

MANAGING MaxDB

SPC150

Exercises / Solutions

MELANIE HANDRECK, SAP AG
JOERG HOFFMEISTER, SAP AG
ASHWATH KAKHANDIKI, SAP LABS, LLC

MANAGING MAXDB

In this workshop you will learn how to monitor and administer all MaxDB instances of your system landscape using one monitoring system.

You will do several exercises to gain practical experience in MaxDB monitoring and administration.

After the presentation part of the workshop you will have time to do the exercises and answer the questions. You will find the answers to the questions at the end of this document.

There are two 7.00 application servers available.

Logon to the SAP system with the following data:

System: M98
Logon Group: Teched1 or
Teched2
Client: 001
User name: SPC150_##
Password: teched

We use a SAP NetWeaver 2004s system (SAP Basis 7.00) in this workshop. The appearance and layout of certain menus might be different than in older SAP releases. However, the principle should be the same.

Database Installation

Introduction

To be able to create a MaxDB instance the MaxDB software has to be installed. You'll find the installation package in directory `C:\SessionContent\SPC150\Software`. Afterwards a new database instance can be created using existing backups from a different database.

Exercises

1. Use *SDBSETUP* to install the database software. This executable is located in directory `C:\SessionContent\SPC150\Software\7.6`.
 - a. Install the Server and Client software.
 - b. Install only the database software – do not create a database instance with *SDBSETUP*.
 - c. You can use the **DEFAULT** values for the independent directories. Install the database software into directory `C:\Program Files\sdb\MYDB`.

Do **not** reboot the laptop after this software installation.

2. Install *DBMGUI* using the provided installation file *DBM76.exe*. This executable is located in directory `C:\SessionContent\SPC150\Software`.
3. Use *DBMGUI* to install the standby database.
 - a. Start the *Instance Wizard (Create...)* and use the configuration type *custom*.
 - b. The database instance should be called *MYDB*.
 - c. Select the newly installed software.
Make sure that **none** of the advanced options is marked.
Enter *dbm* as user and password of the *Database Manager Operator*.
 - d. Restore the database parameters from the Complete Backup provided in directory `C:\SessionContent\SPC150\Backups`. The backup file is called *DataBackup*.
 - e. Make sure that you use 3 Data Volumes – each of a size of 4000 **Pages**.

- f. Create the instance '*for recovery*' – that you can restore the data backup in the next step.
 - g. Restore the complete data backup which you already used to read the parameters. Do **not** start the database after the restore, but choose *Back*.
 - h. Now you can decide if you would like to restore the incremental backup and following log backups or if you just want to restore log backups. Choose *Restore a medium* again. Depending on your restore strategy you have to create one or two new backup media for the corresponding restore operations. If you restore the incremental backup, continue afterwards with the available log backups.
 - i. After you restored all log backup files available in directory *C:\SessionContent\SPC150\Backups*, cancel the restore operation. This brings the database to mode OFFLINE.
This simulates your standby database – so think about this as the point in time where all available backups of your master instance are restored to your standby instance. Whenever a new log backup file is created on the master instance you can restore it to the standby instance. It is also possible to gather all log backup files of one day and to restore all of them only once a day. This depends on the high availability concept of your company and of the allowed down times (=restore times) of your system. In this exercise we will restore a couple of log backups together.
 - j. Perform a Refresh in *DBMGUI*. Then bring the database back to ADMIN mode – make sure that you don't start it to ONLINE mode, as it is not possible to continue the restore afterwards!
 - k. Copy the log backup files from directory *C:\SessionContent\SPC150\NextBackups* to *C:\SessionContent\SPC150\Backups*. Then restore these log backup files. Remember that you have to start with the last successfully restored log backup file again.
 - l. After all log backup file have been restored, start the database instance (*Back -> Ignore*).
 - m. Load the system tables of your database instance. This should always be done after a recovery to make sure that the system tables are really created with exactly the same version which is currently running. To load the system tables choose *Configuration -> Upgrade System Tables* in *DBMGUI*. You have to enter the name and the password of the SYSDBA – this is DBADMIN with password SECRET.
 - n. If you did not use the incremental backup but only the log backups to restore the database, you'll find some BAD INDEXES in the database now. Use *DBMGUI -> Recovery -> Index* to create these indexes.
- Now you can use your standby instance as the productive instance.

