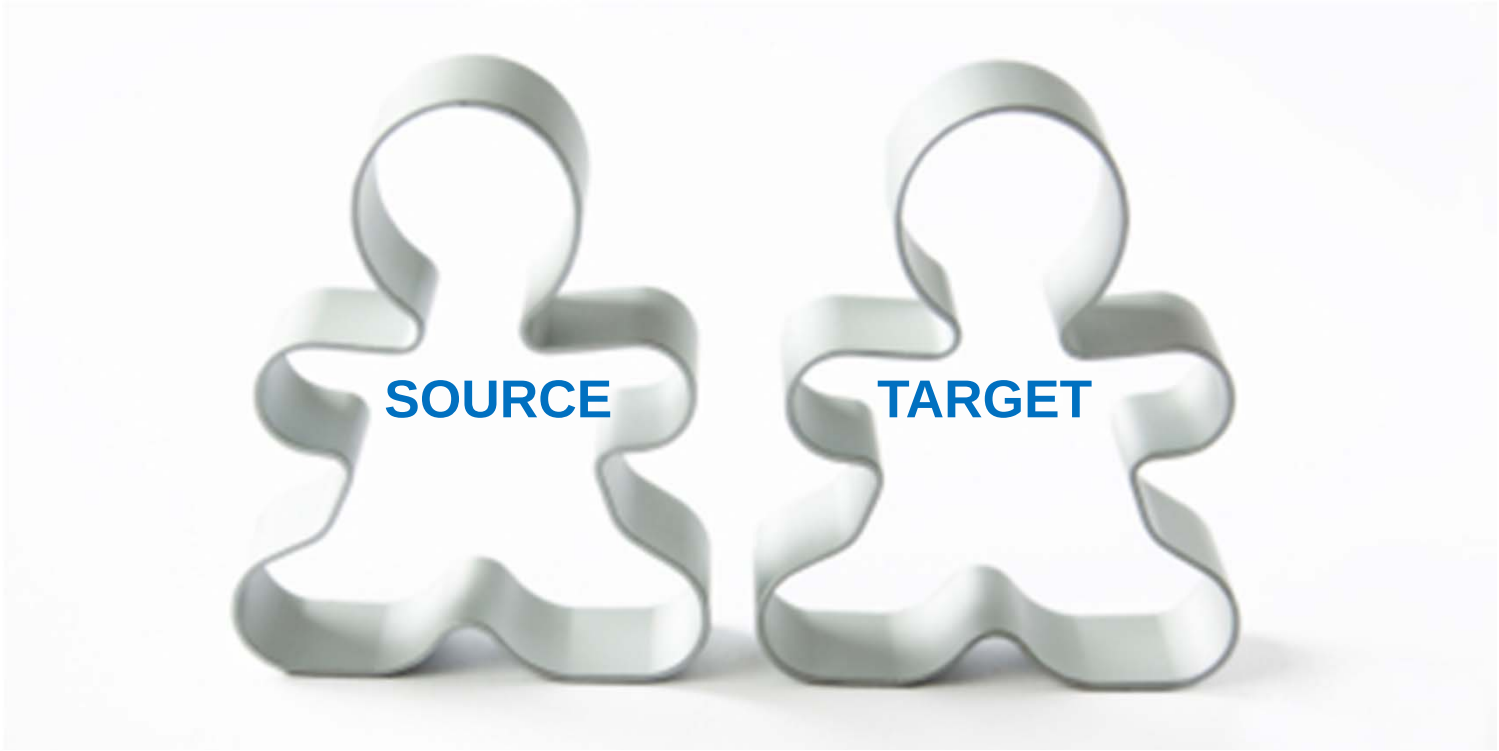
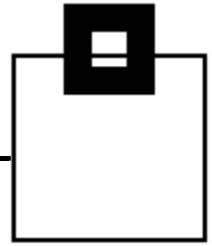
Cloning, Cloning, Cloning … Isn't it always the same?



DB2 z/OS Database cloning using

Instant CloningExpert for DB2 z/OS

Cloning, Cloning, Cloning … Isn't it always the same?

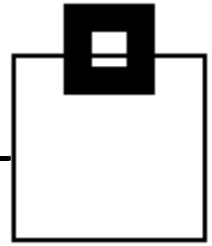


Well ... Yes and No

Yes - once setup for your needs,

it should always be the same for you.

Cloning, Cloning, Cloning … Isn't it always the same?



Yes – Easy to use

Your cloned systems and objects should always be the same as the originals.

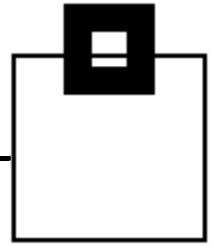
Yes – Easy to be consistent

Independent of operational circumstances, cloning results need to be reproducible.

Yes – Easy to integrate

Outside of cloning, your existing procedures should remain the same.

Cloning, Cloning, Cloning … Isn't it always the same?

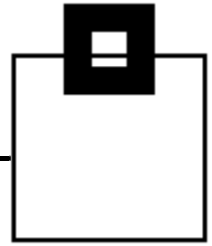


However, solutions and tools differ significantly in

- functionality
- ease of use
- simplicity of operation
- reliability and consistency of results

So … No, it is not always the same when it comes to picking the right solution for your installation.

What can Cloning do for you?

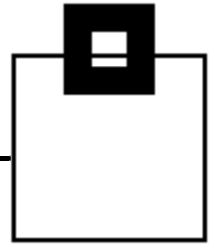


In other words … What do you expect from a cloning solution?

As usual - it depends.

Yet, a cloning solution can and will make your life easier, whenever you need to duplicate DB2 subsystems, DB2 objects, or groups of DB2 objects on a regular, day-to-day basis.

Do you need different types of cloning?



Instant CloningExpert for DB2 z/OS

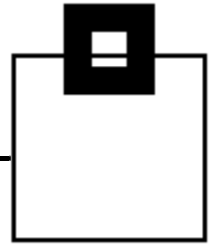
HSC Homogeneous System Cloning

Entire DB2 subsystems are cloned in a straightforward, fast, and reliable way.

HOC Homogeneous Object Cloning

Objects or groups of objects are copied in order to setup or refresh a system or parts thereof.

Your need for cloning

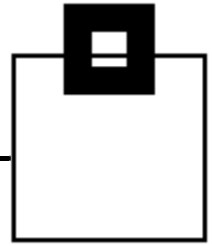


Your need for cloning can arise out of a multitude of possible ...

- strategic decisions
- customer or client requests
- operational circumstances

Non-technical reasons are fairly common.

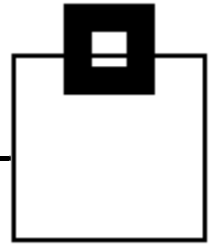
Your reasons for cloning



In the realm of HSC Homogeneous System Cloning

- All kinds of testing
- Quality Assurance
- Auditing
- Reporting, Compliance Reporting
- Data Mining
- Fast creation of new subsystems
- Backup
- Demo and Training
- ...

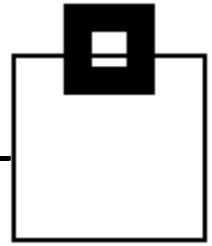
Your reasons for cloning



In the realm of HOC Homogeneous Object Cloning

- Consolidation due to mergers or acquisitions
- Separation of business units, applications, or data
- Refresh of systems or select data
- ...

Cloning is there!

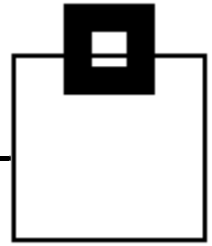


Once you find out that you really do need cloning, there usually is no alternative.

You are facing organizational as well as technical requirements including ...

- cloning functions and cloning options in general
- the type and scope of cloning
- possible problems and side effects

Well? Who is going to do that for you?



Instant CloningExpert for DB2 z/OS

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Entire DB2 subsystems are cloned in a straightforward, fast, and reliable way.

