

# **ADVANCED DATABASE SYSTEMS Coursework-Parts A & B**

## **PRACTICAL GROUP ASSIGNMENT: DATABASE DEVELOPMENT**

### **Part A**

This is the first part of the coursework and it counts for 2 marks. The second part will be announced in December. The whole coursework (parts A and B) counts towards 30% of the course, i.e. **3 marks in total**. Please note that you need to pass this.

Submission deadline 22/01/2026 at 5 p.m.

#### **Deliverables:**

1. Database Design (Table Specifications)
2. Evaluation (Test Plan)
3. Database Development (Script Files)

#### **Database Development:**

Nominate by email to [c.berberidis@ihu.edu.gr](mailto:c.berberidis@ihu.edu.gr) (cc [c.tjortjis@ihu.edu.gr](mailto:c.tjortjis@ihu.edu.gr)) groups of 2, by 6 p.m. 06/11/2025. If you cannot nominate a group, you will be assigned to one.

#### **Database Description:**

Below are the business rules for a **marketing football league database**. Read them through and complete the requirements topic below.

1. A Football League wants to commission a database for recording the teams, the footballers, the stadiums and the sponsors.
2. A **footballer** (player) can play for only one team. Details like name, surname, position (use only 'GK' for the goalkeepers, 'DEF' for the defenders, 'MID' for the midfielders and 'FOR' for the forwards), games played, goals scored, contract, email, country of origin, date of birth etc., are recorded. Each footballer has a unique ID.
3. A **stadium** is where a team plays its home games. The name of the stadium, the city it belongs, its capacity, the year it was built and a review score (from 1 to 5) are recorded. A stadium has a unique ID, and it can host more than one team. Stadiums that are not hosting a team (for various reasons such as renovations), should also be recorded.
4. Each **team** has a unique ID and many footballers belong to it. Other details that are needed are the name of the team, the city and the year it was founded, the total goals scored, the total goals conceded. A team can play in a stadium in another city from the city it was founded.
5. A **sponsor** is advertising its product to the league. Each sponsor has a unique ID, a name, a type (i.e. footwear, clothing, electronics, etc.), the city of its headquarters, etc. Each sponsor can be advertised to one or more teams. A team can have one or more sponsors.
6. In **sponsorship**, the team, the sponsor and the sponsoring fee are recorded.

Notes: Composite key for the sponsoring is required.

#### **Complete the following tasks:**

##### **Task 1: Table Specifications**

Create a table (there is an example in Appendix A) with the database specifications based on the Entity Relationship Diagram (ERD) that is given to create based on the DB description. You should consider the following:

- appropriate table name, datatypes, constraints and defaults
- integrity
- case

## Task 2: Script Files

Use the ERD provided and your table specifications to create the following script files (all files should have an appropriate extension with proper details, run commands and comments).

1. **create\_yourTwoSurnames.txt (e.g. create\_Black\_White.txt)**
  - Create table commands for all tables
  - Tables should be created in the correct order to maintain integrity
  - Include:
    - NULL constraints and defaults
    - Sequences
2. **constraint\_yourTwoSurnames.txt**
  - Alter table... add constraint commands for all tables (primary keys, foreign keys, unique, checks)
  - Constraints should be created in the correct order to maintain integrity and named after the instructions on your lab notes
  - Any changes to the attributes you consider important (add new attributes, defaults, upper, change attributes, etc.)
3. **insert\_yourTwoSurnames.txt**
  - Insert commands for all tables
  - Regarding the number of entries per table, do not overload the database
  - Inserts should be in the correct order to maintain integrity
  - Data should be appropriate to support queries in task 2.5
  - Use two different methods for inserts (with or without the column list, be careful when you have used DEFAULT)
4. **drop\_yourTwoSurnames.txt**
  - Drop table, constraints and sequences
  - Drops should be in the correct order to maintain integrity (do not just drop the table)
  - Any additional commands you consider important
5. **query\_yourTwoSurnames.txt**
  - Queries to achieve the following data:
    - a) All the records from one table
    - b) A projection with 3 columns
      - data returned sorted in reverse alphabetical order
    - c) Restriction queries with *multiple* clauses demonstrating the following
      - E.g. the players from a specific country
      - a condition matching a pattern e.g. begins with J, ends with SON.
      - a negative condition predicate e.g. are *not* from GREECE
      - a date range condition e.g. born from April - September
    - d) Join queries with data from
      - 2 tables
      - 3 tables
      - More tables
    - e) Aggregate functions
      1. Show the footballers that their surname starts with K and ends with S.
      2. Show the total number of players per team.
      3. Which footballer is the highest-paid one?
      4. How many stadiums have a review score less than 2?
      5. Show the footballers (surname and name and ID) in an ascending order and the team they are playing for.

