**What is replication?**

Replication is a set of technologies for **copying and distributing data and database objects from one database to another** and then synchronizing between databases to maintain consistency. Using replication, you can distribute data to **different locations**. Unlike other methods of high availability**, it doesn’t distribute entire database**, but only distributes some **part of database** like tables, views or stored procedures

**There are four types of replication**

* Transactional replication
* Peer to peer replication
* Snapshot replication
* Merge replication
* **Transactional replication**
* It replicates **each transaction** for the **article** being published
* When a transaction is written to the transaction log, **the Log Reader Agent** reads it from the transaction log and writes it to the distribution database and then to the subscriber
* Only committed transactions are replicated to ensure data consistency
* Transactional replication is widely applied where high latency is not allowed, such as an OLTP system for a bank or a stock trading firm, because you always need real-time updates of cash or stocks
* **Log Reader Agent**
* The Log Reader Agent is used with transactional replication. **It moves transactions marked for replication from the transaction log on the Publisher to the distribution database**.
* Each database published using transactional replication has its own Log Reader Agent that runs on the Distributor
* **Push or Pull**
* Push - a push subscription pushes data from publisher to the subscriber
* Pull - a pull subscription requests changes from the Publisher.  This allows the subscriber to pull data as needed.  This is useful for disconnected machines such as notebook computers that are not always connected
* **Distribution Agent**
* The Distribution Agent is used with snapshot replication and transactional replication.
* It applies the initial snapshot to the Subscriber and moves transactions held in the distribution database to Subscribers.
* The Distribution Agent runs at either the Distributor for push subscriptions or at the Subscriber for pull subscriptions

**What is Peer-to-Peer Transactional Replication?**

* Peer to Peer replication is the process of having multiple servers that act as **both publisher and subscriber with its own distributor**. As such, when you update, insert or delete records, they are **synchronized in real time** with each other. The topology (architecture) of the design involves a **master server** from which other servers connect to the master database.
* These server are referred to as **nodes**.
* If any one of the locations is down, the other locations can still stay synchronized, because each node acts as a publisher and a subscriber.
* Backup and restore database to each server in replication is needed
* Enable distributor in each server that is in replication

<https://technet.microsoft.com/en-us/library/ms151196%28v=sql.110%29.aspx>

--sp\_removedbreplication

use master

go

create database PTP

go

use ptp

go

create table Computers

(Computerid int primary key,

Name varchar (20))

use PTP

go

insert into Computers

values (1,'Sony'),(2,'HP'),(3,'Dell'),(4,'Apple')

select \* from Computers

use PTP

go

insert into Computers

values (6,'Lenova')

* **Snapshot replication**:
* As the name suggests, a snapshot replication takes a snapshot of the published objects and applies it to a subscriber
* Primarily used for fairly static data such as data warehouse or when it’s acceptable to have data that does not need to by constantly synchronized
* A subscriber does not always need to be connected, so data marked for replication can be applied the next time the subscriber is connected
* list of items that only changes periodically as in data warehousing

Replication agents

* **Snapshot Agent**
* Used with all types of replication
* It prepares the schema of published tables and objects
* Stores the snapshot files
* Records information about synchronization in the distribution database
* Snapshot Agent runs at the Distributor
* **Push or Pull**
* Push - a push subscription pushes data from publisher to the subscriber
* Pull - a pull subscription requests changes from the Publisher.  This allows the subscriber to pull data as needed.  This is useful for disconnected machines such as notebook computers that are not always connected
* **Distribution Agent**
* The Distribution Agent is used with snapshot replication and transactional replication.
* It applies the initial snapshot to the Subscriber and moves transactions held in the distribution database to Subscribers.
* The Distribution Agent runs at either the Distributor for push subscriptions or at the Subscriber for pull subscriptions
* **Merge replication –**
* This is the most complex types of replication which allows changes to happen at both the publisher and subscriber.
* As the name implies, changes are merged to keep data consistency and a uniform set of data.
* Just like transactional replication, an initial synchronization is done by applying snapshot.
* When a transaction occurs at the Publisher or Subscriber, the change is written to change tracking tables. The Merge Agent checks these tracking tables and sends the transaction to the distribution database where it gets propagated.
* The merge agent has the capability of resolving conflicts that occur during data synchronization.
* An example of using merge replication can be a store with many branches where products may be centrally stored in inventory.
* As the overall inventory is reduced it is propagated to the other stores to keep the databases synchronized.

Some applications also require that changes flow from the Subscriber back to the Publisher. merge replication provide options for these types of applications.

* Merge Agent - The Merge Agent is used with merge replication. It applies the initial snapshot to the Subscriber and moves and reconciles incremental data changes that occur. Each merge subscription has its own Merge Agent that connects to both the Publisher and the Subscriber and updates both. The Merge Agent runs at either the Distributor for push subscriptions or the Subscriber for pull subscriptions.
* Queue Reader Agent - The Queue Reader Agent is used with transactional replication with the queued updating option. The agent runs at the Distributor and moves changes made at the Subscriber back to the Publisher. Unlike the Distribution Agent and the Merge Agent, only one instance of the Queue Reader Agent exists to service all Publishers and publications for a given distribution database.

DMV's and their use?

* sys.dm\_repl\_articles - Contains information about each article being published. It returns data from the database being published and returns a row for each object being published in each article.
* sys.dm\_repl\_schemas - Contains information about each table and column being published. It returns data from the database being published and returns one row for each column in each object being published
* sys.dm\_repl\_traninfo - Contains information about each transaction in a transactional replication