Database Systems (CS 2005) Spring 2024

Department: BS(SE)

Assignment 01

Topic: Entity Relationship Diagram

Deadline: 10 March 2024

Total Marks: 100

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1. Design a conceptual schema through ER diagrams for all the given scenarios.
2. It is necessary to specify all entities, attributes, constraints, relationships, and concepts you have studied in Chapter 03.
3. Mention the diagramming software that you have used for the assignment.
4. If you had to make assumptions concerning the requirements, state them clearly.
5. Mention constraints (business rules) apparent from the requirements that you are unable to model via your ERD.
6. Submit your assignment in PDF format on Google Classroom with the naming convention Rollno_Section_AssignmentNumber.
7. Any plagiarism will result in ZERO marks in the Assignment.

Question 1: Quran online

[25 marks]

The Quran application development company aims to create a comprehensive platform for users to access Quranic recitations and translations in multiple languages. The application will serve as a digital library for users to listen to different recitations by various speakers and read translations in their preferred languages. This includes Quranic text organized by para, surah, and page number, as well as recitations, translations, speakers, and bookmarks. Recitations are associated with attributes such as title, audio file, duration, speaker, and language. Speakers have attributes including name, nationality, and biography. Translations are defined by attributes such as language, and text. Quranic Text is represented by attributes like para number, surah number, verse number, and text. Bookmarks have attributes such as user, recitation, para, surah, verse, and timestamp.

Regarding relationships, there are several key connections between entities. Recitations have a many-to-one relationship with Speakers, meaning that each recitation is associated with a single speaker, while each speaker can have multiple recitations. Recitations also have a one-to-many relationship with Quranic Texts, indicating that each recitation comprises multiple verses organized by para, surah, and verse number. Additionally, there is a many-to-many relationship between Recitations and Translations, as a recitation can have multiple translations and vice versa.

Bookmarks have a many-to-one relationship with both Recitations and Users, meaning that multiple bookmarks can be associated with a single recitation or user.

Question 2: Electoral Management System

[25 marks]

The National Election Commission of Pakistan intends to develop an advanced Electoral Management System (EMS) that will oversee various crucial aspects of the electoral process, including voter registration, candidate nominations, polling station management, vote counting, and real-time result tabulation. The envisioned EMS must prioritize accessibility and ease of use for citizens, facilitating seamless voter registration and verification processes. Eligible voters should be able to register and update their information effortlessly, with robust authentication mechanisms in place to prevent fraudulent registrations and uphold the integrity of the electoral system.

Furthermore, the EMS must streamline the process of candidate nominations, accommodating both political parties and independent candidates. Each party and candidate will have their unique symbol, making it easier for voters to identify them on the ballot. The system should support the submission, verification, and approval of nomination papers, ensuring that only eligible candidates are included on the ballot for national and provincial assembly elections. On election day, the EMS should efficiently manage polling stations across the country, monitoring voter turnout and facilitating the voting process to minimize delays and disruptions. Following the closure of polls, the system must accurately tally votes and tabulate results in real time, providing timely updates to stakeholders and the public.

Question 3: PSL 2025

[25 marks]

The Pakistan Super League (PSL) organizers are seeking to develop an innovative Tournament Management System (TMS) that will serve as the backbone for the administration and execution of the PSL tournament. The TMS should facilitate efficient management of team registrations, player drafts, match scheduling, venue allocation, ticketing, live scoring, and result reporting. Efficient team registration and player draft processes are paramount in ensuring fair competition and balanced team compositions. Each team should have a defined total budget, and the system must enforce maximum spending limits for individual player acquisitions. Before the player auction, the TMS should allow players to set minimum bidding amounts for their participation in the tournament.

The TMS should empower organizers to create a comprehensive schedule of matches, considering various factors such as team availability, venue capacity, facilities, and geographic location. Venue allocations should adhere to predefined criteria to ensure equitable distribution and logistical efficiency. The TMS should feature a robust online ticketing platform, enabling secure transactions and real-time updates on ticket availability and sales. During matches, the TMS should provide live scoring functionality, allowing fans to stay engaged and follow the action in real time through digital platforms. Furthermore, the system should facilitate the management of match staff,

including umpires and referees, ensuring smooth operations on the ground. Post-match, the TMS should promptly report results, including comprehensive match summaries, player performances, and team standings.

Question 4: Blood Donation System (BDS)

[25 marks]

The Blood Donation System (BDS) envisioned by the blood donation organization aims to revolutionize the process of blood collection, storage, distribution, and donor management. This comprehensive system must efficiently manage various aspects such as donor registration, appointment scheduling, blood collection drives, inventory management, recipient matching, and donor engagement. In terms of entities, the BDS encompasses Donors, Blood Donation Drives, Inventory, Recipients, and Patient Profiles. Donors are registered individuals who provide essential information including contact details, blood type, and eligibility criteria. Each donor can donate blood a maximum of twice a year. Blood Donation Drives involve the organization and coordination of collection drives, including the allocation of resources such as staff, equipment, and transportation. Inventory management includes tracking blood donations in real-time, monitoring blood type, quantity, and expiration dates, and implementing automated alerts for inventory replenishment to minimize shortages. Recipients represent individuals in need of blood transfusions, and Patient Profiles maintain crucial data such as blood type and medical history.

Regarding relationships, donors have a one-to-many relationship with Blood Donation Drives, signifying that a donor can participate in multiple drives. Each Blood Donation Drive is associated with one or more Inventory records, indicating the blood collected during the drive. Inventory management involves tracking the quantity of blood available, ensuring efficient allocation for recipients. Recipients have a many-to-many relationship with Blood Donation Drives, as multiple recipients may benefit from blood collected during a single drive. Patient Profiles are associated with Recipients, enabling healthcare professionals to access essential medical information during the transfusion process.