Group 8 - “The Librarians”

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Project Overview

The University of Utah Libraries are poised to use the assets it currently possesses to provide convenient services to faculty and students across the University, and can use these services to generate profits for the library. We will design a database management system to manage the assets and services owned by the University of Utah Libraries, and to provide the possibility of expansion for possible new services in the future. The main user of this database management system is UMember, which is a collection of university students, teachers, and researchers. The library also has its own staff, and these staff may be distributed under different departments. The most important assets in the University of Utah library include rooms, equipment, and books. In addition to the ISBN, author, loan price for each book and the type assigned by the library to the book. All library customers (students, teachers, researchers) can reserve books that are still in the library, and each reservation can include one or more books, and each reservation must be made by a library staff member to process the request. Because each book has a different loan frequency and rarity, each book may receive a different discount on the same pre-order. After each borrowing is completed, a receipt will be generated to the customer for payment.

The library's equipment assets can be divided into computers and printers. Computers store weight and configuration information, while printers record whether they are printed in color. Room assets can be divided into test centers and writing centers, and in some cases the two centers can be used in common. The Writing Center has opening and closing hours. During the opening period, students and teachers can make an appointment for writing instruction in the Writing Center. Each student can take the test at the test center, and the coursework and scores for the test are recorded.

User Requirements

1. Library users want to know how many students, professors and researchers are in the system to judge the popularity of the system. This requires querying the UMember, Student, Teacher and Researcher tables.

2. Library system users often borrow books, so they need to check the information of all unbooked books in the library or books that have been reserved but returned. This requires querying the book asset table, reservation table and reservation details table to track book reservations.

3. The library wants to count the number of reservations processed by each employee. The statistical results include employee department information, employee name (firstname+middlename+lastname) and the number of reservations processed. This requires querying the employee table, booking table and department table to get statistics.

4. The customer wants to know the size of the book library of different book types, and needs to count the number of books of each book type. The statistical result includes BookTypeID and TypeName and the number of books, which needs to query the BOOKTYPE and BOOK table.

5. Query the total cost of each user's book reservation, and judge whether the reservation cost needs to be reduced to meet the user's tolerance range according to the total cost of each user. This requires querying the UMember, RESERVATIONS, RECEIPTS tables.

6. As a measure of library size, the user wants to see the number of computer equipment and printer equipment assets in the University of Utah library. This requires querying the EQUIPMENT, Computer and Printer tables.

7. Students want to query their own exam information, which needs to be based on the specified StudentID to count the exam information, which needs to query the STUDENT_EXAM and Student tables.

8. The number of assets is the best indicator of the size of the library, and users want to know how many assets are in the system. This requires querying the Assets, ROOM, EQUIPMENT and BOOK tables.

9. Students who want to view the information of all writing centers to select the appropriate writing center to book an appointment for writing instruction need to consult the WRITTING_CENTER table to get the opening hours of each writing center.

10. The professor wants to view the information of all test centers to select the appropriate test center to schedule the test for the student, which needs to query the EXAM_CENTER table to get the capacity of each exam center.

11. Students and Professors want to view the information of their own writing instruction, which needs to query the information in the WRITTING_APPOINTMENT, WRITTING_CENTER, Student and Professors tables.

12. Because some books may be borrowed for too long and exceed the library's regulations, it is necessary to count the book information that has been reserved so far, and include the number of days borrowed so far, which requires querying BOOK, RESERVATION_DETAIL and RESERVATIONS tables.

13. The user wants to know whether the rarity of books reserved by different types of users is related, which can be evaluated by the average discount of books borrowed by different types of users, and needs to query the UMember, RESERVATIONS, RESERVATION_DETAIL, Student, Teacher and Researcher tables.

14. If the user wants to count the popularity of different book types, it can be judged by the number of borrowings without the book type, which needs to query the BOOKTYPE, BOOK and RESERVATION_DETAIL tables.

15. Count the number of exams of different EXAM_CENTERs. The statistical results include the capacity of the center and the number of exams, so as to determine whether the capacity and the number of exams are related, which requires querying the EXAM_CENTER and STUDENT_EXAM tables.

16. Count the writing times of different WRITTING_CENTERs. The statistical results include the OpenTime, CloseTime and writing times of the center, so as to judge whether the development time is related to the writing times. This requires querying the WRITTING_CENTER and WRITTING_APPOINTMENT tables.

17. The user wants to query the computer information of the library to obtain the configuration of the computer and judge whether the configuration meets the expectations, which provides a reference for the subsequent computer rental service, which requires querying the EQUIPMENT and Computer tables.

18. The user wants to query the printer information of the library to obtain the printing information, which provides a reference for the subsequent printing service, which needs to query the EQUIPMENT and Printer tables.

19. The researchers have a high reputation in the school. For them, whether to borrow books is a point of contention. Count the total bill of each researcher in the borrowed books to provide reference. This needs to query Researcher, UMember, RESERVATIONS and RECEIPTS table.

