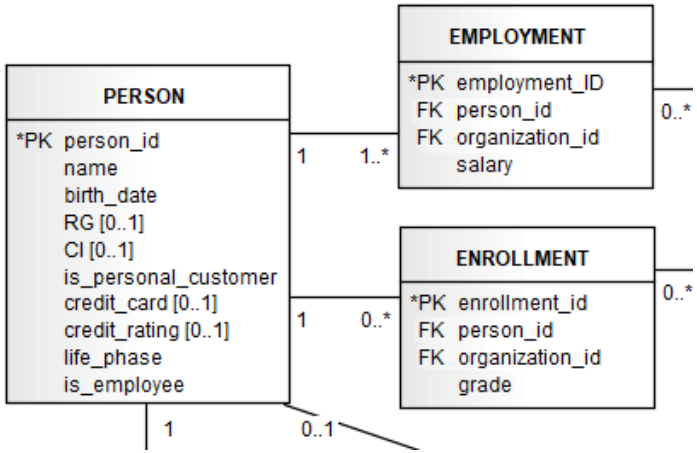
CSE-221

Database Management Systems

Relational Schema

Md. Romizul Islam
romizul@cse.uiu.ac.bd

Schema vs. Relations

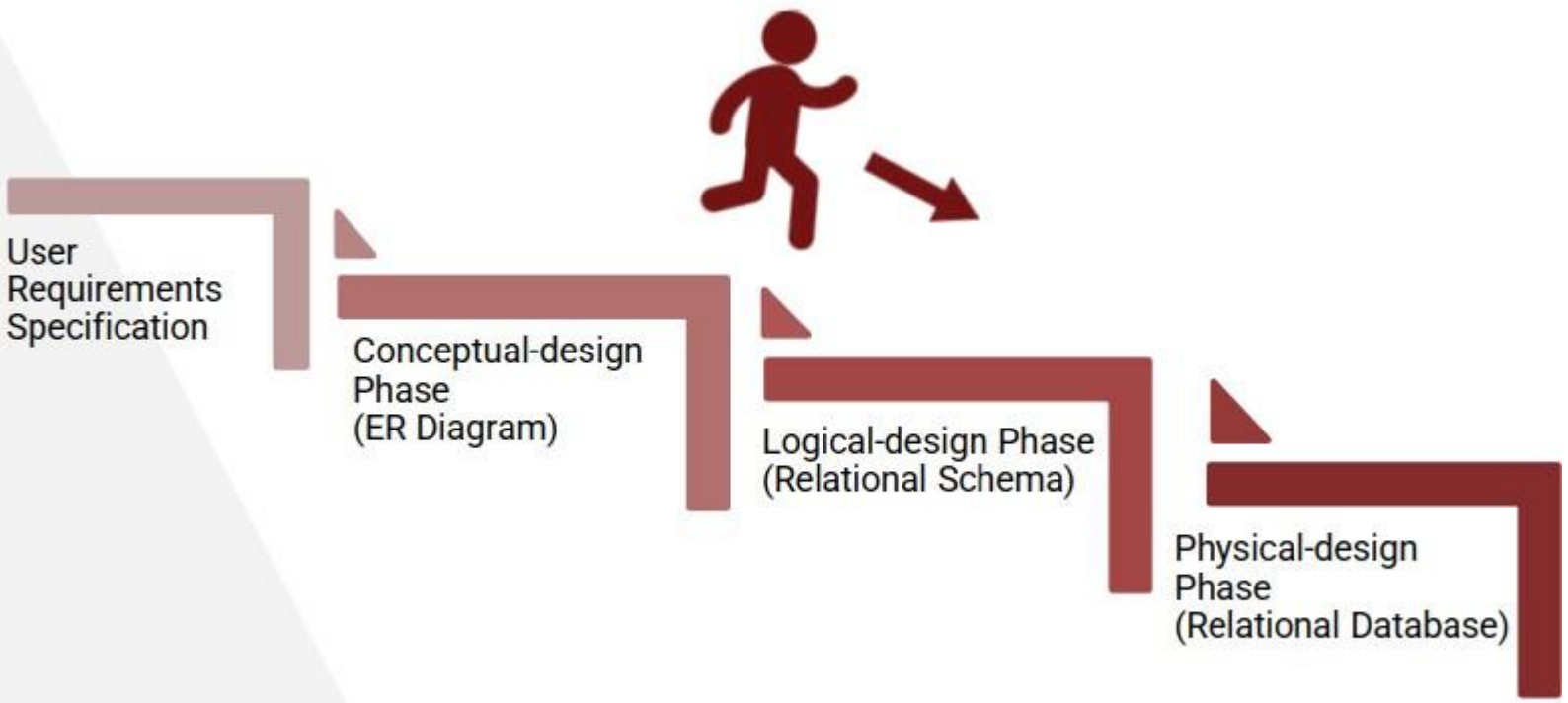


Schema contains design of table/schema

First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
Bat	Man	321 Cavern Ave	Gotham	54
Wonder	Woman	987 Truth Way	Paradise	39
Donald	Duck	555 Quack Street	Mallard	65
Bugs	Bunny	567 Carrot Street	Rascal	58
Wiley	Coyote	999 Acme Way	Canyon	61
Cat	Woman	234 Purrfect Street	Hairball	32
Tweety	Bird	543	Itotltaw	28

