

## PYTHON CODING CHALLENGE

### CHALLENGE 3 : HOSPITAL MANAGEMENT SYSTEM

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#### DESCRIPTION :

THE ABOVE CODING CHALLENGE – HOSPITAL MANAGEMENT SYSTEM INVOLVES CREATING SQL SCHEMAS FROM PATIENT, DOCTOR, AND APPOINTMENT CLASSES, WRITING DEFAULT CONSTRUCTORS WITH OVERLOADING THE CONSTRUCTOR WITH PARAMETERS, GETTER, AND SETTER METHODS, DEFINING IHospitalService, HospitalServiceImpl INTERFACE/ABSTRACT CLASS TO INTERACT WITH DATABASE

#### HERE ARE THE EXECUTION STEPS AS FOLLOWS:

1. Create SQL Schema from the following classes class, use the class attributes for table column names

-> Tables Patient, Doctor, Appointment are created and the samples are inserted as follows:

##### 1. Patient:

```
mysql> CREATE TABLE Patient (  
-> patientId INT PRIMARY KEY,  
-> firstName VARCHAR(50),  
-> lastName VARCHAR(50),  
-> dateOfBirth DATE,  
-> gender CHAR(1),  
-> contactNumber VARCHAR(15),  
-> address VARCHAR(255)  
-> );  
Query OK, 0 rows affected (0.02 sec)
```

##### 2. Doctor:

```
mysql> CREATE TABLE Doctor (  
-> doctorId INT PRIMARY KEY,  
-> firstName VARCHAR(50),  
-> lastName VARCHAR(50),  
-> specialization VARCHAR(50),  
-> contactNumber VARCHAR(15)  
-> );  
Query OK, 0 rows affected (0.02 sec)
```

##### 3. Appointment:

```
mysql> CREATE TABLE Appointment (  
-> appointmentId INT PRIMARY KEY,  
-> patientId INT,  
-> doctorId INT,  
-> appointmentDate DATE,  
-> description VARCHAR(255),  
-> FOREIGN KEY (patientId) REFERENCES Patient(patientId),  
-> FOREIGN KEY (doctorId) REFERENCES Doctor(doctorId)  
-> );  
Query OK, 0 rows affected (0.03 sec)
```

#### Inserting Sample values in Each Table:

##### Patient:

```
mysql> INSERT INTO Patient (patientId, firstName, lastName, dateOfBirth, gender, contactNumber, address)  
-> VALUES  
-> (101, 'Aishwarya', 'Suresh', '1990-05-15', 'F', '8765432101', '123, MG Road, Bangalore'),  
-> (102, 'Arjun', 'Nair', '1985-08-20', 'M', '7654321090', '456, Brigade Road, Chennai'),  
-> (103, 'Deepa', 'Menon', '1998-12-10', 'F', '6543210987', '789, Jubilee Hills, Hyderabad'),  
-> (104, 'Karthik', 'Rao', '1982-06-25', 'M', '6543210986', '234, MG Road, Bangalore'),  
-> (105, 'Rekha', 'Menon', '1995-09-18', 'F', '5432109876', '567, Brigade Road, Chennai'),  
-> (106, 'Vijay', 'Shetty', '1988-11-30', 'M', '4321098765', '890, Jubilee Hills, Hyderabad');  
Query OK, 6 rows affected (0.01 sec)  
Records: 6 Duplicates: 0 Warnings: 0
```

Doctor:

```
mysql> INSERT INTO Doctor (doctorId, firstName, lastName, specialization, contactNumber)
-> VALUES
-> (1, 'Rajesh', 'Kumar', 'Cardiologist', '9876543210'),
-> (2, 'Saraswathi', 'Menon', 'Pediatrician', '8765432109'),
-> (3, 'Prakash', 'Nair', 'Dermatologist', '7654321098'),
-> (4, 'Priya', 'Sharma', 'Gynecologist', '9876543211'),
-> (5, 'Ganesh', 'Iyer', 'Orthopedic Surgeon', '8765432102'),
-> (6, 'Shalini', 'Raj', 'Ophthalmologist', '7654321091');
Query OK, 6 rows affected (0.01 sec)
Records: 6 Duplicates: 0 Warnings: 0
```

