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Index: 188786

Project topic: 1. Authors, books and publishers. Publishers publish books written by authors.

Detailed Project Description:
Customer: The client is the municipal public library.
User: Authorized employees of the library.

Purpose of database: The purpose of the database is to keep information about the borrowing of copies of books as well as information about them: their authors, publishers, location in the library, bookings of the copies.

Possible scenarios of use:

- In case of loss of a book from a given place on shelf, library staff can check by whom it was last borrowed and whether it was returned, and if so, which employee is responsible for the reclaim.
- Interested person comes into the library and wants to get some book from author X. Librarian can check where this person can find the books and what are their titles.
- Person comes into the library and wants to borrow the book on someone's behalf. Librarian can check if this person is authorized by the borrower to do so (checks if this person is a proxy).
- Person comes into library to get the reserved book. Librarian can check if this person is the first one on the reservation list and should get a book or not.
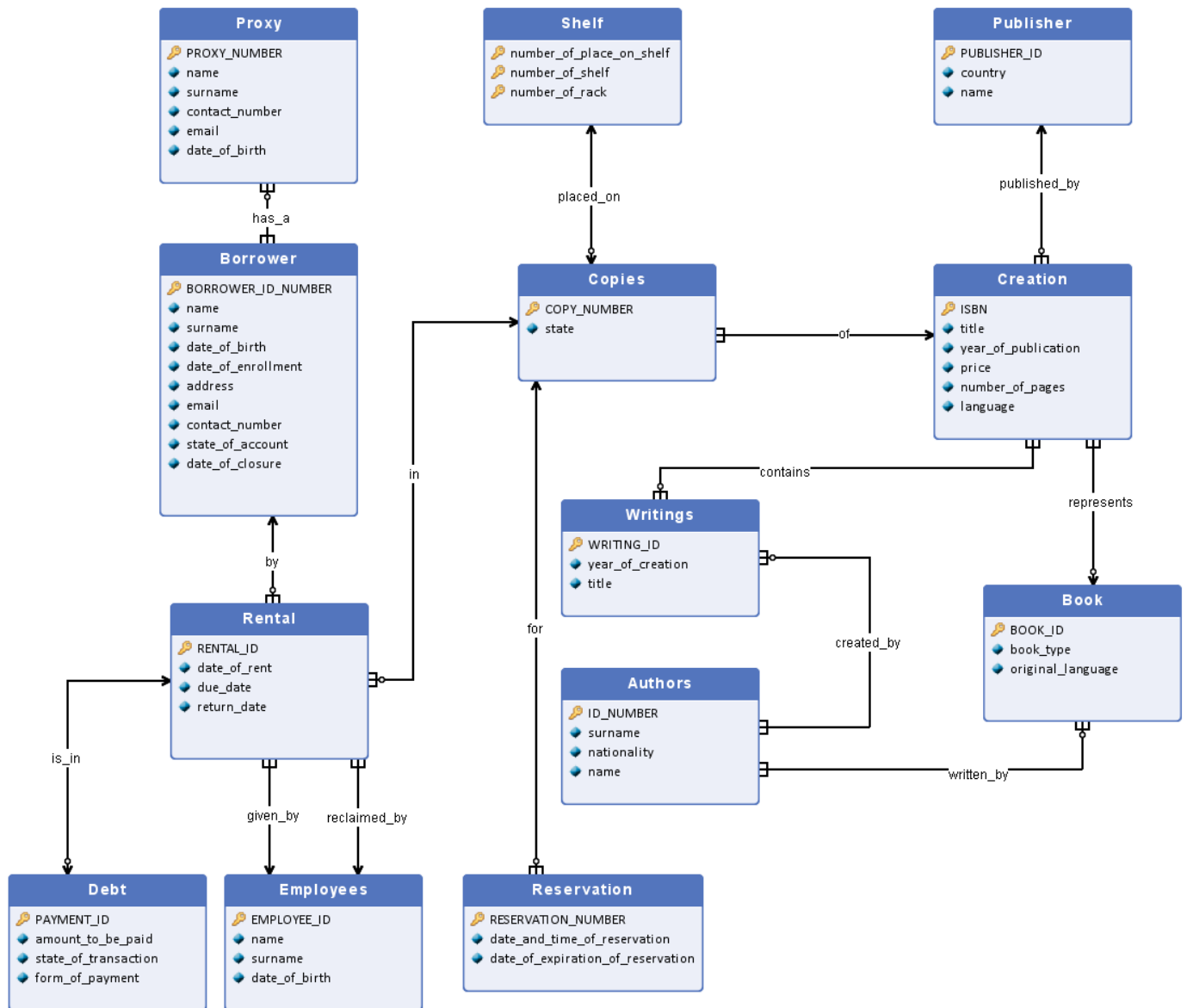
Assumptions and limitations:

The system will not directly act as an intermediary in the payment of fees. Changes may only be introduced by authorized facility employees. The system does not record transactions and the process of acquiring new items. Employees wishing to use the library will be treated as borrowers. Minors are treated as normal borrowers, however their parents / parent / legally responsible person are appointed as the minor's proxy. Creations have multiple copies and each borrowing is unique. One rental can have only one debt assigned to it.

Sample queries:

- Where the creation was published?
- What authors wrote given book/creation/writing?
- What are the creations of given author?
- What is the type of the book stored on given place on the shelf?
- Does the borrower have any debts?
- Which employee gave/reclaimed given copy of book on specific date?
- Is the person who wants to rent the proxy of a borrower on whose account the rental is going to be stored?
- How many copies of given creation there are?
- How many reservation are made on given copy?
- In which language given book was originally written and in which it was published?

ERD Diagram:

Proxy
- 🔑 PROXY_NUMBER
- 🔹 name
- 🔹 surname
- 🔹 contact_number
- 🔹 email
- 🔹 date_of_birth

has_a

Borrower
- 🔑 BORROWER_ID_NUMBER
- 🔹 name
- 🔹 surname
- 🔹 date_of_birth
- 🔹 date_of_enrollment
- 🔹 address
- 🔹 email
- 🔹 contact_number
- 🔹 state_of_account
- 🔹 date_of_closure

by

Shelf
- 🔑 number_of_place_on_shelf
- 🔑 number_of_shelf
- 🔑 number_of_rack

placed_on

Copies
- 🔑 COPY_NUMBER
- 🔹 state

of

in

for

Rental
- 🔑 RENTAL_ID
- 🔹 date_of_rent
- 🔹 due_date
- 🔹 return_date

is_in

given_by   reclaimed_by

Publisher
- 🔑 PUBLISHER_ID
- 🔹 country
- 🔹 name

published_by

Creation
- 🔑 ISBN
- 🔹 title
- 🔹 year_of_publication
- 🔹 price
- 🔹 number_of_pages
- 🔹 language

contains

represents

Writings
- 🔑 WRITING_ID
- 🔹 year_of_creation
- 🔹 title

created_by

Authors
- 🔑 ID_NUMBER
- 🔹 surname
- 🔹 nationality
- 🔹 name

written_by

Book
- 🔑 BOOK_ID
- 🔹 book_type
- 🔹 original_language

Debt
- 🔑 PAYMENT_ID
- 🔹 amount_to_be_paid
- 🔹 state_of_transaction
- 🔹 form_of_payment

Employees
- 🔑 EMPLOYEE_ID
- 🔹 name
- 🔹 surname
- 🔹 date_of_birth

Reservation
- 🔑 RESERVATION_NUMBER
- 🔹 date_and_time_of_reservation
- 🔹 date_of_expiration_of_reservation

Entities description:

<table>
<tr><td colspan="4">Entity name: Authors (about 300 entries)
Description: Entity containing personal information about authors of books stored in the library. New authors are added if the library purchases a book with an author whose works the library does not have. Authors are deleted when the library no longer owns any of their works.</td></tr>
</table>

