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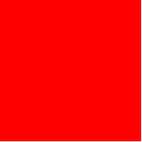


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Oracle Streams Replication: What's New in Oracle Database 11g

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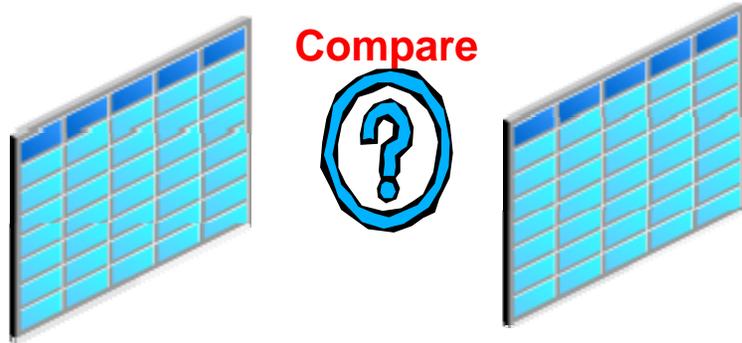
Streams Enhancements

- Documentation: 2Day+ Data Replication & Integration
- Source and Target data compare & converge
- Streams Performance Advisor
- Split/Merge of Streams for Hub & Spoke replication
 - Maintains high performance for all replicas
 - Automated, fast “catch-up” for unavailable replica
- Cross-database LCR tracking
 - Trace Streams messages from start to finish in single view
- Performance optimizations
- Streams Synchronous Capture
 - Available in all Editions of Oracle Database 11g
 - Efficient internal mechanism to immediately capture change

Getting Started...

- Documentation: 2Day+ Data Replication and Integration
 - Replication using Streams , Materialized Views
 - Advanced Queuing
 - Table Data Comparison
- Facilitate Streams knowledge ramp-up
- Provides basic conceptual information
- Cookbook style examples of common configurations

Data Everywhere: But Is It Consistent?



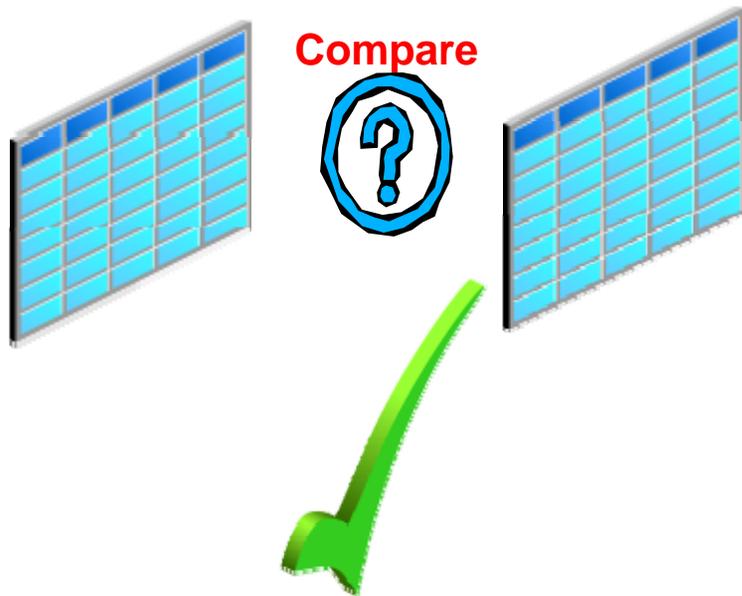
The Challenge:

- Multiple copies of tables across systems
- Validate that data is consistent
- Minimize system resources for determination

The Solution:

- **DBMS_COMPARISON** package

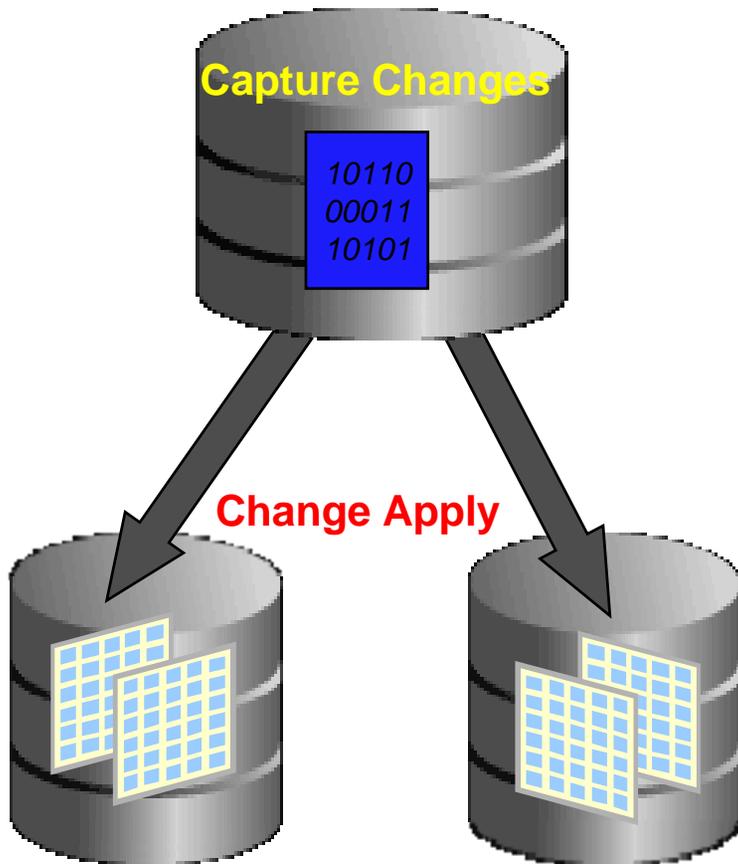
Data Comparison



DBMS_COMPARISON

- Consistency Check Modes
 - Identify tables differ
 - Identify differing rows by key value
- Compare data between live sources
 - Compare 11.1 with 10.1, 10.2 or 11.1
 - Table, View, Materialized View
- Recheck capability
 - In-flight data
 - Rows that are different
- Converge feature
 - Identify “truth” database (local or remote) for rows that are different

Understanding a Streams Environment



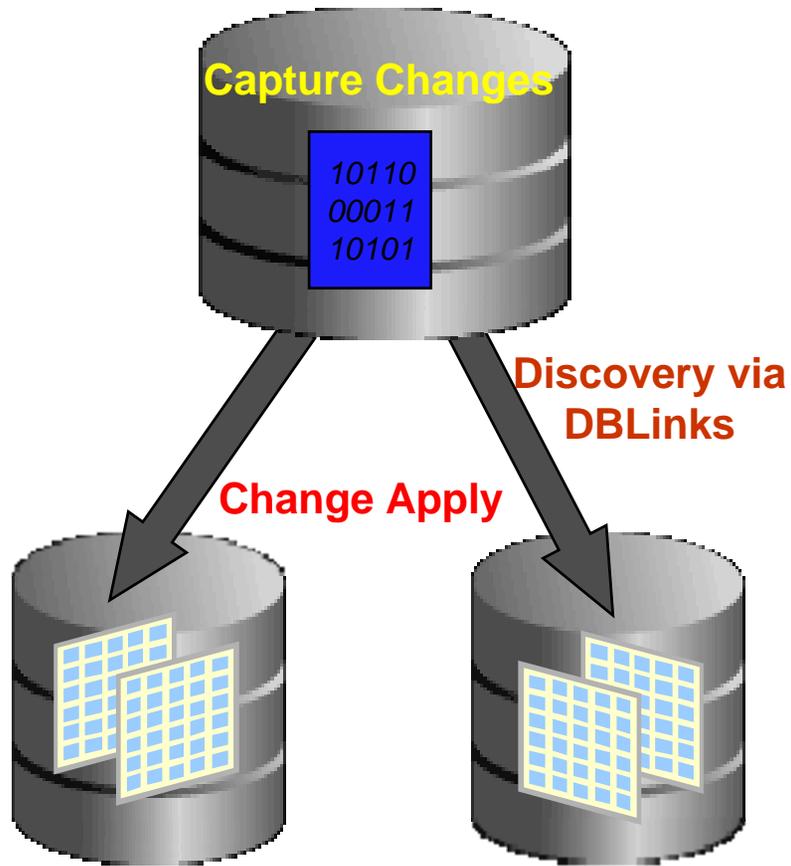
The Challenge:

- Identify configuration
 - Many replicated databases
 - Identify replication components and relationships between databases
- Monitor flow
 - Statistics and rates
 - Analysis of statistics
 - Identify limiting component

The Solution:

- Streams Performance Advisor
DBMS_STREAMS_ADVISOR package

Streams Performance Advisor



ANALYZE_CURRENT_PERFORMANCE

- Auto-discovery of streams topology on multiple databases
- Automatic performance analysis across all databases
- Per-Component Analysis:
 - Throughput and latency
 - Aborted or Enabled
- Per-Stream Analysis:
 - Time-based analysis of each component (waits, CPU, etc.) using ASH
- Bottleneck components
 - Top wait events of bottleneck
- Integrated with ADDM
- Stream errors are integrated with Server-generated Alerts

UTLSPADV

Performance Advisor based STRMMON

Collect_stats

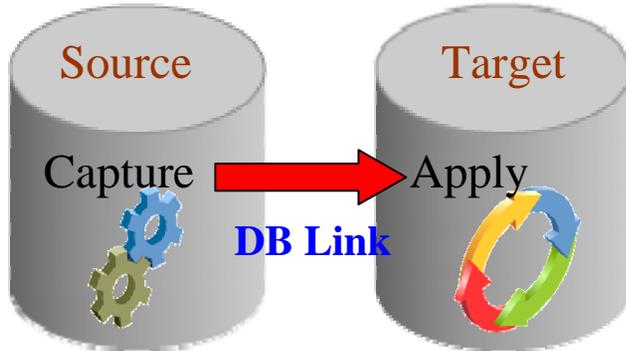
- Run Streams Performance Advisor periodically
- Store statistics permanently in user tables
- User configurable thresholds for top event, idle, flow control analysis

Show_stats

- Display results from collect_stats
- Configurable output selection

Performance Optimizations

Combined Capture and Apply



- Faster Capture processing
 - Capture directly from redo buffer, eliminating disk I/O
- Faster Apply processing
 - Internal optimizations
- Combined Capture and Apply
 - Automatically invoked if single publisher and subscriber for queue
 - Direct communication between capture and apply processes
 - Normal Streams configuration: no special commands or setup
- 11g Streams performance white paper available on OTN

Split and Merge of Streams

Challenge

- With hub&spoke configurations, when one destination is unavailable, queue spill impacts performance for other destinations

