IBM System z Technology Summit

IBM

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

Henry Yim (yimhenry@us.ibm.com)

March 08, 2011

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

All New with DB2 10!

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.*

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.*

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.*

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!*

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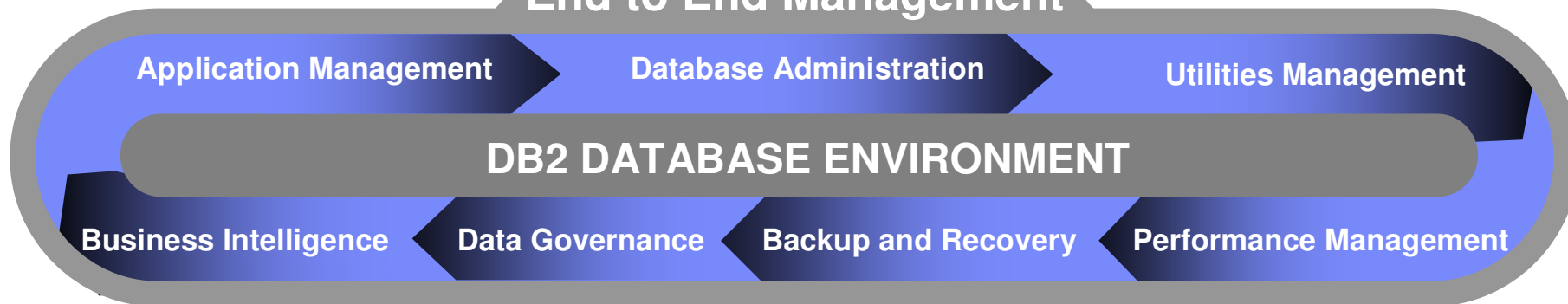
DB2 High Performance Unload 4.1 *reduces the cost of extracting DB2 10 data with support for TCP/IP Pipes and the new internal format as well as a new native XML data unload capability.*

Managing your everyday business

Boost   productivity !!!

End to End Management

| Application Management | Database Administration | Utilities Management |

DB2 DATABASE ENVIRONMENT

| Business Intelligence | Data Governance | Backup and Recovery | Performance Management |

Empower   People !!!

ROI

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

It is very important for my DB2 tools to support the new DB2 10 features since I plan to upgrade to DB2 10 in the near future and take advantage of the new features.

True

False

It is very important for my DB2 tools to support the new DB2 10 features since I plan to upgrade to DB2 10 in the near future and take advantage of the new features.

DB2 Administration Tool V10.1

- **Drive immediate DB2 10 out-of-the-box Performance Savings**

- **Exploit DBA-managed Performance/Productivity 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
   I   POSTCODE               CHAR                10      0 N
**************************** 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**
  - Reduce 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

Redbook: DB2 10 for z/OS Technical Overview (SG24-7892)

DB2 Admin Tool V10.1 INLINE LOB

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

                                                        More:        +
  DB2 Admin ALTER                       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  . . .                     (FLOAT and DECIMAL only)
  Scale  . . . . .                     (DECIMAL and TIMESTAMP only)
  Type schema  . .                     (User-defined type schema)
  Type name  . . .                     (User-defined type name)
  WITH TIME ZONE .                     (Yes/No - for TIMESTAMP only)

  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

```
ADB21TA n -------------------- DSNT Alter Table -------------------- 19:51
Command ===>

 Table schema . . : DNET955    >
 Table name . . . : GLWTEMP                    >

    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


 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/ALTER 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
   ADD COLUMN MASK                     ADD ROW PERMISSION
   DROP COLUMN MASK                    DROP ROW PERMISSION
```

DB2 Admin Tool V10.1 Temporal Table

```
ADB21TAB  -------------------- DSNT Alter Table -------------------- 19:57
Command ===>

  ALTER TABLE
  Table schema . . DNET955   >
  Table name . . . GLWTEMP              >

  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 . no                          (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)
  Program parm . .                                              >

  Hidden . . . . .       (Yes/No)
```

DB2 Admin Tool V10.1 Temporal Table

```
ADB2PSTM  ------------------- DSNT Statement Execution Prompt ------------- 19:58
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  ===> WELLDEMO.WSL
Work statement list name ===> WELLDEMO  Action ===> A (Append or Replace)

Statement that is about to be executed (first 28 lines):
ALTER TABLE "DNET955"."GLWTEMP"
  ADD "SYS_STA" TIMESTAMP (12) NOT NULL GENERATED ALWAYS AS ROW BEGIN
```

