第 6 章习题数据库安全

1. Using the two-step commit presented in the beginning of this chapter, describe how to avoid assigning one seat to two people, as in the airline example. That is, list precisely which steps the database manager should follow in assigning passengers to seats.
两阶段提交 （准备阶段、提交阶段）。可解决多人订一张票，即同时写的冲突问题。详细描述两阶段提交过程

查询空闲座位，选定空闲座位时对该座位锁定不允许别人处理，锁定后 15 分钟自动解锁。

```
Select ‘free seat’ from airline system;
if  status_seat[i]=’free’  and commit_flag=0
      set   commit_flag=1;    wait_time=15;
```

a）准备阶段

修改到临时变量中，如果这个过程出错，也对数据库无影响。减少对数据库的处理时间，操作的处理在数据库外部完成，对数据库仅是修改相应项即可。

```
T_seat[i]=occupy;   T_seat_user[i]=’PassengerA’,   /*临时变量保存*/
If  wait_time=0  then
     status_seat[i]=’free’  and commit_flag=0
```

b）提交阶段

```
If  wait_time=0  then
     status_seat[i]=’free’  and commit_flag=0
else
 Seat[i]=T_seat[i];  Seat_user[i]=T_seat_user[i];  /*把临时变量写入数据库*/
 Set commit_flag=0;  /*修改结束后，修改 commit 标志*/
```

2. UNDO is a recovery operation for databases. It is a command that obtains information from a transaction log and resets the elements of a database to their values before a particular transaction is performed. Describe a situation in which an UNDO command would be useful.
UNDO 是数据库的恢复操作。可从交易日志获得信息，并把数据库中元素重置到交易前状态。描述系统必须采用 UNDO 的场景。

系统出现故障，如掉电等影响了使得系统异常中断
数据库管理员误操作，删除了有用信息，UNDO 恢复。
系统文件被修改了导致系统无法启动，可恢复到修改前状态。

3. Suppose query Q1 obtains the median m1 of a set S1 of values. Suppose query Q2 obtains the median m2 of a subset S2 of S1. If m1 < m2, what can be inferred about S1, S2, and the elements of S1 not in S2?

Q1 查询的结果集 S1，其中位数 m1。 Q2 查询的结果集 S2，其中位数 m2。如果 m1 < m2，可从 S1 和 S2 推测出什么？

S1 {30 100 500} m1=100

S2 { 100 500 800} m2=500

S1 中有较小的元素 30，S2 中有较大的元素 800。

4. Disclosure of the sum of all financial aid for students in Smith dorm is not sensitive because no individual student is associated with an amount. Similarly, a list of names of students receiving financial aid is not sensitive because no amounts are specified. However, the combination of these two lists reveals the amount for an individual student if only one student in Smith dorm receives aid. What computation would a database management system have to perform to determine that the list of names might reveal sensitive data? What records would the database management system have to maintain on what different users know in order to determine that the list of names might reveal sensitive data?

Smith 寝室的贷款总和不敏感，没有泄露个人信息。贷款学生列表也不敏感，没有泄露学生的具体贷款数额。但组合二者，仅一人贷款时，泄露个人贷款额度信息。数据库管理系统如何处理保证不泄露敏感信息？（查询总额时，如果人数为 1 人则不允许查询；查询列表名字时，如果人数为 1 人则不允许查询）

数据库管理系统依据不同人知道不同信息，维护什么记录保证名字列表不泄露敏感数据？（自己查自己的信息可以，自己查别人的列表时，须在总人数多于 2 时可查询）

5. One approach suggested to ensure privacy is the small result rejection, in which the system rejects (returns no result from) any query, the result of which is derived from a small number, for example, five, of records. Show how to obtain sensitive data by using only queries derived from six records.

保证隐私的一种方法是对小数据值拒绝相应，即当返回值较小时拒绝查询，如返回 5 条纪录。如何通过查询结果为 6 条记录得到敏感信息？

比如：A 寝室人数为 6 人。A 寝室贷款人数 5 人。

查询 A 寝室用户列表:OK。查询 A 寝室贷款额不响应，可猜测贷款人较多。

或根据寝室人数，查询寝室成员健康总人数得出其疾病状况。

或根据寝室人数，查询该寝室不及格人数。