

Administration optimisée du couple SAP-DB2

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Agenda

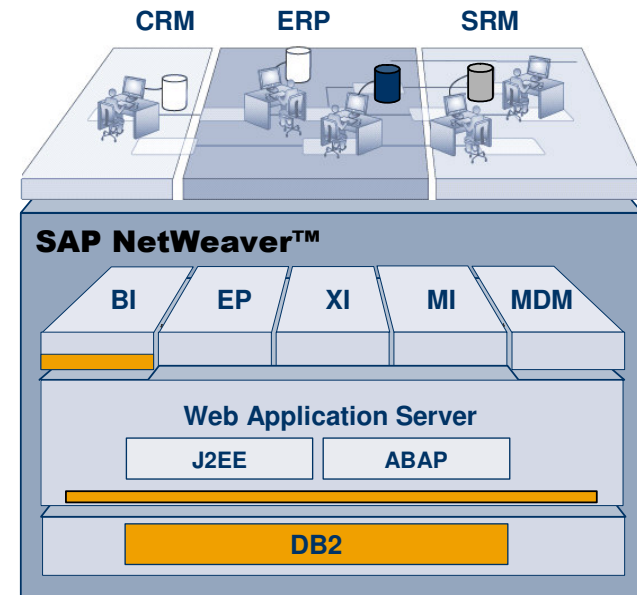
- **DB2 9 , Optimisé pour SAP**
 - ▶ Partenariat
 - ▶ Intégration des produits
 - ▶ Innovation technologique
 - ▶ SAP client DB2
- **Le cockpit d'administration**
 - ▶ Aperçu
 - ▶ Suivi de Performances
 - ▶ Gestion des Tablespaces
 - ▶ Suivi des ordres SQL
 - ▶ Diagnostiques
 - ▶ Administrations des serveurs éloignés



Architecture SAP et bases de données

- Toutes les applications utilisent la **Plateforme d'abstraction** fourni par le **Serveur d' Application Web SAP**

- ▶ Tous les composants SAP NetWeaver sont indépendant de la base de données (à l'exception de SAP BI)
- ▶ Les applications SAP ne se soucient pas de la base de données sur laquelle elles s'appuient



- **La base de données optimale** pour les clients **SAP** est celle qui fournit
 - ▶ La meilleure integration avec SAP
 - ▶ Les meilleures performances
 - ▶ La meilleure scalabilité
 - ▶ Innovation constante
 - ▶ Un produit de qualité
 - ▶ Le cout de propriété le plus bas

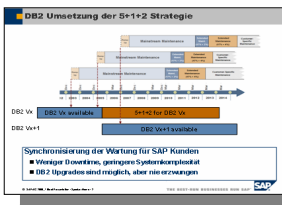
Ces caractéristiques sont le fil conducteur de l'initiative „optimisé pour SAP“

Les 4 piliers de „DB2 Optimisé pour SAP“



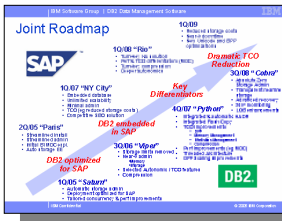
Partenariat

Des équipes communes SAP et IBM qui travaillent ensemble à tous les niveaux



Intégration des produits

Un produit, une stratégie de maintenance, une seule de service



Innovation Technologique

Des plans produits commun jusqu'à 2008



SAP utilise DB2

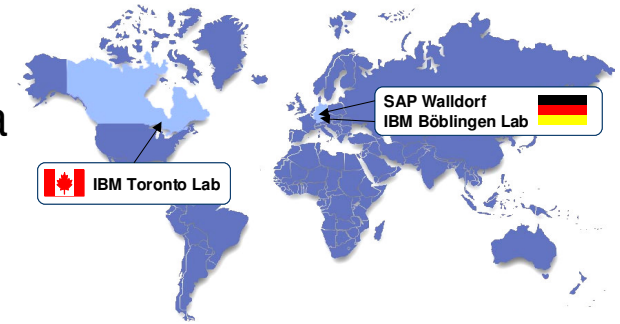
SAP est un client DB2 très satisfait

Ce type de partenariat stratégique est un unique entre SAP et IBM

Partenariat SAP-IBM et intégration des produits

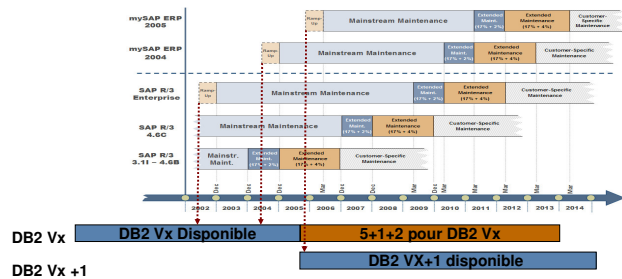
■ SAP sur DB2 est un projet commun depuis 1993:

- ▶ Des équipes commune de développement SAP+IBM à Walldorf
- ▶ Un Centre d'Intégration SAP - IBM à Toronto
Coopération extrêmement proche avec le Développement DB2 à Toronto



■ SAP sur DB2 est un produit complètement intégré

La Stratégie de Maintenance SAP 5-1-2



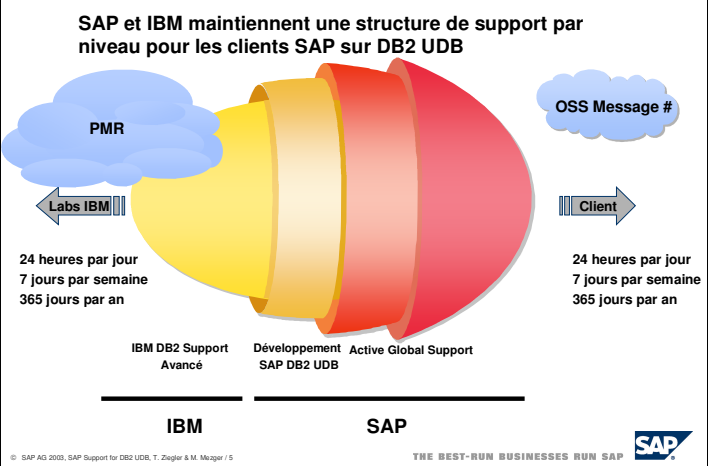
Une valeur unique pour les clients SAP:

- Les mises à jour de DB2 ne sont jamais obligatoires, car la release de DB2 associé au produit SAP reste supportée pendant tout le cycle de vie du système SAP
- Mais on peut aussi choisir de faire évoluer la version de DB2 pour bénéficier des innovations technologiques

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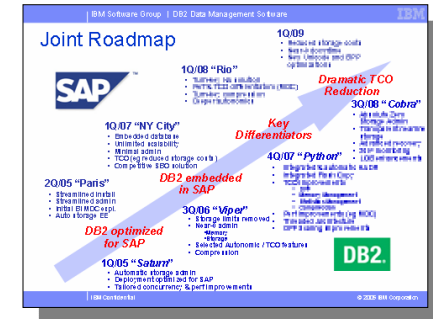


SAP - IBM support



Innovation Technologique

- Planning joint des releases SAP+IBM pour DB2 jusqu'en 2008
- Status des produits DB2 „Optimisés pour SAP“
 - ▶ DB2 Saturn V8.2.2 disponible depuis Avril 2005
 - ▶ DB2 9 disponible depuis Aout 2006
 - ▶ DB2 Python planning complet, livraison planifiée le 4ieme trimestre 2007
 - ▶ DB2 Cobra planning démarré en Avril 2006
- Record de performance pour DB2 comme le prouve les résultats obtenus lors des benchmarks standard SAP :
 - ▶ SD 3-tier benchmark: 168.300 SD User (certificate 2005021)
 - ▶ SAP BI 3-tier benchmark (certificate 2005043)



CERTIFICATION

SAP Standard Application Benchmarks

The SAP Business Information Warehouse 3.5 Standard Application Benchmark suite performed on September 22, 2005 by IBM in Toronto, On, Canada was certified on October 19, 2005 with the following data:

The scenario for 64 GB main memory, which corresponds to 934,400,000 records in fact table, was used.

