Q1:

countryOfbirth

name

type

author

write

except

memberOfname

email

address

year

nameOfPublisher · book · borrow · member

phone

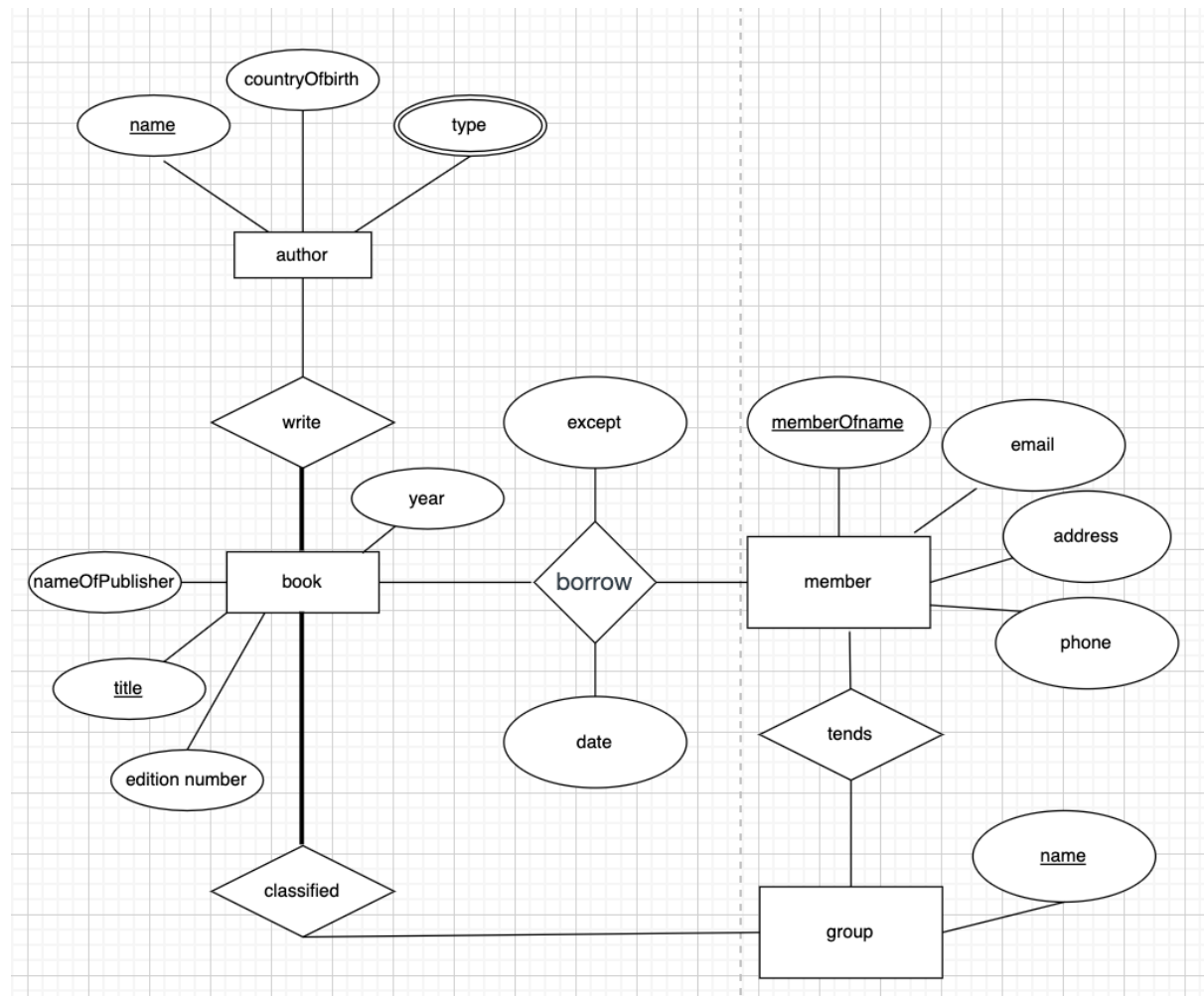title

tends

date

edition number

name

classified

group

Q2:
a)
select customer.name
from customer c, PurchaseOrder p
where c.CustomerID=p.CustomerID
group by CustomerID
having count(*)>=all(select count(*) from PurchaseOrder group by CustomerID)

b)
create view cost as
select OrderID, sum(ItemCost) as total
from PurchaseItem
group by OrderID;
select count(*) from cost where total>200;

Q3:
a)
pass 1: 1000/3 = 334 runs

b)
$\log_2 344 + 1$ pass $= 8.42 + 1 = 10$ passes
c)
$1000/x <= x-1$, $x = 34$

Q4:
Person (personId, name, address phoneNumber)
PK = (personId)

