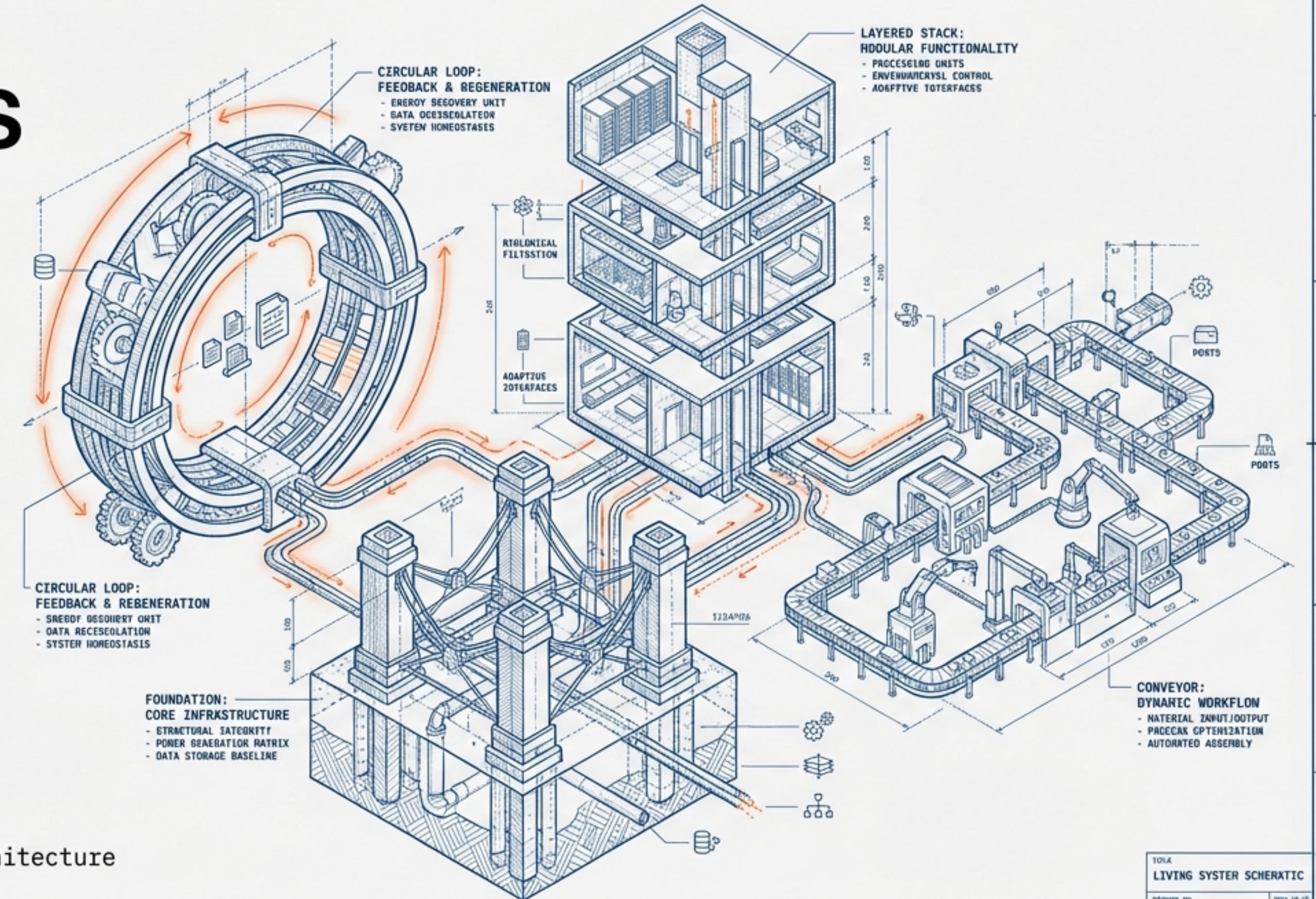


DESIGN PRINCIPLES

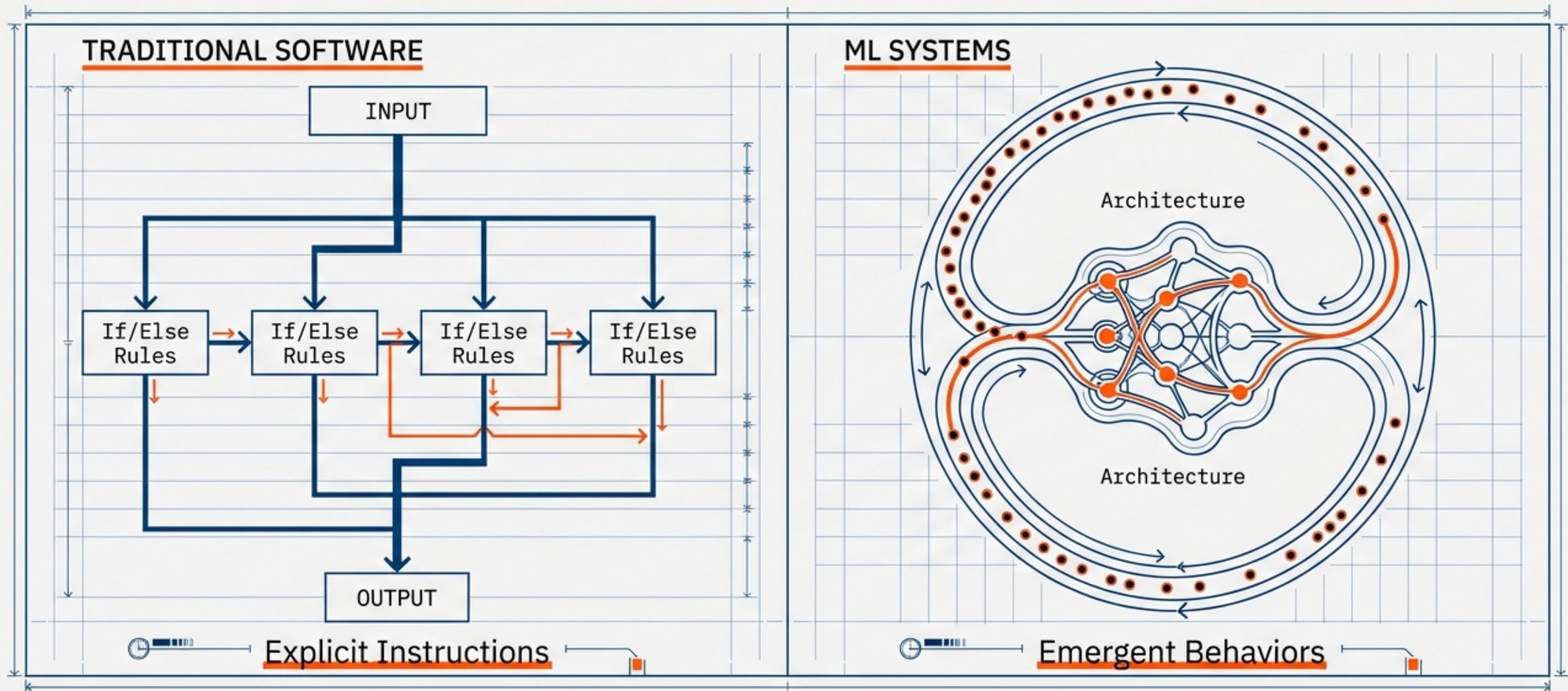
Engineering the Living System



Part II: From Algorithms to Architecture

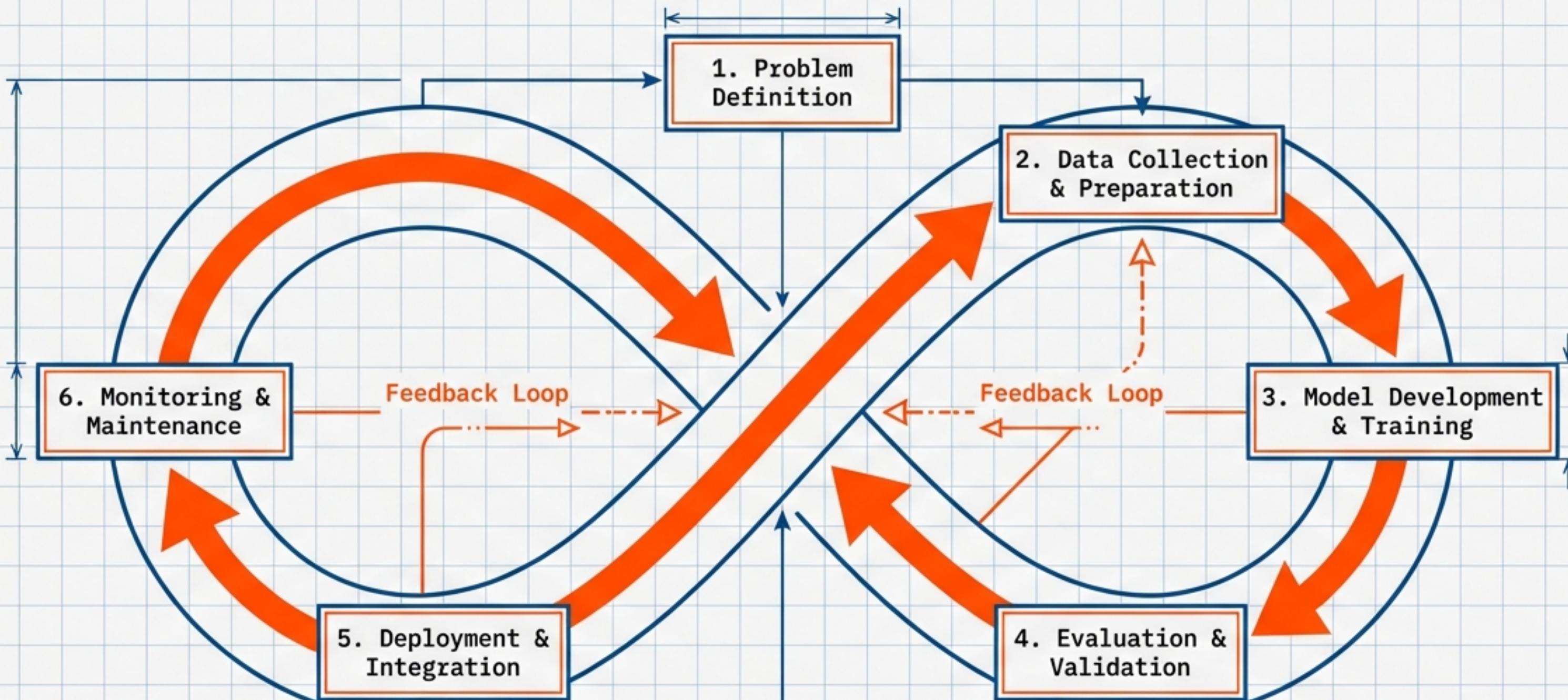
