

Achieving Data Center Optimization with Visual Modeling

An ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) White Paper
Prepared for Avocent

April 2009



IT MANAGEMENT RESEARCH,
INDUSTRY ANALYSIS AND CONSULTING

Table of Contents

Executive Summary	1
Introduction: Data Center Design Challenges	1
Visualizing the IT Infrastructure	2
Maximizing Data Center Efficiency	3
Reducing Operational Expenses	4
Identifying Tools for Success	5
EMA Perspective.....	7
About Avocent Corporation	7

Executive Summary

Growing complexity in today's dynamic data centers has challenged IT managers to develop effective methods for problem identification, capacity management and cost reduction. Fortunately, new visual modeling tools have come of age to simplify these management practices by providing a visual representation of physical computing facilities. With this simple to use graphical interface, IT operations staff can instantly identify potential problems with the infrastructure, enable proactive problem prevention, and successfully plan for future data center growth that maximizes usability and minimizes cost.

In this white paper, ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) analysts identify the value that can be achieved from visual modeling solutions and indicate specific features to look for when evaluating solutions needed to meet business IT management goals.

Introduction: Data Center Design Challenges

Increasingly, enterprises are relying on their IT infrastructures and, in particular, their data center operations to streamline productivity and drive profitability. Communication services, Web commerce, engineering, sales and marketing are all dependent on the success of their IT assets.

While the reliance on IT resources has increased, most data centers and IT management practices have not matured to meet these expanded requirements.

As businesses strive to compete in a 21st century economy, they require more powerful computing functionality and more plentiful computing availability. Yet while the reliance on IT resources has increased, most data centers and IT management practices have not matured to meet these expanded requirements.

The core of the problem is the increased complexity in today's dynamic IT infrastructures. In fact, EMA primary research has identified "reduction of operational complexity" as the data center need most often cited by IT managers. This is not surprising considering the challenges inherent in administering environments that are eclectic not only in their heterogeneous platform deploy-

ments, but also in the broad diversity of business utilizations. Confronted with the vast cacophony of operating system, application, network and device configurations, IT administrators have found it impossible to pinpoint root causes of systemic problems through purely manual processes. Organizations faced with this dilemma quickly devolve into a "break/fix" cycle of IT management where systemic problems are patched, but never truly resolved. When IT administrators are forced to spend the bulk of their time "fighting fires," they are unable to achieve real improvement to IT infrastructure and often fail to meet business IT goals.

Similarly, a significant proportion of IT failures can be attributed to a lack of change management control. Roughly 80% of all IT outages can be attributed to inappropriate changes – that is, changes that occurred outside an established change process. Nearly all of the remaining 20% of critical failures are caused by changes that were introduced correctly, but with unexpected results. Lacking the understanding of what has changed in their support stacks, IT manager often have to wait until a problem appears before attempting to discover the change event that caused it, with only a low margin of success in doing so.

A common attempt to resolve IT management challenges involves the introduction of software tools specifically designed to address each individual management challenge. Although these point products may initially ease the burden of certain specific IT problems, as more and more disparate solutions are deployed, a new challenge arises in the need to manage the management tools. IT administrators are forced to employ “swivel chair” management to learn and utilize the variety of fundamentally different support tool interfaces, significantly decreasing the productivity of the support staff.

Without a deep understanding of the IT infrastructure, it is not only challenging to manage the environment of today, it is impossible to plan for the environment of tomorrow. Data center optimization requires a deep understanding of the IT resources and facilities so that careful planning can be performed to ensure IT resources meet organization requirements. Visual modeling provides the simple, centralized information resource to make these critical informed decisions that will maximize IT investment value.

Visualizing the IT Infrastructure

People are visually oriented. We process information far more rapidly and effectively through pictures than with words. For IT administrators, a visual representation of the supported environment is far easier and quicker to comprehend than a spreadsheet full of numbers, statistics, log information and written reports. This is the core concept behind visual modeling. By utilizing a graphical interface that visually recreates the physical layout of a supported infrastructure – such as a data center – and indicates individual component status with visual cues, IT managers and support

staff can identify the overall health of the environment with a simple glance. These views can be either a real-time indication of the actual environment status or model the expected conditions of planned implementations.

With visual modeling, complex data center topologies are simplified, enabling a truly holistic view of the support stack.

With visual modeling, complex data center topologies are simplified, enabling a truly holistic view of the support stack. Through shared resources, such as networking, power and cooling, data center systems are unquestionably interconnected. Often the root cause of a business impacting problem can be traced not to a

single failing component, but to how multiple components affect each other. By providing a visual context for understanding IT component relationships in the physical world, the actual cause of environment failures due to multi-system interaction can be quickly identified.