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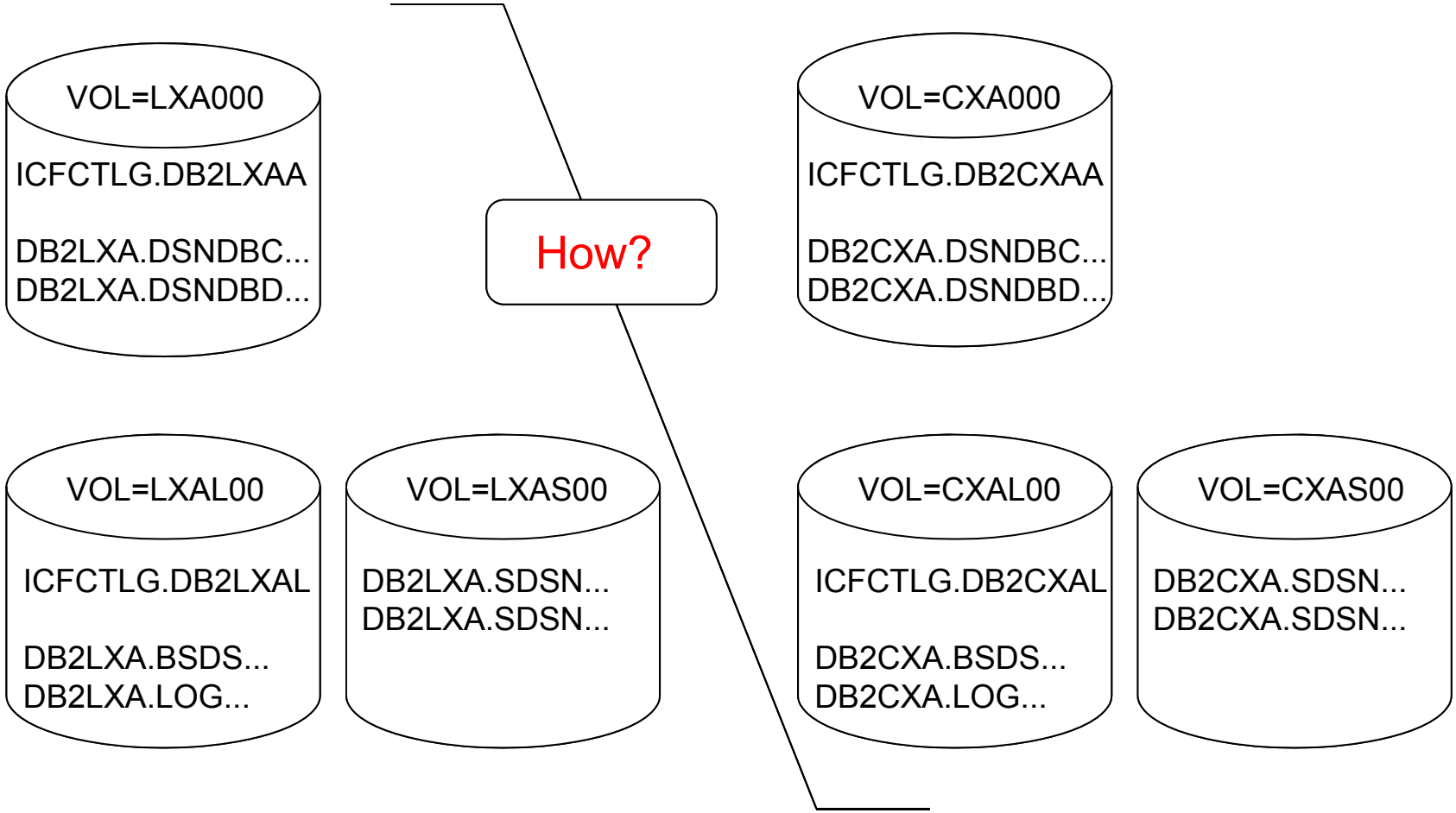
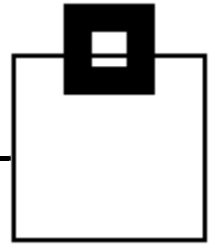
Objects or groups of objects are copied in order to setup or refresh a system or parts thereof.

Type HSC Cloning Scenarios

Cloning an entire DB2 Subsystem – LXA to CXA: DASD view



Type HSC Cloning Scenarios



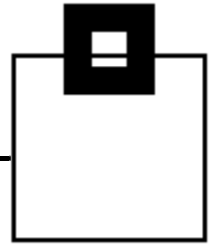
Cloning an entire DB2 Subsystem – LXA to CXA: System view

Steps for processing of DSNZPARM, DSNHDECP, BSDSs, and LOGs are included

DB2 load libraries can be included in case of cross-version cloning

XCF structures forced if and as needed

Type HSC Cloning Scenarios



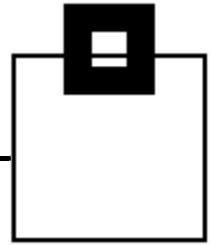
How? Easy!

- Provide a clean copy of all source volumes
- HSC gathers all required source information
- HSC gathers all required target information
- Stop target DB2 subsystem (manually or by HSC)
- Restore the copy to a new set of volumes – the target

- HSC does all the renaming required on the target

- Perform all required post-processing

Type HSC Cloning Scenarios



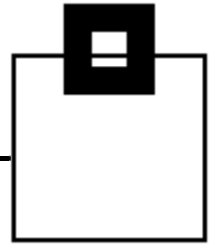
Rename the target?

After the restore, you have a set of volumes with data sets and clusters that are very difficult to access.

The ICF catalogs, the VTOC, VTOCIX and VVDS are all full of *old* data set names.

The ICF catalogs themselves are not named correctly any more.

Type HSC Cloning Scenarios



Rename the target?

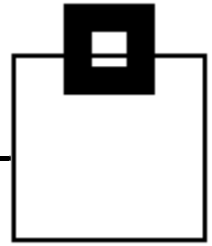
So, the renaming process must be ...

- Complicated
- Slow
- Error prone

- Most probably, all of the above!

Is that the case? No.

Type HSC Cloning Scenarios



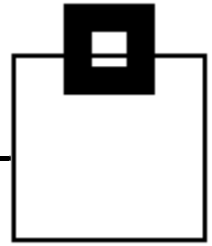
Renaming the target is easy with the

HSC Fast Rename component

As an integral part of the cloning process, renaming is done in a few steps that do not require any activities outside the product.

HSC Fast Rename is approximately 20 to 25 times faster than any other renaming method.

Type HSC Cloning Scenarios



FAQs (1/3)

Can a DS group be cloned to a non-DS DB2, or vice versa?

Yes

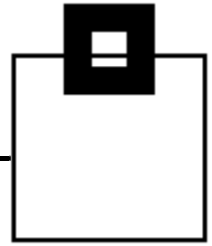
Is the number a members in a DS group of any relevance?

No, at least not from a cloning perspective.

Is any special customization of existing procedures required?

No

Type HSC Cloning Scenarios



FAQs (2/3)

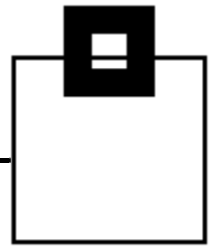
Can certain cloning steps (like rename, start DB2, stop DB2) be isolated, e.g. for administrative or security reasons?

Yes, and some of these options are already integrated in the product.

Can the cloning process be customized in order to meet customer specific needs?

Yes, absolutely. All the internal scenario and process setup is defined using XML. This makes it highly customizable; it can be fit to suit almost any site specific requirement.

Type HSC Cloning Scenarios



FAQs (3/3)

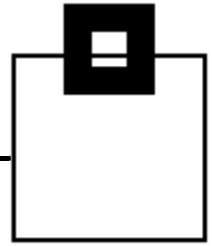
Is the definition of scenarios and XML editing required for the initial setup?

No, most likely not. The product provides 24 pre-defined scenarios that suit many cloning needs. After entering the required data on the *Scenario Selection Filter* panel, the matching scenario is picked automatically.

Do the source and target systems have to reside on the same LPAR?

