Data Bases sem1 lab week2

Part 1:

Task1,1:

Relation A:

1: superkeys – empID, SSN, Phone, empID+SSN, SSN+Phone, Phone+empID, Email+empID
2: candidate keys – empID, SSN, Phone

3: empID, because its unique to every employee and can be used in multiple databases without repeats/mistakes and other bad things.

4: No, two employees cant have same phone number, because phone number can be only registered by only one person, and cannot be shared, as shown in table.

Relation B:

1: primary key = (StudentID, CourseCode, Section, Semester, Year)

2: All attributes are necessary to exclude repeats, duplicates.

3: candidate key = (CourseCode, Section, Semester, Year)

Task 1.2

1: Student.Major - Department.DeptCode

Student.AdvisorID - Professor.ProfID

Professor.Department - Department.DeptCode

Course.DepartmentCode - Department.DeptCode

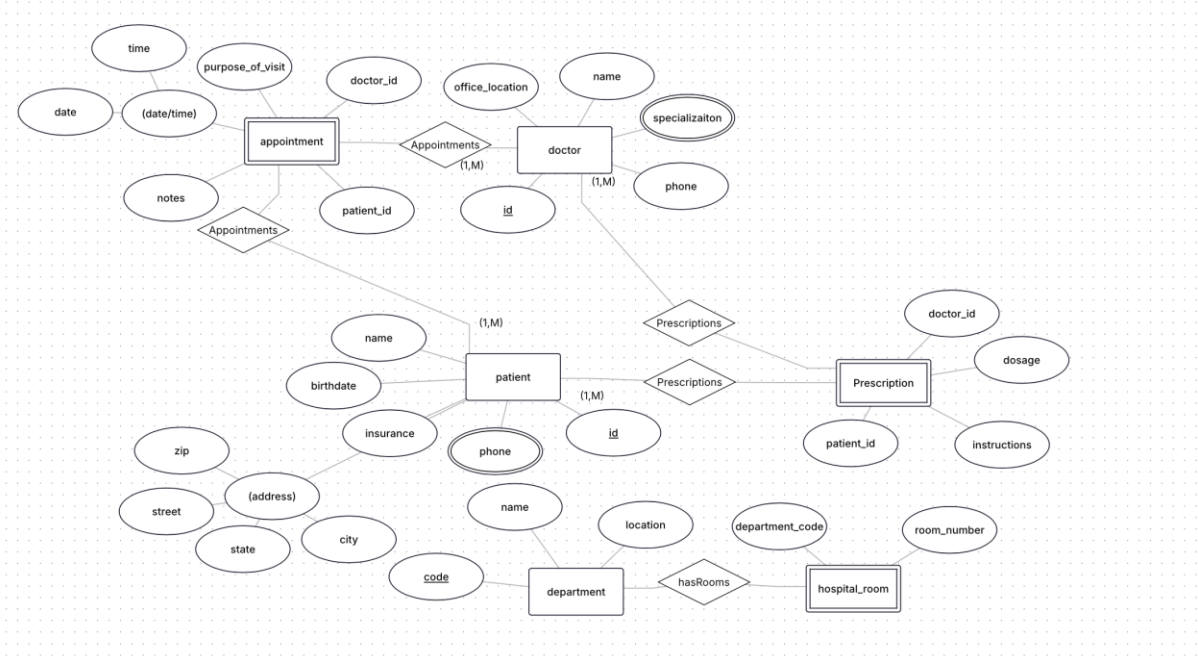
Department.ChairID - Professor.ProfID

Enrollment.StudentID - Student.StudentID

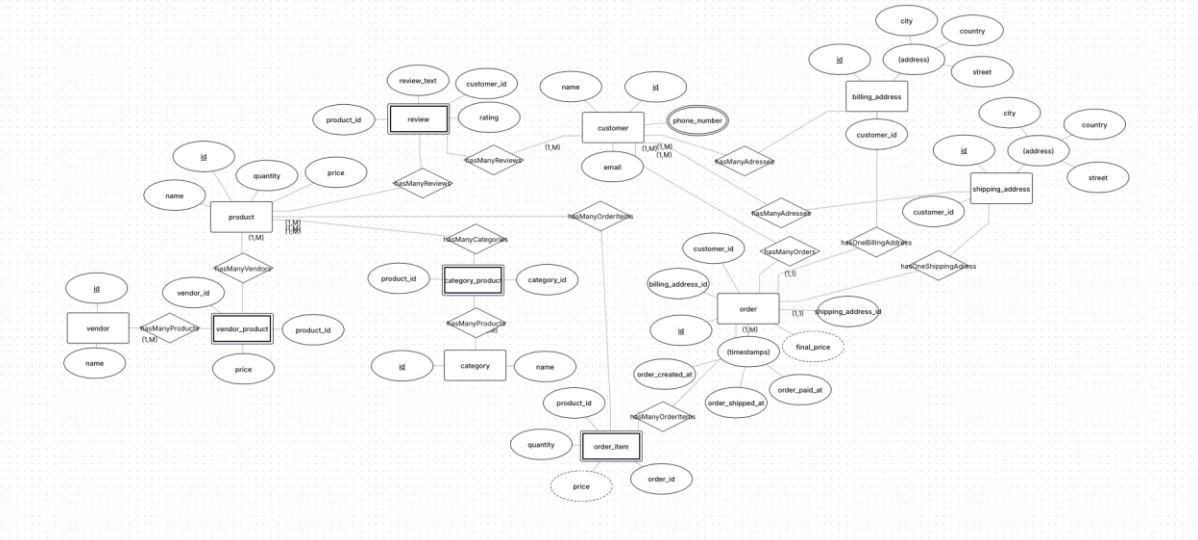
Enrollment.CourseID - Course.CourseID

Part 2:

Task 2.1:



Task 2.2:



Part 4:

Task 4.1:

1: StudentID -- StudentName, StudentMajor

ProjectID -- ProjectTitle, ProjectType, SupervisorID

SupervisorID -- SupervisorName, SupervisorDept

(StudentID, ProjectID) -- Role, HoursWorked, StartDate, EndDate

2: Problems: redundancy - StudentName, StudentMajor repeats for every project

SupervisorName, SupervisorDept repeats for every project and student

Update anomaly – SupervisorName should update everywhere if changed

Inser anomaly – Cant add student without project, and opposite – cant add project without student

Delete anomaly – after deleting all project rows, supervisor and project info deletes too

