SCHOONER
SCALE SMART

WHITE PAPER

Top 10 Reasons Why MySQL Experts Switch to SchoonerSQL™

Solving the Common Problems Users Face with MySQL

About Schooner Information Technology

Schooner Information Technology provides a high-availability, high-performance OLTP database for demanding mission-critical applications that is 100% compatible with standard MySQL and InnoDB. SchoonerSQL, our flagship product, ensures industry-leading 99.999% availability with auto failover, and guarantees no data loss and no stale data by leveraging "synchronous read masters." Schooner delivers industry-leading performance and scalability on commodity servers and storage, radically simplifies cluster administration, and minimizes database Total Cost of Ownership (TCO).

Schooner is headquartered in Sunnyvale, California.

For more information, please visit www.schoonerinfotech.com.

Schooner Information Technology
501 Macara Ave., Suite 101
Sunnyvale, CA 94085, USA
Tel: 408-773-7500
Fax: 408-736-4212
info@schoonerinfotech.com
www.schoonerinfotech.com

December 2011

Top 10 Reasons why MySQL Experts Switch to SchoonerSQL™

Contents

1. Synchronous Replication for InnoDB

Schooner SQL employs a unique approach to deeply integrate parallel synchronous replication into InnoDB. SchoonerSQL synchronous replication handles clusters of up to eight nodes linked by a LAN or MAN, and guarantees no data loss, no slave lag, and no stale data.

MySQL clusters are usually organized in a Master / Slave configuration (most often with multiple Slaves). The term “Slave” is used in MySQL because the Slave servers have to perform every task in copying from the Master binlog, and then update their relay logs and commit to the Slave copies of the database. The Master plays no role in replication other than storing the replication events in the binlog.

There is no concept of a “Slave” in the same sense in a synchronous Schooner cluster. It's more accurate in SchoonerSQL to refer to a "Read Master" instead of a Slave, because Schooner’s multi-threaded synchronous replication architecture ensures that the Master and all Read Masters in a synchronous cluster are always consistent. Synchronization is done using a push mechanism coupled with faster processing of multiple parallel threads applying the replication events on Read Masters.

Schooner's approach provides several important advantages:

- Zero Data Loss
- Guaranteed Data Consistency across all nodes
- No Stale Data
- Zero Lag

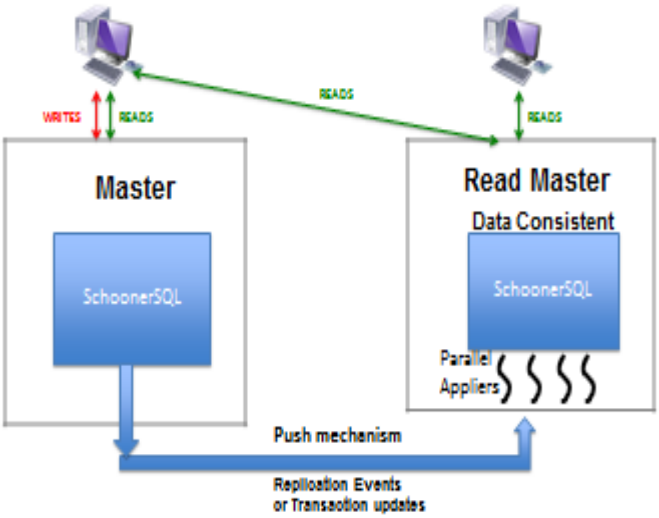


Figure 1: SchoonerSQL Synchronous Replication Architecture

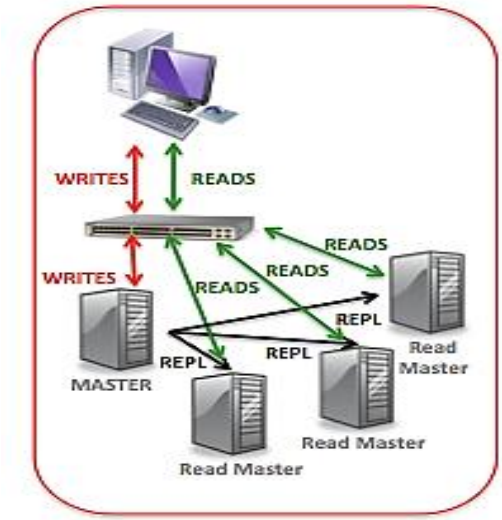


Figure 2: 4-Node Synchronous Cluster

2. Auto Failover Inside a Synchronous Group/Cluster

SchoonerSQL has a proprietary Virtual Internet Protocol (VIP) management mechanism to gracefully and efficiently handle auto failover scenarios. If the Master node fails, the VIP management immediately promotes one of the Read Master nodes in a cluster to become the new Master node. There is never any stale data, data loss, or update lag because SchoonerSQL ensures that every node in the synchronous cluster is always consistent.

Only one instance in the group acts as a Master, receiving writes and reads. The other instances act as Read Masters and accept only read requests. This is easily done through a web-based Administrative GUI.