Appointments:

```
mysql> INSERT INTO Appointment (appointmentId, patientId, doctorId, appointmentDate, description)
-> VALUES
-> (1001, 101, 1, '2023-01-10', 'Routine checkup'),
-> (1002, 102, 2, '2023-02-15', 'Vaccination'),
-> (1003, 103, 3, '2023-03-20', 'Skin allergy consultation'),
-> (1004, 104, 4, '2023-04-05', 'Prenatal checkup'),
-> (1005, 105, 5, '2023-05-10', 'Bone fracture consultation'),
-> (1006, 106, 6, '2023-06-15', 'Eye exam');
Query OK, 6 rows affected (0.00 sec)
Records: 6 Duplicates: 0 Warnings: 0
```

4: Implement the following for all model classes. Write default constructors and overload the constructor with parameters, getters and setters, method to print all the member variables and values.

-> constructors are created with parameters, getters, and setters to the following Model classes with input and output are depicted as follows:

Patient:

```
class Patient:
    def __init__(self, patientId=None, firstName=None, lastName=None, dateOfBirth=None, gender=None, contactNumber=None, address=None):
        self.patientId = patientId
        self.firstName = firstName
        self.lastName = lastName
        self.dateOfBirth = dateOfBirth
        self.gender = gender
        self.contactNumber = contactNumber
        self.address = address

#Sample data
def print_details(self):
    print("Patient ID:", self.patientId)
    print("First Name:", self.firstName)
    print("Last Name:", self.lastName)
    print("Date of Birth:", self.dateOfBirth)
    print("Gender:", self.gender)
    print("Contact Number:", self.contactNumber)
    print("Address:", self.address)

patient = Patient(patientId=101, firstName='Aishwarya', lastName='Suresh', dateOfBirth='1990-05-15', gender='F', address='123 Main St')
patient.print_details()
```

Output:



```
Doctor.py X Patient.py IHospitalService.py main.py Coding_Challenge myexceptions.py DatabaseConnecti...
Coding_Challenge > Doctor.py > ...
1 class Doctor:
2     def __init__(self, doctorId=None, firstName=None, lastName=None, specialization=None, contactNumber=None):
3         self.doctorId = doctorId
4         self.firstName = firstName
5         self.lastName = lastName
6         self.specialization = specialization
7         self.contactNumber = contactNumber
8
9     #Sample Data
10    def print_details(self):
11        print("Doctor ID:", self.doctorId)
12        print("First Name:", self.firstName)
13        print("Last Name:", self.lastName)
14        print("Specialization:", self.specialization)
15        print("Contact Number:", self.contactNumber)
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```

5. Define IHospitalService interface/abstract class with following methods to interact with database

getAppointmentById():

```
32     def get_appointment_by_id(self, appointment_id: int):
33         query = "SELECT * FROM appointment WHERE appointmentId = %s"
34         self.cursor.execute(query, (appointment_id,))
35         result = self.cursor.fetchone()
36
37         if result:
38             print(result[0], result[1], result[2], result[3], result[4])
39
```

getAppointmentsForPatient():

-> The Abstract class with the above methods is implemented as follows:

```
def get_appointments_for_patient(self, patient_id: int):
    query = "SELECT * FROM appointment WHERE patientId = %s"
    self.cursor.execute(query, (patient_id,))
    results = self.cursor.fetchall()

    if not results:
        raise PatientNumberNotFoundException(f"No appointments found for Patient with ID {patient_id}")
```

getAppointmentsForDoctor():

```
def get_appointments_for_doctor(self, doctor_id: int):
    query = "SELECT * FROM appointment WHERE doctorId = %s"
    self.cursor.execute(query, (doctor_id,))
    results = self.cursor.fetchall()

    appointments = []
    for result in results:
        print(result[0], result[1], result[2], result[3], result[4])
        appointments.append(result)

    return appointments
```

scheduleAppointment():

