

ACIT 1630 - Relational Database Design and SQL

More Relationships in MySQL Server

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Introduction:

The goal of this document is to serve as a walkthrough for creating Many-to-Many and Unary relationships in MySQL Server.

Remember that Many-to-Many Relationships are best implemented as two Many-to-One relationships. There is also a composite entity that serves as an intermediate table between the 2 entities (tables). The relationship will implement is the Person - Skill relationship from the previous ERD exercise.

We will also be creating unary relationship between an Employee and their boss (which is also an Employee).

Step 1:

Open MySQL Workbench

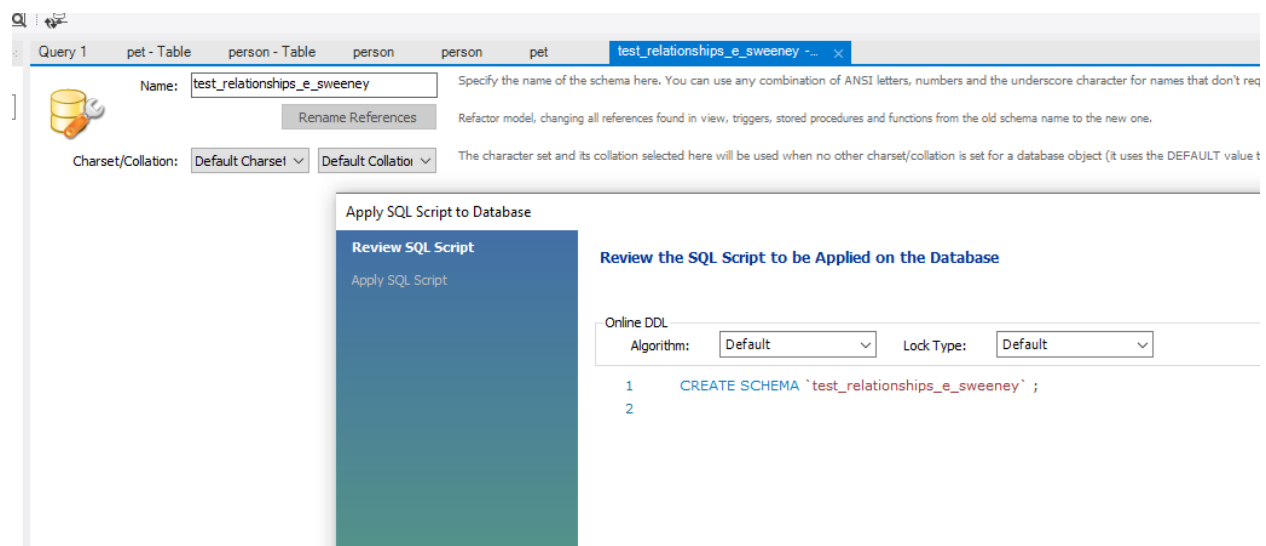
Step 2:

Create a new database in the following format:

Test_Relationships_ + **Your First Initial** + _ + **Your Last Name**

As an example, for me I would create the database as:

Test_Relationships_**E_Sweeney**

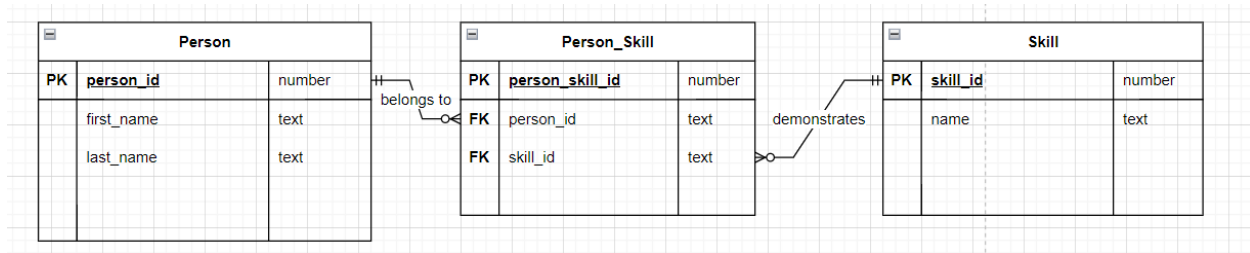


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Step 3:

Using your ERD as a design, implement the Person, Person_Skill and Skill tables.



