Backups

- There are two types of people, those who take backups and those who will be taking them in the future.
- Database backups:
  - Logical backups
    - mysqlbdump, mysqlpump, mydumper
  - Physical backups
    - MEB, Percona Xtrabackup, Mariabackup
  - Binlogs
    - *point-in-time recovery*
Backups

- At Percona, we recommend customers use all three ways of taking a backup of their database
- Schrödinger’s restore:
  - The condition of any backup is unknown until restore is attempted
  - You never known before trying
- Always test backups:
  - pt-table-checksum
Backups

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- Database backups:
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  - Binlogs
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Percona Xtrabackup

- The Percona XtraBackup tool provides a method of performing a hot backup of your MySQL data while the system is running.
- Percona XtraBackup allows you to backup your database while in production, without impacting uptime or data changes.
Percona Xtrabackup

- Opensource
- Supports InnoDB and MyRocks
- Blocking support for MyISAM
- Full & incremental backups
- Partial backups
- Compression
- Encryption
- Streaming
Percona Xtrabackup

- **Backup stage:**
  - PXB backups IBD files while in use
  - PXB tracks changes through redo logs

- **Prepare stage:**
  - PXB applies changes from redo logs onto ibd files

- **Restore stage:**
  - After the prepare stage is done, the backup directory is the new data directory
Percona Xtrabackup

- XBStream
  - To support simultaneous compression and streaming, a new custom streaming format called xbstream was introduced to Percona XtraBackup in addition to the TAR format

```
$ xtrabackup --backup --stream=xbstream \  
   --compress --compress-threads=8 --parallel=8 \  
2>backup.log | ssh newInstance "cat -> file.xbs"
```
Percona Xtrabackup

● XBCloud
  ○ The purpose of xbcloud is to download and upload full or part of xbstream archive from/to cloud
  ○ xbcloud accepts input via a pipe from xbstream so that it can be invoked as a pipeline with xtrabackup to stream directly to the cloud without needing a local storage
Percona Xtrabackup

- XBCloud
  - In addition to Swift, which has been the only option for storing backups in a cloud storage until PXB 2.4.14, xbcloud supports
    - Amazon S3
    - MinIO
    - Google Cloud Storage
    - Any other S3 compatible storages, such as Wasabi or Digital Ocean Spaces
Percona Xtrabackup

- XBCloud

```
$ xtrabackup --backup --stream=xbstream | \ 
   xbcloud put \ 
   --storage=s3 \ 
   --s3-endpoint='s3-us-west-2.amazonaws.com' \ 
   --s3-bucket='mysqlbucketprod' \ 
   --parallel=10 \ 
   $(date +"%Y%m%d%H%M%S")-full_backup
```
Restore Amazon RDS from Xtrabackup

● Overview
  ○ Take backup from database
  ○ Upload into S3 bucket
  ○ Create new instance from the backup
    ■ Amazon MySQL RDS
    ■ Amazon Aurora MySQL
Restore Amazon RDS from Xtrabackup

- Limitations
  - Supported MySQL 5.6 and 5.7
  - Source/Target major versions must match
    - Target minor version must be higher
  - Source tables defined within default datadir
  - 6 TB database size limit
  - Source database can't be encrypted
  - User accounts, functions, stored procedures and time zone info are not imported automatically
Mariabackup

- MariaDB is not just a fork of MySQL
  - It continues to diverge much
- Percona Xtrabackup became incompatible with MariaDB features like:
  - InnoDB Page Compression
  - MariaDB’s implementation of Data-At-Rest encryption
Mariabackup

- Mariabackup should be used with MariaDB
- The syntax is the same as PXB, except for `innobackupex`
  - `--innobackupex is available though`
MariaDB and Percona Xtrabackup

- MariaDB 10.1
  - If instance is using InnoDB Page Compression
    ■ PXB will not work
  - If instance is using Data-at-Rest encryption
    ■ PXB will not work
  - When innodb_page_size is changed from the default value (16KB)
    ■ PXB will not work
MariaDB and Percona Xtrabackup