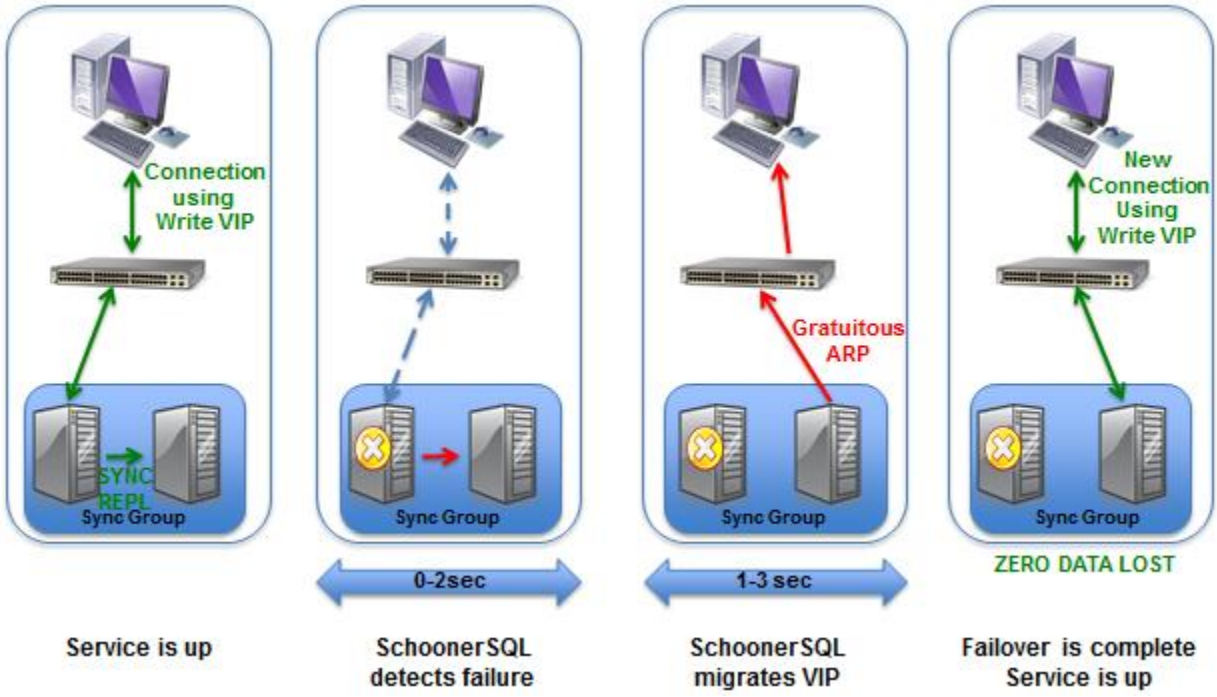


Figure 3: Integrated VIP Failover Solution

The diagram above illustrates that if a Master fails, the VIP management automatically migrates Write+Read VIPs to one of the other nodes, which then acts as the new Master. The other nodes in the cluster join this new Master and are then always in sync. The entire operation happens within seconds, providing users with 99.999% availability.

A failed instance automatically restarts, and undergoes a recovery process where it copies the database contents from one of the other instances inside the synchronous group. Once it is in sync with rest of the nodes, this fully recovered instance is added to the group. Schooner SQL immediately assigns VIPs to this instance so that it can service client requests. The entire process is transparent to the user while the instance continues servicing requests.

3. Powerful, Easy-to-Use Web-Based Cluster Administration GUI

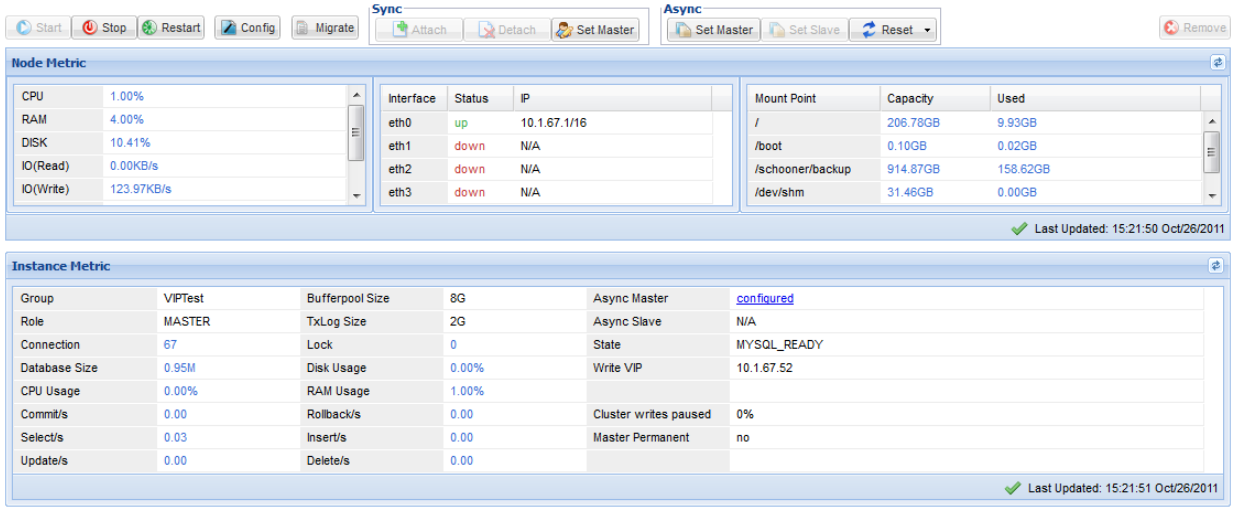
Schooner provides a robust, intuitive GUI that radically simplifies cluster administration. The SchoonerSQL GUI includes:

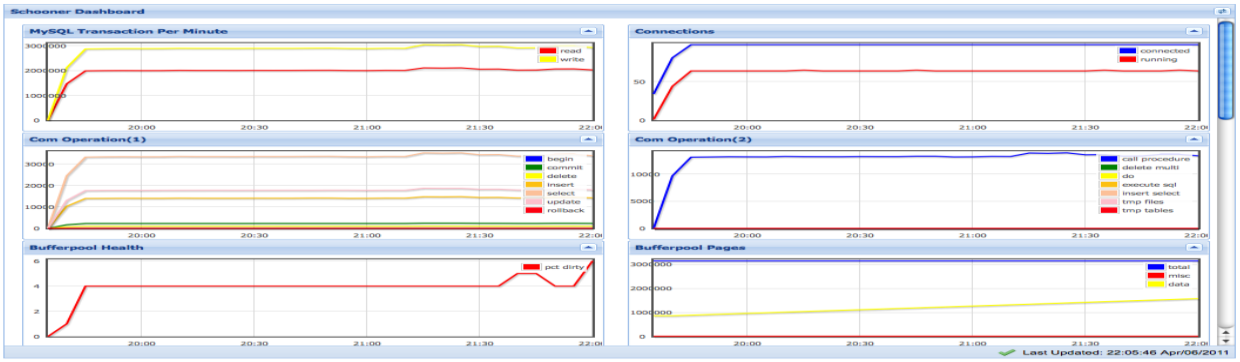
- Online provisioning of servers
- Create/Start/Stop/Remove MySQL instances
- Assignment of VIPs to Masters, Read Masters and Asynchronous Masters and Slaves
- Creation of Synchronous and Asynchronous groups or clusters
- Online migration and upgrades
- Automatic failover and failback
- Integrated online full and incremental hot backup

The GUI also provides monitoring and optimization statistics with extensive displays of resource utilization that include:

- Physical (cores, storage, network) and Logical (buffers, locks)
- CPU, Disk, RAM usage
- IO Read and Write kb/s
- Bytes In & Out kb/s

Figure 4: Schooner Admin Cluster GUI I





4. Asynchronous Parallel Appliers for WAN Replication

SchoonerSQL provides the fastest available asynchronous replication across a WAN. This approach is similar to the approach taken in synchronous replication. The parallel threads apply the replication events coming from the network so rapidly that the delay is very minimal. Performance across a WAN is extremely high, with amazing throughput.

With Schooner's parallel applier technology, the datacenter across a WAN receives the latest updates with less lag and continues servicing load/requests without users experiencing any performance degradation.

