

## **Oracle Standby Database**

White Paper: Oracle Database Administration

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## INTRODUCTION

The standby database configuration is supported officially by Oracle. The Oracle documentation contains detailed information on this database configuration (for example, Backup and Recovery and Disaster Recovery documentation). The following sections provide an overview of the standby database configuration and the support provided by the SAP tools BRBACKUP and BRARCHIVE.



Only configure a standby database scenario if you are an **experienced user**. If you decide to use this scenario you take **full responsibility** for configuring and using the standby database.



As of Oracle 10g, there is now an automated solution for operating a standby database – Oracle Data Guard.

## ADVANTAGES AND DISADVANTAGES OF THE STANDBY DATABASE

Before you use the standby database scenario, carefully weigh up the advantages and disadvantages.

### Advantages

- Very low failure rate  
All system components are duplicated. The primary and standby instances can run on different hosts. They can also have separate locations depending on the safety requirements.
- Very short downtime  
If an error occurs in the primary database system and you have to recover the database, you can perform the recovery very quickly on the standby host. You can avoid the time-consuming datafile restore, since these files are already located on the standby host.  
The only thing you need to do is to import the last entries from the redo log files. Therefore, the standby instance can take over the tasks of the primary instance very quickly.
- Significant decrease of the load on the production host  
The database backup requires considerable resources and time for large databases. Since the backup can run on the standby host, the load on the primary instance is reduced significantly.  
Therefore, the resources on the production host are fully available for production operation, and you do not need to interrupt or restrict database operation for a backup.
- Applying redo log files to the standby database immediately verifies their consistency. No other tool can achieve this level of verification.

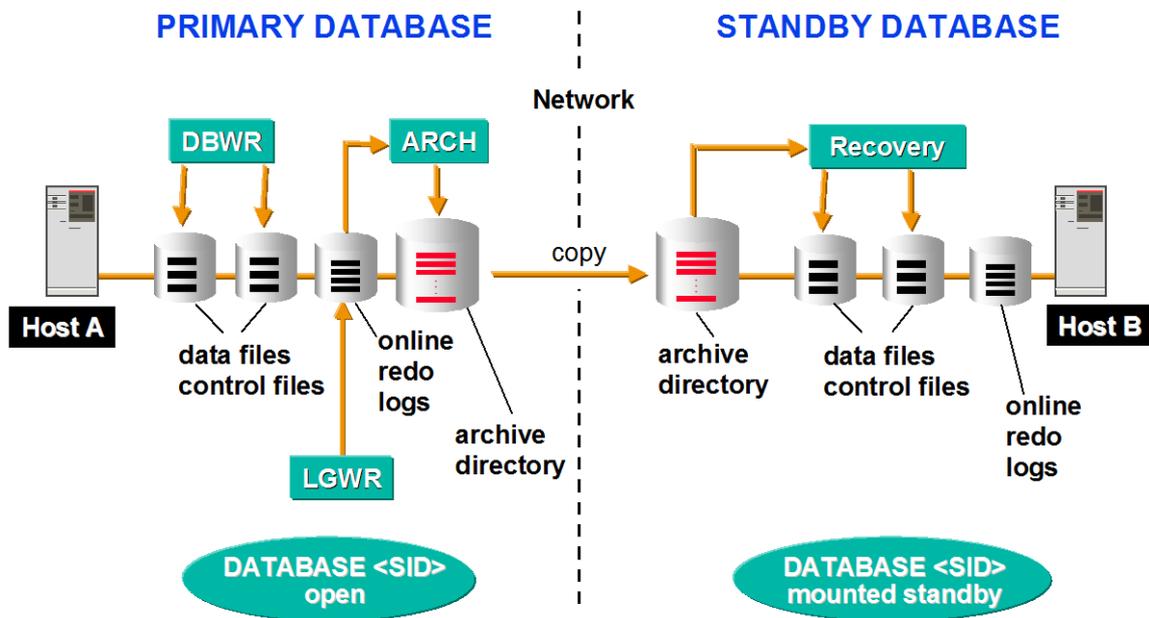
### Disadvantages

- High costs  
For a standby database scenario, all system components need to be available in duplicate. In particular, duplicate hardware resources (CPU, hard disks, and so on) are expensive.
- High system administration expense  
You need to set up the standby host. If structural changes are made on the primary database system, you must make the required resources available on the standby host. When the standby instance has taken over production operation – a “takeover” – you must set up a replacement standby database.
- High requirements for switchover software  
So that the standby instance can take over production operation, the appropriate switchover software is required. The user and the suppliers of the hardware and system software are responsible for selecting this software and making sure that it functions correctly.

## STANDBY DATABASE CONFIGURATION

A standby database configuration is when the primary (that is, production) database is duplicated on the standby database. The aim is to minimize downtime if the primary database suffers an error, since the standby database can very quickly assume the role of the production database.

### Standby Database Configuration



Two identically configured databases operate on two identically configured hosts:

- The **primary** (that is, production) Oracle instance is located on the first host. The database is open and fully available for all SQL calls of the SAP System. The primary database system is the system that directly executes all database requests.
- The **standby** database is a copy of the primary database and is only intended as a recovery system. The standby Oracle instance on the second host is in the "mount-standby" state (that is, not opened) and is constantly recovered. This means that the standby instance incorporates all changes to the data of the primary instance immediately or with a slight delay. To do this, the offline redo log files created in the primary database system are imported to the standby database (only the redo entries already archived by Oracle can be imported).

If the primary database system is not available (for example, after a media error), the standby instance can very quickly take over the functions of the primary instance. This means that the standby instance no longer operates in recovery mode, because it is opened for production operation.

## STANDBY DATABASE AND SAP BACKUP TOOLS

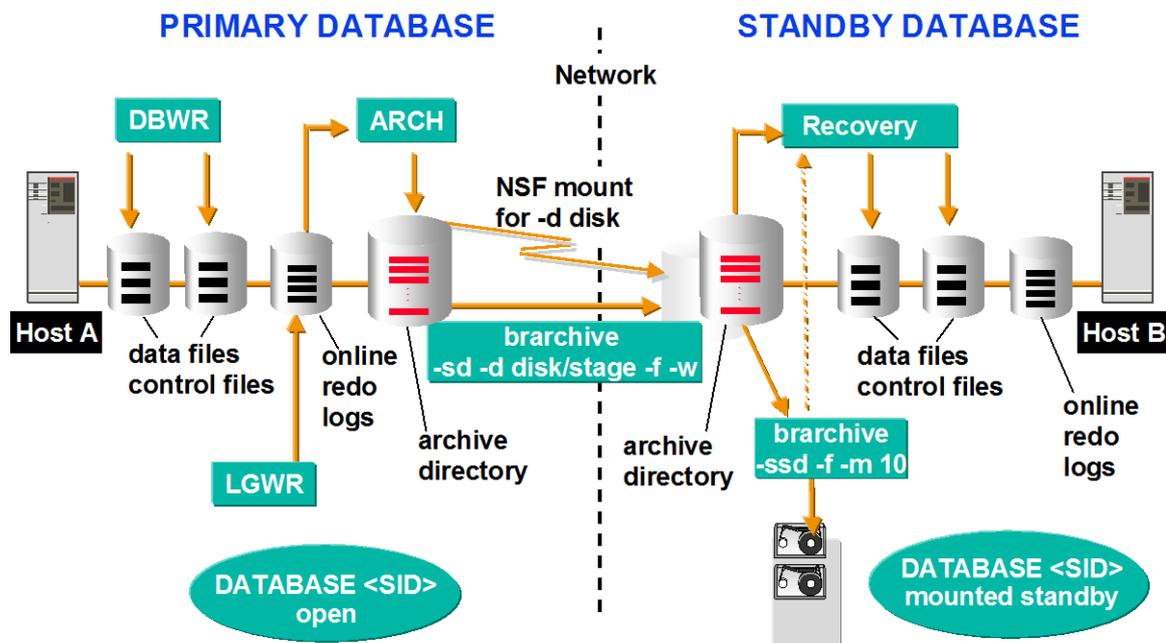
With a standby database, BRBACKUP and BRARCHIVE help you to:

- Copy the offline redo log files from the production database to the standby database, including a check on the copied files
- Import the offline redo log files into the standby database (recovery), followed by backup of the offline redo log files to tape or disk
- Back up the standby database
- Create and configure a new standby database, and reconstruct the production database after a takeover

### Support by BRARCHIVE

In the standby database scenario, you can use the SAP tool BRARCHIVE to control the transfer of the offline redo log files from the primary to the standby instance. This is possible because BRARCHIVE is able to copy offline redo log files to an NFS-mounted or remote disk.

