

# Strategic Challenges in Cloud Systems & Data Architecture Evolution

This survey is part of a Computer Engineering undergraduate thesis research project conducted at the "Università degli Studi di Bergamo". The objective is to analyze the evolution of Cloud Systems and validate critical challenges in Security, FinOps, and Interoperability.

**Privacy:** Participation is anonymous. All responses will be aggregated and used strictly for academic research purposes. No personal or sensitive company data is requested.

**Time:** This survey takes about 5 minutes to complete.

## Demographics & Organizational Profile

**What is your primary role within the organization?**

- CTO / CIO / CDO / CEO
- VP of Engineering / Infrastructure
- Lead Data Architect / Principal Engineer
- Head of Data Governance / Security
- Other:

**What is the approximate headcount of your organization?**

- Less than 5,000
- 5,000 - 9,999
- 10,000 – 49,999
- 50,000 – 99,999
- 100,000+

## Architectural Maturity & Usage

**Which description best matches your current data architecture?**

- Legacy/Monolithic: On-premise Enterprise Data Warehouses (EDW) with rigid schemas
- Data Lake: Centralized storage of raw data (Schema-on-Read), separate from compute
- Lakehouse: Unified architecture supporting ACID transactions and combined BI/ML workloads
- Data Mesh: Decentralized architecture with domain-oriented data ownership and federated governance
- Other:

**What is your primary cloud strategy?**

- Single Cloud (100% on AWS, Azure, or Google Cloud)
- Hybrid Cloud (On-premise + Cloud)

- Multi-Cloud (Strategic use of multiple providers)
- Other:

## Friction Points

**How would you rate the difficulty of enforcing consistent security policies across your data estate?**



**In a decentralized or self-service environment, what is your biggest governance challenge?**

- Inconsistent access control (IAM) across different domains
- Lack of visibility into who is accessing what data
- Ensuring regulatory compliance (GDPR/HIPAA) across independent teams
- We utilize a centralized model, so this does not apply

**How does your organization currently manage Cloud/Data Platform costs?**

- Reactive: We analyze bills at the end of the month and investigate spikes ("Bill Shock")
- Proactive: We use quotas and budget alerts, but optimization is manual
- FinOps: Engineering teams are responsible for the unit cost of their workloads
- Automated: Costs are optimized in real-time by the platform
- Other:

**To what extent do "orphaned resources" (e.g., idle clusters, unreferenced storage) contribute to your cloud waste?**



**Which factor most hinders your ability to move workloads between cloud providers?**

- Egress fees (cost of moving data)
- Data Gravity (the volume of data is too massive to move)
- Proprietary formats (reliance on specific engines like Redshift/BigQuery)
- We are happy with a single vendor and do not wish to move
- Other:

**Are you currently adopting "Open Table Formats" (e.g., Apache Iceberg, Delta Lake) specifically to avoid vendor lock-in?**

- Yes
- No
- We are currently evaluating them

**Are you evaluating or participating in Data Spaces (e.g., IDSA, Gaia-X) for secure, sovereign data sharing between organizations?**

- Yes, we are already active participants
- We are currently evaluating
- No, but we are monitoring the topic
- No, not interested / not applicable

## Prototype Discovery & Future Outlook

**How do you assess the potential of "AI-Native" Data Warehouses (which integrate Generative AI for query optimization and natural language interfaces) in your future roadmap?**

- Transformational (High Priority)
- Interesting but premature
- Low priority
- Not relevant

**Which of the following "missing tools" would provide the highest value to your organization today?**

- Automated Policy Propagation: A tool that automatically translates high-level governance rules into technical policies across distributed data products
- Proactive Cost Anomaly Prevention: A tool that simulates query costs before execution rather than reporting them after
- Cross-Cloud Abstraction Layer: A unified interface to query data residing in different clouds without manual movement
- Data Product Marketplace: A user-friendly interface for discovering and requesting access to domain data

**If a functional prototype was developed to address the challenge selected above, would you be interested in seeing a case study on it?**

- Yes
- No
- Maybe

**(Optional) Is there any other critical friction point in your Cloud Data Platform that was not mentioned above?**