



SAP DB: Reducing Total Cost of Ownership for Data Management

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DBMS are a Commodity !?

Feature-wise: yes

Price-wise: no

The DBMS market is dominated by three players

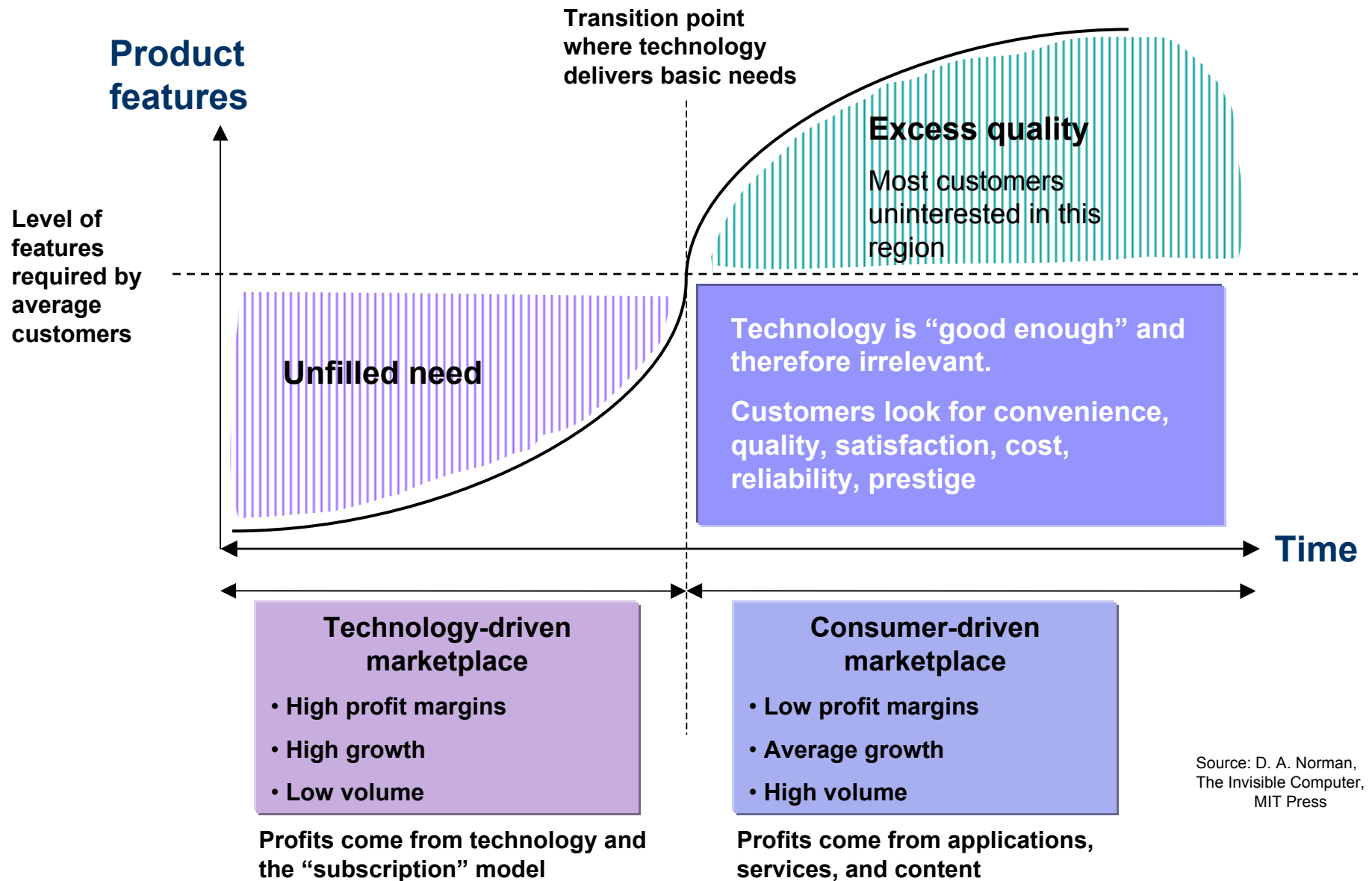
- Oracle
- IBM
- Microsoft

DBMS technology has reached a saturation level

The feature war is over

DBMS pricing has not fully realized this market shift

DBMS Market Transition



Source: D. A. Norman,
The Invisible Computer,
MIT Press

Do OS or DBMS matter?

