

SQL Server Specialist Certificate Program

Maintaining SQL Server 2005

Week 7 – High Availability and Replication
Implementing Database Mirroring and
Log Shipping.

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This Weeks Overview

- Review from Last Week
- Replication Overview
- Mirroring
- Log Shipping
- Replication
- Class Project
- Review and Homework

Topics from last week

- SSRS – SQL Server Report Server
- What do you want out of this class that you are not receiving?

Preparation

You will need 2 instances of SQL Server installed on your computer.

We installed 2 instances in week 1.

1. General Replication Overview

- What is Replication
- High Availability
- High Performance
- High Protection

What is Replication

- Copying and synchronizing a database to one or more locations
- Useful in providing a high availability, high performance, or high protection solution

High Availability

- Fault tolerant
- Highest availability
 - Allows for server reboots and upgrades without downtime
 - Lower performance since data has to be written to 2 locations
- Automatic failover
- Requires a witness server

High Performance

- Multiple servers
- After a transaction is committed it is saved to a second location
- Manual failover option

High Protection

- Most fault tolerant solution
- Transactions are written to both servers
- Automatic failover
- Similar to HA, but no witness server

- End of this section. Any Questions?

1. Mirroring

- What is Mirroring
- Which Database Version?
- Mirroring Components
 - Principal, Mirror, Witness
- Mirroring Terminology
- Mirroring Modes
- Configuration

What is Mirroring

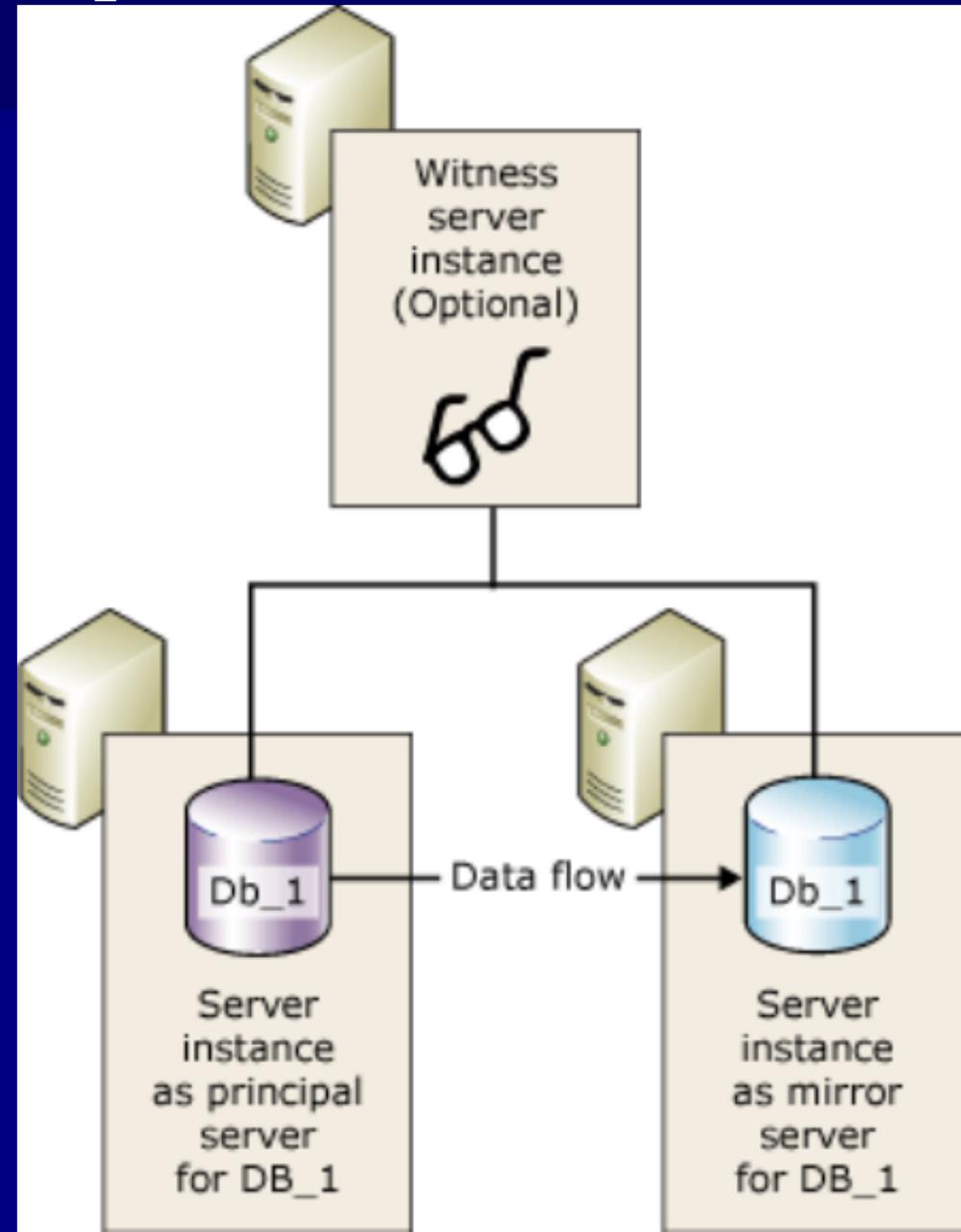
- The process that moves transactions from one database to another
- Benefits of Mirroring
 - Relatively Easy
 - Complete or nearly complete redundancy
 - Increases availability