Many systems management tools provide detailed status of client systems, but correlating that digital information to a physical data center can be time consuming and error prone. In fact, just the task of physically locating a specific IT component can itself often be a challenge. Although this may seem to be a trivial problem on the surface, anyone who has ventured into an unfamiliar data center understands the sometimes daunting task of identifying a particular server. To an untrained eye, equipment racks appear almost identical, and although some systems are labeled, often many are not. Utilizing a static map to identify system locations might solve this problem, but with the frequent changes that occur in most data centers, management of a static map is impractical.

Visual modeling solutions, however, provide the mapping facilities to maintain an accurate graphical representation of a data center, allowing the physical location of IT components to be quickly determined. By easing the process of asset identification, asset management is also simplified as component details are automatically or manually recorded for each device.

Visual modeling is also instrumental in determining actual, available and usable data center capacity. Although apparent space – such as an open slot on a rack or empty space on the floor – can be quickly identified, assessing actual usable data center capacity often cannot. For instance, considerations need to be made on how much power and cooling will be required, and if these exceed availability for the target location. With visual modeling, a new IT component can be virtually inserted into the model to determine the expected results of the new installation. Any potential problems from lack of available environmental capacity will be instantly identified. Visual modeling takes the guess-work out of data center management, enabling informed decisions on the most practical and cost effective methods for optimizing IT resources and support services.

Maximizing Data Center Efficiency

Utilizing the tools of visual modeling, data centers can be designed to most effectively support business initiatives. Traditional data centers were often designed to resolve specific IT related issues, reflecting the reactionary method of IT management. Today's conventional wisdom, however, is to invest in IT solutions that serve the business rather than the technology. Facilitating this requires proactive IT management techniques, the core of which is prompt problem identification and resolution. By ending the break/fix cycle of problem “firefighting,” IT support staffs are freed-up to pursue IT improvements that improve the *business* value of the IT investments.

Best practices have been developed to assist organizations in making the transition to business focused IT infrastructures. The most popular of these – 61% of all best practices adopted according to EMA primary research – is the Information Technology Infrastructure Library (ITIL). Version 3 of ITIL, in particular, adopts a lifecycle-oriented approach that integrates IT service management and business strategy. Although best practices like ITIL can provide a powerful guideline for improving IT operations, caution should be employed when introducing them. Among the two most common problems that occur from best practice implementation is the tendency to introduce too much change too quickly. ITIL recommends a phased-in approach to environment improvement, addressing the greatest pain-points and most significant business impacting issues first. As systemic problems are reduced, resources are freed up to introduce new improvements. The second common mistake is to rely solely on process-based management. As already indicated,

today's complex environments cannot be improved solely through manual methods, regardless of the effectiveness of the core process. As ITIL attests, automated tools – principally those that enable quick problem identification – are absolutely essential.

With a balance of process improvements, the right administrative tools, and visual modeling providing the central interface, organizations can effectively design a data center that addresses business IT goals. Visual modeling is utilized to establish a physical layout prior to actual deployment. In this way, potential problems, effi-

With a balance of process improvements, the right administrative tools, and visual modeling providing the central interface, organizations can effectively design a data center that addresses business IT goals.

cient system distribution, and planning for future growth can be addressed even before systems are unboxed. This same process can be utilized when introducing new data centers, expanding data centers, or improving existing data centers. With the information provided by a visual modeling solution, installations and environment changes should only occur once since normal operating conditions will have been anticipated proactively. Also, through careful planning, the life of data center investments can be extended by creating an environment that minimizes stress on the architectures and maximizes their usability.

Similarly, visual modeling should be included as a standard practice in any change management process. Before introducing any physical change to a data center, the modification should be modeled to identify any impacting conditions which can then be recorded in the change request and reported to the change advisory board (CAB). This information is critical for performing a risk assessment on a requested environment change.

With visual modeling, ongoing data center maintenance is also facilitated. IT support staff are able to promptly identify and resolve infrastructure problems through visual cues on the graphical interface. However, not all changes introduced by administrators are productive. They may resolve an immediate concern, but violate an established business standard or in some other way introduce risk into the environment. In this case, it is not sufficient to simply identify the change that has occurred, it is also essential to identify the individual responsible for the inappropriate update. By holding IT personnel accountable for meeting business IT efficiency goals, failures to meet accepted policies are decreased as a sense of responsibility is encouraged in the staff. It should be noted that identifying problem culprits is extremely difficult when using purely manual processes due to the usual practice of using common administrator accounts for system access. It is for this reason that it is recommended that an automated tool be employed that can record the true identity of the individuals that access supported systems, the exact times such incidents occur, and any files that are touched. With this information, inappropriate change events can be directly correlated with the individuals that introduced them.

Reducing Operational Expenses

Although increased data center productivity is critical to achieving business IT goals, the value is diminished if not accompanied by a reduction in operational costs. There are primarily three areas in which improved infrastructure management can achieve significant cost savings: increased support staff productivity, maximized value in IT investments, and reduced facilities expenses. Again, with all three, visual modeling can play a key role in achieving success.

