
IMS Version 12
DBRC
Information Management software
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DBRC Enhancements

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- CLEANUP.RECON command includes CA records
- VOLLIST, FILESEQ, and UNIT optional with CATDS
- GENJCL enhancements
- LIST command enhancements
- User information in IC, RECOV, REORG and CA records
- CA retention period added to CA Group record
- LIST.HISTORY enhancements
- LIST.RECON enhanced to show the number of registered databases

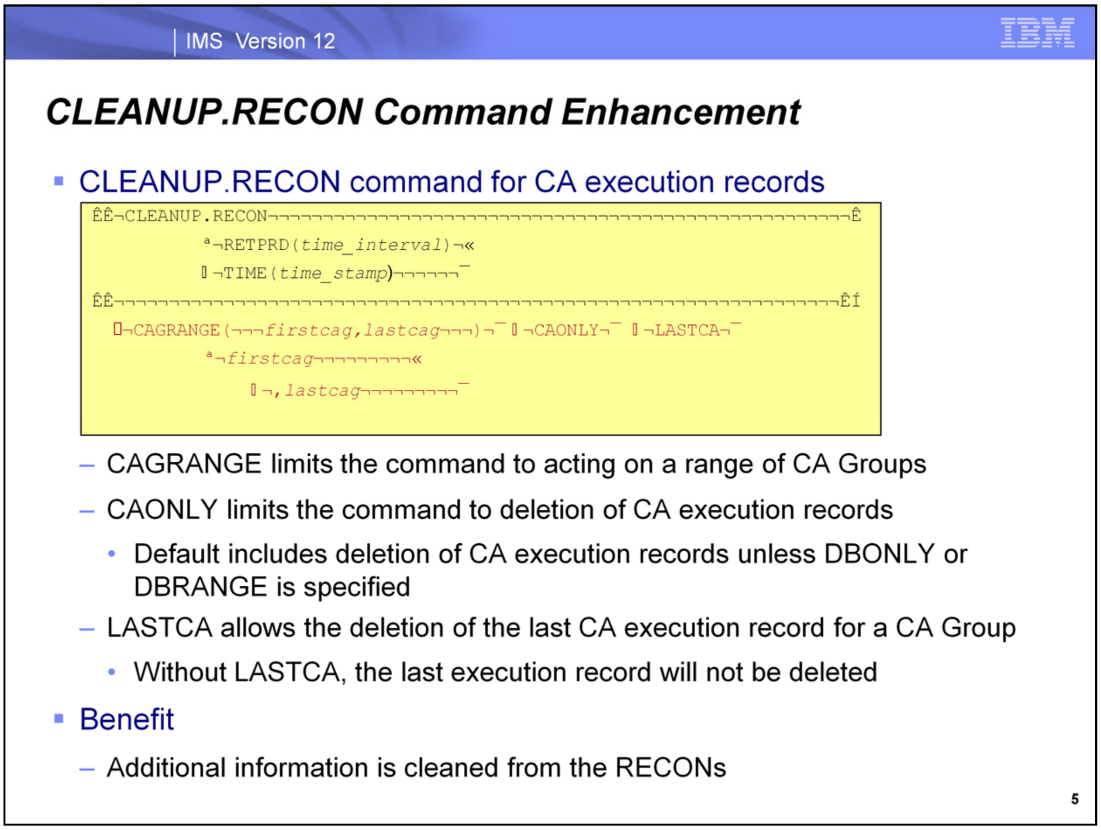
CLEANUP.RECON Command Enhancement

- IMS 11 added CLEANUP.RECON command
  - Used to delete old PRILOG, IC, ALLOC, REORG and RECOV information
- IMS 12 adds deletion of Change Accum execution information

```
CLEANUP.RECON
          RETPRD(time_interval)
          TIME(time_stamp)

   DBRANGE(firstdb,lastdb)   DBONLY   LASTIC
              firstdb
         ,lastdb

  CAGRANGE(firstcag,lastcag)  CAONLY  LASTCA
             firstcag
              ,lastcag

  LISTDL
  NOLISTDL
```


IMS 12 enhances the CLEANUP.RECON command which was introduced in IMS 11. In IMS 11 the command was used to delete PRILOG, IC, ALLOC, REORG and RECOV records from the RECONs. The user specified either a time interval or a timestamp. Records older than the specification were deleted from the RECONs with one exception. The last IC record for a database data set was not deleted unless the LASTIC parameter was specified. The DBONLY parameter could be used to limit the records which were deleted to IC, ALLOC, REORG and RECOV records. That is, DBONLY would not result in the deletion of PRILOG records.

IMS 12 adds CA execution records to those that are deleted.

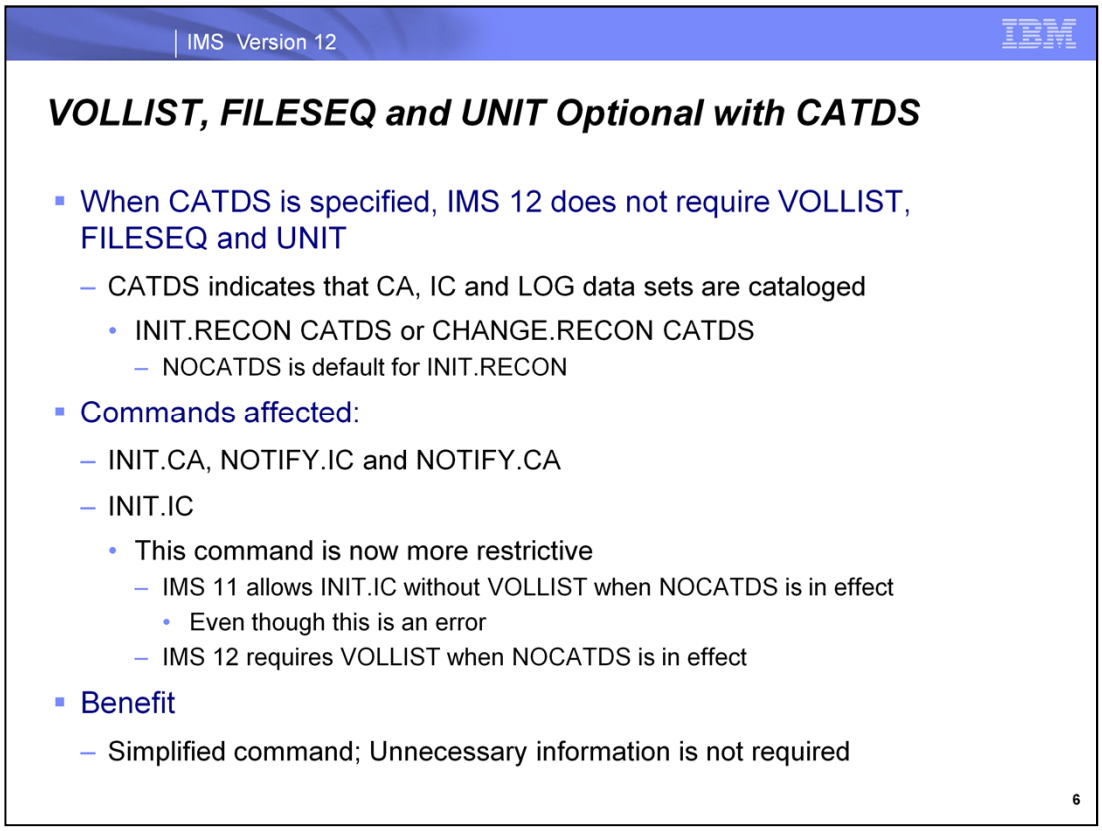


By default, IMS 12 will delete CA execution records when processing the CLEANUP.RECON command. If the user specifies CAGRANGE, only the CA execution records in the specified range are deleted.

If CAONLY is specified, only CA execution records are deleted. PRILOG, IC, ALLOC, REORG and RECOV records are not deleted.

LASTCA is analogous to LISTIC. It allows the deletion of the last CA execution record for a CA Group. If LASTCA is not specified, the latest CA execution record for a CA Group will not be deleted even when it is older than the specified time.

The expansion of the CLEANUP.RECON command to include CA execution records provides for more complete cleanup of the RECONs.



IMS 12 eliminates the requirement to specify VOLLIST, FILESEQ and UNIT to DBRC when CATDS is specified. CATDS indicates that Change Accum data sets, Image Copies and logs are cataloged. The volume, file and unit information are not needed.

INIT.IC is now more restrictive. Before IMS 12 one could issue the INIT.IC command without VOLLIST when NOCATDS was in effect. This was an error. Without CATDS, VOLLIST would be needed. IMS 12 eliminates this problem. IMS 12 requires VOLLIST on the INIT.IC command when NOCATDS is in effect. FILESEQ and UNIT are not required since they have default values.

IMS 12 no longer issues message DSP0201I.

