DATABASES LAB01

Task 1.1 Employee

Superkeys

`{EmpID}, {SSN}, {Email}, {Phone}, {EmpID, Name}, {SSN, Department}`

Candidate Keys

`{EmpID}, {SSN}, {Email}, {Phone}`

Primary Key

`EmpID`, because it's short, numeric, and avoids privacy issues

Phone Uniqueness

No — phone number is unique based on the data and is a candidate key

Task 1.1 Course Registration

Primary Key	`(StudentID, CourseCode, Section, Semester, Year)`
Attribute Justification	Each attribute is needed to uniquely identify a registration instance and avoid duplicates (especially for courses repeated in different semesters or with multiple sections)
Additional Candidate Keys	None - this is the only minimal unique identifier based on the business rules

Task 1.2

• Student(AdvisorID) → Professor(ProfID)

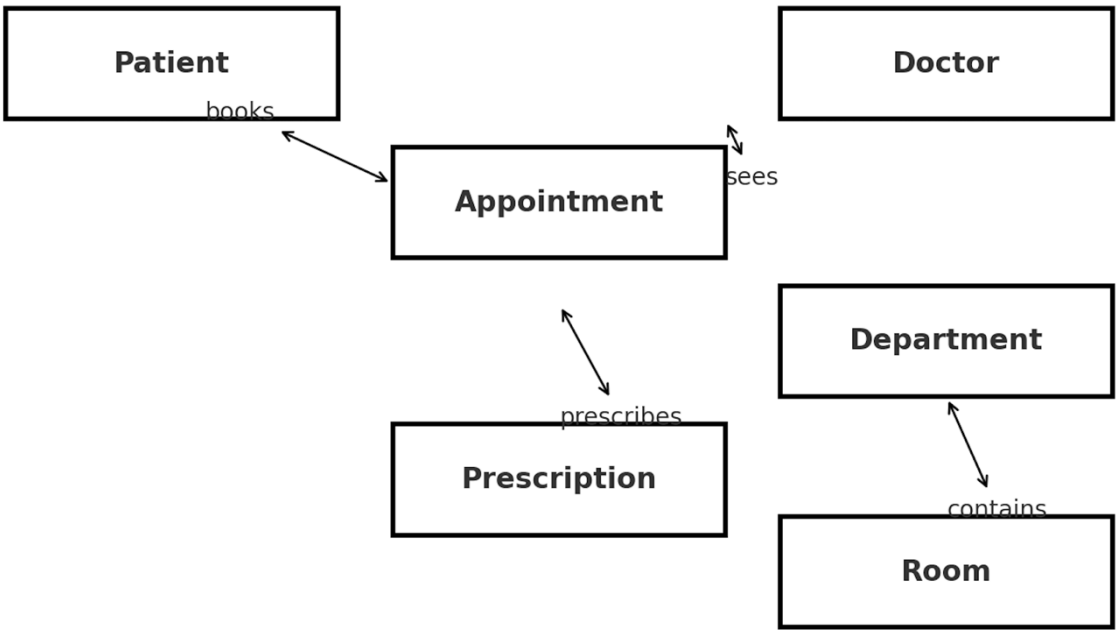
• Course(DepartmentCode) → Department(DeptCode)

• Department(ChairID) → Professor(ProfID)

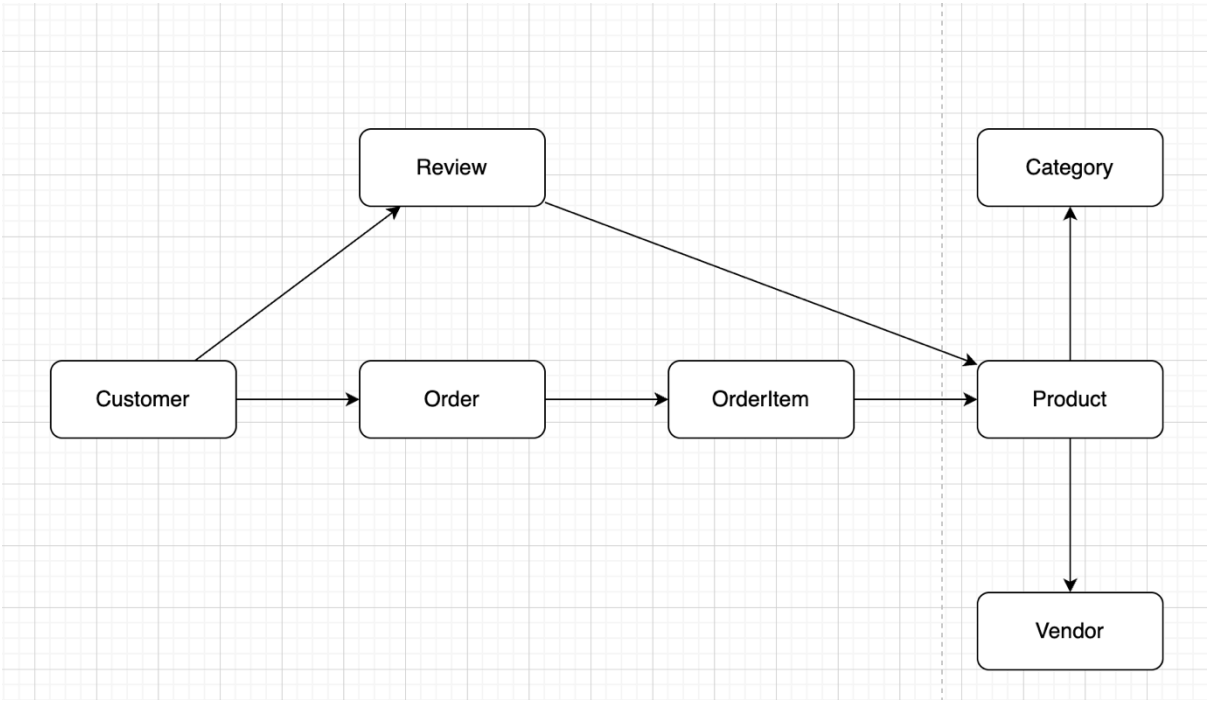
• Enrollment(StudentID) → Student(StudentID)

