

IBM System z Technology Summit



Administering and Optimizing Your DB2 9 & DB2 10 for z/OS Environment with Tools

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IBM DB2 Tools: Are you ready for DB2 10?

- Exploit DB2 10 performance savings out-of-the-box
- Optimize Performance Across Multi-Platform Applications
- Lower CPU costs while reducing batch windows
- Higher data availability through simplified recovery operations



DB2 Utilities Suite 10 drives down costs with *autonomics*, page sampling and further offloads processing to zIIPs and FlashCopy. Developed in conjunction with DB2 10 to provide maximum data integrity and exploit all new functions out of the box.

All New with DB2 10!

Tivoli OMEGAMON XE for DB2 Performance Expert 5.1 extends its insight into distributed workloads and offers a robust infrastructure to support DB2 10 subsystem consolidation, with lower monitoring overhead. The recommended performance monitor of DB2 10!

DB2 Administration Tool/Object Compare 10.1 extends the value of DB2 10 with new capabilities that allow DBAs to quickly exploit DB2 10 features like schema evolution. Reduces the overhead of many routine tasks.

QMF 10 delivers built-in visualizations and reports that dramatically extend the value to end users. A new metadata layer simplifies the process to understand and create reports.

DB2 Sort 1.1 lowers the cost of DB2 Utility sort processing by exploiting advanced features of System z and z/OS while optimizing overall system efficiency. Significantly reduces batch windows.

DB2 High Performance Unload 4.1 reduces the cost of extracting DB2 10 data with support for TCP/IP Pipes and the new internal format as well as a new native XML data unload capability.

Roadmap to Exploit DB2 10 for z/OS

Accelerate your ability to leverage compelling DB2 10 features

➔ Administer DB2 Performance Savings

Optimize Dynamic Infrastructure Performance

Drive DB2 Efficiency and Productivity

Recover DB2 Advanced Technology

Accelerate Time to Value



DB2 Administration Tool V10.1

- **Drive immediate DB2 10 out-of-the-box Performance Savings**
- **Exploit DBA-managed Performance Improvements**
 - INCLUDE additional Columns in Indexes to Exploit Index Only Access
 - Convert LOBs to INLINE to boost performance
- **Extend Administration Capabilities**
 - Manage new Security models
 - Reduce Schema change overhead
 - Recover from Access Path regressions
 - Manage Autonomic Statistics collection
- **Time Travel with Temporal Data – “as of”**
 - Record changes in history – System Time
 - Define, update and query events in past or future – Business Time
 - Browse Temporal Data “as of” a point in time with DB2 Table Editor 4.3

DB2 Admin Tool V10.1 **INCLUDE** Index non-key Column

- **Purpose**
 - Decrease index maintenance
 - Decrease physical storage
 - Index only access
- **Only supported on UNIQUE indexes**
- **Places the object in RBDP (Rebuild Pending)**
- **INCLUDE COLUMN syntax available**
 - CREATE INDEX
 - ALTER INDEX

DB2 Admin Tool V10.1 INCLUDE Index non-key Column

```

DB2 Admin ----- DSNT Redefine Index ----- Row 1 to 5 of 5
Command ==> Scroll ==> PAGE

Commands: CONTINUE ORIGINAL
Line commands: nnn A|D - Sequence & order R - Remove the column I - Include
A - Ascending D - Descending RA - Random U - Update expression/XML pattern
B - Business Time without overlaps

CREATE INDEX TEAM76 . TD76XA32_LCN >
      ON TEAM76.TD76TB32_LCN
Unique . . . . . YES      Where Not Null . . . . . Cluster . . . . . YES
Buffer Pool . . . . . BP16  Close Rule . . . . . YES      Copy Allowed . . . . . NO
Piece Size . . . . . 2097152 Define . . . . . YES      Defer . . . . .
Partitioned . . . . . Padded . . . . . Compress . . . . . NO

Select Column Name      Col Type      Length  Scale N  ColSeq  Ord  OldSeq  Ord
      *              *              *      * *      * *      * *
-----
      LOC_NO           SMALLINT           2      0 N      1 A      1 A
      LOCATION          CHAR              20      0 N
      ADDRESS           VARCHAR            30      0 N
      TOWN              VARCHAR            30      0 N
      POSTCODE          CHAR              10      0 N
I
***** END OF DB2 DATA *****
    
```

DB2 Admin Tool V10.1 INCLUDE Index non-key Column

```

DB2 Admin ----- DSNT Redefine Index ----- Row 1 to 5 of 5
Command ==> Scroll ==> PAGE

Commands: CONTINUE ORIGINAL
Line commands: nnn A|D - Sequence & order R - Remove the column I - Include
A - Ascending D - Descending RA - Random U - Update expression/XML pattern
B - Business Time without overlaps

CREATE INDEX TEAM76 . TD76XA32_LCN >
ON TEAM76.TD76TB32_LCN
Unique . . . . . YES Where Not Null . . . Cluster . . . . . YES
Buffer Pool . . . . . BP16 Close Rule . . . . . YES Copy Allowed . . . NO
Piece Size . . . . . 2097152 Define . . . . . YES Defer . . . . .
Partitioned . . . . . Padded . . . . . Compress . . . . . NO

Select Column Name Col Type Length Scale N ColSeq Ord OldSeq Ord
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
-----
LOC_NO SMALLINT 2 0 N 1 A 1 A
* POSTCODE CHAR 10 0 N 30 I
LOCATION CHAR 20 0 N
ADDRESS VARCHAR 30 0 N
TOWN VARCHAR 30 0 N
***** END OF DB2 DATA *****
    
```

DB2 Admin Tool V10.1 INCLUDE Index non-key Column

```
DB2 Admin ----- Edit Statement ----- Columns 00001 00072
Command ==> _                               Scroll ==> CSR

***** ***** Top of Data *****
000001 -- Created by DBA104 on 2011/01/13 at 10:15
000002 -- Generated by apply exec by DBA104 on 2011/01/13 at 10:15
000003 --#ADMIN PROCESS ALTER
000004 ALTER INDEX TEAM76.TD76XA32_LCN
000005     ADD INCLUDE COLUMN (POSTCODE) ;
000006 COMMIT ;
000007 --#ADMIN PROCESS REBUILD
000008 LISTDEF ADBLD1
000009 INCLUDE INDEXSPACES
000010 INDEX "TEAM76"."TD76XA32_LCN";
000011 REBUILD INDEX LIST ADBLD1;
000012 -- End of Apply statements
***** ***** Bottom of Data *****
```

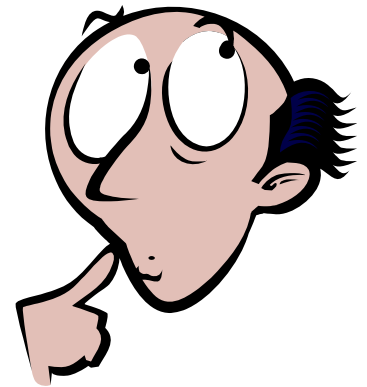

DB2 Admin Tool V10.1 INLINE LOB

- **INLINE LOB data stored in base table space**
 - Must be a universal table space
- **Purpose – improve application performance**
 - Minimize I/O to read LOB data
 - Saves CPU time to access LOB data
 - Minimize the management of auxiliary table space and index space
- **zPARM – LOB_INLINE_LENGTH – defines default max length**
 - Default = 0
- **CREATE TABLE, CREATE TYPE, and ALTER TABLE**
- **Data is moved during the next process that modifies the data or thru a REORG**

DB2 Admin Tool V10.1 INLINE LOB

▪ Operational Considerations

- Base table will be larger
- Potential impact on non-LOB column access
- Tables scans could take longer
- Utility processing could take longer
- Size of image copy increases
- Buffer Pool hit ratio may be impacted



DB2 Admin Tool V10.1 INLINE LOB

OMPE

ZPSYS		VTS	02	V510./C DSNT	01/13/11	12:30:36	25
+ Double Byte CCSID	=	65534					
+ New Function Mode	=	YES					
+ IFCIDS In UNICODE	=	NO		zIIP Support is Present	=	YES	
+ Divide Option (DECDIV3)	=	NO		Change Data Capture (CHGDC)	=	NO	
+ WTO Routing (ROUTCDE)	=	01		Enable DPROP (EDPROP)	=	NO	
+ Site Type (SITETYP)	=	LOCAL		3990-3 Seq Cache (SEQCACH)	=	SEQ	
+ Automatic Rebind (ABIND)	=	YES		Automatic Rebind Explain (ABEXP)	=	YES	
+ CacheDynSql (CACHEDYN)	=	YES		PackageAuthCache (CACHEPAC)	=	5242K	
+ CurDegSpeReg (CDSSRDEF)	=	ANY		Describe Sqllda (DESCSTAT)	=	YES	
+ MaxKptDynSql (MAXKEEPD)	=	5000		RelCurW/hold (RELCURHL)	=	N/A	
+ UtilCacheOpt (SEQPRES)	=	YES		ExtSecurity (EXTSEC)	=	YES	
+ Max DBM1 stg for log	=	0		Default WLM Envir = DSNTWLM			
+ Default BP for indexes	=	BP0		Default BP for user data	=	BP0	
+ Limit restart backout	=	AUTO		Restart backout limit	=	5	
+ Ext query blks DB2 server	=	100		Extra query blks DB2 requester	=	100	
+ Stg for lob - per system	=	2048		Stg for lob - per agent	=	10K	
+ Rollup Accting For DDF	=	10		Sliding Secondary DB2 Managed	=	YES	
+ Measured Usage Pricing	=	NO		Amount Of Space Above MVS	=	65M	
+ Default Space Table Sp	=	0		Use Vsam Var. CI For DB2 Mgt	=	YES	
+ Rollup Accting (PTASKROL)	=	YES		Default Space Index Sp	=	0	
+ LOB Inline Len (QWP1LBIL)	=	0		PLAN MGMT SCOPE (QWP4PMSC)	=	STATIC	
+ DSNHDECP Default Values:							

DB2 Admin Tool V10.1 INLINE LOB

```

DB2 Admin ----- DSNT ALTER Table ----- 12:40
Command ==>

DB2 Admin ALTER                                     More:      +
Schema . . : TEAM80      >
Name . . . : BOOK_BASE_TABLE      >
Column name . . BOOK_TEXT      > (column number 3)
Column type . . CLOB            (CHAR, DECIMAL, INTEGER, SMALLINT, etc.)
Data length . . 38664
Inline length . 200_            (0-32680 BLOB or CLOB, 0-16340 DBCLOB)
Precision . . .
Scale . . . . .
Type schema . .
Type name . . .
WITH TIME ZONE .
Allow Nulls . . NO      (Yes-Nullable, No-NOT NULL)
FOR ? DATA . . .      (B - Bit, S - SBCS, M - Mixed, or blank)
WITH DEFAULT . . YES   (Yes, No, L (SECLABEL) or enter value below)
Default value .
GENERATED . . .      (A-ALWAYS, D-DFLT, I-ALWAYS AS IDENT, J-DFLT AS IDENT,
E-ALWAYS AS UPD TIMESTAMP, F-DFLT AS UPD TIMESTAMP)
FIELDPROC

```

DB2 Admin Tool V10.1 INLINE LOB

```
DB2 Admin ----- Edit Statement ----- Columns 00001 00072
Command ==> _                               Scroll ==> CSR

***** ***** Top of Data *****
000001 -- Created by DBA104 on 2011/01/13 at 12:46
000002 -- Generated by apply exec by DBA104 on 2011/01/13 at 12:46
000003 --#ADMIN PROCESS CREATE
000004 ALTER TABLE TEAM80.BOOK_BASE_TABLE
000005     ALTER COLUMN BOOK_TEXT
000006     SET INLINE LENGTH 200 ;
000007 -- End of Apply statements
***** ***** Bottom of Data *****
```

DB2 Admin Tool V10.1 Temporal Table

- **Temporal Table**
 - Records a period of time when a row is valid
 - System Time or Business Time
- **Benefits**
 - DB2 provides a capability to specify table-level specifications to **control the management of application data based upon time.**
 - Application programmers can specify a **search criteria** based upon the time the data existed or was valid. Simplifies DB2 application development requiring **data versioning.**
 - Customers can **satisfy new compliance laws** faster and cheaper because DB2 will automatically manage the different versions of data