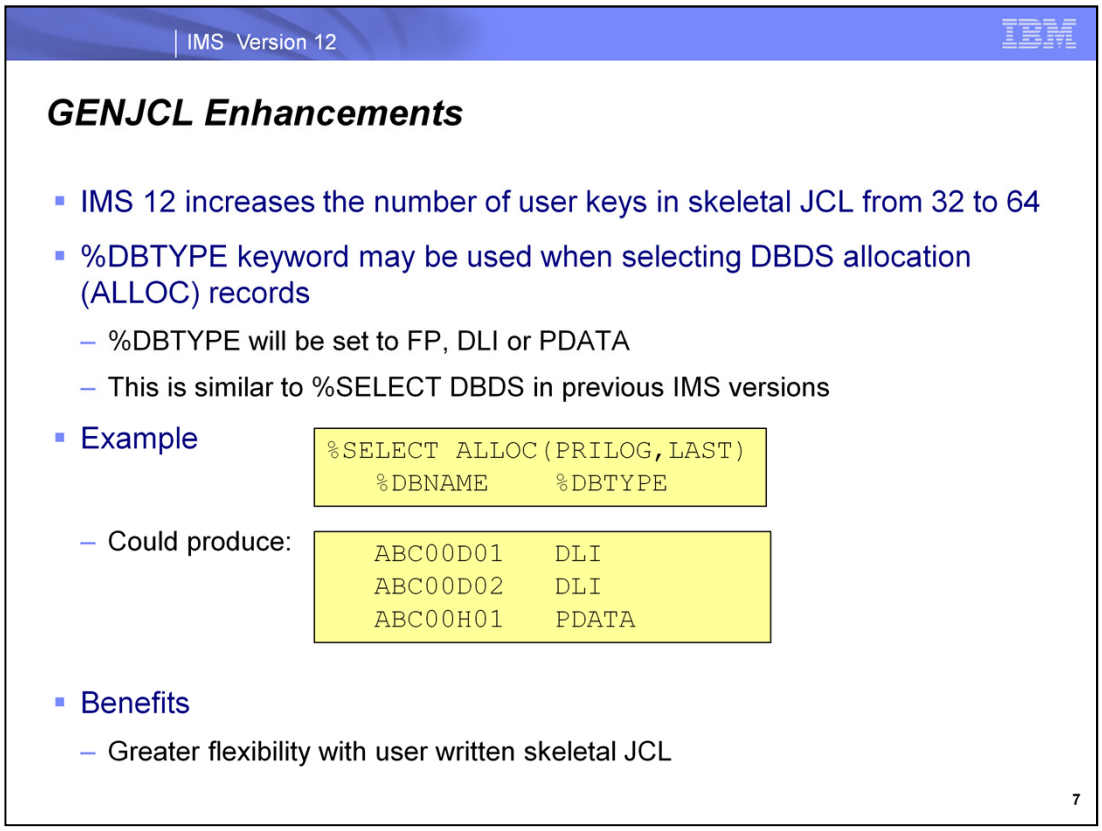
IMS 12 issues DSP0140I when VOLLIST is not specified when NOCATDS is in effect.

```
DSP0140I REQUIRED parameter PARAMETER NOT SPECIFIED
```

IMS 12 issues DSP0105I if FILIESEQ or UNIT is specified without VOLLIST

```
DSP0105I parm1 PARAMETER SPECIFIED WITHOUT CORRESPONDING parm2 PARAMETER
```

This message exists in previous IMS versions.



IMS 12 introduces two enhancements for users of GENJCL who write their own skeletal JCL.

First, the number of user keys that may be specified has been increased from 32 to 64.

Second, the %DBTYPE keyword may be used when selecting DBDS allocation (ALLOC) records. %DBTYPE is replaced by the type of database, either FP for Fast Path, DLI for full function non-HALDB, or PDATA for HALDB data data sets. The example shows a possible use of %DBTYPE. The %SELECT statement selects the last PRILOG record in the RECONs. It is followed by a statement that writes the database name (%DBNAME) and database type (%DBTYPE) for each of the DBDS allocation records associated with this log record. The output shows three databases. The first two are full function non-HALDB database data sets. The last is a HALDB data data set.

These enhancements give writers of skeletal JCL more flexibility in the JCL or other data they create.

List Command Enhancements

- /RMLIST command output > 32K
  - Only for commands entered through OM API
    - Online DBRC only
  - Output size is restricted by the DBRC private storage available for buffering the output message or OM limitations
  - Warning: There may be a performance impact from reading and reserving the RECONs for an extended amount of information
- Benefit
  - Increased data available to OM API users, e.g. TSO SPOC

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The /RMLIST command is used for DBRC LIST commands entered through an online IMS system. The output of these commands has been restricted to 32K. IMS 12 enhances the /RMLIST command to allow output greater than 32K when the command is entered through the OM API. This means that the response size is only limited by either the DBRC region private storage or any OM limitation. Users should be aware that /RMLIST commands with extremely large output could have an effect on the performance of other users of the RECONs. This is true since the RECONs are reserved or RECON records are locked by the /RMLIST command unless Parallel RECON Access (PRA) is used with the LIST.xxx CONCURR option.

List Command Enhancements

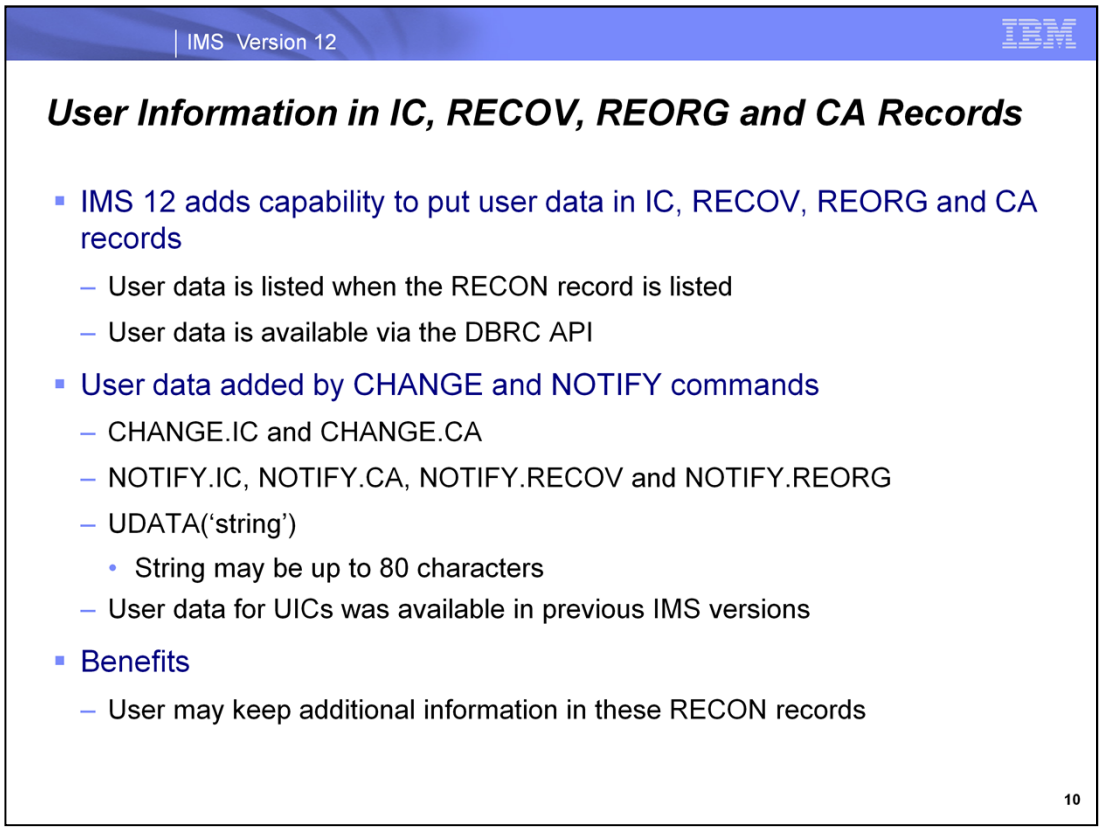
- New NORCVINF keyword for LIST.DB and LIST.DBDS
  - Suppresses recovery related information
    - ALLOC, IC, RECOV and REORG records are not listed
  - Reduces command output

```
ÊÊ¬LIST.DB ... ¬¬®¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬~¬¬¬ ... ¬¬¬¬ÊÍ
          ¦¬DBDS¬¬®¬¬¬¬¬¬¬¬¬¬¬~¬¬¬¯
                ¦¬NORCVINF¬¯
```

```
ÊÊ¬LIST.DBDS ... ¬¬®¬¬¬¬¬¬¬¬¬¬~¬¬¬ ... ¬¬¬¬ÊÍ
            ¦¬NORCVINF¬¯
```

- Benefit
  - Allows users to eliminate unneeded output

IMS 12 has added a new keyword for use with LIST.DB and LIST.DBDS commands. It is NORCVINF. It suppresses listing the information from ALLOC, IC, REORG and RECOV records. This is useful when users don't need this recovery related information. The reduction in the size of the listing may be substantial.



The user data must be specified in character format with single quotes within parentheses, such as UDATA('DONE BY BILL AS PART OF UNIT TESTING').

