# ORACLE GLOBALLY DISTRIBUTED AUTONOMOUS DATABASE

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## CONTEXT

Oracle recently launched its Globally Distributed Autonomous Database, a significant addition to Oracle Cloud Infrastructure (OCI) that's now globally accessible.

The new Oracle Globally Distributed Autonomous Database enhances the management and processing of distributed data, ensuring top-tier scalability, availability, and adherence to data sovereignty laws for users of Oracle Database.

The service's inherent automation and user-friendly nature negate the need for a large team of database experts, streamlining the deployment and management of distributed databases across various locations.

Key features of the Oracle Globally Distributed Autonomous Database include:

- **High Availability**: It employs a sharding technique to divide a logical database across multiple physical locations, ensuring that issues in one shard do not impact the others. It also features automatic shard replication for additional outage protection, running on Exadata infrastructure for unmatched availability.

- **Horizontal Scalability**: The service allows for seamless horizontal scaling by adding more servers and shards without disrupting database operations, supporting data growth from terabytes to petabytes.

- **Data Sovereignty**: Organizations can control where their data resides through customizable data placement policies, ensuring compliance with local data laws.

- **Flexible Data Distribution**: It offers several data distribution methods, surpassing the limited options available in other databases, and includes value-based, consistent hash, user-defined, duplicated, and partitioned distribution methods.

- **Autonomous Management**: Leveraging machine learning, the service autonomously manages database patching, security, tuning, and performance scaling, combining vertical and horizontal scalability.

- **AI and Simple Application Development**: Supports Autonomous Database Select AI for natural language queries and provides a unified database view to simplify distributed application development.

Oracle's Globally Distributed Autonomous Database is designed for various applications, from payment processing to IoT, promising hyperscale performance, data sovereignty, high availability, and cloud-native application development.

# INSIDE THE ORACLE GADB

The Oracle Globally Distributed Autonomous Database is a significant advancement in managing and operating distributed databases, offering a comprehensive solution tailored for enterprises that require high levels of data availability, scalability, and compliance with data sovereignty laws.

This service seamlessly integrates into Oracle Cloud Infrastructure (OCI), utilizing the robust capabilities of Oracle's cloud to deliver a highly sophisticated, autonomous data management platform.

## HIGH AVAILABILITY AND FAULT TOLERANCE

The database architecture employs a sharding mechanism, partitioning a single logical database into multiple physical databases (shards) distributed across different data centers, availability domains, or regions. This design ensures that a fault in one shard doesn't impact the availability of others, enhancing the overall system's resilience.

Shards are automatically replicated across domains or regions, safeguarding against data loss or access interruption due to regional outages. The system runs on Oracle's fault-tolerant Exadata infrastructure, ensuring maximum availability.

## SCALABILITY

The system allows horizontal scaling by adding more servers and database shards as needed, facilitating online expansion without interrupting database operations. This dynamic scalability supports a balanced workload distribution and can accommodate data growth from terabytes to petabytes.

Each shard operates on an Exadata platform within OCI, offering high levels of performance that can be automatically adjusted to meet local demands, scaling up for increased workload or down to optimize costs.

## DATA SOVEREIGNTY

Organizations can define where their data resides using customer-defined data placement policies, ensuring compliance with local and international data sovereignty requirements. These policies automatically direct updates and transactions to the appropriate shard.

## DATA DISTRIBUTION FLEXIBILITY

Unlike competing database systems that offer limited distribution methods, the Oracle Globally Distributed Autonomous Database supports a variety of data distribution strategies within shards, including value-based, system-managed, consistent hash, user-defined, duplicated, and partitioned distribution. This flexibility allows for optimal data placement and access patterns.

## AUTONOMOUS MANAGEMENT

The service leverages machine learning to automate numerous database management tasks, including patching, security updates, tuning, and performance scaling within each shard. This reduces the need for extensive database administration expertise, lowering operational costs and complexity.

## AI-ENABLED ACCESS

The Autonomous Database Select AI feature enables users to perform queries using natural language facilitated by large language models. This allows intuitive access to distributed databases without requiring in-depth data structure or location knowledge.

## SIMPLIFIED APPLICATION DEVELOPMENT

Applications interact with the Globally Distributed Autonomous Database as if it were a single logical entity despite the underlying complexity of distributed data storage. This simplification, combined with cloud-native capabilities and Oracle Database's rich feature set, streamlines the development of modern, scalable applications.

## PRICING

Pricing for the Globally Distributed Autonomous Database is straightforward, based on the number of shards used and the volume of database consumption on each shard, allowing for predictable budgeting and financial planning.

# ANALYSIS

In addition to announcing its Globally Distributed Autonomous Database, Oracle has also recently announced enhancements across its database portfolio, including integrating generative AI with Autonomous Database Select AI, which translates natural language questions into SQL queries.

This, along with upcoming features such as Oracle Database 23c with Raft quorum-based consensus replication and AI Vector Search, positions Oracle's Globally Distributed Autonomous Database as a clearly differentiated, comprehensive, highly functional, and critical solution for distributed database management in the cloud era.

The new capabilities aren't just a technical improvement; they are a strategic enabler for businesses grappling with the complexities of data sovereignty, scalability, and availability on a global scale. The simplicity of deployment and management, courtesy of AI and ML-driven automation, significantly reduces the operational overhead, presenting a compelling value proposition.

Furthermore, integrating generative AI to facilitate natural language processing into SQL queries is a forward-thinking move that enhances the accessibility and usability of database technologies for both users and developers.

As organizations increasingly look to leverage data as a strategic asset across dispersed operations, Oracle's Globally Distributed Autonomous Database is setting a new benchmark for mission-critical distributed database services, offering a robust, scalable, and cost-effective solution that aligns with the global distribution of business operations.