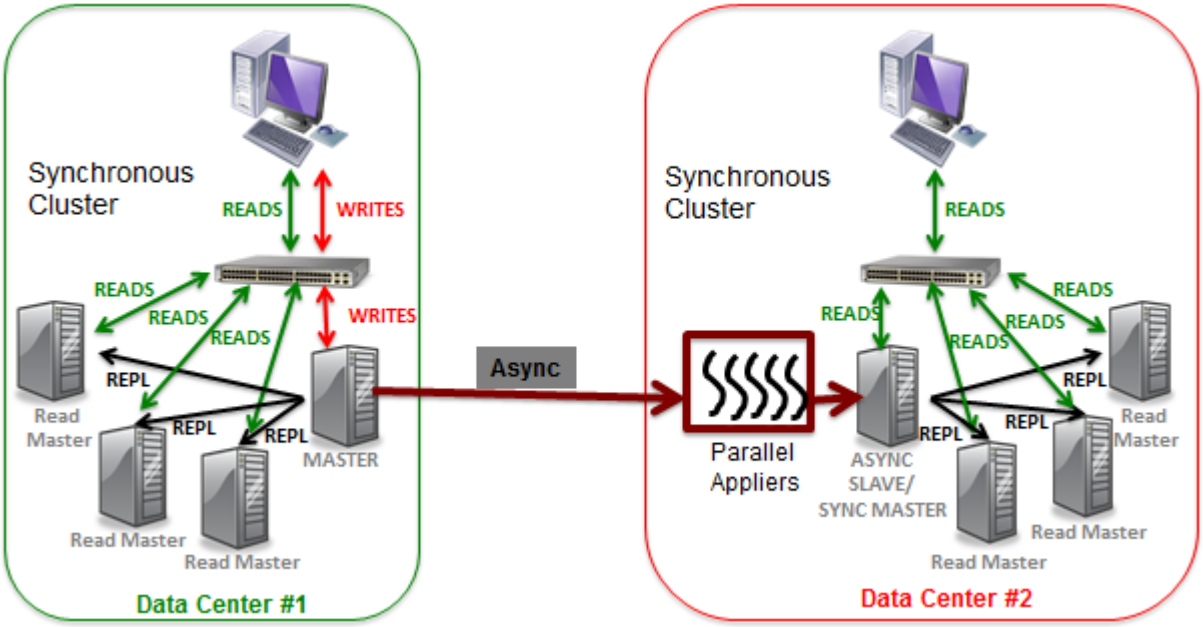


Figure 5: Parallel Appliers across WAN

As seen in the diagram above, the asynchronous Slave in data center #2 starts receiving fresh updates/replication events and can better keep up with data center #1.

SchoonerSQL also provides ideal replication flexibility inside or outside of data centers. Customers can have several synchronous clusters (up to eight nodes in one cluster) inside a data center or deploy the same cluster across two data centers.

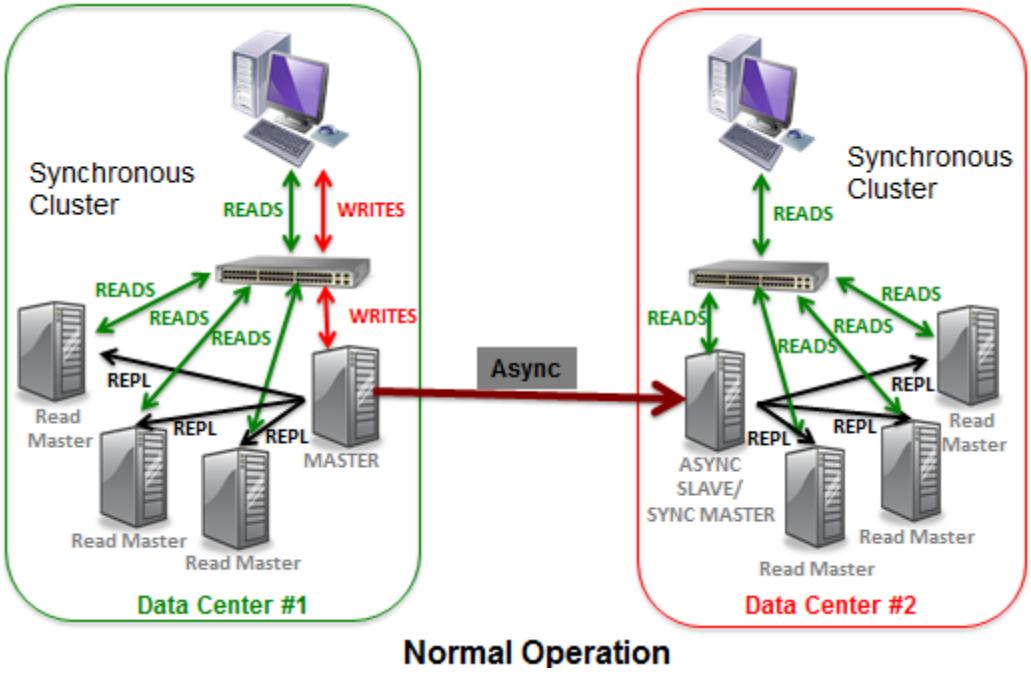
5. Asynchronous Immediate Automatic WAN Failover

Complementing the parallel appliers for WAN replication, SchoonerSQL provides an auto-failover mechanism across the WAN environment. This ensures that the service stays up and running without interruptions.

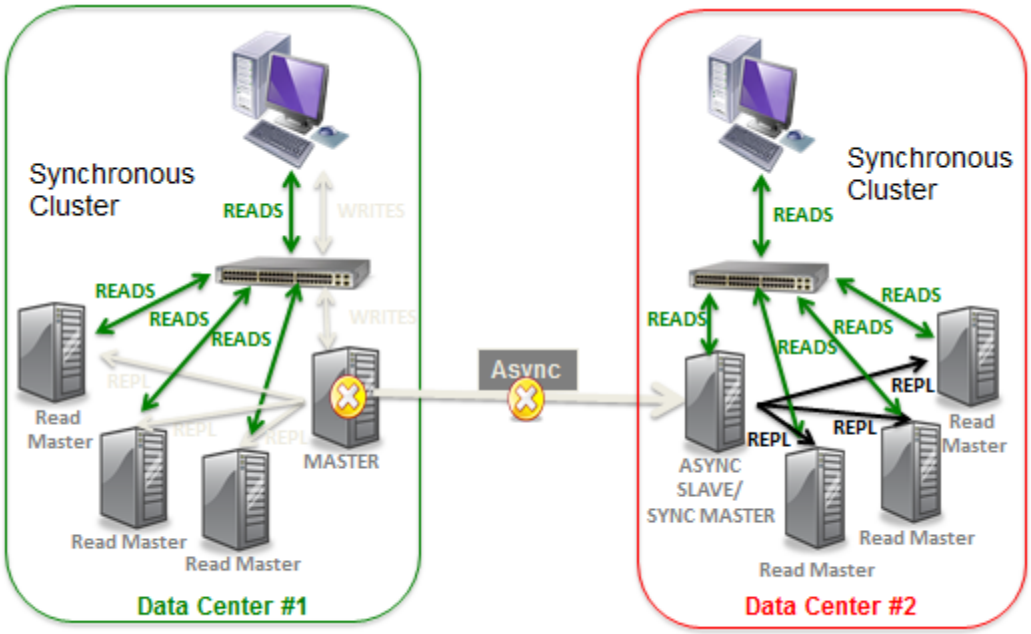
In regular MySQL replication, if a Master node servicing write requests goes down, the user has to manually promote one of the Slaves. This requires first executing all of the events in the relay log, to bring the Slave being promoted up to date before failover can happen. This may take minutes to complete and can result in unacceptably high service downtime.