No, they can, but they do not have to

Type HSC Cloning Scenarios



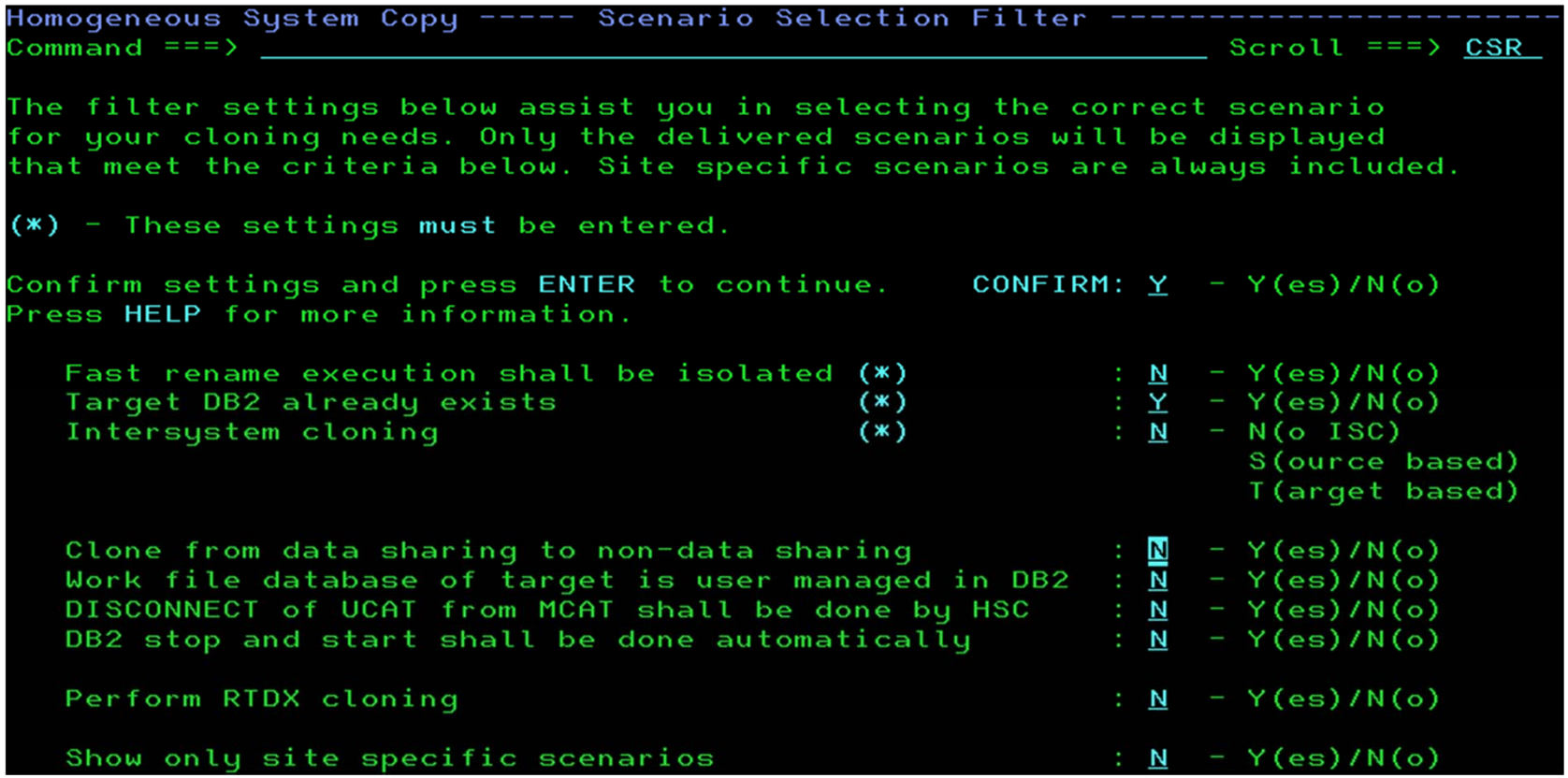
The scope of database cloning is limited. There are things that are not part of it.

- z/OS subsystem definition via SETSSI, or in IEFSSNxx
- DB2 address space JCL procedures setup
- RACF setup or verification
- SMS classes setup or verification
- WLM setup or verification
- Coupling Facility structure definitions
- ...

Check with your local z/OS System Programming and Security Administration colleagues before starting any cloning activities.

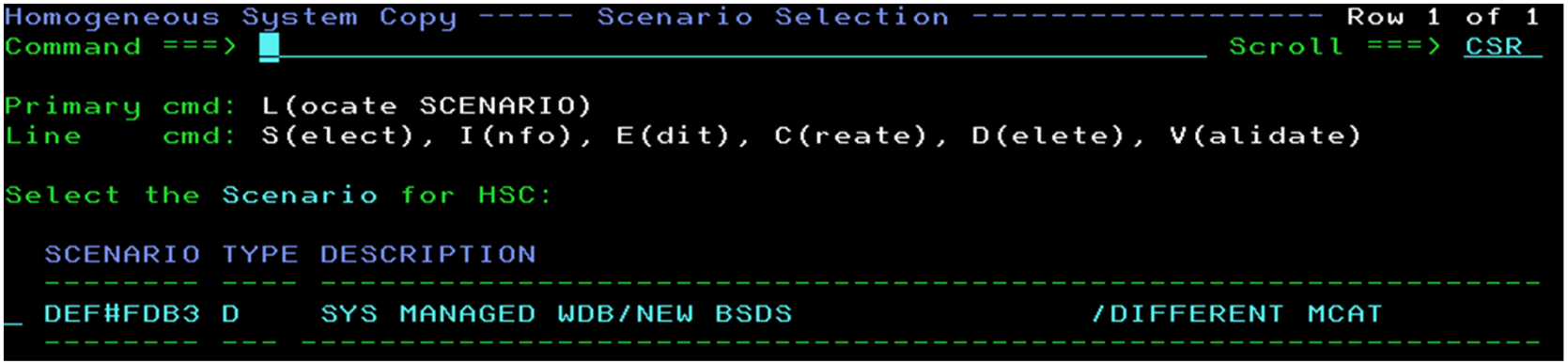
Type HSC Cloning – A few screen shots

Scenario Selection Filter



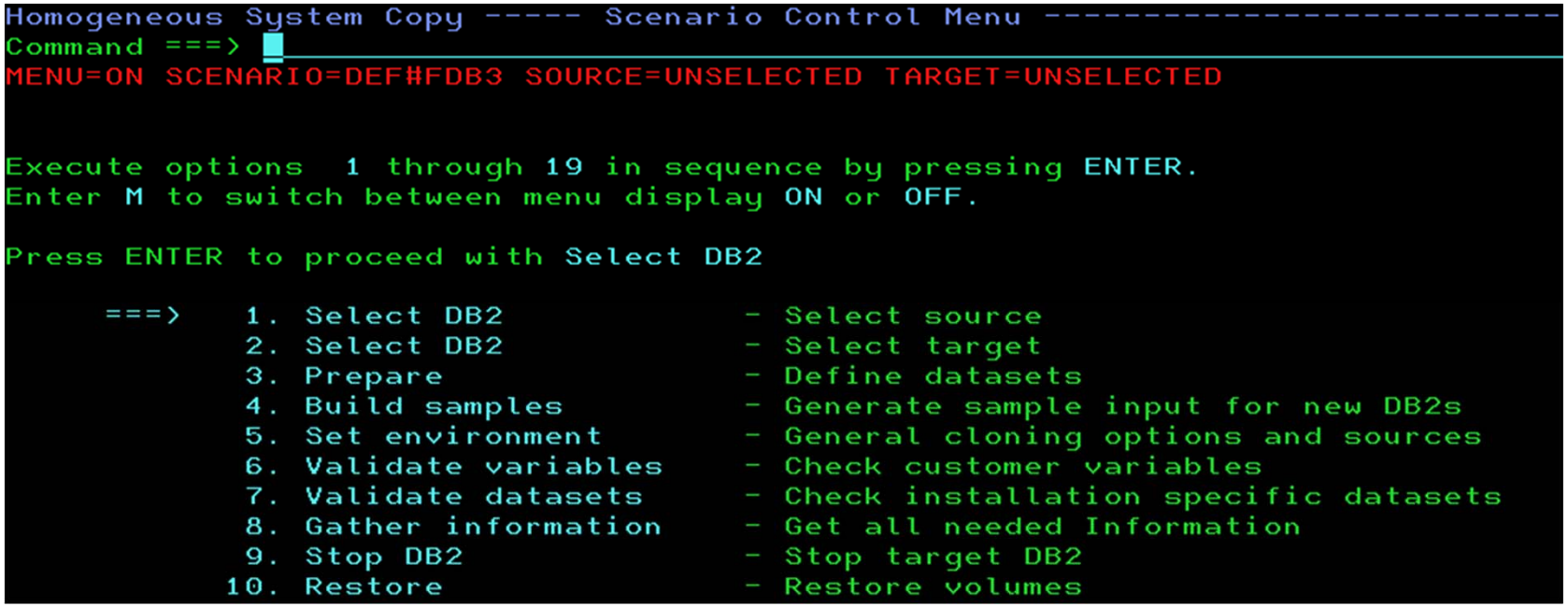
Type HSC Cloning – A few screen shots

Scenario Selection



Type HSC Cloning – A few screen shots

Scenario Control Menu (at the very beginning)



