Name: Megha Samala

# Table of Contents

## Project Direction Overview

I would like to create a web application designed to track a user's media consumption across several different mediums. The application, which I will call "TunedIn," will be a place where users can log the different media they're currently consuming, have consumed, or plan to consume. The media in question can be movies, TV shows, books, music (in album form), and video games. Additionally, the user will be able to track information about the vendor of the media and use this information to organize and revisit their media buys as well as give recommendations to others

I believe an application like this is important because an overall media tracking system does not appear to exist, leaving people to log their consumption on multiple different websites dedicated to only a specific medium (think Letterboxd or MyAnimeList), or create a Twitter thread or blog dedicated to tracking, or alternatively not track their watches/reads/listens at all. As someone who considers herself to be scatterbrained, I also often jump from media to media without finishing a series or completing a playthrough, and I forget what episode I left on or what chapter of a book I was on, and sometimes I completely forget that I was in the middle of watching or reading something. When people ask me what I've been watching or reading or playing, or what my favorite movie or show is, I often blank and fail to answer the question. I can safely presume that I am not the only one with this issue, and therefore an application dedicated to tracking the status of someone's varied media consumption is a convenient solution. I also believe that tracking media consumption encourages users to think more critically about what they are consuming and how they feel about it, rather than finishing a series or book or game and simply moving on to the next one.

TunedIn will offer a place for users to input information about a piece of media, the main focus being on a name, a rating (if completed/desired), and a status on the consumption. Additional information can be added based on relevance, such as author information for a book, or the URL for something consumed online so it can easily be provided to a friend when recommending the media to them, or a link to another existing database-esque website which may contain a blurb/critic ratings of the media (again, think Letterboxd or MyAnimeList or IMDB, etc), and more. Users will be able to log what chapter of a book they are on, or what episode of a show they are on, so that if they drop it and choose to resume it later, they can easily pick up from where they left off. Additionally, users can track when they started and finished a piece of media, to log past watches, and/or determine if it might be time to revisit something they previously consumed and enjoyed. Each kind of media has information that is specific to it, as well as information that can be applicable to multiple kinds of media, such as a genre and a review. Through my multiple project iterations, I will be able to refine my scope and determine what information is most necessary and relevant for the user to have logged, and create the most useful version of my database.

## Use Cases and Fields

Use Case #1: Account Setup

Because TunedIn will be a web application, it will be necessary to register to keep track of each individual user's media.

| Field | What it stores | Why it's needed |
|---|---|---|
| username | This stores a username | Users can share usernames to |

| | | |
|---|---|---|
| | associated with each account | see what another user is consuming, and users can also have multiple accounts if they would prefer |
| first_name | This stores the user's first name. | This can be displayed on screen and shared with other users. |
| last_name | This stores the user's first name. | This can be displayed on screen and shared with other users. |
| account_created | This stores the date on which the user created the account. | Users may want to know how long they have been using the application to track their media consumption. |

Use Case #2: Logging a Piece of Media
This is the supertype that users will log that contains common information across all media types before logging the specific subtype.

| Field | What it stores | Why it's needed |
|---|---|---|
| media_name | This stores the name of the media. | This is necessary for the user to know what media they consumed. |
| date_released | This stores the date that the media was released. | This helps the user determine their viewing trends by date and also distinguish between potential media remakes or remasters with different release dates. |

Use Case #3: Logging a Movie
A movie will be one of the media types that the application will encourage users to log, and has fields that are specific to it. The other media types will track similar information and will be able to be differentiated in the database using a flag.

| Field | What it stores | Why it's needed |
|---|---|---|
| director | This stores the name of the director of the movie. | This is useful for the user if they want to track how much they like movies by a certain director |

| | | |
|---|---|---|
| | | or want to sort by a certain director. |
| production_company | This stores the name of the production company of the movie, such as A24 or Studio Ghibli. | This is useful for the user to track how much they like the works of a certain company or sort by them. |

Use Case #4: Logging a Genre
Since genres are applicable to any media type, users will be able to log them for any media consumed.