In contrast, SchoonerSQL avoids such problems through immediate automated failover, literally completing failover in seconds, minimizing service downtime. The next few figures describe two cases where auto-failover can happen between two data centers.

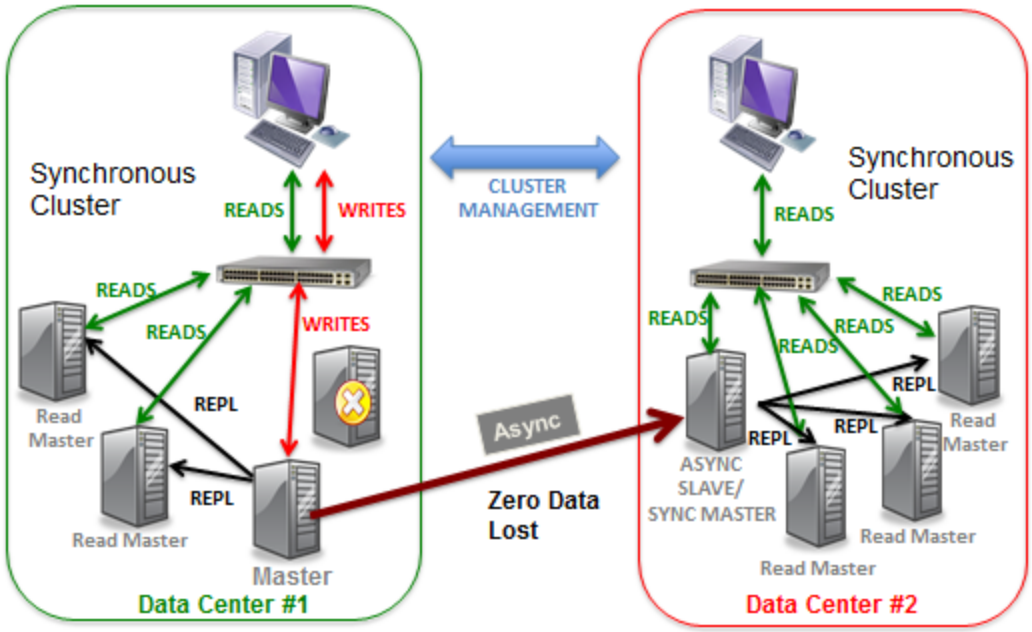
Case 1: Failure of a Master servicing writes in Data Center #1



Normal Operation

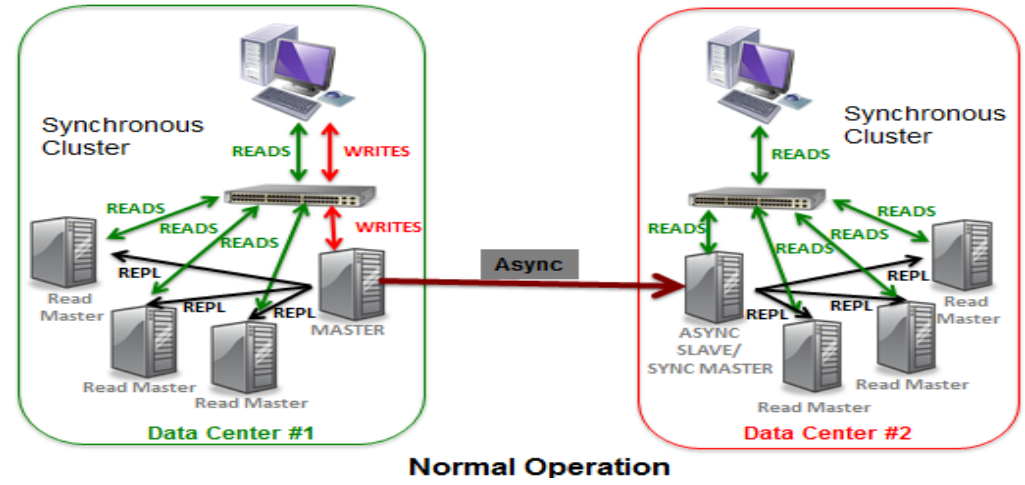


If Master goes down in DC1

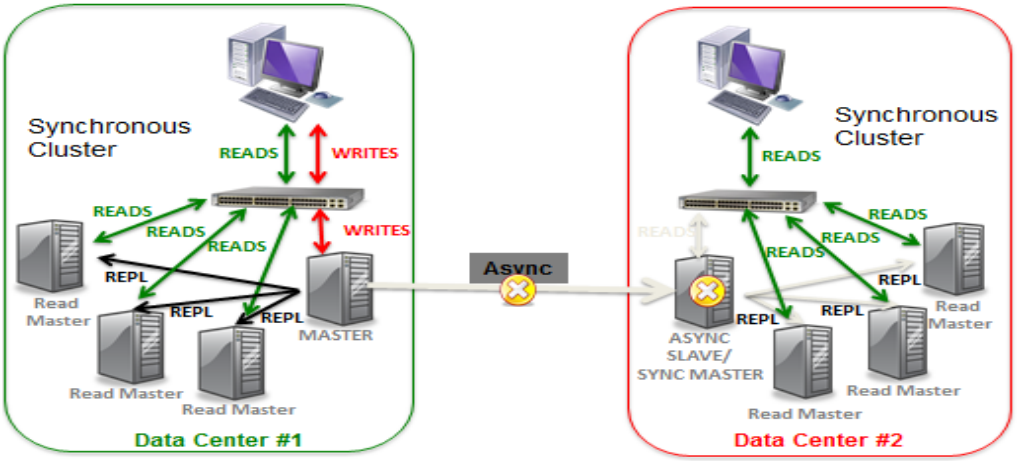


Auto Failover happens inside DC1 & the new master handles writes. The async slave from DC2 connects automatically to this new master in DC1.

