ORACLE

KDDI prevents service downtime with MySQL InnoDB Cluster and reduces failure recovery time by 80%

"MySQL InnoDB Cluster automates failover on database failure. Anyone can perform the same high-quality operation independent of the skill level of the operations staff.

No service down due to the database has ever occurred."

KDDI Corporation
Platform Development Division
Service Application Development Department
Framework Group Supervisor
Yusuke Suzuki

CASE STUDY

KDDI Corporation is increasing in-house DBAs (Database Administrators) and aims to internalize implementation and operation of the database to avoid system failure. The company has adopted MySQL InnoDB Cluster and MySQL Enterprise Edition to strengthen database quality control.

INTRODUCTION

KDDI is a comprehensive telecommunications carrier that provides services such as "au" in mobile communications and fixed/international communications. KDDI has set "being a company that customers can feel closest to" as one of its goals, and is expanding business in various areas other than telecommunications. With the slogan of "the integration of telecommunications and life design", KDDI is spreading services from payments to e-commerce and social infrastructure, including Cashless payment "au PAY," internet banking "Jibun Bank," IoT service "au HOME" that makes life easier and more convenient by operating home appliances with smartphone apps, and electricity business "au Denki."

KDDI's Service Application Development Department, Platform Development Division, builds the IT infrastructure that supports communication services and non-communication businesses..

The Service Application Development Department has various organizational functions, and KDDI DBA Secretariat is positioned as a CoE (Center of Excellence) specialized for databases.

KDDI DBA Secretariat is responsible for consistent quality control of about 1,000 system databases in the company, working closely with many development and operation departments. Specifically, the Group provides training and technical support for the DBAs who are in charge of the development and operation of each service, standarding parameters, monitoring items, operations, and providing tools for development.

CHALLENGE

- In 2014-2015, KDDI assigned DBAs to each development and operation division and they are supported by members dedicated to the Framework Group databases. The reason KDDI tried this system was that there were many failures

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MySQL™

caused by databases at that time. Analysis of those troubles revealed the following two major problems.:

- First, the number of people who were familiar with the databases in the company was limited. When a failure occurred, they spent too much time resolving the trouble because they didn't know the details of the database, which was like a "Black box."

- Second, KDDI didn't have enough resources to check every item entrusted to SI partners and keep the quality of database to a high level because KDDI had many SI partners whose skills with databases were different, and this caused the first problem as well.

- KDDI DBA Secretariat created a basic policy on quality control for the databases of about 1,000 systems that exist in the company, and believed that two database management and operational policies were needed.

- One is a system managed individually and totally like the "F1 machine." The database supporting various telecommunication services, which is KDDI's core business, requires a platform with higher performance and availability, such as Oracle Exadata Database.

- The other is a system generalized and integrated, such as "a mass-produced car." It was difficult to estimate the future workload of databases generated by services in System of Engagement (SoE) fields other than telecommunications, so KDDI often launched the systems on a small start basis. KDDI uses MySQL provided by Oracle for these platforms.

- However, KDDI needed to guarantee the availability and reliability even for general-purpose and collectively managed databases. The cost was an essential requirement at the same time as guaranteeing the service level of the databases. KDDI believed MySQL InnoDB Cluster would be a powerful solution for these types of database. KDDI also decided to adopt MySQL Enterprise Monitor and MySQL Enterprise Backup from MySQL Enterprise Edition.

RESULTS

- By the end of June 2019, KDDI had launched two systems using MySQL InnoDB Cluster.

- One is a system originally using MySQL Master-Slave configuration for replication. The rapid increase in service demanded higher system requirements than initially expected. Since migrating to another platform while providing services was too risky, KDDI chose MySQL InnoDB Cluster as the best option to ensure availability under the same MySQL architecture.

- The other is a system construction project which was started to shift to in-house development. KDDI aimed to accelerate service deployment by using MySQL InnoDB Cluster.

- When a failure occurred in the conventional MySQL Master-Slave configuration, the operator had to perform many operations for recovery, but the number of operators having the necessary skills was limited. MySQL InnoDB Cluster solved the problem and realizes automatic failover, eliminating the fear of a long service outage.

- MySQL Shell has been particularly useful in disaster recovery. It enables everyone to perform the same high-quality operations without depending on the skill level of the operator and reduces the time required for recovery by more than 80%. In some cases, by using MySQL Shell, failure recovery time has been reduced to about 10 minutes when it used to be nearly an hour.

- MySQL InnoDB Cluster made it possible for KDDI to recover from potential failure without affecting applications and businesses. No database downtime has occurred since the system was launched.

- In addition, MySQL Enterprise Monitor is very effective in monitoring failures and detecting potential issues. For operators who are not database experts, it was

difficult to find problems occurring currently and confirm them. Problems could be overlooked until the DBAs confirmed them. MySQL Enterprise Monitor always watches the database and alerts operators to potential problems visually before they affect the system. KDDI has been able to obtain high-quality operation monitoring independent of the experience or skill of the operator.

