

# Using IDCAMS to Manage VSAM Data Sets

Session 12998

Presented by  
Michael E. Friske



# IDCAMS Manual

The IDCAMS commands can be found in the “DFSMS Access Method Services (AMS) for Catalogs” manual. This manual is available on the IBM publications web site.

# Invoking IDCAMS

- Environments IDCAMS can be used in
  - Batch
  - TSO
  - Call within a program
- SYSPRINT and SYSIN DD statements are required
- In batch, the commands must begin in column 2 to 72

# IDCAMS Commands for VSAM

- DEFINE CLUSTER
- DEFINE ALTERNATEINDEX
- DEFINE PATH
- BLDINDEX
- ALTER
- DELETE
- EXPORT
- IMPORT
- REPRO
- LISTCAT
- PRINT
- VERIFY

# DEFINE CLUSTER Command

- This command is used to create a new VSAM data set
- The parameters can be specified on the
  - Cluster
  - Data Component
  - Index Component
  - Any of the above
- [DEFINE CLUSTER parameters](#)

# Defining VSAM Data Sets Using IDCAMS

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  DEFINE CLUSTER(                                -
    NAME(PROD.PAYROLL.MASTER)                   -
    DATACLASS(EXTAVSAM)                         -
    INDEXED KEY(9,0)                             -
    CYLINDERS(500,50)                            -
    FREESPACE(10,0)                              -
    RECORDSIZE(150,150)                          -
    SHAREOPTIONS(2,3)                            -
    SPEED)                                        -
  DATA(CONTROLINTERVALSIZE(4096))              -
  INDEX(CONTROLINTERVALSIZE(2048))
```

# Required Parameters for the DEFINE CLUSTER Command

- NAME(entryname)
- CYLINDERS | TRACKS | KILOBYTES | MEGABYTES | RECORDS
  - Example – CYLINDERS(primary secondary)
- VOLUMES
  - Specify an “\*” for each volume required for SMS managed data sets

# Specifying the Type of VSAM Data Set

- INDEXED - KSDS
- NONINDEXED - ESDS
- NUMBERED - RRDS
- LINEAR - LDS



# Describing the Records to be Loaded

- RECORDSIZE(average, maximum)
- NONSPANNED or SPANNED
- KEYS(length, offset)

# CONTROLINTERVALSIZE

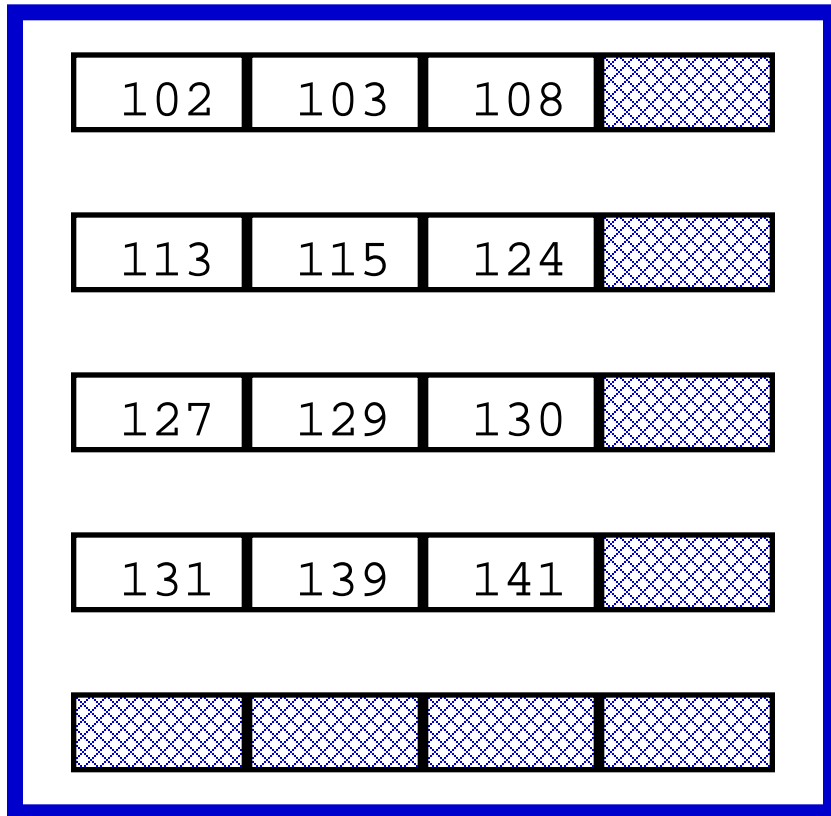
- For NONSPANNED, the CI size must be at least 7 bytes larger than the max record size
- CI size can be 512 to 8192 bytes in 512 byte increments or 8KB to 32KB in 2KB increments
- For Linear data sets, the CI size can be 4096 to 32768 in 4096 increments
- VSAM will adjust if a valid size is not specified
- Usually different sizes for DATA and INDEX component
- FREESPACE(CI% CA%)

