Lab 7

Brennan Rivera, Joey Koumjian

4/6/23
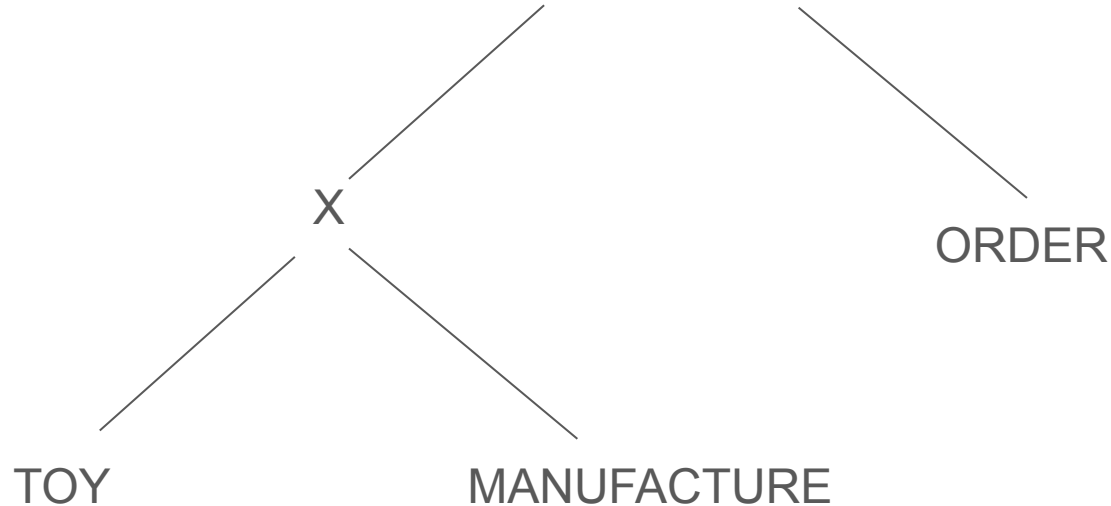
```sql
SELECT M.PHNUM, M.NAME
FROM MANUFACTURER M, TOY T, ORDERS O
WHERE T.MANID = M.MANID AND
O.TNUM = T.TNUM AND
O.DATE > '12/31/2015'
```
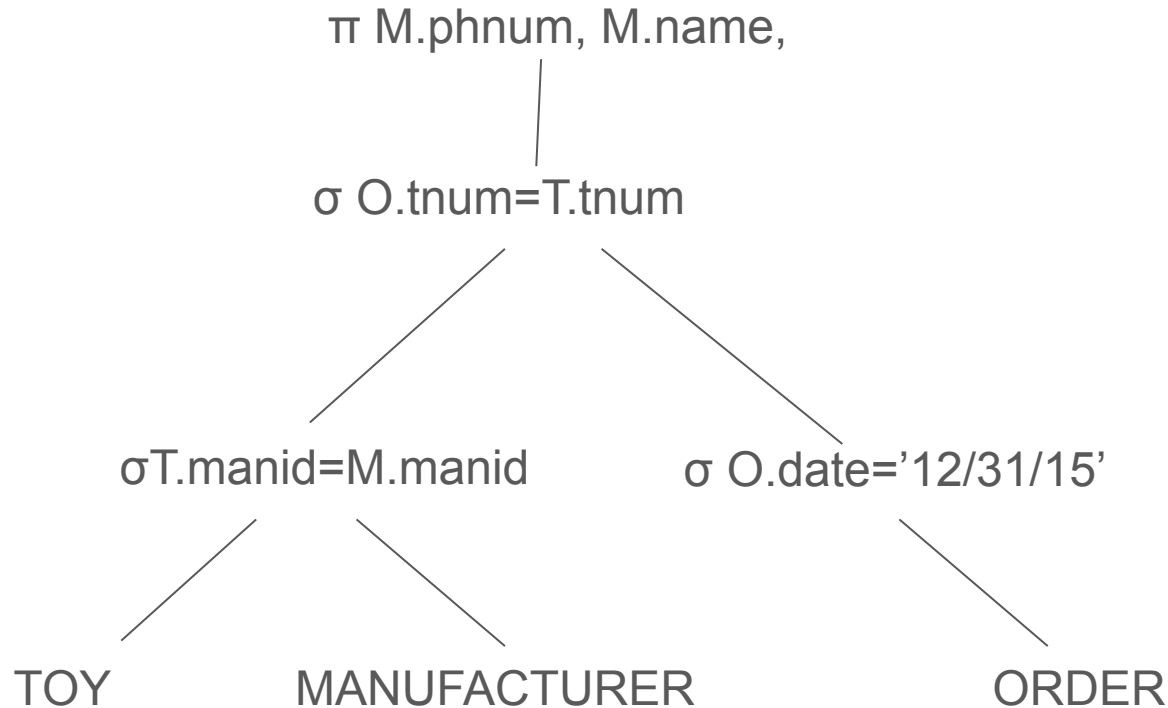
Initial Query Tree