• Enrollment(CourseID) → Course(CourseID)

Task 2.1



Task 2.2



Tasks 4.1

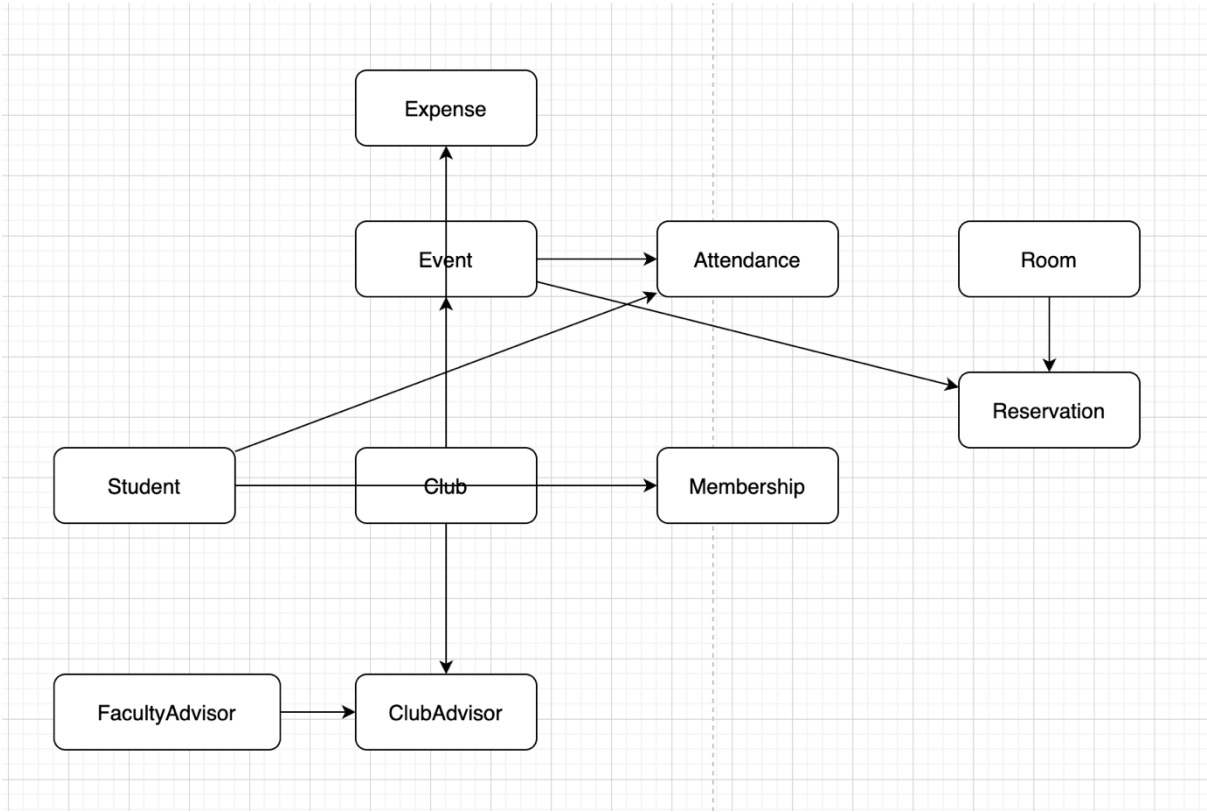
In the `StudentProject` table, data like student info and supervisor details are repeated, causing redundancy and anomalies. For example, updating a supervisor's name must be done in multiple rows. The primary key is `(StudentID, ProjectID)`. There are partial dependencies (e.g., `StudentID → StudentName`), so it violates 2NF. Also, there are transitive dependencies (e.g., `ProjectID → SupervisorID → SupervisorName`), violating

3NF. After normalization, we get separate tables for `Student`, `Project`, `Supervisor`, and `StudentProject`, which removes redundancy and ensures data integrity.

Task 4.2

In `CourseSchedule`, the primary key is `(StudentID, CourseID)`, but there are multiple FDs like `StudentID → StudentMajor`, `CourseID → CourseName`, and `TimeSlot, Room → Building`. Since these don't have superkeys on the left side, the table is not in BCNF. Decomposing into BCNF gives us tables like `Student`, `Course`, `Instructor`, `RoomAssignment`, `CourseOffering`, and `Enrollment`. This eliminates redundancy while preserving all necessary information.

Task 5



Entities (brief): Student, Club, Membership, Event, Attendance, FacultyAdvisor, ClubAdvisor, Room, Reservation, Expense.