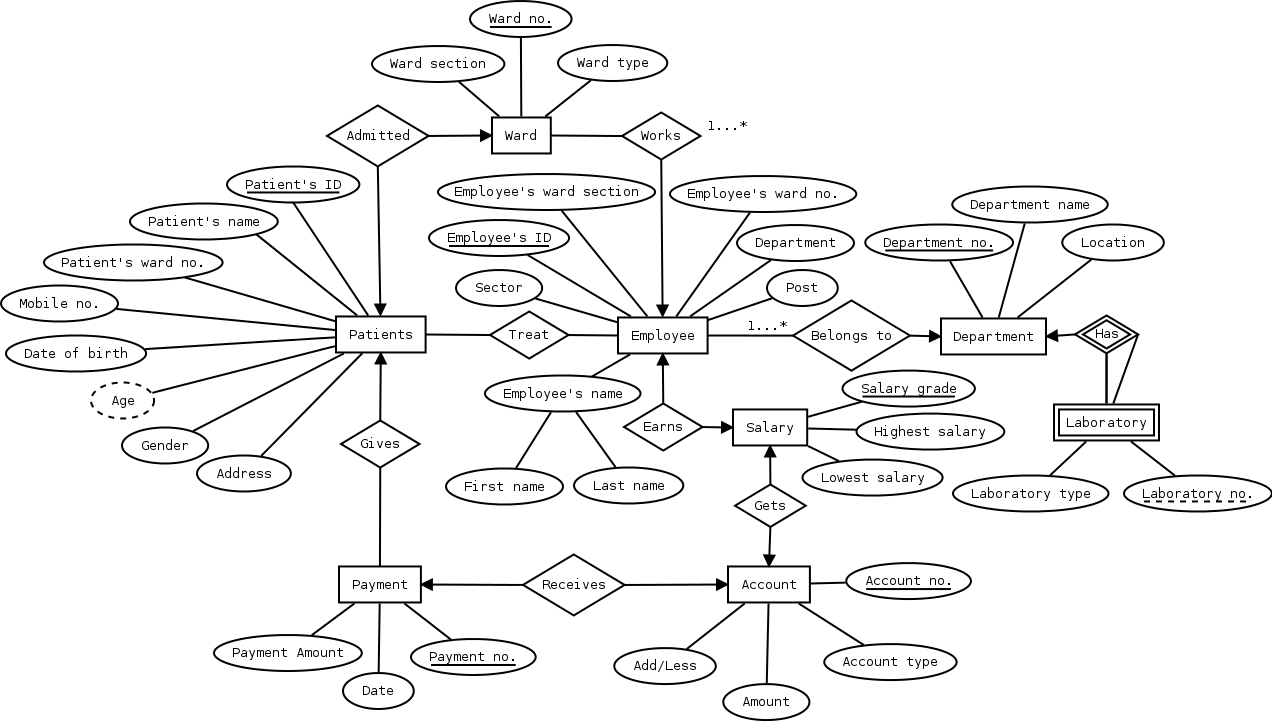
**GROUP NAME: BUTTERFLY**

|  |  |
| --- | --- |
| **NAME** | **ID** |
| **AHMED, RAIHAN** | **19-40978-2** |
| **OSMAN, SUPRIYA** | **19-39735-1** |
| **MANNI, NAHIN AFRIN** | **18-38734-3** |
| **LEO, NAFINUR** | **20-42195-1** |
| **RAHE, TASIN HASAN** | **19-41008-2** |

**Title:** **Hospital Management System**

A patient can be admitted in a ward at ‘X’ hospital, this process can be handled by **Hospital Management System**. A patient is identified by the patient id. At the system also stores patient name, ward number, mobile number, age, date of birth, gender and address. Employee can work in wards. A ward is identified by ward number. Ward type and ward section are also stored. At least one employee must work in a ward. Patient gives payment which contains amount, date and identified by payment number. Employee of hospital treats patient and works in ward. To identify an employee the system stores employee id along with name, sector, post, salary, ward section, ward number and department. An employee name is composed of first name and last name. The entire employee belongs to a department which is identified by department number. Each department should have at least one employee. The system also stores department name, laboratory number and location. Department has a laboratory that identified by laboratory number and it also has laboratory type. Laboratory is fully dependent on department. Employee earns salary. Every employee’s salary is identified by salary grade. Salary also contains highest and lowest salary. Account receives payment from patients as well as employee gets salary from account. Account number is main identification of account which also contains account type, amount and add/less.



**Normalization**

**Belongs to:**

UNF: 1st: First name, Last name, Sector, Employee’s ID, Post, Employee’s ward no., Employee’s ward section, Department, Department no., Department name, Location.

1NF: 1st: First name, Last name, Sector, Employee’s ID, Post, Employee’s ward no., Employee’s ward section, Department, Department no., Department name, Location.

2NF: 1st: Employee’s ID, Employee’s name, First name, Last name, Post, Sector, Employee’s ward no., Employee’s ward section, Department

2NF: 2nd: Department no., Department name, Location.

2NF: 3rd: Department no., Department no.

3NF: 1st: Employee’s ID, Employee’s name, First name, Last name, Post, Sector, Employee’s ward no., Employee’s ward section, Department

3NF: 2nd: Department no., Department name, Location.

3NF: 3rd: Department no., Department no.

**HAS:**

UNF: 1st: Department no., Department name, Location, Laboratory type, Laboratory no.

1NF: 1st: Department no., Department name, Location, Laboratory type, Laboratory no.

2NF: 1st: Department no., Department name, Location.

2NF: 2nd: Laboratory no., Laboratory type.

2NF: 3rd: Department no., Laboratory no.

3NF: 1st: Department no., Department name, Location.

3NF: 2nd: Laboratory no., Laboratory type.

3NF: 3rd: Department no., Laboratory no.

**Earns:**

UNF: 1st: Employee’s ID, Post, Sector, First name, Last name, Employee’s ward no., Employee’s ward section, Department, Salary grade, Highest salary, Lowest salary.

1NF: 1st: Employee’s ID, Post, Sector, First name, Last name, Employee’s ward no., Employee’s ward section, Department, Salary grade, Highest salary, Lowest salary.

2NF: 1st: Employee’s ID, Post, Sector, First name, Last name, Employee’s ward no., Employee’s ward section.

2NF: 2nd: Salary grade, Highest salary, Lowest salary.

2NF: 3rd: Employee’s ID, Salary grade.

3NF: 1st: Employee’s ID, Post, Sector, First name, Last name, Employee’s ward no., Employee’s ward section.

3NF: 2nd: Salary grade, Highest salary, Lowest salary.

3NF: 3rd: Employee’s ID, Salary grade.

**Works:**

UNF: 1st: Employee’s ID, First name, Last name, Sector, Post, Department, Employee’s ward no., Employee’s ward section, Ward section, Ward type, Ward no.

1NF: 1st: Employee’s ID, First name, Last name, Sector, Post, Department, Employee’s ward no., Employee’s ward section, Ward section, Ward type, Ward no.

2NF: 1st: Employee’s ID, First name, Last name, Sector, Post, Employee’s ward section, Employee’s ward no.

2NF: 2nd: Ward no., Ward type, Ward section.

2NF: 3rd: Employee’s ID, Ward no.

3NF: 1st: Employee’s ID, First name, Last name, Sector, Post, Employee’s ward section, Employee’s ward no.

3NF: 2nd: Ward no., Ward type, Ward section.

3NF: 3rd: Employee’s ID, Ward no.

**Treat:**

UNF: 1st: Employee’s ID, Employee’s ward section, Employee’s ward no., First name, Last name, Department, Post, Sector, Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address.

1NF: 1st: Employee’s ID, Employee’s ward section, Employee’s ward no., First name, Last name, Department, Post, Sector, Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address.

2NF: 1st: Employee’s ID, Employee’s ward section, Employee’s ward no., First name, Last name, Department, Post, Sector.

2NF: 2nd: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address.

2NF: 3rd: Employee’s ID, Patient’s ID.

3NF: 1st: Employee’s ID, Employee’s ward section, Employee’s ward no., First name, Last name, Department, Post, Sector.

3NF: 2nd: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address.

3NF: 3rd: Employee’s ID, Patient’s ID.

**Admitted:**

UNF: 1st: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address, Ward no., Ward section, Ward type.

1NF: 1st: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address, Ward no., Ward section, Ward type.

2NF: 1st: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address.

2NF: 2nd: Ward no., Ward section, Ward type.

2NF: 3rd: Patient’s ID, Ward no.

3NF: 1st: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address.

3NF: 2nd: Ward no., Ward section, Ward type.

3NF: 3rd: Patient’s ID, Ward no.

**Gives:**

UNF: 1st: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address, Payment no., Date, Payment amount.

1NF: 1st: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address, Payment no., Date, Payment amount.

2NF: 1st: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address.

2NF: 2nd: Payment no., Date, Payment amount.

2NF: 3rd: Patient’s ID, Payment no.

3NF: 1st: Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address

3NF: 2nd: Payment no., Date, Payment amount.

3NF: 3rd: Patient’s ID, Payment no.

**Receives:**

UNF: 1st: Payment no., Payment amount, Date, Account no., Add/Less, Amount, Account type.

1NF: 1st: Payment no., Payment amount, Date, Account no., Add/Less, Amount, Account type.

2NF: 1st: Account no., Add/Less, Amount, Account type.

2NF: 2nd: Payment no., Payment amount, Date.

2NF: 3rd: Payment no., Account no.

3NF: 1st: Account no., Add/Less, Amount, Account type.

3NF: 2nd: Payment no., Payment amount, Date.

3NF: 3rd: Payment no., Account no.

**Gets:**

UNF: 1st: Account no., Add/Less, Amount, Account type, Salary grade, Highest salary, Lowest salary.

1NF: 1st: Account no., Add/Less, Amount, Account type, Salary grade, Highest salary, Lowest salary.

2NF: 1st: Account no., Add/Less, Amount, Account type.

2NF: 2nd: Salary grade, Highest salary, Lowest salary.

2NF: 3rd: Account no., Salary grade.

3NF: 1st: Account no., Add/Less, Amount, Account type.

3NF: 2nd: Salary grade, Highest salary, Lowest salary.

3NF: 3rd: Account no., Salary grade.

**Final Table:**

1st: Department no., Department name, Location.

2th: Department name, Ward no., Ward type, Ward section.

3nd: Employee’s ID, First name, Last name, Post, Sector, Employee’s ward no., Employee’s ward section, Department.

4rd: Department name, Laboratory no., Laboratory type.

5th: Department name, Salary grade, Highest salary, Lowest salary.

6th: Department name, Patient’s ID, Patient’s name, Patient’s ward no., Mobile no., Date of birth, Age, Gender, Address.