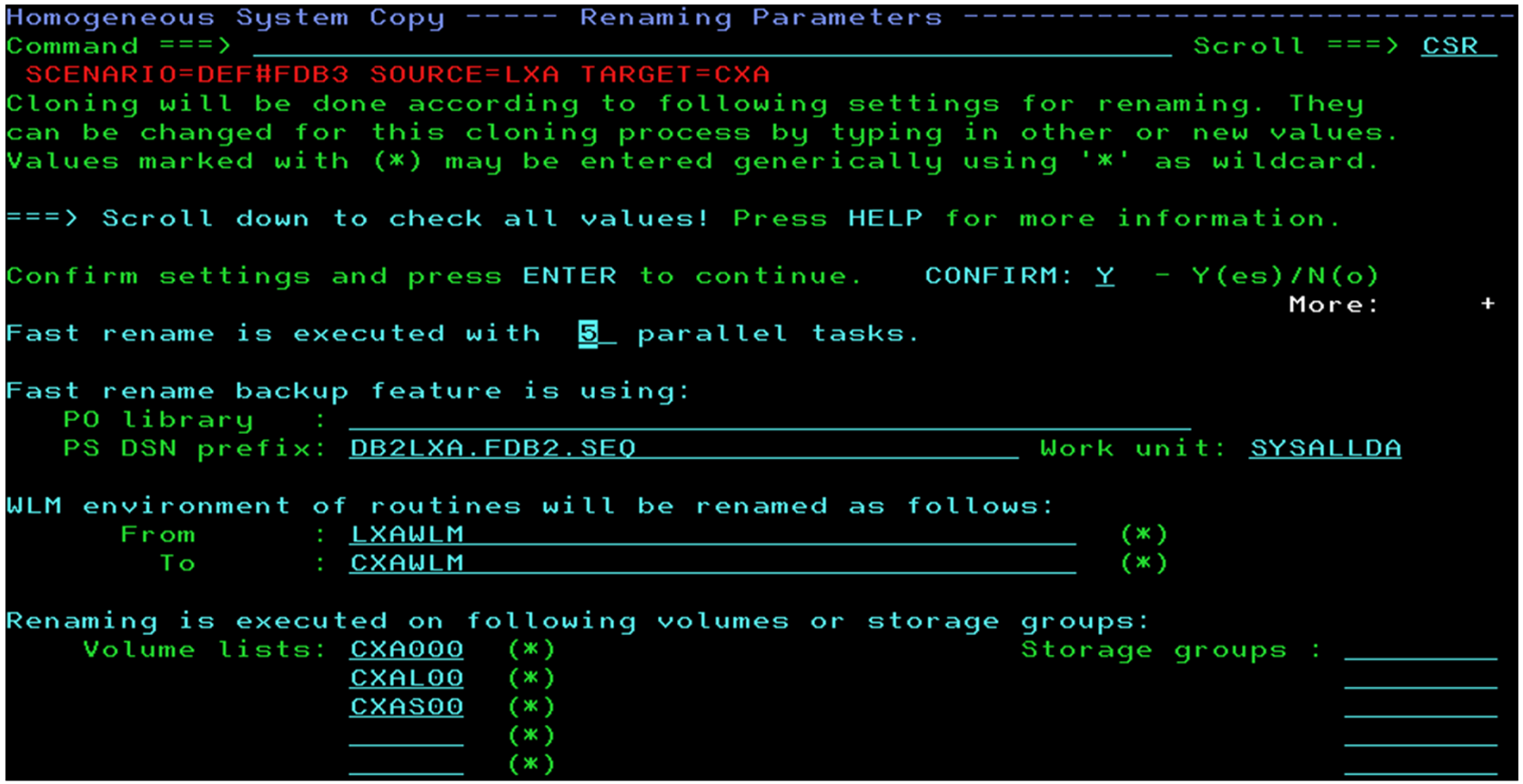
Type HSC Cloning – A few screen shots

Scenario Control Menu (Validate variables for renaming)

```
Homogeneous System Copy ----- Scenario Control Menu ---------------------------
Command ===>
MENU=ON SCENARIO=DEF#FDB3 SOURCE=LXA TARGET=CXA
INTEGRATED FRENAME - EXISTING TARGET - SHARED DASD SCENARIO

Execute options  1 through 19 in sequence by pressing ENTER.
Enter M to switch between menu display ON or OFF.

Press ENTER to proceed with Validate variables

     DONE    3. Prepare                - Define datasets
     DONE    4. Build samples          - Generate sample input for new DB2s
     DONE    5. Set environment        - General cloning options and sources
     ===>    6. Validate variables     - Check customer variables
             7. Validate datasets      - Check installation specific datasets
             8. Gather information     - Get all needed Information
             9. Stop DB2               - Stop target DB2
            10. Restore                - Restore volumes
            11. Rename                 - Rename all datasets
            12. DSNZPARM+DSNHDECP      - Provide system load modules
```

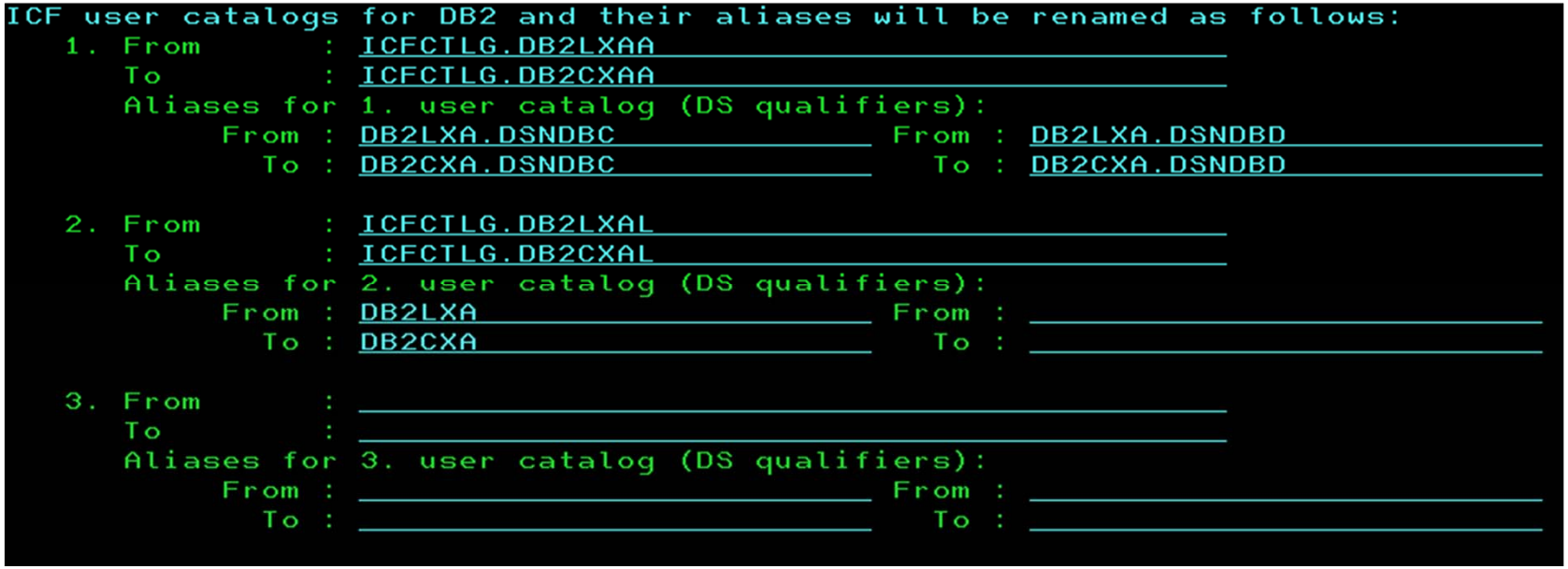
Type HSC Cloning – A few screen shots

Renaming Parameters (1/3)



Type HSC Cloning – A few screen shots

Renaming Parameters (2/3)



Type HSC Cloning – A few screen shots

Renaming Parameters (3/3)

```
Volume ids will be renamed in VVDS and catalog as follows:
           From : LXA000   (*)                  To : CXA000   (*)
           From : LXAL00   (*)                  To : CXAL00   (*)
           From : LXAS00   (*)                  To : CXAS00   (*)
           From : _______  (*)                  To : _______  (*)
           From : _______  (*)                  To : _______  (*)

SMS data classes will be renamed in VVDS and catalog as follows:
           From : DCHSC*__  (*)                 To : DCHSC*__  (*)

SMS management classes will be renamed in VVDS and catalog as follows:
           From : _________  (*)                To : _________  (*)

SMS storage classes will be renamed in VVDS and catalog as follows:
           From : SCLXA*__  (*)                 To : SCCXA*__  (*)
```

