CSE2DBF – CSE4DBF

Relational Database Design (Top Down)

Reading:

Elmasri and Navathe, "Fundamentals of Database Systems, Chapters 1 & 2", Pearson, 2016.

Ebook: *https://ebookcentral-proquest-com.ez.library.latrobe.edu.au/lib/latrobe/detail.action?docID=5573709*

Relational Database Design

Two Approaches in Relational Database Design

- From Data Modeling (eg. ER Model) to Relational Logical Model for implementation.

TOP DOWN DESIGN

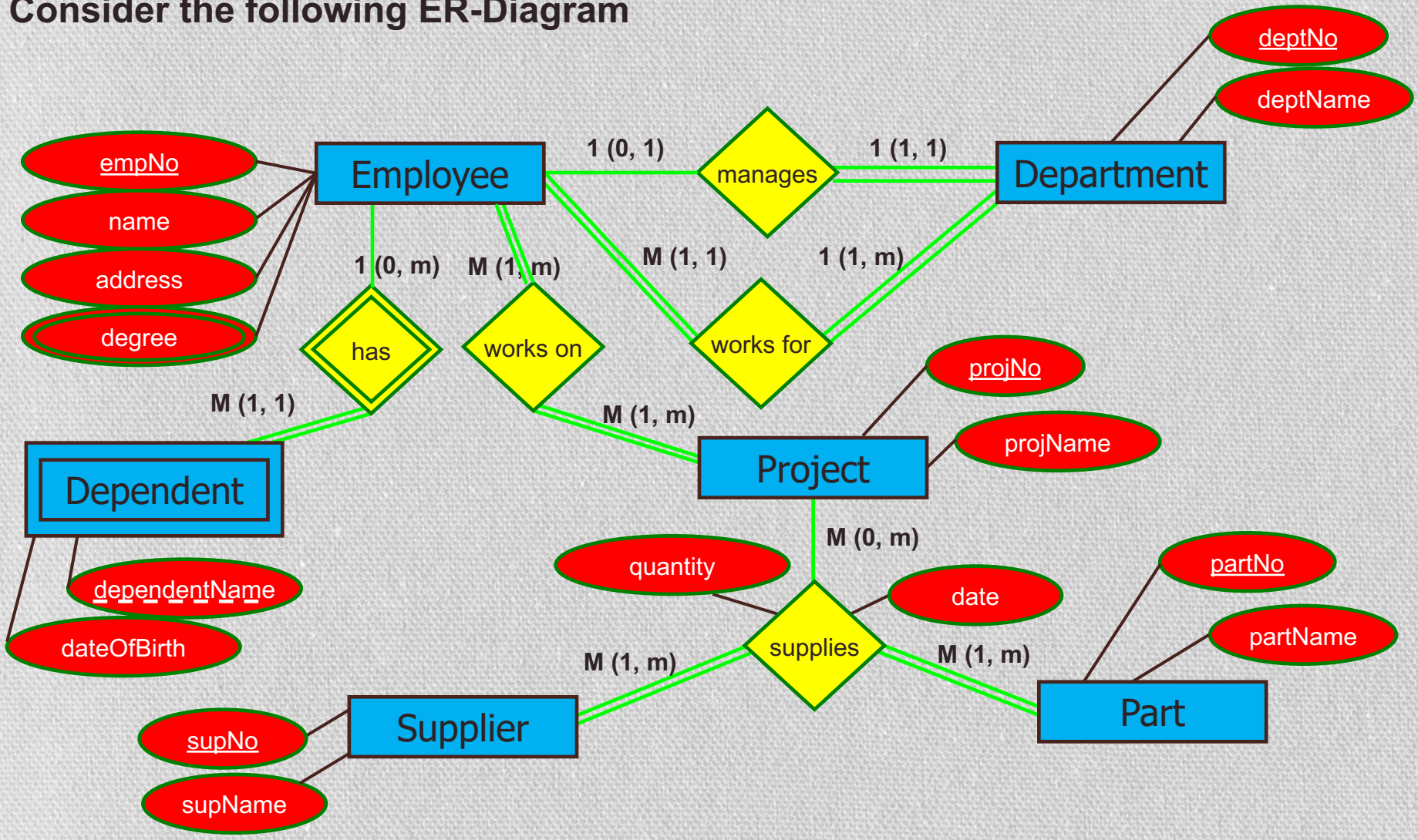
- Normalization of Relations

BOTTOM UP DESIGN

Today's lecture looks at top-down design, bottom-up design will be described in Topic 4.

