EA Practice midterm

Question 1 [10 points] {10 minutes}

a. Suppose we have a Spring application with the following given XML configuration

```
<bean id="customerService" class="basic.CustomerService">
   <constructor-arg ref="emailService"/>
</bean>
<bean id="emailService" class="basic.EmailService">
   <constructor-arg ref="customerService"/>
</bean>
```

When we run the application, Spring gives an error. Explain clearly why Spring gives an error based on the given XML configuration. Answer:

Spring will give an error because both beans depend on each other to be created since we have their dependency being injected via the constructor. In order to solve this either one or both of them need to use setter based dependency injection.

b. Explain why we need an **init()** method in Spring Boot.

Answer:

We need an init method to intitialize recourses at the start of an object like database connection or other resources.

[15 points] {20 minutes}

Suppose we need to write a **Spring Boot** application that allow us to store and find Products. A Product consists of the following attributes: productNumber, name, price and categoryName. A categoryName is something like “clothing” or “toys” or “electronics” The application should

Question 2

allow us to store new Products and we should be able to find products with the following functionality:

- Give all products with a price bigger than a given amount
- Give all products from a certain category

Write **ALL** necessary Java code including annotations. Do **NOT** write the Application class (that contains the main() method). Do **NOT** write imports and do **NOT** write getter and setter methods. Also do **NOT** write constructors.

Use all the best practices we learned in this course.

```
@Entity

Public class Product{

@Id

Private long productNumber;

Private String name;

Private double price;

Private String categoryName;

}

Public record ProductDTO(

Private long productNumber;

Private String name;

Private double price;

Private String categoryName;

){}


Public class ProductAdaptor{

Public Static getProductFromProductDto(ProductDTO productDto){
```

Question 3

Return new
Product(productDto.getProductNumber,productDto.getName(),productDto.getPrice(),productDto.getCatagoryName()};

Public Static getProductDtoFromProduct(Product product){

Return new
Product(productDto.getProductNumber,productDto.getName(),productDto.getPrice(),productDto.getCatagoryName()};

Public Static getPtoductDtosFromProducts(List<Product> products){

List<ProductDto> productDtos = new ArrayList<>();

For(Product pr:products){

productDtos.add(getProductDtoFromProduct(pr);

}

Return productDtos;

}

Public interface ProductRepository extends JpaRepository<Product,Long>{

List<Product> findByCategory(String category);

List<Product> findByPriceGreaterThan(String price);

}

@Service

Public class ProductService{

@Autowired

ProductRepository productRepository;

Public getProductsByCategory(String category){

Return productRepository.findByCategory(category);

}

Question 4

//save

//update

//delete

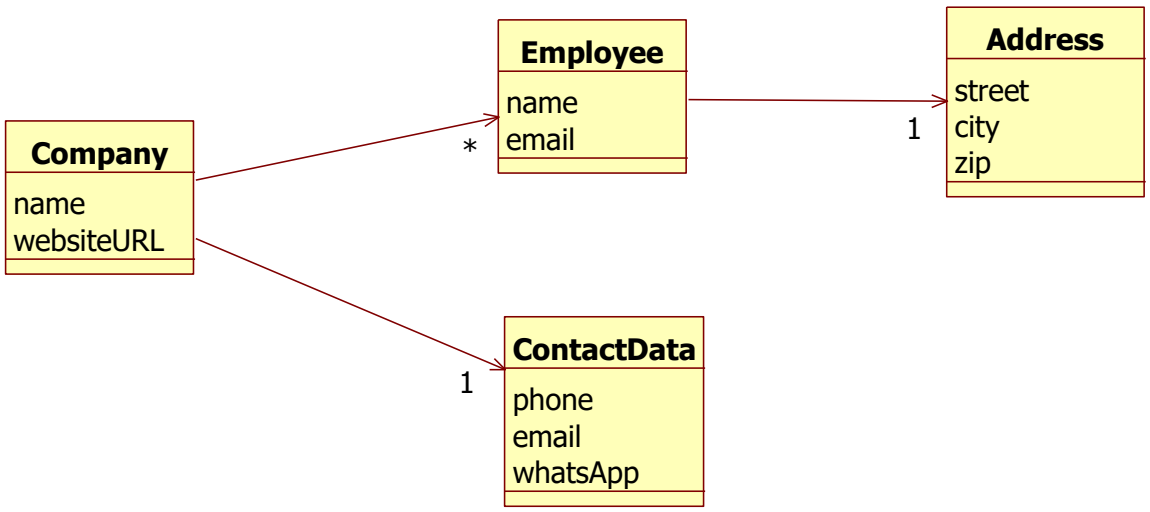
//get

//getall

}

[15 points] {15 minutes}

Suppose we have the following JPA entities:



We need to write the following queries:

These queries should be defined by the method name in the repository:

- **Give all Companies with a given name. Name is a parameter.**
- **Give all streets given a certain city and a certain zip**

These queries should be defined by **@Query** in the repository:

- **Give the name of all companies from a given city**
- **Give the name of the company given a certain phone number**
- **Give all Companies where an employee works with a certain given name.**

Question 5

Write the queries in the corresponding repositories. Write the **complete Java code** of all necessary repositories including the methods and the annotations. **Do not write Java imports**

```
//company
Public interface CompanyRepository extends JpaRepository<Company,Long>{
List<Company> findByName(String name);
@Query("Select distinct c from Company c Joins c.Employee e where e.address.city=:city")
List<Company> findCompanyByCity(@Param("city") String city);
@Query("Select distict c from Company c where c.contactData.phone=:phone")
@Query("Select distinct c from Company c Joins c.Employee where e.name =:name")



}
//address
Public interface AddressRepository extends JpaRepository<Address,Long>
{
List<String> findStreetByCityAndZip(String city, String Zip);
}
```

