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COMP1216. Software Modelling and Design (2023-24)

Group 13: Dental Appointment Management System

Submission date: 15 March 2024

1 Introduction

Group Contributions:
Samuel Nugent - The class diagram and wrote up the Scope, also managed group organisation.
Samuel Hunt - Wrote up the scenario, the use case description and made the sequence diagram for the alternate scenario created by the group (Scenario 2).
Joseph Jewell - (Alert System Scenario 1), (Alert System UML Use case description 1), (Alert System UML Sequence diagram 1).
James Caldow - Use Case Diagram and State Machine Diagram
Chak Tim Lam - Activity Diagram
The whole group contributed to creating the scope.

Interpretations made from the specification: The system automatically blocks invalid appointments as shown by the extensions in the use case diagram. The system automatically assigns dentists from a dentist practice for appointments. Admins block appointments by treatment, however, the limit for the amount of stock left of a consumable which causes treatments to be blocked is handled by the system so that there is sufficient consumables left to complete already booked appointments and only blocks future appointments.

2 Scope

Need People need dental care and need to be able to book and manage their own appointments when they need to. Sometimes people are unable to reach the reception of a dental practice or call during working hours. It can also be hard to manually keep track of inventory at a dental practice.

Goals To make a system which allows patients to book and manage their appointments and to allow a dental practice to manage their appointments, staff and inventory.

Business Case It makes the quality of life better for patients as it will be easier to book and manage appointments so they are more likely to get the dental care that they need. It also allows the dental practice to better keep records of appointments. If more patients find it easier to book an appointment then they will provide treatments more frequently so they will earn more money as a dental practice. By keeping track of consumables it means dental practices are more likely to have consumables when they need them, so won't run out, and practices are less likely to have an excess of perishable items.

Stakeholders The NHS, the administrator, the dentists, the patients, the consumable supplier

High-level Operational Concepts Patients can book appointments but the system can block the booking if it does not meet all the required criteria for that appointment. Administrators can block appointments for certain treatments. Dentists can input consumables used for treatments given to a patient. Administrators can manage the stock of consumables and dentists.

Successful Criteria Increase in the number of appointments booked. Increase the percentage of appointments which are attended. Minimise the number of appointments which are blocked due to a lack of consumables.

3 Scenarios

3.1 Scenario 1. Consumables Alert System

Actors: Dentist: Joe, Administrator: Amy

1. Joe uses 2 masks and 2 fillers on an appointment and activates the System on his computer.
2. The "System" prompts Joe to input a value for each type of consumable used.
3. Joe submits the quantity of masks and filler used to the System.
4. The System updates the quantity of masks and filler in the dental practice and checks if the consumables are below their respective threshold limits.
5. Quantity of masks and filler falls below their limits and the System sends an alert to Amy with a report saying "Multiple consumables are below limit!".
6. Amy receives this notification and blocks future appointments for filling treatments.
7. System will alert Amy after every appointment if the consumables threshold continues to stay below its limit.

3.2 Scenario 2. Dentist Retires from Practice

Actors: Terry: Retiring Dentist, Rachel: Replacement Dentist, Jamie: Administrator, Mary: Patient

1. Terry retires.
2. Terry's details are removed from the system by Jamie.
3. Jamie adjusts the working days and hours to reflect that Terry has left.
4. Jamie hires Rachel.
5. Jamie adjusts the working days and hours to reflect that Rachel has joined.
6. Mary and other patients are now able to book appointments with Rachel.

4 Use Cases

4.1 Use Case 1. Consumables Alert System

Actors: Dentist, Administrator

Implements:

1. Dentist can input the amount of used consumables;Gloves,Mouthwash,Filler,Masks or Floss into "System" after an appointment.
2. Administrator must receive an alert if the Consumables stock is low.
3. Admin must have an alert box/way of being notified.

Pre-conditions:

1. Admin/Dentist have been authenticated on the system.
2. Appointment must be completed/Dentist finishes the appointment.

