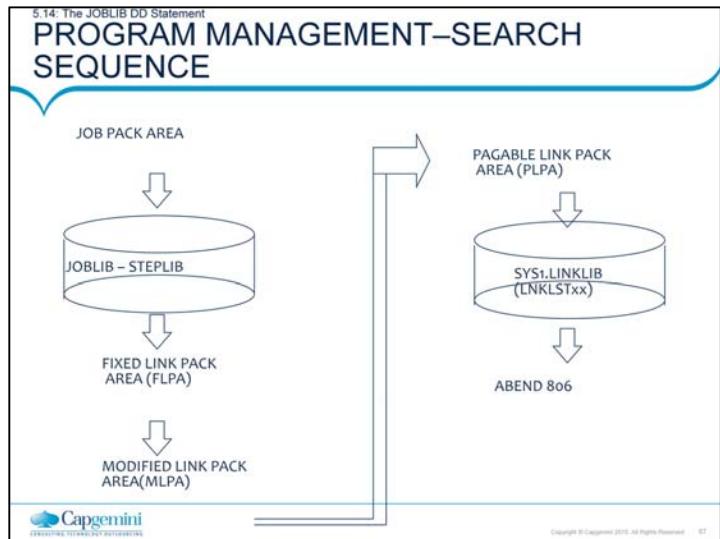
5.14: The JOBLIB DD Statement

## SPECIAL DD STATEMENTS

- **JOBLIB & STEPLIB:**
  - It is not enough to know the program name to be executed, the system needs to know where that program resides.
  - The EXEC statement identifies only the member name only so its location in the system has to be specified by the JOBLIB or STEPLIB statement
  - Load modules will be checked first in this library and then in the system libraries and if it is not found in both the places, then JOB would ABEND with S806 code.
  - Both are DD statements.

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5.14: The JOBLIB DD Statement

## PROGRAM MANAGEMENT – SEARCH SEQUENCE

```
//DA0001TA      JOB LA2719,CG,CLASS=A
//JOBLIB        DD      DSN=DA0001T.LIB.LOAD, DISP=SHR
// S1           EXEC   PGM = PROGA
// S2           EXEC   PGM = PROGB
```

- The PROGA Program is expected to reside in DA0001T.LIB.LOAD as a member of a library and the system searches the directory. If not found, system searches certain predefined libraries. If it is still not found, S806 ABEND failure occurs.
- A JOBLIB DD statement can have several concatenations (maximum : 16).

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5.14: The JOBLIB DD Statement

## The JOBLIB DD - Example 2

- All concatenations may be searched to locate a program. If, however, the program is found in a concatenation other than the last one, other concatenations will not be used.
- When duplicate member names exists in different concatenations, the user can decide which one is to be executed by determining the sequence of the **concatenations**

```
//DA0001TA      JOB LA2719,CG,CLASS=A  
//JOBLIB        DD    DSN=DA0001T.LIB.LOAD, DISP=SHR  
// S1           EXEC  PGM = PROGA  
// S2           EXEC  PGM = PROGB
```



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5.15: The STEPLIB DD Statement

## Characteristics

- The STEPLIB DD statement identifies the library, where the program to be executed for the step where STEPLIB is found resides.
- It can be placed anywhere after the EXEC statement.

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5.15: The STEPLIB DD Statement

### Example1

- Program PROGA is expected to reside in PROD.LOADLIB1 as a member of the library.
- If not found, default libraries are searched

```
//PROD213      JOB    SH21, CLASS=P
//S1           EXEC   PGM=PROGA
//STEPLIB       DD     DSN=DA0001T LIB LOAD1,
//                  DISP=SHR
//S2           EXEC   PGM=PROGB
//STEPLIB       DD     DSN = DA0001T LIB LOAD2,
//                  DISP=SHR
```

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5.15: The STEPLIB DD Statement

## Example2

- A STEPLIB DD statement has the effect of negating the JOBLIB DD statement for a particular step.

```
//DA0001TA   JOB   LA2719,CG,CLASS=P  
//JOBLIB     DD   DSN=DA0001T.LIB.LOAD1,DISP=SHR  
//S1         EXEC  PGM=PROGA  
//S2         EXEC  PGM=PROGB  
//STEPLIB    DD   DSN =DA0001T.LIB.LOAD2,  
//                  DISP=SHR  
//S3         EXEC  PGM=PROGC
```

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5.16: Storage Dump

## Requesting a Storage Dump

- To request a storage dump, one of the following three DD statements must be included in the step:
  - A SYSUDUMP DD statement
  - A SYSMDUMP DD statement
  - A SYSABEND DD statement

//SYSUDUMP DD SYSOUT = \*

- All the virtual storage allocated to your program, that is, the user region of JOB's private address space, is used.

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### Requesting a Storage Dump:

When a step encounters an ABEND failure, it is often advantageous to request a virtual storage dump, which can then be helpful in determining the cause of an ABEND. To request a storage dump, one of the following three DD statements must be included in the step:

- A SYSUDUMP DD statement
- A SYSMDUMP DD statement
- A SYSABEND DD statement

//SYSUDUMP DD SYSOUT=\*

All virtual storage allocated to your program, that is, user region of job's address space, is used. It is a formatted dump. SYSUDUMP usually writes to sysout. It can, however, write to a disk dataset, providing a way to preserve the SYSUDUMP information for later viewing and analysis.

No DCB is required.

//SYSUDUMP DD DSN=DA0001T.DUMPFILE,SPACE=(TRK,(0,5),RLSE),  
// DISP=(,DELETE,CATLG),UNIT=SYSDA

5.16: Storage Dump

## The SYSABEND DD Statement

// SYSABEND DD SYSOUT = \*

- user region + system areas outside the user region that are associated with the job step

// SYSMDUMP DD SYSOUT = \*

- system areas + entire private address space

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### The SYSABEND DD Statement:

This is same as SYSUDUMP DD statement except for the fact that the dump is unformatted. This type of dump is very difficult to analyze unless it is saved on a disk and then processed by the PRDUMP service aid. SYSMDUMP is seldom used.

//SYSMUDUMP DD SYSOUT=\*

When a SYSUDUMP DD statement is included in a step which ABEND's, a formatted virtual storage dump will be provided. This dump also includes information about the failed step, as well as most of the MVS storage-resident information, which is of no use to the average user. SYSABEND is intended for system programmer.

//SYSABEND DD SYSOUT=\*

### Remark:

If neither a SYSUDUMP nor a SYSMDUMP nor a SYSABEND statement is coded within a JCL of an ABENDING step, a small amount of information is provided. This information is seldom useful in resolving the problem that caused the ABEND failure.

5.16. Storage Dump

## The SYSABEND DD Statement - Example

▪ Remark:

- When more than one of the above statements is included in the JCL of a step, only the last one is used.

```
//SYSDDUMP    DD      SYSOUT=*
//SYSDDUMP    DD      DSN=DA0001T.DUMP1,
//                           DISP=(,DELETE,CATLG),UNIT=SYSDA,
//                           SPACE=(CYL,(0,5),RLSE)
```



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5.16. Storage Dump

## SPECIAL DD STATEMENTS

- **JOBCAT & STEPCAT DD STATEMENT**
  - The dataset used in the step are first checked in the STEPCAT (ICF or VSAM catalog) before checking in system catalog.
  - If no STEPCAT in the step and there is a JOBCAT, then the datasets are first searched in JOBCAT before checking in the system catalog.

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5.17: OUTPUT Statement

## OUTPUT STATEMENTS

- **OUTPUT Statement**
- Used to specify processing options for a system output (SYSOUT) data set.
- These processing options are used only when the OUTPUT JCL statement is explicitly or implicitly referenced by a SYSOUT DD statement.
- JES combines the options from this OUTPUT JCL statement with the options from the referencing DD statement.

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OUTPUT JCL statements are useful in processing the output of one SYSOUT data set in several ways.

For example, a SYSOUT dataset can be sent to a distant site for printing, as shown in statement OUT1, while it is also printed locally, as shown in statement OUT2:

```
//OUT1 OUTPUT DEST=STLNODE.WMSMITH  
//OUT2 OUTPUT CONTROL=DOUBLE  
//DS DD SYSOUT=C,OUTPUT=(*.OUT1,*.OUT2)
```

5.17: Storage Dump

## Lab

- Day 2 Lab



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## Summary

- DD statement must appear in a step to define the resources used by that specific step.
- DSN parameter identifies the name of the dataset to be created or retrieved.
- DISP parameter specifies how to dispose of the dataset when the step terminates (normally or abnormally).
- UNIT and VOLUME parameters work together to specify the location of the dataset.
- The SPACE parameter is used to allocate or alter space to a dataset.
- The LABEL parameter is used to specify sequence on a volume and type of label of a tape dataset.



Summary



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## Summary

- The DCB parameter specifies characteristics that are stored in the Data Control Block of the file.
- The SYSOUT parameter can assign the sysout or output class to a dataset.
- Only sequential and partitioned datasets can be concatenated.
- The DUMMY parameter allocates no devices no input/output and read/write operations.
- The JOBLIB and STEPLIB DD and statement identifies the program library.
- The STORAGE DUMP is used place a request for a storage dump.

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## Review Question

- Question 1. Which of the following is/are positional parameter?
  - Option1 : DUMMY
  - Option2 : STORAGE DUMP
  - Option3 : JOBLIB
  
- Question 2. Which of the following statements is/are true?
  - Option1 : A JOBLIB statements can have several concatenations.
  - Option2 : A STEPLIB negates the effect of JOBLIB DD statement.

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**Job Control  
Language (JCL)**

Lesson 6: PROCEDURE

## Lesson Objectives

- Catalog procedures
- Instream procedures
- EXEC and DD statement overriding
- Symbolic parameters and Symbolic overrides
- Set and Include Statement



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6.1: PROCEDURES

## Description

- A procedure is basically a set of standard job steps which are invoked to execute a function within a single job.
- In a working environment the same JCL can be utilized by several users.
- The use of procedure helps minimize duplication of code & probability of error because a procedure consist of pre-tested statements.

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The names of the procedures can be recorded and stored like any other members of PDS.  
Sometimes the same JCL can be utilized by different users but with different parameters, in such cases JCL permits to override one parameter with another.

### 6.1: PROCEDURES Invoking a procedure

- Invoking procedure
  - //STEPNAME EXEC PROC=PROCNAME
  - //STEPNAME EXEC PROCNAME
- Restriction
  - Max of 255 steps



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6.1: PROCEDURES

## Description

- Following are not permitted to reside in a procedure:
  - JOB statement
  - EXEC statement that invokes a procedure.
  - JOBLIB
  - JOBCAT
  - DD \* or DATA
  - // null statement
  - PEND statement
    - If any of the above is included in a procedure then "Invalid statement in procedure" error is displayed while executing the procedure.

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6.1: PROCEDURES  
**Description (Contd...)**

- There are two types of procedures :
  - CATALOGED PROCEDURE
    - Member of a PDS, often referred to as procedure library or PROCLIB.
  - INSTREAM PROCEDURES
    - Contained within a job's input stream.



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6.1: PROCEDURES

## Catalogued Procedure

- A procedure can be cataloged by placing it in one of three types of proclibs:
  - SYS1.PROCLIB – IBM-supplied system procedure library.
  - System PROCLIBs - defined by an installation.
  - A user-defined PROCLIB – OS/390 or MVS/ESA SP V4 or Higher
- The catalogued procedure is a set of JCL statements that refer to a procedure stored as library (proclib) i.e. Code JCLLIB ORDER statement for Catalogued procedures stored in user private libraries.
- It is a member of a PDS. This procedure can be used by any number of jobs.
- The procedure name must be unique with in the procedure library in which it is placed.
- The PEND statement is not required.

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6.1: PROCEDURES

## Catalogued Procedure (Contd...)

- Example: Procedure Library: MAINUSR.JCL.CNTL(JCLPROC)

```

//JCLPROC      PROC
//STEP1 EXEC PGM=IEFBR14
//DD1   DD DSN=MAINUSR.PROC1.PROC,
//
//          DISP=(NEW,CATLG,DELETE),VOL=SER=LP2WK1,
//          UNIT=SYSDA,SPACE=(TRK,(1,1,1),RLSE),
//          DCB=(BLKSIZE=800,LRECL=80,RECFM=FB)
//SYSPRINT     DD SYSOUT=*
//          PEND
//          /*
Main program
//JOBNAME    JOB A123,'SUSAN JOHN'.....
//DD1         JCLLIB ORDER=(MAINUSR.JCL.CNTL,...)
//CREAT EXEC  PROC=JCLPROC
//SYSIN DD    DUMMY
///*

```



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```

//PROC1 PROC
//STEP01 EXEC PGM=FIRST
//DD1 DD DSN=SPEC.A.INFILE1,DISP=SHR
//STEP02 EXEC PGM=SECOND
//DD1 DD DSN=SPEC.A.INFILE2,DISP=SHR
//          PEND

```

The segment of JCL that executes this above procedure

```

//MYJOB JOB (),CLASS=A
//PROCLIB JCLLIB ORDER=SPECTRUM.A.CBL
//BATCH1 EXEC PROC1

```

At Runtime:

```

//MYJOB  JOB
//PROCLIB JCLLIB ORDER=SPECTRUM.A.CBL
//* PROC1 PROC=PROC1
//* This is what the system visualizes
// STEP01 EXEC PGM=FIRST
//DD1 DD DSN=SPEC.A.INFILE1,DISP=SHR
//STEP02 EXEC PGM=SECOND
//DD1 DD DSN=SPEC.A.INFILE2,DISP=SHR

```

6.1: Demo

## Demo

- Example 1  
(Catalogued procedure)



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6.1: PROCEDURES

## Instream Procedure

- An in-stream procedures is a part of a job's input stream and exists only for the duration of the job.
- PROC statement in an in-stream procedure is mandatory and serves two functions:
  - It signals the beginning of in-stream procedure.
  - It contains default symbolic overrides.
- PEND statement must be coded in an in-stream procedure to provide a delimiter.

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As the name says it is a set of JCL statements which is contained within an input stream of a job.

This procedure can be used by only one job but can be executed any number of times within a job.

Must begin with PROC & end with PEND statement  
Must be coded immediately after the JOB statement and before the first EXEC statement.

No more than 15 in-stream procedures can be coded in one JOB.

```
//MFCVT01 JOB (),CLASS=A
//PROC1 PROC
//STEP01 EXEC PGM=FIRST
//DD1 DD DSN=SPEC.A.INFILE1,DISP=SHR
//STEP02 EXEC PGM=SECOND
//DD1 DD DSN=SPEC.A.INFILE2,DISP=SHR
//      PEND
//STEP03 EXEC PROC1
```

6.1: PROCEDURES  
Example of Instream Procedure

```
//DA0001TA      JOB LA2719,CG,MSGCLASS=A,  
//                           MSGLEVEL=(1,1),NOTIFY=DA0001T  
/* INSTREAM PROCEDURE  
//PROCBR14      PROC  
//S1             EXEC   PGM=IEFBR14  
//SYSPRINT       DD      SYSOUT=*  
//DD1    DD       DSN=DA0001T TEMP,  
//                           DISP=(OLD,DELETE)  
//                           PEND  
//Invoking of procedure named PROCBR14  
//STEP1          EXEC   PROC=PROCBR14
```



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6.1: Demo  
**Demo on Instream Procedure**

- Example 2  
(Instream procedure)



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6.1: Notes

## Notes on Instream Procedure

- An Instream procedure can call a Cataloged procedure.
- A Cataloged procedure cannot call an Instream procedure.
- A Cataloged procedure can call a Cataloged procedure.
- There can exist a maximum of 15 nested 'PROC statements' – PROC operation
  - If each procedure resides in 15 different PDS, then the JCLLIB ORDER must identify those PDS to the OS.



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6.1: THE PROC STATEMENT

## Description

- The purpose of the PROC statement is to contain symbolic override defaults.
- When a procedure is executed, the system substitutes symbolic parameters using symbolic overrides coded in the EXEC statement.
  - For symbolic overrides not found in the EXEC statement, default symbolic overrides in the PROC statement are used.

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6.2: Rules to Override JCL Procedures

## Common Rules for EXEC & DD Statement

- Parameter:
  - Can be replaced, added or nullified.
  - When you replace an existing parameter, the overriding parameter must be specified in its complete format.
  - DCB is an exception.
  - An overriding parameter replaces the same parameter, if it exists. It is added to the statement if it does not exist
  - A syntactical JCL error inside a procedure cannot be corrected by overriding the erroneous parameter.



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6.2: Rules to Override JCL Procedures

## Rules for EXEC Statement

- To override an EXEC parameter:
  - Code " parameter.stepname=value" when you add or replace a parameter.
  - Code "parameter.stepname=" when you nullify a parameter.
- PGM parameter cannot be overridden.
- Complete all overrides to EXEC parameters for a step before you override parameters in a subsequent step.
- Within a particular step the sequence of overriding parameters is not important.

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## 6.2: Rules to Override JCL Procedures

**Description**

- Add or Remove an EXEC statement by overriding.
- All overriding EXEC parameters must be coded in the EXEC statement that invokes the procedure.
- All overrides to EXEC parameters must be completed before overriding parameters in a subsequent step.

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## 6.2: Rules to Override JCL Procedures

## Rules for DD statement overriding

- To override any parameter in a DD statement, an independent DD statement must be supplied in the following format:

```
//stepname.ddname DD overriding parameters
```

- Add an entire DD statement:

```
// stepname.ddname DD complete parameter field must be coded
```

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## 6.2: Rules to Override JCL Procedures

**Description**

- To override any parameter in a concatenation other than the first one, code the following:

```
//stepname.ddname DD  
//          DD  
//          .  
//          .  
//          DD overriding parameters
```

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6.2: Rules to Override JCL Procedures

## Description (Contd...)

- Sequence of overriding DD statements must be the same as the sequence of the corresponding overridden statements.
- The sequence of overriding parameters is not important, except for positional parameters.
- An additional DD statement must be the last one in a step's overriding statements. When several additional DD statements are supplied, their relative sequence is not important, unless referbacks are used.
- A DD statement cannot be removed by overriding.



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```
Overriding DD statements of a Procedure
//MYJOB JOB
//MYPROC PROC
//STEP1 EXEC PGM=IEFBR14
//DD1 DD DSN=MAINUSR.JCL.PDS,DISP=SHR,
//                                     VOL=SER=LP1WK1,LRECL=80
//      PEND
//STEP2 EXEC MYPROC
//STEP1.DD1 DD VOL=SER=LP2WK1,LRECL=
//STEP1.DD2 DD DSN=MAINUSR.COPYLIB,DISP=SHR
AT RUNTIME
//MYJOB JOB
//STEP1 EXEC PGM=IEFBR14
//DD1 DD DSN=MAINUSR.JCL.PDS,DISP=SHR,VOL=SER=LP2WK1
//DD2 DD DSN=MAINUSR.COPYLIB,DISP=SHR
```

In the above example

In DD1, LP1WK1 was changed to LP2WK1  
 The LRECL parameter was nullified (discarded)

A new DD statement DD2 was added

Overriding EXEC statements of a Procedure

```
//MYJOB JOB NOTIFY=USERID
//MYPROC PROC
```

```
//STEP1 EXEC PGM=IEBGENER,TIME=NOLIMIT,REGION=4M
//SYSUT1 DD DUMMY
//SYSUT2 DD DUMMY
```

```
//      PEND
//STEP2 EXEC MYPROC,TIME.STEP1=10,REGION.STEP1=
AT RUNTIME
```

//MYJOB JOB NOTIFY=USERID

```
//STEP1 EXEC PGM=IEBGENER,TIME=10
//SYSUT1 DD DUMMY
//SYSUT2 DD DUMMY
```

In the example above:

The value of the TIME parameter has been changed from NOLIMIT to 10

The REGION parameter has been nullified

6.2: Rules to Override JCL Procedures  
**Description (Contd...)**



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Overriding EXEC statements of a Procedure

```
//MYJOB JOB NOTIFY=USERID
//MYPROC PROC
//STEP1 EXEC PGM=IEBGENER,TIME=NOLIMIT,REGION=4M
//SYSUT1 DD DUMMY
//SYSUT2 DD DUMMY
//    PEND
//STEP2 EXEC MYPROC,TIME.STEP1=10,REGION.STEP1=
```

AT RUNTIME

```
//MYJOB JOB NOTIFY=USERID
//STEP1 EXEC PGM=IEBGENER,TIME=10
//SYSUT1 DD DUMMY
//SYSUT2 DD DUMMY
```

In the example above:

The value of the TIME parameter has been changed from NOLIMIT to 10  
The REGION parameter has been nullified

6.2: Rules to Override JCL Procedures

### Example – Procedure LAM (S1)

```
//S1      EXEC PGM=ED, PARM=(A,B,C,E)
//          REGION=900K, TIME=(5,30)
//STEPLIB  DD DSN=DEV.LOADLIB,DISP=SHR
//IN1      DD DSN=USER1.FILE2,DISP=SHR
//IN2      DD DSN=USER1.FILEX,DISP=OLD,
//          UNIT=TAPE, VOL=SER=000101
//REP      DD SYSOUT=*,DISP=NOMOD
//OUT      DD DSN=USER1.PLA,DISP=(,CTLG,DELETE),
//          UNIT=SYSDA,VOL=SER=BS3003,
//          SPACE=(CYL,(20,5),DCB=(BLKSIZE=4000,
//          LRECL=80, RECFM=FB)
//          
```



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### 6.2: Rules to Override JCL Procedures

#### Example

- Following is required in step S1:
  - PARM must be (A,B,C,D) and TIME nullified.
  - In IN1, DSN must be USER1.FILE3.
  - IN2 must retrieve USER1.FILEX as a cataloged dataset.
  - In OUT, BLKSIZE must be 23440.



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6.2: Rules to Override JCL Procedures

### Example - Procedure LAM (S2)

```
//S2      EXEC  PGM=FORM,REGION=900K
//INA     DD    DSN=USER1.PLA,DISP=SHR
//          DD    DSN=USER1.F226,DISP=SHR
//          DD    DSN=USER1.F232,DISP=SHR
//          DD    DSN=USER1.F118,DISP=SHR
//OUTA    DD    DSN=USER.F323,DISP=(CATLG,DELETE),
//                      UNIT=TAPE, VOL=SER=001110,
//                      DCB=BLKSIZE=32700, LRECL=100,
//                      RECFM=FB)
//PRNT DD SYSOUT=*
```



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## 6.2: Rules to Override JCL Procedures

**Example**

- Following is required in step S2:
  - COND = (0, LT) must be coded.
  - In INA DSN in the third concatenation must be USER1.F228.
  - In DD statement OUTA, UNIT be SYSDA.
  - An entire DD statement:
    - //STEPLIB DD DSN=DEV.LOADLIB,DISP=SHR must be coded.

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6.2: Rules to Override JCL Procedures

## Example - Procedure LAM (S3)

- Following is required in step S3:
  - EVEN must be added to the COND parameter.
  - In DD statement OUT3, RLSE must be removed and VOLUME parameter must be nullified.

```
//S3      EXEC PGM=REPO,REGION=400K, COND=(O,LT)
//IN3     DD      DSN=USER1.F333, DISP=OLD
//OUT3    DD      DSN=USER1.F111, DISP=(,CTLG,DELETE),
//                  UNIT=SYSDA, VOL=SER=DEV012,
//                  SPACE=(CYL,(50,15),RLSE),
//                  DCB=(BLKSIZE=23440,LRECL=80,RECFM=FB)
//PRINT DD
/
```



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## 6.2: Rules to Override JCL Procedures

**Solution**

```
//ZP          EXEC LAM PARM.S1=(A,B,C,D),TIME.S1=,
//                      COND.S2=(0,LT),COND.S3=((0,LT),EVEN)
//S1.IN1 DD    DSN=USER1.FILE3
//S1.IN2 DD    VOL=      ALTERNATIVE: VOL=SER=
//S1.OUT     DD   DCB=BLKSIZE=23440
//S2.INA     DD
//S2.OUTA    DD   DSN=USER1.F228
//S2.STEPLIB DD   UNIT=SYSDA
//S2.OUT3     DD   DSN=DEV.LOADLIB,DISP=SHR
//S3.OUT3     DD   SPACE=(CYL,(50,15)),VOL=
```

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## 6.2: Rules to Override JCL Procedures

## Some Typical Examples

- Example 1

```
//S1          EXEC PGM=ONE
//OUT1        DD      DSN=U1.S1,
//                  DISP=(,CTLG,DELETE),
//                  UNIT=TAPE,
//                  DCB=(BLKSIZE=32700)
```

- Required:

- OUT1 must be dummied.

- Override:

```
//S1.OUT1     DD DUMMY
```

- Regardless of the contents, no other parameters are needed.

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## 6.2: Rules to Override JCL Procedures

**Some Typical Examples (Contd...)**

## ■ Example 2:

```
//S1          EXEC PGM=ONE
//IN1         DD    DSN=U1.B1, DISP=SHR
//             DD    DSN=U1.B2, DISP=SHR
//             DD    DSN=U1.B3, DISP=SHR
```

## ■ Required:

- Second concatenation of IN1 must be dummy

## ■ Override:

```
//S1.IN1 DD
//DD    DSN=U1.B3
//DD    DUMMY
```

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Overriding and dummingy the second concatenation causes the third concatenation to also act as DUMMY.

```
//S1.IN1      DD
//             DD      DUMMY
```

## 6.2: Rules to Override JCL Procedures

## Some Typical Examples (Contd...)

- Example 3:

```
//S1          EXEC PGM=ONE  
//CNTL DD     DSN=U1.CNTLIB(S1), DISP=SHR
```

- Required:

- DD statement CNTL must be //CNTL DD\*

- Override:

```
//S1.CNTL    DD *
```

- Regardless of the contents DD \* will override all

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6.2: Rules to Override JCL Procedures

## Some Typical Examples (Contd...)

- Example 4:

```
//S1          EXEC   PGM=ONE
//OUT4 DD      DSN=U1.D1, DISP=NEW
//                                DISP=SYSDA, VOL=SER=TEST26,
//                                SPACE=CTRK,(500,50)),
//                                DCB=(BLKSIZE=23400,
//                                LRECL=100,RECFM=FB)
```

- Required:

- DCB parameter must be eliminated.

- Override:

```
//S1.OUT4      DD DCB=(BLKSIZE=,LRECL=,RECFM=)
```



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6.3: Symbolic Parameters & Symbolic Overrides

## Description

- Symbolic Overrides
  - Can be used only when symbolic parameters have been coded inside the procedure.
- Symbolic Parameter:
  - Name preceded by an ampersand (&).
  - Can be coded in place of any parameter, part of a parameter in the parameter field of an EXEC, DD or OUTPUT statement.
- The default values for the symbolic parameter can be coded in the PROC statement. To override the default parameter you will have to code the values for the symbolic parameter in the EXEC statement that invokes the procedure.
- The method of overriding existing DD statements is easily prone to errors due to the rigid sequencing requirements imposed by OS.



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An alternative approach is to anticipate which JCL parameters may change, and to define these as SYMBOLIC parameters in the procedure.

Symbolic parameters are used to override parameters on the DD statements & used both in Catalogued & In-stream PROC.

The same JCL can be used by different users to implement common task, such as opening, reading, writing of datasets.

A value assigned to a symbolic parameter may be overridden by another value, as long as the redefinition is within the same job. If it is not overridden then the same value will be assigned to it each time it is called.

If Positional parameters are coded as symbolic then a period should be inserted between them.

Symbolic overrides can be used only when symbolic parameters have been coded inside the procedure.

```
//MYPROC PROC A=LP2WK1,B=SYSDA
//STEP1 EXEC PGM=IEFBR14
//DD1 DD DSN=MAINUSR.ABC.INPUT,DISP=SHR,VOL=SER=&A,UNIT=&B
//    PEND
//STEPX EXEC MYPROC,A=LP1WK1,B=SYSSQ
AT RUNTIME
//STEP1 EXEC PGM=IEFBR14
//DD1 DD DSN=MAINUSR.ABC.INPUT,DISP=SHR,
//    VOL=SER=LP1WK1,UNIT=SYSSQ
```

In the above example, A and B are symbolic parameters. Instead of hard-coding the values for the VOL and UNIT parameters, they have been assigned the values contained in the symbolic parameters.

In case we do not change the value of the Symbolic parameters when the Procedure is called, the default values specified at the Procedure-declaration statement (PROC) are taken.

6.3: Symbolic Parameters &amp; Symbolic Overrides

## Symbolic Parameter - Example 1

- First period works as a delimiter.

```
//S1 EXEC PGM=BL  
//IN DD DSN=&HQ..INFILE, DISP=SHR  
//OUT DD DSN=&HQ..OUTFILE,DISP=,CATLG,DELETE),  
// UNIT=SYSDA, DCB=(BLKSIZE=32700)
```

```
//PSK EXEC BLTX, HQ=PROD
```

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6.3: Symbolic Parameters &amp; Symbolic Overrides

## Symbolic Parameter - Example 2

- Procedure BLTX:

```
//S1    EXEC   PGM=BL  
//IN    DD      DSN=&HQ.INFILE, DISP=SHR  
//OUT   DD      DSN=&HQ.OUTFILE, DISP=CATLG,DELETE),  
//                  UNIT=SYSDA, DCB=(BLKSIZE=32700)
```

```
//PSK    EXEC   BLTX, HQ='PROD.'
```



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6.3: Symbolic Parameters & Symbolic Overrides

## Symbolic Overriding

- Rules for Symbolic Overriding:
  - EXEC statement keyword (TIME, REGION etc.) cannot be used as a symbolic parameter.
  - Symbolic override in either the EXEC or PROC statement that has no corresponding parameter in the procedure results in a 'SYMBOL NOT DEFINED' JCL error.
  - In a symbolic and regular override conflict, the regular override always prevails.

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## 6.3: Symbolic Parameters &amp; Symbolic Overrides

## Symbolic Overriding (Contd...)

- A symbolic parameter which is immediately followed by an alphabetic, numeric or national character must have a period at its end.
- A symbolic parameter can be coded many times in a procedure. During substitution, all occurrences receive the same value.
- When nothing must be substituted for a symbolic parameter, "symbolic override=" must be coded in the EXEC or PROC statements.

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## 6.3: Symbolic Parameters &amp; Symbolic Overrides

## Symbolic Overriding - Example 1

- Assume that possible values that PARM parameter assumes are ALD, BLD, CLD, etc.

```
//S1 EXEC PGM = P1, PARM = &PEL
```

- The above example does not work.

```
//S1 EXEC PGM=P1, PARM=&PELLD
```

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## 6.3: Symbolic Parameters &amp; Symbolic Overrides

## Symbolic Overriding - Example 1 (Contd...)

- Procedure SSP can be coded as:

```
//SS1 EXEC PGM=P1, PARM = &PEL.LD
```

- Now if the procedure is invoked:

```
//A EXEC SSP, PEL=A
```

- Substitution results in:

```
//S1 EXEC PGM=P1, PARM = ALD
```

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6.3: Symbolic Parameters & Symbolic Overrides  
**Symbolic Overriding - Example 1 (Contd...)**

//A EXEC SSP, PEL=FLD

- Substitution results in:

//S1 EXEC PGM=P1, PARM=FLD



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6.3: Symbolic Parameters & Symbolic Overrides  
**Symbolic Overriding - Example 2**

- Procedure SSP:

```
//B EXEC SSP, PEL=FLD, TIME = (5, 10)
```

- Substitution results in:

```
//S1 EXEC PGM=P1, PARM=FLD,TIME=(5, 10)
```



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6.3: Symbolic Parameters & Symbolic Overrides  
**Symbolic Overriding - Example 3**

- Substitution results in:

```
//ABC  PROC  R=800K, Q=AUX, U=TAPE
//S1   EXEC  PGM=P2, REGION=&R
//IN   DD    DSN=&Q..FILEX, DISP=SHR
//OUT  DD    DSN=&Q..FILEY, DISP=(,CATLG,DELETE),
//          UNIT = &U
//A    EXEC  SWP, Q=MAX
```

```
//S1   EXEC  PGM=P2, REGION=800K
//IN   DD    DSN=MAX.FILEX, DISP=SHR
//OUT  DD    DSN=MAX.FILEY,DISP=(,CATLG,DELETE),
//          UNIT = TAPE
```



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6.3: Demo on Symbolic Overriding

## Demo

- Example 3  
(Symbolic Overriding)



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**6.4: Statements**

## The SET statement

- The SET statement is another way of assigning values to Symbolic parameters.

```
//MYPROC PROC A=LP2WK1,B=SYSDA
//STEP1 EXEC PGM=IEFBR14
//DD1 DD DSN=MAINUSR.INPUT.FILE1,DISP=SHR,
//          VOL=SER=4&A,UNIT=&B
//          PEND
//SET1  SET A=LP1WK1
//SET2  SET B=SYSQ
//STEPX EXEC MYPROC
```

- AT RUNTIME, the SET statement can appear anywhere in a JCL between the JOB statement and the first point where a SET – statement-assigned symbolic parameter is referenced.

```
JSTEP1 EXEC PGM=IEFBR14
JOB1 DD DSN=MAINUSR.INPUT.FILE1,DISP=SHR,
          VOL=SER=4&WKT,
          UNIT=SYSQ
```

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### The SET Statement

```
//MCVT01A JOB NOTIFY=&SYSUID
//SETPROC PROC A=MCVT01
//STEP1 EXEC  PGM=IEFBR14
//DD1   DD DSN=MFCVT01.GTP74.SET6,
//          UNIT=SYSDA,VOL=SER=&A,
//          DCB=(LRECL=80,BLKSIZE=800,RECFM=FB),
//          SPACE=(TRK,(2,1)),DISP=(NEW,CATLG,DELETE)
//          PEND
//SET   SET A=USER02
//STEP2  EXEC PROC=SETPROC
//SYSIN  DD DUMMY
//
```

6.4: Statements

## The INCLUDE statement

- The INCLUDE statement allows you to copy statements from any member.
- Similar to the way PROCs are used, INCLUDE allows you to code a single set of JCL statements that you can use in multiple jobs.

```
COMMON.PDS  
MEMBER (COMMON)  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD DUMMY  
//SYSOUT DD SYSOUT=*
```

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### The Include Statement

```
//MCVT01A JOB NOTIFY=&SYSUID  
//DD1 JCLLIB ORDER=(MCVT01.GTP74.SATYA)  
//STEP1 EXEC PGM=IEFBR14  
//SYSPRINT DD SYSOUT=*  
//SYSOUT DD SYSOUT=*  
//DD1 DD DSN=MCVT01.GTP.FILEX, DISP=(NEW,CATLG,DELETE),  
// VOL=SER=USER1,UNIT=SYSDA, SPACE=(TRK,(2,1)),  
// DCB=(LRECL=80,BLKSIZE=800,RECFM=FB)  
//INC1 INCLUDE MEMBER=PDSSTAT
```

### And INCLUDE STATEMENTS(PDSSTAT)

```
//SYSPRINT DD SYSOUT=*  
//SYSIN DD DUMMY  
//
```

## 6.4: Statements

## The INCLUDE statement (contd..)

- Example:

```
//MYJOB JOB  
//DD1 JCLLIB ORDER=COMMON.PDS  
//STEP1 EXEC PGM=MYPGM  
//INDD DD DSN=A.B.C,DISP=SHR  
//INC1 INCLUDE MEMBER=COMMON
```

- AT RUNTIME

```
//MYJOB JOB  
//DD1 JCLLIB ORDER=COMMON.PDS  
//STEP1 EXEC PGM=MYPGM  
//INDD DD DSN=A.B.C,DISP=SHR  
//INC1 INCLUDE MEMBER=COMMON  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD DUMMY  
//SYSOUT DD SYSOUT=*
```

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6.4: Demo

## Demo on Statements

- Set and Include Statements.



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6.5: Lab

## Lab

- Day 3 and Day 4 Labs



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## Summary

- CATALOG PROCEDURES is a member of a PDS, which is often referred to as procedure library, or just PROCLIB.
- INSTREAM PROCEDURES is contained within job's input stream.
- Symbolic overrides can be used only when symbolic parameters have been coded inside the procedure.



Summary



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## Review Question

- Question 1: Which of the following must be present in case of instream procedure?
  - PROC
  - PEND
  - INSTREAM
  
- Question 2: A PROC statement in cataloged procedure is optional.
  - True/ False



## **Job Control Language (JCL)**

Lesson 7: Utility

## Lesson Objectives

- IEFBR14 Utility
- IEBGENER Utility
- IEBCOPY
- IEHLIST
- SORT Utility



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## Overview of JCL Utilities

- Utilities are IBM-supplied programs that are intended to perform certain routine and frequently occurring tasks.
- Utilities are used in DASD, tape drives, print and punch operations.
- Utilities are used to allocate, update, delete, catalog and uncatalog data sets, and also to list the contents of VTOC (Volume Table of Contents).
- MVS provides a number of pre-written utility programs that can be used for maintaining and organizing data.
- IEBGENER, IEBCOPY, IEFBR14, IEBCOMPR



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Utilities are broadly classified into two different categories:

Data set Utilities (prefixed with IEB)  
System Utilities (prefixed with IEH)

Data set utilities are used to copy, print, update, reorganize, and compare data at the dataset and/or record level.

System utilities are used to list VTOC information, copy, delete, catalog and uncatalog datasets, to write tape labels and to add or delete dataset passwords.

7.1: IEFBR14 Utility  
**Example 1**

- Commonly used to delete, allocate and to un-catalog dataset.
- Example 1:

```
//DELETE      EXEC PGM=IEFBR14
//* TO DELETE A FILE
//SYSPRINT    DD   SYSOUT=*
//DD1         DD   DSN=DA0001T.EMPLOYEE,
//                  DISP=(MOD,DELETE,DELETE),
//                  UNIT=SYSDA, SPACE=(TRK,0)
```



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7.1: IEFBR14 Utility

## Example 2

```
//CREATE      EXEC PGM=IEFBR14
//* TO ALLOCATE A NEW FILE
//SYSPRINT    DD SYSOUT=*
//DD1         DD   DSN=DA0001T.EMPLOYEE,
//                  DISP=(NEW,CATLG,DELETE),
//                  UNIT=SYSDA, SPACE=(TRK,(2,1)),
//                  DCB=(BLKSIZE=800,LRECL=80,
//                  RECFM=FB,DSORG=PS)
```

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7.2: IEFBR14 Utility

## Demo

- IEFBR14 utility
  - Show a code illustrating, the deletion of a dataset, before COBRUN1 step is executed.



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An except of a code illustrating, the deletion of a dataset, before COBRUN1 step is executed.

```
//DA0001TA   JOB  LA2819,CG,NOTIFY=DA0001T,MSGCLASS=X,  
MSGLEVEL=(1,0)  
//DELETE      EXEC PGM=IEFBR14  
//SYSPRINT    DD   SYSOUT=*<br/>  
//LOGFILE     DD   DSN=DA0001T.MYFILE2,DISP=(MOD,DELETE,DELETE),  
//  SPACE=(TRK,(0),),UNIT=SYSDA  
//  
//COBRUN1    EXEC PGM=ASS1, PARM='AAAA'  
//STEPLIB     DD   DSN=DA00021T,PATNI.LOADLIB,DISP=SHR  
//SYSPRINT    DD   SYSOUT=*<br/>  
//INFILE      DD   DSN=DA00021T,EMPLOYEE,DISP=OLD  
//OUTFILE     DD   DSN=DA00021T.MYFILE2,DISP=(NEW,CATLG,  
DELETE),  
// DCB=(LRECL=80, DSORG=PS, BLKSIZE=80, RECFM=FB),  
// VOL=SER=BS3011, SPACE=(TRK, (45, 15))  
//SYSOUT      DD   SYSOUT  
//
```

**Description**

**7.2: IEBCGENER Utility**

- **Uses:**
  - To copy, concatenate and empty sequential datasets.
  - To reformat records while copying
    - Can be compared to selecting specific columns
  - To specify conditions while copying
    - Can be compared to selecting specific rows
  - To re-block copied records
    - Changing the LRECL and BLKSIZE
  - To concatenate datasets
  - To write instream data into a dataset



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To copy sequential datasets

Example

```
//STEP010 EXEC PGM=IEBCGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1 DD DSN=<Input dataset to be Read from>
//SYSUT2 DD DSN=<Output dataset to be Written into>
//SYSIN DD DUMMY
//
```

The input dataset can be a PS or a member of PDS

The output dataset can also be a PS or a PDS member

Output datasets as PS apply to backing-up operations on tapes

The SYSPRINT DD statement defines the message dataset.

The SYSUT1 DD statement defines the input dataset.

The SYSUT2 DD statement defines the output dataset (can not have multiple SYSUT2).

The SYSIN DD statement defines the control dataset. This is where IEBCGENER looks for any utility control statements. When DUMMY is specified, there are no control statements being used.

