UNIT 4

Using VSAM in Application Coding

Using VSAM in Application coding

- ❑ Objectives
- ❑ Using VSAM for different Languages

Objectives

VSAM programming processing support in

- Assembler

- Cobol

- PL/I

VSAM Processing in Assembler

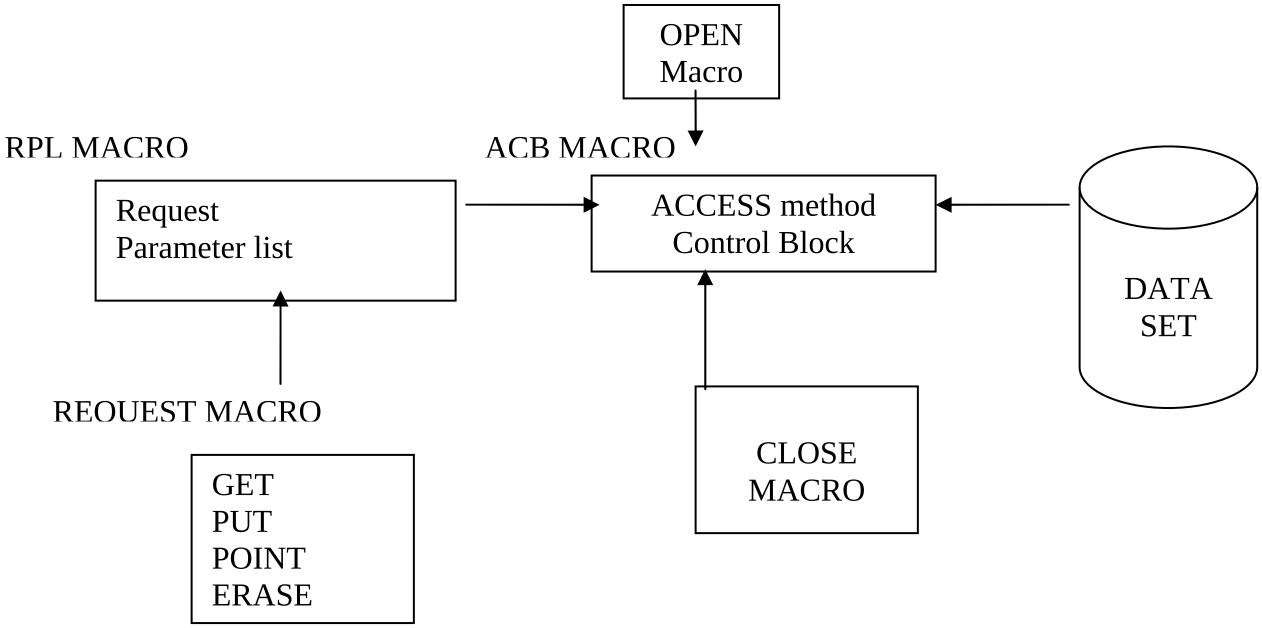
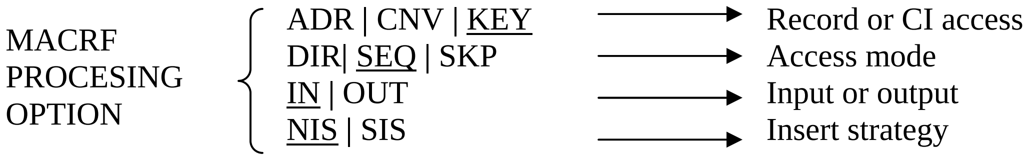


Figure 4-1.

- The ACB macro identifies the data set type of processing and basic options.
- OPEN/CLOSE connect/disconnect application programs and the data set defined in the ACB.
- RPL macros define a request and specify the processing options for the request (e.g. DIR or SEQ access LOC or MVE mode). A RPL identifies the data set to which the request is directed by naming the ACB macro that defines the data set.
- Request macros initiate a request and point to the RPL that defines the request

ACB MACRF Parameter

FILE ACB ….., MACRF = (PROCESSING OPTION LIST),……

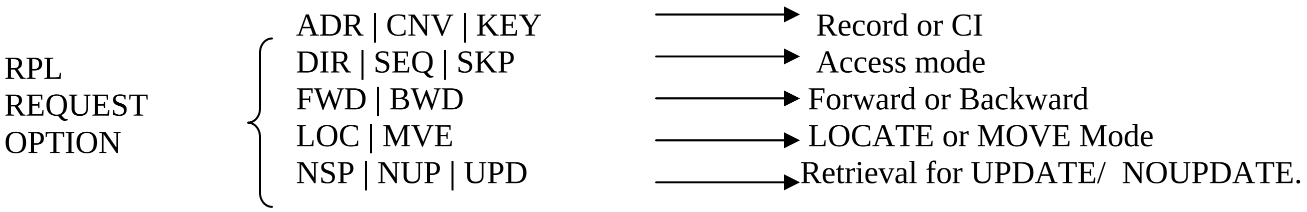


MACRF
PROCESING
OPTION

ADR | CNV | KEY → Record or CI access
DIR| SEQ | SKP → Access mode
IN | OUT → Input or output
NIS | SIS → Insert strategy

RPL OPTCD Parameter

RPLA RPL …….,OPTCD = (request option list),…..



