

CpSc 462/662 Midterm Exam

Name: _____

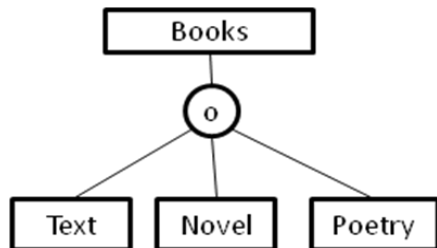
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Question #1 (20 points):

Are the following statements **true** or **false**?

1. In database design, the requirement analysis is always conducted concurrently with ER diagramming. (True)
2. In any relational database, an entity must be related to another entity. (False)
3. Primary key is a single attribute uniquely identifying an instance of an entity. (False).
4. Entity X has total participation in Relationship Z, meaning that every instance of X takes part in at least one relationship. (True)
5. Given two entities with many-to-many relationship, we can simply use foreign keys on each other to represent their relationship. (False)
6. A relational table is 1NF if and only if each row is unique. (False)
7. A foreign key is a column or columns whose values are the same as the primary key of another table. (True)
8. A child entity in a generalization hierarchy inherits the primary key of the parent entity. (True)
9. In a relational table, no subset of a candidate key is a superkey. (True)
10. In a relational database, every foreign key value must match a primary key value in an associated table to ensure the entity integrity. (False)

Question #2 (10 points): Given a superclass “books” and its subclasses “text”, “novel” and “poetry”, please draw an EER diagram to represent the generalization/specialization hierarchy.



Question #3 (10 points): Please briefly describe the essential properties for a relational table.

- **Values are atomic:** This property implies that columns in a relational table are not repeating group or arrays.
- **Column values have the same type:** This means that all values in a column come from the same domain.
- **Each row is unique:** This property ensures that no two rows in a relational table are identical; there is at least one column, or set of columns, the values of which uniquely identify each row in the table.

- **The sequence of the column is insignificant:** The ordering of the columns in the relational table has no meaning. Columns can be retrieved in any order and in various sequences.
- **The sequence of the rows is insignificant:** The ordering of the rows in the relational table has no meaning.
- **Each column has a unique name:** In general, a column name need not be unique within an entire database but only within the table to which it belongs.

Question #4 (10 points): What is the highest degree of normal form the following relational tables comply with respectively? Please fill in the blanks.

1. Tutor/Student Cross-Reference: _____ 3NF
2. Tournament Winners: _____ 2NF
3. Pizza Delivery Permutations: _____ BCNF
4. Customer: _____ None
5. Employees' Skills: _____ INF

Tutor/Student Cross-Reference

Tutor ID	Tutor Soc. Security Num.	Student ID
1078	088-51-0074	31850
1078	088-51-0074	37921
1293	096-77-4146	46224
1480	072-21-2223	31850

Tournament Winners

<u>Tournament</u>	<u>Year</u>	<u>Winner</u>	<u>Winner Date of Birth</u>
Indiana Invitational	1998	Al Fredrickson	21 July 1975
Cleveland Open	1999	Bob Albertson	28 September 1968
Des Moines Masters	1999	Al Fredrickson	21 July 1975
Indiana Invitational	1999	Chip Masterson	14 March 1977

Pizza Delivery Permutations

<u>Restaurant</u>	<u>Pizza Variety</u>	<u>Delivery Area</u>
Vincenzo's Pizza	Thick Crust	Springfield
Vincenzo's Pizza	Thick Crust	Shelbyville
Vincenzo's Pizza	Thin Crust	Springfield
Vincenzo's Pizza	Thin Crust	Shelbyville
Elite Pizza	Thin Crust	Capital City
Elite Pizza	Stuffed Crust	Capital City
A1 Pizza	Thick Crust	Springfield
A1 Pizza	Thick Crust	Shelbyville
A1 Pizza	Thick Crust	Capital City
A1 Pizza	Stuffed Crust	Springfield
A1 Pizza	Stuffed Crust	Shelbyville
A1 Pizza	Stuffed Crust	Capital City