DB2 Admin Tool V10.1 Temporal Table

```
 DB21TAB  --------------------------- DSNT Alter Table --------------------- 20:00
Command ===>


  ALTER TABLE
  Table schema . . DNET955   >
  Table name . . . GLWTEMP              >

  ADD
  Column name  . . sys_end            >  (? 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 . NO                     (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  . . . r    (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)
  Program parm . . _                                                 >

  Hidden . . . . .          (Yes/No)
```

DB2 Admin Tool V10.1 Temporal Table

```
ADB21TAB  --------------------- DSNT Alter Table --------------------- 20:03
Command ===>
ALTER stmt executed

 ALTER TABLE
 Table schema . . DNET955   >
 Table name . . . GLWTEMP            >

 ADD
 Column name  . . trans_id          >   (? 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 . NO                    (Yes/No - for TIMESTAMP only)

 Allow nulls  . .       (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  . . . x     (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)
 Program parm . . _                                                     >

 Hidden . . . . .       (Yes/No)
```

DB2 Admin Tool V10.1 Temporal Table

```
ADB21TA n -------------------- DSNT Alter Table -------------------- 20:09
Command ===>

    Table schema . . :  DNET955   >
    Table name . . . :  GLWTEMP              >

      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


      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/ALTER PARTITION
      ADD CHECK constraint             ADD CLONE
      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
```

DB2 Admin Tool V10.1 Temporal Table

```
ADBPTAP n ------------------------ DSNT Add Period -------------------------- 20:10
Command ===> _

ALTER TABLE   "DNET955"."GLWTEMP"
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)
```

```
ADB2PSTM  --------------- DSNT Statement Execution Prompt --------------- 20:11
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  ===> WELLDEMO.WSL
  Work statement list name ===> WELLDEMO   Action ===> A (Append or Replace)

  Statement that is about to be executed (first 28 lines):
  ALTER TABLE DNET955.GLWTEMP ADD PERIOD SYSTEM_TIME(SYS_STA,SYS_END)
```

DB2 Admin Tool V10.1 Temporal Table

```
ADB21T in -------------- DSNT Tables, Views, and Aliases ---- Row 1 to 1 of 1
Command ===> _                                                Scroll ===> PAGE

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
       *                     *        * *         *           *              *    * *
----- ----------------       -------- - -------   --------    -----  ----------- ---- -
       HS_GLWTEMP            DNET955  T DSN00054  HSRGLWTE      24            -1   0
******************************* END OF DB2 DATA *******************************
```

DB2 Admin Tool V10.1 Temporal Table

```
ADB21TA n --------------------- DSNT Alter Table -------------------- 20:23
Command ===>

 Table schema . . :  DNET955    >
 Table name . . . :  GLWTEMP                    >

    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


    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/ALTER PARTITION
    ADD CHECK constraint              ADD CLONE
    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
```

DB2 Admin Tool V10.1 Temporal Table

```
ADBPTAV n ------------------ DSNT Add Versioning ------------------ 20:25
Command ===> _

ALTER TABLE   "DNET955"."GLWTEMP"
ADD VERSIONING USE HISTORY TABLE

Table schema . . DNET955   >            (Optional, default is DNET955)
Table name . . . HS_GLWTEMP         >  (? to lookup)



     ADB2PSTM  -------------- DSNT Statement Execution Prompt -------------- 20:26
     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  ===> WELLDEMO.WSL
     Work statement list name ===> WELLDEMO  Action ===> A (Append or Replace)

     Statement that is about to be executed (first 28 lines):
     ALTER TABLE DNET955.GLWTEMP  ADD VERSIONING USE HISTORY TABLE DNET955.HS
     _GLWTEMP
```

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
```

DB2 Table Editor V4.3 - Temporal Table Versioning

```
ETI$EDIT   V4R3    --------- Browse Table Rows  --------- 2011/01/13  17:47:27
Option  ===> _                                            Scroll ===> PAGE
----------------------------------------------------------------------------- >
                                                          Row 1 of 5
Table ==> POLICY                 >        Creator ==> IOD07S              >

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

     CLIENT TYPE COPAY   SYS_BEG
     C882   POS       15 2010-11-08-09.12.42.283751061000
     C882   PPO       10 2010-11-08-09.01.29.965116760000
     C882   POS       10 2010-11-08-09.12.42.283751061000
     C882   HMO       15 2010-11-08-09.12.42.283751061000
     C882   HMO       10 2010-11-08-09.12.42.283751061000
  *********************** Bottom of Data ***********************************

                    CURRENT DATA



Valid Option Commands: (Edit, Find, FORM, ZOOM)
```

DB2 Table Editor V4.3 - Temporal Table Versioning