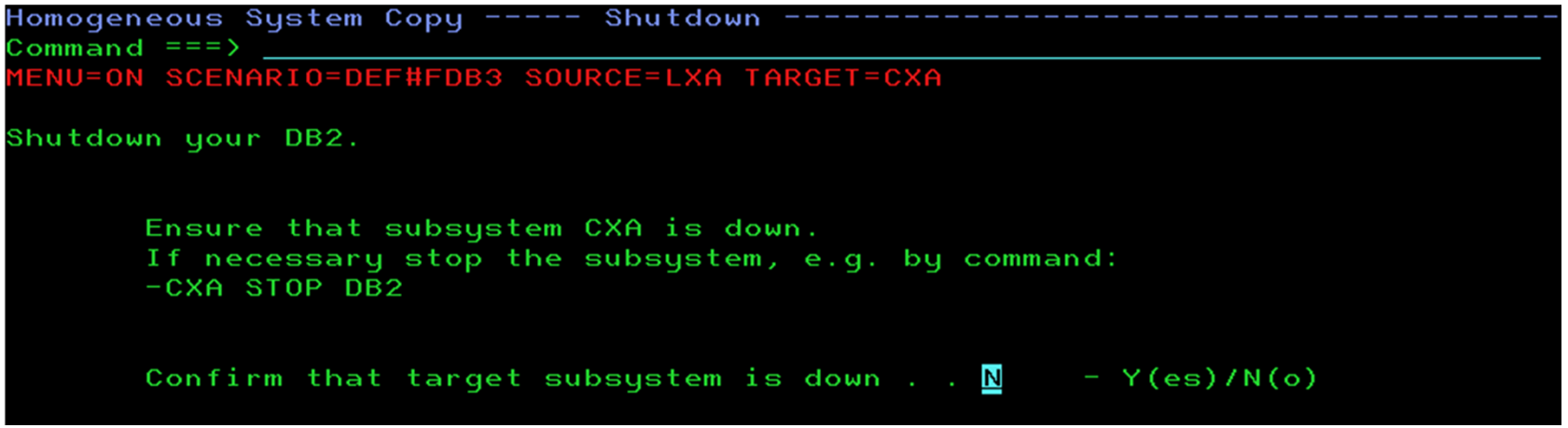
Type HSC Cloning – A few screen shots

Job Submit List (Example)

```
Homogeneous System Copy ----- Job Submit List ------------- Job 00001 of 00018
Command ===> _                                                Scroll ===> CSR
 MENU=ON SCENARIO=DEF#FDB3 SOURCE=LXA TARGET=CXA AUTO=OFF

Primary cmd: SUB(mit), AUTO, J(ob status), G(et failed job), EXIT
Line    cmd: V(iew), E(dit), R(eset status), F(inished)

          Member   Prompt          Size  Created          StatusTime          Status
_________ INIT0001                  74  2012/08/10  2012/08/10 09:56:47  CC=0000
_________ INIT0002                 104  2012/08/10  2012/08/10 09:56:54  CC=0000
_________ INIT0003                 137  2012/08/10  2012/08/10 09:57:02  CC=0000
_________ INIT0004                 107  2012/08/10  2012/08/10 09:57:07  CC=0000
_________ INIT0005                  51  2012/08/10  2012/08/10 09:57:13  CC=0000
_________ INIT0006                  96  2012/08/10  2012/08/10 09:57:23  CC=0000
_________ INIT0007                  63  2012/08/10  2012/08/10 09:56:07  WAIT#01
_________ INIT0008                  88  2012/08/10  2012/08/10 09:56:08  WAIT#01
_________ INIT0009                  87  2012/08/10  2012/08/10 09:56:08  WAIT#01
_________ INIT0010                  77  2012/08/10  2012/08/10 09:57:34  SUBMIT
_________ INIT0011                  73  2012/08/10  2012/08/10 09:56:10  GENERAT
_________ INIT0012                 114  2012/08/10  2012/08/10 09:56:10  GENERAT
_________ INIT0013                  96  2012/08/10  2012/08/10 09:56:11  GENERAT
_________ INIT0014                  60  2012/08/10  2012/08/10 09:56:12  WAIT#01
_________ INIT0015                  73  2012/08/10  2012/08/10 09:56:12  WAIT#01
_________ INIT0016                  61  2012/08/10  2012/08/10 09:56:13  WAIT#02
_________ INIT0017                  87  2012/08/10  2012/08/10 09:56:13  WAIT#02
_________ INIT0018                  88  2012/08/10  2012/08/10 09:56:14  WAIT#05
          **End**
```

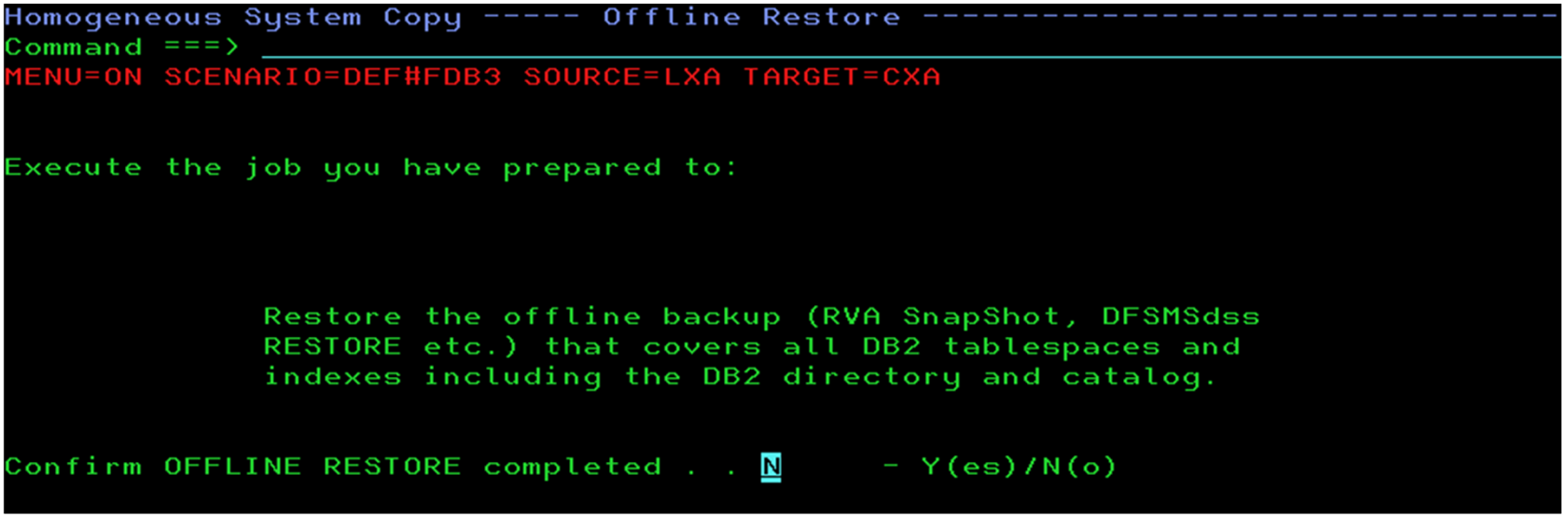
Type HSC Cloning – A few screen shots

Shutdown (Confirmation panel)



Type HSC Cloning – A few screen shots

Offline Restore (Confirmation panel)



Type HSC Cloning – A few screen shots

Partial sample of HSC Fast Rename *input parameters*

```
000024 //FRENAM1 EXEC PGM=FDB2UTIL
000025 //STEPLIB  DD  DISP=SHR,
000026 //             DSN=SE.PRODUCT.HHSC.RDB20420.HHSC.LOAD
000027 //ADRIN    DD  DUMMY
000028 //FDB2IN   DD  *
000029 VOLUMES  CXA000
000030 VOLUMES  CXAL00
000031 VOLUMES  CXAS00
000032 CATOLDDS ICFCTLG.DB2LXAA
000033 CATNEWDS ICFCTLG.DB2CXAA
000034 CATOUTDS CATOUT
000035 CATOLDDS ICFCTLG.DB2LXAL
000036 CATNEWDS ICFCTLG.DB2CXAL
000037 CATOUTDS CATOUT
000038 DSQPAIR  DB2LXA.DSNDBC.**,DB2CXA.DSNDBC.**
000039 DSQPAIR  DB2LXA.DSNDBD.**,DB2CXA.DSNDBD.**
000040 DSQPAIR  DB2LXA.**,DB2CXA.**
000041 VOLPAIR  LXA000,CXA000
000042 VOLPAIR  LXAL00,CXAL00
000043 VOLPAIR  LXAS00,CXAS00
000044 SMSDPAIR DCHSC*,DCHSC*
000045 SMSSPAIR SCLXA*,SCCXA*
```

