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**«Национальный исследовательский ядерный университет «МИФИ»**

**ИНСТИТУТ ИНТЕЛЛЕКТУАЛЬНЫХ КИБЕРНЕТИЧЕСКИХ СИСТЕМ**

**Кафедра №42 (криптологии и кибербезопасности)**

**ОТЧЕТ ПО ЛАБОРАТОРНОЙ РАБОТЕ №2-2**

«Пользователи. Роли. Привилегии. Профили»

по дисциплине: «Безопасность систем баз данных»

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# **Лист с диаграммой отношения сущностей**

Диаграмма базы данных:



# **Таблица ролей и пользователей базы данных**

Таблица ролей и пользователей, которые планируется внедрить в базу данных:

|  |  |  |  |
| --- | --- | --- | --- |
| **Роль** | **Пользователь** | **Выполняемые задачи** | **Предоставляемые привилегии** |
| *DBA* | *administrator* | Администрирование базы данных | *ALL PRIVILEGES* |
| *app\_user\_role* | *client* | Получение информации об игроках в режиме карьеры | *CREATE SESSION* |
| *SELECT ON administrator.career\_mode* |
| *app\_manager\_role* | *manager* | Получение полной информации о командах и игроках | *CREATE SESSION* |
| *SELECT ON administrator.career\_mode* |
| *SELECT ON administrator.clubs* |
| *SELECT ON administrator.players* |
| Обновление стадионов и рейтингов | *UPDATE (club\_stadium) ON administrator.clubs* |
| *UPDATE (player\_ovr) ON administrator.players* |

# **Проверка прав пользователей**

Запросы к базе данных:

* CONNECT client/default@"DESKTOP-UG7SO1F:1521/xepdb1";
* SELECT \* FROM administrator.career\_mode;
* DROP VIEW administrator.career\_mode;
* SELECT \* FROM administrator.national\_teams;
* SELECT \* FROM administrator.leagues;
* SELECT \* FROM administrator.clubs;
* SELECT \* FROM administrator.players;
* CONNECT manager/default@"DESKTOP-UG7SO1F:1521/xepdb1";
* SELECT \* FROM administrator.career\_mode;
* SET ROLE app\_manager\_role IDENTIFIED BY password;
* SELECT \* FROM administrator.career\_mode;
* SELECT \* FROM administrator.national\_teams;
* SELECT \* FROM administrator.leagues;
* SELECT \* FROM administrator.clubs;
* SELECT \* FROM administrator.players;
* UPDATE administrator.clubs  
   SET club\_name = 'FC Base'  
   WHERE club\_id = 1;
* UPDATE administrator.clubs  
   SET club\_stadium = 'Stade de France'  
   WHERE club\_id = 5;
* SELECT \* FROM administrator.clubs;
* UPDATE administrator.players  
   SET player\_trait = 'Finesse Shot'  
   WHERE player\_name = 'Lionel Messi';
* UPDATE administrator.players  
   SET player\_ovr = 90  
   WHERE player\_name = 'Kevin De Bruyne';
* SELECT \* FROM administrator.players;

# **Создание дополнительных профилей для рядовых пользователей базы данных**

Ограничения на ресурсы базы данных:

1. В качестве дополнительной защиты от атак методом перебора паролей в параметре *FAILED\_LOGIN\_ATTEMPTS* указывается количество последовательных неудачных попыток входа в учетную запись пользователя, прежде чем учетная запись будет заблокирована.
2. В качестве дополнительной защиты от атак на отказ в обслуживании в параметре *SESSIONS\_PER\_USER* указывается количество одновременных сеансов, которые могут быть открыты пользователем.