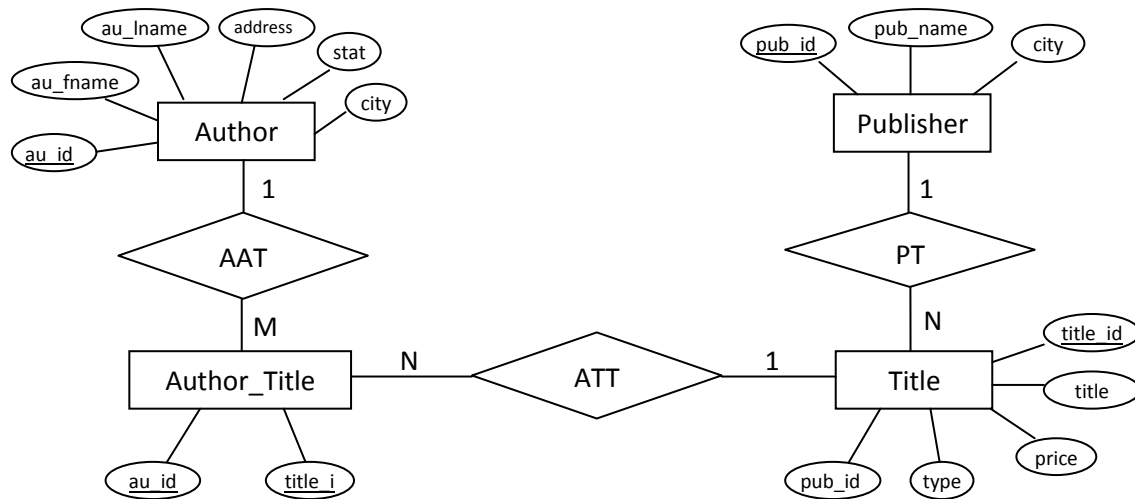
Customer

<u>Customer ID</u>	<u>First Name</u>	<u>Surname</u>	<u>Telephone Number</u>
123	Rachel	Ingram	555-861-2025
456	James	Wright	555-403-1659, 555-776-4100
789	Maria	Fernandez	555-808-9633

Employees' Skills

<u>Employee</u>	<u>Skill</u>	<u>Current Work Location</u>
Jones	Typing	114 Main Street
Jones	Shorthand	114 Main Street
Jones	Whittling	114 Main Street
Roberts	Light Cleaning	73 Industrial Way
Ellis	Alchemy	73 Industrial Way
Ellis	Juggling	73 Industrial Way
Harrison	Light Cleaning	73 Industrial Way

Question #5 (20 points): Given a database described by the following ER diagram, please write SQL statements to create the necessary database tables. You must explicitly specify the primary key and foreign keys of the tables if necessary.



```

create table Author (
    au_id integer primary key not null,
    au_fname varchar(50) not null,
    au_lname varchar(50) not null,
    address varchar(100) not null,
    state varchar(30) not null,
    city varchar(30) not null
);

create table Publisher(
    pub_id integer primary key not null,
    pub_name varchar(50) not null,
    city varchar(30) not null
)

create table Title(
    title_id integer primary key not null,
    pub_id integer NOT NULL references Publisher(pub_id),
    title varchar(200) not null,
    price integer not null,
    type varchar(50),
    foreign key(pub_id) references Publisher(pub_id)
)
  
```

```

create table Author_title (
    au_id integer not null references Author(au_id),
    title_id integer not null references Title(title_id),
    foreign key (au_id) references Author(au_id),
    foreign key (title_id) references Title(title_id),
    primary key (au_id, title_id)
)

```

Question #6 (20 points): Given the following database schema, please draw an ER diagram for this database.

