

Skills 101 - SharePlex

Episode 4

Out-of-Sync Explained

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1. What is an “Out-of-Sync”?
2. Why does data go “Out-of-Sync”?
3. How to spot an “Out-of-Sync” issue
4. Fixing “Out-of-Sync” issues

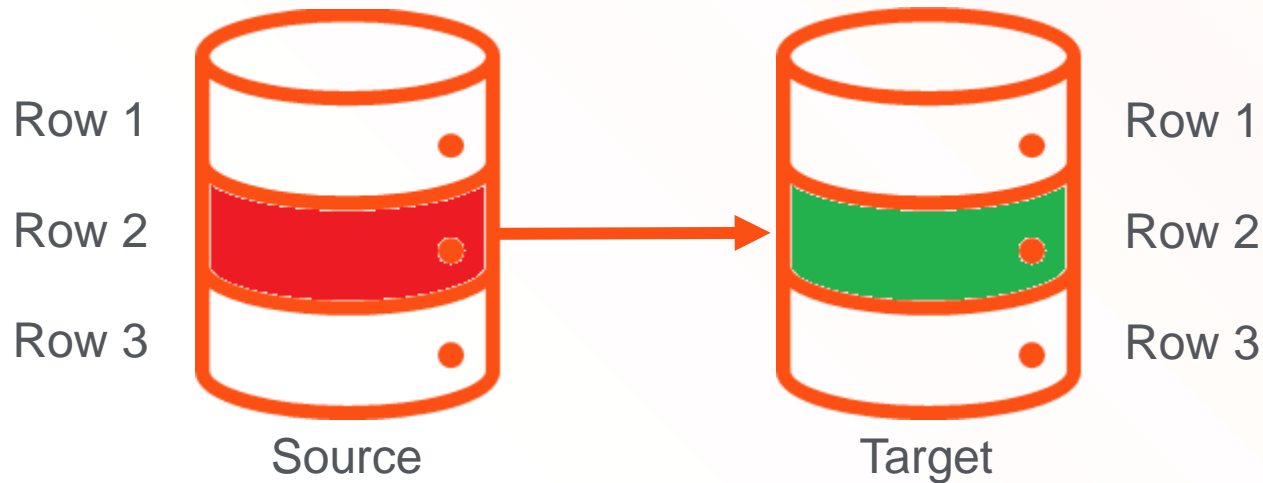


What is an “Out-of-Sync”?

For SharePlex:

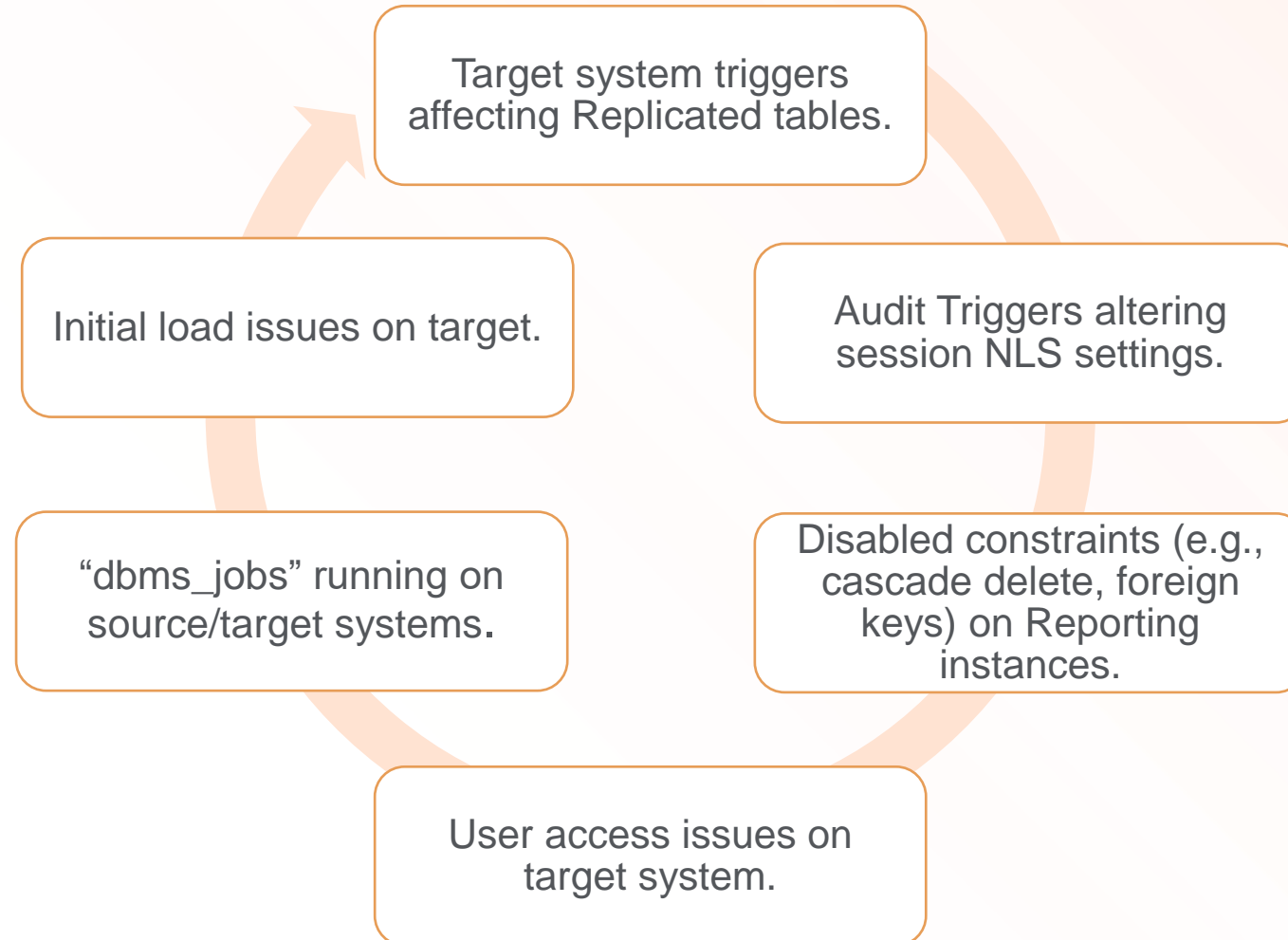
The “**Out-of-Sync**” is a condition in which the contents of a row in the source database do not match the contents of the same row in the target database.

A “**conflict**” arises in bi-directional replication when conflicting changes to the same row are made in the databases involved that would result in an “out-of-sync” condition.



Why Does Data Go Out-of-Sync?

Most common causes for out-of-sync




How to Spot an Out-of-Sync Issue

How to Spot an Out-of-Sync Issue

Before SharePlex post replicated data to target table, it verifies the data are synchronized to ensure data integrity.

Source:

```
SQL> update demo_src
set name='Green'
where name='Red';
SQL> commit;
```

DEMO.DEMO_SRC			
Columns	NAME	ADDRESS	PHONE 
SOURCE	Red	FL	999
TARGET	Green	FL	999

When post detected data goes out-of-sync, it will log the OOS message in event_log, statusdb, and detail about the row in SID_errlog.sql on target system.

event_log:

```
Error      2024-10-28 18:08:06.812394 30908 2079061760 s:4 Table "DEMO"."DEMO_SRC" out-of-sync for
queue source at source rowid AAAYooAAMAABmpkAAC: Row Not Found (posting from o.PDB19, queue
source, to o.PDB19)
```

How to Spot an Out-of-Sync Issue

statusdb:

```
sp_ctrl (target:7777)> show statusdb detail
```

Status Database:

Status Id	Date	Level	Count	Clear?	Details
1	11-Oct-24 10:02	Warning	2	Yes	Network security model not defined. Run 'sp_security --setup' to define.
2	11-Oct-24 10:46	Error	3	Yes	Cop Table "DEMO"."DEMO_SRC" out-of-sync for queue source since 11-Oct-24 10:46:16
3	11-Oct-24 15:19	Error	3	Yes	Poster for o.PDB19-o.PDB19 queue source Process error(s): see the event_log
4	17-Oct-24 10:35	Warning	4	Yes	Command server warning(s): see the event_log (connecting from target) Command & Control from target

show sync:

```
sp_ctrl (target:7777)> show sync
```

Out Of Sync status for target

Count	Details
1	Table "DEMO"."DEMO_SRC" out of sync for queue source since 11-Oct-24 10:46:55

