一. (1) $\Pi_{SNAME}\left(\sigma_{BNAME='红楼梦'}(B\bowtie L\bowtie S)\right)$

(2) $\Pi_{S\#.B\#}(L)\div \Pi_{S\#}\left(\sigma_{CLASS=105}(S)\right)$

(3) $\Pi_{B\#}\left(\sigma_{SNAME='张三'}(S\bowtie L)\right)-\Pi_{B\#}\left(\sigma_{SNAME='李四'}(S\bowtie L)\right)$

(4) $\sigma_{B_1.B\#\neq B_2.B\#}\left(\rho_{B_1}(B)\bowtie_{\substack{B_1.BNAME\\=B_2.BNAME}}\rho_{B_2}(B)\right)$ 为空：满足   不空：不满足

二. (1) Delete from B where UID# In
   (Select UID# From U where UNAME='张三');

(2) Select Count(*) from C where BID# In
   (Select BID# From B,U where B.UID#=U.UID# and U.UNAME='李四')

   And UID# In
   (Select UID# From U where UNAME='张三');

(3) Create View SumU (UID#, UNAME, Year, Count#)
? AS Select UID#, UNAME, Year, Count# From (Select UID#, (BTIME) As year ~~year~~, Count(*) as count# From B
   Group by UID,(BTIME) ~~year~~)
   Netural Join U

(4) Select UID#, UNAME From SumU where Count# In
   (Select Max(Count#) From SumU);
   where year='2015';

2. (1) $F_{AC}^{+}=\{ABCDE\}$

(2) AB / AC

(3) ~~AC→E~~
    B→C ✓
    B→E ✓
    C→B ✓
    ~~AB→C~~
    ~~AB→D~~
    AE→D ✓

$\begin{array}{l}L:A\\R:D\\N:\\LR:B,C,E\end{array}$
$\begin{array}{l}D\\E\end{array}$

(4)

	A	B	C	D	E
ABC	a_1	a_2	a_3	b_{14}	b_{15}
ABDE	a_1	a_2	b_{23}	a_4	a_5

是

(5) ADE, AB, BC, BE

4-1:
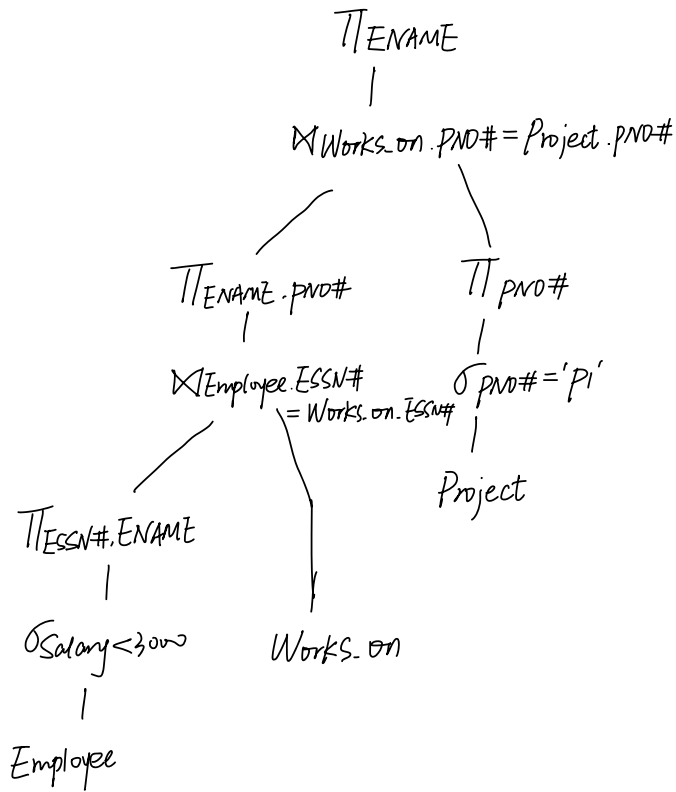|			
5	5	0101	√
19	3	0011	√
24	8	1000	√
26	10	1010	√
35	3	0011	√
48	0	0000	√
53	5	0101	√
61	13	1101	√
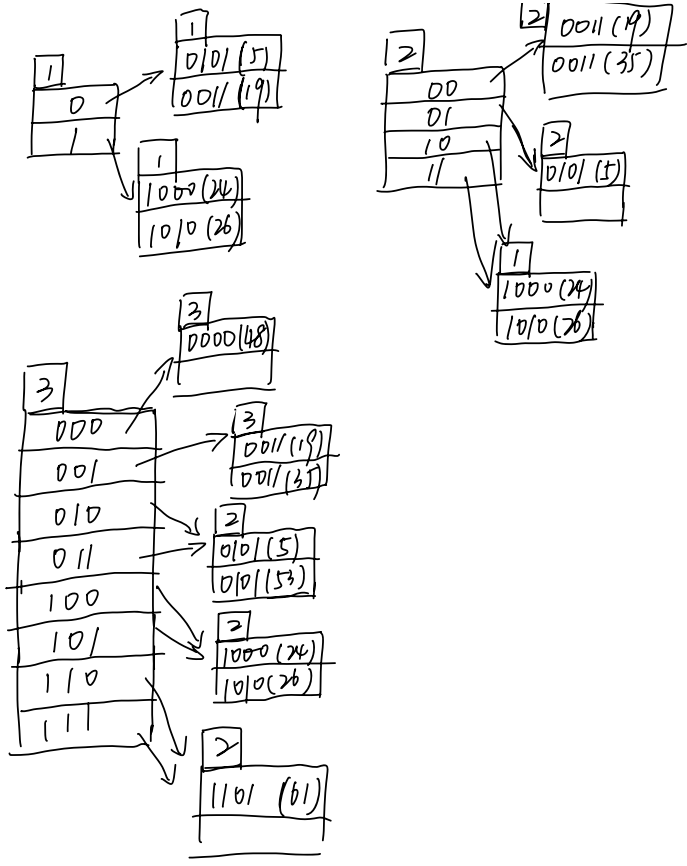
4-2: (1) 归并连接/哈希连接: $3(500+1000) = 4500$

