MySQL Backup for the Oracle DBA

Chander Kant
Zmanda, Inc.
ck@zmanda.com
http://www.zmanda.com/
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

- 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
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

Schedule Customized Backup: Settings

Database
Backup Strategy
Object Type

new
Customized Backup
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 (MMV) Library Parameters not specified

View Default Settings Override Current Settings

Changed settings will only apply to the current backup.

Return to Schedule Backup

Open Source Backup and Recovery
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**

**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: E:\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" archive all not backed up;
```
RMAN and ZRM for MySQL

RMAN Client

- Flash Recovery Area
- Recovery Catalog
- Target Database
  - MML API
  - Backup to Disk
  - Third Party Media Managers
  - Off site backup Media

Zmanda Management Console

- ZRM Index
- ZRM Event Logs
- MySQL Database
  - ZRM API
  - Backup to Disk
  - Media Management Software / Infrastructure Backup
  - Off site backup

Open Source Backup and Recovery
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

Use links in table to override backup parameters in backup set.

Backup set parameters verified successfully.

Use the below buttons to run backups.

<table>
<thead>
<tr>
<th>Backup Set Parameters</th>
<th>Value</th>
<th>Set In</th>
</tr>
</thead>
<tbody>
<tr>
<td>What</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backup Type</td>
<td>netflix</td>
<td>Backup Set</td>
</tr>
<tr>
<td>Host</td>
<td>localhost</td>
<td>System Defaults</td>
</tr>
<tr>
<td>MySQL Client Utilities Path</td>
<td>/usr/bin</td>
<td>System Defaults</td>
</tr>
<tr>
<td>Password</td>
<td>Password set</td>
<td>Backup Set</td>
</tr>
<tr>
<td>Where</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Destination Directory</td>
<td>/var/lib/mysql/inn</td>
<td>System Defaults</td>
</tr>
<tr>
<td>Retention Policy</td>
<td>10D</td>
<td>Backup Set</td>
</tr>
<tr>
<td>Temporary Directory</td>
<td>/tmp</td>
<td>System Defaults</td>
</tr>
<tr>
<td>How</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backup Mode</td>
<td>raw</td>
<td>System Defaults</td>
</tr>
<tr>
<td>Binary Log Path</td>
<td>/var/lib/mysql/inn</td>
<td>System Defaults</td>
</tr>
<tr>
<td>Compress</td>
<td>No</td>
<td>System Defaults</td>
</tr>
</tbody>
</table>
Immediate Full Backup from RMAN

**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
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

Backup methods that best matches storage engine and configuration

- Logical backup
- Raw backup
- Snapshot backup
Snapshots - Logical Copy Of Database

- Snapshots are 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
Incremental Backups

- 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 Backup Reporting

## Backup Report for Movies

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

• 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
http://www.zmanda.com/mysql-backup-considerations.html

Live Demo: http://network.zmanda.com/