| Step 1: Load Phase - Part 1 | |
|---|--------------------------------|
| Average throughput (rows/hour): | 168,360,360 |
| In detail: | |
| Load from PSA into InfoCube (rows/hour): | 218,317,757 |
| Repair secondary indexes on fact table (rows/hour): | 2,712,774,194 |
| Create statistics on fact table: | 7,768,683,603 |
| Rollup of aggregates (rows/hour): | 1,160,344,947 |
| Step 2: Load Phase - Part 2 | |
| Average throughput (rows/hour): | 6,511,120 |
| In detail: | |
| Load from PSA into ODS (rows/hour): | 157,262,272 |
| Activate ODS (rows/hour): | 6,792,343 |
| Average throughput total step 1+2 (rows/hour): | 6,268,687 |
| Step 3: Query Phase | |
| Throughput/hour: | 311,004 query navigation steps |
| Average CPU utilization of servers: | 30% |

The software configuration for all steps of the SAP BW benchmark:

Operating System: SuSE Linux Enterprise Server 9 (64-bit)
 RDBMS: DB2 UDB 8.2.3 (64-bit)
 Platform Release: SAP NetWeaver '04 (64-bit)

Configuration:
 Cluster of 32 servers. Each server:
 IBM x346 Model 884041U, 1 processor/ 1 core/ 2 threads,
 Intel XEON 3.6 GHz, L1 Execution Trace Cache, 2 MB L2 cache,
 2 GB main memory

Certification Number: 2005043

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SAP sur DB2: des avantages uniques

■ DB2 "Database Partitioning Feature" (DPF)

- ▶ Architecture „Shared-Nothing“seule capable d'offrir **une scalabilité linéaire**

DB2 "MultiDimensional Clustering" (MDC)

- ▶ des performances des requêtes SAP BI – amélioration jusqu'à d'un facteur 8 avec Zéro administration

■ DB2 HADR

- ▶ Solution de Haute Disponibilité et de site de secours
- ▶ Inclus dans la licence avec un logiciel de gestion de cluster (AIX, Linux)

■ DB2 Conçu pour être reconstruit

- ▶ Capacités natives et intégrées au moteur: sauvegarde, restauration, gestion des fichiers journaux

Scalability Study
SAP Business Information Warehouse on DB2 Universal Database™ EEE for Linux, UNIX® and Windows®

Overview
SAP Business Information Warehouse (SAP BI) is the core component of mySAP Business Intelligence that delivers enterprise-wide data warehousing, a business intelligence platform and a suite of BI tools. SAP BI is a successful product, proven by a large number of installations in the market.

Results
The study demonstrates the superior scalability of DB2 UDB EEE for SAP BI. Based on the good results on a single 60,000 SP node, an impressive performance increase was achieved when adding additional SP nodes.

```
CREATE TABLE MDCTABLE (
  Year INT,
  Nation CHAR(25),
  Colour VARCHAR(10),
  ... )
ORGANIZE BY ( Year, Nation, Colour )
```

HADR: High Availability Disaster Recovery

- High Availability Disaster Recovery for
 - Ultra-fast failovers (no instance restart)
 - Rolling upgrades
- Two active machines
 - Primary
 - Processes transactions
 - Ships log entries (not logfiles) to the other machine
 - Secondary
 - Cloned from the primary
 - Receives and stores log entries from the primary
 - Re-applies the transactions
- If the primary fails, the secondary can take over the transactional workload
- If the failed machine becomes available again, it can be resynchronized
- Various Operation modes:
 - Asynchronous
 - Near-synchronous
 - Synchronous

DB2 Logfile

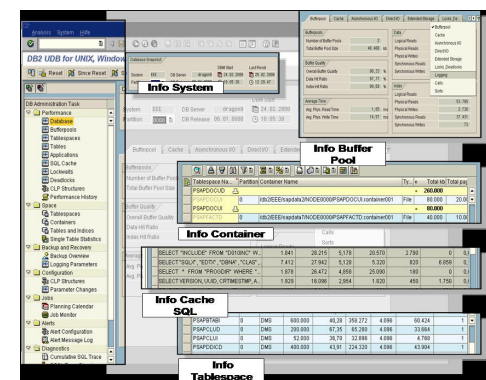
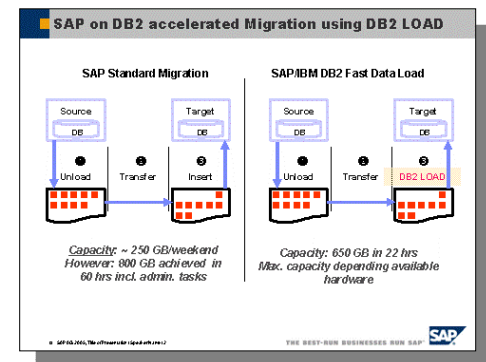
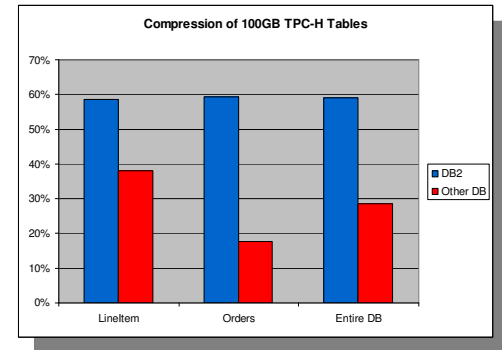
Failover in 11 seconds demonstrated in test of SAP environment with 600 users!

Et encore des unique DB2

- DB2 Compression
 - ▶ DB2 lead

- DB2 Load exploitation by SAP R3load
 - ▶ Temps de chargement divisé par un facteur 10
 - ▶ Complètement supporté depuis le R3load 4.6 et + (SAP Note 454173)
 - ▶ Diminution significative des temps d'arrêt lors de migration
 - ▶ Available with DB2 only

- DBACockpit pour DB2
 - ▶ Performances,space, configuration , compression
 - ▶ Mdc
 - ▶ Backup/Restore,Diagnositics,Alerts
 - ▶ Jobs

