

A Perfect Score:

<http://flip2.engr.oregonstate.edu:15939/>

Group 170

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CS 340 Introduction to Databases

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Executive Summary:

A Perfect Score from the beginning was designed to represent a musical print shop for various musical and opera scores, but has undergone various changes since its inception due to helpful feedback from peers and faculty. The creation of this database began with implementation of the entities and the SQL code to both set the database up and provide CRUD implementation via a Data Manipulation SQL file. A front end user interface was the final implementation.

Major Updates:

- A Composer Table was created as an alternative to a composer being an attribute of a Score Table entity. This helped to prevent any redundancies when multiple scores were made by the same composer and aided in locating those multiple scores made by a single composer.
- Intersection tables Order Scores and Composer Scores were implemented to break up the M:N relationships between Orders/Scores and Composers/Scores respectively.
- The “Score Type” Attribute was added to The Order Scores intersection table in order to calculate the price of an order for a score based on the type of score ordered: hard copy, paperback, or digital download.
- The price attribute was removed from the Order Scores intersection table to prevent any attribute dependencies on foreign keys. Before this change, the attribute “Score Type” directly affected the price attribute, since “Score Type” has three options and each option has a different price.
- The “Total” attribute in the Orders table was changed to calculate the total based on “Score Type” in Order Scores in order to rectify the removal of the price attribute in Order Scores.
- Predetermined primary keys were removed from all SQL table initializations and were instead all set to auto increment.
- Cascade deletion was implemented in Orders, Order Scores, and Composer Scores tables in order to maintain cohesion between the other tables when entities were deleted from one table. Before this, each table would have to individually be updated once an entity was deleted from any of these tables depending on their foreign keys.
- The Customer ID attribute was changed in the Orders table to allow for Null values. This now allows for orders to remain in the Orders table without a designated customer ID, should the event happen where a customer is deleted from the Customers table.

Project Outline:

Musical print shop, A Perfect Score, makes 30,000 sales a year to theater companies nationally, producing top quality musical and opera scores. The only problem is a business run by musicians can, famously, get disorganized pretty quickly! Customers have been asking to find information on scores based on their favorite composers, employees have been wanting to see what scores have the best sales, and higher ups have been wanting to see who their general clientele are. This is where we come in! A database will record the scores they sell, their composers, their various score types (hard copy, paperback, and digital), and their corresponding prices based on format. A Perfect Score will also record their orders and customers to visualize and analyze which types of customers tend to prefer A Perfect Score for their sheet music related needs.

Depending on their need, customers might be shopping by composer, so recording the composer as their own entity is necessary. A production will typically buy one type of score for the whole cast for ease of communication in making musical cuts, so distinction of score type will be needed. The database will also record their sales so A Perfect Score can know which scores are the most in demand. The user can search for scores associated with a specific composer as well as searching for instances of a particular score being ordered.

Database Outline:

- Customers - Customers who will place orders and have their information recorded in the system for potential future orders.
 - customerID (int, incremented, unique, NOT NULL) unique identifier for each customer. **PK**
 - firstName (VARCHAR (45), NOT NULL)
 - lastName (VARCHAR (45), NOT NULL)
 - organization (VARCHAR (45))
 - email (VARCHAR (250, NOT NULL))
 - address (VARCHAR (250))
 - Relationship:
 - 1:M relationship between Customers and Orders with the attribute customerID being a nullable FK in Orders. Each order may have 0 or 1 customer associated, and each customer may be associated with 0 or more orders.

- Orders - Orders to be placed by customers. Each order will have an optional customer associated and a mandatory orderDate and orderTotal associated.
 - orderID (int, incremented, unique, NOT NULL) identifies individual orders **PK**
 - customerID (int, unique, NULL) **FK**
 - orderTotal (Decimal(10, 2), NOT NULL)
 - orderDate: (Date, NOT NULL)
 - Relationships:
 - 1:M between Orders and Order_Scores, where each Order_Scores instance will be associated with one orderID. Order_Scores acts as an intersection table between Orders and Scores.
 - An optional 1:M relationship between Customers and Orders with the attribute customerID being a nullable FK in Orders.
- Order_Scores - Represents an instance of a score being ordered with its scoreType as well as the quantity of that score being ordered. Intersection table between Orders and Scores.
 - orderScoreID (int, incremented, unique, NOT NULL) unique identifier for an instance of ordering a score **PK**
 - scoreID (int, unique, NOT NULL) **FK**
 - quantity (int, NOT NULL)
 - orderID (int, unique, NOT NULL) **FK**
 - scoreType (VARCHAR(10) NOT NULL) represents score format to determine price based on if the score is paperback, hardbound, or digital format.
 - Relationships:
 - 1:M relationship between Scores and Order_Scores, each instance of an Order_Score must include at least one score, while a score

