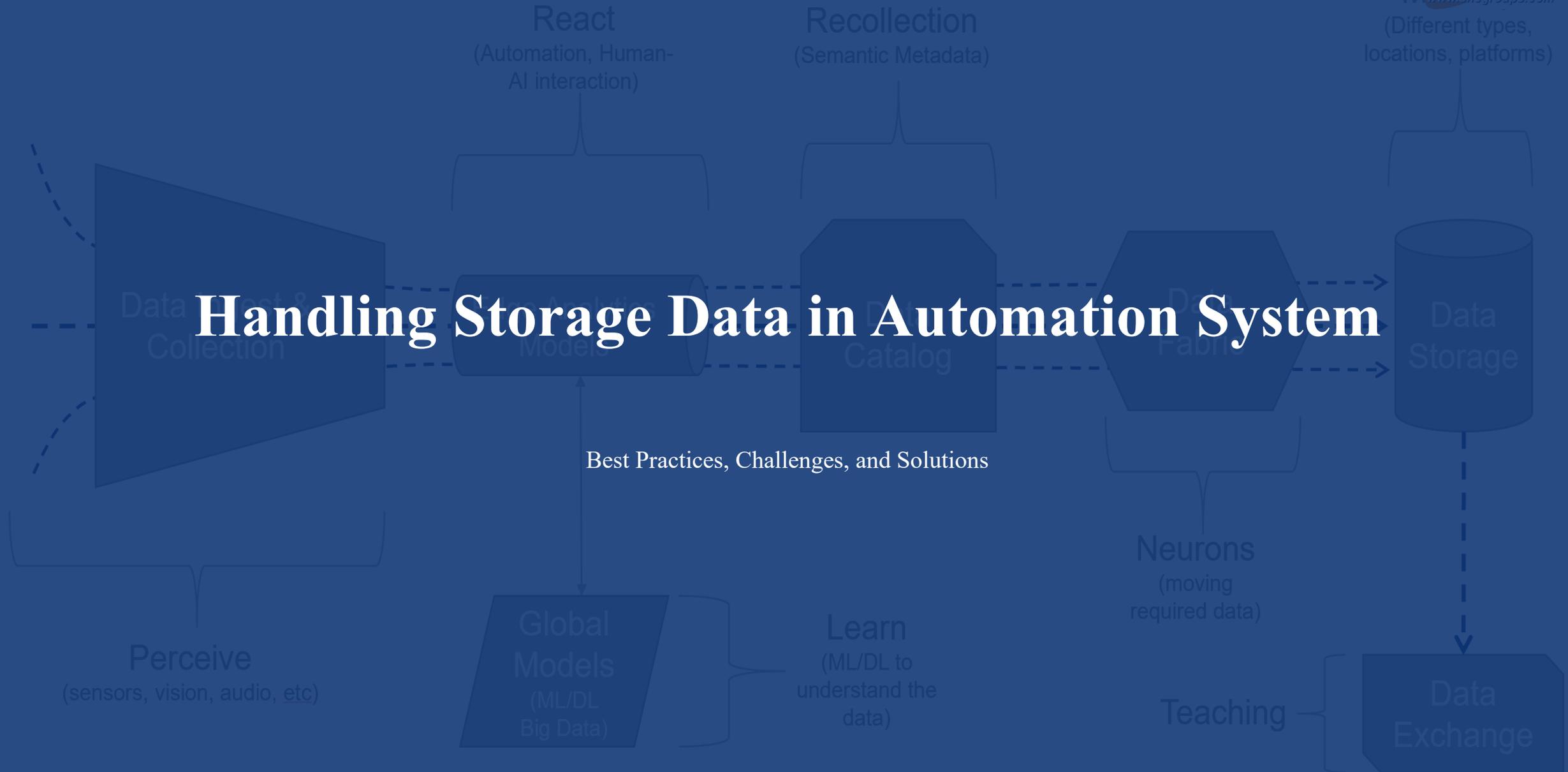


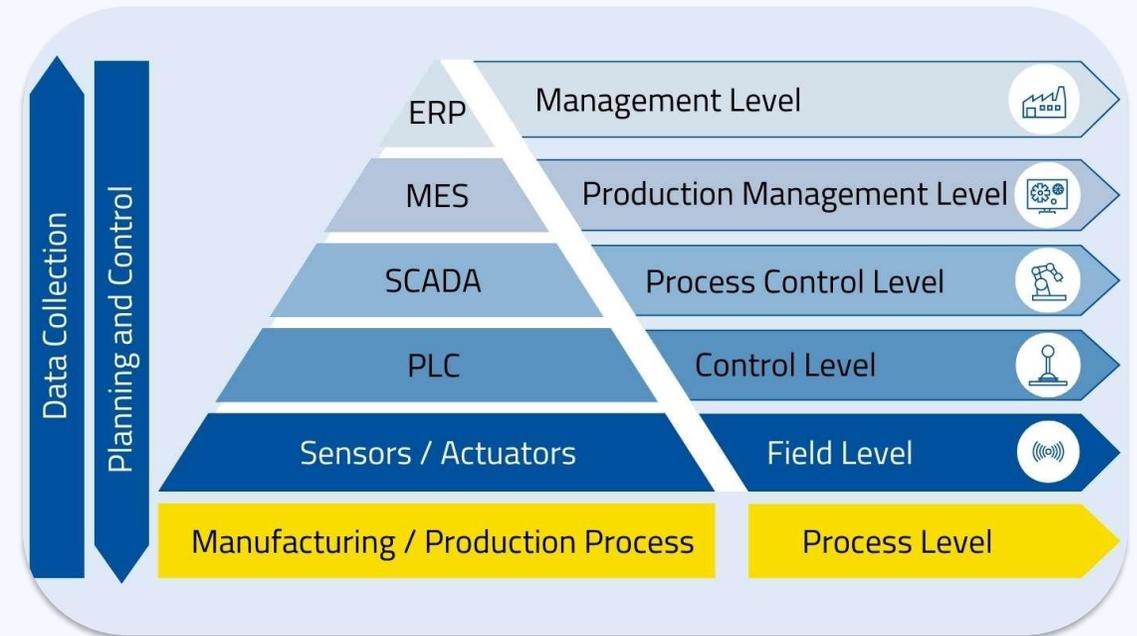
Data Flow →

# Handling Storage Data in Automation System



# Introduction to Storage Data in Automation Systems

- Definition:** Collection, processing, and storage of data generated by automated industrial processes
- Data Types:** Sensor readings, control signals, production metrics, equipment status, historical logs
- Characteristics:** High volume, continuous flow, real-time processing requirements, structured/unstructured
- Importance:** Enables predictive maintenance, process optimization, quality control, and decision-making



# Importance of Effective Data Management in Automation



## Boost Efficiency

Streamlined workflows and reduced manual processes



## Increase Productivity

Optimized resource allocation and utilization



## Reduce Costs

Minimized downtime and improved resource management



## Enable Decision-Making

Real-time insights and predictive analytics



## Ensure Compliance

Standardized data handling and audit trails



## Enhance Security

Controlled access and data protection measures



# Storage Management Automation



**Automated Storage Pooling** Virtualizes data services from underlying hardware, creating logical pools from heterogeneous storage systems



**Capacity Balancing** Automatically distributes workloads across storage resources to optimize performance and utilization



**Automated Data Placement** Uses machine learning to move data between storage tiers based on access patterns and business requirements

