DB2 OBJECT ANALYSIS and MANAGEMENT

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Information Management software

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Presentation Agenda

- Overview and Terminology
- DB2 SMU
  - History and Roadmap
  - Extract and Object Information
  - Scan
  - Space Map
- DB2 Automation Tool
  - Architecture
  - Profiles
  - D/R Support
- V8 Automatic Space Management
- Recent DB2 for z/OS Tools Announcements
- Wrap-up and Q&A

DB2 Object Analysis and Management

Introduction and Terminology

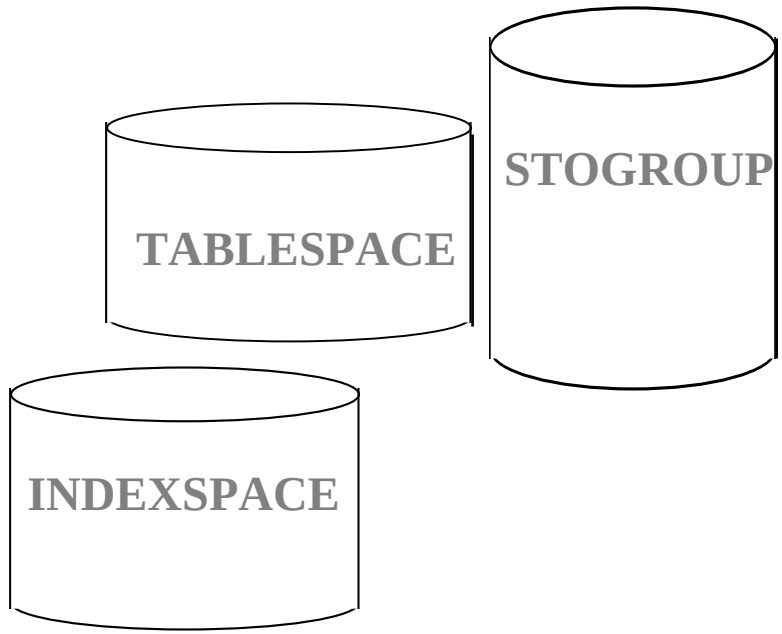
Information Management software

DB2 Objects

- **What are DB2 Objects?**
- **Where are the definitions stored?**

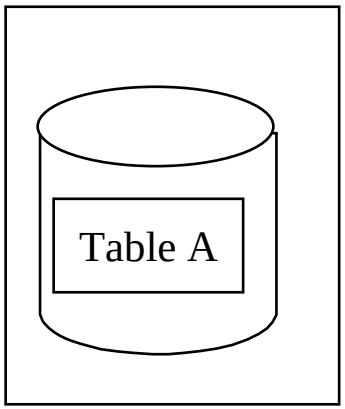
DATABASE
TABLE
COLUMN
VIEW
INDEX
SYNONYM
ALIAS
AUTHORIZATION

PLAN
DBRM
PACKAGE



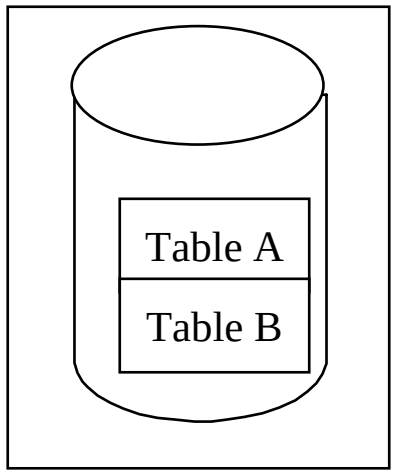
DB2 Table Spaces

- **Table Space - One or more VSAM linear datasets where one or more tables are stored.**



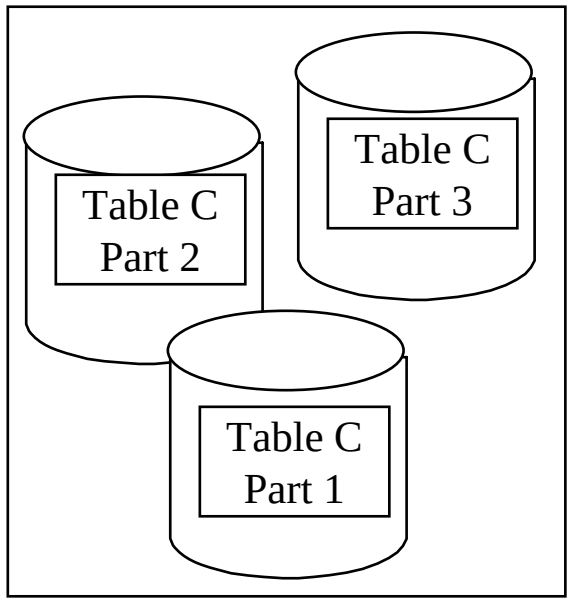
Simple Table Space

1 VSAM dataset



Segmented Table Space

1 VSAM dataset



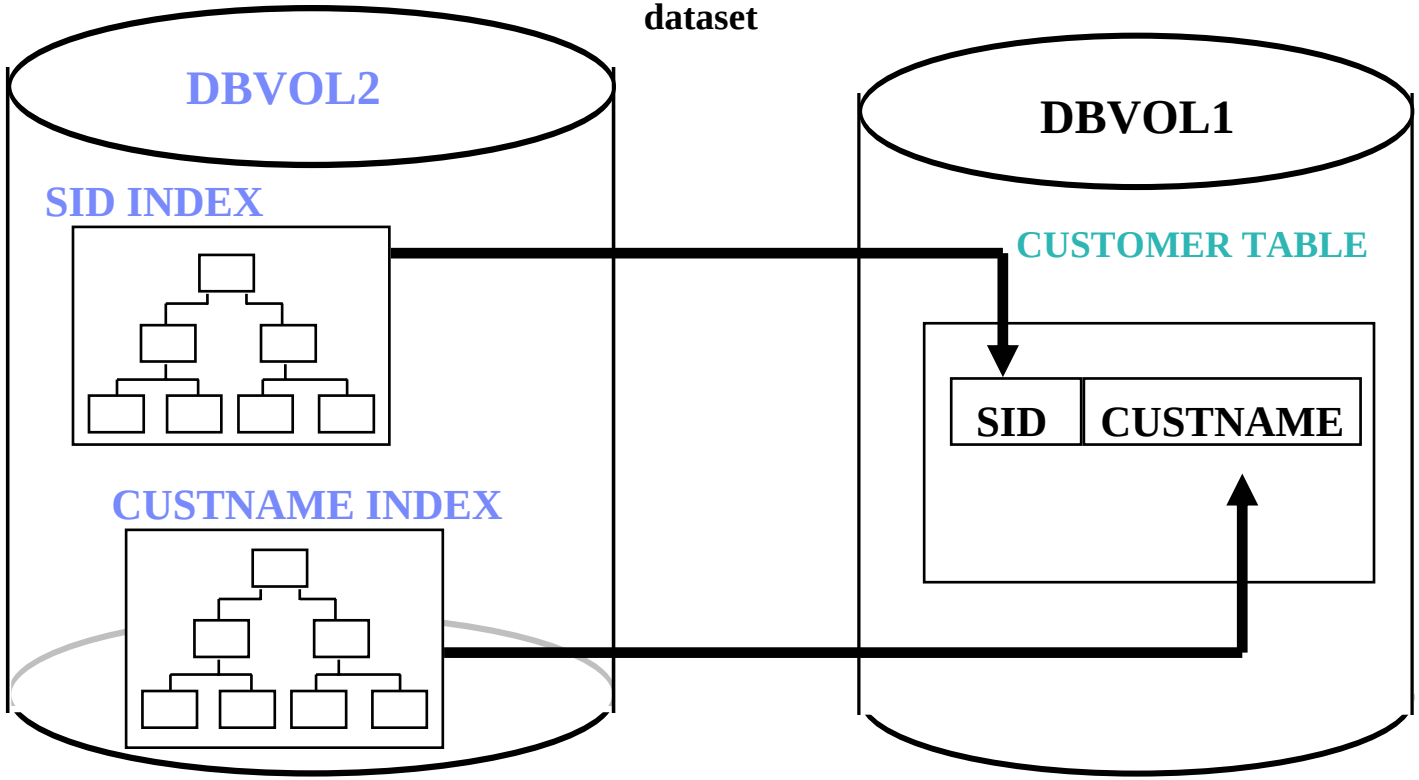
Partitioned Table Space

3 VSAM datasets

DB2 Index Spaces

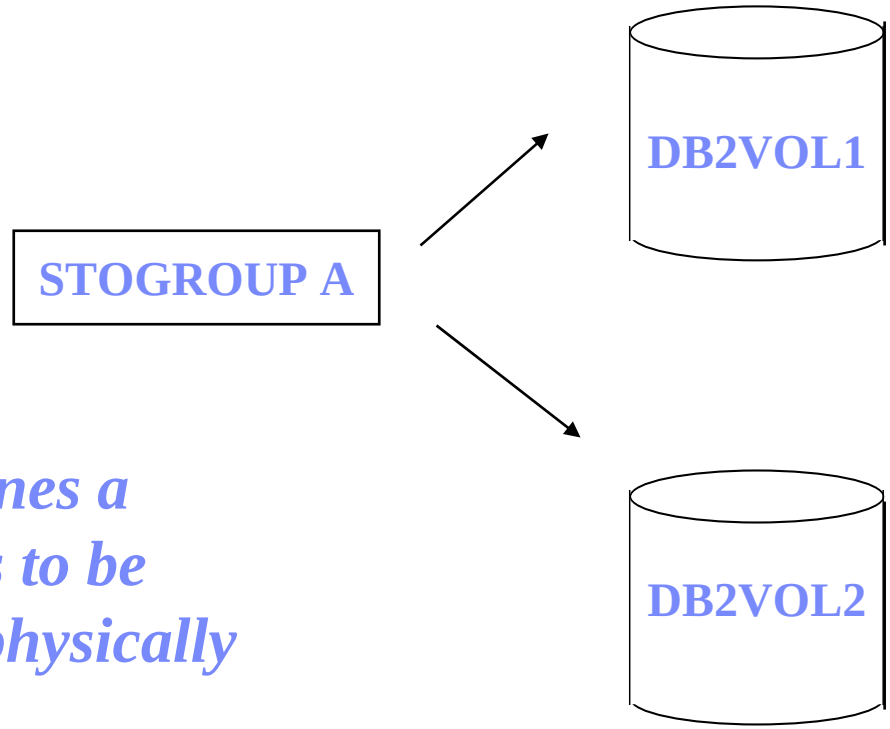
- **Index Space**

INDEXES reside in their own phsysical dataset



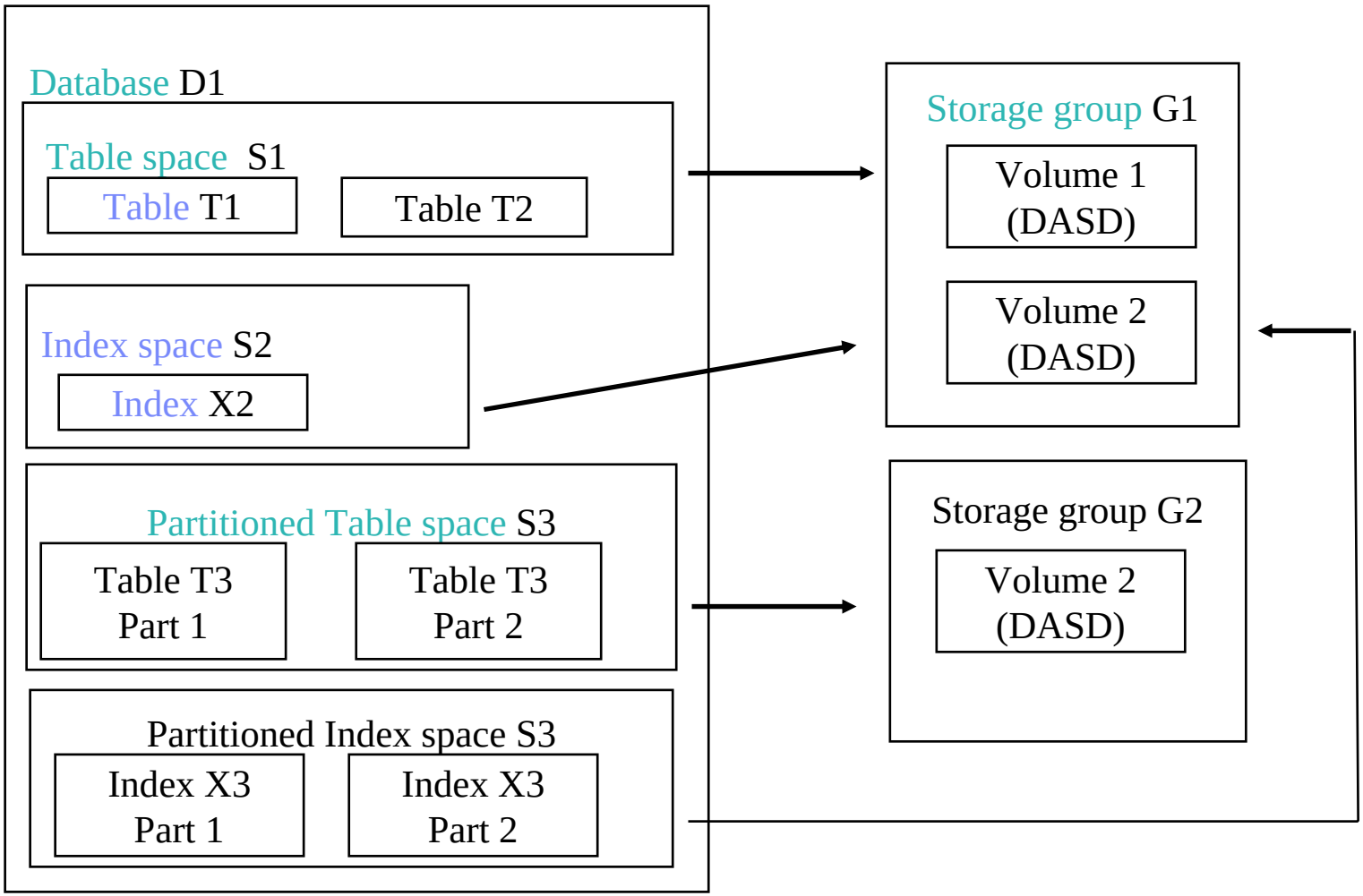
DB2 Storage Groups

- **STOGROUP**



A STOGROUP defines a set of DASD volumes to be selected by DB2 for physically storing the data.

DB2 Structure - Data Objects



Space Management Challenges

- There is no one-to-one correspondence between DB2 objects and MVS DASD definitions.

DB2	MVS
Storage Group	Volumes
Database	
Tablespace	VTOCs
Table	
Index	ICF Catalogs
View	
Synonym	Datasets
Row	
Column	Extents
Page	

VSAM Linear Dataset

- Create Tablespace statement will define automatically a VSAM linear dataset with naming convention:

  Single Tablespace or Segmented Tablespace

  ICAT.DSNDBC.database.tablespace.I0001.A001

  Partitioned Tablespace

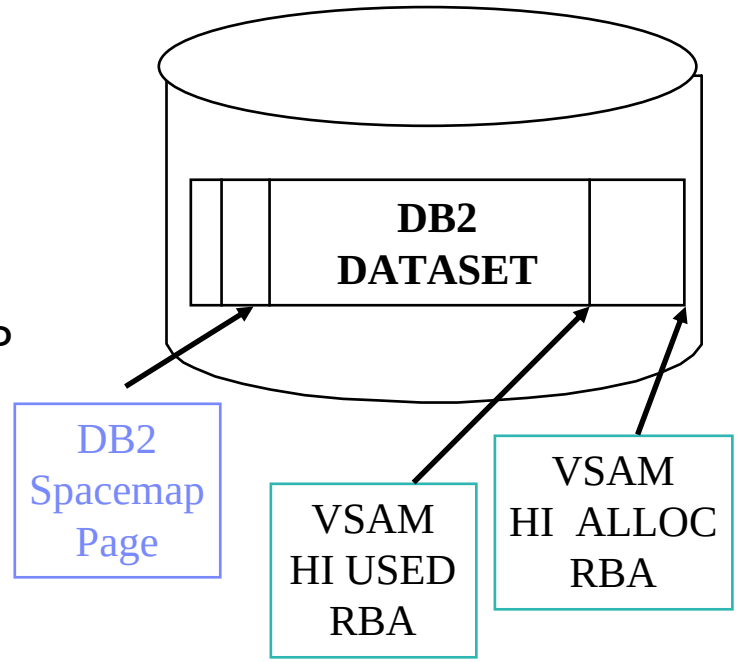
  ICAT.DSNDBC.database.tablespace.I0001.A001

