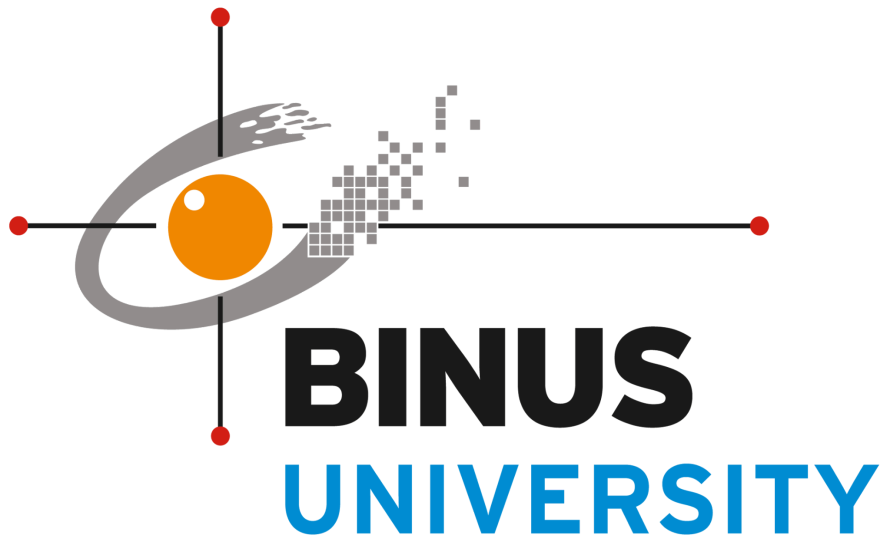# AOL DATABASE TECHNOLOGY
# Varawrant (Esports)

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# TABLE OF CONTENTS

# Chapter 1
## The Description Of The Case Used

In the modern era, data is one of the most valuable assets for any organization, especially for those operating in fast-paced industries like esports. Teams such as Varawrant rely heavily on data to manage their operations, track player performance, record match results, manage sponsorships, and plan future strategies. The quality and structure of this data can directly impact the effectiveness of decision-making and daily operations.

However, if a database is not organized properly, it can lead to a range of problems, such as data duplication, inconsistencies, and difficulties when updating or retrieving information. These problems, often called data anomalies, can waste time, cause errors in reports, and make the database harder to maintain in the long run. For example, a simple mistake in one record might require manual updates in multiple places, or deleting one piece of data might accidentally remove something important.

To prevent these kinds of issues, one of the best solutions is to apply a process called normalization. Normalization is a method used to organize data in a database so that it is clean, efficient, and free from redundancy. In this report, we focus on analyzing the Varawrant database and applying First Normal Form (1NF) through Third Normal Form (3NF) as part of the normalization process. 1NF helps break down data into simpler pieces and removes repeating groups. 2NF makes sure that every piece of information only depends on the whole primary key, not just part of it. 3NF takes things further by removing data that doesn't directly relate to the main key, avoiding indirect relationships that can lead to confusion.

By going through these steps, we aim to improve the structure of the database, reduce duplication, and avoid common data errors like update anomalies, insertion problems, and unwanted data loss during deletions. The goal is to create a database that is easier to manage, more reliable, and ready to support the growing needs of Boom Esports in the future.

Overall, this report shows how normalization isn't just a technical process but it's a way to make sure that important data is well organized, accurate, and useful for everything Boom Esports wants to achieve.

# Chapter 2
## The Sample Data (In Un-Normal Form) With Description

| Un-Normal Form | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **IDPlayer** | NamaPlayer | **IDTeam** | NamaTeam | CoachTeam | **IDTournament** | TournamentName | PlayerActivity |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Jett, Sova_Juara 1_MVP Turnamen |
| PL002 | Siti "SNIPER" Rahayu | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Viper, Killjoy_Juara 1_Support Terbaik |
| PL003 | Rian "GHOST" Wijaya | TM002 | Beta Warriors | Coach Rina | TR001 | Valorant Indonesia Championship 2025 | Omen, Breach_Juara 3_Comeback King |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR002 | Valorant Asia Pacific League 2025 | Phoenix, Reyna_Perempat Final_Top Frag |
| PL004 | Dewi "FLASH" Lestari | TM003 | Gamma Strikers | Coach Budi | TR001 | Valorant Indonesia Championship 2025 | Neon, Deadlock_Juara 2_Rookie of The Year |

