**Phase 3 – Design: Library Management System**

**Class Diagram**

**Diagram

Description automatically generated**

<<boundary class>>

**User Interface Class**

* <<static>> pressEnter() : void
* <<static>> clearScreen() : void
* <<static>> displayMainMenu() : void
* <<static>> displayStaffMenu() : void
* <<static>> displayMemberMenu() : void
* <<static>> displayAdminMenu() : void
* <<static>> displayReportMenu () : void
* <<static>> displayBookMenu() : void
* <<static>> getChar() : char
* <<static>> getString() : string
* <<static>> getInt() : int

void **pressEnter**() {

Display “Press Enter to continue”;

Await User Input;

}

void **clearScreen**() {

Display “Clear Screen” over a popup;

Await User Input

}

void **displayMainMenu**() {

Display “Main Menu” over a popup;

Await User Input;

}

void **displayStaffMenu**() {

Display “User Menu” over a popup;

Await User Input;

}

void **displayMemberMenu**() {

Display “User Menu” over a popup;

Await User Input;

}

void **displayAdminMenu**() {

Display “User Menu” over a popup;

Await User Input;

}

void **displayReportMenu**() {

Display “Report Menu” over a popup;

Await User Input;

}

void **displayBookMenu**() {

Display “Book Menu” over a popup;

Await User Input;

}

char **getChar**() {

Await user input for storing char data

return char;

}

string **getString**() {

Await user input for storing string data

return string;

}

int **getInt**() {

Await user input for storing int data

return int;

}

<<control class>>

**Search Book Class**

* getBookTitle () : string
* getBookISBN () : string
* displayBook () : void

string **getBookTitle** () {

return SearchBookClass.Title;

}

string **getBookISBN** () {

return searchBookClass.ISBN;

}

void **displayBook** () {

for (all books) {

If (available) {

display << searchBookClass.Title << “ is available. “;

}

else {

display << searchBookClass.Title << “ is not available. “;

}

}

}

<<control class>>

**Manage Book Class**

* insertBook(BookDetails) : void
* deleteBook(BookDetails) : void
* editBook(BookDetails) : void

void **insertBook**(BookDetails) {

insert newBook(BookDetails);

}

void **deleteBook** (BookDetails) {

for (all books) {

if (Book matches BookDetails) {

remove(book);

return;

}

}

}

void **editBook** (BookDetails) {

for (all books) {

if (Book matches BookDetails) {

write(BookDetails);

return;

}

}

}

e

<<control class>>

**Manage Order Class**

* searchOrder() : void
* createOrder(OrderDetails) : void
* recieveReturningBook(OrderDetails) : void
* editOrder(OrderDetails) : void

Void **searchOrder**(option) {

If option 1{ searchOrderByISBN)();}

If option 2 {searchOrderByMemberId();}

}

void **createOrder**(OrderDetails) {

add newOrder(OrderDetails);

}

void **recieveReturningBook** (OrderDetails) {

for (all orders) {

if (Order matches OrderDetails) {

update(order);

}

}

}

void **editOrder** (OrderDetails) {

for (all orders) {

if (Order matches OrderDetails) {

write(OrderDetails);

}

}

}

e

<<control class>>

**Manage Staff Class**

* addStaff(StaffDetails) : void
* removeStaff(StaffDetails) : void
* editStaff (StaffDetails) : void

void **addStaff**(StaffDetails) {

add newStaff(StaffDetails);

}

void **removeStaff** (StaffDetails) {

for (all staffs) {

if (Staff matches StaffDetails) {

remove(staff);

return;

}

}

}

void **editStaff** (StaffDetails) {

for (all Staffs) {

if (Staff matches StaffDetails) {

write(StaffDetails);

return;

}

}

}

<<control class>>

**Manage Admin Class**

* addAdmin (AdminDetails) : void
* removeAdmin (AdminDetails) : void
* editAdmin (AdminDetails) : void

void **addAdmin** (AdminDetails) {

add newAdmin(AdminDetails);

}

void **removeAdmin** (AdminDetails) {

for (all admins) {

if (Admin matches AdminDetails) {

remove(admin);

return;

