



From SAP DB to MySQL MaxDB

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SAP AG

Agenda

DBMS Market Today

SAP DB and Open Source

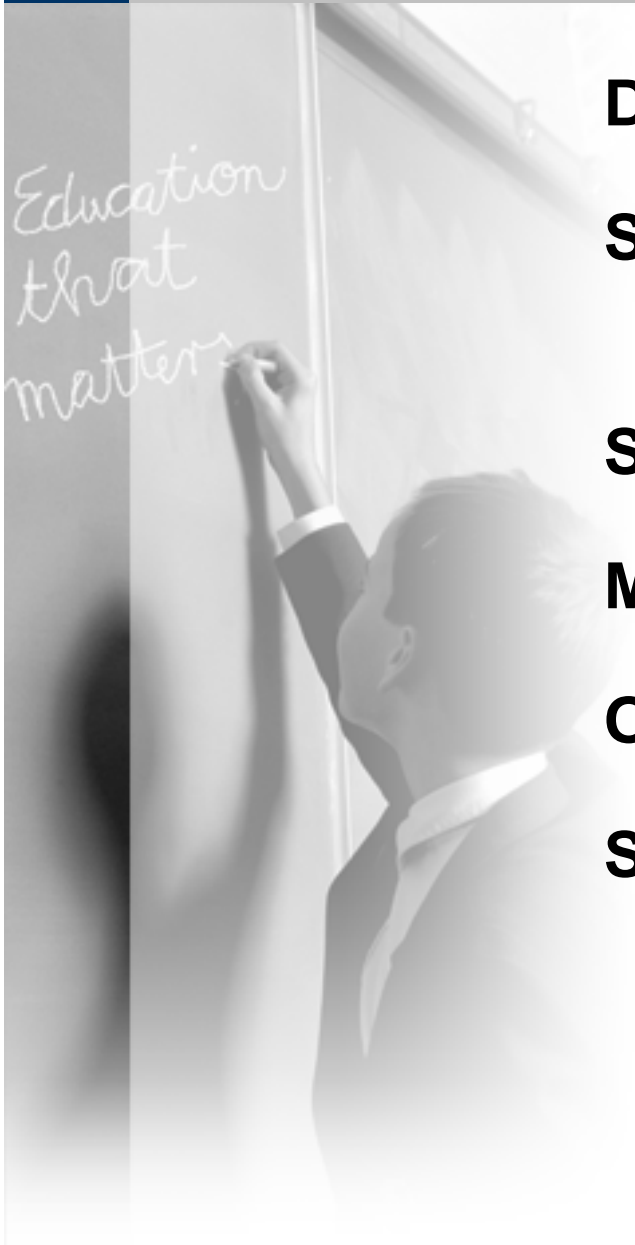
- Teaming up with MySQL

SAP DB at Work

Minimal TCO with SAP DB

Outlook to MaxDB 7.5

Summary





DBMS Market Today

DBMS are 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

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 DB and Open Source



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**

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

Ongoing SAP investment into the development of SAP DB

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 has been renamed to MaxDB by MySQL

Ongoing SAP DB development, maintenance and support by SAP

Joint development of a next-generation DBMS



www.mysql.com



Consequences for SAP Customers

Rebranding will not affect existing SAP customers

SAP solutions on MaxDB will shipped with Web AS 6.40

MaxDB is the continuation of the SAP DB code line, that is identical behaviour and performance