To copy sequential datasets

To copy an input sequential dataset to many members of a PDS Code Generate Maxname and Member name.

```
/DSRC012A JOB NOTIFY=DSRC012
//STEP010 EXEC PGM=IEBCGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1 DD DSN=<Input dataset>
//SYSUT2 DD DSN=<Output PDS>
//SYSIN DD *
   Generate Maxname=3
   (To create 3 members in the output)
   Member name=(mem1,mem2,mem3)
   (mem1,mem2,mem3 will have the contents of sysut1)
/*
```

7.2: IEBGENER Utility  
**Sample**

```
//DA0001TA JOB      LA2719,CG,NOTIFY=DA0001T,  
//                                         MSGCLASS=X  
//*****  
//* USING THE IEBGENER Utility TO EMPTY EXISTING DATASET  
//*****  
/CPYSTEP EXEC PGM=IEBGENER  
//SYSPRINT DD      SYSOUT=*  
//SYSUT1  DD      DUMMY, DCB=(BLKSIZE=800,  
//                           LRECL=80,RECFM=FB)  
//SYSUT2  DD      DSN=DA0001T.MYOUT,DISP=OLD  
//SYSIN   DD      DUMMY  
//
```

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7.2: IEBGENER Utility

## Demo

- IEBGENER Utility to merge the data from two sequential files
- To empty the existing dataset



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```
//DA0001TA    JOB          LA2719, CG, NOTIFY=DA0001T,  
//                                         MSGCLASS=X  
//*********************************************************************  
/* USING THE IEBGENER Utility TO MERGE DATASETS SYSUT1 PROVIDING  
/* THE INPUT AND SYSUT2 BEING THE OUTPUT  
//*********************************************************************  
//CPYSTEP    EXEC      PGM=IEBGENER  
//SYSPRINT   DD        SYSOUT=*  
//SYSUT1     DD        DSN=DA0001T.INDATA1, DISP=SHR  
//SYSUT2     DD        DSN=DA0001T.NEW,DISP=MOD  
//SYSIN      DD        DUMMY  
//
```

7.2: IEBGENER Utility

## Reformatting Data

- Reformat data during copy
  - By reformatting, you can select data-bytes to be output
    - Code Generate Maxflds and Record Field in the control statement (similar to Inrec Fields in Sort utility)
  - Say, to output only the Empnum and Salary data-bytes, in the order of Salary and Empnum

```
//STEP010 EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1 DD DSN=<Input dataset>
//SYSUT2 DD DSN=<Output dataset>
//SYSIN DD
        *  
        Generate Maxflds=2  
        Record field=(5,1,CH,6)  
        field=(5,46,CH,1)  
        (Length,Location in input,Format,Location in the output)
```

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Example:-

```
//JOBNAME JOB NOTIFY=IGTRN30
//STEP01 EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1 DD DSN=IGTRN30.CG.INFILE,DISP=SHR
//SYSUT2 DD DSN=IGTRN30.CG.OUTFILE,DISP=OLD
///* LENGTH,START POSITION,,DESTINATION IN OUTFILE
//SYSIN DD
        *
        GENERATE MAXFLDS=2
        RECORD FIELD=(4,4,,10),FIELD=(10,4,,20)
/*
//
//
```

## 7.2: IEBGENER Utility Reformatting Data (Contd...)

- And to have some character-literals in the output, say, two asterisks between Salary and Empnum fields (similar to 'X' in the Sort utility), code Maxlits:

```
//STEP010 EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1 DD DSN=<Input dataset>
//SYSUT2 DD DSN=<Output dataset>
//SYSIN DD *
      Generate Maxlits=2, Maxlits=2
      Record field=(5,1,CH,8)
      field=(5,46,CH,1)
      (Length,Location in input, Format, Location in the output)
      field=(2,"**",6)
```



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Example2:-

```
/IGTRN30A JOB NOTIFY=IGTRN30
//STEP010 EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1 DD DSN=IGTRN30.CG.INFILE,DISP=SHR
//SYSUT2 DD DSN=IGTRN30.CG.PDS,DISP=OLD
//SYSIN DD *
      GENERATE MAXNAME=3
      MEMBER NAME=(MEM1,MEM2,MEM3)
/*
```

7.2: IEBGENER Utility  
**Concatenating Datasets**

- To concatenate datasets

```
//DSRC012A   JOB    NOTIFY=DSRC012
//STEP010    EXEC    PGM=IEBGENER
//SYSPRINT   DD      SYSOUT=*
//SYSUT1     DD      DSN=<First unsorted dataset>
//                  DD      DSN=<Second unsorted dataset>
//SYSUT2     DD      DSN=<The concatenated dataset>
//SYSIN      DD      DUMMY
//
```



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7.2: IEBGENER Utility

## Writing Instream Data

- To write instream data

```
//DSRC012A   JOB      NOTIFY=DSRC012
//STEP010     EXEC      PGM=IEBGENER
//SYSPRINT    DD        SYSOUT=*
//SYSUT1      DD          *
<Instream data>.....
/*
//SYSUT2      DD        DSN=<Output dataset to be Written>
//SYSIN       DD        DUMMY
//
```

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7.2: IEBGENER Utility

## Demo

- IEBGENER Utility to copy the reformatted data
- IEBGENER Utility to concatenate the data
- IEBGENER Utility to write the instream data into a sequential file



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7.3: IEBCOPY Utility

## Description

- The IEBCOPY is used to copy members of partitioned datasets.
- The COPY statement identifies the input and output files by referring to their DDNAMEs in the JCL.
- The format is:
  - COPY OUTDD=output-DDname , INDD=input-Ddbname

```
/MFCVT01A JOB NOTIFY=MFCVT01
//STEP1 EXEC PGM=IEBCOPY
//SYSPRINT DD           SYSOUT=*
//IN   DD DSN=MFCVT01.FILE1,DISP=SHR
//OUT  DD DSN=MFCVT01.FILE2,DISP=SHR
//SYSIN DD *
COPY OUTDD=OUT,INDD=IN
/*
```

- The above example copies all of the members from the PDS, 'MFCVT01.FILE1' to an existing PDS, 'MFCVT01.FILE2'.
- The IN and OUT DD statements define data sets to be used by IEBCOPY.
- The COPY control statement specifies the input and output DDNAMES.



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7.3: IEBCOPY Utility

## Copying Members

- Copying Specific Members
  - The SELECT statement identifies the members of the PDS to be copied. The format is:
  - **SELECT MEMBER=NAME** (to specify a single member)

```
//MFCVT01A JOB '02AMIP'.....  
//STEP1 EXEC PGM=IEBCOPY  
//SYSPRINT DD SYSOUT=*  
//IN   DD DSN=MFCVT01.FILE1,DISP=SHR  
//OUT  DD DSN=MFCVT01.FILE2,DISP=SHR  
//SYSIN DD *  
      COPY OUTDD=OUT,INDD=IN  
      SELECT MEMBER=ALLOCATE  
/*
```

- The above example copies the member called "ALLOCATE" from the PDS, 'MFCVT01.FILE1' to an existing PDS, 'MFCVT01.FILE2'.

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7.3: IEBCOPY Utility

## Copying Members (Contd...)

- Copying Multiple Specific Members
- SELECT MEMBER=(NAME,NAME,NAME) (to specify multiple members)

```
// MFCVT01A JOB 02AMIP.....  
//STEP1 EXEC PGM=IEBCOPY  
//SYSPRINT DD SYSOUT=*  
//IN   DD DSN=MFCVT01.FILE1,DISP=SHR  
//OUT  DD DSN=MFCVT01.FILE2,DISP=SHR  
//SYSIN DD *  
COPY OUTDD=OUT,INDD=IN  
SELECT MEMBER=(FILE1,FILE2,FILE3)  
/*
```

- The above example copies selected members FILE1, FILE2 and FILE3 from the PDS, 'MFCVT01.FILE1' to an existing PDS, 'MFCVT01.FILE2'.

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7.3: IEBCOPY Utility

## Copying Members (Contd...)

▪ Copying and Renaming Specific Members

```
//MFCVT01A JOB '02AMIP'.....  
//STEP1 EXEC PGM=IEBCOPY  
//SYSPRINT DD SYSOUT=*  
//IN DD DSN=MFCVT01.FILE1,DISP=SHR  
//OUT DD DSN=MFCVT01.FILE2,DISP=SHR  
//SYSIN DD *  
      COPY OUTDD=OUT,INDD=IN  
      SELECT MEMBER=(JOBA,(PROD,TEST,R))  
/*
```

▪ The above example copies the member called "PROD" from the PDS, 'MFCVT01.FILE1' to an existing PDS, 'MFCVT01.FILE2'.  
▪ The SELECT control statement specifies:  
▪ Copy the member JOBA  
▪ the member PROD is to be copied in the following manner  
▪ rename PROD to TEST,  
▪ copy the renamed member TEST to the output dataset,  
▪ if a member by that name exists in the output dataset replace it.

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7.3: IEBCOPY Utility

## Copying Members (Contd...)

- Copying Using EXCLUDE

```
//MFCVT01A JOB '0.2AMIP'.....  
//STEP1 EXEC PGM=IEBCOPY  
//SYSPRINT DD SYSOUT=*  
//IN DD DSN=MFCVT01.FILE1,DISP=SHR  
//OUT DD DSN=MFCVT01.FILE2,DISP=SHR  
//SYSIN DD *  
      COPY OUTDD=OUT,INDD=IN  
      EXCLUDE MEMBER=ALLOCATE  
/*
```

- The above example copies all members 'MFCVT01.FILE1' except the member 'ALLOCATE'

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7.3: IEBCOPY Utility

## Copying Members (Contd...)

- Compressing Data Sets

```
//MFCTCVT01A JOB '0.2AMIP'.....  
//STEP1 EXEC PGM=IEBCOPY  
//SYSPRINT DD SYSOUT=*  
//INPDS DD DSN=MFCVT01.FILE1,DISP=SHR  
//SYSUT3 DD UNIT=SYSDA,SPACE=(TRK,(1,1))  
//SYSUT4 DD UNIT=SYSDA,SPACE=(TRK,(1,1))  
//SYSIN DD *  
      COPY INDD=INPDS,OUTDD=INPDS  
/*
```

- The above example compresses the library 'MTPL.FILE1'.
- Notice that the same DD name is specified in both the INDD and OUTDD parameters.



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7.2: IEBGENER Utility

## Demo

- IEBGENER Utility to copy the partitioned dataset
- To copy the selected members
- Usage of exclude members
- Usage of compressing the dataset



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7.4: IEHLIST Utility

## Description

- The IEHLIST utility is used to
  - list entries in a DASD VTOC (Volume Table of Contents)
  - list entries in a PDS Directory.
  - list entries in a system catalog
- Example 1:

```
//STEP1 EXEC PGM=IEHLIST
//SYSPRINT DD SYSOUT=
//DD1 DD DISP=OLD,UNIT=SYSDA,VOL=SER=ABC
//DD2 DD DISP=OLD,UNIT=SYSDA,VOL=SER=DEF
//SYSIN DD *
      LISTVTOC FORMAT,VOL=SYSDA=ABC
      LISTVTOC FORMAT,VOL=SYSDA=DEF          X
      DSNAME=(MTPL.FILE1,MTPL.FILE2)
*
//
```

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## 7.4: IEHLIST Utility Description (Contd...)

- The above example uses IEHLIST to print two VTOC listings:
- The IEHLIST looks for utility control statements coded below the SYSIN DD statements:
- The first LISTVTOC control statement requests an formatted (FORMAT) VTOC listing for pack ABC. This includes DSCB and space allocation information. If FORMAT is omitted, an abbreviated version is listed.
- The second LISTVTOC control statement requests a formatted VTOC listing for two datasets: MTPL.FILE1 and MTPL.FILE2.

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7.4: IEHLIST Utility

## Description (Contd...)

- Example 2:

```
//STEP1 EXEC PGM=IEHLIST
//SYSPRINT DD SYSOUT=*
//DD1   DD  DISP=OLD,UNIT=SYSDA,VOL=SER=ABC
//SYSIN  DD *
      LISTPDS DSNNAME=MTPL.FILE,VOL=SYSDA=ABC
/*
```

- The above example uses IEHLIST to list entries in a PDS directory.
- The LISTPDS control statement requests a listing of the directory for the PDS, MTPL.FILE.
- NOTE: DSNAME cannot be abbreviated as DSN on a control statement.

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7.5: SORT Utility

## Description

- Provided by MVS
- Commonly used to:
  - sort data
  - copy selective data
  - remove duplicates
  - change data throughout the file
- Reorders Physical Sequential dataset as per requirement on given field(s).
  - These fields are called *control* or *key* fields.

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7.5: SORT Utility

## Description (Contd...)

- Working
  - Assumes all input records to be out of sequence.
  - Puts them in a sequence you request.
    - Example: Employee data is sorted in the sequence of Emp. no., Emp.name or Salary etc.

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7.5: SORT Utility

## The SORT Utility - DFSort

- To reformat data to be sorted
  - Can be compared to selecting specific columns
  - To specify conditions for selecting data
  - Can be compared to selecting specific rows
- To concatenate datasets and sort

```
//SYSIN DD *  
SORT FIELDS=(1,5,CH,A)  
/*
```

- The control statement supplies a Sort-Key implying:
  - Start sorting the record at the absolute byte address (1),
  - Length, the number of bytes to be included in sorting (5) ,
  - Format of sorting (EBCDIC character),
  - Sequence of sorting (ascending / descending)

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7.5: SORT Utility

## Format

Sort fields=(position, length, format, sequence)

- or

Sort fields=(position,length,sequence....),format=format

- Syntax is used if all fields on which the dataset to be sorted are of same type:
- Position: Location of input record's 1st byte of the key field
- Length: Length in bytes of the key field.
- Sum of all key fields (lengths) should not exceed 4092.
- 

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## 7.5: SORT Utility Format (Contd...)

- Format: Two characters code identify the data format (type).
- Sequence:
  - A – Ascending
  - D - Descending



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7.5: SORT Utility

## DFSORT - Description

- DFHSORT:
  - Member of IBM's Data Facility family of products.
- DFSORT:
  - Licensed program. High-performance data arranger.
  - Developed by IBM for MVS users.
  - Sort, merge, and copy data sets.
  - Aids complex tasks such as inventory or billing system management.
  - Record-level editing capability to perform data management tasks.

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### Sorting Data Sets

You can use DFSORT to rearrange the records in your datasets. Sorting is arranging records in either ascending or descending order within a file.

The fields in the records can be in any IBM System/370 format (for example EBCDIC character, decimal, and binary)

You can sort data in several different formats. Following table shows the most common data formats and the codes you use to specify them.

Data Format	Code
EBCDIC (Character)	CH
Binary (Numeric)	BI
Zoned Decimal (Numeric)	ZD
Packed Decimal (Numeric)	PD

**Merging Data Sets**

You can also use DFSORT to merge data sets. DFSORT merges data sets by combining two or more files of sorted records to form a single data set of sorted records.

You can merge up to 16 data sets. The data sets you merge must be previously sorted into the same order (ascending or descending order).

The JCL needed for a merge is the same as that for a SORT, with the following exceptions:

- You do not use the SORTWKnn statement
- Instead of SORTIN DD statement, you use SORTINnn DD statements to define the input datasets. The SORTINnn DD statements name the input datasets to be merged and tell how many datasets are to be merged. The value nn in SORTINnn is a number from 0 to 16, indicating the number of datasets to be merged.

**Copying Data Sets**

DFSORT can also copy data sets without any sorting or merging taking place. You copy data sets in much the same way that you sort or merge them.

**What else can you do with DFSORT?**

While sorting, merging, or copying data sets, you can also:

- Select a subset of records from an input data set. You can include or omit records that meet specified criteria.
- Reformat records, add or delete fields, and insert blanks, constants, or binary zeros. For example, you can make a report more legible by inserting blank characters to separate fields.
- Sum the values in selected records while sorting or merging (but not while copying).
- Alter the collating sequence when sorting or merging records (but not while copying). For example, you can have the lowercase letters collate after the uppercase letters.

## Creating and Running DFSORT Jobs

Processing data sets with DFSORT involves two steps:

- ## Processing Data with DFSORT

You can run a DFSORT job by invoking processing in a number of ways, stated as follows:

- With a JCL EXEC statement using the name of the program or the name of the catalogued procedure.
  - With interactive panels supported under ISPF and ISMF.
  - Within programs written in COBOL, PL1, or basic Assembler language.

*Remarks:* JCL-invoked means that the DFSORT program is initiated by JCL EXEC statement. The phrase dynamically invoked means that the DFSORT program is initiated from another program.

The JCL statements you need for most jobs are described as follows:

//stepname EXEC

Signals the beginning of a job step and tells the operating system what program to run.

//stepname EXEC PGM=SORT

//STEPLIB DD

defines the library containing DFSORT program. If your DFSORT program is in system library, you can omit the STEPLIB statement.

//SYSOUT DD defines the output data set for messages.

//SORTIN DD defines the input data set

//SORTWKnn DD defines a work storage data set for a sort. For most

applications, one work storage data set is sufficient. Increasing the number of work storage data sets does not improve performance.

//SORTOUT DD defines the output dataset.

//SYSIN DD Control statements.

All the control information within SYSIN DD can be coded freely between column 2 and column 71.

7.5: SORT Utility

## SORT 1 JCL - Example

```
//DA0001T JOB LA2719,CG, NOTIFY=DA0001T, MSGCLASS=X
//* SORT ON THE EMPLOYEE NAME IN ASCENDING //ORDER
//SRTSTEP      EXEC    PGM=SORT
//SYSIN        DD *
//              SORT FIELDS=(1,5,CH,A)
/*
//SORTIN DD      DSN=DA0001T.EMPLOYEE,DISP=SHR
//SORTOUT     DD      DSN=DA0001T.OUTSORT,
//                  DISP=(NEW,CATLG, DELETE),
//                  SPACE=(TRK,(3,3)),UNIT=SYSDA
//                  SPACE=(TRK,(10,5)), UNIT=SYSALLDA
```

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### 7.5: SORT Utility SORT 1 JCL - Example (Contd...)

```
//SORTWK02 DD      SPACE=(TRK,(10,5)), UNIT=SYSALLDA
//SYSPRINT DD      SYSOUT=*
//SYSOUT   DD      SYSOUT=*
//SORTMSG  DD      SYSOUT=*
//
```



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### 7.5: SORT Utility SORT 1 JCL - Example (Contd...)

```
//STEP1 EXEC PGM=SORT
//SYSOUT DD SYSOUT=*
//SYSPRINT DD SYSOUT=A
//SORTIN DD DSN=MAINUSR.SEQ1.INPUT,DISP=OLD
//SORTOUT DD DSN=MAINUSR.SEQ2.OUTPUT,DISP=OLD
//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(20,10),RLSE)
//SYSIN DD *
      SORT FIELDS=(21,2,CH,A)
/*
```

- The above example will sort the records of the input dataset specified in the SORTIN DD statement based on the field specified in the control statement of the SYSIN DD. The sorted dataset is copied to the output dataset specified in the SORTOUT DD statement.

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7.5: SORT Utility

## Demo

- SORT Utility (SORT JCL 1)



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7.5: SORT Utility  
**Sorting by Multiple fields - JCL 2**

```
//DA0001T JOB LA2719,CG,NOTIFY=DA0001T, MSGCLASS=X
//* SORTS ON ASCENDING DEPTNO & DESCENDING ENAME
//SRTSTEP      EXEC   PGM=SORT
//SYSIN        DD   *
SORT FIELDS=(17,2,PD,A,2,6,CH,D)
/*
//SORTIN DD      DSN=DA0001T.DEPT,DISP=SHR,
//                           SPACE=(TRK,(3,3)),UNIT=SYSDA
//SORTOUT    DD      DSN=DA0001T.SORTOUT2,
//                           DISP=(NEW,CATLG, DELETE)
```



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7.5: SORT Utility  
**Sorting by Multiple fields - JCL 2 (Contd...)**

```
//SORTWK01 DD      SPACE=(TRK,(10,5)), UNIT=SYSALLDA
//SORTWK02 DD      SPACE=(TRK,(10,5)), UNIT=SYSALLDA
//SYSPRINT DD      SYSOUT=*
//SYSOUT   DD      SYSOUT=*
//SORTMSG  DD      SYSOUT=*
//
```



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7.5: SORT Utility JCL 2 and 3

## Demo

- SORT Utility
  - Simple SORT
  - SORT on multiple fields



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You can further sort the records in the data set by specifying multiple control fields. When you specify two or more control fields, you specify them in the order of greater to lesser priority.

7.5: SORT Utility

## Copying Data Sets

- With DFSORT, copy data sets directly without performing a sort or merge.
  - Use any of the following:
    - SORT FIELDS=COPY
    - MERGE FIELDS=COPY
    - OPTION COPY

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You can use COPY with all of the other DFSORT control statements except SUM. DFSORT can select and reformat the specific data sets you want to copy by using the control statements covered later.

7.5: SORT Utility

## Copying Data Sets - JCL 4

```
//DA0001TA JOB LA2719,CG, NOTIFY=DA0001T,MSGCLASS=X
//*****
//SORTSTEP      EXEC   PGM=SORT
//SYSIN DD *
  SORT FIELDS = COPY
/*
//SORTIN DD      DSN=DA0001T.DEPT,DISP=SHR
//SORTOUT DD     DSN=DA0001T.SORTOUT2,
                DISP=(NEW,CATLG,DELETE),
                SPACE=(TRK,(3,3)),UNIT = SYSDA
//
//SYSPRINT DD    SYSOUT=*
//SYSOUT DD     SYSOUT=*
//SORTMSG DD    SYSOUT=*
//
```

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The JCL for a copy application is the same as for a sort, except that you do not use the SORTWKnn DD statement.

7.5: SORT Utility JCL 4

## Demo

- SORT Utility  
**(SORT JCL 4)**



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7.5. SORT Utility

## Tailoring Input Data Set with INCLUDE and OMIT

- Tailor Data Sets:
  - You may need only a subset of the data set records for any application. Hence, you can tailor data sets.
  - Increase the speed of the sort, merge, or copy.
    - Fewer the records, lesser is the time taken to process them.
  - Steps to tailor an input data set:
    - Use an INCLUDE control statement to collect wanted records.
    - Use an OMIT control statement to exclude unwanted records.
    - Your choice of INCLUDE and OMIT depends on which is easier and more efficient to write for a given application.

**Note:** INCLUDE and OMIT control statements are mutually exclusive.

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7.5. SORT Utility

## Tailoring Input Data Set with INCLUDE and OMIT (Contd...)

- Select from the following comparison operators:

Comparison Operators	Meaning
EQ	Equal to
NE	Not Equal to
GT	Greater than
GE	Greater than or Equal to
LT	Less than
LE	Less than or equal to

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7.5. SORT Utility

## Rules to Tailor Input Data Set with INCLUDE and OMIT

- DFSORT uses following rules to pad and truncate strings.
  - Padding adds fillers in data, usually zeros or blanks.
  - Truncation deletes or omits leading or trailing portions.
  - Field-to-field Comparison: Shorter field is padded as appropriate (with blanks or zeros).
  - Field-to-Constant Comparison:
    - Constant is padded or truncated to the length of the field.
    - Decimal constants are padded or truncated on the left.
    - Character and hexadecimal constants are padded or truncated on the right.



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7.5: SORT Utility

## Allowable Comparisons: INCLUDE and OMIT

- Following table shows field-to-field and field-to-constant comparisons:

Field Format	BI	CH	ZD	PD
BI	✓	✓		
CH	✓	✓		
ZD			✓	✓
PD			✓	✓



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## 7.5: SORT Utility SORT JCL 5 - Copy Selective Data

- INCLUDE COND copies data that matches a condition.
- Example:
  - In this case it copies data with one character in the 19th position that equals 'M' or 'S'.

```
//DA0001TA JOB LA2719,CG,NOTIFY=DA0001T,MSGCLASS=X
//* SORTS ON THE INPUT FILE ON JOB AND SELECTS JOB BEGINNING
//* WITH M OR S INTO A NEW DATASET
//SRTSTEP EXEC PGM=SORT
//SYSIN   DD *
    OPTION EQUALS
    SORT FIELDS=(19,1,CH,EQ,C'M',OR,19,1,CH,EQ,C'S')
/*
/*
```



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7.5: SORT Utility

## SORT JCL 5 - Copy Selective Data (Contd...)

```
//SORTIN      DD DSN=DA0001T.INDATA3,DISP=SHR
//SORTOUT     DD DSN=DA0001T.SORTOUT3, DISP=(NEW,CATLG),
//                  SPACE=(TRK,(3,3)), UNIT=SYSDA,
//                  DCB=(BLKSIZE=800, LRECL=80,RECFM=FB,
//                  DSORG=PS)
//SORTWK01    DD SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SORTWK02    DD SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SYSOUT      DD SYSOUT=*
//
```

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7.5: SORT Utility JCL 5

## Demo

- SORT Utility (SORT JCL 5)



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7.5: SORT Utility

## SORT 6 - Sort Selective Data

- Sort on Job.
- Select jobs that begin with "M" and Deptno begins with 1.

```
//DA0001TA JOB LA2719,CG,NOTIFY=DA0001T,MSGCLASS=X  
//* SORTS ON JOB INCLUDES JOBS BEGINING WITH M AND DEPTNO  
//* BEGINNING WITH 1  
//SRSTEP EXEC PGM=SORT  
//SYSIN DD *  
    OPTION EQUALS  
    SORT FIELDS=(19,6,A),FORMAT=CH  
    INCLUDE COND=(19,1,CH,EQ,C'M',AND,51,1,CSF,EQ,1)  
/*
```

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7.5: SORT Utility  
**SORT 6 - Sort Selective Data (Contd...)**

```
//SORTIN DD DSN=DA0001T.INDATA3,DISP=SHR
//SORTOUT      DD DSN=DA0021T.SORTOUT4, DISP=(NEW,CATLG),
//                           SPACE=(TRK,(3,3)), UNIT=SYSDA,
//                           DCB=(BLKSIZE=800,LRECL=80,RECFM=FB,
//                           DSORG=PS)
//SORTWK01    DD SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SORTWK02    DD SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SYSOUT      DD SYSOUT=*
//
```



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7.5: SORT Utility JCL 6

## Demo

- SORT Utility (SORT JCL 6)



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7.5: SORT Utility

## SORT JCL 7 - OMIT COND

- INCLUDE and OMIT are mutually exclusive.
- Records that do not satisfy the condition are sorted and copied into the output dataset.
- Example: Sorts on Job and omits Jobs that begin with M or S.

```
//DA0001TA JOB LA2719,CG,NODELAY=DA0001T,MSGCLASS=X  
//* SORTS ON JOB OMITS JOBS BEGINNING WITH M OR S  
//SRTSTEP      EXEC PGM=SORT  
//SYSIN        DD *  
          OPTION EQUALS  
          SORT FIELDS=(19,6,A),FORMAT=CH  
          OMIT COND=(19,1,CH,EQ,C'M',OR,19,1,CH,EQ,C'S')  
/*
```

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7.5: SORT Utility  
**SORT JCL 7 - OMIT COND (Contd...)**

```
//SORTIN      DD DSN=DA0001T.INDATA3,DISP=SHR
//SORTOUT     DD DSN=DA0001T.SORTOUT5,DISP=(NEW,CATLG),
//                  UNIT= SYSDA,SPACE=(TRK,(3,3)),
//                  DCB=(BLKSIZE=800, LRECL=80,RECFM=FB,
//                  DSORG=PS)
//SORTWK01    DD SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SORTWK02    DD SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SORTWK03    DD SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SORTWK04    DD SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SYSOUT      DD SYSOUT=*
//
```



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7.5: SORT Utility JCL7

## Demo

- SORT Utility (SORT JCL 7)



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7.5: SORT Utility

## SORT JCL 8

```
//DA0001TA JOB LA2719,CG, NOTIFY=DA0001T,MSGCLASS=X
// Merges fields beginning with column 110 having length 5
//* INDATA1 and INDATA2 are sorted on the control field
//SRSTSTEP EXEC PGM=SORT
//SORTIN01 DD DSN=DA0001T.INDATA1,DISP=OLD
//SORTIN02 DD DSN=DA0001T.INDATA2,DISP=OLD
//SORTOUT DD DSN=DA0001T.SORTOUT4,DISP=(NEW,CATLG),
//           SPACE=(TRK,(3,3.)), UNIT = SYSDA,
//           DCB=(BLKSIZE=800, LRECL=80,
//           RECFM=FB,DSORG=PS)
//SYSOUT DD SYSOUT=*
//SYSIN DD *
      MERGE FIELDS = (110,5,A),FORMAT=CH
/*
```

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7.5: SORT Utility JCL 8

## Demo

- SORT Utility (SORT JCL 8)



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## 7.5: SORT Utility

# Writing Constants

- Formats to write character strings, hexadecimal strings and decimal numbers are as follows:
  - Character Strings
    - Format for writing a character string is: C'x.....x' where x is an EBCDIC character. For example, C'Sheela'.
    - If you wish to include a single apostrophe in the string, you must specify it as two single apostrophes. For example, O'NEILL must be specified as C'O"NEILL'.
  - Hexadecimal Strings
    - Format for writing a hexadecimal string is: X'yy.....yy' where yy is a pair of hexadecimal digits. For example XC1C2' is equivalent to C'AB'.
  - Decimal Strings
    - Format for writing a decimal number is:  
n....n or +n....n or -n...n  
where n....n is a decimal digit. Examples are 24, +24, and -24.
    - Decimal number must not contain commas and decimal points.



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7.5: SORT Utility

## Summing Records – SUM Statement

- Department TRG wishes to know the total salary of all trainers.
  - Use the INCLUDE statement to tailor the file to include only records for the TRG department.
  - Use SORT and SUM to get the sum of salaries.
- On the SUM control statement,
  - Specify one or more numeric fields to be summed whenever records have equal control fields.
    - Control fields are specified on the SORT statement.
  - Numeric fields: Binary, Packed Decimal, Zoned Decimal.



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7.5: SORT Utility

## Summing Records – SUM Statement (Contd...)

- When you sum records, keep in mind that two types of fields are involved:
  - Control fields specified on the SORT statement.
  - Summary fields specified on the SUM statement.
- Writing the SUM Statement:

```
SUM FIELDS=(location, length, data-format,...)
```



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## 7.5: SORT Utility Summing Records – SUM Statement (Contd...)

### Example

- INCLUDE, SORT, and SUM statements are shown below:

```
INCLUDE COND=(26,4,CH,EQ,C'TRG ')
SORT FIELDS=(26,4,CH,A)
SUM FIELDS=(35,5,BI)
```

- Returns the total salary of the TRG department.



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## 7.5: SORT Utility Summing Records – SUM Statement (Contd...)

- Final sum appears in the SALARY field of one record.
  - Other records are deleted.
- By default, records with equal control fields appear in the original order.
- When summing records keeping the original order, DFSORT chooses the first record to contain the original sum.

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Remark: Some of the fields in your summation might not be meaningful, such as the employee number field. You could use the OMIT statement to omit this field. There are two other ways to leave out fields that are not meaningful.

7.5: SORT Utility

## Suppress Records with Duplicate Control Fields

- Use SUM to delete records with duplicate control fields.
- Specify FIELDS=NONE on the SUM statement.
- Example: List all the distinct departments in ascending order.

```
SORT FIELDS=(25,4,CH,A)
SUM FIELDS=NONE
```

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7.5: SORT Utility

## Overflow

- Occurs when a sum becomes larger than the space available for it.
- If it occurs, the two records involved are left unsummarized.
  - Contents of the records are left undisturbed
  - Neither record is deleted
  - Records are still available for summarization
- Does not prevent further summary
  - Correctable in some cases
  - Use INREC control statement to pad summary fields with zeros

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7.5: SORT Utility

## Reformatting Records

- Reformat records in your data sets using OUTREC and INREC control statements
  - Delete fields
  - Reorder fields
  - Insert separators (blanks, zeros, or constants)
- Difference from DFSORT control statements:
  - OUTREC reformats records after they are sorted, copied, or merged
  - INREC reformats records before they are sorted, copied, or merged

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7.5: SORT Utility

## Reformatting Records (Contd...)

- INREC and OUTREC perform the same functions.
- Consider their processing order when you choose which to use:
  - Use INREC to delete fields
    - Shorter records take less time to sort, merge, or copy (INREC reformats the records before they are processed).
  - Use OUTREC to insert separators.
    - Inserts separators into records after they are processed.
    - To reorder fields, use either control statements.
      - This does not affect the record length.



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Note: If you use INREC or OUTREC to change the record length, be sure to specify the final record length on the SORTOUT DD statement using the DCB parameter. The final length is either:

The INREC length if you are using just INREC.

The OUTREC length if you are using just OUTREC or both INREC and OUTREC.

7.5: SORT Utility

## Reformatting Records - OUTREC

- Delete all unrequired fields for the application
  - Fields without meaningful contents in a summation record.
- **Note:** In an OUTREC statement, you do not specify the data format.

```
SORT FIELDS=(26,4,CH,A)
SUM FIELDS=(35,5,BI)
OUTREC FIELDS=(26,4,35,5)
```

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## 7.5: SORT Utility Reformatting Records - OUTREC (Contd...)

- As the record length changed, specify the new length on the SORTOUT DD statement.
- For example:

```
//SORTOUT DD DSN=DA0001T.SORTOUT,  
//           DISP=(NEW,CATLG,DELETE),  
//           SPACE=(TRK,(1,1)),UNIT=SYSDA,  
//           DCB=LRECL=9
```



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7.5: SORT Utility

## Reorder Fields to Reserve Space

- Fields always appear in the order in which you specify them.
- Therefore, if you wish for salary to appear before department, simply reverse the order in the OUTREC statement.

```
SORT FIELDS=(26,4,CH,A)
SUM FIELDS=(35,5,BI)
OUTREC FIELDS=(35,5,26,4)
```

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7.5: SORT Utility

## Inserting Binary Zeros

- Assume you want to reformat the records to include a new 4-byte binary field after the salary field (beginning at byte 39). In this case, you can insert binary zeros as placeholders for the new field (to be filled in with data at later date).
  - To insert the zeros, write 4Z after the last field:
- This time, you must specify on the SORTOUT DD statement the new record length is 13 bytes.

```
SORT FIELDS=(26,4,CH,A)
SUM FIELDS=(35,5,BI)
OUTREC FIELDS=(26,4,35,5,4Z)
```

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You can insert binary zeros before, between, or after fields. You can use Z or 1Z to specify a single binary zero.

7.5: SORT Utility

## Inserting Blanks

- Make a printout more legible with OUTREC
  - Separate fields with blanks.
  - Create margins.
    - Example: Print only employee number and employee name fields.

```
SORT FIELDS=(1,4,ZD,A)
OUTREC FIELDS=(10x,1,4,,4x,5,20)
```

- Specify nX to insert blanks.
- Insert blanks before, between, or after fields.
  - Use X or 1X to specify a single space.

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If an output data set contains only character data, you can print it by writing the SORTOUT DD statement as follows:

```
//SORTOUT DD SYSOUT=*
```

7.5: SORT Utility

## Inserting Constants

- Using OUTREC, insert constants to set up a report format.
- Formats to write constants are shown below:
  - Character Strings
    - Format to write a character string is: C'x.....x' where x is an EBCDIC character.  
For example, C'Sheela'.
    - Format to write a character string repetition is: nC'x.....x'

Where n can be from 1 to 4095; n repetitions of the character string constant (C'x...x') are inserted into the reformatted input records. If n is omitted, 1 is used instead.

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## 7.5: SORT Utility

## Inserting Constants (Contd...)

- If you want to include a single apostrophe in the string, you must specify it as two single apostrophes. For example, O'NEILL must be specified as C'O'"NEILL'.

- Hexadecimal Strings

- Format for writing a hexadecimal string is: X'yy.....yy' where yy is a pair of hexadecimal digits. For example X'C1C2 is equivalent to C'AB'.
- Format to a hexadecimal string repetition is: nC'yy....yy'

Where n can be from 1 to 4095; n repetitions of the hexadecimal string constant X'yy...yy') are inserted into the reformatted input records. If n is omitted, 1 is used instead.



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7.5: SORT Utility

## Setting up the Report Format - Example

- Following statement sets up the report as shown below:

```
OPTION COPY
```

```
OUTREC FIELDS=(11:C'THE EMPLOYEE NUMBER IS ',1,4,  
30:C'THE EMPLOYEE NAME IS ',5,20,4X,25,4)
```

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7.5: SORT Utility

## Reformat Records Using INREC Statement

- INREC statement has the same format as OUTREC
  - INREC FIELDS=(26,4,35,5)
    - SORT FIELDS=(1,4,4,CH,A)
    - SUM FIELDS=(5,5,BI)
- As INREC reformats records before they are sorted.
  - SORT and SUM statements must refer to the reformatted records as they appear in the output data set.

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7.5: SORT Utility

## Preventing Overflow Summing Values

- Prevent overflow in some cases using INREC to pad summary fields with zeros.
- However, you cannot use this method for negative fixed-point binary data.
  - Padding with zeros rather than ones would change the sign.

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7.5: SORT Utility

## Padding Summary fields

- If summary fields overflow, you can pad each of them on the left with 4 bytes (binary fields must be 2, 4, or 8 bytes long).

```
INREC FIELDS=(26,4,Z,35,5)
SORT FIELDS=(1,4,CH,A)
SUM   FIELDS=(5,10,BI)
```
- You cannot use the OUTREC statement to prevent overflow, as it is processed after summarization.

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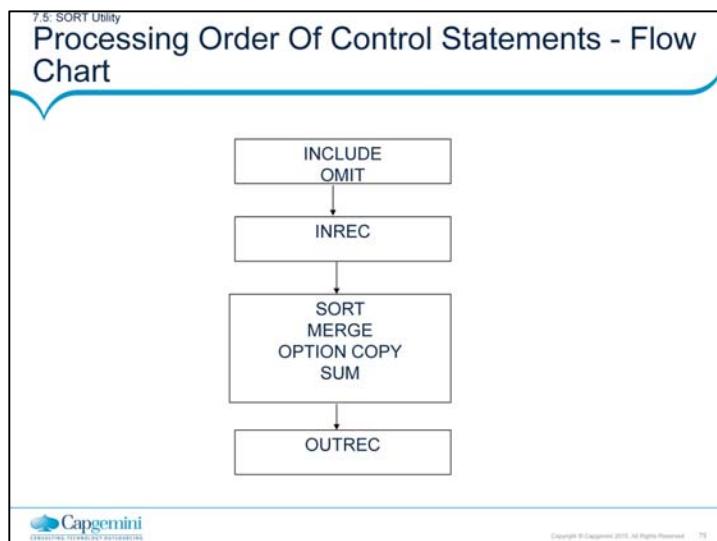
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## 7.5: SORT Utility Processing Order Of Control Statements

- Subsequent flowchart shows the order in which control statements are processed.
  - SUM is processed at the same time as SORT or MERGE.
  - It is not used with COPY.
- You can write statements in any order.
- However, DFSORT always processes them in the order shown as follows.



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## 7.5: SORT Utility SORT JCL 9 - Example

- Sorts on salary removing duplicates, includes only salaries > 2000.
- To sort and pick up selective data, remove duplicates.
- SUM FIELDS=NONE is used to remove duplicates.
- It compares data in columns mentioned in SORT FIELDS= and removes second occurrence of matching data.



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### 7.5: SORT Utility SORT JCL 9 - Example (Contd...)

