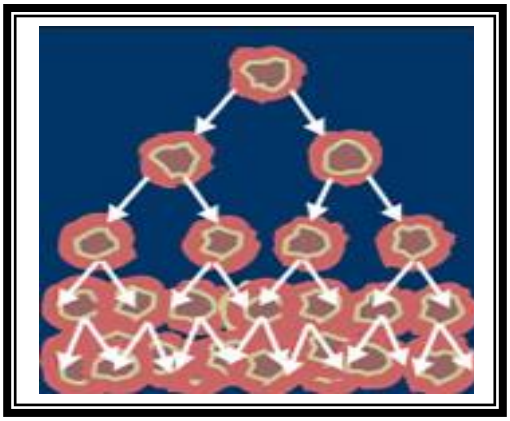


DATABASE MANAGEMENT SYSTEM

Submitted by:

- Durr-e-Nayab 551
- Kashuf Hameed 557
- Saba Bibi 563
- Shanza Tariq 538
- Anoosha Fatima 536

Submitted to:

- Ma'am Iffat Anjum

Report: Cancer Database Management System

Dated: 20-MAY-2019

CANCER DATABASE

INTRODUCTION:

"Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body. These contrast with benign tumors, which do not spread."

In this database we illustrate different stages of a cancer, its symptoms, treatments and factors that cause cancer.

CARCINOMA:

Stage 0: This is used to describe cancer in situ, which literally means "in place." Cancers at this stage are identified according to the location where they initially emerged and multiplied. However, the resulting tumor has not yet spread to nearby tissue.

EARLY STAGE:

This describes a small cancerous tumor that has spread to nearby tissue but not beyond – such as the blood stream or lymph system.

STAGE II &III:

These stages are known as "regional spread" cancers. They indicate that the cancer has expanded and will have embedded itself more deeply into the surrounding tissue.

METASTAIC CANCER:

When cancer spreads from the initial site to other organs or areas of the body, it is referred to as "distant spread" cancer, advanced cancer, or metastatic cancer.

There are some factors that cause cancer:

MUTATION:

Cancer is a genetic disease, resulting from a step-wise accumulation of mutations in genes that normally control cell growth. The majority of gene mutations involved in cancer are somatic, meaning that they are found only in that individual's cancer cells.

Mutation can be caused by many factors some of them are illustrated here:

- Somatic mutation
- Germ line mutation

INFECTIOUS AGENT:

Infectious agents, such as viruses and bacteria, are the causes of several common cancers. Infection with the bacterium Helicobacter pylori predisposes to gastric cancer.

HORMONES:

Hormones can cause breast cancer.

CHRONIC INFLAMMATION:

Chronic inflammation may be caused by infections that don't go away, abnormal immune reactions to normal tissues, or conditions such as obesity. Over time, chronic inflammation can cause DNA damage and lead to cancer.

We also describe treatment of cancer.

PROBLEM IDENTIFICATION AND SOLUTIONS:

In Pakistan, biopsy is usually used for the diagnosis of cancer, in which a part of tumor is taken from patient's body .This method has some consequence: for example, sometime, after biopsy, the rapid and abrupt growth of tumor can occur which can be fatal.

To avoid this we are aimed to develop such tools and software through which we could diagnose the cancer without biopsy.

SCOPE:

In order to prevent and control Cancers, there is need to establish the cancer recod. To data we do not have any National Cancer Registry which can provide the true nature of problem to formulate health policy. Ministry of NHSRC has designed PHRC (Pakistan Health Research Council) to establish a cancer recod by affiliating all major public and private sector hospitals of the country.

To date 08 hospitals are sending their data on quarterly basis to PHRC since May 2015.

