COBOL· Common business oriented language

1958 codasyl - pentagon

Dr· Grace hopper

Application programming language

English like language·

Add a to b giving c·

Divide a by b giving d remainder e·

Create a pds

HLQ·URNAME·REVAT·COBOL·PDS

LRECL=80,RECFM=FB,,DSORG=PDS

PQ=10,SQ=10,DB=10,

Create a member → COMPJCL→ type the job mentioned in the chat·

Create another → RUNJCL → type the next job mentioned in the chat·

CREATE A LIBRARY

HLQ·URNAME·REVAT·COBOL·LOADLIB

LRECL=80,RECFM=U,DSORG=LIBRARY

PQ=10,SQ=10,DB=10,

1· Write the cobol pgm

2·Submit a compile job on behalf of the cobol pgm·

a· Step1 → check syntax errors in cobol stmnts

b· Step2→ convert the cobol codes in loda modules/object code

3. Submit another the job that will run the load module.

PROGRAM STRUCTURE:

4 DIVISIONS.

1.IDENTIFICATION DIVISION.(mandatory)

Note: identifies the program.

PROGRAM-ID. Entry. mandatory
[AUTHOR. Entry].
[INSTALLATION Entry].
[DATE-WRITTEN. Entry].
[DATA-COMPILED. Entry].
[SECURITY. Entry.
[REMARKS. Entry.]

2. ENVIRONMENT DIVISION.(optional)

CONFIGURATION SECTION.

SOURCE-COMPUTER. ZOS.

OBJECT COMPUTER. 390.

INPUT-OUTPUT SECTION.

FILE CONTROL. → where the files are linked.

Note: Files and other external resources are linked here.

logical name for the file is given here.
Accessing mode
Organization

3.DATA DIVISION. (optional)

Note: all the variables are declared

FILE SECTION.

FD – FILE'S FIELD DISCRIPTION (FILE LAYOUT/FILE VARIABLES)

WORKING-STORAGE SECTION.

ALL THE COMMONLY USED VARIABLES

LOCAL-STORAGE SECTION.

REPORTS

LINKAGE SECTION·

SUB PROGRAMS AND to which the values can be received from the user dynamically

PROCEDURE DIVISION·(Mandatory)

Has no predefined sections or paragraphs·

Executable statements are written/verbs

Must be ended by 'stop run'·

COLUMN DISCRIPTION OF COBOL PROGRAM

1-6 - SEQNUM

7 -INDICATOR· SPACE → executable sentence

'*' → comment

'-' → continuation of string from previous sentence·

8-11 AREA/MARIGIN A

DIVISIONS, SECTIONS,PARAGRAPHS, FD,SD 01,77 ENTERIES·

12-72 -AREA/MARIGIN B

02-49,66,88 LEVEL NUMBERS· ALL EXECUTABLE SENTANCE IN PROCEDURE DIVISION(VERBS)·

73-80 - IDENTIFIER - USERS DISCRETION·

Data types:

1. Char → A
2. Numeric → 9
3. Alphanumeric →X

DECLARE A VARIABLE

SYNTAX:

LEVEL-NUMBER SPACE NAME-VAR SPACES PICTURE-CLAUSE DATATYPE(SIZE) VALUE-CLAUSE

LEVEL NUMBER → 01,77,02-49,66,88

VAR-NAME (MAX 36)· ALPHANUMERIC,-,FIRST CHAR MUST BE ALPHABET·

(let the name tell the story)

PIC MANDATORY

DATATYPE(SIZE)

A(05) → left justified with auto spaces on the suffix

9(05) → right justified with auto zeros prefixed

X(10) → left justified with auto spaces on the suffix

VALUE(OPTIONAL) → the user can assign the variable with some initial values·

Date: 29:09-2023

Topics to be covered:

- Singed variables
- Figurative constants
- Decimal variables
- Move statement
- Reference Modification
- Group items
- Arithmetic operations
- Conditions
- Conditional statements
- Loops.

Task of the day:

Max digits. Max chars → alphabetic, max chars → alphanumeric

Singed variables. Numeric.

Pic 9(03) → no sign

01 WS01-A PIC S9(03) VALUE +123. A23.

Note: Signed variable, by default is sign leading. The sign will be combined with the leading digit with the below convention.

01 WS01-A PIC S9(03) **sign leading** VALUE +123. A23

The sign will be combined with the leading digit with the below convention.

01 WS01-B PIC S9(03) **sign trailing** VALUE +123. 12C.

Convention→ +1 → A, +2 →B... +9→ I, -1 → J, -2→ K...
-9 → R. +0 → {, -0 → }

01 WS01-STS PIC S9(03) **sign trailing Separate** VALUE +123.

➔ 123+

01 WS01-SLS PIC S9(03) **sign leading Separate** VALUE +123.

➔ +123

Figurative constants

Space, spaces, 0, zero,zeros,zeroes

Decimal variables.

Virtual → numeric → arithmetic operation. The decimal point will not be displayed. 123.456 → 123456

01 ws01-vd PIC 9(03)V(02) value 123.45

But when you display → 12345

- Physical (alphanumeric) → no arithmetic operation allowed on this Variable.
- no value clause is allowed.
- Move statement is allowed

01 WS01-PD PIC 9(03).9(02)

MOVE

Allocation of a value to a variable can be done 2 ways.

1. Value clause- data division.
2. Move statement in Procedure division.

Syntax:

Move source to dest-variables

Move 10 to ws01-var1

Move 'ca7' to ws05-name

Move ws01-a to ws05-b (provided their data type are same)

Move 10 to ws01-a, ws05-b,ws05-c

Move ws05-d to ws01-a, ws05-b,ws05-c

Move corresponding grp1 to grp2

It willmove the values from source members to the dest members, ONLY IF THEIR NAME MATCHES, irrespective of their sequence.

Move grp1 to grp2

➔ It moves values in the sequence.

Source → single. Value/literal or variables

Destination → single or multiple variables.

Reference Modification.

A technique by which parts of a variable can be handled individually.

