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92 inc review.

Midterm 2023-06

CS544 Enterprise Applications

A. [3 pts] Explain why Hibernate is a Framework (not a library): Hibernate manage entities, mapping associations, manage transaction's generate and excute queries via Entity manager. not call direct to database. It manages == IoC

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B. [3 pts] Explain what the difference is between the @Entity and @Table annotations

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@Entity : Define name of table in Database, can be use with SQL query.
@Table : Define name and using for Hibernate mapping, not use for Hibernate query.

C. [3 pts] What does the @LOB annotation do?

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tell data base store that property as Text

D. [3 pts] What does it mean to be a Bi-directional association – Explain how it differs from two uni-directional associations: bi-directional is an association between Two entities that we have property depent on each orther. In hibernate, we use mappedBy to giving up control side. for bi-directional association. If no mappedBy declared then tow uni-direction will happen with @ManyToOne use FK and @OneToMany use join Table (it not good).

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E. [3 pts] Describe what the difference is between List and Bag collections:

3

Bag : non-indexed, can contain duplicates, no order.
list: has an instrinsic order and can contain duplicates. Need to additional index column in oder to have a real list in database.

F. [3 pts] Explain what the N+1 problem is: when we retrive some objects and loop over them, to loading related datas for each item in collection (do N selects)

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G. [3 pts] Explain how optimistic concurrency solves the lost update problem: Application can be running database in lower isolation level to make it faster. It can use version column (@version) hoping that the lost update problem don't happen.

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H. [3 pts] Why is there is no such thing as a relational database interaction without a transaction?

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Because an Application is no unit work, development without transaction is really bad isolation.

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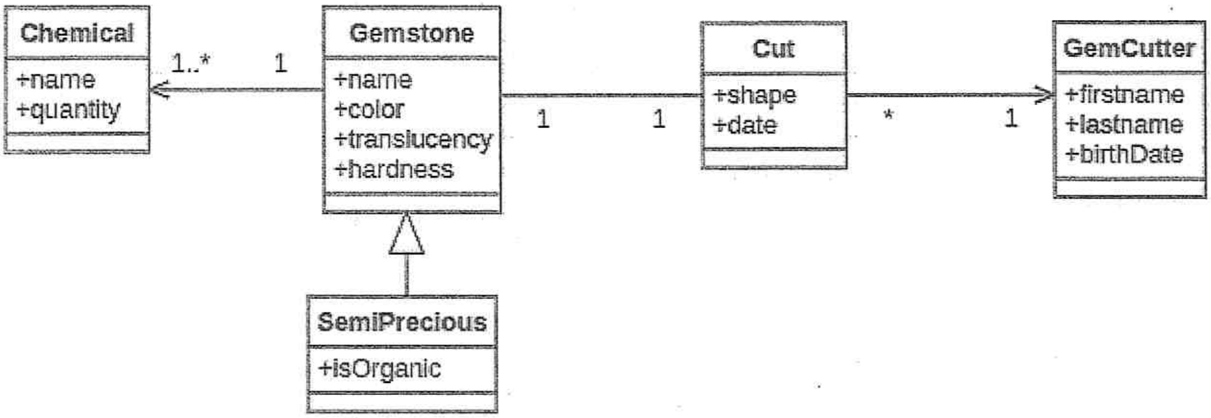
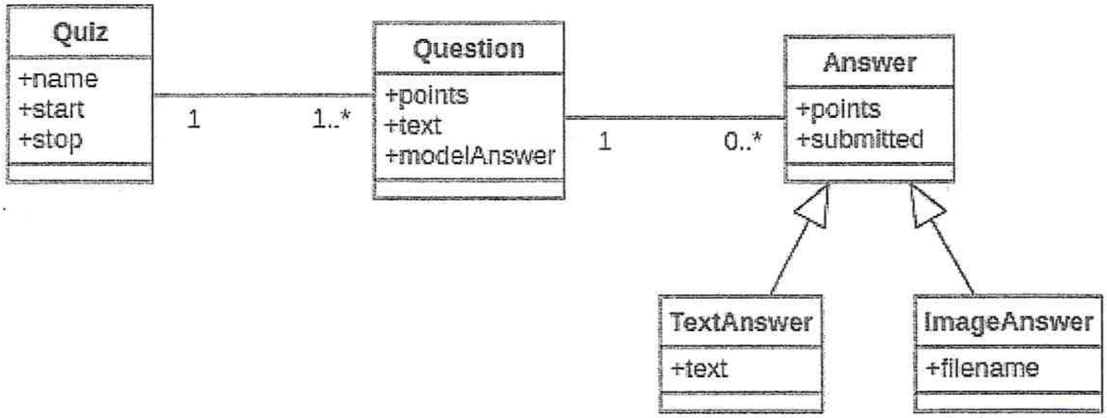
These are the UML diagrams of the domains for the 2 mapping questions:





You can use these UML diagrams to get an overview of what the code looks like, which is useful when writing queries.

Hint: use dates directly in you query string, like: ‘2023-06-10’

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Exercises:

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1. [24 pts] Based on the following classes with annotations write what the tables names, column names, and data types will be (also include if a column is auto_increment).

```
@Entity
@Inheritance(strategy = InheritanceType.JOINED)
public class Gemstone {
  @Id
  @GeneratedValue(strategy =
                  GenerationType.IDENTITY)
  private Long id;
  private String name;
  private String color;
  private double translucency;
  private int hardness;
  @Embedded
  private Cut cut;
  @OneToMany
  private List<Chemical> chemicals;
}

@Entity
public class SemiPrecious extends Gemstone {
  private boolean isOrganic;
}
```

```
@Embeddable
public class Cut {
  private String shape;
  private Date date;
  @ManyToOne
  private GemCutter gemCutter;
}

@Entity
public class GemCutter {
  @Id
  @GeneratedValue(strategy =
                  GenerationType.IDENTITY)
  private Long id;
  private String firstname;
  private String lastname;
  @Temporal(TemporalType.DATE)
  private Date birthDate;
}

@Entity
public class Chemical {
  @Id
  @GeneratedValue(strategy =
                  GenerationType.IDENTITY)
  private Long id;
  private String name;
  private int quantity;
}
```

Gemstone ✓

id	bigint	auto_increment
name	Varchar	
Color	Varchar	
translucency	double	
hardness	int	
Shape	varchar	
date	time stamp	
gemCutter_id	bigint	

SemiPrecious ✓

id	bigint
isOrganic	bit

GemCutter ✓

id	bigint	auto_increment
firstname	varchar	
lastname	Varchar	
birthDate	date.	

Chemical ✓

id	bigint	auto_increment
name	varchar	
quantity	int	

Gemstone_Chemical ✓

Gemstone_id	bigint
chemicals_id	bigint

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2. [24 pts] Add annotations to the following classes to map to the tables shown on the next page.

```
@Entity
public class Quiz {
  @Id
  @GeneratedValue
  private Long id;

  private String name;

  @Temporal(TemporalType.DATE)
  private Date start;

  @Temporal(TemporalType.DATE)
  private Date stop;                               -2
  @OrderColumn(name="sequence")
  @OneToMany(mappedBy="quiz")
  private List<Question> questions =
                      new ArrayList<>();
}

@Entity
public class Question {
  @Id
  @GeneratedValue
  private Long id;

  @Column(nullable = "False")
  private int points;

  @Lob
  private String text;

  @Lob
  private String modelAnswer;

  @ManyToOne
  private Quiz quiz;

  @OneToMany(mappedBy="question")
  private List<Answer> answers =
                      new ArrayList<>();
```

```
@MappedSuperClass                 -2
public abstract class Answer {

  @Id
  @GeneratedValue(strategy=GenerationType.SEQUENCE)
  private Long id;

  @Column(nullable = "False")
  private double points;

  @Temporal(TemporalType.DATE)
  private Date submitted;

  @ManyToOne
  private Question question;


  ~~private User user;~~
}

@Entity
public class ImageAnswer extends Answer {

  private String filename;
}

@Entity
public class TextAnswer extends Answer {

  @Lob
  private String Text;
}
```

