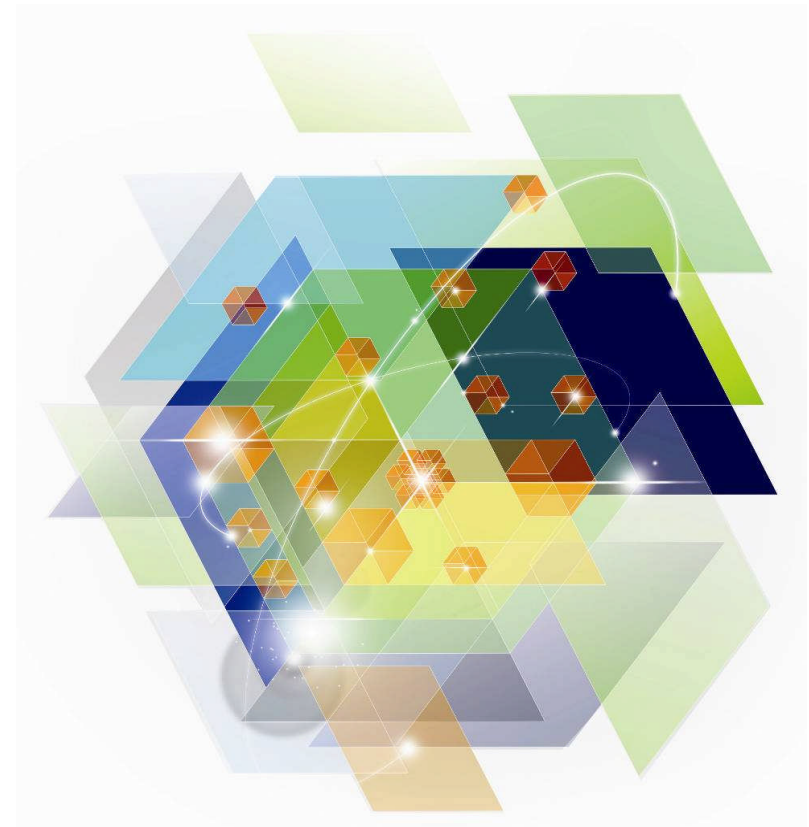# IBM IMS and DB2 for z/OS Tools Strategy and Update

Tom Ramey,

Director DB2 and IMS Tools Development,

IBM Silicon Valley Lab

Disclaimer

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Topic Outline

- **Part 1: Solution introduction**

  - Why IBM DB2 for z/OS and IMS Tools?

- **Part 2: Part 2: Strategic Initiatives**

  - Areas of focus and research

  - Technology to solve problems
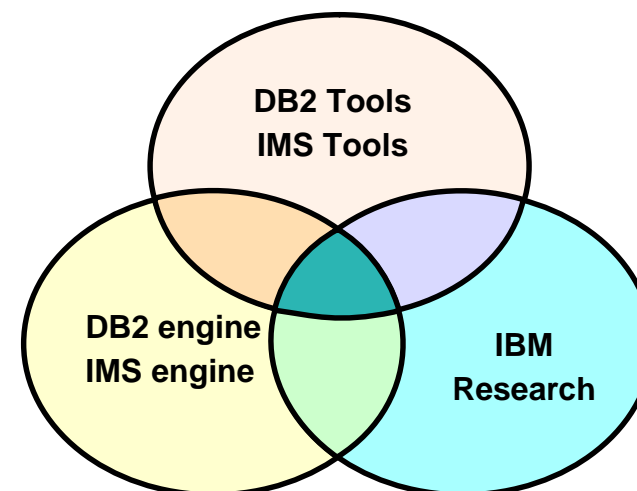
- **Part 3: Core Solutions**

  - Database Administration

  - Utilities Management

  - Performance Management

  - New Version Support

- **Part 4: Summary**

Introduction to DB2 and IMS Tools

- **Significant Investments in**:
  - ✓ Product development
  - ✓ Technical support
  - ✓ Migration and Implementation
  - ✓ Customer Partnerships

- **Continue to improve and expand our portfolio**
  - Continuous product improvement providing more value
  - Integrated and Autonomic Solutions
  - Modern GUI interfaces to attract new talent
  - New Products to address new concerns
  - Best Practices

- **Remain flexible and responsive**
  - Adjust plans to accommodate customer requirements

- **Bottom Line**
  - ✓ **We succeed if we help our customers be successful with DB2 and IMS**

DB2 Tools
IMS Tools

DB2 engine
IMS engine

IBM
Research

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Part 4: Summary

Tools Strategic Initiatives

- **Introduce new solutions to address customer pain points**
  - Capture/Replay technology
  - Manage DB2 Real Storage Pools
  - DB2 and IMS in a private cloud

- **Increase technology lead over other vendors**
  - Extend zIIP exploitation
  - Integrate FlashCopy solutions to replace current unload/load processing
  - Exploit zEnterprise environment to optimize resource utilization

- **Enhance Usability of IBM Solutions**
  - Convert Windows clients to browsers
  - z/OS Management Facility and WebISPF
  - Implementation of key product features based on user feedback

- **Increase solution integration and common architecture**
  - Shared Object and Utility Profiles
  - Common configuration definitions and management
  - Runtime configuration based processing
  - Stored Procedure interfaces to facilitate integration

- **Extend Autonomics within Portfolio**
  - Shared Knowledge Base to store execution metrics
  - Runtime job planning and resource management based on past performance

IBM's Lifecycle Management Strategy
For Database Development and Administration

Data Studio and Optim   **z/OS Tools**
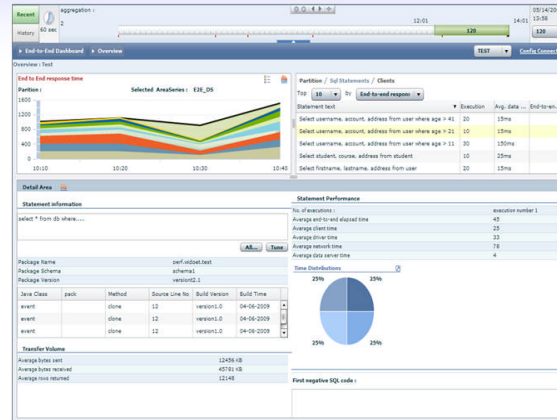
Eclipse UI   Web UI   3270
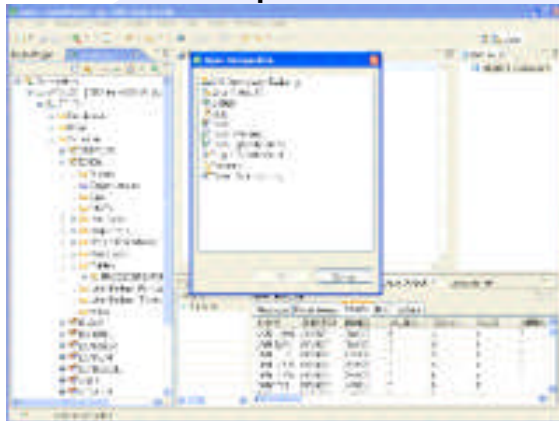
Develop and Deploy
- Design and Development
- Configuration
- Object Management
- Change Management
- Automation Planning
- Data Governance

Operate
- Monitoring
- Automation Management
- Reporting
- Data Governance

z/OS Database Administration
- Rich z/OS function
- Application Management
- Database Administration
- Performance Management
- Data Governance

InfoSphere Optim Query Capture and Replay
Fully assess change impact before production deployment

Improve customer satisfaction

Anticipate and correct potential problems sooner

Reduce Cost of Change

Establish consistent database testing processes

Meet SLAs

Ensure well tuned, high performing workloads before deployment

Report and analyze
Identify and explore errors and performance issues, correct them before production deployment

Capture
Capture production workloads and execute them in nonproduction environments to establish baseline characteristics
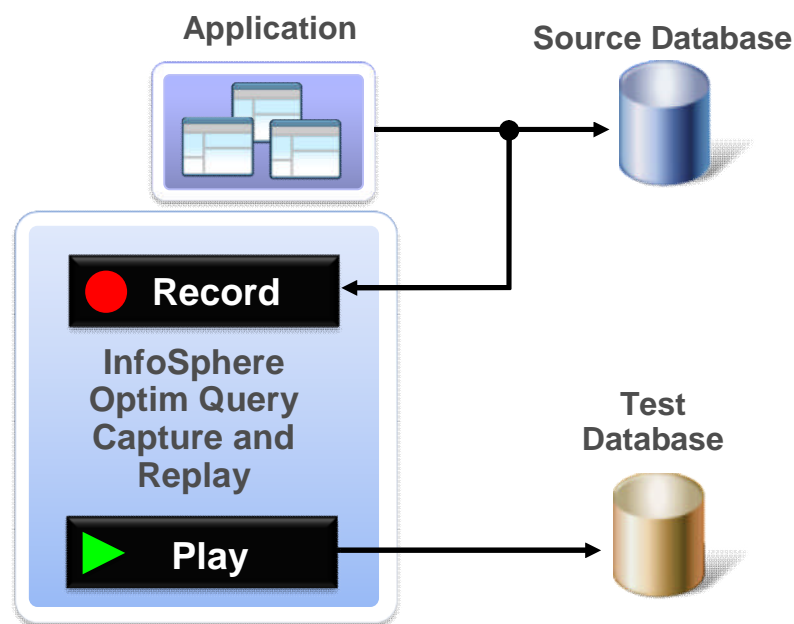
Replay
Apply change and replay the captured workload in nonproduction environments, then compare with baseline

IBM InfoSphere Optim Query Capture and Replay

Capture production workloads and replay them in testing environments

Application

Source Database

● **Record**

InfoSphere Optim Query Capture and Replay

Test Database

▶ **Play**

IBM DB2.

IBM. Informix

Ⓝ NETEZZA

MySQL.

Microsoft SQL Server

ORACLE

TERADATA

SYBASE

Requirements

- Minimize unexpected production problems

- Shorten testing cycles

- Develop more realistic database testing scenarios

Benefits

- Identify database problems sooner with validation reports and performance tuning

- Use actual production workloads for testing rather than fabricated scenarios

- Extend quality testing efforts to include the data layer

Defense in depth to protect the data

Technology to protect data at the source

Optim Data Privacy
- Masking to protect sensitive data

Guardium
- Vulnerability Assessment
- Monitoring activity
- Alerts and prevention of attacks
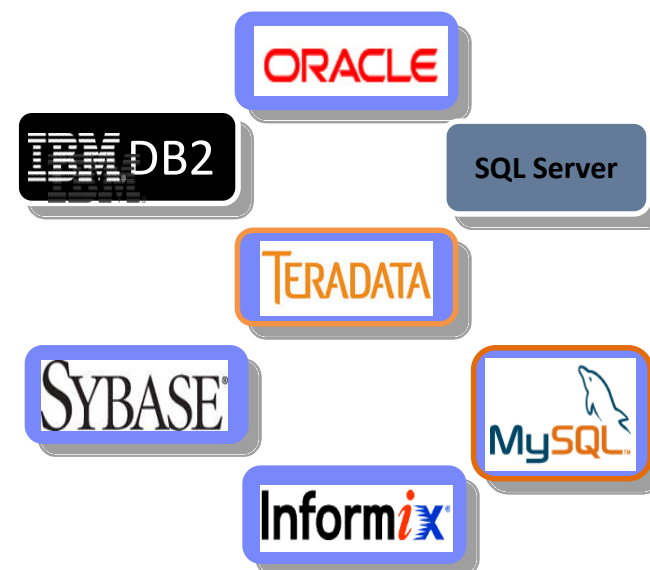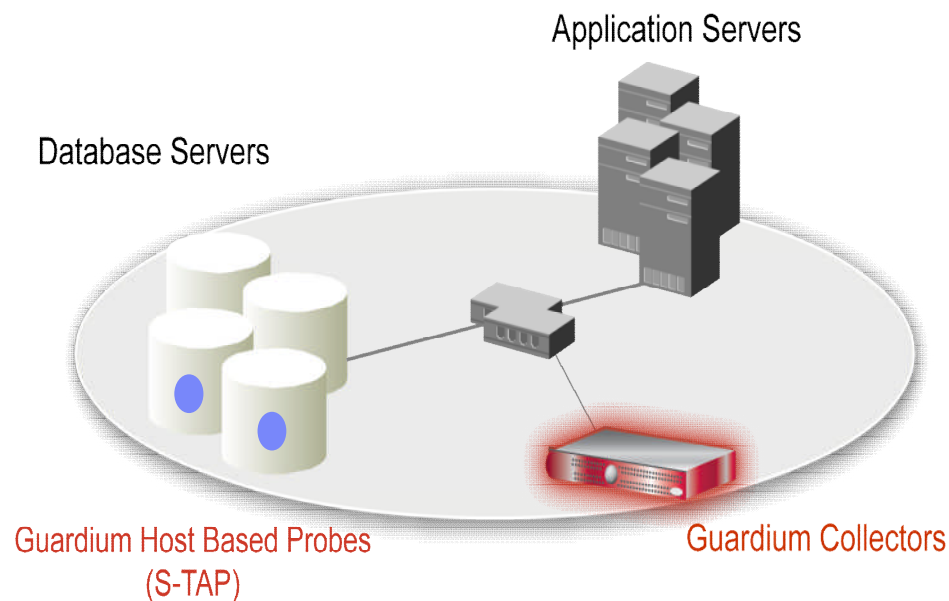- Audit and reporting for compliance

Optim Database Encryption
- Address data breach risk

Optim Data Growth Solution
- Data Retention and archiving

Attacks have moved beyond external hacks to internal breaches

Real-Time Database Security & Monitoring

Application Servers

Database Servers

Guardium Host Based Probes
(S-TAP)

Guardium Collectors

ORACLE

IBM DB2

SQL Server

TERADATA

SYBASE

MySQL

Informix

- Non-invasive
- No DBMS changes
- Minimal impact
- Does not rely on traditional DBMS-resident logs that can easily be disabled by DBAs

