

# DNA Project

Team 20

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## 1 Team 20-Data Dudes

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## 2 Introduction

Welcome to the Mini World Database Project which analyse E-sports gem BGMI The BGMI Analyzer Mini World is a data-driven application that focuses on collecting, processing, and visualizing data from BGMI matches. BGMI is a highly competitive and popular online game where players fight to be the last person or team standing. Analyzing data from these matches can provide valuable insights into player performance, strategies, and game dynamics.

## 3 Purpose

To store information about each round in each match in a database that can be queried by various users for their specific use case to observe the correlation between the available data points.

## 4 Users

- **Casual Users:** Casual users utilize the database to track their personal BGMI gameplay statistics, assess their performance, and uncover areas for improvement to enhance their gaming experience.
- **E-sport Analysts:** E-sport analysts access the database for in-depth statistical analysis of professional BGMI matches, helping them identify trends, player strategies, and crucial moments to enhance their understanding of competitive gameplay.

- **BGMI Game Developers:** BGMI game developers may study the BGMI database to gain inspiration for improving game mechanics, balancing, or features in BGMI, by understanding successful elements of gameplay in BGMI.

## 5 Application

### 5.1 Match Analysis

- Casual users can analyze their performance in a specific match. They can view detailed statistics such as kills, damage dealt, survival time, accuracy, and more.
- Users can track their overall progress and achievements over time, including cumulative statistics across all matches played.

### 5.2 Professional Tournaments

- Teams can develop strategies based on detailed statistics, identifying patterns in the playstyles of top-performing players and teams.
- Professional players and teams can benchmark their performance against the database's aggregate data, gaining insights into areas where they excel or need improvement.

### 5.3 Developers Improvement

- Developers can track the usage of various in-game features and mechanics.
- This information can guide decisions on which features are popular among players and which might need improvement or removal.

## 6 Database Requirements

### Assumptions

1. A Match has exactly 100 Players
2. A Team consists of Exactly 4 Players
3. In the relationship table the relationships which have degree greater than 2 are written with \*
4. Degree and Cardinality ratios of a relationship are mentioned in then same column.
5. A player will be killed by only by a single weapon and won't be killed by any vehicle or something else.

### Entity Types

#### 1. Player

A player refers to the account registered by the user via BGMI. It contains user info and aggregate information over all matches they've played

- **Name**
  - Required
  - Unique(Composite Attribute)
  - MAX 30 characters VAR CHAR
- **Player-Id(Primary Key)**
  - Required
  - Unique
  - INT
- **Date Of Birth**
  - Required
  - Not-Unique
  - DATE
- **Region**(Every BGMI account is linked to some region. Regions are used to restrict matchmaking)
  - Required
  - Domain: [Asia, North America, South America,Africa]
  - VARCHAR
- **Age**(Derived Attribute)

- Derived from DOB
- Integer
- Non-Negative
- **Total time played (in seconds)**
  - Required
  - INT
- **Rank Rating** (Each player has a RR based on which his rank is derived)
  - Required
  - INT
- **Tier**(Derived Attribute from Rank Rating)
  - VARCHAR
  - Domain : Bronze(from I to V), Silver(from I to V),Gold(from I to V),Platinum(from I to V),Diamond(from I to V),Crown(from I to V),Ace(from I to XV),Conqueror(from I to V)

## 2. Teams (Weak Entity)

Teams is a weak entity that lists the collection of all the players who are queueing together for a particular match

- **Players [1, 2, 3, 4]** (Composite attribute contains each player's ID)
  - Required
  - VARCHAR
  - Foreign Key
- **Wins** (Total wins across all matches queued by this team)
  - Required
  - Non-Unique
  - INT
- **Number of matches played** (Total matches played by this team)
  - Required
  - Non-Unique
  - INT
- **Win rate** (Percentage wins per match played for this team)
  - Derived
  - Non-Unique

- FLOAT

- **Average Rating**(Derived from the RR of each individual player)
  - Required
  - Non-Unique
  - FLOAT

### 3. Matches

The "Matches" entity type in your database will store detailed information about individual PUBG matches, including match ID, date and time, map, players' performance statistics, match duration, and outcomes, enabling users to review and analyze specific game play sessions. This data entity will support match-related queries and visualizations within your PUBG Analyzer Mini World application.

