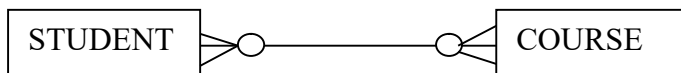
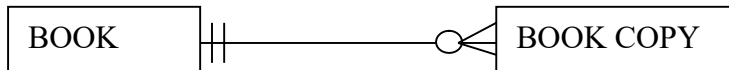


1. For each of the following pairs of entities indicate whether (under typical university circumstances) there is a one-to-many or a many-to-many relationship. Then using the shorthand notation introduced in the lecture, draw a diagram for each of the relationships.

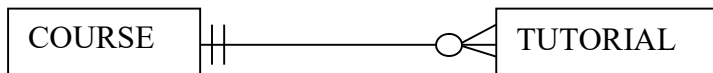
- a. STUDENT and COURSE (students register for courses)
Many-to-many (M:N)



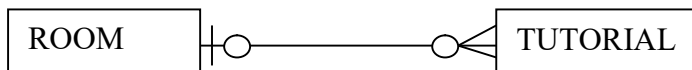
- b. BOOK and BOOK COPY (books have copies)
One-to-many (1:N)



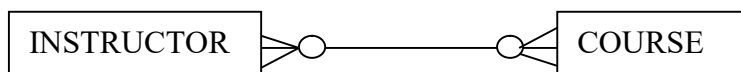
- c. COURSE and TUTORIAL (courses have tutorial sessions)
One-to-many (1:N)



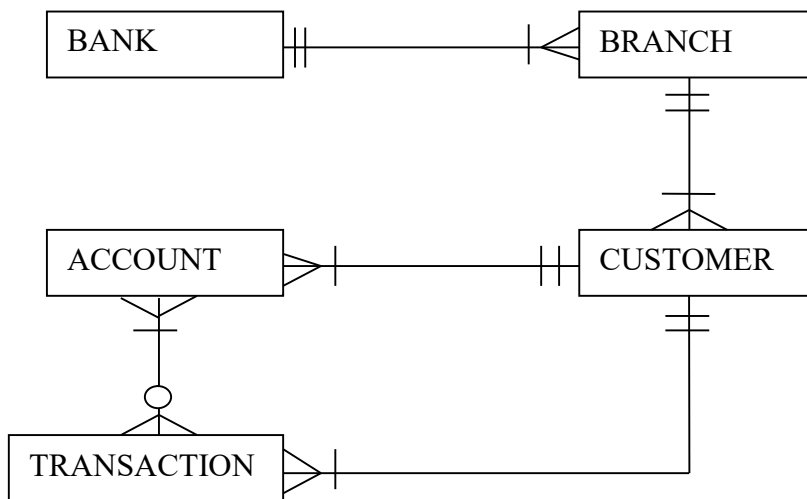
- d. TUTORIAL and ROOM (tutorial sessions are scheduled in rooms)
One-to-many (1:N)



- e. INSTRUCTOR and COURSE
Many-to-many (M:N)



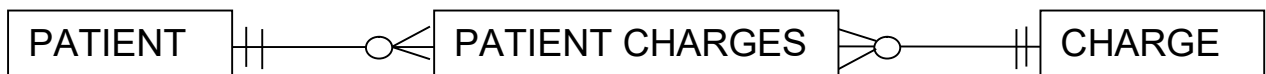
2. Using the shorthand notation, draw a single diagram to represent the following situation. A BANK has one or more BRANCHes (a BRANCH always belongs to exactly one BANK). Each BRANCH may have one or more CUSTOMERs (but a CUSTOMER is assigned to only one BRANCH). Each CUSTOMER may own one or more ACCOUNTs, but each ACCOUNT is owned by only one CUSTOMER. Also each CUSTOMER may submit one or more TRANSACTIONS (but each TRANSACTION is submitted by only one CUSTOMER). Finally, each ACCOUNT may have many TRANSACTIONS, and a TRANSACTION may be for more than one ACCOUNT.



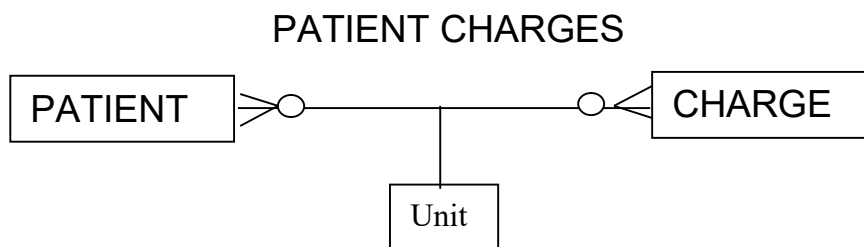
- 3.
- a. This relational database is not good at handling unstructured data, e.g.,
- Medical scans (MRI, X-Ray, ECG, EEG, Ultrasound, etc)
 - Scanned documents (original admission forms filled out by patients, handwritten physician referrals, etc.)

Object-oriented databases are good with unstructured data.

b.



Or equivalently:



c.

Meta data:

Name	Type	Length	Min	Max	Description
Patient Number	Integer	4	0	9999	Patient ID
Family Name	Character	30			Patient's last name
Given Name	Character	30			Patient's first name
Address	Character	40			Street/City
Item Code	Integer	3	0	999	Item ID
Description	Character	20			Item name
Charge	Decimal	7	0.0	99,999.99	Amount
Unit	Integer	3	0	999	Units charged

better:

Name	Type	Length	Min	Max	Description
Patient Number	Alphanumeric	9			Patient ID
Family Name	Character	30			Patient's last name
Given Name	Character	30			Patient's first name
Address	Character	40			Street/City
Item Code	Alphanumeric	6			Item ID
Description	Character	20			Item name
Charge	Decimal	10	0.0	99,999,999.99	Amount
Unit	Integer	3	0	999	Units charged

d.

Patient Name: Dolan, Mark
 Patient Number: 4238
 Patient Address: 818 River Run

Item Code	Item Description	Amount
200	Rome Semi Priv	1600
275	Radiology	150
700	EEG Test	200

Total: 1950

e.

E-R diagram for the hospital:

