



Data Management

How to Thrive in a Recession: Cut costs and boost business resilience with DB2 for z/OS and SAP

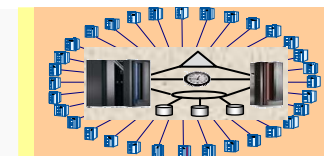
Andreas R Mueller – IBM SAP International Competence Center
Johannes Schuetzner – IBM System z Technology Center for SAP

Agenda

Economic downturn – changing the game



Challenges in an SAP landscape



System z – Benefit and Value for SAP



DB2 9 for z/OS



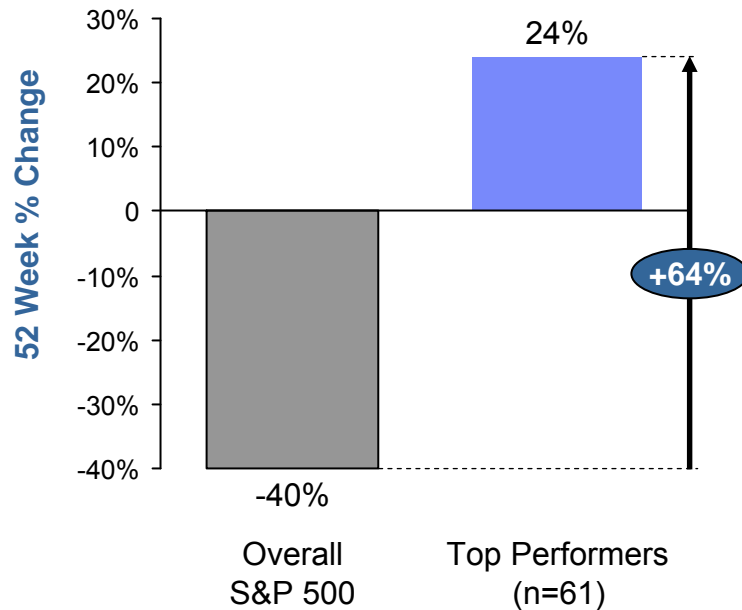
References & TCO studies



An analysis of early winners points to strategies for success

Top performers during 2008...

Average Stock Price Change
2008



Criteria for Top Performers:

- Market Cap >\$1.4B
- 52 week stock price change >5.0%

Exhibited three strategies

1. Focus on Value

2. Exploit Opportunities

3. Act Quickly

Source: Google Finance, IBM S&C analysis, Performance period is 12/27/07 to 12/18/08

Companies need to do three things:

Succeeding in the New Economic Environment

1. Focus on Value 49% of Top Performers

Do more with less

- Cut costs strategically
- Conserve working capital
- Protect cash reserves
- Increase flexibility, responsiveness

TCO

Virtualisation

Focus on the core

- Create value for clients
- Reduce non-core costs
- Identify, preserve, and enhance your core differentiators

Existing IT skills

Understand your customers

- Target value-oriented customers
- Reduce complexity

Consolidation

2. Exploit Opportunities 39% of Top Performers

Capture share

- Disrupt weak competitors
- Focus on growth markets
- Acquire bargain-priced assets

Build future capabilities

- Invest in innovation
- Protect and acquire critical talent
- Establish corporate infrastructure for growth

Change your industry

- Understand the downturn will reshape your industry
- Profit from business model innovation
- Explore new revenue models
- Cultivate strategic partners

3. Act with Speed 12% of Top Performers

Manage change

- Overcome the “change gap”

Empower leaders

- Establish strong, aligning leadership
- Communicate strategy clearly and often

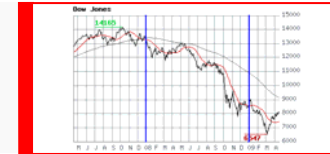
Risk & Transparency

- Reduce risk and increase transparency

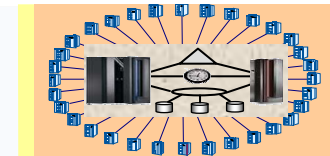
Continuous availability
Security
Accounting&Auditing

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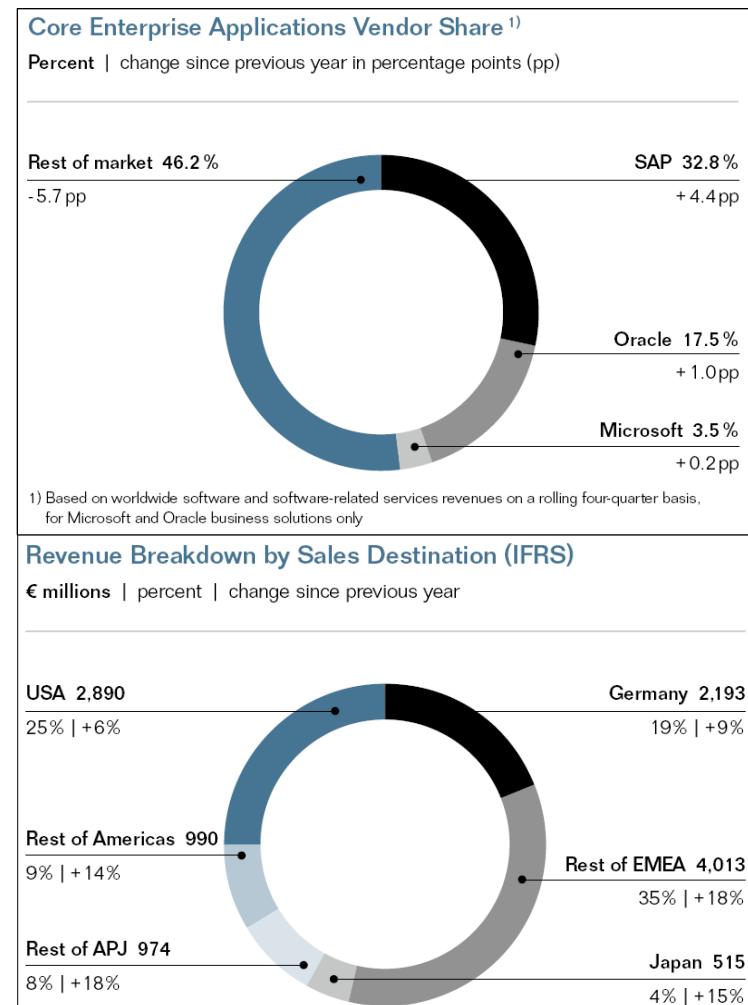
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What is SAP?

