

**Mestrado em Engenharia
Eletrotécnica e de Computadores**

Sistemas de Informação e Bases de Dados

Project (Part1) Report

Group 21

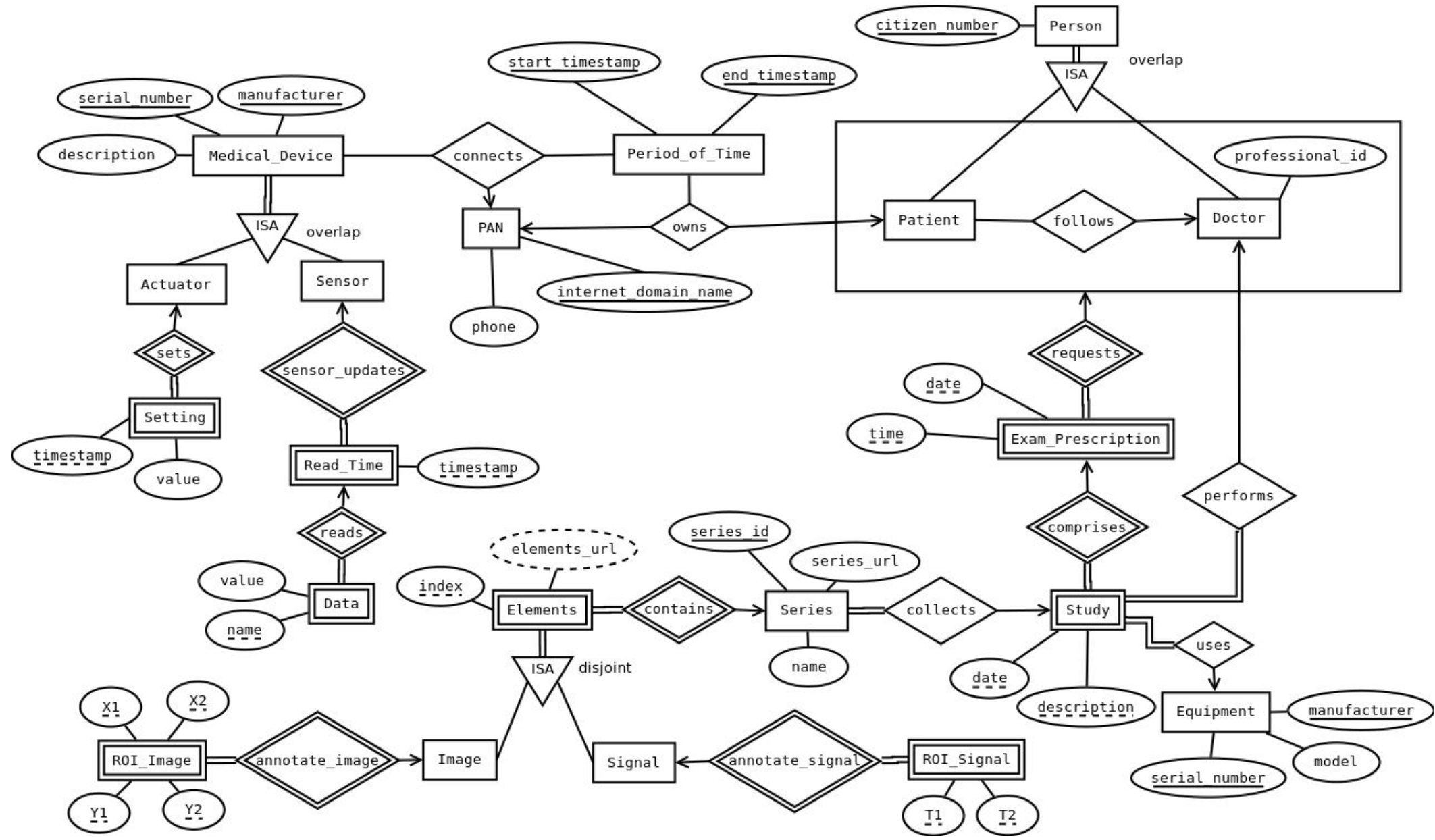
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ER Model



Entities:

Medical_Device(serial_number, manufacturer, description)

Since every manufacturer has their own serial number attribution system, which can be the same for different manufacturers, both serial_number and manufacturer are needed to define the table's primary key.