Chapters 5 - 8

The Transition: Deterministic vs. Probabilistic

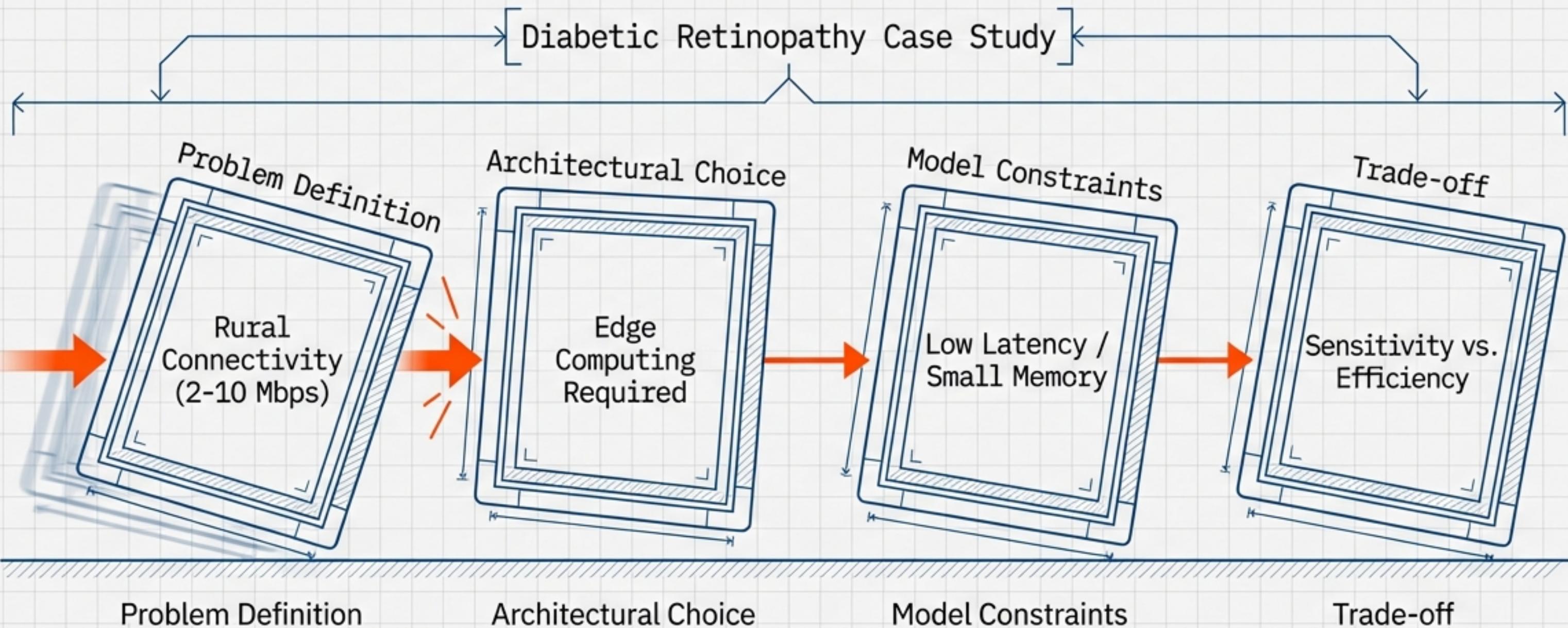


Engineering Challenge: Ensuring reliability when rules are learned, not written.