Main Success Scenario:

1. Dentist uses a given amount of Consumables on an appointment and activates the System on their computer.
2. System prompts Dentist to input a value for each type of consumable used.
3. Dentist submits the quantity of Consumables used to the System.
4. System updates the quantity of Consumables in dentist practice and notices some Consumables are low in supply (e.g. quantity of Gloves < 10 and Masks < 8).
5. This causes an alert to be sent to the Admin with a report saying "Multiple Consumables are running low!"; detailing which consumables are low.
6. Admin receives this notification and blocks future appointments for treatment.
7. System will alert Admin after every appointment if the consumables threshold continues to stay below its limit.

Exceptions:

1. 3a. Dentist leaves a field empty when filling out the Consumables deductions on the System.
2. 4a. System returns an error message displaying what field was left empty and the previous values entered.

Post-conditions:

1. Administrator has received the alert and has responded to it accordingly.
2. Administrator has blocked future appointments.

Quality Requirements:

1. Takes the Dentist very little time and effort to submit Consumable deductions.
2. Alert is sent to the Administrator within 10 seconds.

4.2 Use Case 2. Dentist Retires

Actors: Administrator, Retirement Dentist, Replacement Dentist, Patients

Implements:

1. Dentist will be able to retire
2. A replacement dentist can be hired, as to not cause any interruption at the dental practice.
3. Patients must be able to book appointments with the new dentist, and must not be able to book appointments with the retired dentist.

Preconditions:

1. A replacement dentist is ready to fill in the new vacancy created by the retiring dentist.
2. Replacement dentist's list of treatments which they are qualified to perform must be at least similar to the list of treatments that the retiring dentist is qualified to perform.

Main Success Scenario:

1. Dentist retires.
2. The dentist's details are removed from the system by a high-level administrator.
3. Admin adjusts the working days and hours of the dentist practice and appointments per hour to reflect the change made by the dentist leaving.
4. High-level administrator hires the replacement dentist.
5. Admin adjusts the working days and hours of the dentist practice and appointments per hour to reflect the change made by the new dentist joining.
6. Patients are now able to book appointments with the replacement dentist.

Extensions:

1. Any appointments made after the retiring date will be blocked, and the admin will notify any patients which have blocked appointments of this.

Post-conditions:

1. The dentistry's system now contains the details of the replacement dentist, and no longer contains the details of the retired dentist.
2. Patients can no longer book appointments with the retired dentist, and can now book appointments with the replacement dentist.