## Key Benefits

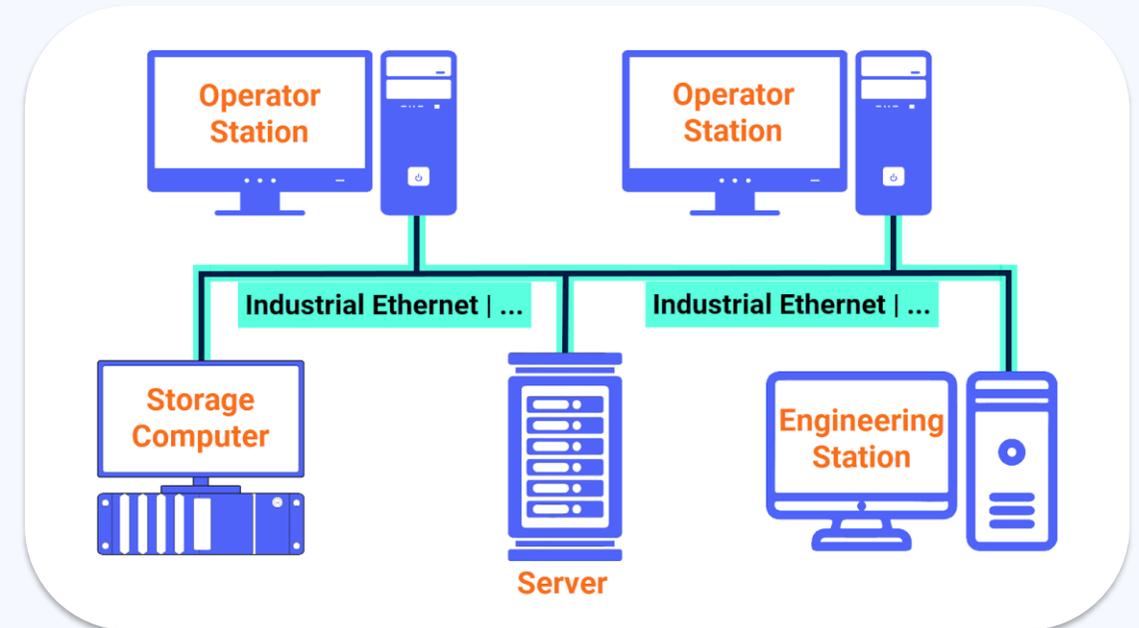
✓ Reduced manual effort

✓ Improved resource utilization

✓ Enhanced performance

✓ Lower operational costs

✓ Better data protection



# Database Management for Industrial Automation Systems



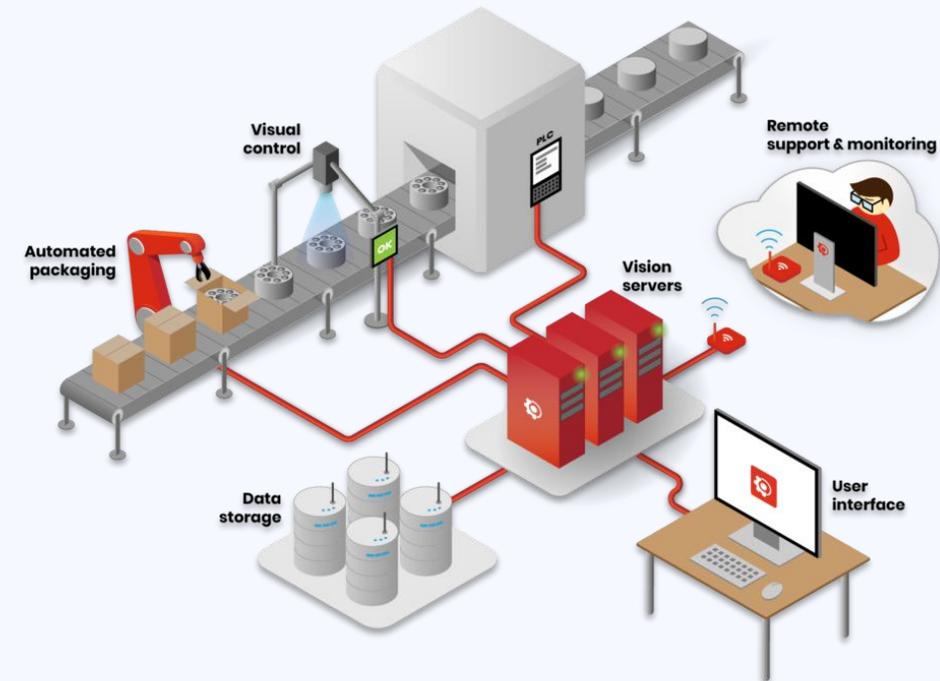
**Embedded Databases** Tightly integrated with automation processes for local data processing



**Real-Time Processing** Handles live data streams with minimal latency for immediate decision-making



**Data Flow Management** Coordinates data movement between plant floor, management systems, and enterprise level



## Key Features

- ✓ Platform independence
- ✓ ACID compliance
- ✓ Encryption capabilities
- ✓ Multi-core support
- ✓ Data replication
- ✓ Automatic recovery

# Best Practices for Data Management in Automation Systems



 **Data Backup & Recovery** Automated scheduling, quick restoration, reduced human error

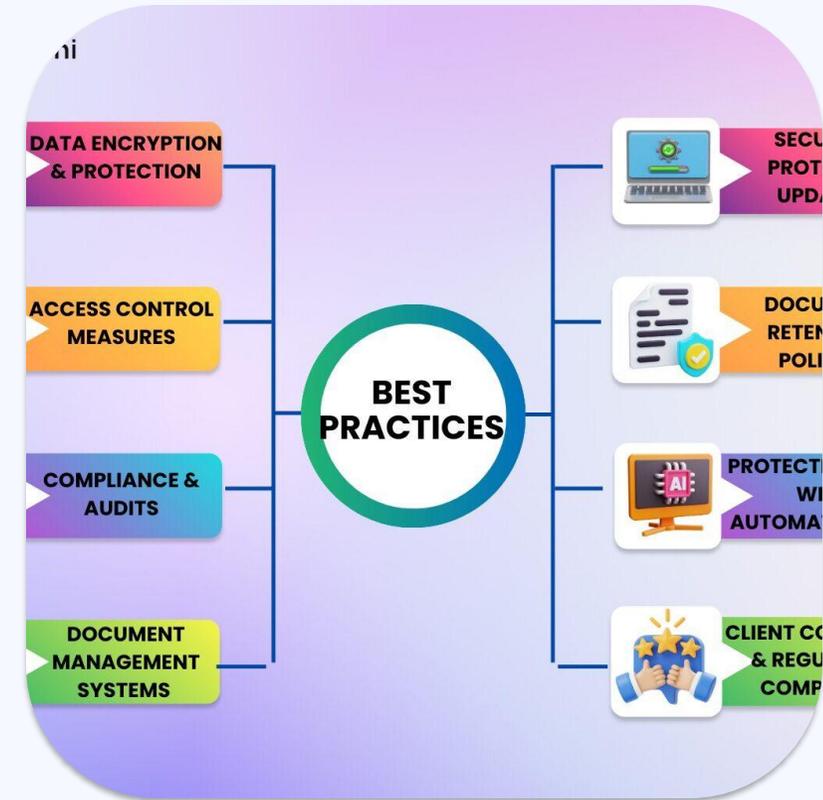
 **Data Archiving** Rule-based classification, metadata tagging, cost optimization

 **Intelligent Data Tiering** Automatic movement based on access patterns, performance optimization

 **Deduplication & Compression** Reduced storage requirements, improved backup efficiency

 **Data Governance & Compliance** Policy enforcement, audit trails, regulatory adherence

 **Storage Provisioning** Dynamic allocation, resource optimization, automated scaling



# Challenges in Data Storage Automation Systems



**High Initial Investment** Significant upfront capital required • **ROI justification difficult** • Budget constraints • Implementation delays



**Integration Complexities** Legacy systems compatibility • **Siloed data sources** • Multiple vendors • Limited visibility • Increased maintenance costs



**System Reliability & Uptime** Unplanned downtime risks • **5-20% productivity loss** • Equipment aging • Limited predictive maintenance • Recovery failures



**Data Inaccuracy & Management** Limited real-time visibility • **Disconnected systems** • Manual processes • Bottlenecks identification • Slow response to changes

## Risks and Limits of Using AI in Cybersecurity

Adversarial AI Attacks

Data Privacy Risks

False Positives and Alert Fatigue

Model Drift Over Time

Bias in Training Data

Overreliance on Automation

Lack of Explainability

Integration With Legacy Systems

High Implementation Costs

Regulatory and Compliance Challenges

# Solutions to Overcome Data Storage Challenges



**Flexible Financing Models** "As-a-Service" options • **CapEx to OpEx conversion** • Predictable monthly payments • Faster project initiation • Improved ROI visibility



