

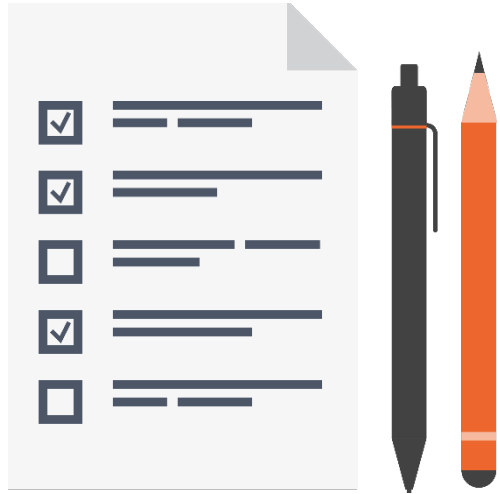
Scaling Out SQL Server



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What This Module Covers



AlwaysOn availability group replicas

Transactional replication

Peer-to-peer replication

Distributed partitioned views

Service-oriented database architecture (SODA)

Data-dependent routing (DDR)

AlwaysOn Availability Group Replicas

- Up to eight read-only secondary replicas are available in SQL Server 2014
 - Allows segregation of read-only workload to different database servers
 - Requires application changes to fully leverage, plus additional core licenses
 - No schema changes are allowed on secondary replicas
 - Temporary statistics are created in tempdb
- May not be able to replace transactional replication for reporting usage
 - Since no schema changes (such as additional indexes) are allowed on secondary replicas
 - Creates additional stress on network and storage infrastructure to keep secondary replicas synchronized
 - More details: <http://bit.ly/1WjaffR>

