CIS 340 Project

E-R Model (50 Points)

Due Sunday, Oct 31, by 11:59 PM

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You MUST do it in groups with both students in the same section.

You MUST sign up for your groups in class by 12:00 pm, Wednesday, Jan 29. Otherwise, you lose five points.

Download the document from D2L and change the file name using your MNSU usernames.

Keep the following instructions and type your work below.

You must follow the given style. You could lose up to five points on the style. Upload your document to D2L by the due time.

Everyone is required to create GitHub repository for this course, but I need only one GitHub submission for this project. Add the link of GitHub in the D2L Dropbox description box.

Each group is required to use Microsoft Teams for communication while working on the project. You must the following style to do Phase I of the project.

1. Identify entity types with brief description

Example

Property: Properties for rent

1. Identify relationship types with brief description. You must include the multiplicity and attributes if any.

Example

Renter (0..\*) Rents (0..\*) Property Attribute: SatrtDate, EndDate, Rent

One property is rented by one renter at one time.

One renter can rent multiple properties at one time.

All renting data, including in the past and in the future, are stored.

1. Describe each entity type in detail

Example

Staff

Sno

Name : Composite (firstName, lastName)

DOB

Age : Derived

Phone : Multi-Value

Advisor : Optional

Primary Key : Sno

Alternate Key: SSN

1. Draw the E-R diagram

Show the primary key for each table.

You must specify the multiplicity on the E-R diagram.

Step 1: Entities)

**Department:** Staff can work in the hospital wards (1 – 17) or the outpatient clinic ( 0 ), and the central stock (18)

**Wards**: Medical wards that hold patients

**Beds**: There are 240 beds total in the hospital: one bed per patient

**Staff**: Wellmeadows keeps on a large medical staff for its operations

**Patients**: Each patient admitted to the hospital for treatment is given a unique number

**Patient’s Next of Kin**: Each patient specifies a next of kin

**Local Doctors**: Local doctors will refer their patients to Wellmeadows

**Patient Appointments**: Each appointment has a unique number attached to it as well as many other details

**Outpatients**: Details on outpatients are also kept by Wellmeadows

**Inpatients**: More details are necessary for inpatients, details like stay time and bed number

**Patient Medication**: When a patient is administered medication, the details are documented

**Supplies:**

* **Surgical Supplies**: An inventory of surgical supplies is kept. Items include syringes and sterile dressings.
* **Non-surgical Supplies**: An inventory of non-surgical supplies is also kept. Items included are things like plastic bags and aprons.
* **Pharmaceutical Supplies**: Inventory on pharmaceuticals is kept, and each drug has its own unique drug number

**Ward Requisitions**: Whenever a charge nurse from a certain ward needs more supplies, be it surgical, non-surgical, or pharmaceutical, the charge can fill out a requisition for supplies from the central stock of the hospital. Each requisition has a unique requisition number.

**Suppliers**: The supplier details of all hospital supplies are kept, and each supplier has a unique supplier number.

**Department Stock:** Each department of the hospital tracks its supply inventory

**Central Stock:** The hospital contains a central supply that wards can request supplies from

Step 2: Relationship Types)

Ward ( M ) Contains Bed ( M )

Many different beds and many different wards

**Attributes:** Ward Number, Ward Name, Ward Block, Charge Nurse, Budget, Bed Count, Phone Number, patients, staff

**Attributes:** Bed Number (Unique), patient name, patient number

Staff ( M ) Work In Department ( 1 )

Many staff can work in one department

**Attributes:** Staff number, name (first and last), address, phone number, DOB, sex, National Insurance Number (NIN), position held, current salary, salary scale

**Attributes:** Location (Hospital or Clinic), Ward Number (or 0 if Clinic), Staff number

Ward ( 1 ) Makes Supply Request ( M )

A single ward has the possibility of making multiple supply requests

**Attributes:** Ward Number, Ward Name, Ward Block, Charge Nurse, Budget, Bed Count, Phone Number

**Attributes:** requisition number, ward number, ward name, charge nurse, requisition date, Drug/item number, item name, item description, dosage (drugs only), method of administration, cost per unit, quantity

