

# A Fresh Look at the Mainframe

Information on Demand

## Data is at the Heart of Every Enterprise

We are using data in more ways than we've ever used it before. What is IBM doing in the area of database technology?



On Demand Insurance  
CIO

The world's largest corporations rely on DB2 for z/OS for their most important database needs



IBM

## Superior Design of DB2 for z/OS

DB2 has the most advanced technology for databases including large-scale clustered databases. Let's start by looking at our clustering technology

- DB2 for z/OS has better
  - ▶ Scalability
  - ▶ Recovery
  - ▶ Availability
  - ▶ Security, Encryption & Compression

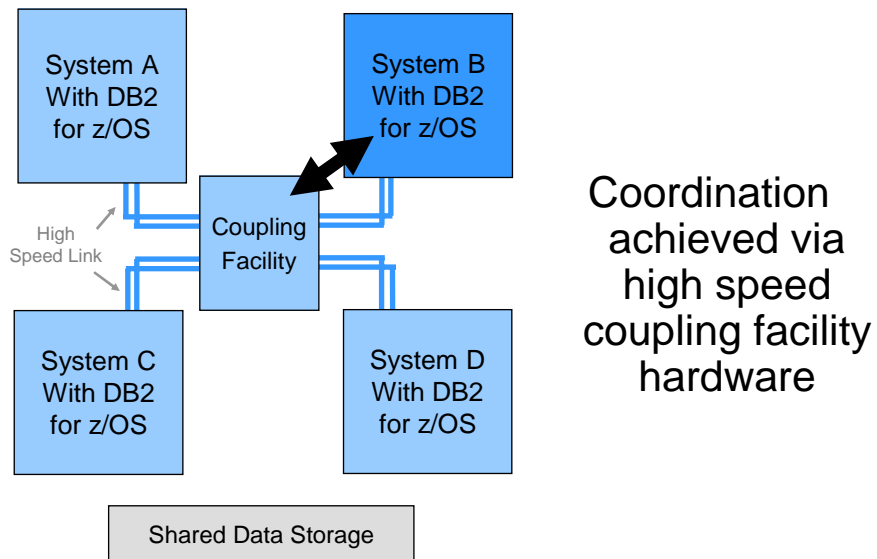


IBM

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3

## DB2 Exploits Parallel Sysplex Architecture for Scale and Availability

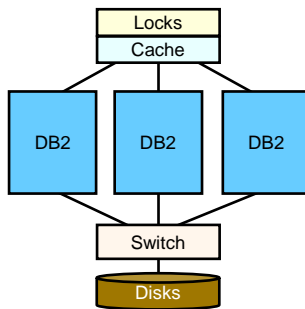


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4

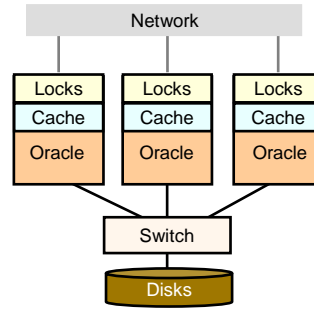
## Contrast the DB2 approach with Oracle RAC