Syntax : var(stpos:length)

01 ws01-a pic a(05) value 12345.

01 ws01-b pic 9(05) value 00000.

1	2	3	4	5

Move ws01-a(2:3) to ws01-b(3:3)

0	0	2	3	4

Group items.

01 - level → 1page-4kb

01 ws01-A pic x(03)

77 level number - elementary data item.

The number bytes allocated is the number bytes mentioned in the size clause.

Suggest: Declare one variable at 01 level number and declare all the other variables in the same page/under that 01 level number variable.

A group item is a variable which has member variables defined.

```
01 ws01-vars.
      02 ws02-var1          pic 9(03).
      02 ws02-var2          pic X(04).
      02 ws02-var3          pic A(15).
```

Note: level numbers 02 - 49 must be mentioned in marigin b

Rules of group item.

- It cannot have picture clause.
- It CAN HAVE value clause. Value are considered to alphanumeric.
- A group item is identified as a group item, if it has variables with higher level number.
- The member items can have their own different pic clauses and sizes.
- The size of a group item is calculated by adding the sizes of its members.

Rules of a member item.

- Must have a level number higher than its group item.
- Any higher level number is the member of its immediate previous lower level number.
- A member item can be a SUB GROUP item.

```
01 ws01-vars VALUE "TOMMY007USANJK991111'.
      05 WS05-NAME       PIC A(05).
      05 WS05-ID         PIC X(03).
      05 WS05-ADDRESS.
            10   WS10-COUNRTY      PIC A(3).
            10   WS10-STATE        PIC A(3).
            10   WS10-PCODE        PIC 9(02).
      05 WS05-PHONE      PIC 9(4).
```

```
PD
      DISPLAY → WS01-VARS.
```

Note: group move. Move corresponding. See video 02-10-2023.

Arithmetic operations:

Numeric data type.

1. ADD.

   ADD 10 TO WS05-A → WS05-A = WS05-A + 10

   ADD WS05-A TO WS05-B → WS05-B = WS05-A + WS05-B

   ADD WS05-A TO WS05-B WS05-C. →

   WS05-B = WS05-B + WS05-A

   WS05-C = WS05-C + WS05-A

   ADD 10 TO WS05-B GIVING WS05-C

   WS05-C = WS05-B + 10.

2. SUBTRACT.

   SUBTRACT 10 FROM WS05-A→ WS05-A = WS05-A - 10

   SUBTRACT WS05-A FROM WS05-B → WS05-B = WS05-B - WS05-A

   SUBTRACT WS05-A FROM WS05-B GIVING WS05-C

3. MULTIPLY.

   MULTIPLY WS05-A BY WS05-B

   MULTIPLY 10 BY WS05-B

   MUTLIPLY WS05-A BY WS05-B GIVING WS05-C

4. DIVIDE

   DIVIDE WS05-A BY WS05-B → WS05-B(QUO)= WS05-A / WS05-B

   DIVIDE WS05-A BY WS05-B GIVING WS05-C REMAINDER WS05-D

5. COMPUTE. (NATURAL ARITHMATIC OPERATORS.)

   C = A * B / F (- 23 + 2) **4

   BODMAS RULE IS FOLLOWED

   COMPUTE C = A * B / F (- 23 + 2) **4

   COMPUTE C ROUNDED = (A * B) / 2 * (- 23 + 2) **4

   Note: a Space must be given before and after the operator.

Conditions

- Relation Condition
  <, LESS THAN, >,GREATER THAN, EQUALS TO, =, <=,>=
- Sign Condition - POSITIVE NEGATIVE,ZERO
- Class Condition -ALPHABETIC, NUMERIC, ALPHABETIC-LOWER, ALPHABETIC-UPPER
- Condition-Name 88 level number declaration.
- Negated Condition - NOT
- Combined Condition - LOGICAL OPERATORS. AND & OR

Conditional statements

```
If ( CONDITION)  THEN
      IMP STMNT
ELSE IF(CONDITION) THEN
      IMP STMNTS
ELSE
      IMP STMNTS
END-IF
END-IF.
```

Note: The number of end-if must be equal to the number of IF in the structure.

There MUST NOT BE A PERIOD ANYWHERE INBETWEEN IF AND END-IF

Evaluate

```
EVALUATE TRUE/FALSE/VARIABLE
WHEN CONDITION
```

IMP
WHEN CONDITON
IMP
WHEN OTHER
IMP
END-EVALUATE.

EXAMPLE:

```
IF ( WS05-A > WS05-B AND WS05-A > WS05-C ) THEN
      DISPLAY 'A IS THE GREATEST'
ELSE IF ( WS05-B > WS05-A AND WS05-B > WS05-C ) THEN
      DISPLAY ' B IS THE GREATEST'
ELSE
      DISPLAY ' C IS THE GREATEST'
END-IF
END-IF.
```

```
EVALUATE TRUE
WHEN (WS05-A > WS05-B AND WS05-A > WS05-C )
      DISPLAY ' A IS THE GREATEST'
WHEN ( WS05-B > WS05-A AND WS05-B > WS05-C )
      DISPLAY ' B IS THE GREATEST'
WHEN OTHER
      DISPLAY ' C IS THE GFREATEST'
END-EVALUATE.
```

LOOPS. ITERATION STATEMENTS.

PERFORM

1. CONDITIONAL

   Until a condition is satisfied the loop run.

   a. Inline perform

      When the group of statements to be iterated lies between "perform' and 'end-perform.

WS05-A PIC 9(02) VALUE 5.
PERFORM UNTIL WS05-A > 10
DISPLAY 'HI'
Add 1 TO ws05-a
END-PERFORM.

Ans: 6 timed.

WS05-A PIC 9(02) VALUE 5.
PERFORM UNTIL WS05-A > 10
DISPLAY 'HI'
END-PERFORM.

Ans: infinite

a. Infinity 722 abend
Ws05-a pic 9(02) value 5.

