University
Mohammed VI
Polytechnic

College of Computing

Deliverable # 1: Conceptual Design for the MNHS

Data Management Course

UM6P College of Computing

Professor: Karima Echihabi **Program:** Computer Engineering

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Team Information

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Repository Link	https://github.com/therealzaini/DMG_LAB2_LEO_FL_BERNABEU

1 Introduction

Introduction: In the problem proposed to us, we are given data requirements about real-life entities that constitute the Moroccan National Health System (MNHS) and that work in harmony to ensure the fluidity of exchanges in this domain. Our job is to create an ER diagram that not only visualises the entities represented, amongst which we find: Patients, staff, hospitals and so on, but also manages the exchanges (relationships) between each of them.

2 Requirements

In order to accomplish our goal and solve this problem we followed a series of subtasks requirements that combined gave birth to the final and complete version of the ERD, to illustrate:

1. Identifying the entities and the attributes of each entity set.

2. Linking the entity sets as instructed by the requirements.

3. Taking in consideration the participation status as well as the cardinality constraints while following the requirements.

3 Methodology

When we started mapping out the Moroccan National Health Services, our first step was to simply identify the most important pieces of the puzzle and see how they connected. It just made sense to begin with the people at the center of it all. For patients, this meant we needed a way to keep track of their fundamental information: their CIN, name, birthday, sex, blood type, phone number, and the different places they might live. The staff is broken down using a specialization (ISA) hierarchy: we have practitioners (defined by their license and specialty), caregiving staff (with a grade and assigned ward), and technical staff (who manage specific equipment and hold certain certifications). These staff members are then assigned to various departments, which in turn are part of a specific hospital.

Next, we tackled the system's core functions. We created a general "Clinical Activities" category, which specializes into either Appointments or Prescriptions. This lets us link Bills directly to any clinical event. An Appointment is the connecting piece between a patient, a staff member, and a department, and it holds practical information like the date, time, reason for the visit, and its current status. A Prescription, on the other hand, links a patient and a staff member to medications. To handle the fact that one prescription can have many drugs and one drug can be on many prescriptions, we used a many-to-many relationship that also stores the specific dosage and duration for each medication. The medications themselves are cataloged with details like a drug ID, name, form, strength, manufacturer, and its therapeutic class and active ingredients.

Finally, we brought in the financial and logistical pieces. We set it up so a patient can have multiple insurance plans, but each bill is linked to only one specific policy to keep things clear. We also made a section for emergencies to record key details like the triage level, admission information, and the final outcome. To manage supplies, a pharmacy inventory was included to connect hospitals with their medication stock, tracking current quantities, reorder points, restock dates, and prices. Across the whole design, we used clear classifications, and specific rules for connections to create a model that is both logical and easy to build on later.

4 Implementation & Results

The ER diagram is presented at Page 4.

5 Discussion

During the development of our ER diagram, our group faced challenges in deciding how to correctly classify concepts as entities, relationships, or hierarchies. This process tested both our technical understanding and our ability to collaborate. Sometimes, there were different interpretations of the same requirement — for example, we debated whether clinical activity should be modeled using an ISA hierarchy, or whether it was better expressed as a standalone entity. In other cases, such as appointments, it was not clear whether they should be treated as an entity or as a relationship between patients and staff. At times, some connections seemed intuitive, but they did not align with the requirements, forcing us to reassess our design choices. These decisions required us to constantly balance what "looked right" with what was logically and structurally consistent with the problem domain.

From these challenges, we learned several lessons that will guide us in our project. First, database design is as much about interpretation and precision as it is about technical knowledge — requirements must always be carefully analyzed. We also realized that building a good ER diagram requires a holistic approach: looking at the full set of requirements and considering how each part fits into the bigger picture. By the end, we all recognized the importance of consistency and simplicity in the design. While it was tempting to overcomplicate the diagram with extra entities or unnecessary relationships, we learned that clarity should always be the priority.