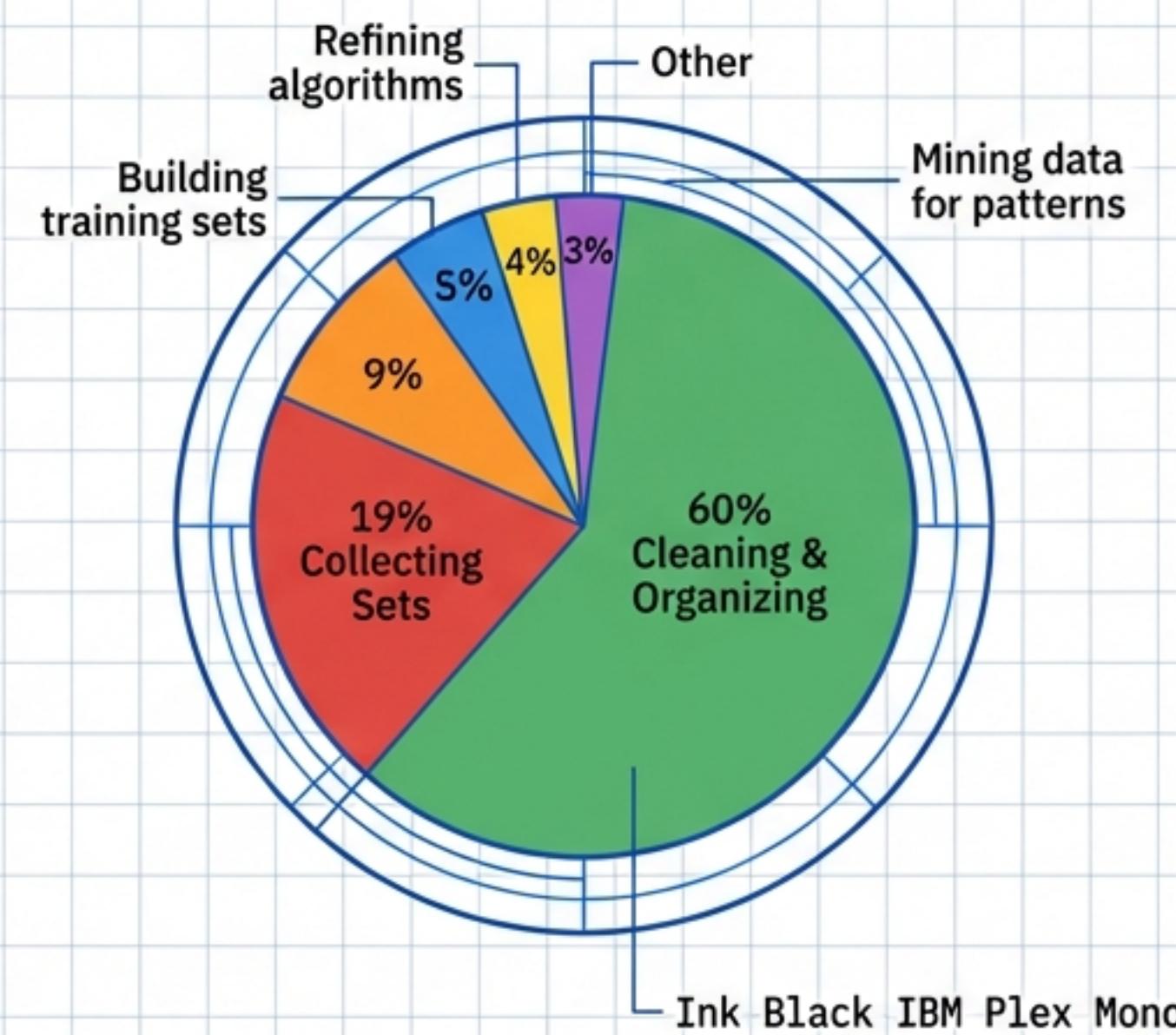
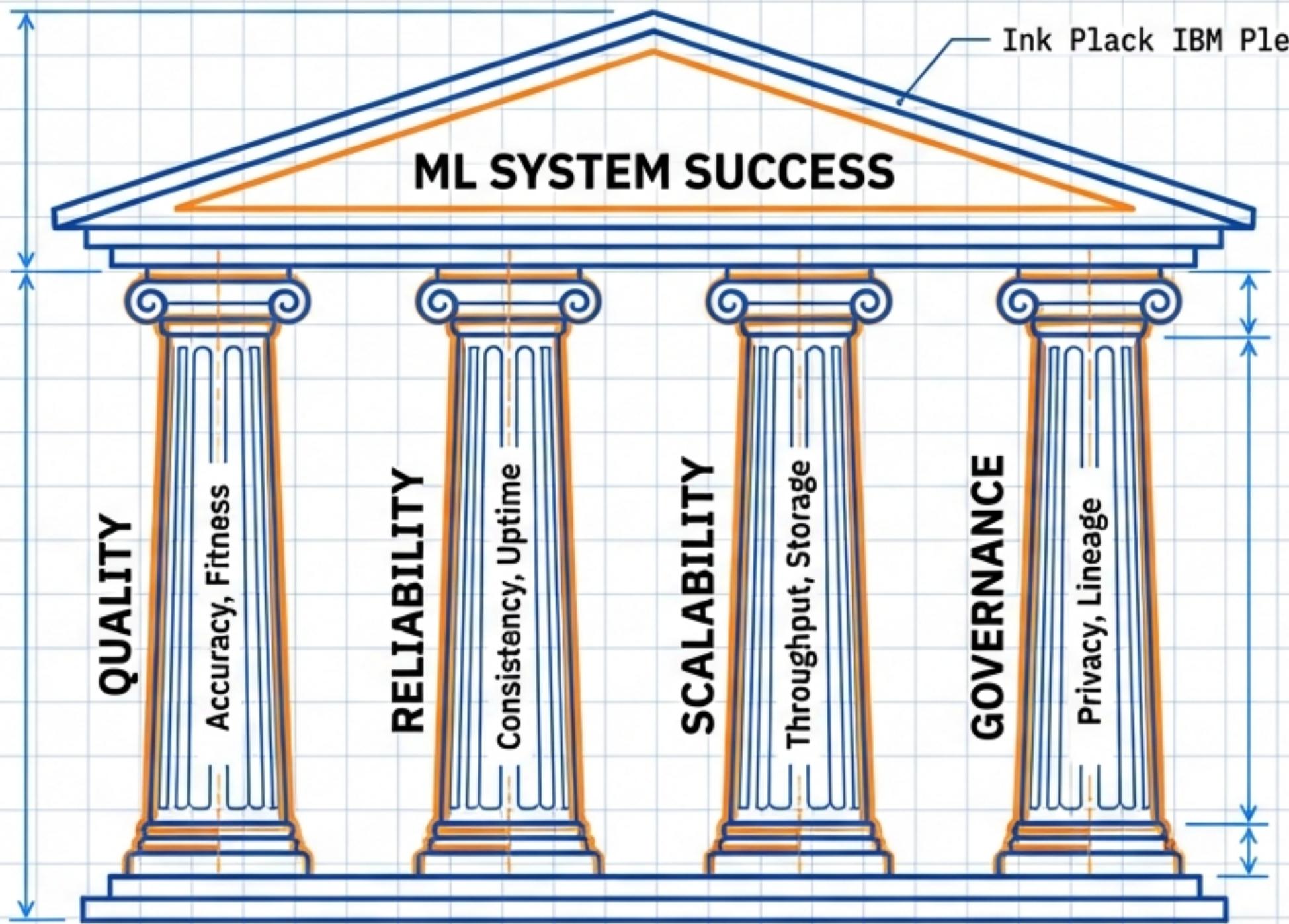
The Cycle of Continuous Adaptation