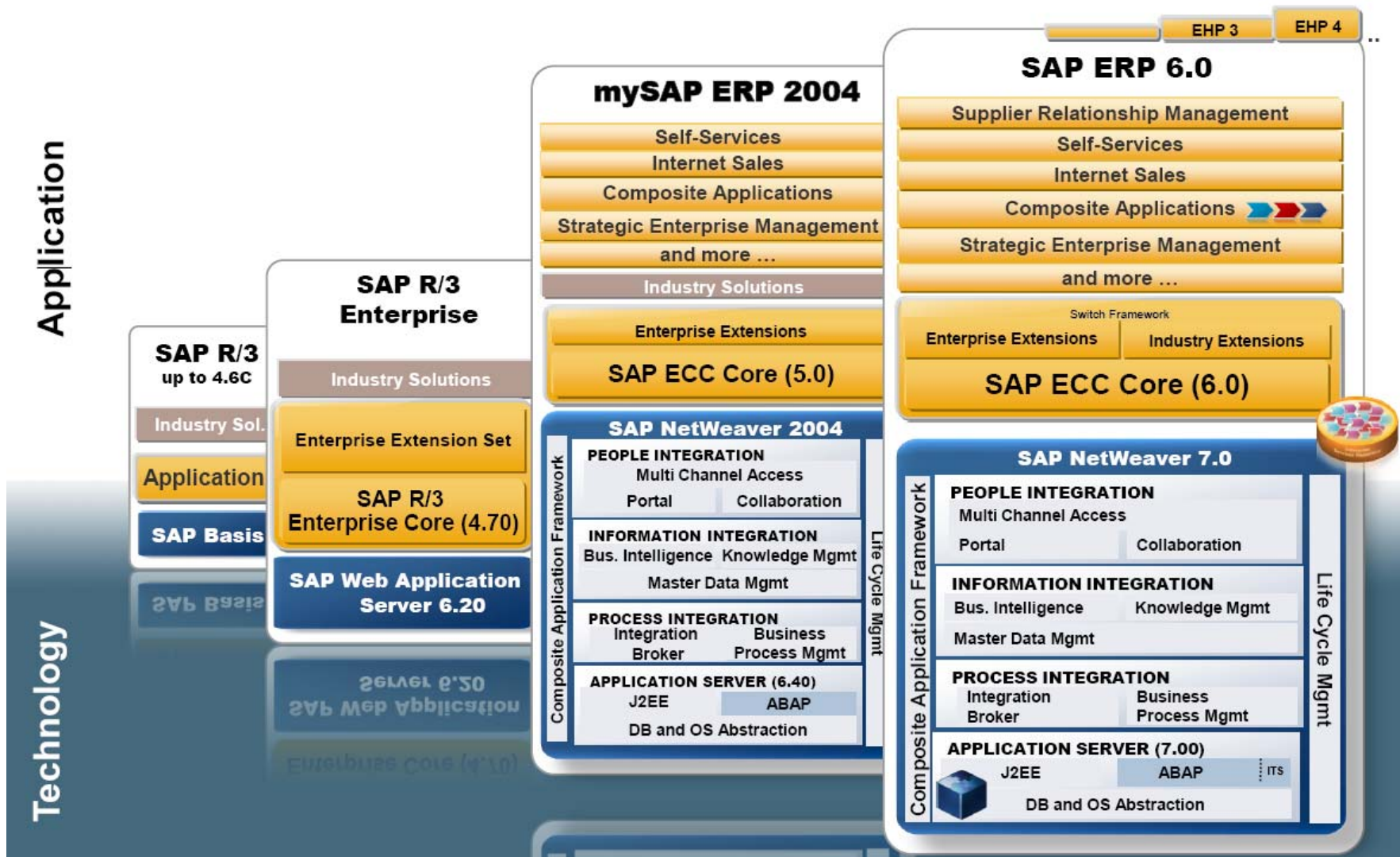
SAP is the leading packaged solution which customers use to:

- **Standardize business processes following company expansion or organizational restructuring.**
- **Implement global language, currency, code page, and legal requirements.**
- **Reduce operational costs associated with maintaining and running legacy systems.**
- **Improve business flexibility and speed to market.**
- **Implement certified business practices like Sarbanes-Oxley, and IT practices like IT Infrastructure Library (ITIL).**

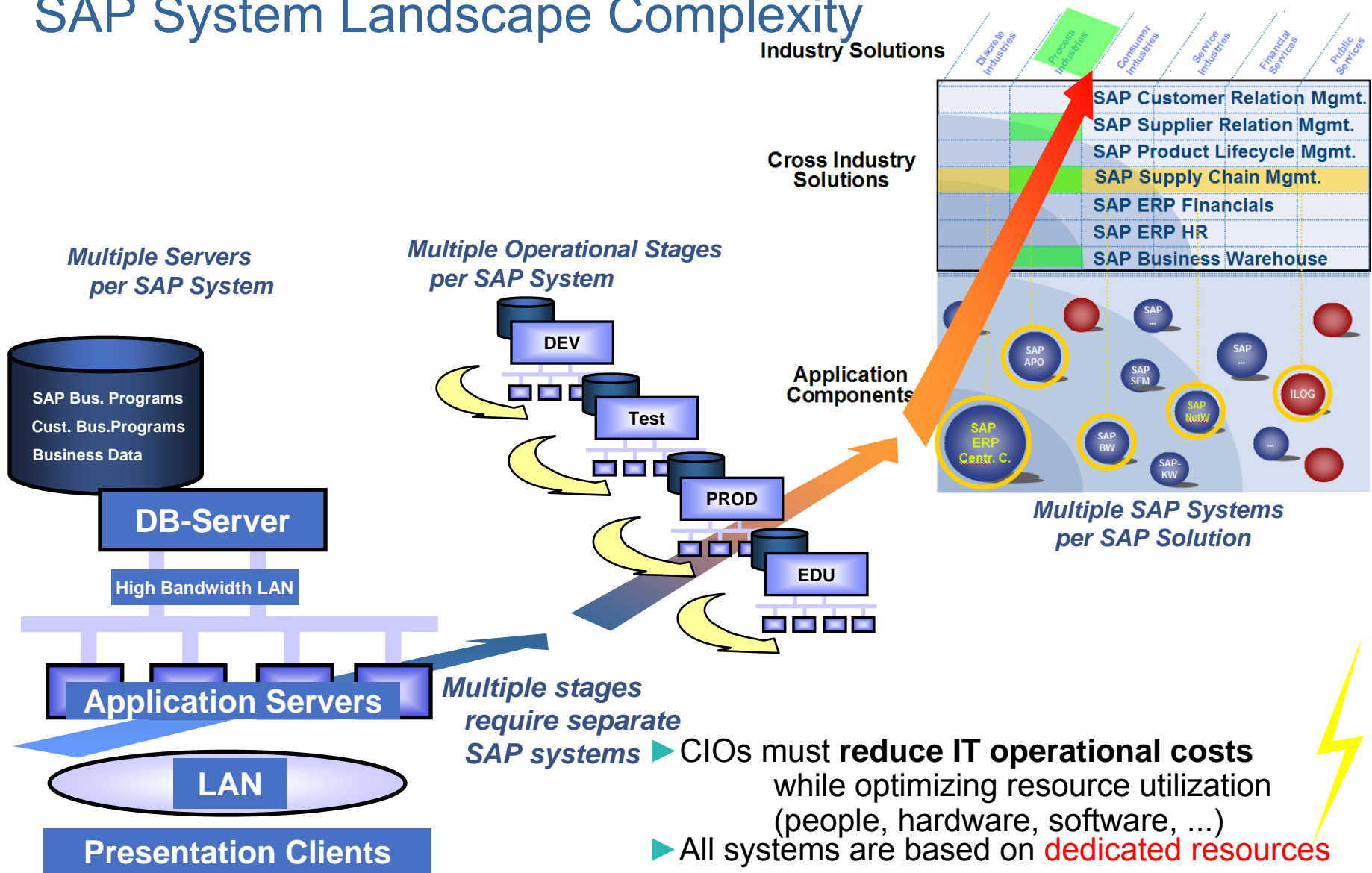


Ref: http://www.sap.com/about/investor/reports/annualreport/2008/pdf/SAP_2008_Annual_Report.pdf

SAP's technology layer has undergone an evolution of its SOA functional and isolated technical layers



SAP System Landscape Complexity

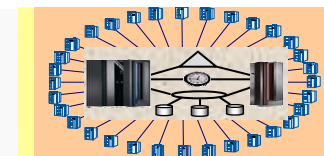


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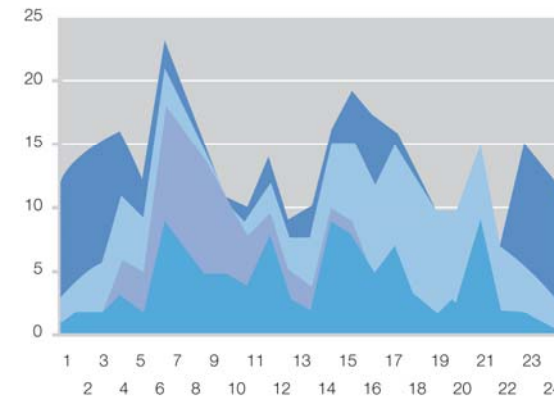
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Consolidate and manage workloads.



Four workloads **with peaks at different times** – each with a relative capacity of 10.



