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# 1 – Introduction

There are various complex processes that need to be performed in a hospital, which are related to a patient, like receiving a patient, recording the basic information of a patient… With a database system, the processes would be greatly simplified. A complete understanding of the business concerned with patient would be of a great help to the database system design. Therefore, we provide this document to describe the business requirements.

# 2 – System Overview

The system contains 23 entities in total. They are:

1. Patient
2. Insurance Plan
3. Surrogate
4. Allergy
5. Immunization
6. Disability
7. Medical History
8. Address
9. AddressType
10. Event
11. Accident
12. Inpatient
13. Doctor
14. Doctor List
15. Staff
16. Staff List
17. Prescription
18. Medication Details
19. Procedure Cost
20. Test Details
21. Test Image
22. Test Standard
23. Vital Set

The high level diagram of these entities is shown below:

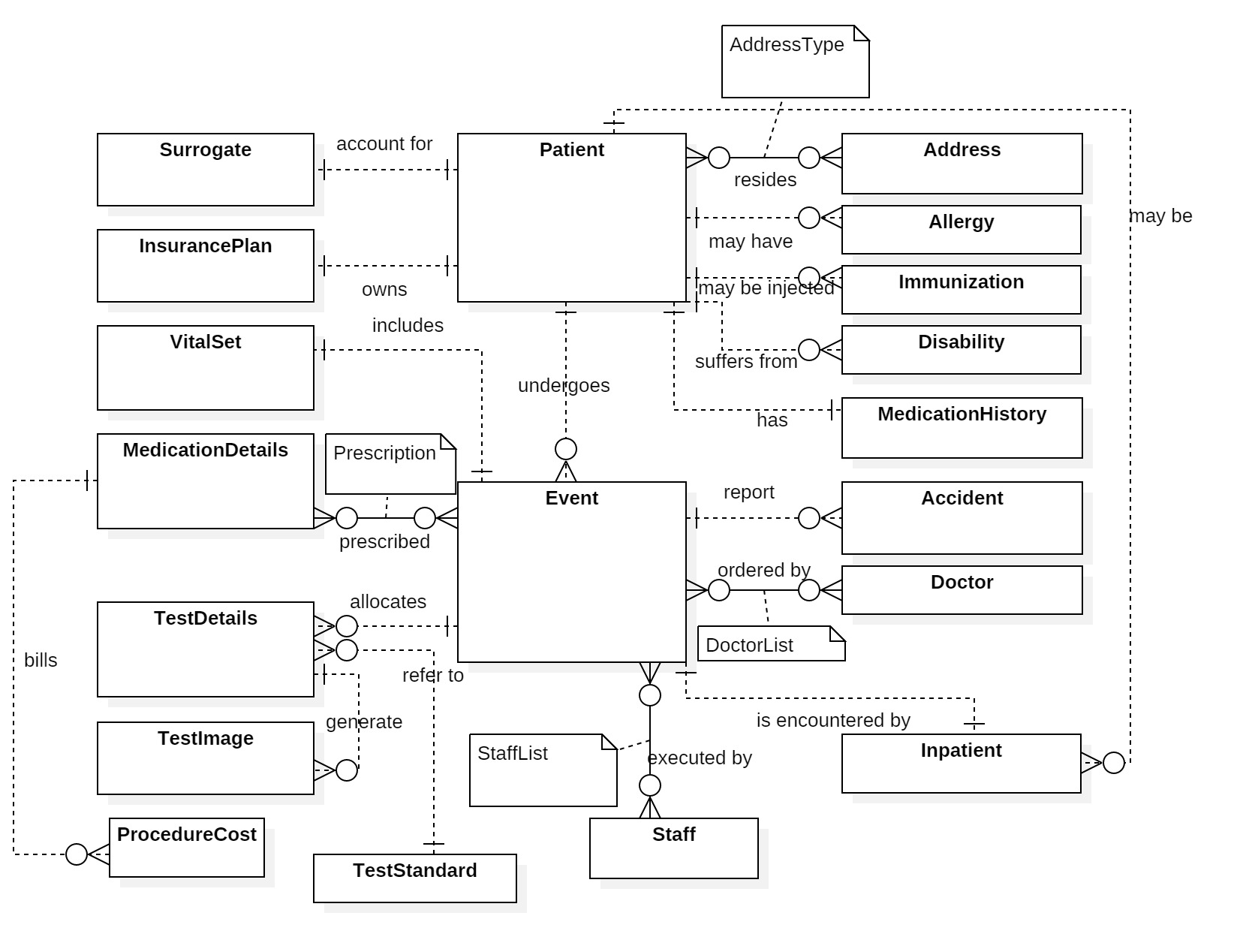


Figure 1: High level diagram of the system

# 3 – Scope Definition

## In Scope Item

|  |  |
| --- | --- |
| **Serial No.** | **Scope item description** |
| IS001 | Record patient information: patient ID, name, date of birth, gender, allergies, existing conditions. **(Patient Entity, Allergy Entity and Medical History Entity)** |
| IS002 | Family history information needs to be recorded. **(Patient Entity)** |
| IS003 | A link to the healthcare proxy is needed if available. **(Patient Entity)** |
| IS004 | Primary Care Physician (PCP) information is managed in the system. **(Patient Entity)** |
| IS005 | Insurance information should be managed as part of the system. Insurance information consists of insurance plan ID, insurance plan details and insurance duration. **(Insurance Plan Entity)** |
| IS006 | Surrogate's information should be recorded. **(Surrogate Entity)** |
| IS007 | The system will record immunization detail of the patient. **(Immunization Entity)** |
| IS008 | Disabilities information will be housed. **(Disability Entity)** |
| Continue | |
| **Serial No.** | **Scope item description** |
| IS009 | Patient’s medical history should be considered. **(Medical History Entity)** |
| IS010 | The address of the patient needed to be considered. **(Address Entity and Address Type Entity)** |