- Granular policies & monitoring
  - *Who, what, when, how*
- Real-time alerting
- Monitors <u>all</u> activities including local access by privileged users
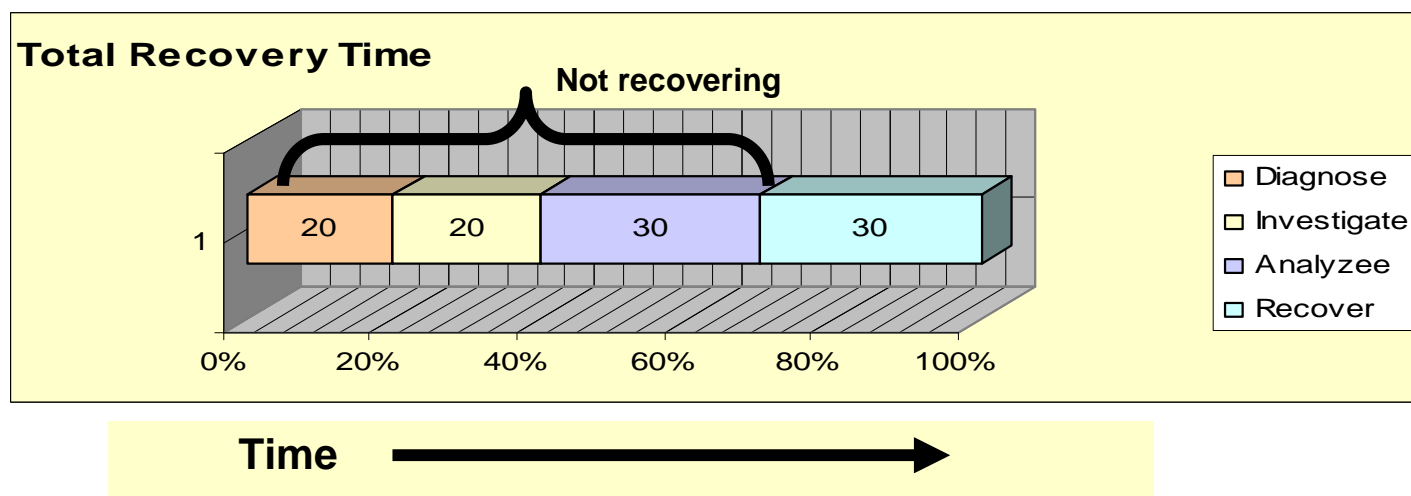
Availability Review

"**Based on extensive feedback from clients, we estimate that, on average, unplanned application downtime is caused:**

- **20 percent of the time by hardware and disasters** (e.g., server and network), OS, environmental factors (e.g., heating, cooling and power failures)

- **40 percent of the time by application failures** including "bugs," performance issues or changes to applications that cause problems (including the application code itself or layered software on which the application is dependent)

- **40 percent of the time by operator errors**, including not performing a required operations task or performing a task incorrectly (e.g., changes made to infrastructure components that result in problems and incur unexpected downtime).

- **Thus, approximately 80 percent of unplanned downtime is caused by people and process issues…. Improving availability requires a different strategy"**

-- Gartner Group

Once you have an event…

- **Up to 70% of *recovery time* is "think time"!**
  - Not processing time

Total Recovery Time

Not recovering

1	20	20	30	30

0%   20%   40%   60%   80%   100%

- Diagnose
- Investigate
- Analyzee
- Recover

Time ➡

Source : McGladrey and Pullen

Expert Backup and Recovery Tools:
DB2 Recovery Expert, IMS Recovery Expert

- **Expert Backup and Recovery capabilities (DB2)**
  - Web-based browser client to make users more productive*
  - Expert functions to recommend best recovery plan
    - Quiet time analysis
    - Less error prone recovery plan creation
    - Less skilled people can be productive faster
    - Choose fastest recovery option
  - Reduce errors through validation of recovery
    - Are all of your ICs good?
  - Dropped object recovery plus undo/redo recovery
  - Guaranteed recovery of critical data and objects
  - Coordinated recovery between DB2 and IMS
  - Storage-aware database tools

Currently in DB2 only

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DB2 Cloning Tool
IMS Cloning Tool

- Clones a **DB2** subsystem AND at an object (Dataset) level
  - Renames and catalogs the data sets, fixes the volume internals, optionally updates all DB2 internal control information
  - No requirement for a clone in a separate LPAR
  - Supports DB2, PeopleSoft, and SAP

→ Clones **IMS** systems AND at an IMS Database level
  - IMS Cloning Tool takes an existing IMS system (complete installation and system generation process completed) and creates a new, or cloned, IMS system from it without having to repeat the entire installation and system generation processes

- Is extremely fast and cheap!
  - Disk vendor independent
    - Uses any snap, mirror or PIT copy, only volumes are eligible for cloning
  - Reduces production online downtime when cloning – takes just minutes
  - Dramatically reduces costs of traditional methods
    - Uses less personnel time
    - DB2 & IMS no longer needs to be shut down or conditioned the long traditional way
  - Provides virtually 24x7 access to the customer's data

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- **Part 3: Core Solutions**

  – Database Administration

  – Utilities Management

  – Performance Management

  – New Version Support

- **Part 4: Summary**

Administer and Optimize: DB2 Tools

Database Administration
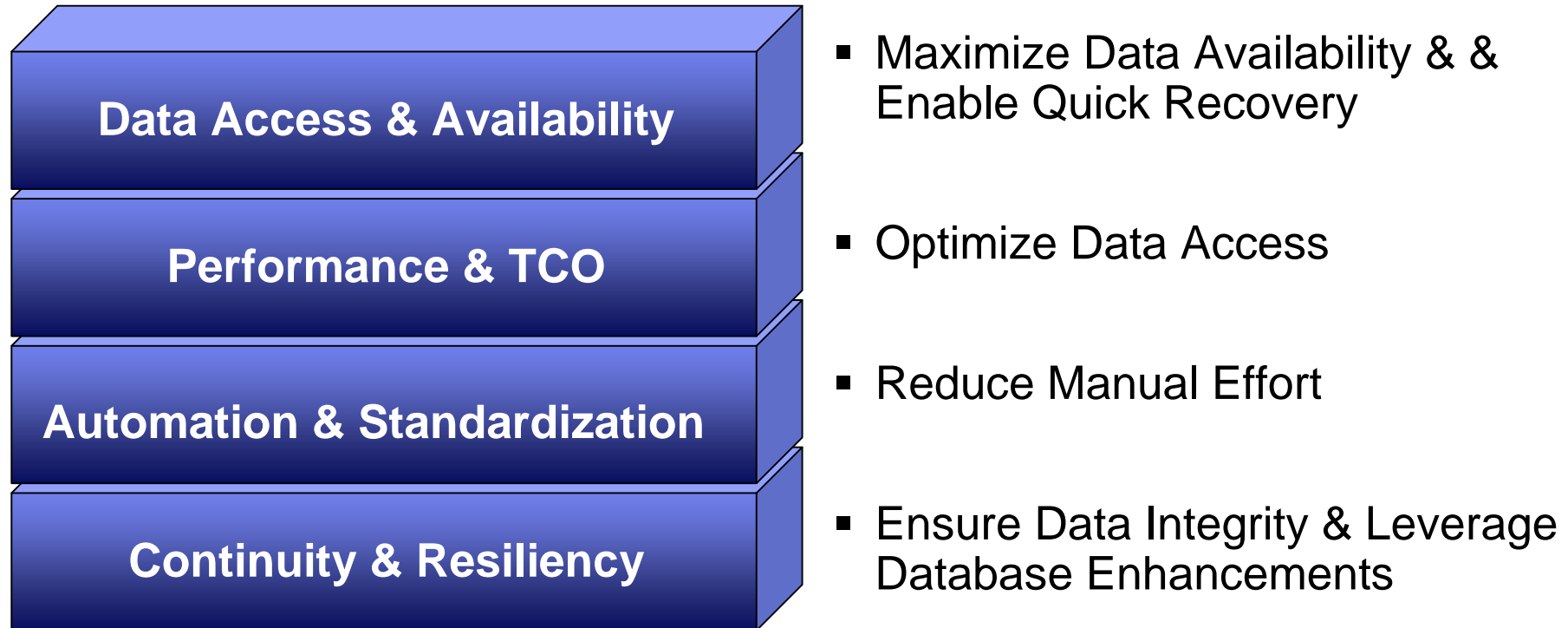
Manage the Database

Utilities Management

Manage the Data

Performance Management

Manage the Performance

Why IBM DB2 for z/OS Core Solutions?

Data Access & Availability

Performance & TCO

Automation & Standardization

Continuity & Resiliency

- ▪ Maximize Data Availability & & Enable Quick Recovery

- ▪ Optimize Data Access

- ▪ Reduce Manual Effort

- ▪ Ensure Data Integrity & Leverage Database Enhancements

Solution Benefits – Compelling Reasons to Act

- Reduce costs
- Increase responsiveness
- Maximize IT staff productivity
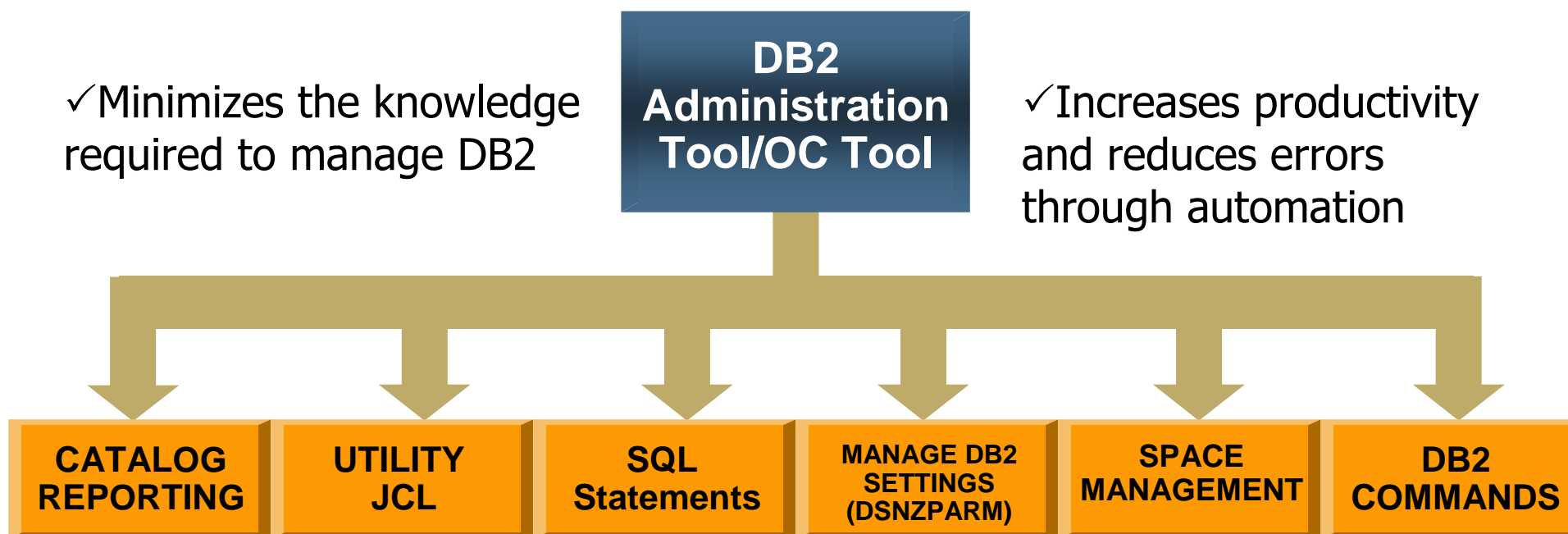
DB2 Administration Tool/Object Comparison Tool

- **DBAs are routinely interrupted by the "unexpected"**

- **Need to be able to find the problem quickly and solve it even faster**

✓Provides intuitive navigation through the DB2 environment

✓Eases the DB2 learning curve

✓Minimizes the knowledge required to manage DB2

DB2 Administration Tool/OC Tool

✓Increases productivity and reduces errors through automation

CATALOG REPORTING	UTILITY JCL	SQL Statements	MANAGE DB2 SETTINGS (DSNZPARM)	SPACE MANAGEMENT	DB2 COMMANDS

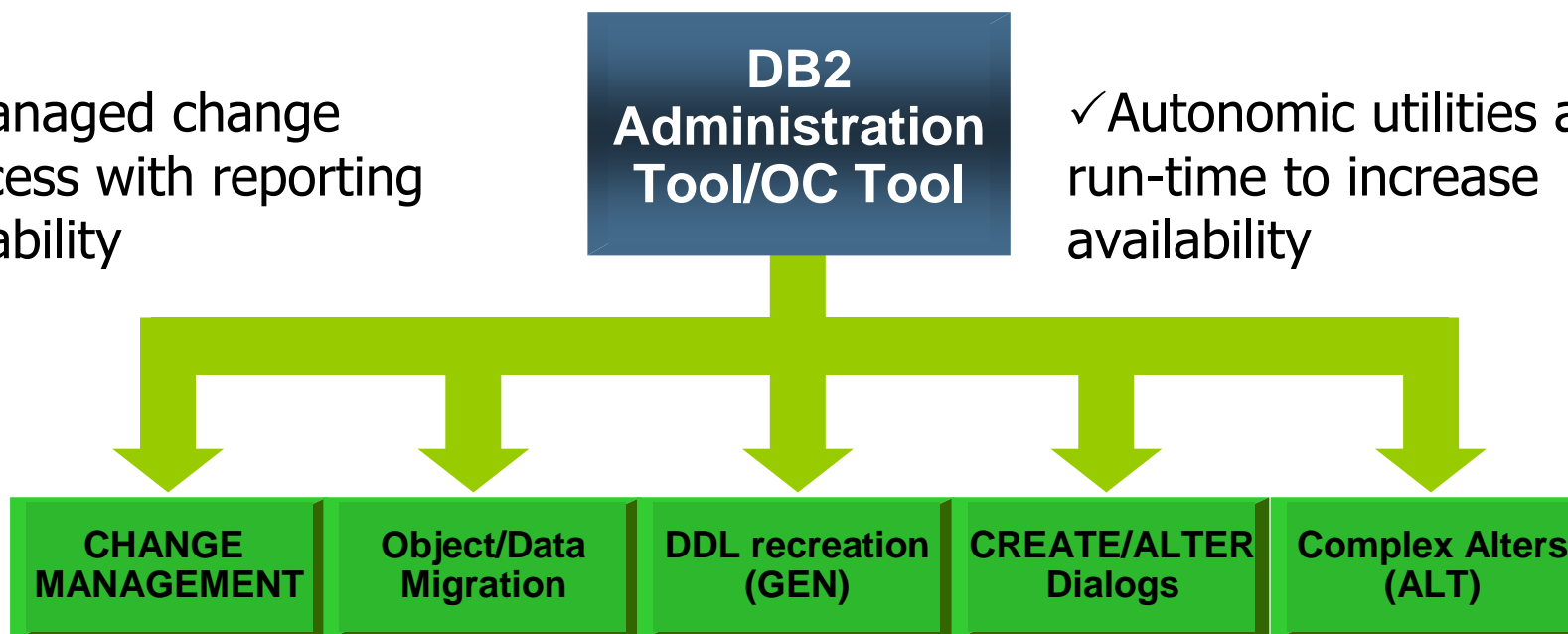# Addressing the changing needs of the enterprise

- **DBAs need to be able to define and change objects**

- **Need to focus on the business needs and let the tool do the detail work**

✓Guided navigations and object dedicated dialogs

✓Analysis engine to choose best change implementation

✓Managed change process with reporting capability

DB2 Administration Tool/OC Tool

✓Autonomic utilities at run-time to increase availability

CHANGE MANAGEMENT	Object/Data Migration	DDL recreation (GEN)	CREATE/ALTER Dialogs	Complex Alters (ALT)

Corporation

DB2 Utilities: More than day 1 support!