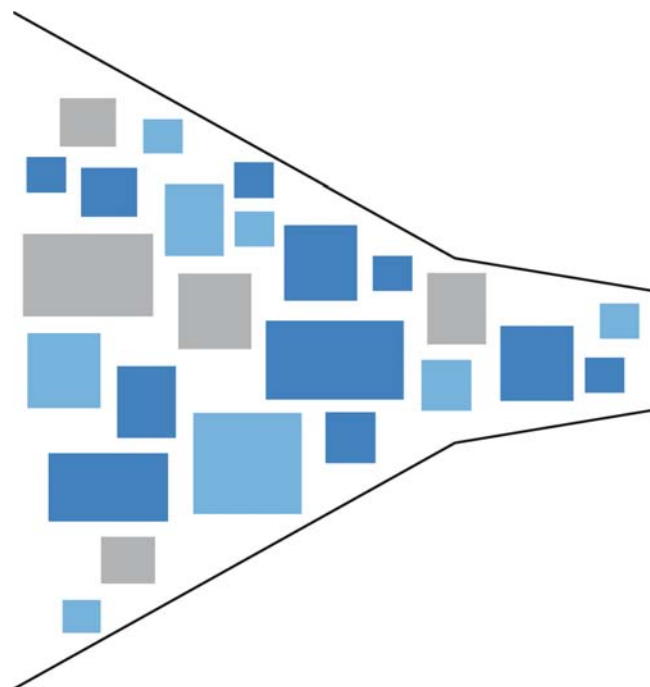
Consolidated mixed workload on a single System z server using virtualization and workload management: a relative capacity of 25 is sufficient; the utilization increases by 1.6 times.

Optimize utilization through workload management.

The IBM System z design allows you

- to parallel process many different workloads and
 - to prioritize different workloads according to rules.
- IBM System z attains a very high utilization with constant response times and thus a superior cost-benefit ratio.

Assigning goals to transactions via workload prioritization



CICS response time

Importance 2 (high),

Goal: 90% complete < 0.7 seconds



Critical batch

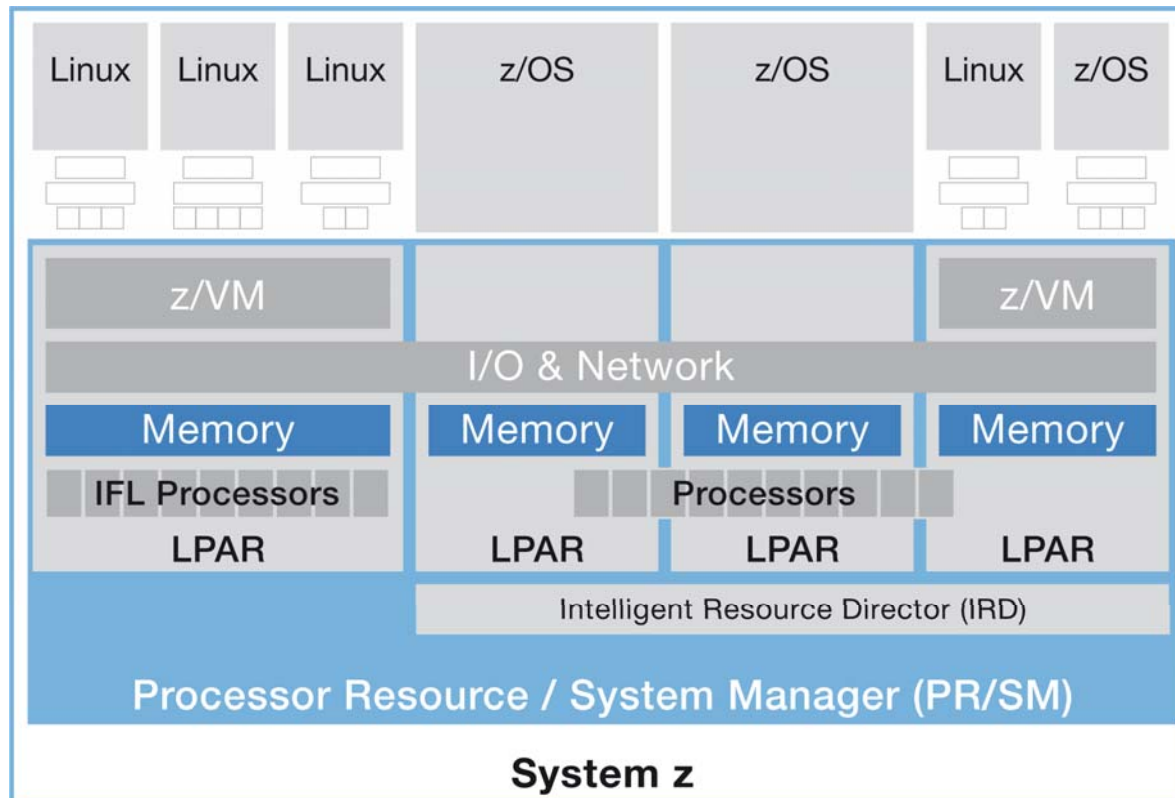
Importance 3 (medium),

Goal: Turnaround
time < 5 minutes

Production SAP database

Importance 2 (high), Velocity Goal: 65 (fast)

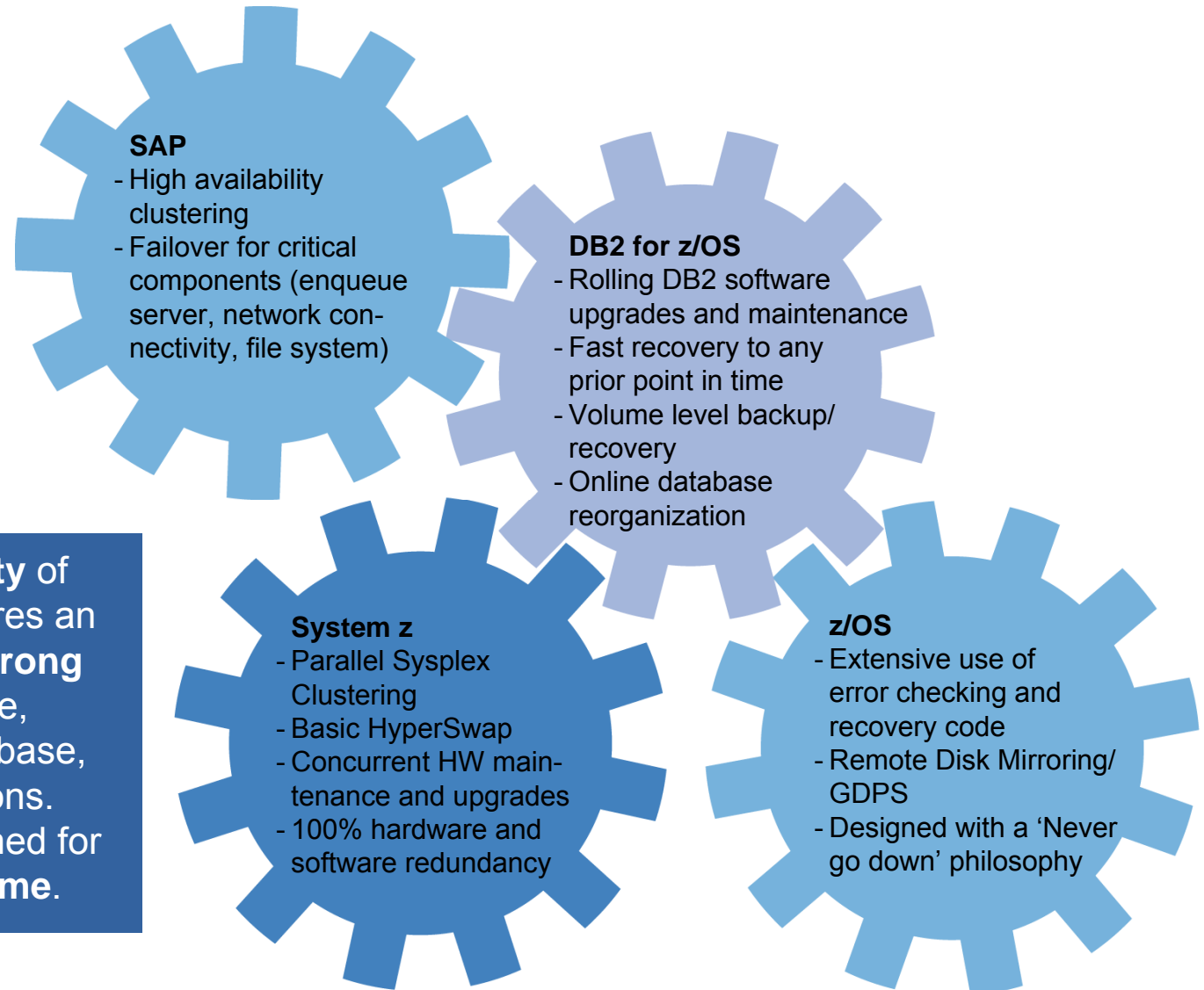
Build on virtualization.



