



Backup Package Guide

Version 2.7

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Introduction

This section includes:

- **About the Backup Package** on page 5
- **Changes from Previous Versions** on page 6

About the Backup Package

The Ex Libris backup package is intended for small product installations with no backup infrastructure. Large product installations will most likely not use the backup package because their existing infrastructure already has more robust backup processes in place.

The backup package is available for the following products:

- Aleph (version 18.01 and later)
- MetaLib (version 4.x)
- DigiTool (version 3.x)
- Primo (version 1.0 and later)
- Verde (version 2.0)
- SFX (version 4) For examples and more information, refer to the **SFX Backup** chapter of the *SFX System Administration Guide*.

Previously, the backup methodology was internal to each product (which is still the case with Voyager). Now, backup scripts are product-independent and reside by default in the `/exlibris/backup` directory. Most products are backed up by the product users. For example, the Aleph user backs up Aleph, the Verde user backs up Verde, and so forth.

All Oracle backups are performed with RMAN. To use the Oracle hot backup, all databases need to be in ARCHIVELOG mode. Once Oracle RMAN backups are verified to be correct, all unnecessary (recovery to the last backup set)

archive logs and previous backups are deleted. By default, three previous backups are kept. However, this parameter is configurable.

The backup of MetaLib software includes all MetaLib library content in Oracle export format instead of sequential format.

Note that within each product, parallel backups are possible. For example, the Oracle software, the Aleph software, and the Oracle database can be backed up at the same time.

Changes from Previous Versions

In the previous backup package, there were ten backup options. In the new backup package, there are seven backup options.

There is no support for backup to tape. Backups are performed to disk only. The former options for gzip, compress, and split are all default options.

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System Requirements and Limitations

This section includes:

- **Requirements** on page 7
- **Notes and Limitations** on page 7

Requirements

To run properly, the Ex Libris backup package requires the following:

- adequate disk space for backup files on disk. Space available for the `backup_files` directory should be minimally 20% of the data being backed up.
- a mail server to send backup status
- UNIX root access (required because the backup package is intended for use by system administrators)

While the backup package significantly streamlines the backup process, a DBA is still required when restoring and recovering a damaged database. This is meant as a common sense recommendation, due to the potentially complex questions encountered in some recovery situations.

Notes and Limitations

- Linux and Solaris are the supported operating systems. The backup package uses the tar, gzip, and split base operating system utilities and the package is therefore bound by the limitations of these utilities.

For example, since tar cannot back up a broken symlink, if the `ORACLE_HOME` has broken symlinks and you are attempting an Oracle software backup, the backup will complete with an error. In this case, once

the broken symlink is resolved, the backup package can be run successfully, without errors.

- Once a backup is complete, the files should be moved to tape.
- To enable RMAN hot backups, the database must be in ARCHIVELOG mode.
- DigiTool digital stream backup is not supported.
- When a password changes for a user outside of an Ex Libris product (specifically user IDs such as `aleph_dba`, `verde_dba`, and so on), the `put_ora_passwd` utility must be used to keep passwords synchronized in Oracle.
- For performance reasons, indexes are created with NOLOGGING. When a datafile is restored and recovered from a backup file, there exists a possibility of system instability and incorrect data results, accompanied by the following error message:

```
ORA-01578: ORACLE data block corrupted (file # 4, block # 301)
ORA-01110: data file 4: '/your/file/name/here.dbf'
ORA-26040: Data block was loaded using the NOLOGGING option
```

To ensure system reliability, drop and recreate indexes after performing datafile recovery. For detailed instructions, consult your product's *System Administration Guide*.

- If the Oracle archive logs are deleted manually, use the RMAN `crosscheck` utility to keep the records from the controlfile in sync with what is actually on the file system. If you do not do this, the automatic deletion of obsolete backup files and archive logs will not succeed. See the example in [Using Crosscheck](#) on page 31.
- The return code after execution of the `<prd>_export` script is always zero. This is a technical limitation, as there is no mechanism to verify the export. For this backup scenario, therefore, it is strongly recommended that you review the log files for errors.
- It is very important to test your backups. A good disaster recovery plan includes testing every six months.

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Required Backups and Backup Types

This section includes:

- **Components Requiring Backup** on page 9
- **Types of Backup** on page 12

Components Requiring Backup

This section lists the Oracle components and components of each product that require backup.

Aleph Components

Table 1. Aleph Components

Description	Example	Environment Variable
Aleph software	/exlibris/aleph/a18_2/	\$aleph_dev
Configuration files	/exlibris/aleph/u18_2/ alephe /exlibris/aleph/u18_2/ usm01	\$alephe_root \$data_root (of each library)

MetaLib Components

Table 2. MetaLib Components

Description	Example	Environment Variable
MetaLib software	/exlibris/Metalib/m4_1/	\$metalib_dev minus \$metalib_conf + \$data_root (of each library)
Configuration files		\$metalib_conf + \$data_root (of each library)

DigiTool Components

Table 3. DigiTool Components

Description	Example	Environment Variable
DigiTool software– Application and demo data	/exlibris/dtl/d3_1/ /exlibris/dtl/j3_1/	\$dtl_dev/ + \$jdtl_dev/ - (\$jdtl_dev/digitool/ home/system* and \$jdtl_dev/digitool/ home/profile)
User-defined Admin Unit and Node configuration	/exlibris/dtl/u3_1/ /exlibris/dtl/j3_1/home/ system /exlibris/dtl/j3_1/home/ profile	\$user_dev/ + (\$jdtl_dev/digitool/ home/system* and \$jdtl_dev/digitool/ home/profile)
Digital media (file streams)		Not supported

Verde Components

Table 4. Verde Components

Description	Example	Environment Variable
Verde software	/exlibris/verde/ v2_3/verde	\$VERDE_BASE minus results of backup_list.sh
Configuration files		results of: \$VERDE_BASE minus results of backup_list.sh The backup_list.sh script is developed by the Verde development team to identify all user directories that require backup.

