COMS 4111 Intro to DB HW3

Name (zd2221)

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1 Warm up

1.1 Q2.1

C->A A->B C->B AC->B AB->C CB->A
KEYS: C

1.2 Q2.2

AB->C, AB->D, BC->D,BC->A, CD->A,CD->B, AD->B,AD->C,
ABD->C
ABC->D
BCD->A
ACD->B
KEYS: AB,AC,BC,BD

2 Real problem

2.1 Q2.3

KEYS: (itemno)

2.2 Q2.4

They only key is itemno,and itemno does not appear on the rightside of the other three functions. Thus the original schema is not 3NF. The four functions compose the Fmin of FDs, so we can apply them on 3NF decomposition.
We split the original table as:
table 1:
store, address, name, city, zipcode, store_location, store_location_adress, county_number, county, store_location_zip, store_location_city
table 2:
vendor_no,vendor_name
table 3:
category, category_name
table 4:
itemno, category, bottle_volume_ml, im_desc, state_bottle_cost, state_bottle_retail, date, store, vendor_no, itemno, invoice_line_no, pack, sale_bottles, sale_dollars, sale_gallons, sale_liters

2.3 Q2.5

The schema is redundancy and anomaly free, because for all four tables and functions, BCNF holds.

2.4 Q2.6

We cannot using functional dependencies to add quantity condition on attributes. Function dependencies can only used to optimize the schema of relations(decide the attributes of each relation), however the detailed constraints cannot be enforced through Function dependencies.

2.5 Q2.7

select count(distinct name) from iowa where store=2508

It turns out that there is only one name for store 2508. However when we execute the following sql:

with temp1 as (select store, count(distinct name) from iowa group by store) select store, count from temp1 where count>1

I found some stores having more than 1 name which violates the rule store->name

2.6 Q2.8

Logically, store->name should holds because store as an ID should encode all information of an store including it name. Though there are some exceptions in database which violate the rule perhaps due to input errors, we have to believe store->name holds. It is not reliable to infer dependencies from data.