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# MySQL Backup and Recovery

*Are you ready?*

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# Who is Chris Grello?

- Sr. Systems Engineer at INetU Managed Hosting
- At INetU since 1999
- Day-to-day tasks involve:
  - MySQL
  - Performance tuning, capacity planning, load testing
  - Security & compliance (PCI DSS)
- Passionate about cycling (NEMBA)
- Amateur photographer


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# Why are you here?

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# Setting the mood

- Linux
- MySQL 5.1
- MyISAM, InnoDB, & MEMORY (HEAP)
- Not going to cover MySQL Cluster (NDB)
- A reasonable size dataset: <50GB?
- Replication is not a backup solution…

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# Why perform backups?

- Accidental data changes (ex: DELETE * FROM, DROP TABLE)
- Hardware failures (disks, power, people swinging hammers)
- MySQL or system crashes
- Other events that could lead to data loss or corruption.
- An attackr haz deletd ur data

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# Recovery

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# Change your focus

- It's really all about recovery
- Backups often eclipse recovery
- Backups are less stressful. Disaster strikes at the worst times…
  - Database goes poof at 3AM on Black Friday
- RPO and RTO are critical
  - RPO: recovery point objective
    - acceptable loss
  - RTO: recovery time objective
    - time to restore

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# Consider all failure scenarios

- Changed row
  - Manually fix?
- Damaged table
  - Restore single table
- Dropped database
  - Restore database
- Complete system failure, data loss
  - Restore entire system and/or datadir
- Site/Regional disaster
  - Off-site tape storage
  - DR site
- You cannot protect against all failures/disasters, but you should consider and plan for them.

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# Recovery nice

Simple example of recovering from a full loss to a point in time:

1. RAID failure – all data lost
2. Get new system online
3. Restore most recent full (raw or logical)
4. Replay binary logs since last full

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# Recovery evil

Not so simple example…

1. Earthquake – data center destroyed
2. Switch to DR site (you were replicating)
3. Find out that some data is outdated and/or missing
4. Request tapes from Iron Mountain
5. Wait a few hours due to delays
6. Restore from tape
7. Replay binary logs
8. Some data still too old or missing

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# Backup

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# The Basics

- When?
  - As often as you can!
- What?
  - Data files, logs, configuration
- How?
  - Full or incremental
  - Raw or logical
  - Online or offline
- Where?
  - Another filesystem, server
  - Keep more than one copy – different locations and/or media.
- Recovery plan?

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# Common tools

| | cost | speed | impact | engines |
|---|---|---|---|---|
| **mysqldump** | free | slow | low-high | all |
| **mysqlhotcopy** | free | fast | med | MyISAM |
| **LVM snapshot** | free | fast | low | all |
| **mylvmbackup** | free | fast | low | all |
| **InnoDB Hot Backup** | $$$ | fast | low | InnoDB |
| **ZRM for MySQL** | free-$$$ | slow-fast | low-high | all |

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# mysqldump

- Provides the most portability and flexibility
- Dump files can be edited
- Important options:
  - --single-transaction
  - --lock-tables & --lock-all-tables
  - --routines

http://dev.mysql.com/doc/refman/5.1/en/mysqldump.html

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# LVM snapshot

- Low impact, high performance raw backups
  - Basic flow of events:
    1. Lock tables, flush logs, record binary log position
    2. Create LVM snapshot
    3. Unlock tables
    4. Copy data, logs, config
    5. Remove LVM snapshot
- Can also be leveraged for logical backups
  - Same as above, but replace step #4 with:
    - 4a. Start temp MySQL instance
    - 4b. Perform MySQL dump using that instance
    - 4c. Stop temp MySQL instance

