Performance Up, Costs Down

Intel® x86 platform helps SAT-Zhoushan design a new generation of information systems

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> Director, Information Center
> SAT-Zhoushan

With the constant improvements in IT over the last few years, the effects are obvious in all areas of life. Gradually, IT has become the most important index to demonstrate an industry's competiveness. The Chinese national tax system is a good example. With the aid of IT, tax administrators at all levels can more effectively handle information collection and management. This has helped to provide a higher standard of services for taxpayers.

SAT-Zhoushan, a city in northeastern China, has benefitted from upgrading its tax system. In 2011, the province of Zhejiang's Provincial Government Office conducted a third-party poll. The public showed 92.59 percent satisfaction with SAT-Zhoushan's administration performance, ranking it No.1 in terms of the evaluation system, which is composed of 10 administrative implementation functions, and No.2 among Zhejiang's 11 prefecture-level cities. Behind these remarkable achievements are the persistent efforts of SAT-Zhoushan's information technology system.

However, while Zhoushan's social and economic environments continue to develop, SAT-Zhoushan's existing information system faces new challenges. In 2011, the Chinese State Council officially approved establishment of the Zhoushan Islands New Area, another state-level new area following Shanghai Pudong New Area, Tianjin Binhai New Area, and Chongqing Two Rivers New Area. This is the first state-level new area primarily based on a marine economy. In 2011, Zhoushan City collected a total tax revenues of 5.693 billion Yuan, an increase of 36.67 percent over 2010. It also processed export tax refund/exemptions of 3.553 billion Yuan and a variety of other tax reductions and exemptions worth 456 million Yuan. However, rapid economic development of the local economy overburdened the minicomputer-based information system. A range of problems emerged including lagging processing capability, high maintenance and capacity expansion costs, poor safety performance, and high energy consumption. These issues created many difficulties for Zhoushan as it developed its information system.

To address all these problems, Intel helped SAT-Zhoushan install a new-generation information system based on the Intel x86 platform. Testing shows the new platform has greatly improved performance. Specifically, the new system shows excellent performance in terms of processing capability, maintenance and expansion costs, safety, energy-efficiency, and environmental protection.

Challenge
- With its rapid social and economic development, the city of SAT-Zhoushan in northeastern China had an outdated minicomputer-based information system with limited capabilities to meet its performance, cost, safety, and energy consumption needs.
- The city needed a next-generation IT system.

Solution
- Intel helped SAT-Zhoushan install a new-generation information system based on the Intel x86 platform.
- The new platform has greatly improved performance according to test results.
- Specifically, the new system has shown excellent processing capability, maintenance and expansion cost reduction, safety, energy-efficiency, and environmental protection.

Impact
- With the X86-based information system, Intel has helped SAT-Zhoushan improve its overall IT performance by 10 percent and meet its goals.
- SAT-Zhoushan has also improved its ability to use different information and been able to provide a higher standard of tax services, increasing taxpayers' satisfaction.

"Based on our actual needs, and after careful discussion and assessment, we decided to choose the Intel x86 platform to replace our previous minicomputer platform," explained Chen Lei, director of the Information Center for SAT-Zhoushan. "In 1995, we started to build our own information system, and from then on we gradually improved our service functions. But with Zhoushan's economy booming, particularly from 2005, our objective was to concentrate on making our tax system's information clear. Our information work has shifted to daily operation and maintenance, safety insurance, and data applications. In addition, the core business of SAT-Zhoushan needed to be concentrated in the

With the success of the new X86-based information system, Intel has helped SAT-Zhoushan significantly improve its performance, cost control, safety, energy-efficiency, and environmental protection.

provincial office of SAT. In this context, the existing minicomputer-based system was overburdened. A range of problems emerged: unsatisfactory operation performance, high costs, poor safety performance, and high energy consumption. Our efficiency was negatively affected. So we decided to replace the outdated minicomputer platform with Intel's superior Intel x86 platform to address these problems."

Intel x86 platform helps SAT-Zhoushan build a new-generation information system

To improve performance, the Intel x86 platform uses the Intel® Xeon® processor E7 and E5 families for SAT-Zhoushan's new-generation information system.

Improving on past generations of processors, the Intel Xeon processor E7 family supports many high-end applications including business intelligence, real-time data analysis, and virtualization. It also features new and strong safety, reliability, and energy-saving features.

Since installing the new system, the performance of SAT-Zhoushan's virtual applications has improved by 25 percent over the previous system. With the industry's highest virtualization performance, the new Intel Xeon processor-based system provides high-level safety features to protect the data's completeness. This plays an important role in enhancing the safety of the data center.

The Intel Xeon processor E5 family also offers leading performance, a superior data center performance/power ratio, I/O innovation technology, and hardware-level safety.

The successful installation of these processors in SAT-Zhoushan's information system has effectively supported the high-efficiency expansion of the data center and enabled SAT-Zhoushan to handle its growing volume of data.

First, the new system has strong processing capabilities. Consider a four-way, eight-core server running nine virtual machines as an example. It normally took a minicomputer an average of 2.7 hours to copy 200M of data. The Intel x86 platform only needs 2.5 hours to handle the same workload. Similarly, it took

a minicomputer 100 seconds to respond to an inquiry about one year's data. The Intel x86 platform does the same work in only 90 seconds. Overall, the performance of the new information system has improved by 10 percent. In the meantime, taking the current 32-bit data version ORACLE* database into account, which has a maximum memory of 3G and only supports four CPUs, SAT-Zhoushan believes a 64-bit ORACLE database will provide better performance when the CPU and memory are upgraded.

Besides boosting performance, the new x86 platform has reduced costs. For the new system, it will cost about 10,000 Yuan to maintain one PC server. In the four-way, eight-core server running nine virtual machines, for example, each minicomputer virtual machine costs about 1,000 Yuan. With the old system, one HP* minicomputer host cost about 100,000 Yuan for one year of maintenance. The new system saves about 60,000 Yuan per year on maintenance.

The Intel x86 platform has also improved information security. The old minicomputer system had only very limited fault recovery options. The only options for data recovery were to set up a cluster with two minicomputers or to use a backup tape library. The first option was costly, and the second could lead to downtime, which is also costly and interrupts normal operations. Once the system went down, only the professional staff could solve the problems. During this downtime, the risk of losing data was quite high.

The new system has higher reliability and availability for its upgraded virtual machine fault recovery solutions. When one host is involved in a fault, the operations can be transferred to another one. In the meantime, the system's DRS overall backup can provide full system security. This way, SAT-Zhoushan can meet its objective of zero downtime — which wasn't possible with the previous minicomputer system.

Finally, the new-generation Intel x86 platform information system does very well in energy savings and environmental protection. One previous four-CPU minicomputer used about 2440W per year, which translates to 21,400

kWh per year. In the new system, one PC server requires about 500W. In the four-way, eight-core server running nine virtual machines, for example, the average minicomputer's virtual machine will consume only 50W of power. The power consumption has also decreased substantially.

"When the minicomputer transferred its operations to the X86 server platform based on the Intel Xeon processor E7 series, our overall performance improved by 10 percent. Our experiences have shown our virtual machine's fault recovery solution is highly reliable and available. When one host is in a fault, the operations can be transferred to another one. Thus, we can achieve our goal of zero downtime, which is an advantage not possible in the previous minicomputer system. In terms of energy consumption, it is estimated to save more than 20,000 kilowatts for SAT-Zhoushan," commented Chen Lei.

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Implementation of migration to the Intel x86 platform for SAT-Zhoushan

- Since October 2011, the SAT-Zhoushan's Information Center has moved from its minicomputer platform to the Intel x86 platform. Before the transfer, the database hardware included one HP minicomputer with four CPUs and 8G of memory and two Sun* 3500 series minicomputers with eight CPUs and 16G of memory.

- For the Sun 3500 servers, SAT-Zhoushan transferred the installed database onto the Windows OS and then imported data. After the migration, they connected the newly-installed 32-bit serial machine (four CPUs, 4G of RAM) to an Huawei* disk array. Intel Xeon processors E7-4830, E7-8830, E5-7420, and E5-5620 replaced the legacy systems, providing the performance SAT-Zhoushan needs to keep up with future demands and growth.

- The new system provides just the support SAT-Zhoushan needs for its tax collection system, association fees collection system, collection and management auxiliary system, and municipal application platform.