  ICAT.DSNDBC.database.tablespace.I0001.A002

  ICAT.DSNDBC.database.tablespace.I0001.A003

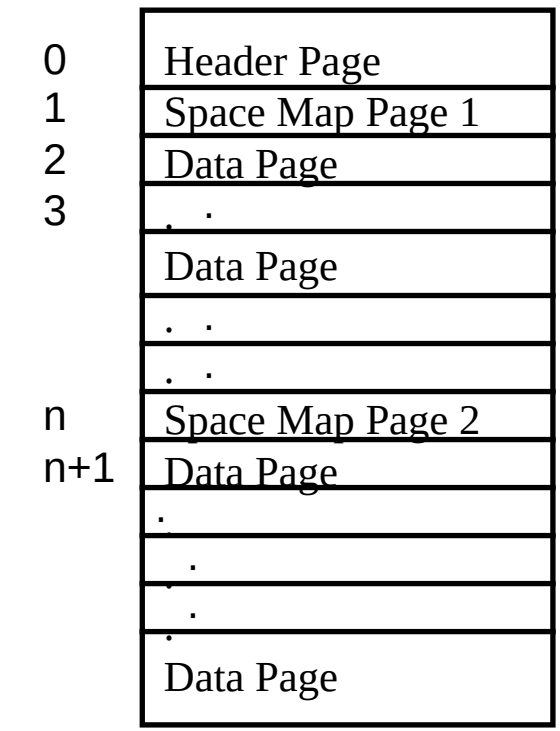
DB2 and VSAM

- VSAM control information stored in MVS catalog
- Number of DASD bytes allocated
  - HI ALLOC RBA
- Number of DASD bytes formatted
  - HI USED RBA
- Number of EXTENTs
- Actual space used stored in DB2 SPACEMAP (= or < than HI USED RBA)



DB2 Page Types

- Header Page
  - Contains control information that DB2 uses
- Space Map Page
  - Identifies the data pages that have enough free space for additional data to be inserted
- Data Page
  - Contains user data (file page sets)
  - Contains index entries that point to user data (index page sets)



DB2 Object Analysis and Management

DB2 Storage Management Utility V1.1 (SMU)

Information Management software

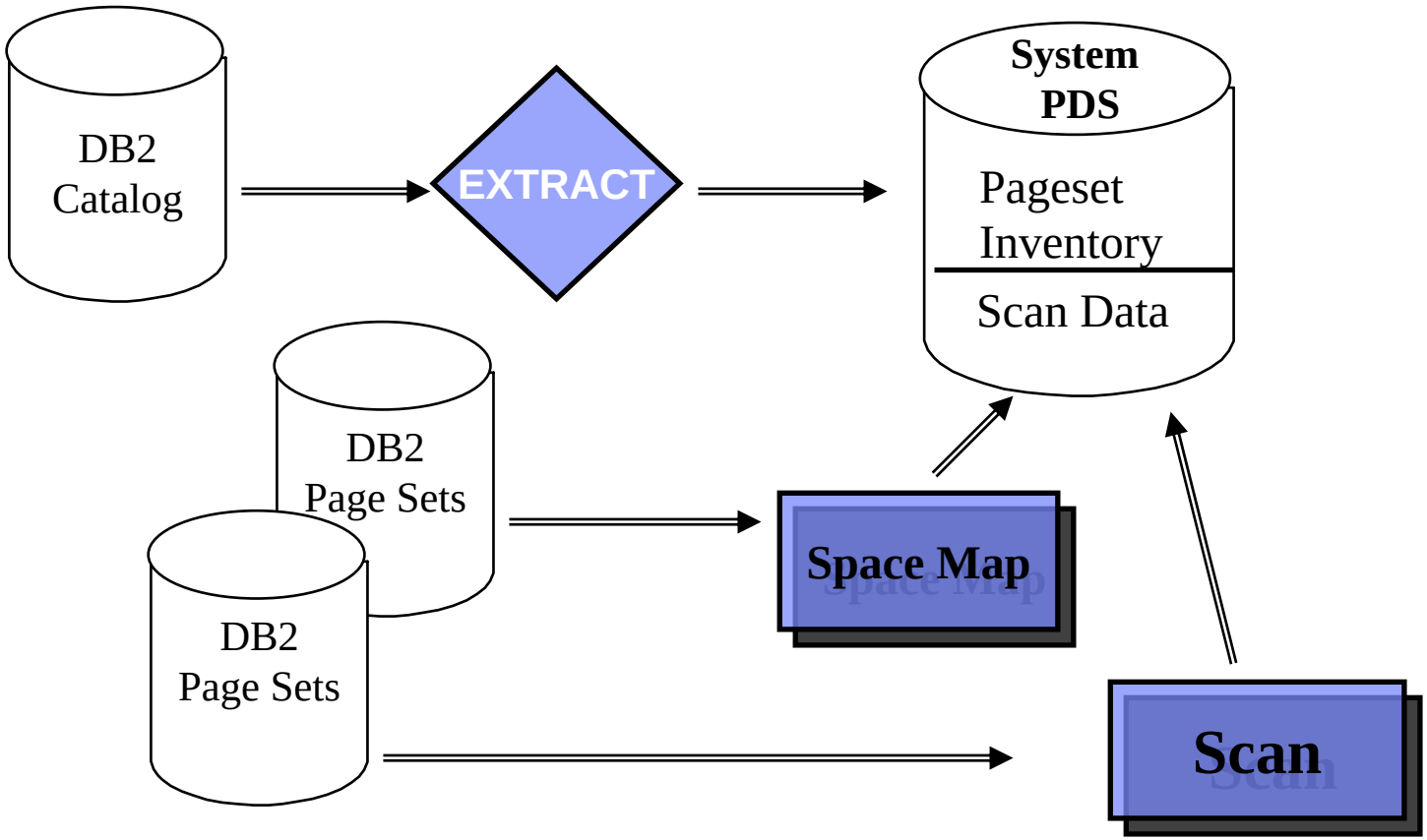
Space Management Problems

- How much DASD space this tablespace really used?
  - DB2 STOSPACE utility reports Kilobytes for Storage Group
  - VSAM LISTCAT reports vsam dataset names only
  - No DB2 DASD usage history
- What's DB2 internal space map like? How was my data loaded into pages?
  - RUNSTATS utility offers no graphics

Statement of Direction for !DB/DASD – !DB/SMU

- Statement of direction from December 7 Announcement 204-297 (USA)
  - IBM plans to develop new products for performance management and storage management for DB2 UDB for z/OS. The technology base for these products will merge some of the recently acquired technology from Candle Corporation with existing technology from the IBM DB2 tools.
  - The storage management product will, over time, converge and expand the capabilities of: IBM DB2 DB/DASD (5608-A13) and IBM DB2 DB/SMU (5608-A17). The utility generation component of IBM DB2 DB/SMU will not be part of the new product.
  - If at the availability date of the new product you have current Subscription and Support for:
    - IBM DB2 DB/DASD and IBM DB2 DB/SMU, then you will be offered a no-charge upgrade to the new product.
    - IBM DB2 DB/DASD, then you will be offered a priced upgrade to the new product.
    - IBM DB2 DB/SMU, then you will be offered a priced upgrade to the new product.

Architecture

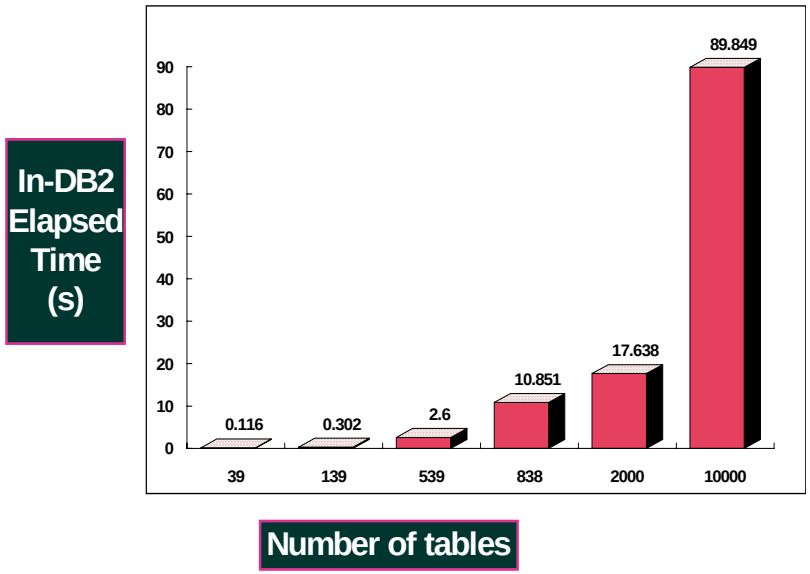


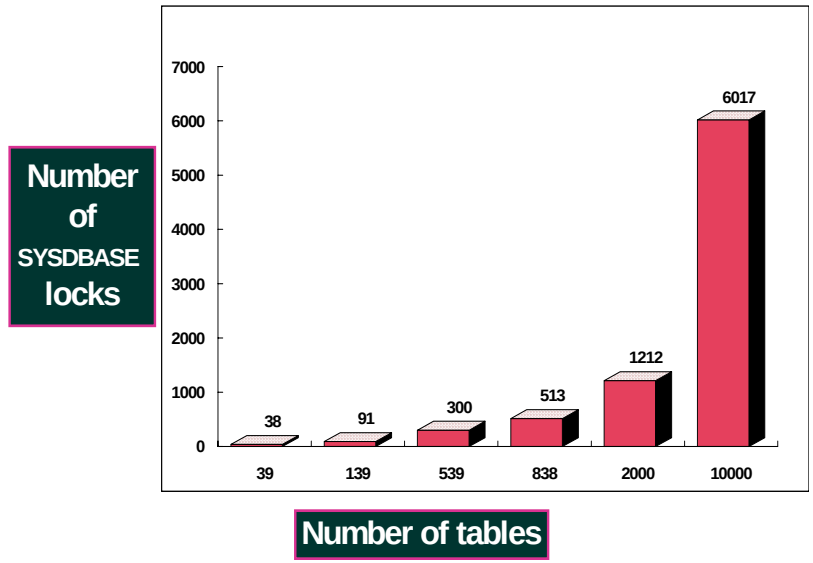
Why extract based reporting?

104 Databases
651 Tablespaces
810 Tables
666 Views
710 Indexes
22,105 Columns

111 SQL Calls
1 Sort
3,803 Locks
79,598 Rows/Keys Processed
107 Rows in Result Set

In-DB2 Elapsed Time - 16.662 Seconds
In-DB2 CPU Time - 2.003 Seconds





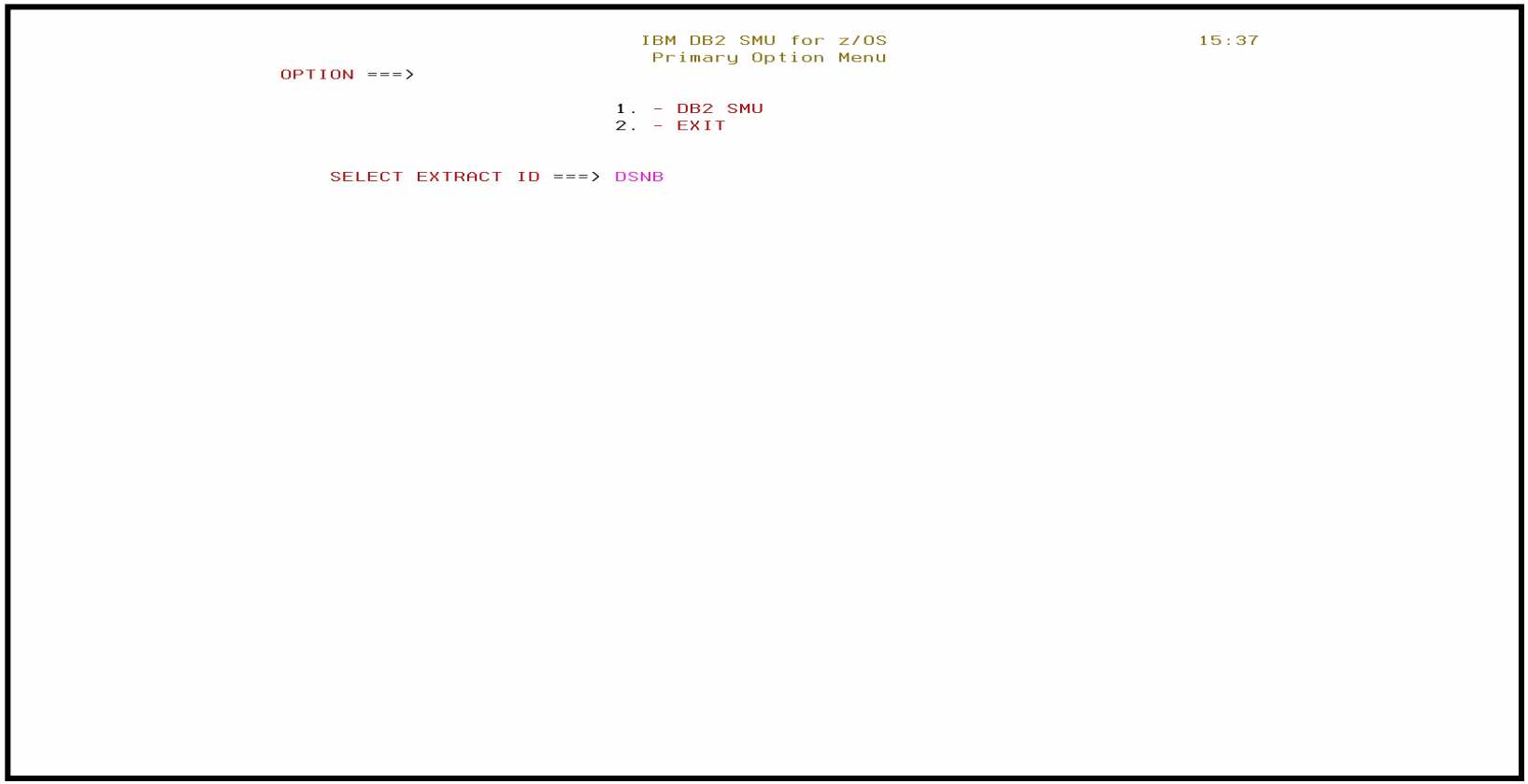
Batch Extract – Highly Recommended!!!

```
  File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
EDIT       DB2SMU.V1R1.SKTSSAMP(DSNBJXTS) - 01.00          Columns 00001 00072
000021 //COMPRESS EXEC  PGM=IEBCOPY,REGION=2048K
000022 //SYSPRINT DD  SYSOUT=*
000023 //SYSUT3   DD  UNIT=SYSDA,SPACE=(CYL,(5))
000024 //SYSUT4   DD  UNIT=SYSDA,SPACE=(CYL,(5))
000025 //STATPDS  DD  DISP=OLD,
000026 // DSN=DB2SMU.V1R1.DSNB.SMU.SYSTEM
000027 //STATUPDS DD  DISP=OLD,
000028 // DSN=DB2SMU.V1R1.DSNB.SMU.USER
000029 //STATLPDS DD  DISP=OLD,
000030 // DSN=DB2SMU.V1R1.DSNB.SMU.LOG
000031 //SYSIN    DD  DISP=SHR,
000032 // DSN=DB2SMU.V1R1.SKTSSAMP(KTSPCTLU)
000033 //*
000034 //*     NOW RUN THE CATALOG EXTRACT
000035 //*
000036 //EXTRACT  EXEC  PGM=KTSXTRCT,PARM='DB2=DSNB',REGION=4096K
000037 //STEPLIB  DD  DISP=SHR,DSN=DB2.V7R1M0.SDSNLOAD
000038 //          DD  DISP=SHR,DSN=DB2SMU.V1R1.SKTSLOAD
000039 //          DD  DISP=SHR,DSN=DB2.V7R1M0.DSNB.SDSNEXIT
000040 //          DD  DISP=SHR,
000041 //              DSN=DB2.V7R1M0.DSNB.RUNLIB.LOAD
000042 //SYSUDUMP DD  SYSOUT=*
000043 //KTSPRINT DD  SYSOUT=*
000044 //SYSPRINT DD  SYSOUT=*
000045 //KTCPROFI  DD  DSN=DB2SMU.V1R1.PROFILE,DISP=SHR
****** ***************************** Bottom of Data ******************************
```