| IS011 | There should be an entity that can house the detail of things happened to the patient in the hospital. **(Event Entity)** |
| IS012 | Injury of the patient like work injury should be stored in a separated table. **(Accident Entity)** |
| IS013 | Location of the patient while staying in the hospital. **(Inpatient Entity)** |
| IS014 | Record doctor information: National Provider Id (NPID), Doctor's First and Last Name, Contact Information. **(Doctor Entity and Doctor List Entity)** |
| IS015 | Consider the information of the staff that associated with the patient. The information should contain: staff ID, staff’s first name and last name, contact number, etc. **(Staff Entity and Staff List Entity)** |
| IS016 | Medication details should be recorded. **(Medical Details Entity and Prescription Entity)** |
| IS017 | House information about medical procedure and procedure cost. **(Procedure Cost Entity)** |
| IS018 | Test Results captured from blood/pathology and radiology tests, etc., with values like: range (low/high of the test), test Image (type, size). **(Test Details Entity, Test Image Entity and Test Standard Entity)** |
| IS019 | There should be an entity that can house patient’s vital signs. Vital signs contain: Heart rate, Respiratory Rate, Blood Pressure, Date of the record. **(Vital Set Entity)** |

## Out of Scope Item

|  |  |
| --- | --- |
| **Serial No.** | **Scope item description** |
| OS001 | Inventory is not managed as part of the system. |
| OS002 | Claim history is not in scope. |
| OS003 | Entities to hold patient appointment schedules (date & time, doctor name), which can both search and arrange appointments are out of scope. |
| OS004 | Doctor’s experience is not considered in the system. |
| OS005 | Don’t need to record the information about the food provided to the patient. |
| OS006 | Table to store the data for the levels of patient care, such as emergency, or normal level is not needed. |
| OS007 | History based rate cards for continuing patients is not considered in the system. |
| OS008 | Schedule regular checkups for patients according to their age slot. |
| OS009 | The severity of allergies is out of scope. |
| OS010 | Specialization of the doctor is out of scope. |
| OS011 | Credit card information is not in scope of the system. |
| OS012 | Do not record SSN information. |
| OS013 | The relation between family members is not need to consider. |

