

1_2 Practice

- Student Registration System:
 - First Name
 - Last Name
 - DOB
 - SSN
 - Address
 - Contact info: phone number, email address
 - Gender
 - Emergency Contacts and their information
 - Parent information
 - Student ID
 - Medical Information
 - New or existing student
- Library Management System:
 - Title of Book
 - Author/Authors
 - ISBN
 - Genre
 - Publication Date
 - Publisher
 - Number of copies of books
 - Library member names/ address/contact information/library ID number/ status/ type of membership
 - Username and password for library account

1_3 Practice

- a) Hierarchical model
- b) Network model
- c) Object oriented model
- d) Relational model
- e) Relational model

1_4 Practice

- LibBook:
 - Business Rules:
 - Membership Types:
 - Three types of membership: corporate, student, and individual
 - Library reserves the right to introduce other membership types in the future
 - Membership Fees:
 - Student memberships are free
 - Corporate and individual membership require a fee, with privileges associated with each
 - Membership Change:

- Can request to change type
 - Change requires justification, which will then be reviewed and approved by LibBook
- Constraints:
 - Fee Structure:
 - Fees for corporate and individual memberships must be clearly defined and stored in the system
 - Make sure that student accounts are not charged
 - Membership change process:
 - System should initiate a way to figure out if the student is still a student
 - System should allow for members to submit request to membership change
- Star Care Hospital:
 - Business Rules:
 - Doctor identification:
 - All doctors registered with hospital must have unique ID starting with the letters "DC"
 - Must have 7 years of working experience
 - Patient registration:
 - Every patient must register with hospital on their first visit
 - Each patient is assigned a unique ID that starts with the letters "PT"
 - Constraints:
 - ID Format:
 - Doctor must have the pre-fix "DC" for their ID
 - Patient must have the pre-fix "PT" for their ID
 - Experience requirements
 - System must be able to verify the 7 years of experience requirement.

2_1 Practice

Book.com

- Books Table:
 - Book_ID (PK)
 - Title
 - ISBN
 - Year
 - Price
 - Author_ID (FK)
 - Publisher_ID (FK)
- Authors Table
 - Author_ID (PK)
 - Name
 - Address

- Homepage_URL
- Publishers Table
 - Publisher_ID (PK)
 - Name
 - Address
 - Phone_Number
 - Website_URL
- Warehouse
 - Warehouse_Code (PK)
 - Address
 - Phone_Number
- Stock
 - Warehouse_Code (FK)
 - Book_ID (FK)
 - Number_of_Copies
- Shopping_Carts
 - Shopping_Cart_ID (PK)
 - Book_ID (FK)
 - Quantity
- Orders
 - Order_ID
 - Customer_ID
 - Billing_Address
 - Shipping_Address
 - Shipping_Option
 - Payment_Information
 - Order_Date
 - ETA

ABC Ltd

- Customer
 - Customer_ID (PK)
 - Name
 - Address
 - Phone_Number
 - Email
- Products
 - Product_ID (PK)
 - Product_Name
 - Product_Details
 - Preferred_Supplier_ID
 - Quantity_in_Stock
 - Reorder_Level
- Supplies

- Supply_ID (PK)
 - Supplier_Name
 - Address
 - Contact_Details
- Orders
 - Order_ID (PK)
 - Customer_ID (FK)
 - Order_Date
- Order_Items
 - Order_Item_ID (PK)
 - Order_ID (FK)
 - Product_ID (FK)
 - Quantity_Ordered
 - Quantity_Dispatched
 - Backorder_Status
- Invoices
 - Invoice_ID (PK)
 - Order_ID (FK)
 - Invoice_Date
 - Total_Amount
- Payments
 - Payment_ID (PK)
 - Customer_ID (FK)
 - Invocie_ID (FK)
 - Payment_Amount
 - Payment_Date

2_2 Practice

- 5 reasons for creating a conceptual data model
 - Captures the functional and informational needs of a business
 - Based on current needs (may reflect future needs)
 - Addresses the needs of a business (what is conceptually ideal)
 - Identifies important entities
 - Identifies relationships among entities
- 2 examples of conceptual models
 - Health Living Mind Maps
 - Restaurant Menu Planning
- 2 examples of physical models
 - Blueprint of a house
 - Wiring Diagram