OBJECTIVE:

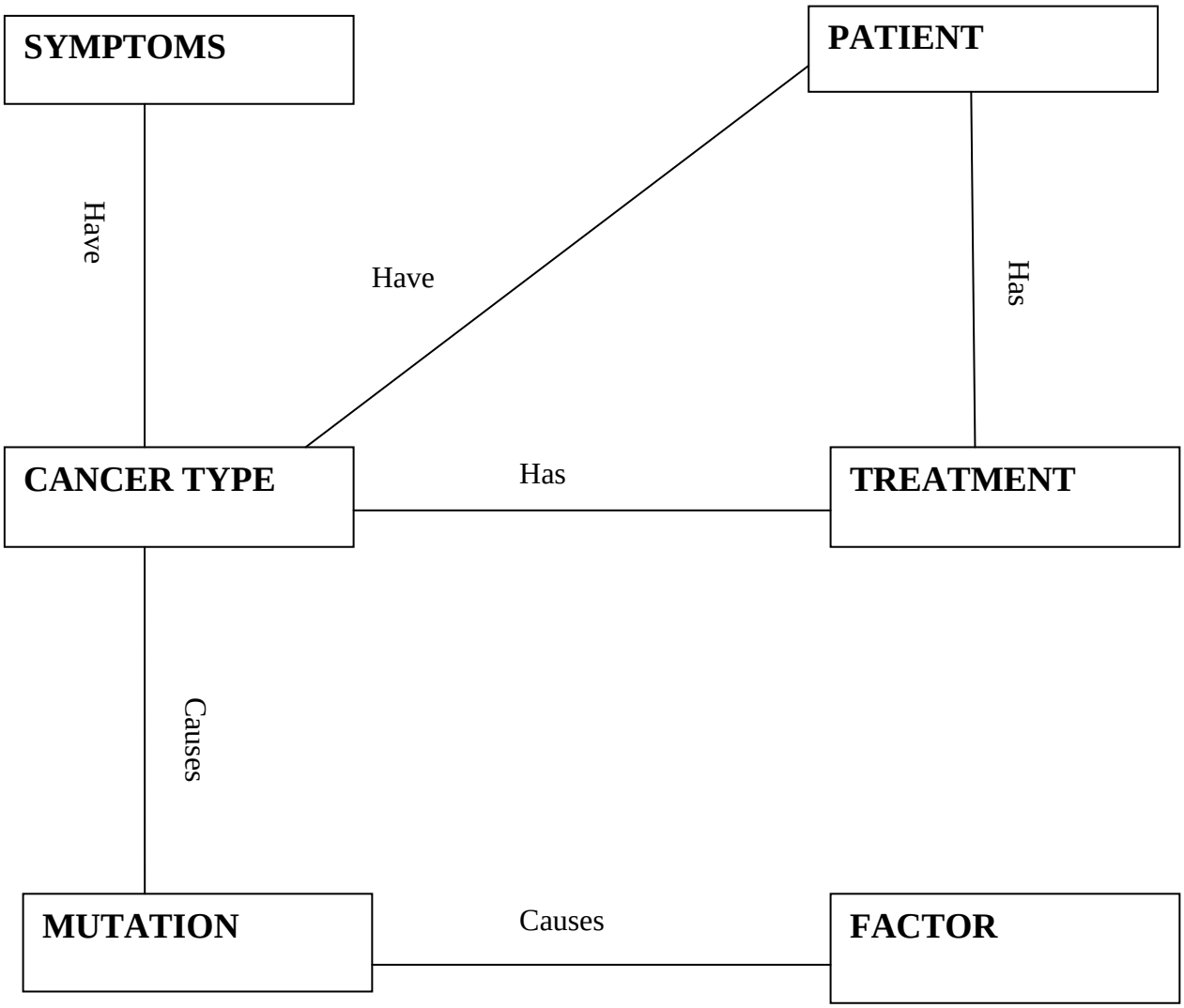
The main objective of this database is:

- The small amount of the data storing into the spreadsheet is fine, however it turn into larger amount of data then spreadsheet solution will not work.
- But in our case, we want to store the data about cancer which is in huge amount. When we want to recode the cancer data into spreadsheet which will creates problem of speed.

