

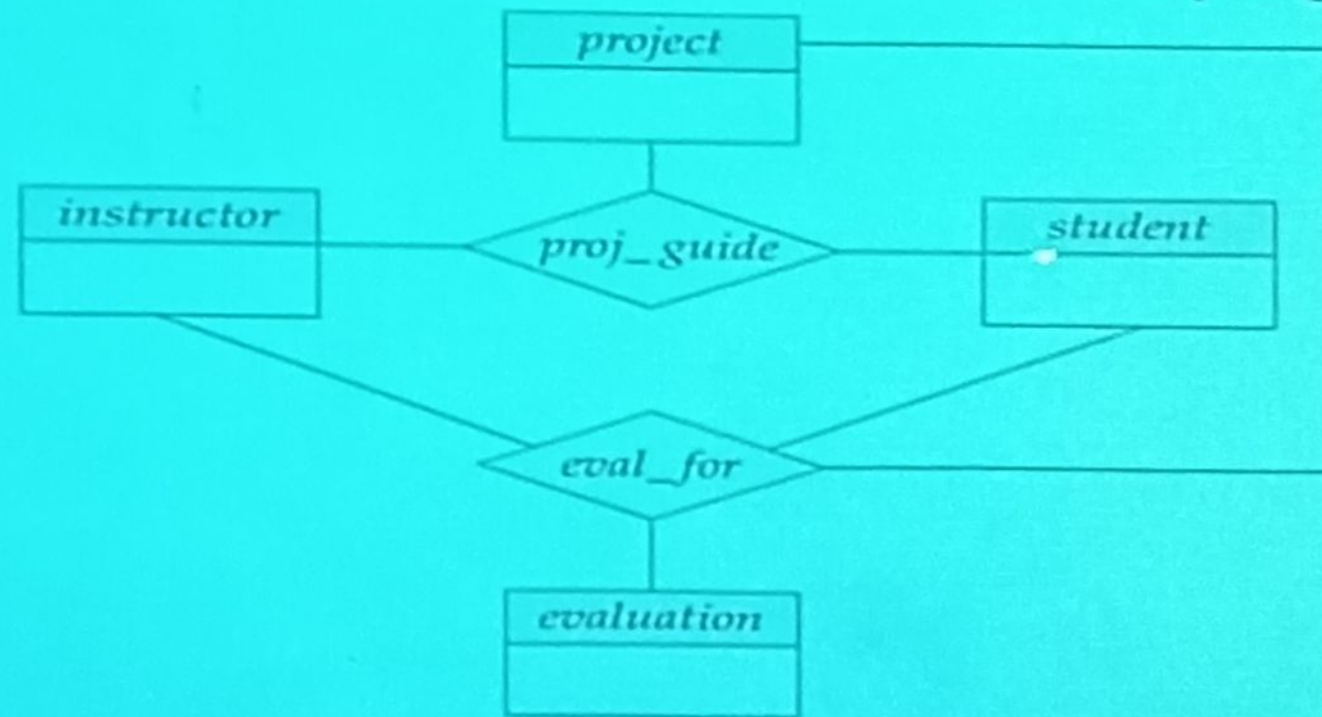
Aggregation

Aggregation refers to the process of combining two or more entities to form a more meaningful new entity. When the entities do not make sense on their own, the aggregation process is used. Limitation of E-R model is that It is not possible to express relationship among relationship.

$$(A' + B')' = r' \cdot C''$$

Aggregation

- Example:-Consider the database describing information about evaluation of students who work on a particular project under the guidance of instructor. Using our basic E-R diagram.
- Consider the ternary relationship *proj_guide* and *eval_for*.
- Suppose we want to record evaluations of a student by a guide on a project.