The dataset merges multiple data points into single rows, including:

- Players
- Teams
- Tournaments
- Activities (which include agents used and awards)
- Redundant repetition of team and tournament info

This un-normalized table has been effectively decomposed into a well-normalized schema, as represented in the below ERD. Each entity and relationship has been carefully handled to:

- Avoid redundancy
- Maintain data integrity
- Support scalable querying and updates

# Chapter 3
## The List Of Anomalies May Occur

The List of Anomalies That May Occur Due to Un-Normalized Database Design

1. Insert Anomaly

   An insert anomaly occurs when it is not possible to insert a new record into a table without including unrelated or unnecessary information.

   Example that may occur from our database: if a new player joins a team but has not yet participated in any tournament, we are still required to fill in the IDTournament, TournamentName and PlayerActivity fields. This leads to the inclusion of null or irrelevant data just to meet the structural requirements of the table.

   Consequence that will occur: this reduces data accuracy and can lead to meaningless or misleading entries.

2. Delete Anomaly

   A deletion anomaly occurs when deleting a record unintentionally removes valuable information that should be retained.

   Example that may occur from our database: if we delete a record related to the IDTournament, we might also remove player information such as the player's name, even though the player is still active on the team and should remain in the database.

   Consequence that will occur: essential data may be lost simply because of the deletion of related but independent information.

3. Update Anomaly

   An update anomaly arises when changing a single piece of information requires multiple updates in different records, increasing the risk of data inconsistency.

   Example that may occur from our database: if one of the CoachTeams changes their name, we have to manually update every record where that CoachTeam is listed. Failing to update just one record can cause data inconsistencies.

   Consequence that will occur: increases the likelihood of inconsistent or outdated data across the table.

# Chapter 4
## Implementation Of Normalization

## 4.1 Detail normalization process from U-NF to 1-NF

**Un-Normal Form**

| IDPlayer | NamaPlayer | IDTeam | NamaTeam | CoachTeam | IDTournament | TournamentName | PlayerActivity |
|---|---|---|---|---|---|---|---|
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Jett, Sova_Juara 1_MVP Turnamen |
| PL002 | Siti "SNIPER" Rahayu | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Viper, Killjoy_Juara 1_Support Terbaik |
| PL003 | Rian "GHOST" Wijaya | TM002 | Beta Warriors | Coach Rina | TR001 | Valorant Indonesia Championship 2025 | Omen, Breach_Juara 3_Comeback King |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR002 | Valorant Asia Pacific League 2025 | Phoenix, Reyna_Perempat Final_Top Frag |
| PL004 | Dewi "FLASH" Lestari | TM003 | Gamma Strikers | Coach Budi | TR001 | Valorant Indonesia Championship 2025 | Neon, Deadlock_Juara 2_Rookie of The Year |

- In PlayerActivity there's a lot of data mixed in there, such as more than one agent name and mixed with the description of thee PlayerActivity

**1NF**

| IDPlayer | NamaPlayer | IDTeam | NamaTeam | CoachTeam | IDTournament | TournamentName | AgentName | TeamRank | Description |
|---|---|---|---|---|---|---|---|---|---|
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Jett | Juara 1 | MVP Turnamen |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Sova | Juara 1 | MVP Turnamen |
| PL002 | Siti "SNIPER" Rahayu | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Viper | Juara 1 | Support Terbaik |
| PL002 | Siti "SNIPER" Rahayu | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Killjoy | Juara 1 | Support Terbaik |
| PL003 | Rian "GHOST" Wijaya | TM002 | Beta Warriors | Coach Rina | TR001 | Valorant Indonesia Championship 2025 | Omen | Juara 3 | Comeback King |
| PL003 | Rian "GHOST" Wijaya | TM002 | Beta Warriors | Coach Rina | TR001 | Valorant Indonesia Championship 2025 | Breach | Juara 3 | Comeback King |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR002 | Valorant Asia Pacific League 2025 | Phoenix | Perempat Final | Top Frag |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR002 | Valorant Asia Pacific League 2025 | Reyna | Perempat Final | Top Frag |
| PL004 | Dewi "FLASH" Lestari | TM003 | Gamma Strikers | Coach Budi | TR001 | Valorant Indonesia Championship 2025 | Neon | Juara 2 | Rookie of The Year |
| PL004 | Dewi "FLASH" Lestari | TM003 | Gamma Strikers | Coach Budi | TR001 | Valorant Indonesia Championship 2025 | Deadlock | Juara 2 | Rookie of The Year |

- Split the multivalue of PlayerActivity into new rows
- Each row contains only one agent and one description

## 4.2 All known functional dependencies that are useful for normalization.

To normalize the database effectively, we must identify all the functional dependencies (FDs) present in the un-normalized data. Functional dependencies define the relationships between attributes and recognizing them is crucial for detecting anomalies and guiding the normalization process.