3: 1NF - No 1NF violaitions

4: 2NF - Primary Key: (StudentID, ProjectID)

Partial dependencies: StudentID -- StudentName, StudentMajor

ProjectID -- ProjectTitle, ProjectType, SupervisorID

2NF Decomposition: Student(StudentID, StudentName, StudentMajor)

Project(ProjectID, ProjectTitle, ProjectType, SupervisorID)

Supervisor(SupervisorID, SupervisorName, SupervisorDept)

StudentProject(StudentID, ProjectID, Role, HoursWorked, StartDate, EndDate)

5: 3NF

Transitive dependency: ProjectID -- SupervisorID -- SupervisorName, SupervisorDept

Moved to Supervisor table

Final 3NF Schema: Student(StudentID, StudentName, StudentMajor)

Supervisor(SupervisorID, SupervisorName, SupervisorDept)

Project(ProjectID, ProjectTitle, ProjectType, SupervisorID)

StudentProject(StudentID, ProjectID, Role, HoursWorked, StartDate, EndDate)

Task 4.2:

1: Primary key: (StudentID, CourseID, TimeSlot)

2: Functional dependencies: StudentID -- StudentMajor

CourseID -- CourseName

InstructorID -- InstructorName

Room -- Building

(CourseID, TimeSlot, Room) -- InstructorID

(StudentID, CourseID, TimeSlot) -- StudentMajor, CourseName, InstructorID, InstructorName, Room, Building

3: The table is not in BCNF because several determinants (StudentID, CourseID, InstructorID, Room) are not candidate keys.

4: BCNF decomposition: Student(StudentID, StudentMajor)

Course(CourseID, CourseName)

Instructor(InstructorID, InstructorName)

Room(Room, Building)

CourseSection(CourseID, TimeSlot, Room, InstructorID)
Enrollment(StudentID, CourseID, TimeSlot, Room)

5: No loss of information occurs because all dependencies are preserved through decomposition