S84

Partition,Re-partition, How Do I Handle All These Partitions

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Introduction

- **Rick Long**
  - IMS Development BI tools (remotely)
    - IMS Data Propagator
    - IMS Data Refresher
  - ITSO
    - Redbooks
    - IMS Specialist
  - IBM and life before IBM
    - IMS Systems Programmer
    - Database Adminstrator
    - Application Programmer
  - ricklong@au1.ibm.com
    - I watch the IMS-L@lists.missouri.edu forum

Prerequisite

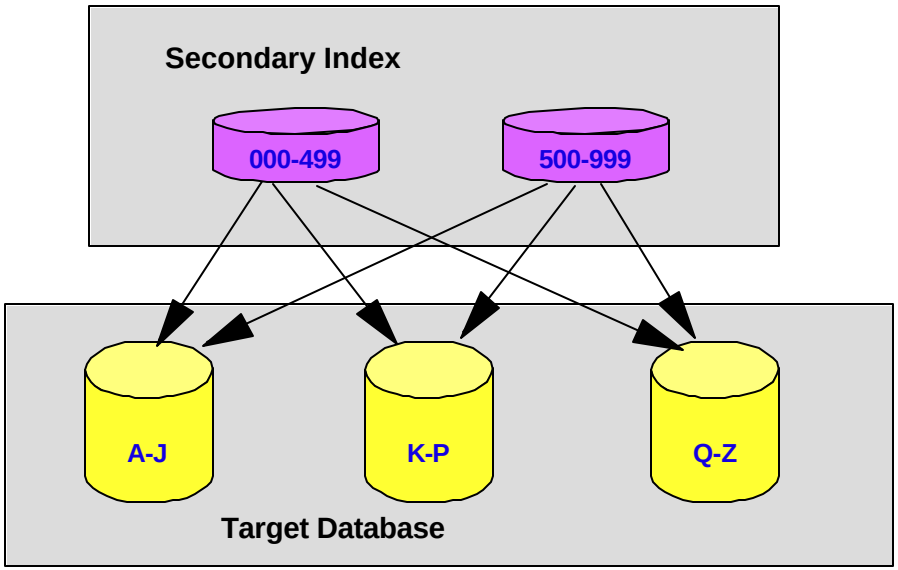
- B13 - Introduction to HALDB
- Basic understanding of HALDB structures
- Other HALDB presentations
  - S45 Migration to HALDB
  - S48 Fallback from HALDB
  - S64 HALDB Migration Utilities with the Latest ESS Numbers
- Recommended reading
  - REDBOOK SG24-5751
    - Available at WWW.REDBOOKS.IBM.COM

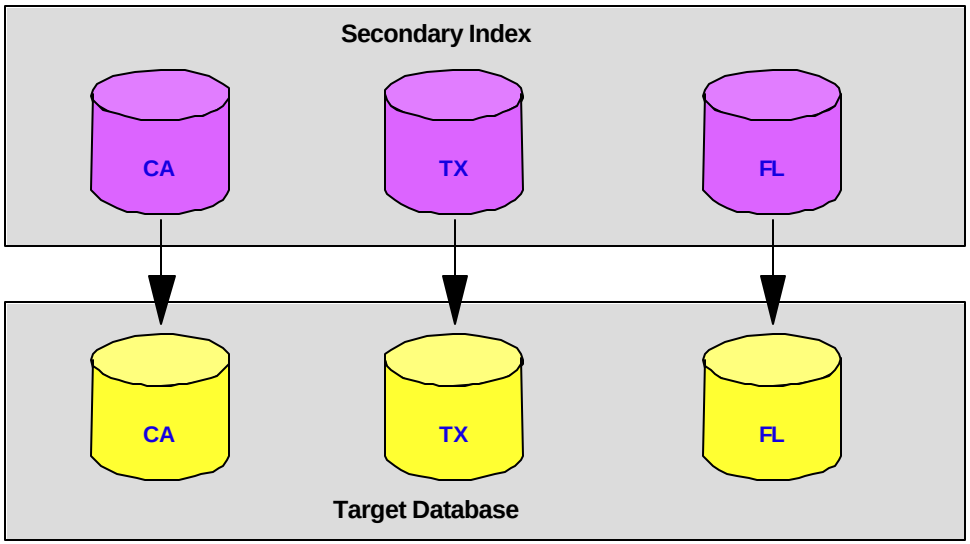
Objectives

- Present the Issues relating to HALDB partitioning
- Present some operational issues relating to HALDB
- Talk about any issues you might have with HALDB (can be continued during the conference)
- Can be continued on the
  ims-l@lists.missouri.edu forum

