Lab 3 - Partitioning

DB/AI Bootcamp

2018 Summer

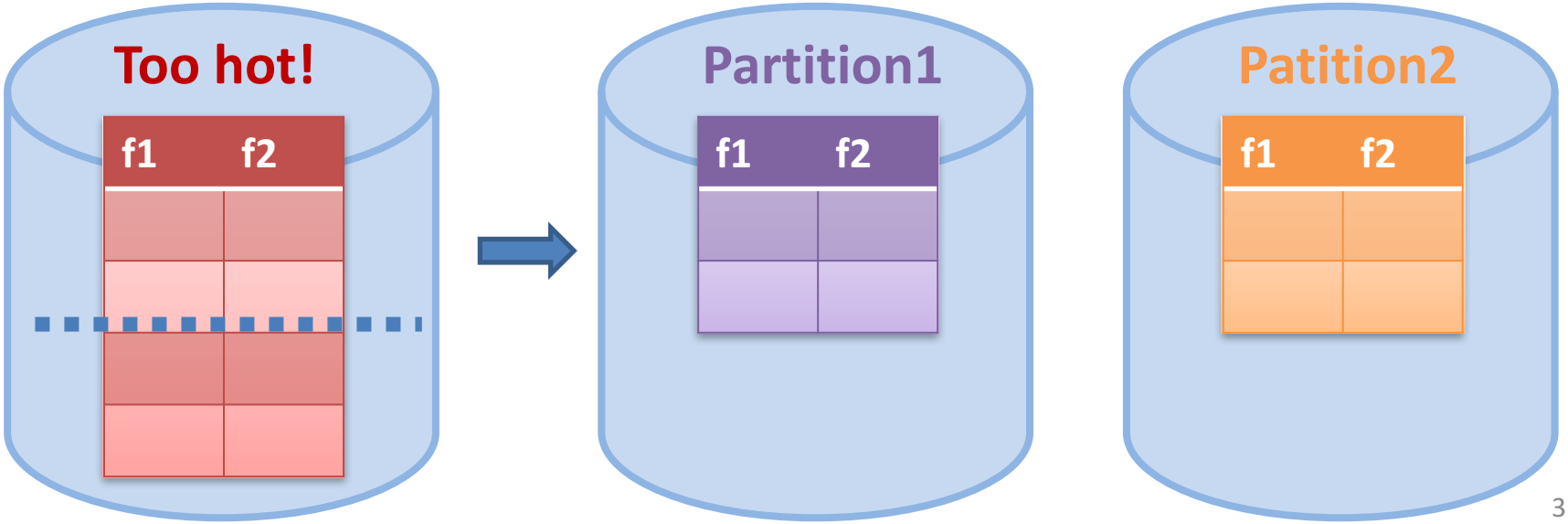
DataLab, CS, NTHU

SAE

- Remember we mentioned that a cloud database should ensure ***SAE***:
- ***high Scalability***
  - High max. throughput
- ***high Availability***
  - Stay on all the time, despite of machines/network/datacenter failure
- ***Elasticity***
  - Add/shutdown machines and re-distribute data on-the-fly based on the current workload

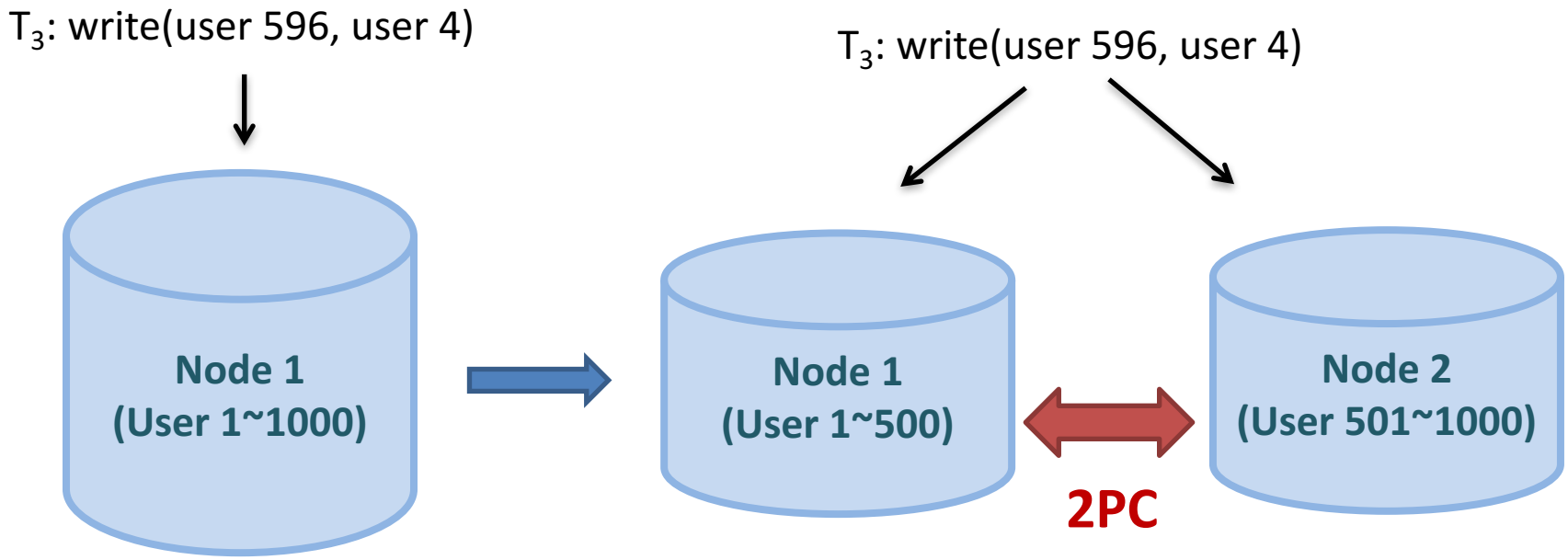
Scalability and Partitioning

- We increase scalability by ***partitioning*** a database
  - Usually horizontally
  - Distribute read/write load to different servers



Distributed Transactions

- It may cause that a transaction needs to access multiple partitions.