SQL Server 2014 Availability Groups

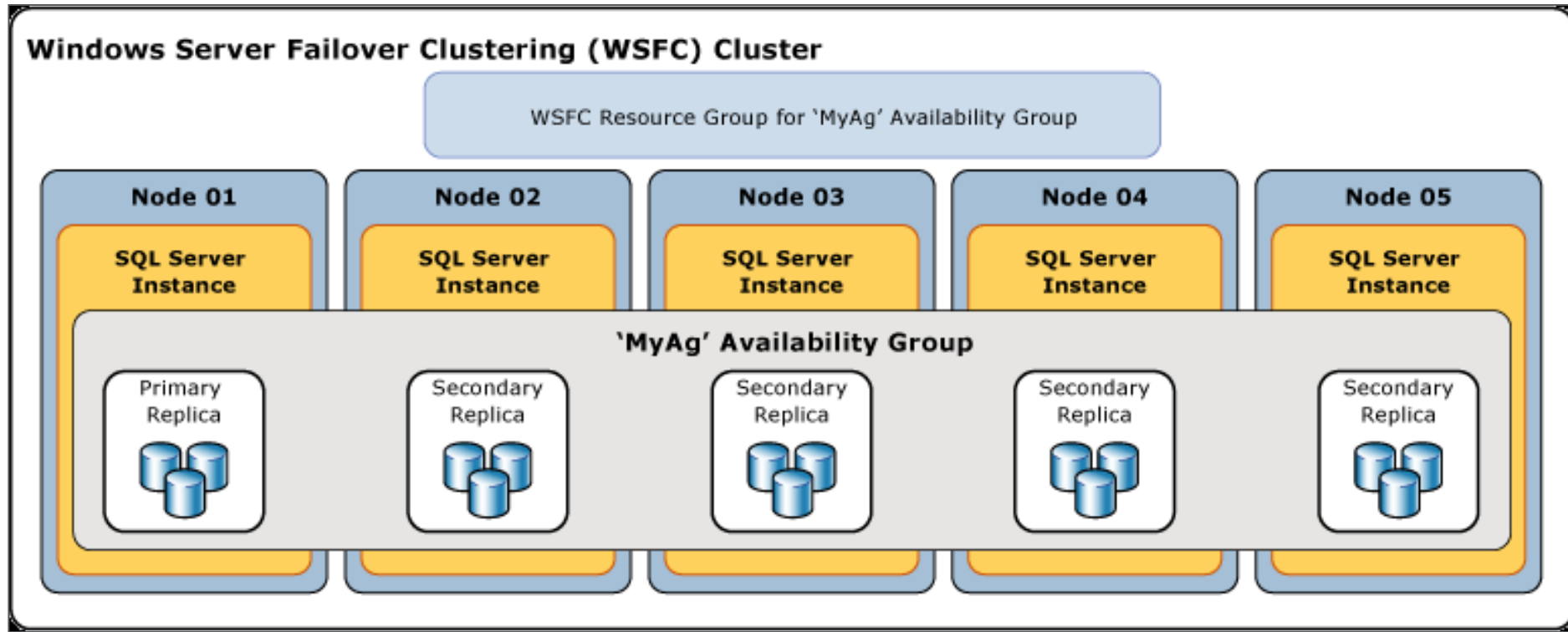


Image source: <http://bit.ly/1uyldU1>

Transactional Replication

Data is copied between multiple servers
and synchronized

Publisher database is writeable

Can have multiple subscriber databases,
on different servers

Schema changes on subscribers allowed

Read-only workloads can run against subscribers for
reporting or scale-out purposes