- **System z provides logical (LPAR) and software (z/VM) partitioning**
- **PR/SM enables highly scalable virtual server hosting for LPAR and z/VM virtual machine environments**
- **IRD coordinates allocation of CPU and I/O resources among z/OS and non z/OS LPARs**

The advantage of the **collective architecture of IBM System z**: Hardware and software technologies are designed by one company with **virtualization as a fundamental requirement**.

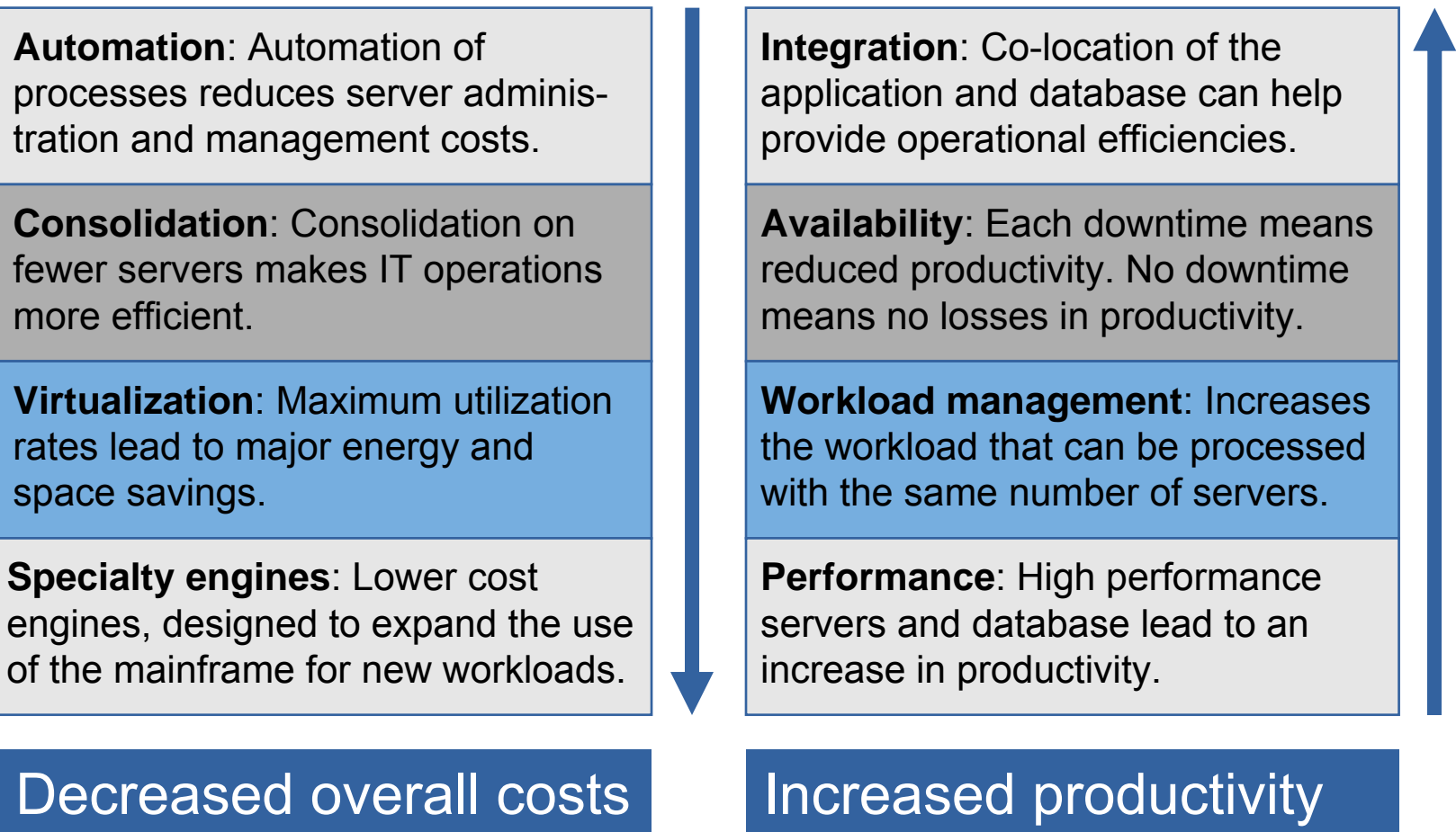
Minimize downtimes.



Continuous availability of SAP applications requires an IT infrastructure with **strong integration** of hardware, operating system, database, and business applications. IBM System z is designed for just that – **zero downtime**.

Decrease costs. Increase productivity.

System z is a highly efficient platform



Why DB2 for z/OS for SAP

Continuous Availability

- 99.999% DB & OS & HW Reliability
- Concurrent everything - Minimize Planned Outages
- Continuous availability for critical SAP functions

Capacity and Scalability

- Vertical and horizontal scaling,
- Improved DB intensive performance
- Exploits Sysplex with Coupling Facility
- System z I/O Bandwidth, data in I/O memory

Large Database Manageability - SAP Optimized

- Multi-Terabyte Databases w/ HW compression
- Online Backup and Reorg
- Storage technology (Flashcopy, Snapshot)
- Self tuning DASD - PAV, Multiple allegiance

Security

- Designed to deliver system integrity and highest levels of security



Fully integrated into SAP

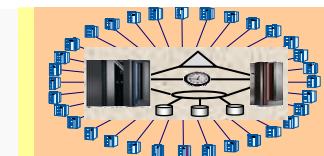
- CCMS
- DB Cockpit
- DB2 Release Cycle in synch with SAP releases

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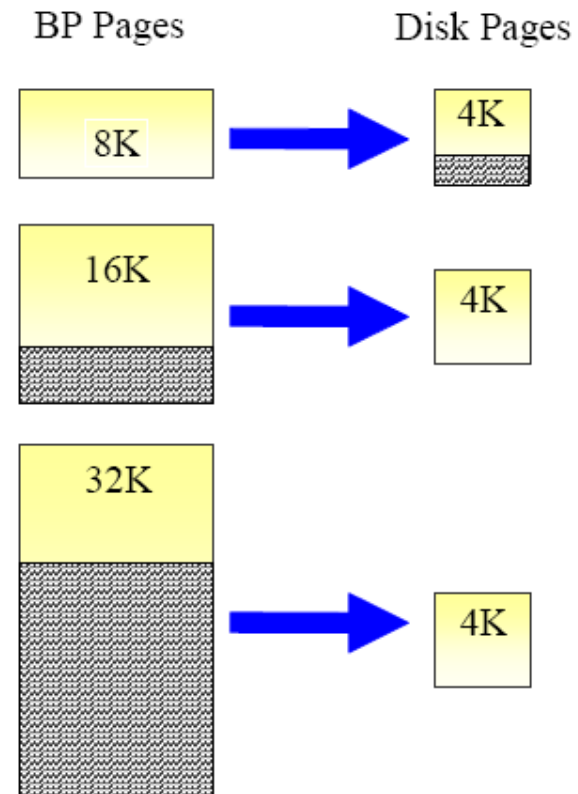
Identify used-defined unused indexes