DB2 Admin Tool V10.1 Temporal Table

- **Application period (Application Period Temporal Table)**
 - 2 columns maintained by the application (timestamp or date)
 - Indicate a period of time the row is valid (user-specified)
- **System period**
 - Implemented by creating a temporal table, a history table, and enabling versioning.
 - 2 columns maintained by the system (timestamp)
 - Old rows are archived to another table → History table (Versioning)
 - Can delete rows that are no longer needed
 - Table with the active rows → System Period Temporal Table
 - Queries **automatically** rewritten to include a UNION to access historical data
- **Bi-temporal table – is both a System Period Temporal Table and an Application Temporal Table**

DB2 Admin Tool V10.1 Temporal Table

```

DB2 Admin ----- DSNT Alter Table ----- 13:53
Command ==>

Table schema . . . : TEAM76   >
Table name . . . : TD76TB11_PARTTB   >

  AUDIT . . . . . NONE          (None, Changes, or All)
  DATA CAPTURE . . . . . NONE      (None/Changes)
  VALIDPROC . . . . . NULL         (NULL/Program name)
  RESTRICT ON DROP . . . . . NO      (Yes/No)
  VOLATILE . . . . . NO            (Yes/No)
  APPEND . . . . . NO              (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

                                                    More:  -
-  DROP FOREIGN KEY                ADD PARTITION
  ADD CHECK constraint             ADD CLONE
  DROP CHECK constraint            DROP CLONE
  ADD UNIQUE constraint            ADD VERSIONING
  DROP UNIQUE constraint           DROP VERSIONING
  ADD PERIOD                       ACTIVATE COLUMN ACCESS CONTROL
  ACTIVATE ROW ACCESS CONTROL      DEACTIVATE COLUMN ACCESS CONTROL
  DEACTIVATE ROW ACCESS CONTROL

```

Establishes the link to the history table

Implementation of an Application Period Temporal Table

USE AL line command next to the name of a table

- **Step 1: Add 2 fields (either a timestamp or date) to the base table**
 - Every row has a pair of time stamps set by Application
 - Start time: when the business deems the row valid
 - End Time: when the business deems row validity ends
 - Query over current, any prior, present or future period in business time
 - Useful for tracking of business events over time, app logic greatly simplified
- **Step 2: ADD a Business Time period**

Field can be defined as either:

- ✓TIMESTAMP(6) WITHOUT TIME ZONE NOT NULL
- ✓DATE NOT NULL

Implementation of an Application Period Temporal Table



```

DB2 Admin ----- DSNT Alter Table ----- 17:14
Command ==>

ALTER TABLE
Table schema . . . TEAM77 >
Table name . . . CUSTOMER_COVERAGE >

ADD
Column name . . . EFF_BEG_DATE > (? to look up)
Column type . . . DATE (Built-in only)
Data length . . . (Built-in only)
Inline length . . . (0-32680 BLOB or CLOB, 0-16340 DBCLOB)
Precision . . . (used only w/FLOAT and DECIMAL)
Scale . . . . . (used only w/DECIMAL and TIMESTAMP)
Type schema . . . > (User-defined only)
Type name . . . > (User-defined only)
WITH TIME ZONE . . . (Yes/No - for TIMESTAMP only)

Allow nulls . . . N_ (Yes or blank-nullable, No-NOT NULL)
FOR ? DATA . . . (B-Bit, S-SBCS, M-Mixed, blank-N/A)
WITH DEFAULT . . . (Yes, No, L (SECLABEL) or enter value below)
Default value . . . >
GENERATED . . . (A-ALWAYS, D-DEFAULT,

```

Implementation of an Application Period Temporal Table



```
DB2 Admin ----- DSNT Statement Execution Prompt ----- 17:15
Option ==> 1_

DB2 Admin is about to execute the statement below. You have asked to be
prompted before DB2 Admin executes this type of statement. What do you want to
do now:
  1 - Execute the statement
  2 - Edit the statement
  3 - Create a batch job with the statement
  4 - Add the statement to the work statement list
CAN - Cancel
Work statement list dsn ==> 'TEAM77.WSL.LIBRARY'
Work statement list name ==> ALT0512   Action ==> A (Append or Replace)
                                           More:      +

Statement that is about to be executed (first 28 lines):
ALTER TABLE "TEAM77"."CUSTOMER_COVERAGE"
  ADD "EFF_BEG_DATE" DATE NOT NULL WITH DEFAULT
```

Repeat the process for the EFF_END_DATE

Implementation of an Application Period Temporal Table



```
DB2 Admin -- DSNT Columns in Table TEAM77.CUSTOMER_ > ----- Row 1 to 6 of 6
Command ==> _                                         Scroll ==> CSR

Line commands:
T - Tables X - Indexes A - Auth GR - Grant H - Homonyms I - Interpret
UR - Update runstats LAB - Label COM - Comment DI - Distribution stats
? - Show all line commands

Select Column Name          Col No Col Type Length Scale  Null Def FP      Col Card
      *                   * *          *          * * *   * *
-----
      CUST_ID                1 INTEGER      4         0 N    N  N      -1
      CATEGORY               2 CHAR          2         0 N    N  N      -1
      DEDUCTABLE             3 DECIMAL     15         2 N    N  N      -1
      COVERAGE               4 DECIMAL     15         2 N    N  N      -1
      EFF_BEG_DATE           5 DATE         4         0 N    Y  N      -1
      EFF_END_DATE           6 DATE         4         0 N    Y  N      -1
***** END OF DB2 DATA *****
```

Implementation of an Application Period Temporal Table



```

DB2 Admin ----- DSNT Alter Table ----- 17:54
Command ==>

Table schema . . . : TEAM77 >
Table name . . . : CUSTOMER_COVERAGE >

AUDIT . . . . . NONE          (None, Changes, or All)
DATA CAPTURE . . . . . NONE      (None/Changes)
VALIDPROC . . . . . NULL        (NULL/Program name)
RESTRICT ON DROP . . . . . NO    (Yes/No)
VOLATILE . . . . . NO           (Yes/No)
APPEND . . . . . NO             (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

DROP CHECK constraint          DROP CLONE
ADD UNIQUE constraint          ADD VERSIONING
DROP UNIQUE constraint         DROP VERSIONING
                               S ADD PERIOD
ACTIVATE COLUMN ACCESS CONTROL  ACTIVATE ROW ACCESS CONTROL
DEACTIVATE COLUMN ACCESS CONTROL DEACTIVATE ROW ACCESS CONTROL
ADD COLUMN MASK                ADD ROW PERMISSION
DROP COLUMN MASK                DROP ROW PERMISSION

```

Implementation of an Application Period Temporal Table



```
DB2 Admin ----- DSNT Add Period ----- 17:55
Command ==> _

ALTER TABLE "TEAM77"."CUSTOMER_COVERAGE"
ADD PERIOD

Type . . . . . B                               (S-SYSTEM TIME or B-BUSINESS TIME)

Start column name . . EFF_BEG_DATE             > (? to lookup)
End column name . . . EFF_END_DATE             > (? to lookup)
```

Implementation of an Application Period Temporal Table



```
DB2 Admin ----- DSNT Statement Execution Prompt ----- 17:55
Option ==> 1_

DB2 Admin is about to execute the statement below. You have asked to be
prompted before DB2 Admin executes this type of statement. What do you want to
do now:
  1 - Execute the statement
  2 - Edit the statement
  3 - Create a batch job with the statement
  4 - Add the statement to the work statement list
CAN - Cancel
Work statement list dsn ==> 'TEAM77.WSL.LIBRARY'
Work statement list name ==> ALT0512   Action ==> A (Append or Replace)
                                           More:      +

Statement that is about to be executed (first 28 lines):
ALTER TABLE TEAM77.CUSTOMER_COVERAGE ADD PERIOD BUSINESS_TIME (EFF_BEG_DA
TE, EFF_END_DATE)
```

Implementation of a System Temporal Table

USE THE AL line command next to the name of a table

- Step 1: Add the 3 system time fields to the base table using the AL line command next to the table name
- Step 2: Add a SYSTEM_TIME period using the AL line command next to the table name
- Step 3: Create a history table
- Step 4: Add versioning – to link the temporal table to the history table

Implementation of a System Temporal Table

Step 1: Add 3 columns



- To create a **SYSTEM TIME TEMPORAL TABLE** – have to add 3 columns
 - **Beginning System time column**
 - Datatype timestamp(12)
 - Must specify **WITHOUT TIME ZONE, NOT NULL, GENERATED ALWAYS AS ROW BEGIN**
 - **Ending System time column**
 - Datatype timestamp(12)
 - Must specify **WITHOUT TIME ZONE, NOT NULL, GENERATED ALWAYS AS ROW END**
 - **Transaction start ID**
 - Datatype timestamp(12)
 - Must specify **WITHOUT TIME ZONE, GENERATED ALWAYS AS TRANSACTION START ID**

Implementation of a System Temporal Table



```

DB2 Admin ----- DSNT Alter Table ----- 10:21
Command ==>

Table schema . . . : TEAM77  >
Table name . . . . : CUSTOMER_COVERAGE  >

  AUDIT . . . . . NONE          (None, Changes, or All)
  DATA CAPTURE . . . . NONE      (None/Changes)
  VALIDPROC . . . . . NULL       (NULL/Program name)
  RESTRICT ON DROP . . . . NO     (Yes/No)
  VOLATILE . . . . . NO          (Yes/No)
  APPEND . . . . . NO            (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

                                     More:  +
s ADD column                        ADD MATERIALIZED QUERY
  ADD PRIMARY KEY                    DROP MATERIALIZED QUERY
  DROP PRIMARY KEY                   REFRESH MATERIALIZED TABLE
  ADD FOREIGN KEY                     ADD PARTITIONING KEY
  DROP FOREIGN KEY                   ADD PARTITION
  ADD CHECK constraint                ADD CLONE
  DROP CHECK constraint               DROP CLONE
  ADD UNIQUE constraint                ADD VERSIONING

```

Implementation of a System Temporal Table



```

DB2 Admin ----- DSNT Alter Table ----- 17:26
Command ==>

More:      +

ALTER TABLE
Table schema . . TEAM77 >
Table name . . . CUSTOMER_COVERAGE >

ADD
Column name . . SYS_STA > (? to look up)
Column type . . TIMESTAMP (Built-in only)
Data length . . (Built-in only)
Inline length . (0-32680 BLOB or CLOB, 0-16340 DBCLOB)
Precision . . . (used only w/FLOAT and DECIMAL)
Scale . . . . . 12 (used only w/DECIMAL and TIMESTAMP)
Type schema . . > (User-defined only)
Type name . . . > (User-defined only)
WITH TIME ZONE . N (Yes/No - for TIMESTAMP only)

Allow nulls . . N (Yes or blank-nullable, No-NOT NULL)
FOR ? DATA . . . (B-Bit, S-SBCS, M-Mixed, blank-N/A)
WITH DEFAULT . . (Yes, No, L (SECLABEL) or enter value below)
Default value . . . >
GENERATED . . . (A-ALWAYS, D-DEFAULT,

```

Implementation of a System Temporal Table



```

DB2 Admin ----- DSNT Alter Table ----- 10:26
Command ==>
Invalid value

Precision . . . . . (used only w/FLOAT and DECIMAL)
Scale . . . . . 12 (used only w/DECIMAL and TIMESTAMP)
Type schema . . . . . > (User-defined only)
Type name . . . . . > (User-defined only)
WITH TIME ZONE . N (Yes/No - for TIMESTAMP only)

Allow nulls . . NO (Yes or blank-nullable, No-NOT NULL)
FOR ? DATA . . (B-Bit, S-SBCS, M-Mixed, blank-N/A)
WITH DEFAULT . . (Yes, No, L (SECLABEL) or enter value below)
Default value . . . . . >

GENERATED . . . Q _ (A-ALWAYS, D-DEFAULT,
                    I-ALWAYS AS IDENTITY, J-DEFAULT AS IDENTITY,
                    E-ALWAYS AS UPD TIMESTAMP, F-DEFAULT AS UPD TIMESTAMP,
                    Q-ALWAYS AS ROW BEGIN, R-ALWAYS AS ROW END,
                    X-ALWAYS AS TRANSACTION START ID)

FIELDPROC
Program name . . . . . (optional)
Progr
Hidden . . . . . (Yes/No)

```

Repeat for all 3 columns – but use 'R' and 'X'