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```
describe Quiz;
+-------+--------------+------+-----+---------+----------------+
| Field | Type         | Null | Key | Default | Extra          |
+-------+--------------+------+-----+---------+----------------+
| id    | bigint(20)   | NO   | PRI | NULL    | auto_increment |
| start | datetime(6)  | YES  |     | NULL    |                |
| stop  | datetime(6)  | YES  |     | NULL    |                |
| name  | varchar(255) | YES  |     | NULL    |                |
+-------+--------------+------+-----+---------+----------------+
describe Question;
+-------------+------------+------+-----+---------+----------------+
| Field       | Type       | Null | Key | Default | Extra          |
+-------------+------------+------+-----+---------+----------------+
| points      | int(11)    | NO   |     | NULL    |                |
| sequence    | int(11)    | YES  |     | NULL    |                |
| id          | bigint(20) | NO   | PRI | NULL    | auto_increment |
| quiz_id     | bigint(20) | YES  | MUL | NULL    |                |
| modelAnswer | tinytext   | YES  |     | NULL    |                |
| text        | tinytext   | YES  |     | NULL    |                |
+-------------+------------+------+-----+---------+----------------+
describe Answer_SEQ;
+----------+------------+------+-----+---------+-------+
| Field    | Type       | Null | Key | Default | Extra |
+----------+------------+------+-----+---------+-------+
| next_val | bigint(20) | YES  |     | NULL    |       |
+----------+------------+------+-----+---------+-------+
describe ImageAnswer;
+-------------+--------------+------+-----+---------+-------+
| Field       | Type         | Null | Key | Default | Extra |
+-------------+--------------+------+-----+---------+-------+
| points      | double       | NO   |     | NULL    |       |
| submitted   | time(6)      | YES  |     | NULL    |       |
| id          | bigint(20)   | NO   | PRI | NULL    |       |
| question_id | bigint(20)   | YES  | MUL | NULL    |       |
| user_id     | bigint(20)   | YES  | MUL | NULL    |       |
| filename    | varchar(255) | YES  |     | NULL    |       |
+-------------+--------------+------+-----+---------+-------+
describe TextAnswer;
+-------------+------------+------+-----+---------+-------+
| Field       | Type       | Null | Key | Default | Extra |
+-------------+------------+------+-----+---------+-------+
| points      | double     | NO   |     | NULL    |       |
| submitted   | time(6)    | YES  |     | NULL    |       |
| id          | bigint(20) | NO   | PRI | NULL    |       |
| question_id | bigint(20) | YES  | MUL | NULL    |       |
| user_id     | bigint(20) | YES  | MUL | NULL    |       |
| Text        | tinytext   | YES  |     | NULL    |       |
+-------------+------------+------+-----+---------+-------+
```

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3. [12 pts] Based on the Gemstone domain, write queries to select:

   a. All gemsttones with name ruby that are cut into the oval shape

   Cut.

   From Gemstone where name = "ruby" and shape = "oval";

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   b. All gemstones that contain the chemical with name "Beryl" whose translucency is 0.8 and whose color is green.

   Select distinct g from Gemstone g

   cannot implicit join collection

   where g. chemicals .name = "Beryl" and g. color = "green"

   and g. translucency = 0.8

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   c. All SemiPrecious gems cut on the 9th of June 2023 by the GemCutter with firstname 'John' and lastname 'Brown'.

   Select distinct g From Gemstone g where type(g) = "Semi Precious"

   and g. date = '2023-06-09' and g. gemCutter. firstname = 'John'

   cut

   and g. gemCutter. last name = 'Brown'.

   cut

3

4. [12 pts] Based on the Quiz domain, write queries to select:

   a. All quizzes that started on the 10th of June 2023 at 10:0 whose name contains the word 'Exam'.

   From Quiz where start = '2023-06-10'

   and name like '% Exam %'

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   b. All questions that are worth 20 points or more on the Quiz with name 'CS544 Midterm 2023-06'

   Select distinct q from Question q where q. points >= 20

   and q. quiz . name = 'CS544 Midterm 2023-06'

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   c. All questtions that were answered with a TextAnswer whose text was "I don't know" on the quiz whose name is "W2D6"

   Select distinct q from Question q join q. answers a

   Where type(a) = 'Text Answer' and a. text = 'I don't know'

   and q. quiz . name = 'W2D6'

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