- **Match ID** (Primary Key)
  - Required
  - Integer
  - Unique
- **Match Start Time**
  - Required
  - Time
- **Duration**(The duration of the match in seconds)
  - Required
  - INT
- **Player-Id1+Player-Id2+.....+Player-Id100**(Composite Attribute listing the Player-Ids of all the teams playing in particular match)
  - Required
  - VAR-CHAR
- **Score1+Score2+....Score100**(Scores of all 100 Players.)
  - Required
  - VAR-CHAR
- **MVP1+.....MVP25**(Derived Attribute from Scores of 100 Players, most valuable player of the team )
  - Required
  - MAX 100 characters VAR CHAR

- Non-Unique
- **Winner**(Player-Id1,Player-Id2,Player-Id3,Player-Id4)(Composite Attribute of all the players who are winning this match)
  - Required
  - VARCHAR
- **Type** (Match can either be unranked or rated)
  - Required
  - VARCHAR
- **MapId** (Foreign Key)
  - Required
  - Not-Unique
  - INT

#### 4. Weapons

- **Weapon ID** (Primary Key)
  - Required
  - VARCHAR
  - Unique
- **Bullets** (types of bullets like 9,7.62,5.56)
  - Required
  - FLOAT
  - Non-Unique
- **Fire-Rate** (Number of bullets fired per sec)
  - Not-Required
  - INT
  - Non-Unique
- **Damage** (Damage per bullet)
  - Required
  - INT
  - Non-Unique
- **Extension** (Extension ID)
  - Required
  - INT
  - Non-Unique

## 5. Maps

- **MapId**(Primary Key)

- Required
- INT
- Unique

- **MapName**

- Required
- VARCHAR
- Unique

- **MapDimension**

- Required
- INT\*INT
- Not-Unique

- **Terrain**

- Required
- VARCHAR

## 6. Extension (Details of Extensions used in Gun)

- **Extension ID**

- Required
- INT
- NOT-Unique

- **SCOPE**

- Not-Required
- VAR-CHAR
- NOT-Unique

- **MAG**

- Not-Required
- VAR-CHAR
- NOT-Unique

- **GRIP**

- Not-Required
- VAR-CHAR
- NOT-Unique

## 7. Inventory Item (Weak Entity Type)

- **Player ID** (Foreign key)
  - Required
  - INT
  - Unique
- **Gun Skin** (MultiValued)
  - Not-Required
  - VAR-CHAR
  - NOT-Unique
- **Vehicle Skin** (MultiValued)
  - Not-Required
  - VAR-CHAR
  - NOT-Unique
- **Backpack Skin** (MultiValued)
  - Not-Required
  - VAR-CHAR
  - NOT-Unique
- **Clothes Skin** (MultiValued)
  - Not-Required
  - VAR-CHAR
  - NOT-Unique

## 8. Clans

- **ClanId**(Primary Key)
  - Required
  - INT
  - Unique
- **ClanLeader**(Leader's playerId)
  - Required
  - INT
  - Unique
- **No. Of Members**(Derived Attribute)
  - INT
  - Not-Unique

## 7 Relationship Types

Relationship Types			
Relationship	Participating Entity Type	Degree and C.R.	(Min,Max)
Player <b>PART-OF</b> Team	Player, Team	2 and N:4	Player(0,N) Team(4,4)
Weapons <b>HAVE</b> Extensions	Weapons, Extensions	2 and M:N	Weapons(0,N),Extensions(0,N)
*Player <b>PARTICIPATES-IN MATCH PLAYED-ON</b> Map	Player,Map,Match	3 and M:P:100	Map(0,N),Player(0,N),Match(100,100)
Player <b>MEMBER-OF</b> Clan	Player,Clan	2 and 1:N	Player(0,1),Clan(1,N)
Player <b>FRIEND-OF</b> Player (recursive)	Player	1 and N:M	Player(0,N)
*Player <b>KILLS</b> Player <b>US-ING</b> Weapon	Player,Weapon	3 and 1:1:N	Player(0,1),Weapon(0,N)
Player <b>HAS</b> Inventory-Items	Player,Inventory-Items	2 and M:N	Player(0,N) Inventory-Items(0,N)

\* represents relationships which have degree  $N \geq 3$ .