Mirroring - Which Database Version

- SQL Server 2005
 - Standard
 - Enterprise
 - Developer

Mirroring Components

- Principal
- Mirror
- Witness



Principal

- The primary active database
- The starting point of a mirroring session
- Every transaction applied to the principal will be transferred to the mirror.

Mirror

- The standby server
- Receives transactions from the principal
- Replays transactions
- Can be activated as the principal

Witness

- Can be any version of SQL Server 2005
- Supports automatic failover
- Confirms that the principal has failed and activates the mirror as the new principal
- Optional: Needed for High Availability, not High Performance or High Protection.

Mirroring Terminology

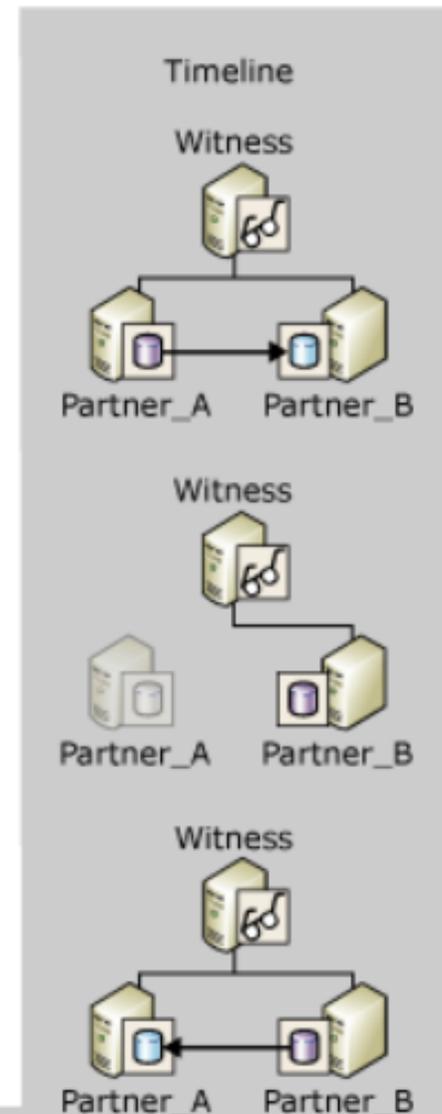
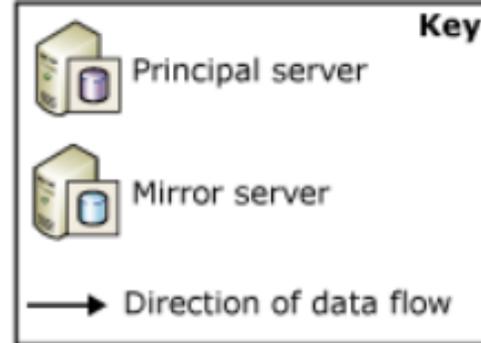
- Synchronous
 - Every transaction applied to the principal will also be committed on the mirror
- Asynchronous
 - Transactions on the principal server commit without waiting for the mirror

Mirroring Modes

- High Availability
 - Synchronous (can impact performance)
 - Automatic Failover
- High Performance
 - Asynchronous
 - Manual Failover
- High Protection
 - Similar to HA, but no Witness
 - Synchronous (can impact performance)
 - Manual Failover

Automatic Failover

- Must have a witness
- Mirror must be synchronized
- Steps to failover
 1. If the principal is still running it changes its state to disconnected.
 2. The witness and mirror recognize that the primary is unavailable.
 3. The mirror finishes rolling forward transactions
 4. The mirror promotes itself to principal



Database mirroring starts with a full quorum; Partner_A is principal, and Partner_B is mirror.

