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On Demand

2009

>>> Comes To You



# How to compete in today's marketplace with DB2 for z/OS



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**PERFORM.**

Unlock the business value of your information.

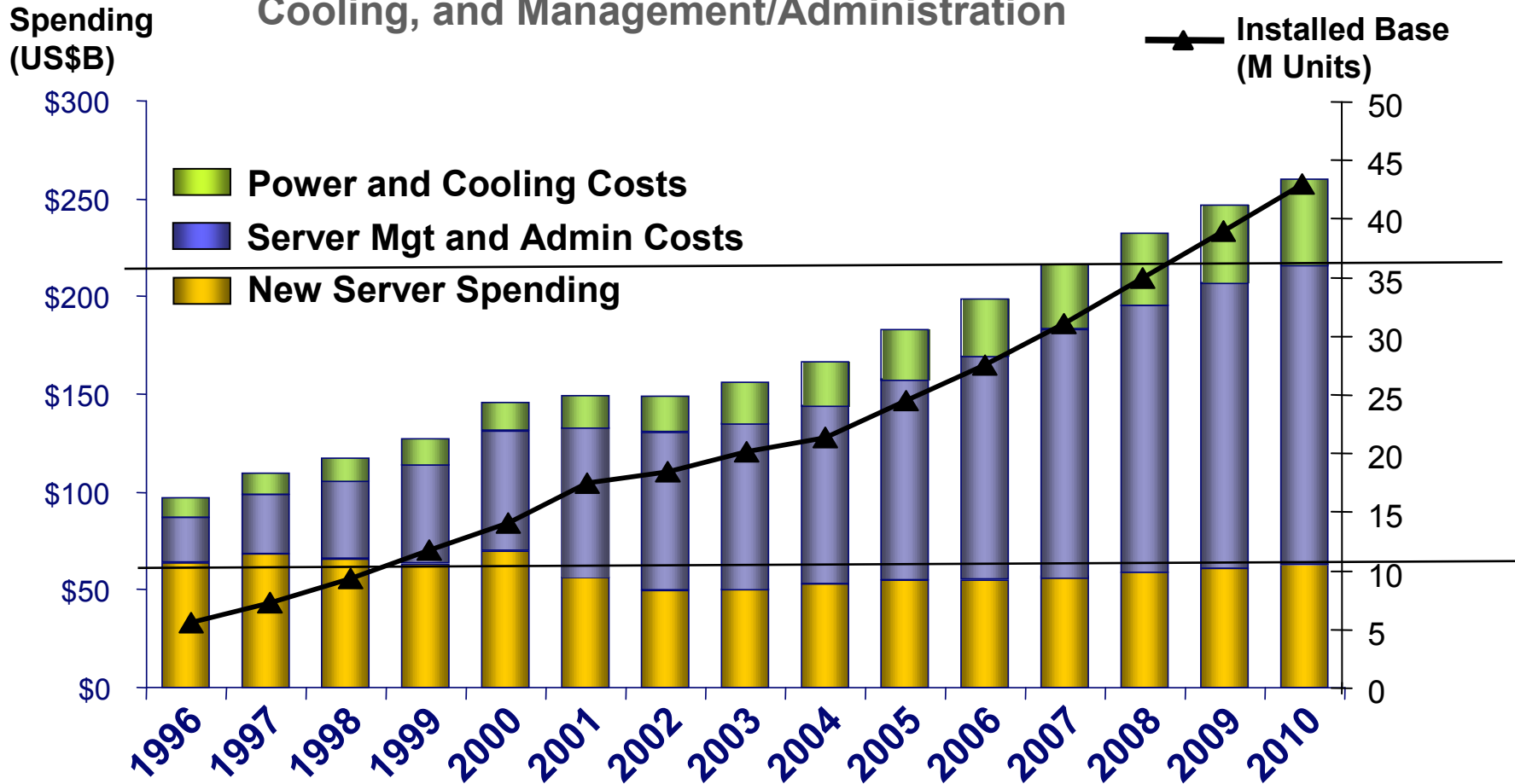
Kevin Harrison

Senior IT Architect/Software Engineer

IBM Silicon Valley Lab

# Typical server costs

Worldwide IT Spending on Servers, Power and Cooling, and Management/Administration