```
ETI$EDIT   V4R3    --------- Browse Table Rows  --------- 2011/01/13   17:48:11
Option  ===> _                                        Scroll ===> PAGE
----------------------------------------------------------------------- <   >
                                                      Row 1 of 5
 Table ==> POLICY                    >       Creator ==> IOD07S              >

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

     CLIENT TYPE COPAY  SYS_END                            N
     C882   POS      15 9999-12-31-24.00.00.000000000000 Y
     C882   PPO      10 9999-12-31-24.00.00.000000000000 Y
     C882   POS      10 9999-12-31-24.00.00.000000000000 Y
     C882   HMO      15 9999-12-31-24.00.00.000000000000 Y
     C882   HMO      10 9999-12-31-24.00.00.000000000000 Y
 ************************** Bottom of Data **********************************

                   CURRENT DATA



Valid Option Commands: (Edit, Find, FORM, ZOOM)
```

DB2 Table Editor V4.3 - Temporal Table Versioning

```
ETI$EDIT  V4R3   ---------- Browse Table Rows  ---------- 2011/01/13  17:50:21
Option  ===> _                                          Scroll ===> PAGE
------------------------------------------------------------------------- < >
                                                         Row 1 of 7
 Table ==> POLICY_HIST            >         Creator ==> IOD07S              >

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

         CLIENT TYPE COPAY   SYS_END                       N
         C882   PPO      10  2010-11-08-09.01.29.965116760000 Y
         C882   HMO      10  2010-11-08-09.03.31.374399156000 Y
         C882   HMO      15  2010-11-08-09.05.31.408412852000 Y
         C882   HMO      15  2010-11-08-09.09.31.741915622000 Y
         C882   HMO      15  2010-11-08-09.10.26.280157593000 Y
         C882   HMO      15  2010-11-08-09.12.42.283751061000 Y
         C882   HMO      10  2010-11-08-09.12.42.283751061000 Y
 ****************************** Bottom of Data ******************************