Add the appropriate primary keys, foreign keys, required attributes (Allow Null = No), optional attributes (Allow Null = Yes).

IMPORTANT: Make sure that all your primary keys have the AI (auto increment) field attribute (which we set in the alter table function) so that MySQL will generate index values for you automatically.

Which tables will need to be created first?

Hint: can a foreign key exist before the primary key it refers to?

On your Person_Skill table, add both your foreign keys.

Make sure that person_id in the Person_Skill table matches the person_id in the Person table **and** skill_id in the Person_Skill table matches skill_id in the Skill table.

Table Name: person_skill Schema: test_relationships_e_sweeney Engine: InnoDB

Column Name | Datatype | PK | NN | UQ | B | UN | ZF | AI | G | Default/Expression

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
person_skill_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
person_id	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
skill_id	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
person_skill_unique	FLOAT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	"person_id" + (1 / "skill_id")...

Column Name: person_skill_unique Data Type: FLOAT Expression: "person_id" + (1 / "skill_id")

Storage: ☒ Virtual ☐ Stored

☐ Primary Key ☐ Not Null ☐ Unique

☐ Binary ☐ Unsigned ☐ Zero Fill

☐ Auto Increment ☒ Generated

Once you are done adding your tables, remember that we wanted to ensure that a person couldn't have the same skill twice?

Let's create a new auto-generated field and add a constraint that it must be unique, to ensure that the combination of the person_id and skill_id columns cannot be repeated.

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There are many ways to achieve this, probably the easiest in MySQL is to create a float (data type) field that, in addition to the skill_id and person_id foreign keys, create a single field that is a combination of both foreign keys, so it takes person_id as its whole number portion of the float number, and the skill_id as its decimal portion of the number.

The screenshot shows the MySQL Workbench Table Designer for a table named 'person_skill' in the 'test_relationships_e_sweeney' schema. The table has four columns: 'person_skill_id' (INT, PK, NN, AI), 'person_id' (INT, NN), 'skill_id' (INT, NN), and 'person_skill_unique' (FLOAT, NN). The 'person_skill_unique' column is highlighted, and its properties are shown in the right-hand pane. The 'Data Type' is 'FLOAT', and the 'Expression' is 'person_id + (1 / skill_id)'. The 'Storage' options are 'Virtual' (selected), 'Stored', 'Primary Key', 'Not Null', 'Unique', 'Binary', 'Unsigned', 'Zero Fill', and 'Generated' (checked). Two yellow arrows point from the 'person_skill_unique' column in the table list to the 'Data Type' and 'Expression' fields in the properties pane.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
person_skill_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
person_id	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
skill_id	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
person_skill_unique	FLOAT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	person_id + (1 / skill_id)

The SQL code should look like this:

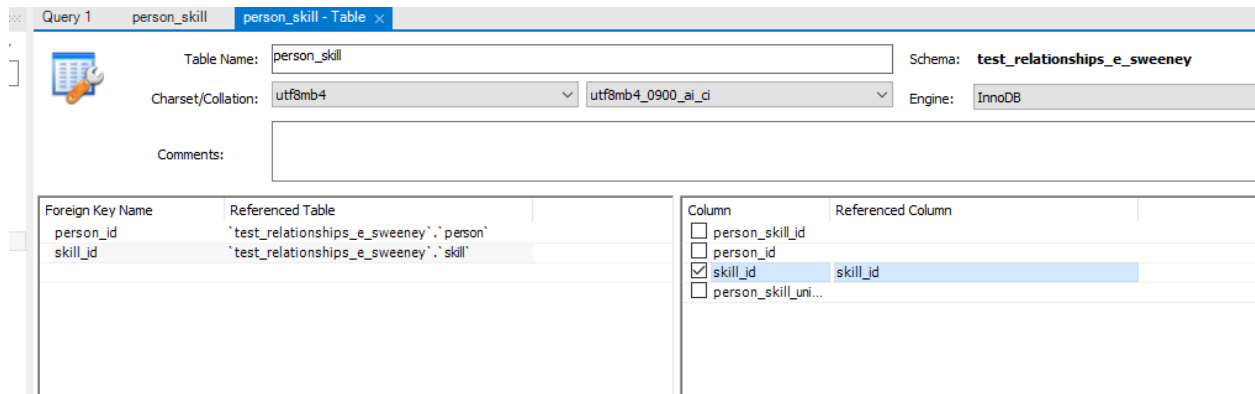
The screenshot shows the MySQL Workbench SQL Editor with the SQL script for creating the 'person_skill' table. The script is as follows:

```
1 CREATE TABLE `test_relationships_e_sweeney`.`person_skill` (  
2   `person_skill_id` INT NOT NULL AUTO_INCREMENT,  
3   `person_id` INT NOT NULL,  
4   `skill_id` INT NOT NULL,  
5   `person_skill_unique` FLOAT GENERATED ALWAYS AS (`person_id` + (1 / `skill_id`)),  
6   PRIMARY KEY (`person_skill_id`));  
7
```

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Next add the two foreign keys for skill and person



Query 1 person_skill person_skill - Table

Table Name: person_skill Schema: test_relationships_e_sweeney

Charset/Collation: utf8mb4 utf8mb4_0900_ai_ci Engine: InnoDB

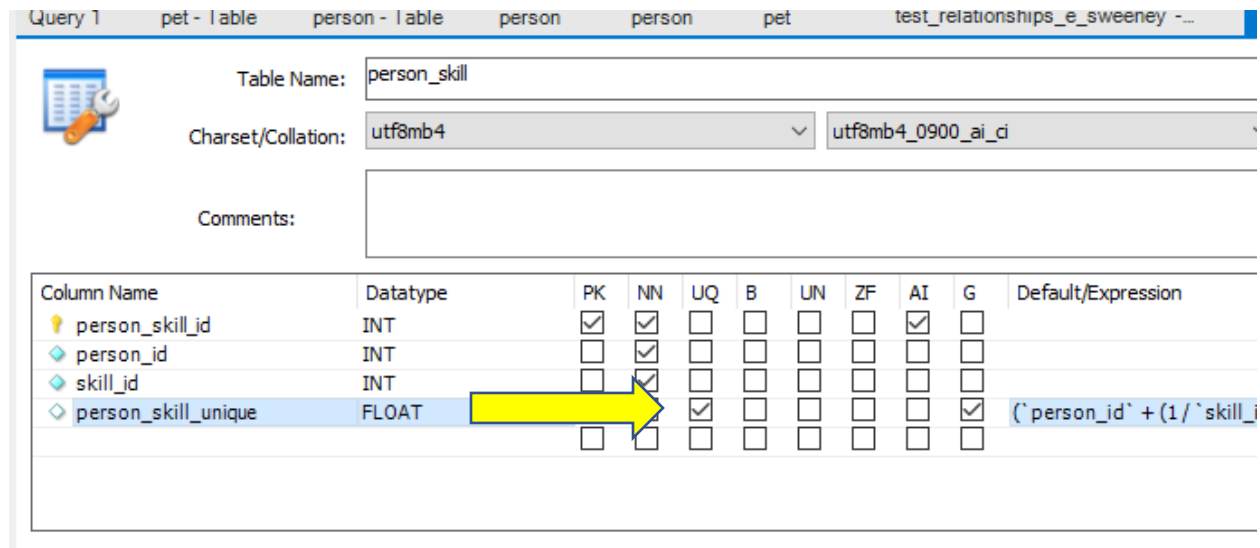
Comments:

Foreign Key Name	Referenced Table
person_id	test_relationships_e_sweeney`.`person`
skill_id	test_relationships_e_sweeney`.`skill`

Column	Referenced Column
<input type="checkbox"/> person_skill_id	
<input type="checkbox"/> person_id	
<input checked="" type="checkbox"/> skill_id	skill_id
<input type="checkbox"/> person_skill_uni...	

