SAP ® TOOLS
TO BACKUP THE ORACLE DATABASE
FOR THE SAP R/3 ® SYSTEM

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Introduction

All the business application data of the three-tiered SAP R/3 client/server system is saved in a relational database. It is therefore essential not only to backup profiles and SAP R/3 programs, but also data and other components of the relational database in sufficiently short intervals.

For the mainframe environment, backup programs that meet all requirements for a comprehensive backup are available . However in contrast, for open operating systems like UNIX, for a long time only rudimentary backup programs have been available (e.g. 'dd', 'cpio', 'tar'). These are not well-suited for backing up a relational database because:

- They do not deal with special problems that may be encountered during a database backup

- They do not provide tape management

SAP therefore offers its own backup programs. It provides tools that enable an easy and complete backup of the R/3 system ensuring smooth system operation.

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The following SAP Tools are available for backing up and managing ORACLE database backups:

- BRBACKUP

    Backup of data files, control files and online redo log files of the database

- BRARCHIVE

    Archiving of the offline redo log files

- SAPDBA

    Database administration, BRBACKUP/BRARCHIVE program calls, automatic restore/recovery, log administration [1]

    The following platforms are supported:

- HP-UX, AIX, SINIX, DG/UX, SUN Solaris, OSF/1, SEQUENT/PTX, AT&T System V.4, WindowsNT

General Information

BRBACKUP/BRARCHIVE for backing up data are command line programs and can therefore simply be scheduled in the background. Online help is provided for entering parameters. The messages of both programs are available in English and German.

The backups are based on the following programs:

- 'cpio' in a UNIX environment ('cp' for a backup to disks)

- MKS-'cpio' for WindowsNT

- External backup programs that can be accessed via the BACKINT interface program (see figure 1)

All actions are logged in the file system and corresponding database tables. When BRBACKUP/BRARCHIVE run, they also save backup logs and profiles.

BRBACKUP/BRARCHIVE allow extensive volume management. To use the functions provided, the volumes need to be initialized with BRBACKUP/BRARCHIVE to ensure that they include an SAP-specific label. Volumes that have not been released for use cannot be overwritten, if the label specifies that they are still locked.

The names and number of volumes required for BRBACKUP/BRARCHIVE or BRRESTORE can be determined in advance using the query mode, without starting a backup or restore.

SAP R/3 Release 3.0 will allow a complete and detailed verification to be carried out when the backup is completed. Up to now this could only be done by comparing information in the logs with the order of the files on the volumes.

BRBACKUP

The SAP BRBACKUP tool allows an online or offline backup of the control file, of data files in individual or all tablespaces and if necessary of the online redo log files (see figure 1). In addition BRBACKUP saves the profiles and logs relevant for the backup.
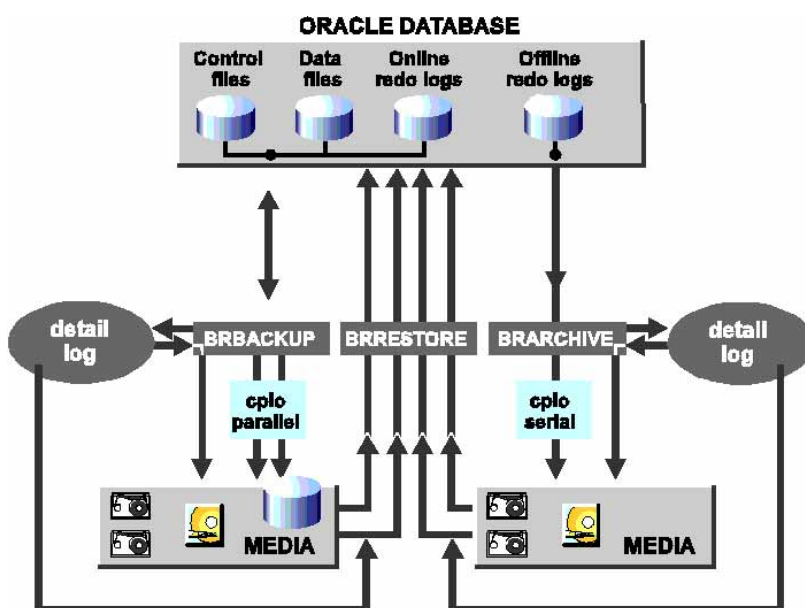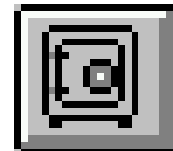
Fig. 1: SAP ORACLE backup (with SAP tools)