}

}

}

void **editAdmin** (AdminDetails) {

for (all admins) {

if (Admin matches AdminDetails) {

write(AdminDetails);

return;

}

}

}

<<control class>>

**Manage Member Class**

* searchMember (MemberDetails) : void
* addMember (MemberDetails) : void
* removeMember (MemberDetails) : void
* editMember (MemberDetails) : void

Void **searchMember** (option) {

if option 1{searchMemberByEmail(); }

if option 2 {search MemberByName(); }

}

void **addMember** (MemberDetails) {

add newMember(MemberDetails);

}

void **removeMember** (MemberDetails) {

for (all members) {

if (Member matches MemberDetails) {

remove(member);

return;

}

}

}

void **editMember** (MemberDetails) {

for (all members) {

if (Member matches MemberDetails) {

write(MemberDetails);

return;

}

}

}

<<entity class>>

**Book Class**

* title : string
* author : string
* ISBN : string
* publisher : string
* availability : String
* shelf : char
* getTitle () : string
* setTitle (n : string) : void
* getAuthor () : string
* setAuthor (n : string) : void
* getISBN () : string
* setISBN (n : string) : void
* getPublisher () : string
* setPublisher (n : string) : void
* getAvailability (): string
* setAvailability (n : string) : void
* getShelf () : char
* setShelf (n : char) : void
* find (findBookID : string) : boolean
* read (fileName : RandomAccessFile) : void
* write (filename : RandomAccessFile) : void
* deleteFile () : void
* printFile () : void
* <<static>> printAll () : void
* updateTitle (): void
* updateAuthor (): void
* updateISBN (): void
* updatepublisher (): void
* updateAvailability (): void
* updateShelf () : void

String **getTitle** () constant {

Return BookClass.title;

}

Void **setTitle** (user\_input) {

BookClass.title = user\_input;

}

String **getAuthor** () constant {

Return BookClass.author;

}

Void **setAuthor** (user\_input) {

BookClass.author = user\_input;

}

String **getIsbn** () constant {

Return BookClass.isbn;

}

Void **setISBN** (user\_input) {

BookClass.ISBN = user\_input;

}

String **getPublisher** () constant {

Return BookClass.publisher;

}

Void **setPublisher** (user\_input) {

BookClass.publisher = user\_input;

}

string **getAvailability** () constant {

Return BookClass.availibility;

}

Void **setAvailability** (user\_input) {

BookClass.availibility = user\_input;

}

char **getShelf** () constant {

Return BookClass.shelf;

}

Void **setShelf** (user\_input) {

BookClass.shelf = user\_input;

}

void **read** ( file\_name ) {

Open file\_name;

content = read next file line;

BookClass.title

content = read next file line;

BookClass.author

content = read next file line;

BookClass.isbn

content = read next file line;

BookClass.publisher

content = read next file line;

BookClass.availibility

content = read next file line;

BookClass.shelf

Close file;

}

void **write** ( file\_name ) {

Create file named file\_name;

Write << BookClass.title << “\n”;

Write << BookClass.author << “\n”;

Write << BookClass.isbn << “\n”;

Write << BookClass.publisher << “\n”;

Write << BookClass.availibilty << “\n”;

Write << BookClass.shelf << “\n”;

Close file;

}

void **deleteFile** (file\_name) {

Include system library;

Delete file named file\_name;

}

void **printFile** (file\_name) {

contents.Open(file\_name);

while(not end of file) {

Display << contents << “ ”;

}

Close file;

}

void static **printAll** () {

Display << “Book Information: ” << “\n”;

Display << BookClass.title << “\n”;

Display << BookClass.author << “\n”;

Display << BookClass.isbn << “\n”;

Display << BookClass.publisher << “\n”;

Display << BookClass.availability << “\n”;

Display << BookClass.shelf << “\n”;

}

void **updateTitle** () {

Display << getTitle ();

Get >> user\_input;

setTitle (user\_input);

}

void **updateAuthor** () {

Display << getAuthor ();

Get >> user\_input;

setAuthor (user\_input);