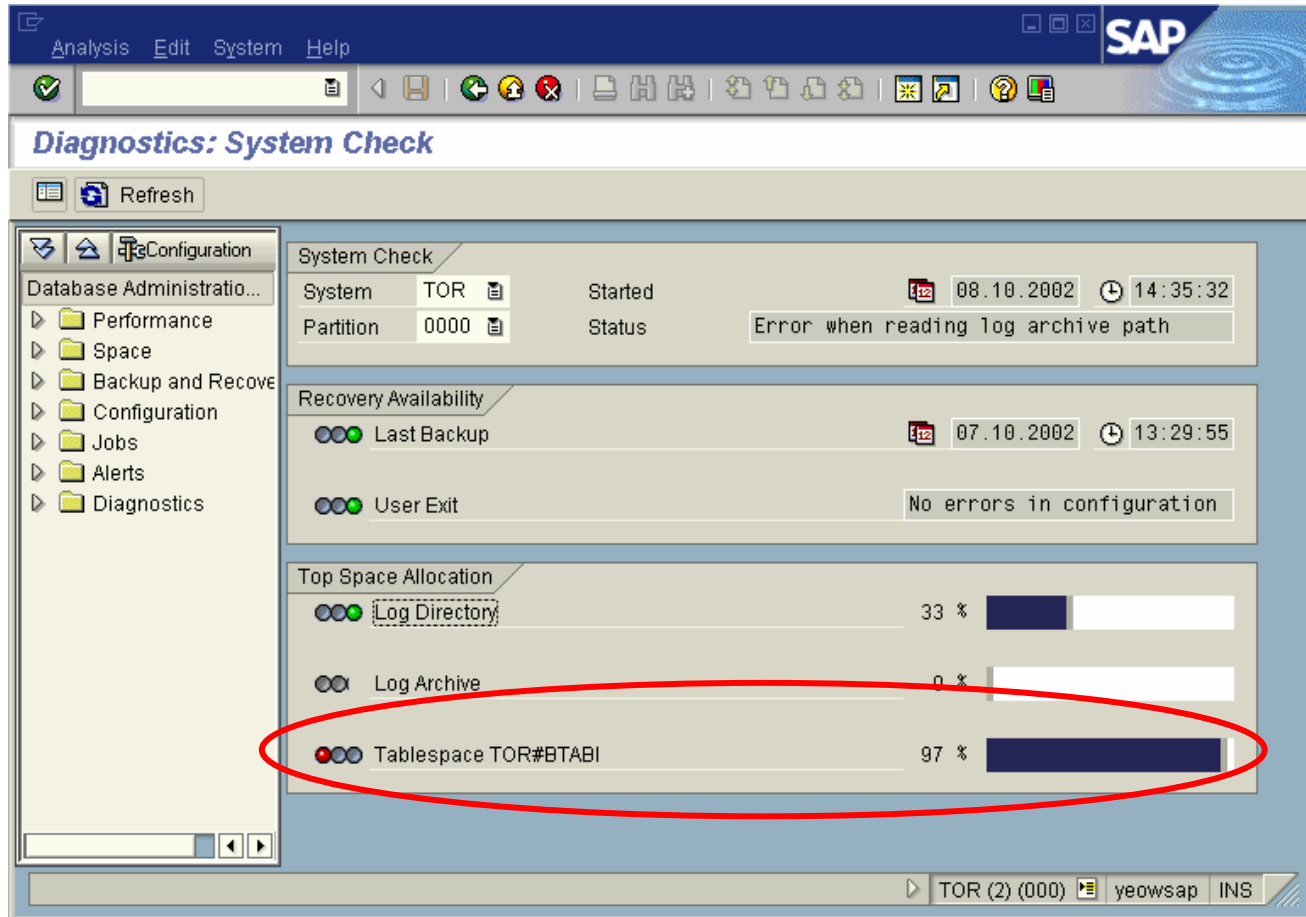


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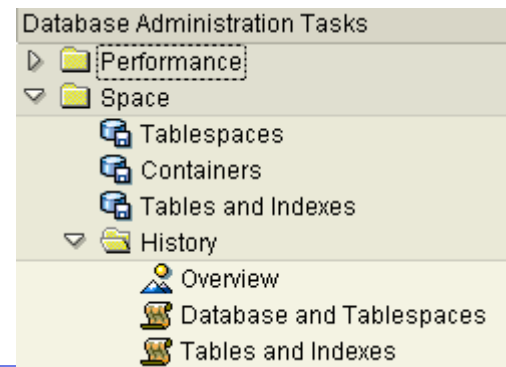
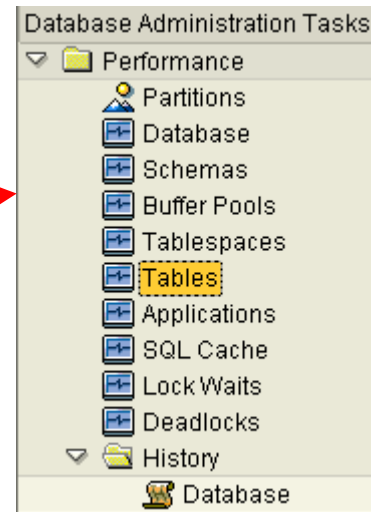
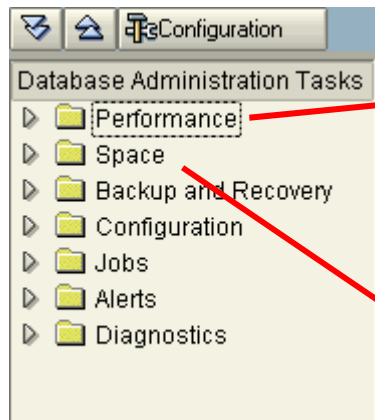
Introduction à DBACOCKPIT



Transaction Code = DB6COCKPIT

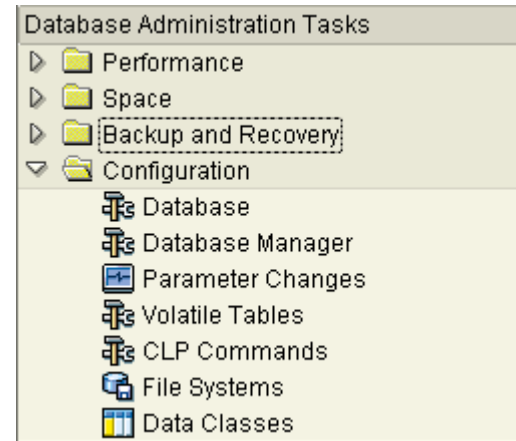
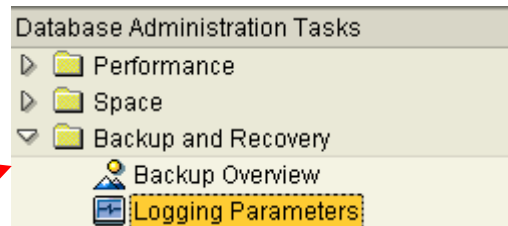
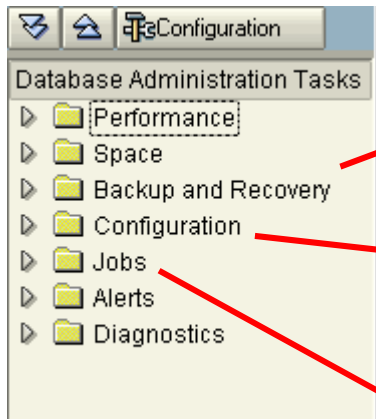
DBACOCKPIT Navigator (1)

Main Panel



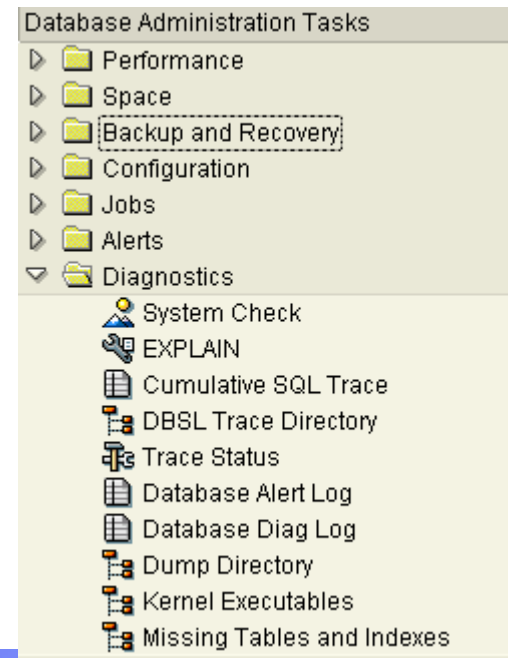
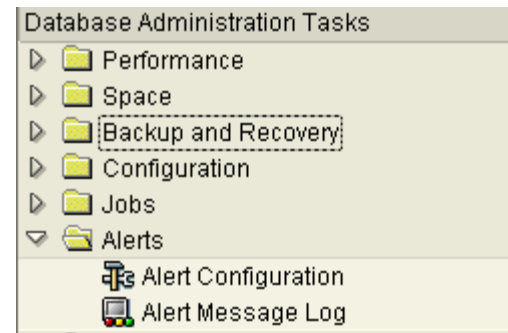
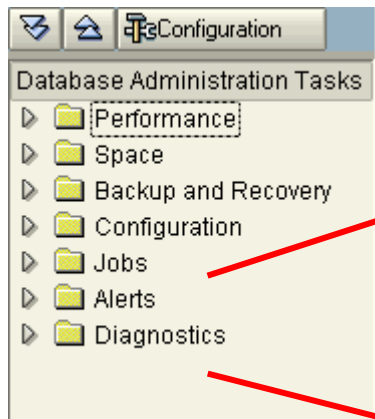
DBACOCKPIT Navigator (2)

Main Panel



DBACOCKPIT Navigator (3)

Main Panel



Performance Monitor

- ▶ Bufferpool
- ▶ Cache
- ▶ Asynchronous I/O
- ▶ Direct I/O
- ▶ Extended Storage
- ▶ Locks and Deadlocks
- ▶ Logging
- ▶ Calls
- ▶ Sorts

Performance Monitor

The screenshot displays the SAP Performance Monitor interface for a Database Snapshot. The window title is "Performance: Database Snapshot". The interface includes a menu bar (Analysis, System, Help), a toolbar, and a navigation pane on the left. The main content area shows a "Database Snapshot" summary with fields for System (TOR), DB Server (yeowsap), DBM Start (08.10.2002 14:27:59), Partition (0000), DB Release (08.01.0000), and Last Reset. Below this, there are tabs for Buffer Pool, Cache, Asynchronous I/O, Direct I/O, Extended Storage, and Locks and Deadlocks. The "Buffer Pools" tab is active, showing a table with 1 pool and a total size of 100,000 KB. A red circle highlights the "Buffer Quality" section, which includes:

| Buffer Quality | |
|------------------------|---------|
| Overall Buffer Quality | 94,15 % |
| Data Hit Ratio | 89,89 % |
| Index Hit Ratio | 97,61 % |

Other sections visible include "Data" (Logical Reads: 246.164, Physical Reads: 24.800, Physical Writes: 200, Synchronous Reads: 7.344, Synchronous Writes: 2) and "Average Time" (Physical Reads: 1,73 ms, Physical Writes: 140,54 ms). The status bar at the bottom shows "TOR (1) (000) yeowsap INS".