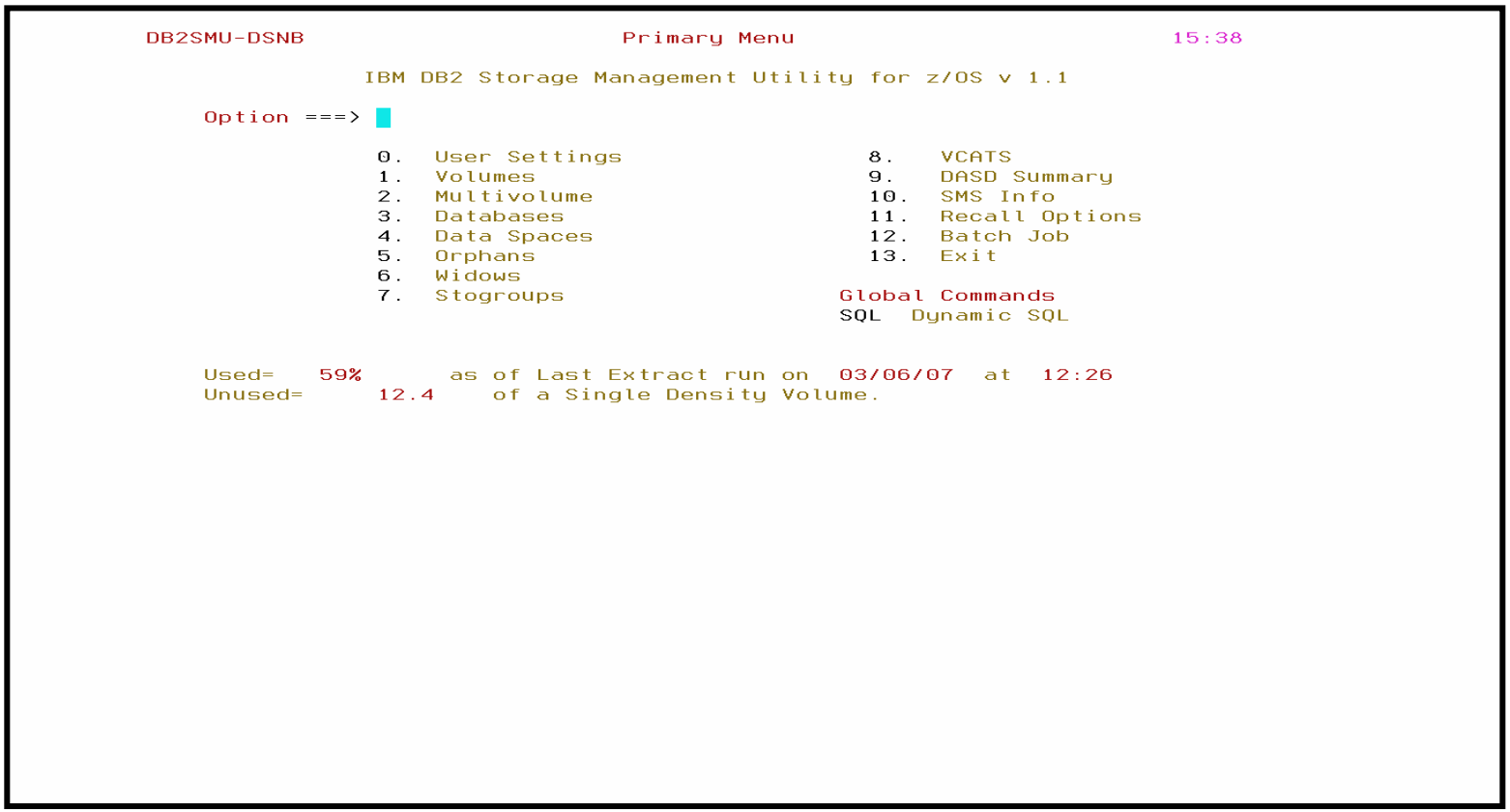
Run Extract – ISPF (Notice the NOTE!!☺)

```
DB2SMU-DS                        Run New Extract                        15:38

                DB2 data is extracted from the DB2 catalog
                using an SQL program that SELECTs the data
                from the DB2 Catalog tables.

                This was last done on 03/06/07 at  11:41


                You must have SELECT authority for the
                DB2 Catalog tables to be able to run the
                extract program.  If you do not, then it
                will fail with an SQL error.

          NOTE: The extract may take a very long time.
                Please do not run it during prime time unless necessary.

                If you do not want to extract at this time, Press END.

                To continue with the extract, Press ENTER.
```

SMU Primary Option Menu

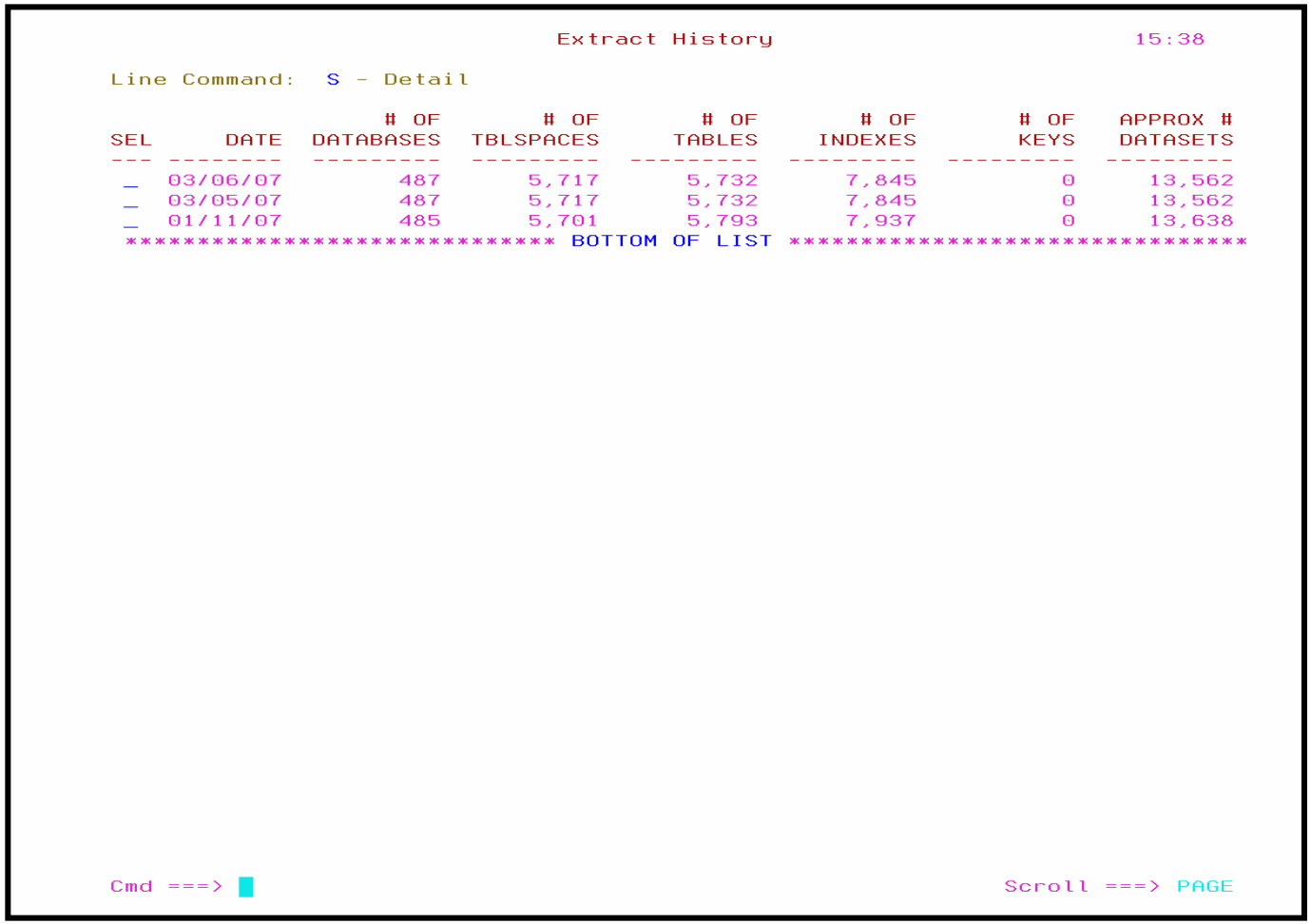


Primary Menu

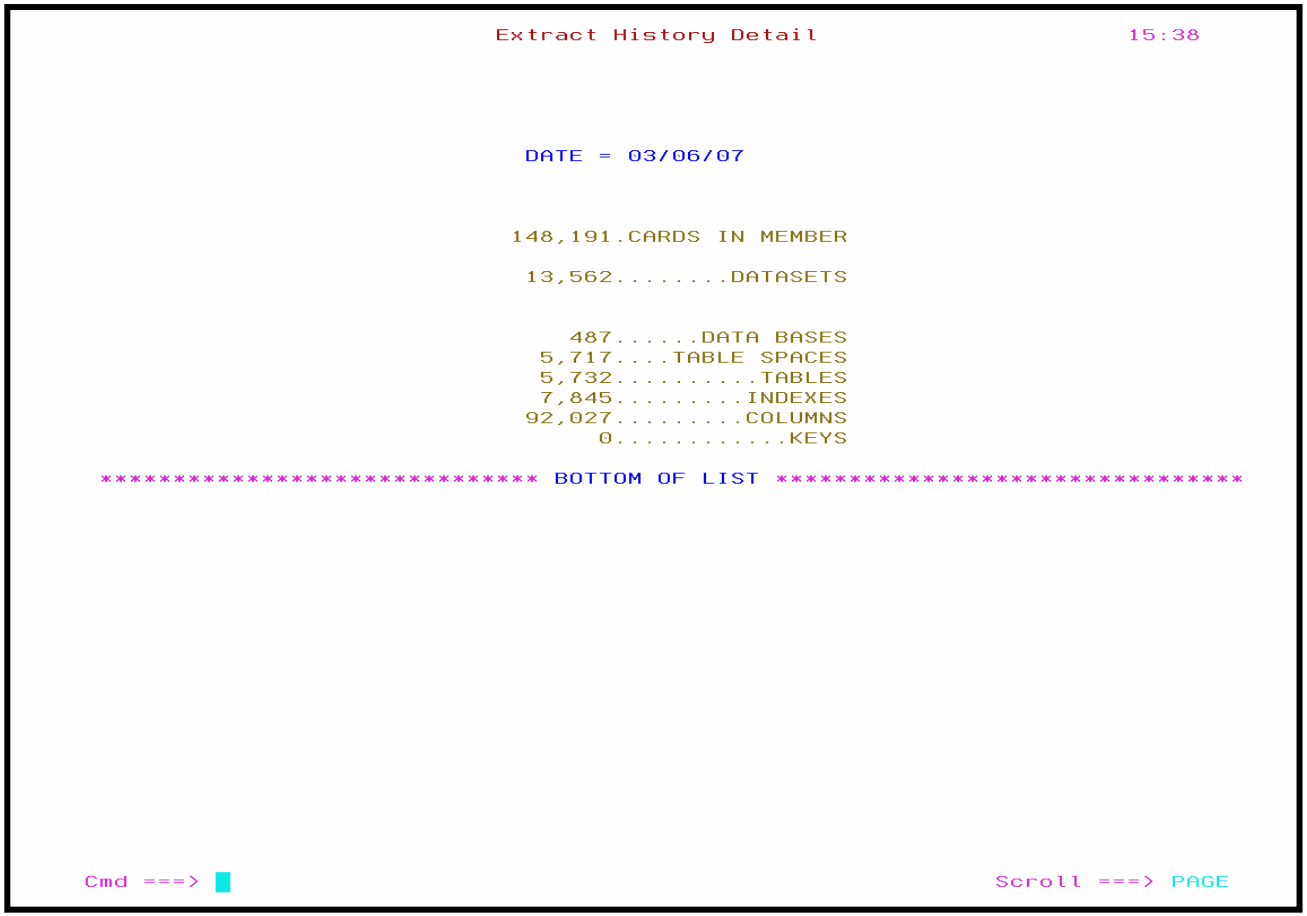


User Settings

Extract History



Extract History Detail



DASD Summary

```
DB2SMU-DSNB                        DASD SUMMARY HISTORY                          16:29
                                                                        SUMMARY 1 OF 4
Line Commands:  D - Detail
-------------------------------------------------------------------------------------
                          # OF    # OF MIGRAT *ERROR     XTS/     ALLO     USED  % ALLO
SEL      DATE    TIME     VOLS   DSETS  DSETS  DSETS     DSET       MB       MB    USED
--- -------- ------ ------ ------ ------ ------ ------- ------- -------- -------- -------
 _   03/17/07  16:25      66 13,518      7    244     1.1   19407    11483      59
 _   03/06/07  12:26      66 13,501      7    242     1.1   19399    11476      59
 _   03/05/07  17:16      66 13,501      7    242     1.1   19399    11476      59
 _   01/11/07  11:42      66 13,577      7    237     1.1   20219    11772      58
 ******************************* BOTTOM OF LIST ********************************
```

DASD Details

```
DB2SMU-DSNB                        DASD HISTORY DETAIL                        16:29

 Press PF3 to return to previous screen.
--------------------------------------------------------------------------------

                 03/17/07  DATE OF EXTRACT
                    16:25  TIME OF EXTRACT

                       66  VOLUMES
                   13,518  DATASETS
                        7  MIGRATED DATASETS
                      244  *ERROR DATASETS
                        2  MULTIVOLUME DSETS
                   14,193  EXTENTS
                      1.1  EXTENTS/DATASET
    ALLOCATED:
                 19,407.2  MB
                  404,317  TRACKS
                     30.5  TRACKS/DATASET
    USED:
                 11,483.3  MB
                  239,382  TRACKS
                     18.0  TRACKS/DATASET
                      59%  USED/ALLOCATED
```

Volumes Display

```
DB2SMU-DSNB                        DISPLAY DB2 VOLUMES                        16:29
                                                                    VOLUME 1 OF 68
Commands:   MENU      UNUSED
Line Commands:   ? - Menu   B - DBDs   H - History
                 S - Data Spaces   U - Unused   X - Extents
-------------------------------------------------------------------------------
                          # OF        # OF       ALLO       USED     % VOL     % VOL      AVAIL D
SEL  VOLSER           DATASETS    EXTENTS     TRACKS     TRACKS      ALLO      USED     TRACKS M
---  ------           --------- --------- ---------- ---------- ------- ------- --------- -
 _   *ERROR               244         -          -          -        0.0       0.0
 _   DMPD02              107       124        336        280        0.2       0.2          *
 _   DMPD03              127       151     10,283      2,749        6.8       1.8          *
 _   DMPD04              100       156        847        699        0.6       0.5          *
 _   DMPD05               93       107        401        301        0.3       0.2          *
 _   DMPD06               88        92        363        214        0.2       0.1          *
 _   DMPD07               85        89     16,757     15,832       11.2      10.5          *
 _   DMPD08              114       121        314        254        0.2       0.2          *
 _   DMPD09              246       259        896        751        0.6       0.5          *
 _   DMPD10              715       735     15,878      4,244       10.6       2.8          *
 _   DMPD11              110       127     10,969      3,407        7.3       2.3          *
 _   DMPD12              253       257     13,436      4,179        8.9       2.8          *
 _   DMPD13              251       275      1,503      1,195        1.0       0.8          *
 _   DMPD14              117       128     11,071     10,964        7.4       7.3          *
 _   DMPD15              226       251     13,721      3,807        9.1       2.5          *
 _   DMPD16              720       784      4,219      3,244        2.8       2.2          *
 _   DMPD17              721       751      3,788      2,876        2.5       1.9          *
 _   DMPD18              225       241     65,442     63,104       43.6      42.0          *
 _   DMPD19              973     1,010     39,211      9,755       26.1       6.5          *
 _   DMPD20              707       743     10,150      4,274        6.8       2.8          *
 _   DMPD21              942       961      7,100      3,991        4.7       2.7          *
 _   DMPD22            1,078     1,087     21,953      6,510       14.6       4.3          *
 _   DMPD23              980     1,026      8,114      4,205        5.4       2.8          *
 _   DMPD24               85       127      1,185        937        0.8       0.6          *
 _   DMPD25              166       201     41,559     41,483       27.7      27.6          *
 _   DMPD26              775       812      5,270      3,297        3.5       2.2          *
 _   DMPD27              437       486     38,476     19,725       25.6      13.1          *
 _   DMPD28              792       854      5,688      4,072        3.8       2.7          *
 _   DMPD29              986     1,002     19,642      7,176       13.1       4.8          *
 _   DMPD30              766       776     19,677      6,544       13.1       4.4          *
 _   DMPP01                1         1          9          6        0.0       0.0          *
 _   DMPP02                1         1          9          2        0.0       0.0          *
 _   DMPP03                3         3         27         12        0.1       0.0          *
Cmd ===>                                                          Scroll ===> PAGE
```

Tablespace Display

```
DB2SMU-DSNB                          SPACES ON DMPD09                          16:29
                                                                    SPACE 1 OF 249
Commands:   MENU
Line Commands: ? - Menu   D - Details   L - List   I - SMS Info
               S - Scan   P - Spacemap   X - Extents
------------------------------------------------------------------------------
                                      PQTY    SQTY NO.      ALLO      USED % DS          D
SEL   DBNAME    SPACE      PT  IX     TRKS    TRKS XTS    TRACKS    TRACKS USED VOLSER M
---   --------  --------  ---  --  ------  ------ ---  ----------  ---------- ------ -
 _    ADBDCHG   ADBCIGNO    1   I       1       1   1           1      1100.0 DMPD09 *
 _    AGBLPDB   PBMT004R    1   I       4       4   1           4         2 50.0 DMPD09 *
 _    AGBLTDB   TRAT015T                1       1   1           1      1100.0 DMPD09 *
 _    BBNMMDB2  SSXEMP1     2   I       1       1   1           1      1100.0 DMPD09 *
 _    BWBDTEST  XT03X1      3   I       1       1   1           1      1100.0 DMPD09 *
 _    CATCOPY2  DSNKKX02    1   I       3       2   1           6      6100.0 DMPD09 *
 _    CATCOPY2  DSNOAX03    1   I       3       2   1           4         2 50.0 DMPD09 *
 _    CATCOPY2  DSNODX01    1   I       3       2   1           4         2 50.0 DMPD09 *
 _    CBDBTDG   CBTSTDG4                1       1   1           1      1100.0 DMPD09 *
 _    CBDBTDGT  CBTSTDG4                1       1   1           1      1100.0 DMPD09 *
 _    CC390     UTPETX01    1   I       1       1   1           1      1100.0 DMPD09 *
 _    CQMDB     DSNBSUM1    3           5       5   1          50         2  4.0 DMPD09 *
 _    CQMDB     STATEMEN    5   I       9       9   1           9         2 22.2 DMPD09 *
 _    CQMDB     SUMMSRV1   11   I       2       2   1           2      2100.0 DMPD09 *
 _    CQREP     QAASN116                1       1   2           3      3100.0 DMPD09 *
 _    DBASYS2A  XEMP1RRS    2   I       1       1   1           1      1100.0 DMPD09 *
 _    DBASYS4A  XEMPPROJ    1   I       1       1   1           1      1100.0 DMPD09 *
 _    DBASYS4A  XEMP1RRS    3   I       1       1   1           1      1100.0 DMPD09 *
 _    DBASYS5A  DBASYS5E    1           1       1   1           1      1100.0 DMPD09 *
 _    DBASYS5A  DBASYS5E    3           1       1   1           1      1100.0 DMPD09 *
 _    DBASYS6A  DBASYS6E    2           1       1   1           1      1100.0 DMPD09 *
 _    DBA019DB  DSNDPX02    1   I       3       2   1           4         2 50.0 DMPD09 *
 _    DBA019DB  DSNOFX01    1   I       3       2   1           4         3 75.0 DMPD09 *
 _    DBA027T   DSN8S61S                1       1   1           1      1100.0 DMPD09 *
 _    DBA027T   XEMP1       3   I       1       1   1           1      1100.0 DMPD09 *
 _    DBA03201  XEMP1       4   I       1       1   1           1      1100.0 DMPD09 *
 _    DBA056DB  TBSPACDD                1       1   1          10     10100.0 DMPD09 *
 _    DBA056DD  TSPACDDD                1       1   1           3      3100.0 DMPD09 *
 _    DBA05615  TSPACAD3                1       1   1           1      1100.0 DMPD09 *
 _    DBA060DB  XDEPT3       1   I       1       1   1           1      1100.0 DMPD09 *
 _    DBA06102  XEMP2        1   I       1       1   1           1      1100.0 DMPD09 *
 _    DBA064P   DSNRFUNC                1       1   1           1      1100.0 DMPD09 *
 _    DBA06401  DSN8S61S                1       1   1           1      1100.0 DMPD09 *
Cmd ===>                                                      Scroll ===> PAGE
```