Primo Components

Table 5. Primo Components

Description	Example	Environment Variable
Primo software	/exlibris/primo/p1_1	\$primo_dev
Primo Publish	/primo_publish	\$PRM_PUB set in bkp_param.conf
Primo Index	/primo_index	\$PRM_IDX set in bkp_param.conf

SFX Components

Table 6. SFX Components

Description	Location	Uniqueness
SFX software	SFX_HOME	Unique
MySQL database	SFX_HOME/data	one or more

Oracle Components

Table 7. Oracle Components

Description	Location	Uniqueness
Oracle software	ORACLE_HOME/app/oracle/ product ORACLE_BASE/admin	Unique
Oracle database	../oradata/{ORACLE_SID}	One or more
Oracle archiving	../oradata/{ORACLE_SID}/ arch	Unique

Types of Backup

The frequency of backup determines how far backward or forward you can recover data.

There are several components to each Ex Libris system. Not all components need frequent backup. The most important components to back up are the following:

- Oracle database and archive files; MySQL database and log files
- Product configuration files
- User data

The following table describes the possible types of backup. Note that <Prd>_ in this table is a variable for *aleph*, *verde*, *dtl*, or *metalib*.

Table 8. Types of Backup

Backup Type	Description
<prd>_usr_data	User data configuration Note: Primo has two existing options for Primo publishing and indexing data. For MetaLib, this is not required.
<prd>_export	User data export (data from Oracle)
<prd>_software	Ex Libris product software and configuration Note: MetaLib <Prd>_software also includes the Oracle library content in Oracle export format.
ora_software	Oracle software
ora_cold	Full Oracle database backup while the database is shut down, in addition to backup and deletion of Oracle archive logs
ora_hot	Full (or incremental if the database version is greater than 10 and a full backup exists on disk) Oracle database backup while the database is open
ora_archive	Backup, then deletion of the backed up Oracle archive logs
sfx_cold	Full backup of all databases when MySQL and SFX is down.
sfx_hot	Backup of MYSQL database when database is up
sfx_inc	Backup of MYSQL database log files when database is up
sfx_software	Backup of SFX software while SFX is running

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Installing, Configuring, and Running the Backup Package

This section includes:

- **Obtaining the .tar File and Installing** on page 13
- **Backup Directory Structure** on page 14
- **Configuring the init File** on page 15
- **Configuring the Parameter File** on page 16
- **Configuring the exec_backup_main Script** on page 17
- **Backup Execution Examples** on page 18

NOTE:

The MetaLib backup is configured with a set of default parameters/values during the MIK installation process. This chapter, therefore, is optional when using the MIK. (You can use it if you want to reconfigure certain parameters/values).

Obtaining the .tar File and Installing

This section describes the installation process of the Ex Libris backup package.

The standard installation directory is `/exlibris/backup`. This is the directory, therefore, that is referred to in this chapter.

To obtain and install the .tar file:

- 1 Refer to Knowledge Base Item #30349 (for Aleph users) or #30698 (for SFX users) in eService (<http://support.exlibrisgroup.com>) to obtain the user name

and password to download the backup package from the Ex Libris FTP server.

- 2 Log on to the FTP server (<ftp.exlibrisgroup.com>). You will be in the directory of the latest backup package.
- 3 In your UNIX environment, go to `/exlibris` as a root user. For example:

```
cd /exlibris
ftp ftp.exlibrisgroup.com
user: bupuser
<enter the password for bupuser>
bin
get backup_package.2.7.tar.gz
quit
```

- 4 Open the archive files using the following command:

```
gunzip < backup_package.2.x.x.tar.gz | tar xvf -
```

You get a new directory, `/exlibris/backup`, which contains the Ex Libris backup package software.

- 5 As a root user, perform the following checks:
 - a Ensure that all the scripts have execute permission:

```
cd /exlibris/backup/scripts
chmod +x *
```

- b Ensure that all users can write to the `logs` directory:

```
cd /exlibris/backup
chmod 777 logs
```

Backup Directory Structure

The following table describes the backup product structure under `/exlibris/backup`:

Table 9. Backup Directory Structure

Name	Type	Description
<code>conf</code>	Directory	Contains the parameter and init files
<code>logs</code>	Directory	Contains the summary and detail logs
<code>scripts</code>	Directory	Contains the scripts used by the backup itself

Configuring the init File

After you install the backup package, verify that the configurations in the init file are correct.

To configure the init file:

- 1 Change the directory to `conf`.
- 2 In the `bkp_init.dat` file, comment out the unnecessary lines using the `#` symbol.
- 3 Correct the users and the paths, if necessary.

