

CPSC 304 Project Cover Page

Milestone #: 4

Date: 12/01/2023

Group Number: 60

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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

Description

Our project involves designing a database to represent a system that manages games of various types, tracks player statistics, supports player profiles, and leaderboard tracking for each game. We are aiming to model how a company might want to handle and track data related to the games they provide and the players that play them. For example, game platforms such as Steam that host different amounts of games, and players can access it all in one place.

Our project accomplished our goal of completing an end-to-end system that allowed the user to "sign-in" to the game management system, then access their profile and see all the games that are available to them. They can explore greater information about the game they want to play such as the Developer Company, or Publisher.

Current Schema

The current schema differs from our original ER diagram outlined in Milestone 1 due to a few small adjustments and two significant changes. The larger modifications include the merging of two entities, removal of a many-to-many relationship, and the decomposition of an entity.

The smaller differences include the addition of attributes aimed to specifically identify the entity and serve as their primary key. An example would be introducing the key 'PlayerID' to uniquely determine a Player. Another adjustment involved the relationship between Publisher and Game, originally defined to be many-to-many with a participation constraint on the side of the Game. Although this constraint could be maintained after learning more about assertions in the SQL module, through further consideration, we decided to model the relationship as a one-to-many relationship such that a Game only has one Publisher, reflecting the typical real-world scenario where a game is published by a single company. As well, we previously did not have a partial key for our weak entity, so we identified that to be the "rank" attribute.

Upon further discussion regarding the behaviour and intent behind the PlayerProfile entity, we discovered its redundancy. As the entity PlayerProfile had only one non-recursive relationship with Player, which had both a key and participation constraint denoting exactly one, merging PlayerProfile and Player seemed much more logical. We could do this because Player and PlayerProfile are one-to-one. Additionally, the combination of these two entities works well because a Player only has one PlayerProfile across all Games, meaning that PlayerProfile never interacts with other relations directly than itself or Player. Thus, the first change is the removal of the entity PlayerProfile. After merging the two entities, the self-referencing relationship that PlayerProfile had became a self-referencing relationship for Player between Player 1 and Player 2.

The second difference between our original and current schema is the removal of the relationship between DeveloperCompany and Publisher. In game production, it is not necessarily the case that a developing company works for the publisher or vice versa, as seen with independent contracting companies. Therefore, in order to more accurately model real-world relationships between these companies, we decided that removing the relationship would enhance comprehensibility and generalize the representation of our schema to the real-world.

The last modification is the decomposition of the table Game into two relations that satisfy 3NF, Game and Genre. To make a more meaningful decomposition into 3NF, we added another functional dependency to Game: ageRestriction and MultiplayerGame: serverRegion. Now, we created a meaningful dependency as Genre and Server determines what the ageRestriction of a game will be and serverRegion determines what the voiceChatProvider will be. For example, violent horror games will have an ageRestriction of R for Restricted, while a

farming RPG will have an ageRestriction or rating of E for Everyone. Another example is that if an 'America-1001' server would be provided by a voice chat 'Voices'.

Schema Screenshots and Data

Schema:

Publisher (publisherID, publisherName)
Genre (genre, ageRestriction)
Game (gameID, title, **genre**, releaseDate, platform)
SinglePlayerGame (gameID, difficulty)
Server (serverRegion, voiceChatProvider)
MultiplayerGame (gameID, **serverRegion**)
Leaderboard (leaderboardID, visibility, timeFrame, **gameID**)
DeveloperCompany (developerID, developerName, hqCity)
Player (playerID, playerEmail, dateOfBirth, rank, avatar, bio)
Statistic (**playerID**, **rank**, score)
Team (teamID, creationDate)
DeveloperGame (**developerID**, **gameID**)
PublisherGame (**publisherID**, **gameID**)
LeaderboardStatistic (**leaderboardID**, **playerID**, **rank**)
GameTeam (**gameID**, **teamID**)
TeamPlayer (**playerID**, **teamID**)
GamePlayer (**playerID**, **gameID**)
Friend (**playerID1**, **playerID2**)

Tuples in each Relation:

Publisher (publisherID, publisherName)

PUBLISHERID	PUBLISHERNAME
1	Ink Splatter Press
2	Game Publishers
3	Wonderful Whimsy
4	Reach for the Stars
5	Midnight Flourish

Genre (genre, ageRestriction)

GENRE	AGERESTRICTION
FPS Shooter	T
Adventure RPG	E
Action RPG	A
MOBA	T
Strategy	E

