

Intro to Databases - Homework 1

Published: September 6

Due: September 15

Please upload your answers in pdf format to Canvas.

If you know you are going to submit your assignment late, please let us know in advance (send an email to nicole.salomons@yale.edu). Any and all resources may be used as long as you cite them, with the exception of collaborating with other people.

If you have ANY questions, please do not hesitate to let us know (email, office hours, etc.)

1 Give 1-3 sentence answers to the following questions. (30 points)

- 1.1 What is a DBMS?
- 1.2 Whats the difference between relational algebra language and SQL?
- 1.3 What is the difference between the logical schema and the physical schema?
- 1.4 In relational algebra language, why are the set intersection operation and the natural join operation not necessary?
- 1.5 Give 2 responsibilities for each of the following: storage manager, query processor, and transaction manager.
- 1.6 What is a relation instance?

2 Multiple Choice questions (30 points)

2.1 Which of the following statements is TRUE.

- A. The order of items in a relations database matters.
- B. Concurrent users using the same database do not cause problems.
- C. SQL has not been used much in the past few years.
- D. Attributes must be atomic in a relational model.

2.2 Which of the following statements is FALSE.

- A. SQL is not an Extensive Markup Language.
- B. End users interact with databases on a physical level.

- C. Object-Relational models can have non atomic values.
- D. The relational model stores all data in tables.

2.3 Which of the following statements is TRUE.

- A. The storage manager is responsible for parsing SQL commands.
- B. It does not make a difference in performance on how you issue the SQL command.
- C. Null values are allowed in relational databases.
- D. Databases are always client-server based.

2.4 Which of the following statements is TRUE.

- A. There may only be one superkey in a relational table.
- B. There may only be one candidate key in a relational table.
- C. There may only be one primary key in a relational table.
- D. There may only be one foreign key in a relational table.

2.5 Physical data independence is the ability to

- A. Modify the logical schema without changing the physical schema.
- B. Modify the physical schema without changing the logical schema .
- C. Modify the data without changing the physical or logical schema.
- D. None of the above

3 Use relational algebra considering the following 3 tables:

The underlines represent the primary keys for each table. "Store" is a foreign key referencing the bookstore id. And "author" (in book) is a foreign key referencing the author id in the author table.

Bookstore(id,name,city,address)
Book(book_id,title,author,price,store)
Author(author_id,name,city,address,age)

- 3.1 Find all bookstore addresses and names in the city New Haven.**
- 3.2 Find all authors who have at least one book under 10 dollars.**
- 3.3 Find all the titles of books where the author is over 40.**
- 3.4 Find all names and addresses of authors who live in a city which has a bookstore selling their books.**
- 3.5 Find out the address, name, and city of the bookstore who is selling the cheapest book called "Game of thrones"**