In addition to the actual backup, BRBACKUP also performs the following:

- Automatically changes the state of the database depending on the type of backup wanted (online or offline)

- Checks the status of files

- Sets the relevant database parameters

- Optimizes the data distribution on the backup media. The algorithm for distribution is specially adapted to the requirements of a database backup i.e. to backing up a small number of very large files. The distribution of data depends on whether you carry out a serial (disk or tape) or parallel (locally connected backup device) backup

- Software compression, if the option is selected

- Saves to hardware compressing tape stations, taking previously determined compression rates into account

The BRCONNECT program ensures that the database status required for the online/offline backup remains unchanged during the bakkup.

The saving rates largely depend on the number of tape stations in use and the CPU load (particularly when software compression is used). For example, when 5 hardware compressing 4mm DAT tape stations are being used, saving rates of 5 GB/h (net) can be achieved.

From SAP R/3 Release 3.0, it will also be possible to backup any files or directories you wish. However, the backup of a directory will be restricted to the files it contains. This will enable backups of all SAP objects that do not belong to the database (e.g. programs, SAP start profiles, selected logs etc. [4]).

BRARCHIVE

The SAP tool, BRARCHIVE, allows you to archive the offline redo log files i.e. the online redo log files saved to the archiving directory by ORACLE (see figure 1). BRARCHIVE also saves all the logs and profiles of the archiving process. It only supports tapes as storage media.

Reasons for archiving offline redo log files:

- In the event of a failure, a consistent database status can only be recovered, if all relevant redo log files are available.

- The database system of a productive R/3 System has to be operated in the ARCHIVELOG mode (to prevent overwriting of not yet saved online redo log files). To protect the archive directory against overflowing, it has to be emptied regularly.

- An online backup of data files is of no use if the related redo log files are missing. It is therefore necessary to archive the offline redo log files generated during the online backup immediately after running BRBACKUP.
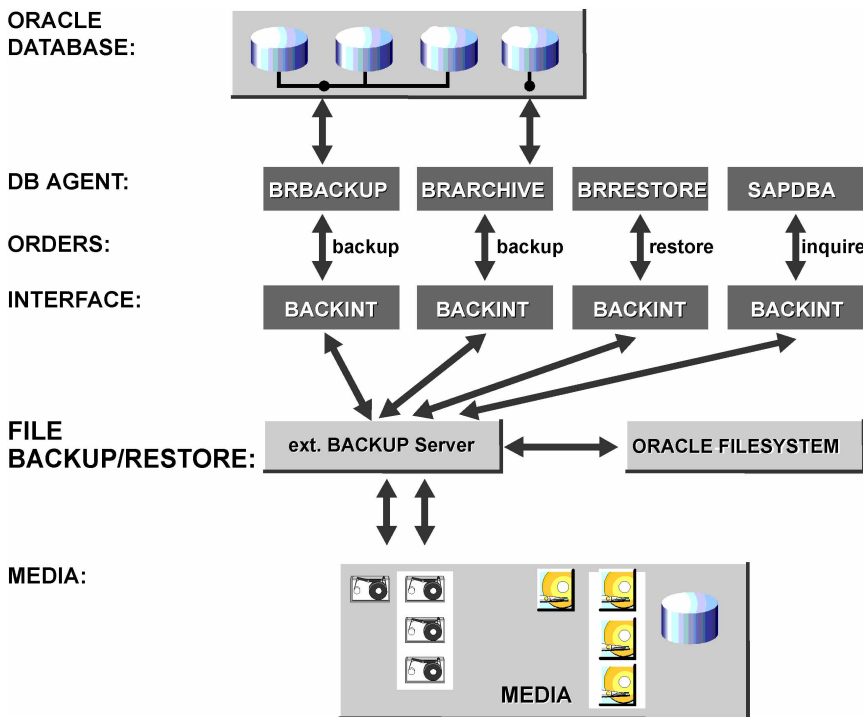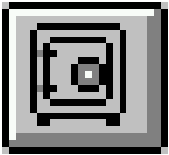
For security reasons, BRARCHIVE