20. The user wants to know whether the average score of the student's exam is related to the number of appointments to the writing center. Count the average score of each student and the number of appointments to the writing center to prove this. The statistical results should include those who have both exam records and Students who make appointments in the Writing Center,

which requires querying the Student, STUDENT_EXAM and WRITTING_APPOINTMENT tables.

Business Rules

1. **UMembers** have one and only one **Account** (subtype of members is student, faculty, researcher)
2. The **University of Utah** has one and only one **Marriott Library**
3. The **Help Desk** assists one or many **UMembers**
4. A **Department** has one or many **Employees**
5. A **Book** can be checked out by one and only one **UMember** at a time.
6. There are many **Book Categories**, but a book could only fall under one **Category.**
7. A **Book** can have one or many **Genres.**
8. A **Book** can be **checked out** zero or many times.
9. A **Book** has one or many **Copies.**
10. A **Genre** must have one **Book** but could have many
11. Each **Copy** can have one or more **Book Reservations**
12. Each **Book** has one and only one **Publisher**
13. Each **Book** one and only one **Author**
14. A **UMember** can have zero or many **Book Reservations**
15. The **Marriott Library** has one or many **Digital Medias**
16. The **Marriott Library** has one or many **Books**
17. The **Marriott Library** has one or many **Rooms**
18. A **UMember** can have zero or many **Digital Media Reservations**
19. **UMember** borrow zero or many pieces of **Equipment**
20. **UMember** borrow one or many **Books**
21. Each **Room Reservation** Belongs to one and only one **Room**
22. Each **Book Reservation** Belongs to one and only one **Book**
23. Each **Digital Media Reservation** belongs to one and only one **Digital Media**
24. Each **Employee** checks out zero or many **Books**
25. **Instructors** hold one or many **Reservations**
26. Each **Employee** has one or many **Emails**
27. Each **Employee** has one or many **Phone Numbers**
28. Each **Student** has one or many **Emails**
29. Each **Student** has one or many **Phone Numbers**

Business Questions

(View)

1.When checking out a book at the desk employees need to validate other books which are Reserved (Reservation_Details table)Employees check to see which books have been returned and which are overdue(View)

2.There have been reports that several books have been checked out and not returned irresponsibly for most of the semester restricting others from having access to it. How can the library identify these individual books?

(Stored Procedure)

3. The Library would like to add a new user account. How would they do this using a stored procedure in the UMember entity?

(Stored Procedure)

4. The Marriott library has recently begun hiring. As a part of the onboarding process they needed to add a new employee to the employee table. How can this be accomplished through a stored procedure?

(Stored Procedure)

5.When the school wants to make an appointment for the writing center, it needs to check the opening hours of the writing center. The output result includes the RoomNumber, RoomName, Location of the writing center room and the OpenTime and CloseTime of the writing center.

Data Outputs (Queries included in Business_Question.sql file)

1. If UMember wants to reserve some books, it needs to check all the unreserved books in the library. The output result includes the book's AssetID, AssetTime, ISBN, Author, Price, TypeName, and the book's historical reservation count ReservationCount.

2. Students want to query their own book reservation records, and the output results include the book's AssetID, AssetTime, ISBN, Author, Price, TypeName, Discount , the scheduled StartDate, EndDate and the student's full name, DOB and the full name of the employee who processes the reservation. and the department to which the employee belongs.

3. The Researcher wants to query the book records that he is currently booking, and the output

result includes the book's AssetID, AssetTime, ISBN, Author, Price, TypeName, Discount, the scheduled StartDate and the Researcher's full name, email.

4. When the school wants to make an appointment for the writing center, it needs to check the opening hours of the writing center. The output result includes the RoomNumber, RoomName, Location of the writing center room and the OpenTime and CloseTime of the writing center.

5. The library needs to count the number of assets in the library, query all asset information in the system, and display the number of rooms, equipment, and books in the form of a list. The output results are: AssetType, AssetCount.

Business Questions Answered

1. To see which books have been checked out he library employee will check the database. The front end user interface will help the employee filter by Reservation status from the Reservation table. The Reservation details table can provide more information on who has checked out a book.
2. Same as in business Question 1 we utilize the Reservation table and view the student information specifically, the Reservation ID. We can cross reference this with the Reservation Details table to find out which student checked out the book and how many of books currently in the database have the same status.
3. To add a new user account, would be to add a new student, or Professor to the Member table and its subtypes. The UID resides in the parent table with the disjoint subtypes helping to differentiate between other entities that are a part of UMember.
4. In the hiring process, Marriott Library will utilize the database to add employees to the table. This is done through the Employees entity and creating a new stored procedure where the table is updated and is used to create a new UID conjoined with other entities such as department.
5. Due to a student's need to make an appointment for a writing center. Marriott library will utilize the opening and closing hours of the writing center in the table.

   This is done through the transaction which could locate the hours of the writing center.

Physical ERD