

Brief Announcement:

**Fast Travellers: Infrastructure-Independent
Deadlock Resolution in Resource-
restricted Distributed Systems**

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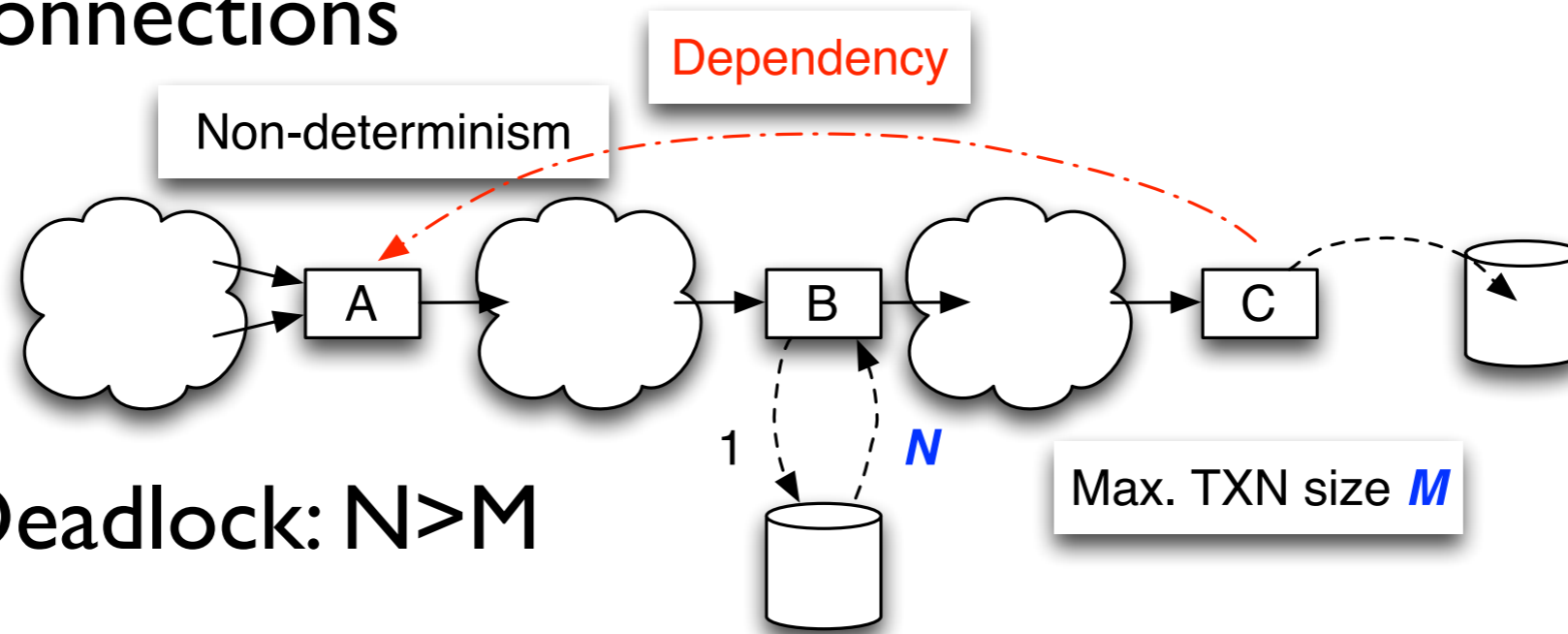
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System Design Challenges

- Challenges in distributed system design [1,2]:
 - Dynamic distributed systems.
 - Limited network & deployment knowledge.
 - Algorithms based on existing channels.