```
//DA0001TA      JOB LA2819,CG,NOTIFY=DA0001T,MSGCLASS=X
//SRTSTEP       EXEC PGM=SORT
//SYSIN         DD *
OPTION EQUALS
SORT FIELDS=(41,4,A),FORMAT=CSF
INCLUDE COND=(41,4,CSF,GT,2000)
SUM FIELDS=NONE
/*
//SORTIN DD      DSN=DA0001T.INDATA3,DISP=SHR
//SORTOUT        DD      DSN=DA0001T.SORTOUT6,DISP=(NEW,CATLG),
//                      SPACE=(TRK,(3,3)), UNIT=SYSDA,
//                      DCB=(BLKSIZE=800,LRECL=80,
//                      RECFM=FB,DSORG=PS)
```

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7.5: SORT Utility  
**SORT JCL 9 - Example (Contd...)**

```
//SORTWK01 DD      SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SORTWK02 DD      SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SORTWK03 DD      SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SORTWK04 DD      SPACE=(TRK,(10,5)),UNIT=SYSALLDA
//SYSOUT       DD    SYSOUT=*
//
```



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7.5: SORT Utility JCL 9

## Demo

- SORT Utility (SORT JCL 9)



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## 7.5: SORT Utility SORT JCL 10 - Example

```
//DA0001TA JOB LA2719,CG,NOTIFY=DA0001T, MSGCLASS=X
//Copies those records where either employee jobs begin with 'M' or 'S'
//SRTSTEP      EXEC   PGM=SORT
//SYSOUT       DD      SYSOUT=*
//SORTIN        DD      DSN=DA0021T.INDATA3,DISP=SHR
//SORTOUT       DD      DSN=DA0021T.SORTOUT7,
//                  DISP=(CATLG,DELETE), UNIT=SYSDA,
//                  SPACE=(TRK,(5, 2))
//
//SYSIN         DD   *
OPTION COPY
INCLUDE COND=(19,1,CH,EQ,C'M',OR,19,1,CH,EQ,C'S')
/*
//
```



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7.5: SORT Utility JCL 10

## Demo

- SORT Utility (SORT JCL 10)



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## 7.5: SORT Utility SORT JCL 11 - Example

- Change data throughout file.
  - In this example, the 163rd character in the file is changed to C.
  - Useful to change data in a file which is more than 255 characters in length as TSO edit option cannot be used for it.



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7.5: SORT Utility  
**SORT JCL 11 - Example (Contd...)**

```
//DA0001TA   JOB LA2719.CG,NOTIFY=DA0001T,MSGCLASS=X
//SRTSTEP    EXEC PGM=SORT
//SYSOUT      DD SYSOUT=*
//SORTIN      DD DSN=DA0001T.EMPLOYEE,DISP=SHR
//SORTOUT     DD DSN=DA0001T.EMPLOYEE,DISP=SHR
//SYSIN      DD *
OPTION COPY
OUTREC FIELDS =(1,162,C'C',164,137)
/*
//
```



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7.5: SORT Utility JCL 11

## Demo

- SORT Utility (SORT JCL 11)



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7.5: SORT Utility

## Reformatting Code

- To reformat, code:
  - Before sort fields, INREC FIELDS to reformat the record before sorting
  - After sort fields, OUTREC FIELDS to reformat the record after sorting
- Consider the following layout of a PS with fixed length records:
  - Empno :starting at absolute byte 1, for 5 bytes long
  - Empname :at absolute byte 6, for 25 bytes long
  - Department :at absolute byte 31, for 15 bytes long
  - Salary :at byte 46, for 5 bytes long
- The PS being populated with the following records:

• 11111sujit	admin	10000
• 55555danny	marketing	15000
• 22222ajay	admin	07000
• 33333mala	projects	20000^



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## 7.5: SORT Utility Reformatting Code (Contd...)

- Before sorting, to include only employee number and salary field and to sort in descending order of salary field:

```
//SYSIN    DD      *
INREC FIELDS=(1,5,46,5)-----1111110000
SORT FIELDS=(6,5,CH,D)          5555515000
/*                                2222207000
                           3333320000
```

- The sorted dataset will contain:

```
3333320000
5555515000
1111110000
2222207000
```



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7.5: SORT Utility

## Reformatting Data-Bytes

- To reformat data-bytes after sorting, OUTREC FIELDS is used.
- Also used to space out fields in the output.
- To obtain only the Empno and Salary fields in the output, but to sort on Empname field in ascending order:

```
//SYSIN      DD      *  
  
SORT FIELDS=(6,25,CH,A) ..... 22222ajay.....  
OUTREC FIELDS=(1,5,46,5)       55555danny.....  
                                33333mala.....  
                                11111sujith.....
```

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## 7.5: SORT Utility Reformatting Data-Bytes (Contd...)

- To include character-literals, say, spaces between the Empno and Salary fields in the output dataset:
  - Code OUTREC FIELDS=(1,5,2X,46,5)

Two spaces

- The output dataset will contain:

22222	07000
55555	15000
33333	20000
11111	10000



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7.5: SORT Utility

## SORT JCL 12 - Example

```
DA0001TA   JOB LA2719.CG, NOTIFY=DA0001T,MSGCLASS=X
/* Merges fields beginning with column 110 having length 5
/* INDATA1 and INDATA2 are sorted on the control field
//SRTSTEP      EXEC PGM=SORT
//SORTIN01     DD DSN=DA0001T.INDATA1,DISP=OLD
//SORTIN02     DD DSN=DA0001T.INDATA2,DISP=OLD
//SORTOUT      DD DSN=DA0001T.SORTOUT4,DISP=(NEW,CATLG),
//                  SPACE=(TRK,(3,3)), UNIT = SYSDA,
//                  DCB=(BLKSIZE=800, LRECL=80,
//                  RECFM=FB,DSORG=PS)
//SYSOUT       DD SYSOUT=*
//SYSIN        DD *
      MERGE    FIELDS = (110,5,A),FORMAT=CH
/*
```

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7.5: SORT Utility JCL 12

## Demo

- SORT Utility (SORT JCL 12)



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7.5: SORT Utility

## Example

- To select employees getting a salary of 1000 and sort in ascending order of employee number

```
//SYSIN      DD      *
INCLUDE COND=(46,5,CH,EQ,C'1000)
SORT FIELDS=(1,3,CH,A)
/*
```

- Conversely, Omit Cond can be used to exclude employees with salary of 1000.
- INCLUDE and OMIT are mutually exclusive
- Can use connect operators AND and OR to form several logical conditions

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7.5: Lab

## Lab

- Day 3 and Day 4 Labs



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## Summary

- IEFBR14 is commonly used to delete, allocate and un-catalog a dataset.
- IEBGENER Utility is commonly used to copy, concatenate and to empty sequential datasets.
- SORT Utility is used to sort data, copy selective data, remove duplicates, and change data throughout the file.



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## Review Question

■ Question 1: Which of the following utility is used to uncatalog a dataset?

- IEBGENER
- IEFBR14
- SORT



■ Question 2: Which of the following utility can be used to copy contents of a sequential dataset?

- IEFBR14
- IEBGENER
- SORT

**JCL**  
Lab Book

**Document Revision History**

Date	Revision No.	Author	Summary of Changes
23-July-2009	4.0	Arjun Singh	Content creation
26-Oct-2009		CLS Team	Review
23 <sup>rd</sup> - May- 2011	5.0	Vaishali Kasture	Revamp and Content Creation
8 <sup>th</sup> -Aug-12	5.1	Rajita Dhumal	Revamped after Assignment Review

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## Getting Started

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### Overview

This lab book is a guided tour for learning JCL. It comprises assignments.

### Setup Checklist for JCL

Here is what is expected on your machine in order for the lab to work.

#### Minimum System Requirements

- Intel Pentium 90 or higher
- Microsoft Windows 95, 98, or NT 4.0, 2k, XP.
- Memory: 32MB of RAM (64MB or more recommended)
- Internet Explorer 6.0 or higher

#### Please ensure that the following is done:

- PASSPORT PC-TO-HOST (mainframe terminal simulator) is installed
- Connectivity to the Mainframe

#### Instructions

- You need three PDS, one each for storing COBOL source code, JCL code and loadlib. The convention followed for naming the PDS is as follows:  
USRID.NAME.X where:

USRID is IBM login id used by the participant,  
NAME is name of the participant and  
X is either COBOL/SRCLIB or JCL or LINKLIB.

- For example: The participant using IBM login id DA0001T and name as SHEELA will have three PDS as follows:

as	DA0001T.ARJUN.COBOL	– for storing COBOL source programs PDS members
	DA0001T.ARJUN.JCL	– for storing the JCL's as PDS members
	DA0001T.ARJUN.LINKLIB	– for storing load modules of programs as PDS members

If these PDSs do not exist, then these are to be created. Kindly refer to the MVS lab book for the same.

#### Learning More (Bibliography)

- Expert MVS/XA JCL by Mani Carathanassis
- MVS/JCL by Doug Lowe

## Lab 1. Learning the various parameters of JCL statements

Goals	• Learning the various parameters of JCL statements
Time	120 minutes

### Problem 1:

1. Allocate a data set to contain your JCL.
2. Edit the JCL data set and add the necessary JCL. Use ISPF to edit the data set that you just allocated.
3. Enter the following JCL statements into the data set after making the necessary changes as per the suggestions given below:

```
//JOB1 JOB 'accounting_data',
// 'user_name',
// NOTIFY=,
// MSGCLASS=message_class,
// MSGLEVEL=(1,1),
// CLASS=n,
//COBRUN EXEC PROG=your own Cobol program name
//STEPLIB DD DSN=your own dataset name,DISP=SHR
//SYSPRINT DD SYSOUT=*
```

In the JCL code above:

- a. Replace accounting\_data with the appropriate identification information. Account information should be with the batch name i.e. MF123.
- b. Replace Job name with your userid.
- c. Replace user\_name with your name.
- d. Job notification should be given to you
- e. Replace message\_class with the appropriate message class value.
- f. Tell the system to reproduce this JCL code in the output, and to include Allocation/termination messages if the job terminates abnormally/normally

### Problem 2:

Refer to shared file named 'Sysin Prg' for Cobol and Run JCL coding

- The participants have to analyze the program, remove the error and successfully execute the program.
- After completion of the assignment, the Program/JCL i.e. Run JCL should successfully execute.
- All the participants have to document the error in the excel sheet along with steps taken to resolve the error.

**Problem 3:**

Refer to shared file named 'if\_else Prg' for Cobol and JCL coding

- Do analyze the given programs. Participants have to modify JCL in such a ways that after submitting the job, 2<sup>nd</sup> program i.e. named 'SYSPRG' should get executed though prior program i.e. 'CHAP1' do have one alignment error.
- All the participants have to document the error in the excel sheet along with steps taken to implement the change request.

**Problem 4:**

Implement a Referrback on DD Statement .Make your own assumptions.

**Problem 5:**

Refer to shared file named 'File\_Prg' for Cobol and JCL coding. This shared Cobol code will copy data from source dataset to target dataset.

- The participants have to analyze the program and successfully execute the program.
- Specify a DD statement that creates the new file in your RUN JCL.

**Problem 6:**

Execute a Simple COBOL program (For ex. CHAP1 from shared folder) and specify the JOBCAT and STEPCAT commands for the same

**Problem 7:**

Create 2 physical sequential files of LRECL as 80, BLKSIZ as 800  
(Userid.MPST.JCL01.MAST.IN.PS and Userid.MPST.JCL02.MAST.IN.PS)

- Refer to shared files MPST-JCL01-IN01-PS.Dat and MPST-JCL01-IN02-PS.Dat for input records and copy the records into the dataset created in the previous step.
- Perform Concatenation of both the PS
- Create 2 PDS Userid.PDS1 and Userid.PDS2 and implement concatenation of 2 PDS.

**Problem 8:**

Refer to shared file Instream\_Symbolic\_Prg' for Cobol and Run JCL coding

- The participants have to analyze the program, remove the error and successfully execute the program.
- After completion of the assignment, the Program/JCL i.e. Run JCL should successfully execute.
- All the participants have to document the error in the excel sheet along with steps taken to resolve the error

## Lab 2. Utilities & Procedures

Goals	• Understand how to use utilities and write procedures.
Time	180 Minutes

### 2.1: Assignments on Utilities and Procedures:

1. Write a JCL to create a sequential data set using **IEFBR14**.
2. Write a JCL to delete a sequential data set using **IEFBR14**.
3. Write a JCL for **IEBGENER** to copy from **EMPFILE** into another. Try out all the JCLs given in the handout.
4. Try concatenation of sequential files using **IEBGENER**.
5. Write a JCL to sort the **EMPFILE** in descending or ascending order of **EMP-NO**.
6. Try all the parameters for Sort, namely, INREC, OUTREC, SUM fields.
7. Create a PS Dept which includes (Deptno,DeptName,Loc) & list all the distinct Departments in Ascending order from the Dept File
8. Write a cataloged procedure for invoking either **IEFBR14** or **IEBGENER** or **SORT** utility.
9. Write an **instream** procedure for the assignment 7.
10. Using the ITEM-FILE as Sample Input, write the solution for following assignments.

ITEM-FILE			
Item Code	Vendor	Status	Quantity
E001	780005	Y	10
E003	780005	N	0
E002	780006	Y	8
E003	780005	N	0
E005	780004	Y	2
E004	780005	Y	4
E006	780006	N	0
E005	780004	Y	2
E007	780006	N	0

E006	780006	N	0
E008	780008	Y	14

**Assignment-1:** Write a JCL to create an output file having unique records (with respect to Item Code column) using the **SORT** utility.

**Assignment-2:** Write a JCL to extract records having Item-code 'E003' in new file.

**Assignment-3:** Write a JCL to create a file having only two columns (using OUTREC) using SORT utility.

[Create Vendor-Item-File having only two fields say Item-Code and Vendor].

**Assignment-4:** Taking above **Item-File** as input, write a JCL to create another file (ITEM-FILE-SEQ) having same data and sequence-number as additional column using **SORT** utility.

**Assignment-5:** Taking above **Item-File** as input, write a JCL to create another file (ITEM-FILE-REV) having same records in reverse order of sequence number using **SORT** utility. (Use **INREC** and **OUTREC**)

**Assignment-6:** Considering the file created in Lab 5, that is ITEM-FILE, as input, write a JCL to concatenate these two files into a single file (ITEM-CONCT\_FILE) lengths using **IEBGENER**.

**Assignment-7:** Taking above **Item-File** as input, write a **Job** to skip the first 3 records and copying next 4 subsequent records into a new dataset (ITEM-FILE-4R) using **SORT** utility.

11. Write a JCL that will create new PDS USerid.MyPDS and will be cataloged on successful execution of the step and dataset will be deleted if job terminates abnormally.

### Lab 3. Analysis, Enhancement and Debugging Assignments based on Utilities & Procedures

<b>Goals</b>	• Solve Analysis, Enhancement and Debugging Assignments.
<b>Time</b>	180 Minutes

#### Analysis/Enhance Assignment

##### Problem 1: MPST0PG01

MPST01-Concatenate, Duplicate, Sort, Report

The participants have to analyze the program/JCL, remove the error and successfully execute the program.

1. Create partitioned dataset Userid.MPST.JCL01.PDS for writing the Source code\JCL.
2. Create 2 physical sequential files of LRECL as 80, BLKSIZ as 800(Userid.MPST.JCL01.IN01.PS and Userid.MPST.JCLxx.IN02.PS)
3. Refer to MPST-JCL01-IN01-PS.Dat and MPST-JCL01-IN01-PS.dat for input records and copy the records of these two .dat files into the dataset created in the previous step.
4. Create a member (JCL01REP) into Userid.MPST.JCLxx.PDS and upload the program into it from JCL01REP.CBL
5. Create a member (CMPLNK01) into Userid.MPST.JCLxx.PDS and upload the program into it from CMPLNK01.JCL
6. Create a member (MSTJCL01) into Userid.MPST.JCLxx.PDS and upload the program into it from MSTJCL01.JCL

Member Name	Description
JCL01REP	Cobol program for Generating report from Userid.MPST.JCLxx.OUT03S.PS
CMPLNK01	Comp link for Cobol program JCL01REP
MSTJCL01	Master JCL for execution of all steps

After completion of the assignment, the jcl (MSTJCL01) should successfully execute. All the participants have to document the error in the excel sheet along with steps taken to resolve the error.

**Stepwise Functionality of MSTJCL01:****Step 1:**

The records inside the dataset IN01.PS & IN02.PS have to be concatenated inside physical sequential dataset (Userid.MPST.JCLxx.OUT01.PS)

Input dataset: Userid.MPST.JCLxx.IN01.PS (Existing)  
Userid.MPST.JCLxx.IN02.PS (Existing)  
Output dataset: Userid.MPST.JCLxx.OUT01.PS (New)

**Step 2:**

The step remove duplicate records from Userid.MPST.JCLxx.OUT01.PS and rest of the records are copied into the physical sequential dataset (Userid.MPST.JCLxx.OUT02S.PS)

Input dataset: Userid.MPST.JCLxx.OUT01.PS  
Output dataset: Userid.MPST.JCLxx.OUT02S.PS (New)

**Step3:**

This step sort the records of the Userid.MPST.JCLxx.OUT02S.PS on the field ITEM-GROUP and the sorted records are stored in physical sequential dataset (Userid.MPST.JCLxx.OUT03S.PS)

Input dataset: Userid.MPST.JCLxx.OUT02S.PS  
Output dataset: Userid.MPST.JCLxx.OUT03S.PS (New)

**Step4:**

The steps generate a Group wise report into the dataset Userid.MPST.JCLxx.REP.PS showing details of item that will be supplied by the vendor

Input dataset: Userid.MPST.JCLxx.OUT03S.PS  
Output dataset: Userid.MPST01.JCLxx.REP.PS (New)

Dataset created after execution of MSTJCL01:

Userid.MPST.JCLxx.OUT01.PS  
Userid.MPST.JCLxx.OUT02S.PS  
Userid.MPST.JCLxx.OUT03S.PS  
Userid.MPST01.JCLxx.REP.PS

**Record Layout of files:**

DSRB048.MPST.JCL01.IN01.PS, DSRB048.MPST.JCL01.IN02.PS

Column Name	PIC Desc
Item-Code	X(4)
Vendor-Code	X(4)
Quantity	X(2)
Group-Name	X(10)

Order-Date	X(10)
------------	-------

**Note: Between two fields have a space**

#### Problem 2: MPST0PG02

##### MPST02-Extraction of input records, Empty, Sort, Report, Abend

The participants have to analyze the program, remove the error and successfully execute the program.

1. Create partitioned dataset Userid.MPST.JCL02.PDS for writing the Source code\JCL.
2. Create physical sequential files of LRECL as 80, BLKSIZ as 800(Userid.MPST.JCL02.MAST.IN.PS)
3. Refer to MPST-JCL02-MAST-IN-PS.Dat for input records and copy the records into the dataset created in the previous step.
4. Create a member (GRITMAST) into Userid.MPST.JCL02.PDS and upload the program into it from GRITMAST.CBL
5. Create a member (CMPLNK01) into Userid.MPST.JCL02.PDS and upload the program into it from CMPLNK01.JCL
6. Create a member (MST02REP) into Userid.MPST.JCL02.PDS and upload the program into it from MST02REP.CBL
7. Create a member (CMPLNK02) into Userid.MPST.JCL02.PDS and upload the program into it from CMPLNK02.JCL
8. Create a member (MST02AB) into Userid.MPST.JCL02.PDS and upload the program into it from MST02AB.CBL
9. Create a member (CMPLNK03) into Userid.MPST.JCL02.PDS and upload the program into it from CMPLNK03.JCL.
10. Create a member (MSTJCL02) into Userid.MPST.JCL02.PDS and upload the program into it from MSTJCL02.JCL

After completion of the assignment, the jcl (MSTJCL01) should successfully execute.  
All the participants have to document the error in the excel sheet along with steps taken to resolve the error.

Member Name	Description
GRITMAST	Cobol program for extraction of GRIT records from DSRB048.MAIN.PS.
MST02REP	Cobol program for generating report BU wise
MST02AB	Cobol program for displaying Abends Error in JCL
CMPLNK01	Comp link for Cobol program GRITMAST
CMPLNK02	Comp link for Cobol program MST02REP
CMPLNK03	Comp link for Cobol program MST02AB
MSTJCL02	Master JCL for execution of all steps

**Stepwise Functionality of MSTJCL02:****Step 1:**

To extract records of a particular BU into Userid.MPST.JCL02.BUOUT.PS from the master file (Userid.MPST.JCL02.MAST.IN.PS)

Input dataset: Userid.MPST.JCL02.MAST.IN.PS (Existing)  
Output dataset: Userid.MPST.JCL02.BUOUT.PS (New)

**Step 2:**

To sort the records of Userid.MPST.JCL02.BUOUT.PS on Empid and copy the sorted records into Userid.MPST.JCL02.BU.PS

Input file: Userid.MPST.JCL02.BUOUT.PS  
Output file: Userid.MPST.JCL02.BU.PS (New)

**Step 3:**

This Step for generates BU wise report in sequence of employee number.

Input file: Userid.MPST.JCL02. BU.PS  
Output file: Userid.MPST.JCL02. BUREP.PS (New)

**Step 4:**

This Step executes only when if any previous step has been abended.

Dataset created after execution of MSTJCL02:

DSRB048.MPST.JCL02.BU.PS  
DSRB048.MPST.JCL02.BUOUT.PS  
DSRB048.MPST.JCL02.BUREP.PS

**Record Layout of files:**

Userid.MPST.JCL02.MASTER.IN.PS

Column Name	PIC Desc
EMP-NO	9(4)
EMP-FNAME	X(12)
EMP-LNAME	X(10)
EMP-BU	X(8)
EMP-SBU	X(8)
EMP-DESIG	X(15)
BASIC	9(5)V99
HRA	9(5)V99
CHLD-ALLOW	9(5)V99

EXTRA-ALLOW

9(5)V99

**Note: Between two fields have a space****Problem 3: MPST0PG03****MPST03- File& Table, Search & output, Sort, Report**

The participants have to analyze the program, remove the error and successfully execute the program.

1. Create partitioned dataset Userid.MPST.JCL03.PDS for writing the Source code\JCL.
2. Create 2 physical sequential files of LRECL as 80, BLKSIZ as 800(Userid.MPST.JCL03.IN.PRMTR.PS and
3. Userid.MPST.JCL03.IN.ITEM.PS)
4. Refer to MPST-JCL03-IN-PRMTR-PS.Dat and MPST-JCL03-IN-ITEM-PS.dat for input records and copy the records of these two .dat files into the dataset created in the previous step.
5. Create a member (JCL03TRN) into Userid.MPST.JCL03.PDS and upload the program into it from JCL03TRN.CBL
6. Create a member (CMPLNK01) into Userid.MPST.JCL03.PDS and upload the program into it from CMPLNK01.JCL
7. Create a member (JCL03REP) into Userid.MPST.JCL02.PDS and upload the program into it from JCL03REP.CBL
8. Create a member (CMPLNK02) into Userid.MPST.JCL03.PDS and upload the program into it from CMPLNK02.JCL
9. Create a member (MSTJCL03) into Userid.MPST.JCL03.PDS and upload the program/JCL into it from MSTJCL03.JCL

After completion of the assignment, the Program/JCL i.e. MSTJCL03 should successfully execute.

All the participants have to document the error in the excel sheet along with steps taken to resolve the error.

Member Name	Description
JCL03TRN	Cobol program for fetching the data from DSRB048.MPST.JCL03.IN.PRMTR.PS And DSRB048.MPST.JCL03.IN.ITEM.PS And creation of DSRB048.MPST.JCL03.ITMGRPO.OUT.PS
JCL03REP	Cobol program for Report Generation
CMPLNK01	Comp link for Cobol program JCL03TRN
CMPLNK02	Comp link for Cobol program JCL03REP
MSTJCL03	Master JCL for execution of all steps

**Stepwise Functionality of MSTJCL03:****Step 1:**

This step Executes program(JCL03TRN) using Userid.MPST.JCL03.IN.ITEM.PS and Userid.JCL03.IN.PRMTR.PS as input files and write output records into Userid..MPST.JCL03.ITMGRPO.OUT.PS

Input file: Userid.MPST.JCL03.IN.ITEM.PS (Existing)  
Userid.MPST.JCL03.IN.PRMTR.PS (Existing)  
Output File: Userid.MPST.JCL03.ITMGRPO.OUT.PS (New)

**Step 2:**

Sorting records of Userid.MPST.JCL03.ITMGRPO.OUT.PS on group-name and item-code and placing the sorted records into Userid.MPST.JCL03.ITMGRPS.PS

Input File: Userid.MPST.JCL03.ITMGRPO.OUT.PS  
Output File: Userid.MPST.JCL03.ITMGRPS.PS (New)

**Step 3:**

This step Executes program JCL03REP and creates vendor-wise report into dataset Userid.MPST.JCL03.REP.PS

Input File: Userid.MPST.JCL03.ITMGRPS.PS  
Output File: Userid.MPST.JCL03.REP.PS (New)

Dataset created after the execution of MSTJCL03

Userid.MPST.JCL03.ITMGRPO.OUT.PS  
Userid.MPST.JCL03.ITMGRPS.PS  
Userid.MPST.JCL03.REP.PS

**Record Layout of files:**

Userid.MPST.JCL03.IN.PRMTR.PS

Column Name	PIC Desc
ITEM-NO	X(04)
GROUP-NO	X(03)
GROUP-NAME	X(10)

Userid..MPST.JCL03.IN.ITEM.PS

Column Name	PIC Desc
ITEM-CODE	X(04)
VENDOR-NO	X(03)
ITEM-QTY	9(03)
ITEM-RATE	9(04)V99

DSRB048.MPST.JCL03.ITMGRPO.OUT.PS

Column Name	PIC Desc
OUT-ITEM-NO	X(04)
OUT-GROUP-NO	X(03)
OUT-GROUP-NAME	X(10)
OUT-ITEM-RATE	9(4)
OUT-ITEM-QTY	9(03)

Note: Between two fields have a space

**Problem 4:****To Do**

1. Write a JCL which will implement reformatting while copying datasets using IEBGENER utility
2. Write a JCL which will implement relocking of records.
3. Write a JCL using IEBCOPY which will copy to datasets but exclude a single PS.(Make your own assumptions).(Hint implement Exclude with IEBCOPY)
4. Compress any dataset using IEBCOPY
5. Write a JCL to Merge two unsorted datasets into one sorted dataset.
6. Using Set statement assign Symbolic Parameter to Unit and Volume parameter
7. Define in a PDS SYSPrint and SYSOUT statements and then using the INCLUDE statement include them in RUN JCL.

## Lab 4. Assignments on Procedures

<b>Goals</b>	<ul style="list-style-type: none"> <li>To understand how to write procedures.</li> </ul>
<b>Time</b>	60 minutes

Sample input for **ITEM-FILE-TRANS1**

Item Code	Vendor	Qty-Ordered	Item-Group
E001	780005	12	Infra
E003	780005	10	Infra
E002	780006	10	Hardware
E003	780005	10	Infra
E005	780004	19	Admin

Sample input for **ITEM-FILE-TRANS2**

E004	780005	23	Infra
E006	780006	34	Hardware
E005	780004	19	Admin
E007	780006	80	Hardware
E006	780006	37	Hardware
E008	780008	60	Admin

### Procedures:

Specification for Procedure **CUSTOM**:

**Step1:** Copy all records from ITEM-FILE-TRANS1 to ITEM-FILE-TRANS3.

**Step2:** Append records from ITEM-FILE-TRANS2 into the file which was created by step1, that is ITEM-FILE-TRANS3.

**Step3:** Sort records vendor-wise.

**Step4:** Process both dataset ITEM-FILE-TRANS1 and ITEM-FILE-TRANS2 data by a Program REPORT (program 'report' a simple single level control break report).

### Solution:

**Step 1:** Write a catalog procedure **CUSTOM** to perform the above tasks as described.

**Step 2:** Write a JCL to invoke the catalog procedure **CUSTOM**. However, program **REPORT** should receive records only from **ITEM-FILE-TRANS1** as input.

**Step 3:** Write an in-stream procedure **IN-CUSTOM** to perform the task as described in Lab1. (Use ITEM-FILE-TRANS30 instead of ITEM-FILE-TRANS3 )

**Step 4:** Write a JCL to override **DSN** of step1 in an in-stream procedure **IN-CUSTOM** to **ITEM-FILE-TRANS3** by symbolic and regular override together.

## Appendices

## Executing the COBOL program

### Solution:

## Steps:

- Step 1: Key in the program.
  - Step 2: Modify and submit the **Complink JCL**.
  - Step 3: Modify and submit the **Run JCL**.
  - Step 4: Check the output.

### Example 1: Program to display ‘Hello’

The following program is a simple COBOL program, which displays 'Hello' in the SYSOUT.

1 - Trg\_mainframe [3.32.24.12]

File Edit Transfer Fonts Options Macro View Window Help

P1 P2 P3 ENT CLR

File Edit Edit\_Settings Menu Utilities Compilers Test Help

EDIT DA0099T.VANDANA.COBOL(SAMP) - 01.07 Columns 00007 00078

Command ==> Scroll ==> CSR

\*\*\*\*\* \* Top of Data \*\*\*\*\*

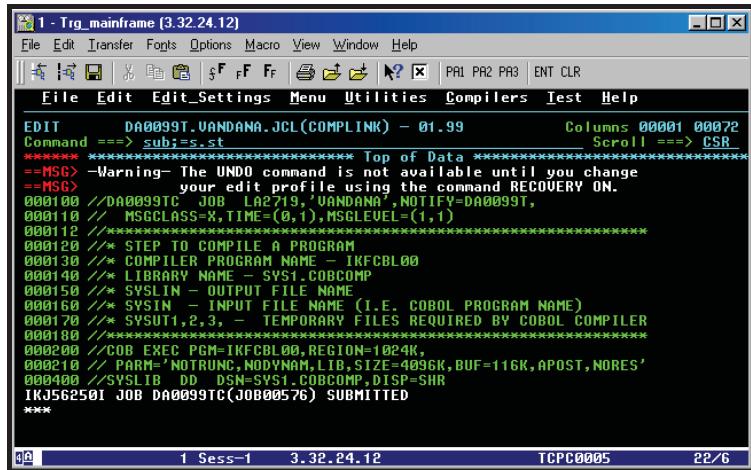
000100 IDENTIFICATION DIVISION.  
000200 PROGRAM-ID. SAMP.  
000300 ENVIRONMENT DIVISION.  
000400 DATA DIVISION.  
000410 WORKING-STORAGE SECTION.  
000500 PROCEDURE DIVISION.  
000600 0000-MAIN.  
000610      DISPLAY 'HELLO'.  
000000 STOP RUN.

\*\*\*\*\* \* Bottom of Data \*\*\*\*\*

**Figure 1: Sample COBOL source code**

Use the complink JCL to compile and link a COBOL program as shown below.

Type **SUB:=S.ST** on the command line as shown below, and then press **ENTER**.



The screenshot shows a Mainframe terminal window titled "1 - Trg\_mainframe (3.32.24.12)". The window displays a JCL (Job Control Language) script named DA0099T.VANDANA.JCL. The JCL includes several job steps, notably one for COBOL compilation (IKFCBL00) and one for execution (IKJ562501). A warning message is present, stating that the UNDO command is not available until you change your edit profile using the command RECOVERY ON. The terminal window also shows system messages like "Columns 00001 00072" and "Scroll ==> CSR". The bottom of the window shows session information: "1 Sess-1 3.32.24.12 TCP/C0005 22/6".

Figure 4: Submission of COMLINK JCL

The following panel is displayed which indicates the status of your job successful (zero return code, that is 0) or unsuccessful (non zero return code, that is 12). Then again press **ENTER**.

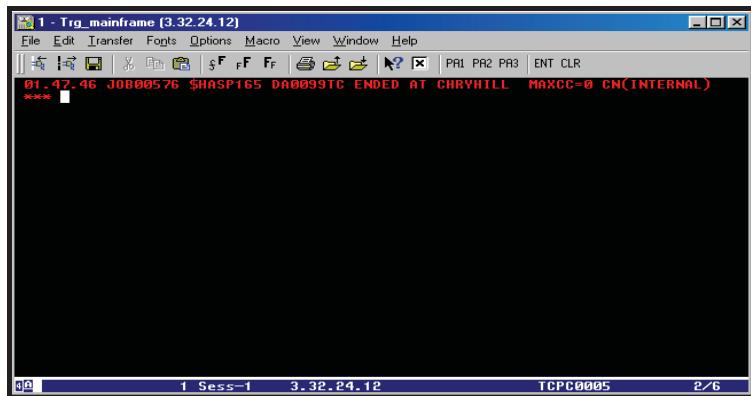


Figure 5: Notification message of COMPLINK JCL

After pressing **ENTER**, you will get the following panel.

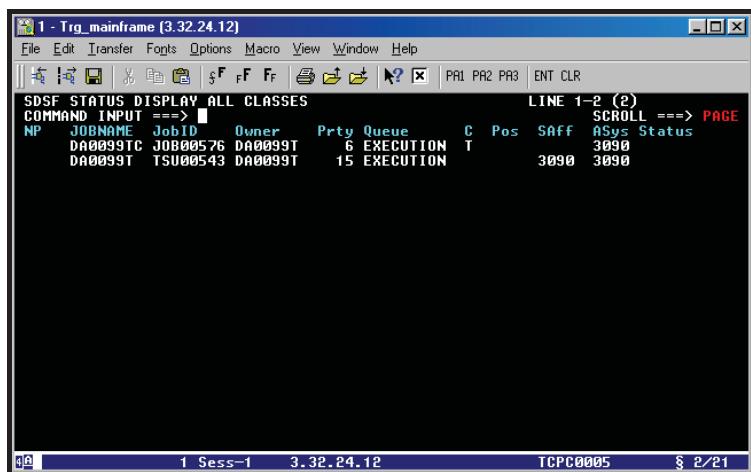
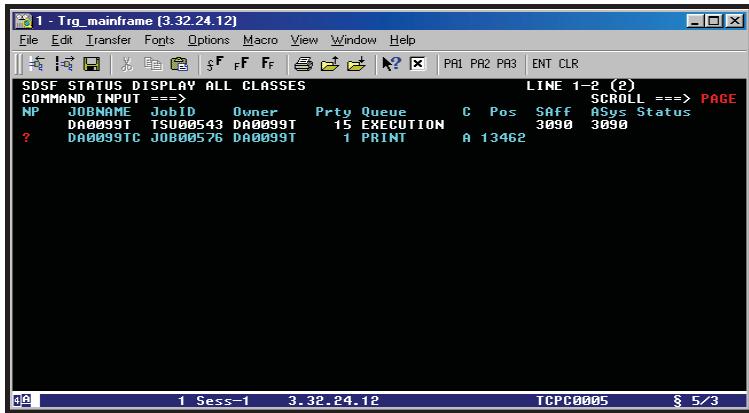


Figure 6: Execution status of COMPLINK JCL

You keep pressing **ENTER** till you get the following panel, then press **TAB** till the cursor is positioned as shown in the following figure and type **? . Then press **ENTER**.**

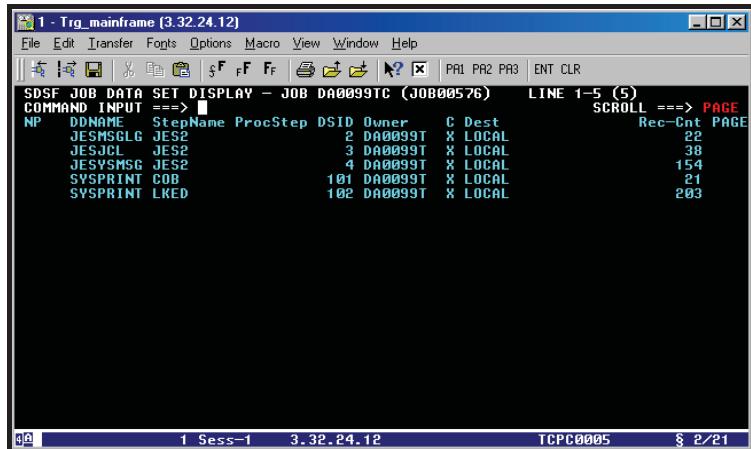


The screenshot shows a mainframe terminal window titled "1 - Trg\_mainframe (3.32.24.12)". The window has a menu bar with File, Edit, Transfer, Fonts, Options, Macro, View, Window, Help. Below the menu is a toolbar with icons for file operations like Open, Save, Print, and a question mark. A status bar at the bottom shows "1 Sess-1 3.32.24.12 TCP/C0005 \$ 5/3". The main area displays a command-line interface:

```
DSDF STATUS DISPLAY ALL CLASSES LINE 1-2 (2)
COMMAND INPUT ===> SCROLL ===> PAGE
NP   JOBNAM JobID Owner Prty Queue   C Pos SAFF ASys Status
DA0099T TSU00543 DA0099T 15 EXECUTION 3090 3090
?     DA0099TC JOB00576 DA0099T    1 PRINT A 13462
```

Figure 7: Execution status of COMPLINK JCL (Cont...)

You get the next panel, which indicates that compilation, and linking is successful.



The screenshot shows a mainframe terminal window titled "1 - Trg\_mainframe (3.32.24.12)". The window displays a list of files created by the COMPLINK process. The command entered was "SDSF JOB DATA SET DISPLAY - JOB DA0099TC (J0800576)". The output shows five data sets (DSID) and their details:

NP	DDNAME	StepName	ProcStep	DSID	Owner	C	Dest	Rec-Cnt	PAGE
	JESMSGLG	JES2		2	DA0099T	X	LOCAL		22
	JESJCL	JES2		3	DA0099T	X	LOCAL		38
	JESVMSG	JES2		4	DA0099T	X	LOCAL		154
	SYSPRINT	COB		101	DA0099T	X	LOCAL		21
	SYSPRINT	LKED		102	DA0099T	X	LOCAL		203

The bottom of the window shows session information: "1 Sess-1 3.32.24.12 TCP/C0005 § 2/21".

Figure 8: List of Files created after COMPLINK process

Alternately, you can type **S** on the line command and press **ENTER**.



1 - TRG\_MAINFRAME (3.32.24.12)

File Edit Transfer Fonts Options Macro View Window Help

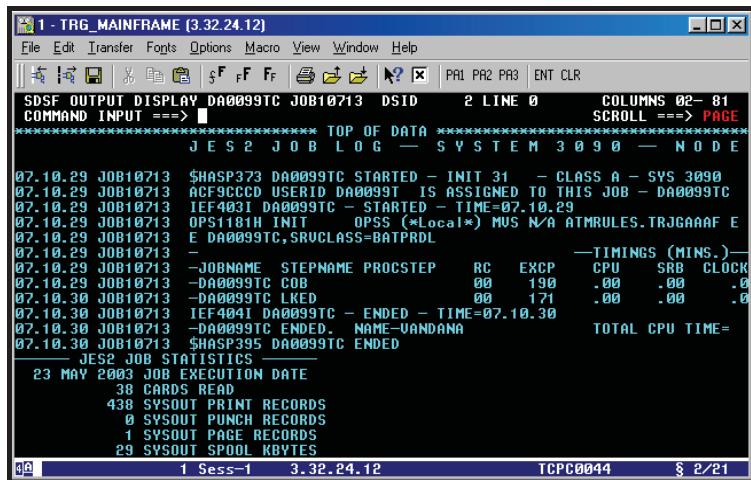
SDSF STATUS DISPLAY ALL CLASSES DATA SET DISPLAYED  
COMMAND INPUT ==> SCROLL ==> PAGE

NP	JOBNAME	JobID	Owner	Prtv	Queue	C	Pos	S AFF	R Sys	Status
	DA0099T	TSU10400	DA0099T		15 EXECUTION			3090	3090	
S	DA0099TC	JOB10713	DA0099T		1 PRINT		A	18358		

1 Sess-1 3.32.24.12 TCP/C0044 \$ 5/3

**Figure 9: Panel to see the Statistics of the Job Submitted**

You get the next panel, which indicates that compilation and linking is successful.



