

## Letter from the Editor-in-Chief

For decades, the relational model and declarative query languages have served as the North Star of our community. We built massive, general-purpose engines based on a simple, powerful philosophy: users declare what data they want, and the system figures out how to retrieve it. Today, we stand at the precipice of a foundational paradigm shift that elevates this abstraction even further. We are transitioning from declarative data management to agentic data management. In this new era, we are no longer just asking our systems to passively fetch records; we are asking autonomous agents to navigate ambiguity, synthesize multimodal evidence, and actively mutate our enterprise environments to achieve high-level business objectives.

The papers in this special issue capture the sheer magnitude of this pivot, separating the rigid architectures that will fall away from the bedrock principles that will endure. Perhaps the most striking change is the shift in how databases are constructed. The long-standing pursuit of a single, general-purpose engine designed to handle any arbitrary schema or workload is being challenged. Eckmann et al. present a bold vision where the future is bespoke. They propose leveraging large language models to automatically synthesize full database systems on demand, crafting "one-size-fits-one" engines that shed the overhead of general-purpose flexibility to hardcode data structures and algorithms optimal for a single specific workload.

Simultaneously, the role of the database is shifting from a passive system of record to a high-stakes, active nervous system. As Ang et al. note, modern data agents are transitioning from simply reading data to acting on it, bringing real-world consequences and coupling mutation with profound risk. To safely unleash these capabilities, our static databases must evolve into Agentic Data Environments that actively discover information while natively supporting speculative branching and enforcing strict data flow controls across the entire computing stack. This underscores a broader reality explored by Özsü et al.: there is a powerful duality between LLMs and data management systems. While LLMs are revolutionizing natural language querying and data integration, our underlying data architectures must be fundamentally redesigned to support the unpredictable, multi-step workloads required to train and serve these models efficiently.

Yet, as we embrace these autonomous, bespoke, and active environments, the foundational principles of our discipline are not dying—they are reaching their ultimate form. The declarative dream is evolving into true model-data independence. Patel et al. introduce the semantic operator model, which allows programmers to write application logic using high-level, natural language operations while the system transparently optimizes the underlying, complex AI executions. To make these semantic operations financially and computationally viable, we must still rely on classic, hardcore database engineering. Trummer demonstrates this beautifully by reimagining the traditional block nested loops join for semantic operations, proving that we can optimize batch sizes to dramatically reduce the costs and API overhead of LLM invocations.

Above all, the agentic future reaffirms that advanced reasoning is entirely useless—and often dangerous—without a rigorous grounding in reality. Chung et al. emphasize that embedding AI capabilities directly into the core engine is only part of the solution; the reliability of these autonomous systems is strictly predicated on a rigorous semantic foundation. Universal metadata catalogs, schema lineage, and robust semantic models will remain the indispensable anchors that keep non-deterministic LLMs tethered to deterministic enterprise facts.

The shift from declarative to agentic data management is ultimately about relinquishing micro-management in exchange for goal-oriented autonomy, while simultaneously building stronger, smarter architectures to govern that autonomy. I invite you to read the outstanding contributions in this issue

and join us in building this bespoke, agentic future.

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