PERFORM VARYING WS05-A FROM 1 BY 1 UNTIL WS05-A > 10
DISPLAY 'HI'
DISPLAY WS05-A
END-PERFORM.
ANS : 10

b. Out-of-the-line

When a perform statement performs/calls a paragraph that is/not in the sequence of the statements.
The perform statement jumps to the paragraph and executes the statements in the paragraph and after doing so it comes back to the next from where it went.

PROCEDURE DIVISION.
PERFORM PARA-A UNTIL WS05-A > 5

```
        PERFORM PARA-B  VARYING WS05-A FROM 1 BY 1 UNTIL WS05-A >10
        PERFORM TERM-PARA.
TERMP-PARA.
        STOP RUN.
PARA-A.
        DISPLAY 'HI'.
        ADD 1 TO WS05-A
PARA-B.
        DISPLAY 'HELLO'.
```

2. UNCONDITIONAL

a. Inline perform

When the group of sentence that are to be iterated are written between perform and end-perform stmnts.

```
PERFORM 5 TIMES
        DISPLAY ' HI'
END-PERFORM.
PERFORM
        DISPLAY ' HI'
END-PERFORM.
PERFORM WS05-A TIMES
        DISPLAY 'HI'
END-PERFORM
ANS:ws05-a times
PERFORM WS05-A TIMES
        DISPLAY 'HI'
        ADD 1 TO WS05-A
        DISPLAY WS05-A
END-PERFORM
```

b. Out-of-the-line

Dosn't check any condition to be satisfied.

When a paragraph is performed.

The program can be executed out of sequence.

```
PROCEDURE DIVISION.
    PERFORM PARA-A
    PERFORM PARA-B 3 TIMES
    PERFORM TERM-PARA.
TERMP-PARA.
    STOP RUN.
PARA-A.
    DISPLAY 'HI'.
PARA-B.
    DISPLAY 'HELLO'.
```

CONTROL STATEMENTS.

CONTNIUE

Transfers the control to the next COBOL statement which come next in the program flow.

NEXT SENTENCE

Transfers control to the next COBOL statement, which is immediately after the sentence ending with period.

Copy:

A group reusable statements can be written in any pds member.

They can be COPied into any division of your program.

Note: we need to mention the PDS in which the copy member is kept, in the compile jcl → compile.syslib.

The member is called COPY BOOK

The PDS is called copy library.

Syntax: copy memname

FILE HANDLING

FILES→ TRANSACTION, MASTER, BATCH

Processing data from a dataset and sending it to another datasets.

1. Link the file with program.

ENVIRONMENT DIVISION.

INPUT-OUTPUT SECTION.

FILE-CONTROL.

```
SELECT TI001-PS ASSIGN TO DDNAME
                ORGANIZATION IS SEQUENTIAL
                ACCESS       IS SEQUENTIAL
                FILE STATUS  IS WS05-FST-TI001.
```

ORGANIZATION → SEQUENTIAL PS,ESDS
INDEXED - KSDS
RELATIVE - RRDS
LINEAR - LDS

ACCESS → SEQUENTIAL
RANDOM
DYNAMIC

2. File variables. File layout.

Declare variables for the fields in the file.

```
6090 TOMMY INDIA     03800.89
```

```
DATA DIVISION.
FILE SECTION.
FD T1001-PS.
01 T1001-PS-REC.
      05 T1001-ID          PIC 9(04).
      05 FILLER            PIC X(01).
      05 T1001-NAME        PIC A(05).
      05 FILLER            PIC X(01).
      05 T1001-LOC         PIC A(09).
      05 FILLER            PIC X(01).
      05 T1001-SAL         PIC 9(05).9(02).
      05 FILLER            PIC X(51).
```

3. Open appropriate mode

PROCEDURE DIVISION.

SYNTAX: OPEN MODE LOGICAL-FILENAME

- INPUT → reading from it
- OUTPUT → Writing into it
- I-O → reading, rewriting from and into it
- EXTEND → Writing records by appending.

4. Read, write, rewrite, delete, start, read next

PROCEDURE DIVISION

READ FILENAME → one record from the dataset is copied into the file layout.

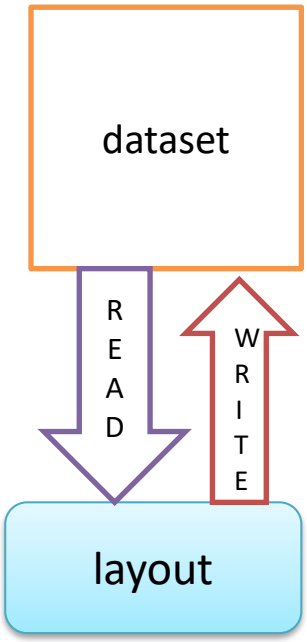
```
READ FILENAME
AT END
    IMPERATIVE
NOT AT END
  IMPERATIVE
END-READ.
```

WRITE RECORD-NAME → The values in the layout are moved into the file.
DELETE FILE-NAME → the matching record would be removed from the file.
REWRITE RECORD-NAME → MODIFIES THE RECORD
START, READ-NEXT DYNAMIC ACCESS.

DATASETS AND ITS ALLOWED OPERATIONS AND MODES.

FILENAME	ORGANIZATION	ACCESS MODES	OPERATIONS	DDNAME IN CBL
PS	SEUQENTIAL	SEQUENTIAL	READ, WRITE	DDNAME
ESDS	SEQUENTIAL	SEQUENTIAL	READ,WRITE	AS-DDNAME
KSDS	INDEXED	SEQUENTIAL, RANDOM, DYNAMIC	READ, WRITE, DELETE, REWRITE, START, READ-NEXT	DDNAME
RRDS	RELATIVE	SEQUENTIAL, RANDOM DYNAMIC	READ,WRITE	DDNAME

Movement of data from and to dataset and File layout



5. Close.

PROCEDURE DIVISION.

CLOSE FILENAME.

6. File operation status.

STATUS CODE: 00 → OPERATION SUCCESS.

10 → END OF FILE IS REACHED

SCENARIO.

Sweep / read all the records from the ps and validate the records with the below validations.