Запросы к базе данных:

* CREATE PROFILE app\_user LIMIT  
   FAILED\_LOGIN\_ATTEMPTS 2  
   SESSIONS\_PER\_USER 1;
* ALTER USER client PROFILE app\_user;
* CREATE PROFILE app\_manager LIMIT  
   FAILED\_LOGIN\_ATTEMPTS 1  
   SESSIONS\_PER\_USER 2;
* ALTER USER manager PROFILE app\_manager;

# **Заключение**

В данной лабораторной работе изучены механизмы базы данных, связанные с управлением возможностями пользователей, и приобретены навыки разработки многопользовательской базы данных. В частности, проконтролирована корректная работа базы данных от лица каждой категории пользователей.

Также созданы и применены дополнительные профили для рядовых пользователей базы данных, повышающие уровень защиты от атак методом перебора паролей и атак на отказ в обслуживании.

**Приложения**

SQL-инструкции, использованные при создании пользователей и таблиц:

SQL> CREATE USER administrator IDENTIFIED BY default;

SQL> GRANT DBA TO administrator;

SQL> CONNECT administrator/default@"DESKTOP-UG7SO1F:1521/xepdb1";

SQL> CREATE TABLE national\_teams(

2 national\_team\_id NUMBER(3, 0) NOT NULL,

3 national\_team\_name NVARCHAR2(60) NOT NULL,

4 national\_team\_points NUMBER(6, 2) NOT NULL,

5 national\_team\_association NVARCHAR2(10) NOT NULL,

6 PRIMARY KEY (national\_team\_id)

7 );

SQL> CREATE TABLE leagues(

2 league\_id NUMBER(3, 0) NOT NULL,

3 national\_team\_id NUMBER(3, 0) NOT NULL,

4 league\_name NVARCHAR2(50) NOT NULL,

5 PRIMARY KEY (league\_id),

6 FOREIGN KEY (national\_team\_id) REFERENCES national\_teams(national\_team\_id)

7 );

SQL> CREATE TABLE clubs(

2 club\_id NUMBER(5, 0) NOT NULL,

3 league\_id NUMBER(3, 0) NOT NULL,

4 club\_name NVARCHAR2(50) NOT NULL,

5 club\_stadium NVARCHAR2(50) NOT NULL,

6 PRIMARY KEY (club\_id),

7 FOREIGN KEY (league\_id) REFERENCES leagues(league\_id)

8 );

SQL> CREATE TABLE players(

2 player\_id NUMBER(6, 0) NOT NULL,

3 club\_id NUMBER(5, 0) NOT NULL,

4 national\_team\_id NUMBER(3, 0) NOT NULL,

5 player\_name NVARCHAR2(50) NOT NULL,

6 player\_ovr NUMBER(2, 0) NOT NULL,

7 player\_age NUMBER(2, 0) NOT NULL,

8 player\_trait NVARCHAR2(50) NOT NULL,

9 player\_speciality NVARCHAR2(40) NOT NULL,

10 PRIMARY KEY (player\_id),

11 FOREIGN KEY (club\_id) REFERENCES clubs(club\_id),

12 FOREIGN KEY (national\_team\_id) REFERENCES national\_teams(national\_team\_id)

13 );

SQL> INSERT ALL

2 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (1, 'Belgium', 1828.45, 'UEFA')

3 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (2, 'Brazil', 1823.42, 'CONMEBOL')

4 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (3, 'France', 1786.15, 'UEFA')

5 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (4, 'Argentina', 1766.99, 'CONMEBOL')

6 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (5, 'England', 1755.52, 'UEFA')

7 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (6, 'Portugal', 1660.25, 'UEFA')

8 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (7, 'Mexico', 1647.91, 'CONCACAF')

9 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (8, 'Senegal', 1587.78, 'CAF')

10 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (9, 'IR Iran', 1572.89, 'AFC')

11 INTO national\_teams(national\_team\_id, national\_team\_name, national\_team\_points, national\_team\_association) VALUES (10, 'New Zealand', 1161.66, 'OFC')