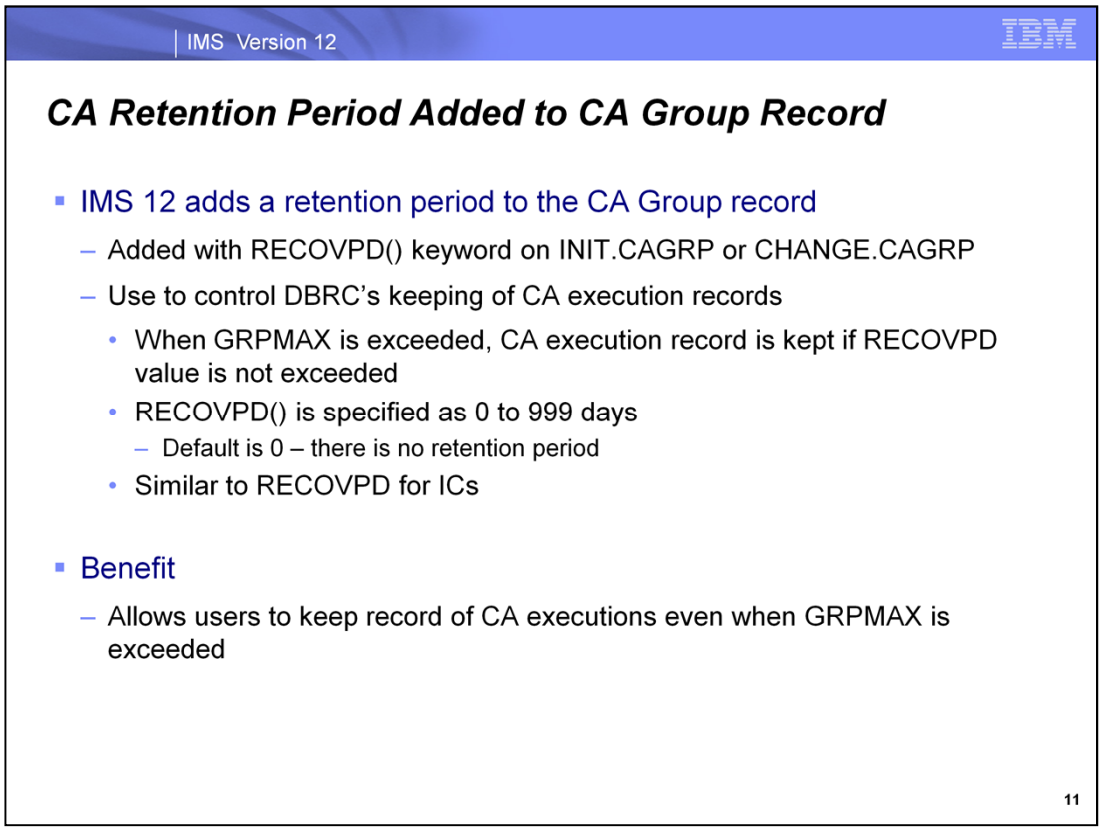
The new DBRC API fields are DSPAPQIC for IC, DSPAPQRV for RECOV, DSPAPQRR for REORG and DSPAPQCA for CA.

The IC, REORG, RECOV and CA records are 80 bytes longer if user data is specified. Their size does not increase when user data is not specified. There is no change in the size of records for user image copies since user data was supported for user image copies in previous IMS versions.

Since there are no CHANGE.RECOV or CHANGE.REORG commands, the only way to add or change the user data is to delete these records and reinsert them. For example, one could issue a DELETE.REORG command followed by a NOTIFY.REORG with UDATA('…') specified.

An example of the output for the listing of a RECOV record with user data is:

```
RECOV
  RUN      = 09.082 00:00:26.351867   *  RUN USID    = 0000000001
  USERDATA= DONE BY BILL AS PART OF UNIT TESTING
```



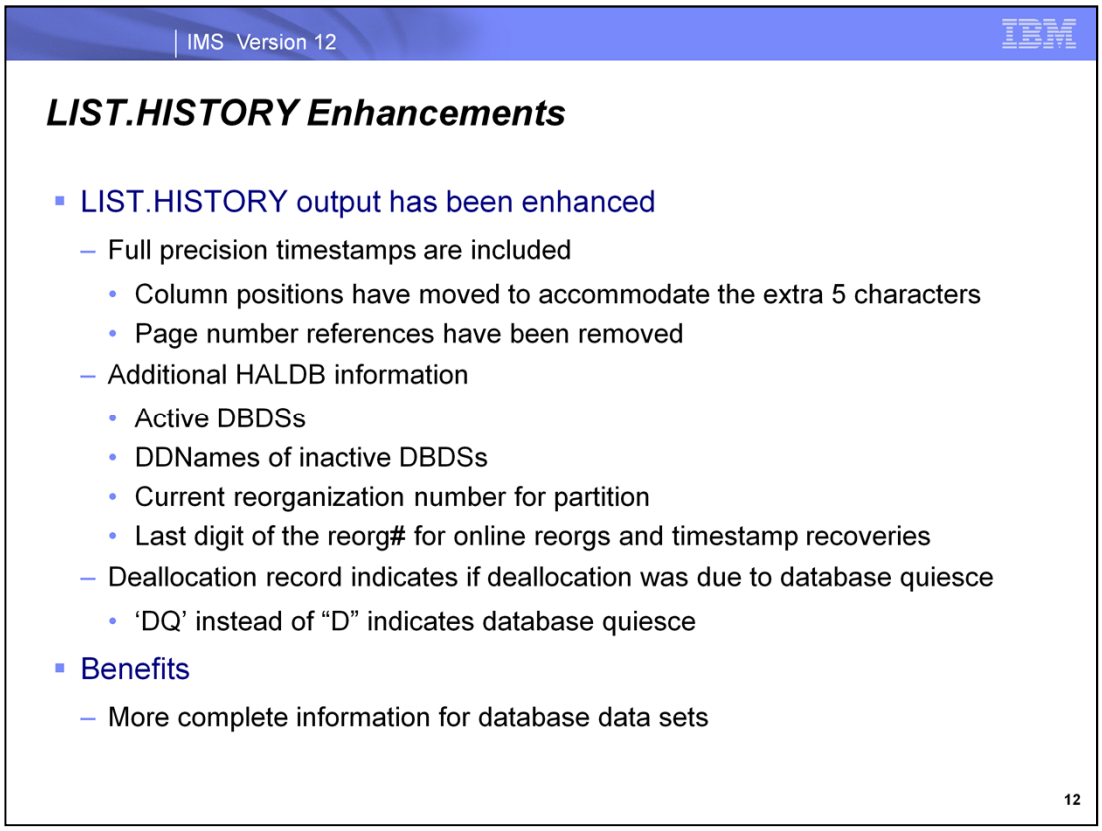
IMS 12 adds a retention period for CA execution records. This is similar to the RECOVPD specification for Image Copies. When RECOVPD is specified for a CA group, execution records for the group will only be deleted when both the GRPMAX value has been exceeded and the RECOVPD value has been exceeded. The GRPMAX value tells DBRC how many CA execution records to keep for the CA group. The RECOVPD value tells DBRC to keep more than the GRPMAX number of execution records when the oldest records are not older than the number of days specified in the RECOVPD value. That is, DBRC will retain any CA execution record that is not older than the value specified in RECOVPD.

RECOVPD is specified in days. It must be a value from 0 to 999. The default is 0. 0 indicates that there is no retention period and CA execution records will be deleted by using the GRPMAX value. This is how DBRC worked with versions previous to IMS 12.

The CA retention period allows users to keep DBRC records of CA executions even when the GRPMAX value is exceeded.

The RECOVPD value is shown in the CAGRP record listing as this example shows.

```
CAGRP
  GRPNAME=CAGRP1     GRPMAX=3     CA AVAIL=0    CA USED=1
  NOREUSE CAJCL=CAJCL             DEFLTJCL=**NULL**    RECOVPD=30
                                  #MEMBERS=2        -DBD-     -DDN-
                                                    DEDBJN21  DB21AR1
                                                    DEDBJN21  DB21AR2
```



The output of the LIST.HISTORY command for database data sets has been enhanced.

First, full precision timestamps are listed. These include times to the microsecond. Previously, times were only listed to the tenth of a second. This required the moving of column positions and the deletion of page references which used to appear at the right end of lines.

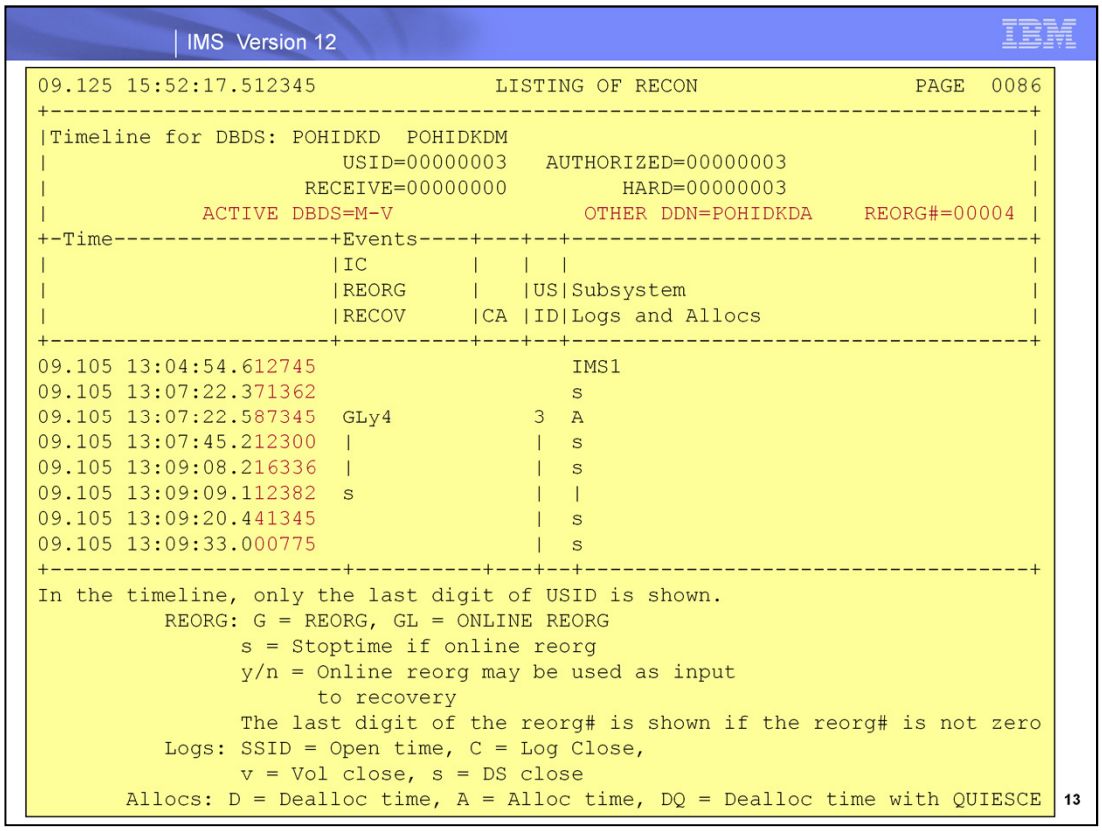
If you have programs which read the output of LIST.HISTORY they may need to be modified for these changes.