# 4 – Entities

## Patient

A patient is defined as the person that has a history of medical records and may be admitted to the hospital in case of emergency. This entity will house all the basic details of the patient.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| PatientID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new patient. |
| PFirstName | Character(10) | No |  | A common first name that the patient is referred to by staff and doctor. |
| PLastName | Character(10) | No |  | A common last name that the patient is referred to by staff and doctor. |
| DOB | Date | No |  | Date of Birth of the patient. If we don’t know the exact date store it as 1/1/Year. |
| Gender | Character(10) | No |  | Gender of the patient. |
| PrimaryCarePhysician | Character(35) | Yes |  | Name of the Primary Care Physician of the patient. There should be a space between first name and last name. In case of the patient has not been assigned a PCP, this attribute can be null. |
| Contact | Character(10) | Yes |  | Record a contact number where the patient can be reached. |
| HealthcareProxyFormLink | Varchar(500) | Yes |  | The link to the Healthcare proxy form. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| PatientID | 78953451 | 78953452 | 78953453 |
| PFirstName | Ron | Show | Jane |
| PLastName | David | Johnson | Edson |
| DOB | 1/1/2015 | 1/12/2011 | 2/2/2015 |
| Gender | Male | Female | Male |
| PrimaryCarePhysician | Jason Mraz | null | Steve Jobs |
| Contact | 7475981 | null | 74864146 |
| HealthcareProxyFormLink | [www.legalnature.com/lp/hpro/healthcare-proxy](http://www.legalnature.com/lp/hpro/healthcare-proxy) | [www.legalnature.com/lp/lthcare-proxy](http://www.legalnature.com/lp/hpro/healthcare-proxy) | [www.legalnature.com/lp/hprosefse/e-proxy](http://www.legalnature.com/lp/hprosefse/e-proxy) |

## Insurance Plan

The insurance plan that owned by the patient. This entity will house the detail of the insurance plan.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| InsurancePlanID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new insurance plan record. |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| InsuranceCompany | Character(50) | No |  | The companies that provide insurance to the patient. |
| InsuranceNumber | Integer | No |  | The number of the insurance. The number of different company can be the same. |
| InsurancePlanDetails | Varchar(Max) | No |  | The details of the insurance plan. |
| EffectiveDate | Date | No |  | The plan’s effective date. |
| ExpiryDate | Date | No |  | The expiry date of the plan. Must larger than effective dates and the day the patient go to the hospital. |

**Sample Data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| InsurancePlanID | 4353451 | 4353452 | 4353453 | 4353454 |
| PatientID | 6568484 | 6568484 | 6568484 | 6568484 |
| InsuranceCompany | AG Insurance | Asurion | EFU Life | CGM Gallagher |
| InsuranceNumber | 34543857 | 2345245 | 9875243 | 987589347 |
| InsurancePlanDetails | Monthly Premium:$170.59. Annual Deductible:Part A: $1,288 Part B: $166. Doctor/Hospital Choice: Any Doctor or medical provider that accepts Medicare. Office Visit: No charge after Part B deductible. Out-of-Pocket Max: No Limit. | a. $4,900 for services you receive from in-network providers. b. $4,900 for services you receive from any provider. Your limit for services received from in-network providers will count toward this limit. | Deductible Individual: $3,000.Coinsurance: 20% after deductible. Coinsurance Limit: $0. Maximum Lifetime Coverage: $100,000. Out of Pocket Limit: $10,000. | Deductible Individual: $5,000.Coinsurance: 20% after deductible. Coinsurance Limit: $0. Maximum Lifetime Coverage: $100,000. Out of Pocket Limit: $10,000. |
| EffectiveDate | 1/1/2010 | 1/2/2010 | 1/3/2010 | 1/4/2010 |
| ExpiryDate | 3/1/2015 | 6/1/2015 | 7/1/2015 | 7/11/2015 |