Attribute name	Primary Key	Domain	Description
ID_NUMBER	YES	natural number	Author identification number
surname	NO	a set of up to 20 characters, consisting of Latin letters, with the admission of Polish characters and with the use of up to two characters (-).	Author's last name
nationality	NO	a set of up to 60 characters, consisting of Latin letters, with the admission of Polish characters.	The author's country of origin
name	NO	a set of up to 20 characters, consisting of Latin letters, with the admission of Polish characters.	Author's first name

<table>
<tr><td colspan="4">Entity name: Creation (about 3000 entries)
Description: An entity containing information about the work owned by the library, its price, and date and language of the publication. A new creation is added after it is acquired by the library, if it did not exist in the database before. It is removed from it when there are no copies of the work in the library (this is not the case when all copies have been borrowed).</td></tr>
</table>

Attribute name	Primary key	Domain	Description
ISBN	YES	a unique combination of 13 digits that are placed in five groups separated by a sign (-)	ISBN number assigned to the creation
title	NO	a text consisting of letters of the Latin alphabet with the admission of Polish characters as well as numbers, spaces and punctuation marks, up to a maximum of 100 characters.	Title of the creation
year_of_publication	NO	4 digit natural number (range from 1900 to current year number)	Year the creation was published
price	NO	rational number with a finite decimal expansion to two decimal places after the coma	The price of the work
number_of_pages	NO	natural number from range 0 to 3000	The number of pages of the work
language	NO	a text composed of Latin letters with the admission of Polish characters, up to a maximum of 60 characters	The language in which the work was published

<table>
<tr><td>Entity name: Publisher (about 50 entries)
Description: Entity containing information about publishers of books from the library and their country of release. A new publisher is added if the library acquires the book from this publisher and if it did not already exist in the database at the same time. The publisher may be removed if the library does not have a single copy of the book from a given publisher (it is not a case when all such copies are borrowed).</td></tr>
</table>

Attribute name	Primary Key	Domain	Description
PUBLISHER_ID	YES	natural number	Publisher number
country	NO	a set of up to 60 characters, consisting of Latin letters, with the admission of Polish characters.	Country from which the publisher is
name	NO	a set of up to 30 characters, consisting of Latin letters, with the admission of Polish characters.	Publisher name

Entity name: Borrower *(about 4000 entries)*			
Description: Entity containing information about people who have (or had in the past) a library account. It contains their personal details and contact information, as well as the date of opening and optionally of closing the account. A new borrower is added, if a new person registers in the library.			
Attribute name	Primary Key	Domain	Description
BORROWER_ID_NUMBER	YES	natural number	Borrower identification number
name	NO	a set of up to 20 characters, consisting of Latin letters, with the admission of Polish characters.	The borrower's first name
surname	NO	a set of up to 20 characters, consisting of Latin letters, with the admission of Polish characters and with the use of up to two characters (-).	The borrower's last name
date_of_birth	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to 130 years ago. Days, months and years are separated by a period. The date cannot represent a future date.	Day, month and year of birth of the borrower
date_of_enrollment	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to the year of the library opening. Days, months and years are separated by a period. The date cannot be before the library opening date or cannot represent a future date.	Day, month and year of enrollment of the borrower to the system
address	NO	text consisting of up to 100 characters, including numbers and Latin characters (including Polish characters) and separators (dot, dash). The text consists of six parts (street, number of local, number of apartment, city, country, postal code) separated by a comma.	Place of residence of the borrower

email	NO	a text consisting of a maximum of 40 characters, Latin letters are allowed, including Polish characters, punctuation marks (dot, underscore, internet monkey) and numbers.	Email of the borrower
contact_number	NO	a unique 9-digit number	The borrower's telephone number
state_of_account	NO	text (open, closed)	Account status (open, closed)
date_of_closure	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to the year of the library opening. Days, months and years are separated by a period. The date cannot be before the library opening date or cannot represent a future date.	Account closing day, month and year

