

IBM System z Technology Summit



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



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.

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
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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 Sqlda (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

```


DB2 Admin Tool V10.1 Temporal Table

```

DB2 Admin ----- DSNT Tables, Views, and Aliases ----- Row 1 from 2
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
    *                   *      * *      *      *      *    *    * *
-----
POLICY                IOD07S  T DSN00330 POLICY    8      5     1
POLICY_HIST           IOD07S  H DSN00331 POLICYRH  8      7     0
***** END OF DB2 DATA *****
    
```

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 *****
    
```

DB2 Table Editor V4.3 - Temporal Table Versioning

```

ETI$EDIT  V4R3  ----- Browse Table Rows ----- 2011/01/13 17:47:27
Option ==> _____ Scroll ==> PAGE
----->
Table ==> POLICY > Creator ==> IOD07S >
----->
          Row 1 of 5
----->
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
-----
Table ==> POLICY_HIST > Creator ==> IOD07S >
-----
Row 1 of 7
-----
CLIENT TYPE COPAY SYS_END IN
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 *****

```

END = BEG in Current

History data

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

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

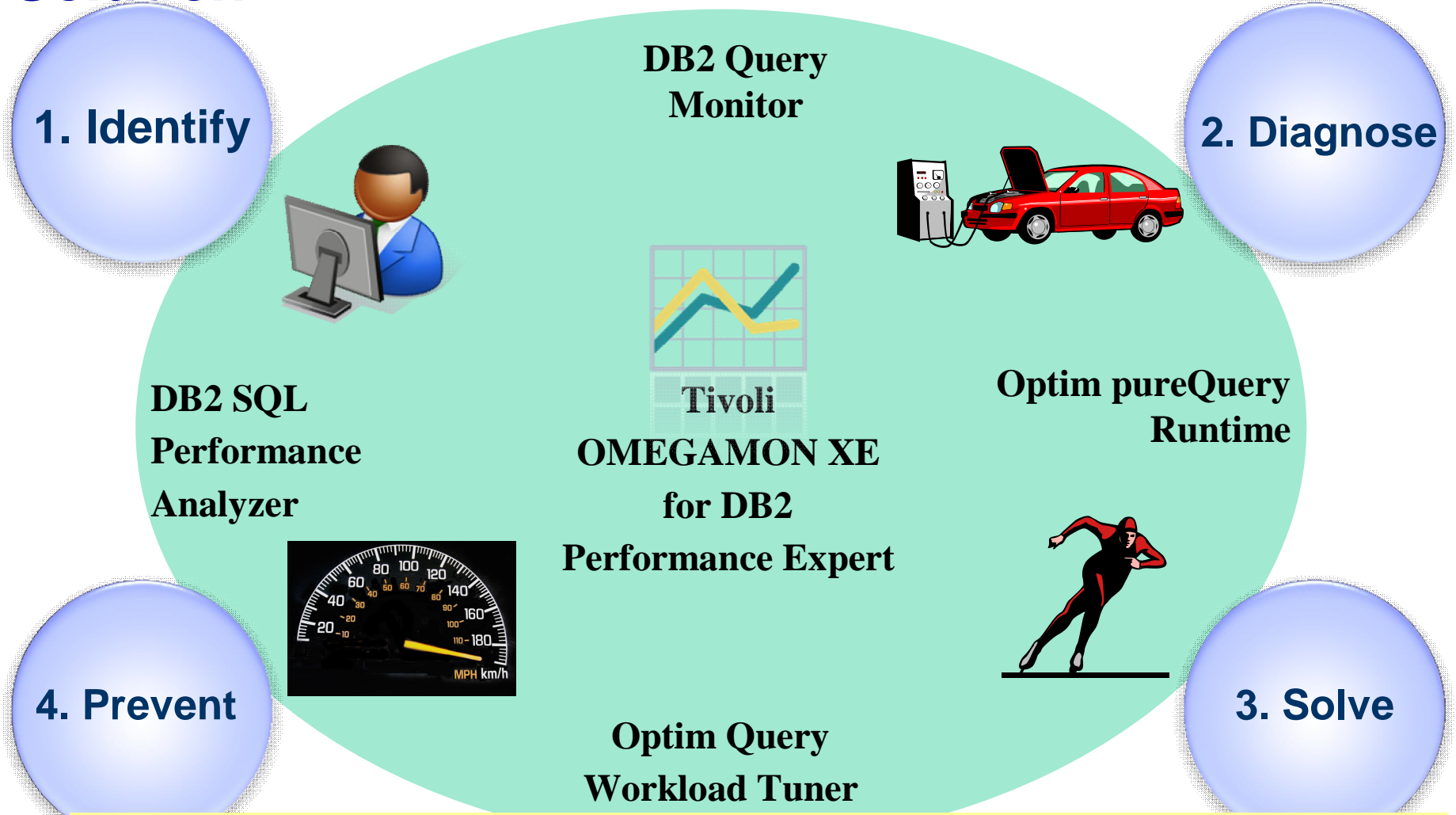
Drive DB2 Efficiency and Productivity

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

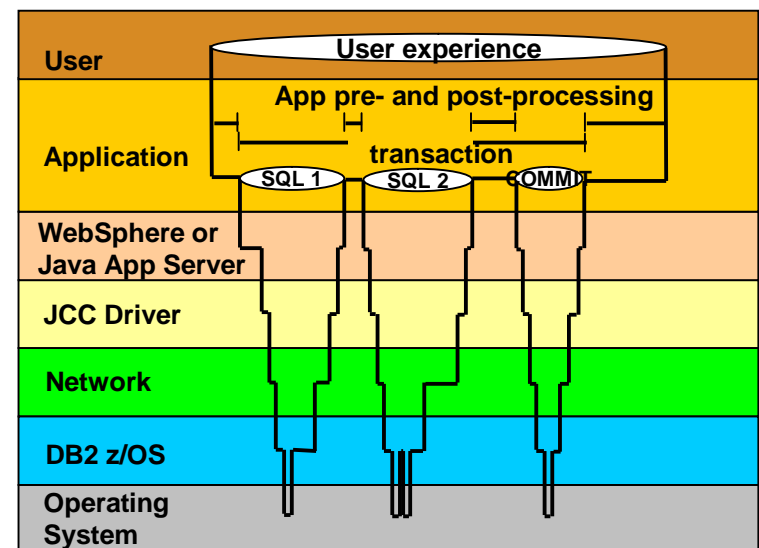
- **Summary SQL Reporting**

- **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

Extended Insight Analysis Dashboard: OMP1D911

Locate the source of performance problems, determine how those problems affect different parts of the workload, and analyze the impact of those problems on the system. **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

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 (%)

