

# **CS 631 - DATA MANAGEMENT SYSTEMS DESIGN PROJECT**

## **Purpose of this project**

Analyze, design, implement, and document a database system application. You will use the methodology for database development learned in class. The system must be implemented on a DBMS with any language as a host-language for the application. The system must be menu-driven and include the basic functionality described below.

## **The Online Computer Store**

*The following specifications are intended as a guide; they are not the complete specifications. These are intended to be a basis for you to get started in the right direction in designing your system. You as the designer must analyze and decide what other details or features should be specified for your system. Thus, individual group implementations will differ in terms of design and implementation styles. Every group has to mention clearly in its report what other specifications are assumed. However: (a) they should not contradict the assumptions described below, and (b) they have to be clearly stated in your report.*

## **DATABASE REQUIREMENTS (Requirements for the design of the database)**

Newark-IT is a company that sells computers all over the world. It is a web-based company. All sales are managed via a website. The company wants to build a database system for customers, products, and sales transactions. You have been approached to help Newark-IT with the database design and application development.

1. A customer has an ID, a first name and a surname.
2. Each customer has a home address, a telephone number, and an email address.
3. A customer can have one or multiple credit cards. Each credit card has a number, a security number, the name of its owner, the billing address, the type of credit card, and an expiry date.
4. A customer can specify multiple shipping addresses. A shipping address is identified by the name the customer chooses for this address (which is unique among the shipping addresses of this customer) and the ID of the customer. For a shipping address the zip code, street name, street number, city, state and country are provided. If a customer is deleted, we need not keep track of her shipping addresses any longer.

5. Customers have a status (regular, silver, gold and platinum). A status level corresponds to different advantages. In particular, a credit amount is offered to the customers of silver status and above which might be different for each of these customers. In addition, the company proposes each month special offers (reduced prices) for some products exclusively for gold and platinum status customers.
6. An offer is the combination of a particular product and a price.
7. Each product has its own product ID, a name, a recommended price, and a brief textual description.
8. Each product has also a unique product type. The quantity of each product in stock is recorded in the database.
9. A customer can collect several products in a shopping basket each at a different quantity. If the product is on offer and the customer is of gold or platinum status, she is charged the reduced price for this product.
10. A shopping basket is always non-empty. It is created with the first item added.
11. A successful sales transaction is recorded in the database, when a customer buys a shopping basket (with products), chooses one and only one shipping addresses and the payment is confirmed. The price and the quantity of every product in the transaction should be available as well as the total amount of the transaction.
12. The payment of a sales transaction is done with a credit card. It can be one of the credit cards stored by the customer, or a credit card whose information is recorded for this particular transaction.
13. As soon as a sales transaction is confirmed, the shipment is started. If a product is not delivered successfully, for instance because the cargo got lost, the transaction gets tagged with not-delivered tag.
14. There are three main categories of product types: Desktop computers, laptops, and printers.
15. There are also product types that do not belong to any of these main categories (e.g., different kinds of accessories).
16. Product types of main categories have specific attributes: Desktop computers and laptops have both a CPU type, and laptops have also a weight and a battery running time. Printers have a resolutions and a printer-type.

## **FUNCTIONAL REQUIREMENTS**

### **(Requirements for the development of the application programs)**

The Newark-IT is interested in an online application program interface that is easy to use so that they do not have to spend time unnecessarily to train their employees. Newark-IT would also like the program interface to be easy for the customers. In particular Newark-IT is interested in the next three applications: *Customer registration and management*, *Online sales*, and *Collection of statistics*. The last application is crucial in decision making by the analysts, managers and knowledge workers of the company. For instance, it will allow the introduction of new products in certain categories or the discontinuation of certain products, or the suggestion of new offers to increase the profit of the company. As database and application program designers you are expected to write a menu-based main program which consists of the following three application programs for the daily transactions of the company and is open to the inclusion of additional functionality in the future. Note that many functions are left out in order to reduce the size and the complexity of the project.

#### **1. Registration and Management**

Every customer has to register before being able to place an order. This interface will help the customers register and manage/edit their registration information. Procedures for registering, updating and deleting a credit card and a shipping address should be available.

#### **2. Online Sale**

The online sale program will manage the shopping basket, and help the customer place an order. When an order is placed, the customer should be able to check and inquiry about the status of his/her order. The status of an order is updated as the company processes it. The customer should be able to view his transaction history, and pull up specific transactions based on different criteria (for instance, based on the name of the customer and the name of a product involved in the transaction and/or a range of dates).

#### **3. Sale statistics**

This program provides statistics and is used by Newark-IT to analyze its sales and customers. In particular, this program should be able to make the following computations:

1. Compute the total amount charged per credit card.
2. Compute the 10 best customers (in terms of money spent) in descending order.
3. For a given time period (begin date and end date) compute the most frequently sold products.
4. For a given time period (begin date and end date) compute the products which are sold to the highest number of distinct customers.

5. For a given time period (begin date and end date) compute the maximum basket total amount per credit card.
6. For a given time period (begin date and end date) compute the average selling product price per product type (desktop, laptop and printer).