浙江大学 2015－2016 学年秋季学期

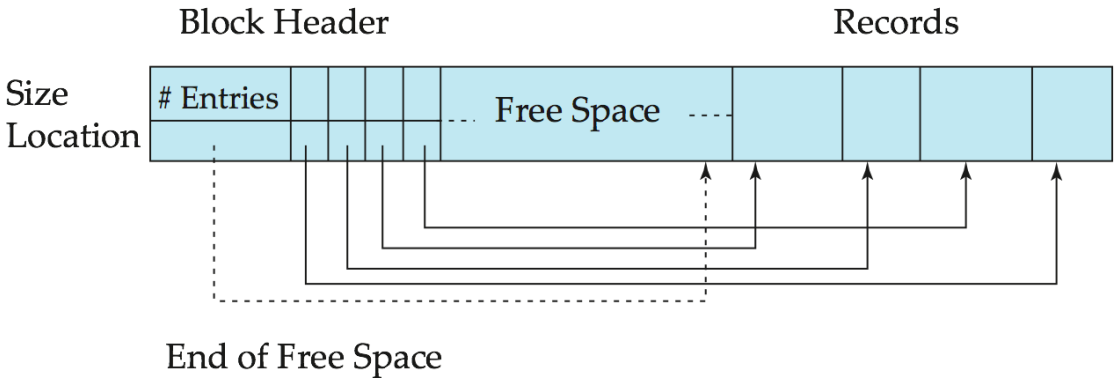
《数据库系统设计》课程期末考试试卷-参考答案

Problem 1: Variable-length Records (10 points)

1)

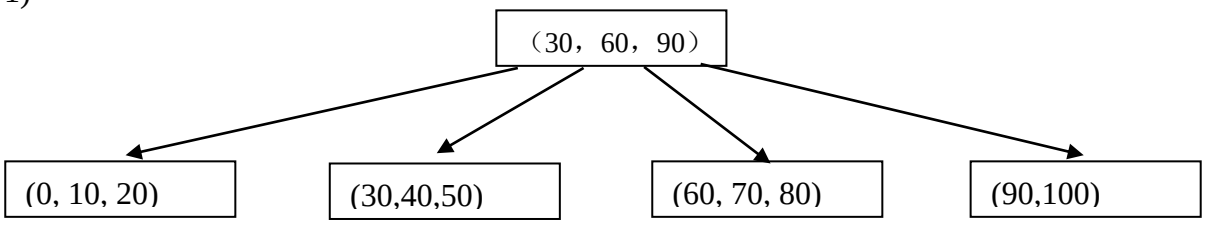
1001	15,10	60		0001	Bill Gates	
0	4	8	10	14	15	
1002	15,12	60	27,20	0000	Bob Williams	111, State Street, MA.
0	4	8	10	14	15	27
1001	15,12			0011	John Harvard	
0	4	8	10	14	15	

2)

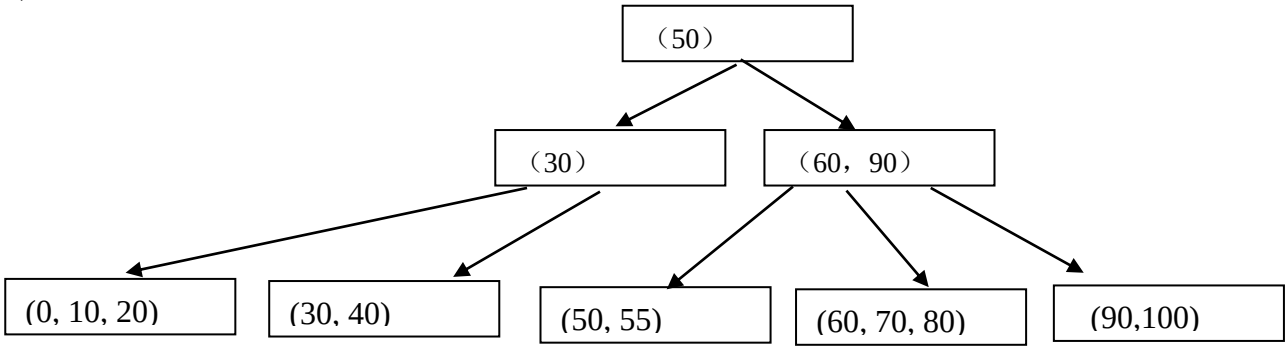


Problem 2: B+ -Tree (16 points, 4 points per part)

1)



2)



3）min height : $\log_4(10000)$ = 7 (up) max height: log 2 (10000/2) +1 = 13 (low)
4) min size: 4443 maz size: 9995

Problem 3: Cost Estimation (18 points, 9 points per part)