2_3 Practice

- Exercise 1
 - School
 - Department
 - Courses

- Faculty
 - Faculty Log
 - Student
 - Parent Information
 - Exam
 - Result
 - Attendance
 - Academic session
- Exercise 2
 - Course
 - Course_ID*
 - Course_Name*
 - Credits*
 - Department_ID*
 - Faculty_Name°
 - Department
 - Department_ID*
 - Department_Name*
 - Student
 - Student_ID*
 - Student_Name*
 - DOB*
 - Department_ID°
 - Matriculation_Date*
 - email*
 - phone_number*
 - Faculty
 - faculty_ID*
 - Faculty_name*
 - Department_ID*
 - email*
 - Phone number*
 - date_of_hire*
 - Academic Session
 - session_ID*
 - session_name*
 - Start_date
 - end_date
 - Parent Information
 - parent_ID*
 - Parent_name*
 - Phone_number*
 - Email*
 - address°

- Exam
 - exam_ID*
 - course_ID*
 - session_ID*
 - exame_date*
 - grade*

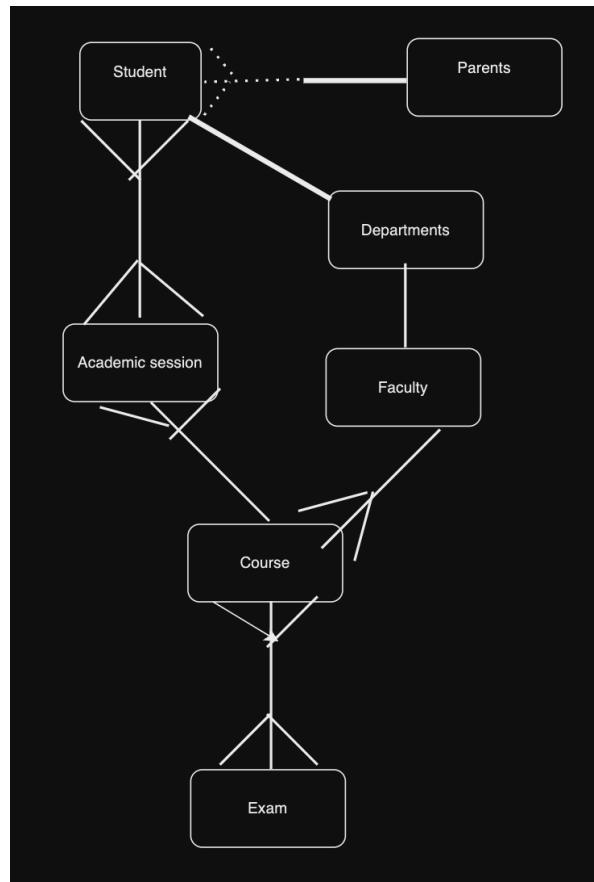
2_4 Practice

- Exercise 1
 - How do you find a particular song in the whole collection? What would be a unique identifier for SONG?
 - Song_id
 - Think about all the students in the classroom. Each student is described by several traits or attributes. Which attribute or attributes allow you to pick a single student from the rest of the class?
 - Student_id
 - For each entity, select the attribute that could be the unique identifier of each entity.
 - Entity: STUDENT
 - student_id
 - Entity: MOVIE
 - movie_id
 - Entity: LOCKER
 - locker_id
- Exercise 2
 - Use the Academic Database ERD from the previous exercises to identify the following:
 - Course:
 - Unique identifiers: course_id
 - Candidate unique identifiers: course_name
 - Department:
 - Unique identifiers: department_id
 - Candidate unique identifiers: department_name
 - Student
 - Unique identifiers: student_id
 - Candidate unique identifiers: email, phone_number
 - Faculty
 - Unique identifiers: faculty_id
 - Candidate unique identifiers: email, phone_number
 - Academic session
 - Unique identifiers: session_id

- Candidate unique identifiers: session_type + year
- Parent information
 - Unique identifiers: parent_id
 - Candidate unique identifiers: phone_number
- Exam
 - Unique identifiers: exam_ID
 - Candidate unique identifiers: course_ID + academic_session