## Surrogate

Details of the information of the patient’s surrogate. He/she is authorized to take decisions on behalf of the patient in case of emergency.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| SurrogateID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new surrogate. |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| SFirstName | Character(10) | No |  | The first name of the surrogate. |
| SLastName | Character(10) | No |  | The last name of the surrogate. |
| Contact | Character(10) | Yes |  | Records a contact number where the surrogate can be reached. |

**Sample Data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SurrogateID | 8377489 | 8377490 | 8377491 | 8377492 |
| PatientID | 34243 | 2435435 | 14532 | 4756 |
| SFirstName | Pet | Rocky | Lily | Jon |
| SLastName | Smith | Bryant | Bush | Zhang |
| Contact | 6174587949 | 6924607912 | 6924607912 | 6748289124 |

## Allergy

The allergies a patient may have.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| AllergyID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new Allergy record. |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| AllergyName | Character(50) | No |  | The exact name for the type of allergy. |
| AllergyDesc | Varchar(500) | Yes |  | The description that the allergy may be described. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| AllergyID | 9234234 | 9234235 | 9234236 |
| PatientID | 2234234 | 23453454 | 9235243 |
| AllergyName | Adenoids | Hay fever | Anaphylaxis |
| AllergyDesc | An exaggerated response to a substance produced by the release of histamine. | Allergic reaction caused by the pollens. | Severe, life-threatening allergic response. |

## Immunization

The immunization a patient had in the past. This entity will house the details of the immunization.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| ImmunizationID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new Immunization record. |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| ImmunizationName | Character(50) | No |  | The exact name for the type of immunization. |
| ImmunizationDesc | Varchar(500) | Yes |  | The description that the immunization may be described. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| ImmunizationID | 045656 | 045657 | 045658 |
| PatientID | 2246839 | 869734 | 346579 |
| ImmunizationName | Pertussis vaccine | Measles Vaccine | Pertussis vaccine |
| ImmunizationDesc | A vaccine that protects against whooping cough. | A vaccine that is very effective at preventing measles. | A vaccine that protects against whooping cough. |

## Disability

The disability a patient may suffer. This entity will house the details of the patient’s disability information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| DisabilityID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new disability record. |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| DisabilityName | Character(50) | No |  | The exact name for the type of disability. |
| DisabilityDesc | Varchar(500) | Yes |  | The description that the disability may be described. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| DisabilityID | 2678678 | 2678679 | 2678680 |
| PatientID | 23456 | 434566 | 9345635 |
| DisabilityName | Deaf | Blind | Idiot |
| Continue | | | |
| DisabilityDesc | null | A person cannot see anything. | A person with an IQ of 0–30. |

## Medical History

This entity is defined as the medical history a patient may have in the past.This entity will house details about the existing condition, family history and past surgery.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| MedicalHistID | Integer | No | PK | Unique identifier assigned by the system increments by one for each medical history. |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| ExistingConditions | Varchar(500) | No |  | The existing condition for each medical history. In case of new born, record “No medical history”. |
| FamilyHistory | Varchar(max) | Yes |  | The family medical history a patient may have. If not know the family history, record ”Family history not knows”. |
| PastSurgery | Varchar(500) | Yes |  | The past surgery a patient may take. If the patient doesn’t have past surgery, record “No past surgery”. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| MedicalHistID | 222673 | 222674 | 222675 |
| PatientID | 224523 | 2453464 | 9346346 |
| ExistingConditions | Having a fever. Body temperature: 39 C. | No obvious symptom. | Left eye injury. |
| FamilyHistory | Family history not knows. | Grandfather has Heart Disease. | Father has diabetes. |
| PastSurgery | No past surgery. | Heart pass. | Bone marrow transportation. |