```

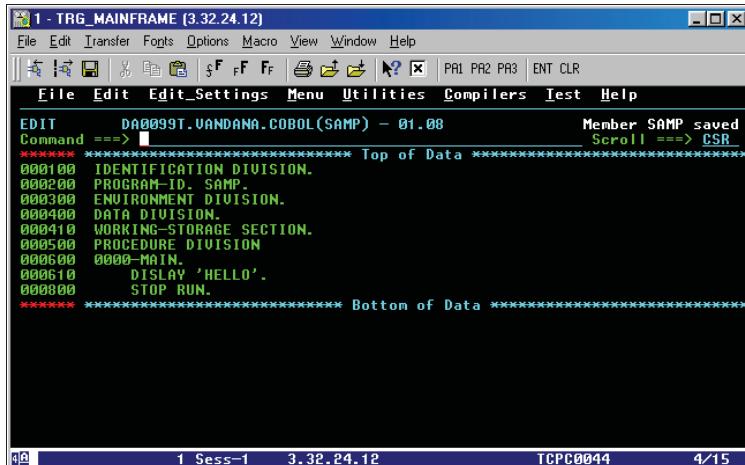
1 - TRG_MAINFRAME (3.32.24.12)
File Edit Transfer Fonts Options Macro View Window Help
| F f F F | P1 P2 P3 | ENT CLR
SDSF OUTPUT DISPLAY DA0099TC JOB10713 DSID      2 LINE 0      COLUMNS 02- 81
COMMAND INPUT ==> ■      SCROLL ==> PAGE
***** TOP OF DATA *****
J E S 2   J O B   L O G   —   S Y S T E M   3 0 9 0   —   N O D E
07.10.29 JOB10713 SHASP373 DA0099TC STARTED - INIT 31  - CLASS A - SYS 3090
07.10.29 JOB10713 ACF9CCC USERID DA0099T IS ASSIGNED TO THIS JOB - DA0099TC
07.10.29 JOB10713 IEF483I DA0099TC - STARTED - TIME=07.10.29
07.10.29 JOB10713 OPS118IH INIT    OPSS (*Local*) MVS N/A ATMRULES.TRJGAAAF E
07.10.29 JOB10713 E DA0099TC,SRVCLASS=BATPRDL
07.10.29 JOB10713 -                                     —TIMINGS (MINS.)—
07.10.29 JOB10713 -JOBNAME STEPNAME PROCSTEP   RC   EXCP   CPU   SRB   CLOCK
07.10.29 JOB10713 -DA0099TC COB       00   190   .00   .00   .0
07.10.30 JOB10713 -DA0099TC LKED      00   171   .00   .00   .0
07.10.30 JOB10713 IEF484I DA0099TC - ENDED - TIME=07.10.30
07.10.30 JOB10713 -DA0099TC ENDED, NAME=VANDANA          TOTAL CPU TIME=
07.10.30 JOB10713 SHASP395 DA0099TC ENDED
JES2 JOB STATISTICS
23 MAY 2003 JOB EXECUTION DATE
 38 CARDS READ
 438 SYSOUT PRINT RECORDS
  0 SYSOUT PUNCH RECORDS
  1 SYSOUT PAGE RECORDS
 29 SYSOUT SPOOL KBYTES
48 1 Sess-1 3.32.24.12          TCP0044      § 2/21

```

Figure 10: Statistics of COMPLINK jcl

If there is any compilation error, then **LKED** step is not shown. In that case, go to the **COB** step by pressing the **TAB** key. You will get the next panel that shows the COBOL source listing. On the command line, type **BOTTOM**, where you see all the compilation error along with the line numbers. Correct all the COBOL errors and repeat the above steps until you get the return code zero.

Following is a program with some errors, wherein DISPLAY is mentioned instead of DISPLAY and period is missing in the PROCEDURE DIVISION.



The screenshot shows a window titled "1 - TRG\_MAINFRAME (3.32.24.12)". The menu bar includes File, Edit, Transfer, Fonts, Options, Macro, View, Window, Help, and a toolbar with various icons. The main area displays a COBOL program:

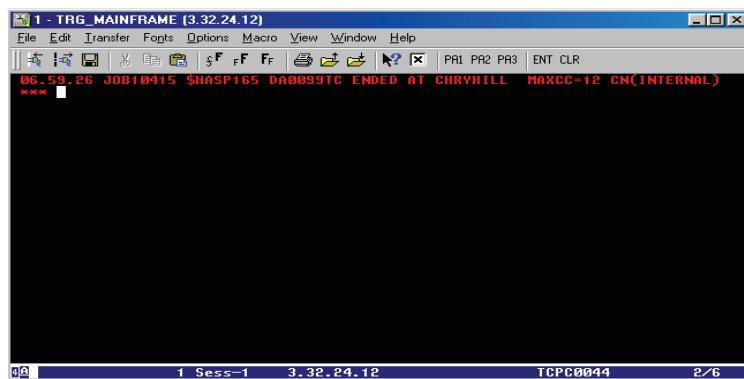
```
EDIT      D00099T.VANDANA.COBOL(SAMP) - 01.00          Member SAMP saved
Command ==> I                                         Scroll ==> CSR
***** **** Top of Data ****
000100 IDENTIFICATION DIVISION.
000200 PROGRAM-ID. SAMP.
000300 ENVIRONMENT DIVISION.
000400 DATA DIVISION.
000410 WORKING-STORAGE SECTION.
000500 PROCEDURE DIVISION.
000600 0000-MAIN.
000610     DISPLAY 'HELLO'.
000800 STOP RUN.
***** **** Bottom of Data ****
```

The status bar at the bottom shows "1 Sess-1 3.32.24.12 TCP/C0044 4/15".

Figure 11: Sample COBOL program

Repeat the same step as discussed earlier to compile and link edit the program SUB=S.ST and then press ENTER.

On pressing ENTER, you will get the following panel, which indicates the status of your job, which is **successful** or **unsuccessful**. In this case non-zero return code of 12 means there is some syntax errors in the COBOL program.



The screenshot shows a terminal window with the title "1 - TRG\_MAINFRAME (3.32.24.12)". The menu bar includes File, Edit, Transfer, Fonts, Options, Macro, View, Window, and Help. The toolbar contains icons for file operations like Open, Save, Print, and Cut/Copy/Paste. The status bar at the bottom shows "1 Sess-1 3.32.24.12 TCP0044 2/6". The main window displays a red error message: "06.59.26 JOB10415 \$HASPI65 DA0099TC ENDED AT CHRYHILL MAXCC=12 CN(INTERNAL) \*\*\*".

Figure 14: Notification message of COMPLINK JCL

Again, press **ENTER**, and the next panel will be displayed.

On this panel, position the cursor and type ? as shown below, then press **ENTER**.



The screenshot shows a terminal window with the title "1 - TRG\_MAINFRAME (3.32.24.12)". The menu bar includes File, Edit, Transfer, Fonts, Options, Macro, View, Window, and Help. The toolbar contains icons for file operations like Open, Save, Print, and Cut/Copy/Paste. The status bar at the bottom shows "1 Sess-1 3.32.24.12 TCP0044 § 5/3". The main window displays the SDSF STATUS DISPLAY ALL CLASSES command output. It shows two jobs: "DA0099T TSU10400 DA0099T" and "DA0099TC JOB10415 DA0099T". The output also includes the command "COMMAND INPUT ===>" and the message "Member COMPLINK saved SCROLL ==> PAGE".

Figure 15: Execution status of COMPLINK JCL

You get the next panel and type **S** as shown below and then press **ENTER**.



NP	DDNAME	StepName	ProcStep	DSID	Owner	C Dest	Rec-Cnt	PAGE
	JESMSGLG	JES2		2	DA0099T	X LOCAL	22	
	JESJCL	JES2		3	DA0099T	X LOCAL	38	
	JESYMSG	JES2		4	DA0099T	X LOCAL	110	
S	SYSPRINT	COB		101	DA0099T	X LOCAL	27	

Figure 16: List of files created after COMPLINK operation

After you get the next panel, type **BOTTOM** and then press **ENTER**.

1 - TRG\_MAINFRAME [3.32.24.12]

File Edit Transfer Fonts Options Macro View Window Help

SDSF OUTPUT DISPLAY D00093TC JOB10415 DSID 101 LINE 0 COLUMNS 02- 81  
 COMMAND INPUT ==> BOTTOM SCROLL ==> PAGE

\*\*\*\*\* TOP OF DATA \*\*\*\*\*  
 PP 5740-CB1 RELEASE 2.4 IBM OS/VS COBOL JULY 1, 1

```

1          6.59.25      MAY 23,1903
00001  000100 IDENTIFICATION DIVISION.
00002  000200 PROGRAM-ID. SAMP.
00003  000300 ENVIRONMENT DIVISION.
00004  000400 DATA DIVISION.
00005  000410 WORKING-STORAGE SECTION.
00006  000500 PROCEDURE DIVISION.
00007  000600 0000-MAIN.
00008  000610      DISPLAY 'HELLO'.
00009  000800      STOP RUN.
2          SAMP      6.59.25      MAY 23,1903

*STATISTICS*   SOURCE RECORDS = 9   DATA DIVISION STATEMENTS =
*OPTIONS IN EFFECT*   SIZE = 4194304   BUF = 118784   LINECNT = 54   SPACE1, FLA
*OPTIONS IN EFFECT*   NODMAP, NOPMAP, NOCLIST, NOSUPMAP, NOXREF, NOSXREF, LO
*OPTIONS IN EFFECT*   NOTERM, NONUM, NOBATCH, NONAME, COMPILE=01, NOSTATE, NOR
*OPTIONS IN EFFECT*   NOOPTIMIZE, NOSYMDMP, NOTEST, VERB, ZWB, SYST, NOEND
*OPTIONS IN EFFECT*   NOLST, NOFDECK, NOCDECK, LCOL2, L120, DUMP, NOADV,
*OPTIONS IN EFFECT*   NOCOUNT, NOUBSUM, NOUBREF, LANGLUL(1)
```

1 Sess-1 3.32.24.12 TCP0044 \$ 2/27

Figure 17: Compilation Errors of sample COBOL program

You get to the bottom of screen where you can see the error listing with line number, which enables the user to debug the error.

1 - TRG MAINFRAME [3.32.24.12]

File Edit Transfer Fonts Options Macro View Window Help

SDSF OUTPUT DISPLAY D00099TC JOB10415 DSID 101 LINE ? COLUMNS 02- 81  
 COMMAND INPUT ==> SCROLL ==> PAGE

```

00004 000400 DATA DIVISION.
00005 000410 WORKING-STORAGE SECTION.
00006 000500 PROCEDURE DIVISION.
00007 000600 0000-MAIN.
00008 000610 DISPLAY 'HELLO'.
00009 000800 STOP RUN.
      2 SAMP          6.59.25      MAY 23,1903

*STATISTICS* SOURCE RECORDS = 9 DATA DIVISION STATEMENTS =
*OPTIONS IN EFFECT* SIZE = 4194304 BUF = 118784 LINECNT = 54 SPACE1, FLA
*OPTIONS IN EFFECT* NODMAP, NOPMAP, NOCLIST, NOSUPMAP, NOXREF, NOSXREF, LO
*OPTIONS IN EFFECT* NOTERM, NONUM, NOBATCH, NONAME, COMPILE=01, NOSTATE, NOR
*OPTIONS IN EFFECT* NOOPTIMIZE, NOSYMDMP, NOTEST, VERB, ZWB, SYST, NOEND
*OPTIONS IN EFFECT* NOLST, NOFDECK, NOCODECK, LCOL2, L120, DUMP, NOADV,
*OPTIONS IN EFFECT* NOCOUNT, NOUBSUM, NOUBREF, LANGLVL(1)
CARD ERROR MESSAGE

? IKF1043I-W END OF SENTENCE SHOULD PRECEDE 0000-MAIN . ASSUMED PRESEN
? IKF3001I-E DISPLAY NOT DEFINED. DELETING TILL LEGAL ELEMENT FOUND.

***** BOTTOM OF DATA *****

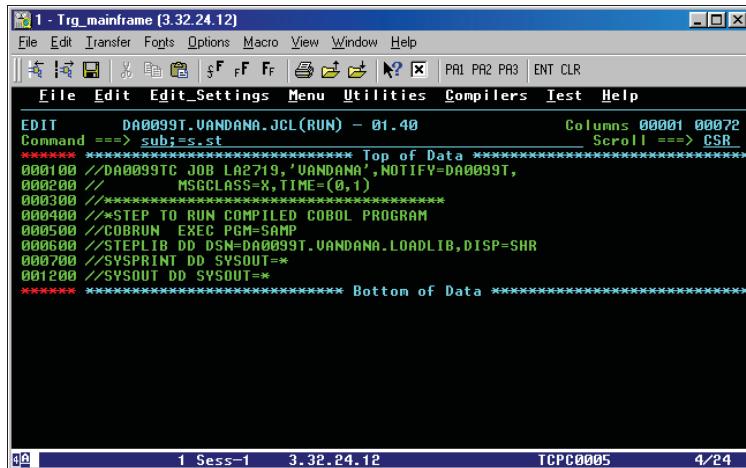
```

1 Sess-1 3.32.24.12 TCP0044 \$ 2/21

Figure 18: Compilation Errors of sample COBOL program (Cont...)

Once you have debugged your COBOL program, repeat the above steps for COMPLINK viz., **SUB;=S.ST**

Once the compilation and linking is successful, execute the COBOL program. For this open the **RUN** jcl and repeat the same above steps, namely, **SUB;=S.ST**.

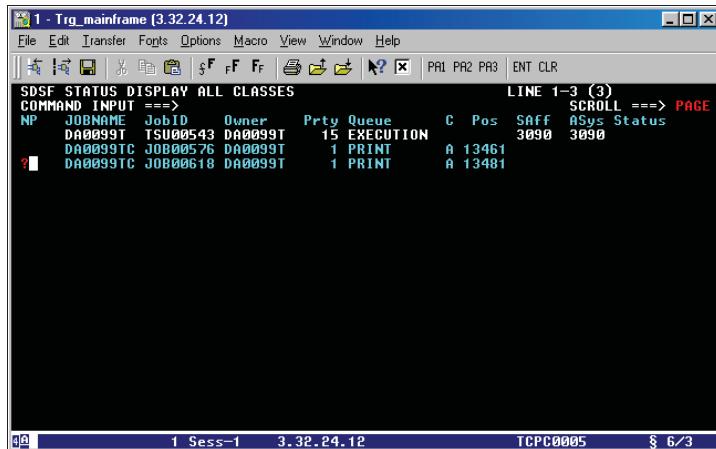


The screenshot shows a mainframe terminal window titled "1 - Trg\_mainframe [3.32.24.12]". The window contains JCL (Job Control Language) code. The code includes commands like //DA0099TC, //COBRUN, and //SYSOUT. The terminal window has a menu bar with File, Edit, Transfer, Fonts, Options, Macro, View, Window, Help. Below the menu is a toolbar with icons for file operations. The status bar at the bottom shows session information: 1 Sess-1, 3.32.24.12, TCP/C0005, and 4/24.

```
EDIT      DA0099T.VANDANA.JCL(RUN) - 01.48          Columns 00001 00072
Command ==> sub;=s.st                               Scroll ==> CSR
***** **** Top of Data *****
000100 //DA0099TC JOB LA2719,'VANDANA',NOTIFY=DA0099T,
000200 //           MSGCLASS=X,TIME=(0,1)
000300 //*****
000400 //STEP TO RUN COMPILED COBOL PROGRAM
000500 //COBRUN EXEC PGM=SAMP
000600 //STEPLIB DD DSN=DA0099T.VANDANA.LOADLIB,DISP=SHR
000700 //SYSPRINT DD SYSOUT=*
001200 //SYSOUT DD SYSOUT=*
***** **** Bottom of Data *****

```

Figure 19: Sample Run JCL



1 - Trg\_mainframe (3.32.24.12)

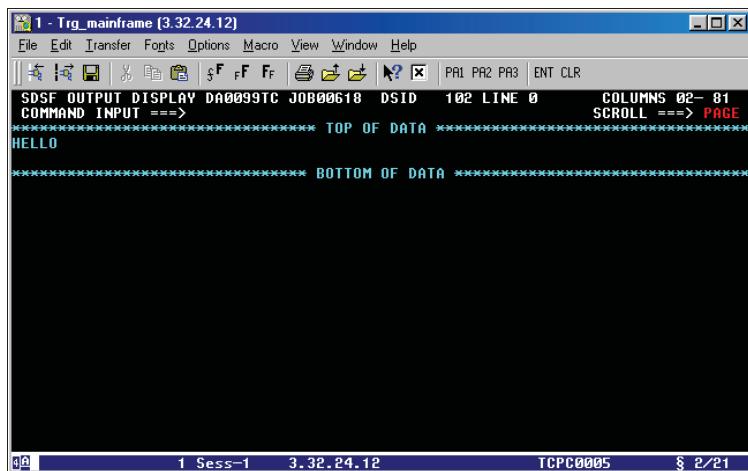
File Edit Transfer Fonts Options Macro View Window Help

SDSF STATUS DISPLAY ALL CLASSES LINE 1-3 (3)  
 COMMAND INPUT ==> SCROLL ==> PAGE

NP	JOBNAME	JobID	Owner	Prtv	Queue	C	Pos	SAff	ASys	Status
	DA0099T	TSU00543	DA0099T		15 EXECUTION			3090	3090	
?	DA0099TC	JOB00576	DA0099T		1 PRINT		A	13461		
?	DA0099TC	JOB00618	DA0099T		1 PRINT		A	13481		

1 Sess-1 3.32.24.12 TCPG0005 § 6/3

Figure 21: Execution status of Run JCL



1 - Trg\_mainframe (3.32.24.12)

File Edit Transfer Fonts Options Macro View Window Help

SDSF OUTPUT DISPLAY DA0099TC JOB00618 DSID 102 LINE 0 COLUMNS 02~ 81  
 COMMAND INPUT ==> SCROLL ==> PAGE

\*\*\*\*\* TOP OF DATA \*\*\*\*\*

HELLO

\*\*\*\*\* BOTTOM OF DATA \*\*\*\*\*

1 Sess-1 3.32.24.12 TCPG0005 § 2/21

 Figure 22: Output of Run JCL  
 (The output as it appears in SYSOUT COBRUN.)

## Map the IBM MVS Environment into Windows 95 or Windows NT

### Introduction:

“**CA-Realia for JCL**” enables you to use **IBM MVS Job Control Language** as an execution control language in the PC environment. With “**CA-Realia for JCL**”, you define a relationship between the constructs of MVS JCL and MVS file system and Windows 95 or Windows NT files.

### MVS Datasets versus Windows 95 or Windows NT Files:

In IBM MVS, uncataloged datasets are uniquely defined by their fully qualified dataset name and the volume where they reside.

#### For example:

VOLUME=SER=BS3007,DSN=DA0001T.PATNI.TESTFILE

It identifies a dataset name **DA0001T.PATNI.TESTFILE** on volume **BS3007**. The same dataset name on a different volume is a different dataset. The different dataset names on different volumes are different datasets.

In Windows 95 or Windows NT, a file is identified by drive letter, directory, filename, and extension.

#### For example:

D:\DA0001T.PATNI.TESTFILE.IBM

It is a Windows 95 or Windows NT file on drive D: in directory \DA0001T\PATNI with filename TESTFILE and extension .IBM.

You must define an association between IBM MVS dataset names and Windows 95 or Windows NT full filenames. The association of the IBM MVS file VOLUME=SER=BS3007,DSN=DA0001T.PATNI.TESTFILE and Windows 95 or Windows NT file D:\DA0001T.PATNI.TESTFILE.IBM is fairly obvious:

- IBM MVS volume BS3007 corresponds to Windows 95 or Windows NT drive D:
- IBM MVS name level DA0001T corresponds to Windows 95 or Windows NT directory \DA0001T
- IBM MVS name level PATNI corresponds to Windows 95 or Windows NT sub-directory \PATNI
- IBM MVS name level TESTFILE corresponds to Windows 95 or Windows NT filename TESTFILE with .IBM extension in the directory \DA0001T\PATNI

CA-Realia for JCL permits a flexible mapping of IBM MVS datasets into Windows 95 or Windows NT files by generalizing the type of relationship.

### VOLUME NAME MAPPING

The Windows 95 or Windows NT drive/directory names is specified by a &VOLUME directive in the CA-Realia for JCL configuration file. It possesses a structure as shown below:

```
/*&VOLUME:ibm-mvs-volume-ser/ibm-mvs-unit;dos-drive-directory
```

where:

**ibm-mvs-volume-ser** is the IBM volume serial number you specify in the VOLUME=SER parameter in the DD card.

**ibm-mvs-unit** is the IBM mainframe device-type of this volume as referenced in a UNIT=parameter in a DD statement.

**dos-drive-directory** is the Windows 95 or Windows NT identifier for the drive and directory to be associated with the IBM MVS volume.

Following are valid specifications of a &VOLUME directive:

```
/*&VOLUME:SYS000/3350;E:\VSY0  
/*&VOLUME:TESTA/3350;E:TESTVA  
/*&VOLUME:BS3007/3390;D:\
```

The last one corresponds to the volume mapping used in the example shown above. With these definitions, volumes SYS000 and TESTA both reside on the same Windows 95 or Windows NT drive D:.

#### **DATASET NAME MAPPING:**

After you map volume serial numbers to their corresponding Windows 95 or Windows NT directories, any uncataloged datasets can be mapped to Windows 95 or Windows NT files.

#### **Simple Datasets:**

For simple IBM MVS datasets, CA-Realia for JCL converts each qualification level name in the IBM MVS dataset name to a Windows 95 or Windows NT directory, except for the last level name. The last level name is converted into the filename. CA-Realia adds an extension to the filename. The default extension is .IBM and it will be used unless there is &DSNAME directive specifying an extension.

Using the &VOLUME directive examples above to define the volumes SYS000, TESTA, and BS3007, here are some examples of IBM MVS dataset name conversion to Windows 95 or Windows NT filenames.

IBM MVS	Windows 95 or Windows NT
VOLUME=SER=SYS000, DSN=SYS1.DEF.WORKFILE	E:\VSY0\SYS1\DEF\WORKFILE.IBM
VOLUME=SER=TESTA, DSN=F045J7.AR.TESTFILE	E:\TESTA\F045J7\AR\TESTFILE.IBM
VOLUME=SER=BS3007, DSN=DA0001T.PATNI.TESTFILE	D:\DA0001T\PATNI\TESTFILE.IBM
VOLUME=SER=BS3007, DSN=DA0001T.EMPFILE	D:\DA0001T\EMPFFILE.IBM

#### **Partitioned Datasets:**

For partitioned datasets (PDS), each member of the PDS must be converted into a separate Windows or Windows NT file. CA-Realia for JCL converts each qualification level name in the IBM MVS PDS name to a Windows 95 or Windows NT directory name, including the last level name. We append the extension .PDS, to the last directory name. The PDS member name is converted into the filename.

Many partitioned datasets are used to hold the JCL, procedures, source programs, and executable programs. For these, Windows 95 or Windows NT requires a specific extension.

**For example:** Executable programs must have an extension of .EXE or .COM; and COBOL source programs have extension of .COB or .CBL. To do this, you can use &DSNAME directive as shown below:

```
/*&DSNAME:pds-data-set-name(*);dos-directory\*.dos-ext
```

where:

**pds-data-set-name** is the IBM MVS PDS dataset name with no member.

**dos-directory** is the path for the files corresponding to pds-data-set-name.

**dos-ext** is the Windows 95 or Windows NT filename extension required for this dataset.

For example, you can specify the following for two PDSs:

```
/*DSN:SYS1.PROCLIB(*);SYS1\PROCLIB.PDS\*.JCL
```

```
/*DSN:AR.JOBLIB(*);AR\JOBLIB.PDS\*.EXE
```

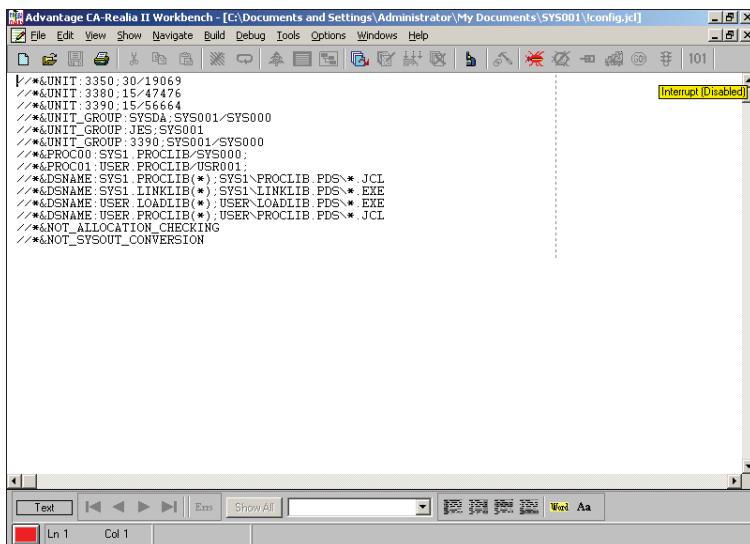
```
/*DSN:TEST.COBLIB(*);TEST\COBLIB.PDS\*.JCL
```

IBM MVS	Windows 95 or Windows NT
VOLUME=SER=SYS000, DSN=SYS1.PROCLIB(TRS06)	E:\VSY000\SYS1\PROCLIB.PDS\TRS06.JCL
VOLUME=SER=TESTA, DSN=AR.JOBLIB(BETA01)	E:\TESTA\JOBLIB.PDS\BETA01.EXE
VOLUME=SER=BS3007, DSN=DA0001T.PATNI.SRCLIB(ASS1)	D:\DA0001T\PATNI\SRCLIB.PDS\ASS1.CBL
VOLUME=SER=BS3007, DSN=DA0001T.PATNI.OBJLIB(ASS1)	D:\DA0001T\PATNI\OBJLIB.PDS\ASS1.OBJ
VOLUME=SER=BS3007, DSN=DA0001T.PATNI.PROCLIB(IEBGEN)	D:\DA0001T\PATNI\PROCLIB.PDS\IEBGEN.JCL
VOLUME=SER=BS3007, DSN=DA0001T.PATNI.LINKLIB(ASS1)	D:\DA0001T\PATNI\SRCLIB.PDS\ASS1.EXE

### Configuration:

#### Configuration File:

The configuration file in the installation directory !CONFIG.JCL, determines how the IBM MVS system is mapped into Windows 95 or Windows NT on your computer. It contains a number of configuration directives.



```

//&UNIT:3350;30/19069
//&UNIT:3380;15/47476
//&UNIT:3390;15/56664
//*&UNIT_GROUP:SYSDA;SYS001/SYS000
//*&UNIT_GROUP:JES:SYS001
//*&UNIT_GROUP:3390;SYS001/SYS000
//*&PROC00:SYS1 PROCLIB/SYS000
//*&PROC00:USER PROCLIB/SYS001
//*&DSNAME:SYS1 PROCLIB(*) SYS1\PROCLIB PDS\* JCL
//*&DSNAME:SYS1 LINKLIB(*) SYS1\LINKLIB PDS\* EXE
//*&DSNAME:USER LOADLIB(*) USER\LOADLIB PDS\* EXE
//*&DSNAME:USER PROCLIB(*) USER\PROCLIB PDS\* JCL
//*&NOT_ALLOCATION_CHECKING
//*&NOT_SYSOUT_CONVERSION

```

Figure 87: RealJCL !config.jcl (Screen Shot)

Run the **setupjcl.bat** from the folder where Ca-Realia is installed (For example: E:\CAWB31).The following **!config.jcl** is created as a result of this.

```

//*&UNIT:3350;30/19069
//&UNIT:3380;15/47476
//&UNIT:3390;15/56664
//*&VOLUME:SYS000/3390;E:\cawb31\SYS000
//*&VOLUME:SYS001/3390;D:\DOCUME~1\koleshva\MYDOCU~1\SYS001
//*&VOLUME:USR001/3390;D:\DOCUME~1\koleshva\MYDOCU~1\SYS001
//*&UNIT_GROUP:SYSDA;SYS001/SYS000

```

```
/*&UNIT_GROUP:JES:SYS001
/*&UNIT_GROUP:3390;SYS001/SYS000
/*&PROC00:SYS1.PROCLIB/SYS000;
/*&PROC01:USER.PROCLIB/USR001;
/*&DSNAME:SYS1.PROCLIB(*);SYS1\PROCLIB.PDS\*.JCL
/*&DSNAME:SYS1.LINKLIB(*);SYS1\LINKLIB.PDS\*.EXE
/*&DSNAME:USER.LOADLIB(*);USER\LOADLIB.PDS\*.EXE
/*&DSNAME:USER.PROCLIB(*);USER\PROCLIB.PDS\*.JCL
/*&NOT_ALLOCATION_CHECKING
/*&NOT_SYSOUT_CONVERSION
```

#### Example 1: RealJCL !config.jcl

**Note:** The volume specification may differ as per the installation. Also the setupjcl.bat has to be run only once initially. If the settings as mentioned above are already present then the setupjcl.bat need not be run.

#### Configuring the Configuration file

Follow the steps given below to configure the **!config.jcl** file in order to customize the Windows environment to IBM mainframe environment:

**Step 1:** Create **JCL.PDS** folder in your own path. (for example: C:\ramu\jcl)

**Step 2:** Copy the **!config.jcl** to **JCL.PDS**.

**Step 3:** Customize the JCL configuration file (**!config.jcl**) as follows:

```
/*&UNIT:3350;30/19069
/*&UNIT:3380;15/47476
/*&UNIT:3390;15/56664
/*&VOLUME:SYS000/3390;C:\cawb31\SYS000
/*&VOLUME:SYS001/3390;C:\DOCUME~1\ramuthiy\MYDOCU~1\SYS001
/*&VOLUME:USR001/3390;C:\DOCUME~1\ramuthiy\MYDOCU~1\SYS001
/*&VOLUME:BS3007/3390;C:\RAMU\JCL
/*&UNIT_GROUP:SYSDA;BS3007/SYS001/SYS000
/*&UNIT_GROUP:JES:BS3007/SYS001
/*&UNIT_GROUP:3390;BS3007/SYS001/SYS000
/*&PROC00:DA0001T.RAMU.PROCLIB/BS3007;
/*&PROC01:SYS1.PROCLIB/SYS000;
/*&PROC02:USER.PROCLIB/USR001;
/*&DSNAME:SYS1.PROCLIB(*);SYS1\PROCLIB.PDS\*.JCL
/*&DSNAME:SYS1.LINKLIB(*);SYS1\LINKLIB.PDS\*.EXE
/*&DSNAME:USER.LOADLIB(*);USER\LOADLIB.PDS\*.EXE
/*&DSNAME:USER.PROCLIB(*);USER\PROCLIB.PDS\*.JCL
/*&DSNAME:DA0001T.RAMU.COBOL(*);JCL.PDS\*.COB
/*&DSNAME:DA0001T.RAMU.JCL(*);JCL.PDS\*.JCL
/*&DSNAME:DA0001T.RAMU.PROCLIB(*);JCL.PDS\*.JCL
/*&DSNAME:DA0001T.RAMU.LOADLIB(*);JCL.PDS\*.EXE
/*&DSNAME:DA0001T.RAMU.OBJLIB(*);JCL.PDS\*.OBJ
```

```
/*&DSNAME:DA0001T.EMPFILE(*);JCL.PDS\EMPFILER.IBM  
/*&DSNAME:DA0001T.FILE.;JCL.PDS*.IBM  
/*&NOT_ALLOCATION_CHECKING  
/*&NOT_SYSOUT_CONVERSION
```

**Example 2: Customized !config.jcl**

**Step 4:** Create all your source code, object code, executable files and data files in the same JCL.PDS.

**Step 5:** Make **JCL.PDS** as your working directory.

**Program Execution**

Programs can be in one of the three places to be executed by CA-Realia for JCL:

Lab 1. SYS1.LINKLIB (Path:

C:\DOCUME~1\ramuthiy\MYDOCU~1\SYS001\LINKLIB.PDS)

Lab 2. A user-defined JOBLIB (Path: C:\ramu\jcl\JCL.PDS, if you customize your !config.jcl as above)

Lab 3. A user-defined STEPLIB (Path: C:\ramu\jcl\JCL.PDS, if you customize your !config.jcl as above)

Your development environment must know the Windows 95 or Windows NT name of this drive/directory. You can use the rules for conversion from IBM dataset names to Windows 95 or Windows NT files names via the information in the configuration file.

## Executing JCL Using CA-Realia II workbench

### Introduction

This section describes how to execute job step programs that call Windows 95 or Windows NT programs using the CA-Realia Workbench.

This section discusses the following:

- Defining an execution profile
- Creating or editing CA-Realia for JCL session options

### Defining an Execution Profile

Before you execute your JCL using CA-Realia Workbench, you must first define an execution profile. To define an execution profile, follow the steps given below:

**Step 1:** To open a JCL file, select the **File** menu and choose **Open**.

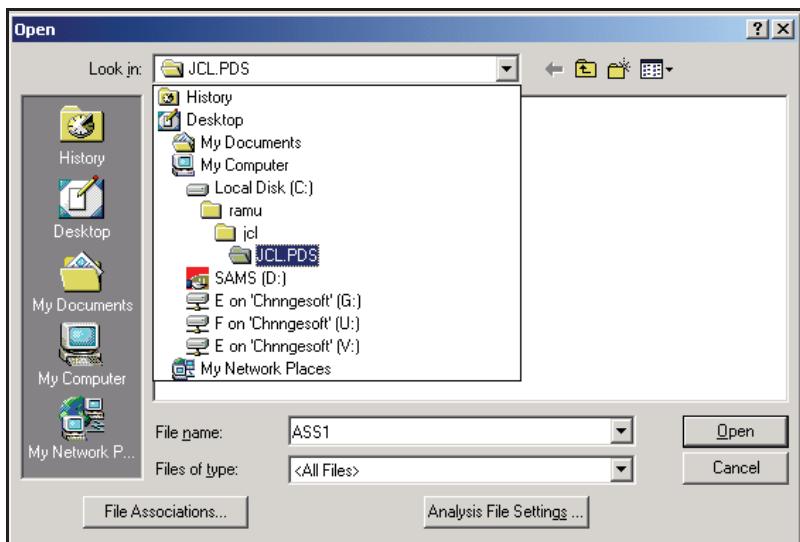
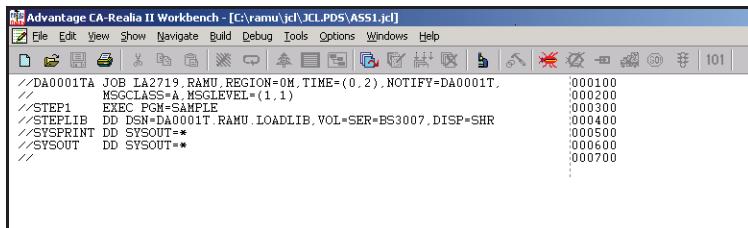


Figure 88: Open Menu for an existing JCL file

**Step 2:** The Run jcl file is displayed.

```
//DA0001TA JOB LA2719,RAU,REGION=0M,TIME=(0,2),NOTIFY=DA0001T.
//          MSGCLASS=A, MSGLEVEL=(1,1)
//STEP1 EXEC PGM=SAMPLE
//STEPLIB DD DSN=DA0001T.RAMU,LOADLIB,VOL=SER=BS3007,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSOUT DD SYSOUT=**
//
```

Figure 89: Sample Run JCL file (ASS1.jcl)

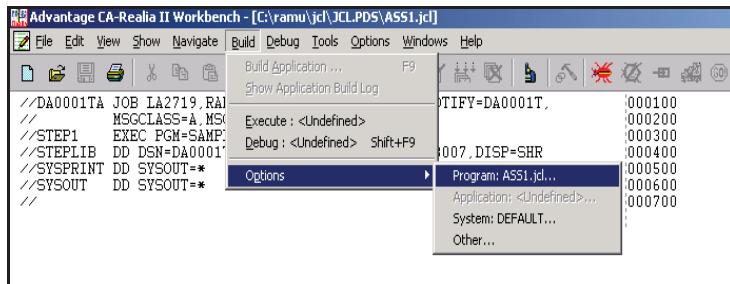
**Step 3:** Select the Build menu, and choose Options.

Figure 90: Creation of session options for Run JCL

**Step 4:** If your program is not yet defined, choose **Program: <Undefined>**. The **Select Application/Program Type** dialog will be displayed. Select **JCL Model** and click **OK**.

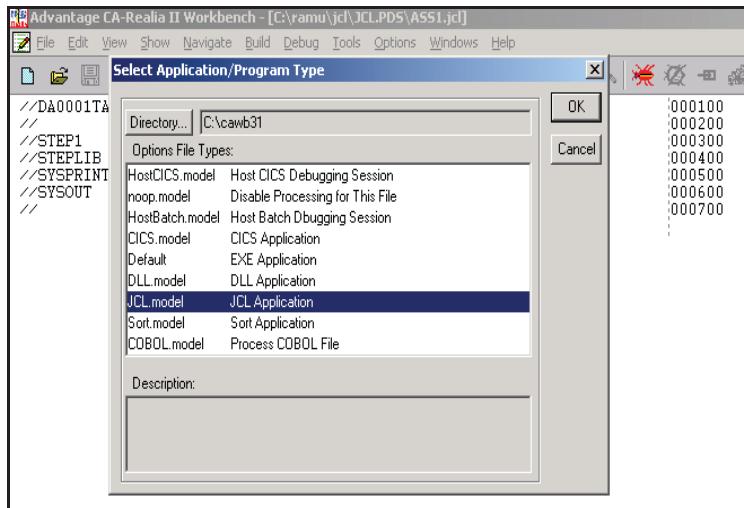


Figure 91: Selection of JCL Model

**Step 5:** If your program is already defined, choose Program: *yourprogramname* from the **Build/Options** dialog. The **RealJCL Jobrun Options Notebook** will be displayed. Here you can specify whether you are creating a new profile or editing an existing profile.

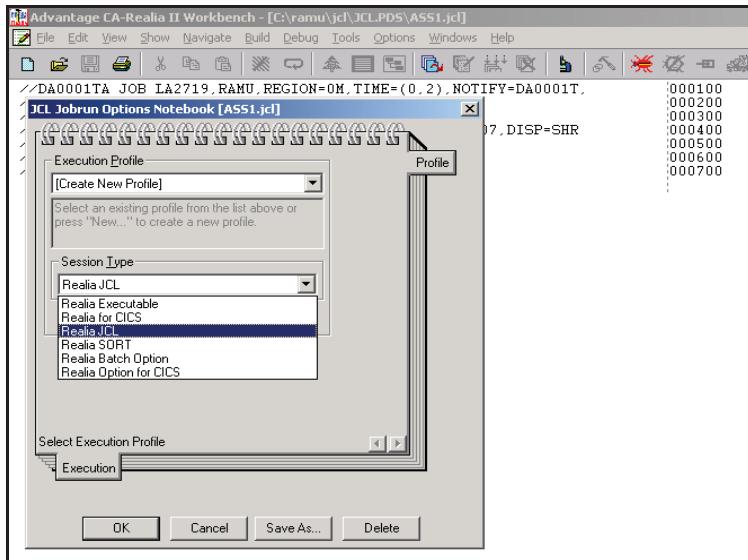
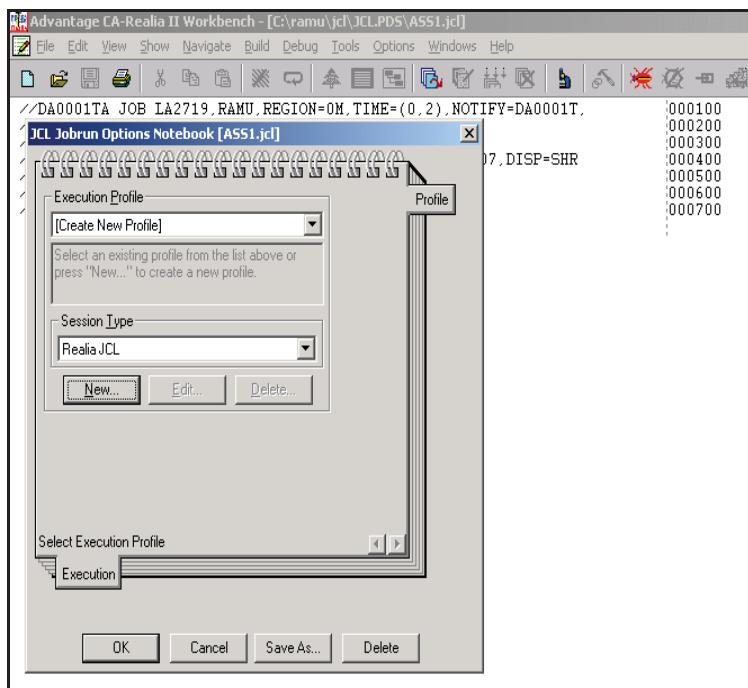


Figure 92: Selection of Session Type



**Figure 93: Creation of new Profile**

You will see the following elements in the JCL Jobrun Options Notebook:

- **Execution Profile:** This drop-down combination box lists all existing execution profiles.
- **New:** Click this button to define a new execution profile.
- **Edit:** Click this button to change an existing execution profile.
- **Delete:** Click this button to delete the highlighted execution profile.
- **Session Type:** This field identifies the type of application to debug. Select Realia JCL for this debug session if it is not already selected.

**Step 6:** Click **New** to create session options for a new profile or **Edit** to edit session options for an existing profile.

**.Creating or Editing CA-Realia for JCL Session Options:**

When you click **New** or **Edit** on the **RealJCL Jobrun Options Notebook** dialog, the **Realia for JCL Session Options Notebook** is displayed. Here you define your session options to your system.

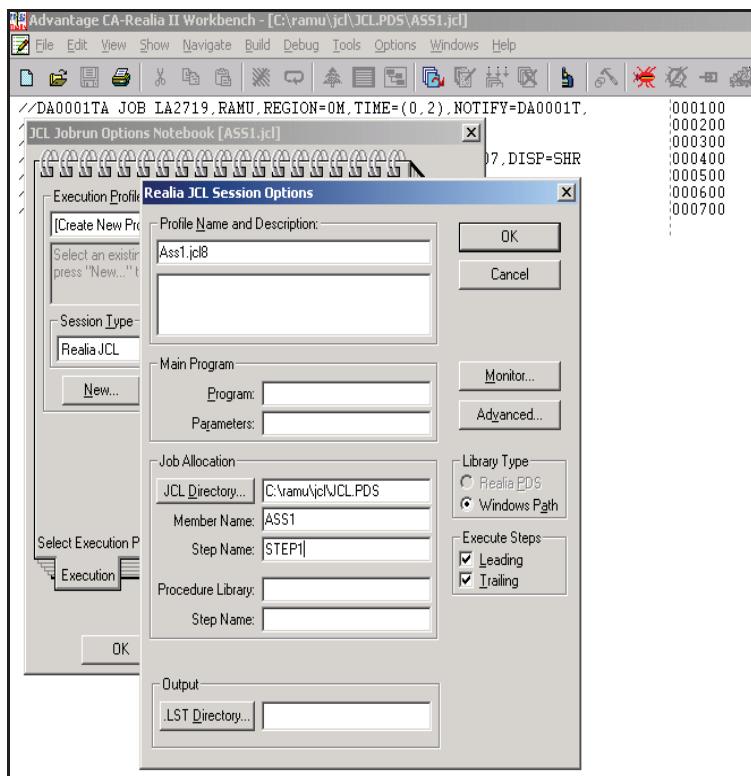


Figure 94: Creation or Editing Session Options

The **JCL directory** in this case is **C:\ramu\jcl\jcl.pds**. The drive name may be different as per the installation.

You will see the following elements on the Realia:

- **Profile Name and Description:** In this field, you can enter a name for the session options profile you are creating. You can then enter description of the profile.

- **Program:** In this field, you can enter the name of the main program that should be executed when this profile is selected for the debug session. This is the name that appears in an EXEC PGM= JCL statement or the JCL step name identified in this dialog. This field is required for debugging only. It is ignored if you are not debugging a job step.
- **Parameters:** In this field, you can enter parameters to override parameters on the JCL EXEC statement. If you do not supply any parameters here, then the parameters on JCL EXEC statement are used. This field is required for debugging only.
- **JCL Directory:** In this field, you can enter the name of Windows drive and directory that contain the JCL member that defines the data set allocations to be performed when the application is executed. This field is required.
- **Member Name:** In this field, you can enter the name of the member within the JCL directory that is going to be executed. An extension of .JCL is assumed. This field is required.
- **Step Name:** In this field, you can enter the name of the step within the JCL member that should be executed. The step name must correspond the program name shown in the Program field. This field is required for debugging only.
- **Procedure Library:** In this field, you can specify the procedure library that contains the external procedure invoked by specified steps within the JCL member. If the JCL step invokes the main program directly, Procedure Library and Step Name must be left blank. This field is required for debugging only.
- **Step Name:** In this field, you can specify the name of the step within the procedure that is going to be executed, if any. The step name must correspond to the program name shown in the Program field. This field is required for debugging only.
- **Library Type - Windows Path:** This option indicates the drive and directory where the execution profile resides. Realia PDS is reserved for future use. This field is required for debugging only.
- **Execute Steps – Leading:** Select this check box if the JCL member contains steps that you want to be executed before the step has to be debugged. This field is required for debugging only.
- **Execute Steps – Trailing:** Select this check box if the JCL member contains steps that you want to be executed following the step to be debugged. This field is required for debugging only.

### Advanced Options

To modify the execution of CA-Realia for JCL for the current run, click **Advanced** on the the **Realia for JCL Session Options**. A dialog box will be displayed.

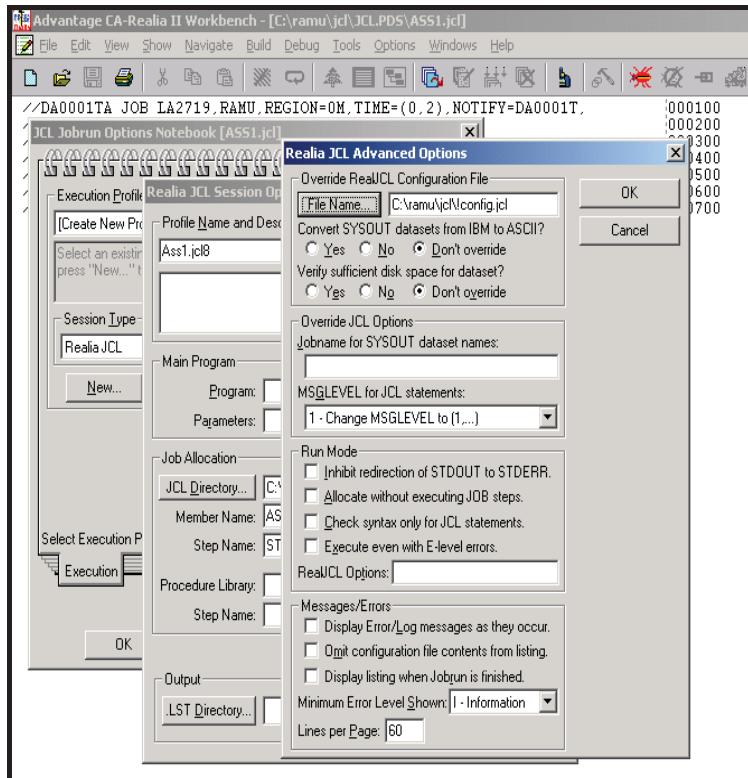


Figure 95: Advanced Options

**File Name:** CA-Realia for JCL normally uses the configuration file !CONFIG.JCL in the installation directory where it finds the REALJCL.EXE module. This field lets you point to

an alternate configuration file. Here you select the customized **Iconfig.jcl** file so that your path and volume will be selected for execution.

### Running and Debugging a Program

To proceed with running your job, select **Build** and then **Execute** while your profile is displayed. When the execution completes, you can debug your job by selecting **Build** and then **Debug**.

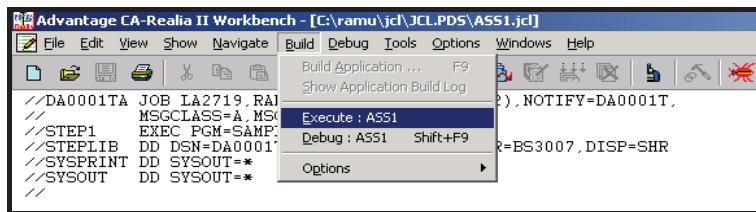


Figure 96: Execution of Run JCL file

### Executing procedures:

#### A) Cataloged procedures:

To create and invoke a catalogued procedure, proceed with the following steps.

**Step 1:** Write down a COBOL program, compile, link and create an executable.  
Store the executable in D:\cawb31\SAMPLES\jcl.pds.

Following is the COBOL program which is invoked from the procedure.

