

# CS 4400 Exam 3 Practice

ER-Relational Mapping, SQL, Relational Design

## ANSWER KEY

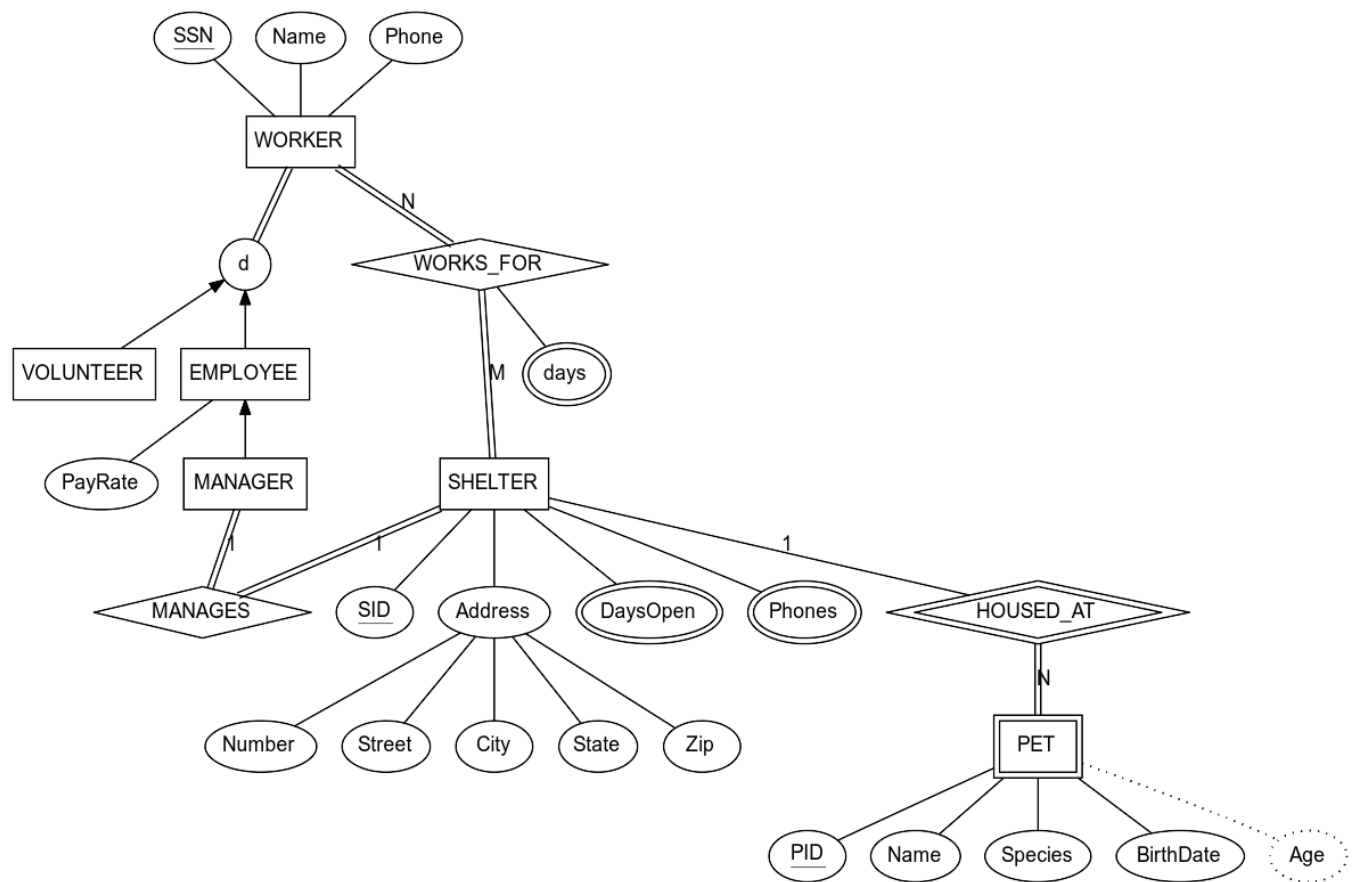
Completely fill in the box corresponding to your answer choice for each question.

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| 18. | <input type="checkbox"/> A | <input type="checkbox"/> B | <input type="checkbox"/> C | <input type="checkbox"/> D |
| 19. | <input type="checkbox"/> A | <input type="checkbox"/> B | <input type="checkbox"/> C | <input type="checkbox"/> D |
| 20. | <input type="checkbox"/> A | <input type="checkbox"/> B | <input type="checkbox"/> C | <input type="checkbox"/> D |