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE		
GENRE	RELEASED	DATE	PLATFORM
1	Maple Story		
Adventure RPG	10-OCT-23		iOS
2	League of Legends		
MOBA	10-OCT-23		Microsoft Windows
3	Valorant		
FPS Shooter	10-OCT-23		Microsoft Windows
GAMEID	TITLE		
GENRE	RELEASED	DATE	PLATFORM
4	TeamFight Tactics		
Strategy	10-OCT-23		Microsoft Windows
5	Genshin Impact		
Adventure RPG	10-OCT-23		Microsoft Windows
6	The Witcher 3: Wild Hunt		
Adventure RPG	10-OCT-23		PC
GAMEID	TITLE		
GENRE	RELEASED	DATE	PLATFORM
7	Assassins Creed Valhalla		
Action RPG	10-OCT-23		Xbox
8	The Legend of Zelda: Breath of the Wild		
Adventure RPG	10-OCT-23		Nintendo Switch
9	Cyberpunk 2077		
Action RPG	10-OCT-23		PC

GAMEID	TITLE		
GENRE	RELEASED	DATE	PLATFORM
10	Red Dead Redemption 2		
Action RPG	10-OCT-23		PlayStation
12	test		
FPS Shooter	30-NOV-23		PC

SinglePlayerGame (gameID, difficulty)

GAMEID	DIFFICULTY
6	6
7	8
8	10
9	9
10	3
12	10

Server (serverRegion, voiceChatProvider)

SERVERREGION	VOICECHATPROVIDER
America-1001	Voices
America-1002	VoicePro
America-1003	TeamSpeak
America-1004	Noise
America-1005	Mumble

MultiplayerGame (gameID, serverRegion)

GAMEID	SERVERREGION
1	America-1001
2	America-1002
3	America-1003
4	America-1004
5	America-1005

Leaderboard (leaderboardID, visibility, timeFrame, gameID)

LEADERBOARDID	VISIBILITY	TIMEFRAME
GAMEID		
1	1	2023-10-12 - 2023-10-19
2	1	2023-10-12 - 2023-10-19
3	1	2023-10-12 - 2023-10-19
4	0	2023-10-12 - 2023-10-19
5	1	2023-10-12 - 2023-10-19
6	1	2023-10-12 - 2023-10-19

LEADERBOARDID	VISIBILITY	TIMEFRAME

GAMEID		

7	1	2023-10-12 - 2023-10-19
8	1	2023-10-12 - 2023-10-19
9	0	2023-10-12 - 2023-10-19
LEADERBOARDID VISIBILITY TIMEFRAME		

GAMEID		

10	1	2023-10-12 - 2023-10-19
10		

DeveloperCompany (developerID, developerName, hqCity)

DEVELOPERID	DEVELOPERNAME	HQCITY

1	Awesome Games	Calgary
2	Cool Games	Vancouver
3	Machine Games	Toronto
4	Riot	LA
5	Blizzard	NYC

Player (playerID, playerEmail, dateOfBirth, rank, avatar, bio)

PLAYERID	PLAYEREMAIL	DATEOFBIR	RANK

AVATAR			

BIO			

1	grace@gmail.com	10-OCT-02	1
/path/to/avatar1.jpg			
Gamer, explorer, and thrill-seeker.			
2	sophie@gmail.com	23-OCT-02	2
/path/to/avatar2.jpg			
Casual gamer			
PLAYERID PLAYEREMAIL DATEOFBIR RANK			

AVATAR			

BIO			

3	audrey@gmail.com	20-NOV-03	3
/path/to/avatar3.jpg			
competitive.			
4	jane@gmail.com	30-APR-03	4
/path/to/avatar4.jpg			

PLAYERID	PLAYEREMAIL	DATEOFBIR	RANK

AVATAR			

BIO			

live laugh love.			