Database Instance Integration Into the SAP System

Introduction

To be able to access MaxDB instances from an SAP system the connect information has to be stored. Use transaction *DB59* and choose *Integrate Database* to insert or *Display/Change Integration Data* to change or delete the connect information.

Exercises

1. Start transaction DB59 (e.g. using the transaction code /nDB59)
2. Enter the integration data for the database instance, which is running on your laptop.
Specify SPC## for the DB Connection Name. ## is the number of your laptop.
Choose the appropriate Database Type for your MaxDB instance.
The name of the database installed on the laptop should be MYDB (specified during the last exercise).
Our SAP system doesn't know the name of your local machine. Get the IP-address of your machine using the command ipconfig in a DOS command prompt.
The DBM operator is called DBM with the password DBM (specified during the last exercise). The checkbox for the Central Authorization should be marked.
The Standard Database User of this database is called MONA with password RED.
Activate the Alert Monitor on tab Automatic Monitoring.
3. Where is the connect information stored, if the central authorization is used?
4. Check if all connection information is entered correctly using the *Connection Test*. If an error occurs, check the *Connection Test Log* and correct the problem.

5. Open the *Assistant* for your MaxDB instance.

Database Assistant – Transaction DB50(N)

Introduction

During the next exercises you will first determine some information about your MaxDB instance. Then you will start the performance analysis tools and execute some SQL statements. You'll have to use the output of the different monitors to figure out which statements have been executed and how they can be improved.

Exercises

1. Check the *backup history* of your database instance. Can you see all restore actions?
2. What is the size of the *I/O Buffer Cache*?
3. Check the filling level of the Data and Log Volumes.
4. Check which tables are available in your database instance.
5. Determine the largest table in the database instance.
6. Please start the *Database Analyzer*. Choose an interval of *60 seconds*.
7. Start the *Command Monitor*. Use the DEFAULT values for all monitor settings but the *Selectivity* – choose 3% for that.
8. Activate the *Resource Monitor*.
9. Start transaction *SE38* and execute report *Z_TECHED2006_DEMO_1*.
Enter your connection identifier (*SPC##*) as the *DB Connection Name*.
10. Check the Database Analyzer log file for problems.
11. Check if you can find the statement causing the problems in the *Command Monitor*.
Which statement is it?
12. Determine the execution plan of this statement using the *Explain* Button in the *Command Monitor*.
13. Check if an appropriate primary key or index exists for this table, which could be used to speed up the execution of this statement.
Why can't this index be used? Make sure that the index can be used the next time the statement is executed.
14. Check if your solution did solve the problem: execute the EXPLAIN statement again.
15. Execute report *Z_TECHED2006_DEMO_2* in transaction *SE38*. Use again *SPC##* as the *DB Connection Name*.
16. Check the Database Analyzer *log file* for problems.
17. Check if you can find any statements causing problems in the *Command Monitor*.
If you cannot find any there, check the *Resource Monitor* output.
What can you see?

Alert Monitor – Transaction RZ20

Introduction

The Alert Monitor informs you about critical situations of your database instance. If you integrate a MaxDB instance in the monitoring system in transaction DB59, you can activate the Alert Monitor easily.

Exercises

1. Look for critical alerts in the *Alert Monitor*. You can start it in the *Database Assistant*.
You might find a red alert concerning *data backups*. Do you know, how to solve this problem?
Create a complete data backup using *DBA Planning Calendar*. Please create a **new** backup medium for this backup.
2. The threshold values for the node *Free Log Space* do not fit to your database size. As the log volume is very small, the red alert should only occur, if less than 2 MB are free. Change the thresholds as follows:

Change from GREEN to YELLOW	4	MB
Change from YELLOW to RED	2	MB

Reset from RED to YELLOW 3 MB

Reset from YELLOW to GREEN 5 MB

3. Check which data collectors are responsible for the *Backup* node and the *Free Log Space* node and start them manually. Are these nodes green, now?