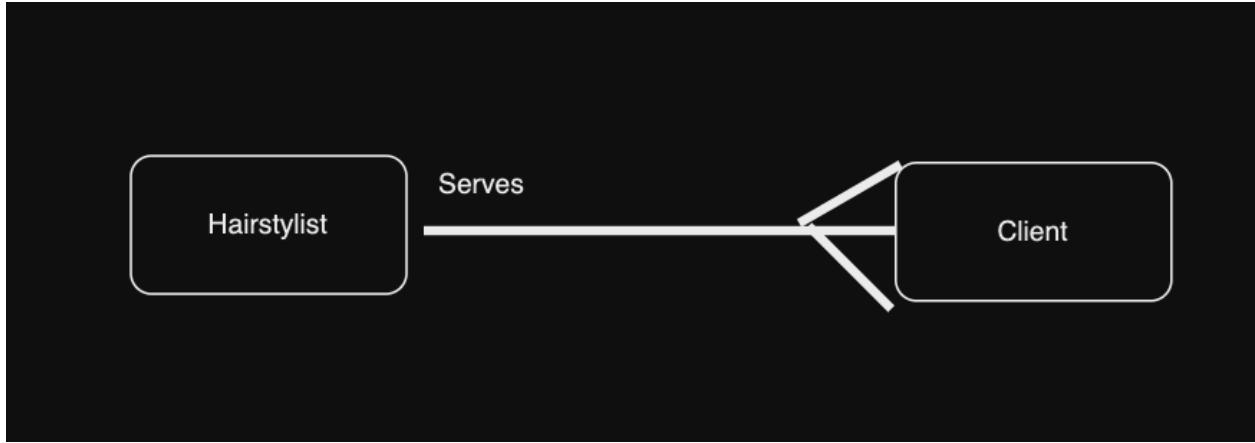
2_5

- Exercise 1
 - Task 1
 - Each EMPLOYEE must be assigned to one and only one DEPARTMENT.
 - Each DEPARTMENT must be responsible for one or more EMPLOYEES
 - Task 2
 - A person must be born in a town.
 - A town can be a birthplace of a person
 - Many persons can be living in a town
 - A town can be the hometown of many persons
 - Many persons can be a visitor of a town.
 - Many towns must be visited by many persons
 - A person can be a mayor of a town
 - A town can be governed by a person
 - Exercise 2:

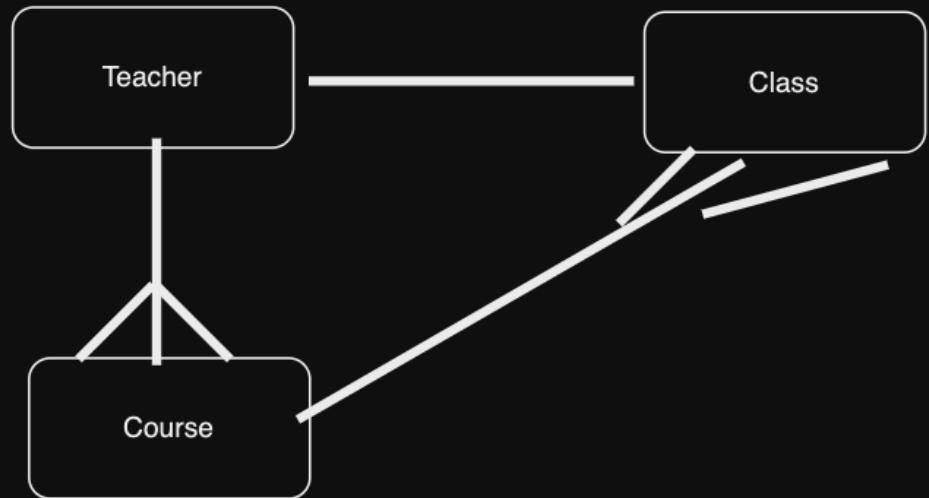


2_6 Exercise

- Department
 - Attributes
 - Department name
 - Supervisor name
 - Supervisor number
- Employee
 - Attributes
 - Employee name
 - Employee number
 - Department
- Project
 - Attributes
 - Project name
 - Project number
 - Assigned employee



