

## 2008 SYMPOSIUM

### GREEN ENTERPRISE COMPUTING

*Capitalizing on Current Opportunities and Exploring Future Trends in Energy Efficiency*

RESEARCH UNDERWRITER WHITE PAPER  
MODIUS

### **Greener Data Centers Through Improved Measurement**

*A Case Study at the Sybase Corporate Data Center*

## Greener Data Centers Through Improved Measurement

### A Case Study at the Sybase Corporate Data Center

#### Abstract

Sybase Facility Engineering used continuous measurements of the data center facility infrastructure to rebalance the load on the power chain and optimize the cooling system. The information provided by the Modius OpenData® Infrastructure Management System enabled Sybase to avoid a costly data center expansion project by identifying the imbalanced distribution of IT equipment across their 3-phase power system. By rebalancing the load, they were able to tap into hidden unused capacity, thereby avoiding the costly downtime required to retrofit the data center, or the substantial capital expenditure for building a new data center to accommodate planned growth in new servers.

In addition, as part of its “Green Energy Efficiency” initiative, Sybase was able to optimize the data center cooling system using accurate temperature and air conditioner load information from the OpenData Infrastructure Management System. By isolating imbalanced loads on cooling equipment, the Sybase Facility Engineering team was able to cool the room more efficiently and raise the chilled water temperature by 8 degrees, thereby delivering substantial annual savings from the reduced energy required for cooling.



#### Sybase Company Overview

Founded in 1984, Sybase, Inc. is a global enterprise software company providing industry-leading technologies and solutions in data management, analytics, mobile middleware, and mobile services. It is a highly profitable company with annual revenue of more than \$1 billion. Today, Sybase is the largest enterprise software and services company exclusively focused on managing and mobilizing information. Sybase is the vendor of choice for a loyal, global customer base — 89 of the *Fortune 100* use Sybase technology. Sybase is headquartered in Dublin, California, with 4,000 employees in 60 countries.

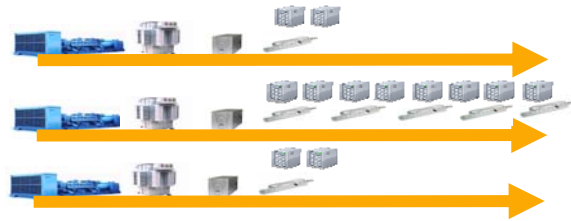
#### Sybase Data Center

Sybase’s main data center is located in Dublin, California. It is a 16,000-square-foot raised-floor facility housing more than 1,800 servers and peripherals. This center is a 7/24/365 operation and supports Sybase’s global business enterprise. The corporate disaster recovery site is located in Boulder, Colorado. These two data centers use power, mechanical, environmental, and security equipment provided by a number of manufacturers including: Liebert, MGE, APC, Caterpillar, Fenwall, Carrier, Trane, and others. Modius OpenData Infrastructure Management System is used to measure the critical I infrastructure equipment in the data center.

## Finding Hidden Power Capacity through Better Load Balancing

The Sybase IT team had undertaken a server expansion project that would exhaust the power and cooling capacity of the data center. Although the local utility was able to supply the needed additional power, the redundant power distribution system would need to be retrofitted in order to handle the additional load. Proceeding with this retrofit would mean significant downtime while electricians and construction crews expanded the power infrastructure within the data center. An alternative approach provided the less disruptive solution of building a second complete data center in another part of the building, so that the new servers could be brought on-line without impacting operations in the existing data center. Faced with these two economically unattractive alternatives, the Facility Engineering and IT teams needed to collaborate to find a workable and economically feasible solution.

Over time parallel power circuits that deliver electricity to server racks, storage arrays and networking equipment became imbalanced due to the “adds, moves and changes” that occur as part of normal data center operations. In the Sybase data center, one of the three-phase circuits had become significantly more loaded than the other two phases. Finding this imbalance proved to be a daunting task as neither the Building Management System, nor the Power Strip Management software were able to construct an end-to-end view of the entire power chain. Modius’ OpenData Infrastructure Management system was used to collect and measure utilization from each device in the chain from the generator in the parking lot, through the battery room, to the UPS transformers down to the Power Distribution Units (PDU’s).



*Figure 1 – Imbalanced Power Distribution*

By collecting data throughout the entire power infrastructure, facilities engineering was able to create detailed utilization reports for each of the three phases within Sybase’s power chain. Comparing the utilization numbers clearly showed the imbalance and the existence of latent power capacity on the other two circuit phases. This discovery led to the exploration of a minimally disruptive project to re-balance the equipment across the three phases. Balancing equipment evenly across the three phases would yield the release of “hidden” capacity that was not being effectively utilized.

Facility Engineering determined that the re-balancing would take a fraction of the time estimated to add capacity to the existing data center and a fraction of the cost to build a new data center. Another benefit of spreading the load more evenly is that the wear on the electrical coils in the transformer and other equipment in the power chain is also distributed evenly across the parallel systems. Spreading the load, and therefore the stress on the equipment, would lead to an increase in the availability and effective-in-service life-span for the equipment.

## Result

Using OpenData to collect and report accurate trending data, Sybase was able to determine the real capacity of the power chain in the data center and avoid a \$10 million data center expansion project. Power utilization information let them re-balance the IT assets more evenly across the three phases of the electrical distribution system and leverage hidden capacity within the existing data center. The retrofit was accomplished over a weekend costing less than 1/10 the proposed expansion project and led to the optimization of several other out-of-balance conditions in the data center, and proactively addressed potential future problems.

