

MySQL Backup for the Oracle DBA

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Agenda



- ☐ Zmanda Inc Overview
- ☐ ZRM for MySQL
- ☐ RMAN/Oracle vs. ZRM/MySQL
- ☐ Quickstart
- ☐ Backup Methods
- ☐ Backups using Snapshots
- ☐ Point in Time Recovery of Database
- ☐ Reporting and Monitoring
- ☐ Advanced Features
- ☐ Q & A

Zmanda : Open Source Backup and Recovery



Overview: Market leader in open source backup and recovery
Amanda: Network Backup
Zmanda Recovery Manager for MySQL

Business Model: Annual subscription fee model as pioneered by open source leaders MySQL and Red Hat

Adoption: 500,000+ servers protected by Zmanda

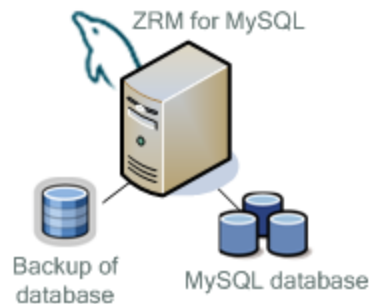
Zmanda and MySQL :



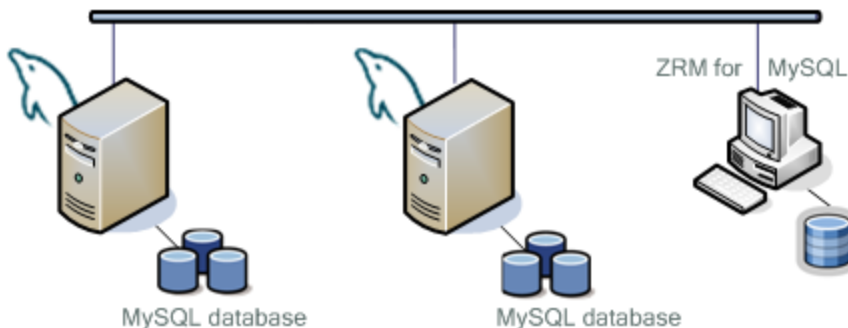
Zmanda Recovery Manager (ZRM) for MySQL



ZRM local to MySQL



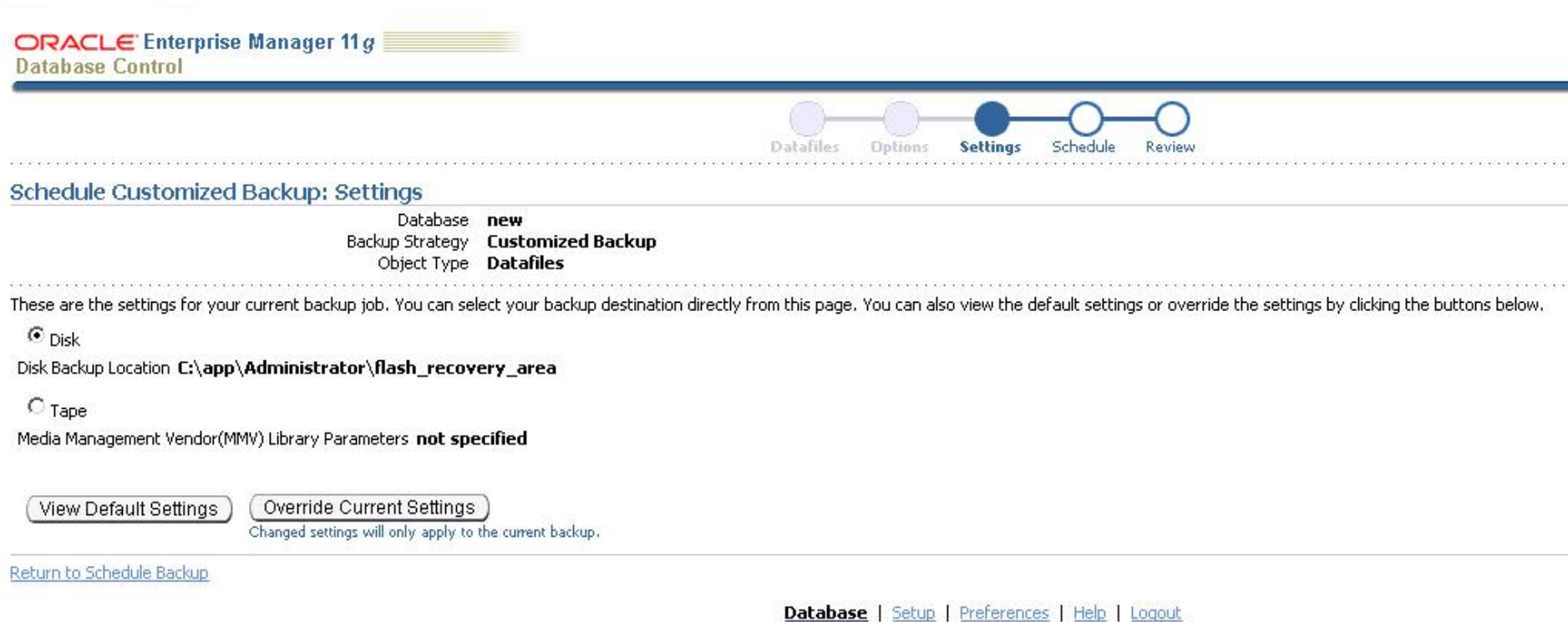
Enterprise-wide MySQL backup



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- Centralized backup and recovery of multiple MySQL databases
- Schedule full and incremental backups
- Perform logical or raw backups of MySQL database
- Get e-mail or RSS notification about status of backups
- Monitoring and Reporting
- Enforcement of site or application specific backup policies
- Recover database easily to a required point in time or to any particular database event

- Backup/Restore Scripts and Backup Manager in Oracle Enterprise Manager
- Block level corruption detection
- Block level differential backup
- Recovery information integrated into the database control files