Patient ( 1 ) Designates Next of Kin ( 1 )

A patient designates a single next of kin

**Attributes:** Patient Number (Unique), Name (first and last), address, phone number, DOB, sex, next of kin details, doctor clinic number

**Attributes:** Next of kin details (full name, relationship to patient, address, phone number)

Local Doctor ( 1 ) Refers Patient ( M )

A doctor can refer many different patients

**Attributes**: Clinic Number (unique), full name, clinic address, clinic phone number

**Attributes**: Patient Number (Unique), Name (first and last), address, phone number, DOB, sex, next of kin details

Staff ( 1 ) consults Patient Appointment ( 1 )

There is one staff member assigned per appointment

**Attributes**: Staff number, name (first and last), address, phone number, DOB, sex, National Insurance Number (NIN), position held, current salary, salary scale

**Attributes**: Appointment Number (unique), Staff name, Staff number, room number, date, patient name, patient number

Patient ( 1 ) attends Patient Appointment ( 1 )

There is one patient attending each appointment

**Attributes**: Patient Number (Unique), Name (first and last), address, phone number, DOB, sex, next of kin details

**Attributes**: Appointment Number (unique), Staff name, Staff number, room number, date, patient name, patient number

Supplier ( 1 ) supplies Central Supply ( M )

A supplier can offer many different kinds of items to stock the hospital

**Attributes**: Supplier number (unique), name, phone number, address, fax number

**Attributes**: Item Number, Quantity in stock, Supplier number

Ward ( M ) services Patient ( M )

Many wards can serve many different patients

**Attributes**: Ward Number, Ward Name, Ward Block, Charge Nurse, Budget, Bed Count, Phone Number

**Attributes**: Patient Number (Unique), Name (first and last), address, phone number, DOB, sex, next of kin details

Patient ( 1 ) occupies Bed ( M )

One patient can be in a bed at a time, there are many beds though

**Attributes:** Patient Number (Unique), Name (first and last), address, phone number, DOB, sex, next of kin details

**Attributes:** Bed Number (Unique), patient name, patient number

Department ( 1 ) tracks Department Stock ( M )

A section of the hospital has many different items to keep track of

**Attributes:** Location (Hospital or Clinic), Ward Number (or 0 if clinic), staff number

**Attributes:** Ward number, item number, quantity in stock

Central Supply ( 1 ) completes Supply Request ( M )

The central stock supply of the hospital serves all other areas of the hospital by stocking them

**Attributes:** Item number, quantity in stock

**Attributes:** requisition number, ward number, ward name, charge nurse, requisition date, Drug/item number, item name, item description, dosage (drugs only), method of administration, cost per unit, quantity

Step 3: Describing each entity in detail)

**Ward**

Ward Number: Integer, unique, required

Ward Name: Varchar

Ward Block: Integer

Charge Nurse: Varchar

Budget: Decimal

Bed Count: Integer

Phone Number: Varchar

Primary Key: Ward Number

**Bed**

Bed Number: Integer, required, unique

Patient Name: Varchar, optional

Patient Number: Integer

Primary Key: Bed number

Foreign Key: Patient number references Patient(Patient number)

**Staff**

Staff number: Integer, unique, required

Name (first and last): Varchar, required, composite (firstName, lastName)

Address: Varchar

Phone number: Varchar

DOB: Date

Sex: Varchar

National Insurance Number (NIN): Integer, unique, required

Position held: Varchar

Current salary: Decimal

Salary scale: Decimal

Primary Key: Staff number

Alternate Key: NIN

**Department**

Location (Hospital or Clinic): Varchar, required

Ward Number: Integer (0 if clinic, 18 if central stock), required

Staff Number: Integer

Primary Key: Composite: (Location, Ward Number)

Foreign Key: Staff Number references Staff(Staff Number)

**Patient**

Patient Number: Integer, unique, required

Name (first and last): required, composite (varchar firstName, varchar lastName)

