Database Systems (CS2005)

Assignment #1 Deadline: 4-March-2024

Course Team		
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Assignment Guidelines:

- This is an individual assignment.
- Kindly provide a *single* document in either **Word format (.docx)** or **Portable Document Format (.pdf)**, encompassing diagrams, explanations, and Structured Query Language (SQL) code. Submissions in alternative formats will *not* be considered.
- To ensure timely and accurate grading, please follow the file naming convention "**RollNumber_FullName_A1**" (for instance, "**i211234_JohnDoe_A1.docx**"). Failure to comply with the correct naming convention will result in a *deduction* of **5 marks**.
- To improve the clarity of your submission, we kindly request the utilisation of a dedicated diagramming tool such as **Visual Paradigm Online**, **draw.io**, or **Lucidchart**. Diagrams created on paper will *not* be accepted for consideration.
- To potentially earn additional marks, ensure that your diagrams are neatly presented and easily readable.

Plagiarism Policy:

Plagiarism is a grave academic offense that can severely undermine your academic integrity and reputation. Any instance of a student found to have plagiarised their assignment, whether from a peer or external source, will be subject to strict

consequences. This may result in a zero score for the current or all assignments, or in severe cases, even a failure in the course. Furthermore, all instances of plagiarism will be promptly reported to the Disciplinary Committee for further action.

Problem #1

[55 Marks]

You're employed by an airline company to create a centralized database for its new booking and management system. The booking system involves multiple airlines. Each airline has a code, name, and headquarters address. Airlines also offer various mileage programs, each with its own code, description, and start date. Airlines provide different types of flights, each with a unique number, day of the week, departure and arrival times, origin, destination, and any stops along the way. Passengers booking flights are identified by a number, name, address, gender, and age. Passengers can sign up for a mileage program offered by an airline. The system keeps track of passenger information for each flight, including the date, seat number, pilot's name, and crew members. It also records the miles earned by passengers on each flight. Booking can be done through travel agencies, which have their own code, name, address, contact person, and phone number. Each passenger on a flight is offered a menu with different options, each with a code and description. Menu options include vegetarian, low-fat, and kosher meals. Details such as protein level and calorie count are recorded for vegetarian and low-fat meals. Kosher meals require approval from the kosher community.

- Design an entity-relationship diagram (ERD) for the booking and management system, ensuring comprehensive coverage of all entities, attributes and their relationships with cardinalities.

Problem #2

[65 Marks]

The rise of artificial intelligence-powered chat-bots has revolutionised the way businesses interact with their customers and users. Chat-bots like ChatGPT have become integral parts of numerous online platforms, offering personalised assistance, engaging conversations, and efficient information retrieval.

Your task is to design an entity-relationship diagram (ERD) for an advanced chatbot system that can handle a wide range of functionalities and data management tasks. The system should be capable of managing user accounts, facilitating conversations between users, storing and retrieving messages, tracking user preferences, integrating with external services, and logging system activities.

Requirements:

- The system should support the registration and management of user accounts. Users can have various attributes such as username, email, profile picture, and user-specific details like age, gender, and location. User roles (e.g., admin, moderator, regular user) should also be considered.
- Users should be able to engage in conversations, which can be one-on-one or group conversations. Each conversation should have metadata such as creation time, participants, and conversation type.
- The system should allow users to send and receive messages within conversations. Messages may contain text, media files, or attachments. Message metadata such as sender, recipient, timestamp, and message content should be stored.
- Topics can be assigned to conversations to categorize discussions. Each topic should have a unique identifier, a name, a description, and a category.
- Users should be able to set preferences such as preferred topics, notification settings, and language preferences. These preferences should be stored and associated with each user account.
- The system should support integration with external services, enabling additional functionalities such as accessing external databases, performing actions on external platforms, or fetching real-time information from external sources.
- All system activities, including user logins, logouts, message exchanges, and interactions with external services, should be logged for monitoring, analysis, and security purposes. Logged data should include timestamps, user identifiers, actions performed, and relevant details.

You are required to create an entity-relationship diagram (ERD) that captures the various entities, attributes, and relationships involved in the design of the chat-bot system. The diagram should be well-organized, clearly illustrating the structure of the database schema and the connections between different components of the system.

Rubric:

Criteria	Problem #1	Problem #2
Entity Identification	15	20
Attribute identification	5	5
Relationship Identification	15	20
Cardinalities identification	5	5
Creativity	10	10
Diagram Quality	5	5