

The Modern Data Center

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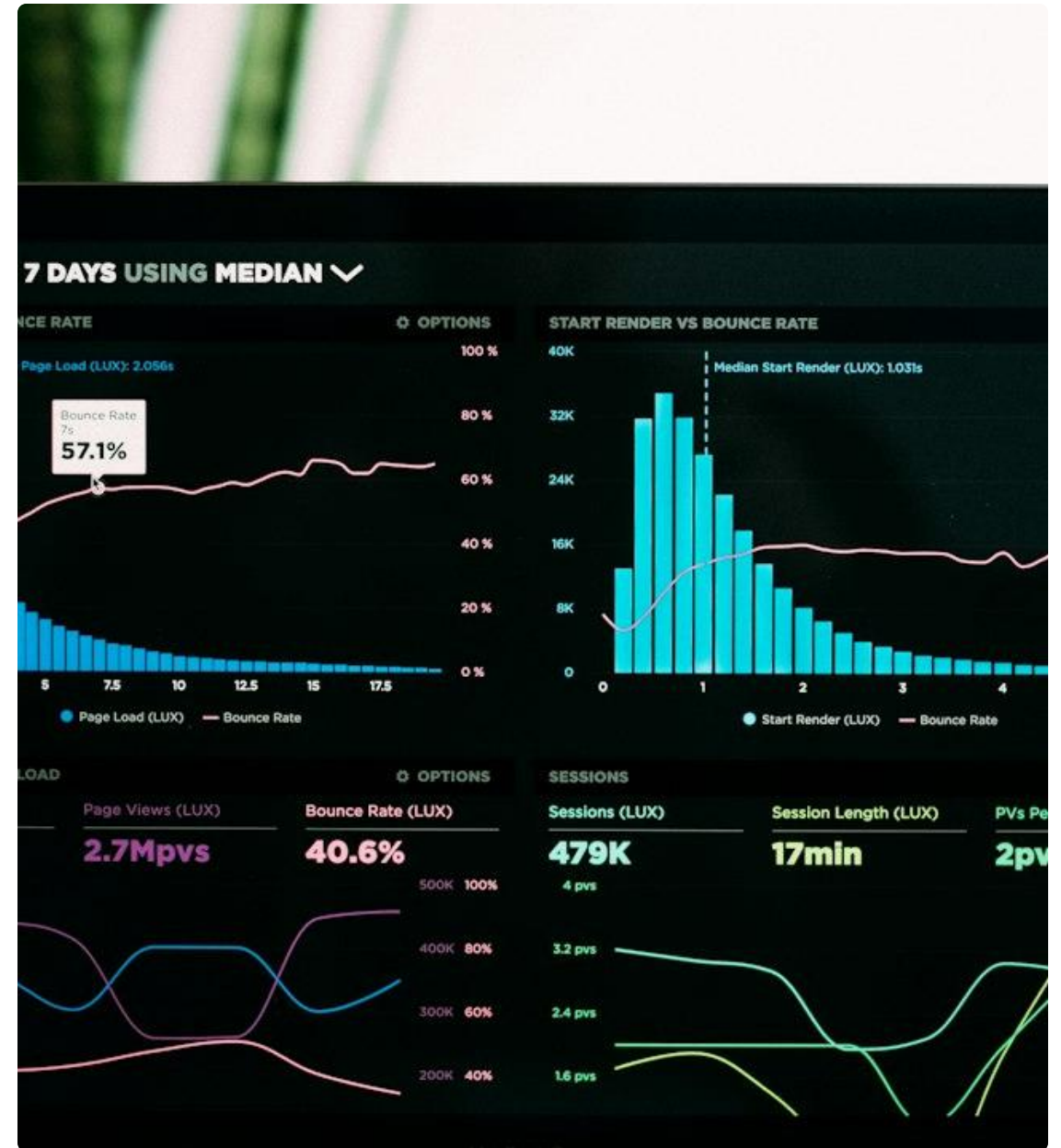
The Modern Data Center

A modern data center operates as a fully integrated ecosystem rather than a collection of isolated technologies. Its architecture is built in layers, each contributing to reliability, efficiency, and long-term resilience. At the highest level, strategic success metrics—availability, capacity, operations, efficiency, resilience, innovation, and safety—guide how the entire environment is designed and optimized. These metrics ensure that every component supports mission-critical applications without interruption.



