Databases and Information Systems

Course code: CS-303

Assignment 3

Total: 50 marks

Q1. Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff in ordering cars.
Each vehicle is identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g., the XF is a model of the car brand Jaguar of Tata Motors). Each model can be offered with a variety of options, but an individual car may have only some (or none) of the available options. The database needs to store information about models, brands, and options, as well as information about individual dealers, customers, and cars. Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints. [10 Marks]

Q2. Design a database for a world-wide package delivery company (e.g., DHL or Fed EX). The database must be able to keep track of customers (who ship items) and customers (who receive items); some customers may do both. Each package must be identifiable and trackable, so the database must be able to store the location of the package and its history of locations.
Locations include trucks, planes, airports, and warehouses. Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints.
[10 Marks]

Q3. Consider a carelessly written Web application for an online-shopping site, which stores the price of each item as a hidden form variable in the Web page sent to the customer; when the customer submits the form, the information from the hidden form variable is used to compute the bill for the customer. What is the loophole in this scheme? (There was a real instance where the loophole was exploited by some customers of an online shopping site, before the problem was detected and fixed.)
[5 Marks]

Q4. Consider another carelessly written Web application, which uses a servlet that checks if there was an active session, but does not check if the user is authorized to access that page, instead depending on the fact that a link to the page is shown only to authorized users. What is the risk with this scheme? (There was a real instance where applicants to a college admissions site could, after logging into the Web site, exploit this loophole and view information they were not authorized to see; the unauthorized access was however detected, and those who accessed the information were punished by being denied admission.)
[5 Marks]

Q5. Hackers may be able to fool you into believing that their Web site is actually a Web site (such as a bank or credit card Web site) that you trust. This may be done by misleading email, or even by breaking into the network infrastructure and rerouting network traffic destined for, say ***mybank.com***, to the hacker's site. If you enter your user name and password on the hacker's site, the site can record it, and use it later to break into your account at the real site. When you use a URL such as ***https://mybank.com*** , the HTTPS protocol is used to prevent such attacks. Explain how the protocol might use digital certificates to verify authenticity of the site. [5 Marks]

Q6. Write a servlet and associated HTML code for the following simple application: A user logins using *userid* and *password* and then a servlet authenticates the user (based on user ids and passwords stored in a database relation), and sets a session variable called *userid* after authentication.

[10 Marks]

Q7. What is an XSS attack? Explain how it works, and what measures must be taken to detect or prevent XSS attacks? [5 Marks]

NOTE:

1. Due date for Assignment is ***17th October 2022(11:59 PM).***
2. Answer all the questions and submit the answers in LATEX format on Moodle.
3. Mode of submission is moodle.
4. We will run a plagiarism check for all the submissions.
5. Penalty for late submission is 15% of secured marks.
6. Penalty for plagiarism is 100% of the secured marks.