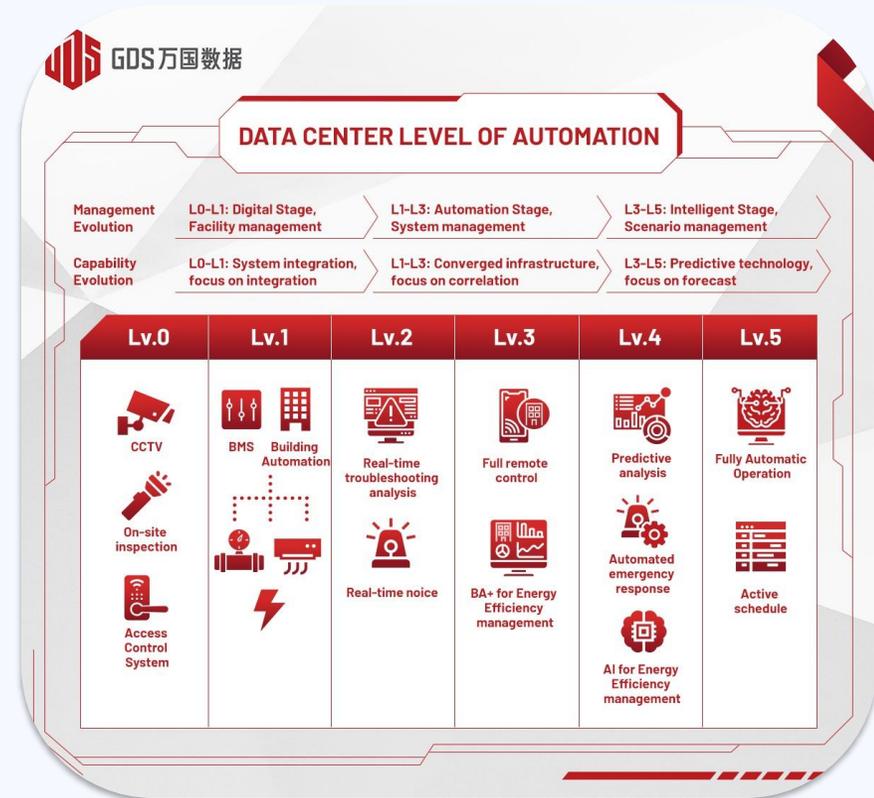
**End-to-End Automation Solutions** Smart software integration • **System orchestration** • Simplified vendor management • Reduced downtime • Seamless connectivity



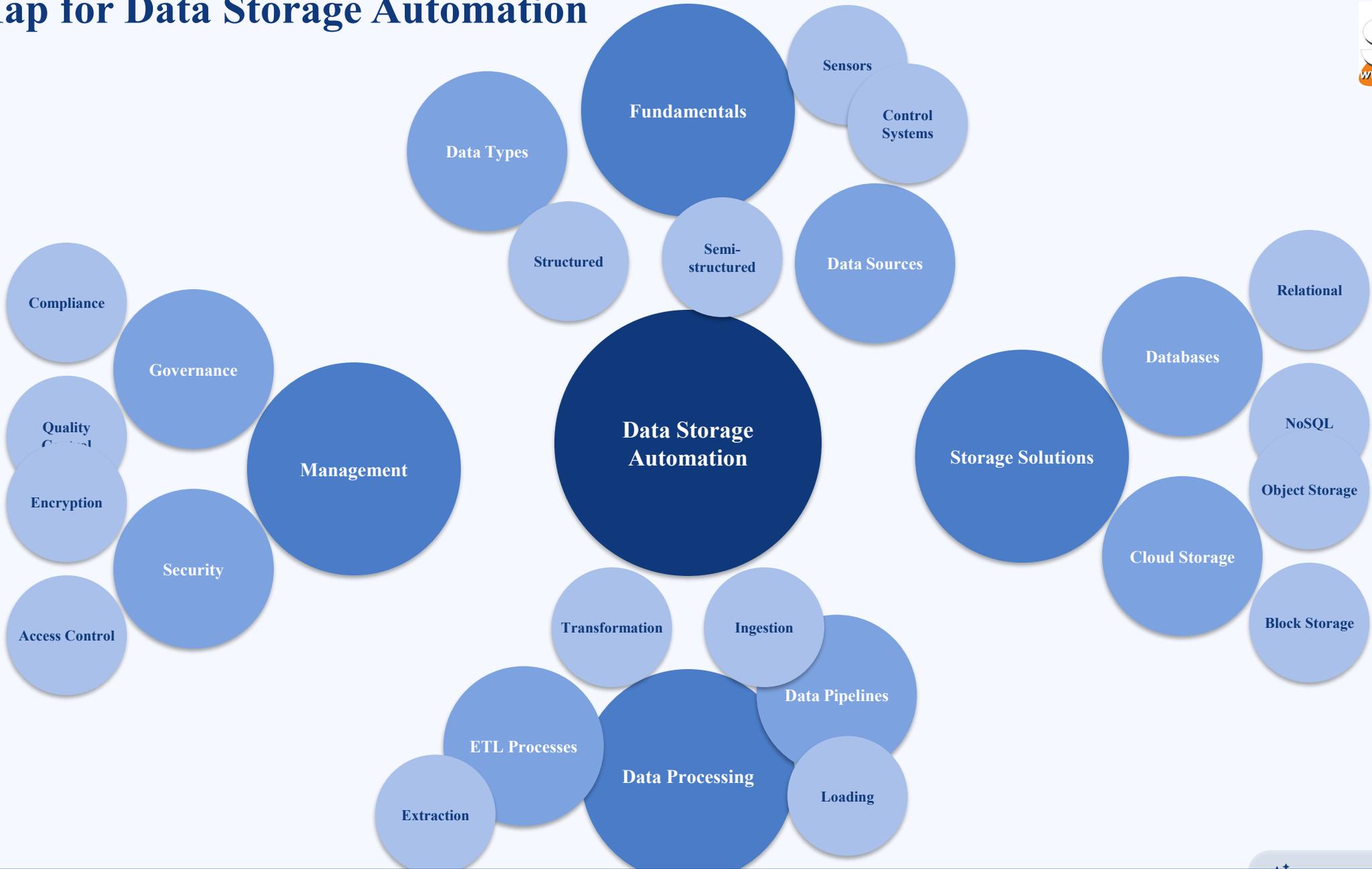
**High-Reliability Equipment** Digital services integration • **IoT-enabled monitoring** • Predictive maintenance • Remote diagnostics • Extended equipment lifespan