| Field | What it stores | Why it's needed |
|---|---|---|
| category | This is a catch-all for the different media types where the category/large genres can be stored, such as things like fiction or nonfiction for books, documentary or short film for movies, RPG or shooter for video games, etc. | This allows for users to sort and search for certain pieces of media in a broad way. |
| main_genre | This stores the primary genre of a piece of media, which can differ in definition based on the user, but is generally a broader category such as horror, action, etc. | This allows for users to sort media by genre when organizing and also looking for previously logged media. |
| subgenre | This stores the subgenre of a piece of a media, which can be a specifier, like historical fantasy vs urban fantasy, etc. | This is optional but allows for more specific searching and sorting for the user. |

Use Case #5: Logging a Review
Since reviews are applicable to any media type, users will be able to log them for any media consumed.

| Field | What it stores | Why it's needed |
|---|---|---|
| out_of_ten | This stores a number rating out of 10. | This is a typical method of rating not just media, but anything, and will let users reflect on what they enjoyed or disliked. |

| | | |
|---|---|---|
| review | This stores a text review. | This lets the user give clarification on the number rating and offers more information about the media. |
| review_link | This stores an optional link that leads to an external blog review or a website like Letterbox or Goodreads that the user may have posted their review on. | This lets the user organize relevant info in one place by allowing them to keep track of different websites they may have used to review a piece of media. |

Use Case #6: Logging a Status
Each piece of media will have a consumption status that can be logged by the user.

| Field | What it stores | Why it's needed |
|---|---|---|
| overall_status | This stores a general status like Planned, In Progress, Completed, Dropped, or On Hold. | This helps users keep track of all the media they want to watch, are watching, and have watched, as well as media they chose to not complete and media they plan to return to, which is handy for not forgetting their progress. |
| section | This stores a larger indicator of progress, such as a season of a TV show, a chapter for a book, a section/act of a video game, etc | This is helpful for giving context to the part of the media the user is on, or is an indicator that they finished it. |
| subsection | This stores a smaller indicator of progress, such as an episode of a TV show, a page of a book, a level of a video game, etc. | This is helpful for tracking the exact part of a piece of media that the user left off on so they can jump back in. |
| date_started | This stores the date when the user started consuming the media. | This is helpful for the user to know when they first began a piece of media and for tracking how long it is taking them to complete it. |
| date_finished | This stores the last date the user interacted with/finished the media. | This is helpful for tracking the amount of time the user has spent with the media and for |

| | | |
|---|---|---|
| | | tracking how long ago they interacted with the media to see if it is worth a revisit. |

Use Case #7: Logging a Vendor
Media is offered by multiple vendors and these vendors can be frequented by users, and therefore are logged in the database.

| Field | What it stores | Why it's needed |
|---|---|---|
| vendor_name | This stores the name of the vendor. | This is needed for the user to know what vendors they buyt from. |
| vendor_type | This stores the type of vendor, such as website, streaming service, or physical storefront. | This is useful for the user to know where they acquired a piece of media. |
| vendor_link | This stores a link to the vendor website, if available. | This can help the user track past visits to an online vendor and allow them to revisit it or recommend it. |

Use Case #8: Vendor-Media Relationship
This connects the vendor to the piece of media and provides useful information about the purchase.

| Field | What it stores | Why it's needed |
|---|---|---|
| vendor_name | This stores the name of the vendor and will reference the vendor table. | This lets users know where they bought or can buy a piece of media. |
| date_purchased | This stores the date of the purchase of the media from the vendor. | This can assist with tracking the consumption of media by time. |
| media_link | This stores a direct link to the media on the vendor site, if available/applicable | This can help the user revisit their purchase easier or recommend the purchase to a friend. |
| price | This stores the price of the media purchase, if applicable | This can help users budget and track their money spent on media and also play into their |

| | | |
|---|---|---|
| | | review of the media by determining if it was worth the price they paid for it. |

Use Case #9: Series, Anthology, Collection
Some pieces of media are part of a series or anthology or collection, such as a book series or short film anthology, and users can specify which series a piece of media is part of.

| Field | What it stores | Why it's needed |
|---|---|---|
| SAC_name | This stores the name of the series, anthology, collection or other extended body of work that a piece of media is part of. | This helps users see how their media is connected as well as track their consumption of a series or the like. |
| sub_SAC_name | This is optional and stores the name of a subseries/sub-extended body of work within a larger series. | This further helps users organize and search for media. |
| SAC_part | This is optional and stores a number to indicate which part of a chronological series the piece of media is (such as the second book in a trilogy, etc) | This helps users track completion of a connected/chronological body of media. |

