

CS340: Intro to Databases

Group 31

Adam Andreatta, Harpreet Sahota

Project Step 6 FINAL

Project Title: EzGames Database

**PLEASE USE CHROME WHEN TESTING THE PROJECT**

<http://classwork.engr.oregonstate.edu:5600/>

### **Executive Summary:**

Throughout the course of the project, many adjustments were made to ensure the project was easy to use and intuitive. The project received UI and padding changes, as well as changes in how much functionality was added. The additions helped to provide our app with a much more stylized visualization for the user of the given company. Other changes were made to our schema as well as the structure of our database, and the amount of tables we used to represent the data effectively. Our design process was simple, to provide the user an easy way to traverse and add data to the database. Making it easy to stay in a workflow when using the program. The database structure will handle if a piece that is necessary is deleted and remove the other insertions accordingly. The website also received changes to the database structure throughout the course of its development, which allowed us to satisfy our needs of the criteria. Various changes to conditions as well as relationships were done as well, these changes allowed to do things more efficiently without the need of moving too much data around from place to place. All of these changes allowed us to create a final product that we are satisfied with, and believe the end user will be happy to use during its operations.

### **Step 4 Feedback**

1. Do the implemented CRUD steps function as the team expects (e.g. if the team stated that a CRUD step worked, but you found an error, please tell them)?
  - a. They have select and insert working for all tables except for "Games" table.(Nadir Isweesi)
  - b. They seem to work, except for the delete operation in CRUD. - (Michelle Rollberg)
  - c. Games is pending update in next step
2. Would a user easily be able to use the UI to complete the step? If not, or you have suggestions for how the UI can be improved, please elaborate.
  - a. I would suggest having margin and padding to make the tables not on the furthest left of the screen - (Nadir Isweesi)
  - b. One suggestion would be to make it more evident which row ID is being edited. I had difficulty locating the transparent ID in the update table - (Erick Veletanga)
  - c. The update functionality is a little confusing since the update input form is there even if you haven't first selected the 'edit' button. Maybe you can hide it unless the 'edit' button has been pressed, or move that form to a separate page that you are routed to after pressing 'edit'? (Dominic Maluski) (similar comment by Michelle Rollberg)
  - d. Added margins and padding.
  - e. I don't think we need to modify the row id being edited because our edit button is in the row the user would want to edit.
  - f. For the update input, we prefer having the update form show but have added instructions mentioning to click edit and then to update the form.
3. What suggestions do you have for the team in any areas where they are blocked or having difficulty? Detailed, helpful feedback will receive higher credit. If the team is not blocked or is having difficulty, encouraging and supportive comments would be a better response than NO feedback.

- a. The UI is a kind of game website; I would suggest using a formal or better design since this is for a database, not a game site. And would like to suggest focusing on delete, and update for M:N relationships, since the table are connected very well. (Nadir Isweesi)
  - b. You should name the JavaScript files to reflect the operation and the entity they are associated with. Overall, the Customer table functions well, and the UI is smooth and intuitive. Good job! (Erick Veletanga)
  - c. We believe our format is fine and even though it's a database, it's not required to be formal but depends on the business itself.
  - d. Renamed our Javascript files to match the tables easier.
4. Delete isn't working. Next time, indicate which entity is CRUDing (TA)
- a. Delete is working

### Part A Overview:

The company for which we are providing database solutions is a video game-selling organization that provides consumer gaming products to the public of varying genres, and types.

The products shipped are both new and used, allowing for more flexible market access. The company has 50 employees who must handle the sales, purchasing, and redistribution of the used products. The company has an annual average sales volume of 150,000 games. The company will need to be able to log both new and used sales. Manage product IDs, the amount of inventory for each game on hand, as well as track date of sale in the event the product the user purchases needs to be returned.

The employees entity is responsible for storing information on the 50 employees with each employee being assigned a unique employee ID and storing their first and last name.

Games will display a title, the platform for which the game belongs to, studio and inventory to display amount of games available and have it's own unique game id.

Conditions will be an optional table with a condition rating of the game on a scale of 1-10 where 1 will be worst and 10 will be in best condition. In addition, this will include the name of the game, game id and if it's used where 0 confirms it is and 1 represents new.

Invoice details will be assigned an invoice id to distinguish the invoices. Attributes will be employee id and customer id to track the employee making the sale and the customer who is purchasing the game. Name of the game, date of sale for history purposes and price will also be stored.