(2) 块嵌套循环/归并/哈希连接: $500 + \dfrac{500 \times 1000}{126-1} = 4500$

4-3: (1) $\Pi_{ENAME} \left(\sigma_{Salary<3000 \,\wedge\, Project.PNO='P_1' \,\wedge\, Employee.ESSN\#=Works.on.ESSN\# \,\wedge} \right.$

$\left._{Works.on.PNO\#=Project.PNO\#} ((Employee \times Works.on) \times Project) \right)$

(2)

$$\Pi_{ENAME}$$
|
$$\bowtie_{Works\_on.PNO\# = Project.PNO\#}$$

$$\Pi_{ENAME,PNO\#} \qquad \Pi_{PNO\#}$$
| |
$$\bowtie_{Employee.ESSN\# = Works\_on.ESSN\#} \qquad \sigma_{PNO\# = 'P1'}$$
|
$$\Pi_{ESSN\#,ENAME} \qquad Project$$
|
$$\sigma_{Salary < 3000} \qquad Works\_on$$
|
$$Employee$$
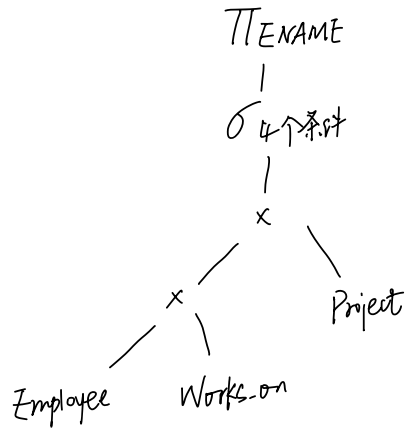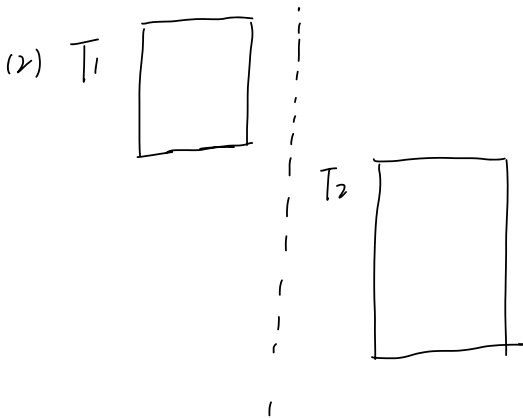
4-4 (1) 2PL：事务令加锁、解锁两阶段，加锁阶段只能给变量加锁，解锁阶段只能给变量解锁。