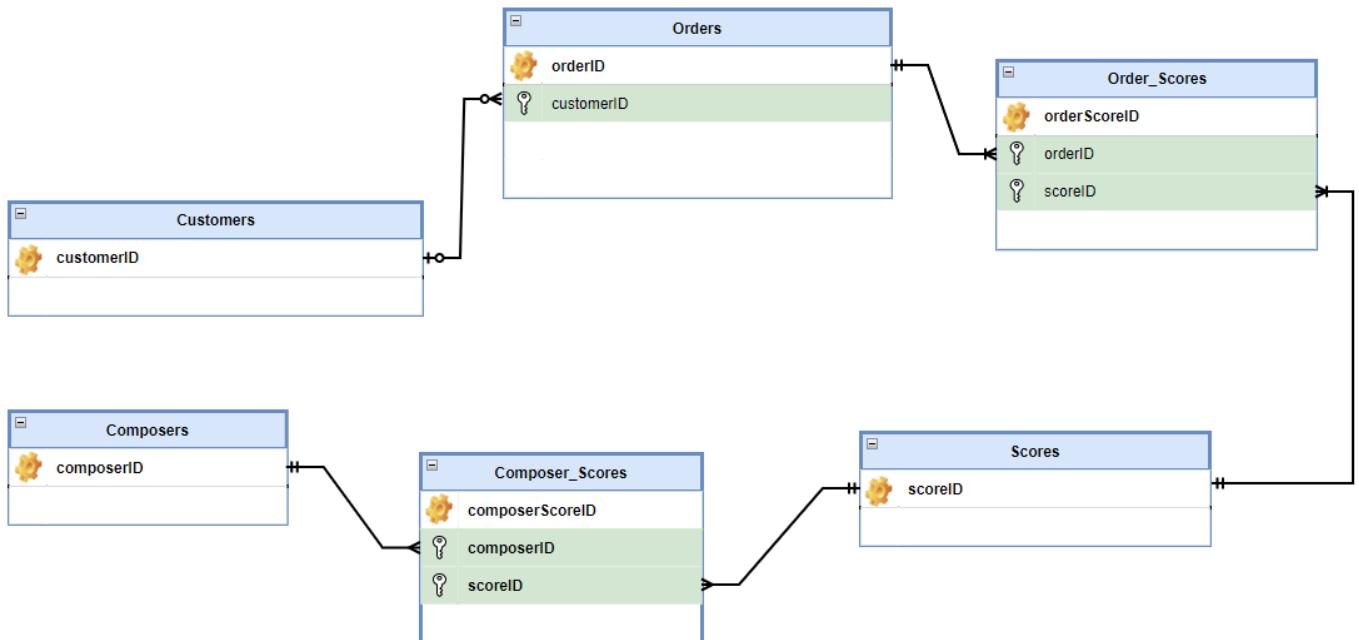
may be in multiple different Order_Scores instances. Scores' scoreID attribute is FK in the Order_Scores table.

- 1:M between Orders and Order_Scores as described above.
Orders' orderID is FK

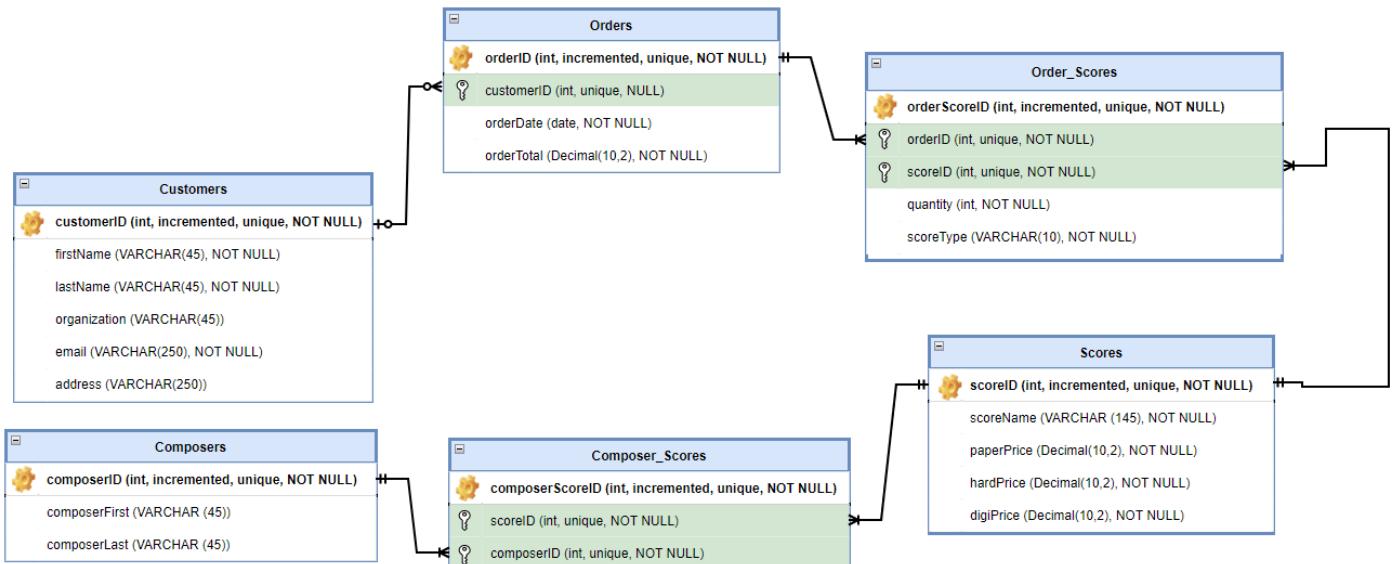
- Scores - represents a musical score that can be added to Order_Scores
 - scoreID (int, incremented, unique, NOT NULL) unique identifier for a score **PK**
 - scoreName (VARCHAR(145), NOT NULL)
 - paperPrice (Decimal(10,2), NOT NULL) price for paperback copy
 - hardPrice (Decimal(10,2), NOT NULL) price for hardcover copy
 - digiPrice (Decimal(10,2), NOT NULL) price for digital copy
 - Relationships:
 - 1:M relationship between Scores and Order_Scores. Order_Scores contains the attribute scoreID as FK.
 - M:M relationship between Scores and Composers with Composer_Scores acting as an intersection table. One instance of Score could have multiple composers and one composer could be related to more than one Score.
- Composers - represents a composer who worked on or wrote a score.
 - composerID (int, incremented, unique, NOT NULL) **PK**
 - composerFirst (VARCHAR (45), NOT NULL)
 - composerLast (VARCHAR (45), NOT NULL)
 - Relationships:
 - M:M between Scores and Composers, Composer_Scores acts as an intersection table. A score may have multiple composers and a composer can have multiple scores they were involved with.

- Composer_Scores - represents an instance of a composer and an associated score, intersection table between Composers and Scores
 - composerScoreID (int, unique, NOT NULL) **PK**
 - composerID (int, NOT NULL) **FK**
 - scoreID (int, NOT NULL) **FK**
 - Relationships:
 - 1:M between Composers and Composer_Score with composerID as a FK referencing Composers
 - 1:M between Scores and Composer_Score with scoreID as a FK referencing Scores

ERD:



Schema:



Sample Data Tables:

Customers:

| customerID | firstName | lastName | organization | email | address |
|------------|-----------|----------|-----------------------|-----------------------|--|
| 1 | Jim | Smith | Jim's Musical Majesty | Jims@hotmail.com | 1103 Godfrey Road, New York, NY, 10029 |
| 2 | Miranda | Caldera | NYU | miracal@NYU.edu | 3880 Farnum Road, New York, NY, 10031 |
| 3 | Bobby | Hill | The Manger Babies | bobbyhill@hotmail.com | 5295 Rainey St, Arlen, TX, 75693 |
| 4 | Elizabeth | Knowles | Houston Grand Opera | LizK@hgo.com | 341 Sam Street, Houston, TX, 72984 |
| 5 | Zach | Joplin | Boston Lyric Theatre | Zjop@blt.com | 1824 Commonwealth Ave, Boston, MA, 00124 |

Orders:

| orderID | customerID | orderDate | orderTotal |
|---------|------------|------------|------------|
| 1 | 2 | 2024-02-05 | 2200.00 |
| 2 | 3 | 2024-02-06 | 875.00 |
| 3 | 1 | 2024-02-07 | 500.00 |
| 4 | NULL | 2024-03-08 | 550.00 |
| 5 | 4 | 2024-03-10 | 3000.00 |

Order_Scores:

| orderScoreID | orderID | scoreID | quantity | scoreType |
|--------------|---------|---------|----------|-----------|
| 1 | 1 | 1 | 40 | hard |
| 2 | 2 | 2 | 25 | paper |
| 3 | 3 | 3 | 50 | digital |
| 4 | 5 | 1 | 100 | paper |

Scores:

| scoreID | scoreName | paperPrice | hardPrice | digiPrice |
|---------|------------------|------------|-----------|-----------|
| 1 | La Traviata | 30.00 | 50.00 | 10.00 |
| 2 | Wicked | 32.00 | 55.00 | 18.00 |
| 3 | Into The Woods | 35.00 | 60.00 | 20.00 |
| 4 | The Last 5 Years | 40.00 | 65.00 | 30.00 |
| 5 | Aida | 25.00 | 45.00 | 9.00 |

Composer_Scores:

| composerScoreID | composerID | scoreID |
|-----------------|------------|---------|
| 1 | 1 | 3 |
| 2 | 2 | 1 |
| 3 | 3 | 2 |
| 4 | 4 | 4 |
| 5 | 2 | 5 |

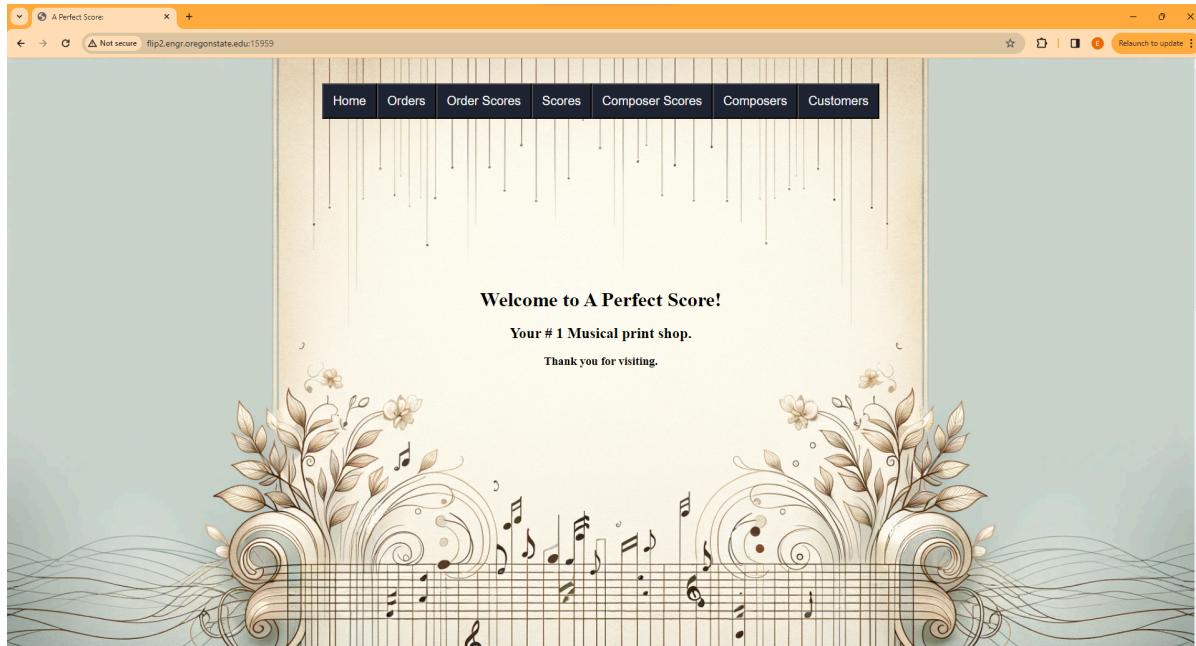
Composers:

| composerID | composerFirst | composerLast |
|------------|---------------|--------------|
| 1 | Stephen | Sondheim |
| 2 | Giuseppe | Verdi |
| 3 | Stephen | Schwartz |
| 4 | Jason | Brown |

Screen Captures:

Home Page:

Figure 1. Home Page with navigation links to all other pages



Orders Page:

Figure 2. Orders page READ/SELECT to display Orders table

The screenshot shows a web browser window for the 'Orders' page at the URL <http://flip2.engr.oregonstate.edu:15959/Orders>. The page includes a navigation bar with links to Home, Orders, Order Scores, Scores, Composer Scores, Composers, and Customers. Below the navigation bar, the word 'Orders:' is displayed above a table showing seven rows of order data. Each row contains columns for Order Number, Customer ID, Order Date, Order Total, and a 'Delete' button. The table data is as follows:

| Order Number: | Customer: | Order Date: | Order Total: | Delete |
|---------------|-----------|---|--------------|-------------------------|
| 1 | 2 | Mon Feb 05 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 2200 | <button>Delete</button> |
| 2 | 3 | Tue Feb 06 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 875 | <button>Delete</button> |
| 3 | 1 | Wed Feb 07 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 500 | <button>Delete</button> |
| 4 | | Sat Mar 09 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 550 | <button>Delete</button> |
| 5 | 4 | Sun Mar 10 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 3000 | <button>Delete</button> |
| 6 | 5 | Tue Mar 12 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 2250 | <button>Delete</button> |
| 7 | 6 | Thu Mar 14 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 300 | <button>Delete</button> |

Below the table, there is a section titled 'Add Order:' containing three input fields: 'Customer ID:' (with a dropdown menu labeled 'Select Customer ID'), 'Order Date:' (with a date input field showing 'mm/dd/yyyy'), and 'Order Total:' (with a text input field).

Figure 3. Orders page CREATE to add new orders and UPDATE to edit orders

The screenshot shows a web browser window with a title bar "A Perfect Score" and a URL "flip2.engr.oregonstate.edu:15959/Orders". The main content area contains two forms side-by-side.

Add Order:

- Customer ID:** Select Customer ID
- Order Date:** mm/dd/yyyy
- Order Total:**
- Submit**

Update Order:

- Order ID:** Select an Order:
- Customer ID:** Select Customer
- Order Date:** mm/dd/yyyy
- Order Total:**
- Submit**

Figure 4. Orders page **UPDATE null FK** (form view)

The screenshot shows the "Update Order" form from Figure 3. A red box highlights the "Customer ID" field, which currently displays "None".

Update Order:

- Order ID:** 7
- Customer ID:** None
- Order Date:** 03/14/2024
- Order Total:** 300
- Submit**

Figure 5. Orders page **UPDATE null FK** (after submission)

| Orders: | | | | | |
|---------------|-----------|---|--------------|-------------------------|--|
| Order Number: | Customer: | Order Date: | Order Total: | Delete | |
| 1 | 2 | Mon Feb 05 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 2200 | <button>Delete</button> | |
| 2 | 3 | Tue Feb 06 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 875 | <button>Delete</button> | |
| 3 | 1 | Wed Feb 07 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 500 | <button>Delete</button> | |
| 4 | | Sat Mar 09 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 550 | <button>Delete</button> | |
| 5 | 4 | Sun Mar 10 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 3000 | <button>Delete</button> | |
| 6 | 5 | Tue Mar 12 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 2250 | <button>Delete</button> | |
| 7 | | Thu Mar 14 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 300 | <button>Delete</button> | |

Figure 6. Orders page **CREATE** (before submission)

| Order Number: | Customer: | Order Date: | Order Total: | Delete |
|---------------|-----------|---|--------------|-------------------------|
| 1 | 2 | Mon Feb 05 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 2200 | <button>Delete</button> |
| 2 | 3 | Tue Feb 06 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 875 | <button>Delete</button> |
| 3 | 1 | Wed Feb 07 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 500 | <button>Delete</button> |
| 4 | | Sat Mar 09 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 550 | <button>Delete</button> |
| 5 | 4 | Sun Mar 10 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 3000 | <button>Delete</button> |
| 6 | 5 | Tue Mar 12 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 2250 | <button>Delete</button> |
| 7 | | Thu Mar 14 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 300 | <button>Delete</button> |

Add Order:

Customer ID:

Order Date:

Order Total:

Figure 7. Orders page table after CREATE's addition

| Order Number: | Customer: | Order Date: | Order Total: | Delete |
|---------------|-----------|---|--------------|-------------------------|
| 1 | 2 | Mon Feb 05 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 2200 | <button>Delete</button> |
| 2 | 3 | Tue Feb 06 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 875 | <button>Delete</button> |
| 3 | 1 | Wed Feb 07 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 500 | <button>Delete</button> |
| 4 | | Sat Mar 09 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 550 | <button>Delete</button> |
| 5 | 4 | Sun Mar 10 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 3000 | <button>Delete</button> |
| 6 | 5 | Tue Mar 12 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 2250 | <button>Delete</button> |
| 7 | | Thu Mar 14 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 300 | <button>Delete</button> |
| 8 | 5 | 2024-02-12T08:00:00.000Z | 1234 | <button>Delete</button> |

Figure 7. Orders page table after using DELETE on Order Number 6

| Order Number: | Customer: | Order Date: | Order Total: | Delete |
|---------------|-----------|---|--------------|-------------------------|
| 1 | 2 | Mon Feb 05 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 2200 | <button>Delete</button> |
| 2 | 3 | Tue Feb 06 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 875 | <button>Delete</button> |
| 3 | 1 | Wed Feb 07 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 500 | <button>Delete</button> |
| 4 | | Sat Mar 09 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 550 | <button>Delete</button> |
| 5 | 4 | Sun Mar 10 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 3000 | <button>Delete</button> |
| 7 | | Thu Mar 14 2024 00:00:00 GMT-0700 (Pacific Daylight Time) | 300 | <button>Delete</button> |
| 8 | 5 | Mon Feb 12 2024 00:00:00 GMT-0800 (Pacific Standard Time) | 1234 | <button>Delete</button> |

Order Scores Page:

Figure 8. Order Scores page READ/SELECT to display Order_Scores table

The screenshot shows a web browser window titled "A Perfect Score" with the URL "Not secure flip2.engr.oregonstate.edu:15959/Order_Scores". The page has a navigation bar with links: Home, Orders, Order Scores, Scores, Composer Scores, Composers, and Customers. Below the navigation bar is a section titled "Order Scores:" containing a table with the following data:

| Order Score ID: | Order ID: | Score ID: | Quantity: | Format: | Delete |
|-----------------|-----------|----------------------|-----------|---------|-------------------------|
| 1 | 1 | 1 - La Traviata | 40 | hard | <button>Delete</button> |
| 2 | 2 | 2 - Wicked | 25 | paper | <button>Delete</button> |
| 3 | 3 | 3 - Into The Woods | 50 | digital | <button>Delete</button> |
| 4 | 5 | 1 - La Traviata | 100 | paper | <button>Delete</button> |
| 6 | 7 | 4 - The Last 5 Years | 10 | digital | <button>Delete</button> |

Below the table is a search section titled "Search by Score Name:" with a dropdown menu labeled "Select Score" and buttons for "Submit" and "Reset".

At the bottom of the page is another search section titled "Add Order Score:" with fields for "Order ID:" (dropdown menu "Select Order ID") and "Score:" (dropdown menu).

Figure 9. Order Scores page SELECT to search for Order Scores by score name

The screenshot shows the same web browser window and navigation bar as Figure 8. The page title is now "Order Scores:".

The table data is identical to Figure 8:

| Order Score ID: | Order ID: | Score ID: | Quantity: | Format: | Delete |
|-----------------|-----------|----------------------|-----------|---------|-------------------------|
| 1 | 1 | 1 - La Traviata | 40 | hard | <button>Delete</button> |
| 2 | 2 | 2 - Wicked | 25 | paper | <button>Delete</button> |
| 3 | 3 | 3 - Into The Woods | 50 | digital | <button>Delete</button> |
| 4 | 5 | 1 - La Traviata | 100 | paper | <button>Delete</button> |
| 6 | 7 | 4 - The Last 5 Years | 10 | digital | <button>Delete</button> |

Below the table is a search section titled "Search by Score Name:" with a dropdown menu containing the value "La Traviata" and buttons for "Submit" and "Reset".

Figure 10. Order Scores page after using SELECT to filter by score name

| Order Scores: | | | | | |
|-----------------|-----------|-----------------|-----------|---------|-------------------------|
| Order Score ID: | Order ID: | Score ID: | Quantity: | Format: | Delete |
| 1 | 1 | 1 - La Traviata | 40 | hard | <button>Delete</button> |
| 4 | 5 | 1 - La Traviata | 100 | paper | <button>Delete</button> |

| Search by Score Name: | |
|--|----------------------------------|
| Select Score | <input type="button" value="▼"/> |
| <input type="button" value="Submit"/> <input type="button" value="Reset"/> | |

Figure 11. Order Scores page CREATE to add a new Order Score

| Add Order Score: | |
|------------------|--|
| Order ID: | <input type="text" value="4"/> |
| Score: | <input type="text" value="Aida"/> |
| Quantity: | <input type="text" value="50"/> |
| Score Type: | <input type="text" value="Hardcover"/> |
| | <input type="button" value="Submit"/> |

Figure 12. Order Scores page after CREATE adds new Order Score

| Order Scores: | | | | | | |
|-----------------|-----------|----------------------|-----------|---------|-------------------------|--|
| Order Score ID: | Order ID: | Score ID: | Quantity: | Format: | Delete | |
| 1 | 1 | 1 - La Traviata | 40 | hard | <button>Delete</button> | |
| 2 | 2 | 2 - Wicked | 25 | paper | <button>Delete</button> | |
| 3 | 3 | 3 - Into The Woods | 50 | digital | <button>Delete</button> | |
| 4 | 5 | 1 - La Traviata | 100 | paper | <button>Delete</button> | |
| 6 | 7 | 4 - The Last 5 Years | 10 | digital | <button>Delete</button> | |
| 7 | 4 | 5 - Aida | 50 | hard | <button>Delete</button> | |

Figure 13. Order Scores page UPDATE (intersection table)

Update Order Score:

Order Score ID:
Select an Order Score

Order:
Select Order ID:

Score:
Select Score

Quantity:
[Input field]

Score Type:
Paperback

Figure 14. Order Scores page UPDATE (intersection table) after submission

| Order Scores: | | | | | | |
|-----------------|-----------|----------------------|-----------|---------|-------------------------|--|
| Order Score ID: | Order ID: | Score ID: | Quantity: | Format: | Delete | |
| 1 | 1 | 1 - La Traviata | 40 | hard | <button>Delete</button> | |
| 2 | 2 | 2 - Wicked | 25 | paper | <button>Delete</button> | |
| 3 | 3 | 3 - Into The Woods | 50 | digital | <button>Delete</button> | |
| 4 | 5 | 1 - La Traviata | 100 | paper | <button>Delete</button> | |
| 6 | 7 | 4 - The Last 5 Years | 10 | digital | <button>Delete</button> | |
| 7 | 4 | 5 - Aida | 100 | paper | <button>Delete</button> | |

Figure 15. Order Scores page using **DELETE(M:N)** on Order Score 6

| Order Scores: | | | | | | |
|-----------------|-----------|--------------------|-----------|---------|-------------------------|--|
| Order Score ID: | Order ID: | Score ID: | Quantity: | Format: | Delete | |
| 1 | 1 | 1 - La Traviata | 40 | hard | <button>Delete</button> | |
| 2 | 2 | 2 - Wicked | 25 | paper | <button>Delete</button> | |
| 3 | 3 | 3 - Into The Woods | 50 | digital | <button>Delete</button> | |
| 4 | 5 | 1 - La Traviata | 100 | paper | <button>Delete</button> | |
| 7 | 4 | 5 - Aida | 100 | paper | <button>Delete</button> | |

Scores Page:

Figure 16. Scores page with CREATE to add new Scores

The screenshot shows a web browser window titled "A Perfect Score". The address bar indicates the URL is "flip2.engr.oregonstate.edu:15959/Scores". The page has a navigation menu at the top with links: Home, Orders, Order Scores, Scores, Composer Scores, Composers, and Customers. Below the menu is a section titled "Scores:" containing a table with the following data:

| Score ID: | Score Name: | Paperback Price: | Hardcover Price: | Digital Price: | Delete |
|-----------|------------------|------------------|------------------|----------------|---------------------------------------|
| 1 | La Traviata | 30 | 45 | 10 | <input type="button" value="Delete"/> |
| 2 | Wicked | 30 | 60 | 10 | <input type="button" value="Delete"/> |
| 3 | Into The Woods | 35 | 60 | 30 | <input type="button" value="Delete"/> |
| 4 | The Last 5 Years | 40 | 65 | 30 | <input type="button" value="Delete"/> |
| 5 | Aida | 25 | 45 | 9 | <input type="button" value="Delete"/> |

Below the table is a section titled "Add Score:" containing a form with four input fields: "Score Name:", "Paper Price:", "Hard Price:", and "Digital Price:". There is also a "Submit" button.

Figure 17. Scores page after adding new Score

The screenshot shows the same Scores page after adding a new score. The table now includes an additional row at the bottom:

| Score ID: | Score Name: | Paperback Price: | Hardcover Price: | Digital Price: | Delete |
|-----------|------------------|------------------|------------------|----------------|---------------------------------------|
| 1 | La Traviata | 30 | 45 | 10 | <input type="button" value="Delete"/> |
| 2 | Wicked | 30 | 60 | 10 | <input type="button" value="Delete"/> |
| 3 | Into The Woods | 35 | 60 | 30 | <input type="button" value="Delete"/> |
| 4 | The Last 5 Years | 40 | 65 | 30 | <input type="button" value="Delete"/> |
| 5 | Aida | 25 | 45 | 9 | <input type="button" value="Delete"/> |
| 6 | Cats | 15 | 40 | 25 | <input type="button" value="Delete"/> |

The last row, which contains the newly added score "Cats", is highlighted with a red rectangular box.

Figure 18. Scores page UPDATE form to update a Score

Update Score:

| | |
|---------------------------------------|--|
| Score ID: | |
| Select Score ID | |
| Score Name: | |
| | |
| Paper Price: | |
| | |
| Hard Price: | |
| | |
| Digital Price: | |
| | |
| <input type="button" value="Submit"/> | |

Figure 19. Scores page after using UPDATE on Score 2 ('Wicked')

Scores:

| Score ID: | Score Name: | Paperback Price: | Hardcover Price: | Digital Price: | Delete |
|-----------|------------------|------------------|------------------|----------------|---------------------------------------|
| 1 | La Traviata | 30 | 45 | 10 | <input type="button" value="Delete"/> |
| 2 | Wicked | 20 | 50 | 10 | <input type="button" value="Delete"/> |
| 3 | Into The Woods | 35 | 60 | 30 | <input type="button" value="Delete"/> |
| 4 | The Last 5 Years | 40 | 65 | 30 | <input type="button" value="Delete"/> |
| 5 | Aida | 25 | 45 | 9 | <input type="button" value="Delete"/> |
| 6 | Cats | 15 | 40 | 25 | <input type="button" value="Delete"/> |

Figure 20. Scores page after using DELETE on Score 5

| Scores: | | | | | |
|-----------|------------------|------------------|------------------|----------------|-------------------------|
| Score ID: | Score Name: | Paperback Price: | Hardcover Price: | Digital Price: | Delete |
| 1 | La Traviata | 30 | 45 | 10 | <button>Delete</button> |
| 2 | Wicked | 20 | 50 | 10 | <button>Delete</button> |
| 3 | Into The Woods | 35 | 60 | 30 | <button>Delete</button> |
| 4 | The Last 5 Years | 40 | 65 | 30 | <button>Delete</button> |
| 6 | Cats | 15 | 40 | 25 | <button>Delete</button> |

Composer Scores Page:

Figure 21. Composer Scores page with READ displaying the Composer Scores (intersection) table and CREATE to add new Composer Score

The screenshot shows a web application interface for managing composer scores. At the top, there's a navigation bar with links for Home, Orders, Order Scores, Scores, Composer Scores, Composers, and Customers. Below the navigation is a title "Composer Scores:" followed by a table listing existing scores.

| Composer Score ID: | Composer ID: | Score ID: | Delete |
|--------------------|--------------|----------------------|-------------------------|
| 1 | 1 - Sondheim | 3 - Into The Woods | <button>Delete</button> |
| 2 | 2 - Verdi | 1 - La Traviata | <button>Delete</button> |
| 3 | 3 - Schwartz | 2 - Wicked | <button>Delete</button> |
| 4 | 4 - Brown | 4 - The Last 5 Years | <button>Delete</button> |

Below the table are two forms. The first form is titled "Add Composer Score:" and contains fields for "Composer ID" (a dropdown menu with "Select Composer ID") and "Score" (a dropdown menu with "Select Score"). A "Submit" button is at the bottom of this form. The second form is titled "Update Composer Score:" and contains a single field "Composer Score ID" (a dropdown menu with "Select Composer Score ID").

Figure 22. Composer Scores Page after CREATE adds new Composer Score

| Composer Scores: | | | |
|--------------------|--------------|----------------------|---------------------------------------|
| Composer Score ID: | Composer ID: | Score ID: | Delete |
| 1 | 1 - Sondheim | 3 - Into The Woods | <input type="button" value="Delete"/> |
| 2 | 2 - Verdi | 1 - La Traviata | <input type="button" value="Delete"/> |
| 3 | 3 - Schwartz | 2 - Wicked | <input type="button" value="Delete"/> |
| 4 | 4 - Brown | 4 - The Last 5 Years | <input type="button" value="Delete"/> |
| 6 | 1 - Sondheim | 6 - Cats | <input type="button" value="Delete"/> |

Figure 23. Composer Scores page with UPDATE(M:N) to Composer Score 3

| Composer Scores: | | | |
|--------------------|--------------|----------------------|---------------------------------------|
| Composer Score ID: | Composer ID: | Score ID: | Delete |
| 1 | 1 - Sondheim | 3 - Into The Woods | <input type="button" value="Delete"/> |
| 2 | 2 - Verdi | 1 - La Traviata | <input type="button" value="Delete"/> |
| 3 | 3 - Schwartz | 6 - Cats | <input type="button" value="Delete"/> |
| 4 | 4 - Brown | 4 - The Last 5 Years | <input type="button" value="Delete"/> |
| 6 | 1 - Sondheim | 6 - Cats | <input type="button" value="Delete"/> |

Figure 24. Composer Scores page after using DELETE on Composer Score 3

| Composer Scores: | | | |
|--------------------|--------------|----------------------|---------------------------------------|
| Composer Score ID: | Composer ID: | Score ID: | Delete |
| 1 | 1 - Sondheim | 3 - Into The Woods | <input type="button" value="Delete"/> |
| 2 | 2 - Verdi | 1 - La Traviata | <input type="button" value="Delete"/> |
| 4 | 4 - Brown | 4 - The Last 5 Years | <input type="button" value="Delete"/> |
| 6 | 1 - Sondheim | 6 - Cats | <input type="button" value="Delete"/> |

Composers Page:

Figure 25. Composers page with READ/SELECT and CREATE to add new Composer

The screenshot shows a web browser window with the title "A Perfect Score". The address bar indicates the URL is <http://flip2.engr.oregonstate.edu:15959/Composers>. The page has a header with navigation links: Home, Orders, Order Scores, Scores, Composer Scores, Composers, and Customers. Below the header is a section titled "Composers:" containing a table with four rows of data. The table columns are "Composer ID:", "First name:", "Last Name:", and "Delete". The data rows are: 1. Stephen Sondheim, 2. Giuseppe Verdi, 3. Stephen Schwartz, 4. Jason Brown. Each row has a "Delete" button. Below the table is a search bar labeled "Search by Composer" with a dropdown menu set to "Select Composer" and buttons for "Submit" and "Reset". At the bottom of the page is a form titled "Add Composer:" with fields for "Composer First Name:" and "Composer Last Name:", each with a text input field and a "Submit" button.

| Composer ID: | First name: | Last Name: | Delete |
|--------------|-------------|------------|---------------------------------------|
| 1 | Stephen | Sondheim | <input type="button" value="Delete"/> |
| 2 | Giuseppe | Verdi | <input type="button" value="Delete"/> |
| 3 | Stephen | Schwartz | <input type="button" value="Delete"/> |
| 4 | Jason | Brown | <input type="button" value="Delete"/> |

Search by Composer:

Select Composer

Submit Reset

Add Composer:

Composer First Name:

Composer Last Name:

Figure 26. Composers page after using CREATE to add new Composer

The screenshot shows the same web browser window as Figure 25, but now with a fifth row of data in the "Composers:" table. The table structure is identical to Figure 25. The new row, which was added via the "CREATE" operation, contains the values: Composer ID: 5, First name: Andrew, Last Name: Lloyd Webber. This entire row is highlighted with a thick red border. The rest of the table data remains the same as in Figure 25.

| Composer ID: | First name: | Last Name: | Delete |
|--------------|-------------|--------------|---------------------------------------|
| 1 | Stephen | Sondheim | <input type="button" value="Delete"/> |
| 2 | Giuseppe | Verdi | <input type="button" value="Delete"/> |
| 3 | Stephen | Schwartz | <input type="button" value="Delete"/> |
| 4 | Jason | Brown | <input type="button" value="Delete"/> |
| 5 | Andrew | Lloyd Webber | <input type="button" value="Delete"/> |

Figure 27. Composers page filtering with SELECT to find Scores by a Composer

Search by Composer

Search by Composer:

Scores by Stephen Sondheim

Into The Woods
Cats

Figure 28. Composers page after using UPDATE on Composer 4

Composers:

| Composer ID: | First name: | Last Name: | Delete |
|--------------|-------------|--------------|---------------------------------------|
| 1 | Stephen | Sondheim | <input type="button" value="Delete"/> |
| 2 | Giuseppe | Verdi | <input type="button" value="Delete"/> |
| 3 | Stephen | Schwartz | <input type="button" value="Delete"/> |
| 4 | Jason | Yellow | <input type="button" value="Delete"/> |
| 5 | Andrew | Lloyd Webber | <input type="button" value="Delete"/> |

Figure 29. Composers page after using DELETE on Composer 3

Composers:

| Composer ID: | First name: | Last Name: | Delete |
|--------------|-------------|--------------|---------------------------------------|
| 1 | Stephen | Sondheim | <input type="button" value="Delete"/> |
| 2 | Giuseppe | Verdi | <input type="button" value="Delete"/> |
| 4 | Jason | Yellow | <input type="button" value="Delete"/> |
| 5 | Andrew | Lloyd Webber | <input type="button" value="Delete"/> |

Customers Page:

Figure 30. Customers page with READ/SELECT displaying Customers table

A screenshot of a web browser window titled "A Perfect Score". The address bar shows "Not secure flip2.engr.oregonstate.edu:15959/Customers". The page content is titled "Customers:" and displays a table of customer information. The table has columns for Customer ID, First Name, Last Name, Organization, Email, Address, and Delete. There are six rows of data, each with a "Delete" button.

