## Proiect BD

## -managementul unui centru de imprumut

**1. Reguli de functionare:**

**-**in cadrul unitatii se pot face imprumuturi si achizitii da carte, precum si acces la sala de lectura;

- mai multi angajati pot lucre loa mai multe departamente;

-fiecare angajat are un numar specific de zile de concediu in functie de departamentul in care lucreaza;

-un angajat poate lucra in mai multe departamente;

-un client poate solicita mai multe tipuri de servicii;

- pretul aceleiasi carti poate varia in functie de editura si de annul tiparirii.

-un serviciu este realizat de un singur angajat;

-nu toate cartile pot fi achizitionate.

**2. Constrangeri**

-doar clientii cu permis pot imprumuta carti;

- nu se pot imprumuta mai mult de 5 carti de catre singur client;

- in cadrul unui imprumut, data penalizarii se calculeaza in functie de cate carti au fost imprumutate.

***3. Descriere entitati:- de adaugat descriere***

1. **Filiala biblioteca- info generale despre filiala**

Atribute: id\_filiala, nume, adresa

Cheie primara: id\_filiala

1. **Carti- info generale despre cart**

Atribute: id\_carte, id\_filiala, autor, editura, nume, autor, editura, data\_publicare, disponibilitate, achizitie, pret

Cheie primara: id\_carte

1. **Carte\_imprumut-tip de carte**

Atribute: id\_carte, id\_lista

Cheie primara: id\_carte

1. **Carte\_achizitie- tip de carte**

Atribute: id\_carte, id\_lista, pret

Cheie primara: id\_carte

1. **Departament- info generale despre departament**

Atribute: Denumire\_departament,id\_filiala, posture\_ocupate, posturi\_total, zile\_concediu

Cheie primara: Denumire\_departament , id\_filiala

1. **Angajat- lucratori directi ai bibliotecii**

Atribute: id\_angajat, id\_filiala, nume, prenume, cnp, telefon, salariu, data\_angajare, adresa

Cheie primara: id\_angajat

1. **Client- consumatorul**

Atribute: id\_client, nume, prenume, permis , varsta

Cheie primara: id\_client

1. **Serviciu- produsul bibliotecii**

Atribute: id\_serviciu, data\_serviciu, tip

Cheie primara: id\_serviciu

1. **Imprumut- tip serviciu**

Atribute: id\_serviciu, id\_lista, data\_predare, data\_penalizare, pret\_penalizare

Cheie primara: id\_serviciu

1. **Achizitie- tip serviciu**

Atribute: id\_serviciu, id\_lista, pret

Cheie primara: id\_serviciu

1. **Permis- poate fi detinut de un client**

Atribute: id\_client, Numar, data\_inceput, data\_expirare

Cheie primara: id\_client

**Tabele associative:**

1. **Relatie\_departament\_angajat – legatura dintre departament si angajat**

Atribute: id\_relatie, id\_angajat, Denumire\_departament

Cheie primara: id\_relatie

1. **Consultatie- client, angajat, serviciu**

Atribute: id\_client, id\_serviciu, id\_angajat , nr\_receptie

Cheie primara: (id\_client, id\_serviciu, id\_angajat)

***4.Descriere relatii:- dupa diagrama***

|  |  |  |
| --- | --- | --- |
| **Relatie** | **Cardinalitate** | **Observatii** |
| Are | Filiala- Departament (one to many)  Filiala-Angajat(One to many)  Filiala- Carte(One to many)  Client(one to one) | O filiala are mai multe departamente(numele lor corespund intre filiale diferite)  O filiala are unul sau mai multi angajati.  O filiala are mai multe carti.  Un client poate avea un singur permis. |
| lucreaza | Angajat- Departament(many to many) | Un angajat poate lucre in mai multe departamente iar intr-un depratament lucreaza mai multi angajati. |
| serveste | Angajat-(Serviciu, Client) (One to many)  Client- (Angajat, Serviciu) (One to many)  Serviciu(Angajat, Client) | Un angajat poate servi mai mult client care pot solicita mai mulye servicii |
| ISA | Carte- Carte\_imprumut(One to one)  Carte- Carte\_achizitie(One to one)  Serviciu- Imprumut(One to one)  Serviciu- achizitie(One to one) | O carte poate fi de imprumutat sau de achizitionat.  Un serviciu poate fi un imprumut sau o achizitie. |

***5. Descriere atribute:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Atribut** | **Precizie** | **Exemplu** | **Tip date** | **Observatii** |
| **Filiala\_biblioteca** | | | | |
| *Id\_filiala* | 8, 0 | 100 | number | Primary key, not null |
| *Nume\_filiala* | 50 | Biblioteca facultatii de Matematica si Informatica | Varchar2 | Not null |
| *Adresa\_filiala* | 100 | Strada academiei , nr 15 | Varchar2 | Not null |
| **Carte** | | | | |
| *Id\_carte* | 8, 0 | 1 | number | PK, not null |
| *Id\_filiala* | 8, 0 | 1 | number | FK(filiala\_biblioteca, id\_filiala), not null |
| *Autor* | 50 | Victor Hugo | Varchar2 | Not null |
| *Editura* | 50 | Polirom | Varchar2 | Not null |
| *Data\_tiparire* | - | 14-JUN-2020 | Date | Not null |
| *Autor* | 50 | Victor Hugo | Varchar2 | Not null |
| *disponibilitate* | 1 | Y/ N | Varchar2 | Not null |
| *achizitie* | 1 | Y/ N | Varchar2 | Not null |
| *Pret* | - | 15.00 | Float | By default null |
| **Carte\_imprumut** | | | | |
| *Id\_carte* | 8, 0 | 1 | number | PK, FK(carte, id\_carte), not null | |
| *Id\_serviciu* | 8, 0 | 3 | number | FK(serviciu), not null |
| **Carte\_achizitie** | | | | |
| *Id\_carte* | 8, 0 | 2 | number | PK, FK(carte, id\_carte), not null |
| *Id\_serviciu* | 8, 0 | 5 | number | FK(serviciu), not null |
| *Pret* | - | 15.00 | Int | Not null |
| **Angajat** | | | | |
| *Id\_angajat* | 8, 0 | 1 | number | PK, not null |
| *Id\_filiala* | 8, 0 | 1 | number | Not null, FK(filiala\_biblioteca, id\_filiala) |
| *Nume* | 50 | Popescu | Varchar2 | Not null |
| *Prenume* | 50 | Ion | Varchar2 | Not null |
| *Cnp* | 50 | 53478653287 | Varchar2 | Not null, unique |
| *Telefon* | 50 | 0720063443 | Varchar2 | Not null, unique |
| *Salariu* | - | 2300 | Float | Not null |
| *Data\_angajare* | - | 13-Apr-2009 | Date | Not null |
| **Departamente** | | | | |
| *Denumire\_departament* | 50 | Receptie | Varchar2 | Primary key, not null |
| *Id\_filiala* | 8, 0 | 1 | number | PK, FK(filiala\_biblioteca, id\_filiala), not null |
| *Posture\_totale* | - | 30 | Int | Not null |
| *Posturi\_ocupate* | - | 20 | Int | Check  (<=posturi\_total), not null,  Default: 0 |
| *Zile\_concediu* | - | 30 | Int | Not null |
| **Rel\_departament\_angajat** | | | | |
| *Id\_relatie* | 8, 0 | 18 | Number | Primary key , not null |
| *Denumire\_separtament* | 50 | 3 | Varchar2 | FK(departament, deniumire\_departament), not null |
| *Id\_angajat* | 8, 0 | 4 | number | Not null,  FK(angajat, id\_angajat) |
| **Client** | | | | |
| *Id\_client* | 8, 0 | 100 | number(8,0) | Primary key |
| *Nume* | 50 | Popescu | Varchar2 | Not null |
| *prenume* | 50 | Ion | Varchar2 | Not null |
| *Permis* | 1 | Y/ N | Varchar2 | Not null |
| **Servicii** | | | | |
| *Id\_serviciu* | 8, 0 | 1 | number | Primary key, not null |
| *Data\_serviciu* | - | 13-DEC-2021 | Date | Not null |
| **Achizitie** | | | | |
| *Id\_serviciu* | 8, 0 | 1 | number(8,0) | pK, FK(serviciu, id\_serviciu), not null |
| *Id\_lista* | 8, 0 | 1 | number | FK(lista\_achizitie, id\_lista) |
| *Pret\_final* | - | 50.00 | Float | Not null |

**Imprumut**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Id\_serviciu* | 8, 0 | 1 | Number | PK, FK(serviciu, id\_serviciu), not null | |
| *Id\_lista* | 8, 0 | 1 | Number | FK(lista\_imprumut, id\_lista), not null |
| *Data\_predare* | - | 13-Jan-2021 | Date | Not null |
| *Data\_penalizare* | - | 13-Jan-2021 | Date | Not null, > data\_servciu+ 1 luna/carte |
| *Pret\_[enalizare* | - | 6 | Float | Default null |

