

COMP1044

Coursework Assignment 2

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Group 4

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ABSTRACT

Book Swamp Semenyih is a book swap Facebook group created by a now graduate from Nottingham, Daniel Stephen. The group utilized a google excel page where users typed in their contact information and the book title that they would like to share with their peers. Peers may then view the Google Excel Sheet and contact the owner for the book. The shortcoming of this system is large as a Google Excel Sheet is prone to errors and has no constraint checking. Information can also be removed from the file without anyone's knowledge. Users cannot be banned as they can simply change their names and no real validation can be conducted through a publicly shared google file. This project attempts to automate the process of book swapping by allowing users to create accounts in an online system where they may share and borrow books. Errors can be minimized through constraints. Users can be validated as University of Nottingham students before being granted access as well as banned for misbehavior permanently. The system facilitates convenient quick book sharing between Nottingham students to encourage student self-learning and collaboration.

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Introduction

Background

The proposed system is one that allows users to lend and borrow books via a web application interface. This project attempts to automate the process of book swapping by allowing users to create accounts in an online system where they may share and borrow books. Errors can be minimized through constraints. The system facilitates convenient quick book sharing between Nottingham students to encourage student self-learning and collaboration.

Methodology

The web application is designed in Figma. Jira was used for personnel and project management. Various tools were used in the development of the front end of the application including HTML, CSS, JavaScript, and PHP. The complete database was implemented in MySQL using MariaDB server on XAMPP. The web application is hosted on a VM instance on the Google Cloud Platform utilizing Apache as the web server.

Purpose

The purpose of the proposed web application is to provide University of Nottingham students with a platform to share books conveniently and quickly. This system facilitates discussions between students by encouraging interactions.

Development Process

Development Process

The development process used to develop the application was the AGILE development process. The AGILE development process is one that follows an iterative development process. The AGILE framework used is the SCRUM framework which has allowed us the ability to perform development in incremental changes while allowing for flexibility in further sprints.

Requirements Specifications

The functional and non-functional requirements for the system are specified below.

1. Any person may create a member account by registering on the webpage
2. Any member may login
3. Any user may add any number of books
4. Any user may edit the details of their books
5. Any user may delete their books
6. Any user may borrow any number of books
7. Any admin may edit any user's account details
8. Any admin may ban any user
9. Users may search for books by their name or ISBN
10. Admins may search for members by their OWA (outlook web access username)
11. The website must be accessible on the major browsers Chrome, Firefox, and Edge
12. The website must be both mobile and desktop accessible
13. The development process must take from 22-3-2022 to 22-4-2022

Block diagram

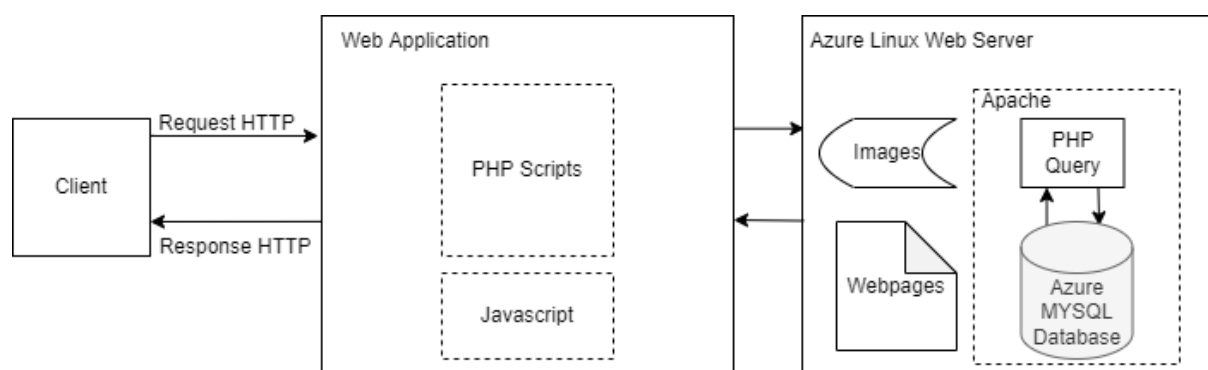


Figure 1. Block Diagram

Use Case Diagram

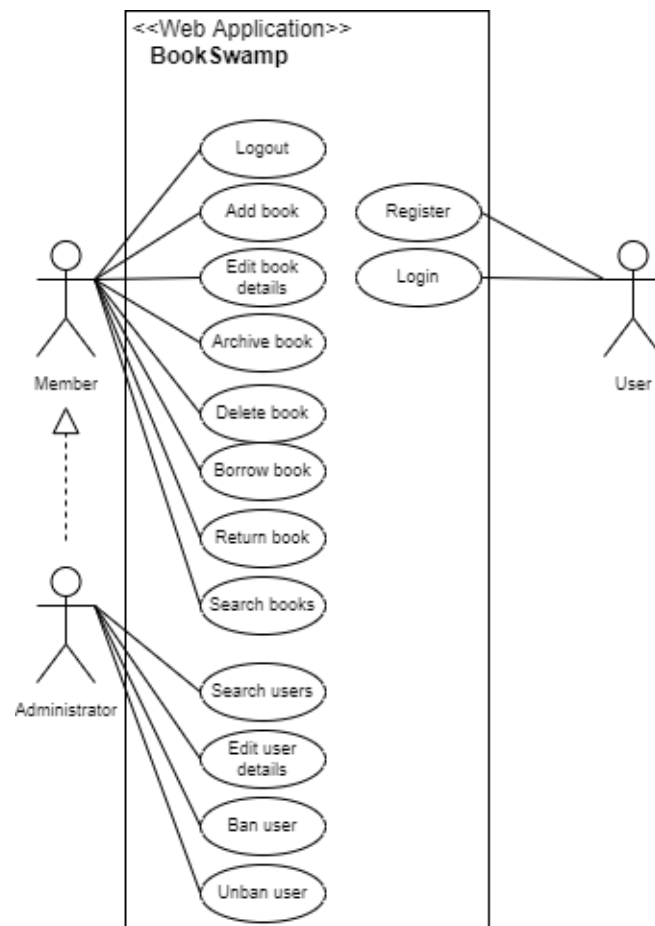


Figure 2. Use Case Diagram

Test Suites

Test Case	1
Based on requirement	R01
Pre-requisites	
<ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login screen 	
Steps the tester has to perform	
<ol style="list-style-type: none"> 1. Enter valid account credentials 2. User clicks on <i>Register</i> 	
Acceptance criteria	
<ol style="list-style-type: none"> 1. Account is created for member 	