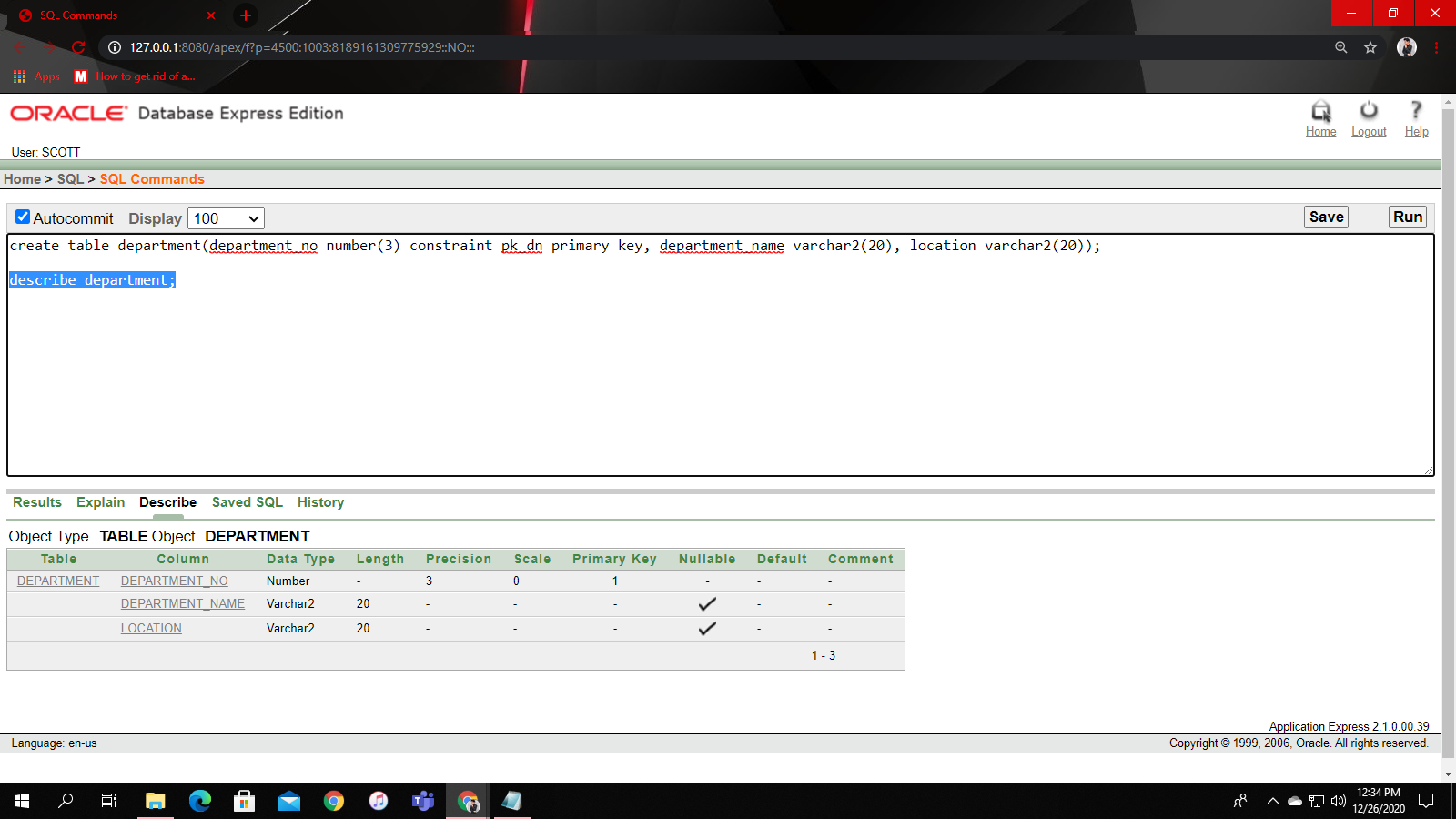
7th: Department name, Payment no., Date, Payment amount.

8th: Department name, Account no., Add/Less, Amount, Account type.

**Table creation**

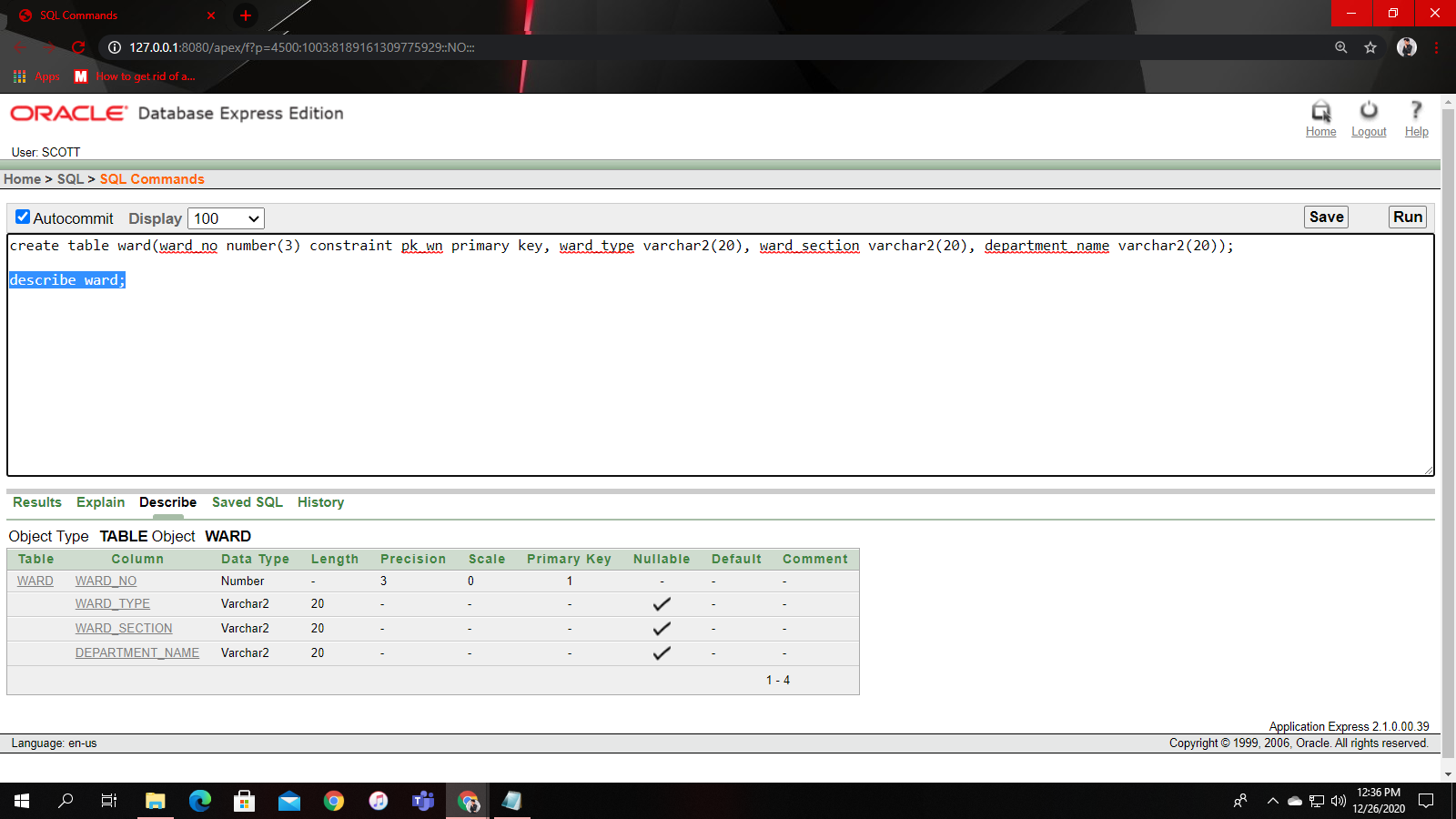
1st: Department table:

create table department(department\_no number(3) constraint pk\_dn primary key, department\_name varchar2(20), location varchar2(20));



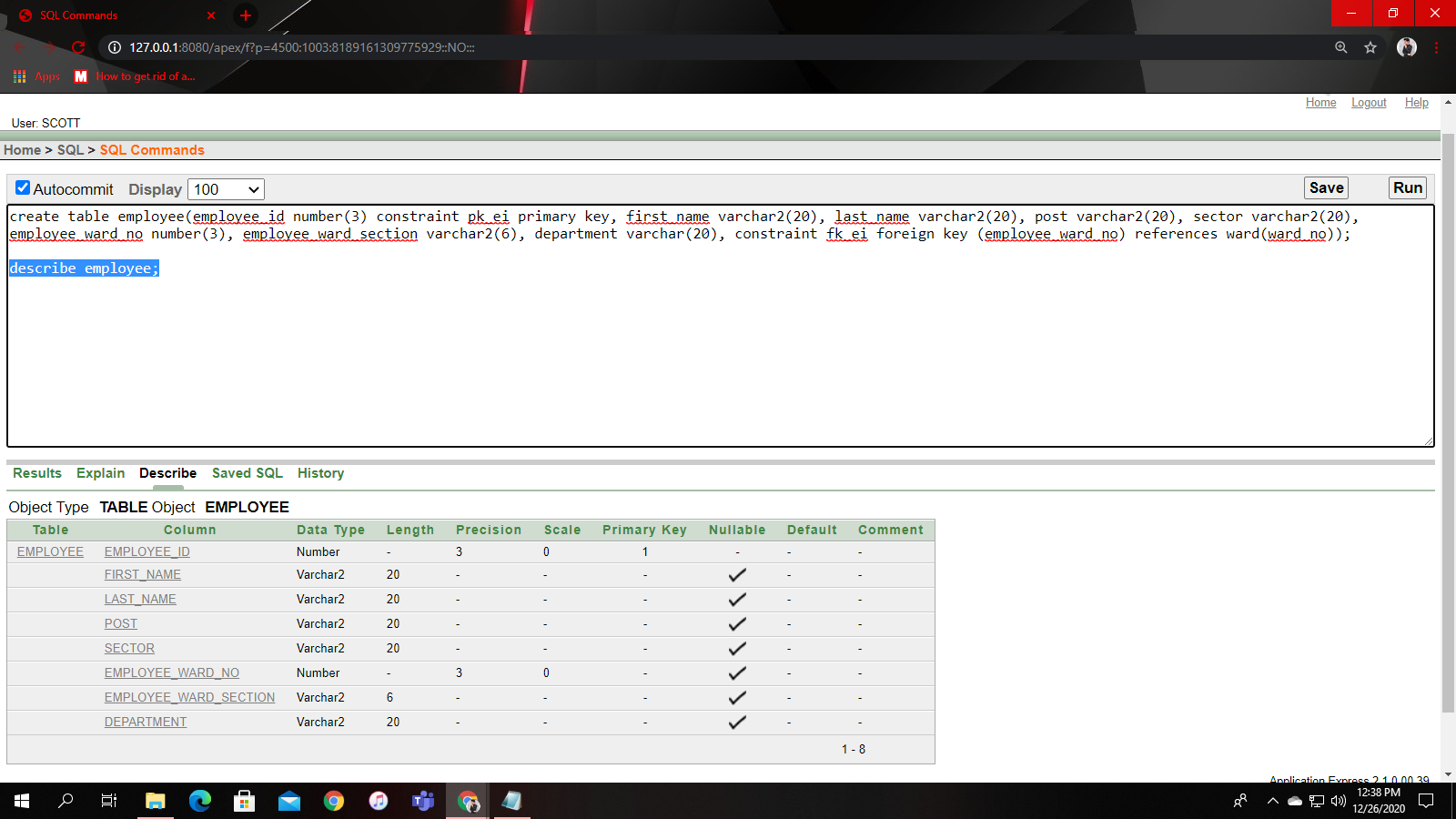
2th: Ward table:

create table ward(ward\_no number(3) constraint pk\_wn primary key, ward\_type varchar2(20), ward\_section varchar2(20), department\_name varchar2(20));



