SOLUTION BRIEF
Intel® Xeon® Processor E5-2670
Biomedical Research

Intel Xeon Processor Speeds Work to Analyze the Human Whole-Genome Sequence

Researchers are deciphering genome sequences faster than ever, using Intel Xeon processors

DIAGNOMICS

"We are working with Intel's hardware and software engineering teams to make one of the best genome analysis solutions they can put into a clinic."

—Dr. Min Lee
CEO, Cofounder, and President, Diagnomics Inc.

CHALLENGES

- Researchers needed faster analysis of genome sequences from next-generation sequencing data
- Existing servers took days to complete a process
- To apply to clinical settings, bioinformatics must be delivered in hours

SOLUTIONS

- Implemented HP ProLiant DL380* G8 servers based on the Intel® Xeon® processor E5-2670
- Reduced indexing process from four days to 11 hours
- Exploration of how Intel data storage technologies may help launch new line of business

Unraveling DNA to personalize medicine

A decade ago, at the dawn of the revolution in human genomics, researchers studied the DNA of the typical human. Now, they're focusing on the personal variations that can determine whether an individual has a higher risk for cancer or a genetic disease. Working with companies such as Illumina, which provides next-generation sequencing technologies, Diagnomics Inc. provides the analytical power to find variations in genes that can lead to clues about disease and personalized treatment.

"By knowing the variations in cancer tissue, we can understand what pathways have been broken during the disease development. That information can be used to tailor treatment and predict patient outcomes," said Dr. Min Lee, the CEO, cofounder, and president of Diagnomics Inc. "This is a very hot field."

However, to turn the power of sequencing into practical, personalized medical solutions, Diagnomics must speed up its analysis of massive amounts of genome sequence data. This way, hospitals and clinics can immediately use the genetic findings to help diagnose and care for patients.

Faster processing of genome sequences

Diagnomics serves Illumina, a company that develops innovative solutions for DNA and RNA analysis, and other clinical and research customers—such as hospitals, universities, and pharmaceutical and private research companies—by processing the data of genetic sequences. The company's servers often run nonstop for days at a time.

"Our most computer-intensive steps are the first two in processing raw sequencing data: aligning the sequenced data to the reference genome and then finding variations. Those are very important steps," said Lee.

Intel Xeon processors reduce indexing from four days to 11 hours[1]

To shorten the time to complete this part of the process, Diagnomics implemented HP ProLiant DL380 G8 servers based on the Intel Xeon processor E5-2670. Diagnomics worked closely with Intel's Health Strategy and Solutions and Enterprise Solution Sales groups, which recommended a hardware configuration that would deliver the most efficient platform. In addition, the Intel® Software and Services Group provided software tools and engineers to optimize the code for the platform, further speeding the process.

"We tested our other servers and compared them to this new architecture, and we are very satisfied with the performance. The Intel Xeon processor-based servers showed a very big advantage over other solutions," Lee said.

The team ran an indexing process on their old platform, and then on the new Intel Xeon processor E5-2670-based platform. While the old servers took about four days to complete the job, the new architecture took less than 11 hours.[1]

"That's critically important, because we are hoping to apply this service to personalized medicine and implement it into a real clinic to benefit patients and physicians," said Lee, adding that clinical use will be possible only if the analysis can be done in less time.

Diagnomic's processes are incredibly I/O intensive. The team said the new processors reduce latency by integrating well with PCI Express controllers and solid-state drives (SSDs), speeding the time it takes to process data. "Analysis will no longer be a bottleneck in sequencing a personal genome," said Lee.

The future of medicine

Diagnomics is also exploring how Intel® storage technologies can help the company launch a new line of business that several customers have already requested. The company is considering the Intel® Solid-State Drive DC S3700 Series, a direct attach storage solution, which they think will offer faster speeds and better reliability than anything else on the market. "We want to be a one-stop shop, not only for the analysis of the genome, but also for the storage. That's also a very good revenue model," said Stephan Gruenwald, CTO and cofounder of Diagnomics. "We would like to have Intel participating in that space."

Experts in the field of personalized genomics believe that the price of sequencing an individual's entire genome will drop to less than USD 1,000 in the next year or two. When this happens, personal genome information may become a part of routine medical care. Lee said that by carefully optimizing Diagnomics' software with Intel® hardware, his engineers can achieve the maximum processing speed. "Ideally, we'll process genomes in a day," said Lee. "That's how we envision our relationship with Intel going forward. We are working with Intel's hardware and software engineering teams to make one of the best genome analysis solutions they can put into a clinic."

ABOUT DIAGNOMICS INC.

Diagnomics Inc. is a genomics and bioinformatics products and services solutions provider. Clinics and researchers enlist Diagnomics' help to create personalized medicine and next-generation healthcare applications. Its team of highly qualified scientists and researchers include early pioneers in human genomic sequencing and novel diagnostic tools.

To learn more about personalized medicine and healthcare applications powered by Intel Xeon processor-based solutions, visit **www.diagnomics.com**.

To learn more about healthcare across Intel, visit **www.intel.com/healthcare**.

To learn more about healthcare IT tools from Intel, visit **http://premierit.intel.com/community/ipip/healthcare**.

1. Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. Configurations: All claims based on overall packaging of services provided by Diagnomics Inc. Results may vary. For more information go to http://www.intel.com/performance.

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