Address: Varchar

Phone number: Varchar

DOB: Date, required

Sex: Varchar

Next of kin details: composite (full name composite (firstName, lastName), varchar relationship to patient, varchar address, varchar phone number

Doctor clinic number: integer

Expected Leave: date

Registration date: date

Actual leave: date

Marital status: varchar

Ward location: integer

Primary key: Patient name

Alternate key: Composite (name, DOB)

Foreign key: Next of kin details references next of kin attributes

Foreign key: Doctor clinic number references local doctor

Foreign key: ward location references ward

**Next of Kin**

Full name: composite (firstName, lastName), required

Relationship to Patient: varchar, required

Address: varchar, required

Phone number: varchar, required

Primary Key: All columns

**Supply Request**

Requisition number: integer, unique, required

Ward number: integer, required

Ward name: varchar

Charge nurse: varchar

Requisition date: date, required

Drug/item number: integer, required

Item name: varchar

Dosage (drugs only): integer

Method of administration: varchar

Quantity: integer

Date: date

Primary key: requisition number

Foreign key: ward number references ward

Foreign key: Drug/item number

**Local Doctor**

Clinic Number: integer, unique, required

full name: varchar

clinic address: varchar

clinic phone number: varchar

Primary key: clinic number

**Patient Appointments**

Appointment Number: integer, unique, required

Staff name: varchar, required

Staff number: integer, required

Room number: integer, required

Date and time: datetime, required

Patient name: varchar

Patient number: integer, required

Primary key: appointment number

Alternate key: composite (room number, date)

Foreign key: staff number references staff

Foreign key: patient number references patient

**Supplier**

Supplier number: integer, unique, required

Name: varchar

Phone number: varchar

Address: varchar

Fax number: integer

Primary key: supplier number

**Supplies**

Item number: integer, unique, required

item name: varchar

item description: varchar

quantity in stock: integer

reorder level: integer

cost per unit: decimal

Primary key: item number

**Department Stock**

Ward Number: integer, required

Item number: integer, required

Quantity in stock: integer, required

Primary key: All columns

**Central Supply**

Item number: integer, required

Quantity in stock: integer, required

Primary Key: All columns

IT 340 – Project

Consider the following case study, you are to build a relational database for Wellmeadows Hospital.

This case study describes a small hospital called Wellmeadows, which is located in Edinburgh. The Wellmeadows Hospital specializes in the provision of healthcare for elderly people. Listed below is a description of the data recorded, maintained, and accessed by the hospital staff to support the management and day to day operations of the hospital.

# Wards

The Wellmeadows Hospital has 17 wards with a total of 240 beds available for short and long stay patients, and an outpatient clinic. Each ward is uniquely identified by a number (i.e. - ward 11) and also a ward name (i.e. - Orthopedic), location (i.e. - E block), total number of beds, and a telephone extension number (i.e. - Extn 7711).

# Staff

The Wellmeadows Hospital has a Medical Director, who has overall responsibility for the management of the hospital. The Medical Director maintains control over the use of the hospital resources (including staff, beds, and supplies) in the provision of cost-effective treatment for all patients.

The Wellmeadows Hospital has a Personnel Officer who is responsible for ensuring that the appropriate number and type of staff are allocated to each ward and the outpatient clinic. The information stored on each staff member includes a staff number, name (first and last), full address, telephone number, date of birth, sex, National Insurance Number (NIN), position held, current salary, and salary scale. It also includes each member’s qualifications (which includes date of qualification, type, and name of institution) and work experience details (which includes the name of the organization, position, and start and finish dates). The type of employment contract for each member of staff is also recorded, including the number of hours worked per week, whether the staff member is on a temporary or permanent contract, and the type of salary payment (weekly/monthly).

Each ward and the outpatient clinic has a member of staff with the position of Charge Nurse. The Charge Nurse is responsible for overseeing the day to day operations of the ward/clinic. The Charge Nurse is allocated a budget to run the ward and must ensure that all resources are used effectively in the care of patients. The Medical Director works closely with the Charge Nurses to ensure the effective running of the hospital. A Charge Nurse is responsible for setting up a weekly staff rotation, and must ensure that the ward/clinic has the correct number and type of staff on duty at any time during the day or night. In a given week, each staff member is assigned to work an early, late, or night shift.