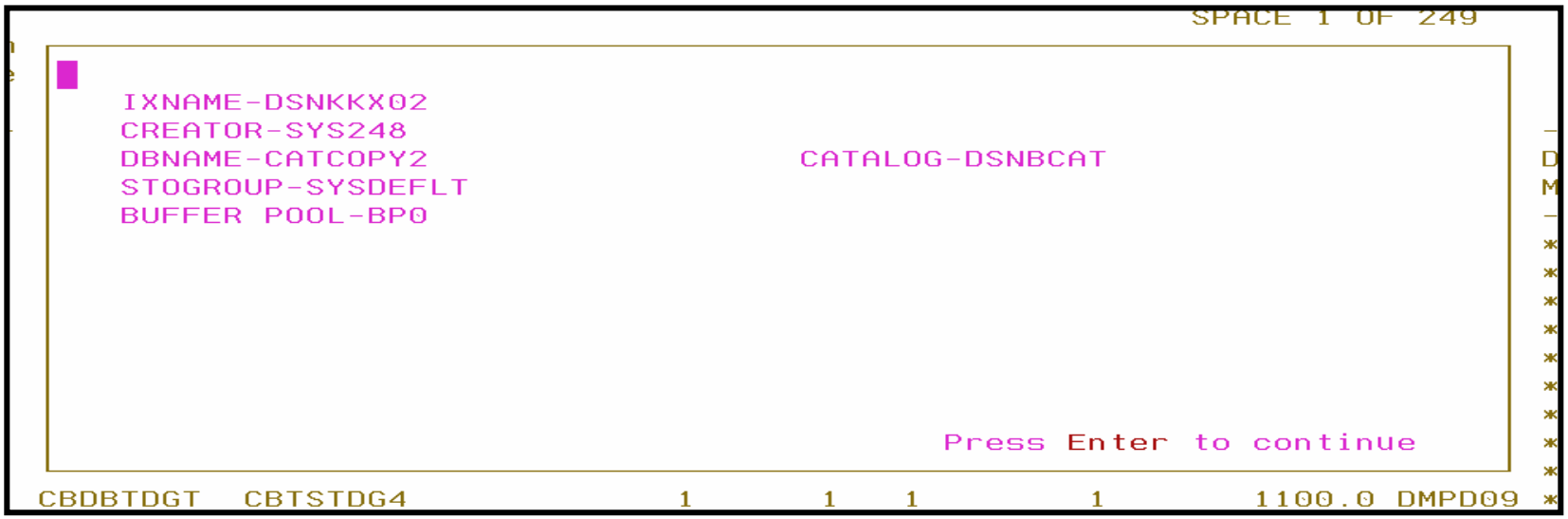
Filter/Sort fields – Example for Tablespaces

```
-------------------------------------DISPLAY DB2 SPACES---------------------------
------------------------------- DATA SPACES DISPLAY -------------------------------


  The following filter commands are valid on this display:

             "ALLO"    -- Number of allocated tracks.
             "DB"      -- Database name.
             "PRIQTY"  -- Primary Quantity in tracks.
             "SECQTY"  -- Secondary Quantity in tracks.
             "SG"      -- Storage Group name.
             "SP"      -- Data Space name.
             "STORTP"  -- Storage Type- I(Implicit) E(Explicit)
             "TYPE"    -- Data set Type- I(Index space) T(Table space)
             "USED"    -- Number of used tracks.
             "USED%"   -- Percentage of allocated space that is used.
             "VC"      -- VSAM Catalog name.
             "VOL"     -- Volume Serial.
             "XTNTS"   -- Number of extents.


                                                 Press END to return.
```

Multi – Volume Tablespaces

```
DB2SMU-DSNB                  DISPLAY DB2 MULTIVOL DSETS                    16:29
                                                                  SPACE 1 OF 5
Commands:    MENU
Line Commands: ? - Menu   D - Details   L - List   I - SMS Info
               S - Scan   P - Spacemap   X - Extents
------------------------------------------------------------------------------
                                    PQTY    SQTY NO.      ALLO     USED % DS      D
SEL   DBNAME    SPACE      PT IX    TRKS    TRKS XTS    TRACKS   TRACKS USED VOLSER M
---   --------  -------- --- -- ------ ------ --- -------------------- ------ -
 _    DBA128    BIGTABX   196  I       1      1   1          1        1100.0 DMPD18 *
 _    DBA128    BIGTABX   104  I       1      1   1          1        1100.0 DMPD12 *

             TOTAL          Spaces                  2  Extents                 2
             TOTAL TRACKS   Allocated               2  Used                    2
 ********************************* BOTTOM OF LIST *********************************
```

Spaces Display



HSM Recall - Options

```
DB2SMU-DSNB                          RECALL OPTION                          16:29
Cmd ===>

          Recall can severely impact processing time.  DB2 SMU
          uses the information you enter on this panel to determine
          the action to take when it encounters data sets that
          have been Migrated.

            *RECALL FROM TAPE ===> Y    (Y/N)

            *RECALL FROM DASD ===> Y    (Y/N)

             *PROMPT PER DSET ===> Y    (Y/N)   For above Migration
                                                Levels Marked Yes

        Press ENTER to continue.       Press F3   to cancel Option.
```

VCAT Display

```
DB2SMU-DSNB                          DISPLAY VCATS                          16:29
                                                                      VCAT 1 OF 12
Commands:   MENU
Line Commands:   ? - Menu   S - Data Spaces
-------------------------------------------------------------------------------
                      # OF          # OF         ALLO         USED
SEL   VCAT         SPACES           XTS         TRKS         TRKS
---   --------   --------    ---------    ---------    ---------
 _    APP031           13           13           27           18
 _    DBA019          216          213       11,957        4,340
 _    DBA105            1            1            7            7
 _    DB2DBA          263          261        8,232        1,635
 _    DNET064           4            5           16           16
 _    DSNABWB          21           20           28           24
 _    DSNBCAT      12,947       13,628      382,947      233,166
 _    DSNPARTS          1            1          100            2
 _    DSQVCAT          28           28          938          112
 _    QMFCATB          20           20          136          101
 _    SGPFANN           1            0            0            0
 _    SYSDEFLT          3            3            3            3
 ******************************** BOTTOM OF LIST ********************************
```

Stogroups Display

```
DB2SMU-DSNB                    DISPLAY STORAGE GROUPS                    16:29
                                                                GROUP 1 OF 97
Commands:   MENU
Line Commands:  ? - Menu   D - Details   S - Data Spaces
--------------------------------------------------------------------------------

SEL   GROUP      CREATOR    #VOLS VOLUME   VOLUME   VOLUME   VOLUME   VOLUME   CATALOG
---   --------   --------   ----- ------   ------   ------   ------   ------   --------
 _    ADBGCC     PLS            1 *                                            DSNBCAT
 _    ADBGCH     ADB            1 *                                            DSNBCAT
 _    ADBGCHG    ADB            1 *                                            DSNBCAT
 _    AGBLPSG    DBA128         1 *                                            DSNBCAT
 _    AGBLTSG    DBA128         1 *                                            DSNBCAT
 _    AHXFLWDB   DNET018        1 *                                            DSNBCAT
 _    AHXFLWSG   KLTAYLO        1 *                                            DSNBCAT
 _    AISSG      SYS248         1 *                                            DSNBCAT
 _    AMEXSG     DBA019         1 *                                            DBA019
 _    BO         DB2ADMO        1 *                                            DSNBCAT
 _    BODT01     DB2ADMO        1 *                                            DSNBCAT
 _    BODT02     DB2ADMO        1 *                                            DSNBCAT
 _    BODT03     DB2ADMO        1 *                                            DSNBCAT
 _    BODT04     DB2ADMO        1 *                                            DSNBCAT
 _    BODT05     DB2ADMO        1 *                                            DSNBCAT
 _    BWBSG      DNET009        1 *                                            DSNABWB
 _    CCHOCHOY   DNET841        1 *                                            DSNBCAT
 _    DBA019G3   DBA019         1 *                                            DBA019
 _    DBA019G4   DBA019         1 *                                            DBA019
 _    DBA019SG   DBA019         1 *                                            DBA019
 _    DBA061     DBA061         1 *                                            DSNBCAT
 _    DBA105SG   DBA105         1 *                                            DSNBCAT
 _    DBA110G1   DBA110         5 DMPU10 DMPU20   DMPU18   DMPU25   DMPU24   DBA110
 _    DBA128SG   DBA128         1 *                                            DSNBCAT
 _    DEFGA001   DBA128         1 *                                            DSNBCAT
 _    DEFGN001   DBA128         1 *                                            DSNBCAT
 _    DEMOSG     DNET060        1 *                                            DB2DBA
 _    DMUSRSG1   DSNBADM        1 *                                            DSNBCAT
 _    DNET018G   DNET018        1 DMPD09                                       DSNBCAT
 _    DNET072    DNET072        1 *                                            DSNBCAT
 _    DNET072G   DNET072        1 *                                            DSNBCAT
 _    DNET072H   DNET293        1 *                                            DSNBCAT
 _    DNET115G   DNET115        1 DMPU30                                       DSNBCAT
 _    DNET293G   DNET293        1 *                                            DSNBCAT
Cmd ===>                                                    Scroll ===> PAGE
```

Widows

```
DB2SMU-DSNB                          WIDOWS                          09:11

  Enter qualifiers below for dataset search.  Dummy datasets will
  be created for all DB2 generated datasets.  All widow datasets
  matching the qualifiers will be dropped.  Widow datasets
  are those datasets which no longer exist but have not been dropped
  from the DB2 Catalog.

           *VCAT Name ===> dsnbcat

        Data Base Name ===>


  When the DB2 DROPs are generated, COMMITs will be generated.

  Number of datasets processed between COMMITs ===> 0
    (Enter 0 to COMMIT only after all DROPs are done.)

  Press ENTER when done.  Press PF3 to cancel.
```

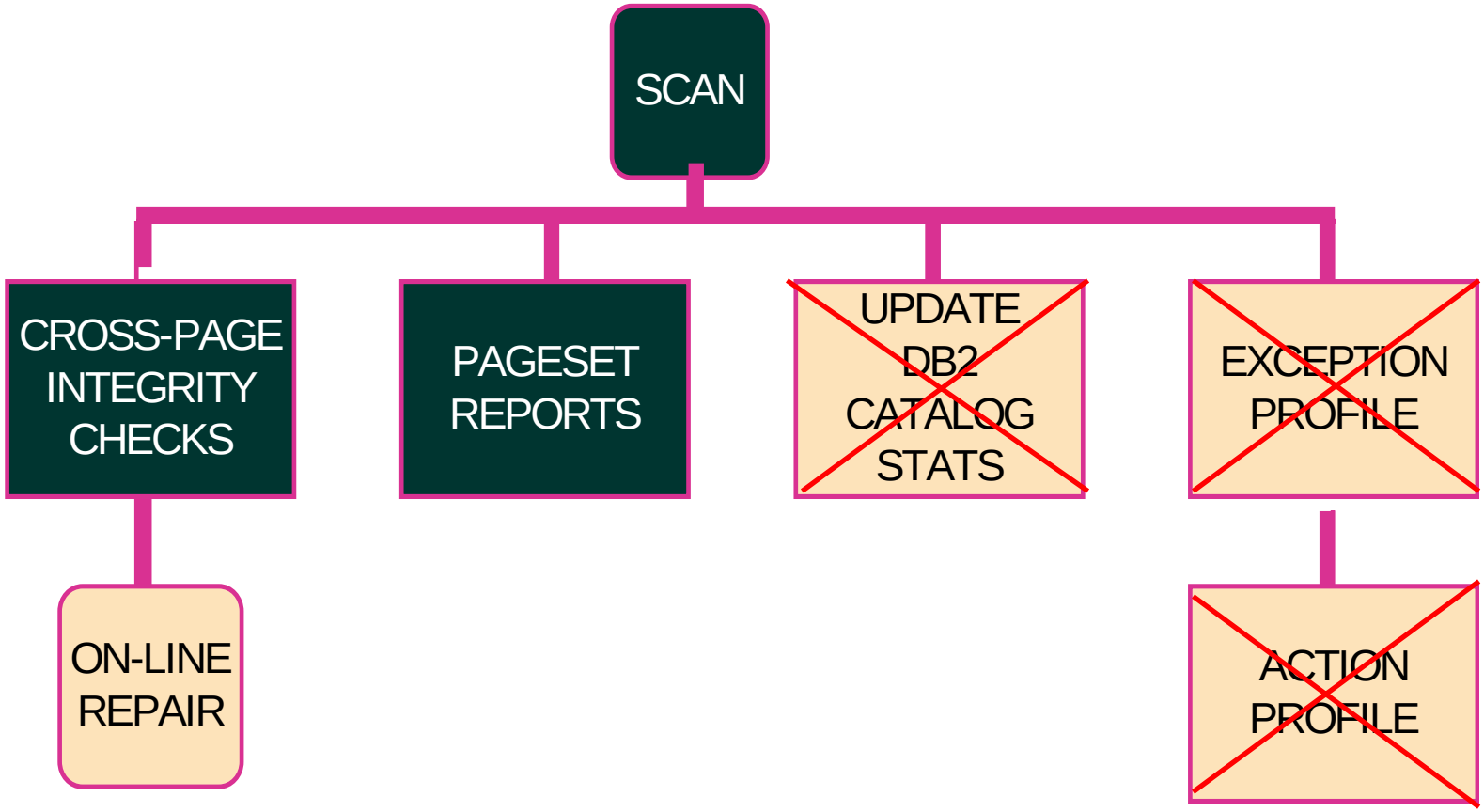
Widows - Review Statements

```
DB2SMU-DSNBPRIMARY MENU-------------------------------------------------------------

    Statements have been saved in member SYS248W

    Specify next action to be performed.

          Option ===> 2

                      1 BUILD JCL Convert the statements to JCL.
                      2 EDIT control cards.
                      3 DELETE saved statements.
                      4 PRINT the statements member.

                      5 EXIT now.
                        or  F3, END
```

Widows - Build JCL

```
JOBCARD OPTIONS ---------PRIMARY MENU-----------------------------------------
Cmd ===>                                                    07/03/18  09:11
                          J O B C A R D   O P T I O N S

          To include a JOB (and JES) statements in the generated Utility JCL,
          enter the names of the library and member.


 JOB card member name ===> JBCRDMDL


JOB card dataset name ===> 'DB2SMU.V1R1.DSNB.SMU.USER'

                             This library will be opened for READ only.
                             TSO naming conventions will be used.
                             Enclose the name in quotes if it does
                             not begin with your TSO Prefix.

    Press F10   to back up to previous screen.
    Press ENTER to continue.       Press F3    to cancel Utility generate.
```

Scan Functions



Scan – Report Select / Perform

```
                          REPORT SELECT LIST                                10:49
    The following  Full Space Scans  are available for
Table Space  AHXCTLTS
                                    Data Base    AHXCTLDB
 Select here    ===> _ to perform a new full space scan now.

 Select a line with              S Display reports    D Drop reports
                                 E Erase record
 Today is 03/18/07  10:49
                            REORG   COPY                          PAGES
     SEL     DATE     TIME  FACTOR FACTOR EXTENTS      PAGES    REQUIRED RPTS
     ---   --------  -----  ------ ------ -------- ---------- ---------- ----
      _    03/18/07  10:49    31.0    0.0        7      3,888      3,842  YES
       ************************** BOTTOM OF LIST ******************************
```

Scan Results

```
TABLESPACE REPORT MENU ------------------------------------------------------------

     Database - AHXCTLDB
  Table Space - AHXCTLTS                        on - 03/18/07

                        3815 pages were scanned.

                ************************************************
                * * * * * * * * * * * * * * * * * * * * * * * * *
                * *                                            * *
                * *  THE TABLE SPACE IS OK.  ALL TESTS PASSED.  * *
                * *           NO  ERRORS WERE DETECTED.        * *
                * *                                            * *
                * * * * * * * * * * * * * * * * * * * * * * * * *
                ************************************************

                      Press ENTER to display statistics.

                      Press END to return to the select list.
```