```

IDENTIFICATION DIVISION.
PROGRAM-ID. SAMPLE.

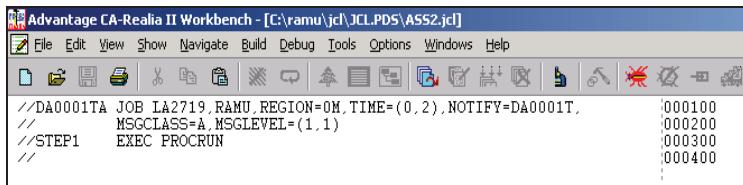
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. IBM-PC.
OBJECT-COMPUTER. IBM-PC.

DATA DIVISION.
WORKING-STORAGE SECTION.
01 W01-DUMMY PIC 9(02) VALUE ZEROS.

PROCEDURE DIVISION.
0000-MAIN.
  DISPLAY 'MY FIRST COBOL PROGRAM'.
  ACCEPT W01-DUMMY.
  STOP RUN.

```

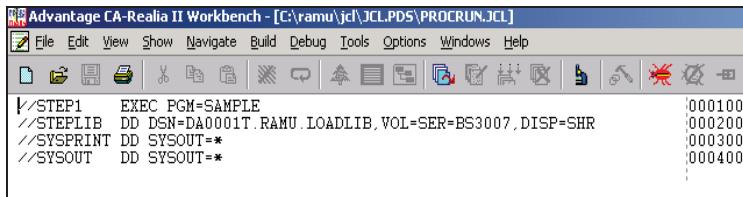
**Step 2:** Create a cataloged procedure and store it in the same **JCL.pds**.



```
//DA0001TA JOB LA2719, RAMU, REGION=0M, TIME=(0,2), NOTIFY=DA0001T,      '000100
//          MSGCLASS=A, MSGLEVEL=(1,1)           '000200
//STEP1     EXEC PROCRUN                   '000300
//                                         '000400
```

Figure 97: Cataloged procedure

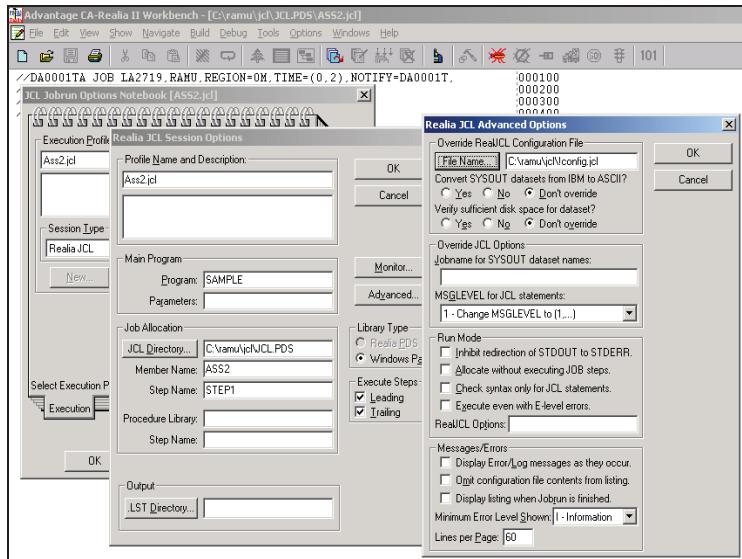
**Step 3:** Create a JCL which invokes the above cataloged procedure and store it in the same **JCL.PDS**.



```
/STEP1    EXEC PGM=SAMPLE               '000100
//STEPLIB  DD DSN=DA0001T.RAMU, LOADLIB, VOL=SER=BS3007, DISP=SHR   '000200
//SYSPRINT DD SYSOUT=*                  '000300
//SYSOUT   DD SYSOUT=*                  '000400
```

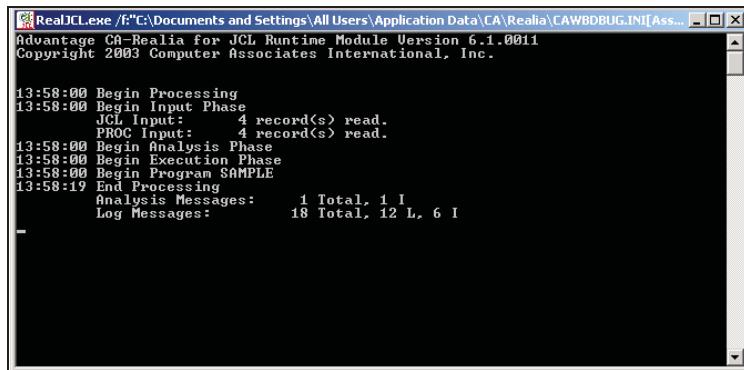
Figure 98: Run JCL that executes the Cataloged procedure

**Step 4:** Select Build → options → program → new and make the entries as given in the screen mentioned below.



**Figure 99: Creation of new profile for execution of catalogued procedure**

**Step 5:** Execute the JCL. The output will be displayed as follows:



```

RealJCL.exe /F:"C:\Documents and Settings\All Users\Application Data\CA\Realia\CAWBDBUG.INI[Ass...
Advantage CA-Realia for JCL Runtime Module Version 6.1.0011
Copyright 2003 Computer Associates International, Inc.

13:58:00 Begin Processing
13:58:00 Begin Input Phase
    JCL Input:        4 record(s) read.
    PROC Input:       4 record(s) read.
13:58:00 Begin Analysis Phase
13:58:00 Begin Execution Phase
13:58:00 Begin Program SAMPLE
13:58:19 End Processing
    Analysis Messages:   1 Total, 1 I
    Log Messages:      18 Total, 12 L, 6 I
-
```

Figure 100: After Execution of Run JCL

To see the message printed by the COBOL program, open the **JES** folder in the same path, that is, **C:\ramujcl** and find the folder with the name as same as your job name. Open the folder with the job name and you can find two text files starting with the character that ends in your job name. One of the files will contain the message printed by the COBOL program (that is **SYSOUT**) and the other file is for **SYSPRINT** which would not contain any output.

**Note:** If you have only one **SYSOUT** statement in your run JCL, then only one text file will be created in the folder and that contains the output message.

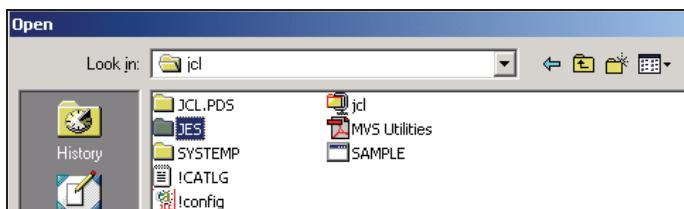


Figure 101: Open JES folder



Figure 102: Open the folder named with your job name

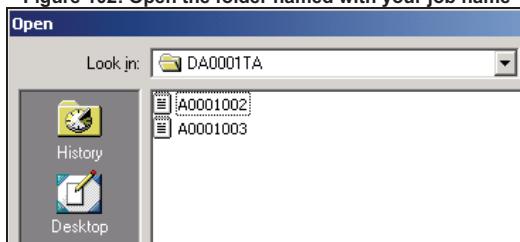


Figure 103: Two text files – First one for SYSPRINT and Second for SYSOUT

**Note:** This may differ according to the order you code these two statements.

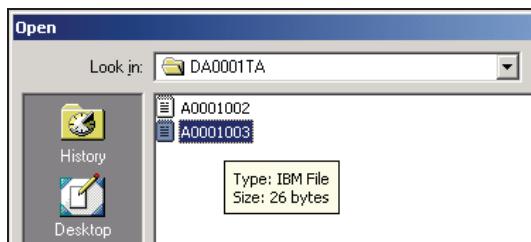


Figure 104: Open the SYSOUT text file for the output message

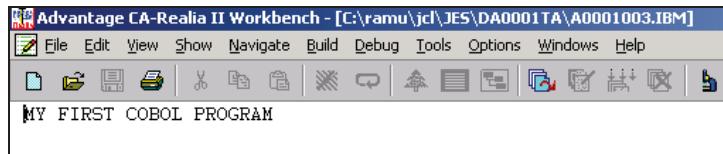
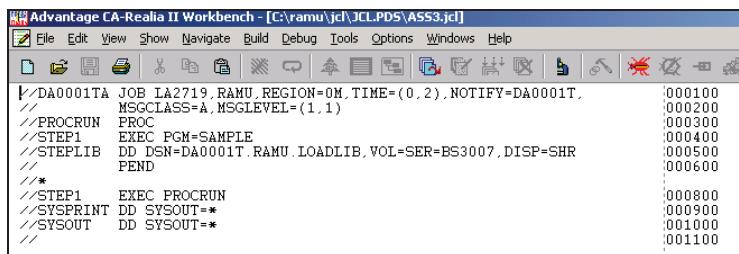


Figure 105: Output message printed by the COBOL program named SAMPLE

### B) Instream procedure:

Step 1: Create an **instream** procedure and store it in your **jcl.pds**.



```
//DA0001TA JOB LA2719, RAMU, REGION=0M, TIME=(0, 2), NOTIFY=DA0001T,      000100
//          MSGCLASS=A, MSGLEVEL=(1, 1)           000200
//PROCRUN  PROC                           000300
//STEP1    EXEC PGM=SAMPLE                 000400
//STEPLIB  DD DSN=DA0001T.RAMU, LOADLIB, VOL=SER=BS3007, DISP=SHR   000500
//          PEND                           000600
//*
//STEP1    EXEC PROCRUN                  000800
//SYSPRINT DD SYSOUT=*                   000900
//SYSOUT   DD SYSOUT=*                   001000
//                                     001100
```

Figure 106: Instream procedure

**Step 2:** Select Build → options → program → new and make the entries as given in the screen mentioned below.

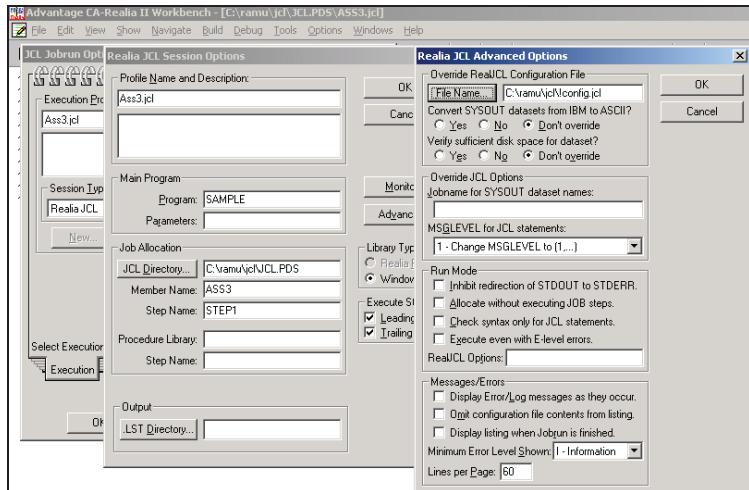
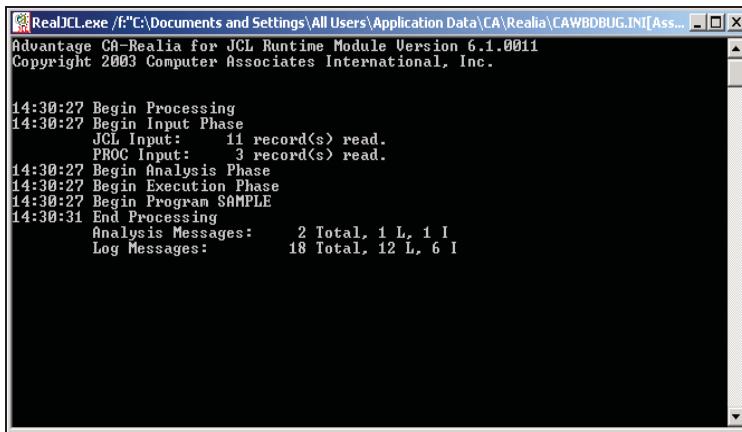


Figure 107: Creation of new profile for execution of instream procedure

**Step 3:** Execute the JCL. The output will be as shown below:



```
RealJCL.exe /F:"C:\Documents and Settings\All Users\Application Data\CA\Realia\CAWBDBUG.INI[Ass..."]
Advantage CA-Realia for JCL Runtime Module Version 6.1.0011
Copyright 2003 Computer Associates International, Inc.

14:30:27 Begin Processing
14:30:27 Begin Input Phase
    JCL Input:    11 record(s) read.
    PROC Input:   3 record(s) read.
14:30:27 Begin Analysis Phase
14:30:27 Begin Execution Phase
14:30:27 Begin Program SAMPLE
14:30:31 End Processing
    Analysis Messages:    2 Total, 1 L, 1 I
    Log Messages:        18 Total, 12 L, 6 I
```

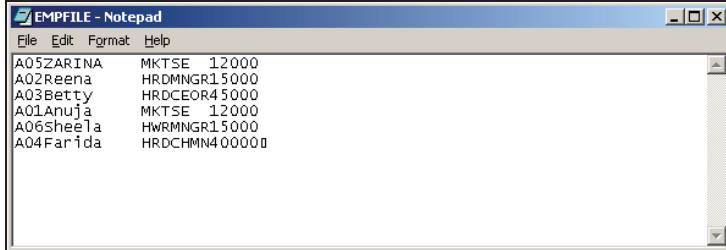
**Figure 108: Execution of Run JCL that invokes the instream procedure**

To see the message printed by the COBOL program, follow the same procedure shown in Fig: 4.14 to Fig: 4.18.

**Sorting:**

**Step 1:** Create a file through **IEFBR14** (Ref. Page no. 28) or by executing a COBOL program.

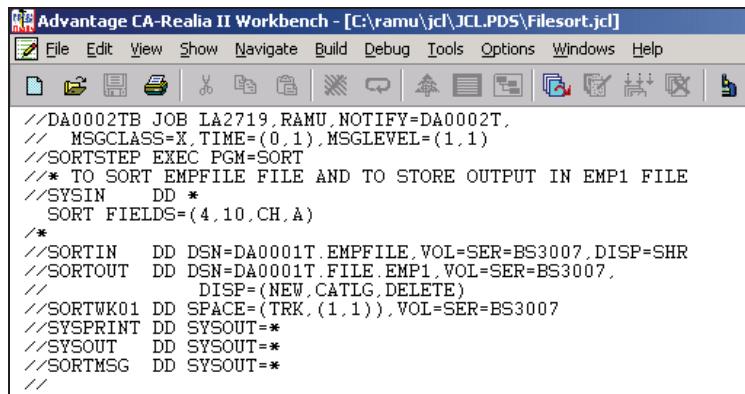
**Step 2:** Store the following records in this file. This is the file which will be sorted. Store the file in **JCL.PDS**.



EMPFILE - Notepad		
File	Edit	Format
A05ZARINA	MKTSE	12000
A02Reena	HRDMngr15000	
A03Betty	HRDCEOR45000	
A01Anuja	MKTSE	12000
A06Sheela	HwRMngr15000	
A04Farida	HRDChmn40000	

**Figure 109: Input file for Sorting**

**Step 3:** Create the following JCL and store it in **jcl.pds**.



```
//DA0002TB JOB LA2719, RAMU, NOTIFY=DA0002T,
//  MSGCLASS=X, TIME=(0,1), MSGLEVEL=(1,1)
//SORTSTEP EXEC PGM=SORT
//* TO SORT EMPFILE FILE AND TO STORE OUTPUT IN EMP1 FILE
//SYSIN    DD *
//      SORT FIELDS=(4,10,CH,A)
/*
//SORTIN    DD DSN=DA0001T.EMPFILE, VOL=SER=BS3007, DISP=SHR
//SORTOUT   DD DSN=DA0001T.FILE.EMP1, VOL=SER=BS3007,
//              DISP=(NEW,CATLG,DELETE)
//SORTWK01  DD SPACE=(TRK,(1,1)), VOL=SER=BS3007
//SYSPRINT DD SYSOUT=*
//SYSOUT    DD SYSOUT=*
//SORTMSG   DD SYSOUT=*
//
```

**Figure 110: Code to sort EMPFILE and to store the sorted output in EMP1 file**

**Step 4:** Select **Build → options → program → new** and make the entries as given in the screen shown below:

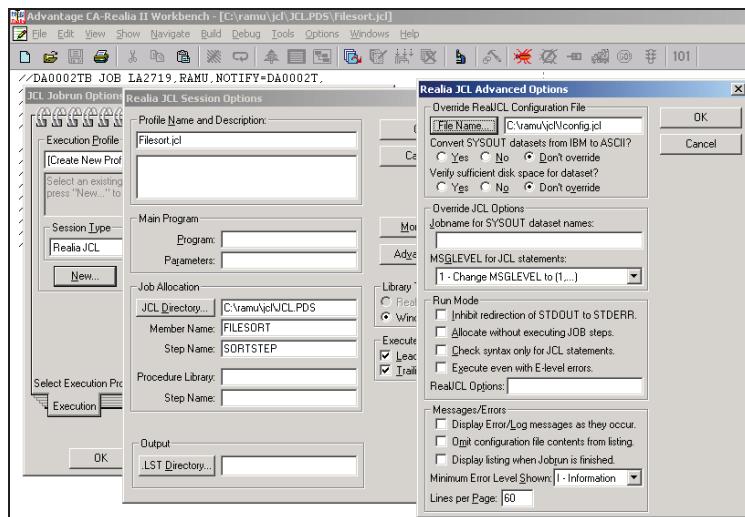


Figure 111: Creation of new profile for FILESORT run JCL

**Step 5:** Execute the JCL. A file named **EMP1** gets created in your **JCL.PDS**. This file is sorted on the employee name.

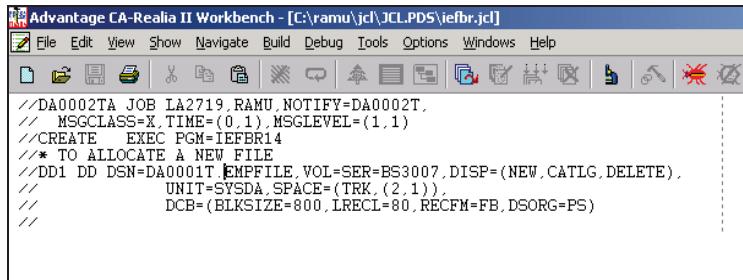
The contents of EMP1 are as shown below:

Advantage CA-Realia II Workbench - [C:\ramu\jcl\JCL.PDS\EMP1.IBM]		
<a href="#">File</a> <a href="#">Edit</a> <a href="#">View</a> <a href="#">Show</a> <a href="#">Navigate</a> <a href="#">Build</a> <a href="#">Debug</a> <a href="#">Tools</a> <a href="#">Options</a> <a href="#">Windows</a> <a href="#">Help</a>		
A01Anuja      MKTSE  12000 A03Betty      HRDCEOR45000 A04Farida     HRDCHMN40000 A02Reena      HWRMNGR15000 A06Sheela     HWRMNGR15000 A05ZARINA    MKTSE  12000		

Figure 112: Contents of EMP1 file

### Creating a file through IEFBR14:

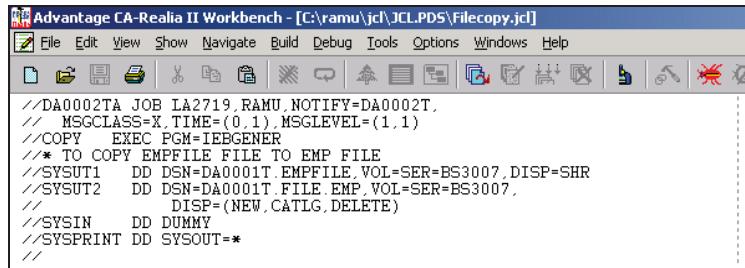
**Step 1:** Write the following program in **jcl.pds**.



```
//DA0002TA JOB LA2719,RAMU,NOTIFY=DA0002T,  
// MSGCLASS=X,TIME=(0,1),MSGLEVEL=(1,1)  
//CREATE EXEC PGM=IEFBR14  
//* TO ALLOCATE A NEW FILE  
//DD1 DD DSN=DA0001T,EMPFILE,VOL=SER=BS3007,DISP=(NEW,CATLG,DELETE),  
// UNIT=SYSDA,SPACE=(TRK,(2,1)),  
// DCB=(BLKSIZE=800,LRECL=80,RECFM=FB,DSORG=PS)  
//
```

Figure 113: Code to create sequential file named **EMPFILE** in **JCL.PDS**

**Step 2:** Execute the JCL. This will create a file by the name **EMPFILE** in your **JCL.PDS**. Also, The corresponding entry for the file is also made in the **lcatlg.ibm**. Since **DA0001T.EMPFILE** is mapped to your **JCL.PDS** in customized **lconfig.jcl**, this file will be created in your **JCL.PDS** folder.

**Copying a file through IEBGENER:****Step 1:** Write the following program.

```
//DA0002TA JOB LA2719, RAMU, NOTIFY=DA0002T,  
// MSGCLASS=X, TIME=(0,1), MSGLEVEL=(1,1)  
//COPY EXEC PGM=IEBGENER  
///* TO COPY EMFILE FILE TO EMP FILE  
//SYSUT1 DD DSN=DA0001T.EMFILE, VOL=SER=BS3007, DISP=SHR  
//SYSUT2 DD DSN=DA0001T.FILE.EMP, VOL=SER=BS3007,  
// DISP=(NEW,CATLG,DELETE)  
//SYSIN DD DUMMY  
//SYSPRINT DD SYSOUT=*  
//
```

**Figure 114: Code to copy one file to another file in JCL.PDS****Step 2:** Execute the JCL. This will create a file by the name **EMP** in your **JCL.PDS** since dataset name **DA0001T.FILE** is mapped to **JCL.PDS**. Also, the corresponding entry for the file is also made in **!catlg.ibm**.The contents of **!catlg.ibm** are as shown below:

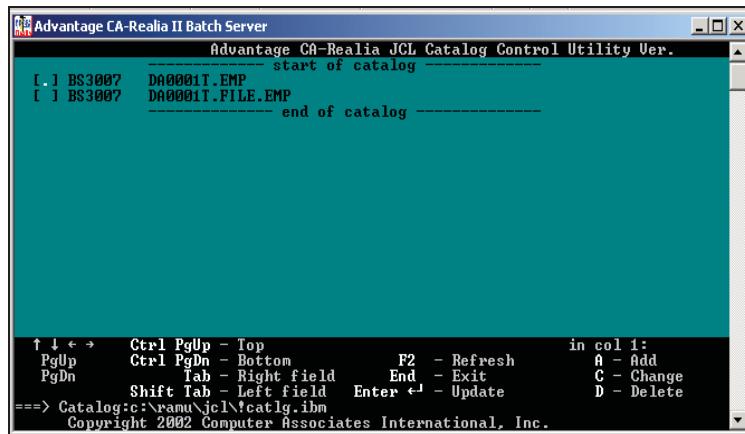


Figure 115: Catalog contents

The output message of the **FILECOPY.JCL** is stored in the **JES** folder under the directory named with the job name, **DA0002TA** as shown below.

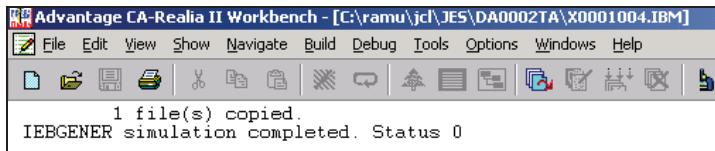


Figure 116: Output Message of IEBGENER after COPY operatio

## Operators Procedure to enquire the details of tape using CA1

Use Operators Procedure to enquire the details of tape using CA1

Solution:

Step 1: Get tape number or name of the dataset.

Procedure to get tape volume number:

Enter 3.4 at ISPF Command Line.

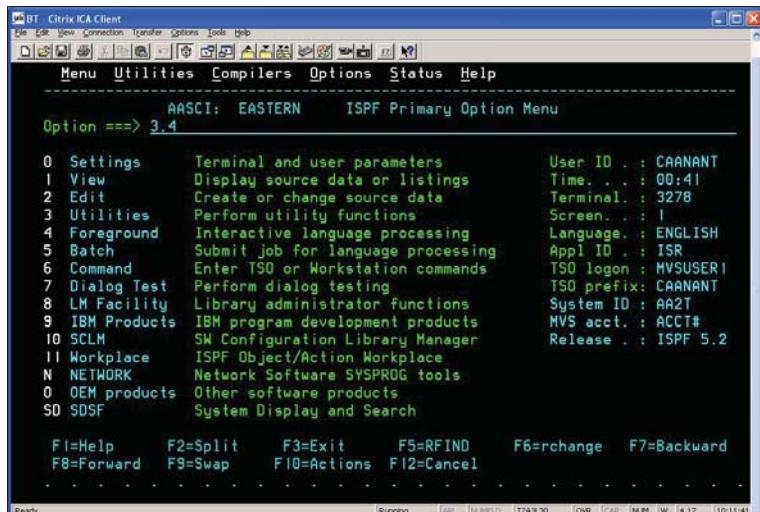
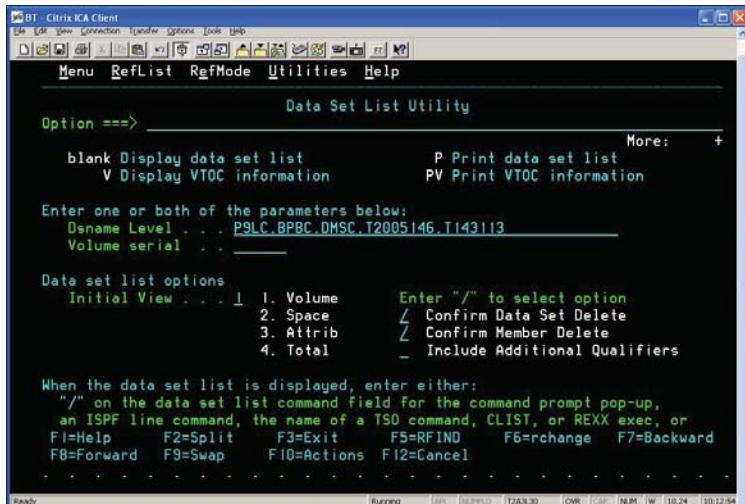


Figure 23: Output

Step 2: Type Dataset Name and press ENTER.



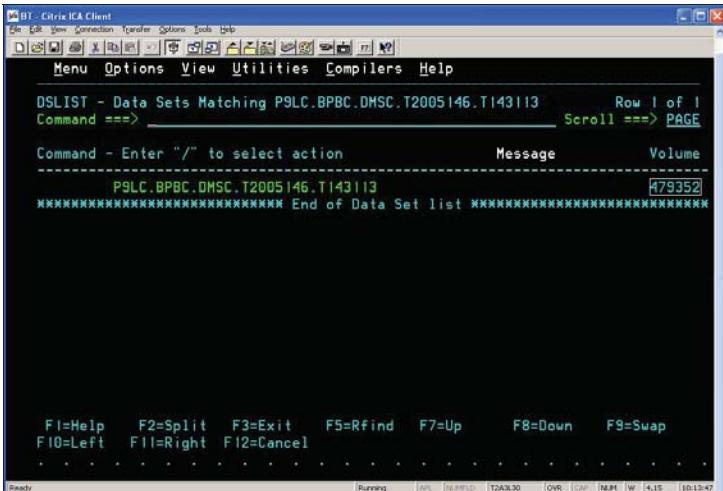
```
BT - Citrix ICA Client
File Edit View Connection Transfer Options Tools Help
Menu RefList RefMode Utilities Help
Data Set List Utility
Option ==> _____ More: +
blank Display data set list          P Print data set list
V Display VTOC information          PV Print VTOC information
Enter one or both of the parameters below:
Dname Level . . . P9LC.BPBC.DMSC.T2005146.T143113
Volume serial . .
Data set list options
Initial View . . . 1. Volume      Enter "/" to select option
                    2. Space       ↘ Confirm Data Set Delete
                    3. Attrib      ↘ Confirm Member Delete
                    4. Total       - Include Additional Qualifiers

When the data set list is displayed, enter either:
"/" on the data set list command field for the command prompt pop-up,
an ISPF line command, the name of a TSO command, CLIST, or REXX exec, or
F1=Help   F2=Split   F3=Exit   F5=RFIND   F6=rchange   F7=Backward
F8=Forward   F9=Swap   F10=Actions   F12=Cancel
Ready      Running  [Save] [Recover] T2A3L30  OVR  [OK]  NUM  W  [10,24]  [10:12:54]
```

Figure 24: Output

Step3: Note down the Tape volume Number.

**Note:** If it shows + next to volume number, then it indicates that Dataset is on multiple Tapes. Volume number is Numeric for tapes.



```
BT - Citrix ICA Client
File Edit View Connection Transfer Options Tools Help
Menu Options View Utilities Compilers Help
DSLIST - Data Sets Matching P9LC.BPBC.DMSC.T2005146.T143113 Row 1 of 1
Command ==> Scroll ==> PAGE
Command - Enter "/" to select action Message Volume
-----
P9LC.BPBC.DMSC.T2005146.T143113 479352
***** End of Data Set list *****

F1=Help F2=Split F3=Exit F5=Rfind F7=Up F8=Down F9=Swap
F10=Left F11=Right F12=Cancel
-----
```

Figure 25: Output

**Step 4:** Get tape details using **CA1**. Type **CA1** and press **ENTER**

**Note:** Find out where the **CA1** option exists for your application. Sometimes you see this option in **ISPF** menu directly, sometimes residing as part of other products option.

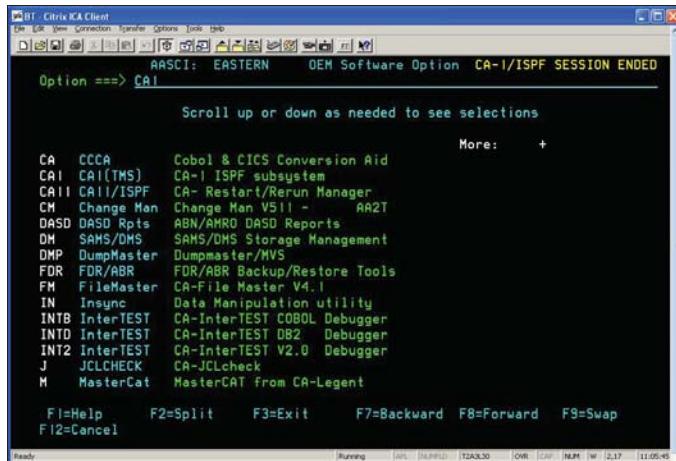


Figure 26: Output

**Step 5:** Type 1 and press **ENTER**.

**Note:** Password is required if dataset is secured by CA1. Otherwise default is blank for the password.

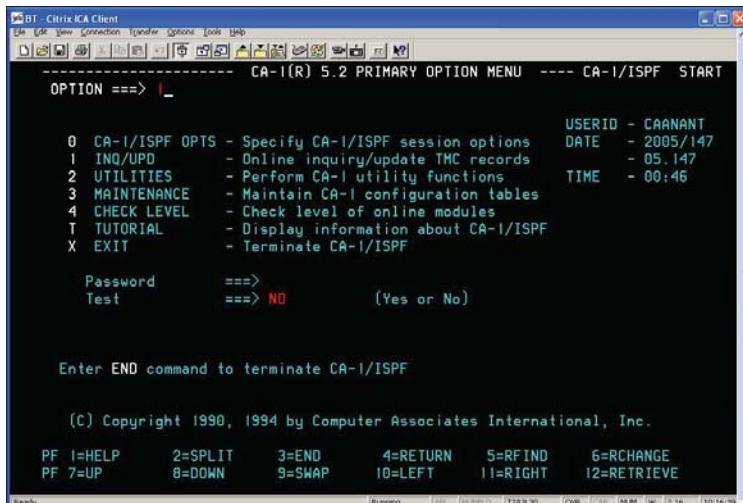
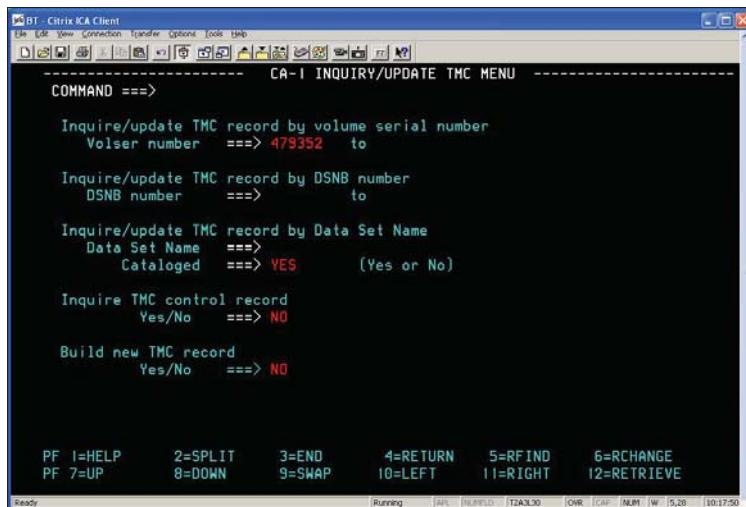


Figure 27: Output

**Step6:** Get tape details using CA1.

If you have volume number of the tape from Step1, enter here.



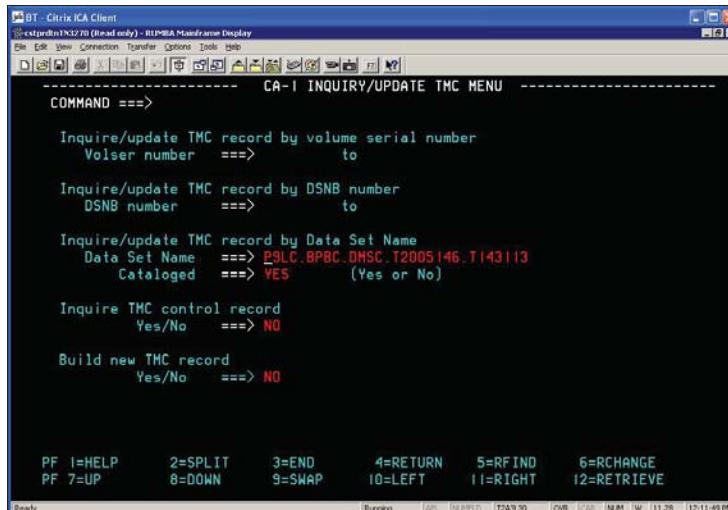
```
ps:BT - Citrix ICA Client
File Edit View Connection Transfer Options Tools Help
[Icons] [New] [Open] [Save] [Print] [Exit] [Copy] [Paste] [Find] [Replace] [Select All] [Cut] [Delete] [Insert] [Format] [Font] [Color]
----- CA-I INQUIRY/UPDATE TMC MENU -----
COMMAND ==>
Inquire/update TMC record by volume serial number
  Volser number ==> 479352 to
Inquire/update TMC record by DSNB number
  DSNB number ==>
Inquire/update TMC record by Data Set Name
  Data Set Name ==>
    Cataloged ==> YES      (Yes or No)
Inquire TMC control record
  Yes/No ==> NO
Build new TMC record
  Yes/No ==> NO

PF 1=HELP      2=SPLIT      3=END       4=RETURN     5=RFIND      6=RCHANGE
PF 7=UP        8=DOWN       9=SWAP      10=LEFT      11=RIGHT     12=RETRIEVE
Ready
```

**Figure 28: Output**

### Step7: Get tape details using CA1.

If you do not have volume number, then you can enter data set name here.



```

DT - Citrix ICA Client
[File] [Edit] [View] [Connection] [Transfer] [Options] [Tools] [Help]
----- CA-1 INQUIRY/UPDATE TMC MENU -----
COMMAND ==>
Inquire/update TMC record by volume serial number
Volser number ==> to
Inquire/update TMC record by DSNB number
DSNB number ==> to
Inquire/update TMC record by Data Set Name
Data Set Name ==> PQLC.BP8C.DHSC.T2005146.T143113
Cataloged ==> YES (Yes or No)
Inquire TMC control record
Yes/No ==> NO
Build new TMC record
Yes/No ==> NO

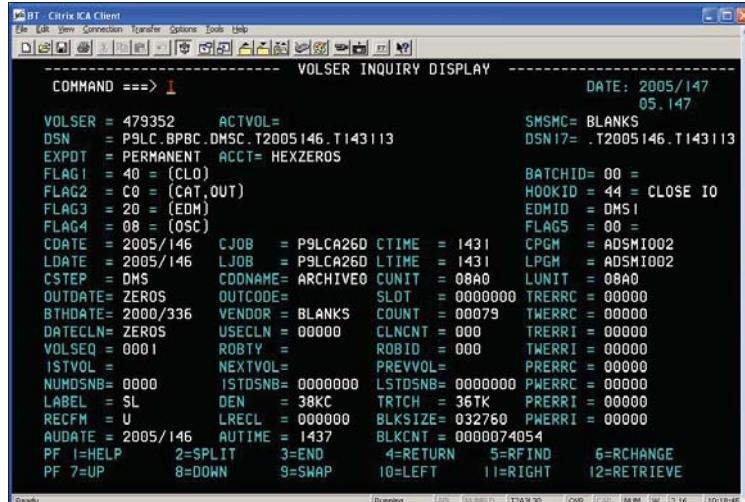
PF 1=HELP      2=SPLIT      3=END       4=RETURN     5=RFIND      6=RCHANGE
PF 7=UP        8=DOWN       9=SWAP      10=LEFT     11=RIGHT     12=RETRIEVE

```

Figure 29: Output

**Step 8:** Get tape details using CA1.

**Note:** Please see next panels to see the details of some important fields. Rest of the details can be found by pressing **PF1** when you are at CA1 screen.