Valid Option Commands: (Edit, Find, FORM, ZOOM)
```

END = BEG in Current

History data

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

1. Identify

2. Diagnose

DB2 Query Monitor

DB2 SQL Performance Analyzer

Tivoli OMEGAMON XE for DB2 Performance Expert

Optim pureQuery Runtime

4. Prevent

3. Solve

Optim Query Workload Tuner
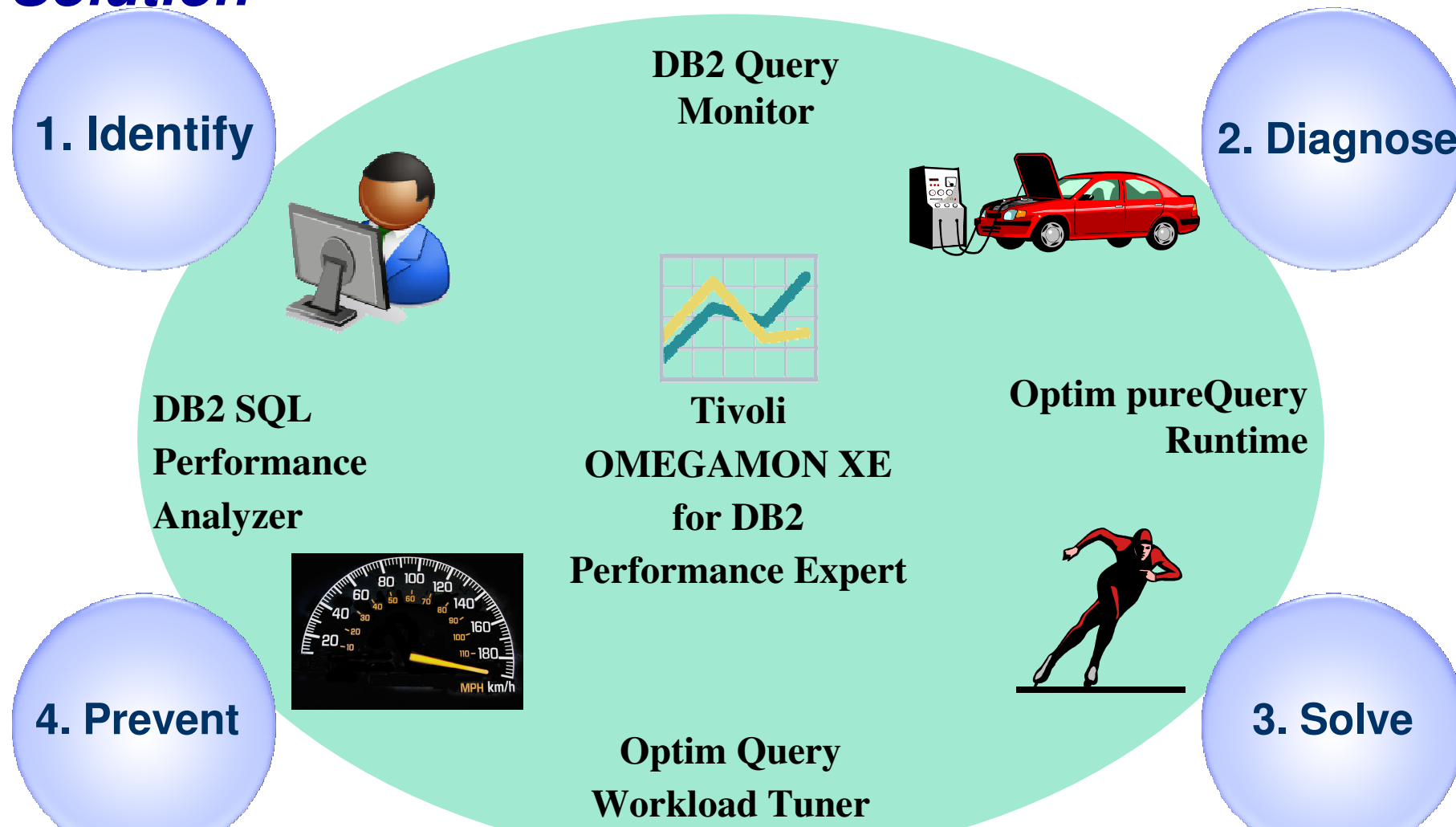
Identify, diagnose, solve and prevent performance problems

33

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**

34

© 2011 IBM Corporation
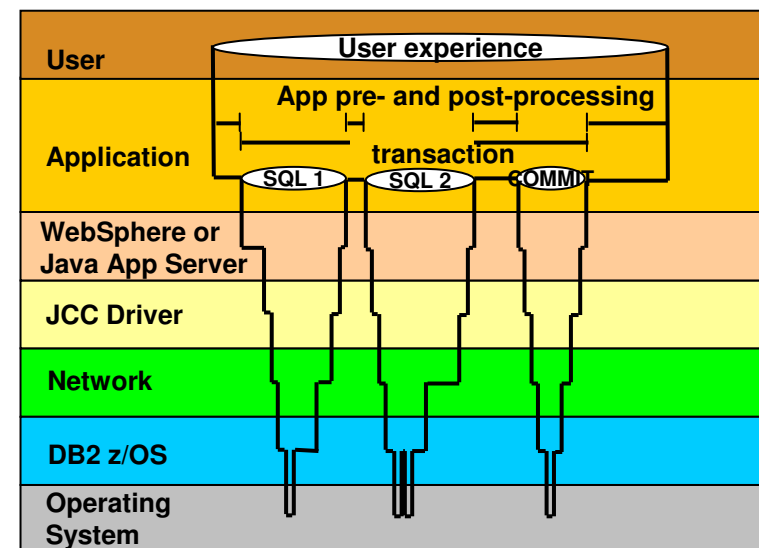
OMEGAMON DB2 PE 5.1 Extended Insight
Zoom into selected workload and see the TOP SQL list

- **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

Top SQL statements executed by Java or CLI applications like SAP, Cognos, DataStage or WebSphere
- **Zoom in on a selected SQL**

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

SQL Statement Text

Tune SQL with Optim Query Workload Tuner

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

Corporation

OMEGAMON PE V510 Performance Testing Results

➢ Measurable CPU savings across all user scenarios for online monitoring

➢ Below the bar memory usage improvements

➢ CPU improvements in batch reporting processing DB2 9

➢ Support for approximately 30 DB2 Line-items and change requests for DB2 10

➢**OM PE V510 customer-driven requirements**

•Cancel remote threads

•Identify CPU utilization for remote threads

•Report on DSN Activity for remote threads

•See DB2 Connect Server details for a distributed thread originating on a remote LPAR

•See statement text for static SQL in Application Trace

•Launch "explain" tools: Optim Query Workload Tuner as well as Data Studio from OM PE