Significant reductions in CPU and elapsed time with more zIIP offload

Leading-edge technology to break performance barriers

- *Virtual elimination of CPU & elapsed time through use of FlashCopy technology*
- *Complete elimination of CPU & elapsed time through improved utility avoidance techniques in engine & tools*
- *DB2 Sort can cut CPU cost & elapsed time by over 35%*
- *Improved efficiency with increased parallelism*
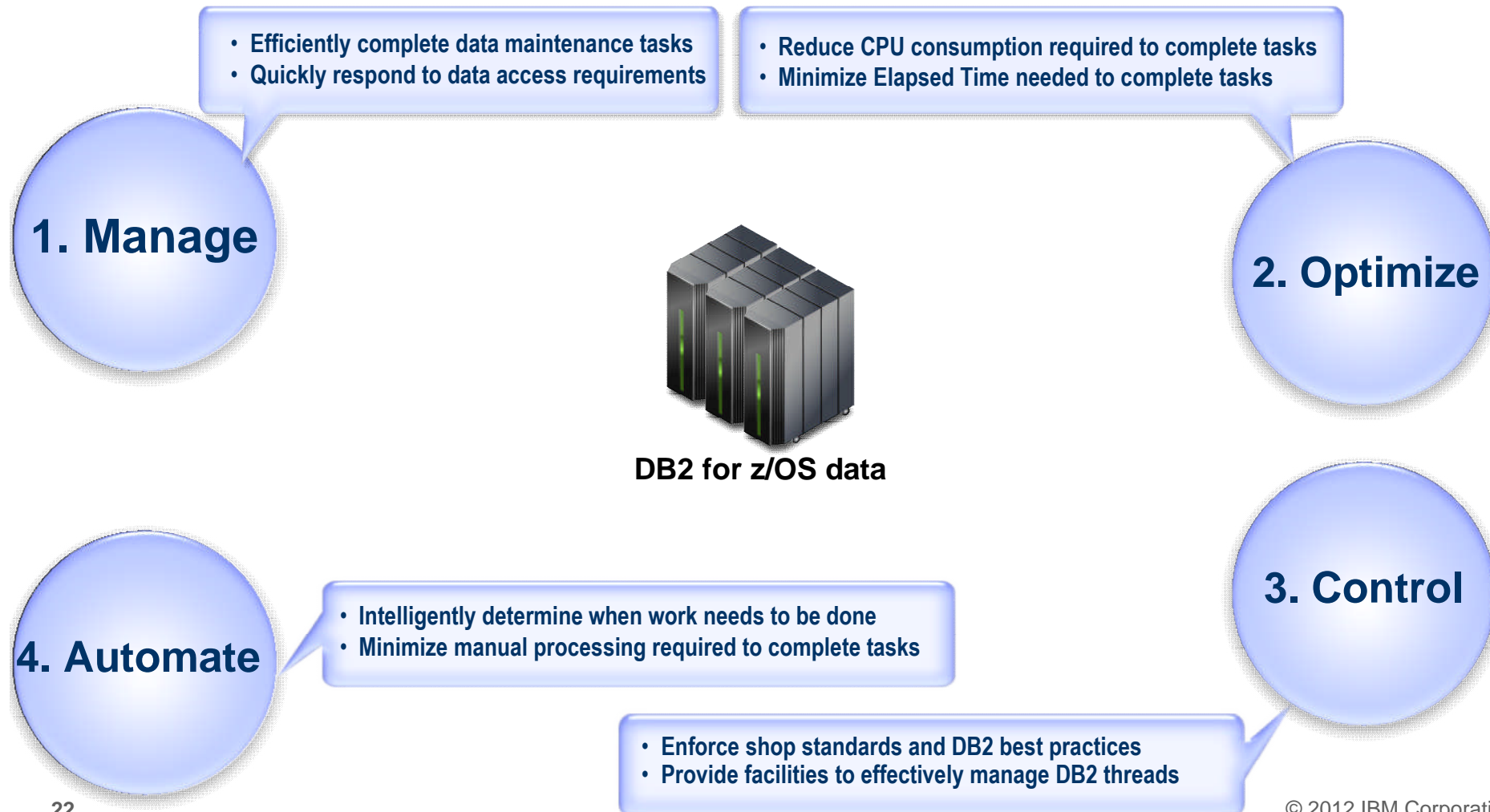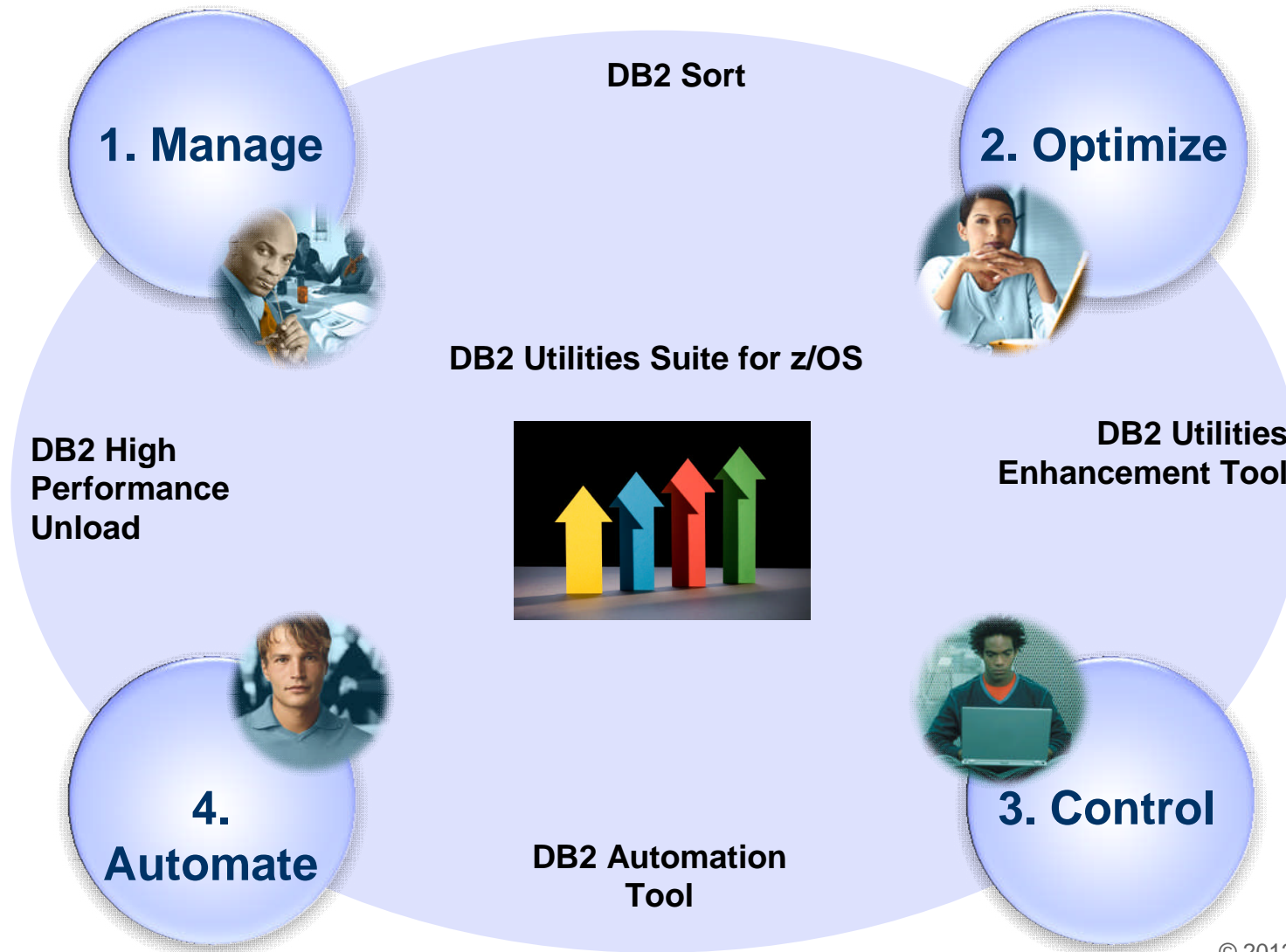- *Focus on business continuity and resiliency with data integrity*

Manage, optimize, control & automate data maintenance tasks

The Need: To provide tools that maximize DBA productivity and minimize resource consumption when performing daily actions required to keep enterprise data available and accessible

- Efficiently complete data maintenance tasks
- Quickly respond to data access requirements

- Reduce CPU consumption required to complete tasks
- Minimize Elapsed Time needed to complete tasks

1. Manage

2. Optimize

DB2 for z/OS data

4. Automate

- Intelligently determine when work needs to be done
- Minimize manual processing required to complete tasks

3. Control

- Enforce shop standards and DB2 best practices
- Provide facilities to effectively manage DB2 threads

IBM DB2 Utility Management Tools Solution
Manage, optimize, control and automate data maintenance tasks

DB2 Sort

1. Manage

2. Optimize

DB2 Utilities Suite for z/OS

DB2 High Performance Unload

DB2 Utilities Enhancement Tool

4. Automate

3. Control

DB2 Automation Tool

IBM Technology Strategy – Best Practices for DB2
New ways to do longstanding utility processing

Copy Utilities -

Flash Copy backups

System Level Backup

Load Utilities -

Cloning as an
alternative

Policy driven utility execution

Accelerated Sorting techniques

Enterprise level utility syntax adherence

Enterprise-wide utility journaling/auditing
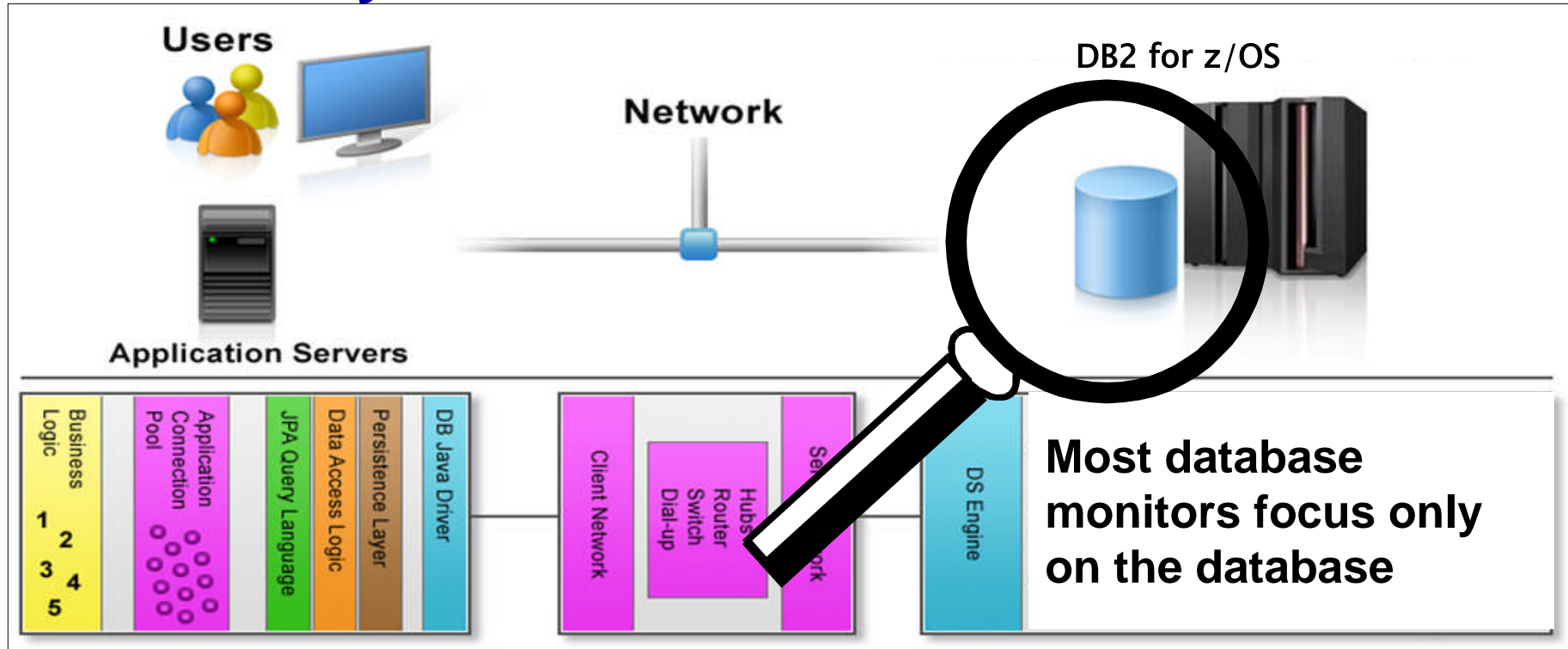
Traditional (batch) Reorgs -

Online Reorgs

Runstat Utilities -

zIIP offload

Improve Performance and Reduce Costs *with DB2 for z/OS Performance Management Tools*

- **Integrate business priorities** more directly
  - Monitor KPIs that better reflect end user experience
  - Monitor and report on transaction response-time service objectives
    - By user, application, application server, transaction, report, or other classification
  - Allocate resources according to business priorities

- **Save hours** of staff time and stress
  - Isolate problems to correct area instantly
    - Correct layer of the application stack, database component, even the line of code

- **Improve application performance**
  - Get query recommendations, optimize statistics, create appropriate indexes
  - Optimize results for entire workloads, not just single queries