```

----- VOLSER INQUIRY DISPLAY -----
COMMAND ==> 1
DATE: 2005/147
05.147
VOLSER = 479352 ACTVOL=
DSN = PSLC.BPBC.DMSC.T2005146.T143113 SMSMC= BLANKS
EXPDT = PERMANENT ACCT= HEXZEROS DSN17= .T2005146.T143113
FLAG1 = 40 = (CLO) BATCHID= 00 =
FLAG2 = 00 = (CAT,OUT) HOOKID = 44 = CLOSE IO
FLAG3 = 20 = (EDM) EDMID = DNS1
FLAG4 = 08 = (OSC) FLAG5 = 00 =
CDATE = 2005/146 CJOB = P9LC260 CTIME = 1431 CPGM = A0SM1002
LDATE = 2005/146 LJOB = P9LC260 LTIME = 1431 LPGM = A0SM1002
CSTEP = DNS CODNAME= ARCHIVE0 CUNIT = 08A0 LUNIT = 08A0
OUTDATE= ZEROS OUTCODE= SLOT = 0000000 TRRRC = 00000
BTHDATE= 2000/336 VENDOR = BLANKS COUNT = 00079 TWERRC = 00000
DATECLN= ZEROS USECLN = 00000 CLNCNT = 000 TRERRI = 00000
VOLSEQ = 0001 ROBTY = ROBID = 000 TWERRI = 00000
ISTVOL = NEXTVOL= PREVVOL= PRERRC = 00000
NUMDSNB= 0000 ISTDSNB= 0000000 LSTDSNB= 0000000 PWERRC = 00000
LABEL = SL DEN = 38KC TRTC = 36TK PRERRI = 00000
RECFM = U LRECL = 000000 BLKSIZE= 032760 PWERRI = 00000
AUDATE = 2005/146 AUTIME = 1437 BLKCNT = 0000074054
PF 1=HELP 2=SPLIT 3=ENO 4=RETURN 5=RFIND 6=RCHANGE
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE
  
```

Figure 30: Output

**Step 9:** Get tape details using CA1

<b>VOLSER</b>	Volume serial number
<b>DSN</b>	Data set name
<b>EXPDT</b>	Expiration date

(Note: This date can be changed by using Utilities option 2 in CA1 but authorization is required to do this.)

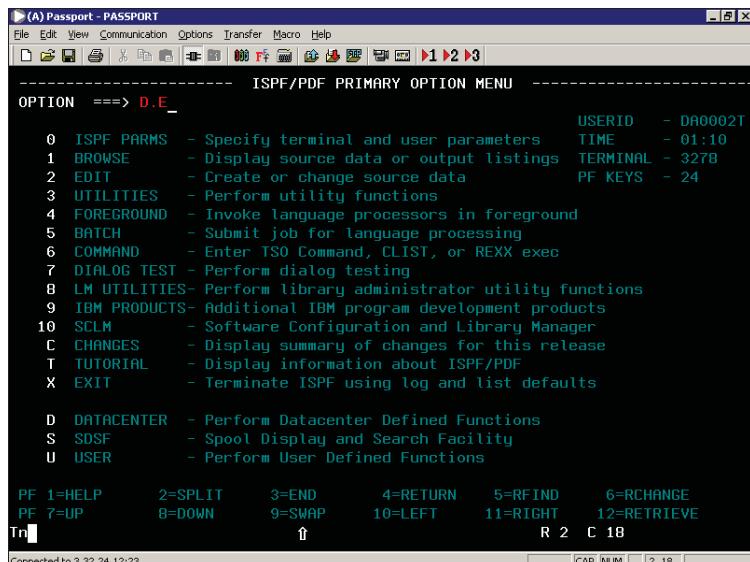
<b>CJOB</b>	Creating job name
<b>CDATE</b>	Creation date
<b>CTIME</b>	Creation time
<b>CSTEP</b>	Creating step name
<b>CPGM</b>	Creating Program
<b>LJOB</b>	Name of the last job to use the volume
<b>LPGM</b>	Last Used Program
<b>CDDNAME</b>	DD name of the creating step

<b>TRTCH</b>	Recording technique (tracks)
<b>RECFM</b>	Record format
<b>LRECL</b>	Logical record length
<b>BLKSIZE</b>	Block size
<b>BLKCNT</b>	Number of blocks
<b>1STVOL</b>	First volume serial of a multi-volume data set
<b>NEXTVOL</b>	Next volume serial of a multi-volume data set
(Note: 1ST VOL and NEXTVOL will be populated if the dataset is stored in multiple tapes. In this case, other volume details can also be found by entering "V" and pressing ENTER on this screen).	
<b>VOLSEQ</b>	Volume sequence

## Xpeditor

### Solution:

**Step 1:** To logon to Xpediter, type D.E.



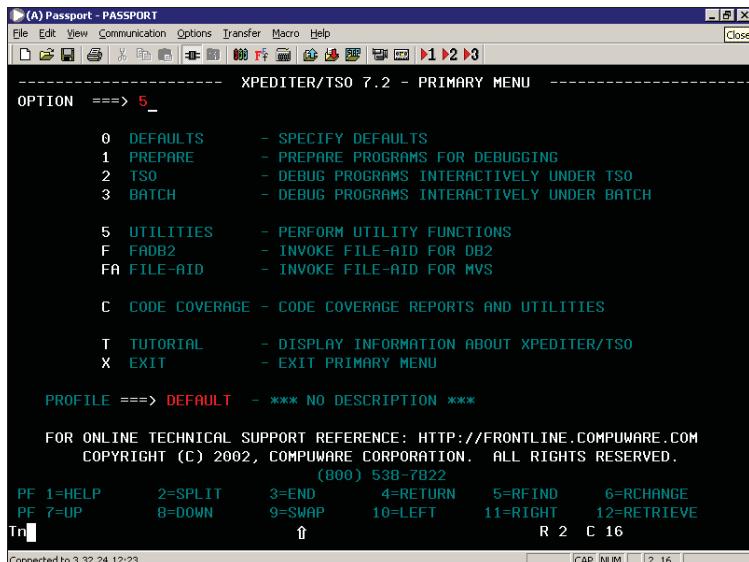
```
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[Icons] 1 2 3
----- ISPF/PDF PRIMARY OPTION MENU -----
OPTION ===> D.E_
0 ISPF PARMS - Specify terminal and user parameters      USERID - DA0002T
1 BROWSE       - Display source data or output listings   TIME   - 01:10
2 EDIT         - Create or change source data            TERMINAL - 3278
3 UTILITIES    - Perform utility functions               PF KEYS - 24
4 FOREGROUND   - Invoke language processors in foreground
5 BATCH        - Submit job for language processing
6 COMMAND      - Enter TSO Command, CLIST, or REXX exec
7 DIALOG TEST  - Perform dialog testing
8 LM UTILITIES - Perform library administrator utility functions
9 IBM PRODUCTS - Additional IBM program development products
10 SCLM        - Software Configuration and Library Manager
C CHANGES      - Display summary of changes for this release
T TUTORIAL     - Display information about ISPF/PDF
X EXIT         - Terminate ISPF using log and list defaults

D DATACENTER   - Perform Datacenter Defined Functions
S SDSF         - Spool Display and Search Facility
U USER         - Perform User Defined Functions

PF 1=HELP      2=SPLIT      3=END       4=RETURN     5=RFIND      6=RCHANGE
PF 7=UP        8=DOWN       9=SWAP      10=LEFT      11=RIGHT    12=RETRIEVE
Tr [          R 2 C 18
Connected to 3.32.24.12:23                                     CAP NUM | 2,18 |
```

Figure 31: Output

Step 2: Type 5, to enter the utilities menu.



(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

Close

XPEDITER/TSO 7.2 - PRIMARY MENU

OPTION ==> 5

0 DEFAULTS - SPECIFY DEFAULTS  
1 PREPARE - PREPARE PROGRAMS FOR DEBUGGING  
2 TSO - DEBUG PROGRAMS INTERACTIVELY UNDER TSO  
3 BATCH - DEBUG PROGRAMS INTERACTIVELY UNDER BATCH

5 UTILITIES - PERFORM UTILITY FUNCTIONS  
F FAODB - INVOKE FILE-AID FOR DB2  
FA FILE-AID - INVOKE FILE-AID FOR MVS

C CODE COVERAGE - CODE COVERAGE REPORTS AND UTILITIES

T TUTORIAL - DISPLAY INFORMATION ABOUT XPEDITER/TSO  
X EXIT - EXIT PRIMARY MENU

PROFILE ==> DEFAULT - \*\*\* NO DESCRIPTION \*\*\*

FOR ONLINE TECHNICAL SUPPORT REFERENCE: [HTTP://FRONTLINE.COMPUWARE.COM](http://FRONTLINE.COMPUWARE.COM)  
COPYRIGHT (C) 2002, COMPUWARE CORPORATION. ALL RIGHTS RESERVED.  
(800) 538-7822

PF 1=HELP PF 2=SPLIT PF 3=END PF 4=RETURN PF 5=RFINDE PF 6=RCHANGE  
PF 7=UP PF 8=DOWN PF 9=SWAP PF 10=LEFT PF 11=RIGHT PF 12=RETRIEVE

Tr [ ] R 2 C 16

Connected to 3.32.24.12:23 CAP INUM [2, 16]

Figure 32: Output

**Step 3:** Create a **DDIO** file. This is a one-time job. Once a **DDIO** file is created, then you need not create it every time you use **Xpediter**. Type **3** in the **OPTION** to enter the **DDIO** file facility.

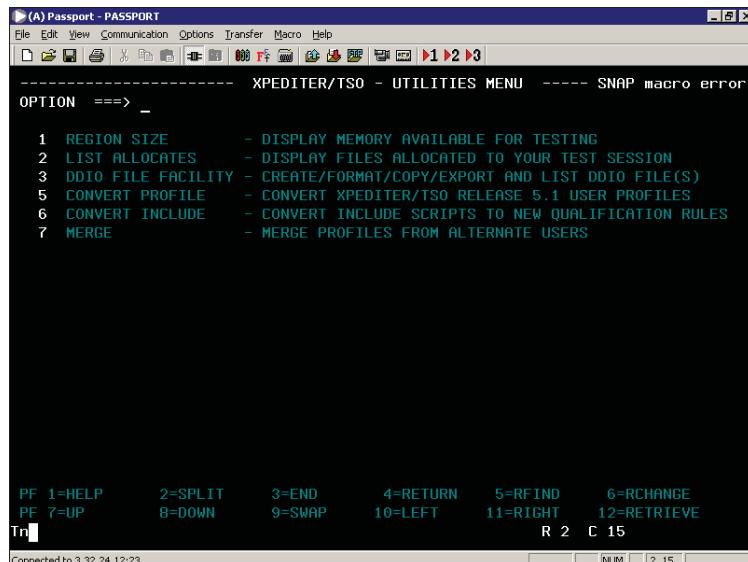


Figure 33: Output

**Step 4:** Type **C** to create a file. Also type the name of the **DDIO** file in single quotes.

(A) Passport - PASSPORT  
File Edit View Communication Options Transfer Macro Help

PROFILE: DEFAULT ----- XPEDITER/TSO - DDIO FILE FACILITY -----  
COMMAND ===>

HARDCOPY OPTIONS:  
PAGE SIZE ==> 60  
SYSOUT CLASS ==> A  
DESTINATION ==>

SOURCE LISTING OPTIONS:  
CONFIRM DELETE ==> YES  
LANGUAGE ==> ENGLISH

SEL OPTIONS: C (CREATE/FORMAT) I (INFO) S (DDIO MEMBER LIST)  
O (OPTION - COPY/MOVE/IMPORT/EXPORT)

SEL ----- DDIO FILE(S) -----

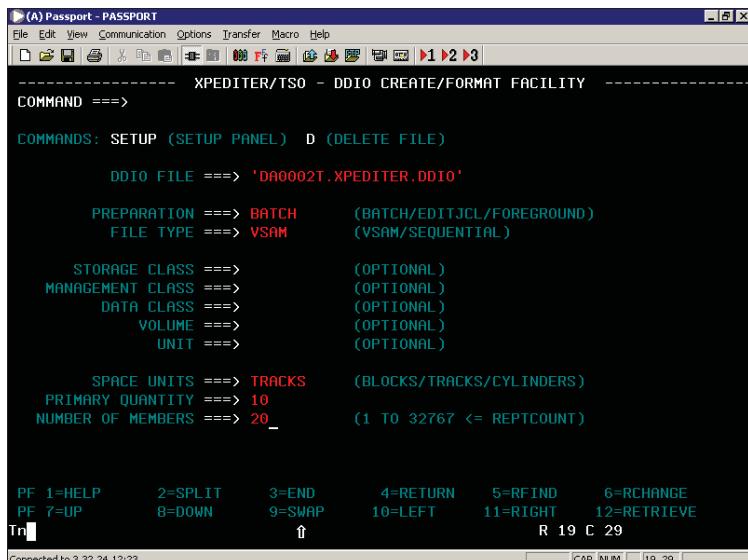
C 'DA0002T.XPEDITER.DDIO'  
(1)  
(2)  
(3)  
(4)  
(5)  
(6)  
- (7) 'SYS6.XPED.H72.DDIO'  
(8)

PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RCHANGE 6=RCHANGE  
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE

Tn R 14 C 7

**Figure 34: Output**

**Step 5:** Change the preparation to **BATCH** and File Type to **VSAM**. Give the appropriate values for **Space Units**, **Primary Quantity**, and **Number of Members**. After specifying values for all the parameters hit **Enter** key. This will submit a job to create the DDIO file.

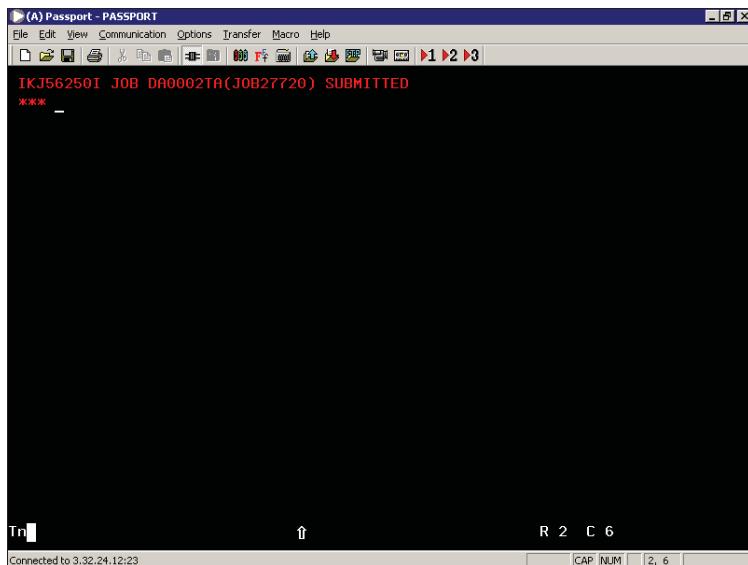


```
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[Icons] ----- XPDITER/TSO - DDIO CREATE/FORMAT FACILITY -----
COMMAND ==>
COMMANDS: SETUP (SETUP PANEL) D (DELETE FILE)
DDIO FILE ==> 'DA0002T.XPDITER.DDIO'
PREPARATION ==> BATCH      (BATCH/EDITJCL/BACKGROUND)
FILE TYPE ==> VSAM        (VSAM/SEQUENTIAL)
STORAGE CLASS ==>          (OPTIONAL)
MANAGEMENT CLASS ==>       (OPTIONAL)
DATA CLASS ==>             (OPTIONAL)
VOLUME ==>                 (OPTIONAL)
UNIT ==>                   (OPTIONAL)
SPACE UNITS ==> TRACKS    (BLOCKS/TRACKS/CYLINDERS)
PRIMARY QUANTITY ==> 10
NUMBER OF MEMBERS ==> 20_   (1 TO 32767 <= REPTCOUNT)

PF 1=HELP      2=SPLIT      3=END       4=RETURN     5=RFIND      6=RCHANGE
PF 7=UP        8=DOWN       9=SWAP      10=LEFT      11=RIGHT     12=RETRIEVE
Tr [ ]          ↑           R 19 C 29
Connected to 3.32.24.12:23
CAP NUM | 19,29 |
```

Figure 35: Output

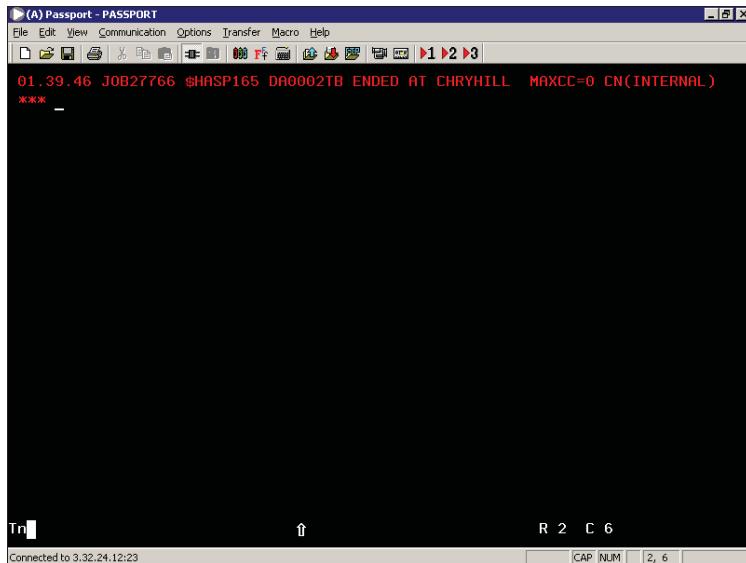
**Step 6:** Observe the output message saying that the job is submitted for creating the DDIO file.



The screenshot shows a terminal window titled '(A) Passport - PASSPORT'. The menu bar includes File, Edit, View, Communication, Options, Transfer, Macro, and Help. The toolbar contains various icons for file operations like Open, Save, Print, and Cut/Copy/Paste. The status bar at the bottom indicates 'Connected to 3.32.24.12:23' and shows 'CAP NUM | 2, 6 |'. The main window displays the following text:  
TKJ56250I JOB D00002TA(JOB27720) SUBMITTED  
xxxx -  
Tr [ ] R 2 C 6

**Figure 36: Output**

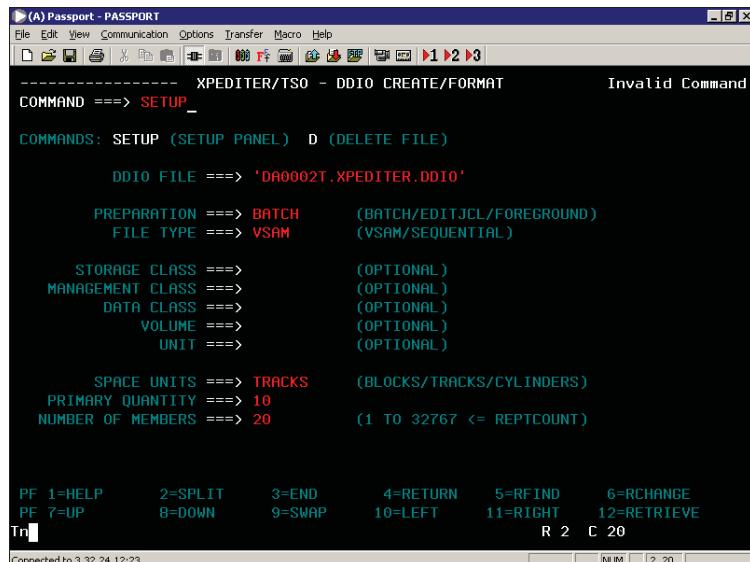
**Step 7:** Now observe the output message saying that the job has ended successfully and the DDIO file is created.



The screenshot shows a terminal window titled '(A) Passport - PASSPORT'. The window has a menu bar with File, Edit, View, Communication, Options, Transfer, Macro, and Help. Below the menu is a toolbar with various icons. The main area of the window displays the following text:  
01.39.46 JOB27766 \$HASP165 DA0002TB ENDED AT CHRYHILL MAXCC=0 CN(INTERNAL)  
\*\*\*  
At the bottom left, there is a status bar with 'Connected to 3.32.24.12:23'. On the right side of the status bar, it says 'R 2 C 6'. Below the status bar, there are two small input fields: 'CAP INUM' containing '2, 6'.

Figure 37: Output

**Step 8:** When you submit the job and if you get any JCL Error, you need to setup the Process. To do this setup, enter **SETUP** in the command prompt as shown in the figure given below.



```
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[File] [Edit] [View] [Communication] [Options] [Transfer] [Macro] [Help]
----- XPDITER/TSO - DDIO CREATE/FORMAT ----- Invalid Command
COMMAND ==> SETUP -
COMMANDS: SETUP (SETUP PANEL) D (DELETE FILE)

DDIO FILE ==> 'DA00002T.XPDITER.DDIO'

PREPARATION ==> BATCH (BATCH/EDITJCL/BACKGROUND)
FILE TYPE ==> VSAM (VSAM/SEQUENTIAL)

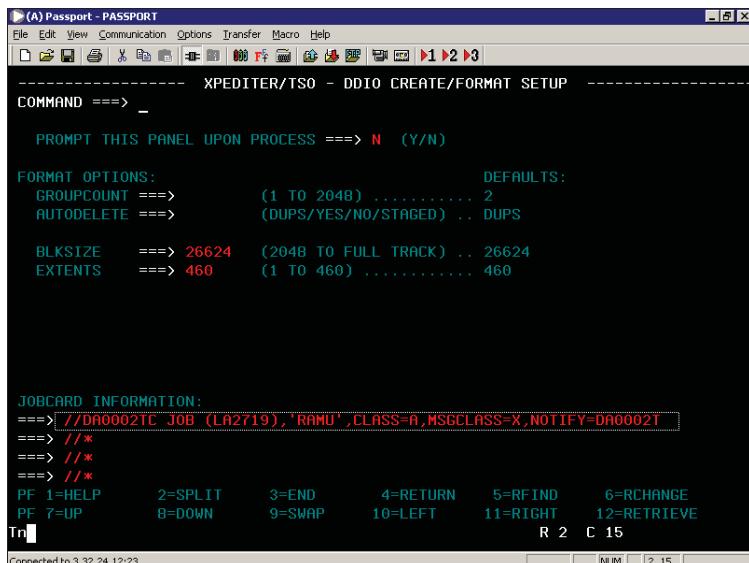
STORAGE CLASS ==> (OPTIONAL)
MANAGEMENT CLASS ==> (OPTIONAL)
DATA CLASS ==> (OPTIONAL)
VOLUME ==> (OPTIONAL)
UNIT ==> (OPTIONAL)

SPACE UNITS ==> TRACKS (BLOCKS/TRACKS/CYLINDERS)
PRIMARY QUANTITY ==> 10
NUMBER OF MEMBERS ==> 20 (1 TO 32767 <= REPTCOUNT)

PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFIND 6=RCHANGE
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE
Tr R 2 C 20
Connected to 3.32.24.12:23
```

Figure 38: Output

**Step 9:** Enter account information, name, class, msgclass, and so on under the **JOBCARD INFORMATION** for setting up the DDIO file creation job. This is also one time process and this has to be done only if you get any JCL error while you create the DDIO file.



```
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[Icons] File Edit View Communication Options Transfer Macro Help
----- XPDITER/TSO - DDIO CREATE/FORMAT SETUP -----
COMMAND ==> -
PROMPT THIS PANEL UPON PROCESS ==> N (Y/N)

FORMAT OPTIONS:                               DEFAULTS:
GROUPCOUNT ==>      (1 TO 2048) ..... 2
AUTODELETE ==>      (DUPS/YES/NO/STAGED) .. DUPS

BLKSIZE    ==> 26624  (2048 TO FULL TRACK) .. 26624
EXTENTS    ==> 460    (1 TO 460) ..... 460

JOBCARD INFORMATION:
==> //DR0002TC JOB (LA2719), 'RAMU',CLASS=A,MSGCLASS=X,NOTIFY=DR0002T
==> //*
==> //*
==> //*
PF 1=HELP     2=SPLIT     3=END      4=RETURN   5=RFIND    6=RCHANGE
PF 7=UP       8=DOWN      9=SWAP     10=LEFT    11=RIGHT   12=RETRIEVE
Tr [ ]                                                 R 2 C 15
Connected to 3.32.24.12:23
[ ] [ ] NUM [ ] 2, 15 [ ]
```

Figure 39: Output

Step 10: Select 1 to prepare the program for debugging.

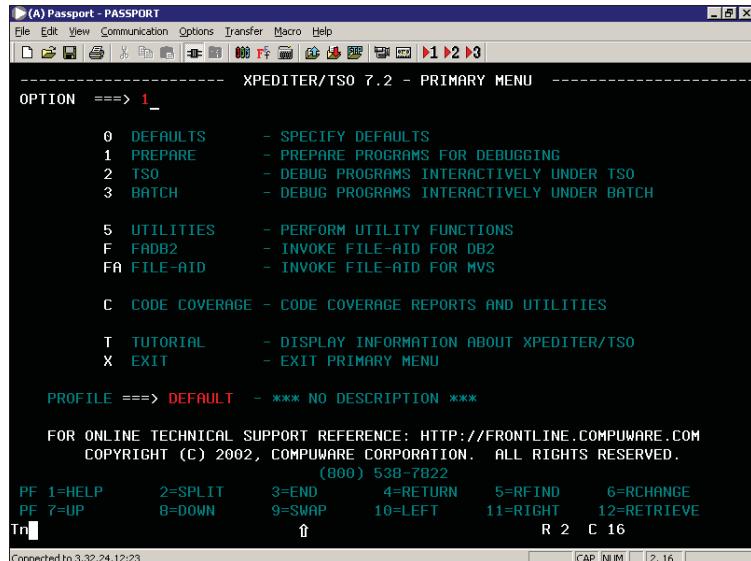
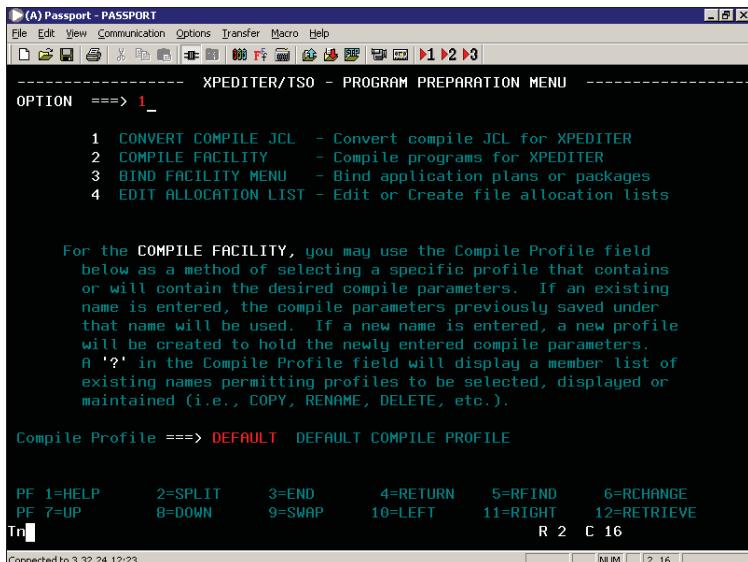


Figure 40: Output

**Step 11:** Select 1 to convert the Compile JCL.

(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

XPEDITER/TSO - PROGRAM PREPARATION MENU

OPTION ==> 1

1 CONVERT COMPILE JCL - Convert compile JCL for XPEDITER  
2 COMPILE FACILITY - Compile programs for XPEDITER  
3 BIND FACILITY MENU - Bind application plans or packages  
4 EDIT ALLOCATION LIST - Edit or Create file allocation lists

For the COMPILE FACILITY, you may use the Compile Profile field below as a method of selecting a specific profile that contains or will contain the desired compile parameters. If an existing name is entered, the compile parameters previously saved under that name will be used. If a new name is entered, a new profile will be created to hold the newly entered compile parameters. A '?' in the Compile Profile field will display a member list of existing names permitting profiles to be selected, displayed or maintained (i.e., COPY, RENAME, DELETE, etc.).

Compile Profile ==> DEFAULT DEFAULT COMPILE PROFILE

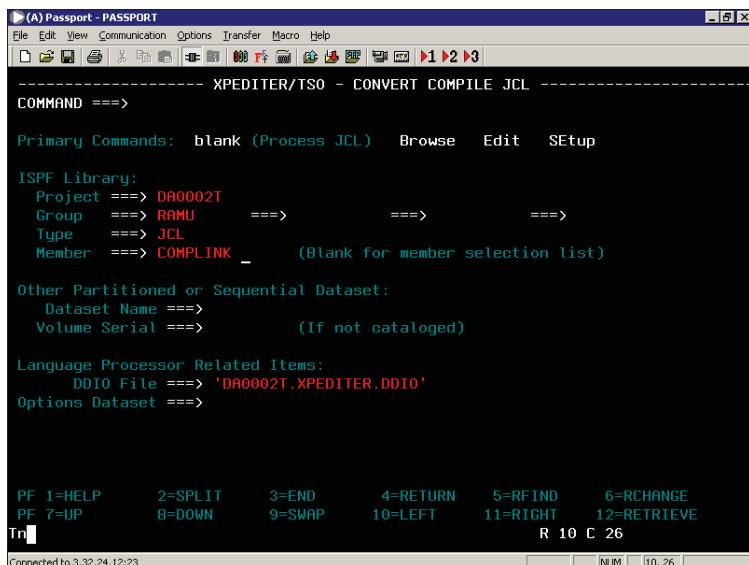
PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFIND 6=RCHANGE  
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE

Tn | R 2 C 16

Connected to 3.32.24.12:23

**Figure 41: Output**

Step 12: Enter the Member, DDIO file name, and so on and press ENTER.



(A) Passport - PASSPORT  
File Edit View Communication Options Transfer Macro Help  
File Edit View Communication Options Transfer Macro Help  
XPEDITER/TSO - CONVERT COMPILE JCL  
COMMAND ==>  
Primary Commands: blank (Process JCL) Browse Edit SSetup  
ISPF Library:  
Project ==> DA0002T  
Group ==> RAMU ==> ==> ==>  
Type ==> JCL  
Member ==> COMPLINK\_ (Blank for member selection list)  
Other Partitioned or Sequential Dataset:  
Dataset Name ==>  
Volume Serial ==> (If not catalogued)  
Language Processor Related Items:  
DDIO File ==> 'DA0002T.XPEDITER.DDIO'  
Options Dataset ==>  
  
PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFIND 6=RCHANGE  
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE  
Tr | R 10 C 26  
Connected to 3.32.24.12:23 NUM [10, 26]

Figure 42: Output

**Step 13:** This modifies the JCL to compile with **Xpediter**. Change the time parameter as **TIME=(,30)**.

(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

Columns 001 072

COMMAND ==> SCROLL ==> PAGE

JCL HAS BEEN MODIFIED TO COMPILE WITH XPEDITER.

==MSG> \*=====

==MSG> \* COMMANDS:

==MSG> \* SUB - SUBMIT THIS JOB

==MSG> \* RUN - SUBMIT THIS JOB AND CHECK STATUS

==MSG> \* END - TERMINATE

==MSG> \*

000001 //DA0002TA JOB LA2719,'RAMU',CLASS=A,

000002 // MSGCLASS=X,MSGLEVEL=(1,1),

000003 // NOTIFY=DA0002T,

000004 // TIME=(.,01),

000005 // REGION=4096K

000006 //\*\*\*\*\*

000007 //\* THIS JCL COMPILES AND LINK THE PRECOMPILED PGM

000008 //\*

000009 //\*\*\*\*\*

000010 //\* THIS STEP COMPILES THE PRECOMPILED PGM

000011 //\*\*\*\*\*

=MSG> \*\*\* THE FOLLOWING STEP IS MODIFIED TO COMPILE WITH XPEDITER \*\*\*

000012 //COB EXEC PGM=CWPMAIN,REGION=1024K,

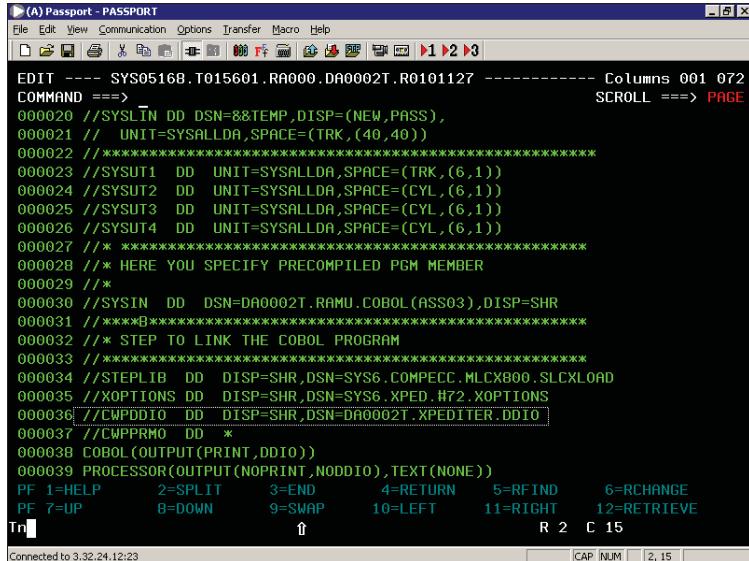
PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFINDE 6=RCHANGE

PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE

Tn

**Figure 43: Output**

**Step 14:** Type **SUB** in the command prompt to submit the job.



```

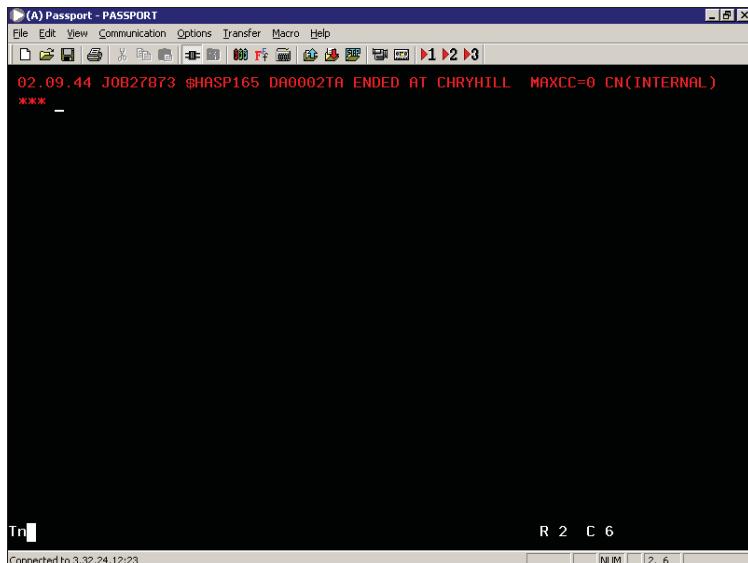
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[File] [Edit] [View] [Communication] [Options] [Transfer] [Macro] [Help]
[Open] [Save] [Print] [Exit] [New] [Open] [Save] [Print] [Exit] [1] [2] [3]

EDIT ---- SYS05168.T015601.RA000.DA0002T.R0101127 ----- Columns 001 072
COMMAND ==> SCROLL ==> PAGE
000020 //SYSLIN DD DSN=&&TEMP,DISP=(NEW,PRSS),
000021 // UNIT=SYSALLDA,SPACE=(TRK,(40,40))
000022 //*****+
000023 //SYSUT1 DD UNIT=SYSALLDA,SPACE=(TRK,(6,1))
000024 //SYSUT2 DD UNIT=SYSALLDA,SPACE=(CYL,(6,1))
000025 //SYSUT3 DD UNIT=SYSALLDA,SPACE=(CYL,(6,1))
000026 //SYSUT4 DD UNIT=SYSALLDA,SPACE=(CYL,(6,1))
000027 //* ****+
000028 /* HERE YOU SPECIFY PRECOMPILED PGM MEMBER
000029 /*
000030 //SYSTIN DD DSN=DA0002T.RHMU.COBOL(ASS03),DISP=SHR
000031 //*****+
000032 /* STEP TO LINK THE COBOL PROGRAM
000033 //*****+
000034 //STEPLIB DD DISP=SHR,DSN=SYS6.COMPECC.MLCX800.SLCXLLOAD
000035 //XOPTIONS DD DISP=SHR,DSN=SYS6.XPED.H72.XOPTIONS
000036 //UWPDDIO DD DISP=SHR,DSN=DH0002T.XPEDITER.DDIO
000037 //CWPPRMO DD *
000038 COBOL(OUTPUT(PRINT,DDIO))
000039 PROCESSOR(OUTPUT(NOPRINT,NODDIO),TEXT(NONE))
PF 1=HELP      2=SPLIT      3=END      4=RETURN     5=R FIND     6=RCHANGE
PF 7=UP        8=DOWN       9=SWAP      10=LEFT      11=RIGHT     12=RETRIEVE
Tr |           If           R 2          C 15
Connected to 3.32.24.12:23
[CAP] [NUM] [2, 15]

```

**Figure 44: Output**

**Step 15:** Check for **MAXCC = 0** to ensure that the job is completed successfully.



The screenshot shows a terminal window titled '(A) Passport - PASSPORT'. The window has a menu bar with File, Edit, View, Communication, Options, Transfer, Macro, and Help. Below the menu is a toolbar with various icons. The main area of the window displays the following text:  
02.09.44 JOB27873 \$HASP165 DA0002TA ENDED AT CHRYHILL MAXCC=0 CN(INTERNAL)  
\*\*\*  
At the bottom left, there is a status bar with 'Connected to 3.32.24.12:23'. On the right side of the status bar, it says 'R 2 C 6'. The bottom right corner of the status bar shows 'NUM [2, 6]'. The overall background of the window is black, and the text is white.

**Figure 45: Output**

Step 16: Again, to logon to Xpediter, type D.E.

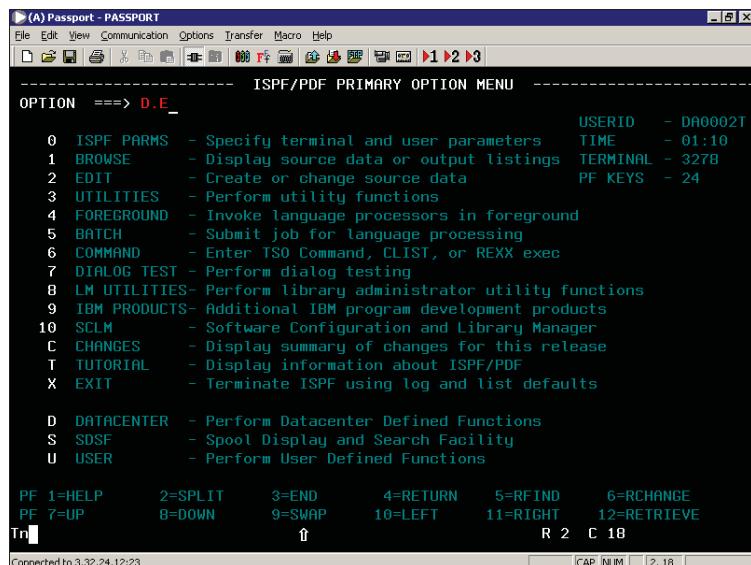


Figure 46: Output

**Step 17:** From the **Xpediter Menu**, choose **2** to debug programs interactively under **TSO**. If you are entering the **TSO Debugging menu** for the first time, this will open the **Environments menu**.

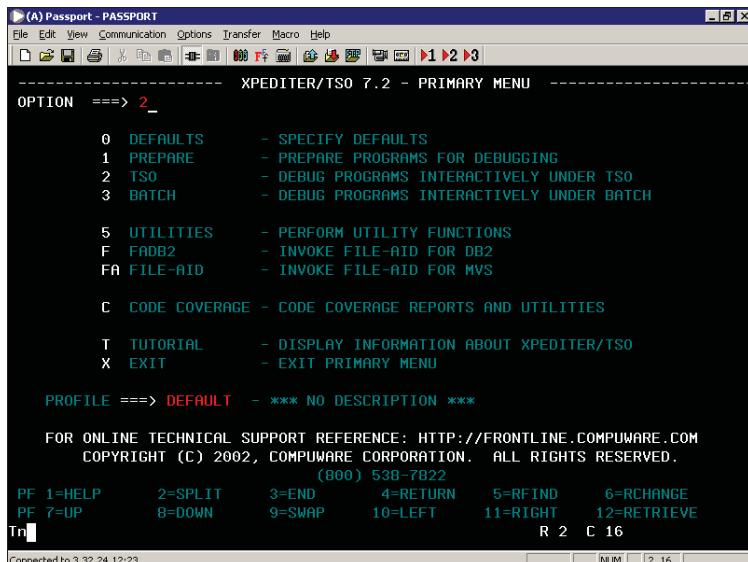
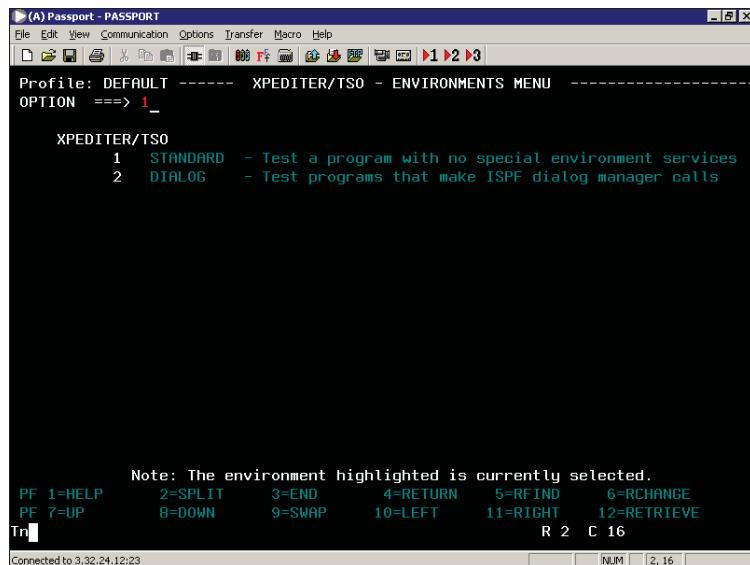


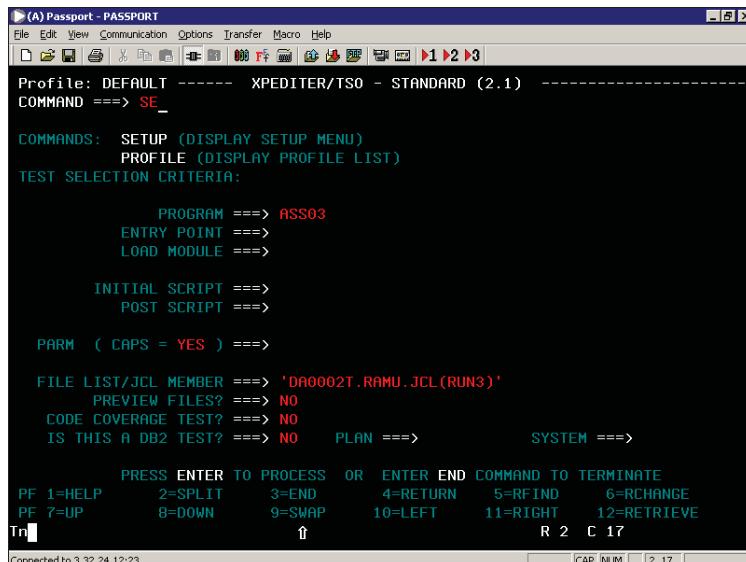
Figure 47: Output

**Step 18:** From the **Environments Menu**, choose **1** to test the program with no special environment services.



**Figure 48: Output**

**Step 19:** Under the **Test Selection Criteria**, enter the name of the COBOL program, which needs to be debugged. Also enter the name of the **run JCL**, which will be used to execute the program. Type **SE** to enter the **Setup Menu**.