These enhancements provide more complete information about database data sets.

An example of LIST.HISTORY output appears on the next page.

Second, additional HALDB information is listed. In the heading there is information about the currently active data set and the DDNAME of the inactive partner data set. The current reorganization number for the partition is listed. In the timeline, the last digit of the reorganization number is listed for online reorganizations and timestamp recoveries.

Third, when a data set is deallocated by database quiesce, this is indicated in the timeline by 'DQ.' Other deallocations list only 'D."



```
09.125 15:52:17.512345              LISTING OF RECON                  PAGE  0086
+-------------------------------------------------------------------------------+
|Timeline for DBDS: POHIDKD  POHIDKDM                                           |
|                       USID=00000003   AUTHORIZED=00000003                     |
|                     RECEIVE=00000000         HARD=00000003                    |
|            ACTIVE DBDS=M-V                OTHER DDN=POHIDKDA    REORG#=00004 |
+-Time-----------------+Events----+---+--+-----------------------------------+
|                      |IC        |   |  |                                   |
|                      |REORG     |   |US|Subsystem                          |
|                      |RECOV     |CA |ID|Logs and Allocs                    |
+----------------------+----------+---+--+-----------------------------------+
09.105 13:04:54.612745                    IMS1
09.105 13:07:22.371362                    s
09.105 13:07:22.587345  GLy4           3  A
09.105 13:07:45.212300  |              |  s
09.105 13:09:08.216336  |              |  s
09.105 13:09:09.112382  s              |  |
09.105 13:09:20.441345                 |  s
09.105 13:09:33.000775                 |  s
+----------------------+----------+---+--+-----------------------------------+
In the timeline, only the last digit of USID is shown.
          REORG: G = REORG, GL = ONLINE REORG
                 s = Stoptime if online reorg
                 y/n = Online reorg may be used as input
                       to recovery
                 The last digit of the reorg# is shown if the reorg# is not zero
          Logs: SSID = Open time, C = Log Close,
                 v = Vol close, s = DS close
       Allocs: D = Dealloc time, A = Alloc time, DQ = Dealloc time with QUIESCE
```

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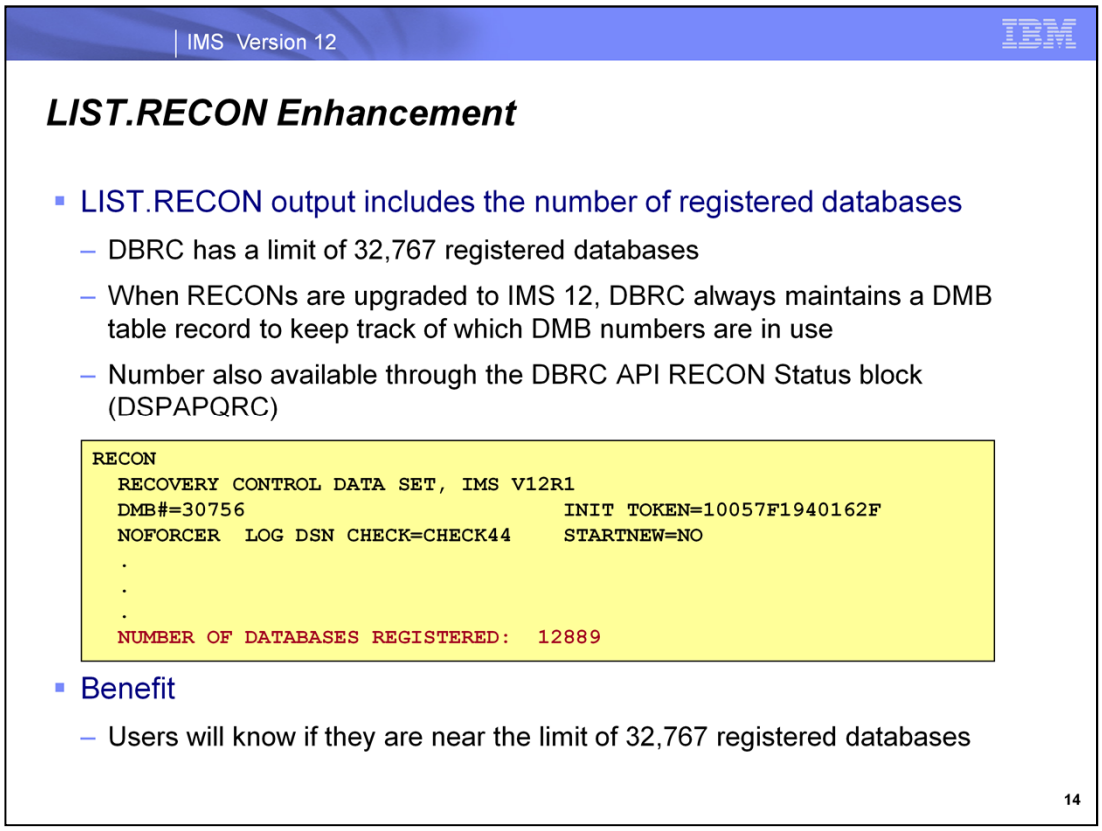
This is an example of a LIST.HISTORY output for a HALDB database data set. The data set is DD POHIDKDM. The M-V data sets are active for this partition. The partner data set for POHIDKDM is POHIDKDA. The reorganization number for the partition is 4.

In this example, subsystem IMS1 opened its log at 09.105 13:04:54.612745. The next line shows that the log was switched. At time 09.105 13:07:22.587345 GLy4 indicates that the database data set was reorganized (G), the reorganization was online (L), the log records may be used for recovery (y) and the reorganization number for the partition is 4. An ALLOC record was created at this time. The next two lines show that the log was switched. Online reorg ended at time 09.105 13:09:09.112382.



IMS 12 keeps track of the number of registered databases in the RECONs. This information is available in the output of a LIST.RECON command. It is also available through the DBRC API since it is kept in the RECON Status block.

After the RECONs are upgraded to IMS 12, DBRC always maintains a DMB table record. This means that IMS 11 and IMS 10 systems will update the table if the RECONs have been upgraded to IMS 12. DBRC keeps track of the DMB numbers which are currently being used. Before IMS 12 the DMB table record was only created when the high used DMB number reached 32767 and previously used DMB numbers were reused. This means that the DMB table record will probably be new for most RECONs.

The example shown here shows that 12889 databases are registered. The next DMB number is 30756. This indicates that many databases that were previously registered have been deleted from the RECONs. Before IMS 12 users would not know if a high value for the DMB# would also mean that there were many databases currently registered. IMS 12 solves this problem by directly tracking and reporting this number.

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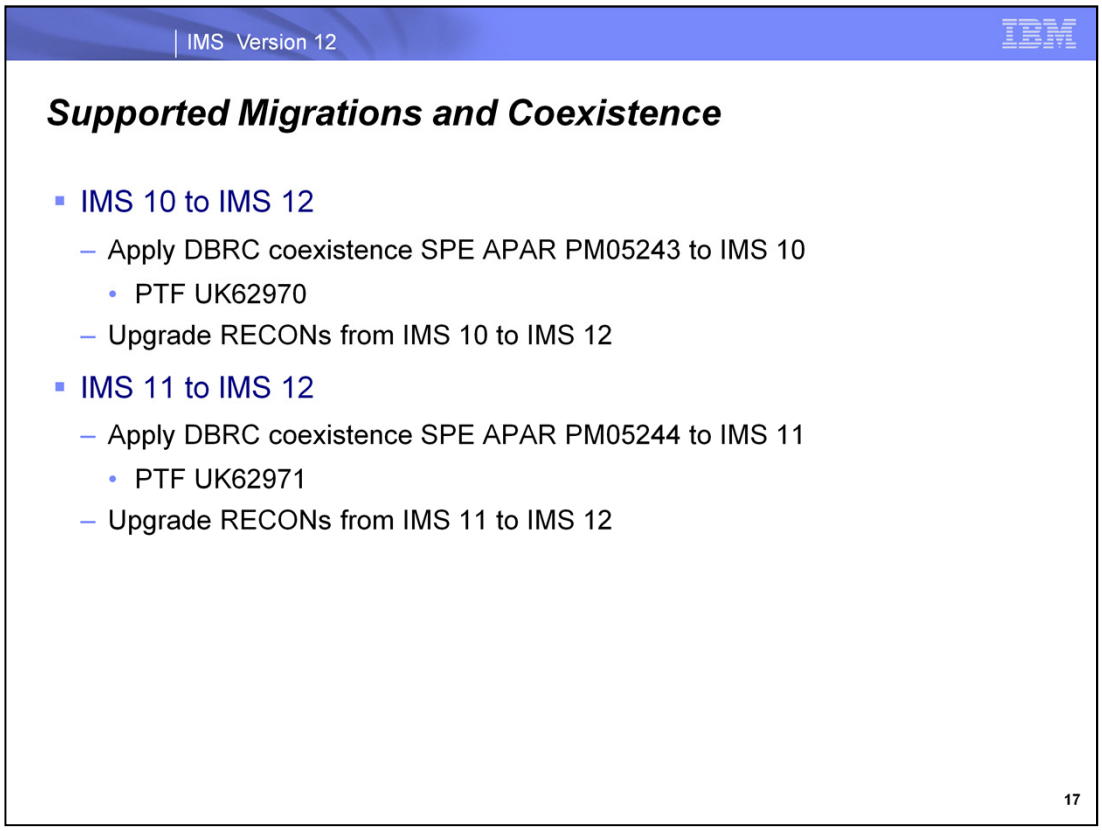
- LIST command enhancements
- User information in IC, RECOV, REORG and CA records
- CA retention period added to CA Group record
- LIST.HISTORY enhancements
- LIST.RECON enhanced to show the number of registered databases

DBRC Migration and Coexistence



IMS 10 RECONs may be upgraded directly to IMS 12. Similarly, IMS 11 RECONs may be upgraded to IMS 12. There is no support to upgrade RECONs from previous releases directly to IMS 12.

