



## Small Business Case Study

Business servers with Intel® Xeon® and Itanium® 2-based processors



# Helping an entire industry dig deeper and work smarter

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### Case Summary

MIRARCO was originally established as a research facility to help mining companies make effective use of the information at their disposal. As clients' requirements for information analysis increased, and with the emergence of virtual reality technology, the need for increased graphical and processing speed prompted MIRARCO to move to a cluster of servers running Intel® Xeon® processor-based technology and a new SGI Prism server\* powered by Intel® Itanium® 2 technology to help mining companies make better decisions based on their data.

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### Challenge

The mining industry is often viewed as a pick-and-shovel business but behind the scenes, modern mines use a vast amount of data from hundreds of thousands of mine core samples and daily mining records. Technology is needed to help convert this data into effective business decisions as sources of mineral resources become scarcer and mining companies look to maximize their ROI.

MIRARCO is a not-for-profit research and development organization owned by Laurentian University in Sudbury. It was founded as a research organization to help mining companies better understand rock burst issues and the stability of mine openings. Over time, it has evolved to include specialized research solutions in environmental technology, rehabilitation and mining technology.

Andrew Dasys, Start Up Director at MIRARCO, says that in the early days they were a typical university research organization with a few computers strung together and a Novell server\* sitting in the corner for printing. Important data was stored on individual hard drives, which presented risks for data loss if a hard drive failed.

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**“The combination of SGI technology and Intel® Itanium® 2 processors are already yielding positive results.”**

“Most research data was decentralized sitting on staff desktop computers,” recalls Dasys. The growth of MIRARCO into new areas of research was stretching their infrastructure and with a further move into the area of virtual reality and visualization research, Dasys knew that MIRARCO needed to upgrade its network and computing infrastructure.

### **Solutions**

To help researchers and mining experts analyze, review and understand the infrastructure in which they worked, MIRARCO constructed CIMTEC\*, the Centre for Integrated Monitoring Technology. A virtual reality visualization centre was one of CIMTEC’s central components and was the first facility specifically designed for the mineral industry. As part of a recent upgrade, MIRARCO chose an SGI Prism server\* with Itanium® 2-based processor technology. The Prism’s combination of speed, scalability and stability made it the right choice for MIRARCO.

In addition to CIMTEC’s construction, MIRARCO also upgraded its storage, support and networking infrastructure. Servers with Pentium® and Intel® Xeon® processor technology supply most of the infrastructure computing capability at MIRARCO today, providing e-mail, web access and internal applications, as well as providing an efficient back-end infrastructure for day-to-day business operations.

“We have a better ability to now go out and more effectively analyze the data we are collecting,” says Dasys, adding that he brought Mike Richer

to MIRARCO as the system administrator to make the vision for an enhanced, technology-rich research centre a reality.

“We really needed more speed,” says Richer.

“The combination of SGI technology and Intel® Itanium® 2 processors are already yielding positive results. The Prism platform takes full advantage of the 64-bit technology we need for the integration of fluid dynamic simulations with our core capabilities of rock mass characterization.”

### **Key Advantages**

For Dasys, the need for a more flexible and reliable computing environment was obvious. With more fields of research being undertaken, and the large amount of data coming in from clients, MIRARCO needed a more robust computing and storage environment to allow MIRARCO to continue to grow.

With their new computing environment, the opportunity to enter into new areas of research, collaborate with other research facilities and provide better information to their clients more quickly have been important advantages. Using the SGI Prism server\* has allowed MIRARCO to work with datasets that would not “fit” in desktop systems.

### **Corporate Decision Saves Money**

Using advanced visualization solutions helped a client of MIRARCO to make decisions more effectively. MIRARCO installed a virtual reality centre for the mine using workstations with Intel® Xeon® processor technology. Within its first year



of operation the use of large scale stereoscopic projection has changed how engineers and geologists work.

Domain experts at this mine were able to more effectively review and analyze important mine data. That analysis saved the company enough money in one decision to pay for the virtual reality centre. Additional process savings have been publicly stated to be over \$1 million per year.

