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Data + Education. Redis Is a Cache or More?

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Redis is a cache or more?

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Abstract

In these rapid changes of technology, the only way to survive by providing data quickly. Also, previously database servers utilize their particular memory which is time-consuming. Redis is one of the fastest databases in the market which uses cache memory for storing and retrieving data frequently. Redis means is Remote Dictionary Server which is a fast in-memory data store that is mostly used as a cache, database, queue, and message broker. It also provides various modules like Redis Search, Redis Gear, and many more which help to build powerful applications such as search, real-time inventory monitoring, analytics, gaming, and more. Redis is enormous popularity among developers. Developers use it for its high performance, compatibility, and simplicity while developing complex functionality. You use plenty of applications that use Redis as session, storage, cache, and another way.

1 Introduction

In the last few years, software application users are increased from small shops to big organizations are on the internet. In this era, the difficulty of maintaining and providing data to users in a fraction of seconds is too difficult. Cloud is one of the solutions that can easily increase the servers and data storage based on application load. Yet it is not a final solution for application developers it provides space to manage users not provide speed to boost up applications and it is too costly. Redis is the ultimate solution for manage data and fetching data in a fraction of seconds. Also, Redis installation is very easy. It is the perfect solution for session management, caching, analytics, geospatial, and real-time analytics applications. Redis was created by Salvatore Sanfilippo in 2006 and it is written in C.

Its wide variety of data structures that make it better than others are hashes, sets, lists hyperloglogs, geospatial indexes, streams, bitmaps, and strings. Redis stores data in memory which helps to write and read operations to work fast. It can perform 81,000 read operations per second and 1,10,000 write operations per second. Also, RDMA type of technology implements with Redis accelerates Redis by two times faster (Tang, Lu et al. 2017).

2 Why it is more than a cache?

Mostly Redis used to store high-velocity data where the user interaction is high in every second required to fetch data and some operations required. Where the most of client use Redis as primary data storage for data which required fast or instant processing.

While server crashing all the data stored in memory can be lost; however, Redis provides back-up mechanisms which load the data from disk to memory while the server reboots (Chinnachamy 2013).

Sometimes user can request for some time of data on repetitive bases which take lots of bandwidth while requesting. To improve the performance of the Redis cache it stored the most frequently used keys in the client-side cache which makes it better(Reagan 2018). It is known as tracking. It has two different approaches. The first approach is the default mode which sends notifications to the client cache if any changes are found in a key that is stored in client-key. The second approach is the broadcasting mode which if any changes are found related to the key then it can check client subscribed key matching certain prefixes then send notification.

Redis also has the functionality of the publish-subscribe paradigm which is mostly used as a message broker (Redis, n.d.). Where it provides a list data structure for store data and publish-subscribe paradigm for published messages are send in specifics channels and subscribers can get only notifications of their interest.

It stores high-velocity of data, in-memory replication, and handles auto-failover scenarios which make it better than cache it has not provided by any other caching technologies.

3 Data Structures of Redis

Redis provides more data structures than NoSQL or other key-value stores which make it better than other databases(2021). It has strings, hashes, bit arrays and fields, hyperloglogs, geospatial indices, sorted sets, sets, and lists.

Strings are commonly found in all key-value stores; however, they can store text, integers, floats, images, videos, or audio files (Redis, n.d.). Redis provides operations perform on strings like incrementing numeric value and manipulation of strings.

Hashes stores multiple values of more than 4 billion in a small hash object. For example, it stores all student information in a single object of student id.

Bit arrays and fields use the required amount of space. Specially it's useful when software online users count and counting type of scenarios.

Hyperloglogs is used to count unique data in less processing time with accurate results(Redis, n.d.).

Geospatial indices use to store every user's geographical coordinate(Redis, n.d.). And it's the ultra-fast data structure of Redis that provides functions for find out nearest users, search all users in a particular area, and distance between two users.

Sorted sets it to define by itself from naming convention it retrieve all data in sorted order based on details. It helps to find out the most viewed articles, purchases by order amount, real-time bid management, top scores, etc. It is also used as a building block for search engines.

Set is a collection of strings that are unordered. It performs all types of operations like intersect, difference and union. Sets are useful for finding common purchases, interests, friends, create recommendations, and for identify similar items.

Lists are collections of string elements which are linked one to another, similar to links of a chain. It provides structures like insert the only top of the list or bottom of the list. It can take an equal amount of type to insert 500 records same for 50,000 records.

4 Redis modules: which make Redis better than others.

Redis modules make Redis core functionality better than others by providing search and new latest data models such as artificial intelligence, graph, time series, and JSON. It helps to developer build an application services with accuracy and fast result.

RediSearch is developed from scratch on top of Redis which provides a full-text search (redislabs, n.d.). research's main features are a powerful auto-suggest engine, support for multiple languages using UTF-8 encoding, simple, fast indexing, and searching.