The Modern Data Center

Unified monitoring and management systems, including DCIM and BMS platforms, provide real-time visibility across infrastructure. This oversight allows operators to detect issues early, balance workloads, and maintain optimal performance. Beneath this layer lies the IT infrastructure and network fabric, where compute, storage, and networking resources converge to support the logical application ecosystem. This is the operational heart of the data center, enabling scalability, workload mobility, and high-speed connectivity.



The Modern Data Center

Advanced power and cooling systems form the next foundational tier. Redundant power architectures, energy-efficient cooling, and environmental controls ensure that equipment operates safely and sustainably. Safety and physical security add another critical layer, incorporating fire protection, access control, surveillance, and environmental safeguards to protect both personnel and assets.



The Modern Data Center

At the base of the ecosystem is site and facility integration. Strategic location selection, structural engineering, and utility coordination determine long-term resilience, sustainability, and operational cost. When all layers work together as a holistic system, organizations achieve higher performance, stronger resilience, and more efficient operations.



Continuous 24/7 thermal monitoring

Continuous 24/7 thermal monitoring ensures that electrical systems remain safe and stable at all times. By constantly tracking temperature changes, operators gain full visibility into equipment conditions. This proactive approach reduces risks, prevents overheating, and supports long-term reliability across critical MCC infrastructure.



Real-Time Data Capture

Real-time data capture provides immediate insights into equipment performance.

Operators can quickly identify abnormal patterns, track trends, and make informed decisions. This capability enhances operational efficiency, supports predictive maintenance, and ensures that MCC systems operate within optimal parameters at all times.



