

2. Relational Data Model

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* ER Model

In Entity Relationship model a graphical representation of Database system is generated. Diagrams are used in this model. These diagrams are known as Entity Relational model.

Basic concept

1] Entity

Entity is a an object that exists known as Entity.

An Entity is a thing that exists ^{together} either physically or logically.

Ex:

In Company employee is the entity set which has similar properties like employee id, employee name, employee salary.

There are two types

1] Strong Entity

2] Weak Entity

1] Strong Entity :

If an Entity having its own key attribute. Specify then it is a strong Entity. Key attribute is used to identify that Entity uniquely among set of Entity in Entity set. Strong Entity is also called Regular Entity.



Ex:

In a parents' child relationship, a parent is considered as a strong entity.

Strong entity is denoted by:  Single rectangle

2] Weak entity
The entity which does not have any key attribute is known as weak entity.

The weak entity depends on the strong entity for its existence.

Weak entity is denoted by:  Double rectangle

Ex:

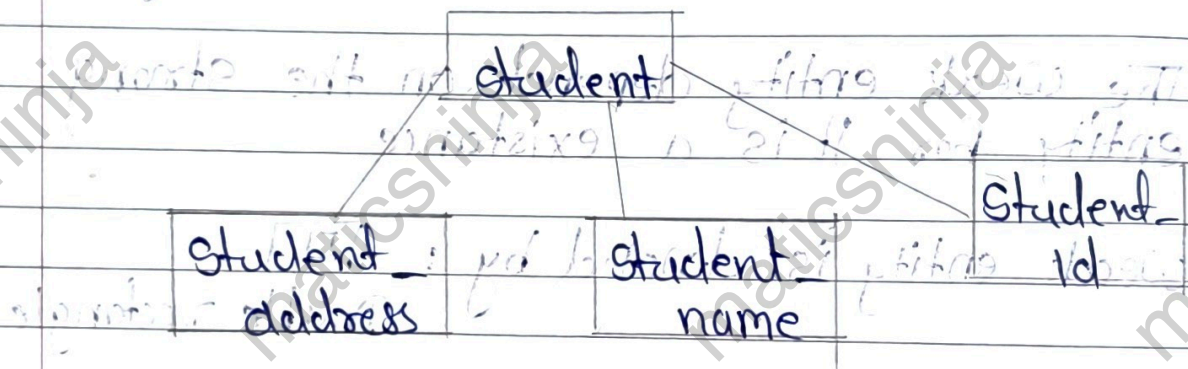
In parents' child relationship, a child is considered as a weak entity which is completely depends upon the strong entity Parents.

2] Attribute:

Attribute is a characteristics of an Entity. Entity are represented by means of their attributes or attributes have their own specific value.

Ex:

An student entity may have student_id, student_name, student_address are the attribute.



In a database management system an attribute is a database component such as a field or column of a table.

⇒ Different types of attribute.

i] Single value attribute

Single value attribute is the attribute which can hold a single value for the single entity.

ex:

In the entity student student_name is a the single value attribute.

Student

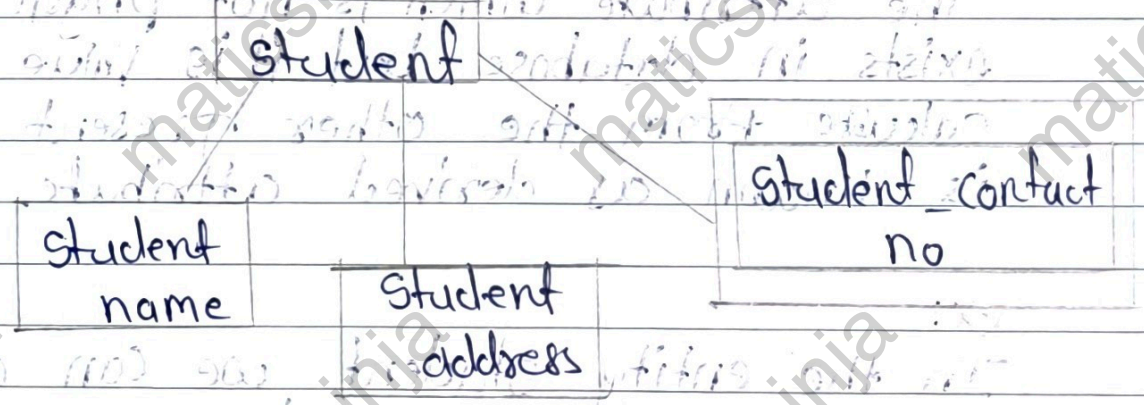
Student_name

2] Multivalued Attribute :

A multivalued attribute which can hold multiple values for the single entity.

