پایگاه داده

تمرین سری سوم

پارسا ملکیان ۴۰۲۱۷۱۰۷۵

Library Management

سوال۱

	member_id_result	first_name_result	last_name_result	membership_status_result	total_debt_result
1	1	Mahdi	Akbari	• true	2320000
2	2	Sara	Hosseini	• true	2165000
3	4	Fatemeh	Kazemi	• true	2020000
4	7	Mohammad	Salehi	• true	135000
5	6	Narges	Rahmani	• true	30000
6	3	Reza	Ahmadi	false	25000
7	5	Amir	Naseri	false	25000
8	8	Zahra	Moradi	false	5000
9	10	Parisa	Jamshidi	• true	0
10	9	Hossein	Alavi	• true	0

سوال ۲

```
Member ID 1 has total fines of 233000. Membership renewal failed due to excessive fines.
Member ID 2 has total fines of 217500. Membership renewal failed due to excessive fines.
Member ID 3 has total fines of 2500. Membership renewed successfully.
Member ID 4 has total fines of 203000. Membership renewal failed due to excessive fines.
Member ID 5 has total fines of 2500. Membership renewed successfully.
Member ID 6 has total fines of 3000. Membership renewed successfully.
Member ID 7 has total fines of 13500. Membership renewal failed due to excessive fines.
Member ID 8 has total fines of 500. Membership renewed successfully.
Member ID 9 has total fines of 0. Membership renewed successfully.
Member ID 10 has total fines of 0. Membership renewed successfully.
```

سوال ۳

جدول loans قبل از عملیات insert

	load_id	member_id	book_id	loan_date	return_date	due_date
1	1	1	1	2024-01-05	2024-01-10	2024-01-19
2	2	1	2	2024-01-15	<null>	2024-01-29
3	3	2	3	2024-02-10	2024-02-20	2024-02-24
4	4	2	4	2024-02-15	<null>	2024-02-29
5	5	3	5	2024-03-01	2024-03-20	2024-03-15
6	6	4	6	2024-03-10	2024-03-15	2024-03-24
7	7	4	7	2024-03-15	<null>	2024-03-29
8	8	5	8	2024-04-01	2024-04-20	2024-04-15
9	9	6	9	2025-04-19	<null>	2025-05-03
10	10	6	10	2025-05-04	<null>	2025-05-18
11	11	7	1	2025-04-14	<null>	2025-04-28
12	12	7	2	2025-04-09	<null>	2025-04-23
13	13	8	3	2025-04-24	<null>	2025-05-08
14	14	9	4	2025-04-29	<null>	2025-05-13
15	15	10	5	2025-05-06	<null>	2025-05-20

Insert زمانی که کاربر عضویت فعال ندارد:

```
INSERT INTO loans (member_id, book_id, loan_date, return_date) VALUES
( member_id 3,  book_id 1,  loan_date current_date,  return_date NULL)
```

در اینجا کتاب با id=1 موجود است اما کاربر با id=3 عضویت فعال ندارد.

نتیجه:

```
[2025-05-09 19:16:31] [P0001] ERROR: Member with ID 3 does not have an active membership
[2025-05-09 19:16:31] Where: PL/pgSQL function validate_loan() line 19 at RAISE
```

Insert زمانی که کتاب موجود نیست:

```
INSERT INTO loans (member_id, book_id, loan_date, return_date) VALUES
( member_id 2,  book_id 3,  loan_date current_date,  return_date NULL)
```

در اینجا کاربر با id=2 اشتراک فعال دارد اما کتاب با id=3 موجود نیست.

نتیجه:

```
[2025-05-09 19:18:26] [P0001] ERROR: Book with ID 3 is not available for loan
[2025-05-09 19:18:26] Where: PL/pgSQL function validate_loan() line 11 at RAISE
```

سوال۴

با توجه به اطلاعات فعلی دیتابیس، هیچ کتابی دارای شرایط سوال نیست:

	book_id	total_loans_last_month
1	9	1
2	3	1
3	5	1
4	4	1
5	10	1
6	2	1
7	1	1

	book_id	total_loans_this_year
1	1	1
2	2	1
3	3	1
4	4	1
5	5	1
6	9	1
7	10	1

پس ابتدا تعدادی دیتا دارای شرایط سوال، برای تست کوئری خود اضافه میکنیم:

```
INSERT INTO loans (member_id, book_id, loan_date, return_date) VALUES
    (member_id 1, book_id 10, loan_date CURRENT_DATE - INTERVAL '150 days', return_date NULL),
    (member_id 2, book_id 1, loan_date CURRENT_DATE - INTERVAL '300 days', return_date NULL),
     (member_id 10, book_id 7, loan_date CURRENT_DATE - INTERVAL '200 days', return_date CURRENT_DATE - INTERVAL '130 days'),
    (member_id 4, book_id 7, loan_date CURRENT_DATE - INTERVAL '120 days', return_date CURRENT_DATE - INTERVAL '60 days'),
    (member_id 2, book_id 7, loan_date CURRENT_DATE - INTERVAL '45 days', return_date NULL);
```

	book_id	total_loans_last_month
1	9	1
2	3	1
3	5	1
4	4	1
5	10	1
6	2	1
7	1	1

	book_id	total_loans_this_year
1	1	1
2	2	1
3	3	1
4	4	1
5	5	1
6	7	2
7	9	1
8	10	1

سپس کوئری را اجرا میکنیم:

	book_id	title	author	total_loans_this_year
1	7	Algorithms	Michael Brown	2

سوال۵.

