High-Performance Billing System

Yunnan Telecom reduces total cost of ownership (TCO) and improves the overall cost effectiveness and energy efficiency of its billing system by migrating from its legacy RISC platform to Intel® Xeon® processors E7 family

**CHALLENGES**

- **Implement cost-effective measures in the billing system.** Reduce TCO, capital expenditures (CAPEX), and maintenance costs without compromising overall performance and availability of the system.
- **Enable rapid deployments within the billing system.** Shorten system deployment cycles, respond quickly to new business demands, expand system capacity, and optimize structure.
- **Improve performance in billing processing.** Ensure and increase overall performance of the existing billing platforms by eliminating current system bottlenecks.

**SOLUTION**

- **Achieve smooth migration to Intel Xeon processor E7 family-based servers.** Migrate the billing application and systems to Intel Xeon processor E7 4870-based servers for better performance than the traditional RISC-based platforms and servers.
- **Create parallel expansion of the existing billing system and environment.** The billing database system, after migration, will run in parallel with the existing RISC-based platform, improving the overall system performance by taking over parts of the original system’s workload.

**Introduction**

With both its user base and number of service offerings growing quickly, Yunnan Telecom has a lot to keep up with in network size, skill level and communication services capabilities. Yunnan Telecom believes that as the business model for telecom operators gradually transitions from a traditional resource-based model to a user-based model, the status and importance of its telecom business operations support system (B/OSS) continually rises. B/OSS is an IT system for telecommunications networks that focuses on handling customer-related processes such as taking orders, processing bills, and collecting payments.

The core hardware platform of the traditional B/OSS system has been a RISC-based server running on a closed system. This closed nature has made hardware acquisition and maintenance costs high, putting pressure on telecom operators, including Yunnan Telecom. Apart from the high costs, the comparatively long delivery cycles also do not allow Yunnan Telecom to adapt to the demands for rapid deployment of new businesses in the telecommunications industry.

**Performance bottleneck in billing system threatens smooth business operation**

As the core of Yunnan Telecom B/OSS system, the billing system provides multiple function modules with user billing details including accounts, billing details, customer relationship management (CRM), and business decision-making support. With the continual expansion of Yunnan Telecom, the billing system is close to creating a performance bottleneck. But the new investment and maintenance costs needed a vertical upgrade based on the original RISC-based platform, which greatly exceeded the budgeted cost.

Yunnan Telecom realized that what its current billing system needs is a smooth migration that will enable the efficient sharing of workload in the billing system. Using servers based on the Intel Xeon processor E7 family, Yunnan Telecom was able to boost performance while resolving issues with maintenance, operation costs and energy management.

*By adjusting the architecture design of the existing system, such as workload sharing, parallel systems, or heterogeneous backup, we’ve discovered that the Intel Xeon processor-based platform is fully capable of safely and effectively reducing the system’s total cost of ownership. It has also improved cost-effectiveness, energy-efficiency, and flexibility,* explained Cheng Zhongji, general manager of enterprise information for Yunnan Telecom.
With breakthroughs such as RAS features, the Intel Xeon processor E7 family now matches RISC-based servers in terms of performance and stability.

Eyeing efficient migration and high availability through the Intel Xeon processor E7 family RAS and Oracle® RAC

Since the billing system is a key subsystem of the telecom B/OSS system, Yunnan Telecom knew its upgrade or migration must proceed smoothly. The migration needed adequate planning to avoid unexpected downtime and business interruptions. Also, all the server platforms in Yunnan Telecom’s existing billing system used RISC-based servers, so the company had no experience in deploying billing systems based on the Intel Xeon processor. Key goals for the migration plan included:

- **High system stability.** As a mission-critical application in the telecom B/OSS system, the billing system must be able to run 24/7 with no interruptions.
- **Smooth migration.** During the migration process, any failure or downtime in the billing system would affect the normal operation of a number of connected systems and cause immeasurable loss.
- **Migration process standardization.** Combining Intel’s recommended migration process to optimize the system based on the characteristics of the telecom B/OSS system, this will serve as a reference for subsequent similar projects.

