Formula 1

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Formula 2

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Formula 3

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Detailed Explanation

SCADA historians serve as centralized time-series databases for collecting, storing, and retrieving process data from field devices (e.g., PLCs, RTUs, DCS). As modern IIoT deployments scale to tens of thousands of tags with sub-second sampling rates, raw data volumes can exceed terabytes per year—making accurate sizing critical for performance, cost, and compliance. The 2024 Benchmark Report addresses this by aggregating anonymized telemetry from 47 production environments, measuring metrics such as bytes-per-tag-per-second (BPTS), effective compression ratios (ECR), and query response times across leading historian platforms (e.g., OSIsoft PI, Canary Labs, AVEVA Historian, and open-source alternatives like TimescaleDB with custom codecs). It introduces a standardized sizing model that factors in tag type (analog, digital, event), update frequency, metadata overhead, deadband/deadtime filtering, and retention policies—enabling engineers to project storage growth over 5–10 year horizons with statistical confidence intervals. Crucially, the report evaluates lossless vs. lossy compression strategies (e.g., Gorilla, Delta-of-Delta, LZ4, and domain-aware quantization), benchmarking their impact on fidelity (e.g., maximum deviation < 0.1% for analog signals) and analytical usability (e.g., trend accuracy for root-cause analysis or ML feature engineering).

Key Components

#	Component
1	Tag Cardinality & Sampling Profile
2	Compression Algorithm Benchmark Matrix
3	Storage Growth Projection Model

Applications

#	Application
1	Capacity planning for cloud or on-premise historian deployments
2	Vendor selection and ROI analysis based on storage efficiency
3	Regulatory compliance documentation for data retention and audit trails

Related Concepts

#	Concept
1	Time-Series Database Optimization
2	Industrial Data Lifecycle Management
3	IIoT Edge-to-Cloud Data Pipelines

Tags

> SCADA, industrial automation, time-series database