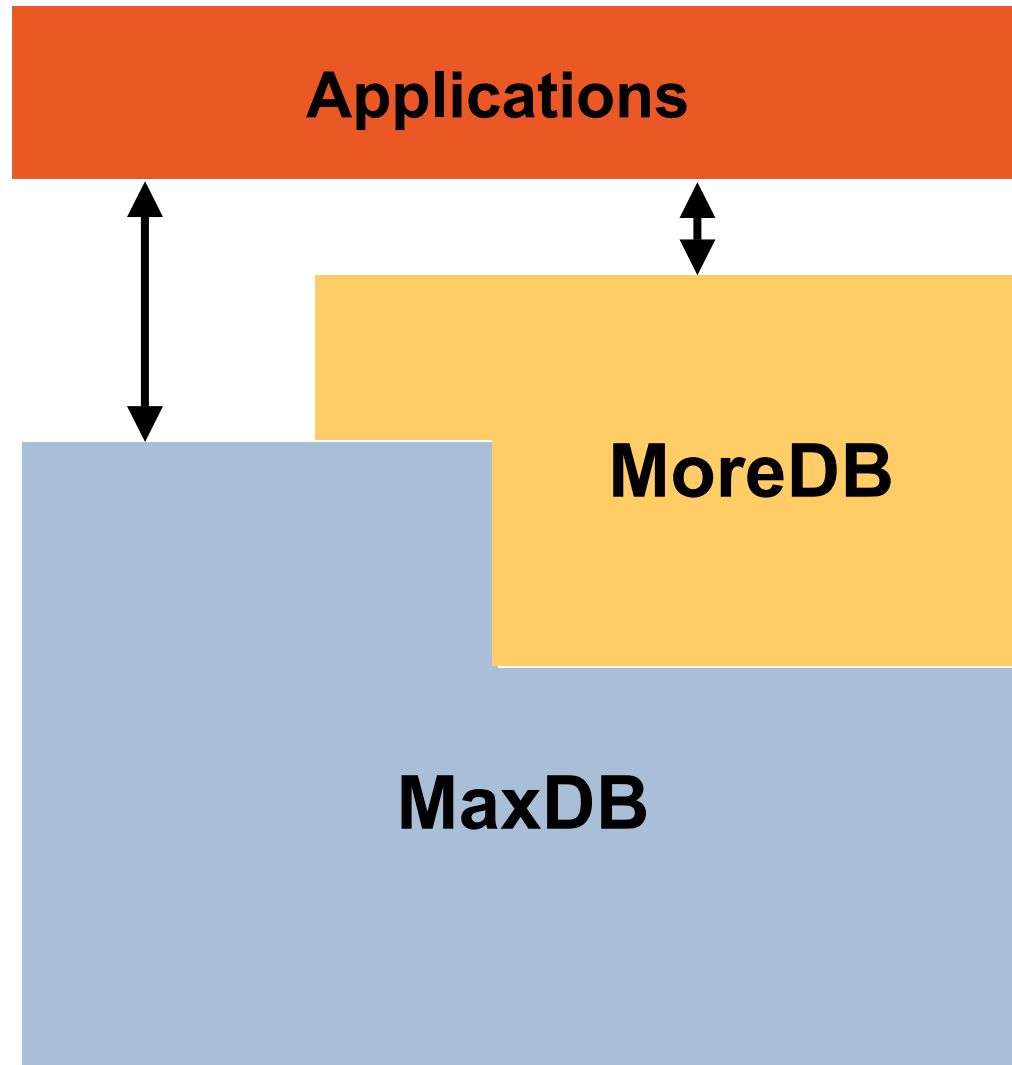
Replacing SAP DB 7.3 and 7.4 by MaxDB 7.5 in our open source offering has no impact on the end of their maintenance schedule

Pricing will not change for current SAP DB users even when upgrading to MaxDB versions

Pricing changes planned for new customers in 2004

No impact for mySAP SCM and *liveCache* customers

liveCache = MaxDB + MoreDB





SAP DB at Work

Statistics

SAP DB as core DBMS has about **2300** installations

SAP DB as *liveCache* for APO has about **2700** installations

SAP DB as Content Server for KM has about **1800** (optional) installations

This means a total of of about **5000 – 6800** installations worldwide

Numbers of August 2003

SAP DB Customers (1)

R/3

Vaillant GmbH, Germany, 800 GB, 1800 user, R/3, HP-UX/64

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

**Deutsche Post, Germany, 120 systems, e.g. 8*120 GB,
Windows, 8 CPU**

TDS, Germany, 90 systems, application service provider

Thyssen (Triaton), Germany, 90 systems , one with 2 TB size

Toyota, South Africa

Tenaga, Malaysia

APEX Corp. , Japan

Yamaha, Japan

Showa Denko, Japan

SAP DB Customers (2)

APO / liveCache

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:

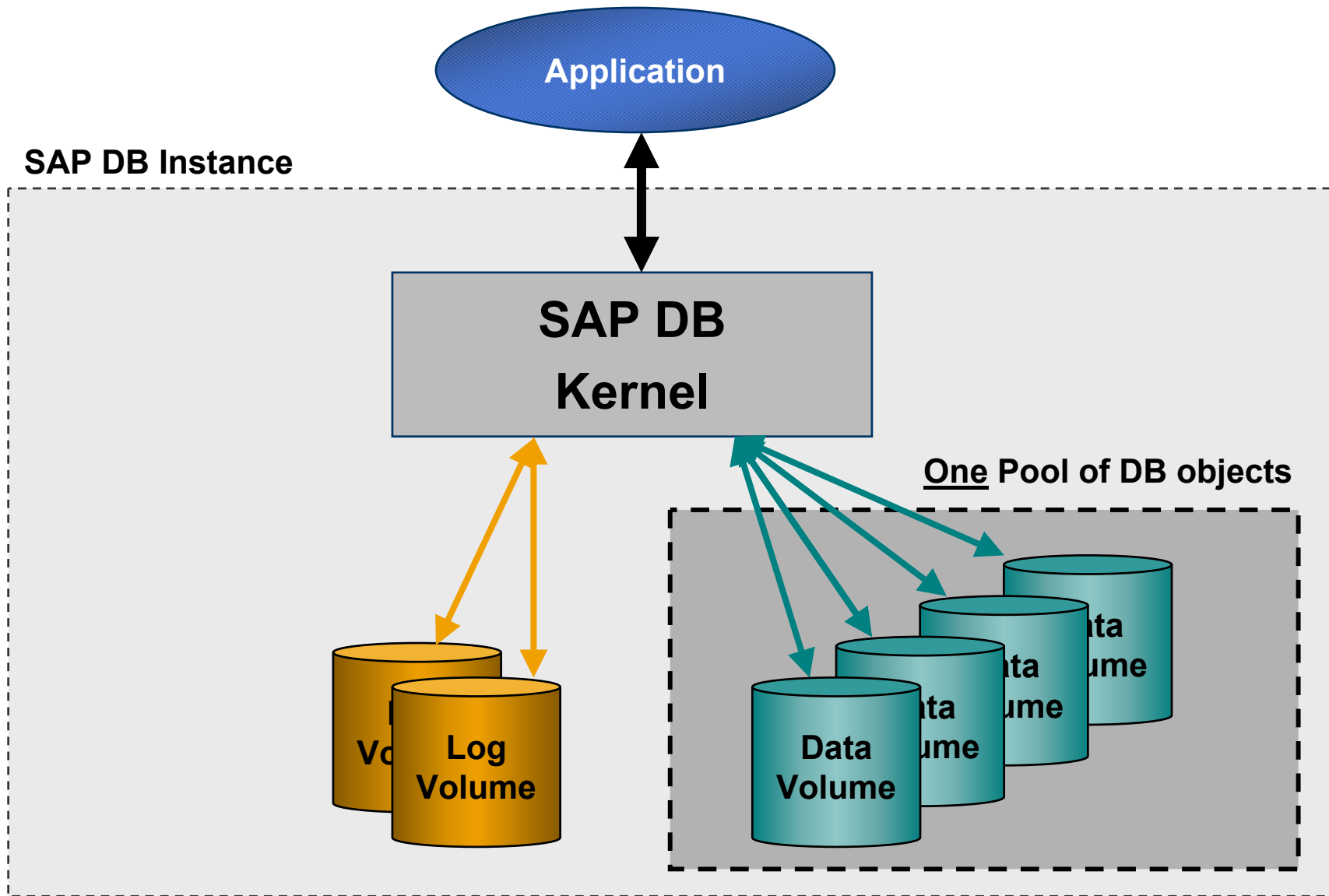
- **Lowest cost of ownership**
- **Simplicity**
- **Convenience**

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 !**

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



Minimal TCO with SAP DB

What Means Minimal Cost of Ownership?

DBMS license costs	low impact
DBMS maintenance costs	low impact
Hardware resources	medium 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

CREATE INDEX with parallel processing

Tuned 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) |

SAP R/3 4.6C, 2-tier, Certification No. 2003021

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)

SAP R/3 4.6C, 2-tier, Certification No. 2003031

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) |

SAP R/3 4.6C, 3-tier, Certification No. 2003014

www.sap.com/benchmark

Customer Statement of Thyssen-Krupp Hosting

Quotes from Hans Reiffer, Head of Triaton Hosting Center:

As an SAP partner for Hosted Solution, Triaton has been using SAP DB as a database for Hosting customers for many years. Of now more than 600 systems in Triaton's computer centers, 90 systems work with a SAP DB database.

The biggest system with a size of about 2 TB was recently put into productive operation.