PM05243 is an IMS 10 SPE (Small Programming Enhancement) APAR. It allows IMS 10 to use RECONs which have been upgraded to IMS 12. The PTF associated with this SPE is UK62970.

PM05244 is an IMS 11 SPE APAR. It allows IMS 11 to use RECONs which have been upgraded to IMS 12. The PTF associated with this SPE is UK62971.

These APARs should be applied to IMS 10 or IMS 12 before its RECONs are upgraded to IMS 12.

RECON Listings

- "COEXISTENCE LEVEL" in subsystem record listing
  - Added by IMS 10
  - May be used to determine if subsystems would cause an upgrade failure

```
SSYS
 SSID=IMS1      LOG START=10.267 18:45:47.2
 SSTYPE=ONLINE  ABNORMAL TERM=OFF  RECOVERY STARTED=NO   BACKUP=N
 TRACKED=NO     TRACKER TERM=OFF   SHARING COVERED DBS=NO
 IRLMID=**NULL**  IRLM STATUS=NORMAL        GSGNAME=**NULL**
 COEXISTENCE LEVEL=12.1

 AUTHORIZED DATA BASES/AREAS=4      VERSION=10.1 XRF CAPABLE=NO
                                                 ENCODED
   -DBD-        -AREA-    -LEVEL-  -ACCESS INTENT-  -STATE-
   PDHDOKA      **NULL**     0        UPDATE           6
   PDHDOKB      **NULL**     0        UPDATE           6
   PDHDOKC      **NULL**     0        UPDATE           6
   PDHDOKD      **NULL**     0        UPDATE           6
```

- In this example the subsystem is at 10.1 but has the 12.1 coexistence maintenance applied

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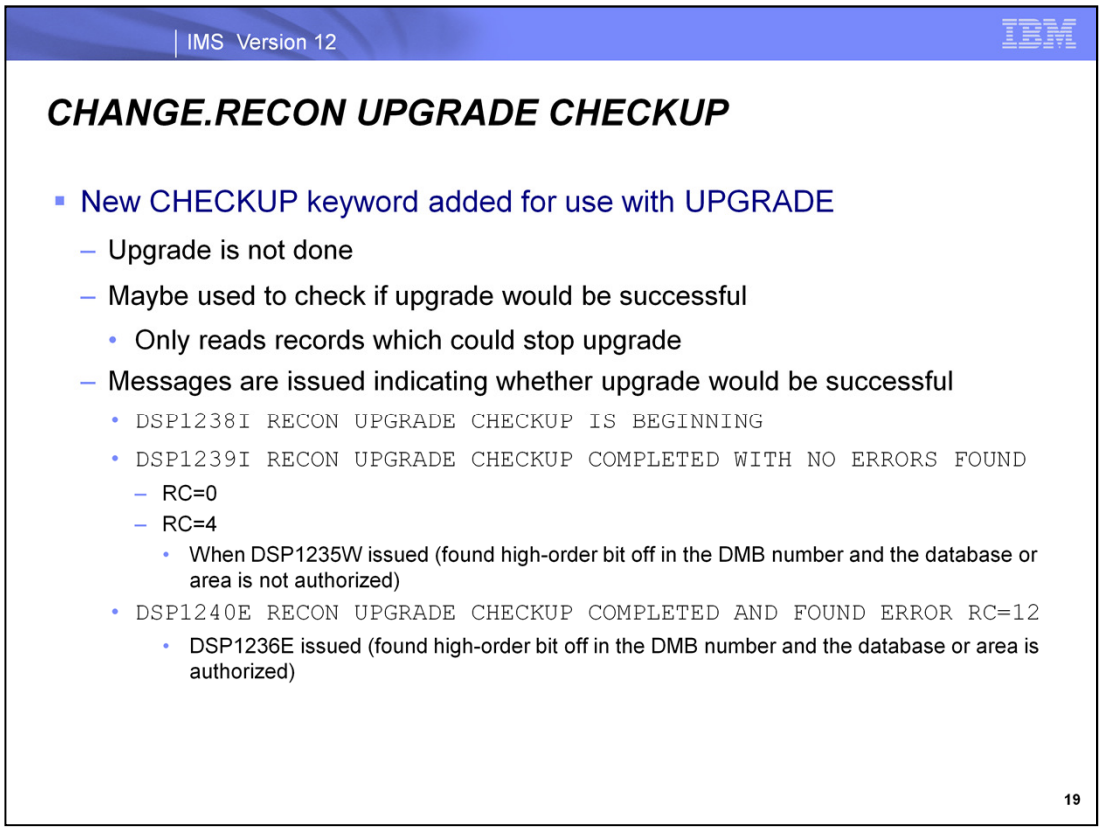
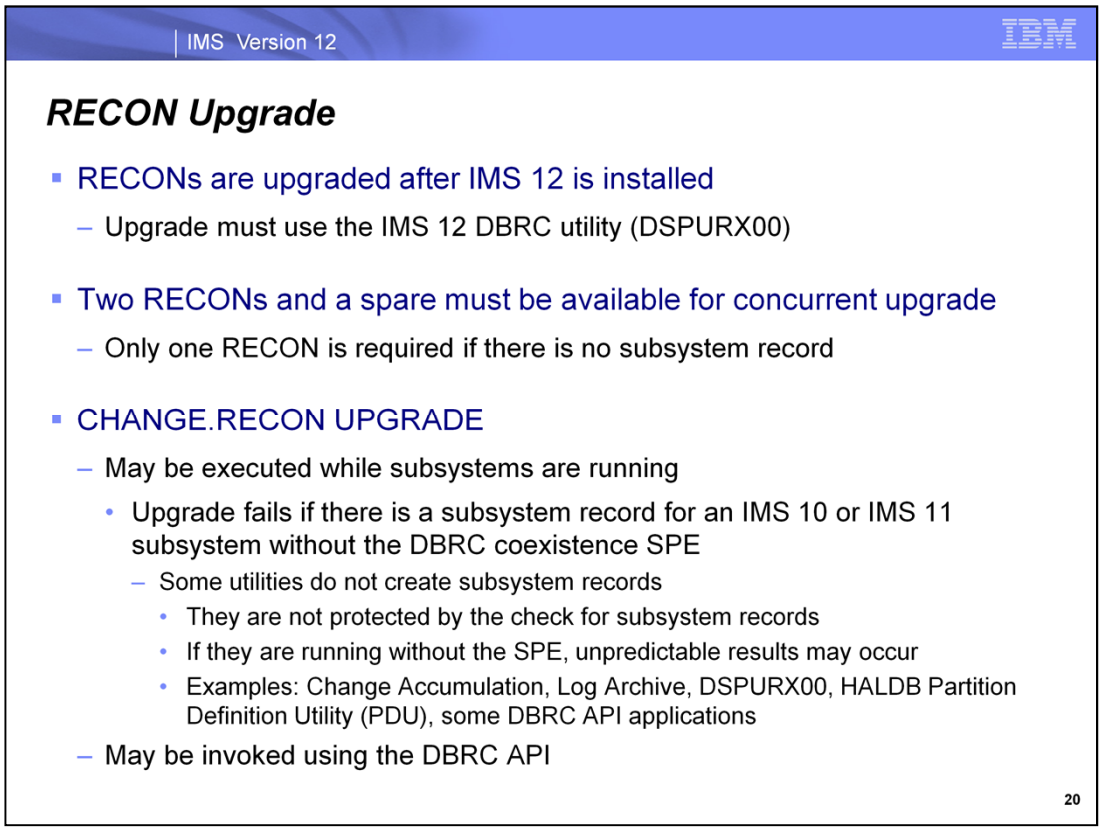
IMS 10 added the coexistence level to the RECON listing of subsystem records. The VERSION= field indicates the IMS release level of the subsystem. The COEXISTENCE LEVEL= field indicates if the coexistence maintenance for a later release has been applied. In this example, the IMS 12 DBRC coexistence maintenance has been applied to the IMS 10 system used by this subsystem. This listing could have been produced by an IMS 10 or IMS 11 DBRC utility with the IMS 12 coexistence SPE applied or it could have been produced by the IMS 12 DBRC utility.



IMS 12 adds the new CHECKUP keyword for the CHANGE.RECON UPGRADE command. When CHECKUP is included in the command, an upgrade is not done; however, all records which could prevent an upgrade from being successful are read. This includes the database records mentioned on the previous page. The DFS1235W and DFS1236E messages are issued when the high-order bit of database records are not on.

