FACT DATA MODELING FUNDAMENTALS (II)

*RL: Raw Logs

MUSTs of FACT data

- Quality guarantees: no duplicates, no NULLs in 'what', 'when' event fields
- Size: keep it small, FACT < RL* (what's needed for analysis only)
- Parse out hard-to-understand columns

✓✓ Strings, integers, decimals, enumerates
✓ Array of strings
✗ JSON files

WHEN to model dimensions in FACT data

Network Logs (Traffic) Pipeline NETFLIX

- Goal: understand how Netflix microservices (apps) 'talk' to each other. Analyze traffic data
  ie. What is the impact of app A 'talking' to n apps if being hacked?
- Problem: Huge dataset (2PB/day)
- Solution (2-sided):

IPv4 IP addreses (32-bit)

- IP addresses as app identifier, stored in a smaller database!
- BROADCAST JOIN (Spark) of IDs with Network Logs data

1028x the IPv4 volume!

IPv6 IP addresses (128-bit hexadecimal)

Denormalize FACT data & log it ahead of time. To get rid of the join, Each app adopts a "sidecar proxy" to log of which app they are

- Learning for Data Engineers:

✓ DO: Go upstream & solve the problem at source.
✗ DONT: Optimize a pipeline at first

HOW logging fits into FACT data

- Brings in all critical context (columns)
  Collaborative work with system engineers (handle event generation in the app)
- Necessary logs only (RL ~ expensive)
- Comformance: logging needs to be in some type of contract, shared schema/vision

Setting Pricing Comformance at

- Goal: What describes a price, what pricing is available?
- Problems: two teams (Pricing team Online Service Team), two programming frameworks (Ruby, Scala), potential difference in pricing understanding/definition.
  How to ensure definition and replication on both framework is aligned?
- Solution: shared schema (middle layer)

Thrift Schema
- Way to describe schemas/functions in a specific, language agnostic way
  Ruby/Scala reference both to same schema for price (ie. Scala adds a new pricing column, then schema sends push notification to Ruby to update code)

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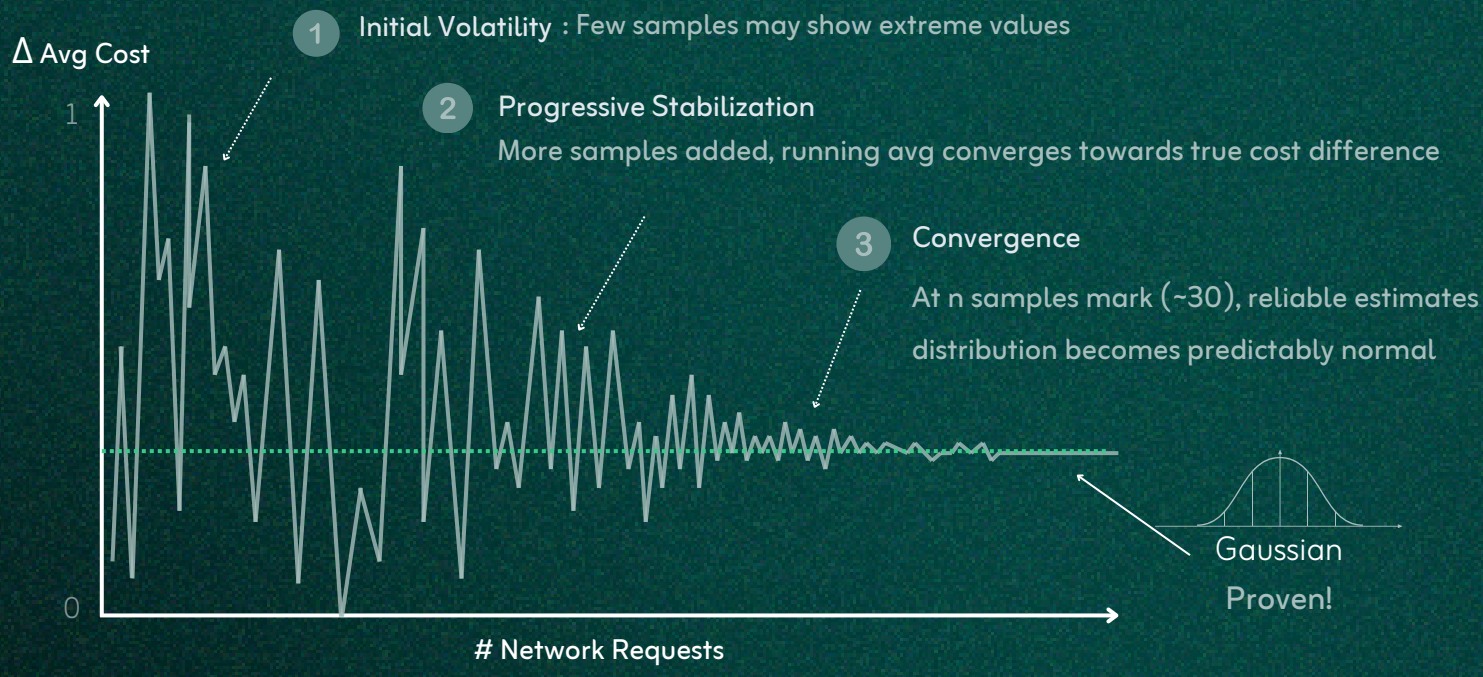
1 SAMPLING ~ small data subset; validated by law of Large Numbers

- Works for problems/ metrics that gauge directionality of things.
- Does not work for security related problems, low probability events, specific row data events.

