

3. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007.
4. Thomas A. Sudkamp: An Introduction to the Theory of Computer Science, Languages and Machines, 3rd Edition, Pearson Education, 2006.

DATABASE APPLICATIONS LABORATORY

Subject Code: 10CSL57

I.A. Marks : 25

Hours/Week : 03

Exam Hours: 03

Total Hours : 42

Exam Marks: 50

1. Consider the following relations:
 Student (*snum*: integer, *sname*: string, *major*: string, *level*: string, *age*: integer)
 Class (*name*: string, *meets at*: string, *room*: string, *d*: integer)
 Enrolled (*snum*: integer, *cname*: string)
 Faculty (*fid*: integer, *fname*: string, *deptid*: integer)
 The meaning of these relations is straightforward; for example, Enrolled has one record per student-class pair such that the student is enrolled in the class. Level is a two character code with 4 different values (example: Junior: JR etc)
 Write the following queries in SQL. No duplicates should be printed in any of the answers.
 - i. Find the names of all Juniors (level = JR) who are enrolled in a class taught by Prof. Harshith
 - ii. Find the names of all classes that either meet in room R128 or have five or more Students enrolled.
 - iii. Find the names of all students who are enrolled in two classes that meet at the same time.
 - iv. Find the names of faculty members who teach in every room in which some class is taught.
 - v. Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five.
2. The following relations keep track of airline flight information:
 Flights (*no*: integer, *from*: string, *to*: string, *distance*: integer, *Departs*: time, *arrives*: time, *price*: real)
 Aircraft (*aid*: integer, *aname*: string, *cruisingrange*: integer)
 Certified (*eid*: integer, *aid*: integer)
 Employees (*eid*: integer, *ename*: string, *salary*: integer)
 Note that the Employees relation describes pilots and other kinds of employees as well; Every pilot is certified for some aircraft, and only pilots are certified to fly.

Write each of the following queries in SQL.

- i. Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs.80, 000.
 - ii. For each pilot who is certified for more than three aircrafts, find the *eid* and the maximum *cruisingrange* of the aircraft for which she or he is certified.
 - iii. Find the names of pilots whose *salary* is less than the price of the cheapest route from Bengaluru to Frankfurt.
 - iv. For all aircraft with *cruisingrange* over 1000 Kms, .find the name of the aircraft and the average salary of all pilots certified for this aircraft.
 - v. Find the names of pilots certified for some Boeing aircraft.
 - vi. Find the *aids* of all aircraft that can be used on routes from Bengaluru to New Delhi.
3. Consider the following database of student enrollment in courses & books adopted for each course.
STUDENT (regno: string, name: string, major: string, bdate:date)
COURSE (course #:int, cname:string, dept:string)
ENROLL (regno:string, course#:int, sem:int, marks:int)
BOOK _ ADOPTION (course# :int, sem:int, book-ISBN:int)
TEXT (book-ISBN:int, book-title:string, publisher:string, author:string)
 - i. Create the above tables by properly specifying the primary keys and the foreign keys.
 - ii. Enter at least five tuples for each relation.
 - iii. Demonstrate how you add a new text book to the database and make this book be adopted by some department.
 - iv. Produce a list of text books (include Course #, Book-ISBN, Book-title) in the alphabetical order for courses offered by the 'CS' department that use more than two books.
 - v. List any department that has *all* its adopted books published by a specific publisher.
 - vi. Generate suitable reports.
 - vii. Create suitable front end for querying and displaying the results.
4. The following tables are maintained by a book dealer.
AUTHOR (author-id:int, name:string, city:string, country:string)
PUBLISHER (publisher-id:int, name:string, city:string, country:string)
CATALOG (book-id:int, title:string, author-id:int, publisher-id:int, category-id:int, year:int, price:int)
CATEGORY (category-id:int, description:string)

ORDER-DETAILS (order-no:int, book-id:int, quantity:int)

- i. Create the above tables by properly specifying the primary keys and the foreign keys.
 - ii. Enter at least five tuples for each relation.
 - iii. Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
 - iv. Find the author of the book which has maximum sales.
 - v. Demonstrate how you increase the price of books published by a specific publisher by 10%.
 - vi. Generate suitable reports.
 - vii. Create suitable front end for querying and displaying the results.
5. Consider the following database for a banking enterprise
- BRANCH(branch-name:string, branch-city:string, assets:real)
- ACCOUNT(accno:int, branch-name:string, balance:real)
- DEPOSITOR(customer-name:string, accno:int)
- CUSTOMER(customer-name:string, customer-street:string, customer-city:string)
- LOAN(loan-number:int, branch-name:string, amount:real)
- BORROWER(customer-name:string, loan-number:int)
- i. Create the above tables by properly specifying the primary keys and the foreign keys
 - ii. Enter at least five tuples for each relation
 - iii. Find all the customers who have at least two accounts at the *Main* branch.
 - iv. Find all the customers who have an account at *all* the branches located in a specific city.
 - v. Demonstrate how you delete all account tuples at every branch located in a specific city.
 - vi. Generate suitable reports.
 - vii. Create suitable front end for querying and displaying the results.

Instructions:

1. The exercises are to be solved in an RDBMS environment like Oracle or DB2.
2. Suitable tuples have to be entered so that queries are executed correctly.
3. Front end may be created using either VB or VAJ or any other similar tool.
4. The student need not create the front end in the examination. The results of the queries may be displayed directly.

5. Relevant queries other than the ones listed along with the exercises may also be asked in the examination.
6. Questions must be asked based on lots.

**SYSTEM SOFTWARE & OPERATING SYSTEMS
LABORATORY**

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PART - A

LEX and YACC Programs:

Design, develop, and execute the following programs using LEX:

1. a) Program to count the number of characters, words, spaces and lines in a given input file.
b) Program to count the numbers of comment lines in a given C program. Also eliminate them and copy the resulting program into separate file.
2. a) Program to recognize a valid arithmetic expression and to recognize the identifiers and operators present. Print them separately.
b) Program to recognize whether a given sentence is simple or compound.
3. Program to recognize and count the number of identifiers in a given input file.

Design, develop, and execute the following programs using YACC:

4. a) Program to recognize a valid arithmetic expression that uses operators +, -, * and /.
b) Program to recognize a valid variable, which starts with a letter, followed by any number of letters or digits.
5. a) Program to evaluate an arithmetic expression involving operators +, -, * and /.
b) Program to recognize strings 'aaab', 'abbb', 'ab' and 'a' using the grammar ($a^n b^n, n \geq 0$).
6. Program to recognize the grammar ($a^n b, n \geq 10$).



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