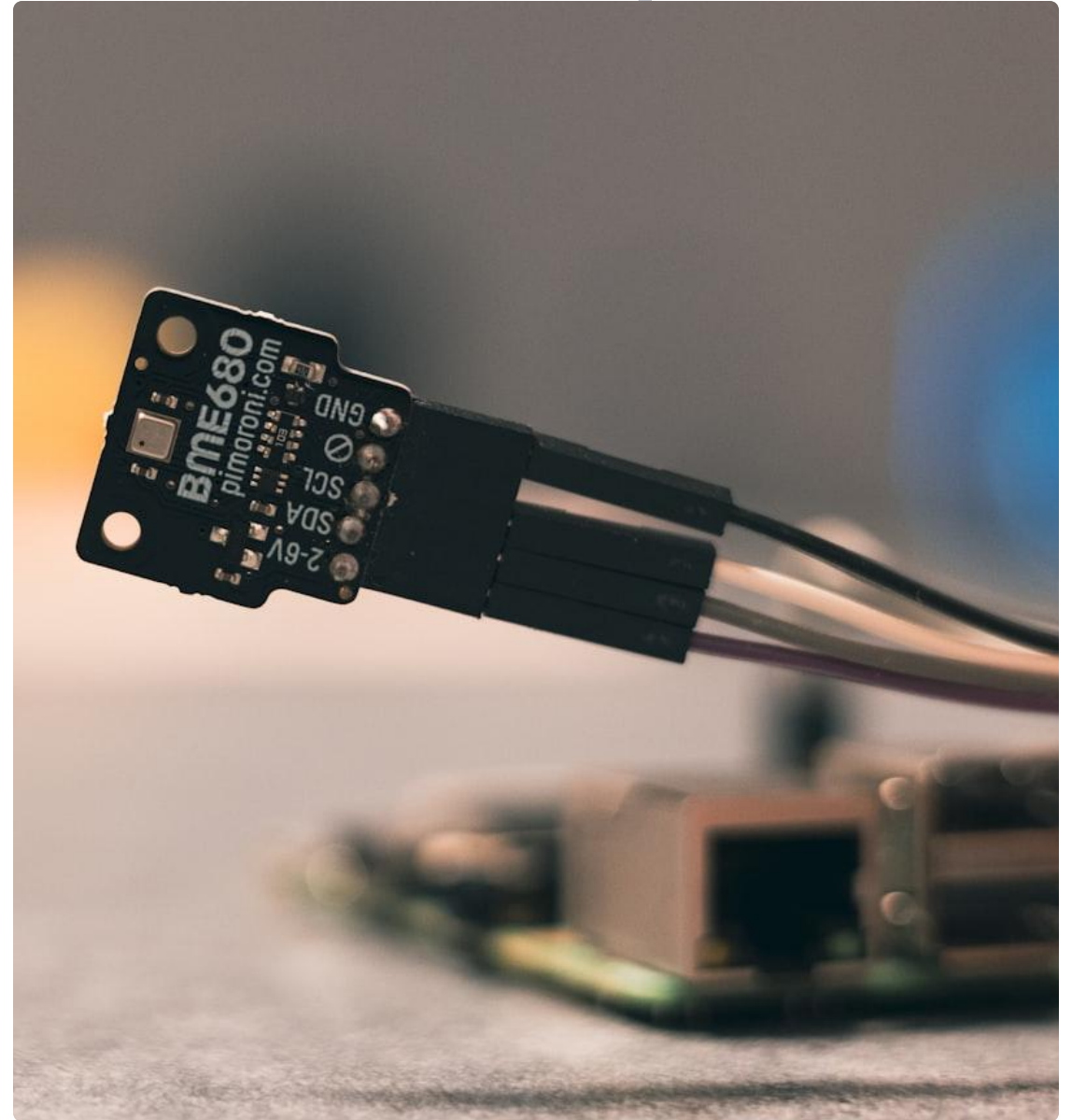
Early fault detection

Early fault detection helps identify issues before they escalate into failures. By recognizing subtle warning signs, the system enables timely intervention and reduces downtime. This proactive protection strengthens safety, minimizes repair costs, and ensures continuous operation of MCC equipment in demanding environments.



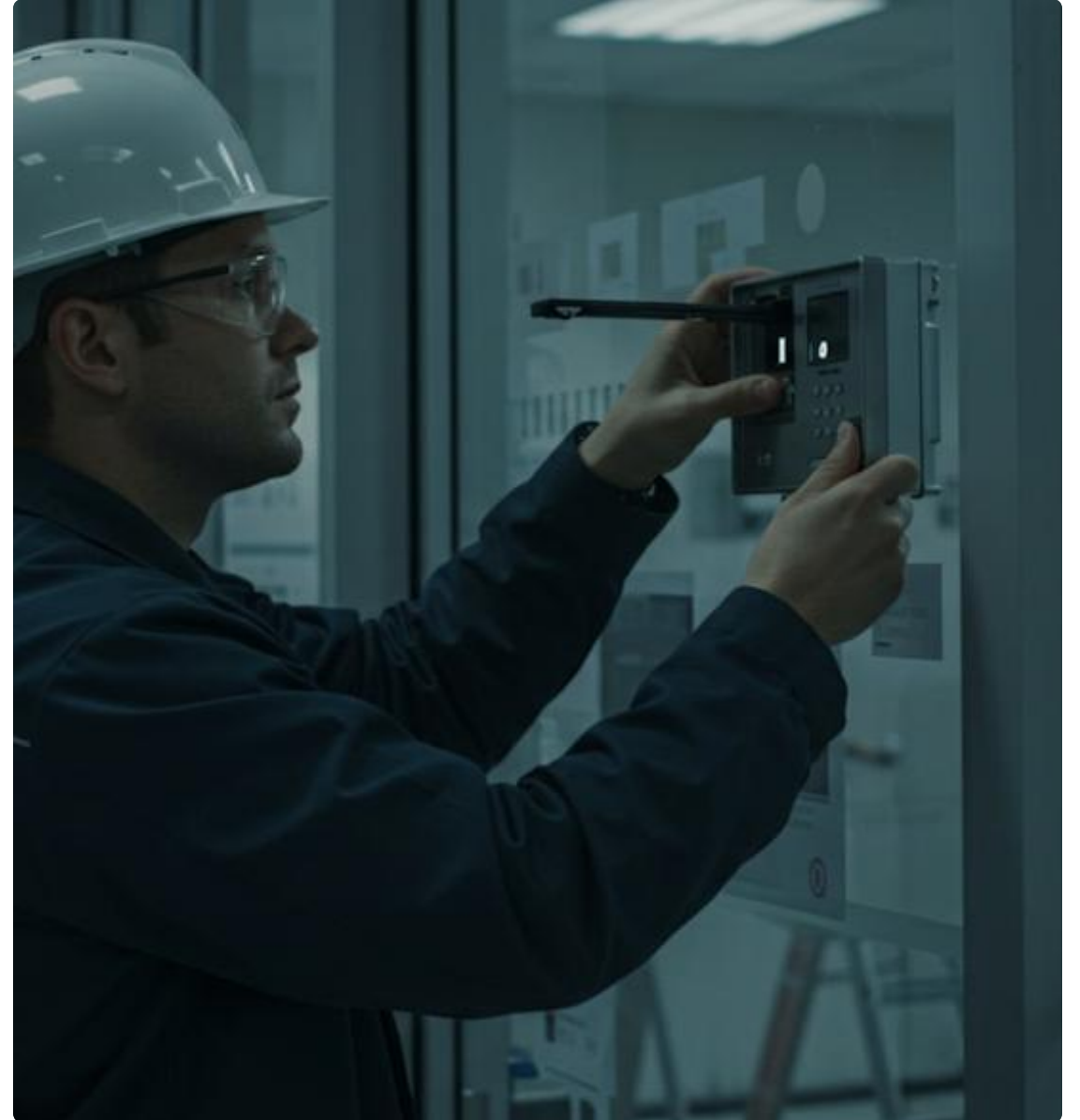
Precise monitoring at hard-to-reach connection points