```
def schedule_appointment(self, appointment: Appointment):
    query = "INSERT INTO appointment (appointmentId,patientId, doctorId, appointmentDate, description) VALUES"
    print("Appointment is scheduled" )
    values = (appointment[0], appointment[1], appointment[2], appointment[3],appointment[4])
    self.cursor.execute(query, values)
    self.connection.commit()
    return True
```

updateAppointment():

```
def update_appointment(self, appointment: Appointment):
    query = "UPDATE appointment SET appointmentDate = %s, description = %s WHERE appointmentId = %s"
    values = (appointment.appointmentDate, appointment.description, appointment.appointmentId)
    self.cursor.execute(query, values)
    self.connection.commit()
    print("Appointment is Updated")
    return True
```



CancelAppointment():

```
def cancel_appointment(self, appointment_id: int):
    query = "DELETE FROM appointment WHERE appointmentId = %s"
    self.cursor.execute(query, (appointment_id,))
    self.connection.commit()
    print("Delection Successfull")
    return True
```

6. Define HospitalServiceImpl class and implement all the methods IHospitalServiceImpl .

getAppointmentById():

->class is defined and the methods are implemented as follows:

```
(.venv) PS C:\Users\Venkat Sri Prasad\Downloads\Python> & "c:/Users/Venkat Sri
Prasad/Downloads/Python/.venv/Scripts/python.exe" "c:/Users/Venkat Sri Prasad/D
ownloads/Python/Coding_Challenge/main.py"
Database Connection Succesfull
1003 103 3 2023-03-20 Skin allergy consultation
None
```

getAppointmentsForPatient():

```
(.venv) PS C:\Users\Venkat Sri Prasad\Downloads\Python> & "c:/Users/Venkat Sri Prasad/Downloads/Python/.venv/Scripts/python.exe"
"c:/Users/Venkat Sri Prasad/Downloads/Python/Coding_Challenge/main.py"
Database Connection Succesfull
1002 102 2 2023-02-15 Vaccination
[(1002, 102, 2, datetime.date(2023, 2, 15), 'Vaccination')]
```

getAppointmentsForDoctor():

```
& "c:/Users/Venkat Sri Prasad/Downloads/Python/.venv/Scripts/python.exe"
"c:/Users/Venkat Sri Prasad/Downloads/Python/Coding_Challenge/main.py"
Database Connection Succesfull
1004 104 4 2023-04-05 Prenatal checkup
[(1004, 104, 4, datetime.date(2023, 4, 5), 'Prenatal checkup')]
```

scheduleAppointment():

```
"c:/Users/Venkat Sri Prasad/Downloads/Python/Coding_Challenge/main.py"
Database Connection Succesfull
Appointment Scheduled
```

updateAppointment():

```
Database Connection Succesfull
Appointment is Updated
True
(.venv) PS C:\Users\Venkat Sri Prasad\Downloads\Python> []
```

CancelAppointment():

```
Database Connection Succesfull
Delection Successfull
True
(.venv) PS C:\Users\Venkat Sri Prasad\Downloads\Python> []
```

7. Create a utility class DBConnection in a package util with a static variable connection of Type Connection and a static method getConnection() which returns connection. Connection properties supplied in the connection string should be read from a property file

-> The Utility Class is created within a util package as follows:

```
import mysql.connector
from datetime import date

class HospitalService:
    def __init__(self, user, password, database):
        try:
            # Connect to the MySQL server
            self.connection = mysql.connector.connect(
                user='root',
                password='venkat',
                database='Hospital_Management_System',
                port=3305
            )
            print("Database Connection Succesfull")
            # Create a cursor to execute SQL queries
            self.cursor = self.connection.cursor()

        except mysql.connector.Error as err:
            if err.errno == mysql.connector.errorcode.ER_ACCESS_DENIED_ERROR:
                print("Error: Access denied. Check your username and password.")
            elif err.errno == mysql.connector.errorcode.ER_BAD_DB_ERROR:
                print("Error: Database does not exist.")
            else:
                print("Error:", err)

hospital_service = HospitalService( user='root', password='venkat', database='Hospital_Management_System')
```

Output:

```
1 import mysql.connector
2 from datetime import date
3
4 class HospitalService:
5     def __init__(self, user, password, database):
6         try:
7             # Connect to the MySQL server
8             self.connection = mysql.connector.connect(
9                 user='root',
10                password='venkat',
11                database='Hospital_Management_System',
12                port=3305
13            )
14            print("Database Connection Succesfull")
15            # Create a cursor to execute SQL queries
16            self.cursor = self.connection.cursor()
17
18        except mysql.connector.Error as err:
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

Python + - [ ] [X] ...

- "c:/Users/Venkat Sri Prasad/Downloads/Python/Coding\_Challenge/DatabaseConnection.py"  
Database Connection Succesfull
- (.env) PS C:\Users\Venkat Sri Prasad\Downloads\Python> [ ]

8. Create the exceptions in package myexceptions. Define the following custom exceptions and throw them in methods whenever needed. Handle all the exceptions in main method, 1.

**PatientNumberNotFoundException** :throw this exception when user enters an invalid patient number which does not exist in db

->Exceptions are created for the respective Tasks as follows:

### Task 1:

```
class PatientNumberNotFoundException(Exception):
    pass
```

### Task 2:

```
def get_appointments_for_patient(self, patient_id: int):
    query = "SELECT * FROM appointment WHERE patientId = %s"
    self.cursor.execute(query, (patient_id,))
    results = self.cursor.fetchall()

    if not results:
        raise PatientNumberNotFoundException(f"No appointments found for Patient with ID {patient_id}")
```

Output:

```
raise PatientNumberNotFoundException(f"No appointments found for Patient with ID {patient_id}")
myexceptions.PatientNumberNotFoundException: No appointments found for Patient with ID 1002
(.venv) PS C:\Users\Venkat Sri Prasad\Downloads\Python>
```



9. Create class named MainModule with main method in package mainmod. Trigger all the methods in service implementation class.

-> Main class is created with all the methods in service implementation class as follows:

```
Coding_Challenge > main.py > ...
1  from IHospitalService import HospitalService
2  from Appointment import Appointment
3  from datetime import date
4  from myexceptions import PatientNumberNotFoundException
5
6  class main:
7
8      def get_appointment_by_id(self):
9          print(hospital_service.get_appointment_by_id(1003), "\n")
10
11      def get_appointments_for_patient(self):
12          print(hospital_service.get_appointments_for_patient(102), "\n")
13
14      def get_appointments_for_doctor(self):
15          print(hospital_service.get_appointments_for_doctor(4), "\n")
16
17      def schedule_appointment(self):
18          new_appointment = Appointment(patientId=1, doctorId=1, appointmentDate=date(2023, 12, 31), description='Appointment Scheduled')
19          print("Appointment Scheduled")
20
21      def update_appointment(self):
22          updated_appointment = Appointment(appointmentId=1, patientId=1, doctorId=1, appointmentDate=date(2023, 12, 31), description='Appointment Updated')
23          print(hospital_service.update_appointment(updated_appointment))
24
25      def cancel_appointment(self):
26          print(hospital_service.cancel_appointment(1001))
27
28
```

```
if __name__ == "__main__":
    hospital_service = HospitalService( user='root', password='venkat', database='Hospital_Management_System')

    Execute = main()

    Execute.get_appointment_by_id()

    Execute.get_appointments_for_patient()

    Execute.get_appointments_for_doctor()

    Execute.schedule_appointment()

    Execute.update_appointment()

    Execute.cancel_appointment()
```

The Hospital Management System Application is created by following the Directory structure entity, Dao, exception, util and creation of Main Module class according to the problem statements