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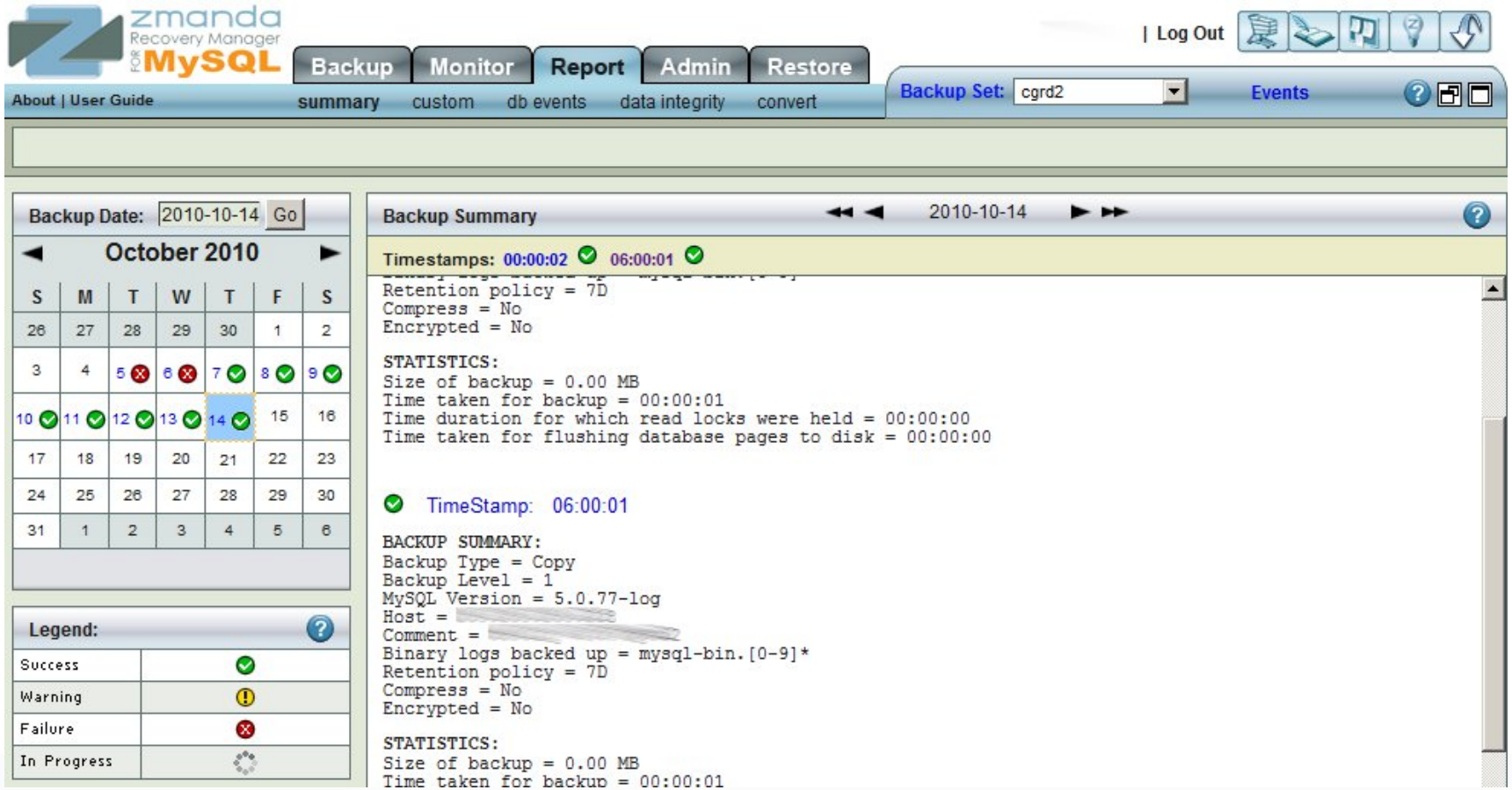
# mylvmbackup

- Automates the manual LVM procedure previously described.
- Provides additional features such as:
  - Ability to perform InnoDB crash recovery.
  - Multiple copy options: tar/gzip, rsync, rsnap, none
- Written in Perl – easy customization.