- **SAP applications shipped with standard set of indexes**
 - Should not be deleted even if never used so far
 - May become important when new SAP service pack applied
- **Additional indexes may have been created by accident**
- **DB2 9 allows you to identify used-defined indexes that are not relevant anymore**
 - New column `LASTUSED` in RTS table `SYSIBM.SYSINDEXSPACESTATS`

→ Reduces size of SAP systems

DB2 9 Index Compression

- **Leaf pages compressed**
 - Prefix compression (software)
- **Buffering**
 - Bufferpool must be > 4KB (8KB, 16KB, 32KB)
 - On DASD always 4KB
- **No dictionary**
 - CREATE INDEX ... COMPRESS YES
- **Expected space savings 25-75%**
- **Columns that are part of index can be altered in table**
 - However, index is set to PSRBD
→ APARs PK75002 and PK79312



→ Reduces size of SAP systems

Native seamless JDBC failover for SAP Java stack

- **For SAP Java stack, DB2 driver for JDBC provides new native failover capabilities**
 - Existing native failover based on sysplex workload balancing also distributes SAP's long-running DB2 threads evenly among DB2 member
- **Transparent to SAP**
 - **Not a single line of SAP code needs to be changed**
- **Enhancements rolled out in recent fixpaks of DB2 Connect 9 and 9.5**
- **For details, refer to SAP Note 1085521**

Seamless and cascaded failover for SAP Java

- **To cover planned outages and to enable cascaded failover**
 - Delivered through DB2 Connect 9.5 FP1 Special Build 20539
 - Supports both DB2 for z/OS V8 and 9
 - APARs PK41236
- **Optimized for SAP workload**
 - Seamless failover for JDBC threads using `KEEPDYNAMIC(YES)`
 - Cascaded failover
 - Precedence of DB2 members as specified in the URL string is always honored
- **Extension to approach for JDBC failover for unplanned outages**

Collecting DB2 optimizer statistics

- **DB2 provides real-time statistics (RTS) to count the number of table changes**
 - Introduced with DB2 V7
 - **DB2 stored procedures DSNACCOR and DSNACCOX use RTS as basis for RUNSTATS recommendations**
 - Input into SAP DBA Cockpit
 - **However, which statistics should be collected for a table?**
 - Often default statistics with RUNSTATS KEYCARD option sufficient
 - For problem queries:
 - Just cardinalities?
 - Frequency distributions or a column or column group? For which columns?
 - With DB2 9, do histogram statistics help?
- This depends on the queries that access a table

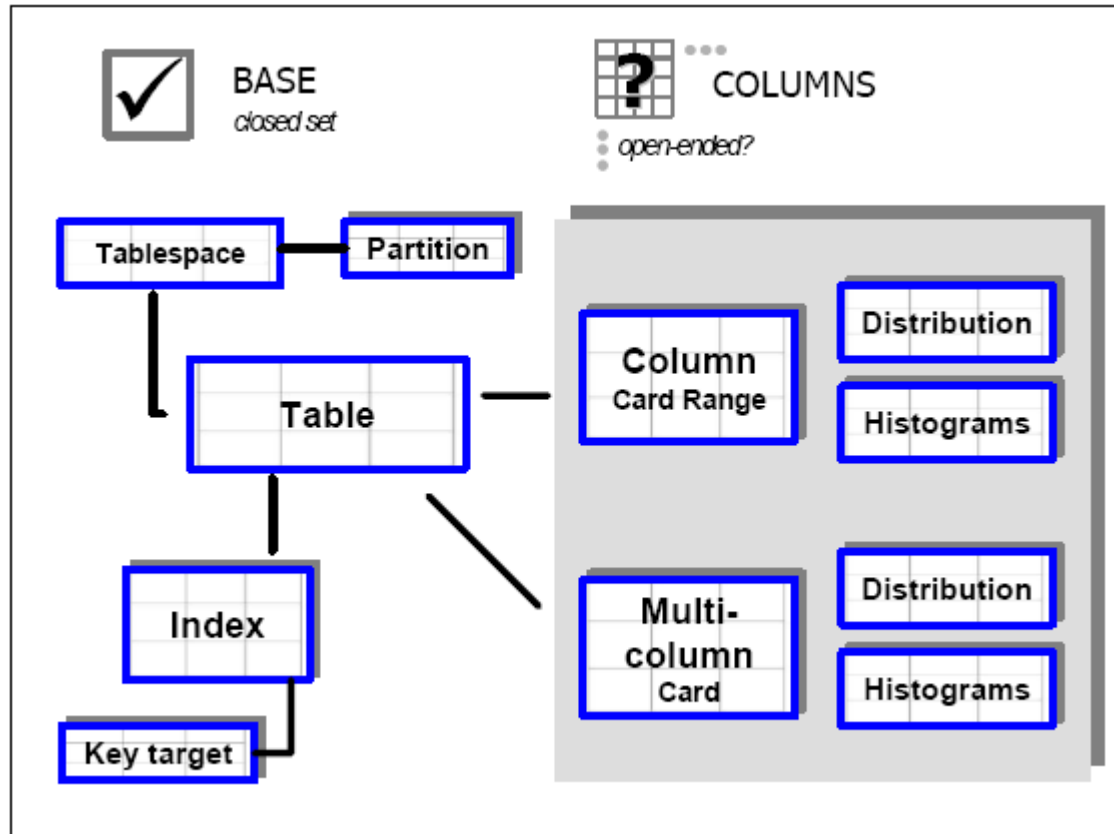
Types of DB2 statistics

- **Base statistics**

- Table cardinalities
- Index cardinalities
- Cluster ratio
- # index levels
- ...

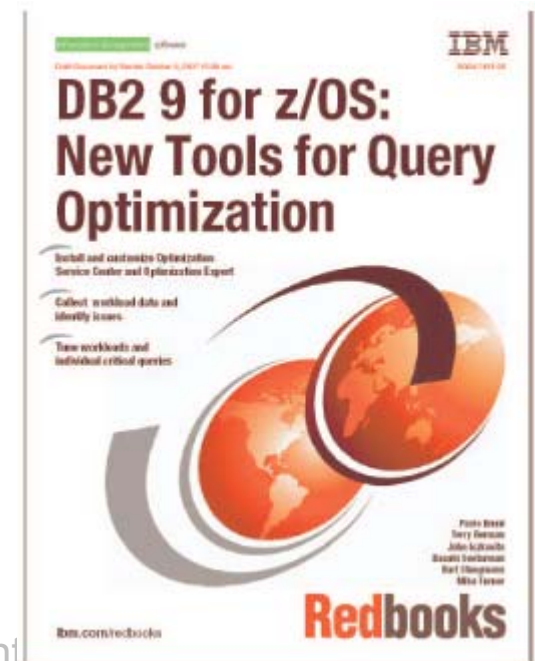
- **Column statistics**

- Single column / multi column
- Cardinality / frequency / histogram



DB2 Optimization Service Center (OSC)

- **Graphical tool running on client that deals with DB2 query optimization**
 - Built on Eclipse
- **Part of DB2 Accessories Suite for z/OS**
 - As No-charge
 - Supports DB2 for z/OS V8 and 9
 - Replaces Visual Explain
 - Also available via Web download:
 - www.ibm.com/software/data/db2/zos/downloads/osc.html
- **DB2 Optimization Expert for z/OS V2.1**
 - Add-on, one-time-charge tool
 - Exploits DB2 9 Virtual Index “What-if” Optimizer support



Identifying Problem Queries – Dynamic Statements

- **Control capturing of statements from dynamic statement cache**
 - Frequency:
 - Once – immediately or at specified time
 - Periodic sampling
 - Filter on statistics and timer fields of statement cache (IFCID 316):
 - Elapsed time
 - CPU time
 - # executions
 - # rows processed
 - ...

Tuning Queries with Stats Advisor: Single or Workload

Recommendation Summary

Number	Priority	Recommendation	Description
1	High	Run repairing RUNSTATS	Repair statistics problems for this query. Ga...
2	Low	Run complete RUNSTATS	Gather and recollect all of relevant statistic...