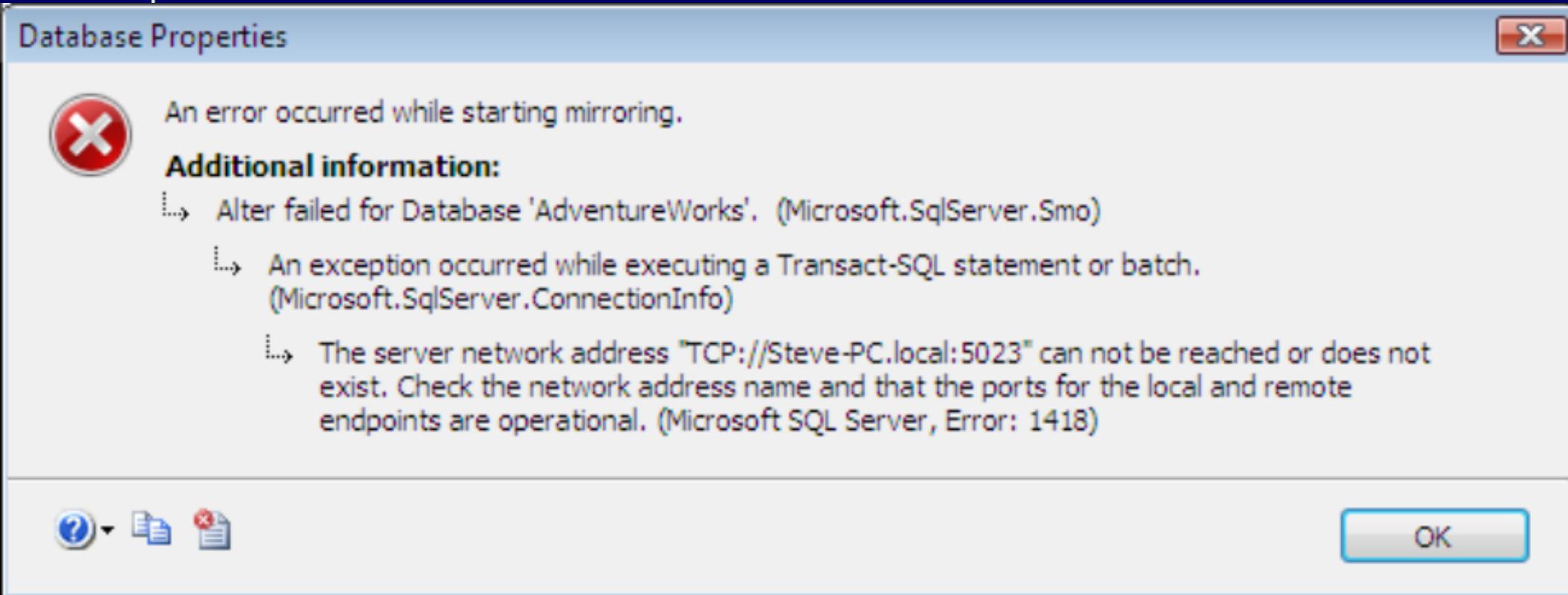
Partner_A is lost.
The witness and Partner_B retain quorum and agree to switch the principal role to Partner_B.

Partner_B becomes the principal server and serves the database.

Partner_A reconnects and learns that Partner_B is now the principal server.

Partner_A switches to mirror role, and begins synchronizing the mirror database.

What does this error mean?



