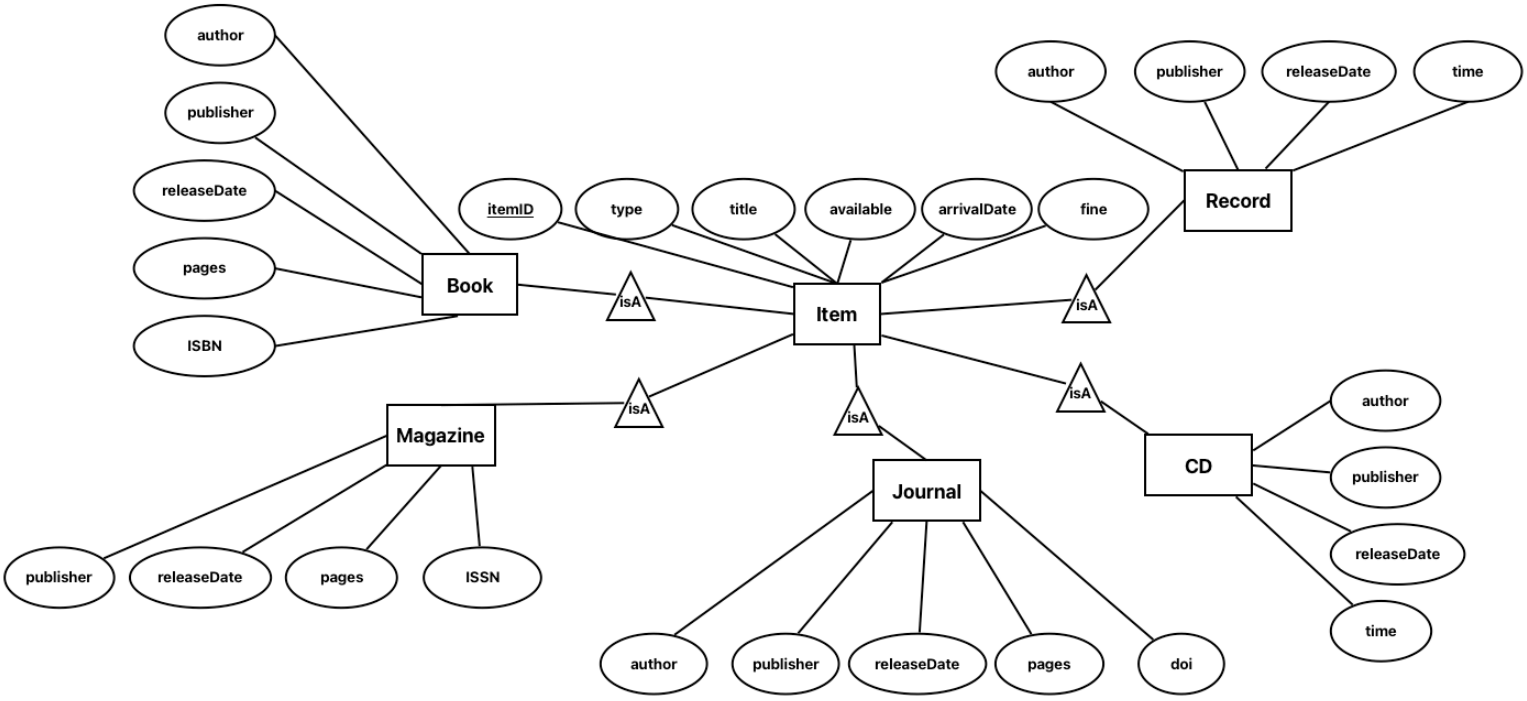
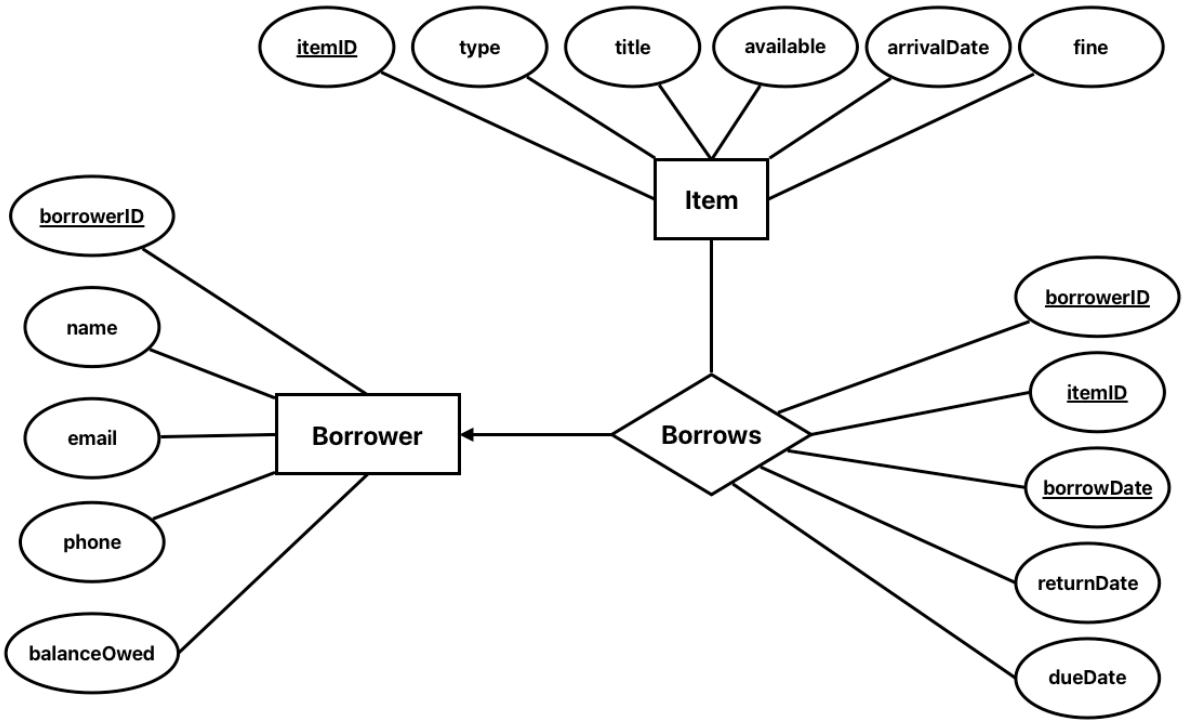
Step 2. Project Specifications

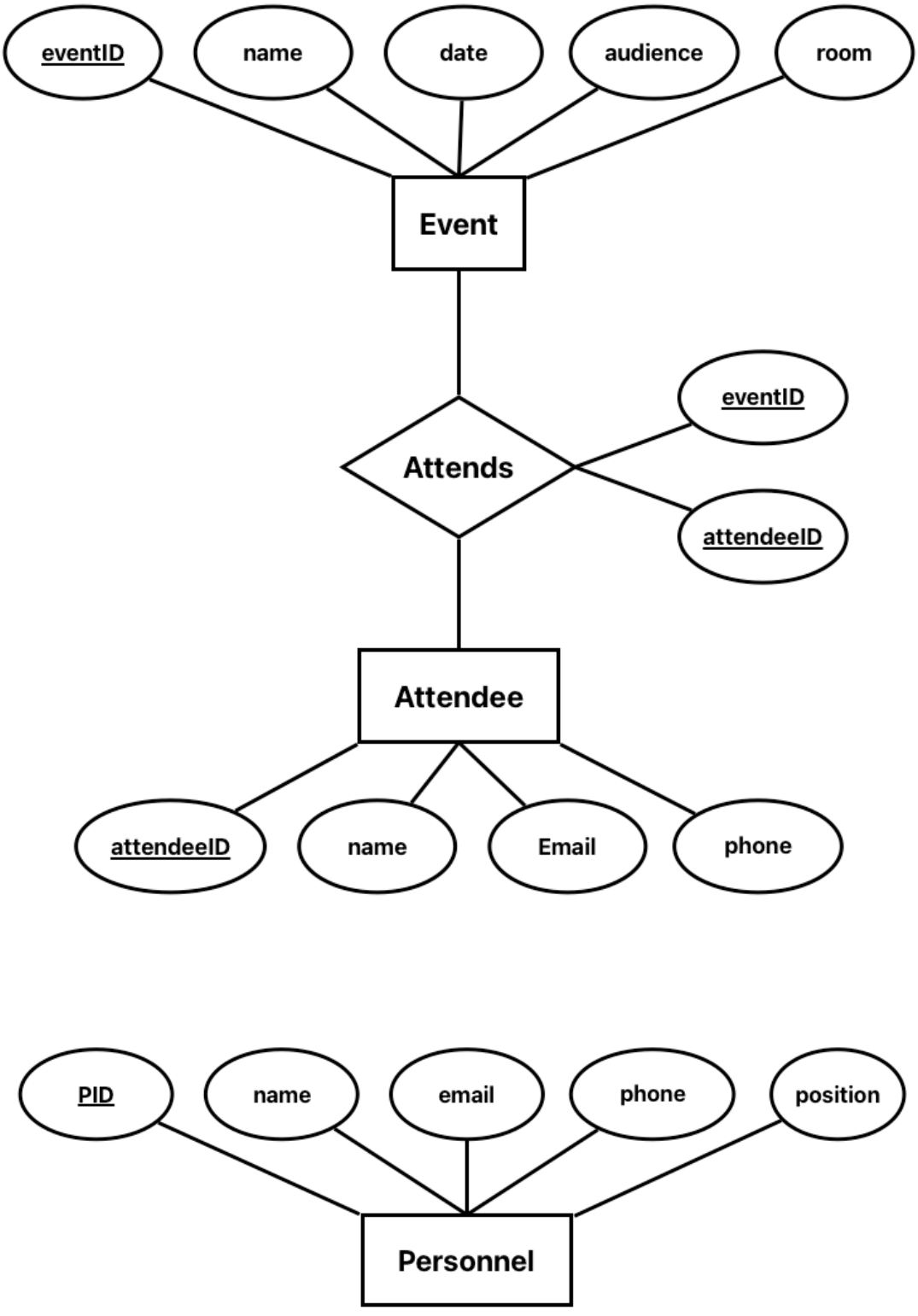
In addition to the information given in the assignment, we think a database for a library should be easily expandable for future types of media. We have decided to use a subclass structure to represent items that can be borrowed. This allows us to add new types of items easily and also have specific attributes for each different type of item. Each item needs to be uniquely identifiable while multiple copies of the same item can exist at the same time. For example there may be multiple copies of the same book or magazine that can be lent out to different people at once.