- **Hairstylist Attributes:**
 - First Name (mandatory)
 - Last name (mandatory)
 - Address (mandatory)
 - Phone number (mandatory)
 - SSN (mandatory, unique)
 - Salary (mandatory)
- **Client Attributes:**
 - First Name (Mandatory)
 - Last Name (Optional)
 - Phone Number (optional)
- Relationship: serves
- Optionality: one hairstyles serves many clients. One client is served by one hairstylist
- Cardinality : 1:0

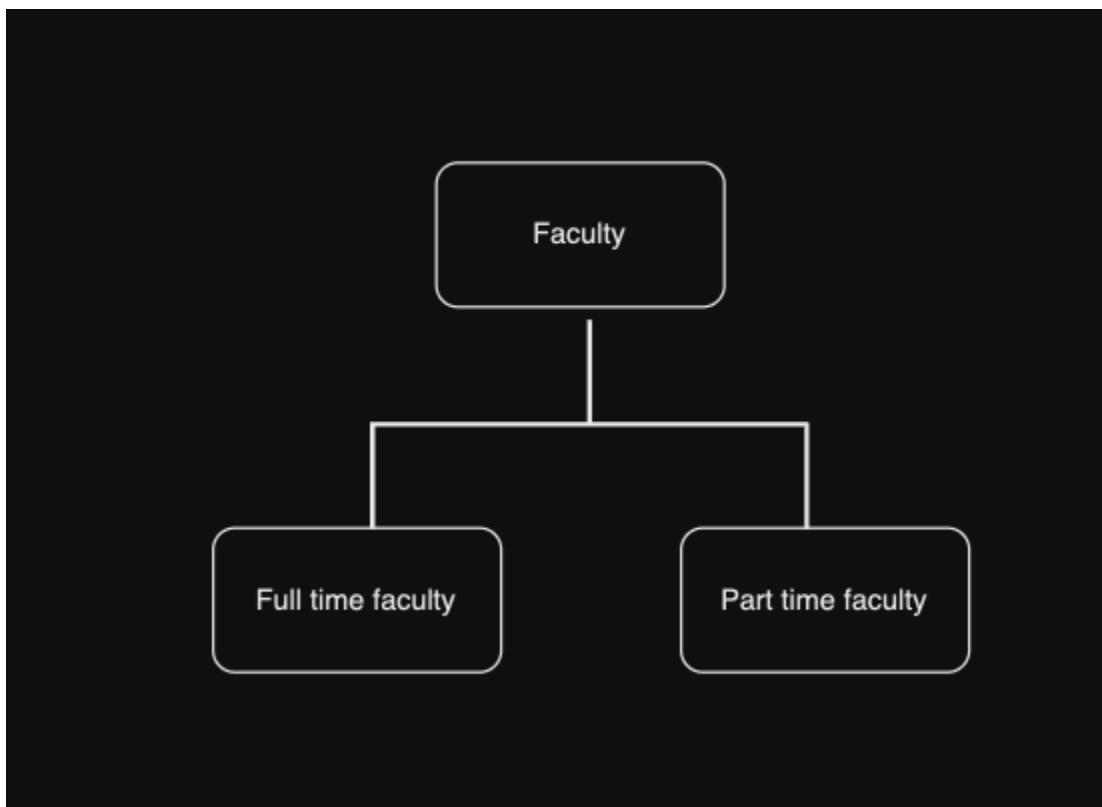
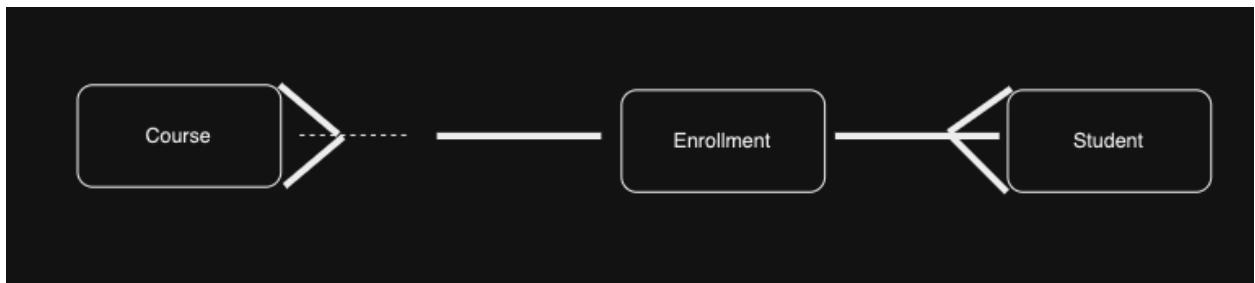