How to Spot an Out-of-Sync Issue

<SID>_errlog.sql:

```
-- Host (source) Sid (pdb19)

-- session 4, 1 error --

-- [1] Mon Oct 28 18:08:06 2024

-- redolog seq#/offset 5445/35381776
-- redolog timestamp 1183576080 (10/28/24 19:08:00)
-- original rowid AAAYooAAMAABmpkAAC
-- Row Not Found-- NOT FOUND
```



```
update "DEMO"."DEMO_SRC" t set "NAME"='Green' where rownum = 1 and "NAME"='Red' and
"PHONE"='0999';
```



```
update "DEMO"."DEMO_SRC" t set "NAME"='Green' where rownum = 1 and "NAME"='Red' and
"ADDRESS"='FL' and "PHONE"='0999';
```


How to Spot an Out-of-Sync Issue

These parameters control which parts of the operation in the redo log are included in the replication stream and the post where clause:

	Oracle	PostgreSQL	Open Target
Source	SP_OCT_REDUCED_KEY SP_OCT_USE_SUPP_KEYS	SP_CAP_REDUCED_KEY	
Target	SP_OPO_REDUCED_KEY	SP_OPX_REDUCED_KEY	SP_OPX_REDUCED_KEY

See the **SharePlex Reference Guide** for detailed information about these parameters and their interactions.

By default, out-of-sync errors are logged, but post will continue processing. This behavior can be changed with either the SP_OPO_OUT_OF_SYNC_SUSPEND or SP_OPX_OUT_OF_SYNC_SUSPEND parameters.

How to Spot an Out-of-Sync Issue

Purpose of Compare and Repair Commands

Compare Command:

- Detects discrepancies between source and target tables.
- Identifies rows with inconsistencies.

Repair Command:

- Automatically corrects mismatches.
- Aligns target data with source data.
- Re-run the compare command to ensure full synchronization.

How to Spot an Out-of-Sync Issue

Hidden Out-of-Sync Conditions

Limitations of Post Verification:

- Only verifies integrity of affected rows.
- Does not check synchronization of other rows in the same or different tables.

Risks:

- Undetected hidden out-of-sync conditions.
- Issues may arise during data usage or replication changes.

How to Spot an Out-of-Sync Issue

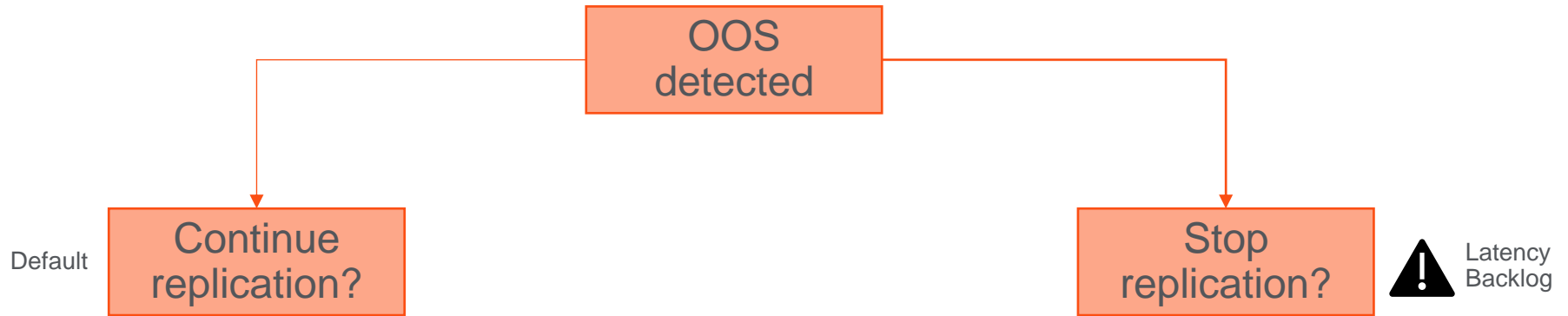
Recommendation: Running a Compare

Helps detect hidden out-of-sync issues.