Recommendation Detail

RUNSTATS Control Statements

```

RUNSTATS TABLESPACE DB4LINE1.TSLINE
TABLE(SYSADM.LINEITEM) SAMPLE 5
COLGROUP(L_RETURNFLAG) FREQVAL
COUNT 10
SORTDEVT SYSDA
SHRLEVEL CHANGE REPORT YES
RUNSTATS TABLESPACE DB4SUPPLY.TSSUPPLY
TABLE(SYSADM.SUPPLIER)
COLGROUP(S_NATIONKEY) FREQVAL COUNT
10
SORTDEVT SYSDA
SHRLEVEL CHANGE REPORT YES
RUNSTATS TABLESPACE DB4ORDER.TSORDER
TABLE(SYSADM.ORDER) SAMPLE 5
    
```

Description

Repair statistics problems for this query. Gather missing statistics. Recollect conflicting statistics and potential obsolete statistics. Collect statistics for potential data skew and data correlation problems.

Actions

- Details...
- Run...
- Copy
- Save

Recommendation Explanation

DB2 BACKUP SYSTEM utility

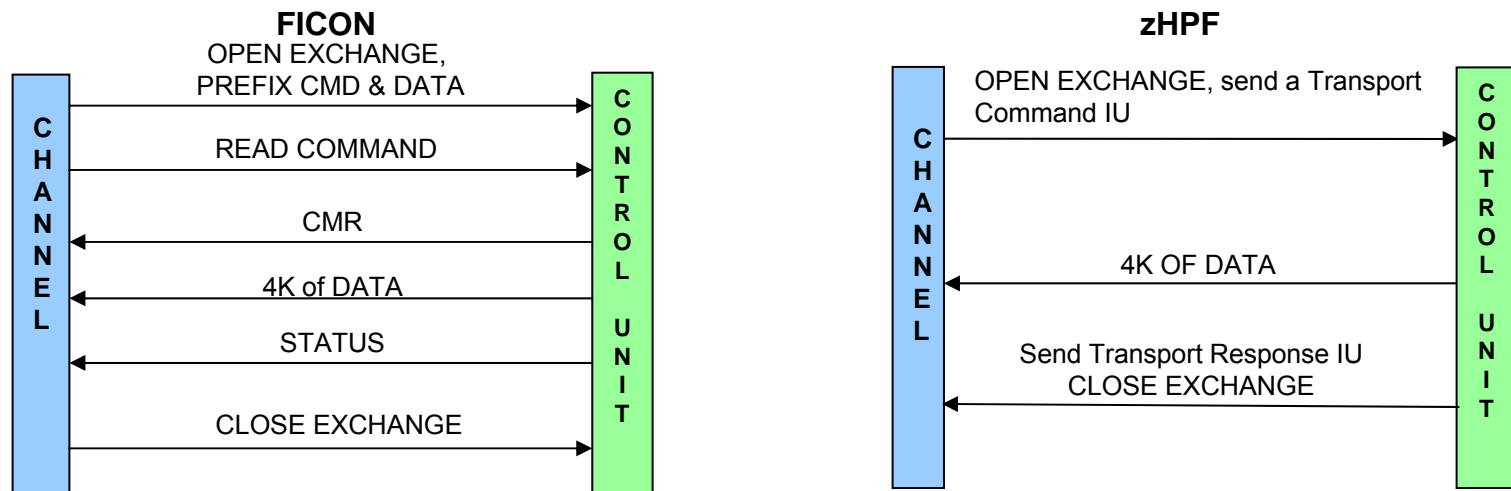
- **Initially introduced in DB2 V8**
- **Takes FlashCopy backup of data and logs**
 - Exploits z/OS DFSMSHsm fast replication services
- **Considers complete DB2 database as entity → ideal for SAP**
- **No downtime necessary**
 - Write log activity is NOT suspended
 - Always "dirty" → consistent state established during recovery
 - Compatible with any other DB2 utility
 - Prevents operations at data set level only, e.g. creation of new table space
- **DB2 single point of control**
 - Including dumping backups to tape and recovery of single objects with DB2 9

DS8000 R4.2 – Remote Pair FlashCopy

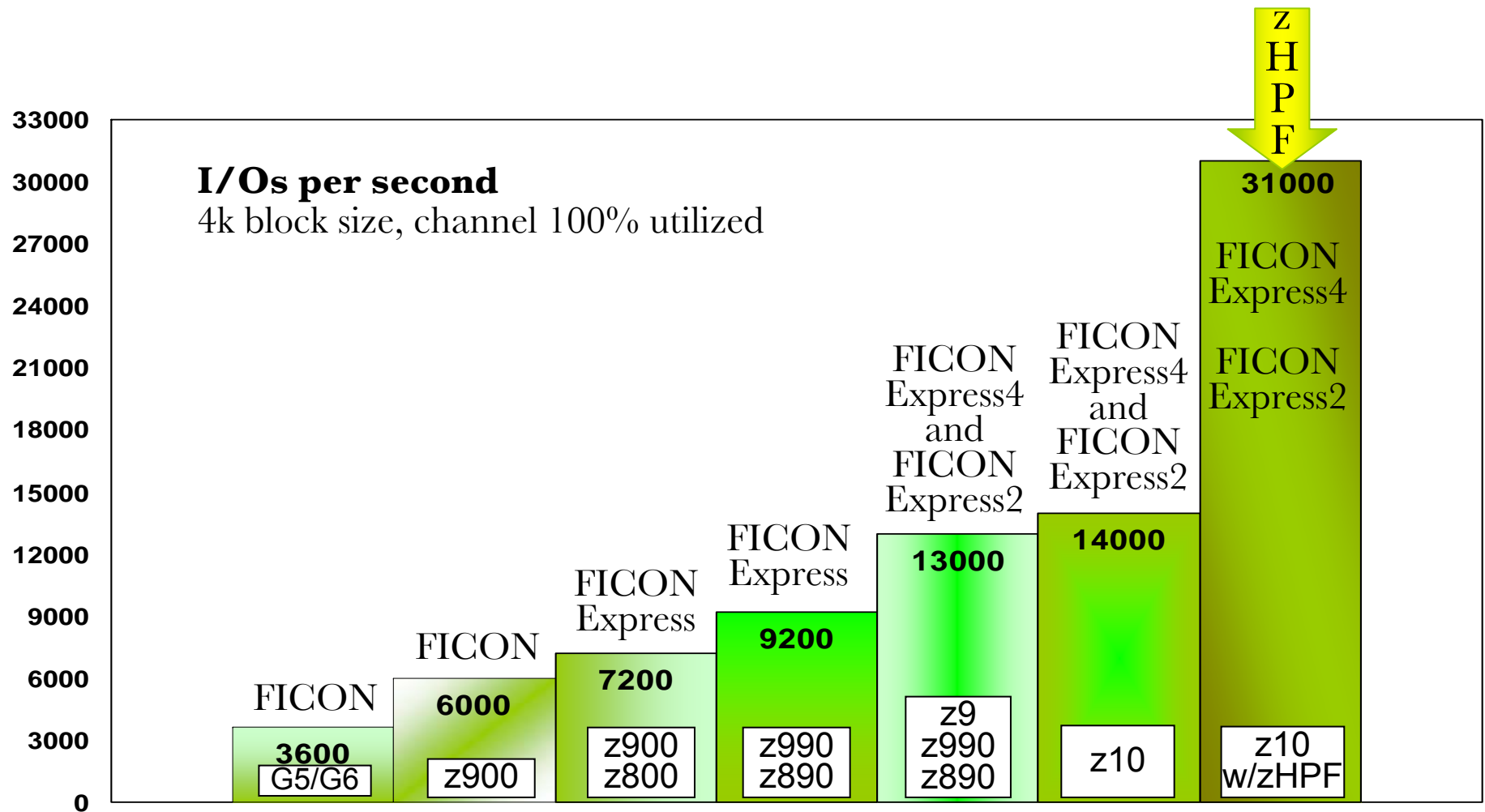
- **DS8000 R4.2**
 - Announce Date Feb 10, 2009
 - Generally available since March 6, 2009
- **Remote Pair FlashCopy**
 - Ensures seamless cooperation of FlashCopy, Metro Mirror (a.k.a. PPRC) and GDPS
 - Supports GDPS/PPRC, GDPS/Hyperswap Manager and TPC-R Basic HyperSwap
 - Allows symmetric setup of primary and secondary site
- **Particularly important for DB2 BACKUP SYSTEM**
 - If used in combination with Metro Mirror and GDPS
 - BACKUP SYSTEM implicitly invokes FlashCopy via DFSMSHsm fast replication services