Test Case	2
Based on requirement	R02
Pre-requisites <ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login screen 	
Steps the tester has to perform <ol style="list-style-type: none"> 1. Enter valid account login 2. Member clicks on <i>Login</i> 	
Acceptance criteria <ol style="list-style-type: none"> 1. Session is started for member 2. Member is transported to dashboard 	

Test Case	3
Based on requirement	R03
Pre-requisites <ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login screen 3. Login to any account 	
Steps the tester has to perform <ol style="list-style-type: none"> 1. Member clicks on <i>Add Book</i> 2. Member enters valid book details 3. Member clicks on <i>Donate my Book</i> 	
Acceptance criteria <ol style="list-style-type: none"> 1. Book is shown in <i>Library</i> page 	

Test Case	4
Based on requirement	R04
Pre-requisites <ol style="list-style-type: none"> 1. Navigate to web application 	

<ol style="list-style-type: none"> 2. Navigate to Login screen 3. Login to any account
Steps the tester has to perform <ol style="list-style-type: none"> 1. Member clicks on <i>Update Book</i> 2. Member enters valid new book details 3. Member clicks on <i>Donate my Book</i>
Acceptance criteria <ol style="list-style-type: none"> 1. Book is shown in <i>My Books</i> section

Test Case	5
Based on requirement	R05
Pre-requisites <ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login screen 3. Login to any account 	
Steps the tester has to perform <ol style="list-style-type: none"> 1. Member clicks on <i>Delete Book</i> for any book 	
Acceptance criteria <ol style="list-style-type: none"> 1. Book disappears from <i>My Books</i> section 	

Test Case	6
Based on requirement	R06
Pre-requisites <ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login screen 3. Login to any account 	
Steps the tester has to perform <ol style="list-style-type: none"> 1. Member clicks on <i>Borrow</i> for any book 	
Acceptance criteria	

1. Selected book now appears in <i>Borrowed Books</i> section

Test Case	7
Based on requirement	R07
Pre-requisites <ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login screen 3. Login to any admin account 	
Steps the tester has to perform <ol style="list-style-type: none"> 1. Admin clicks on <i>Manage Users</i> 2. Admin clicks on <i>Manage User Details</i> for any member 3. Admin inputs valid new user information 4. Admin clicks on <i>Update user records</i> 	
Acceptance criteria <ol style="list-style-type: none"> 1. Member information has been changed 	

Test Case	8
Based on requirement	R08
Pre-requisites <ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login screen 3. Login to any admin account 	
Steps the tester has to perform <ol style="list-style-type: none"> 1. Admin clicks on <i>Manage Users</i> 2. Admin clicks on <i>Ban</i> for any member 	
Acceptance criteria <ol style="list-style-type: none"> 1. User status has been changed to banned 	

Test Case	9
Based on requirement	R09

Pre-requisites	
<ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login page 3. Login to any account 	
Steps the tester has to perform	
<ol style="list-style-type: none"> 1. Member inputs any book name or ISBN in search bar 2. Member clicks on search button 	
Acceptance criteria	
<ol style="list-style-type: none"> 1. Only inputted book name or ISBN results are shown 	

Test Case	10
Based on requirement	R10
Pre-requisites	
<ol style="list-style-type: none"> 1. Navigate to web application 2. Navigate to Login page 3. Login to any admin account 4. Navigate to <i>Manage Users</i> page 	
Steps the tester has to perform	
<ol style="list-style-type: none"> 1. Admin inputs any OWA in search bar 2. Admin clicks on search button 	
Acceptance criteria	
<ol style="list-style-type: none"> 1. Only inputted OWA results are shown 	

Test Case	11
Based on requirement	R11
Pre-requisites	
None	
Steps the tester has to perform	
<ol style="list-style-type: none"> 1. Navigate to web application on a desktop computer using the Chrome Browser 	

2. Navigate to web application on a desktop computer using the Firefox Browser
3. Navigate to web application on a desktop computer using the Edge Browser
Acceptance criteria
1. All website instances load appropriately

Test Case	12
Based on requirement	R12
Pre-requisites	
None	
Steps the tester has to perform	
1. Navigate to web application in any browser on Mobile Phone	
2. Navigate to web application in any browser on Mobile Phone	
Acceptance criteria	
1. Website instance runs appropriately	

Testing Results

Test cases provided scenarios to test our web application system and the criteria in order to determine a successful system. The conduction of the testing provided a compilation of test case results. The results of the test cases proved no failed test cases.

Test Case	Test Results	
	Pass	Fail
1	✓	
2	✓	
3	✓	
4	✓	
5	✓	
6	✓	
7	✓	
8	✓	
9	✓	
10	✓	
11	✓	
12	✓	
13	✓	

Dataset Cleaning

Dataset Error Corrections

The provided dataset contained several issues that were corrected prior to designing the database including missing information, incorrect information, and improper entity creation. The completeness of the dataset was incomplete, as information was missing from the book table.

One issue was that several records from the *book* table contained missing information. This was rectified by searching up the record in online databases and manually inputting the correct missing information. As the record for the book “The Philippine Daily Inquirer” is not applicable for the attributes *author* or *ISBN*, “N/A” values were provided. Another solution would be to create a separate table for newspapers with relevant attributes. As this is a book swapping application, the number of newspapers will be very low, minimizing the need to create a table for them.

Another issue was the lack of clarity provided by the name of the *user* table. As the name of the table does not properly explain the usage of that table, it could cause confusion to its usage. Correcting this issue consisted of renaming the table to *account*. Another issue in the *user* table is that the password is stored in plain text. This is very dangerous as it can be stolen and used to login to the user’s account. To fix this security violation, the *password* attribute is renamed to *SHA1_hashedpassword* and all passwords are SHA1 hashed before being inserted into the database.

The *ISBN* attribute is not consistent as it contains both ISBN-13 and ISBN-10 values. To correct this the equivalent ISBN-13 is written for all ISBNs and the attribute is renamed to *ISBN-13*.

The *book* table containing the attributes *copies*, *status*, and *date_added* does not make logical sense as each book copy could be added in a different date and be of a different quality status. For this reason, a *book_information* table was introduced containing all the attributes except status and date_added. The table *book* contains the attributes *status*, *availability*, and *book_information_id_fk*.

The *status* attribute can contain the possible values of “available”, “lost”, “old”, “new” and “damage”. As availability status and book quality status are not mutually exclusive the *status* attribute is separated into two attributes *status* and *availability*.

In the table *member*, the *contact* attribute is vague about what value is stored inside it. For this reason, we rename this attribute to *contactnumber*. We change the values to suit the name.

