DISTRIBUTED DATABASE SCHEMA PATENT

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Assignee: Summit Digital Solutions, Inc.

ABSTRACT

A system and method for implementing a distributed database schema optimization framework that dynamically adjusts database architectures across distributed enterprise environments. The invention comprises an AI-driven schema analysis engine that continuously monitors query patterns, data access frequencies, and system performance metrics to automatically recommend and implement optimized database structures. The system utilizes machine learning algorithms to predict future data access patterns and preemptively restructure database schemas to maintain optimal performance.

BACKGROUND OF THE INVENTION

[0001] Modern enterprise systems frequently operate across multiple geographic locations with varying data access patterns and performance requirements. Traditional static database schemas struggle to efficiently handle dynamic workloads in distributed environments.

[0002] Existing solutions typically require manual intervention to modify database structures, leading to operational inefficiencies and potential system downtime. There exists a need for an automated, intelligent system to optimize database schemas in real-time across distributed enterprise environments.

SUMMARY OF THE INVENTION

[0003] The present invention provides a novel approach to database schema optimization through:

a) Continuous monitoring of query patterns and performance metrics across distributed database instances

b) Machine learning-based prediction of future data access patterns

c) Automated schema modification recommendations based on historical and predicted usage patterns

d) Dynamic implementation of schema changes with minimal system disruption

e) Real-time performance validation and rollback capabilities

DETAILED DESCRIPTION

System Architecture

[0004] The system comprises the following primary components:

Data Collection Module

- Query pattern analyzer
- Performance metric collector
- Usage pattern tracker
- System resource monitor

Machine Learning Engine

- Historical pattern analysis
- Predictive modeling
- Anomaly detection
- Optimization recommendation generator

Schema Modification Module

- Change impact analyzer
- Implementation scheduler
- Rollback manager
- Performance validator

Implementation Method

[0005] The system operates through the following process:

Initial Setup Phase

- Database connection establishment
- Baseline performance measurement
- Historical data collection
- Pattern recognition training

Continuous Monitoring Phase

- Real-time metric collection

- Pattern analysis
- Performance threshold monitoring
- Alert generation

Optimization Phase

- Schema change recommendation
- Impact analysis
- Implementation scheduling
- Change execution
- Performance validation

CLAIMS

A method for optimizing distributed database schemas comprising:

a) Collecting performance metrics across distributed database instances

b) Analyzing query patterns using machine learning algorithms

c) Generating schema optimization recommendations

d) Implementing schema changes automatically

e) Validating performance improvements

The method of claim 1, wherein the machine learning algorithms comprise:

a) Neural networks for pattern recognition

b) Predictive analytics for future usage estimation

c) Decision trees for optimization selection

d) Reinforcement learning for continuous improvement

A system for implementing the method of claim 1, comprising:

a) Data collection modules

b) Machine learning engines

c) Schema modification modules

d) Performance validation components

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ASSIGNMENT

All rights, title, and interest in this patent application are assigned to Summit Digital Solutions, Inc., a Delaware corporation having its principal place of business at 2200 Innovation Way, San Francisco, CA 94105.

DECLARATION

I hereby declare that I am the original inventor of the subject matter which is claimed and for which a patent is sought. The foregoing is true and I acknowledge that willful false statements are punishable by fine or imprisonment, or both.

Executed on: March 15, 2022

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