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Hospital System requirements document

The requirements document for the Hospital System

System domain

In the hospital, there are a number of wards, each of which may be empty or have on it one or more patients. There are two types of ward, male wards and female wards. A ward can only have patients of the specified sex on it. Every ward has a fixed capacity, which is the maximum number of patients that can be on it at one time (i.e. the capacity is the number of beds in the ward). Different wards may have different capacities. Each ward has a unique name. The hospital has an Administration department that is responsible for recording information about the hospital's wards and the patients that are on each ward.

The doctors in the hospital are organised into teams, each of which has a unique team code (such as Orthopaedics A, or Paediatrics). Each team is headed by a consultant doctor who is the only consultant doctor in the team; the rest of the team are all junior doctors, at least one of whom must be at grade 1. Each doctor is in exactly one team. The Administration department keeps a record of these teams and the doctors allocated to each team.

Each patient is on a single ward and is under the care of a single team of doctors; the consultant who heads that team is responsible for the patient. A patient may be treated by any number of doctors but they must all be in the team that cares for the patient. A doctor can treat any number of patients.

Use cases

The Hospital system will provide support for the administration of the hospital by allowing hospital administrators to do the following.

A Admit Patient. The administrator provides the system with the patient's name, sex and date of birth and identifies the team that cares for the patient.

The system identifies a ward of the appropriate type with empty beds; if there is a choice of such wards one of those with the largest number of empty beds is chosen.

If there is no appropriate ward with empty beds the administrator is informed of this fact.

If there is an appropriate ward with empty beds the system does the following two things.

- 1 It records:
 - ▶ the patient's name, sex and date of birth;
 - ▶ that the patient is under the care of the given team;
 - ▶ that the consultant that heads the team is responsible for the patient;
 - ▶ that the patient is on the ward.
- 2 It informs the administrator of the ward to which the patient has been admitted.

- B Treat Patient.** The administrator identifies the patient and the doctor; the doctor must be in the team that cares for the patient. The system records that the doctor has treated the patient.
- C Discharge Patient.** The administrator identifies the discharged patient. All information relating to that patient is removed from the system.
- D Transfer Patient.** The administrator identifies the patient and the new ward. The new ward should be of the appropriate type and have at least one free bed. The system records:
 - ▶ the removal of the patient from their current ward;
 - ▶ the admission of the patient to the new ward.
- E List Ward's Patients.** The administrator identifies the ward. For each patient on the ward the system displays the patient's name and age in years.
- F List Team's Patients.** The administrator identifies the team. For each patient cared for by the team the system displays:
 - ▶ the patient's name;
 - ▶ the name of the ward that the patient is on.
- G List Patient's Treatment.** The administrator identifies the patient. The system displays:
 - ▶ the name of the consultant responsible for the patient;
 - ▶ the team code of the team that cares for the patient;
 - ▶ the name of each doctor who has treated the patient and, for each such junior doctor, their grade (1, 2 or 3).

Acceptance tests

- A** Test that, when there is an appropriate ward available:
 - ▶ the admission of a patient is recorded correctly;
 - ▶ the administrator is informed of the ward to which the patient has been allocated.

Test that, when no appropriate ward is available, an attempt to record the admission of a patient results in the administrator being informed that there is no appropriate ward available.
- B** Test that the treatment of a patient, by a doctor on the team that cares for the patient, is recorded correctly.
- C** Test that the discharge of a patient is recorded correctly.
- D** Test that the transfer of a patient to an appropriate ward with an empty bed is recorded correctly.
- E** Test that a list of patients on a ward is produced correctly when there are no patients on the ward.

Test that a list of patients on a ward is produced correctly when there are some patients on the ward.
- F** Test that a list of patients cared for by a team is produced correctly when there are no patients cared for by the team.

Test that a list of patients cared for by a team is produced correctly when there are some patients cared for by the team.
- G** Test that a list of a patient's treatment is produced correctly when no doctors have treated the patient.

Test that a list of a patient's treatment is produced correctly when some doctors have treated the patient.

