Vietnamese National University HCM
HCMC International University
School of Computer Science and Engineering

List of Topics for Assignments

Course "Principles of Database Management"

Nguyen, Thi Thanh Sang, PhD.

2015

Guidelines for students

The following list are topics for an assignment in Principles of Database Management course – Semester 2, Academic year 2014-2015, at the School of Computer Science and Engineering, International University, HCM National University. This list will be updated in the next teaching time of the course.

Three students will be randomly selected to form a group. After formed, students in their group will work together on a given topic. Once again, a topic of this list will be randomly assigned to each group. During lab sections, students learn how to implement their assignments stage by stage. In the last lab session, each group represents their result to other groups and gets contribution from their classmates.

This assignment will focus on database design and the implementation of simple but typical functions which can access and modify data stored on database servers.

After choosing a topic, you have to study it carefully. Try to discuss with your teammates to gain a deeper understanding about your topic. During labs, you can clarify unclear issues with your tutors. Remember that all the hard works are yours; tutors only give you some brief advices based on what you have done.

Topic A: Restaurant Management System

Steve wants to open a new restaurant with full using of technologies and as few human labor as possible. On each table, there is a computer with a touching screen. After entering the restaurant, customers find an empty table, start browsing the menu, select their favor foods and then order their meal of several courses. Their order will be transmitted to the computer of the cook in the kitchen.

Because of several orders can come to the cook in a time, the cook has to plan his cooking schedule. After receiving an order, depending on his schedule, he enters the time the course will be prepared and ready to use. This time will be reported back to customers.

After the cook finish a course, he will send to a delivery system to transport it to the customer's table.

When the customers finish their meal, they send a signal to the casher over the system. The casher send a bill, in which the cost is based on what customers have been ordered and used, will be sent back to customers. They will fill in their debit card information to pay the bill. The system checks the filled information, finishes the payment process and send to thankful message to the customers. The customers happily leave the restaurant without talking to anyone.

The restaurant manager has to manage the menu. Every time, there is any change (a course appears, an old course is removed, the price of a course is changed…), he use the system to make that change in the morning before the restaurant is opened.

Customers will be very happy with the system because they do not need to wait waiters to order any meal. They can order what they like whenever they want. After ordering their foods, they can know when their food is ready. They can enjoy their meal in their place without being interfered by anyone.

Your role is to develop the system to help Steve to manage his restaurant.

Topic B – Forum

Have you ever joined and sent a message in a forum? Surely the answer is 'Yes'. The topic for your assignment is to develop a forum similar with the one you often use.

The new forum has to have main following features (but not limited to):

- Users of the forum: Admin, Moderator, User

- Activities of Users: registry; read and post messages; registry for the system to remind new messages appearing in favor their threads.
- Activities of Moderator: remove and modify messages, create/remove threads, ban or remove users.
- Activities of Admin: Manage moderators.

- Old messages and threads will be automatically removed after a number of days (setting by the Admin).

Topic C – Library

Library is a popular place of students. Especially, in HCM International University, library is a very good place to study because of its air-conditioning, bright and quite environment. Lending books to students is the main duty of library. Books in the library are classified into disciplines (Maths, IT, Biology…). Each book is assigned a unique code. Student information can be imported from the management system of the Academic Affair. Each student can be uniquely by his/her student ID.

Lecturers are also popular customers of library. They just pop in to read newspapers or borrow some books to prepare for their new courses or their research. Of course, they can borrow more books with longer duration than students.

After entering the library, everyone feels free to find his/her needed books on the shelves. After finding, he/she can bring his/her books to the counter and then show his/her ID card to the librarian. The librarian enters his/her information to the system, check whether he/she is valid to borrow books this time. If being valid, the librarian writes the borrowing and expected return dates to a form that is attached on page 3 of books. After that, the librarian let him/her bring his/her books home.

Whenever finishing reading, students can return their books back to the library. The librarian checks returned books and updates the historical borrowing data of students.