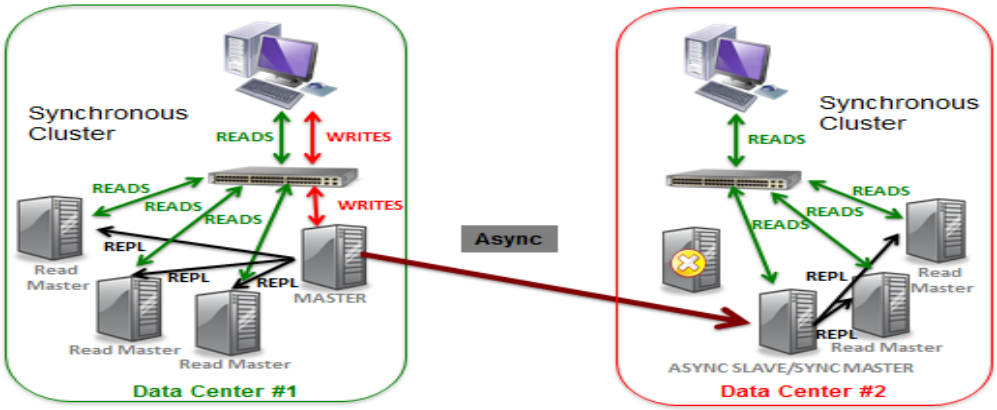
Case 2: Failure of Async Slave/Async Master servicing reads in DataCenter #1



Normal Operation



If Async Slave goes down in DC2



Auto failover occurs inside DC2 and the new async slave handles reads. The async slave from DC2 connects automatically to the master in DC1.

In the two cases above, auto-failover is completed smoothly and the database can continue servicing requests with no interruptions.

6. Fast Sync Incremental Recovery

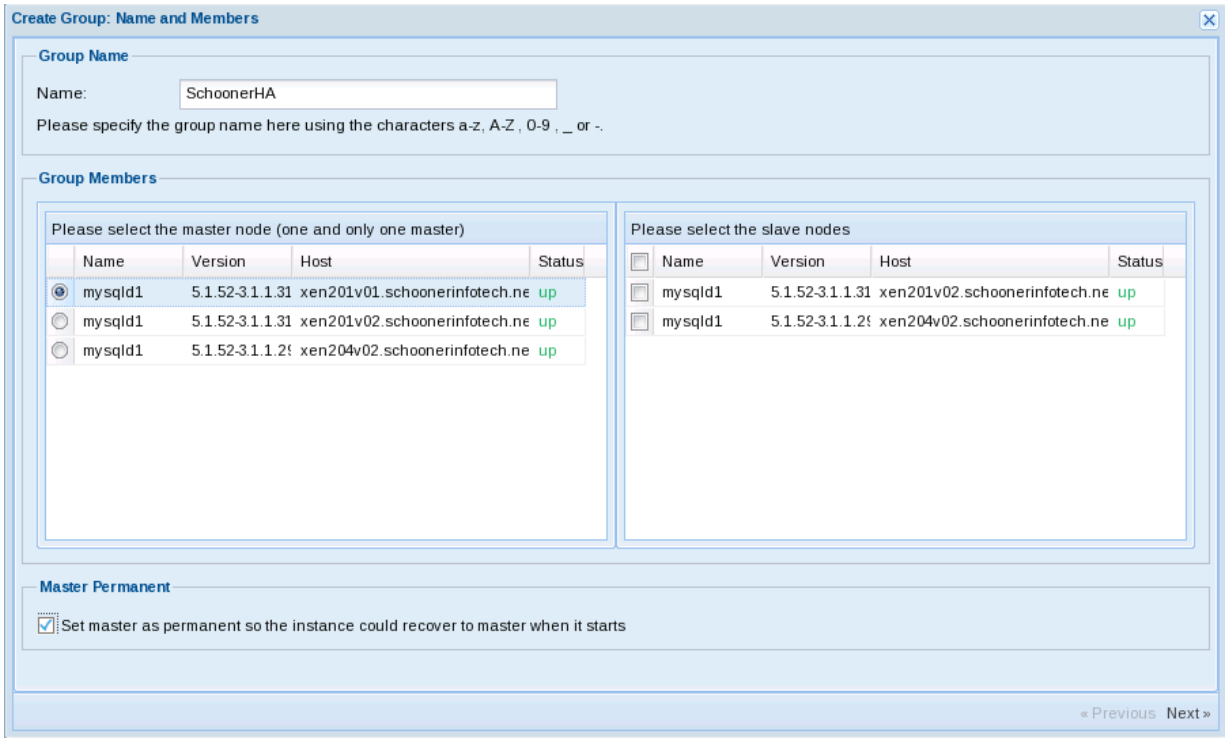
SchoonerSQL allows nodes to recover incrementally whenever possible, greatly speeding up the recovery process and further reducing database downtime. Only missing transactions are applied, rather than all data being copied. Fast synchronous recovery of a node not only applies the transactions posted to the node before it went down but also the in-flight transactions that happen during the recovery process. Schooner's implementation ensures that the failed node recovers fast and efficiently.

7. One-Click Online Provisioning of Servers and Instances

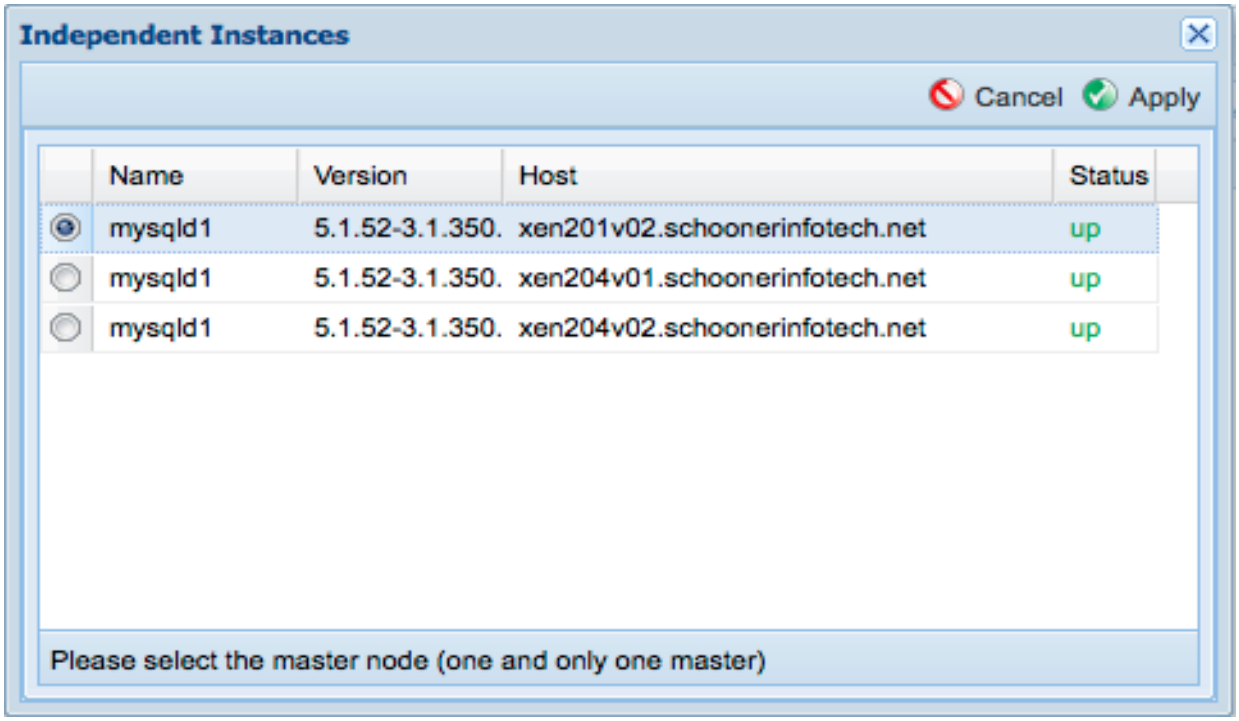
SchoonerSQL provides a highly robust GUI that enables users to:

- Instantly add/remove instances with a single click without service interruption
- Choose priorities for auto failover
- Set Master role
- Create replication group
- Set Write and Read VIPs

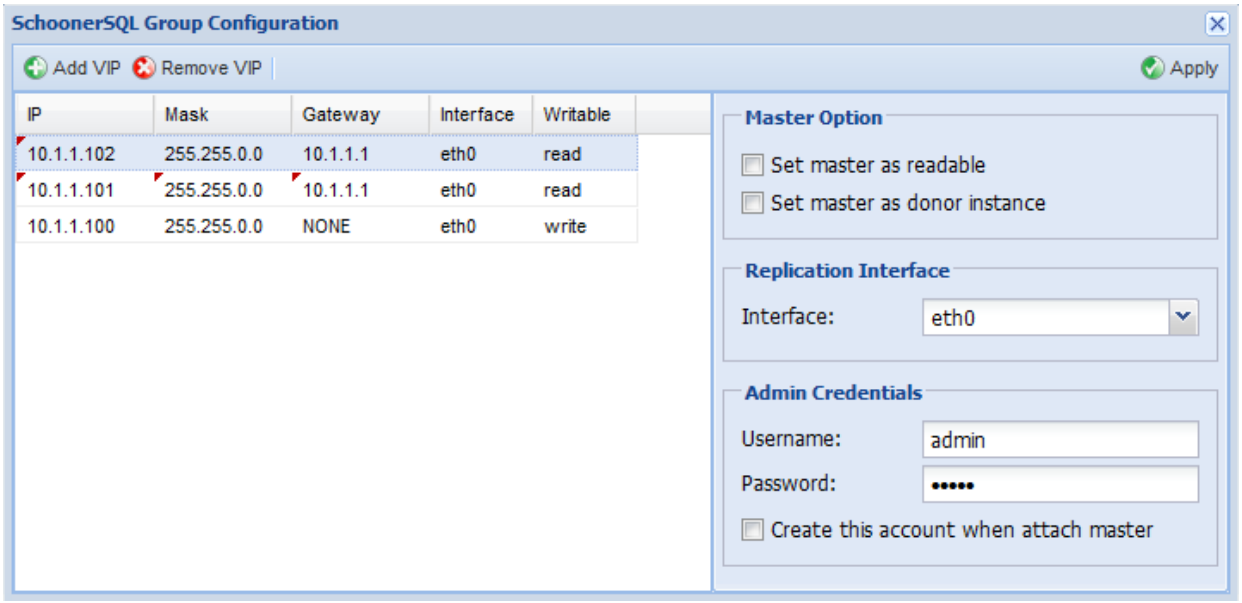
Creating a new Synchronous Group



Adding an Instance to a Synchronous Group

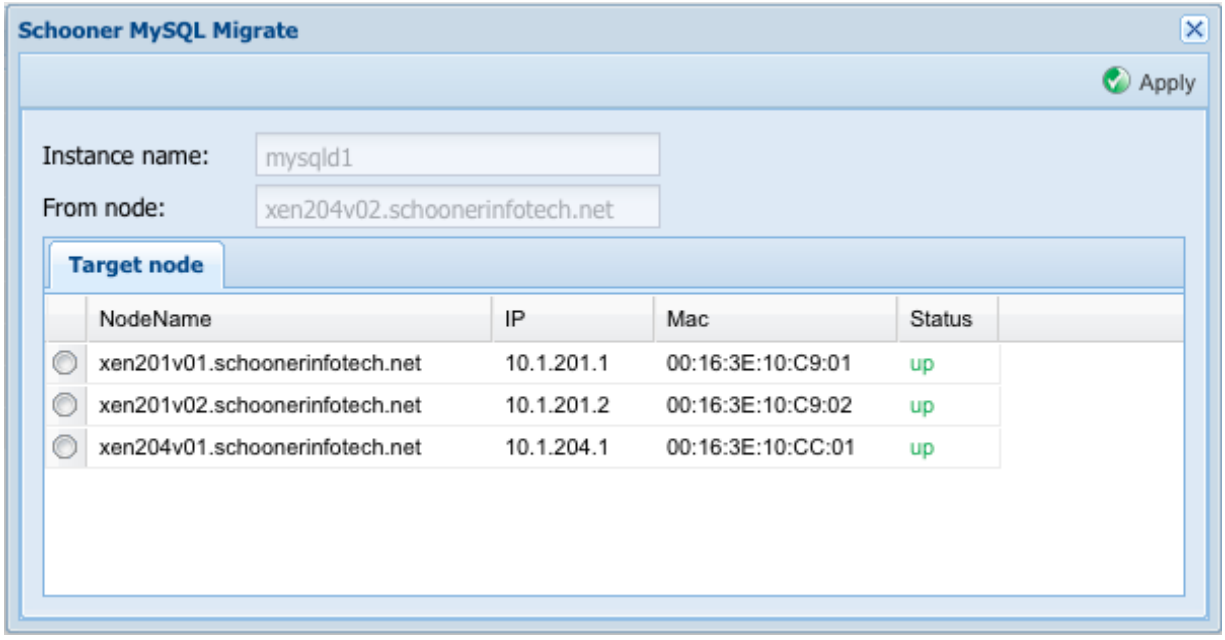


Setting Master and Read Master Roles with Write and Read VIPs



8. One-Click Database Migration

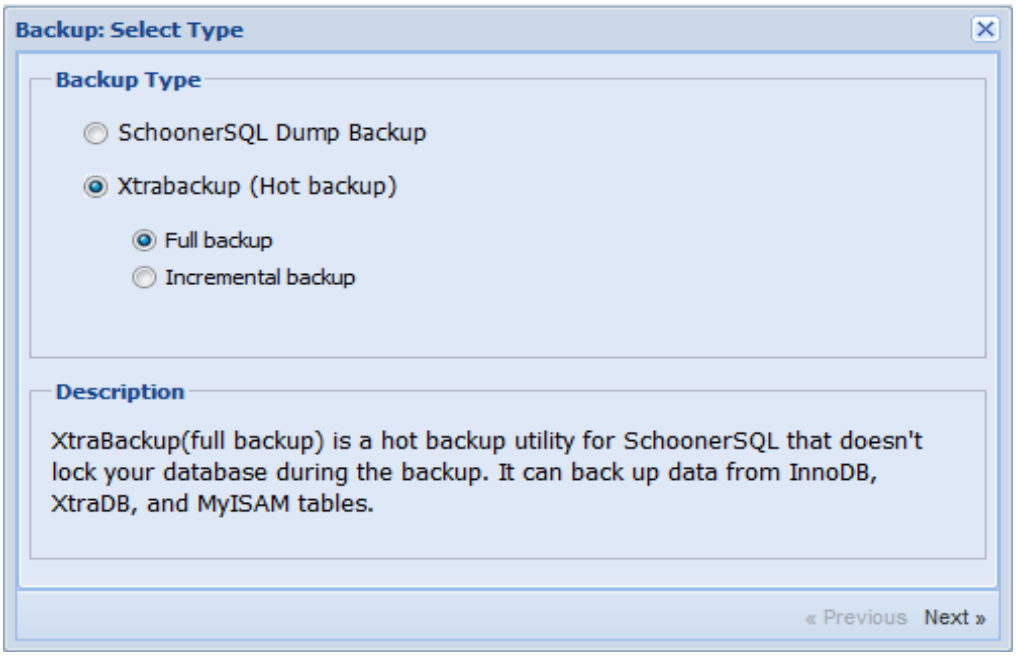
The SchoonerSQL Cluster Admin GUI provides an easy way of migrating an instance from one node to another within a