**COEN 178 Intro to Database Systems**

**Project (Two people per group) Fall 2016**

**Total Points: 200**

**Note: A Demo is required. Demos will be in the 10th Week**

*SoPrompt Services* Inc. provides system administration and computer maintenance services for small to medium sized companies. A customer company employs the services of *SoPrompt* to maintain a number of machines (PCs workstations, printers etc) for them, where the services may include a regularly-scheduled hardware maintenance, software updates and trouble-shooting when problems arise (both hardware and software). *SoPrompt* employs a number of hardware and software technicians to provide the services to their customers as part of the **service/maintenance contracts**. *SoPrompt* is planning to automate its **record-maintenance system**.

You are required to design and implement the Record Maintenance System for *SoPrompt* services. The system to be designed is to assist the *SoPrompt* administrators to keep track of customer warranties, repair services and customer billing using a relational database for data and transaction management.

1.0 The following details are given to design and implement a database for *SoPrompt*’s Record maintenance.

*SoPrompt* sells Service contracts to companies to maintain their computer systems. The fees that are charged are based on the number of machines that are included under the service/maintenance contract. The record maintenance system will help *SoPrompt*’s administration to do the following tasks.

1. Maintain a detailed list of the customer service contracts with the details of the repair jobs done.
2. Maintain a record of the repair jobs to assist the management in customer billing.
3. All the information in the database helps the management in calculating their monthly and yearly revenues and the future areas for business expansion.

**2.0 The enterprise-specific details of the *SoPrompt Services* relevant to designing the database are given below.**

For ease of allocating technicians and computing the fees, the machines at a client site are considered either as **single machines** or a **cluster** of machines where a cluster may consist of other single machines. A single machine (or a cluster) is each considered a **Service Item**.

A single service/maintenance contract may consist of at most three **service line items**. A service line item consists of an item id and a reference to a service item (that may be a single machine or a cluster of machines). A service item (if it is a single machine) has a machine id and model. A service item that is a cluster (of single machines) has a group id, number of machines in the cluster and references to the individual machines.

A customer may have several service contracts, but a specific machine is covered by a single contract.

Each service contract consists of the customer id, starting and ending dates of service, service line items and types of coverage for each item. There are two types of coverage:

Service fees are charged $50 per month per single computer (PC or work station) and $20 for a peripheral device like a printer. The fees for a cluster is (where a cluster may include single machines or clusters of them) the sum of fees for the individual components in the clusters with a 10% discount applied.

**2.1 A service contract (warranty)** contains a contract id, machine id, begin date and end date of the warranty, during which time the contract is valid and any repairs on the machine covered are free. You may assume that *SoPrompt* has a list of all warranty (or maintenance contracts) issued to the customers and when a warranty is presented, checks the number against the list of numbers stored and accepts it if it is valid for the repair date.

**2.2 A repair job** is identified by the model (and make) of the computer, a machine id, a warranty or contract number (if under warranty or maintenance contract), the time of arrival (this is the date and time that the machine is accepted for repair), owner’s information (name, email or phone number).

A computer that is brought to the repair shop may have one or more problems, where each problem is identified by a problem code. A problem code is one of the set of codes that broadly categorize the type of problem. For example, a problem code of 10 may indicate a “faulty disc drive”. You can assume that there are a predefined set of codes assigned to different problem types and a problem type ‘0’ may be used to indicate that it is ‘ not determined yet”. The status of a machine can be indicated as 1, 2, or 3, where a 1 indicates that it is not ready, 2 indicates that the parts are ordered, 3 is ready and 4 is delivered to the customer.

A single repair-person is assigned to be responsible for a repair-job. A repair-job refers to a problem or a group of problems associated with the machine. In other words, when a computer is brought in for a repair, it is considered as a single repair-job (even if involves fixing several things).The information that is maintained for each repair-person includes the employee No, name and phone.

A repair job include the following information: the machine id, model of the machine, customerName, phone (or email address) time in (machine accepted for repair), time out (time that it is ready), the problems ids associated with the machine, status, repair-personId, labor hours and the cost of the parts used.

**2.3** **Customer Bill:** A customer is billed a minimum of $50.00 service fee for the repair job + cost of parts used and labor ($25 dollars an hour). For customers with a maintenance contract, the repair service (including parts) is free (provided that the contract is valid and covers the dates of repair).

Design a relational database to maintain the records of customer contracts and repair jobs for *SoPrompt* keeping in mind that the database should support the data requirements to serve the repair shop in its daily tasks of generating customer bills and maintain a list of service contracts. In addition, the system should provide support for queries to find the amount of revenue generated etc.

**3.0 Part 1**

i) A detailed, conceptual design using the E-R model should be included, showing the entities, relationships, cardinalities and integrity constraints. Any diagramming tool may be used, but a detailed legend to identify the notation used, should be included **(20 pts)**

ii) Show the schema of tables resulting from the E-R model in I). Show any normalization process applied to each of the tables and identify if the tables are in BCNF or 3NF. Clearly identify the primary keys and foreign keys **(15 pts)**

3.1 **Part 2**

Create the tables using SQL and load the tables with data of your choice **(20 pts)**

4.0 **Part 3**

Design and implement a Relational Database to facilitate the functionality described below.

In addition, you may implement the application as a web application using PHP.

The functionality to be provided is described below.

4.1 Create a Service Contract for a Customer: See the description in 2.1. (**10 pts**)

4.2 Create a Repair Job (Accept a machine for repair): The user should provide the necessary information. If a warranty number is given, it should be checked against the database of stored warranty numbers and accept the warranty, if the warranty period covers the date the machine was brought in. If the warranty is not valid, a message to that effect should be displayed and the machine accepted for repair (with costs) (**25pts**)

* 1. Update the machine status:

The status of a machine that is in for a repair can be updated. For example, one may change the status to 3 (it is ready) and enter the current time, costs and other information associated with the repair. (**10 pts)**

* 1. Show Machine Status: Given the machine id or customer-phone or email address, should show a machine(s) status. **(10 pts)**
  2. Show Customer Bill: Should display the billing information. A customer’s bill shows the customer’s information (name, phone or email), the model of the computer repaired, time (and date) the machine was brought in; time the machine is ready and repair information. Repair information includes the name and description of each type of problem that is fixed, charge for each service, names and price of parts used (if any) and the total amount due. If the machine is under warranty, total amount due should be 0. (**30** pts)
  3. Show Repair-Jobs: Should display all the repair-jobs that have a status of 1 or 2. **(10 pts)**
  4. Show Revenue Generated:The user enters two dates and the revenue generated (money collected) from repair-jobs during this time should be displayed. The money is considered collected when the status of machine is 4 (delivered to the customer). This should clearly show the total amount collected on machines that are not covered by a warranty and the total amount covered by warranty. **(25 pts)**
  5. Graphical user Interface **(25 pts):**

**Note:** You are free to include any additional attributes you may require for the entities described in this document.

You can implement the above system using SQL, PL/SQL and PHP.