OS are important, but they matter less and less

- **Linux vs. Windows is important for Microsoft but not for CIOs**

DBMS are important, but they matter less and less

- **SAP DB vs. any other DBMS is no more important for CIOs**

Important questions for CIOs are:

- **Do we run the right applications?**
- **Can they be customized?**
- **Does everything fit into our budget?**
- **Can our IT staff handle the systems?**
- **Who will provide service and support?**

SAP's Motivation to Open Source SAP DB

Energize competition in the DBMS market

- Establish SAP DB in the DBMS market
- End the over-priced phase of the DBMS market
- Define new rules for the DBMS market

Create a community of SAP DB users beyond SAP's customers

Use the Open Source community to get feedback for improvements



SAP's Commitment to SAP DB

SAP DB is SAP's strategic DBMS offering

- Part of SAP's technology stack
- Runs all SAP applications
- Means one-stop shopping for our customers
- Default DBMS for SAP J2EE Engine in Web AS 6.30

SAP DB's feature set and performance level is comparable to our competitors

SAP DB has been designed for easy administration and minimal costs of ownership

SAP heavily invests into the development of SAP DB

Open sourcing SAP DB is our “sales channel” to the non-SAP world

Teaming up with MySQL

Cross licensing and joint development agreement with MySQL

MySQL is the most popular Open source DBMS

Combining the enterprise-ready SAP DB technology with the community and eco-system of MySQL

SAP DB will be renamed with a MySQL branding

Ongoing SAP DB development, maintenance and support by SAP

Joint development of a next-generation DBMS



www.mysql.com

SAP DB Customers (1)

R/3

Vaillant GmbH, Germany, 650 GB, 1800 user, R/3, HP-UX/64

Intersnack, Germany, 400 GB, 300 user, R/3, Windows

Deutsche Post, Germany, 120 systems (40P), e.g. 8*120 GB, Windows, 8 CPU

TDS, Germany, 80 systems, application service provider

Thyssen TKIS, Germany, 80 systems

Toyota, South Africa

Tenaga, Malaysia

APEX Corp. , Japan

Yamaha, Japan

Showa Denko, Japan

Siderar, Argentina

SAP DB Customers (2)

APO / *live*Cache

Colgate, USA

Intel, USA

Eli Lilly, USA

Bayer, Germany

Bosch, Germany

Daimler-Chrysler, Germany

Epcos, Germany

Nestlé, Switzerland

Aventis, France



SAP DB Platforms

IBM AIX

HP-UX

Sun Solaris

Linux

Windows NT, 2000, XP, 2003

It's your choice

Present and Future DBMS Requirements

1) Performance

2) Availability

3) Ease of use

Our vision:

- Zero administration DBMS
- Invisible DBMS

Your benefit:

- Lowest cost of ownership
- Simplicity
- Convenience

Design Rationale of SAP DB

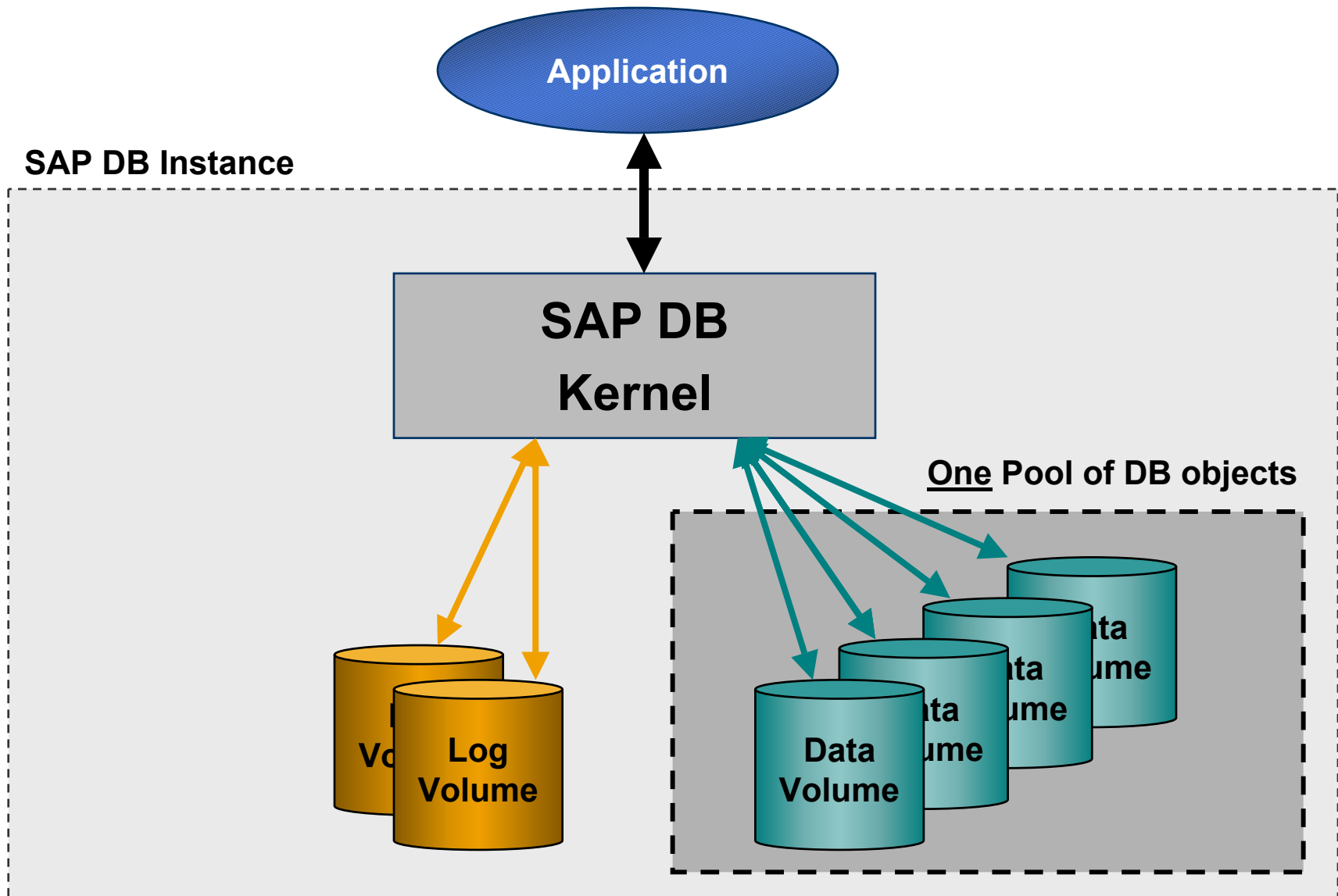
- Do things right** – **simply elegant**
- No non-sense** – **less is more**
- Fight complexity** – **elegant simplicity**

Make the product as simple as possible – but not simpler

Our Vision



Anatomy of a SAP DB Instance





SAP DB's Ease of Use

Few configuration parameters

No size estimates for individual database objects

Automatic space allocation and de-allocation

Automatic balancing of disk I/O

No permanent attention required

Low cost of ownership



High Availability of SAP DB

No reorganization

Online backup of database and log

Online extension of database and log

Online change of configuration parameters

Parallel backup and restore

Support of cluster and hot-stand-by configurations (failover)

No planned shutdowns, continuous operation

What Means Minimal Cost of Ownership?

License costs low impact

Maintenance costs low impact

Hardware resources low impact

DBA resources high impact

TCO means people

DBMS Experiences of SAP Hosting

System A:

- ◆ Needs lots of hard disk space
- ◆ Needs DB reorg every 3 to 6 months
- ◆ Inefficient backup
- ◆ Needs higher I/O rate (factor 2) in comparison to SAP DB (same workload)

System B:

- ◆ Can not backup logs and DB in parallel
- ◆ Needs higher I/O rate (factor 2) in comparison to SAP DB (same workload)
- ◆ High CPU consumption

System C:

- ◆ Needs lots of hard disk space
- ◆ Needs DB reorg every 3 to 6 months

SAP DB:

- ◆ More or less no administration needed once the database is set up
- ◆ Does not need a DB reorganization
- ◆ Less disk and CPU resources needed

Disk Space Comparisons Made by SAP Hosting

Migrations from System A → SAP DB:

- ◆ Database size shrinks to 30 - 40% of its previous size

Migration from System C → SAP DB

- ◆ Database size shrinks to 30 - 40% of its previous size

DBA Resources As Planned by SAP Hosting

DB Size / Instance	SAP DB	System B	System A	System C
0 - 30 GB	0,1	0,2	0,2	0,2
30 - 100 GB	0,1	0,2	0,5	0,5
100 - 500 GB	0,2	0,4	0,5	0,5
500 GB - 1 TB	0,2	0,5	1,0	1,0
> 1 TB	0,3	1,0	1,5	1,5



SAP DB Performance

Multi-process / multi-threaded server

SMP scalability

Minimal I/Os

Parallel CREATE INDEX

Specific tuning for SAP applications

Competitive performance level

SAP DB Benchmark – Small Configuration

■ 1 Central Server

- 2-way SMP, Intel Xeon 3.06 GHz
- 512 KB L2 Cache, 3 GB main memory

■ 292 concurrent users in SAP's SD Benchmark Profile

- | | |
|--------------------------------|------------------------------|
| ■ Average Dialog Response Time | 1,96 sec |
| ■ CPU utilization on DB server | 98 % |
| ■ SAP DB Version | 7.3 |
| ■ Operating System | SuSE SLES 8 |
| ■ Total Disk Space | 108 GB |
| ■ Throughput | 1.470 Benchmark Items (SAPS) |

- www.sap.com/benchmark

SAP DB Benchmark – Small Configuration II

■ 1 Central Server

- 4-way SMP, Intel Itanium II, 1 GHz
- Caches: 32 KB L1, 256 KB L2, 3 MB L3
- 7 GB main memory

■ 470 concurrent users in SAP's SD Benchmark Profile

- | | |
|--------------------------------|------------------------------|
| ■ Average Dialog Response Time | 1,74 sec |
| ■ CPU utilization on DB server | 99% |
| ■ SAP DB Version | 7.3 |
| ■ Operating System | SuSE SLES 8 |
| ■ Total Disk Space | 51 GB |
| ■ Throughput | 2.400 Benchmark Items (SAPS) |

- www.sap.com/benchmark

SAP DB Benchmark – Medium Large Configuration

■ 1 Database Server

- 8-way SMP, Intel Xeon 2.0 GHz
- 2 MB L3 Cache, 8 GB main memory

■ 61 Application Servers

- 48 Dialog Servers, 2-way SMP
- 12 Update Servers, 2-way SMP
- 1 Message/Enqueue Server , 1-way

■ 5500 concurrent users in SAP's SD Benchmark Profile

- | | |
|------------------------------------|-------------------------------|
| ■ Average Dialog Response Time | 1,96 sec |
| ■ CPU utilization on DB server | 98 % |
| ■ SAP DB Version | 7.3 |
| ■ Operating System Database Server | SuSE SLES 8 |
| ■ Operation System Applic. Servers | SuSE SLES 7 |
| ■ Total Disk Space | 2.500 GB |
| ■ Throughput | 27.770 Benchmark Items (SAPS) |

- www.sap.com/benchmark

Customer Statement of Translogic Corporation (1)

Located in Denver, CO

Part of Swisslog, Switzerland

Product portfolio:

- **Pneumatic tube systems**
- **Electric track vehicles**
- **Automatic guided vehicles**
- **Selective vertical conveyors**

SAP system landscape:

- **2 application servers (2-way Intel boxes)**
- **DB server with 2 GB memory and 270 GB disk space**
- **140 named R/3 users**
- **SAP DB customer since 1996**

Customer Statement of Translogic Corporation (2)

Quotes from Charlie Brann, SAP Administrator:

During these last seven years, we have found this database product to be very stable and highly reliable. We have a relatively small IT staff with only one SAP Technical Resource person: me. I serve as ABAP programmer, Security administrator, Basis administrator, and DBA.