Step 3. E/R Diagrams





(The “Item” entity set is the same one as depicted above, these two are separated for easier viewing.)


eventID
name
date
audience
room
Event
eventID
Attends
attendeeID
Attendee
attendeeID
name
Email
phone
PID
name
email
phone
position
Personnel

Step 4
We made sure our schemas are all in BCNF.

FDs:
Item(itemID, type, title, available, arrivalDate, fine)
- itemID -> type, title, available, arrivalDate
- closure(itemID) = type, title, available, arrivalDate, fine
    - BCNF

Book(itemID, author, publisher, releaseDate, pages, ISBN)
- itemID -> author, publisher, releaseDate, pages, ISBN
- closure(itemID) = author, publisher, releaseDate, pages, ISBN
    - BCNF

Magazine(itemID, publisher, releaseDate, pages, ISSN)
- itemID -> publisher, releaseDate, pages, ISSN
- closure(itemID) = publisher, releaseDate, pages, ISSN
    - BCNF

Journal(itemID, author, publisher, releaseDate, pages, doi)
- itemID -> author, publisher, releaseDate, pages, doi
- closure(itemID) = author, publisher, releaseDate, pages, doi
    - BCNF

CD(itemID, author, publisher, releaseDate, time)
- itemID -> author, publisher, releaseDate, time
- closure(itemID) = author, publisher, releaseDate, time
    - BCNF

Record(itemID, author, publisher, releaseDate, time)
- itemID -> author, publisher, releaseDate, time
- closure(itemID) = author, publisher, releaseDate, time
    - BCNF

Borrows(borrowerID, itemID, borrowDate, returnDate, dueDate)
- borrowerID, itemID, borrowDate -> returnDate, dueDate, fine
- closure(borrowerID, itemID, borrowDate) = returnDate, dueDate
    - BCNF

Borrower(borrowerID, name, email, phone, balanceOwed)

- borrowerID -> name, email, phone, balanceOwed
- closure(borrowerID) = name, email, phone, balanceOwed
  - BCNF

Event(eventID, name, date, audience, room)

- eventID -> name, date, audience, room
- closure(eventID) = name, date, audience, room
  - BCNF

Attends(eventID, attendeeID)

- BCNF

Attendee(attendeeID, name, email, phone)

- attendeeID -> name, email, phone
- closure(attendeeID) = name, email, phone
  - BCNF

Personnel(PID, name, email, phone, position)

- PID -> name, email, phone, position
- closure(PID) = name, email, phone, position
  - BCNF