Programming Applications with Databases

Exercise Set 6

1. Consider the following table:

ID	Patient	Patient Address	Appointment time and location	Price	Physician	Appointment cause
1	Jan Kot	6 Dolna Street, 44-444 Bór	2029-02-01 12:30, room 12	300 zł	Oleg Wyrwiząb	Dental: Denture fitting in (...)
2	Maria Mysz	9 Górna Street, 55-555 Las	2030-01-04 11:45, room 7	150 zł	Ewa Pieprzyk	Dermatology: Birthmark inspection (...)

Design alternative schemas for the same data that conform to 1NF, 2NF, and 3NF. There is no need to create an SQL script; instead, it is enough to present appropriate schemas.
[3p]

2. Propose at least one denormalization for the 3NF scheme created as a result of the previous exercise. If needed, extend the scheme, e.g., with additional aggregated values.
[1p]

3. Consider the following query:

```
SELECT DISTINCT c.PESEL, c.Nazwisko
FROM Egzemplarz e
JOIN Ksiazka k ON e.Ksiazka_ID=k.Ksiazka_ID
JOIN Wypozyczenie w ON e.Egzemplarz_ID=w.Egzemplarz_ID
JOIN Czytelnik c ON c.Czytelnik_ID = w.Czytelnik_ID;
```

The following query which contains a subquery, returns the same result:

```
SELECT c.PESEL, c.Nazwisko
FROM Czytelnik c WHERE c.Czytelnik_ID IN (
    SELECT w.Czytelnik_ID FROM Wypozyczenie w WHERE w.Egzemplarz_ID IN (
        SELECT e.Egzemplarz_ID FROM Egzemplarz e WHERE e.Ksiazka_ID IN (
            SELECT k.Ksiazka_ID FROM Ksiazka k)))
```

Compare and briefly analyze query plans. Show the differences and draw appropriate conclusions.
[1p]

4. Consider a query that joins the tables *Książka* (book) and *Egzemplarz* (book copy, specimen). Create clustered and non-clustered indexes, and analyze the query plans.
[1p]

5. Prepare a small example that shows the concept of "covering index". Ensure that the respective execution plans support your explanation.
[2p]

6. Prepare a small example that shows the concept of "filtered index". Ensure that the respective execution plans support your explanation.
[2p]

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