

Prairie View A&M University
ROY G. PERRY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE

SWAC FOOTBALL DATABASE

Comp 3395-PO1- Database Management

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INTRODUCTION

Effective management of the Southwestern Athletic Conference (SWAC) involves a diverse data set related to various sports, teams, and players. The complexity of this data set leads to challenges with organization, efficiency, and security. To address these challenges and provide effortless database management for our stakeholders, including colleges, fans, recruiters, and more, we proudly introduce the SWAC Football Database. This comprehensive database ensures around the clock, user-friendly access to all data associated with the SWAC conference.

The SWAC, considered the premier HBCU conference, is made up of historically black colleges and universities in the Southern United States and is considered the premier HBCU conference. The SWAC football division consists of 12 colleges: Alabama A&M University, Alabama State University, Bethune-Cookman University, Florida A&M University, Jackson State University, Mississippi Valley State University, Alcorn State University, University of Arkansas at Pine Bluff, Grambling State University, Prairie View A&M University, Southern University, and Texas Southern University. The SWAC division stands out as a testament to excellence, progress, and tradition.

We recognize the diverse range of stakeholders invested in the success of SWAC, so we aim to cater to the needs of colleges seeking comprehensive performance insight, fans craving real-time updates, and recruiters seeking to make the best decisions. This database is more than just a solution, it connects our stakeholders to what matters most to them. With an emphasis on security, efficiency, and accessibility, the database ensures every user has a seamless experience with SWAC football data. This database is a dynamic platform showing the unique identity of the SWAC and everything that makes up its success.

Overview

This database is designed with 5 interconnected tables: Staff, SWAC Teams, Team Statistics, Games, and Players. Each table plays an important role in organizing essential information. The Staff table records key personnel involved in the management of this database, the SWAC Teams table catalogs details about each team, the Team Statistics table captures performance metrics, the Games table keeps track of game details, and the Players table provides insight into player profiles.

Each table has a unique primary key which serves to identify a row/record from the table; The primary keys are named after the table and tagged with ID at the end, i.e., TeamID. While there are five tables, there are only four foreign keys. For the Players, Games, and Team Statistics table, the foreign key references the SWAC Teams table. The Team Statistics table features another foreign key, which links to the Games table.

This database will assist various shareholders with organizing and accessing data. The database has five tables: Staff, SWAC Teams, Team Statistics, Games, and Players. Each table has a primary key and foreign key except for the SWAC Teams table, which lacks a foreign key. Each table is connected to the SWAC Teams table through their foreign key. The Team Statistics table is the only table with two foreign keys as it has relations with the Team table and the Games table. The Player's table is linked to the SWAC Teams table through the TeamID foreign key, which connects players to their teams. The Games table uses two foreign keys to establish connections with the home and away team for each match. The Team Statistics table has two foreign keys, allowing a relationship with the SWAC Teams table and Games table.

Architecture & ER Diagram

Figure 1 depicts the architecture of the SWAC Football Database, showcasing the data types and variables associated with each attribute. In Figure 2, an ER diagram of the database is presented, illustrating the structural organization and primary key-foreign key relationships within the database.