The following are example lines for each product:

```
#PRIMO
p1:primo:primo:/exlibris/primo/p1_1:ora_cold
p2:primo:primo:/exlibris/primo/p1_1:ora_hot
p3:primo:primo:/exlibris/primo/p1_1:ora_archive
p4:primo:primo:/exlibris/primo/p1_1:prd_software
p5:primo:primo:/exlibris/primo/p1_1:prm_idx
p6:primo:primo:/exlibris/primo/p1_1:prm_pub

#Aleph
a1:aleph:aleph:/exlibris/aleph/a18_2:ora_cold
a2:aleph:aleph:/exlibris/aleph/a18_2:ora_hot
a3:aleph:aleph:/exlibris/aleph/a18_2:ora_archive
a4:aleph:aleph:/exlibris/aleph/a18_2:prd_software
a5:aleph:aleph:/exlibris/aleph/a18_2:user_data
a6:aleph:aleph:/exlibris/aleph/a18_2:exp_user_data

#Verde
v1:verde:verde:/exlibris/verde/v2_3/verde:ora_cold
v2:verde:verde:/exlibris/verde/v2_3/verde:ora_hot
v3:verde:verde:/exlibris/verde/v2_3/verde:ora_archive
v4:verde:verde:/exlibris/verde/v2_3/verde:prd_software
v5:verde:verde:/exlibris/verde/v2_3/verde:user_data

#Metalib
m1:metalib:metalib:/exlibris/metalib/m4_1:ora_cold
m2:metalib:metalib:/exlibris/metalib/m4_1:ora_hot
m3:metalib:metalib:/exlibris/metalib/m4_1:ora_archive
m4:metalib:metalib:/exlibris/metalib/m4_1:prd_software
m5:metalib:metalib:/exlibris/metalib/m4_1:exp_user_data

#DigiTool
d1:dtl:dtl:/exlibris/dtl/d3_1:ora_cold
d2:dtl:dtl:/exlibris/dtl/d3_1:ora_hot
d3:dtl:dtl:/exlibris/dtl/d3_1:ora_archive
d4:dtl:dtl:/exlibris/dtl/d3_1:prd_software
d5:dtl:dtl:/exlibris/dtl/d3_1:user_data
d6:dtl:dtl:/exlibris/dtl/d3_1:exp_user_data
```

```
#Oracle
o4:oracle:oracle:/exlibris/app/oracle/product/102:ora_software
#Oracle (example for version 10 and 11)
o5:oracle:oracle:/exlibris/app/oracle/product/11:ora_software

#SFX
s1:sfx:sfxglb43:/exlibris/sfx_ver/sfx4_3/sfxglb43:sfx_cold
s2:sfx:sfxglb43:/exlibris/sfx_ver/sfx4_3/sfxglb43:sfx_hot
s3:sfx:sfxglb43:/exlibris/sfx_ver/sfx4_3/sfxglb43:sfx_inc
s4:sfx:sfxglb43:/exlibris/sfx_ver/sfx4_3/sfxglb43:prd_software
```

The following table describes the fields in these lines:

Table 10. Description of Fields

Field	Description
First field	A two-character distinct identifier (for example, a5, which can be any two alpha-numeric characters)
Second field	The product name (for example, aleph)
Third field	The user name (for example, aleph)
Fourth field	The product root directory (for example, /exlibris/aleph)
Fifth field	The backup type (for example, ora_cold)

Configuring the Parameter File

In addition to configuring the init file, you must configure the parameter file.

To configure the parameter file:

- 1 Change the directory to `conf`.
- 2 In the `bkp_param.conf` file, change the e-mail address.

NOTE:

This is the only required change, unless you are not using the default directory.

The following table describes the environment variable settings that are contained in the `bkp_param.conf` file, which are used by the backup scripts.

Table 11. Environment Variable Settings

Name	Description
BKP_ROOT	The root directory for the backup package
BKP_DIR	The directory to which the backup files are written

Table 11. Environment Variable Settings

Name	Description
BKP_SCR	The directory of the backup script files
BKP_LOG	The directory of the log files
INIT_FL	The location and name of the init file
SUCCESS_BKPS	This indicates how many successful Oracle cold backups or hot incremental level 0 (which is the functional equivalent of a cold backup) are checked before deleting obsolete oracle backup files. This does not apply to archivelogs. After the successful backup of archivelogs, they are automatically deleted from the disk.
BKP_MAIL	The e-mail address to which notification of the backup status should be sent
PRIMO_PUB	For Primo publishing data
PRIMO_IDX	For Primo indexing data
SFX_LOG	For SFX only. Required for incremental backup. This matches the log file prefix set in <code>my.cnf</code> (For more information, refer to Appendix A - Enabling Binary Logging of the <i>SFX System Administration Guide</i> .)
SFX_RT	For SFX only. This is the MySQL root password in encrypted format. (For more information, refer to the Generate Encrypted Passwords for Use in Configuration Files section of the <i>SFX System Administration Guide</i> .)
SFX_USE_NEW_HBKP	This parameter determines which version of the hot backup to use. Starting with SFX version 4.1.1, a new hot backup method has been created to copy all local instance data referenced in the global instance to a dump file (as well as doing a full hot backup). This data can be used to restore the instance to another server (into another global instance). To use the new method, set <code>SFX_USE_NEW_HBKP</code> <code>Y</code> . By default, the parameter is set to <code>N</code> – use the old hot backup method.

Configuring the `exec_backup_main` Script

If you are not using the default backup directory, you configure the `exec_backup_main` script after you configure the init and parameter files.

To configure the `exec_backup_main` script:

- 1 Change the directory to the script directory.
- 2 Enter the following command to edit the `exec_backup_main` script:

```
vi exec_backup_main
```
- 3 Set the initial variables by entering the following command. Note that `/exlibris/backup` should be changed to match the `BKP_ROOT` from the parameter file:

```
setenv BKP_SLOT $1  
source /exlibris/backup/conf/bkp_param.conf
```

NOTE:

As explained at the beginning of this chapter, `/exlibris/backup` = the name of your default directory.

Backup Execution Examples

This section presents two examples of backup package execution: crontab and command line.

crontab Execution

This is the preferred method of backup execution.

To execute the backup package using crontab:

- 1 Enter `su` to become a superuser.
- 2 Edit crontab as follows:

```
crontab -e  
23 00 * * * /exlibris/backup/scripts/exec_backup_main a1
```

In the above example, `exec_backup_main` is scheduled for 12:23 AM every day with one parameter. This parameter is resolved in the `bkp_init.dat` file.

If you are working on a SUN platform, edit the root-owned crontab in the following way:

- 1 Enter `su` to become a superuser.
- 2 Enter the following commands:

```
tssh
setenv TERM vt220
setenv EDITOR vi
crontab -e
```

Command Line Execution

You can also execute the backup package from the command line.

To perform backup using the command line:

- 1 Enter `su` to become a superuser.
- 2 On the command line, type the following:

```
/exlibris/backup/scripts/exec_backup_main a1
```

In the above example, `exec_backup_main` will execute immediately with one parameter. This parameter is resolved in the `bkp_init.dat` file.

Backup File Maintenance

The files containing backups of the Oracle Database (cold, hot and archive) are automatically deleted. The files from all other types of backup need to be deleted manually.

