OO Analysis & Design Project 2014 Instructions

* The Project that you are required to undertake is specified below. There are two parts to this project.

**Part A** Involves creating a design for an application given a specification. 70%

**Part B** involves the application of design patterns. 30 %

* You will be required to submit solutions in electronic format before **midnight on May 12th.**
* You must submit **two** files as part of your project submission, a word and a Visual Paradigm file. The word document will contain answers to all questions. Any models created in Visual Paradigm should be copied as images.
* Include a Cover page and a table of contents. A student declaration of the following nature should be included at the back of the project. Plagiarised material **will not** be allocated a mark.

**Student declaration**

I can confirm the following details:

**Student ID/Registration number:** 296338

**Name:** Mary Murphy

**Module Name:** OO Analysis and Design

**Module Lecturer :** Mary Davin

I confirm that this is my own work.

**Due Date:** Monday May 11th

**Student Signature**

* You may be required to attend an oral examination on Week 13th
* You may work with 1 other student on this project. Please inform me in advance if you plan on completing project with another student.

**:**

# Part A 70%

Using the following requirements specifications for a hospital management system create a design document by following the instruction steps as outlined below.

Requirements Specification for St. Peters Hospital

St Peters hospital is located in Cork City. The hospital primarily treats patients from Cork and Kerry which have a combined population of more than 620,000.

St Peters is one of Ireland's largest hospitals, with a 1000-bed capacity. The hospital has a number of departments. A person can only be admitted to the hospital if there is a bed available. All beds are located in wards.

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 department has a discharge coordinator who is an administrative staff member. Each ward has a number of registered nurses assigned for any one shift. A nurse will be assigned different shifts. Each shift will have a date, start time, and end time. At any one time there will be one nurse manager on duty in a 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. Any treatment carried out on the patient needs to be recorded. Some patients may have a preadmissions assessment carried out in advance of being admitted to the hospital. Some patients may require surgery.

The hospital has a number of clinics within the hospital. Each clinic has a clinical co-ordinator. The Clinical Co-Coordinator Nurse is responsible for directing and overseeing the daily activities of the unit on an assigned shift. The **Pre Admission Assessment Clinic** has been in operation since 2006. Traditionally patients were admitted to hospital a few days before their operation to arrange for any tests or investigations to be carried out. This often led to a delay in operations or patients being cancelled. Pre Admission Assessment aims to ensure that patients (age 16 and over) are fit for an anaesthetic and planned surgery. Pre admission assessment is mandatory for any patient with a surgery date confirmed. Not all patients admitted to hospital will require surgery.

The assessment will help to prepare the patient so that they know what to expect before, during and after their surgery.

A Pre Admission Assessment will allow for any investigations and treatments to be carried out well before surgery, which will prevent unnecessary delays and cancellations.

# What happens at Pre Admission Assessment

A patient will be seen by one of the Pre Admission Assessment Nurses who will:

* Take patient name and address and PPS number
* Record weight and height.
* Check their temperature, pulse, blood pressure.
* Provide with information on fasting before planned surgery

Following completion of the assessment patient may require further tests:

* Blood tests

Occasionally it may be necessary to defer a surgery date for a short time in an effort to optimise the patients’ health and ensure that they are ready for surgery. The results of all tests need to be recorded i.e. Type of test, date test carried out and reading. Each type of test has a value which represents what the value should be for a healthy person.

# Use cases

The Hospital system will provide support for the administration of the hospital by allowing hospital administrators to do the following. [not all use cases have been identified]

**Admit Patient**.

The administrator provides the system with the patient’s name, sex , date of birth and PPS (public service number)number identifies the team that cares for the patient. If the patient is a previously assessed patient their details are recovered from the system using PPS number

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.

**Treat Patient**

The administrator identifies the patient and the doctor and date /time of treatment; the doctor must be in the team that cares for the patient. Any medication prescribed during the treatment needs to be recorded as well as the dosage

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| **Discharge Patient** |

The administrator identifies patient to be discharged. An invoice is produced detailing cost of stay. The cost is calculated on the basis of number of days and the charge per night in the ward. Different ward types have a different cost associated with them. The capacity of the ward determines the price per night.

**Transfer a 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 patient is removed from their current ward and admitted to new ward.

**List Ward’s Patients**

He administrator identifies the ward. For each patient on the ward the system displays the patient’s name and age in years.

**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.

**List Patient’s treatments.**

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 treated the patient and for each such junior doctor their grade (1,2or 3) . The System should also display the names of any drugs that were prescribed in the treatment of the patient.

# Instructions

1. Identify any 4 more Use Cases. [4]
2. Create a Use Case Diagram to model functional requirements. [6]
3. Create a System Sequence Diagram for each Use Case listed above. [14]
4. Create a Domain Model. [15]
5. Create a sequence or a Communication diagram to realize the happy scenario for each use case listed above. [21]
6. Create a Design Class Diagram to support interaction diagrams developed in (v)[10]

# Part B 30%

## Q1

Review the code provided to answer question given

The LoanApprovalHander class is responsible for approving two different types of loans. The code needs to be modified to handle a new type of holiday loan. The code violates the “Open closed Principle design” principle.

1. Draw a class diagram to model the code.
2. Explain why the code violates the open closed principle
3. Rewrite the code so it does not violate this design principle.
4. Draw a class diagram to model revised code.

**[15]**

**public class LoanApprovalHandler**

{

public void approvePersonalLoan (PersonalLoanValidator validator)

{

if ( validator.isValid())

{

//Process the loan.

}

}

public void approveVehicleLoan (VehicleLoanValidator validator )

{

if ( validator.isValid())

{

//Process the loan.

}

}

// Method for approving other loans.

}

**public class PersonalLoanValidator**

{

public boolean isValid()

{

//Validation logic

}

}

**public class VehicleLoanValidator**

{

public boolean isValid()

{

//Validation logic

}

}

## Q2

Create a design class diagram to model a home entertainment system and the ability for a user to be able to use a single remote control to control multiple digital devices such as a TV or sound system etc.

Give an explanation of your design

*Create a Remote Control class with 3 methods in it. One for choosing the device to connect the remote control to (make this a static method), and the other 2 methods are for turning that particular device on or off. Create three other classes – Projector, TV, SurroundSoundSystem. All three of these devices should follow a consistent interface so that the same remote can be used to turn the devices on or off. Remember, you want to implement this in such a way that if more devices need to be controlled by the same remote in the future, that can be easily done. We don’t want to keep modifying the internals of the remote control class to be able to support more devices in the future. The last class you can create is the Person class. This will be the user of the home entertainment system. You can define a main method in this class to test out your code. Initialize the devices here and have the remote connect to that device to turn it on or off. Indicate how a new device could be added to home entertainment system without breaking existing code.*

[15]

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