Use Case #10: Rating
Most pieces of media have a rating, and users will be able to log this.

| Field | What it stores | Why it's needed |
|---|---|---|
| rating | This stores the rating of a piece of media, such as G or PG-13 or R in the case of movies, E or T in the case of video games, etc. | This allows users to sort by the rating of the media they are looking for and keep track of their consumption trends. |

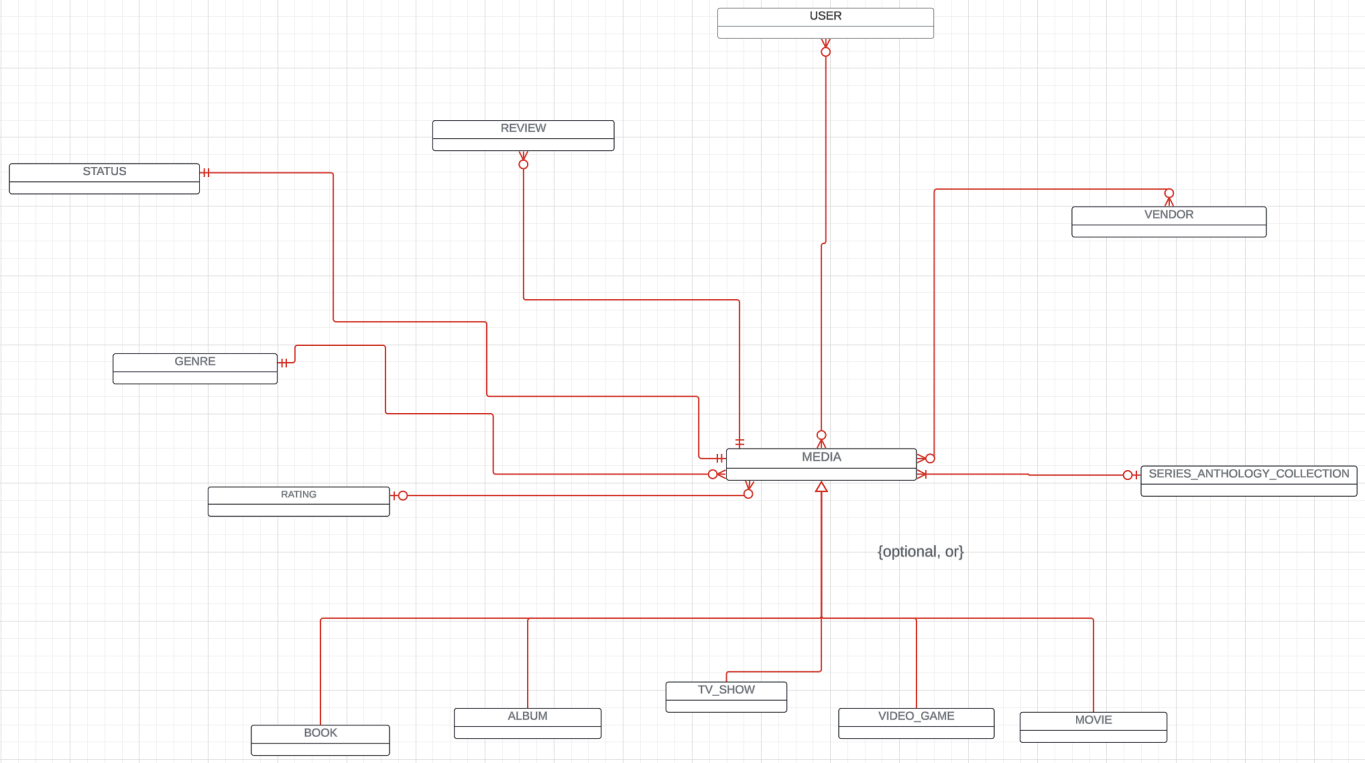
## Structural Database Rules

1) Each user may log zero to many pieces of media, and each piece of media may be logged by zero to many users.
2) A piece of media is a book, album, TV show, movie, video game, or none of these.
3) Each piece of media may have zero to many reviews, and each review will apply to one piece of media.