RPL REQUEST OPTION

ADR | CNV | KEY → Record or CI

DIR | SEQ | SKP → Access mode

FWD | BWD → Forward or Backward

LOC | MVE → LOCATE or MOVE Mode

NSP | NUP | UPD → Retrieval for UPDATE/ NOUPDATE.

ASSEMBLER ERROR HANDLING

```
INPUT           ACB     MACRF=(KEY,SEQ,IN)
        RETRIVE         RPL     ACB=INPUT,
                                AREA=IN,
                                AREALEN=100,
                                OPTCD=(KEY,SEQ,SYN,NUP,MVE)
                                .
                                .
                        LOOP    GET     RPL=RETRIVE
                                        LTR     15,15
                                        BNZ     ERROR
                                .
                                .
                                .
                                Another loop
                                .
                                error….
```

- When OPEN/CLOSE or request macro completes, VSAM always places a return code in register 15 indicating success or failure.
- The application program has to check for return code.

VSAM Processing in COBOL

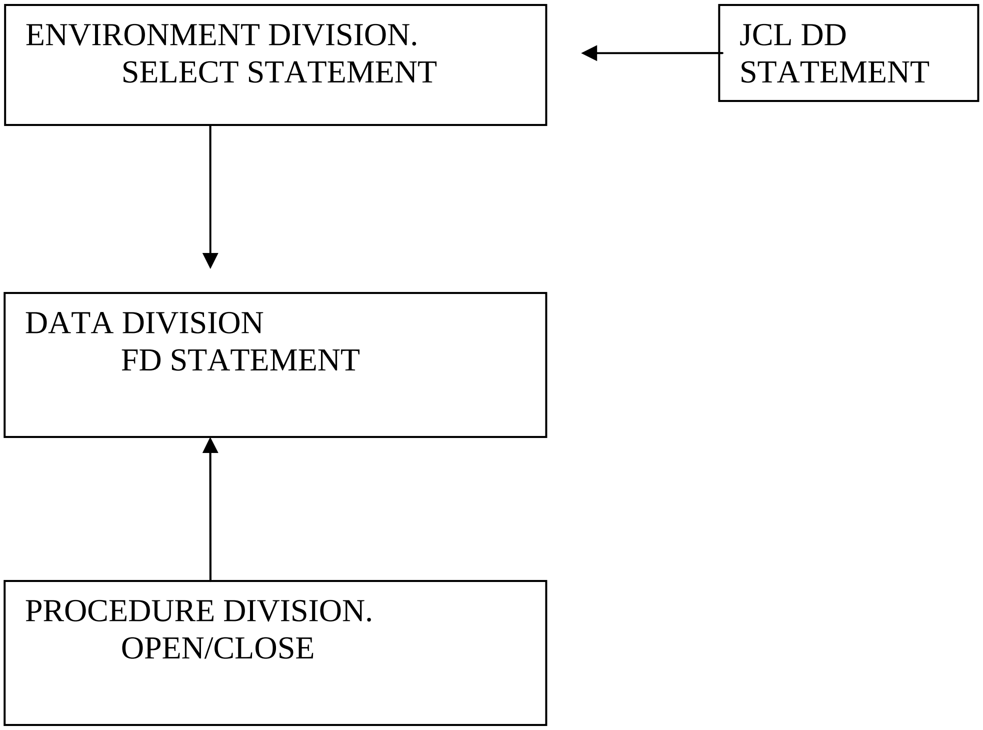


Figure 4-2.

- SELECT statements specify data set names and describe the mode of access to the data as well as establish the connection to the dd statement in JCL.
- FD statements further describes file attributes and record formats
- Procedures Division statements issue the OPEN/CLOSE and I/O requests.

COBOL SELECT Statements

ESDS

```
SELECT FILE-MAINTEC
          ASSIGEN TO AS-MAINTEC
          ORGANIZATION IS SEQUENTIAL
          FILE STATUS FILE-STAT.
```

RRDS

```
SELECT FILE-MAINTEC
          ASSIGEN TO MAINTEC1
          ORGANIZATION IS RANDOM
          RELATIVE KEY IS REC-NO
          FILE STATUS FILE-STAT.
```

KSDS

```
SELECT FILE-MAINTEC
          ASSIGN TO AS MAINTEC1
          ORGANIZATION IS DYNAMIC
          RECORD KEY IS ACCT-NO
          ALTERNATE RECORD KEY IS
                    NAME
          FILE STATUS FILE-STAT
```

Figure 4-3.

- For an ESDS only, AS-ddname is required.
- For KSDS or RRDS, access mode can be SEQUENTIAL, RANDOM OR DYNAMIC.
- The FILE STATUS clause provides error-handling capabilities.
- An ALTERNATE index does not require a separate FD.