Configuration

- First set up a FQDN (domain name with a . in it)
- Use the SSMS wizard to create a mirroring configuration
- Demo – walk through process of configuring a mirrored scenario

Lab Project

- Configure the AdventureWorks database for mirroring between 2 instances
- Configure this in a high protection (safety) solution
- Test the configuration by creating a table, then forcing a failover

- End of this section. Any Questions?
- 10 Minute Break

1. Log Shipping

- Differences between Mirroring and Log Shipping
- What is Log Shipping
- Log Shipping Components
- Log Shipping Operations

Differences between Mirroring and Log Shipping

- How Many destination servers to you desire?
 - If the answer is 1 then mirroring is recommended
 - If you require more than one, then you need to use log shipping
- If you need a delay on the restore then you need to use log shipping
 - Typically used to protect against logical errors

What is Log Shipping

- Log shipping is used to synchronize one SQL Server to one or more other SQL Servers
- Log shipping is done as an automated process
- No automatic failover
- It is a continuous backup and restore process

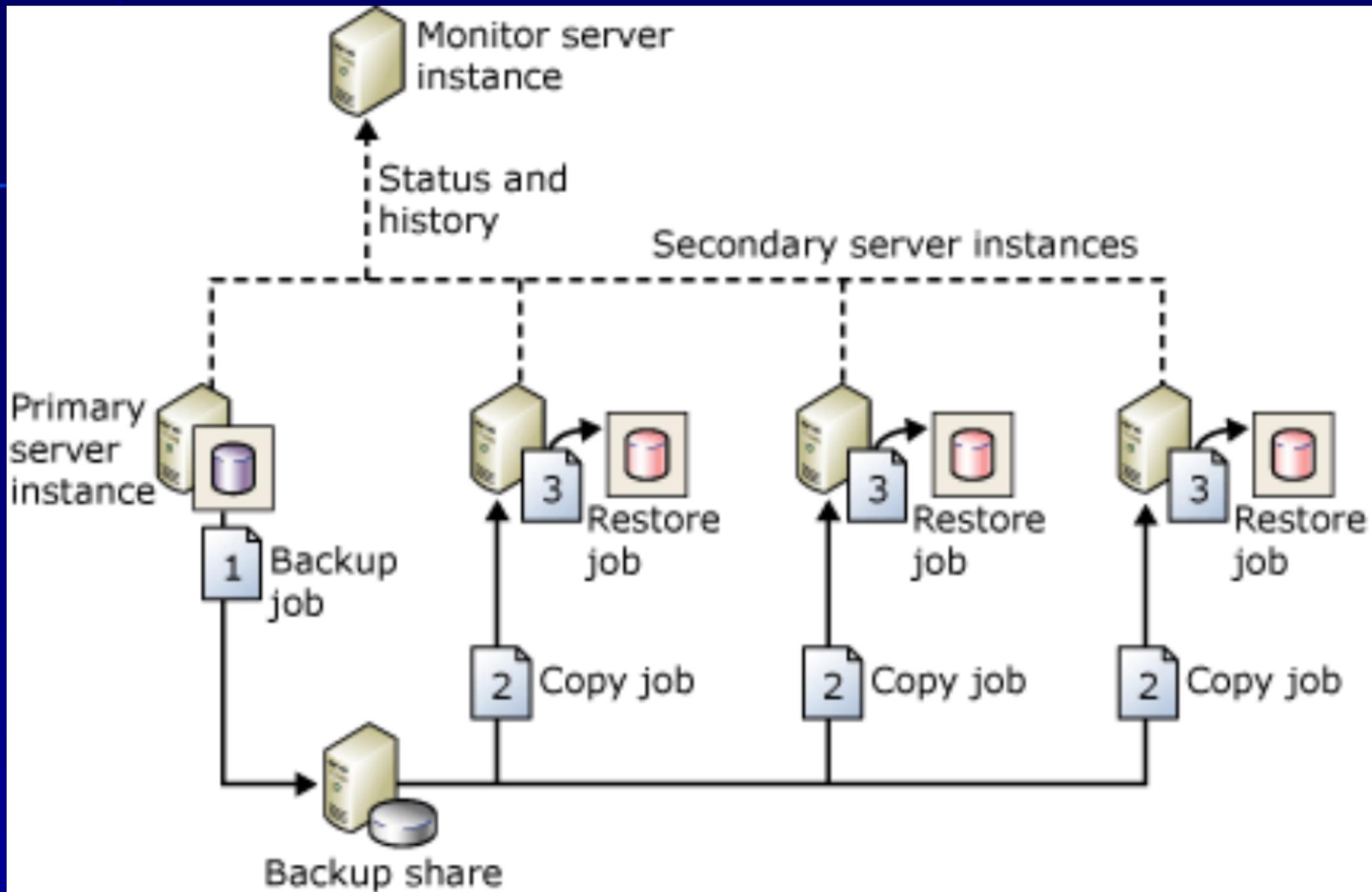
Log Shipping Components

- Primary Database
- Secondary Database
- Primary Server
- Secondary Server

- Monitor Server (optional)