```
CQM$SU8J 7 21:23:45   ---- Activity by SQL Text ----   Row 1 of 192
Option  ===>                                           Scroll ===> PAGE
DB2 QM Subsystem: DQ3A         Interval Start Date: 03/05/2011  Time: 21:00:00
Filters Enabled: N             Interval End   Date: CURRENT     Time: CURRENT
DB2:          Plan: DISTSERV  Pgm:          Authid:
              Section:         Call:          Type:
              WSUser:                         WSName:
              WSTran:                                 CorrID:
C: 1-Plan,2-DB2(Op),3-Pgm,4-Authid,5-DB2(St),6-DBase,7-Buff,8-Pageset,
   9-Objs,10-Corr,11-Sect,12-Call,13-WSUser,14-WSName,15-WSTran,17-View,
   18-Analyze,19-Delay,20-Locks,21-Misc,22-Buffstat
-------------------------------------------------------------------------  +>
CMD  SQL Text                                           Calls DB2  Plan
--   ----------------------------------------------     ------ ---- --------
18   SELECT * FROM CPAHDB2.CPA_EXPLOR41 WHERE              34
     SELECT * FROM CPAHDB2.CPA_EXPLOR41 WHERE              22
__   select distinct t1.ITEM_ID, t1.STATE_ID               4
__   select t1.ITEM_ID, t1.STATE_ID from CCM_             200
__   SELECT UUID FROM CCM_REPOSITORY.CONTENT_            3480
__   SELECT UUID FROM CCM_REPOSITORY.CONTENT_             172
__   select t1.ITEM_ID, t1.STATE_ID from CCM_            300
__   select t1.ITEM_ID, t1.STATE_ID from CCM_            300
__   select t1.ITEM_ID, t1.STATE_ID from CCM_            300
__   select t1.ITEM_ID, t1.STATE_ID from CCM_            600
__   DELETE FROM CCM_REPOSITORY.CHANGE_EVENT_           2610
__   SELECT * FROM CPAHDB2.CPA_EXPLOR41 WHERE              6
__   SELECT KEY_UUID FROM CCM_REPOSITORY.ITEM          6960
__   SELECT MAX(START_DATE),MIN(START_DATE) F              5
__   SELECT DISTINCT(TRAN),COUNT(TRAN) FROM C              4
__   SELECT DISTINCT(TRAN),COUNT(TRAN) FROM C              4
__   SELECT DISTINCT(APPLID) FROM CPAHDB2.CPA             5
__   SELECT * FROM CPAHDB2.CPA_EXPLOR41 WHERE              5
__   SELECT DISTINCT START_DATE FROM CPAHDB2.             5
__   SELECT DISTINCT(TRAN),COUNT(TRAN) FROM C              5
```

Most SQL calls in my system are well tested prior to production promotion and that is not my concern.

True

False

Most SQL calls in my system are well tested prior to production promotion and that is not my concern.

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 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

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)
```

Also defines the set of statistics to be collected when running autostats

Autonomic statistics – stored procedures used to determine whether statistics should be collected or recollected

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)        Read DB2 log backwards

   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)
```

DB2 Automation Tool V3.1 Cancel Readers Preventing Online Drains and Switch

```
AUTOTOOL V3R1 ---------- Online Reorg options ---------- 2011/01/21  13:09:31
Option   ===> _____  Scroll ===> PAGE
  Commands: END - Return to the previous screen.