I've worked with System A and System B in the past, but I find SAP DB to be easier to administer, more stable, and it requires a great deal less of my time.

There is no recurring daily, weekly, or monthly process that must be accomplished to keep the DB humming. I spend only an hour or so a week on the DB directly, just checking and verifying – just in case ...

SAP DB Interfaces & Tools

Operations	Tools	Interfaces
Database Manager DBMGUI (Windows) Web DBM DBMCLI DBAnalyzer <ul style="list-style-type: none">• Installation• Configuration• Monitoring• Backup/Restore• AutoSave	SQL Studio (Windows) Web SQL Loader	C/C++ precompiler ODBC 3.5 JDBC 3.0 Perl Python PHP SQLCLI

SAP DB Kernel

SAP DB Database Manager (1)

The screenshot displays the SAP DB Database Manager application window. The interface includes a menu bar (File, Edit, View, Instance, Database, Help), a toolbar, and a left-hand navigation pane. The main area shows a table of database status and a detailed view for the selected database, DB_74.

Databases Table:

Name	State	Data	Log	Sessions	Data Cache Hit ...	AutoLog	Backup	Warning
DB_72	Offline							
DB_73	Online	24 %	27 %	20 %	100 %	On		
LC1_74	Online	26 %	2 %	20 %	100 %	On		
CS_74	Online	26 %	28 %	20 %	100 %	Off		
DB_74	Online	29 %	16 %	20 %	100 %	On		

Database - DB_74 (04.06.2002 14:06:57)

Data: 29 %
Perm:20.440KB Temp:112KB Used:20.552KB Free:51.448KB

Log: 16 %
Used:1.296KB Free:6.688KB

Sessions: 20 %
Used: 1 Free: 4

Configuration:

Converter Cache Hit Rate:		Database Full:	No
Data Cache Hit Rate:	100 % <input checked="" type="checkbox"/>	Connect Possible:	Yes
AutoLog:	On <input checked="" type="checkbox"/>		
Bad Devspaces:	0		
Bad Indexes:	0		
Database Monitoring:	On		
Command Monitoring:	Off	Kernel Trace:	On

Bottom Panel:

Database	Error Code	Description	Date/Time

DB_74 DB_74 on <local>

SAP DB Database Manager (2)

The screenshot displays the SAP DB Database Manager window. The left sidebar shows a tree view of databases: Berlin (DBS72, DBS73, DBS74) and Hamburg (DB_74). The main area shows a table of database status and a backup progress window for DB_74.

Name	State	Data	Log	Sessions	Data Cache Hit ...	AutoLog	Backup	Warning
DB_72	Offline							
DB_73	Online	24 %	27 %	20 %	100 %	On		
LC1_74	Online	26 %	2 %	20 %	100 %	On		
CS_74	Online	26 %	28 %	20 %	100 %	Off		
DB_74	Online	29 %	16 %	20 %	100 %	On	52 %	

Backup - Complete - DB_74

Save to medium...
 10496 KB transferred (52%).
 1312 pages transferred (52%).

dat3

Backup Type:
Complete

Location:
c:\dbs\db_74\dat3

Modified:
16.05.2002 14:24:44

Recovery
Tuning
Check
Configuration

Database	Error Code	Description	Date/Time
----------	------------	-------------	-----------

DB_74 DB_74 on <local>

SAP DB Database Manager (3)

Database Manager

File Edit View Instance RecoveryDatabase Help

Databases

- Berlin
 - DBS72
 - DBS73
 - DBS74
- Hamburg

Name	State	Data	Log	Sessions	Data Cache Hit ...	AutoLog	Backup	Warning
DB_72	Offline							
DB_73	Online	30 %	35 %	40 %	100 %	On		
LC1_74	Online	40 %	1 %	20 %	100 %	On		
CS_74	Online	16 %	15 %	20 %	100 %	On		
DB_74	Admin							

Recovery - Database - DB_74

Restoring from medium...