Partitioning Considerations

- **Determine number of partitions required**
  - **Size of data sets (4GB limit)**
  - **Partition independence**





Partitioning Considerations

- **Determine type of partitioning**
  - Key range
  - Partition selection exit
  - PHDAM
    - partition selection done before randomizing
    - partitions with less data could have smaller RAA
  - PHIDAM
    - Roots segments still in sequence unless
      - partition selection exit is used
      - partition selection not on root key value as highest part of the selection process

Partitioning Considerations

- **Partition naming standards**
  - Meaningful name for partitions?
  - Re-partitioning later
    - Growth of data sets
    - New data
    - Automatic generation of partitions
  - Lots of partitions?
    - Consider using automatic names

Partition Naming

DD partitionnameletter
(<=7)

DSN prefix.letterPartitionid
(<=37)

PR.IMSB.dbdname.A00001

- **Unique Names within the RECON**
  - **Partition name must be unique**
  - **Partition ID also used in DSN**
  - **Partition IDs increase in value**
  - **Partition IDs have nothing to do with sequence of processing partitions**

Naming Standard Example

Master DBD Name	Partition Name	DD Name	Partition ID	DSN
DFXCSTP	CUST1	CUST1A CUST1X CUST1L	1	IMS.SJIMSR.DFXCSTP.A00001 IMS.SJIMSR.DFXCSTP.X00001 IMS.SJIMSR.DFXCSTP.L00001
DFXCSTP	CUST2	CUST2A CUST2X CUST2L	2	IMS.SJIMSR.DFXCSTP.A00002 IMS.SJIMSR.DFXCSTP.X00002 IMS.SJIMSR.DFXCSTP.L00002
DFXCSTP	CUST3	CUST3A CUST3X CUST3L	3	IMS.SJIMSR.DFXCSTP.A00003 IMS.SJIMSR.DFXCSTP.X00003 IMS.SJIMSR.DFXCSTP.L00003
DFXCSTP	CUST4‘	CUST4A CUST4X CUST4L	4	IMS.SJIMSR.DFXCSTP.A00004 IMS.SJIMSR.DFXCSTP.X00004 IMS.SJIMSR.DFXCSTP.L00004
DFXCSTP	CUST5	CUST5A CUST5X CUST2L	5	IMS.SJIMSR.DFXCSTP.A00005 IMS.SJIMSR.DFXCSTP.X00005 IMS.SJIMSR.DFXCSTP.L00005
DFXCSTP	CUST6	CUST2A CUST2X CUST2L	6	IMS.SJIMSR.DFXCSTP.A00006 IMS.SJIMSR.DFXCSTP.X00006 IMS.SJIMSR.DFXCSTP.L00006
DFXBALY	BAL1	BALY1A	1	IMS.SJIMSR.DFXBALY.A00001
DFXZIPY	ZIP1	ZIPY1A	1	IMS.SJIMSR.DFXZIPY.A00001
DFXPRDP	PROD1	PROD1A PROD1L	1	IMS.SJIMSR.DFXPRDP.A0001 IMS.SJIMSR.DFXPRDP.L0001
DFXPRDP	PROD2	PROD2A PROD2L	2	IMS.SJIMSR.DFXPRDP.A0002 IMS.SJIMSR.DFXPRDP.L0002

Naming Standards

Automatic Generation of partitions

Master DBD Name	Partition Name	DD Name	Partition ID	DSN
DFJP4PH	DFPH4AA	DFPH4AAA DFPH4AAB DFPH4AAC DFPH4AAD DFPH4AAX DFPH4AAL	1	IMS.SJIMSR.DFJPH4H.A00001 IMS.SJIMSR.DFJPH4H.B00001 IMS.SJIMSR.DFJPH4H.C00001 IMS.SJIMSR.DFJPH4H.D00001 IMS.SJIMSR.DFJPH4H.X00001 IMS.SJIMSR.DFJPH4H.L00001
DFJP4PH	DFPH4AB	DFPH4ABA DFPH4ABB DFPH4ABC DFPH4ABD DFPH4ABX DFPH4ABL	2	IMS.SJIMSR.DFJPH4H.A00002 IMS.SJIMSR.DFJPH4H.B00002 IMS.SJIMSR.DFJPH4H.C00002 IMS.SJIMSR.DFJPH4H.D00002 IMS.SJIMSR.DFJPH4H.X00002 IMS.SJIMSR.DFJPH4H.L00002
DFJP4PH	DFPH4AC	DFPH4ACA DFPH4ACB DFPH4ACC DFPH4ACD DFPH4ACX DFPH4ACL	3	IMS.SJIMSR.DFJPH4H.A00003 IMS.SJIMSR.DFJPH4H.B00003 IMS.SJIMSR.DFJPH4H.C00003 IMS.SJIMSR.DFJPH4H.D00003 IMS.SJIMSR.DFJPH4H.X00003 IMS.SJIMSR.DFJPH4H.L00003
DFJP4PH	DFPH4AD	DFPH4ADA DFPH4ADB DFPH4ADC DFPH4ADD DFPH4ADX DFPH4ADL	4	IMS.SJIMSR.DFJPH4H.A00004 IMS.SJIMSR.DFJPH4H.B00004 IMS.SJIMSR.DFJPH4H.C00004 IMS.SJIMSR.DFJPH4H.D00004 IMS.SJIMSR.DFJPH4H.X00004 IMS.SJIMSR.DFJPH4H.L00004