5 Use Case Diagram

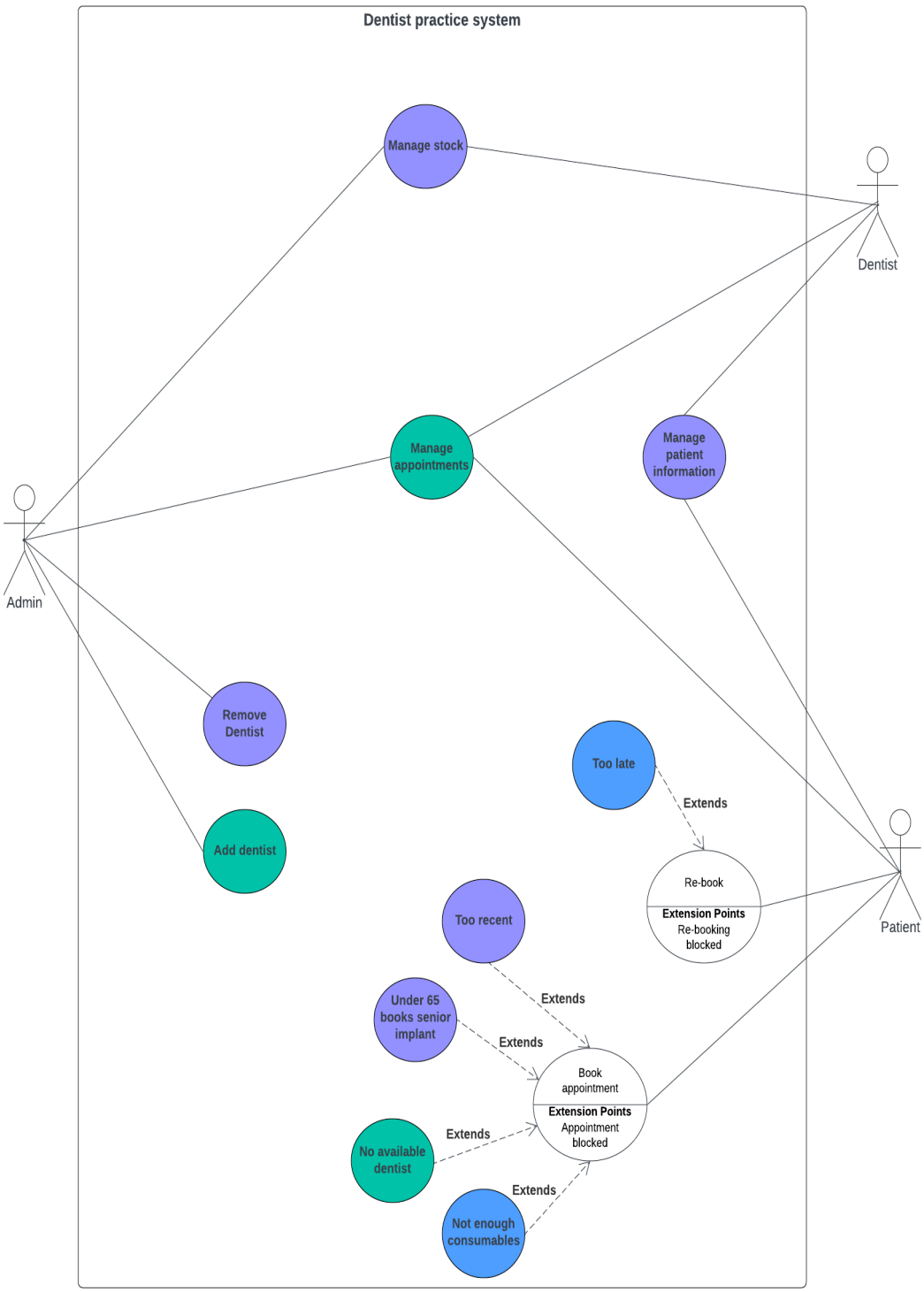

Figure 1: Use Case Diagram

6 Class Diagram

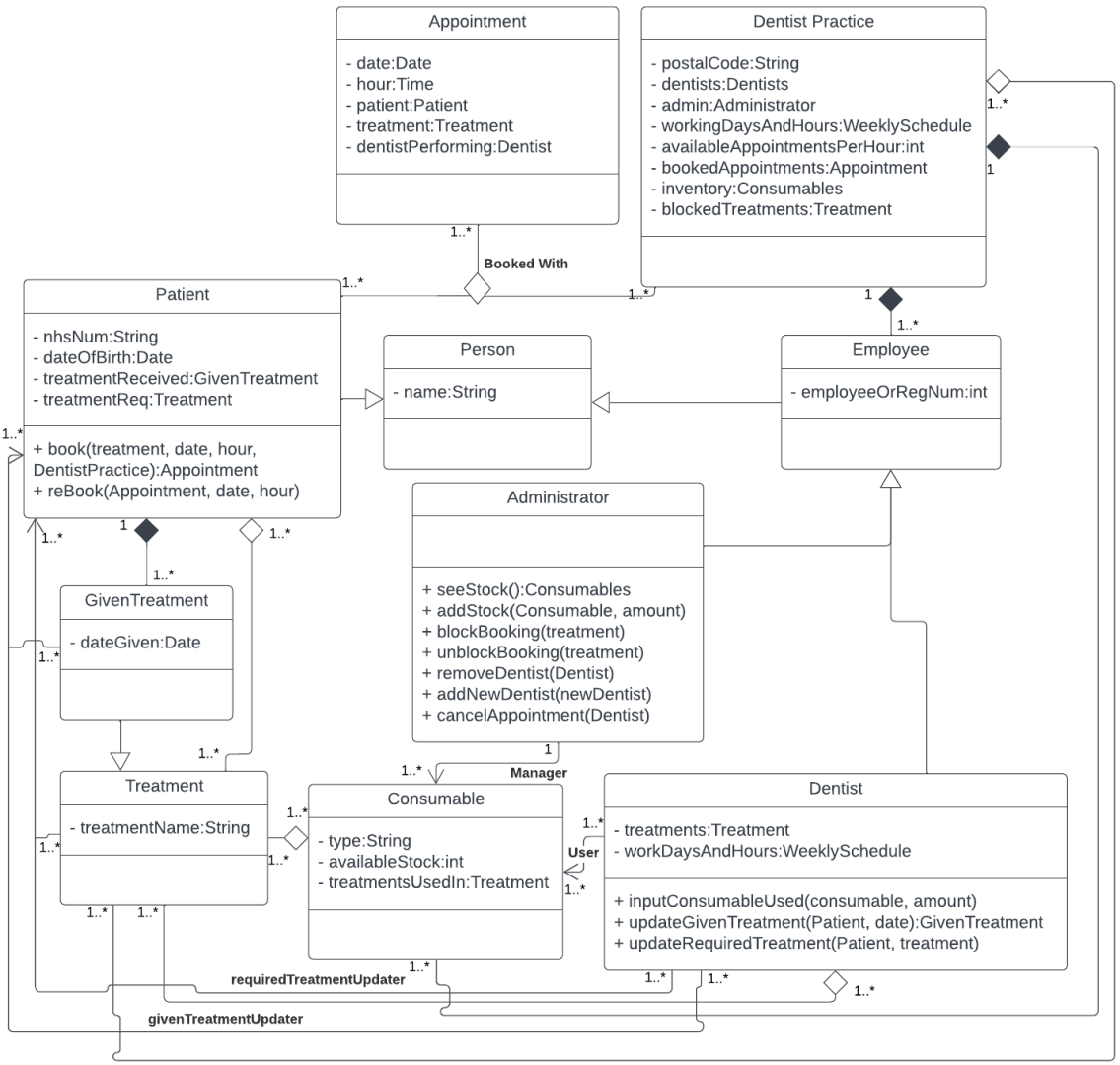

Figure 2: Class Diagram

The associations requiredTreatmentUpdater and givenTreatmentUpdater, which are between Dentist, Patient and Treatment or GivenTreatment, are shown as the system should store that the dentist has given, or says the patient now requires, a treatment. This is so the system has a history of which dentists give which treatments to patients or which dentists say patients require which treatments.