Number missed: \_\_\_\_\_ Written Score: \_\_\_\_\_

+ Queries score: \_\_\_\_\_ = Final Score: \_\_\_\_\_

Refer to the following EER diagram for Questions 1 – 7



- [4] 1. Which of the following (sets of) relation schemas is a correct mapping of the SHELTER entity type? (Disregard the MANAGES relationship.)
- A. SHELTER(SID, Number, Street, City, State, Zip, DaysOpen, Phones)
  - B. SHELTER(SID, Number, Street, City, State, Zip, Phones), DaysOpen(SID, Day)
  - C. SHELTER(SID, Number, Street, City, State, Zip), DaysOpen(SID, Day), Phones(SID, Phone)**
  - D. All of the above.
- [4] 2. Which of the following relation schemas is a correct mapping of the PET entity type?
- A. PET(PID, Name, Species, BirthDate, Age)
  - B. PET(PID, Name, Species, BirthDate)
  - C. PET(PID, SID, Name, Species, BirthDate)**
  - D. None of the above
- [4] 3. Which of the following sets of relation schemas is a correct mapping of the WORKS\_FOR relationship (Disregard multivalued attributes of SHELTER.)?
- A. WORKER(SSN, Name, Phone, SID), SHELTER(SID, Number, Street, City, State, Zip)
  - B. WORKER(SSN, Name, Phone), SHELTER(SID, Number, Street, City, State, Zip, SSN)
  - C. WORKER\_SHELTER(SSN, SID), WORK\_DAYS(SSN, SID, Day)**
  - D. WORKER\_SHELTER(SSN, SID, Days)
- [4] 4. What's the least number of tables necessary to model the WORKER - VOLUNTEER - EMPLOYEE - MANAGER class hierarchy?
- A. 1**
  - B. 2
  - C. 3
  - D. 4
- [4] 5. Which of the following sets of relation schemas acceptably represents the WORKER - VOLUNTEER - EMPLOYEE - MANAGER class hierarchy?
- A. WORKER(SSN, Name, Phone), VOLUNTEER(SSN), EMPLOYEE(SSN, PayRate), MANAGER(SSN)
  - B. EMPLOYEE(SSN, Name, Phone, PayRate, IsManager), VOLUNTEER(SSN)
  - C. WORKER(SSN, Name, Phone, PayRate, IsManager)
  - D. All of the above.**
- [4] 6. Which of the following create table statements creates a PET table that accurately models the PET entity type?
- A. create table pet(PID int primary key, Name varchar(20), Species varchar(20), Birthdate date)
  - B. create table pet(PID int primary key, Name varchar(20), Species varchar(20), Birthdate date, SID int)
  - C. create table pet(PID int, Name varchar(20), Species varchar(20), Birthdate date, SID int, primary key (PID, SID), foreign key (SID) references shelter(SID))**
  - D. None of the above.
- [4] 7. Which of the following create table statements creates a table that accurately models the WORKS\_FOR relationship? (Disregard multivalued attributes.)
- A. create table worker\_shelter(SSN int, SID int, days enum (M, Tu, W, Th, F))
  - B. create table worker\_shelter(SSN int, SID int, primary key (SSN, SID), foreign key (SSN) references worker (SSN), foreign key (SID) references shelter (SID))**
  - C. create table worker\_shelter(SSN int, SID int, primary key (SSN))
  - D. None of the above.

Refer to the following create table statements and table data for Questions 8 – 10.

```
create table dorm (  
    dorm_id integer primary key auto_increment,  
    name text not null,  
    spaces integer  
);  
  
create table student (  
    student_id integer primary key auto_increment,  
    name text,  
    gpa float(3,2),  
    dorm_id integer not null,  
    foreign key (dorm_id) references dorm(dorm_id)  
);
```

```
mysql> select * from dorm;  
+-----+-----+-----+  
| dorm_id | name      | spaces |  
+-----+-----+-----+  
|      1 | Armstrong |    124 |  
|      2 | Brown     |    158 |  
+-----+-----+-----+  
2 rows in set (0.00 sec)
```

```
mysql> select * from student;  
+-----+-----+-----+-----+  
| student_id | name  | gpa  | dorm_id |  
+-----+-----+-----+-----+  
|          1 | Alice | 3.60 |        1 |  
|          2 | Bob   | 2.70 |        1 |  
+-----+-----+-----+-----+  
2 rows in set (0.00 sec)
```

- [4] 8. Which of the following insert statements will succeed?
- A. `insert into dorm (name, spaces) values('Caldwell', 158);`
  - B. `insert into dorm values('Caldwell', 158);`
  - C. `insert into dorm (name, spaces) values(null, 158);`
  - D. All of the above.
- [4] 9. Which of the following insert statement is certain to succeed?
- A. `insert into student (name, gpa, dorm_id) values ('Cheng', 3.6, 3);`
  - B. `insert into student (name, gpa, dorm_id) values ('Cheng', 3.6, 1);`
  - C. `insert into student (name, gpa) values ('Cheng', 3.6);`
  - D. All of the above.
- [4] 10. Which of the following delete statements will fail?
- A. `delete from student`
  - B. `delete from dorm where name = 'Brown';`
  - C. `delete from dorm where name = 'Armstrong';`
  - D. None of the above.

