

ASSALAMU'ALAIKUM

# Chapter II

# SCHEDULING PROBLEM

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- ❖ **The Operating Room Scheduling Problem**
- ❖ **Best of Rules**
- ❖ **Generate and Test**

# The Operating Room Scheduling Problem

- ❖ The scheduling problem appears in many areas, including healthcare (Zweben & Fox, 1994)
- ❖ A hospital's operating room provides a prime example: surgeries must be scheduled according to several rules and considerations.
- ❖ For example:
  - The availability of surgeons, anesthesiologists, nurses, equipment, medicine, and operating rooms must be taken into account.

- ❖ Some rules are mandatory for patient safety, while others are desirable for patient comfort and hospital profitability.
- ❖ With many (potentially conflicting) requirements on a surgery schedule, how can we quickly and easily find one that works?
- ❖ Let's consider what an AI-based scheduling system might look like for a hospital with two operating rooms.

- ❖ **Requirement 1:** Surgeons want the operating rooms (Room1 and Room2) to be available for procedures whenever the need arises.

ORoom1

ORoom2

- ❖ **Requirement 2:** Administrators want the operating rooms to be fully utilized, illustrated by two filled rectangles. This preference is understandable because scheduling one additional case per day can result in substantial revenue per year.

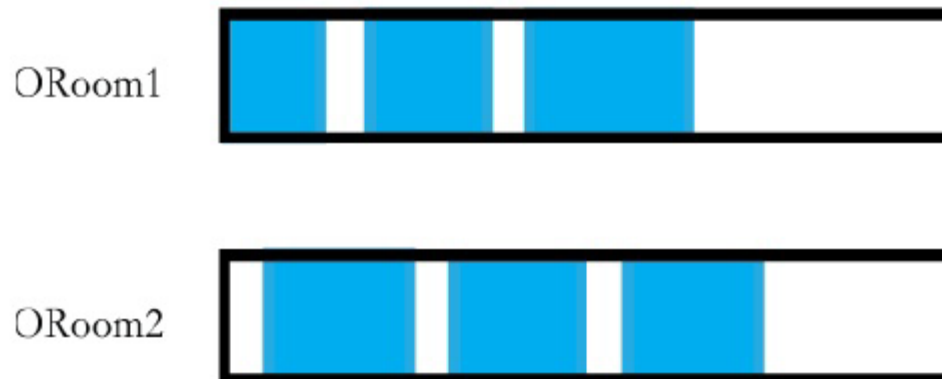
ORoom1



ORoom2



- ❖ **Requirement 3:** Anesthesiologists like procedures to start intermittently. This way they can start a procedure with one patient while monitoring another patient who is in post-operative recovery.



- ❖ **Requirement 4:** Staffers would like a predictable schedule with clear start and end times as well as breaks. They also want to avoid having to stay late during the day.





- Rule 1: Patient wait-times for surgeries should be minimized.
- Rule 2: Room utilization should be maximized.
- Rule 3: Procedure start times between the two ORooms should be staggered by a minimum of 20 minutes.
- Rule 4: The difference between the staff's daily schedule and the actual schedule followed should be minimized. The lunch hour will ideally be between 12:00pm and 1:00pm, and no elective surgeries should be performed before 7:00am or after 6:30pm.

*"Imagine there are five slots into which patients can be scheduled. In Slot 1, any of the 5 patients could be scheduled. For slot 2, we can pick one of the remaining 4 patients. For slot 3, any of the remaining 3 patients could be scheduled, and so on. You will find the total number of potential combinations would be different schedules by continuing this pattern"*  
*(Kurniawan, 2016)*

- Artificial Intelligence Simplified: Understanding Basic Concepts (Binto George and Gail Carmichael, 2016)



❖ **Thank you**