# CI Size and Disk Utilization

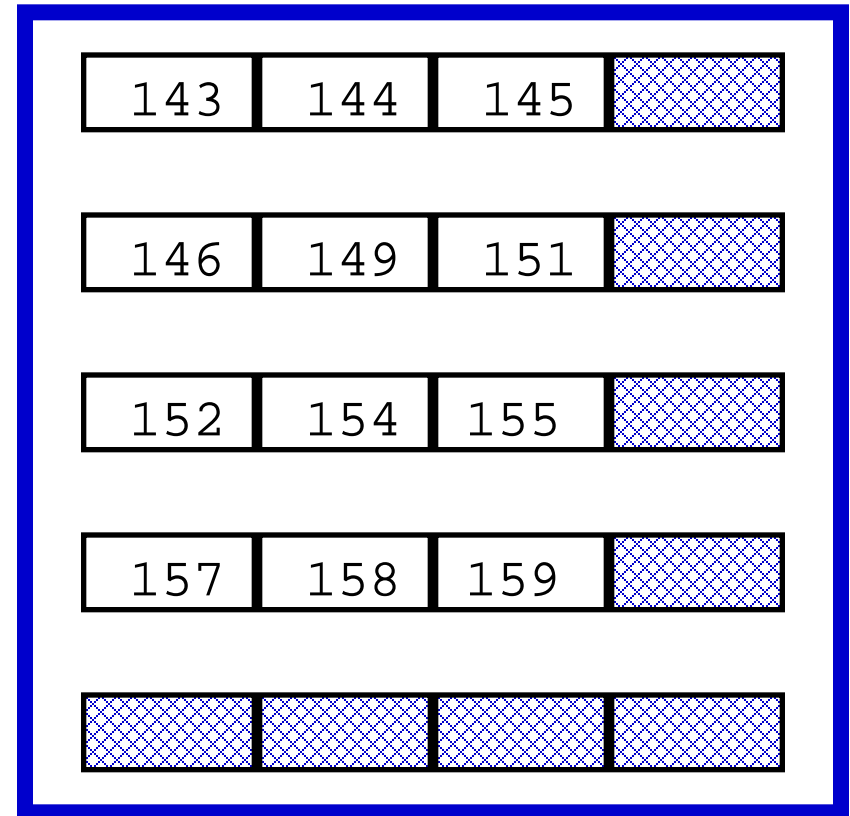
DATA CI Size	CI/CA Non-EF	Disk Utilization (%) Non-EF	CI/CA Extended Format	Disk Utilization (%) Extended Format
512	735	45	720	46
1024	495	61	495	63
1536	390	72	375	72
2048	315	78	315	81
2560	255	79	255	82
3072	225	83	225	87
3584	195	84	195	88
4096	180	89	180	92
4608	150	83	150	87
5120	135	83	135	87
5632	135	92	135	95
6144	120	89	120	92
6656	105	84	105	88
7168	105	91	105	94
7680	90	83	90	87
8192	90	89	90	92
10240	75	93	75	96
12288	60	89	60	92
14336	52	90	45	81
16384	45	89	45	92
18432	45	100	40	88
20480	37	91	37	95
22528	33	90	33	93
24576	30	89	30	92
26624	30	96	30	100
28672	26	90	22	81
30720	25	93	25	86
32768	22	87	22	92

# FREESPACE(25 20)

## Control Area



## Control Area



# FREESPACE Is Not “Free”

VSAM KSDS:

DATA CISZ = 4096

CI/CA = 180

FREESPACE(15,20)

Total bytes in CA =  $4096 * 180 = 737,280$

CA Free Space =  $(180 * .2) * 4096 = 147,456$

CI Free Space =  $4096 * .15 * (180 * .8) = 88,560$

Percentage of each CA reserved for Free Space =  
 $(147,456 + 88,560) / 737,280 = 32\%$

# SPEED vs. RECOVERY

- RECOVERY tells VSAM to pre-format each DATA CI before loading data into it
- SPEED tells VSAM not to pre-format the data component's space during the load process
- RECOVERY is the default, so always specify SPEED (or use a DATACLAS definition that specifies SPEED)

# REUSE vs. NOREUSE

- REUSE – When the data set is opened for OUTPUT (Load Mode), the High Used Relative Byte Address (HURBA) is reset to zero
- NOREUSE – When the data set is opened for OUTPUT, it must be empty

# DEFINE ALTERNATEINDEX

- This command is used to create an alternate index over a KSDS or an ESDS
- The KEY parameter specifies the key length and the offset where the key begins in the data record
- Most parameters for an alternate index are the same as the parameters for a KSDS
- An alternate index can be define with UPGRADE or NOUPGRADE
- The AIX can be defined with either UNIQUEKEY or NONUNIQUEKEY



# DEFINE ALTERNATEINDEX Example

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DEFINE AIX(
    NAME (PROD.PAYROLL.MASTER.AIX) -
    RELATE (PROD.PAYROLL.MASTER) -
    RECORDSIZE(24,74)
    KEYS(10,76)
    NONUNIQUEKEY
    CYL(25,5)
    FREESPACE(00,05)
    SHAREOPTIONS(2 3)
    UPGRADE)
DATA (
    NAME(PROD.PAYROLL.MASTER.AIX.DATA) -
    VOLUMES(* *)
    CISZ(4096))
INDEX (
    NAME(PROD.PAYROLL.MASTER.AIX.INDEX))
    VOLUMES(*) CISZ(1536))
```

