

INFO 6210

Data Management & Database Design

Fall 2019

LAB 1

Part 1

Entities

The screenshot displays two instances of the MySQL Workbench 'Properties' tab for table creation. The top instance is for a table named 'Degree' and the bottom instance is for a table named 'Department'. Both tables are configured with the InnoDB engine, utf8mb4 charset, and utf8mb4_0900_ai_ci collation. The 'Degree' table has three columns: DegreeID (int(11), primary key, not null, auto increment), DegreeName (varchar(100), not null), and DegreeDescription (varchar(100), not null). The 'Department' table has two columns: DepartmentID (int(11), primary key, not null, auto increment) and DepartmntName (varchar(100), not null). The 'Columns' tab is selected for both, showing the column details in a table format.

Degree Table Structure:

Column Name	#	Data Type	Not Null	Auto Increment	Key	Default	Extra	Exp
DegreeID	1	int(11)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PRI		auto_increment	
DegreeName	2	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				
DegreeDescription	3	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				

Department Table Structure:

Column Name	#	Data Type	Not Null	Auto Increment	Key	Default	Extra	Exp
DepartmentID	1	int(11)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PRI		auto_increment	
DepartmntName	2	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				

6210Lab Degree Department Major **Student**

MySQL 8+ - localhost Databases 6210Lab Tables Major

Properties Data ER Diagram

Table Name: Major

Engine: InnoDB

Auto Increment: 1

Charset: utf8mb4

Collation: utf8mb4_0900_ai_ci

Description:

Column Name	#	Data Type	Not Null	Auto Increment	Key	Default	Extra	Exp
123 MajorID	1	int(11)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PRI		auto_increment	
ABC MajorName	2	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				
123 DepartmentID	3	int(11)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MUL			

Columns Constraints Foreign Keys References Triggers Indexes

6210Lab Degree Department Major **Student**

MySQL 8+ - localhost Databases 6210Lab Tables Student

Properties Data ER Diagram

Table Name: Student

Engine: InnoDB

Auto Increment: 1

Charset: utf8mb4

Collation: utf8mb4_0900_ai_ci

Description:

Column Name	#	Data Type	Not Null	Auto Increment	Key	Default	Extra	Exp
123 StudentID	1	int(11)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PRI		auto_increment	
ABC StudentLastName	2	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				
ABC StudentFirstName	3	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				
ABC StudentBirthDate	4	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				
ABC StreetNumber	5	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				
ABC City	6	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				
ABC State	7	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				
123 ZipCode	8	int(11)	<input type="checkbox"/>	<input type="checkbox"/>				

Columns Constraints Foreign Keys References Triggers Indexes Partitions Statistics