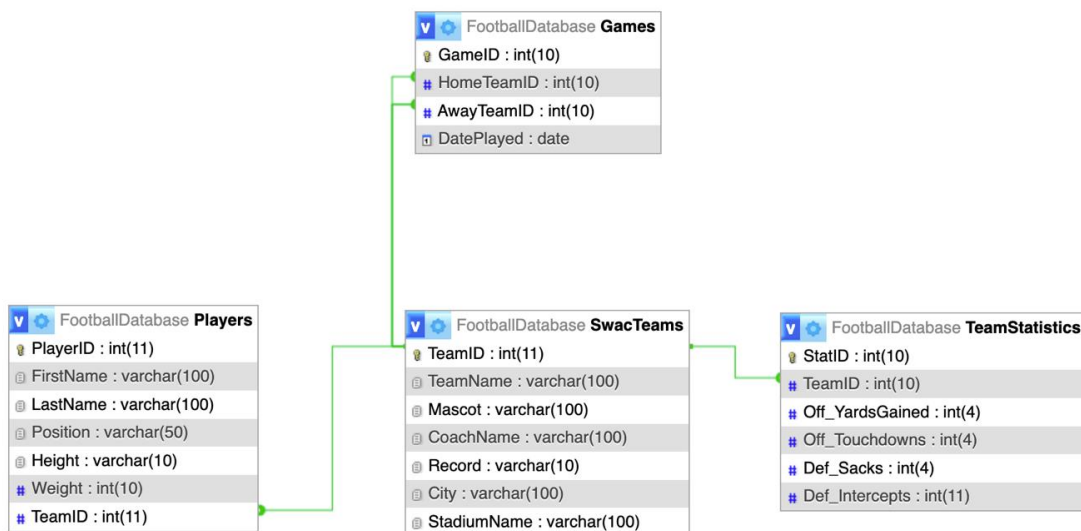


Figure 1. Structure of SWAC Football Database

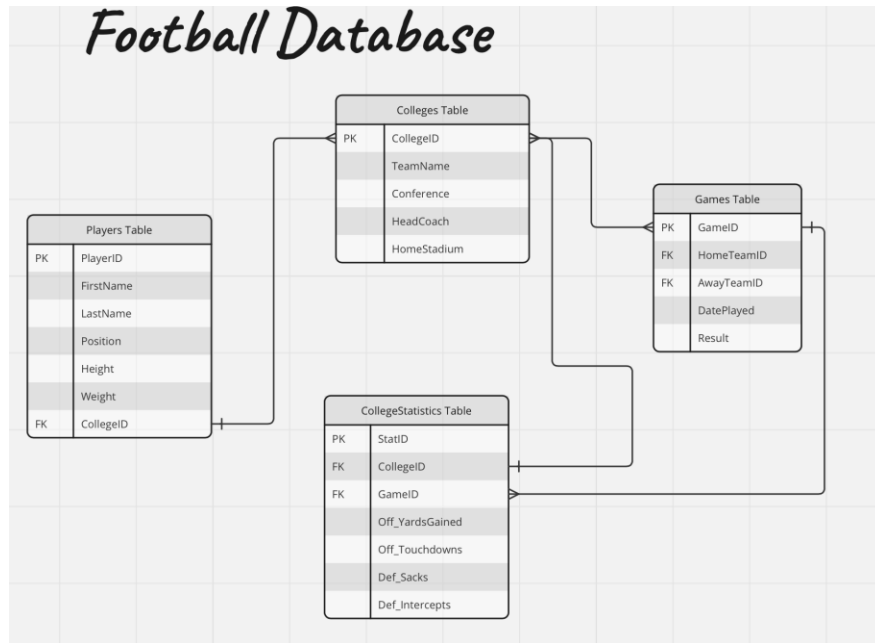


Figure 2. ER Diagram of SWAC Football Database

Implementation Methods

The SWAC Football Database was developed using MySQL, phpMyAdmin, and XAMPP. Initial table creation was done through MySQL in a terminal, establishing tables, primary, and foreign keys. phpMyAdmin played a key role in data insertion, leveraging SQL commands within its interface for ease. Figure 3 below illustrates the implementation of the SWAC Football Database in phpMyAdmin. The platform was also used for the creation of triggers and procedures. The database web interface was crafted using .php code.