### DB2 Centralized Sysplex Design



**High speed centralized**  
lock manager in  
coupling facility

### Oracle RAC Distributed Lock and Data Design

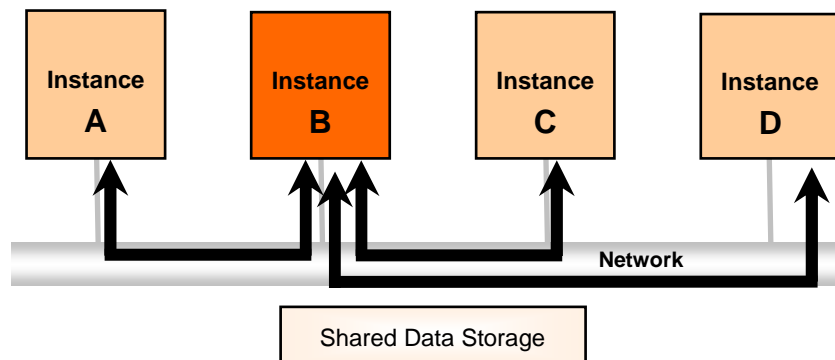


**Distributed lock**  
management with  
high messaging **overhead**

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5

## Oracle RAC



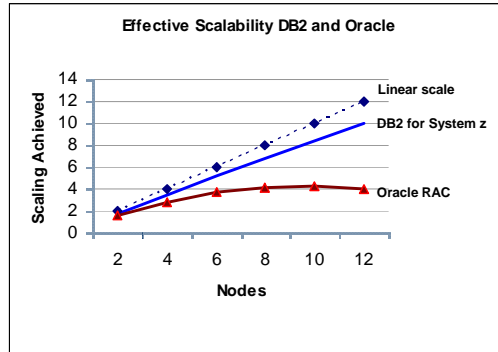
Local members must **constantly communicate** and  
**context switch** to maintain consistency between copies

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6

## The Difference Between These Technologies Can Be Seen in Scalability

- The Centralized Coupling design of z/OS allows DB2 for z/OS to share data efficiently
- The Oracle RAC distributed lock design loses efficiency after only 4 nodes



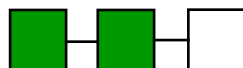
Data from Enterprise Data Base Clustering Solutions ITG - October 2003

## Single Server Failure



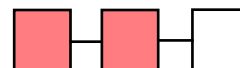
### DB2 for z/OS

on Parallel Sysplex



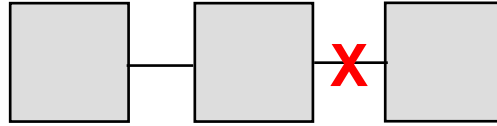
**A** No impact to running queries.

### Oracle 10g RAC

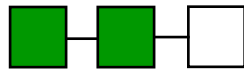


**B-** Sub 30 second outage. In a high volume real world OLTP application all nodes freeze for a period of time

## Network Failure Between Nodes



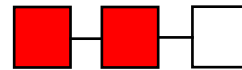
**DB2 for z/OS**  
on Parallel Sysplex



**A**

z/OS will partition one of the members out of the cluster based on policy information provided by the customer

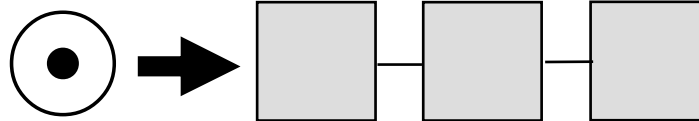
**Oracle 10g RAC**



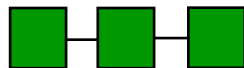
**C-**

The entire cluster will come down

## Availability: Minor version upgrade



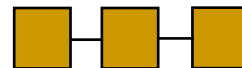
**DB2 for z/OS**  
on Parallel Sysplex



**A**

New fixes can be applied in a **rolling fashion without impact to the application**

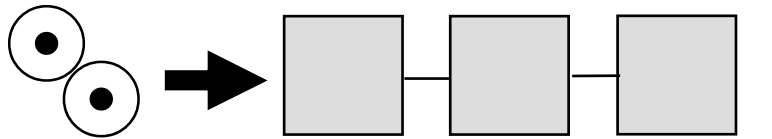
**Oracle 10g RAC**



**C+**

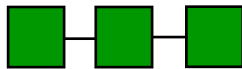
Not all fixes are rolling upgradeable

## Availability: Major version upgrade



### DB2 for z/OS

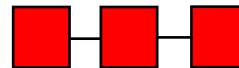
on Parallel Sysplex



**A**

New versions of DB2 for z/OS can be applied in a **rolling fashion without impact to the application**

### Oracle 10g RAC



**C**

**Does not support rolling version upgrades**

## DB2 Has Better Security

### ■ IBM's Record

- ▶ Integrated Hardware and Software security
- ▶ RACF centralized administration with Vanguard
- ▶ Seamless encryption and key management
- ▶ Less than 10 security related patches in the last 10 years

### ■ Oracle's Record

- ▶ Oracle's recent problems are causing customers to question their security
- ▶ Oracle security is not integrated with the operating system
- ▶ Oracle has shipped over 100 patches a single quarter
- ▶ Frequent fixes drive high administration and operational costs

**'The Forum Consensus:** Downtime for both routine maintenance and upgrades is too high and becoming more critical due to global operations'... AMR Research