Dataset Changes

Several changes were conducted to the dataset to implement good naming conventions, remove redundancies and unnecessary entities as well as remove unnecessary relationships. In order to maintain consistency and good practices, every primary key is followed by the suffix “_pk” and every foreign key is preceded by the followed “_fk”.

In the *member* table, the artificial primary key *member_id* is removed and replaced with *owa*. This is due to the OWA being an important value to validate that the user is a student. As the OWA is unique for each member, we no longer need to use an artificial primary key. The attribute *gender* is changed to only accept ‘M’ or ‘F’. One character is enough to store the gender and taking a string would be redundant and allow for misspellings. The attribute *address* is renamed to *city* for clarity as that is a more accurate description of what is stored in that attribute.

Since a person must be both a member and an admin, the admin’s details are included in the *member* table. The admin table is reduced to the attributes *owa_fk_pk* and *start_date*.

In the *account* table, the attributes of *firstname* and *lastname* are removed since all user’s information has been moved to the member table. The primary key *owa_pk* is used instead of the previous *user_id*.

The attribute *classname* is renamed simply to *name* in the category table. This is to promote consistency between different tables. The table *type* is renamed to *member_type* for the name to better describe what the table contains. The *member_type* table attribute *borrowtype* is renamed to *name* to promote consistency between different tables.

The table *borrow* and *borrow_details* are combined as the relationship is one to one and unnecessary. As the tables are combined the artificial key *borrow_details_id* is removed as it no longer serves the purpose of linking the tables together. The attribute *borrow_status* is removed as it is redundant as *date_returned* is already an attribute that serves the same purpose.

The *borrow* table contains the *date_return* attribute. As most books will not be returned for some after they are checked out, this is a display of gross redundancy. To combat this, the *date_return* attribute is removed into its own table called *returns*. The returns table simply contains the *borrow_id_fk_pk* and *return_date* attributes.

In the *book_details* table, the attribute *book_id* is renamed to *id_pk* and the attribute *book_title* is renamed to *title*. The dashes are removed from the *ISBN-13* attribute as they are not necessary as well as since all formatting should be done in the front end before presenting to the user and not in the backend. The *author* attribute is renamed to *authors* to better describe that listing several authors is allowed.

The publisher information of *book_publisher* and *publisher_name* is removed into their own table called *publisher* alongside an auto incrementing artificial primary key of *id_pk* to reduce redundant data. The *book_publisher* attribute is renamed to create a shorter, more descriptive attribute name. The *publisher_name* column is split into two attributes *parentcompany* and *hq_address* so that the information is contained in different attributes and can be accessed without parsing.

In the *book* table an artificial auto incrementing primary key *id_pk* is introduced. As our database is a book swapping application, an *owner_owa_fk* is included to identify the book owner. Each book record is then created individually such that its status and date added can be changed independently to other copies of the same book.

Database Design

Design Justification

The relationships are created only when required, as redundant relationships have been removed to create a cleaner and faster database. The entities were designed to remove all instances of redundancies. The datatype of each attribute was set in order to match the attribute data and constraint the input as to not allow incorrect data input.

All numerical *id_pks*' and their corresponding foreign keys are declared of the data type int. This is due to them being integer values. The padding space allowed is 2 because we do not expect more than 100 records. All foreign key data types are specified as the attributes they reference.

The *name* attributes in the entities *category* and *member_type* are of the data type varchar due to their containing alphanumeric values.

The *firstname*, *lastname* and *city* attributes in the *member* entity are specified as a varchar datatype as they include alphanumeric characters of size 30 as this is the industry standard.

The attribute *contactnumber* contains the varchar datatype of 17 characters as the largest possible phone number can be 15 characters long and the remaining 2 characters allow for dashes in the contact number.

The attributes *gender*, *year_level* and *status* from the members table alongside the attribute's *status* and *availability* from the book table are specified as the datatype of enum's as they have only a few possible values allowing for us to constraint input to a list of specified choices. The attribute *owa* is set to the datatype of varchar allowing for 6 characters.

The attribute *SHA1_hashedpassword* in the entity *account* allowed is set to the datatype which allows for 40 characters as SHA1 hashes are 40 characters long.

In the entity *publisher*, the attribute *id_pk* is of the size 3 integers such that it can contain up to 999 records, which we consider as an appropriate maximum number of publishers as there are only around 700 publisher companies in each continent.

The attribute *book_information* is given the datatype int of size 4. This allows for the maximum number of records of 9999 which is considered an appropriate amount. The title allows for 50 characters of the datatype as it is the length of the longest book title in the library. The *authors* attribute allows for varchar input of 50 characters as each first name is around 25 characters and we would like to store up to 2 names.

The date values of *date_added*, *date_return* and *start_date* are datetime datatype formatted.

In the entity book, the foreign key attribute for owner ID in the book table is renamed to owner. The attribute *ISBN_13* is of the data type varchar as specifying this value as an integer would remove trailing zeros. The datatype for the attribute *year* is set to year in order to enforce and accept valid year data only.

Design Justification Summary

Table	Field	Datatype	Justification
account	owa_fk_pk	varchar(6)	An OWA contains 6 alphanumeric characters
	SHA1_hashedpassword	varchar(40)	A SHA1 hash contains 40 alphanumeric characters
admin	owa_fk_pk	varchar(6)	An OWA contains 6 alphanumeric characters
	start_date	date	The date datatype accepts values of the format 'YYYY-MM-DD'
book	id_pk	int(4)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 9999
	owner_owa_fk	varchar(6)	An OWA contains 6 alphanumeric characters
	book_information_id_fk	int(4)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 9999
	date_added	datetime	The datetime datatype accepts values of the format 'YYYY-MM-DD HH:MI:SS'
	status	enum('New', 'Old', 'Damaged')	As there are only 3 possible non-dynamic choices, we create an Enum as creating a table for information that will never be altered is unnecessary
	availability	enum('Available', 'Archived', 'Lost')	As there are only 3 possible non-dynamic choices, we create an Enum as creating a

			table for information that will never be altered is unnecessary
book_ information	id_pk	int(4)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 9999
	title	varchar(50)	The maximum number of characters in the book titles is 50
	category_fk	int(2)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 99
	publisher_fk	int(2)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 999
	authors	varchar(100)	As a single name is 25 characters on average and the maximum number of authors is said to be 4 per book, we estimate that 100 characters is the appropriate amount of up to 4 authors
	isbn_13	varchar(13)	As an ISBN-13 consists of 13 numerals. We use varchar instead of int to avoid the deletion of trailing zeros
	copyright_year	year(4)	The year datatype accepts values of the format 'YYYY'
borrow	id_pk	int(4)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 9999
	book_id_fk	int(4)	As we would like to auto increment the id, we set it to an integer, and we assume a