Entity name: Employees *(about 20 entries)*			
Description: An entity that contains personal information about current and past library employees. A new employee is added when he/she is hired.			
Attribute name	**Primary Key**	**Domain**	**Description**
EMPLOYEE_ID	YES	natural number	Number assigned to an employee
name	NO	a set of up to 20 characters, consisting of Latin letters, with the admission of Polish characters.	Employee's first name
surname	NO	a set of up to 20 characters, consisting of Latin letters, with the admission of Polish characters and with the use of up to two characters (-).	Employee's last name
date_of_birth	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to 130 years ago. Days, months and years are separated by a period. The date cannot represent a future date.	Employee's day, month and year of birth

Entity name: Rental *(about 2000 entries)*			
Description: An entity containing information about the borrowed book and the dates on which it was borrowed, on which it should be returned and the date when it was actually returned. The new one is registered with the new rental.			
Attribute name	**Primary Key**	**Domain**	**Description**
RENTAL_ID	YES	natural number	Book borrowing identification number

date_of_rent	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to the year of the library opening. Days, months and years are separated by a period. The date cannot be before the library opening date or cannot represent a future date.	Day, month and year in which the book was borrowed
due_date	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to the year of the library opening. Days, months and years are separated by a period. The date must represent a future date, but no later than 30 days from current date.	Day, month and year to which the book is given
return_date	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to the year of the library opening. Days, months and years are separated by a period. The date cannot be before the date of rental or cannot represent a future date.	Day, month and year in which the book was returned

Entity name: Shelf (about 12000 entries)			
Description: An entity that contains information about the current exact location of a copy of a book in the library.			
Attribute name	**Primary Key**	**Domain**	**Description**
number_of_place_on_shelf	YES	natural number in range from 1 to 30	Shelf space assigned number
number_of_shelf	YES	natural number in range from 1 to 10	Shelf number assigned
number_of_rack	YES	natural number in range from 1 to 40	Rack number assigned

Entity name: Copies (about 12000 entries)			
Description: Entity containing information about the current status of a given copy of the book. A new copy is added if the library purchases several pieces of one work (for each piece entry is made separately).			
Attribute name	**Primary Key**	**Domain**	**Description**
COPY_NUMBER	YES	natural number	Number of the copy of the book in the library
state	NO	text (borrowed, reserved, in stock)	Book status

		Entity name: Proxy *(about 400 entries)*	
Description: An entity containing information about account representatives who are currently authorized to borrow and return works for the person authorizing them (e.g. parents of children). Includes representative contact and personal information. Proxies can be added and removed at the request of the borrower if they are of legal age, else the legally responsible person for the borrower has the right to do so.			
Attribute name	**Primary Key**	**Domain**	**Description**
PROXY_NUMBER	YES	natural number	Number assigned to the proxy
name	NO	a set of up to 20 characters, consisting of Latin letters, with the admission of Polish characters.	Name of the proxy
surname	NO	a set of up to 20 characters, consisting of Latin letters, with the admission of Polish characters and with the use of up to two characters (-).	Surname of the proxy
contact_number	NO	a unique 9-digit number	The proxy's telephone number
email	NO	a text consisting of a maximum of 40 characters, Latin letters are allowed, including Polish characters, punctuation marks (dot, underscore, internet monkey) and numbers.	Email of the proxy
date_of_birth	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to 130 years ago. Days, months and years are separated by a period. The date cannot represent a future date.	Day, month and year of birth of the proxy