There are primarily three areas in which improved infrastructure management can achieve significant cost savings: increased support staff productivity, maximized value in IT investments, and reduced facilities expenses.

support staff productivity, maximized value in IT investments, and reduced facilities expenses. Again, with all three, visual modeling can play a key role in achieving success.

Without insight into the existing status of an IT support stack, administrators spend the bulk of their time reactively resolving environment failures. To achieve organizational goals, enterprises must either increase staff size or pay excessive costs for overtime or contractors. With IT management solutions, like visual modeling, organizations can actually reduce support staff sizes while increasing productivity. By simplifying problem identification and

enabling root cause analysis, less staff is required to reactively resolve environment failures and more resources are available to proactively improve the IT infrastructure. Additionally, a simplified management platform reduces the amount of required personnel training, so less experienced staff members can be hired to perform tasks that could previously only be performed by more knowledgeable (and expensive) technicians.

IT computing resources are inherently expensive, so enterprises are clearly advantaged if they can increase the value they receive from these investments. With visual modeling, decisions can be made on how to maximize the value of IT components. Determining ways to consolidate servers, for example, will reduce the number of new servers that will need to be purchased and/or free-up resources that can be utilized elsewhere. Also, using visual modeling to identify stresses on the data center infrastructure will increase the life expectancy of the IT investments – further reducing the number of new equipment purchases.

Consolidation and reduction of equipment can also reduce the facilities costs, such as power and cooling, necessary to maintain ongoing activity in the data center. Electricity costs can be further diminished by utilizing energy efficient practices commonly employed as part of “green IT” initiatives. In fact, EMA research has indicated that roughly 94% of enterprises that have implemented green IT solutions did so primarily to reduce energy costs. The first step to achieving significant power reduction is to identify existing energy consumption. This will help identify where electricity is being used inefficiently so that adjustments can be made appropriately. With a visual modeling solution that tracks energy consumption, decisions can be easily made on how to distribute IT resources across systems and data center racks to minimize consumption. Similarly, through integration with thermal sensors units, visual modeling tools can track heat produced by data center hardware components. This information, in conjunction with a solution for identifying air flow – such as with computational fluid dynamics (CFD) software – can accurately model thermal conditions in a data center. By reducing “hot spots” in the environment and enabling a more even distribution of temperature, environmental units do not need to work as hard to maintain safe operating temperatures, thus decreasing fan activity on computing resources – reducing both energy costs and wear-and-tear on the environment. A modeling solution that monitors power and thermal conditions can track this status over time, so reductions in energy costs achieved from power management solutions can actually be quantified, providing concrete business justification for the new management processes and tools.

Identifying Tools for Success

Clearly, visual modeling solutions can achieve significant value in providing both improved performance and cost-effectiveness in a data center infrastructure. Choosing a solution that can provide the best performance for a particular organization, however, may not be as clear. When evaluating potential packages, EMA recommends considering solutions that provide the following key features:

- **Centralized Interface** – Look for solutions that can be utilized as a single common interface for a variety of systems management resources. Additionally, the interface should be easily accessible from any network location, such as via Web access.

- **Ease-of-use** – The simpler the interface is to use, the more it will be utilized by the IT management and support staff. Also, the visual cues for determining environment health should be completely intuitive to ensure potential problems are quickly identified.
- **Detailed Status Information** – Once a problem is identified, the solution should have a facility for “drilling down” into the affected systems to quickly determine the root cause.
- **Integration with Automation and Remote Access Tools** – Ideally, the solution will provide access to these facilities so that prompt problem resolution can be initiated from the single common interface.
- **Third-Party Integration** – In particular, the solutions should include monitoring of power and thermal data collecting units to facilitate power management. Additionally, technology integrations should exist to provide asset, status, and configuration data for monitored resources.

As an example of a solution that meets these criteria, Avocent has introduced the MergePoint Infrastructure Explorer visual modeling solution. Infrastructure Explorer provides an easy-to-use interface for modeling an accurate graphical reproduction of a data center facility including detailed information on available space, power, cooling, weight, and network connectivity. Each of these environmental states can be reported to ensure IT operations practices are in-line with established best practices. Graphical displays provide detailed views of racks, individual IT components, or a high-level view of the entire data center infrastructure. The interface enables a centralized holistic view of the environment to effectively achieve systems management, capacity management and energy efficiency goals and thresholds.