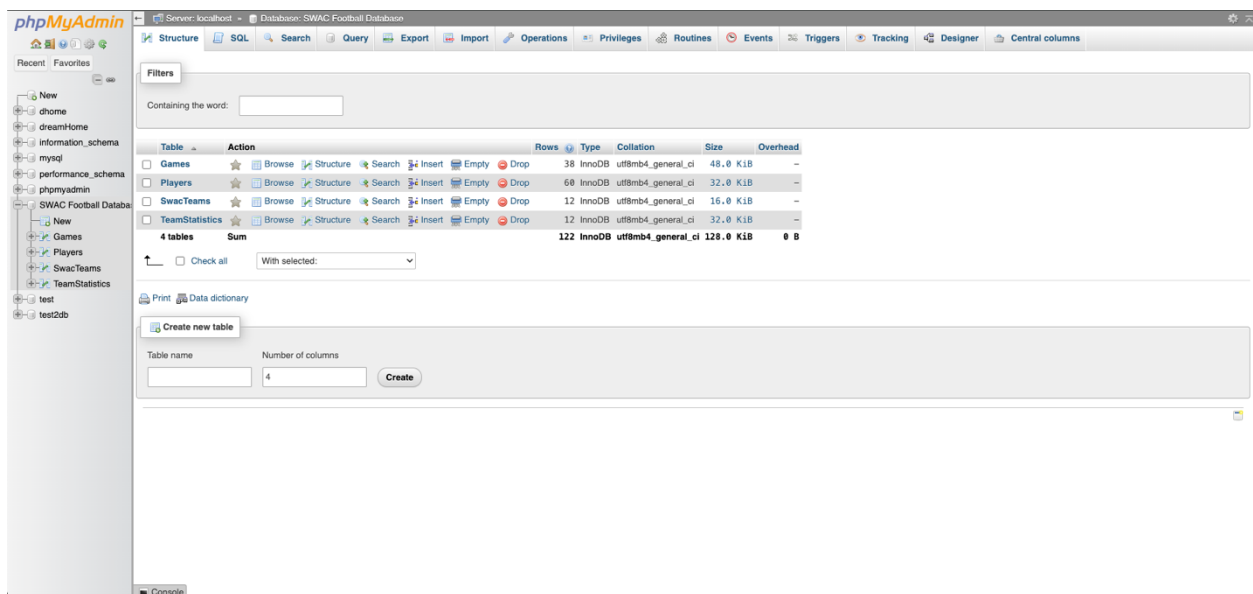


Figure 3. photo of SWAC Football Database inside phpMyAdmin

Database Website

The database web interface was created using .php. The file Query_Wizards.php contains the source code of the website. The website displays the tables and data within our SWAC Football database.

TeamStatistics Table

StatID	TeamID	Off_YardsGained	Off_Touchdowns	Def_Sacks	Def_Intercepts
0	4	3740	34	33	9
1	1	3486	23	15	8
2	2	3852	35	28	16
3	3	3286	27	24	6
5	5	3695	36	21	13
6	11	2473	13	10	5
7	10	2584	18	23	8
8	9	2630	22	22	9
9	8	2784	18	18	4
10	7	3810	32	25	5
11	6	3687	38	19	10
12	12	3542	23	28	14

Figure 4: Screenshot of .php web interface displaying ‘TeamStatistics’ table

SwacTeams Table

TeamID	TeamName	Mascot	CoachName	Record	City	StadiumName
1	Prairie View A&M	Panthers	Bubba McDowell	3-1	Prairie View	Panther Stadium
2	Jackson State University	Tigers	Thomas Taylor	3-2	Jackson State	JSU Stadium
3	Southern University A&M	Jaguars	Eric Dooley	2-3	Southern University	A.W. Mumford Stadium
4	Florida A&M University	Rattlers	Willie Simmons	4-0	Tallahassee	Bragg Memorial Stadium
5	Grambling State	Tigers	Hugh Jackson	2-1	Grambling	Eddie G Robinson Memorial Stadium
6	Alabama A&M University	Bulldogs	Connie Shells	4-1	Huntsville	Louis Crews Stadium
7	Texas Southern University	Tigers	Clarence McKinney	1-4	Houston	BBVA Stadium
8	University of Arkansas at Pine Bluff	Golden Lions	Doe Gamble	2-3	Pine Bluff	Simmons Bank Field
9	Bethune-Cookman University	Wildcats	Terry Sims	2-3	Daytona Beach	Municipal Stadium
10	Alabama State	Hornets	Donald Hill-Eley	3-2	Montgomery	ASU Stadium
11	Mississippi Valley State	Delta Devils	Vincent Dancy	1-4	Itta Bena	Rice-Totten Stadium
12	Alcorn State University	Braves	Fred McNair	6-4	Lorman, MS	Jack Spinks Football Stadium