- MariaDB 10.2
  - Same as MariaDB 10.1
  - You can hit issues due to the MySQL 5.7 undo log format incompatibility bug that was fixed in MariaDB 10.2.2
    - Backups prepared with XtraBackup may fail to recover some transactions
MariaDB and Percona Xtrabackup

- MariaDB 10.3+
  - PXB is not working
Mariabackup

- Mariabackup was originally forked and extended from PXB 2.3.8 version
- It supports feature that PXB was missing for MariaDB
- It is also used in Mariadb’s Galera cluster SST
- Can be used on Microsoft Windows
Mariabackup

- It however lacks of some PXB features:
  - When doing the backup of InnoDB tables, it’s possible to omit the secondary index pages. This will make the backups more compact and this way they will take less space on disk.
  - `--compact` and `--rebuildindexes` are not available in Mariabackup
Mariabackup

- It however lacks of some PXB features:
  - Percona XtraBackup has implemented support for encrypted backups. It can be used to encrypt/decrypt local or streaming backup with xbstream option in order to add another layer of protection to the backups.
  - --encrypt is not available in Mariabackup
Mariabackup

mariabackup --user=root --backup --stream=xbstream | openssl \
enc -aes-256-cbc -k mypass
Mariabackup

- It however lacks of some PXB features:
  - Support for `--stream=tar` was removed from Mariabackup in MariaDB 10.1.24
  - `xbstream` is available, the name was changed to `mbstream`
  - However, to select this output format when creating a backup, Mariabackup's `--stream` option still expects the `xbstream` value
Mariabackup

- It however lacks of some PXB features:
  - Percona XtraBackup implemented support for lock-less binary log information in 2.3.2. If possible on the server, PXB can avoid executing `LOCK BINLOG FOR BACKUP`.
  - Mariabackup does not support lockless binlog
MySQL Enterprise Backup

- Overview
  - Online Backup for MySQL Databases
  - Replacement of `innobackup`
  - High Performance
  - Multi-Platform (Unix, Linux, Windows)
  - Licensed software (MySQL Enterprise Edition)
  - Cloud Storage Support
  - LZ4 compression algorithm
MEB and XtraBackup

- Available features in MEB not present in XtraBackup
  - Reports backup progress
    - `--show-progress`

```
RPR1 INFO: Progress: 0 of 641 MB; state: Copying system tablespace; compression: -
RPR1 INFO: Progress: 183 of 641 MB; state: Copying .ibd files; compression: 95%
RPR1 INFO: Progress: 439 of 641 MB; state: Copying .ibd files; compression: 60%
RPR1 INFO: Progress: 671 of 671 MB; state: Copying binlogs; compression: 69%
...```
MEB and XtraBackup

- Available features in MEB not present in XtraBackup
  - Performs Offline backups
    - --no-connection
MEB and XtraBackup

- Available features in MEB not present in XtraBackup
  - Backup to Tape with Oracle Secure Backup
    - Single file backup --backup-image=sbt:name
    - --sbt-database-name=storage_selector
    - --sbt-lib-path=/path/to/libobbk.so
MEB and XtraBackup

- Available features in MEB not present in XtraBackup
  - Binary and Relay log files backups
    - Enabled by default
    - Allows Point in Time Recovery
    - Limited Auditing
    - Avoids pulling again replication events
    - `--skip-binlog --skip-relaylog`
MEB and XtraBackup

- Available features in MEB not present in XtraBackup
  - Rename table at restore
    - `--rename="OLD-NAME to NEW-NAME"`
  - Transportable Tablespace Backup `--use-tts`
- Used with Selective Backups
MEB and XtraBackup

- Available features in XtraBackup not present in MEB
  - Open Source
  - Supports MariaDB, MySQL and Percona Server
  - Parallel streaming backups
  - Parallel compressed Backups
  - Backup locks
  - Create AWS RDS instances from backups
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