

## Relational Thinking: How Data Works (and Why It Still Matters)

### **Module 1: The Relational Mindset**

- History: Codd, IBM, the invention of "relations"
- Data vs. Information: why structure matters
- Why tables aren't spreadsheets

### **Module 2: Keys, Constraints, and Dependencies**

- Primary keys, foreign keys, and NULL logic
- Functional dependencies and Armstrong's Axioms
- Case studies of constraint failures (real-world horror stories)

### **Module 3: Algebra & Querying**

- Relational Algebra walkthrough (with Venn diagram visuals)
- Mapping algebra to SQL
- Optimization strategies (index use, join order)

### **Module 4: Normalization Demystified**

- 1NF through BCNF (with everyday analogies)
- Pros and cons of denormalization
- How NoSQL changed — but didn't kill — this logic

### **Module 5: Transactions, Isolation, and Serializability**

- ACID explained simply (with demos)
- Why dirty reads matter
- Real-life use: money transfers, e-commerce carts

### **Module 6: Extensions and the Modern Landscape**

- What NewSQL, NoSQL, and Graph DBs keep from relational theory
- Polyglot persistence and data lakes
- The future: is relational theory still enough?