LOG_00056

Label	Medium	Location	External Backup ID	Transferred	Status
✓ DAT_00004	dat2	c:\dbs\db_74\dat2		100 %	58240 KB transferred (100%)
✓ PAG_00005	incr3	c:\dbs\db_74\incr3		100 %	7808 KB transferred (100%)
✓ LOG_00052	log	c:\dbs\db_74\log.052		100 %	5504 KB transferred (100%)
✓ LOG_00053	log	c:\dbs\db_74\log.053		100 %	5504 KB transferred (100%)
✓ LOG_00054	log	c:\dbs\db_74\log.054		100 %	5504 KB transferred (100%)
✓ LOG_00055	log	c:\dbs\db_74\log.055		100 %	5504 KB transferred (100%)
→ LOG_00056	log	c:\dbs\db_74\log.056			
LOG_00057	log	c:\dbs\db_74\log.057			
LOG_00058	log	c:\dbs\db_74\log.058			

Database Error Code Description Date/Time

DB_74 DB_74 on <local>

Web DBM

SAPDB Database Manager - Microsoft Internet Explorer provided by SAP IT

File Edit View Favorites Tools Help

Log Off **SAP DB**

Database Manager

Information

- Backup History
- Caches
- Data
- IO
- Log
- Locks
- Sessions
- Versions

Backup

- Complete
- Incremental
- Log
- AutoLog On/Off

Recovery

- Database
- Index
- Volumes

Tuning

- Optimizer
- Statistics
- Index Use

Check

- Database
- Backup
- Server
- Files
- Kernel Trace
- Command

Configuration

- Backup Media
- Parameters
- Volumes
- Log Mode
- Users
- Upgrade System
- Tables

State - db_74 on p59953

Refresh

Data	91%	Converter Cache Hit Rate	0%	AutoLog	ON
Log	3%	Data Cache Hit Rate	100%	Bad Indexes	NO
ONLINE Sessions	40%	Database Full	NO	Kernel Trace	ON

Offline Admin Online

javascript:Refresh()

Local intranet

SAP DB SQL Studio

SQL Studio [SQLTRAVEL00,DB72B,Local Host]

File View Direct SQL Window Help

SQL QBE ! ? WAN Mode No Timeout

DB72B

- SQL Studio Objects
 - Local Folder
 - Customers
 - Customer 1999
 - Customer 2000
 - Customer-Hotel
 - SQL All Customer
 - Hotel
 - QBE Hotel 2
 - new hotel
 - Rooms
 - most exp. room
 - Webqueries
 - All Customers
 - New Customers
- Tables
 - DBA
 - DOMAIN
 - SQLTRAVEL00
 - ACCOUNT
 - CITY
 - CUSTOMER
 - CUSTOMER_ADDR
 - CUSTOM_HOTEL
 - HOTEL
 - HOTEL2
 - HOTEL_ADDR
 - RESERVATION
 - ROOM
 - SQLTRAVEL10
 - HOTEL
 - HOTEL_ADDR
 - ROOM
 - SQLTRAVEL20
 - SYS
 - Indexes
 - Sequences
 - Favorites
 - SQLTRAVEL00.CITY
 - SQLTRAVEL00.HOTEL
 - Owned Users

New SQL Statement

```
Select * From "SQLTRAVEL00"."ROOM" where Price < 1000
//
Select Continent,Country,Region,Name Address,Zip
RooyType,Price
From Hotel,Room
Where Continent Like 'Am*'
And Hotel.Hno = Room.Hno
```

INS Ln 5, Col 16 Ln 1 - Ln 7 of 7 Lns

	CONTINENT	COUNTRY	REGION	ADDRESS	ROOMTYPE	PRICE
1	America	U.S.A	New York	Long Island	11788	100
2	America	U.S.A	New York	Long Island	11788	70
3	America	U.S.A	Missouri	Regency	20037	80
4	America	U.S.A	Missouri	Regency	20037	45
5	America	U.S.A	California	Eight Avenue	10019	140
6	America	U.S.A	California	Eight Avenue	10019	85
7	America	U.S.A	Michigan	Lake Michigan	60601	180
8	America	U.S.A	Michigan	Lake Michigan	60601	105
9	America	U.S.A	Michigan	Lake Michigan	60601	500
10	America	U.S.A	Texas	Airport	60018	200
11	America	U.S.A	Texas	Airport	60018	120
12	America	U.S.A	Texas	Airport	60018	500
13	America	U.S.A	New York	Empire State	12203	180
14	America	U.S.A	New York	Empire State	12203	115
15	America	U.S.A	Georgia	Midtown	10019	150
16	America	U.S.A	Georgia	Midtown	10019	90
17	America	U.S.A	Georgia	Midtown	10019	400
18	America	U.S.A	California	Sunshine	33575	150