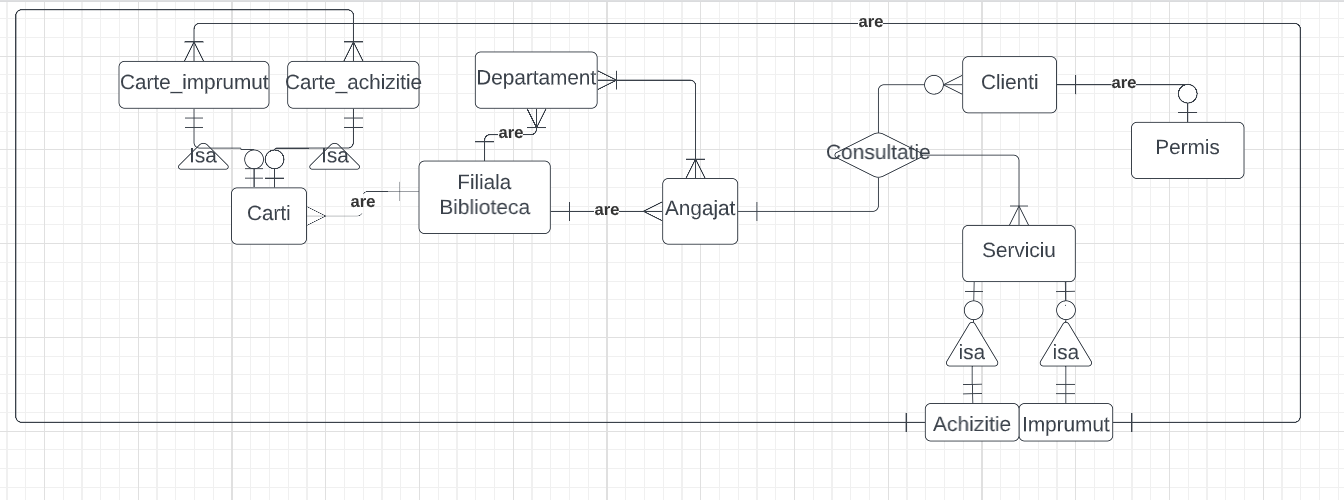
**Consultatie**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Id\_client* | 8, 0 | 1 | Number | PK, FK(client, id\_client), not null |
| *Id\_angajat* | 8, 0 | 1 | Number | PK, FK(angajat, id\_angajat), not null |
| *Id\_serviciu* | 8, 0 | 1 | Number | PK, FK(serviciu, id\_serviciu), not null |
| *Nr\_receptie* | - | 1 | Int | Not null |

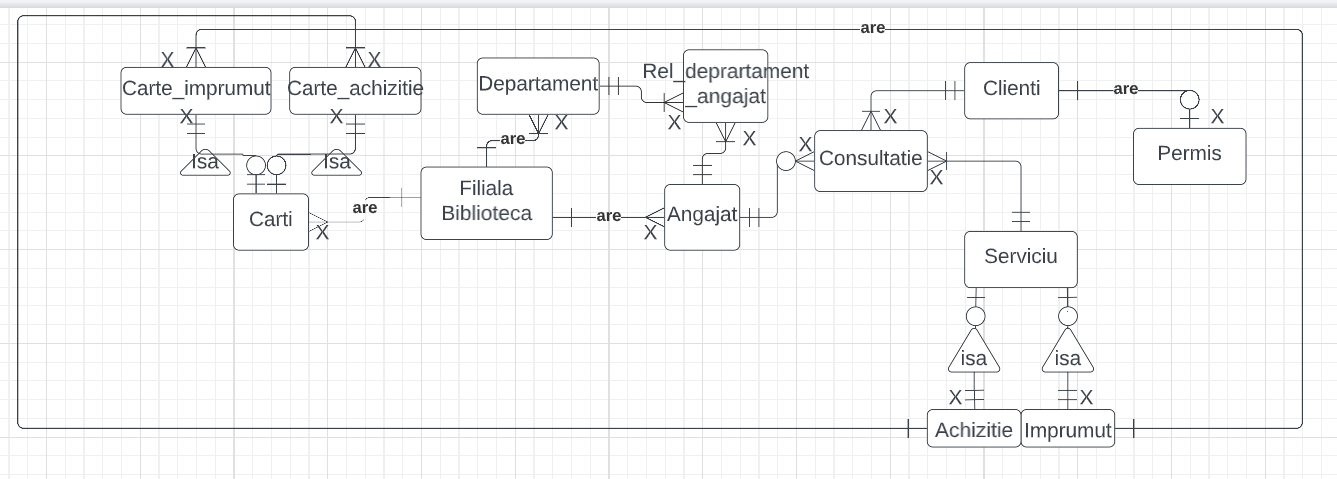
**Permis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Id\_client* | 8, 0 | 1 | Number | PK, FK(id\_client), not null |
| *Nr\_permis* | 50 | 1788 | Varchar2 | Not null, unique |
| *Data\_inceput* | - | 14-DEC-2021 | Datr | Not null |
| *Data\_expirare* | - | 14-DEC-2021 | Date | Not null, data\_inceput+ 1 an |

***6. Diagrama entitate-relatie- realizata inainte de normalizari***



***7. Diagrama conceptuala:***



***8.Scheme relationale:***

Filiala\_biblioteca(id\_filiala(PK), nume\_filiala, adresa\_filiala)

Carte( id\_carte(PK), id\_filiala(FK), autor, nume, editura, data\_tiparire, disponibilitate, achizitie)

Carte\_imprumut(id\_carte(PK, FK), id\_serviciu(FK))

Carte\_achizitie( id\_carte(PK, FK), id\_serviciu(FK), pret\_total)

Departament(Denumire\_departament(PK), id\_filiala(PK, FK), posture\_ocupate, posture\_totale, zile\_concediu)

Angajat( id\_angajat(PK), id\_filiala(FK), nume, prenume, cnp, telefon, salariu, data\_anagajare, adresa)

Client(id\_client(PK), nume, prenume, permis, varsta)

Serviciu(id\_serviciu(PK), data\_servciu, tip)

Imprumut(id\_serviciu(PK, FK), data\_predare, data\_penalizare, pret\_penalizare)

Achizitie(id\_serviciu(PK, FK), pret\_final)

Permis(id\_client(PK, FK), nr\_permis, data\_inceput, data\_expirare)

*pentru tabele asociative:*

Relatie\_departament\_angajat(id\_relatie(PK), Denumire\_departament(FK), id\_anagajat(FK))

Consultatie(id\_client(PK, FK), id\_serviciu(PK, FK), id\_angajat(Pk, FK), nr\_receptie)

***9. Normalizari (FN1, FN2, FN3)***

**Tabelele din acest proiect sunt aduse in cele 3 forme normale.**

***exemplu FN1:***

**Exemplu non-FN1**: in cazul entitatii angajat daca ar avea atributul multiplu telefon

Consideram tabelul

|  |  |  |
| --- | --- | --- |
| **#id\_angajat** | **Nume** | **Telefon** |
| 1 | Popescu | 0758392821 |
| 2 | Ionescu | 0763816395  0756361940 |
| 3 | Marinescu | 0756291749 |

**Solutionarea: atribute atomice**

|  |  |  |
| --- | --- | --- |
| **#id\_angajat** | **Nume** | **Telefon** |
| 1 | Popescu | 0758392821 |
| 2 | Ionescu | 0763816395 |
| 2 | Ionescu | 0756361940 |
| 3 | Marinescu | 0756291749 |

**exemplu FN2:**

Consideram tabelul care nu este in FN2:

Departament(#denumire\_filiala, #id\_filiala , nume\_filiala, locuri\_total)

**Dependente:**

(#denumire\_filiala, #id\_filiala )-> locuri\_total

#Id\_filiala -> nume\_filiala

**Descompunere fara pierdere de informatie:**

Departament(#denumire\_departament, #id\_filiala, locuri\_total)

Filiala (#id\_filiala , nume\_filiala)

**exemplu FN3:**

Consideram tabelul care nu este in FN3:

Serviciu(#id\_serviciu, #id\_client, data, nume\_angajat)

**cu dependentele:**

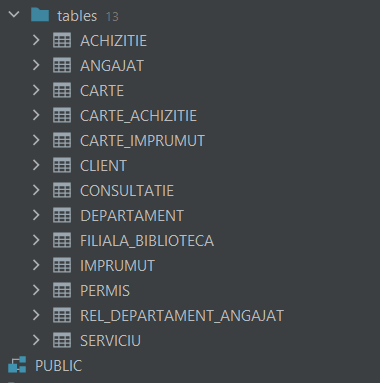
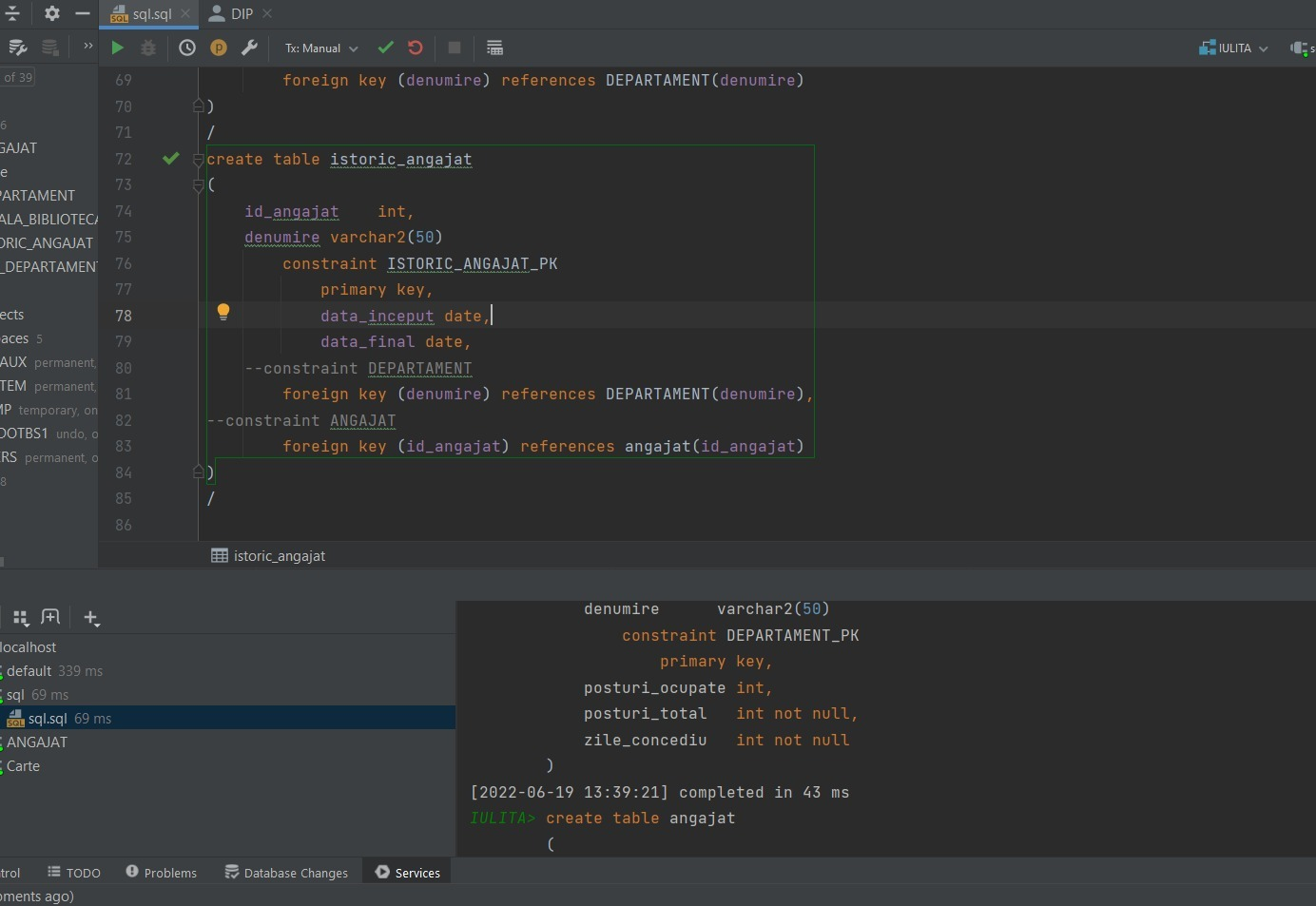
(#id\_serviciu, #id\_client) -> id\_angajat