A. Full Functional Dependencies (FFD)

A full functional dependency occurs when an attribute is fully dependent on the entire primary key (not just a part of it). This kind of dependency indicates a valid relationship for a well-structured table in 1NF.

B. Partial Dependencies

Partial dependency arises when an attribute is dependent on only a part of a composite primary key rather than the whole key. This situation violates the rules of Second Normal Form (2NF) and must be eliminated during normalization.

C. Transitive Dependencies

A transitive dependency exists when one non-prime attribute depends on another non-prime attribute, which in turn depends on the primary key. This situation violates Third Normal Form (3NF).

## 4.3 Detail normalization process from 1-NF to 2-NF

**1NF**

| IDPlayer | NamaPlayer | IDTeam | NamaTeam | CoachTeam | IDTournament | TournamentName | AgentName | TeamRank | Description |
|---|---|---|---|---|---|---|---|---|---|
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Jett | Juara 1 | MVP Turnamen |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Sova | Juara 1 | MVP Turnamen |
| PL002 | Siti "SNIPER" Rahayu | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Viper | Juara 1 | Support Terbaik |
| PL002 | Siti "SNIPER" Rahayu | TM001 | Alpha Esports | Coach Alex | TR001 | Valorant Indonesia Championship 2025 | Killjoy | Juara 1 | Support Terbaik |
| PL003 | Rian "GHOST" Wijaya | TM002 | Beta Warriors | Coach Rina | TR001 | Valorant Indonesia Championship 2025 | Omen | Juara 3 | Comeback King |
| PL003 | Rian "GHOST" Wijaya | TM002 | Beta Warriors | Coach Rina | TR001 | Valorant Indonesia Championship 2025 | Breach | Juara 3 | Comeback King |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR002 | Valorant Asia Pacific League 2025 | Phoenix | Perempat Final | Top Frag |
| PL001 | Budi "ACE" Santoso | TM001 | Alpha Esports | Coach Alex | TR002 | Valorant Asia Pacific League 2025 | Reyna | Perempat Final | Top Frag |
| PL004 | Dewi "FLASH" Lestari | TM003 | Gamma Strikers | Coach Budi | TR001 | Valorant Indonesia Championship 2025 | Neon | Juara 2 | Rookie of The Year |
| PL004 | Dewi "FLASH" Lestari | TM003 | Gamma Strikers | Coach Budi | TR001 | Valorant Indonesia Championship 2025 | Deadlock | Juara 2 | Rookie of The Year |

- There are still partial dependencies, because some attributes are independent of all key combinations

**2NF**

| IDPlayer | NamaPlayer |
|---|---|
| PL001 | Budi "ACE" Santoso |
| PL002 | Siti "SNIPER" Rahayu |
| PL003 | Rian "GHOST" Wijaya |
| PL004 | Dewi "FLASH" Lestari |

| IDTeam | NamaTeam | CoachTeam |
|---|---|---|
| TM001 | Alpha Esports | Coach Alex |
| TM002 | Beta Warriors | Coach Rina |
| TM003 | Gamma Strikers | Coach Budi |

| IDTournament | TournamentName |
|---|---|
| TR001 | Valorant Indonesia Championship 2025 |
| TR002 | Valorant Asia Pacific League 2025 |

| IDTeam | IDTournament | TeamRank |
|---|---|---|
| TM001 | TR001 | Juara 1 |
| TM002 | TR001 | Juara 3 |
| TM001 | TR002 | Perempat Final |
| TM003 | TR001 | Juara 2 |

| IDPlayer | IDTeam | IDTournament | AgentName | Description |
|---|---|---|---|---|
| PL001 | TM001 | TR001 | Jett | MVP Turnamen |
| PL001 | TM001 | TR001 | Sova | MVP Turnamen |
| PL002 | TM001 | TR001 | Viper | Support Terbaik |
| PL002 | TM001 | TR001 | Killjoy | Support Terbaik |
| PL003 | TM002 | TR001 | Omen | Comeback King |
| PL003 | TM002 | TR001 | Breach | Comeback King |
| PL001 | TM001 | TR002 | Phoenix | Top Frag |
| PL001 | TM001 | TR002 | Reyna | Top Frag |
| PL004 | TM003 | TR001 | Neon | Rookie of The Year |
| PL004 | TM003 | TR001 | Deadlock | Rookie of The Year |

