

# CS 2005 Database Systems

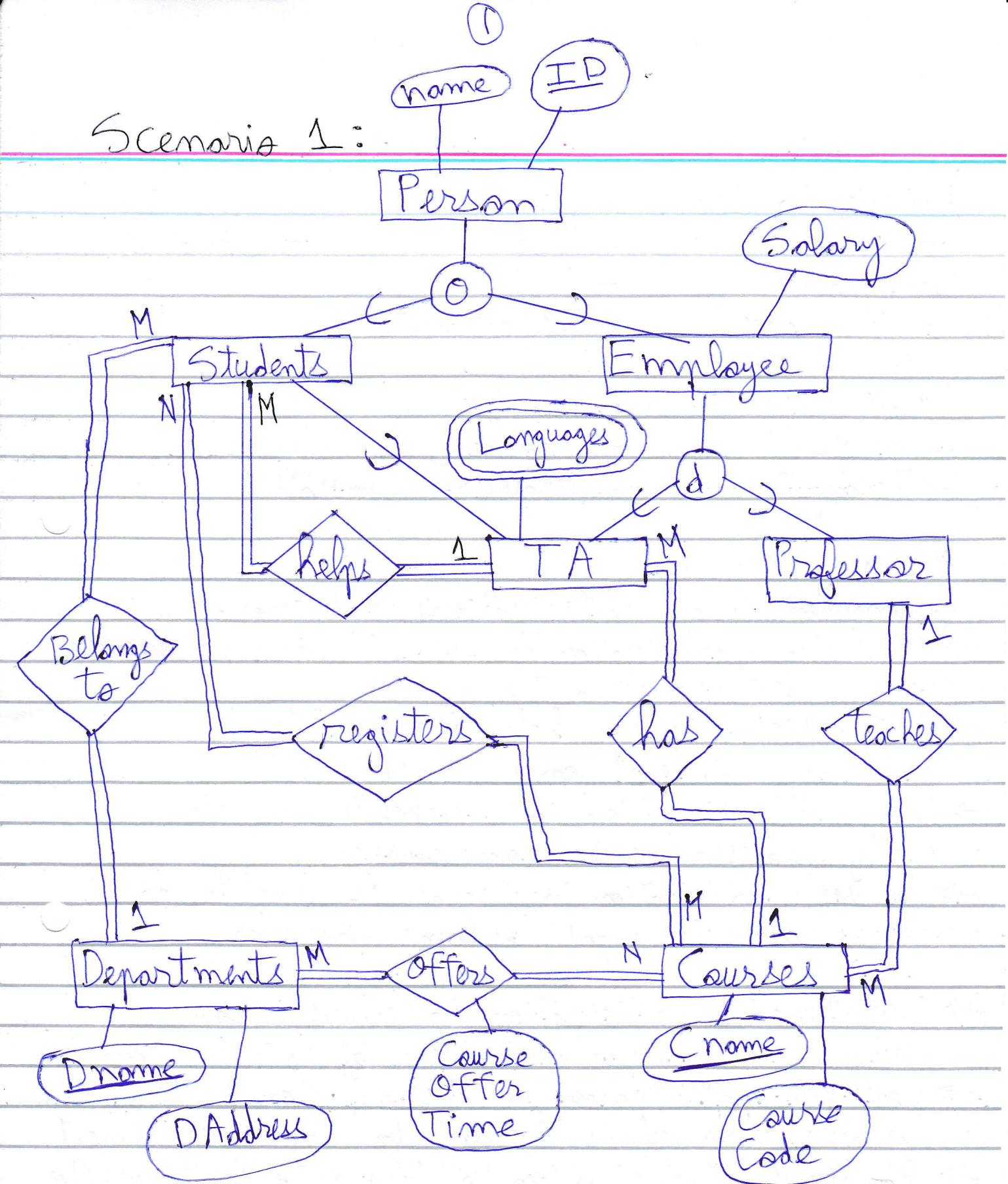
## Assignment 3

Name: Faizan Shabirz

Roll Number: 22L-6552

Section: 4 H

## Scenarios 1:



Entities in scenario 1:

- Person
- Students
- Employee
- TA
- Professor
- Departments

- Courses

Relationships in scenario 1:

- helps
- Belongs to
- teaches
- registers
- offers
- has

~~Assumptions~~

Assumptions about participations in scenario 1:

- Students participation in helps is complete because every student will get a TA
- TA participation in helps is complete as a TA will help at least one student
- Professor participation in teaches is complete as every professor teaches some course
- Courses participation in teaches is complete as every course is taught by some professor
- Departments participation in offers is complete because every department offers at least one course
- Courses participation in offers is complete because every course belongs to some department
- Students participation in Belongs to is complete because every student belongs to a department
- Departments participation in Belongs to is complete because every department has at least one student

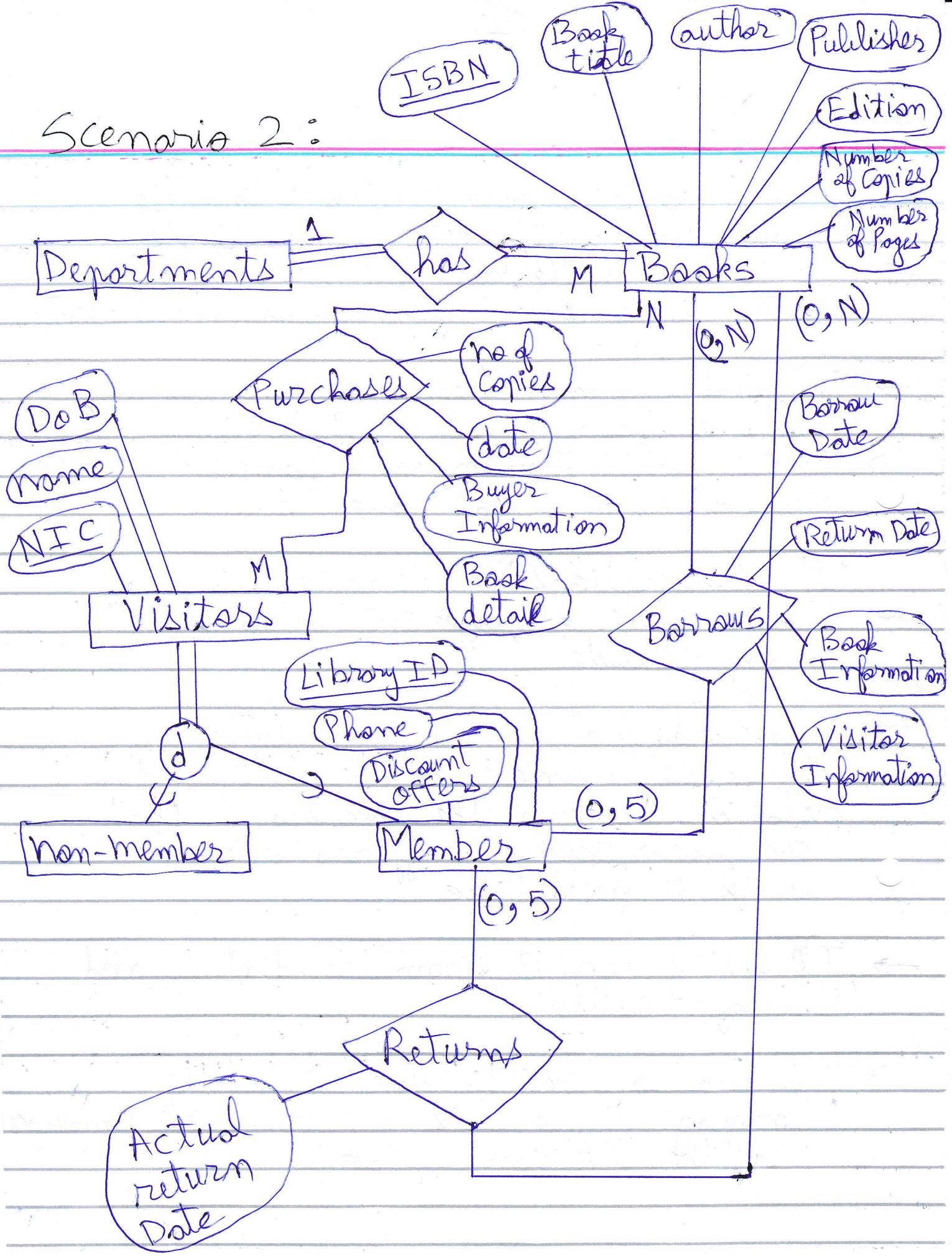
(2)

- Students participation in registers is complete because every student registers some course
- Courses participation in registers is complete because every course is registered by some student.
- TA participation in has is complete because every TA is a TA of one course
- Courses participation in has is complete because every course has at least one TA.