ORACLE Enterprise Manager 11g
Database Control

Navigation: Datafiles Options **Settings** Schedule Review

Schedule Customized Backup: Settings

Database: **new**
Backup Strategy: **Customized Backup**
Object Type: **Datafiles**

These are the settings for your current backup job. You can select your backup destination directly from this page. You can also view the default settings or override the settings by clicking the buttons below.

☒ Disk
Disk Backup Location: **C:\app\Administrator\flash_recovery_area**

☐ Tape
Media Management Vendor(MMW) Library Parameters: **not specified**

[View Default Settings](#) [Override Current Settings](#)
Changed settings will only apply to the current backup.

[Return to Schedule Backup](#)

Database | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Oracle RMAN



- Backup/Restore Scripts and Backup Manager in Oracle Enterprise Manager
- Block level corruption detection
- Block level differential backup
- Recovery information integrated into the database control files

ORACLE Enterprise Manager 11g Database Control

Setup Preferences Help Logout

Database

Options Settings Schedule **Review**

Schedule Customized Backup: Review

Database: **new**
Backup Strategy: **Customized Backup**
Object Type: **Whole Database**

Cancel Edit RMAN Script Back Step 4 of 4 Submit Job

Settings

Destination: **Disk**
Backup Type: **Full Backup**
Backup Mode: **Online Backup**
Flash Recovery Area: **C:\app\Administrator\flash_recovery_area**

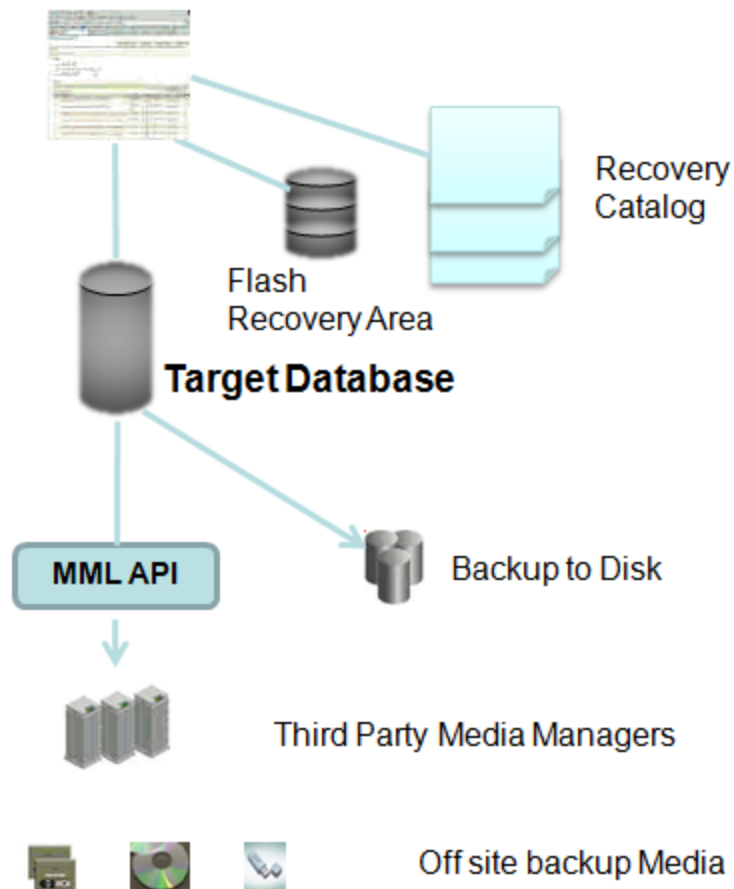
RMAN Script

The RMAN script below is generated based on the user input from previous pages.

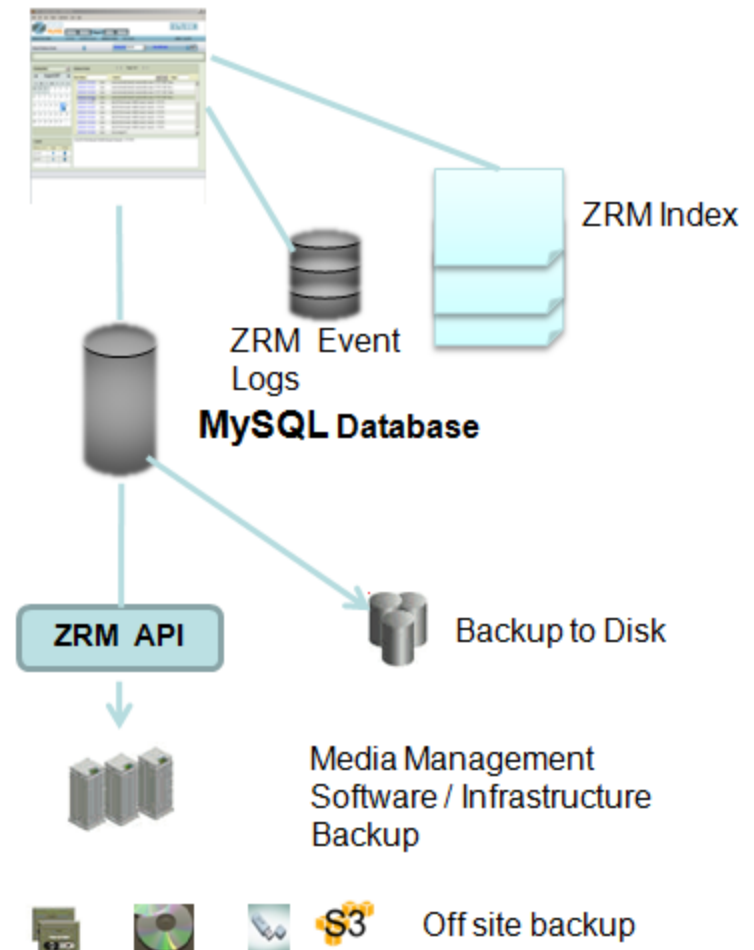
```
backup device type disk tag '%TAG' database include current controlfile;  
backup device type disk tag '%TAG' archivelog all not backed up;
```

RMAN and ZRM for MySQL

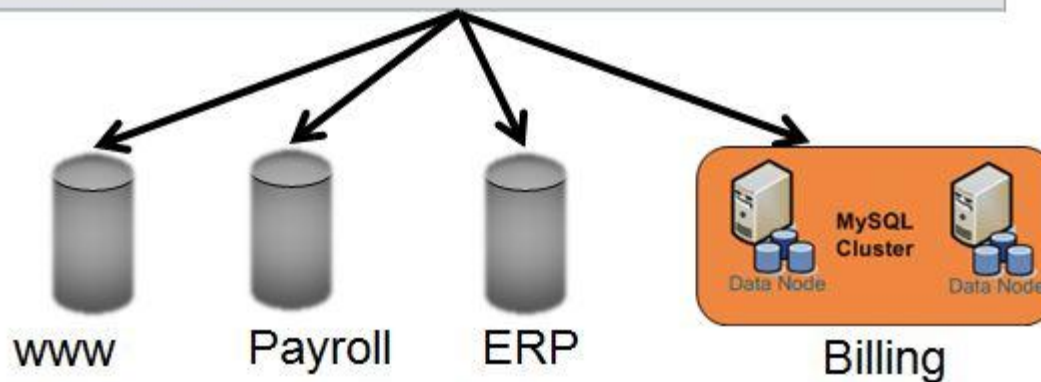
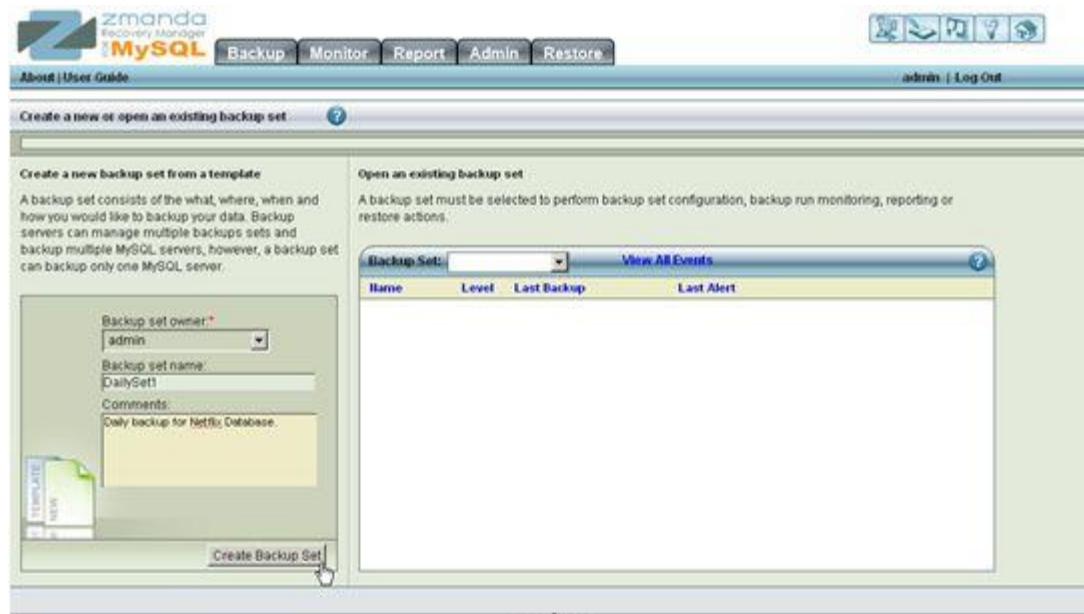
RMAN Client



Zmanda Management Console



ZRM for MySQL – Global Management for Online Databases



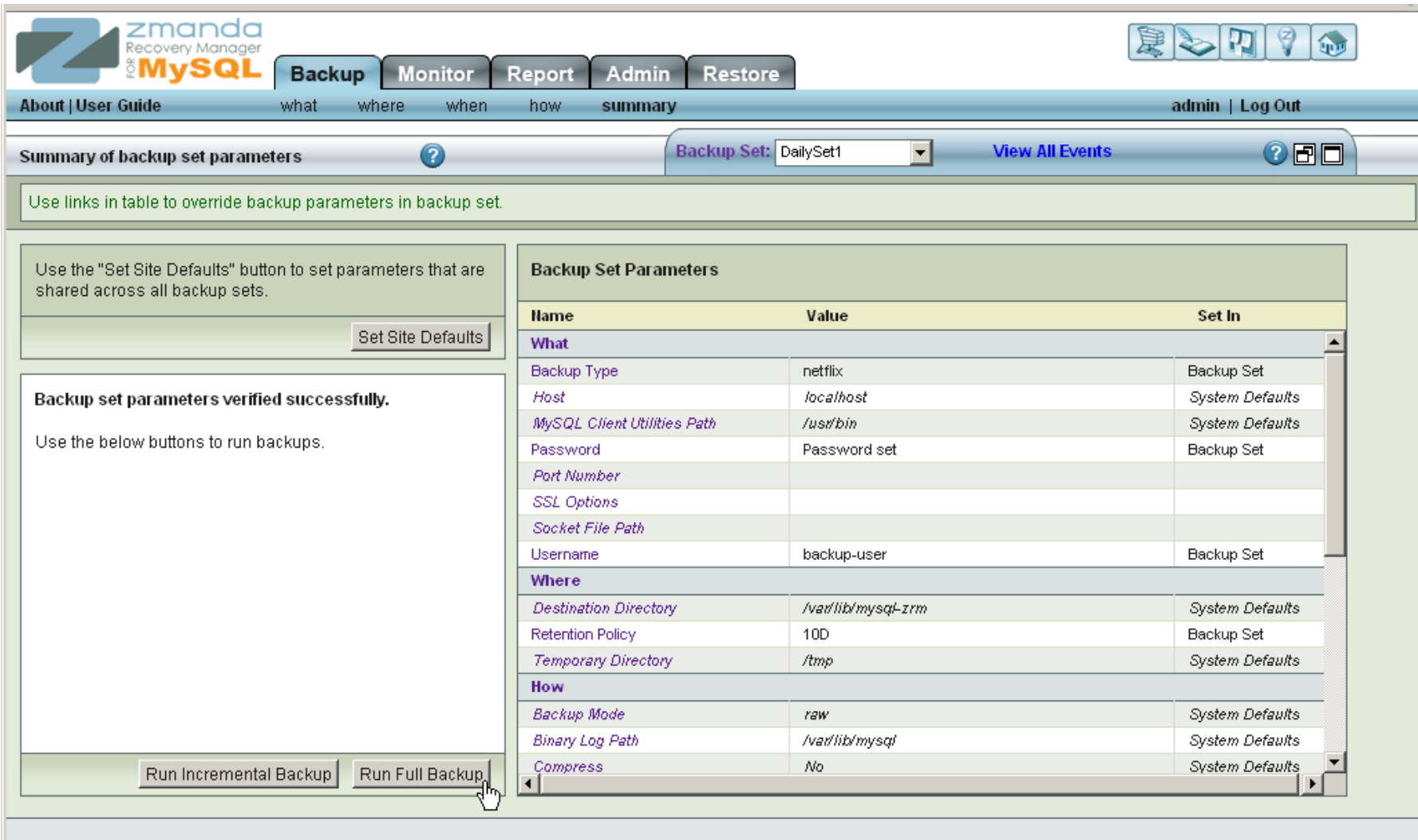
Backup of Enterprise wide MySQL Databases

Quick Start – Default Configuration



- RMAN/Oracle
 - \$ORACLE_HOME/config/scripts/backup.sh***
 - Runs full backup of all databases under ORACLE_HOME
 - Default retention policy is last two backups
- ZRM/MySQL
 - /usr/bin/mysql-zrm-backup***
 - Runs full backup of all local databases
 - Default retention policy is forever

Immediate Full Backup from Management Console



The screenshot shows the Zmanda Recovery Manager for MySQL Management Console. The top navigation bar includes tabs for Backup, Monitor, Report, Admin, and Restore. The Backup tab is active, and the 'summary' sub-tab is selected. The main content area displays the 'Summary of backup set parameters' for the 'DailySet1' backup set. A table lists the parameters, categorized into 'What', 'Where', and 'How'. The 'Run Full Backup' button is highlighted with a mouse cursor.

Backup Set Parameters

Name	Value	Set In
What		
Backup Type	netflix	Backup Set
Host	localhost	System Defaults
MySQL Client Utilities Path	/usr/bin	System Defaults
Password	Password set	Backup Set
Port Number		
SSL Options		
Socket File Path		
Username	backup-user	Backup Set
Where		
Destination Directory	/var/lib/mysql-zrm	System Defaults
Retention Policy	10D	Backup Set
Temporary Directory	/tmp	System Defaults
How		
Backup Mode	raw	System Defaults
Binary Log Path	/var/lib/mysql	System Defaults
Compress	No	System Defaults

Run Incremental Backup Run Full Backup

Immediate Full Backup from RMAN



ORACLE® Enterprise Manager 11g
Database Control



Schedule Customized Backup: Review

Database **new**
Backup Strategy **Customized Backup**
Object Type **Whole Database**

Settings

Destination **Disk**
Backup Type **Full Backup**
Backup Mode **Online Backup**
Flash Recovery Area **C:\app\Administrator\flash_recovery_area**

RMAN Script

The RMAN script below is generated based on the user input from previous pages.

```
backup device type disk tag '%TAG' database include current controlfile;  
backup device type disk tag '%TAG' archivelog all not backed up;
```

[Return to Schedule Backup](#)

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Logical Backups



- Extract logical definitions and data from the database to a file
- Can be done at Database level or Table level
- Allows for selective recovery
- Command line and Management Console

Oracle

- EXP (export) and IMP (import) utilities
- Data Pump (Introduced in Oracle 10g)
- Uses Oracle proprietary binary file format

MySQL

- *mysqldump* client program
- Can backup local or remote servers
- Stores backup as SQL statements
- Portable

Physical (Raw) Backups



- Binary copies of Database files
- Faster and preferred method for large databases
- Very limited portability

Oracle

- Backup Data files, Control files, Server Parameter file and Redo Log files
- Online backup requires ARCHIVELOG mode
- Hot Tablespace Backups (ALTER TABLESPACE BEGIN BACKUP)
- Recovery Manager (RMAN)
- Snapshot: Oracle 11g on Windows has a VSS Writer

MySQL

- Actual files depend on storage engine being used
 - MyISAM : .frm, .MYD and .MYI files
 - InnoDB: .frm, .ibd, InnoDB log files
- mysqlhotcopy : For MyISAM storage engine on UNIX and Netware
- ibbackup (InnoDB Hot Backup): InnoDB storage engine only
- Snapshot based solutions

ZRM for MySQL – Optimized for your Configuration



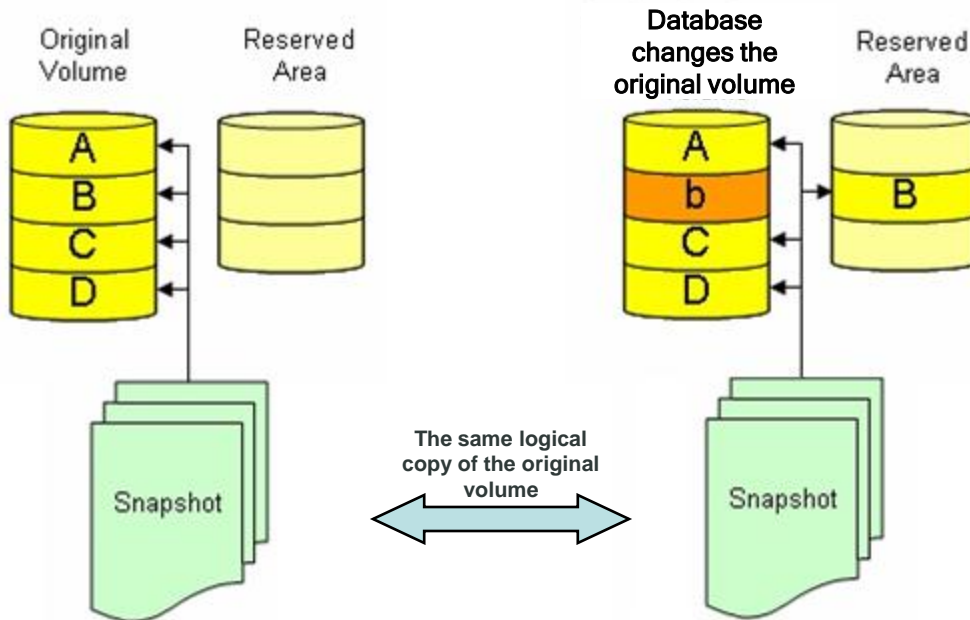
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Backup methods that best matches storage engine and configuration