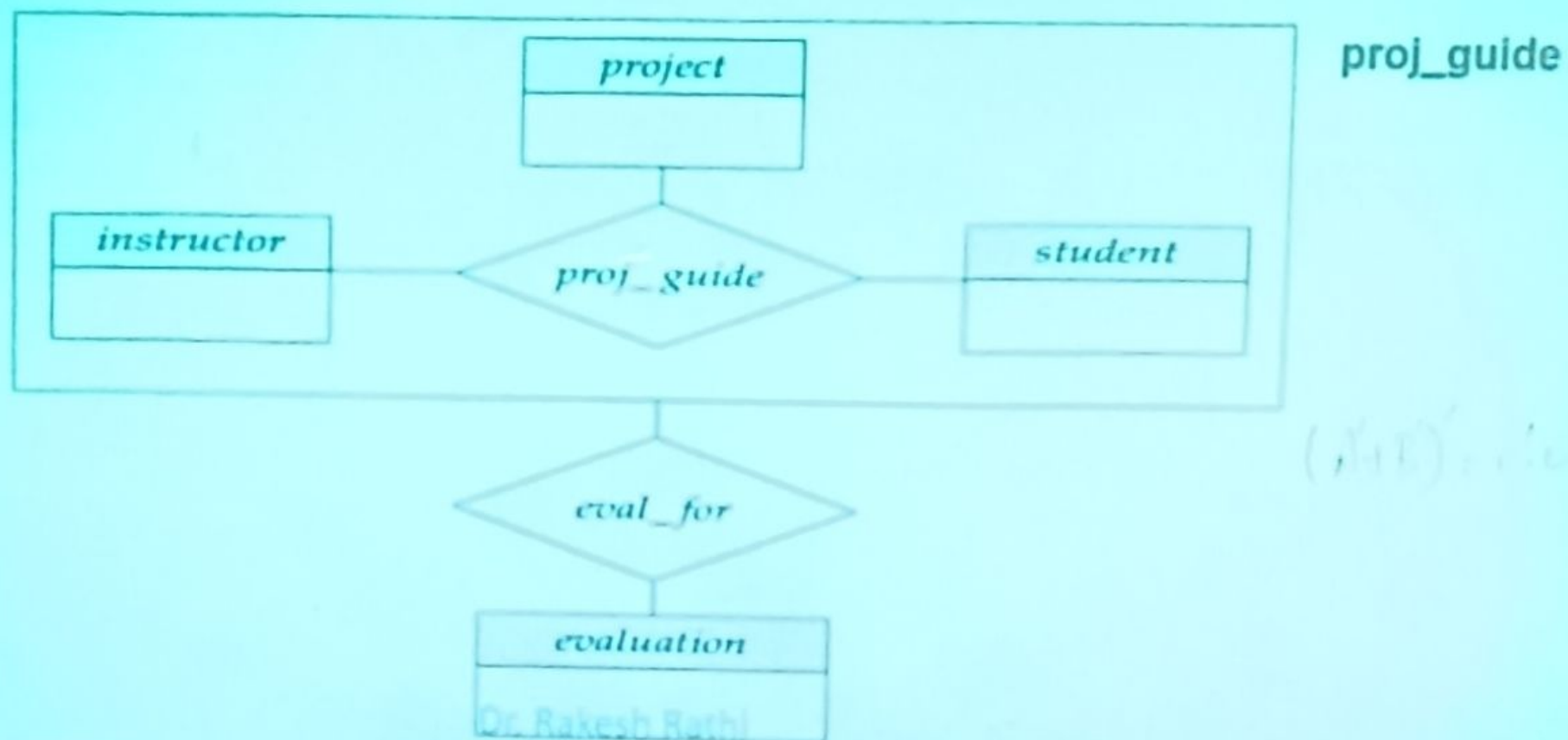


$$(A' + B')' = A' \cdot B'$$

Aggregation (Cont.)

Eliminate this redundancy via aggregation without introducing redundancy, the following diagram represents:

- A student is guided by a particular instructor on a particular project
- A student, instructor, project combination may have an associated evaluation



Aggregation (Cont.)

Relationship sets eval_for and proj_guide represent overlapping information

- Every eval_for relationship corresponds to a proj_guide relationship.
- However, some proj_guide relationships may not correspond to any eval_for relationships.
- So we can't discard the proj_guide relationship.

The solution is to use Aggregation. Aggregation is an abstraction through which relationships are treated as a higher level entities. In our example relationships set proj_guide and the entity set instructor, project and students treated as higher level entity set called proj_guide.

Eliminate this redundancy via aggregation

- Treat relationship as an abstract entity set.
- Allows relationships between relationships.
- Abstraction of relationship into new entity set.