Relations contain actual data

DB Design Steps

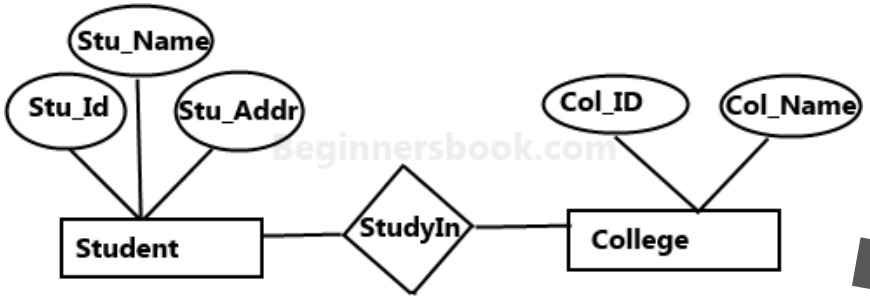


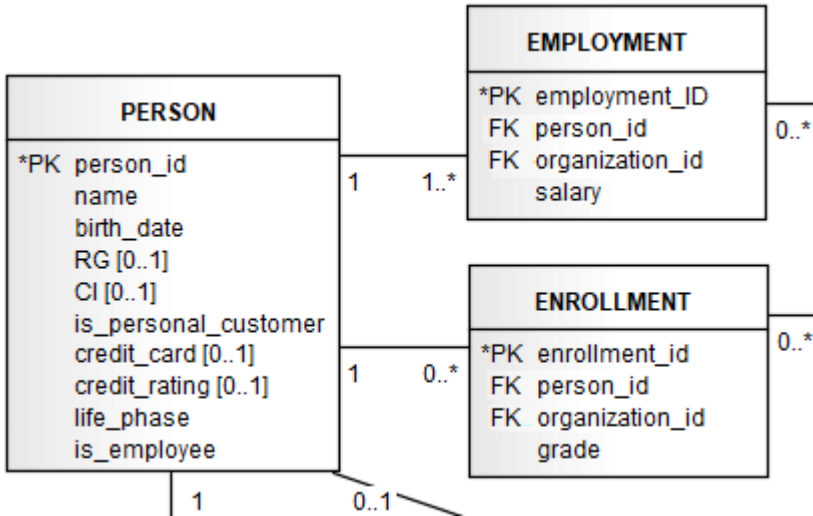
DB Design Steps

1. User Requirement Specification (Planning)

2. ER Diagram (Conceptual Design)

3. Relational Schema (Logical Design)





Example Relational Schema

Schema of a university database

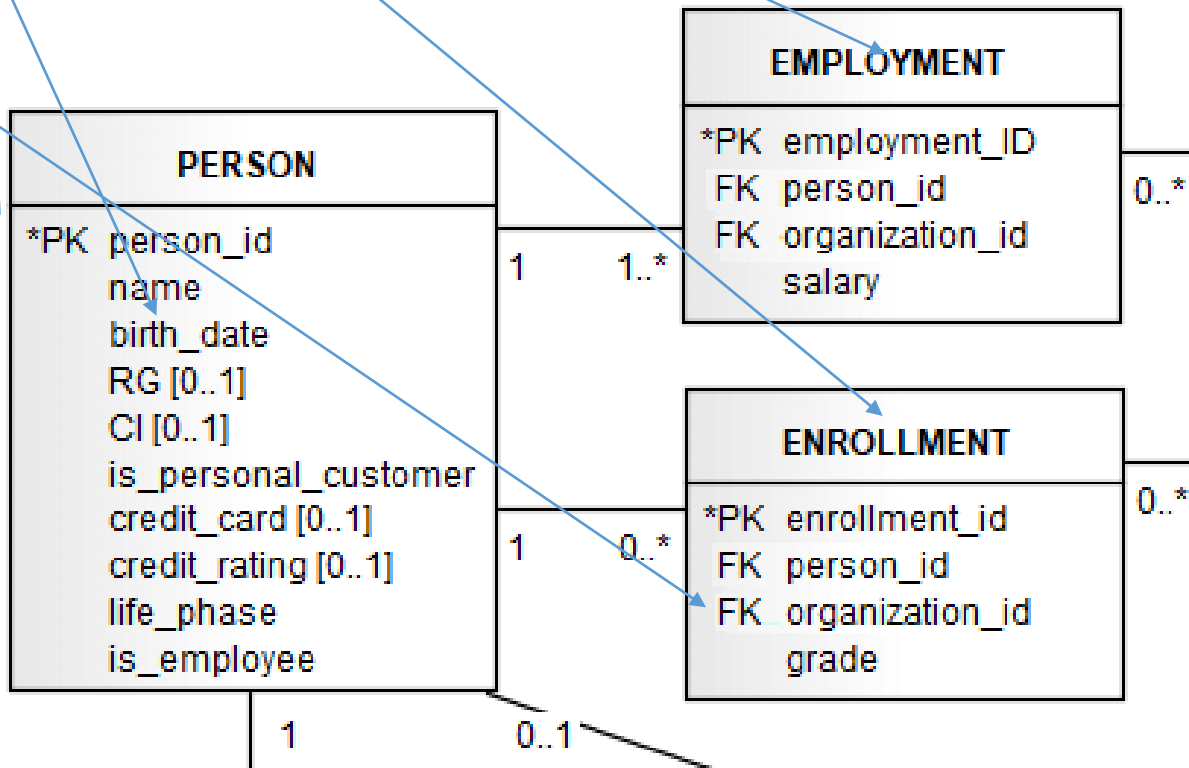
classroom(*building*, *room_number*, *capacity*)
department(*dept_name*, *building*, *budget*)
course(*course_id*, *title*, *dept_name*, *credits*)
instructor(*ID*, *name*, *dept_name*, *salary*)
section(*course_id*, *sec_id*, *semester*, *year*, *building*, *room_number*, *time_slot_id*)
teaches(*ID*, *course_id*, *sec_id*, *semester*, *year*)
student(*ID*, *name*, *dept_name*, *tot_cred*)
takes(*ID*, *course_id*, *sec_id*, *semester*, *year*, *grade*)
advisor(*s_ID*, *i_ID*)
time_slot(*time_slot_id*, *day*, *start_time*, *end_time*)
prereq(*course_id*, *prereq_id*)

ER Diagram vs. Schema

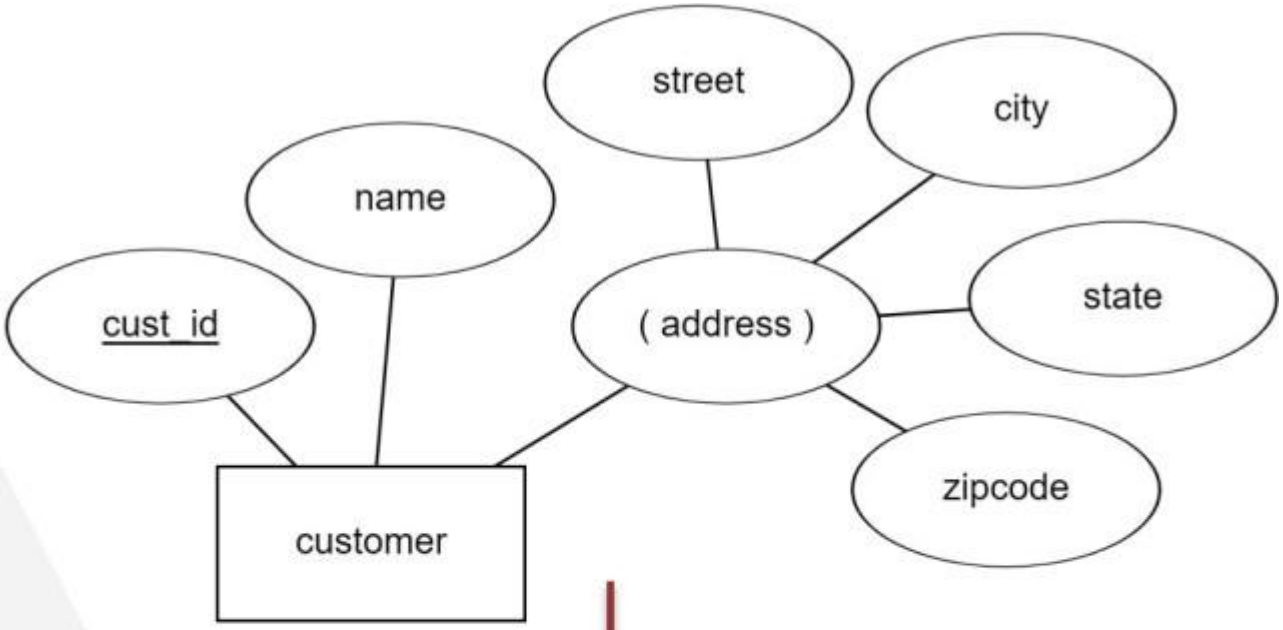
ER Diagram	Relational Schema
The main components of ER Model are: • Entity Set – set of similar entities • Relationship Set – set of similar relationships • Attributes – including different types of keys	The main components of Relational Model are: • Relations (tables) • Attributes (columns, unordered) • Domain (column type) • Primary Key • Foreign Key

Components

- Relations (tables)
- Attributes (columns, unordered)
- Domain (column type)
- Primary Key
- Foreign Key