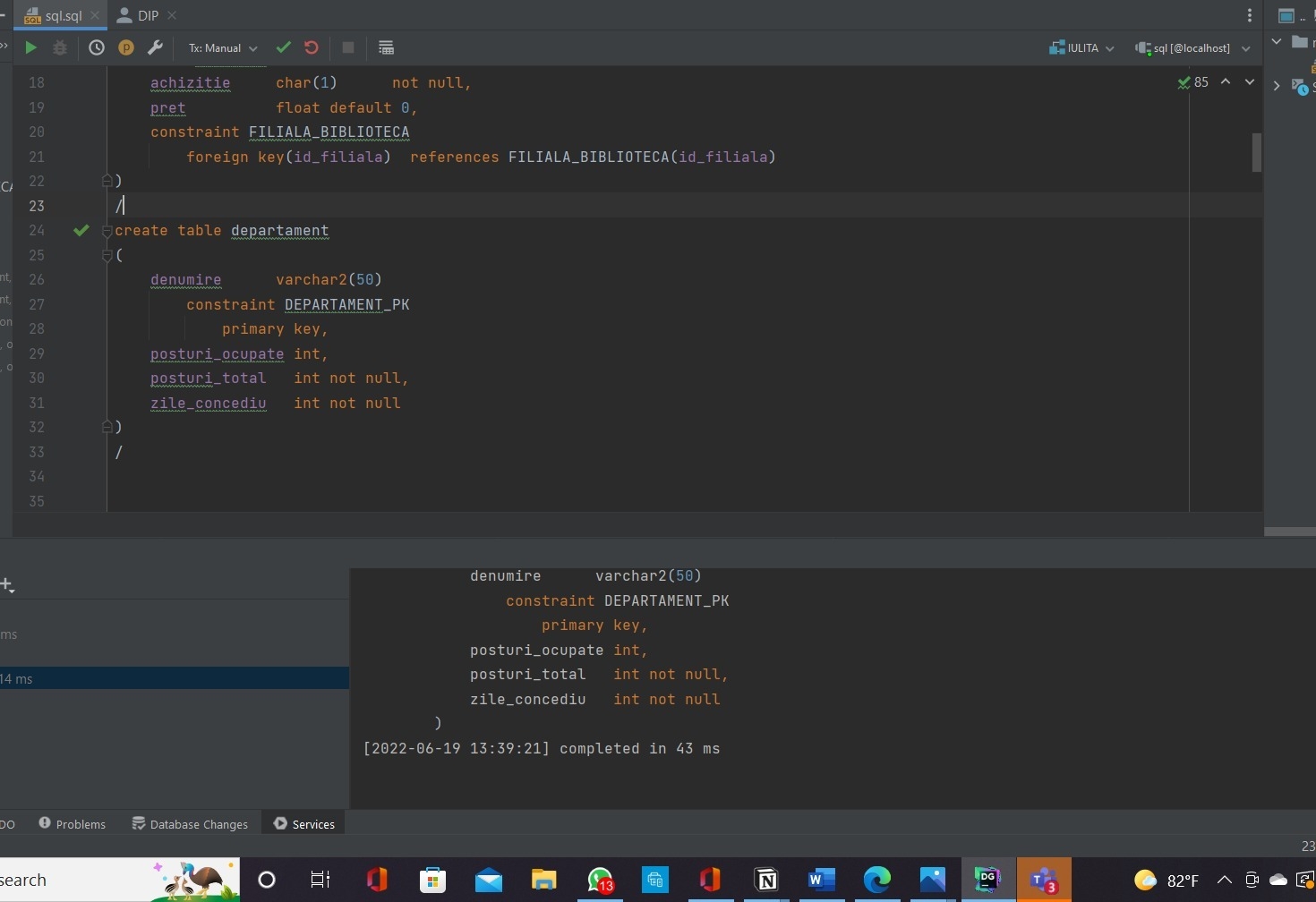
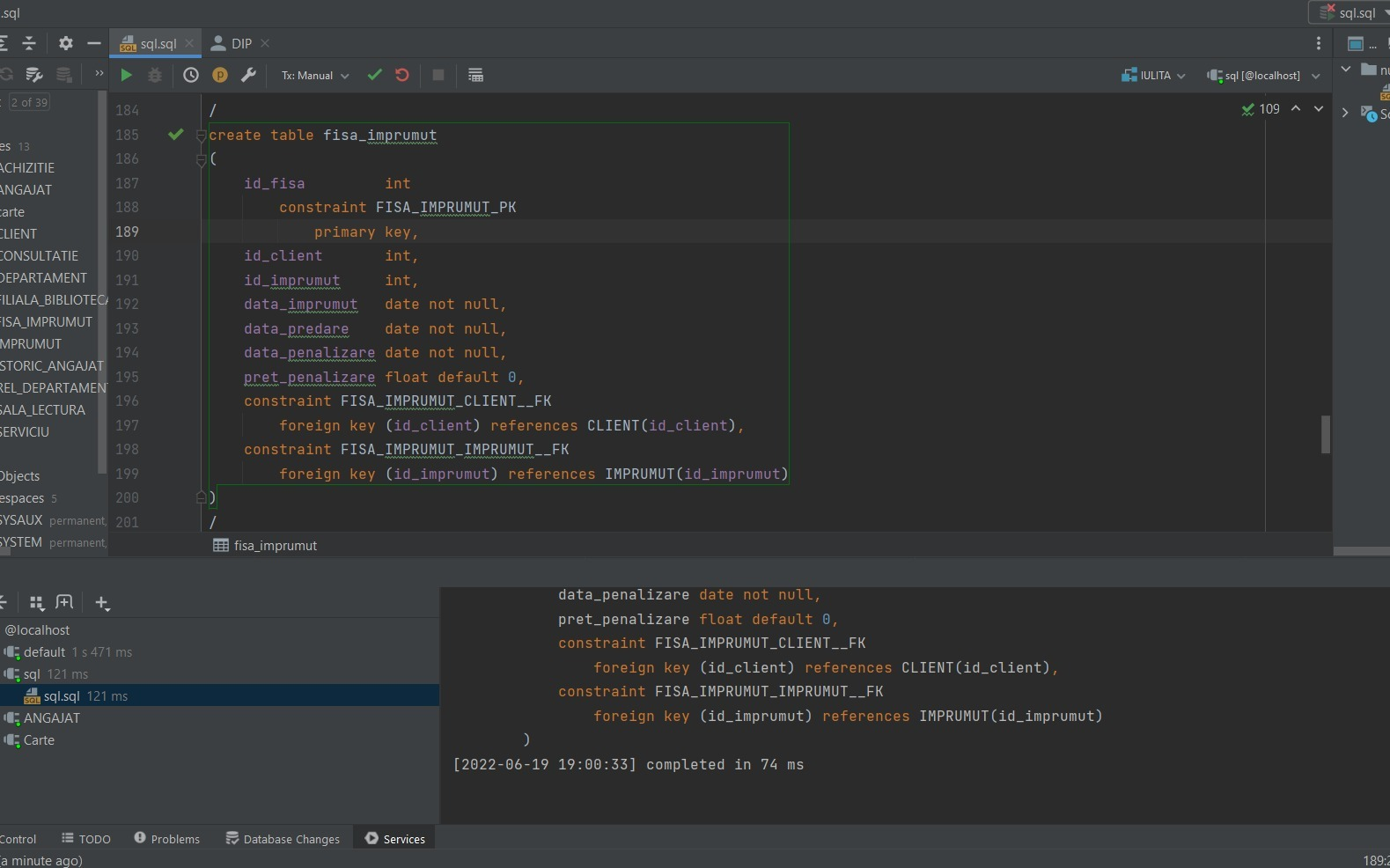
Id\_angajat->nume\_angajat

