

# CPSC 304 Project Cover Page

Milestone #: 4

Date: Oct 15th 2023

Group Number: 28

Name	Student Number	CS Alias (Userid)	Preferred Email Address
Ram Jayakumar	15967981	ramj21	ramjayakumar21@gmail.com
Amin Fahiminia	13006549	afahimi	afahimi@student.ubc.ca
Mercury Mcindoe	85594505	merc0606	mercurymcindoe@gmail.com

By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia.

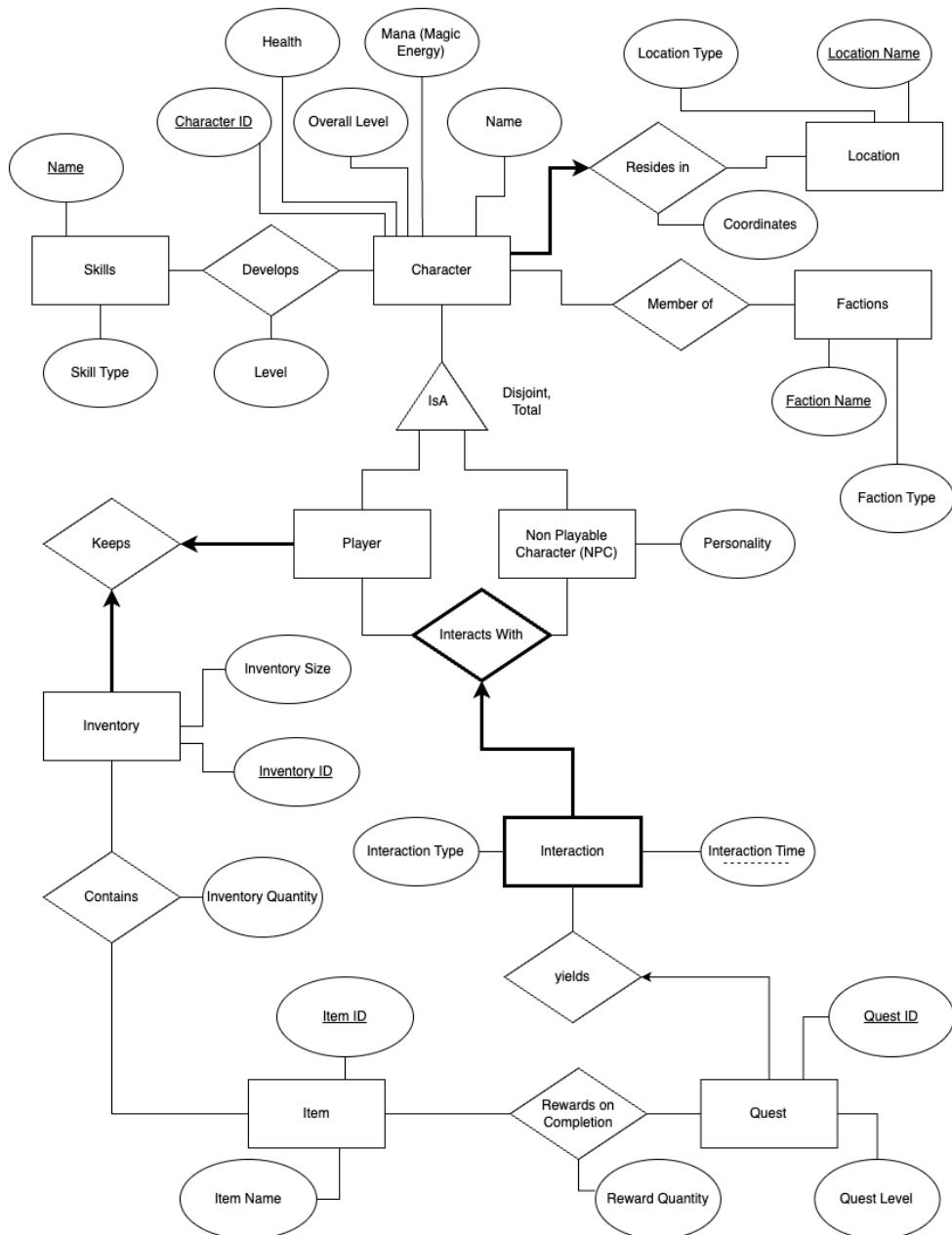
## **1. A short description of the final project, and what it accomplished.**

Our final project provides a GUI for implementing and modifying the game world in a low-code and robust way. Our project's main demographic is server administrators and owners, who can use our application to change their respective game world without needing to know any SQL or database knowledge. It would also be useful for faction leaders to see statistics on their team, and modify their users (given the correct access of course). Within this game, characters traverse through diverse landscapes, engage in social exchanges, align themselves with factions, embark on quests, and oversee inventories filled with a wide array of items. Our application generates visuals to see all that data in a simplified way.

## **2. Describe how your final schema differed from the schema you turned in.**

Our final schema changed in two ways: We changed the Inventory relation to only use InventoryId and InventoryCount, and removed PlayerID. This was at the request of the TA, as they pointed out that the PlayerID was unnecessary due to how there is a one-to-one relationship between inventories and players.