- **Prevent performance problems** before they occur
  - Leverage performance data for pre-emptive analysis and capacity planning
  - Help developers identify query hot spots, tune queries, and validate results
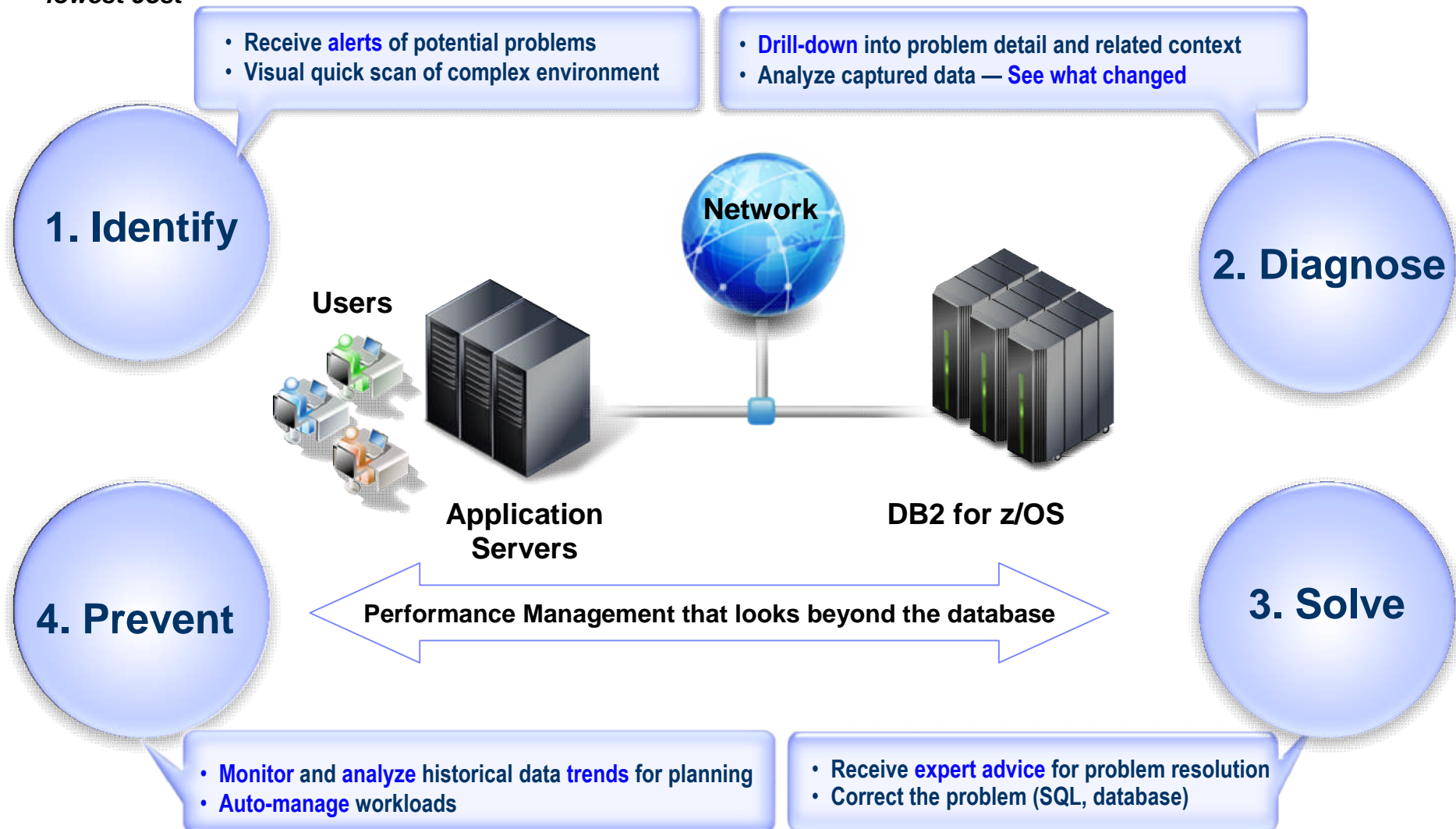
Where Is My Problem?

Most database monitors focus only on the database

DB2 for z/OS

Users

Network

Application Servers

Business Logic — 1 2 3 4 5 — Application Connection Pool — JPA Query Language — Data Access Logic — Persistence Layer — DB Java Driver — Client Network — Hub Switch Router Dial-up — DS Engine

Extended Insight looks beyond the database

- See where transactions spend time
- Monitor workload response time
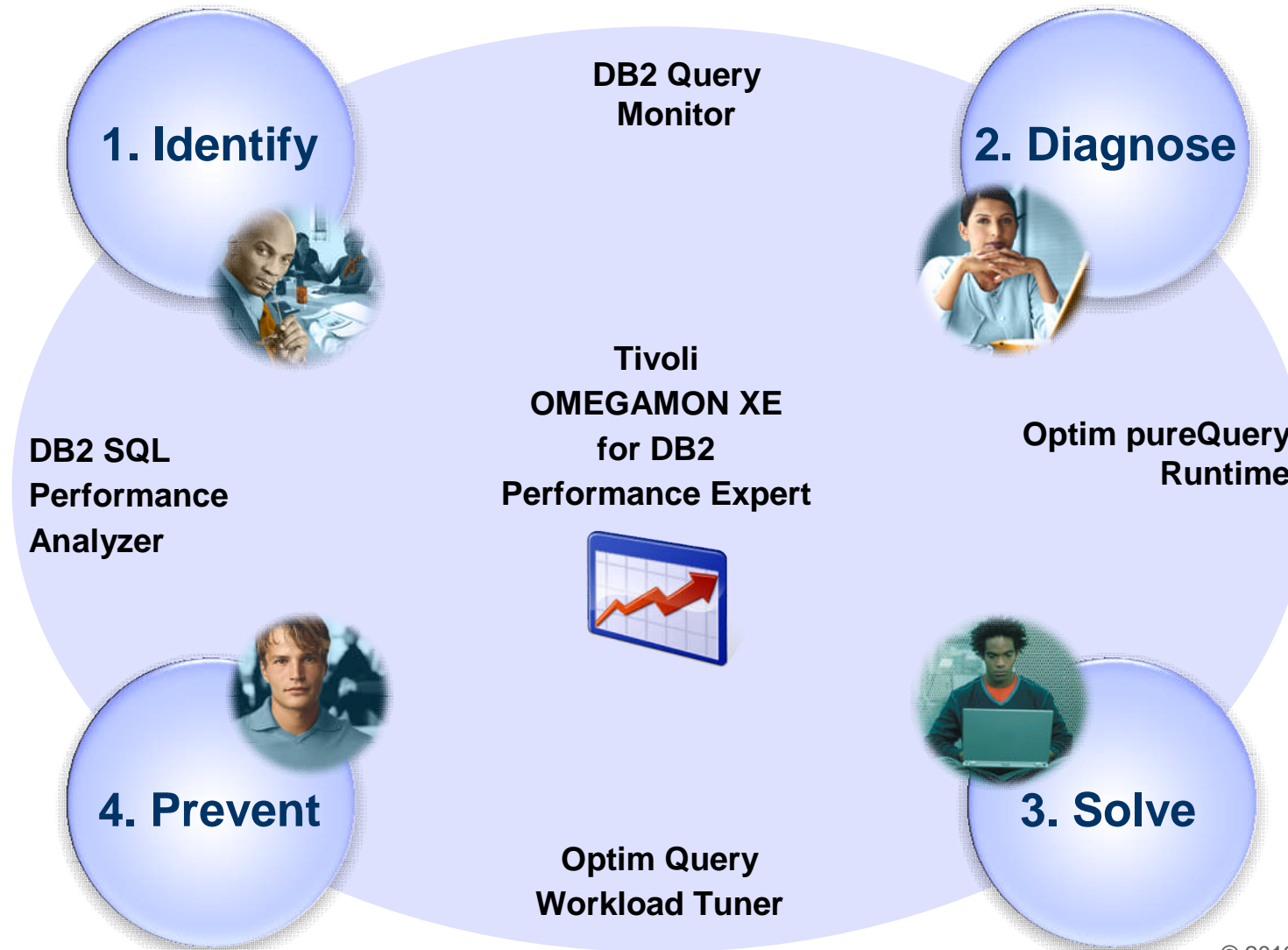- View database time spent analysis
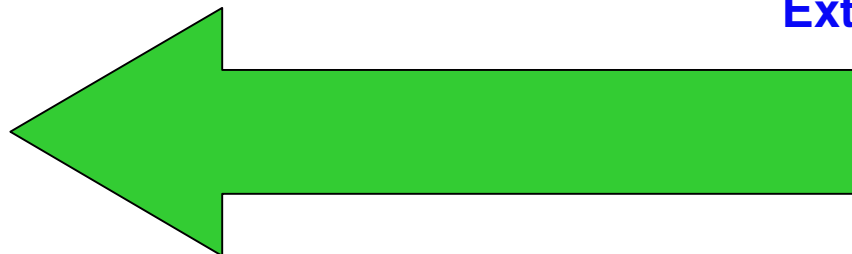
Identify, diagnose, solve and prevent performance problems

The Need: To provide tools to monitor and tune DB2 systems and applications to obtain optimal performance and lowest cost

- Receive **alerts** of potential problems
- Visual quick scan of complex environment

- **Drill-down** into problem detail and related context
- Analyze captured data — **See what changed**

1. Identify

2. Diagnose

Network

Users

Application Servers

DB2 for z/OS

4. Prevent

Performance Management that looks beyond the database

3. Solve

- **Monitor** and **analyze** historical data **trends** for planning
- **Auto-manage** workloads

- Receive **expert advice** for problem resolution
- Correct the problem (SQL, database)

27

IBM DB2 Performance Management Tools Solution
Identify, diagnose, solve and prevent performance problems

DB2 Query
Monitor

1. Identify

2. Diagnose

Tivoli
OMEGAMON XE
for DB2
Performance Expert

DB2 SQL
Performance
Analyzer

Optim pureQuery
Runtime

4. Prevent

3. Solve

Optim Query
Workload Tuner

Integration Speeds Resolution Times

Solve problems closing the loop on problem determination

Solve
- **Receive expert advise for problem resolution**
- **Correct the problem**

DB2 Query Monitor

DB2 SQL Performance Analyzer

Optim Query Workload Tuner

OMPE Extended Insight

DB2 10 for z/OS – Industry Leading Innovation

- **Top 3 IT issues today according to the 2010 IBM CIO Study**

  1. Reduce Cost
  2. Improve Service
  3. Manage Risk

  IBM DB2 10 for z/OS and IBM DB2 Tools directly address these key issues

  - **Up to 20% reductions in CPU for transactions, queries, and batch; 5-10X concurrent users => scales with less complexity and cost**

  - **Direct Row Access – up to 50% improvement in data access**

  - **Time Travel Query – IBM is 1st in the Industry to provide integrated bi-temporal capabilities that is essential for Financial Services customers**

bankdata

"As much as 80% of our applications can use this, which will drastically save developer time and even more importantly make applications easier to understand to improve business efficiency and effectiveness"

IBM DB2 Tools: *Are your Tools 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 1.2 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.

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 – New Version Support

■**Part 4: Summary**

IBM DB2 and IMS Tools - Why?

- *Our focus is lowering your costs associated with IT management*
  - Resources, Data availability, Administrator productivity
  - Free up staff and resources to drive business growth and optimization!
  - Think strategically about your IT investment

- **IBM is in the unique position of building both the Tools and the Database**
  - Uniquely focused on Best Practices for DB2 and IMS
  - Teamwork between DB2/IMS Development and DB2/IMS Tools to make sure we have complementary products
  - The broadest portfolio of solutions for your full set of business requirements
  - "Day One" support for each new GA release of DB2 and IMS

- **Committed to the long-term future of the System z platform**
  - Investment exceeds all other vendors combined

- **Being in the tools market allows us to**
  - Continue our on-going effort to reduce the cost of the System z platform

- **Bottom Line …**

  "We succeed if we help you (our customers) to be successful with IMS and DB2"

IMS Tools
DB2 Tools

IMS
DB2

IBM
Research
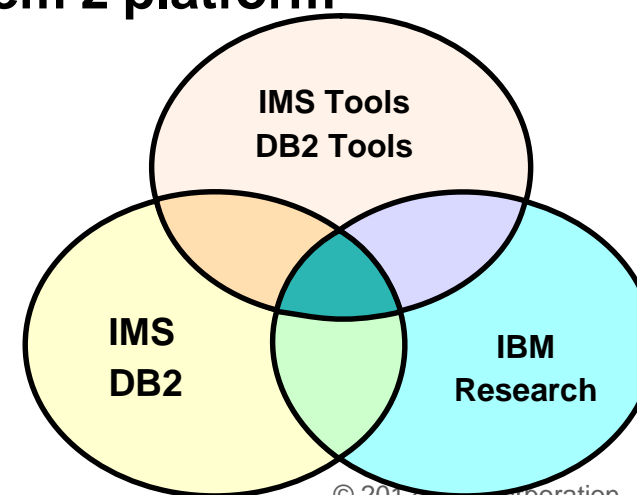
Tom Ramey

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Backup

Agenda

- IBM's strategy…Reducing costs

  - Cost realization: Get the most out of new versions…fast

  - Save license costs

  - Save CPU and elapsed time
    - New technology exploitation

  - Remove worries about data corruption and loss

  - Diagnose and solve performance issues easily

Why IBM DB2 for z/OS and IMS Tools?