- Client time: 6.67%
- Network time: 32.00%
- Data server time: 61.33%

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 WKLDID, '...	1	0.504
SELECT 'PVT_40K' AS WKLDID, '...	1	0.474
SELECT 'PVT_40K' AS WKLDID, '...	1	0.518
SELECT 'PVT_40K' AS WKLDID, '...	1	1.393
N/P	1	1.023

Display this list by the selected graph layer

Statement information

```
SELECT 'PVT_40K' AS WKLDID, '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

Tune SQL with Optim Query Workload Tuner

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

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)
    
```

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

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 Automation Tool V3.1 Exceptions CLUSTERSENS and HASHACCESS

```

AUTOTOOL V3R1  ---- Update Exceptions Profile Display  --- 2011/01/21 13:03:51
Option  ==> _____ Scroll ==> PAGE
  Commands: END - Save and exit.
Line Commands: A - And  O - Or  S - Select  D - Deselect  R - Repeat
  CONDitions: LT|<|LE|<=|EQ|=|GT|>|GE|>=|NE|!=|<> "*" indicates DAT stat
-----
Creator: DBA104      Profile: CROSS BRAND      User: DBA104
Share Option: U (U - Update, V - View, N - No)
Description: SEMINAR      Scroll Right for Column Help
Use Stats From: R (R - Repository,      Update Runstats Options: N (Y - Yes,
                  C - Catalog,              N - No)
                  U - Runstats,      Save Triggers in Repository: N (Y - Yes,
                  S - Shadow,          N - No)
                  H - History)      WTO number of triggered Objects: N (Y - Yes,
                                      N - No)
Combine IX/TS Exceptions if evaluating IX triggering a TS: N (Y - Yes, N - No)
-----
S Statistics Type--- *Column----- Cond -----Exception Value-----
- REALTIME REORG TS  MASS_DELETES      - _____
-                   CLUSTERSENS      - _____
-                   HASHACCESS       - _____
-                   SCANACCESS       - _____
- REALTIME REORG IX  REAL TIME STAT    - _____
-                   DAYS_SINCE_LAST  - _____
    
```