12 SELECT \* FROM dual;

SQL> INSERT ALL

2 INTO leagues(league\_id, national\_team\_id, league\_name) VALUES (1, 5, 'Premier League')

3 INTO leagues(league\_id, national\_team\_id, league\_name) VALUES (2, 3, 'Ligue 1 Conforama')

4 INTO leagues(league\_id, national\_team\_id, league\_name) VALUES (3, 6, 'Liga NOS')

5 INTO leagues(league\_id, national\_team\_id, league\_name) VALUES (4, 1, 'Pro League')

6 INTO leagues(league\_id, national\_team\_id, league\_name) VALUES (5, 2, 'Serie A')

7 SELECT \* FROM dual;

SQL> INSERT ALL

2 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (1, 1, 'Arsenal', 'Emirates Stadium')

3 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (2, 1, 'Everton', 'Goodison Park')

4 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (3, 1, 'Manchester United', 'Old Trafford')

5 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (4, 1, 'Manchester City', 'Etihad Stadium')

6 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (5, 2, 'Paris Saint-Germain', 'Parc des Princes')

7 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (6, 2, 'Olympique de Marseille', 'Stade Velodrome')

8 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (7, 3, 'SL Benfica', 'Estadio da Luz')

9 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (8, 3, 'FC Porto', 'Estadio do Dragao')

10 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (9, 4, 'Club Brugge KV', 'Jan Breydel Stadium')

11 INTO clubs(club\_id, league\_id, club\_name, club\_stadium) VALUES (10, 5, 'Atletico Mineiro', 'Estadio Governador')

12 SELECT \* FROM dual;

SQL> INSERT ALL

2 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (1, 5, 4, 'Lionel Messi', 93, 34, 'One Club Player', 'Free Kick Specialist')

3 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (2, 3, 6, 'Cristiano Ronaldo', 91, 36, 'Long Shot Taker', 'Aerial Threat')

4 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (3, 5, 2, 'Neymar Jr', 91, 30, 'Technical Dribbler', 'Acrobat')

5 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (4, 5, 3, 'Kylian Mbappe', 91, 23, 'Speed Dribbler', 'Speedster')

6 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (5, 4, 1, 'Kevin De Bruyne', 91, 30, 'Playmaker', 'Engine')

7 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (6, 4, 2, 'Ederson', 89, 27, 'Comes for Crosses', 'Long Passer')

8 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (7, 5, 2, 'Marquinhos', 88, 27, 'Leadership', 'Tackler')

9 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (8, 4, 6, 'Ruben Dias', 88, 24, 'Power Header', 'Solid Player')

10 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (9, 4, 5, 'Raheem Sterling', 87, 26, 'Clinical Finisher', 'Team Player')

11 INTO players(player\_id, club\_id, national\_team\_id, player\_name, player\_ovr, player\_age, player\_trait, player\_speciality) VALUES (10, 8, 9, 'Mehdi Taremi', 79, 29, 'Strength', 'Flair')

12 SELECT \* FROM dual;

SQL> CREATE VIEW career\_mode AS

2 SELECT

3 players.player\_name AS player,

4 clubs.club\_name AS club,

5 national\_teams.national\_team\_name AS national\_team,

6 players.player\_ovr AS rating,

7 players.player\_age AS age

8 FROM

9 players,

10 clubs,

11 national\_teams

12 WHERE

13 players.club\_id = clubs.club\_id AND

14 players.national\_team\_id = national\_teams.national\_team\_id

15 ORDER BY

16 rating DESC,

17 age ASC;

SQL> CREATE USER client

2 IDENTIFIED BY default

3 DEFAULT TABLESPACE users

4 TEMPORARY TABLESPACE temp

5 QUOTA 100M ON users;

SQL> GRANT CREATE SESSION TO client;

SQL> CREATE ROLE app\_user\_role NOT IDENTIFIED;

SQL> GRANT SELECT ON administrator.career\_mode TO app\_user\_role;

SQL> GRANT app\_user\_role TO client;