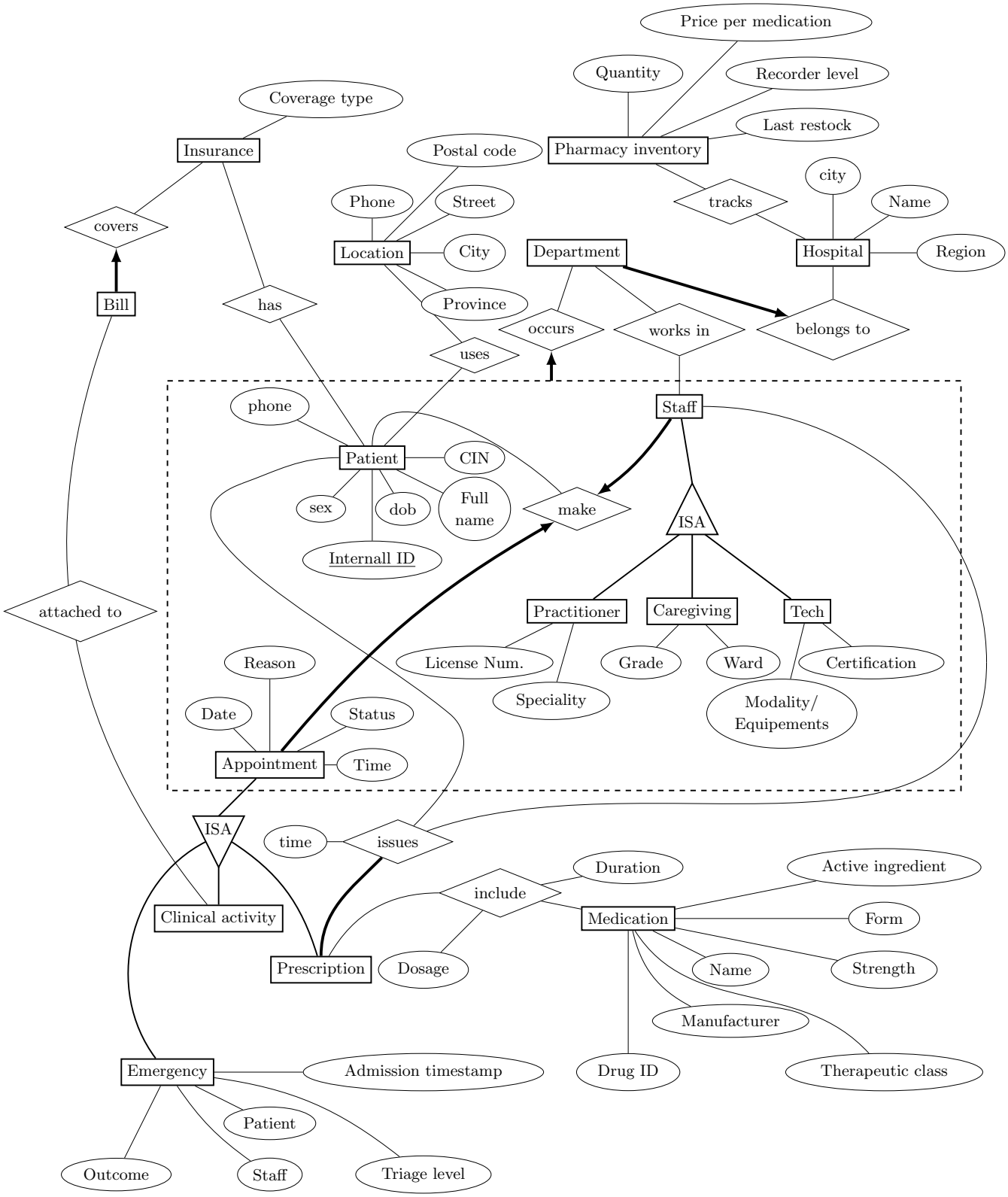
6 Conclusion

Our team successfully created an ER diagram for the Moroccan National Health Services that captures all the essential components of a modern healthcare system. The final design includes patients, specialized staff categories, hospitals with departments, clinical activities (appointments and prescriptions), medications, insurance coverage, emergency services, and pharmacy inventory management.

Through this project, we learned that good database design requires careful analysis of requirements and clear thinking about how real-world entities relate to each other. Our biggest challenge was deciding when something should be an entity versus a relationship, but working through these decisions as a team helped us create a more solid design.

The ER diagram we built provides a strong foundation for the MNHS system. It can handle the day-to-day operations like scheduling appointments and managing prescriptions, while also supporting future needs like data analysis and reporting. Most importantly, our design is simple and clear, making it easier to implement and maintain in the real world.

This experience showed us that database design is not just about technical skills - it's about understanding the problem domain and making smart choices that balance complexity with usability.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