			maximum possible number of records to be 9999
	borrower_owa_fk	varchar(6)	An OWA contains 6 alphanumeric characters
	borrow_date	datetime	The datetime datatype accepts values of the format 'YYYY-MM-DD HH:MI:SS'
	due_date	date	The date datatype accepts values of the format 'YYYY-MM-DD'
category	id_pk	int(2)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 99
	name	varchar(40)	The length of the maximum length category is 40
member	owa_pk	varchar(6)	An OWA contains 6 alphanumeric characters
	firstname	varchar(30)	The convention for the size of a name is 30 characters of alphanumeric values
	lastname	varchar(30)	The convention for the size of a name is 30 characters of alphanumeric values
	gender	enum('M', 'F')	As there are only 2 possible non-dynamic choices, we create an Enum as creating a table for information that will never be altered is unnecessary
	city	varchar(30)	The convention for the size of a location is 30 characters of alphanumeric values
	contactnumber	varchar(17)	The maximum length of a contact number is 15 characters. An additional 2 spaces are available for dashes. Alphanumeric characters are used instead of numeric as using numeric

			values would remove leading zeros.
	type_fk	int(2)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 99
	year_level	enum('First Year','Second Year','Third Year','Fourth Year','Faculty')	As there are only 5 possible non-dynamic choices, we create an Enum as creating a table for information that will never be altered is unnecessary
	status	enum('Active', 'Banned')	As there are only 2 possible non-dynamic choices, we create an Enum as creating a table for information that will never be altered is unnecessary
member_type	id_pk	int(2)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 99
	name	varchar(40)	The length of the maximum length type is 40
publisher	id_pk	int(3)	As we would like to auto increment the id, we set it to an integer, and we assume a maximum possible number of records to be 999
	name	varchar(50)	The convention for the size of a location is 50 characters of alphanumeric values
	parentcompany	varchar(50)	The convention for the size of a location is 50 characters of alphanumeric values
	hq_address	varchar(100)	The convention for the size of an address is 100 characters of alphanumeric values
returns	borrow_id_fk_pk	int(4)	As we would like to auto increment the id, we set it to

			an integer, and we assume a maximum possible number of records to be 9999
	return_date	datetime	The datetime datatype accepts values of the format ‘YYYY-MM-DD HH:MI:SS’

Table 1. Datatype Justifications Summary

Additional Constraints

All attributes are specified as not null, as there are no redundancies permissible in the database. The attribute *contact* is renamed to *contactnumber*.

The attributes *id_pk* in the entities, *category*, *publisher*, *book_information*, *book* and *borrow* are set to auto increment.

In the entity *member*, the attribute *owa_pk* length is only accepted if it is equal to 6. The attribute *contactnumber* must be within the length of 9 and 17.

The attribute *SHA1_hashedpassword* must contain a length of 40 characters as every SHA1 hash must contain 40 characters.

The attribute *ISBN_13* must be of the length 13 as every ISBN13 code consists of 13 digits.

The *copyright_year* attribute length must be four, as the length of a year must contain 4 digits.

Database Implementation

Entity Relationship Diagram

The entity relationship diagram(ERD) demonstrates the relations between entities, primary keys, and foreign keys in the BookSwamp database through illustration.

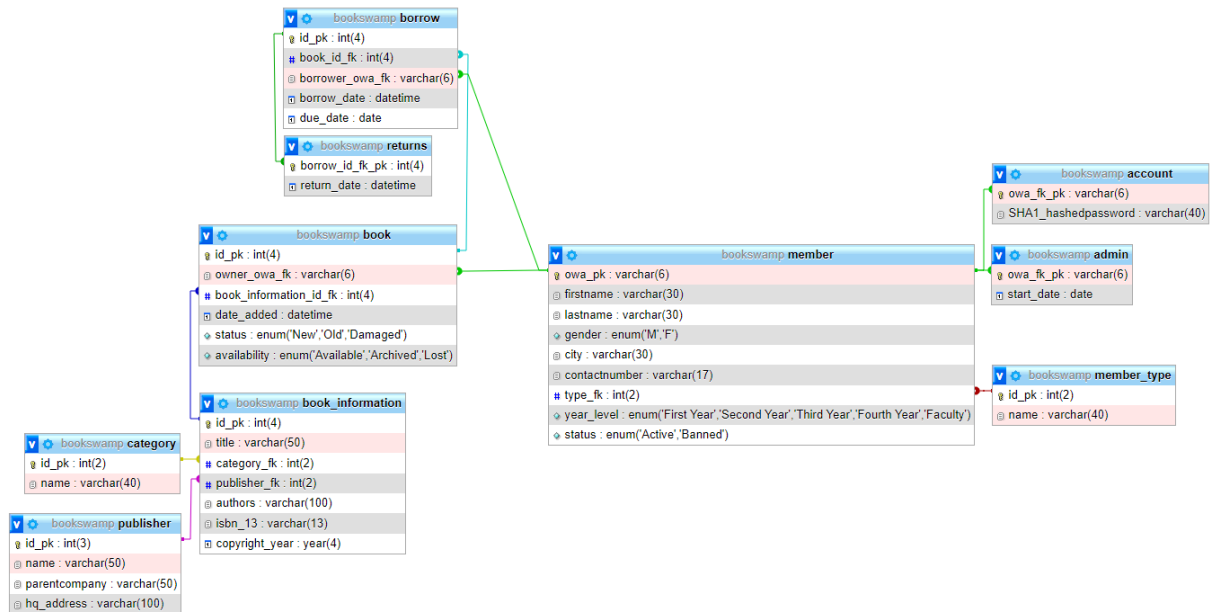


Figure 3. Entity Relationship Diagram of BookSwamp Database

Database Structure

The database structure displays and identifies all entities in the BookSwamp database.