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Hospital System initial structural model

Class diagram

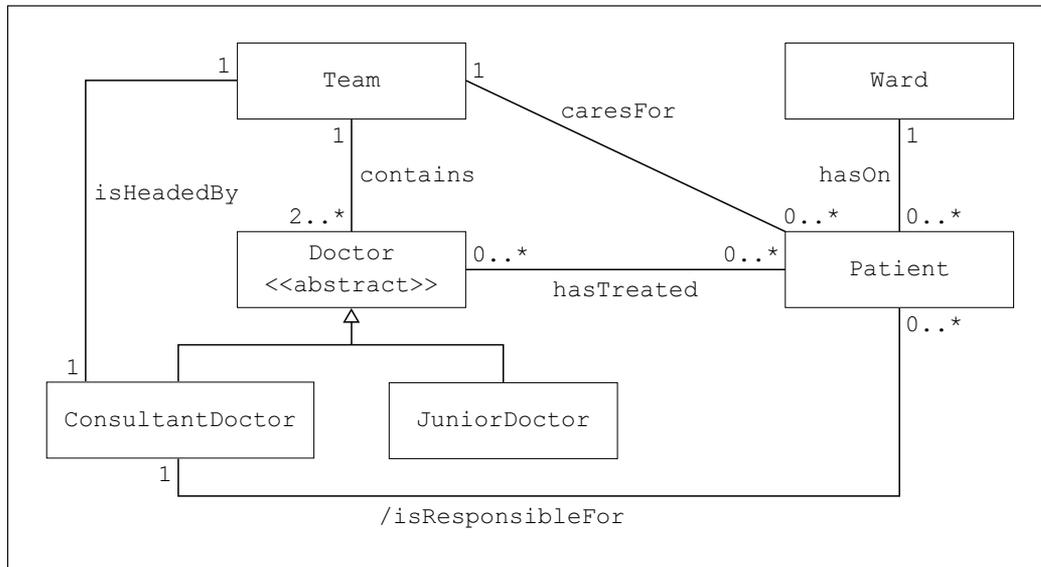


Figure 2 Class diagram for the Hospital System initial structural model

Class descriptions

Class Ward A hospital ward

Attributes

name The unique name of the ward
 type Whether the ward is for male or female (M or F) patients
 capacity The maximum number of patients that can be on the ward at any one time
 /numberOfFreeBeds The number of free beds on the ward

Class Patient A patient in the hospital

Attributes

name The name of the patient
 /sex The sex (M or F) of the patient
 dateOfBirth The date of birth of the patient
 /age The age of the patient in years

Class	Team	A team of doctors
	Attributes	
	code	The unique code of the team
Class	Doctor	A doctor at the hospital Abstract: generalises JuniorDoctor and ConsultantDoctor
	Attributes	
	name	The name of the doctor
Class	JuniorDoctor	A junior doctor at the hospital Specialises Doctor
	Attributes	
	grade	The grade (1, 2 or 3) of the junior doctor
Class	ConsultantDoctor	A consultant doctor at the hospital Specialises Doctor
	Attributes	
	None	

Invariants

- 1 The sex attribute of any Patient object has the same value as the type attribute of the linked Ward object.
- 2 For each Patient object, the value of its age attribute is equal to the difference (in years) between the current date and the value of its dateOfBirth attribute.
- 3 For each Ward object, the value of its numberOfFreeBeds attribute is equal to the value of its capacity attribute minus the number of Patient objects to which it is linked.
- 4 Each Team object is linked to at least one JuniorDoctor object for which the grade attribute has a value of 1.
- 5 The ConsultantDoctor object linked to a Team object via isHeadedBy is linked to the same Team object via contains.
- 6 The ConsultantDoctor object linked to any Patient object via isResponsibleFor is linked via isHeadedBy to the Team object to which that Patient object is linked.
- 7 If aPatient is any Patient object, then any Doctor object linked to aPatient is also linked to the Team object which is linked to aPatient.