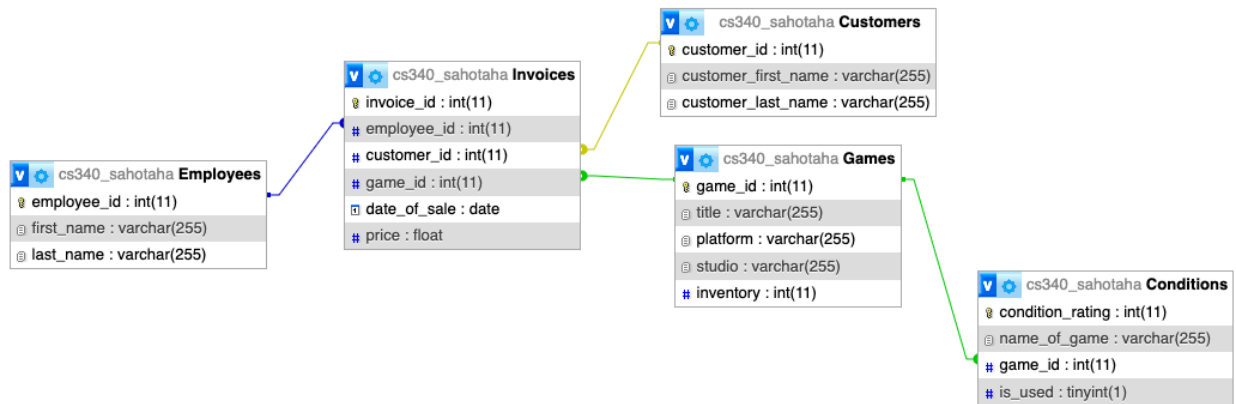
Customers will be storing information about the customer with each customer being assigned a unique customer id to distinguish them from other customers with the same first and last name.

## Part B Database Outline:

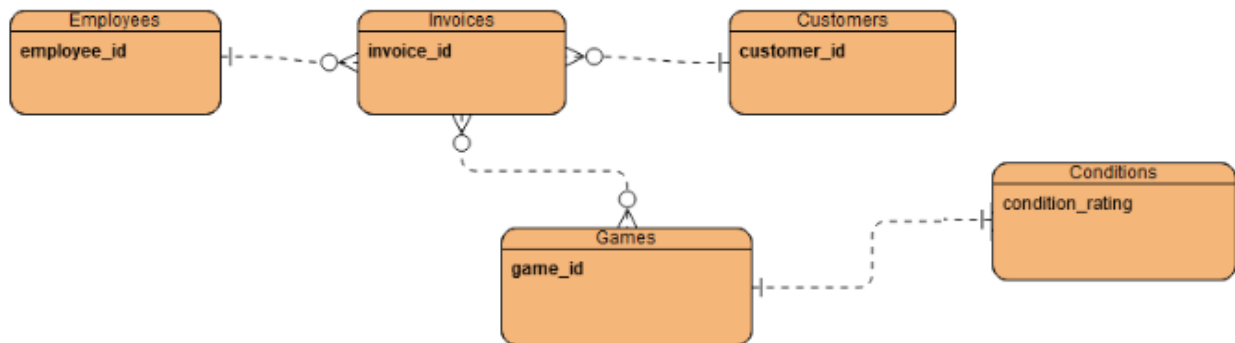
Schema follows 2NF style

- Employees:
  - Relationship:
    - Employees share a 1:M relationship with invoices since one employee can appear on many invoices
  - Attributes:
    - employee\_id: INT not NULL (Primary Key)
    - first\_name: VARCHAR(255), not NULL
    - last\_name: VARCHAR(255), not NULL
- Games:
  - Relationship:
    - Games has M:1 relationship with the Conditions table as there is one condition and multiple games can be having the same condition
  - Attributes:
    - game\_id int(11) not null auto\_increment (Primary Key)
    - title: VARCHAR, not NULL
    - platform: VARCHAR(255) not null
    - studio: VARCHAR(255), not null
    - inventory: int not null
- Conditions:
  - Relationship: shares and optional 1:M relationship with games since games can only have one condition, but many games have a condition.
  - Attributes:
    - name\_of\_game: VARCHAR(255) not null
    - game\_id: int(11)
    - Is\_used: boolean not null default 0
    - Foreign key (game\_id) references Games(game\_id)
- Customers:
  - Relationship:
    - Customers has one-to-one relationship with invoices, as they receive one invoice for their transaction.
  - Attributes:
    - customer\_id int(11) not null auto\_increment (Primary Key)
    - customer\_first\_name: varchar(255) not null,
    - customer\_last\_name: varchar(255) not null
- Invoices:
  - Relationship
    - Invoices has 1:M relationship with customers and an M:1 employees since 1 employee can be present on multiple invoices and shares an M:N relationship with games since many Invoices can have many games and many games can appear on many invoices
  - Attributes:
    - invoice\_id: int(11) not null auto\_increment (Primary Key)
    - employee\_id int,
    - customer\_id int,
    - game\_id int,
    - date\_of\_sale date not null,
    - price float not null,
    - Foreign key (game\_id) references Games(game\_id),
    - Foreign key (employee\_id) references Employees(employee\_id),
    - Foreign key (customer\_id) references Customer(customer\_id)