Performance & TCO

Data Access & Availability

Automation & Standardization

Continuity & Resiliency

- **Performance & TCO**
  - Reduce high third party software costs
  - Reducing CPU and elapsed time to achieve lowest TCO
  - Meeting or exceeding SLA's and/or chargeback
- **Data Access & Availability**
  - Fast retrieval of information
  - Reducing the amount of down time or minimizing batch window for maintenance
- **Automation & Standardization**
  - Reducing repeated tasks, manual effort and error
  - Ensuring consistency at company level
- **Continuity & Resiliency**
  - Ensuring data integrity
  - Ensuring Day-1 support of new versions of DB2 for z/OS and IMS

DB2 for z/OS Tools Portfolio

Application Management
- DB2 Administration Tool
- DB2 Path Checker
- DB2 Bind Manager
- DB2 Query Monitor
- DB2 SQL Performance Analyzer
- DB2 High Performance Unload
- DB2 Table Editor
- Data Studio
- Optim Development Studio
- Optim Data Growth
- Optim Query Tuner
- Optim Test Data Management
- InfoSphere Data Architect

Utilities Management
- DB2 Utilities Suite
- DB2 Sort
- DB2 Automation Tool
- DB2 Automation Toolkit SAP Edition
- DB2 Utilities Enhancement Tool
- DB2 High Performance Unload

Database Administration
- DB2 Administration Tool
- DB2 Object Comparison Tool
- DB2 Administration Toolkit SAP Edition
- DB2 Storage Management Utility

Performance Management
- OMEGAMON XE DB2 Performance Expert
- OMEGAMON XE DB2 Performance Monitor
- DB2 Query Monitor
- DB2 SQL Performance Analyzer
- DB2 Buffer Pool Analyzer
- DB2 Performance Toolkit SAP Edition
- Optim Query Workload Tuner
- Optim Development Studio
- Optim pureQuery Runtime

Information Integration
- InfoSphere Information Server
- InfoSphere Classic Data Event Publisher
- InfoSphere Classic Federation Server
- InfoSphere Classic Replication Server
- InfoSphere DataStage
- InfoSphere Replication Server
- InfoSphere Change Data Capture

Backup and Recovery
- DB2 Recovery Expert
- DB2 Log Analysis Tool
- DB2 Cloning Tool
- DB2 Change Accumulation Tool
- DB2 Object Restore Tool
- DB2 Archive Log Accelerator
- Application Recovery Tool for IMS and DB2 Databases

Data Governance
- Optim Data Growth
- Optim Data Privacy
- Optim Test Data Management
- Guardium
- S-Tap for DB2 for z/OS
- Guardium Data Encryption for DB2 and IMS

Business Intelligence
- Cognos for Linux on System z
- DataQuant
- QMF

IMS Tools Product Portfolio

IMS Database Solution Pack for z/OS	IMS Fast Path Solution Pack for z/OS	IMS Recovery Solution Pack for z/OS	IMS Performance Solution Pack for z/OS
IMS DB Reorganization Expert - Unload, Load, Index Build, Prefix Resolution/Update IMS HP Image Copy IMS HP Pointer Checker IMS Library Integrity Utilities	IMS HP Fast Path Utilities IMS DB Repair Facility IMS HP Image Copy IMS Library Integrity Utilities	IMS HP Image Copy IMS Database Recovery Facility IMS HP Change Accumulation IMS Index Builder IMS DRF Extended Functions	IMS Connect Extensions IMS Performance Analyzer IMS Problem Investigator

IMS Tools Base for z/OS

Data Base Administration	▪IMS HALDB Toolkit ▪IMS Sequential Randomizer Generator	**System / TM Administration**	**System** ▪IMS Command Control Facility ▪IMS ETO Support ▪IMS HP Sysgen Tools ▪IMS Queue Control Facility ▪IMS Workload Router
Utility Management	▪IMS Online Reorganization Facility ▪IMS Cloning Tool ▪IMS Database Control Suite		**TM** ▪IMS Configuration Manager ▪IMS Sysplex Manager
Backup and Recovery	▪IMS HP Image Copy ▪IMS DEDB Fast Recovery ▪IMS Recovery Expert V2	**Application Management**	▪Batch Terminal Simulator ▪Batch Backout Manager ▪Program Restart Facility
Performance Management	▪IBM Transaction Analysis Workbench ▪IMS Buffer Pool Analyzer ▪IMS Network Compression Facility	**Regulatory Compliance**	▪IMS Audit Management Expert ▪IBM Infosphere Guardium Data Encryption for DB2 and IMS Databases

39

Take advantage of new version savings – quicker, faster, cheaper

Benefits DB2 users saw from running the IBM DB2 Tools
During the DB2 10 Beta

- **DB2 Admin Tool**

  – Full catalog navigation with visibility to new DB2 10 data types

  – Exploit Index Only Access; convert LOBs to in-line to boost performance

  – Manage new Security models

  – Reduce Schema change overhead since DB2 10 online schema changes supported

  – Support of Time Travel with Temporal Data

  – Many, many, others

- **DB2 Utilities**

  – Developed in partnership with DB2 10

  – Immediate support for <u>full</u> utility execution with V10 function

- **OMEGAMON for DB2**

  – Surface DB2 for z/OS end-to-end response time metrics with Extended Insight

  – Support new DB2 10 monitoring data

  – Manage thousands of threads now possible with DB2 10

- **Sampling of other tools**

  – Support flash copy image copies in multiple tools: DB2 Admin, DB2 Automation Tool, DB2 HPU, DB2 Recovery Expert, …

  – Create subsystem and object clones to test DB2 10 systems with minimal effort and near zero resource overhead

    • Test LPAR consolidation and Data Sharing to non-Data Sharing with DB2 Cloning Tool

  – Time Travel views in DB2 Table Editor

  – Avoid unnecessary reorgs; DB2 Automation Tool detects when indexes are insensitive to clustering, avoiding Reorgs for poorly structured indexes

  – Convert more reorgs to online reorgs by defining policies to cancel threads before the Switch phase

Announcing DB2 10 for z/OS
Savings … right out of the box

→ Learn more

Ex. Inline LOBs with DB2 Admin Tool 10.1


```
ADB21TAB  ----------------------- DSNA Alter Table ----------------------- 10:22
Command ===>

                                                                    More:      +

ALTER TABLE
Table schema . . J148286    >     Specify length of
Table name . . . TIMESTZ          inline portion of LOB

ADD
Column name  . . NEWCOL1           >   (? to look up)
Column type  . . CLOB                  (Built-in only)
Data length  . . 10000                 (Built-in only)
Inline length  . 1000_                 (0-32680 BLOB or CLOB, 0-16340 DBCLOB)
Precision  . . .                       (used only w/FLOAT and DECIMAL)
Scale  . . . . .                       (used only w/DECIMAL and TIMESTAMP)
Type schema  . .         >             (User-defined only)
Type name  . . .         >             (User-defined only)
WITH TIME ZONE .                       (Yes/No - for TIMESTAMP only)

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

Ex. Fine Grain Security with DB2 Admin Tool 10.1

```
ADBP6CPM  ---------------- DSNA Create Row Permission ---------------- 13:49
Command ===>

Commands: EDIT   COPY   CREATE

CREATE PERMISSION                                Easily Create Row
Schema  . . . . . J148286  >     (default is J148286)    Level Security
Name  . . . . . . T14676_PERMISSI >  (? to look up)
ON (Table)
Schema  . . . . . J148286  >     (default is J148286)
Name  . . . . . . T14676      >   (? to look up)
AS (Correlation)
Name  . . . . . . _          >
FOR ROWS WHERE Search condition: (first 6 lines displayed, use EDIT to modify)
  C1 = 1
```

```
ADBP6CSM  ---------------- DSNA Create Column Mask ---------------- 13:50
Command ===>

Commands: EDIT   COPY   CREATE

CREATE MASK
ENFORCED FOR ALL AC   Schema  . . . . . J148286  >     (default is J148286)
ENABLE/DISABLE        Name  . . . . . . LI827MK1      >   (? to look up)
Initial state . . E   ON (Table)
                      Schema  . . . . . J148286  >     (default is J148286)
                      Name  . . . . . . LI827TB1      >   (? to look up)
                      AS (Correlation)
                      Name  . . . . . . _          >
                      FOR COLUMN
                      Name  . . . . . . C1             (? to look up)
                      RETURN (Expression):         (first 5 lines displayed, use EDIT to modify)
                        CASE
                        WHEN (SESSION_USER = 'PAUL') THEN       Mask Column Data
                          J148286.LI827TB1.C1                  based on UserID
                        ELSE
                          J148286.LI827TB1.C1 - 10
                      ENABLE/DISABLE
                      Initial state . . ENABLE      (Enable/Disable)
```

Ex. Edit Business Time "AS OF" with DB2 Table Editor

```
ETI$EDIT   V4R3   --------------------------------------- Edit Table Rows
Option  ===> _
-----------------------------------------------------------------------

  Table ==> POLICY_INFO              >       Creator ==> PDD

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

Cmd S POLICY_ID COVERAGE          BUS_START   BUS_END
___      A123              12,000 01/01/2008 06/01/2008
___      A123              13,000 06/01/2008 07/01/2008
___      A123              14,000 07/01/2008 08/01/2008
___      A123              15,000 08/01/2008 01/01/2009
  *********************************************** Bottom of Data ***********
```

Select from multiple time periods

```
ETI$DPSC   V4R3   --------------------------------------- Select Columns
Option  ===> _                                   Scroll ===> CSR
-----------------------------------------------------------------------
Saved Table Profile exists   N  (Y or N)    Location ==>
And/Or on Where Clause       A              Creator
Long or Short Data Types     L  (L or S)    Table
Omit Business Time Columns   N
Retrieve Data As Of:         06/15/2008
-----------------------------------------------------------------------

Select Ord Srt Frz Type          Column Name      Where Clause
   1        A   N   CHAR(4)       POLICY_ID
   2        A   N   INTEGER       COVERAGE
   3    1   A   N   DATE          BUS_START
   4        A   N   DATE          BUS_END
  *********************************************** Bottom of Data ***********
```

Retrieve Business Time data AS OF specific date

Ex. DB2 Automation Tool 3.1
Cancel Readers Preventing Online Reorg Drains

Ex. DB2 Log Analysis Tool 3.2 Undo Redo Temporal Data

Undo Business Time

```
  Menu   Utilities   Compilers   Help
 ─────────────────────────────────────────────────────────────────
 BROWSE       PDMCWH.ALA.V330.SQLOUT.TEST              Line 00000000 Col 001 080
 Command ===>                                               Scroll ===> CSR
 ******************************* Top of Data ********************************
 --UNDO SQL FOR SUBSYSTEM: DA1A
 --#00000001 *UNDO INSERT*   URID:00192753D000   DATE/TIME:2011-01-18/16.22.39 ....

   DELETE FROM
 "PDMCWH"."D330_TEMPORAL_BUSINESS_DATA"
   WHERE
       "BK" = 'P138'
 AND "EFF_BEG" = '2004-09-01'
 AND "EFF_END" = '2006-05-01'
 AND "CLIENT" = 'C002'
 ;
```

```
  Menu   Utilities   Compilers   Help
 ─────────────────────────────────────────────────────────────────
 BROWSE       PDJOH2.ALA.RUN.SQLOUTR                   Line 00000000 Col 001 080
 Command ===> _                                             Scroll ===> CSR
 ******************************* Top of Data ********************************
 --REDO SQL FOR SUBSYSTEM: DA1A
 --#00000001 *REDO INSERT*   URID:0014F9FC7634   DATE/TIME:2010-11-19/13.07.16 ....