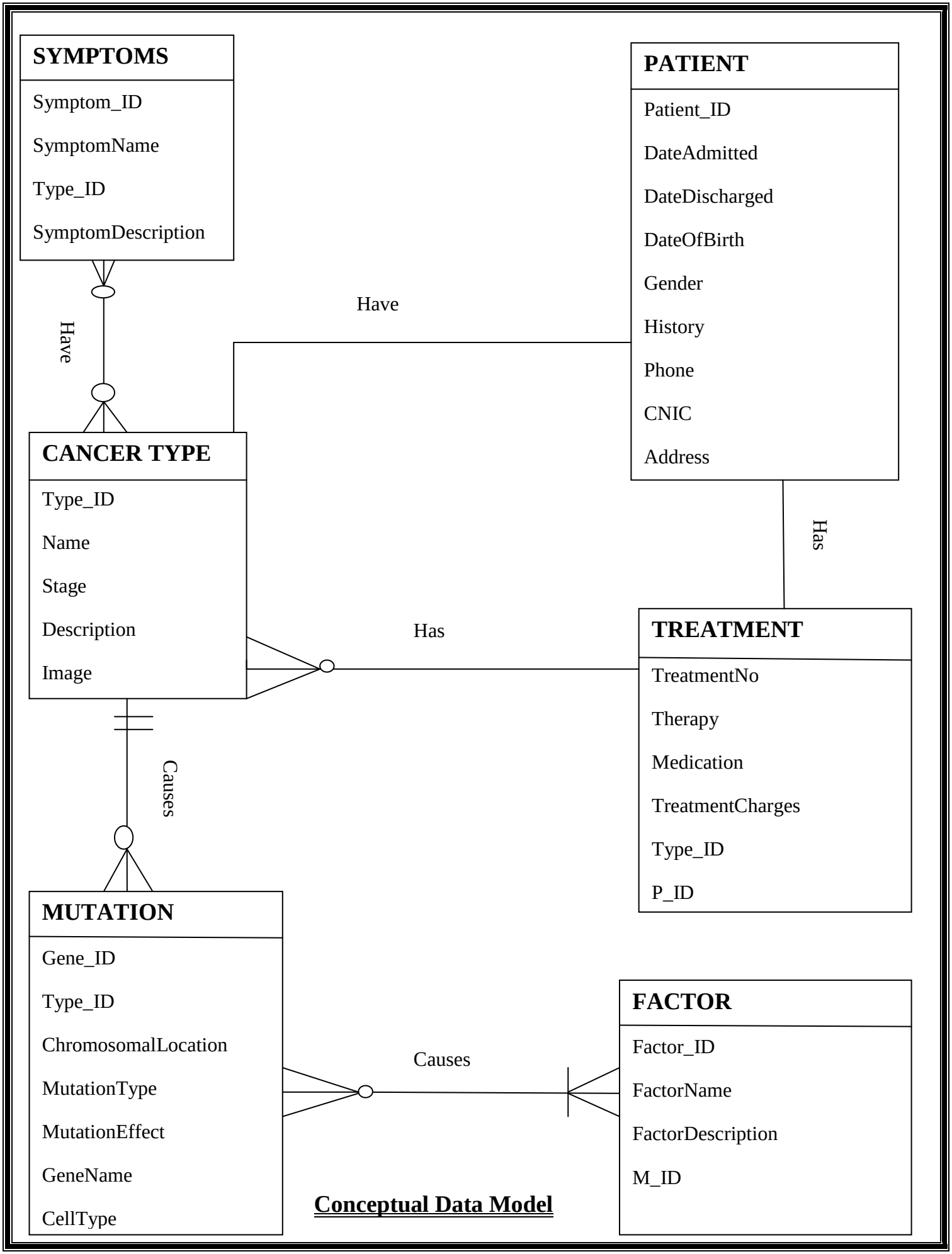
- When we want to retrieve the data it is very difficult to find it from the multiple spreadsheet files.
- When user doing data entry in files then it might be possible to incorrect data use due to no validation present like you can enter wrong spelling, wrong dates and wrong amount.
- So the data accuracy is hard to maintain. But data cannot be secure in case of file and spreadsheet.
- Data duplication is also possible. To solve all problems we need database. We can easily store a large amount of data in the database.
- Data is accessible to everyone so any one can add or update the data in the database.
- We can easily retrieve the data and no data redundancy is occurs.
- Data can be validates based on the business rules.

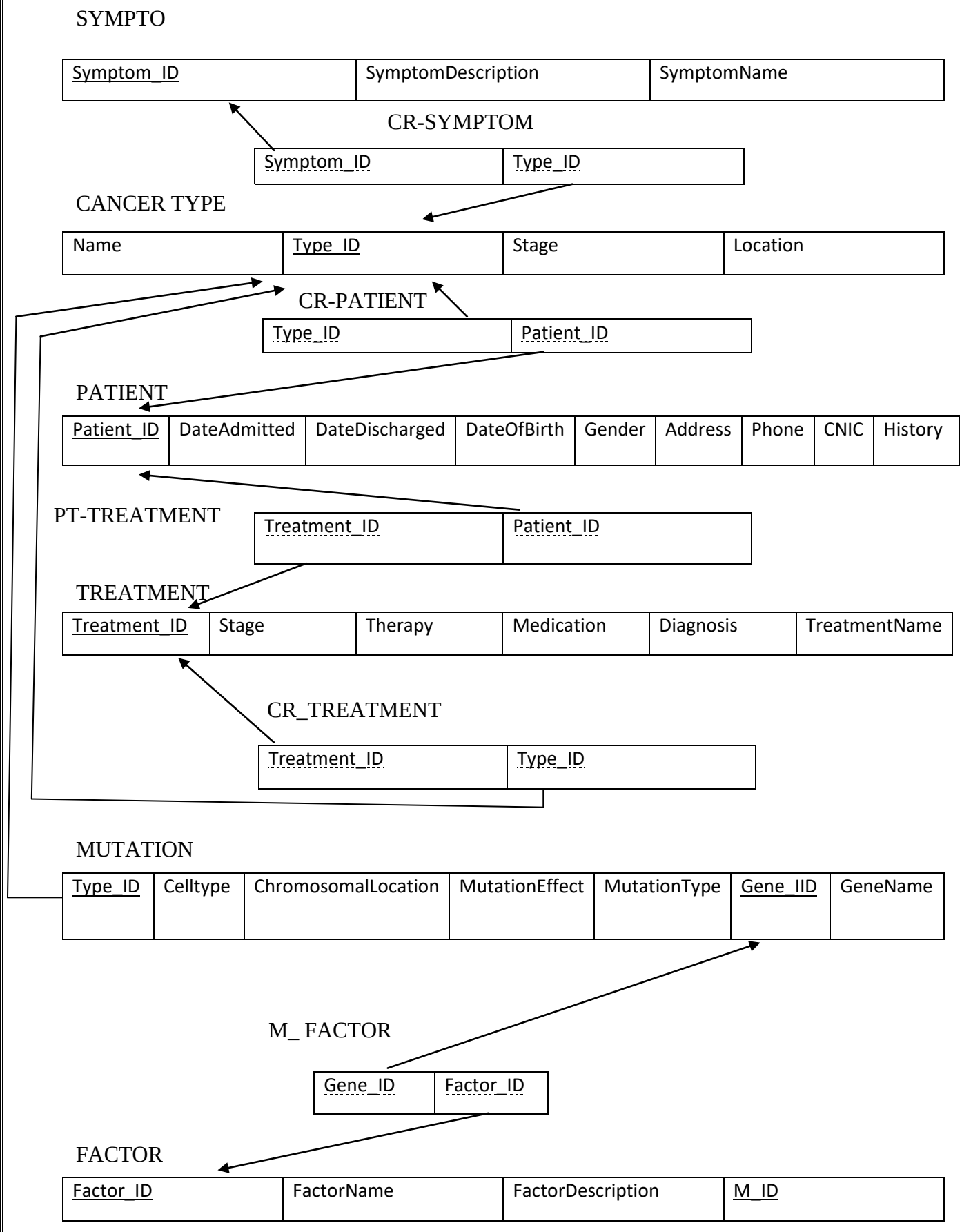
Business Rule:

- A symptom may have many cancer types.
- A cancer type may have many symptoms.
- A cancer type has a patient.
- A patient has a cancer type.
- A cancer type has a treatment.
- A treatment may have one or more cancer types.
- A patient has a treatment.
- A cancer type may have one or more mutations.
- A mutation can cause only one cancer type.
- A mutation is caused by one or more factors.
- A factor may cause one or more mutation.