**Software-First Approach** Scalable command center • **Data-driven decisions** • Real-time visibility • Predictive analytics • Flexible system architecture



# Mind Map for Data Storage Automation



# Recap of Key Points



▸ Data types: sensor readings, control signals

High volume, continuous flow, real-time



▸ Boosts efficiency & productivity

▸ Enables better decision-making



▸ Backup, archiving, intelligent tiering

▸ Governance & compliance



▸ High costs, integration, reliability

▸ Flexible financing, end-to-end solutions



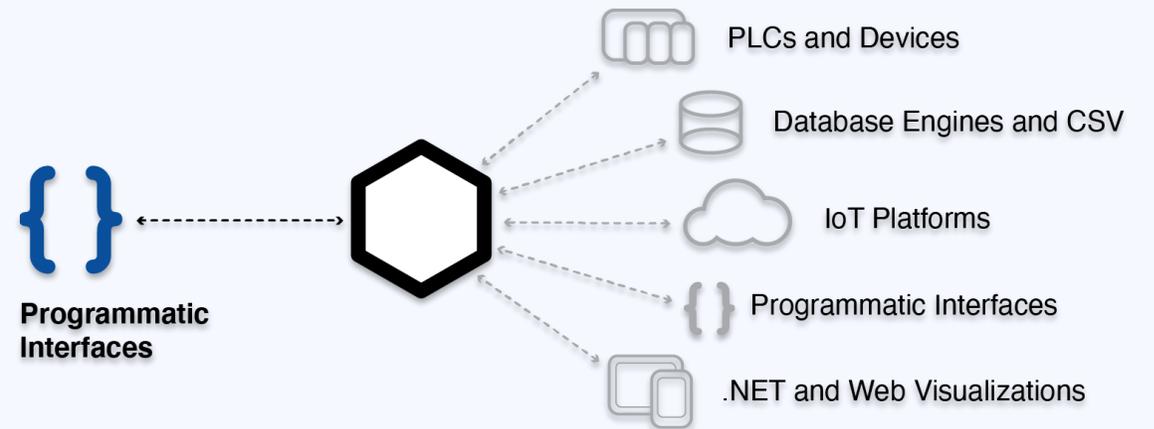
▸ Automated pooling & capacity balancing

▸ Machine learning for data placement



▸ Embedded databases for real-time processing

Platform independence & ACID compliance



# Summary and Conclusion



✓ Boosts efficiency

✓ Reduces costs

✓ Enables decision-making



✓ Streamlines processes

✓ Optimizes resources

✓ Enhances reliability



✓ Integrated approach required

✓ Balance between challenges & solutions

✓ Continuous improvement essential

## Future Trends

AI-driven automation

Edge computing

Zero-trust security

Real-time analytics