ابتدا یک جدول برای نگهداری تعداد نسخه‌های موجود هرکتاب ایجاد میکنیم:

```
CREATE TABLE IF NOT EXISTS book_copies (
    book_id INTEGER PRIMARY KEY REFERENCES books(book_id),
    total_copies INTEGER DEFAULT 5 NOT NULL,
    available_copies INTEGER DEFAULT 5 NOT NULL,
    CHECK (available_copies >= 0 AND available_copies <= total_copies)
);
INSERT INTO book_copies (book_id)
SELECT book_id FROM books;
```

سپس مقادیر واقعی موجودی هرکتاب را براساس کتاب‌هایی که قرض گرفته شده‌اند ولی پس داده نشده‌اند، تعیین میکنیم:

```
UPDATE book_copies bc
SET available_copies = total_copies - (
    SELECT COUNT(*)
    FROM loans l
    WHERE l.book_id = bc.book_id AND l.return_date IS NULL
);
```

	book_id	total_copies	available_copies
1	1	5	3
2	2	5	3
3	3	5	4
4	4	5	3
5	5	5	4
6	6	5	5
7	7	5	3
8	8	5	5
9	9	5	4
10	10	5	3

توجه کنید که مقادیر متفاوت در دستگاه شما میتواند به علت اضافه نکردن دیتای سوال ۴ باشد.

سپس دو تریگر مختلف مینویسم. یکی برای insert در loan که از موجودیت کتاب ها کم کند و دیگری برای update در loan، زمانی که تاریخ برگشت کتاب در سطرِ آپدیت شده، از NULL به تاریخ واقعی تغییر مقدار میدهد که به موجودیت کتاب ها اضافه کند.

نتیجه برای Insert در loans:

```
postgres.public> INSERT INTO loans (member_id, book_id, loan_date, return_date) VALUES
                 (1, 1, '2024-01-05', NULL),
                 (1, 1, '2024-01-15', NULL),
                 (2, 1, '2024-02-10', NULL),
                 (2, 1, '2024-02-15', NULL)
[2025-05-09 20:36:41] [P0001] ERROR: No available copies for book ID 1
[2025-05-09 20:36:41] Where: PL/pgSQL function check_book_availability() line 10 at RAISE
```

نتیجه برای update در loans:

```
postgres.public> UPDATE loans
                 SET return_date = CURRENT_DATE
                 WHERE load_id = 11
Book with ID 1 has been returned
[2025-05-09 20:38:55] 1 row affected in 5 ms
```

امتحان مجدد insert با مقادیر جدید:

```
postgres.public> INSERT INTO loans (member_id, book_id, loan_date, return_date) VALUES
                 (1, 1, '2024-01-05', NULL),
                 (1, 1, '2024-01-15', NULL),
                 (2, 1, '2024-02-10', NULL),
                 (2, 1, '2024-02-15', NULL)
[2025-05-09 20:40:12] 4 rows affected in 5 ms
```

سوال ۶.

:Active_loans

	first_name	last_name	title	author
1	Mahdi	Akbari	Database Fundamentals	John Smith
2	Mahdi	Akbari	Database Fundamentals	John Smith
3	Mahdi	Akbari	Advanced SQL	Maria Garcia
4	Mahdi	Akbari	Network Security	Lisa Taylor
5	Hossein	Alavi	Data Modeling	Emily Chen
6	Sara	Hosseini	Database Fundamentals	John Smith
7	Sara	Hosseini	Algorithms	Michael Brown
8	Sara	Hosseini	Data Modeling	Emily Chen
9	Sara	Hosseini	Database Fundamentals	John Smith
10	Sara	Hosseini	Database Fundamentals	John Smith
11	Parisa	Jamshidi	Programming Basics	David Lee
12	Fatemeh	Kazemi	Algorithms	Michael Brown
13	Zahra	Moradi	PostgreSQL 16 Guide	Robert Johnson
14	Narges	Rahmani	Network Security	Lisa Taylor
15	Narges	Rahmani	Artificial Intelligence	Thomas Miller
16	Mohammad	Salehi	Advanced SQL	Maria Garcia

:Popular_books

	title	author	total_loans
1	Database Fundamentals	John Smith	7
2	Algorithms	Michael Brown	4
3	Network Security	Lisa Taylor	2
4	PostgreSQL 16 Guide	Robert Johnson	2
5	Advanced SQL	Maria Garcia	2
6	Data Modeling	Emily Chen	2
7	Programming Basics	David Lee	2
8	System Design	Jennifer Davis	1
9	Web Development	Sarah Wilson	1
10	Artificial Intelligence	Thomas Miller	1