}

void **updateIsbn** () {

Display << getIsbn ();

Get >> user\_input;

setIsbn (user\_input);

}

void **updatePublisher** () {

Display << getPublisher ();

Get >> user\_input;

setPublisher (user\_input);

}

void **updateAvailability** () {

Display << getAvailability ();

Get >> user\_input;

setAvailability (user\_input);

}

void **updateShelf** () {

Display << getShelf ();

Get >> user\_input;

setShelf (user\_input);

}

<<entity class>>

**Order Class**

* orderID : string
* staffID : string
* memberID : string
* ISBN : string
* rentDate : String
* dueDate : String
* returnDate : String
* status : string
* getOrderID (): string
* setOrderID (n : string) : void
* getStaffID () : string
* setStaffID (n : string) : void
* getMemberID () : string
* setMemberID (n : string) : void
* getISBN () : string
* setISBN (n: string) : void
* getRentDate () : String
* setRentDate (n : String) : void
* getDueDate () : String
* setDueDate (n : String) : void
* getReturnDate () : String
* setReturnDate (n : String) : void
* get status (n : string) : void
* set status (n : string) : void
* find (findOrderID : string) : boolean
* read (fileName : RandomAccessFile) : void
* write (filename : RandomAccessFile) : void
* deleteFile () : void
* printFile () : void
* <<static>> printAll () : void
* updateOrderID () : void
* updateStaffID () : void
* updateMemberID () : void
* updateBookID () : void
* updateRentDate () : void
* updateDueDate () : void
* updateReturnDate () : void
* updateStatus () : void

String **getOrderID** () constant {

Return OrderClass.oderID;

}

Void **setOrderID** (user\_input) {

OrderClass.orderID = user\_input;

}

String **getStaffID** () constant {

Return OrderClass.staffID;

}

Void **setStaffID** (user\_input) {

OrderClass.staffID = user\_input;

}

String **getMemberID** () constant {

Return OrderClass.memberID;

}

Void **setMemberID** (user\_input) {

OrderClass.memberID = user\_input;

}

String **ISBN** () constant {

Return OrderClass.ISBN;

}

Void **ISBN** (user\_input) {

OrderClass.ISBN = user\_input;

}

String **getRentDate** () constant {

Return OrderClass.rentDate;

}

Void **setRentDate** (user\_input) {

OrderClass.rentDate = user\_input;

}

String **getDueDate** () constant {

Return OrderClass.dueDate;

}

Void **setDueDate** (user\_input) {

OrderClass.dueDate = user\_input;

}

String **getReturnDate** () constant {

Return OrderClass.returnDate;

}

Void **setReturnDate** (user\_input) {

OrderClass.returnDate = user\_input;

}

String **getStatus** () constant {

Return OrderClass.status;

}

Void **setStatus** (user\_input) {

OrderClass.status = user\_input;

}

void **read** ( file\_name ) {

Open file\_name;

content = read file line;

OrderClass.orderID = content;

content = read next file line;

OrderClass.staffID

content = read next file line;

OrderClass.memberID

content = read next file line;

OrderClass.ISBN

content = read next file line;

OrderClass.rentDate

content = read next file line;

OrderClass.dueDate

content = read next file line;

OrderClass.returnDate

Content = read next file line;

OderClass.status

Close file;

}

void **write** ( file\_name ) {

Create file named file\_name;

Write << OrderClass.orderID << “\n”;

Write << OrderClass.staffID << “\n”;

Write << OrderClass.memberID << “\n”;

Write << OrderClass.ISBN << “\n”;

Write << OrderClass.rentDate << “\n”;

Write << OrderClass.dueDate << “\n”;

Write << OrderClass.returnDate << “\n”;

Write << OrderClass.status << “\n”;

Close file;

}

void **deleteFile** (file\_name) {

Include system library;

Delete file named file\_name;

}

void **printFile** (file\_name) {

contents.Open(file\_name);

while(not end of file) {

Display << contents << “ ”;

}

Close file;

}

void static **printAll** () {

Display << OrderClass.orderID << “\n”;