- Teacher-Class
 - Relationship: Teaches
 - One teacher teaches 0 to 3 classes
 - Each class is taught by one teacher
- Course-Class
 - Relationship: contains
 - One course contains one or more classes
 - Each class is part of one course

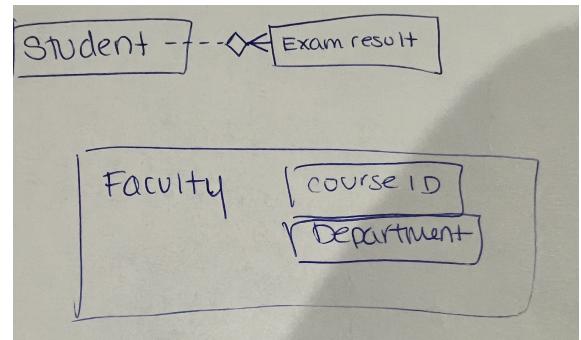
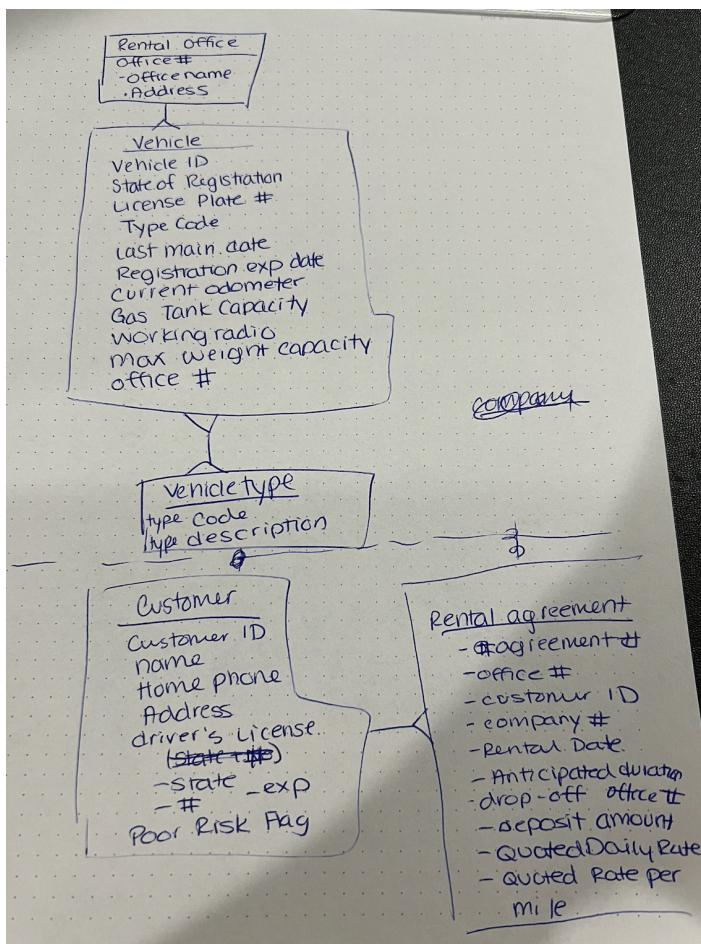
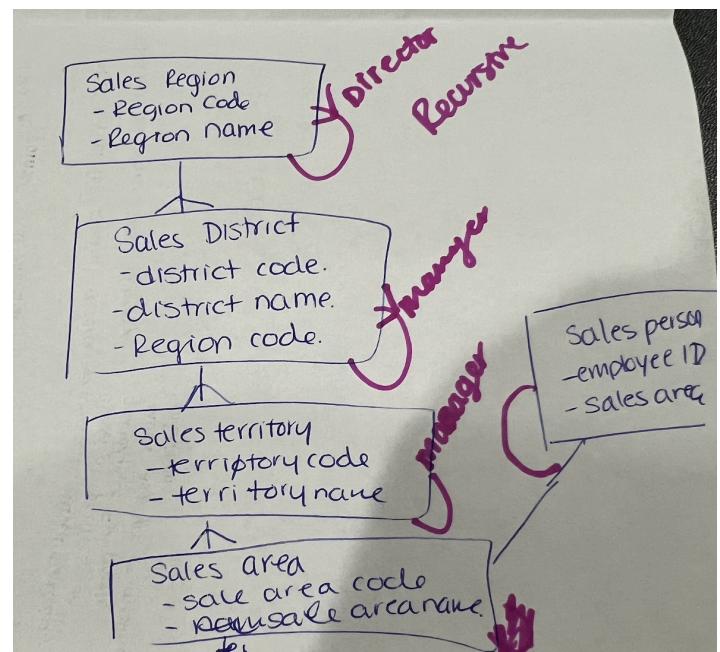
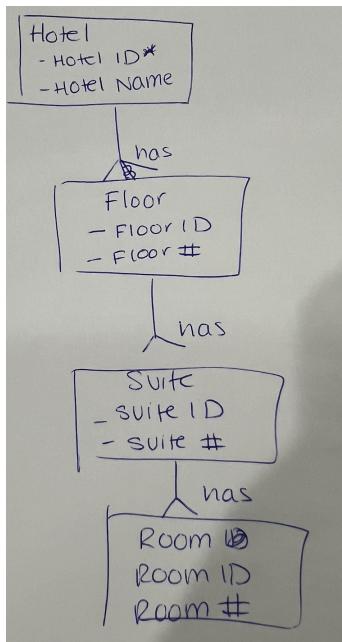
3_1 Practice