6. Which footballer (surname, name and team) has scored the most goals?
7. Show the total number of teams per city.
8. Which team has the worst goal difference (goals scored – goals received)?
9. How many stadiums were built between 1980 and 1999?
10. Show the footballers that were born in July (regardless of the year).
11. How many stadiums do not host a team in the database?
12. Which team has the word “SAINT” in its title?
13. Which player from “BRAZIL” has the highest contract or scored the most goals?
14. Show the player with the highest contract per position.
15. Assume a username for the footballers is made up of the first 2 letters of their country of origin, added to the first 4 letters of their first name added to the first 4 letters of their surname. Write the query to create and show the username for each footballer. Do not attempt to input it in the ‘Players’ table.
16. Show the total of the footballers’ contracts of the league (sum of all contracts of all players for all the teams).
17. Which sponsor spends the most money for advertising (sponsoring fees)?
18. Which type of business spends the most money for advertising (sponsoring fees)?
19. Show the footballers with the highest average contracts per sponsor. Assume that footballers have the same sponsors as their team.
20. Which team gets the most from the ‘ELECTRONICS’ sponsors?
  - Other complex queries you can think of...

**Table 3: Test Plan with or without Artificial Intelligence**

Document and evaluate all parts of the database, following the table shown at the end of this file. Show all your tables, your primary keys, the sequences, all your queries by recording the actual query, which element was tested (i.e., the tables of the database, query #12, query showing a projection of 3 columns, dropping all the tables of the database etc.), the expected result, whether the result was successful and a screenshot of the result.

The use of **Artificial Intelligence (AI)** tools is not prohibited, provided it is done responsibly and transparently. If you choose to use such tools, you must clearly mention their use in your testing, specifying for which parts you used them and in what way. **Failure to report the use of AI tools will be considered academic misconduct (equivalent to plagiarism) and will result in a zero grade for the entire set of exercises.**

**Important:** AI can only be used for the TESTING and not the IMPLEMENTATION of the database.

**Usage Procedure:**

If you use AI tools, follow these steps:

1. First, create the database **without** the help of the tool.
2. Next, give your database and the results of your queries (solutions) to the tool and ask it to correct them.
3. Ask the tool to explain the mistakes it found.
  - o **The tool makes many mistakes.** If you disagree with its corrections, stick to your initial solution and ask the tool for clarifications. It’s possible that your original solution is the correct one.
4. Briefly record the reason for each mistake in your initial solution. Possible reasons:
  - (a) inattention,
  - (b) incomplete understanding of the theory,
  - (c) incorrect application of the theory,

- (d) misunderstanding of the wording,
- (e) other (specify).

### **Submission of Solutions**

In the solutions you submit, include:

- For each query in which you used the AI tool: (1) your original solution, (2) the corrected solution, and (3) the reason you think the mistake occurred.
- For the parts / solutions where you did **not** use the AI tool: explicitly state that you did not use it.

### **Extra information and tasks:**

- You should use **SQL and Oracle** to produce your database
- The database design is minimal (improvements can be made). The goal of the assignment is to test the ability to create a physical database based on a specific database design.
- Comment appropriately your scripts
- Be careful with the **date format (DD-MON-YYYY) ONLY.**
- All text inserts should be in **UPPER Case**
- Select - create carefully your primary keys.
- Do not insert many rows. Keep it, if possible, to less than 20 rows per table.
- Insert values that will return results (i.e., players from England, football teams containing the word "SAINT" in their name, etc.) and also repeated values in various columns (i.e. position, surnames, country, etc)
- **At the end of each script show what you have done with the appropriate commands (show all tables, describe the tables, show all the sequences and constraints - all the pk's, fk's, checks, unique -, show all the data from the tables, show that the database is dropped).**