For administrating the SAP DB databases of these 90 systems, only 2 FTE are required, as the database system has stood out for years through its easy operation, robustness and performance.

ThyssenKrupp



Triaton
The BusinessProcessor



Customer Statement of TDS

Quotes from Klaus Zimmermann, SAP Administrator:

TDS Informationstechnologie AG has been employing SAP DB successfully in Application Hosting since 1992. At present, we run approximately 90 SAP DB installations in 7x24 operation for various mySAP solutions.

Thanks to the convenient maintenance and operating characteristics of SAP DB, the administration effort is distinctly lower than with other databases. The storage management concept saves memory space and costs of reorganization.

SAP DB is completely integrated into our backup and monitoring concept and thus runs efficiently, performant and “silent” - all that for the benefit of our satisfied customers.



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 ...



Outlook to MaxDB 7.5

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 Replication Manager WebDAV MySQL Proxy	C/C++ precompiler ODBC 3.5 JDBC 3.0 Perl Python PHP SQLCLI

SAP DB Kernel



MySQL Proxy

Connectivity between existing MySQL applications and MaxDB

MySQL applications will work with MaxDB with almost no changes

Supports upgrading from MySQL to MaxDB

MySQL Proxy converts SQL syntax and kernel protocol

Improved administration of multiple database instances

Backup Wizard

Recovery Wizard

Installation Wizard

Configuration Wizard

Backup History

- Improved access to backup history
- Context-specific visual guidance during the recovery process (Backup/recovery, complete/incremental/log backup)

Documentation integrated as Windows Help

Support of Hot-standby configurations

Support of Archive instances

Database Manager (1)

The screenshot shows the SAP Database Manager window for a database named MYDB. The interface includes a menu bar (File, Edit, View, Instance, Actions, Tools, Help), a toolbar with various icons, and a left-hand navigation pane. The navigation pane has sections for 'My Folders' (Servers, <Local>, All) and 'MYDB' (Information, Backup, Backup Wizard..., Backup History, Backup Medium, Recovery, Tuning, Check, Configuration). The main area displays a table of database instances and a detailed view for the selected MYDB instance.

Name	State	Data	Log	Sessions	Data Cache Hit...	Auto Log
MYDB	Online	8 %	36 %	20 %	100 %	Off

Database MYDB

MYDB Data: 8 %
Total: 24.000 KB Perm: 1.712 KB Temp: 96 KB Used: 1.808 KB Free: 22.192 KB