Generating Delete/Defines

```
GENJCL.USER GROUP(HALDBS) MEMBER(DBDDDEF)  LIST JOB(JOBCARD) -
ONEJOB DEFAULTS(DBGGDFLT)
USERKEYS((%UPRIM,"500"),(%USEC,"100"),(%UCISZ,'4096"))
GENJCL.USER GROUP(HALDBSX) MEMBER(DBDDDEFL)  LIST  JOB(JOBCARD) -
ONEJOB DEFAULTS(DBGGDFLT) USERKEYS((%UPRIM,"500"),(%USEC,"100"))
```

DBDDDEF (ESDS)

```
%DELETE (%STPNO NE '00000')
//S%STPNO  EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
%ENDDEL
%SELECT DBDS((%DBNAME,%DDNAME))
  DELETE %DBDSN
  SET MAXCC = 0
  DEFINE CLUSTER (NAME(%DBDSN) -
       VOLUMES (* * * )-
       CYL(%UPRIM %USEC) -
       REUSE SHR(3 3)-
       CISZ(%UCISZ)  -
       SPEED -
       NONINDEXED -
       RECORDSIZE  (4089 4089)) -
   DATA(NAME(%DBDDN.DATA))
%ENDSEL
```

DBDDDEFL (ILDS)

```
%DELETE (%STPNO NE '00000')
//S%STPNO  EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
%ENDDEL
%SELECT DBDS((%DBNAME,%DDNAME))
 DELETE %DBDSN
 SET MAXCC = 0
 DEFINE CLUSTER (NAME(%DBDSN) -
     VOLUMES (* * *) -
     CYLINDERS (%UPRIM %USEC)-
     RECORDSIZE (50 50)  -
     FREESPACE (10 10) -
     REUSE SHR(3 3) -
     CISZ(1024) -
     SPEED -
     KEYS  (9  0)) -
 INDEX(NAME(%DBDSN.INDEX)) -
 DATA (NAME(%DBDSN.DATA))
%ENDSEL
```

Sequence of Partitions

```
                                Database Partitions              Row 1 to 3 of 3
COMMAND ===>

Select an item by pressing a '/' on the desired line then press Enter.

Database Name  . . . . . : D4PEOPLE

Act    Name       Id          Data Set Name Prefix
       D4PEOPA             1  DPR.IMSB.D4PEOPLE
       D4PEOPB             2  DPR.IMSB.D4PEOPLE
       D4PEOPC             3  DPR.IMSB.D4PEOPLE
*******************************************************************************
DDNAMES              DSN
D4PEOPAA    DPR.IMSB.D4PEOPLE.A00001
D4PEOPAL    DPR.IMSB.D4PEOPLE.L00001
D4PEOPBA    DPR.IMSB.D4PEOPLE.A00002
D4PEOPBL    DPR.IMSB.D4PEOPLE.L00002
D4PEOPCA    DPR.IMSB.D4PEOPLE.AO0003
D4PEOPCL    DPR.IMSB.D4PEOPLE.L00003
```

Sequence of Partitions

partition name sequence

```
                                Database Partitions          Row 1 to 4 of 4
COMMAND ===>

Select an item by pressing a '/' on the desired line then press Enter.

Database Name  . . . . . : D4PEOPLE

Act    Name       Id         Data Set Name Prefix
       D4PEOPA           1   DPR.IMSB.D4PEOPLE
       D4PEOPB           2   DPR.IMSB.D4PEOPLE
       D4PEOPC           3   DPR.IMSB.D4PEOPLE
       D4PEOPD           4   DPR.IMSB.D4PEOPLE
******************************************************************************
DDNAMES             DSN
D4PEOPAA    DPR.IMSB.D4PEOPLE.A00001
D4PEOPAL    DPR.IMSB.D4PEOPLE.L00001
D4PEOPBA    DPR.IMSB.D4PEOPLE.A00002
D4PEOPBL    DPR.IMSB.D4PEOPLE.L00002
D4PEOPCA    DPR.IMSB.D4PEOPLE.A00003
D4PEOPCL    DPR.IMSB.D4PEOPLE.L00003
D4PEOPDA    DPR.IMSB.D4PEOPLE.AO0004
D4PEOPDL    DPR.IMSB.D4PEOPLE.L00004
```