Implementation of a System Temporal Table

```

DB2 Admin ----- Edit Statement ----- Columns 00001 00072
Command ==> _                               Scroll ==> CSR

***** ***** Top of Data *****
==MSG> If any changes are made, all statements will be saved to the work
==MSG> statement list. Enter the CANCEL primary command to cancel edit without
==MSG> saving the data. Enter the SAVE primary command to save the data
==MSG> without ending the edit session.
==MSG>
==MSG> -Warning- The UNDO command is not available until you change
==MSG> your edit profile using the command RECOVERY ON.
000001 ALTER TABLE "TEAM77"."CUSTOMER_COVERAGE"
000002     ADD "SYS_STA" TIMESTAMP (12) NOT NULL GENERATED ALWAYS AS ROW BEGIN;
000003 ALTER TABLE "TEAM77"."CUSTOMER_COVERAGE"
000004     ADD "SYS_END" TIMESTAMP (12) NOT NULL GENERATED ALWAYS AS ROW END;
000005 ALTER TABLE "TEAM77"."CUSTOMER_COVERAGE"
000006     ADD "TRANS_ID" TIMESTAMP (12) GENERATED ALWAYS AS TRANSACTION START ID
000007 ;
***** ***** Bottom of Data *****

```

Could have added each statement to a WSL member

Implementation of a System Temporal Table

Step 2: Add a period



```

DB2 Admin ----- DSNT Alter Table ----- 07:27
Command ==>

Table schema . . . : TEAM77 >
Table name . . . : CUSTOMER_COVERAGE >

AUDIT . . . . . NONE (None, Changes, or All)
DATA CAPTURE . . . . . NONE (None/Changes)
VALIDPROC . . . . . NULL (NULL/Program name)
RESTRICT ON DROP . . . . . NO (Yes/No)
VOLATILE . . . . . NO (Yes/No)
APPEND . . . . . NO (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

More: -

DROP CHECK constraint          DROP CLONE
ADD UNIQUE constraint          ADD VERSIONING
DROP UNIQUE constraint         DROP VERSIONING
                               s ADD PERIOD
ACTIVATE COLUMN ACCESS CONTROL  ACTIVATE ROW ACCESS CONTROL
DEACTIVATE COLUMN ACCESS CONTROL DEACTIVATE ROW ACCESS CONTROL
ADD COLUMN MASK                ADD ROW PERMISSION
DROP COLUMN MASK                DROP ROW PERMISSION
  
```

Implementation of a System Temporal Table



```
DB2 Admin ----- DSNT Add Period ----- 07:28
Command ==>

ALTER TABLE "TEAM77"."CUSTOMER_COVERAGE"
ADD PERIOD

Type . . . . . S _                (S-SYSTEM TIME or B-BUSINESS TIME)

Start column name . . SYS_STA      > (? to lookup)
End column name . . . SYS_END      > (? to lookup)
```

Implementation of a System Temporal Table

Step 3: Create the HISTORY table



- The value of adding a system period is that it enables versioning (archiving)
- **Versioning**
 - Old rows are archived to a separate table – HISTORY table
 - Current rows table is referred to as the SYSTEM PERIOD TEMPORAL table
- **HISTORY table must have the same**
 - Columns
 - Data types
 - Null attributes
 - CCSID
 - Subtypes
 - Hidden attributes
 - Field Procsas the SYSTEM TIME PERIOD TEMPORAL table
but without the GENERATED ALWAYS clauses

Implementation of a System Temporal Table

3

```

File Edit Edit_Settings Menu Utilities Compilers Test Help

EDIT          SYS11141.T180008.RA000.DBA104.R0162983          Columns 00001 00072
Command ==> _____ Scroll ==> CSR
***** ***** Top of Data *****
000001  SET CURRENT SQLID='TEAM77';
000002  CREATE TABLE TEAM77.CUSTOMER_COVERAGE
000003      (CUST_ID          INTEGER NOT NULL,
000004      CATEGORY          CHAR(2) FOR SBCS DATA NOT NULL,
000005      DEDUCTABLE        DECIMAL(15, 2) NOT NULL,
000006      COVERAGE          DECIMAL(15, 2) NOT NULL,
000007      EFF_BEG_DATE      DATE NOT NULL WITH DEFAULT,
000008      EFF_END_DATE      DATE NOT NULL WITH DEFAULT,
000009      SYS_STA           TIMESTAMP (12) WITHOUT TIME ZONE NOT NULL
000010      GENERATED ALWAYS AS ROW BEGIN,
000011      SYS_END           TIMESTAMP (12) WITHOUT TIME ZONE NOT NULL
000012      GENERATED ALWAYS AS ROW END,
000013      TRAN_ID          TIMESTAMP (12) WITHOUT TIME ZONE NOT NULL
000014      GENERATED ALWAYS AS TRANSACTION START ID,
000015      PERIOD BUSINESS_TIME (EFF_BEG_DATE, EFF_END_DATE),
000016      PERIOD SYSTEM_TIME (SYS_STA, SYS_END),
000017      CONSTRAINT CUST_ID
000018      PRIMARY KEY (CUST_ID,
000019                  CATEGORY))

```

Need to add commas

Implementation of a System Temporal Table



```

File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT      SYS11141.T180008.RA000.DBA104.R0162983      Columns 00001 00072
Command ==> _____ Scroll ==> CSR
000020    IN TDTEAM77.TD77TS70
000021    PARTITION BY SIZE
000022    AUDIT NONE
000023    DATA CAPTURE NONE
000024    CCSID      EBCDIC
000025    NOT VOLATILE
000026    APPEND NO  ;
000027    COMMIT;
***** ***** Bottom of Data *****

```

Implementation of a System Temporal Table

```
DB2 Admin ----- DSNT Tables, Views, and Aliases -- Row 1 to 12 of 24
Command ==> _                               Scroll ==> CSR
```

```
Commands: GRANT MIG ALL
```

```
Line commands:
```

```
C - Columns  A - Auth  L - List  X - Indexes  S - Table space  D - Database
V - Views    T - Tables  P - Plans  Y - Synonyms  SEL - Select prototyping
? - Show all line commands
```

Sel	Name	Schema	T	DB Name	TS Name	Cols	Rows	Chks	C
*	*	*	*	*	*	*	*	*	*
	BOOK_BASE_TABLE	TEAM77	T	TD77LOBD	TD77LOBS	4	-1	0	
	CUSTOMER_COVERAGE	TEAM77	T	TDTEAM77	TD77TS70	9	-1	1	
	HCUSTOMER_COVERAGE	TEAM77	T	DSN00638	HCUSTOME	9	-1	0	
	TD77TB01_DEPT	TEAM77	T	TDTEAM77	TD77TS01	10	-1	0	
	TD77TB02_EMP	TEAM77	T	TDTEAM77	TD77TS02	19	-1	0	
	TD77TB03_ACT	TEAM77	T	TDTEAM77	TD77TS03	3	-1	0	
	TD77TB04_PROJECT	TEAM77	T	TDTEAM77	TD77TS04	13	-1	0	
	TD77TB05_PROJACT	TEAM77	T	TDTEAM77	TD77TS05	10	-1	0	
	TD77TB06_EMPPROJAC	TEAM77	T	TDTEAM77	TD77TS06	10	-1	0	
	TD77TB11_PARTTB	TEAM77	T	TDTEAM77	TD77TS10	10	-1	0	
	TD77TB31_JBS	TEAM77	T	TDTEAM77	TD77TS30	4	-1	0	
	TD77TB32_LCN	TEAM77	T	TDTEAM77	TD77TS30	5	-1	0	

Implementation of a System Temporal Table

```

DB2 Admin -- DSN=TEAM77 Columns in Table TEAM77.HCUSTOMER > ----- Row 1 to 9 of 9
Command ==> _ Scroll ==> CSR

Line commands:
T - Tables X - Indexes A - Auth GR - Grant H - Homonyms I - Interpret
UR - Update runstats LAB - Label COM - Comment DI - Distribution stats
? - Show all line commands

Select Column Name          Col No Col Type Length Scale Null Def FP      Col Card
      *                * *          *      * *   * *   * *
-----
CUST_ID                    1  INTEGER      4      0  N   N   N   -1
CATEGORY                   2  CHAR          2      0  N   N   N   -1
DEDUCTABLE                 3  DECIMAL     15      2  N   N   N   -1
COVERAGE                   4  DECIMAL     15      2  N   N   N   -1
EFF_BEG_DATE               5  DATE         4      0  N   Y   N   -1
EFF_END_DATE               6  DATE         4      0  N   Y   N   -1
SYS_STA                    7  TIMESTMP    13     12  N   N   N   -1
SYS_END                    8  TIMESTMP    13     12  N   N   N   -1
TRAN_ID                    9  TIMESTMP    13     12  N   N   N   -1
***** END OF DB2 DATA *****

```

Implementation of a System Temporal Table

Step 4: Add versioning



```

DB2 Admin ----- DSNT Alter Table ----- 08:08
Command ==>

Table schema . . . : TEAM77  >
Table name . . . . : CUSTOMER_COVERAGE  >

  AUDIT . . . . . NONE          (None, Changes, or All)
  DATA CAPTURE . . . . . NONE      (None/Changes)
  VALIDPROC . . . . . NULL        (NULL/Program name)
  RESTRICT ON DROP . . . . . NO     (Yes/No)
  VOLATILE . . . . . NO           (Yes/No)
  APPEND . . . . . NO             (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

                                                    More:  -
  DROP CHECK constraint          DROP CLONE
  ADD UNIQUE constraint          s ADD VERSIONING
  DROP UNIQUE constraint         DROP VERSIONING
                                 ADD PERIOD
  ACTIVATE COLUMN ACCESS CONTROL  ACTIVATE ROW ACCESS CONTROL
  DEACTIVATE COLUMN ACCESS CONTROL DEACTIVATE ROW ACCESS CONTROL
  ADD COLUMN MASK                ADD ROW PERMISSION
  DROP COLUMN MASK               DROP ROW PERMISSION

```

Implementation of a System Temporal Table

Step 4: Add versioning



```
DB2 Admin ----- DSNT Add Versioning ----- 18:16
Command ==>

ALTER TABLE "TEAM77"."CUSTOMER_COVERAGE"
ADD VERSIONING USE HISTORY TABLE

Table schema . . TEAM77 > (Optional, default is TEAM77)
Table name . . . HCUSTOMER_COVERAGE > (? to lookup)
```

Implementation of a System Temporal Table

Step 4: Add versioning



```
DB2 Admin ----- DSNT Statement Execution Prompt ----- 18:17
Option ==> 1_

DB2 Admin is about to execute the statement below. You have asked to be
prompted before DB2 Admin executes this type of statement. What do you want to
do now:
  1 - Execute the statement
  2 - Edit the statement
  3 - Create a batch job with the statement
  4 - Add the statement to the work statement list
CAN - Cancel
Work statement list dsn ==> 'TEAM77.WSL.LIBRARY'
Work statement list name ==> ALT0512 Action ==> A (Append or Replace)
                                                    More: +

Statement that is about to be executed (first 28 lines):
ALTER TABLE TEAM77.CUSTOMER_COVERAGE ADD VERSIONING USE HISTORY TABLE T
EAM77.HCUSTOMER_COVERAGE
```

Implementation of a System Temporal Table

```
DB2 Admin ----- DSNT Tables, Views, and Aliases ---- Row 1 to 1 of 1
Command ==>                                         Scroll ==> CSR

Commands: GRANT  MIG  ALL
Line commands:
C - Columns  A - Auth  L - List  X - Indexes  S - Table space  D - Database
V - Views    T - Tables P - Plans  Y - Synonyms  SEL - Select prototyping
? - Show all line commands

Sel  Name                Schema  T DB Name  TS Name  Cols  Rows Chks C
     *                  *      * *      *      *      *    *  * *
-----
H  HCUSTOMER_COVERAGE  TEAM77  (H) DSN00638  HCUSTOME  9     -1   0
```

```
DB2 Admin ----- DSNT Tables, Views, and Aliases ---- Row 1 to 1 of 1
Command ==>                                         Scroll ==> CSR

Commands: GRANT  MIG  ALL
Line commands:
C - Columns  A - Auth  L - List  X - Indexes  S - Table space  D - Database
V - Views    T - Tables P - Plans  Y - Synonyms  SEL - Select prototyping
? - Show all line commands

Sel  Name                Schema  T DB Name  TS Name  Cols  Rows Chks C
     *                  *      * *      *      *      *    *  * *
-----
T  CUSTOMER_COVERAGE  TEAM77  (T) TDTEAM77  TD77TS70  9     -1   1
```


