DB2 Recovery Expert for z/OS V1.1

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Presentation Agenda

- **DB2 z/OS recovery**

- **Current IBM products for recovery**

- **DB2 Recovery Expert z/OS function**

- **DB2 Recovery Expert z/OS architecture**

- **DB2 Recovery Expert z/OS demonstration**

DB2 Recovery

- **DB2 recovery is perhaps the most complex activity that DBAs participate in**

- **There are many different potential scenarios**

- **Recoveries are not an everyday thing**
  - most people don't practice recovery enough
  - skills are often not sharp when they are needed

- **There is a need for an Expert type product to assist DBAs in recovery activities**

DB2 Recovery

- **Different types of recovery situations all requiring different recovery solutions**

  - Hardware failures

  - Application failures

  - Accidentally dropped objects

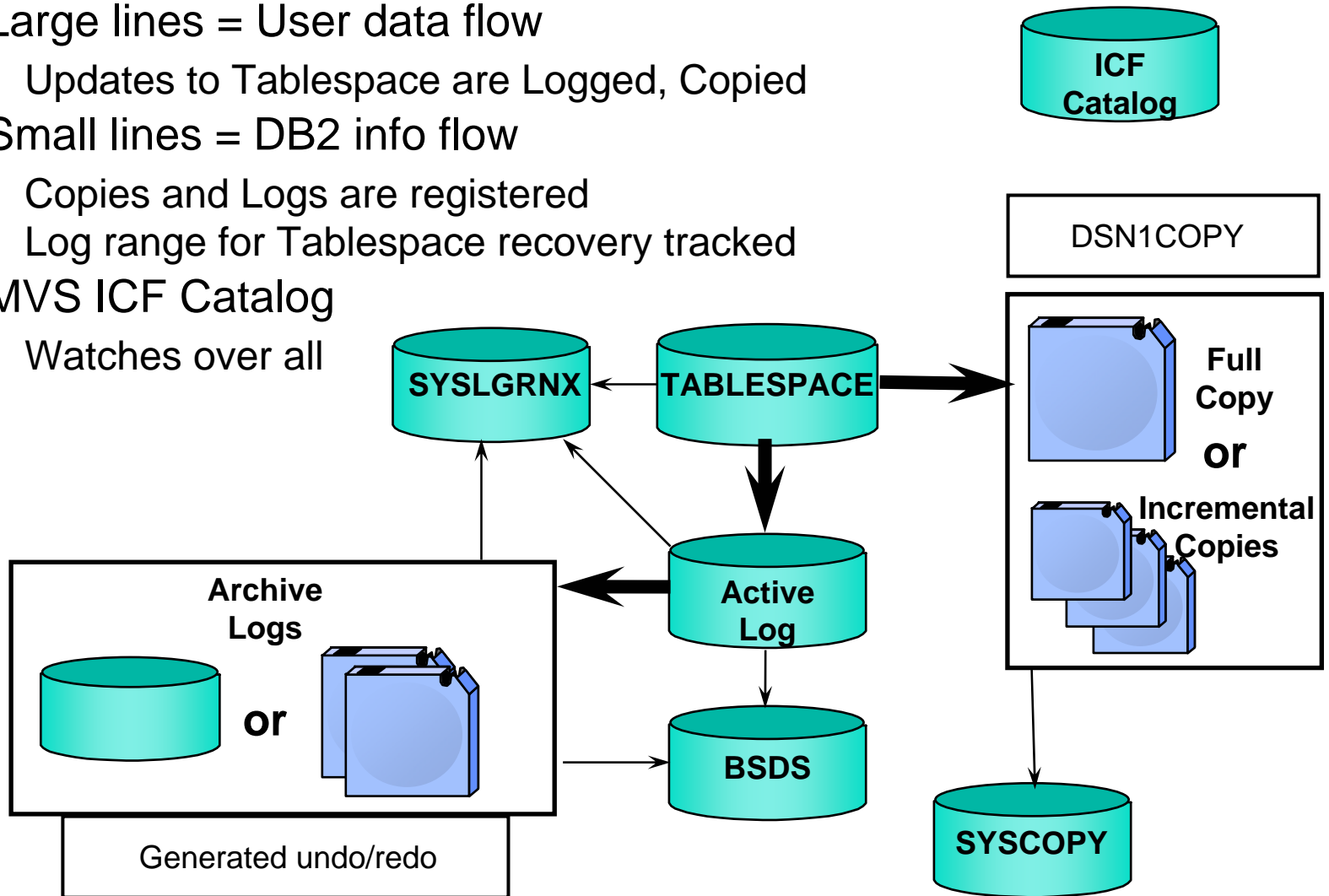 - Application System recovery

  - Disaster recovery

- **Different recovery choices**

  - Recover to
    - Current, IC, PIT, LRSN, Timestamp (quite time)
  - Recover using
    - IC, log, DSN1COPY, undo, redo
  - Recover related objects