Sequence of Partitions

key selection sequence

```
                                Database Partitions          Row 1 to 4 of 4
COMMAND ===>

Select an item by pressing a '/' on the desired line then press Enter.

Database Name  . . . . . : D4PEOPLE

Act    Name       Id          Data Set Name Prefix
       D4PEOPA           1   DPR.IMSB.D4PEOPLE
       D4PEOPB           2   DPR.IMSB.D4PEOPLE
       D4PEOPD           4   DPR.IMSB.D4PEOPLE
       D4PEOPC           3   DPR.IMSB.D4PEOPLE
**************************************************************************************
DDNAMES              DSN
D4PEOPAA    DPR.IMSB.D4PEOPLE.A00001
D4PEOPAL    DPR.IMSB.D4PEOPLE.L00001
D4PEOPBA    DPR.IMSB.D4PEOPLE.A00002
D4PEOPBL    DPR.IMSB.D4PEOPLE.L00002
D4PEOPDA    DPR.IMSB.D4PEOPLE.A00004
D4PEOPDL    DPR.IMSB.D4PEOPLE.L00004
D4PEOPCA    DPR.IMSB.D4PEOPLE.AO0003
D4PEOPCL    DPR.IMSB.D4PEOPLE.L00003
```

Sequence of Partitions

key selection sequence

```
                        Database Partitions                 Row 1 to 5 of 5
COMMAND ===>

Select an item by pressing a '/' on the desired line then press Enter.

Database Name  . . . . . : D4PEOPLE

Act    Name       Id          Data Set Name Prefix
       D4PEOPA             1  DPR.IMSB.D4PEOPLE
       D4PEOPE             5  DPR.IMSB.D4PEOPLE
       D4PEOPD             4  DPR.IMSB.D4PEOPLE
       D4PEOPC             3  DPR.IMSB.D4PEOPLE
       D4PEOPF             6  DPR.IMSB.D4PEOPLE
********************************************************************************************************************************
```

DDNAMES	DSN	DDNAMES	DSN
D4PEOPAA	DPR.IMSB.D4PEOPLE.A00001	D4PEOPCA	DPR.IMSB.D4PEOPLE.A00003
D4PEOPAL	DPR.IMSB.D4PEOPLE.L00001	DRPEOPCL	DPR.IMSB.D4PEOPLE.L00003
D4PEOPEA	DPR.IMSB.D4PEOPLE.A00005	D4PEOPFA	DPR.IMSB.D4PEOPLE.A00006
D4PEOPEL	DPR.IMSB.D4PEOPLE.L00005	D4PEOPFL	DPR.IMSB.D4PEOPLE.L00006
D4PEOPDA	DPR.IMSB.D4PEOPLE.A00004		
D4PEOPDL	DPR.IMSB.D4PEOPLE.L00004		

Migrating to other Systems

- **Export/Import**
  - Can't modify export file
  - Use EDIT menu to change DSN prefix
    - 1. Copy partition...
    - 2. Delete a partition
    - 3. Find...
    - 4. Change all partitions...
    - 5. Change selected partitions...
  - Changes are immediate
  - Have to work with all partitions
    - can't import changes to some parititions