Implementation of a System Temporal Table

```
DB2 Admin ----- DSNT Tables, Views, and Aliases ---- Row 1 to 1 of 1
Command ==>                                         Scroll ==> CSR
```

Commands: GRANT MIG ALL

Line commands:

C - Columns A - Auth L - List X - Indexes S - Table space D - Database
 V - Views T - Tables P - Plans Y - Synonyms SEL - Select prototyping
 ? - Show all line commands

Sel	Name	Schema	T	DB Name	TS Name	Cols	Rows	Chks	C
	*	*	*	*	*	*	*	*	*
BR	CUSTOMER_COVERAGE	TEAM77	T	TDTEAM77	TD77TS70	9	-1	1	

```
DB2 Admin -- DSNT BROW ----- CUSTOMER_CO > ----- Line 00000000 Col 001 080
Command ==> _                               Scroll ==> PAGE
```

Base Table

```
***** Top of Data *****
```

CUST_ID	CATEGORY	DEDUCTABLE	COVERAGE	EFF_BEG_DATE	EFF_END_D
111111	01	500.00	10000.00	0001-01-01	0001-01-0
222222	01	500.00	10000.00	0001-01-01	0001-01-0
333333	02	1000.00	30000.00	0001-01-01	0001-01-0
444444	01	1000.00	40000.00	0001-01-01	0001-01-0
555555	01	2000.00	50000.00	0001-01-01	0001-01-0
555555	02	1000.00	35000.00	0001-01-01	0001-01-0

Implementation of a System Temporal Table

```
DB2 Admin ----- DSNT Tables, Views, and Aliases ---- Row 1 to 1 of 1
Command ==> Scroll ==> CSR
```

```
Commands: GRANT MIG ALL
```

```
Line commands:
```

```
C - Columns  A - Auth  L - List  X - Indexes  S - Table space  D - Database
V - Views    T - Tables  P - Plans  Y - Synonyms  SEL - Select prototyping
? - Show all line commands
```

Sel	Name	Schema	T DB Name	TS Name	Cols	Rows	Chks	C
	*	*	* *	*	*	*	*	*
BR	HCUSTOMER_COVERAGE	TEAM77	H DSN00638	HCUSTOME	9	-1	0	

```
DB2 Admin ----- DSNT Tables, Views, and Aliases ---- Row 1 to 1 of 1
Command ==> Scroll ==> CSR
```

```
No rows returned
```

History Table

```
Commands: GRANT MIG ALL
```

```
Line commands:
```

```
C - Columns  A - Auth  L - List  X - Indexes  S - Table space  D - Database
V - Views    T - Tables  P - Plans  Y - Synonyms  SEL - Select prototyping
? - Show all line commands
```

Sel	Name	Schema	T DB Name	TS Name	Cols	Rows	Chks	C
	*	*	* *	*	*	*	*	*
*R	HCUSTOMER_COVERAGE	TEAM77	H DSN00638	HCUSTOME	9	-1	0	

Implementation of a System Temporal Table

```
DB2 Admin ----- Edit Statement ----- Columns 00001 00072
Command ==>                                     Scroll ==> CSR

000009 DELETE FROM TEAM77.CUSTOMER_COVERAGE WHERE CUST_ID = 333333;
000010 UPDATE TEAM77.CUSTOMER_COVERAGE
000011     SET DEDUCTABLE = 800.00, EFF_BEG_DATE = '2011-05-20', EFF_END_DATE =
000012     '2011-06-20' WHERE CUST_ID = 555555 AND CATEGORY = '02';
000013 INSERT INTO TEAM77.CUSTOMER_COVERAGE(CUST_ID, CATEGORY, DEDUCTABLE,
000014 COVERAGE, EFF_BEG_DATE, EFF_END_DATE)
000015 VALUES(999999, '01', 2000.00, 50000.00, '2011-05-25', '2011-06-25');
000016 COMMIT;
```

UPDATE THE DATA IN THE TEMPORAL TABLE

Implementation of a System Temporal Table

```
DB2 Admin -- DSNT BROWSE TEAM77.CUSTOMER_CO > ----- Line 00000000 Col 001 080
Command ==> _                               Scroll ==> PAGE
```

Temporal Table

```
***** Top of Data *****
CUST_ID CATEGORY          DEDUCTABLE          COVERAGE EFF_BEG_DATE EFF_END_D
-----
111111 01                500.00             10000.00 0001-01-01 0001-01-0
222222 01                500.00             10000.00 0001-01-01 0001-01-0
444444 01                1000.00            40000.00 0001-01-01 0001-01-0
555555 01                2000.00            50000.00 0001-01-01 0001-01-0
555555 02                 800.00             35000.00 2011-05-20 2011-06-2
999999 01                2000.00            50000.00 2011-05-25 2011-06-2
```

```
DB2 Admin -- DSNT BROWSE TEAM77.HCUSTOMER_C > ----- Line 00000000 Col 001 080
Command ==> _                               Scroll ==> PAGE
```

History Table

```
***** Top of Data *****
CUST_ID CATEGORY          DEDUCTABLE          COVERAGE EFF_BEG_DATE EFF_END_D
-----
333333 02                1000.00            30000.00 0001-01-01 0001-01-0
555555 02                1000.00            35000.00 0001-01-01 0001-01-0
```

TEMPORAL TABLES

- **If you have defined system times in a table and have associated that table with the version table (history table)**
 - You are unable to alter the base table unless you DROP the version (connection) first
- **In the example here, we need to DROP the connection using the AL command next to the name of the base table and then select the DROP VERSION option**

DROP VERSIONING

```

DB2 Admin ----- DSNT Tables, Views, and Aliases ---- Row 1 to 1 of 1
Command ==>                                           Scroll ==> CSR

Commands: GRANT  MIG  ALL
Line commands:
  C - Columns  A - Auth  L - List  X - Indexes  S - Table space  D - Database
  V - Views    T - Tables  P - Plans  Y - Synonyms  SEL - Select prototyping
  ? - Show all line commands

Sel   Name                Schema  T DB Name  TS Name   Cols      Rows Chks C
  *   *                  *      * *      *        *         *     * *
-----
AL_   CUSTOMER_COVERAGE  TEAM77  T TDTEAM77 TD77TS70   9         -1    1
***** END OF DB2 DATA *****

```

DROP VERSIONING

```

DB2 Admin ----- DSNT Alter Table ----- 07:57
Command ==>

Table schema . . . : TEAM77 >
Table name . . . : CUSTOMER_COVERAGE >

  AUDIT . . . . . NONE          (None, Changes, or All)
  DATA CAPTURE . . . . . NONE      (None/Changes)
  VALIDPROC . . . . . NULL        (NULL/Program name)
  RESTRICT ON DROP . . . . . NO     (Yes/No)
  VOLATILE . . . . . NO           (Yes/No)
  APPEND . . . . . NO             (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

                                                    More: -
DROP CHECK constraint
ADD UNIQUE constraint
DROP UNIQUE constraint

ACTIVATE COLUMN ACCESS CONTROL
DEACTIVATE COLUMN ACCESS CONTROL
ADD COLUMN MASK
DROP COLUMN MASK

DROP CLONE
ADD VERSIONING
S DROP VERSIONING
ADD PERIOD
ACTIVATE ROW ACCESS CONTROL
DEACTIVATE ROW ACCESS CONTROL
ADD ROW PERMISSION
DROP ROW PERMISSION

```

DROP VERSIONING

```
DB2 Admin ----- DSNT Statement Execution Prompt ----- 08:25
Option ==> _

DB2 Admin is about to execute the statement below. You have asked to be
prompted before DB2 Admin executes this type of statement. What do you want to
do now:
  1 - Execute the statement
  2 - Edit the statement
  3 - Create a batch job with the statement
  4 - Add the statement to the work statement list
CAN - Cancel
Work statement list dsn ==> 'TEAM76.WSL.LIBRARY'
Work statement list name ==> ALT0512   Action ==> A (Append or Replace)
                                           More:      +

Statement that is about to be executed (first 28 lines):
ALTER TABLE "TEAM77"."CUSTOMER_COVERAGE" DROP VERSIONING
```


DB2 Admin Tool V10.1 Bi-Temporal Table

```

DB2 Admin -- DSNT Columns in Table IOD07S.POLICY          ----- Row 1 to 8 of 8
Command ==> _                                           Scroll ==> PAGE

Line commands:
T - Tables  X - Indexes  A - Auth  GR - Grant  H - Homonyms  I - Interpret
UR - Update runstats  LAB - Label  COM - Comment  DI - Distribution stats
? - Show all line commands

Select Column Name          Col No Col Type Length Scale  Null Def FP      Col Card
      * *                   * *      *      * * * * * * * *
-----
      CLIENT                1 CHAR      4      0 N    N  N      1
      TYPE                  2 CHAR      4      0 N    N  N      3
      COPAY                 3 SMALLINT  2      0 N    N  N      2
      EFF_BEG               4 DATE       4      0 N    N  N      5
      EFF_END               5 DATE       4      0 N    N  N      5
      SYS_BEG               6 TIMESTMP  13     12 N    Q  N      2
      SYS_END               7 TIMESTMP  13     12 N    R  N      1
      TRANS_ID              8 TIMESTMP  13     12 Y    X  N      2
***** END OF DB2 DATA *****

```

SECADM

```

DB2 Admin ----- DSNT System Parameters - System Parameters ----- 07:13
Command ==>

          DB2 System: DSNT
          DB2 SQL ID: DBA104
          More:      - +
(*) Online changeable parameter
U Lock for RR or RS . . . . . NO (RRULOCK ) *
Security administrator 1 . . . . . SECADM > (SECADM1 ) *
Security administrator 1 input style . . . . . CHAR (SECADM1_INPUT_) *
Security administrator 1 type . . . . . AUTHID (SECADM1_TYPE ) *
Security administrator 2 . . . . . SECADM > (SECADM2 .. ) *
Security administrator 2 input style . . . . . CHAR (SECADM2_INPUT_) *
Security administrator 2 type . . . . . AUTHID (SECADM2_TYPE ) *
Secondary space allocation. . . . . 540 (SECQTY ) *
Separate security between SYSADM/SECADM . . . . . NO (SEPARATE_SECUR.) *
3390 cache mode. . . . . BYPASS (SEQCACH ) *
Utility cache option. . . . . NO (SEQPRES ) *
Star join max pool . . . . . (SJMXPPOOL ) *
Star join threshold (PQ51765) . . . . . 10 (SJTABLES ) *
Skip uncommitted inserts. . . . . NO (SKIPUNCI ) *
Compress SMF records . . . . . OFF (SMFCOMP ) *
Perform detailed tracking for measured usage pricing. . . . . NO (SMF89 ) *
SMS dataclass table space. . . . . (SMSDCFL ) *
SMS dataclass index space . . . . . (SMSDCIX ) *

```

AUTHORIZATIONS - GRANT

```

ADB2GZ in ----- DSNT Grant System Privileges ----- 14:53
Command ==>

GRANT

Specify Y or G (for with grant option) or ' ' (for none)

Y SYSADM          BSDS          CREATESG         STOPALL
- SYSOPR          CREATEDBA      DISPLAY          STOSPACE
  BINDADD         CREATEDBC      RECOVER          TRACE
  MONITOR1        MONITOR2       CREATEALIAS      SYSCtrl
  BINDAGENT       ARCHIVE        CREATETMTAB     DEBUGSESSION
  EXPLAIN         SQLADM         ACCESSCTRL      DATAACCESS
  CREATE_SECURE_OBJECT          DBADM

Yes/No is only valid below when DBADM is specified with Y above.

WITH ACCESSCTRL . . YES (Yes/No)
WITH DATAACCESS . . YES (Yes/No)

TO

To . . DNET755

```

AUTHORIZATIONS - REVOKE

ADB2RZ in ----- DSNT Revoke System Privileges ----- 15:11

Command ==>

REVOKE

DB2 SQL ID: DBA104

Enter any character in front of the privilege to revoke it from the user:

Y	SYSADM	BSDS	CREATESG	STOPALL
	SYSOPR	CREATEDBA	DISPLAY	STOSPACE
	BINDADD	CREATEDBC	RECOVER	TRACE
	MONITOR1	MONITOR2	CREATEALIAS	SYSCTRL
	BINDAGENT	ARCHIVE	CREATETMTAB	DEBUGSESSION
	EXPLAIN	SQLADM	DBADM	DATAACCESS
	ACCESSCTRL	CREATE_SECURE_OBJECT		