- <http://www.amrresearch.com/Content/View.asp?pmillid=19165>

## Oracle RAC Quiz

- How many nodes are in an Oracle cluster on average?
  - ▶ **under 3**                      4                      6 or more
- What % of Oracle database installs run RAC, 5 years after it was first available?
  - ▶ **under 3%**                      9.5%                      19%
- How many DB2 for System z customers have migrated to Oracle RAC?
  - ▶ **zero**                      two                      130

**Oracle is struggling with clustering scalability since >14 years**

## Features to Meet ODI's Requirements

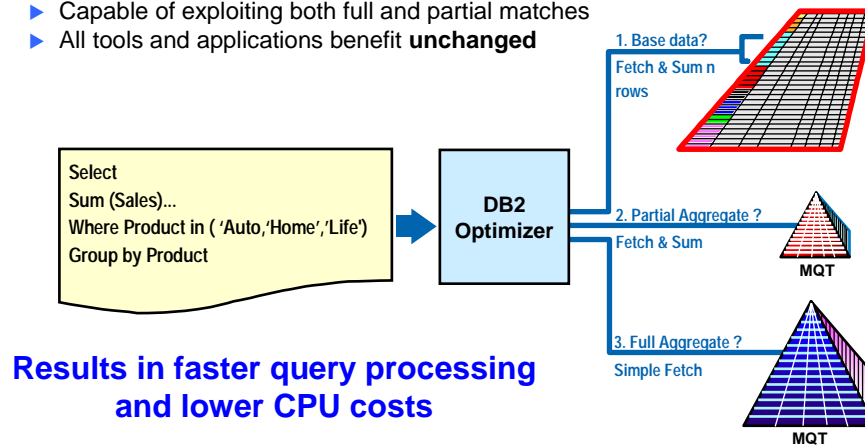
Let's look in more detail how DB2 on z/OS V8 can meet ODI's needs...



**IBM**

## High Performance Query Capability New in DB2 V8

- Partial results are saved and reused as Materialized Query Tables
  - ▶ Database managed tables for Aggregates
    - Join elimination
  - ▶ Optimizer **transparently** rewrites incoming queries
  - ▶ Capable of exploiting both full and partial matches
  - ▶ All tools and applications benefit **unchanged**



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15

## DB2 Reduces ODI's Planned Outages

- Database changes can be made while running for example:
  - ▶ Add or modify new type of customer and product information changes a table schema without dropping and recreating
    - Table or column changes, type and length
    - Dynamic adding and rotating partitions
- Performance adjustments made while database is online
  - ▶ Reorganization of the database
  - ▶ Secondary Indexes partitioning
  - ▶ Partition without an index; cluster on any index
  - ▶ Online database parameter changes
- Housekeeping operations can be done without taking databases down
  - ▶ Image copy, backup while running the database

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16



## DB2 Meets ODI's Security Requirements

- ODI need to have different security access levels to protect customer data
- ODI need to ensure that DBA's test their data anonymously
- ODI must implement encryption of sensitive data to meet privacy and compliance needs
- Large amounts of data may need to be archived
- Audits are often reviewed years later
- DB2 implements Multi Level Security via RACF. End to end security including applications disks, printers and network!
- DB2 Test Database Generator
  - ▶ Ensures anonymous access to data necessary for testing
- IBM Data Encryption Tool for DB2 & IMS
  - ▶ Exploits System z and s/390 Crypto Hardware
  - ▶ Key management of z/OS
- DB2 Archive Expert
  - ▶ Allows customers to easily archive and access data
- DB2 Audit Management Expert
  - ▶ Allows automated record retention

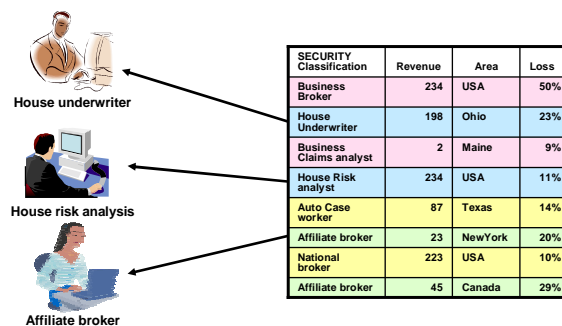
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17