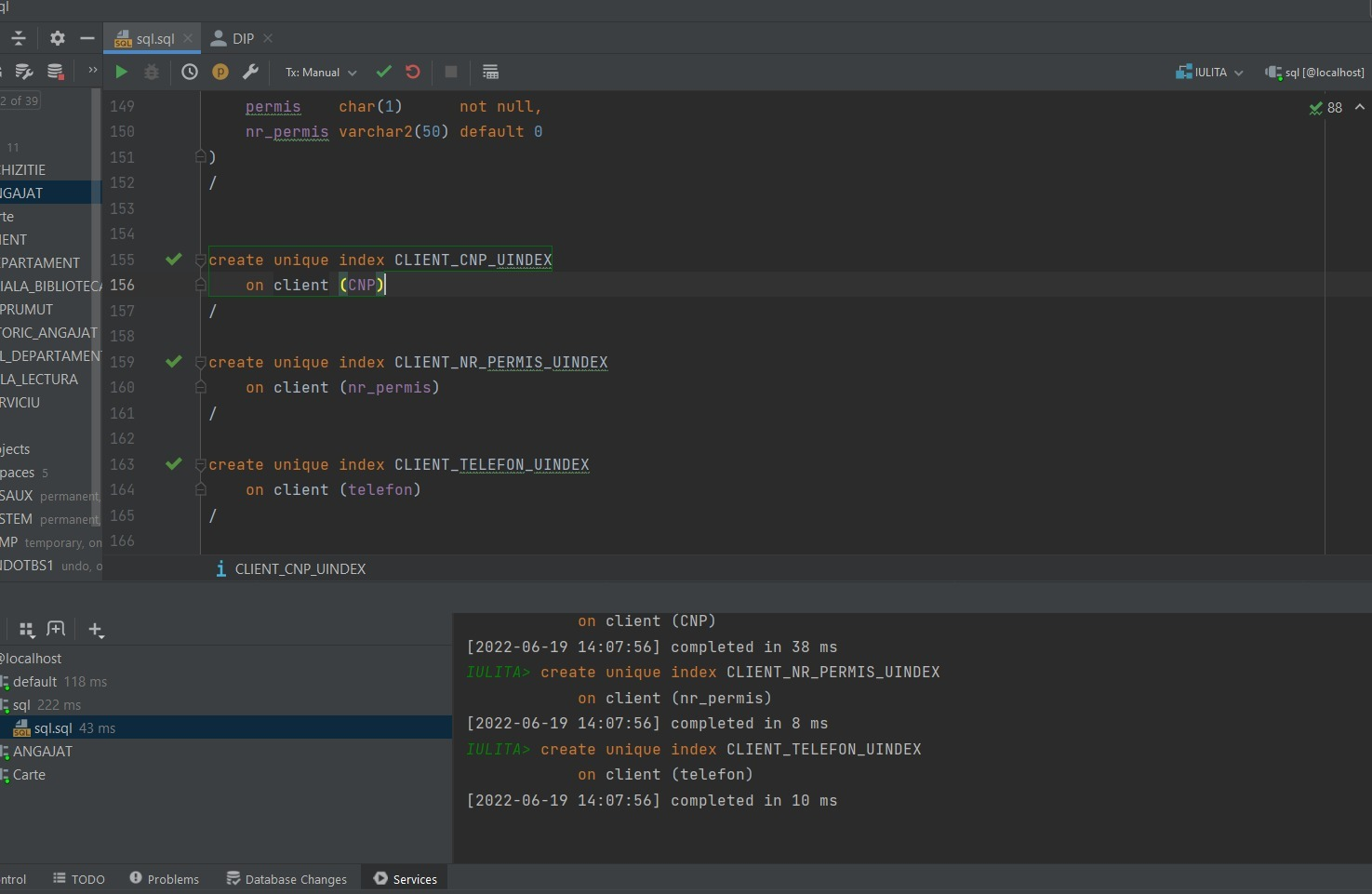
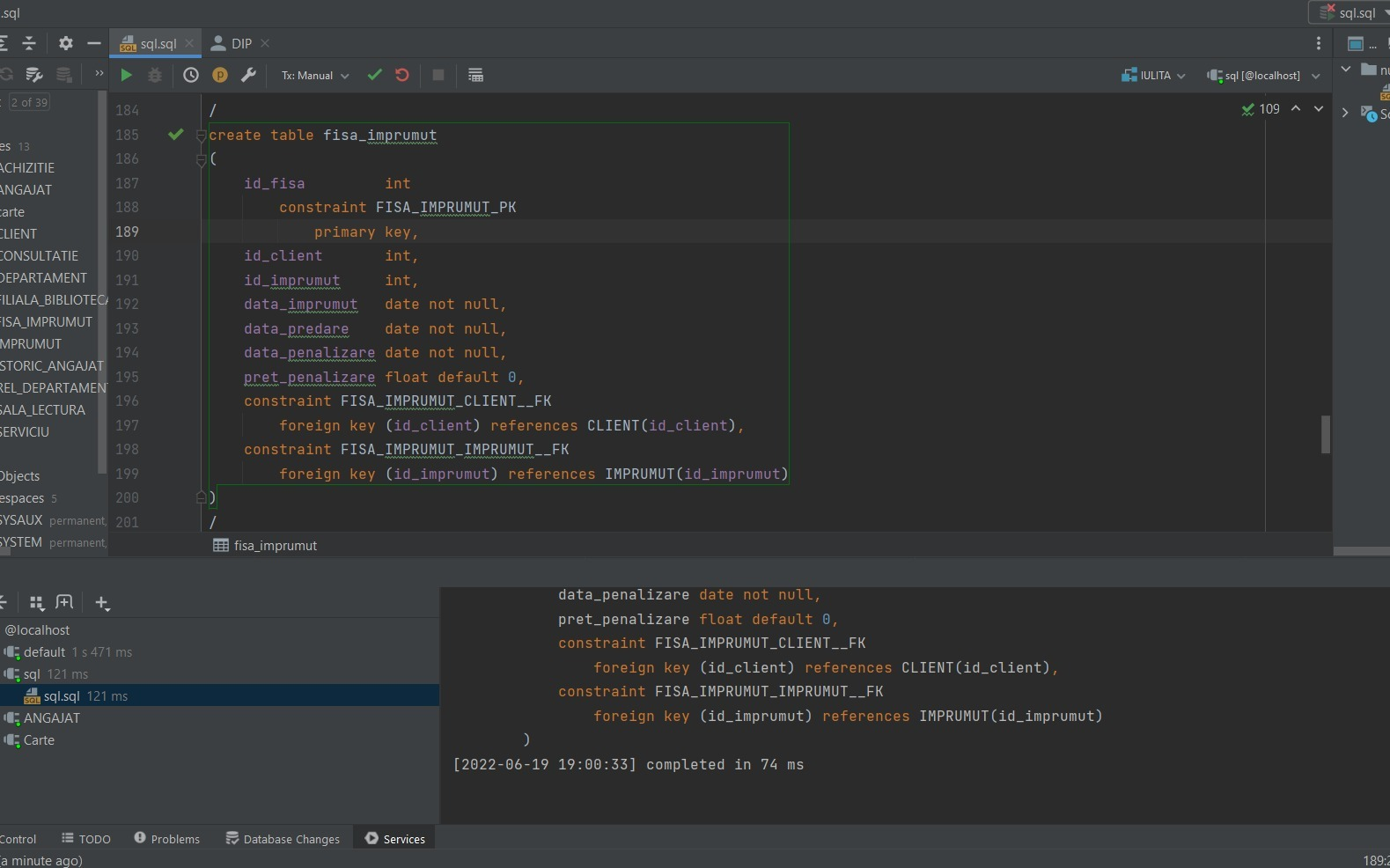
**Descompunere fara pierdere de informatie:**

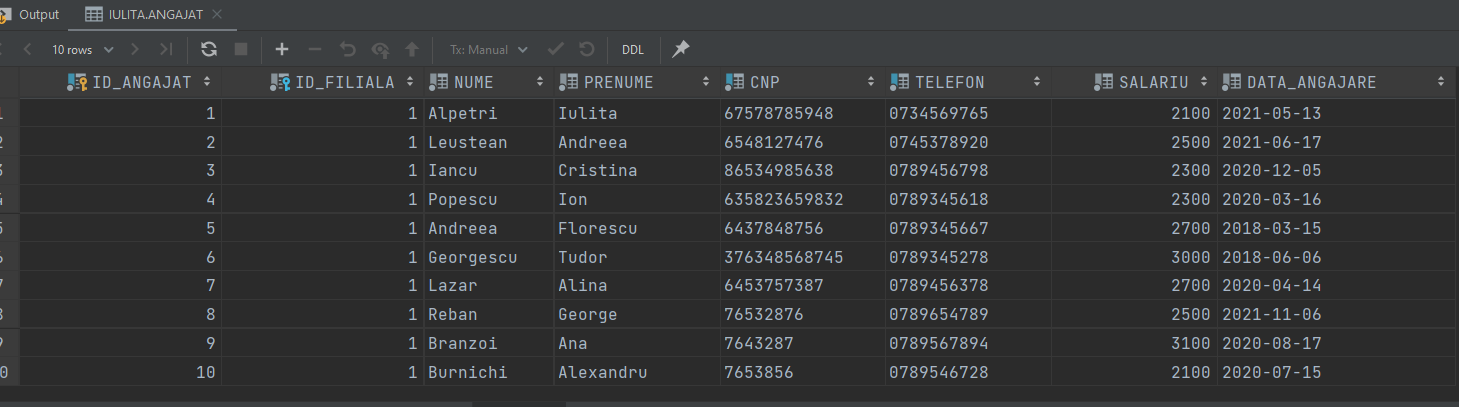
serviciu(#id\_serviciu, #id\_client, data, id\_anagajat)