● **Log Shipping Operations**

1. Backing up the transaction log of the primary database
2. Copying that log to each secondary server
3. Restoring the transaction log backup on the secondary server



- End of this section. Any Questions?

1. More Replication

- How is this different from Mirroring or Log Shipping
- Terminology
- Server Roles
- Subscriptions
- Replication Types

How is this different from Mirroring or Log Shipping

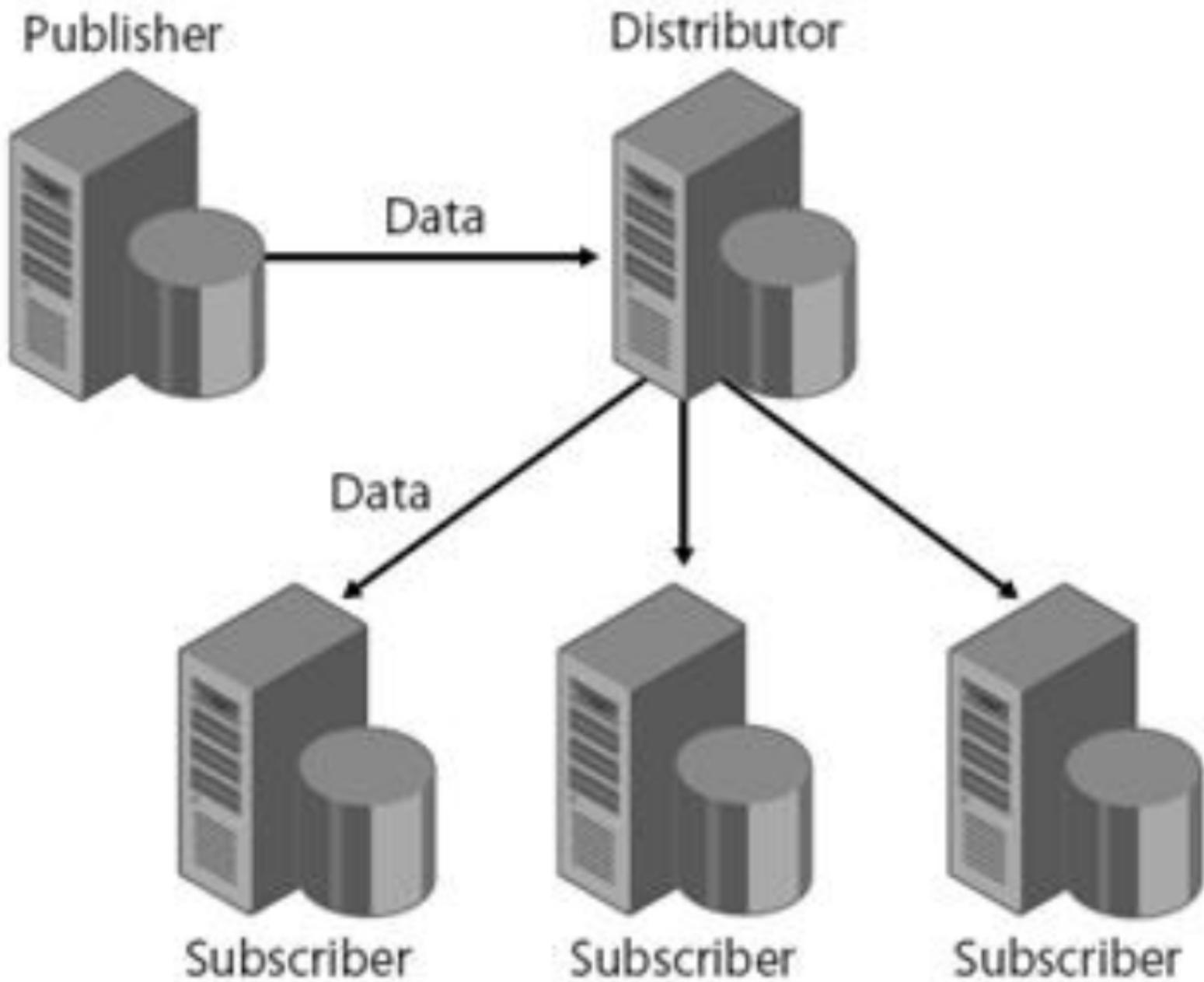
- Replicates part or all of the database
- Databases or tables can be merged from multiple locations

