

1. Write a script that adds an index to the my_guitar_shop database for the zip code field in the Customers table.

The screenshot shows the MySQL Workbench interface. The SQL Editor at the top contains the following script:

```
1 • USE my_guitar_shop;
2 • CREATE INDEX idx_zip_code ON addresses(zip_code);
3 • SHOW INDEX FROM addresses;
```

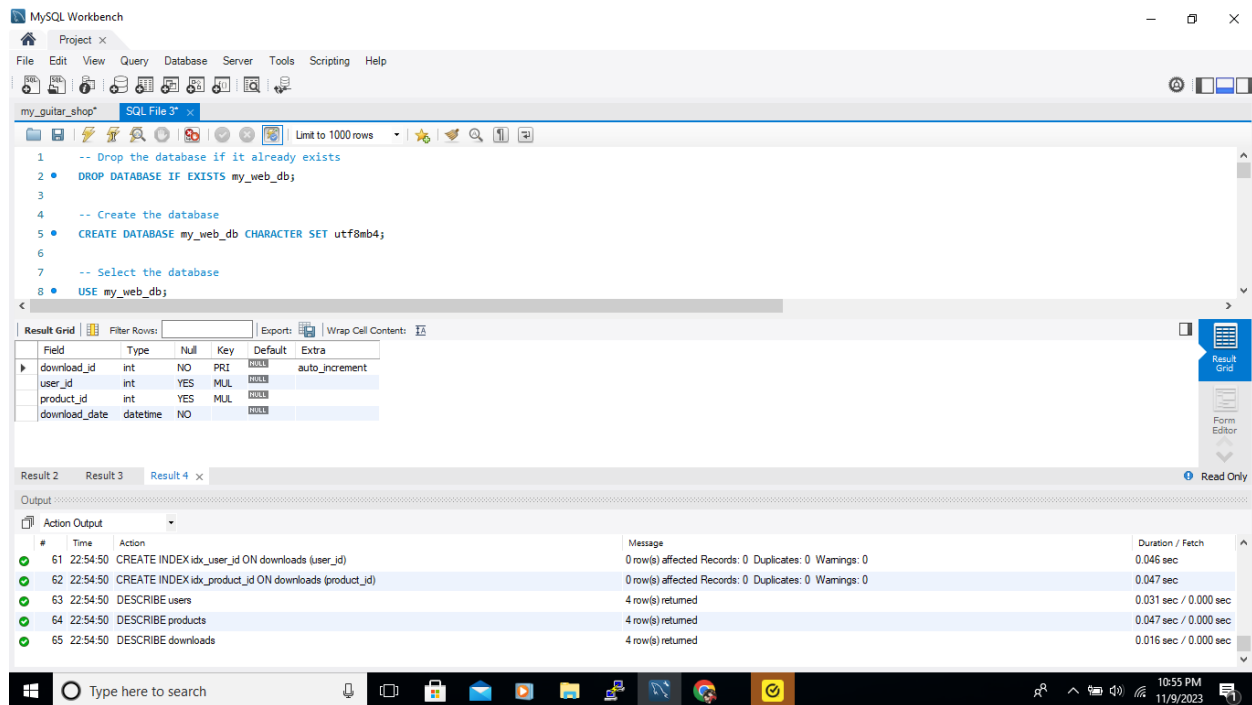
Below the editor, the 'Result Grid' displays the output of the `SHOW INDEX FROM addresses;` command. It shows three indexes on the `addresses` table:

Table	Non_unique	Key_name	Seq_in_index	Column_name	Collation	Cardinality	Sub_part	Packed	Null	Index_type	Comment	Index_comment	Visible	Expression
addresses	0	PRIMARY	1	address_id	A	12				BTREE			YES	
addresses	1	addresses_fk_customers	1	customer_id	A	8				BTREE			YES	
addresses	1	idx_zip_code	1	zip_code	A	11				BTREE			YES	

The 'Output' pane at the bottom shows the execution log:

#	Time	Action	Message	Duration / Fetch
17	22:38:37	INSERT INTO administrators (admin_id, email_address, password, first_name, last_name) VALUES (1, 'admin@my...'	3 row(s) affected Records: 3 Duplicates: 0 Warnings: 0	0.016 sec
18	22:38:37	GRANT SELECT, INSERT, UPDATE, DELETE ON * TO mgs_user@localhost IDENTIFIED BY 'pa55word'	Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL server...	0.031 sec
19	22:38:40	USE my_guitar_shop	0 row(s) affected	0.016 sec
20	22:38:40	CREATE INDEX idx_zip_code ON addresses(zip_code)	0 row(s) affected Records: 0 Duplicates: 0 Warnings: 0	0.094 sec
21	22:38:40	SHOW INDEX FROM addresses	3 row(s) returned	0.031 sec / 0.000 sec

2. Write a script that implements the following design in a database named my_web_db: In the Downloads table, the user_id and product_id columns are the foreign keys. Include a statement to drop the database if it already exists. Include statements to create and select the database. Include any indexes that you think are necessary. Specify the utf8mb4 character set for all tables. Specify the InnoDB storage engine for all tables



3. Write a script that adds rows to the database that you created in exercise 2. Add two rows to the Users and Products tables. Add three rows to the Downloads table: one row for user 1 and product 2; one row for user 2 and product 1; and one row for user 2 and product 2. Use the NOW function to insert the current date and time into the download_date column. Write a SELECT statement that joins the three tables and retrieves the data from these tables like this Sort the result set by the email address in descending sequence and the product name in ascending sequence.

MySQL Workbench

Project x

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my_guitar_shop SQL File 3*

```

1 -- Add rows to the Users table
2 • INSERT INTO users (username, password, email) VALUES
3   ('user1', 'password1', 'user1@example.com'),
4   ('user2', 'password2', 'user2@example.com');
5
6 -- Add rows to the Products table
7 • INSERT INTO products (product_name, description, price) VALUES
8   ('Product 1', 'Description for Product 1', 19.99),

```

Result Grid

user_id	username	email	product_id	product_name	description	price	download_date
2	user2	user2@example.com	1	Product 1	Description for Product 1	19.99	2023-11-10 03:59:15
2	user2	user2@example.com	2	Product 2	Description for Product 2	29.99	2023-11-10 03:59:15
1	user1	user1@example.com	2	Product 2	Description for Product 2	29.99	2023-11-10 03:59:15

Result 5 x

Output

Action Output

#	Time	Action	Message	Duration / Fetch
65	22:54:50	DESCRIBE downloads	4 row(s) returned	0.016 sec / 0.000 sec
66	22:59:33	INSERT INTO users (username, password, email) VALUES ('user1', 'password1', 'user1@example.com'), ('user2', 'password2', 'user2@example.com');	2 row(s) affected Records: 2 Duplicates: 0 Warnings: 0	0.078 sec
67	22:59:33	INSERT INTO products (product_name, description, price) VALUES ('Product 1', 'Description for Product 1', 19.99);	2 row(s) affected Records: 2 Duplicates: 0 Warnings: 0	0.016 sec
68	22:59:33	INSERT INTO downloads (user_id, product_id, download_date) VALUES (1, 2, NOW()), (2, 1, NOW()), (2, 2, NOW());	3 row(s) affected Records: 3 Duplicates: 0 Warnings: 0	0.016 sec
69	22:59:34	SELECT u.user_id, u.username, u.email, p.product_id, p.product_name, p.description, p.price, d.download_date FROM users u JOIN products p ON u.user_id = d.user_id JOIN downloads d ON u.user_id = d.user_id JOIN products p ON d.product_id = p.product_id ORDER BY u.email DESC, p.product_name ASC LIMIT 0, 1000;	3 row(s) returned	0.016 sec / 0.000 sec

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4. Write an ALTER TABLE statement that adds two new columns to the Products table created in exercise 2. Add one column for product price that provides for three digits to the left of the decimal point and two to the right. This column should have a default value of 9.99. Add one column for the date and time that the product was added to the database.