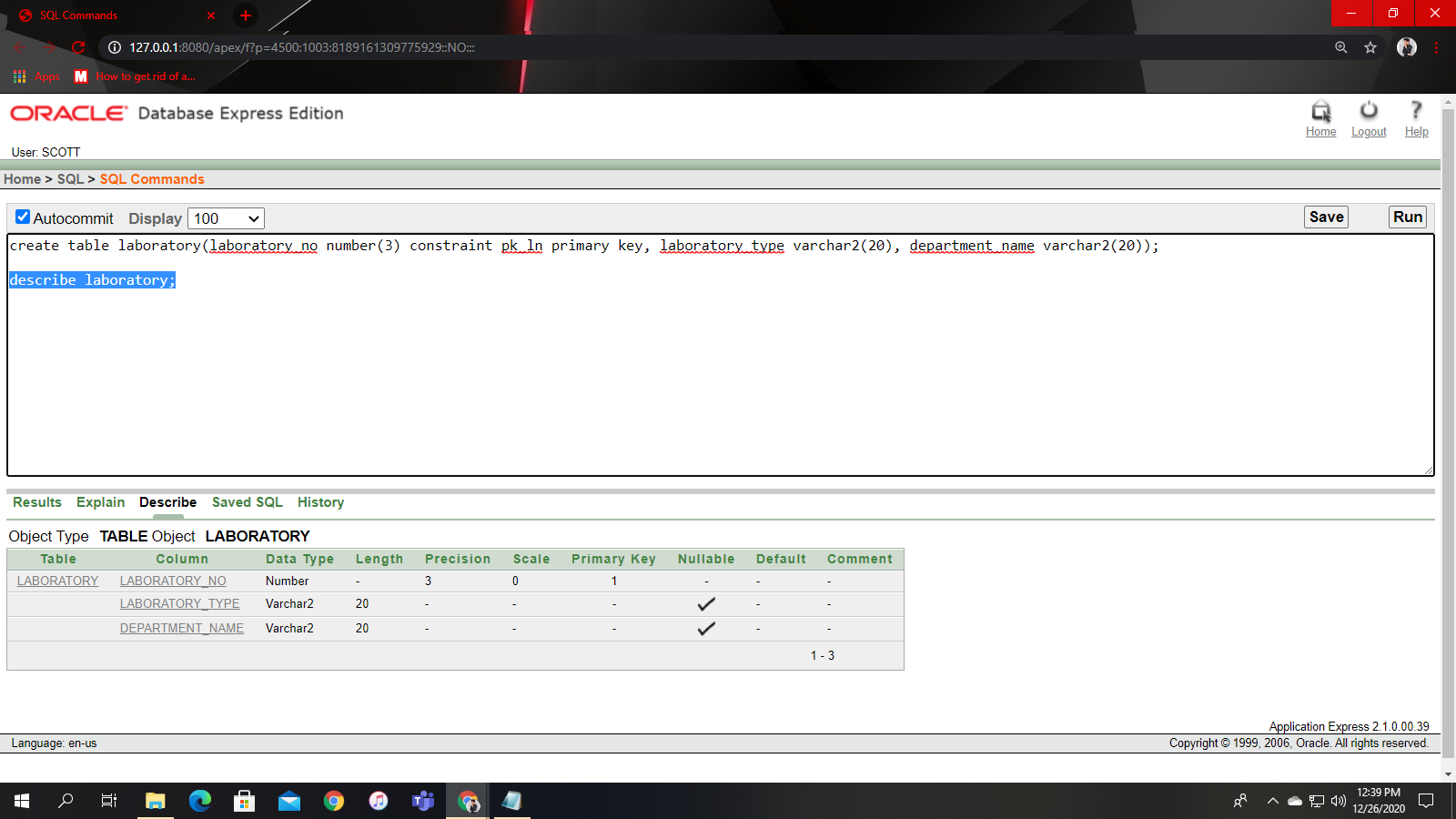
3nd: Employee table:

create table employee(employee\_id number(3) constraint pk\_ei primary key, first\_name varchar2(20), last\_name varchar2(20), post varchar2(20), sector varchar2(20), employee\_ward\_no number(3), employee\_ward\_section varchar2(6), department varchar(20), constraint fk\_ei foreign key (employee\_ward\_no) references ward(ward\_no));



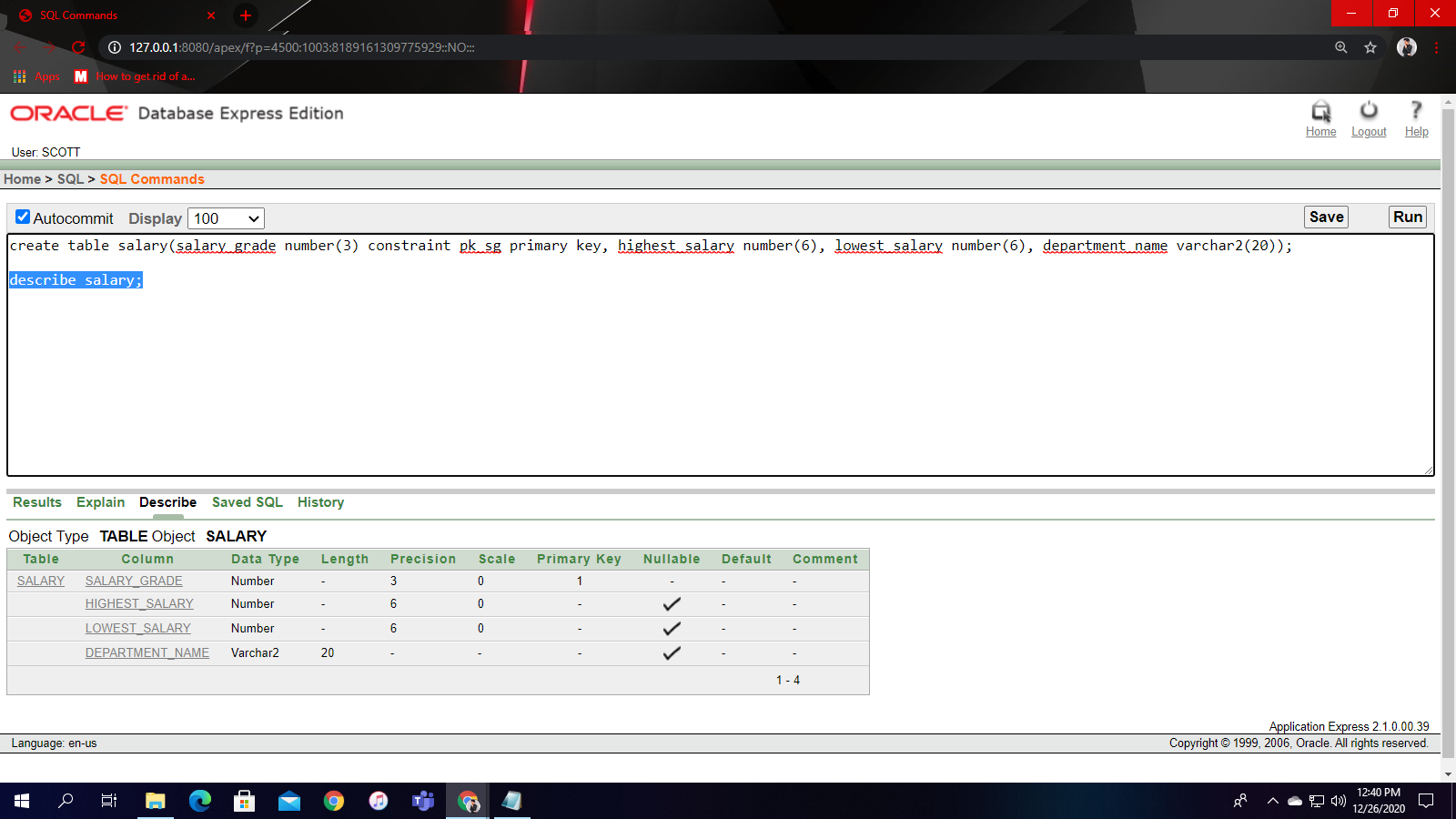
4rd: Laboratory table:

create table laboratory(laboratory\_no number(3) constraint pk\_ln primary key, laboratory\_type varchar2(20), department\_name varchar2(20));



