ORACLE NOSQL DATABASE, 12.1.3.5, COMMUNITY EDITION

The Oracle NoSQL Database (ONDB) provides network-accessible multi-terabyte distributed key/value pair storage with predictable latency. Data is stored in a very flexible key-value format, where the key consists of the combination of a major and minor key (represented as a string) and an associated value (represented as a JSON data format or opaque set of bytes). It offers full Create, Read, Update and Delete (CRUD) operations, with adjustable durability and consistency guarantees. It also provides powerful and flexible transactional model that eases the application development.

The Oracle NoSQL Database is designed to be a highly available and extremely scalable system, with predictable levels of throughput and latency, while requiring minimal administrative interaction.

Architecture

The Oracle NoSQL Database is built upon the proven Oracle Berkeley DB Java Edition high-availability storage engine, which is in widespread use in enterprises across industries. In addition, it adds a layer of services for use in distributed environments.

The resulting solution provides distributed, highly available key/value storage that is well suited to large-volume, latency-sensitive applications.

High Availability and No-Single Point of Failure

The Oracle NoSQL Database provides single-master, multi- replica database replication. Transactional data is delivered to all replica nodes with flexible durability policies per transaction.

In the event the master replica node fails, a PAXOS-based automated fail-over election process minimizes downtime. This allows for scalability, fail-over, and hot-standby.

Transparent Load Balancing

The Oracle NoSQL Database Driver partitions the data in real time and evenly distributes it across the storage nodes. It is network topology and latency-aware, routing read and write...
Use Cases
• “Last mile” Big Data connectivity
• Click-through data capture
• High-throughput event processing
• Social networks
• Online retail
• Customer profile management
• Mobile application backend infrastructure
• Real-time sensor aggregation
• Networking device monitoring and management
• Scalable authentication
• Content management
• Archiving

KEY BENEFITS
• High throughput
• Bounded latency (sub-millisecond)
• Near-linear scalability
• High Availability
• Short time to deployment
• Smart Topology Management
• Online Elastic Configuration
• No conflict resolution requirement
• Commercial-Grade Software and Support

RELATED PRODUCTS
• Oracle Big Data Appliance
• Oracle Exadata
• Berkeley DB Java Edition
• Oracle Big Data SQL

operations to the most appropriate storage node in order to optimize load distribution and performance.

JSON Data Format
The Oracle NoSQL Database has support for the Avro data serialization, which provides an extremely compact, schema-based binary data format. Avro allows for the definition of a schema (using JSON) for the data contained in a record’s value and it also supports schema evolution.

Configurable Smart Topology
System administrators indicate how much capacity is available on a given storage node, allowing more capable storage nodes to host multiple replication nodes. Once the system knows about the capacity for the storage nodes in a configuration, it automatically allocates replication nodes intelligently. This results better load balancing for the system, better use of system resources and minimizing system impact in the event of storage node failure. Smart Topology also supports Data Centers, ensuring that a full set of replicas is initially allocated to each data center.

Elastic Configuration
The Oracle NoSQL Database includes a topology planning feature, with which an administrator can now modify the configuration of a NoSQL database, while the database is still online. This allows the administrator to:

Increase Data Distribution: by increasing number of shards in the cluster, this increases write throughput.

Increase Replication Factor: by assigning additional replication nodes to each shard, which increases read throughput and system availability.

Rebalance Data Store: by modifying the capacity of a storage node(s), the system can be rebalanced, re-allocating replication nodes to the available storage nodes, as appropriate. The topology rebalance command allows the administrator to move replication nodes and/or partitions from over utilized nodes onto underutilized storage nodes or vice versa.

Easy Administration and Enhanced System Monitoring
The Oracle NoSQL Database provides an administration service, which can be accessed either from a web console or a command-line interface (CLI). This service supports core functionality such as the ability to configure, start, stop and monitor a storage node, without requiring manual effort with configuration files, shell scripts, or explicit database operations.