Players Table

PlayerID	FirstName	LastName	Position	Height	Weight	TeamID
1	Tylik	Bethea	QB	6'6"	225	9
2	Ejike	Brown	DL	6'2"	247	9
3	Julian	Calvez	QB	6'3"	190	5
4	Sundiata	Anderson	DL	6'5"	240	5
5	Harold	Blood	QB	6'2"	180	3
6	Darius	Harry	DE	6'2"	245	3
7	Cornelius	Brown	QB	6'5"	210	6
8	Hayden	Aniagor-Gilford	DE	6'2"	220	6
9	Allen	Walker	LB	6'2"	234	2
10	Rico	Powers	WR	6'2"	187	2
11	Jared	Wilson	RB	5'11"	230	11
12	Jaquez	Pennimon	DB	6'1"	180	11
13	Mekhi	Hagens	QB	6'2"	204	8
14	Dean	Sarris	K	6'0"	176	8
15	Jaclyn	Lay	TE	6'6"	260	10
104	Brian	Jenkins Jr	WR	5'7"	160	1
105	TreVion	Green	LB	6'0"	195	1
106	Isaiah	Major	LB	6'1"	230	4
107	Jeremiah	Pruitt	TE	6'5"	230	4
108	Evan	Means	WR	6'2"	160	7
109	Isaiah	Bogerty	LB	6'3"	215	7

Figure 5: Screenshot of .php website displaying ‘SwacTeams’ table & ‘Players’ table

Games Table

GameID	HomeTeamID	AwayTeamID	DatePlayed
1	4	1	2023-10-28
2	1	5	2023-09-30
3	3	1	2023-11-11
4	1	7	2023-09-16
5	1	5	2023-09-30
6	1	5	2023-09-30
7	5	7	2023-09-23
8	7	4	2023-10-21
9	2	4	2023-09-03
10	2	6	2023-10-07
11	2	7	2023-11-04
12	4	2	2023-09-03
13	4	1	2023-10-28
14	2	7	2023-11-04
15	3	2	2023-09-02
16	3	6	2023-09-09
17	3	4	2023-10-07
18	3	7	2023-10-28
19	3	1	2023-11-11
20	5	7	2023-09-23
21	5	6	2023-10-14
22	5	10	2023-10-04
23	6	3	2023-09-16
24	6	8	2023-09-21
25	6	2	2023-09-07
26	6	4	2023-11-04
27	9	7	2023-09-14
28	9	6	2023-11-11
29	9	3	2023-10-21
30	11	4	2023-09-30
31	11	8	2023-10-14
32	11	2	2023-10-21
33	8	3	2023-09-30
34	8	2	2023-10-28
35	8	5	2023-10-10
36	9	7	2023-09-14
37	9	3	2023-10-21
38	9	5	2023-10-28

TeamStatistics Table

Figure 6: Screenshot of .php website displaying 'Games' table

Players Table

ID	Name	Position	Height	Weight	Experience
108	Evan Means	WR	6'2"	160	7
109	Isaiah Bogerty	LB	6'3"	215	7
110	Jarveon Howard	RB	5'10"	200	12
111	Michael Okamoto	LB	6'2"	235	12
112	Stacy Brown	S	6'3"	205	1
113	Shemar Savage	WR	6'4"	210	1
114	Connor Wisham	RB	6'0"	180	1
115	Joshua Clarke	LB	6'2"	225	2
116	George McCortley	WR	6'3"	215	2
117	Jaheem Hazel	CB	6'0"	190	2
118	Rodney Johnson	DB	6'3"	200	3
119	Cassius Allen	WR	6'4"	200	3
120	Keylin Roach	DB	6'1"	185	3
121	Lovie Jenkins	DB	6'1"	195	4
122	Jaquez Yant	RB	6'2"	235	4
123	Jamari Gassett	WR	5'10"	170	4
124	Trent Henry	DB	5'11"	195	5
125	Nigel Lanier	WR	6'2"	180	5
126	Kevin Thomas	DB	6'0"	185	5
127	Manquez Beason	CB	5'11"	185	6
128	Terrell Gardner	WR	5'8"	160	6
129	Kaleb Dawson	S	5'11"	200	6
130	Viramontes Pippens	DT	6'1"	300	7
131	Andrew Body	QB	6'1"	190	7
132	Charles George	S	6'3"	229	7
133	Rico Douer	LB	6'0"	221	8
134	Daemon Dawkins	WR	5'10"	170	8
135	Kenji Lewis	WR	6'1"	200	8
136	Iverson Clement	CB	6'0"	190	9
137	CamRon Ransom	QB	6'3"	227	9
138	Tink Boyd	WR	5'11"	186	9
139	Colton Adams	LB	6'1"	244	10
140	Kisean Johnson	WR	6'0"	209	10
141	Tacaris Bozeman	RB	5'9"	182	10
142	Andrew Ogletree	DL	6'2"	274	10
143	Brandon Williams	DB	5'10"	180	11
144	Christian Pagan	DB	5'9"	180	11
145	Aaron Webb	DB	6'0"	180	11
146	Anthony Williams	WR	6'0"	200	12
147	Terrence Ellis	LB	6'2"	120	12

Figure 7: screenshot of .php website displaying 'Players' table.

