

Home exercise 2

Course name: Object oriented programming and design for engineering

Course number: 157109

Subject: Class diagrams

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(Answers below)

Below are the requirements for a system which represents a hospital which includes wards of patients and teams of doctors.

We want to know the following information about the hospital:

- A. name: Name of the hospital (of type String)
- B. address: Address of the hospital (of type String).
- C. phone: Phone number of the hospital (of type int)

The hospital keeps at least two teams of doctors and no more than five. When the hospital is closed, all its teams are terminated as well. We want to know the following about a team of doctors: the team's name, 'name', which is of type String. A team can contain any number of doctors (including an empty team). At any given moment each doctor belongs to one team only, but he can switch teams, and if the team is closed, the doctor can stay at the hospital.

The information we want to save on each doctor is:

- A. name: Name of the doctor (of type String)
- B. specialty: The doctor's specialty (of type String)

In addition, there are two types of doctors:

- A. Consultant doctor
 - i. A consultant doctor treats a number of (zero or more) patients. A doctor object has a list of its patients.
 - ii. A patient can be treated by a number of consultant doctors. A patient object does **not** hold a list of its doctors.
- B. Junior doctor

The hospital contains a number of wards. The information saved on each ward is:

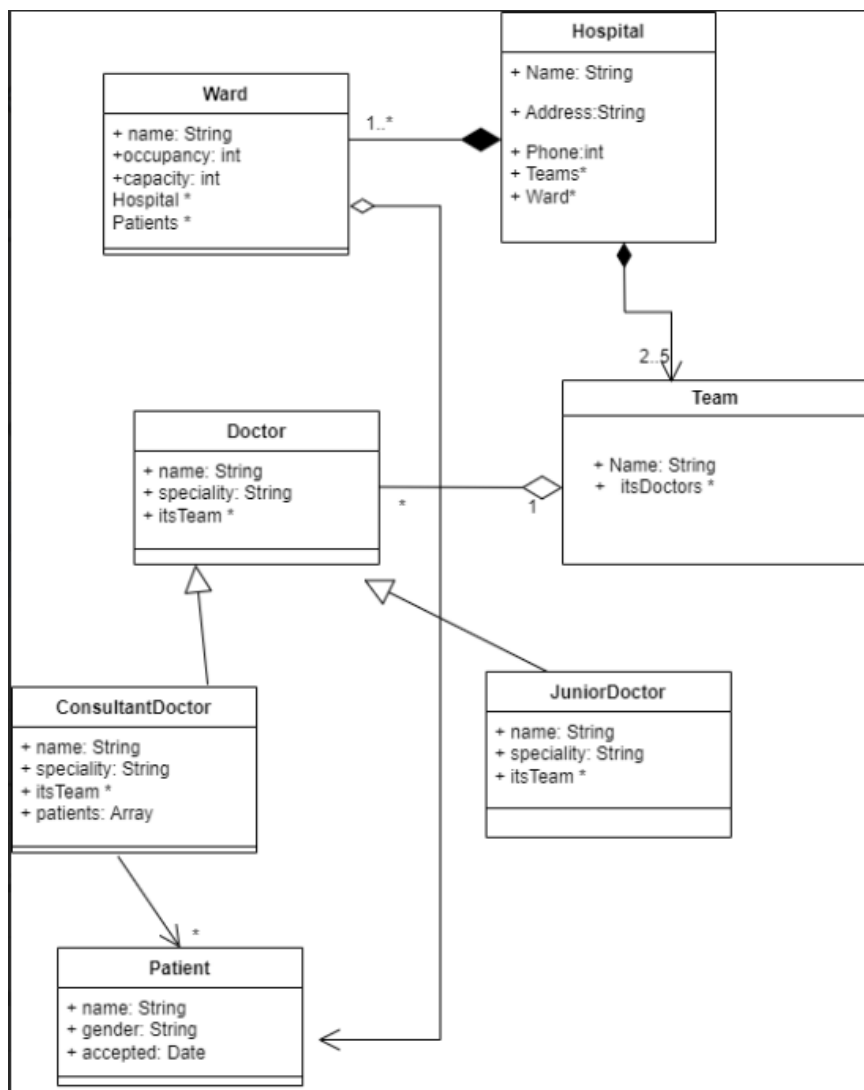
- A. name: Name of the ward (of type String)

- B. occupancy: The current number of patients in the ward (of type int)
- C. capacity: The ward's maximum occupancy (of type int).
- D. The ward contains a pointer back to the hospital

Each ward contains a number of patients. The information saved on each patient is:

- A. name: Name of the patient (of type String)
- B. gender: Gender of the patient (of type String)
- C. accepted: Date the patient was admitted to the ward (of type Date)

Draw a UML describing the following classes and their relationships according to the requirements above: Hospital, Team, Doctor, ConsultantDoctor, JuniorDoctor, Ward and Patient.



Answer the following questions (note that in some questions there is no relation between the classes):

A. What is the relation type between the classes Hospital and Team?

Composition. Because the teams don't exist without the hospital.

B. What is the relation type between the classes Team and Doctor?

Bidirectional Aggregation, the Team has a any number of doctors, and each doctor belongs to only 1 team but they are not existence dependent, and the doctor knows which team it belongs to

C. What is the relation type between the classes Doctor and ConsultantDoctor?

Inheritance, the consultant doctor is everything that the Doctor is and maybe extends its functionality.

D. What is the relation type between the classes Doctor and JuniorDoctor?

Inheritance, the consultant doctor is everything that the Doctor is and maybe extends its functionality.

E. What is the relation type between the classes Team and ConsultantDoctor?

There is none.

F. What is the relation type between the classes Hospital and Ward?

Bi-directional composition. The ward is supposed to point back to its Hospital, and without the hospital the wards do not exist.

G. What is the relation type between the classes Ward and Patient?

Aggregation, because every patient only belongs to one ward, and patient doesn't point back to ward.

H. What is the relation type between the classes Team and Patient?

There is none

I. What is the relation type between the classes Doctor and Patient?

There is none

J. What is the relation type between the classes ConsultantDoctor and Patient?

Directed association, the consultantDoctor has a list of its patients, but the patients do not know their doctors, and each consultant can have any number of patients and each patient can have any number of consultants.

In each relation, make sure to detail the type, direction (unidirectional or bidirectional) and the multiplicity.

The assignment must be submitted as a PDF which contains the students' details and the answers. The zip file and the pdf file will be named based on the submitters' ID number (for example 12346_12345.pdf).

Tip: You can use a service or application that supports UML diagrams. One application is Rhapsody (accessible through this [link](#)). Another application is

White Star UML ([download link](#)). There is also a cloud service called [draw.io](#). You can also choose not to use any software and draw the diagrams on a page and scan it to a pdf file. The file must be clear and readable.

Good luck!