   INSERT INTO
 "PDJOH2"."POLICY_INFO"
   VALUES(
 'A123'
 +12000
 ,'2010-01-01'
 ,'2010-07-01'
 );
```
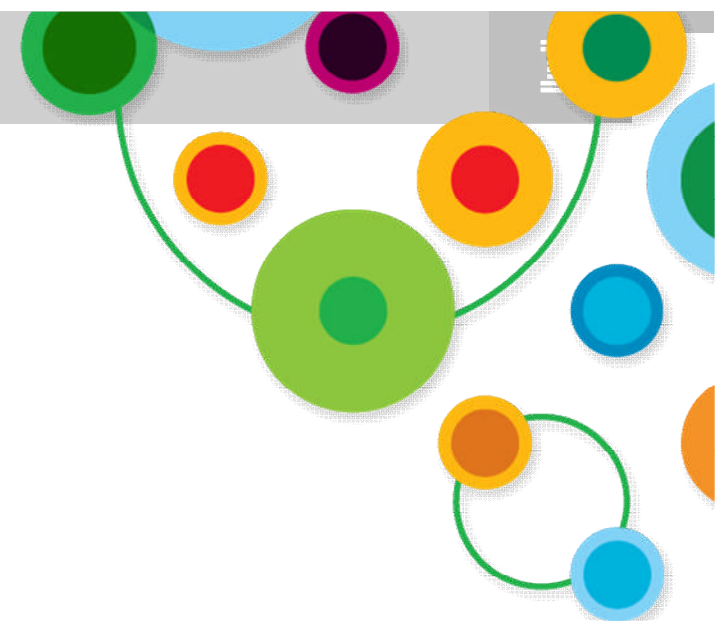
Redo Business Time

IMS 12 is GA

Reduced Costs!

- Up to **10%** out of the box MIPS savings

- Up to **30%** savings on network support

Improved Productivity!

- Up to **50%** faster deployment of IMS resource definitions and changes using the **IMS Explorer**
- Ability to create PLI code from WDSL for rapid application development

Improved Performance!
Database logging up to **2x** faster

Growth Enablement!
Additional storage constraint relief and dynamic change capabilities

IMS

Benefits of IMS Tools to IMS V12 QPP customers

- **IMS Tools delivers on Day 1 support of new IMS Versions**

    – IMS V12 support at Day 1 of IMS V12 QPP

- **With IMS V12 General Availability**

    – Exploits IMS 12 performance savings, right out of the box

    – Automates ongoing IMS database monitoring and maintenance

    – Provides insight into the health and availability of IMS databases

    – Enhances application programmer productivity

- **IMS V12 Exploitation example: Support of FP Secondary Indexes**

    – IMS Fast Path Solution Pack

        ✓ Build and Analyze functions

    – IMS Recovery Solution Pack

        ✓ Integrated build of new secondary indexes during recovery of Fast Path areas

    – Clone IMS FP Secondary Indexes with IMS Cloning Tool

I am IMS

Accelerate IMS V12 Time to Value

IMS Cloning Tool

- Exploit Storage-based copies to drastically reduce CPU and outages
- Create Subsystem and Object Clones to test IMS 12 with minimal effort
  - Automatically reduce number of Data Sharing Members
  - Convert Data Sharing to non-Data Sharing
  - Create Subsystem Clone from System Level Backup
- Supports native IBM, EMC and Hitachi Storage-based copies

IMS Queue Control Facility (QCF)

- Replay production transactions from one IMS version to another for testing

**IMS Performance Analyzer (IMS PA)**

- Track all relevant IMS performance metrics before and after Migration
- Built in reports to compare performance between versions

IMS Problem Investigator (IMS PI)

- Dig deep into any regressions

IMS Configuration Manager

- Upgrades parameters automatically easing migration from one IMS version to the next
- Complete context help for all new parameters
- Keeps a complete audit history of all parameter changes
- Provides for deployment of changes to global sites from a single location
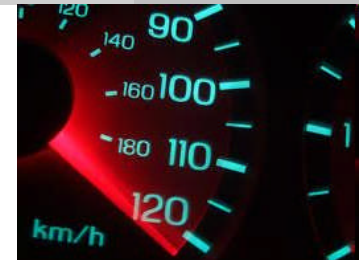
Utilities performance improvements

Base Utilities Enhancements by APAR
Recent Improvements

- Up to 20% additional zIIP offload for REORG in UNLOAD phase
  - **PM37622**

- Reduce CPU & elapsed time for REORG in log phase
  - **PM46632**

- Reduce CPU & elapsed time for REORG of multi-table table spaces up to 20%
  - **PM52469**

- LOAD & UNLOAD FORMAT INTERNAL cuts CPU by up to 85%
  - Delivered on DB2 9 & 10
  - Unload and load data in true internal format
  - **PM19584**

- LOAD PRESORTED
  - Delivered on DB2 9 & 10
  - Avoid sort overhead in LOAD Utility
  - Up to 25% CPU reduction, 33% ET reduction depending on no of indexes
  - **PM19584**

- LOAD INDEXDEFER for fast load with index avoidance
  - Internal measurement showed up to 93% elapsed time & 65% CPU reduction
  - **PM27962**

- Many Others….
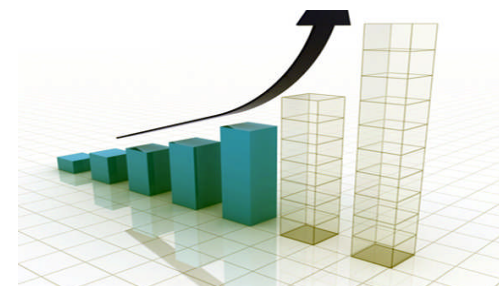
DB2 Sort

- **Will provide relief if you**
    - Have large amounts of data
    - Have utility batch window constraints
    - Have to execute utility maintenance during peak business hours that may affect elapsed time and/or CPU
    - Have purchased utilities from ISVs, requiring
        - Paying for multiple sets of utilities
        - Managing multiple sets of utilities
- **Once installed and enabled, is used by all utility sorting**
- **Requires no changes to utility jobs**
- **Improves/reduces resource consumption for single and parallel sorts**
- **Can result in higher degree of utility parallelism**
- **Gives greater resilience with respect to inaccurate sort estimates**

DB2 Sort Benefits

- **Use of DB2 Sort 1.2 with DB2 Utilities, may see:**
  - Up to 39% reduction of sort CPU usage *
  - Up to 41% reduction of utility elapsed time *
  - *** Exploiting zIIPs may result in additional benefit ***

- **IBM DB2 Utilities where you'll see performance benefits**
  - LOAD, REBUILD INDEX, REORG, RUNSTATS, CHECK INDEX / DATA / LOB
  - DB2 Sort supports DB2 V8, 9 & 10

- Workloads more likely to benefit from DB2 Sort 1.2
  - Highly-transactional workloads performing lots of insert, update, delete operations requiring REORG
  - Applications such as data warehousing applications performing frequent or large volumes of loading data requiring LOAD & REBUILD INDEX

- Sophisticated disk allocations reduce **Sort Capacity Exceeded** errors caused by large data volumes and/or inaccurate statistics

* The information contained on this slide is distributed AS IS. Performance data and results presented were determined in various controlled laboratory environments, using specific, limited test configurations, and are for reference purposes only.   The results that may be obtained in other operating and production environments may vary significantly. Based on system reports of CPU utilization and elapsed time generated in the specific customer's environment and provided to IBM. Results obtained in other operating environments may differ significantly. Users of the product should verify the applicable results they might achieve for their specific environment. Aug. 9, 2011

Financial Institution Wants to Reduces Costs

- **The Need**
  - A leading European insurance company had high availability needs and equally high volumes of data. They needed to reduce their batch window and reduce the use of system resources

DB2 Sort V1.2 Installation Verification Program Results

Percent Improvement Using DB2 Sort

Table Size	DB2 Utility	Sort CPU Time	Step CPU Time	Elapsed Time
8 GB	LOAD	58.3%	22.7%	-1.0%
8 GB	REBUILD	54.9%	26.4%	14.1%
8 GB	REORG	33.5%	30.6%	1.6%
10 GB	LOAD	58.4%	23.2%	0.5%
10 GB	REBUILD	55.5%	23.5%	19.4%
10 GB	REORG	33.6%	30.9%	2.9%
25 GB	LOAD	59.7%	29.5%	8.0%
25 GB	REBUILD	60.6%	32.6%	29.8%
25 GB	REORG	40.6%	35.1%	13.1%
40 GB	LOAD	61.9%	32.1%	17.8%
40 GB	REBUILD	62.2%	33.6%	33.3%
40 GB	REORG	39.2%	34.3%	13.2%
Averages		52.0%	31.6%	16.3%

Environment

Machine Type	z196
Operating System Level	1.12
DB2 Level	9
Number of Regular Processors	5

Based on system reports of CPU utilization and elapsed time generated in the specific customer's environment and provided to IBM.
Results obtained in other operating environments may differ significantly.

Lowering Systems Costs While Ensuring Growth

The Need

- **BG Phoenics provides IT infrastructure and software services to social security institutions in Germany**
  - Many of the organizations that they serve have statutory obligations to their members to ensure efficient, effective and secure information processing at low operational costs

- **Has extremely high standards in the availability and performance of its IT infrastructure**

The Solution

> *"DB2 Sort is an easy to install product which can be integrated in the DBA maintenance processes with less modifications. Having DB2 Sort active, DB2 utilities in our shop benefit from significant CPU time reductions and additional zIIP offload, which also leads to a lower batch window frame. "*
>
> *Roland Schwarz, Lead DB2 Systems Programmer, BG-Phoenics*

Customer Benefits

- **BG-Phoenics saw a 30% CPU reduction during testing even on one of their larger DB2 tables of over 50M rows. They experienced reduction in elapsed time and increased zIIP offload with no changes to their current DB2 utility jobs.**

Determining the need to REORG for DB2 and IMS… Reorg Avoidance

- **For DB2, DBA initiates a dialog with the tool**
  - Define an object profile with ALL the table spaces
  - Define a utility profile for REORG with the proper options
  - Define an exception profile with checks for the proper statistics
  - Job profile is placed in job scheduler to run at a desired frequency

- **That's it !**
  - When the job profile is run, statistics for each table space in the utility profile are retrieved and compared to the criteria in the exception profile
  - Jobs are generated using the REORG utility profile for table spaces that meet the exception profile criteria

- **For IMS, Introducing 'as needed' reorgs based on user defined criteria**
  - Reorganizations are now executed only when needed
  - Saving CPU cycles and boosting system availability
  - DBAs can focus their attention on more critical business needs

- **ROI**
  - ✓ Reduce frequency of reorganizations thereby reducing system costs (CPU) and increasing database availability
  - ✓ No more IMS Reorgs "just because it's time". We'll do what's needed *when* it's needed!

Set it…. And forget it !

Best Approach for Utilities Comparisons
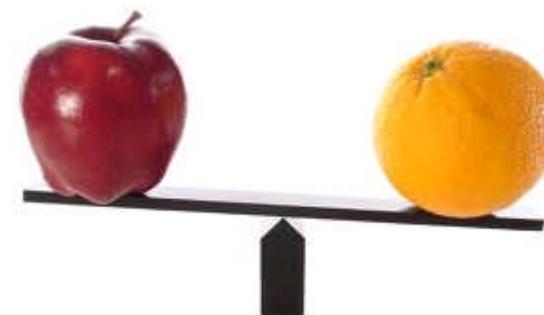
- **What we have observed in several benchmarks**

  1. Reorg-ing/Loading data not representative of real world
     - Reorg-ing data that was already reorg'd, data not disorganized, small amounts of data, only one index, small number of partitions, …
     - Elapsed Time judgments made on busy, variable, loaded systems
     - Rushed tests - errors

  2. Analysis showed that the amount of data being managed was not even
     - There is a parameter difference between vendors, resulting in a default of managing less data for the other vendor