#### Support by BRARCHIVE



A BRARCHIVE process runs on the primary host. It copies the offline redo log files to an NFS-mounted directory, which represents the archive directory (usually `oraarch`) on the standby host. The copy process runs across the network. Therefore, to verify the copy, BRARCHIVE should be used with the verify option `-w`.

BRARCHIVE can also use reliable copy programs such as `rcp`, `scp`, or `ftp` for the copying of the offline redo log files from the primary host onto the standby host (`backup_dev_type = stage`). Therefore, NFS-mounting and verification are not necessary.

A second BRARCHIVE process runs on the standby host. This process waits for the offline redo log files created in the standby archive directory. When a redo log file has been completely copied, BRARCHIVE imports these redo entries into the standby instance (option `-m| -modify`), if necessary backing up the redo log files and deleting them.

BRARCHIVE thus initiates the recovery process of the standby database, in which the offline redo log files are processed individually. Importing the redo entries can be delayed by minutes or hours. You can specify the delay with the option `-m <delay(minutes)>`. Therefore, if a logical error occurs on the primary instance (for example, accidental deletion of a table), this prevents the error being imported immediately into the standby instance.



The offline redo log files are imported by BRARCHIVE with the Oracle command `recover standby database`.

When the volume of offline redo log files is high, the import to the standby database is performed in parallel to the backup, leading to significantly faster processing.



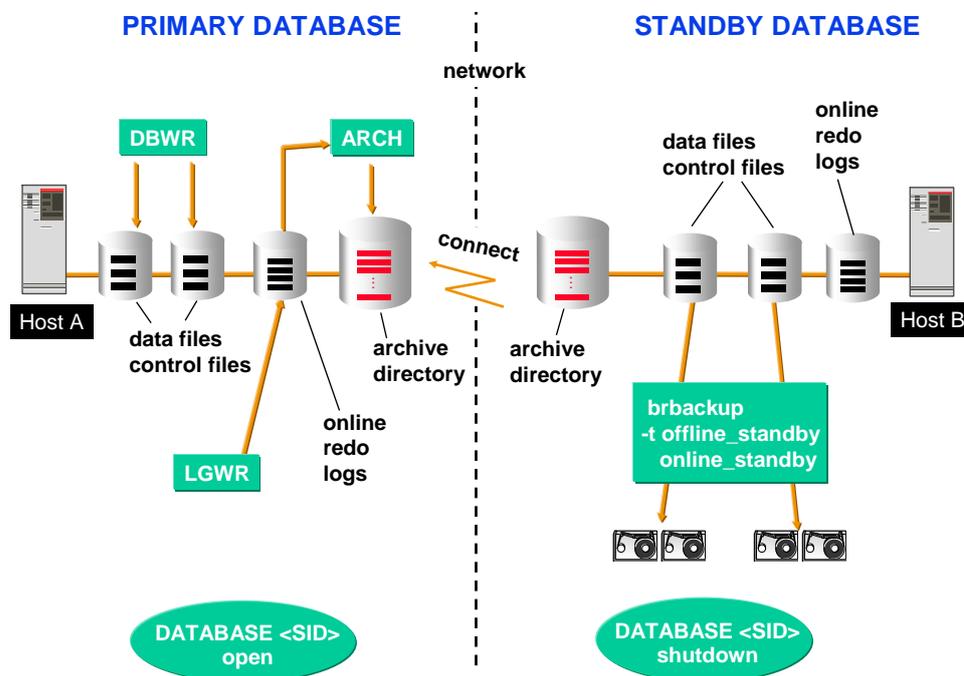
Such structural changes to the primary database – like adding a new tablespace or file – are automatically incorporated into the standby database by BRARCHIVE.

### Support by BRBACKUP

The main advantage of the standby database is that you do not have to perform backups in the primary (that is, production) database system. Instead, a standby database enables you to back up the data files of the standby database. Therefore, database backups do not increase the load on the host of the primary database instance in any way. Since production operation does not occur on the standby database, all host resources can be made available for the database backup.

The SAP tool BRBACKUP can support you when backing up the data in the standby database.

