

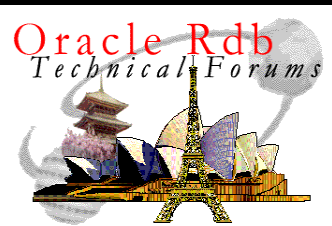
New Options for Backing Up Your Oracle Rdb Database

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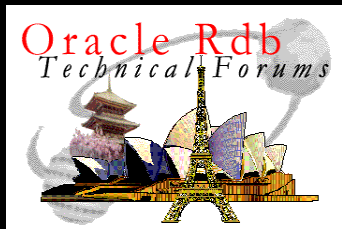
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Agenda

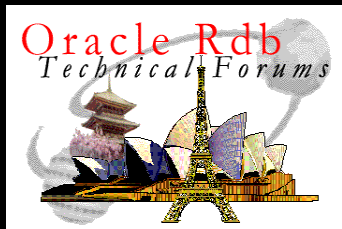
- Backing up Rdb Databases to Disks
- Parallel Backup Options
- Tape Library Support
- SAN Backups
- Miscellaneous Topics



Backing Up to Disks

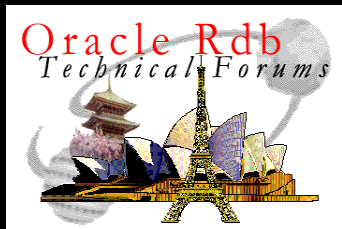
- RMU always supported backup to a single disk file
- Rdb 7.1 added support for backups to multiple disks
 - Similar to parallel threads when backing up to tape
 - Storage areas allocated to output threads using same algorithm as for tapes
 - Backup file size, writer threads can be limited
 - Two new compression options offered for disk backups
 - Specify the backup file name only for the first device:

```
$ RMU/BACKUP/DISK MF_PERSONNEL -  
    DEVICE1:[DIRECTORY1]MFP.RBF, -  
    DEVICE2:[DIRECTORY2]
```



Parallel Backup

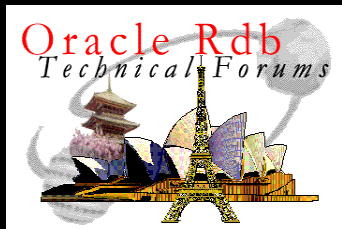
- Two kinds of parallel backup
 - Parallel threads – since a very long time ago
 - Parallel processes – since Rdb version 7
- New for Rdb 7.1
 - Limit number of active input threads:
 - /READER_THREAD_RATIO = n improves performance for very large database backups
 - /READER_THREAD_RATIO = 0 produces 7.0 behavior
 - Tape librarian support



Tape Library Support

- Oracle Media Management version 2.0 API support begins in Rdb version 7.1.1.0
 - Used by leading librarians: ABS, Legato, Veritas
- ABS tested and supported¹
 - Other support possible
- LIBRARIAN qualifier added
 - Database backup and restore
 - Journal backup and recovery
- Parallel backup plan files supported

¹Testing by HP will be completed before ship date



Tape Library Support (Cont.)

- Device, directory, file type are ignored
- Specify reader and writer threads in commands, like:

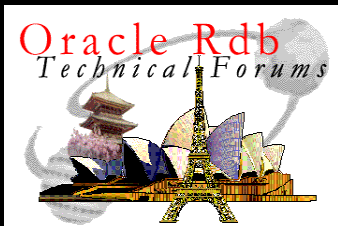
```
$ RMU /BACKUP /LIBRARIAN=(WRITER_THREADS = 3) /LOG -  
_ $ rdb-root-file rmu-backup-file
```

- Results in three backup files (managed by tape librarian)

```
RMU-BACKUP-FILE.RBF  
RMU-BACKUP-FILE02.RBF  
RMU-BACKUP-FILE03.RBF
```

- If reader threads don't match writer threads use /VOLUMES

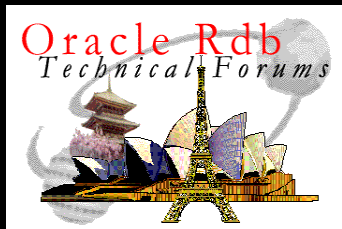
```
$ RMU /RESTORE /LIBRARIAN=(READER_THREADS = 2) -  
_ $ /VOLUMES=3 rmu-backup-file
```



Plan Files

- Added in Rdb 7.0 to make parallel backups easier to manage
- Extended in Rdb 7.1.1.0 for easier management of /LIBRARIAN options
- Generate, use with this syntax:

```
$ RMU /BACKUP /LIBRARIAN=(PLAN_FILE=BACKUP.PLAN) -  
_ $ rdb-root-file rmu-backup-file  
$ RMU /RESTORE /LIBRARIAN=(PLAN_FILE=BACKUP.PLAN) -  
_ $ rmu-backup-file
```

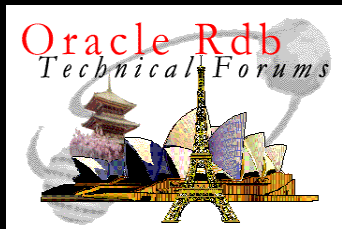


Parallel Backups with Tape Librarian

- Specify number of processes and threads in command
- Generate a backup plan then execute:

```
$ RMU /BACKUP /PARALLEL = EXECUTOR = 3
_ $ /LIBRARIAN = WRITER_THREADS = 3 -
_ $ /LIST_PLAN = parallel_backup.plan -
_ $ /NOEXECUTE /LOG
_ $ rdb-root-file rmu-backup-file
$ RMU /BACKUP /PLAN parallel_backup.plan
```

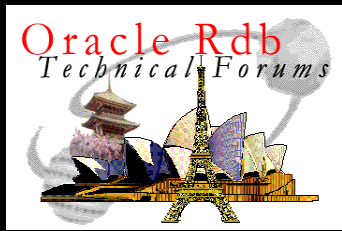
- These commands write to 9 tape devices
- SQL/Services required for parallel backups



Restoring using Tape Librarian

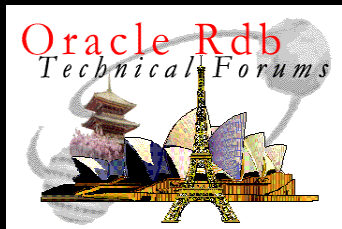
- Use the same plan file to restore the database
- Parallel restore still not supported
- Limit restore threads like this:

```
$ RMU /RESTORE
_ $ /LIBRARIAN = (READER_THREADS = 3, -
_ $ PLAN_FILE = parallel_backup.plan) -
_ $ /LOG
_ $ rmu-backup-file
```



Which Librarian to Use?

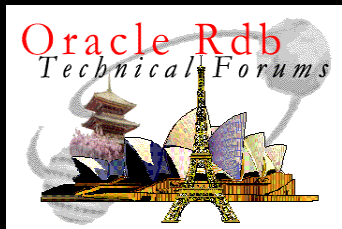
- Librarian sharable image specified using logical name `RMU$LIBRARIAN_PATH`
- Debug information from logical name `RMU$DEBUG_SBT`



SAN Backups

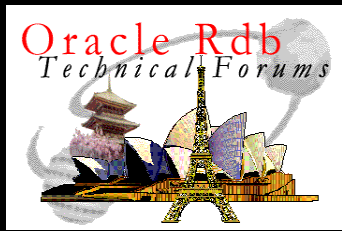
OK, it's possible to use your SAN to backup your database but it is,

- Very complicated
- Not recommended or supported
- Use RMU/BACKUP instead
 - Efficient
 - Transactional
 - Easy to use
 - Minimizes performance impact



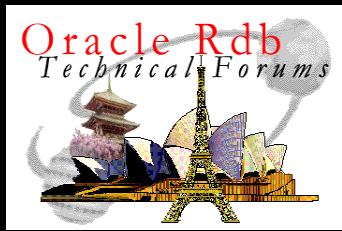
SAN Backups (Cont.)

- Close the database before splitting mirrored database disks
- Recover all failed transactions
- Mount the split mirror disks on another machine using identical physical device names or concealed device level logical names
- Back up this copy database using RMU
- Test, test, test both backup and restore including journal recovery
- If this procedure fails, call us for sympathy



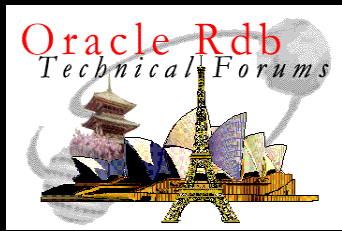
SAN Backups (Cont.)

