Challenges Facing Today’s Data Centers
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Challenges facing today’s Data Centers

Across all industries, data center managers are being challenged on multiple fronts. Increased budget constraints, along with the decentralized control of funds, are hindering data center managers’ decision-making. The scarcity of cheap power notwithstanding, the energy consumption and carbon footprints of data centers are being met with heightened environmental scrutiny and regulatory pressures. Then there are the new models of computerization (i.e., cloud computing, virtualization) and facility design trends such as container data centers which are introducing new considerations. Another challenge to data center managers is the lack of integration between facilities managers and Information Technology (IT) managers. Finally, OEMs like Oracle/Sun, for example, are introducing new, monopolistic policies that are preventing data center managers from making decisions about their IT systems maintenance that is in their best interest. They are making it impossible for data center managers to choose a break-fix maintenance only option or forcing them to an all-or-nothing (i.e., have all Oracle/Sun hardware covered under the same contract, could not buy Solaris software support only, being penalized for selecting a third-party service provider by refusing to sell service parts, not providing diagnostics, specialty tools, etc.).

Amidst all of these challenges, data center managers have the mission before them to drive data centers efficiency and cost-effectiveness without compromising availability and reliability. In order to achieve this mission, they must first understand what factors affect data center operations, efficiencies and economies and how best to mitigate the negative effects.

Top Factors Affecting Data Center Efficiency

Limited Capital

Regardless of the size or rating of a data center, limited access to capital, tighter internal budgets and a heightened focus on “Total Cost of Ownership” are affecting data centers. The inability to make new equipment purchases is causing data center managers to place more emphasis on extending the life of existing equipment. This imperative is not likely to change anytime soon either. According to projections made by the Uptime Institute (www.uptimeinstitute.com), by 2016, there will be no capital available for data center investments.

Application of More Building Blocks for Smaller Capacity

Higher operating costs, exacerbated by diminishing funds, are forcing data centers to cut costs where they can: in their energy consumption and real estate. The end result is a focus on new topologies for their IT systems emphasizing greater
scalability, modularity and sustainability. This scenario gives rise to new risks in the
data center, for example, failure in a small block which impacts interconnections
within an IT architecture and subsequently disrupts operations.

**Container Data Centers**

Modularization for greater scalability has given rise to the container data center
environment which has its own limitations. While cost factors may have been a
driving force for the modular data center initially, it turns out the cost of many
container data centers approach the costs associated with a Tier-4 classified center.
The container data center does have the benefit of the Tier-4 classification and the
availability and reliability it affords. There are the issues of vendor-dependency,
since many container components are proprietary to a single vendor and lack of
standardization between container offerings which cause problems with
performance and reliability. Despite some of these issues, many data center
managers are seriously considering this new model. A survey conducted by Data
Center Knowledge in August 2011, of its readers found that 35% were either using
modular products or reviewing them for future use within one to two years. The
Uptime Institute’s spring 2011 survey, reported that 50% of large center operators
were expecting to go modular in the future.

**Lack of Integration and a Holistic Approach**

Another major factor impacting data centers is the lack of coordination between
facility managers, IT systems managers, and procurement departments. Without
this integrated, holistic approach by all business units, the data center and its
operations are compromised and certainly cannot rise to the heights of maximum
efficiency. To drive efficiencies and facilitate a true Total Cost of Ownership,
especially given the homogeneous mix of equipment in most data centers (i.e.,
owned facilities, cloud, hosted and third-party), having the entire team working
together in making data center decisions is vital.

**The Role of Hardware Maintenance**

While these factors are well known by most data center managers, what may be
less apparent is the role of hardware maintenance in addressing these factors,
driving greater efficiencies and cost savings. With smaller capacity, higher density
data center environments, hardware maintenance takes on a critical level of
importance. Over the past several years, data centers have seen their rack density
almost double and servers crowded into less and less space. The end result is
greater heat and the increased potential for hardware failures – particularly if there is not an effective maintenance plan in place. For equipment off warranty, the stakes are higher. For any data center, downtime stemming from less than perfect conditions shows up directly on the bottom line. The Ponemon Institute estimated that data center downtime costs an organization approximately $5,000 per minute which quickly escalates to costs approaching hundreds of thousands of dollars.

A well-designed hardware maintenance plan tailored to the specific data center’s equipment configuration and operational requirements will not only minimize downtime, it will also generate measurable efficiency and provide valuable cost savings.