Example Queries/Executions

Below are examples of queries that our stakeholders can utilize to address business inquiries related to the SWAC Football Database.

```

MariaDB [SWAC Football Database]> SELECT
->     Players.FirstName,
->     Players.LastName,
->     Players.Position,
->     SwacTeams.TeamName,
->     SwacTeams.Record
-> FROM
->     Players
-> JOIN
->     SwacTeams ON Players.TeamID = SwacTeams.TeamID
-> WHERE
->     Players.Position = 'QB';

```

FirstName	LastName	Position	TeamName	Record
Harold	Blood	QB	Southern University A&M	2-3
Julian	Calvez	QB	Grambling State	2-1
Cornelius	Brown	QB	Alabama A&M University	4-1
Andrew	Body	QB	Texas Southern University	1-4
Mekhi	Hagens	QB	University of Arkansas at Pine Bluff	2-3
Tylik	Bethea	QB	Bethune-Cookman University	2-3
Cam'Ron	Ransom	QB	Bethune-Cookman University	2-3

7 rows in set (0.002 sec)

Figure 8: Select players who play the 'QB' position and retrieve their personal information along with team name.

```

MariaDB [SWAC Football Database]> SELECT Players.FirstName, Players.LastName, Players.Position, Players.Height FROM Players WHERE Players.Position = 'RB' AND Players.Height BETWEEN '5-11' AND '6-5';

```

FirstName	LastName	Position	Height
Connor	Wisham	RB	6'0"
Jaquez	Yant	RB	6'2"

2 rows in set (0.001 sec)

Figure 9: Find players within specific position and height range.

```

MariaDB [SWAC Football Database]> SELECT Players.*, SwacTeams.TeamName
-> FROM Players
-> JOIN SwacTeams ON Players.TeamID = SwacTeams.TeamID
-> ORDER BY Players.Weight DESC
-> LIMIT 1;

```

PlayerID	FirstName	LastName	Position	Height	Weight	TeamID	TeamName
130	Viramontes	Pippens	DT	6'1"	300	7	Texas Southern University

1 row in set (0.040 sec)

Figure 10:

Retrieve the personal details and team information for the player with the highest weight.


```
bin -- mysql -u root -p -- 180x68
```

MariaDB [SWAC Football Database]> SELECT Players.*, SwacTeams.TeamName
-> FROM Players
-> JOIN SwacTeams ON Players.TeamID = SwacTeams.TeamID;