The Deadlock Problem

- Example: Near real-time data integration [3,4]
- Application requirement: exactly-once delivery
- Limited System Knowledge: use markers, no extra connections



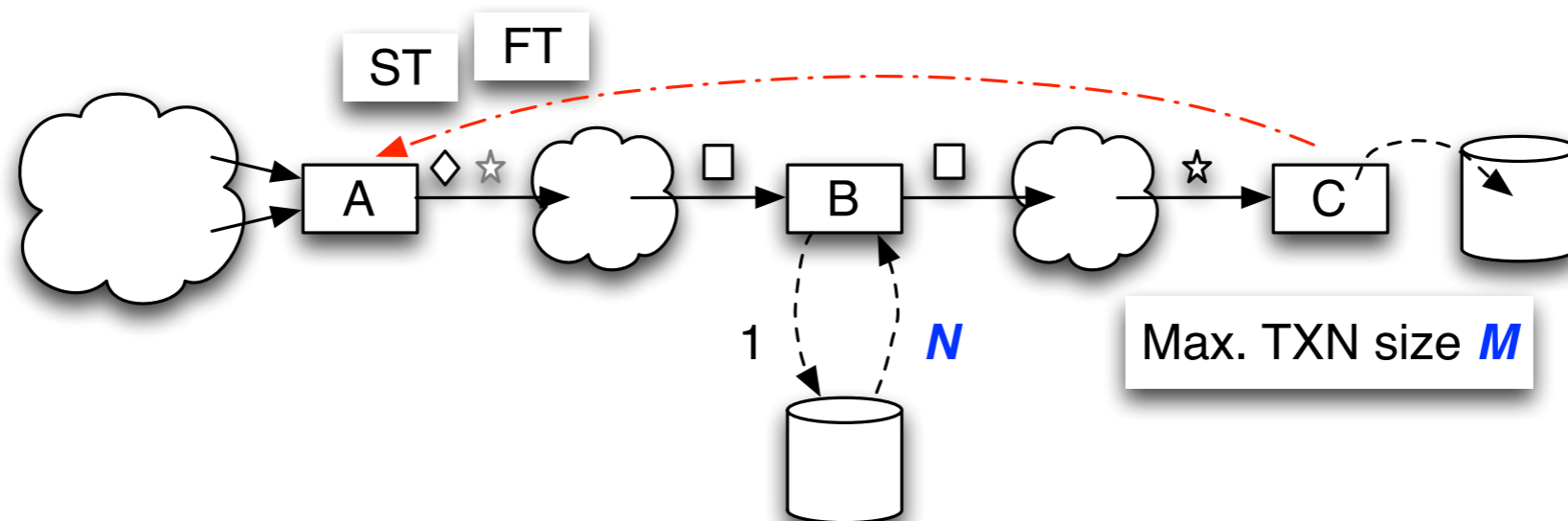
- Deadlock: $N > M$

Marker Classification

- *Slow Traveller (ST - “distributed snapshot[5]” marker)* propagate in-line with the messages.
- *Fast Traveller (FT - out-of-band)* by-passes every message.
- Requirement: One free slot in the RAM of every node allows deadlock resolution.

Marker Pairs

- A marker pair consisting of
 - a Fast Traveller to resolve deadlocks
 - a Slow Traveller to preserve marker semantics
- The information of the Fast Traveller holds until the Slow Traveller arrives.



References

- [1] Attiya, H., Welch, J.: Distributed Computing: Fundamentals, Simulations and Advanced Topics. John Wiley & Sons (2004)
- [2] Lynch, N.A.: Distributed Algorithms. Morgan Kaufmann Publishers Inc., San Francisco, CA, USA (1996)
- [3] Polyzotis, N., Skiadopoulos, S., Vassiliadis, P., Simitsis, A., Frantzell, N.: Supporting streaming updates in an active data warehouse. In: ICDE. (2007)
- [4] Bruckner, R.M., List, B., Schiefer, J.: Striving towards near real-time data integration for data warehouses. DaWaK (2002) 317–326
- [5] Chandy, K.M., Lamport, L.: Distributed snapshots: determining global states of distributed systems. ACM Trans. Comput. Syst. 3 (February 1985) 63–75

Derived Model