We also updated the errors in the schema, namely the mistakes of not having CharacterID be a foreign key in Player and NonPlayerCharacter. There was also the error of missing the foreign key in the RewardsOnCompletion relation, but that was resolved during normalization as that specific table was broken up.



3. A copy of the schema and screenshots that show what data is present in each relation after the SQL script from item #2 is run.

**BOLD = Foreign Key, UNDERLINE = Primary Key**

**CharacterInfo**(Character ID: int, **Coordinates**: string, Health: int, Overall Level: int, Mana, Name: int)

WHERE ORDER BY

	CHARACTERID	COORDINATES	HEALTH	OVERALLLEVEL	MANA	CHARACTERNAME
1	1382	10-20-103	100	28	38	RemmyRoblox
2	3312	15-25-20	90	4	40	Mercury1989
3	5869	5-15-20	80	3	60	AminTheAdmin
4	1129	20-30-40	70	2	70	SteveGamer
5	1269	22-36-40	60	1	80	xX_JoeShmoe_Xx
6	2001	5-15-20	1120	28	38	Average Man
7	2002	5-15-20	90	4	40	Witch
8	2003	5-15-22	82	3	60	Bug
9	2004	20-30-40	70	2	70	Demon
10	2005	22-36-40	50	1	80	Demon Dark

**CoordinateLocations**(Coordinates: string, Location Name: string *not null*)

WHERE ORDER BY

	COORDINATES	LOCATIONNAME
1	10-20-103	Floating City
2	15-25-20	The Great Forest
3	5-15-20	The Great Forest
4	5-15-22	The Great Forest
5	20-30-40	The End
6	22-36-40	The End

**Location**(Location Name: string, Location Type: string)

WHERE ORDER BY

	LOCATIONNAME	LOCATIONTYPE
1	Floating City	Sky
2	The Great Forest	Forest
3	The End	Endgame
4	Atlantis	Sea
5	Verudon	City

**MemberOf**(Character ID: int, Faction Name: string)

WHERE ORDER BY

	CHARACTERID	FACTIONNAME
1	1129	Endkeepers
2	1269	Endkeepers
3	1382	Skyguard
4	3312	Forestwatch
5	5869	Forestwatch

Factions(Faction Name: string, Faction Type: string)

WHERE ORDER BY

	FACTIONNAME	FACTONTYPE
1	Skyguard	Holy
2	Forestwatch	Neutral
3	Endkeepers	Dark
4	Seeguard	Neutral
5	Citywatch	Lawful

Skill(Skill Name: string, Skill Type: string)

WHERE 0

	SKILLNAME	SKILLTYPE
1	Sky Slash	Attack
2	Forest Heal	Heal
3	End Shield	Defense
4	Sea Wave	Attack
5	City Guard	Defense

Develops(Skill Name: string, Character ID: int, Level: int)

WHERE ORDER BY

	SKILLNAME	CHARACTERID	CURRENTLEVEL
1	Sky Slash	1382	10
2	Forest Heal	3312	5
3	Forest Heal	5869	3
4	End Shield	1129	8
5	City Guard	1269	2

Player(Character ID: int, Inventory ID: int *unique not null*)

WHERE ORDER BY

	CHARACTERID	INVENTORYID
1	1382	1001
2	3312	1002
3	5869	1003
4	1129	1004
5	1269	1005

NonPlayableCharacter(Character ID: int, Personality: string)

WHERE ORDER BY

	CHARACTERID	PERSONALITY
1	2001	Aggressive
2	2002	Helpful
3	2003	Mysterious
4	2004	Talkative
5	2005	Silent

Inventory(Inventory ID: int, **Player.CharacterID**: int *not null*, Inventory Size: int)

WHERE

ORDER BY

	INVENTORYID	INVENTORYSIZE
1	1001	20
2	1002	15
3	1003	18
4	1004	25
5	1005	10

**Contains(Inventory ID: int, Item ID: int, Inventory Quantity: int)**

WHERE

ORDER BY

	INVENTORYID	ITEMID	INVENTORYQUANTITY
1	1001	1001	1
2	1001	1002	1
3	1001	1004	1
4	1001	1003	1
5	1001	1005	1
6	1002	1002	1
7	1003	1003	5
8	1004	1004	2

**Item(Item ID: int, Item Name: string)**

WHERE

ORDER BY

	ITEMID	ITEMNAME
1	1001	Sword of Light
2	1002	Dark Shield
3	1003	Health Potion
4	1004	Bow of Eternity
5	1005	Ring of Strength