- All non-primary attributes in the main tabole depend directly on the combination of three PKs
- Other non-primary attributes, like NamaPlayer , NamaTeam, etc have been moved to tables that depend on their respective single keys

## 4.4 Detail normalization process from 2-NF to 3-NF

**2NF**

| IDPlayer | NamaPlayer |
|---|---|
| PL001 | Budi "ACE" Santoso |
| PL002 | Siti "SNIPER" Rahayu |
| PL003 | Rian "GHOST" Wijaya |
| PL004 | Dewi "FLASH" Lestari |

| IDTeam | NamaTeam | CoachTeam |
|---|---|---|
| TM001 | Alpha Esports | Coach Alex |
| TM002 | Beta Warriors | Coach Rina |
| TM003 | Gamma Strikers | Coach Budi |

| IDTournament | TournamentName |
|---|---|
| TR001 | Valorant Indonesia Championship 2025 |
| TR002 | Valorant Asia Pacific League 2025 |

| IDTeam | IDTournament | TeamRank |
|---|---|---|
| TM001 | TR001 | Juara 1 |
| TM002 | TR001 | Juara 3 |
| TM001 | TR002 | Perempat Final |
| TM003 | TR001 | Juara 2 |

| IDPlayer | IDTeam | IDTournament | AgentName | Description |
|---|---|---|---|---|
| PL001 | TM001 | TR001 | Jett | MVP Turnamen |
| PL001 | TM001 | TR001 | Sova | MVP Turnamen |
| PL002 | TM001 | TR001 | Viper | Support Terbaik |
| PL002 | TM001 | TR001 | Killjoy | Support Terbaik |
| PL003 | TM002 | TR001 | Omen | Comeback King |
| PL003 | TM002 | TR001 | Breach | Comeback King |
| PL001 | TM001 | TR002 | Phoenix | Top Frag |
| PL001 | TM001 | TR002 | Reyna | Top Frag |
| PL004 | TM003 | TR001 | Neon | Rookie of The Year |
| PL004 | TM003 | TR001 | Deadlock | Rookie of The Year |

- In the Agent and Description table (2NF), Description is transitively dependent on the primary key via AgentName.

**3NF**

| IDPlayer | NamaPlayer |
|---|---|
| PL001 | Budi "ACE" Santoso |
| PL002 | Siti "SNIPER" Rahayu |
| PL003 | Rian "GHOST" Wijaya |
| PL004 | Dewi "FLASH" Lestari |

| IDTeam | NamaTeam | CoachTeam |
|---|---|---|
| TM001 | Alpha Esports | Coach Alex |
| TM002 | Beta Warriors | Coach Rina |
| TM003 | Gamma Strikers | Coach Budi |

| IDTournament | TournamentName |
|---|---|
| TR001 | Valorant Indonesia Championship 2025 |
| TR002 | Valorant Asia Pacific League 2025 |

| IDTeam | IDTournament | TeamRank |
|---|---|---|
| TM001 | TR001 | Juara 1 |
| TM002 | TR001 | Juara 3 |
| TM001 | TR002 | Perempat Final |
| TM003 | TR001 | Juara 2 |

| IDPlayer | IDTeam | IDTournament |
|---|---|---|
| PL001 | TM001 | TR001 |
| PL002 | TM001 | TR001 |
| PL003 | TM002 | TR001 |
| PL001 | TM001 | TR002 |
| PL004 | TM003 | TR001 |

| AgentName | Description |
|---|---|
| Jett | MVP Turnamen |
| Sova | MVP Turnamen |
| Viper | Support Terbaik |
| Killjoy | Support Terbaik |
| Omen | Comeback King |
| Breach | Comeback King |
| Phoenix | Top Frag |
| Reyna | Top Frag |
| Neon | Rookie of The Year |
| Deadlock | Rookie of The Year |

| IDPlayer | IDTeam | IDTournament | AgentName |
|---|---|---|---|
| PL001 | TM001 | TR001 | Jett |
| PL001 | TM001 | TR001 | Sova |
| PL002 | TM001 | TR001 | Viper |
| PL002 | TM001 | TR001 | Killjoy |
| PL003 | TM002 | TR001 | Omen |
| PL003 | TM002 | TR001 | Breach |
| PL001 | TM001 | TR002 | Phoenix |
| PL001 | TM001 | TR002 | Reyna |
| PL004 | TM003 | TR001 | Neon |
| PL004 | TM003 | TR001 | Deadlock |