## Multi Level Security Access (MLS)

*ODI needs to set different security levels for field, regional and national brokers and isolate one broker's information from others*

- MLS can classify data based on both permissions and security categories
- Centralized repository features different sensitivity attributes accessible by users with varying security levels, personal, broker, adjustor and customer access
- Eliminates need for duplicate I/T infrastructures, silos, redundant software



*Single image of data is sharable by multiple enterprise departments with different levels of "need to know"*

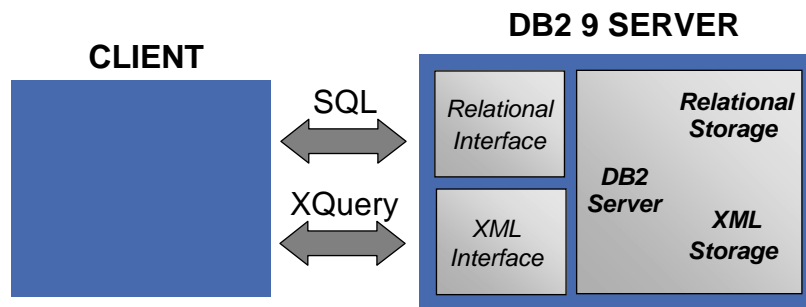
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18

## Disaster Recovery – Many Options

- ODI can make a point in time copy of databases with no interruption in service
- ODI can mirror data disks at remote site
  - ▶ Low cost recovery method option. Use remote site disks in care of failure
  - ▶ Asynchronous mirroring over long distances
  - ▶ Data consistency on the host for all data
- ODI can be disaster proof via GDPS.....**Gold standard** for availability
  - ▶ Automated Disk mirroring
  - ▶ Continuously maintains a time consistent copy data
  - ▶ Switches workload to a backup site
  - ▶ Automatically accesses copy of data and rapidly restarts critical applications
  - ▶ Enables automatics database restart (in minutes)

## DB2 9 Supports Native XML Storage



Native XML Support Improves Performance

## On Demand Insurance

Our sales promotions should be more effective.  
We need to do a better job of identifying promotion opportunities.



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CEO

We have the information, but it's spread across a lot of systems and not easy to analyze.



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## ODI Needs a Data Warehouse

I need to build a data warehouse



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We've recently introduced new products to help you manage your data



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## WebSphere DataStage Makes Extract, Transform, and Load (ETL) Simple

WebSphere DataStage can help you move data easily and efficiently from all your systems into a data warehouse



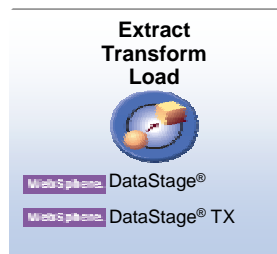
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24

## WebSphere DataStage

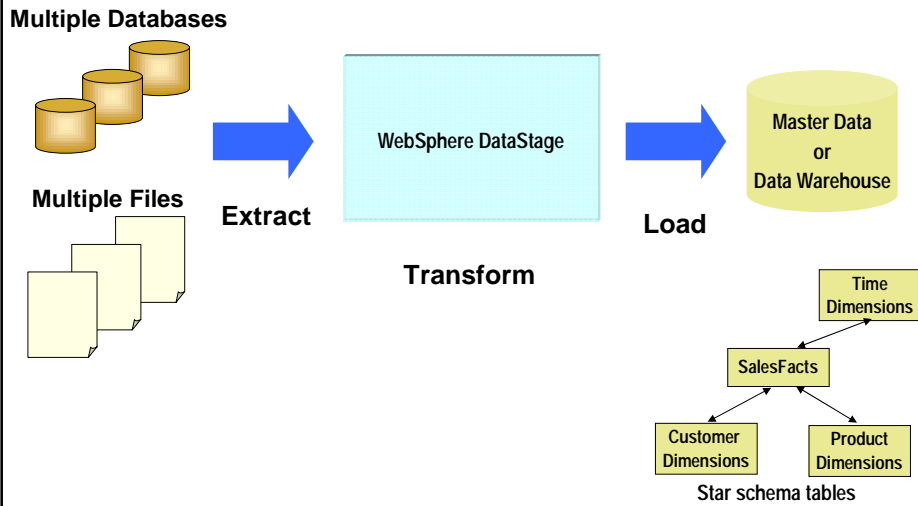
- Execute and monitor jobs to extract, transform, and load data
- Graphically design, develop, deploy, and reuse transformations quickly and easily
- Parallel Processing delivers Unmatched Function, Performance, and Scalability
- Deploy jobs in real-time, batch mode, or as services using SOAP, JMS or EJB bindings
- Take advantage of native mainframe processing as needed