Ex:

In the entity student the attribute student contact no could be considered a multivalued attribute.



3] Simple Value Attribute.

An attribute whose value cannot be further divided is known as a simple attribute. It means atomic nature.

Ex:

In the entity student the attribute student age cannot be divided. Therefore, student age is the simple attribute of the student entity.

4] Composite Attribute

The Composite Attribute are the attribute which can be further divided into sub-parts.

ex:

In the entity Student, Student name is the composite attribute we can divided this attribute in the in three different parts

First name, Middle name, Last name

5] Derived Attribute

The attribute which is not physically exists in database but it's value can be calculate from the other present attribute is known as derived attribute.

ex:

In the entity student we can calculate the avg age of student this average age is not physically present in the database but it can be derived from the attribute Student age.

(Tenure)

Do

Employee

3] Relationship

The Association between two different entities is called Relationship

① Degree of relationship:

The Degree of Relationship refers to number of Entity Participate in the Relation.

1] Unary :

A unary relationship exists when there is relation between single entity

Ex: A person can be in the relationship with another person such as.
A person that is someone's child.

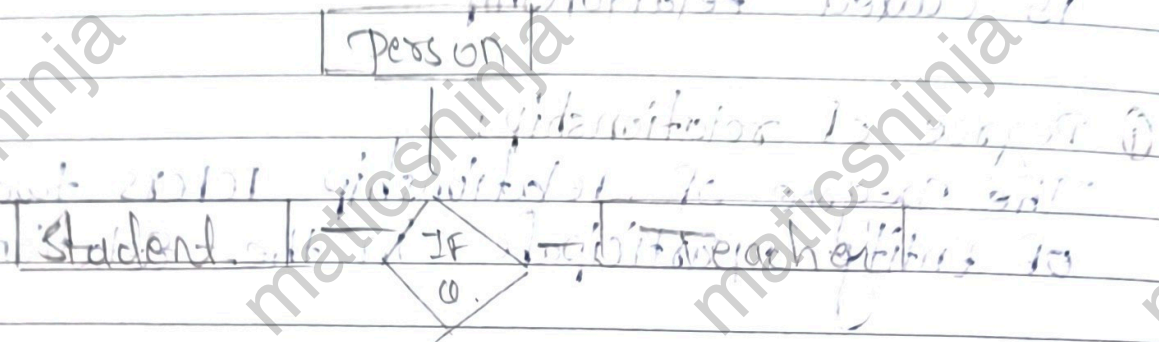
2] Binary Relationship:

Binary Relation exists only when there is relation between only two entities

Ex: A teacher teaches the student in this teacher & student are two different entities which are connected with each other.
Relation teaches.

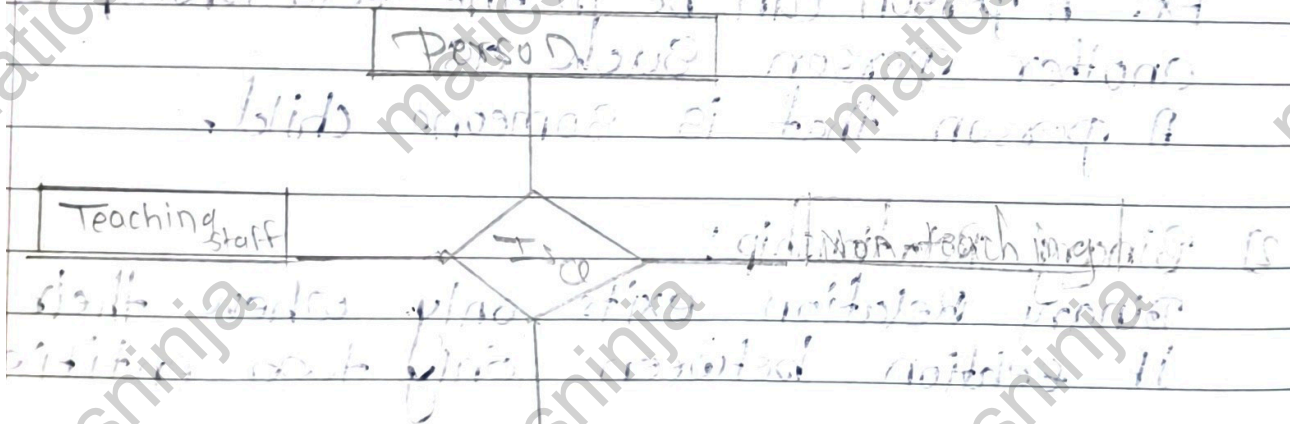
Ternary:

Ternary Relationship exists only when their if relation between 3 entities

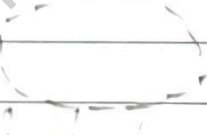


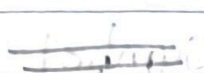
Quaternary:

Quaternary Relationship exists only when their if relation between four entities





Symbol	Symbol Name	Symbol description
1 	Rectangle	Entity
2 	Double Rectangle	Weak Entity
3 	ellipse	Attribute
4 	ellipse with underline	key attribute
5 	Double ellipse	Multivalued attribute
6 	Dash ellipse	Derived attribute
7 	Diamond	Relationship
8 	Line	Link, link attribute to Entity, set to entity, set to relationship

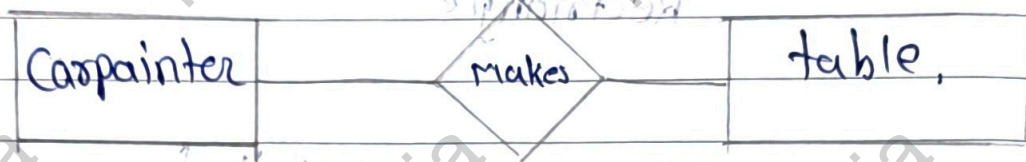


Double
line

Represent total participate
of an Entity in Relationship
Set.

⇒ Mapping Cardinality in ER Diagrams.

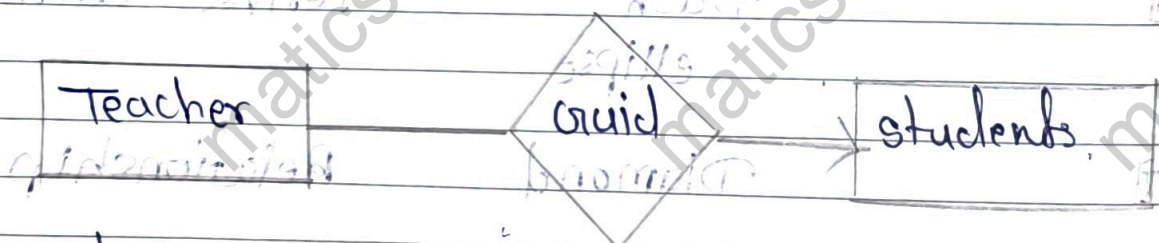
1) one to one



In one to one directed line from relationship guide are draw toward both Entity set, teachers & student.

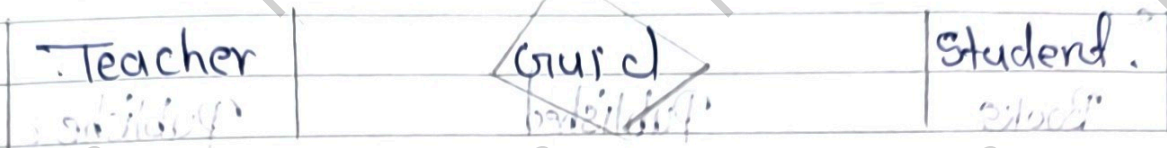
In this teachers can guide at most one student and the student can take guidance from at most one teachers.

