Building technology protects valuable data centers

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Smartphones, tablets, digital TV, exabytes of data transferred over the Internet month after month: No doubt about it, information technology is racing ahead with unprecedented speed. The amount of data stored doubles every 18 months, with demand on supporting infrastructures rising in equal measure. Data centers play an essential role in the world of networked data. This is where the worlds of IT and infrastructure meet. It is not just about processing, storing and protecting data. The buildings that house the computers must be secure and efficiently run. What is needed are high-performance systems to manage building infrastructures and technology.

The changing world of IT is fraught with technical challenges. The data traffic over mobile devices alone is growing by more than 50 percent a year. As of October 2013, there were a million Apple apps and 500,000 Google apps. The exabyte – a number with 18 zeros – has been the de-facto data storage unit for some time. For data center managers, that means their systems will be outdated and need replacing after three to five years.

Infrastructures that support compaction

However, data center infrastructures, much like computer rooms or power supply equipment, cannot be replaced at the same rate. Their lifecycle, generally fifteen to twenty years, is considerably longer than that of IT components. This fact is evident in data centers where the worlds of IT and infrastructure overlap. One technical solution to this dilemma is known as compaction. Compact blade servers provide a great deal of computing power in a relatively small space. But there is a flip side: Blades need a great deal of energy, which increases electricity consumption per

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square meter – and hence the risk of overheating and even fire.

Because a building's infrastructure must support the continued rise in computing power, it, too, must be scalable. Infrastructure management is therefore of critical importance. How important is determined by the business model of the individual data center. If a company is the sole user of its data center, management is relatively simple. Ideally the server structure is uniform, energy consumption even and easily predictable, and physical access restricted to a clearly defined group of employees. The same is true for the data centers of major Internet companies because their level of standardization is usually quite high.

IT and infrastructure: a balancing act

However, this is not the case for suppliers of hosted managed services, or for "colocators." They supply other companies with computing services and operations – or simply provide the space those companies need to set up their own computers. The space and energy requirements can therefore fluctuate greatly, depending on the specific contracts. In addition, the number of persons authorized to enter a data center is usually higher and more complex to administer for colocators. While customers do need access to their own servers, preferably 24/7, they should not be able to touch another customer's IT equipment.

The more heterogeneous a data center's IT infrastructure is, the more important good infrastructure and asset management becomes. On the other hand, the more homogeneous a data center's IT components are, the more opportunities for optimization exist. To uncover and take advantage of these opportunities requires not only expertise in building infrastructure, technology and automation, but comprehensive industry knowledge of the processes in and the management of data centers.

Factories of the 21st century

The secure and efficient operation of IT infrastructures is in many ways analogous to the operation of traditional industrial infrastructures. Data centers could easily be referred to as 21st century factories, with good reason. Now as then, the inherent processes and workflows must be understood and uniform, integrated solutions deployed to support and automate them.

In this context, “integrated” means that all the individual pieces dovetail seamlessly and that their interplay is technically transparent. Siemens offers a solution-oriented approach specifically for data centers that not only takes the individual components into account, but bundles different components into a single package. “Integrated” can also mean that the implementation of such solutions covers multiple areas of competence. For this reason, Siemens extends its core competencies in building technology and energy efficiency through cooperation with selected partners in infrastructure and IT and, if needed, incorporates their products into its own solution portfolio.

The systems and equipment used in a data center must meet the highest standards of availability, comparable to the high priority uptime has in an industrial production plant. Data centers need to run without interruption all day, every day – the keyword here is business continuity. And with good reason: If data processing fails, businesses in all industries grind to a halt sooner or later, possibly with fatal consequences.

Intervention before damage occurs

Integrated total solutions allow professional control and transparent management of the complex workflows and processes of the data center infrastructure. The following example illustrates how that impacts day-to-day operations. If energy consumption data points to peak electricity use or if sensors indicate an unusual amount of heat accumulating in a specific area of the center, this can be an early indicator of a problem or a possibly damaging event, such as a fire. Corrective action can be taken early on, before greater damage can result.

The Desigo product family from Siemens handles overall management, control and automation of the IT center infrastructure. This includes energy and building management, fire safety and building surveillance. These applications also support 3D visualization, even 4D, with additional data such as temperature or energy consumption displayed in the 3D view.