  3. No Real Time Stats (RTS) were copied to Test for the objects involved in a benchmark
     - DB2 utilities rely on accurate Real Time Stats (RTS), meaning they were run completely un-tuned

  4. Option to do parallel loads and reloads turned on for other vendor
     - Not turned on for IBM DB2 Utilities – ran in serial mode

  5. Missing or misused basic IBM Utility parameters like MEMSIZE, SORTNUM, KEEPDICTIONARY REUSE, tape settings, ….

  6. Not running with the latest DB2 Utility performance enhancements or best practices

  7. Not factoring in IBM's superior zIIP exploitation

  8. Many others…

- **It is important to work in partnership**

  - Ensure an Apples to Apples comparison

  - Ensure <u>critical</u> business decisions are made with accurate information
    - Can you afford two sets of utilities that do similar things?

IBM Utilities win big at large LA bank

Long time exclusive BMC Utilities user migrates to DB2 10 and the IBM DB2 Utilities

- **The situation**
  - Bank told by BMC that they HAD to acquire IBM Utilities – BMC Utilities still do not fully support DB2 10
  - In 3Q '11 the bank acquired the IBM Utilities
  - Cost was a huge concern

- **Test Results**
  - Client focused on 6 scenarios, including LOAD,COPY and REORG on DB2 10
  - **IBM Beat BMC** in 5/6 scenarios for elapsed time, 4/6 scenarios for CPU
    - LOAD using 79% less elapsed time and 40% less CPU than BMC
    - REORG INDEX cutting elapsed time and CPU by 1/3rd compared to BMC
  - In addition the bank tested DB2 10 RUNSTATS
    - RUNSTATS test showed 98% offload to zIIP compared to V9. CPU cost was so low that customer needed to validate that the stats had actually been collected.
  - DB2 Sort, DB2 High Performance Unload and DB2 UET were also part of evaluation
  - Client VP quoted **"CPU and Performance (of IBM Utilities) are no longer a concern…"**

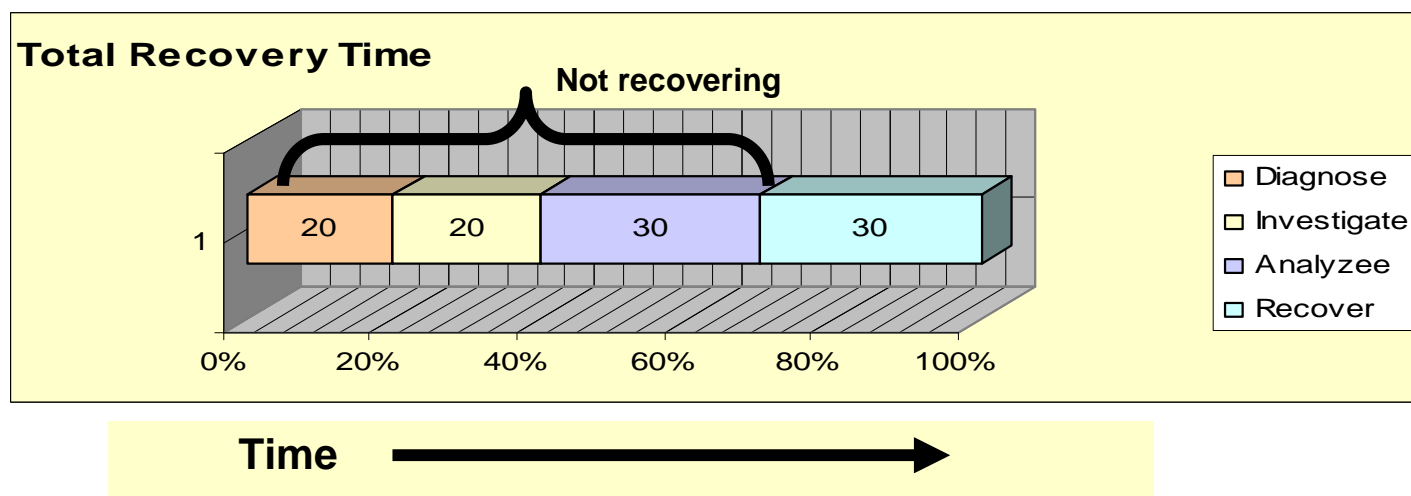# Storage Aware Database Solutions

Availability Review

"**Based on extensive feedback from clients, we estimate that, on average, unplanned application downtime is caused:**

- **20 percent of the time by hardware and disasters** (e.g., server and network), OS, environmental factors (e.g., heating, cooling and power failures)

- **40 percent of the time by application failures** including "bugs," performance issues or changes to applications that cause problems (including the application code itself or layered software on which the application is dependent)

- **40 percent of the time by operator errors**, including not performing a required operations task or performing a task incorrectly (e.g., changes made to infrastructure components that result in problems and incur unexpected downtime).

- **Thus, approximately 80 percent of unplanned downtime is caused by people and process issues…. Improving availability requires a different strategy"**
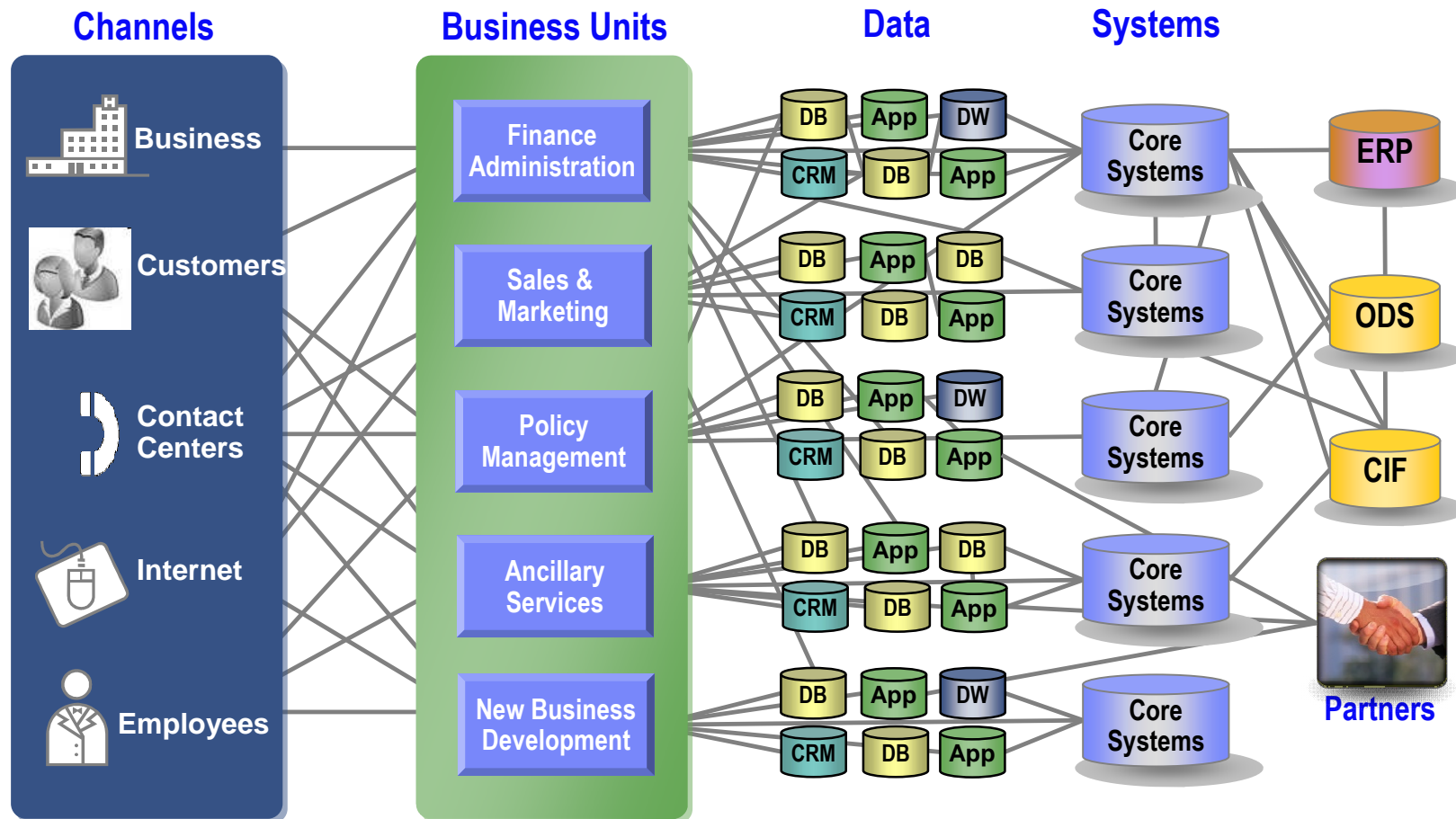
-- Gartner Group

Once you have an event…

- **Up to 70% of *recovery time* is "think time"!**
  - Not processing time

Source : McGladrey and Pullen

# Complexity of Enterprise Environments Continues to Grow

Backing up or restoring all data at any point in time is a major challenge

Channels

- Business
- Customers
- Contact Centers
- Internet
- Employees

Business Units

- Finance Administration
- Sales & Marketing
- Policy Management
- Ancillary Services
- New Business Development

Data

| DB | App | DW |
| CRM | DB | App |

| DB | App | DB |
| CRM | DB | App |

| DB | App | DW |
| CRM | DB | App |

| DB | App | DB |
| CRM | DB | App |

| DB | App | DW |
| CRM | DB | App |

Systems

- Core Systems
- Core Systems
- Core Systems
- Core Systems
- Core Systems

- ERP
- ODS
- CIF
- Partners

Expert Recovery Tools:
DB2 Recovery Expert, IMS Recovery Expert

- **Expert Recovery capabilities (DB2)**
  - GUI interface to make users more productive
  - Expert functions to recommend best recovery plan
    - Quiet time analysis
    - Less error prone recovery plan creation
    - Less skilled people can be productive faster
    - Choose fastest recovery option
  - Reduce errors through validation of recovery
    - Are all of your ICs good?
  - Dropped object recovery plus undo/redo recovery
  - Validation of recoverability
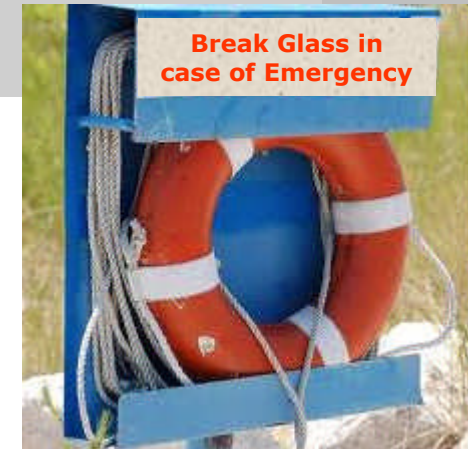
Why are 'storage-aware' data management tools important?

- **Perform DB2 or IMS backups, restores and clones instantly**
  - With no downtime or business impact

- **Reduce recovery time by performing instant restore and parallel recovery**

- **Offload CPU and I/O resource utilization to the storage processor**

  - Removes the cost of potentially your most expensive operation

- **Simplify disaster recovery operations and procedures**
  - A DR takeover just becomes a restart

- **Provide a sophisticated infrastructure and metadata to manage the DBMS and storage processor coordination**

  - Makes managing storage solutions easy for DBAs

- **Provide insurance that you will have a backup and be able to recover**
  - Automated backup processing plus validation

DB2 Cloning Tool   **DB2 Recovery Expert**

IMS Cloning Tool   **IMS Recovery Expert**

DB2 Cloning Tool
IMS Cloning Tool

New

- Clones a **DB2** subsystem AND at an object (Dataset) level
  - Renames and catalogs the data sets, fixes the volume internals, optionally updates all DB2 internal control information
  - No requirement for a clone in a separate LPAR
  - Supports DB2, PeopleSoft, and SAP

→ Clones **IMS** systems AND at an IMS Database level
  - IMS Cloning Tool takes an existing IMS system (complete installation and system generation process completed) and creates a new, or cloned, IMS system from it without having to repeat the entire installation and system generation processes

- Is extremely fast and cheap!
  - Disk vendor independent
    - Uses any snap, mirror or PIT copy, only volumes are eligible for cloning
  - Reduces production online downtime when cloning – takes just minutes
  - Dramatically reduces costs of traditional methods
    - Uses less personnel time
    - DB2 & IMS no longer needs to be shut down or conditioned the long traditional way
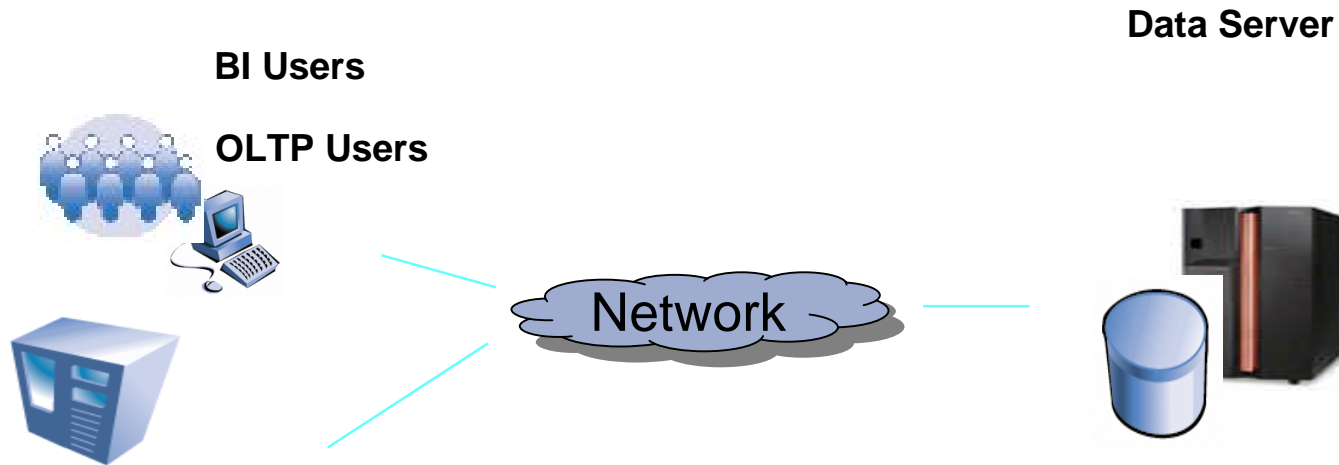 - Provides virtually 24x7 access to the customer's data
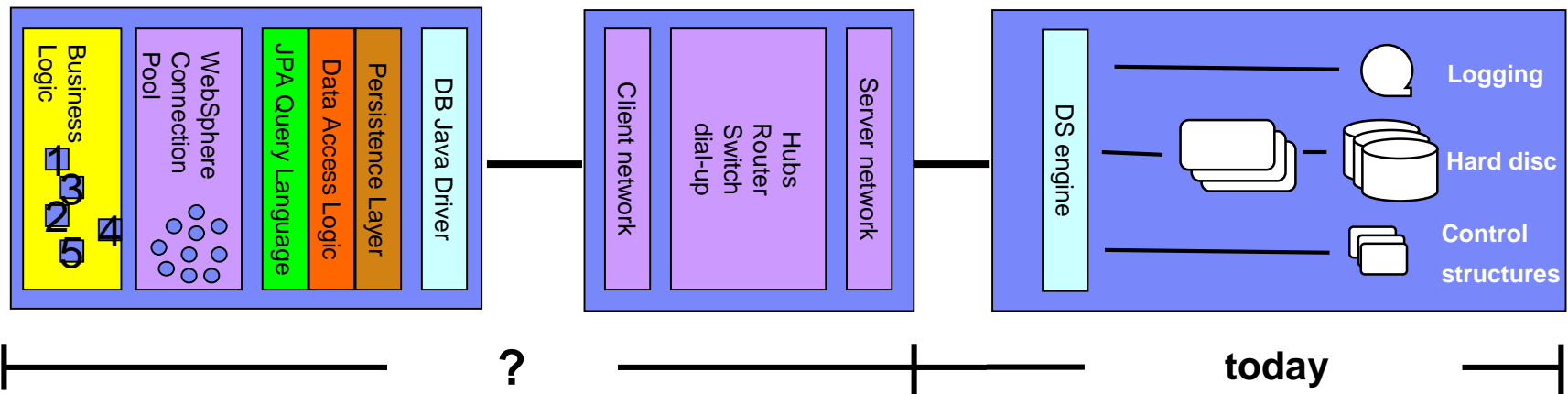
DB2 Cloning Tool ROI Example

- **Replace labor-intensive home-grown tasks and techniques with cloning automation**
  - Reduces DBA and Storage Admin time it takes to clone DB2 subsystem or datasets

- **Productivity – what used to take days now takes just minutes**
  - The elapsed time, I/O, and CPU of cloning process is dramatically less than load/unload utility execution

- **Manage larger environments without staff changes**

- **Keep DB2 online while cloning a subsystem or make data unavailable for only short period of time when cloning individual objects**

- **Creating clones or test systems from packaged apps can be particularly taxing, DB2 Cloning Tool can add significant value for**
  - SAP
  - Peoplesoft

- **What customers are saying:**
  - "It used to take 48 hours to clone a DB2 subsystem, now it takes 30 minutes"
  - "It took 2 days, using 2 people to clone 6 DB2 systems for a total of 96 days per year. Now it takes 1 person 30 minutes for a savings of 84 person days per year"
  - "We cloned a 20TB system (7200 volumes with 59,000 data sets) in 18 seconds, 11 minutes for the renaming".

# Diagnose and solve performance problems easily

Where is my problem?

Data Server

BI Users

OLTP Users

Network

Application Servers

Business Logic

WebSphere Connection Pool

JPA Query Language

Data Access Logic

Persistence Layer

DB Java Driver

Client network

Hubs Router Switch dial-up

Server network

DS engine

Logging

Hard disc

Control structures

?

today

Optimize Dynamic Infrastructure Performance

OMEGAMON XE for DB2 Performance Expert 5.1

- 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
  - Support DB2 9 & 10

- Summary SQL Reporting

- Manage thousands of Threads

- Full support for new DB2 10 Monitoring Data

- Lower Monitoring Overhead

- zIIP offload of Near Term History *

Customer results may vary, results based on lab testing
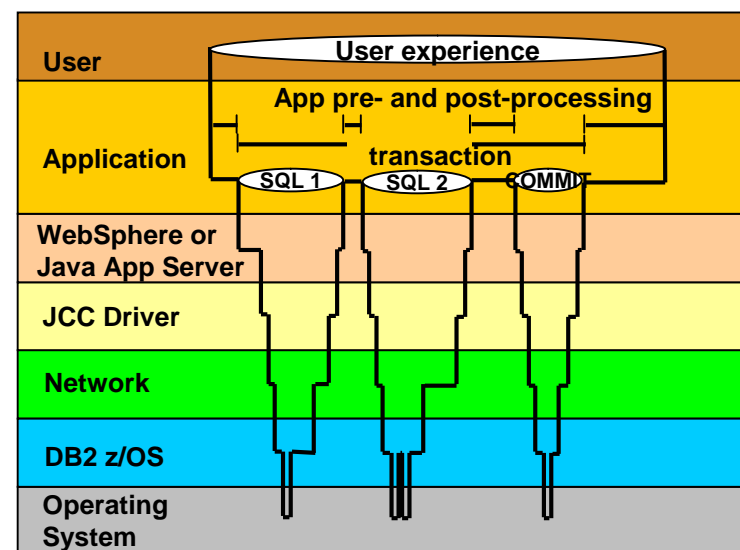
OMEGAMON DB2 PE 5.1 Extended Insight
Zoom into selected workload and see the TOP SQL list

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 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
	1	0.474
	1	0.518
	1	1.393
N/P	1	1.023

☑ Display this list by the selected graph layer

SQL Statement Text

Statement information

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

All | Tune

Open Optim Query Tuner to analyze this SQL statement.

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
TestOPM	my.test	main	13	blahVer	N/P	N/P	blah	capture...

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

Statement Performance

Number of Executions:	1
Average end-to-end elapsed time:	0
Average client time:	0
Average driver time:	0.488 sec
Average network time:	0 sec
Average data server time:	0 sec
	013 sec
	4 sec

Statement Time Distribution (%)

- Client time
- Driver time
- Network time
- Data server ti

97.33%   2.67%

Tune SQL with Optim Query Workload Tuner

Statement Outcome

| | 0 % |
| | N/P |

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

71

Expert insight into application performance for DBAs
Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS

New!

- **Visibility into IBM DB2 Analytics Accelerator (IDAA)** delivering query results for 'Train of Thought' analysis

  – Maximize your organization's ROI from appliances