2) one to many

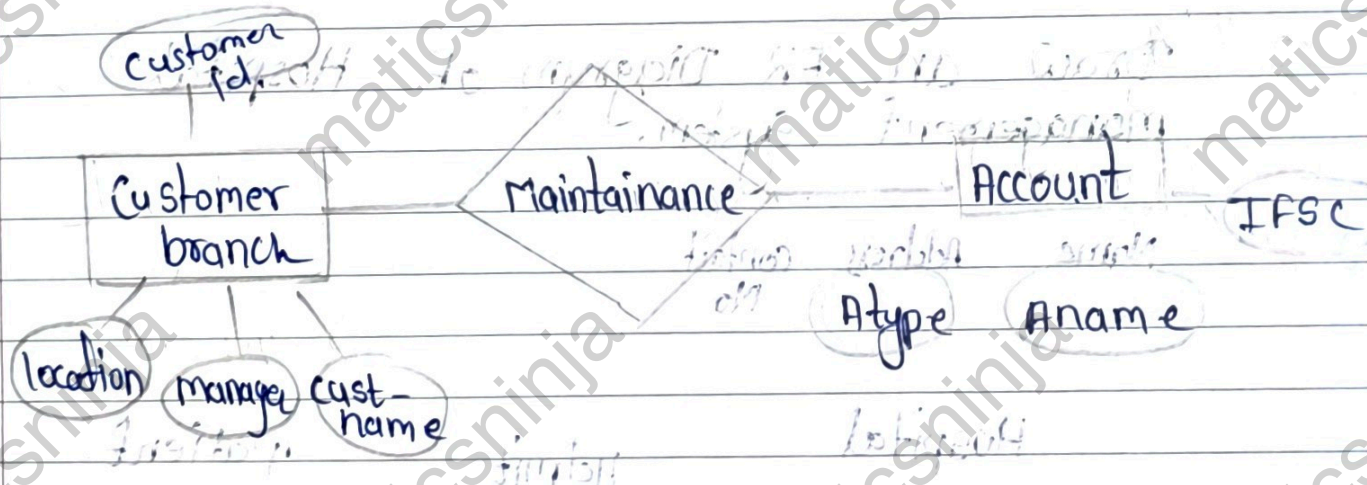


Direct line from Relationship guide to entity said teacher is draw and undirected line from relationship guide to Entity said student is draw in this Teacher can guide many student but student can take guidance from at most one teacher.

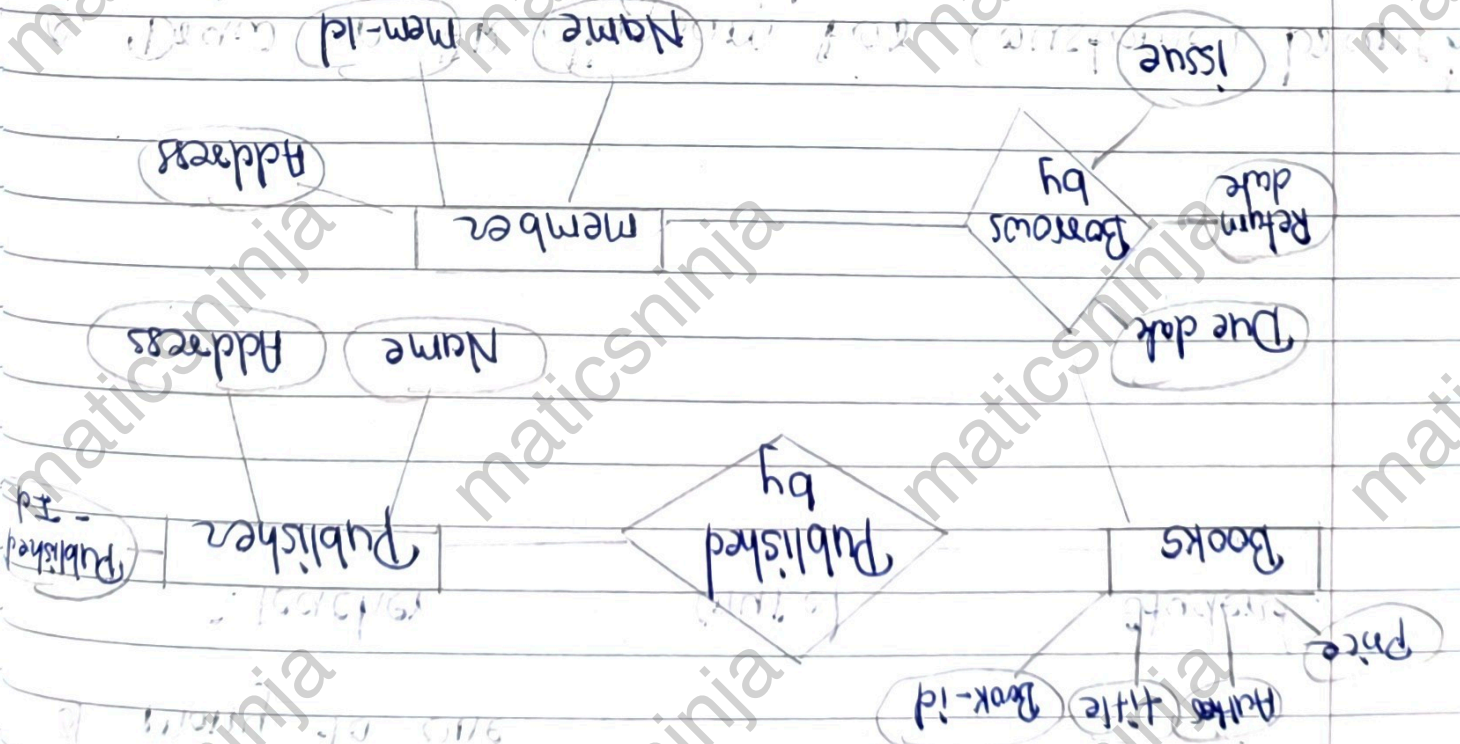
3) many to one



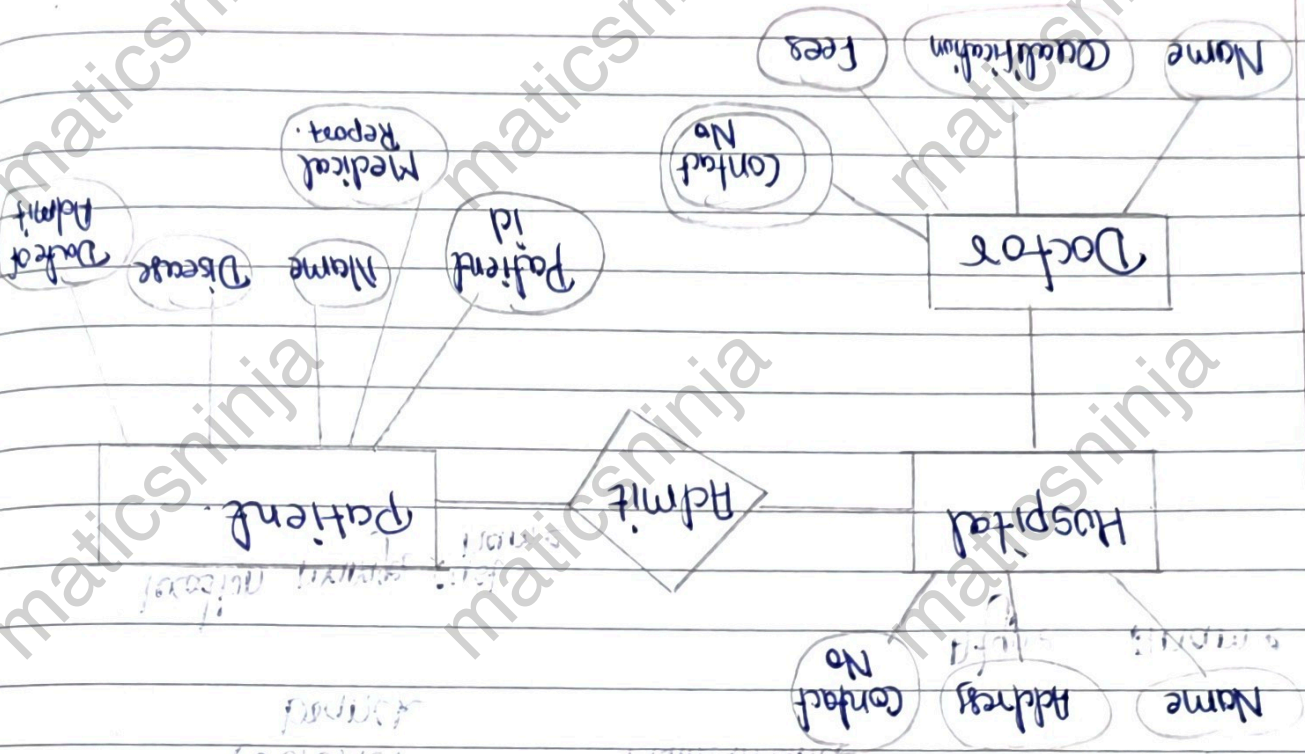
Q. Draw an ER diagram for Customer branch and account relationship.