Terminology

- Article
 - Tables, views, filtered tables or views, indexed views, stored procedures
- Publication
 - A group of articles is called a publication

Server Roles

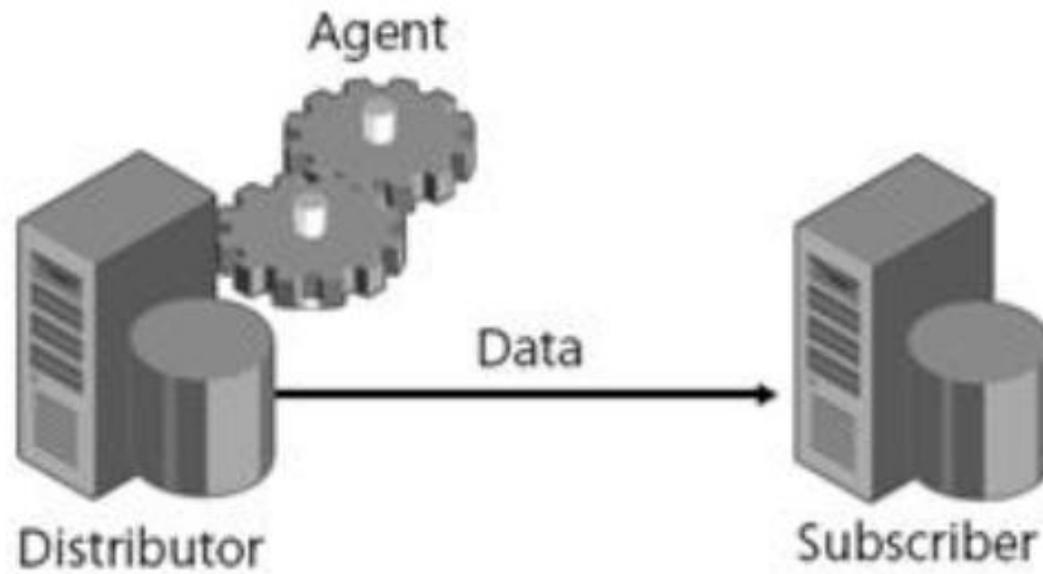
- Publisher
 - The Publisher is the original owner of the information that is published.
- Distributor
 - Helps move the data to one or more locations
- Subscriber
 - Recipient of the data