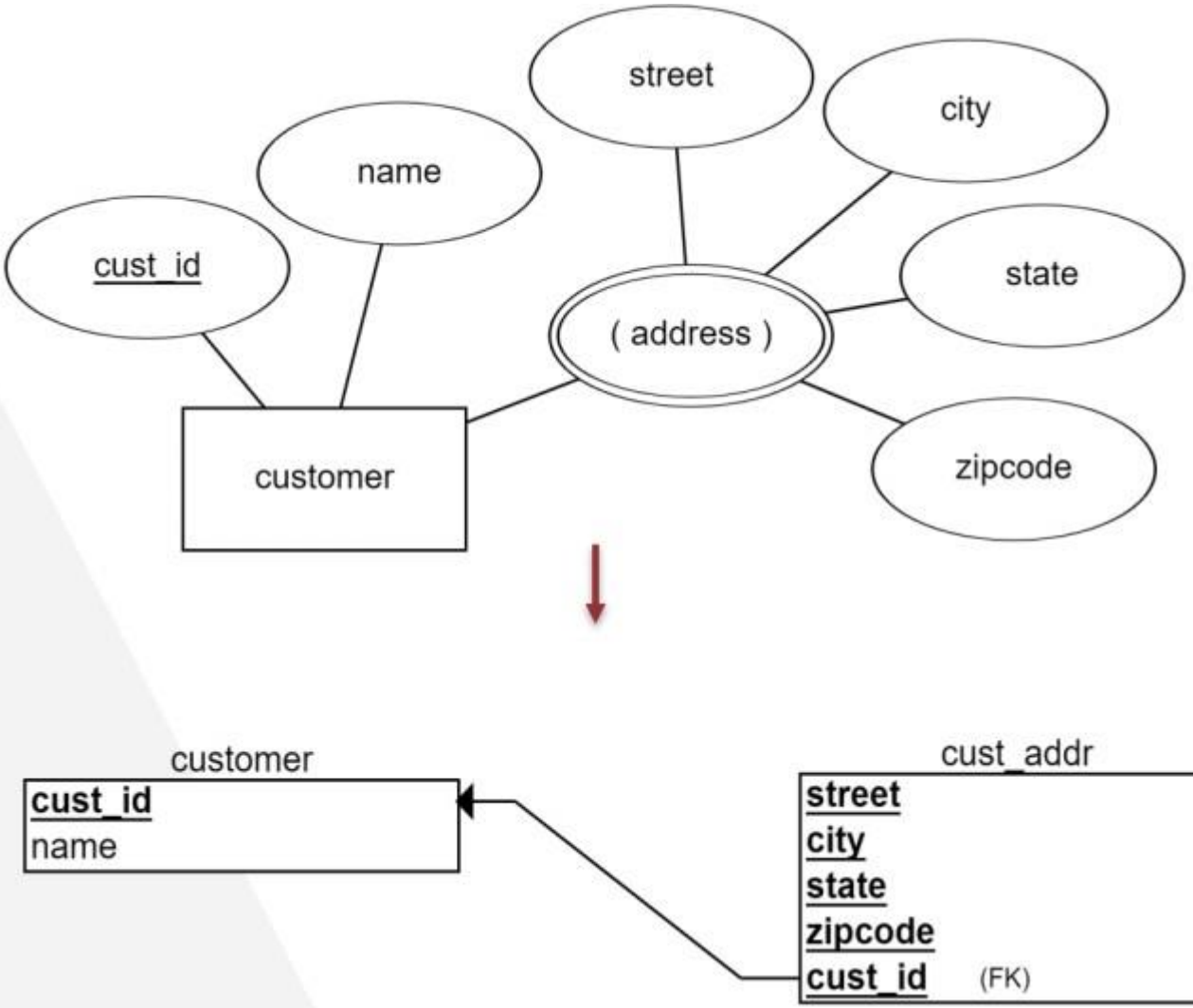
Composite Attribute



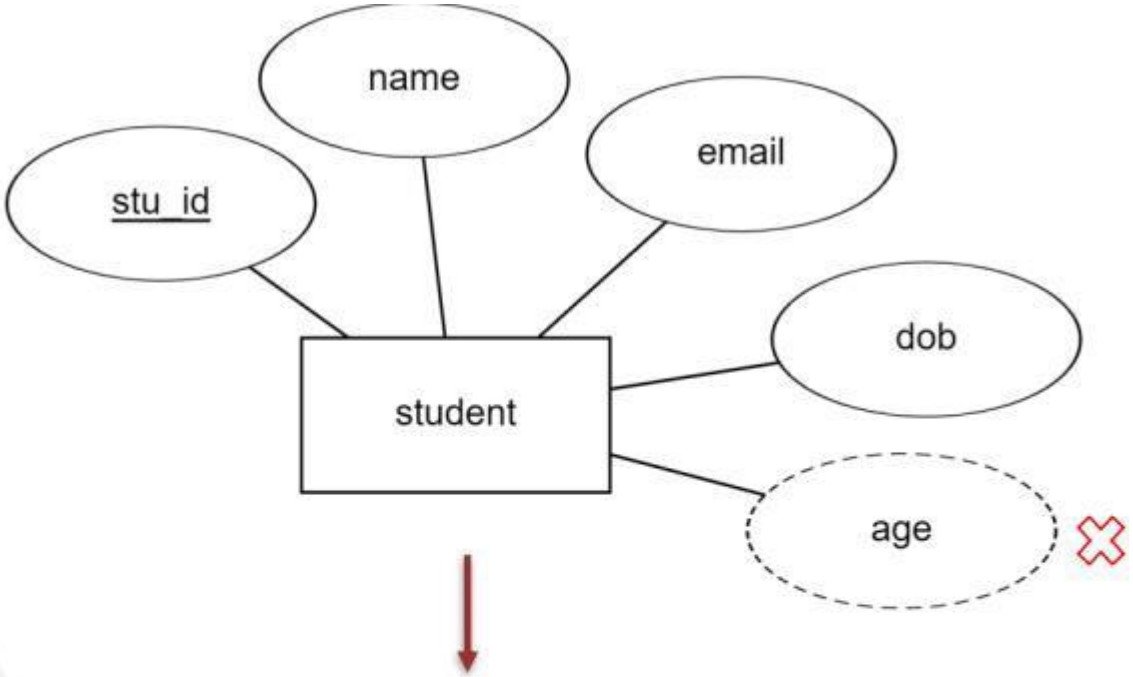
customer

cust_id
name
street
city
state
zipcode

Multivalued Attribute



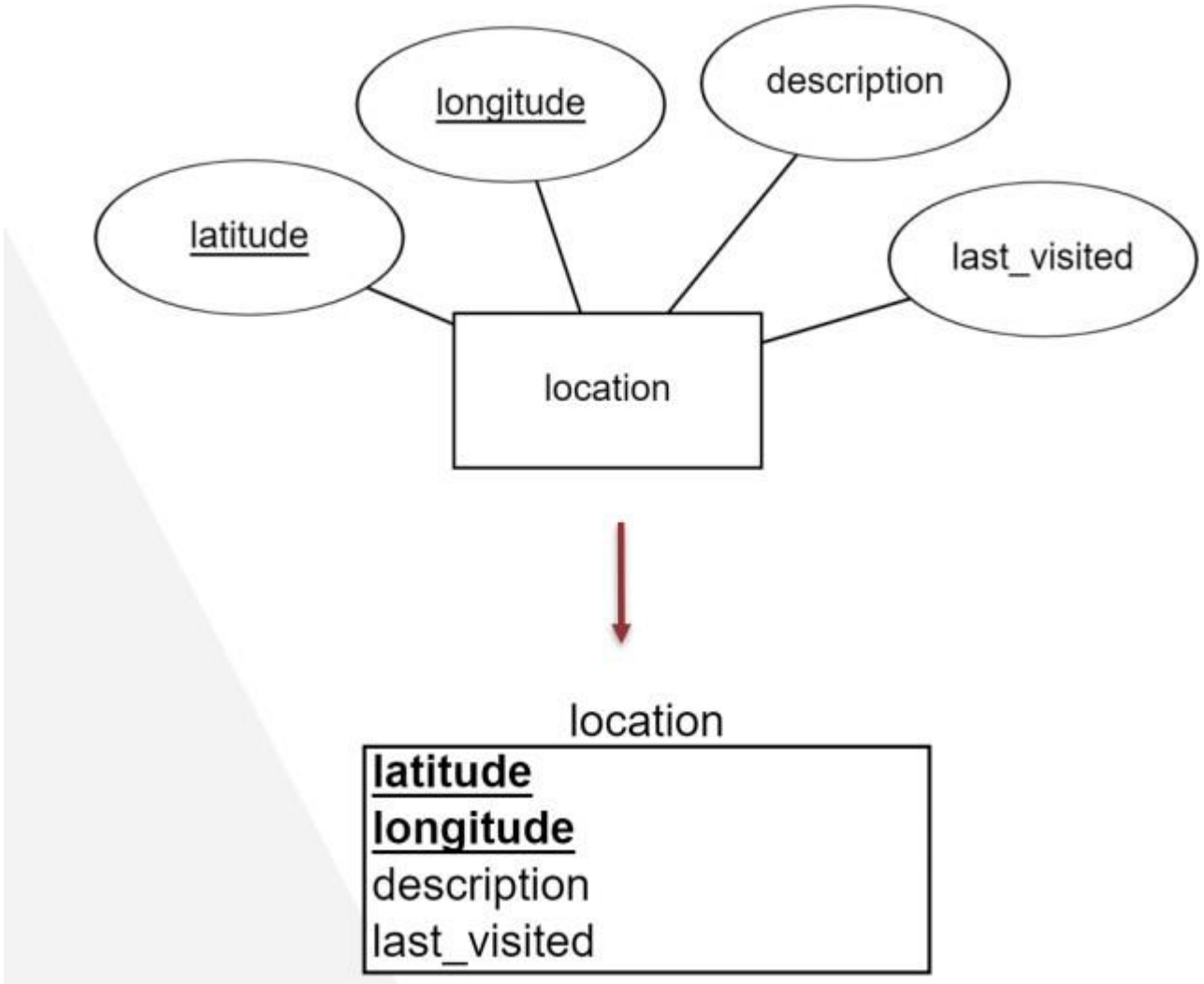
Derived Attribute



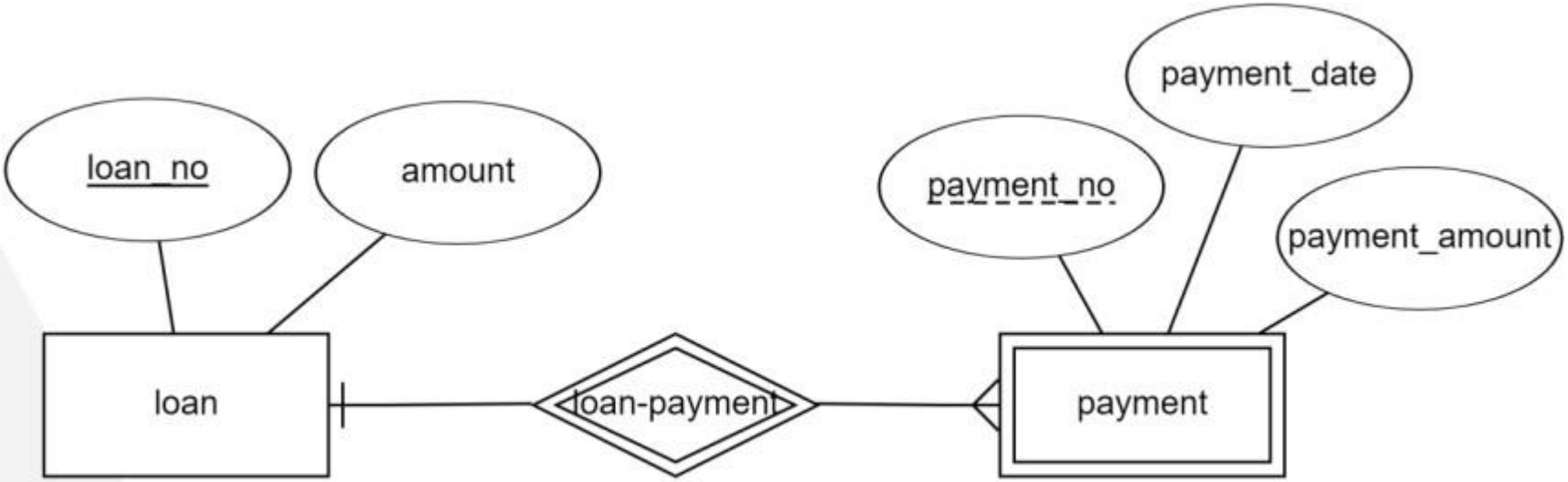
student

stu_id
name
email
dob

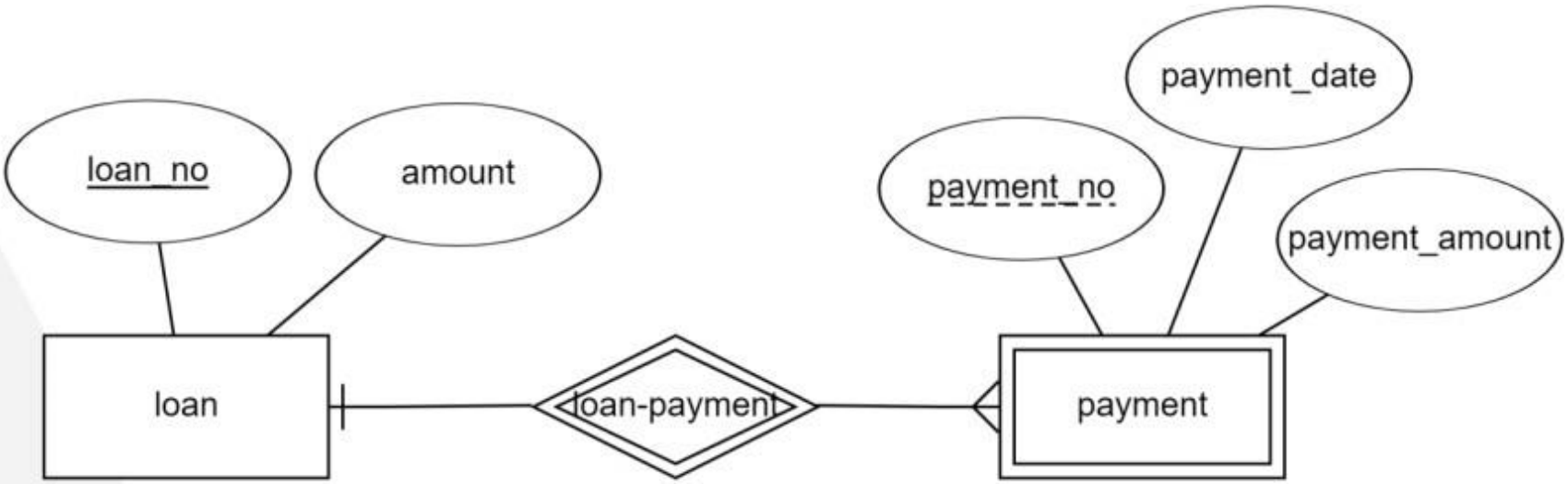