5

Overview of Product Backups, Oracle Database Backups, and Backup Strategy

This section includes:

- [Product Backup Overview](#) on page 21
- [Oracle Database Backup \(RMAN\) Overview](#) on page 21
- [Backup Strategy](#) on page 24

Product Backup Overview

Using operating system utilities and existing Ex Libris product scripts and utilities, the Ex Libris backup package provides a common interface for backup tasks across different Ex Libris products. A typical backup for an Ex Libris product performs the following:

- 1 Sets all environment variables of the application user
- 2 Calls the operating system utilities to create a list of files to back up, as identified by the types of backup
- 3 Builds the backup file in the backup directory by calling the tar, gzip, and split utilities
- 4 Sends notification of the status of the backup

Oracle Database Backup (RMAN) Overview

A complete high availability and disaster recovery strategy requires dependable data backup, restore, and recovery procedures. Oracle Recovery Manager (RMAN), a command-line and Enterprise Manager-based tool, is the Oracle-preferred method for efficiently backing up and recovering your Oracle

database. RMAN is designed to work intimately with the server, providing block-level corruption detection during backup and restore. RMAN optimizes performance and space consumption during backup with file multiplexing and backup set compression, and integrates with leading tape and storage media products via the supplied Media Management Library (MML) API.

RMAN takes care of all underlying database procedures before and after backup or restore, freeing dependency on OS and SQL*Plus scripts. It provides a common interface for backup tasks across different host operating systems and offers features not available through user-managed methods, such as parallelization of backup/recovery data streams, a backup file retention policy, and a detailed history of all backups.

The RMAN environment consists of the utilities and databases that play a role in backing up your data. At a minimum, the environment for RMAN must include the following: a target database to be backed up and an RMAN client, which interprets backup and recovery commands, directs server sessions to execute these commands, and records your backup and recovery activity in the target database control file.

Target Database

The target database is the database that you are backing up, restoring, or recovering with RMAN.

RMAN Client

RMAN is a command-line-oriented database client, much like SQL*Plus, with its own command syntax. From the RMAN client, you can issue RMAN commands and SQL statements to perform and report on backup and recovery operations.

RMAN can take interactive input or read input from plain text files (called command files). RMAN then communicates with one or more server processes on the target database server, which actually perform the work. You can also access RMAN through the Enterprise Manager. (Refer to the *Oracle Enterprise Manager Administrator's Guide* for more details.)

The RMAN executable is typically installed in the same directory as the other database executables. On UNIX systems, for example, the RMAN executable is located in `$ORACLE_HOME/bin`.

RMAN Repository

RMAN maintains metadata about the target database and its backup and recovery operations in the RMAN repository. Among other things, RMAN stores information about its own configuration settings, the target database schema, archived redo logs, and all backup files on disk or tape. RMAN's `LIST`, `REPORT`, and `SHOW` commands display RMAN repository information.

RMAN repository data is always stored in the control file of the target database. The `CONTROL_FILE_RECORD_KEEP_TIME` initialization parameter controls how long backup records are kept in the control file before these records are re-used to hold information about more recent backups. The repository can also be kept in a recovery catalog, a separate database that keeps historical data on backup activities much longer than the control file and preserves backup information if the control file is lost.

Recovery Catalog

In addition to RMAN repository records, the recovery catalog can also hold RMAN stored scripts, which are sequences of RMAN commands for common backup tasks. Storing scripts centrally in the recovery catalog can be more convenient than working with command files. For more information on the recovery catalog, refer to the *Oracle Database Backup and Recovery Advanced User's Guide*.

Media Managers

To access sequential media devices such as tape libraries, RMAN uses third-party media management software. A media manager controls these devices during backup and recovery, managing the loading, labeling and unloading of media, among other functions. Oracle Corporation's Backup Solutions Program (BSP) works with vendors to help them produce media management software for their devices. For enterprises that already use media management software, many of these software products can be directly integrated with RMAN. Contact your media management software vendor for details about whether your vendor participates in the BSP and has an RMAN-compatible media management layer.

Automatic Block Corruption Detection and Repair

Block Media Recovery allows RMAN to fix a corrupted block (detected on backup) while the data file remains online, and non-affected data continues to be available for selecting and updating. This increases data availability and reduces mean time to recover by selectively restoring and recovering the damaged blocks. Minimal I/O is needed because redo is only applied to damaged blocks.

Comprehensive Reporting

Using special V\$ views, users can retrieve information on all currently executing and completed RMAN backup jobs, as well as details on all backed-up files and obsolete backup sets. This output can also be easily viewed in Enterprise Manager, under **Backup Set Management**.

Performance-Optimized, Space-Saving Operations

RMAN takes advantage of intimate knowledge of Oracle block structures to provide high backup and restore data streaming performance and efficient file compression. By default, when creating backup sets, RMAN backs up only blocks that are in use (or have ever been used) and saves disk space by merging blocks into as few backup pieces as necessary.

Extensible to Third-Party Media Managers

Through one standard Media Management Layer API (MML), third-party media management vendors can leverage the functionality of RMAN to provide robust backup solutions for Oracle databases.

Backup Strategy

Once you understand the product components, how they are modified, and how often they are modified, you can set a backup plan. With the exception of the Oracle database, the other components are basically directories and files. The more frequently they are backed up, the more updated the restoration will be. This minimizes the chance of data loss.

The database is backed up using two major methods: physical and logical. The physical backup can be performed as a “cold” backup while the database is down. The other physical backup is performed as a “hot” backup while the database is open for normal activities. A hot backup can run only when the database is running in ARCHIVELOG mode. Archived logs enable reapplying transactions to the database if recovery is needed.

Cold backup has an advantage over the hot backup in the sense that a database can be recovered from a cold backup “as is.” If there are archived logs after the time of the cold backup, they can be applied. The hot backup must be restored together with the archived logs in order to synchronize the database. Recovery from a hot backup itself will not work.