6210Lab Degree Department Major Student **StudentDegreeMajor**

MySQL 8+ - localhost Databases 6210Lab Tables StudentDegreeMajor

Properties Data ER Diagram

Table Name: StudentDegreeMajor

Engine: InnoDB

Auto Increment: 0

Charset: utf8mb4

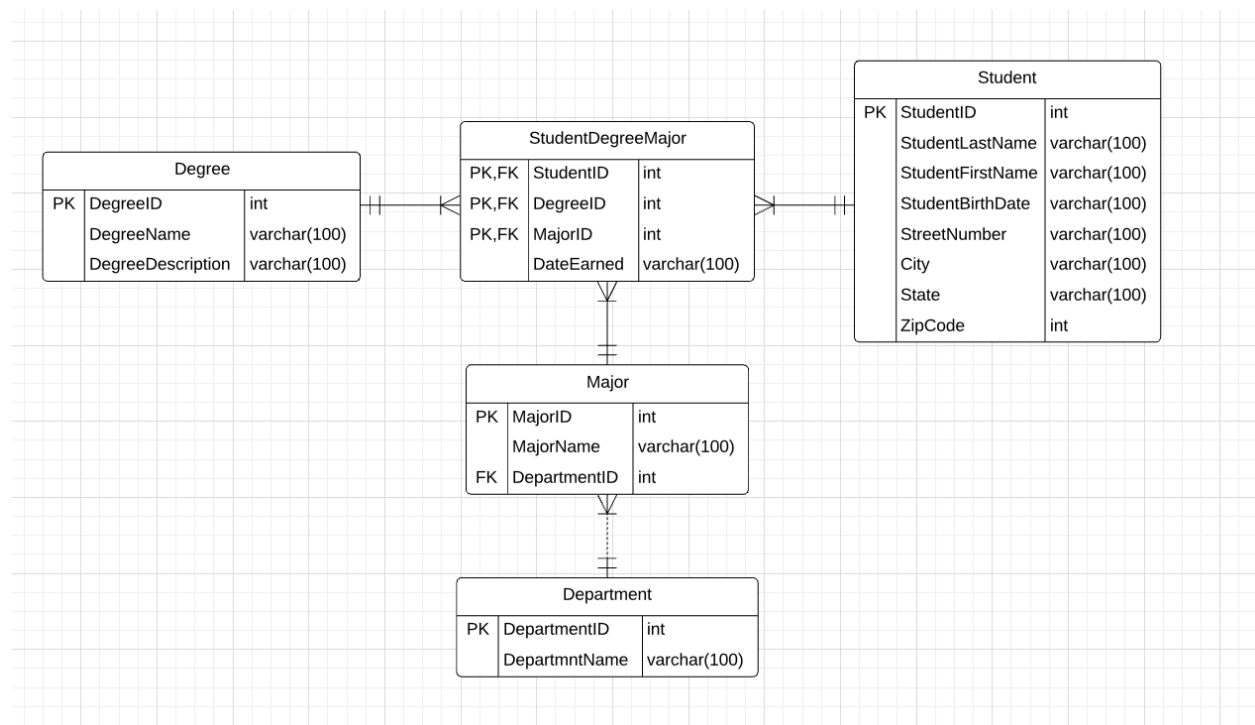
Collation: utf8mb4_0900_ai_ci

Description:

Column Name	#	Data Type	Not Null	Auto Increment	Key	Default	Extra	Exp
123 StudentID	1	int(11)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	PRI			
123 DegreeID	2	int(11)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	PRI			
123 MajorID	3	int(11)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	PRI			
ABC DateEarned	4	varchar(100)	<input type="checkbox"/>	<input type="checkbox"/>				

Columns Constraints Foreign Keys References Triggers Indexes Partitions Statistics DDL Virtual

Here is the ERD(the entities are created as followed):



Part 2

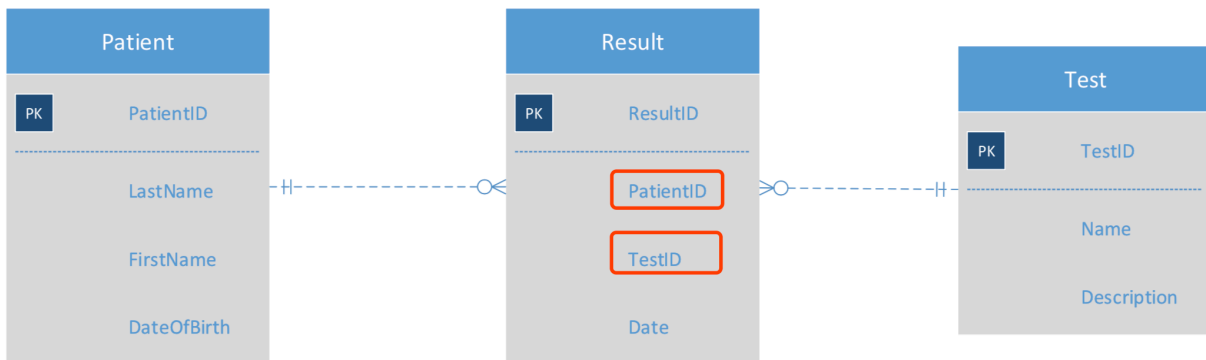
In the Result entity, the PatientID and TestID should be set to foreign keys, corresponding to the Patient entity and Test entity respectively. And both of them should be constrained to not-null.

In this part, the operation is to replace the composite primary key in the Result entity with the surrogate primary key. In the process of replacement, we must ensure that the original business roles are unchanged. To ensure that the business role does not change, must allow the following three points:

1. PatientID and TestID must be mandatory attributes, so it must be not-null.
2. Create an index to ensure the combination of PatientID and TestID is unique. In this place, the original composite primary key is replaced with ResultID, which is a surrogate primary key.
3. Set up the referential integrity. Make sure when PatientID and TestID are valid when they are entered and related parent entities have a correct form.