Log: 36 %
Total: 7.984 KB Used: 2.888 KB Free: 5.096 KB

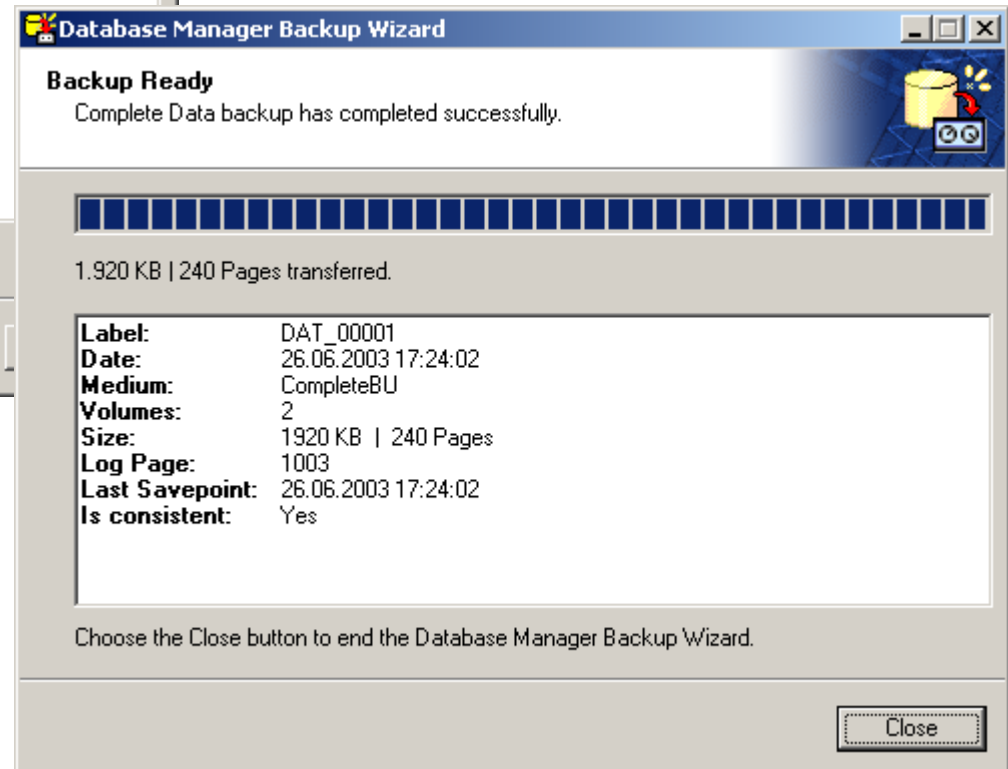
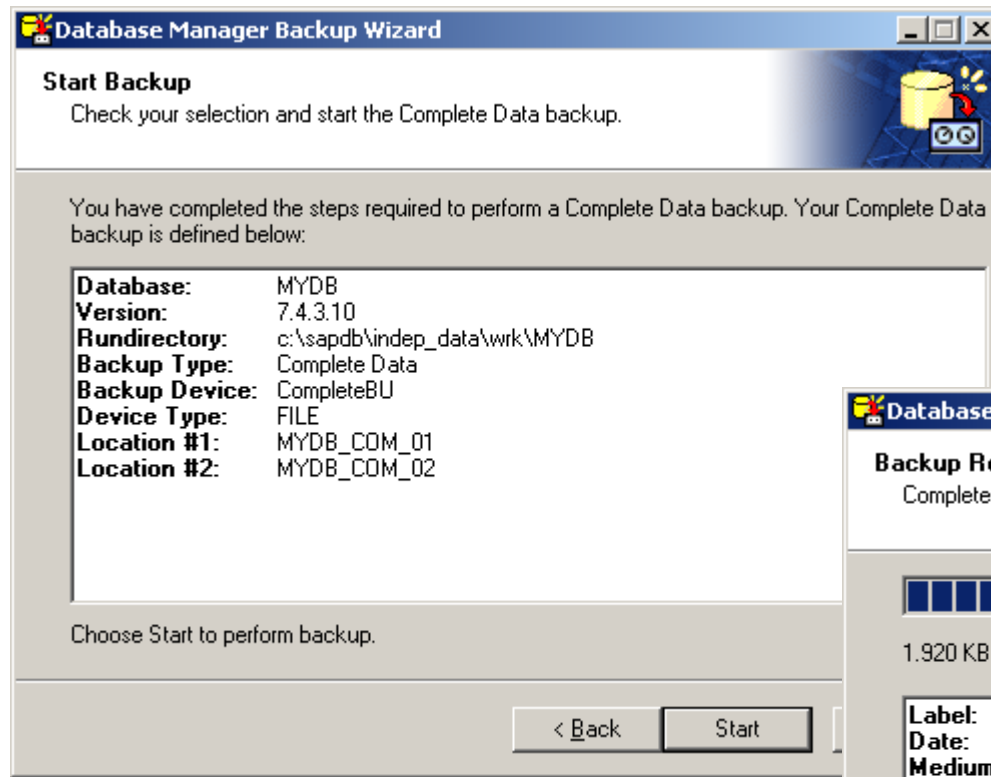
ONLINE Sessions: 20 %
Used: 1 Free: 4

General	
Name	MYDB
Version	7.4.3.10
Operating System	Windows 2000 (WIN32)
Rundirectory	c:\sapdb\indep_data\wrk\MYDB
Start On	6/30/2003 4:37:14 PM

Auto Log	Off
Command Monitor	Off
Resource Monitor	Off
Database Trace	Off

Data Cache	
Total	23.800 KB
Hit Rate	100 %

Database Manager (2)



Database Manager (3)

Database Manager Recovery Wizard

Select Items for Recovery
Select items to specify the use of incremental backups.

Select the incremental backup items you want to use for recovery. The use of incremental backups is much faster than recovery of log. It is recommended to use the specified incremental backups.

Label	Beginning	Medianame	Log Required	Size (KB)
<input checked="" type="checkbox"/> PAG_00002	27.06.2003 13:21:08	IncrBU	NO	33.856


< Back Next >

Database Manager Recovery Wizard

Start Recovery
Check your selection and start the recovery.