Display << OrderClass.staffID << “\n”;

Display << OrderClass.memberID << “\n”;

Display << OrderClass.ISBN << “\n”;

Display << OrderClass.rentDate << “\n”;

Display << OrderClass.dueDate << “\n”;

Display << OrderClass.returnDate << “\n”;

Display << OrderClass.status << “\n”;

}

void **updateOrderID** () {

Display << getOrderID ();

Get >> user\_input;

setOrderID (user\_input);

}

void **updateStaffID** () {

Display << getStaffID ();

Get >> user\_input;

setStaffID (user\_input);

}

void **updateMemberID** () {

Display << getMemberID ();

Get >> user\_input;

setMemberID (user\_input);

}

void **updateISBN** () {

Display << getISBN ();

Get >> user\_input;

setISBN (user\_input);

}

void **updateRentDate** () {

Display << getRentDate ();

Get >> user\_input;

setRentDate (user\_input);

}

void **updateDueDate** () {

Display << getDueDate ();

Get >> user\_input;

setDueDate (user\_input);

}

void **updateReturnDate** () {

Display << getReturnDate ();

Get >> user\_input;

setReturnDate (user\_input);

}

Void **upadteStatus** () {

Display << getStatus ();

Get >> user\_input;

setStatus (user\_input);

}

<<entity class>>

**Member Class**

* memberID : int
* fName : string
* lName : string
* email : string
* password : string
* status : string
* getMemberID () : int
* setMemberID (n : int) : void
* getFName () : string
* setFName (n : string) : void
* getLName () : string
* setLName (n : string) : void
* getEmail () : string
* setEmail (n : string) : void
* getPassword () : string
* setPasswoed (n : string) : void
* getStatus (n : string) : void
* setStatus (n : string) : void
* find (findMemberID : int) : boolean
* read (fileName : RandomAccessFile) : void
* write (filename : RandomAccessFile) : void
* deleteFile () : void
* printFile () : void
* <<static>> printAll () : void
* updateMemberID () : void
* updateFName () : void
* updateLName () : void
* updateEmail () : void
* updatePassword () : void
* updateStatus () : void

String **getMemberID** () constant {

Return MemberClass.memberID;

}

Void **setMemberID** (user\_input) {

MemberClass.memberID = user\_input;

}

String **getFName** () constant {

Return MemberClass.fName;

}

Void **setFName** (user\_input) {

MemberClass.fName = user\_input;

}

String **getLName** () constant {

Return MemberClass.lName;

}

Void **setLName** (user\_input) {

MemberClass.lName = user\_input;

}

String **getEmail** () constant {

Return MemberClass.email;

}

Void **setEmail** (user\_input) {

MemberClass.email = user\_input;

}

String **getPassword** () constant {

Return MemberClass.password;

}

Void **setPassword** (user\_input) {

MemberClass.password = user\_input;

}

String **getStatus** () constant {

Return MemberClass.status;

}

Void **setStatus** (user\_input) {

MemberClass.status = user\_input;

}

void **read** ( file\_name ) {

Open file\_name;

content = read file line;

MemberClass.memberID = content;

content = read next file line;

MemberClass.fName

content = read next file line;

MemberClass.lName

content = read next file line;

MemberClass.email

content = read next file line;

MemberClass.password

Content = read next file line;

MemberClass.status

Close file;

}

void **write** ( file\_name ) {

Create file named file\_name;

Write << MemberClass.memberID << “\n”;

Write << MemberClass.fName << “\n”;

Write << MemberClass.lName << “\n”;

Write << MemberClass.email << “\n”;

Write << MemberClass.password << “\n”;

Write << MemberClass.status << “\n”;

Close file;

}

void **deleteFile** (file\_name) {

Include system library;

Delete file named file\_name;

}

void **printFile** (file\_name) {

contents.Open(file\_name);

while(not end of file) {

Display << contents << “ ”;

}

Close file;

}

void static **printAll** () {

Display << MemberClass.memberID << “\n”;

Display << MemberClass.fName << “\n”;

Display << MemberClass.lName << “\n”;