ORACLE
DATABASE:

DB AGENT: BRBACKUP BRARCHIVE BRRESTORE SAPDBA

ORDERS: backup backup restore inquire

INTERFACE: BACKINT BACKINT BACKINT BACKINT

FILE
BACKUP/RESTORE: ext. BACKUP Server ORACLE FILESYSTEM

MEDIA:

MEDIA

Fig. 2: SAP ORACLE backup (via interface)

offers duplicate archiving of offline redo log files (redundant serial or parallel archiving is possible).

On the basis of the logs, BRARCHIVE can ensure that redo log files are not deleted before they have been archived and that the same files are archived once or twice.

BRARCHIVE allows the database administrator to continually archive offline redo log files. This means that the archiving directory, where ORACLE places the offline redo log files, can be kept free by continually archiving and then deleting current redo log files.

BRRESTORE

The SAP tool, BRRESTORE, will be available from SAP R/3 Release 3.0 [4]. BRRESTORE can be used to restore files of the following type:

- database data files, control files and online redo log files saved with BRBACKUP

- offline redo log files archived with BRARCHIVE

- non-database files saved with BRBACKUP

You can specify files, tablespaces, complete backups, log sequence numbers of redo log files or the position of a file on tape. The BRRESTORE program automatically determines the corresponding backup tape and the position of the files needed on the tape. BRRESTORE checks whether the required free disk space is availa-

ble to allow the files to be restored.

Backup Concept

To a large extent, the backup concept depends on the changing amount of data, the available hardware and tolerated downtimes in case of an offline backup or a recovery. A reliable backup concept is essential to deal with situations such as:

- database failure due to faulty disk

- database failure due to handling errors

- resetting the database to a previous status

A possible backup strategy for the ORACLE database of a productive R/3 System is:

- Full backup (offline) every week

- Full backup (online) every second day (a daily backup would be ideal)

- Daily backup of the offline redo log files (double, possibly continuous, especially when mass data is transferred)

- Double backup of offline redo log files after an offline backup or directly after an online backup

- Possibly an additional logical backup (using ORACLE export) of the most important tables

The amount of data involved varies. It ranges from about 4 GB with little redo information (when R/3 is used more or less as a DSS System) to about 50 GB, with 2 GB redo information per day, when a production system is using OLTP processing. Capacity planning for the future has estimated values of up to 500 GB data in a database (depending on the application). The backup procedure for such large amounts of data has to take

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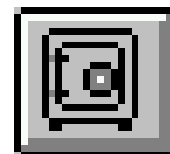
into account tolerated downtimes and technical strategies that ensure high availability and prevent failures. This can, for example, be achieved by using an ORACLE parallel server configuration, disk mirroring with a RAID system or having a „standby" database system.

All measures taken to prevent hardware failure do not help if a logical error occurs. For this reason, restoring (BRRESTORE) and recovering data (e.g. with SAPDBA) [1] is just as important as the already discussed data backup (BRBACKUP, BRARCHIVE). For further information refer to the manual [3,4] or other SAP information sources such as OSS.

External Backup Programs

All SAP backup programs can call the interface program BACKINT via an open interface that enables them to communicate with an external backup program (see figure 2). Generally this interface program is implemented and sold by the vendor of the external backup program. SAP assumes responsibility for defining BACKINT and guarantees the functionality related to BRBACKUP, BRARCHIVE, BRRESTORE and SAPDBA.

All the external backup programs mentioned (see fig. 3) support well-known UNIX operating systems on the client side. Under WindowsNT the products HIBACK, NETWORKER (Test) and ARCserve (planned) are currently available for the client side. Many vendors offer a link to OBACKUP (ORACLE PARALLEL BACKUP/RESTORE UTILITY), but this cannot be used for productive operation until it has been released by ORACLE.