The following backup policy is recommended:

- ora_cold – weekly
- ora_hot – on days that a cold backup is not run
- ora_archive – per the institution’s requirements
- prd_software – once every two months and after each service pack
- ora_software – once every two months and after each service pack
- prd_usr_data – per the institution’s requirements
- prd_export – per the institution’s requirements

Another important consideration is the number of successful backups to keep and where to keep the backup files. It is recommended that after the successful completion of a backup, the backup files be moved to another device, such as a tape or a disk on another machine. Furthermore, it is recommended that you keep three successful backups, before deleting old backup files. This is determined by the `SUCCESS_BKPS` parameter, which is set to three by default.

6

Restore Examples

This section includes:

- [Overview of RMAN Recovery](#) on page 27
- [Recovery from Loss of Disk](#) on page 28
- [Recovering to a Point in Time](#) on page 29

Overview of RMAN Recovery

This chapter describes two typical recovery scenarios. The first scenario is a complete disk failure and all the steps necessary for recovery are demonstrated. The second scenario shows the steps required to recover one Oracle table to a point in time.

NOTE:

Only a DBA should perform a restore.

To perform restore and recovery with RMAN:

- 1 Determine which database files require recovery.
- 2 Place the database in the appropriate state for the type of recovery that you are performing. For example, if you are recovering all datafiles, then mount the database. If you are recovering a single tablespace or datafile, then you can keep the database open and take the tablespace or datafile offline.
- 3 Restore the necessary files using the `RESTORE` command.
- 4 Recover the restored files using the `RECOVER` command.
- 5 Place the database in its normal state. For example, open the database if it is closed, or bring all recovered files online if they are offline.

Recovery from Loss of Disk

This section describes:

- **Recovering Oracle Software**
- **Recovering the Database**

Recovering Oracle Software

To recover Oracle software:

- 1 Mount a disk with the same name as that which was previously backed up.
- 2 If the backup files are split (multiple files with the `.gz_*` suffix, for example: `<>.tar.gz_aa`, `<>.tar.gz_ab`, etc.), combine them into one file with the following command:

```
cat ora_software_<your file name>.tar.gz_a* >
ora_software_<your file name>.tar.gz
```

- 3 Gunzip the `.tar` file of the Oracle software using the following command:
- 4 Create the directory structure from the mount point to the `$ORACLE_BASE`—that is, `/exlibris/app/oracle`—and ensure that the Oracle user has write permissions as a root user to copy the `.tar` file to `/` and untar it.

```
cd /
cp /exlibris/backup_files/ora_software_<your file
name>.tar .
tar xvf ora_software_<your file name>.tar
```

Recovering the Database

To recover the database:

- 1 Mount a disk with the same name as that which was previously backed up.
- 2 Create the directory structure from the mount point to the `oradata` directory—for example, `/exlibris/oradata/aleph0`. Include the `arch` directory and ensure that the Oracle user has write permissions.
- 3 Configure the DBID. You locate the DBID by listing the files in the `/exlibris/backup_files` directory, as follows:

```
ls -la *control*
```

For example, for the `aleph0_ora_archive_control_file_c-624078755-20060122-03_ora_archive` backup file, the DBID is the nine-digit number after the text `control_file_c-`.

4 Log on to RMAN as displayed in the following example:

```
ORACLE10>> rman target /
RMAN> set DBID 624078755;
RMAN> startup nomount;
RMAN> set CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK
TO '/exlibris/backup_files/
aleph0_920_ora_cold_control_file_%F';
RMAN> RESTORE CONTROLFILE FROM AUTOBACKUP;
RMAN> alter database mount;
RMAN> restore database;
RMAN> recover database;
RMAN> alter database open resetlogs;
```

Recovering to a Point in Time

In the following example, a datafile was accidentally deleted. Fortunately, there is a hot backup from the night before. The datafile is restored from the hot backup and all available logs are applied so that a recovery to the latest point in time is possible (the last archive log and what is in the redo log).

```
Error in System Datafile:
ORA-00604: error occurred at recursive SQL level 2
ORA-01116: error in opening database file 1
ORA-01110: data file 1: '/exlibris/oradata/aleph0/
aleph0_system01.dbf'
ORA-27041: unable to open file

RMAN> shutdown abort;
RMAN> startup mount;
RMAN> restore datafile "/exlibris/oradata/aleph0/
aleph0_system01.dbf";
RMAN> recover database;
RMAN> alter database open;

Error in Non-System Datafile:
RMAN> alter database datafile '/exlibris/oradata/aleph0/
aleph0_users01.dbf' offline;
RMAN> restore datafile "/exlibris/oradata/aleph0/
aleph0_users01.dbf";
RMAN> alter database datafile '/exlibris/oradata/aleph0/
aleph0_users01.dbf' online;
alter database datafile '/exlibris/oradata/aleph0/
aleph0_users01.dbf' online

*
ERROR at line 1:
ORA-01113: file 4 needs media recovery
ORA-01110: data file 4: '/exlibris/oradata/aleph0/
aleph0_users01.dbf'
RMAN> recover datafile 4;
Media recovery complete
```


7

Troubleshooting

This section includes:

- [Overview](#) on page 31
- [Using Crosscheck](#) on page 31
- [Checking the Number of Oracle Backups](#) on page 32
- [NOARCHIVELOG Mode ORA-00258 Error](#) on page 32

Overview

All error messages are written to the detail log of each backup (unique by type and invocation). Normally, a careful reading of the detail log will show the specific root cause of the error. This chapter focuses on specific troubleshooting issues raised by several customers.

Using Crosscheck

If the Oracle archive logs are deleted manually, use the RMAN crosscheck utility to keep the records from the controlfile in sync with what is actually on the file system. If you do not do this, the automatic deletion of obsolete backup files and archive logs will not succeed.

To use the RMAN crosscheck utility:

- 1 Log on to RMAN, ensuring that the `ORACLE_SID` is set to the desired Oracle environment:

```
ORACLE10>> rman target /
```

- 2 Enter the following command:

```
RMAN> crosscheck archivelog all;
```

Checking the Number of Oracle Backups

You can determine the number (if any) of Oracle backups for a particular Oracle environment.