In addition, Datacenter Clarity LC, the DCIM (Data Center Infrastructure Management) software solution from Siemens, can be used to link facility and IT management and merge data from different systems. In addition to asset management and 3D modeling of the data center, the software also offers

simulations to pinpoint how changes in the IT landscape would impact building technology. If, for instance, server hardware is added to boost computing power, the software identifies the effect on energy consumption or calculates the required adjustment to cooling capacity.

Optimized energy demand

Not only do their energy-hungry servers make data centers among the biggest consumers of energy overall, but so do the building systems needed for their continuous operation. According to estimates, data centers account for approximately two percent of energy use worldwide. Energy costs, therefore, represent the lion's share of a data center's operating costs. If the infrastructure is designed for greater energy efficiency, operating expenses (OPEX) can drop significantly. Power usage effectiveness (PUE) is a measure of how efficiently a data center uses energy. In moderate climates, a PUE of 1.2 to 1.3 is considered very good.

Probably the most significant factor in energy optimization of a data center is efficient cooling, which at locations in Central Europe so far accounts for 30 to 40 percent of the total energy consumed. Desigo supports not only different cooling systems and concepts, but also the integration of other infrastructure components and their management.

Nothing happens without electricity

In a data center, electricity is the elixir of life. Because power companies do not guarantee an uninterrupted supply, it falls to data center operators to build in the best possible protection against power failures through redundant power distribution, UPS units and generators. The design, of course, must be comprehensive and satisfy the desired tier level certification. Besides fulfilling their primary functions, the components of the power supply system must minimize the risks generally associated with electricity. Employees need protection in their day-to-day activities and fire hazards should be minimized. Bus power distribution systems, for example, not only offer operational flexibility but also reduce the risk of fire.

The power supply system needs constant supervision during ongoing operations to monitor consumption and supply quality, among other things. These values are selectively measured at various locations in the system and in some cases recorded

for later analysis. Deviations from the target parameters can even trigger alarms. Siemens also offers a wide-ranging product portfolio for supplying electrical energy to data centers, ideally suited to their availability and reliability needs.

Nipping fires in the bud

Fire is the most frequent cause of downtime in a data center. Smoldering fires in cabling are just one source. Fire prevention is not only a primary task in property-oriented safety, but is also a legal requirement in all countries. To meet this need, Siemens offers specific fire safety solutions for data centers. In each case, the goal is to detect any fire as early as possible and to fight it effectively.

Aspirating smoke detectors (ASDs) installed in computer rooms constantly draw air samples through a network of pipes to check for smoke particles. If a fire is detected, automatic gas extinguishing systems are triggered. They flood the room with extinguishing gas very rapidly. Water is not a suitable as it could damage sensitive IT hardware.

Gas extinguishing systems can damage data center hard drives although that is uncommon. In addition, partial failures can occur but they are extremely rare. Studies by Siemens as well as independent organizations show that the damage actually stems from the comparatively high sound pressure generated by the gas extinguishing system when flooding the affected area – it is not unusual for the noise level to reach 130 dB, similar to a fighter jet taking off. To protect hard drives from potential noise damage, Siemens has developed the Sinorix Silent Nozzle. It is designed to keep the noise level below 100 dB to protect hard drives without diminishing the distribution of the extinguishing agent. In addition, the emission of gas, and hence sound, is focused in a predefined direction, which also prevents sound-generated hard drive problems.

Security to protect a company's reputation

Unlike the fire safety codes regulated by law, companies usually define their own, highly individual standards for safeguarding their data centers. That does not mean, however, that these standards – from access authorization and intrusion detection to sweeping campus surveillance – are any less stringent.

Physical security is extremely important, particularly for a data center that provides services to third parties, because the level of security contributes significantly to its positive image. Perhaps the converse is even more important: A hosting provider with security gaps in its buildings and infrastructures rapidly loses its good reputation – and with it the foundation of its business model. Customers implicitly assume that the appropriate security mechanisms, like electronic access control, video technology and intrusion detection systems, are in place. The Siemens portfolio for data centers offers these components as well.

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