**QuestRewards(Quest ID: int, Reward Quantity: int)**

WHERE ORDER BY

	QUESTID	RewardQuantity
1	101	1
2	112	1
3	312	5
4	12	1
5	99	3

**RewardItems**(Reward Quantity: int, Item ID: int)

WHERE ORDER BY

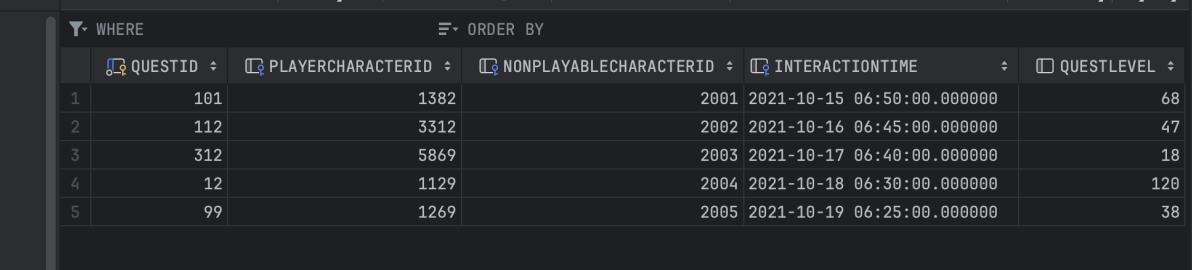
	REWARDQUANTITY	ITEMID
1	1	1001
2	2	1002
3	5	1003
4	3	1004
5	4	1005

**Interactions**(Player.Character ID: int, NonPlayableCharacter.Character ID: int  
Interaction Time: int *not null*, Interaction Type: string)

WHERE ORDER BY

	PLAYERCHARACTERID	NONPLAYABLECHARACTERCHARACTERID	INTERACTIONTIME	INTERACTIONTYPE
1	1382		2001 2021-10-15 06:50:00.000000	Conversation
2	3312		2002 2021-10-16 06:45:00.000000	Combat
3	5869		2003 2021-10-17 06:40:00.000000	Trade
4	1129		2004 2021-10-18 06:30:00.000000	Trade
5	1269		2005 2021-10-19 06:25:00.000000	Conversation

**YieldsQuest(QuestID: int, **Player.CharacterId**: int,  
**NonPlayableCharacter.CharacterId**: int, **Interaction Time**: int, **Quest Level**: int)**



QUESTID	PLAYERCHARACTERID	NONPLAYABLECHARACTERID	INTERACTIONTIME	QUESTLEVEL
1	101	1382	2001 2021-10-15 06:50:00.000000	68
2	112	3312	2002 2021-10-16 06:45:00.000000	47
3	312	5869	2003 2021-10-17 06:40:00.000000	18
4	12	1129	2004 2021-10-18 06:30:00.000000	120
5	99	1269	2005 2021-10-19 06:25:00.000000	38

#### 4. ANSWERS TO qD AND qE

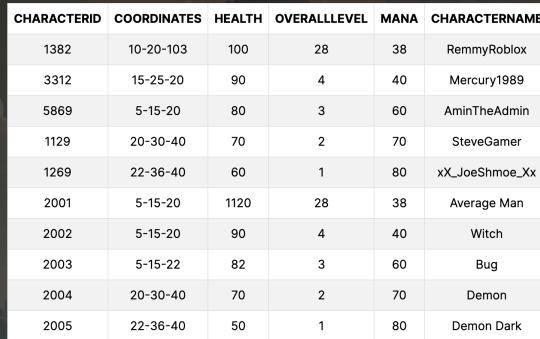
##### INSERT

Location: ./app/app/page.tsx, Lines 742 - 751

```
case "INSERT":
  let entities = Object.keys(query).join(",");
  let values = Object.values(query)
    .map(entity) => {
      const converted = convertStringToIntIfPossible(entity);
      return typeof converted === "number" ? converted : `.${converted}.`;
    }
  .join(",");
  executeQuery = `INSERT INTO ${currTable} VALUES (${sanitizeInputs(values)}); COMMIT`;
  break;
```

Screenshots:

Character Table before insert



CHARACTERID	COORDINATES	HEALTH	OVERALLLEVEL	MANA	CHARACTERNAME
1382	10-20-103	100	28	38	RemmyRoblox
3312	15-25-20	90	4	40	Mercury1989
5869	5-15-20	80	3	60	AminTheAdmin
1129	20-30-40	70	2	70	SteveGamer
1269	22-36-40	60	1	80	xX_JoeShmoe_Xx
2001	5-15-20	1120	28	38	Average Man
2002	5-15-20	90	4	40	Witch
2003	5-15-22	82	3	60	Bug
2004	20-30-40	70	2	70	Demon
2005	22-36-40	50	1	80	Demon Dark

Fill in input elements for inserting new Character based off its properties



Character table now has new tuple of 'Goblin'

CHARACTERID	COORDINATES	HEALTH	OVERALLLEVEL	MANA	CHARACTERNAME
4922	10-20-103	37	12	37	Goblin
1382	10-20-103	100	28	38	RemmyRoblox
3312	15-25-20	90	4	40	Mercury1989
5869	5-15-20	80	3	60	AminTheAdmin
1129	20-30-40	70	2	70	SteveGamer
1269	22-36-40	60	1	80	xX_JoeShmoe_Xx
2001	5-15-20	1120	28	38	Average Man
2002	5-15-20	90	4	40	Witch
2003	5-15-22	82	3	60	Bug
2004	20-30-40	70	2	70	Demon
2005	22-36-40	50	1	80	Demon Dark