5	sam@gmail.com	10-MAY-03	5
/path/to/avatar5.jpg			
i will win			

Statistic (playerID, rank, score)

PLAYERID	RANK	SCORE

1	200	49988
2	7	2020204
3	1	8000878
4	20	4482748
5	9000	434

Team (teamID, creationDate)

TEAMID	CREATIOND

1	10-MAY-03
2	07-JUN-18
3	14-JAN-21
4	13-DEC-22
5	10-MAY-13

DeveloperGame (developerID, gameID)

DEVELOPERID	GAMEID

1	1
1	2
2	3
2	4
3	5
3	6
4	7
4	8
5	9
5	10

PublisherGame (publisherID, gameID)

PUBLISHERID	GAMEID
1	1
1	2
2	3
2	4
3	5
3	6
4	7
4	8
5	9
5	10

LeaderboardStatistic (leaderboardID, playerID, rank)

LEADERBOARDID	PLAYERID	RANK
1	1	200
2	2	7
3	3	1
4	4	20
5	5	9000

GameTeam (gameID, teamID)

GAMEID	TEAMID
1	1
1	2
2	3
2	4
2	5

TeamPlayer (playerID, teamID)

PLAYERID	TEAMID
1	1
1	2
1	5
2	1
2	2
3	3
3	4
3	5
4	4
5	4

GamePlayer (playerID, gameID)

PLAYERID	GAMEID
1	1
2	1
3	1
4	1
5	1
5	2
5	3
5	4
5	5
5	6
5	7
PLAYERID	GAMEID
5	8
5	9
5	10

Friend (**playerID1**, **playerID2**)

PLAYERID1	PLAYERID2
1	2
2	3
3	4
4	5
5	3

SQL Queries

d. A list of all SQL queries used and where it can be found in the code (i.e., file name and line number(s)). For SQL query requirements, check the rubric listed on Canvas for Milestone 4. e. Screenshots demonstrating the functionality of each query using the GUI. We want to see a before/during/after progression of events.

For example, the before screenshot would be what data is in the table before you run the query, the during screenshot(s) is how the query is triggered using the GUI, and the after screenshot is what data is in your table afterwards.

Please label each set of screenshots with the name of the query it is meant to address (e.g., “Insert Operation”). You need only to include screenshots for the required queries – if you implemented more than what was required, screenshots are not needed for those extra queries.

INSERT (Game)

File: appService.js

Line: 132

Before:Game (gameID, title, **genre**, releaseDate, platform)

GENRE	RELEASE	DATE	PLATFORM
-------	---------	------	----------

1 Maple Story			
Adventure RPG	10-OCT-23		iOS

2 League of Legends			
MOBA	10-OCT-23		Microsoft Windows

3 Valorant			
FPS Shooter	10-OCT-23		Microsoft Windows

GAMEID TITLE

GENRE	RELEASE	DATE	PLATFORM
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4 TeamFight Tactics			
Strategy	10-OCT-23		Microsoft Windows

5 Genshin Impact			
Adventure RPG	10-OCT-23		Microsoft Windows

6 The Witcher 3: Wild Hunt			
Adventure RPG	10-OCT-23		PC

GAMEID TITLE

GENRE	RELEASE	DATE	PLATFORM
-------	---------	------	----------

7 Assassins Creed Valhalla			
Action RPG	10-OCT-23		Xbox

8 The Legend of Zelda: Breath of the Wild			
Adventure RPG	10-OCT-23		Nintendo Switch

9 Cyberpunk 2077			
Action RPG	10-OCT-23		PC

GAMEID TITLE

GENRE	RELEASE	DATE	PLATFORM
-------	---------	------	----------

10 Red Dead Redemption 2			
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GAMEID	TITLE	GENRE	RELEASEDA	PLATFORM
10	Red Dead Redemption 2	Action RPG	10-OCT-23	PlayStation

During:

Filter Games: You have selected:

Please fill out the information below to Add Your Desired Game:

Game ID:

Title:

Genre:

Release Date:

Platform:

Success. Check the tuple in Query Available Game Tables.

After:

8	The Legend of Zelda: Breath of the Wild	Adventure RPG	10-OCT-23	Nintendo Switch
9	Cyberpunk 2077	Action RPG	10-OCT-23	PC
10	Red Dead Redemption 2	Action RPG	10-OCT-23	PlayStation
23	New Game	Adventure RPG	24-DEC-02	Microsoft

11 rows selected.