You have completed the steps required to perform a recovery. Your recovery is defined below:

Label	Medium	Location	External Backup ID	State
→ DAT_00001	CompleteBU	MYDB_COM_01		
→ DAT_00001	CompleteBU	MYDB_COM_02		
PAG_00002	IncrBU	MYDB_INC		

 Make the specified medium available for recovery. Choose 'Start' to begin recovery. If you want to restore the database until a particular point in time specify the date and time.

☐ Restore database until a specific time.

< Back Start Cancel

Web DBM

SAPDB Database Manager - Microsoft Internet Explorer provided by SAP IT

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Links

Address http://p59951:85/webdbm/004000000000 Go Links

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

State - MYDB

 Data 54% Converter Cache Hit Rate 0%
 Log 7% Data Cache Hit Rate 99%
 ONLINE  Sessions 6% Database Full NO

Offline Admin Online

Information - CACHES - MYDB

Type	Accesses	Successful	Unsuccessful	Hit Rate (%)
DATA	9712	9587	125	99
CATALOG	6574	4819	1755	73
SEQUENCE	0	0	0	0

Local intranet

Rule-based expert system to watch SAP DB instances

Collects statistical and monitoring data

Collects system messages

Supports remote access

Detects and reports

- **Low cache hit rates**
- **High I/O load**
- **Low hit rates of DML commands (Select, Update, Delete)**
- **Log queue overflows**
- **User lock collisions**
- **Command timings**
- **Timings and frequencies of system locks**

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

Web SQL Studio

The screenshot shows the Web SQL Studio web application. The browser address bar shows `http://p48123:85/websql/005000000000`. The interface includes a menu bar (File, Edit, View, Favorites, Tools, Help), a status bar (Log Off, SAP DB), and a left sidebar with a tree view of the database structure. The tree view shows the following hierarchy:

- sqltravel00 on db73
 - City
 - Customer
 - test
 - Hotels
 - Call dbproc
 - Hotel (selected)
 - Proc_Hotel_Preis
 - some sql