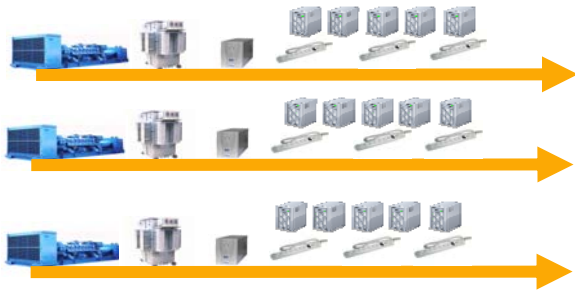


Figure 2 – Balanced Power Distribution

## Optimizing the Data Center Cooling System with Real-time Utilization Information

Using Modius' OpenData Infrastructure Management system to measure the performance of data center infrastructure equipment, Sybase performed an operational review using trend data collected from various infrastructure equipment and environmental sensors. Based on these reviews, the team then performed an audit of all connected infrastructure equipment from the bottom up, and from an energy usage perspective, to identify and quantify the potential efficiency gains that could be implemented as part of Sybase's "Green Energy Efficiency" initiative.

After reviewing the historical performance data provided by OpenData, it was determined that the total amount of cooling being delivered was much greater than the cooling actually needed. The team determined that there were significant savings to be realized by intelligently adjusting the cooling to more closely match the actual cooling needed in

each area of the data center. In addition, a significant improvement in availability could be achieved by ensuring that adjacent Computer Room Air Conditioning (CRAC) units were operating with enough spare capacity so that the failure of a single CRAC unit would not compromise the cooling in the area served by the failed CRAC. The prerequisite to achieve this energy savings was to have a system in place that could collect and organize continuous data feeds from the many different devices within the data center, so the team could easily analyze, correlate and review trend data from a number of different monitored devices.

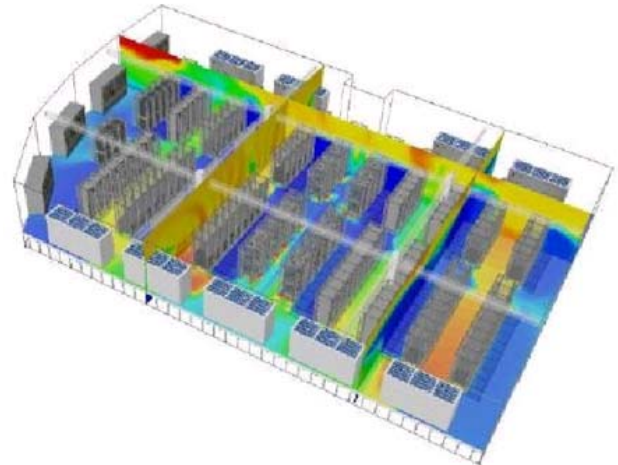


Figure 3 – Data Center Hot Spots

With OpenData providing measurement and data collection, this energy reduction exercise helped the team identify the hot spots within the data center and helped the team eliminate the hot spots by airflow management -- redirecting airflow from the cold spots to the hot spots. This energy conservation effort was an ongoing iterative process in which the objective was to raise the chilled water temperature to the highest, and therefore most economical, temperature that satisfied the actual cooling demand. The goal of the cooling system optimization was to increase energy efficiency without compromising the availability of the cooling plant by ensuring adequate reserve capacity was available in the event of a failure.

## **Result**

The energy reduction effort by the Sybase team resulted in an increase of the chilled water temperature thus far from 43° F to 52° F, saving \$94,500 annually by reducing the energy required to chill the water in the air conditioning system. Not included in these savings are reduced long-term operating and capital expenses due to the reduced workload on the cooling tower pumps and other equipment. The energy savings also resulted in reduced power plant emissions of approximately 259 metric tons of CO<sub>2</sub> annually without any additional investment

## **About Modius**

Modius is the leading provider of facility management solutions designed to address the unique challenges of data centers. Modius OpenData® Infrastructure Management System was developed to address the difficulty and cost of integrating IT and Facilities management in a comprehensive real-time system. OpenData allows IT management and Facility engineers to work together to improve the availability and efficiency of enterprise-wide data center operations. The system performs continuous real-time monitoring and measurement of disparate infrastructure equipment from multiple vendors -- and provides an enterprise-wide view of the power chain and cooling systems that support critical data center operations.

Headquartered in Oakland, California, Modius is a customer-focused company with extensive experience in facility equipment monitoring and management. To learn more about Modius and the OpenData® Infrastructure Management System, please visit our web-site at [www.modius.com](http://www.modius.com).

This savings represented a 25% reduction in the energy required to cool the data center and even more impressively was achieved despite a 12% year-over-year increase in the power load due to growth of Sybase's business. In addition, by balancing the load among the CRAC units, mechanical upset recovery and data center availability have been simultaneously improved.

## **Summary**

The Sybase facility engineering team relies on the Modius OpenData Infrastructure Management system to perform continuous, real-time measurement of equipment in the power chain and cooling system for all the equipment in their critical infrastructure regardless of make or manufacturer. The collected information is used to alert facility engineering and IT operations to device health exceptions, as well as gathering performance data from all critical infrastructure equipment. Having access to the long-term trending proved invaluable when faced with the prospect of a multi-million dollar data center facility expansion to accommodate adding more servers to the data center as well as supporting an internal Sybase "Green Energy Conservation" initiative.