SQL> CREATE PROFILE app\_user LIMIT

2 FAILED\_LOGIN\_ATTEMPTS 2

3 SESSIONS\_PER\_USER 1;

SQL> ALTER USER client PROFILE app\_user;

SQL> CREATE USER manager

2 IDENTIFIED BY default

3 DEFAULT TABLESPACE users

4 TEMPORARY TABLESPACE temp

5 QUOTA 100M ON users;

SQL> GRANT CREATE SESSION TO manager;

SQL> CREATE ROLE app\_manager\_role IDENTIFIED BY password;

SQL> GRANT app\_user\_role TO app\_manager\_role;

SQL> GRANT

2 SELECT,

3 UPDATE (club\_stadium)

4 ON administrator.clubs

5 TO app\_manager\_role;

SQL> GRANT

2 SELECT,

3 UPDATE (player\_ovr)

4 ON administrator.players

5 TO app\_manager\_role;

SQL> GRANT app\_manager\_role TO manager;

SQL> CREATE PROFILE app\_manager LIMIT

2 FAILED\_LOGIN\_ATTEMPTS 1

3 SESSIONS\_PER\_USER 2;

SQL> ALTER USER manager PROFILE app\_manager;

SQL-инструкции, использованные при проверке прав пользователей:

SQL> CONNECT client/default@"DESKTOP-UG7SO1F:1521/xepdb1";

SQL> SELECT \* FROM administrator.career\_mode;

SQL> DROP VIEW administrator.career\_mode;

SQL> SELECT \* FROM administrator.national\_teams;

SQL> SELECT \* FROM administrator.leagues;

SQL> SELECT \* FROM administrator.clubs;

SQL> SELECT \* FROM administrator.players;

SQL> CONNECT manager/default@"DESKTOP-UG7SO1F:1521/xepdb1";

SQL> SELECT \* FROM administrator.career\_mode;

SQL> SET ROLE app\_manager\_role IDENTIFIED BY password;

SQL> SELECT \* FROM administrator.career\_mode;

SQL> SELECT \* FROM administrator.national\_teams;

SQL> SELECT \* FROM administrator.leagues;

SQL> SELECT \* FROM administrator.clubs;

SQL> SELECT \* FROM administrator.players;

SQL> UPDATE administrator.clubs  
 2 SET club\_name = 'FC Base'  
 3 WHERE club\_id = 1;

SQL> UPDATE administrator.clubs  
 2 SET club\_stadium = 'Stade de France'  
 3 WHERE club\_id = 5;

SQL> SELECT \* FROM administrator.clubs;

SQL> UPDATE administrator.players  
 2 SET player\_trait = 'Finesse Shot'  
 3 WHERE player\_name = 'Lionel Messi';

SQL> UPDATE administrator.players  
 2 SET player\_ovr = 90  
 3 WHERE player\_name = 'Kevin De Bruyne';

SQL> SELECT \* FROM administrator.players;

SQL> CONNECT client@"DESKTOP-UG7SO1F:1521/xepdb1";

Enter password:

SQL> CONNECT client@"DESKTOP-UG7SO1F:1521/xepdb1";

Enter password:

SQL> CONNECT client@"DESKTOP-UG7SO1F:1521/xepdb1";

Enter password:

SQL> CONNECT client/default@"DESKTOP-UG7SO1F:1521/xepdb1";

SQL> CONNECT client/default@"DESKTOP-UG7SO1F:1521/xepdb1";

SQL> CONNECT manager@"DESKTOP-UG7SO1F:1521/xepdb1";

Enter password:

SQL> CONNECT manager@"DESKTOP-UG7SO1F:1521/xepdb1";

Enter password:

SQL> CONNECT manager/default@"DESKTOP-UG7SO1F:1521/xepdb1";

SQL> CONNECT manager/default@"DESKTOP-UG7SO1F:1521/xepdb1";

SQL> CONNECT manager/default@"DESKTOP-UG7SO1F:1521/xepdb1";