PlayerID	FirstName	LastName	Position	Height	Weight	TeamID	TeamName
184	Brian	Jenkins Jr	WR	5'7"	168	1	Prairie View A&M
185	TreVion	Green	LB	6'0"	195	1	Prairie View A&M
112	Stacy	Brown	S	6'3"	205	1	Prairie View A&M
113	Shemar	Savage	WR	6'4"	218	1	Prairie View A&M
114	Connor	Wisham	RB	6'0"	188	1	Prairie View A&M
9	Allen	Walker	LB	6'2"	234	2	Jackson State University
10	Rico	Powers	WR	6'2"	187	2	Jackson State University
115	Joshua	Clarke	LB	6'2"	225	2	Jackson State University
116	George	McDorley	WR	6'3"	215	2	Jackson State University
117	Jahiem	Harol	CB	6'0"	198	2	Jackson State University
5	Harold	Blood	QB	6'2	188	3	Southern University A&M
6	Darius	Harry	DE	6'2	245	3	Southern University A&M
118	Rodney	Johnson	DB	6'3"	208	3	Southern University A&M
119	Cassius	Allen	WR	6'4"	208	3	Southern University A&M
120	Keylin	Roach	DB	6'1"	185	3	Southern University A&M
186	Isaiah	Major	LB	6'1"	238	4	Florida A&M University
107	Jeremiah	Pruitt	TE	6'5"	238	4	Florida A&M University
121	Lovie	Jenkins	DB	6'1"	195	4	Florida A&M University
122	Jaquez	Vant	RB	6'2"	235	4	Florida A&M University
123	Jamari	Gassett	WR	5'10"	178	4	Florida A&M University
3	Julian	Calvez	QB	6'3	198	5	Grambling State
4	Sundiata	Anderson	DL	6'5	248	5	Grambling State
124	Trent	Henry	DB	5'11"	195	5	Grambling State
125	Nigel	Lanier	WR	6'2"	188	5	Grambling State
126	Kevin	Thomas	DB	6'0"	185	5	Grambling State
7	Cornellious	Brown	QB	6'5	218	6	Alabama A&M University
8	Hayden	Anlagor-Gilford	DE	6'2	228	6	Alabama A&M University
127	Marquez	Beason	CB	5'11"	185	6	Alabama A&M University
128	Terrell	Gardner	WR	5'8"	168	6	Alabama A&M University
129	Kaleb	Dawson	S	5'11"	208	6	Alabama A&M University
188	Evan	Means	WR	6'2"	168	7	Texas Southern University
189	Isiah	Bogarty	LB	6'3"	215	7	Texas Southern University
130	Viramontes	Pippens	DT	6'1"	388	7	Texas Southern University
131	Andrew	Body	QB	6'1"	198	7	Texas Southern University
132	Charles	George	S	6'3"	229	7	Texas Southern University
13	Mekhi	Hagens	QB	6'2"	284	8	University of Arkansas at Pine Bluff
14	Dorian	K	WR	6'0"	174	8	University of Arkansas at Pine Bluff
133	Rico	Dozier	LB	6'0"	221	8	University of Arkansas at Pine Bluff
134	Daemon	Dawkins	WR	5'10"	178	8	University of Arkansas at Pine Bluff
135	Kenji	Lewis	WR	6'1"	208	8	University of Arkansas at Pine Bluff
1	Tylik	Bethea	QB	6'6	225	9	Bethune-Cookman University
2	Ejike	Brown	DL	6'2	247	9	Bethune-Cookman University
136	Iverson	Clement	CB	6'0"	198	9	Bethune-Cookman University
137	Cam/Ron	Ransom	QB	6'3"	227	9	Bethune-Cookman University
138	Tink	Boyd	WR	5'11"	186	9	Bethune-Cookman University
15	Jaelyn	Ley	TE	6'6"	268	10	Alabama State
139	Colton	Adams	LB	6'1"	244	10	Alabama State
140	Kisean	Johnson	WR	6'0"	209	10	Alabama State
141	Tacaris	Bozeman	RB	5'9"	182	10	Alabama State
142	Andrew	Ogletree	DL	6'2"	274	10	Alabama State
11	Jared	Wilson	RB	5'11"	238	11	Mississippi Valley State
12	Jaquez	Pennimon	DB	6'1"	188	11	Mississippi Valley State
143	Brandon	Williams	DB	5'10"	188	11	Mississippi Valley State
144	Christian	Fagan	DB	5'9"	188	11	Mississippi Valley State
145	Aaron	Webb	DB	6'0"	188	11	Mississippi Valley State
110	Jarveon	Howard	RB	5'10"	288	12	Alcorn State University
111	Michael	Okamofufile	LB	6'2"	235	12	Alcorn State University
146	Anthony	Williams	WR	6'0"	208	12	Alcorn State University
147	Terrence	Ellis	LB	6'2"	228	12	Alcorn State University
148	Malik	Rodgers	WR	5'10"	178	12	Alcorn State University

68 rows in set (0.016 sec)

Figure 11: Show teams along with their respective coaches and the number of interceptions.

```
MariaDB [SWAC Football Database]> SELECT SwacTeams.TeamName, COUNT(Games.GameID) AS NumGamesPlayed  
-> FROM SwacTeams  
-> LEFT JOIN Games ON SwacTeams.TeamID = Games.HomeTeamID OR SwacTeams.TeamID = Games.AwayTeamID  
-> WHERE MONTH(Games.DatePlayed) = 10 AND YEAR(Games.DatePlayed) = 2023  
-> GROUP BY SwacTeams.TeamID, SwacTeams.TeamName;
```