PatientID and TestID should be the same data type as the Primary Keys in Patient entity and Test Entity.

In summary, in the Result entity, the PatientID and TestID should be treated as foreign keys, corresponding to the Patient entity and the Test entity. This ensures that the relationship between the result entity and the patient entity and the test entity is constant - they can provide the correct response at the same time when doing anything.



set PatientID and TestID as FK

Part 3 (2 points)

Here are the 12 documents I created

```
_id: ObjectId("5d8aa2061c9d440000a9a3e1")
CustomerID: 11005
SalesOrderID: 43704
OrderValue: 3729
TotalQuantityInOrder: 1
```

```
_id: ObjectId("5d8aa2d61c9d440000a9a3e5")
CustomerID: 11005
SalesOrderID: 51612
OrderValue: 2610
TotalQuantityInOrder: 4
```

_id: ObjectId("5d8aa2fa1c9d440000a9a3e6")
CustomerID: 11005
SalesOrderID: 57361
OrderValue: 2634
TotalQuantityInOrder: 1

_id: ObjectId("5d8aa3121c9d440000a9a3e7")
CustomerID: 11006
SalesOrderID: 43819
OrderValue: 3757
TotalQuantityInOrder: 1

_id: ObjectId("5d8aa32b1c9d440000a9a3e8")
CustomerID: 11006
SalesOrderID: 51198
OrderValue: 2580
TotalQuantityInOrder: 3

_id: ObjectId("5d8aa3401c9d440000a9a3e9")
CustomerID: 11006
SalesOrderID: 58007
OrderValue: 2634
TotalQuantityInOrder: 1

_id: ObjectId("5d8aa3581c9d440000a9a3ea")
CustomerID: 11007
SalesOrderID: 43743
OrderValue: 3757
TotalQuantityInOrder: 1

_id: ObjectId("5d8aa36d1c9d440000a9a3eb")
CustomerID: 11007
SalesOrderID: 51581
OrderValue: 2643
TotalQuantityInOrder: 5

_id: ObjectId("5d8aa3871c9d440000a9a3ec")
CustomerID: 11007
SalesOrderID: 54705
OrderValue: 2673
TotalQuantityInOrder: 2

_id: ObjectId("5d8aa39f1c9d440000a9a3ed")
CustomerID: 11008
SalesOrderID: 43826
OrderValue: 3729
TotalQuantityInOrder: 1

_id: ObjectId("5d8aa3b51c9d440000a9a3ee")
CustomerID: 11008
SalesOrderID: 51282
OrderValue: 2555
TotalQuantityInOrder: 4

_id: ObjectId("5d8aa3c81c9d440000a9a3ef")
CustomerID: 11008
SalesOrderID: 53765
OrderValue: 2673
TotalQuantityInOrder: 2

Here is the pipeline

The screenshot shows the MongoDB Compass interface for the ShoppingCartDB.ShoppingCart collection. The 'Aggregations' tab is active, displaying a pipeline with a single \$group stage. The preview shows documents grouped by CustomerID, with fields like _id, CustomerID, SalesOrderID, OrderValue, and TotalQuantityInOrder.

Here is the code

Group by CustomerID and sum the OrderValue & TotalQuantityInOrder

The screenshot shows the MongoDB Compass interface with the aggregation pipeline code for the \$group stage. The code is as follows:

```
1 /**
2  * _id - The id of the group.
3  * field1 - The first field name.
4  */
5 {
6   _id: "$CustomerID",
7   totalPurchaseValue: {
8     $sum: "$OrderValue"
9   },
10  totalPurchaseQuantity: {
11    $sum: "$TotalQuantityInOrder"
12  }
13 }
```

Here are the results:

Customer ID	Total purchase value	Total purchase quantity
<div><div><div>_id: 11005 totalPurchaseValue: 8973 totalPurchaseQuantity: 6</div></div></div>	8973	6
<div><div><div>_id: 11006 totalPurchaseValue: 8971 totalPurchaseQuantity: 5</div></div></div>	8971	5
<div><div><div>_id: 11007 totalPurchaseValue: 9073 totalPurchaseQuantity: 8</div></div></div>	9073	8
<div><div><div>_id: 11008 totalPurchaseValue: 8957 totalPurchaseQuantity: 7</div></div></div>	8957	7