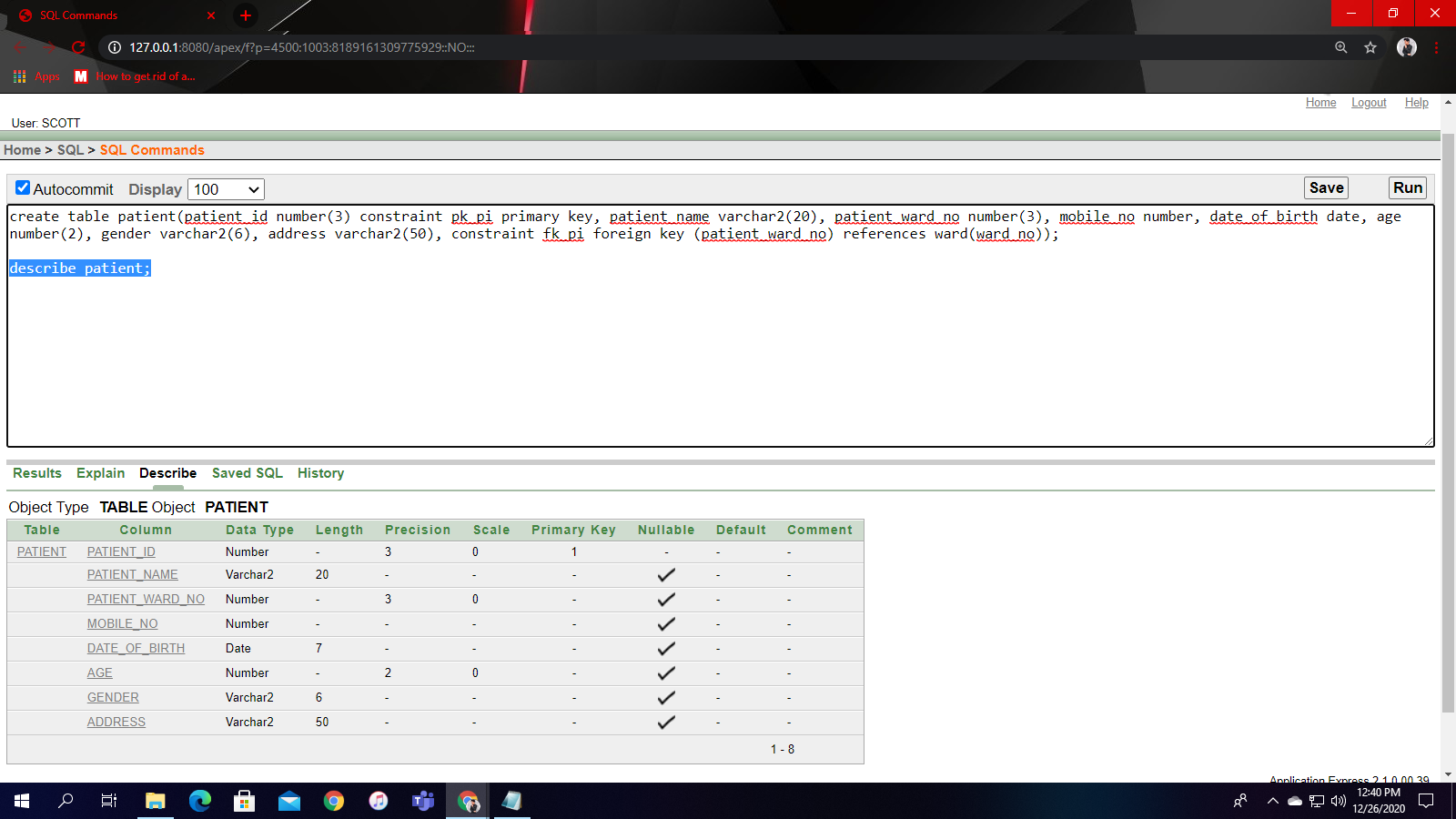
5th: Salary table:

create table salary(salary\_grade number(3) constraint pk\_sg primary key, highest\_salary number(6), lowest\_salary number(6), department\_name varchar2(20));



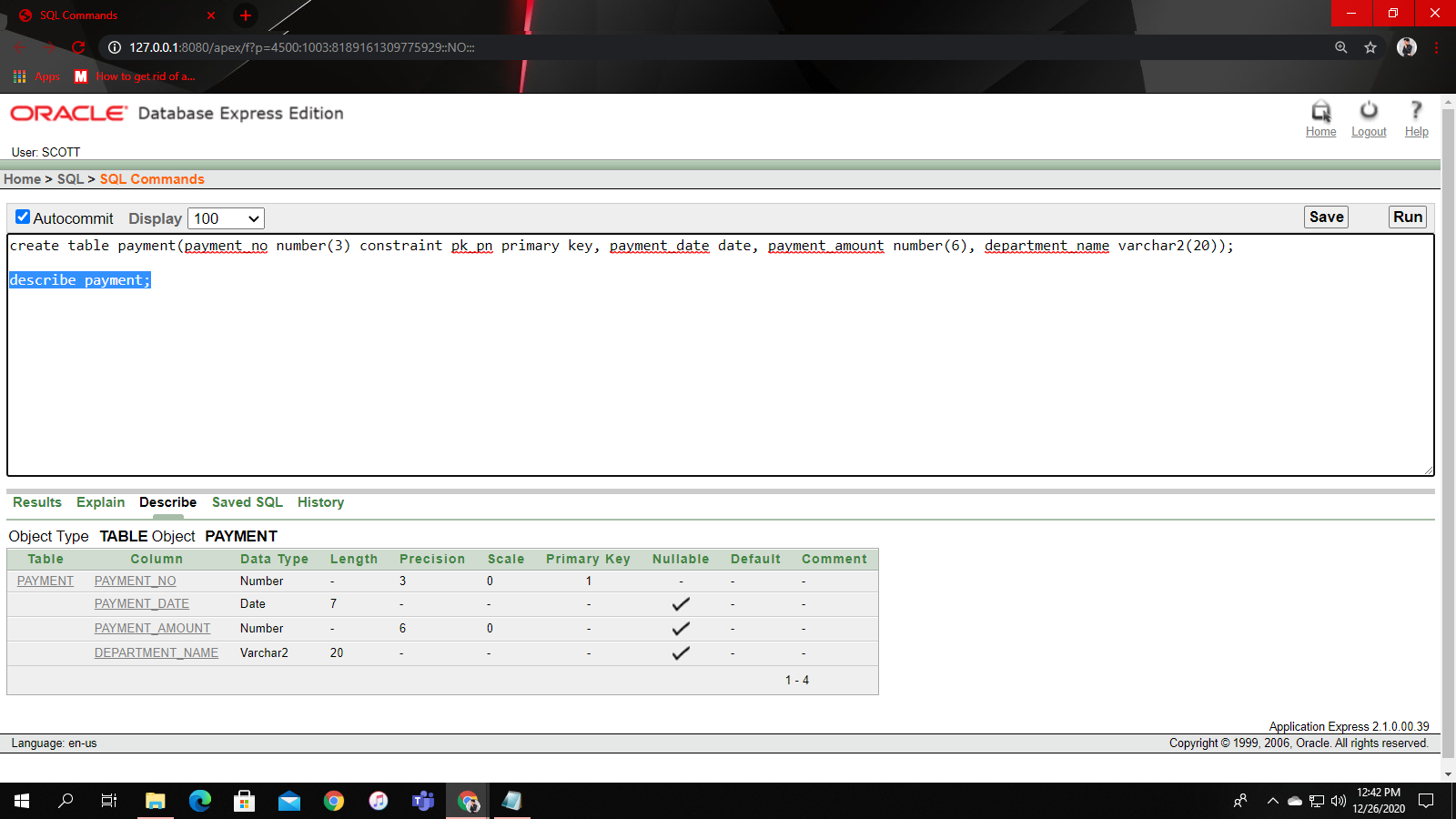
6th: Patient table:

create table patient(patient\_id number(3) constraint pk\_pi primary key, patient\_name varchar2(20), patient\_ward\_no number(3), mobile\_no number, date\_of\_birth date, age number(2), gender varchar2(6), address varchar2(50), constraint fk\_pi foreign key (patient\_ward\_no) references ward(ward\_no));



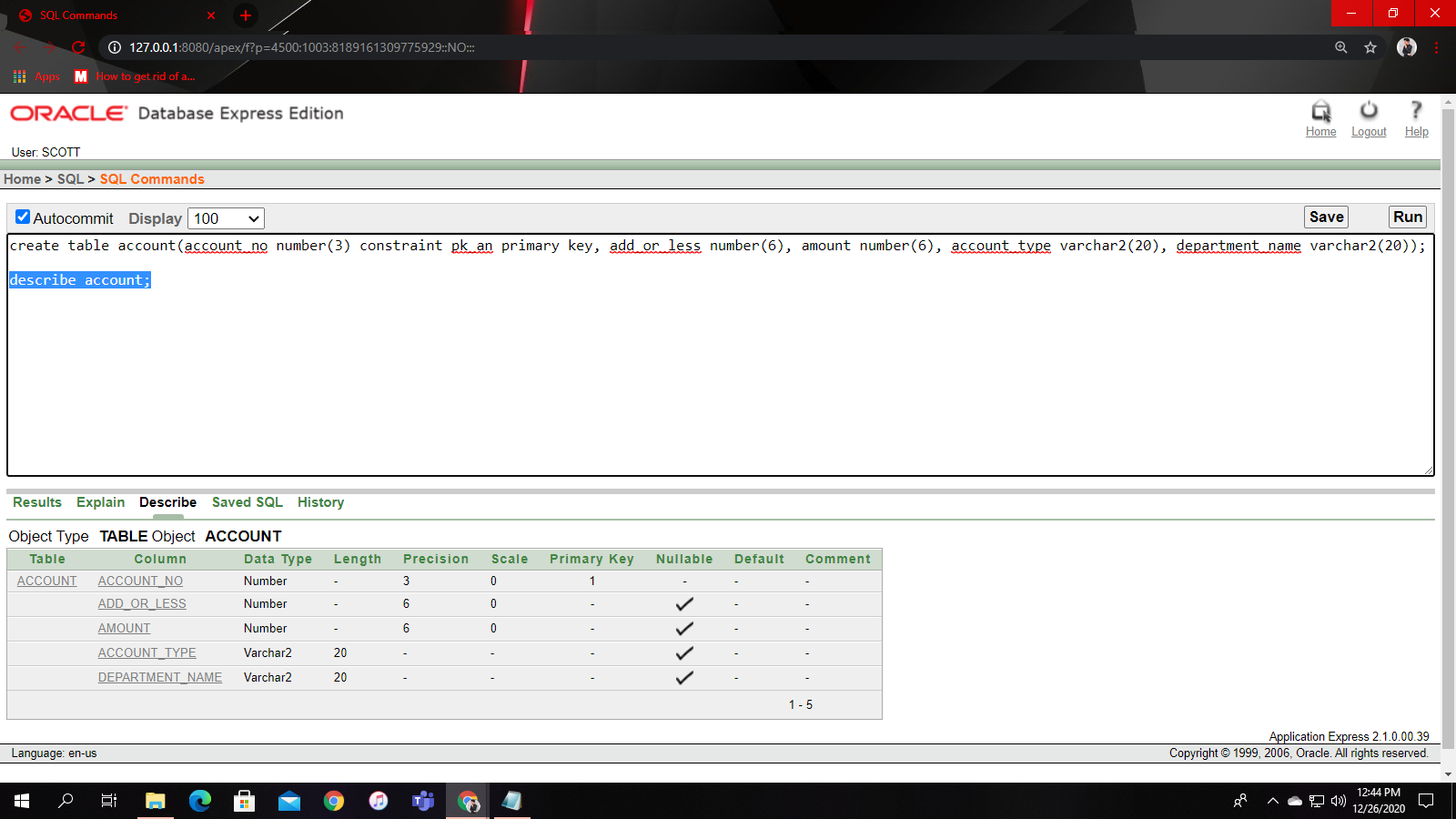
7th: Payment table:

create table payment(payment\_no number(3) constraint pk\_pn primary key, payment\_date date, payment\_amount number(6), department\_name varchar2(20));