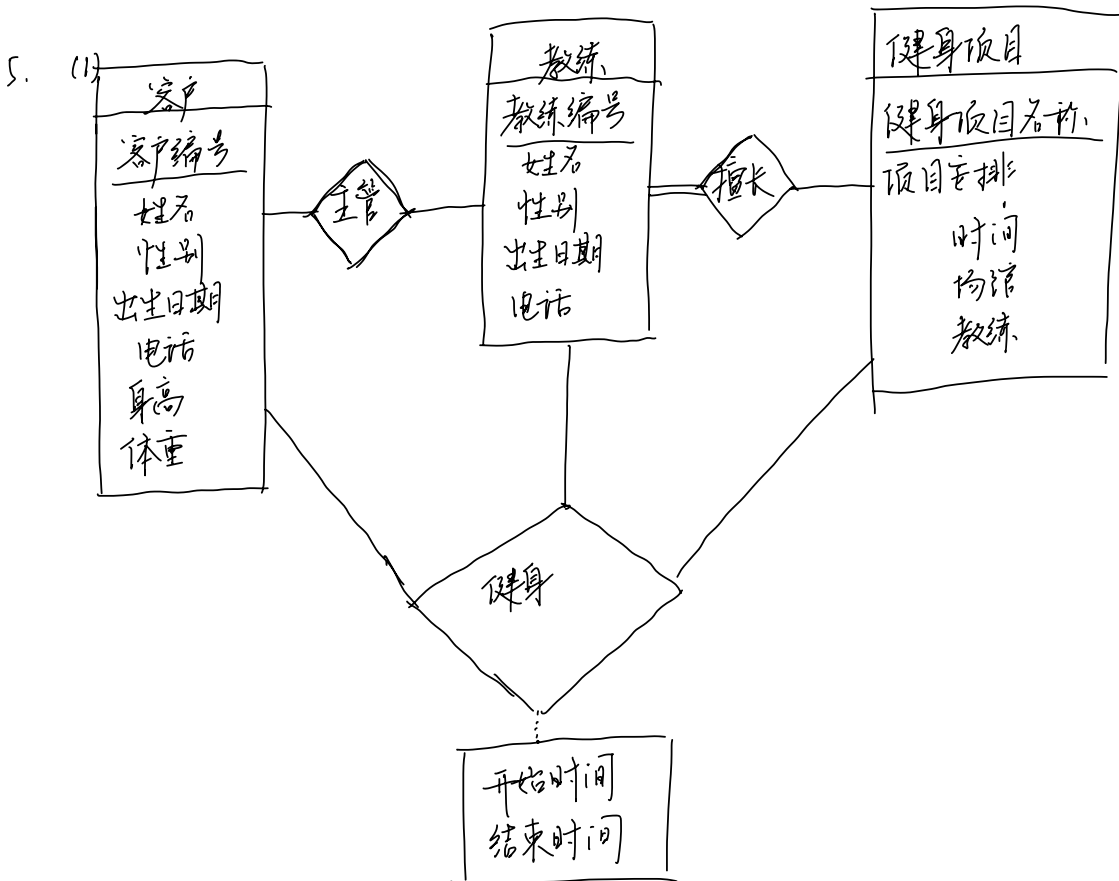$T_1:$ Lock-S(A)
　　　Lock-X(B)
　　　r(A)
　　　Unlock(A)
　　　r(B)
　　if A>B then B:=A
　　　W(B)
　　　Unlock(B)

$T_2:$ Lock-S(B)
　　　Lock-X(A)
　　　r(B)
　　　Unlock(B)
　　　r(A)
　　if B<0 then A:=B*B
　　　W(A)
　　　Unlock(A)

(2) T_1　□

T_2　□

(3) 如: T_1 Lock-S(A) T_2

        Lock-S(B)

        Lock-X(A)

    Lock-X(B)

4-5: (1) 由 12 知: 0

(2) 由 0, 1, 2, 6, 9, 10 知 T_1, T_3

(3) redo: 无   undo: T_1, T_3

5. (1)

(2) 客户 (编号, 姓名, 性别, 出生日期, 电话, 身高, 体重)

教练 (编号, 姓名, 性别, 出生日期, 电话)

健身项目 (名称, 时间, 场馆, 教练编号)

主管 (客户编号, 教练编号)

健身记录 (客户编号, 教练编号, 开始时间, 结束时间, 训练场馆, 项目名称)

擅长 (教练编号, 项目名称)