Relational Database Design

Consider the following ER-Diagram



Transformation of E-R Model into Relational Logical Model (Top Down design)

- **E-R to Relational Mapping Algorithm will be explained here step by step.**

STEP 1: For each regular entity in the ER model, create a relation (i.e a table that includes all the simple attributes). Make sure to identify the primary key for the relation (i.e the PK of the entity).

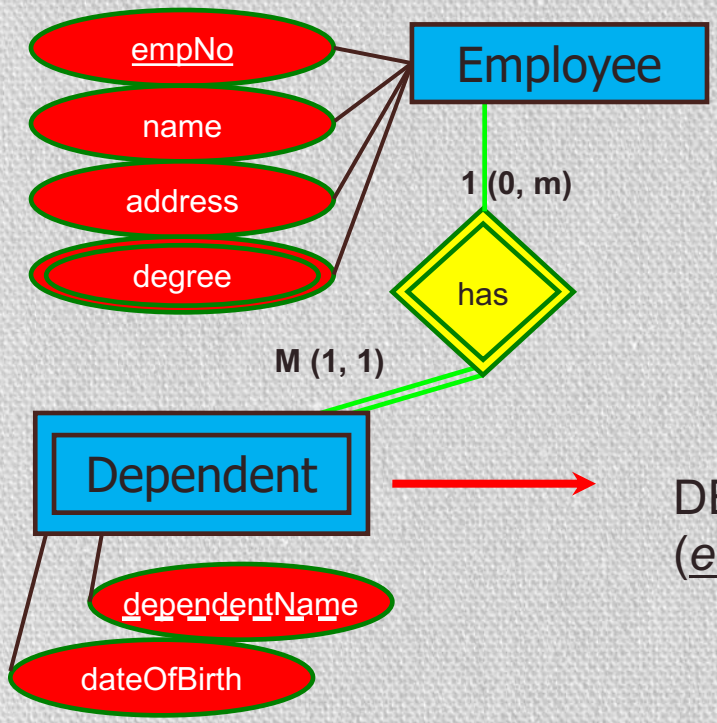
Note: if there is a specialization/generalization relationship in your EER (to be discussed in Topic 3 – Part 2, you need to transform the 'superclass' entity only within this Step 1).

Taking the ER-Diagram on the previous slide as an example:

EMPLOYEE (empNo, name, address)
DEPARTMENT(deptNo, deptName)
PROJECT(projNo, projTitle)
SUPPLIER(supNo, supName)
PART(partNo, partName)

Transformation of E-R Model into Relational Logical Model (Top Down design)

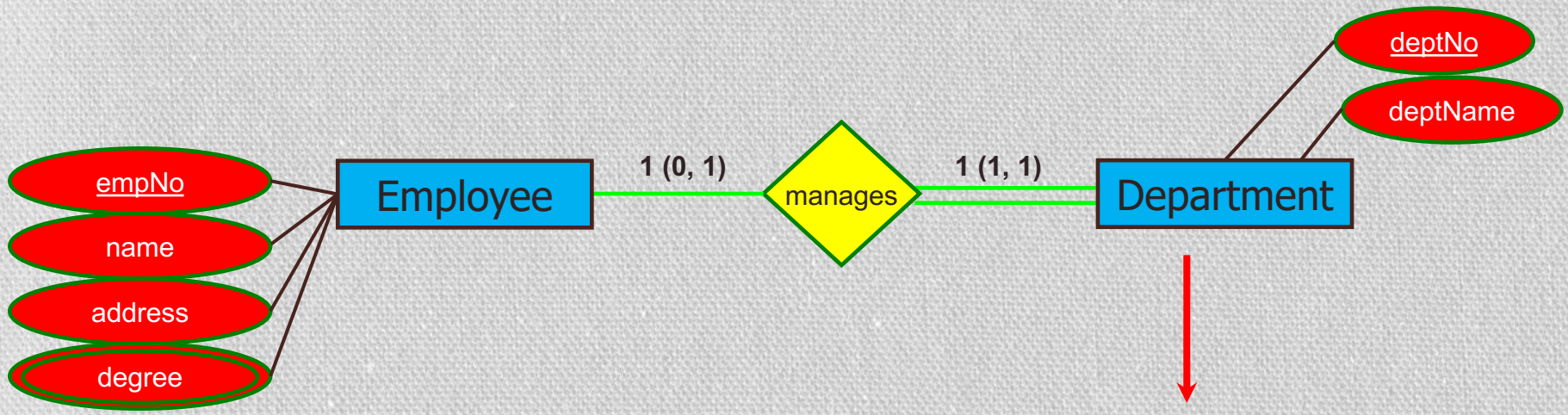
STEP 2: For each weak entity in the ER model, create a relation which includes all the simple attributes. The primary key of the relation is the combination of the primary key/s of the 'owner' and the key of the weak entity itself.