7 Sequence Diagrams

7.1 Sequence Diagram 1. Consumables Alert System

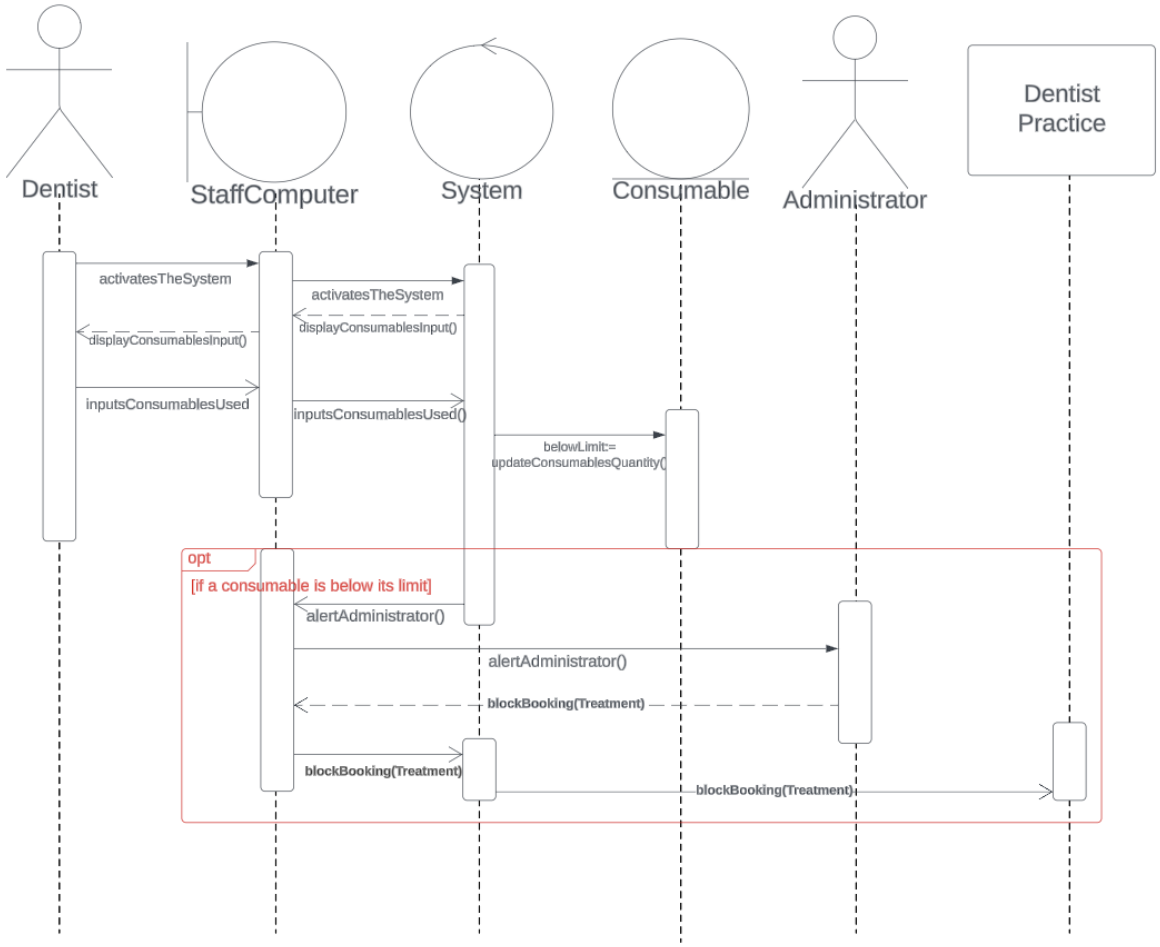

Figure 3: Sequence Diagram 1

7.2 Sequence Diagram 2. Dentist Retires

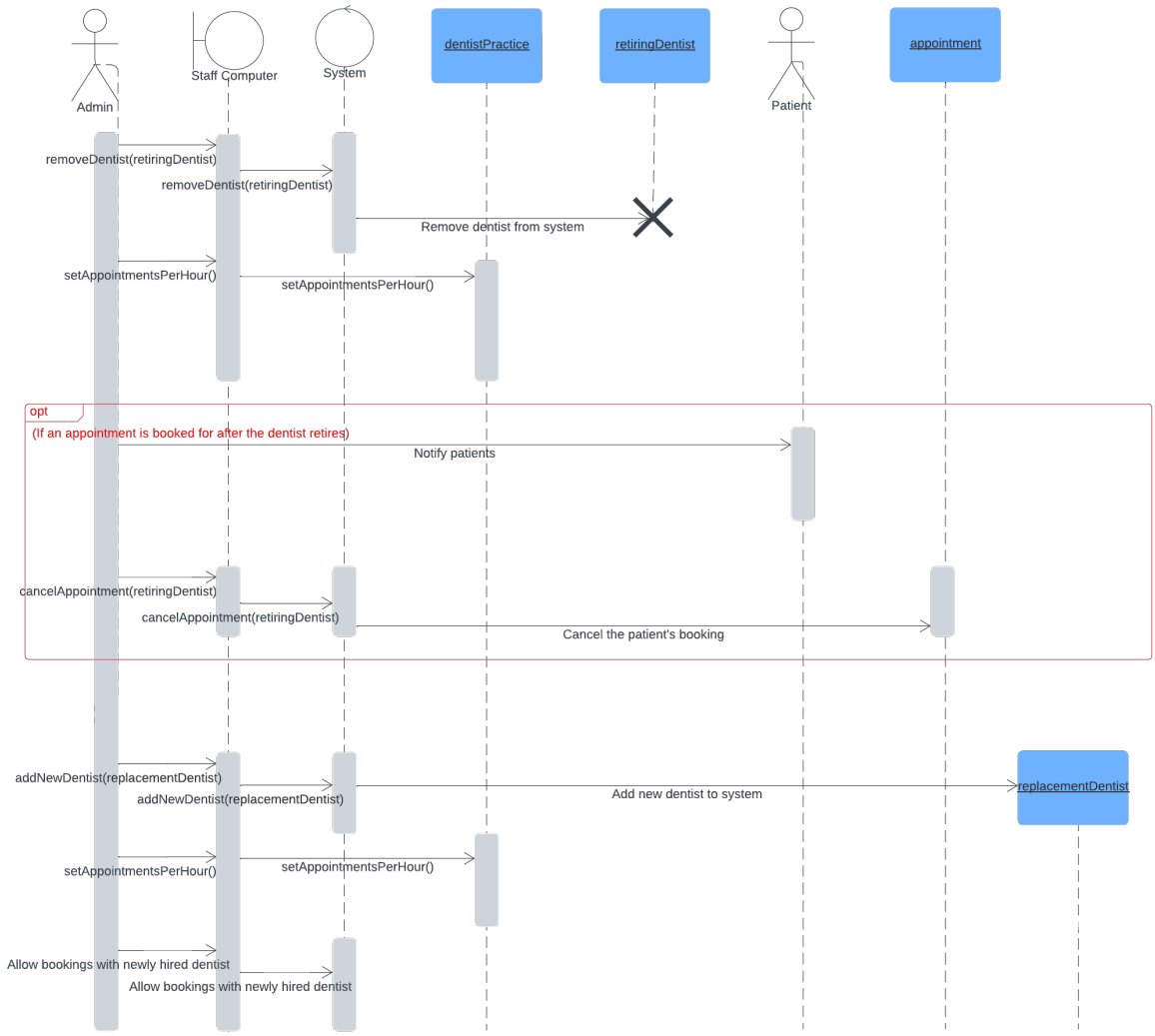

Figure 4: Sequence Diagram 2

8 Activity Diagram

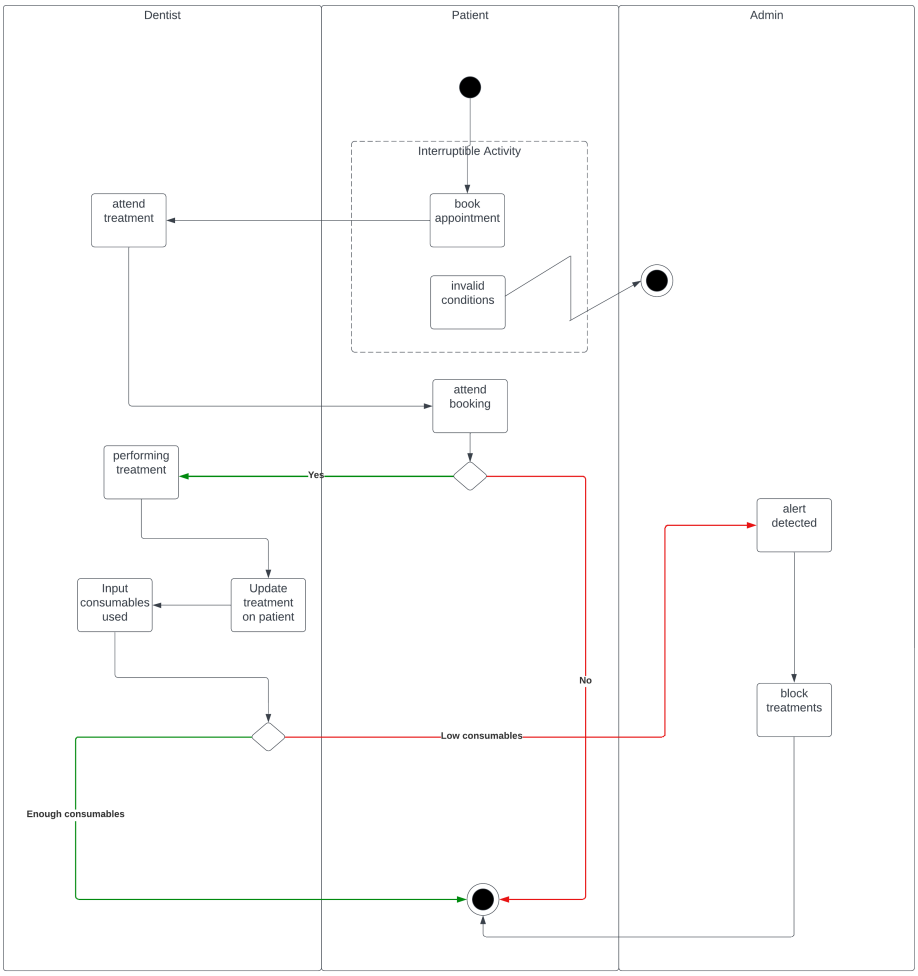

Figure 5: Activity Diagram

Specifically the invalid conditions are the following: the appointment is for a treatment that the patient has received within two weeks before the requested date and time; the patient is under 65 years old but is booking for senior implants; there is no available dentist; the treatment has been blocked.