ACCOUNT:

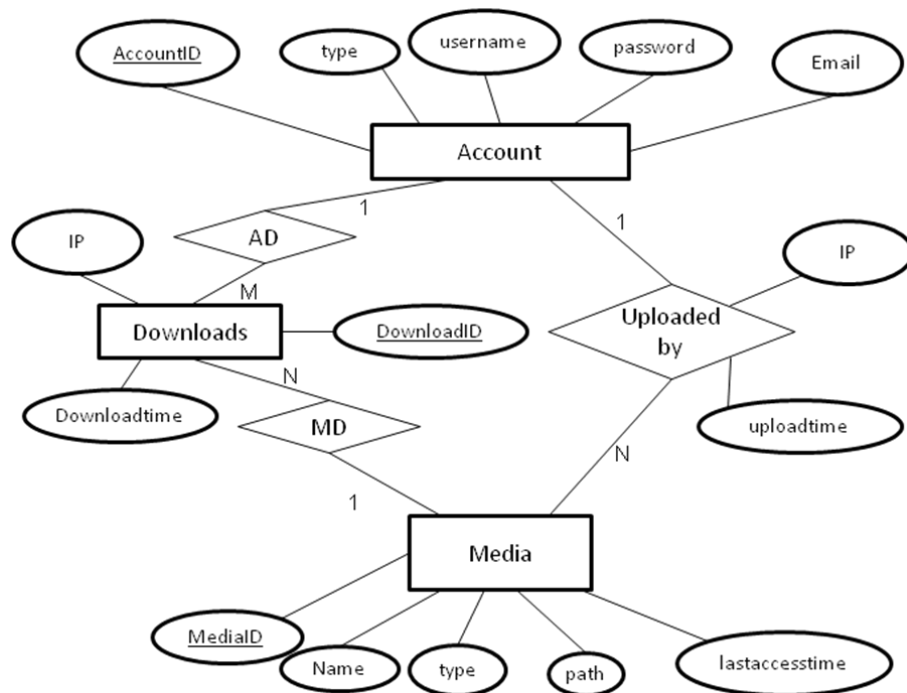
Field	Type	Null	Key	Default	Extra
AccountID	int(11)	NO	PRI	NULL	auto_increment
email	varchar(1024)	NO			
username	varchar(100)	NO			
password	varchar(100)	NO			
type	tinyint(4)	NO			

DOWNLOADS:

Field	Type	Null	Key	Default	Extra
DownloadID	int(11)	NO	PRI	NULL	auto_increment
AccountID	int(11)	YES	MUL	NULL	
MediaID	int(11)	YES	MUL	NULL	
ip	varchar(128)	NO			
downloadtime	datetime	NO			

MEDIA:

Field	Type	Null	Key	Default	Extra
MediaID	int(11)	NO	PRI	NULL	auto_increment
type	int(11)	NO			
name	varchar(100)	NO			
path	varchar(4096)	NO			
lastaccess	datetime	YES		NULL	
AccountID	int(11)	NO	MUL		
uploadTime	datetime	NO			



Question #7 (10 points): Given the database described in Question #6, please write SQL statements to retrieve the following information from the database.

1. List the image files (assume type = 1) uploaded by User #1.
2. List all media files downloaded by user "xyz" in the database.
3. Show media name and path that were uploaded before 09/20/2007.
4. Find the name of the most recently downloaded media.
5. Find the name of the most frequently downloaded media.

1. `SELECT * FROM Media WHERE AccountID = 1 AND type = 1;`

2. `SELECT * FROM Media, Downloads, Account
WHERE Media.MediaID = Downloads.MediaID AND
Account.AccountID = Downloads.AccountID AND
Account.username = 'xyz';`

3. `SELECT name, path FROM Media WHERE uploadTime < '2007-09-20';`

4. `SELECT name, downloadtime FROM Media, Downloads
WHERE Media.MediaID = Downloads.MediaID
ORDER BY downloadtime DESC
LIMIT 1;`

```
5. SELECT Media.name, Downloads.MediaID, count(Downloads.MediaID) as cnt
   FROM Media, Downloads
  WHERE Media.MediaID = Downloads.MediaID
  GROUP BY MediaID
  ORDER BY cnt DESC
  LIMIT 1;
```