23k-0055
BAI S-A

DATABASES

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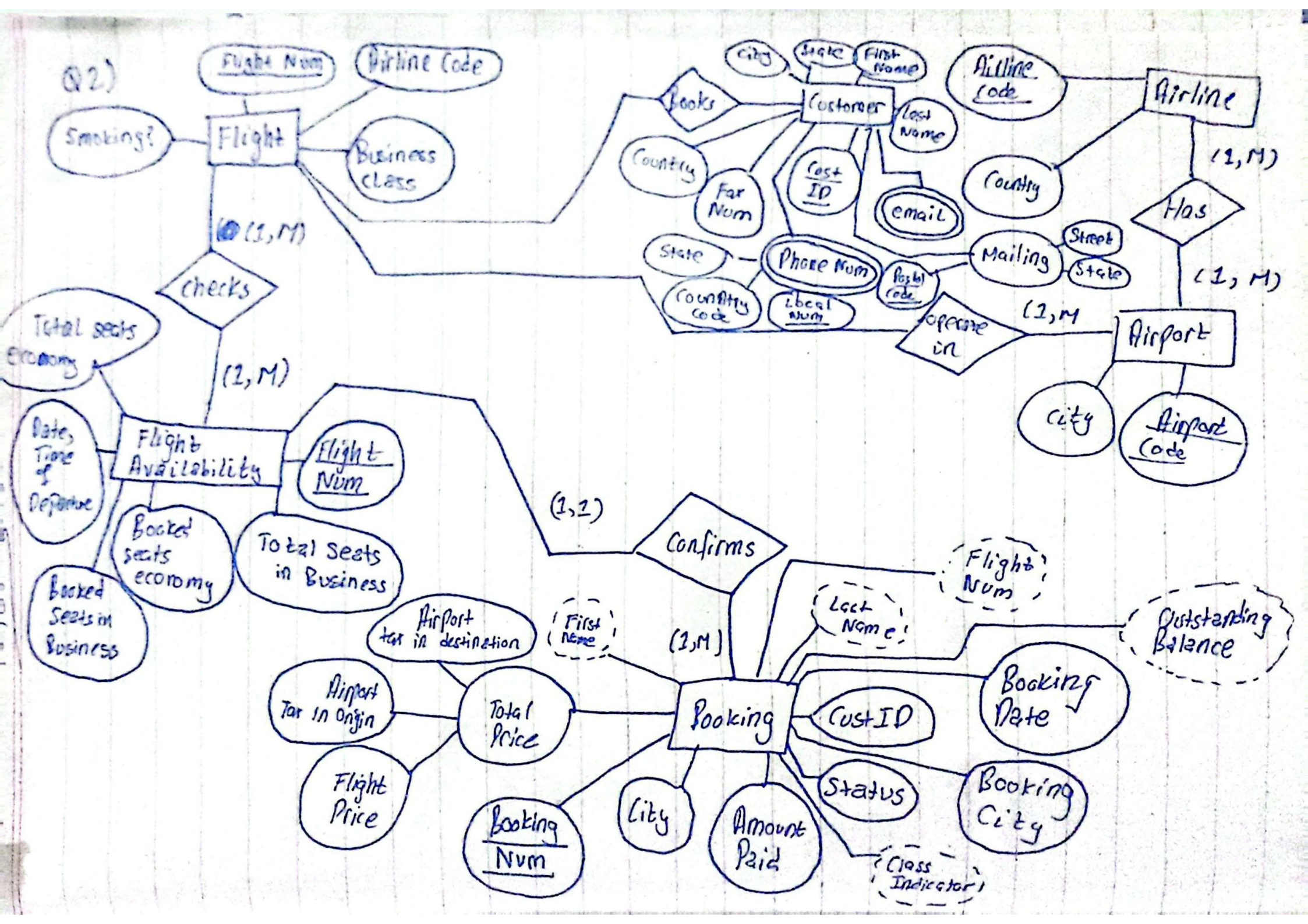
ASSIGNMENT 2

Q1) A) FILM (FilmID, Title, Budget, ReleaseDate, DirectorName)
ACTOR (ActorID, Name, Phone)
PRODUCTION (CompanyID, Name, Address)

B) Film has multiple actors (M:N)
Films are produced by production companies (M:N)
Film has a director (1:1)

C) FILM & ACTOR holds the CharacterName attribute
Attributes → FilmID (FK), ActorID (FK), CharacterName
Composite Primary key: (FilmID, ActorID)

D) DirectorName shouldn't be made into a separate entity because we don't keep any other info about the director. DirectorName is dependent only on FilmID.