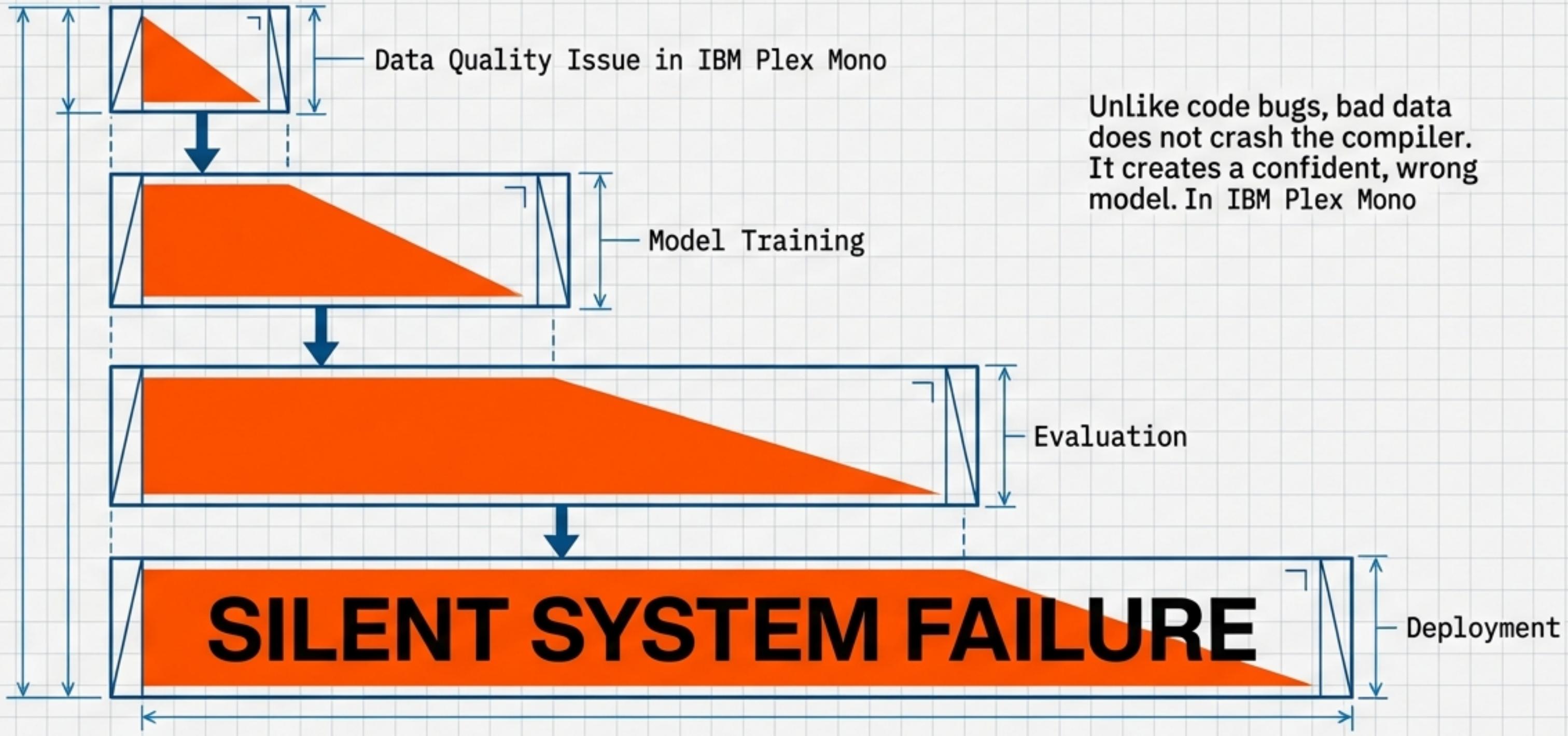
Constraint Propagation



Data Engineering: The Four Pillars

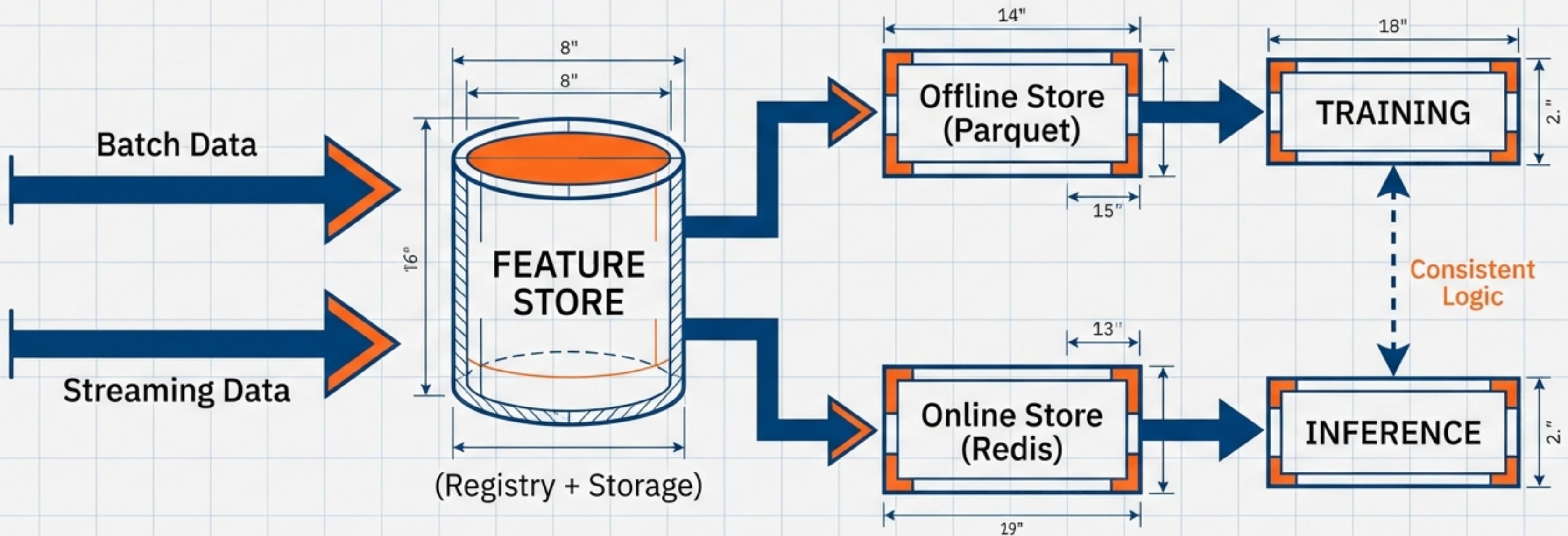


The Silent Failure: Data Cascades