Avocent has expanded the value of Infrastructure Explorer beyond environment modeling through key integrations. By directly collecting status and configuration information from a broad range of hardware and software components, the solution is able to report clear and accurate real-time environment status information. For achieving power and thermal efficiency goals, the solution integrates directly with Avocent’s DSView 3 solution to enable actual data center management so that energy consumption and temperature conditions can be reported and modeled visually. Also, currently Avocent is in the process of developing integrations between Infrastructure Explorer and the LANDesk Asset Lifecycle Manager solution, which will provide detailed asset inventories, relationship mappings and workflow generations for the entire lifecycle of the business IT investments.

Avocent has established itself as an industry leader in platform management solutions and is able to leverage its knowledgebase and 25 years of IT industry experience to ensure its MergePoint Infrastructure Explorer package continues to develop organically to meet new data center challenges of the future.

Avocent has established itself as an industry leader in platform management solutions and is able to leverage its knowledgebase and 25 years of IT industry experience to ensure its MergePoint Infrastructure Explorer package continues to develop organically to meet new data center challenges of the future. In fact, the Infrastructure Explorer architecture was built on the company’s proprietary Avocent Management Platform Foundation, enabling the planned future functional integration with Avocent’s broad family of IT operations management solutions. MergePoint Infrastructure Explorer is ultimately intended to be the central interface for the full range of Avocent’s management suites.

Regardless of which visual modeling solution is chosen, it is essential to ensure it meets each organization's unique data center requirements. With the proper tool in place, enterprises can reap significant rewards in increased productivity and operational cost reductions.

EMA Perspective

Traditional data center management solutions typically involve the utilization of problem identification and performance evaluation alarming tools. Many of these function quite well for the sole purpose of systems managing, but they impart little, if any, indication of the physical condition and interaction of the IT components. Visual modeling takes the traditional management model a step further by essentially creating a virtual view of the physical data center. This provides the perfect central interface for coordinating all IT management processes. By selecting an individual rack or IT component, all configurations, status, log, network, security, power, thermal, and change history data collected from a variety of IT management resources are instantly at the administrator's finger tips via a direct link to a federated CMDB.

Currently, the only real difficulty with this scenario is that it doesn't actually exist... yet. The visual modeling of today is really the starting point of the management interface of tomorrow. Certainly the technology as it exists today still provides significant value as a standalone product, as attested in this EMA white paper, but the true potential has yet to be developed. With MergePoint Infrastructure Explorer, Avocent has developed a technology from which they are in a perfect position to realize this potential. Other visual modeling solutions (with the notable exception of those integrated with IBM's Tivoli Monitoring) are primarily designed for specific standalone purposes, such as capacity management or power monitoring. Avocent, however, is able to leverage its existing IT management solution suite to expand the value of Infrastructure Explorer. To achieve the full potential of providing a central data center management interface, though, Avocent will need to extend integration not only to its own management suites, but to third-party solutions as well. Systems management vendors, on the other hand, would be advantaged to establish just such a relationship or incur the expense of developing a similar product in-house, since it seems likely consumers will embrace this new technology as a powerful method for monitoring and managing data center infrastructure requirements.

EMA applauds Avocent for taking this bold step and recommends the current release of MergePoint Infrastructure Explorer to enterprises seeking to streamline data center management practices, simplify capacity planning, and achieve operational cost saving.

About Avocent Corporation

Avocent (NASDAQ: AVCT) delivers IT infrastructure management solutions that reduce operating costs, simplify management and increase the availability of critical, "always on" IT environments via integrated, centralized in-band and out-of-band hardware and software. Additional information is available at www.avocent.com

About Enterprise Management Associates, Inc.

Founded in 1996, Enterprise Management Associates (EMA) is a leading industry analyst and consulting firm dedicated to the IT management market. The firm provides IT vendors and enterprise IT professionals with objective insight into the real-world business value of long-established and emerging technologies, ranging from security, storage and IT Service Management (ITSM) to the Configuration Management Database (CMDB), virtualization and service-oriented architecture (SOA). Even with its rapid growth, EMA has never lost sight of the client, and continues to offer personalized support and convenient access to its analysts. For more information on the firm's extensive library of IT management research, free online IT Management Solutions Center and IT consulting offerings, visit www.enterprisemanagement.com.

This report in whole or in part may not be duplicated, reproduced, stored in a retrieval system or retransmitted without prior written permission of Enterprise Management Associates, Inc. All opinions and estimates herein constitute our judgement as of this date and are subject to change without notice. Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies. "EMA" and "Enterprise Management Associates" are trademarks of Enterprise Management Associates, Inc. in the United States and other countries.

©2009 Enterprise Management Associates, Inc. All Rights Reserved. EMATM, ENTERPRISE MANAGEMENT ASSOCIATES®, and the mobius symbol are registered trademarks or common-law trademarks of Enterprise Management Associates, Inc.

Corporate Headquarters:
5777 Central Avenue, Suite 105
Boulder, CO 80301
Phone: +1 303.543.9500
Fax: +1 303.543.7687
www.enterprisemanagement.com