Fixing Out-of-Sync Issues

Fixing Out-of-Sync Issues



Parameter	Value
SP_OPO_OUT_OF_SYNC_SUSPEND	0
SP_OPX_OUT_OF_SYNC_SUSPEND	

Parameter	Value
SP_OPO_OUT_OF_SYNC_SUSPEND	1
SP_OPX_OUT_OF_SYNC_SUSPEND	

- ✓ By default, when a transaction contains an out-of-sync operation, post will continue processing other valid operations in the transaction to minimize latency and keep targets as current as possible.
- ✓ SQL statement and data for the OOS will be logged in the SID_errlog.sql file.

- ✓ Post stop when it encounters OOS.
- ✓ SQL statement and data for the OOS will be logged in the **SID_errlog.sql** file.
- ✓ Stopping Post causes latency between source and target databases

Fixing Out-of-Sync Issues

If the **SP_OPO_SAVE_OOS_TRANSACTION** parameter is set to 1, the ENTIRE transaction or SCN is written to a file in the **\$SP_SYS_VARDIR/oos** directory.

event_log:

```
Notice 2024-10-29 11:04:05.368274 11167 1848264448 s:3 Poster: transaction is rolled back due to
SP_OPO_SAVE_OOS_TRANSACTION being enabled, details in file /u00/install_temp/Gaby/var112/oos/000676172946_target.sql
(posting from o.PDB19, queue target, to o.PDB19) [module opo]
Error 2024-10-29 11:04:05.368054 11167 1848264448 s:3 Table "DEMO"."DEMO_SRC" out-of-sync for queue target at
source rowid AAAYooAAMAABmpkAAC: Row Not Found (posting from o.PDB19, queue target, to o.PDB19)
```

000676172946_target.sql:

```
alter session set nls_date_format = 'MMDSYYYYHH24MISS';
alter session set nls_timestamp_format = 'MMDSYYYYHH24MISS.FF';
alter session set nls_timestamp_tz_format = 'MMDSYYYYHH24MISS.FF TZR';
alter session set time_zone = '+00:00';
INSERT INTO "DEMO"."DEMO_SRC" ("NAME", "ADDRESS", "PHONE") VALUES('White', 'NY', '789');
UPDATE "DEMO"."DEMO_SRC" SET "NAME" = 'Black' WHERE "NAME" = 'Red' AND "PHONE" = '999' AND ROWNUM = 1;
-- Prior line has out-of-sync
-- redolog seq#/offset 5448/34485472
-- redolog timestamp 1183637348 (10/29/24 12:09:08)
-- original rowid AAAYooAAMAABmpkAAC
-- Row Not Found
COMMIT;
```

Fixing Out-of-Sync Issues

Compare and repair overview.

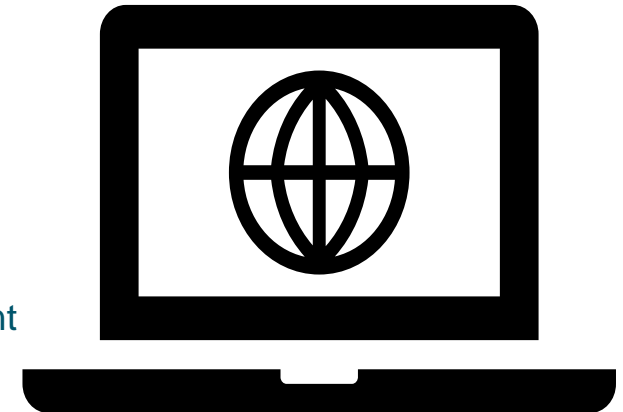
- SharePlex offers compare and repair tools to verify accurate and reliable replication for Oracle and PostgreSQL.
- Regularly compare source and target data to ensure synchronization.
- SharePlex post detects out-of-sync conditions during processing, but hidden out-of-sync issues may still exist.

Command	Description
compare	Compares an individual source table to its target table or compares a wildcard set of tables in the same schema
compare using	Takes input from a file to compare some or all of the tables in the active replication configuration
repair	Repairs an individual target table or a wildcard set of tables in the same schema.
repair using	Takes input from a file to repair some or all of the tables in the active replication configuration.