Main features (but not limited to) of your system:

- Student/lecturer: Borrow/return book, order in advance
- System: Remind for borrowing deadlines or the availability of ordered books, generate penalty for late return/miss
- Staff: Add/remove/modify book information, report to manager
- Manager: manage staff

Topic D – Bookstore

Whenever needing some new books or pencils, you will think about a book shop. With students having thin pockets, book shops are the place they can read new and interesting books without paying a cost.

Books in a bookstore are often organized into disciplines (language, novel, technology…). After entering the store, customers freely select and view their favor books or magazine. When finishing choosing of books, they go to the check-out counter to pay their bill.

Some functions concern you:
- Order book
- Sale off
- Book management
- Report
- Remind users of availability of ordered books

Topic E – Home Delivery Foods

Sitting on your living room, make a phone call to number …, you can have a delicious KFC meal delivered to your door in around 10 minutes.

A typical process of a phone to the restaurant with home delivery service:
> A telephoning staff receives a phone call
> During the conversation with users, he fills order's information to the system
> When the conversation finished, the order is transferred to the kitchen
> The order is cooked and packed
> The packed food is transferred to the delivery department
> The delivery staff bring the packed food and its bill to the address of users
> He give the food and receive money
> He return to the restaurant and give money to casher

Develop a system to help a restaurant to manage its home delivery service.

In this system, manager can have abilities of managing menus and their price. In some period, he can start a campaign of sale off a group of menus.

A food is cooked by a set of materials. The manager can pre-set an expected and minimum amount for each kind of material. When the amount of a material is less than the minimum amount, it has to be ordered to reach the expected value. Every day, in the morning, the system can automatically generate the list of materials (with their amount) which the staff has to buy.

Topic F – Car Renting

Car's price in Vietnam is currently too high for many people. If having a driving license and needing to travel far away the city, anyone can come to a Car Renting shop to rent a car to drive by himself. The renting price is dependent on the period and the type of rented car.

Develop a system to manage a company providing car renting services. Main features (but not limited to) of your system:

- Users: Manager, Staff, User, Technician

- Staff: meet a customer, guide him the showroom to select the car, show him the renting price. If he agrees to rent, get user's information, keep user's ID card, deposited asset and then give the car the user. After users return the rented car, call the technician to check the car. If no penalty (because the car can be damaged by accidents or lost some parts) is made, the staff receives the fee, return user's ID card and deposited asset, and receive the car.

- Technician: check the returned car

- Manager: manage users and employees, get reports

- User: pre-order a car for a date

Topic G – Coach Ticket Selling

Nowadays, buying something over Internet is very popular. It is very convenience that you can sit at home to order and buy a ticket for your trip over Internet. You do not need to go to a station to buy a ticket. Sometimes, after coming there, you can disappointedly discover that the ticket of your favor trip is sold out. With a new e-commerce site, you can buy and pay for your ticket over Internet. You only need to print your ticket out, carry it with you at the traveling day and then enjoy your trip. This kind of ticket is called "e-ticket", that is very popular in Western countries. Try it at site: http://www.nationalexpress.com/home.aspx.

The new forum has to have main following features (but not limited to):

- Users: Manager, coach driver, users

- Manager: manage user information, trip information (time table, source & destination, number of seats, price…)

- Coach driver: receiving customer's list, check ticket, report after the trip finished

- Customer: browse/search trips, seat availability of each trip, buy ticket

- Remind service: the system will remind registered users the availability of their pre-ordered trip

Topic H – Course Activity Management for Distance Learning

In Distance Learning, most of class activities are happening over Internet, in a virtual classroom, similar to a special forum.

In E-learning, each student has his own account, accessing by the pair of user and password. After the registration stage, he will be provided a right to login to his registered courses.