In addition it also allows Java Management Extensions (JMX) or Simple Network Management Protocol (SNMP) agents to be available for monitoring. This allows management clients to poll information about the status, performance metrics and operational
parameters of the storage node and its managed services.

**Table Data Model**

A tabular data structure is available, which simplifies application data modeling by leveraging existing schema design core concepts. Table model is layered on top of the distributed key-value structure, inheriting all its advantages and simplifying application design even further by enabling seamless integration with familiar SQL-based applications.

**Secondary Index**

Primary key only based indexing limits number of low latency access paths. Sometime application needs a few non-primary-key based paths to support the whole solution for the real-time system. Being able to define secondary index on any value field dramatically improves performance for queries.

**APIs**

The Oracle NoSQL Database includes Java and C APIs. These simple APIs allow the application developer to perform CRUD operations on the Oracle NoSQL Database. These libraries also include Avro support, so that developers can serialize key-value records and de-serialize key-value records interchangeably between C and Java applications.

**Python and NodeJS drivers**

The Oracle NoSQL Database has added support for NodeJS and Python drivers. Customers can now use their Python or NodeJS application to query, create, update or delete data that's stored in NoSQL using these drivers.

**Oracle RESTful Services**

The Oracle NoSQL Database includes support for exposing the Oracle NoSQL Database tables as REST API endpoints. The data stored in the tables can be created, queries, updated, and deleted using REST with JSON filters. This allows customers to build a REST-based application that can access data in either the Oracle Database or the Oracle NoSQL Database.

**Large Object Support**

Stream based APIs are provided in the product to read and write Large Objects (LOBs) such as audio and video files, without having to materialize the value in its entirety in memory. This permits low latency operations across mixed workloads of objects of varying sizes.

**Apache Hadoop Integration**

`KVAvroInputFormat` and `KVInputFormat` classes are available to read data from the Oracle NoSQL Database natively into Hadoop Map/Reduce jobs. One use for this class is to read the Oracle NoSQL Database records into Oracle Loader for Hadoop.

**High Performance**

The Oracle NoSQL Database is network topology and latency aware. The Oracle NoSQL Database Driver working in conjunction with highly scalable, fault tolerant, high throughput storage engine enables a more granular distribution of resources and processing, which reduces the incidence of hot spots and provides greater performance on commodity based hardware.

**Online Rolling Upgrade**

Upgrade and patching is an important part of any software support cycle. The Oracle NoSQL Database provides facilities to perform a rolling upgrade, allowing a system administrator to upgrade all of the nodes in the Oracle NoSQL Database cluster while the database continues to remain online and available to clients.

**Multi Zone Deployment**

The Oracle NoSQL Database supports the definition of multiple zones from within the
topology deployment planner. It leverages the definition of these zones internally to intelligently allocate replication of processes and data, ensuring optimal reliability during hardware, network & power related failure scenarios.

There are two types of Zones: Primary zones contain nodes that can be served as masters or replicas and are typically connected by fast interconnects. Secondary zones contain nodes which can only be served as replicas. Secondary zones can be used to provide low latency read access to data at a distant location, or to offload read-only workloads, like analytics, report generation, and data exchange for improved workload management. The Oracle NoSQL Database allows users to continue business operations in the event of zone failures. This allows for any planned maintenance that results in the taking of one or more zones offline without impacting business operations.

Security

OS-independent, cluster-wide file based user password authentication, enables greater protection from unauthorized access to sensitive data. Additionally, session-level Secure Sockets Layer (SSL) encryption and network port restrictions deliver greater protection from network intrusion.

Commercial Grade Software and Support

The Oracle NoSQL Database overcomes a significant limitation faced by many enterprises considering the implementation of NoSQL databases—the need for full supportability. The Oracle NoSQL Database is a commercial product fully supported by Oracle. This gives organizations the confidence and reduces the risk they need to deploy the Oracle NoSQL Database in the production environments they depend on to manage their business-critical data.
Contact Us
For more information about the Oracle NoSQL Database, visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.

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