Patient (personId, age)
PK=(personId)
Fk=(personId -> Person)

Assigned(personId)
PK=(personId)
FK=(personId ->Person)

Doctor(personId, yearsOfExperience)
PK=(personId)
Fk=(personId -> Person)

Speciality(personid, speciality)
PK=(personId, speciality)
Fk=(personId-> Person)

Prescription (personid, date, quantity, name, name)
PK=(patientId, name)
FK=(patientId -> Person, Name-> Medicine)

Pharmacy(name, address, numberOfMedicine, phoneNumber)
PK=(name)

Medicine(name, productionDate)
PK=(name, medName)
FK=(name-> name)

Sell(name, name, name, price)
PK=(name, name, name)
FK=(name-> Pharmacy, (name, name) -> Medicine)

PharmaceuticalCompany(name, emailAddress)
PK=(name)

Q5:
a)
R1=P[ManufacturerName](S[Country="Australia"](Manufacturer))

R2=R1 J Car
R3= P[DealerName](R2 J Sell)
R=P[DAddress](R3 J DealerName)

b)
R1= p[Make,ModelNum](S[ManufacturerName="Toyota"](Car))
R2= P[DealerName](R1 J Sell)
R3= P[DealerName](Dealer)
R= R3 D R2

Q6:
Check(ProjectID)+
Result = ProjectID
Result = ProjectID, ProjectTitle, ProjectBudget (ProjectID -> ProjectTitle, ProjectBudget)
Result = ProjectID, ProjectTitle, ProjectBudget, ProjectManager (ProjectTitle ->
ProjectManager)
Result = ProjectID, ProjectTitle, ProjectBudget, ProjectManager, ProjectDescription =R
(ProjectDescription -> ProjectID)

Check(ProjectDescription)+
Result = ProjectDescription
Result = ProjectDescription, ProjectID (ProjectDescription -> ProjectID)
Result = ProjectDescription, ProjectID, ProjectTitle, ProjectBudget (ProjectID -> ProjectTitle,
ProjectBudget)
Result = ProjectDescription, ProjectID, ProjectTitle, ProjectBudget, ProjectManager = R (
ProjectTitle -> ProjectManager)

Check(ProjectBudget, ProjectManager)+
Result = ProjectBudget, ProjectManager
Result = ProjectBudget, ProjectManager, ProjectDescription (ProjectDescription ->
ProjectID)
Result = ProjectBudget, ProjectManager, ProjectDescription, ProjectID(ProjectDescription ->
ProjectID)
Result = ProjectBudget, ProjectManager, ProjectDescription, ProjectID, ProjectTitle = R
(ProjectID -> ProjectTitle, ProjectBudget)

Check(ProjectBudget, ProjectTitle)+
Result = ProjectBudget, ProjectTitle
Result = ProjectBudget, ProjectTitle, ProjectManager(ProjectTitle -> ProjectManager)
Result = ProjectBudget, ProjectTitle, ProjectManager, ProjectDescription (ProjectBudget,
ProjectManager -> ProjectDescription)
Result = ProjectBudget, ProjectTitle, ProjectManager, ProjectDescription, ProjectID = R (
ProjectDescription -> ProjectID)

Candidate keys: (ProjectID), (ProjectDescription), (ProjectBudget, ProjectManager), and (
ProjectBudget, ProjectTitle)

Q7:

R1(A) -> W2(A), T1 -> T2
W1(B) -> W4(B), T1 -> T4
R2(C) -> W3(C), T2 -> T3
W4(D) -> R3(D), T4 -> T3
W5(F) -> R2(F), T5 -> T2
R2(G) -> W5(G), T2 -> T5
There is a cycle between T2 and T5, so not conflict serializable

Q8:
   a) We need to do a linear search of the data, which requires a total of 1000.
   b) 1000 disk pages, $2^9<1000<2^{10}$, $\log_2(1000) = 10$.
   c) 1000/625 = 2, so B+ index search = 2. because the data page = 1, so total 3.

Q9:
   a) It's 1NF, and all of the properties are base properties. There are non-primary characteristics that aren't dependent on candidate attributes, therefore it's not 2NF or 3NF.
   b) Salescar(Car_id,Salesperson_id)
      Salescom(Salesperson_id,Commission)
      Cardate(Car_id,Date_purchased)
      Discountdate(Date_purchased,Discount)

Q10:
a)
Agent is 500/100 =5 pages
Property is 10000/50 =200 pages
        (i) Agent is the outer relation: (500 * 200) +5 = 100005 I/Os
        (ii) Property is the outer relation: (10000 * 5) = 50200 I/Os
b)
        (i) Agent is the outer relation: (200 * 5) + 5 = 1005 I/Os
        (i) Property is the outer relation: (200 * 5) + 200 = 1200 I/Os