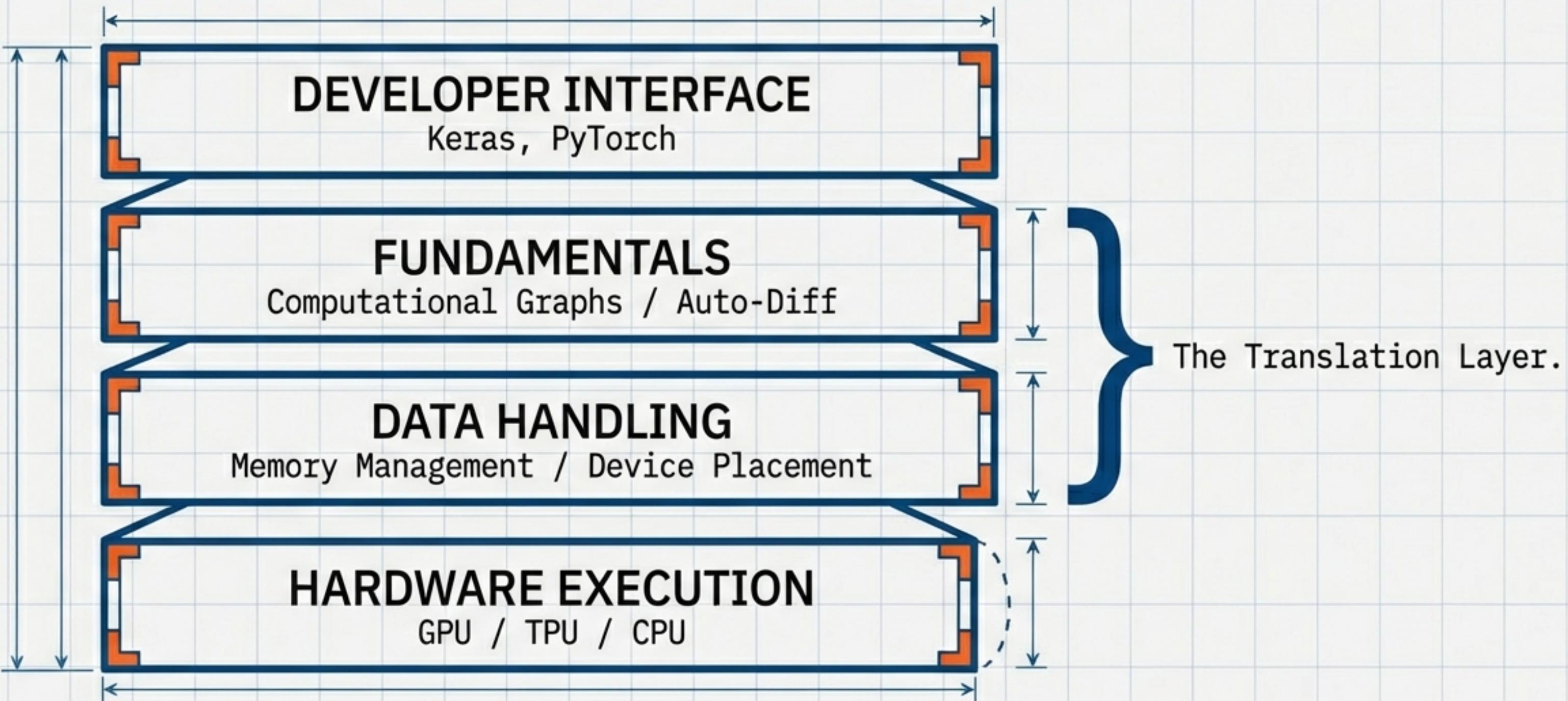


The Feature Store Architecture

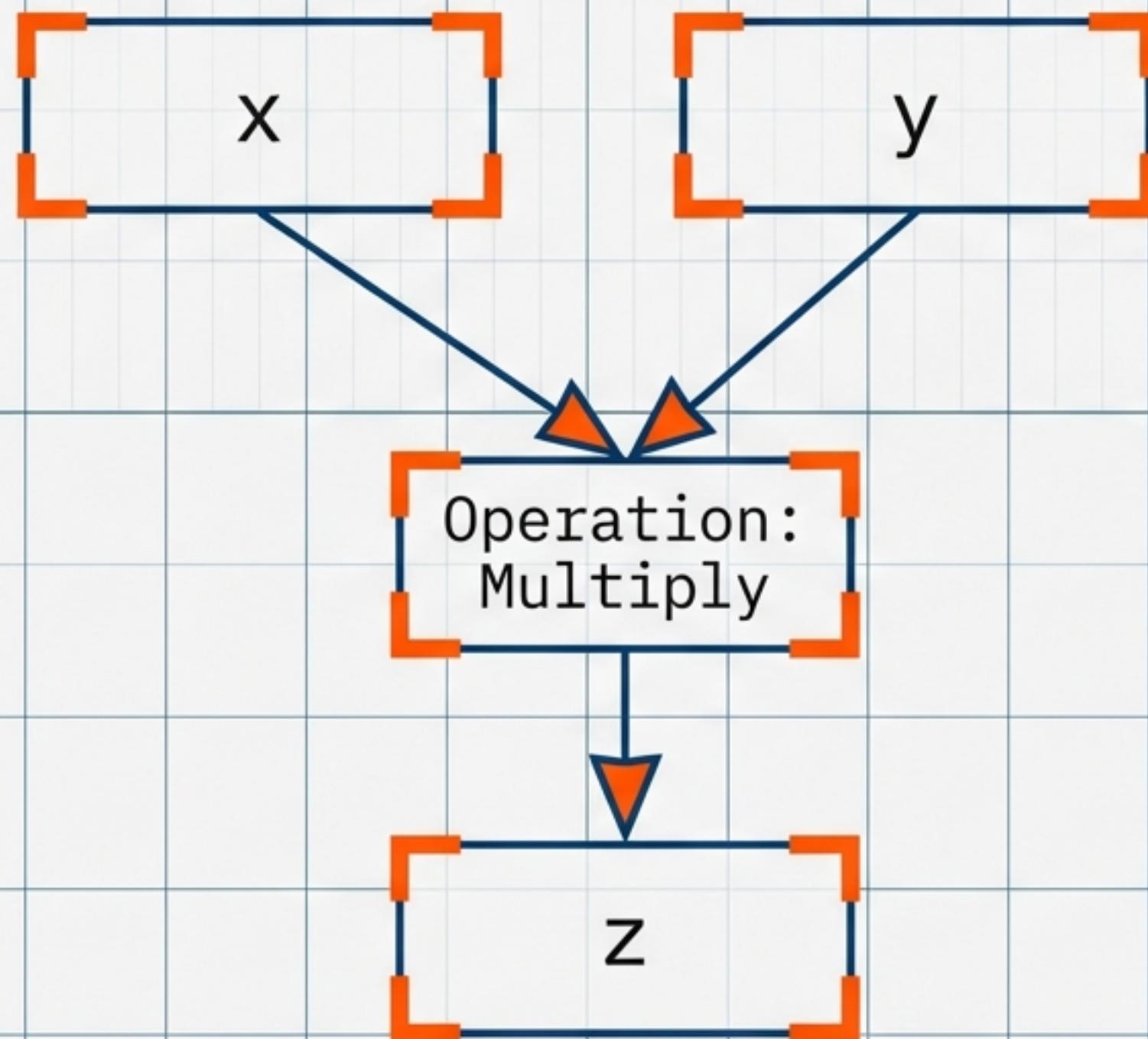
Solving Training-Serving Skew



The Abstraction Stack