In the planning and design process, Yunnan Telecom ensured high system availability in three ways:

- **Intel Xeon processor E7 family RAS features.** These features helped to achieve circuit-level high stability of the server, protect the company’s data, and minimize planned downtime.
- **Database systems architecture.** Yunnan Telecom deployed two Intel Xeon processor-based servers and used Oracle RAC. The two database nodes joined the RAC environment through load balancing to achieve high reliability of the database while taking full advantage of server resources to enhance the overall performance of the Intel Xeon processor-based database.
- **System structure.** The newly deployed Intel Xeon processor-based billing system will not entirely replace the existing RISC-based billing platform in the short term, but it will share workload in a parallel mode to achieve heterogeneous interoperability between the two system devices.

Smooth migration through synchronizing data asynchronously

The key to the smooth migration of the system is the migration of data. Taking into account the difficulty of cross-platform data migration and the zero downtime requirements for the production database, the billing system from AsiaInfo Linkage modified the original storage program so that it could asynchronously write the same data into two databases (both the RISC-based platform and the Intel Xeon processor-based platform) while keeping the synchronization delay under two minutes. Based on this, Yunnan Telecom synchronized historical data statically and real-time data for the current month asynchronously through the storage program. This ensured a smooth migration of data between the two database systems.

Optimized migration workflow

Based on Intel’s standard RISC migration procedures and the characteristics of the telecommunications billing system, Yunnan Telecom divided the telecom B/OSS system migration process into six phases:

- **Phase I: Detailed assessment of RISC solutions and infrastructure architecture.** Analyze the overall structure of the RISC-based platform and clarify the physical architecture and logical structure of each subsystem as well as the interdependent relationships between the subsystems. Analyze and evaluate the workload of the current system and system performance and use this as the basis for follow-up planning and architecture design.
- **Phase II: Identify key subsystems in the server migration project.** Based on the analysis results of Phase I, identify the application systems that may be migrated at a different stage and confirm as the proposed Intel Xeon processor-based solutions are available. After considering the improvements to ROI/TCO that migration of key subsystems may bring, as well as the impact on operation and project implementation cycle, select one or a few subsystems to migrate.
- **Phase III: Designing server migration procedure.** Design detailed technical solutions, architecture and an implementation plan for the chosen application functions.
- **Phase IV: Proof of concept (PoC).** Deploy a test environment and validate the key technologies involved in the detailed technical program, including application system migration, data migration, and system performance optimization. After the test is completed, perform any necessary optimization and adjustment to the detailed technical solutions and architecture based on test results.
- **Phase V: Testing.** Before formally deploying the Intel Xeon processor-based platform in the production environment, Yunnan needed to test the final solution in three steps:
  - **1. Offline test.** Use static production data to conduct a preliminary test for the functionality and performance of the Intel Xeon processor-based solution.
  - **2. Online test.** Make the Intel Xeon processor-based platform a part of the production environment that does not take up any workload. Test the functionality and performance of the solution.
  - **3. Production test.** Use the planned maintenance time for production testing. Switch the Intel Xeon processor-based system to the production environment, and then test the connectivity and functionality between the Intel Xeon processor-based system and other connected systems under the actual production environment.
- **Phase VI: Intel Xeon processor-based platform in production.** Officially put the Intel Xeon processor-based platform into operation and production. Continuously monitor and analyze the operational status of the system to ensure it can achieve the desired objectives.

High-performance billing system

After Yunnan Telecom’s Intel Xeon processor-based billing system went online, an analysis of the performance monitoring data over a full billing cycle showed that the Intel Xeon processor E7 family-based database server can take over about 30 to 40 percent of the high-end, RISC-based server workloads. Also, the server’s CPU and memory usage remained low. Overall cost-effectiveness of the system compared to the RISC-based platform has increased about 3 to 5 times, and TCO was lowered by nearly 60 percent.

“We hope to continue working with Intel to try newer and better technology, and to discover effective, high-performance, and low-cost approaches for Yunnan Telecom,” said Zhongji. Find the solution that’s right for your organization. Contact your Intel representative, visit Intel’s Business Success Stories for IT Managers (www.intel.com/itscasestudies), or explore the Intel.com IT Center (www.intel.com/itcenter).