[20 points] {20 minutes} Given are the following entities:

```
@Inheritance(strategy=inheritanceStrategy.SINGLE_TABLE)
@DiscrimitatorColumn(name="vehicle_Type")
```

Question 6

@Entity

```
public abstract class Vehicle {
     private long id;
private String brand;
private String color;

   public Vehicle() { }

   public Vehicle(String brand, String color) {
this.brand = brand;        this.color = color;
   } }
```

```
@Entity
public abstract class Car extends Vehicle{
private String licencePlate;    public
Car() { }
   public Car(String brand, String color, String licencePlate) {
super(brand, color);
      this.licencePlate = licencePlate;
   } }
```

```
 @Entity
@DiscriminatorValue("rentalBycycle")
  public class RentalBycicle extends
Vehicle{    private double pricePerHour;
public RentalBycicle() {   }
   public RentalBycicle(String brand, String color, double pricePerHour) {
super(brand, color);
      this.pricePerHour = pricePerHour;
   }
}
```

```
 @Entity
@DiscriminatorValue("sellablecar")
public class SellableCar extends Car {
private double sellPrice;    public
SellableCar() { }
   public SellableCar(String brand, String color, String licencePlate, double
sellPrice) {
      super(brand, color, licencePlate);
this.sellPrice = sellPrice;
   }
}


 @Entity
@DiscriminatorValue("rentalcar")

  public class RentalCar extends Car
{    private double pricePerDay;
public RentalCar() {   }
   public RentalCar(String brand, String color, String licencePlate, double
pricePerDay) {
      super(brand, color, licencePlate);
this.pricePerDay = pricePerDay;
   }
}
public interface RentalBycicleRepository extends JpaRepository<RentalBycicle,
Long> { }
public interface RentalCarRepository extends JpaRepository<RentalCar, Long> {
}
public interface SellableCarRepository extends JpaRepository<SellableCar,
Long> {
}

@SpringBootApplication
public class Application implements CommandLineRunner {
   @Autowired
   RentalCarRepository rentalCarRepository;
   @Autowired
   SellableCarRepository sellableCarRepository;
   @Autowired
   RentalBycicleRepository rentalBycicleRepository;

   public static void main(String[] args) {
      SpringApplication.run(Application.class,   args);
}

   @Override
   public void run(String... args) throws Exception {
      RentalCar rentalCar = new RentalCar("BMW", "Black", "KL-980-1", 67.00);
rentalCarRepository.save(rentalCar);
      SellableCar sellableCar = new SellableCar("Audi", "White", "KM-956-2",
45980.00);
```

```
        sellableCarRepository.save(sellableCar);
        RentalBycicle rentalBycicle = new RentalBycicle("Moof", "Grey", 10.50);
rentalBycicleRepository.save(rentalBycicle);
    }

}
```

a. In the given code above, add **all the necessary mapping annotations** so that the whole inheritance hierarchy is mapped according the **single table per hierarchy** strategy. Do **NOT** rewrite any code. Only write the correct annotations in the given code.

b. Explain **ALL** advantages and disadvantages we learned about the **single table per hierarchy** strategy.
Answer:

Advantages”

Really fast

Easy to implement

Disadvantages

Many null values

De normalized

Adding a column in one entity will result in restructuring the whole table

Many colums

c. Draw the corresponding database table with all the columns and corresponding data if we run Application.java.

ID	BRAND	COLOR	LISCENCE_PLATE	PRICE_PER_HOUR	SELLPRICE	PRICE_PER_DAY

d. Suppose we map the given inheritance hierarchy with the strategy **Joined Tables**. Draw the corresponding database tables with all the columns and corresponding data if we use the strategy **Joined Tables**

Id	BRAND	COLOR
1		
2		
3		

LISCENCE_PLATE	

PRICE_PER_HOUR	

SELLPRICE	

PRICE_PER_DAY	

e. Suppose we map the given inheritance hierarchy with the strategy **Table per concrete class**. Draw the corresponding database tables with all the columns and corresponding data if we use the strategy **Table per concrete class**

ID	BRAND	COLOR	LISCENCE_PLATE	PRICE_PER_DAY

ID	BRAND	COLOR	PRICE_PER_HOUR

ID	BRAND	COLOR	LISCENCE_PLATE	SELLPRICE

Question 5 [10 points] {15 minutes}

Circle all statements that are correct:

a. When we add a version attribute to an entity and we annotate this with @Version then you will never have the dirty read problem on this entity.
b. If we do not allow the phantom read problem in our application, we cannot run 2 transactions at the same time.
c. In a Spring boot application that uses JPA, you cannot use dependency injection on JPA entities.
d. When you make one method of a Spring bean transactional the 2 phase commit protocol will never be used. If you make 2 or more methods of a Spring bean transactional the 2 phase commit protocol will be used.
e. Cascading is only applicable for inserts, updates and deletes.
f. In JPA, a @OneToOne relation is stored in the database as a @ManyToOne relation.
g. A named query cannot contain a join.
h. An entity class in a Spring Boot JPA application is always a singleton.
i. With the TransactionReadCommitted isolation level, you can never have the lost update problem
j. In databases that use sequences, every table contains a sequence column.