

# PoINT Jukebox Manager Mirroring

## Overview

### Terms

Primary mirror - a disc that has a mirror (the original)

Secondary mirror - a disc that is a mirror of another disc

Primary server - PJBM that controls the primary mirror media

Mirror server - PJBM that controls the secondary mirror media (may be the same system as the primary server)

### Mirror media pools

Blank media can be assigned to a 'mirror media pool'. When activating mirroring for a disc, the Administrator specifies the name of the pool to take the mirror media from. If a Volume Set should be mirrored and automatic Volume Set expansion is enabled, the user should also specify a pool to take the mirror media from. Jukebox Manager will automatically expand the mirror media pool, if necessary.

### Transaction journal

A journal will be used to log write/modify operations on the primary disc. By default, contents of the journal will be purged as soon as it has been written to the secondary mirror. Optionally, it is possible not to purge data from the journal, so that it can be used to create an additional copy/mirror. It is also possible to import such a journal to a system and write it to a blank disc, just like an image file.

## Creating mirrored media

### Creating mirrored media while formatting

When formatting a disc or adding a disc to a Volume Set, the user can specify that the disc should be mirrored. After formatting the disc, PoINT Jukebox Manager will automatically format the secondary mirror volume.

Rather than explicitly specifying the location of the secondary mirror, the user specifies the name of a media mirror pool. Jukebox Manager will then use a disc from this pool as secondary mirror.

For example to format all media in Pack 1 and use the media in Pack 2 as mirrors, it is necessary to select all media in Pack 2, execute the command "Add to mirror pool.." and specify a mirror pool name, e.g. "mirror\_for\_pack1". Now select all media from Pack 1 and execute "Format media". In the format dialog, specify that the media should be mirrored using the mirror media from pool "mirror\_for\_pack1".

### Creating~ a mirror for non-blank media

There is a context menu which allows to specify that a disc which is not yet mirrored should be mirrored. This command allows specifying the mirror media pool as has been described above. After creating the secondary mirror, Jukebox Manager will synchronize the secondary mirror with the primary mirror.

## Writing to mirrored media

Writing to mirrored media works just like writing to other media. Jukebox Manager automatically performs synchronization and ensures consistency of the mirrored media, as long as there are no hardware failures.

### Keep primary or secondary mirror off-line

By default, Jukebox Manager does not allow write requests to mirrored media if the secondary mirror is not available (ie. hardware defect, mirror server down,). However, it is also possible to enable a mode in which write requests will be accepted, if the secondary mirror is off-line. Because write requests will also be written to the transaction journal, the mirror can be synchronized as soon as it is online again. The synchronization can also be performed if the primary mirror is off-line.

### Replacing a defective disc with the mirror

I. If a mirrored disc must be replaced (see error recovery below), the following steps should be performed: The secondary mirror can be converted into a mirror disc using a command in the context menu (e.g. "00 not use as mirror"). After performing this operation, this disc does not act as a mirror anymore and can be used as

replacement for the original disc. It is now possible to create a new mirror for this disc (see: Creating a mirror for non-blank media). This method implies that the mirror server is running on the same computer or that it is an integral part of the Jukebox Manager (Le. each PJBM server may act as mirror server and client).

2. There is a command to rebuild the primary mirror from the secondary mirror. In this case, the Administrator replaces the defective disc and executes the appropriate command from the context menu of the new (blank) disc.

#### Synchronizing~ secondary and primary mirror

Synchronizing means that Jukebox Manager ensures that both media contain the same data. To ease this operation, it will be presumed that the primary mirror is always at a more recent state than the secondary mirror. This requirement must be fulfilled by the implementation.

Synchronization will be performed automatically as long as there are no hardware failures. However, after a failure, the synchronization must be performed by executing the appropriate command in the context menu of the primary mirror.

#### Media type constraints

The secondary and primary mirror media must be of the same type and double sided media can only be mirrored to double sided media. If either side of a double sided disc is defect, the whole disc must be replaced.

#### Mirror status information

Mirror status information are available in the properties dialog of a volume. This dialog contains these information:

Type: primary/secondary mirror or not mirrored

Location of the other mirror volume

Status and size of the journal buffer

#### SDK

The Jukebox Manager SDK will provide functions to query the status of both, the primary and the secondary mirror disc. It is also possible to initiate synchronization of the secondary mirror.

#### Volume Sets

Jukebox Manager does not mirror Volume Sets as a whole, but mirrors individual media. This means, if a disc from a Volume Set is defect, it can be replaced by its mirror without replacing all the other media.

When using the option to automatically expand a Volume Set, it is necessary to specify whether the new media should be mirrored and if appropriate, to specify a key word to identify the location of the mirror media to use, as described above.

#### Finalized media

When the primary and secondary mirror have been finalized, one of the media can be exported and further read requests will be satisfied using the disc which is on-line.

#### Error recovery

##### Handling write error to the primary mirror

If a write error occurs while writing to the primary mirror, the mirror will be marked as 'read only' and further write operations to the primary and the secondary mirror will be prevented. It is now necessary to fix the problem, for example by replacing the primary mirror by the secondary mirror.

##### Handling write error to the secondary mirror

If a write error occurs while the primary mirror is off-line, so that there cannot be any new write requests, the synchronization stops and the user should fix the situation.

If the primary mirror is on-line and writable while a write error to the secondary mirror occurs, one of the following actions will be performed, depending on user settings:

The primary mirror will be marked as read only and the user needs to fix the situation.

Jukebox Manager continues to accept write requests for the primary mirror and continues writing to the transaction journal.

In both situations, it will be necessary to repair the secondary mirror. If repairing cannot be performed without losing data on the disc, the disc will be treated as defect and must be replaced. The administrator must decide whether to continue using the primary or secondary mirror.

Write failure on Volume Sets containing! sequential media

In case of a write failure on a sequential disc (either the primary or secondary mirror), Jukebox Manager allocates a new pair of media for this Volume Sets and writes the data which could not be committed to the new media.

This allows to continue writing in case of an unrecoverable.write failure.

Crash of either the primary or the mirror server

If the crash happened while writing to either of the media, it is necessary to manually initiate synchronization of the secondary and the primary mirror media.