```

(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[File Edit View Communication Options Transfer Macro Help]
Profile: DEFAULT ----- XPEDITER/TSO - STANDARD (2.1) -----
COMMAND ==> SE_

COMMANDS: SETUP (DISPLAY SETUP MENU)
          PROFILE (DISPLAY PROFILE LIST)
TEST SELECTION CRITERIA:

      PROGRAM ==> ASS03
      ENTRY POINT ==>
      LOAD MODULE ==>

      INITIAL SCRIPT ==>
      POST SCRIPT ==>

      PARM ( CAPS = YES ) ==>

FILE LIST/JCL MEMBER ==> 'D00062T.RAMU.JCL(RUN3)'
      PREVIEW FILES? ==> NO
      CODE COVERAGE TEST? ==> NO
      IS THIS A DB2 TEST? ==> NO      PLAN ==>           SYSTEM ==>

PRESS ENTER TO PROCESS OR ENTER END COMMAND TO TERMINATE
PF 1=HELP    2=SPLIT    3=END    4=RETURN   5=RFIND    6=RCHANGE
PF 7=UP     8=DOWN    9=SWAP    10=LEFT    11=RIGHT   12=RETRIEVE
Tr [ ]       ⇤           R 2 C 17
Connected to 3.32.24.12:23
  CAP [NUM] | [2, 17]

```

Figure 49: Output

Step 20: From the **Setup Menu**, select **0** (Zero) to go to the **Environments Menu**.

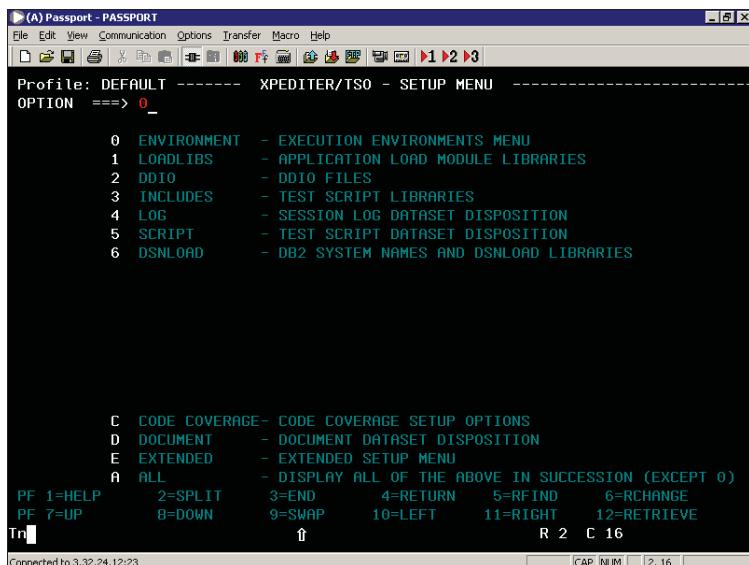
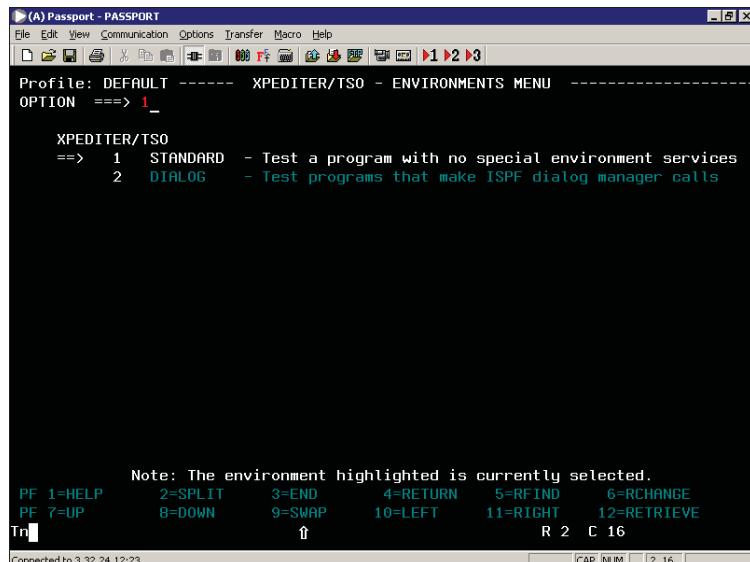


Figure 50: Output

**Step 21:** Enter the **Load Libraries (LOADLIBs)** that you will be using to execute the program. You may add more than one Loadlib. To enter the **LOADLIBs**, type **1** in the following **Environments Menu** and press **ENTER**. This will take you to the **Setup Menu**.



(A) Passport - PASSPORT  
File Edit View Communication Options Transfer Macro Help  
| D F G H I J K L M N P R S T V W X Y Z | ►1 ►2 ►3 |

Profile: DEFAULT ----- XPEDITER/TSO - ENVIRONMENTS MENU -----  
OPTION ==> 1 \_

XPEDITER/TSO  
=> 1 STANDARD - Test a program with no special environment services  
2 DIALOG - Test programs that make ISPF dialog manager calls

Note: The environment highlighted is currently selected.  
PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFIND 6=RCHANGE  
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE  
Tr R 2 C 16

Connected to 3.32.24.12:23 CAP NUM [2,16]

Figure 51: Output

**Step 22:** Select 1 to enter the **LOADLIBs**, where the load module of your COBOL program is created.

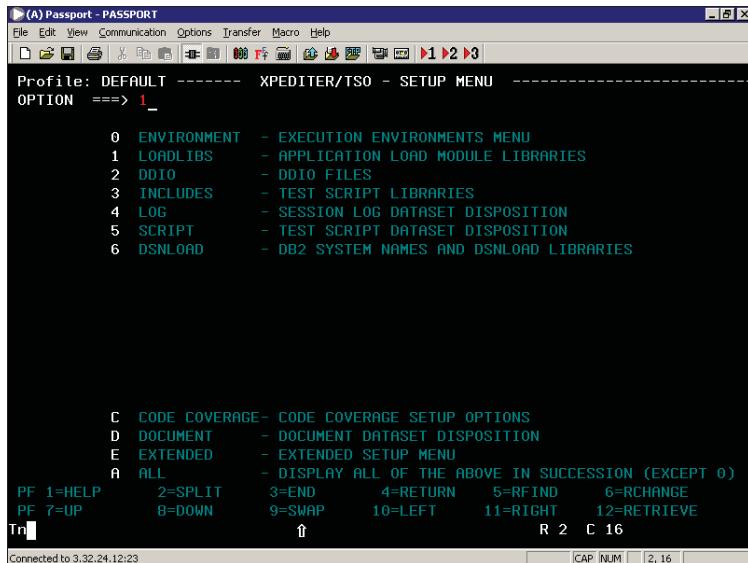
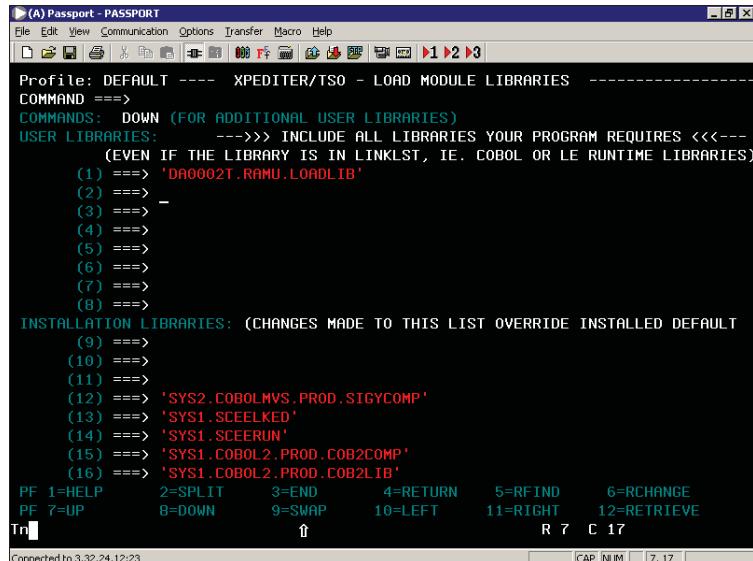


Figure 52: Output

Step 23: Enter the LOADLIB Dataset name of your COBOL program.



The screenshot shows a terminal window titled '(A) Passport - PASSPORT'. The window title bar includes standard menu options: File, Edit, View, Communication, Options, Transfer, Macro, Help. Below the title bar is a toolbar with various icons. The main area displays JCL code for a 'LOAD MODULE LIBRARIES' command. The JCL includes several INCLUDE statements for user libraries and installation libraries, with specific dataset names like 'DA0002T.RAMU.LOADLIB' and 'SYS2.COBOLMVS.PROD.SIGYCOMP'. The window also shows PF key definitions at the bottom.

```
Profile: DEFAULT ---- XPDITER/TSO - LOAD MODULE LIBRARIES -----
COMMAND ==>
COMMANDS: DOWN (FOR ADDITIONAL USER LIBRARIES)
USER LIBRARIES: -->>> INCLUDE ALL LIBRARIES YOUR PROGRAM REQUIRES <<<---
(EVEN IF THE LIBRARY IS IN LINKLST, IE. COBOL OR LE RUNTIME LIBRARIES)
(1) ==> 'DA0002T.RAMU.LOADLIB'
(2) ==> -
(3) ==> -
(4) ==> -
(5) ==> -
(6) ==> -
(7) ==> -
(8) ==> -
INSTALLATION LIBRARIES: (CHANGES MADE TO THIS LIST OVERRIDE INSTALLED DEFAULT
(9) ==> -
(10) ==> -
(11) ==> -
(12) ==> 'SYS2.COBOLMVS.PROD.SIGYCOMP'
(13) ==> 'SYS1.SCEELKED'
(14) ==> 'SYS1.SCEEERUN'
(15) ==> 'SYS1.COBOL2.PROD.COB2COMP'
(16) ==> 'SYS1.COBOL2.PROD.COB2LIB'
PF 1=HELP      2=SPLIT      3=END       4=RETURN     5=RFINDD    6=RCHANGE
PF 7=UP        8=DOWN       9=SWAP      10=LEFT      11=RIGHT     12=RETRIEVE
Tr  |          If           R 7 C 17
Connected to 3.32.24.12:23
```

Figure 53: Output

Step 24: From the Setup Menu, select 2 to go to DDIO Files option.

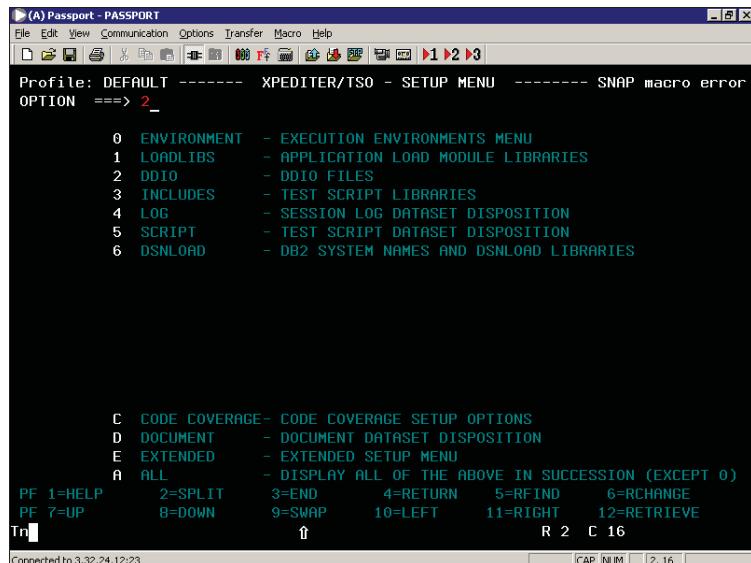
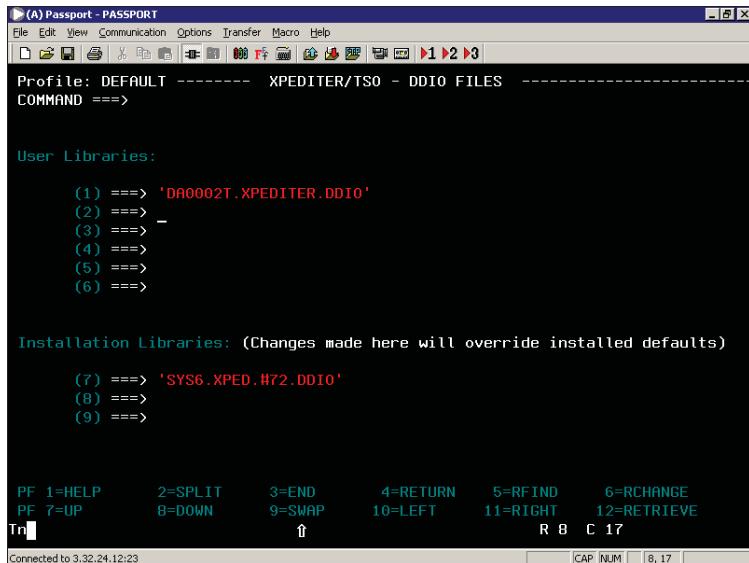


Figure 54: Output

**Step 25:** Enter the name of the **DDIO file** and press **Enter**. Press **F3** key to go back to the **TSO Execution Screen**.



```
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
|<|>|<<|>>|<<<|>>>|<<<<|>>>>|>1|>2|>3|
Profile: DEFAULT ----- XPEDITER/TSO - DDIO FILES -----
COMMAND ==>

User Libraries:

(1) ==> 'DA0002T.XPEDITER.DDIO'
(2) ==>
(3) ==>
(4) ==>
(5) ==>
(6) ==>

Installation Libraries: (Changes made here will override installed defaults)

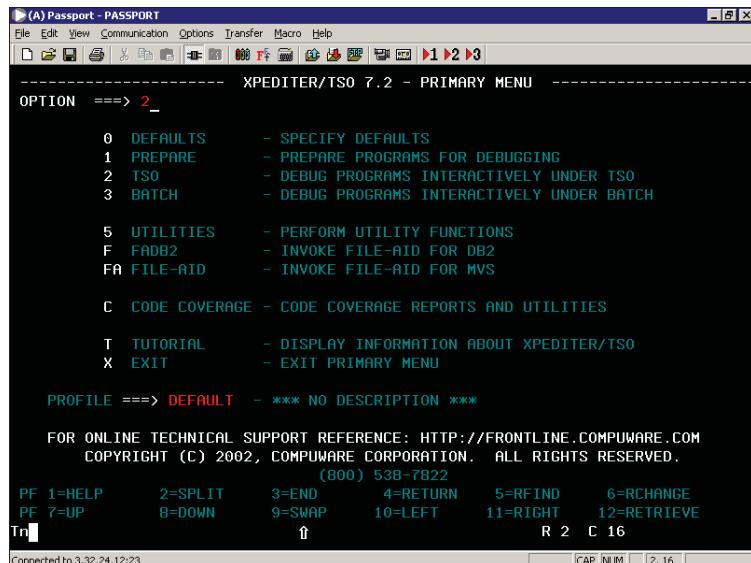
(7) ==> 'SYS6.XPED.#72.DDIO'
(8) ==>
(9) ==>

PF 1=HELP      2=SPLIT      3=END      4=RETURN     5=RFIND      6=RCHANGE
PF 7=UP        8=DOWN       9=SWAP      10=LEFT      11=RIGHT     12=RETRIEVE
Tr [          ⇩          R 8 C 17

Connected to 3.32.24.12:23 | CAP NUM | 8, 17 |
```

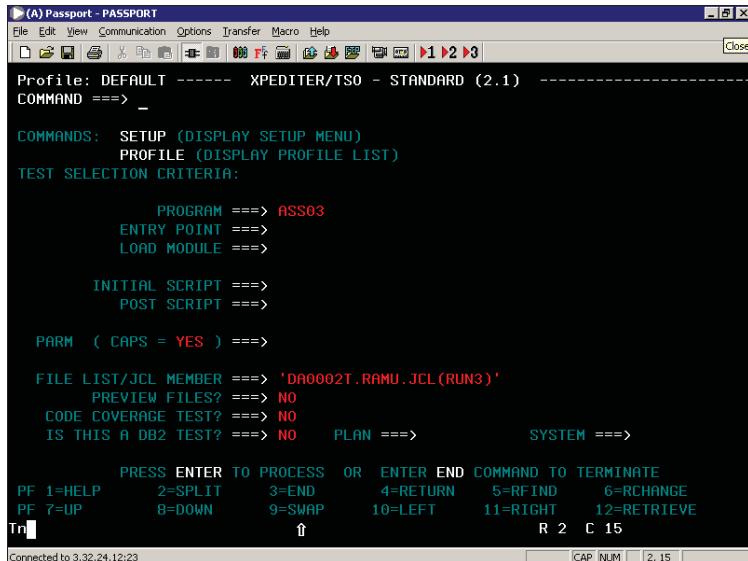
Figure 55: Output

**Step 26:** Select option 2 to debug programs interactively under TSO.



**Figure 56: Output**

Step 27: Press Enter to start debugging the Program.



(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

Profile: DEFAULT ----- XPEDITER/TSO - STANDARD (2.1) -----

COMMAND ==> \_

COMMANDS: SETUP (DISPLAY SETUP MENU)  
PROFILE (DISPLAY PROFILE LIST)

TEST SELECTION CRITERIA:

PROGRAM ==> ASS03  
ENTRY POINT ==>  
LOAD MODULE ==>

INITIAL SCRIPT ==>  
POST SCRIPT ==>

PARM ( CAPS = YES ) ==>

FILE LIST/JCL MEMBER ==> 'D00002T.RAMU.JCL(RUN3)'  
PREVIEW FILES? ==> NO  
CODE COVERAGE TEST? ==> NO  
IS THIS A DB2 TEST? ==> NO PLAN ==> SYSTEM ==>

PRESS ENTER TO PROCESS OR ENTER END COMMAND TO TERMINATE

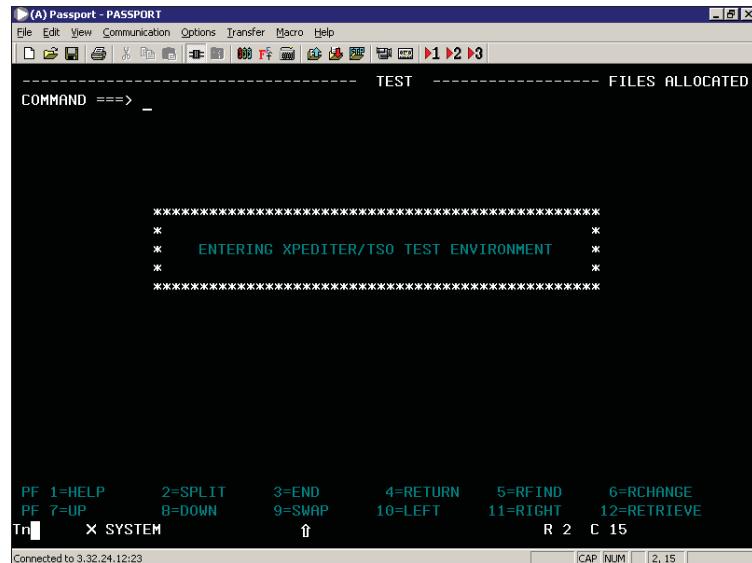
PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFIND 6=RCHANGE  
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE

Tr [ ] R 2 C 15

Connected to 3.32.24.12:23 CAP NUM 2,15

Figure 57: Output

**Step 28:** The TSO debugging entry screen will be displayed as shown below. Press **ENTER** to continue.



**Figure 58: Output**

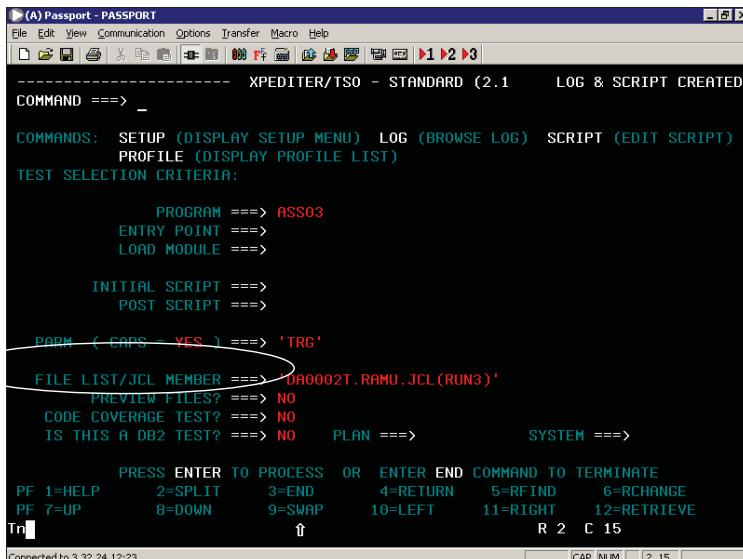
**Step 29:** Now you are in the debugging session. You can see a highlighted line (above line no. 000053) in your code, which indicates that the control of execution is started with the highlighted line.

**Figure 59: Output**

**Note:** On screen, you can see a red-dotted arrow on the left of the highlighted line.

**Step 30:** Since the above code is using **PARM parameter value** as the input for this program, you must set the **PARM parameter value** before you move to the debug session.

To set the **PARM parameter**, type the **PARM parameter value**, under the **Test selection** criteria in the highlighted area as shown in the following figure.



```
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
| D F Ff | 1 2 3 |
----- XPEDITER/TSO - STANDARD (2.1) LOG & SCRIPT CREATED
COMMAND ===> -
COMMANDS: SETUP (DISPLAY SETUP MENU) LOG (BROWSE LOG) SCRIPT (EDIT SCRIPT)
PROFILE (DISPLAY PROFILE LIST)
TEST SELECTION CRITERIA:
PROGRAM ===> ASS03
ENTRY POINT ===>
LOAD MODULE ===>

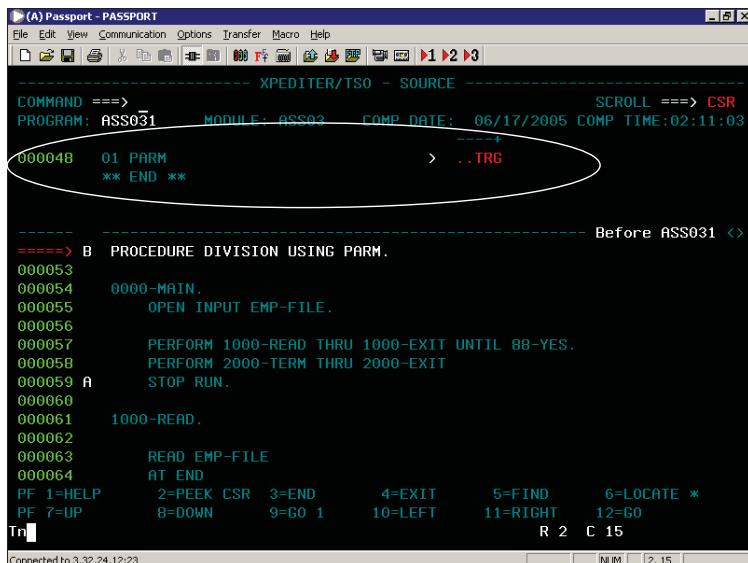
INITIAL SCRIPT ===>
POST SCRIPT ===>

PARM (< CAPS = YES >) ===> 'TRG'
FILE LIST/JCL MEMBER ===> 'DA0002T.RAMU.JCL(RUN3)'
PREVIEW FILES? ===> NO
CODE COVERAGE TEST? ===> NO
IS THIS A DB2 TEST? ===> NO PLAN ===> SYSTEM ===>
PRESS ENTER TO PROCESS OR ENTER END COMMAND TO TERMINATE
PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFIND 6=RCHANGE
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE
Tr | R 2 C 15
Connected to 3.32.24.12:23
CAP NUM | 2,15 |
```

**Figure 60: Output**

**Note:** 'TRG' is the input value specified for this program and it varies according to your code and your input.

Step 31: Press **ENTER** key till you get the following screen and check if the **PARM** parameter is set to **TRG**.



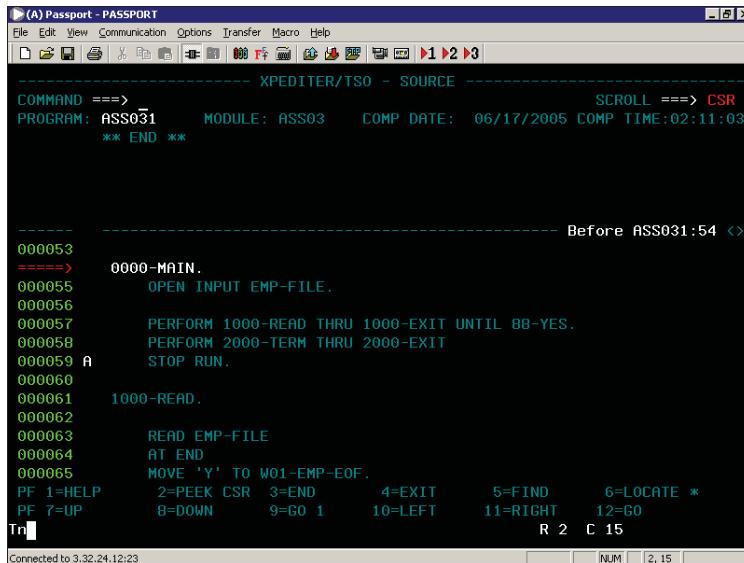
The screenshot shows a TSO terminal window titled '(A) Passport - PASSPORT'. The window displays assembly language code for a module named ASS031. A callout bubble highlights the line '000048 01 PARM > ...TRG' and the instruction '\*\* END \*\*'. The code includes sections for PROCEDURE DIVISION and various PERFORM statements. At the bottom, there is a PF key mapping table and a status bar indicating the connection is to 3.32.24.12:23.

```
----- XPEDITER/TSO - SOURCE -----
COMMAND ===> SCROLL ===> CSR
PROGRAM: ASS031 MODULE: ASS031 COMP DATE: 06/17/2005 COMP TIME: 02:11:03
000048 01 PARM > ...TRG
** END **

----- Before ASS031 <-----
=====> B PROCEDURE DIVISION USING PARM.
000053
000054 0000-MAIN.
000055      OPEN INPUT EMP-FILE.
000056
000057      PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.
000058      PERFORM 2000-TERM THRU 2000-EXIT
000059 A     STOP RUN.
000060
000061 1000-READ.
000062
000063      READ EMP-FILE
000064      AT END
PF 1=HELP   2=PEEK CSR 3=END      4=EXIT      5=FIND      6=LOCATE *
PF 7=UP     8=DOWN    9=G0 1    10=LEFT    11=RIGHT   12=G0
Tr[ ] R 2 C 15
Connected to 3.32.24.12:23
```

Figure 61: Output

**Step 32:** Press **F9** key for line-by-line debugging of the program. Observe that the first line from the source code, **0000-MAIN.**, is highlighted.

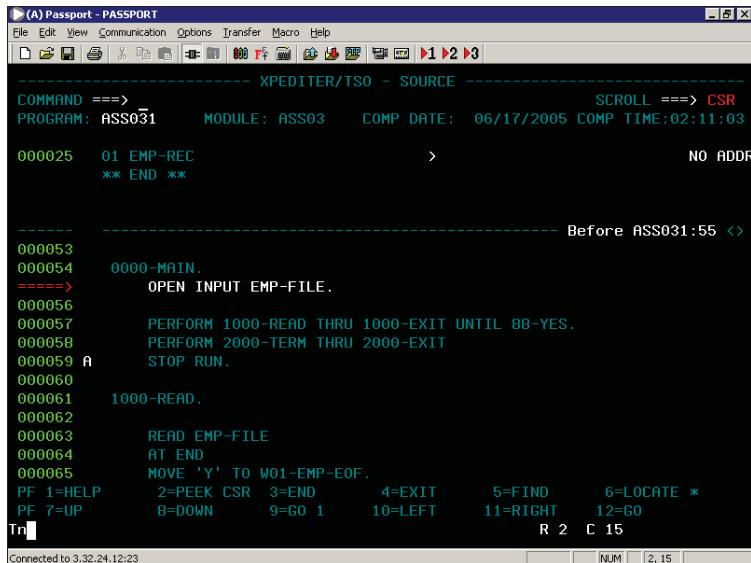


```
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[Icons]
----- XPEDITER/TSO - SOURCE -----
COMMAND ==> SCROLL ==> CSR
PROGRAM: ASS031 MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME:02:11:03
** END **

----- Before ASS031:54 <>
000053
=====> 0000-MAIN.
000055      OPEN INPUT EMP-FILE.
000056
000057      PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.
000058      PERFORM 2000-TERM THRU 2000-EXIT
000059 A     STOP RUN.
000060
000061      1000-READ.
000062
000063      READ EMP-FILE
000064      AT END
000065      MOVE 'Y' TO W01-EMP-EOF.
PF 1=HELP    2=PEEK CSR  3=END      4=EXIT      5=FIND      6=LOCATE *
PF 7=UP      8=DOWN     9=G0 1     10=LEFT     11=RIGHT    12=G0
Tr [ ] R 2 C 15
Connected to 3.32.24.12:23  |  NUM | 2, 15 |
```

Figure 62: Output

**Step 33:** Press F9 key so that control passes to the next line. The line being executed is highlighted.



The screenshot shows a mainframe terminal window titled '(A) Passport - PASSPORT'. The window has a menu bar with File, Edit, View, Communication, Options, Transfer, Macro, and Help. Below the menu is a toolbar with various icons. The main area displays JCL code for reading an EMP-FILE. The code includes commands like OPEN, PERFORM, and MOVE. A specific line, '000054 0000-MAIN.', is highlighted in red, indicating it is the current line being executed. The window also shows scroll bars and status information at the bottom.

```
----- XPEDITER/TSO - SOURCE -----
COMMAND ===> SCROLL ==> CSR
PROGRAM: ASS031 MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME:02:11:03

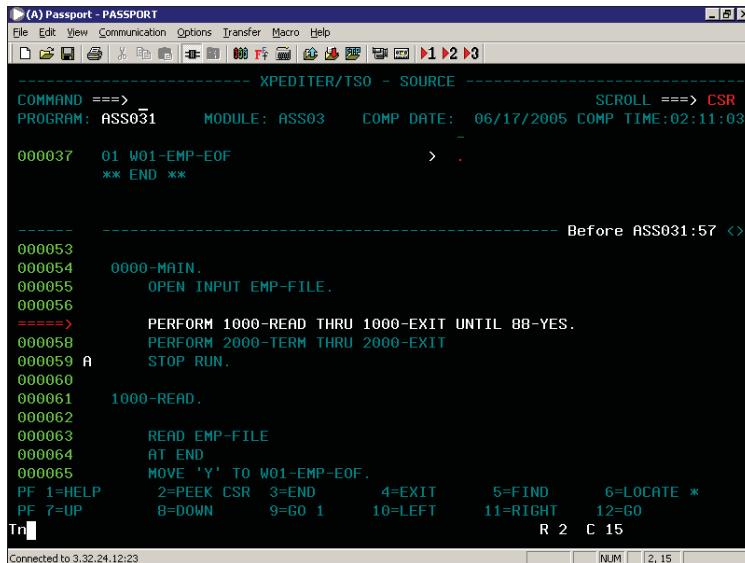
000025 01 EMP-REC > NO ADDR
** END **

-----
Before ASS031:55 <
000053
000054 0000-MAIN.
=====> OPEN INPUT EMP-FILE.
000056
000057      PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.
000058      PERFORM 2000-TERM THRU 2000-EXIT
000059 A STOP RUN.
000060
000061 1000-READ.
000062
000063      READ EMP-FILE
000064      AT END
000065      MOVE 'Y' TO W01-EMP-EOF.
PF 1=HELP   2=PEEK CSR 3=END    4=EXIT    5=FIND    6=LOCATE *
PF 7=UP     8=DOWN   9=GO 1   10=LEFT   11=RIGHT 12=GO
Tr R 2 C 15

Connected to 3.32.24.12:23
```

Figure 63: Output

**Step 34:** Press F9 key. Whenever the control reaches a **PERFORM PARA** statement, the control jumps to the respective **PARA**.



```

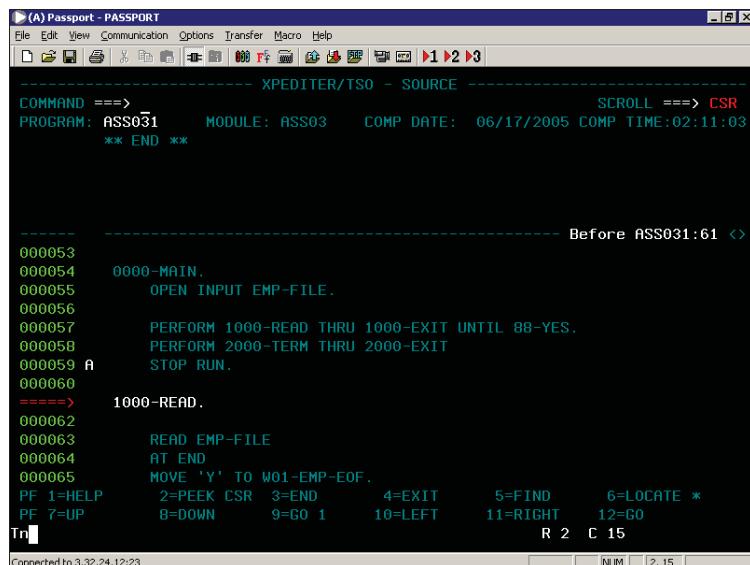
(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[File, Edit, View, Communication, Options, Transfer, Macro, Help, F1-F12, 1, 2, 3]
----- XPEDITER/TSO - SOURCE -----
COMMAND ==> SCROLL ==> CSR
PROGRAM: ASS031 MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME: 02:11:03
000037 01 W01-EMP-EOF > .
** END **

----- Before ASS031:57 < -----
000053
000054 0000-MAIN.
000055 OPEN INPUT EMP-FILE.
000056
=====> PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.
000058 PERFORM 2000-TERM THRU 2000-EXIT
000059 A STOP RUN.
000060
000061 1000-READ.
000062
000063 READ EMP-FILE
000064 AT END
000065 MOVE 'Y' TO W01-EMP-EOF.
PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE *
PF 7=UP 8=DOWN 9=G0 1 10=LEFT 11=RIGHT 12=G0
Tr R 2 C 15
Connected to 3.32.24.12:23
[File, Edit, View, Communication, Options, Transfer, Macro, Help, F1-F12, 1, 2, 3]

```

Figure 64: Output

Step 35: Press F9 key. Note that the control has transferred to 1000-READ para.



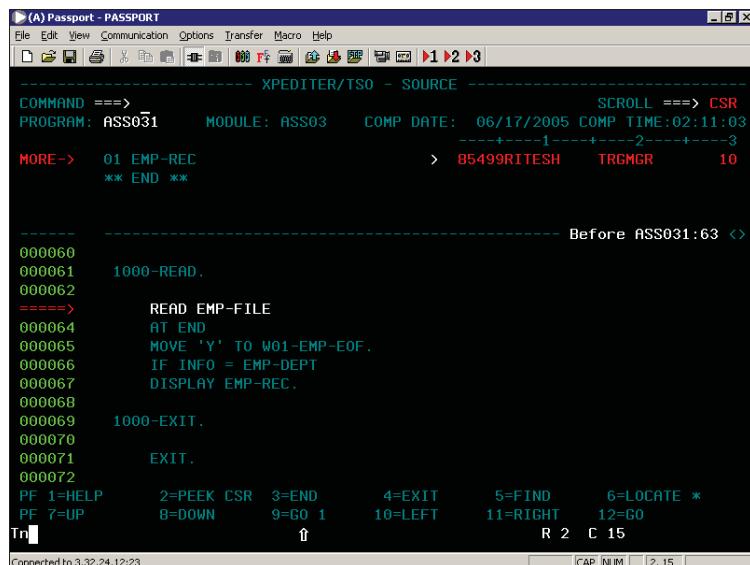
The screenshot shows a window titled '(A) Passport - PASSPORT' with a menu bar: File, Edit, View, Communication, Options, Transfer, Macro, Help. Below the menu is a toolbar with icons for file operations. The main area is labeled 'XPEDITER/TSO - SOURCE'. It displays JCL code:

```
COMMAND ===>                                SCROLL ==> CSR
PROGRAM: ASS031      MODULE: ASS03      COMP DATE: 06/17/2005 COMP TIME:02:11:03
** END **

----- Before ASS031:61 <>
000053
000054    0000-MAIN.
000055      OPEN INPUT EMP-FILE.
000056
000057      PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.
000058      PERFORM 2000-TERM THRU 2000-EXIT
000059 A      STOP RUN.
000060
=====> 1000-READ.
000062
000063      READ EMP-FILE
000064      AT END
000065      MOVE 'Y' TO W01-EMP-EOF.
PF 1=HELP   2=PEEK CSR  3=END     4=EXIT     5=FIND     6=LOCATE *
PF 7=UP     8=DOWN    9=G0 1    10=LEFT    11=RIGHT   12=G0
Tr |                                                 R 2 C 15
Connected to 3.32.24.12:23
```

Figure 65: Output

Step 36: Continue pressing F9 key for line-by-line execution.



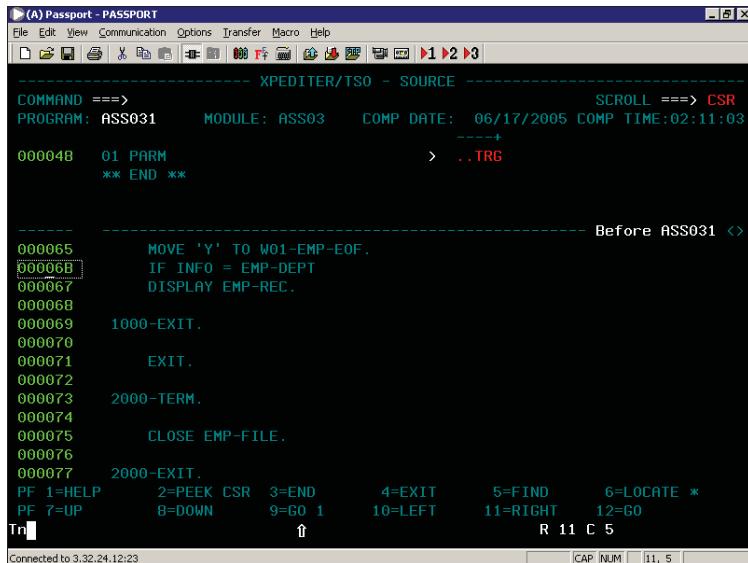
The screenshot shows a TSO terminal window titled '(A) Passport - PASSPORT'. The window displays a JCL program named ASS031. The command line is 'ASS031' and the module is 'ASS03'. The compilation date is '06/17/2005' and the compilation time is '02:11:03'. The job is being run by user 'R5499RITESH' under 'TRGMGR' with job number '10'. The JCL code reads data from an 'EMP-REC' file, moves it to a temporary file 'W01-EMP-EOF', and then processes it based on the value of 'INFO'. The terminal window includes standard TSO function keys at the bottom.