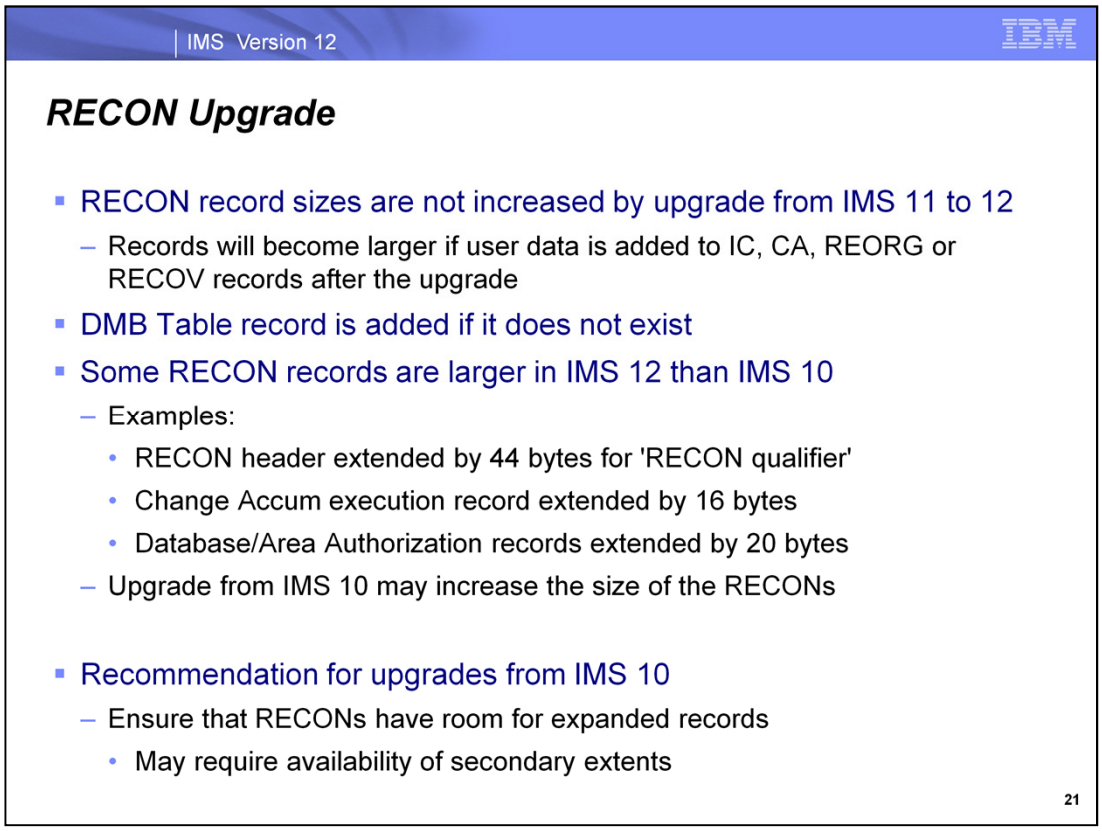


RECONs are upgraded to IMS 12 by using the DBRC CHANGE.RECON UPGRADE command with the IMS 12 DBRC utility (DSPURX00).

The concurrent upgrade process requires that there are two active RECON data sets with an available spare. On the other hand, if there are no subsystem records, the upgrade may be done with one RECON. The upgrade process upgrades the records in COPY1 and then copies COPY1 to COPY2.

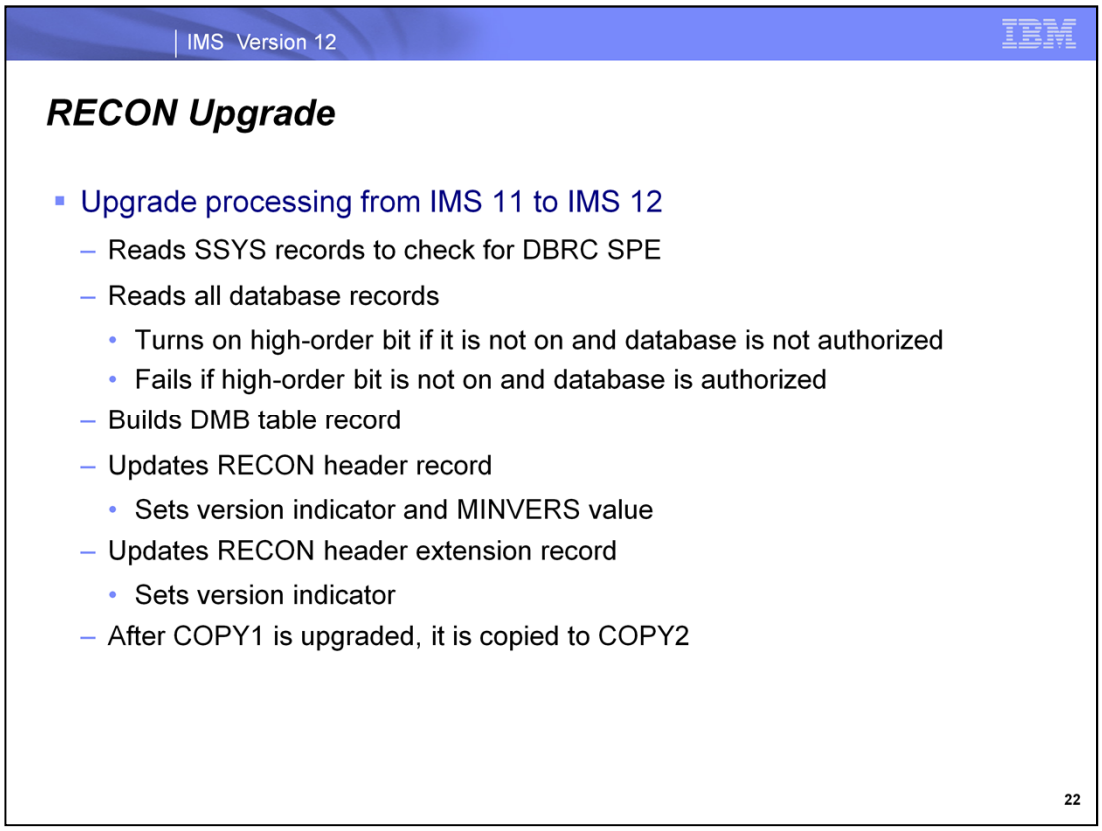
The upgrade may be run while the RECONs are allocated to and being used by IMS 10 or IMS 11. Of course, these systems must be able to use IMS 12 RECONs. The upgrade checks the RECONs to ensure that any subsystems using the RECONs are capable of using IMS 12 RECONs. It does this by examining the SUBSYS records in the RECONs. Some IMS utilities do not create SUBSYS records. Thus, the upgrade cannot determine if they are running. Users must ensure that any IMS utility which is running at the time of the upgrade has the appropriate maintenance (PM05243 or PM05244) which allows it to read IMS 11 RECONs.

IMS 10 added the capability to issue DBRC commands from programs using the DBRC API. This includes the capability to issue the CHANGE.RECON UPGRADE command.



The upgrade of RECONs from IMS 11 to IMS 12 does not increase the size of the records. On the other hand, the size of IC, CA, REORG and RECOV records could be larger if user data is added to them by NOTIFY or CHANGE commands. The upgrade will add a DMB Table record if it does not already exist. It probably does not exist because it was only built in previous releases of IMS when the global DMB number reached 32,767 and reuse of these numbers was begun.

The upgrade of RECONs from IMS 10 to IMS 12 will increase the size of some RECON records. The RECON header is extended by 44 bytes to accommodate the RECON qualifier which was added in IMS 11. The Change Accum execution records are extended by 16 bytes. Authorization records for databases and areas are extended by 20 bytes. This means that an upgrade from IMS 10 to IMS 12 may increase the size of the RECON data sets; however, it is unlikely that this will be a significant increase in the overall size. Nevertheless, you should ensure that the RECONs have room for the expanded records.



The upgrade of the RECONs includes the reading of the subsystem (SSYS) records to ensure that these subsystems are running with the DBRC coexistence SPE. If not, the subsystem could not use the RECONs and the upgrade fails.

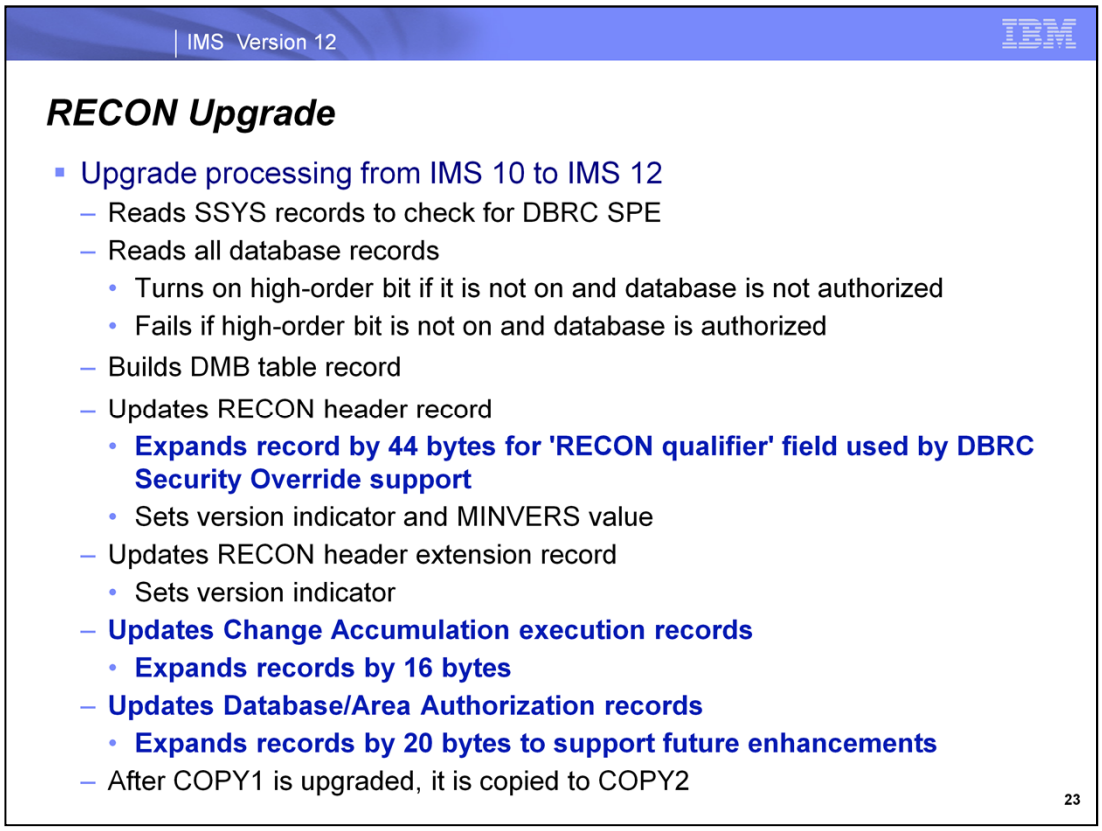
The update changes a few records in the RECONs.

