Cairo University
Faculty of Engineering
Computer Engineering Department
CMP2020

SEM - team 5

Introduction to Database Systems

The Central Library

Project ER Report

Team Number: #5

Team Members:

#	Name	Sec	B.N
1	Ahmed Fawzy Mohamed Ibrahim	1	7
2	Abdelrahman Mohamed Salem	1	38
3	Mamdouh Ahmed Mohamed Attia	2	25
4	Youssef Said Ibrahim Rabie	2	38

Contact info:

1. ahmed.ibrahim011@eng-st.cu.edu.eg
2. abdosalm555@gmail.com
3. mamdouh.attia01@eng-st.cu.edu.eg
4. youssef.ibrahim01@eng-st.cu.edu.eg

<28/11/2021>

Project description

The project we intend to implement is a desktop application for a multi-branch library. This application would be for both readers, and administrative users such as librarians, branch administrators, and finally owners (potentially *owner*). It would include the business side such as: vending, business meetings, and finance management; and regular reader side such as: subscribing to the library or one-time visiting, reading books in-house, borrowing, events attendance…etc.

Entities	
Book	Category
Author	Publishing house
Event	Finance record
Event attendant	Scheduled business meetings
Vendor	Meetings attendants
Request	Person
Employee	Administrator
Librarian	Owner
Reader	Transactions
Branch	Request

Users	Functionality
Reader*	• Search for books • Request transaction (borrowing, reading, visiting, subscription, and event attendance). • Register for an event. • View branches. • Request a non-existing book • View their history. • Contact librarian.
Librarian	• Accept readers' transactions. • Add, remove books, or mark unavailable. • Sign up and remove readers. • Add and remove event attendants. • View each day's activity history. • Contact administrators, and readers who did not return books.
Administrator	• Hire and fire librarians. • Hire and fire vendors. • Make events. • Request for books from vendors. • Contact owner or librarians. • View registered users. • Prepare financial reports.
Owner	• Hire and fire any employee. • Make and remove a new branch. • Contact administrators. • View, add, and remove financial reports. • Prepare for business plans meetings with administrators.

* We modified reader to include both visitor and subscriber, illustrated better in the entities section.

PROBLEM DEFINITION

The problem is coming up with a good database design that suits a functional multi-branch library that does not only fit the managerial side of things, but also the day-to-day low-level transactions. The design must include various functional users: like the owner, and the reader, and must accommodate the needed functionality. The users are described next.

SYSTEM USERS*

Users	Privileges
Reader[1]	• Viewing access on the available books and searching them. • Requesting some transactions such as: borrowing, inhouse reading, and subscribing. • View access on all the events, and themselves attending them. • View access on their activity history (only for long-term subscribers, not visitors). • View access on branches. • Emailing librarians.
Librarian	• Full access to books and readers. • View access to category. • View access on event entity. • Full access on event attendant entity. • View, insert and update access on transaction entity, and thus authorizing transaction requests (at least, the ones they're authorized to *authorize*, which are mainly the reader's request). • Emailing both readers and administrators.
Administrator	• Full access to event and event attendant entity. • Full access to librarian entity. • View access to business meetings entity. • Full view, update and delete access on books, vendors, and finance records of his branch. • Full view and update access on *his* branch.

	• Emailing the owner and the librarians.
Owner	Root privilege. Of the few additional functionalities they will have are: • Full update and delete access on branch entity. • Full view, update, and delete access on employee entity and all its subclasses. • Full access to the business meetings entity.

* Please, bear in mind that each user will have the mentioned privileges, *and all the privileges to the preceding users.* That is: this is a hierarchical structure.

[1] We modified reader to include both visitor and subscriber, illustrated better in the entities section

ENTITIES

Person	This is the superclass of all the subclass entities designating any types of persons under them. It's further specialized to one of the following subclasses: Employee and Reader. It's related to each of them through an ISA relationship.
Employee	A subclass of the entity person, and a further superclass for other following entities: Librarian, Administrator and Owner. It, obviously, inherits all the attributes of its superclass, person, and adds to it certain relevant, to the employment, attributes.
Librarian	A subclass of the entity employee. It has no further attributes apart from those present in employee but will certainly have different privileges from its sibling descendants from employee. It's the person dealing with readers, handling the daily tasks.
Administrator	Same description as librarian concerning its descendancy. For each branch is an administrator; deals with bigger issues like hiring/firing librarians.
Owner	Same description as the two above concerning its descendancy.