  Creator: DBA104    Name: ONLINE REORG                    User: DBA104

  Enter the options to associate with this utility profile

     Sharelevel . . . . . . . . . ==> C      (R - Reference, C - Change, N - None)
     Drain Wait . . . . . . . . . ==> _____  (blank, 0-1800 seconds)
     Retry  . . . . . . . . . . . ==> ___    (blank, 0-255)
     Retry Delay  . . . . . . . . ==> _____  (blank, 1-1800 seconds)
     Timeout  . . . . . . . . . . ==> T      (A - Abend, T - Term, N - None)
     Force                        ==> N      (A - All, R - Readers, N - None)
     AUX  . . . . . . . . . . . . ==> N      (Y - Yes, N - No)
                                  Include                 Update
     Deadline Options         ==> N  (Y - Yes, N - No) ==> N  (Y - Yes, N - No)
     Shrlevel Change Options  ==> Y  (Y - Yes, N - No) ==> N  (Y - Yes, N - No)
```

FORCE – actions to be taken when utility is draining the TS

NONE – no action – wait for claimers to commit

READERS – read claimers are canceled

ALL – readers and writers are canceled

DB2 Utility Enhancement Tool V2.1

- **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
- **Enforces the use or disuse of utility parameters (Standardization)**

DB2 Utility Enhancement Tool V2.1

- **Extends utility syntax for LOAD**
  - **CONSTANT** replace a given value for a particular field in the input records with another specified value being loaded at run-time

  - **VALUEIF** is a conditional parameter – if a condition is met a new value is used in its place

  - **PRESORT** by table object identifier (OBID) and by clustering index key
    - If no clustering index key is available sorts by the oldest defined index
    - Reduces elapsed time & CPU times
  - **DISCARDTO** – name of a flat file to write discarded data (rather than a DB2 table)

DB2 Utility Enhancement Tool V2.1

- **Enhances the native DB2 REORG TABLESPACE**
  - Automatically sizes and creates the mapping table and mapping-table index that are required for the DB2 REORG TABLESPACE utility when the SHRLEVEL CHANGE option is specified
  - Automatically drops these objects when reorganization processing completes to preserve space
  - No changes to the existing utility JCL are required

DB2 Utility Enhancement Tool V2.1

- **Enhances the native DB2 CHECK DATA syntax**

  - Supports discarding rows to a flat file

  - Automatically creates and sizes the discard table
    - Unloads from the discard table to a LOAD-format SYSREC file
    - Creates LOAD-format SYSPUNCH file
    - LOAD-format SYSREC / SYSPUNCH file can be used by other utilities
    - Automatically drops discard table