- Split all database mirror sets at the same instant (.RDB, .RDA, .AIJ, .RUJ)
- Mount the split mirror disks on another machine using identical physical device names or concealed device level logical names
- Recover all failed transactions
- Back up this copy database using RMU
- Test, test, test both backup and restore including journal recovery
- If this procedure fails, call us for even less sympathy



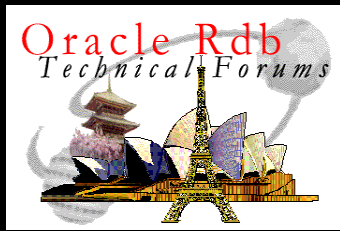
SAN Backups of Standby Database

- Might possibly work
- Similar to previous; gracefully stop Hot Standby before splitting mirror sets
- Mount the mirror disks on yet another machine
- Back up this copy of a copy database using RMU
- Test, test, test both backup and restore including journal recovery
- If this procedure fails, don't even call for sympathy



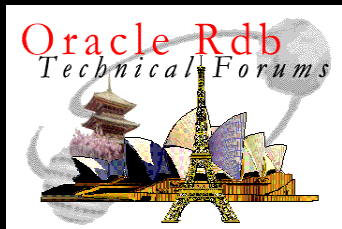
Daily Backup Procedure Best Practice

1. Use After Image Journaling
 - and Fast Commit
 - and ALS
 - Keep AIJ files on separate disks
2. Verify the database
 - Use `RMU/EXTRACT/ITEM=VERIFY` for parallel verify procedure
3. Use full, on-line backup of all storage areas
 - Disable Fast Incremental Backup optimization
4. Use `CHECKSUM_VERIFICATION` to be sure you aren't backing up corrupt pages
5. Always use `/CRC` checking for tape or disk backups



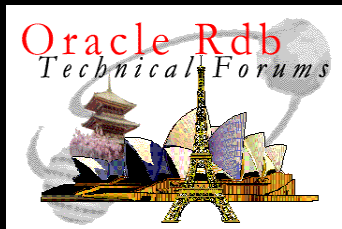
Daily Backup Procedure Best Practice (cont.)

6. Don't mix incompatible tape drives
7. Daily backup operation should be scheduled,
 - When there is a minimum of other activity on the system
 - Just after large batch changes
8. Back up journals using QUIET_POINT qualifier
 - Assures usefulness of current After Image Journal for automatic recovery
9. Then back up database using NOQUIET_POINT qualifier
 - QP benefit is application related
10. Rehearse partial and full database restore operations
 - “There is no need to test backup operations - only restores”
 - N. Lastovica



Other Changes

- CHECKSUM_VERIFICATION is now the default
- CRC default will be changed for most tape drives
- Change in behavior: Can't use /INCLUDE and /EXCLUDE in the same command
- Lifted restriction on RMU/BACKUP and PAGE TRANSFER VIA MEMORY
- Control location of operator prompts



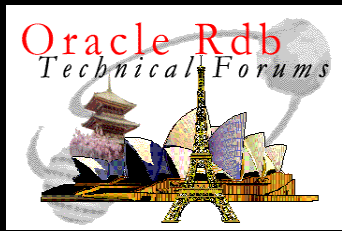
Journal Backup Changes

- Global Symbol for last AIJ backup file specification is created with /LOG

```
$ RMU/BACKUP/AFTER/LOG ...  
$ SHOW SYMBOL RDM$AIJ_LAST_OUTPUT_FILE  
RDM$AIJ_LAST_OUTPUT_FILE == "DKA0:[DB]MFPAIJ_324.AIJ;1"
```

- Standby Database Journal Backup now supported

```
$ DEFINE/SYSTEM RDM$BIND_LRS_BACKUP_AIJ 1
```



For More Information

- Rdb Version 7.1.1.0 Release Notes
- www.oracle.com/rdb
- metalink.oracle.com
- Bill.Gettys@Oracle.com

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