Display << MemberClass.email << “\n”;

Display << MemberClass.password << “\n”;

Display << MemberClass.status << “\n”;

}

void **updateMemberID** () {

Display << getMemberID ();

Get >> user\_input;

setMemberID (user\_input);

}

void **updateFName** () {

Display << getFName ();

Get >> user\_input;

setFName (user\_input);

}

void **updateLName** () {

Display << getLName ();

Get >> user\_input;

setLName (user\_input);

}

void **updateEmail** () {

Display << getEmail ();

Get >> user\_input;

setEmail (user\_input);

}

void **updatePassword** () {

Display << getPassword ();

Get >> user\_input;

setPassword (user\_input);

}

void **updateStatus** () {

Display << getStatus ();

Get >> user\_input;

setStatus (user\_input);

}

<<entity class>>

**Staff Class**

* staffID : int
* fName : string
* lName : string
* emai : string
* password : string
* status : string
* getStaffID () : int
* setStaffID (n : int) : void
* getFName () : string
* setFName (n : string) : void
* getLName () : string
* setLName (n : string) : void
* getEmail () : string
* setEmail (n : string) : void
* getPassword () : string
* setPasswoed (n : string) : void
* getStatus () : string
* setStatus (n : string) : void
* find (findStaffID : int) : boolean
* read (fileName : RandomAccessFile) : void
* write (filename : RandomAccessFile) : void
* deleteFile () : void
* printFile () : void
* <<static>> printAll () : void
* updateStaffID () : void
* updateFName () : void
* updateLName () : void
* updateEmail () : void
* updatePassword () : void
* updateStatus () : void

String **getStaffID** () constant {

Return StaffClass.StaffID;

}

Void **setStaffID** (user\_input) {

StaffClass.StaffID = user\_input;

}

String **getFName** () constant {

Return StaffClass.fName;

}

Void **setFName** (user\_input) {

StaffClass.fName = user\_input;

}

String **getLName** () constant {

Return StaffClass.lName;

}

Void **setLName** (user\_input) {

StaffClass.lName = user\_input;

}

String **getEmail** () constant {

Return StaffClass.email;

}

Void **setEmail** (user\_input) {

StaffClass.email = user\_input;

}

String **getPassword** () constant {

Return StaffClass.password;

}

Void **setPassword** (user\_input) {

StaffClass.password = user\_input;

}

String **getStatus** () constant {

Return StaffClass.status;

}

Void **setStatus** (user\_input) {

StaffClass.status = user\_input;

}

void **read** ( file\_name ) {

Open file\_name;

content = read file line;

StaffClass.staffID = content;

content = read next file line;

StaffClass.fName

content = read next file line;

StaffClass.lName

content = read next file line;

StaffClass.email

content = read next file line;

StaffClass.password

content = read next file line;

StaffClass.status

Close file;

}

void **write** ( file\_name ) {

Create file named file\_name;

Write << StaffClass.staffID << “\n”;

Write << StaffClass.fName << “\n”;

Write << StaffClass.lName << “\n”;

Write << StaffClass.email << “\n”;

Write << StaffClass.password << “\n”;

Write << StaffClass.status << “\n”;

Close file;

}

void **deleteFile** (file\_name) {

Include system library;

Delete file named file\_name;

}

void **printFile** (file\_name) {

contents.Open(file\_name);

while(not end of file) {

Display << contents << “ ”;

}

Close file;

}

void static **printAll** () {

Display << StaffClass.staffID << “\n”;

Display << StaffClass.fName << “\n”;

Display << StaffClass.lName << “\n”;

Display << StaffClass.email << “\n”;

Display << StaffClass.password << “\n”;

Display << StaffClass.status << “\n”;

}

void **updateStaffID** () {

Display << getStaffID ();

Get >> user\_input;

setStaffID (user\_input);

}

void **updateFName** () {

Display << getFName ();

Get >> user\_input;

setFName (user\_input);

}

void **updateLName** () {

Display << getLName ();

Get >> user\_input;

setLName (user\_input);

}

void **updateEmail** () {

Display << getEmail ();