TeamName	NumGamesPlayed
Prairie View A&M	2
Jackson State University	3
Southern University A&M	4
Florida A&M University	4
Grambling State	4
Alabama A&M University	2
Texas Southern University	2
University of Arkansas at Pine Bluff	3
Bethune-Cookman University	3
Alabama State	1
Mississippi Valley State	2

11 rows in set (0.062 sec)

Figure 12: Display the teams that have played in October 2023 along with the number of games played.

```
MariaDB [SWAC Football Database]> SELECT Players.FirstName, Players.LastName, Players.Weight, SwacTeams.TeamName
-> FROM Players
-> JOIN SwacTeams ON Players.TeamID = SwacTeams.TeamID
-> WHERE Players.Weight BETWEEN '180' AND '220';
```

FirstName	LastName	Weight	TeamName
TreVion	Green	195	Prairie View A&M
Stacy	Brown	205	Prairie View A&M
Shemar	Savage	210	Prairie View A&M
Connor	Wisham	180	Prairie View A&M
Rico	Powers	187	Jackson State University
George	McCorley	215	Jackson State University
Jahiem	Hazel	190	Jackson State University
Harold	Blood	180	Southern University A&M
Rodney	Johnson	200	Southern University A&M
Cassius	Allen	200	Southern University A&M
Keylin	Roach	185	Southern University A&M
Lovie	Jenkins	195	Florida A&M University
Julian	Calvez	190	Grambling State
Trent	Henry	195	Grambling State
Nigel	Lanier	180	Grambling State
Kevin	Thomas	185	Grambling State
Cornelius	Brown	210	Alabama A&M University
Hayden	Anigbor-Gilford	220	Alabama A&M University
Marquez	Beason	185	Alabama A&M University
Kaleb	Dawson	200	Alabama A&M University
Isaiah	Bogerty	215	Texas Southern University
Andrew	Body	190	Texas Southern University
Mekhi	Hagens	204	University of Arkansas at Pine Bluff
Kenji	Lewis	200	University of Arkansas at Pine Bluff
Iverson	Clement	190	Bethune-Cookman University
Tink	Boyd	186	Bethune-Cookman University
Kisean	Johnson	209	Alabama State
Tacaris	Bozeman	182	Alabama State
Jaquez	Pennimon	180	Mississippi Valley State
Brandon	Williams	180	Mississippi Valley State
Christian	Fagan	180	Mississippi Valley State
Aaron	Webb	180	Mississippi Valley State
Jarveon	Howard	200	Alcorn State University
Anthony	Williams	200	Alcorn State University
Terreance	Ellis	220	Alcorn State University

35 rows in set (0.019 sec)

Figure 13: Retrieve players and their corresponding teams within a specified weight range.

```
MariaDB [SWAC Football Database]> SELECT TeamName, AVG(Off_YardsGained) AS AvgYardsGained
-> FROM TeamStatistics
-> JOIN SwacTeams ON TeamStatistics.TeamID = SwacTeams.TeamID
-> GROUP BY TeamName
-> ORDER BY AvgYardsGained DESC
-> LIMIT 5;
```

TeamName	AvgYardsGained
Jackson State University	3852.0000
Texas Southern University	3810.0000
Florida A&M University	3740.0000
Grambling State	3695.0000
Alabama A&M University	3687.0000

5 rows in set (0.019 sec)

Figure 14: Display the top 5 teams based on the highest average offensive yards gained.

Example of Triggers

Triggers					
<input type="checkbox"/>	Check all		Export		Drop
Name	Table	Time	Event		
<input type="checkbox"/> before_insert_team_games	TeamStatistics	BEFORE	INSERT		Edit
<input type="checkbox"/> before_insert_update_team_statistics	TeamStatistics	BEFORE	INSERT		Export
<input type="checkbox"/> check_insert_swac_teams	SwacTeams	BEFORE	INSERT		Drop

Figure 15: Screenshot of triggers in our database.