All database records are read. A check is made to ensure that the high-order bit of the DMB numbers is on. If it is not on and the database is not authorized, the bit is turned on. If the high-order bit is not on and the database is authorized, the upgrade fails. The count of database records is kept. If the DMB table does not exist, it is built. If it does exist, it is rebuilt. The count of database records is kept.

The version indicator is set to 12 and the MINVERS value is set to ‘10.1' if it previously was ‘9.1'. The Cross DBRC Service Level ID (CDSLID) is set to the higher of the value in the RECONs before the upgrade and "1".

The version indicator in the RECON header extension record is set to 12.

The upgrade is done by upgrading the records in COPY1 and then copying it to COPY2.



The upgrade of the RECONs includes the reading of the subsystem (SSYS) records to ensure that these subsystems are running with the DBRC coexistence SPE. If not, the subsystem could not use the RECONs and the upgrade fails.

The update changes a few records in the RECONs.

All database records are read. A check is made to ensure that the high-order bit of the DMB numbers is on. If it is not on and the database is not authorized, the bit is turned on. If the high-order bit is not on and the database is authorized, the upgrade fails. The count of database records is kept. If the DMB table does not exist, it is built. If it does exist, it is rebuilt. The count of database records is kept.

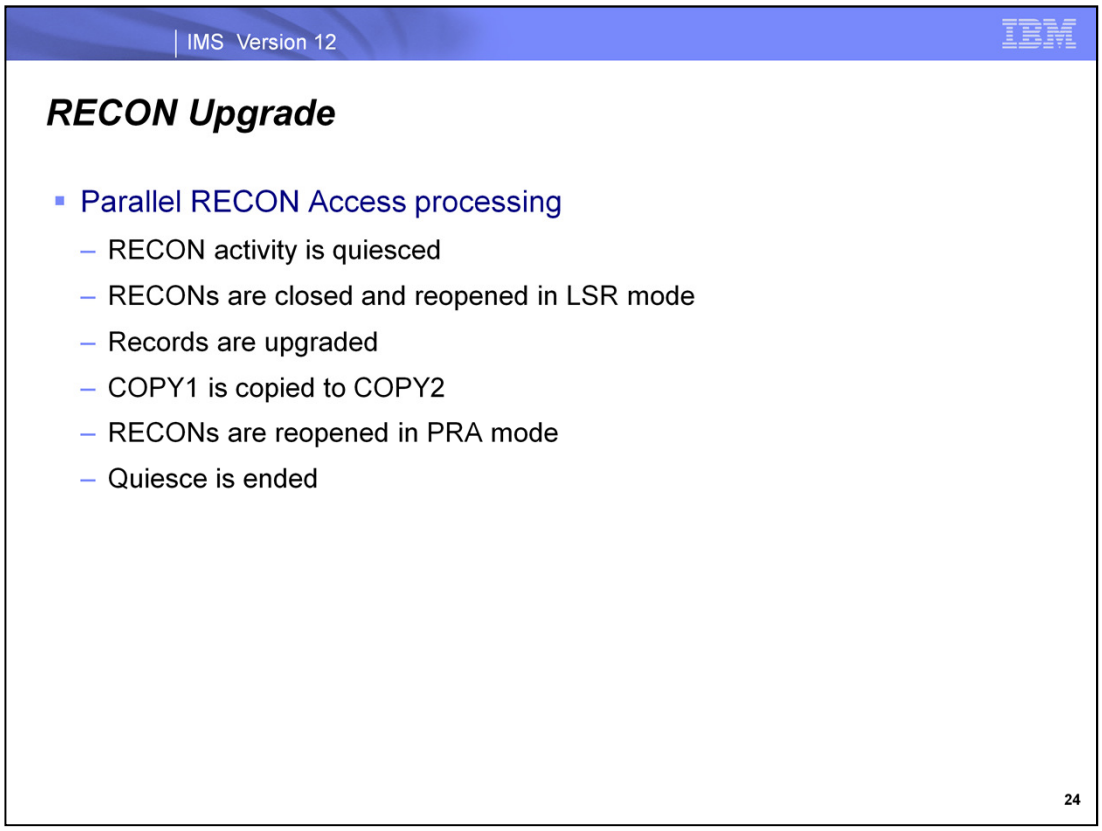
The header record is expanded for support of DBRC Security Override for Copies of RECONs. The version indicator is set to 12 and the MINVERS value is set to ‘10.1' if it previously was ‘9.1'. The Cross DBRC Service Level ID (CDSLID) is set to the higher of the value in the RECONs before the upgrade and "1".

The version indicator in the RECON header extension record is set to 12.

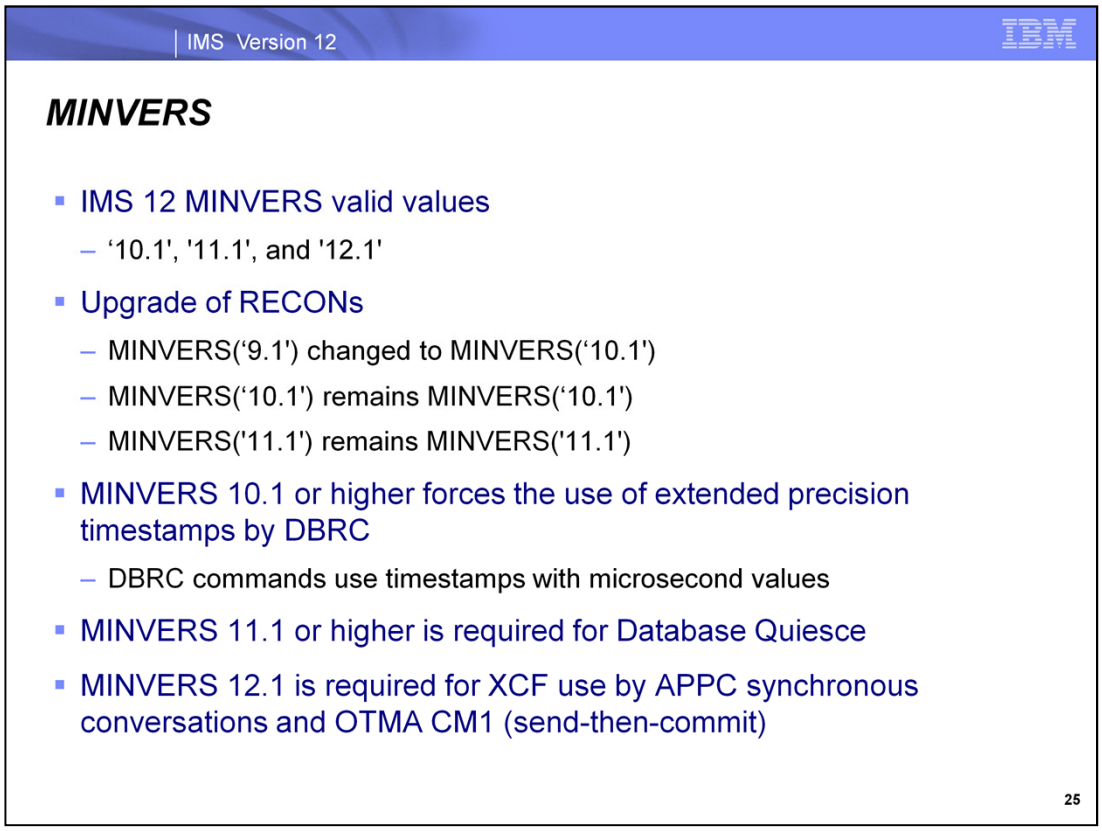
The Change Accumulation Execution records are expanded for support of user data.

The Database records and Area Authorization records are expanded by 20 bytes to support future enhancements.

The upgrade is done by upgrading the records in COPY1 and then copying it to COPY2.



If Parallel RECON Access is in effect, there cannot be any shunted I/O when the upgrade begins. The process begins with a quiesce close and a check for shunted I/O. The RECONs are closed and reopened in LSR mode. The records are upgraded as they are for non-PRA. This includes upgrading the records in COPY1 and then copying COPY1 to the spare. After the upgrade completes, the RECONs are reopened in PRA mode and the quiesce is ended.