The main area displays the 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
```

Below the query are buttons: Execute, Clear, Prev Statement, Next Statement, and Save in selected Folder. To the right of the query are settings: Autocommit: On, SQL Mode: Internal, Isolationlevel: Committed, and Type: Visual Query.

The results pane shows the following table:

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

Document Repository and XML Indexing

WebDAV server

- Document repository with files and folders
- Accessible via HTTP (web folders)
- Checkout / checkin support
- The Internet file system

Indexing of XML data

- XML data are stored as LOB
- XML indexes are defined by XPath expressions
- Synchronous or asynchronous index maintenance
- XML indexes are implemented by SQL tables
- Retrieval support for pre-defined XML indexes

Internet connectivity to (XML) documents

Snapshots

Freeze a consistent state of the database (for a future restore)

- **Instantaneous backup of the complete database**
- **All subsequent changes are written to new pages**

Recovery to previous snapshot

- **Restore snapshot**
- **Restart**

Usage scenarios

- **Restore of demo or training systems to a previous state**
- **Very fast point-in-time recovery (e.g. during SAP solution upgrades)**

Archive Instances

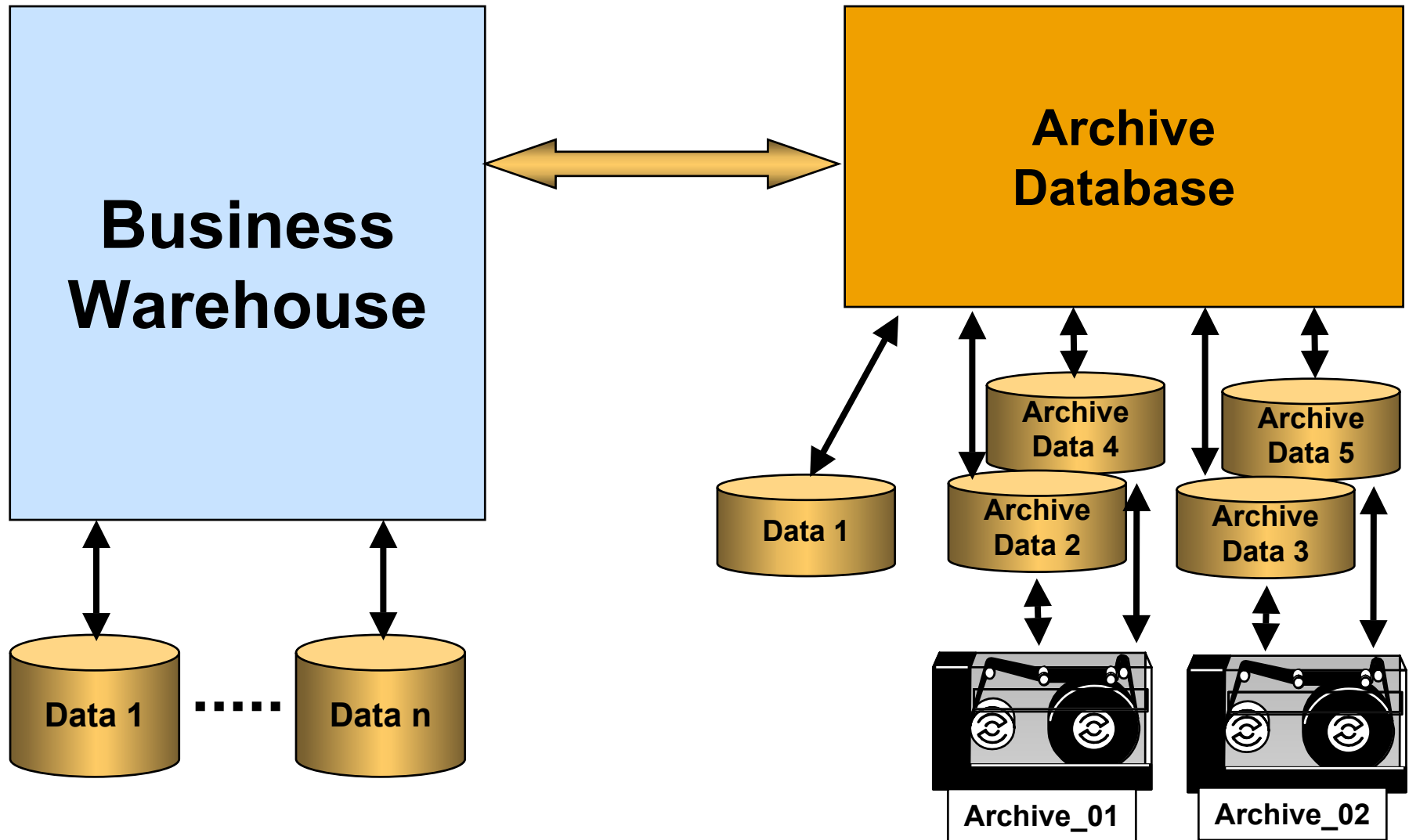
Support for archive instances

- **Archive attribute for SQL tables**
- **Archive tables are stored using special archive volumes**
 - ◆ **Archive volumes can be mapped to large archive systems based on cheaper and slower tertiary storage (e.g. tapes)**
- **Archive rows can only be written once**
 - ◆ **Restricted DML on Archive tables**
- **Secondary indexes are stored on standard data volumes**
- **Data backup does not include Archive tables**

Usage scenario

- **Extending the SAP Business Warehouse by a semi-online Archive**
- **Current business data is available online for queries**
- **Archived business data will be made transparently available from the Business Warehouse Archive**