Fixing Out-of-Sync Issues

Compare and Repair prerequisites:

- **Processes:** All SharePlex processes (Capture, Read, Export, Import, Post) must be running.
- **Current:** Capture should be current.
- **Configuration:** Tables for comparison/repair must be in an active configuration file.
- **Transactions:** Commit all transactions on the source table before comparison/repair to ensure brief lock acquisition for read consistency.
- **TEMP Tablespace:** Large tables may need sorting in TEMP tablespace; consider increasing its size based on the SP_DEQ_THREADS parameter.
- **UNDO Tablespace:** Increase the UNDO tablespace size and the undo_retention parameter to prevent ORA-1555 Snapshot too old errors, especially for high transaction volumes and large tables.
- **LOBs:** Tables with LOBs take significantly longer to compare/repair.
- **Unsupported Scenarios:** Refer to the Reference Guide for Unsupported Scenarios.



Fixing Out-of-Sync Issues

Compare and repair logs.

- Detailed logs can be found in the \$SP_SYS_VARDIR/log directory.
- The **desvr** process runs on the source, and the **declt** process runs on the target. The log file names are formatted as follows.

Source: **desvr_JobID_SID_pProcessID.log**, where:

- *JobID* is the SharePlex-assigned job ID.
- *SID* is the ORACLE_SID of the Oracle instance where the source table resides.
- *ProcessID* is the process ID of the **sp_desvr** process.

Example: *desvr_3_o.PDB19_p6414.log*

Target: **declt_JobIDTableID_SID_SourceHost_pProcessID** appended with either **.log** or **.sql**:

- *JobID* is the SharePlex-assigned job ID for the job.
- *TableID* is the SharePlex-assigned table ID for the table in the job.
- *SID* is the ORACLE_SID of the Oracle instance where the source table resides.
- *SourceHost* is the name or IP address of the source host.
- *ProcessID* is the process ID of the **sp_declt** process.

Example: *declt_3-1_o.PDB19_source_p15988.log*
declt_3-1_o.PDB19_source_p15988_01.sql

Fixing Out-of-Sync Issues

Compare and Compare using options.

```
compare -
Compare contents of a source table to contents of a target table
to verify synchronization.
  OR
Compare contents of all source tables specified by wildcard to contents of
target tables to verify synchronization.

Usage: compare {source_owner}.{source_table}[.{partition}]
  [not ({list of exceptions})]
  [to {target_owner}.{target_table}[.{partition}]
  [at {target_host}[@{connection_id}]]
  [for {connection_id}]
  [key]
  [quickcheck]
  [orderby "{column list}"]
  [exclude "{column list}"]
  [include "{column list}"]
  [hint "{hint}"]
  [where "{clause}"]
  [threads {thread count}]
  [parallelism {parallelism count}]
  [sourcewhere "{clause}"]
  [targetwhere "{clause}"]
  [log {rowdata | split}]
  [nosqllog]
  [override]
  [on {host}] | [on {host}:{port}] |
    [on {login}/{password}@{host}] |
    [on {login}/{password}@{host}:{port}]
```

```
compare using -
Compare contents of all source tables in a configuration to contents of
target tables to verify synchronization.

Usage: compare using {filename}
  [key]
  [quickcheck]
  [threads {thread count}]
  [parallelism {parallelism count}]
  [log {rowdata | split}]
  [override]
  [on {host}] | [on {host}:{port}] |
    [on {login}/{password}@{host}] |
    [on {login}/{password}@{host}:{port}]
```

Fixing Out-of-Sync Issues

Repair and Repair using options.

```
repair -
  Compare contents of a source table to contents of a target table
  to verify synchronization and repair out-of-sync rows.
  OR
  Compare contents of all source tables specified by wildcard to contents of
  target tables to verify synchronization and repair out-of-sync rows.

Usage: repair {source_owner}.{source_table}[.{partition}]
             [not ({list of exceptions})]
             [to {target_owner}.{target_table}[.{partition}]]
             [at {target_host}[@{connection_id}]]
             [for {connection_id}]
             [exclude "{column list}"]
             [include "{column list}"]
             [where "{clause}"]
             [key]
             [onepass]
             [orderby "{column list}"]
             [hint "{hint}"]
             [threads {thread count}]
             [parallelism {parallelism count}]
             [sourcewhere "{clause}"]
             [targetwhere "{clause}"]
             [insertonly]
             [log split]
             [nosqllog]
             [override]
             [on {host}] | [on {host}:{port}] |
               [on {login}/{password}@{host}] |
               [on {login}/{password}@{host}:{port}]
```

```
repair using -
  Compare contents of all source tables in a configuration to contents of
  target tables to verify synchronization and repair out-of-sync rows.

Usage: repair using {filename}
             [key]
             [onepass]
             [threads {thread count}]
             [parallelism {parallelism count}]
             [insertonly]
             [log split]
             [override]
             [on {host}] | [on {host}:{port}] |
               [on {login}/{password}@{host}] |
               [on {login}/{password}@{host}:{port}]
```