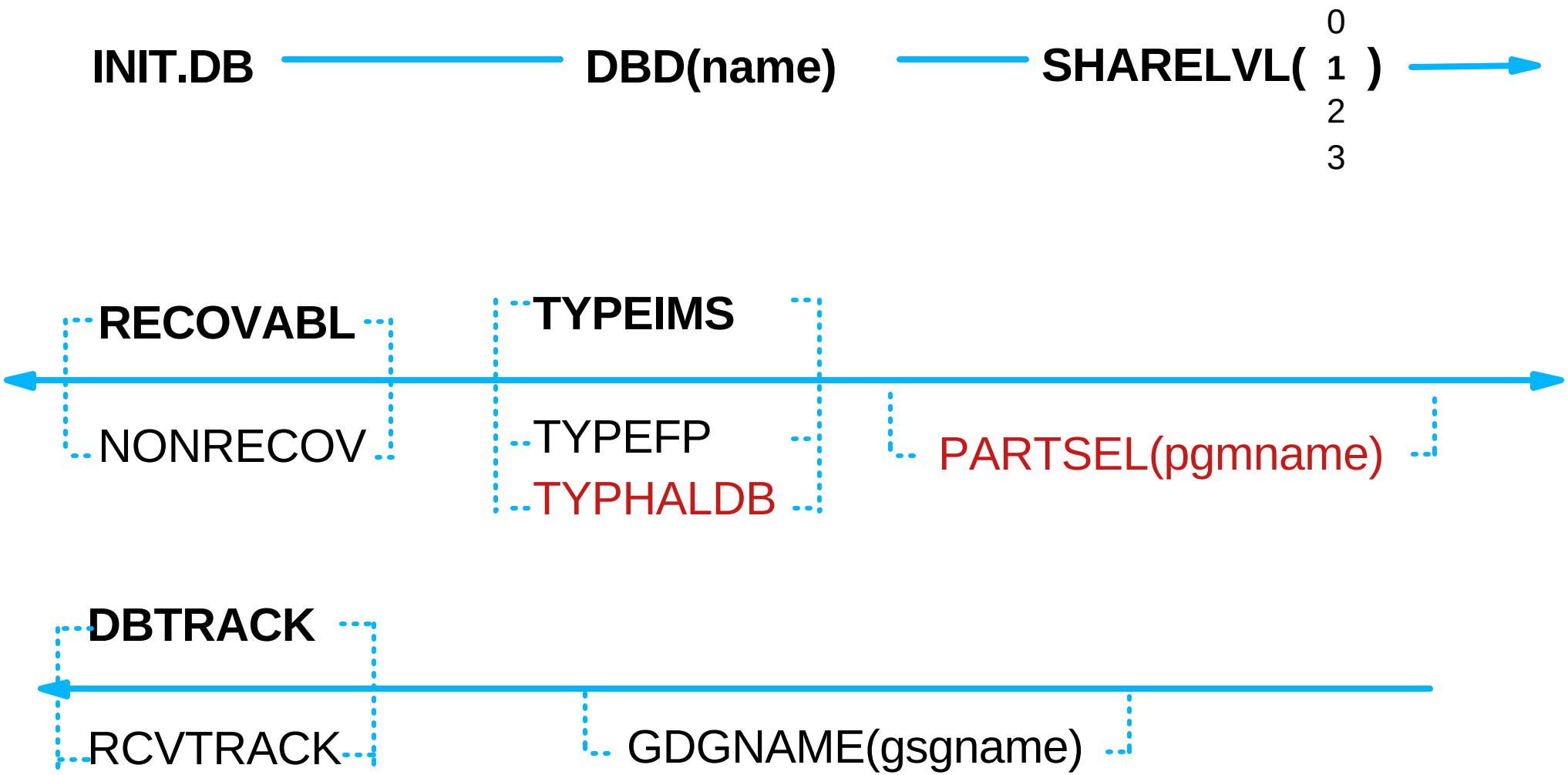
Migrating to other Systems

- **Import**
  - Re-sequence partition id on key ranges
    - Starting from 00001
    - Delete define control cards now have wrong DSNs
  - Changes are immediate
  - DBD must not be registered to DBRC