As well as the Charge Nurse, each ward is allocated senior and junior nurses, doctors, and auxiliaries. Specialist staff (i.e. – consultants, physiotherapists) are allocated to several wards or the clinic.

# Patients

When a patient is first referred to the hospital, he or she is allocated a unique patient number. At this time, additional details of the patient are also recorded including the name (first and last), address, phone number, date of birth, sex, marital status, date registered with the hospital, and the details of the patient’s next of kin.

# Patient’s Next of Kin

The details of a patient’s next of kin are recorded, which includes the next of kin’s full name, relationship to the patient, address, and phone number.

# Local Doctors

Patients are normally referred to the hospital by their local doctor. The details of local doctors are held, including their full name, clinic number, clinic address, and clinic phone number. The clinic number is unique throughout the U.K.

# Patient Appointments

When a patient is referred to by his or her doctor, the patient is given an appointment for examination by a hospital consultant. Each appointment has a unique number. The details of each patient’s appointment are recorded and include the name and staff number of the consultant undertaking the examination, the date and time of the appointment, and the examination room.

As a result of the examination, the patient is either recommended to attend the outpatient clinic or is placed on a waiting list until a bed can be found in an appropriate ward.

# Outpatients

The details of outpatients are stored and include the patient number, name (first and last), address, phone number, date of birth, sex, and the date and time of the appointment at the outpatient clinic.

# Inpatients

The Charge Nurse and other senior medical staff are responsible for the allocation of beds to patients on the waiting list. The details of patients currently placed in a ward and those on the waiting list for a place on a ward are recorded. This includes the patient number, name (first and last name), address, telephone number, date of birth, sex, marital status, the details of the patient’s next-of-kin, the date placed on the waiting list, the ward required, expected duration of stay (in days), date placed in the ward, date expected to leave the ward, and the actual date the patient left the ward, when known. When a patient enters the ward, he or she is allocated a bed with a unique bed number.

# Patient Medication

When a patient is prescribed medication, the details are recorded. This includes the patient’s name and number, drug number and name, units per day, method of administration (for example, oral, intravenous (IV)), start and finish date. The medication (pharmaceutical supplies) given to each patient is monitored.

# Surgical and Nonsurgical Supplies

The Wellmeadows Hospital maintains a central stock of surgical (for example, syringes, sterile dressings) and non-surgical (for example, plastic bags, and aprons) supplies. The details of surgical and non-surgical supplies include the item number and name, item description, quantity in stock, reorder level, and cost per unit. The item number uniquely identifies each type of surgical or non-surgical supply. The supplies used by each ward are monitored.

# Pharmaceutical Supplies

The hospital also maintains a stock of pharmaceutical supplies (for example, antibiotics, and painkillers). The details of pharmaceutical supplies include drug number and name, description, dosage, method of administration, quantity in stock, reorder level, and cost per unit. The drug number uniquely identifies each type of pharmaceutical supply. The pharmaceutical supplies used by each ward are monitored.

# Ward Requisitions

When required, the Charge Nurse may obtain surgical, non-surgical, and pharmaceutical supplies from the central stock of supplies held by the hospital. This is achieved by ordering supplies for the ward using a requisition form. The information detailed on a requisition form includes a unique requisition number, the name of the member of staff placing the requisition, and the number and name of the ward. Also included is the item or drug number, name, description, dosage and method of administration (for drugs only), cost per unit, quantity required, and date ordered. When the requisitioned supplies are delivered to the ward, the form must be signed and dated by the Charge Nurse who initiated the order.

# Suppliers

The details of the suppliers of the surgical, non-surgical, and pharmaceutical items are stored. This information includes the supplier’s name and number, address, telephone, and fax numbers. The supplier number is unique to each supplier.

Here are some helpful figures illustrating the tables:





