Application and Environment Requirements Formal-language Requirements

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SyncFree: **W**ork **P**ackage **1**

M12

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What is it?

Work **P**ackage **1**: Application and environment requirements

D1.1 [6 months] Natural-language requirements

D1.2 [18 months] Formal-language requirements

WP1 at M12

Mathematical notation

- Reasoning
  - Validation of the representation
- Verification
  - Constraints
  - Objectives
  - Properties
- Computation
- Dissemination

Mathematical notation

Difficult to get all in one mathematical notation

Mathematical notation

Constraints mathematical representation

Temporal **L**ogic of **A**ctions, TLA+

$$(V \cup W) \cap Q$$

$$A_{an} = \sum_{q \in N} B_{anq} + C_a$$

$$Spec == Init \wedge [][Next]\_vars$$

$$THEOREM\ Spec => TypeInvariant \mid * \wedge Consistency\ *)$$

Mathematical notation

Temporal **L**ogic of **A**ctions, TLA+

- Based on the use of simple mathematics
- Well suited for concurrent and distributed systems
- Open-Source Project

Mathematical notation

Temporal **L**ogic of **A**ctions, TLA+

- Parser and Syntax checker
- Model checker and Simulator, TLC
- Converter from TLA+ to LaTex, TLATeX
- Other components