# DEFINE PATH Command

- A PATH defines a relationship between a base cluster and an alternate index
  - UPDATE - specifies that, when records in the base cluster are modified or deleted, or when records are added to the base cluster, each alternate index in the base cluster's upgrade set is modified to reflect the change in the cluster's data
  - NOUPDATE - specifies that, when opening the path, the path's base cluster is to be allocated and the base cluster's upgrade set is not to be allocated

# BLDINDEX Command

- The BLDINDEX command loads the alternate index
- If the AIX is defined with NONUNIQUEKEY, the CISIZE for the AIX needs to be large enough to contain pointers to all of the records for each alternate index key

# ALTER Command

- The ALTER command is used to change the logical characteristics of a VSAM data set
- The physical characteristics of a VSAM data set cannot be changed with the ALTER command
- The ALTER command is used to rename VSAM data sets and their associated components

# DELETE Command

- The DELETE command can be used to VSAM base clusters, alternate indexes, and path definitions
- When an alternate index is deleted, the associated path is also deleted
- When a base cluster is deleted, all of the associated alternate indexes and paths are also deleted

# EXPORT Command

- The EXPORT command can be used to create a backup of a VSAM data set
- The backup data set is in a proprietary format that can only be used by the IMPORT command

# EXPORT Examples

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//DDNAME1 DD DSN=PROD.EXPORT.PAYROLL.MASTER(+1),
//    DISP=(NEW,CATLG,DELETE),
//    SPACE=(CYL,(500,50),RLSE)
//SYSIN DD *
EXPORT PROD.PAYROLL.MASTER -
    OUTFILE(DDNAME1) PERMANENT
```

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//INDD DD DSN=PROD.PAYROLL.TAXFORMS,DISP=SHR
//OUTDD DD DSN=PROD.EXPORT.PAYROLL.TAXFORMS,
//    DISP=(NEW,CATLG,DELETE),
//    SPACE=(CYL,(500,50),RLSE)
//SYSIN DD *
EXPORT INFILE(INDD) -
    OUTFILE(OUTDD) TEMPORARY
```