FROM

From DNET755 >

BY

By >

INCLUDING DEPENDENT PRIVILEGES

Cascade revoke . . . (Yes/No)

Report Revoke Impacts . . . YES (Yes/No)

Report Dropped Synonyms & Aliases . . NO (Yes/No)

AUDT POLICY

- ✓ To create an audit policy, insert a row in the new SYSIBM.SYSAUDITPOLICIES table.
- ✓ Specify the category and the related fields
- ✓ -STA TRACE (Option Z off of the main menu)

```

DB2 Admin -----
Command ==>

-START

TRACE . . . . . AUDIT      (Stat, ACctg, AUdit, PERfm or MOnitor)
CLASS . . . . . 01
DEST . . . . .           (SMF, GTF, OPn, OPX and/or SRV)
SCOPE . . . . . -        (L - Local, G - Group)
IFCID . . . . .
BUFSIZE . . . . .      (8-1024)

TDATA CORRELATION
  Include cor header . . (Yes/No)
  Include CPU header . . (Yes/No)
  Include trace hdr . . . (Yes/No)
  Include dist hdr . . . (Yes/No)
COMMENT . . . . .
RMID . . . . .
AUDTPLCY . . . . .
    
```

Specify the filters to include or exclude below:

Include

Exclude

ROW POLICY

- Who can see what rows in a table
- Policy can use session information like user in what group or user is using what role to control when row is returned in result set
- Applicable to **SELECT, INSERT, UPDATE, DELETE, & MERGE**
- Defined as a row permission:

***CREATE PERMISSION policy-name ON table-name
FOR ROWS WHERE search-condition
ENFORCED FOR ALL ACCESS ENABLE;***

- Optimizer inserts search condition in all SQL statements accessing table. If row satisfies search-condition, row is returned in answer set

AL on table – Select ADD ROW PERMISSION

```

DB2 Admin ----- DSNT Alter Table ----- 07:41
Command ==>

Table schema . . . : DBA104 >
Table name . . . . : SS01TB01_ACT >

AUDIT . . . . . NONE (None, Changes, or All)
DATA CAPTURE . . . . . NONE (None/Changes)
VALIDPROC . . . . . NULL (NULL/Program name)
RESTRICT ON DROP . . . . . NO (Yes/No)
VOLATILE . . . . . NO (Yes/No)
APPEND . . . . . NO (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

More: -

DROP CHECK constraint          DROP CLONE
ADD UNIQUE constraint          ADD VERSIONING
DROP UNIQUE constraint         DROP VERSIONING
                               ADD PERIOD
ACTIVATE COLUMN ACCESS CONTROL  ACTIVATE ROW ACCESS CONTROL
DEACTIVATE COLUMN ACCESS CONTROL DEACTIVATE ROW ACCESS CONTROL
ADD COLUMN MASK                (S) ADD ROW PERMISSION
DROP COLUMN MASK               DROP ROW PERMISSION

```

COLUMN POLICY

- How a column value is returned
- Policy can use session information to mask value like user is in what group or user is using what role
- Applicable to the output of outermost subselect
- Defined as column masks :

CREATE MASK mask-name ON table-name

FOR COLUMN column-name RETURN CASE-expression ENABLE;

- Optimizer inserts case statement in all SQL accessing table to determine mask value to return in answer set

AL on table – Select **ADD COLUMN MASK**

```

DB2 Admin ----- DSNT Alter Table ----- 07:44
Command ==>

Table schema . . . : DBA104   >
Table name . . . . : SS01TB01_ACT   >

  AUDIT . . . . . NONE          (None, Changes, or All)
  DATA CAPTURE . . . . . NONE    (None/Changes)
  VALIDPROC . . . . . NULL       (NULL/Program name)
  RESTRICT ON DROP . . . . . NO    (Yes/No)
  VOLATILE . . . . . NO          (Yes/No)
  APPEND . . . . . NO           (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

                                                    More:  -

  DROP CHECK constraint          DROP CLONE
  ADD UNIQUE constraint          ADD VERSIONING
  DROP UNIQUE constraint         DROP VERSIONING
                                 ADD PERIOD
  ACTIVATE COLUMN ACCESS CONTROL  ACTIVATE ROW ACCESS CONTROL
  DEACTIVATE COLUMN ACCESS CONTROL DEACTIVATE ROW ACCESS CONTROL
  S ADD COLUMN MASK              ADD ROW PERMISSION
  DROP COLUMN MASK              DROP ROW PERMISSION

```

AL on table – Select ADD COLUMN MASK

```

DB2 Admin ----- DSNT Create Column Mask ----- 07:45
Command ==>

Commands: EDIT COPY CREATE

CREATE MASK
Schema . . . . . _ > (default is DBA104)
Name . . . . . > (? to look up)
ON (Table)
Schema . . . . . DBA104 > (default is DBA104)
Name . . . . . SS01TB01_ACT > (? to look up)
AS (Correlation)
Name . . . . . >
FOR COLUMN
Name . . . . . (? to look up)
RETURN (Expression): (first 5 lines displayed, use EDIT to modify)
CASE

END
ENABLE/DISABLE
Initial state . . DISABLE (Enable/Disable)

```

ACTIVATE / DEACTIVATE ROW LEVEL AND COLUMN LEVEL ACCESS CONTROL

▪ Activate Row-level and Column-level Access Control

- Make row permissions and column masks become effective in DML
 - All row permissions are connected with 'OR' to filter out rows
 - All column masks are applied to mask output
- **Prevent all access to the table if no user-defined row permissions**

ALTER TABLE *table-name*

ACTIVATE ROW LEVEL ACCESS CONTROL

ACTIVATE COLUMN LEVEL ACCESS CONTROL;

▪ Deactivate Row-level and Column-level Access Control

- Make row permissions and column masks become ineffective in DML
- Open all access to the table

ALTER TABLE *table-name*

DEACTIVATE ROW LEVEL ACCESS CONTROL

DEACTIVATE COLUMN LEVEL ACCESS CONTROL;

AL Table: ACTIVATE / DEACTIVATE ROW LEVEL AND COLUMN LEVEL ACCESS CONTROL

```

DB2 Admin ----- DSNT Alter Table ----- 07:49
Command ==>

Table schema . . . : DBA104 >
Table name . . . . : SS01TB01_ACT >

AUDIT . . . . . NONE (None, Changes, or All)
DATA CAPTURE . . . . NONE (None/Changes)
VALIDPROC . . . . . NULL (NULL/Program name)
RESTRICT ON DROP . . NO (Yes/No)
VOLATILE . . . . . NO (Yes/No)
APPEND . . . . . NO (Yes/No)

ALTER TABLE with any of the above changes OR select one of the options below

More: -
- DROP CHECK constraint          DROP CLONE
  ADD UNIQUE constraint          ADD VERSIONING
  DROP UNIQUE constraint         DROP VERSIONING
                                ADD PERIOD
  ACTIVATE COLUMN ACCESS CONTROL  ACTIVATE ROW ACCESS CONTROL
  DEACTIVATE COLUMN ACCESS CONTROL DEACTIVATE ROW ACCESS CONTROL
  ADD COLUMN MASK                ADD ROW PERMISSION
  DROP COLUMN MASK                DROP ROW PERMISSION

```

AL Table: ACTIVATE / DEACTIVATE ROW LEVEL AND COLUMN LEVEL ACCESS CONTROL

```
DB2 Admin ----- DSNT Statement Execution Prompt ----- 07:52
Option ==> _

DB2 Admin is about to execute the statement below. You have asked to be
prompted before DB2 Admin executes this type of statement. What do you want to
do now:
  1 - Execute the statement
  2 - Edit the statement
  3 - Create a batch job with the statement
  4 - Add the statement to the work statement list
CAN - Cancel
Work statement list dsn ==> 'DBA104.WSL.LIB'
Work statement list name ==> GRANTS      Action ==> A (Append or Replace)
                                           More:      +

Statement that is about to be executed (first 28 lines):
ALTER TABLE "DBA104"."SS01TB01_ACT" ACTIVATE COLUMN ACCESS CONTROL
```

Roadmap to Exploit DB2 10 for z/OS

Accelerate your ability to leverage compelling DB2 10 features

Administer DB2 Performance Savings

➔ Optimize Dynamic Infrastructure Performance

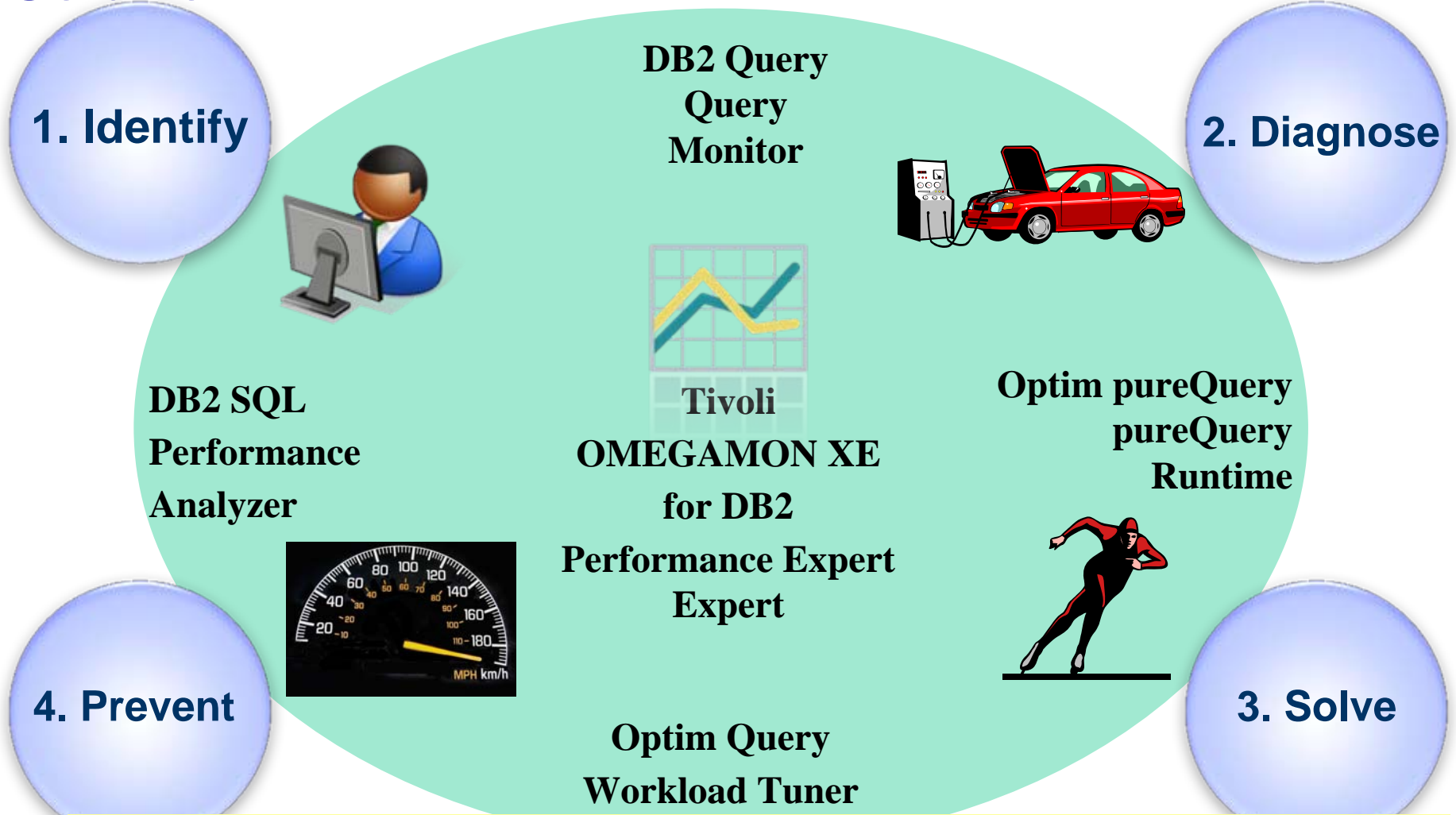
Drive DB2 Efficiency and Productivity

Recover DB2 Advanced Technology

Accelerate Time to Value



IBM DB2 Performance Management Tools Solution



Identify, diagnose, solve and prevent performance problems

Optimize Dynamic Infrastructure Performance

OMEGAMON XE for DB2 Performance Expert 5.1 Exploitation

Extended Insight

- Surface DB2 for z/OS end-to-end response time metrics
 - Visibility to **all** the components that make up end-user response time
 - Facilitates platform-agnostic identification of response time bottlenecks
 - Enables near-instantaneous response to and prevention of application slowdowns
- Leverages Tivoli Enterprise Portal GUI