Precise monitoring at hard-to-reach connection points ensures no critical area is overlooked. Sensors placed in challenging locations provide accurate thermal readings, improving visibility and reducing blind spots. This capability enhances overall system reliability and ensures comprehensive coverage across the MCC infrastructure.



Eliminating energized inspection

Eliminating energized inspection removes the need for manual checks on live equipment, significantly improving safety. Automated thermal monitoring reduces human exposure to electrical hazards, streamlines maintenance workflows, and ensures compliance with modern safety standards. This approach enhances protection while maintaining



Circular 03/2013/TT-BTTTT (and amendments)

1. Circular 03/2013/TT-BTTTT (and amendments)
2. Issued by the Ministry of Information & Communications (MIC). Defines how standards must be applied during design, construction, operation of data centers. Updated by Circular 23/2022/TT-BTTTT.
3. Key points:
 1. Applies to all data centers built after the effective date.
 2. Requires compliance with TCVN 9250:2021, ANSI/TIA-942-B:2017, and Uptime Tier.
 3. Excludes small edge data centers



Circular 42/2025/TT-BKHCHN (MOST)

1. Circular 42/2025/TT-BKHCHN (MOST)
2. Issued by the Ministry of Science & Technology. Provides updated rules on applying technical standards and regulations to data centers.
3. Key points:
 1. Applies to both government-funded and enterprise data centers.
 2. Recognizes TCVN 9250:2021, ANSI/TIA-942-B:2017, ANSI/TIA-942-C:2024, and Uptime Tier as valid rating systems.
4. Defines what qualifies as a “small edge data center” (excluded).



International Standards Explicitly Accepted in VN

1. Vietnam's regulations explicitly allow the following international standards as equivalents:
2. ANSI/TIA-942-B:2017 & ANSI/TIA-942-C:2024
3. Recognized as “rated” levels for data center assurance.
4. Uptime Institute Tier Standard (Tier I–IV)
5. Recognized as “tier” levels for redundancy and availability.
6. These are legally accepted alternatives to TCVN 9250:2021.