The id MUST ONLY HAVE NUMBERS

The salary must number before and after decimal point.

The decimal point must be a period.

Display all the valid records.

Don't display the invalid records.

DATA FLOW:

OPEN THE FILE → FAILURE → KILL THE PROGRAM

→ READ UNTIL EOF → VALIDATION → DISPLAY

INVALID →SKIP

CLOSE

PROCEDURE DIVISION

0000-MAIN-PARA.

PERFORM 1000-INIT-PARA

PERFORM 3000-PROC-PARA

THRU 3000-PROC-PARA-EXIT

PERFOMR 9000-TERM-PARA

.

1000-INIT-PARA.

EXIT

.

```
3000-PROC-PARA.
      PERFORM 3100-OPEN-PARA
            THRU 3100-OPEN-PAR-EXIT
      PERFORM 3200-READ-PARA
            THRU 3200-READ-PARA-EXIT
            UNTIL WS05-FST-TI001 = 10
      PERFORM 3300-CLOSE-PARA
            THRU 3300-CLOSE-PARA-EXIT
      .
3000-PROC-PARA-EXIT.
      EXIT
      .
9000-TERM-PARA.
      STOP RUN
      .
3100-OPEN-PARA.
      OPEN INPUT TI001-PS
      EVALUATE TRUE
      WHEN WS05-FS-TI001 = 00
            DISPLAY ' TI001 OPEN SUCCESS '
      WHEN OTHER
            DISPLAY ' TI001 OPEN FAILED   :' WS05-FST-TI001
            PERFORM 9000-TERM-PARA
      END-EVALUATE
      .
3100-OPEN-PARA-EXIT.
      EXIT
      .
3200-READ-PARA.
      READ TI001-PS
      EVALUATE TRUE
      WHEN WS05-FS-TI001 = 00
            ADD 1 TO WS05-REC-COUNT
            PERFORM 3210-VALID-PARA
```

```
            THRU 3210-VALID-PARA-EXIT
      WHEN WS05-FST-TI001 = 10
            IF WS05-REC-COUNT = 0
                  DISPLAY 'EMPTY  INPUT FILE'
            ELSE
                 DISPLAY ' ALL RECORDS PROCESSED'
            END-IF
      WHEN OTHER
            DISPLAY ' TI001- READ FAILED   ' WS05-FST-TI001
      END-EVALAUTE
      .
3200-READ-PARA-EXIT.
      EXIT
      .
3210-VALID-PARA.
      EVALAUTE TRUE
      WHEN  TI001-ID        IS NUMERIC   AND
            TI001SAL(1:5) IS NUMERIC   AND
            TI001-SAL(6:1) = '.'         AND
            TI001-SAL(7:2) IS NUMERIC
                  PERFORM 3211-CAL-PARA
                        THRU 3211-CAL-PARA-EXIT
      WHEN OTHER
            DISPLAY ' INVALID RECORD  :  ' TI001-ID
      END-EVALUATE
      .
3210-VALID-PARA-EXIT.
      EXIT
      .
3300-CLOSE-PARA.
      CLOSE TI001-PS
      .
```

```
3211-CAL-PARA.
      DISPLAY ' THE RECORD IS A VALID RECORD'
      DISPLAY ' THE ID        :   '  TI001-ID
      DISPLAY ' THE NAME      :   '  TI001-NAME
      DISPLAY ' THE LOC       :   '  TI001-LOC
      DISPLAY ' THE OLD SAL   :   '  TI001-SAL
      MOVE TI001-SAL TO WS05-SAL
      IF (TI001-LOC = 'CHENNAI' OR
          TI001-LOC = 'CHINA' )
            COMPUTE  WS05-SAL =  WS05-SAL * 1.15
      ELSE IF ( TI001-LOC = 'DETROIT' OR
                  TI001-LOC = 'MICHIGEN' )
            COMPUTE  WS05-SAL =  WS05-SAL * 1.20
      ELSE
            COMPUTE  WS05-SAL =  WS05-SAL * 1.30
      END-IF
      END-IF
      MOVE WS05-SAL TO TI001-SAL
      DISPLAY ' THE NEW SAL :' TI001-SAL
      .
3211-CAL-PARA-EXIT.
      EXIT
      .
3300-CLOSE-PARA-EXIT.
      EXIT
      .
```

1. EMPTY INPUT FILE HANDLING.

   Define a counter and add 1 to it when the read is successful.

   In the read para, when EOF is checked, use if condition to check the rec counter. If the counter is 0 → empty file

   Else → end file of reached.

2. Read → Invalid → display 'invalid record.
validated → display
id :
name :
loca:
old sal:10000
new sal: 11500
br →
if the location is in asia → 15 %
else if location US → 20 %
else → 30%

SCENARIO. READ ALL RECORDS FROM THE INPUT DATSET AND VALIDATE THEM.
if the record is invalid → display invalid record
if the record is valid
display the fields of the record as well as new field.

VALIDTIONS CONDITIONS
New field logic is given
if the location is in asia → 15 %
else if location US → 20 %
else → 30%

Thought process.
How do I link? Organization, access

What is the layout? → physical decimal point, and is there any requirement that expects me to perform arithmetic operation on that variable?

What mode do I open? input

Read until eof

- Move spaces to the layout
- Reada filename
- Check the file status variable
    - If file status is 00
        Add 1 to rec-counter
        Perform - valid-para
    - Else if the file status = 10
        ****** check for empty file
    - Else
        ** read failed

Close

Valid - fails → display 'invalid

Passess → caluculation → display the record

Data flow

Open-para

Read-para until eof

Close-para

Read-para → valid-para → calc-para → display

Failed →

Data flow

Scenario 3:

Read records from ps,

Validate the records.

Calculate the new salary

Write the valid records into another ps.

The output ps layout is as below.

Id	name	loc	old sal	new sal
Pic9(04)	pic a(05)	pic a(09)	pic 9(05).9(02)	pic 9(05).9(02)

With one filler between fields.