#### Support by BRBACKUP



The standby instance is in recovery mode and **must not be opened**. You can perform an offline or online backup. In this case “online” means that the database remains in “mount” state so that additional offline redo log files can be imported. This is only possible when the backup uses Oracle Recovery Manager (RMAN). BRBACKUP takes this into account: to back up the standby data with BRBACKUP, the `init<DBSID>.sap`

parameter `backup_type = offline_standby|online_standby` must be set. The process is as follows:

- BRBACKUP logs on to the primary database instance (the entry for the connection string is made in the `init<DBSID>.sap` parameter `primary_db`) and retrieves the information required on the database structure. This information is entered in the backup logs.
- The standby database instance is stopped (only for `offline_standby`).
- BRBACKUP backs up the standby data files.
- After the backup has been performed, the original state of the standby database instance is restored. If the database was in recovery mode, the mount-standby state is restored, using the Oracle commands `startup nomount, alter database mount standby database` (only for `offline_standby`).



To create and configure a production database after a takeover, you can back up the current production database by setting `backup_type = offline_stop`. This enables you to switch the production database directly to mount-standby state after the backup, so it can take over the role of the standby database.

After a restore, the backup can become the production system. If you want to set it up in one step (without restore), also set `backup_dev_type = disk_copy` or `stage_copy`. For more information, see "SAP Library" [page 10].

## TECHNICAL NOTES

### Requirements

You must set the parameter `primary_db` in the `init<DBSID>.sap` file to enable BRARCHIVE and BRBACKUP to connect to the primary (that is, production) database:

```
primary_db = <conn_name>
```

<conn\_name> is a connection name (alias) in `TNSNAMES.ORA` pointing to the production database

### Control File Backup and Complete Online Backup after a Takeover

Since all data files are already located on the standby host, costly reloading of the files is avoided. You might still need to apply some redo entries to the files to enable all transactions to be incorporated in the standby instance. Therefore, make sure you import the missing offline redo log files from the primary instance. Afterwards, you can try to archive the current online redo log file of the primary instance with the Oracle command `ALTER SYSTEM ARCHIVE LOG CURRENT` and also to import these redo entries into the standby instance.



If this command fails, it is risky to import the current online redo log file into the standby database, because you **might destroy the standby database**.

After a takeover, you must back up the control file immediately (for example, `brbackup -m 0 -t online`) and then make a complete online backup (for example, `brbackup -m all -t online`). This is the only way to ensure that the database can be recovered, if necessary.

After the takeover, you must set up a replacement standby database, usually on what was previously the primary host.

### Incorporation of Changes in Physical Structure

Not all changes to the physical structure of the primary database (that is, renaming files, or changes to online redo log files and control files) are automatically incorporated in the standby database in every case. You might need to intervene depending on the type of change.

If it is not possible to incorporate the changes automatically, BRARCHIVE stops the recovery process, and you must intervene manually to incorporate the structural change in the standby database. You must then restart BRARCHIVE.

The original names of the primary database files ought to be retained. But we support renaming all database files to another `SAPDATA_HOME` directory for BRBACKUP backups using the `init<SID>.sap` parameter `orig_db_home`. If you use this parameter, it is even possible to run the standby database on the same host as the primary database. However, we do **not** recommend this for high availability.

### Regular Alert File Check

If commands are executed in the primary database with the `UNRECOVERABLE` option, these changes do not appear in the redo log files. Therefore, it is not possible for the standby instance to receive any information about such changes. In this case, only warning messages appear during the recovery process. However, they are recorded in the standby database alert file. Therefore, we recommend you to check the alert file regularly.

## ADDITIONAL INFORMATION

### SAP Library

You can find more information on Oracle database administration and the contents of this document in the SAP Library as follows:



All paths refer to SAP NetWeaver 7.3.

1. Call up the SAP Help Portal at [help.sap.com/nw73](http://help.sap.com/nw73) → *Application Help* → *SAP Library: English*.
2. Choose *SAP NetWeaver Library: Function-Oriented View* → *Database Administration* → *Database Administration for Oracle* → *SAP Database Guide: Oracle* → *Approach to Oracle DBA* → *Database Backup* → *Advanced Backup and Recovery* → *Standby Database*.



You can also find this plus selected extracts from the SAP Library at:

[www.sdn.sap.com/irj/sdn/ora](http://www.sdn.sap.com/irj/sdn/ora) → *SAP on Oracle Knowledge Center* → *SAP Documentation in Help Portal*

### SAP Notes

You can find SAP Notes at:

[service.sap.com/notes](http://service.sap.com/notes)

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