- **Supports the standard DB2 restart of a DB2 utility for which interception is occurring or has occurred.**

My DB2 Utility jobs need to be improved immediately in the following category to meet my batch window or other restrictions.

CPU Usage

Elapsed Time

Both

None at the moment

My DB2 Utility jobs need to be improved immediately in the following category to meet my batch window or other restrictions.

DB2 Sort

- **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

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

Recovery Management

- **Recovery is one of the most complex tasks undertaken by DBAs**

- **In most shops, recovery scenarios are not practiced**

- **When the crisis comes, DBAs are presented with**

  – A short timeframe for recovery of critical production data assets

  – A potentially unpracticed recovery scenario

  – Utilities and tools with many options and features to help them, but with which they are often not completely familiar

  – A lot of stress!

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 – 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**
  - UNDOn/ REDO recoveries
  - Quiet point analysis
- **Drop Recovery**
- **Dependency analysis**

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**

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

Accelerate DB2 10 Time to Value

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

Accelerate DB2 10 Time to Value

DB2 PathChecker

- **3 Major Functions**

  - **Report** access path

  - **Test** DBRM's to identify potential access path changes without a bind (**Before** you bind)

  - **Compare** access paths after bind

- EXPLAIN **command**

  - Explain a DBRM without having to compare to a previous access path

- OPTION MATCHSQL **- matches plan table rows based on SQL characteristics (rather than having to have a matching line number)**

IBM InfoSphere Optim Query Work Load Tuner

Development Environment

Production Environment

Optim Query Tuner

Optim Query Workload Tuner

Tune SQL pre-production while costs and impact are low

Optimize workload for peak performance

Streamlined Analysis

Define or select workload

Execute advisors

Drill into advice

Validate improvement

IBM InfoSphere Optim solutions
Managing data throughout its lifecycle in heterogeneous environments

Production → **Subset** → Training / Development / Test

Mask → **Archive**
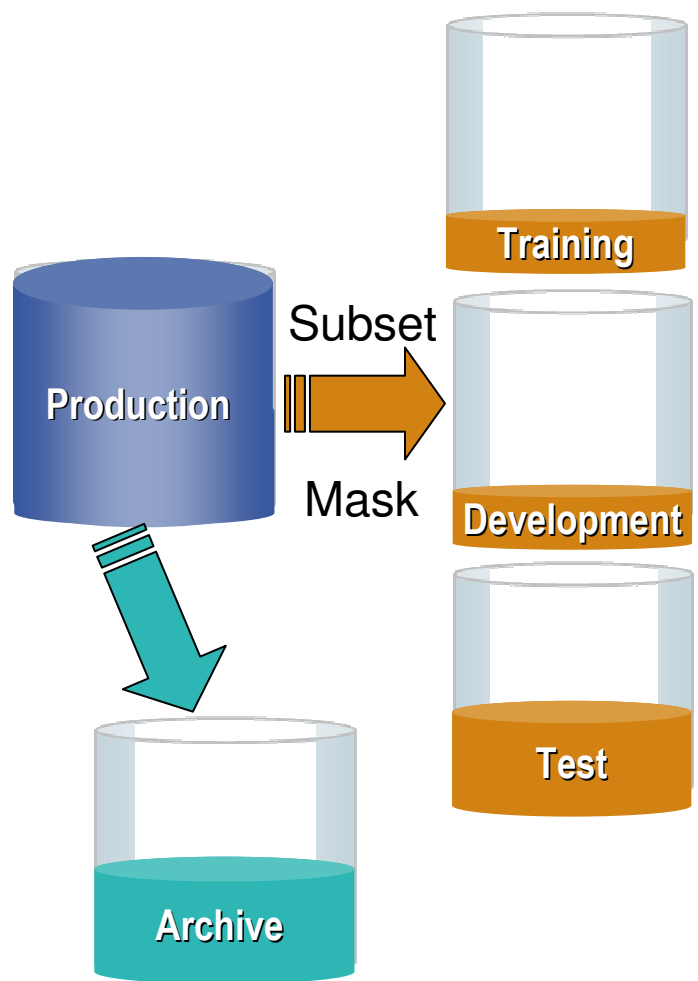
Data Growth Management

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

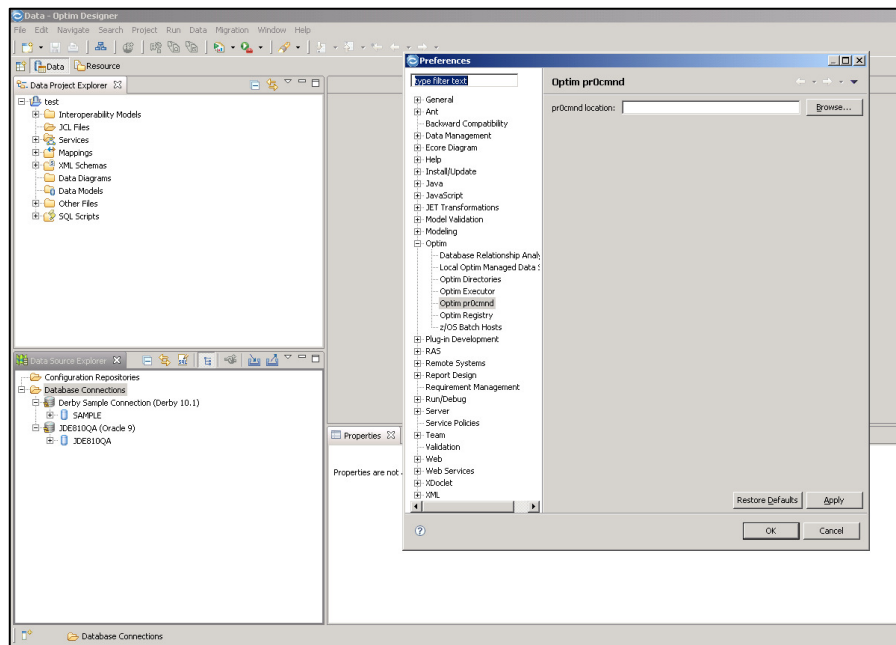# IBM InfoSphere Optim Data Growth Solution

Data Growth

