Assignment 2

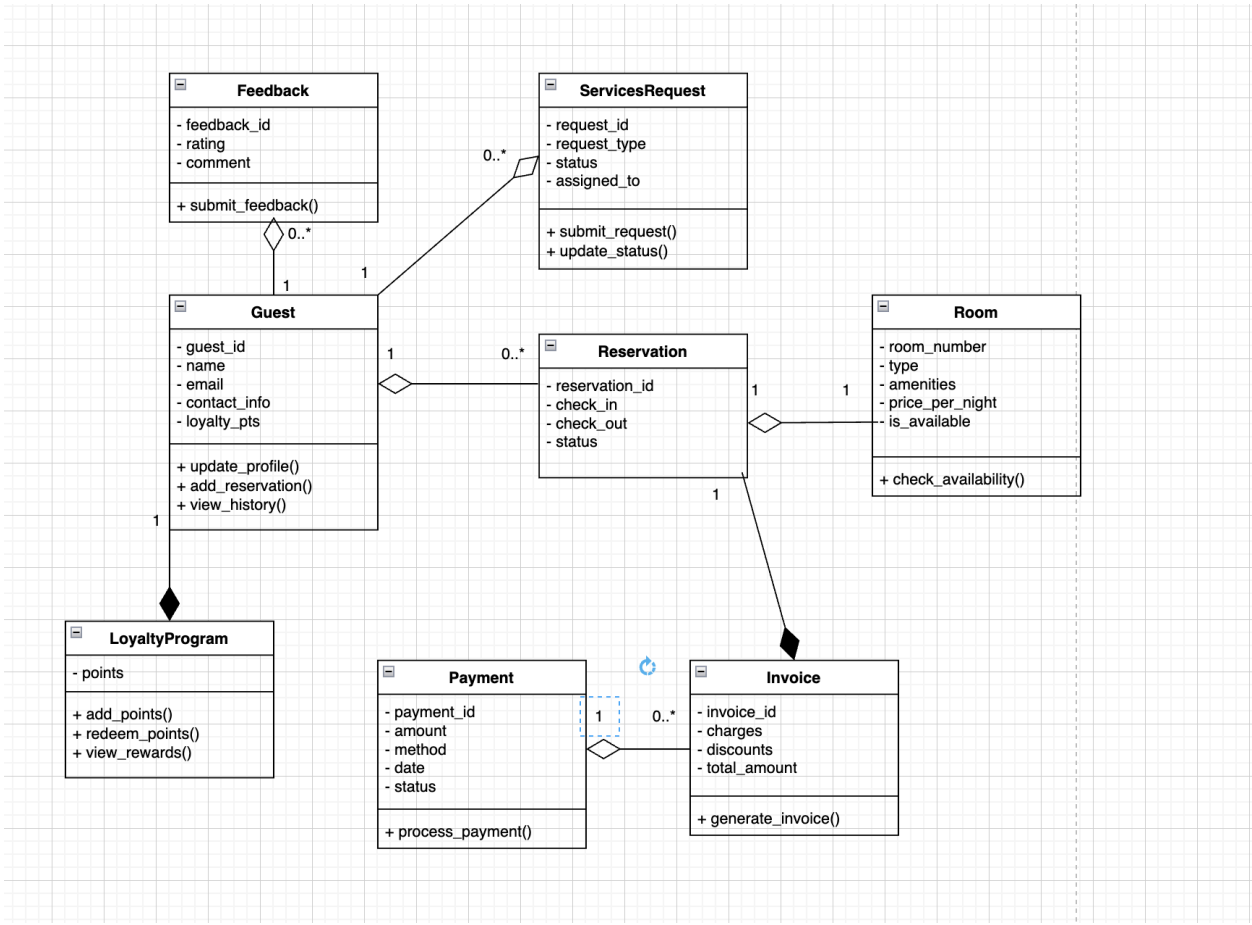
ICS220 > 22111 Program. Fund. >

Zayed University

Sultan Allanjawi / 202307697

Prof: Sujith Mathew

UML Diagram:



In this UML diagram, I have shown how the hotel system works. I have different classes like Guest, Room, Reservation, Payment, and Feedback. Each class has its own details and actions. For example, a Guest can make a reservation, request services, and earn loyalty points. The lines between the classes show how they're connected. This setup makes it easier to manage bookings, payments, and guest services in the system.