# IMPORT Command

- The IMPORT command recovers the data for a VSAM data set from an EXPORT backup



# IMPORT Command Examples

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//DDNAME1 DD DSN=STORAGE.EXPORT.SMALLDS.VHSM049,DISP=OLD
//SYSIN DD *
IMPORT INFILE(DDNAME1) -
    OUTDATASET(HSM.SMALLDS.VHSM049)
```

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//DDNAME1 DD DSN=STORAGE.SCDS.UNLOAD.G0282V00,DISP=SHR
//SYSIN DD *
IMPORT IFILE(DDNAME1) ODS(SMS.PROD.SCDS.RECOVER) -
    OBJECTS( -
        (SMS.PROD.SCDS -
        NEWNAME(SMS.PROD.SCDS.RECOVER)) -
        (SMS.PROD.SCDS.DATA -
        NEWNAME(SMS.PROD.SCDS.RECOVER.DATA)))
```

# REPRO Command

- The REPRO command can be used to copy some or all of the records from a VSAM data set to either another VSAM data set or a sequential data set
- The REPRO command can also be used to copy records from a sequential data set into a VSAM data set

# REPRO Command Example #1

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//INDD1 DD DSN=HSM.PROD.MCDS,DISP=SHR
//OUTDD1 DD DSN=STORAGE.MCDS1.UNLOAD,
// DISP=(NEW,CATLG,DELETE),
// DATACLAS=EXTENDED,
// SPACE=(CYL,(1500,500),RLSE),
// DSORG=PS,RECFM=VB,LRECL=2044,BLKSIZE=0
//SYSIN DD *
REPRO INFILE(INDD1) OUTFILE(OUTDD1)
```

# REPRO Command Example #2

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//OUTDD1 DD DSN=TEST.TESTDATA.UNLOAD,
//      DISP=(NEW,CATLG,DELETE),
//      AVGREC=U,SPACE=(80,(50,10),RLSE),
//      DSORG=PS,RECFM=FB,LRECL=80,BLKSIZE=0
//SYSIN DD *
      REPRO IDS(TEST.VSAM.TESTDATA) -
      OUTFILE(OUTDD1)
```

# REPRO Command Example #3

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//INDD1 DD DSN=PROD.CUSTOMER.MASTER,DISP=SHR
//OUTDD1 DD DSN=TEST.CUSTOMER.UNLOAD.SUBSET,
// DISP=(NEW,CATLG,DELETE),
// SPACE=(TRK,(20,3),RLSE),
// DSORG=PS,RECFM=FB,LRECL=520,BLKSIZE=0
//SYSIN DD *
REPRO IFILE(INDD1) OUTFILE(OUTDD1) SKIP(1000) COUNT(5000)
```

# REPRO Command Example #4

```
//STEP030 EXEC PGM=IDCAMS  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
  REPRO IDS(PROD.CHECK.FILE.UPDATES) –  
    ODS(PROD.CHECK.FILE.D080212) –  
    FROMKEY(2012215) TOKEY(2012216)
```

# PRINT Command

- The PRINT command can be used to print records in a VSAM data set

# PRINT Command Examples

```
//STEP010 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//DDNAME1 DD DSN=PROD.SHIFT.STAFFING,DISP=SHR
//DDNAME2 DD DSN=PROD.PARTS.INVENTORY,DISP=SHR
//VSAMDS1 DD DSN=PROD.CUST.MASTER.AIX02,DISP=SHR
//VSAMDS2 DD DSN=PROD.STAFF.CONTACTS,DISP=SHR
//SYSIN DD *
PRINT IFILE(DDNAME1) CHARACTER

PRINT IFILE(DDNAME2) HEX FROMKEY('KE7 025429') COUNT(5)