```
----- XPEDITER/TSO - SOURCE -----
COMMAND ===> SCROLL ==> CSR
PROGRAM: ASS031      MODULE: ASS03      COMP DATE: 06/17/2005 COMP TIME:02:11:03
MORE-> 01 EMP-REC          > R5499RITESH   TRGMGR    10
*** END **

----- Before ASS031:63 <>
000060
000061 1000-READ.
000062
----->     READ EMP-FILE
000064     AT END
000065     MOVE 'Y' TO W01-EMP-EOF.
000066     IF INFO = EMP-DEPT
000067     DISPLAY EMP-REC.
000068
000069 1000-EXIT.
000070
000071     EXIT.
000072
PF 1=HELP      2=PEEK  CSR  3=END      4=EXIT      5=FIND      6=LOCATE *
PF 7=UP        8=DOWN   9=G0 1    10=LEFT     11=RIGHT    12=G0
Tr  |           R 2       C 15
Connected to 3.32.24.12:23
CAP NUM [2, 15]
```

Figure 66: Output

**Step 37:** To set a breakpoint at a particular line, type **B** in the particular line number and press **ENTER**.



```

(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
[File Explorer] [File] [Edit] [View] [Communication] [Options] [Transfer] [Macro] [Help]
----- XPEDITER/TSO - SOURCE -----
COMMAND ==> SCROLL ==> CSR
PROGRAM: ASS031 MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME:02:11:03
-----+
000048 01 PARM > ..TRG
** END **

----- Before ASS031 < -----
000065 MOVE 'Y' TO W01-EMP-EOF.
00006B IF INFO = EMP-DEPT
000067 DISPLAY EMP-REC.
000068
000069 1000-EXIT.
000070
000071 EXIT.
000072
000073 2000-TERM.
000074
000075 CLOSE EMP-FILE.
000076
000077 2000-EXIT.
PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE *
PF 7=UP 8=DOWN 9=GO 1 10=LEFT 11=RIGHT 12=60
Tr [ ] R 11 C 5
-----+
Connected to 3.32.24.12:23
[CAP NUM | 11, 5 |]

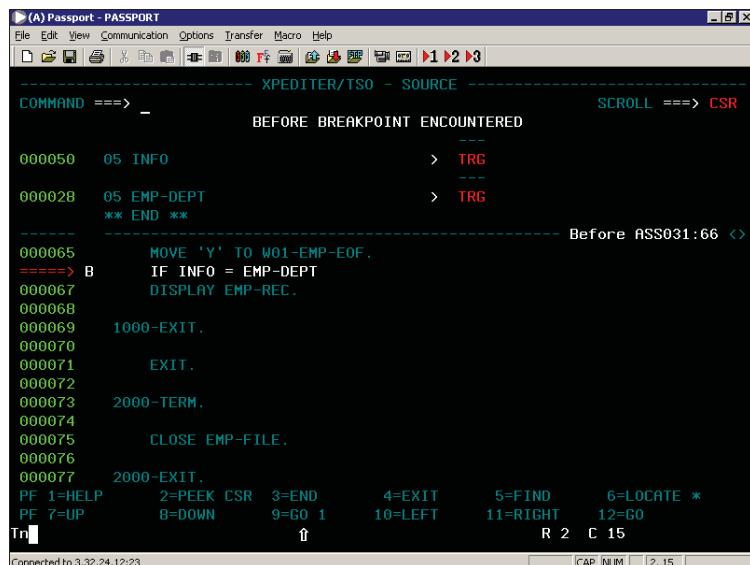
```

Figure 67: Output

**Step 38:** Once a breakpoint is placed on a line, the letter B appears in between the line number and the content on that line and you will get the status as “**1 COMMAND(S) COMPLETED**”.

**Figure 68: Output**

Step 39: Use F12 to execute debugging between two breakpoints.



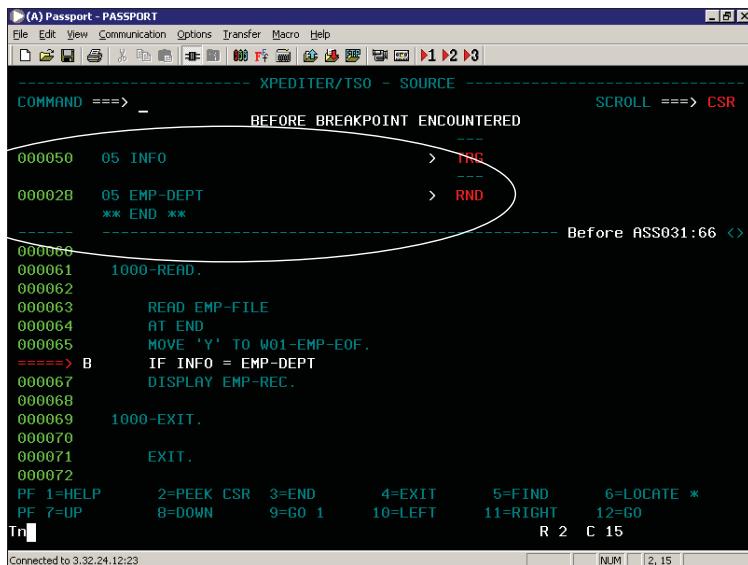
The screenshot shows a window titled '(A) Passport - PASSPORT'. The menu bar includes File, Edit, View, Communication, Options, Transfer, Macro, Help. The toolbar has icons for Open, Save, Print, etc. The main area is labeled 'XPDITER/TSO - SOURCE'. It displays assembly language code with comments and labels. A cursor is at line 000065. A callout bubble points to the label 'B' at line 000065 with the text 'Before ASS031:66'. The status bar at the bottom shows 'Connected to 3.32.24.12:23' and 'CAP INUM [2, 15]'. The bottom right corner shows 'R 2 C 15'.

```
----- XPDITER/TSO - SOURCE -----
COMMAND ===> -
SCROLL ==> CSR
----- BEFORE BREAKPOINT ENCOUNTERED -----
000050 05 INFO > TRG
000028 05 EMP-DEPT > TRG
** END **

000065 MOVE 'Y' TO W01-EMP-EOF.
===== B IF INFO = EMP-DEPT
000067 DISPLAY EMP-REC.
000068
000069 1000-EXIT.
000070
000071 EXIT.
000072
000073 2000-TERM.
000074
000075 CLOSE EMP-FILE.
000076
000077 2000-EXIT.
PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE *
PF 7=UP 8=DOWN 9=G0 1 10=LEFT 11=RIGHT 12=G0
Tr | R 2 C 15
Connected to 3.32.24.12:23 CAP INUM [2, 15]
```

Figure 69: Output

Note: The F12 key will not debug line-by-line. If you want to execute line-by-line, then press F9 key at any point of time.



The screenshot shows a TSO terminal window titled '(A) Passport - PASSPORT'. The window displays assembly language code with annotations. A callout bubble highlights two specific lines of code:

```

----- XPEDITER/TSO - SOURCE -----
COMMAND ===> -
BEFORE BREAKPOINT ENCOUNTERED
000050 05 INFO > TRC
000028 05 EMP-DEPT > RND
** END **

000060
000061 1000-READ.
000062
000063      READ EMP-FILE
000064      AT END
000065      MOVE 'Y' TO W01-EMP-EOF.
===== B      IF INFO = EMP-DEPT
000067      DISPLAY EMP-REC.
000068
000069 1000-EXIT.
000070
000071      EXIT.
000072
PF 1=HELP   2=PEEK CSR  3=END      4=EXIT      5=FIND      6=LOCATE *
PF 7=UP     8=DOWN    9=G0 1    10=LEFT    11=RIGHT   12=G0
Tr [ ]          R 2 C 15

```

The assembly code includes labels like 'INFO', 'EMP-DEPT', '1000-READ.', 'DISPLAY EMP-REC.', and '1000-EXIT.'. Breakpoints are marked with 'B' before certain instructions. Annotations 'TRC' and 'RND' are placed above the lines containing 'INFO' and 'EMP-DEPT' respectively. The status bar at the bottom indicates 'Connected to 3.32.24.12:23'.

Figure 70: Output

**Step 40:** Since the condition is not matching, it skipped the Display statement (**Display Emp-rec**) and jumped to **1000-Exit**.

(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

XPEDITOR/TSO - SOURCE

COMMAND ==> SCROLL ==> CSR

PROGRAM: ASS031 MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME: 02:11:03

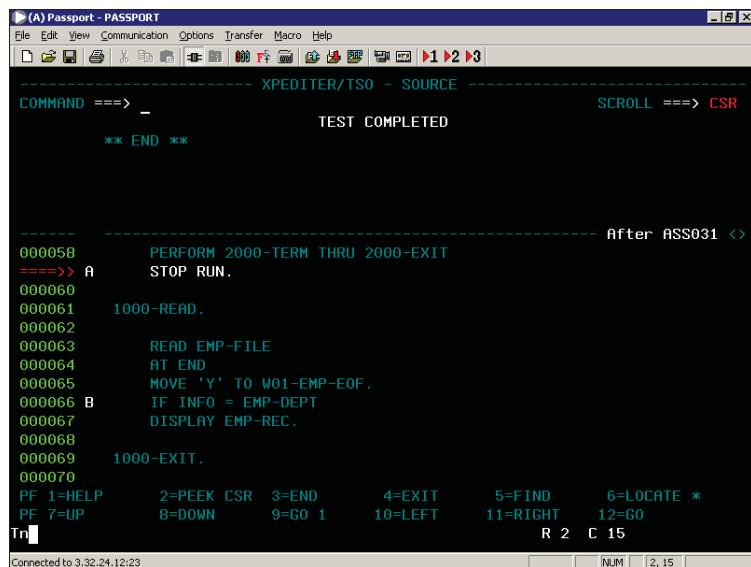
\*\* END \*\*

----- Before ASS031:69 <>

```
000060
000061      1000-READ.
000062
000063      READ EMP-FILE
000064      AT END
000065      MOVE 'Y' TO W01-EMP-EOF.
000066 B      IF INFO = EMP-DEPT
000067      DISPLAY EMP-REC.
000068
=====> 1000-EXIT.
000070
000071      EXIT.
000072
PF 1=HELP    2=PEEK CSR  3=END        4=EXIT      5=FIND      6=LOCATE *
PF 7=UP      8=DOWN     9=GO 1      10=LEFT     11=RIGHT   12=GO
Tr R 2 C 15
```

**Figure 71: Output**

**Step 41:** Once the test is completed, you will get the following screen.



The screenshot shows a terminal window titled '(A) Passport - PASSPORT'. The window has a menu bar with File, Edit, View, Communication, Options, Transfer, Macro, Help. Below the menu is a toolbar with icons for file operations. The main area is labeled 'EXPEDITOR/TSO - SOURCE'. It displays the following JCL code:

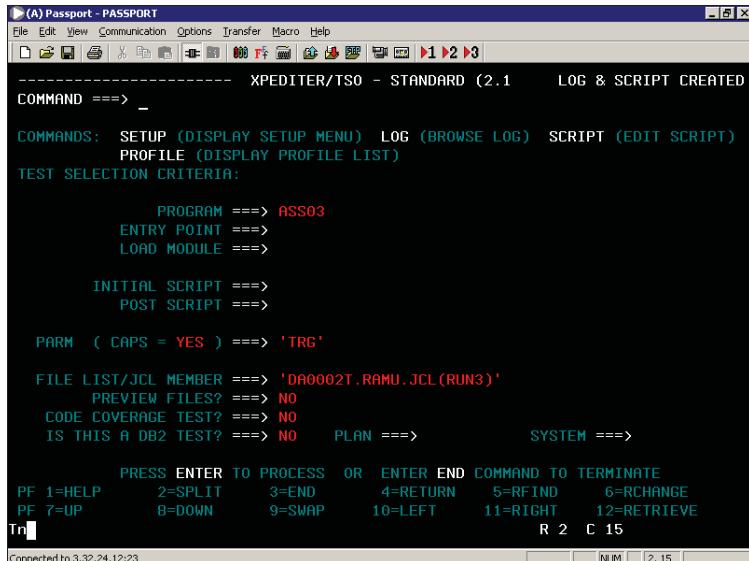
```
----- XPEDITOR/TSO - SOURCE -----
COMMAND ===> -
TEST COMPLETED
** END **

-----
000058      PERFORM 2000-TERM THRU 2000-EXIT
===> A     STOP RUN.
000060
000061      1000-READ.
000062
000063      READ EMP-FILE
000064      AT END
000065      MOVE 'Y' TO W01-EMP-EOF.
000066 B     IF INFO = EMP-DEPT
000067      DISPLAY EMP-REC.
000068
000069      1000-EXIT.
000070
PF 1=HELP   2=PEEK CSR  3=END      4=EXIT      5=FIND      6=LOCATE *
PF 7=UP     8=DOWN    9=G0 1    10=LEFT    11=RIGHT   12=G0
Tr|          R 2       C 15
Connected to 3.32.24.12:23
```

The code performs a series of operations: it runs a program named '2000-TERM' (via 'PERFORM'), stops the run ('STOP RUN'), reads record 1000 from an 'EMP-FILE', moves a value to a specific location in memory ('MOVE'), and then checks if the 'INFO' field equals 'EMP-DEPT'. If so, it displays the 'EMP-REC'. Finally, it exits record 1000 ('1000-EXIT').

**Figure 72: Output**

Step 42: Press F9 to STOP the debugging and you will be on the following screen:



(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

----- XPEDITOR/TSO - STANDARD (2.1) LOG & SCRIPT CREATED

COMMAND ==> \_

COMMANDS: SETUP (DISPLAY SETUP MENU) LOG (BROWSE LOG) SCRIPT (EDIT SCRIPT)  
PROFILE (DISPLAY PROFILE LIST)

TEST SELECTION CRITERIA:

PROGRAM ==> ASS03  
ENTRY POINT ==>  
LOAD MODULE ==>

INITIAL SCRIPT ==>  
POST SCRIPT ==>

PARM ( CAPS = YES ) ==> 'TRG'

FILE LIST/JCL MEMBER ==> 'DA0002T.RAMU.JCL(RUN3)'  
PREVIEW FILES? ==> NO  
CODE COVERAGE TEST? ==> NO  
IS THIS A DB2 TEST? ==> NO PLAN ==> SYSTEM ==>

PRESS ENTER TO PROCESS OR ENTER END COMMAND TO TERMINATE

PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFIND 6=RCHANGE  
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE

Tn [Connected to 3.32.24.12:23] R 2 C 15

[ ] [NUM] [2,15]

Figure 73: Output

**Step 43:** To set **After Break Point** in a particular line, type **A** in the particular line number and press **ENTER**.

(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

XPEDITOR/TSO - SOURCE

COMMAND ==> SCROLL ==> CSR

PROGRAM: ASS031 MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME: 02:11:03

000048 01 PARM > ..TRG  
\*\* END \*\*

-----+----- Before ASS031 <-----

===== B PROCEDURE DIVISION USING PARM.

000053  
000054 0000-MAIN.  
000055 OPEN INPUT EMP-FILE.  
000056  
000058 PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.  
000059 A PERFORM 2000-TERM THRU 2000-EXIT  
STOP RUN.  
000060  
000061 1000-READ.  
000062  
000063 READ EMP-FILE  
000064 AT END

PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE \*

PF 7=UP 8=DOWN 9=GO 1 10=LEFT 11=RIGHT 12=GO

Tn R 15 C 3

Connected to 3.32.24.12:23 NUM 15, 3

**Figure 74: Output**

**Step 44:** Once a breakpoint is placed on a line, the letter A appears in between the line number and the content on that line and you will get the status as “1 COMMAND(S) COMPLETED”.

(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

XPEDITOR/TSO - SOURCE

COMMAND ==> - SCROLL ==> CSR

1 COMMAND(S) COMPLETED

000048 01 PARM > ..TRG  
\*\* END \*\*

===== Before ASS031 <=====

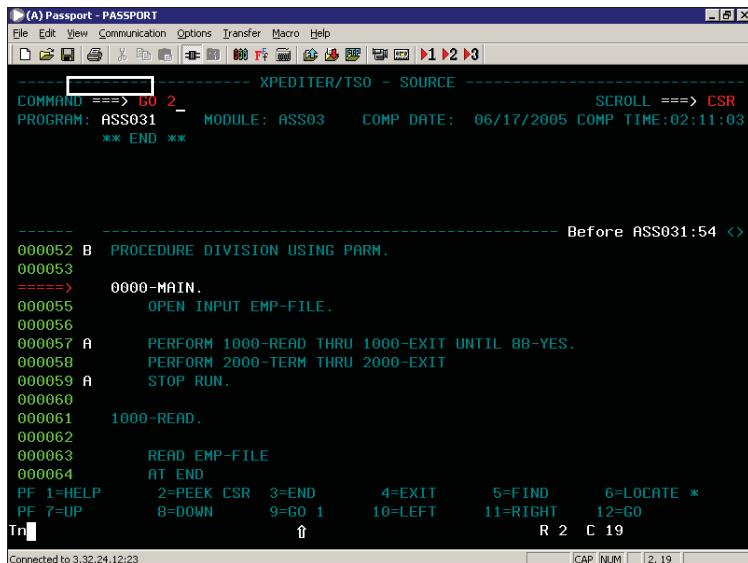
=====> B PROCEDURE DIVISION USING PARM.

000053  
000054 0000-MAIN.  
000055 OPEN INPUT EMP-FILE.  
000056  
000057 A PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.  
000058 PERFORM 2000-TERM THRU 2000-EXIT  
000059 A STOP RUN.  
000060  
000061 1000-READ.  
000062  
000063 READ EMP-FILE  
000064 AT END  
PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE \*  
PF 7=UP 8=DOWN 9=GO 1 10=LEFT 11=RIGHT 12=GO  
R 2 C 15

**Figure 75: Output**

**Step 45:** The command, **Go n**, where n is an integer, is used to take the control 'n' lines forward from the current line. This will skip the line-be-line execution of in between lines and you can resume the same from the n<sup>th</sup> line.

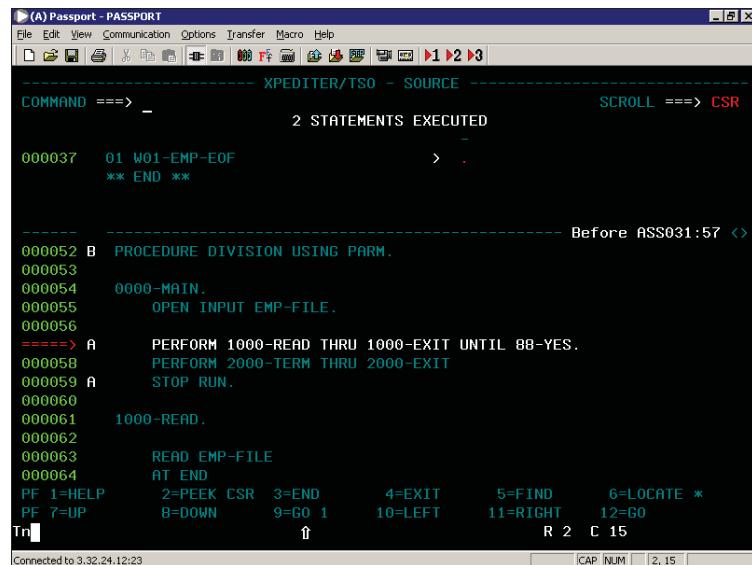
**For example:** In the following figure, the control is kept on the line 54, and **Go 2** command is issued.



The screenshot shows a TSO terminal window titled '(A) Passport - PASSPORT'. The window has a menu bar with File, Edit, View, Communication, Options, Transfer, Macro, Help. Below the menu is a toolbar with icons for file operations. The main area displays assembly language code and a command prompt. The command prompt shows 'COMMAND ==> GO 2' and 'PROGRAM: ASS031 - MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME:02:11:03 \*\* END \*\*'. The code starts with PROCEDURE DIVISION USING PARM, followed by several lines of assembly instructions. At the bottom, there is a PF key mapping section and status information: 'Connected to 3.32.24.12:23' and 'CAP NUM | 2, 19 |'.

Figure 76: Output

**Step 46:** After the execution of **Go 2** command, the control has now shifted to line 57. The message “**2 STATEMENTS EXECUTED**” is displayed on the screen.



The screenshot shows a TSO terminal window titled '(A) Passport - PASSPORT'. The window displays JCL code for a procedure division. The code includes several OPEN, READ, and PERFORM statements. A 'PF' key mapping table is visible at the bottom. The message '2 STATEMENTS EXECUTED' is displayed above the code. The status bar at the bottom indicates the connection is to 3.32.24.12:23 and shows cursor coordinates R 2 C 15.

```
----- XPEDITER/TSO - SOURCE -----
COMMAND ==> -
2 STATEMENTS EXECUTED
-
000037 01 W01-EMP-EOF > .
** END **

-----
000052 B PROCEDURE DIVISION USING PARM.
000053
000054 0000-MAIN.
000055      OPEN INPUT EMP-FILE.
000056
=====> A      PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.
000058      PERFORM 2000-TERM THRU 2000-EXIT
000059 A      STOP RUN.
000060
000061 1000-READ.
000062
000063      READ EMP-FILE
000064      AT END
PF 1=HELP   2=PEEK CSR  3=END      4=EXIT      5=FIND      6=LOCATE *
PF 7=UP     8=DOWN    9=GO 1    10=LEFT    11=RIGHT   12=60
Tr[ ]          ↑
R 2 C 15

Connected to 3.32.24.12:23
| CAP NUM | 2, 15 |
```

Figure 77: Output

**Step 47:** Use the delete command to clear the breakpoints. Take the cursor to the line from which you want to remove the breakpoint and type the letter 'D' at the beginning of that line to remove the breakpoint.

**For example:** The figure given below shows how the breakpoint from line 57 is removed.

(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

XPEDITER/TSO - SOURCE

COMMAND ==> SCROLL ==> CSR

PROGRAM: ASS031 MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME: 02:11:03

SAME-> 01 EMP-REC > \*

\*\* END \*\*

----- Before ASS031:63 -----

000052 B PROCEDURE DIVISION USING PARM.

000053

000054 0000-MAIN.

000055 OPEN INPUT EMP-FILE.

000056

000057 A PERFORM 1000-READ THRU 1000-EXIT UNTIL B8-YES.

000058 PERFORM 2000-TERM THRU 2000-EXIT

000059 A STOP RUN.

000060

000061 1000-READ.

000062

=====> READ EMP-FILE

000064 AT END

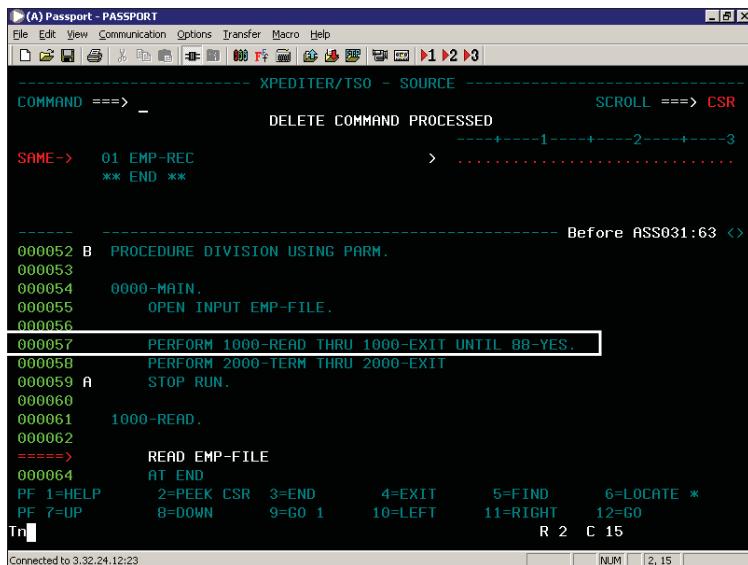
PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE \*

PF 7=UP 8=DOWN 9=GO 1 10=LEFT 11=RIGHT 12=GO

Tn R 16 C 2

**Figure 78: Output**

**Step 48:** The message “**DELETE COMMAND PROCESSED**” is flashed after removing the breakpoint. Now note the breakpoint is removed in the particular line.



```

(A) Passport - PASSPORT
File Edit View Communication Options Transfer Macro Help
File Edit View Communication Options Transfer Macro Help
----- XPEDITER/TSO - SOURCE -----
COMMAND ===> -
DELETE COMMAND PROCESSED
SCROLL ===> CSR
SAME-> 01 EMP-REC > ..... .
** END **

----- Before ASS031:63 < -----
000052 B PROCEDURE DIVISION USING PARM.
000053
000054 0000-MAIN.
000055 OPEN INPUT EMP-FILE.
000056
000057 PERFORM 1000-READ THRU 1000-EXIT UNTIL B8-YES.
000058 PERFORM 2000-TERM THRU 2000-EXIT
000059 A STOP RUN.
000060
000061 1000-READ.
000062
=====> READ EMP-FILE
000064 AT END
PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE *
PF 7=UP 8=DOWN 9=G0 1 10=LEFT 11=RIGHT 12=G0
Tr R 2 C 15
Connected to 3.32.24.12:23
----- NUM | 2, 15 | -----

```

Figure 79: Output

**Step 49:** The **Keep** Command is used to keep a watch on values of variables. Enter the letter 'K' on a line in which the variable you want to watch is present.

**For example:** In figure given below, K1 is entered on the line 57 indicating that a watch should be placed on the variable associated with 88-YES.

(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

1 2 3

XPEDITER/TSO - SOURCE

COMMAND ==> SCROLL ==> CSR

DELETE COMMAND PROCESSED

SAME-> 01 EMP-REC > 1 2 3  
\*\*\* END \*\*\*

----- Before ASS031:63 -----

000052 B PROCEDURE DIVISION USING PARM.

000053

000054 0000-MAIN.

000055 OPEN INPUT EMP-FILE.

000056

000057 PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES

000058 PERFORM 2000-TERM THRU 2000-EXIT

000059 A STOP RUN.

000060

000061 1000-READ.

000062

=====> READ EMP-FILE

000064 AT END

PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE \*

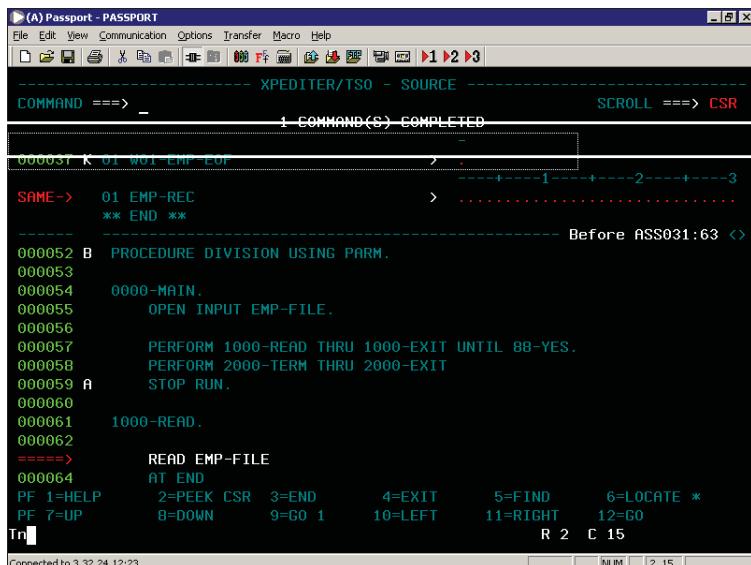
PF 7=UP 8=DOWN 9=GO 1 10=LEFT 11=RIGHT 12=GO

Tn R 15 C 2

**Figure 80: Output**

**Note:** K1 indicates the first (1) variable in the line has to be kept on the watch window. General Syntax is Kn, where n indicates the position of the variable in a particular line.

**Step 50:** Observe here that the variable **W01-EMP-EOF** is placed in the **KEEP** window and you can monitor its value. The highlighted area is the **KEEP** window, where you can monitor the values of the variable at any point of time.



The screenshot shows the Xpediter/TSO - SOURCE window. The command entered was `-`. One command was completed. The assembly code listed includes:

```
000031    OI W01-EMP-EOF
SAME-> 01 EMP-REC
** END **

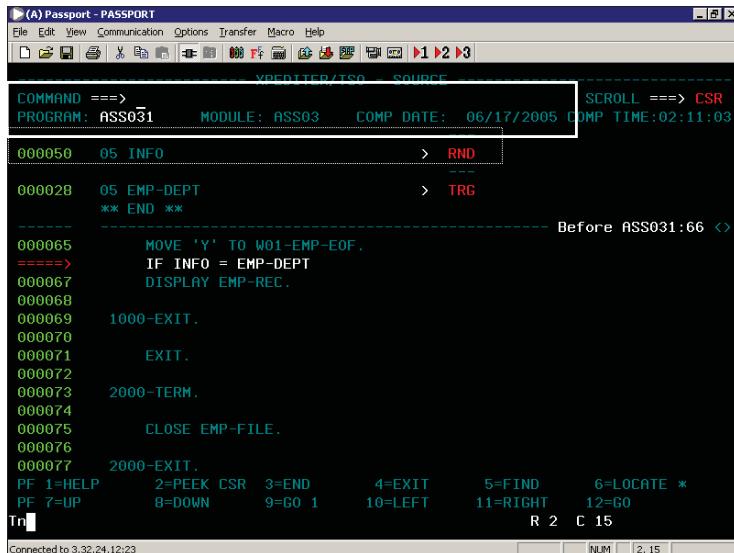
000052 B  PROCEDURE DIVISION USING PARM.
000053
000054     0000-MAIN.
000055         OPEN INPUT EMP-FILE.
000056
000057         PERFORM 1000-READ THRU 1000-EXIT UNTIL 88-YES.
000058         PERFORM 2000-TERM THRU 2000-EXIT
000059 A  STOP RUN.
000060
000061     1000-READ.
000062
=====>     READ EMP-FILE
000064     AT END
PF 1=HELP   2=PEEK CSR  3=END      4=EXIT      5=FIND      6=LOCATE *
PF 7=UP     8=DOWN    9=G0 1      10=LEFT    11=RIGHT   12=G0
Tr [ ] R 2 C 15
Connected to 3.32.24.12:23
NUM [ ] 2, 15 [ ]
```

Figure 81: Output

**Step 51:** The value of a variable can be changed during the execution by using the “**MOVE new-value TO variable-name**” command.

**Figure 82: Output**

**Step 52:** Notice that the value of the variable **INFO** is now **RND** and the same is displayed in the **KEEP** window.



The screenshot shows a window titled '(A) Passport - PASSPORT'. The menu bar includes File, Edit, View, Communication, Options, Transfer, Macro, and Help. The toolbar contains various icons. The title bar also displays 'XREFITTER/TSO - SOURCE'. The status bar at the bottom shows 'Connected to 3.32/24.12:23' and 'INUM 2,15'. The main area displays assembly language code:

```

COMMAND ===> SCROLL ===> CSR
PROGRAM: ASS031 MODULE: ASS03 COMP DATE: 06/17/2005 COMP TIME:02:11:03

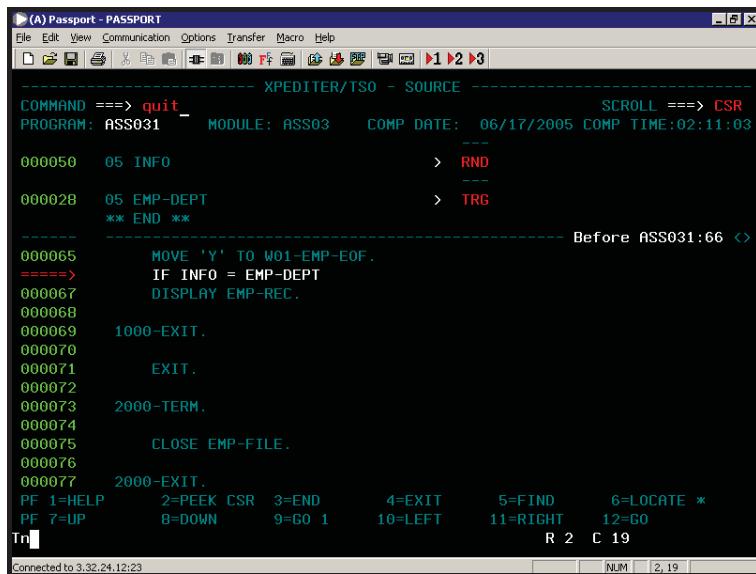
000050 05 TINFO > RND
000028 05 EMP-DEPT > TRG
** END **

----- Before ASS031:66 <-----
000065 MOVE 'Y' TO W01-EMP-EOF.
=====> IF INFO = EMP-DEPT
000067 DISPLAY EMP-REC.
000068
000069 1000-EXIT.
000070
000071 EXIT.
000072
000073 2000-TERM.
000074
000075 CLOSE EMP-FILE.
000076
000077 2000-EXIT.
PF 1=HELP 2=PEEK CSR 3=END 4=EXIT 5=FIND 6=LOCATE *
PF 7=UP 8=DOWN 9=G0 1 10=LEFT 11=RIGHT 12=G0
R 2 C 15

```

Figure 83: Output

Step 53: To quit the Xpediter, type QUIT.



```
----- XPEDITER/TSO - SOURCE -----
COMMAND ===> quit                               SCROLL ==> CSR
PROGRAM: ASS031      MODULE: ASS03     COMP DATE: 06/17/2005 COMP TIME:02:11:03
          ---  

000050  05 INFO                                > RND  

000028  05 EMP-DEPT                            > TRG  

*** END **  

----- ----- ----- Before ASS031:66 <>
000065      MOVE 'Y' TO W01-EMP-EOF.  

=====>      IF INFO = EMP-DEPT  

000067      DISPLAY EMP-REC.  

000068  

000069      1000-EXIT.  

000070  

000071      EXIT.  

000072  

000073      2000-TERM.  

000074  

000075      CLOSE EMP-FILE.  

000076  

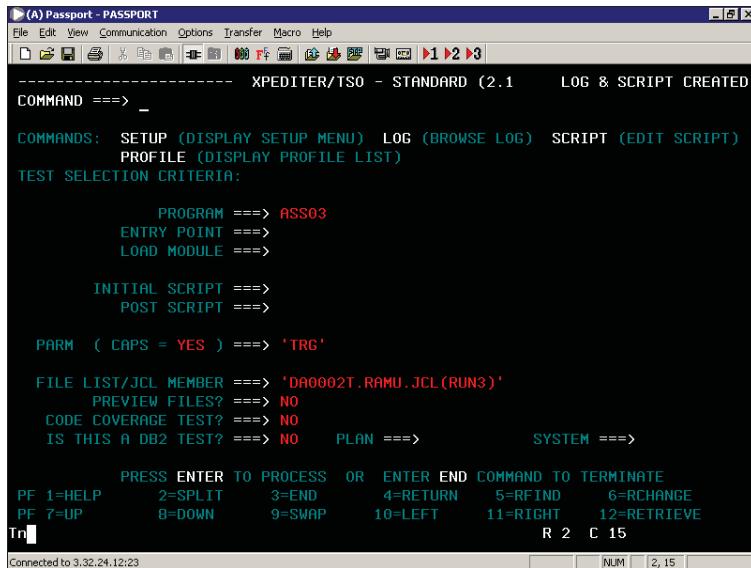
000077      2000-EXIT.  

PF 1=HELP      2=PEEK CSR  3=END      4=EXIT      5=FIND      6=LOCATE *
PF 7=UP       B=DOWN    9=G0 1    10=LEFT    11=RIGHT   12=G0
Tr [ ]                                     R 2  C 19  

Connected to 3.32.24.12:23
```

Figure 84: Output

**Step 54:** Quitting the **Xpediter** takes you to the **XPEDITER/TSO – STANDARD** menu screen. Press F3 key to return to the **XPEDITER/TSO – PRIMARY** menu.



(A) Passport - PASSPORT

File Edit View Communication Options Transfer Macro Help

----- XPEDITER/TSO - STANDARD (2.1) LOG & SCRIPT CREATED

COMMAND ==> \_

COMMANDS: SETUP (DISPLAY SETUP MENU) LOG (BROWSE LOG) SCRIPT (EDIT SCRIPT)  
PROFILE (DISPLAY PROFILE LIST)

TEST SELECTION CRITERIA:

PROGRAM ==> ASS03  
ENTRY POINT ==>  
LOAD MODULE ==>

INITIAL SCRIPT ==>  
POST SCRIPT ==>

PARM ( CAPS = YES ) ==> 'TRG'

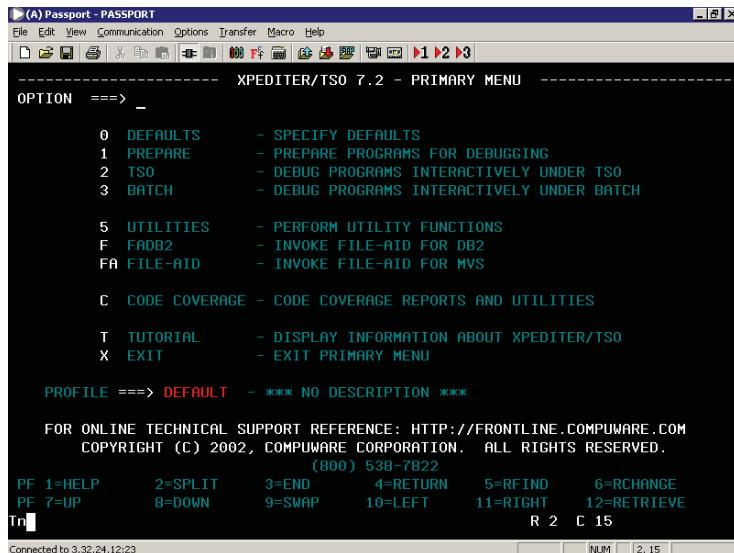
FILE LIST/JCL MEMBER ==> 'DA0002T.RAMU.JCL(RUN3)'  
PREVIEW FILES? ==> NO  
CODE COVERAGE TEST? ==> NO  
IS THIS A DB2 TEST? ==> NO PLAN ==> SYSTEM ==>

PRESS ENTER TO PROCESS OR ENTER END COMMAND TO TERMINATE  
PF 1=HELP 2=SPLIT 3=END 4=RETURN 5=RFINDD 6=RCHANGE  
PF 7=UP 8=DOWN 9=SWAP 10=LEFT 11=RIGHT 12=RETRIEVE  
R 2 C 15

Tn [Connected to 3.32.24.12:23] NUM [2, 15]

Figure 85: Output

Step 55: Press F3 key or X to return to the ISPF Primary option menu.



The screenshot shows a terminal window titled '(A) Passport - PASSPORT'. The title bar includes standard menu options: File, Edit, View, Communication, Options, Transfer, Macro, Help. Below the title bar is a toolbar with various icons. The main area displays the 'XPEDITER/TSO 7.2 - PRIMARY MENU'. The menu lists several options with their descriptions:

OPTION	====>	
0	DEFUALTS	- SPECIFY DEFUALTS
1	PREPARE	- PREPARE PROGRAMS FOR DEBUGGING
2	TSO	- DEBUG PROGRAMS INTERACTIVELY UNDER TSO
3	BATCH	- DEBUG PROGRAMS INTERACTIVELY UNDER BATCH
5	UTILITIES	- PERFORM UTILITY FUNCTIONS
F	FADB2	- INVOKE FILE-AID FOR DB2
FA	FILE-AID	- INVOKE FILE-AID FOR MVS
C	CODE COVERAGE	- CODE COVERAGE REPORTS AND UTILITIES
T	TUTORIAL	- DISPLAY INFORMATION ABOUT XPEDITER/TSO
X	EXIT	- EXIT PRIMARY MENU

Below the menu, there is a section for 'PROFILE' with 'DEFAULT' selected, followed by a note: '- \*\*\* NO DESCRIPTION \*\*\*'. A copyright notice follows:

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COPYRIGHT (C) 2002, COMPUWARE CORPORATION. ALL RIGHTS RESERVED.  
(800) 538-7822

PF 1=HELP PF 7=UP PF 2=SPLIT PF 8=DOWN PF 3=END PF 9=SWAP PF 4=RETURN PF 10=LEFT PF 5=RFIND PF 11=RIGHT PF 6=RCHANGE PF 12=RETRIEVE  
Tn R 2 C 15

Connected to 3.32.24.12:23

Figure 86: Output