Code:

```
class Room:
    """Represents a hotel room with specific details."""
```

```
    def __init__(self, room_number, room_type, amenities, price_per_night,
is_available=True):
        self.__room_number = room_number
        self.__type = room_type
        self.__amenities = amenities
        self.__price_per_night = price_per_night
        self.__is_available = is_available

    # Getters and Setters
    def get_room_number(self):
        return self.__room_number

    def set_room_number(self, room_number):
        self.__room_number = room_number

    def get_type(self):
        return self.__type

    def set_type(self, room_type):
        self.__type = room_type

    def get_amenities(self):
        return self.__amenities

    def set_amenities(self, amenities):
        self.__amenities = amenities

    def get_price_per_night(self):
        return self.__price_per_night

    def set_price_per_night(self, price):
        self.__price_per_night = price

    def is_available(self):
        return self.__is_available

    def set_availability(self, availability):
        self.__is_available = availability

    def __str__(self):
```

```
        return f"Room {self.__room_number} ({self.__type}) - {'Available' if self.__is_available else 'Booked'}"


class Guest:
    """Represents a hotel guest."""
    def __init__(self, guest_id, name, email, contact_info):
        self.__guest_id = guest_id
        self.__name = name
        self.__email = email
        self.__contact_info = contact_info
        self.__loyalty_pts = 0
        self.__reservations = []

    # Getters and Setters
    def get_guest_id(self):
        return self.__guest_id

    def set_guest_id(self, guest_id):
        self.__guest_id = guest_id

    def get_name(self):
        return self.__name

    def set_name(self, name):
        self.__name = name

    def get_email(self):
        return self.__email

    def set_email(self, email):
        self.__email = email

    def get_contact_info(self):
        return self.__contact_info

    def set_contact_info(self, contact_info):
        self.__contact_info = contact_info

    def get_loyalty_pts(self):
```

```
        return self.__loyalty_pts

    def set_loyalty_pts(self, pts):
        self.__loyalty_pts = pts

    def get_reservations(self):
        return self.__reservations

    def update_profile(self, name=None, email=None, contact_info=None):
        if name: self.__name = name
        if email: self.__email = email
        if contact_info: self.__contact_info = contact_info

    def add_reservation(self, reservation):
        self.__reservations.append(reservation)

    def view_history(self):
        return self.__reservations

    def __str__(self):
        return f"Guest: {self.__name}, Email: {self.__email}"


class Reservation:
    """Represents a reservation made by a guest for a specific room."""
    def __init__(self, reservation_id, guest, room, check_in, check_out):
        self.__reservation_id = reservation_id
        self.__guest = guest
        self.__room = room
        self.__check_in = check_in
        self.__check_out = check_out
        self.__status = "Pending"

    # Getters and Setters
    def get_reservation_id(self):
        return self.__reservation_id

    def set_reservation_id(self, rid):
        self.__reservation_id = rid
```

```
    def get_guest(self):
        return self.__guest

    def get_room(self):
        return self.__room

    def get_check_in(self):
        return self.__check_in

    def set_check_in(self, check_in):
        self.__check_in = check_in

    def get_check_out(self):
        return self.__check_out

    def set_check_out(self, check_out):
        self.__check_out = check_out

    def get_status(self):
        return self.__status

    def set_status(self, status):
        self.__status = status

    def calculate_total(self):
        nights = (self.__check_out - self.__check_in).days
        return nights * self.__room.get_price_per_night()

    def confirm_reservation(self):
        self.__status = "Confirmed"
        self.__room.set_availability(False)

    def cancel_reservation(self):
        self.__status = "Cancelled"
        self.__room.set_availability(True)

    def __str__(self):
        return f"Reservation {self.__reservation_id}: {self.__status}"
```

```python
class Invoice:
    """Represents an invoice for a reservation."""
    def __init__(self, invoice_id, reservation, charges=None, discounts=0):
        self.__invoice_id = invoice_id
        self.__reservation = reservation
        self.__charges = charges if charges else []
        self.__discounts = discounts
        self.__total_amount = 0

    # Getters and Setters
    def get_invoice_id(self):
        return self.__invoice_id

    def get_total_amount(self):
        return self.__total_amount

    def get_discounts(self):
        return self.__discounts

    def set_discounts(self, amount):
        self.__discounts = amount

    def add_charge(self, charge):
        self.__charges.append(charge)

    def generate_invoice(self):
        base = self.__reservation.calculate_total()
        extra = sum(self.__charges)
        self.__total_amount = base + extra - self.__discounts
        return self.__total_amount

    def __str__(self):
        return f"Invoice {self.__invoice_id} - Total:
${self.__total_amount}"


class Payment:
    """Represents a payment transaction."""
    def __init__(self, payment_id, amount, method, date):
        self.__payment_id = payment_id
```

```
        self.__amount = amount
        self.__method = method
        self.__date = date
        self.__status = "Pending"

    # Getters and Setters
    def get_payment_id(self):
        return self.__payment_id

    def get_amount(self):
        return self.__amount

    def set_amount(self, amt):
        self.__amount = amt

    def get_method(self):
        return self.__method

    def set_method(self, method):
        self.__method = method

    def get_date(self):
        return self.__date

    def set_date(self, d):
        self.__date = d

    def get_status(self):
        return self.__status

    def process_payment(self):
        self.__status = "Paid"

    def __str__(self):
        return f"Payment {self.__payment_id} - {self.__status} via
{self.__method}"


class LoyaltyProgram:
    """Manages the loyalty points of a guest."""
```

```
    def __init__(self):
        self.__points = 0

    def get_points(self):
        return self.__points

    def add_points(self, points):
        self.__points += points

    def redeem_points(self, amount):
        if amount <= self.__points:
            self.__points -= amount
            return True
        return False

    def view_rewards(self):
        return self.__points

    def __str__(self):
        return f"Loyalty Points: {self.__points}"


class ServiceRequest:
    """Represents a guest's service request (e.g., housekeeping)."""
    def __init__(self, request_id, guest, request_type):
        self.__request_id = request_id
        self.__guest = guest
        self.__request_type = request_type
        self.__status = "Pending"
        self.__assigned_to = None

    # Getters and Setters
    def get_request_id(self):
        return self.__request_id

    def get_guest(self):
        return self.__guest

    def get_request_type(self):
        return self.__request_type
```

```
    def get_status(self):
        return self.__status

    def get_assigned_to(self):
        return self.__assigned_to

    def set_assigned_to(self, staff):
        self.__assigned_to = staff

    def submit_request(self):
        self.__status = "Submitted"

    def update_status(self, new_status):
        self.__status = new_status

    def __str__(self):
        return f"ServiceRequest {self.__request_id} - {self.__request_type}
[{self.__status}]"


class Feedback:
    """Stores guest feedback about their stay."""
    def __init__(self, feedback_id, guest, rating, comment):
        self.__feedback_id = feedback_id
        self.__guest = guest
        self.__rating = rating
        self.__comment = comment

    # Getters and Setters
    def get_feedback_id(self):
        return self.__feedback_id

    def get_guest(self):
        return self.__guest

    def get_rating(self):
        return self.__rating

    def set_rating(self, rating):
```

```
        self.__rating = rating

    def get_comment(self):
        return self.__comment

    def set_comment(self, comment):
        self.__comment = comment

    def submit_feedback(self):
        return f"Feedback {self.__feedback_id} submitted with rating
{self.__rating}"

    def __str__(self):
        return f"Feedback: {self.__rating}/5 - {self.__comment}"
```