$$(A' + B')' = A'' + B''$$

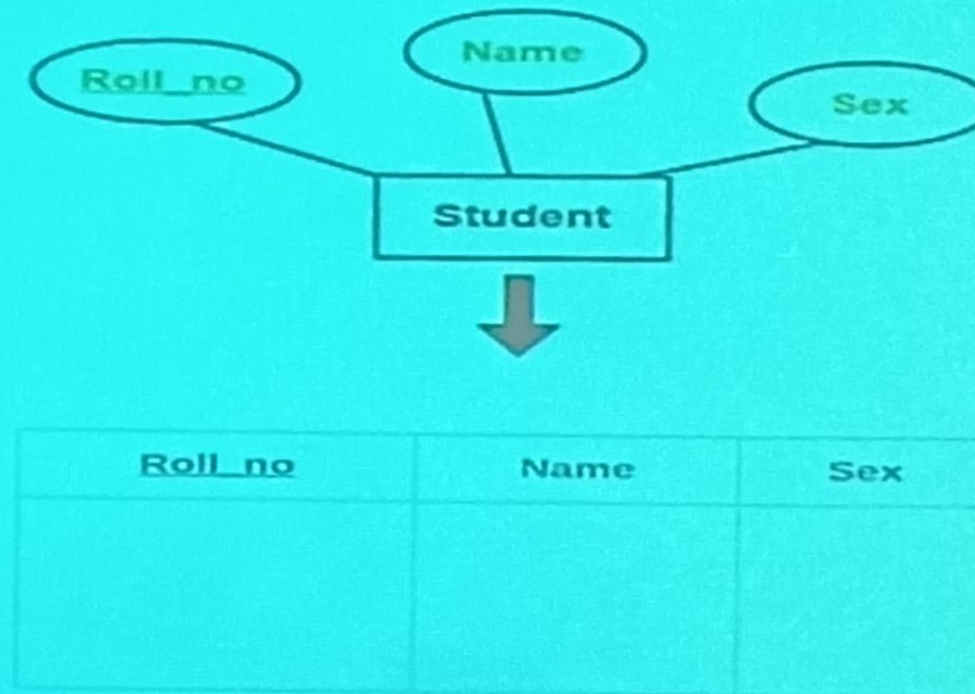
ER DIAGRAM TO TABLE

(1/18/2020)

RULE-01: FOR STRONG ENTITY SET WITH ONLY SIMPLE ATTRIBUTES-

- Column of the table will be the attributes of the entity set.
- The primary key of the table will be the key attribute of the entity set.

Example-



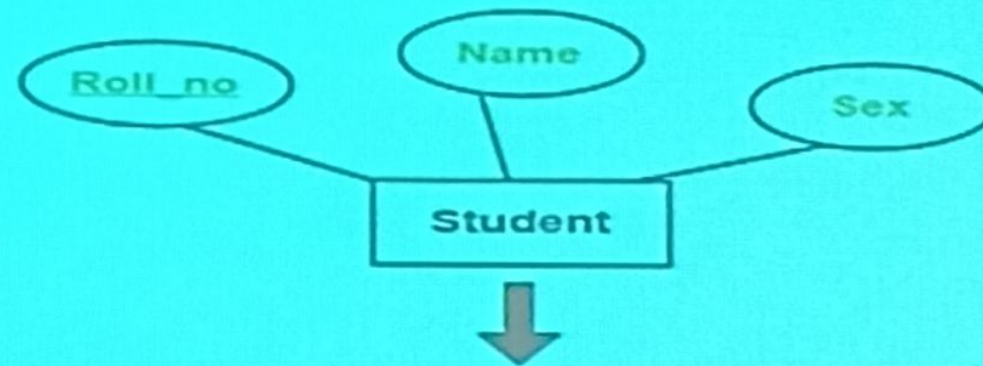
Schema : Student (Roll_no , Name , Sex)

$$(A' + B')' = A' \cdot B''$$

RULE-01: FOR STRONG ENTITY SET WITH ONLY SIMPLE ATTRIBUTES-

- Column of the table will be the attributes of the entity set.
- The primary key of the table will be the key attribute of the entity set.

Example-



<u>Roll_no</u>	Name	Sex

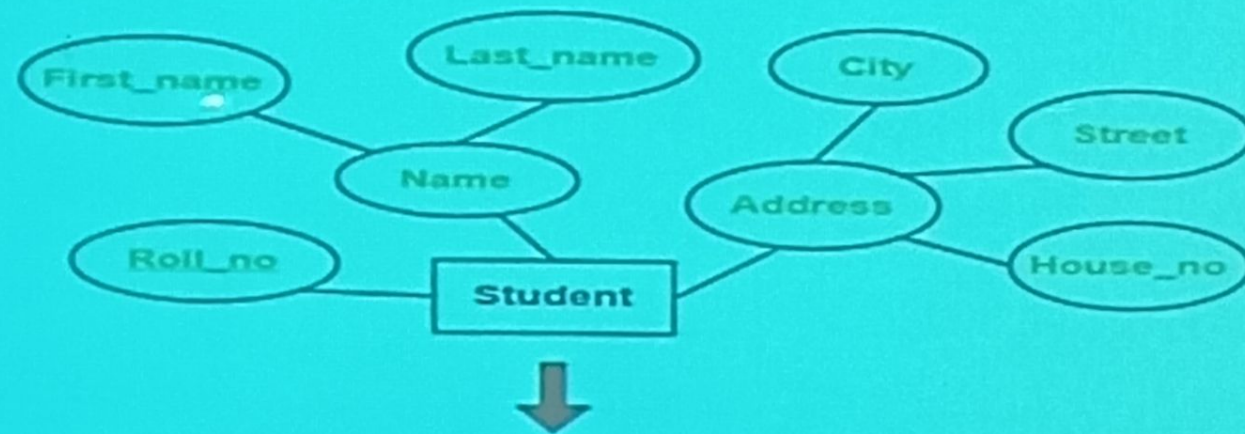
Schema : Student (Roll_no , Name , Sex)