For questions 11 – 20 use this relation schema and set of functional dependencies  $F$ :

$ATL - TRANSIT(DriverSsn, EmpName, RouteNum, BusId, RouteDate, ServiceDate)$

$$\begin{aligned} DriverSsn &\rightarrow RouteNum \\ RouteNum, RouteDate &\rightarrow BusId \\ BusId &\rightarrow ServiceDate \\ RouteNum, RouteDate &\rightarrow DriverSsn \\ DriverSsn &\rightarrow EmpName \end{aligned}$$

- [4] 11. Which one of the following functional dependencies is in  $F^+$ ?
- $RouteDate \rightarrow BusId$
  - $ServiceDate \rightarrow BusId$
  - $RouteNum \rightarrow BusId$
  - $BusId, DriverSsn, EmpName \rightarrow BusId$
- [4] 12. What is  $\{RouteNum, RouteDate\}^+$  with respect to  $F$ ?
- $\{RouteNum, RouteDate\}$
  - $\{RouteNum, RouteDate, BusId, DriverSsn\}$
  - $\{RouteNum, RouteDate, BusId, DriverSsn, EmpName, ServiceDate\}$
  - the empty set
- [4] 13. Which of the following is a key for the ATL-TRANSIT schema?
- $DriverSsn$
  - $\{RouteNum, RouteDate\}$
  - $\{DriverSsn, RouteDate\}$
  - Both B and C**
- [4] 14. What is the highest normal form that the ATL-TRANSIT schema satisfies?
- 1NF**
  - 2NF
  - 3NF
  - BCNF
- [4] 15. Suppose we decompose the ATL-TRANSIT schema into
- $$ATL1(DriverSsn, RouteNum, BusId, RouteDate, ServiceDate)$$
- $$ATL2(DriverSsn, EmpName)$$
- Does that decomposition have the lossless join property?
- Yes**
  - No
- [4] 16. Suppose we decompose the ATL-TRANSIT schema into
- $$ATL1(RouteNum, RouteDate, BusId)$$
- $$ATL2(DriverSsn, RouteNum, EmpName, ServiceDate)$$
- Does that decomposition have the lossless join property?
- Yes
  - No**

For questions 11 – 20 use this relation schema and set of functional dependencies  $F$ :

$ATL - TRANSIT(DriverSsn, EmpName, RouteNum, BusId, RouteDate, ServiceDate)$

$DriverSsn \rightarrow RouteNum$   
 $RouteNum, RouteDate \rightarrow BusId$   
 $BusId \rightarrow ServiceDate$   
 $RouteNum, RouteDate \rightarrow DriverSsn$   
 $DriverSsn \rightarrow EmpName$

[4] 17. Which attribute is fully functionally dependent on the set of attributes  $\{RouteNum, RouteDate\}$ ?

- A. *BusId*
- B. *DriverSsn*
- C. *EmpName*
- D. all of the above**

[4] 18. Which of the following attributes are prime attributes?

- A. Only *DriverSsn*
- B. Only *RouteNum*
- C. *RouteNum* and *RouteDate*
- D. *DriverSsn*, *RouteNum* and *RouteDate***

[4] 19. Suppose we decompose the ATL-TRANSIT schema into

$ATL1(RouteNum, RouteDate, BusId, DriverSsn)$

$ATL2(DriverSsn, RouteDate, EmpName, ServiceDate)$

Which of those schemas is in 3NF?

- A. ATL1**
- B. ATL2
- C. Both ATL1 and ATL2
- D. None of the above

[4] 20. Consider the current state for our ATL-TRANSIT schema as shown below. What values could be inserted for the two missing column values, *RouteNum* and *ServiceDate*, without violating any of the FDs that have been defined for the ATL-TRANSIT schema. The domain for *RouteNum* is  $\{10, 11, 12, 13, 14\}$  and the domain for *ServiceDate* is any valid date

| <i>DriverSsn</i> | <i>EmpName</i> | <i>RouteNum</i> | <i>BusId</i> | <i>RouteDate</i> | <i>ServiceDate</i> |
|------------------|----------------|-----------------|--------------|------------------|--------------------|
| 111-22-3333      | Brown          | 11              | 101          | 07-07-2007       | 06-06-2006         |
| 333-33-4444      | Smith          |                 | 202          | 07-11-2007       | 07-12-2005         |
| 222-44-5555      | Green          | 12              | 101          | 07-12-2007       |                    |
| 333-33-4444      | Smith          | 10              | 203          | 07-12-2007       | 08-22-2006         |

- A. The values 11 for *RouteNum* and '07-12-2005' for *ServiceDate*
- B. The values 10 for *RouteNum* and '06-06-2006' for *ServiceDate***
- C. The values 13 for *RouteNum* and '09-01-2006' for *ServiceDate*
- D. None of the above