4) Each piece of media will have one status, and each status will apply to one to many pieces of media.
5) Each piece of media will have one genre, and each genre can apply to zero to many pieces of media.
6) Each piece of media can be part of one series/anthologies/collections, and each series/anthology/collection can contain many pieces of media.
7) Each piece of media can be purchased/rented from zero to many vendors, and each vendor can offer zero to many pieces of media.
8) Each piece of media may have one rating, and each rating can apply to zero to many pieces of media.

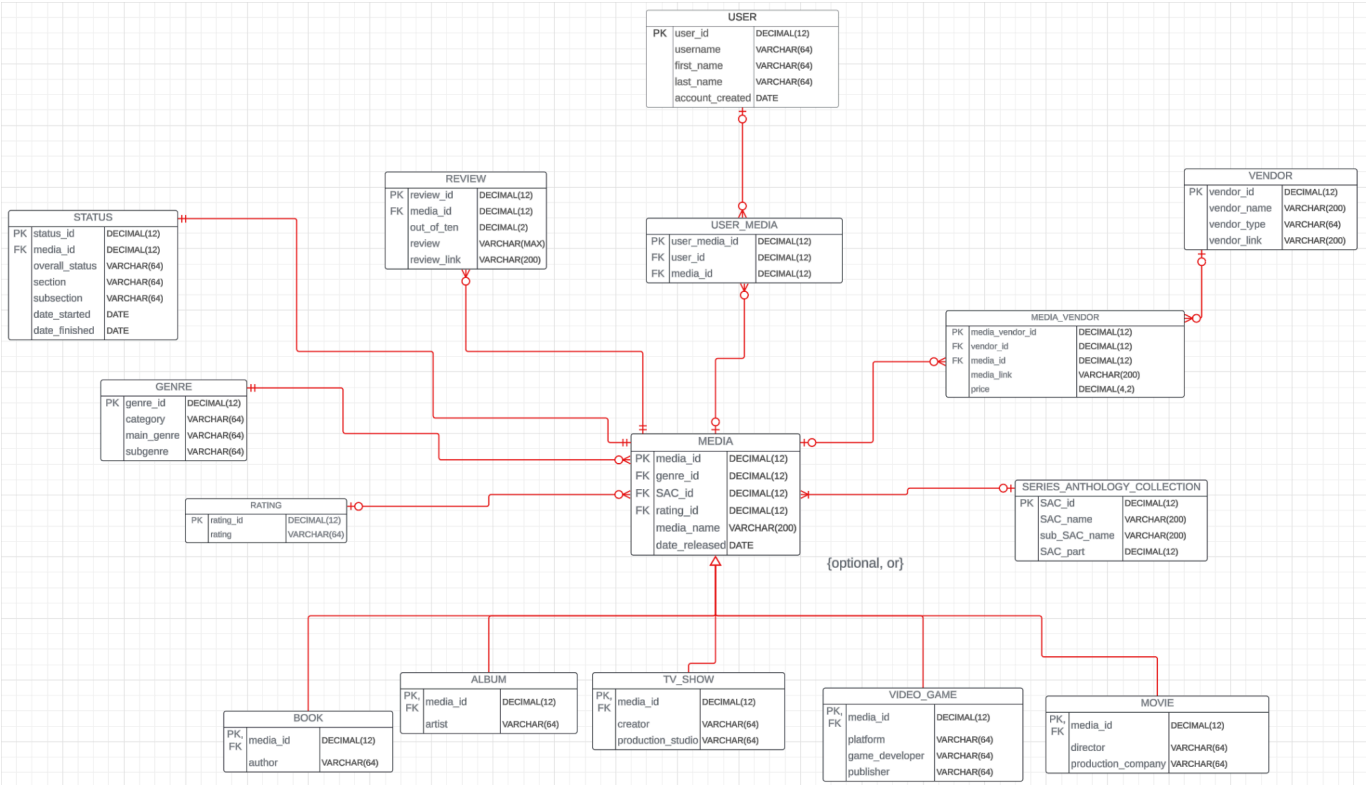
I updated rules 3 and 4 to reflect the feedback I received and the changed relationships between Status -> Media and Media -> Review.

## Conceptual Entity-Relationship Diagram




My conceptual ERD has not changed much since my last iteration. Based on the feedback received, I changed the relationship between Media -> Review to one-to-many from one-to-one. I kept the relationship between Status -> Media as one-to-one because the information contained in each status entry is highly personalized. Because users can input the exact part they are on and when they started/finished a piece of media, it is unlikely that one status can be used by more than one user on more than one piece of media. Additionally, removing the status_id foreign key from the Media entity makes it so that there don't have to be multiple entries of the same piece of media with the only difference being the status of each one.

## Full DBMS Physical ERD




I changed some of the relationships in my physical ERD as I did in the conceptual ERD, which is explained above. I also removed SAC_id and genre_id foreign key fields from my subtypes as these foreign keys are only supposed to be in the supertype, and I removed the date_purchased field from media_vendor to make the it so that multiple media purchases aren't logged with the only difference between them being the date purchased, thus making the Media_vendor entity more applicable to all users.

## Stored Procedure Execution and Explanations

```
-- adding users
CREATE OR REPLACE PROCEDURE add_user(
    username_arg IN VARCHAR,
    first_name_arg IN VARCHAR,
    last_name_arg IN VARCHAR)
    LANGUAGE plpgsql
AS
$$
BEGIN
    INSERT INTO Users(user_id, username, first_name, last_name, account_created)
    VALUES(nextval('user_seq'), username_arg, first_name_arg, last_name_arg, CURRENT_DATE);
END;
$$;

START TRANSACTION;
DO
$$ BEGIN
    CALL add_user('msamala', 'Megha', 'Samala');
    CALL add_user('nbardhan', 'Neha', 'Bardhan');
    CALL add_user('aismail', 'Afra', 'Ismail');
    CALL add_user('sanand', 'Soummitra', 'Anand');
    CALL add_user('mkoleti', 'Manish', 'Koleti');
    CALL add_user('tnguyen', 'Tim', 'Nguyen');
END $$;
COMMIT TRANSACTION;
```

```sql
-- adding rating
CREATE OR REPLACE PROCEDURE add_rating(
    rating_arg IN VARCHAR)
    LANGUAGE plpgsql
AS
$$
BEGIN
    INSERT INTO Rating(rating_id, rating)
    VALUES(nextval('rating_seq'), rating_arg);
END;
$$;

START TRANSACTION;
DO
$$ BEGIN
    CALL add_rating('TV-Y');
    CALL add_rating('TV-Y7');
    CALL add_rating('TV-G');
    CALL add_rating('TV-PG');
    CALL add_rating('TV-14');
    CALL add_rating('TV-MA');
    CALL add_rating('G');
    CALL add_rating('PG');
    CALL add_rating('PG-13');
    CALL add_rating('R');
    CALL add_rating('NC-17');
    CALL add_rating('E');
    CALL add_rating('E10+');
    CALL add_rating('T');
    CALL add_rating('M');
    CALL add_rating('NR');
    CALL add_rating('Explicit');
END $$;
COMMIT TRANSACTION;
```

```sql
-- adding a media as a book
CREATE OR REPLACE PROCEDURE add_book(
    media_name_arg IN VARCHAR,
    date_released_arg IN DATE,
    author_arg IN VARCHAR) LANGUAGE plpgsql
AS
$$
DECLARE
    v_media_id DECIMAL(12);
BEGIN
    SELECT media_id
    INTO v_media_id
    FROM Media
    WHERE media_name = media_name_arg AND date_released = date_released_arg;

    INSERT INTO Book(media_id, author)
    VALUES(v_media_id, author_arg);
END;
$$;

START TRANSACTION;
DO
$$ BEGIN
    CALL add_book('The Honjin Murders', CAST('04-AUG-2020' AS DATE), 'Seishi Yokomizo');
    CALL add_book('Death on Gokumon Island', CAST('05-JUL-2022' AS DATE), 'Seishi Yokomizo');
    CALL add_book('Mistborn: The Final Empire', CAST('17-JUL-2006' AS DATE), 'Brandon Sanderson');
    CALL add_book('Jujutsu Kaisen', CAST('05-MAR-2018' AS DATE), 'Gege Akutami');
    CALL add_book('Bleach', CAST('07-AUG-2001' AS DATE), 'Tite Kubo');
END $$;
COMMIT TRANSACTION;
```