Table	Action	Rows	Type	Collation	Size	Overhead
<input type="checkbox"/> account	★ Browse Structure Search Insert Empty Drop	14	InnoDB	utf8mb4_general_ci	16.0 KiB	-
<input type="checkbox"/> admin	★ Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	16.0 KiB	-
<input type="checkbox"/> book	★ Browse Structure Search Insert Empty Drop	309	InnoDB	utf8mb4_general_ci	48.0 KiB	-
<input type="checkbox"/> book_information	★ Browse Structure Search Insert Empty Drop	18	InnoDB	utf8mb4_general_ci	48.0 KiB	-
<input type="checkbox"/> borrow	★ Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	48.0 KiB	-
<input type="checkbox"/> category	★ Browse Structure Search Insert Empty Drop	9	InnoDB	utf8mb4_general_ci	16.0 KiB	-
<input type="checkbox"/> member	★ Browse Structure Search Insert Empty Drop	14	InnoDB	utf8mb4_general_ci	32.0 KiB	-
<input type="checkbox"/> member_type	★ Browse Structure Search Insert Empty Drop	5	InnoDB	utf8mb4_general_ci	16.0 KiB	-
<input type="checkbox"/> publisher	★ Browse Structure Search Insert Empty Drop	17	InnoDB	utf8mb4_general_ci	16.0 KiB	-
<input type="checkbox"/> returns	★ Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	16.0 KiB	-
10 tables	Sum	391	InnoDB	utf8mb4_general_ci	272.0 KiB	0 B

Figure 4. Database Structure of BookSwamp Database

Entity Structures

The entity structures display the attributes and datatypes of all entities in the BookSwamp database.

<u>publisher</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	id_pk	int(3)			No	None		AUTO_INCREMENT
<input type="checkbox"/>	2	name	varchar(50)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	3	parentcompany	varchar(50)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	4	hq_address	varchar(100)	utf8mb4_general_ci		No	None		
<u>member_type</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	id_pk	int(2)			No	None		
<input type="checkbox"/>	2	name	varchar(40)	utf8mb4_general_ci		No	None		
<u>category</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	id_pk	int(2)			No	None		AUTO_INCREMENT
<input type="checkbox"/>	2	name	varchar(40)	utf8mb4_general_ci		No	None		
<u>member</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	owa_pk	varchar(6)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	2	firstname	varchar(30)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	3	lastname	varchar(30)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	4	gender	enum('M', 'F')	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	5	city	varchar(30)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	6	contactnumber	varchar(17)	utf8mb4_general_ci		Yes	NULL		
<input type="checkbox"/>	7	type_fk	int(2)			No	None		
<input type="checkbox"/>	8	year_level	enum('First Year', 'Second Year', 'Third Year', 'Fourth Year')	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	9	status	enum('Active', 'Banned')	utf8mb4_general_ci		No	None		
<u>admin</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	owa_fk_pk	varchar(6)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	2	start_date	date			Yes	NULL		
<u>account</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	owa_fk_pk	varchar(6)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	2	SHA1_hashedpassword	varchar(40)	utf8mb4_general_ci		Yes	NULL		

<u>book_information</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	id_pk	int(4)			No	None		AUTO_INCREMENT
<input type="checkbox"/>	2	title	varchar(50)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	3	category_fk	int(2)			Yes	NULL		
<input type="checkbox"/>	4	publisher_fk	int(2)			Yes	NULL		
<input type="checkbox"/>	5	authors	varchar(100)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	6	isbn_13	varchar(13)	utf8mb4_general_ci		Yes	NULL		
<input type="checkbox"/>	7	copyright_year	year(4)			Yes	NULL		

<u>book</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	id_pk	int(4)			No	None		AUTO_INCREMENT
<input type="checkbox"/>	2	owner_owa_fk	varchar(6)	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	3	book_information_id_fk	int(4)			No	None		
<input type="checkbox"/>	4	date_added	datetime			No	None		
<input type="checkbox"/>	5	status	enum('New', 'Old', 'Damaged')	utf8mb4_general_ci		No	None		
<input type="checkbox"/>	6	availability	enum('Available', 'Archived', 'Lost')	utf8mb4_general_ci		No	None		

<u>borrow</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	id_pk	int(4)			No	None		AUTO_INCREMENT
<input type="checkbox"/>	2	book_id_fk	int(4)			Yes	NULL		
<input type="checkbox"/>	3	borrower_owa_fk	varchar(6)	utf8mb4_general_ci		Yes	NULL		
<input type="checkbox"/>	4	borrow_date	datetime			Yes	NULL		
<input type="checkbox"/>	5	due_date	date			Yes	NULL		

<u>returns</u>									
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
<input type="checkbox"/>	1	borrow_id_fk_pk	int(4)			No	None		
<input type="checkbox"/>	2	return_date	datetime			Yes	NULL		

Table 2. Entity Structures of BookSwamp Database

User Interface Design

Interface Block Diagram

The interface block diagram illustrates the page associations of the web application. The interface was designed with ease of use in mind. The system is by forefront created to be simple and intuitive to user.

