



# Extending Xtrabackup A Point-In-Time System

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# What we'll cover today

- What is Xtrabackup
- Backup Requirements and System at Ning
- Challenges
- Overall Architecture
- Data about Backups and Monitoring
- Historical tracking
- Into the Future

# What is Xtrabackup

- An Open Source Backup tool created and provided by Percona
- Backup Features
  - Non-Blocking
  - Incremental
  - Remote
  - Streaming
  - Full (Partially Blocking)

# Xtrabackup

- Innobackupex perl wrapper
  - Streaming
  - File copies
  - Point-in-Time backups for InnoDB/XtraDB/MyISAM
- Xtrabackup C program
  - C Program linked to InnoDB libs and MySQL client libs
- Similar backup tools
  - InnoDB Hot Backup (Deprecated)
  - MySQL Enterprise Backup

# Backups Requirements at Ning

- Needed to have point-in-time backups
- Needed full backups every day
  - On all servers
- Mysqldump was also needed
- ETL processes
- Needed to be easy to use and see backups

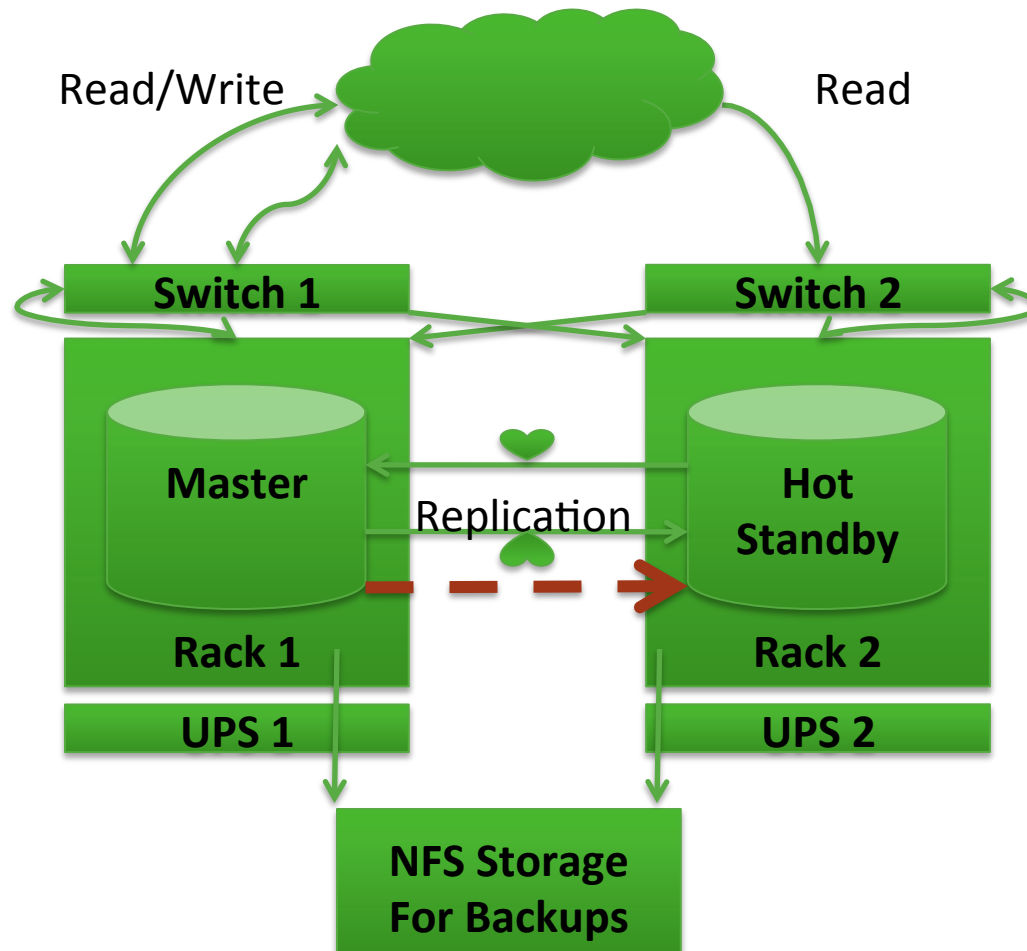
# Administration Challenges

- What if a slave is promoted to Master
- Timing of different backups
- Timing of ETL
- Full backups every day
- Point-in-time from both master and slave
- Large Tables ~80 - 120GB
  - Full datasets range from 50GB – 1TB+
- Small amount of local disk space on slower disks