synchronous cluster group: the One-Click Migrate button. Users can select the source node and the target node for migration. One-Click database migration saves significant time and effort for users, giving them more time to work on other priorities.



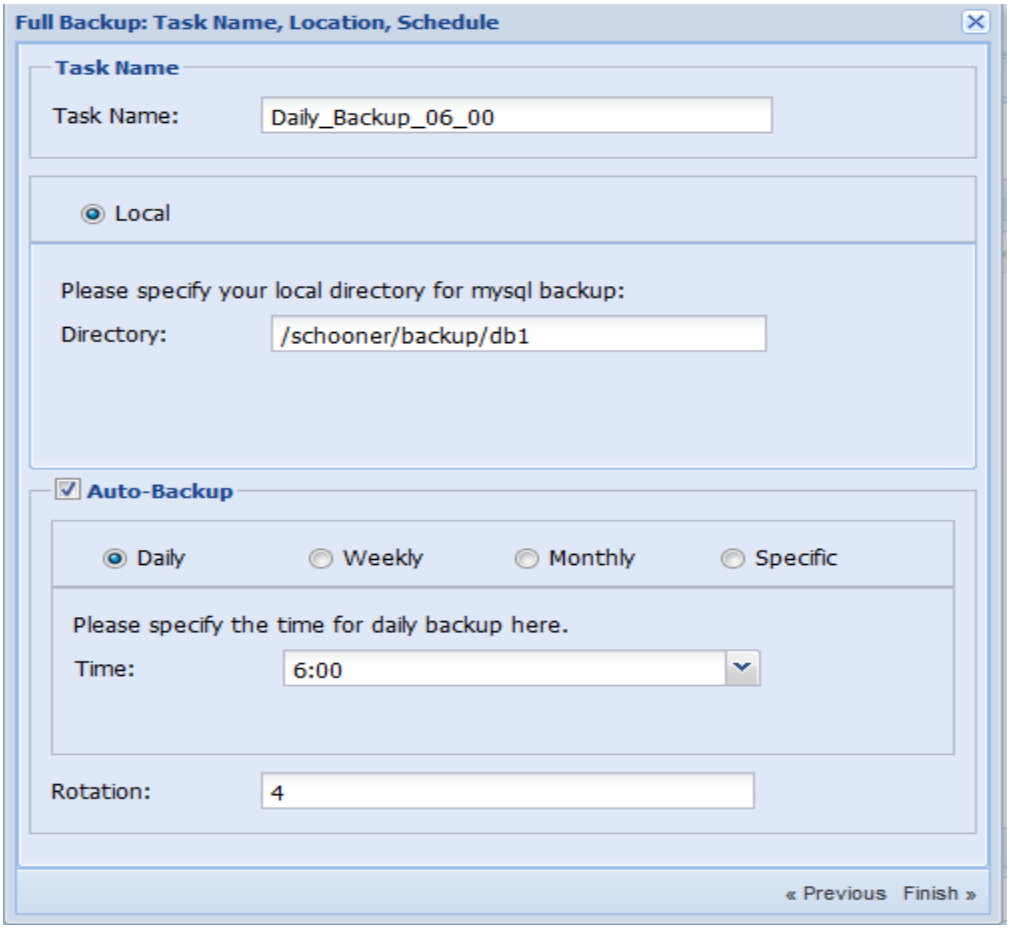
9. Integrated Online Full and Incremental Hot Backup

SchoonerSQL gives users the flexibility to do both logical backup through “mysqldump” or “hot backup” through an online backup tool. With hot backup, users are provided an option of “Full Backup” or “Incremental Backup” at regular intervals (scheduled backup):