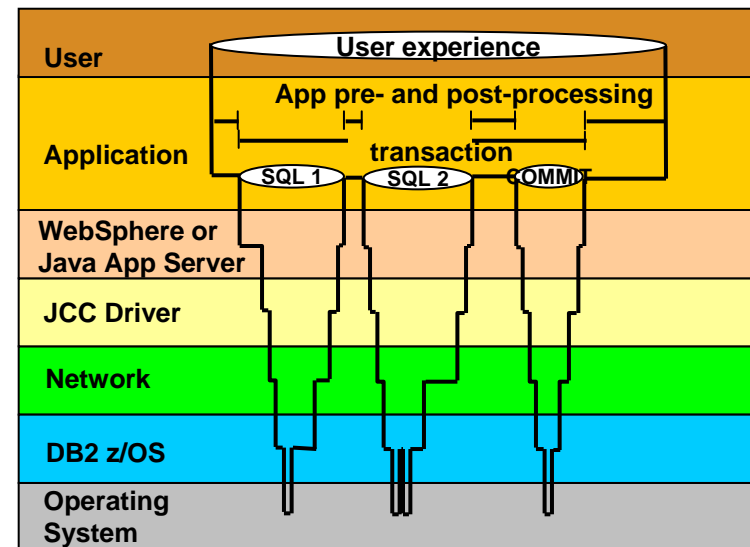
Summary SQL Reporting

Manage thousands of Threads

Support new DB2 10 Monitoring Data

Lower Monitoring Overhead

25% zIIP offload of Near Term History *



OMEGAMON DB2 PE 5.1 Extended Insight

Zoom into selected workload and see the TOP SQL list

- **OMEGAMON PE's Extended Insight** is an advanced way to monitor the database workload (SQL) of your applications and solutions
 - **Get total response times and response time breakdown (appl, driver, network, data server) per defined workload/cluster (e.g. per system, application, user)**
 - **Compare workload from various servers / applications**
 - **Select a time period for analysis**
 - **Get top SQL statements per defined workload**
 - **Identify top clients contributing in the workload**

OMEGAMON DB2 PE 5.1 Extended Insight

Zoom into selected workload and see the TOP SQL list

Optim Performance Manager TSCHAFFL | Log out | About | ?

Task Manager | Manage Database Connections | Welcome - My Optim Central

Extended Insight Dashboard: OMP1D911

Locate the source of performance problems, determine how those problems affect different parts of the workload, and analyze the workload. Response Time Details: 9.152.205.30

Graph | Grid

Selected layer: Average End-to-End Response Time | Show Maximum

SQL Statements | Clients

Show highest 10 by Average Data Server Time (sec)

Statement Text	Statement Executions	Average Data Server Time (sec)
SELECT 'PVT_40K' AS WKLID, '...	1	0.504
SELECT 'PVT_40K' AS WKLID, '...	1	0.474
SELECT 'PVT_40K' AS WKLID, '...	1	0.518
SELECT 'PVT_40K' AS WKLID, '...	1	1.393
N/P	1	1.023

Display this list by the selected graph layer

Detail Area for Average End-to-End Response Time

End-to-End Response Time

Overall average response time per transaction:	0.075 sec
Maximum response time:	15.282 sec
Maximum Time of running transactions:	10.688 sec
Number of transactions:	61,245
Statements:	65,344

Time Distribution (%)

Transaction Throughput

Statement Throughput

Top SQL statements executed by Java or CLI applications like SAP, Cognos, DataStage or WebSphere

- Zoom in on a selected SQL

Detailed End-to-End Response Time

OMEGAMON DB2 PE 5.1 Extended Insight Select Static or Dynamic SQL and zoom into SQL details

Extended Insight Analysis Dashboard: OMP1D911

Back

Locate the source of performance problems, determine how those problems affect different parts of the workload, and analyze the performance of individual SQL statements, clients, and partitions.

Response Time Details: 9.152.205.30

Graph Grid

Selected layer: No layer selected Show Maximum

SQL Statement Text

Statement Text	Statement Executions	Average Data Server Time (sec)
SELECT 'PVT_40K' AS WKLID, '...	1	0.504
SELECT 'PVT_40K' AS WKLID, '...	1	0.474
SELECT 'PVT_40K' AS WKLID, '...	1	0.518
SELECT 'PVT_40K' AS WKLID, '...	1	1.393
N/P	1	1.023

Display this list by the selected graph layer

Statement information

```
SELECT 'PVT_40K' AS WKLID, '100319#13:45:21:250' AS TIME, '1' AS STMTNR, '40000' AS LENGTH, '0' AS LB, '0' AS TB, 'false' AS TABNEWLINE, COUNT(*) AS COUNT FROM LGQ#0002 WHERE A=0001000 OR A=0001000 OR...
```

Statement Performance

- Number of Executions: 1
- Average end-to-end elapsed time: 0
- Average client time: 0
- Average driver time: 088 sec
- Average network time: 0 sec
- Average data server time: 0.3 sec

Open Optim Query Tuner to analyze this SQL statement.

Statement Time Distribution (%)

- Client time: 97.33%
- Driver time: 2.67%
- Network time: 0%
- Data server time: 0%

Statement Outcome

- Failure rate (with negative SQL code): 0 %
- First SQL code: N/P

Package name: N/P
Section number: 0
Package name: N/P
Section number: 0
Package Consistency token: N/P
Package Version: N/P
Collection: N/P

Java class	Java package	Method	Source line number	Build version	Source expression	Method Signature	Application Name	Metadata File

Transfer Volume

- Average bytes transferred locally: 0 bytes
- Average bytes transferred remotely: 41.369 KB
- Average rows returned: 0
- Average number of round trips: 1

Java class, package and method shown if pureQuery Is installed.

Tune SQL with Optim Query Workload Tuner

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Accelerate Time to Value



DB2 Automation Tool V3.1

- **Autonomic Statistics**
 - Exploit real-time, sampling driven Statistics collection
 - Invoke RUNSTATS with new Profile option
 - Interface with existing Job Schedulers
- **FlashCopy Image Copy**
 - Reduce Batch-windows
 - Reduce CPU consumption with Storage-based Backups
 - Drive improved Recovery Time Objectives
- **Avoid Unnecessary Reorgs**
 - Set REORG thresholds based on DB2 10 Best Practices
 - Detect when Indexes are insensitive to Clustering
 - Avoid REORGs for poorly structured Indexes

More details on REORG in the next presentation

DB2 Automation Tool V3.1

RUNSTAT Profile

```

AUTOTOOL V3R1 ----- Runstats Options ----- 2011/01/21 11:41:58
Option ==> _____ Scroll ==> PAGE
Commands END - Return to the previous screen.
Press <PF7/PF8> to scroll for additional options.
Creator: DBA104      Name: AUTONOMIC STATS      User: DBA104
                                      More:      -

Numcols              ==> 1 (Number)
Count                ==> 10 (Number)
Histogram Numcols   ==> _____ (Number)
    Numquantiles .   ==> _____ (Number)
Save Stats in Repository ==> N (Y - Yes, N - No)
Profile . . . . . ==> - (Blank - Not used,
    U - Use,
    I - use Include npi,
    D - Delete,
    P - uPdate,
    S - Set,
    E - set from Existing stats)

Optional Skeletals:  -- BEFORE --  -- AFTER --
JCL Skeletal . . . . ==> _____ ==> _____ (8 Character Name)
Control Cards Skeletal ==> _____ ==> _____ (8 Character Name)
Step End Skeletal . . . ==> _____ ==> _____ (8 Character Name)
    
```

Define the set of statistics to be collected when running autostats

Autonomic statistics – stored procedures used to determine whether statistics should be collected or recollected (ADMIN_UTL_MONITOR; ADMIN_UTL_EXECURE; ADMIN_UTL_MODIFY)

DB2 Automation Tool V3.1 FLASHCOPY

```

AUTOTOOL V3R1 ----- Image Copy Options ----- 2011/01/21 12:43:46
Option ==> _____
Creator: DBA104      Name: AUTONOMIC STATS      User: DBA104

Enter the Image Copy options to associate with this utility profile

                Take Image Copy          View/Update Options

Local Primary . . . . . ==> N (Y - Yes,    ==> N (Y - Yes,
                        N - No)           N - No)
Local Backup      ==> N (Y - Yes,    ==> N (Y - Yes,
                        N - No)           N - No)
Recovery Site Primary . . . ==> N (Y - Yes,    ==> N (Y - Yes,
                        N - No)           N - No)
Recovery Site Backup      ==> N (Y - Yes,    ==> N (Y - Yes,
                        N - No)           N - No)
FlashCopy         ==> N (Y - Yes,    ==> N (Y - Yes,
                        N - No)           N - No)
    
```

Flashcopy –

Save CPU and elapse time

Create with COPY, REORG, LOAD, REBUILD INDEX

Can be used by RECOVER

DB2 Automation Tool V3.1 FLASHCOPY Options

```

AUTOTOOL V3R1 ----- FlashCopy Options ----- 2011/01/21 12:47:08
Option ==> _____
  Tablespace Reorg FlashCopy
  Creator: DBA104      Name: AUTONOMIC STATS      User: DBA104

Update DSN create spec . => Y (Y - Yes, N - No)
CONSISTENT . . . . . => N (Y - Yes, N - No)
Unit Type              => _____ (SYSDA - DISK - etc.)
Catalog Options
DISP=Status . . . . . => _ (M - MOD, N - NEW, O - OLD, S - SHR)

    Normal Termination => _ (C - CATLG, D - DEL, K - KEEP, U - UNCATLG)

    Abnormal Termination => _ (C - CATLG, D - DEL, K - KEEP, U - UNCATLG)

Data Class . . . . . => _____ (8 character class)
Storage Class          => _____ (8 character class)
Management Class . . . => _____ (8 character class)
Expiration date *or*   => _____ (YYYYDDD - YYDDD)
Retention period       => _____ (4 digit number)
    
```

COPY & LOAD w/ SHRLEVEL CHANGE

CONSISTENT copy – copy the object and back out uncommitted changes

DB2 Automation Tool V3.1 FLASHCOPY w/ RECOVER

```

AUTOTOOL V3R1 ----- Recover Utility Profile Options ----- 2011/01/21 12:56:26
Option ==> _____
                                                    More: -
Exception Rule . . . . . ==> A (A - Accepted, R - Rejected, B - Both)

Utility ID . . . . . ==> RECOVER (16 characters)
TO method . . . . . ==> L (L - Log, C - Copy, E - Error)
Alter method options ==> N (Y - Yes, N - No)
Site . . . . . ==> L (L - Local, R - Recovery, blank)

Optional Skeletals: -- BEFORE -- -- AFTER --
JCL Skeletal . . . . . ==> _____ ==> _____ (8 Character Name)
Control Cards Skeletal ==> _____ ==> _____ (8 Character Name)
Step End Skeletal . . . . . ==> _____ ==> _____ (8 Character Name)

Rebuild Ix Statistics Optns ==> N (Y - Yes, N - No)
Online Rebuild Index ==> N (Y - Yes, N - No)
  Alter Online Rbld Options ==> N (Y - Yes, N - No)
Perform LOB Dependency checks ==> Y (Y - Yes, N - No)
  Exclude objects that failed Dependency check ==> Y (Y - Yes, N - No)
                                Include Update
FlashCopy . . . . . ==> N (Y - Yes, N - No) ==> N (Y - Yes, N - No)
    
```

