Alibaba Cloud

Cloud Native Distributed Database PolarDB-X

Product Introduction

Alibaba Cloud

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Document conventions

Style	Description	Example
⚠ Danger	A danger notice indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	⚠ **Danger:** Resetting will result in the loss of user configuration data.
🔔 Warning	A warning notice indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.	🔔 **Warning:** Restarting will cause business interruption. About 10 minutes are required to restart an instance.
🔊 Notice	A caution notice indicates warning information, supplementary instructions, and other content that the user must understand.	🔊 **Notice:** If the weight is set to 0, the server no longer receives new requests.
❓ Note	A note indicates supplemental instructions, best practices, tips, and other content.	❓ **Note:** You can use Ctrl + A to select all files.
>	Closing angle brackets are used to indicate a multi-level menu cascade.	Click **Settings**> **Network**> **Set network type**.
Bold	Bold formatting is used for buttons , menus, page names, and other UI elements.	Click **OK**.
Courier font	Courier font is used for commands	Run the `cd /d C:/window` command to enter the Windows system folder.
Italic	Italic formatting is used for parameters and variables.	`bae log list --instanceid` _Instance_ID_
[] or [a|b]	This format is used for an optional value, where only one item can be selected.	`ipconfig [-all|-t]`
{} or {a|b}	This format is used for a required value, where only one item can be selected.	`switch {active|stand}`

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1.Overview

This topic describes the features of PolarDB-X 1.0 to help you get started with PolarDB-X 1.0.

Introduction

PolarDB-X 1.0 is developed by Alibaba Cloud. This service is integrated with the distributed SQL engine PolarDB-X 1.0 and the self-developed distributed storage X-DB. Based on the integrated cloud-native architecture, this service supports up to tens of millions of concurrent connections and hundreds of petabytes of mass data storage. PolarDB-X 1.0 aims to provide solutions for mass data storage, ultra-high concurrent throughput, performance bottlenecks for large tables, and efficiency for complex computing. PolarDB-X 1.0 has been tested in each Tmall Double 11 Shopping Festival and in the business of Alibaba Cloud customers in various industries. This service boosts the digital transformation of enterprises.

PolarDB-X 1.0 adopts standard relational database technologies to provide core features. The databases are deployed with the comprehensive management, O&M, and product-based capabilities. This makes the databases more stable, reliable, scalable, maintainable, and operable as in a traditional single-instance MySQL database.

PolarDB-X 1.0 has been used on Alibaba Cloud and Apsara Stack for many years, and has been tested in core transaction services of each Tmall Double 11 Shopping Festival and in the business of Alibaba Cloud customers in various industries. PolarDB-X 1.0 supports core online business for a large number of users across many industries, such as the Internet, finance and payment, education, communications, and public utilities. PolarDB-X 1.0 is an industry standard for all the core online services of Alibaba Group and business of Alibaba Cloud customers to connect to distributed databases.

Features

- Stability

  For most applications, relational databases are the core foundation of the data management system. The database performance affects user experience on services and protects business data. Therefore, stability is the core factor for you to select a database.

  Proper use of the time-tested MySQL databases ensures the stability of PolarDB-X 1.0. However, single-instance MySQL databases provide low performance in the high-concurrency, large-volume data storage, and complex computing scenarios.

  PolarDB-X 1.0 distributes data to multiple ApsaraDB RDS for MySQL instances. To ensure stable services, each instance undertakes a proper number of concurrent requests and computing loads, and stores a proper amount of data. PolarDB-X 1.0 implements distributed logic at the computing layer. This forms a stable, reliable, and highly scalable distributed relational database system.

  Compared with self-developed distributed NewSQL databases, PolarDB-X 1.0 focuses on continuous stability and O&M availability. By using standard database technologies, PolarDB-X 1.0 databases can be operated in a similar way as single-instance databases. You can get started with PolarDB-X 1.0 in a simple way and increase your business value.

- High scalability

  Compared with traditional single-instance relational databases, PolarDB-X 1.0 uses a hierarchical architecture to ensure linear scaling in concurrency, computing, and data storage. PolarDB-X 1.0 allows you to scale out computing and storage resources.

Compared with new cloud-native databases based on distributed storage, PolarDB-X 1.0 databases can be scaled out without limits. This eliminates the worries and O&M pressures on database scalability during rapid business development.

