CSC 540 – Project 1
Fall 2015

DATABASE APPLICATION PROJECT DESCRIPTION

University Library

The Director of the University Library requires you to design a database to assist with the administration of the library. The requirements collection and analysis phase of the database design process has provided the following data requirements specification for the University Library database.

Note: Slight revisions are expected to be made to description for clarification based on questions that come up.

Library Patrons

Students
The data stored about each full-time student includes: the student number, name (first and last name), phone number, alternate phone, home address (street, city, postcode), date of birth, sex, nationality, their department, student classification (undergraduate or postgraduate), degree program e.g. B.S, M.S M.A. Ph.D., etc. category of student (for example, first year undergraduate, postgraduate). Some combinations should clearly not be allowed e.g. an undergraduate in a Ph.D degree program. Information about the courses a student is enrolled is also maintained for purposes of restricting course-reserved materials to only appropriate students.

Faculty
The data stored about each faculty includes: the faculty number, name (first and last name), category of faculty (for example, assistant professor, associate professor, professor, lecturer), nationality, and the department that the faculty belongs to and the course the faculty teaches.

RESOURCES

Libraries
There are two libraries present on campus - the D.H Hill Library and the J.B. Hunt Library. Each of the libraries contains certain books, journals, E books, some study/conference rooms and devices like cameras. Each of these resources are available for check out to both students and faculty members. More details about these resources are described below.

A patron can query the library database to check on availability of a library resource at any time. The search interface is presented first to patrons as a list of categories e.g. books, cameras, etc. When a user selects the category they are interested in, a list of options of category-specific attributes is presented.

Publications
The library houses different kinds of publications, e.g. books, journals and conference proceedings. The data stored on each book available in the library includes: the ISBN number which uniquely identifies a specific edition of a book, the title of the book, the edition, the name of the author(s), year of publication and publisher. The data stored on each journal includes : the ISSN number which uniquely identifies a specific journal, the names of the authors, the year published and the title of the journal. The data stored on each conference proceedings includes: Conf_num which uniquely identifies each conference papers, the year published, the name of the conference where the paper was published, the names of the authors and the title of the conference paper.

Publications can be electronic or hardcopy. The library may have multiple hardcopies of the same publication and in some cases will have both electronic and hard copies of same publication. Some books are reserved for a particular class by a faculty member. The checkout regulations for the different types of publications are:

1. Reserved books - Book may be reserved for a course by a faculty member for a period up till 4 months. Reserved books can be checked out for maximum of 4hrs and by only students of the class for which the book is reserved. .
2. Electronic publications - Have no checkout duration.
3. Journals and Conference Proceedings can be checked out for a period of 12 hours but cannot be taken out of the library.
4. Every other book - can be checked out by either student or faculty. Students generally have 2 weeks checkout duration while faculty members have 1 month.

A patron is only allowed to have one copy of particular publication checked out, at a time.

Checkout and Return Policy
The checkout process is initiated by the patron (after finding the desired item(s)). The checkout process updates the appropriate tables in the database with respect to availability and assigns return dates to items based on relevant rules for the type of holding and type of patron (mentioned throughout the description). Checkout should only be possible for available items. Additional requests for items not currently available will be placed on a wait queue and serviced on a first-come-first-serve based. However, faculty always have priority on the wait queue. Checked out items can be renewed by a patron only if no patrons are waiting for item. If it is possible to renew, the due dates and relevant data are updated in database.

Due date Reminder. Late fee Reminder.
If patrons do not return an item and do not renew, late fees are assessed. Late fees are assessed at $2/day.. Reminders are generated to notify patrons about upcoming due dates and late fees. For upcoming due dates, two reminders are sent, one 3days before and the other 24hrs before. For late fee reminders, three reminders are sent, 30, 60 and 90 days past due. After 90 days, the account is considered delinquent and library privileges are suspended for the concerned patron. Additionally, for students, a record is included in a registration hold list. (There will be no need to implement the registration system. You only need to maintain a list of students who have a hold. Students belonging to this list should not be allowed any further check outs until the outstanding dues are cleared). Patrons can query the system for their account balance and clear it at any time. Once cleared, privileges if suspended are restored, and any holds placed due to these fees are removed (it is possible that other holds exist for other reasons).

Conference/Study Rooms

The library contains several conference/study rooms that can be used by a patron to discuss ideas. Conference rooms are present only in the J. B. Hunt Library and not in D. H. Hill library while study rooms are present in both. The data contained on each of these rooms includes: the room number, the name of the library that the room belongs to, the position of the room in the library (which floor), the capacity of the room, and the type of the room (study or conference). The type of the room determines who is eligible to book the room. A conference room can be booked only by faculty while a study room can be booked by both student and faculty.

Room reservation and checkout policy

Patrons can request a room by providing a time period (day and hour interval of no more than 3 hours) and occupancy and room type (study or conference). Based on these criteria, the list of available rooms (which takes into account patron type) is presented. If patron is not authorized for room type, an error message is presented (or request interface should prevent the generation of such a request. Either strategy is fine). If study room is being reserved, a list of available study rooms (only rooms that are available and have appropriate size) is presented and the patron can then select and reserve a room. If a conference room is being requested, a list of available conference rooms is presented and the faculty can then select and reserve the room of their choice. Each successful reservation process ends with an acknowledgment notice which includes information about the reservation (room information, duration, etc.). The patron initiates the "checking out" (taking hold) the room. Checking out the room can only happen after the designated start time for reservation. "Checking in the room" must be done by the end of assigned duration and returns the room to the list of available rooms.

If a room is not "checked out" by 1 hour after reserved start time, the reservation is automatically cancelled.

Camera

The library also allows a patron to check out DSLR cameras. The data contained for each of the cameras includes: a unique camera ID, the make, model, configuration of the lens, memory available and the name of the library where the camera is housed. All cameras have a check out duration of Friday till Thursday of the following week. Check out time is between 9 am - noon am on Fridays and return time is by 6pm on the following Thursday. Camera checkouts cannot be extended. A request for a camera entails filling out a request form where a patron begins by indicating which friday they are interested in. The list of all cameras that will be available at that time is presented. This includes those presently in stock and those that are expected to be returned by that date.

If there is more than one request made for the same camera for the same pick up date, they are placed in a queue and position in queue is returned to patron. The first person in the queue gets maximum priority. Final confirmation of availability is sent by 8am on friday. In case the camera requested by a patron is not available by Friday 8 am, then this message should be communicated to the concerned patron. The patron initiates "check out" (taking hold) of the camera. If the patron fails to "check out" the camera by 10am on Friday, then he/she should be notified that their reservation has been cancelled and consequently another message should be sent to the next person in the queue stating that the camera is now available for pick up.

Late fee
The patron also initiates the "check in" (returning) of the camera. In case the patron fails to return the camera by the deadline then he/she should receive a notification about late penalty. Late fees are assessed for late returns at a hourly rate of $1/hour for every hour beyond the return deadline. Library also sends bills monthly to patrons with outstanding charges.

DELIVERABLES

The following dates are the recommended dates for submission. You can formulate your own plan of action if you wish to plan the project differently.

- **September 21st** - Plan of Action for the project - Every team is required to **submit**
    - **a list of team members (also fill online form/spreadsheet)**
    - **their project plan -** list of tasks identified to be done, by whom and by what dates. Some key tasks that you should be thinking about include ER model design, Identification of Integrity Constraints (there are various class of constraints), SQL implementation of ER Model, SQL implementation of Constraints (again there are several classes), User Interface Development (not necessarily GUI), etc.
    - **2 questions** on the moodle forum about any doubts that they might have regarding the project description. Teams do not have to wait till the 21st to ask questions, questions can be posted anytime on or before that date. However, in the plan of action report, the link to the teams' questions should be included. Responses will be made by TAs and others on the forum so that information can be shared widely. It is expected that teams check the forum first to ensure their questions are not already answered. If a team finds that it has many questions about project, then it will be best to also schedule a meeting with TAs for one-on-one discussion. On the other hand, if a team feels that it doesn't have any questions, that it should include this explicitly in plan of action report to the effect "*We have read the project description closely and are completely clear about its requirements and do not have any question*s". Key tasks are ER Model, Relational Model, Database Supported Application Constraints e.g. Triggers etc, Application code level supported constraints. All constraints that can be supported by database should be supported in that way.
- **October 6th - Mid Project report** - This report should include the tasks that have been accomplished with some snapshots. The tasks that are left. Revised schedule.
- **October 13th -** Choose demo time slots - Every team is required to **select a particular time slot** on a google sheet (which will be made available by then) from the ones available for the demo. **Time slots will be allocated on a first come first served basis.**
- **November 1st** - Final submission contains the following components:
  Final Report - The final report should be a discussion of what was does and explanation of design choices. At the very least, it should include the following:
    - **ER Diagram:** a listing of entity and relationship types and a sentence description for each and list of key, participation constraints and other constraints represented in the ER model, along with a sentence description for each.
    - **Relational Model:** a list of tables, 2 - 3 sentences description of each including what constraints it encodes, the SQL for the table, a listing of functional dependencies, a discussion of normal form choices faced and justification for decision made.

    - **Constraints:** a description of constraints that were not implemented as part of table definitions and why and how they were implemented. In particular, a separate subsection here should highlight constraints that couldn't be implemented in the database at all and had to be implemented in application code. *Note that a key part of assessing your design is how well you used the DBMS to implement constraints vs. implementing in application code*.
    - **SQL queries and snapshots of the results**- a listing showing how queries given are implemented in your design. The TAs will publish these queries in due time. (**These queries need to be run on the sample data that will be provided by the TAs**)
    - Executable file (Ex - JAR file) and source Java Code
    - README.txt - This should contain the names of the members of the team and any additional instructions that you might want to add that will be necessary to execute your code.
- **November 5th/6th -** Final Demo - You will be required to give a demo of the project to the TAs at designated time slot that you selected. At the time of demo, **please ensure that the database contains only the sample data that will be provided by the TAs in due time. Failure to adhere to this will lead to some points deduction**.
- **November 6th** - Late submission - For teams that fail to meet the November 1st deadline, will need to **submit their project latest by November 6th**. Teams submitting their projects anytime after November 1st will be **penalized.**