· Also, MySQL Enterprise Backup drastically reduced the time required for database backup and restore. The backup time was 10% or less compared to using the mysqldump command. It solves problems such as backup not ending overnight or abnormal termination.
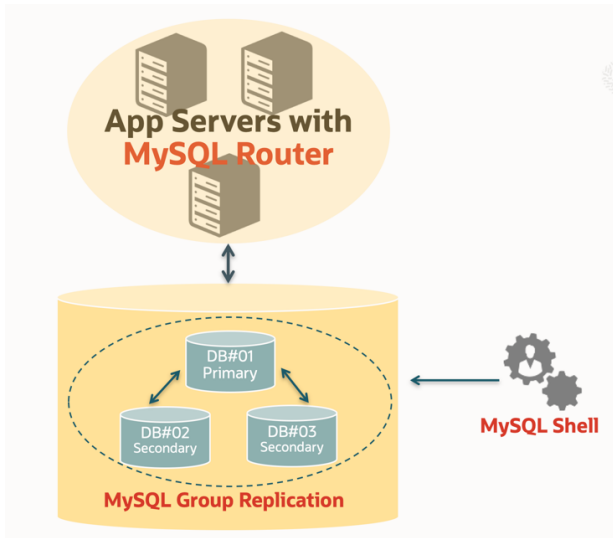
MySQL group replication configuration diagram

WHY ORACLE

Oracle Consulting was the key that enabled KDDI decide to adopt MySQL InnoDB Cluster, MySQL Enterprise Monitor, and MySQL Enterprise Backup. KDDI still highly appreciates the program even after the systems have been launched.

"Database quality control cannot be achieved only by installing a product. Oracle provided full-scale support for our initiatives aimed at insourcing database construction/operation and eliminating system failures, from personnel training to standardization of operations and catch-up with new functions of MySQL. As a result, it has been possible to train DBAs who excel in the relevant divisions of each service. Their capacity to promote technical ability is huge, and it has now increased company-wide motivation to create services that will delight our customers. On the other hand, now that we have accumulated specialist expertise relating to databases in-house, we can converse with SI partners on an equal footing, and we have become able to properly negotiate with them."
- Shinya Miyazawa, Framework Group Manager, Service Application Development Department, Platform Development Division, KDDI Corporation

"From the perspective of further strengthening our database quality control, we want to focus on building environments that the relevant divisions of each service can use easily, making full-scale use of MySQL Query Analyzer, which we are yet to master, and implementing a structure whereby databases can be restored and recovered with a single click. In addition, we need to fully understand and respond to the various demands that come up from the service site. In that sense, Oracle's support and consulting are essential for us going forward."
- Yusuke Suzuki, Framework Group Supervisor, Service Application Development Department, Platform Development Division, KDDI Corporation

In the future, KDDI plans to evolve and develop DBAs operating in the department on each service into DBRE (Database Reliability Engineering).

KDDI will formulate an optimal operation policy and develop convenient operation support tools based on the idea that "database experts are engineers, not administrators." Additionally, KDDI aims to improve the service level of the database and the entire system by conducting troubleshooting on its own when a failure occurs, initiating recovery, and pursuing the root cause. KDDI looks forward to continuing its close cooperation with Oracle to achieve these aims.

ABOUT KDDI CORPORATION

Recently, the environment surrounding businesses and consumers is undergoing a major transformation. With the advancement of technologies such as 5G (5th generation mobile communication systems), IoT, AI, and big data, full-scale digitalization has progressed, and it is transforming the world into a "data-driven society" that finds even more value in data. KDDI has formulated its medium-term management plan (FY2019-2021) to achieve sustainable growth while quickly responding to such changes in the business environment. For individual customers, KDDI aims to strengthen customer engagement and maximize lifetime value by providing communication and various life design services together.

KDDI also contributes to customers' core businesses and promote business creation through open innovation by supporting digital transformation (DX) for corporate customers using KDDI's IoT/ICT-related technology.

In this way, KDDI is expanding its growth businesses, centered on telecommunications services to further promote "the integration of telecommunications and life design" which is the core of its business strategy.

KDDI are trying to create value in the 5G / IoT era, both domestically and globally.

ORACLE SOLUTIONS USED

・MySQL InnoDB Cluster

・MySQL Enterprise Edition
(MySQL Enterprise Backup, MySQL Enterprise Monitor)

ORACLE CUSTOMER

KDDI Corporation

・ https://www.kddi.com/

・ Industry: Telecommunications

・ Annual sales: 5,080,353,000,000 yen
(Consolidated, year ending March 2019)

・ Employees: 41,996
(Consolidated, as of March 31, 2019)

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