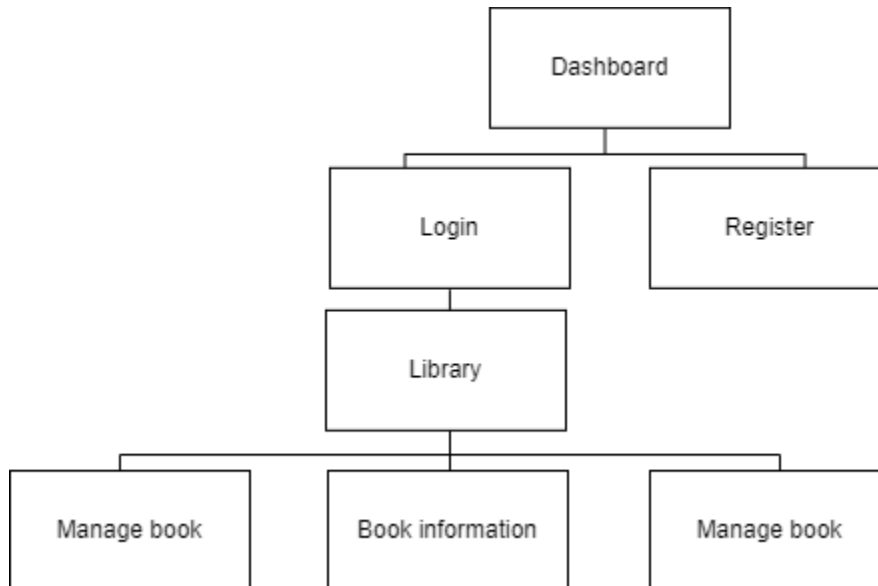


Figure 5. Member Interface Diagram

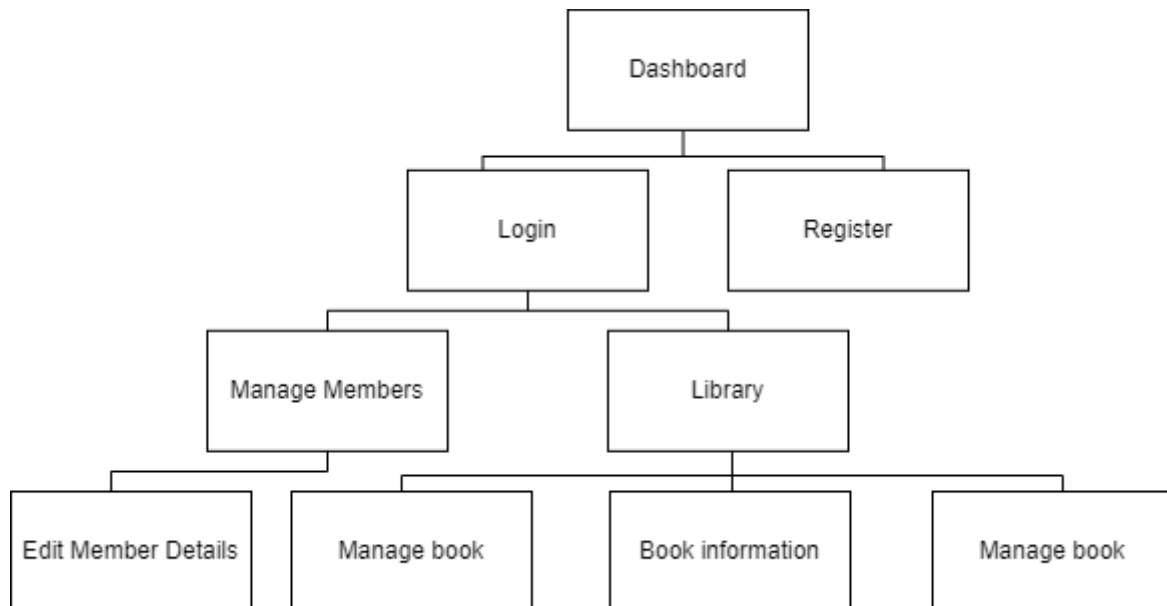


Figure 6. Admin Interface Diagram

Interface Implementation

Input Validation

Input validation is performed in all forms via scripting in PHP. Information is first validated by the PHP process before requests are made to the database. This is in order to minimize requests that will fail constraints set in the database. This is also performed to minimize the risk of inputting bad information into the database. Finally, performing input validation allows us to provide the user with real-time feedback on which values they have inputted incorrectly, allowing the user to fix their mistake before any changes are performed.

Database Interfacing

Interfacing with the database is performed by scripting in PHP. All sessions are persistent until the session is either closed by request of the user or closed by the exiting of the web application. The PHP is used as both an intermediary script to respond to forms as well as the main page in multiple forms.

Web Hosting

When the interface was successfully made and implemented, it is all committed and saved within a Github repository, and as it was implemented mainly using XAMPP locally on our personal machines, we had to change a few lines of code within the PHP for it to comfortably run by an Apache web server.

We chose the Google Cloud Platform as our hosting platform of choice due to their free trial credits in using their cloud platform, and we used a Virtual Machine running on the cloud platform, running the Debian 10 Linux operating system. The hosting process was as simple as installing Apache2, MariaDB, and MySQL directly on the linux operating system through the cloud platform's ssh feature. Basically, a LAMP (Linux, Apache, MySQL, PHP) stack was installed to host the web application. To simplify the work as well, we installed phpMyAdmin onto the server for easier importing of our SQL database.

Finally, we simply git cloned from our Github repository into `/var/www/html` default folder that Apache2 uses to present the web pages. The live website can be seen at the following URL: http://34.121.148.200/COMP1044_CW_G4/. (Please note that the site will be taken down within 4-5 months from the submission of the coursework).

As stated above as well, our interface code is published and uploaded in a Github repository, below is the link to said repository: https://github.com/ybmirz/COMP1044_CW_G4

Conclusion

In conclusion, a solution to encourage users to share books together is created by allowing users to easily lend and borrow books with their peers. Members may simply browse and search up books by using various attributes. Members are encouraged to discuss amongst each other and fuel self-learning through self-sufficient peer collaboration.

Suggestions

Multiple features are suggested to be implemented in the future to improve on the book swapping system. Email verification should be implemented to enforce real OWAs only. The reason for this is that currently a banned user can simply create a new account with a fake OWA and be granted access to the system. Email verification would ensure that the user is a valid current member of the University Nottingham Malaysia. MailChimp is used to send automated messages to users. Another feature to be implemented is allowing users to reset their own passwords so that they may recover their accounts on their own without requiring help from the database administrator. Common passwords such as “password” and “abcd1234” should be disallowed from being chosen as they are very common and unsafe passwords.

References

- [1] Drkusic, E. (2021, May 17). Learn SQL: Naming Conventions. Naming Conventions. Retrieved 19 April 2022, from <https://www.sqlshack.com/learn-sql-naming-conventions/>
- [2] SQL Server on Linux. (2022, April 1). Microsoft Docs. <https://docs.microsoft.com/en-us/sql/linux/sql-server-linux-overview?view=sql-server-ver15>
- [3] SQL programming. (s.d.). SQL Programming. Retrieved 19 April 2022, from <https://www.ibm.com/docs/en/i/7.3?topic=programming-sql>

Appendix

Appendix A. Usernames and Passwords in Plain Text

Username	Password
hcyaa1	Hcyaa1!
hcyap1	Hcyap1!
hycl1	Hycl1!
hycp1	Hycp1!
hcyed1	Hcyed1!
hcyee1	Hcyee1!
hcyja1	Hcyja1!
hcyjs1	Hcyjs1!
hcykd1	Hcykd1!
hcym1	Hcym1!
hcyrm1	Hcyrm1!
hcyrm2	Hcyrm2!
hcyrp1	Hcyrp1!
hcysg1	Hcysg1!