## DELETE

Location: ./app/app/page.tsx, Lines 753 - 761

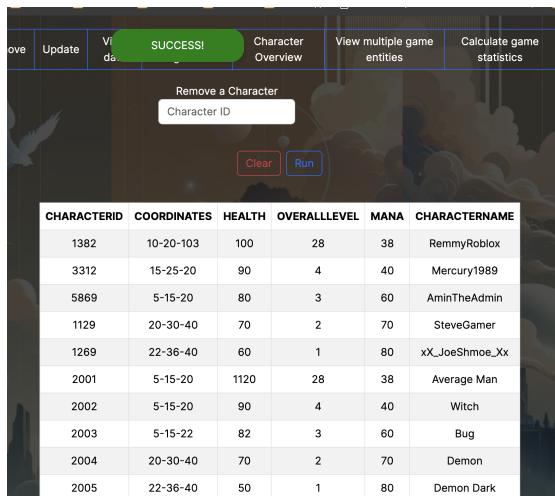
Screenshots: Character table with tuple 'Goblin'

CHARACTERID	COORDINATES	HEALTH	OVERALLLEVEL	MANA	CHARACTERNAME
4922	10-20-103	37	12	37	Goblin
1382	10-20-103	100	28	38	RemmyRoblox
3312	15-25-20	90	4	40	Mercury1989
5869	5-15-20	80	3	60	AminTheAdmin
1129	20-30-40	70	2	70	SteveGamer
1269	22-36-40	60	1	80	xX_JoeShmoe_Xx
2001	5-15-20	1120	28	38	Average Man
2002	5-15-20	90	4	40	Witch
2003	5-15-22	82	3	60	Bug
2004	20-30-40	70	2	70	Demon
2005	22-36-40	50	1	80	Demon Dark

Enter in primary key of table, for Character it is Character ID



After running, Success notification is given and 'Goblin' tuple is removed



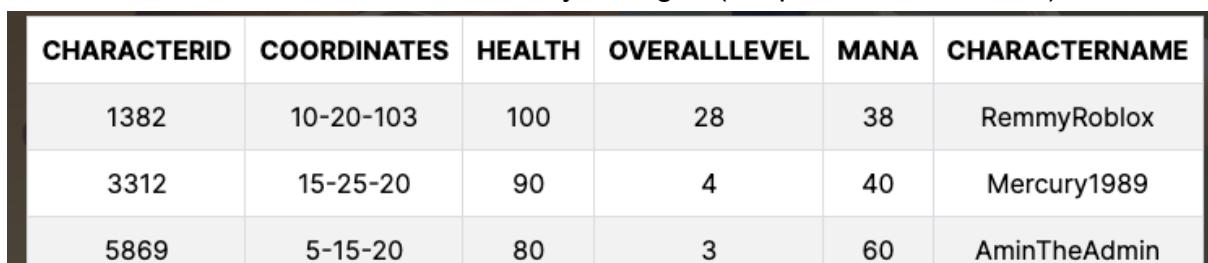
CHARACTERID	COORDINATES	HEALTH	OVERALLLEVEL	MANA	CHARACTERNAME
1382	10-20-103	100	28	38	RemmyRoblox
3312	15-25-20	90	4	40	Mercury1989
5869	5-15-20	80	3	60	AminTheAdmin
1129	20-30-40	70	2	70	SteveGamer
1269	22-36-40	60	1	80	xX_JoeShmoe_Xx
2001	5-15-20	1120	28	38	Average Man
2002	5-15-20	90	4	40	Witch
2003	5-15-22	82	3	60	Bug
2004	20-30-40	70	2	70	Demon
2005	22-36-40	50	1	80	Demon Dark

## UPDATE

Location: ./app/app/page.tsx, Lines 763 - 780

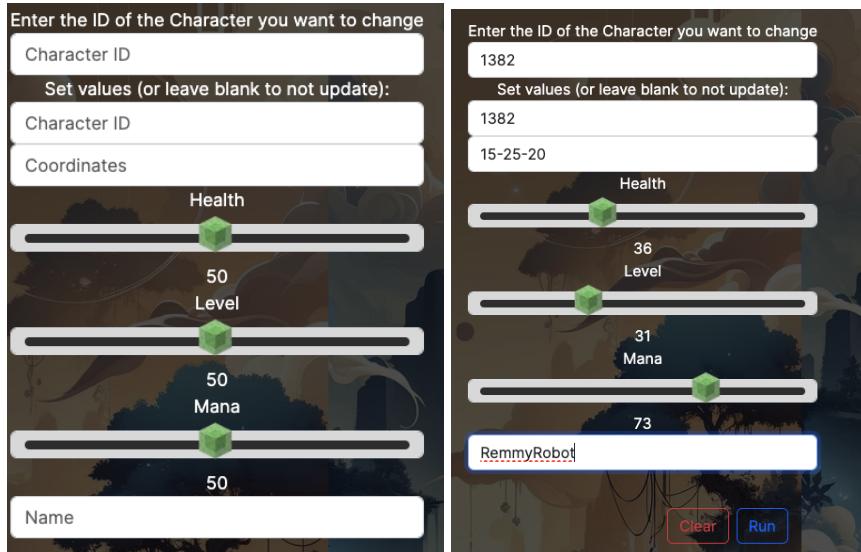
```
case "UPDATE":  
  let targetRow = Object.entries(query)  
    .map(([key, value]) => {  
      return returnProperString(key, value);  
    })  
    .join(" AND ");  
  
  console.log(updateValues);  
  
  let updates = Object.entries(updateValues)  
    .filter(([key, value]) => value.trim() !== "")  
    .map(([key, value]) => {  
      return returnProperString(key, value);  
    })  
    .join(", ");  
  executeQuery = `UPDATE ${currTable} SET ${sanitizeInputs(updates)} WHERE ${targetRow}; COMMIT`;  
  setUpdateValues({});  
  break;
```