# Application Challenges

- Re-indexing our customers networks
  - Large full table selects for every customer
- Iterations' for killing long running SQL
  - Originally killed select statements on slave during indexing
  - Then only killed select statements during the lock phase
  - Finally added CURL calls to the end of the script that starts the re-index process

# Ning's Basic MySQL Setup





# Some key points

- All backups performed on the slave hosts
  - Any backup can be recovered from either master or slave host
- The role of log\_slave\_updates
- The role of --slave-info within innobackupex
- Streaming backups to local mount
  - Then moved to NFS

# The Backup System

- Is really a wrapper for the wrapper
  - Provides reporting on all point-in-time backups
  - Some of the features include
    - MD5SUMs
    - Start time, start lock time, end lock time, end time
    - Directory locations
    - Backup name with PK id identification
    - Disk checks, balances, threshold margins
    - And more...

# Xtrabackup Line

- `/usr/bin/innobackupex-1.5.1 \`
- `--defaults-file=/etc/my.cnf \`
- `--throttle=5 \`
- `--slave-info \`
- `--compress=0 \`
- `--user=SomeUser \`
- `--password=SomePass \`
- `--socket=/tmp/mysql.sock \`
- `--stream=tar ./ 2> $RUN_LOG | gzip -> $dump_name`

# Let's Get Into the Data Gathered

- Xtrabackup is a great tool
- I wanted more out of my backups
  - Transparency
    - Ability for others to see backup status with ease
    - Reporting on backup status
    - More information about the backups themselves

# Lets take a look

- `select * from db_backups where id = 2272\G`
- `***** 1. row *****`
- `id: 2272`
- `host: host_not_shown`
- `backup_type: pit`
- `db: NULL` -- Mostly used for mysqldump
- `start_time: 1288985610`
- `bckup_completed_time: 1288985843`
- `end_time: 1288985931`
- `status: finished`
- `compressed: Y`
- `binlog: binary-logs.000034`
- `position: 4331571`
- `1 row in set (0.00 sec)`

# Logging Directories and Master host

- `select * from db_pit_general where db_bk_id = 2272\G`
- `***** 1. row *****`
- `id: 1`
- `db_bk_id: 2272`
- `masterhost: 192.168.1.101`
- `bk_dir: /local/mysql/backups/host_not_shown`
- `bk_bin_dir: /local/mysql/backups/host_not_shown/binlogs`
- `data_dir: /local/mysql/data`
- `whattime: 1288985931`
- `1 row in set (0.00 sec)`

# Logging Date and Time

- `select * from db_pit_locks where db_bk_id = 2272\G`
- `***** 1. row *****`
- `id: 1`
- `db_bk_id: 2272`
- `completed: 2010-11-05 19:37:30`
- `start_lock: 2010-11-05 19:37:20`
- `lock_flushed: 2010-11-05 19:37:21`
- `start_bk: 2010-11-05 19:37:08`
- `end_bk: 2010-11-05 19:37:21`
- `unlocked: 2010-11-05 19:37:23`
- `whattime: 1288985931`
- `1 row in set (0.00 sec)`

# Pit log file – From Xtrabackup

- 120411 03:56:11 innobackupex-1.5.1:  
Connected to database with mysql child  
process (pid=14549)
- **120411 03:56:13 innobackupex-1.5.1:  
Starting to lock all tables...**
- >> log scanned up to (1891049505733)
- 120411 03:56:24 innobackupex-1.5.1: All  
tables locked and flushed to disk