## Part C: Schema



## ER Diagram



## Step 1 Feedback

1. Does the outline of entity details describe the purpose of each, list attribute datatypes and constraints and describe relationships between entities?
  - a. The outline of each entity listed attributes, constraints, and relationships but neglected to include the purpose of each entity or a description of them.(Amin Hussien)
  - b. The outline lists each entity with relevant attributes with data types and constraints, however for a number of the entities the relationship (primary key, foreign key) isn't so clear to understand. For example in the ERD there is a relationship between Employees and Sales, but there are no overlapping attributes in either of those entities.(Jonathan David-Jackson)
  - c. Yes, it is easy to understand what each attribute is doing. I think there are several adjustments that can be made to the datatypes of your attributes. Following the basic SQL datatypes ([https://www.w3schools.com/sql/sql\\_datatypes.asp](https://www.w3schools.com/sql/sql_datatypes.asp)), we can change all the dates to date datatypes. While this is more of a personal preference, I think the game type should be a boolean. So instead of a string "new" or "used" we have an attribute *game\_is\_new* that can be "True" or "False".(Yuji Oshiro)

We updated our overview to reflect all entities with a quick description. Updated our relationships to display the Primary Key (PK) and Foreign Key (FK) more clearly. Updated date to 'date type'. Updated 'is\_used' attribute to a boolean where 'true' represents it's used and 'false' as new

2. Are 1:M relationships correctly formulated? Is there at least one M:M relationship? Does the ERD present a logical view of the database?
  - a. There are multiple correctly formulated 1:M relationships and one M:M relationship (Invoicing table). Although I am not sure if all of these relationships make the most sense. I do not understand the purpose of the invoicing table being many to many.(Amin Hussien)
  - b. I don't think the 1:M and M:M relationships are fully fleshed out. In addition to foreign keys not being illustrated in the ERD there is also a general lack of shared attributes between entities that are said to have relationships. I think it would be worthwhile to think of some intersectional relationships that would serve as a bridge between otherwise unrelated entities. The company entity has a relationship with other entities, but not through the other entities attributes.(Jonathan David-Jackson)
  - c. There is only one 1:M relationship mentioned, which is the relationship between games and invoicing (although it is shown as a M:M in the ERD). I think there is an issue with this sentence "Since there could be multiple copies of the game within the given stock." Even if there are multiple copies of a single game, each game should have it's own unique ID. Two copies of the same game may have different prices, run on different consoles, and be new or used. There are several M:M relationships shown in the ERD, but I don't think they are set up correctly. Again, it's a bit difficult to understand what the use of having a Sales entity and Invoicing entity is, but I would think a one sale should only be attached to one invoice. A customer making one purchase should not receive multiple invoices. Similarly, while an invoice can relate to multiple games, a game should only belong to a single invoice. It would be weird for a single game to be part of multiple transactions as that means multiple people can purchase the same game. And as mentioned earlier, each game should be unique.(Yuji Oshiro)
  - d. 1:M Relationships: Relationships are formed within the sentence, however, either the mention of a primary key is non-existent within the sentence and/or attributes, additionally there is inconsistent application. For the Company entity, there is no

mention of a primary key under relationship nor attributes sections. The Employee entity, mentions unique ID's but not that the employeeID's are the PKs, yet they are mentioned within the attributes section. It would be wise to be consistent in this context. The Games entity has the same issue as the Employees entity. It is important to be precise and consistent, so stakeholders aren't trying to guess or parse the true intention/meaning behind these relationships. A significant detail to check is if your ER diagram is drawn correctly, as it seems that the relationship lines drawn are inverted. An example of this is a company can have many employees, but each employee can only be employed by one company. As drawn will be interpreted as each company employs one employee, but an employee can be employed by multiple (many) companies.(TA)