- This violates 3NF since non-prime attribute (Description) depends on another non-prime (AgentName).
- Split the Description attribute into a new table with AgentName as the key.
- Each row now contains only AgentName and its corresponding Description.

# Chapter 5
## The ERD Of Refined Database With Conclusions
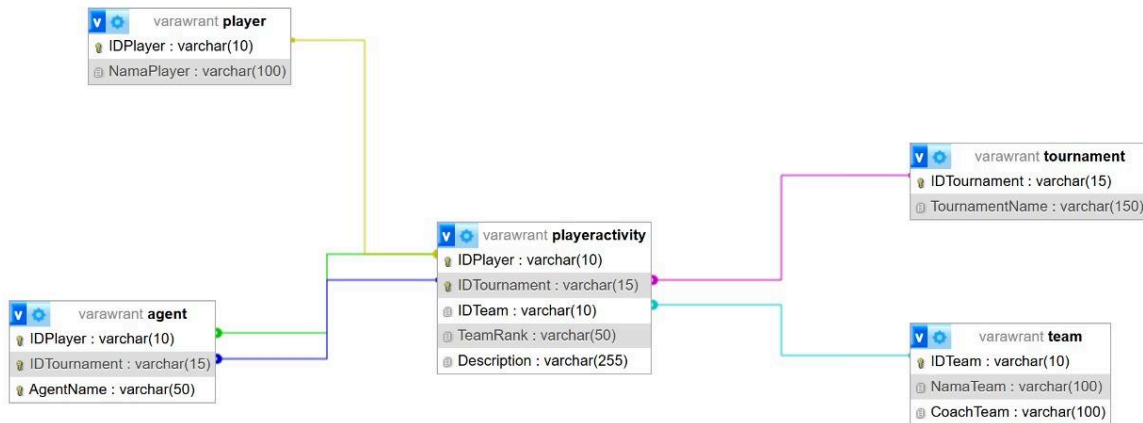


Main Entities and Roles
1. Table Player:
   - Contains player details (IDPlayer, NamaPlayer).
   - Connected to playeractivity (1 player can have many activities).
2. Table Team:
   - Stores team details (IDTeam, NamaTeam, CoachTeam).
   - Referenced by playeractivity.
3. Table Tournament:
   - Stores tournament details (IDTournament, TournamentName)
   - Referenced by both playeractivity and agent.
4. Table playerActivity:
   - A junction table connecting players, tournaments, and teams.
   - Stores what team a player was in, during which tournament, and their rank and description.
   - Acts as a core log of participation.
5. Table Agent:
   - A linking table showing which agents a player used in a tournament.
   - Uses a composite primary key (IDPlayer, IDTournament, AgentName).
   - References playeractivity via a composite foreign key.

Conclusions:
This ERD focuses on being a well structured relational model for an esports tracking system. It effectively manages players, their tournament activities, teams, agents used, and performance insights. The use of composite keys and linking tables makes it robust and reliable for analytics or event management in a competitive gaming context.

# Chapter 6
## The .sql File

SQL FILE LINK:

INSERT INTO Player VALUES
       ('PL001', 'Budi "ACE" Santoso'),
       ('PL002', 'Siti "SNIPER" Rahayu'),
       ('PL003', 'Rian "GHOST" Wijaya'),
       ('PL004', 'Budi "ACE" Santoso'),
       ('PL005', 'Dewi "FLASH" Lestari')

Extra options

| | | | | | IDPlayer | NamaPlayer |
|---|---|---|---|---|---|---|
| ☐ | 🖉 Edit | Copy | ⊝ Delete | | PL001 | Budi "ACE" Santoso |
| ☐ | 🖉 Edit | Copy | ⊝ Delete | | PL002 | Siti "SNIPER" Rahayu |
| ☐ | 🖉 Edit | Copy | ⊝ Delete | | PL003 | Rian "GHOST" Wijaya |
| ☐ | 🖉 Edit | Copy | ⊝ Delete | | PL004 | Budi "ACE" Santoso |
| ☐ | 🖉 Edit | Copy | ⊝ Delete | | PL005 | Dewi "FLASH" Lestari |