Click Apply

Let's add the constraint for the skill name to be unique so that no 2 skills have the same name.



Query 1 pet - Table person - Table person person pet test_relationships_e_sweeney - ...

Table Name: person_skill

Charset/Collation: utf8mb4 utf8mb4_0900_ai_ci

Comments:

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
person_skill_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
person_id	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
skill_id	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
person_skill_unique	FLOAT	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	(`person_id` + (1 / `skill_id`))

This should prevent adding "Golf" (or any other skill) twice as a skill.

Step 4:

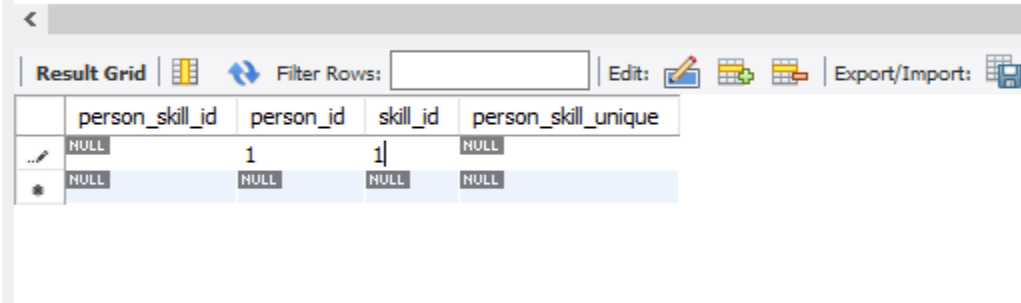
Adding our skilled people.

What order do we need to add our data to our tables? If our database is doing its job, it should prevent us from adding to our person_skill table data before we have both people and skills data.

Let's test this.

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Using the table data editor, accessed by hovering over the table name in the navigator window, edit the person_skill table data and add a row with person_id = 1 and skill_id = 1.



	person_skill_id	person_id	skill_id	person_skill_unique
	NULL	1	1	NULL
	NULL	NULL	NULL	NULL

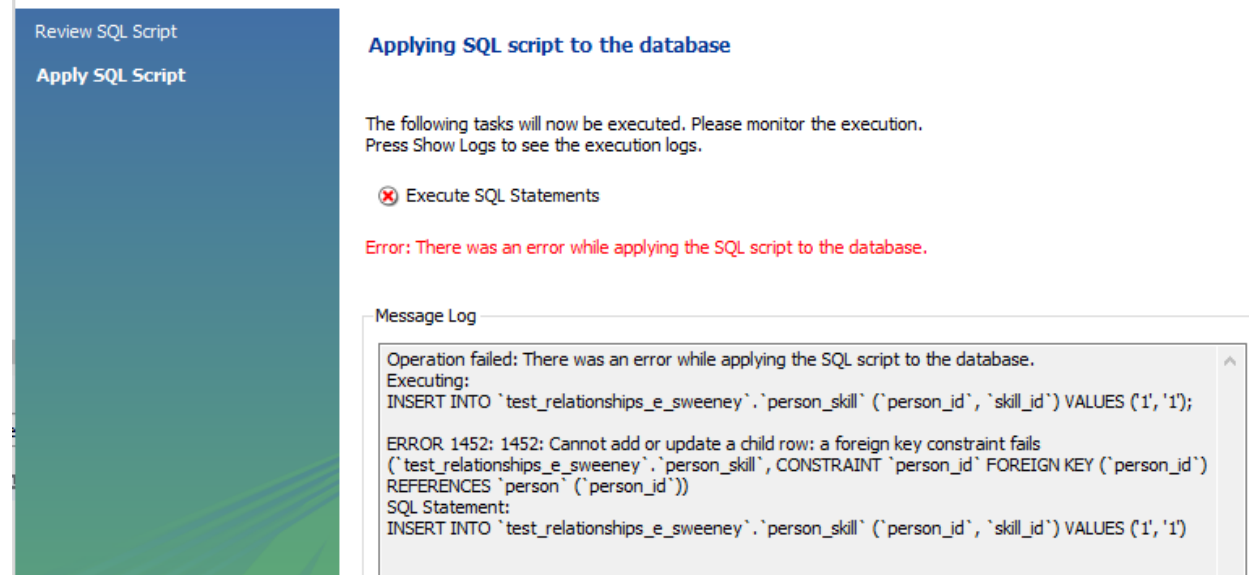
Click Apply.