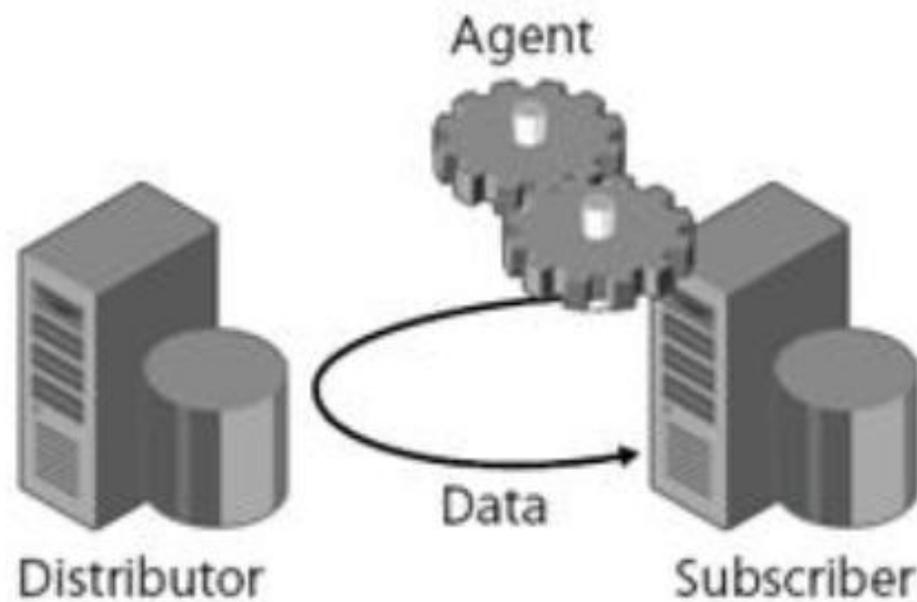
Server roles in replication

Subscriptions

- With a push subscription, the Distributor copies the data to the Subscriber database.
- With a pull subscription, the Subscriber retrieves the data from the Distributor.