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 . . . . . ==> I      (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
- **Utility Syntax Monitor – used to enforce 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
- **Supports the standard DB2 restart of a DB2 utility for which interception is occurring or has occurred.**



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.**



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



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**
 - UNDOOn/ 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

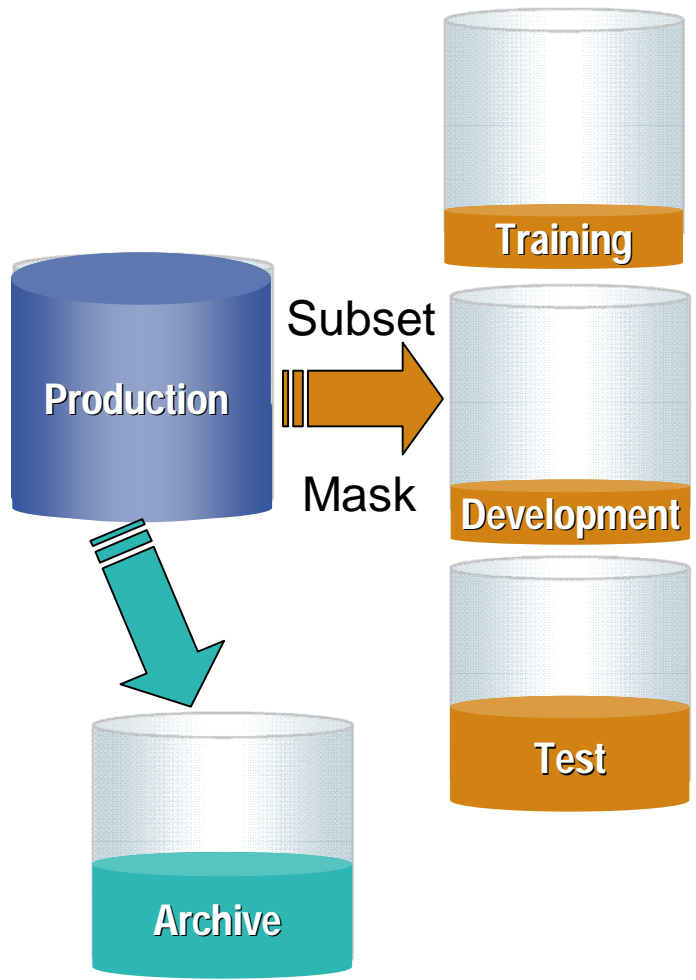
- Identify potential Access Path regressions
- Export SQL to Optim Query Workload Tuner or Data Studio for tuning
- Save packages with DB2 9 Plan Management before DB2 10 Migration