DEPENDENT
(*empNo*, dependentName, dateOfBirth)

Transformation of E-R Model into Relational Logical Model (Top Down design)

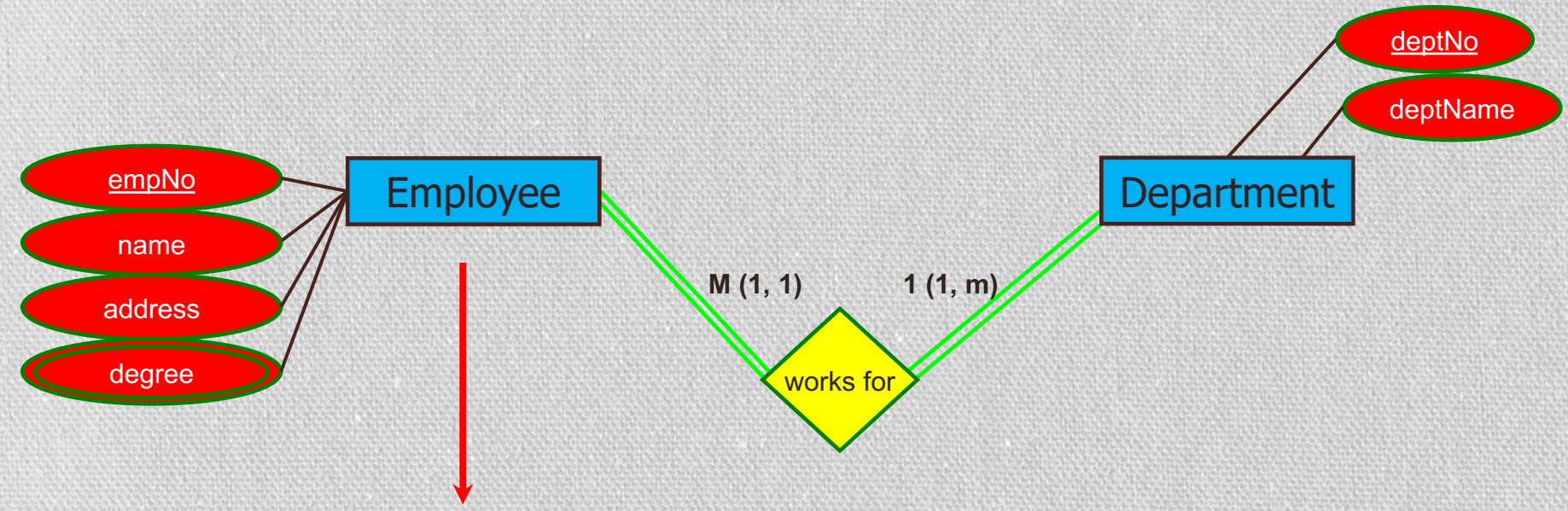
STEP 3: For each binary 1 TO 1 Relationship identify the two relations that correspond to the entities participating in the relationship. Choose one of the Relation (usually the one with total participation) and include as foreign key the primary key of the other relation.