Archive Instance for Business Warehouse



Workstation Installation

Goal: Invisible DBMS

- Mobile Clients
- Workstations
- Embedded DBMS

Installation and configuration without user interaction

- Silent mode
- Optional template (S, M, L) selection

Automatic operations

- Restart, shutdown
- Backup, recovery
- Database extension

Minimal footprint pure Java DBMS in main memory

Targets mobile clients (PDA) and desktops

JDBC-compliant

Subset of MaxDB JDBC

Supported SQL functionality:

- **Create/Delete Table**
- **Simple Select, Insert, Update, Delete, Commit/Rollback**

Multi-session support

Backup and restore of the main memory database



Replication Manager

Replication of tables or views from a master database to multiple client databases

Replication Server decouples master and client DBMS

Replication of the initial state

Replication of single or accumulated changes (transactions)

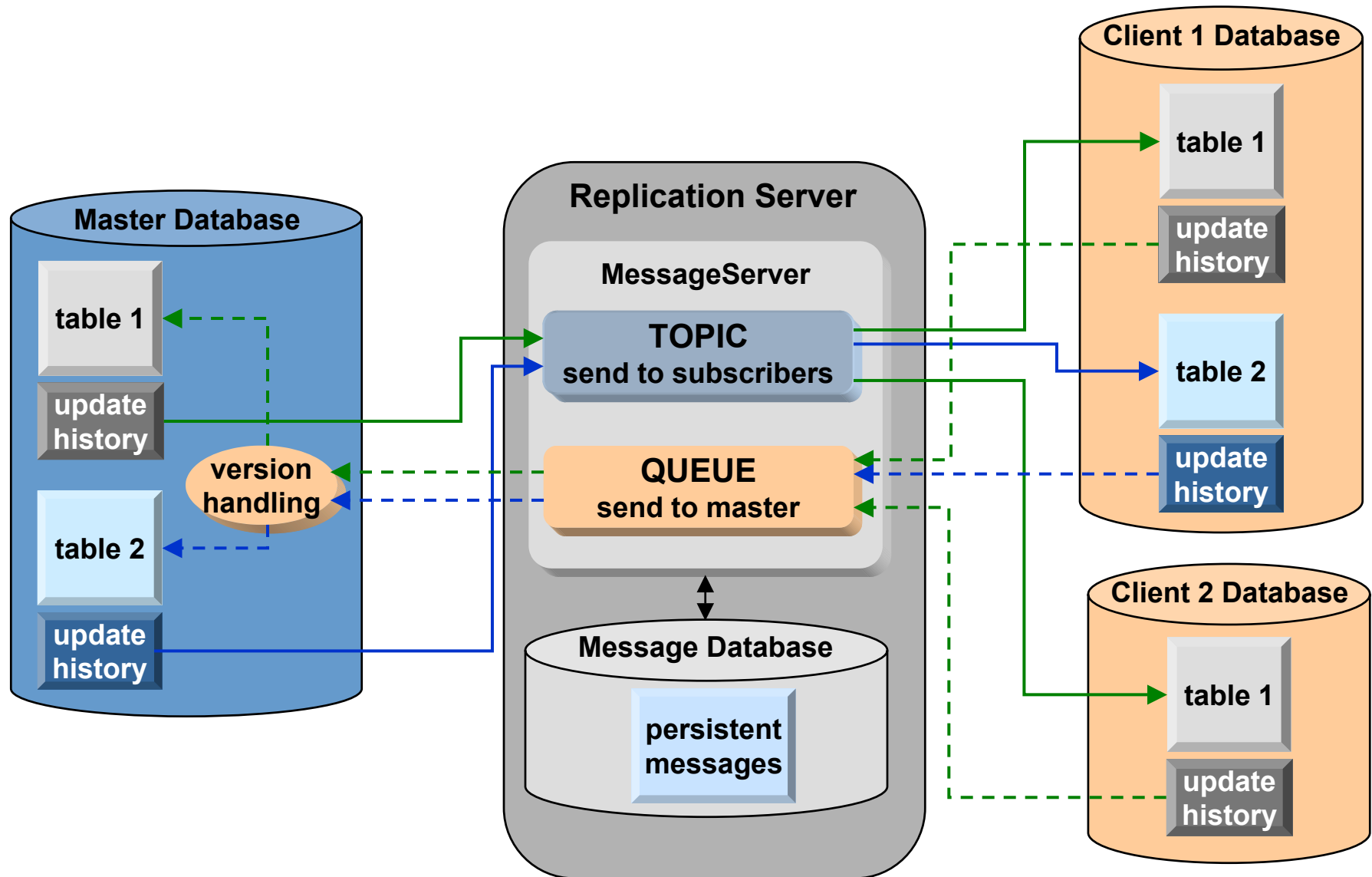
Point-to-point replications (queues)

Broadcast replications (publish/subscribe)

Support for bi-directional replications

Admin tool to define replication scenarios

Replication Architecture



Summary

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

Reasons to buy MaxDB

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



www.sapdb.org
www.mysql.com/maxdb

Further Information



Public Web:

www.sapdb.org, www.mysql.com/maxdb

SAP Customer Services Network: www.sap.com/services/



Consulting Contact

Jörg Hoffmeister, Theo Theis



Related SAP Education Training Opportunities

<http://www.sap.com/education/>

ADM515, Database Administration SAP DB

WB550, SAP DB Internals Workshop



Related Workshops/Lectures at SAP TechEd 2003

SAP DB – Administration made Easy, Hand-On Workshop

liveCache – Administration and Monitoring, Hand-On Workshop

Questions?

Q&A

Feedback



Please complete your session evaluation and
drop it in the box on your way out.

Thank You !

The SAP TechEd '03 Basel Team