SQL > █

DELETE

File: appService.js

Line: 155

Before: Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE	GENRE	RELEASEDA	PLATFORM
1	Maple Story	Adventure RPG	10-OCT-23	iOS
2	League of Legends	MOBA	10-OCT-23	Microsoft Windows
3	Valorant	FPS Shooter	10-OCT-23	Microsoft Windows
4	TeamFight Tactics	Strategy	10-OCT-23	Microsoft Windows
5	Genshin Impact	Adventure RPG	10-OCT-23	Microsoft Windows
6	The Witcher 3: Wild Hunt	Adventure RPG	10-OCT-23	PC
7	Assassins Creed Valhalla	Action RPG	10-OCT-23	Xbox
8	The Legend of Zelda: Breath of the Wild	Adventure RPG	10-OCT-23	Nintendo Switch
9	Cyberpunk 2077	Action RPG	10-OCT-23	PC
10	Red Dead Redemption 2	Action RPG	10-OCT-23	PlayStation
12	test	FPS Shooter	30-NOV-23	PC

(Single Player Game)

GAMEID	DIFFICULTY
6	6
7	8
8	10
9	9
10	3
12	10

6 rows selected.

During:

Filter Games:

Select an option

You have selected:

Add Game

12

Delete Game

DELETE request successful:

Please fill out the information below to Add Your Desired Game:

Game ID:

23

Title:

New Game

After:

```
select * from game;
```

GAMEID TITLE	
GENRE	RELEASEDA PLATFORM
1 Maple Story	
Adventure RPG	10-OCT-23 iOS
2 League of Legends	
MOBA	10-OCT-23 Microsoft Windows
3 Valorant	
FPS Shooter	10-OCT-23 Microsoft Windows

GAMEID TITLE	
GENRE	RELEASEDA PLATFORM
4 TeamFight Tactics	
Strategy	10-OCT-23 Microsoft Windows
5 Genshin Impact	
Adventure RPG	10-OCT-23 Microsoft Windows
6 The Witcher 3: Wild Hunt	
Adventure RPG	10-OCT-23 PC

GAMEID TITLE	
GENRE	RELEASEDA PLATFORM
7 Assassins Creed Valhalla	
Action RPG	10-OCT-23 Xbox
8 The Legend of Zelda: Breath of the Wild	
Adventure RPG	10-OCT-23 Nintendo Switch
9 Cyberpunk 2077	
Action RPG	10-OCT-23 PC

GAMEID TITLE	
GENRE	RELEASEDA PLATFORM
10 Red Dead Redemption 2	
Action RPG	10-OCT-23 PlayStation

```
10 rows selected.
```

GAMEID	DIFFICULTY
6	6
7	8
8	10
9	9
10	3

(Single Player Game)

UPDATE

File: appService.js

289, 306

Before:

PLAYERID	PLAYEREMAIL	DATEOFBIR	RANK
AVATAR			
BIO			
1	grace@gmail.com	10-OCT-02	1
/path/to/avatar1.jpg			
Gamer, explorer, and thrill-seeker.			
2	sophie@gmail.com	23-OCT-02	2
/path/to/avatar2.jpg			
Casual gamer			
live laugh love.			
3	audrey@gmail.com	20-NOV-03	3
/path/to/avatar3.jpg			
competitive.			
4	jane@gmail.com	30-APR-03	4
/path/to/avatar4.jpg			

PLAYERID	PLAYEREMAIL	DATEOFBIR	RANK
AVATAR			
BIO			
live laugh love.			
5	sam@gmail.com	10-MAY-03	5
/path/to/avatar5.jpg			
i will win			

During:

Here are all your accounts, choose one to sign in and you can further modify your profiles!

id	email	date	rank	avatar	bio
1	grace@gmail.com	2002-10-10T07:00:00.000Z	1	/path/to/avatar1.jpg	Gamer, explorer, and thrill-seeker.
2	sophie@gmail.com	2002-10-23T07:00:00.000Z	2	/path/to/avatar2.jpg	Casual gamer
3	audrey@gmail.com	2003-11-20T08:00:00.000Z	3	/path/to/avatar3.jpg	competitive.
4	jane@gmail.com	2003-04-30T07:00:00.000Z	4	/path/to/avatar4.jpg	live laugh love.
5	sam@gmail.com	2003-05-10T07:00:00.000Z	5	/path/to/avatar5.jpg	i will win

Email:

Sign In

Never logged in before?

Sign up instead

Here are all your accounts, choose one to sign in and you can further modify your profiles!

id	email	date	rank	avatar	bio
1	grace@gmail.com	2002-10-10T07:00:00.000Z	1	/path/to/avatar1.jpg	Gamer, explorer, and thrill-seeker.
2	sophie@gmail.com	2002-10-23T07:00:00.000Z	2	/path/to/avatar2.jpg	Casual gamer
3	audrey@gmail.com	2003-11-20T08:00:00.000Z	3	/path/to/avatar3.jpg	competitive.
4	jane@gmail.com	2003-04-30T07:00:00.000Z	4	/path/to/avatar4.jpg	live laugh love.
5	sam@gmail.com	2003-05-10T07:00:00.000Z	5	/path/to/avatar5.jpg	i will win

Email:

Successfully signed in!