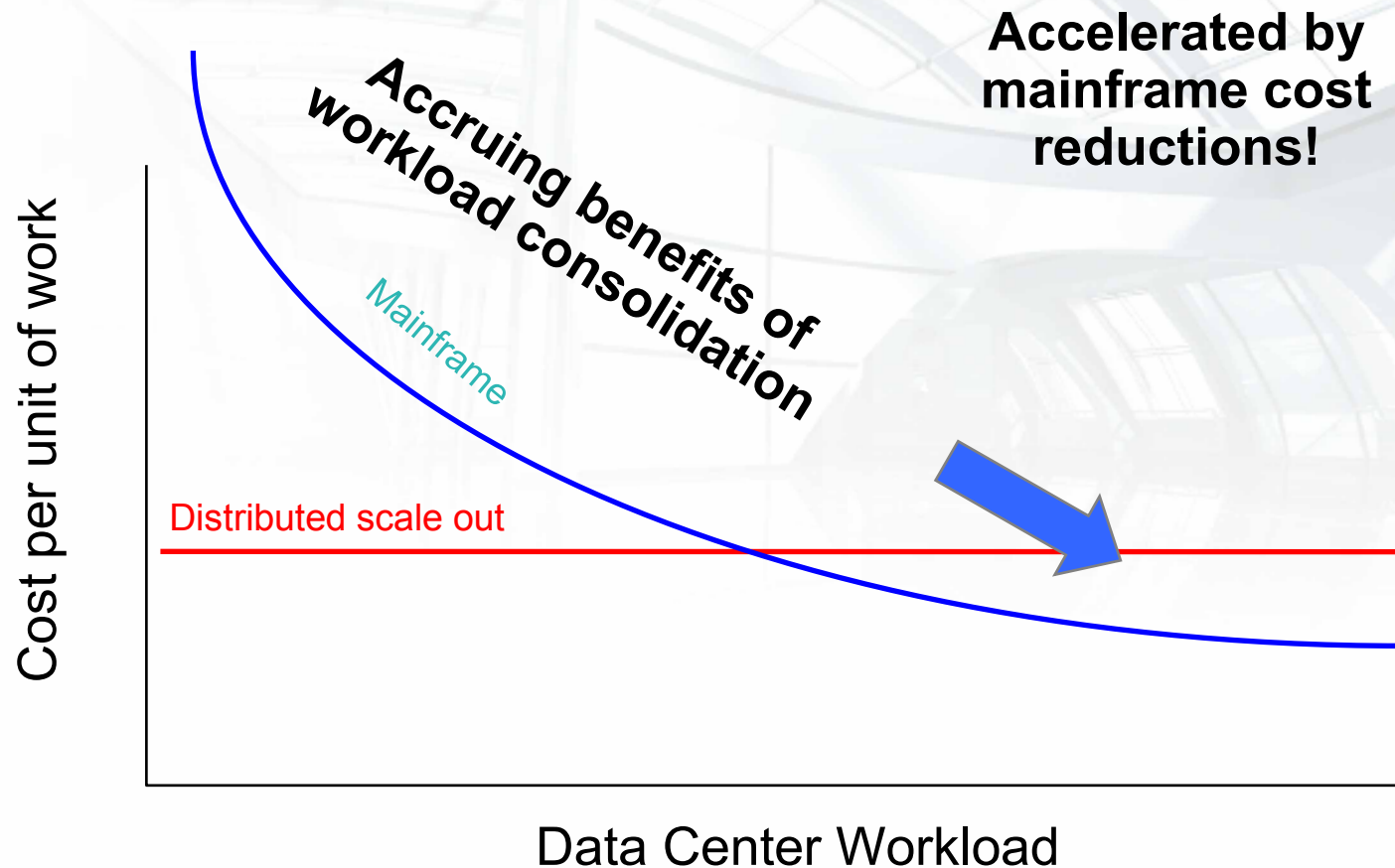
Source: IDC, 2006



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# Mainframe cost per unit of work goes down as workload increases



A photograph of a server room. The image shows rows of server racks with a dense network of cables (black, white, and yellow) running through them. The room has a tiled floor and fluorescent lighting on the ceiling.

In distributed computing environments 85% of computing capacity sits idle.

In six years the power consumption of a server has risen from 8 watts to more than 100 watts per \$1,000 worth of technology.

On average, for every 100 units of energy piped into a data center, only 3 units are used for actual computing. More than half goes to cooling the servers.

# System z can dramatically reduce Carbon Footprint and return **green money**

Example scenario: 1528 UNIX servers vs. 4x System z9 54-way frames

Environmentals	Current	Alt. Case
Total RackU	9,198	na
Racks	500.0	4.0
Total kW	2,203	41
Adjusted kWh/yr	19,396,862	360,956
Heat BTU/hr	5,038,017	93,752
CO2 tonnes /yr	8,341	155
Carbon tonnes /yr	2,276	42
RIPs /kW	425	2,400
RIPS / tonne CO2	112	634
W /m2	14,373	6,000
RackU / Server	6.0	2.0
Watts / Server	1,442	200

**CO<sub>2</sub> Reduction = 27,073 Trees**

\* All performance information was determined in a controlled environment. Actual results may vary. Source: Scorpion Study results 2007



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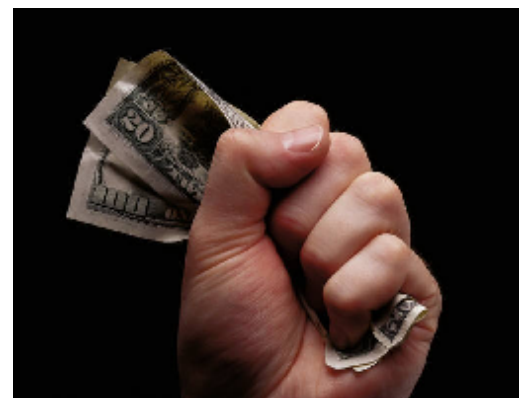
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# DB2 for z/OS

## *Lowering TCO*

- **Maximum value for dollar investment**

- Hardware pricing
  - CPU saving specialty engines (zIIP, zAAP..)
  - Compression of disk space (data, index)
- Software pricing
  - Reduction for tiers
  - Parallel Sysplex aggregation
  - z990, z9, z10 technology dividend
    - 10% reduction in charge units for each step
  - zNALC, Value Unit Edition, Subcapacity pricing



- **CPU + Memory + I/O and disk + Software + Energy and floor space + People = Improved Total Cost of Ownership (TCO)**



# Deep Synergy with System z

DB2 delivers quality of service of z/OS & System z

Key integration points include:

- Hardware data compression
- Data sharing (availability and scale out)
- Unicode conversion
- Encrypted TCP/IP communication (SSL)
- Encrypted data
- Sorting
- zIIP specialty engines
- 64-bit addressing and large memory
- z/OS Workload Manager
- z/OS Security Server (RACF)



# Helping to drive down the cost of IT

*Now even more workloads can benefit from zIIP*

- Integrate data across the enterprise, optimize resources and lower the cost of ownership
  - Centralized data serving
  - Serving XML data
  - Use by ISVs
  - New HiperSockets™ for large messages
  - New IBM GBS Scalable Architecture for Financial Reporting™
- zIIPs offer economics to help you
  - **PLUS** zIIP price same for z10 EC as z9 EC

Network IPSec encryption  
z/OS Global mirror



**IBM System z10 Integrated Information Processor and  
IBM System z9 Integrated Information Processor**

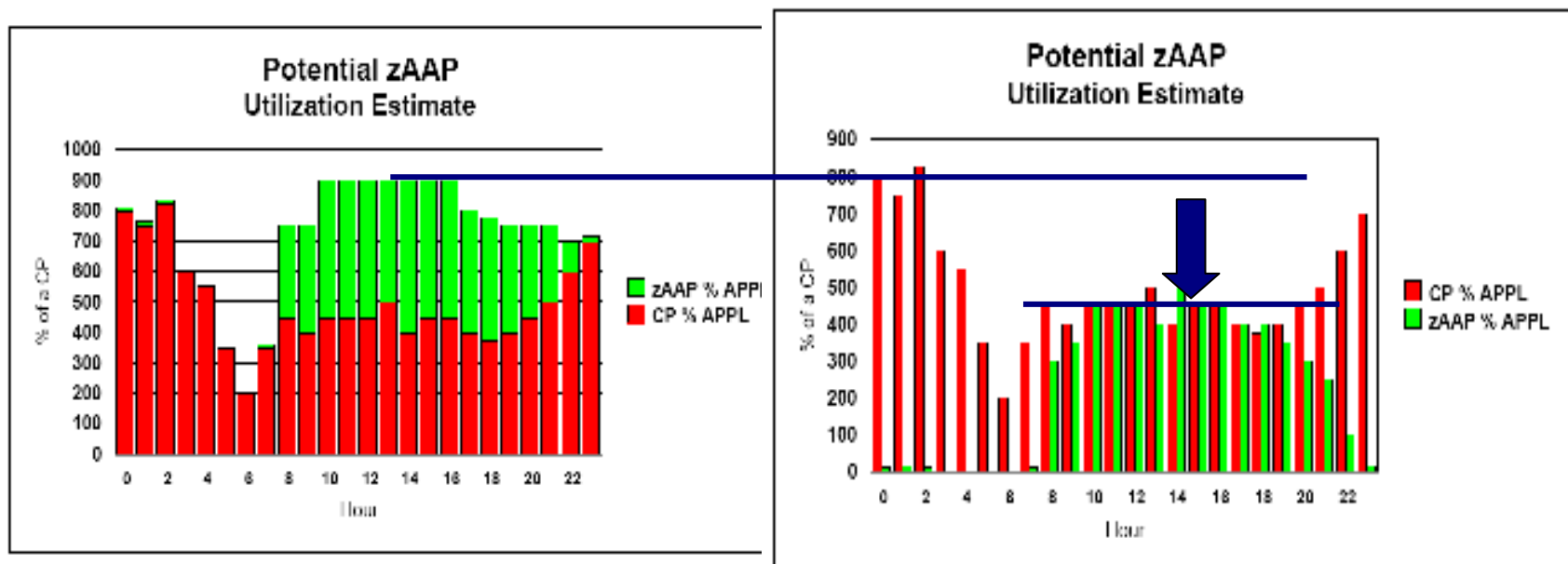


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# Why do zIIPs, zAAPs and IFLs Reduce Cost?