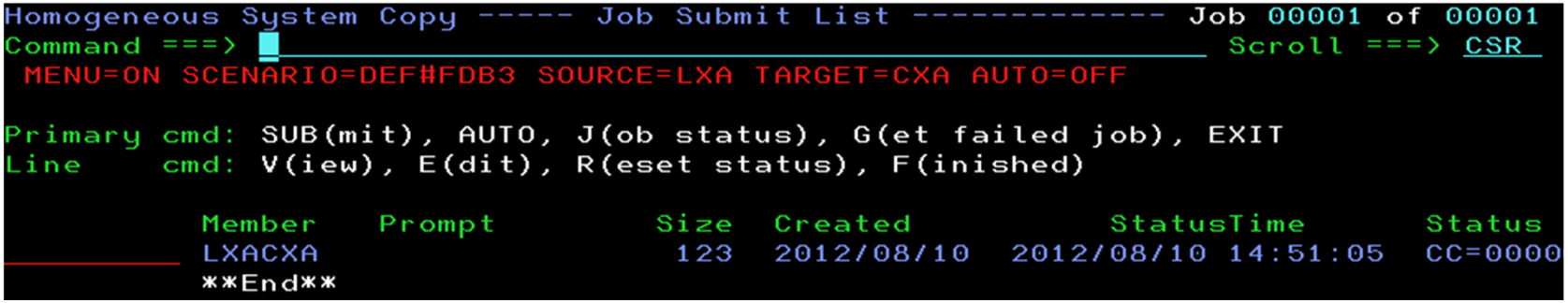
Type HSC Cloning – A few screen shots

Scenario Control Menu (right before VCAT switch)

```
Homogeneous System Copy ----- Scenario Control Menu --------------------------
Command ===>
MENU=ON SCENARIO=DEF#FDB3 SOURCE=LXA TARGET=CXA
INTEGRATED FRENAME - EXISTING TARGET - SHARED DASD SCENARIO

Execute options  1 through 19 in sequence by pressing ENTER.
Enter M to switch between menu display ON or OFF.

Press ENTER to proceed with VCAT SWITCH/WKDB

     DONE   10. Restore                - Restore volumes
     DONE   11. Rename                 - Rename all datasets
     DONE   12. DSNZPARM+DSNHDECP      - Provide system load modules
     DONE   13. Start DB2/ACC MAINT    - Start one target system
     ===>   14. VCAT SWITCH/WKDB       - Switch VCAT and recreate workfile DB
            15. Stop target DB2        - Stop target system
            16. Start target DB2       - Start all target systems
            17. Final processing       - WLM and bufferpool processing
            18. Cleanup                - Delete work files
            19. Finished               - Cloning completed
```

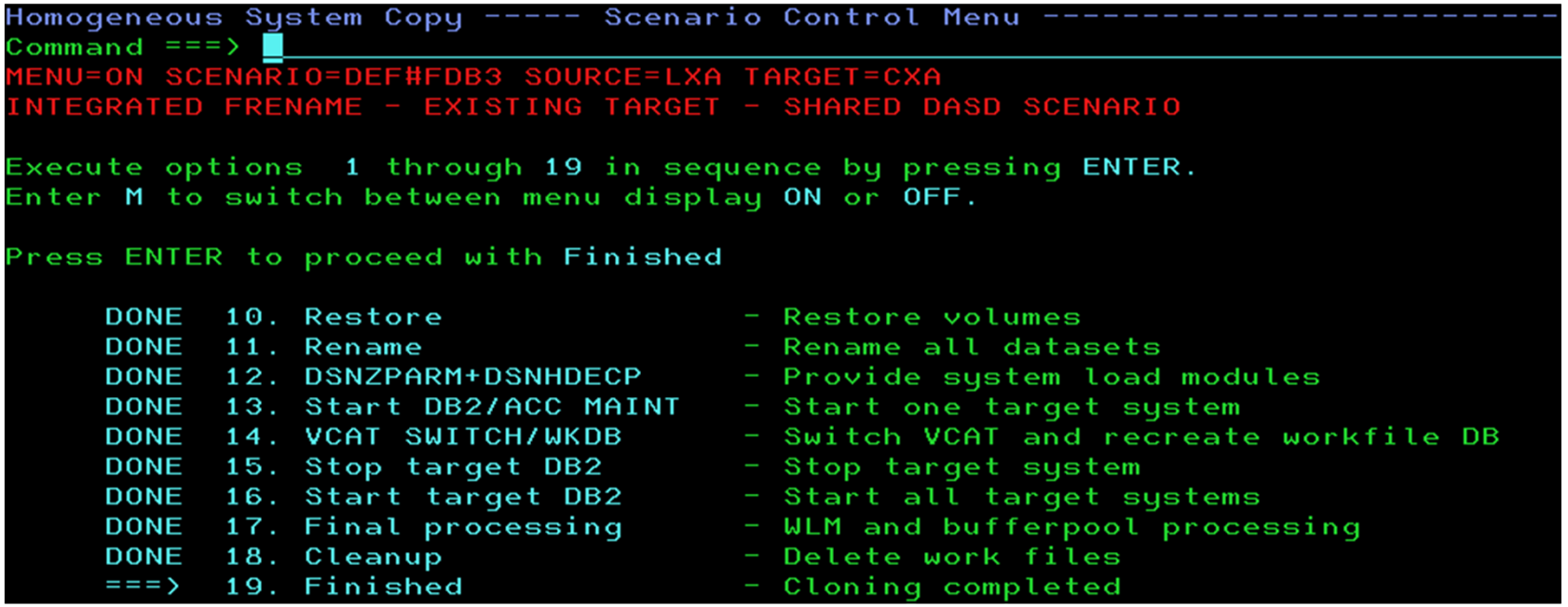
Type HSC Cloning – A few screen shots

Job Submit List (for cleanup)



Type HSC Cloning – A few screen shots

Scenario Control Menu (Cloning completed)



Type HSC Cloning – A few screen shots

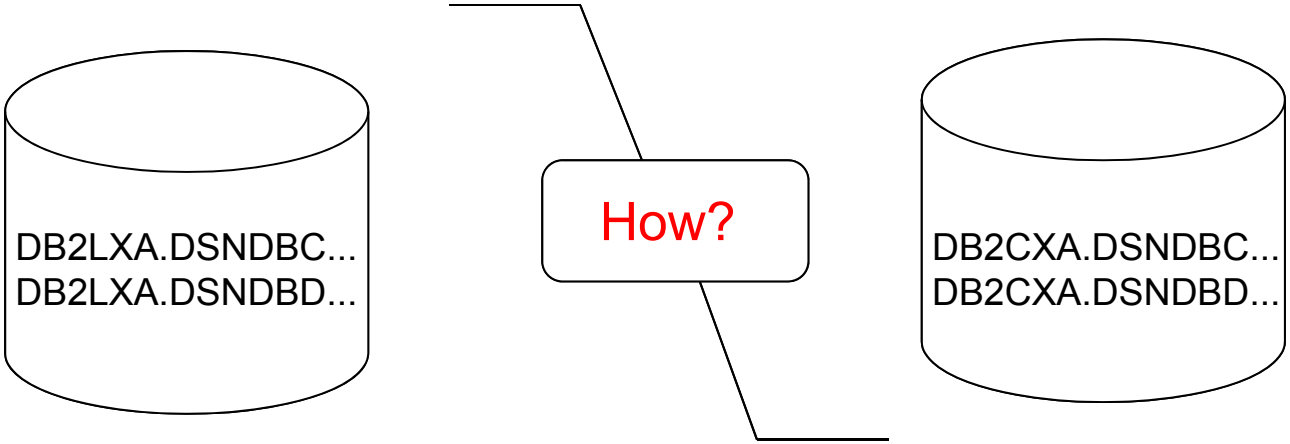
Partial sample of XML scenario definition

```
000252      <displaypanel name="HSTRSBCK" confirm="y" />
000253      <showmenu />
000254      <force>
000255        <ftailor temp="y">
000256          <finclude>HSC#VARS</finclude> <Ü-- GLOBAL DB2 INFO -->
000257        </ftailor>
000258        <ftailor temp="y">
000259          <finclude>####CATP</finclude> <Ü-- DEF USER CAT PARMS -->
000260        </ftailor>
000261        <ftailor temp="y">
000262          <finclude>####SUFF</finclude> <Ü-- SUFFIX LIST -->
000263        </ftailor>
000264      </force>
000265      <jobsubmitlist prefix="PRST">
000266        <description>Rename/Restore DB2</description>
000267        <if var="HSTENV" operator="EQ" val="D">
000268        <Ü-- FORCE XCF STRUCTURES                    -->
000269          <ftailor >
000270            <finclude>HSC#S061</finclude> <Ü-- LOCAL JOB              -->
000271          </ftailor>
000272        </if>
000273        <ftailor wait="01">
000274          <finclude>HSC#R001</finclude> <Ü-- FAST RENAME VCAT VVDS -->
000275        </ftailor>
000276        <ftailor wait="02">
```

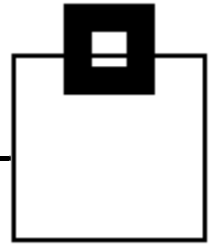
Type HOC Cloning Scenarios

Cloning objects to another DB2 Subsystem – LXA to CXA

- Don’t care about ICF catalogs
- Don’t care about DB2 catalog and directory
- Don’t care about subsystem particularities



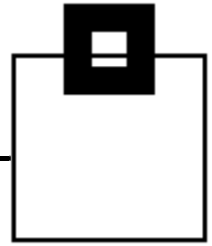
Type HOC Cloning Scenarios



How? Easy!