1. Link.

```
ENVIRONMENT DIVISION.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
        SELECT TI001-PS ASSIGN TO DD1
                                ORGANIZATION IS SEQUENTIAL
                                ACCESS       IS SEQUENTIAL
                                FILE STATUS   IS WS05-FST-TI001.
        SELECT TO001-PS ASSIGN TO DD2
                                ORGANIZATION IS SEQUENTIAL
                                ACCESS       IS SEQUENTIAL
                                FILE STATUS   IS WS05-FST-TO001.
```

2. LAYOUT.

```
DATA DIVISION.
FILE SECTION.
FD TI001-PS.
01 TI001-PS-REC.
        05 TI001-ID          PIC 9(04).
        05 FILLER            PIC X(01).
        05 TI001-NAME        PIC A(05).
        05 FILLER            PIC X(01).
        05 TI001-LOC         PIC A(09).
```

```
        05 FILLER          PIC X(01).
        05 TI001-SAL       PIC 9(05).9(02).
        05 FILLER          PIC X(51).

    FD TO001-PS.
    01 TO001-PS-REC.
        05 TO001-ID        PIC 9(04).
        05 FILLER          PIC X(01).
        05 TO001-NAME      PIC A(05).
        05 FILLER          PIC X(01).
        05 TO001-LOC       PIC A(09).
        05 FILLER          PIC X(01).
        05 TO001-SAL       PIC 9(05).9(02).
        05 FILLER          PIC X(01).
        05 TO001-NEW-SAL   PIC 9(05).9(02)
        05 FILLER          PIC X(41).
```

3. OPEN

```
        OPEN INPUT TI001-PS
        OPEN OUTPUT TO001-PS
```

4. READ→ VALID→ CAL→ WRITE

WRITE → PLACE THE VALUES IN THE OUTPUT LAYOUT, THAT YOU ARE PLANNING TO WRITE.(MOVE STATEMNTS)

```
            WRITE TO001-PS-REC.
```

```
PROCEDURE DIVISION
0000-MAIN-PARA.
    PERFORM 1000-INIT-PARA
    PERFORM 3000-PROC-PARA
        THRU 3000-PROC-PARA-EXIT
    PERFOMR 9000-TERM-PARA
    .
1000-INIT-PARA.
```