PRINT IDS(PROD.USPS.ZIPCODES) DUMP COUNT(300)

PRINT IFILE(VSAMDS1) DUMP -
  FROMADDRESS(16220160) TOADDRESS(17694720)

PRINT INFILE(VSAMDS2) CHAR FROMKEY(X'F1') TOKEY(X'F2')
```



# VERIFY Command

- The VERIFY command is used to correctly reflect the end of the VSAM data set that was not closed properly
- The RECOVER parameter can be specified to fix errors caused by an incomplete CA reclaim

# VERIFY Command Examples

```
//STEP010 EXEC PGM=IDCAMS  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
VERIFY DATASET(CICSV.TCPIP32.CISORDT.EZACONFG)
```

```
//STEP010 EXEC PGM=IDCAMS  
//SYSPRINT DD SYSOUT=*  
//VSAMFILE DD DSN=TEST.RUN04.CHECKS.Y,DISP=SHR  
//SYSIN DD *  
VERIFY FILE(VSAMFILE)
```

```
//STEP010 EXEC PGM=IDCAMS  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
VERIFY DATASET(PROD.CROSSREF.LEVEL3) RECOVER
```

# Using IDCAMS LISTCAT

- Provides extensive information about VSAM data sets including:
  - Data set attributes
  - SMS information
  - RLS information
  - Allocation information (like primary and secondary space requested, CI size, split information, etc.)
  - Volume and extent information
  - Sphere information

# Selecting Entries to List

- LISTCAT ENTRIES(PAYROLL.PROD.ACTIVE)
- LISTCAT LEVEL(QA.BALANCE)
- LISTCAT LEVEL(ACCT.PROD.GRP%N)
- LISTCAT ENT(HR.PROD.EMPLID) ALL OUTFILE(OUTDD)

# What Information to List

- LISTCAT ENT(entname) NAME
- LISTCAT ENT(entname) HISTORY
- LISTCAT ENT(entname) ALLOCATION
- LISTCAT ENT(entname) VOLUME
- LISTCAT ENT(entname) ALL

# Output from LISTCAT – Cluster Information



```
LISTCAT ENT(MRKT.PROD.DMPIIMST) ALL
CLUSTER ----- MRKT.PROD.DMPIIMST
  IN-CAT --- CAT.PROD01
  HISTORY
    DATASET-OWNER----(NULL)  CREATION-----2013.031
    RELEASE-----2  EXPIRATION-----0000.000
  SMSDATA
    STORAGECLASS ---STANDARD      MANAGEMENTCLASS-ONLINE
    DATACLASS -----EXTAVSAM      LBACKUP ---0000.000.0000
    CA-RECLAIM----- (YES)
    EATTR----- (NULL)
    BWO STATUS-----00000000    BWO TIMESTAMP---00000 00:00:00.0
    BWO----- (NULL)
  RLSDATA
    LOG -----NONE  RECOVERY REQUIRED --(NO)  FRLOG -----(NULL)
    VSAM QUIESCED -----(NO)  RLS IN USE -----(NO)  LOGREPLICATE----- (NO)
    LOGSTREAMID----- (NULL)
    RECOVERY TIMESTAMP LOCAL----X'000000000000000000'
    RECOVERY TIMESTAMP GMT-----X'000000000000000000'
  PROTECTION-PSWD----(NULL)  RACF----- (NO)
  ASSOCIATIONS
    DATA----MRKT.PROD.DMPIIMST.DATA
    INDEX---MRKT.PROD.DMPIIMST.INDEX
```

# Output from LISTCAT – DATA Component



