

INFS1025

Data-Driven Web Technologies  
(DDWT)

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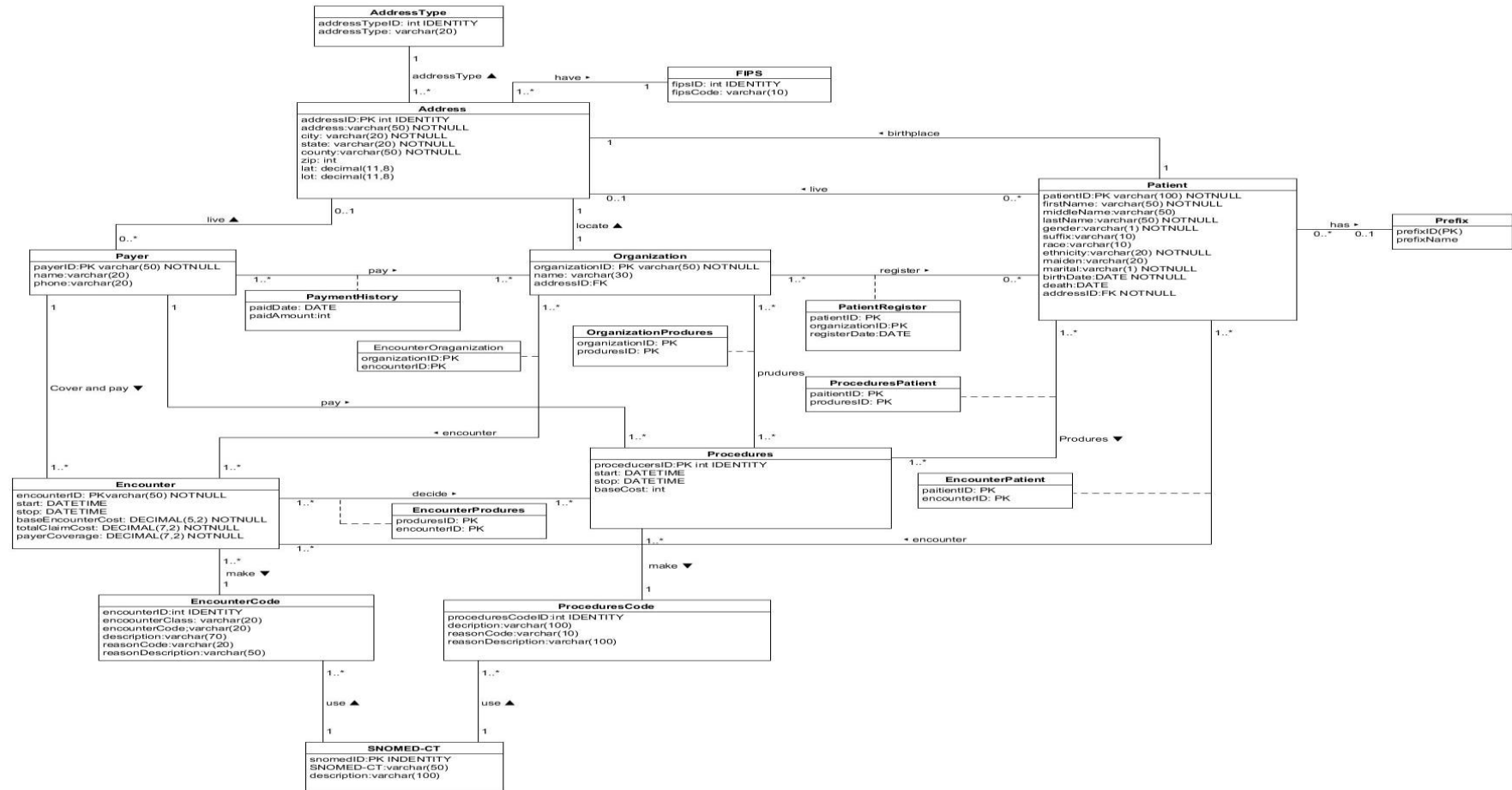
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## Introduction

This is assignment for DDWT. I make data-base for Massachussets General Hospital because the hospital manage data which are patient, procedures, encounters and payer by using excel spreadsheets. Also, Entity relationship diagram (ERD) which I make includes future requirements that the data-base share with other hospitals. Task1 show ERD for data-base. Task1-2 explain that justification for ERD. Task1-3 demonstrate that one example of justification from excel spreadsheets which is provided. Other tasks continue to other word files.