Scan Reports

```
TABLESPACE REPORT MENU --
Cmd ===>
              TABLESPACE AHXCTLTS                    ON 03/18/07 AT 10:50

    SELECT ENTRY BY NUMBER, OR
     PRESS ENTER TO VIEW IN SEQUENCE

                1. PAGES         PAGES ANALYSIS REPORT
                2. PTRS          OVERFLOW RECORDS POINTERS
                3. FREESPACE     ANALYSIS OF PAGES FREESPACE
                4. DASD          SUMMARY OF DASD SPACE USAGE
                5. ROWS          TABLE ROWS SUMMARY
                6. ROWSPACE      ANALYSIS OF TABLE ROWS SPACE
                7. SEG STATS     SEGMENT STATISTICS
                8. SEG MAP       SEGMENT MAP

-------------------------------------------------------------------------------

1. PAGES ANALYSIS
                                NUMBER          PCT OF
                              OF PAGES         ALL PGS
                              ---------        -------
          PAGES WITH ROWS        1,972          50.72%
        DB2 CONTROL PAGES            2           0.05%
              EMPTY PAGES            1           0.03%
        UNFORMATTED PAGES        1,913          49.20%

                    TOTAL        3,888         100.00%
   ESTIMATED AFTER REORG         3,842

            UPDATED PAGES            0              0%
           UPDATED TRACKS            0                        COPY FACTOR =      0
      UPDATED EMPTY PAGES            0
-------------------------------------------------------------------------------

No. Report No.      N Next Report      P Previous Report      T Top      F3   END
 1 Pages          2 Pointers           3 Free space              4 DASD space
 5 Rows           6 Rows space         7 Segment Stats           8 Segment Map
 Optional CPR Reports:   9 Dict       10 CPR Rows     11 CPR Usage
```

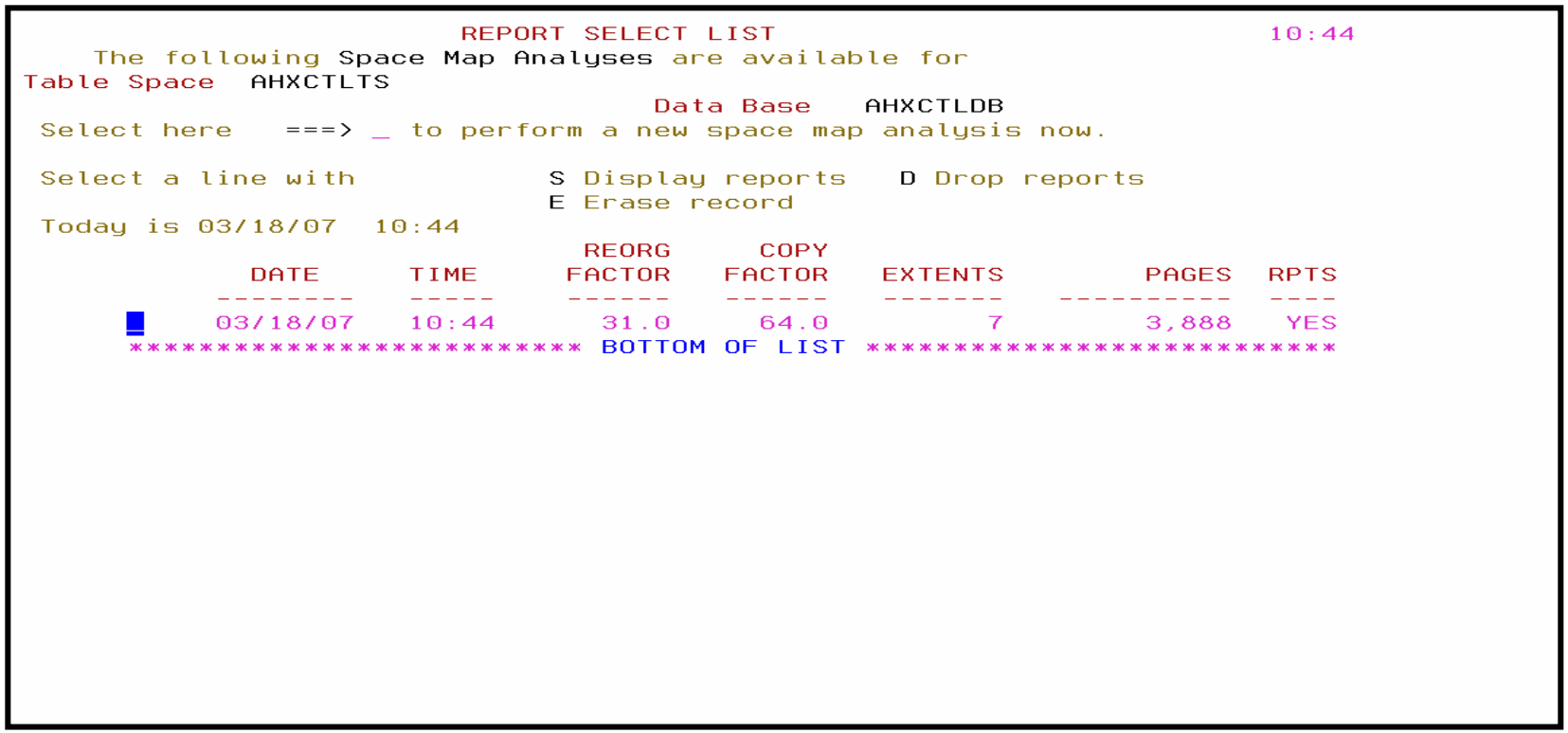
Scan – FREESPACE Report

```
TABLESPACE REPORT MENU --
Cmd ===>
            TABLESPACE AHXCTLTS                  ON 03/18/07 AT 10:50

3. FREESPACE ANALYSIS

                                 NUMBER          PCT OF
                                OF PAGES         ALL PGS          SIZE
                               ----------        -------          -----
     PAGES WITH:
                  NO ROOM            540          13.89%         4,096

       ROOM FOR SHORT ROW          1,328          34.16%

     ROOM FOR AVERAGE ROW             25           0.64%

       ROOM FOR LONG ROW          1,995          51.31%

     FREESPACE SPECIFIED       5%                          REORG FACTOR =   31.1
       FREEPAGE SPECIFIED      0                 PRESS ENTER FOR FREESPACE GRAPH




No. Report No.      N Next Report      P Previous Report      T Top      F3   END
 1 Pages          2 Pointers           3 Free space             4 DASD space
 5 Rows           6 Rows space         7 Segment Stats          8 Segment Map
 Optional CPR Reports:    9 Dict      10 CPR Rows     11 CPR Usage
```

Scan – DASD Space Analysis

```
TABLESPACE REPORT MENU --
Cmd ===>
          TABLESPACE AHXCTLTS                    ON 03/18/07 AT 10:50

4. DASD SPACE ANALYSIS

                                NUMBER      AMOUNT       % USED       % TOTAL
                              OF PAGES    OF SPACE        SPACE         SPACE
                             ---------    --------      -------       -------

                  ROWS DATA       1,972       6,771K      44.37%        43.54%
     PAGES WITH  OVERHEAD         1,975         632K       4.14%         4.06%
     PAGES W WASTED SPACE         1,726         133K       0.87%         0.86%
     PAGES WITH FREESPACE         3,721       7,685K      50.36%        49.41%
          FORMATTED EMPTY             1           4K                     0.03%
       UNFORMATTED EMPTY         1,840       7,360K                    47.33%
     ALLOCATED / NOT USED           73         292K       1.91%         1.88%

       TOTAL DATASET SPACE                   15,552K        PCT FREESPACE = 51.3
-------------------------------------------------------------------------------

5. TABLE ROWS SUMMARY
                              ROWS IN   PCT OF     PAGES   ROWS OVERFLOW COMPRESS
CREATOR.TABLE                   TABLE    TOTAL OCCUPIED  /PAGE      ROWS     ROWS
---------------------------- ---------- ------ -------- ----- -------- --------

         .                         209     0.3%        6  34.8        0        0
         .                         470     0.6%        7  67.1        0        0
         .                         177     0.2%        2  88.5        0        0
         .                         149     0.2%        2  74.5        0        0
         .                       1,088     1.5%       21  51.8        6        0
         .                         498     0.7%       13  38.3        0        0
         .                       1,088     1.5%       19  57.3        0        0
         .                       7,793    10.5%      140  55.7        0        0
         .                       3,527     4.7%       57  61.9        0        0
         .                         428     0.6%        6  71.3        0        0
         .                         455     0.6%        8  56.9        0        0


 No. Report No.      N Next Report      P Previous Report      T Top      F3   END
  1 Pages          2 Pointers             3 Free space              4 DASD space
  5 Rows           6 Rows space           7 Segment Stats           8 Segment Map
  Optional CPR Reports:   9 Dict        10 CPR Rows     11 CPR Usage
```

Space Map - Select



Space Map - Menu

```
TABLESPACE REPORT MENU --DISPLAY DB2 SPACES-----------------------------------

 Space Map Analysis for DB2 TABLESPACE AHXCTLTS
                          ON 03/18/07 AT 10:45

    Select Report ===>

                      1   SUMMARY          Display Summary stats for Tablespace.
               F5     2   SPACE GRAPH      Display a graph of freespace.
               F10    3   UPDATE GRAPH     Display a graph of modified pages.
               F6     4   SPACE MAP        Display map of freespace.
               F11    5   UPDATE MAP       Display map of modified pages.


    Press ENTER to see the reports in order.
    Press END to return to the list of available analyses for this Tablespace.
    Press RETURN to go back to the Primary Menu after processing DB2 spaces.
```

Space Map – Summary Report

TABLESPACE SUMMARY ------ 10:44

TABLESPACE AHXCTLTS Page Size = 4K

SPACE SUMMARY

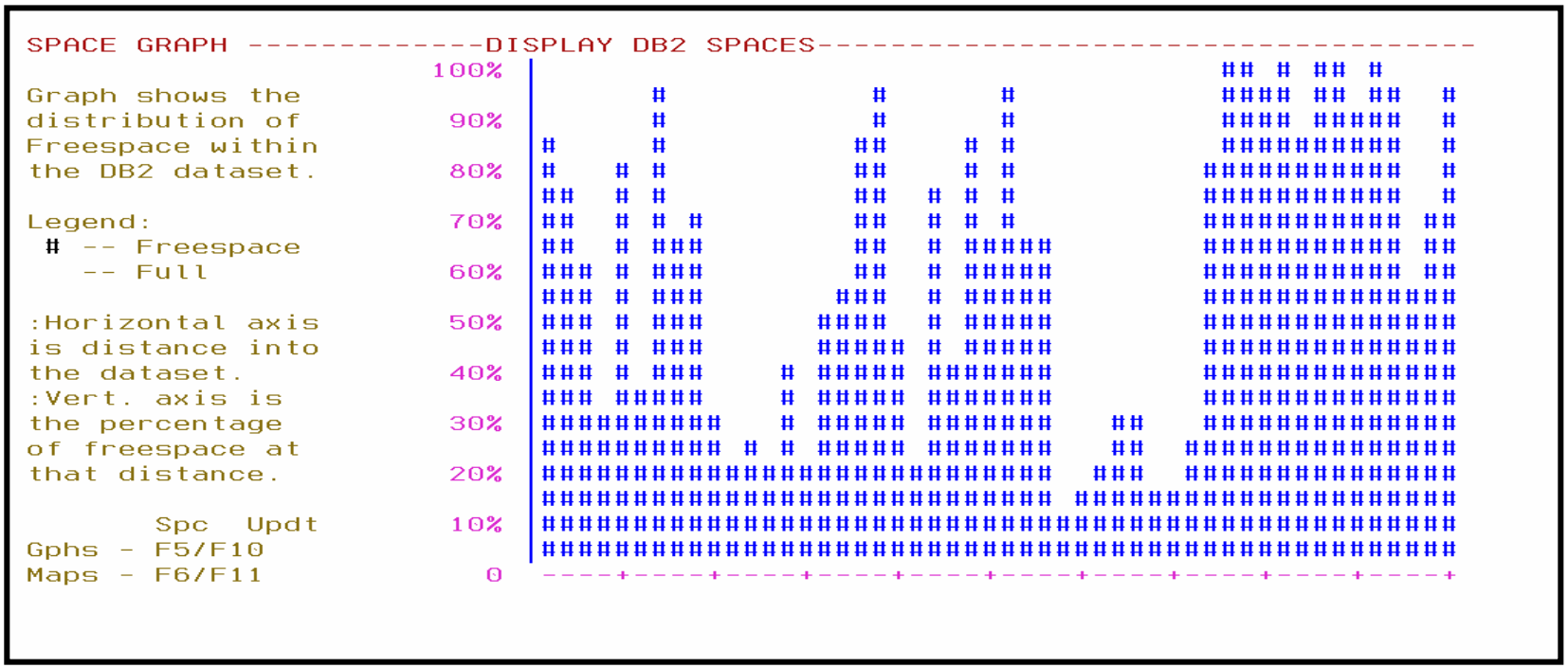
	Number	Percent of Total	Reorg Factor
Pages with room	1995	51.31	0
with avg. room ...	25	0.64	1
with small room ..	1328	34.16	2
with NO room	540	13.89	4
TOTAL	3888	100.00	31.13

UPDATE SUMMARY

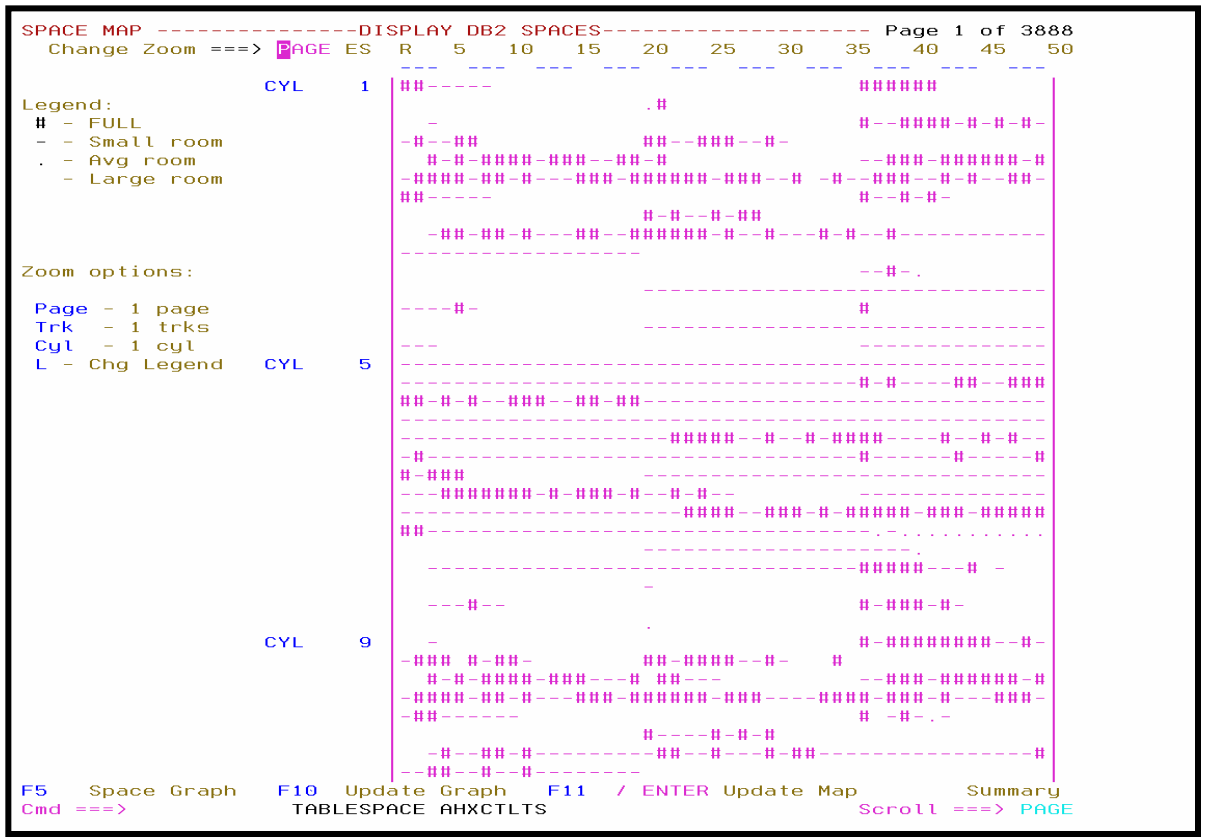
	Number	No. Updated	Pct Updated
Pages...	3888	1390	35.75
Tracks...	324	208	64.20
Cylinders...	22	22	100.00

F5 = Space Graph F6 = Space Map ENTER = Space Graph
F10 = Update Graph F11 = Update Map = Summary

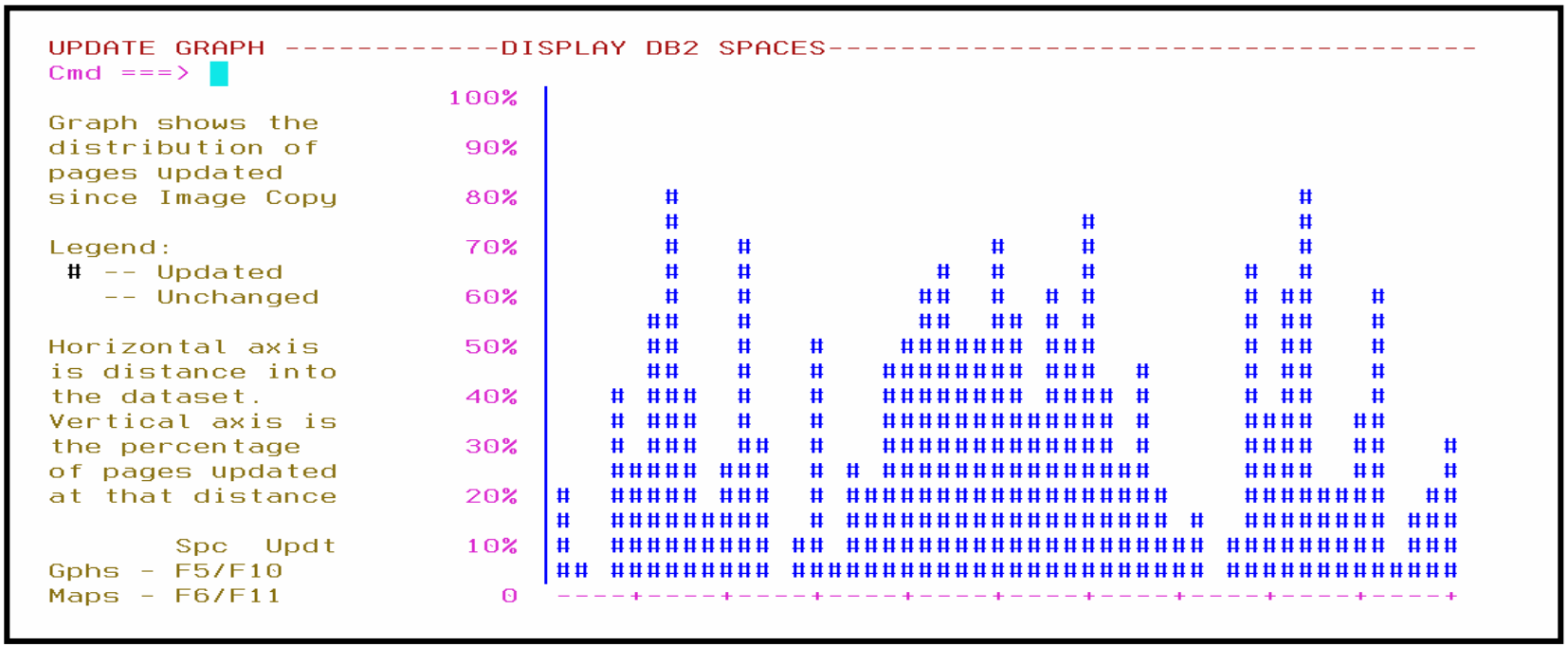
Space Map – Space Graph



Space Map – Page Map



Space Map – Update Graph



DB2 Object Analysis and Management

DB2 Automation Tool – V2.2

Information Management software

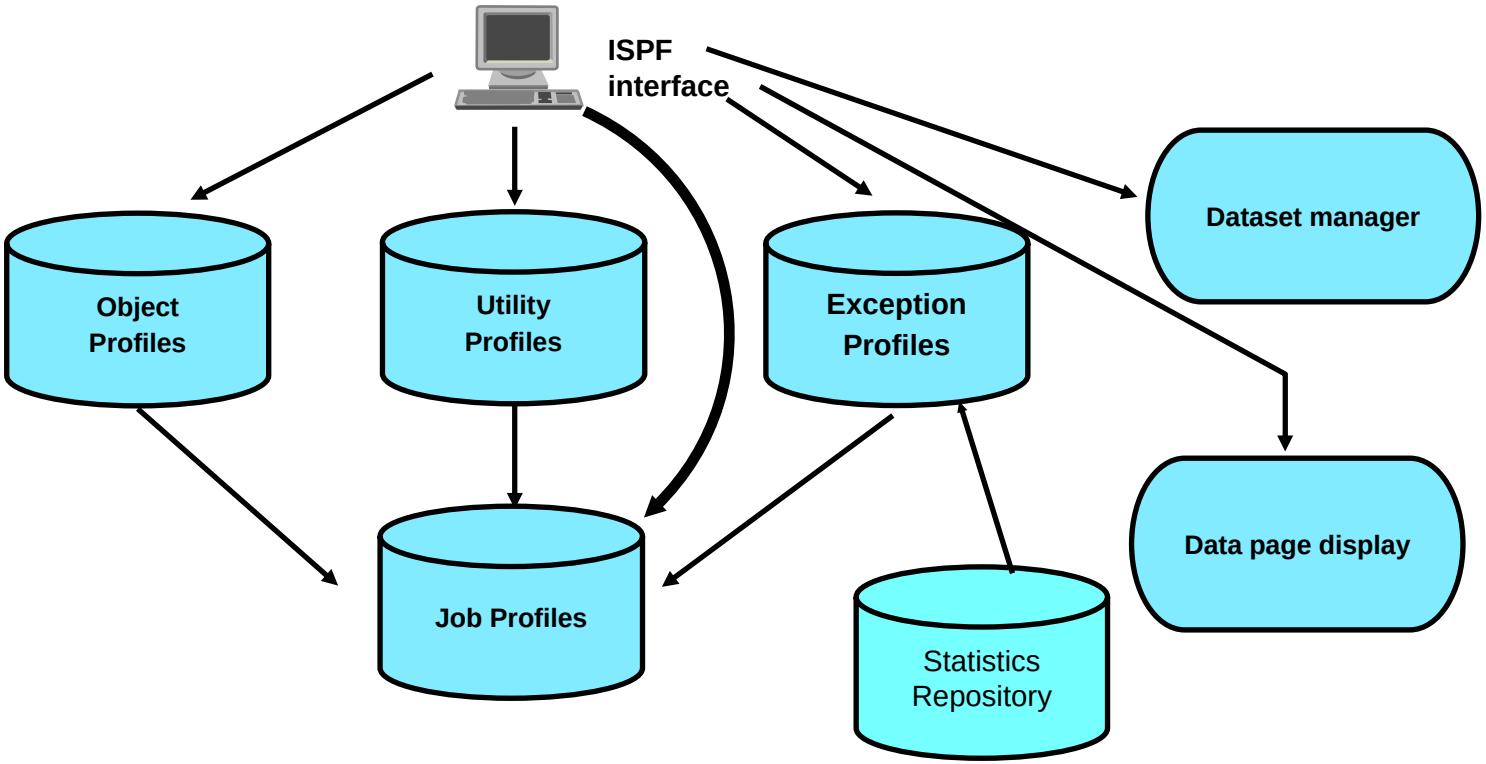
DB2 Automation Tool: Housekeeping Challenges

- Basic Principles of Housekeeping
  - Securing the data
    - Create backups - COPY
    - Create application point of consistency - QUIESCE
    - Clean up the DB2 Catalog and Directory - MODIFY
  - Performance
    - Reorganise tablespaces and indexspaces - REORG
    - Populate the DB2 Catalog for the optimiser - RUNSTATS
  - Common Issues
    - Dataset sizing
    - New and dropped objects
    - How to avoid rebinds changing access paths while at same time knowing when a REORG is necessary

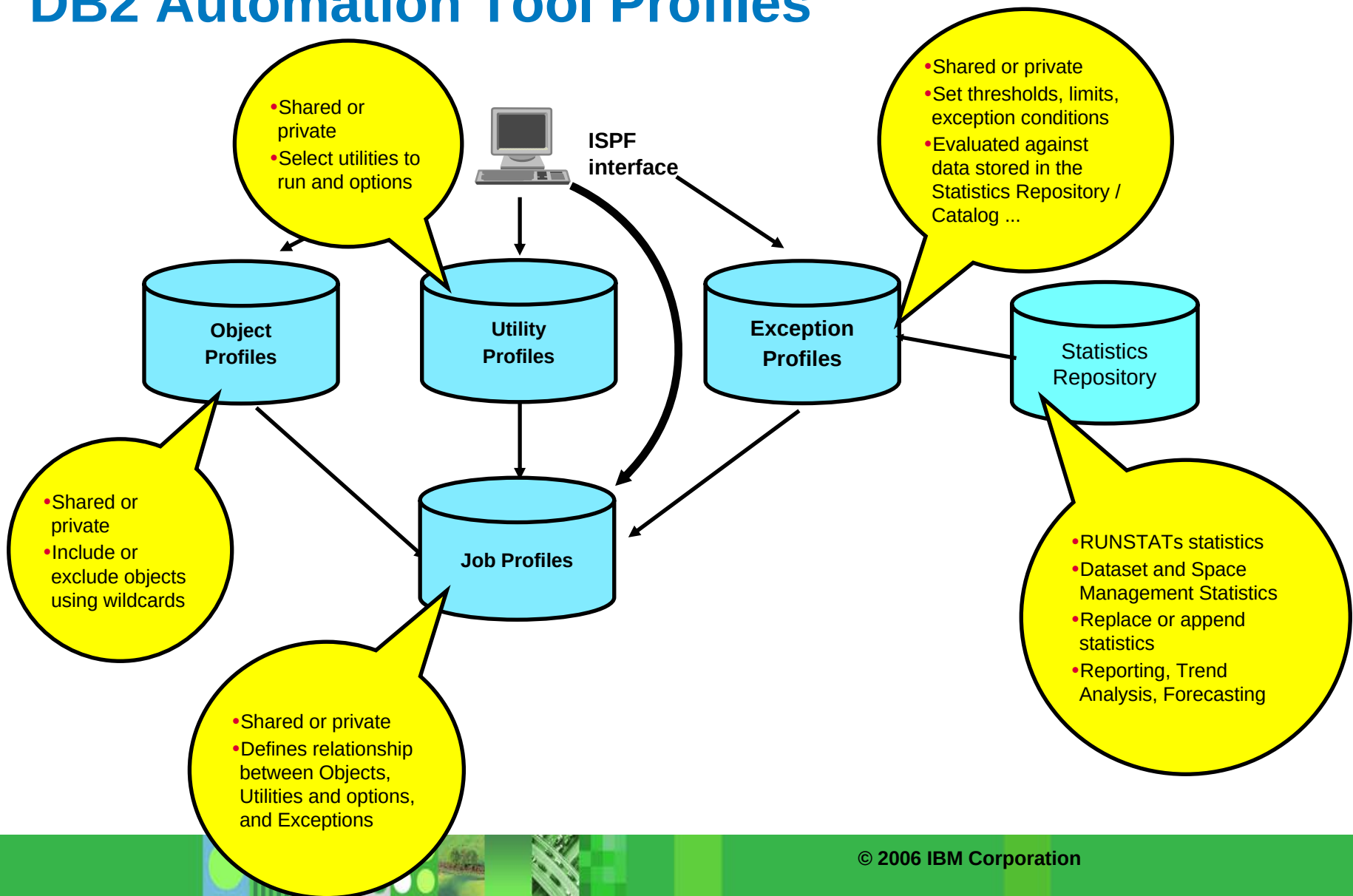
What is DB2 Automation Tool?

- Automates the execution of DB2 utilities
  - Utility jobs created and executed based on DBA-defined conditions
  - Database/Tablespace/Indexspace granularity
  - Jobs can be regularly scheduled or ad-hoc
  - Support for most pageset based utilities
  - Multiple job generation options to support ERP applications
- Provides statistical history reports for trend analysis and forecasting
- Also includes:
  - Dataset Manager
    - NOTICE: This functionality is being stabilized and any future enhancements in this area will be place in DB2 SMU
    - Dataset Page Browse/Edit Facility
    - Integrity Checker
- Does include:
  - Restart capability
  - Flashcopy support
  - Automation Tool Recovery knows Flashcopies

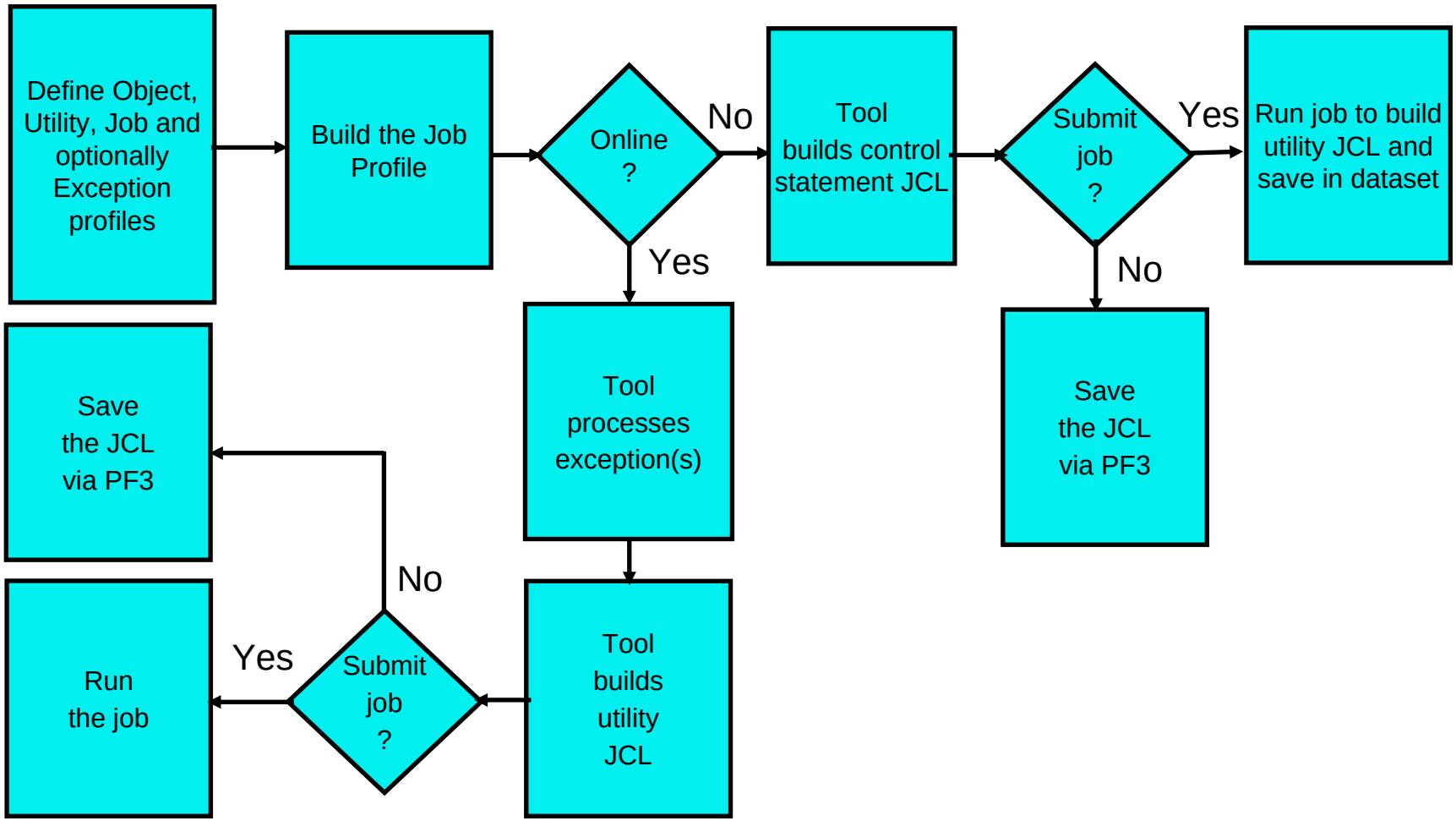
DB2 Automation Tool Profiles



DB2 Automation Tool Profiles



Process Flow



Object Profiles

- Identify tablespace and indexes to be processed
  - By database name, tablespace name, creator,partitions
  - By database name, index name, creator, partitions
  - By volume
- Wildcard characters can be used in names
- They may be specified explicitly
- They may be contained in a dynamic list
- Can use multiple include/excludes if required
  - A later exclude will override all includes
- Exclude objects from a more general include (using masking)
- Processes ALL partitions by default, 0 for non-partitioned object
- Object lists are built dynamically at generator run time

Sample Object Profile

```
DLC$OPRU   V2R2    ----- Update Object Profile Display ---- 2007/03/18  11:27:27
------------------------------------------------------------------------------

Creator: SYS248        Profile: SAMPLE DATABASE WITH EXCLUDE     User: SYS248

Share Option: V   (Upd,View,No)     Description: EXCLUDE EXCEPTION TABLESPACE
                                                          Row 1 of 2     >
------------------------------------------------------------------------------
                                                 Volume /
            Wild Process   Include/  IX DB Name/ IX Crtr/   IX Name/
Cmd   Type  Card Indexes   Exclude   TS Crtr     DB Name    TS Name              Part
 _     TS     Y      Y       INC     *           DSN8D*1A   *                     ALL
 _     TS     Y      N       EXC     *           DSN8D*1A   DSN8S*1R              ALL
********************************* Bottom of Data ********************************
```

Utility Profiles

- Select one or more utilities and specify utility options
  - COPY
  - RECOVER
  - COPYTOCOPY
  - REORG
  - RUNSTATS
  - QUIESCE
  - MODIFY
  - REPAIR
  - Dataset reallocation and resizing
    - resizing can be based upon % used or % allocated
  - Data page verification
    - Validity check of header, space map and data pages
    - Reports inconsistencies
- Multiple utilities selected in one profile executed in sequence on selection screen
- Each utility executed against all objects

Utility Profile – Image Copy Example

```
HAA$UOPT   V2R2 --------- Utility Profile Options -------- 2007/03/18  11:28:59
Option    ===>

  Creator: SYS248      Profile: COPY TO TAPE                      User: SYS248

Share Option  ==> V   (Upd/View/No) Description: GDG DSN WITH PART NUM

                                        Include in                Update Utility
                                         Profile                     Options
 Data Page Verification Reporting     ==> N    (Yes/No)          ==> N    (Yes/No)
 Reallocation                         ==> N    (Yes/No)          ==> N    (Yes/No)
 Recover                              ==> N    (Yes/No)          ==> N    (Yes/No)
 Image Copy                           ==> Y    (Yes/No)          ==> N    (Yes/No)
 Copy to Copy                         ==> N    (Yes/No)          ==> N    (Yes/No)
 Runstats                             ==> N    (Yes/No)          ==> N    (Yes/No)
 TS Reorg                             ==> N    (Yes/No)          ==> N    (Yes/No)
 IX Reorg                             ==> N    (Yes/No)          ==> N    (Yes/No)
 Quiesce                              ==> N    (Yes/No)          ==> N    (Yes/No)
 Modify                               ==> N    (Yes/No)          ==> N    (Yes/No)
 Repair                               ==> N    (Yes/No)          ==> N    (Yes/No)
```

Utility Profile – General Copy Options

```
HAA$UTSC  V2R2 ------------ Image Copy options ------------ 2007/03/18  11:29:39
Option    ===>
  Creator: SYS248      Name: COPY TO TAPE                        User: SYS248
                                                                 More:      +
   Exception Rule                      ==> A                (Accepted/Rejected/Both)
   Image Copy Utility mode             ==> D                (DB2/Symmetrix/Ess)
     Alter EMC Symm/IBM ESS Optns      ==> N                (Yes/No)
   Alter Image Copy DSN specs          ==> N                (Yes/No)
   Utility ID                          ==> COPY             (16 characters)

   Parallel                            ==> N                (Yes/No)
     Number of objects                 ==>                  (0 - 99)
     Number of tape units              ==>                  (0 - 99)
   Filter DDname                       ==>                  (8 character DD name)
   Sharelevel                          ==> R                (Reference/Change)
   Full Image Copy                     ==> Y                (Yes/No)
   Check Page                          ==> N                (Yes/No)
   Concurrent                          ==> N                (Yes/No)
   Change Limit
     First Percent                     ==>                  (% value)
     Second Percent                    ==>                  (% value)
```

Utility Profile – Additional including Skeleton Support

```
HAA$UTSC  V2R2 ------------ Image Copy options ------------ 2007/03/18  11:29:39
Option    ===>
  Creator: SYS248      Name: COPY TO TAPE                        User: SYS248
                                                                 More:   -
   Filter DDname                          ==>                  (8 character DD name)
   Sharelevel                             ==> R                (Reference/Change)
   Full Image Copy                        ==> Y                (Yes/No)
   Check Page                             ==> N                (Yes/No)
   Concurrent                             ==> N                (Yes/No)
   Change Limit
     First Percent                        ==>                  (% value)
     Second Percent                       ==>                  (% value)
     Report only                          ==> N                (Yes/No)
   Max Tape Volume/DASD Unit Cnt          ==> 5                (1-255 volumes)
   Stack Copy Control Cards               ==> Y                (Yes/No)

 Optional Skeletals:
   Run User Step                          ==> N                (No/Before/After)
   JCL Skeletal                           ==>                  (8 Character Name)
   Control Cards Skeletal                 ==>                  (8 Character Name)
   Step End Skeletal                      ==>                  (8 Character Name)
```

Utility Profile – Parameter control for each type

```
HAA$UIMG  V2R2 ----------- Image Copy Options ----------- 2007/03/18  11:31:20
Option    ===>

  Creator: SYS248      Name: COPY TO TAPE                        User: SYS248

  Enter the Image Copy options to associate with this utility profile

                                  Take Image Copy:     View/Update Options:

   Local Primary                  ==> Y    (Yes/No)    ==> N    (Yes/No)
   Local Backup                   ==> N    (Yes/No)    ==> N    (Yes/No)
   Recovery Site Primary          ==> N    (Yes/No)    ==> N    (Yes/No)
   Recovery Site Backup           ==> N    (Yes/No)    ==> N    (Yes/No)
```

Utility Profile – Device Allocation Characteristics

```
HAA$UCPO  V2R2 ------------ Image Copy Options ------------ 2007/03/18  11:31:45
Option    ===>

  Creator: SYS248      Name: COPY TO TAPE                        User: SYS248

 Image Copy options for IMAGE COPY LOCAL PRIMARY

  Use Threshold Unit if allocated space exceeds x Meg/Trks/Cyls:   (Optional)
                                                 =>        _      (Quantity M|T|C)
                              Std Unit           Threshold Unit
  Update DSN create spec   => N                 => N             (Yes/No)
  Unit Type                => CART              =>               (CART/DISK/etc.)
  Catalog                  => Y                 => Y             (Yes/No)
  Data Class               =>                   =>               (8 character class)
  Storage Class            =>                   =>               (8 character class)
  Management Class         =>                   =>               (8 character class)
  Tape specific parameters (only needed if Unit Type is a Tape device):
  Expiration date *or*     =>                   =>               (YYYYDDD/YYDDD)
  Retention period         => 30                =>               (4 digit number)
```

Utility Profile – Symbolic Dynamic Dataset Name

```
HAA$UCPM  V2R2 ------ LP Image Copy DSN Generation ------ 2007/03/18  11:32:22
Option    ===>
  Creator: SYS248      Name: COPY TO TAPE                      User: SYS248
  IMAGE COPY LOCAL PRIMARY THRESHOLD
  Qualifier code  ==> __   Free form literal  ==> ___________   Show DSN  ==> N
  GDG Limit ==> ___ (1-255)  Use Standard DSN in Threshold Proc ==> Y  (Yes/No)
  Current dataset name generation qualifier string:

Valid dataset name generation codes are:
( * marked items are not supported in IC dynamic dataset generation.)
  1. Database                    11. Date (YYYYDDD)    * 21. GDG (+1)..(+n)
  2. Space Name                  12. Year (YYYY)         22. ICBACKUP (#23.#24)
  3. Partition/DSNUM             13. Month (MM)          23. Local/Recovery (L/R)
* 4. Volser                      14. Day (DD)            24. Primary/Backup (P/B)
* 5. Partition/DSNUM             15. Julian Day (DDD)    25. ICTYPE (Full/Incr)
     only when partitioned       16. Hours (HH)          26. Utility Name
* 7. Vcatname                    17. Minutes (MM)        27. Job Name
  8. Subsystem ID                18. Seconds (SS)        28. Step Name
* 9. User ID                   * 19. Timestamp           29. Substring Qualifier
 10. Time (HHMMSS)             * 20. Random Number       30. Use freeform literal
```

Exception Profiles

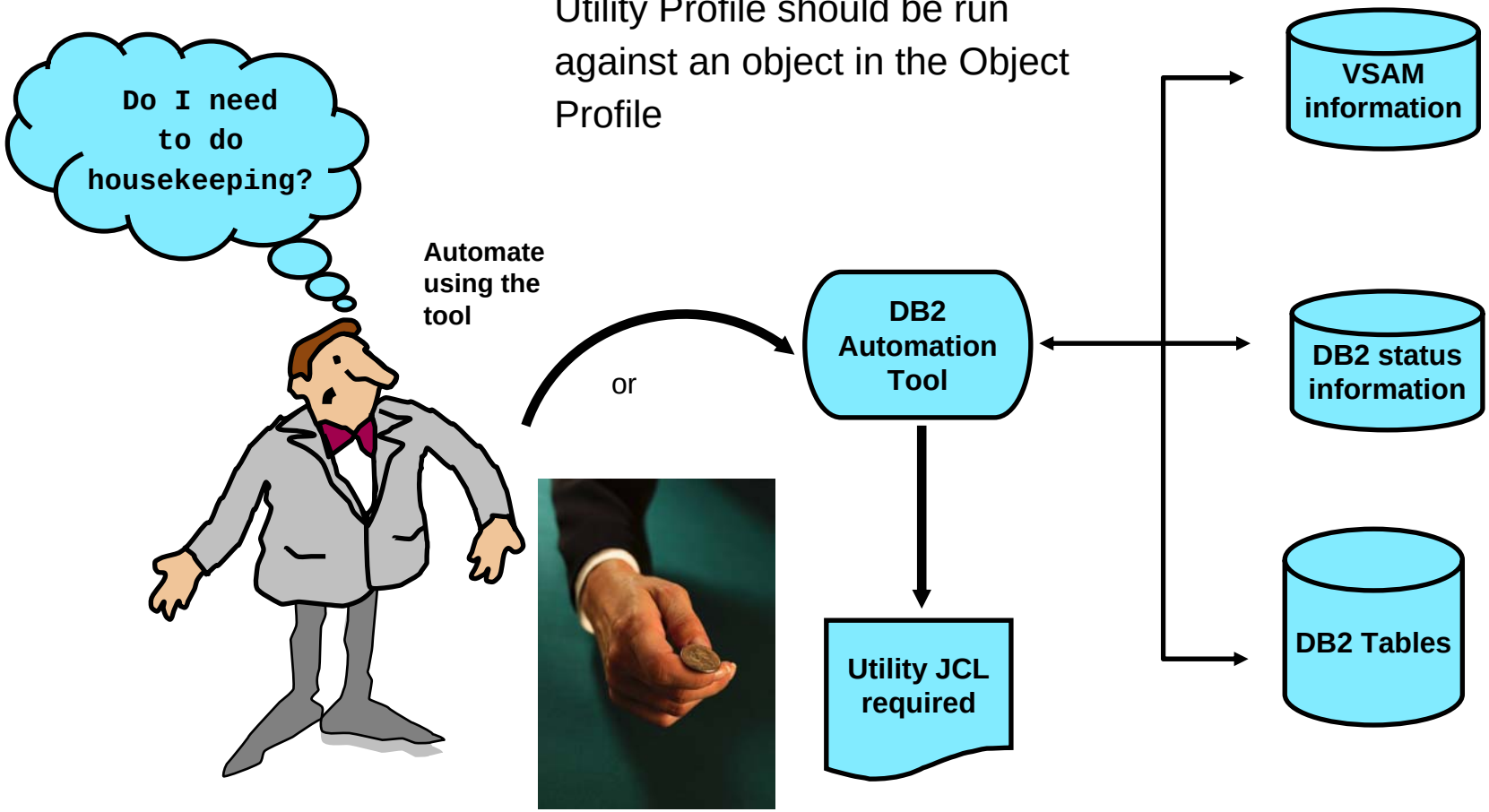
- Defines conditions for processing selected objects
  - Primarily to select objects for COPY, REORG and RUNSTATS
- Multiple conditions acceptable
- Evaluated before any JCL generated
- Conditions can be AND/ORed together
- Multiple Exception Profiles can be used .
  - Multiple conditions ANDed together

Exception Profiles - information sources

- VSAM catalog
- SYSCOPY
- Object status
- RUNSTATS
  - DB2 Catalog
  - DB2 History tables
  - Shadow Catalog
  - Automation Tool Statistics Repository
  - Dynamic RUNSTATS
- Calendar
- Real Time Statistics
- User defined conditions

Exception Profiles

Define WHEN a utility in a Utility Profile should be run against an object in the Object Profile



Exception Profiles - examples

- Tablespace status
  - Check pending
  - Recover pending and so on
- Image copy status
  - ICTYPE
  - Days since last copy
- Compare select values in
  - SYSTABLEPART
  - SYSTABLES
  - SYSTABLESPACE
  - SYSTABSTATS
  - SYSCOLUMNS
  - SYSCOLSTATS
  - SYSINDEXES
  - SYSINDEXPART
  - SYSINDEXSTATS
- VSAM data set status
  - DSNUM
  - EXTENTS
  - PERCENT_USED
- Supported conditions are
  - Less than
  - Less than or equal to
  - Equal
  - Greater than
  - Greater than or equal to
  - Not equal to

Statistics Repository

- Consists of 12 tables in 1 table space containing object stats defined
- Updated by RUNSTATS REPORT YES and collect statistics
- Allows DBA to keep statistics on objects, such as growth, without updating DB2
- Data can be reported upon to provide Trend Analysis
- Exception Profiles can use the repository to decide an objects suitablility for processing
  - Update the repository to FORCE action

Exceptions Profile – Calendar Exceptions

```
HAA$EPRV  V2R2    ----- View Exceptions Profile Display ---- 2007/03/18 11:33:3
-------------------------------------------------------          Row 1 of 168    +>
Creator: SYS248       Profile: COPY CONDITIONS                    User: SYS248

Share Option: V (Update,View,No)  Description: COMMON CONDITIONS FOR COPY

Use Stats From: C (Repository,Catalog,Shadow,History,rUnstats)

Conditions To Be: O (Anded,Ored)  View Runstats Options: N (Yes,No)

Combine IX/TS Exceptions when evaluating IX triggering a TS: N (Yes,No)
--------------------------------------------------------------------------------
S Statistics Type--- *Column------------ Cond ---------Exception Value----------
  DAY OF WEEK          MONDAY
                       TUESDAY
                       WEDNESDAY
                       THURSDAY
                       FRIDAY
                       SATURDAY
                       SUNDAY
  DAY OF MONTH         NTH_MONDAY
                       NTH_TUESDAY
                       NTH_WEDNESDAY
                       NTH_THURSDAY
                       NTH_FRIDAY
                       NTH_SATURDAY
                       NTH_SUNDAY
                       NTH_DAY
                       LAST_DAY
                       DAY_MONTH                    /     DD/MM
  TIME OF DAY          TIME_FROM                    :       M
                       TIME_TO                      :       M
--------------------------------------------------------------------------------
  OBJECT               EXCLUDE|ONLY
                       LOB
                       PGSIZE_32K
--------------------------------------------------------------------------------
  USER EXIT            LOAD_MODULE

Scroll Right for Column Help - "*" indicates a DAT statistic
You are currently in View Mode, no changes will be allowed
```

Exception Profiles – Image Copy Indicators

```
HAA$EPRV  V2R2    ----- View Exceptions Profile Display ---- 2007/03/18 11:34:0
-------------------------------------------------------          Row 26 of 168  -+>
Creator: SYS248       Profile: COPY CONDITIONS                    User: SYS248

Share Option: V (Update,View,No)  Description: COMMON CONDITIONS FOR COPY

Use Stats From: C (Repository,Catalog,Shadow,History,rUnstats)

Conditions To Be: O (Anded,Ored)  View Runstats Options: N (Yes,No)

Combine IX/TS Exceptions when evaluating IX triggering a TS: N (Yes,No)
--------------------------------------------------------------------------------
S Statistics Type--- *Column------------ Cond ---------Exception Value---------
  USER EXIT           CLIST_REXX_EXEC
--------------------------------------------------------------------------------
  TABLESPACESTATS     REAL TIME STAT
                      TOTALROWS
                      NACTIVE
                      SPACE
                      EXTENTS
  INDEXSPACESTATS     REAL TIME STAT
                      TOTALENTRIES
                      NLEVELS
                      NACTIVE
                      SPACE
                      EXTENTS
  REALTIME ICOPY      REAL TIME STAT
                      REORG_OR_LOAD
                      DAYS_SINCE_LAST
                      UPDATED_PAGES
                      UPDATED_PAGES_PCT
                      COPY_CHANGES
                      COPY_CHANGES_PCT
  REALTIME REORG TS   REAL TIME STAT
                      DAYS_SINCE_LAST
                      INS_UPD_DEL
                      INS_UPD_DEL_PCT
                      UNCLUST_INS

Scroll Right for Column Help - "*" indicates a DAT statistic
You are currently in View Mode, no changes will be allowed
```

Job Profiles

- Job Profiles combine Object, Utility and Exception Profiles
  - At least one Object and one Utility Profile is required
  - Exception profiles are optional
- Set of options, per profile, that allows controlling of utility JCL
  - One or multiple jobs
  - Job name templates
  - Load balancing by object size or utility run time
  - Generate copy dataset GDG base
  - DB2 TEMPLATE support
- Utility JCL is built from Job Profile in two modes
  - Online - immediately builds the utility JCL, first validating any exception profiles if present, then presenting generated utility JCL. Utility JCL created can also be saved in a PDS for later processing
  - Batch - generator JCL is built which when submitted first checks exceptions, then builds the required JCL
- Use batch 'mode' to integrate with your Job Scheduler

Job Profiles - options

- Important Options
  - Maximum nbr of jobs
  - Maximum nbr of objects per job
  - Set JCL member equal to jobname
  - Load Balancing
  - Jobnames
  - Jobname Templates
    - Increments are AFTER JCL generation

- Controlling Utility sequence
  - The ORDER column is used to specify the order of utility execution
    - Two utilities in one Utility Profile will only execute in screen order.