In the first day of the course, the lecturer enters the course syllabus, where to download/see course's material

Every week, at a given time, the lecturer creates a new discussion topic, similar to a thread in a forum. In a week after the topic is created, all students are required to log in the system, contribute to the topic by posting messages. After the posting period is over, the topic is locked. Depending on the quality and quantity of students' postings as well as the topic difficulty, the lecturer will give an appropriate mark for each student.

The final examination is organized as a special topic. The exam topic is posted in the announced time. The posting period is only around 2 or 3 hours. Students can post their exam papers several times but the last posting is marked by the lecturer. Students cannot see the content of other posts.

There is another interesting feature of this system. During the course, when the lecture sends an announcement to all students, the message is posted to a common topic "Announcement" and intermediately mailed to students as a reminder.

Specify main users and their activities in your new proposed system. Develop it also!

Topic I – Inventory Control Management

Design goals: maintain a proper variety of required items, increase inventory turnover, reduce and maintain optimize inventory and safety stock levels, obtain low raw material prizes, reduce storage cost, reduce insurance cost, reduce taxes

Specify main users and their activities in your new proposed system. For example, some main features (but not limited to) should be taken into account:
- Browsing the catalogue of items
- Updating items: prizes, qualities, warehouse
- Reporting inventory

Topic J – Find a House for rent

With a second or third students, looking for a suitable house to rent is a difficult task. Develop a web site to help students to find a house for rent.

When a student needs a house to rent, he/she search information of available houses on your website. The website will show all categories of houses with descriptions such as location, area, interior, price, contact, etc.

The student will select a house and contact the landlord via email. After dealing, two parties sign a contract confirming the payment and the residing time for the student.

The new web site has to have main following features (but not limited to):

- Users: landlord (house owner), student, staff

- Activities of landlord: registry his house, pay a monthly fee, update the status of the house when it is rented or released in the end of contract

- Activities of student: find a house by several criteria, pre-order his wanted house

- Staff: manage landlord, registered student and fee

Topic K – Auction Site

eBay is a very popular auction site because it is where you can be second-hand products with an affordable price.

When having something to sell, sellers need to give product information to the staff of the auction site. Their product will be showed on the web page for a number of days paid by sellers. It means when the time requested by the sellers is up nobody will see or bid these products.

While the products are available on the auction page, bidders can bid and keep track of bidding process of the products. The bidding information includes bidder name, bid, and time. And the final bidder having the highest bid will win and be able to buy the product from the seller.

The winner will contact the seller for dealing on shipping and payment way.

The auction ends when the seller finishes buying their product or he/she no longer want to buy it or the auction registering time ends.

Develop your own auction site. Main features (but not limited to) of your system:

- Users: Seller, bidder, staff

- Activities of Seller: registry his goods, give product information such as product name, category, characters (old or new, and other descriptions), initial price, contact information (phone, address, etc.), shipping, payment ways, etc.
- Activities of Bidder: bid a product with proposed cost
- Activities of Staff: fee, monitor auction process, and manage users.

Topic L – Property Management Company

A property management company has approached you to build a system that will help it keep track of its properties, tenants, and employees. Consider the following requirements and design a database conceptual schema to support such an application.

The property management company owns several buildings, each at a distinct address. Each of the buildings contains several apartments. All apartments in a given building are assigned an apartment number that is unique within that building (but not necessarily across different buildings). The system should keep track of the number of bedrooms and number of bathrooms that each apartment has.

The system also needs to handle different kinds of people. A person is identified by a unique SSN, and has a name consisting their first name and last name. Each person may have several phone numbers. People handled by the application fall into two disjoint categories: tenants and employees.

For each tenant, it is necessary to record their bank account number for the purposes of deducting their rent. The application also needs to store the name and phone number of their next-of-kin for contact purposes in case of an emergency.

For each employee, the application needs to keep track of their monthly salary. Employees can be managers or technicians (or both). Each manager has an office located in one of the apartments, and is in charge of managing at least one building. All buildings must have a manager. For technicians, the application should keep a record of their skills, which is one or more of the following: "carpentry", "plumbing", "electrical".