Strong Entity

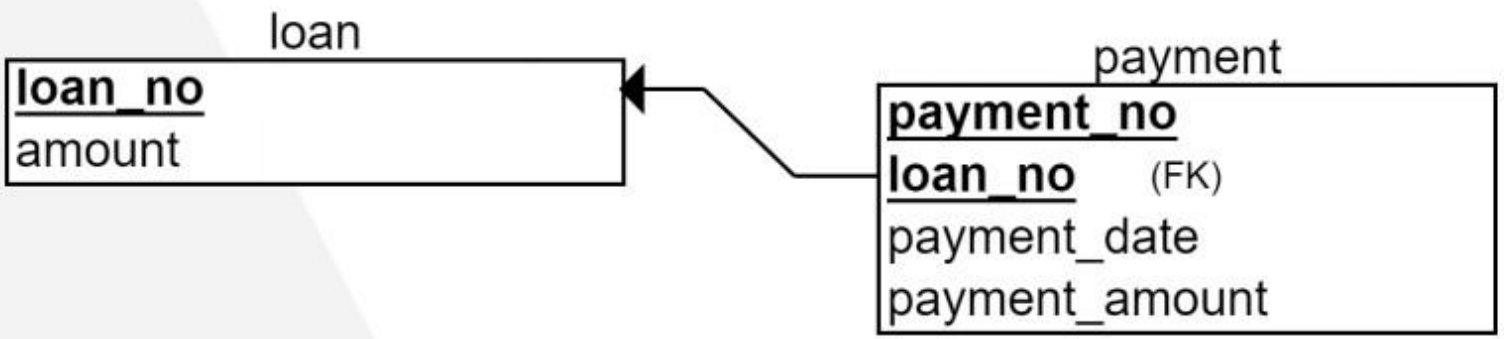


Identifying Relation

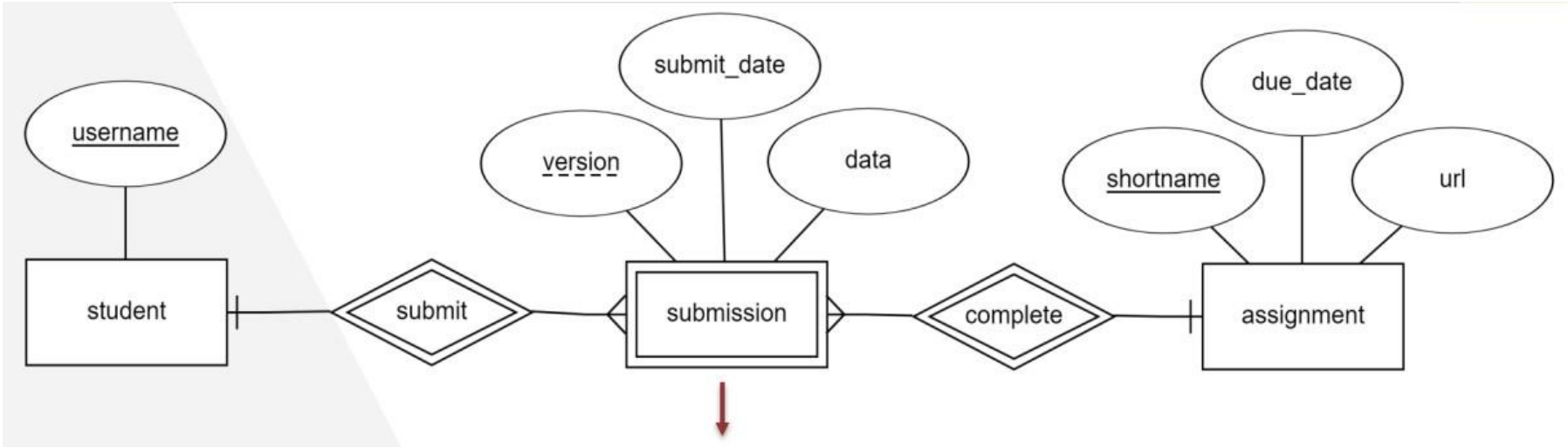


Identifying Relation

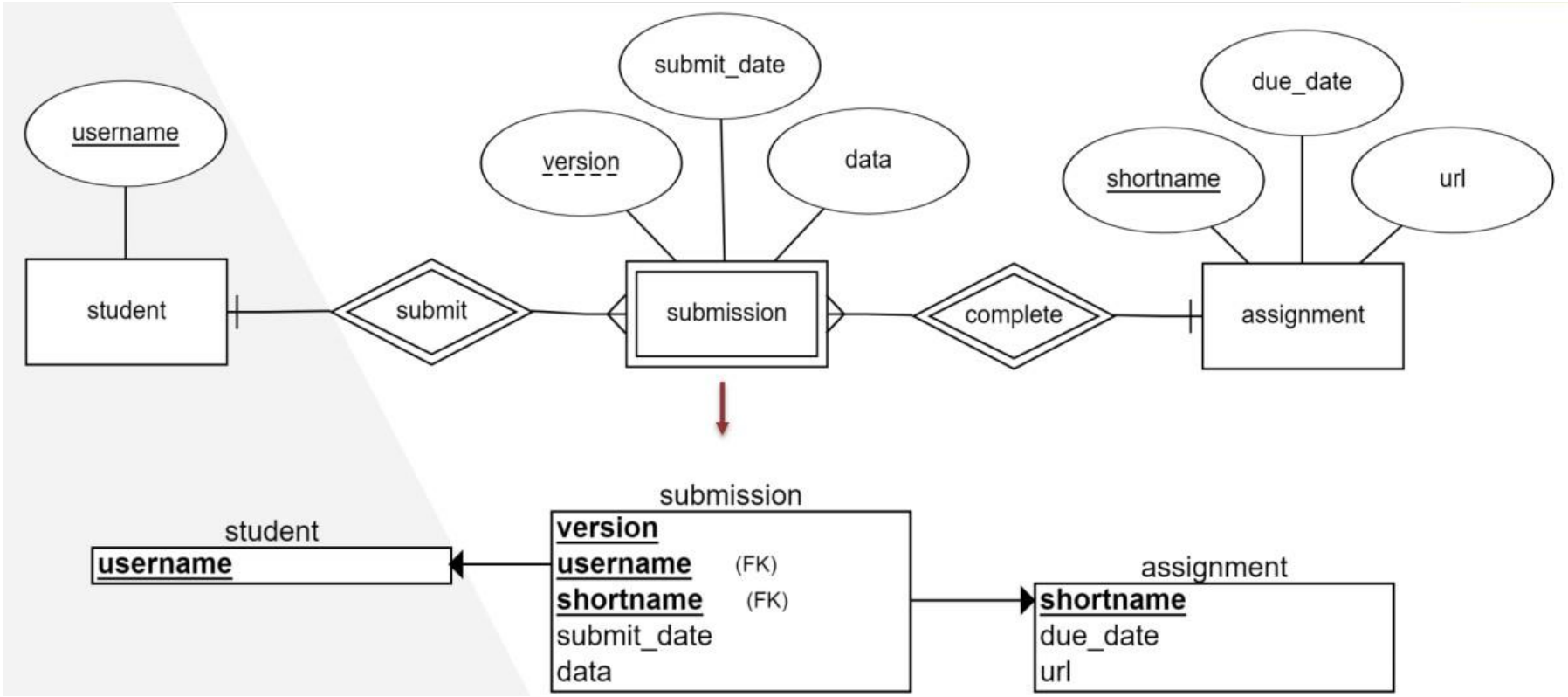




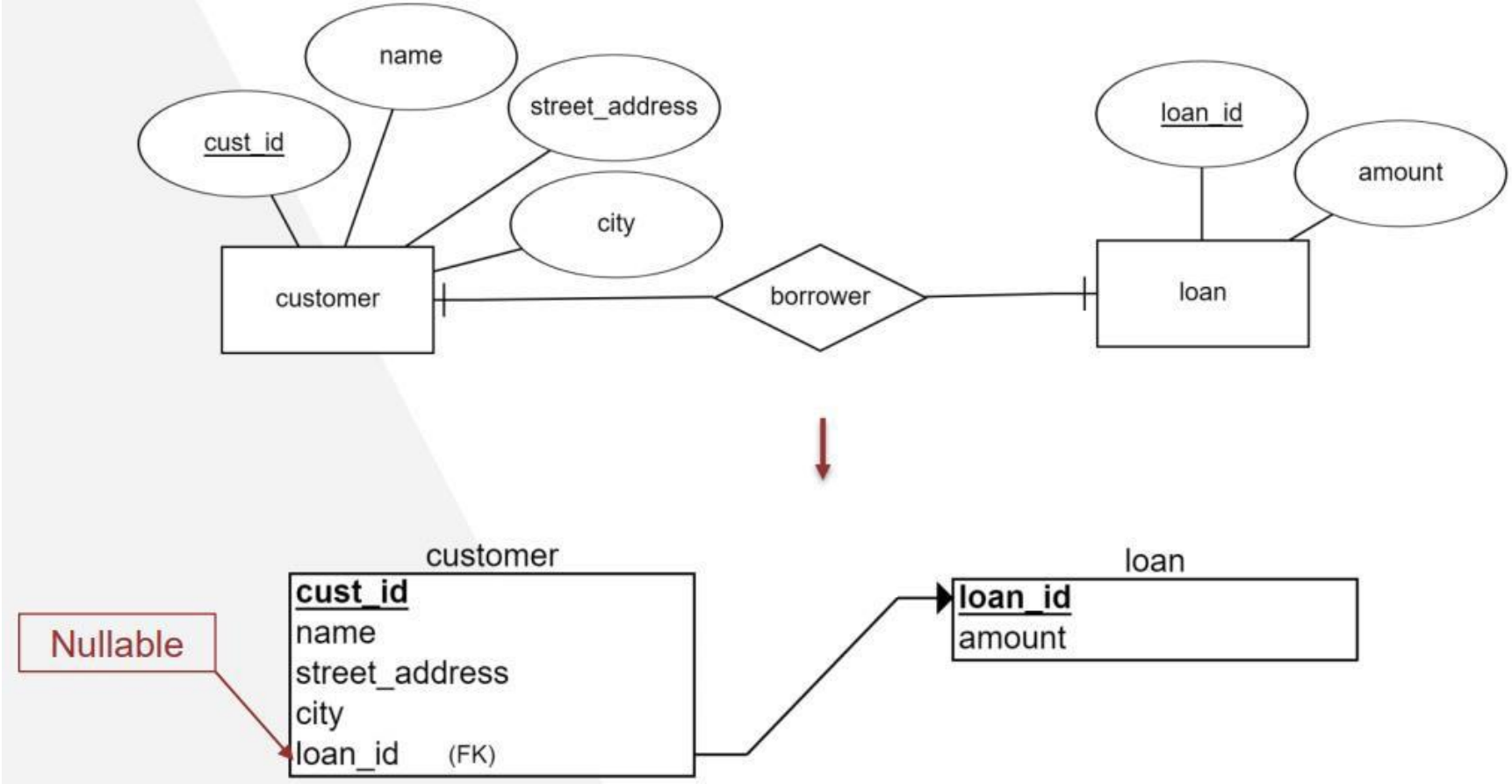
Weak Entity


username
submit_date
version
data
due_date
shortname
url
student
submit
submission
complete
assignment

Weak Entity