# Pit log file – From Xtrabackup

- 120411 03:56:26 innobackupex-1.5.1: Starting to backup .frm, .MRG, .MYD, .MYI, .TRG, .TRN, .ARM, .ARZ, .CSM, .CSV and .opt files in subdirectories of '/local/mysql/data'
- innobackupex-1.5.1: Backing up files '/local/mysql/data/001/\*.{frm,MYD,MYI,MRG,TRG,TRN,ARM,ARZ,CSM,CSV,opt,par}' (97 files)
- innobackupex-1.5.1: Backing up file '/local/mysql/data/localinfo/heartbeat.frm'
- innobackupex-1.5.1: Backing up file '/local/mysql/data/localinfo/db.opt'
- innobackupex-1.5.1: Backing up file '/local/mysql/data/localinfo/dbs.frm'
- innobackupex-1.5.1: Backing up files '/local/mysql/data/mysql/\*.{frm,MYD,MYI,MRG,TRG,TRN,ARM,ARZ,CSM,CSV,opt,par}' (72 files)
- innobackupex-1.5.1: Backing up files '/local/mysql/data/performance\_schema/\*.{frm,MYD,MYI,MRG,TRG,TRN,ARM,ARZ,CSM,CSV,opt,par}' (18 files)
- innobackupex-1.5.1: Backing up files '/local/mysql/data/001\_restore/\*.{frm,MYD,MYI,MRG,TRG,TRN,ARM,ARZ,CSM,CSV,opt,par}' (94 files)
- 120411 03:56:27 innobackupex-1.5.1: Finished backing up .frm, .MRG, .MYD, .MYI, .TRG, .TRN, .ARM, .ARZ, .CSV, .CSM and .opt files

# Pit log file – From Xtrabackup

- innobackupex-1.5.1: Resuming ibbackup
- xtrabackup: The latest check point (for incremental): '1891045439877'
- >> log scanned up to (1891049508753)
- xtrabackup: Transaction log of lsn (1890708286577) to (1891049508753) was copied.
- **120411 03:56:29 innobackupex-1.5.1: All tables unlocked**
- 120411 03:56:29 innobackupex-1.5.1: Connection to database server closed
- innobackupex-1.5.1: Backup created in directory '/root'
- innobackupex-1.5.1: MySQL binlog position: filename 'binary-logs.000406', position 239286546
- innobackupex-1.5.1: MySQL slave binlog position: master host '192.168.1.101', filename 'binary-logs.001041', position 415571643
- innobackupex-1.5.1: You must use -i (--ignore-zeros) option for extraction of the tar stream.
- **120411 03:56:47 innobackupex-1.5.1: completed OK!**

# Errors and Messages During Backup

- `select * from db_pit_msg where job_id = 2272\G`
- `***** 1. row *****`
- `id: 16`
- `job_id: 2272`
- `host: host_not_shown.example.com`
- `whattime: 1288985610`
- `type: warning`
- `msg: WARNING: Initial backup NOT found, cannot gauge local capacity with certainty`
- `1 row in set (0.00 sec)`

# Backup Name, log name, MD5SUM, Locations

- `select * from db_pit_names_sums where db_bk_id = 2272\G`
- `***** 1. row *****`
- `id: 1`
- `db_bk_id: 2272`
- `dump_name: /local/mysql/backups/host_not_shown/2010-11-05_19-33-29_2272.tar.gz`
- `md5_dump_name: 9f03786b11540276287a3edc16659f06`
- `run_log_name: /local/mysql/backups/host_not_shown/pit_2272.log`
- `md5_run_log: f2ff0e0008c62e4a57c81abadb9fdcf8`
- `whattime: 1288985931`

# Master and Slave Binlog and Position

- `select * from db_pit_pit where db_bk_id = 2272\G`
- `***** 1. row *****`
- `id: 1`
- `db_bk_id: 2272`
- `master_bin: binary-logs.000034`
- `master_pos: 4331571`
- `master_host_ip: 192.168.1.101`
- `slave_bin: binary-logs.000015`
- `slave_pos: 107`
- `whattime: 1288985931`
- `1 row in set (0.00 sec)`

# Pit log file – From Xtrabackup

- innobackupex-1.5.1: Resuming ibbackup
- xtrabackup: The latest check point (for incremental): '1891045439877'
- >> log scanned up to (1891049508753)
- xtrabackup: Transaction log of lsn (1890708286577) to (1891049508753) was copied.
- 120411 03:56:29 innobackupex-1.5.1: All tables unlocked
- 120411 03:56:29 innobackupex-1.5.1: Connection to database server closed
- innobackupex-1.5.1: Backup created in directory '/root'
- **innobackupex-1.5.1: MySQL binlog position: filename 'binary-logs.000406', position 239286546**
- **innobackupex-1.5.1: MySQL slave binlog position: master host 192.168.1.101', filename 'binary-logs.001041', position 415571643**
- innobackupex-1.5.1: You must use -i (--ignore-zeros) option for extraction of the tar stream.
- 120411 03:56:47 innobackupex-1.5.1: completed OK!

