

# MySQL Backup and Recovery

*Are you ready?*

## *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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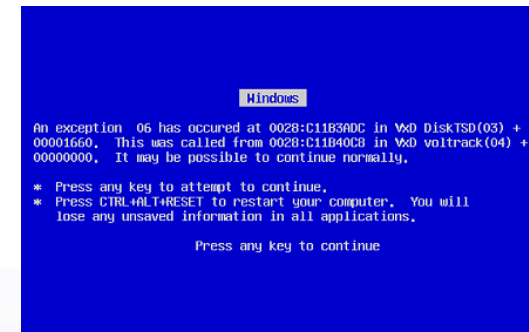
?

## *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...

## *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 attacker has deleted your data



# RECOVERY

## *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



## *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.



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

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 Find out that some data is outdated and/or missing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

# BACKUP

- 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?

## *Common tools*

	cost	speed	impact	engines
<b>mysqldump</b>	free	slow	low-high	all
<b>mysqlhotcopy</b>	free	fast	med	MyISAM
<b>LVM snapshot</b>	free	fast	low	all
<b>mylvmbbackup</b>	free	fast	low	all
<b>InnoDB Hot Backup</b>	\$\$\$	fast	low	InnoDB
<b>ZRM for MySQL</b>	free-\$\$\$	slow-fast	low-high	all

- 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>

- 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

- 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/>



Backup Date: 2010-10-14 Go

October 2010

S	M	T	W	T	F	S
26	27	28	29	30	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	1	2	3	4	5	6

Legend:

Success	✓
Warning	!
Failure	✗
In Progress	⌛

Backup Summary

2010-10-14

Timestamps: 00:00:02 ✓ 06:00:01 ✓

Retention policy = 7D  
Compress = No  
Encrypted = No

STATISTICS:

Size of backup = 0.00 MB  
Time taken for backup = 00:00:01  
Time duration for which read locks were held = 00:00:00  
Time taken for flushing database pages to disk = 00:00:00


✓ TimeStamp: 06:00:01

BACKUP SUMMARY:

Backup Type = Copy  
Backup Level = 1  
MySQL Version = 5.0.77-log  
Host =   
Comment =   
Binary logs backed up = mysql-bin.[0-9]\*  
Retention policy = 7D  
Compress = No  
Encrypted = No

STATISTICS:







Size of backup = 0.00 MB  
Time taken for backup = 00:00:01




 **zmanda**  
Recovery Manager  
for **MySQL**


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[what](#) | [where](#) | [when](#) | [how](#) | [summary](#)

Log Out      

Backup Set:  [Events](#)   

How would you like to backup? 

Values entered on this page will override [Site Settings](#).

Backup Parameters

Backup Mode:

Binary Log Path:

Email Address:

Email Policy:

MySQL Integration Settings

Use MySQL Replication: ☐ Yes ☐ No ☒ Default (N)

Include Stored Routines: ☒ Yes ☐ No ☐ Default (Y)

Force InnoDB Backup: ☒ Yes ☐ No ☐ Default (Y)

Default Character Set:

Plugin Parameters

Compression: ☐ Yes ☐ No ☒ Default (N)

OTF Compression: ☐ Yes ☒ No ☐ Default (N)  
(On The Fly Compression, only for Logical Backup)

Encryption: ☐ Yes ☒ No ☐ Default (N)

Path to Passphrase File:

Copy: ☒ Custom ☐ Default

Copy Plugin:

Socket Remote Port:

Remote MySQL Binary Path:

InnoDB Hot Backup: ☐ Yes ☒ No ☐ Default (N)

Binary Path:

Pre Backup: ☐ Custom ☒ Default

Plugin Path:

Plugin Option(s):

Post Backup: ☐ Custom ☒ Default

Plugin Path:

Plugin Option(s):

Snapshot: ☐ Custom ☒ Default

Snapshot Type:

# NOW WHAT?

- 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](http://en.wikipedia.org/wiki/Rick_Rescorla)

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



***Thank You!***

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