Test cases:

Test case 1

```
from datetime import date

# Create guest and room
guest1 = Guest("1", "Sultan Allanjawi", "Sultan@gmail.com", "055-444-444")
room1 = Room("101", "Suite", ["Wi-Fi", "TV", "snacks"], 150.0)

# Create reservation
reservation1 = Reservation("R1", guest1, room1, date(2025, 4, 1),
date(2025, 4, 4))
guest1.add_reservation(reservation1)
reservation1.confirm_reservation()

print(guest1)
print(room1)
print(reservation1)
```

Output:

Guest: Sultan Allanjawi, Email: Sultan@gmail.com
Room 101 (Suite) - Booked
Reservation R1: Confirmed

Test case 2

```
# Create invoice for the reservation
invoice1 = Invoice("Inv1", reservation1, charges=[20, 30], discounts=25)
total = invoice1.generate_invoice()

# Make payment
payment1 = Payment("P1", total, "Credit Card", date(2025, 3, 27))
payment1.process_payment()

print(invoice1)
print(payment1)
```

Output:

Invoice Inv1 - Total: $475.0
Payment P1 - Paid via Credit Card

Test case 3

```
# Guest submits feedback
feedback1 = Feedback("F1", guest1, 5, "Amazing place, very clean and great
service!")
print(feedback1.submit_feedback())
print(feedback1)

# Guest requests room service
service_request1 = ServiceRequest("S1", guest1, "Room Cleaning")
service_request1.submit_request()
service_request1.update_status("In Progress")
```

```
print(service_request1)
```

Output:

Feedback F1 submitted with rating 5
Feedback: 5/5 - Amazing place, very clean and great service!
ServiceRequest S1 - Room Cleaning [In Progress]

Test case 4

```
# Create a guest and room
guest2 = Guest("2", "Sultan Allanjawi", "Sultan@gmail.com", "055-444-444")
room2 = Room("102", "Double", ["Wi-Fi", "TV"], 120.0)

# Create and confirm a reservation
reservation2 = Reservation("R2", guest2, room2, date(2025, 4, 5),
date(2025, 4, 7))
guest2.add_reservation(reservation2)
reservation2.confirm_reservation()

# Cancel the reservation
reservation2.cancel_reservation()

# Generate a refund invoice (simulate by using a negative invoice)
invoice2 = Invoice("Inv2", reservation2, charges=[], discounts=0)
refunded_amount = invoice2.generate_invoice()  # Should still calculate
value, but treat it as refund

print(reservation2)
print(f"Refund Processed: ${refunded_amount}")
print(room2)  # Room should now be available again
```

Output:

Reservation R2: Cancelled
Refund Processed: $240.0
Room 102 (Double) - Available

Test case 5

```
# Create a guest and two rooms
guest3 = Guest("3", "Sultan Allanjawi", "Sultan@gmail.com", "055-444-444")
room3a = Room("103", "Single", ["Wi-Fi"], 90.0)
room3b = Room("104", "Suite", ["Wi-Fi", "TV", "Mini-bar"], 200.0)

# Create and confirm two reservations
res1 = Reservation("R3", guest3, room3a, date(2025, 5, 1), date(2025, 5,
3))
res2 = Reservation("R4", guest3, room3b, date(2025, 6, 1), date(2025, 6,
4))
res1.confirm_reservation()
res2.confirm_reservation()

guest3.add_reservation(res1)
guest3.add_reservation(res2)

# Display reservation history
print(f"Reservation History for {guest3}")
for r in guest3.view_history():
   print(r)
```

Output:

Reservation History for Guest: Sultan Allanjawi, Email: Sultan@gmail.com
Reservation R3: Confirmed
Reservation R4: Confirmed

Summary of learning:

In this assignment, I learned how to create a UML class diagram and convert it into actual Python code. Through this assignment I practiced implementing object-oriented programming by using classes and

objects alongside aggregation and composition relationships. I also discovered how to create test cases and structure code in a clear way.

Github Link:

https://github.com/SultanAllanjawi/Assignment-2-programming-fundamental-