At present we recommend the use of the SAP tool BACKINT, as descri-

At present solutions are available for:

Vendor	Product	Client	Server Interface	OBACKUP Interface	SAP-Interface: BACKINT
IBM	ADSM	UNIX, OS/2, WINDOWS, NETWARE	MVS, AIX/6000	Test	productive
HP	OMNIBACKII	UNIX, NETWARE	HP	Test	productive
Hinrichs&Hin.	HIBACK	UNIX, WIN-NT, NETWARE	UNIX, WIN-NT, NETWARE	no	productive

At the latest, the product NETWORKER (LEGATO) will be supported in Release 3.0:

Vendor	Product	Client	Server Interface	OBACKUP Interface	SAP-Interface: BACKINT
LEGATO	NETWORKER	UNIX, WIN-NT, NETWARE	UNIX, NETWARE	Test	Test, (productive 4. Qrt. 95)

The following interfaces are in a project planning phase:

Vendor	Product	Client	Server Interface	OBACKUP Interface	SAP-Interface: BACKINT
EPOCH	EPOCH BACKUP	UNIX, NETWARE	UNIX, NETWARE	Test	planned
CHEYENNE	ARCServe	UNIX, WIN-NT, NETWARE	UNIX, WIN-NT, NETWARE	spec. Agent (without OBACKUP)	planned

Fig. 3: External backup programs

Fig. 4: CCMS - overview

Fig. 5: CCMS - detailed display of a backup

bed here, to implement a company-wide, uniform backup strategy. A major advantage of this procedure is that it allows easy database administration via SAPDBA, particularly in the case of a database recovery.

For more information on the external backup programs, please contact the relevant vendor [5-10].

CCMS LINK

CCMS (Computing Center Management System) allows the scheduling of an online backup with BRBACKUP. Starting an offline backup with BRBACKUP and starting the BRARCHIVE program will also be supported from SAP R/3 Release 3.0.

CCMS lets you display the following:

- Overview of all backups performed with BRBACKUP/BRARCHIVE (see figure 4).

- All detailed information (see figure 5) including the runtime of the actions and the amounts of data transferred

- init<SID>.sap profile used during the backup

Preview

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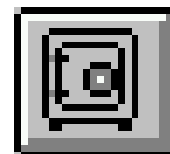
In future, ORACLE will offer the backup program ORACLE PARALLEL BACKUP/RESTORE UTILITY (OBACKUP) as part of its standard package. The program is an interface to an external backup program (see figure 3) that has to be purchased separately. You can obtain further information on the current state of this solution from the database vendor [2].

Besides consolidating existing features, SAP R/3 Release 3.0 also provides the following new functions:

- Backup of non-database files with BRBACKUP
- SAP tool BRRESTORE integrated in SAPDBA for restoring files
- Verification of completed backups
- Enhancement of the CCMS functionality to schedule backups (e.g. BRARCHIVE archiving, BRBACKUP offline backups)
- Support of raw devices
- Support of the OPS configuration

References

1. SAP article „SAPDBA ORACLE Database Administration for the SAP R/3 System"

2. ORACLE/SAP Technology Centre, G.Hannken, Neurottstr.16, 69190 Walldorf (FAX (0)6227 343027)

3. SAP Documentation: BC SAP Database Administration ORACLE Rel.2.2, July 1994, order number 50009693

4. SAP Documentation: BC SAP Database Administration ORACLE Rel.3.0, September 1995, order number 50012512

5. IBM Deutschland Entw., Dr.H.J.Renger, Schönaichenstr.220, 71032 Böblingen (FAX (0)7031 163619)

6. Hinrichs&Hinrichs, Gründgensstr.16, 22309 Hamburg (FAX (0)40 631604)

7. Hewlett-Packard, O.Rörden, Herrenbergstr.130, 71034 Böblingen (FAX (0)7031 141888)

8. LegatoSystems, 3145 Porter Drive, Palo Alto, CA 95304, U.S.A. (FAX 415 8126032)

9. Epoch, 8 Technology Drive, Westborough, MA 01581-1751, U.S.A. (FAX 508 3666853)

10. Cheyenne Software, 3 Expressway Plaza, Roslyn Heights, NY 11577, U.S.A. (FAX 516 484 3446)

11. SAP article: „ComputerCenterManagementSystem for the SAP System R/3" order number 50007196

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