## Address

The Address that the patient resides. This entity will house all details about the patient’s address.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| AddressID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new Address. |
| Continue | | | | |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| Street | Varchar(100) | No |  | Patient’s address-street name. |
| City | Character(20) | No |  | Patient’s address-city name. |
| State | Character(2) | No |  | Must be a standard US Postal State Code of 2 digits as defined by US Postal Service.  <http://pe.usps.gov/text/pub28/28apb.htm> |
| Zip | Character(10) | No |  | Must be a 5-digit Number or a 5-digit number followed by a hyphen and a 4-digit number. |
| AddressType | Character(20) | No |  | The type of the address, work address or home address. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| AddressID | 1453453 | 1453454 | 1453455 |
| Street | 37 Stephen St | 24 Stephen St | 75 Alphonsus St |
| City | Boston | Los Angeles | New York |
| State | MA | CA | NJ |
| Zip | 02114 | 02345 | 02115 |

## Address Type

The bridge-table that connected patient and address table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| AddressID | Integer | No | PFK | Unique identifier assigned by the system increments by one for each new Address. |
| PatientID | Integer | No | PFK | Unique identifier assigned by the system increments by one for each new patient. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| AddressID | 678678 | 678679 | 678680 |
| Patient ID | 223452345 | 234527644 | 1258799 |

## Event

The event is defined as the things happened in the hospital related to the patient.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| EventID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new event. |
|  |  |  |  |  |
| Continue | | | | |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| EventDate | Datetime | No |  | The exact date time of the event happens. |
| EventType | Character(20) | No |  | The type of the event. |
| Location | Varchar(50) | Yes |  | Location where the event is scheduled. If the event is related to an inpatient, then it may be empty. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| EventID | 1345345 | 1345346 | 1345347 |
| PatientID | 942695814 | 74678514 | 46014 |
| EventDate | 11/11/2014  15:22:45 | 02/12/2015  12:07:12 | 1/1/2015  22:35:17 |
| EventType | Visit | Blood Test | Physical Exam |
| Location | 308 Harward Building | 103 Endocrine Building | 101 Ell Building |

## Accident

Accident is defined as the injure the patient is suffered from. It can be work injury or non-work injury.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| AccidentID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new accident. |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| WorkInjury | Character(1) | No |  | Work injure is an indicator of the accident type. Record Y for work injury accident, N for non-work injury accident. |
| AccidentDesc | Varchar(500) | No |  | The description that the accident may be described. |
| EmployerName | Varchar(35) | Yes |  | If the accident is a work injury, then the employer’s name should be recorded. |
| EmployeeID | Integer | Yes |  | If the accident is a work injury, then the patient’s employee ID should be recorded. |

**Sample data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AccidentID | 89843 | 89844 | 89845 | 89846 |
| PatientID | 8377489 | 8442784172 | 78746974 | 482075 |
| WorkInjury | Y | N | N | Y |
|  |  |  |  |  |
| Continue | | | | |
| AccidentDesc | Fell down while walking on the street, and injured right leg. | Left thumb has been injured while working. | Car collision, injury on right leg. | Bruised left arm while working. |
| EmployerName | Blue cross | null | null | Apple |
| EmployeeID | 34534502 | null | null | 346304 |

## Inpatient

The patient who should be hospitalized in the hospital for a while. This entity will house the information related to the inpatient.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| InpatientID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new inpatient. |
| PatientID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new patient. |
| EventID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new event. |
| RoomNum | Integer | No |  | The number of the exact room which the inpatient should be in. |
| Floor | Integer | No |  | The number of the floor the inpatient should be at. |
| Building | Character(20) | No |  | The building name the inpatient should be in. |
| CheckInTime | DateTime | No |  | The exact check in time of the inpatient. |
| CheckOutTime | DateTime | Yes |  | Record the exact check out time if the inpatient can check out from the hospital. |

**Sample data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| InPatientID | 66054 | 66055 | 66056 | 66057 |
| EventID | 8377489 | 8442784172 | 78746974 | 482075 |
| RoomNum | 003 | 010 | 409 | 502 |
| Floor | 1 | 20 | 10 | 5 |
| Building | Inpatient 02 | Oncology 03 | Orthopedics 01 | Surgery 04 |
| CheckInTime | 2016-02-24 12:32:54 | 2014-04-30  16:43:40 | 2016-03-25  16:45:20 | 2016-04-01  02:24:30 |
| CheckOutTime | Null | 2016-04-14  15:30:35 | 2015-04-14  12:30:38 | 2016-04-13  14:23:54 |