Enterprise Data Model


SYMPTOMS
Symptom_ID
SymptomName
Type_ID
SymptomDescription
PATIENT
Patient_ID
DateAdmitted
DateDischarged
DateOfBirth
Gender
History
Phone
CNIC
Address
Have
Have
CANCER TYPE
Type_ID
Name
Stage
Description
Image
Has
Has
TREATMENT
TreatmentNo
Therapy
Medication
TreatmentCharges
Type_ID
P_ID
Causes
MUTATION
Gene_ID
Type_ID
ChromosomalLocation
MutationType
MutationEffect
GeneName
CellType
Causes
FACTOR
Factor_ID
FactorName
FactorDescription
M_ID
Conceptual Data Model



Logical Data Model

Queries:

Name	Uses	Function
Where	Use in symptom, cancer type and patient to get specific results	Use a WHERE clause to limit the results
Order By	Use in symptom, cancer type and patient to sort the result	Records are sorted in ascending and descending
Between	Use between symptom and cancer type to get a range	Between is used to get result in a range
Sum	Use in treatment to get the sum of the charges	Sum function returns the sum of a set of numeric values
Count	Use in treatment and patient	Count function returns the number of records in a select query.
Concatenation	Use in patient, mutation, mutation factor and cancer type	Concatenation multiple strings together into a single string with the & operator.
Delete	Use in symptom, cancer type, Patient, treatment	A DELETE query is an action query (SQL statement) that deletes a set of records according to criteria (search conditions) you specify.
Update	Use in treatment, patient, mutation and cancer type	An Update Query is an action query (SQL statement) that changes a set of records according to criteria (search conditions) you specify.
Insert	Use in cancer type, mutation, patient, factor and treatment	Pick the procedure you need based on what kind of object you want to change.

Queries:

There are many queries here some of them.

WHERE CLAUSE:

Example:

```
SELECT ("Due to " & [FACTOR].[FactorName] & "  "
 & [MUTATION].[Gene] & " mutation occur and lead to the
& [CANCER_TYPE].[Name]) AS ["FACTOR AND MUTATION"]
 FROM FACTOR,
CANCER_TYPE INNER JOIN MUTATION ON CANCER_TYPE.Type_ID = MUTATION.Type_ID
WHERE (((CANCER_TYPE.Name)=[ENTER CANCER NAME]));
```

2nd example:

```
SELECT ([MUTATION].[Gene] & " mutation is a risk factor for  "
 & [CANCER_TYPE].[Name] & "   and its mutation type  is  " &
 [MUTATION].[MutationType]) AS ["GENETIC RISK FACTOR OF CANCER"]
FROM CANCER_TYPE INNER JOIN MUTATION ON CANCER_TYPE.Type_ID = MUTATION.Type_ID
WHERE (((CANCER_TYPE.Name)=[ENTER CANCER NAME]));
```

Between:

Example:

```
SELECT CANCER_TYPE.Name, SYMPTOM.SymptomName, SYMPTOM.SymptomDescription
FROM SYMPTOM INNER JOIN CANCER_TYPE ON SYMPTOM.Type_ID = CANCER_TYPE.Type_ID
WHERE (((CANCER_TYPE.Name) Between "c%" And "l%"));
```

Sum:

Example:

```
SELECT Sum([TREATMENT].[TreatmentCharges]) AS [SUM of Charges]
FROM TREATMENT
WHERE (((TREATMENT.p_ID)=[enter patient id]));
```

Count:

Example:

```
SELECT Count(TREATMENT.Therapy) AS CountOfTherapy,
Count(TREATMENT.Medication) AS CountOfMedication,
Count(TREATMENT.Diagnosis) AS CountOfDiagnosis,
Count(TREATMENT.TreatmentCharges) AS CountOfTreatmentCharges,
Count(TREATMENT.[Patient name]) AS [CountOfPatient name]
FROM TREATMENT
HAVING (((Count(TREATMENT.Therapy)) Is Not Null) AND
((Count(TREATMENT.Medication)) Is Not Null) AND ((Count(TREATMENT.Diagnosis)) Is Not Null));
```

Concatenation:

Example:

```
SELECT (CANCER_TYPE.Name & " Is caused by Mutated "
 & MUTATION.Gene & " at Chromosomal location  " &
 MUTATION.ChoromosomalLocation & "."
& MUTATION.MutationType & "  occurs  "
& MUTATION.MutationEffect) AS ["Mutation And Cancer"]
FROM CANCER_TYPE INNER JOIN MUTATION
ON CANCER_TYPE.Type_ID = MUTATION.Type_ID
WHERE (((CANCER_TYPE.Name)=[enter cancer  type]));
```

Delete:

Example:

```
DELETE SYMPTOM.Symptom_ID, SYMPTOM.SymptomName,
SYMPTOM.Type_ID, SYMPTOM.SymptomDescription
FROM SYMPTOM
WHERE (((SYMPTOM.Type_ID)=[enter cancer type_id for which you want to delete symptoms]));
```

2nd example:

```
DELETE TREATMENT.TreatmentNo, TREATMENT.Therapy,
TREATMENT.Medication, TREATMENT.Diagnosis, TREATMENT.TreatmentCharges,
TREATMENT.Type_ID, TREATMENT.p_ID, TREATMENT.[Patient name]
FROM TREATMENT
WHERE (((TREATMENT.p_ID)=[enter patient id of the patient for which you want to delete treatment details]));
```

Update:

Example:

```
UPDATE TREATMENT SET TREATMENT.[Patient name] = [enter patient name],
TREATMENT.p_ID = [enter patient id], TREATMENT.Type_ID = [enter cancer type id],
TREATMENT.Therapy = [enter therapy], TREATMENT.Medication = [enter medication],
TREATMENT.Diagnosis = [enter diagnosis], TREATMENT.TreatmentCharges = [enter treatment charges]
WHERE (((TREATMENT.TreatmentNo)=[enter treatment no]));
```

2nd example:

```
UPDATE PATIENT INNER JOIN CANCER_TYPE ON PATIENT.Type_ID
= CANCER_TYPE.Type_ID SET PATIENT.DateDischarged = [enter new discharge date]
WHERE (((PATIENT.Patient_ID)=[enter patient id for which you want to update data]));
```

Insert:

Example:

```
INSERT INTO CANCER_TYPE ( Name, Description, [Image] )
SELECT [enter  Cancer name] AS Expr1, [enter description] AS Expr2, [add image] AS Expr3;
```

2nd example:

```
INSERT INTO FACTOR ( FactorName, FactorDescription, Type_ID, Mut_ID )
SELECT [enter Factor name] AS Expr1, [enter factor description] AS
Expr2, [enter cancer type id] AS Expr3, [enter mutation id] AS Expr4;
```

Forms:

Examples:

Some examples of forms.

SYMPTOM FORM

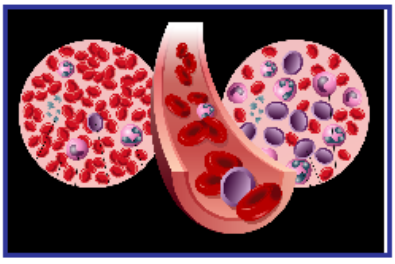
Symptom_ID	SymptomName	SymptomDescription	Type_ID
1	SWELLING	• Swollen lymph nodes, enlarged liver or spleen.	1
2	BLEEDING	• Easy bleeding or bruising. • Recurrent nosebleeds.	1
3	Physical and mental health issues	• Fever or chills. • Persistent fatigue, weakness. • Frequent or severe infections.	1
4	Spots and weight changing	• Tiny red spots in your skin (petechiae) • Losing weight without trying.	1
5	Lumps formation	A lump or mass in the breast.	2
6	Swelling	Swelling of all or part of the breast, even if no lump is felt.	2

CANCER_TYPE

Name: leukemia

Description: Leukemia is a cancer of the blood or bone marrow. Bone marrow produces blood cells.

