case study

Advanced Integration for AI-Ready Data Center in Great Lakes Region

A vital data center hub for one of the top-ten IT service firms in the world is located in one of the largest metro areas in the Great Lakes region of the USA. This location was selected due to its attractiveness for businesses seeking optimal performance and low-latency connectivity to both US coasts. The free cooling provided by the climate also factored into the site selection. The Great Lakes region has cold winters and the proximity of the big bodies of water tempers the heat of summer. Plus, state governments in this region offer attractive financial incentives for energy conservation. This particular data center was constructed for sustainable operations and is recognized as an Energy Star building.

The global-brand IT service firm has reserved an isolated vault within this data center to provide its customers with custom buildouts. It is a high-performance computing (HPC) environment designed with an infrastructure that can support high-density requirements and connectivity to a full mix of cloud, network and IT providers. It is the kind of co-location facility needed to run AI algorithms and to meet multi-cloud (e.g. AWS, Microsoft Azure, Google Cloud etc.) requirements. Niagara Framework is the integration engine for this facility.

CHALLENGE

With 36MW of critical IT load, this data center requires an advanced cooling and energy efficiency strategy. To manage heat inside this critical facility, the HVAC design starts with fan coil walls that flow cold air over the server racks. CRAC (Computer Room Air Conditioning), CRAH (Computer Room Air Handling), and humidification units work together to collect warm air as it rises, and then to cool it, as well as humidify/dehumidify it before recirculating. Another loop takes heat from the warm air and rejects it into the outside atmosphere.

The HVAC design incorporates a dedicated air-chiller plant with a closed-loop system that provides cooling using recirculated chilled liquid (See Figure on Page 2). Air-cooled chillers like this use a sub-condenser to generate the chilled liquid. They reject heat from the condenser side of the chiller to outside air. While packaged air-cooled chillers like this are state-of-the-art in terms of energy efficiency, they also present a significant control and maintenance challenge due to their complexity and many different parts. A Niagara-based building management system (BMS) integrated with an electrical power management system (EPMS) is at the foundation of successful facility operations for this data center, orchestrating operations among chilled water

"The backbone of this integration is driven by Honeywell Optimizer Advanced controllers, seamlessly operating on the Tridium Niagara N4 platform. It is an architecture built for scale, reliability, and control."

Anton Savenko
Field Service Technician
Honeywell Building Solutions

FAST FACTS

Niagara Partner:

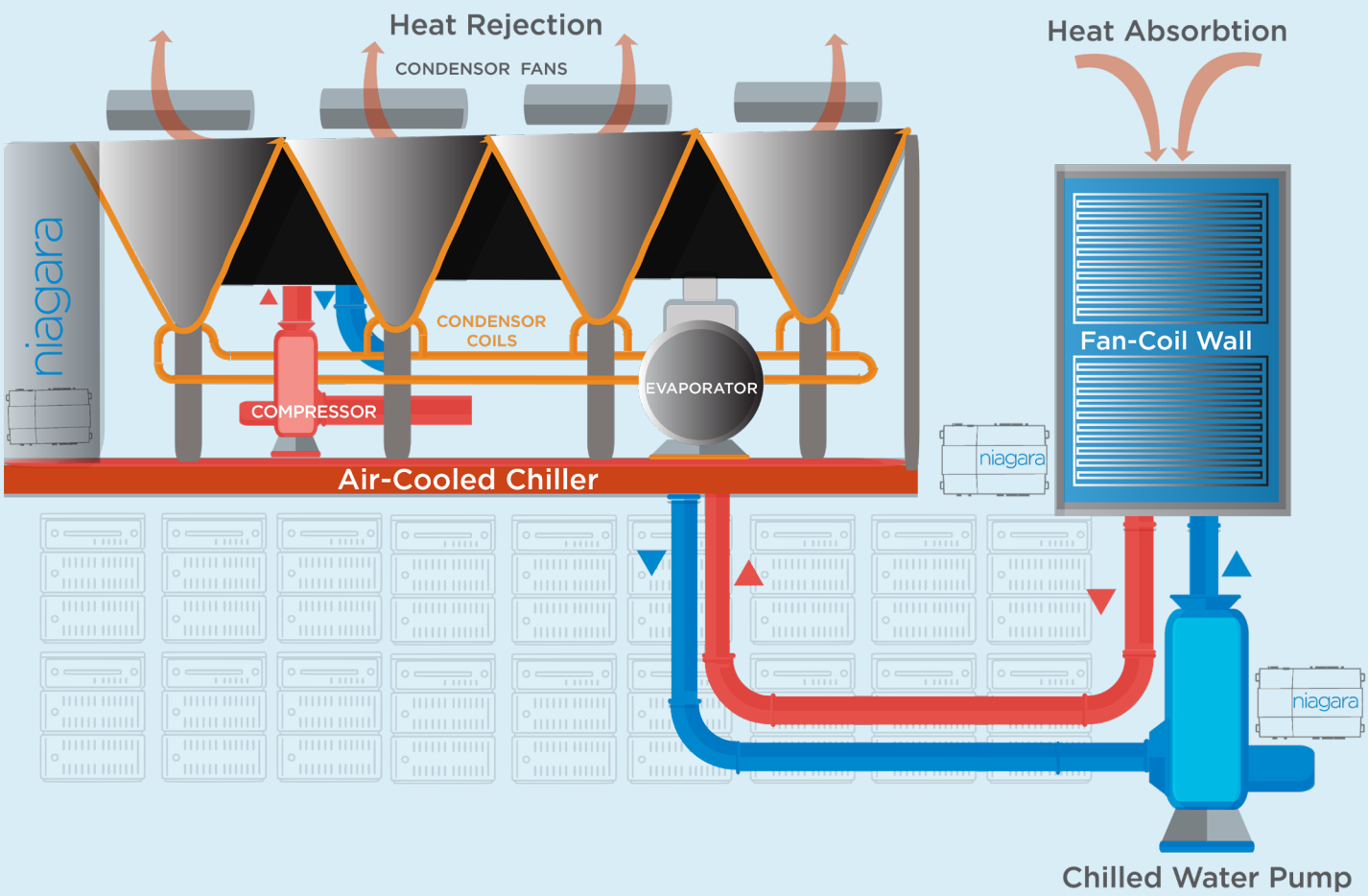
Honeywell
BUILDING SOLUTIONS

Customer: A Global IT Service Firm
Project Type: Data Center

Capacity Snapshot:
- 36MW critical IT load
- 126,000 sq. ft. of IT space
- Designed for the next generation of AI and cloud workloads

Project Scope: Advanced Integration of chillers, fan coil walls, electric power management system (EPMS), PDUs, AHUs, and more.

Key Technologies:
- Niagara Framework® for data integration and normalization
- EPMS for power management
- Honeywell Optimizer Advanced Controllers



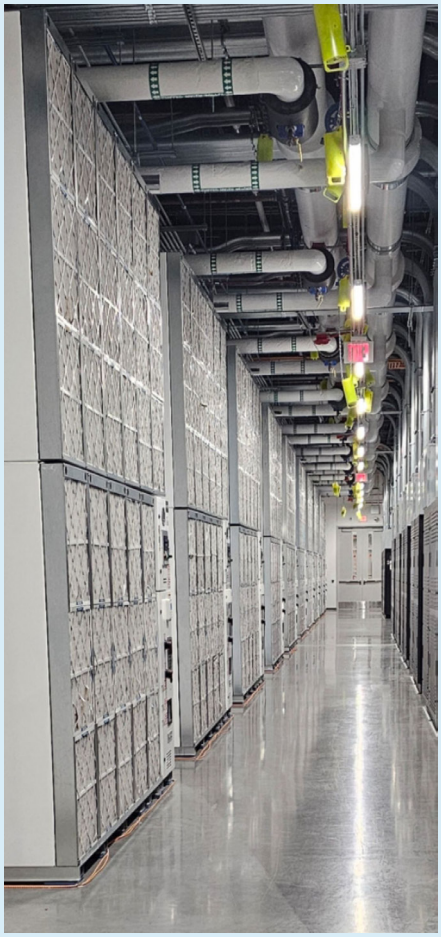
A closed-loop water-cooled chiller design has liquid coolant recirculated between server racks and a chiller system that cools the liquid and rejects heat to the atmosphere. Controlling and maintaining a sophisticated air-cooled chiller system like this requires that all equipment be tied into a unified network and that critical control points be constantly observed and supervised.