Rows in Result: 39 Select Continent,Country,Region,Name Address,Zip RooyType,Price From Hotel,Room Where Cont

Auto Commit: On SQL Mode: Internal Select * From "SQLTRAVEL00"."ROOM" where Price < 1000 Select Continent,Country,Region,Name Address,Zip RooyType,Price From Hotel,Room Where Continer

SQLTRAVEL00 DB72B Local Host

SAP DB Web SQL Studio

The screenshot displays the SAP DB Web SQL Studio interface. The top menu bar includes File, Edit, View, Favorites, Tools, and Help. The address bar shows the URL: http://p48123:85/websql/005000000000. The main header area contains 'Log Off' and 'SAP DB'.

On the left, a tree view shows the database structure: sqltravel00 on db73, with folders for City, Customer, Hotels, and test. Under Hotels, there are objects: Call dbproc, Hotel (selected), Proc_Hotel_Preis, and some sql. Below the tree are buttons for 'Create Folder', 'Rename', 'Move To Folder', and 'Delete'.

The central area displays a SQL query:


```
SELECT SQLTRAVEL10.HOTEL.NAME,
       Hoteladdress = SQLTRAVEL10.HOTEL.ADDRESS,
       SQLTRAVEL00.CUSTOMER.TITLE,
       Customername = SQLTRAVEL00.CUSTOMER.NAME,
       SQLTRAVEL00.CUSTOMER.FIRSTNAME,
       SQLTRAVEL00.CUSTOMER.ADDRESS,
       SQLTRAVEL00.RESERVATION.ARRIVAL,
       SQLTRAVEL00.RESERVATION.DEPARTURE
```

 The 'Path of Stored Statement' is set to /Hotels/Hotel. To the right of the query editor are settings: Autocommit (On), SQL Mode (Internal), Isolationlevel (Committed), and Type (Visual Query). Below the query editor are buttons for 'Execute', 'Clear', 'Prev Statement', 'Next Statement', and 'Save in selected Folder'.

The bottom section shows the query results in a table format. The table has 8 columns: NAME, HOTELADDRESS, TITLE, CUSTOMERNAME, FIRSTNAME, ADDRESS, ARRIVAL, and DEPARTURE. The results are as follows:

NAME	HOTELADDRESS	TITLE	CUSTOMERNAME	FIRSTNAME	ADDRESS	ARRIVAL	DEPARTURE
Lake Michigan	354 OAK Terrace	Company	Datasoft	?	486 Maple Str.	1995-11-14	1995-11-18
Empire State	65 Yellowstone Dr.	Mrs	Smith	Sally	250 Curtis Street	1996-03-14	1996-03-24
Empire State	65 Yellowstone Dr.	Mrs	Baker	Susan	200 MAIN STREET, #94	1995-04-12	1995-04-15
Midtown	12 Barnard Str.	Mrs	Porter	Jenny	1340 N.Ash Street, #3	1995-11-13	1995-11-15
Midtown	12 Barnard Str.	Company	T00Lware	?	410 Mariposa Str., # 10	1995-04-12	1995-04-30
Beach	1980 34th Str.	Mrs	Porter	Jenny	1340 N.Ash Street, #3	1995-12-24	1996-01-06
Atlantic	111 78th Str.	Mr	Howe	George	111 B Parkway, #23	1996-02-01	1996-02-03

The status bar at the bottom indicates 'Local intranet'.

Summary

Buying a DBMS is no longer a strategic but a tactical decision

Reasons to buy SAP DB

- **SAP DB automates most DBA activities which means minimal TCO**
- **Buying your DBMS from SAP means one-stop shopping**
- **SAP DB is fit for the job and tuned for SAP applications**

SAP DB

The Enterprise Open Source DBMS

www.sapdb.org





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