Performance Monitor

Cache

| Buffer Pool | | Cache | | Asynchronous I/O | | Direct I/O | | Extended Storage | | Locks and I/O | |
|-----------------|--|--------|----|------------------|--|------------|--|------------------|--|---------------|--|
| Catalog Cache | | | | | | | | | | | |
| Size | | 10,240 | KB | | | | | | | | |
| Quality | | 85,00 | % | | | | | | | | |
| Lookups | | 2,713 | | | | | | | | | |
| Inserts | | 407 | | | | | | | | | |
| Overflows | | 0 | | | | | | | | | |
| Heap Full | | 0 | | | | | | | | | |
| Package Cache | | | | | | | | | | | |
| Size | | 20,480 | KB | | | | | | | | |
| Quality | | 98,87 | % | | | | | | | | |
| Lookups | | 98,564 | | | | | | | | | |
| Inserts | | 1,118 | | | | | | | | | |
| Overflows | | 0 | | | | | | | | | |
| High-Water Mark | | 6,210 | KB | | | | | | | | |

Locks and Deadlocks

| Direct I/O | | Extended Storage | | Locks and Deadlocks | |
|------------------------|--|------------------|----|---------------------|--|
| Lock List | | | | | |
| Size | | 40,000 | KB | | |
| In Use | | 10 | KB | | |
| Lock Waits | | | | | |
| Total | | 25 | | | |
| Time Waited | | 9,752 | ms | | |
| Average Time Waited | | 390,08 | ms | | |
| Escalations | | | | | |
| Lock Escalations | | 0 | | | |
| Excl. Lock Escalations | | 0 | | | |
| Locks | | | | | |
| Locks Currently Held | | 2 | | | |
| Deadlocks Detected | | 0 | | | |
| Lock Timeouts | | 0 | | | |

Sorts

| Direct I/O | | Extended Storage | | Locks and Deadlocks | | Logging | | Calls | | Sorts | |
|----------------|--|------------------|----|---------------------|--|---------|--|-------|--|-------|--|
| Sort Heap | | | | | | | | | | | |
| Total Size | | 8,192 | KB | | | | | | | | |
| Allocated | | 0 | KB | | | | | | | | |
| Sort Time | | | | | | | | | | | |
| Total | | 970 | ms | | | | | | | | |
| Average | | 1,46 | ms | | | | | | | | |
| Sorts | | | | | | | | | | | |
| Total Sorts | | 664 | | | | | | | | | |
| Sort Overflows | | 4 | | | | | | | | | |
| Active Sorts | | 0 | | | | | | | | | |

Tablespace Management

- ▶ Check actual data
- ▶ Add a new tablespace
- ▶ Add a new container to a tablespace
- ▶ Change an existing container
 - Extend a container
 - Resize a container

Tablespace Management

Analysis System Help SAP

Space: Tablespace Configuration

Set Checkpoint Delta to Checkpoint Current Configuration

Database Administration...

- Performance
- Space
 - Tablespaces**
 - Containers
 - Tables and Indexes
- History
- Backup and Recovery
- Configuration
- Jobs
- Alerts
- Diagnostics
 - System Check
 - EXPLAIN
 - Cumulative SQL
 - DBSL Trace Directory
 - Trace Status
 - Database Alert Log
 - Database Diagnostic
 - Dump Directory
 - Kernel Execution
 - Missing Tables

Tablespace Configuration

System **TOR** DBM Start **08.10.2002 14:27:59**

Partition **0000** Checkpoint

Summary

| | | |
|-------|------------|----|
| Total | 22.062.080 | KB |
| Used | 84,86 | % |
| Free | 3.339.424 | KB |

Contents Change Add Delete

| Tablespace Name | TS Type | KB Total | Percent Used | KB Free | Page Size | High-Water Mark | No. Containers | Contents |
|-----------------|---------|-----------|--------------|---------|-----------|-----------------|----------------|----------|
| PSAPTEMP | SMS | 0 | 100,00 | 0 | 4.096 | 0 | 1 | Tempora |
| SYSCATSPACE | DMS | 563.200 | 94,48 | 31.104 | 4.096 | 132.992 | 1 | Any data |
| TOR#BTABD | DMS | 1.228.800 | 87,24 | 156.800 | 4.096 | 267.984 | 1 | Any data |
| TOR#BTABI | DMS | 512.000 | 96,95 | 15.616 | 4.096 | 124.088 | 1 | Any data |
| TOR#CLUD | DMS | 51.200 | 45,73 | 27.648 | 4.096 | 5.824 | 1 | Any data |
| TOR#CLUI | DMS | 20.480 | 47,17 | 10.752 | 4.096 | 2.400 | 1 | Any data |
| TOR#DDICD | DMS | 1.536.000 | 84,13 | 243.776 | 4.096 | 323.040 | 1 | Any data |
| TOR#DDICI | DMS | 409.600 | 95,47 | 18.560 | 4.096 | 97.744 | 1 | Any data |
| TOR#DOCUD | DMS | 102.400 | 48,69 | 52.480 | 4.096 | 12.448 | 1 | Any data |
| TOR#DOCUI | DMS | 81.920 | 47,73 | 42.752 | 4.096 | 9.760 | 1 | Any data |
| TOR#EL620D | DMS | 204.800 | 38,45 | 126.016 | 4.096 | 19.680 | 1 | Any data |
| TOR#EL620I | DMS | 81.920 | 5,79 | 77.120 | 4.096 | 1.184 | 1 | Any data |
| TOR#ES620D | DMS | 7.065.600 | 85,96 | 992.256 | 4.096 | 1.518.304 | 2 | Any data |
| TOR#ES620I | DMS | 1.045.600 | 80,31 | 208.064 | 4.096 | 424.288 | 1 | Any data |

TOR (1) (000) yeowsap INS

Display Properties of a Tablespace

Space: Tablespace Maintenance - Display Tablespace

Tablespace Maintenance

| | | | |
|------------|----------------|-----------|------|
| System | TOR | Partition | 0000 |
| Name | TOR#BTABD | | |
| Node Group | SAPNODEGRP_TOR | | |

Space

| | | |
|-------|-----------|----|
| Total | 1.228.800 | KB |
| Used | 87,24 | % |
| Free | 156.736 | KB |

Containers

Contents

- Regular Data
- Large Objects
- Temporary User Objects
- Temporary System Objects

Space Management by

- Database (DMS)
- System (SMS)

Technical Settings **Containers** **Select**

| Container Name | KB Total | Type |
|--|----------|------|
| F:\db2\TOR\sapdata3\NODE0000\TOR#CLUD.conta... | 51.200 | File |

Adding a New Tablespace (1)

The screenshot shows the SAP 'Space: Tablespace Maintenance - Add Tablespace' dialog box. The interface includes a menu bar (Maintenance, Edit, System, Help), a toolbar, and a left-hand navigation tree. The main area is divided into several sections:

- Tablespace Maintenance:** Fields for System (TOR), Partition (0000), Name (ZSAPNEW1D), and Node Group (IBMDEFAULTGROUP). The Name field is circled in red.
- Space:** A field containing a '%' symbol.
- Contents:** Radio buttons for Regular Data (selected), Large Objects, Temporary User Objects, and Temporary System Objects.
- Space Management by:** Radio buttons for Database (DMS) (selected) and System (SMS). This section is circled in red.
- Size of I/O Units:** Fields for Page Size (4 KB), Extent Size, and Prefetch Size. The Page Size field is circled in red.
- Disk Performance:** Fields for Overhead (24,1 msec) and Transfer Rate (0,9 msec).
- Recovery:** A checked checkbox for Dropped Tables.
- Buffer Pool:** A field containing IBMDEFAULTBP.

A red arrow points from the word 'Select' to the 'Space Management by' section.

