Distributed Data Management
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Exercise 10 - Transaction Management

1 Transactional Integrity

The company Miller Real Estates transfers the monthly salary of its employee Henry Robertson from their bank account at bank A to his bank account at bank B on December 25th. On the following day the company also transfers the outstanding travel expenses to Henry Robertsons account. At bank A a transfer requires 6 days, i.e. debit on day one, 4 days processing time, and credit entry on day 6. On December 27th Henry Robertson transfers the monthly rent for his house to his landlord, which has a bank account at bank C. At bank B a transfer only requires 4 days.

- What is the intertwined schedule for these transactions and what are the intermediate states of the bank accounts? What are possible serial schedules and the intermediate states? Is the result equivalent?
- What happens if any of the transactions fails on the last day?

2 Distributed Transaction Structures

A network of nodes A, B, C, D, E stores the following global relations:

```
PARTS(PartNo, Quantity)
STOCK(PartNo, StockNo)
```

The following fragmentation and allocation is given:

Fragment	**Allocation**
$PARTS_1 = PARTS \ltimes (\sigma_{StockNo=1}(STOCK))$	C, A
$PARTS_2 = PARTS \ltimes (\sigma_{StockNo=2}(STOCK))$	B, D
$PARTS_3 = PARTS \ltimes (\sigma_{StockNo=3}(STOCK))$	C, E
$STOCK_1 = \sigma_{PartNo<3000}(STOCK)$	C
$STOCK_2 = \sigma_{PartNo\geq3000}(STOCK)$	B

The following update must be performed initiating on node A:

```
UPDATE PARTS SET Quantity = Quantity + 100 WHERE PartNo = 3822
```

What is an execution strategy for this update operation that shifts as little data as possible, where the tuple (3822,1) is stored in $STOCK_2$, and node A has all fragmentation and allocation information. What is the according structure of the update transaction.