To determine the number of Oracle backups:

- 1 Log on to RMAN, ensuring that the `ORACLE_SID` is set to the desired Oracle environment:

```
ORACLE10>> rman target /
```

- 2 Enter one of the following commands:

- `RMAN> LIST BACKUP SUMMARY;` – shows the backup sets
- `RMAN> report need backup;` – reports the number of files with less than one redundant backup (`SUCCESS_BKPS` in this case is set to 1)

NOARCHIVELOG Mode ORA-00258 Error

If you are running a cold backup and the database is in NOARCHIVELOG mode, you will see the following error message in the log files:

```
=====
ERROR at line 1:
ORA-00258: manual archiving in NOARCHIVELOG mode must
identify log
```

This is actually not an error; it is a statement. The reason for this is your current configuration, in which no archiving is used. This kind of configuration is correct for small-size institutes. However, if you want to change this configuration, you can do so using `UTIL O`.

A

Restoring the Aleph Application and Database

This appendix explains how to restore a full Aleph application including the Oracle software and database and third-party products installed on the `/exlibris` directory. In addition, information that is part of the OS such as UNIX users and system parameters need to be restored separately.

Set up the new server with the same network configuration (server name, firewall configuration, server IP, etc.) as the original one.

To restore Aleph:

- 1 Download and run the Aleph Installation Kit:

```
su -
cd /exlibris/
mkdir ftp_from_exlibris
ftp ftp.exlibris.co.il
get aik.tar
tar xvf aik.tar
cd aik
./ikit_menu
```

NOTE:

To receive FTP access, send a request to Aleph support.

The main menu is displayed:

```
ALEPH Installation Kit
-----

Date : Tue Jun 21 15:32:23 CEST 2011
OS : Linux
ALEPH version : 20.00
ALEPH directory :
Oracle database :
Server : de-psalephtest

-----

- 1. Download software from ftp server
- 2. Pre installation tasks
- 3. Oracle database installation and configuration
- 4. Third party products installation
- 5. ALEPH software installation and configuration
- 6. Post installation tasks

Enter key (q to quit) [q]: 1
```

2 Download the Aleph software from the FTP server:

a Select **1 Download software from ftp server** from the main menu. The following is displayed:

```
ALEPH Installation Kit
-----

Date : Tue Jun 21 15:39:07 CEST 2011
OS : Linux
ALEPH version : 20.00
ALEPH directory :
Oracle database :
Server : de-psalephtest

-----

1. Download software from ftp server

- 1. Download Aleph software
- 2. Download Oracle software and third party products
- 3. Check if Aleph software download successfully completed
- 4. Check if Oracle and products download successfully
   completed

Enter key (q to quit) [q]: 1
```

b Select **1. Download Aleph software.**

- c** Select **3. Check if Aleph software download successfully completed** to confirm that the download is completed. The following is displayed:

```
Checking ... please wait ...

The ALEPH software has downloaded properly
```

- 3** Select **2. Pre installation tasks** from the main menu. The following is displayed:

```

                                ALEPH Installation Kit
-----
Date : Tue Jul  5 11:10:35 CEST 2011
OS : Linux
ALEPH version : 20.00
ALEPH directory :
Oracle database :
Server : de-psalephtest
-----

2. Pre installation tasks

OK 1. Pre installation checks.
OK 2. Inserting listener definition in the /etc/services file
as root user.
OK 3. Change system parameters as root user.
OK 4. Create oracle user and dba group as root user.
OK 5. Create aleph user and exlibris group as root user.
OK 6. Create Aleph and Oracle required directories as root
user.
OK 7. Install COBOL software as root user.
OK 8. Create system auto startup/shutdown script and links as
root user.
```

- 4** Recreate the oratab file:

```
vi /etc/oratab
aleph20:/exlibris/app/oracle/product/11:Y
```

- 5** Restore the Oracle software:

a Locate the last backup file:

```
cd /exlibris/backup_files
mkdir oracle

ls -lrth ora_software_o4*
-rw-r--r-- 1 root root 2.0G Jun 17 10:56
ora_software_o4_110617_0500.tar.gz_aa
-rw-r--r-- 1 root root 145M Jun 17 10:59
ora_software_o4_110617_0500.tar.gz_ab
```

b Select the last backup file. (In the example above, the backup is split into two files.) and save this file to the /exlibris/backup_files/oracle directory:

```
cd /exlibris/backup_files
cat ora_software_o4_110617_0500.tar.gz_a* > /exlibris/
backup_files/oracle/ora_software_o4_110617_0500.tar.gz

cd /exlibris/backup_files/oracle
tar xvfz ora_software_o4_110617_0500.tar.gz

ls -l
drwxr-xr-x 3 root root      4096 Jun 21 17:22 exlibris
-rw-r--r-- 1 root root 2248323402 Jun 21 17:22
ora_software_o4_110617_0500.tar.gz
cd exlibris/

ls -l
drwxr-xr-x 3 root root 4096 Jun 21 17:22 app
mv app/ /exlibris/

cd /exlibris
chown -R oracle:exlibris app/
```

c Check that the Oracle files have the correct permissions:

```
ls -l /exlibris/app/oracle/product/11/bin/oracle
-rwsr-s--x 1 oracle dba 195894523 Jul 13 2009 /exlibris/app/
oracle/product/11/bin/oracle*
```

d If the permissions are different than `-rwsr--x`, execute the following:

```
chmod 6751 /exlibris/app/oracle/product/11/bin/oracle
```