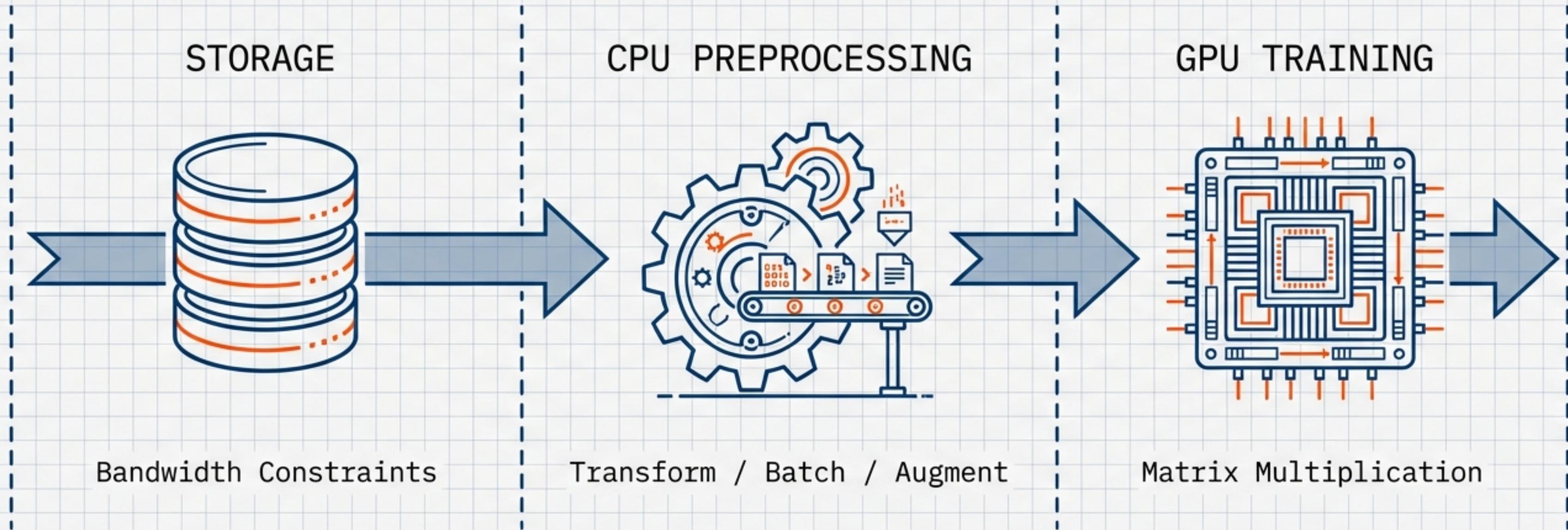


The Computational Graph (DAG)



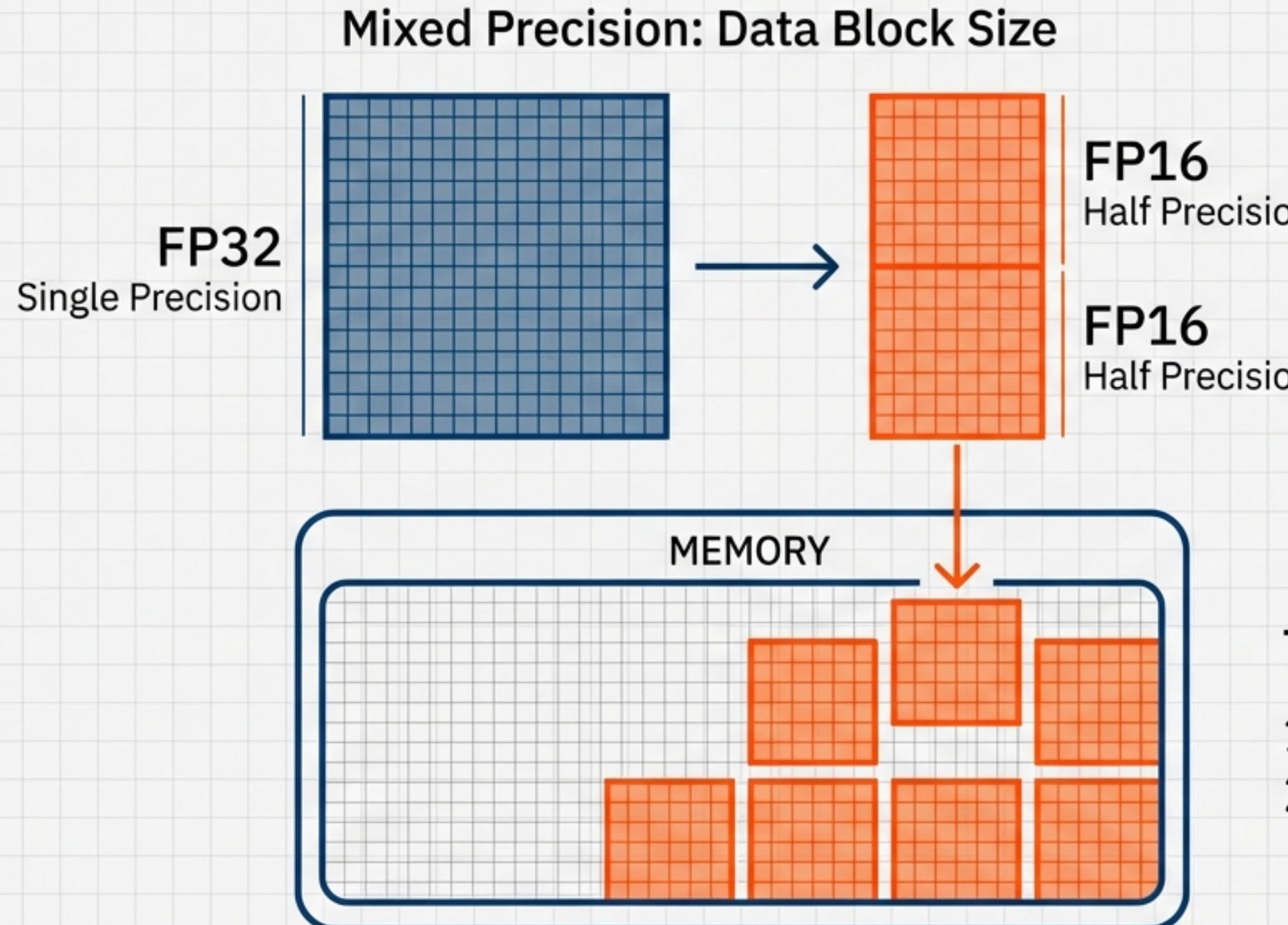
- Forward Pass: Compute Output
- Backward Pass: Auto-Differentiation (Gradients)