Other Assumptions in scenario 1:

- I have made Employee entity to store salary attribute
- I have added a descriptive attribute 'Course Offer Time' in the 'Offers' relation to handle the constraint that ~~each~~ each course is offered once a week at fixed time
- TA entity inherits from 'Students' and 'Employee' entity
- TA has a multi-value attribute 'Languages' to store one or more languages that the TA can speak.

## Scenario 2:



③

Entities in scenario 2:

- Departments
- Books
- Visitors
- Member
- Non-member

Relationships in Scenario 2:

- has
- Purchases
- ~~Books~~ Borrows
- Returns

Assumptions about participations in scenario 2:

- Departments participation in has is complete because every department has some books
- Books participation in has is complete because every book belongs to some department
- Visitors participation in Purchases is partial because some visitors may not purchase a book
- Books participation in Purchases is partial because some books might not have any purchasers
- Member participation in Borrows is partial because some members will not borrow any book
- Books participation in Borrows is partial because some books might not be borrowed by any member.

- Member participation in Returns is partial because some members will have no books to return
- Books participation in Returns is partial because books that are not borrowed will not be returned.

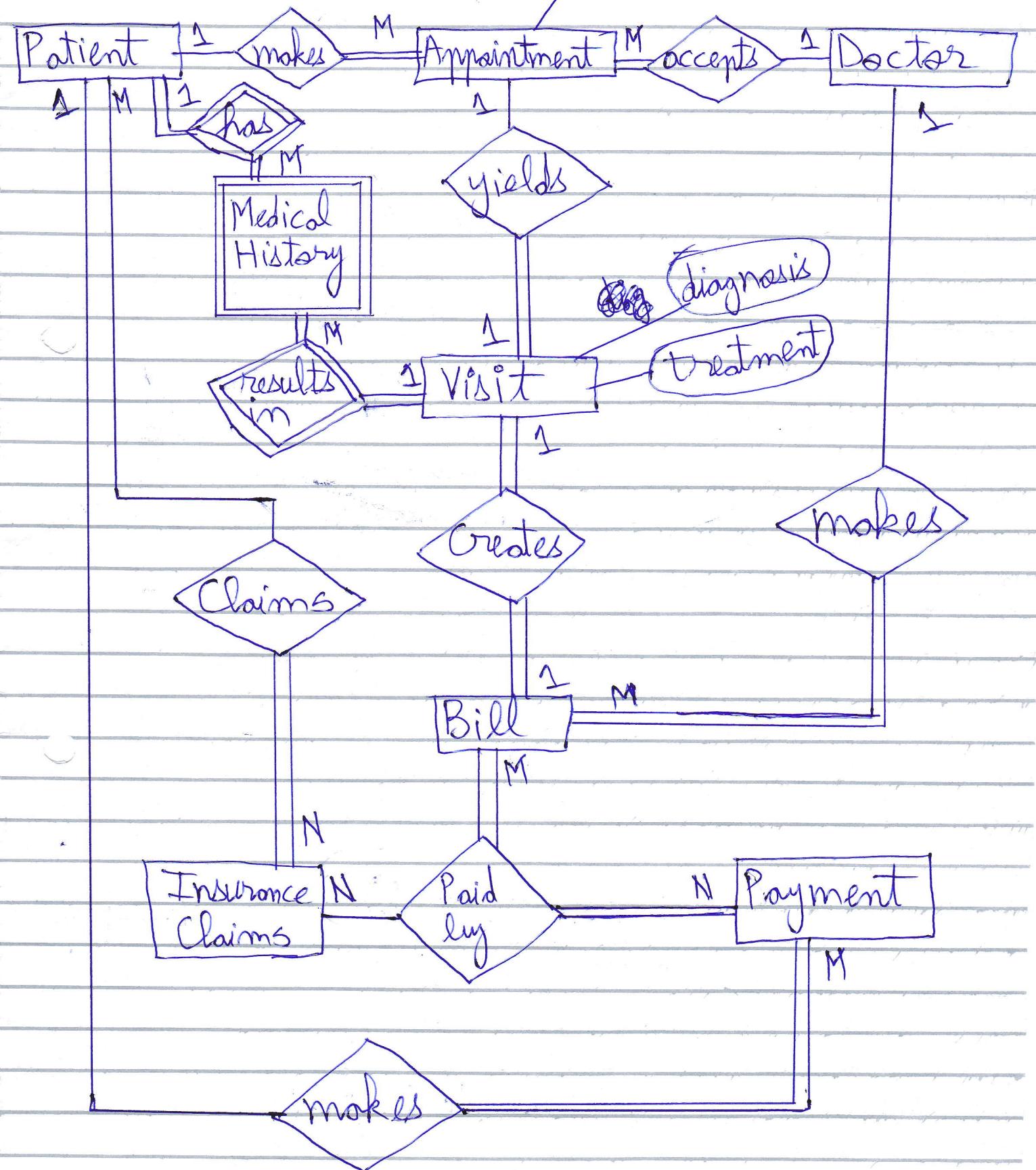
Other assumptions in scenario 2:

- I have made a separate Returns relationship to keep track of 'actual return date' of a book.
- (0, 5) in Borrows relationship on Member side means that a member can borrow a minimum of 0 books and a maximum of 5 books
- (0, N) in Borrows relationship on Books side mean that a book can be borrowed by 0 member at minimum and by many members at maximum
- (0, 5) in Returns relationship on Member side means a member can return a minimum of 0 books and a maximum of 5 books
- (0, N) in Returns relationship on Book side means a book can be returned by 0 members at minimum and many members at maximum.

④

Scenarios 3:

Appointment Type



Entities in scenario 3:

- |                    |          |           |
|--------------------|----------|-----------|
| - Patient          | - Doctor | - Bill    |
| - Appointments     | - Visit  | - Payment |
| - Insurance Claims |          |           |

Relationships in scenario 3:

- |             |             |              |
|-------------|-------------|--------------|
| - makes (1) | - Claims    | - Paid by    |
| - accepts   | - creates   | - makes (3)  |
| - yields    | - makes (2) | - has        |
|             |             | - results in |

Assumptions about participations in scenario 3:

- Patient participation in makes is partial because some patients will not have any appointment
- Appointment participation in makes is complete because every appointment has a patient involved
- Doctor participation in accepts is partial because some doctor may not have any appointment
- Appointment participation in accepts is complete because every appointment has a doctor involved.
- Appointment participation in yields is partial because some patients may or not make a visit after making an appointment

⑤

- Visit participation in yeilds is complete because every visit has an appointment
  - Patient participation in claims is partial because some patients will not have any insurance
  - Insurance claims participation in claims ~~claims is complete~~ is complete because every insurance claim has a patient involved.
  - Visit participation in creates is complete because every visit will have a bill.
  - Bill participation in creates is complete because every bill has a visit at its backend
  - Doctor participation in makes is partial because some doctors may not make any bill on a particular day
  - Bill participation in makes is complete because every bill has a doctor who ~~made~~ made it
- Bill has complete
- Bill participation is complete ~~is~~ in Paid by because every bill is paid by some patient or insurance claim

- Insurance claims participation in Paid by is ~~not~~ partial because some insurance claims may not have been used to pay a bill
- Payment participation in Paid by is complete because every payment ~~is~~ has a bill at its block end.
- Patient participation in makes is partial because some patients who do not visit the doctor will not make any payment
- Payment participation in makes is complete because every payment is made by some patient.
- Visit participation in results in is ~~not~~ complete because every visit will result in a medical history
- Medical history participation in results in ~~is~~ is complete since its a weak entity
- Patient participation in has is complete because every patient will have a medical history
- Medical history ~~not~~ participation in has is complete ~~is~~ since its a weak entity.

6

Other assumptions about scenario 3:

- Paid by is a ternary relationship involving Bill, Insurance Claims and Payments
- For diagnosis and treatment, I have made two attributes in Visit entity
- Appointment entity has an attribute 'Appointment Type' which ~~because~~ will be used to handle emergency cases. This attribute will have a value 'unscheduled' when there is an emergency
- I have made a separate entity for medical history
- Since there is a many to many cardinality between Bill and payment which means that a Bill can be paid in ~~installments~~ many installments and a payment may cover more than one bill
- Since there is a many to many ~~relationship~~ cardinality between Insurance claim and Bill so an insurance claim can be used to pay multiple bills and multiple insurance claims can be used to pay a single ~~bill~~ bill as well

→ Medical History is a weak entity because it cannot exist if there is no patient entity.