Q2)
Flight Num
Airline Code
Smoking?
Flight
Business class
(1,M)
Checks
Total seats economy
(1,M)
Date, Time of Departure
Flight Availability
Flight Num
Booked seats economy
Total Seats in Business
Booked Seats in Business
Books
City
State
First Name
Customer
Last Name
Country
Fax Num
Cust ID
email
State
Phone Num
Postal Code
Country Code
Local Num
Mailing
Street
State
Airline Code
Airline
Country
(1,M)
Has
(1,M)
Operate in
(1,M)
Airport
City
Airport Code
(1,1)
Confirms
(1,M)
Booking
First Name
Last Name
Flight Num
Outstanding Balance
Booking Date
CustID
Status
Booking City
Class Indicator
Airport for in destination
Airport for in Origin
Flight Price
Total Price
Booking Num
City
Amount Paid

Q3)a) Insertion anomaly: new school added to system but no teacher has been assigned to it yet. We can't insert the new school because all records require a teacher assignment

Deletion anomaly: If the only teacher assigned to a school leaves the agency & their row is deleted, we also lose all data about that school

Update anomaly: If a school's name is changed, the name must be updated for every row.

Q3b) FDs

NIN → tName

schoolID → schoolName, schoolCity

(NIN, schoolID, ContractNo) → hours

already in 1NF

2NF (removing partial dependencies)

1. Teacher (NIN, tName)
2. School (schoolID, schoolName, schoolCity)
3. WorkRecord (NIN, contractNo, schoolID, hours)

3NF (removing transitive dependencies)

NIN → tName (kept in separate table)
schoolID → schoolName, schoolCity (separate table)

Final Schema

1. Teacher (NIN, tName)
2. School (SchoolID, schoolName, schoolCity)
3. WorkRecord (NIN, contractNo, schoolID, hours)

Q4) A. PK: Only key that determines all attributes is the composite key: FilmID, ActorID

B. The table violates 2NF

Violation: There are partial dependencies where non-key attributes depend on only a part of composite key

FilmID → FilmTitle, DirectorName

ActorID → ActorName, AgentID

C. Decomposing to 2NF

FILM_T (FilmID, FilmTitle, DirectorName)

ACTOR_T (ActorID, ActorName, AgentID, AgentPhone)

CASTING_T (FilmID (FK), ActorID (FK))

D. Decomposing to 3NF.

FILM (FilmID, FilmTitle, DirectorName)

ACTOR (ActorID, ActorName, AgentID (FK))

AGENT (AgentID, AgentPhone)

CASTING (FilmID (FK), ActorID (FK))

E. This would cause update anomaly. If agent's phone num changes, every single row w/ that phone num will have to be updated.

25) a) Assumptions

Each StudentID/CourseID uniquely identifies one student/course
Each course taught by one instructor
Student may have many courses

StudentID → FirstName, LastName, Address
CourseID → courseName, Credits, InstructorName
(StudentID, CourseID) → EnrollmentDate

b) ENROLLMENT_FORM (StudentID, FirstName, LastName, Address, Course_ID, CourseName, Credits, InstructorName, EnrollmentDate)

↓ 2NF

~~Student~~. StudentID will allow separate Student table creation
. CourseID allows separate course table creation
. keep (StudentID, CourseID, enrollmentDate) in enrollment table

3NF

Student (Student_ID, FirstName, LastName, Address)

Instructor (InstructorID, InstructorName)

Course (CourseID, CourseName, Credits, InstructorID)
↓ FK

Enrollment (StudentID, CourseID, EnrollmentDate)
↓ PK ↓ FK

c)

Table	PK	Alt-keys	FK
Student	Student ID	-	-
Instructor	Instructor ID	-	-
Course	Course ID	-	InstructorID
Enrollment	(Student ID, Course ID)	-	StudentID, courseID