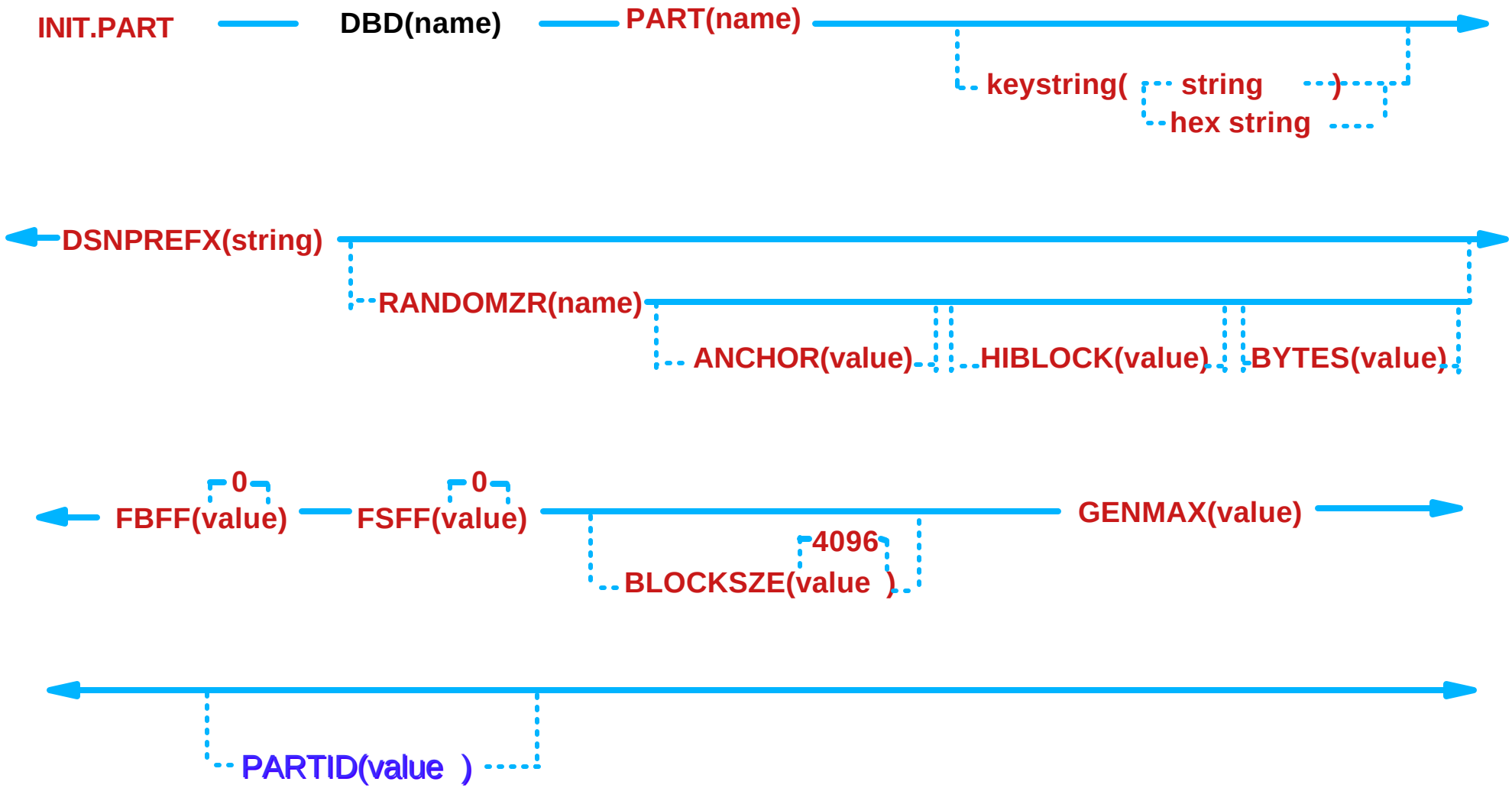
Batch Commands

- Introduced after GA via Maintanence Process
- INIT commands available
  - INIT.DB
  - INIT.PART
- Other commands available soon
  - CHANGE.DB
  - CHANGE.PART
  - DELETE.DB
  - DELETE.PART