Adding a New Tablespace (2)

Tablespace Maintenance

System TOR Partition 0000

Name ZSAPNEW1D

Node Group IBMDEFAULTGROUP

Space %

Technical Settings Containers

Select

| Container Name | KB Total | Type |
|--|----------|------|
| F:\db2\TOR\sapdata1\NODE0000\ZSAPNEW1D.cont... | 10.000 | F... |
| F:\db2\TOR\sapdata1\NODE0000\ZSAPNEW1D.cont... | 10.000 | F... |

```
CREATE REGULAR TABLESPACE ZSAPNEW1D
IN NODEGROUP IBMDEFAULTGROUP
PAGESIZE 4 K
MANAGED BY DATABASE
USING (
FILE 'F:\db2\TOR\sapdata1\NODE0000\ZSAPNEW1D.container000' 10000 K,
FILE 'F:\db2\TOR\sapdata1\NODE0000\ZSAPNEW1D.container001' 10000 K
)
ON NODE ( 0 )
BUFFERPOOL IBMDEFAULTBP
OVERHEAD 24.1
TRANSFERRATE 0.9
DROPPED TABLE RECOVERY ON
:
COMMIT WORK
GRANT USE OF TABLESPACE ZSAPNEW1D TO PUBLIC
:
COMMIT WORK
```

Adding a new container (1)

The screenshot shows the SAP Space: Container Configuration interface. The left sidebar contains a tree view with 'Containers' selected. The main area displays a table of container configurations. A red arrow points from the 'Add' button in the toolbar to the 'AXA#DDICD' row in the table. Another red arrow points from the number '1' to the 'Containers' folder in the sidebar.

| Tablespace Name | Container Name | Type | KB Total |
|-----------------|---|--------------|-----------|
| AXA#BTABD | /db2/AXA/sapdata1/NODE0000/AXA#BTABD.container000 | Striped File | 1.628.800 |
| AXA#BTABI | /db2/AXA/sapdata2/NODE0000/AXA#BTABI.container000 | Striped File | 800.000 |
| AXA#CASCON01D | /db2/AXA/sapdata1/NODE0000/AXA#cascon01.container000 | Striped File | 30.000 |
| | /db2/AXA/sapdata1/NODE0000/AXA#cascon01.container001 | Striped File | 30.000 |
| AXA#CASCON01I | /db2/AXA/sapdata1/NODE0000/AXA#CASCON01I.container000 | Striped File | 30.000 |
| AXA#CASCON02D | /db2/AXA/sapdata1/NODE0000/AXA#CASCON02.container000 | Striped File | 1.000 |
| AXA#CLUD | /db2/AXA/sapdata3/NODE0000/AXA#CLUD.container000 | Striped File | 51.200 |
| AXA#CLUI | /db2/AXA/sapdata2/NODE0000/AXA#CLUI.container000 | Striped File | 20.480 |
| AXA#DDICD | /db2/AXA/sapdata5/NODE0000/AXA#DDICD.container000 | Striped File | 1.536.000 |
| AXA#DDICI | /db2/AXA/sapdata2/NODE0000/AXA#DDICI.container000 | Striped File | 600.000 |

Select

2

Adding a new container (2)

Space: Tablespace Maintenance - Change Tablespace

Execute ... **Select**

Tablespace Maintenance

| | | | |
|------------|----------------|-----------|------|
| System | AXA | Partition | 0000 |
| Name | AXA#DDICD | | |
| Node Group | SAPNODEGRP_AXA | | |

Space

| | |
|-------|--------------|
| Total | 1.536.000 KB |
| Used | 84,60 % |
| Free | 236.480 KB |

Technical Settings Containers

| Container Name | KB Total | Type |
|---|-----------|------|
| /db2/AXA/sapdata5/NODE0000/AXA#DDICD.container... | 1.536.000 | F... |
| /db2/AXA/sapdata5/NODE0000/AXA#DDICD.container... | 1.536.000 | F... |

```
new containers
ALTER TABLESPACE "AXA#DDICD"
ADD (
  FILE '/db2/AXA/sapdata5/NODE0000/AXA#DDICD.container001' 1536000 K
)
ON NODE ( 0 )
;
COMMIT WORK
```

Diagnostics

- ▶ SQL Cache Access Plans
- ▶ CLP Commands
- ▶ Trace Status
- ▶ Cumulative Trace

Diagnosics - SQL cache – Access Plans (1)

Analysis System Help SAP

Performance: SQL Cache Snapshot

Refresh Set Selection Criteria...

SQL Cache Snapshot

System TOR DBM Start 03.09.2002 18:51:38

Partition 0000 Last Snapshot 04.09.2002 12:03:10

Total Cache Sum

Execution Time 239.917 ms

Rows Read 5.152.829

Rows Written 304.616

Select

| SQL Text | User | Executions | Total Executi... | Total... | Avg. E... | Total User C... | Total System... |
|---|------|------------|------------------|----------|-----------|-----------------|-----------------|
| select count (*) from (select i.indsc... | | 52 | 9.322 | 3,89 | 179,27 | 2.328 | 125 |
| SELECT COUNT (*) FROM SYSCAT... | | 52 | 5.919 | 2,47 | 113,83 | 5.500 | 141 |
| SELECT "PROG", "R3STATE", "MAC... | | 205 | 11.941 | 4,98 | 58,25 | 500 | 453 |
| SELECT SUM("DB6ISIZE") FROM ... | | 52 | 2.588 | 1,08 | 49,77 | 2.047 | 31 |
| SELECT SUM("DB6TSIZE") FROM ... | | 52 | 2.416 | 1,01 | 46,46 | 1.766 | 31 |
| SELECT * FROM "PAH" WHERE ... | | 10 | 325 | 0,14 | 32,50 | 78 | 0 |
| SELECT "PROGNAME", "STATUS", ... | | 12 | 380 | 0,16 | 31,67 | 0 | 31 |
| SELECT "BLOCKLG", "BLOCK" FRO... | | 222 | 7.028 | 2,93 | 31,66 | 172 | 156 |
| SELECT "FUNCNAME", "PNAME", ... | | 643 | 20.343 | 8,48 | 31,64 | 203 | 94 |
| INSERT INTO "VARI" ("MANDT", "R... | | 18 | 566 | 0,24 | 31,44 | 16 | 16 |
| SELECT * FROM "D020L" WHERE ... | | 36 | 932 | 0,39 | 25,89 | 0 | 0 |
| INSERT INTO "TBTCO" ("JOBNAME... | | 36 | 913 | 0,38 | 25,36 | 47 | 0 |
| SELECT "BLOCKLG", "BLOCK" FRO... | | 18 | 417 | 0,17 | 23,17 | 0 | 16 |
| SELECT "SQLX", "EDTX", "DBNA", ... | | 141 | 2.974 | 1,24 | 21,09 | 78 | 78 |
| INSERT INTO "DB6PMPROT" ("PR... | | 24 | 503 | 0,21 | 20,96 | 16 | 0 |

TOR (1) (000) yeowsap OVR

Diagnostics - SQL cache – Access Plans (2)

The image displays two side-by-side screenshots of the SAP SQL execution plan tool. Both windows show the same SQL statement:

```
select count ( ^ ) from ( select i.indschema, i.indname from syscat.indexes i, syscat.tables t where i.tabname = t.tabname and i.tabschema = t.tabschema and t.index_tspace is null and t.tspace = ? union all select i.indschema, i.indname from syscat.indexes i, syscat.tables t where i.tabname = t.tabname and i.tabschema = t.tabschema and t.index_tspace = ? ) as index_objects ( indschema, indname )
```

The left screenshot shows the 'Access Plan' for this statement with the following details:

- Access Plan (Opt Level = 5 ; Parallelism = None)
- 8 SELECT STATEMENT (Estimated Costs = 6,614E+03 [timersons])
- 1 RETURN
- 2 GRPBY
- 3 UNION
- 4 GRPBY
- 5 NLJOIN
- 6 [0] FETCH SYSTABLES
- 7 RIDSCN
- 8 SORT
- 9 IXSCAN IBM22 #key columns: 1
- 10 [1] IXSCAN IBM03 #key columns: 2
- 11 GRPBY

The right screenshot shows a different access plan for the same statement:

- 1 RETURN
- 2 GRPBY
- 3 UNION
- 4 GRPBY
- 5 NLJOIN
- 6 [0] FETCH SYSTABLES
- 7 RIDSCN
- 8 SORT
- 9 IXSCAN IBM22 #key columns: 1
- 10 [1] IXSCAN IBM03 #key columns: 2
- 11 GRPBY
- 12 NLJOIN
- 13 [0] FETCH SYSTABLES
- 14 RIDSCN
- 15 SORT
- 16 IXAND
- 17 IXSCAN IBM21 #key columns: 1
- 18 IXSCAN IBM22 #key columns: 1
- 19 [1] IXSCAN IBM03 #key columns: 2

Diagnostics - SQL cache – Access Plans (3)

The screenshot displays the SAP SQL execution plan interface. The main window shows a tree view of the execution plan with steps numbered 1 through 19. A dialog box titled "Change Query Optimization" is open over the plan. The dialog has a title bar with a close button. Below the title bar, it lists "OPTIMIZER LEVEL" with a row of radio buttons numbered 0 through 9. The radio button for level 5 is selected and circled in red. Below this, "QUERY DEGREE" is set to 1. There are icons for saving, printing, and refreshing. Below these icons are "Select All" and "Deselect All" buttons. A table with columns "VOLATILE", "Schema", and "Tablename" is shown, with two rows: one for "SYSIBM SYSINDEXES" and one for "SYSIBM SYSTABLES". At the bottom of the dialog are "Explain Again", "Cancel", and a help icon. The SAP status bar at the bottom shows "TOR (1) (000)", "yeowsap", and "OVR".

Change Query Optimization

OPTIMIZER LEVEL

0 1 2 3 4 5 6 7 8 9

QUERY DEGREE 1
(default: 1)

| VOLATILE | Schema | Tablename |
|--------------------------|--------|------------|
| <input type="checkbox"/> | SYSIBM | SYSINDEXES |
| <input type="checkbox"/> | SYSIBM | SYSTABLES |

Explain Again Cancel

Diagnostics - SQL cache – Access Plans (4)

The screenshot displays the SAP SQL cache diagnostics interface. A context menu is open over the access plan tree, listing various actions such as 'Display details', 'Change OPTIMIZER Parameters', and 'Collect Explain Informations'. The access plan tree shows a sequence of operations: 0 [0] FETCH SYSTABLES, 7 RIDSCN, 8 SORT, 9 IXSCAN IBM22 #key, 10 [1] IXSCAN IBM03 #key columns, 11 GRPBY, 12 NLJOIN, 13 [0] FETCH SYSTABLES, 14 RIDSCN, 15 SORT, 16 IXAND, 17 IXSCAN IBM21, 18 IXSCAN IBM22, and 19 [1] IXSCAN IBM03 #key columns. A 'Set Download Criteria' dialog box is open on the right, showing a list of criteria to be downloaded, including DB2 Level, Registry Variables, DBM Configuration, DB Configuration, Table Structure, Tablespace Configuration, Statistics, and Explain. The dialog also shows the path and file name on the local machine: Path: D:\DOCUME~1\yeow\LOCALS~1\... and File: TOR_20020904144205. The GUI section of the dialog has 'Display Download on Screen' checked. The SAP logo is visible in the top right corner of the window.

Context Menu:

- Display details F5
- Change OPTIMIZER Parameters F6
- System Catalog Information F2
- ABAP Dictionary Definition F8
- Test Execution
- More/Less Tree Information Shift+F1
- Edit Statement Shift+F2
- Source Code
- Collect Explain Informations Shift+F4
- Back F3

Access Plan Tree:

- 0 [0] FETCH SYSTABLES
- 7 RIDSCN
- 8 SORT
- 9 IXSCAN IBM22 #key
- 10 [1] IXSCAN IBM03 #key columns
- 11 GRPBY
- 12 NLJOIN
- 13 [0] FETCH SYSTABLES
- 14 RIDSCN
- 15 SORT
- 16 IXAND
- 17 IXSCAN IBM21
- 18 IXSCAN IBM22
- 19 [1] IXSCAN IBM03 #key columns

Set Download Criteria Dialog:

Download Selection:

- DB2 Level
- Registry Variables
- DBM Configuration
- DB Configuration
- Table Structure
- Tablespace Configuration
- Statistics
- Explain

Path and File Name on Local Machine:

Path: D:\DOCUME~1\yeow\LOCALS~1\...
File: TOR_20020904144205

GUI:

- Display Download on Screen

Diagnostics - CLP Commands

The screenshot shows the Oracle Enterprise Manager interface. The title bar reads 'Analysis System Help'. Below it is a toolbar with various icons. The main window title is 'Configuration: CLP Structures'. On the left, there is a tree view under 'Database Administration T...' with 'Configuration' expanded and 'CLP Commands' selected. The main pane shows a table of CLP Commands for Database TOR. A dropdown menu is open over the 'Function' column, listing various configuration options.

| System | TOR | Partition | 0000 | Function |
|--------|-----|-----------|------|--|
| | | | | Database Configuration |
| | | | | DB2 Level |
| | | | | DB2 Profile Registry |
| | | | | Database Manager Configuration |
| | | | | Database Configuration |
| | | | | Tablespace Configuration |
| | | | | Buffer Pool Configuration |
| | | | | Buffer Pool to Tablespace Assignment |
| | | | | Node Group Configuration |
| | | | | CLI Configuration |
| | | | | Database Directory Configuration |
| | | | | Node Directory Configuration |
| | | | | Database Manager Snapshot |
| | | | | Database Snapshot |
| | | | | Application Snapshot |
| | | | | Bufferpool Snapshot |
| | | | | Table Snapshot |
| | | | | Tablespace Snapshot |
| | | | | Lock Snapshot |
| | | | | Dynamic SQL Query management (DYN_QUER) |
| | | | | Discovery support for this database (DISCO) |
| | | | | Default query optimization class (DFT_QUER) |
| | | | | Degree of parallelism (DFT_DEGREE) = 1 |
| | | | | Continue upon arithmetic exceptions (DFT_SQLMATHWARN) = NO |
| | | | | Default refresh age (DFT_REFRESH_AGE) = 0 |
| | | | | Number of frequent values retained (NUM_FREQVALUES) = 10 |
| | | | | Number of quantiles retained (NUM_QUANTILES) = 20 |
| | | | | Backup pending = NO |

Diagnostics - Trace Status

The screenshot shows the SAP Diagnostics: Trace Status window. The interface includes a menu bar (System, Help), a toolbar, and a left-hand navigation pane under 'Database Administration Tasks'. The main area is divided into three sections: Trace Status, DBSL Trace, and Cumulative Trace. The Trace Status section shows System: TOR, DB Server: yeowsap, and Operating System: Windows NT. The DBSL Trace section has a checked 'Trace Level' and settings for I/O records (5), display length (64), search string, and time limit (0 μsec). The Cumulative Trace section has a checked 'Trace Level' and shows the first and last trace entries with their timestamps and a total of 218 entries. The Deadlock Trace section has a checked 'Detection Interval' set to 0 sec. The status bar at the bottom indicates 'TOR (1) (000) yeowsap INS'.

| Trace Status | |
|------------------|------------|
| System | TOR |
| Operating System | Windows NT |
| DB Server | yeowsap |
| DB Release | 08.01.0000 |

| DBSL Trace | |
|---|--------|
| <input checked="" type="checkbox"/> Trace Level | 0 |
| Number of I/O Records to be traced | 5 |
| Display Length for String/Raw Data | 64 |
| DBSL Trace Search String | |
| DBSL Trace Minimum Time Limit | 0 μsec |

| Cumulative Trace | |
|---|----------------------------|
| <input checked="" type="checkbox"/> Trace Level | 0 |
| First Trace Entry | 2002-10-10-14.25.00.468000 |
| Last Trace Entry | 2002-10-10-15.30.43.765002 |
| Number of Entries | 218 |

| Deadlock Trace | |
|--|-------|
| <input checked="" type="checkbox"/> Detection Interval | 0 sec |

Diagnostics - Cumulative SQL Trace (1)

Diagnostics: Cumulative SQL Trace

Refresh

Configuration

Database Administration T...