MySQL Workbench

Project x

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my_guitar_shop SQL File 3*

```

1 -- Add columns to the Products table
2 • ALTER TABLE products
3   ADD COLUMN product_price DECIMAL(5,2) DEFAULT 9.99,
4   ADD COLUMN date_added DATETIME;
5 -- Select data from the Products table
6 • SELECT * FROM products;
7

```

Result Grid

product_id	product_name	description	price	product_price	date_added
1	Product 1	Description for Product 1	19.99	9.99	NULL
2	Product 2	Description for Product 2	29.99	9.99	NULL
3	Product A	Description for Product A	50.00	9.99	NULL
4	Product B	Description for Product B	75.00	9.99	NULL
5	Product A	Description for Product A	50.00	9.99	NULL
6	Product B	Description for Product B	75.00	9.99	NULL
7	Product A	Description for Product A	50.00	9.99	NULL
8	Product B	Description for Product B	75.00	9.99	NULL

products 9 x

Output

Action Output

#	Time	Action	Message	Duration / Fetch
138	23:26:31	SELECT * FROM downloads LIMIT 0, 1000	9 row(s) returned	0.015 sec / 0.000 sec
139	23:26:31	SELECT u.email, p.product_name, d.download_date FROM users u JOIN downloads d ON u.user_id = d.user_id JOIN products p ON d.product_id = p.product_id ORDER BY u.email DESC, p.product_name ASC LIMIT 0, 1000;	9 row(s) returned	0.016 sec / 0.000 sec
140	23:26:31	ALTER TABLE products ADD COLUMN price DECIMAL(5,2) DEFAULT 9.99, ADD COLUMN date_added DATETIME	Error Code: 1064	0.016 sec
141	23:27:59	ALTER TABLE products ADD COLUMN product_price DECIMAL(5,2) DEFAULT 9.99, ADD COLUMN date_added DATETIME	0 row(s) affected	0.047 sec
142	23:27:59	SELECT * FROM products LIMIT 0, 1000	8 row(s) returned	0.015 sec / 0.000 sec

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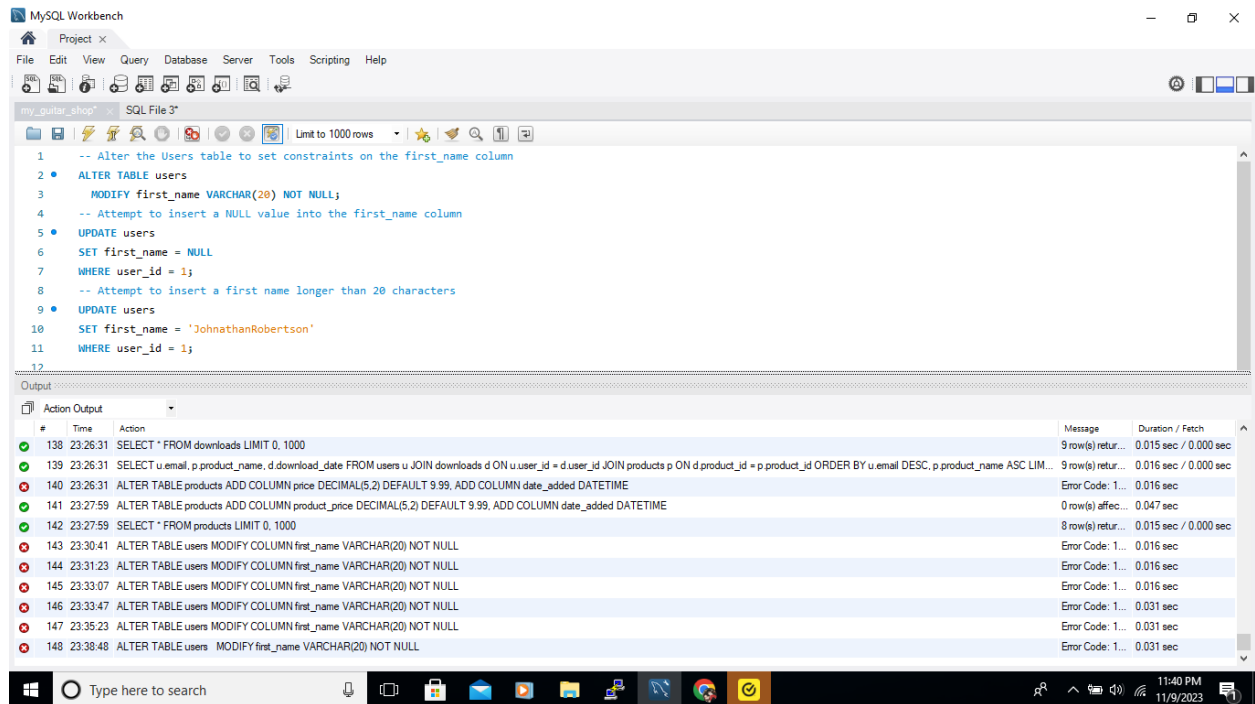
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5. Write an ALTER TABLE statement that modifies the Users table created in exercise