## Doctor

A person who treats the patient and prescribes medicines or assigns tests to the patient.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| NPID | Bigint | No | PK | A unique 10-digit identification number issued to health care providers in the United States by the Centers for Medicare and Medicaid Services (CMS). |
| DFirstName | Character(10) | No |  | A common first name that the doctor is referred to. |
| DLastName | Character(10) | No |  | A common last name that the doctor is referred to. |
| Contact | Character(10) | No |  | Records a contact number where the doctor can be reached. |

**Sample Data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NPID | 7672428945 | 2471427485 | 2746856348 | 2645626424 |
| DFirstName | Steve | Hudson | Ron | Jane |
| DLastName | David | Jon | Johnson | Shawn |
| Contact | 6178552469 | 6178552454 | 64272688852 | 764275287 |

## DoctorList

A bridge table that connected doctor and event.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| EventID | Integer | No | PFK | Unique identifier assigned by the system increments by one for each new event. |
| NPID | Bigint | No | PFK | A unique 10-digit identification number issued to health care providers in the United States by the Centers for Medicare and Medicaid Services (CMS). |

## Staff

Staff is defined as the person who will execute the event that related to the patient. This entity will house information that about all the staff.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| StaffID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new staff person. |
| StFirstName | Character(10) | No |  | A common first name that the staff is referred to. |
| StLastName | Character(10) | No |  | A common last name that the staff is referred to. |
| Contact | Character(10) | No |  | Records a contact number where the staff can be reached. |

**Sample Data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| StaffID | 8377489 | 8377490 | 8377491 | 8377492 |
| StFirstName | Pet | Rocky | Lily | Jon |
| StLastName | Smith | Bryant | Bush | Zhang |
| Contact | 6174587949 | 6924607912 | 6924607912 | 6748289124 |

## Staff List

A bridge table that connected staff and event.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| StaffID | Integer | No | PFK | Unique identifier assigned by the system increments by one for each new staff person. |
| EventID | Integer | No | PFK | Unique identifier assigned by the system increments by one for each new event. |

**Sample Data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| StaffID | 8377489 | 8442784172 | 78746974 | 482075 |
| EventID | 28482646 | 2746 | 72248779 | 1354657 |

## Prescription

A bridge table that connected medication details and event.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** | |
| EventID | Integer | No | FK | | Unique identifier assigned by the system increments by one for each new event. |
| MedicationDetailID | Integer | No | PK | | Unique identifier assigned by the system increments by one for each new medication. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| EventID | 28482646 | 28482647 | 28482648 |
| MedicationDetailID | 109548 | 109543 | 109549 |

## Medication Details

Details of the medication prescribed to the patient by the doctor.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** | |
| MedicationDetailID | Integer | No | PK | | Unique identifier assigned by the system increments by one for each new medication. |
| Dosage | Character(20) | Yes |  | | A dosage is the amount of a medicine or drug that someone takes or should take. |
| MedicationName | Varchar(500) | Yes |  | | A common name that the medication is referred to. |
| MedicineType | Varchar(50) | Yes |  | | The type of the medicine. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| MedicationDetailID | 837591 | 837592 | 837593 |
| Dosage | 2 caplets/day | 5 tablets/day | 1 injection/day |
| MedicationName | TYLENOLÆ 8 HR Extended-Release Caplets | Betamethasone | Morphine |
| MedicineType | Muscle relaxants | Nonsteroidal anti-inflammatory drugs (NSAIDs) | Anti-anxiety drugs |

## Procedure Cost

The procedure cost is defined as the money the patient should pay to the hospital for each procedure he/she has taken. This entity will house every detail related to the cost.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| CostID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new cost. |
| MedicationDetailID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new medication detail. |
| Amount | Money | No |  | The amount of money that the patient should pay to the hospital. |
| CostType | Varchar(20) | No |  | The type of the cost. |