		Entity name: Reservation *(about 200 entries)*	
Description: Entity containing information about the reservation of a copy of the book, including the reservation date and the reservation expiration date. A new entry is added when submitting the booking.			
Attribute name	**Primary Key**	**Domain**	**Description**
RESERVATION_NUMBER	YES	natural number	Number of the reservation
date_and_time_of_reservation	NO	date-time in the format HH:MM/DD.MM.YYYY, where the first four digits represent the time and next eight the date (they are separated by slash). The first two number of time are in range from 1 to 23 and represent the hour, the next two represent the minutes and are in range from 1 to 59. Hour and minutes are separated by colon. In date, the first two numbers represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current	Hour, minute, day, month and year of reservation

		year to the year of the library opening. Days, months and years are separated by a period. The date cannot be before the library opening date or cannot represent a future date.	
date_of_expiration_of_reservation	NO	date in the format DD.MM.YYYY, where the first two digits represent the day and range from 1 to 31, the next two digits represent the month and range from 1 to 12, and the next four digits represent the year and range from the current year to the year of the library opening. Days, months and years are separated by a period. The date must represent a future date, but no later than 7 days from current date.	Day, month and year of reservation

Entity name: Book *(about 2000 entries)*			
Description: An entity containing information about the book from the library's collection, the language in which it was written, and its genre. A new entry is added if the library has purchased a new title that was not in the database.			
Attribute name	**Primary Key**	**Domain**	**Description**
BOOK_ID	YES	natural number	Number assigned to a book
book_type	NO	a text composed of Latin letters with the admission of Polish characters, up to 15 characters, with the possibility of using spaces and a hyphen (-)	Type of the book
original_language	NO	a text composed of Latin letters with the admission of Polish characters, up to a maximum of 60 characters with possibility of using spaces	The language in which the book was written

Entity name: Writings *(about 400 entries)*			
Description: An entity containing information about the writing from library's collection, the year it was created, and the title. A new entry is added if the library has purchased a new title that was not in the database.			
Attribute name	**Primary Key**	**Domain**	**Description**
WRITING_ID	YES	natural number	Number of the writing in the system
year_of_creation	NO	4 digit natural number (range from 1400 to current year number)	The year the work was created
title	NO	a text consisting of letters of the Latin alphabet with the admission of Polish characters as well as numbers, spaces and punctuation marks, up to a maximum of 100 characters.	Title of the writing

Entity name: Debt *(about 250 entries)*			
Description: An entity containing information about the debt of a given book borrowing. New entry is added if given book borrowing is late. It contains information about the transaction number, its status, amount and payment type.			
Attribute name	**Primary Key**	**Domain**	**Description**
PAYMENT_ID	YES	natural number	Number of the transaction
amount_to_be_paid	NO	a rational number with up to two digits after the decimal point and up to three figures before the decimal point	The amount of money to be paid
state_of_transaction	NO	text (paid, unpaid)	Transaction status
form_of_payment	NO	text (card, cash)	Form of execution of the transaction

Relationships descriptions:

		Relationship name: published_by	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Creation	Publisher	0..n : 1	Creation published by Publisher; One creation can be published by one publisher. One publisher can (but does not have to) publish many creations.

		Relationship name: created_by	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Writings	Authors	0..n : 1..n	Writings created by Authors; One writing can be written by more than one author and an author can write many writings but does not have to write any.

		Relationship name: by	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Borrower	Rental	1: 0..n	Rental by Borrower; One rental can be made by one borrower. One borrower can make many or no rentals.

		Relationship name: reclaimed_by	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Rental	Employees	1..n : 1	Rental reclaimed by Employees; One rental is reclaimed by one employee. One employee reclaims many rentals.

		Relationship name: placed_on	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Shelf	Copies	1 : 0..1	Copies placed on Shelf; On one place on the shelf there can be placed one copy or none. Copy has one place on shelf assigned to it.

		Relationship name: in	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Rental	Copies	0..n : 1	Copies in rental; One rental is of one copy of the book. One copy can be in many or no rentals.

		Relationship name: of	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Copies	Creation	1..n : 1	Copies of Creation; One copy is of one creation. One creation can have many copies.

		Relationship name: has_a	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Proxy	Borrower	0..n : 1..n	Borrower has a Proxy; One borrower can have many or no proxies. One proxy can be assigned to many borrowers.