DEPARTMENT(deptNo, deptName, *mngrEmpNo*)

Transformation of E-R Model into Relational Logical Model (Top Down design)

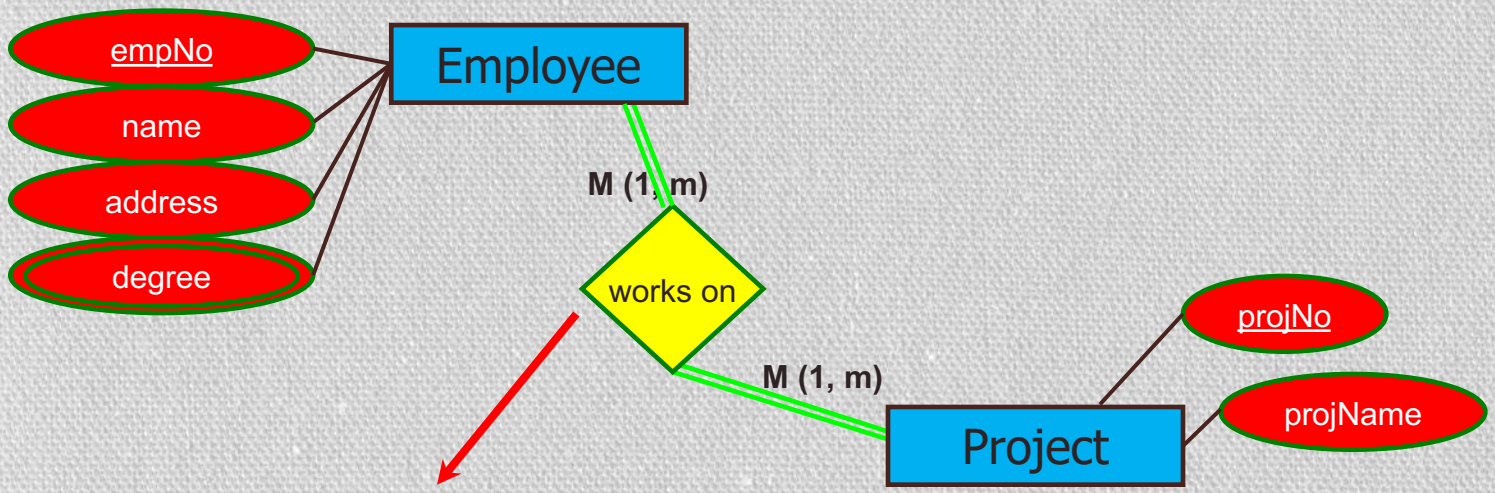
STEP 4: For each binary 1 TO N Relationship identify the relations that represent the participating entity at the N (i.e many) side of the relationship. Include as foreign key in the relation that holds the N side, the primary key of the other entity (that holds the 1 side).



EMPLOYEE (<u>empNo,</u> name, address, *deptNo*)

Transformation of E-R Model into Relational Logical Model (Top Down design)

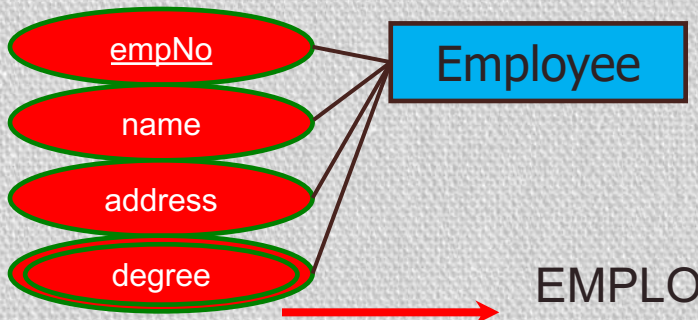
STEP 5: For each binary M:N Relationship create a new relation to represent the relationship. The primary key of the new relation is the combination of the primary keys of the two connected entities.



WORKS ON (*empNo*, *projNo*)

Transformation of E-R Model into Relational Logical Model (Top Down design)