**Sample data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CostID | 231 | 232 | 233 | 234 |
| MedicationDetailID | 8377489 | 8442784172 | 78746974 | 482075 |
| Amount | $123 | $333 | $2423 | $2352 |
| CostType | Clinic | Hospital | Skilled Nursing | Clinic |

## Test details

This entity is defined as the details of the test that was assigned to the patient by the doctor.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| TestID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new test. |
| EventID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new event. |
| StandardID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new test standard. |
| TName | Varchar(50) | No |  | The exact name that the test is referred to. |
| TestResults | Varchar(10) | No |  | Results of the test performed, values could be absent in case tests have not been performed yet. In case the result is positive or negative, record “Positive” for positive result and “Negative” for negative result. |
| Value | Character(10) | No |  | Comparison of the normal test result, Like: High, Low, and Normal etc. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| TestID | 385741 | 385742 | 385743 |
| EventID | 28482646 | 3242746 | 72248779 |
| StandardID | 13423 | 64564 | 23423 |
| TName | Blood Test-WBC | Blood Test-RBC | Analysis of Urine-WBC |
| TestResults | 5.0 | 3,70 | 5 |
| Value | Normal | Low | High |

## Test Image

Image of the test that was assigned to the patient by the doctor. This entity will house all details that related to the test image.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| ImageID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new image. |
| TestID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new test. |
| ImageName | Varchar(35) | No |  | The name that the image is referred to. |
| ImageType | Character(15) | No |  | The type of the image. |
| ImageSize | Decimal(12,2) | No |  | The size number of the image |
| Unit | Character(10) | No |  | The unit of the image size. |
| ImageLink | Varchar(500) | No |  | The exact image link. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| ImageID | 135645 | 135646 | 135647 |
| TestID | 323423 | 32445 | 365464 |
| ImageName | X-Ray | B ultrasound | color doppler ultrasound |
| ImageType | jpg | png | bmp |
| ImageSize | 123 | 544 | 64.65 |
| Unit | m | mb | kb |
| ImageLink | [www.ethealth\_XRay.jpg](http://www.ethealth_XRay.jpg) | [www.Ehealth\_2132.BUltra.png](http://www.Ehealth_2132.BUltra.png) | [www.health\_34234.cdu.bmp](http://www.health_34234.cdu.bmp) |

## Test Standard

The test standard is defined as the standard result of a certain test. The test result of the patient can refer to them.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute Name** | | **Data Type** | **Null** | **Key** | **Definition** |
| StandardID | Integer | | No | FK | Unique identifier assigned by the system increments by one for each new test standard. |
| TestName | Varchar(50) | | No |  | A common name that the test is referred to. |
| TestItem | Varchar(10) | | No |  | The specific item of the test. |
| LowRange | Integer | | No |  | The lowest range of the test should be. |
| HighRange | Integer | | No |  | The highest range of the test should be. |
| Unit | | Character(10) | No |  | The unit of the test value. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| StandardID | 13421 | 13422 | 13423 |
| TestName | Blood Test | Blood Test | Blood Test |
| TestItem | WBC | RBC | HGB |
| LowRange | 4.0 | 4.2 | 12.0 |
| HighRange | 11.0 | 5.4 | 16.0 |
| Unit | K/MM3 | M/MM3 | GM/DL |

## Vital Set

The vital signs of the patient.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| VitalRecordID | Integer | No | PK | Unique identifier assigned by the system increments by one for each new vital record. |
| EventID | Integer | No | FK | Unique identifier assigned by the system increments by one for each new event. |
| HeartRate | Integer | No |  | Heart rate of patient. |
| Continue | | | | |
| **Attribute Name** | **Data Type** | **Null** | **Key** | **Definition** |
| RespiratoryRate | Integer | No |  | Respiratory rate of patient. |
| BloodPressure | Integer | No |  | Recorded blood pressure of patient. |
| Date | DateTime | No |  | Date and Time at which the vitals were records. |