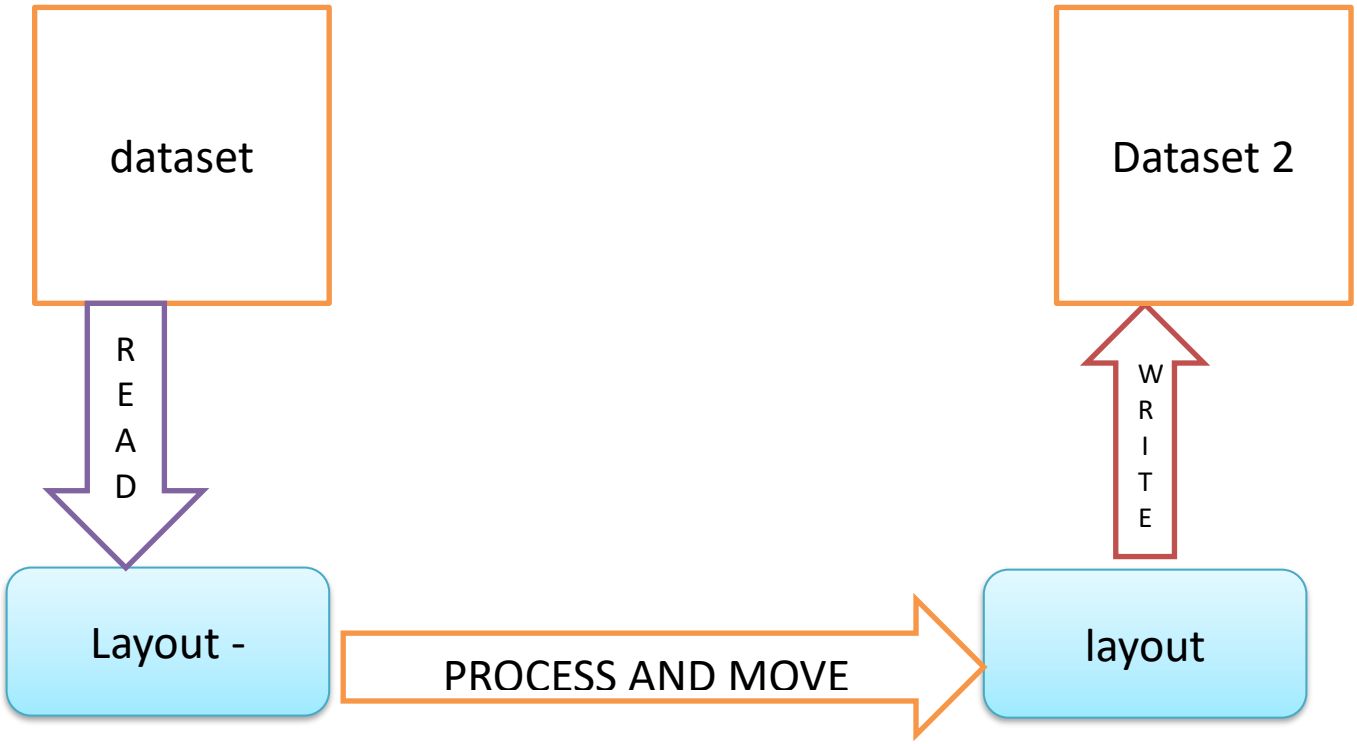
```
        EXIT
        .

3000-PROC-PARA.
        PERFORM 3100-OPEN-PARA
                THRU 3100-OPEN-PAR-EXIT
        PERFORM 3200-READ-PARA
                THRU 3200-READ-PARA-EXIT
                UNTIL WS05-FST-TI001 = 10
        PERFORM 3300-CLOSE-PARA
                THRU 3300-CLOSE-PARA-EXIT
        .
3000-PROC-PARA-EXIT.
        EXIT
        .
9000-TERM-PARA.
        STOP RUN
        .
3100-OPEN-PARA.
        OPEN INPUT TI001-PS
        EVALUATE TRUE
        WHEN WS05-FS-TI001 = 00
                DISPLAY ' TI001 OPEN SUCCESS '
        WHEN OTHER
                DISPLAY ' TI001 OPEN FAILED   :' WS05-FST-TI001
                PERFORM 9000-TERM-PARA
        END-EVALUATE
        OPEN OUTPUT TO001-PS
        EVALUATE TRUE
        WHEN WS05-FS-TO001 = 00
                DISPLAY ' TO001 OPEN SUCCESS '
        WHEN OTHER
                DISPLAY ' TO001 OPEN FAILED   :' WS05-FST-TO001
                PERFORM 9000-TERM-PARA
        END-EVALUATE
```

```
      .
3100-OPEN-PARA-EXIT.
      EXIT
      .
3200-READ-PARA.
      MOVE SPACES TO TI001-PS-REC TO001-PS-REC
      MOVE 0 WS05-NEW-SAL
      READ TI001-PS
      EVALUATE TRUE
      WHEN WS05-FS-TI001 = 00
            ADD 1 TO WS05-REC-COUNT
            PERFORM 3210-VALID-PARA
             THRU 3210-VALID-PARA-EXIT
      WHEN WS05-FST-TI001 = 10
            IF WS05-REC-COUNT = 0
                  DISPLAY 'EMPTY  INPUT FILE'
            ELSE
                 DISPLAY ' ALL RECORDS PROCESSED'
            END-IF
      WHEN OTHER
            DISPLAY ' TI001- READ FAILED   ' WS05-FST-TI001
      END-EVALAUTE
      .
3200-READ-PARA-EXIT.
      EXIT
      .
3210-VALID-PARA.
      EVALAUTE TRUE
      WHEN  TI001-ID       IS NUMERIC   AND
            TI001SAL(1:5) IS NUMERIC   AND
            TI001-SAL(6:1) = '.'       AND
            TI001-SAL(7:2) IS NUMERIC
                  PERFORM 3211-CAL-PARA
                        THRU 3211-CAL-PARA-EXIT
      WHEN OTHER
```

```
            DISPLAY ' INVALID RECORD  :  ' TI001-ID
        END-EVALUATE
        .
3210-VALID-PARA-EXIT.
        EXIT
        .
3211-CAL-PARA.
         MOVE TI001-ID       TO TO001-ID
        MOVE TI001-NAME    TO TO001-NAME
        MOVE TI001-LOC      TO TO001-LOC
        MOVE TI001-SAL      TO TO001-SAL
        MOVE TI001-SAL      TO WS05-SAL
        IF (TI001-LOC = 'CHENNAI' OR
           TI001-LOC = 'CHINA' )
            COMPUTE  WS05-SAL =  WS05-SAL * 1.15
        ELSE IF ( TI001-LOC = 'DETROIT' OR
                    TI001-LOC = 'MICHIGEN' )
            COMPUTE  WS05-SAL =  WS05-SAL * 1.20
        ELSE
            COMPUTE  WS05-SAL =  WS05-SAL * 1.30
        END-IF
        END-IF
        MOVE WS05-SAL TO TO001-SAL
        WRITE TO001-PS-REC
        EVALUATE TRUE
        WHEN WS05-FST-TO001 = 00
            DISPLAY ' WRITE SUCCESS'
        WHEN OTHER
            DISPLAY ' TO001 WRITR FAILED  ' WS05-FST-TO001
        END-EVALUATE
        .
3211-CAL-PARA-EXIT.
        EXIT
        .
3300-CLOSE-PARA.
```

```
        CLOSE TI001-PS TO001-PS
        .
3300-CLOSE-PARA-EXIT.
        EXIT
        .
```

MOVEMENT OF DATA ACROSS FILES.



Scenario 4:

Read records from a ps and validate the same. For the valid records do the calculation and write in KSDS.

```
        ENVIRONMENT DIVISION.
        INPUT-OUTPUT SECTION.
        FILE-CONTROL.
            SELECT TI001-PS ASSIGN TO DD1
                                ORGANIZATION IS SEQUENTIAL
                                ACCESS       IS SEQUENTIAL
```

```
                                    FILE STATUS     IS WS05-FST-T1001.
        SELECT T0001-PS ASSIGN TO DD2
                                    ORGANIZATION IS INDEXED
                                    ACCESS          IS RANDOM
                                    RECORD KEY      IS T0001-ID
                                    FILE STATUS     IS WS05-FST-T0001.
```

Handling ksds in cobol.

1. Writing → access can sequential → the inputs are in sorted order based the key.
2. Writing → accees can be random → never mind the sequence of the records written.
3. Reading → all records → access can be sequential.
4. Reading/deleting → by giving the key of the record → access must be RANDOM

04-10-2023

Agenda.

Delete, modify, read matching records from ksds.

Sub program

Character manipulation.

Delete:

Keep the key value in the key variable

```
        Eg: 9909. Move T1001-ID TO DB01-ID
DELETE FILENAME.
EVALUATE TRUE
WHEN WS05-FST-T1002 = 00
        DISPLAY ' DELETED'
WHEN OTHER
        DISPLAY ' DELETE FAILED  ' T1002-ID
        DISPLAY  WS05-FS-T1002
END-EVALUATE
```

READ:

Keep the key value in the key variable

Eg: 9909. Move TI001-ID TO DB01-ID

```
READ FILENAME.
EVALUATE TRUE
WHEN WS05-FST-TI002 = 00
     DISPLAY  ' RECORD FOUND IN KSDS'
     DISPLAY TI002-KSDS-REC
WHEN OTHER
     DISPLAY ' MATCHING RECORD READ FAILED  ' TI002-ID
     DISPLAY  WS05-FS-TI002
END-EVALUATE
```

MODIFY:

Keep the key value in the key variable

Eg: 9909. Move TI001-ID TO DB01-ID

Note: READ → SUCCESSFUL → DO THE CHANGES TO THE COLUMNS THAT YOU WANT TO MODIFY → REWRITE RECORDNAME.

```
READ FILENAME.
EVALUATE TRUE
WHEN WS05-FST-TI002 = 00
     DISPLAY  ' RECORD FOUND IN KSDS'
     PERFORM 3210-REWRITE-PARA
          THRU 3210-REWRTIE-PARA-EXIT
WHEN OTHER
     DISPLAY ' MATCHING RECORD READ FAILED  ' TI002-ID
     DISPLAY  WS05-FS-TI002
END-EVALUATE
```

```
3210-REWRITE-PARA.
*** CHANGE THE VALUES IN THE COLUMNS EXCEPT ID CLOUMN.
      REWRITE TI002-KSDS-REC
      EVALUATE TRUE
      WHEN WS05-FST-TI002 = 00
            DISPLAY  ' RECORD modified'
      WHEN OTHER
            DISPLAY ' rewrite failed  ' TI002-ID
            DISPLAY  WS05-FS-TI002
      END-EVALUATE
      .
3210-REWRITE-PARA-EXIT.
      EXIT
      .


Logical file name →
      Hlq.q1.q2.q3.q4
      ENVIRONMENT DIVISION.
      INPUT-OTPUT SECTION.
      FILE-CONTROL.
            SELECT MI01-PS ASSIGN DDNAME
Record name.
DATA DIVISION.
FILE SECTION.
FD MI01-PS.
01 MI01-PS-REC.
      05 MI01-ID
```

SCEANRIO 5:

DATASSETS:

HLQ.ALWYN.REVAT.VSAM.KSDS → DATABASE

ID (PIC 9(04), NAME PIC A(05) LOC PIC A(09) SAL PIC 9(05).9(02).

1 filler between fields.

TRANSACTION FILE:

HLQ.ALWYN.OPRTN.PS.

Id pic 9(04) f optrn pic A(01) fillers

1002 D

1234 R

3456 D

7987 M

5676 Z

8987 M

BR;

Sweep all the records from PS and perform the operations on KSDS.

Evaluate true

when the operation is D

Delete the matching records from ksds

when the operation is M

read → do the changes to the columns → rewrite

Modify the matching record

Change the location → new jersy

Change the salary → 10%

when the operation is R

Read the matching record and display the same in the spool

When other

Display ' ionvalid operation'

End-evaluate

Analysis:

PS select TI001-PS ASSSIGN TO DD1

Access is sequential

Organization is sequential

File status is ws05-fst-ti001.

SELECT DB01-KSDS ASSIGN TO DD2

ACCESS IS RANDOM

ORGANIZATION IS INDEXED

RECORD KEY IS DB01-ID

FILE STATUS IS WS05-FST-DB01.

OPEN INPUT TI001-PS

OPEN I-O DB01-KSDS

DATA FLOW.

PD

3000-PROC-PARA.

OPEN-PARA

READ-PS-PARA UNTIL EOF

CLOSE-PARA

3000-PROC-PARA-EXIT.

EXIT

.

READ → BRACNHC-PARA → D → DELETE PARA

R → READ-PARA

M → MODIFY PARA

O → DISPLAY INVALID OPERATION

BRNCH-PARA.

EVALUATE TRUE

WHEN TI001-OPRTN = 'D'

PERFORM 3211-DELETE-PARA

THRU 3211-DELETE-PARA-EXIT

WHEN TI001-OPRTN = 'R'

```
        PERFORM 3211-READ-PARA
                THRU 3211-READ-PARA-EXIT
    WHEN TI001-OPRTN = 'M'
        PERFORM 3211-MODIFY-PARA
                THRU 3211-MODIFY-PARA-EXIT
    WHEN OTHER
                DISPLAY 'INVALID OPERATION' TI001-OPRTN
    END-EVALUATE
```

SUB-PROGRAMs.

A reusable program that can be called from any program.

A sub program MUST NOT HAVE STOP RUN rather it can have GOBACK, END PROGRAM.

If values are to be received and sent from and to the sub program, LINKAGE SECTION must be defined in the subprogram.

The values from the main program WILL BE AUTMATICALLY MAPPED ONLY TO THE LINKAGE SECTION variables in the subprogram.

Linkage section variables...

- Are not readily available to the procedure division.
- Because, the linkage section variables live somewhere in the common buffer area between the main program and the sub program.
- To use the linkage variables in the procedure division, write the USING CLUASE in the procedure division along with list of variables in the exact sequence.

SYNTAX of calling:

CALL 'SUBPGM' USING <LIST OF VARIABLES SEPERATAED BY COMMA>

The list of variables mentioned while calling will be mapped to the same sequence of variables in the linkage section of the subprogram. Name doesn't matter, but the data type matters.

Types:

Catalogued·

Subprogram is written in a different member·

1· Sub program must have GOBACK instead of end program·

2· Compile the sub program first·

3· Compile the main program with a new ddname
LKED·SYSLIB DD DSN=LOADLIB(SUBPGM),DISP=SHR·

4· RUN THE MAINPROGRAM·

Instream·

The subprogram is written after the last statement of the main program in the same member·

2 WAYS OF CALLING THE SUBPROGRAM·

1· CALL BY REFERENCE

By default·

The calling program's variables and the called program's variables(linkage section) share the same memory· Changing its values by sub program is reflected in the main program·

2· CALL BY CONTENT

The initial values are copied from the main program· But, the those values are changed in the sub program, it WILL NOT REFLECT IN THE MAIN PORGRAM·

The call by content variable have a different memory· Hence, changes in the sub program will not be reflected in the main·

Syntax:

```
CALL 'SUBPGM' USING BY CONTENT WS05-A WS05-B
                    BY REFERENCE WS05-C·
```

05-10-2023
ESDS
RRDS
DATES
Arrays.