Screenshots: Character table before any changes (keep notice of first row)



CHARACTERID	COORDINATES	HEALTH	OVERALLLEVEL	MANA	CHARACTERNAME
1382	10-20-103	100	28	38	RemmyRoblox
3312	15-25-20	90	4	40	Mercury1989
5869	5-15-20	80	3	60	AminTheAdmin

Select primary key and values wish to be changed for that tuple



After command is run, updated tuple is now visible

CHARACTERID	COORDINATES	HEALTH	OVERALLLEVEL	MANA	CHARACTERNAME
1382	15-25-20	36	31	73	RemmyRobot
3312	15-25-20	90	4	40	Mercury1989

## JOIN

Location: ./app/app/page.tsx, Lines 789 - 805

```

case "MULTIJOIN":
    where_clause = defaultQuery
    ? sanitizeInputs(defaultQuery) !== ""
    ? `WHERE ${sanitizeInputs(defaultQuery)}`
    : ""
    : "";
executeQuery =
SELECT DISTINCT CHARACTERNAME, HEALTH, OVERALLLEVEL, MANA, LOCATIONNAME, SKILLNAME FROM CHARACTERINFO
LEFT JOIN PLAYER ON PLAYER.CHARACTERID = CHARACTERINFO.CHARACTERID
LEFT JOIN COORDINATELOCATIONS ON COORDINATELOCATIONS.COORDINATES = CHARACTERINFO.COORDINATES
LEFT JOIN DEVELOPS ON CHARACTERINFO.CHARACTERID = DEVELOPS.CHARACTERID
```
if (whereHavingStr !== "") {
    executeQuery += `WHERE ${sanitizeInputs(whereHavingStr)}`;
}
break;

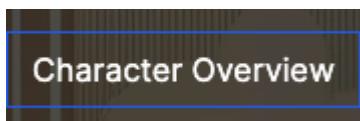
```

Screenshots:

The character table before any joins

| CHARACTERID | COORDINATES | HEALTH | OVERALLLEVEL | MANA | CHARACTERNAME  |
|-------------|-------------|--------|--------------|------|----------------|
| 1382        | 15-25-20    | 36     | 31           | 73   | RemmyRobot     |
| 3312        | 15-25-20    | 90     | 4            | 40   | Mercury1989    |
| 5869        | 5-15-20     | 80     | 3            | 60   | AminTheAdmin   |
| 1129        | 20-30-40    | 70     | 2            | 70   | SteveGamer     |
| 1269        | 22-36-40    | 60     | 1            | 80   | xX_JoeShmoe_Xx |
| 2001        | 5-15-20     | 1120   | 28           | 38   | Average Man    |
| 2002        | 5-15-20     | 90     | 4            | 40   | Witch          |
| 2003        | 5-15-22     | 82     | 3            | 60   | Bug            |
| 2004        | 20-30-40    | 70     | 2            | 70   | Demon          |
| 2005        | 22-36-40    | 50     | 1            | 80   | Demon Dark     |

Character overview will join character info, locations, and skills to get more info on a character



By joining, we will get the following table

| CHARACTERNAME  | HEALTH | OVERALLLEVEL | MANA | LOCATIONNAME     | SKILLNAME   |
|----------------|--------|--------------|------|------------------|-------------|
| RemmyRoblox    | 100    | 28           | 38   | Floating City    | Sea Wave    |
| Average Man    | 1120   | 28           | 38   | The Great Forest |             |
| Bug            | 82     | 3            | 60   | The Great Forest |             |
| RemmyRoblox    | 100    | 28           | 38   | Floating City    | End Shield  |
| Mercury1989    | 90     | 4            | 40   | The Great Forest | Forest Heal |
| xX_JoeShmoe_Xx | 60     | 1            | 80   | The End          | City Guard  |
| SteveGamer     | 70     | 2            | 70   | The End          |             |
| Demon Dark     | 50     | 1            | 80   | The End          |             |
| RemmyRoblox    | 100    | 28           | 38   | Floating City    | City Guard  |
| AminTheAdmin   | 80     | 3            | 60   | The Great Forest | Forest Heal |
| RemmyRoblox    | 100    | 28           | 38   | Floating City    | Sky Slash   |
| Witch          | 90     | 4            | 40   | The Great Forest |             |
| RemmyRoblox    | 100    | 28           | 38   | Floating City    | Forest Heal |
| Demon          | 70     | 2            | 70   | The End          |             |

## PROJECTION

Location: ./app/app/page.tsx, Lines 782 - 787