Solution

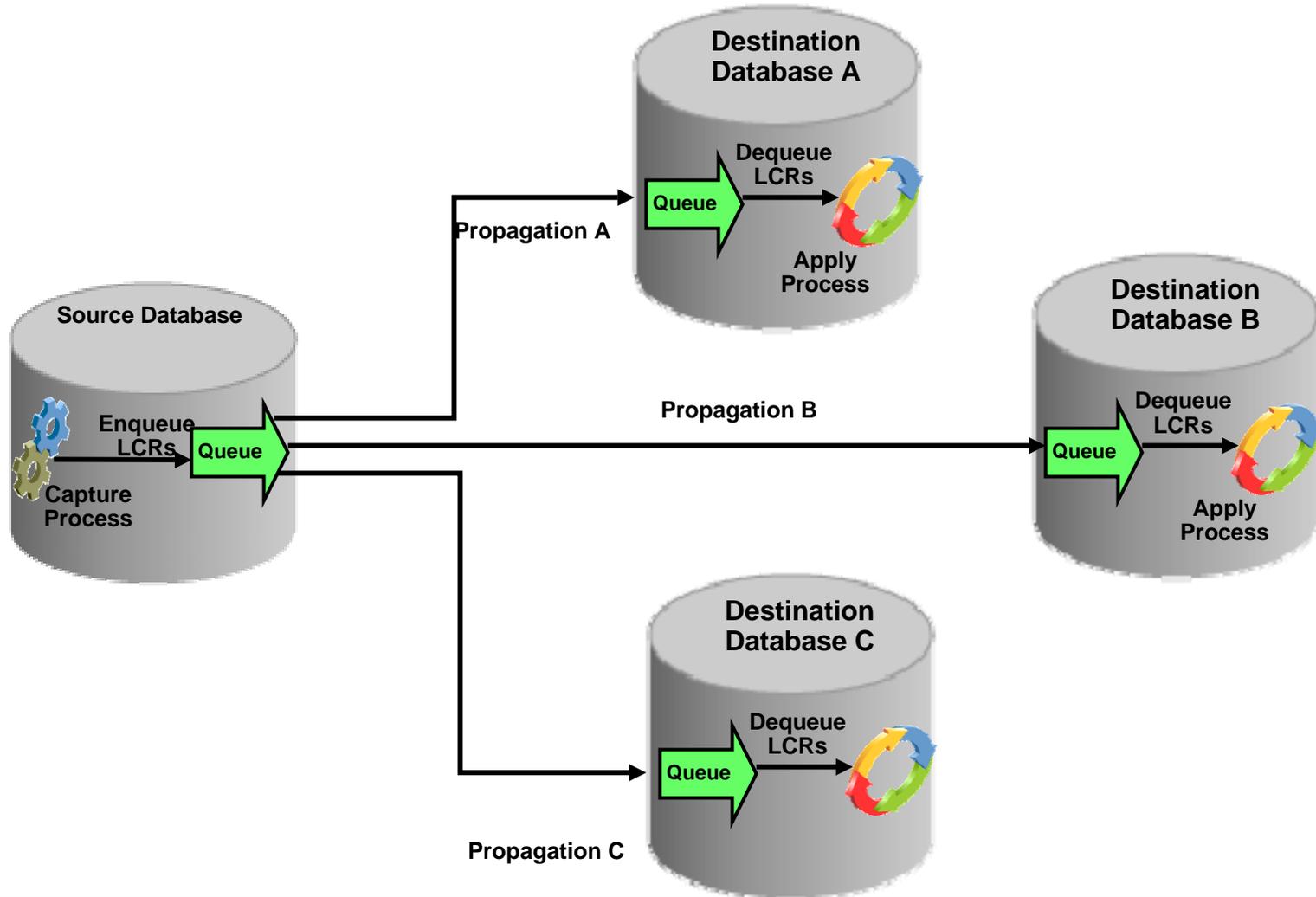
- Split the queue between live and down destinations
- Merge queues after recovery
- Maintains high performance for all replicas
- Automated, fast “catch-up” for unavailable replica