Creates additional workload on network
and storage infrastructure

More details: <http://bit.ly/166z4Tz>

Transactional Replication

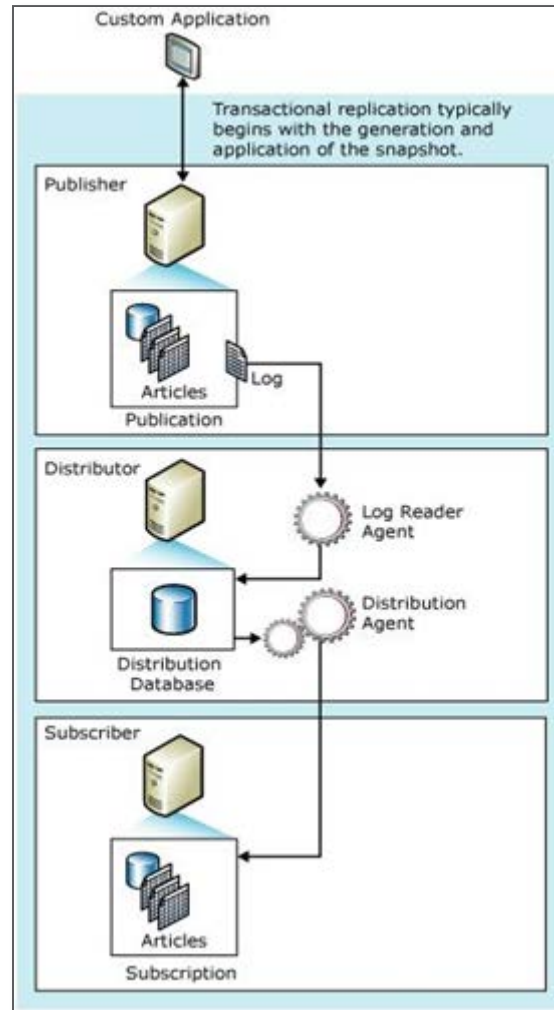


Image source: <http://bit.ly/1qj69DK>

Peer-to-peer Replication

P2P replication gives read/write capability on each node

Based on transactional replication and requires Enterprise Edition

More difficult to set up and maintain than basic transactional replication

P2P provides scale-out for read operations, but not for write-operations

More details: <http://bit.ly/fj1l7p>

Peer-to-peer Replication

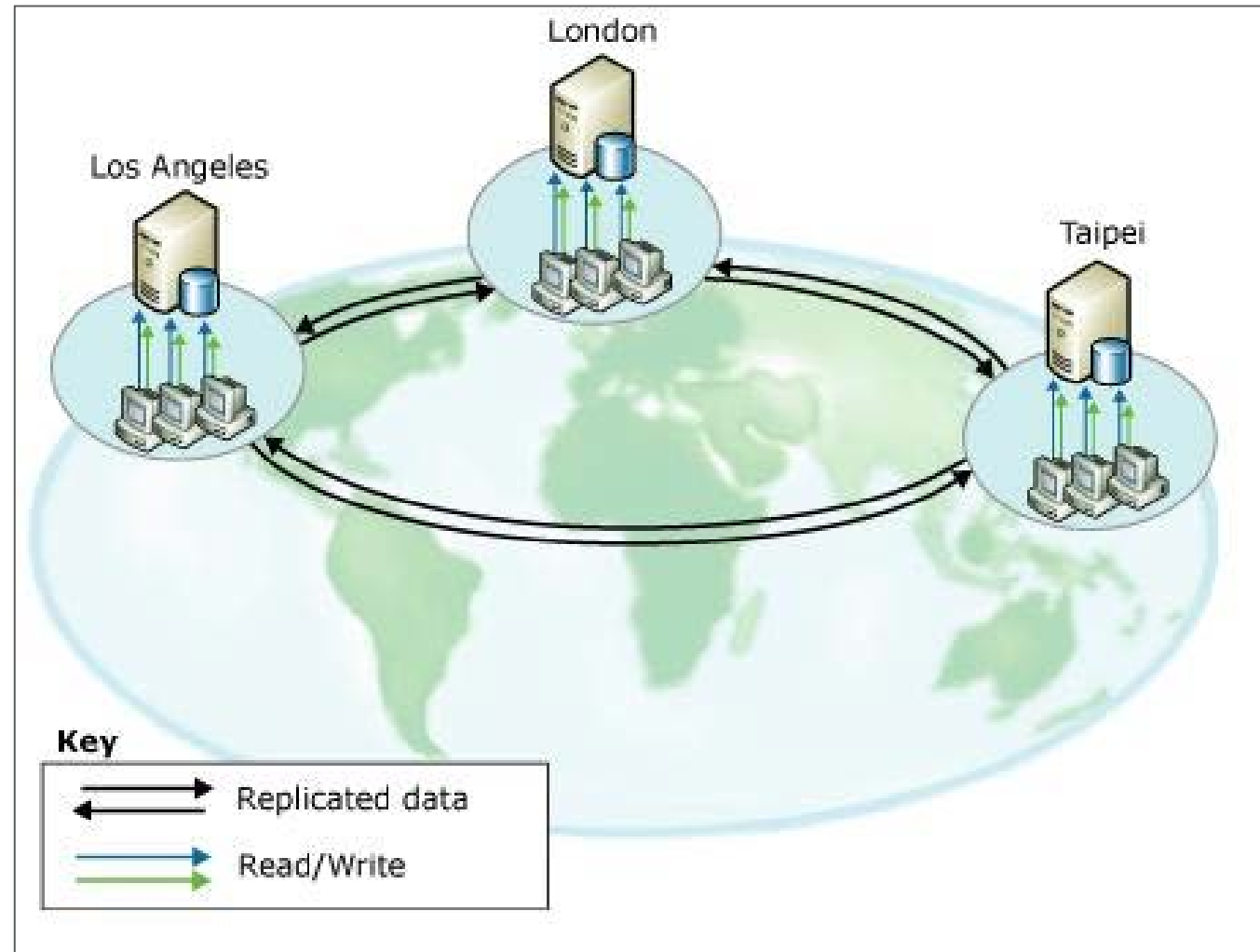


Image source: <http://bit.ly/1qj786T>

Distributed Partitioned Views

Tables split by ranges and in separate databases on separate servers

A UNION ALL view on one server ties them all together

Distributed Query does various optimizations

Unfortunately does not usually work very well, but influenced later partitioned table/index feature

More details: <http://bit.ly/xUpfou>

Service-oriented Database Architecture (SODA)

- Engineering technique to partition database/application by business function
 - Monolithic database split into multiple databases (usually 4-5 or less)
 - Each business function in separate database
- Databases are moved to separate database servers
 - Spreads load across multiple machines and gives some limited scale-out
 - May need some application changes to make this work
 - E.g., connection string changes

SODA Implementation Details

Separate data and objects by business function

Using database schema objects (besides dbo) can help do this later

Use a common database for writeable copy of shared tables

May want to use transactional replication to replicate common tables to all databases to avoid cross database (and cross server) joins

More details: <http://bit.ly/1dKVbWI>

Data Dependent Routing (DDR)

- Engineering technique to horizontally partition database (a.k.a. “sharding”)
 - Monolithic database split into multiple databases on different servers
 - Application knows how to find data it needs
 - Resources must be balanced as load changes and grows
- Engineering and development more difficult than SODA
 - Once engineering is done, easy to add more database servers
 - Use a hashing mechanism to allocate data between servers
 - “Scaling out SQL Server with Data Dependent Routing” at <http://bit.ly/1bj6uiu>