- e. M:N Relationships: Relationship are formed within the sentence, however, either the mention of two or more foreign keys are non-existent within the sentence and/or attributes, additionally there is inconsistent application. Under the relationship section, there is no mention of any keys (primary nor foreign), however there is only one mention of a FK and a mention of a PK. For an intersection table, two FKs are required. Perhaps, the other FKs are the employeeID and customerID? If so, they should be marked as FKs under attributes. Since ER Diagrams typically don't display intersection tables, there is no need to include it within the current diagram.(TA)

Invoices table was updated to reflect the 1:1 relationship between the invoice and customers. Revised our ERD diagram relationships adding games\_in\_stock, customers and removing 'EZGames' since this database is under the company and added Games instead

- 3. Is there consistency in a) naming between overview and entity/attributes b) entities plural, attributes singular c) use of capitalization for naming?
  - a. The naming was inconsistent and did not follow the naming style guide for SQL entities listed in the course modules. I think a second pass at consistent formatting would implement the database much easier.(Amin Hussien)
  - b. There is a lack of consistency in the capitalization and in snake case layout. The entities, with the exception of Invoicing, are properly pluralized and the attributes are appropriately singular.(Jonathan David-Jackson)
  - c. There seems to be a lack of formatting in the attribute names. For example, snake case (snake\_case) is used for 2 of the attributes in Employees and the other is just written as lowercase words. Capitalization of terms like ID is inconsistent as well. (Tristan Vosburg)
  - d. There is little consistency with the naming and format of the attributes. in the outline, we see a combination of snake\_case, camelCase, and just the Words themselves. In the ERD, we see snake\_case and also spaces in the attribute names.(Yuji Oshiro)
  - e. Consistency in Naming: Between the DB outline and ER diagram found multiple naming inconsistencies. Company (DB outline) vs Companies (ER diagram), employeeid, productid, invoicedid, customerid (DB outline) vs (no companyID) employeeID, productID, invoicedID, customerID (ER Diagram). The InvoiceDetails table has InvoiceID (camelCase) and the other ids all lowercase. (TA)

Renamed our ER diagram entities, attributes and on outline to be consistent. Entities are capitalized and plural & attributes are lowercase and singular

4. Does the overview list specific facts?

- a. I think it might be nice to have quantified some things such as a max capacity of games that the database would be able to handle just to put an upper bound on the DB. (Jonathan David-Jackson)
- b. The only explicit fact the overview states is that the company employs 50 people. There are no metrics about the volume of games sold or the number of transactions that are made on any sort of timeline. (Yuji Oshiro)
- c. Overview Quality: The overview could be more detailed by adding facts such as sales volume per year as an example. Additionally, the overview should refer to the actual entities more closely. (TA)

Updated our overview to reflect the sales volume per year and referenced our other entities with a quick description for their purpose and the assigned attributes.

5. Are at least four entities described and does each one represent a single idea to be stored as a list?

- a. The document outlines five different entities, but I'm not quite sure it is necessary to have an entity for EZ Games, or the actual company/organization. The database itself is the EZ Games Database. Creating a table to connect all of the other entities feels like a redundant step that is not needed. I'm also not sure what the invoicing entity adds to the database. Why can't this just be a part of the Sales entity? Getting rid of those two entities, it may be beneficial to create a Customers entity as you have *customer\_id* in the Invoicing entity, but your overview doesn't really describe anything else about customers. (Yuji Oshiro)

Removed 'EZGames' as stated in feedback the database itself is for EZ Games. Add customers entity, *games\_in\_stock* and updated our attributes to be more accurate