### **APPENDIX A: SAMPLE TABLE SPECIFICATION (EXAMPLE – INCOMPLETE)**

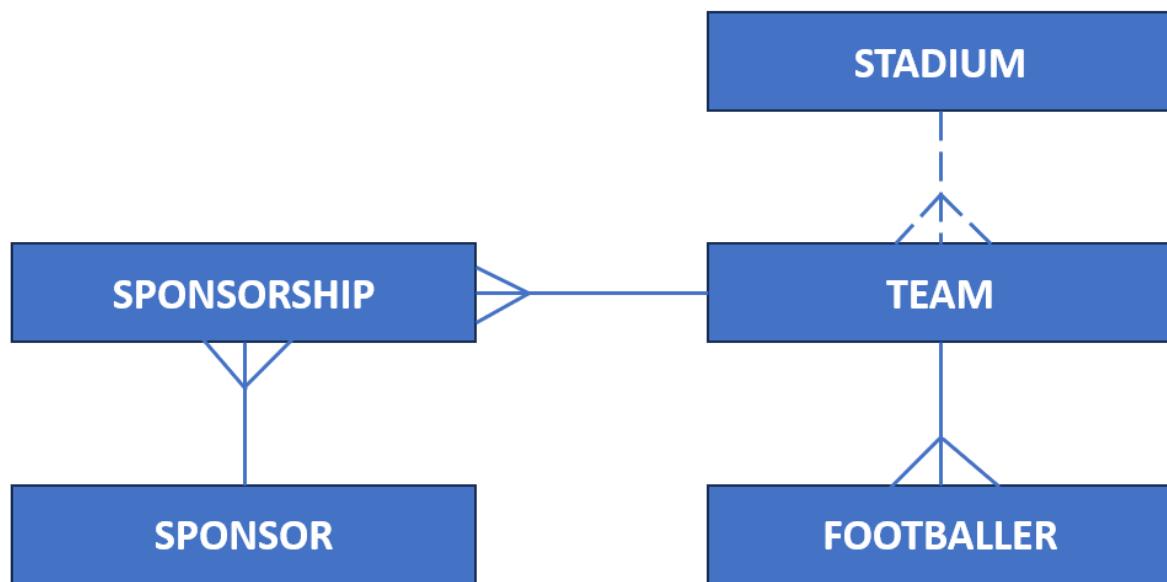
ATTRIBUTE	DATATYPE	CONSTRAINT	DEFAULT	DESCRIPTION
footballers				
player_id	NUMBER(9)	PK, pk_player_id		The unique ID of a player
f_lastname		UPPER, NOT NULL		
f_position	VARCHAR2(30)		'DEFENDER'	
f_email		UNIQUE		
...				

### **ATTRIBUTE EXPLANATION (NOT EVERY ATTRIBUTE)**

Attribute	Description
Position	The position on the field for each player. Use only 'GK' for the goalkeepers, 'DEF' for the defenders, 'MID' for the midfielders and 'FOR' for the forwards
Contract	The total amount each player costs the team
Goals_scored	The number of goals a player scored
Capacity	The number of seats a stadium has
Stadium City	The name of the city the stadium was built.
Team City	The name of the city, the team is from.
Sponsoring Fee	The yearly fee paid from the sponsor to the team

## ERD

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## Test Plan

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How you planned your testing and demonstrate the results

ID	Test	Element tested	Expected Result	Actual Result
1	SELECT * FROM TAB;	Database tables	6 tables returned	As expected
<b>+SCREENSHOT</b>				
2	SELECT DISTINCT COUNTRY FROM PLAYERS;	Query #33	GREECE, BRAZIL, CROATIA, SERBIA	As expected
<b>+SCREENSHOT</b>				
3	SELECE USERNAME FROM PLAYERS	Query #39	25 ROWS RETURNED	Not returned

```
SQL> SELECT username from customers;

USERNAME
-----
CASM
MASM
PABR
PEHI
ALSM
JAFI
SAGR
JASM
LIWH
JAHA
JASM

USERNAME
-----
ALHA
NIRI
CASM
MASM
PABR
PEHI
ALSM
JAFI
SAGR
JASM
LIWH

USERNAME
-----
JAHA
JASM
ALHA

25 rows selected.
```

**\*TEST ID IS A DUMMY TEST**

**\*\* THE SCREENSHOT IS NOT FROM THE DATABASE**

**Part B**

1. Write a report of up to 500 words, briefly discussing prominent indexing techniques.  
Propose suitable indexes for the database you created in Part A.

**0.4 marks**

2. Could a star or snowflake schema be used for the database you created in Part A? What changes should you introduce? Provide an implementation.

**0.6 marks**