Manage data growth and improve performance by intelligently archiving historical data
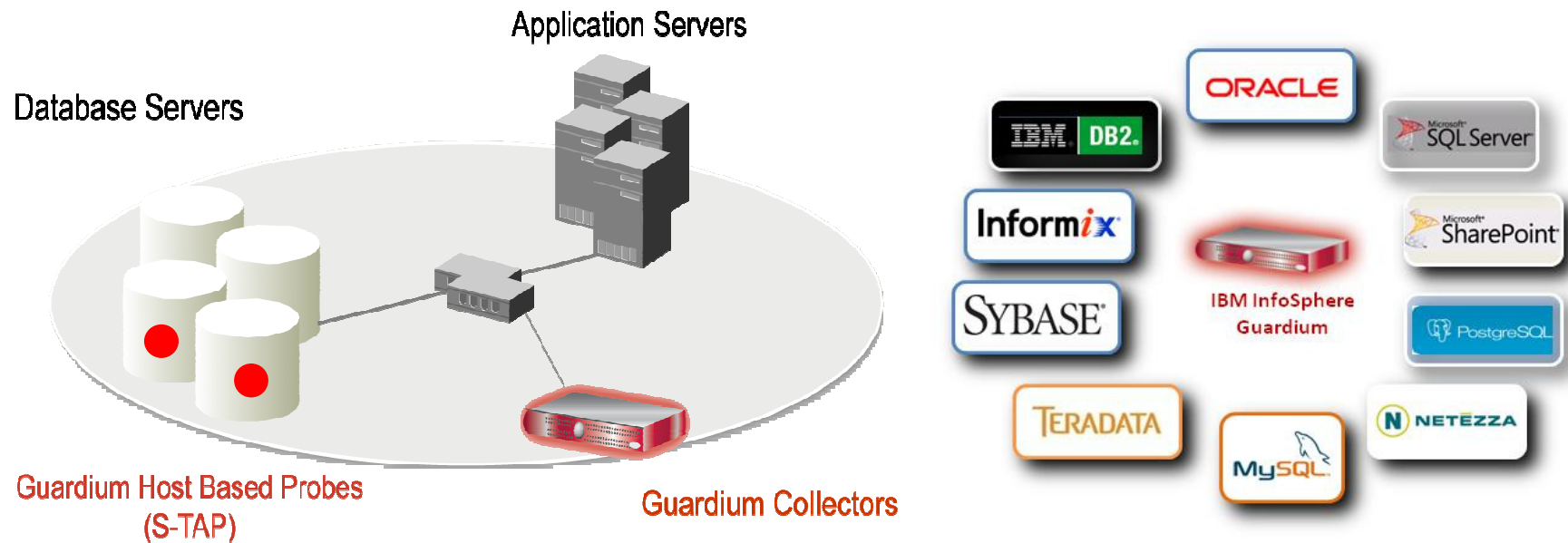
Requirements

- 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

Guardium Database Activity Monitoring

Application Servers

Database Servers

Guardium Host Based Probes
(S-TAP)

Guardium Collectors

ORACLE

IBM DB2.

SQL Server

Informix

IBM InfoSphere Guardium

SharePoint

SYBASE

PostgreSQL
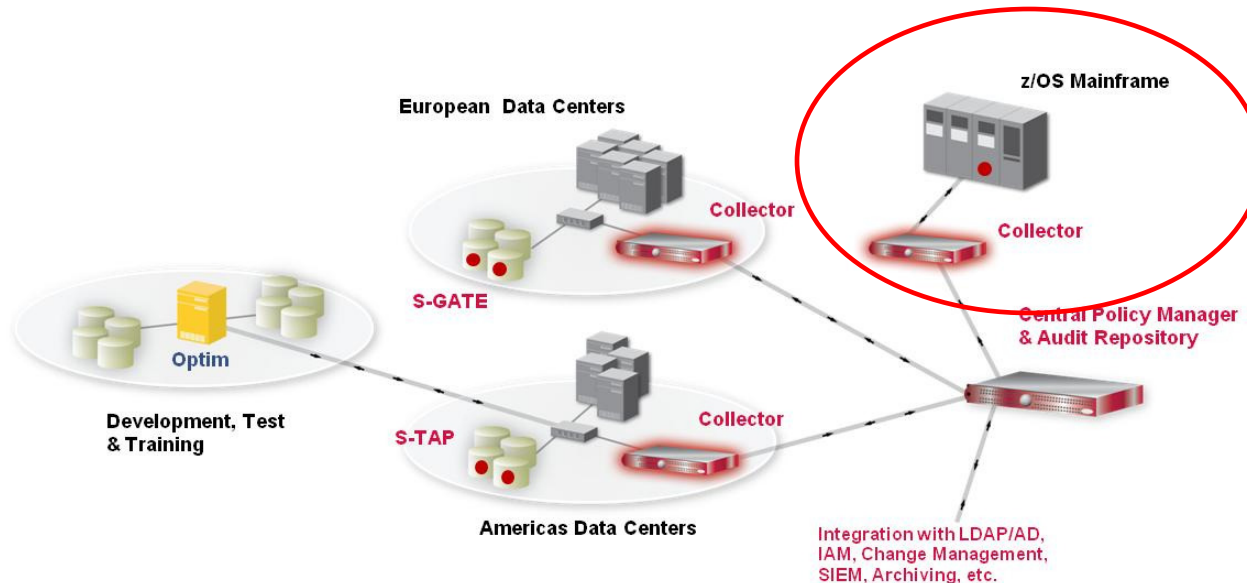
TERADATA

MySQL

NETEZZA

- 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.)

IBM InfoSphere Guardium

Database Protection and Compliance Made Simple

16

European Data Centers

Collector

Optim

Development, Test & Training

S-GATE

S-TAP

Collector

Americas Data Centers

z/OS Mainframe

Collector

Central Policy Manager & Audit Repository

Integration with LDAP/AD, IAM, Change Management, SIEM, Archiving, etc.

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**

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

Disclaimer/Trademarks

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements, or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

The information on the new products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information on the new products is for informational purposes only and may not be incorporated into any contract. The information on the new products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. The development, release, and timing of any features or functionality described for our products remains at our sole discretion.

This information may contain examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious, and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Trademarks   The following terms are trademarks or registered trademarks of other companies and have been used in at least one of the pages of the presentation:

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both: DB2 Universal Database, eServer, FlashCopy, IBM, IMS, iSeries, Tivoli, z/OS, zSeries, Guardium, IBM Smart Analytics Optimizer, 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, Optim Data Growth Solution for z/OS, Optim Development Studio, Optim pureQuery Runtime, Optim Query Workload Tuner, Optim Test Data Management Solution for z/OS, Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS
EMC and TimeFinder are trademarks of EMC Corporation
Hitachi is a traademark of Hitchi Ltd

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.
Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.
Other company, product, or service names may be trademarks or service marks of others.