COBOL FD STATEMENTS

```
FD  Filename……

 01  RECORD-DATA-AREA.
     05 ACCT-NO      PIC X(08).
     05 SSNO         PIC 9(09).
     05…………
```

- The FD statement filename must match a SELECT statement.
- No additional Clause is required for VSAM.
- Most clauses are regarded as comments.

COBOL PROCEDURE DIVISION

OPEN
CLOSE } OPEN/CLOSE OF THE DATA SET

- ❑ START – establish position for continued sequential retrieve
- ❑ READ – Retrieval of data
- ❑ REWRITE – REPLACE EXISTING RECORD
- ❑ WRITE – ADD a new record
- ❑ DELETE – Deletes existing record

COBOL ERROR HANDLING

```
SELECT FILE-A …….
          FILE STATUS STAT.
               .
               .
WORKING -STORAGE SECTION.
01 STAT   PIC XX.
               .
               .
PROCEDURE DIVISION.
               .
               .
     READ FILE-A
     IF STAT = ‘10’
          MOVE 1 TO EOF-SW
     ELSE
          IF STAT NOT = ZEROS
                 PERFORM ERR-HANDLE-ROUTINE.
          .
          .
```

COBOL LIMITATIONS

COBOL does NOT Support:

- ❑ SKIP-SEQUENTIAL Processing
- ❑ BCKWARD Processing
- ❑ SEQUENTIAL INSERT STRATEGY
- ❑ RBA Addressing
- ❑ CI Access

VSAM Processing PL/I

SEQUENTIAL

```
DCL file name FILE RECORD
                INPUT | OUTPUT | UPDATE
                SEQUENTIAL
                BUFFERED
                [KEYED]
                ENVIRONMENT(options);
```

DIRECT

```
DCL file name FILE RECORD
                INPUT | OUTPUT | UPDATE
                DIRECT
                BUFFERED
                [KEYED]
                ENVIRONMENT(options);
```

VSAM Processing PL/I (Cont….)

ENVIRONMENT OPTIONS:

BKWD
BUFNI(n)
BUFD(n)
BUFSP(n)
COBOL
GENKEY
PASSWORD(pw)
REUSE
SCALARVARYING
SIS
SKIP
VSAM

PL/I Supports:

- ❑ SKIP-SEQUENTIAL PROCESSING
- ❑ BACKWARD PROCESSING
- ❑ SEQUENTIAL INSERT STRATEGY
- ❑ RBA ADDRESSING

PL/I ERROR HANDLING

```
UPDTPGM:            PROC   OPTIONS(MAIN)
        DCL    MASTER FILE RECORD UPDATE DIRECT
               UNBUFFED KEYED ENVIRONMENT(VSAM);
        DCL    ONCODE      BUILIN:
               .
               .
               .
        ON ENDFILE(TRANSIN) GOTO PRINT;
        ON KEY(MASTER) BEGIN;
               IF ONCODE = 51 THEN CALL NOTFOUND;
               ELSE IF
                       .
                       .
               END;
        OPEN FILE(MASTER);
               .
               .
```

The ISAM Interface Program

- To use the IIP (ISAM interface Program):
- Convert the ISAM data set to VSAM
- Modify the application JCL to refer to the VSAM data set

CONVERSION STEPS

DEFINE KSDS

```
VARIABLE LENGTH RECORDS;
                REC    LEN = ISAM DCBLRECL-4
                KEY    LEN = ISAM DCBKEYLE
                KEY    POS = ISAM DCBKRP-4

        FIXED LENGTH RECORDS;
        REC     LEN = ISAM DCBLRECL(+DCBKEYLE,IF DCBRKP=0
                                        AND RECORDS UNBLOCKED)
                KEY    LEN = ISAM DCBKEYLE
                KEY POS = ISAM DCBRKP
```

REPRO

```
//CONVERT   JOB……………
        //JOBCAT              DD      DISP=SHR,DSNAME=USERCTLG
        //STEP         EXEC   PGM=IDCAMS
        //SYSPRINT     DD     SYSOUT=A
        //ISAM                DD      DISP=OLD,DSNAME=ISAMDATA,
                                      DCB=DSROG=IS
        //VSAM                DD      DISP=OLD,DSNAME=VSAMDATA
        //SYSIN               DD      *
                       REPRO          -
                              INFILE(ISAM ENVIRONMENT(DUMMY))-
                              OUTFILE(VSAM)
/*
```

Figure 4-4.

JCL FOR IIP

```
//MYJOB          JOB…….. 
//STEP1          EXEC  PGM=ISAMPGM
//FILEA          DD         DSN=MY.CONVERTD.KSDS,DISP=SHR,
//                          AMP=(‘AMROG,RECFM=FB,STRNO=1’)
//
//…………
```

The AMP parameter can convey the following information to the IIP:

- A VSAM data set is being processed (AMORG)
- Extra index buffers are needed (BUFNI)
- Extra data buffers are needed (BUFND).
- Whether to remove flagged records (OPTCD)
- What record format does the processing program use?
- The number of concurrent requires (STRNO) that the processing program may issue
- The name of an ISAM exit routine to analyze physical and logical error (SYNAD)

UNIT 4 Exercises

Unit 4 Lab Exercises

Notes