6 Restore the data files:

a Log on to rman:

```
su - oracle
rman target /

Recovery Manager: Release 11.1.0.7.0 - Production on Wed Jun
22 11:38:39 2011

Copyright (c) 1982, 2007, Oracle. All rights reserved.

connected to target database (not started)
```

b Locate the DBID. This information is in the backup file name:

```
ls /exlibris/backup_files/*control*
/exlibris/backup_files/aleph20_11_ora_archive_control_file_c-
1911789030-20110621-01
/exlibris/backup_files/aleph20_11_ora_cold_control_file_c-
1911789030-20110621-00
/exlibris/backup_files/aleph20_11_ora_hot_control_file_c-
1911789030-20110622-00
```

c Set the DBID:

```
RMAN> set dbid 1911789030
executing command: SET DBID
```

7 Restore the controlfile. (Text in bold is entered by the user):

```
su - oracle

rman target /

Recovery Manager: Release 11.1.0.7.0 - Production on Wed Jun
22 14:46:37 2011

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connected to target database: ALEPH20 (not mounted)

RMAN> set dbid 1911789030

executing command: SET DBID

RMAN> startup force nomount

Oracle instance started

Total System Global Area      730714112 bytes

Fixed Size                    2163280 bytes
Variable Size                 444599728 bytes
Database Buffers              276824064 bytes
Redo Buffers                   7127040 bytes

RMAN>restore controlfile from '/exlibris/backup_files/
aleph20_11_ora_cold_control_file_c-1911789030-20110621-00';

Starting restore at 22-JUN-11
using channel ORA_DISK_1

channel ORA_DISK_1: restoring control file
channel ORA_DISK_1: restore complete, elapsed time: 00:00:03
output file name=/exlibris/oradata/aleph20/
aleph20_control01.ctl
output file name=/exlibris/oradata/aleph20/
aleph20_control02.ctl
output file name=/exlibris/oradata/aleph20/
aleph20_control03.ctl
Finished restore at 22-JUN-11

RMAN> shutdown

Oracle instance shut down

RMAN> exit

Recovery Manager complete.
```

8 Restore the database:

```
oracle11@de-psalephtest(aleph20)~$rman target /

Recovery Manager: Release 11.1.0.7.0 - Production on Thu Jun
30 15:14:59 2011

Copyright (c) 1982, 2007, Oracle. All rights reserved.

connected to target database: ALEPH20 (DBID=1911789030, not
open)

RMAN> startup mount ;

RMAN> restore database;

Starting restore at 22-JUN-11
using channel ORA_DISK_1

channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from
backup set
channel ORA_DISK_1: restoring datafile 00001 to /exlibris/
oradata/aleph20/aleph20_system01.dbf
channel ORA_DISK_1: restoring datafile 00002 to /exlibris/
oradata/aleph20/aleph20_sysaux01.dbf
channel ORA_DISK_1: restoring datafile 00003 to /exlibris/
oradata/aleph20/aleph20_undotbs01.dbf
channel ORA_DISK_1: restoring datafile 00004 to /exlibris/
oradata/aleph20/aleph20_users01.dbf
channel ORA_DISK_1: restoring datafile 00005 to /exlibris/
oradata/aleph20/aleph20_tslob01.dbf
channel ORA_DISK_1: restoring datafile 00006 to /exlibris/
oradata/aleph20/aleph20_log01.dbf
channel ORA_DISK_1: restoring datafile 00007 to /exlibris/
oradata/aleph20/aleph20_ts0_01.dbf
channel ORA_DISK_1: restoring datafile 00008 to /exlibris/
oradata/aleph20/aleph20_ts1_01.dbf
channel ORA_DISK_1: restoring datafile 00009 to /exlibris/
oradata/aleph20/aleph20_ts1d_01.dbf
channel ORA_DISK_1: restoring datafile 00010 to /exlibris/
oradata/aleph20/aleph20_ts1x_01.dbf
channel ORA_DISK_1: restoring datafile 00011 to /exlibris/
oradata/aleph20/aleph20_ts2d_01.dbf
channel ORA_DISK_1: restoring datafile 00012 to /exlibris/
oradata/aleph20/aleph20_ts2x_01.dbf
channel ORA_DISK_1: restoring datafile 00013 to /exlibris/
oradata/aleph20/aleph20_ts3d_01.dbf
channel ORA_DISK_1: restoring datafile 00014 to /exlibris/
oradata/aleph20/aleph20_ts3x_01.dbf
channel ORA_DISK_1: restoring datafile 00015 to /exlibris/
oradata/aleph20/aleph20_ts4d_01.dbf
```

```
channel ORA_DISK_1: restoring datafile 00016 to /exlibris/
oradata/aleph20/aleph20_ts4x_01.dbf
channel ORA_DISK_1: restoring datafile 00017 to /exlibris/
oradata/aleph20/aleph20_ts1d_02.dbf
channel ORA_DISK_1: restoring datafile 00018 to /exlibris/
oradata/aleph20/aleph20_ts1d_03.dbf
channel ORA_DISK_1: restoring datafile 00019 to /exlibris/
oradata/aleph20/aleph20_ts1x_02.dbf
channel ORA_DISK_1: restoring datafile 00020 to /exlibris/
oradata/aleph20/aleph20_ts3d_02.dbf
channel ORA_DISK_1: restoring datafile 00021 to /exlibris/
oradata/aleph20/aleph20_ts3d_03.dbf
channel ORA_DISK_1: restoring datafile 00022 to /exlibris/
oradata/aleph20/aleph20_ts3d_04.dbf
channel ORA_DISK_1: restoring datafile 00023 to /exlibris/
oradata/aleph20/aleph20_ts2x_02.dbf
channel ORA_DISK_1: restoring datafile 00024 to /exlibris/
oradata/aleph20/aleph20_ts3d_05.dbf
channel ORA_DISK_1: restoring datafile 00025 to /exlibris/
oradata/aleph20/aleph20_ts0_02.dbf
channel ORA_DISK_1: restoring datafile 00026 to /exlibris/
oradata/aleph20/aleph20_ts3d_06.dbf
channel ORA_DISK_1: restoring datafile 00027 to /exlibris/
oradata/aleph20/aleph20_ts3d_07.dbf
channel ORA_DISK_1: restoring datafile 00028 to /exlibris/
oradata/aleph20/aleph20_ts3d_08.dbf
channel ORA_DISK_1: restoring datafile 00029 to /exlibris/
oradata/aleph20/aleph20_ts2x_03.dbf
channel ORA_DISK_1: restoring datafile 00030 to /exlibris/
oradata/aleph20/aleph20_ts3d_09.dbf
channel ORA_DISK_1: reading from backup piece /exlibris/
backup_files/ALEPH20_11_ora_cold_20110621_405_1
channel ORA_DISK_1: piece handle=/exlibris/backup_files/
ALEPH20_11_ora_cold_20110621_405_1 tag=TAG20110621T050357
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: reading from backup piece /exlibris/
backup_files/ALEPH20_11_ora_cold_20110621_405_2
channel ORA_DISK_1: piece handle=/exlibris/backup_files/
ALEPH20_11_ora_cold_20110621_405_2 tag=TAG20110621T050357
channel ORA_DISK_1: restored backup piece 2
channel ORA_DISK_1: reading from backup piece /exlibris/
backup_files/ALEPH20_11_ora_cold_20110621_405_3
channel ORA_DISK_1: piece handle=/exlibris/backup_files/
ALEPH20_11_ora_cold_20110621_405_3 tag=TAG20110621T050357
channel ORA_DISK_1: restored backup piece 3
channel ORA_DISK_1: reading from backup piece /exlibris/
backup_files/ALEPH20_11_ora_cold_20110621_405_4
channel ORA_DISK_1: piece handle=/exlibris/backup_files/
ALEPH20_11_ora_cold_20110621_405_4 tag=TAG20110621T050357
```

```
channel ORA_DISK_1: restored backup piece 4
channel ORA_DISK_1: restore complete, elapsed time: 01:11:12
Finished restore at 22-JUN-11

RMAN>

RMAN> alter database open resetlogs;

database opened

RMAN>
```