DB2 Automation Tool V3.1 RECOVER BACKOUT

```

AUTOTOOL V3R1 ----- Recover Utility Log Options ----- 2011/01/21 12:54:05
Option ==> _____
Commands: END - Return to the previous screen.
          PF7/PF8 - Scroll for additional options.
Creator:  DLC           Name: RECOVER                       User: DBA104
                                                More:      +

Object event . . . . . ==> _ (Q - Quiesce, blank)
Event generation      ==> 00 (00 -1 -2 -3 ... -9)

Select point-in-time . . . ==> N (Y - Yes, N - No)
  Log RBA/LRSN        ==> _____ (blank = current)
  Log timestamp:
Select RESTOREBEFORE . . . ==> N (Y - Yes, N - No)
  RESTOREBEFORE Log RBA/LRSN ==> _____ (blank = none)
  RESTOREBEFORE Log timestamp

Verifyset . . . . . ==> Y (Y - Yes, N - No)
Backout              ==> N (Y - Yes, N - No)

Reuse existing datasets . . ==> N (Y - Yes, N - No, L - Log only)
Parallel object restores  ==> N (Y - Yes, N - No)
Max nbr of parallel objects ==> 0 (0 = optimal)
Nbr of dynamic tape drives ==> 0 (0 = optimal)
    
```

Read DB2 log backwards

DB2 Sort

More details in the next presentation

- **High speed utility sort**
 - Process data stored in DB2 for z/OS
 - Improves sort performance
 - Optimizes overall system efficiency by exploiting the advanced facilities of the z/OS operating system and System z.
- **DB2 Sort leverages the strengths of the System z platform, DB2 for z/OS and the DB2 Utilities Suite to drive:**
 - Significant savings in elapsed time and CPU during utility sort processing, especially LOAD, REORG and RUNSTATS
 - Relief from application constraints of large volumes of data in highly-transactional workloads performing numerous insert, update and delete operations against DB2 for z/OS databases
 - Continued commitment from IBM to deliver DB2 solutions to provide the highest level of ROI

DB2 Utility Enhancement Tool V2.1

More details in the next presentation

- **Offers a proactive way to cancel threads holding locks.**
 - View and cancel threads through ISPF panels
 - Cancel and block threads through:
 - Batch processing
 - DSNUTILB Intercept processing
- **Started Task ‘watches’ utilities on the DB2 SSIDs you specify**
 - Cancels threads on DB2 objects that match criterion you define
 - Extends utility functionality if using UET parameters

Roadmap to Exploit DB2 10 for z/OS

Accelerate your ability to leverage compelling DB2 10 features

Administer DB2 Performance Savings

Optimize Dynamic Infrastructure Performance

Drive DB2 Efficiency and Productivity

Recover DB2 Advanced Technology

Accelerate Time to Value



DB2 Recovery Expert V2.2 – Application Recovery

- **Provides Expert assist for performing many types of DB2 recoveries**
 - Analyze the requested recovery
 - Provide a selection of possible recovery plans
 - Selecting for you, the needed recovery assets and utilities
 - Assists in selecting recovery points
 - Builds RECOVERY jobs
- **Includes a subset of DB2 Log Analysis services**
 - UNDO/ REDO recoveries
 - Quiet point analysis
- **Drop Recovery**
- **Dependency analysis**



DB2 Recovery Expert V2.2 – System Recovery

- Provides backup and recovery solutions that leverage sophisticated storage processor capabilities
- The ability to backup and restore an entire DB2 subsystem almost instantaneously using fast replication storage hardware
- Individual DB2 objects or groups of DB2 objects can be restored from the system level backups
 - ISPF or GUI
- Automated disaster recovery process
 - Gathers resources needed at the local site and copying them to tape for use at the disaster site
 - Supports disaster recovery from both system backups and image copies

DB2 Recovery Expert V2.2 – DB2 10

- **Exploit FlashCopy Image Copy**
 - Take Consistent Online Image Copies in seconds
 - Reduce CPU and Batch-windows
 - Improve Recovery Times
 - Automate Recovery Jobs
 - Native EMC Storage-based copies

- **Exploit RECOVER BACKOUT for faster recoveries**

DB2 Log Analysis Tool V3.2

- **Reads DB2 logs and DB2 pages directly**
- **Phased components allow more granular specifications for more expensive jobs (I/O,CPU)**
 - Initial run asks to show any changes to database X for Monday
 - Subsequent run asks to show only actual row changes to table Y in database
- **Does NOT require DATA CAPTURE for any tables – does support**
- **Extensive filtering capabilities**
- **Robust reports – General / Summary / Detail / Quiet Time / Impact**

DB2 Log Analysis Tool V3.2

- **Archive capability** – archive output so that the reports can be rerun without having to re-read the archive logs
- **Load data into DB2 tables for analysis**
- **Transparently** supports **data sharing environments**
 - Optionally allows to bypass processing of logs from other members
- **Continuous mode** – able to extract continuous information based on filter factors
 - Not going to miss any transactions
 - Store details of uncommitted units of work
- Can **view LOB / XML data**

DB2 Log Analysis Tool V3.2 – DB2 10

- **Undo and Redo / Reports on Temporal Data**
 - ⌘ Restriction due to GENERATED ALWAYS for TIMESTAMP of base table
 - ⌘ UNDO / REDO works well with history table – no GENERATE ALWAYS clause in the table
- **FlashCopy Image Copy**
- **New functions for updating XML columns**
- **XML columns with versioning**
- **INCLUDE column on an index**
- **INLINE LOB**
- **Greater precision for TIMESTAMP**
- **New Timestamp with TIME ZONE data type**
- **All new DB2 10 Log changes**

Jump into DB2 10! The water's fine.



DB2 V8

DB2 9

DB2 10

Key Questions are WHEN? and HOW?

Roadmap to Exploit DB2 10 for z/OS

Accelerate your ability to leverage compelling DB2 10 features

Administer DB2 Performance Savings

Optimize Dynamic Infrastructure Performance

Drive DB2 Efficiency and Productivity

Recover DB2 Advanced Technology

 *Accelerate Time to Value*



Accelerate DB2 10 Time to Value

DB2 Cloning Tool V2.2

- Exploit Storage-based copies to drastically reduce CPU and outages
- Create Subsystem and Object Clones to test DB2 10 with minimal effort
 - Automatically reduce number of Data Sharing Members
 - Convert Data Sharing to non-Data Sharing
 - Create Subsystem Clone from System Level Backup
 - Mask sensitive production data
- Supports native IBM, EMC and Hitachi Storage-based copies

DB2 Query Monitor V2.3

- Track SQL Performance before and after Migration

DB2 Path Checker V4.1

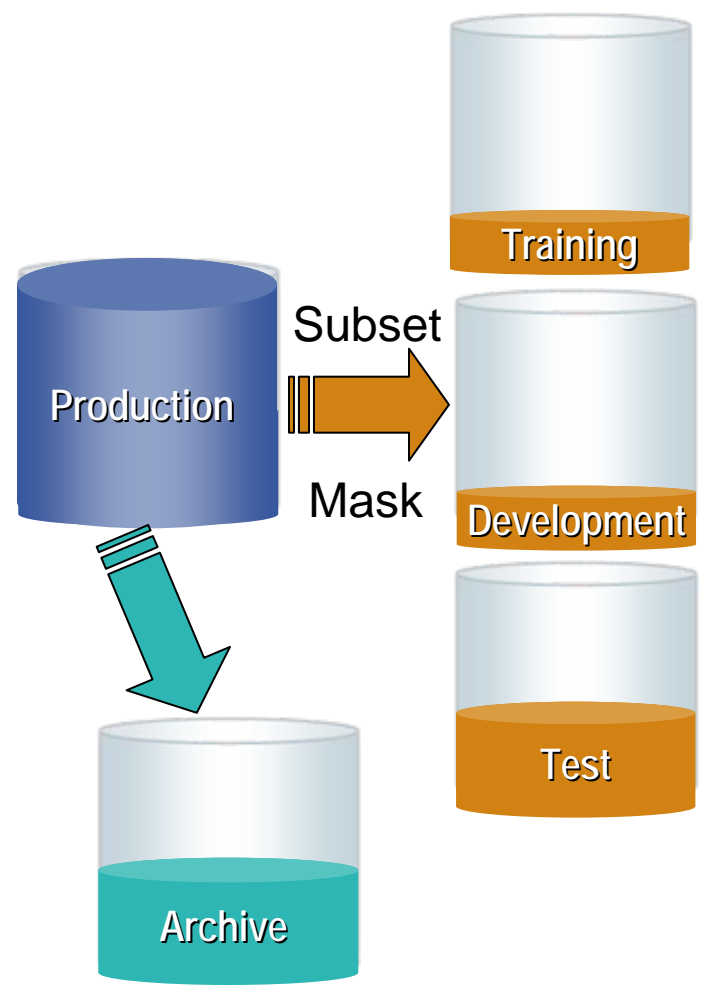
- Identify potential Access Path regressions
- Export SQL to Optim Query Workload Tuner or Data Studio for tuning
- Save packages with DB2 9 Plan Management before DB2 10 Migration

DB2 Bind Manager V2.4

- Identify and Free unused Packages
- Reduce Bind impacts

IBM InfoSphere Optim solutions

Managing data throughout its lifecycle in heterogeneous environments



Data Growth Management

Benefits

- Reduce hardware, storage & maintenance costs
- Streamline application upgrades & improve application performance
- Safely retire legacy & redundant applications while retaining the data

Test Data Management

Benefits

- Easily refresh & maintain data in non-production environments
- Deploy new functionality more quickly and with improved quality
- Reduce storage and operational costs

Data Masking

Benefits

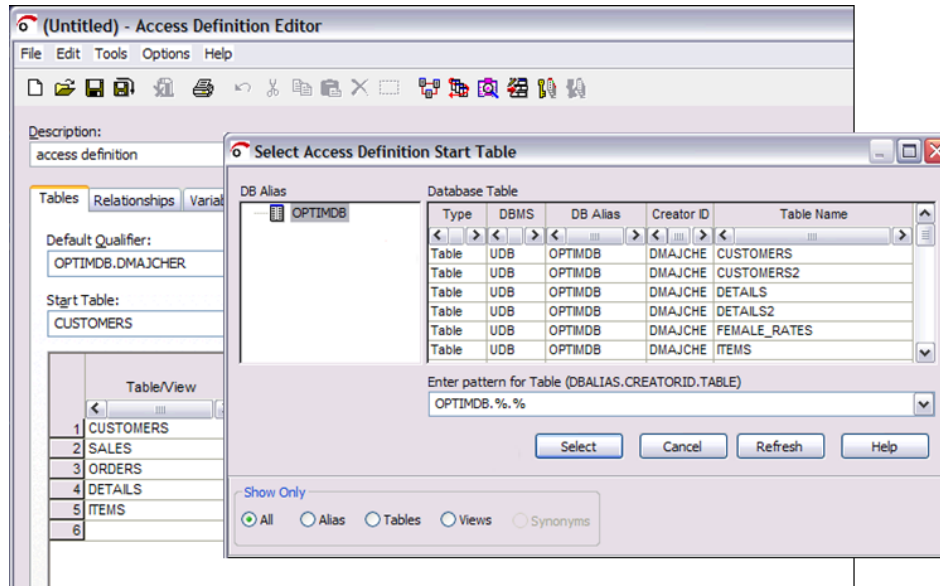
- Protect sensitive information from misuse & fraud
- Prevent data breaches and associated fines
- Achieve better data governance

IBM InfoSphere Optim Test Data Management Solution



Test Data Management

Create “right-size”
production-like environments
for application testing



Requirements

- Create referentially intact, “right-sized” test databases
- Automate test result comparisons to identify hidden errors
- Shorten iterative testing cycles and accelerate time to market

Benefits

- Deploy new functionality more quickly and with improved quality
- Easily refresh & maintain test environments
- Reduce storage and operational costs

IBM InfoSphere Optim Data Growth Solution



Data Growth

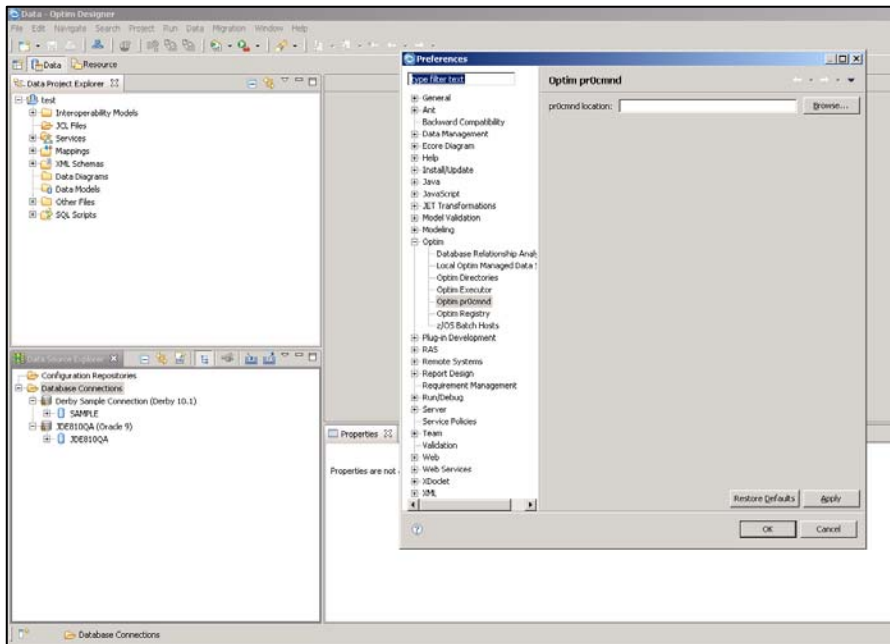
Manage data growth and improve performance by intelligently archiving historical data

Requirements

- Archive, manage and retain application data according to business policies
- Minimize downtime during application upgrades
- Consolidate application portfolio and retire legacy applications

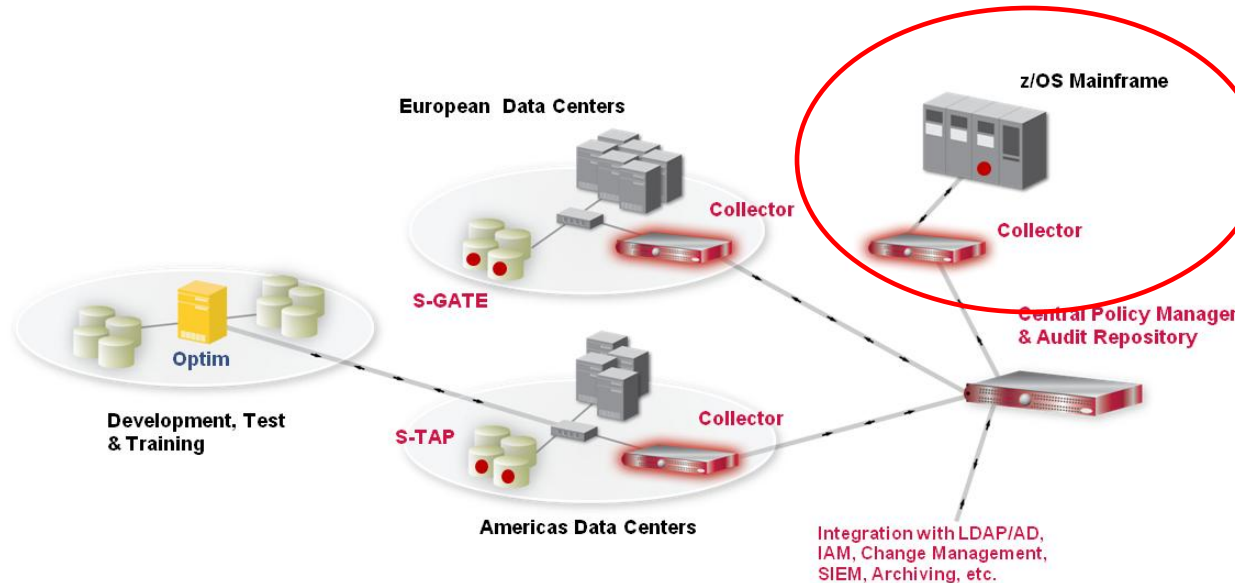
Benefits

- Reduce hardware, storage and maintenance costs
- Streamline application upgrades and improve application performance
- Safely retire legacy & redundant applications while retaining the data



IBM InfoSphere Guardium

Database Protection and Compliance Made Simple



Requirements

- **Maintain a trusted information supply chain by protecting sensitive data from unauthorized access or changes**
 - In 2010 92% of compromised records came from DB servers
- **Validate compliance with regulatory mandates**
- **Minimize operational costs**

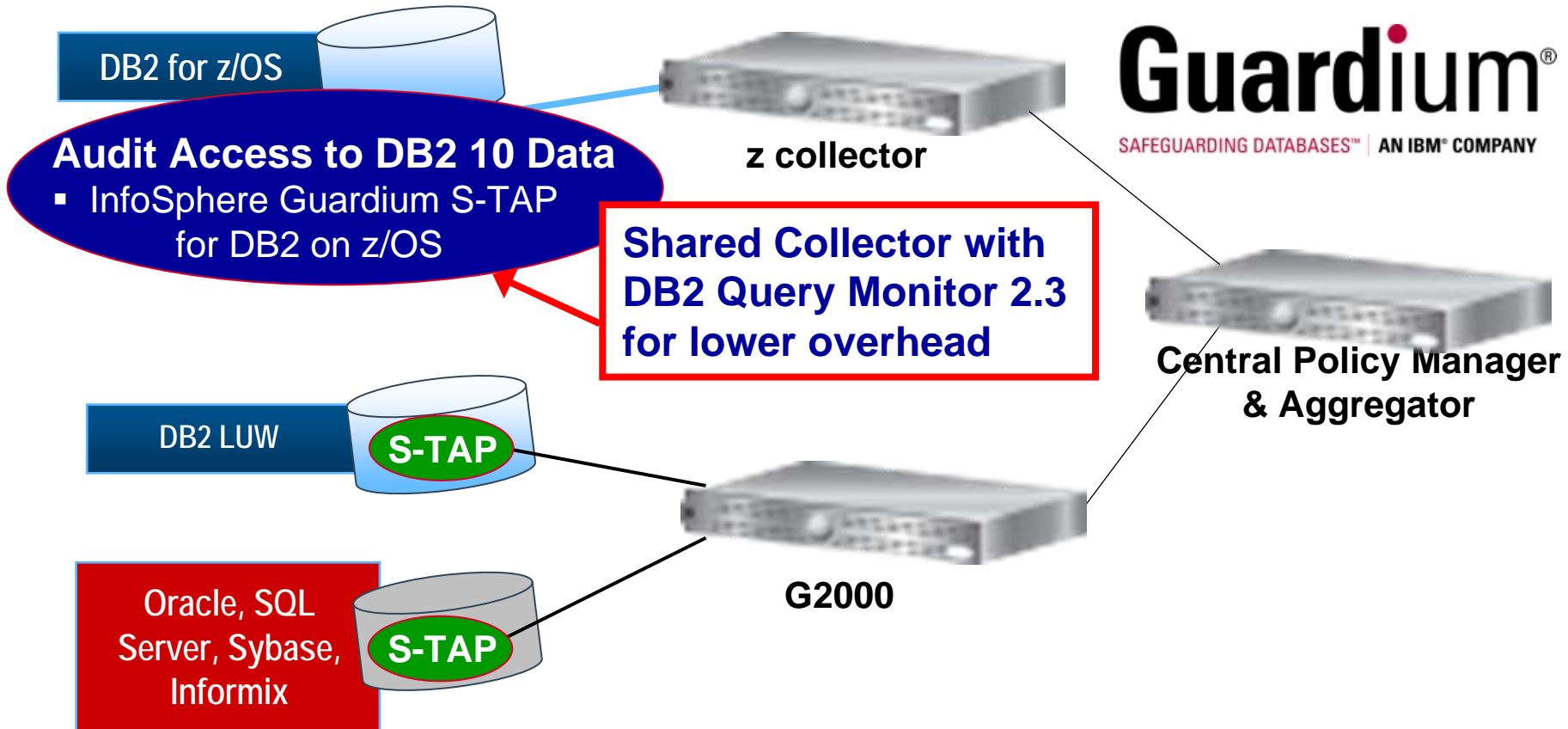
Benefits

- **Secures high-value databases by continuous monitoring and protecting against threats from legitimate users and potential hackers**
- **Streamlines compliance processes with automated and centralized controls; slashing compliance costs**

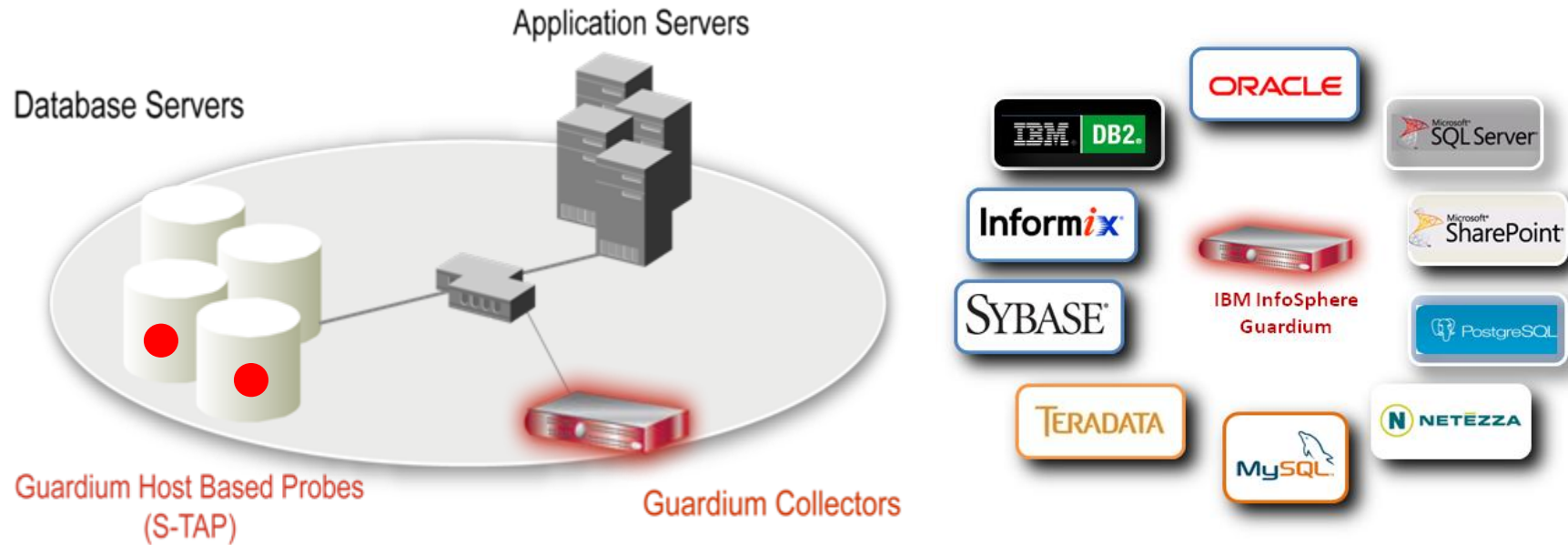
Safeguard DB2 10 Data

Encrypt DB2 10 Data

- Data Encryption Tool for DB2



Guardium Database Activity Monitoring



- Non-invasive architecture
 - Outside database
 - Minimal performance impact
 - No DBMS or application changes
- Cross-DBMS solution
- 100% visibility including local DBA access
- Enforces separation of duties
- **Does not rely on DBMS-resident logs that can easily be erased by attackers, rogue insiders**
- Granular, real-time policies & auditing
 - *Who, what, when, how*
- Automated compliance reporting, sign-offs & escalations (SOX, PCI, NIST, etc.)

Exploit DB2 10 for z/OS with IBM DB2 Tools

Accelerate your ability to leverage compelling DB2 10 features with comprehensive Tools support

Data Encryption Tool for IMS and DB2 Databases

DB2 Administration Tool / DB2 Object Compare for z/OS

DB2 Audit Management Expert for z/OS

DB2 Automation Tool for z/OS

DB2 Bind Manager for z/OS

DB2 Change Accumulation Tool for z/OS

DB2 Cloning Tool for z/OS

DB2 High Performance Unload for z/OS

DB2 Log Analysis Tool for z/OS

DB2 Object Restore for z/OS

DB2 Path Checker for z/OS

DB2 Query Management Facility for z/OS

DB2 Query Monitor for z/OS

DB2 Recovery Expert for z/OS

DB2 SQL Performance Analyzer for z/OS

DB2 Table Editor for z/OS

DB2 Utilities Enhancement Tool for z/OS

DB2 Utilities Suite for z/OS

InfoSphere Change Data Capture

InfoSphere Data Event Publisher

InfoSphere Replication Server

InfoSphere Optim Data Growth Solution for z/OS

Optim Development Studio

Optim pureQuery Runtime

Optim Query Workload Tuner

InfoSphere Optim Test Data Management Solution for z/OS

Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS

Exploitation PTFs: <http://www-01.ibm.com/support/docview.wss?uid=swg21409518>



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