Split and Merge of Streams

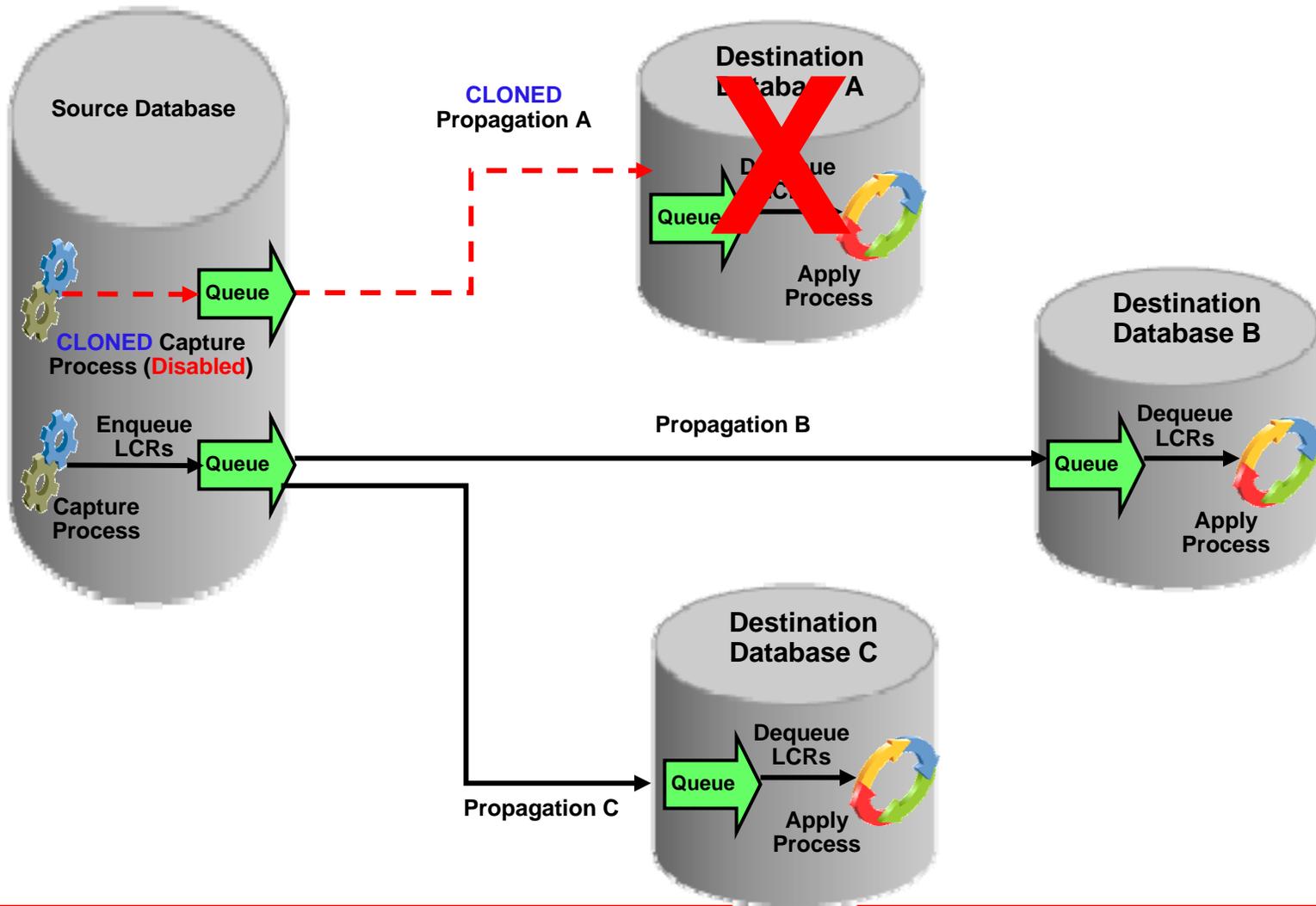
DBMS_STREAMS_ADM package

- **Split_streams**
 - Use for slow/unavailable subscriber
 - Clones queue, capture, propagation
 - Threshold for automatic merge
- **Merge_streams**
 - Merge cloned stream back to original configuration