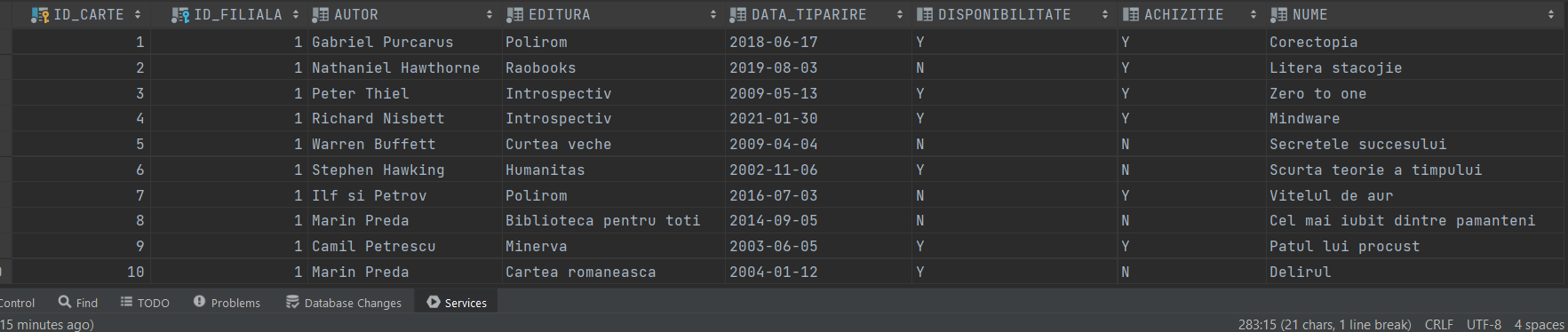
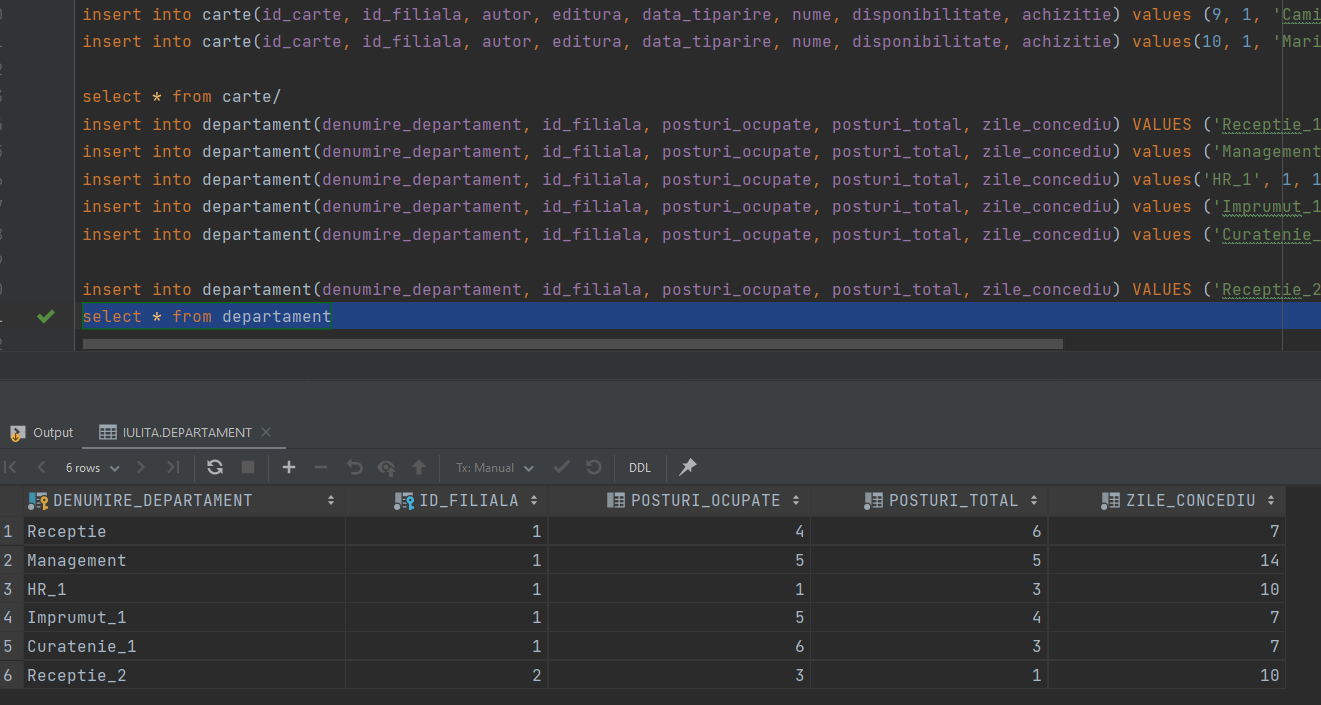
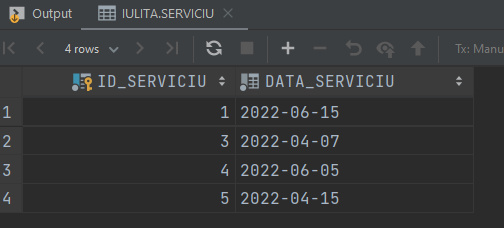
angajat(#id\_angajat, nume\_angajat)

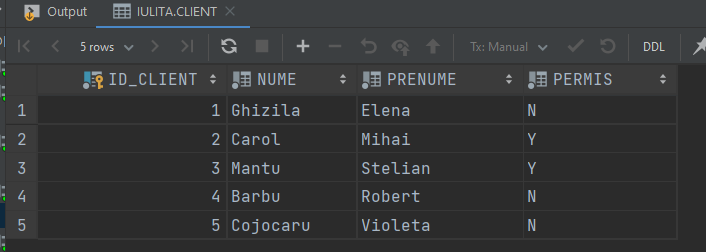
1. Crearea tabelelor si inserarea unor date coerente
   1. Crearea tabelelor