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25

## Loading Your Data Warehouse with WebSphere DataStage



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26

## Ensuring the Quality of Your Data

We find a lot of duplications in our databases  
We don't want these duplications to show up in our data warehouse



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WebSphere QualityStage can help cleanse your data by identifying duplicate information



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31

## Two Methods to Decide a Match

*Are these two records a match?*

WILLIAM J	HOLDEN	128	MAIN	ST	02111	12/8/62
WILLIAM JOHN	HOLDEN	128	MAINE	AVE	02110	12/8/62

B      B            A            A      B      D      B            A      = BBAABDBA

+5    +2            +20            +3    +4    -1    +7            +9    = +49

### Deterministic Decisions Tables:

- ▶ Fields are compared
- ▶ Letter grade assigned
- ▶ Combined letter grades are compared to a vendor delivered file
- ▶ Result: Match; Fail; Suspect

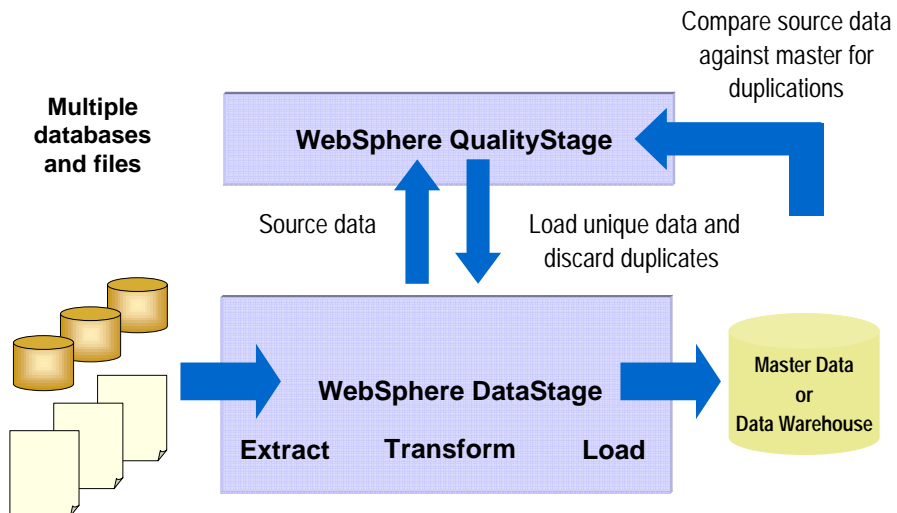
### Probabilistic Record Linkage:

- ▶ Fields are evaluated for degree-of-match
- ▶ Weight assigned: represents the "information content" by value
- ▶ Weights are summed to derived a total score
- ▶ Result: Statistical probability of a match

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35

## QualityStage Typical Scenario



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36

## Real Time Business Intelligence

Now we can start answering those business questions



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With Alphablox and Cube Views, business managers can have customized insight into business performance



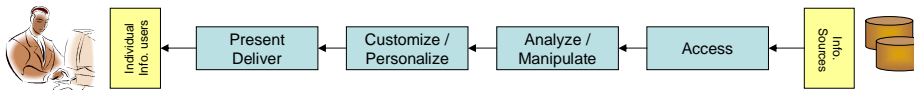
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38

## Alphablox: Analytic Information Delivered to Browsers

- Alphablox is an infrastructure
  - ▶ A set of Blox components, an application framework, and development tools
  - ▶ Leverages standard J2EE application servers for run time
  - ▶ For quick / easy assemble and deploy custom analytics applications



- Real time, interactive, with dynamic insights
- Simple, easy and highly customizable

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40

# Alphablox – Quick, Easy, and Customized Analytical Applications

## Customized analytical applications

- Business performance and Key Performance Indicator dashboards
- Self-service reporting and analysis
- Financial reporting and analysis
- Operational analysis and planning