Pictured above are some of the stored procedures I have implemented in my project to assist with populating the database tables. I have a variety of stored procedures to represent different use cases that I have outlined for my project, such as a procedure for adding a new user account, a procedure for adding content ratings to select from, and more, and the comments above each procedure talk about the purpose of the procedure. My database is populated using the stored procedures as well as manual inserts. All of the stored procedures can be viewed in my SQL script file. Additionally, I added error checking functionality, as shown below:

```
169 -- throw error if username is already taken when creating new user account
170 CREATE OR REPLACE FUNCTION user_username_func()
171     RETURNS TRIGGER LANGUAGE plpgsql
172     AS $$
173     BEGIN
174         IF EXISTS(
175             SELECT username FROM Users WHERE username = NEW.username
176         ) THEN
177             RAISE EXCEPTION USING MESSAGE = 'Username is already taken',
178             ERRCODE = 23000;
179         END IF;
180         RETURN NEW;
181     END;
182     $$;
183 CREATE TRIGGER user_username_trg
184 BEFORE UPDATE OR INSERT ON Users
185 FOR EACH ROW
186 EXECUTE PROCEDURE user_username_func();
187
188 INSERT INTO Users(user_id, username, first_name, last_name, account_created)
189 VALUES(nextval('user_seq'), 'msamala', 'Sdnfsdf', 'Hjsdfjb', CURRENT_DATE);
190

Data Output   Messages   Notifications

ERROR:  Username is already taken
CONTEXT:  PL/pgSQL function user_username_func() line 6 at RAISE

SQL state: 23000
```

This function makes it such that usernames cannot be reused for different accounts.

## Question Identification and Explanations

First Query: Which subscription service is the most used for watching TV shows? This question is useful because it allows users to determine which subscription service appears to have the most media available, and is therefore the most worth paying for compared to the others. Additionally, if a subscription service is being used less, users can be made aware and can choose to cancel their subscription.

Second Query: What is the best reviewed video game that falls under the “fantasy” genre? This question is useful because it is a good example of the kinds of questions users will ask while using the database to determine what piece of media they might choose to interact with next. Creating a query for this question allows for users to see what high quality media, specifically video games, is out there being recommended to them in a genre of their choice.

Third Query: What is the average rating given to a piece of media by each user? This question is useful because users can see which users are harsher critics than others, and use the average rating given by each user to determine which users are consuming more quality media, and then use that information to determine what media they might interact with next - they may take recommendations from users that give a higher rating to media on average.

## Query Executions and Explanations

First Query:

```
908 -- first query: Which subscription service is the most used for watching TV shows?
909 SELECT vendor_name, COUNT(*) AS use_count
910 FROM Vendor
911 JOIN Media_vendor ON Media_vendor.vendor_id = Vendor.vendor_id
912 JOIN Media ON Media.media_id = Media_vendor.media_id
913 JOIN TV_show ON TV_show.media_id = Media.media_id
914 GROUP BY vendor_name;
915
```

Data Output | Messages | Notifications

| | vendor_name character varying (200) | use_count bigint |
|---|---|---|
| 1 | Netflix | 3 |
| 2 | HBO Max | 1 |

The query that answers the first question has 4 tables joined: Vendor, Media_vendor, Media, and TV_show, and uses the COUNT function to count how many TV shows were watched on each streaming subscription service. From this query, it is clear that Netflix is the most used service for watching TV shows.

Second Query:

```
941 -- second query: What is the best reviewed video game that falls under the “fantasy” genre?
942 SELECT media_name, out_of_ten
943 FROM Review
944 JOIN Media ON Media.media_id = Review.media_id
945 JOIN Genre ON Genre.genre_id = Media.genre_id
946 JOIN Video_game on Video_game.media_id = Media.media_id
947 WHERE main_genre = 'Fantasy' OR subgenre = 'Fantasy'
948 ORDER BY out_of_ten DESC;
949
```

Data Output | Messages | Notifications

| | media_name character varying (200) | out_of_ten numeric (2) |
|---|---|---|
| 1 | Final Fantasy VII Remake | 9 |
| 2 | Final Fantasy XVI | 9 |
| 3 | Fire Emblem: Three Houses | 8 |

This query joins the Video_game subtype with the Media supertype and the Review and Genre tables to answer the question. The joins combined with the WHERE clause limits the results to video games that only have “Fantasy” listed as one of the genres, and the ORDER BY clause puts the highest rated video game at the top of the result set. From this query, it is shown that Final Fantasy VII Remake and Final Fantasy XVI are tied for the highest rated fantasy video games in the database.