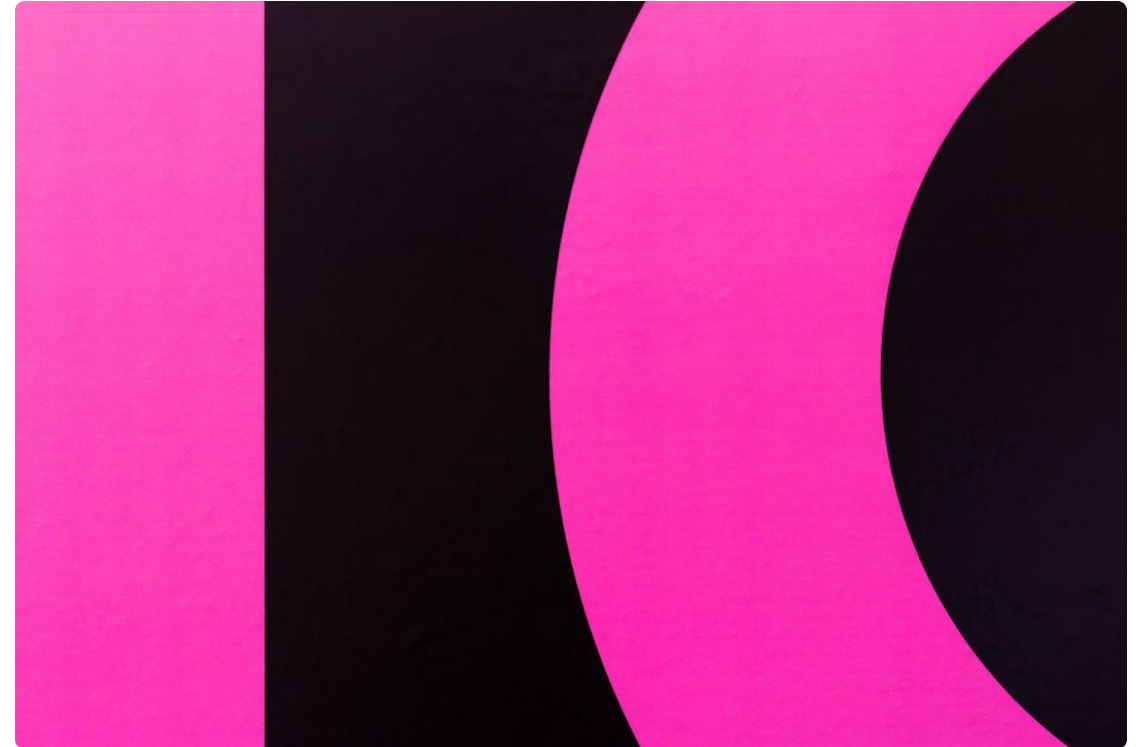
Additional Regulatory (Non-technical standards)

- 1. Environmental compliance:** Data center operators must meet requirements on energy efficiency, water use, waste management, and environmental impact assessments.
- 2. Cybersecurity, data protection & telecom licensing:** Operators must comply with Vietnam's Cybersecurity Law, personal data protection rules, content removal obligations, and telecom licensing under the 2023 Telecommunications Law.
- 3. Construction & infrastructure regulations:** Mandatory compliance with building laws, fire safety, real-estate regulations, and technical infrastructure operation requirements.



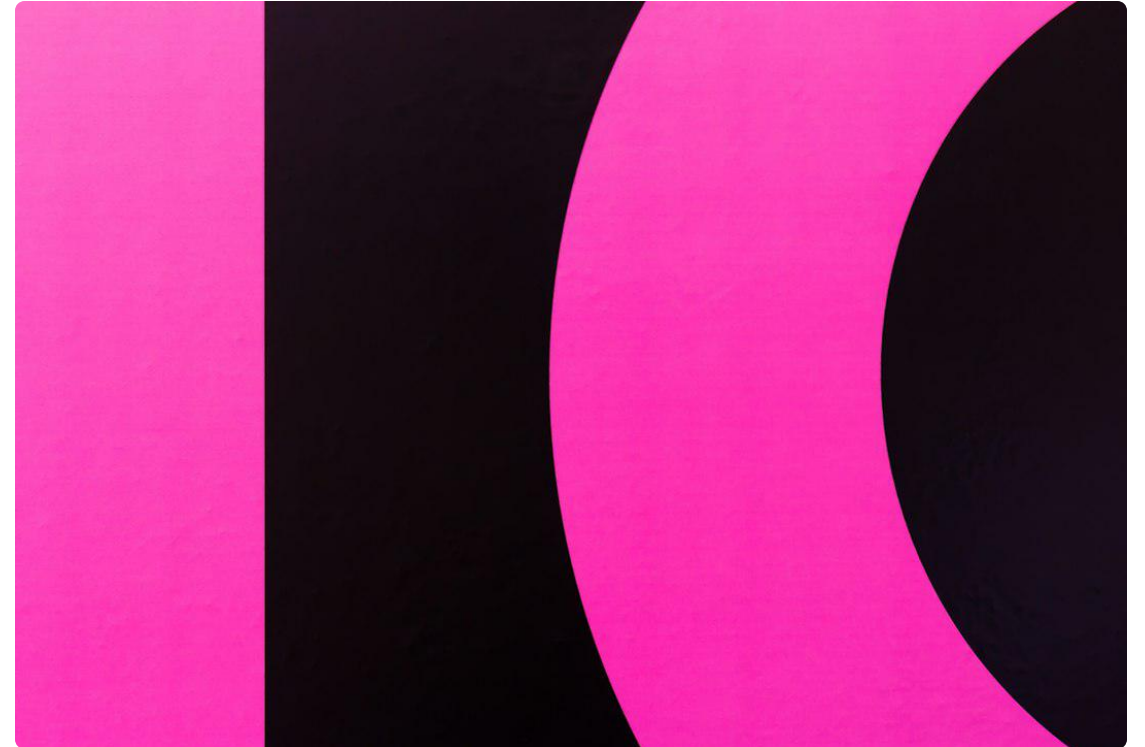
ISO 9001 QMS (Quality Management System)