DS8000 R4.1 – System z High Performance FICON (zHPF)

- **zHPF enhances z/Architecture and FICON interface architecture**
 - FICON channel and control unit overhead is reduced
 - Latency is improved and throughput is enlarged
 - DB2 benefits for sync I/Os, some log I/Os and some deferred writes
- **Today, DS8000 is the only disk system that supports this protocol**
 - Optional feature
- **zHPF provides much simpler link protocol than FICON:**



zHPF – Benchmark results for single channel

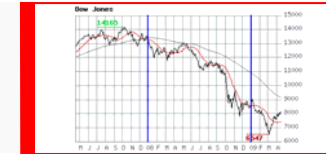


DS8000 R4.2 – Solid State Disks (SSD)

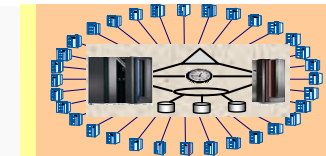
- **Semiconductor (NAND flash memory)**
 - No mechanical read/write interface, no moving parts
 - High random access rate
- **“Clustering” with respect to pages no longer matters to the disk**
- **DS8000 can mix HDDs and SSDs**
 - Supports Metro Mirror (PPRC), FlashCopy, DFSMSHsm copy pools
 - DFSMS policy based storage management (ACS routines) controls allocation of new datasets on traditional disk versus SSD
- **First measurements with SAP for Banking on DB2 9 for z/OS**
 - Technical brief „IBM System z® and System Storage DS8000: Accelerating the SAP® Deposits Management Workload With Solid State Drives” (www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101442)
 - Whitepaper „SAP for Banking performance improves running on IBM System z10 and IBM System Storage DS8300 disk system“ (<ftp://ftp.software.ibm.com/common/ssi/pm/sp/n/zss03026usen/ZSS03026USEN.PDF>)

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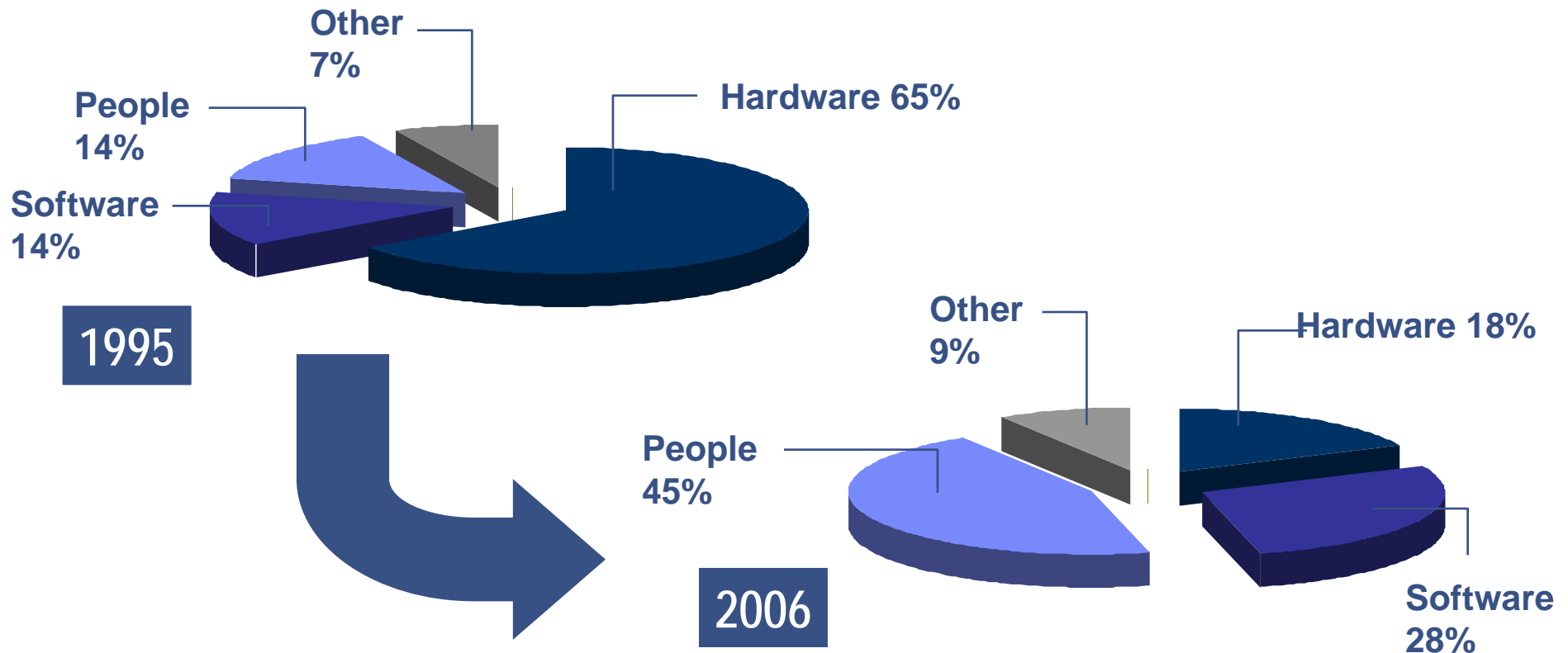
DB2 9 for z/OS