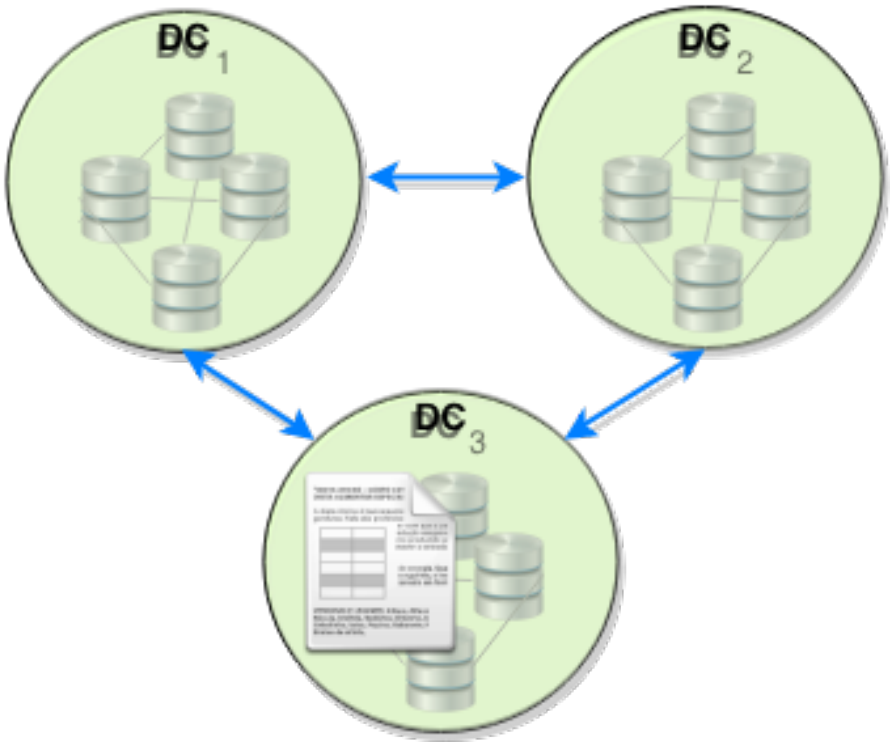
Adaptive Replication

Adaptive Location of Replicas

Partial Replication

Adaptive Location of Replicas

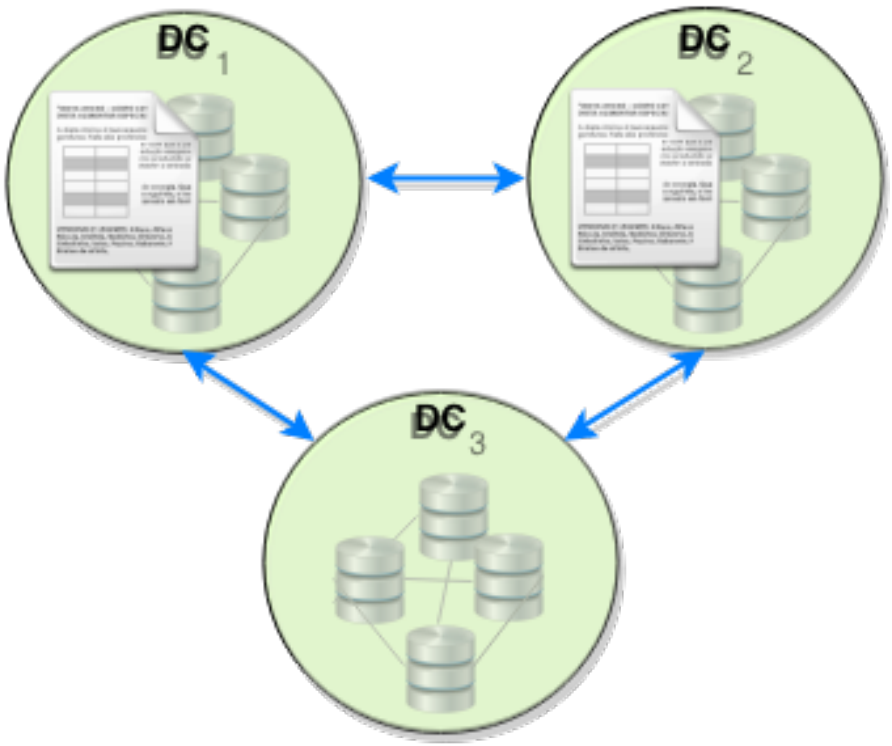
Do not replicate into all Data Centres (DC)



Adaptive Location of Replicas

Do not replicate into all Data Centres (DC)

Not necessarily only in one DC

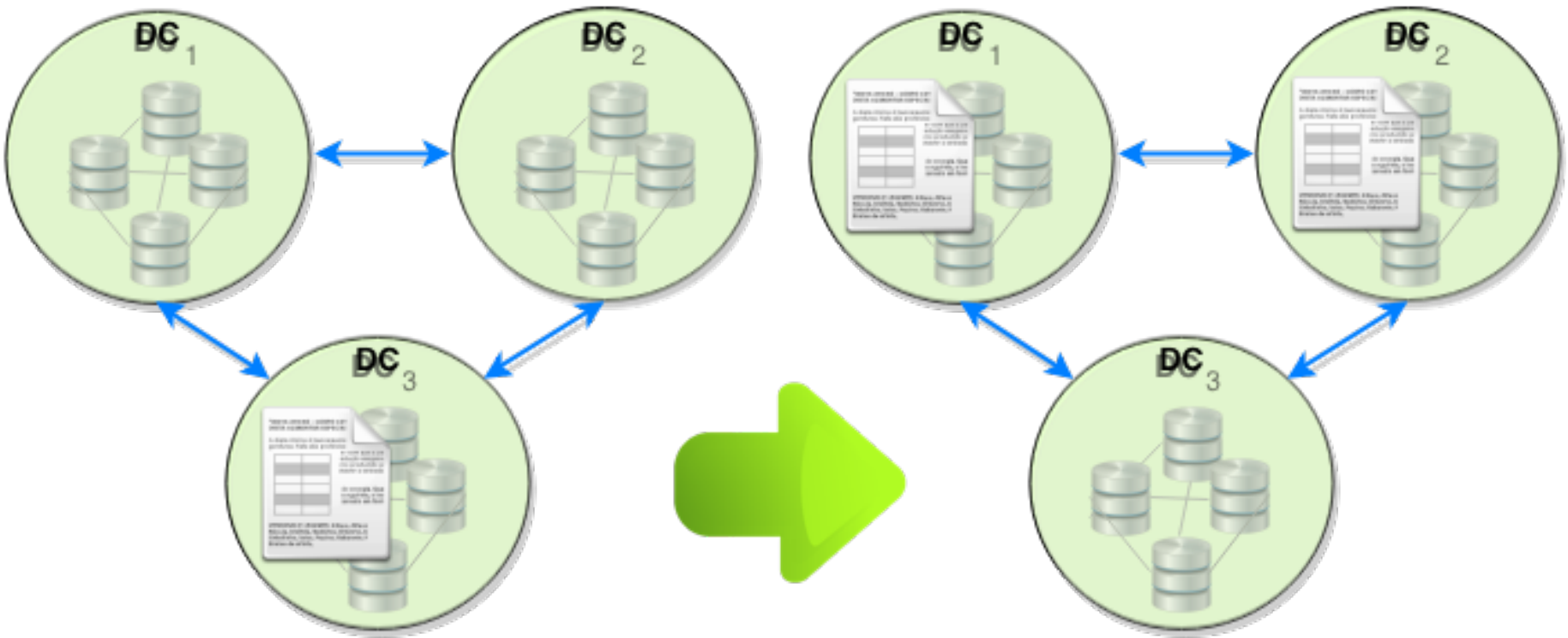


Adaptive Location of Replicas

Do not replicate into all Data Centres (DC)