8th: Account table:

create table account(account\_no number(3) constraint pk\_an primary key, add\_or\_less number(6), amount number(6), account\_type varchar2(20), department\_name varchar2(20));



**Data insertion:**

1.

insert into department values(1, 'Outpatient', 'With entrance');

insert into department values(2, 'Inpatient Service', '2nd floor');

insert into department values(3, 'Pharmacy', 'Beside OPD');

select \* from department;

2.

insert into ward values(1, 'Beds', 'A', 'Inpatient Service');

insert into ward values(2, 'ICU', 'B', 'Inpatient Service');

insert into ward values(3, 'Operating theatre', 'C', 'Inpatient Service');

select \* from ward;

3.

insert into employee values(1, 'David', 'Williams', 'Doctor', 'Surgeon', 3, 'C', 'Inpatient Service');

insert into employee values(2, 'James', 'Rodriguez', 'Doctor', 'Medical technologist', 2, 'B', 'Inpatient Service');

insert into employee values(3, 'Maria', 'Garcia', 'Nurse', 'Registered nurse', 1, 'A', 'Inpatient Service');

select \* from employee;

4.

insert into laboratory values(1, 'Hematology', 'Inpatient Service');

insert into laboratory values(2, 'Chemistry', 'Pharmacy');

insert into laboratory values(3, 'Microbiology', 'Pharmacy');

select \* from laboratory;

5.

insert into salary values(1, 10000, 4000, 'Pharmacy');

insert into salary values(2, 20000, 10001, 'Outpatient');

insert into salary values(3, 30000, 20001, 'Inpatient Service');

select \* from salary;

6.

insert into patient values(1, 'James', 2, 01687499999, '25-MAR-01', 19, 'Male', '123 Main Street, New York, NY 10030');

insert into patient values(2, 'Michael', 1, 01715704035, '15-JUL-04', 15, 'Male', 'Celeste Slater 606-3727 Ullamcorper. Street');

insert into patient values(3, 'Jenifer', 1, 01300666180, '19-JUN-02', 18, 'Female', 'Theodore Lowe Ap #867-859 Sit Rd. Azusa');

select \* from patient;

7.

insert into payment values(1, '24-DEC-20', 4500, 'Pharmacy');

insert into payment values(2, '25-DEC-20', 10500, 'Outpatient');

insert into payment values(3, '26-DEC-20', 20500, 'Inpatient Service');

select \* from payment;

8.

insert into account values(1, 500, 26000, 'Patient account', 'Inpatient Service');

insert into account values(2, 100, 18000, 'Patient account', 'Outpatient');

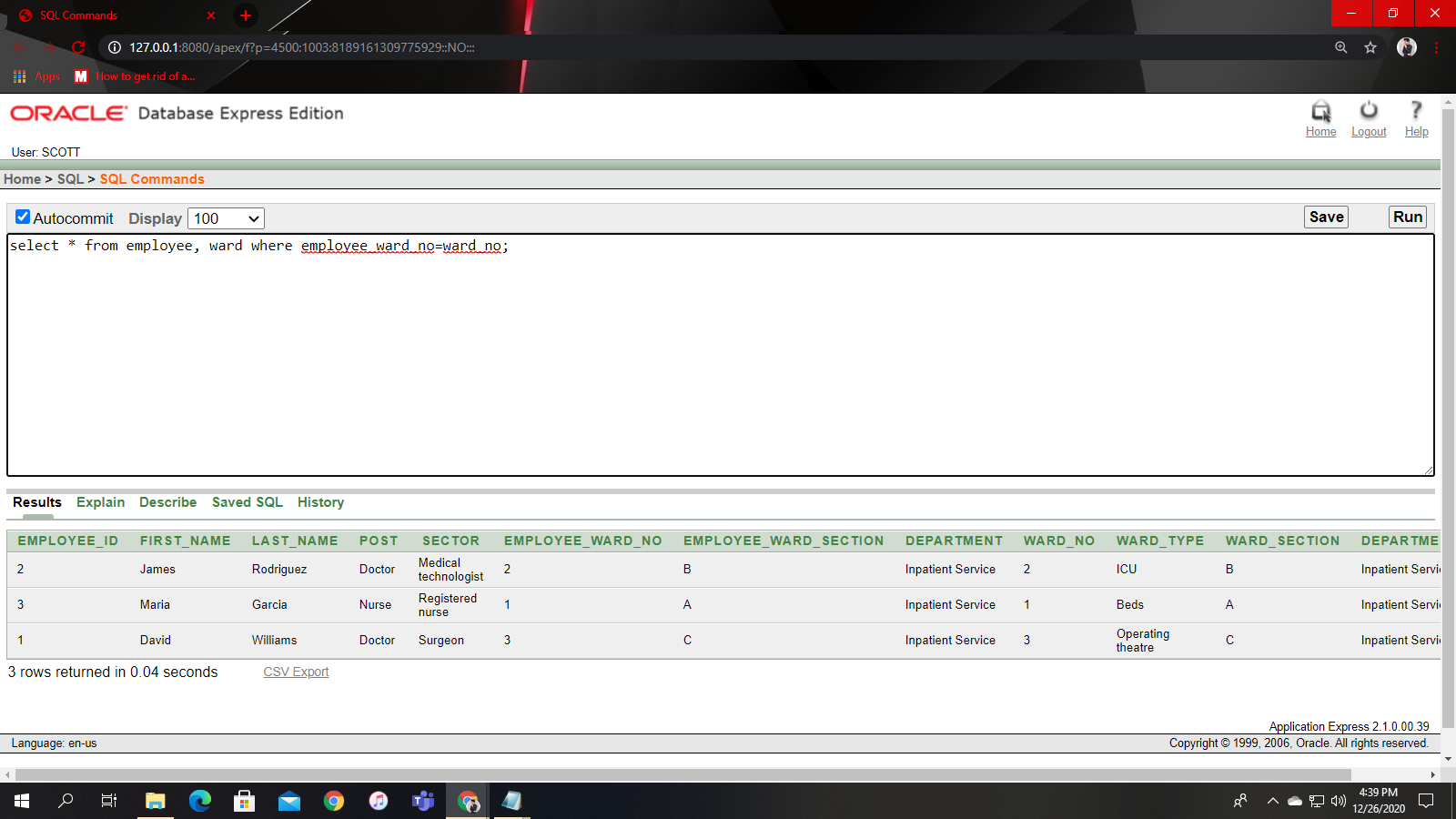
insert into account values(3, 2000, 27000, 'Employee account', 'Inpatient Service');

select \* from account;

**Joining:**

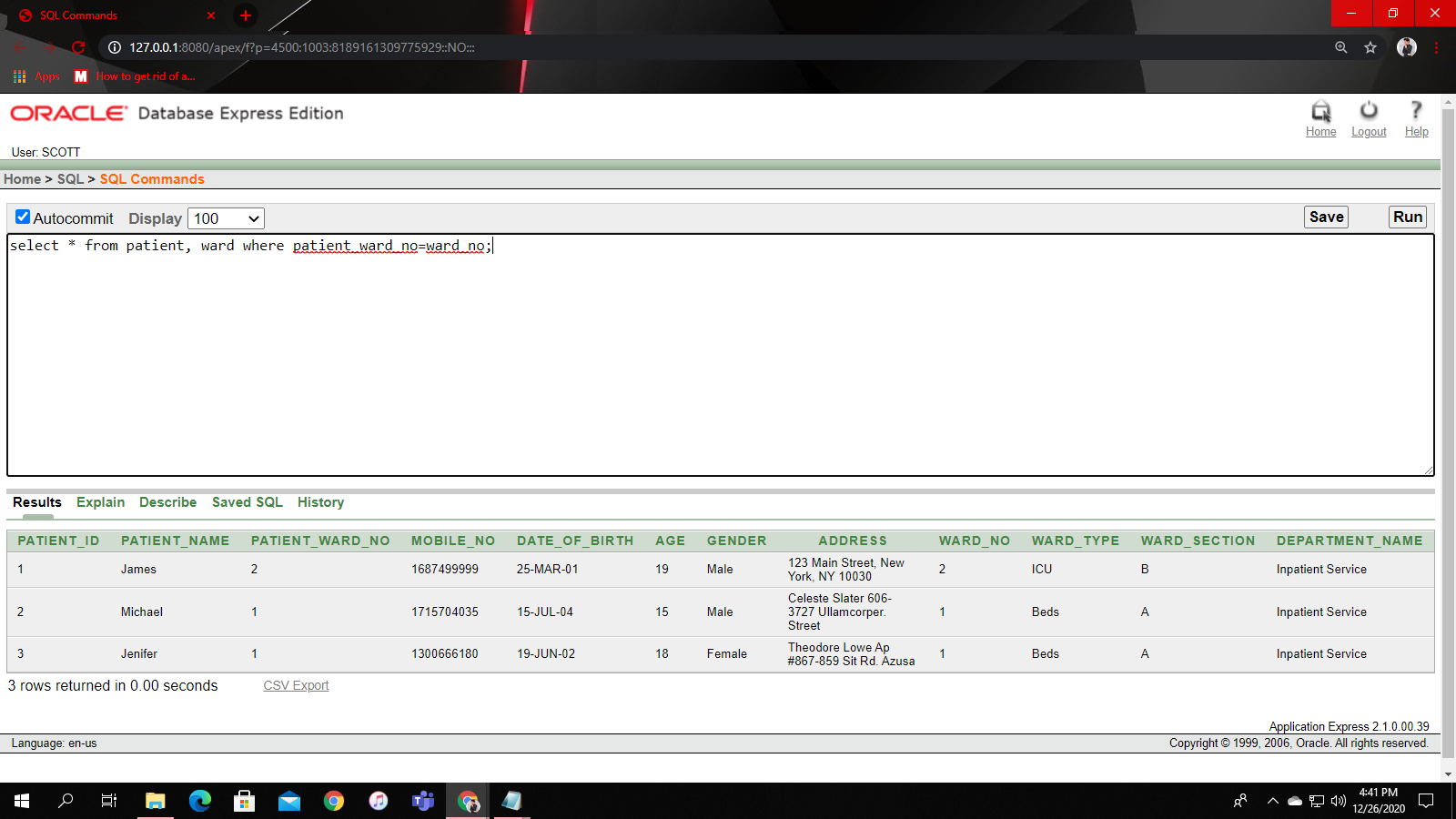
Equijoin: 1

select \* from employee, ward where employee\_ward\_no=ward\_no;