To rent an apartment from the property management company, tenants must sign a lease agreement. A lease agreement is a formal contract by one or more tenants (as may be the case with roommates) to lease an apartment; it includes the start date and expected duration of occupation of the apartment, as well as the amounts for security deposit and monthly rent. The lease agreement is also countersigned by the manager in charge of the building, on behalf of the company

Topic M - Commercial Cleaning

There are several times when you need a professional cleaning service to help you to finish some difficult tasks. A few of the services you could use are:
- Carpet cleaning
- Furniture cleaning
- Wall washing
- Floor cleaning
- Draperies cleaning
- Water, smoke, and fire damage restoration
- Air-quality testing

To use this service, you have to make an appointment with the Cleaning Company over telephone or its website. Someone, called the examiner, from the company will come and examine your house before giving the detail and price of the contract. Each cleaning task has a different price dependent on its type and size. After you sign the contract that is assigned a unique number, the contract is not valid yet until you make your payment in the next day.

After examining, the examiner brings the contract back to the company to enter to the waiting list. Depending on the available resource, the company will give the list of possible dates the contract can be executed. In the next day, you can use the company's website to see the list of possible dates for your contract, select the most appropriate date and make the deposit (often 30% of the contract value) by your visa card. The company will send the contract and the receipt of your deposit to your address.

On the selected date, a team from the company will come and execute the contract. Most contracts are finished in one day. During the cleaning, you have to inspect the execution of tasks. When all tasks are finished, you sign the receipt and give it back to the team.

You have to come to the company website once again to make the final payment of the contract. In addition, you give your grade of satisfactory about the result of the contract. The staff of the company will send the receipt of your payment to your address by post.

Develop a system to help the company manage its business. Typical users and their activities:
- User: as above
- Examiner: as above
- Staff: manage contracts, payment, types of cleaning and their prices, produce reports to manager

Topic N - Dining Guide

This one is super easy to start and run for someone who loves the art of critiquing cuisine and sharing it with an audience. This business, although online, is regionally based because one should go to the restaurant and eat the meals to write the review. The content should remain current, and revenue can be generated primarily from advertising by local restaurants and eateries that want to be featured within the guide.

Your dining guide could be a simple searchable database of dining establishments in your local area or a comprehensive site with full menus updated on a regular basis, links to the restaurants' Web sites, and even reservation-taking capability. Alternatively, your site could be an independent restaurant review site.

Topic O – Online Retail Application

A customer can register to purchase an item. The customer will provide bank account number and bank name (can have multiple account number). After registration each customer will have a unique customerid, userid and password. Customer can purchase one or more item in different quantities. The items can of different classes based upon their prices. Based on the quantity, price of the item and discount (if any) on the purchased items, the bill will be generated. A bank account is required to settle the bill. The items can be ordered to one or more suppliers.

Specify main users and their activities in your new proposed system.

Topic P - Employment Agency

One of the most important things which graduates care about is to look for a suitable and well-paid job. Have you ever heard about or browsed the web site of employment agencies, such as www.vietnamworks.com? Your topic is to build a system where employers can post their vacancies, employees can browse or search suitable vacancies based on their attributes (age, degree, experience, required salary…)

Typical users and their activities in the required system:
- Employer: registry, post vacancies, browse or search available resumes
- Employee: registry, browse or search suitable vacancies
- Staff: manage vacancies (erase outdated vacancies, remind employees with the availability of suitable vacancies…)
- Manager: manage staffs

Topic Q – College Database

A college contains many departments. Each department can offer any number of courses. Many instructors can work in a department but an instructor can work only in one department. For each department there is a head and an instructor can be head of only one department. Each instructor can take any number of courses and a course can be taken by only one instructor. A student can enroll for any number of courses and each course can have any number of students.

