High Level Transactional Replication Process Flow

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Introduction

This article describes the process flow of the Log Reader and Distribution replication agents. The information was created back in 2008 or 2010 for on-premise SQL Server, but the internal architecture of the replciation components is still the same on Azure Managed Instance.

You will see the names of the replication stored procedures associated with each step. If you see these proc names in any status or error message, you can directly relate to the exact step in the process flow and narrow down on the cause. The procedure names are also recorded on the verbose output files (-OutputVerboseLevel 4) if you have collected any.

The actual process logic is much more complicated than what is shown here, but this simplified overview is sufficient for most support purposes.

Log Reader Agent (logread.exe) – Sequence of Steps

- Calls `sp_MSadd_logreader_history` to write to table `distribution..MSlogreader_history` – "Starting Agent"
- `sp_MShelp_logreader_agentid` – obtain Log Reader Agent-specific information for that publication
- `sp_MShelp_profile` – obtains profile information for the Log Reader
- `MSadd_logreader_history` to write to MSlogreader_history – "Initializing"
- `sp_MSget_last_transaction` – determine where the Log Reader Agent left off reading the log on the previous iteration.
- `sp_replcmds` - read the transaction log
- `sp_MSadd_repl_commands` - processes the commands returned by `sp_replcmds` in batches by calling `sp_MSadd_repl_commands`
- `sp_repldone` - marks this transaction as committed in distribution database by using `sp_repldone` procedure
- Adjusts the identity range if necessary and if you are using Automatic Identity Range Management by calling `sp_MSpub_adjust_identity`
- `sp_MSget_last_transaction` - check the last transaction read and stored in table `distribution..MSreplication_transactions`

- `sp_MSadd_logreader_history` - When all transactions are read, logread.exe calls `sp_MSadd_logreader_history` and writes final message to `distribution..MSlogreader_history` - "nn transaction(s) with mm command(s) were delivered"

Distribution Agent (distrib.exe) – Sequence of Steps

- `master.db.sp_msget_jobstate` – get the status of the job (if it is already started)
- `sp_Msadd_distribution_history` – writes to `distribution..MSdistribution_history` – "Starting agent"
- `sp_MSsubscription_status` – check whether the subscription has expired or a snapshot is ready
- `sp_server_info` - determines the collation
- `sp_mshelp_subscriber_info` – retrieve subscriber information
- `sp_mshelp_subscription_agentid` – determine the name of the distribution agent
- `sp_Msadd_distribution_history` – write message to `distribution..Msrepl_distribution_history` - "Initializing"
- `sp_Msadd_distribution_history` – write message to `distribution..Msrepl_distribution_history` - "Connecting to Subscriber"
- `sp_datatype_info` – determine the data type mapping necessary to create the tracking table necessary for the Distribution agent
- `sp_MScheck_subscribe` on Subscriber database – verifies that SQL Server Agent account is in sysadmin and db_owner role in Subscriber database
- `sp_mscreate_sub_tables` on Subscriber database – creates `MSsubcription_agents` and `MSreplication_subscriptions` tables if needed
- `sp_MSinit_subscription_agent` – updates the Subscription agent information on Subscriber database
- Retrieves `transaction_timestamp` and `subscription_guid` to determine what Distribution agent has already replicated to the Subscriber.
  `Transaction_timestamp` correlates to xact_seqno column in `MSreplication_transactions` table in distribution database. All values large than the xact_seqno will be replicated.
- If we are doing initial sync, Distribution Agent calls `sp_MSupdatelastsyncinfo` which updates `MSreplication_susbcriptions` and `MSsubcription_agents` table
- Starts to retrieve all transactions and their corresponding commands from `distribution..MSreplication_transactions` and `distribution..MSreplication_commands` table where `transaction_timestamp` column in Subscriber database < xact_seqno column in `MSreplication_transactions` table. Applies the transaction using `sp_MS_get_repl_commands` procedure
- Issues dynamic SQL to update the `MSreplication_subscriptions` table with the last delivered transaction ID
- `sp_MSdistribution_history` to update the `MSrepl_distribution_history` table with status message - "nn transaction(s) with mm command(s) were delivered"

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