## Step 2 Feedback and Updates

1. Does the schema present a physical model that follows the database outline and the ER logical diagram exactly?
  - a. **Charles Cuellar** - Things look good here for the most part but as far as I can see it looks like they only have a picture of their schema. This is also labeled as an ER Diagram which confuses me a bit. This could be me misunderstanding the terms. My impression is that the ERD should be more how the tables themselves are related in general and only really show the table name and primary key whereas a schema has all the attributes and foreign keys detailed.
  - b. **Velislav Babatchev** - The schema presents a physical model that follows the database outline, with the exception that the condition\_rating attribute in the Conditions table is missing from the outline. Also, the schema provided is labeled as the ER Diagram, and there is no basic ERD provided. The outline mentions a relationship between Games and a Games\_in\_stock table that I couldn't find referenced anywhere else in the document.
  - c. **William Seaders** - There appears to be no ER diagram, only the schema. I assume one exists from past assignments, so definitely add that in for this assignment
  - d. **Jacob Caudill** - The outline mentions a Games\_in\_stock table but doesn't declare the table anywhere else in the outline or in the model. Other than that it all looks good on the model.
  - e. Added ER Diagram
2. In the SQL, are the primary and foreign keys correctly defined when compared to the Schema? Are appropriate CASCADE operations declared?
  - a. **Charles Cuellar** - I don't see CASCADE being used but the primary and foreign keys are defined well.
  - b. **Velislav Babatchev** - Yes, the primary and foreign keys are correctly defined with the use of primary key and references. However, there were no CASCADE operations used.
  - c. **Jacob Caudill** - I do not see any CASCADE operations but all of the PKs and FKs are correctly defined.
  - d. Added CASCADE styles to sql
3. In the SQL, are relationship tables present when compared to the ERD/Schema?
  - a. **Jacob Caudill** - According to the ERD/Schema it is there, but the outline mentions some other table.
  - b. Updated name



### Step 3 Feedback and Updates:

1. *Does the UI utilize a SELECT for every table in the schema?* In other words, data from each table in the schema should be displayed on the UI. Note: it is generally not acceptable for just a single query to join all tables and displays them.
  - a. Dillon Scott - Yes, it appears there is a SELECT for each table entity: Employees, Games, Customers, and Invoices. Appears the conditions table is being displayed along with the Games table. I am a little confused about the outline and schema for the Games and Conditions tables. I am not clear on why there is a 1:M relationship. It seems each particular game is allowed to have 1 Condition rating, but I am unsure on how a particular condition rating would apply to multiple games. Seems like each rating would be unique. Seems like conditions is serving as a category table for each game and are more like attributes. The data manipulation query seems like it would need more to fill the UI table on the games view. Might need an inner join or something to match the game with the condition. **Fixed relationship 1:1**
2. *Does at least one SELECT utilize a search/filter with a dynamically populated list of properties?*
  - a. Connor Schutze - No, there are no SELECT's that utilize a search/filter. All searches select an entire entity and presents it.
  - b. Zachary Hogan - I don't see a SELECT utilizing a search/filter, although I may be looking in the wrong place.
  - c. Adam Steiner - No, there are no SELECT that utilize a search/filter.
    - i. **Added a search/filter for SELECT**
3. Do you have any other suggestions for the team to help with their HTML UI? For example, using AS aliases to replace obscure column names such as fname with First Name.
  - a. Dillon Scott - Filling the UI with sample data may help in providing guidance for during the CRUD implementation. Seeing how the tables should look with sample data should help with the SQL queries as well.
  - b. Connor Schutze - UI looks good. The main page is the Games entity, improving on the search to gather specific games regarding any of their attributes would work well.
  - c. Zachary Hogan - I would add some sample information to the Home Page for first time users.
  - d. Adam Steiner - Perhaps you can add some sample data to make the UI look more clear. Also, maybe flesh out the home/menu page, and a paragraph describing the website/video game company. Overall, great job!
    - i. **After consideration, we feel having sample data is not necessary. Our input fields for the user to submit the data is sufficient.**
4. "There is little consistency with the naming and format of the attributes. in the outline, we see a combination of snake\_case, camelCase, and just the Words themselves. In the ERD, we see snake\_case and also spaces in the attribute names. "There are several M:M relationships shown in the ERD, but I don't think they are set up correctly. Again, it's a bit difficult to understand what the use of having a Sales entity and Invoicing entity is, but I would think a one sale should only be attached to one invoice. A customer making one purchase should not receive multiple invoices." - **TA**
  - a. Actions based on feedback:
    - i. **Casing issues were addressed, and now the following document provides consistent casing across all the values contained within each entity.**
    - ii. **Relationships were adjusted within the ERD to properly match the schema generated.**
  - b. Upgrades to draft:
    - i. **Added additional as mentioned within the assignment rubric. The file now has all the necessary tables created and formed into their assigned pages.**