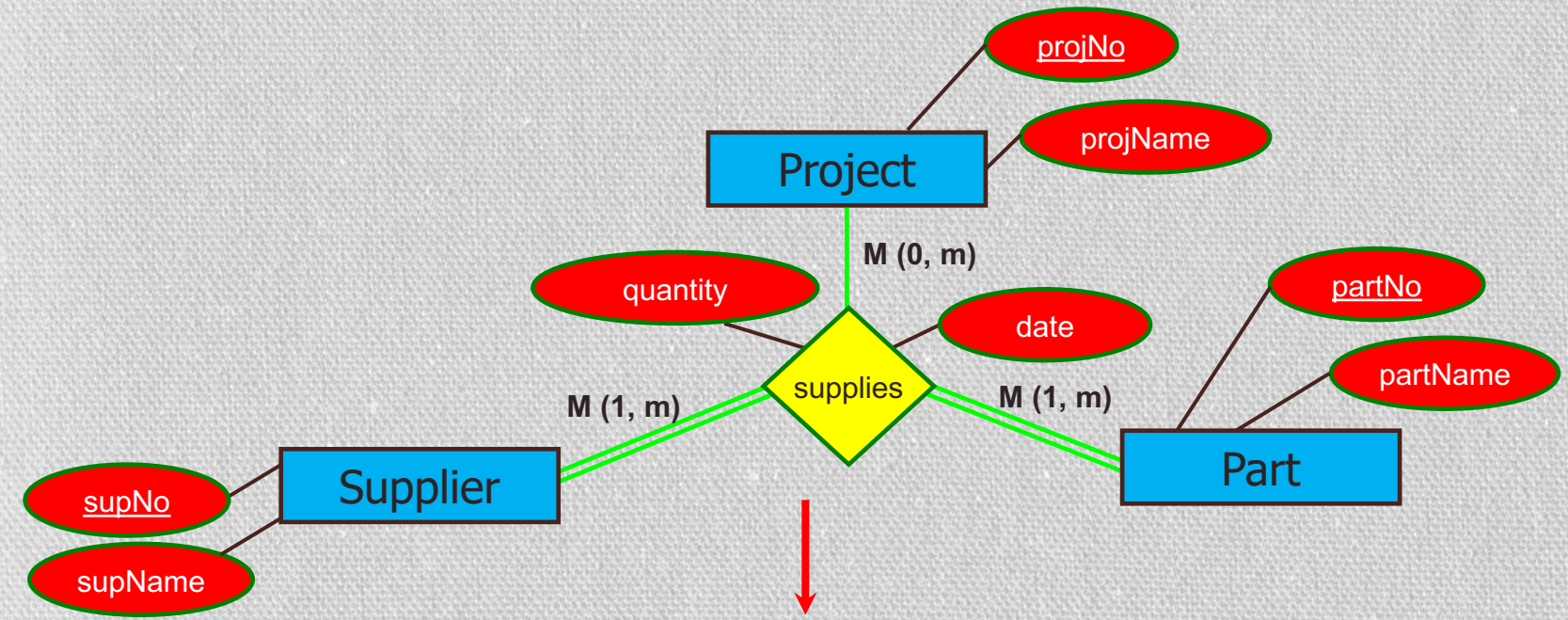
STEP 6: For each multivalued attribute, create a new relation that includes the multivalued attribute and the primary key of the entity where the multivalued attribute is attached.



EMPLOYEE (empNo, name, address, *deptNo*)
EDEGREE(*empNo*, degree)

Transformation of E-R Model into Relational Logical Model (Top Down design)

STEP 7: For each n-ary (> 2) Relationship create a new relation to represent the relationship. The primary key of the new relation is the combination of the primary keys of the participating entities that hold the N (many) side. In most cases of an n-ary relationship all the participating entities hold a many side.



SUPPLIES (*supNo* , *projNo*, *partNo* , date, quantity)

Transformation of E-R Model into Relational Logical Model (Top Down design)

FINAL TABLES

PROJECT(projNo, projTitle)

SUPPLIER(supNo, supName)

PART(partNo, partName)

DEPENDENT(*empNo*, dependentName, dateOfBirth)

DEPARTMENT(deptNo, deptName, *mngrEmpNo*)

EMPLOYEE (empNo, name, address, *deptNo*)

WORKS ON (*empNo*, *projNo*)

EDEGREE(*empNo*, degree)

SUPPLIES (*supNo* , *projNo*, *partNo*, date, quantity)

Relational Database Design

Perform the complete transformation steps for the E-R Model of the ‘Real Estate Agency’ described in Topic 2.

SOLUTION: (to be discussed in the lecture)

Next Lecture

EER Modelling and Transformation

Reading:
Elmasri and Navathe, "Fundamentals of Database Systems, Chapters 1 & 2", Pearson, 2016.
Ebook: *https://ebookcentral-proquest-com.ez.library.latrobe.edu.au/lib/latrobe/detail.action?docID=5573709*