PostgreSQL Replication Solutions

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Replication is a complex feature. PostgreSQL supports a variety of replication options.

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Uses for Replication

https://www.flickr.com/photos/eugnius/
Fail Over
Data Warehousing
Load Balancing
Remote Servers
Mobile Servers
Shared Storage

- No overhead
- No data loss on fail-over
- Slave cannot execute queries
Storage Mirroring

- No overhead on master
- Synchronous or asynchronous
- Possible data loss on fail-over when using asynchronous
- Slave cannot execute queries
Streaming Replication

- No overhead on master
- Slaves can execute queries
- Possible data loss on fail-over when using asynchronous mode
- Synchronous option available
• Triggers add overhead to the master
• Possible data loss on fail-over
• Replication possible even over slow links
• Slave can execute read-only queries
• Table-level granularity allows complex data partitioning configurations
CREATE TABLE ...

Slony Internals

CREATE TRIGGER fills sl_log

CREATE TRIGGER prevents modifications

USER User

Origin

Subscriber

Other Subscribers

Slonik
Slony Master Switching
Bucardo

- Similar to Slony, except multi-master with conflict resolution
- Conflict resolution rules are user-configurable
Pgpool II

- Automatically load-balances read queries
- Queries with non-deterministic behavior can cause inconsistency
- Allows parallel query execution on all nodes
- Also does connection pooling and query caching
Streaming replication avoids the problem of non-deterministic queries producing different results on different hosts.
## Summary

<table>
<thead>
<tr>
<th>Feature</th>
<th>Shared Disk Fail-over</th>
<th>File System Replic.</th>
<th>Transaction WAL Log Shipping</th>
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<th>Transaction WAL Log Shipping</th>
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</thead>
<tbody>
<tr>
<td>Most Popular Implementation</td>
<td>NAS</td>
<td>DRBD</td>
<td>Log shipping</td>
<td>Slony</td>
<td>pgpool-II</td>
<td>Bucardo</td>
<td>Bucardo</td>
<td>Bucardo</td>
</tr>
<tr>
<td>Communication Method</td>
<td>shared disk</td>
<td>disk blocks</td>
<td>WAL</td>
<td>table rows</td>
<td>SQL</td>
<td>table rows</td>
<td>table rows &amp; row locks</td>
<td>table rows &amp; row locks</td>
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<tr>
<td>No Special hardware required</td>
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<tr>
<td>Allows multiple master servers</td>
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<tr>
<td>No master server overhead</td>
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<td>No waiting for multiple servers</td>
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<td>Master failure will never lose data</td>
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<tr>
<td>Slaves accept read-only queries</td>
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<td>Per-table granularity</td>
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<tr>
<td>No conflict resolution necessary</td>
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