Go to profile

Sign In

300 × 300

Email: grace@gmail.com

Avatar:
changing my bio!

Edit button

Success! Your old avatar was: /path/to/avatar1.jpg. You can verify changes in the Query Available Game Tables.

Bio:
Click the button to edit me!

All Game Ranking

Game 1	Rank 1
Game 2	Rank 2

After:

```
select * from player;
```

PLAYERID	PLAYEREMAIL	DATEOFBIR	RANK
----------	-------------	-----------	------

AVATAR			
--------	--	--	--

BIO			
-----	--	--	--

1	grace@gmail.com	10-OCT-02	1
changing my bio!			
Gamer, explorer, and thrill-seeker.			

2	sophie@gmail.com	23-OCT-02	2
/path/to/avatar2.jpg			
Casual gamer			

PLAYERID	PLAYEREMAIL	DATEOFBIR	RANK
----------	-------------	-----------	------

AVATAR			
--------	--	--	--

BIO			
-----	--	--	--

In this update query, we have made a deliberate decision to restrict the update options available. Specifically, a user is now only able to update their biography and avatar. This choice stems from recognizing that modifications of a player's email and date of birth tend to be impractical and unavailable across many platforms. Furthermore, we choose to enforce this logical limitation within our database to ensure that it aligns with the real-world practices.

SELECTION (WHERE Clause)

File: appService.js

Line: 338

Before:Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE	GENRE	RELEASEDATE	PLATFORM
1	Maple Story	Adventure RPG	10-OCT-23	iOS
2	League of Legends	MOBA	10-OCT-23	Microsoft Windows
3	Valorant	FPS Shooter	10-OCT-23	Microsoft Windows
4	TeamFight Tactics	Strategy	10-OCT-23	Microsoft Windows
5	Genshin Impact	Adventure RPG	10-OCT-23	Microsoft Windows
6	The Witcher 3: Wild Hunt	Adventure RPG	10-OCT-23	PC
7	Assassins Creed Valhalla	Action RPG	10-OCT-23	Xbox
8	The Legend of Zelda: Breath of the Wild	Adventure RPG	10-OCT-23	Nintendo Switch
9	Cyberpunk 2077	Action RPG	10-OCT-23	PC

GAMEID	TITLE	GENRE	RELEASEDATE	PLATFORM
10	Red Dead Redemption 2	Action RPG	10-OCT-23	PlayStation
12	test	FPS Shooter	30-NOV-23	PC

During:

Filter Games:

Select an option

Adventure RPG

Action RPG

Strategy

MOBA

FPS Shooter

You have selected:

Adventure RPG

Action RPG

Strategy

MOBA

FPS Shooter

300 × 300

300 × 300

300 × 300

300 × 300

Maple Story

Genshin Impact

The Witcher 3: Wild Hunt

The Legend of Zelda: Breath of the Wild

Filter Games:
You have selected:
Adventure RPG
Strategy

Add Game

Delete Game

300 × 300

300 × 300

300 × 300

300 × 300

Maple Story

TeamFight Tactics

Genshin Impact

The Witcher 3: Wild Hunt

300 × 300

The Legend of Zelda: Breath of the Wild

After: Unchanged Relation

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE		
1	Maple Story		
Adventure RPG		10-OCT-23	iOS
2	League of Legends		
MOBA		10-OCT-23	Microsoft Windows
3	Valorant		
FPS Shooter		10-OCT-23	Microsoft Windows
4	TeamFight Tactics		
Strategy		10-OCT-23	Microsoft Windows
5	Genshin Impact		
Adventure RPG		10-OCT-23	Microsoft Windows
6	The Witcher 3: Wild Hunt		
Adventure RPG		10-OCT-23	PC

GAMEID	TITLE	
7	Assassins Creed Valhalla	
Action RPG	10-OCT-23	Xbox
8	The Legend of Zelda: Breath of the Wild	
Adventure RPG	10-OCT-23	Nintendo Switch
9	Cyberpunk 2077	
Action RPG	10-OCT-23	PC

GAMEID	TITLE	
10	Red Dead Redemption 2	
Action RPG	10-OCT-23	PlayStation

JOIN

File: appService.js

Line: 436

Before:

Genre (genre, ageRestriction)

GENRE	AGERESTRICTION
FPS Shooter	T
Adventure RPG	E
Action RPG	A
MOBA	T
Strategy	E

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE		
GENRE	RELEASED	DATE	PLATFORM
1	Maple Story		
Adventure RPG	10-OCT-23		iOS
2	League of Legends		
MOBA	10-OCT-23		Microsoft Windows
3	Valorant		
FPS Shooter	10-OCT-23		Microsoft Windows
GAMEID	TITLE		
GENRE	RELEASED	DATE	PLATFORM
4	TeamFight Tactics		
Strategy	10-OCT-23		Microsoft Windows
5	Genshin Impact		
Adventure RPG	10-OCT-23		Microsoft Windows
6	The Witcher 3: Wild Hunt		
Adventure RPG	10-OCT-23		PC

During:

Statistics

Enter Rating:

Games with Specified Rating

Game that All Users Play

Highest average single player game
difficulty for all Genres

Average genre difficulty for single
player games

Show the number of genres
available

Statistics

Enter Rating:

Games with Specified Rating

League of Legends
MOBA

Valorant
FPS Shooter

Game that All Users Play

Highest average single player game
difficulty for all Genres

Average genre difficulty for single
player games

Show the number of genres
available

After: Unchanged Relations

Genre (genre, ageRestriction)

GENRE	AGERESTRICTION
FPS Shooter	T
Adventure RPG	E
Action RPG	A
MOBA	T
Strategy	E

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE
GENRE	RELEASEDA PLATFORM
1 Maple Story	
Adventure RPG	10-OCT-23 iOS
2 League of Legends	
MOBA	10-OCT-23 Microsoft Windows
3 Valorant	
FPS Shooter	10-OCT-23 Microsoft Windows
4 TeamFight Tactics	
Strategy	10-OCT-23 Microsoft Windows
5 Genshin Impact	
Adventure RPG	10-OCT-23 Microsoft Windows
6 The Witcher 3: Wild Hunt	
Adventure RPG	10-OCT-23 PC

AGGREGATION - GROUP BY

File: appService.js

Line: 360

Before: Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE
GENRE	RELEASEDA PLATFORM
1 Maple Story	
Adventure RPG	10-OCT-23 iOS
2 League of Legends	
MOBA	10-OCT-23 Microsoft Windows
3 Valorant	
FPS Shooter	10-OCT-23 Microsoft Windows
4 TeamFight Tactics	
Strategy	10-OCT-23 Microsoft Windows
5 Genshin Impact	
Adventure RPG	10-OCT-23 Microsoft Windows
6 The Witcher 3: Wild Hunt	
Adventure RPG	10-OCT-23 PC

GAMEID	TITLE		
GENRE	RELEASED	DATE	PLATFORM
7	Assassins Creed Valhalla	10-OCT-23	Xbox
Action RPG			
8	The Legend of Zelda: Breath of the Wild	10-OCT-23	Nintendo Switch
Adventure RPG			
9	Cyberpunk 2077	10-OCT-23	PC
Action RPG			
10	Red Dead Redemption 2	10-OCT-23	PlayStation
Action RPG			

During:

Statistics

Enter Rating:

T

Games with Specified Rating

League of Legends
MOBA

Valorant
FPS Shooter

Game that All Users Play

Maple Story

Highest average single player game
difficulty for all Genres

Average genre difficulty for single
player games

Show the number of genres
available

After: Unchanged Relations

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE	GENRE	RELEASEDATE	PLATFORM
1	Maple Story	Adventure RPG	10-OCT-23	iOS
2	League of Legends	MOBA	10-OCT-23	Microsoft Windows
3	Valorant	FPS Shooter	10-OCT-23	Microsoft Windows
4	TeamFight Tactics	Strategy	10-OCT-23	Microsoft Windows
5	Genshin Impact	Adventure RPG	10-OCT-23	Microsoft Windows
6	The Witcher 3: Wild Hunt	Adventure RPG	10-OCT-23	PC

GAMEID	TITLE	GENRE	RELEASEDATE	PLATFORM
7	Assassins Creed Valhalla	Action RPG	10-OCT-23	Xbox
8	The Legend of Zelda: Breath of the Wild	Adventure RPG	10-OCT-23	Nintendo Switch
9	Cyberpunk 2077	Action RPG	10-OCT-23	PC
10	Red Dead Redemption 2	Action RPG	10-OCT-23	PlayStation