Training as a Supply Chain



⚠️ Bottleneck Risk: Data Starvation.

Optimization: Breaking the Memory Wall

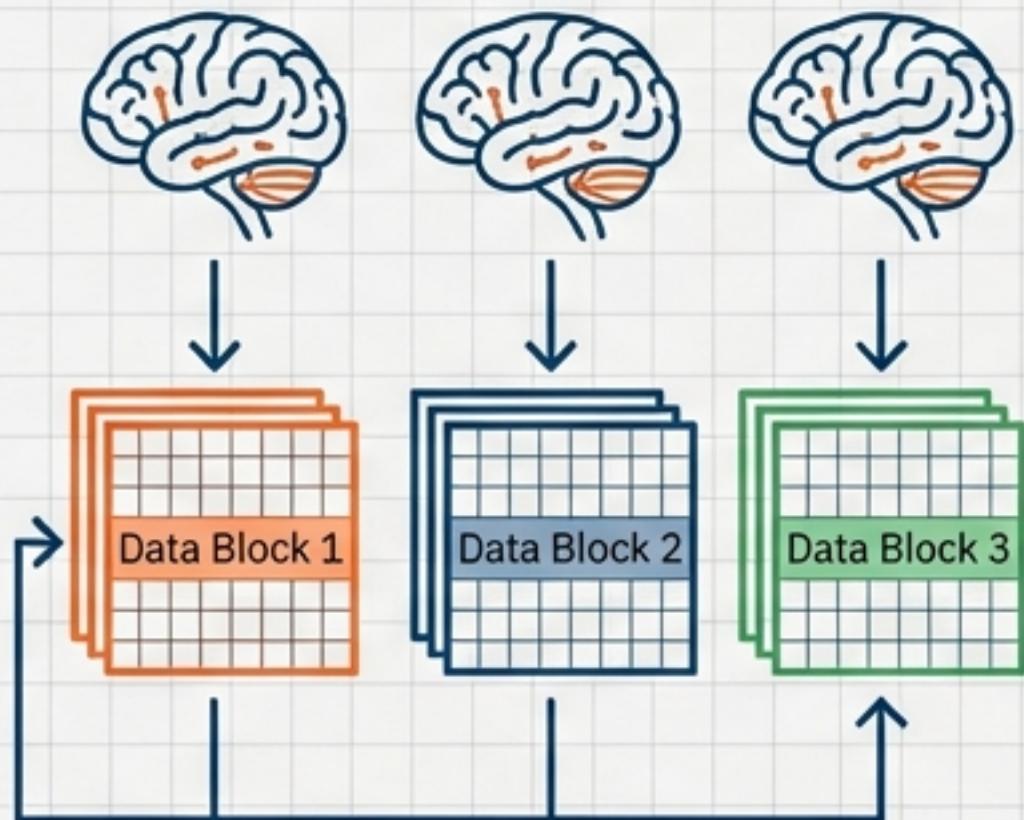


Technique: Mixed Precision Training

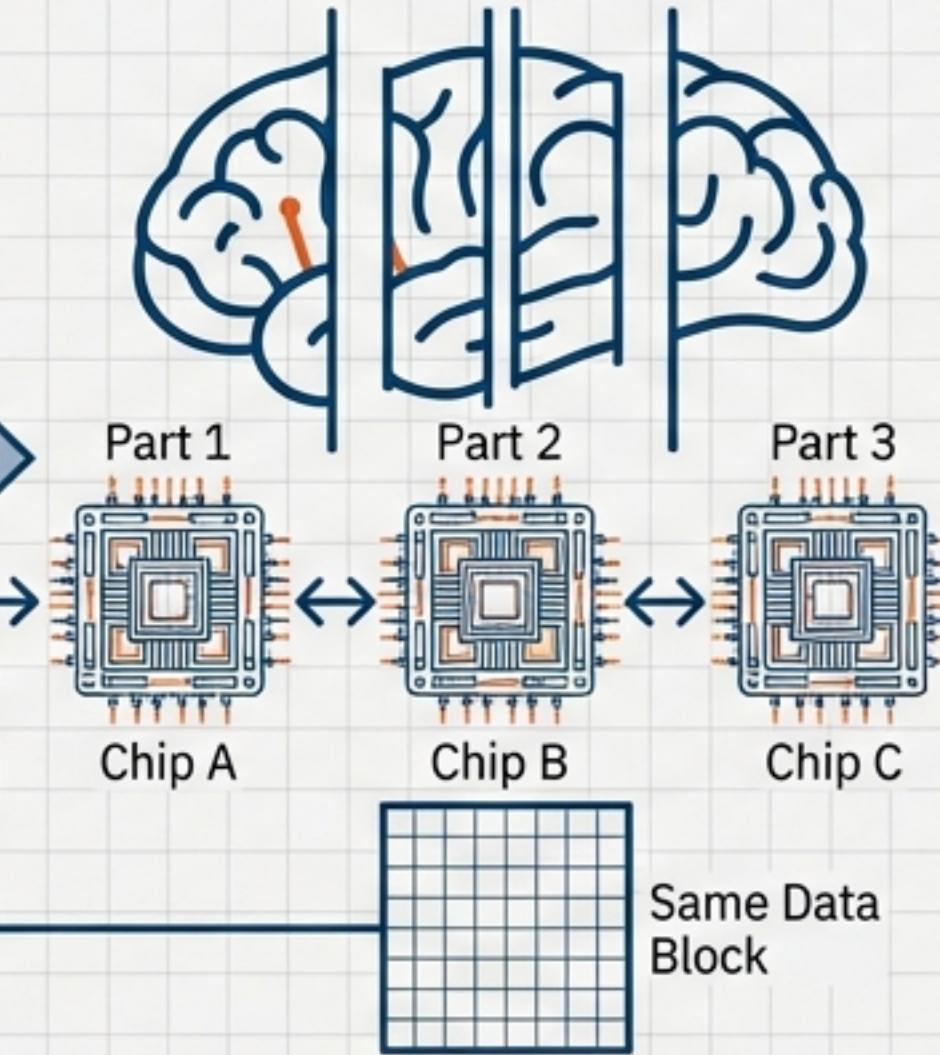
1. Reduces Memory Footprint
2. Increases Compute Throughput