9 State Machine Diagram

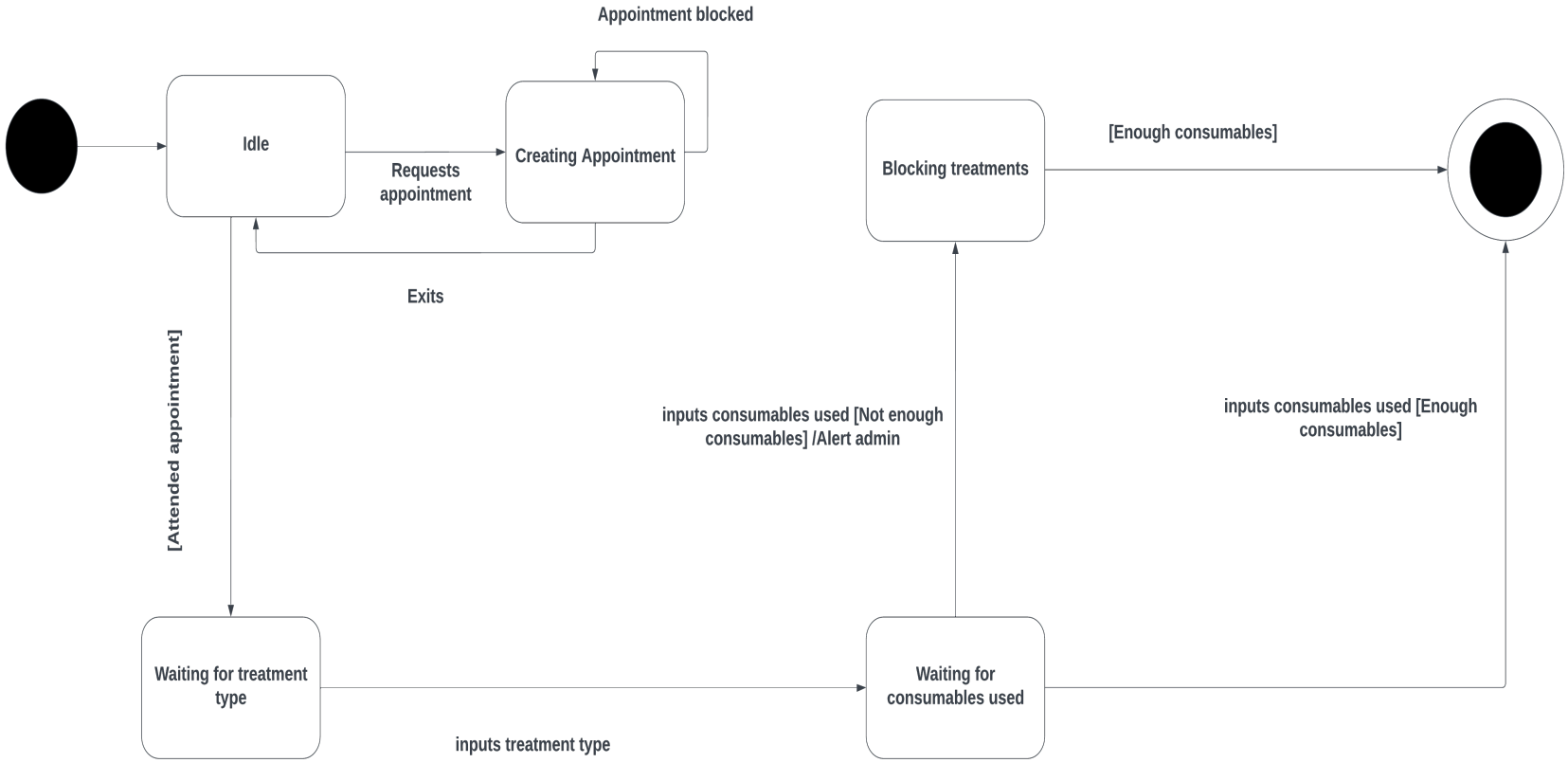

Figure 6: State Machine Diagram