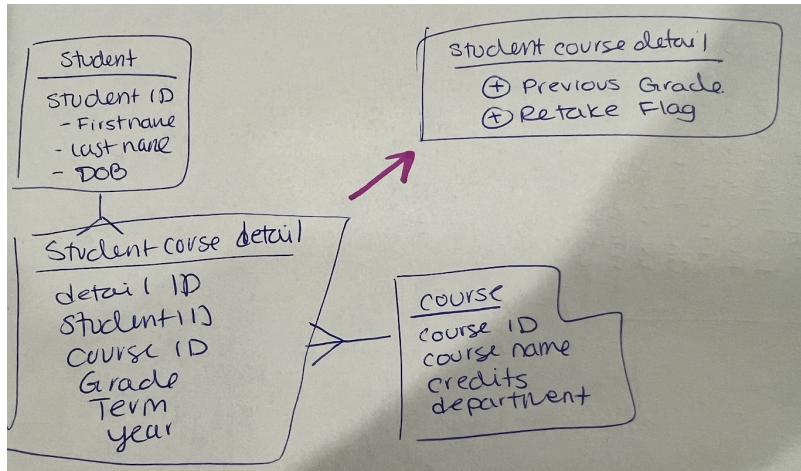
- Add in ENROLLMENT
 - Course ID*
 - Student ID*
 - Enrollment Date°
 - Grade °
- Add in COURSE FACULTY
 - Course ID*
 - Faculty ID*
 - Semester°
 - Teaching Hours°
- Add in ENROLLMENT: (between Course and student)
 - Course ID*

- Student ID*
- Enrollment Date°
- Grade °



- Full Time: Salary, Insurance Plan
- Part Time: Hourly Rate





- 3-2
 - Why is start time part of the UID of assignments?
 - To track the different phases of the assignment
 - Name 3 time-related constraints
 - End time must be later than start time
 - Start time must be earlier than end time
 - Exam date must be the same for date as the classroom assignment

3-3 Practice

- 1NF: Repeating color in Color column

	A	B	C
1	Item ID	Color	Unit Price
2	IT001	Red	\$16.56
3	IT001	Blue	\$16.56
4	IT002	Yellow	\$17.48
5	IT003	Green	\$19.76
6	IT004	Blue	\$20.00
7	IT004	Yellow	\$20.00

- 2NF: Location is only dependent on Store ID because non-key attributes should be dependent on the primary key only.
 - Create 2 separate tables

E	F
Store ID	Location
S1	New York
S1	New Hampshire
S2	Rhode Island
S3	Vermont
S3	Illinois