1. **Hardware costs:** By moving workload from general purpose processors to zIIP, zAAP and IFL processors (higher cost to lower cost processors).

2. **Software Costs:** license/maintenance costs based on number of and usage of general purpose central processors. Specialty engines can reduce number of CP's.

No z/OS software charges based on zIIP, zAAP and IFL processors or usage.



## DB2 for z/OS & IBM zIIP value

Portions of DB2 V8 and **DB2 9 (blue)** workloads may benefit from zIIP\*:

**ERP, CRM, Business Intelligence or other enterprise applications**

- Via DRDA over a TCP/IP connection
- **DB2 9 for z/OS Remote native SQL procedures**
- **DB2 9 XML parsing**



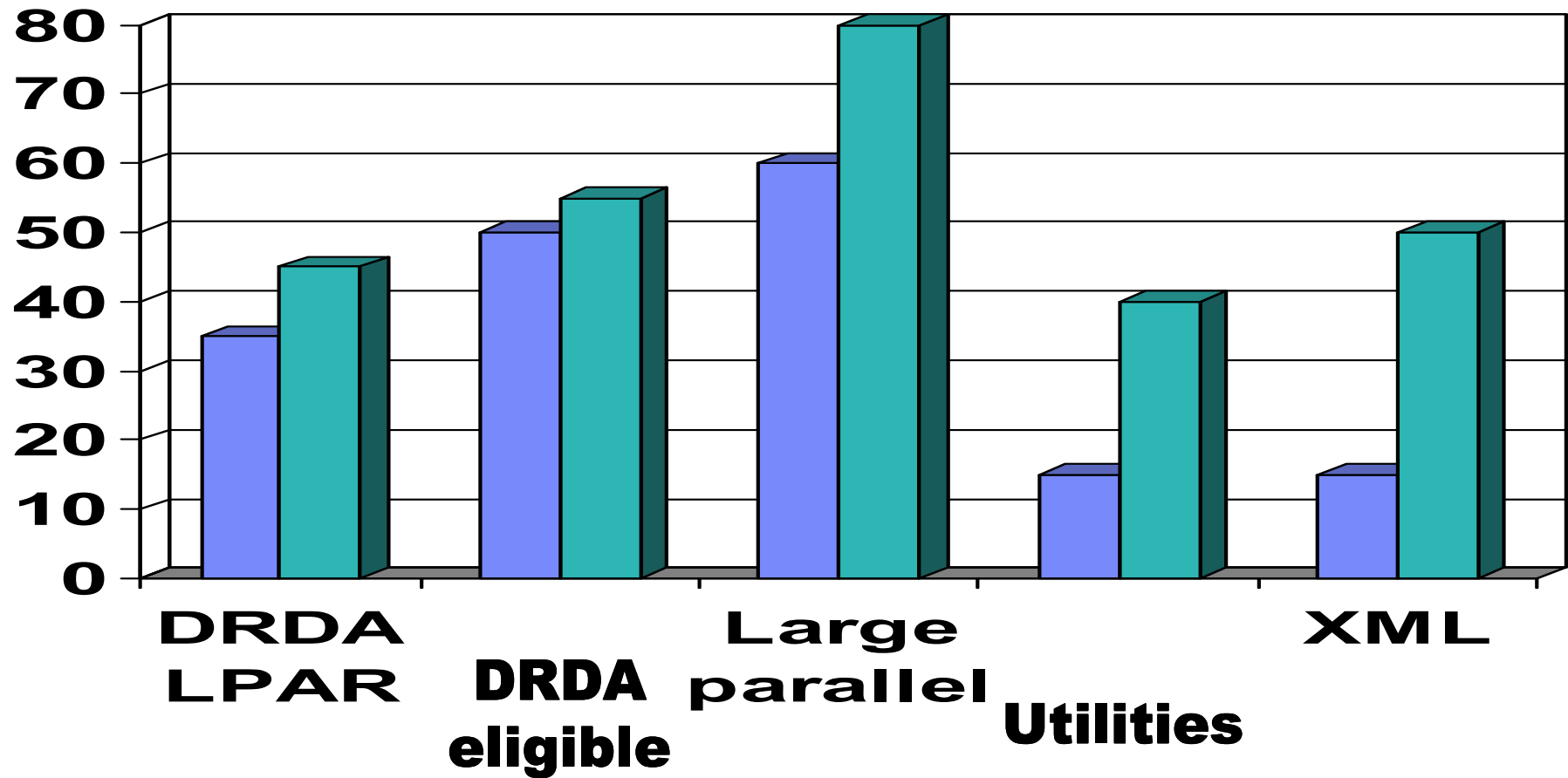
**Data warehousing applications\*:** Large parallel SQL queries