Q. Library management.



Q. Draw an ER Diagram of Hospital management system.



RDBMS

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Relational Database management System

The Relational model stores data in the form of table

Relational is most famous because of its simple structure as compare to other database Model

There are the three components

- 1] Data Structure
- 2] Data integrity
- 3] Data manipulation

1] Data Structure

The Set of Relation Set of Domains that Define the way data can be represented

2] Data integrity :

That Define the procedure to protect the data.

3] Data manipulation :

The operation that can be perform on data.

In relational database model the data is stored in the different tables this table are interly with each other with the help of column Fields in between them.

Characteristics of RDBMS.

- 1] The whole data of the system is represented as a systematic arrangement of data into Rows & Columns called Relation or table.
- 2] A table is also form in two dimensional structure.
- 3] At any given Row & Column position means in every cell in the Relation there is one & only one value which is known as Null cell value.
- 4] Column represented attribute and each column has a distinct name.
- 5] All value entry in the columns are of the same data format.

⇒ Advantages

- 1] Easy to use
- 2] Security
- 3] Data Independence
- 4] Data manipulation

• Keys (Set of attributes)

- 1] Primary Key
- 2] Super Key
- 3] Candidate Key
- 4] Foreign Key

1] Primary Key: It is most common of all keys. It uniquely identify each Entity in the Entity set it must have unique values and can not hold null value.

Ex: In Bank database the Account number Entity should be primary key because this field cannot be kept null as well as no account number should be repeated.

2] Super Key: This key combine more than one attribute for the purpose of the uniquely identify entities.

Ex:

In student database having attribute Student register id, Student Roll no, Student name, Student address.

3) Candidate Key :
Collection of attributes which hold unique Value candidate key are selected from the set of Super key.

Ex: In student database which attribute is student Register id, Roll-no, address, contact.
candidate key is student.

4) Foreign Key :
Foreign key represent relationship between tables. there is relationship between two tables having common column.

Ex: In student database and account. Common Column Register id
Student table Account table

Register id	Name	Contact no	Register id	Total Fees
1	Vaishu	9403707507	1	40,000
2	Pooja	9309200158	2	40,000
3	Sanskriti	820806199	3	40,000

⇒ Types of Normalization

⇒ Normalization:

Process of organize the tables in a way to reduce the data redundancy, normalization divide tables and their is relation between them.

It is divide large table to smaller tables and links this smaller tables using their Relationship.

create database design in normalization from base on a called set of dependancy.

The Relation of this database is further divided into multiple Relation to improve the design.

Normalization is the multiple step process it create smaller tables from large table.

• Advantage

- 1) Database Security.
- 2) Organised database.
- 3) Flexible database design.
- 4) Data redundancy.

- 1] No repeating value in group.
- 2] No repeating group.
- 3]

Stud-id	Sta_name	Address	Contact
001	Ashu	Nanded	8767420311
002	Mahi	Pune	9376,42012

Stud name	Contact
Ashu	87674203 11
Vaishnavi	8767420312
Vaishnavi	8767898278
mahiji	8767893276
mahiji	9403707507
Sanskriti	9403707506
Nakshtra	9403181814
Sanskriti	95033181815

Repeating value equal to more than one information in one column.

2] 2 NF

Any none key Filled should entirely depend on it is the primary key should be in 1 NF

No partial dependancy

Accuse where there is Composit key

Stud_id	Course	Stud_name	TeTeacher
001	SIW	Ashu	A
002	SIW	Priya	B
003	IT	Nishu	C
004	web	Asmita	D

Partial dependancy

Course	Teacher
SIW	A
SIW	B
IT	C
web	D

Composit key

There are more than one primary keys they are called Composit key.

Teacher is only depend on one of the Composit key means Partial dependancy

Take away partial dependency to new table

- 3) 3rd NF
- Any non-key field depend on other non key field should be in 1st normalization & 2nd normalization no transitive dependency

When you can guess value of any column from non key column

Stu-id	Name	Stud-name	Exam-type	Marks
001	slw	Mansi	Viva	20
002	web	Priya	Theory	80
003	Testing	Asmita	Practical	30
004	Presen	Shonakshi	Viva	20
005	web	Riya	Theory	80

Stu-id	Name	Stud-name
001	slw	Mansi
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