Dasys says interest in facilities like this one is increasing. MIRARCO is in negotiation to sell a facility to China. "Part of Canada's mining future is going to be as a supplier of intellectual property to emerging markets. Technology like the VR centre cements Canada's place as an IP leader, and provides us access to significant capabilities overseas." The facility, connected over the Internet, will be a means of providing research capabilities to the world's fastest emerging economy. The link will also allow MIRARCO to tap into other opportunities in civil engineering applications.

### **Saving Research Time**

With the vast number of drill holes and volumes of data, virtual reality systems are the best way to allow companies to analyze their information. "We didn't have the processing power before," says Richer. "With the new SGI\* system, we can process more information even faster."

Richer says that they have cut the time needed for fluid analysis from three days to three hours using the SGI Prism server\* system. This allows researchers to ask more questions and get more answers in a shorter period of time.

### **Optimizing Answers for Mines**

Mines generate a tremendous amount of information. Dasys says that in one mine in Northern Ontario, data from more than 200,000 drill holes were collected in the last 150 years. Every foot of those core samples is logged and the information stored.

"That's a lot of information and it's not feasible for a human being to grasp all of that data so it has to be processed and queried digitally to identify trends," he says. "We created some mathematical models to allow mining and exploration companies to query their data and get better answers to make better decisions."

Dasys notes that the analysis is more than simply mining the data for information. The information needs to be visually interpreted by a group of multi-disciplinary experts to effectively make decisions, which is where the virtual reality simulator is paying off for many companies.

### **Answers For A Dynamic Environment**

In a mine, every day is different. While often compared to manufacturing, mining is one of the only industries whose manufacturing floor changes daily and the process for extracting the key minerals needs to change to constantly increase efficiency. MIRARCO helps companies optimize their mine environment to enhance profitability.

"By more effectively integrating all of a mine's data, we can help companies make better decisions and improve the processes they deal with every day," says Dasys. "A mine is a dynamic manufacturing environment. The length of its line, the area in which people work is constantly changing. We help mines understand their environment and make better decisions that lead to increased profitability."

In addition to a constantly expanding "manufacturing floor", mines are further challenged by the fact that rock is not contiguous, meaning there are different rock types with different physical properties and mineralization. To ensure the mine is optimizing the extraction and processing of economic minerals, they need more effective analysis tools which MIRARCO provides through its algorithms. The key to success is not only in understanding three dimensions, but in combining space with time and financial indicators.

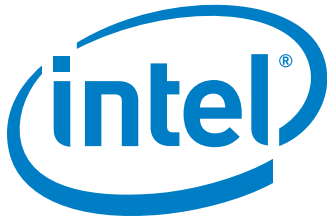
### **Processing Vast Amounts Of Geological Data**

Any given mine might have up from 10,000 to 250,000 holes dissecting it, which provides a great deal of data to the company. Research is helping companies get better answers about the rock they are mining, and reducing the hazards associated with the mining industry.

"In mining, the rock mass is characterized by relatively little information," says Dasys. "Mining has a lot of data but it's a little like the oil and gas industry in that data is not always used effectively. We're taking data that most mines currently collect and process and optimizing the processing and interpretation of that data." With technology like the SGI server\* cluster running Intel® Itanium® processor technology, researchers can better understand the data coming out of the mine and provide mining companies with more intelligent information to make important decisions.

### **Enhanced Researcher Communication**

In addition to the speed of the new technology, Richer notes that using SGI servers\* with open source code allows MIRARCO to link with other researchers who are using or creating software for SGI. This has allowed increased collaboration at the academic and research levels, creating the technology that will eventually be transferred to industry.



### Future Uses

As for the future, Dasys and Richer know the need for more processing power, speed and reliability will continue to increase. Since clients access the virtual reality centre on an as-needed or project basis, MIRARCO will expand its capability and add new servers to their clusters as needed.

Dasys sees further expansion in the areas of providing intellectual property and technology expertise to youth and the public. As part of a Northern Ontario Heritage Fund sponsored project, MIRARCO is partnering with the City of Timmins to create a Virtual Reality theatre in the city's public library. This will be the first time that large scale visualization and associated software applications will be made available in a public library. By using servers with Intel® processor technology, the general population will be able to access and display the results of leading-edge research.

With the leadership already demonstrated, MIRARCO is hoping to use their expertise in data modelling to support more researchers locally, as well as globally.

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