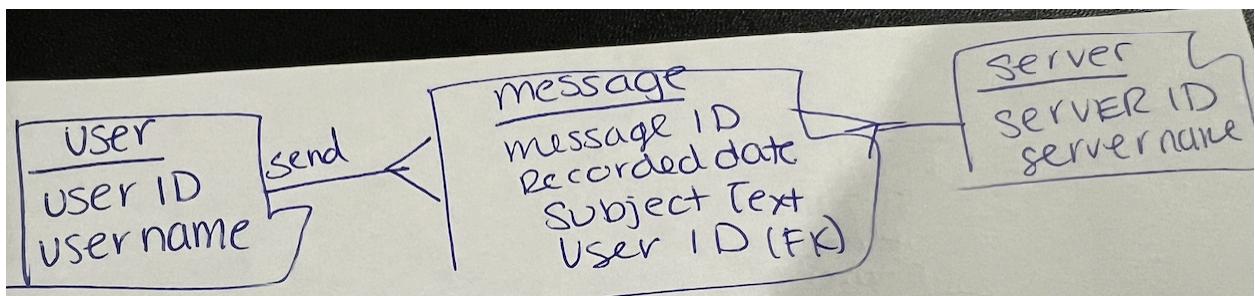
Supplier ID	Store ID
SP001	S1
SP001	S3
SP002	S1
SP003	S2
SP004	S3

- 3NF: transitive dependency
 - Create 2 separate table, related but non-key attributes.
- Exercise 2:
 - Separate the student block--perhaps add in student attendance block with number of working days and number of days off
 - Separate the faculty block-- add in login with login date and login time

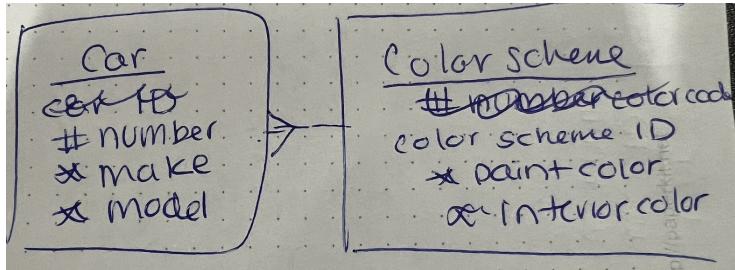
	Book ID	Category ID	Price
Books	1	1	\$27.99
	2	2	\$17.99
	3	1	\$20.99
	4	3	\$40.99
	5	2	\$19.99

	Category ID	Category Desc
Categories	1	Cooking
	2	Travel
	3	Computers

- Exercise 3



User ID	User Name	Message ID	Recorded Date	Subject Text	User ID
2301	Smith	54101	7-May	Meeting Today There is...	2301
5607	Jones	54098	12-Jul	Promotions I like to...	2301
7773	Walsh	54445	6-Oct	Next Assignment Your next...	2301
22	Patel	54512	7-Jun	Lunch? Can You...	5607
		54101	7-May	Meeting Today There is...	5607
Server ID	Server Name	Message ID	Server ID		
3786	IMAP05	54660	1-Dec	Jogging Today? Can you...	5607
6001	IMAP08	54101	7-May	Meeting Today There is...	7773
9988	EMEA01	54554	17-Mar	Stock Quote The latest...	7773
		54101	7-May	Meeting Today There is...	22
		54512	7-Jun	Lunch? Can you...	22



3_4 Practice

Analysis Design	Database Element
1. Attribute	a. Column
2. Entity	f. Table
3. ER Model	c. Physical design
4. Instance	e. Row
5. Primary UID	d. Primary key
6. Relationship	b. Foreign key
7. Secondary UID	g. Unique key

- Identifying keys
 - Pk = primary key
 - Fk = foreign key
 - Uk = unique key
 - * many
 - o = optional

Full Term	Short Name
a. Authors	tbl_authors
b. Publishers	tbl_publishers
c. Customers	tbl_customers

Attribute	SONG	EVENT	CUSTOMER
Title	✓		
Description	✓	✓	
Venue		✓	
First Name			✓
Phone Number			✓
Release date	✓		
Last Name			✓
Type	✓		
Email address			✓

Exercise 2

- IDs (course, student, session, exam, faculty), student login, student email, faculty email = pk, uid
 - fk= parent information
- Optional = eligibility of student, start date of exam, description of exam
- Exam type = uid