Solutions

Database Installation

1. To add the software directory to the PATH variable a reboot would be necessary. However, this is not needed for this workshop.
2. The installation of DBMGUI creates a shortcut on the desktop. Use this shortcut to start DBMGUI.
3. When you install the database instance as described, it will be created with two standard users:
 DBM Operator: DBM, password: DBM
 System Administrator (SYSDBA): DBADMIN, password: SECRET
 A third user will be created – a SQL user: MONA with password RED. This user owns the 'application data' of the database.

Database Instance Integration Into the SAP System

1. Start transaction DB59 (e.g. using the transaction code /nDB59).
2. When you enter the logon information for the first time, it is not necessary to restart the SAP system. This is only necessary when the work processes are already connected to the database instance and the logon information has been changed (e.g. the system should connect to a standby-instance of the database on a different server).
3. If central authorization is used, the connect information is stored in tables DBCON and DBCONUSR in the database of the monitoring system.
4. Check if all connection information is entered correctly using the *Connection Test*. If an error occurs, check the *Connection Test Log* and correct the problem. Problems with the connection to your database instance might occur if you enter a space at the end of the IP address. Furthermore you should double-check the entered users and passwords and if the TCP/IP listener (x_server) is running. To start the x_server you have to enter the complete path:
`"c:\Program Files\sdb\programs\bin\x_server start"`
5. You can either double-click the entry of your database instance or mark this entry and press the *Assistant* button to start transaction DB50N for your database instance.

Database Assistant – Transaction DB50(N)

1. You can check the backup history either in the *Properties* section of DB50 -> *Files* -> *BACKHIST* or in section *Problem Analysis* -> *Log Files* -> *DBA History*. All restore activities are listed in the log file of the database kernel (BACKHIST and DBA History -> Backup/Restore (Kernel) but not in the extended Backup History (DBA History -> Backup/Restore (DBM Server)). The extended Backup History is activated when you enter the DBA History the first time. So all further backup/restore activities will be logged there as well.
2. You can check the *I/O Buffer Cache size* in section *Current Status* -> *Memory Areas* -> *Caches*. The I/O Buffer Cache has a size of 3000 Pages.
3. You can check the filling level of the volumes in transaction DB50 in section *Current Status* -> *Memory Areas* -> *Data Area and Log Area*.
 The filling level of the data volumes is appr. 53 %.
 The filling level of the log volume is appr. 23 %.
4. You can check the tables in section *Problem Analysis* -> *Tables/Views/Synonyms* of DB50. The following tables should be owned by user MONA:
 BKPF, CITY, HOTEL, CUSTOMER, ROOM, RESERVATION, EMPLOYEE.
 CUSTOMER_ADDR, HOTEL_ADDR and CUSTOM_HOTEL are Views owned by MONA.
5. You can determine the largest tables in transaction DB50 in section *Statistics* -> *Table Sizes* -> *Largest Tables*. Use Button *Update Table Statistics*. The largest table is BKPF.
6. To start the Database Analyzer choose *Problem Analysis* -> *Database Analyzer* -> *Bottlenecks*. Then use the *Start Analysis* button and enter 60 seconds as the interval for the data collection.