Submit your screenshot of you attempting to adding to person_skill before adding to the person or skill tables.

Filename: **05_data_in_wrong_order.jpg**

Apply SQL Script to Database

Submit



Review SQL Script

Apply SQL Script

Applying SQL script to the database

The following tasks will now be executed. Please monitor the execution.
Press Show Logs to see the execution logs.

Execute SQL Statements

Error: There was an error while applying the SQL script to the database.

Message Log

```
Operation failed: There was an error while applying the SQL script to the database.  
Executing:  
INSERT INTO `test_relationships_e_sweeney`.`person_skill` (`person_id`, `skill_id`) VALUES ('1', '1');  
  
ERROR 1452: 1452: Cannot add or update a child row: a foreign key constraint fails  
(`test_relationships_e_sweeney`.`person_skill`, CONSTRAINT `person_id` FOREIGN KEY (`person_id`)  
REFERENCES `person` (`person_id`))  
SQL Statement:  
INSERT INTO `test_relationships_e_sweeney`.`person_skill` (`person_id`, `skill_id`) VALUES ('1', '1')
```

Add the following data, this time in the correct order.

Person	Skills
Mario Ben Turner	Carpentry, Metalwork, Automotive Repair, Fishing, Golf
Jessica Colleen Ingram	Painting, Rock Climbing, Rollerblading, Skiing
Zoila Jones	Cooking, Reading, Computer Programming, Golf
Craig Oyer	Hockey, Golf, Automotive Repair
Robert Larry Pickard	Rock Climbing, Computer Programming, Salsa Dancing

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IMPORTANT! Pay close attention to what number gets assigned to each person and skill for your primary key columns, person_id and skill_id, so that you can properly link them in the person_skill table.

Submit your screenshot of your person table data.

Filename: **06_person_data.jpg**

Submit

person_id	first_name	middle_name	last_name
	Mario	Ben	Turner
	Jessica	Colleen	Ingram
	Zoila	NULL	Jones
	Craig	NULL	Oyer
	Robert	Larry	Pickard
▶*	NULL	NULL	NULL

Submit your screenshot of your skill table data.

Filename: **07_skill_data.jpg**

Submit

skill_id	name
	Carpentry
	Metalwork
	Automotive Re...
	Fishing
	Golf
	Painting
	Rock Climbing
	Rollerblading
	Skiing
	Cooking
	Reading
	Computer Prog...
	Hockey
	Salsa Dancing
▶*	NULL

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Submit your screenshot of your person_skill table data.

