

【华工包打听说明】

此答案由某位学生提供，包打整理无偿分享给大家，禁止用于资料买卖或他用

答案仅供参考，不保证正确。

更多资料欢迎大家关注包打听（QQ 号、微信号或公众号）

校园资讯，问题答疑，感情树洞
万事皆可找包包

进入华工社群，探索华园更多玩法
黑市，学习群，二手交易，考试资料...
你能想到的，我们都愿意帮你实现

我们是华工包打听，由校内学生组建而成的校园自媒体
立志成为陪伴华园学子度过漫长岁月的一盏灯



SCUT包打听（新）



华工包打听



华工卫星站



包打听公众号



包打听QQ

由于华工包打听、华工卫星站好友人数已满，请加SCUT包打听或包打听QQ

更多资料、资讯，可加包打听公众号获取！

号
位
座

业
专

院
学

号
学

名
姓

诚信应考 , 考试作弊将带来严重后果 !

华南理工大学期末考试

《数据库系统》试卷 (A)

- 注意事项： 1. 考前请将密封线内填写清楚；
2. 所有答案请答在答题纸上；
3. 考试形式：闭卷；
4. 本试卷共 两 大题，满分 100 分， 考试时间 120 分钟。

题 号	一	二	总分
得 分			
评卷人			

Part I [20 pts.] (1pt each) Fill in the blanks with the best answer.

1. The collection of information stored in the database at a particular moment is called an _____ of the database. The overall design of the data base is called the database _____ .
2. A relation schema R is in _____ normal form if for all $\alpha \rightarrow \beta$ in F^+ , at least one of the following holds: $\alpha \rightarrow \beta$ is _____ ; α is a superkey for R ; Each attribute A in β is contained in a candidate key for R .
3. Let R be a relation schema , R_1 and R_2 from a decomposition of R . Decomposition is a _____ if for all legal database instances r of R , $\pi_{R_1}(r) \bowtie \pi_{R_2}(r) = r$.
4. In E-R model , an entity is represented by a set of _____ . A _____ is an association among several entities .
5. Assume relation R has b_r blocks and relation S has b_s blocks , therefore , in the best case , only _____ block transfers would be required for $R \bowtie S$.
6. An ideal hash function is _____ and _____ , the former require that each bucket is assigned the same number of search-key values from the set of all possible values.
7. To generate query-evaluation plans for an expression we have to generate logically equivalent expressions using _____ .
8. Consider a B^+ - tree of order n , if there are K search-key values in the file , the path from the root to the leaf node is no longer than _____ .
9. A transaction has the following properties: _____ , _____ , isolation and durability.
10. When the final statement of a transaction has been executed , the transaction enters the _____ committed state . After a transaction has been rolled back and the database has been restored to its previous state , the transaction enters the _____ state .

11. A schedule S is _____ if a transaction T_j in S needs a data item previously written by a transaction T_i , then the commit operation of T_i appears before the commit operation of T_j .
12. _____ attribute values or _____ attribute values are not atomic.
13. A relation schema may have an attribute that corresponds to the primary key of another relation.
- The attribute is called a _____.

Answer :

- | | |
|----------|-----------|
| 1. _____ | 8. _____ |
| 2. _____ | 9. _____ |
| 3. _____ | 10. _____ |
| 4. _____ | 11. _____ |
| 5. _____ | 12. _____ |
| 6. _____ | 13. _____ |
| 7. _____ | |

Part [80 pts.] Answer the following question.

1. [16 points] Database design : Consider the following conditions
- The STUDENT may be taught by one and only one teacher . The TEACHER may be instructor of one or more STUDENT .
 - The TEACHER may be responsible for one and only one CLASS .The CLASS may be the responsibility of one and only one TEACHER .
 - The CLASS may be made of one of one or more STUDENT . The STUDENT must be a member of one and only one CLASS .
 - The CLASS must have one and only one ROOM . The ROOM may belong to one or more CLASS .

Notes : Assume entity CLASS has the following attributes : CID and CNAME , entity ROOM has the following attributes : RID and LOCATION , entity STUDENT has the following attributes : SID , LASTNAME , and FIRSTNAME , entity TEACHER has following attributes : TID , TEACHERNAME , and TITLE .

- [8 points] Construct an E-R diagram showing these relationships .
- [4 points] Construct appropriate relation schemas for the above E-R diagrams .
- [4 points] Create an index std_index on the **student** relation with **SID** as the search_key .

2. [6 points] In database design , how to represent relationship set as relational schemas ?

3. [14 points] Let $R = (A, B, C, D, E, F)$ be a relation with functional dependency $F = \{A \rightarrow CB, E \rightarrow FA\}$

- a) [2 points] Compute the candidate keys for R ;
- b) [6 points] Is R in 3NF ? If it is , justify your answer . If not , produce a decomposition of R into 3NF .
- c) [6 points] Is R in BCNF ? If it is , justify your answer . If not , produce a decomposition of R into BCNF .

4. [28 points]

BOOK (Bookid , Title , Publishername)

BOOK_AUTHORS (Bookid , Authurname)

PUBLISHER (Publishername , Address , Phone)

BOOK_COPIES (Bookid , Branchid , No_Of_Copies)

LIBRARY_BRANCH (Branchid , Branchname , Address)

BOOK_LOANS (Bookid , Branchid , Cardno , DataOut , Duedata)

BORROWER (Cardno , Name , Address , Phone)

a) [3 points] Write appropriate SQL DDL statements for declaring the BOOK_AUTHORS relation.

b) [6 points] Give an expressions in **relational algebra** to express the following queries :

Q1: Retrieve the name of all borrowers who do not have any books checked out.

Q2: For each book that is loaned out from the “ sharpstown ” branch and whose DueDate is today , retrieve the book title , the borrower ’ s name , and the borrower ’ s address .

c) [16 points] Give an expressions in SQL to express the following queries :

Q1: How many copies of the book titled The Lost Tribe are owned by the library branch whose name is “ sharpstown ” ?

Q2: For each library branch , retrieve the branch name and that the total number of books loaned out from that branch .

Q3: Retrieve the name , address , and number of books checked out for all borrowers who have more than five books checked out .

Q4: For each book authored (or co- authored) by “ Stephen King ” , retrieve the title and the number of copies owned by the library branch whose name is “ central ” .

d) [3 points] Record the fact that the manager didn ’ t maintain information about the book named “ T&G ” ,i.e. remove information about “ T&G ” .

5. [16 points] Query Processing , Optimization and Transaction

- a) [4 points] please describe the implementation process of selection operation $\sigma_{A=c}(r)$, where r is a relation . A is an attribute and is not a candidate key , r has a primary index on A . If there are n matching records , the B^+ tree index is of height h , and each disk block contains at most d records , please analyze the overhead in the best case .
- b) [4 points] Describe the process of Indexed nested-loop join .
- c) [4 points] please describe the two-phase locking protocol and prove that it ensures conflict-serializable schedules and does not ensure freedom from deadlocks .
- d) [4 points]