**DB2 9 higher percentage of parallel queries eligible for zIIP**

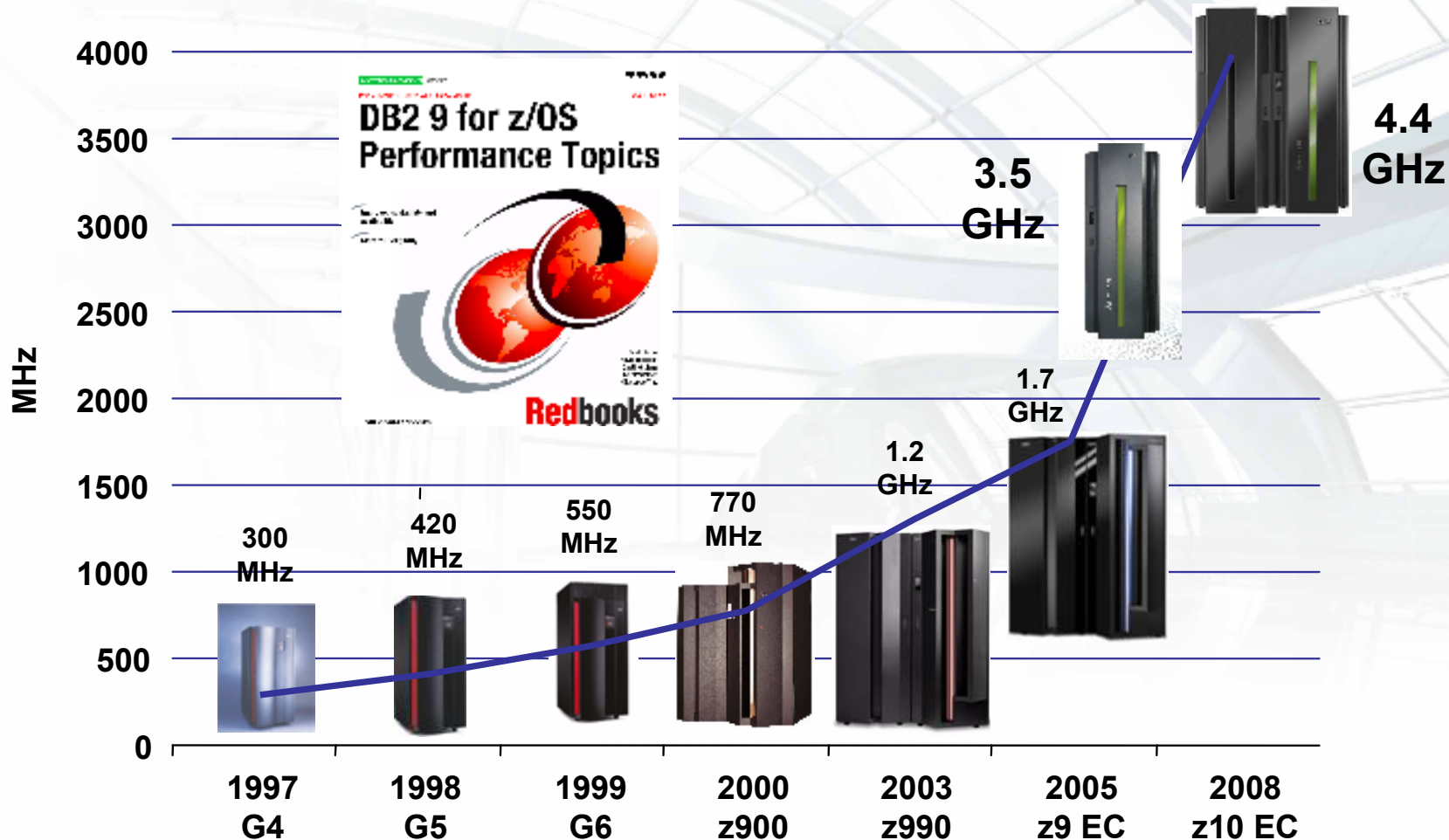
**DB2 Utilities LOAD, REORG & REBUILD** maintaining index structures



## How much CPU gets redirected typically?



# IBM z10 Extends Scale and Value



- G4 - 1<sup>st</sup> full-custom CMOS S/390®
- G5 - IEEE-standard BFP; branch target prediction
- G6 – Copper Technology (Cu BEOL)
- z900 - Full 64-bit z/Architecture®
- z990 - Superscalar CISC pipeline
- z9 EC - System level scaling
- z10 EC – Architectural extensions

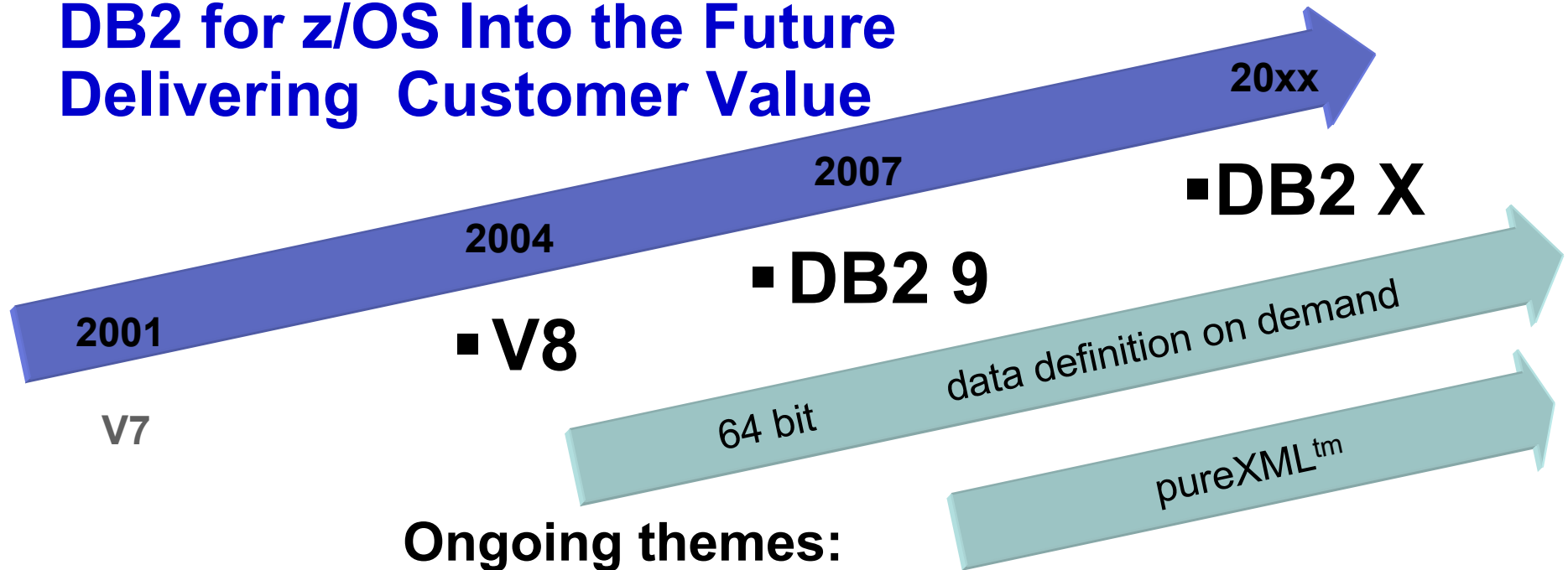


## IBM System z10 Benefits for DB2

- **Faster CPUs, more CPUs, more memory**
  - 50% more n-way performance “on average”
  - 62% more uniprocessor performance
  - 70% more server capacity (54->64 CPUs)
  - Up to 64 CPUs, z/OS 1.9 needed for 64-way in a single LPAR
  - Up to 1.5 TB, z/OS 1.8 needed for >256G in a single LPAR
- **Infiniband Coupling Facility links**
- **New OSA-Express3, 10 GbE for faster remote apps**
- **HiperDispatch**
- **Hardware Decimal Floating Point facility**
- **1MB page size (DB2 X plans to exploit)**
- **50+ instructions added to improve compiled code efficiency (DB2 X plans to use)**



# DB2 for z/OS Into the Future Delivering Customer Value



Ongoing themes:  
Performance Scalability  
Reliability Availability Serviceability  
Security Productivity  
Application Development  
SQL XML SOA