Data Dependent Routing

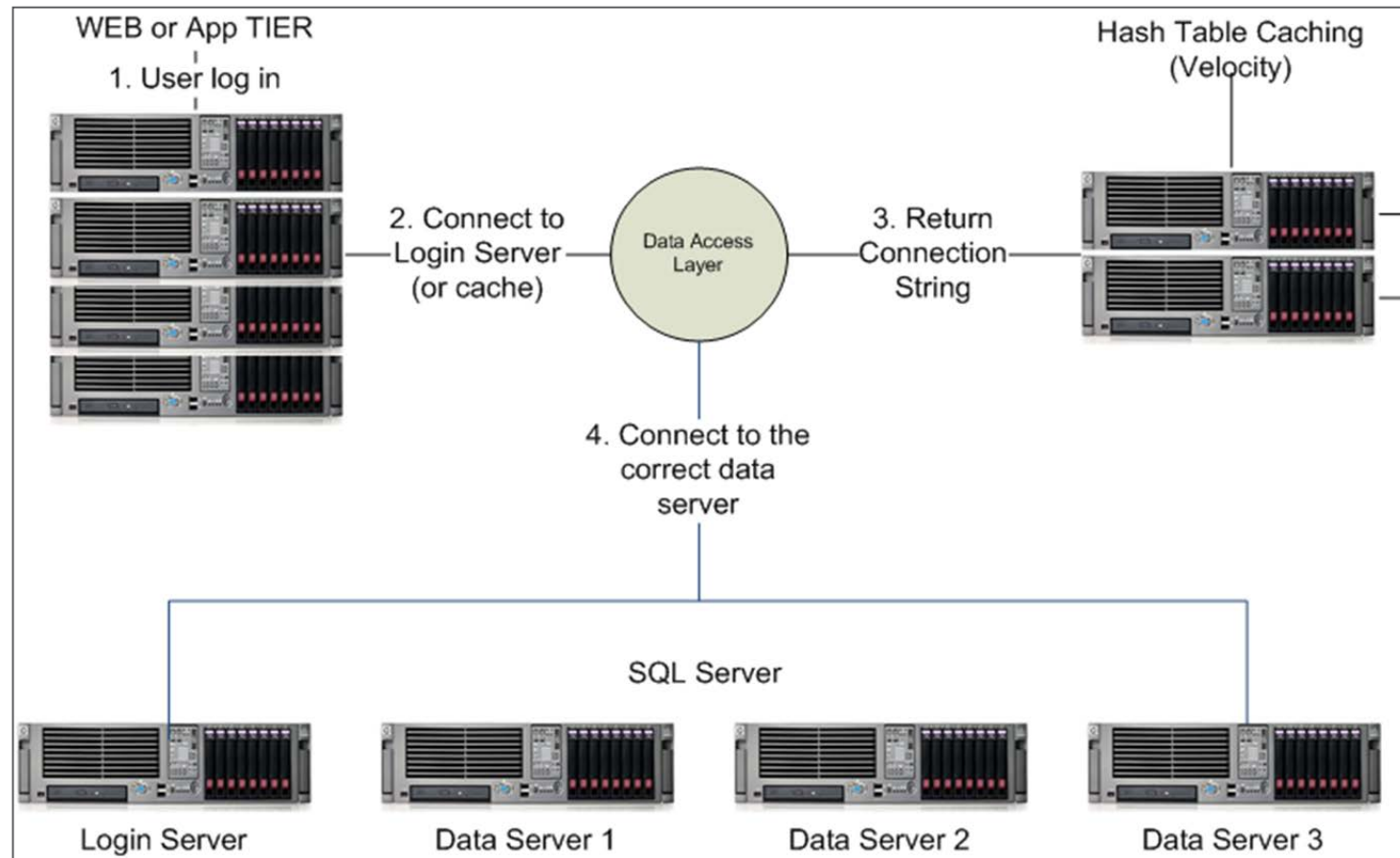


Image source: <http://bit.ly/1EdWK5Y>

Scale Out Realities to Remember



Scaling out requires talented engineering resources and time

Do not underestimate time and effort that will be required

Extra engineering costs may far outweigh capital cost savings

Plan carefully to minimize SQL Server license costs

Allows handling of a much larger overall workload than is possible by scaling up

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