



Meeting Rigorous Database Demands for Healthcare

Intermountain Healthcare increases database performance, enhances scalability, and reduces costs by moving its database environments to the Intel® Xeon® processor E7 family



“By implementing a larger infrastructure based on the Intel® Xeon® processor E7 family, we rarely surpass 25 percent utilization for our enterprise data warehouse. As a result, we have the headroom to accommodate more user workloads and process queries much faster than before.”

– Chuck Lyon,
Operations Lead,
Enterprise Data Warehouse,
Intermountain Healthcare

Intermountain Healthcare was ready to make a large-scale platform change for its numerous database environments, which support users ranging from clinicians to financial administrators. Beginning with the organization's enterprise data warehouse environment, the database team migrated to a Linux* operating system running on IBM System x* servers based on the Intel® Xeon® processor E7 family. The new environment has helped significantly increase database performance, simplify management, and facilitate scalability while providing cost savings that enable Intermountain to implement a high-availability clustered environment.

CHALLENGES

- **Increase performance.** Accelerate queries and reporting for a wide range of users across the healthcare organization.
- **Enhance scalability, maintain stability.** Gain the ability to scale database environments to meet rising demand without forklift upgrades, and maintain the high availability that users expect.
- **Reduce the total cost of ownership.** Cut hardware acquisition costs and drive down management expenses by standardizing on a single, industry-standard hardware platform and operating system across the organization.

SOLUTION

- **IBM System x servers with the Intel Xeon processor E7 family.** Beginning with the organization's enterprise data warehouse environment, Intermountain replaced an existing RISC-based infrastructure with IBM System x servers based on the Intel Xeon processor E7 family running Red Hat Enterprise Linux* and Oracle Database* software.

TECHNOLOGY RESULTS

- **Faster responses.** With a larger infrastructure based on the Intel Xeon processor E7 family, the enterprise data warehouse team has reduced query times by more than 90 percent while decreasing processor utilization by 75 percent.
- **Greater scalability, high availability.** Moving to a clustered infrastructure based on Intel Xeon processors enables Intermountain to cost-effectively scale the environment and maintain uptime.

BUSINESS VALUE

- **Lower cost of ownership.** By selecting a single, industry-standard platform for the organization's numerous database environments, the Intermountain team is reducing hardware acquisition and ongoing management costs.

Dedicated to delivering high-quality care and maximizing efficiency across its 22 hospitals, 185 physician clinics, and affiliated health insurance company, Intermountain Healthcare relies heavily on 455 database environments to provide administrators and clinicians with key information and to support critical decision making. A few years ago, the IT group decided to make a change in the

operating system and hardware platform used for those numerous, discrete database environments.

“We wanted to standardize on mainstream servers running a Linux operating system in part to simplify management,” says Kyle Brokaw, enterprise database administrator for SQL Server* and Oracle Database. “At the same time, we wanted to reduce costs



Intel® Xeon® processors boost performance for database workloads

by moving to a hardware platform that could provide easy scalability. We needed the ability to add servers to existing environments rather than having to rip and replace infrastructures each time we scaled.”

The database team decided to begin with the organization’s enterprise data warehouse (EDW) environment, which was ready for a refresh. The EDW environment supports a wide range of uses across the organization, from running financial reports to providing outcome analysis for physicians. “We have been continuously adding users and source systems for several years. Currently, we run thousands of reports every day,” says Chuck Lyon, operations lead for the EDW team. “Because of that growth, our previous environment often ran at 100 percent processor utilization. Queries and reports took longer and longer to run, which frustrated users.”

Migrating to Intel Xeon Processors

For the EDW infrastructure, which includes production plus test and development environments, the Intermountain team selected IBM System x3850 X5* servers equipped with the Intel Xeon processor E7 family. The EDW team runs Oracle Database in an Oracle Real Application Clusters (RAC)* environment that uses the Red Hat Enterprise Linux operating system.

The database team found that the Intel Xeon processor E7 family delivers the right combination of raw compute power, memory capacity, and I/O throughput for rigorous database environments such as the EDW. “In our testing, the Intel Xeon processor E7 family provided outstanding performance for our database workloads,” says Casey Bowden, senior Oracle database administrator at Intermountain. “By offering large-scale memory capacity and providing processing cores with direct access to memory, these Intel Xeon processors can

significantly accelerate memory-intensive Oracle Database workloads compared with previous-generation processors.”

Additional features helped solidify the processor selection. “Intel® Turbo Boost Technology gives us the extra processing boost to keep the Oracle RAC environment operating even when we’re maxing out processor resources,” says Bowden.

The Intel Xeon processor E7 family also provides the reliability required for mission-critical environments. “Across our organization, database environments play a critical role in delivering high-quality healthcare and maintaining efficiency,” says Frederick Holston, Intermountain’s chief technology officer. “We require a robust architecture capable of delivering highly available results. The built-in reliability and availability features of the Intel Xeon processor E7 family help us to avoid problems and maximize uptime.”

Improving Performance and Providing Headroom for Growth

The new EDW environment can now handle a much larger volume of data warehouse queries and reports than before. “By implementing a larger infrastructure based on the Intel Xeon processor E7 family, we rarely surpass 25 percent utilization for our enterprise data warehouse,” says Lyon. “As a result, we have the headroom to accommodate more user workloads and process queries much faster than before.”

Query performance improvements have been substantial. “A query that used to take 450 seconds now takes just 30,” says Lyon. “Our users don’t have to wait in a long queue before their queries and reports are run. We estimate that some users have increased their productivity by approximately 25 percent.”

Reducing Costs, Enhancing Stability

Moving to servers based on Intel Xeon processors has helped Intermountain reduce capital expenditures and cut management costs. “We were able to reduce our initial hardware investment

LESSONS LEARNED

- **Begin a large-scale overhaul with a willing participant.** “Across our organization, we had a number of database environments in mind for this initial migration,” says Brokaw. “But the enterprise data warehouse group showed that they understood the potential benefits, and they were willing to work with us closely to address any challenges.”
- **Test repeatedly.** “As you configure a new environment, be sure to test it every time you make a component change to avoid problems later,” says Brokaw.

compared with the previous platform, and over the long run we gain the ability to scale while preserving our investment,” says Brokaw. “In the meantime, we will drive down management costs by standardizing on a single hardware platform and operating system across our database environments.”

The Intermountain team is using some of those savings to help maintain the stability and availability of its database environments. “We adopted clustering with Oracle RAC to help ensure uptime even if a single node fails,” says Brokaw. “The cost savings we achieved by implementing the new infrastructure helps us afford that move to high-availability clusters.”

Continuing the Migrations with Intel® Processors

The Intermountain database team is now launching similar migration projects for additional database environments across the organization. “Using IBM System x servers with Intel Xeon processors is proving to be a robust, scalable, and cost-effective platform for our database environments,” says Brokaw. “As we can continue to migrate the Intermountain databases, standardizing on this hardware platform will help us maintain the performance that our users expect while enabling us to control costs.”

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