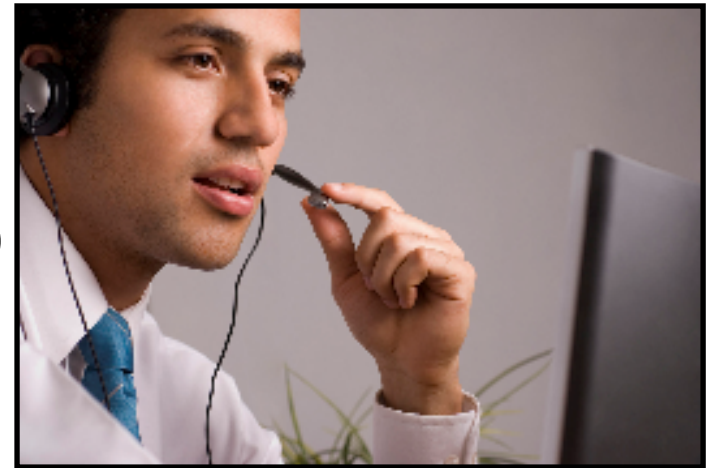


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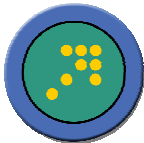



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## DB2 9 for z/OS field update

- **DB2 9: Climbing Sharply**
  - 33% of Top 100      27% of Top 200
  - Over 450 customers
  - Big push 2H08; Continuing push in '09
- **How's the Quality (compared to V8)?**
  - Lower overall PMR volume
  - Less Severity 1 APARs
  - Lower PE rate
- **DB2 V8: Migration finishing in most of world**
  - 100% of Top 100      Over 99% of Top 200
  - V7 End of Service: June 30, 2008
  - V8 Withdrawal from Marketing
    - Announced: Dec. 2, 2008
    - Effective: Sept. 8, 2009



## DB2 for z/OS Version 8 *Extending the limits*

<p>SQL OLTP Leadership</p>	<ul style="list-style-type: none"> <li>• Lengths of table names, columns, statements</li> <li>• Cursor scrolling</li> <li>• New expressions &amp; recursion</li> <li>• Predicates &amp; diagnostics</li> </ul>	
<p>Performance &amp; scalability</p>	<ul style="list-style-type: none"> <li>• Index, materialized query tables,</li> <li>• Faster, more efficient I/O</li> <li>• Reduce CPU with multi-row fetch &amp; insert</li> <li>• More storage, partitions &amp; log</li> </ul>	
<p>Database changes without an outage</p>	<ul style="list-style-type: none"> <li>• Add a new partition or rotate partitions</li> <li>• Extend columns</li> <li>• New backup and restore system</li> </ul>	
<p>Integration with platform and applications</p>	<ul style="list-style-type: none"> <li>• System z, z/OS &amp; Total Storage</li> <li>• Middleware stack</li> <li>• SAP, PeopleSoft, Siebel and others</li> </ul>	

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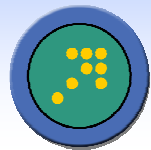


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# DB2 9 for z/OS *Serving the Most Demanding Data Goals*



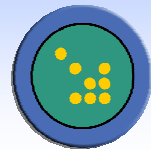
## ***SOA Enablement***

- ***pureXML***
- ***Optimistic locking for WebSphere***
- ***LOB performance, usability***



## ***Dynamic Warehousing***

- ***Many SQL improvements***
- ***New built-in OLAP expressions***
- ***Dynamic index ANDing***
- ***Histogram statistics***
- ***Optimization Service Center***



## ***Simplification, Reduced Cost***

- ***Index compression***
- ***Partition By Growth tables***
- ***Cloned tables***
- ***Volume based backup / recovery***



## ***Workload Consolidation***

- ***More online schema changes***
- ***Online REBUILD INDEX***
- ***Trusted context and ROLES***
- ***Parallel Sysplex cluster improvements***



*If you are not on DB2 9, look what you are missing!*

*Availability, Scale & Resiliency*

More Online Schema Changes  
Volume Level Backup & Recovery



Business Flexibility  
Faster, Cheaper, Granular Recovery

*Compliance & Security*

Database Roles & Trusted Context

Efficient Auditing & Compliance

*Easier Application Development*

PureXML



Streamlined Data Integration

*OLTP & Warehousing*

Query Optimization

Highly Available, Secure Data

*Reduce Cost of Ownership & Skills*

Index Compression



50% Disk Savings



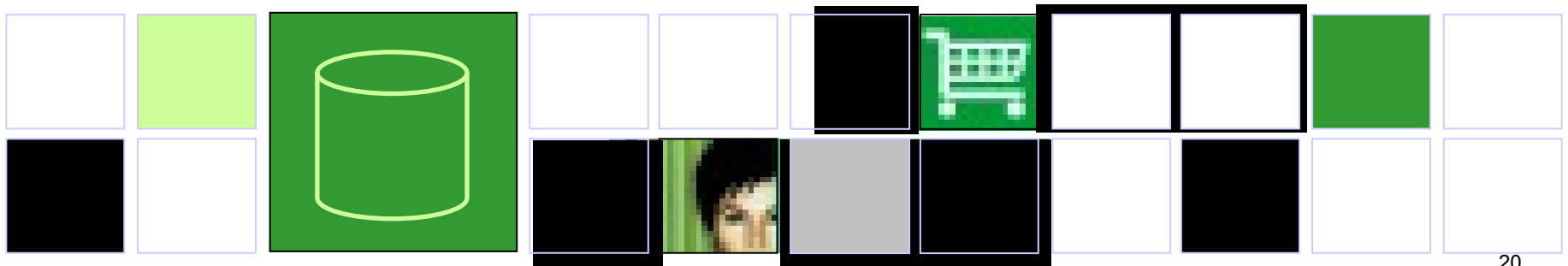
## DB2 9 cost savings: Selected features save CPU or storage

- Index compression
- zIIP and SQL native stored procedures
- CPU reductions in most utilities: LOAD, REORG, RUNSTATS, COPY, RECOVER, CHECK, ...
- **INSERT performance enhancements**
- **Improved performance for VARCHAR**
- **Improve LOB performance and manageability**
- DDF 64-bit shared memory
- 10 to 15% improvement in virtual storage
- Improved query performance
- **Enhanced index split, larger pages and sequential key insert**
- **See much more in the DB2 9 Performance Topics Redbook, SG24-7473**



# Performance improvements and tuning

- Use of zIIP and zAAP
- Monitor performance, but not too much
- Parameter changes
- Buffer pools and other storage
- New versions and service