INSERT INTO Team VALUES
       ('TM001', 'Aplha Esports', 'Coach Alex'),
       ('TM002', 'Beta Warriors', 'Coach Rina'),
       ('TM003', 'Gamma Strikers', 'Coach Budi')

Extra options

| | | | | | IDTeam | NamaTeam | CoachTeam |
|---|---|---|---|---|---|---|---|
| ☐ | 🖉 Edit | Copy | ⊝ Delete | | TM001 | Aplha Esports | Coach Alex |
| ☐ | 🖉 Edit | Copy | ⊝ Delete | | TM002 | Beta Warriors | Coach Rina |
| ☐ | 🖉 Edit | Copy | ⊝ Delete | | TM003 | Gamma Strikers | Coach Budi |

INSERT INTO tournament VALUES
       ('TR001', 'Valorant Indonesia Championship 2025'),
       ('TR002', 'Valorant Asia Pacific League 2025')

| ←T→ | | | | | IDTournament | TournamentName |
|---|---|---|---|---|---|---|
| ☐ | 🖉 Edit | Copy | ⊖ Delete | | TR001 | Valorant Indonesia Championship 2025 |
| ☐ | 🖉 Edit | Copy | ⊖ Delete | | TR002 | Valorant Asia Pacific League 2025 |

↑  ☐ Check all  *With selected:*  🖉 Edit  Copy  ⊖ Delete  Export

INSERT INTO PlayerActivity (IDPlayer, IDTournament, IDTeam, TeamRank, Description) VALUES
      ('PL001', 'TR001', 'TM001', 'Juara 1', 'MVP Turnamen'),
      ('PL002', 'TR001', 'TM001', 'Juara 1', 'Support Terbaik'),
      ('PL003', 'TR001', 'TM002', 'Juara 3', 'Comeback King'),
      ('PL001', 'TR002', 'TM001', 'Perempat Final', 'Top Frag'),
      ('PL004', 'TR001', 'TM003', 'Juara 2', 'Rookie of The Year')

| ←T→ | | | | IDPlayer | IDTournament | IDTeam | TeamRank | Description |
|---|---|---|---|---|---|---|---|---|
| ☐ | 🖉 Edit | Copy | ⊖ Delete | PL001 | TR001 | TM001 | Juara 1 | MVP Turnamen |
| ☐ | 🖉 Edit | Copy | ⊖ Delete | PL001 | TR002 | TM001 | Perempat Final | Top Frag |
| ☐ | 🖉 Edit | Copy | ⊖ Delete | PL002 | TR001 | TM001 | Juara 1 | Support Terbaik |
| ☐ | 🖉 Edit | Copy | ⊖ Delete | PL003 | TR001 | TM002 | Juara 3 | Comeback King |
| ☐ | 🖉 Edit | Copy | ⊖ Delete | PL004 | TR001 | TM003 | Juara 2 | Rookie of The Year |

INSERT INTO Agent (IDPlayer, IDTournament, AgentName) VALUES
      ('PL001', 'TR001', 'Jett'),
      ('PL001', 'TR001', 'Sova'),
      ('PL002', 'TR001', 'Viper'),
      ('PL002', 'TR001', 'Killjoy'),
      ('PL003', 'TR001', 'Omen'),
      ('PL003', 'TR001', 'Breach'),
      ('PL001', 'TR002', 'Phoenix'),
      ('PL001', 'TR002', 'Reyna'),
      ('PL004', 'TR001', 'Neon'),
      ('PL004', 'TR001', 'Deadlock');

| | | | | IDPlayer | IDTournament | AgentName |
|---|---|---|---|---|---|---|
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL001 | TR001 | Jett |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL001 | TR001 | Sova |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL001 | TR002 | Phoenix |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL001 | TR002 | Reyna |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL002 | TR001 | Killjoy |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL002 | TR001 | Viper |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL003 | TR001 | Breach |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL003 | TR001 | Omen |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL004 | TR001 | Deadlock |
| ☐ | 🖊 Edit | Copy | ⊘ Delete | PL004 | TR001 | Neon |