Get >> user\_input;

setEmail (user\_input);

}

void **updatePassword** () {

Display << getPassword ();

Get >> user\_input;

setPassword (user\_input);

}

void **updateStatus** () {

Display << getStatus ();

Get >> user\_input;

setStatus (user\_input);

}

<<entity class>>

**Admin Class**

* adminID : int
* fName : string
* lName : string
* emai : string
* password : string
* status : string
* getAdminID () : int
* setAdminID (n : int) : void
* getFName () : string
* setFName (n : string) : void
* getLName () : string
* setLName (n : string) : void
* getEmail () : string
* setEmail (n : string) : void
* getPassword () : string
* setPasswoed (n : string) : void
* getStatus () : string
* setStatus (n : string) : void
* find (findAdminID : int) : boolean
* read (fileName : RandomAccessFile) : void
* write (filename : RandomAccessFile) : void
* deleteFile () : void
* printFile () : void
* <<static>> printAll () : void
* updateAdminID () : void
* updateFName () : void
* updateLName () : void
* updateEmail () : void
* updatePassword () : void
* updateStatus () : void

String **getAdminID** () constant {

Return AdminClass.adminID;

}

Void **setAdminID** (user\_input) {

AdminClass.adminID = user\_input;

}

String **getFName** () constant {

Return AdminClass.fName;

}

Void **setFName** (user\_input) {

AdminClass.fName = user\_input;

}

String **getLName** () constant {

Return AdminClass.lName;

}

Void **setLName** (user\_input) {

AdminClass.lName = user\_input;

}

String **getEmail** () constant {

Return AdminClass.email;

}

Void **setEmail** (user\_input) {

AdminClass.email = user\_input;

}

String **getPassword** () constant {

Return AdminClass.password;

}

Void **setPassword** (user\_input) {

AdminClass.password = user\_input;

}

String **getStatus** () constant {

Return AdminClass.status;

}

Void **setStatus** (user\_input) {

AdminClass.status = user\_input;

}

void **read** ( file\_name ) {

Open file\_name;

content = read file line;

AdminClass.adminID = content;

content = read next file line;

AdminClass.fName

content = read next file line;

AdminClass.lName

content = read next file line;

AdminClass.email

content = read next file line;

AdminClass.password

content = read next file line;

AdminClass.status

Close file;

}

void **write** ( file\_name ) {

Create file named file\_name;

Write << AdminClass.adminID << “\n”;

Write << AdminClass.fName << “\n”;

Write << AdminClass.lName << “\n”;

Write << AdminClass.email << “\n”;

Write << AdminClass.password << “\n”;

Write << AdminClass.status << “\n”;

Close file;

}

void **deleteFile** (file\_name) {

Include system library;

Delete file named file\_name;

}

void **printFile** (file\_name) {

contents.Open(file\_name);

while(not end of file) {

Display << contents << “ ”;

}

Close file;

}

void static **printAll** () {

Display << AdminClass.adminID << “\n”;

Display << AdminClass.fName << “\n”;

Display << AdminClass.lName << “\n”;

Display << AdminClass.email << “\n”;

Display << AdminClass.password << “\n”;

Display << AdminClass.status << “\n”;

}

void **updateAdminID** () {

Display << getAdminID ();

Get >> user\_input;

setAdminID (user\_input);

}

void **updateFName** () {

Display << getFName ();

Get >> user\_input;

setFName (user\_input);

}

void **updateLName** () {

Display << getLName ();

Get >> user\_input;

setLName (user\_input);

}

void **updateEmail** () {

Display << getEmail ();

Get >> user\_input;

setEmail (user\_input);

}

void **updatePassword** () {

Display << getPassword ();

Get >> user\_input;

setPassword (user\_input);

}

void **updateStatus** () {

Display << getStatus ();

Get >> user\_input;

setStatus (user\_input);

}

<<boundary class>>

**Generate Order Report Class**

* <<static>> printReport() : void

Void **printReport** () {

Display << getStaffID(), getMemberID, getAvailableBooks(), getBookLoans(), getOrderLoans(), getOverdueOrders();

}