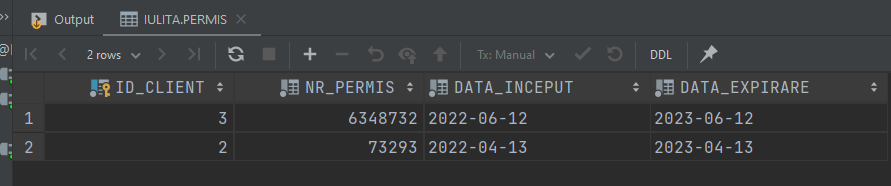




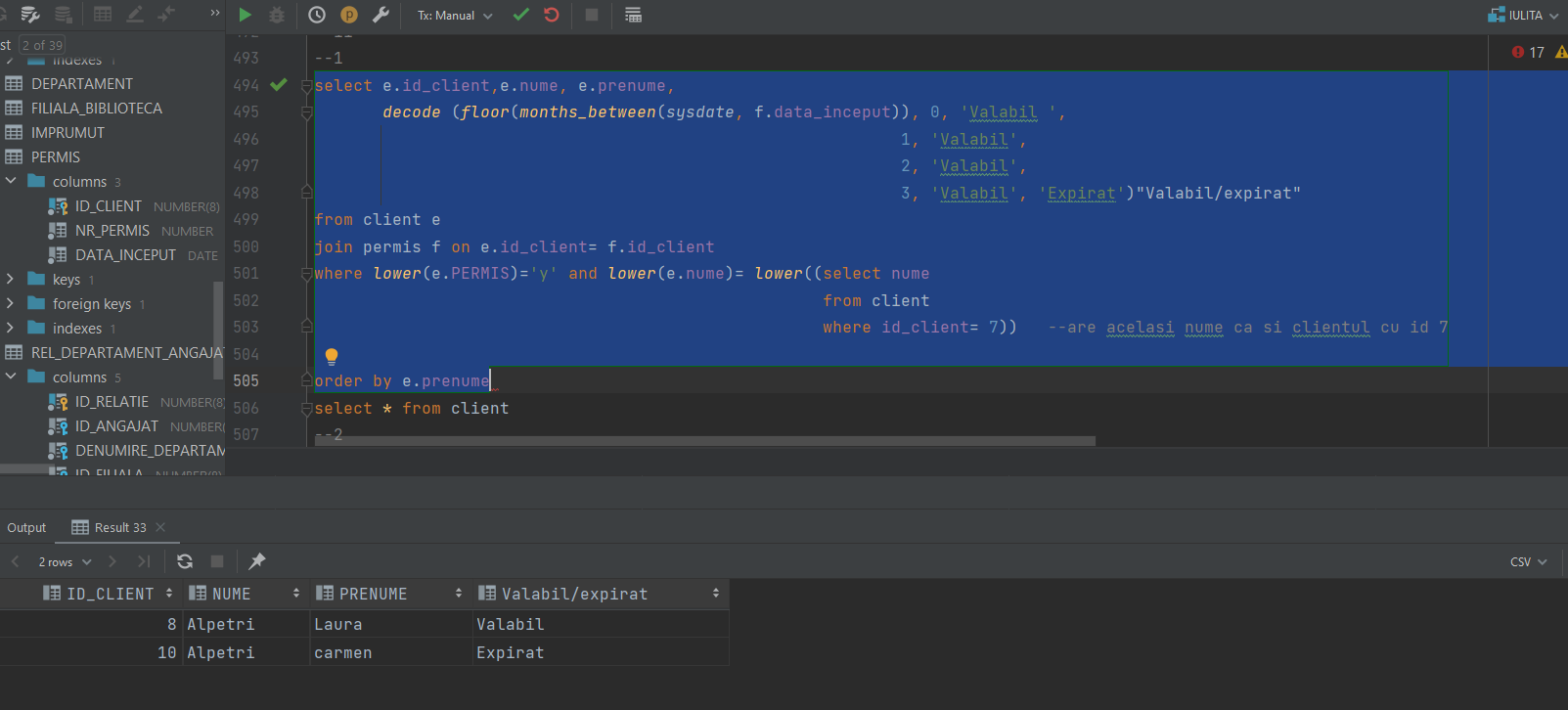
* 1. Inserarea datelor

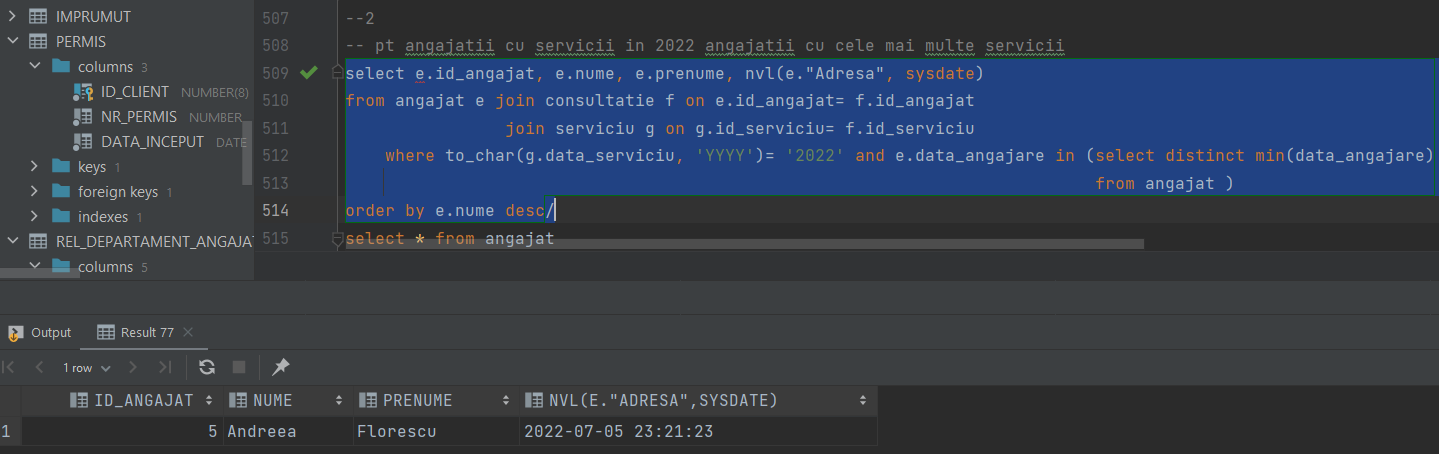


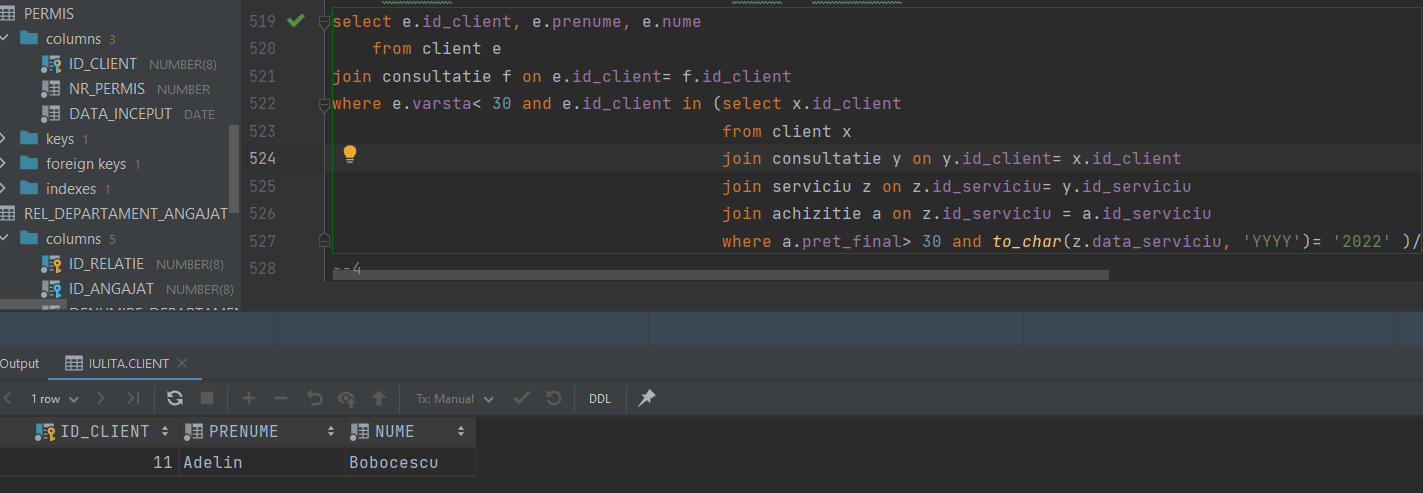




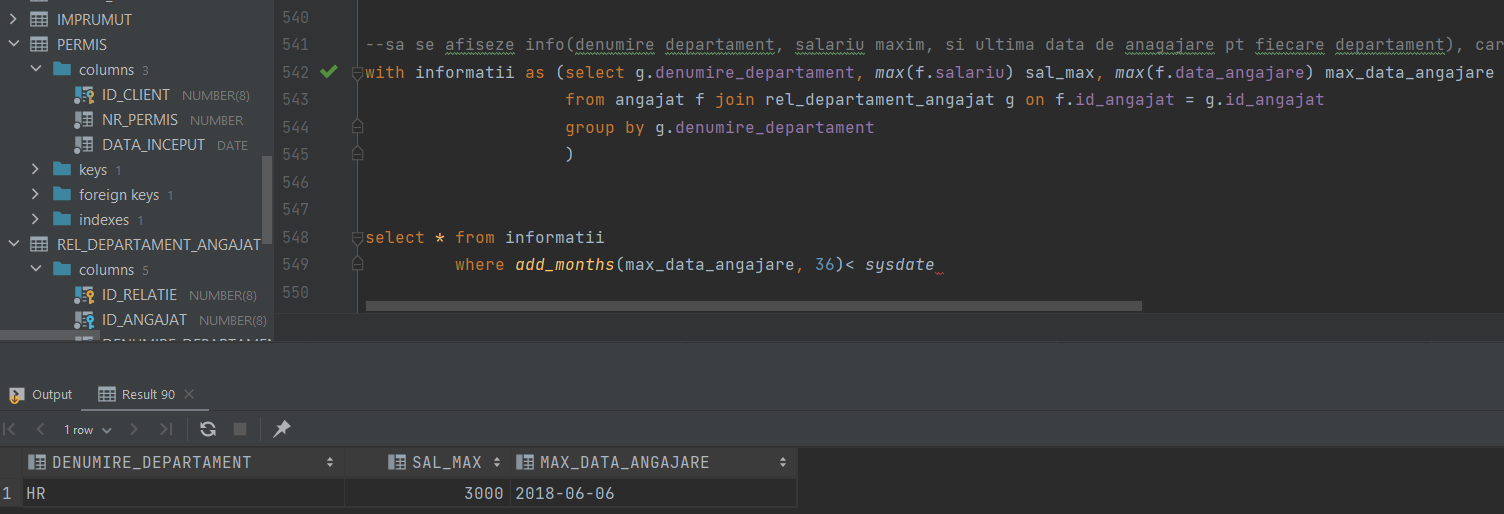
1. Formulati in limbaj natural si implementati 5 cereri SQL comlexe.
2. Sa se afiseze id-ul, numele si prenumele clientilor care au permis si daca permisul lor de biblioteca a expirat(daca au trecut 3 luni de la data facerii), care au acelasi nume ca si clientul cu id=7.



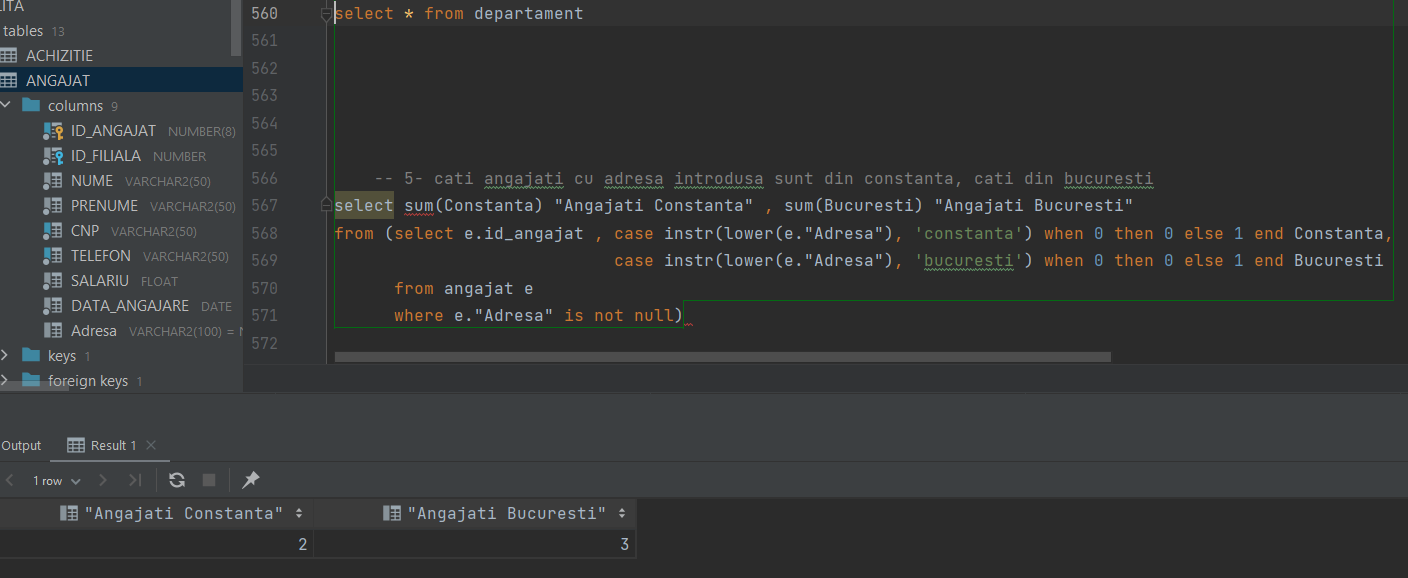
1. Sa se afiseze id-ul, numele , prenumele si adresa(daca exista, in caz contrar data\_curenta) angajatilor celor mai vechi care au prestat cel putin un serviciu in annul 2022.
2. Sa se afiseze id-ul, numele si prenumele clientilor cu varsta sub 30 de ani si care au macar o achizitie cu valoarea mai mare de 30 de lei in 2022.



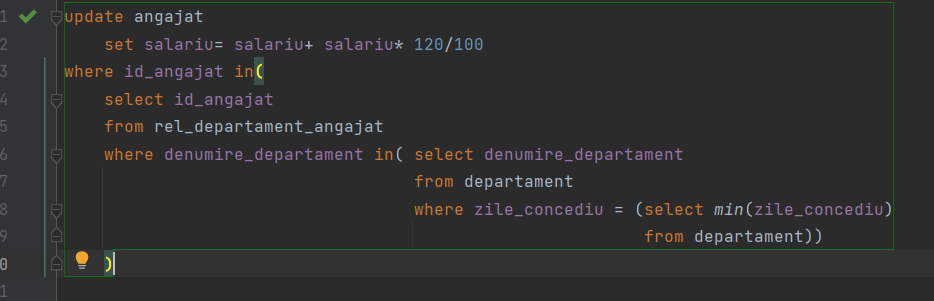
1. Sa se afiseze informatii(denumire departament, salariu maxim si ultima data de anagajare )pt fiecare departament care a facut ultima angajare acum 3 ani.\



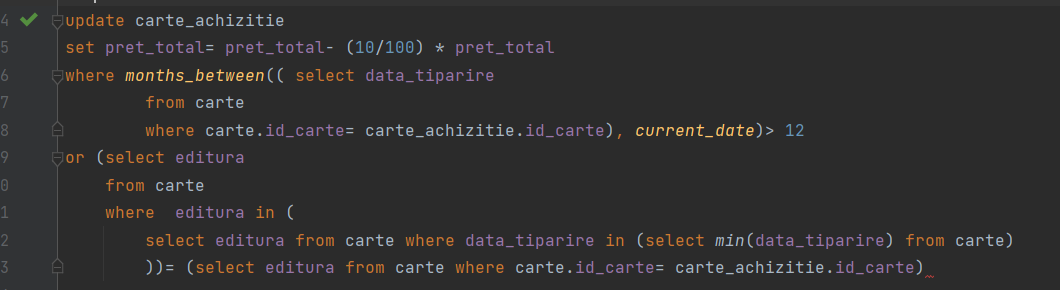
1. Cati angajati care au adresa introdusa sunt din Constanta, cati sunt din Bucuresti.