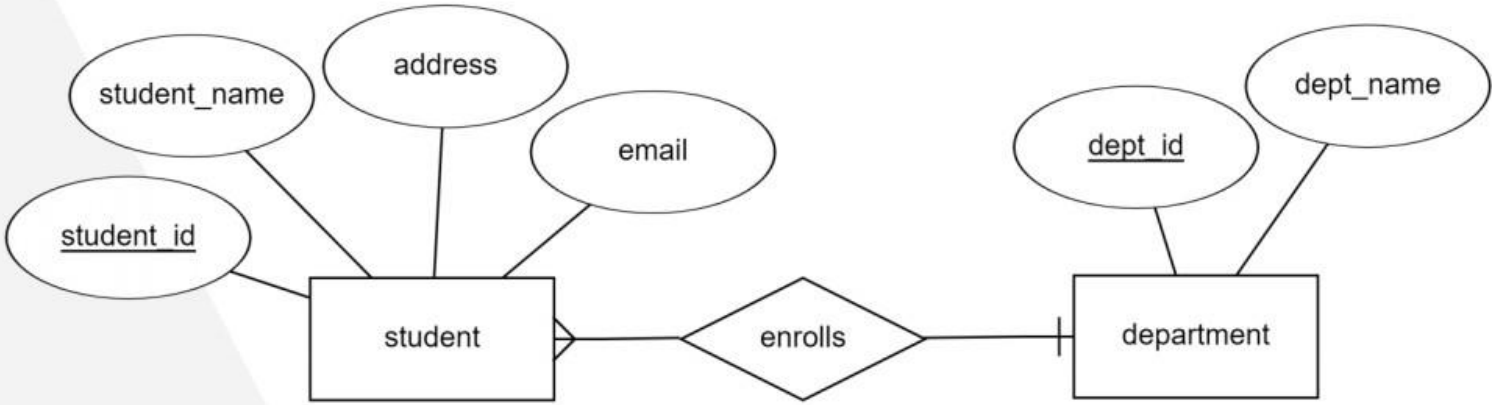

username
submit_date
version
data
due_date
shortname
url
student
submit
submission
complete
assignment
submission
student
username
version
username (FK)
shortname (FK)
submit_date
data
assignment
shortname
due_date
url

One to One Relation



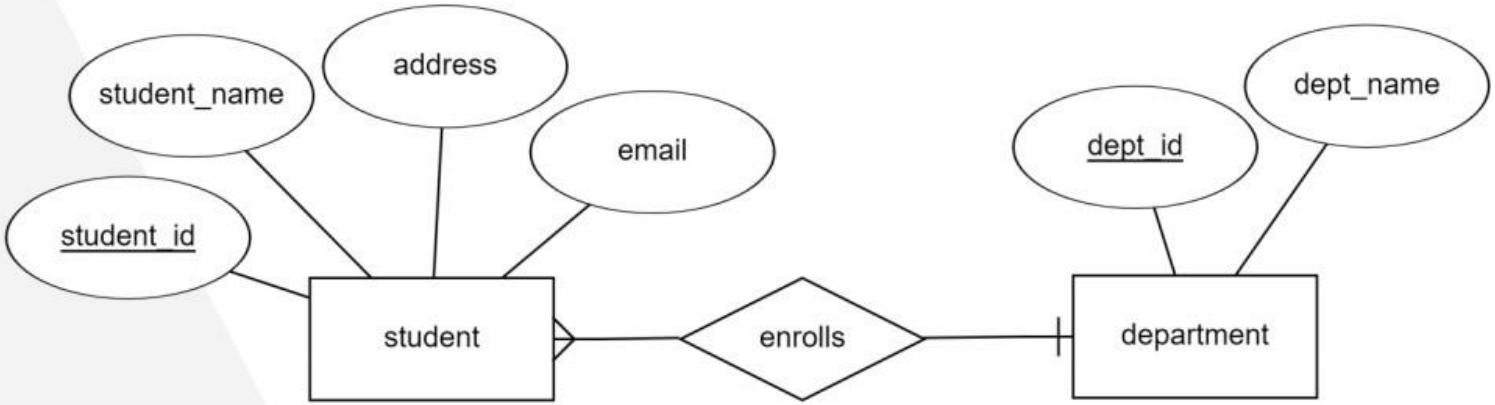
One to Many Relation

ER Diagram :