Appendix B: Entity Records

member_type	
id_pk	name
2	Teacher
20	Employee
21	Non-Teaching
22	Student
32	Construction

category

id_pk	name
1	Periodical
2	English
3	Math
4	Science
5	Encyclopedia
6	Filipiniana
7	Newspaper
8	General
9	References

publisher

id_pk	name	parentcompany	hq_address
1	Benchmark Books	Marshall	3269 S Main St #250, Salt Lake City, UT 84115, Uni...
2	Grolier Inc.	Grolier Inc.	Conneticut
3	Prentice Hall	Pearson Education. Inc	Hoboken, New Jersey
4	Philipines Daily Inquirer	Publication Inc.	Pasay City
5	Prentice Hall	Regency Publishing Group	Hoboken, New Jersey, United States
6	Publication Inc.	Mansueto Ventures LLC	Lexicon
7	Publisher	Pearson PLC	Westport Conneticut
8	Vibal Group	Vibal Publishing House Inc.	12536. Araneta Avenue Corner Ma. Clara St., Quezon...
9	McGrawhill	The McGrawHill Companies Inc.	New York, United States
10	Jgm Publishing Ltd.	JGM & S Corporation	Oldham, Greater Manchester, England
11	SD Publications, Inc.	SD Publications, Inc.	Gregorio Araneta Avenue, Quezon City, Singapore
12	Vibal Group	Vibal Publishing House Inc.	Araneta Avenue . Cor. Maria Clara St., Quezon City...
13	McGraw-Hill Education	the McGrawHill Companies Inc	New York, United States
14	Alfred A. Knoff, Inc	Knopf Doubleday Publishing Group	New York, New York, United States
15	Silver	Silver Burdett Company	211 E. 7th Street, Suite 620, Austin, TX
16	Houghton Mifflin Company	Houghton Mifflin Company	Boston, United States
17	Brian INC	CHMSC	7101 SW 66th St, Miami, Florida, United States

member

owa_pk	firstname	lastname	gender	city	contactnumber	type_fk	year_level	status
hcyaa1	April Joy	Aguilar	F	E.B. Magalona	60105510093	22	Second Year	Banned
hcyap1	Alfonso	Pancho	M	E.B. Magalona	60105510094	22	First Year	Active
hcycl1	Chinie marie	Laborosa	F	E.B. Magalona	60105510103	22	Second Year	Active
hcyep1	Chairty Joy	Punzalan	F	E.B. Magalona	60105510101	2	Faculty	Active
hcyed1	Eleazar	Duterte	M	E.B. Magalona	60105510097	22	Second Year	Active
hcyee1	Ellen Mae	Espino	F	E.B. Magalona	60105510098	22	First Year	Active
hcyja1	Jonathan	Antanilla	M	E.B. Magalona	60105510095	22	Fourth Year	Active
hcyjs1	John	Smith	M	Kuala Lumpur	60105510091	2	First Year	Active
hcykd1	Kristine May	Dela Rosa	F	Silay City	60105510102	22	Second Year	Active
hcyms1	Mark	Sanchez	M	Talisay	60105510092	2	Faculty	Active
hcyrm1	Ruth	Magbanua	F	E.B. Magalona	60105510099	22	Second Year	Active
hcyrm2	Ruby	Morante	F	E.B. Magalona	60105510104	2	Faculty	Active
hcyrp1	Renzo Bryan	Pedroso	M	Silay City	60105510096	22	Third Year	Active
hcysg1	Shaina Marie	Gabino	F	Silay City	60105510100	22	Second Year	Active

admin

owa_fk_pk	start_date
hcyjs1	2022-04-01

account

owa_fk_pk	SHA1_hashedpassword
hcyaa1	14f0938df30b1b6f2697b3eb6f29a64f371282ca
hcyap1	567775b8280711d8231fdb1c779d2e4b4a77f96d
hcycl1	b4c04c2f4f1a329f42fc3fa2153e3ffacacc5b82
hcyep1	a9640f21d75b77812c374e9689fa75e0ccd0670b
hcyed1	73e28bc94e5621e687c07dc2b093a5f5d4aa7f2f
hcyee1	c3dcb88e1813d1201a0c2804fe68fd14efaf4b06
hcyja1	d9288fece1bd24e06103b5603481527635f3847f
hcyjs1	086cca3460b4d4500d869ca518742ff8ec37bedd
hcykd1	13ec6dfa02966f718b1ef846d8f0e8d4d8c9eeee
hcym1	4b509c98a50433b8cc72a9fdbb5d055dddbdf38ac
hcyrm1	e79837c83d6dc4ed8372ac09390889cd0a2c5011
hcyrm2	8acd035fda4c015cc3d421c9302b195dccf7a63c
hcyrp1	30f44a7d8c1df9a8ee0749eb0bbe56eaf467661c
hcysg1	fa2e32c6a752648843831a1117a5805b374bb122

borrow

id_pk	book_id_fk	borrower_owa_fk	borrow_date	due_date	return_date
482	16	hcym1	2014-03-20 23:38:22	2014-01-03	0000-00-00 00:00:00
483	15	hcyja1	2014-03-20 23:49:34	2014-03-21	2014-03-21 00:30:51
484	16	hcyja1	2014-03-20 23:50:27	2014-03-21	0000-00-00 00:00:00

book_information

id_pk	title	category_fk	publisher_fk	authors	isbn_13	copyright_year
15	Natural Resources	8	1	Robin Kerrod	9781854356284	1994
16	Encyclopedia Americana	5	2	Grolier	9781854356284	1993
17	Algebra 1	3	3	Carolyn Bradshaw, Michael Seals	9780717201198	2004
18	The Philippine Daily Inquirer	7	4	Various	9780131250871	2013
19	Science in our World	4	5	Brian Knapp	9781864180497	1996
20	Literature	9	5	Greg Glowka	9780130508416	2001
21	Lexicon Universal Encyclopedia	5	6	Lexicon	9780717220250	1993
22	Science and Invention Encyclopedia	5	7	Clarke Donald, Dartford Mark	9780863074912	1992
23	Integrated Science Textbook	4	8	Merde C. Tan	9780071107587	2009
24	Algebra 2	3	9	Glencoe McGraw Hill	9780078738302	2008
25	Wiki at Panitikan	7	10	Lorenza P. Avera	9789710715749	2000
26	English Expressways TextBook for 4th year	9	11	Virginia Bermudez Ed. O. et al	9789710315338	2007
27	Asya Pag-usbong Ng Kabihasnan	8	12	Ricardo T. Jose, Ph . D.	9789710723249	2008
28	Literature (the readers choice)	9	13	Glencoe McGraw Hill	9780026353786	2001
29	Beloved a Novel	9	14	Toni Morrison	9781400033416	1987
30	Silver Burdett English	2	15	Judy Brim	9780382035753	1985
31	The Corporate Warriors (Six Classic Cases in Ameri	8	16	Douglas K. Ramsey	9780395354872	1987
32	Introduction to Information System	9	17	George M Marakas	9780073376882	2013