Fixing Out-of-Sync Issues

Compare example.

```
sp_ctrl (ptysupl6:7777)> compare demo.demo_src
comparing 1 of 1 objects
compare started; job id 4
```

```
sp_ctrl (ptysupl6:7777)> compare status
```

```
Job ID      : 4
PID        : 7774
Host       : ptysupl6
Started    : 31-Oct-2024 09:10:31
Job Type   : Compare
Status     : Done - 1 object completed
```

ID	Tablename	Status	Time	Total Rows	%Comp	Total Time
1	"DEMO"."DEMO_SRC"	Out Sync	N/A	3	100	0:11

Source: desvr_4_o.PDB19_p7774.log

```
desvr 2024-10-31 09:10:44.504559 7774 4093331200 [1] NOTE: total number of rows fetched = 3 (./src/deqtr/de_select.cpp,L1654)
desvr 2024-10-31 09:10:44.504593 7774 4093331200 [1] Current status: got batch of rows
desvr 2024-10-31 09:10:44.504601 7774 4093331200 [1] Status: Fetching... Elapsed time: 0.022 seconds
desvr 2024-10-31 09:10:44.711066 7774 4093331200 [1] Status: Comparing Elapsed time: 0.206 seconds
desvr 2024-10-31 09:10:44.715974 7774 4093331200 [1] Status : Out Sync
desvr 2024-10-31 09:10:44.722598 7774 4093331200 [1] Entering de_msg_svr_postCompareMessaging,L676
desvr 2024-10-31 09:10:44.723596 7774 4093331200 [1] Leaving de_msg_svr_postCompareMessaging,L749
desvr 2024-10-31 09:10:44.726461 7774 4093331200 [1] NOTE: total out of sync row(s) =3
desvr 2024-10-31 09:10:44.744770 7774 4093331200 [1] Status: Out Sync Elapsed time: 0.033 seconds
desvr 2024-10-31 09:10:44.751519 7774 4093331200 [1] Compare DEMO.DEMO_SRC to DEMO.DEMO_SRC completed.
desvr 2024-10-31 09:10:47.762310 7774 4093331200 [0] Exiting.....[oracle@ptysupl6 log]$
```

Target: declt_4-1_o.PDB19_a03163f_p28323.log

```
declt 2024-10-31 08:10:44.502261 28323 1081804736 NOTE: total number of rows fetched = 2 (./src/deqtr/de_select.cpp,L1654)
declt 2024-10-31 08:10:44.502277 28323 1081804736 Current status: got batch of rows
declt 2024-10-31 08:10:44.502295 28323 1081804736 SP_DEQ_PART_UPDATE : 0
declt 2024-10-31 08:10:44.727596 28323 1081804736 Status : Out Sync
declt 2024-10-31 08:10:44.727645 28323 1081804736 Exiting without any errors
```

```
* Do not use it to repair target tables for out-of-sync rows.
* The data in this file was recorded when the compare command was run
* & may be different from the current data in the database.
* To repair out-of-sync rows, please use the repair command.
* Compare Report
*
* Job ID      : 4
* Schema     : DEMO
* Table      : DEMO_SRC
* Repair     : Off
* Key Compare: Off
* Select Hint:
* Log File   : declt_4-1_o.PDB19_a03163f_p28323
* Date      : Thu Oct 31 08:10:44 2024
*
*/

/* source rowid='AAAYooAAMAABmpkAAA' */
insert into "DEMO"."DEMO_SRC" A (
hash_val1,
hash_val2,
hash_val3
) values (
'982724581'
,'114488050'
,'3606010839');
/*;*/
delete from "DEMO"."DEMO_SRC" where rowid = 'AAWKXAAMAAhY1AAA';
/*;*/
/* source rowid='AAAYooAAMAABmpkAAC' */
insert into "DEMO"."DEMO_SRC" A (
hash_val1,
hash_val2,
hash_val3
) values (
'3028748107'
,'3763180399'
,'1280064865');
/*;*/

/*
* Compare Results
*
* 3 source and 2 target rows compared successfully.
* 3 out-of-sync row(s) found in this table.
* The SQL statements above are needed to bring this
* table back in sync.
*
* To bring this table back in sync, run the compare
* command again with the repair option.
* See SharePlex documentation for more details.
*
* Inserts : 2
* Updates : 0
* Deletes : 1
*
*/
```