- Tables
- Applications
- SQL Cache
- Lock Waits
- Deadlocks
- History
- Space
- Backup and Recovery
- Configuration
 - Database
 - Database Manager
 - Parameter Change
 - Volatile Tables
 - CLP Commands
 - File Systems
 - Data Classes
- Jobs
- Alerts
- Diagnostics
 - System Check
 - EXPLAIN
 - Cumulative SQL Tr**
 - DBSL Trace Direct

Cumulative SQL Trace

System: TOR

First Trace Entry: 2002-10-10-14.25.00.468000

Last Trace Entry: 2002-10-10-15.30.43.765002

Select

EXECUTE Time | PREPARE Time | FETCH Time

| Total Time | % | Cou... | Time/Stmt | Table | SQL Statement |
|------------|------|--------|-----------|------------|---|
| 323.972 | 98,7 | 212 | 1.528 | DB6CSTRACE | UPDATE DB6CSTRACE SET PREP_TIME = PREP_TIME + ?, PRE |
| 186 | 0,1 | 1 | 186 | TMENU01 | SELECT "TREE_ID", "EXTENSION", "NODE_ID", "EXT_KEY", "PAR |
| 180 | 0,1 | 1 | 180 | TMENU01R | SELECT "NODE_ID", "EXT_KEY", "REF_TYPE", "REF_OBJECT", "E |
| 131 | 0,0 | 1 | 131 | TMENU01R | SELECT "NODE_ID", "EXT_KEY", "REF_TYPE", "REF_OBJECT", "E |
| 112 | 0,0 | 1 | 112 | TNODEEE | SELECT "NODE_TYPE", "TEXT_POS", "STXT_RTYPE", "LTXT_RTY |
| 58 | 0,0 | 1 | 58 | TMENU01 | SELECT "TREE_ID", "EXTENSION", "NODE_ID", "EXT_KEY", "PAR |
| 114 | 0,0 | 2 | 57 | TMENU01T | SELECT "SPRAS", "TREE_ID", "EXTENSION", "BRANCH", "NODE_ |
| 53 | 0,0 | 1 | 53 | V_ADDR_USR | SELECT * FROM "V_ADDR_USR" WHERE "CLIENT" = ? AND "ADDF |
| 50 | 0,0 | 1 | 50 | DDFTX | SELECT "TABNAME", "FIELDNAME", "DDLLANGUAGE", "POSITION" |
| 46 | 0,0 | 1 | 46 | TRDIRT | SELECT "NAME", "SPRSL", "TEXT" FROM "TRDIRT" WHERE "NAME |
| 97 | 0,0 | 3 | 32 | D010TAB | INSERT INTO "D010TAB" ("MASTER", "TABNAME") VALUES (?, ?) |
| 31 | 0,0 | 1 | 31 | D010INC | INSERT INTO "D010INC" ("MASTER", "INCLUDE") VALUES (?, ?) |
| 29 | 0,0 | 1 | 29 | TMENU01 | SELECT "TREE_ID", "EXTENSION", "NODE_ID", "EXT_KEY", "PAR |

Diagnostics - Cumulative SQL Trace (2)

Diagnostics: Cumulative SQL Trace - Details

Configuration Explain

Database Administration T...

- Tables
- Applications
- SQL Cache
- Lock Waits
- Deadlocks
- History
- Space
- Backup and Recovery
- Configuration
 - Database
 - Database Manager
 - Parameter Change
 - Volatile Tables
 - CLP Commands
 - File Systems
 - Data Classes
- Jobs
- Alerts
- Diagnostics
 - System Check
 - EXPLAIN
 - Cumulative SQL Tr
 - DBSL Trace Direct
 - Trace Status

Cumulative SQL Trace Detail

| | |
|-----------------------|----------------------------|
| Optimization Level | 0 |
| Query Degree | 1 |
| First Statement Usage | 2002-10-10-14.26.59.859001 |
| Last Statement Usage | 2002-10-10-14.26.59.859001 |

Statement Infos Time Histograms

Program Line

| | |
|----------|----------|
| LSHI2U07 | 00000281 |
|----------|----------|

```
SELECT "TREE_ID" , "EXTENSION" , "NODE_ID" , "EXT_KEY" , "PARENT_ID" ,  
"BROTHER_ID" , "REFNODE_ID" , "REFTREE_ID" , "NODE_TYPE" , "LOCAL_FL  
G" , "VALID_F_R" , "VALID_T_R" , "VALID_F_D" , "VALID_T_D" , "W_SUBNOD  
ES" , "APPL_FLAG1" , "APPL_FLAG2" , "APPL_FLAG3" , "COPY_NODE" , "COPY  
_TREE" , "COPNODEFRST" , "COPTREFRST" , "COMPONENT" , "SYSTEMINST" , "C  
OMPREFR" , "COMPRELTO" , "DEFAULTFLG" , "PRDVERSFR" , "PRDVERSTO" , "  
FUSER" , "FDATE" , "FTIME" , "FRELEASE" , "LUSER" , "LDATE" , "LTIME"  
 , "LRELEASE" FROM "TMENU01" WHERE "PARENT_ID" IN ( ? ? ? ? ? ? ?  
 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?  
 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?  
 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?  
 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?  
 , ? , ? , ? , ? , ? , ? , ? , ? , ? ) AND "EXT_KEY" = ?
```

Application Server:
yeowsap

Select

Diagnostics - Cumulative SQL Trace (3)

Diagnostics: Cumulative SQL Trace - Details

Explain **Select**

Configuration

Database Administration T...

- Tables
- Applications
- SQL Cache
- Lock Waits
- Deadlocks
- History
- Space
- Backup and Recovery
- Configuration
 - Database
 - Database Manager
 - Parameter Change
 - Volatile Tables
 - CLP Commands
 - File Systems
 - Data Classes
- Jobs
- Alerts
- Diagnostics
 - System Check
 - EXPLAIN
 - Cumulative SQL Tr**
 - DBSL Trace Direct
 - Trace Status

Cumulative SQL Trace Detail

Optimization Level: 0

Query Degree: 1

First Statement Usage: 2002-10-10-14.26.59.859001

Last Statement Usage: 2002-10-10-14.26.59.859001

Statement Infos Time Histograms

Summary

| | Total Time | Count | Time/Stmt |
|---------|------------|-------|-----------|
| PREPARE | 18 | 1 | 0 |
| EXECUTE | 186 | 1 | 0 |
| FETCH | 63 | 341 | 0 |

Operation Ty... > 5s > 1s > 500ms > 100ms > 50ms > 20ms > 10ms > 5ms > 2ms > 1ms < 1ms

| | | | | | | | | | | | |
|---------|---|---|---|---|---|---|---|---|---|---|-----|
| PREPARE | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| EXECUTE | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FETCH | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 340 |

Agenda

- ▶ Remote System Administration

Support for Remote Administration

The screenshot shows the 'Performance: Database Snapshot' window in SQL Enterprise Manager. A context menu is open over the 'TOR' partition, listing options: AXA, BS1, TOR (highlighted), WKB, and WKE. The window displays various performance metrics for the selected snapshot.

| System | DB Server | DBM Start |
|--------|-----------|---------------------|
| TOR | yeowsap | 08.10.2002 14:27:59 |

| Partition | DB Release | Last Reset |
|-----------|------------|------------|
| AXA | 08.01.0000 | |
| BS1 | | |
| TOR | | |
| WKB | | |
| WKE | | |

| Buffer Pools | |
|--------------|------------|
| Number | 1 |
| Total Size | 100.000 KB |

| Buffer Quality | |
|------------------------|---------|
| Overall Buffer Quality | 98,19 % |
| Data Hit Ratio | 97,09 % |
| Index Hit Ratio | 99,10 % |

| Average Time | |
|-----------------|-----------|
| Physical Reads | 1,34 ms |
| Physical Writes | 183,30 ms |

| Data | |
|--------------------|-----------|
| Logical Reads | 2.782.250 |
| Physical Reads | 81.086 |
| Physical Writes | 1.355 |
| Synchronous Reads | 52.363 |
| Synchronous Writes | 7 |

| Index | |
|--------------------|-----------|
| Logical Reads | 3.402.693 |
| Physical Reads | 30.590 |
| Physical Writes | 1.878 |
| Synchronous Reads | 27.255 |
| Synchronous Writes | 12 |