RedisJSON stores data in a tree and hierarchical format (redislabs, n.d.). Also, JSON documents are manipulated in-memory at a high-velocity and volume.

RedisGears is useful for notifying or add new messages in the stream (redislabs, n.d.). It uses when need to make multiple data structures combination. Also, It is used when transfer or write of combination structures required.

RedisAI provides high availability and scalability (redislabs, n.d.). It serves deep learning and machine learning models which are trained by state-of-the-art platforms (Yegulalp 2016). It runs everywhere on state-of-the-art GPUs, CPUs, NVIDIA jetson devices, high-end compute engines, or even on tiny Raspberry Pi.

RedisGraph translates Cypher queries to matrix operations which are executed on a GraphBLAS engine (redislabs, n.d.). It is the fastest graph database that can process complex graph operations 10x-600x faster than other graph databases.

RedisTimeSeries provide a few simple codes using that retention rules, multi-key queries, and down sampling are easily possible (redislabs, n.d.). Also, it easiest and most efficient way to store time-series data in Redis.

5 Redis Session Management

The application maintains user details for various purposes for log their details, manage their activities, provide roles and rights, find out user logged in or logged out details. This all details are managed by Session. Session State is data that captures the user interaction with an application such as web application, games, or mobile application.

Where some applications use long-time sessions and some types of applications use short-time sessions. A session is managed by the application for example long-time sessions are available in a web application like Gmail, mobile or desktop games like clash of clans and valorant, or mobile application like Google Search, Google Photos. This all application maintains user session from logged in to logged out. In this type of application, users required one-time login. While banking mobile application or web application required daily or time session. This type of application session will be maintained for few hours or few minutes. After closing down of tab of the web application or close or go outside in the mobile banking application you required a password or user details for logged in again, Also in the payment service applications session will be maintained for few hours. After that session will be expired. This all process will be done by session management futures. In the current market several types of session management tools and applications available that helps to maintain your application session.

While storing sessions several points are concern like persistence, isolation, and volatility. Redis session contains all these concern solutions. And it is based on an asymmetric architecture that helps data size grow linearly and seamlessly without any changes in programming code. Also, it provides backup approach Append Only File(AOF) which can take backups of each writing operations and in every one second it take backup and store file in the disk. It helps to recover data in several scenarios like server failure or cache failure or restart of Redis.

6 Benefits of use Redis

In lots of application databases or servers, failure occurred if it timely not recovered then it may result in loss of data and millions of operations. Redis offers high availability with diskless replication and instant failure detection because of that Redis guarantees 99.99 % uptime and 99.999% active-active deployments which matters for a big organization wherein seconds millions or billions of users visit and perform tasks such as Gmail, Youtube, and so on (Redis, n.d.).

Organizations required high security in their application; however, Redis offers multi-layer security for authentication, authorization, encryption, and role-based access control (Redis, n.d.). Also, it isolates data from administrative access.

Redis Enterprise can be deployed on hybrid or multi-cloud architecture, on-premises, or any cloud platform. It provides active-active technology which helps to smoothly migrate applications on a cloud platform, or between clouds without a cutoff process.

Redis provides multiple data types in a single database platform with modules such as RedisAI, RedisGear, RedisJSON, RedisTimeSeries, RedisGraph, and RedisBloom.

Several enterprises offer or deploy their application in a distributed manner; however, in this application maintain the same data set on different geolocation is too difficult, and complete in a given time is very challenging. For globally distributed database active-active distribution provided by Redis which helps to simultaneously read and write operations on same datasets across multiple geo-locations. And it can automatically resolve conflicts writes, without any change in application. It provides the disaster-proof architecture for geo-distributed applications.

Day by Day technologies are growing more and they demand more cloud services. For that cloud environment required cluster-recovery, disaster-recovery, and robust backup mechanisms. Redis provides all capabilities to allow fast recovery in case of disaster and protect data in failure scenarios.

Redis provides a serverless engine and runs inside Redis which is known as RedisGear. It runs near to application data sets which helps to

perform any cluster-wide operations on nodes, data structures, or data models, and shards at a sub-millisecond speed in a fully programmable manner.

Redis Enterprise provides a cost-effective solution for host large datasets by SSD(Flash), DRAM, and persistence Memory. Using this approach helps to maintain fast accessing data in memory and less accessing data in SSD and persistence memory.

7 Conclusion

The conclusion is Redis is a database, cache, and message broker. Also, it provides unique and accurate results with high performance. Based on trends it works perfectly and easily install and fit in any applications with faster processing. It helps developer who likes to start developing in big applications in any platform for maintaining datasets Redis is best among the other datasets. And a huge and wide variety of supports, data structures, and data models make it more than cache.

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