## Task1: Domain model



## Task1-2: Justification

The figure of entity relationships reflects requirement of data management for Massachusetts General Hospital. Also, more hospital may be interested in sharing their data so that Classes and Attributes are subdivided.

- The entity of Patient define information to identify each patient. Also, the Patient connect to entity of Address as zero to many that can manage address for each person. The Patient ID is the primary key and the Address ID is the foreign key. This maintains referential integrity and prevents data inconsistencies. The longest name in the world is 51 characters long, so I set varchar (50) as possibility.
- The entity of Address define detail of address. The Address connect to Patients as zero to many relationships, Organization as one to one relationship, Payer as zero to many relationships, FIPS and Address Type as many to one so that Payer, Organization also have address ID as foreign key which also maintains referential integrity. The Address Type define type of address such as workplace, and home address.
- The entity of Federal Information Processing Standard (FIPS) define code of FIPS. FIPS connect to Address as one to many relationships. The FIPS is a code for identifying geographical locations within the United States. When expanding in the future, the structure will need to be changed if it includes in the entity of Address, otherwise, it causes increasing value of NULL because it cannot be applied to addresses in other countries. It enhances scalability of the database.
- The entity of Organization define name of organization by using organization ID as primary key. The Organization connects to Payer, Procedures, Encounter, Patient and Address. Between Organization and Patient, I defined entity of PatientRegister to express many to many relationships which includes attribute of registerDate which enhance patient information to be more fulfilled. Also, it creates PaymentHistory entity between Payer which defines paid date and paid amount to express many to many relationships and provide payment history.

- The entity of Payer define name of insurance and phone number. One payer pays many times to organization which is many to many relationships between Organization as possibility. Also, it makes PaymentHistory to explain many to many relationships. It can analyze payer which can make business strategy and budget planning as needed. It also makes relationships to ProceduresCost and EncounterCost as one to many because one payer has many paymentst as possibility which enhance referential integrity.
- The entity of Procedures define start date, stop date and cost. One procedure has many patients which means many to many relationships with patient. Also, one procedure has many encounters so that is many to many relationships.
- The entity of Encounter define start date, stop date and encounter cost. Also, one encounter has many patients, one patient has many encounters so that makes many to many relationships.
- The entity of EncounterCode and ProceduresCode are made by Encounter and Procedures. It can enhance referential integrity. Also, these quote or use SNOMED-CT CODE when it identifies. SNOMED-CT changes frequently so that it is divided to manage easily such as update, insert and delete.

### Task1-3: Normalisation

Choose Payer table from excel spreadsheets.

#### First normal form

We need to check three things that are Atomicity and Uniqueness of Rows and No Repeating Groups.

Atomicity: This means to separate information such as name for name and address for address. In the Payer table, it doesn't have like this so that is fine.

Uniqueness of Rows: Each row in a table cannot be exactly the same as the others. In the Payer table, Payer ID has unique number that can be primary key which guarantee uniqueness of rows.

No repeating groups: means that do not repeat similar information side by side like name1. Name2. Name3. In the table, it does not have similar information so that is fine.

#### Second normal form

First of all, it is required to satisfy requirement of first normal form so that is fine.

Secondly, it needs to check partial dependency. It usually has composite primary keys.

In the table, it does not have composite primary keys so that is fine.

#### Third normal form

First of all, it is required to satisfy requirement of second normal form so that is fine.

Secondly, it needs to check transitive dependency which occurs when a non-key attribute depends on another non-key attribute that is depends on the primary key. It does not have transitive dependency.

However, it can see data redundancy in the address. In terms of third normal form viewpoint, the same address appears in multiple records should be divided to another table.

Therefore, it makes address table to satisfy third normal form requirements.