| Customer ID: | First Name: | Last Name: | Organization: | Email: | Address: | Delete |
|--------------|-------------|------------|-----------------------|---------------------------|--|---------------------------------------|
| 1 | Jim | Smith | Jim's Musical Majesty | jimsm@hotmail.com | 1106 Godfrey Road, New York, NY 10029 | <input type="button" value="Delete"/> |
| 2 | Miranda | Caldera | NYU | miracal@NYU.edu | 36660 Farnum Road, New York, NY 10031 | <input type="button" value="Delete"/> |
| 3 | Bobby | Hill | The Manger Babies | bobbyhill@hotmail.com | 5288 Rainey St, Arien, TX, 75693 | <input type="button" value="Delete"/> |
| 4 | Elizabeth | Knowles | Houston Grand Opera | LizK@lgo.com | 3417 Sam Street, Houston, TX, 72984 | <input type="button" value="Delete"/> |
| 5 | Zack | Joplin | Boston Lyric Theatre | Zjop@blt.com | 1824 Commonwealth Ave, Boston, MA, 00124 | <input type="button" value="Delete"/> |
| 6 | Katherine | Devereux | Artsview | KatherineDev@artsview.org | 756 Tulane Road, Portland, ME, 97035 | <input type="button" value="Delete"/> |

Figure 31. Customers page with CREATE to add new Customer

A screenshot of a web form titled "Add Customer:". The form contains fields for First Name, Last Name, Organization, Email, and Address, each with an input field. Below the address field is a "Submit" button.

Add Customer:

First Name:
Dana

Last Name:
Scully

Organization:
FBI

Email:
BADcat@FBI.com

Address:
Quantico Virginia

Submit

Figure 32. Customers page after using CREATE to add new Customer

| Customers: | | | | | | |
|--------------|-------------|------------|-----------------------|---------------------------|--|-------------------------|
| Customer ID: | First Name: | Last Name: | Organization: | Email: | Address: | Delete |
| 1 | Jim | Smith | Jim's Musical Majesty | jimsm@hotmail.com | 1106 Godfrey Road, New York, NY 10029 | <button>Delete</button> |
| 2 | Miranda | Caldera | NYU | miracal@NYU.edu | 36660 Farnum Road, New York, NY 10031 | <button>Delete</button> |
| 3 | Bobby | Hill | The Manger Babies | bobbyhill@hotmail.com | 5288 Rainey St, Arlen, TX, 75693 | <button>Delete</button> |
| 4 | Elizabeth | Knowles | Houston Grand Opera | LizK@hgo.com | 3417 Sam Street, Houston, TX, 72984 | <button>Delete</button> |
| 5 | Zack | Joplin | Boston Lyric Theatre | Zjop@blt.com | 1824 Commonwealth Ave, Boston, MA, 00124 | <button>Delete</button> |
| 6 | Katherine | Devereux | Artsview | KatherineDev@artsview.org | 756 Tulane Road, Portland, ME, 07035 | <button>Delete</button> |
| 7 | Dana | Scully | FBI | BADcat@FBI.com | Quantico Virginia | <button>Delete</button> |

Figure 33. Customers page UPDATE form to edit a Customer

Update Customer Information:

| | |
|---------------------------------------|--|
| Customer ID: | <input type="text" value="1 - Jim Smith"/> |
| First Name: | <input type="text" value="Jimmy"/> |
| Last Name: | <input type="text" value="Smith"/> |
| Organization: | <input type="text" value="Jim's Musical Majesty"/> |
| Email: | <input type="text" value="jimmyjsm@hotmail.com"/> |
| Address: | <input type="text" value="1106 Godfrey Road, New York, NY 10029"/> |
| <input type="button" value="Submit"/> | |

Figure 34. Customers page after using UPDATE on Customer 3

| Customers: | | | | | | |
|--------------|-------------|------------|-----------------------|---------------------------|--|---------------------------------------|
| Customer ID: | First Name: | Last Name: | Organization: | Email: | Address: | Delete |
| 1 | Jimmy | Smith | Jim's Musical Majesty | jimmysm@hotmail.com | 1106 Godfrey Road, New York, NY 10029 | <input type="button" value="Delete"/> |
| 2 | Miranda | Caldera | NYU | miracal@NYU.edu | 36660 Farnum Road, New York, NY 10031 | <input type="button" value="Delete"/> |
| 3 | Bobby | Hill | The Manger Babies | bobbyhill@hotmail.com | 5288 Rainey St, Arlen, TX, 75693 | <input type="button" value="Delete"/> |
| 4 | Elizabeth | Knowles | Houston Grand Opera | LizK@hgo.com | 3417 Sam Street, Houston, TX, 72984 | <input type="button" value="Delete"/> |
| 5 | Zack | Joplin | Boston Lyric Theatre | Zjop@blt.com | 1824 Commonwealth Ave, Boston, MA, 00124 | <input type="button" value="Delete"/> |
| 6 | Katherine | Devereux | Artsview | KatherineDev@artsview.org | 756 Tulane Road, Portland, ME, 97035 | <input type="button" value="Delete"/> |
| 7 | Dana | Scully | FBI | BADcat@FBI.com | Quantico Virginia | <input type="button" value="Delete"/> |

Figure 35. Customers page after using DELETE on Customer 4

| Customers: | | | | | | |
|--------------|-------------|------------|-----------------------|---------------------------|--|---------------------------------------|
| Customer ID: | First Name: | Last Name: | Organization: | Email: | Address: | Delete |
| 1 | Jimmy | Smith | Jim's Musical Majesty | jimmysm@hotmail.com | 1106 Godfrey Road, New York, NY 10029 | <input type="button" value="Delete"/> |
| 2 | Miranda | Caldera | NYU | miracal@NYU.edu | 36660 Farnum Road, New York, NY 10031 | <input type="button" value="Delete"/> |
| 3 | Bobby | Hill | The Manger Babies | bobbyhill@hotmail.com | 5288 Rainey St, Arlen, TX, 75693 | <input type="button" value="Delete"/> |
| 5 | Zack | Joplin | Boston Lyric Theatre | Zjop@blt.com | 1824 Commonwealth Ave, Boston, MA, 00124 | <input type="button" value="Delete"/> |
| 6 | Katherine | Devereux | Artsview | KatherineDev@artsview.org | 756 Tulane Road, Portland, ME, 97035 | <input type="button" value="Delete"/> |
| 7 | Dana | Scully | FBI | BADcat@FBI.com | Quantico Virginia | <input type="button" value="Delete"/> |