systems, large chillers, heat exchangers, water treatment systems, VFD-controlled pumps, humidification systems, emergency standby diesel generator systems, fuel/oil systems, electrical generation and distribution systems (both 480/277 and 208/120 voltage configurations), and UPS (Uninterruptible Power Supply) equipment. The data center's IT, OT and power systems are designed for high reliability and to achieve — to the degree modern technology allows —100% uptime. Operators use the full range of automation and analytics tools available to anticipate, avoid and mitigate situations that could cause an outage.

SOLUTION

A building management system (BMS) integrated with an Energy Power Management Systems (EPMS), along with PLC controls are crucial to maintaining operational stability and efficiency in the face of all this technology. The EPMS provides an additional layer of automation technology for monitoring and controlling power distribution, optimizing energy usage, and further ensuring a reliable power supply to critical data center equipment. Integration of the EPMS with the Niagara Framework-based BMS is how operators gain a comprehensive view of the entire facility's operations. Some of the functions enabled through this *single-pane-of-glass* include:

- **Real-time UPS Status**: Monitoring of the UPS, including battery health, power load, and overall system performance.
- **Power Distribution**: Managing the distribution of power from the UPS to various components within the data center, including power flow through Power Distribution Units (PDUs). EPMS software works to ensure that each piece of equipment receives the necessary power.
- **Load Management:** Optimizing the load on the UPS and other power sources, preventing overloads and maximizing energy efficiency.
- **Energy Optimization:** Analyzing energy consumption patterns and identifying inefficiencies. The integrated



Fan-Coil Wall works with the air-cooled chiller system to maintain sufficient cooling of the server racks.

BMS-EPMS enables data center operators to implement strategies for reducing energy waste and lowering operational costs.

- **Fault Detection and Management:** Detecting and alerting operators to potential issues—both the specialized HVAC equipment and the UPS and power distribution equipment—allow for prompt corrective action and work together to prevent downtime.
- **Remote Management:** Allowing operators to monitor and manage the system from anywhere, improving response times and operational flexibility.

RESULTS

The Niagara-Framework-based EPMS integration has enabled:

- Development of analytical tools (deterministic, AI and hybrid) and control strategies that exploit the full set of data available in the integrated automation system. Also, the data center operators are achieving increasingly faster time-to-incident resolution. They are better able to balance their simultaneous goals of lowest possible carbon footprint, instantaneous energy use, and 24/7 system availability.
- Deployment of a full range of automation and analytics tools has helped to maximize reliability and uptime of assets and prevent outage conditions that can damage assets. Access to structured time-sequence data that indicates equipment condition and operational effectiveness has helped to avoid spikes in energy use. There has been little need to start-up high carbon-intensity backup power systems. Compromised equipment that is running inefficiently is recognized early. Proactive detection of declining asset health is improving resiliency as well as sustainability

ABOUT HONEYWELL BUILDING SOLUTIONS

Honeywell is an integrated operating company serving a broad range of industries and geographies around the world. Our business is aligned with three powerful megatrends – automation, the future of aviation and energy transition – underpinned by our Honeywell Accelerator operating system and Honeywell Forge IoT platform. As a trusted partner, we help organizations solve the world's toughest, most complex challenges, providing actionable solutions and innovations through our Aerospace Technologies, Industrial Automation, Building Automation and Energy and Sustainability Solutions business segments that help make the world smarter and safer as well as more secure and sustainable. For more, please visit https://buildings.honeywell.com/us/en/home.

ABOUT TRIDIUM

For over 25 years, Tridium has led the world in business application frameworks — advancing truly open environments that harness the power of the Internet of Things. Our products allow diverse monitoring, control and automation systems to communicate and collaborate in buildings, data centers, manufacturing systems, smart cities and more. We create smarter, safer and more efficient enterprises and communities — bringing intelligence and connectivity to the network edge and back. Additional information about Tridium is available at www.tridium.com

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