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

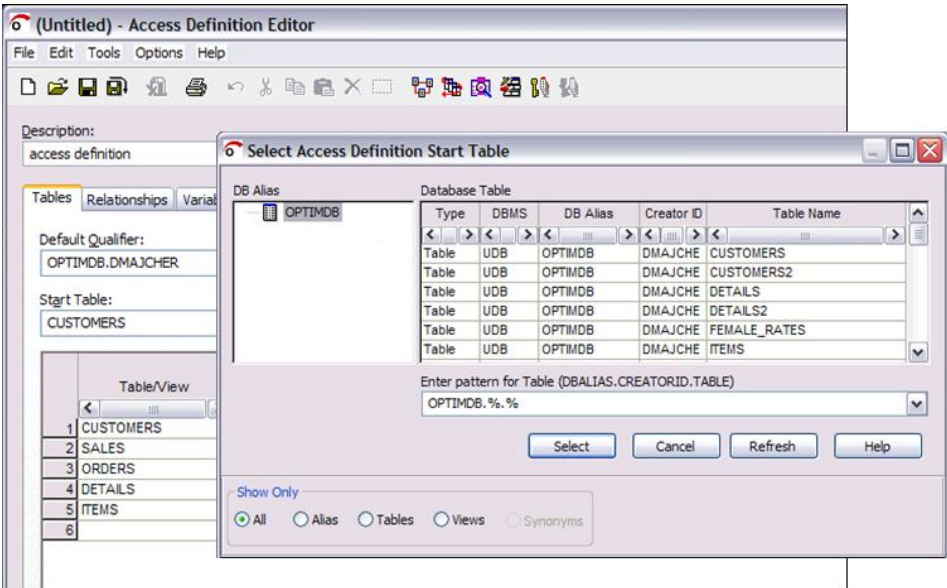
- Protect sensitive information from misuse & fraud
- Prevent data breaches and associated fines
- Achieve better data governance

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

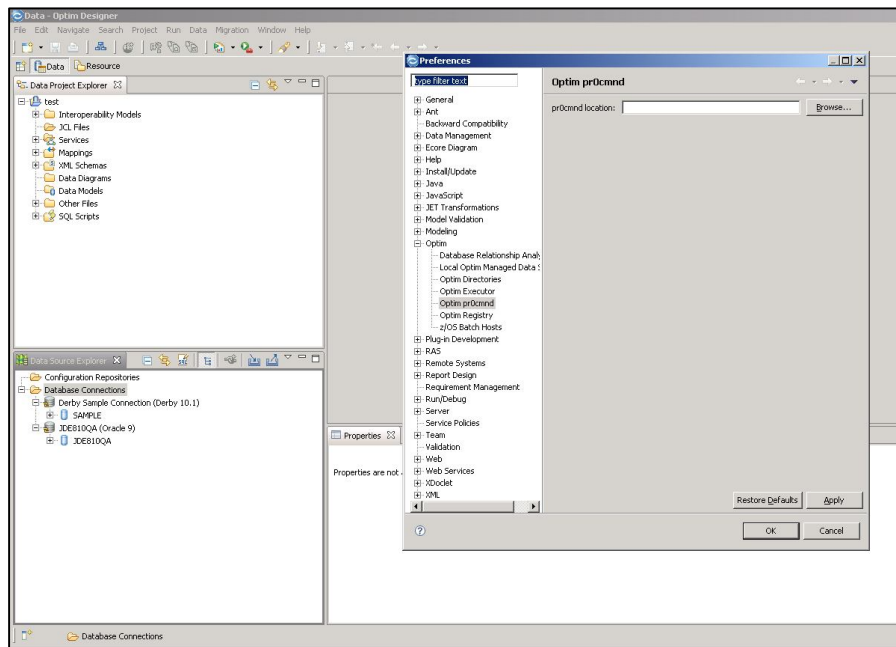
Manage data growth and improve performance by intelligently archiving historical data