Specify main users and their activities in your new proposed system.

Topic R – Health Care Organization

This organization provides following functionalities:

- Emergency Care 24x7
- Support Groups
- Support and Help Through calls

Any new Patient is first registered in their data base prior to meet the doctor. The Doctor can update the data related to patient upon diagnosis (Including the disease diagnosed and prescription). This organization also provides rooms facility to admit patient who are critical. Apart from doctors this organization has nurses and ward boy. Each nurse and ward boy is assigned to a doctor. Also they can be assigned to patients (to take care of them). The bill is paid by patient with cash and E-banking. Record of each payment made is also maintained by organization. The record of each call received to provide help and support to its existing person is also maintained.

Topic S – School Management System

Design a database to maintain information about school staff and students satisfying following properties:

- Staff will be having their id, name and classes they are teaching
- Student will be having name, roll no, section, class
- Another table containing section, subject and teacher information
- Next will be containing fee information for students
- One contains salary information for teachers
- Rooms are assigned to classes keeping in mind that there is no time clash of same room or lab, student cannot be entered in more than one section, no student should be there who has not paid fee up to a particular date.

Topic T – Salary Management System

Design a database to maintain information about employees and their salaries satisfying following properties:

1. Employee list to be maintained is having id, name, designation, experience
2. Salary details are having employee id, current salary
3. Salary in hand details are having employee id, salary, deduction or any other deduction and net salary to be given and also maintain details of total savings of employee
4. Salary increment to be given by next year if any is depending upon constraints
5. Deduction in monthly salary if any is depending upon any discrepancy in work and amount to be deducted.

Topic U – Wholesale Management System

Design a database to maintain information about stock, buyers and customers satisfying following properties:

1. Maintain the details of stock like their id, name, quantity
2. Maintain the details of buyers from which manager has to buy stock like buyer id, name, address, stock id to be bought
3. Details of customers i.e. name, address, id
4. Default list of customers who has not paid their pending amount
5. List of payment paid or pending
6. Stock that is to be buy if quantity goes less than a particular amount.
7. Profit calculation for a month.
8. Quantity cannot be sold to a customer if required amount is not present in stock and date of delivery should be maintained up to which stock can be provided.

Topic V – Hotel Management System

A hotel is a hive of numerous operations such as front office, booking and reservation, banquet, finance, HR, inventory, material management, quality management, security, energy management, housekeeping, CRM and more. Hotel has a number of rooms and these rooms are of different categories. On the basis of room category, each room has different price. Hotel has a number of employees to manage the services provided to customers. Customer can book the room either online or by cash payment at the hotel. Customer record is stored in hotel database which contains customer identity, his address, check in time, check out time etc. hotel provide food and beverages to their customers and generate the bill for this at the time of their check out.

Topic W – Railway Management System

A railway system, which needs to model the following:

1. Stations
2. Tracks, connecting stations. You can assume for simplicity that only one track exists between any two stations. All the tracks put together form a graph.
3. Trains, with an ID and a name
4. Train schedules recording what time a train passes through each station on its route.

You can assume for simplicity that each train reaches its destination on the same day, and that every train runs every day. Also for simplicity, assume that for each train, for each station on its route, you store

1. Time in,
2. Time out (same as time in if it does not stop)
3. A sequence number so the stations in the route of a train can be ordered by sequence number.

1 Passenger booking consisting of train, date, from-station, to-station, coach, seat and passenger name.

Topic X – Hospital Management System

A patient will have unique Patient ID. The full description of a patient is about personal detail and phone number, and then Disease and what treatment is going on. Doctor will handle patients. One doctor can treat more than 1 patient. Also each doctor will have unique ID. Doctor and Patients will be related. Patients can be admitted in hospital. So different room numbers will be there, also rooms for Operation Theaters and ICU. There are some nurses and ward boys for the maintenance of hospital and for patient take care. Based upon the number of days and treatment, bill will be generated.