- **Quickly and concisely identify primary contributor to poor distributed application response time with *Extended Insight***

  – Single web-UI display with response time metrics

  – Reduce time chasing down problems that turn out to not be DB2

- **Unlock performance of DB2 Stored Procedures with new displays**

  – Improve performance for multiple applications simultaneously with increased visibility

OMEGAMON family can reduce fix times from 90 minutes to **2 minutes**
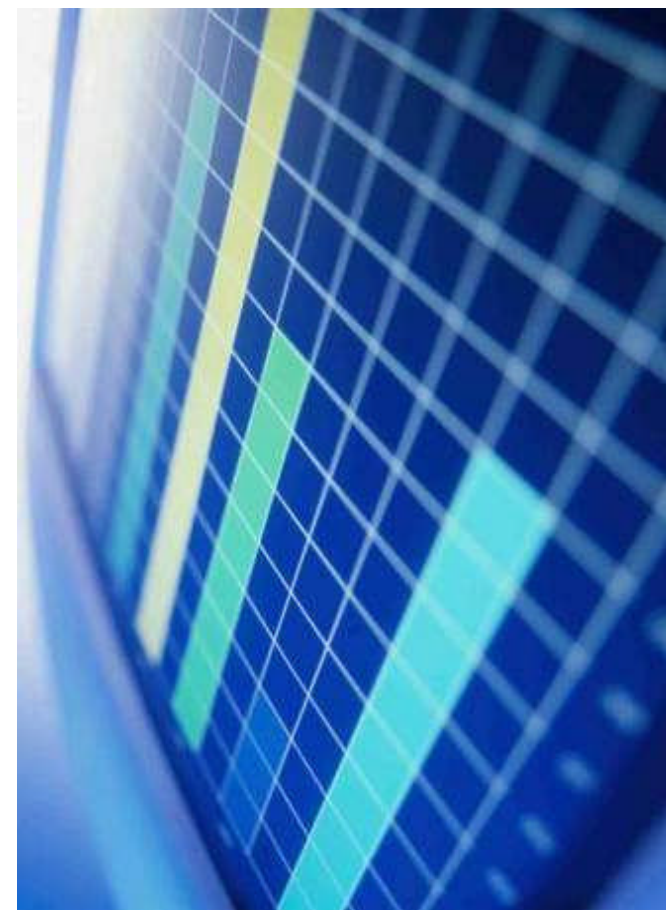
DB2 Query Monitor 3.1 Browser Client

Quickly navigate across DB2 Data Sharing Groups and Subsystems

Easily drill into performance problems

ISPF based line commands for power users

Success Story – A Large Worldwide Financial Services Company Gains Significant Cost Savings by Monitoring SQL

Challenges

➢ A financial services company serving 100 million WW customers. Required to evaluate and find the premier dynamic SQL monitoring product from the myriad of monitoring products in the marketplace

Solutions

➢ IBM DB2 Query Monitor, the only product among those evaluated that did not require standard traces to be started

➢ The company selected IBM DB2 Query Monitor as the strategic tool to identify the most expensive SQL statements that were running in the System z environment.

Benefits

➢ DB2 Query Monitor active in all ww data centers

➢ Used the product to track down SQL statements that were increasing chargeback costs to the users

➢ The company experienced tremendous cost savings by using DB2 Query Monitor, and was able to show a true return on investment.

New Challenges -- Capture/Replay

- Testing challenges
  - Most customers have only 10-15% of prod workloads automated to run in test
  - Often, test systems don't have access to production-like transaction volumes
  - It is very expensive to actually run a comprehensive test workload that mimics production
  - SQL query cost can vary tremendously, which makes it tough to compare one run to another

- Where customers want to realize better testing value
  - Accurately test changes in DB2 Version, hardware, OS, workload changes, database definitions, applications
  - Troubleshooting production problems "offline"
  - Comparing one workload time period to another (why is Friday mid-day looking so heavy compared to Wed?)
  - Spend less system resources and less administrator time, resulting in faster migrations

- A potential solution – Capture/Replay technology
  - Capture a real workload
  - Execute the workload and establish a baseline of key performance metrics
  - Apply specified changes to the database; Workload frequencies, Database configuration, data content or volume, server configuration
  - Compare key performance metrics and/or data results with baseline to determine impact on the system
  - Drill in on metrics that changed from baseline to replay to determine root case. Correct a condition, by resetting the baseline, apply a change and replaying

IBM's Common SQL Collector Strategy

DB2 activity auditing

DB2 query monitoring and reporting

DB2 workload capture and replay

Optim Query Workload Tuner Improved Statistics Quality

Statements | Recommendation Summary | **Workload Statistics Advisor** ✕ | Workload Query Advisor

Existing statistics status 🚫 5 tables need repair out of the 7 tables that were checked

Repair | Complete

This version of the RUNSTATS command repairs the problems that the Workload Statistics A...

RUNSTATS Control Statements

RUNSTATS TABLESPACE DB4LINEI.TSLINEI
    TABLE(SYSADM.LINEITEM) SAMPLE 5
    COLGROUP(L_QUANTITY) FREQVAL COUNT 10
    COLGROUP(L_DISCOUNT) FREQVAL COUNT 10
    COLGROUP(L_DISCOUNT) HISTOGRAM NUMQUANTILES 20
    COLGROUP(L_SUPPKEY) HISTOGRAM NUMQUANTILES 20
    COLGROUP(L_SHIPDATE) FREQVAL COUNT 10
    COLGROUP(L_SHIPDATE) HISTOGRAM NUMQUANTILES 20
    COLGROUP(L_RECEIPTDATE) FREQVAL COUNT 10
    COLGROUP(L_RETURNFLAG) FREQVAL COUNT 10
    COLGROUP(L_TAX) FREQVAL COUNT 10
    COLGROUP(L_RECEIPTDATE,L_RETURNFLAG,L_SHIPDATE,L_SHIPMODE)
    COLGROUP(L_SHIPMODE) FREQVAL COUNT 10
    COLGROUP(L_ORDERKEY,L_QUANTITY)

Generates RUNSTATS control statements

- **Provides advice on**
  - Missing statistics
  - Conflicting statistics
  - Out-of-date statistics

New! Repair and Complete Control Statements

▼ **Statistics Advisor report**

Interesting columns:

S_SUPPKEY
    Cardinality: 10000.0
    Uniform statistics collection time: 2008-09-29 16:06:48.376482
    Uniform statistics status: OK
    Frequency statistics collection time: 2008-09-29 16:06:48.376482
    Frequency statistics status: OK
    Histogram statistics collection time: null
    Histogram statistics status: missing
    Possibly point skewed: No
    Possibly range skewed: No

S_NATIONKEY
    Cardinality: 25.0
    Uniform statistics collection time: 2008-09-29 16:06:...
    Uniform statistics status: OK
    Frequency statistics collection time: null
    Frequency statistics status: missing
    Histogram statistics collection time: null

Indicates conflicting and missing statistics

- **Results**
  - Accurate estimated costs
  - Better query performance
  - Less CPU consumption
  - Improved maintenance window throughput

"Half of access path PMRs could be resolved by statistics advisor before calling IBM support." – IBM Support

▼ Conflicts detail

One of the frequency records (-1.0) of the L_ORDERKEY column group is out of range [0,1]
    Tolerance: 0.0010

The maximum frequency of the column group or column (L_ORDERKEY), (0.0), is less than ... greater than the average unless only least-frequently occurring values are being collected.
    Tolerance: 0.0010

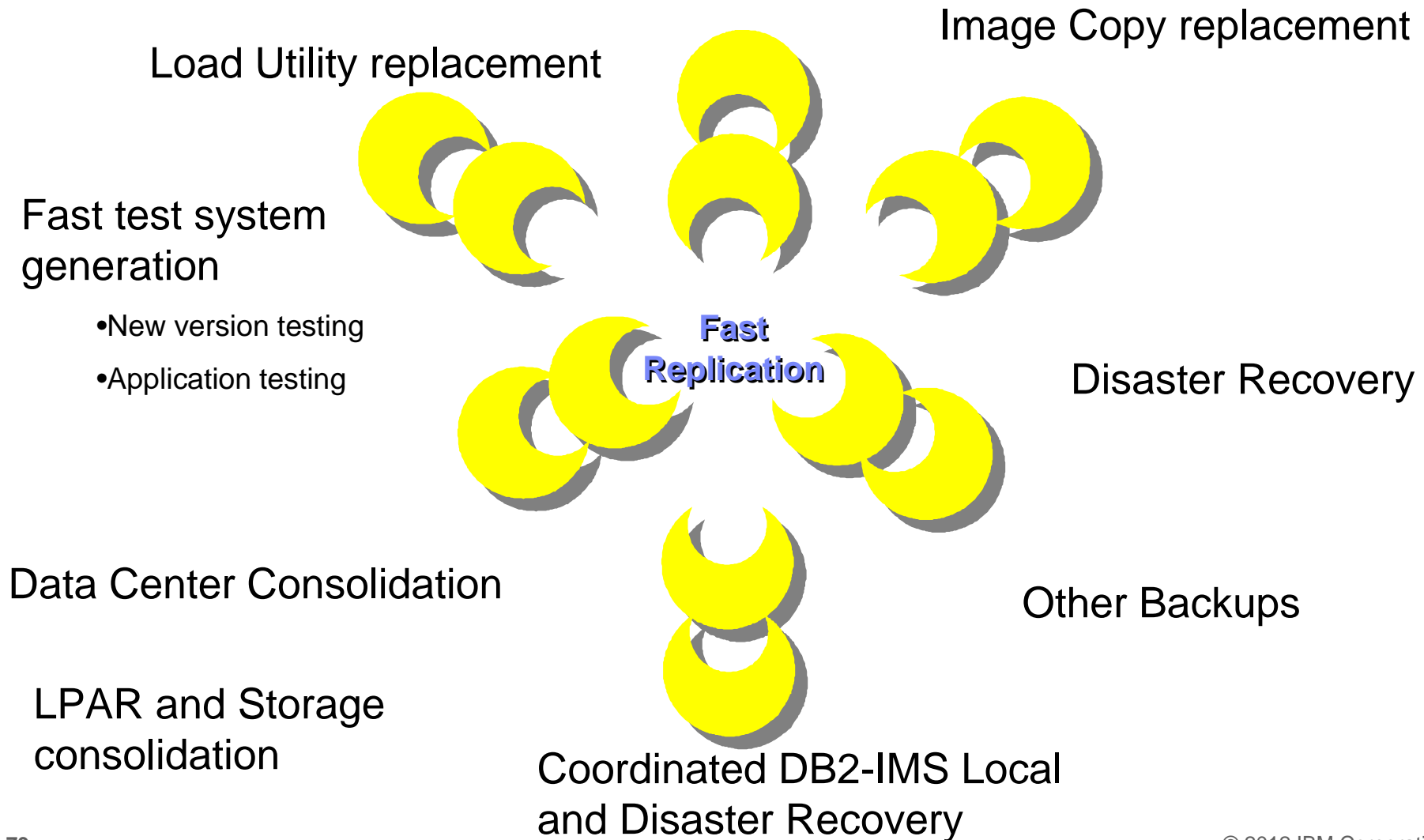**Conflicting statistics explanation**

zIIP Exploitation Recap for the IBM Utilities and Tools

- **DB2 utility functions used to maintain index structure for LOAD, REORG & REBUILD**

- **zIIP offload for utility sorting in DFSORT**

- **zIIP offload of the unload phase of REORG**

- **New DB2 Sort product for accelerated sort processing**
  - further reduction in sort elapsed & CPU

- **zIIP offload for RUNSTATS in DB2 10**

- **DB2 Utility Enhancement Tool**

- **Guardium S Tap for z/OS**

- **DB2 Query Monitor**
  - zIIP offload reporting

- **OMEGAMON for DB2**
  - Reporting on zIIP offload since 2006
  - Offload of Near Term History processing in 5.1 release

IBM Technology Exploitation Strategy
Best Practices for DB2-Fast Replication Uses

Load Utility replacement

Image Copy replacement

Fast test system generation

- New version testing
- Application testing

Fast Replication

Disaster Recovery

Data Center Consolidation

Other Backups

LPAR and Storage consolidation

Coordinated DB2-IMS Local and Disaster Recovery

Introducing the IBM Tools Customizer for z/OS (TCz)

Goal: A more consistent, usable and simple solution for the simultaneous and ongoing configuration of multiple IBM Tools

- **Assists in the post-SMP/e configuration, tailoring and customization**

- **Provides**

  - **Consumability** – Faster up and running time to Tool usage
    - Product templates are customized by TCz
    - Provides Job execution sequence
    - Due to automatic discovery of previous release customization parameters, there is less manual entry

  - **Easy customization of multiple tools simultaneously**
    - Step by step, with HELP text, ISPF panel-driven dialog allows specification of multiple DB2 Tool products customization

  - **Easier upgrades**
    - Parameters from previous customization are saved for future new product releases and DB2 upgrades

German Federal Reserve Bank (Deutsche Bundesbank)

The Need

- The German Federal Reserve was concerned because their BMC tools did not provide timely DB2 support of key features that they needed to run their business. Although they were licensed for the BMC DB2 utilities, they did not trust their use. There was also a growing need to standardize, to follow other European reserve banks.

The Solution

- The company standardized on IBM DB2 Tools, in addition to the DB2 Utilities Suite

Customer Benefits

- The bank is extremely satisfied with the IBM tools, especially the intuitive features and support for DB2 for z/OS releases. They valued the quick response to any technical issue over their competitor. They were able to complete the migration on time with no disruption to business.

Large Health Care insurer switches to IBM IMS Tools

A very large health insurer replaces 25 BMC IMS tools (4 different tool suites) with IBM IMS tools in 6 months

- **Their objective:**
  - Improve the scalability, stability, efficiency, maintainability, and availability while lowering the costs of their IMS environment by moving to an IBM Best Practices approach and leveraging IBM's IMS tool set and IMS enhancements

  - For applications, undertake NEON to HALDB conversions
    - Accelerate the migration to HALDB for improved scalability, availability, performance and efficiency
      - 1022 Databases converted, 68 Production Databases, 954 Test Databases
    - Migrate to IBM Best Practices approach for checkpoint / restart

- **Benefits**
  1. Financial – Significant savings by removing BMC software licenses (millions)
  2. The IBM IMS tools enabled…
     - Moving to a 24 X 7 online availability – improved business continuity/availability
     - Consistent toolset and standards across all IMS environments
     - Best practices for IMS workloads as a result of the project implementation
  3. Reduced contention
     - More granular database partitions, smarter checkpoints, reduced contention abends,
     - Means less program restarts