- Logical backup
- Snapshot backup
- Raw backup

The screenshot shows the Zmanda Recovery Manager for MySQL web interface. The top navigation bar includes links for Backup, Monitor, Report, Admin, and Restore. The main content area is titled 'Create a new or open an existing backup set'. On the left, under 'Create a new backup set from a template', there is a form with fields for 'Backup set owner' (set to 'admin'), 'Backup set name' (set to 'DailySet1'), and 'Comments' (set to 'Daily backup for Netflix Database.'). A 'Create Backup Set' button is at the bottom of this form. On the right, under 'Open an existing backup set', there is a 'Backup Set' dropdown menu and a 'View All Events' link. Below these is a table with columns 'Name', 'Level', 'Last Backup', and 'Last Alert', which is currently empty.

Snapshots - Logical Copy Of Database



snapshot is a copy of a set of files and directories as they were at a particular point in the past

- ✓ Copy on Write
- ✓ Taking a snapshot is very fast and does not depend on size of the database
- ✓ Always a “full” point-in-time backup of database

Database Backup Using Snapshot



- Momentarily read lock the database
- Flush the memory buffers for logical consistency of data on disk
- Take the snapshot
- Unlock the database
- Manage the snapshot
 - Moving to a different location
 - Catalog backup images
 - Monitoring and reporting

Requires snapshot manager such as ZRM that is aware of MySQL and specific snapshot technology

- Differential and Cumulative backups using RMAN
 - Differential: Faster Backup/Slower Recovery
 - Cumulative: Slower Backup/Faster Recovery
- ZRM only does Differential backups
 - ZMC enables easy recovery
- Differential backups difference
 - Oracle RMAN: Changed blocks
 - ZRM: Database Event Log

Storing backups



- Encryption
- Compression
- RMAN media management interface
- ZRM for MySQL integration with Amanda Enterprise
- Storing backups on the storage grid
 - Amazon S3

Point in Time Restore of Databases



- Recovering from logical errors
- Audit and analyze transactions
- Oracle Flashback Commands
 - RMAN Flashback Transaction History
- MySQL Log Analyzer pin-points the time of recovery
 - ZRM can recover to any point in time since last backup

MySQL Log Analyzer



ZRM - DataBase Events - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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Recovery Manager
for **MySQL**

Backup Monitor Report Admin Restore

About | User Guide summary predefined reports database events data integrity admin | Log Out

Report Database Events ? Backup Set: DailySet1 View All Events ?

Backup Date: Go

◀ August 2007 ▶

S	M	T	W	T	F	S
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Legend

Backup Level	Single	Multiple
Level 0		
Level 1		

Database Events Page 1 of 1

Time Stamp: Search: Next Prev Page:

2007-08-17 16:16:30	Query	insert into MovieID (MovieID,Year,MovieTitle) values ("17775","2005","Sahar ...
2007-08-17 16:16:35	Query	insert into MovieID (MovieID,Year,MovieTitle) values ("17776","1993","Die A...
2007-08-17 16:16:36	Query	insert into MovieID (MovieID,Year,MovieTitle) values ("17777","1997","Golde...
2007-08-17 16:16:40	Query	insert into MovieID (MovieID,Year,MovieTitle) values ("17778","2005","Harry...
2007-08-17 16:16:41	Query	DELETE FROM `MovieID` WHERE `MovieID`.`MovieID` = 17771/*!*/;
2007-08-17 16:16:43	Query	DELETE FROM `MovieID` WHERE `MovieID`.`MovieID` = 17772/*!*/;
2007-08-17 16:16:44	Query	DELETE FROM `MovieID` WHERE `MovieID`.`MovieID` = 17773/*!*/;
2007-08-17 16:16:44	Query	DELETE FROM `MovieID` WHERE `MovieID`.`MovieID` = 17774/*!*/;
2007-08-17 16:16:44	Query	DELETE FROM `MovieID` WHERE `MovieID`.`MovieID` = 17775/*!*/;
2007-08-17 16:16:45	Query	DELETE FROM `MovieID` WHERE `MovieID`.`MovieID` = 17776/*!*/;
2007-08-17 16:16:46	Query	flush privileges/*!*/;

DELETE FROM 'MovieID' WHERE 'MovieID'.'MovieID' = 17773/*!*/;

MySQL Backup Reporting



Backup **Monitor** **Report** **Admin** **Restore**

[About](#) | [User Guide](#)

[summary](#)

[predefined reports](#)

[database events](#)

[data integrity](#)

[admin](#) | [Log Out](#)

View Predefined Reports



Backup Set: Movies

[View All Events](#)



Restore a particular backup by clicking the hyperlinks in the row.

Select a predefined report:

Backup Report

Customize report

- ☒ Backup Date & Time
- ☐ Backup Directory
- ☒ Backup Size
- ☐ Backup Size (Compressed)
- ☐ Binary Logs
- ☐ Comment
- ☐ Compression
- ☐ Compression/Encryption Time
- ☒ Databases
- ☐ Databases (Logical)
- ☐ Databases (Raw)
- ☒ Databases (Snapshot)
- ☐ Encryption
- ☐ Flush Logs time
- ☐ Host
- ☐ InnoDB Data Files
- ☐ InnoDB Logs

[View Customized Report](#)

Backup Report for Movies

Backup Date & Time	Backup Size	Databases	Databases (Snapshot)	Level	MySQL Version	Read Locks Time	Status	Time Taken
2007-12-05 16:23:44	346.63 GB	movies	movies	0	5.0.50-enterprise-gpl-log	00:00:00	Backup succeeded	03:35:31
2007-12-05 16:22:46	517.04 MB	moviesinnodb	moviesinnodb	0	5.0.50-enterprise-gpl-log	00:00:00	Backup succeeded	00:00:12
2007-12-05 16:22:38	0.00 MB			1	5.0.50-enterprise-gpl-log	00:00:00	Backup succeeded	00:00:00
2007-12-05 16:16:54				0	5.0.50-enterprise-gpl-log	00:00:00	Backup failed	00:00:00
2007-12-04 23:05:31		movies	movies	0	5.0.50-enterprise-gpl	00:00:00	Backup failed	00:00:00
2007-12-04 23:04:42	517.04 MB	moviesinnodb	moviesinnodb	0	5.0.50-enterprise-gpl	00:00:00	Backup succeeded	00:00:15
2007-12-04 23:02:27	146.37 MB	moviesinnodb		0	5.0.50-enterprise-gpl	00:00:12	Backup done but with errors	00:00:13
2007-12-04 22:47:43	146.37 MB	moviesinnodb		0	5.0.50-enterprise-gpl	00:00:13	Backup done but with errors	00:00:15

- Database Duplication
 - RMAN Network Database Duplication
 - ZRM can instantiate MySQL Replication Slaves
- Access control
 - RMAN Virtual Private Catalog
 - ZRM Role Based Access Control
- Cluster support
 - RMAN supports Real Application Cluster (RAC)
 - ZRM supports MySQL NDB Clusters

ZRM/MySQL == RMAN/Oracle



- Multiple Backup methods to suit multiple storage engines
- Plug-in Architecture
 - Snapshots
 - Scheduling
- Customizable compression and encryption methods
- Flexible, robust and very easy to use

Top 5 Considerations while setting up your MySQL Backup
<https://www.zmanda.com/mysql-backup-considerations.html>

Live Demo: <https://network.zmanda.com/>