数据库原理CH16作业

18340040 冯大纬

17.15

17.15 Consider the following two transactions:

T_{13}: read(A);
read(B);
if $A = 0$ then $B := B + 1$;
write(B).
T_{14}: read(B);
read(A);
if $B = 0$ then $A := A + 1$;
write(A).

Let the consistency requirement be $A = 0 \vee B = 0$, with $A = B = 0$ as the initial values.

a. Show that every serial execution involving these two transactions preserves the consistency of the database.

b. Show a concurrent execution of T_{13} and T_{14} that produces a nonserializable schedule.

c. Is there a concurrent execution of T_{13} and T_{14} that produces a serializable schedule?

Answer:

a.

假如顺序为$T_{13} \rightarrow T_{14}$，那么最终结果为$A = 0, B = 1$，满足$A = 0 \vee B = 0$

假如顺序为$T_{14} \rightarrow T_{13}$，那么最终结果为$A = 1, B = 0$，满足$A = 0 \vee B = 0$

b.

T13	T14
read(A)	
	read(B);
	read(A);
	if B=0 then A:=A+1;
	write(A);
read(B);	
if A=0 then B:=B+1;	
write(B);	

这种并行会破坏一致性

c.

不存在任何并行执行顺序可以不破坏一致性，原因如下：

假设T_{14}在T_{13}执行完成前并行执行，无论在任何时候执行$read(B)$，得到的B值均为0，结果导致T_{14}将A修改为1，最后结果为$A=1, B=1$。

T_{13}在T_{14}执行完成前并行也会导致一样的结果，所以任何并行执行都会破坏一致性条件$A=0 \vee B=0$。