Requirements

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

Benefits

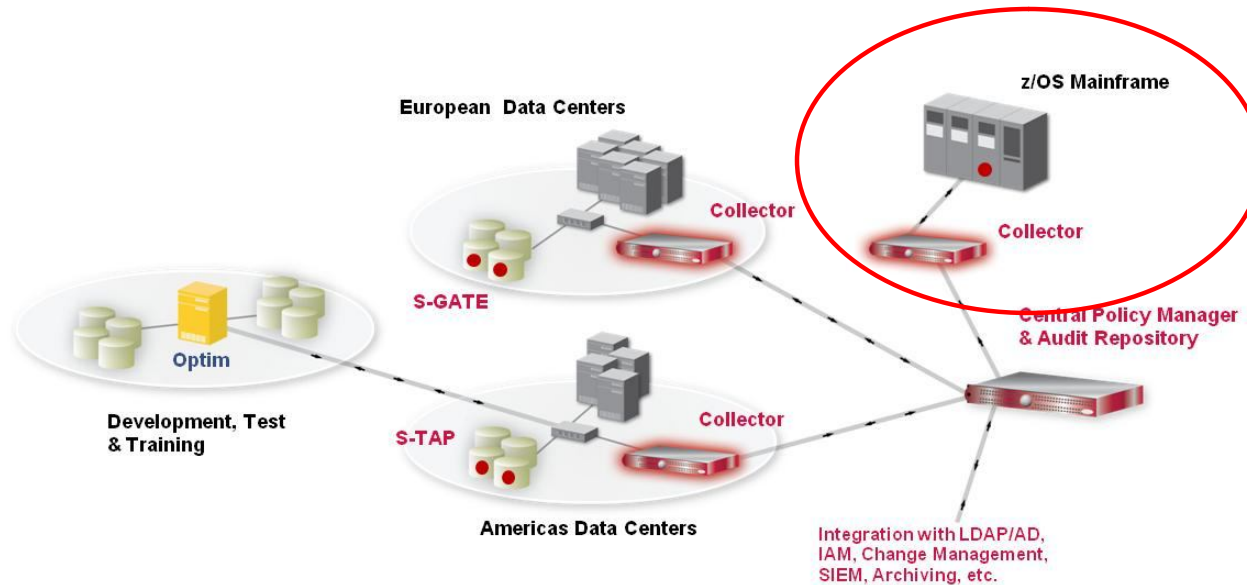
- Reduce hardware, storage and maintenance costs
- Streamline application upgrades and improve application performance
- Safely retire legacy & redundant applications while retaining the data