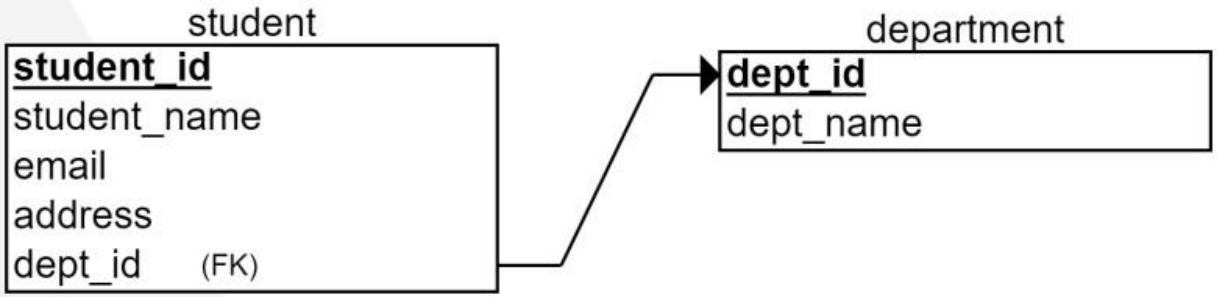


One to Many Relation

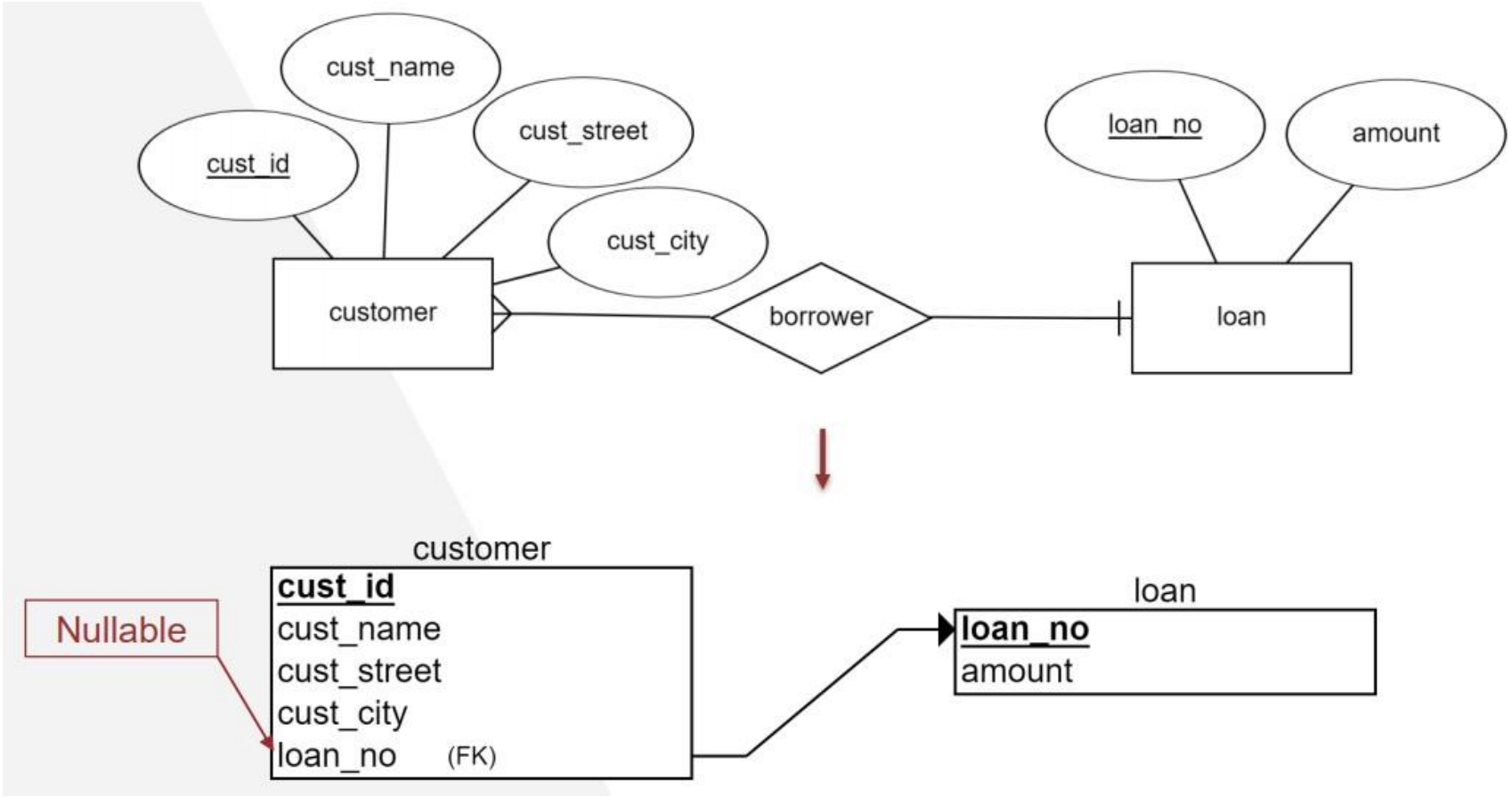
ER Diagram :



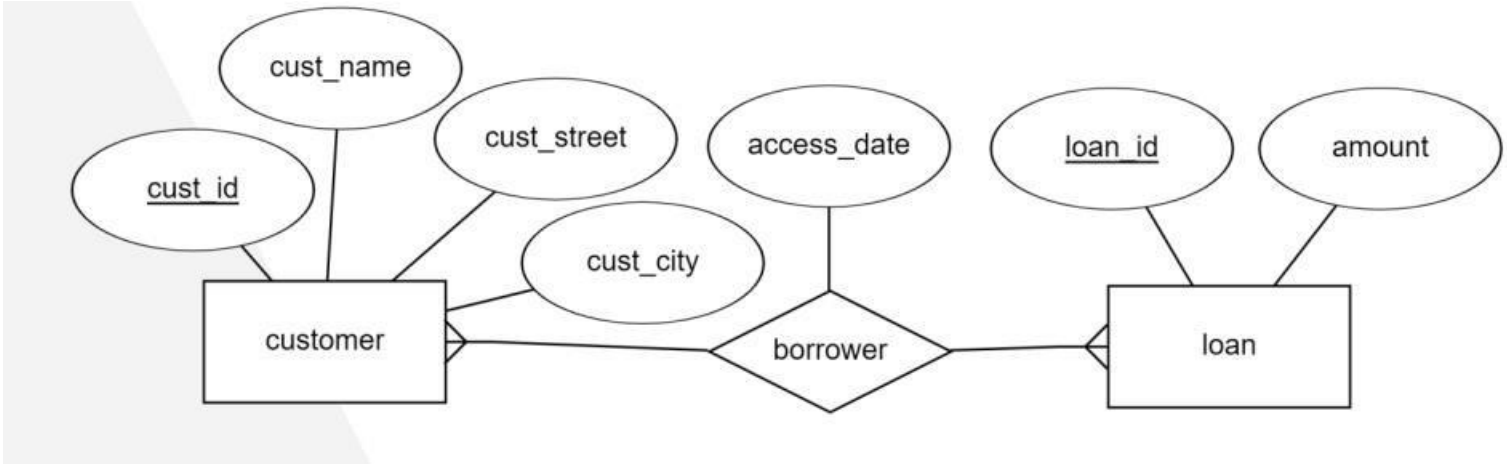
Relational Schema :



