The MSU Data Center stands ready to support the advanced information technology (IT) needs of a research university. Our highly secure system provides data storage, reliability, redundancy, and resiliency needs to the academic, research, and healthcare units across our campuses.

**Purposefully Planned**
Our data center delivers a future focused IT infrastructure that is intentionally constructed to support expanded computing capacity, enhanced security, improved business continuity, and the high-performance research computing demands of the university.

This includes meeting stringent government security standards including Payment Card Industry (PCI) standards, Health Insurance Portability and Accountability Act (HIPAA), and Family Educational Rights and Privacy Act (FERPA) regulations for sensitive information.

**Collaboratively Designed**
The MSU Data Center was collaboratively designed with input from departments across the university to accommodate the storage and high compute needs of MSU while ensuring the ability for future growth capacity.

**Research Focused**
The MSU Data Center is positioned to serve rigorous needs of the community with enterprise-level security, high availability, and grant compliant configurations. Enterprise licenses and centralized storage options help many colleges and departments see cost savings.
The newly constructed building provides ample storage capacity to host all enterprise and distributed IT systems currently housed in units throughout the university.

The MSU Data Center offers increased protections from disasters for crucial computing, network, and storage equipment, providing a safe and stable center for digital growth and expansion. As a hub for the university’s technologies, this facility provides students, faculty, researchers and staff with tools and resources vital to education, research, and outreach while offering the logistical space and flexibility to keep the university competitive.

**Features**

At more than 25,191 square feet, the MSU Data Center holds a reliable and scalable infrastructure with 24x7x365 system monitoring and notification. The building is a lights-out operation with minimal entry points to increase security, it is designed to run during temporary power outages, and it can withstand winds up to 185 MPH!

**Benefits**

- Incorporates a fire protection system to ensure that all data remains safe and secure.
- Easily accessible in the event of an emergency.
- Lower utility extension costs due to its close proximity to the power plant.
- Physical location avoids the MSU flood plain.
- Space to physically expand in the future.

Graphic courtesy ch2m
- Removed from central-campus activity to reduce security risks.
- Consistent with campus master plan in service district.

**Climate Control**

The MSU Data Center climate is controlled with indirect air-side economization cooling technology. Ventilation units are designed to deliver full free cooling 91% of the year by utilizing energy wheel technology. By utilizing ventilation technologies and maximizing electrical efficiencies, the MSU Data Center is designed for a power usage effectiveness (PUE) of 1.24.

IT rack electronic controllers observe and maintain internal components to deliver the required supply air temperature and volume to satisfy the operating IT load. The controllers are capable of responding to climate-related alerts for hot spots, excessive temperatures, and other conditions exceeding system thresholds.

**Cooling**

The one-story building has advanced, efficient air cooling technology. These air conditioning units have a potential capacity of 135 tons of cooling each and continually re-circulate air in the space by utilizing energy wheel technology to reduce the requirement for standard electric cooling. Using this technology, the system is capable of taking 106°F Fahrenheit (F) hot aisle exhaust air and supplying 78°F cold aisle air, mostly with “free” cooling.

Each one of the six air conditioning units have a standard cubic foot per minute rating of 56,415 cfm of supply air. Full redundancy is provided at the unit level along with supplemental redundancy at the component level.

**Power**

The electrical distribution system within the data center employs a “2N” configuration, ensuring that all data loads are served with two sources of power at all times. To maximize energy efficiency and minimize PUE, the compute voltages are 415/240 Volts. Critical, non-critical, and mechanical equipment loads are powered by individual substations, which greatly reduces the likelihood that one system will adversely affect another.

The data center is served by “Primary Selective” service consisting of two medium voltage circuits which originate from MSU’s T.B. Simon Power Plant and are encased in an underground concrete duct bank. The circuits support both “Critical” and “Non-Critical” switchgear configurations and are currently sized to provide 8MW of power, however both can be expanded to support a total facility load of 14MW.