π M.phnum, M.name,

|

σ T.manid=M.manid AND O.tnum=T.tnum AND O.date='12/31/15'

X   ORDER
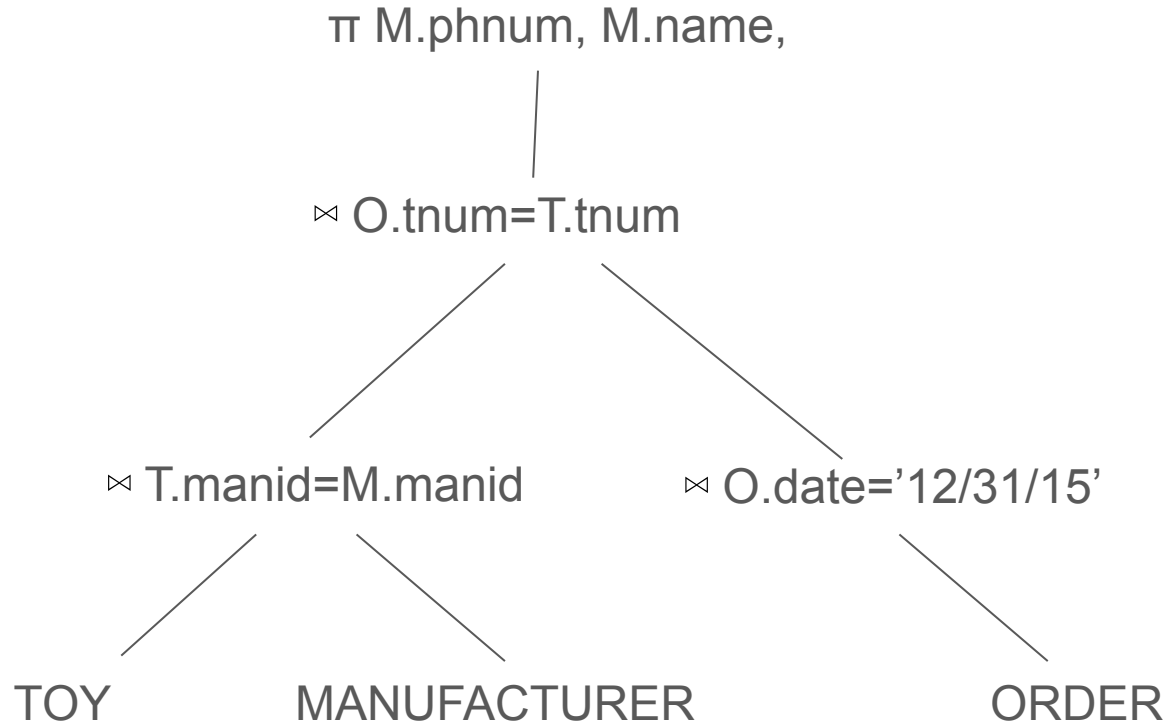
TOY   MANUFACTURE

R1 - break up select operations into cascade of select operations.
R9 - rearrange leaf nodes of the tree so that the leaf nodes with most restrictive select operations are executed first in the query tree.

π M.phnum, M.name,

σ O.tnum=T.tnum

σT.manid=M.manid   σ O.date='12/31/15'

TOY   MANUFACTURER   ORDER

R12 - Combine Cartesian product operation with subsequent select operation into a join operation.

π M.phnum, M.name,
|
⋈ O.tnum=T.tnum
／　＼
⋈ T.manid=M.manid　　　⋈ O.date='12/31/15'
／　＼　　　　　　　　　＼
TOY　　MANUFACTURER　　　ORDER

R3, R4, R7, and R11 - break down and move lists of projection attributes down tree as far as possible by creating new project operations as needed.

π M.phnum, M.name,

⋈ O.tnum=T.tnum

π T.tnum

π o.tnum

⋈ T.manid=M.manid

σ O.date='12/31/15'

π T.manid

π M.manid

TOY

MANUFACTURER

ORDER