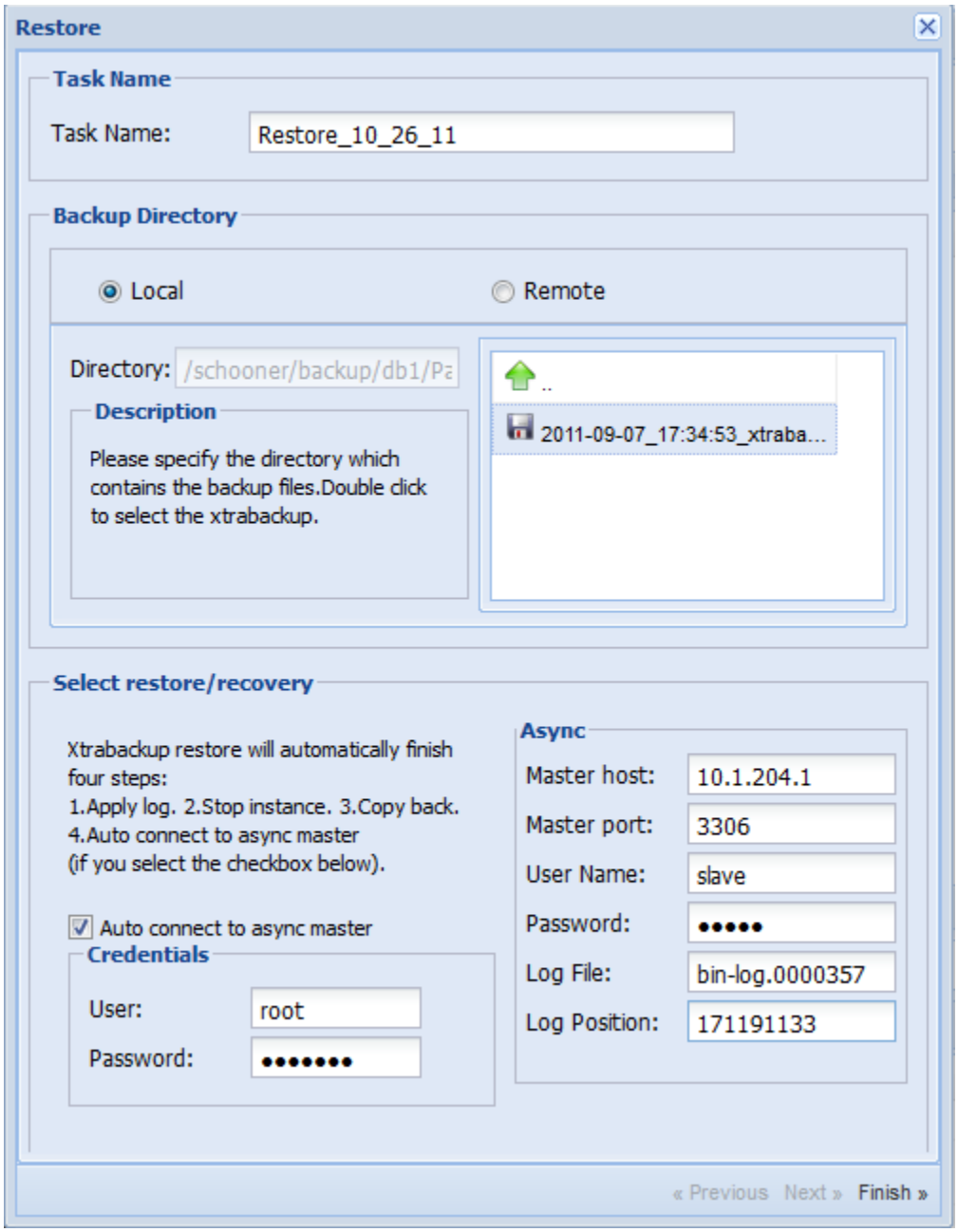
- Daily at a specific time
- Weekly or Monthly at a specific day and time
- Regular intervals in terms of hours, days or weeks



The hot backup tool provides full or Incremental backup with schedule options as shown in the diagram below:



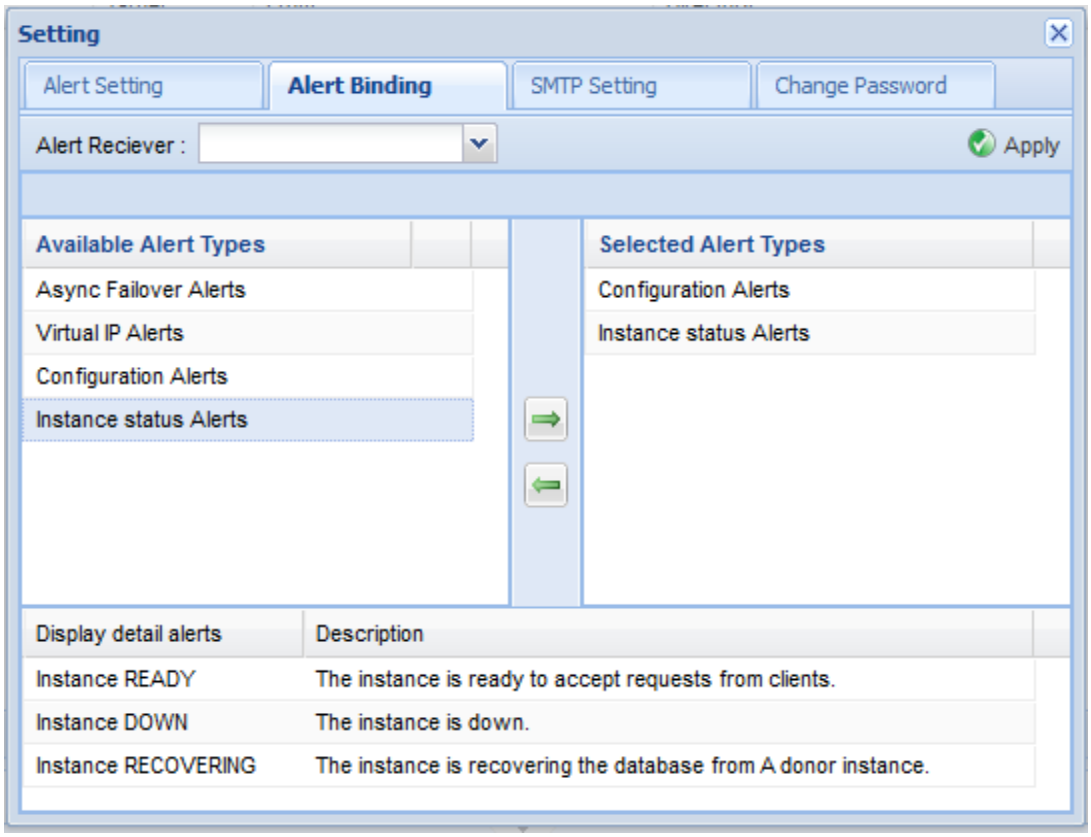
Online hot backup supports full database restore. This tool automatically synchronizes the Read Master/Slave with its Master.



10. Email-Based Alerts

SchoonerSQL sends email-based alerts that are useful in monitoring the overall database cluster. These alerts contain name, date and time, severity, description and configurable thresholds. The following alerts are supported:

- Instance created/deleted
- Instance up/down
- Instance attached/detached
- Group created/removed
- Recovery started with several phases
- Async failover
- VIP configuration



Schooner has created a mission-critical SQL database, 100% compatible with the widely-used MySQL and InnoDB, that provides 5 9s availability, great performance, and the lowest total cost of ownership of any SQL solution. SchoonerSQL is broadly deployed across many industry segments, with customers realizing valuable business benefits 24/7/365.

99.999% High Availability

- Slash unplanned downtime with immediate automatic fail-over
- Slash planned downtime with automated upgrade and migration
- Various replication flexibility

Highest Data Integrity

- No slave lag
- Zero data loss
- No stale data
- No data corruption

Hassle-Free Operations

- Immediate automated failover, recovery across LAN, MAN, or WAN
- No error-prone manual processes for failover, recovery, provisioning

Highest Scalability

- Transparent sharding with unlimited read and write scaling
- Easy vertical scaling using processor cores and SSDs

Great Performance

- Get the most out of your HDDs, SSDs, or SAN
- 4x more throughput vs. MySQL 5.5
- Reduce your server footprint
- High performance WAN support

Easiest Management

- 1-click node addition, removal, promotion
- Extensive monitoring capabilities
- Easy alerts
- Integrated hot backup

100% MySQL Enterprise/Community Compatible

If you'd like to discuss the technologies described in this paper, or speak with one of our database solution experts to help you see the benefit of SchoonerSQL in your shop, please call us or send email.

info@schoonerinfotech.com

www.schoonerinfotech.com

Tel: +1 408-773-7500