```
DATA ----- MRKT.PROD.DMPIIMST.DATA
IN-CAT --- CAT.PROD01
HISTORY
  DATASET-OWNER----(NULL)  CREATION-----2013.031
  RELEASE-----2  EXPIRATION-----0000.000
  ACCOUNT-INFO------(NULL)
  PROTECTION-PSWD----(NULL)  RACF------(NO)
ASSOCIATIONS
  CLUSTER--FSVP.FBSI.DMPIMSTD
ATTRIBUTES
  KEYLEN-----8  AVGLRECL-----100  BUFSPACE-----6144  CISIZE-----1024
  RKP-----0  MAXLRECL-----100  EXCPEXIT------(NULL)  CI/CA-----495
  STRIPE-COUNT-----1
  SHROPTNS(2,3)  SPEED  UNIQUE  NOERASE  INDEXED  NOWRITECHK  UNORDERED  NOREUSE
  NONSPANNED  EXTENDED  EXT-ADDR
STATISTICS
  REC-TOTAL-----15006  SPLITS-CI-----23  EXCPS-----49
  REC-DELETED-----0  SPLITS-CA-----2  EXTENTS-----1
  REC-INSERTED-----0  FREESPACE-%CI-----0  SYSTEM-TIMESTAMP:
  REC-UPDATED-----0  FREESPACE-%CA-----0  X'CADB0E18220D0706'
  REC-RETRIEVED-----4851  FREESPC-----101376
ALLOCATION
  SPACE-TYPE-----CYLINDER  HI-A-RBA-----1520640
  SPACE-PRI-----3  HI-U-RBA-----1519616
  SPACE-SEC-----1
VOLUME
  VOLSER-----M1P072  PHYREC-SIZE-----1024  HI-A-RBA-----1520640  EXTENT-NUMBER-----1
  DEVTYPE-----X'3010200F'  PHYRECS/TRK-----33  HI-U-RBA-----1519616  EXTENT-TYPE-----X'40'
  VOLFLAG-----PRIME  TRACKS/CA-----15
EXTENTS:
  LOW-CCHH----X'00420000'  LOW-RBA-----0  TRACKS-----150
  HIGH-CCHH---X'00C1000E'  HIGH-RBA-----5070848
```

# Output from LISTCAT – INDEX Component



```

INDEX ----- MRKT.PROD.DMPIIMST.INDEX
IN-CAT --- CAT.PROD01
HISTORY
  DATASET-OWNER----(NULL)  CREATION-----2013.031
  RELEASE-----2  EXPIRATION-----0000.000
PROTECTION-PSWD----(NULL)  RACF------(NO)
ASSOCIATIONS
  CLUSTER--FSVP.FBSI.DMPIMSTD
ATTRIBUTES
  KEYLEN-----8  AVGLRECL-----0  BUFSPACE-----0  CISIZE-----4096
  RKP-----0  MAXLRECL-----4089  EXCPEXIT------(NULL)  CI/CA-----12
  SHROPTNS(2,3)  SPEED  UNIQUE  NOERASE  NOWRITECHK  UNORDERED  NOREUSE  EXTENDED
  EXT-ADDR
STATISTICS
  REC-TOTAL-----11  SPLITS-CI-----0  EXCPS-----59  INDEX:
  REC-DELETED-----0  SPLITS-CA-----0  EXTENTS-----1  LEVELS-----3
  REC-INSERTED-----0  FREESPACE-%CI-----0  SYSTEM-TIMESTAMP:  ENTRIES/SECT-----22
  REC-UPDATED-----0  FREESPACE-%CA-----0  X'CADB0E18220D0706'  SEQ-SET-RBA-----0
  REC-RETRIEVED-----0  FREESPC-----4096  HI-LEVEL-RBA-----8192
ALLOCATION
  SPACE-TYPE-----TRACK  HI-A-RBA-----49152
  SPACE-PRI-----1  HI-U-RBA-----45056
  SPACE-SEC-----1
VOLUME
  VOLSER-----M1P072  PHYREC-SIZE-----4096  HI-A-RBA-----49152  EXTENT-NUMBER-----1
  DEVTYPE-----X'3010200F'  PHYRECS/TRK-----12  HI-U-RBA-----45056  EXTENT-TYPE-----X'00'
  VOLFLAG-----PRIME  TRACKS/CA-----1
EXTENTS:
  LOW-CCHH----X'0041000B'  LOW-RBA-----0  TRACKS-----1
  HIGH-CCHH---X'0041000B'  HIGH-RBA-----49151
  
```