New HP Solution for Replicating NonStop SQL DDL: SDR

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Agenda

- Where HP NonStop SDR fits
- Product overview
- Release plan
- Q&A
NonStop Business Continuity Strategy

Provide high performance, reliable, NonStop to NonStop database replication products that:

• Allow smooth migration and upgrade
• Support no lost business in disaster events – very hot standby
• Provide zero lost transactions where required

Provide access to our partners who offer heterogeneous data transformation, and replication options
NonStop Customers

- Over 300 current Business Continuity customers
  - Banking
  - Exchanges
  - Telecom
  - Retail
  - Healthcare
  - Government

- Some success stories online, but most prefer no publicity
HP NonStop Disaster Proof
Disaster Tolerant Solutions That Work!

• **No** lost transactions: 550 tps
• Fast Takeover ~30 seconds
• All HP systems performed as expected
  – All data protected on Storageworks XP 24000
  – All shared network gear (Procurve, Brocade, etc.)
• See our ATC white paper at: www.hp.com/go/nonstopcontinuity
Integrated HP NonStop Server products

- **Transaction Management Facility (TMF)**
  - Foundation for transaction integrity and data protection

- **Remote Database Facility (RDF)**
  - High-performance database replication – fast Takeover

- **AutoTMF**
  - NonStop TMF protection for non audited databases

- **AutoSYNC**
  - Synchronization non database files

Integrated products providing business continuity without specialist programming knowledge
And introducing this month, our latest addition...

**HP NonStop SQL DDL Replicator, or, SDR!**

- Automatic SQL DDL replication
Why HP NonStop SDR?

- Much requested and needed
- To automate procedures
- To reduce errors
- To be more efficient
- To be more cost effective
- It’s so easy…from the team that brings you AutoTMF and AutoSYNC
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NonStop SQL DDL Replicator (SDR)

- Extracts, replicates and applies NS SQL/MP DDL operations to backup tables
- Designed to work with RDF
- All SQL DDL operations replicated
  - CREATE, DROP, COMMENT operations
  - ALTER TABLE and ALTER INDEX (including split and merge partitions)
  - Can replicate DDL on non-audited tables (configurable)
- No impact on performance or operations of applications on primary
SDR and RDF

- SDR is a companion to, and depends upon, RDF
- SDR requires no operator intervention when RDF is being initialized, configured, started or stopped
- SDR and RDF coordinate replication to execute DDL in proper sequence
- RDF data replication configuration (volumes, network, etc.) used for DDL replication
- Like RDF, operates automatically, day in and out
  - No operator intervention for normal operations
SDR Supports Typical RDF Topologies

- **Simplex**
  - A-Z to A-Z

- **Centralized**
  - Replication

- **Multiple duplicates**
  - Network Transaction Replication

- **Ring**
  - Reciprocal

- **Reciprocal**
  - A-L to M-Z

- **Chain**
One Exception - Unsupported Topology

Same primary to same backup with same volume pair

\$P1
\$B1
RDF PRIMA
EXCLUDE TEST.*
INCLUDE TEST.*
RDF PRIMB

\PRIM
\BACK

Multiple
Same volume pair
TMF and RDF – Now **SDR** and RDF

- Audited data updates captured by TMF are replicated by RDF
- Similarly, SQL DDL updates captured by SDR are replicated by RDF
Applications and utilities update data in the primary tables.
TMF captures, updates and stores changes in the audit trails.
Data Replication – TMF and RDF (3 of 4)

RDF transports data updates to the backup system
RDF applies data updates to the backup tables.
Now SDR and RDF

- Audited data updates captured by TMF are replicated by RDF
- Similarly, SQL DDL updates captured by SDR are replicated by RDF
Applications and utilities apply DDL changes to primary tables
DDL Replication – **SDR** and **RDF** (2 of 4)

**SDR captures the DDL operations performed on the primary tables**
DDL Replication – **SDR** and **RDF** (3 of 4)

**RDF transports captured DDL operations to the backup system**
**DDL Replication – SDR and RDF**

*SDR applies replicated DDL operations to the backup tables*
SDR Product Components

• SDRCOM – Command Interpreter
• SDRMON – Monitor Process
• SDRRUNTM – Runtime for DDL Extraction
• SDRUPDT – Updater for DDL Replication
• Message, Help, Template and Filter files
SDR Installation

Download or IPSETUP the SDR PAK file

1. Run INSTALL macro
2. Create SDR database (SDRCOM command)
3. Install product license
4. SDRCOM INSTALL SDR
   - Updates SQL software to extract DDL operations
   - Required after any update to SQL components
5. Update EMS Templates
6. Update Cold Load procedures to start SDR monitor
DDL Extraction – On Primary

