

Features

Data centers get religion

Would you house a data center in a diamond mine or an old chapel? These organizations did, with great success.

[Barbara Darrow](#) 10/10/2007 12:43:32

Are you looking for a new data center? One that promises an abundant supply of energy and offers the latest in cooling technology?

You might want to take a gander at what Boston College (BC) is doing with its new data center. Not only does it provide the latest amenities, but it boasts its very own patron saint watching over the racks of blades, storage devices and power gear.

The center, which moved to the empty St. Clement's chapel last year, features 16 stained-glass windows, one of which depicts St. Isidore (a.k.a. San Ysidro). Isidore of Seville was credited with creating the first encyclopedia, and the Vatican recently gave him purview over the World Wide Web. Now Isidore looks down at BC's glass-enclosed control center from his stained-glass perch.

BC had to make the move after outgrowing its old digs at the O'Neill Library.

The chapel, on BC's Brighton campus, has a space advantage over the library. The library's fifth-floor data center was a nonexpandable 3,000 square feet. In comparison, St. Clement's Hall is about 4,500 square feet -- enough space to add a backup generator.

In densely populated areas, IT pros must often make a hard choice between retrofitting existing sites or building a new one where land is at a premium and construction costs are high. In this case, BC's CIO found in the chapel exactly what she needed: A big chunk of space, unused and available.

"The space was so monumental, we had to take advantage of it," says Marian Moore, BC's vice president of information technology and CIO.

The challenge then was to retrofit the space for IT needs while respecting its aesthetics. To take best advantage of the chapel while preserving the windows, the architects designed a glass room -- a box within the box of the chapel -- for the operator control room.

BC removed some mainframes and started using blade servers instead, about 300 now. The old building's infrastructure couldn't have handled the blade servers' load, or the heat it would generate, Moore said. "Blades may be smaller, but they put out a lot more heat. The

other major problem with the old space was there was no backup power." The latter issue was huge a couple of times when construction work cut the main utility power line, Moore says.

St. Clement's is not the only religious-themed working data center. Barcelona's MareNostrum supercomputer center, created by the Spanish government and IBM, is in a 1920s-era chapel at the Technical University of Catalonia. The chapel, secularized years ago, was available and viable -- with some work -- says Juan Jose Porta, chief architect for high-performance computing at IBM's Boeblingen Labs in Germany, who led this effort.

Back in 2003, the idea was to prove how quickly a blade-and-Linux-based supercomputer center could come together, Porta says. "We had a very tight schedule; we had to go from original design to up and running in nine months," he said.

The church had been closed for more than 50 years and during that time had served as a private estate and a school for nuns, and was then donated to the town, he explains.

There were dual challenges. First, the designers had to figure out how to control humidity, temperature and even dust. Second, the architects had to "integrate the new technology into an old building," he says.

As at BC, they put a glass cage inside the building for the operations console. While there are some big hurdles in converting older buildings to IT centers, chapels and churches offer the advantage of big open spaces and high ceilings, which actually offer an air-flow advantage over even some of the newer buildings.

MareNostrum uses air flow, front to back, as the primary means of cooling, with the air entering at 15 degrees Celsius and exiting at 32 degrees to 35 degrees Celsius. That air then enters a secondary cycle, flowing into heat exchangers that use water to suck out the accumulated heat. That warmer water is then cycled out of the system and is allowed to cool for reuse.

From sanctuary to war room

For its part, Advanced Data Centers (ADC) is using part of the old McClellan Air Force Base outside Sacramento. ADC has bought an on-base facility and is working with the local utility to make sure it has plentiful -- and economic -- power. ADC is a San Francisco-based start-up that hopes to build a business around providing energy-efficient data centers for Fortune 1,000 companies, including banks, insurance providers and retailers.

The 3,700-acre base was closed as a military site six years ago but remains an industrial and business park.

When it goes online in a bit more than a year, it will be just shy of a quarter of a million square feet, says ADC President Michael Cohen.

There are other amenities that go part and parcel with the site, including police and fire presences nearby in case of emergencies, two local power substations and room for expansion on the rest of the 3,700-acre base.

In addition, Sacramento is "not on a flood plain and is basically seismically inactive" -- important considerations in California, says Cohen.