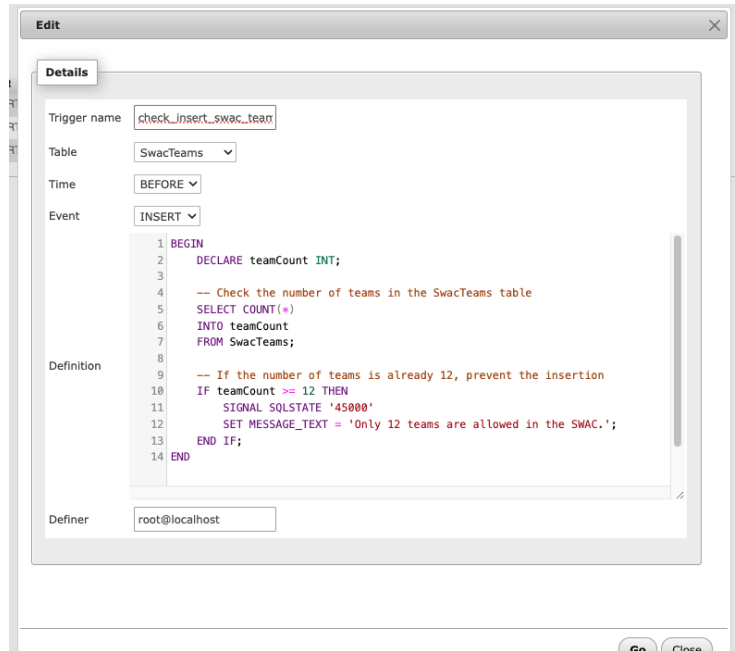


Figure 16: Source code of trigger to block insertion of more than 12 SWAC teams.

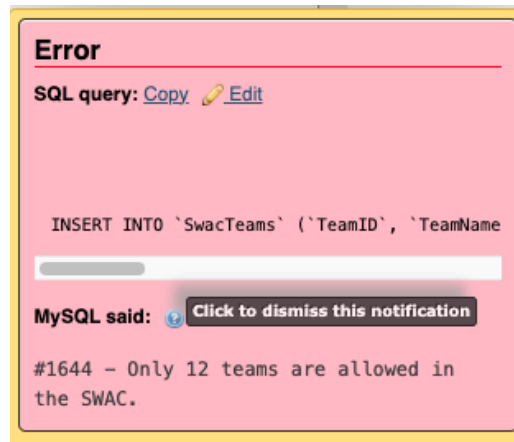


Figure 17: Illustration of the trigger being activated

Discussion & Conclusion

The football database project for the SWAC Championship holds immense importance in its practical implications and the comprehensive lessons it imparted. This project wasn't solely about creating a functional database; it encapsulated the essence of hands-on learning, providing a rich tapestry of experiences crucial for our growth in the field of computer and information technology.

The project's significance lies in its ability to simulate real-world scenarios, allowing us to comprehend the intricate nuances of database design, implementation, management, and utilization. Through this endeavor, we have grasped the pivotal role of databases in sports management, understanding how these systems are pivotal in organizing, analyzing, and managing vast amounts of sports-related data. This practical insight expanded our understanding of database applications beyond theoretical concepts.

Moreover, the project was a catalyst for personal and professional development. It served as a platform to foster essential skills such as problem-solving, teamwork, adaptability, and effective communication. These soft skills, coupled with technical proficiency, form the cornerstone of a successful career in the computer and information technology domain.

The importance of this project lies not only in the creation of a functional football database but also in the holistic learning journey it provided. It instilled in us a deeper appreciation for the practical applications of our academic knowledge and illuminated the vast possibilities within the realm of database systems.

In essence, the football database project for the SWAC Championship was an invaluable learning experience that transcended technical expertise. It was a journey that sculpted us into adaptable, proficient, and collaborative professionals, ready to tackle the challenges and opportunities that await in the dynamic landscape of technology.

Roles and Contributions:

Jabin (Group Leader): Oversaw project organization, ensured task delegation, and coordinated team efforts. Jabin was pivotal in setting project timelines and ensuring each member stayed on track with their responsibilities. Additionally, Jabin actively contributed to database design, the implementation of triggers and procedures, the php website creation, and final paper.

Rakshith: Played a significant role in database implementation using phpMyAdmin, specifically focusing on inserting data, and executing queries for testing purposes.

Kolade: Contributed extensively to the development of the database structure, particularly in designing the Entity-Relational (ER) model. Kolade ensured that database attributes, integrity constraints, and relationships were well-defined, contributing significantly to the database's coherence and functionality.

Zero: Zero concentrated on the finer details of the database, working on constraints and triggers, business questions and queries, and database implementation. Their contribution was crucial in ensuring the database had a good foundation to start on.

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