7. To start the Command Monitor choose *Problem Analysis -> SQL Performance -> Command Monitor*. Then use the *Change Monitor Settings* button. Press the *Apply SAP Default Settings* button to enter the DEFAULT values and then change the *Selectivity* value to 3%. Confirm these settings with the *Activate Monitor Settings* button.
8. To activate the Resource Monitor choose *Problem Analysis -> SQL Performance -> Resource Monitor*. Then use the *Start Recording* button to switch on the Resource Monitor.
9. Start transaction SE38 and execute report Z_TECHED2006_DEMO_1.
Enter *SPC##* as the *DB Connection Name*.
10. Check the Database Analyzer log file for problems. Therefore choose *Problem Analysis -> Database Analyzer -> Bottlenecks* in transaction DB50 again. Press the *Refresh* button to reload the log file. You should find a message like
*** W3 Selects and fetches selectivity 0.03 %: 205 selects and fetches, 100214 rows read, 29 rows qualified**
or
*** W3 21 table scans, selectivity 0,03 %: 100213 rows read, 28 rows qualified**
So a lot of rows had to be read to get just a few result rows.
11. Check if you can find the statement causing the problems in the *Command Monitor*. Therefore choose *Problem Analysis -> SQL Performance -> Command Monitor* and press the *Refresh* button here, too. You can see a statement with a long runtime (appr. 5 seconds) on table BKPF. Double-click this entry to get the complete statement:

```
SELECT
  MANDT, BUKRS, BELNR, BLDAT
FROM
  MONA.BKPF
WHERE
  GJAHR='1995' AND MONAT='07' AND BLART='RV' AND BELNR='1200000008'
```

12. To get the execution plan of the SQL statement, use the *EXPLAIN* button in the Command Monitor. The used strategy is a table scan:

OWNER	TABLENAME	COLUMN_OR_INDEX	STRATEGY	PAGECOUNT
MONA	BKPF		TABLE SCAN	4148
			RESULT IS NOT COPIED , COSTVALUE IS	4148

13. To determine the primary key of the table, choose *Problem Analysis -> Tables/Views/Synonyms* in transaction DB50. Enter the table name BKPF and press the *Display: Table Information* button. Select the *Definition* tab. You can see, that no primary key is defined for this table.

To determine the existing indexes for this table, select the *Indexes* tab.

Compare the columns of the different indexes with the WHERE condition of the executed statement.

Index BKPF~7 consists of the columns GJAHR, MONAT and BLART – which are three of the columns in the WHERE condition.

Using this index less rows need to be read and the execution of the statement should be much faster.

The index cannot be used because it is disabled (yellow exclamation mark).

Place the cursor on this index and press the *Allow Index Access* button to enable the index again.

14. If you execute the EXPLAIN statement again, you can see, that this index is used now:

OWNER	TABLENAME	COLUMN_OR_INDEX	STRATEGY	PAGECOUNT
MONA	BKPF	BKPF~7	EQUAL CONDITION FOR INDEX	213
		GJAHR	(USED INDEX COLUMN)	
		MONAT	(USED INDEX COLUMN)	
		BLART	(USED INDEX COLUMN)	
			RESULT IS NOT COPIED , COSTVALUE IS	20

15. Execute report Z_TECHED2006_DEMO_2 in transaction SE38. Use again *SPC##* as the *DB Connection Name*.
16. Check the Database Analyzer log file for problems. Therefore choose *Problem Analysis -> Database Analyzer -> Bottlenecks* in transaction DB50 again. Press the *Refresh* button to reload the log file. Probably you won't find W1-W3

messages – just an information about the executed number of statements – which seems to be quite high for this test database.

17. Check if you can find any statements causing problems in the Command Monitor. Therefore choose *Problem Analysis -> SQL Performance -> Command Monitor* and press the refresh button here, too.

You won't find any new critical statements here.

To check the Resource Monitor output, choose *Problem Analysis -> SQL Performance -> Resource Monitor* and press the refresh button.

You can see, that the statement

```
SELECT CNO, TITLE, FIRSTNAME, NAME, ZIP, ADDRESS FROM MONA.CUSTOMER
```

has been executed very often (1500 times). Each single execution was very fast – therefore you could not see any problems in the Database Analyzer log file or in the command monitor. Furthermore the overall execution time is not that high. But still all the data had to be read and transferred through the network. In such a case the application should be checked to avoid unnecessary load on the system.

Alert Monitor – Transaction RZ20

1. There are several red and yellow alerts concerning your database instance. One of the alerts is about complete backups – no complete backup does exist for your database instance.

To solve this problem, create a backup medium. Choose *Current Status -> Configuration -> Backup Media* in transaction DB50N and then press the *Create Medium* button. Enter a name and the location for the backup medium – the default values for the other options are OK.

