MySQL backups: strategy, tools, recovery scenarios

Akshay Suryawanshi
Roman Vynar

April 15, 2015

PERCONA LIVE

Introduction

This is a brief talk on Backups for MySQL, where we will cover basics of backing up MySQL, types of backups, tools used to perform backups, ensuring Point-In-Time-Recovery solution for your MySQL schemas.

Prerequisites:

- basic knowledge of MySQL and Linux;
- and a curious mind!

Topics and tasks to be covered

- Why do we need backups?
- Types of backups available with MySQL.
- Tools for backing up MySQL.
- Using slaves to run backups.
- Understanding Point-In-Time-Recovery
- Important command lines (Backups and Recovery)
- Resources..

Why do we need backups ?

- Anything can and will fail
- Applications have bugs
- Everyone makes mistakes
- Plan for the worst

Software issues

- A customer removes data through your app then realises it was a mistake
- An admin runs UPDATE/DELETE on the wrong data
- Your application has a bug that overrides or removes data
- A table or entire schema was dropped
- InnoDB corruption bug that propagates via replication
- Your database or application was hacked

All of the above changes replicate to your replication slaves!

Hardware issues

- Your server, RAID controller or other attached hardware crashes and all data is lost or is unavailable
- A disk failed and RAID array does not recover

Redundant hardware with no shared components is the answer.

Disaster scenario

- You lose your entire SAN and all your DB servers were located there
- You lose a PSU or network switch in your datacenter and some or all of your servers go down in that location
- Your entire datacenter loses power and the generators do not start
- A hurricane puts a few feet of water in your data centre

Types of backups for MySQL

- Binary backups
  - Can restore an entire server very fast.
  - Can backup a server quickly, typically only limited by available IO
- Logical backups
  - Simplest way of doing logical backups
  - Standard utility provided with MySQL.
- Binary-log backups
  - Very useful for disaster recovery

Tools for MySQL backups

- mysqldump
- mydumper / myloader
- Percona XtraBackup
- mylvmbackup
- mysqlbinlog

Logical backups: mysqldump

- Simplest way of doing logical backups
- Standard utility provided with MySQL.
- With InnoDB tables can provided almost online backups
- Lacks multi-threaded support.

- Full dump:
  mysqldump —single-transaction —all-databases

Logical backups: mydumper/myloader

- Very fast for logical backups compared to mysqldump
- Consistent backups between myisam and innodb tables.
- Almost no locking, if not using myisam tables
- Each table is dumped to a separate file.
- Built in compression
- Compressed mydumper typically 3x-5x smaller vs compressed xtrabackup
- Perfect for uploading to S3 given bandwidth constraints

When do we restore from mydumper?

- Restoring a single table
- Restoring a single schema or rolling forward a single schema to a point in time
- Restoring data while automatically replicating out to all slaves

Binary backups: Percona XtraBackup

- Performs Binary backups
- Can restore an entire server very fast.
- Can backup a server quickly, typically only limited by available IO
- Also possible to stream backup to another server.
- FREE!!

PERCONA
XTRABACKUP

When do we restore from XtraBackup?

- Setting up new slaves
- When we lose an entire server due to hardware failure, corruption, etc
- When the majority of data on the server was lost.

- Basically when restoring may take less time that trying to load a logical backup (For eg: Multi-terabyte data)

Creating a backup with XtraBackup

- innobackupex —rsync —slave-info backup_dir
- Increase open_file_limit
- innobackupex —rsync —slave-info —incremental backup_dir

Binlog backups: mysqlbinlog

- Point-In-Time-Recovery needs binary logs to be applied.
- As such it is a good idea to copy the bin logs generated to the backup servers
- One way to copy/stream bin logs is by using “mysqlbinlog --read-from-remote-server --raw —stop-never"
- Mirror the binlogs on the master to a second server
- Works with 5.1/5.5 servers also
- Takes very little resources to run. Can run about anywhere with disk space and writes out binlog files sequentially.

Additional backups: mylvmbackup

- http://www.lenzg.net/mylvmbackup/
- Also provides the binary backup.
- Relies on LVM snapshot, and Copy-On-Write feature.
- Mostly useful in backing up large non-innodb datasets, where xtrabackup would incur locking. For e.g.: Backing up an instance with TokuDB tables.

- mylvmbackup —backupdir=/dir

Using slaves to run backups

- Backups usually add some overhead to the system.
- Increase in load avg, high IO saturation, Flush table with read lock blocking, MyISAM tables locked etc.
- Can be quite intrusive on the Master/Standalone server.
- Recommended to setup a Slave and use it for backups.
- Master has no overhead now and Slave can catch up easily after backup is done.

Understanding Point-In-Time-Recovery

- Point-in-time-recovery refers to recovery of data changes made since a given point in time.
- In real world, translates into a need to recover instance completely upto the point of failure.
- Prerequisites : A Full backup (with current bin-log position), binary logs (until the server crash).
- Steps to recover :
  - Restore the full backup, note the binlog position from the backups.
  - Apply binlogs using mysqlbinlog tool with —start-position option.
  - Further bin logs can be applied completely.
  - Optionally to stop recovery at a particular point, specify --stop-position or —stop-datetime.

Important command lines

- Logical backup (Schema only)
  - mysqldump --no-data -u <username> -p<password> <schemas>|--all-databases
- Logical backup (data only)
  - mysqldump --no-create-info -u <username> -p<password> <schemas>|--all-databases
- Percona xtrabackup compression
  - innobackupex —compress —rsync —slave-info <backup_dir>
- While restoring xtrabackup backup
  - innobackupex —apply-log —use-memory=1G <backup_dir>
- Streaming xtrabackup to another server
  - command

Web resources

- http://dev.mysql.com/doc/refman/5.6/en/mysqldump.html
- http://www.percona.com/blog/2014/09/26/logical-mysql-backup-tool-mydumper-0-6-2-now-available/
- http://www.percona.com/software/percona-xtrabackup
- http://www.lenzg.net/mylvmbackup/
- http://dev.mysql.com/doc/refman/5.6/en/mysqlbinlog.html

Percona Backup Service

- We handle your backups
- Binary, Logical, S3, Real-time binlogs
- We monitor them
- We add extra features to lessen impact of common backup related issues
- We will restore your data
- Investing in improving backups

“Percona Backup Service”

- Let the Percona Managed Services team worry about your MySQL backups and data recovery! http://www.percona.com/products/percona-managed-services/percona-backup-service

- Reliable MySQL Backups
- Efficient MySQL Data Recovery
- Cost Effective and Highly Flexible

Questions?

Thank you for attending!

Percona Live MySQL Conference
and Expo 2015

www.percona.com/live