Replica not necessarily only in one DC

Replicate where it is most advantageous



Adaptive Location of Replicas

Proposed an Ant Colony based algorithm

A simple Java GUI application

Partial Replication

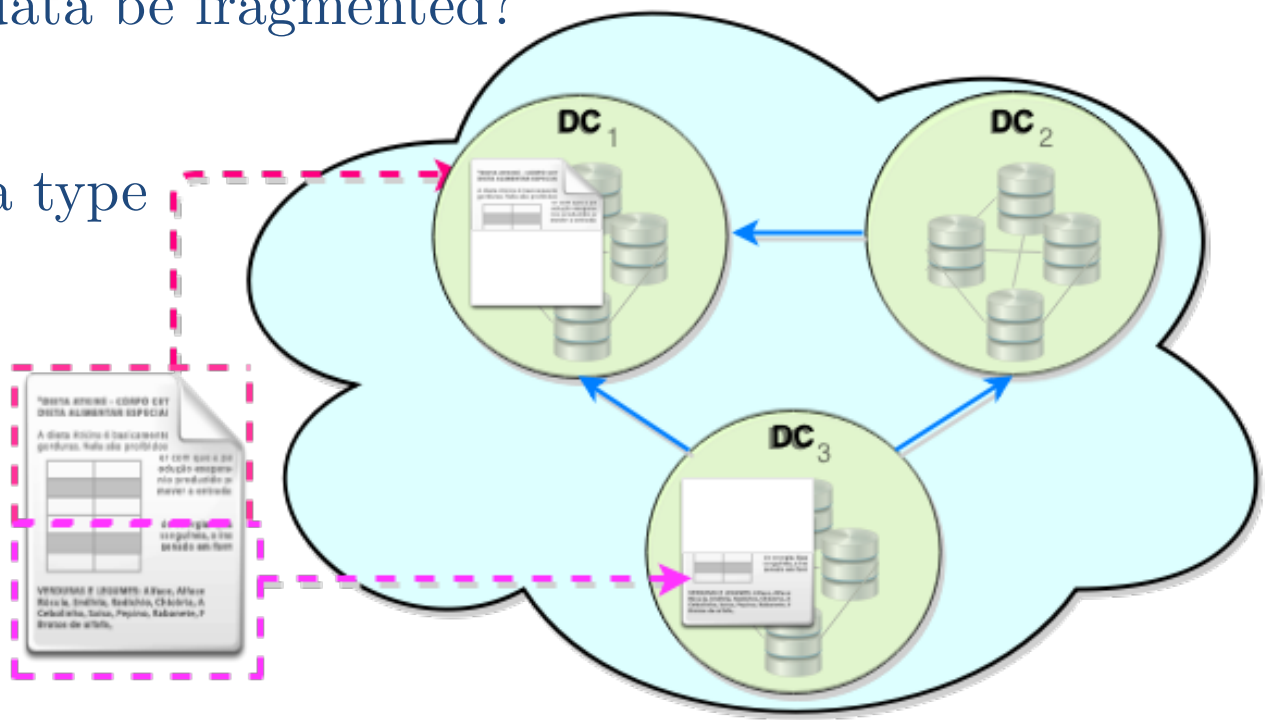
Replicate parts of the data

The data is fragmented and spread between the different DCs

No Data Centre may have the whole data

Can \ Should the data be fragmented?

- Data size
- Underlying data type



Summary

- Mathematical Representation
  - Simple mathematical representation
    - Already provided for the six use cases, available in D1.2
  - **T**emporal **L**ogic of **A**ctions (TLA+) representation
    - Already provided for the two use cases in D1.2: "Ad Counter"and "Virtual Wallet"
    - In progress for two more use cases in D1.2: "Leader Board"and "FMK"
- Adaptive Replication
  - Adaptive Location of Replicas
    - A simple algorithm has been proposed
    - Java GUI application
  - Partial Replication

Any Questions?

Thank You!