Scaling and Optimizing Microsoft SQL Server with Citrix NetScaler

The challenges posed by exponential data growth

With the continued interest in web, mobile and social networking applications, the demand for data is growing exponentially. The interactive nature of today's applications requires data to be highly available and accessible. Enterprises and service providers responded by implementing Microsoft® SQL Server®; however, this rapid growth in data and increasing rate of data access is placing significantly higher demands on SQL Server scalability, availability and security.

Scalability – Database servers do not scale linearly as connection counts increase. SQL connections are highly memory and CPU-intensive, causing increased latency and poor application performance. In addition, a spike in SQL queries can overwhelm a database server's connection limits.

Availability – Balancing Microsoft SQL queries amongst database servers is complex because each SQL query can have widely varying runtimes rendering a simple, load balancing solution ineffective. TCP load balancers do not have the SQL transaction intelligence to divide the workload efficiently or accurately monitor the health of the database servers. Automatic failover also comes at a steep cost and requires extremely complex architectures with Microsoft SQL Server clustering. For non-clustered solutions, failover involves manual triggering and custom scripting.

Security – Regulatory and compliance requirements, such SOX, PCI DSS, HIPAA and other privacy laws require extensive logging and real-time monitoring of users and data. Security is also needed to protect against unauthorized data access and prevent sensitive data from being leaked or compromised.

Optimizing Microsoft SQL Server

Citrix® NetScaler® is an industry-leading application delivery controller (ADC) that is typically deployed at the web/application tier in the datacenter. NetScaler has extended its expertise and technologies for HTTP to SQL, enabling full native intelligence of Microsoft TDS (Tabular Data Stream). TDS protocol awareness enables NetScaler to operate as a SQL proxy for both SQL server 2005 and SQL Server 2008/2008 R2. In addition, NetScaler integrates policy

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and control with Microsoft Systems Center and is available as a virtual appliance, NetScaler VPX on Hyper-VTM. This enables NetScaler to provide an integrated, intelligent load balancing, connection multiplexing, health monitoring and database protections to increase the scalability, availability and security to the data tier.

Connection multiplexing – NetScaler's SQL transaction intelligence allows Microsoft SQL requests initiated from multiple clients to be sent over significantly fewer long-lived SQL connections to the database server, drastically reducing the ratio of client to server connections.

Load balancing – With SQL transaction awareness, NetScaler can route one client's many SQL transactions in a single connection to several different servers, allowing for more optimal load balancing of SQL traffic.

Content switching (e.g. read/write split) – NetScaler can read into Microsoft SQL transactions and decipher between "select", "drop", "insert", "update" and other SQL statements splitting SQL read and write queries and offloading the decision making and policy enforcement from the application servers to NetScaler.

Health monitoring – NetScaler intelligently load balances Microsoft SQL server requests by selecting the database server that will return up-to-date data the fastest at the time of the request and sending the read request to only that server. In the event of database server failure, NetScaler automatically and transparently reroutes outstanding SQL requests from the failed server to another available server without terminating client-side SQL connections.

Data security and threat control – Polices can be applied at the user level to control access to back-end database servers. NetScaler inspects all SQL transactions and can perform SQL protocol validation and data access control. Data access events can be audited and logged to meet compliance requirements.

Scaling-up Microsoft SQL Server with NetScaler

Scaling-up requires expensive and sophisticated hardware and operating systems to deliver scalability and availability to business applications. Scaling-up helps Microsoft SQL database servers take advantage of faster CPU, memory and I/O; however, server connection capacity remains a bottleneck which effectively limits the number of databases that can be hosted on a server. NetScaler's SQL connection management effectively scales-up database infrastructure in several ways.

Optimizes Connection Management – SQL connection multiplexing reduces the number of back-end server connections while simultaneously offloading SQL connection management, which directly solves database performance challenges and enables more databases to be hosted on a single Microsoft SQL Server.

Improved Response Time – SQL connection management reduces the amount of server memory and CPU cycles consumed, accelerating database response times.

Simplifies High-Availability – Automated IP failover with extensive health monitoring database replication provides a cost-effective high-availability solution when compared to clustering.

Scaling-out Microsoft SQL Server with NetScaler for OLTP

Online Transaction Processing (OLTP) scaling with commoditized hardware is a good option when high-speed data access is required. By intelligently distributing database queries across multiple servers, NetScaler can deliver the data reliably at a much lower cost point than scaling up. NetScaler's database load balancing feature simplifies SQL Server scale-out by:

Optimizing Load Balancing of Microsoft SQL Queries – Native TDS-aware load balancing distributes SQL requests based on query parameters and routes the request to the most appropriate SQL database for best performance and availability.

Performing Accurate Health Monitoring – SQL Server health monitors can measure server performance based on a variety of factors including replication backlog and response time, detect server failures and seamlessly failover to back-up databases.

Conclusion

With Citrix NetScaler's database load balancing feature, enterprises can tackle the challenges of an ever-growing sprawl of database servers. NetScaler's native SQL intelligence addresses the connection management, load distribution and high-availability pain points of scaling Microsoft SQL Server deployments. NetScaler simplifies database management and scaling resulting in greater availability, performance and security.

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