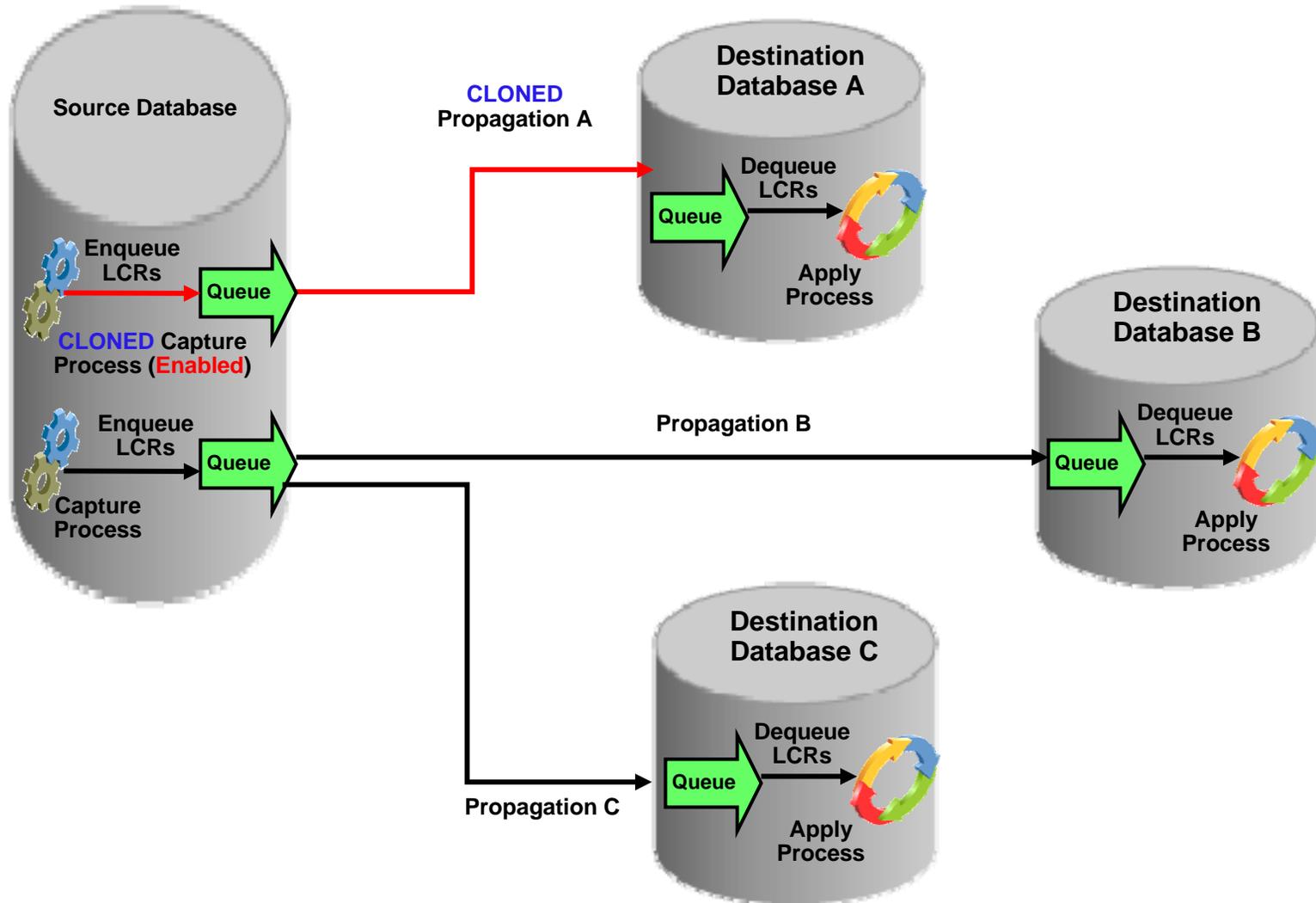
Streams: Hub with 3 Spokes



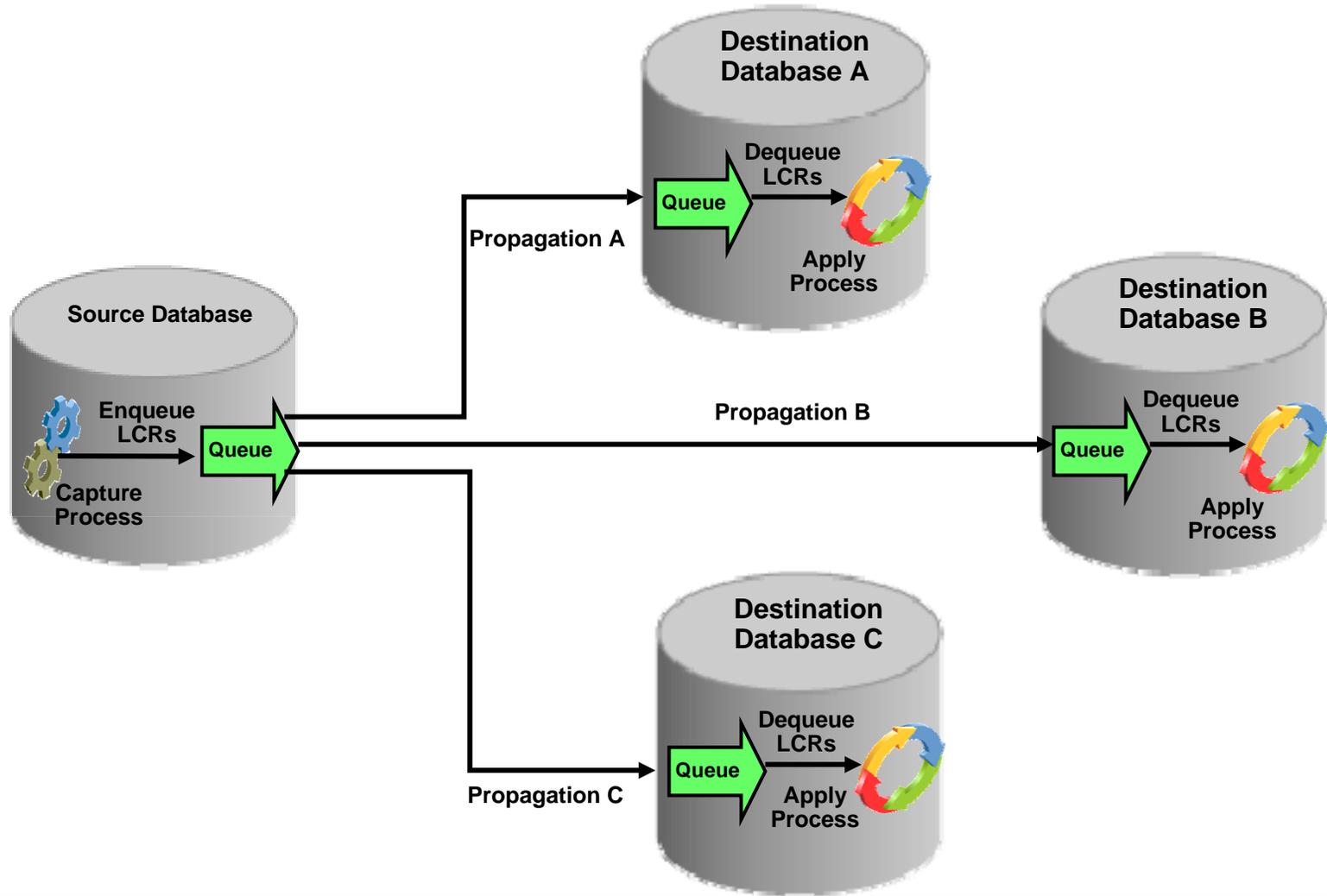
Split Streams: Site A Unavailable



Split Streams: Site A Available



Merge Streams: Original Configuration



Diagnosability

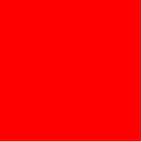
- **Improved error messages:**
 - ORA-1403 -> ORA-26786 or ORA-26787
 - DML and Error Handlers need to handle these new exceptions
 - More Detail added to many error messages
- **Cross-database LCR tracking**
 - Trace Streams messages from start to finish

```
DBMS_STREAMS_ADM.SET_MESSAGE_TRACKING('mylabel')
```

```
V$STREAMS_MESSAGE_TRACKING
```

Additional Supported Data Types

- **XMLType**
 - Storage CLOB (BasicFile)
- **Transparent Data Encryption (TDE)**
 - PRESERVE_ENCRYPTION apply parameter controls behavior when destination columns are not encrypted
 - Default: Capture TDE=> Apply TDE



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