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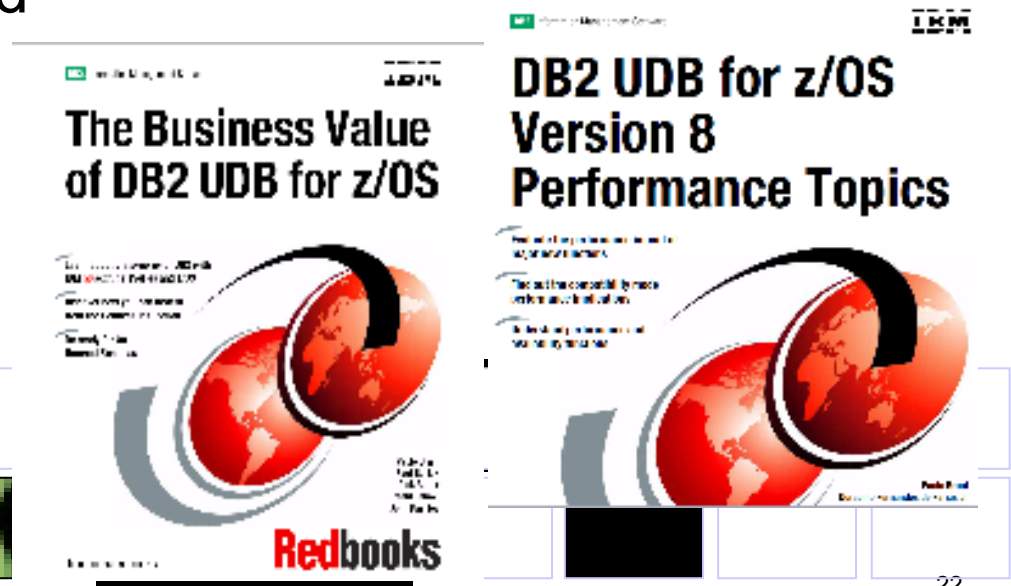
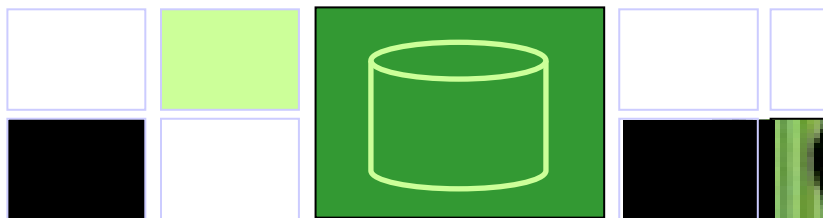
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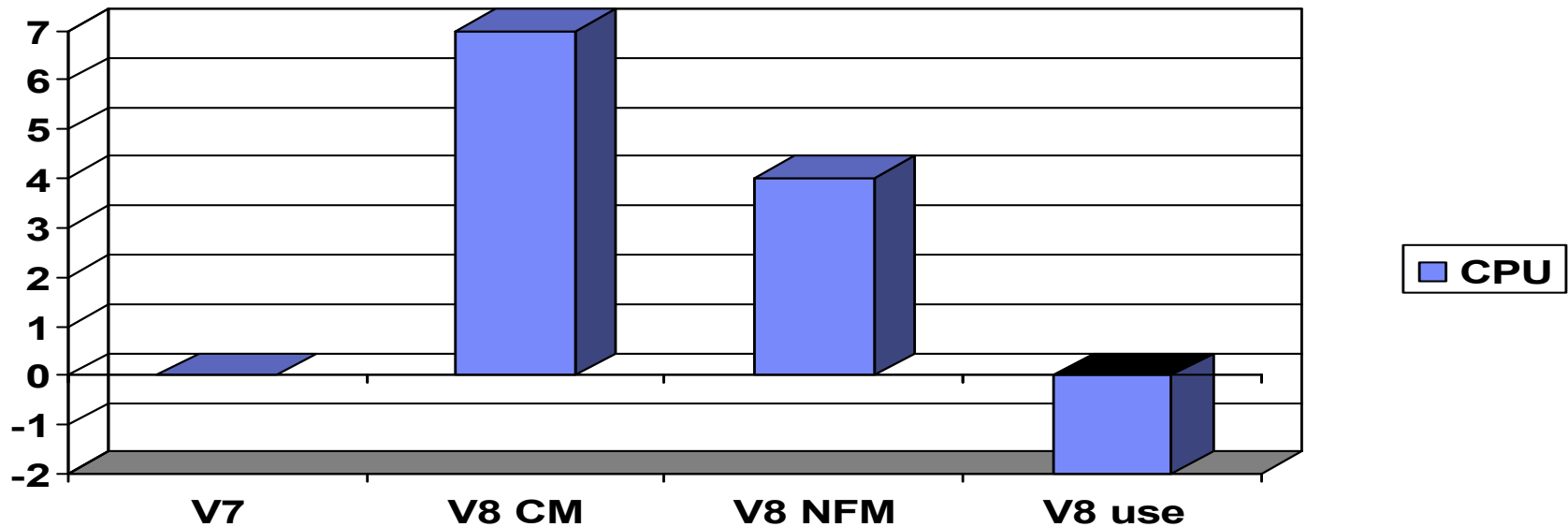


# Why Migrate to DB2 for z/OS V8? It's better!

- Business needs
  - Reduce risk
  - Improve business stability
  - Availability
- Application developers need
  - SQL enhancements
  - Java and the web
  - Porting applications
- Database Administrators need
  - Scalability, very large database
  - Queries and data warehouses
  - Performance improvements



## DB2 V8 best practice performance plan scenario



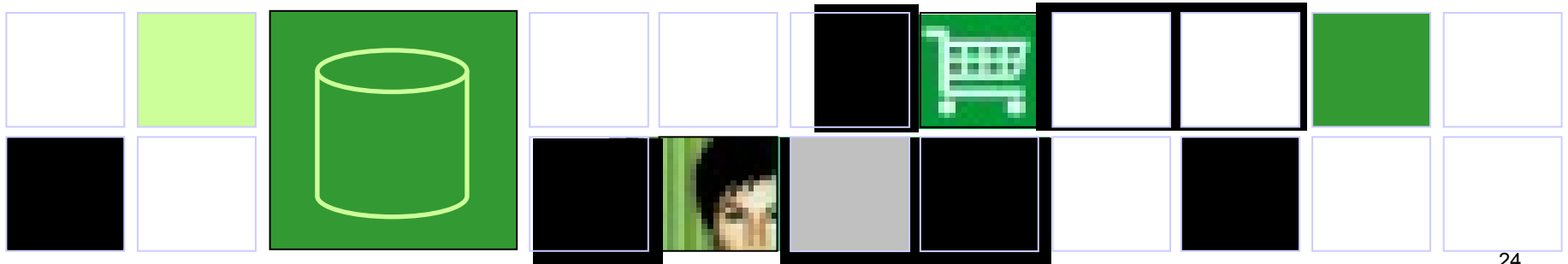
Data sharing      Better statistics      DB design adjustments  
REBIND            Cluster, index  
PGFIX(YES)        application changes  
zIIP                 multirow fetch & insert  
zparms              SQL adjustments

Your situation will vary. Less CPU is better.