IBM InfoSphere Guardium

Database Protection and Compliance Made Simple

16



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**

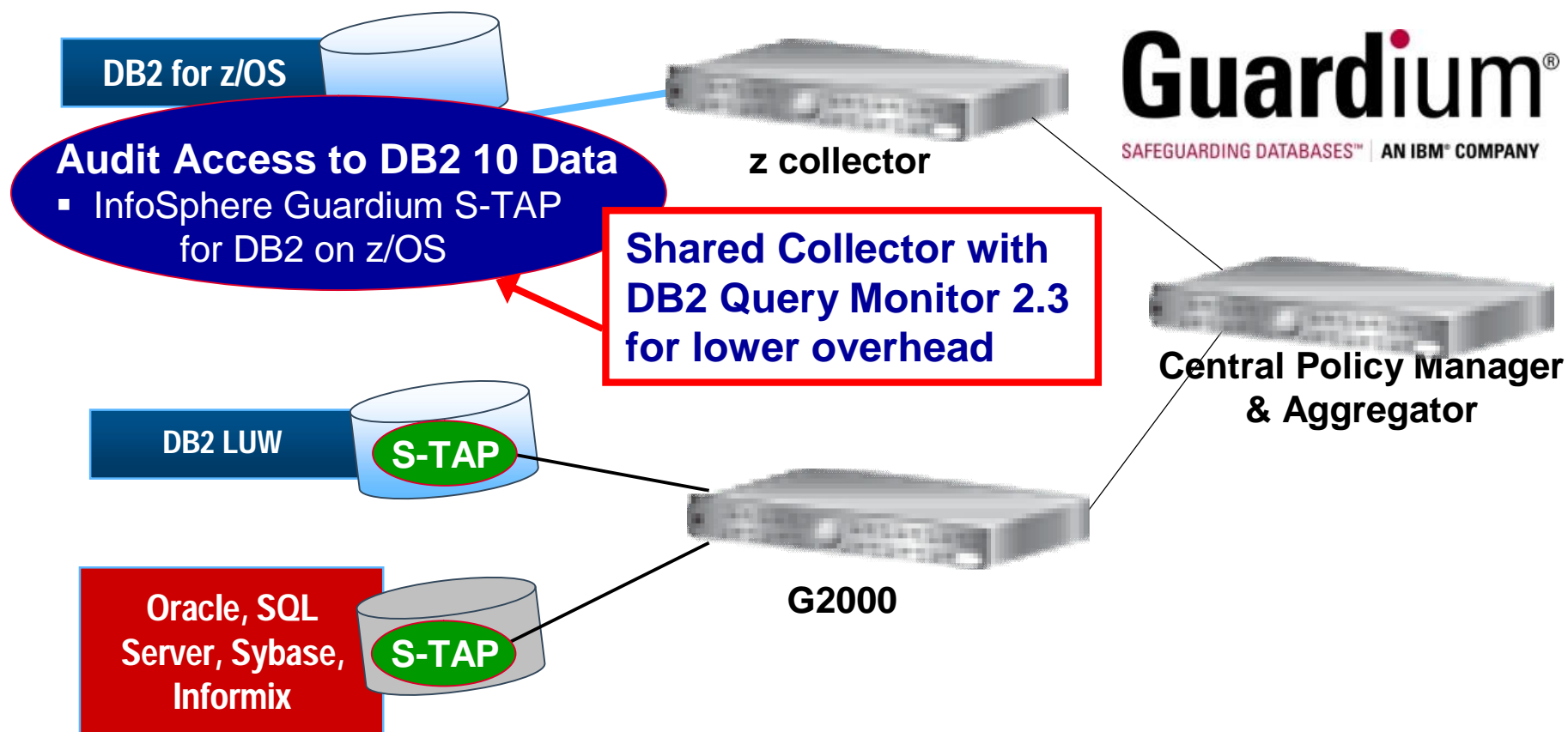
Benefits

- **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**

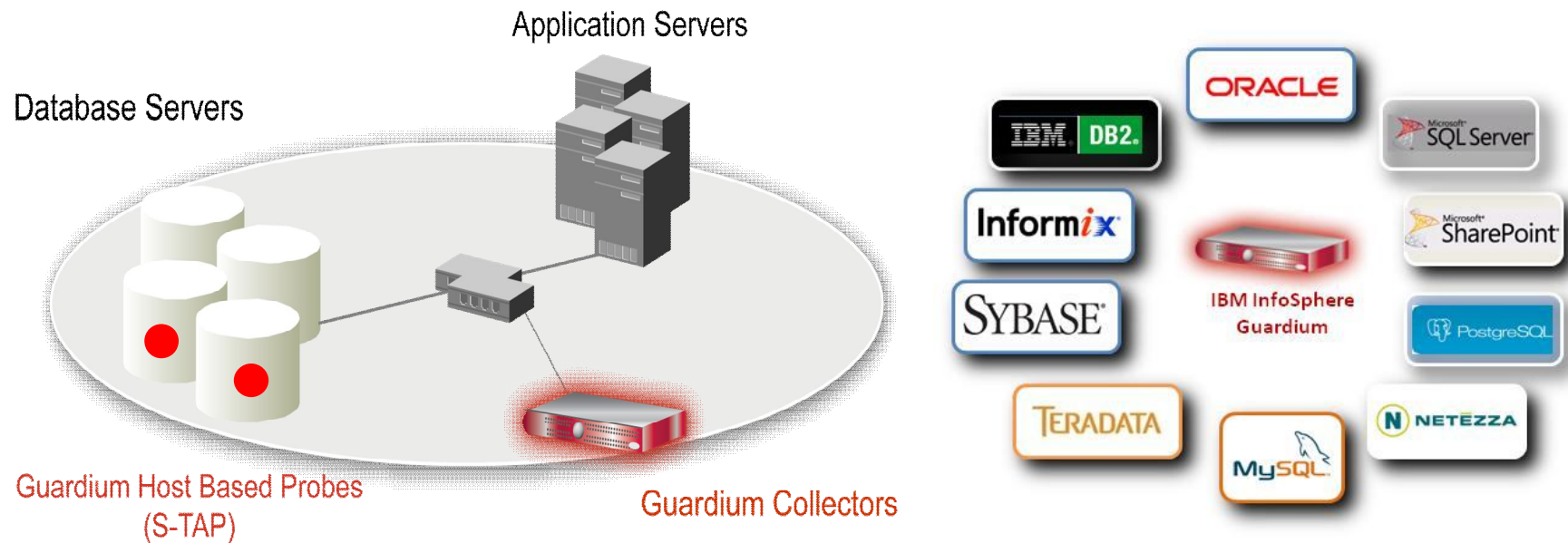
Safeguard DB2 10 Data

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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