INIT.DB



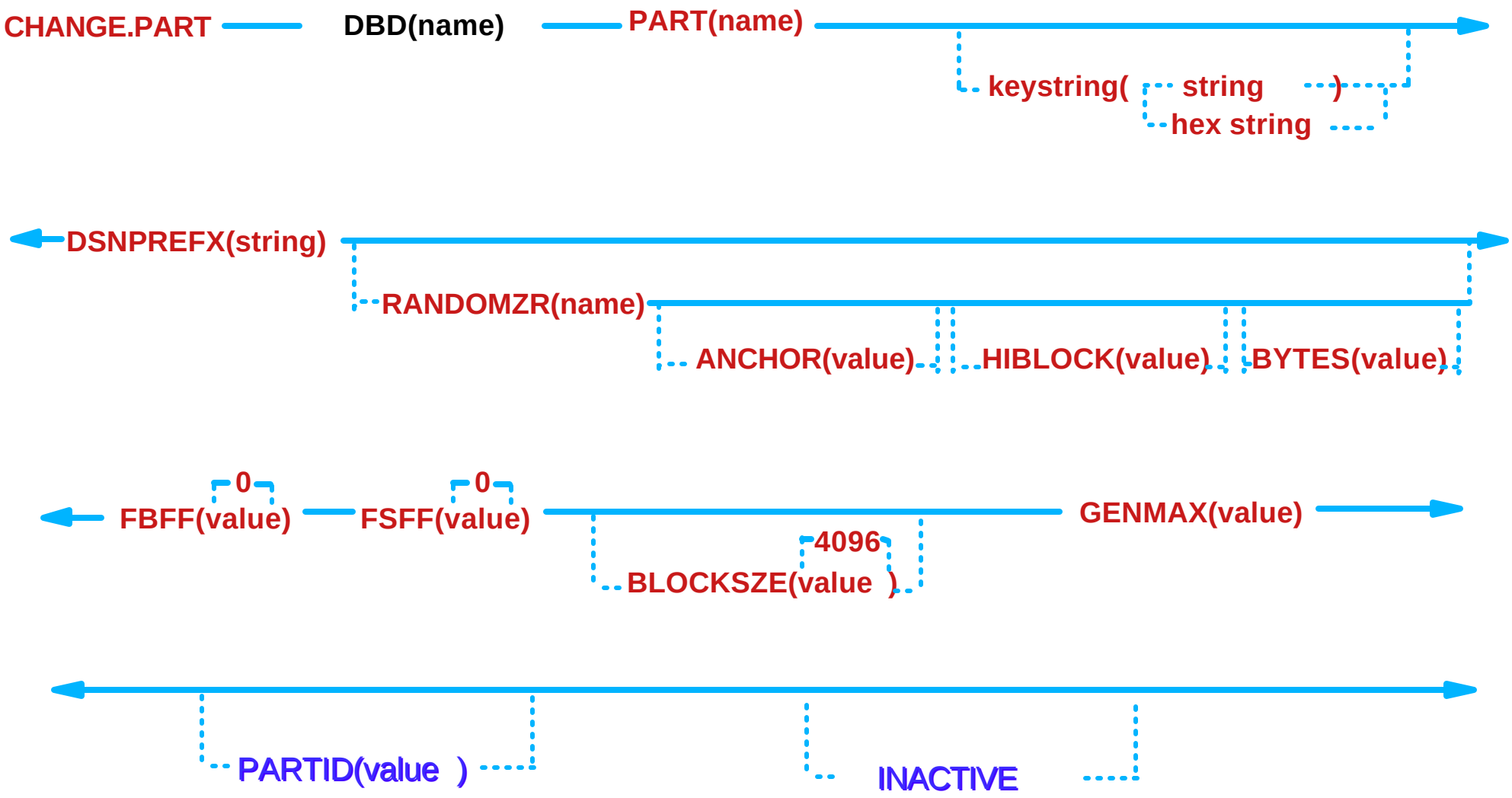
INIT.PART



INIT.PART

- **PARTID**
  - **NEVER NEVER Specify UNLESS**
    - Populating an RSR RECON
    - Recreating a deleted partition and you have the image copy or unloaded data to restore into it (can't be application unload data)
    - Populating a RECON which has not had this database before and you are using data from and existing system
  - If you use wrongly, you will corrupt the indirect pointers
    - the EPS contains orginal partid and RBA which could now be duplicated
  - We don't validate it, we use what you tell us, unless already defined in an active partition

CHANGE.PART

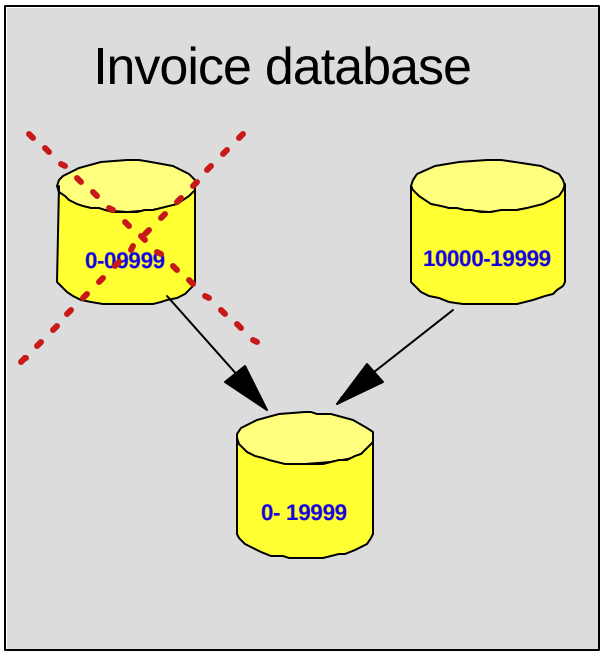


Inactive Part

- **INACTIVE/ACTIVE**
  - Used to logically delete a partition
    - HALDB will treat the partition as Deleted
      - partitions should have been unloaded before becoming inactive
      - partition selection will "ignore" this partition
    - Will preserve partition history
    - Should be used when deleting a partition
      - Creates a fallback capability should the change fail
      - Delete partition on completion of change process

Repartitioning

- **Combine 2 partitions into 1**
  1. Image copy both partitions
  2. Unload both partitions
  3. CHANGE.PART DBD(INV) PART(A) INACTIVE
  4. Reload partition B
  5. DELETE.PART DBD(INV) PART(A)
  6. Image copy partition B



- **Fallback**
  1. CHANGE.PART INV(DBD) PART(A) ACTIVE
  2. Recover both partitions