Image:



TREATMENT FORM

TreatmentNo	Therapy	Medication	Diagnosis	TreatmentCharges	Type_ID	p_ID
1	Surgery to remove the tumor or Liver transplant	sofosbuvi	Blood tests	345	6	1
2	Heating cancer cells and Freezing cancer cells.	Simeprevir	Imaging tests.	300	6	
3	Injecting alcohol into the tumor, chemotherap y drugs into		Removing a sample of liver	2000	6	

PATIENT FORM

Patient_ID	DateAdmitted	DateDischarged	DateOfBirth	History	Type_ID	T_ID	Gender
1	2/3/2019	3/4/2019	4/4/1990	Patient has cervical cancer of stage IIA at the age of 29	8	59	female
2	12/3/2018	3/4/2019	4/4/1980	Patient has cervical cancer of stage IIIB at the age of 38	8	60	female
3	12/6/2017	12/4/2019	7/11/1987	Patient has breast cancer of stage IIIB at the age of 30 years.	2	50	female
4	2/6/2016	12/6/2016	8/14/1992	Patient has lung cancer of stage IIIB at the age of 28 years.	10	27	male

MUTATION FORM

Gene_ID	Type_ID	CellType	ChoromosomalLocation	MutationEffect	MutationType	GeneDescription
1	1	Receptor tyrosine kinase (RTK) FLT3 cells	Chromosome 13, NC_000013.11 (28003274..28100592, complement)	It may lead to the constitutive activation of the receptor.	Internal tandem duplications (ITD) point mutation	FLT3 gene
2	1	receptor tyrosine kinase (RTK) FLT3 cells	Chromosome 13, NC_000013.11 (28003274..28100592, complement)	It may lead to the constitutive activation of the receptor	D835 Point Mutation	FLT3 gene
3	13	This mutation can occur	Chromosome 3R, NT_033777.3 (23049657..23054082,	It promotes cell fate plasticity and myloid leukemia	Missense mutations	p53 gene

Reports:

Here some examples of reports.

SYMPTOM

Symptom_ID 1

SymptomDescriptio •Swollen lymph nodes, enlarg

SymptomName

SWELLING

Symptom_ID 2

SymptomDescriptio •Easy bleeding or bruising.

SymptomName

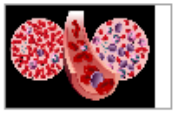
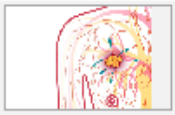
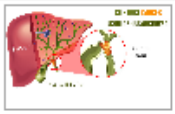
BLEEDING

Symptom_ID 3

SymptomDescriptio •Fever or chills.

CANCER_TYPE

Monday, May 20, 2019 6:17:58

Type_ID	Name	Description	Image
1	leukemia	Leukemia is a cancer of the blood or bone marrow. Bone marrow produces blood cells.	
2	Breast cancer	Breast cancer is cancer that develops from breast tissue. Signs of breast cancer may include a lump in the breast, a change in breast shape, dimpling of the skin, fluid coming from the nipple, a newly inverted nipple, or a red or scaly patch of skin.	
3	bile duct cancer	Cancer of the bile duct (cholangiocarcinoma) is a rare type of cancer that mainly affects adults aged over 65. Bile ducts are small tubes that connect the liver and small intestine.	

MUTATION

Gene_ID	ChoromosomalLoca	MutationType	MutationEffect
1	Chromosome 13, NC	Internal tandem dup	It may lead to the constitutiv
2	Chromosome 13, NC	somatic or point mut	It may lead to the constitutiv
3	Chromosome 3R, NT_	Missense mutations	It promotes cell fate plasticity
4			