What are your DB2 Recovery Assets

- **DB2 Active and Archived Log**

  - Generated Undo/Redo

- **Bootstrap Dataset – BSDS**

- **SYSLGRNX**

- **SYSCOPY**

- **Full and Incremental copies**

  - DSN1COPY

- **Tablespace to be recovered**

- **ICF Catalog**

DB2 Recovery Asset Review

– Large lines = User data flow
  - Updates to Tablespace are Logged, Copied
– Small lines = DB2 info flow
  - Copies and Logs are registered
  - Log range for Tablespace recovery tracked
– MVS ICF Catalog
  - Watches over all

ICF Catalog

DSN1COPY

SYSLGRNX

TABLESPACE

Full Copy

or

Incremental Copies

Archive Logs

or

Active Log

BSDS

Generated undo/redo

SYSCOPY

Current IBM products for DB2 z/OS recovery

- **DB2 COPY Utility**
  - Make backups of application and catalog objects

- **DB2 RECOVER Utility**
  - Primary recovery tool for application and catalog objects

- **Log Analysis Tool**
  - Selective backout and recovery

- **Object Restore**
  - Dropped object recovery (and more)

- **Change Accum Tool**
  - Speed recovery by producing log subset files or using log records to update image copies

- **Automation Tool**
  - Disaster recovery support

- **V8 – SYSTEM BACKUP and RESTORE Utilities**
  - Backup and restore complete application subsystems

- **DB2 RECOVERY EXPERT for z/OS**

DB2 Recovery Expert for z/OS V1.1

- **Provide Expert assist for performing many types of DB2 recoveries**

- **DB2 Recovery Expert analyses the requested recovery**

  – Providing a selection of possible recovery plans

    - Selecting for you, the needed recovery assets and utilities
    - Assists in selecting recovery points
    - Builds required JCL

Select objects to recovery

- **Selecting Groups of Objects to Recover**

  - Recovery Expert provides 4 ways to specify a group of objects to be recovered

    - Explicit selection (one by one)

    - By pattern

    - Via RI relationships (Grouper and catalog RI)
      - Grouper groups can be selected in the object tree

    - If Automation Tool is available, via Automation Tool object profiles
      - Automation Tool profiles can be selected in the object tree

Select objects to recovery

Recover Points

- **There are 3 choices when specifying a recovery point**

  – Recover to current

  – Recover to a timestamp

    • Can be selected from
      – Object version
      – Recovery history events
      – Quiet points

  – Recover to an RBA/LRSN

    • Can be selected from
      – Recovery history events
      – Quiet points

Select Recovery Point

Recovery Advisor

Welcome

1. Location

2. Objects

3. Point in Time

4. Recovery Plan

Select the point in time to which you want to recover.

Select one of the available options for the point in time to which to recover.

Point in time

- ● Current

  Select this option when you want to recover data that is logically consistent, but has a physical error or other corruption in how it is stored.

- ○ Timestamp `2006-06-05` ▼ `10.02.44` ⬍ `000000` ⬍ `...` (explicit)

  Select this option when you want to recover previous versions of the selected objects, or when data has become logically inconsistent and you can identify a prior timestamp when the data was consistent.
  Use the browse button for help in selecting the timestamp.

- ○ Log RBA `0000C3AB86F0` `...` (explicit)

  Select this option when data has become logically inconsistent and you can identify a prior log RBA when the data was consistent.
  Use the browse button for help in selecting the log RBA.

◀ Back   Next ▶   Save...   Close   Help

Recovery Plans

Recovery Advisor

Generate and execute a plan to recover the selected objects.