Database Loading

- **PROCOPT=L**

- **Must load a key in each partition to initialize it**
  - **Must insert secondary index source segment to initialize the secondary index data set**
  - **IMAGE COPY NEEDED flag set for each partition initialized.**

```
DSP0132I  IMAGE COPY NEEDED FOR
DSP0132I  DBDNAME=D4PEOA1   DDNAME=D4PEOA1A
DSP0132I  IMAGE COPY NEEDED FOR
DSP0132I  DBDNAME=D4PEOC1   DDNAME=D4PEOC1A
DSP0132I  IMAGE COPY NEEDED FOR
DSP0132I  DBDNAME=D4PEOD1   DDNAME=D4PEOD1A
```

Production Vs Test

- **Different number of partitions**
  - Don't always have keys in every partition
  - DBDLIB is the same only RECON information is different
    - DSNs
    - Size
    - RAA
  - Program function testing is independent of partitions

Production Vs Test

Advantages

- Fewer data sets
- Fewer RECON records
  - size of RECON
  - looking at RECON LIST output
- Less SPACE

Production Vs Test

Disadvantages

- Can't use Image to recover from production
  - IC is full data sets recovery
  - Most need to "recreate" a production problem with a specific set of database records
- Consider using Segment Restructure Utility
  - Can "unload" then "reload" a segment or a range of segments
  - Can run as a BMP or DLI (both unload/reload)

Production Vs Test

Segment Restructure Unload

- Root key range for Unload
  - First Root Key SSA
  - Key of last key to be selected

```
DBDNAME  DDOUT C ROOTSEGM(ROOTKEY EQ1234)
'4444'
```

- Reload reads input file from Unload
  - PROCOPT = A or I
  - BMP or DLI

RECON Management

- "Change Control Information"
  - Randomizer parameters
    - Make sure you list the current value before changing it
  - Number of partitions
    - Adding or deleting may set the PARTITION NEEDED FLAG for more than one partition
  - Partition IDs
    - Always increasing, changes IDCAM control cards
  - Authorization process
    - approvals confirmed
    - audit of changes
    - Sysprogs and DBAs have ALTER access to do day to day work
  - PARTITION INIT NEEDED
    - Means partition is unavailable for use
    - Set when paritition information is changed

RECON Management

Timing of Changes

- PDU is ISPF "Real Time"
- USERID Access
- Can't pre-define changes
- PDU is only way to CHANGE/DELETE

Separate RECON for partition definition

- Allows pre defining of partitions/changes
- Allows PROD RECON to be protected from USERID access

Operating with HALDB

Starting and Stopping HALDB

- Master must be started to access any partition
- A /DBR command will DBR all the partitions
- The master name or partition can be used on these IMS commands:
  - /DBDUMP
  - /DBRECOVERY
  - /DISPLAY
  - /LOCK
  - /START
  - /STOP
  - UNLOCK

Operating with HALDB

- Partitions can be started or stopped explicitly
- Once a partition is DBR'd explicitly, it must be STARTED explicitly
  - A /START DB mastername will not start an explicitly DBR'd partition
  - A /START DB ALL will not start an explicitly DBR'd partition

Operating with HALDB

- **Displaying HALDB information**
  - /DISPLAY DB mastername
  - /DISPLAY DB partitionname
  - /DISPLAY DB ALL

/DISPLAY DB mastername

Stopped HALDB master

```
/DISPLAY DB DFXCSTP
DATABASE  TYPE  TOTAL UNUSED  TOTAL UNUSED ACC  CONDITIONS
DFXCSTP   PHDAM                                 UP   STOPPED
*00228/193925*
```

Started HALDB master

```
/DISPLAY DB DFXCSTP
    DATABASE  TYPE  TOTAL UNUSED  TOTAL UNUSED ACC  CONDITIONS
   DFXCSTP   PHIDAM                                UP
   CUST1     PART                                  UP   NOTOPEN
   CUST2     PART                                  UP   NOTOPEN
   CUST3     PART                                  UP   NOTOPEN
   CUST4     PART                                  UP   NOTOPEN
   CUST5     PART                                  UP   NOTOPEN
   CUST6     PART                                  UP   NOTOPEN
   *00229/170020*
```

/DISPLAY DB ALL

DFXBALY	PSINDEX	UP	STOPPED
DFXCLAP	DL/I	UP	NOTOPEN
DFXCLAX	DL/I	UP	NOTOPEN
DFXCLAY	DL/I	UP	NOTOPEN
DFXCLY2	DL/I	UP	NOTOPEN
DFXCSTP	PHIDAM	UP	STOPPED
DFXPHNP	DL/I	UP	NOTOPEN
DFXPRDP	PHDAM	UP	STOPPED
DFXSTUP	DL/I	UP	NOTOPEN
DFXSTUY	DL/I	UP	NOTOPEN
DFXZIPY	PSINDEX	UP	STOPPED
DI21PART	DL/I	UP	NOTOPEN
IVPDB1	DL/I	UP	NOTOPEN

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