**Sample Data**

|  |  |  |  |
| --- | --- | --- | --- |
| VitalRecordID | 836541 | 836542 | 836543 |
| EventID | 72462744 | 7752648746 | 742674 |
| HeartRate | 78 | 79 | 97 |
| RespiratoryRate | 79 | 86 | 68 |
| BloodPressure | 89 | 78 | 76 |
| Date | 11/11/2015  12:12:12 | 12/12/2015  12:12:12 | 1/1/2015  12:12:12 |

# 5 – Relationships

1. **Patient->Resides->Address (m:n).**

One patient can resides in many addresses. An address can be resided by many patients. PatientID and AddressID act as the primary foreign key constraint for this relationship.

1. **Patient->account for-> Surrogate (1:1).**

One patient can be accounted by only one surrogate. PatientID acts as the foreign key constraint for this relationship.

1. **Patient->may have->Allergy (1:m)**

One patient may have many allergies. PatientID acts as the foreign key constraint for this relationship.

1. **Patient->may be injected->Immunization (1:m).**

One patient may be injected of many immunizations. PatientID acts as the foreign key constraint for this relationship.

1. **Patient->suffers from->Disability (1:m).**

One patient may have many disabilities. PatientID acts as the foreign key constraint for this relationship.

1. **Patient->has->Medical History (1:1).**

One patient can has only one medical history. PatientID acts as the foreign key constraint for this relationship.

1. **Patient->may be->Inpatient (1:1).**

One patient may be an inpatient. PatientID acts as the foreign key constraint for this relationship.

1. **Patient->suffers from->Accident (1:m).**

One patient can suffer from many accidents. PatientID acts as the foreign key constraint for this relationship.

1. **Patient->owns->Insurance Plan (1:1).**

One patient owns only one insurance plan in the scope of this database. PatientID acts as the foreign key constraint for this relationship.

1. **Patient->undergoes-> Event (1:m).**

One patient can undergo many events. PatientID acts as the foreign key constraint for this relationship.

1. **Event->report->Accident (1:m).**

One event may report many accidents. PatientID acts as the foreign key constraint for this relationship.

1. **Event->ordered by ->Doctor (m:n).**

One event can be ordered by different doctors. One doctor can order many events. EventID and NPID act as the primary foreign key constraint for this relationship.

1. **Event->executed by->Staff (m:n).**

One event can be executed by many staffs. A staff may execute many events. EventID and StaffID act as the primary foreign key constraint for this relationship.

1. **Event->encountered by->Inpatient (1:m).**

One event can be encountered by one inpatient at one time. EventID acts as the foreign key constraint for this relationship.

1. **Event->allocate->Test Details (1:m).**

One event can allocate different tests to a patient. EventID acts as the foreign key constraint for this relationship.

1. **Event->prescribes->Medication Details (m:n).**

One event can prescribe different medications to a patient. A medication detail can be prescribed by many events. EventID and MedicationDetailID act as the primary foreign key constraint for this relationship.

1. **Event->includes->Vital Set (1:1).**

One event includes only one set of vitals. PatientID acts as the foreign key constraint for this relationship.

1. **Test Details->generate->Test Image (1:m).**

One test detail may generate many test images. TestID acts as the foreign key constraint for this relationship.

1. **Test Details-> refer to->Test Standard (m:1).**

Many test details may refer to one test standard. StandardID acts as the foreign key constraint for this relationship.

1. **Medication Details-> bills ->Procedure cost (1:m).**

One medication detail can bill different procedure cost. MedicationDetailID acts as the foreign key constraint for this relationship.

# Abbreviations

* SSN= Social Securety Number
* ID= IDentification
* DOB = Date Of Birth
* PCP= Primary Care Physician
* NPID= National Provider Identifier
* Desc= Desrciption
* WBC= White Blood Cell
* RBC= Red Blood Cell
* HGB= Hemoglobin