Click Generate to generate one or more recovery plans for the selected objects.
After generating, you can select a plan to review its details.
If it has been some time since you generated the recovery plans, you can click Validate to check whether the external resources required by the plans (such as image copy data sets) are still available.
Finally, select the plan you wish to use for recovery, and click Run to run it. To instead view or edit the JCL generated to run the plan, click View JCL.

Welcome
1. Location
2. Objects
3. Point in Time
4. Recovery Plan

Recovery plans

Generate...

Plans

- Plan 1: Using DSN1COPY and RECOVER LOGONLY (cost = 2)
- Plan 2: Using DSN1COPY of IC and redo SQL (cost = 2)
- Plan 3: Using RECOVER (cost = 2)
- Plan 4: Using RECOVER to IC and redo SQL (cost = 2)
- Recovered Objects
  - Table space TESTDB02.TESTTS02
  - Table partition TESTDB02.TESTTS02.1
  - Table partition TESTDB02.TESTTS02.2
  - Table partition TESTDB02.TESTTS02.3
  - Table partition TESTDB02.TESTTS02.4
  - Table CSPITT.CSPITT_TBL02
  - View CSPITT.CSPITT_VIEW2
  - Index CSPITT.CSPITT_IDX02
  - Index partition CSPITT.CSPITT_IDX02.1
  - Index partition CSPITT.CSPITT_IDX02.2

Properties

Name	Value
Plan cost	2
Plan name	Using RECOVER

Validate   Run   View JCL...

◀ Back   Next ▶   Save...   Close   Help

Recovery Plans steps

Recovery JCL

Recovery JCL

Recovery plan: Plan 3: Using RECOVER (cost = 2)

Statements

```
//RCVR0004 EXEC PGM=DSNUTILB,PARM=(I81A),COND=(4,LT)
//STEPLIB  DD DISP=SHR,DSN=I81A.SDSNEXIT
//         DD DISP=SHR,DSN=RSRTE.DSN.V810.SDSNLOAD
//SYSPRINT DD    SYSOUT=*
//SYSIN    DD    *

  RECOVER
    TABLESPACE TESTDB02.TESTTS02

/*
//*
//RBLD0005 EXEC PGM=DSNUTILB,PARM=(I81A),COND=(4,LT)
//STEPLIB  DD DISP=SHR,DSN=I81A.SDSNEXIT
//         DD DISP=SHR,DSN=RSRTE.DSN.V810.SDSNLOAD
//SYSPRINT DD    SYSOUT=*
//UTPRINT  DD    SYSOUT=*
//SYSOUT   DD    UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//SYSIN    DD    *

  REBUILD INDEX
    ( "CSPITT"."CSPITT_IDX02" )
      SCOPE ALL

/*
//*
//COPY0006 EXEC PGM=DSNUTILB,PARM=(I81A),COND=(4,LT)
//STEPLIB  DD DISP=SHR,DSN=I81A.SDSNEXIT
//         DD DISP=SHR,DSN=RSRTE.DSN.V810.SDSNLOAD
```

Run   Export...   Close   Help

DB2 Recovery Expert for z/OS V1.1

- **Recovery Expert V1.1 provides**

  - Application recovery

  - Drop recovery

  - Single or multiple objects

  - Dependency analysis

  - Quiet point analysis

  - SYSTEM RESTORE

DB2 Recovery Expert for z/OS V1.1

- **Includes functionality from:**

  – Log Analysis Tool

  – Object Restore

    • NO pre-reqs for LAT or OR

- **Recovery Expert can utilize Automation Tool Object Profiles for object selection IF:**

  – the customer has Automation Tool

  – the customer already has object profiles set up in Automation Tool

DB2 Recovery Expert for z/OS V1.1

- **V1.1 does not include functionality from:**

  – Change Accum

- **V1.1 does not do backup management**

  – Customers can use Automation Tool to perform the backups

- **V1.1 does not support**

  – Disaster recovery

  – Hardware assisted recovery

  – Integration with RE MP

Product Architecture

- **3 Tier Architecture**

  - UI – Windows - Java (no ISPF interface)

  - SERVER

    - z/OS - C/C++

  - AGENT

    - z/OS - C/C++ and assembler

- **Server and Agent run as started tasks or batch jobs**

- **Communication via TCP Sockets**

- **One UI can log onto any number of Servers across an Enterprise (one at a time)**

- **Servers can talk to any number of agents across an Enterprise**

  - Servers can talk to agents on different LPARs or systems

The DB2 Recovery Expert for z/OS environment

Schema Level Repository

- **Schema Level Repository (SLR)**
  - Enhanced version of Object Restore's Version Repository
  - Stored in DB2 tables
  - Updated via batch job
    - like Object Restore today

- **The SLR update program**
  - goes through the DB2 catalog and builds the base for the Schema Level Repository

- **The SLR update needs to be scheduled on a regular basis to insure that the SLR is up to date**

DB2 Recovery Expert V1.1 Recovery Scenarios

Scenarios

– Scenario 1 – Recovery of table space to current

– Scenario 2 – Recovery of table space to a selected timestamp point-in-time from quiet time

– Scenario 3 – Selection of an RBA or LRSN from recovery history events or quiet times – dropped object

– Scenario 4 – Recovery of a set of related table

Scenario 1 – Recover TS to Current

- **Description**

  - TS DEMODB07.DEMOTS07

    - Updates to table

    - Full image copy

    - Perform SLR update

    - Updates to table

    - Selects from table

  - Recover to current

    - Using Recovery Utility

RE z/OS starting screen

Select Location

Select object/objects or group

Select recovery point

Generate and select Recovery plan then run

Recovery job results

Review job output by step name

Scenario 2 – Recover TS to PIT using undo

- **Description**
  - TS DEMODB03.DEMOTS03
    - Updates to table
    - Full image copy
    - Perform SLR update
    - Updates to table
    - Incremental image copy
    - Wait
    - Updates to table
    - Quiesce
    - Wait
    - Updates to table
    - Quiesce
    - Wait
    - Updates to table
    - Selects from table
    - Perform SLR update
  - Recover to PIT, quite time
    - Using Undo SQL

Select object to recover

Select Timestamp and click on (explicit)

Select 'Quiet times' and 'Run New Report'

Specify date and time to analyze

Review and change if needed objects to report on

Review and sub

If desired review log analysis job

Click Refresh, select Quiet Time Timestamp, OK

Generate plans, select Recovery plan then run

Recovery job results

Scenario 3 – Recover Dropped TS to RBA

- **Description**
  - TS DEMODB04.DEMOTS04
    - Updates to table
    - Full image copy
    - Perform SLR update
    - Updates to table
    - Incremental image copy
    - Wait
    - Updates to table
    - Quiesce
    - Wait
    - Updates to table
    - Selects from table
    - Wait
    - Perform SLR update
    - Drop Table Space
    - Perform SLR update
  - Recover of Dropped TS to RBA
    - Using DSN1COPY and REDO SQL

Objects in SLR only show in red

Select object to be recovered

Recovery Advisor

1. Location
2. Objects
3. Point in Time
4. Recovery Plan

Select the objects that you want to recover.

Select the objects you wish to recover in the list of available objects, and click the right arrow to add them to the list of objects to recover. The list at the bottom of the window will help you by showing detailed properties for the objects you click on.

In order to define a pattern matching multiple objects, select the node labeled "Pattern" under the type of object you wish to select, then click the right arrow. A window will display where you can type the specific pattern values.

The objects you select, as well as objects related to them, will be recovered. For example, if you select a table space, the tables it contains will also be recovered. On the Recovery Plan page, you should carefully review the complete list of objects under Recovered Objects in the Recovery plans tree.

Available objects

- I81A
  - Storage Groups
  - Databases
  - Table Spaces
    - *Pattern*
    - DEMODB03.DEMOTS03
    - DEMODB04.DEMOTS04
    - DEMODB07.DEMOTS07
  - Tables
  - Plans

Selected objects

- Table space DEMODB04.DEMOTS04

Properties

Name	Value
Implicit?	N
OBID	1
PSID	2
Partition count	4
Repository status	Repository only

◄ Back   Next ►   Save...   Close   Help

Select RBA and click on (explicit)

Recovery Advisor

1. Location
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Select the point in time to which you want to recover.

Select one of the available options for the point in time to which to recover.

Point in time

○ Current

Select this option when you want to recover data that is logically consistent, but has a physical error or other corruption in how it is stored.

○ Timestamp [2006-06-18 ▼] [19.00.18 ⬍] [000000 ⬍] [...] (explicit)

Select this option when you want to recover previous versions of the selected objects, or when data has become logically inconsistent and you can identify a prior timestamp when the data was consistent.
Use the browse button for help in selecting the timestamp.

⦿ Log RBA [0000C58E6288] [...] (explicit)

Select this option when data has become logically inconsistent and you can identify a prior log RBA when the data was consistent.
Use the browse button for help in selecting the log RBA.

[◀ Back] [Next ▶] [Save...] [Close] [Help]

Click on 'Recovery history events', refresh, select

Log RBA filled for us

Generate and select plan, view JCL

Recovery JCL

Recovery JCL

Recovery plan: Plan 1: Using DSN1COPY of IC and redo SQL (cost = 3)

Statements

```
//*
//DCPX0004 EXEC PGM=ARY#UTIL,PARM='UTGENA,I81A ',COND=(4,LT)
//STEPLIB  DD DISP=SHR,DSN=RSDEMO.ARY310.D010606.LOADLIB
//         DD DISP=SHR,DSN=I81A.SDSNEXIT
//         DD DISP=SHR,DSN=RSRTE.DSN.V810.SDSNLOAD
//DB2PARMS DD DISP=SHR,DSN=RSTEST.ARY310.D010606.CONTROL
//SYSPRINT DD   SYSOUT=*
//CONTROLS DD   *
CONFIG DEFAULT
//SYSXLAT  DD   DSN=PDDAVI.ARY06169.S192240.M898716.SYSXLAT,
//             UNIT=SYSALLDA,SPACE=(CYL,(1,1),RLSE),
//             DISP=(NEW,CATLG,DELETE)
//SYSIN    DD   *
TABLESPACE
0302,DEMODB04
0002,DEMOTS04
0003,"PDDAVI"."PDDAVI_TBL04"
/*
//*
//DCPY0005 EXEC PGM=ARYLDSN1,COND=(4,LT),
// PARM='CHECK,PAGESIZE(4K),FULLCOPY,NUMPARTS(4),OBIDXLAT,RESET'
//STEPLIB  DD DISP=SHR,DSN=RSDEMO.ARY310.D010606.LOADLIB
//         DD DISP=SHR,DSN=I81A.SDSNEXIT
//         DD DISP=SHR,DSN=RSRTE.DSN.V810.SDSNLOAD
//SYSUT1   DD DISP=SHR,DSN=PDDAVI.I81A.DB04TS04.D060618.T224837
//SYSIN    DD *
I81A.DSNDBC.DEMODB04.DEMOTS04.I0001.A001
//SYSPRINT DD   SYSOUT=*
```

Run   Export...   Close   Help

Recovery Advisor

1. Location
2. Objects
3. Point in Time
4. Recovery Plan
5. Results

Review recovery job results.

Select one of the jobs in the list and click View to view its results. If you do not need to retain a job's results for future reference, select the job and click Delete.
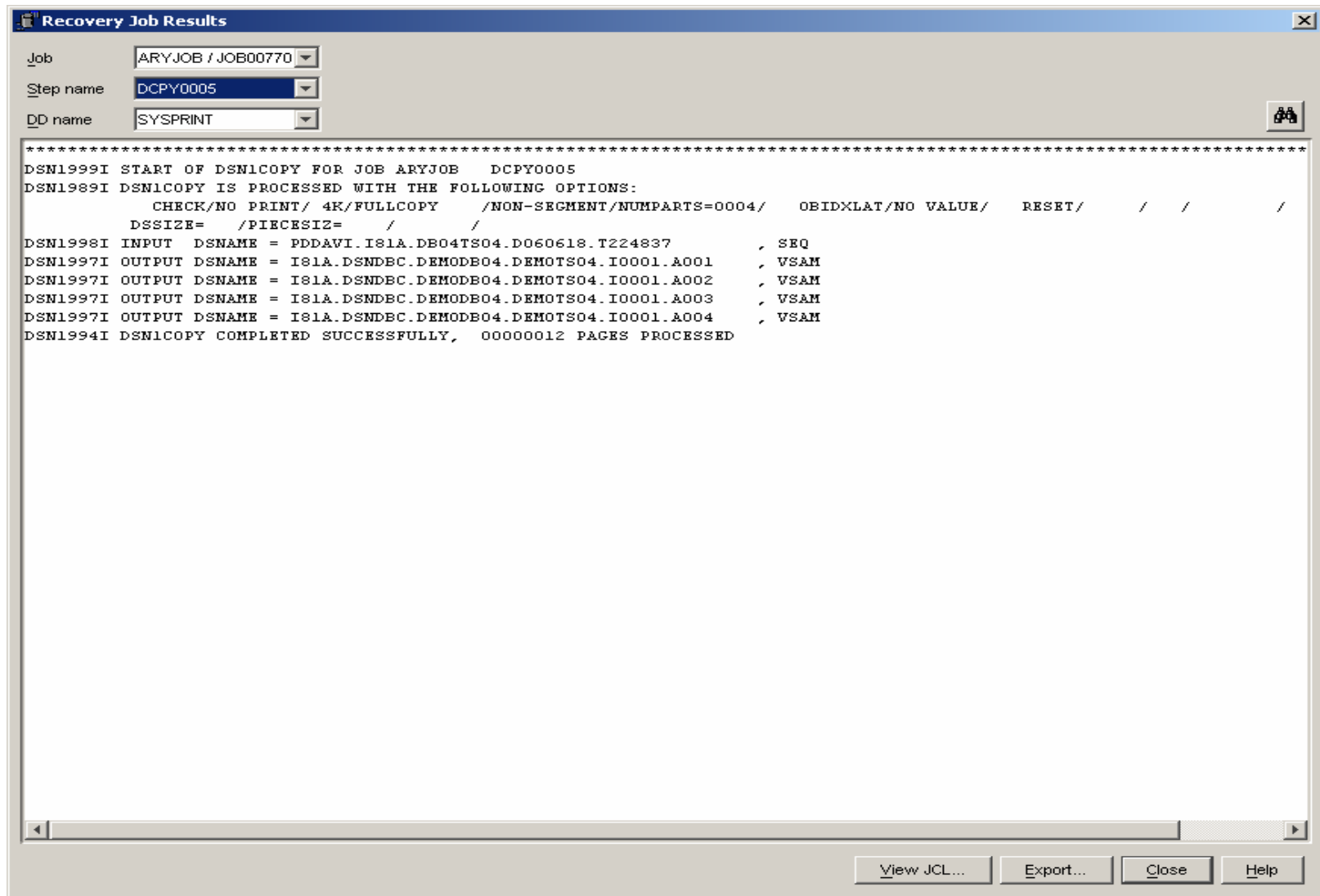
Plans

Plan	Start	End	MAXCC	Job count
Plan 1: Using DSN1COPY of IC and redo S...	2006-06-18-19.38.05.761629	2006-06-18-19.38.46.151153	0	1

Jobs

Job name	Job ID	Start	End	MAXCC
ARYJOB	JOB00770	2006-06-18-19.38.05.761908	2006-06-18-19.38.46.088407	0

View...   Delete

◄ Back   Next ►   Save...   Close   Help

View SYSPRINT, select by step name

Scenario 4 – Recovery of a set of related table

- **Description**
  - Use Grouper set of related tables
    - TDBG01
      - Version DEPT_EMP
      - Group1
  - Recover
    - Using recover to current

Select Grouper Set of related tables

Recovery Advisor

1. Location
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Select the objects that you want to recover.

Select the objects you wish to recover in the list of available objects, and click the right arrow to add them to the list of objects to recover. The list at the bottom of the window will help you by showing detailed properties for the objects you click on.

In order to define a pattern matching multiple objects, select the node labeled "Pattern" under the type of object you wish to select, then click the right arrow. A window will display where you can type the specific pattern values.

The objects you select, as well as objects related to them, will be recovered. For example, if you select a table space, the tables it contains will also be recovered. On the Recovery Plan page, you should carefully review the complete list of objects under Recovered Objects in the Recovery plans tree.

Available objects

- Grouper Groups
  - *Pattern*
  - CATALOGWIDE
  - IVP
  - SAMPLE
  - TDBG01
    - DEPT_EMP
      - Group_1
        - Tables
          - CSBANK.ACT

Selected objects

- Grouper group TDBG01.DEPT_EMP.Group_1

Properties

Name	Value
Created timestamp	2006-05-09-15.51.54.608359
Creator	PDDAVI
Group ID	329
Remarks	
Version ID	104

◄ Back   Next ►   Save...   Close   Help

Select recover to current

Selected Related Tables and constraints to recover

Select Plan and View JCL

Recovery JCL

Questions