The 'Infrastructure Cost' metric case at NETFLIX

Q: Does an A/B test cause a higher AWS S3/EC2 infra cost in test group vs control group?



1 BUCKETING

- Bucket on the 'who' (ie. user_id)
- Join the bucketed column w/o shuffling across the entire dataset. Faster, help minimize shuffle in Spark.
  SMB join (sorted merged bucket) ·····→ joins w/o shuffle at all. Both buckets lined up & sorted

? How Long to hold onto FACT data?

Data Size

\+ ←---------- RETENTION

Dimensional	FACT	FACT
As long as legally possible	10 TB	100TB

? How to handle duplicates in data?

Deduplication ~ remove duplicate/redundant copies of data (storage & efficiency improvement)

- Analyze distribution of duplicates over time periods (week/day/hour) & set a timeframe where deduplication matters (latency).

\- ←---------- → + LATENCY

Usage:	STREAMING	MICROBATCH
	Moderate data sets	Larger data sets
	Immediate data consistency	Efficient large-scale deduplication
	Usage of in-memory state stores	Slight delays are acceptable

Albert Campillo

Repost

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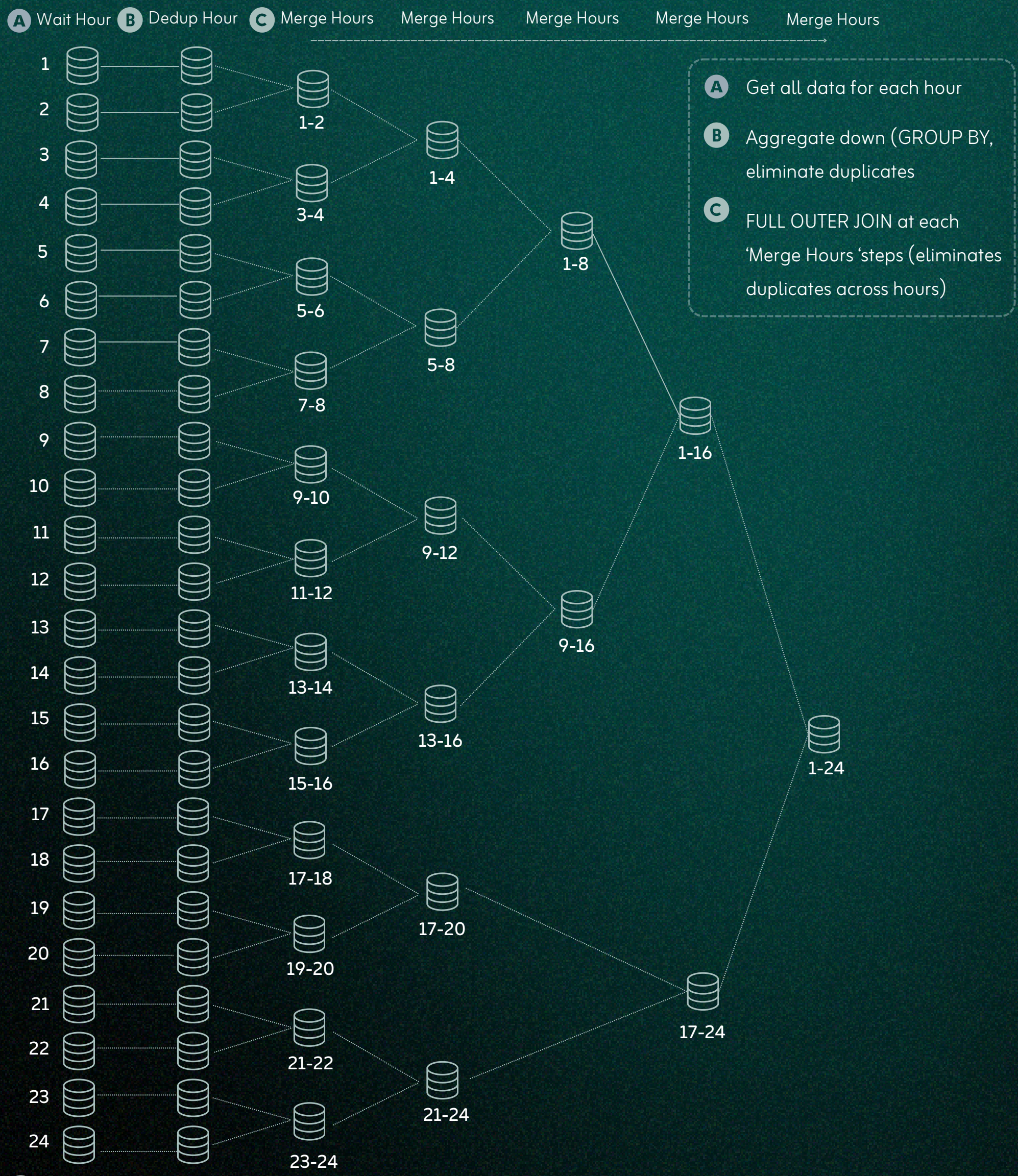
B MICROBATCH ~ Example: Hourly Deduplication with daily microbatch



A Get all data for each hour

B Aggregate down (GROUP BY, eliminate duplicates

C FULL OUTER JOIN at each 'Merge Hours 'steps (eliminates duplicates across hours)