-For example: **Player PART-OF Team** is a Identifying relationship because Team entity type(Weak entity) can only be identified using combination of Player-Id1,Player-Id2,Player-Id3,Player-Id4 which is Primary key in Player Entity.Hence Team and Player entity have child parent relationship.

## 8 Functional requirements

### 8.1 Modifications

#### INSERT

1. We can create new player accounts and add their necessary details such as username and their player IDs.
2. Addition of friends to player's friend list.
3. Inserting match results.
4. Adding new weapons or any other inventory items for a particular Player.
5. Inserting Team Details including Player-Id of all 4 Players and forming a new team.
6. Inserting Matches by giving all necessary details.
7. Inserting New clan by giving all necessary details such as Clan Leader's Player-Id.

8. Inserting Players in Clan.

### **Delete**

1. Deleting player accounts and their necessary details.
2. We can remove inactive players.
3. Deleting Match and Match Results.
4. Removing Player from a Team.
5. Deleting Match History as well as blocked players.
6. Removing Players in clan.

### **Update**

1. Updating Player Information.
2. Updating Clan information.
3. Updating Inventory Items.
4. Updating Matchmaking Preferences and modifying friends list.
5. Updating Players in Clan.
6. Updating Gun Information.

## **8.2 Retrievals**

### **Selection**

1. Get the list of all Game Mode and Map.
2. Get the list of all Matches' History and Results.
3. Fetching details of the leader-board.
4. Retrieving Clan Information.
5. Fetching Inventory Item Details.
6. Retrieve Friends of a player.
7. Retrieve Guns for particular Extension.
8. Get the list of all the round-stats of a player.

### **Aggregate**

1. Total Number of Matches, Kills,etc. details of a Player.
2. Average Rating of a user in database.
3. Computing Clan Rankings.
4. Computing Weapon usage statistics.
5. Calculating average match duration.
6. Aggregating Daily Active Users(using starting time mentioned under MATCHES).
7. Aggregate win rate of a player in a particular map.

## Projection

1. Finding list of all the players having  $K/DN \geq x$ .
2. Finding List of players having rating  $N \geq x$ .
3. Finding list of guns used by a player having kills  $N \geq x$ .
4. Finding list of all guns having damage  $N \geq x$ .
5. Finding list of all teams having number of wins  $N \geq x$ .

## Search

1. Searching Player Names starting with a particular character.
2. Searching all matches who have a particular starting time we need to search.
3. Searching a particular gun name whose name follows some series (for example: MK47, MK14, etc).
4. Search all the clans ending with a particular word.

## Analysis

1. **Tier analysis** : Predict the tier of player in a specific season.  
-For this we will use RR of the player in the database.
2. **Performance analysis** : Predict the number of kills, revives etc.  
-For this, we will analyse it's previous matches to fetch the necessary details.
3. **Connection analysis** : Frequency of player playing with a specific player (synergy).  
-For this, we will iterate over all the teams and increase the synergy based on the number of matches played between every possible pair of the team players.
4. **Playtime analysis** : Avg playtime of a specific player.  
-For this, we will use the duration time and the start time of all the matches.
5. **Growth analysis** : Performance improvement of a player w.r.t to past seasons.  
-For this, we will fetch details of matches over a particular period of time for a particular player so that we can see the improvement of a player over different seasons.
6. **Gun analysis** : Frequency of a specific gun used by a player.  
-For this, we will iterate over all the kills derived from the above relations and then for a particular player and a particular gun, we will find the frequency.
7. **Map analysis** : Performance of a player in specific map.  
-For this, we will iterate over all the matches played by a particular player in a particular map and will fetch the necessary performance details.

## 9 Summary

”In the creation of the PUBG Mini- World Database, a comprehensive gaming universe has been meticulously crafted. This database serves as a treasure trove of information for players and enthusiasts, encompassing crucial data on gameplay modes, maps, weapons, characters, and in-game events. The 'Gameplay Modes' section provides insights into diverse playing styles. Detailed maps and weapon descriptions enrich the tactical understanding of the game, while character profiles shed light on unique abilities and playstyles. In-depth records of in-game events and challenges enhance the competitive spirit. Interconnected relationships between gameplay elements offer strategic depth, and player stats and achievements add layers to the gaming experience. Regular updates and additions ensure that this database stands as the ultimate hub for PUBG enthusiasts, offering a wealth of knowledge and insights into the ever-evolving world of battle royale gaming.”

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THANK YOU !!!