$$(A' + B')' = A' \cdot B''$$

RULE-02: FOR STRONG ENTITY SET WITH COMPOSITE ATTRIBUTES-

- A strong entity set with any number of composite attributes will require only one table in relational model.
- While conversion, simple attributes of the composite attributes are taken into account and not the composite attribute itself.

Example-



Roll_no	First_name	Last_name	House_no	Street	City
		Dr. Rakesh Rath			

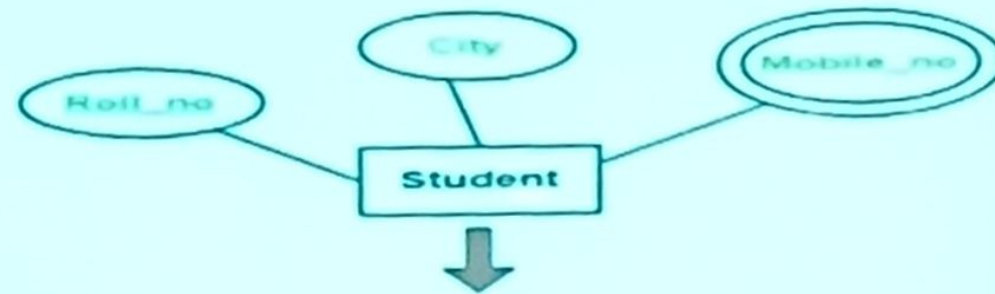
$$(A' + B')' = A' \cdot B''$$

RULE-03: FOR STRONG ENTITY SET WITH MULTI VALUED ATTRIBUTES-

A strong entity set with any number of multi valued attributes will require two tables in relational model.

- One table will contain all the simple attributes with the primary key.
- Other table will contain the primary key and all the multi valued attributes.

Example-



Roll_no	City

Roll_no	Mobile no

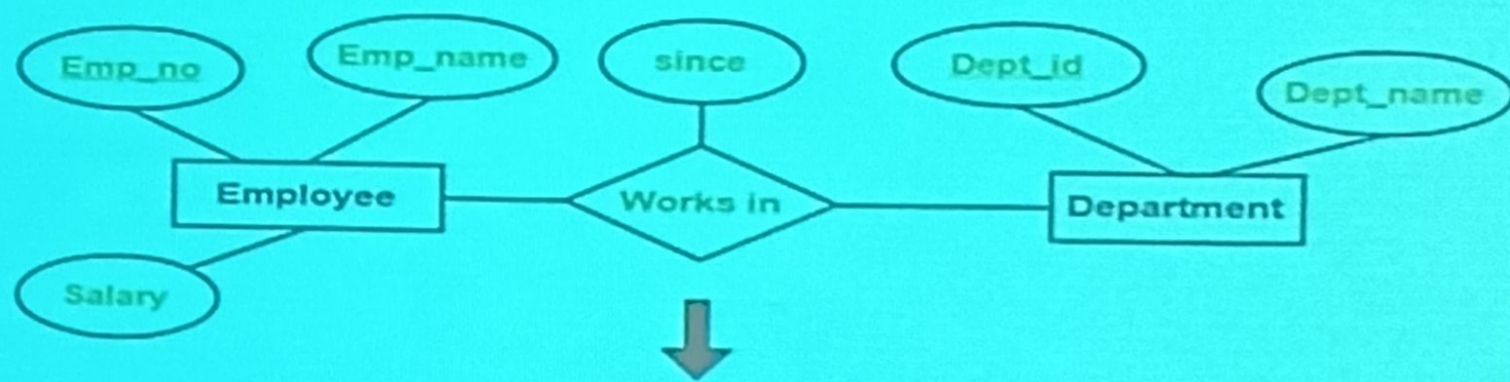
$(A+B)' = A' \cap B'$

Attributes of the Relationship Set table

- Primary key attributes of the participating entity sets
- Its own descriptive attributes if any.

Set of non-descriptive attributes will be the primary key.

Example-



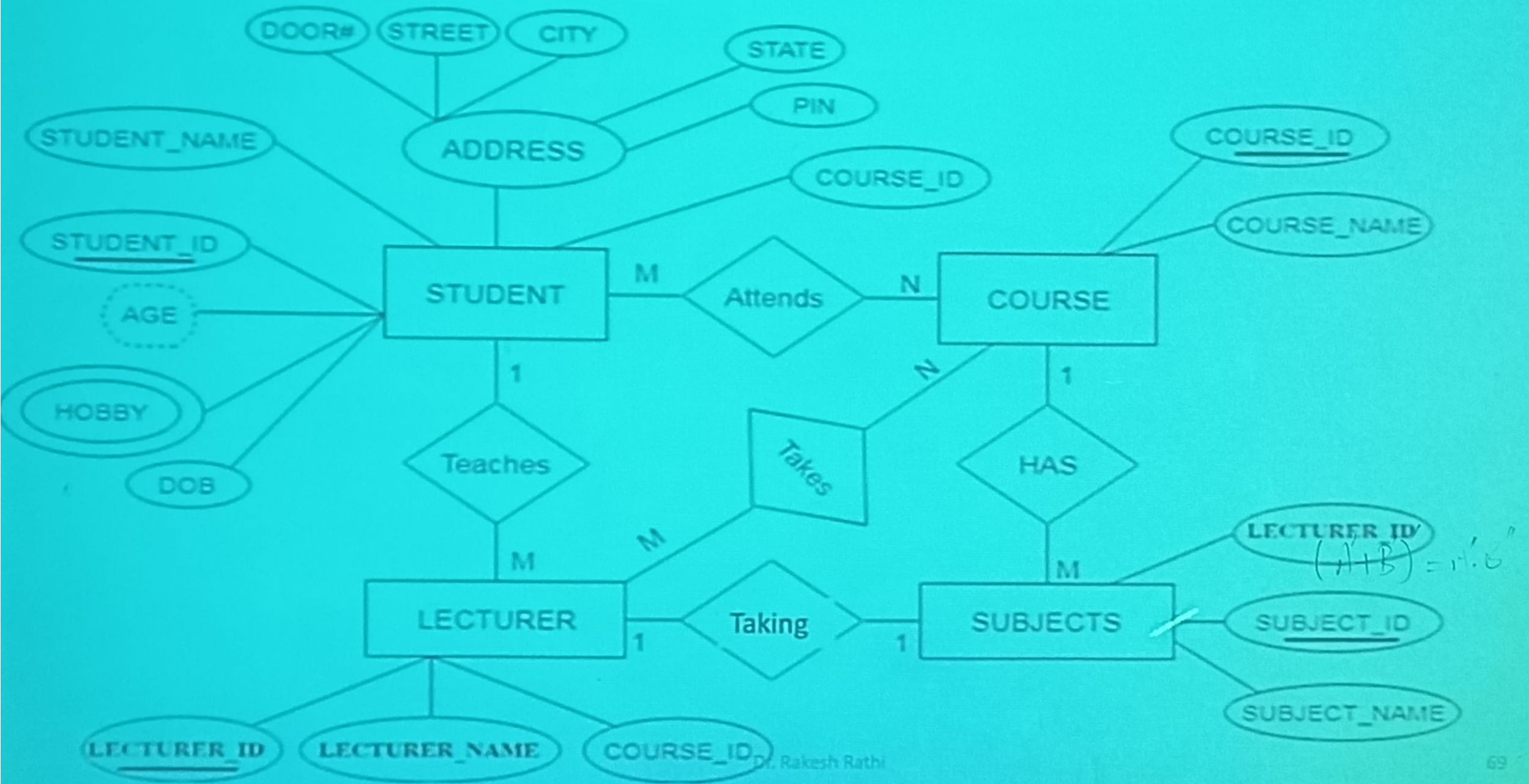
↓

Emp_no	Dept_id	since

Schema : Works in (Emp_no, Dept_id, since)

$$(A' + B')' = A' \cdot B''$$

The ER diagram is given below:



There are some points for converting the ER diagram to the table:

- **Entity type becomes a table.**

In the given ER diagram, LECTURE, STUDENT, SUBJECT and COURSE forms individual tables.

- **All single-valued attribute becomes a column for the table.**

In the STUDENT entity, STUDENT_NAME and STUDENT_ID form the column of STUDENT table. Similarly, COURSE_NAME and COURSE_ID form the column of COURSE table and so on.

- **A key attribute of the entity type represented by the primary key.**

In the given ER diagram, COURSE_ID, STUDENT_ID, SUBJECT_ID, and LECTURE_ID are the key attribute of the entity.

- **The multivalued attribute is represented by a separate table.**

In the student table, a hobby is a multivalued attribute. So it is not possible to represent multiple values in a single column of STUDENT table. Hence we create a table STUD_HOBBY with column name STUDENT_ID and HOBBY. Using both the column, we create a composite key.

- **Composite attribute represented by components.**

In the given ER diagram, student address is a composite attribute. It contains CITY, PIN, DOOR#, STREET, and STATE. In the STUDENT table, these attributes can merge as an individual column.

- **Derived attributes are not considered in the table.**

In the STUDENT table, Age is the derived attribute. It can be calculated at any point of time by calculating the difference between current date and Date of Birth.

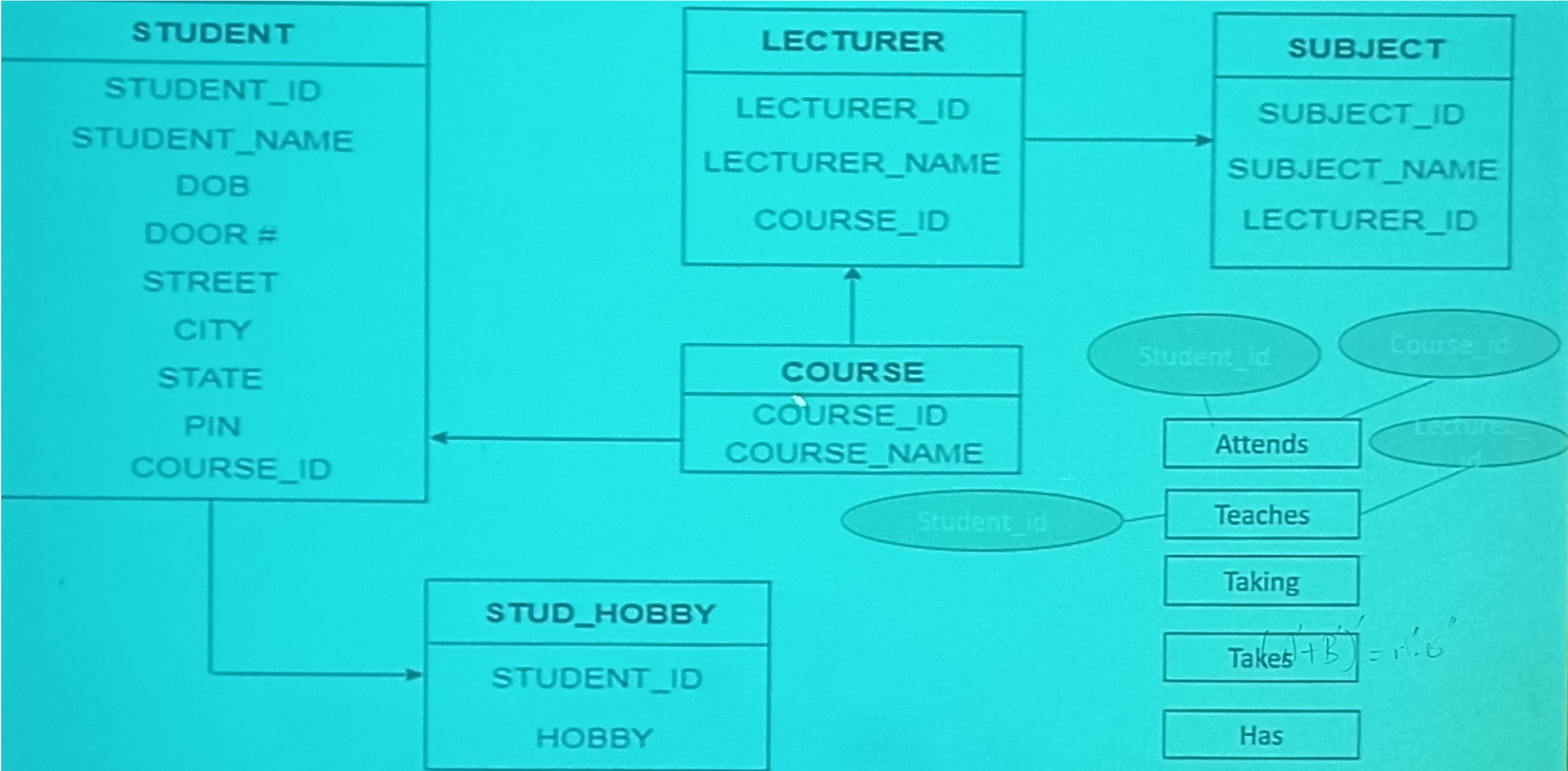
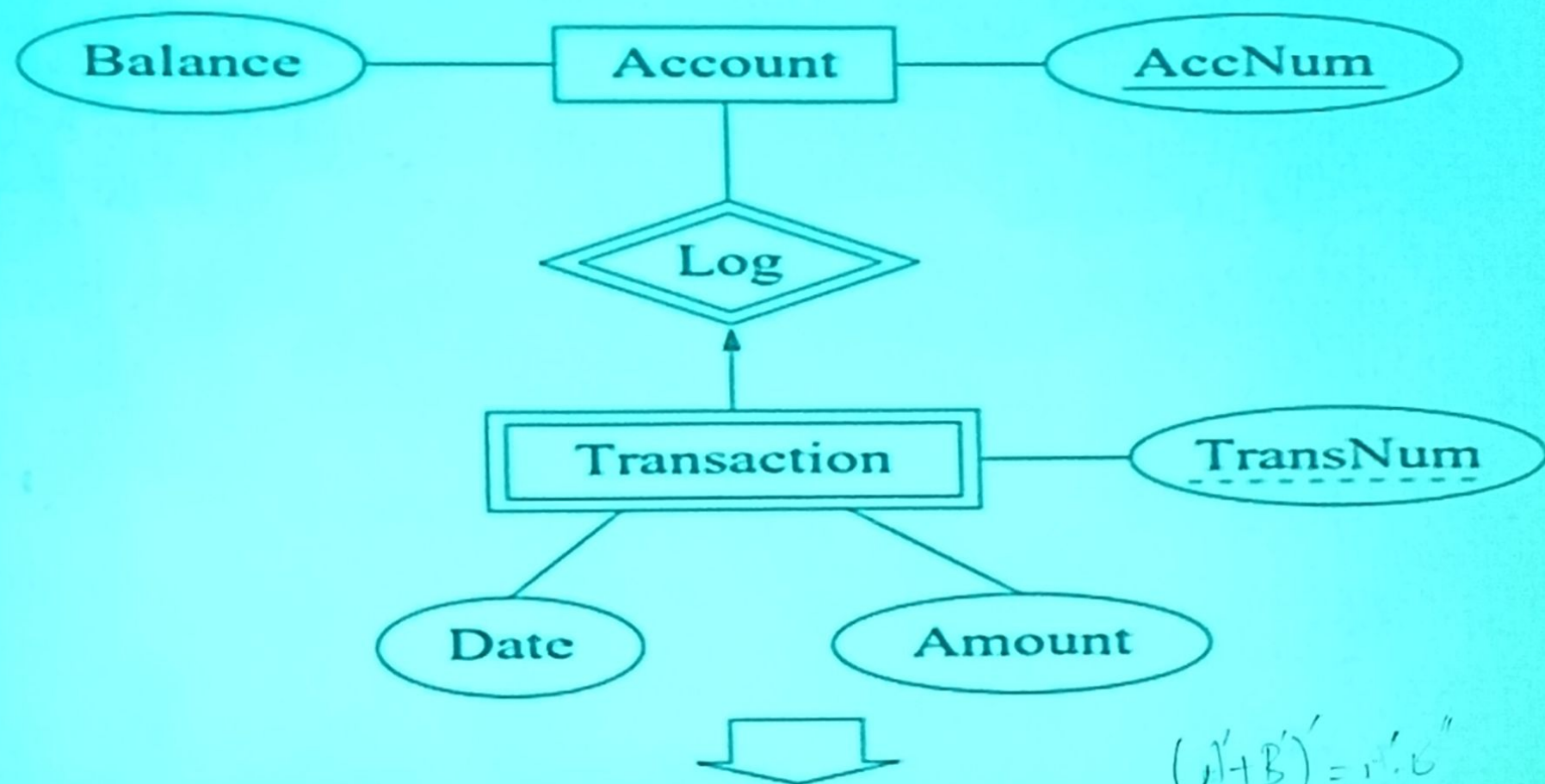


Figure: Table structure

Example:



Log

<u>AccNum</u>	TransNum
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Account