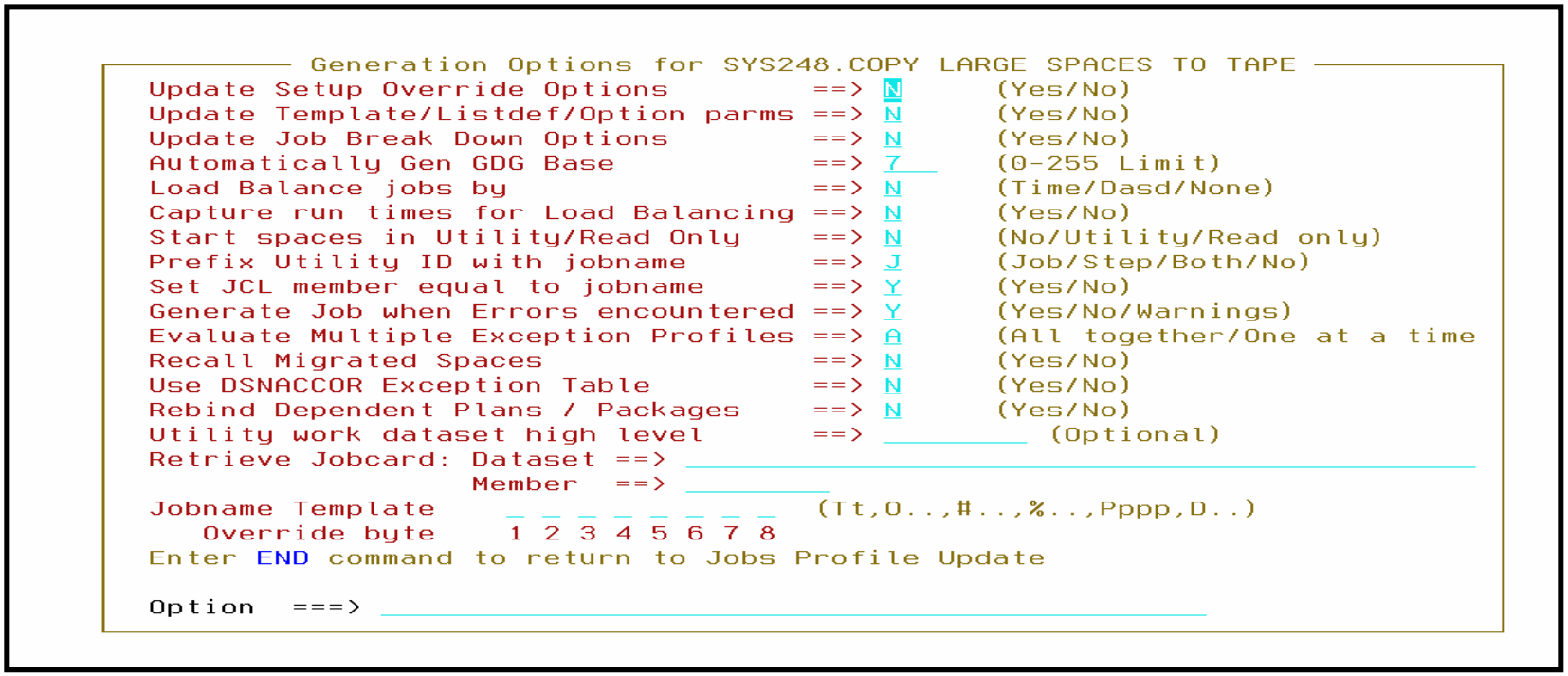
Integration with Scheduler

- Set up Schedule
  - Constant number of jobs
    - Automation Tool will generate IEFBR14 to fill "empty" PDS members
  - Multiple LPARS/One Scheduler
    - Generators on Scheduler LPAR
    - Generated Utility JCL remains on Target LPAR
    - "Submitter" jobs in Scheduler control utility execution

Job Profiles – Associating other Profiles

```
DLC$JPRU  V2R2    ------ Update Jobs Profile Display ----- 2007/03/18  11:34:43
-------------------------------------------------------------------------------

Creator: SYS248        Profile: COPY LARGE SPACES TO TAPE        User: SYS248

Share Option: V  (Upd,View,No)     Description: WITH COMMON COPY CONDITIONS

Update Job Generation Options: N  (Yes/No)                    Row 1 of 4    >

-------------------------------------------------------------------------------
                                                          <------ Last Update
Cmd   Type  Order  Name                              Creator   Userid    Timestamp
 _    OBJS    1   SAMPLE DATABASE                   SYS248    IBM1      2002-11-0
 _    UTIL    1   COPY TO TAPE                      SYS248    SYS248    2007-03-1
 _    EXCP    1   COPY CONDITIONS                   SYS248    IBM1      2002-11-0
 _    EXCP    2   LARGE OBJECTS                     SYS248    IBM1      2002-11-0
****************************** Bottom of Data ********************************
```

Job Profiles – Job generation specifications



Preparing for disaster recovery

- Standard Disaster Recover as outlined in DB2 Admin Guide
  "Remote Site Recover from disaster at a local site"
- Local environment recreated at recovery site
- Create JCL for application recovery
- Create DB2 catalog recovery JCL
  - Use object profiles
  - Include databases DSNDB06, DSNDB01, and DLCDB

Preparing for disaster recovery

- Create disaster recovery profiles
  - Primary profile
    - Forces checkpoint(-set log logload(0))
    - Forces log archive(-archive log)
    - Execute daily after catalog/ directory backup
    - Discovers objects datasets and finds available IC
  - Secondary profile
    - Archive log only process
      - Run periodically throughout the day
- Build DR profiles in batch
  - Find image copies, archive logs, etc.

D/R Profile – Generate Recoverysite Materials

```
HAA$YPRU  V2R2 ---- Update Disaster Recovery Profile ---- 2007/03/18  11:37:44
Option  ===>
--------------------------------------------------------------------------------
  Creator: SYS248      Name: D/R PROFILE TEST GENERATION      User: SYS248
  Share Option: U  (Upd,View,No)    Description:
--------------------------------------------------------------------------------
 Archive Log Options
  Archive Logs used at DR                ==> 2    (Copied/1/2)
  Copy Localsite Logs                    ==> 2    (1/2/Both/Create 2 copies from 1)
  Force a checkpoint before Archiving    ==> N    (Yes/No)
  Force the Active log to Archive        ==> Y    (Yes/No)
  Only run Archive Log Update Process    ==> N    (Yes/No)
  Process Datasharing Subsystems         ==> A    (All,Ssid,Lpar)
  Archive Logs needed at DR              ==> 001  (days) and/or  000   (hours)
  Copy Archive Logs to DASD              ==> 001  (days) and/or  000   (hours)
  Unit for copying Archive Logs          ==> SYSDA
  DR Archive Log Prefix 1                ==> DSNBCAT.ARCHLOG1
  DR Archive Log Prefix 2                ==> DSNBCAT.ARCHLOG2
 Image copy Options
  Image Copies used at DR                ==> R    (Localsite/Recoverysite)
  Catalog x days of Image Copies at DR==> 001  (0-365)
```

Recovery at the remote site

- Run the ssid#JCL job
  - Cleanup MVS catalog
  - Restores DB2 catalog and BSDS files
  - Recatalogs image copy data sets
  - Rebuilds BSDS and restores to VSAM format
  - Creates conditional restart record
  - Uncatalogs tape archive logs, cpies them to DASD and recatalogs the DASD versions

Recovery at the remote site

- Reassemble ZPARMS
- Start DB2
- Reply to conditional restart messages
- Recover the DB2 catalog from the image copies
- Run the ssid#STF job
  - Restarts application spaces in RW mode
  - Optional but recommended
- Restart DB2 using normal
- Recover applications

Dataset Manager

- Quickly resize object datasets without REORG
- Change object dataset attributes
  - PRIQTY and SECQTY
  - VCAT or STOGROUP
  - SMS classes
  - DASD volume
- Select datasets by database, tablespace, index, STOGROUP, VCAT, or volume
- Moves object datasets
  - New dataset created with altered attributes
  - Data copied from old dataset
  - Old dataset deleted
  - DB2 Catalog updated to reflect changes

DB2 Object Analysis and Management

DB2 V8 Automatic Space Management

Information Management software

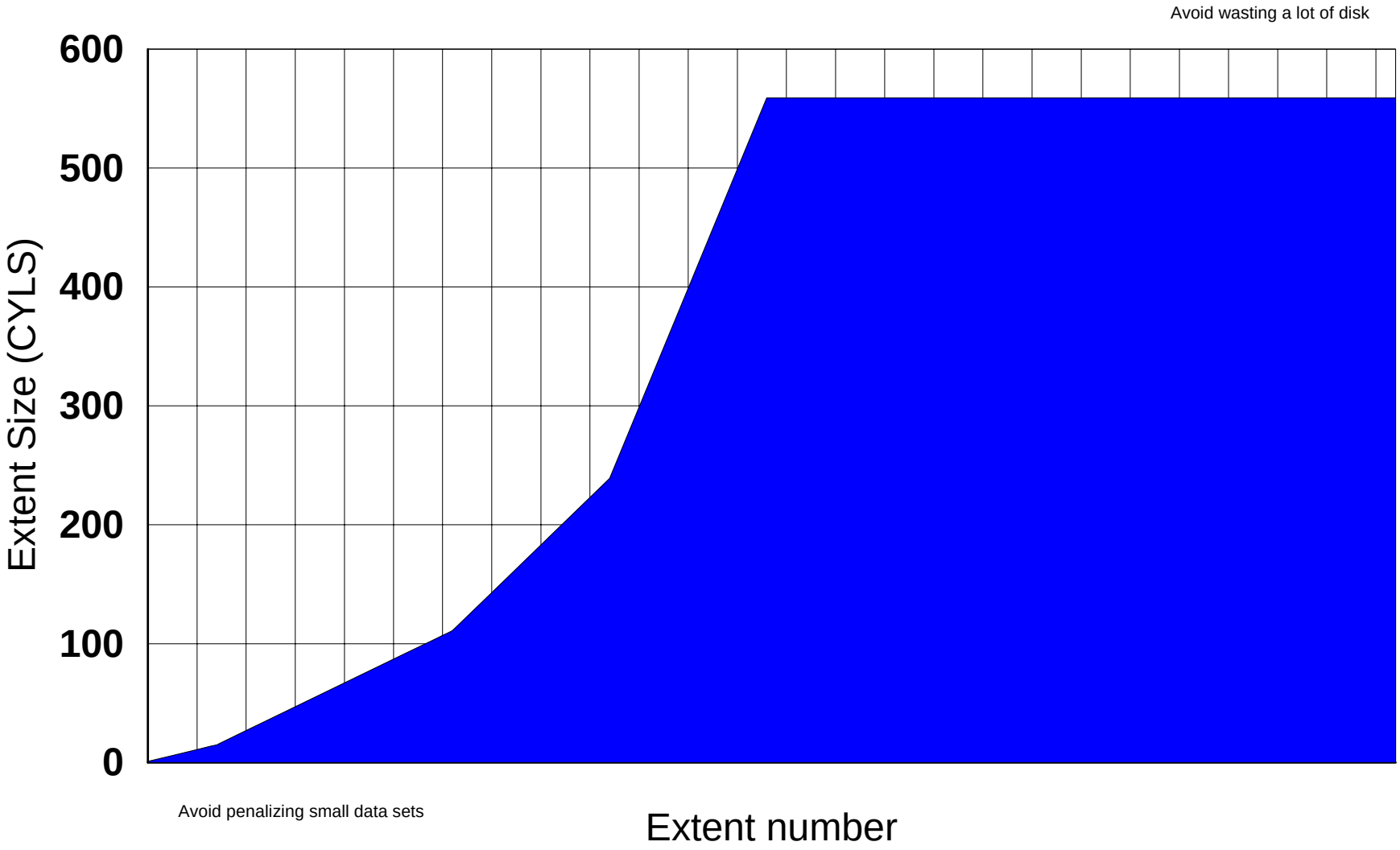
Automatic Space Management

- SMART enhancement: sliding secondary allocation quantity size
- Applies to DB2 managed pagesets only
- Tries to avoids VSAM maximum extent limit errors
- Can reach maximum dataset size before running out of extents
- Uses cylinder allocation
  - Default PRIQTY
    - 1 cylinder for non-LOB tablespaces and indexes
    - 10 cylinders for LOB tablespaces
  - Improved SQL SELECT and INSERT performance
    - 2x improvement relative to track allocation
- Can be used for
  - New pagesets: No need for PRIQTY/SECQTY values
  - Existing pagesets: SQL ALTER PRIQTY/SECQTY values to -1 (minus) plus schedule a REORG

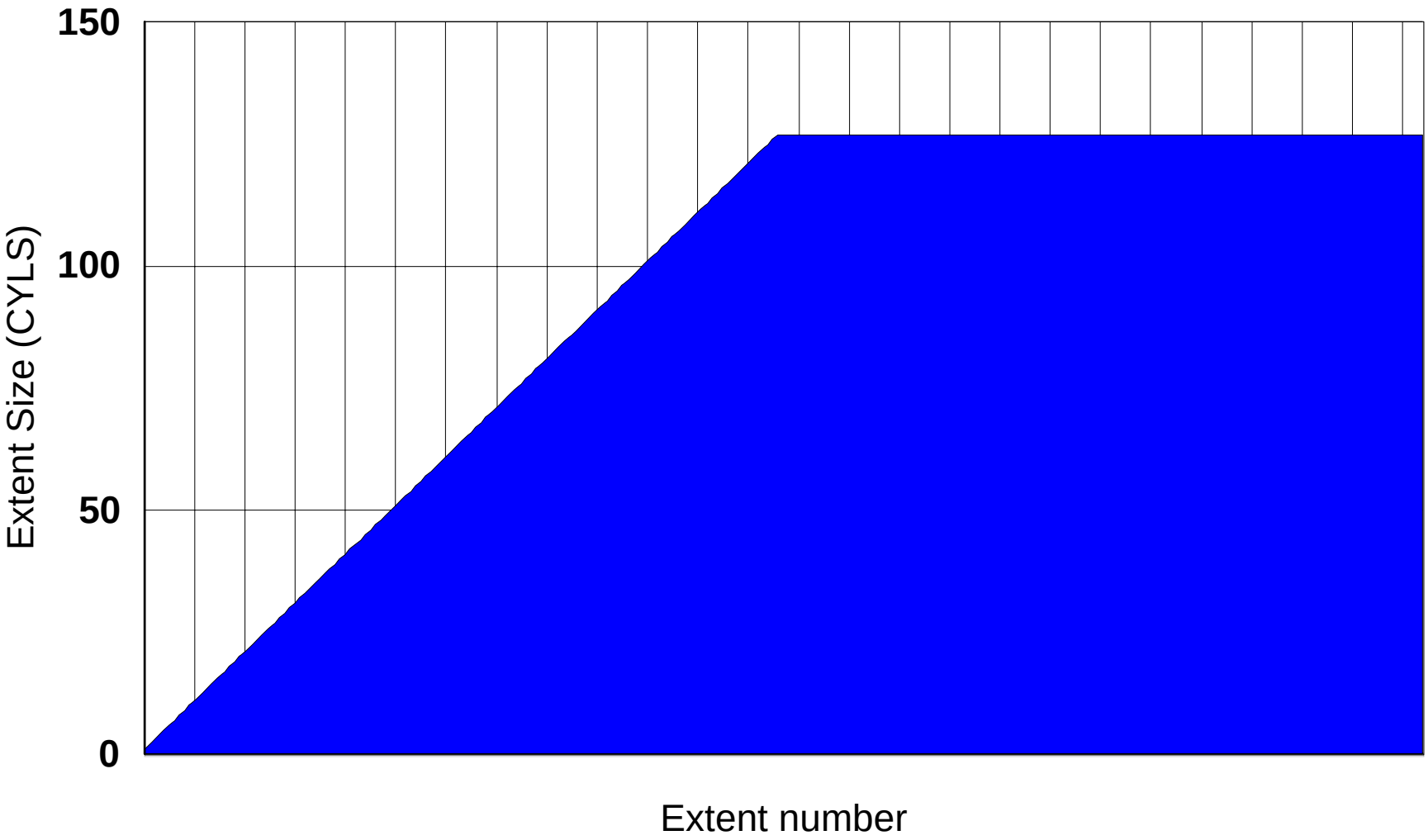
Automatic Space Management …

- Two sliding scales will be used depending on maximum dataset size
  - 32GB and 64GB data sets
  - Less than 1GB, 1GB, 2GB, 4GB, 8GB, 16GB datasets
- Maximum dataset size determined based on DSSIZE, LARGE and PIECESIZE
- Both sliding scales will allocate
  - Increasing secondary quantity size up to 127 extents
  - Constant number there after
    - 559 cylinders for the 32GB and 64GB datasets
    - 127 cylinders for the rest
- Sliding scale minimizes potential for wasted space by
  - Increasing the secondary extent size slowly at first
  - Avoiding very large secondary allocations from extents 125-255
- Particularly helpful for users of ERP/CRM vendor applications

Sliding Scale for 32GB and 64GB Data Sets



Sliding Scale for Other Data Sets



DB2 Object Analysis and Management

Recent DB2 for z/OS Tools Announcements

Information Management software

DB2 TOOLS Included in Announcement

PRODUCT	NUMBER	VERSION / RELEASE	DATE
DB2 Optimization Expert for z/OS	5655-S19	New Product	3/16/2007
Data Quant for z/OS	5697-N64	New Product	3/16/2007
DB2 Accessories Suite for z/OS	5655-R14	New Product	3/16/2007
DB2 Utility Suite for z/OS	5655-N97	V9	3/16/2007
DB2 Administration Toolkit for z/OS SAP Edition	5697-L30	New Version 2.1	3/16/2007

For additional information…….

- http://www-306.ibm.com/software/data/db2imstools/
  - Library
    - IBM DB2 Automation Tool for z/OSUser's Guide Version 2 Release 2 - SC18-9280-02
    - IBM DB2 Storage Management Utility for z/OSUser's Guide Version 1 Release 1 SC19-1063-01
    - DB2 UDB for z/OS Version 8 Administration Guide - SC18-7413-00
  - Fact Sheets
  - Announcement Letters
    - IBM United States Software Announcement 207-040 March 6, 2007
- http://www.redbooks.ibm.com/
  - Administration Solutions for DB2 UDB for z/OS - SG24-6685-00
  - DB2 UDB for z/OS Version 8 Performance Topics - SG24-6465-00

Trugarez
Breton

Merci
French

Gracias
Spanish

شكرا
Arabic

감사합니다
Korean

תודה רבה
Hebrew

धन्यवाद
Hindi

多謝
Traditional Chinese

Tack så mycket
Swedish

Obrigado
Brazilian Portuguese

go raibh maith agat
Gaelic

Tak
Danish

Grazie
Italian

Dankon
Esperanto

多谢
Simplified Chinese

Danke
German

ありがとうございました
Japanese

Dank u
Dutch

ขอบคุณ
Thai

Thank You
English

நன்றி
Tamil

Dekujeme Vam
Czech