# Why Migrate to DB2 9 for z/OS?

- Business needs
  - Reduce CPU time & disk space
  - Improve business agility
  - Service Oriented Architecture
- Application developers need
  - Powerful new SQL enhancements
  - Portability with SQL and data definition compatibility
  - PureXML for a powerful SQL and XML interface to XML data
- Database Administrators need
  - Improve availability and performance
  - More flexible security and easier regulatory compliance
  - Better web application & data warehouse function and performance
  - LOB function, performance, usability



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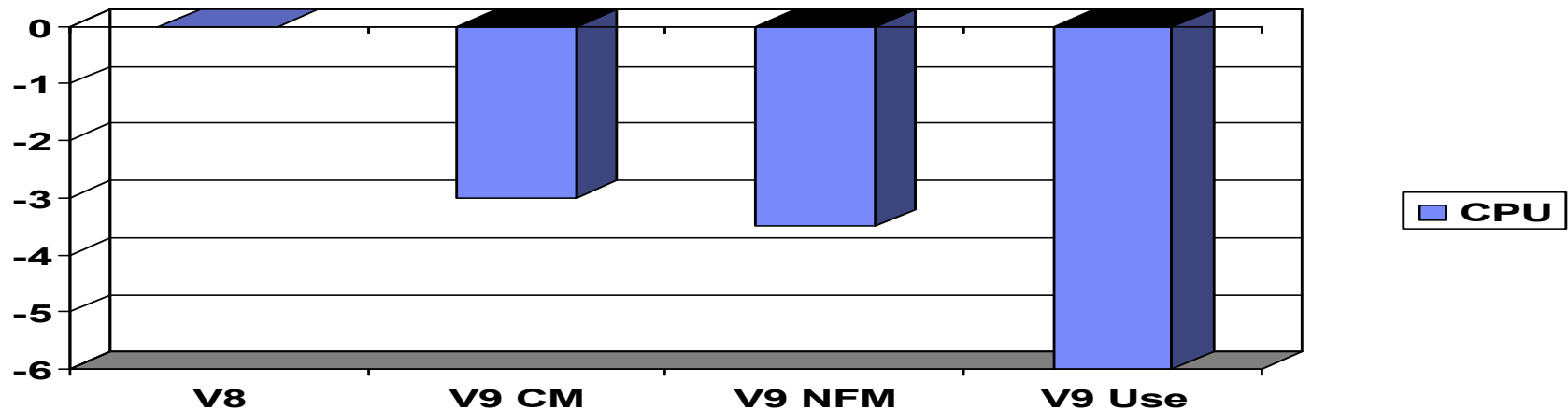


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## DB2 9 z10, z9, z890 & z990 performance plan scenario



Utilities  
Histogram statistics  
REBIND  
DSNZPARMS

DB design adjustments  
Index improvements  
application changes  
native SQL procedures  
SQL adjustments

Your situation will vary. Less CPU is better.  
z800 and z900 expect +5% to +10% CPU



# DB2 9 Easier Application Development

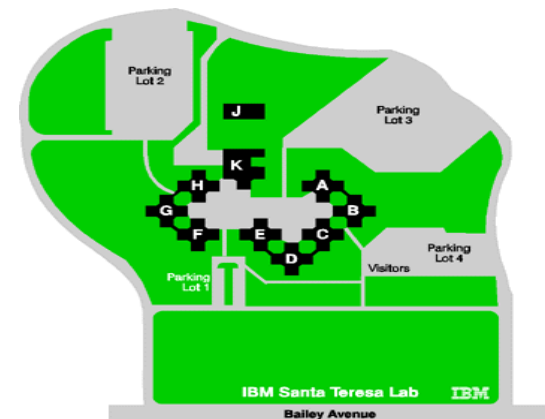
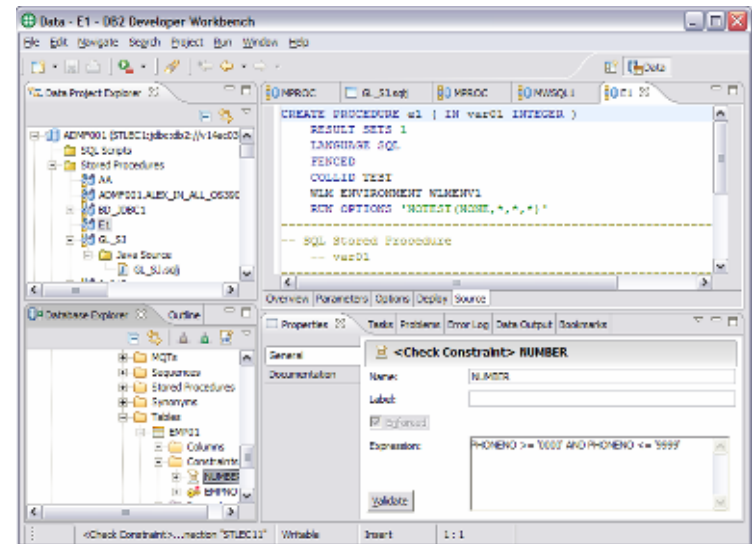
SOA and XML

Simplify development process

Improve performance

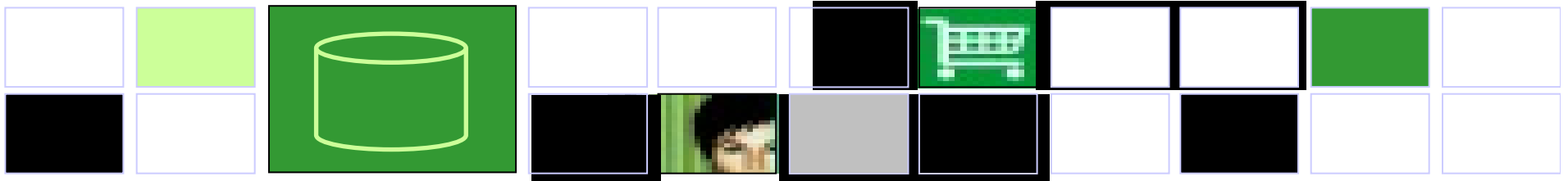
Numerous SQL enhancements

- Merge / Truncate
- Select from update, delete & merge
- Instead of triggers
- BIGINT & DECIMAL FLOAT
- New Built-in functions e.g. SOUNDEX
- DDL porting improvements
- Optimistic locking
- Developer Workbench
- Spatial or geographic data
- Text Search server included
- Native SQL Stored Procedures



## Most consumable DB2 9 improvements

- CM very little to no action:
    - Utility CPU reductions
    - Logging improvements
    - Improved index page split
    - Larger prefetch, write & preformat quantities
    - LOB performance
    - DDF VSCR
    - Optimization Service Center, Opt. Expert, & Data Studio
  - Changed online REORG
  - Improved RUNSTATS
  - Optimization improvements, EDMPOOL VSCR
- NFM
- LOB lock avoidance
  - Reordered row format
  - Index: larger page sizes, compression, index on expression