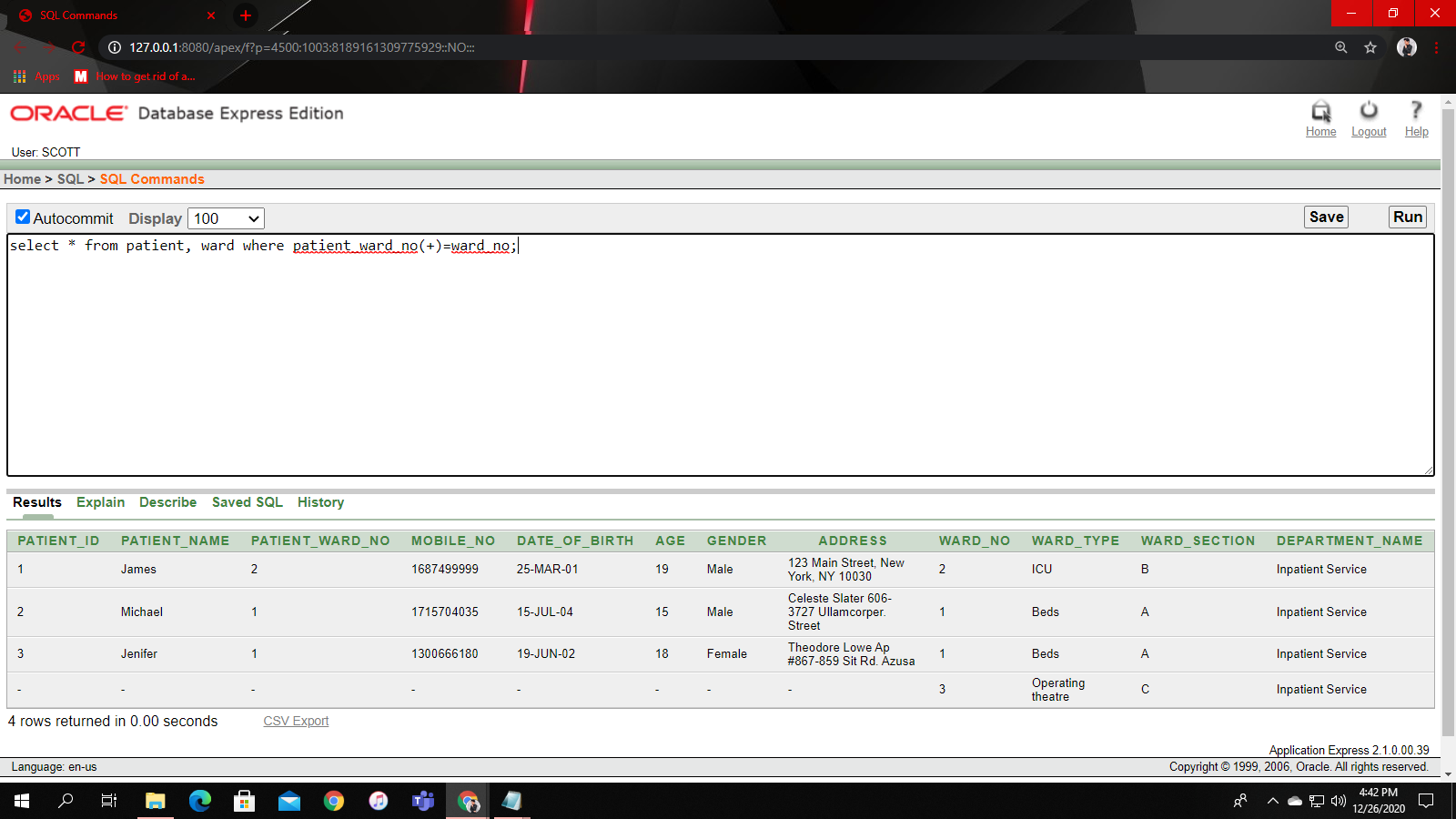
Equijoin: 2

select \* from patient, ward where patient\_ward\_no=ward\_no;



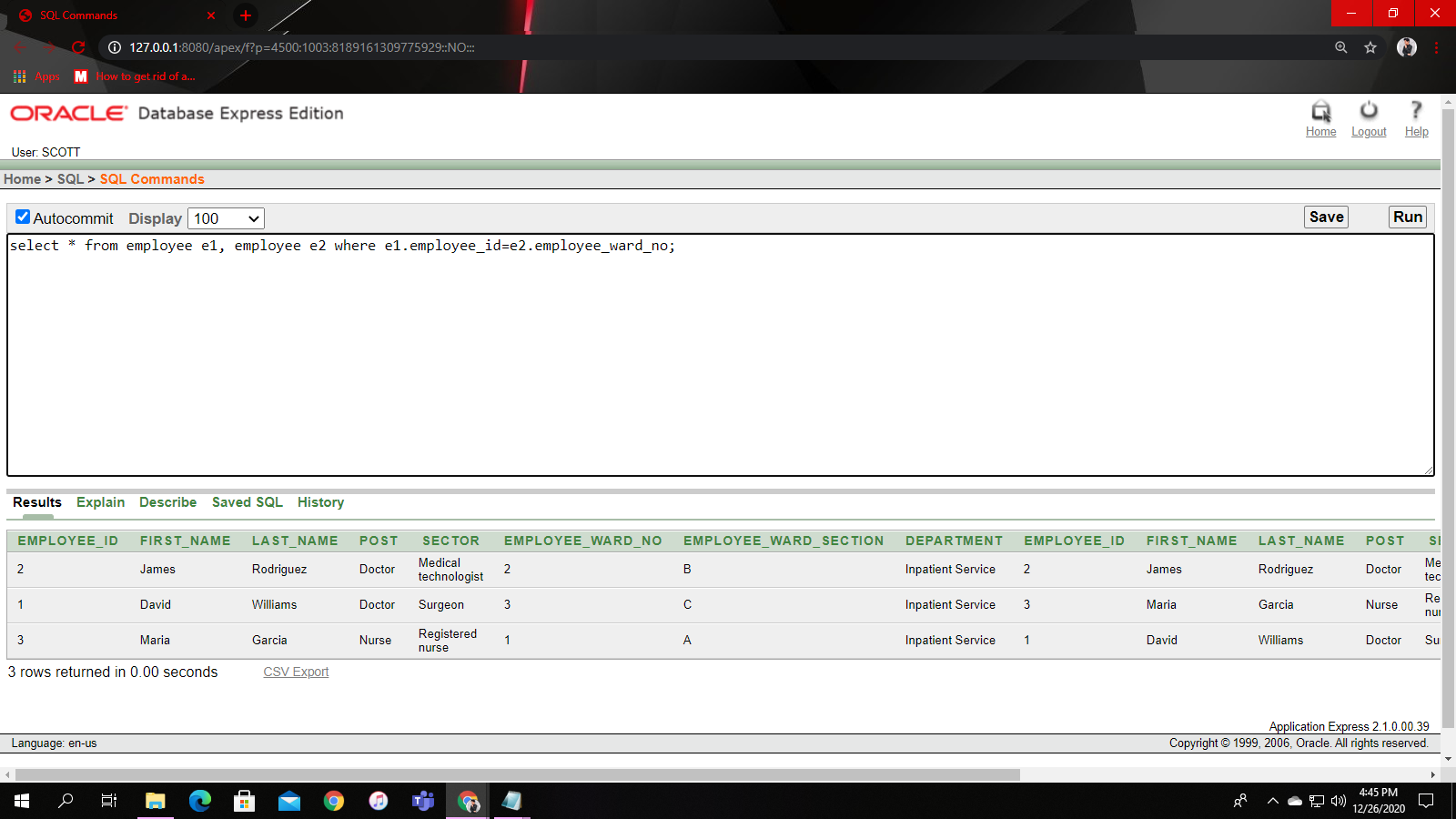
Outer join: 1

select \* from patient, ward where patient\_ward\_no(+)=ward\_no;



Self-join: 1

select \* from employee e1, employee e2 where e1.employee\_id=e2.employee\_ward\_no;

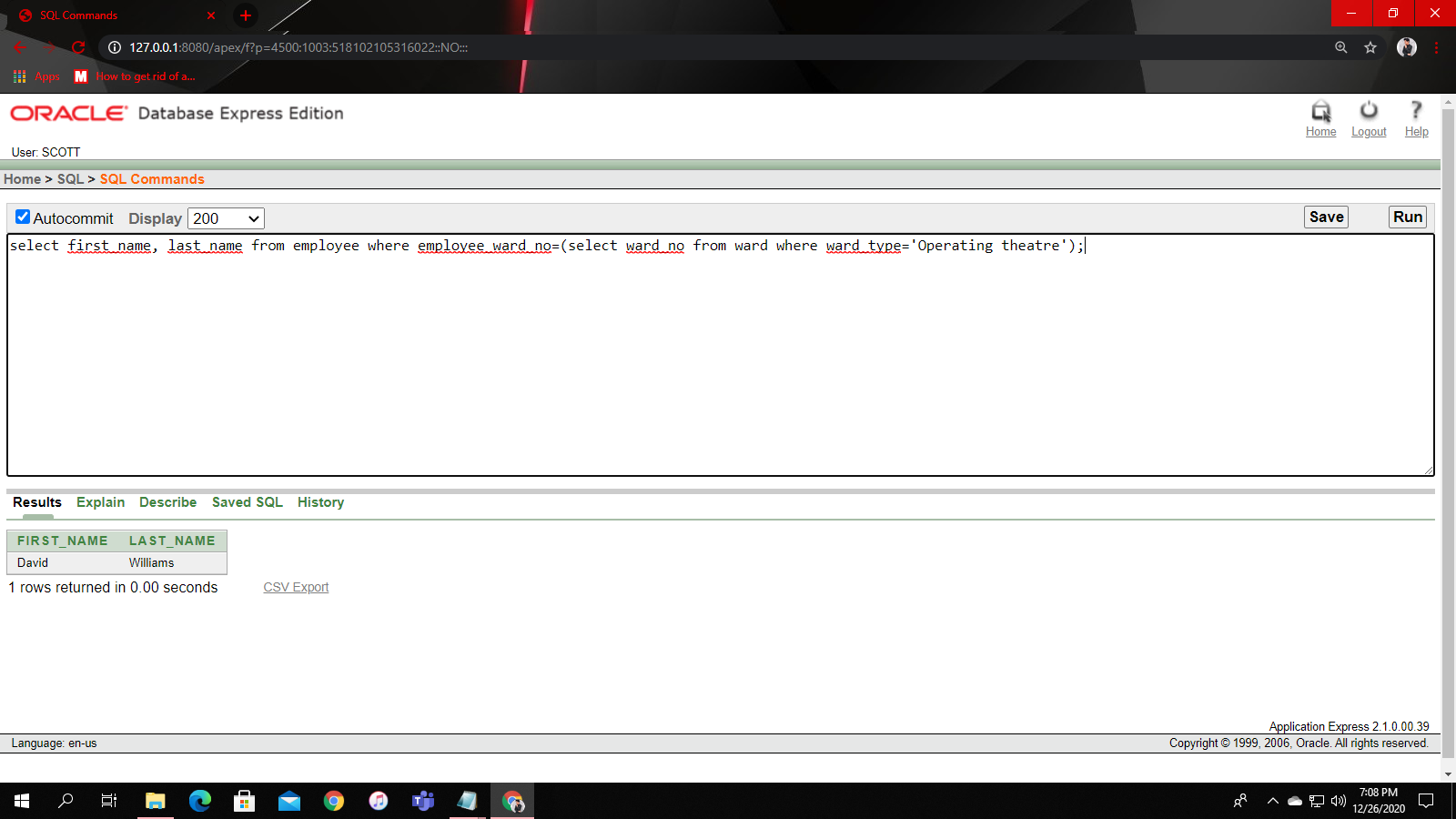


**Subquery:**

Without group function:

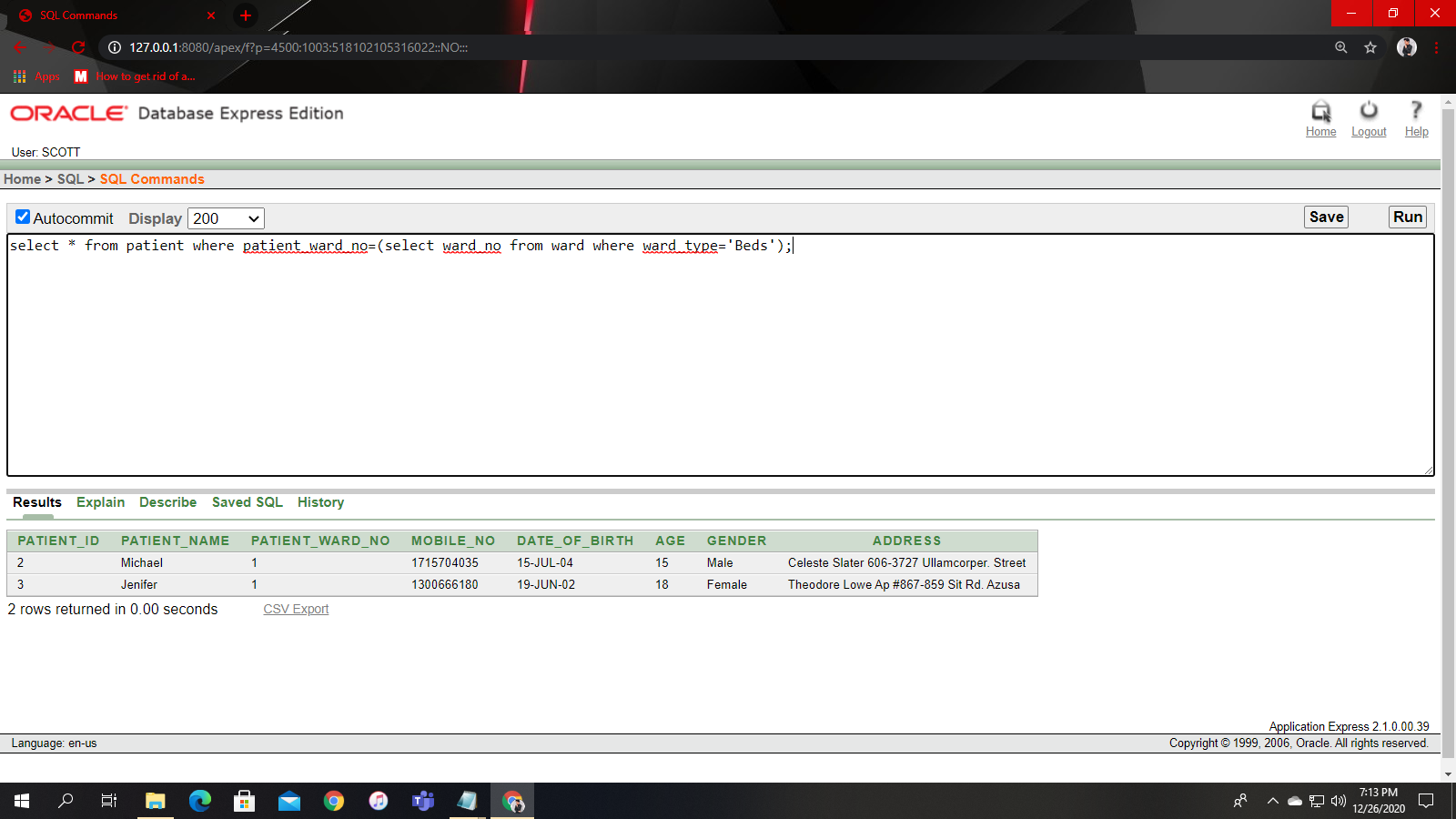
Q1. Show first name and last name of all employees who works in operating theatre.

Sol: select first\_name, last\_name from employee where employee\_ward\_no=(select ward\_no from ward where ward\_type='Operating theatre');



Q2. Show all patients who are in beds.

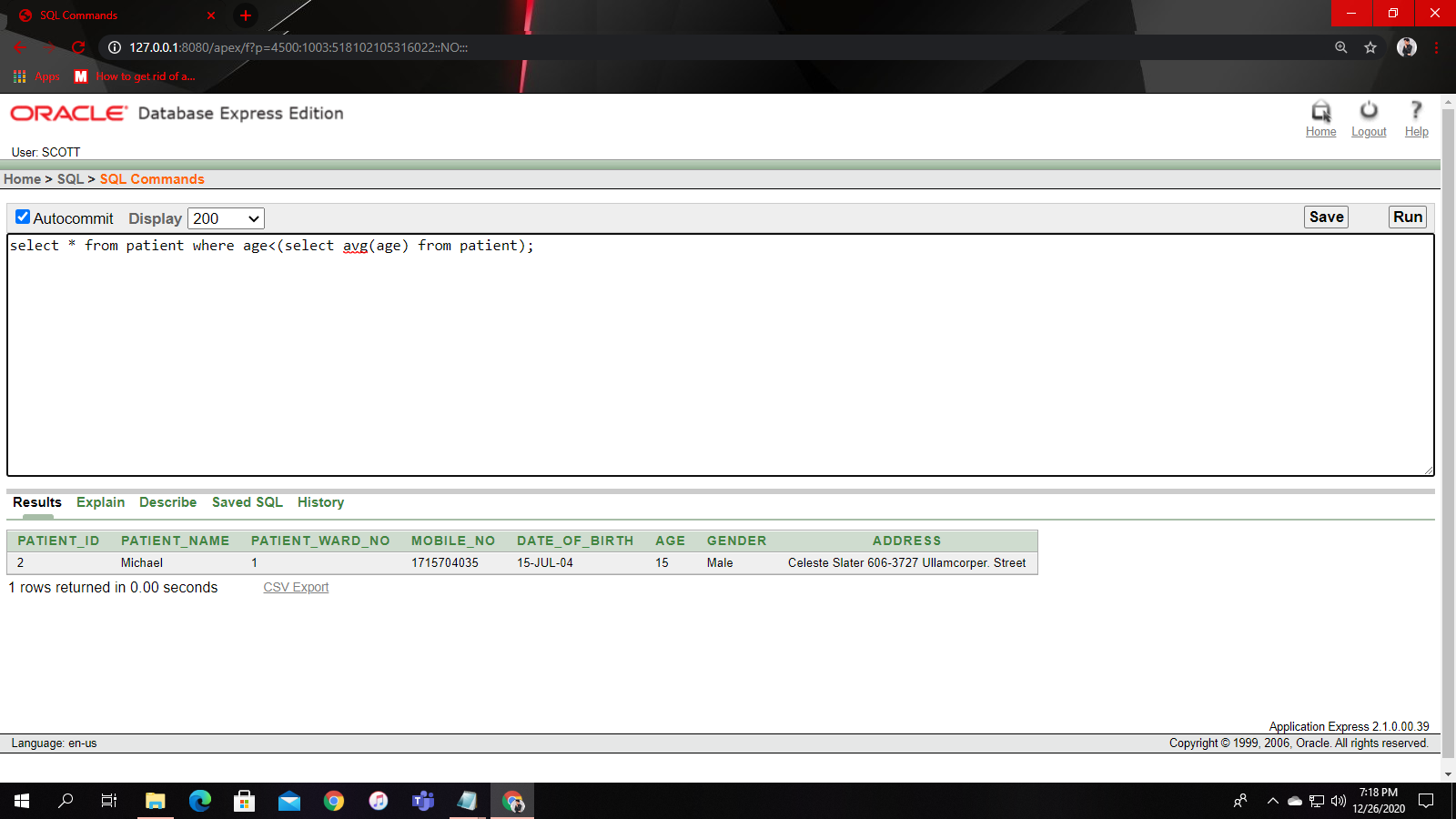
Sol: select \* from patient where patient\_ward\_no=(select ward\_no from ward where ward\_type='Beds');



With group function:

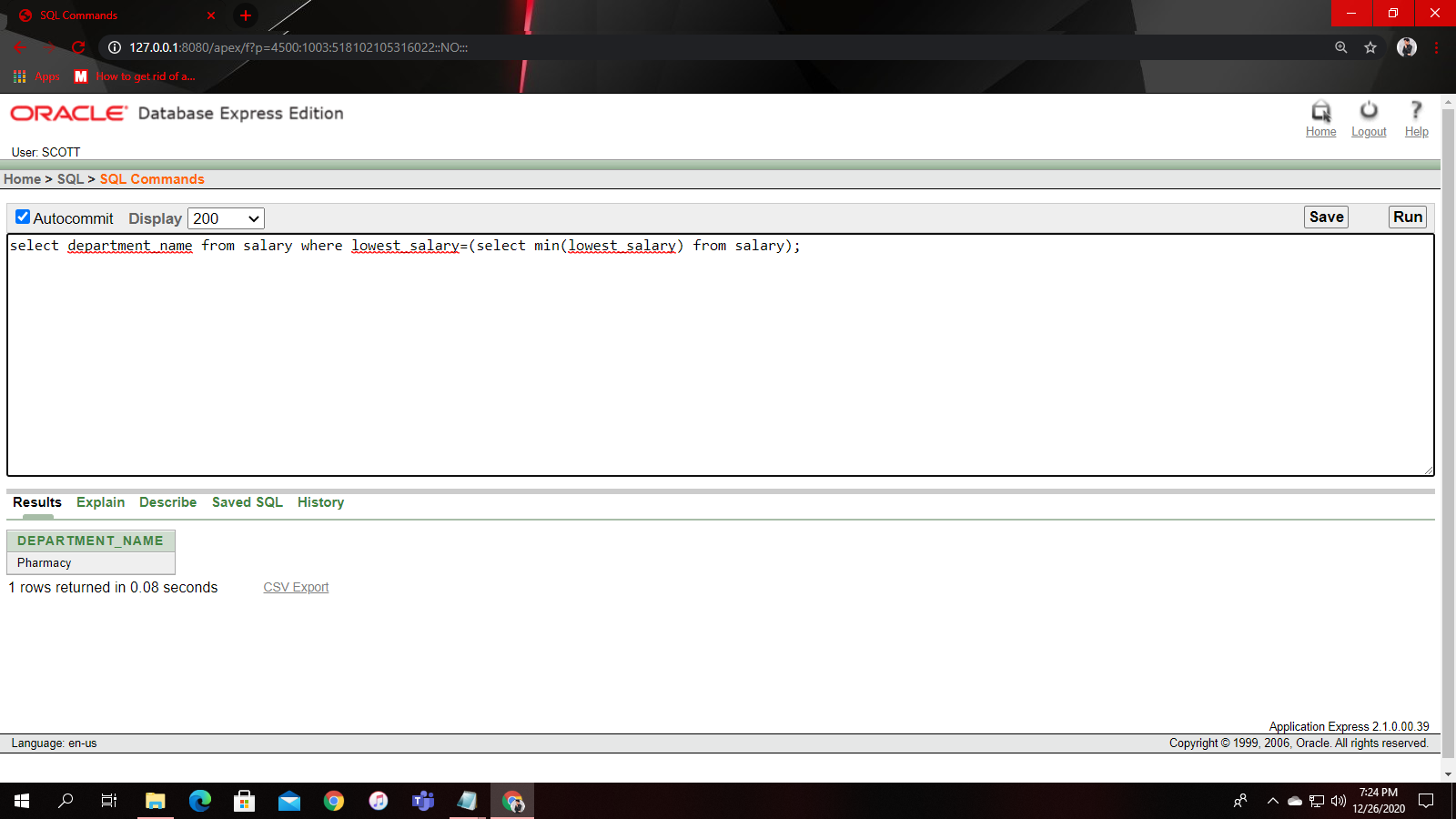
Q3. Display all the patients whose age are below less than the average age of all patients.

Sol: select \* from patient where age<(select avg(age) from patient);



Q4. Show the name of department which recerives lowest salary.

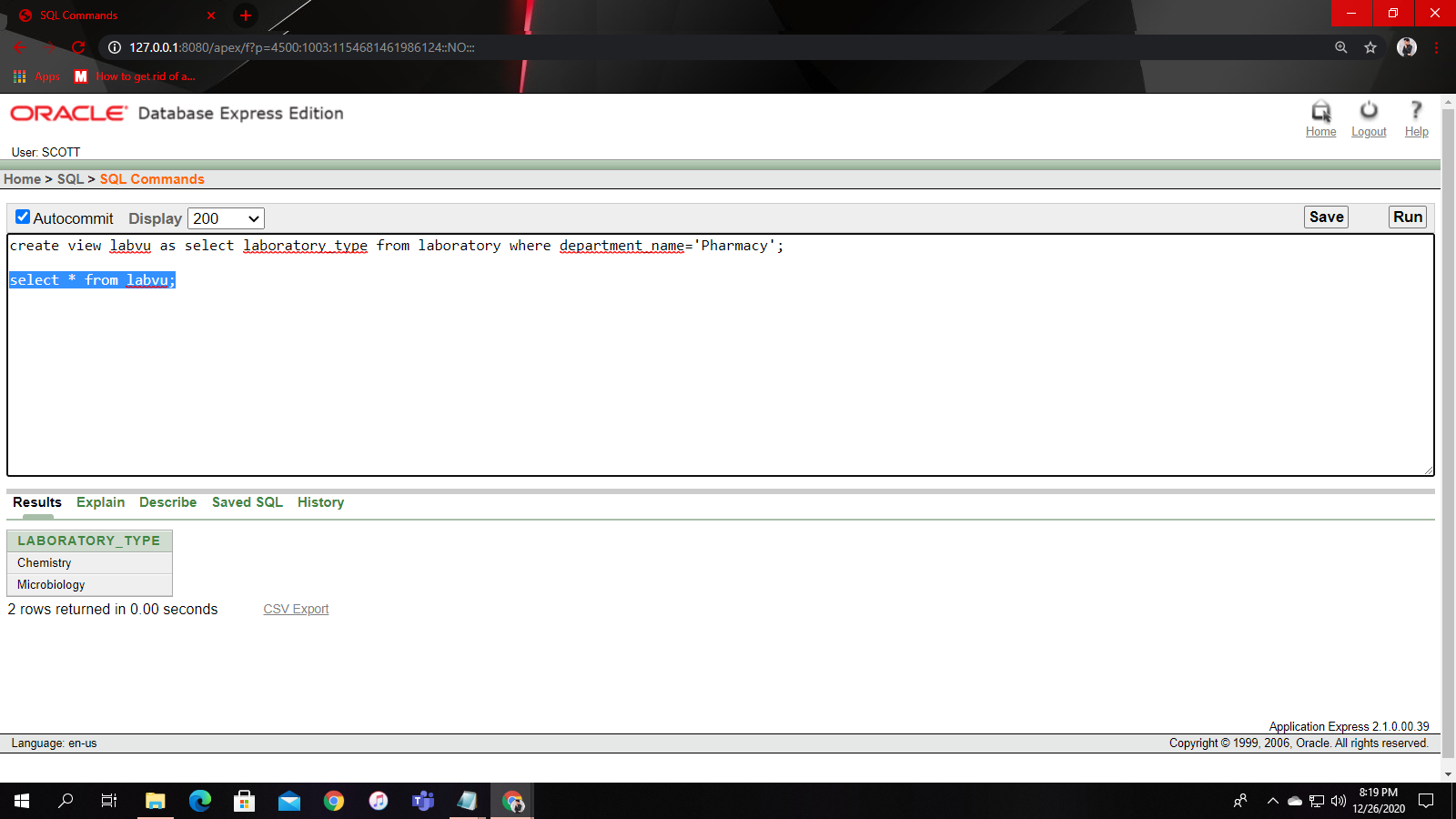
Sol: select department\_name from salary where lowest\_salary=(select min(lowest\_salary) from salary);



**View:**

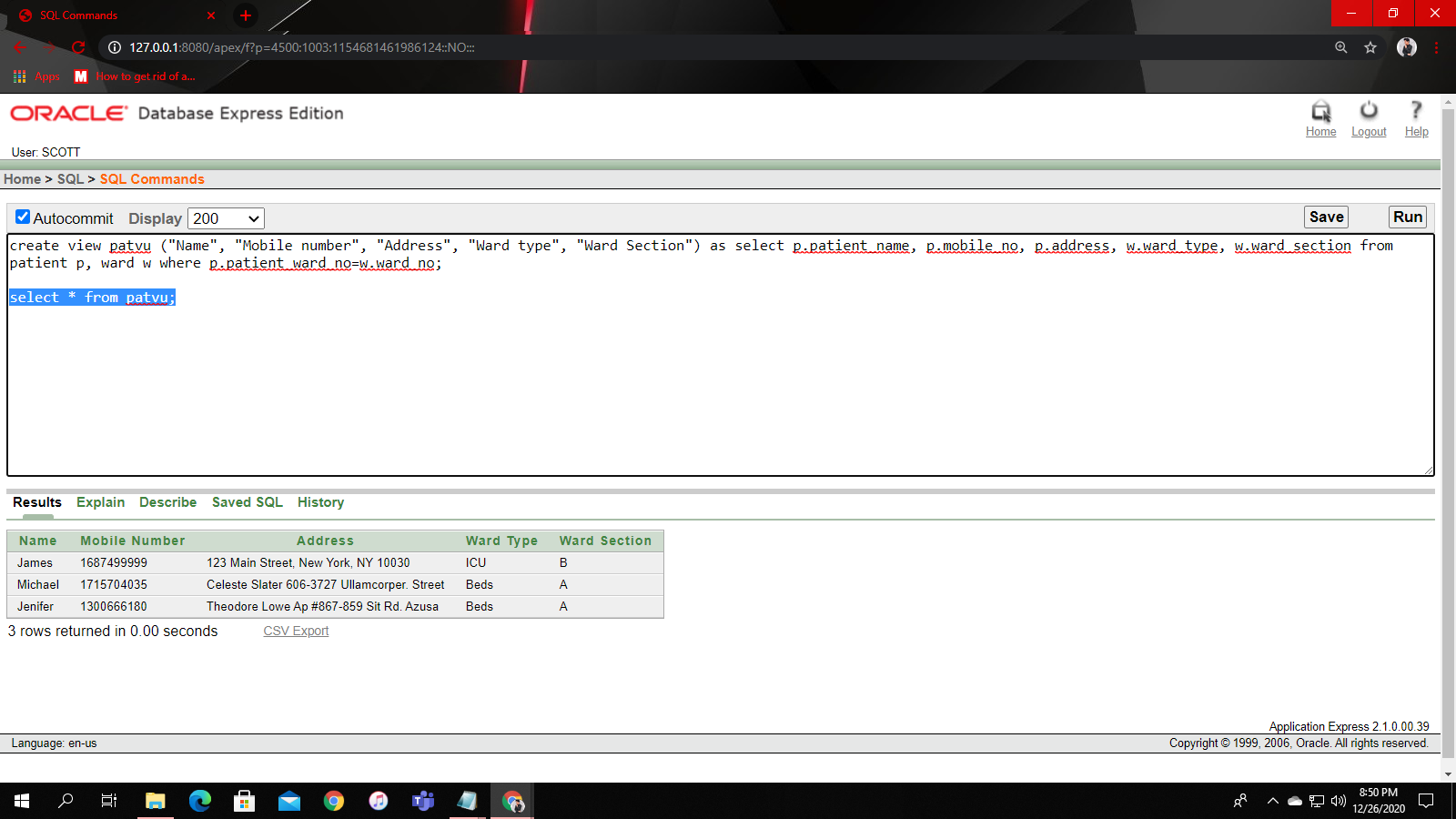
Simple:

create view labvu as select laboratory\_type from laboratory where department\_name='Pharmacy';



Complex:

create view patvu ("Name", "Mobile number", "Address", "Ward type", "Ward Section") as select p.patient\_name, p.mobile\_no, p.address, w.ward\_type, w.ward\_section from patient p, ward w where p.patient\_ward\_no=w.ward\_no;



**Add constraint:**

alter table payment modify payment\_amount default(0);