2 so the first_name column cannot store NULL values and can store a maximum of 20 characters.

Code an UPDATE statement that attempts to insert a NULL value into this column. It should fail due to the NOT NULL constraint.

Code another UPDATE statement that attempts to insert a first name that's longer than 20 characters. It should fail due to the length of the column.



The screenshot shows the MySQL Workbench interface. The SQL editor contains the following queries:

```
1 -- Alter the Users table to set constraints on the first_name column
2 ALTER TABLE users
3   MODIFY first_name VARCHAR(20) NOT NULL;
4 -- Attempt to insert a NULL value into the first_name column
5 UPDATE users
6   SET first_name = NULL
7   WHERE user_id = 1;
8 -- Attempt to insert a first name longer than 20 characters
9 UPDATE users
10  SET first_name = 'JohnathanRobertson'
11  WHERE user_id = 1;
```

The Output window shows the execution results:

#	Time	Action	Message	Duration / Fetch
138	23:26:31	SELECT * FROM downloads LIMIT 0, 1000	9 row(s) retur...	0.015 sec / 0.000 sec
139	23:26:31	SELECT u.email, p.product_name, d.download_date FROM users u JOIN downloads d ON u.user_id = d.user_id JOIN products p ON d.product_id = p.product_id ORDER BY u.email DESC, p.product_name ASC LIM...	9 row(s) retur...	0.016 sec / 0.000 sec
140	23:26:31	ALTER TABLE products ADD COLUMN price DECIMAL(5,2) DEFAULT 9.99, ADD COLUMN date_added DATETIME	Error Code: 1...	0.016 sec
141	23:27:59	ALTER TABLE products ADD COLUMN product_price DECIMAL(5,2) DEFAULT 9.99, ADD COLUMN date_added DATETIME	0 row(s) affec...	0.047 sec
142	23:27:59	SELECT * FROM products LIMIT 0, 1000	8 row(s) retur...	0.015 sec / 0.000 sec
143	23:30:41	ALTER TABLE users MODIFY COLUMN first_name VARCHAR(20) NOT NULL	Error Code: 1...	0.016 sec
144	23:31:23	ALTER TABLE users MODIFY COLUMN first_name VARCHAR(20) NOT NULL	Error Code: 1...	0.016 sec
145	23:33:07	ALTER TABLE users MODIFY COLUMN first_name VARCHAR(20) NOT NULL	Error Code: 1...	0.016 sec
146	23:33:47	ALTER TABLE users MODIFY COLUMN first_name VARCHAR(20) NOT NULL	Error Code: 1...	0.031 sec
147	23:35:23	ALTER TABLE users MODIFY COLUMN first_name VARCHAR(20) NOT NULL	Error Code: 1...	0.031 sec
148	23:38:48	ALTER TABLE users MODIFY first_name VARCHAR(20) NOT NULL	Error Code: 1...	0.031 sec