Third Query:

```sql
-- third query: What is the average rating given to a piece of media by each user?
CREATE OR REPLACE VIEW User_ratings AS
SELECT username, media_name, out_of_ten
    FROM Review
    JOIN Media ON Media.media_id = Review.media_id
    JOIN User_media ON User_media.media_id = Media.media_id
    RIGHT JOIN Users ON Users.user_id = User_media.user_id
    ORDER BY username, out_of_ten DESC;

SELECT user_ratings.username, ROUND(AVG(out_of_ten), 2) AS avg_rating
FROM User_ratings
GROUP BY user_ratings.username;
```

Data Output | Messages | Notifications

| | username character varying (64) | avg_rating numeric |
|---|---|---|
| 1 | aismail | 8.25 |
| 2 | mkoleti | [null] |
| 3 | msamala | 8.40 |
| 4 | nbardhan | 9.00 |
| 5 | sanand | 8.00 |
| 6 | tnguyen | 7.00 |

The view I created is called User_ratings and shows all of the ratings out of 10 each user has given to pieces of media, and includes all users regardless of if they have reviewed any media or not by using the RIGHT JOIN on the Users table. The ORDER BY clause displays the results in alphabetical order of usernames, and descending order of ratings out of 10 within each username. Using the view in my query, I used the AVG aggregate function to retrieve the average rating given by each username to a piece of media. From this we see that some users give lower ratings on average than others, and one user has not rated any media yet.

## Index Identification and Creations

The primary keys of my database are already indexed, and the foreign keys of my database need to be indexed. I have concluded that most of the foreign keys do not need unique indexes because most of them are non-unique - for example, foreign keys such as genre_id and SAC_id, among others, do not need unique indexes because many pieces of media can fall under the same genre or series/anthology/collection. The only foreign key that needs to have a unique index is Status.media_id because of the 1:1 relationship between Status and Media. Additionally, in one of my queries I used main_genre and subgenre in the WHERE clause, and therefore will be giving non-unique indexes to these two columns in the Genre table. Below is the creation of the indexes:

```sql
-- index creation
CREATE INDEX media_genre_idx
ON Media(genre_id);
CREATE INDEX media_SAC_idx
ON Media(SAC_id);
CREATE INDEX media_rating_idx
ON Media(rating_id);
CREATE INDEX user_media_user_idx
ON User_media(user_id);
CREATE INDEX user_media_idx
ON User_media(media_id);
CREATE INDEX media_vendor_media_idx
ON Media_vendor(media_id);
CREATE INDEX media_vendor_vendor_idx
ON Media_vendor(vendor_id);
CREATE INDEX review_media_idx
ON Review(media_id);
CREATE UNIQUE INDEX status_media_idx
ON Status(media_id);
CREATE INDEX book_media_idx
ON Book(media_id);
CREATE INDEX album_media_idx
ON Album(media_id);
CREATE INDEX tv_show_media_idx
ON TV_show(media_id);
CREATE INDEX video_game_media_idx
ON Video_game(media_id);
CREATE INDEX movie_media_idx
ON Movie(media_id);
```

Data Output | Messages | Notifications

```
CREATE INDEX

Query returned successfully in 175 msec.
```

```sql
-- query-driven indexes
CREATE INDEX main_genre_idx
ON Genre(main_genre);
CREATE INDEX main_genre_idx
ON Genre(subgenre);
```

Data Output | Messages | Notifications

```
CREATE INDEX

Query returned successfully in 175 msec.
```

## Summary and Reflection

My database is for a web application called “TunedIn” in which users can track their media consumption across various mediums, as well as media purchases from various vendors. The application allows users to rate their media and track their progress in consuming it.

This week I made a few tweaks to my physical and conceptual ERDS as well as my structural database rules based on feedback from last week. The main progress this week was creating a large amount of stored procedures for my database and populating the database using these procedures and a large number of manual inserts. Additionally, I created queries based on relevant questions to the database, and indexes to make querying more efficient. All of these, including parts I could not include in this iteration document can be viewed in my SQL script file.

Ultimately, I am excited to wrap up the project, but I had a few doubts regarding my overall database structure while I was building it out, mainly realizing that things like Status and Reviews are personal to each user but I cannot think of how to link these to the User at this stage. I appreciate any feedback regarding this matter and any other part of this week's iteration.