Good Partitioning

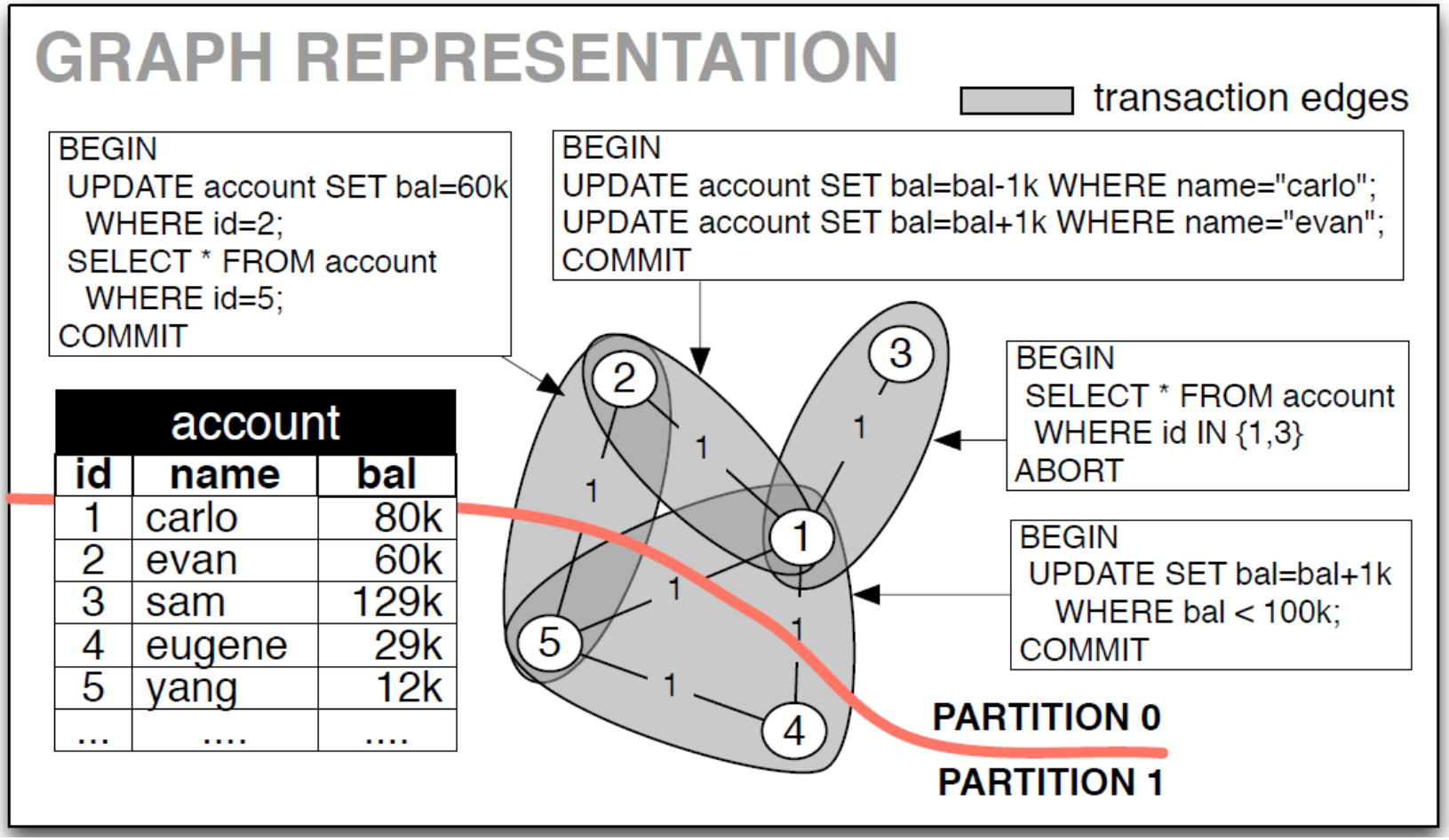
- We want to partition data such that
  - the system increases scalability.
  - each machine gets equal load.
  - #dist. txs are minimized.

- How? Hire an DBA?
  - No. Too expensive.

Automation: Graph Partitioner

- Model the recent workload as a graph
  - Nodes: data objects, with weight denoting their access frequency
  - Edges: common access by txs, also weighted
- Find the minimal balanced partition of this graph
  - Machines are evenly loaded
  - Dist. txs are minimized

Schism [SIMGOD'10]



Problems of Schism

- Schism generates a partition table.
  - Input: a key (e.g. primary key)
  - Output: a partition id

- The size of this table $\propto$ the size of the DB
  - This table would become extremely large if the DB was large.
  - It may not fit in memory.
- Schism cannot handle unseen data.

Lab

- Task 1:
  - Given a workload, we firstly use Schism to generate a partition table.
  - Train a NN to mirror the table.
    - Much smaller
    - Able to handle unseen data
- Task 2:
  - Find the best partitioning without using Schism.

https://github.com/yschang1206/dbai-labs