AGGREGATION - HAVING

File: appService.js

Line: 181

Before:

SinglePlayerGame (gameID, difficulty)

GAMEID	DIFFICULTY
6	6
7	8
8	10
9	9
10	3

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID TITLE		
GENRE	RELEASEDA	PLATFORM

1 Maple Story		
Adventure RPG	10-OCT-23	iOS
2 League of Legends		
MOBA	10-OCT-23	Microsoft Windows
3 Valorant		
FPS Shooter	10-OCT-23	Microsoft Windows

GAMEID TITLE		

GENRE	RELEASEDA	PLATFORM

4 TeamFight Tactics		
Strategy	10-OCT-23	Microsoft Windows
5 Genshin Impact		
Adventure RPG	10-OCT-23	Microsoft Windows
6 The Witcher 3: Wild Hunt		
Adventure RPG	10-OCT-23	PC

GAMEID TITLE		
GENRE	RELEASEDA	PLATFORM

7 Assassins Creed Valhalla		
Action RPG	10-OCT-23	Xbox
8 The Legend of Zelda: Breath of the Wild		
Adventure RPG	10-OCT-23	Nintendo Switch
9 Cyberpunk 2077		
Action RPG	10-OCT-23	PC

GAMEID TITLE		

GENRE	RELEASEDA	PLATFORM

10 Red Dead Redemption 2		
Action RPG	10-OCT-23	PlayStation

During: Unchanged Relations

Statistics

Enter Rating: Games with Specified Rating

League of Legends MOBA Valorant FPS Shooter

Game that All Users Play Maple Story

Highest average single player game difficulty for all Genres 8

Average genre difficulty for single player games Adventure RPG 8 Action RPG 6.666666666666667

Show the number of genres available

After: Unchanged Relations

SinglePlayerGame (gameID, difficulty)

GAMEID	DIFFICULTY
6	6
7	8
8	10
9	9
10	3

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE
1	Maple Story
2	League of Legends
3	Valorant
4	TeamFight Tactics
5	Genshin Impact
6	The Witcher 3: Wild Hunt

GENRE	RELEASEDA	PLATFORM
Adventure RPG	10-OCT-23	iOS
MOBA	10-OCT-23	Microsoft Windows
FPS Shooter	10-OCT-23	Microsoft Windows
Strategy	10-OCT-23	Microsoft Windows
Adventure RPG	10-OCT-23	Microsoft Windows
Adventure RPG	10-OCT-23	PC

GAMEID	TITLE	
GENRE	RELEASED	PLATFORM
7	Assassins Creed Valhalla	
Action RPG	10-OCT-23	Xbox
8	The Legend of Zelda: Breath of the Wild	
Adventure RPG	10-OCT-23	Nintendo Switch
9	Cyberpunk 2077	
Action RPG	10-OCT-23	PC
GAMEID	TITLE	
GENRE	RELEASED	PLATFORM
10	Red Dead Redemption 2	
Action RPG	10-OCT-23	PlayStation

NESTED AGGREGATION

File: appService.js

Line: 194

Before: SinglePlayerGame (gameID, difficulty)

GAMEID	DIFFICULTY
6	6
7	8
8	10
9	9
10	3

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE	
GENRE	RELEASED	PLATFORM
1	Maple Story	
Adventure RPG	10-OCT-23	iOS
2	League of Legends	
MOBA	10-OCT-23	Microsoft Windows
3	Valorant	
FPS Shooter	10-OCT-23	Microsoft Windows
GAMEID	TITLE	
GENRE	RELEASED	PLATFORM
4	TeamFight Tactics	
Strategy	10-OCT-23	Microsoft Windows
5	Genshin Impact	
Adventure RPG	10-OCT-23	Microsoft Windows
6	The Witcher 3: Wild Hunt	
Adventure RPG	10-OCT-23	PC

GAMEID	TITLE

GENRE	RELEASEDATE PLATFORM

7	Assassins Creed Valhalla
Action RPG	10-OCT-23 Xbox
8	The Legend of Zelda: Breath of the Wild
Adventure RPG	10-OCT-23 Nintendo Switch
9	Cyberpunk 2077
Action RPG	10-OCT-23 PC

GAMEID	TITLE

GENRE	RELEASEDATE PLATFORM

10	Red Dead Redemption 2
Action RPG	10-OCT-23 PlayStation

During:

Statistics

Enter Rating:

Games with Specified Rating

League of Legends MOBA

Valorant FPS Shooter

Game that All Users Play

Maple Story

Highest average single player game difficulty for all Genres

8

Average genre difficulty for single player games

Show the number of genres available

After: Unchanged Relations
SinglePlayerGame (gameID, difficulty)

GAMEID	DIFFICULTY

6	6
7	8
8	10
9	9
10	3

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE	GENRE	RELEASEDATE	PLATFORM
1	Maple Story	Adventure RPG	10-OCT-23	iOS
2	League of Legends	MOBA	10-OCT-23	Microsoft Windows
3	Valorant	FPS Shooter	10-OCT-23	Microsoft Windows
4	TeamFight Tactics	Strategy	10-OCT-23	Microsoft Windows
5	Genshin Impact	Adventure RPG	10-OCT-23	Microsoft Windows
6	The Witcher 3: Wild Hunt	Adventure RPG	10-OCT-23	PC

GAMEID	TITLE	GENRE	RELEASEDATE	PLATFORM
7	Assassins Creed Valhalla	Action RPG	10-OCT-23	Xbox
8	The Legend of Zelda: Breath of the Wild	Adventure RPG	10-OCT-23	Nintendo Switch
9	Cyberpunk 2077	Action RPG	10-OCT-23	PC
10	Red Dead Redemption 2	Action RPG	10-OCT-23	PlayStation

DIVISION

File: appService.js

Line: 392

Before:

Genre (genre, ageRestriction)

GENRE	AGERESTRICTION
FPS Shooter	T
Adventure RPG	E
Action RPG	A
MOBA	T
Strategy	E

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE		
GENRE	RELEASED	DATE	PLATFORM
1	Maple Story		
Adventure RPG	10-OCT-23		iOS
2	League of Legends		
MOBA	10-OCT-23		Microsoft Windows
3	Valorant		
FPS Shooter	10-OCT-23		Microsoft Windows
4	TeamFight Tactics		
Strategy	10-OCT-23		Microsoft Windows
5	Genshin Impact		
Adventure RPG	10-OCT-23		Microsoft Windows
6	The Witcher 3: Wild Hunt		
Adventure RPG	10-OCT-23		PC

During:

Statistics

Enter Rating:

Games with Specified Rating

League of Legends
MOBA
Valorant
FPS Shooter

Game that All Users Play

Maple Story

Highest average single player game difficulty for all Genres

8

Average genre difficulty for single player games

Show the number of genres available

After: Unchanged Relations
Genre (genre, ageRestriction)

GENRE	AGERESTRICTION
FPS Shooter	T
Adventure RPG	E
Action RPG	A
MOBA	T
Strategy	E

Game (gameID, title, **genre**, releaseDate, platform)

GAMEID	TITLE	GENRE	RELEASEDA	PLATFORM
1	Maple Story	Adventure RPG	10-OCT-23	iOS
2	League of Legends	MOBA	10-OCT-23	Microsoft Windows
3	Valorant	FPS Shooter	10-OCT-23	Microsoft Windows
4	TeamFight Tactics	Strategy	10-OCT-23	Microsoft Windows
5	Genshin Impact	Adventure RPG	10-OCT-23	Microsoft Windows
6	The Witcher 3: Wild Hunt	Adventure RPG	10-OCT-23	PC

PROJECTION

File: appService.js
Line: 78 (table), 63 (attributes of table)
Before: Unchanged Relations
During: Unchanged Relations

Select a Table to Query

Select an option

Select an option

Get Tables

Select a Table to Query

PUBLISHER

Select an option

PUBLISHER

GENRE

GAME

SINGLEPLAYERGAME

SERVER

MULTIPLAYERGAME

LEADERBOARD

DEVELOPERCOMPANY

PLAYER

Get Tables

Select a Table to Query

PUBLISHER

PUBLISHERNAME

Get Tables

PUBLISHERID	PUBLISHERNAME
1	Ink Splatter Press
2	Game Publishers
3	Wonderful Whimsy
4	Reach for the Stars
5	Midnight Flourish

Select a Table to Query

PUBLISHER

Select an option

PUBLISHERID

PUBLISHERNAME

Get Tables

Select a Table to Query

PUBLISHER

PUBLISHERNAME

Get Tables

PUBLISHERID	PUBLISHERNAME
1	Ink Splatter Press
2	Game Publishers
3	Wonderful Whimsy
4	Reach for the Stars
5	Midnight Flourish

After: Unchanged Relations