- Determine objects to be cloned
- Get dependencies: indexes, views, authorizations
- Source: Extract DDL and/or data
- Apply naming conversion if and as desired
- Target: Run DDL and load data

Type HOC Cloning Scenarios

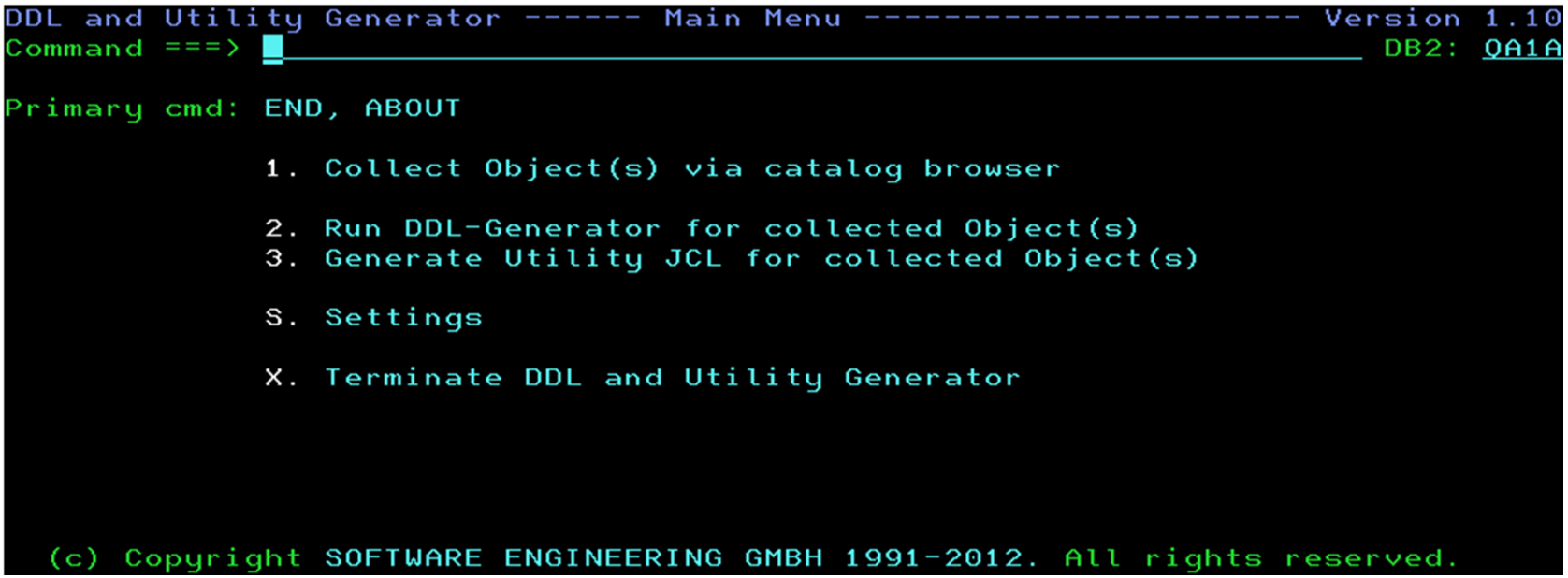


HOC highlights:

- Uses DB2 image copies, or VSAM clusters (TS, TP, IS, IP) as data source
- Makes use of existing possibilities, like FlashCopy2™
- Fully supports multi-linear data sets and PBGs
  → unbalanced data sets management
- Handles user-defined objects
  → Generates all IDCAMS statements
- Fully handles SQL sequences