```
case "PROJECT":  
    setProjectSelections([]);  
    executeQuery = `SELECT ${projectSelections.join(  
        ","  
    )} FROM ${currTable}`;  
    break;
```

This is the Interaction table prior projection

| PLAYERCHARACTERID | NONPLAYABLECHARACTERCHARACTERID | INTERACTIONTIME              | INTERACTIONTYPE |
|-------------------|---------------------------------|------------------------------|-----------------|
| 1382              | 2001                            | 15-OCT-21 06.50.00.000000 AM | Conversation    |
| 3312              | 2002                            | 16-OCT-21 06.45.00.000000 AM | Combat          |
| 5869              | 2003                            | 17-OCT-21 06.40.00.000000 AM | Trade           |
| 1129              | 2004                            | 18-OCT-21 06.30.00.000000 AM | Trade           |
| 1269              | 2005                            | 19-OCT-21 06.25.00.000000 AM | Conversation    |

We'll select columns InteractionTime and Non Playable Character ID to project on



After executing, we have only columns InteractionTime and Non Playable Character ID left

| INTERACTIONTIME              | NONPLAYABLECHARACTERCHARACTERID |
|------------------------------|---------------------------------|
| 18-OCT-21 06.30.00.000000 AM | 2004                            |
| 19-OCT-21 06.25.00.000000 AM | 2005                            |
| 15-OCT-21 06.50.00.000000 AM | 2001                            |
| 16-OCT-21 06.45.00.000000 AM | 2002                            |
| 17-OCT-21 06.40.00.000000 AM | 2003                            |

## SELECTION

Location: ./app/app/page.tsx, Lines 726 - 740

```

switch (op) {
  case "SELECT":
    let string = defaultQuery ? `${defaultQuery}` : "*";
    setProjectSelections([]);
    where_clause = defaultQuery
      ? sanitizeInputs(defaultQuery) !== ""
        ? `WHERE ${sanitizeInputs(defaultQuery)}`
        : ""
      : "";
    executeQuery = `SELECT ${projectSelections.join(
      ","
    )} FROM ${currTable} ${where_clause}`;
    if (whereHavingStr !== "") {
      executeQuery += `WHERE ${whereHavingStr}`;
    }
  break;
}

```

This is the Player Skills (Develops in SQL) table when no SQL query has been ran

| SKILLNAME   | CHARACTERID | CURRENTLEVEL |
|-------------|-------------|--------------|
| Sky Slash   | 1382        | 10           |
| Forest Heal | 1382        | 18           |
| End Shield  | 1382        | 20           |
| Sea Wave    | 1382        | 5            |
| City Guard  | 1382        | 2            |
| Forest Heal | 3312        | 5            |
| Forest Heal | 5869        | 3            |
| City Guard  | 1269        | 2            |

We'll select those columns skill name and current level where the level is greater or equal to 7

The screenshot shows a search interface for player skills. On the left, there's a sidebar labeled "Find in Player Skills". On the right, there's a search bar with the placeholder "Filter:".

The search bar contains the following filters:

- A dropdown menu for "CURRENTLEVEL" with the operator ">>" and the value "7".
- A dropdown menu for "SKILLNAME" with the operator "=" and the value "Forest Heal".
- An "OR" button.

As a result we get skills with level  $\geq 7$  or skill name = "Forest Heal"

| SKILLNAME   | CURRENTLEVEL |
|-------------|--------------|
| Sky Slash   | 10           |
| Forest Heal | 18           |
| End Shield  | 20           |
| Forest Heal | 5            |
| Forest Heal | 3            |

## AGGREGATION GROUP BY

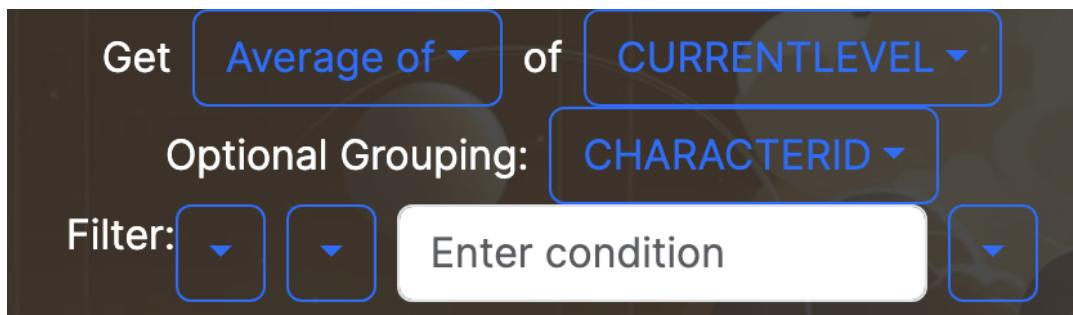
Location: ./app/app/page.tsx, Lines 828 - 841