MINVERS is the parameter on the INIT.RECON and CHANGE.RECON commands which controls the minimum level of IMS which may use the RECONs. The minimum level of IMS which can use IMS 12 RECONs is IMS 10. If the previous MINVERS value was for 9.1', it is changed to ‘10.1' by the upgrade. Otherwise, upgrades do not change the MINVERS value.

When the RECONs are upgraded to IMS 12 the minimum MINVERS value is 10.1. MINVERS 10.1 or higher causes DBRC to use timestamp with microsecond values. With MINVERS 9.1 or lower, the timestamps were only sensitive to tenths of seconds. Some DBRC commands must specify timestamps. For example, a command used to specify an IC record must specify its timestamp. These commands must specify these timestamps with microsecond accuracy when MINVERS 10.1 or higher is used.

MINVERS 11.1 is required for the use of the Database Quiesce function which was introduced in IMS 11.

MINVERS 12.1 is required for XCF use (instead of RRS) by APPC synchronous conversations and OTMA CM1 (send-then-commit).

Log Archive (DFSUARC0) Region Size

- After RECONs are upgraded to IMS 12, then IMS 11 or IMS 10 Log Archive jobs will use additional memory
  - Both the IMS 12 and either IMS 10 or IMS 11 versions of RECON records are kept in memory
    - DBRC converts the records to IMS 10 or IMS 11 for processing by IMS 10 or IMS 11
- Recommendation
  - Use REGION=0M for IMS 10 and IMS 11 archive jobs

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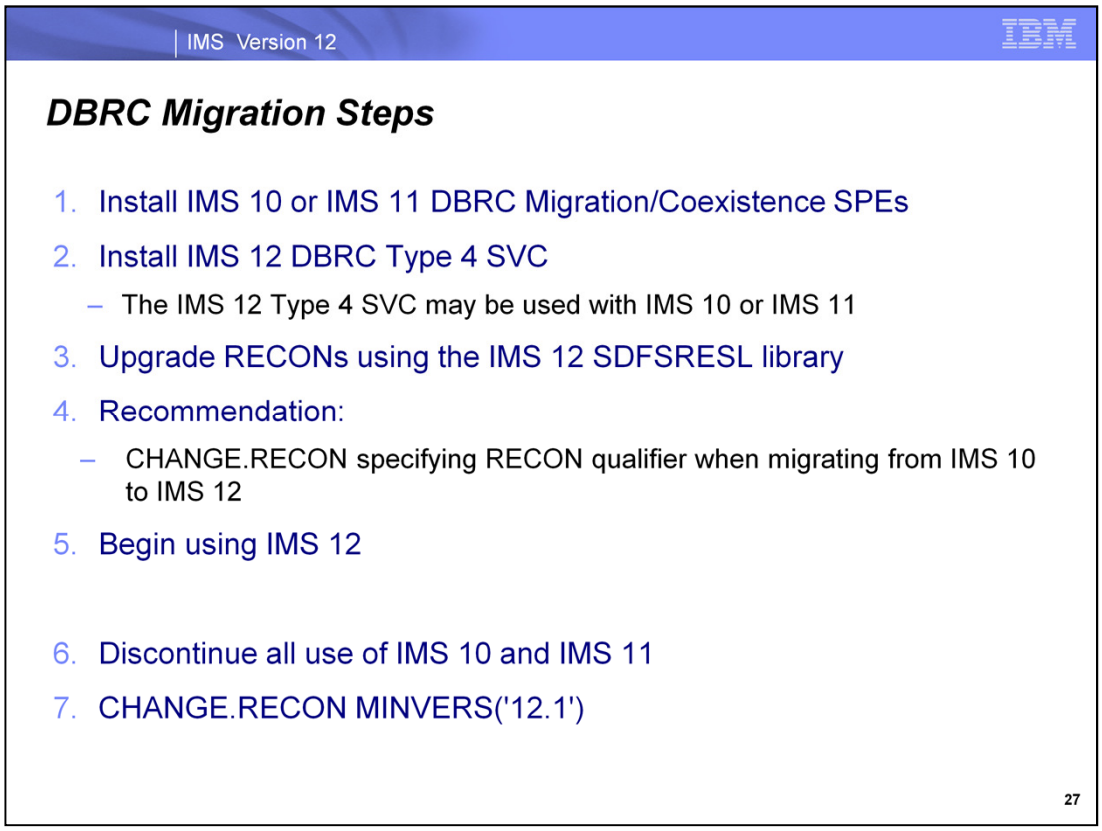
When the RECONs are at a higher level than the Log Archive utility, the utility keeps two copies of each RECON record. One is at the higher level. It is read from the RECONs or written to the RECONs. The other copy is at the lower level. It is processed by the utility. Records are converted from one level to the other when necessary. The second copy of each RECON record uses extra memory. This increases the memory requirement for the utility when it uses RECONs at a higher level.



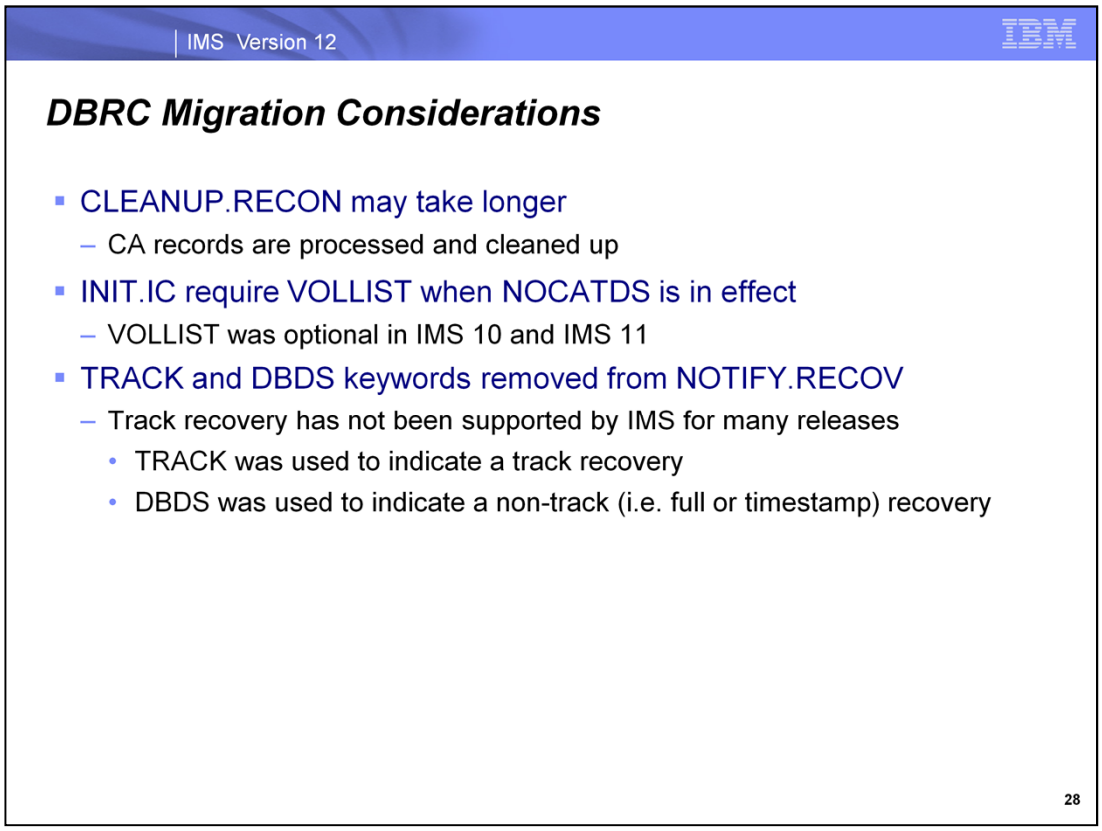
This shows the DBRC steps for migration to IMS 12.

The first set of steps allows you to begin using IMS 12. The migration/coexistence SPE must be installed on the old release before you upgrade the RECONs to IMS 12. The IMS 12 DBRC Type 4 SVC must be installed before you may use IMS 12. The upgrade of the RECONs to IMS 12 requires that you use the SDFSRESL library created by the installation of IMS 12. The upgrade using this library will be to the IMS 12 format. Once the RECONs have been upgraded, you may begin using IMS 12. You may also continue to use IMS 10 or IMS 11. If you are upgrading from IMS 10, you may want to specify the RECON qualifier by issuing the CHANGE.RECON command after the upgrade completes.

If you are migrating from IMS 10 to IMS 11 you may want to take advantage of the RECON qualifier that was introduced in IMS 11. The RECON qualifier makes it easier to use copies of RECONs when security is being used. Security is only invoked when the RECON qualifier is included in the data set name of COPY1 of the RECONs. It is assumed that you will not want security for a copy.

When you upgrade the RECONs to IMS 12, the MINVERS value will be 10.1 or higher. Full precision timestamps will be used by DBRC. If the MINVERS value was previously, ‘9.1’ this will be a change.

Once you have discontinued all use of IMS 10 and IMS 11, you can change the MINVERS value to '12.1'.



When CLEANUP.RECON is executed in IMS 12 it may take longer than it would under IMS 11. With IMS 12 it cleans up Change Accumulation execution records. This does not occur with IMS 11.

INIT.IC requires that the VOLLIST keyword be specified when NOCATDS is in effect. Previous IMS versions did not require this on the command, although the VOLLIST parameter was required for the actual use of the data sets.

The TRACK and DBDS keywords have been removed from the NOTIFY.RECOV command. TRACK was used to indicate a track recovery. DBDS was used to indicate any other recovery, that is, full or timestamp. Since track recovery has not been supported by IMS for many releases, there is no use for these keywords. DBDS was the default. In IMS 12 it cannot be specified.