1) 100000*1/4*1/50*80000/1000000=100000*1/4*1/50*8/100=40

2) Size of account record=44

Number of account record per block=4096/44 = 93

Number of blocks of account= 10000/93=108

Size of access record=28

Number of account record per block=4096/28 = 146

Number of blocks of account= 100000/146=685

br/M-2*bs+br = 108/98*685+ 108 = 2*685+108 =1478 block transfers

2*br/(M-2) seeks = 2*108/98 = 4 seeks

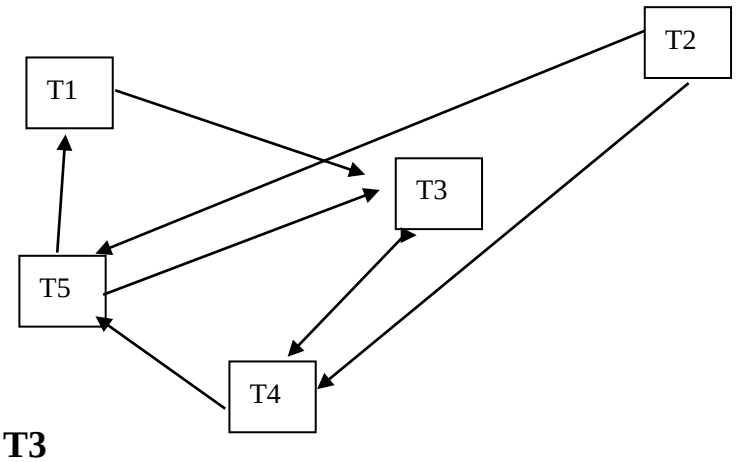
Problem 4: Materialized View (10 points, 5 points per part)

1) π account.account_no, account.customer_name, access.access_date(
δ branch_name=’Hangzhou’(account)⋈ δ ammount>=50000(access))

2)
π account.account_no, account.customer_name, access.access_date(
δ branch_name=’Hangzhou’(account)⋈ δ ammount>=50000(access∪S))
=
π account.account_no, account.customer_name, access.access_date(
δ branch_name=’Hangzhou’(account)⋈(δ ammount>=50000(access)∪ δ ammount>=50000(S)))
=
π account.account_no, account.customer_name, access.access_date(
δ branch_name=’Hangzhou’(account)⋈(δ ammount>=50000(access))
∪
π account.account_no, account.customer_name, access.access_date(
δ branch_name=’Hangzhou’(account)⋈(δ ammount>=50000(S))
=V ∪V’, 其中:
V’ =π account.account_no, account.customer_name, access.access_date(
δ branch_name=’Hangzhou’(account)⋈(δ ammount>=50000(S))
=π account.account_no, account.customer_name, access.access_date(
V”⋈(δ ammount>=50000(S))
V”=δ branch_name=’Hangzhou’(account)

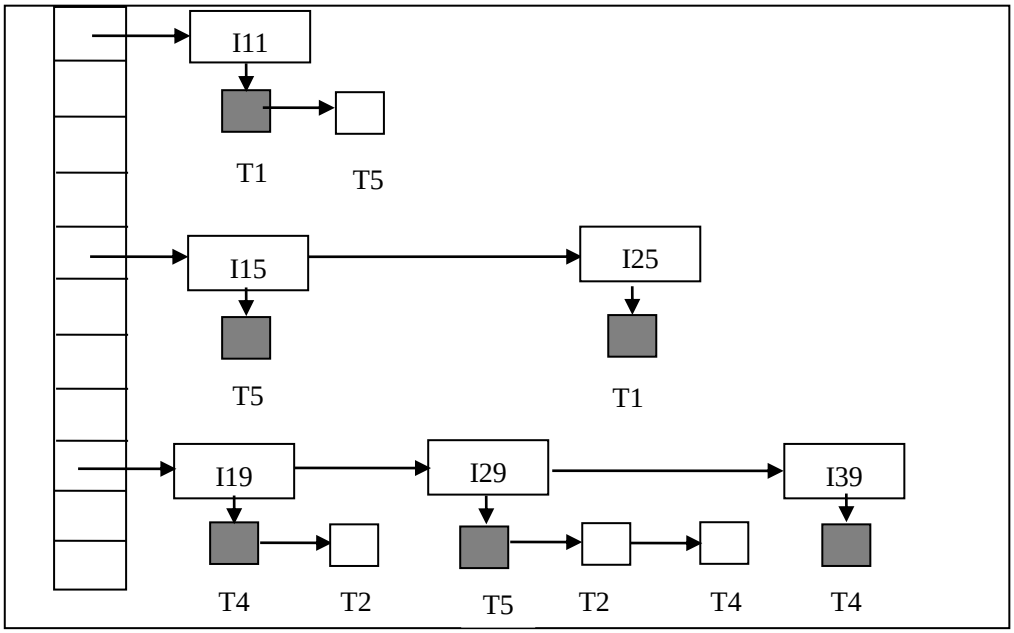
Problem 5: Deadlock Handling (12 points, 4 points per part)

1） T1，T3 ，T4， T5



2） T3

3）



Problem 6: Transactions (10 points)

要点为：

由于事务遵循 2PL，事务持有的锁并不是用好即释放，而是要等到在 shrinking 阶段才释放，因此，对于访问频繁、冲突概率高的数据操作（更新分行的总现金余额），要放在冲突概率低的数据操作（更新某账户的余额）之后执行，这样才能总体减少锁的等待时间，提高并发度，从而提高事务的吞吐率。

Problem 7: Crash Recovery (16 points, 4 points per part)

1） redo : T1，T3
undo : T4
2） start point of redo phase: [12]
end point of undo phase: [10]
3） A 33 B 33 C 22 D 22
4）

[17] <T4, D, 22>
[18] <T4 abort>

Problem 8: Aries Recovery Method (8 points)

Aries recovery method is widely used in industrial DBMSs. Please answer following questions about ***Aries***.

1) What contents are in the checkpoint log of ***Aries***?
   Dirty Page Table
   Active Transaction List
2) Why checkpoint operation of ***Aries*** puts less side effects on normal transaction processing of DBMS?
   Doesn't output dirty pages in buffer to disk during checkpointing.