Then start the DBA Planning Calendar (choose *Tools -> DBA Planning Calendar* in transaction DB50N). Double-click the action *Complete Data Backup* in the *Action Pad*. Select the newly created backup medium and press button *Execute*.

2. To change the threshold value of a node, place the cursor on this node and press the *Properties* Button. Then press the *Display <-> Change* button and enter the new threshold values. Please make sure to save the new values.
3. To figure out which data collector is responsible for the backup node, place the cursor on this node and press F1 then choose *Long Text*. Do the same for the *Free Log Space* node. Collector B is responsible for the *Backup* node, collector A for the *Free Log Space* node.

To start the data collector, start transaction RZ20.

Choose *CCMS monitor sets -> SAP CCMS Technical Expert Monitors -> All Monitoring Contexts*.

Then choose *Extras -> Activate maintenance function*.

Afterwards select both data collectors (make sure the checkbox is marked) and choose *Edit -> Nodes (MTE) -> Start methods -> Start data collection method*.

Copyright 2006 SAP AG. All Rights Reserved

- No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP AG. The information contained herein may be changed without prior notice.
- Some software products marketed by SAP AG and its distributors contain proprietary software components of other software vendors.
- Microsoft, Windows, Outlook, and PowerPoint are registered trademarks of Microsoft Corporation.
- IBM, DB2, DB2 Universal Database, OS/2, Parallel Sysplex, MVS/ESA, AIX, S/390, AS/400, OS/390, OS/400, iSeries, pSeries, xSeries, zSeries, z/OS, AFP, Intelligent Miner, WebSphere, Netfinity, Tivoli, Informix, i5/OS, POWER, POWER5, OpenPower and PowerPC are trademarks or registered trademarks of IBM Corporation.
- Adobe, the Adobe logo, Acrobat, PostScript, and Reader are either trademarks or registered trademarks of Adobe Systems Incorporated in the United States and/or other countries.
- Oracle is a registered trademark of Oracle Corporation.
- UNIX, X/Open, OSF/1, and Motif are registered trademarks of the Open Group.
- Citrix, ICA, Program Neighborhood, MetaFrame, WinFrame, VideoFrame, and MultiWin are trademarks or registered trademarks of Citrix Systems, Inc.
- HTML, XML, XHTML and W3C are trademarks or registered trademarks of W3C®, World Wide Web Consortium, Massachusetts Institute of Technology.
- Java is a registered trademark of Sun Microsystems, Inc.
- JavaScript is a registered trademark of Sun Microsystems, Inc., used under license for technology invented and implemented by Netscape.
- MaxDB is a trademark of MySQL AB, Sweden.
- SAP, R/3, mySAP, mySAP.com, xApps, xApp, SAP NetWeaver, and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP AG in Germany and in several other countries all over the world. All other product and service names mentioned are the trademarks of their respective companies. Data contained in this document serves informational purposes only. National product specifications may vary.
-
-
- The information in this document is proprietary to SAP. No part of this document may be reproduced, copied, or transmitted in any form or for any purpose without the express prior written permission of SAP AG.
- This document is a preliminary version and not subject to your license agreement or any other agreement with SAP. This document contains only intended strategies, developments, and functionalities of the SAP® product and is not intended to be binding upon SAP to any particular course of business, product strategy, and/or development. Please note that this document is subject to change and may be changed by SAP at any time without notice.
- SAP assumes no responsibility for errors or omissions in this document. SAP does not warrant the accuracy or completeness of the information, text, graphics, links, or other items contained within this material. This document is provided without a warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability, fitness for a particular purpose, or non-infringement.
- SAP shall have no liability for damages of any kind including without limitation direct, special, indirect, or consequential damages that may result from the use of these materials. This limitation shall not apply in cases of intent or gross negligence.
- The statutory liability for personal injury and defective products is not affected. SAP has no control over the information that you may access through the use of hot links contained in these materials and does not endorse your use of third-party Web pages nor provide any warranty whatsoever relating to third-party Web pages.

SAP assumes no responsibility for errors or omissions in these materials