Target: declt_4-1_o.PDB19_a03163f_p28323_01.sql

Fixing Out-of-Sync Issues

Repair example.

```
sp_ctrl (ptysupl6:7777)> repair demo.demo_src  
  
repairing 1 of 1 objects  
  
repair started; job id 5
```

```
sp_ctrl (ptysupl6:7777)> repair status  
  
Job ID      : 5  
PID        : 14763  
Host       : ptysupl6  
Started    : 31-Oct-2024 09:21:03  
Job Type   : Repair  
Status     : Done - 1 object completed  
  
ID  Tablename          Status      Time      Total Rows %Comp Total Time  
----  
1  "DEMO"."DEMO_SRC"    Repaired    N/A       3      100      0:14
```

Source: desvr_5_o.PDB19_p14763.log

```
desvr 2024-10-31 09:21:20.233069 14763 3083450112 [1] NOTE: total out of sync row(s) =3  
desvr 2024-10-31 09:21:20.245207 14763 3083450112 [1] Status: Repaired Elapsed time: 0.023 seconds  
desvr 2024-10-31 09:21:20.253517 14763 3083450112 [1] Compare DEMO.DEMO_SRC to DEMO.DEMO_SRC completed.  
desvr 2024-10-31 09:21:23.400748 14763 3083450112 [0] Exiting.....
```

Target: declt_5-1_o.PDB19_a03163f_p29196.log

```
declt 2024-10-31 08:21:20.020644 29196 2291681216 Current status: got batch of rows  
declt 2024-10-31 08:21:20.020663 29196 2291681216 SP_DEQ_PART_UPDATE : 0  
declt 2024-10-31 08:21:20.188636 29196 2291681216 Current status: Table Unlocked  
declt 2024-10-31 08:21:20.188661 29196 2291681216 NOTE:sp_declt_clear_outofsync ("DEMO"."DEMO_SRC")  
declt 2024-10-31 08:21:20.233863 29196 2291681216 Status : Repaired  
declt 2024-10-31 08:21:20.236033 29196 2291681216 Exiting without any errors|
```

```
/*  
* Compare Report  
*  
* Job ID      : 5  
* Schema     : DEMO  
* Table      : DEMO_SRC  
* Repair     : On  
* Key Compare : Off  
* Select Hint :  
* Log File   : declt_5-1_o.PDB19_a03163f_p29196  
* Date      : Thu Oct 31 08:21:20 2024  
*  
*/  
  
/* source rowid='AAAYooAAMAABmpkAAA' */  
insert into "DEMO"."DEMO_SRC" A (  
"NAME",  
"ADDRESS",  
"PHONE"  
) values (  
'White',  
'NY',  
'789');  
/*;*/  
/* source rowid='AAAYooAAMAABmpkAAC' */  
insert into "DEMO"."DEMO_SRC" A (  
"NAME",  
"ADDRESS",  
"PHONE"  
) values (  
'Red',  
'FL',  
'999');  
/*;*/  
delete from "DEMO"."DEMO_SRC" where rowid = 'AAAWKXAAMAAhY1AAA';  
  
/*  
* Compare Results  
*  
* 3 source and 2 target rows compared successfully .  
* 3 out-of-sync row(s) found and repaired.  
* The table is now in sync.  
* The SQL statements above were applied to bring this  
* table back in sync  
*  
* Inserts : 2  
* Updates : 0  
* Deletes : 1  
*  
*/
```

Target: declt_5-1_o.PDB19_a03163f_p29196_01.sql

Summary

1. What is an “Out-of-Sync”?



2. Why does data go “Out-of-Sync”?



3. How to spot an “Out-of-Sync” issue



4. Fixing “Out-of-Sync” issues





Thank You

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Jan 15th

Anu Maddukuri