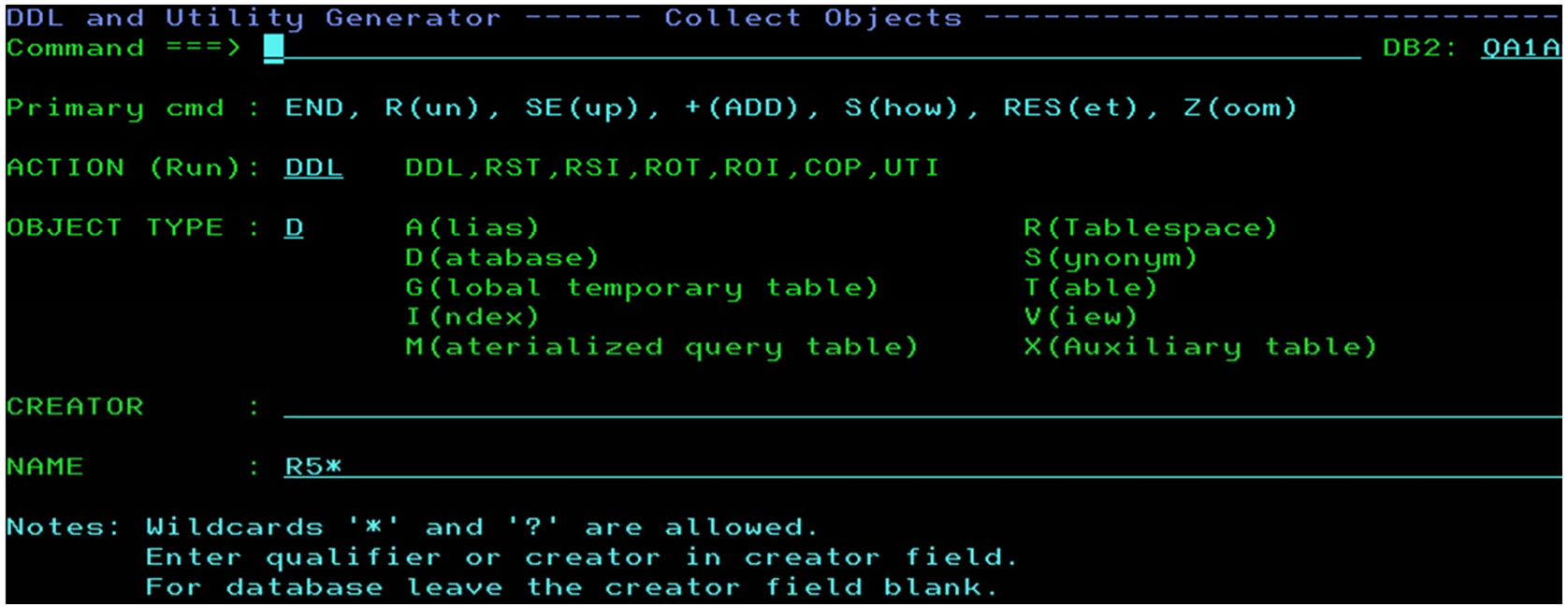
Type HOC Cloning – A few screen shots

Main Menu



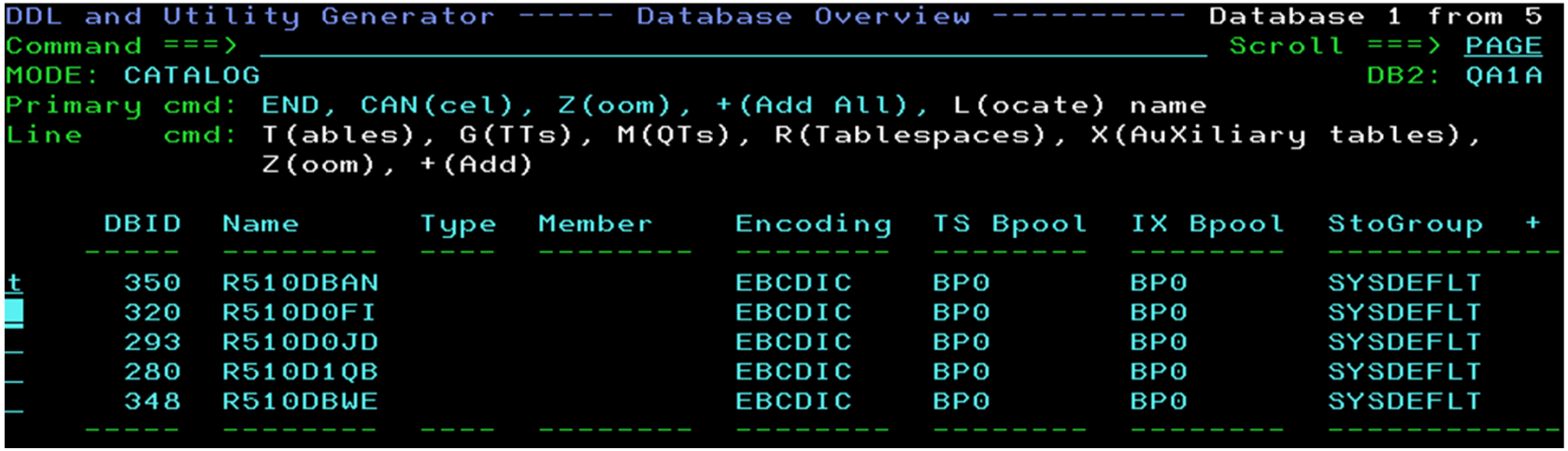
Type HOC Cloning – A few screen shots

Collect Objects



Type HOC Cloning – A few screen shots

Database Overview



Type HOC Cloning – A few screen shots

Table Overview

```
DDL and Utility Generator ----- Table Overview ---------------- Table 1 from 82
Command ===> +                                                 Scroll ===> PAGE
MODE: CATALOG                                                        DB2: QA1A
Primary cmd: END, CAN(cel), Z(oom), +(Add All), L(ocate) creator
Line     cmd: C(olumns), A(liases), D(atabase), T(ablespace), I(ndexes),
              L(CoLdist), P(artitions), S(ynonyms), Z(oom), +(Add)

     Creator +     Name              +     Database  Tablespace  Statstime        +
     ----------    ------------------    --------  ----------  -------------------
_    R510ANK       R510THE1              R510DBAN  R510SHE1    2012-07-30-09.08.16
_    R510ANK       R510TI01              R510DBAN  R510SI01    2012-07-30-09.08.15
_    R510ANK       R510TI02              R510DBAN  R510SI02    2012-07-30-09.08.15
_    R510ANK       R510TI03              R510DBAN  R510SI03    2012-07-30-09.08.15
_    R510ANK       R510TI04              R510DBAN  R510SI04    2012-07-30-09.08.15
_    R510ANK       R510TI05              R510DBAN  R510SI05    2012-07-30-09.08.15
_    R510ANK       R510TI06              R510DBAN  R510SI06    2012-07-30-09.08.15
_    R510ANK       R510TI07              R510DBAN  R510SI07    0001-01-01-00.00.00
_    R510ANK       R510TI08              R510DBAN  R510SI08    2012-07-30-09.08.15
_    R510ANK       R510TI09              R510DBAN  R510SI09    2012-07-30-09.08.16
_    R510ANK       R510T001              R510DBAN  R510S001    2012-07-30-09.08.16
_    R510ANK       R510T002              R510DBAN  R510S002    2012-07-30-09.08.16
_    R510ANK       R510T003              R510DBAN  R510S003    2012-07-30-09.08.16
```

Type HOC Cloning – A few screen shots

Change Data (generated DDL 1/2)

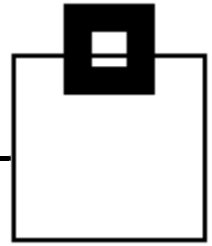
```
DDL and Utility Generator ----- Change Data -----------------------------------
EDIT       SYS12223.T170415.RA000.HENN.R0129696            Columns 00001 00072
Command ===> _____________________________________________ Scroll ===> PAGE
****** ***************************** Top of Data ********************************
000001 -- DATABASE       "R510DBAN"
000002   SET CURRENT SQLID = 'R510ANK'   ;
000003     CREATE DATABASE "R510DBAN"
000004            BUFFERPOOL BP0
000005            INDEXBP    BP0
000006            STOGROUP   SYSDEFLT
000007            CCSID EBCDIC
000008   ;
000009 -- TABLE          "R510ANK"."R510THE1"
000010   SET CURRENT SQLID = 'HENN'      ;
000011     CREATE TABLE "R510ANK"."R510THE1"
000012     ("KEYWORD"                          VARCHAR(   80)
000013                                                 FOR SBCS DATA  NOT NULL
000014     WITH DEFAULT
000015     ,"DESCRIPTION"                      VARCHAR( 3800)
000016                                                 FOR SBCS DATA  NOT NULL
000017     WITH DEFAULT
000018     ,CONSTRAINT KEYWORD
000019      PRIMARY KEY
000020     ("KEYWORD"
000021     )
000022     )
```

Type HOC Cloning – A few screen shots

Change Data (generated DDL 2/2)

```
006012                                                          FOR SBCS DATA  NOT NULL
006013      ,"EXTM_EXCLUDE_DB19"                 CHAR(     8)
006014                                                          FOR SBCS DATA  NOT NULL
006015      ,"EXTM_EXCLUDE_DB20"                 CHAR(     8)
006016                                                          FOR SBCS DATA  NOT NULL
006017      ,"EXTM_EXCLUDE_DB21"                 CHAR(     8)
006018                                                          FOR SBCS DATA  NOT NULL
006019      ,"EXTM_EXCLUDE_DB22"                 CHAR(     8)
006020                                                          FOR SBCS DATA  NOT NULL
006021      ,"EXTM_EXCLUDE_DB23"                 CHAR(     8)
006022                                                          FOR SBCS DATA  NOT NULL
006023      ,"EXTM_EXCLUDE_DB24"                 CHAR(     8)
006024                                                          FOR SBCS DATA  NOT NULL
006025      )
006026      IN   "R510DBAN"."R510S95"
006027      AUDIT NONE
006028      DATA CAPTURE NONE
006029      CCSID EBCDIC
006030      NOT VOLATILE CARDINALITY
006031      APPEND NO
006032    ;
****** ***************************** Bottom of Data ******************************
```

HSC and HOC – What have we seen up to here?



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HSC Homogeneous System Cloning

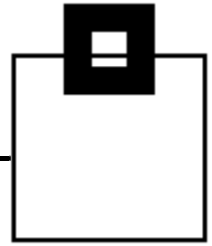
Entire DB2 subsystems are cloned in a straightforward, fast, and reliable way.

HOC Homogeneous Object Cloning

Objects or groups of objects are copied in order to setup or refresh a system or parts thereof.

Aren't they a nice couple?

HSC and HOC – What else?



How about a real world example, featuring

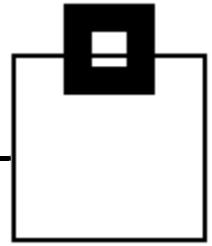
HSC

HOC

along witch a couple of other folks from around the area?

OK? OK!

A real world example



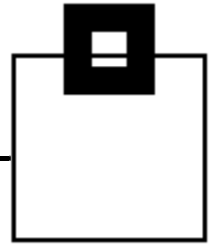
What had happened?

Over time, the database and application environment had developed into many computer center sites, all using a single DB2 subsystem with the same subsystem name.

What was the challenge?

Merge all of the single non-DS subsystems into one big new data sharing group.

A real world example



What did the experts say?

(Sorry, folks. I cannot repeat that, even if no minors are around.)

What was the solution?

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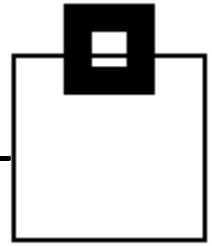
HSC cloned the first subsystem to initially setup the new DS group

HOC merged in all the data from the remaining systems

A real world example



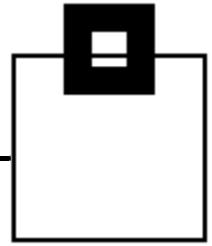
Anything else?

Well, you might want to make sure that you're not running into performance problems right after the setup of the new environment.

Just verify all access paths for static and dynamic SQL using

Bind ImpactExpert for DB2 z/OS

A real world example



Was that it?

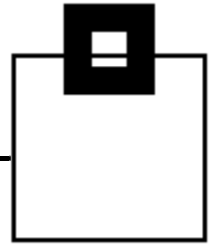
Not quite. ***Before*** going live with your new DB2 environment, you might also prefer to check production availability regarding

- ZPARMS
- CF structures
- recoverability for all objects
- correct logging for the DS environment

With all of that, you're in good hands using

Recovery AssuranceExpert

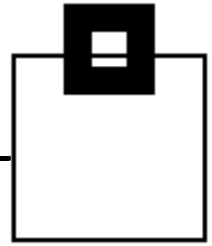
And now ... the cloning conclusion



Summary

- Cloning is powerful
- Know your requirements
- Exploit your environment
- Stick to your standards
- Pick the right solution

Do you need to be an expert?

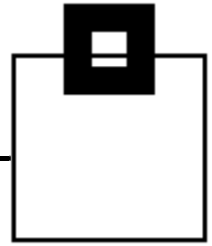


Yes, no doubt about that!

But it is no problem to be and stay an expert.

- Talk to other experts
- Get expert advice
- Use expert tools

Cloning, Cloning, Cloning … Isn't it always the same?



Yes - once you start using

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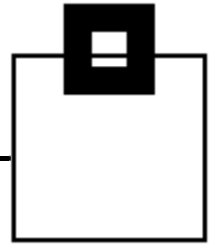
Instant CloningExpert for DB2 z/OS

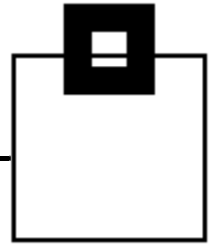


Find more information on

http://www.segus.com

Products ► DB2 z/OS Products ► Fast Cloning for DB2 Databases

Instant CloningExpert for DB2 z/OS



Thank you.

Questions, comments, and remarks are very welcome.

http://www.segus.com