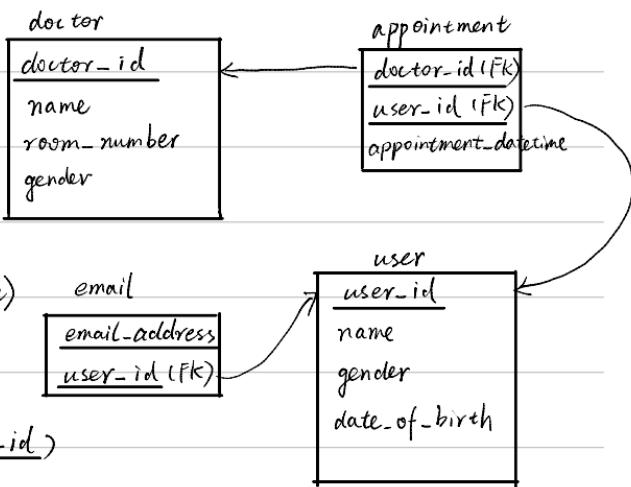


日期 Q1.



Q2. ① check $A \rightarrow C$, $A^+ = \{ACE\}$,

A is not superkey, so R relation is not BCNF

② $CD \rightarrow B$, $CD \rightarrow A$ is redundancy, since $A \rightarrow C$, $B \rightarrow D \Rightarrow AB \rightarrow CD \rightarrow A$, B

$CD \rightarrow E$ is redundant, since $AB \rightarrow CD \rightarrow A \rightarrow E \Rightarrow CD \rightarrow E$.

so consider functional dependencies $f = \{A \rightarrow C, A \rightarrow E, B \rightarrow D\}$
 $f = f_C$.

decompose : result = $\{R\}$

1. R is not in BCNF

$A \rightarrow C$ is nontrivial

$A \rightarrow R$ & f^+ and $A \cap C = \emptyset$

result = $\{ABDE, AC\}$

2. $R_1 = ABDE$ is not in BCNF,

since $A^+ = \{AE\} \neq \{ABDE\}$.

$A \rightarrow E$ is nontrivial

$A \rightarrow R$ & f^+ and $A \cap E = \emptyset$

result = $\{ABD, AE, AC\}$

3. $R_2 = ABD$ is not in BCNF

日期: / since $B^+ = \{BD\} \neq R_2$,

consider $B \rightarrow D$, $B \rightarrow (ABD)$ not holds, $B \wedge D = \emptyset$

result = {AB, BD, AE, AC}

BCNF decomposition = {AB, BD, AE, AC}

Q4. 4(a)

Π staff.names, staff.city, ($\{ \text{branchname} = 'B1' \text{ and } \text{salary} > 26000 \}$ and $(\text{WORKIN} \bowtie \text{STAFF})$)

Select s. StaffName, s.city, w.salary

from STAFF s

inner join

(Select * from WORKIN where BranchName = 'B1' and salary > 26000) w
on s.StaffID = w.StaffID;

4. (b) Π staff.names, staff.city, salary ($\{ \text{branchname} = 'B1' \text{ and } \text{salary} > 26000 \text{ and } \text{staff.staffID} = \text{workin.staffID} \}$ and $(\text{STAFF} \times \text{WORKIN})$)

Select s. StaffName, s.city, w.salary

from STAFF s, WORKIN w

where s.StaffID = w.StaffID and w.salary > 26000 and w.BranchName = 'B1'

4. (c)

Π staffnames, branch.street, branch.city ($\{ \text{staff.city} = \text{branch.city}, \text{staff.staffID} = \text{workin.staffID}, \text{branch.branchname} = \text{workin.branchname} \}$ and $(\text{STAFF} \times \text{BRANCH} \times \text{WORKIN})$)

Select s.staffnames, b.street, b.city from STAFF s, BRANCH b, WORKIN w
where s.StaffID = w.StaffID, b.BranchName = w.BranchName, s.city = b.city ;

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4. (d)

$\Pi_{\text{staffname}, \text{branchname}, \text{workin}, \text{salary}} (\text{branchname} = 'B1' \text{ and } (\text{STAFF} \bowtie \text{WORKIN}))$
 $\text{salary} > \text{AVG}(\text{salary})(\text{WORKIN})$

select s.staffname, w.salary
from WORKIN w
inner join STAFF s
on w.staffID = s.staffID
where w.branchname = 'B1' and w.salary >
(select avg(salary) from WORKIN);

4. (e) MID $\leftarrow \Pi_{\text{staffID}} G_{\text{staffID} = \text{ManagerID}} (\text{WORKIN} \times \text{MANAGE})$

NMID $\leftarrow \Pi_{\text{staffID}} (\text{WORKIN}) - \text{MID}$

$\Pi_{\text{staffname}, \text{branch}} (\text{STAFF} \bowtie \text{WORKIN} \bowtie \text{NMID})$

name Δ we can combine 3 expressions to 1 expression.

set view NMID as $\text{but it's not clear to read}$

select staffID

from WORKIN

minus

select w.staffID

from WORKIN w, MANAGE m

where w.staffID = m.managerID;

select s.staffname, w.branchname

from STAFF s

inner join WORKIN w

on s.staffID = w.staffID

inner join NMID n

on s.staffID = n.staffID;

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4. (f) $\text{SUB-CITY} \leftarrow \prod_{\text{MemberID}, \text{ManagerID}, \text{City}} \text{MemberID}, \text{ManagerID}, \text{City} = \text{staffID} (\text{STAFF} \times \text{MANAGE})$

$\text{SUP-CITY} \leftarrow \prod_{\text{MemberID}, \text{ManagerID}, \text{City}} \text{MemberID}, \text{ManagerID}, \text{City} = \text{staffID} (\text{STAFF} \times \text{MANAGE})$

$\text{SUB-CITY} \cap \text{SUP-CITY}$ (we can combine 3 expressions to 1,
but it's not explicit to read)

select m. MemberID, m. ManagerID, s.city

from MANAGE m

inner join STAFF s

on m. MemberID = s. STAFFID

intersect

select m. MemberID, m. ManagerID, s.city

from MANAGE m

inner join STAFF s

on m. ManagerID = s. STAFFID;

3. ① if branch is outer, account is inner

$$\text{cost} = 2200 + \lceil 2200 / (55 - 2) \rceil \cdot 250000 = 10502200 \text{ blocks}$$

② if account is outer, branch is inner.

$$\text{cost} = 250000 + \lceil 250000 / (55 - 2) \rceil \cdot 2200 = 10627400 \text{ blocks.}$$

日期: /