# Important to Note

- **Actually the Slave**
  - innobackupex-1.5.1: MySQL binlog position: filename 'binary-logs.000406', position 239286546
- **Actually the Master**
  - innobackupex-1.5.1: MySQL **slave** binlog position: master host '192.168.1.101', filename 'binary-logs.001041', position 415571643

# Data and Directory Size Information

- `select * from db_pit_size where db_bk_id = 2272\G`
- `***** 1. row *****`
- `id: 1`
- `db_bk_id: 2272`
- `mnt_local_size: 87930816 -- 83GB`
- `mnt_local_used: 224248 -- 218.9922MB`
- `mnt_local_avail: 83167804 -- Difference`
- `du_data_dir: 7476100 -- 7.1GB`
- `info_sche_size: 6018088 -- 5.7GB`
- `pct_local_for_use: NULL`
- `allowed_local_space: 0.85`
- `est_compressed_guess: 1504522 -- 1.43GB`
- `size_of_bk: 939666 -- 917.6426MB = Actual size`
- `whattime: 1288985931 -- 2010-11-05 19:38:51 GMT`
- `1 row in set (0.00 sec)`



# Viewing Backups

[Dashboard](#) [Repl Status](#) [Ganglia](#) [Backups](#) [Processlist](#) [Table Sizes](#) [Slow Queries](#) [ETL Last 24 hours](#)

ays or in progress **3><5 Days** <=3 Days GMT: 2012-04-11 17:29:58

Day 
Month 
Year

Day 
Month 
Year

Default view over the past 24 hours

Hostname <input type="text"/>	Type <input type="text"/>	Database <input type="text"/>	Start Time <input type="text"/>	Backup End Time <input type="text"/>	Total End Time <input type="text"/>	Status
Server_not_shown	dump	some_db	2012-04-11 17:00:01		1970-01-01 0:00:00	copy_or
Server_not_shown	dump	some_db	2012-04-11 17:00:01		1970-01-01 0:00:00	copy_or
Server_not_shown	pit	some_db	2012-04-11 17:00:01		1970-01-01 0:00:00	runn
Server_not_shown	pit	some_db	2012-04-11 16:30:02		1970-01-01 0:00:00	runn
Server_not_shown	pit	some_db	2012-04-11 16:00:02	2012-04-11 16:55:05	2012-04-11 17:06:00	finisl
Server_not_shown	dump	some_db	2012-04-11 16:00:01	2012-04-11 17:24:52	1970-01-01 0:00:00	sleep
Server_not_shown	dump	some_db	2012-04-11 16:00:01	2012-04-11 16:07:35	2012-04-11 16:16:18	finisl
Server_not_shown	dump	some_db	2012-04-11 15:30:01	2012-04-11 16:32:38	2012-04-11 17:03:32	finisl
Server_not_shown	pit	some_db	2012-04-11 15:00:02		1970-01-01 0:00:00	runn
Server_not_shown	dump	some_db	2012-04-11 15:00:02	2012-04-11 16:27:21	2012-04-11 17:14:10	finisl
Server_not_shown	pit	some_db	2012-04-11 15:00:02	2012-04-11 15:54:59	2012-04-11 16:02:35	finisl
Server_not_shown	pit	some_db	2012-04-11 15:00:02	2012-04-11 16:49:01	2012-04-11 16:59:33	finisl
Server_not_shown	dump	some_db	2012-04-11 15:00:01	2012-04-11 15:07:36	2012-04-11 15:12:12	finisl
Server_not_shown	dump	some_db	2012-04-11 14:00:02	2012-04-11 15:16:45	2012-04-11 15:46:59	finisl
Server_not_shown	pit	some_db	2012-04-11 14:00:01	2012-04-11 14:27:47	2012-04-11 14:31:58	finisl
Server_not_shown	pit	some_db	2012-04-11 14:00:01	2012-04-11 16:45:00	2012-04-11 17:04:51	finisl
Server_not_shown	dump	some_db	2012-04-11 14:00:01	2012-04-11 14:08:12	2012-04-11 14:17:59	finisl

# Daily Report

- Daily Emails to the DBA team
- Include
  - Point in Time backups
  - MySQLDUMP
  - ETL Processes

# Future Development and Challenges

- Development
  - Possibly team up with Xtrabackup Manager
  - Finish the Backup ID reporting Front End
    - Better search capabilities
  - Automated restore capabilities
- Challenges
  - Innobackupex may be replaced in the near future
  - Time

# Questions?

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