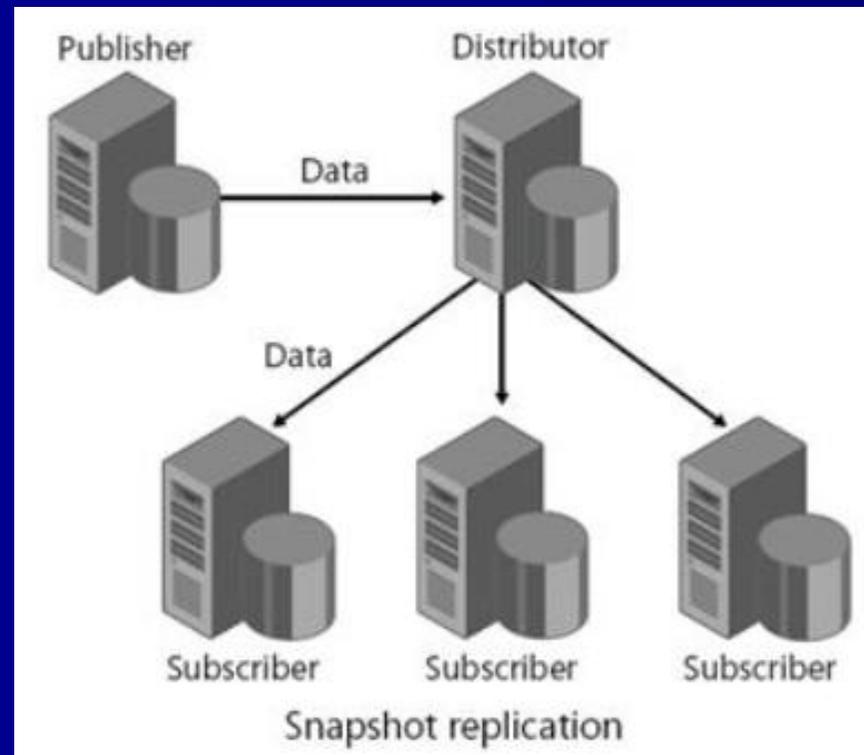
Push subscription



Pull subscription

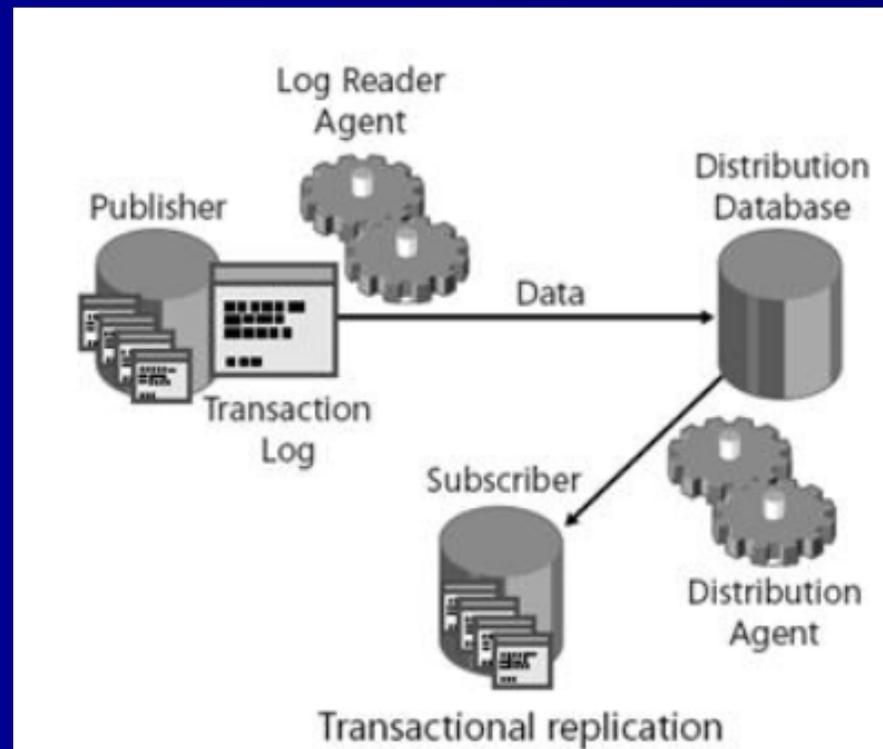
Snapshot replication

- Good for small amounts of data
- Conceptually similar to a full backup and restore.



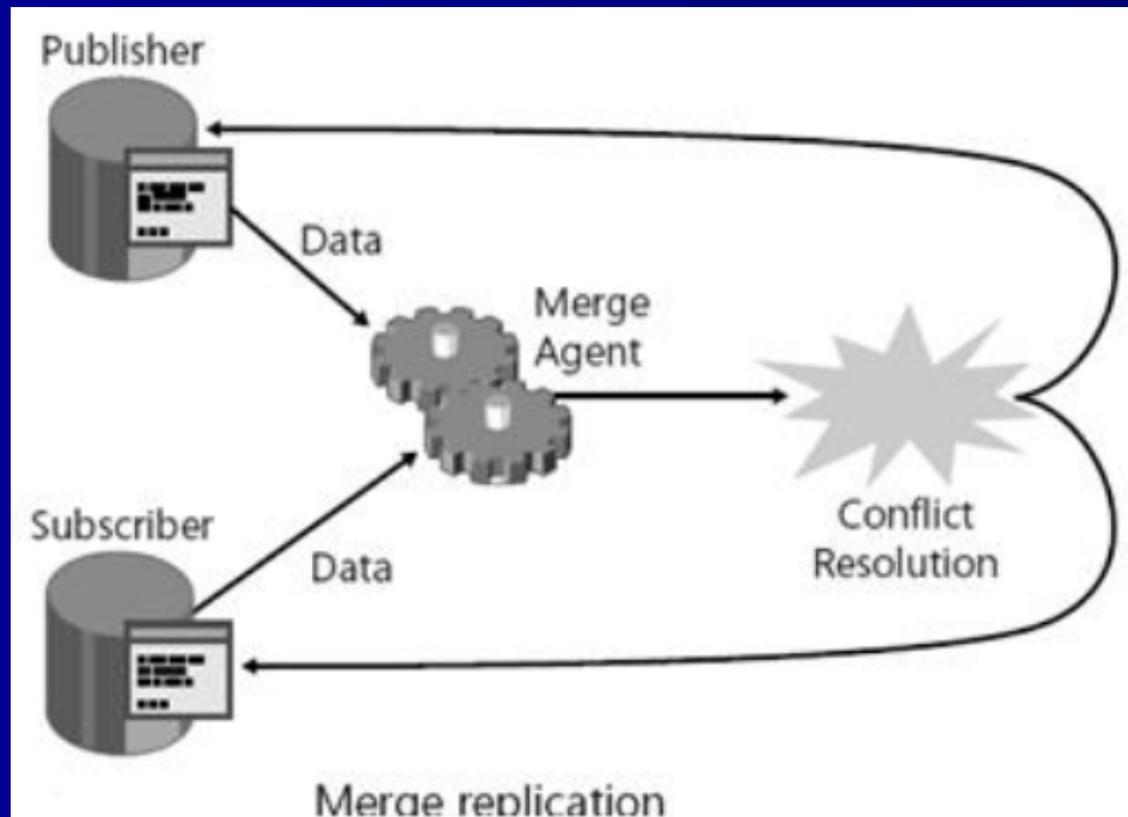
Transactional replication

- An initial complete copy of the data, and then all subsequent copies transfer modified data only.



Merge replication

- Merges data from multiple locations
- May run into merge conflicts



- End of this section. Any Questions?

Class Project

- Status Update
- Review of research and experimentation required for the group project.
- Presentations will be week 9 May 26

Questions?

Homework

- Continue working on your class projects