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**Distributed database technology financial application
specification Technical architecture
(English Translation)**

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Foreword

This document is in accordance with GB/T 1.1-2020 "Guidelines for Standardization Part 1: Structure and Drafting Rules of Standardization Documents" to be drafted.

This document was submitted by the People's Bank of China. Please note that some of the contents of this document may involve patents. The issuing agency of this document is not responsible for Identify the responsibilities of these patents.

This document is under the jurisdiction of the National Financial Standardization Technical Committee (SAC/TC 180).

Introduction

With the transformation and upgrading of the distributed architecture in the financial field, the application of distributed database technology in the financial field has gradually deepened. For canonical distribution Application of distributed database technology in the financial field, strengthen the technical support of distributed database technology for financial services, and improve distributed database technology this document is specially

prepared for the ability of technology to ensure business continuity and information security.

This document is one of the distributed database technology financial application series standards. The distributed database technology financial application series standards include.

- "Technical Framework of Distributed Database Technology Financial Application Specification";

- "Distributed Database Technology Financial Application Specification Security Technical Requirements";

- "Disaster Recovery Requirements for Distributed Database Technology Financial Application Specification".

Distributed database technology financial application specification technical framework

1 Scope

This document specifies the architectural requirements for distributed transaction database technology in the financial field, covering technical frameworks, functional features, and operation and maintenance management.

This document is suitable for the development, testing, evaluation, and application of distributed transaction databases in the financial field.

2 Normative references

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. Among them, dated reference documents, Only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document file.

GB/T 15387.1-2014 Terminology database development document preparation guide GB/T 17532-2005 Terminology Work Computer Application Vocabulary GB/T 25069-2010 Information Security Technical Terms GB/T 30994-2014 Relational database management system testing specifications GT/T 32633-2016 Distributed relational database service interface specification JR/T 0204 Distributed Database Technology Financial Application Specification Security Technical Requirements JR/T 0205 Distributed Database Technology Financial Application Specification Disaster Recovery Requirements

3 Terms and definitions

JR/T 0204-2020, JR/T 0205-2020 The following terms and definitions apply to this document.

Database

A collection of data organized according to a predetermined structure.

[Source. GB/T 17532-2005, 7.5] 3.2 Transaction A group of related operations characterized by atomicity, consistency, durability, and isolation.

Distributed transaction A transaction in which transaction participants, transaction-supporting servers, resource servers, and transaction managers are located on different nodes.

Distributed transaction database Database with distributed transaction processing mechanism.

Consistency

In a certain system or component, the degree of uniformity, standardization and non-contradiction between documents or parts.

[Source. GB/T 25069-2010, 2.1.61] 3.6 Data replica that is, in a distributed database, multiple redundant versions of data are introduced to ensure the reliability of the data.

Data sharding

The data in the database table is distributed to multiple data storage nodes according to certain sharding rules to balance the data capacity and Visit load.

4 Abbreviations

The following abbreviations apply to this document.

ACID. Atomicity, Consistency, Isolation, Durability (Atomicity, Consistency, Isolation, Durability) CSV. Comma-Separated Values DDL. Data Definition Language (Data Definition Language) DML. Data Manipulation Language (Data Manipulation Language) IO. Input and Output (Input Output) LOG. Log file (Logfile) QPS. Queries Per Second (Queries Per Second) RTO. Recovery Time Objective SQL. Structured Query Language (Structured Query Language) TPS. Transactions Per Second (Transactions Per Second) JDBC. Java Database Connectivity Specification (Java Database Connectivity Specification) ODBC. Open Database Connectivity Specification (Open Database Connectivity Specification)

5 Overview

The database system is the basic software that organizes, stores and manages data according to a specific data structure. It can be divided into centralized data based on different architectures.

Database and distributed database. The centralized database stores and processes data in a physical space, which is a relatively classic and traditional architecture mode. Distributed

database is a physically dispersed and logically centralized database system, using distributed transaction processing, automatic data sharding, Technologies such as multi-copy storage of data connect multiple logically related nodes scattered in a computer network to provide services to the outside world.

6.1 Overview of the technical framework

The technical architecture of distributed transaction database includes three parts. management module, computing module and storage module. The main functions and logic of each part are the relationship between the series is shown in Figure 1.

Figure 1 Distributed transaction database technology architecture

6.2 Physical resource layer

The physical resource layer refers to the basic hardware facilities and equipment of the distributed transaction database, which provides for the distributed transaction database and upper-level business system.

Provides the basic support environment, including physical infrastructure such as power supply for the physical computer room, computing equipment and storage equipment, and network equipment. The physical resource layer should Use safe and controllable hardware with an open architecture for construction to ensure safety, availability and reliability. The specific requirements are as follows.

- a) It should support computing acceleration capabilities such as processor multi-channel interconnection technology, compression and decompression.
- b) The network topology of each network element should be dynamically monitored to achieve reliability, scalability, and easy maintenance.
- c) It should support more than two processor architecture systems, and the processor has trusted computing capabilities.
- d) A dynamically configured blacklist mechanism or firewall mechanism should be provided to prevent network paralysis caused by malicious nodes.

6.3 Calculation module

The computing module is responsible for parsing application query requests, generating query plans, and automatically assigning query plans to each computing node for parallel execution.

Row. Use technologies such as distributed transaction processing to ensure data correctness, and use technologies such as concurrency control and dynamic resource allocation to improve distributed transactions the calculation efficiency of the database in complex business scenarios, the specific requirements are as follows.