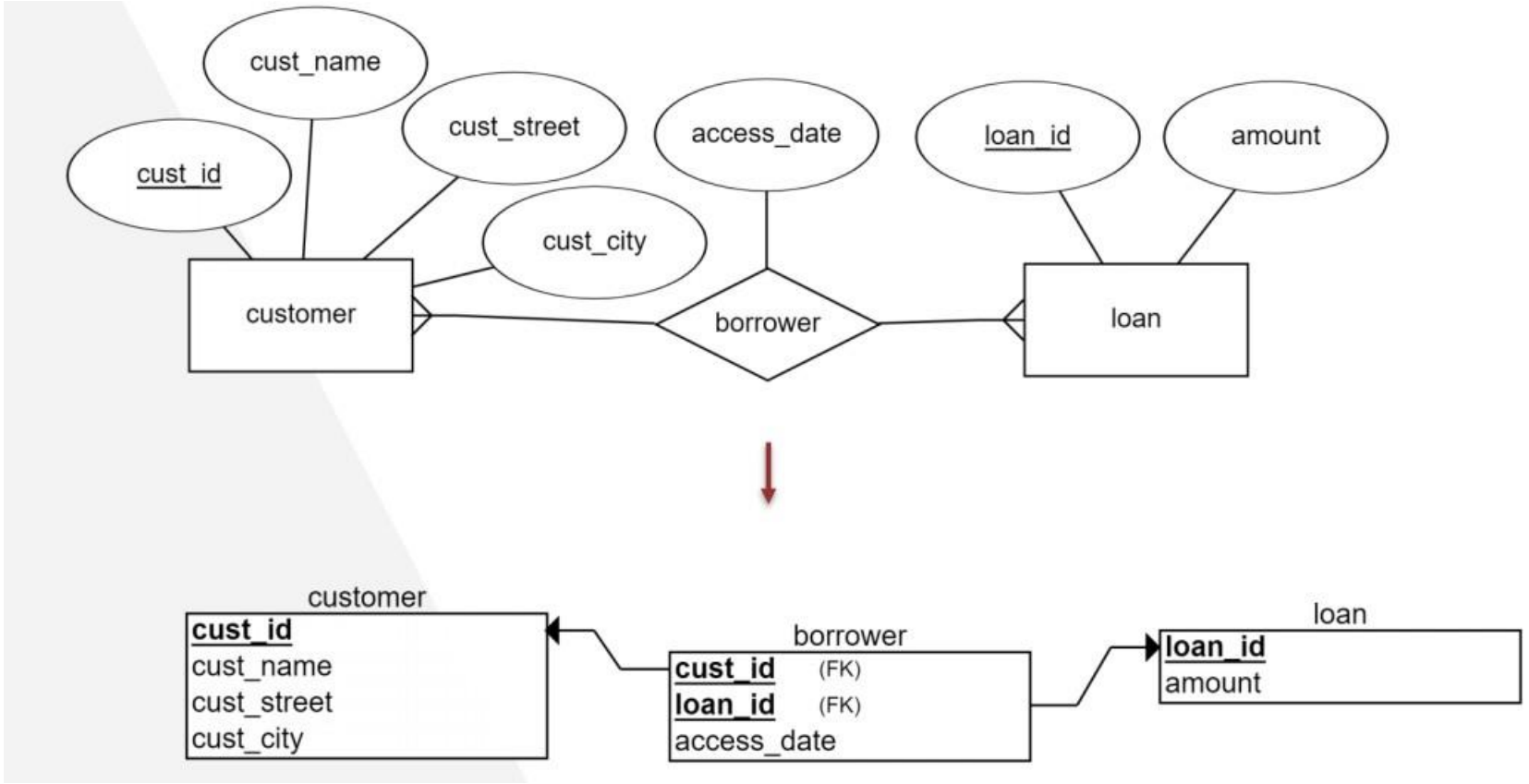
One to Many Relation



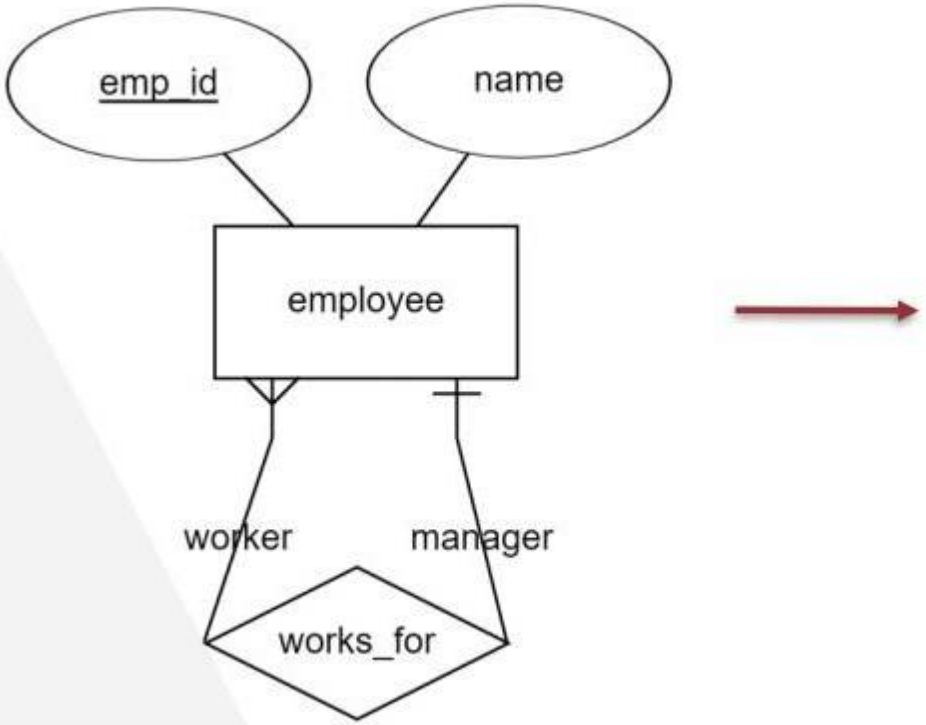
Many to Many Relation



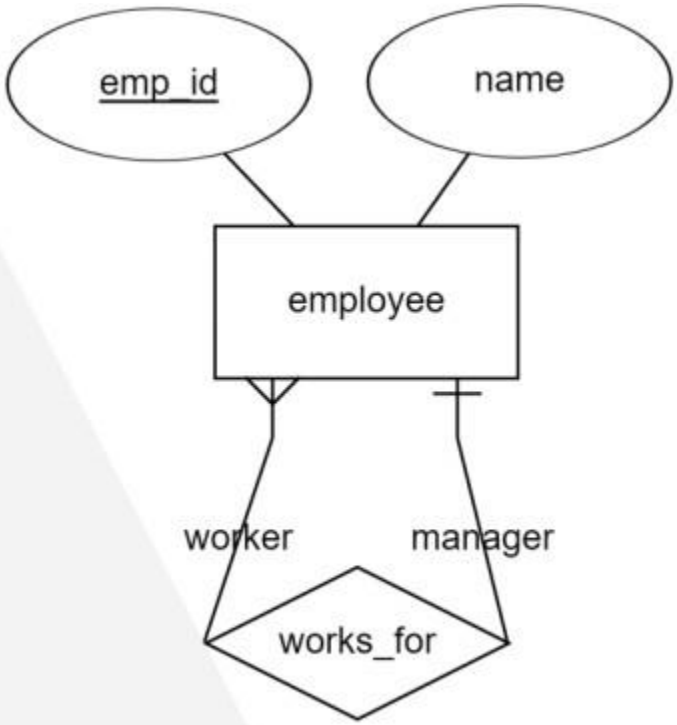
Many to Many Relation

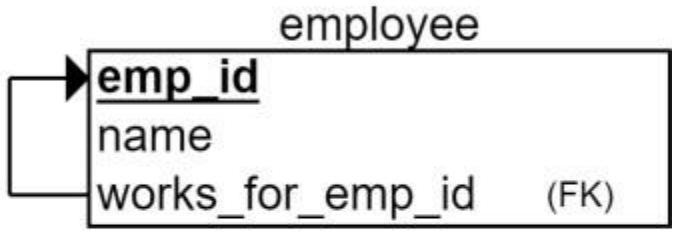


Recursive Relation



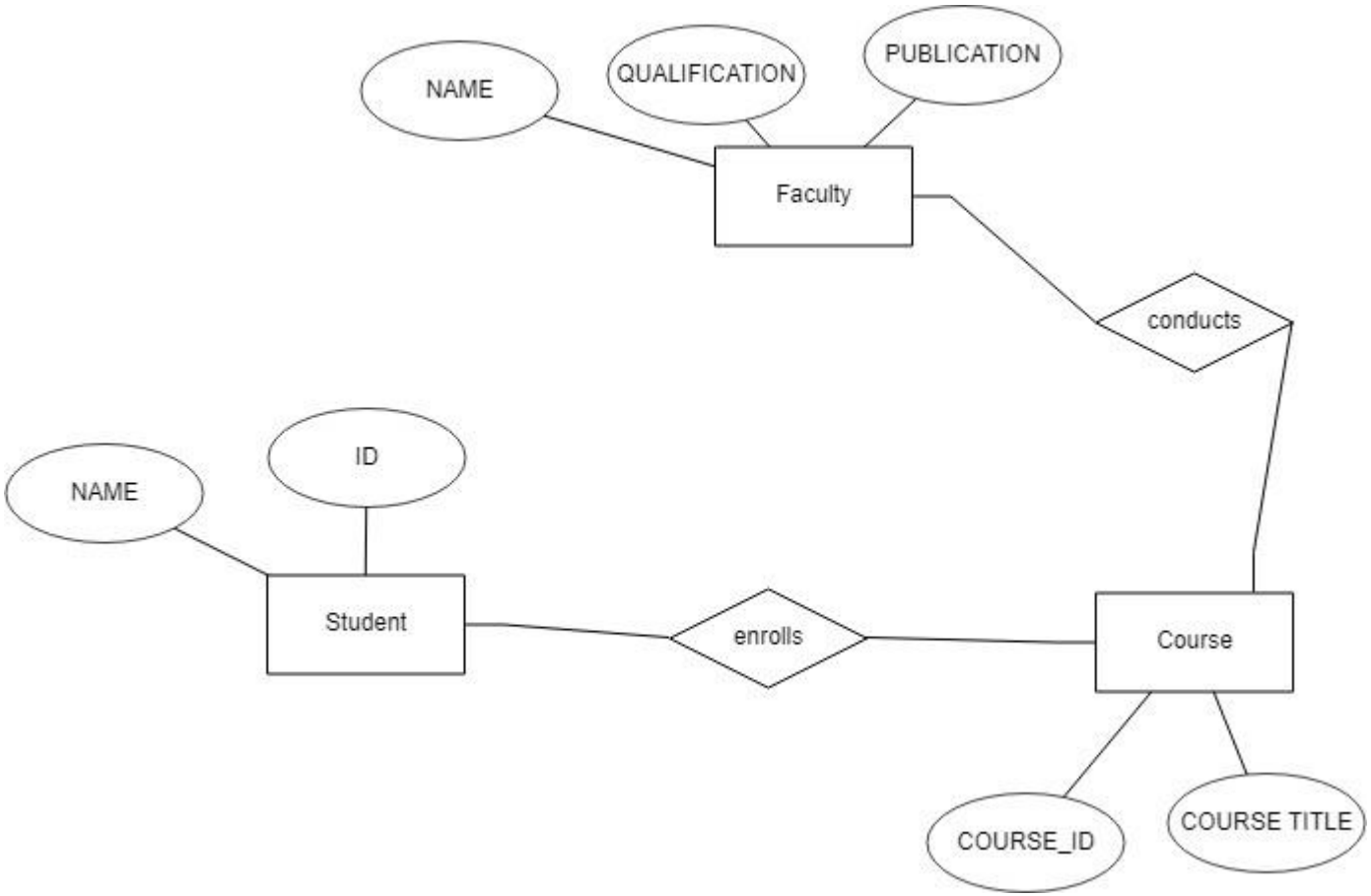
Recursive Relation



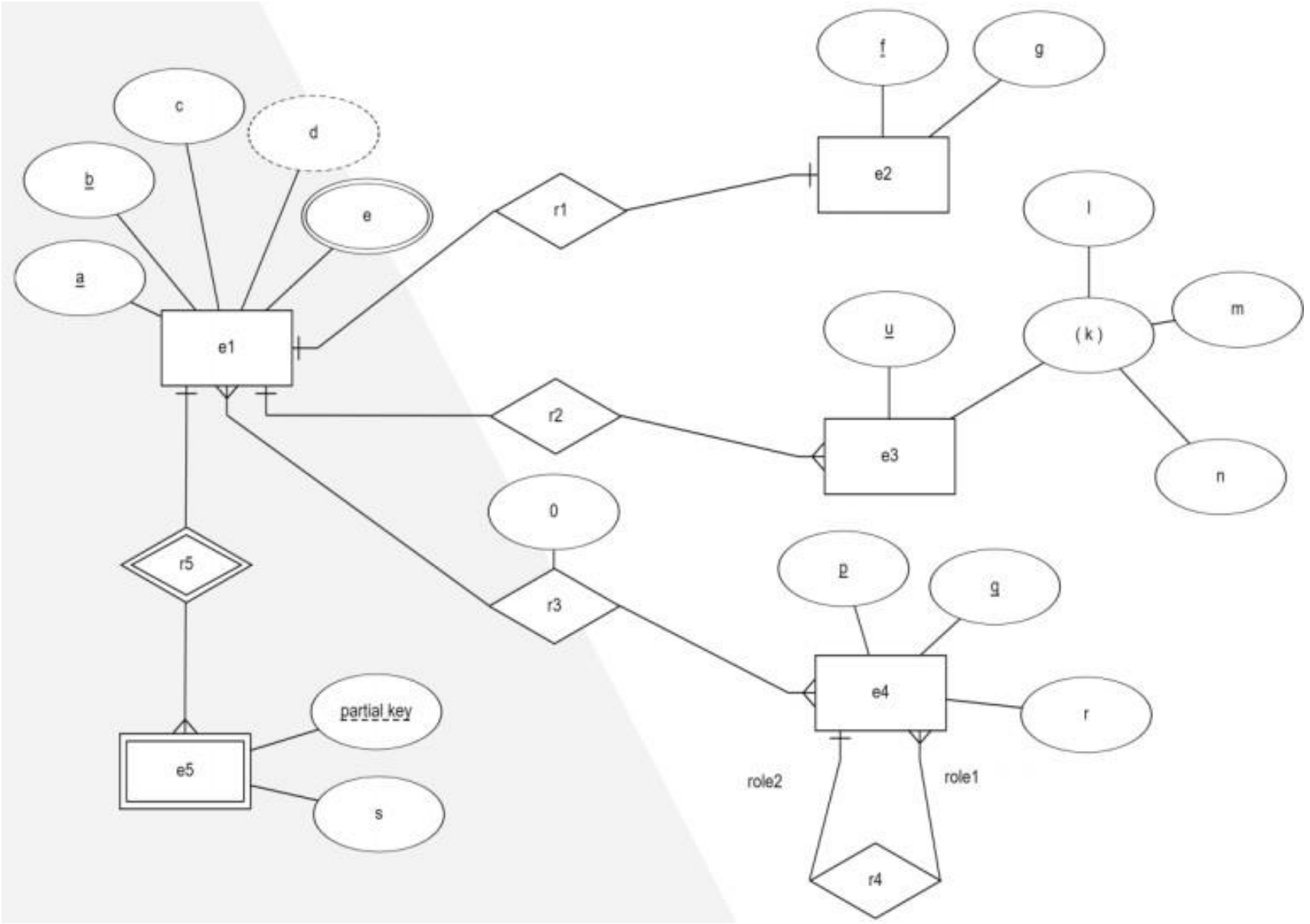


Practice

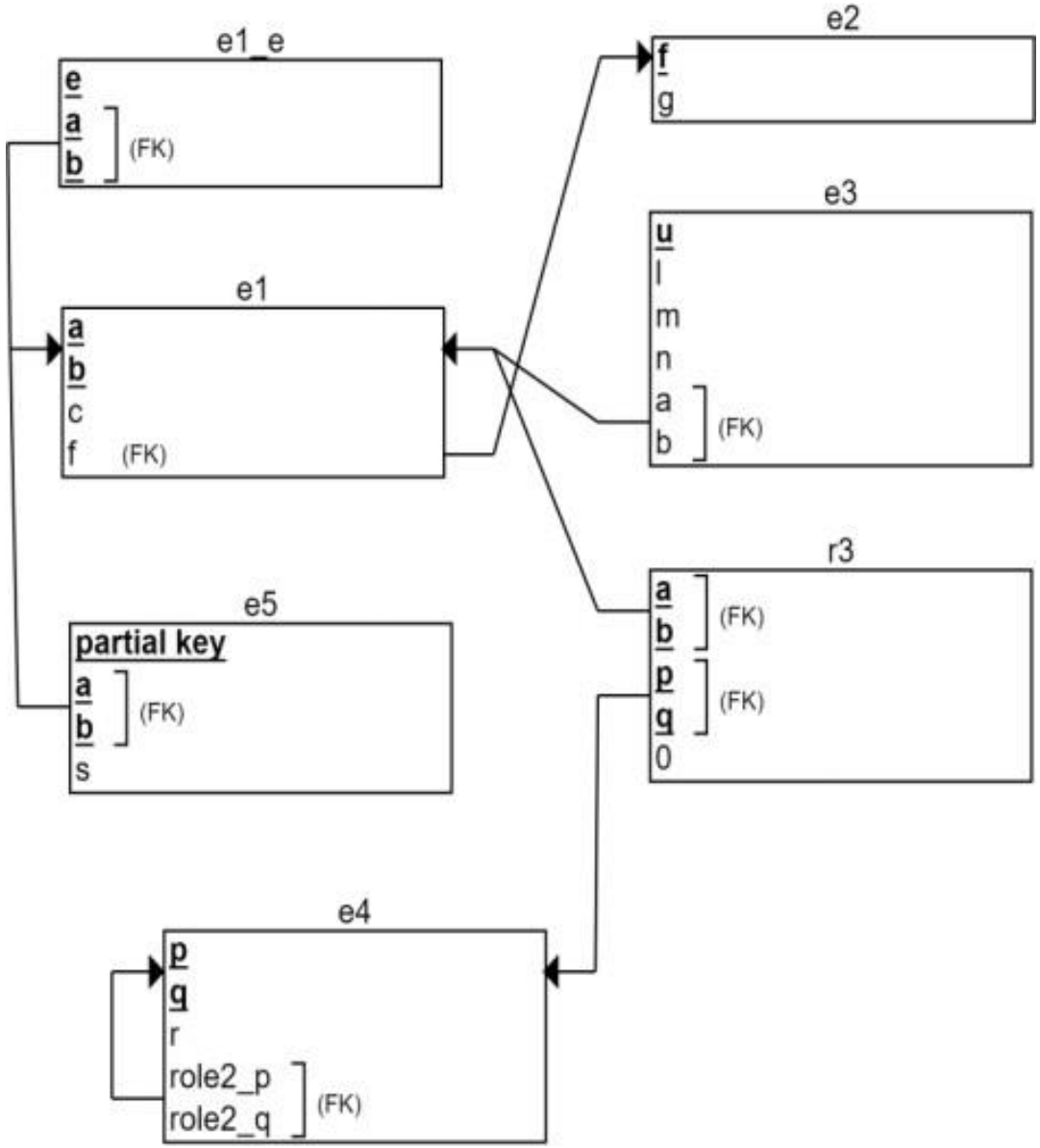
"Faculty conducts a course. Students enroll in a course"



Practice


f
g
c
d
b
e
a
r1
e2
l
e1
u
(k)
m
r2
e3
n
0
r5
r3
p
g
e4
r
partial key
e5
s
role2
role1
r4

Solution


e1_e
e
a
b
(FK)
e2
f
g
e3
u
l
m
n
a
b
(FK)
e1
a
b
c
f
(FK)
r3
a
b
(FK)
p
q
(FK)
0
e5
partial key
a
b
(FK)
s
e4
p
q
r
role2_p
role2_q
(FK)

Reference

1. https://www.slideshare.net/imamhossain75054/presentations