- 1. Establishes a structured Quality Management System** to ensure consistent processes and high-quality products or services.
- 2. Improves customer satisfaction** through better control, documentation, and continuous process optimization.
- 3. Ensures compliance and continual improvement** by monitoring performance and implementing corrective actions.



ISO 14001 EMS (Environmental Management System)

- 1. Establishes an Environmental Management System** to identify, control, and reduce environmental impacts across operations.
- 2. Improves resource efficiency** through better energy use, waste reduction, and sustainable practices.
- 3. Ensures legal compliance and continuous improvement** in environmental performance and regulatory obligations.



ISO 37001:2016 Anti-Bribery Management Systems

1. What it covers

1. Establishing anti-bribery policies and controls
 2. Conducting risk assessments
 3. Implementing training and reporting mechanisms
 4. Monitoring, auditing, and continuous improvement
 5. Ensuring compliance with anti-corruption laws
- ## 2. ISO 37001 helps organizations strengthen integrity, reduce corruption risks, and demonstrate commitment to ethical business practices — often required in government, finance, construction, and data center sectors.



ISO 45001 (HSE)

- 1. Establishes an Occupational Health & Safety Management System to identify, assess, and control workplace risks.**
- 2. Protects employees by preventing accidents, occupational illnesses, and improving overall working conditions.**
- 3. Ensures legal compliance and continuous improvement through regular monitoring, evaluation, and enhancement of HSE performance.**



ISO 27001 Information Security Management System

- 1. Establishes a structured Information Security Management System to protect data confidentiality, integrity, and availability.**
- 2. Identifies and manages security risks through systematic assessment, controls implementation, and continuous monitoring.**
- 3. Ensures compliance and strengthens trust by meeting global security standards and demonstrating robust governance.**



UTI Tier IV Design

1. **Highest level of fault tolerance**, requiring full redundancy (2N) across all critical systems to ensure continuous operation.
2. **Supports concurrent maintainability and fault isolation**, meaning any single failure or maintenance activity will not interrupt data center services.
3. **Delivers maximum uptime**, typically achieving **99.995% availability**, suitable for mission-critical workloads and high-risk environments.



UTI Tier IV Facility

1. **Fully fault-tolerant facility infrastructure**, requiring 2N or system+system redundancy across power, cooling, and all critical components.
2. **Supports continuous operation during failures**, ensuring no downtime even if an entire system fails or is taken offline for maintenance.
3. **Delivers the highest availability level**, typically achieving **99.995% uptime** for mission-critical environments.



UTI Tier III Design

1. **Supports concurrent maintainability**, allowing any single component to be taken offline for maintenance without disrupting operations.
2. **Provides N+1 redundancy** across critical power and cooling systems to ensure resilience against individual equipment failures.
3. **Delivers high availability**, typically achieving **99.982% uptime**, suitable for enterprise-grade and mission-critical workloads.



UTI Tier III Operation Rating Gold

- 1. Recognizes excellence in operational sustainability,** demonstrating that the data center follows industry-leading processes and governance.
- 2. Ensures strong risk management and operational discipline,** including maintenance, staffing, training, and incident response readiness.
- 3. Validates long-term reliability,** showing that the facility consistently meets Tier III performance standards in real-world operations.



Trung tâm dữ liệu hiện đại