The best plans reflect:

- an attention to keeping servers, networks, computers and peripherals up and running;
- the inclusion of escalation plans in place to quickly contain faults;
- a preventive maintenance (PMs) plan
- a business continuity plan and disaster recovery strategy.

Data center managers would be wise to take note of a recent Data Center Journal report which cited that the total investment associated with hiring a third-party hardware maintenance program is often far less than costs to manage this function internally and recover quicker from downtime. The decisions relating to in-house or third-party maintenance are frequently a result of a budget crunch or the limitations of over-burdened staff members who simply can’t make the time to make the right decision about outsourcing maintenance. These fiscal- and time-related challenges should not stand in the way of making a prudent maintenance decision which will ultimately result in increased productivity, energy efficiency, cost savings and data center uptime/reliability.

In addition to keeping the servers up and running, a sound hardware maintenance program will also effectively support the data center’s other efficiency drivers, for example, server virtualization, which reduces the number of physical servers required. Server virtualization is believed to boost utilization by a factor of up to 20 percent. However, while virtualization is an efficient model, it also has the potential of a single server’s failure causing the failure of the various virtual machines which potentially drive mission critical applications. Having the right preventive maintenance and response plan in place reduces the risks of potential downtime. In addition to server virtualization, storage virtualization, cloud computing and document management all benefit from increased efficiencies and economies when backed by a well executed hardware maintenance program.
Hardware maintenance firms can also be instrumental in helping data center managers rely less on their facility’s design for operational efficiency and more on sound practices to optimize operational efficiency. These practices incorporate preventive maintenance, redundant system protocols and emergency response management procedures.

**Best in Class Practices**

A “Best in Class” third-party hardware maintenance program has at its foundation prevention of downtime, quick and efficient response to remediation, and a strategy that supports the data center’s “Total Cost of Ownership” objectives. Prevention should encompass a plan that includes continuous monitoring and diagnostics, tracking of system performance and facility conditions which might induce a system failure (i.e., systems demonstrating slow boot times, unusual noises stemming from hard drives or processors, energy fluctuations, excessive power consumption, etc.) in order to offset such failures. The maintenance provider should have in place “Standard Operating Procedures” along with a methodology for scheduled maintenance operations, repairs, emergency responses and equipment installations.

A fast response to urgent and/or emergency-level system fault demands that the maintenance provider have an escalation policy in place. The Service Level Agreement action plan should outline the company’s escalation policies, along with incident reporting and failure analyses measures. For all unexpected system faults, there should be an experienced technician readily available with the right spare parts to get primary servers back online quickly or to affect a repair on various system components. A maintenance provider’s emphasis on efficient dispatch, logistics and well-stocked inventories of spare parts is key.

Regarding technician experience, the majority (75%) of studies suggest that human error is the root cause of the majority of data center downtime incidences. The best third-party hardware maintenance firms have rigorous training and continuing education programs in place for their technicians and field service engineers to assure that the expertise is there and high quality repair services will be consistently provided. These continuing education and training programs should be outlined within the maintenance firm’s Quality Assurance and Quality Control plans and linked to a goal of zero preventable downtime.

Another practice to assure the effective scheduling and tracking of preventive maintenance, corrective maintenance, emergency responses and continuity planning is the application of a computer maintenance management system. Not only does the computer maintenance management system help automate
preventive maintenance activities and facilitate fast responses to unexpected faults or emergency situations, it can also be used for more effective analyses of system performance and vulnerabilities to intercept future failures.

**The ROI from Optimized Maintenance**

Best in class maintenance delivers direct benefits to the data center in terms of improved and continuous system performance, availability and reliability. When servers are maintained to peak performance and faults are contained, it becomes easier for a data center to grow and more efficiently deploy additional servers.

There are also indirect benefits derived from a well-planned and implemented hardware maintenance program, including: cost savings derived from reduced power consumption, increased energy-efficiency, and maximization of data center space. For data centers striving to achieve sustainability, the right data center hardware maintenance program will identify problems in servers, network devices and other hardware which not only impede functionality, but also consume excess energy. These problems can range from processors with voltage distribution issues causing a system to draw excess power, to malfunctions in hard drives promoting inefficient disk rotation and dust build-up preventing efficient airflow, etc.

The intangible ROI from a better maintained and operating data center is the credibility and trust the center’s users gain when they can count on their systems to perform reliably. Even small system failures, that begin to accumulate, can negatively affect morale, productivity and potentially, an organization’s reputation and valuation. By optimizing its hardware maintenance plan as delivered by a “Best in Class” service provider, data centers can realize a significant ROI in terms of operational efficiencies and measurable cost savings.