- Dashboards
- Scorecards
- Portal KPIs
- Reporting
- Real time BI

## Heterogeneous information sources

- OLTP, OLAP, data warehouses, EIS, others

## Pre-built Blox capabilities

- Interactive and real time
- Web-based spreadsheets
- Guided analysis and alerts
- Personalization and customization
- Sharing and collaboration

## Web browser interface

- No client to download or install

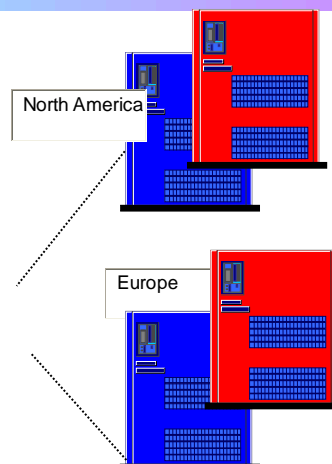
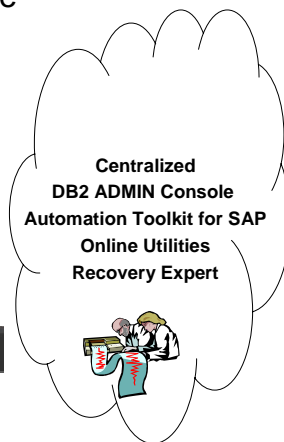


# Centralized Administration with Tools

What about tools to help me manage  
The database environment?



Data Architect





## IBM Tools for Information Management

- Comprehensive portfolio of Tools
  - ▶ Database Administration
  - ▶ Utility Management
  - ▶ Performance Management
  - ▶ Recovery Management
  - ▶ Application Management
  - ▶ Information Integration
  - ▶ Compliance
  - ▶ DB2 Toolkits for SAP/Content Management/Business Intelligence
  
- IBM continues to invest in tools
  - ▶ Autonomic in design and facilitates automated operations
  - ▶ Reduces cost and complexity of operations
  - ▶ May be less expensive than your current third party tools
  - ▶ Tested and release simultaneous to DB2 releases

## IBM Tools Offer a Lower Cost Alternative

VENDOR	PRODUCT	IBM PRODUCT	IBM ADVANTAGE
Computer Associates	RC/Migrator	DB2 Administration Tool	Equivalent capability of RC/Migrator and RC/Query
BMC	Mainview	Omegamon Performance Expert & monitor	Industry standard Batch reports DB2 Connect monitoring Web Based Interface
NONE	NONE	Audit Expert	Give auditors access to compliance data and takes DBA audit overhead away

## New zIIP Processor from IBM

IBM has recently announced a specialty processor called zIIP for data base workloads



IBM

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45

## New zIIP Processor Dramatically Lowers Cost

- IBM System z9 Integrated Information Processor (zIIP)
- New specialty engine for the System z9 mainframe designed to:
  - ▶ Lower the cost of ownership for eligible data base workloads
  - ▶ \$95,000 - \$125,000 one time charge for zIIP processor
  - ▶ No IBM software charges on the zIIP
- DB2 for z/OS V8 is the first IBM exploiter of the zIIP

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46

## What Workloads Can Be Run on a zIIP?

- DRDA over a TCP/IP connection
  - ▶ May benefit ERP, CRM, Business Intelligence and other enterprise application solutions
- Parallel queries
  - ▶ May benefit data warehouse solutions
- Internal DB2 utility functions used for index maintenance
  - ▶ Benefit to utility operations
- IBM has tools to help customers estimate their off load potential

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47

## More Workload Moving to the Mainframe

### DBMS Migration Plans

- Nearly 30% intend to transition DBMS to z/OS®
- Large percentage moving from Microsoft® Windows®
- “This [trend] reflects the robust reputation of the mainframe hardware”
- Amount of data doubles every 12 months



Gartner: CIO Study March, 2006

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50

## The World Relies on DB2 for System z – You Can Too

- Over 10,000 Licenses World Wide
- Owns 96% of Relational System z Market Place
- Over 3,000 TBs of Production Data
- Over 8 Million Clients
- Over 700 ISV Applications and Packages
- Many, Many More Customer References