		Relationship name: given_by	
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Rental	Employees	1..n : 1	Rental given by Employees; One rental is given by one employee. One employee gives many rentals.

Relationship name: for			
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Copies	Reservation	1 : 0..n	Copies for reservation; One reservation can be made for one copy of the book. One copy can have many or no reservations made.

Relationship name: represents			
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Creation	Book	1..n : 0..1	Creation represents Book; Creation can (but does not have to) represent a book. One book has many creations.

Relationship name: written_by			
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Book	Authors	0..n : 1..n	Books written by Authors; One Book can be written by more than one author and an author can write many books but does not have to write any.

Relationship name: contains			
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Writings	Creation	0..n : 1..n	Creation contains Writings; One Creation can contain more than one writing or does not have to contain any. One writing can be in more than one creation.

Relationship name: is_in			
Entity 1	**Entity 2**	**Type of relationship**	**Description**
Debt	Rental	0..1 : 1	Rental is in Debt; One rental can be in debt, but does not have to. One debt can be assigned to one rental.

RDB Schema

Publisher(PUBLISHER_ID, country, name)
      (PUBLISHER_ID) KEY

Creation(ISBN, title, year_of_publication, price, number_of_pages, language, PUBLISHER_ID, BOOK_ID)
      (ISBN) KEY
      (PUBLISHER_ID) REF Publisher
      (BOOK_ID) REF Book

Book(BOOK_ID, book_type, original_language)
      (BOOK_ID) KEY

Authors(ID_NUMBER, surname, nationality, name)
      (ID_NUMBER) KEY

Written(Author, Book)
      (Author, Book) KEY
      (Author) REF Authors
      (Book) REF Books

Writings(WRITING_ID, year_of_creation, title)
      (WRITING_ID) KEY

Containing(Writing, Creations)
      (Writing, Creations) KEY
      (Writing) REF Writings
      (Creations) REF Creation

Created(Author, Writing)
      (Author, Writing) KEY
      (Author) REF Authors
      (Writing) REF Writings

Copies(COPY_NUMBER, state, ISBN, number_of_place_on_shelf, number_of_shelf, number_of_rack)
      (COPY_NUMBER) KEY
      (ISBN) REF Creation
      (number_of_place_on_shelf, number_of_shelf, number_of_rack) REF Shelf

Shelf(number_of_place_on_shelf, number_of_shelf, number_of_rack)
      (number_of_place_on_shelf, number_of_shelf, number_of_rack) KEY

Reservation(RESERVATION_NUMBER, date_and_time_of_reservation, date_of_expiration_of_reservation, COPY_NUMBER)
      (RESERVATION_NUMBER) KEY
      (COPY_NUMBER) REF Copies

Debt(PAYMENT_ID, amount_to_be_paid, state_of_transaction, form_of_payment, RENTAL_ID)
      (PAYMENT_ID) KEY

(RENTAL_ID) REF Rental

Rental(RENTAL_ID, date_of_rent, due_date, return_date, COPY_NUMBER, given_by_EMPLOYEE_ID , reclaimed_by_EMPLOYEE_ID , BORROWER_ID_NUMBER)
    (RENTAL_ID) KEY
    (COPY_NUMBER) REF Copies
    (given_by_EMPLOYEE_ID) REF Employees
    (reclaimed_by_EMPLOYEE_ID) REF Employees
    (BORROWER_ID_NUMBER) REF Borrower

Employees(EMPLOYEE_ID, name, surname, date_of_birth)
    (EMPLOYEE_ID) KEY

Borrower(BORROWER_ID, name, surname, date_of_birth, date_of_enrollment, address, email, contact_number, state_of_account, date_of_closure)
    (BORROWER_ID) KEY

Proxy(PROXY_NUMBER, name, surname, contact_number, email, date_of_birth)
    (PROXY_NUMBER) KEY

Proxy-Borrower(Proxies, Borrowers)
    (Proxies, Borrowers) KEY
    (Proxies) REF Proxy
    (Borrowers) REF Borrower