http://www.lenzg.net/mylvmbackup/

# ZRM for MySQL



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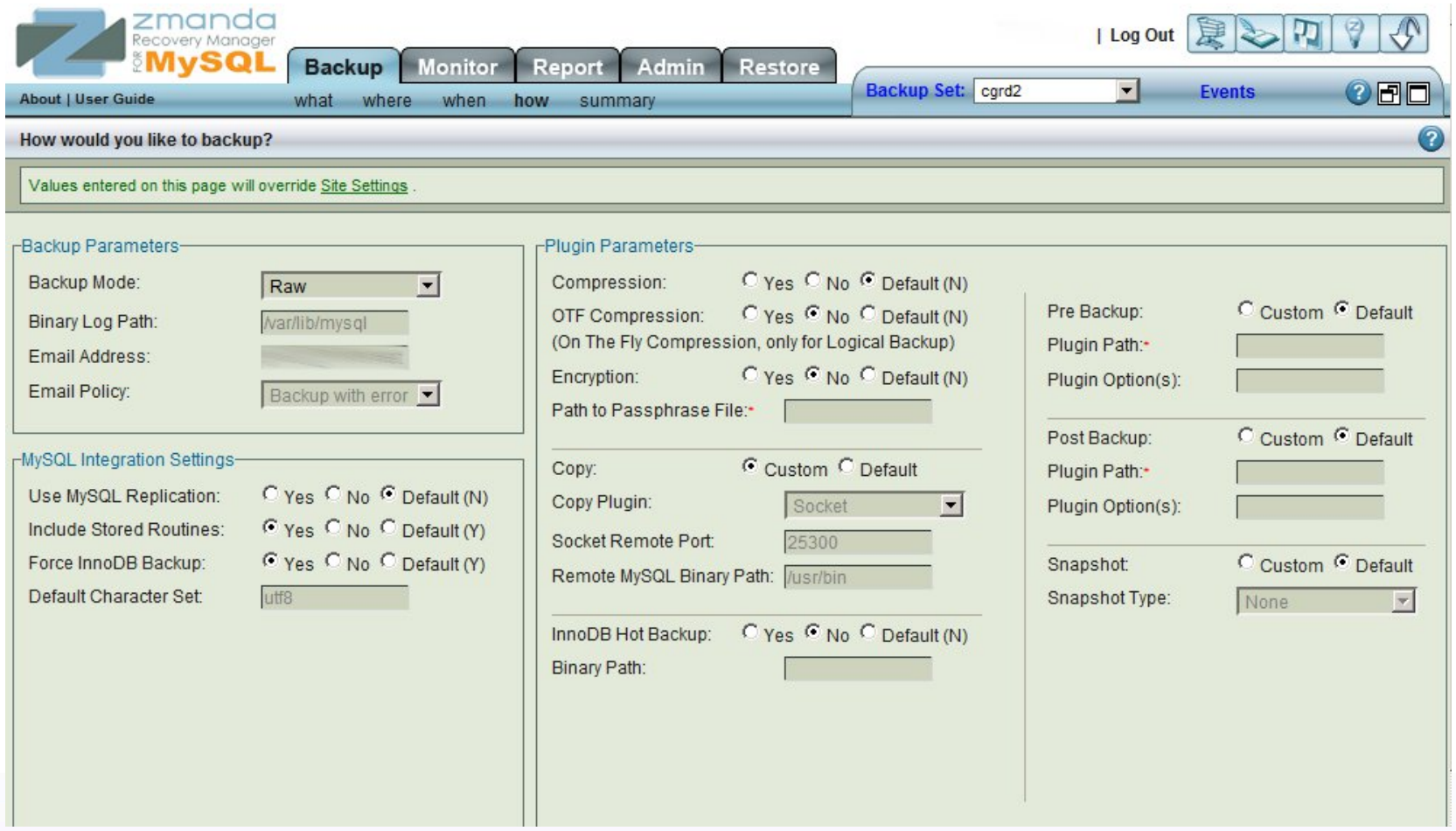
# ZRM for MySQL



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# Now What?

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# Learn from others

- Who is Rick Rescorla?
  - Chief of security at WTC for Morgan Stanley in 2001
  - Methodical planning and testing.
  - All but 6 of 2700 employees survived!

http://en.wikipedia.org/wiki/Rick_Rescorla

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# Practice!

- Whatever backup and recovery methods you choose – be sure to test and do so thoroughly.
- Fire drills are good! 

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# Thank You!

**Chris Grello**
cgrello@inetu.net