- Continuous O&M availability

For most applications, relational databases must work around the clock in a stable way. Therefore, continuous O&M availability is the key capability for relational databases.

PolarDB-X 1.0 has been used on Alibaba Cloud and Apsara Stack for many years, and provides a variety of product capabilities and a complete O&M system. Services can be automatically scheduled and integrated based on a complete set of API operations.

2.Architecture

PolarDB-X 1.0 assumes the role of the online core database in Online Transaction Processing (OLTP), and can be used with data integration, data transmission, caching, and big data ecosystems.

Kernel architecture

PolarDB-X 1.0 consists of Distributed Relational Database Service (DRDS) instances at the compute layer and custom ApsaraDB RDS for MySQL instances at the storage layer. Horizontal partitioning is implemented based on multiple mounted ApsaraDB RDS for MySQL instances for database sharding and table sharding.

Like most traditional single-instance relational databases, PolarDB-X 1.0 is divided into the network layer, protocol layer, SQL parsing layer, optimization layer, and execution layer. The optimization layer includes logical optimization and physical optimization. The execution layer includes single-instance two-stage execution, single-instance parallel execution, and multi-instance parallel execution. A variety of traditional single-instance database optimization and execution techniques are adopted.

Deployment architecture

PolarDB-X 1.0 is deployed on Alibaba Cloud and supports the following features to ensure production security:

- Supports virtual private clouds (VPCs), IP address whitelist, asymmetric encryption, and Transparent Data Encryption (TDE) to ensure data service security.
- Provides dedicated high-performance physical resources, full isolation between instances, and multi-zone instances to ensure data service stability.
- Deploys the O&M system in multiple regions and unbinds the Service Level Agreement (SLA) of core data services from O&M SLA to ensure O&M stability.

3.Scenarios

This topic describes applicable scenarios of PolarDB-X 1.0.

By application type

PolarDB-X 1.0 is suitable for Internet-based transaction businesses that require ultra-high concurrency and large data storage space. Due to the continuous growth of data, online transaction databases with higher computing capacity are required for traditional enterprise applications. In the last two years, PolarDB-X 1.0 has made significant progress in complex SQL optimization, parallel computing, and distributed transactions, which effectively satisfies such requirements.

By capacity

In Online Transaction Processing (OLTP) business scenarios, database capacity usually involves three dimensions: concurrency, data storage, and response time of complex SQL queries. For consideration of avoiding performance bottlenecks in a dimension or planning database selection for rapid business development, PolarDB-X 1.0 is used to create a distributed database. This can effectively reduce the later database expansion and O&M pressure.

In the early stage of business development, you must determine whether to use single-instance databases or distributed databases based on many factors. However, in terms of databases, features required for the business, such as the SQL statements, data types, transactions, and indexes, are fixed. For most businesses, an optimal distributed database like PolarDB-X 1.0 needs to support complete SQL syntax, data types, transactions, and indexes, and can be effectively scaled out in extreme scenarios.

By cost

The cost-based database selection for the business can be divided into the following two parts.

- If business development is too difficult to get started, projects may be delayed and business results are unsatisfactory. It is crucial for a new database to be compatible with the usage habits and full features of existing popular databases. PolarDB-X 1.0 is compatible with the MySQL ecosystem and the mainstream clients and drivers. In addition, it is compatible with SQL syntax, allowing quick service interconnection and adaptation.

- The long-term stability and excellent performance of a database are crucial to the business. PolarDB-X 1.0 distributes data and loads to multiple ApsaraDB RDS for MySQL instances. Therefore, PolarDB-X 1.0 databases are more stable than large-scale single-instance databases in face of the increasing loads. In terms of performance, PolarDB-X naturally supports distributed processing and is good at handling ultra-high concurrency. Based on single-instance parallel computing and multi-instance directed acyclic graph (DAG) computing, PolarDB-X 1.0 can meet the complex computing requirements of most online businesses.

By application lifecycle

PolarDB-X 1.0 partitioning modes can be seamlessly and smoothly connected to meet the database scalability requirements in each business lifecycle.

4.Pricing

PolarDB-X 1.0 integrates the distributed SQL engine and the proprietary X-DB distributed storage. Based on the integrated cloud-native architecture, PolarDB-X 1.0 supports up to tens of millions of concurrent requests and hundreds of petabytes of data storage.

For more information about the pricing of PolarDB-X 1.0, see Pricing.