- SDR Runtime captures SQL DDL
  - SQL statement
  - DEFINEs
  - Network topology for distributed tables
- Writes DDL to audited SDR Depot file
- Inserts “STOP-RDF-UPDATE” in audit trail
- Does not require RDF to be configured or active
- Does not affect SQL DDL processing
DDL Extraction – Step by Step (1 of 5)

SQL utilities execute DDL changes to the primary tables
DDL Extraction – Step by Step (2 of 5)

SDR captures DDL operations executed on the primary tables
DDL Extraction – Step by Step (3 of 5)

SDR stores DDL in audited Depot file and TMF captures changes
DDL Extraction – Step by Step (4 of 5)

SDR Runtime

Application
SQL
SQLCI
Primary DB

SDR inserts SRU in the audit trail to control RDF updaters on backup
DDL Extraction – Step by Step (5 of 5)

RDF extracts DDL and SRU from audit trail for replication
DDL Replication – On Backup

- RDF transports extracted DDL description
  - Replicated audited update to SDR Depot file
- RDF updaters suspend updating
- SDR Updater monitors RDF configuration and detects it has work to do
- SDR analyzes, translates, and executes DDL
- SDR notifies RDF to resume updating
DDL Replication – Step by Step (1 of 5)

RDF Updaters find updates to Depot file from primary
DDL Replication – Step by step (2 of 5)

Updaters apply updates to Depot file on the backup
DDL Replication – Step by step (3 of 5)

RDF Image Trail

RDF Updaters

RDF

SDR Updater

DDL

**RDF Updaters stop when processing SRU and SDR Updater reads DDL from replicated Depot file**
DDL Replication – Step by step (4 of 5)

SDR applies DDL operation to backup tables
DDL Replication – Step by step (5 of 5)

RDF Image Trail

RDF

RDF Updaters

Resume Updating

SDR Updater

SDR starts RDF Updaters
SDR Performance

- No significant impact on SQL DDL operations
  - A few SDR file updates
  - Uses SQL’s transaction

- No impact on RDF audit extraction
  - Extractor to Receiver audit transfer unimpeded

- RDF updating interrupted for DDL execution
  - Usually under 5 seconds, but more for long DDL ops like CREATE INDEX or partition split/move
Monitoring and Manual Control of SDR

- Simple SDRCOM commands
- “STATUS” commands to show DDL details and state of replication
- “HOLD” SDR Updater
  - SDR issues EMS message when DDL is ready
- “EXECUTE” or “CANCEL” pending statement
- “RELEASE” Updater to resume automatic operation
SDR Configuration Based on RDF

• SDR works “out of the box”
• SDR requires no separate configuration; all basic settings are adopted from RDF config:
  – Primary and Backup nodes
  – Primary -> Backup volume mapping
  – Includes/Excludes, MAPFILE
  – REPLICATEPURGE
  – NETWORK
SDR Configuration Options

- To customize SDR, you can change:
  - Retention: how long to keep extracted DDL
  - CreateID: backup table owner
  - AutoCreateCatalog: don’t need to synchronize cats
  - KeepPHYSVOL: retain Virtual-to-Physical volumes
  - UnAuditedDDL: replicate DDL on unaudited tables
  - UserTransaction: how to handle DDL in a user tx
Interesting Situation – User Transaction

• DDL in User Transactions
  – User can embed DDL in BeginTX/EndTx with database updates
  – Believed to be very rare in the real world – your input is most welcome
  – SDR requires user intervention OR assumed commit
Interesting Situation – Network Tables

- DDL for Distributed Table
  - Requires coordination of RDF updating on multiple backup nodes
  - User must have RDF/IMPX
  - Otherwise, configure SDR network (SDRCOM NETWORK) on all nodes
NonStop SDR Summary

• Easy to install, easy to use
  – User interface SDRCOM is like RDFCOM
  – Once installed, just leave SDR running
• Must be deployed on primary and target
• Requires SUPER group to configure and control
• Captures DDL on primary system
  – Independent of RDF and, like TMF-RDF, can be configured after SQL DDL capture
• Executes DDL on backup
  – Works closely with RDF to ensure correct sequence
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General Product Information

- Marketing ID (H, Q) SA47v1
- Product ID T2828 H01
  - Supported on S-Series, NS-Series, NS BladeSystems
  - One version works on all supported NSOS releases
  - One version works with RDF IMP, IMPX, and ZLT except:
    - T0346ABJ (superceded by T0346ABR)
    - T0346ABO (superceded by T0346ABS)
    - Base release T0346H08
- Targeted for release late October
- Try it – you’ll like it!
NonStop Remote Database Facility

- High throughput and low CPU utilization, out of the box
- *White hot standby* included
- Focused on data integrity (nodes in sync)
- Active/active split reciprocal
- Easy installation and maintenance
- March 2009: 9 enhancements
  - availability, performance, manageability
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Stay prepared, be NonStop – test!

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- Thanks!
- Questions?