ADC is working with Sacramento Municipal Utility District (SMUD) on the power supply aspect. SMUD is "a forward-thinking utility with a mix of renewable energy in their portfolio," Cohen says.

To make the best use of the power available, ADC is building what Cohen calls state-of-the-art HVAC systems that can cool in excess of 225 watts of power. Thus, ADC can offer air cooling as well as water-cooled cabinets to companies that need them. He thinks water cooling will be a big seller.

As microprocessors need more and more power, eventually he will need liquid cooling, Cohen believes. "We're building hot aisles and cold aisles to increase the efficiency and lower the TCO for the customer," he says.

A real bunker mentality

If you want an even more hardened environment for your data, you might look at the aptly named InfoBunker in Boone, Iowa, about an hour outside Des Moines.

It's about as hard-core as you get -- a 1960s era "purpose-built" underground site that once housed communications equipment used by the North American Aerospace Defense Command and the U.S. Air Force.

Conversion started three years ago, with the site opening for business last October, says Jason McGinnis, president of InfoBunker.

"We have two major sale pitches: One is a lot of open space. We provide standard racks and also private rooms, which have special cooling for equipment," McGinnis says.

The other is sheer security. The 65,000-square-foot, five-story site is dug deep into the ground. No one gets in without passing through the 4.5-ton steel door and then a three-step process. A scanner uses radio frequency to read the would-be entrant's skin as a biometric identifier. He then needs to use a keycard and enter a code on the keypad. This three-tier security is standard for high-level military installations, McGinnis explains.

The site itself offers the speedy network, the power and the cooling -- "everything a modern computing site needs except the computers," McGinnis says.

InfoBunker's Cold War roots show in its three-foot-thick reinforced concrete construction built to survive a "maximum probable event." That would be a 20-megaton nuclear blast at 2.5

miles away. The facility was constructed to keep operating in complete isolation mode -- cut off from the rest of the world and all its amenities -- for three months, according to InfoBunker's Web site.

Other perks: Electro Magnetic Pulse protection up to military standards, multistage air filtering to screen out particles larger than three microns. Dust and particles are not a computer's friends and can really gum up the works. Also on-site are a 16,000-gallon water supply for fire suppression, a six-day fuel reserve and a backup 750 kW generator.

The site is equipped with the Nortel communications systems and American Power Conversion power gear, including line conditioners.

Going green with renewable energy

In contrast to the data centers described above, which force-fit technology gear into existing structures, AISO.net started from scratch to build a "green" data center relying on alternative energy, says Phil Nail, chief technology officer at Affordable Internet Services Online, a Web hoster and design firm in California.

Aiso.net, which hosted the Live Earth Web effort, uses solar panels to run its IBM X Series servers, NetApps clustered SAN servers and a whole lot of VMware. It also relies on solar tubes to pipe in natural light and recycles its "gray" water for landscaping. Special air conditioning units monitor outside temperature so when it drops to below 60 degrees outside, the building brings that air inside.

Nail estimates the energy investment paid for itself within a few years.

The 2,000-square foot data center is steel-framed and uses no wood except for its interior door frames. Walls are 12 inches thick and are insulated with recycled material. Not to rest on its laurels, Aiso.net is now working on a green roof -- basically a rooftop garden that will be stocked with drought-resistant plants. That addition should reduce its cooling costs by more than 50 percent, the company says.

Aiso.net is redundant to a fare-thee-well, Nail says. "We use remote management, we have redundant monitoring servers. I even carry two cell phones on two different providers in case there's a problem with cell coverage," he explains.

In the mines

DeBeers Canada put the data center for its newly opened Snap Lake diamond mine into two cargo ship containers retrofitted with doors, windows and insulation for IT use. The environment is punishing. The data center is in Canada's Northwest Territories in the Arctic Circle, some 190 miles north of DeBeers' regional office in Yellowknife. Temperatures at the mine site can hit the 90s in the summer and plummet to negative 20 degrees Fahrenheit in the winter.

"We built out walls, windows and have two racks of servers and put in giant truck air conditioners on both ends," says Ben Lacasse, IT superintendent. Shipping containers don't have windows and have cargo doors instead of the usual type, so windows had to be put in after the fact.

While the mine just opened for business, the data center itself has been in operation for a year, and has handled the load and temps just fine, Lacasse said.

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