Power protection for sensitive electronic equipment for this data center is provided by 2.5MW Medium Voltage PureWave UPS XT system, designed to expand to 7.5mW with an N+1 configuration; totaling overall system capability of 10MW without impacting the building footprint. The system protects critical load from utility disturbances and outages and employs the latest in Lithium-Ion battery technology.
This uninterrupted power supply (UPS) system can maintain 5 minutes of uptime when fully loaded at 2.5MW.

**Temperature Control**
The secured server room uses hot and cool aisles for efficient temperature control, maintaining a constant temperature of 78°F. The 312 racks house critical computing, networking, and storage equipment that serve Michigan State University. There are 96 racks available with up to 30kW power with the remaining racks providing 10kW of power.

Reduction of overall power consumption includes the use of:
- Cloud services with remotely hosted servers.
- Virtualization allowing multiple servers to share unused resources.
- Archive policy: engaging hosted services and solutions to retain compressed historical data.
- Consolidation: combining disparate department applications.

- Colocating with other universities: hosting disaster recovery at other institutions
- De-duplicate: removing multiple copies of information in applications using enhanced technologies.
- Moore’s Law: compute power increases every 18 months, helping reduce the footprint.

**Indirect Airside Economizer Cooling System**

Designed Power Utilization Effectiveness = 1.24

(Annualized average including mechanical and electrical loads)

Economizer Mode (from cooling):
- Full Free Cooling Annual Hours: 7,996 (91%)
- Partial Free Cooling Annual Hours: 764 (9%)
- Full Mechanical Cooling Annual Hours: 0
Security
The MSU Data Center is available 24 hours a day, 7 days a week. Physical access and video monitoring is controlled and monitored by MSU Police. Entry into the building is limited to those with approved and authorized access.

Savings
Annual utility savings is estimated to be around $600,000* through the consolidation of the Administration Building, Computer Center, and High Performance Computing data centers alone. More savings will be realized as other units migrate their equipment to this one location.

Optimization
Moving to a central enterprise data center:
• Consolidates campus physical server counts.

*Based on calculation of top 15 data centers surveyed with an average of MSU’s three primary datacenters.
Colocation
Colocation allows departments to place their servers in the MSU Data Center ensuring the same high level of security, temperature control, and backup power other university applications benefit from. It optimizes server storage and overhead costs for departments and the university.

Benefits of Colocation:
- Reduced space and cooling costs.
- Increased energy savings.
- Power reliability and redundancy.
- Protection with video surveillance and restricted building access.

Storage
Scalable storage is available that is highly redundant and secure and includes automatic backups. This shared file space allows faculty, staff, and student employees to access their data from any computer or device. Different levels of permissions are available and set at the department level.

Benefits of Storage:
- Highly available and dependable.
- Secure and routinely patched.
- Backed up so data may be easily retrieved within a 60-day period.
- Managed at the department level.
- Supported in Windows, Mac, and Linux operating systems.

Virtualization
Virtual server hosting uses technology that makes one server appear to mimic multiple servers running at one time. This hosting is more efficient in server capacity, hardware, and energy usage.

Benefits of Virtualization:
- Reduced hardware, server, and cooling costs.
- Increased energy savings.
- Enhanced IT service continuity.
- Improved security.

Meets and Exceeds Federal Grant Requirements
- Physical and virtual security have been designed into several layers of the datacenter.
- Security controls are on by default.
- All systems are up to date on patching and follow change management processes for any system alteration.
- All staff members who interact with datacenter systems have appropriate annual information security training commensurate with their level of access.
- All physical access within the datacenter is monitored, audited, and follows the principle of least privilege; all guest access is escorted and monitored.
- Once data is no longer in use, data storage systems are destroyed consistent with MSU data destruction standards.

More Information
Interested in how the MSU Data Center can support your research, academic and business needs?

Please visit tech.msu.edu for more information including additional technology resources available that benefit the MSU community.