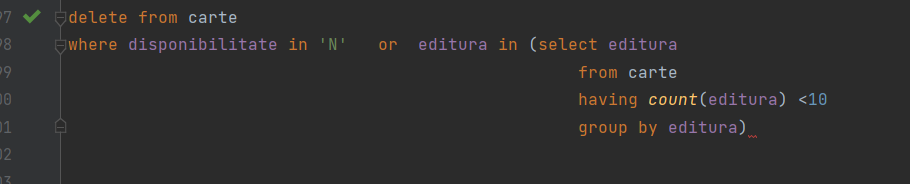
1. Implementarea a 3 operații de actualizare sau suprimare a datelor utilizând subcereri
   1. Sa se mareasca salariul cu 20% angajatilor care lucreaza si in departamentele cu numar minim de zile de concediu.

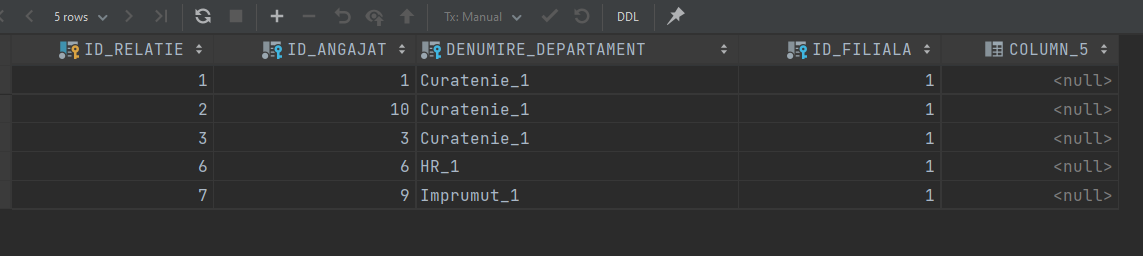


* 1. Sa se scada cu 10% pretul tuturor cartilor mai vechi de un an.

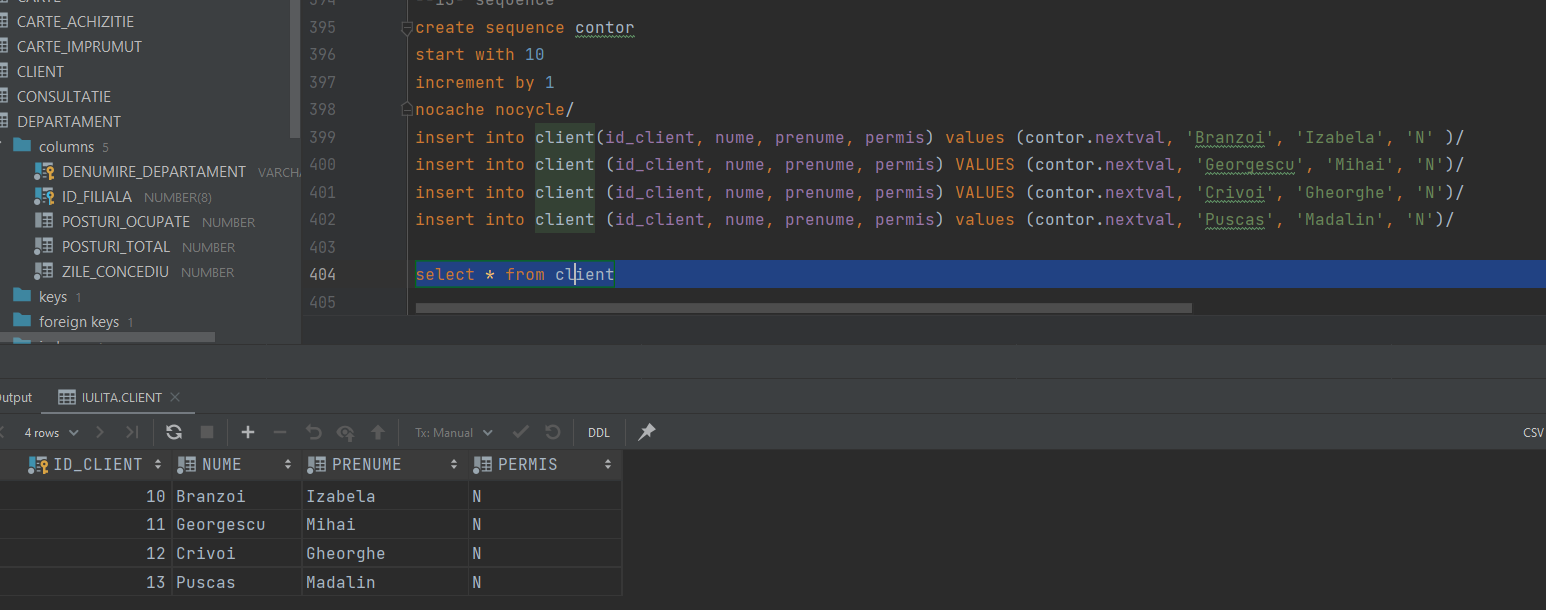


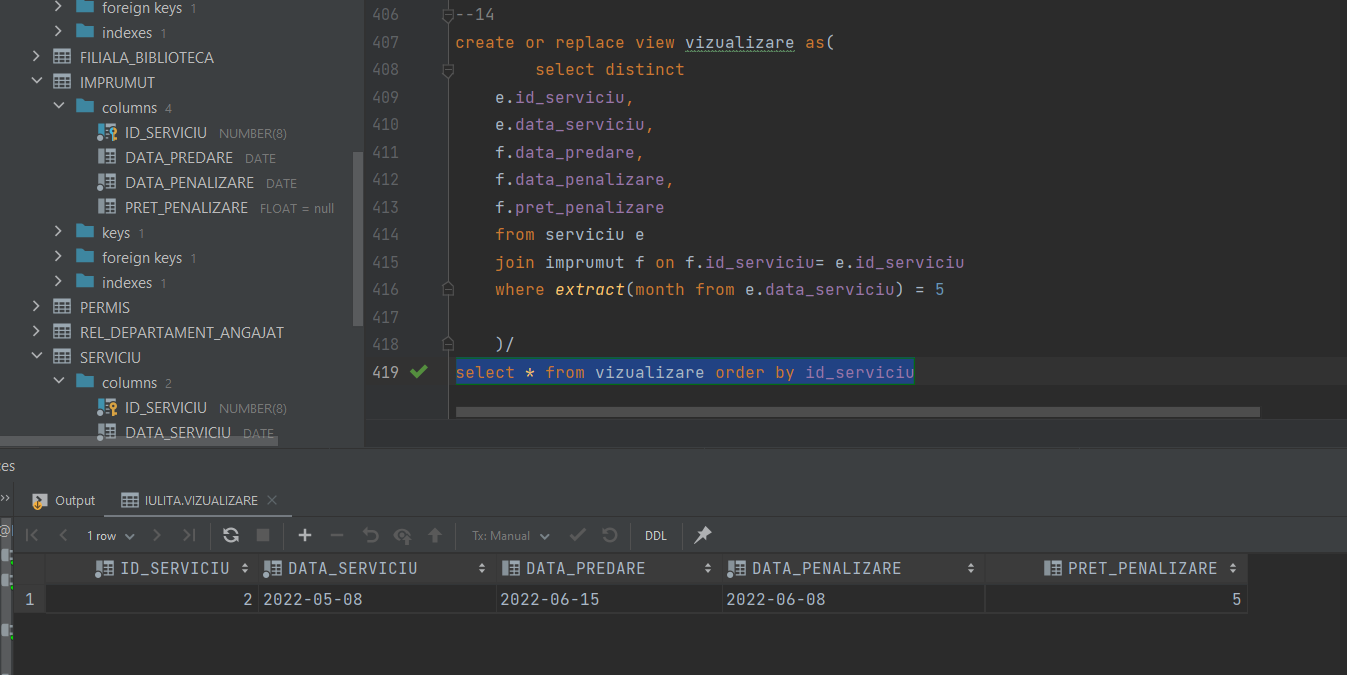
* 1. Sa se stearga toate cartile achizitionate sau care apartin editurii cu mai putin de 10 carti publicate.

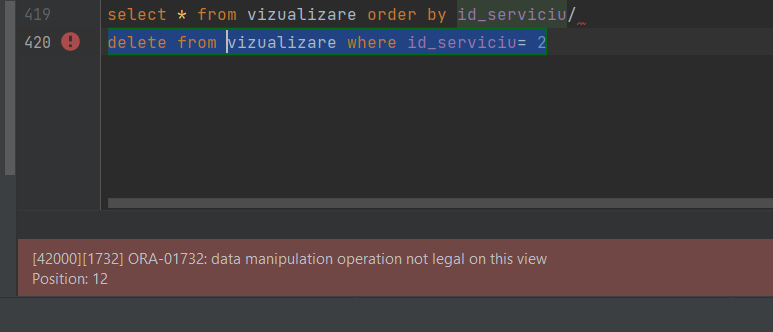




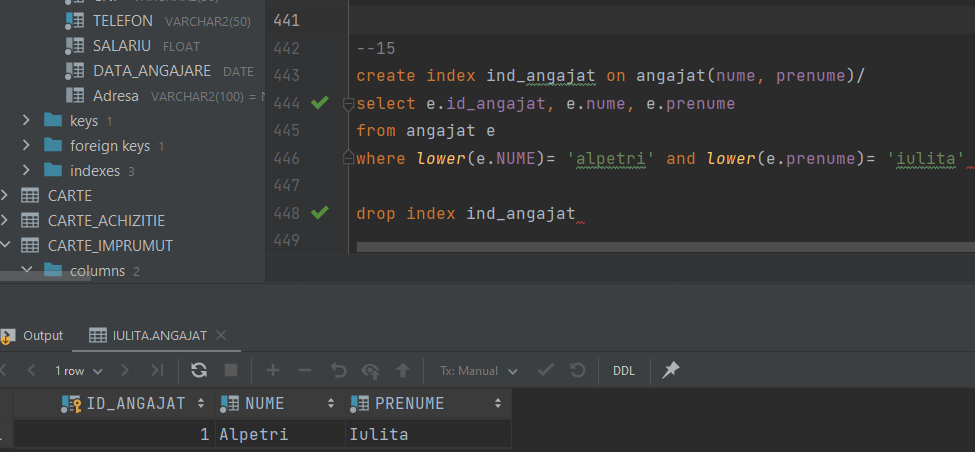
**13. Crearea unei secvențe ce va fi utilizată în inserarea înregistrărilor în tabele**



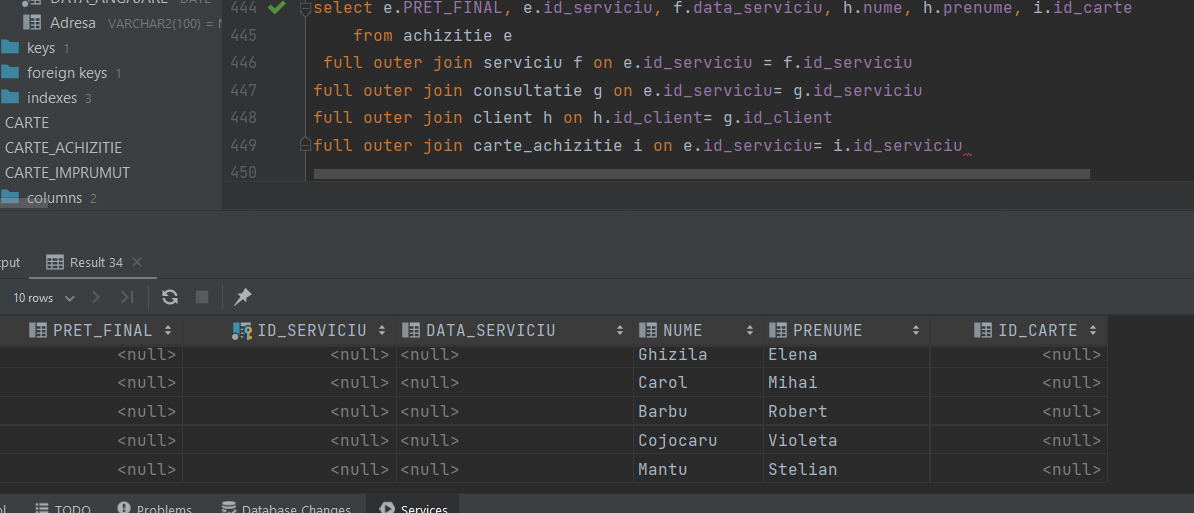
1. **Crearea unei vizualizări compuse. Dați un exemplu de operație LMD permisă pe vizualizarea respectivă și un exemplu de operație LMD nepermisă.**

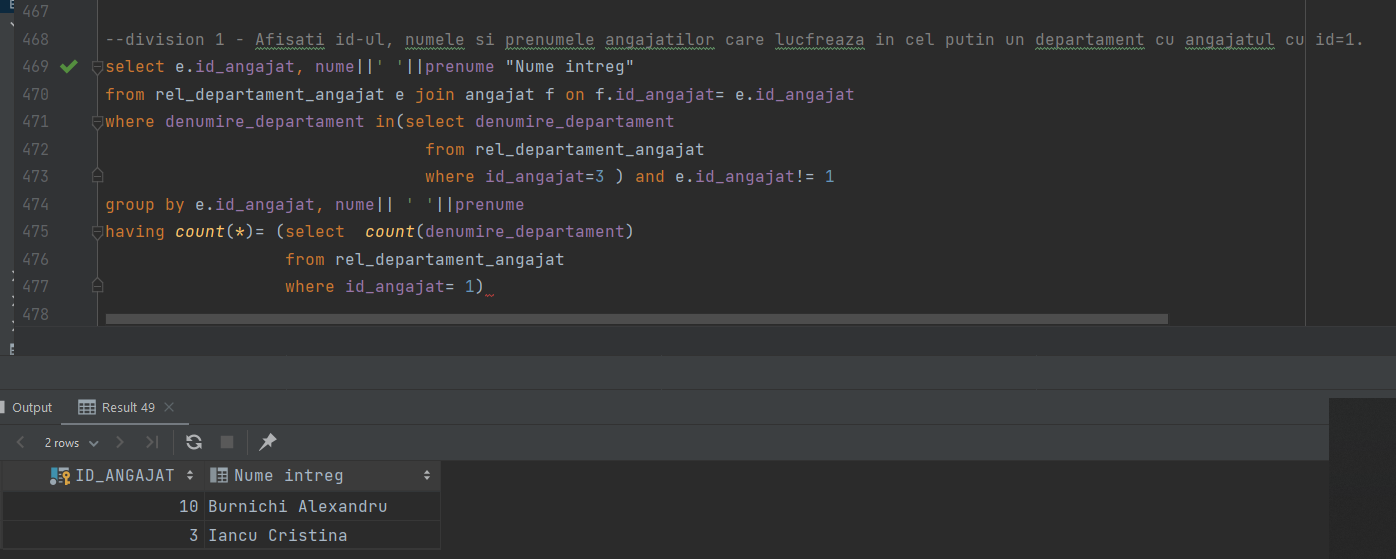
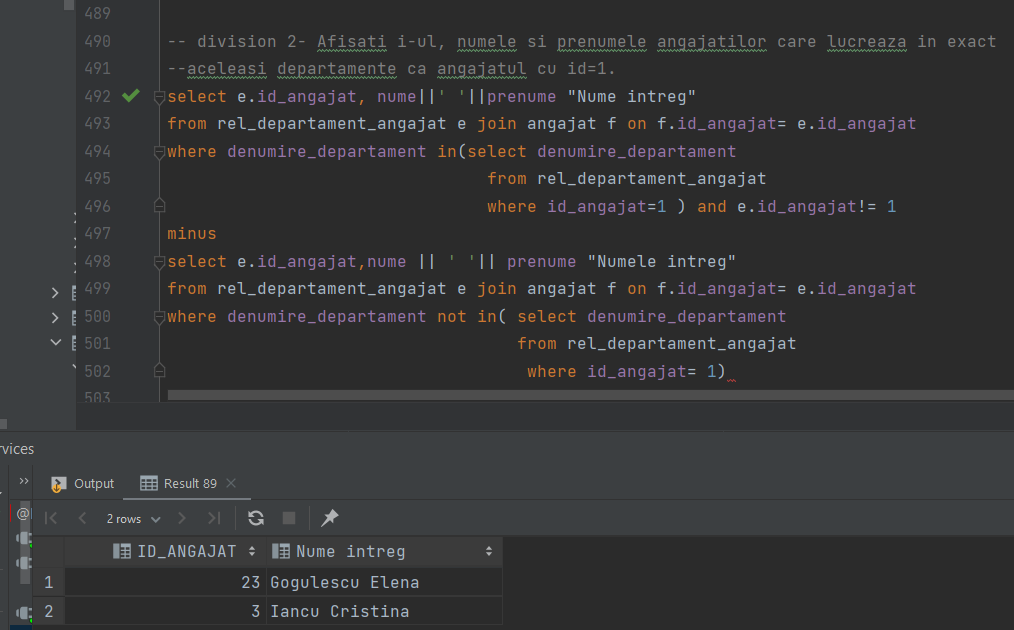


1. **Crearea unui index care să optimizeze o cerere de tip căutare cu 2**

**criterii. Specificați cererea-** Sa se afiseze eficient angajatul Alpetri Iulita.

1. **Formulați în limbaj natural și implementați în SQL: o cerere ce utilizează operația *outerjoin* pe minimum 4 tabele și două cereri ce utilizează operația *division*.** 
   * 1. Outerjoin pe 4 tabele.



* + 1. Division

**18.**

**exemplu BCNF:**

Consideram tabelul care nu este in BCNF:

Serviciu(id\_angajat, data\_serviciu, id\_serviciu)

**cu dependentele**

(id\_angajat, data\_serviciu)->id\_serviciu

Id\_serviciu->data\_serviciu

**Descompunere fara pierdere de informatie:**

Serviciu (#id\_angajat, id\_serviciu)

DATA\_serviciu (#id\_serviciu, data\_serviciu)

**exemplu FN4:**

Considerand ca un eveniment poate fi sustinut de mai multi manageri si ca pot participa mai multi angajati, se considera tabelul care nu e in FN4:

Eveniment (id\_eveniment, id\_manager, id\_angajat)

**Descompunere fara pierdere de informatie:**

Angajati\_evenimente (#id\_angajat, #id\_eveniment)

Manageri\_eveniment(#id\_manager, #id\_eveniment)

Deci fara normalizare apar dependente multivaloare care vor conduce la repetitie nenecesara a datelor cat si la anomalii.

**exemplu FN5:**

Daca consideram ca exista relatii de tip many to many intre:

* Departamente si angajat
* angajat si serviciu
* servciu si client

Un tabel care ar contine toate aceste 3 atribute ar trebui descompus in 3 tabele astfel:

Dapartament\_angajat(id\_departament, id\_angajat)

Angajat\_serviciu(id\_angajat, id\_serviciu)

Serviciu\_client(id\_serviciu, id\_client)