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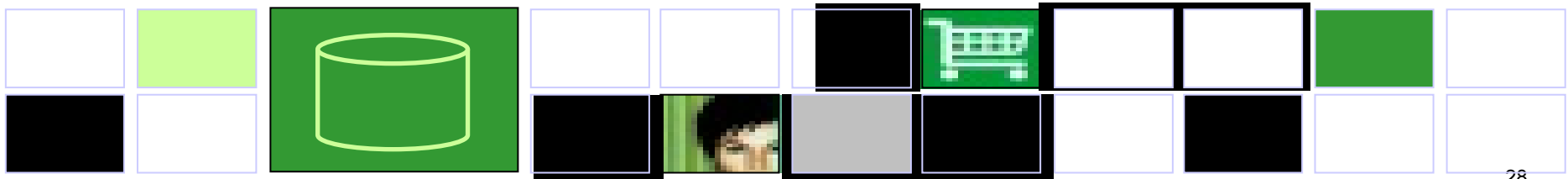


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## Migration to DB2 9 for z/OS is easier than V7 to V8

- Migration process enhancements: ENFM shorter, CM\*
- Much less performance regression:
  - Earlier improvements
  - Plan stability & tools for avoiding access path issues
- CCSIDs and old product issues resolved in V8
- Simpler virtual storage considerations
- Less impact from incompatible changes
- Earlier deliveries from vendors



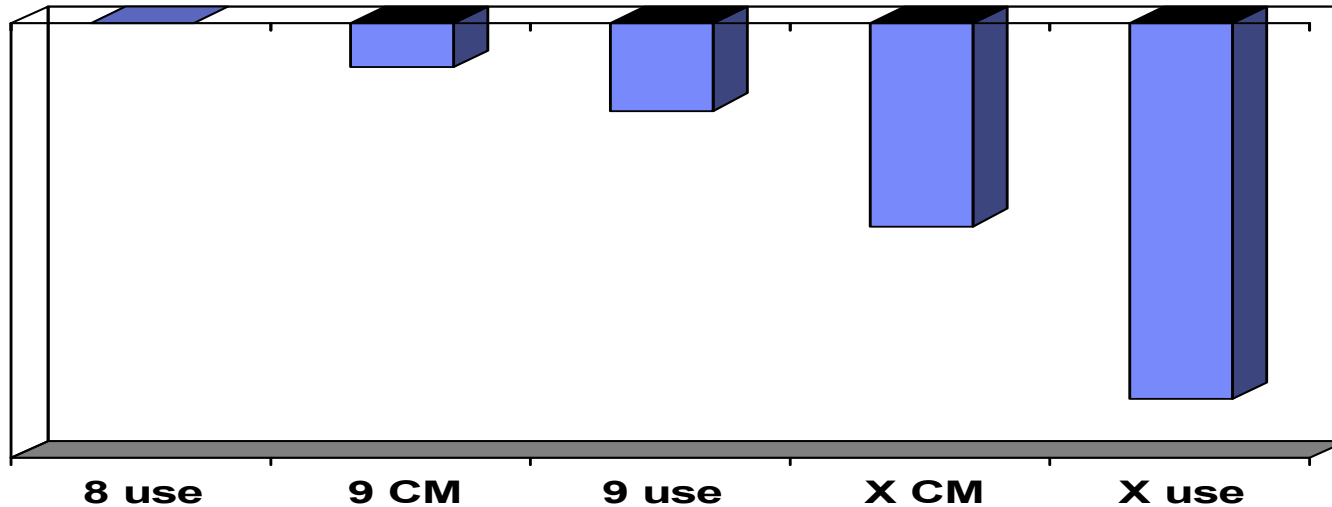
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# DB2 X: performance plan → significant CPU reductions, best with latest processors



Transactions DB design changes  
Batch Hash access  
REBIND application changes  
SQL adjustments

Your situation will vary. Less CPU is better.

Processors z10, z9, z990, z990, and later z/OS 1.10 and later



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# Questions?

Thank  
You



## Answers for early written questions

- With the very large DBs resulting from usage of XML, how is IBM addressing image copy and reorg efficiency in the ever narrowing batch windows? The primary techniques are use of the hardware, such as FlashCopy and making the operations online. FlashCopy can be used to take terabytes of copy in seconds, with no disruption to applications. DB2 9 is excellent for improved availability. See the concurrency and availability pointers below.
- Do you have advice and pointers for DB2 9 Migration?  
<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/migration/>
- How can I deal with security to keep out hackers?  
<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/security/>
- Performance is a key concern for me. Where can I learn more?  
<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/performance/>
- DB2 currency:
  - Concurrency & availability
  - <ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/v9-new-function/availability-betaworks-2007.pdf>
  - <ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/v9-new-function/utilities-db2roadshow-2008.pdf>
  - <ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/v9-new-function/xml-db2-9-zroadshow-2007.pdf>
  - What versions are currently in service or Product support lifecycle <http://www-111.ibm.com/software/support/lifecycle/PLCDetail.wss?psynkey=Z736916P90323T50&synkey=M164003R29014P61&synkey=O720420C40253K34&from=spf>



# DB2 for z/OS Business Value References

Information Management software



## DB2 9 for z/OS Performance Topics

Use the functions that provide

IBM Redbooks



### The Business Value of DB2 UDB for z/OS

Technical overview of DB2 UDB for z/OS

Technical overview of DB2 UDB for z/OS

IBM Redbooks



Redbooks

ibm.com/redbooks



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## IBM System z Strengths and Values

DB2 9 for z/OS  
Data On Demand

Technical presentation of System z hardware and z/OS

Enterprise-wide roles for the System z platform

Cost of computing considerations



IBM

System z 9.9 Reference: The Quantized New Enterprise Data Center

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System z 9.9 Reference: The Quantized New Enterprise Data Center

System z 9.9 Reference: The Quantized New Enterprise Data Center

System z 9.9 Reference: The Quantized New Enterprise Data Center

System z 9.9 Reference: The Quantized New Enterprise Data Center

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## DB2 9 for z/OS Technical Overview

Read about the new features and functions of DB2 Version 9.1 for z/OS

Understand performance and retention issues



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# DB2 9 in **IBM Redbooks** Publications

1. DB2 9 Technical Overview SG24-7330
2. DB2 9 Performance Topics SG24-7473
3. DB2 9 Stored Procedures SG24-7604
4. Index Compression with DB2 9 for z/OS redp4345
5. SQL Reference for Cross-Platform Development
6. Enterprise Database Warehouse, SG24-7637
7. 50 TB Data Warehouse on System z, SG24-7674
8. DB2 9 Optimization Service Center SG24-7421
9. LOBs with DB2 for z/OS SG24-7270
10. Deploying SOA Solutions SG24-7663
11. Enhancing SAP - DB2 9 SG24-7239
12. SAP Application on Linux z SG24-6847
13. Best practices SAP BI - DB2 9 SG24-6489-01
14. Data Sharing in a Nutshell, SG24-7322
15. Securing DB2 & MLS z/OS SG24-6480-01
16. Data Sharing: Distributed Load Balancing & Fault Tolerant Configuration redp4449
17. Considerations on Small & Large Packages redp4424
18. Backup and Recovery Considerations redp4452
19. Powering SOA with IBM Data Servers SG24-7259
20. Packages Revisited, SG24-7688
21. Data Studio V2.1 Web Services redp4510