Built-in Support for Multi-partitioned DB

The screenshot displays the Oracle Enterprise Manager interface for a Database Snapshot. The left-hand navigation pane shows the tree structure under 'Performance' > 'Database Administration' > 'Database'. The main area is titled 'Performance: Database Snapshot' and includes a 'Database Snapshot' configuration table. A red circle highlights the 'Partition' column, which lists '0000', '0000', and '0001', indicating a multi-partitioned database. Below the configuration table, there are tabs for 'Buffer Pool', 'Cache', 'Asynchronous I/O', 'Direct I/O', 'Extended Storage', and 'Locks and Deadlocks'. The 'Buffer Pool' tab is active, showing performance metrics for Buffer Pools, Buffer Quality, and Average Time.

| System | BS1 | DB Server | so1ingen | DBM Start | 08.10.2002 14:48:57 |
|-----------|------|------------|--|------------|---------------------|
| Partition | 0000 | DB Release | 08.01.0000 <th>Last Reset</th> <td></td> | Last Reset | |
| 0000 | | | | | |
| 0001 | | | | | |

| Buffer Pools | |
|--------------|------------|
| Number | 3 |
| Total Size | 136.000 KB |

| Buffer Quality | |
|------------------------|---------|
| Overall Buffer Quality | 99,62 % |
| Data Hit Ratio | 99,67 % |
| Index Hit Ratio | 98,71 % |

| Average Time | |
|-----------------|---------|
| Physical Reads | 0,09 ms |
| Physical Writes | 0,00 ms |

| Data | |
|--------------------|-----------|
| Logical Reads | 2.385.029 |
| Physical Reads | 7.924 |
| Physical Writes | 0 |
| Synchronous Reads | 2.457 |
| Synchronous Writes | 0 |

| Index | |
|--------------------|---------|
| Logical Reads | 116.862 |
| Physical Reads | 1.507 |
| Physical Writes | 0 |
| Synchronous Reads | 1.499 |
| Synchronous Writes | 0 |

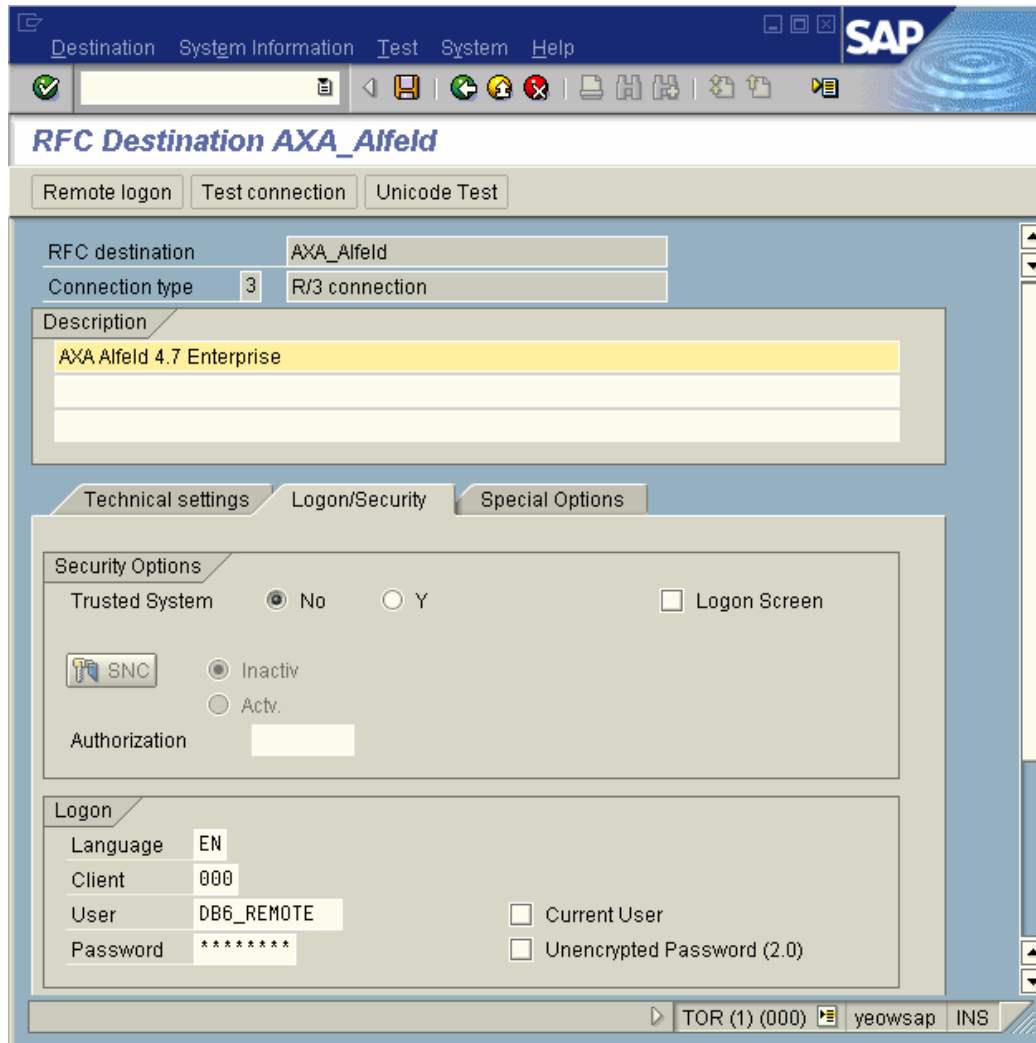
Remote Administration

The screenshot displays the SAP Cockpit Configuration interface. The title bar includes 'Analysis Edit Goto System Help' and the SAP logo. The main window is titled 'Cockpit Configuration' and features a 'Select' button. A red arrow points to the 'Configuration' icon in the left-hand navigation pane. The central area shows a table of system registrations with columns for State, SysID, Release, RFC Destination, Schema Name, DB Host, and DB Release. The table contains five entries, all with a green status indicator.

| State | SysID | Relea... | RFC Destination | Schema Name | DB Host | DB Release |
|-------|-------|----------|-----------------|-------------|-----------|------------|
| ● | TOR | 620 | | SAPTOR | yeows... | 08.01.0000 |
| ● | AXA | 620 | AXA_Alfeld | SAPAXA | alfeld | 08.01.0000 |
| ● | BS1 | 620 | BS1_Solingen | SAPBS1 | soling... | 08.01.0000 |
| ● | WKE | 620 | WKE_Wittenberg | SAPWKE | witten... | 08.01.0000 |
| ● | WKB | 46C | WKB Weilheim | SAPR3 | weilhe... | 07.02.0006 |

At the bottom of the window, the status bar shows 'TOR (2) (000) yeowsap INS'.

Configuring RFC Connections



Transaction SM59

Adding the Remote System

The screenshot shows the SAP Cockpit Configuration interface. The main window displays a table of registered systems. A dialog box titled "Add System for Remote Monitoring" is open, showing the configuration for a new system. The fields in the dialog are:

- System Identifier: AXA
- Status: Initial
- RFC Destination: AXA_Alfeld
- Schema: SAPAXA
- Component Version: 620
- Database Host: alfeld
- Database Release: 08.01.0000

The main Cockpit Configuration window shows a table with the following data:

| State | SysID | Relea... | RFC Destination | Schema Name | DB Host | DB Release |
|-------|-------|----------|-----------------|-------------|-----------|------------|
| ● | TOR | 620 | | SAPTOR | yeows... | 08.01.0000 |
| ● | AXA | 620 | AXA_Alfeld | SAPAXA | alfeld | 08.01.0000 |
| ● | BS1 | 620 | BS1_Solingen | SAPBS1 | soling... | 08.01.0000 |
| ● | WKE | 620 | WKE_Wittenberg | SAPWKE | witten... | 08.01.0000 |
| ● | WKB | 46C | WKB Weilheim | SAPR3 | weilhe... | 07.02.0006 |

Points techniques forts améliorant le TCO global :

- ❑ Facilités de déploiement
- ❑ Facilités de configuration et d'administration
- ❑ Facilités de support
- ❑ Différenciateur au niveau BI
- ❑ Recovery et HA



Réduction TCO

Quand faut-il penser à DB2 pour SAP ?

- Vous cherchez des options pour réduire le TCO de votre environnement SGBD ?
- Des problèmes de performance ou de stabilité avec SAP?
- Une consolidation de serveurs SAP?
- Besoin d'augmenter la disponibilité du système SAP (24x7) ?
- Besoin de faire évoluer les systèmes SAP existants qui deviennent obsolètes ?
- Etes-vous concernés par le futur d'Oracle avec SAP?