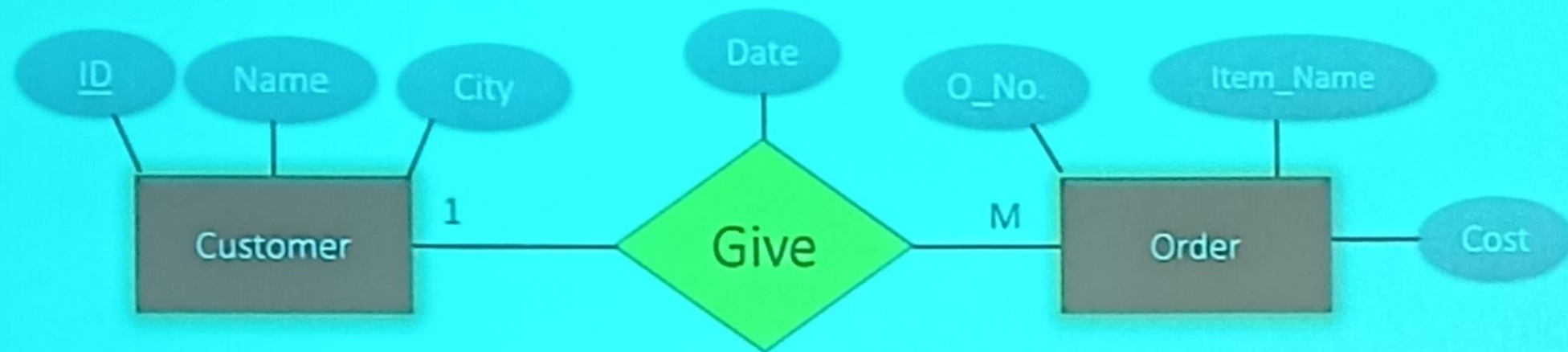
<u>AccNum</u>	Balance
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Transaction

<u>TransNum</u>	<u>AccNum</u>	Date	Amount
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$$(A' + B')' = A' \cup B'$$

One to Many Relationship (1- M)



PK			FK			PK							
ID	Name	City	ID	O_No.	Date	O_No.	Item_Name	Cost	ID	O_No.	Item_Name	Cost	Date
C1	A	Jalandhar	C1	O1	12/04/2021	O1	Bucket	1000	C1	O1	Bucket	1000	12/04/2021
C2	B	Delhi	C2	O2	13/04/2021	O2	Shoes	2000	C2	O2	Shoes	2000	13/04/2021
C3	C	Mumbai	C3	O3	14/04/2021	O3	Shirt	1500	C3	O3	Shirt	1500	14/04/2021
			C3	O4	15/04/2021	O4	Jeans	2000	C3	O4	Jeans	2000	15/04/2021

Customer

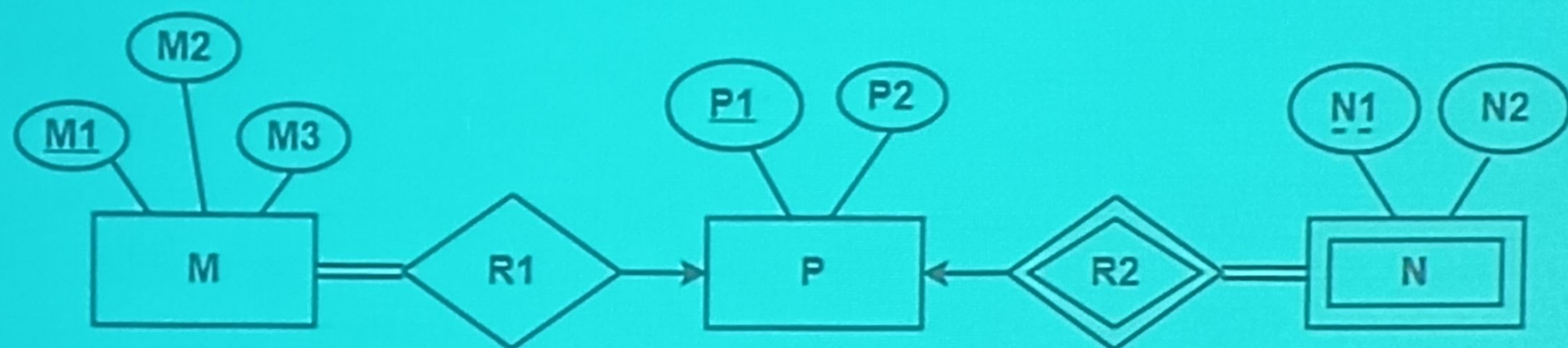
Give

Order

Give Order

Handwritten note: $(1' + 2') = 1' + 2'$

Find the minimum number of tables required for the following ER diagram in relational model-



Solution-

Solution

Applying the rules, minimum 3 tables will be required-

- MR1 (M1 , M2 , M3 , P1)
- P (P1 , P2)
- NR2 (P1 , N1 , N2)

$$(A' + B')' = A'' + B''$$