Actuator(serial_number, manufacturer)

serial_number, manufacturer: FK(Medical_Device)

Sensor(serial_number, manufacturer)

serial_number, manufacturer: FK(Medical_Device)

Setting(serial_number, manufacturer, timestamp, value)

serial_number, manufacturer: FK(Actuator)

Read_Time(serial_number, manufacturer, timestamp)

serial_number, manufacturer: FK(Sensor)

Data(serial_number, manufacturer, timestamp, name, value)

serial_number, manufacturer, timestamp: FK(Read_Time)

PAN(internet_domain_name, phone)

Period_of_Time(start_timestamp, end_timestamp)

Person(citizen_number)

Patient(citizen_number)

citizen_number: FK(Person)

Doctor(citizen_number, professional_id)

citizen_number: FK(Person)

Exam_Prescription(patient_citizen_number, date, time)

patient_citizen_number: FK(follows)

This was considered a weak entity due to the fact that several exams can be prescribed for the same date and time.

Study(patient_citizen_number, exam_date, exam_time, doctor_citizen_number, date,
description, manufacturer, serial_number)
patient_citizen_number, exam_date, exam_time: FK(Exam_Prescription)
doctor_citizen_number: FK(Doctor)
manufacturer, serial_number: FK(Equipment)

Since the relationships *performs* and *uses* are many-to-one with total participation, it was decided to include the foreign keys to *Doctor* and *Equipment* in this table, which allows the relationships to be defined without the need of extra tables.

Equipment(manufacturer, serial_number, model)

Series(series_id, series_url_name, patient_citizen_number, exam_date, exam_time,
study_date, description)
patient_citizen_number, exam_date, exam_time, study_date, description: FK(Study)

This was considered a strong entity because it was considered that series_id was unique in the database, and not only amongst a study.

Since the relationship *collects* is many-to-one with total participation, it was decided to include the foreign key to *Study* in this table, which allows the relationship to be defined without the need of an extra table.

Elements(series_id, index, elements_url)
series_id: FK(Series)

Signal(series_id, index)
series_id, index: FK(Elements)

Image(series_id, index)
series_id, index: FK(Elements)

ROI_Signal(series_id, index, T1, T2)
series_id, index: FK(Signal)

ROI_Image(series_id, index, X1, X2, Y1, Y2)
series_id, index: FK(Image)

Relationships:

connects(serial_number, manufacturer, internet_domain_name, start_timestamp, end_timestamp)

serial_number, manufacturer: FK(Medical_Device)

internet_domain_name: FK(PAN)

start_timestamp, end_timestamp: FK(Period_of_Time)

The keys of *Medical_Device* and *Period_of_Time* are sufficient to define and serve as primary key of *connects*. This is true because each *Medical_Device* is connected only to one *PAN*, during a *Period_of_Time*.

owns(internet_domain_name, citizen_number, start_timestamp, end_timestamp)

internet_domain_name: FK(PAN)

citizen_number: FK(Patient)

start_timestamp, end_timestamp: FK(Period_of_Time)

The keys of *Patient* and *Period_of_Time* are sufficient to define and serve as primary key of *owns*. The key of *PAN* could be used instead of the key of *Patient*, since each *Patient* only carries one *PAN* and only one *PAN* is worn by a *Patient*, during a *Period_of_Time*.

follows(patient_citizen_number, doctor_citizen_number)

patient_citizen_number: FK(Patient)

doctor_citizen_number: FK(Doctor)

It was considered as not mandatory for a patient to be followed by a doctor.

Notes:

The following was not implemented in the ER model in order to maintain its simplicity:

- The doctor that performs the study can't be the same who prescribed the exam.
- The end timestamp of an interval must be later than the start timestamp.