References & TCO studies



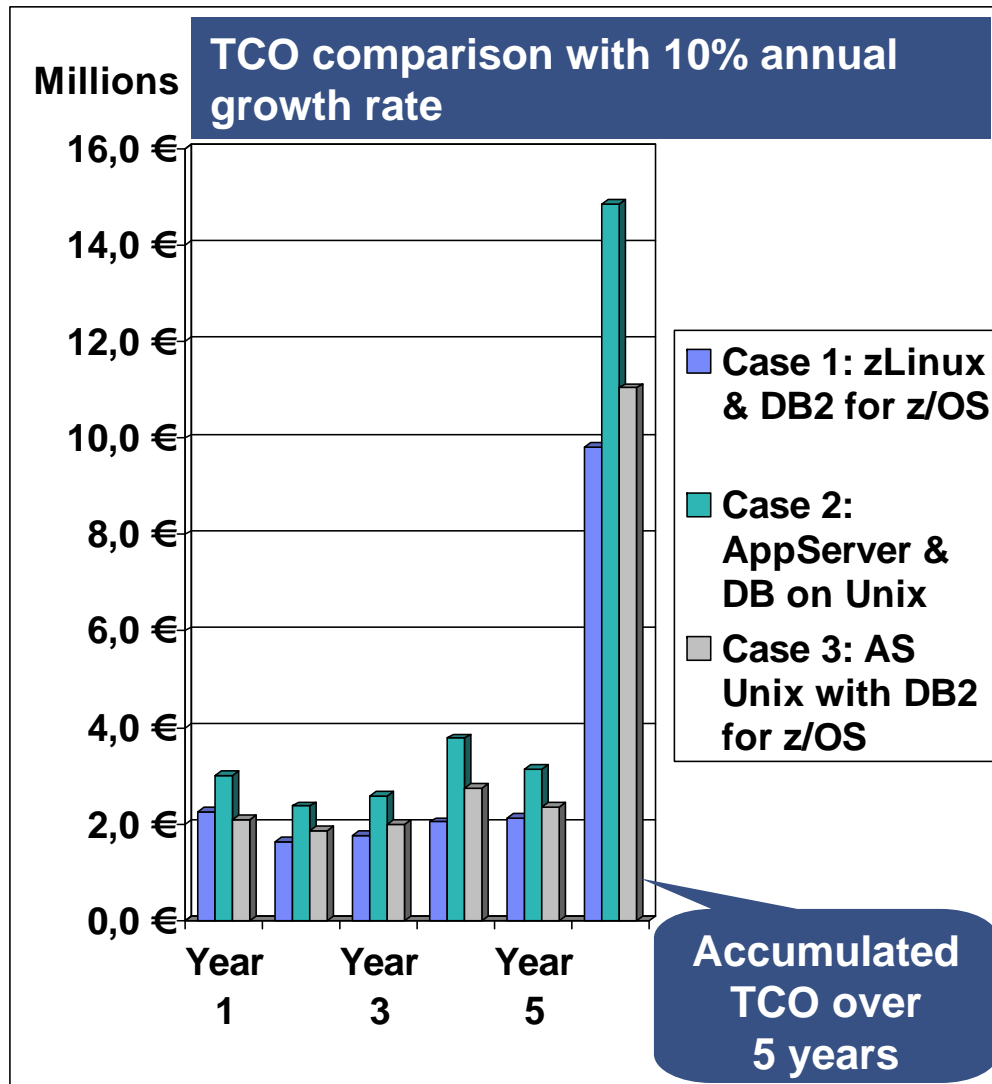
TCO factors



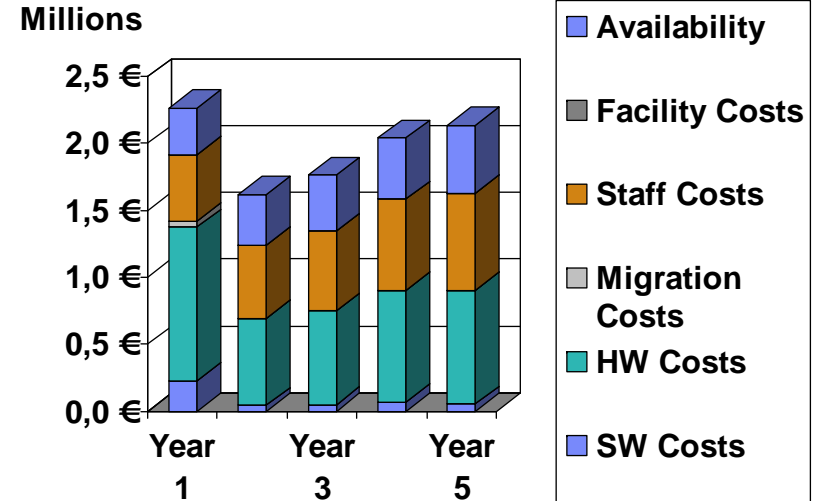
- Hardware (TCA & Maintenance)
- Software (TCA & Support)
- IT staff (Administration & Development)
- Cost of planned or unplanned Downtime

- Cost of Data Loss
- Cost of security breaches
- Cost of datacenter infrastructure
- Migration costs

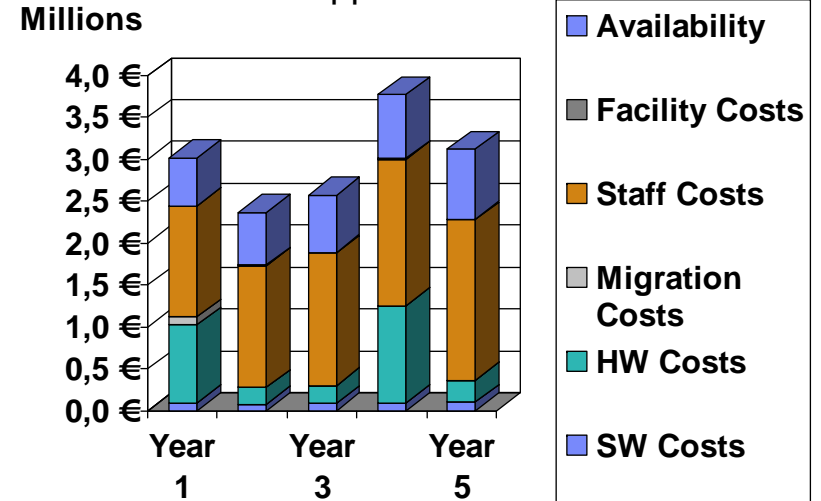
TCO study – European Retail customer 2008



Details Case 1: zLinux & DB2 for z/OS



Details Case 2: AppServer & DB on Unix



gkd-el boosts throughput by 2.7 and cuts costs by 30 %

gkd-el

manages the entire IT infrastructure for the Gelsenkirchen city government and several other customers.

Challenge

- Rapid workload growth vs. SLA
- Ensure continuous availability of key systems
- Fast provisioning of SAP application servers
- Comply to highest security standards

Solution

SAP landscape on Linux for System z to benefit from IBM z/OS® and IBM z/VM® virtualization technologies:

- IBM System z10™ Enterprise Class with IBM System z Integrated Information Processor™ (zIIP)
- IBM System z Integrated Facility for Linux™ (IFL) processor exclusively for Linux workloads
- IBM System Storage DS8100™ for data storage



Benefits:

- Average SAP dialog response times from 570ms to 190ms
- Significant reduction in upgrade downtime
- TCO reduced by 30 % with the help of zIIP and Subcapacity settings
- a flexible yet easy-to-manage infrastructure

“ The advantages of IBM System z – such as excellent stability, advanced virtualization technologies, high security and easy management – make us confident that we are prepared for any future challenge.”

Dieter Schiffer, head of IT department gkd-el

Karl Große Vogelsang, CTO at gkd-el

Harnessing the power of IBM System z and SAP for Retail at dm-drogerie markt

dm-drogerie markt is one of Germany's leading pharmacy, health, and beauty retail chains, with annual revenues of more than four billion Euros and a network of 2,000 stores. Its subsidiary, FILIADATA GmbH, provides the IT services.

Challenge

In an intensely competitive environment, squeezing costs out of logistics and related business processes is central to success. This in turn depends on rapid analysis of data. To enable this, dm-drogerie markt continuously develops its SAP applications. As the sophistication of the software increased, its existing hardware platform was struggling to keep up – hindering the company's growth.

Solution

A seamless migration of the DB2 databases supporting its SAP for Retail environment to two IBM System z9 Enterprise Class mainframes – mirrored between two data centers for high availability and disaster recovery.



Benefits:

- Response times faster than 500ms give users the performance they need
- Standardized virtual environment makes it simpler to add new SAP applications
- Robust and fully redundant infra-structure bolsters business resilience.
- Workload-based pricing model helps to control costs and plan IT budgeting.

“The maturity and technical sophistication of the System z platform is second to none, and IBM is the only supplier with the expertise to unite SAP applications with mainframe technologies.”

Mr. Christian Stäblein

IT Production Manager FILIADATA GmbH

Next Steps & More Information !

- **IBM global CEO Study 2008**
 - [The Enterprise of the Future](#)
- **Business Value of Running SAP Applications on System z**
 - [Pocket Mentor: Backbone for Business Success](#)
- **Customer References**
 - [gkd-el boosts SAP system throughput by 270 per cent and cuts costs by 30 per cent by migrating SAP solutions to IBM System z10 Enterprise Class](#)
 - [Harnessing the power of IBM System z and SAP for Retail at dm-drogerie markt](#)
 - [Belarusian Railways transforms operations and reporting with SAP and IBM](#)
- **IBM Redbooks**
 - [Best Practices for SAP BI using DB2 9 for z/OS](#)
 - [Enhancing SAP by Using DB2 9 for z/OS](#)
 - [SAP on DB2 9 for z/OS: Implementing Application Servers on Linux for System z](#)
- **SAP Community Network**
 - [SAP on DB2 for z/OS](#)
- **SAP Reference Architectures for System Infrastructure**
 - [SAP for Banking on System z](#)
 - [SAP for Insurance on System z](#)



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Questions ? Need Help ?

Contact ISICC@de.ibm.com

System z10

zEND

Thank you !

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