	It’s the top in the hierarchy, owner of all branches.
Author	Author of a book. It’s not included in the inheriting hierarchy of the entity person since there are not many attributes in common. For example: no need to have his contact info, or age (for they may be dead).
Publishing house	Publishers of any available books.
Reader	A subclass of the entity person. They are the daily subscribers and visitors combined. We distinguished between the two through the attribute *valid_until* that describes the temporal validity of their stay. Visitors’ data are ephemeral, unlike subscribers.
Vendor	A third-party book supplier.
Event	Any arranged event in the library. Each instance is constricted to a single branch.
Event attendant	Attendants of any event. A worthy attribute of it to mention is the *special_guest* attribute; it indicates, from its name, whether the attendant is a guest of honor or not.
Scheduled business meetings	An entity for any business meetings between the concerned administrators, and the owner. Not a low-level meeting.
Business meetings attendants	An entity for all business meetings attendants. It references both the employee attending, and the meeting itself.
Book	Any of the available (or once available, but no longer) books.
Category	An entity for holding the various categories of books.
Branch	An entity for existing branches of the library.
Transaction	Any transaction made in the library. This includes the day-to-day ones, which are: borrowing, subscription, visiting, event-attendance, etc.; and the large business-side ones including the vending transactions.
Finance Records	A daily branch-specific sum up of the transactions made in the branch.

Email	The main communication channel for all the internal employees and vendors alike. This can be made also available for users.
Request	The sole communication channel specific to daily reader requests which will need approval from the appropriate employee.

RELATIONSHIPS

request_receiver	A 1:1 relationship between the request and its receiver.
request_sender	A 1:1 relationship between the request and its sender.
email_receiver	A 1:1 relationship between the email and its receiver.
email_sender	A 1:1 relationship between the email and its sender.
person_reader	An ISA relationship between the superclass person and its subclass reader entity.
person_employee	An ISA relationship between the superclass person and its subclass employee entity.
employee_librarian	An ISA relationship between the superclass employee and its subclass librarian entity.
employee_administrator	An ISA relationship between the superclass employee and its subclass administrator entity.
employee_owner	An ISA relationship between the superclass employee and its subclass owner entity.
employee_branch	A one-to-many relationship, from the branch to the employee, tying each employee to their sole branch.
finance_branch	A one-to-many relationship, from the branch to the finance record, tying each finance record to its branch.
book_category	A one-to-many relationship, from the category to the book, tying each book with a certain category.

vendor_category	A many-to-many relationship between the vendor and category entities, tying vendors to the categories they supply.
requested_books_id	A one-to-one relationship
event_branch_id	A one-to-many relationship from the branch to the event, tying each event to where it's held.
attendant_event_id	A one-to-many relationship from the event attendant entity to the event entity, tying each person attending an event to the event itself.
person_event_attendant	A one-to-one relationship between the event attendant entity and the person entity.
administ_biz_attendant	A one-to-one relationship between the business meeting attendant entity and the administrator entity.
attendant_meeting_id	A one-to-many relationship from the business meeting attendant entity to the business meeting entity, tying each employee attending a meeting to the meeting itself.
authorized_by	A one-to-one relationship between the employee and transaction entities, tying each transaction made to whoever authorized it.
initiated_by	A one-to-one relationship between the person and transaction entities, tying each transaction made to whoever initiated it.
transaction_branch	A one-to-many relationship, from the branch to the transaction entity, tying each transaction to the branch it occurred in.
authored_by	A one-to-many relationship from the author to the book entity, tying each book to its author. (For sake of simplicity, we prevented the case where more authors share writing a book).
reader_borrowed_book	A one-to-many relationship from the reader to the book entity, tying each reader to the borrowed books.
vendor_branch_id	A many-to-many relationship between the vendor and branch entities, tying each vendor to the branches they vend for.

request
ID
text
status
send_date
request_receiver
email_receiver
email
ID
subject
text
send_date
request_sender
email_sender
Person
ID
name
email
age
gender
password
Reader
reader_borrowed_book
return_date
ISA
book
ISBN
title
language
publication_date
status
price
number_of_requests
Author
Employee
Salary
hired_id
employee_branch
Administrator
Librarian
Owner
branch
ID
name
location
num_of_subscribers
num_of_staff
KPI
Finance Record
ID
value
day
finance_branch

Category
name
book_category
book
vendor_category
Published_by
Publishing house
ID
name
phone
address
Authored_by
Vendor
ID
name
phone
address
email
vendor_branch_id
Author
ID
name

person_event_attendant
Person
Administrator
event_attendant
special_guest
administ_biz_attendant
Initiated_by
attendant_event_id
business_meeting_attendant
attendant_meeting_id
event
ID
title
description
num_of_visitors
ticket_price
date
business_,meeting
ID
title
description
num_of_attendants
date
Transactions
ID
type
timestamp
value
authorized_by
event_branch_id
Employee
branch
transaction_branch_id