ESDS - COBOL PROGRAM.

```
      SELECT TI001-ESDS ASSIGN TO AS-DDNAME
                        ACCESS IS SEQUENTIAL
                        ORGANIZATION IS SEQUENTIAL.
```

OPERATIONS → OPEN, READ, WRITE,CLOSE

RRDS - COBOL PROGRAM.

```
      SELECT TI001-RRDS ASSIGN TO DDNAME
                        ORGANIZATION IS RELATIVE
                        ACCESS IS RANDOM/SEQUENTIAL/DYNAMIC
                        RELATIVE KEY IS WS05-RRN
                        FILE STATUS IS WS05-FST-TI001.
```

OPERATIONS. OPEN, CLOSE, READ, WRITE.
PLACE THE RRN IN THE WS05-RRN AND THEN
READ TI001-RRDS →

RANDOM READ FROM RRDS.

```
           MOVE 5 TO WS05-RRN
           READ TI001-RRDS
```

DYNAMIC READ FROM RRDS
MOVE 5 TO WS05-RRN
START TI001-RRDS RECORD KEY >= WS05-RRN
EVALUATE TRUE
WHEN WS05-FST-TI001 = 00
PERFROM 3333-READ-NEXT-PARA

```
            THRU 3333-READ-NEX-PARA-EXIT
                 3 TIMES
WHEN OTHER
            DISPLAY ' RRDS START FAILED'
END-EVALUATE.


3333-READ-NEXT-PARA.

      READ TI001-RRDS NEXT RECORD
      EVALUATE TRUE
      WHEN WS05-FST-TI001 = 00
                 DISPLAY TI001-RRDS-REC
      WHEN OTHER
                 DISPLAY 'RRDS READ NEXT FAILED'
      END-EVALUATE

SYSTEM DATE:

WORKING-STORAGE SECTION.
01 WS01-VARS.
      05 WS05-DATE.
            10 WS10-DATE PIC 9(08).
            10 WS10-TIME  PIC X(15).

MOVE FUNCTION CURRENT-DATE TO WS05-DATE
DISPLAY WS05-DATE → 20231005111223423+053
```

Arrays: Linear collection of data. Internal table.

```
01 ws01-vars.
      05 WS05-TEMP PIC 9(02)V9(02) OCCURS 24 TIMES.
      05 ws05-sub pic 9(02) value 2
```

1 2 3..... 24

	1798																					

Initialize ws05-temp → empty the array elements.
Move 17.98 to ws05-temp(ws05-sub)
Display ws05-temp(2)

```
01 ws01-vars.

   07 century-temp  occurs 10 times.
        08 decade -temp occurs 10 times.
           10 yearly-temp occurs 12 times.
              20 monthly-temp-report occurs 5 times
                 25 Weekly-temp-report occurs 7 times.
                       30 TEMP PIC 9(02)V9(02) OCCURS 24 TIMES.
```

Move 19.78 to temp(10,5,6,2,7,24)

Rules for an array.

1. 01 level number CANNOT BE AN ARRAY. It cannot have OCCURS clause.
2. An array must have occurs clause.
3. An array can be a group item or a member item.
4. An array element can referred by a subscript variable or a value.
5. An array element can also be referred by the index variable if the array is INDEXED.
6. The element are from 1 to the size of the array.
   Eg: If array occurs 10 times, the elements can be referred from 1 till 10.

SIMPLE ARRAY.

NEEDS AN EXTRA VARIABLE AS SUBSCRIPT

```
01 ws01-vars.
        05 WS05-SUBSCIRPT      PIC 9(03) VALUE 0.
        05 ws05-stud occurs 10 times.
            10 STUD-ID         PIC 9(04).
            10 STUD-NAME       PIC A(05).
            10 STUD-MARKS      PIC 9(03).
```

INDEXED ARRAY.

WHATEVER NAME MENTIONED IN ' INDEXED BY' CLAUSE ACTS AS AN SUBSCRIPT.

THE INDEX VARIABLE ALLOWS ONLY THE BELOW OPERATION ON THAT

```
        SET ALWYN TO X
        SET ALWYN UP BY X
        SET ALWYN DOWN BY X
01 ws01-vars.
        05 ws05-stud occurs 10 times INDEXED BY ALWYN.
            10 STUD-ID         PIC 9(04).
            10 STUD-NAME       PIC A(05).
            10 STUD-MARKS      PIC 9(03).
```

2 TYPES SEARCHES IN ARRAYS.

1. SEARCH FUNTION (TABLE MUST INDEXED)

   Note: Reset/reposition the indexed variable to the first value before starting the search.

   Note: The search function stops the search, once a match is found. The duplicate records(if any) will not be searched.

   a. Search

```
   SEARCH ARRAY-NAME
   AT END
        IMPRT
```

```
    WHEN STUD-NAME(ALWYN) = 'TOMMY'
        DISPLAY WS05-STUD(ALWYN)
    END-SEARCH
```

b. Search all.

Note: this method applies binary search technique.

But, the values in the array must be in sorted order based on the key on which the search is done.

```
SEARCH ALL ARRAY-NAME
AT END
   IMPRT
WHEN STUD-NAME(ALWYN) = 'TOMMY'
     DISPLAY WS05-STUD(ALWYN)
END-SEARCH
```

2. MANUAL SEARCH

***** SUBSCRIPT SEARCH

```
PERFORM VARYING WS05-SUBSCRIPT FROM 1 BY 1 UNTIL WS05-SUBSCRIPT > 5
    EVALUATE TRUE
    WHEN STUD-NAME(WS05-SUBSCRIPT) = 'JERRY'
        MOVE 1 TO WS05-FOUND
        DISPLAY ' RECORD FOUND'
        DISPLAY STUD-ID(WS05-SUBSCIRPT)
        DISPLAY STUD-NAME(WS05-SUBSCIRPT)
        DISPLAY STUD-PHONE(WS05-SUBSCIRPT)
        DISPLAY STUD-MARKS(WS05-SUBSCIRPT)
     END-EVALUATE
END-PERFORM.
IF WS05-FOUND = 0
        DISPLAY 'JERRY NOT FOUND'
END-IF
```