Sample Data:

```
--inserts the necessary data into each of the given tables using selects to capture id values that are already generated within the tables
insert into Employees (first_name, last_name)
values('Michael', 'Harrison'),
('Janet', 'Jameson'),
('Harry', 'Oliver');

insert into Games (title, platform, studio, inventory)
values('Skyrim', 'Xbox','Bethesda', 4),
('FarCry', 'Playstation', 'Ubisoft', 5),
('Rainbow Six', 'PC', 'Ubisoft', 3);

insert into Conditions(condition_rating, name_of_game, game_id, is_used)
values(10, 'Skyrim', (select game_id from Games where title = 'Skyrim'), 0),
(9, 'FarCry', (select game_id from Games where title = 'FarCry'), 1),
(8, 'Rainbow Six', (select game_id from Games where title = 'Rainbow Six'), 0);

insert into Customers(customer_first_name, customer_last_name)
values('Jon', 'Marston'),
('Mary', 'Jane'),
('Harry', 'Osborn');

insert into Invoices(customer_id, employee_id, game_id, date_of_sale, price)
values(1, (select employee_id from Employees where first_name = 'Michael' and last_name = 'Harrison'), (select game_id from Games where title = 'Skyrim'), '2024-05-14', 59.99),
(2, (select employee_id from Employees where first_name = 'Janet' and last_name='Jameson'), (select game_id from Games where title = 'FarCry'), '2023-06-15', 49.99),
(3, (select employee_id from Employees where first_name = 'Harry' and last_name='Oliver'), (select game_id from Games where title = 'Rainbow Six'), '2019-09-22', 48.99);
```

Sample Output:

employee_id	first_name	last_name
1	Michael	Harrison
2	Janet	Jameson
3	Harry	Oliver

3 rows in set (0.000 sec)

game_id	title	platform	studio	inventory
1	Skyrim	Xbox	Bethesda	4
2	FarCry	Playstation	Ubisoft	5
3	Rainbow Six	PC	Ubisoft	3

3 rows in set (0.000 sec)

condition_rating	name_of_game	game_id	is_used
8	Rainbow Six	3	0
9	FarCry	2	1
10	Skyrim	1	0

3 rows in set (0.000 sec)

customer_id	customer_first_name	customer_last_name
1	Jon	Marston
2	Mary	Jane
3	Harry	Osborn

3 rows in set (0.000 sec)

invoice_id	employee_id	customer_id	game_id	date_of_sale	price
1	1	1	1	2024-05-14	59.99
2	2	2	2	2023-06-15	49.99
3	3	3	3	2019-09-22	48.99

### Employees

Employees Invoices Customers Games Conditions

Browse employees

employee_id	first_name	last_name	action
1	Michael	Harrison	DELETE EDIT
2	Janet	Jameson	DELETE EDIT
3	Harry	Oliver	DELETE EDIT

Read / browse / display

Delete

insert

update

Add Employee

First name

Last name

Add

Update Employee

Employee ID

First Name

Last Name

Update

### Invoices

Employees Invoices Customers Games Conditions

Browse Invoices

invoice_id	employee_id	customer_id	game_id	date of sale	price	action
2	2	2	2	Thu Jun 15 2023 00:00:00 GMT-0700 (Pacific Daylight Time)	49.99	DELETE EDIT
3	3	3	3	Wed May 15 2024 00:00:00 GMT-0700 (Pacific Daylight Time)	50	DELETE EDIT
4	1	2	1	0000-00-00	55	DELETE EDIT

Browse / Display

Delete

insert

update

Add Invoice

employee id

customer id

game id

date of sale

price

Add

Update Invoice

Invoice ID

Employee ID

Customer ID

Game ID

Date of Sale

Price

Update

Games tables shares the M:N relationship with invoices and handles to the M:N deletion process with the given invoices table

### Games

Employees Invoices Customers Games Conditions

Browse games

game_id	title	platform	studio	inventory	action
1	Skyrim	Xbox	Bethesda	4	DELETE EDIT
2	FarCry	Playstation	Ubisoft	5	DELETE EDIT
3	Rainbow Six	PC	Ubisoft	3	DELETE EDIT

← Browse

← delete M:N

← insert

Add Game

title

platform

studio

inventory

condition rating

name is used

Add

Update game

Game ID

title

platform

studio

inventory

update

← update

### Conditions

Employees Invoices Customers Games Conditions

Browse conditions

condition_rating	name_of_game	game_id	is_used	action
10	Skyrim	1	0	DELETE EDIT
9	FarCry	2	1	DELETE EDIT
8	Rainbow Six	3	0	DELETE EDIT

← Browse

← Delete

← insert

Add Conditions

condition rating

name of game

game id

is used

Add

Update Condition

Game ID

Condition Rating

Name of Game

is Used

update

← update

Nullable Relationship Type

NULLABLE relationship is presented here in the form of the is used condition