```
case "AGGREGATION":  
  if (groupBy[1] == undefined) {  
    executeQuery = `SELECT ${groupBy[0]} FROM ${currTable}`;  
  }  
  
  else {  
    executeQuery = `SELECT ${groupBy[0]}, ${groupBy[1]} FROM ${currTable} GROUP BY ${groupBy[1]}`;  
  }  
  
  if (whereHavingStr !== "") {
```

This is the Develops table prior to running anything.

| SKILLNAME   | CHARACTERID | CURRENTLEVEL |
|-------------|-------------|--------------|
| Sky Slash   | 1382        | 10           |
| Forest Heal | 1382        | 18           |
| End Shield  | 1382        | 20           |
| Sea Wave    | 1382        | 5            |
| City Guard  | 1382        | 2            |
| Forest Heal | 3312        | 5            |
| Forest Heal | 5869        | 3            |
| City Guard  | 1269        | 2            |

We're going to get the average of the current skill level and group it by character id



The result is the following,

| AVG(CURRENTLEVEL) | CHARACTERID |
|-------------------|-------------|
| 11                | 1382        |
| 5                 | 3312        |
| 2                 | 1269        |
| 3                 | 5869        |

## AGGREGATION WITH HAVING

Location: ./app/app/page.tsx, Lines 828 - 845

```
executeQuery += `WHERE ${sanitizeInputs(whereHavingStr)}`;  
} else {  
  executeQuery = `SELECT ${groupByOperation}(${groupBy[0]}), ${groupBy[1]} FROM ${currTable} GROUP BY ${groupBy[1]}`;  
  executeQuery += `HAVING ${sanitizeInputs(whereHavingStr)}`;  
}  
};
```

This is the character table before grouping.

| CHARACTERID | COORDINATES | HEALTH | OVERALLLEVEL | MANA | CHARACTERNAME  |
|-------------|-------------|--------|--------------|------|----------------|
| 1382        | 15-25-20    | 36     | 31           | 73   | RemmyRobot     |
| 3312        | 15-25-20    | 90     | 4            | 40   | Mercury1989    |
| 5869        | 5-15-20     | 80     | 3            | 60   | AminTheAdmin   |
| 1129        | 20-30-40    | 70     | 2            | 70   | SteveGamer     |
| 1269        | 22-36-40    | 60     | 1            | 80   | xX_JoeShmoe_Xx |
| 2001        | 5-15-20     | 1120   | 28           | 38   | Average Man    |
| 2002        | 5-15-20     | 90     | 4            | 40   | Witch          |
| 2003        | 5-15-22     | 82     | 3            | 60   | Bug            |
| 2004        | 20-30-40    | 70     | 2            | 70   | Demon          |
| 2005        | 22-36-40    | 50     | 1            | 80   | Demon Dark     |

We will get the count of Character Ids and group by Coordinates, excluding Coordinates 20-30-40

The screenshot shows a user interface for data aggregation. At the top, it says "Get Count of of CHARACTERID". Below that, under "Optional Grouping:", is "COORDINATES". Under "Filter:", there is a dropdown set to "COORDINATES", a comparison operator " $<>$ ", and a value "20-30-40". A small dropdown arrow is also visible.

As a result we get,

| COUNT(CHARACTERID) | COORDINATES |
|--------------------|-------------|
| 2                  | 15-25-20    |
| 2                  | 22-36-40    |
| 3                  | 5-15-20     |
| 1                  | 5-15-22     |

## NESTED AGGREGATION WITH GROUP BY

Location: ./app/app/utils/nested\_aggregations.ts, Lines 36 - 41

```
"Count of Players with Health Greater than Average Player Health For each Level": `SELECT COUNT(P.CharacterID) AS Count, OVERALLLEVEL
FROM Player P, CharacterInfo C
WHERE P.CharacterID = C.CharacterID AND C.Health > (SELECT AVG(Health)
FROM CharacterInfo C2, Player P1
WHERE P1.CharacterID = C2.CharacterID)
GROUP BY OVERALLLEVEL` ,
```

The tables Location, Coordinates and CharacterInfo will be used for nested aggregation.

| CHARACTERID | COORDINATES | HEALTH | OVERALLLEVEL | MANA | CHARACTERNAME  |
|-------------|-------------|--------|--------------|------|----------------|
| 1382        | 15-25-20    | 36     | 31           | 73   | RemmyRobot     |
| 3312        | 15-25-20    | 90     | 4            | 40   | Mercury1989    |
| 5869        | 5-15-20     | 80     | 3            | 60   | AminTheAdmin   |
| 1129        | 20-30-40    | 70     | 2            | 70   | SteveGamer     |
| 1269        | 22-36-40    | 60     | 1            | 80   | xX_JoeShmoe_Xx |
| 2001        | 5-15-20     | 1120   | 28           | 38   | Average Man    |
| 2002        | 5-15-20     | 90     | 4            | 40   | Witch          |
| 2003        | 5-15-22     | 82     | 3            | 60   | Bug            |
| 2004        | 20-30-40    | 70     | 2            | 70   | Demon          |
| 2005        | 22-36-40    | 50     | 1            | 80   | Demon Dark     |

We'll select the query,

What would you like to know? Count of Players with Health Greater than Average Player Health For each Level ▾

By running this we're running the nested aggregation query

```
SELECT COUNT(P.CharacterID) AS Count, OVERALLLEVEL
FROM Player P, CharacterInfo C
WHERE P.CharacterID = C.CharacterID AND C.Health > (SELECT AVG(Health)
    FROM CharacterInfo C2, Player P1
    WHERE P1.CharacterID = C2.CharacterID)
GROUP BY OVERALLLEVEL
```

And this will give the result,

| COUNT | OVERALLLEVEL |
|-------|--------------|
| 1     | 4            |
| 1     | 28           |

## DIVISION

Location: ./app/app/utils/division\_questions.ts, Lines 6 - 29  
Screenshots:

```

export const divisionQueries: DivisionQueries = {
  "Select all players who have all items": `

    CREATE OR REPLACE VIEW DIVIDEND AS
      SELECT ITEMID, INVENTORYID, CHARACTERID, HEALTH, OVERALLLEVEL, MANA, CHARACTERNAME, INVENTORYQUANTITY FROM PLAYER
      NATURAL JOIN CHARACTERINFO
      NATURAL JOIN CONTAINS;

    CREATE OR REPLACE VIEW TEMP_DIVIDEND AS
      SELECT DISTINCT INVENTORYID, CHARACTERID, HEALTH, OVERALLLEVEL, MANA, CHARACTERNAME, INVENTORYQUANTITY
      FROM DIVIDEND;

    CREATE OR REPLACE VIEW DIVISOR AS
      SELECT DISTINCT ITEMID FROM ITEM;

    CREATE OR REPLACE VIEW INTERMEDIATE AS
      SELECT * FROM DIVISOR, TEMP_DIVIDEND
      MINUS
      SELECT * FROM DIVIDEND;

    SELECT * FROM TEMP_DIVIDEND
    MINUS
    SELECT INVENTORYID, CHARACTERID, HEALTH, OVERALLLEVEL, MANA, CHARACTERNAME, INVENTORYQUANTITY FROM INTERMEDIATE;
  `,
};

```

These are the tables that will be used for the division query,

| CHARACTERID | COORDINATES | HEALTH | OVERALLLEVEL | MANA | CHARACTERNAME  |
|-------------|-------------|--------|--------------|------|----------------|
| 1382        | 15-25-20    | 36     | 31           | 73   | RemmyRobot     |
| 3312        | 15-25-20    | 90     | 4            | 40   | Mercury1989    |
| 5869        | 5-15-20     | 80     | 3            | 60   | AminTheAdmin   |
| 1129        | 20-30-40    | 70     | 2            | 70   | SteveGamer     |
| 1269        | 22-36-40    | 60     | 1            | 80   | xX_JoeShmoe_Xx |
| 2001        | 5-15-20     | 1120   | 28           | 38   | Average Man    |
| 2002        | 5-15-20     | 90     | 4            | 40   | Witch          |
| 2003        | 5-15-22     | 82     | 3            | 60   | Bug            |
| 2004        | 20-30-40    | 70     | 2            | 70   | Demon          |
| 2005        | 22-36-40    | 50     | 1            | 80   | Demon Dark     |
| 2331        | 15-25-20    | 33     | 69           | 26   | dad            |

| INVENTORYID | ITEMID | INVENTORYQUANTITY |
|-------------|--------|-------------------|
| 1001        | 1001   | 1                 |
| 1001        | 1002   | 1                 |
| 1001        | 1004   | 1                 |
| 1001        | 1003   | 1                 |
| 1001        | 1005   | 1                 |
| 1002        | 1002   | 1                 |
| 1003        | 1003   | 5                 |
| 1004        | 1004   | 2                 |

| ITEMID | ITEMNAME         |
|--------|------------------|
| 1001   | Sword of Light   |
| 1002   | Dark Shield      |
| 1003   | Health Potion    |
| 1004   | Bow of Eternity  |
| 1005   | Ring of Strength |

And by selecting the corresponding query

What would you like to know?: Select all players who have all items ▾

Then this runs the query,

```
" CREATE OR REPLACE VIEW DIVIDEND AS
SELECT ITEMID, INVENTORYID, CHARACTERID, HEALTH, OVERALLLEVEL,
MANA, CHARACTERNAME, INVENTORYQUANTITY FROM PLAYER
NATURAL JOIN CHARACTERINFO
NATURAL JOIN CONTAINS;

CREATE OR REPLACE VIEW TEMP_DIVIDEND AS
SELECT DISTINCT INVENTORYID, CHARACTERID, HEALTH,
OVERALLLEVEL, MANA, CHARACTERNAME, INVENTORYQUANTITY
FROM DIVIDEND;

CREATE OR REPLACE VIEW DIVISOR AS
SELECT DISTINCT ITEMID FROM ITEM;

CREATE OR REPLACE VIEW INTERMEDIATE AS
SELECT * FROM DIVISOR, TEMP_DIVIDEND
MINUS
SELECT * FROM DIVIDEND;

SELECT * FROM TEMP_DIVIDEND
MINUS
SELECT INVENTORYID, CHARACTERID, HEALTH, OVERALLLEVEL, MANA,
CHARACTERNAME, INVENTORYQUANTITY FROM INTERMEDIATE;"
```

And we get the result,

| INVENTORYID | CHARACTERID | HEALTH | OVERALLLEVEL | MANA | CHARACTERNAME | INVENTORYQUANTITY |
|-------------|-------------|--------|--------------|------|---------------|-------------------|
| 1001        | 1382        | 36     | 31           | 73   | RemmyRobot    | 1                 |