Distributed Training Strategies

Data Parallelism



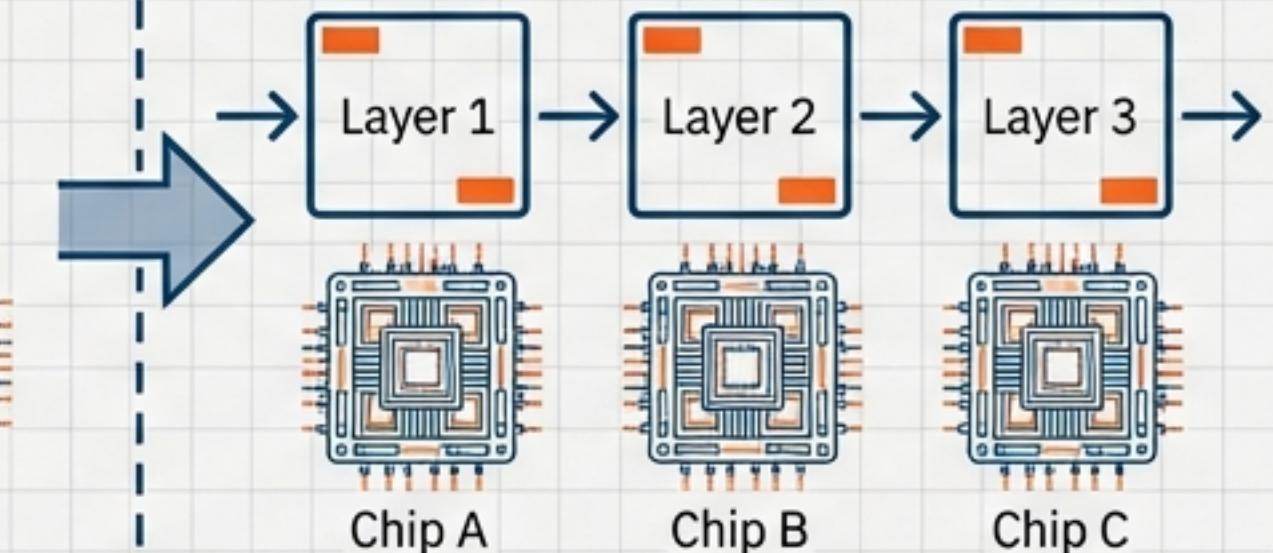
Model Parallelism



Clone the Model, Split the Data.

Split the Model, Same Data.

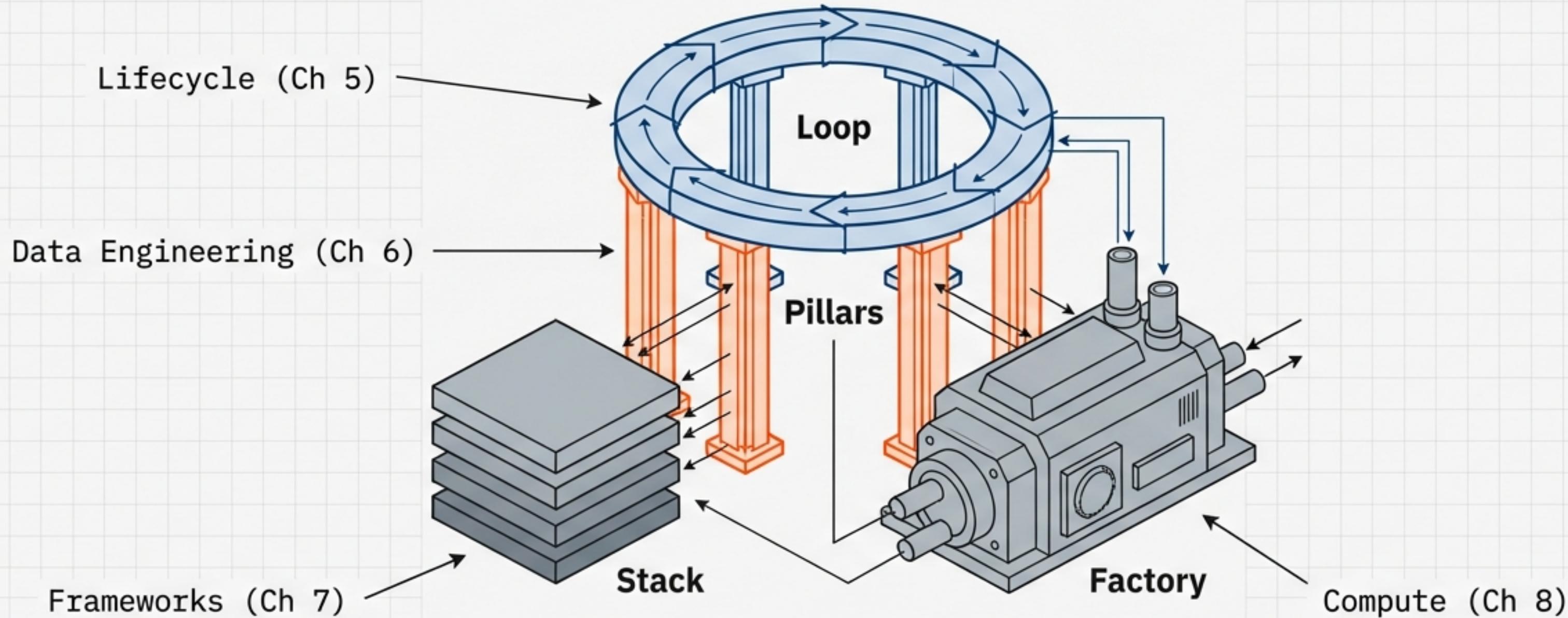
Pipeline Parallelism



Sequential Processing.

Engineering Editorial

The Integrated Blueprint



System Design = Managing Trade-offs