Filename: **08_person_skill_data.jpg**

Submit

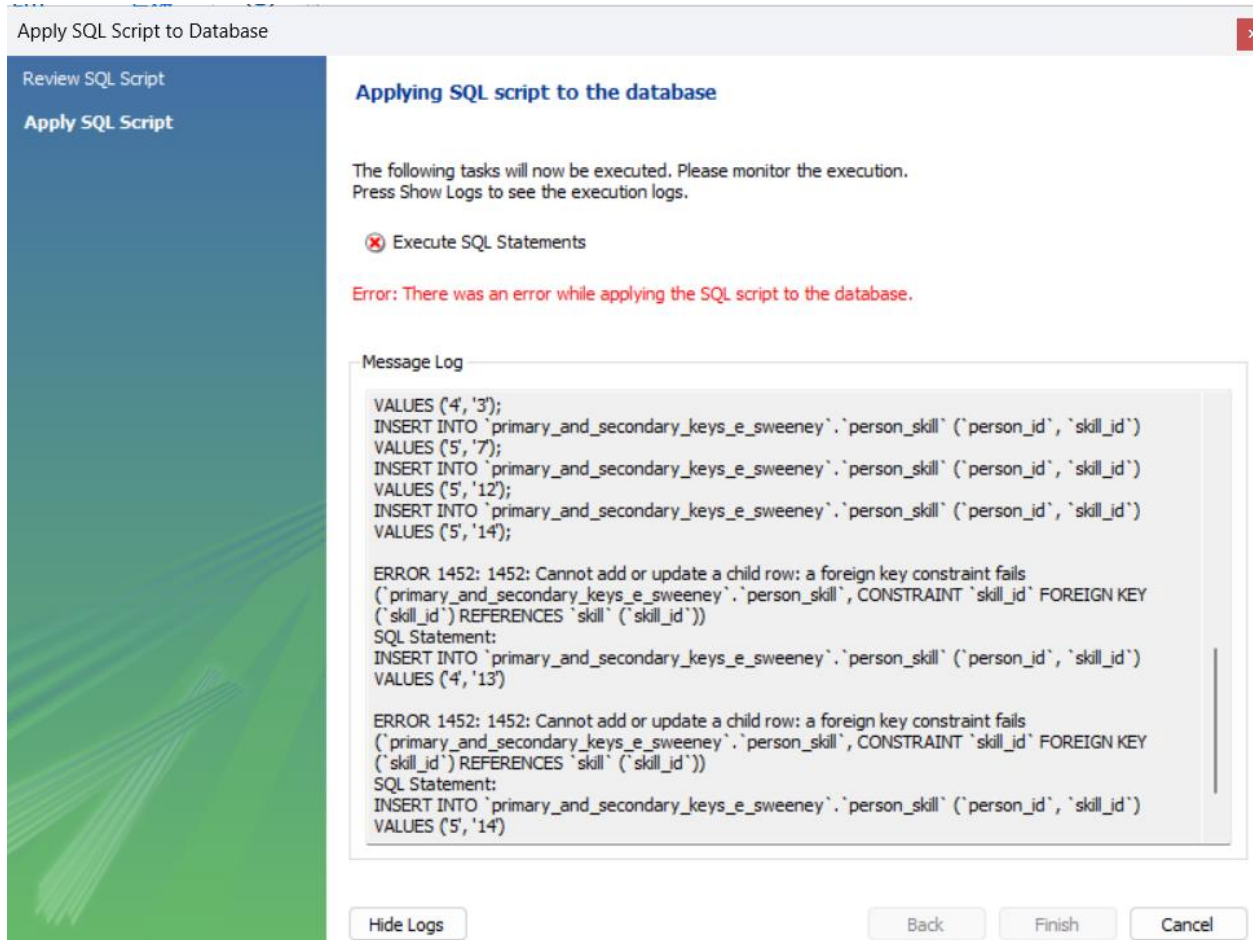
	person_skill_id	person_id	skill_id
		1	1
		1	2
		1	3
		1	4
		1	5
		2	6
		2	7
		2	8
		2	9
		3	10
		3	11
		3	12
		3	5
		4	13
		4	5
		4	3
		5	7
		5	12
		5	14
▶*	NULL	NULL	NULL

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Let's try to add Mario's Carpentry skill a second time and confirm that our unique constraint is working.

Submit your error image:



Awesome! It failed like it should. This should help us accidentally add the same skill to the same person twice!

That's it! You're done!