9 Restore the Aleph software:

■ a_tree

```
cd /exlibris/backup_files
mkdir prd_software
cp prd_software_a4_110623_0001.tar.gz_aa prd_software
cd prd_software

tar xvfz prd_software_a4_110623_0001.tar.gz_aa
mv exlibris/aleph/a20_1 /exlibris/aleph
```

■ u_tree

```
cd /exlibris/backup_files
mkdir user_data
cp user_data_a5_110703_0200.tar.gz_aa user_data
cd user_data
tar xvfz user_data_a5_110703_0200.tar.gz_aa
mv exlibris/aleph/u20_1 /exlibris/aleph
```

■ Third Party-Products

```
cd /exlibris/backup_files
mkdir thrid_part
cp thrid_part_product_3p_110705_0130.tar.gz_aa thrid_part
cd thrid_part
tar xvfz thrid_part_product_3p_110705_0130.tar.gz_aa
mv exlibris/product /exlibris/product
```

10 Restart Aleph:

```
/etc/init.d/exlibris start
```

11 If you do not have any errors, start the connection test (pc_server, www_server, etc.)

Potential Restore Errors

The following are examples of possible errors that you may encounter after performing a restore:

- If the following Oracle error is displayed:

```
RMAN-00571: =====
RMAN-00569: ===== ERROR MESSAGE STACK FOLLOWS =====
RMAN-00571: =====
RMAN-03002: failure of startup command at 06/30/2011 11:08:48
RMAN-04014: startup failed: ORA-16032: parameter
LOG_ARCHIVE_DEST_1 destination string cannot be translated
ORA-07286: sksagdi: cannot obtain device information.
Linux-x86_64 Error: 2: No such file or directory
```

- a Determine the definition of `log_archive_dest_1` in the oracle init file:

```
more /exlibris/app/oracle/product/11/dbs/spfilealeph20.ora
aleph20.__java_pool_size=8388608
aleph20.__large_pool_size=4194304
aleph20.__oracle_base='/exlibris/app/oracle'#ORACLE_BASE set
from environment
aleph20.__pga_aggregate_target=255852544
aleph20.__sga_target=478150656
aleph20.__shared_io_pool_size=0
aleph20.__shared_pool_size=171966464
aleph20.__streams_pool_size=4194304
*.audit_file_dest='/exlibris/app/oracle/admin/aleph20/adump'
*.audit_trail='db'
*.compatible='11.1.0.0.0'
*.control_files='/exlibrisC
*.db_block_size=8192
*.db_domain=''
*.db_name='aleph20'
*.diagnostic_dest='/exlibris/app/oracle'

*.fast_start_mttr_target=300
*.job_queue_processes=10
*.log_archive_dest_1='location=/exlibris/oradata/aleph20/
arch'
*.log_archive_format='arch_aleph20_%t_%s_%r.dbf'
*.memory_target=700m
*.open_cursors=1000
*.OPTIMIZER_DYNAMIC_SAMPLING=0
*.OPTIMIZER_MC
*.pga_aggregate_target=101711872
*.processes=400
*.recyclebin='off'
*.remote_login_passwordfile='EXCLUSIVE'
*.sec_case_sensitive_logon=false
*.service_names='aleph20.turquoise.unice.fr'
*.SQLTUNE_CATEGORY='limited'
*.undo_tablespace='UNDOTBS1'
```

b Correct the error by creating the missing directory:

```
mkdir -p oradata/aleph20/arch/  
chown -R oracle11:dba oradata
```

■ If the http port is < 1024:

a Start Apache as the root user and not the aleph user

```
(13)Permission denied: make_sock: could not bind to address  
[::]:80  
no listening sockets available, shutting down  
Unable to open logs
```

b Change the init.dat from:

```
[root@de-psalephtest aik]# more /exlibris/startup/init.dat  
. . .  
  
# apache  
Y:apache:aleph:httpd:/exlibris/aleph/u20_1:../  
a20_1:apachectl_auto:apachectl
```

To:

```
root@de-psalephtest aik]# more /exlibris/startup/init.dat  
. . .  
  
# apache  
Y:apache:root:httpd:/exlibris/aleph/u20_1:../  
a20_1:apachectl_auto:apachectl
```

c Restart Aleph.