book

id_pk	owner_owa_fk	book_information_fk	date_added	status	availability
1	hcyms1	15	12/11/13 06:34 AM	New	Available
2	hcyms1	15	12/11/13 06:34 AM	New	Available
3	hcyms1	15	12/11/13 06:34 AM	New	Available
4	hcyms1	15	12/11/13 06:34 AM	New	Available
5	hcyms1	15	12/11/13 06:34 AM	New	Available
6	hcyms1	15	12/11/13 06:34 AM	New	Available
7	hcyms1	15	12/11/13 06:34 AM	New	Available
8	hcyms1	15	12/11/13 06:34 AM	New	Available
9	hcyms1	15	12/11/13 06:34 AM	New	Available
10	hcyms1	15	12/11/13 06:34 AM	New	Available
11	hcyms1	15	12/11/13 06:34 AM	New	Available
12	hcyms1	15	12/11/13 06:34 AM	New	Available
13	hcyms1	15	12/11/13 06:34 AM	New	Available
14	hcyms1	15	12/11/13 06:34 AM	New	Available
15	hcyms1	15	12/11/13 06:34 AM	New	Available
16	hcyms1	16	12/11/13 06:36 AM	New	Archived
17	hcyms1	16	12/11/13 06:36 AM	New	Archived
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19	hcyms1	16	12/11/13 06:36 AM	New	Archived
20	hcyms1	16	12/11/13 06:36 AM	New	Archived
21	hcyms1	16	12/11/13 06:36 AM	New	Archived
22	hcyms1	16	12/11/13 06:36 AM	New	Archived
23	hcyms1	16	12/11/13 06:36 AM	New	Archived
24	hcyms1	16	12/11/13 06:36 AM	New	Archived
25	hcyms1	16	12/11/13 06:36 AM	New	Archived
26	hcyms1	16	12/11/13 06:36 AM	New	Archived
27	hcyms1	16	12/11/13 06:36 AM	New	Archived
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33	hcyms1	16	12/11/13 06:36 AM	New	Archived
34	hcyms1	16	12/11/13 06:36 AM	New	Archived
35	hcyms1	16	12/11/13 06:36 AM	New	Archived
36	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
37	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
38	hcyms1	17	12/11/13 06:39 AM	Damage d	Available

39	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
40	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
41	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
42	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
43	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
44	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
45	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
46	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
47	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
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49	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
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61	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
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63	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
64	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
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67	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
68	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
69	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
70	hcyms1	17	12/11/13 06:39 AM	Damage d	Available
71	hcyms1	18	12/11/13 06:41 AM	New	Available
72	hcyms1	18	12/11/13 06:41 AM	New	Available
73	hcyms1	18	12/11/13 06:41 AM	New	Available
74	hcyms1	19	12/11/13 06:44 AM	Old	Lost
75	hcyms1	19	12/11/13 06:44 AM	Old	Lost
76	hcyms1	19	12/11/13 06:44 AM	Old	Lost
77	hcyms1	19	12/11/13 06:44 AM	Old	Lost
78	hcyms1	19	12/11/13 06:44 AM	Old	Lost
79	hcyms1	19	12/11/13 06:44 AM	Old	Lost
80	hcyms1	19	12/11/13 06:44 AM	Old	Lost
81	hcyms1	19	12/11/13 06:44 AM	Old	Lost
82	hcyms1	19	12/11/13 06:44 AM	Old	Lost
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84	hcyms1	19	12/11/13 06:44 AM	Old	Lost
85	hcyms1	19	12/11/13 06:44 AM	Old	Lost
86	hcyms1	19	12/11/13 06:44 AM	Old	Lost
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89	hcyms1	19	12/11/13 06:44 AM	Old	Lost
90	hcyms1	19	12/11/13 06:44 AM	Old	Lost
91	hcyms1	19	12/11/13 06:44 AM	Old	Lost
92	hcyms1	19	12/11/13 06:44 AM	Old	Lost
93	hcyms1	19	12/11/13 06:44 AM	Old	Lost
94	hcyms1	19	12/11/13 06:44 AM	Old	Lost
95	hcyms1	19	12/11/13 06:44 AM	Old	Lost
96	hcyms1	19	12/11/13 06:44 AM	Old	Lost
97	hcyms1	19	12/11/13 06:44 AM	Old	Lost
98	hcyms1	19	12/11/13 06:44 AM	Old	Lost

99	hcyms1	20	12/11/13 06:47 AM	Old	Available
100	hcyms1	20	12/11/13 06:47 AM	Old	Available
101	hcyms1	20	12/11/13 06:47 AM	Old	Available
102	hcyms1	20	12/11/13 06:47 AM	Old	Available
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107	hcyms1	20	12/11/13 06:47 AM	Old	Available
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112	hcyms1	20	12/11/13 06:47 AM	Old	Available
113	hcyms1	20	12/11/13 06:47 AM	Old	Available
114	hcyms1	20	12/11/13 06:47 AM	Old	Available
115	hcyms1	20	12/11/13 06:47 AM	Old	Available
116	hcyms1	20	12/11/13 06:47 AM	Old	Available
117	hcyms1	20	12/11/13 06:47 AM	Old	Available
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119	hcyms1	21	12/11/13 06:49 AM	Old	Available
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123	hcyms1	21	12/11/13 06:49 AM	Old	Available
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126	hcyms1	21	12/11/13 06:49 AM	Old	Available
127	hcyms1	21	12/11/13 06:49 AM	Old	Available
128	hcyms1	21	12/11/13 06:49 AM	Old	Available
129	hcyms1	22	12/11/13 06:52 AM	New	Available
130	hcyms1	22	12/11/13 06:52 AM	New	Available
131	hcyms1	22	12/11/13 06:52 AM	New	Available
132	hcyms1	22	12/11/13 06:52 AM	New	Available
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136	hcyms1	22	12/11/13 06:52 AM	New	Available
137	hcyms1	22	12/11/13 06:52 AM	New	Available
138	hcyms1	22	12/11/13 06:52 AM	New	Available
139	hcyms1	22	12/11/13 06:52 AM	New	Available
140	hcyms1	22	12/11/13 06:52 AM	New	Available

141	hcyms1	22	12/11/13 06:52 AM	New	Available
142	hcyms1	22	12/11/13 06:52 AM	New	Available
143	hcyms1	22	12/11/13 06:52 AM	New	Available
144	hcyms1	22	12/11/13 06:52 AM	New	Available
145	hcyms1	23	12/11/13 06:55 AM	New	Available
146	hcyms1	23	12/11/13 06:55 AM	New	Available
147	hcyms1	23	12/11/13 06:55 AM	New	Available
148	hcyms1	23	12/11/13 06:55 AM	New	Available
149	hcyms1	23	12/11/13 06:55 AM	New	Available
150	hcyms1	23	12/11/13 06:55 AM	New	Available
151	hcyms1	23	12/11/13 06:55 AM	New	Available
152	hcyms1	23	12/11/13 06:55 AM	New	Available
153	hcyms1	23	12/11/13 06:55 AM	New	Available
154	hcyms1	23	12/11/13 06:55 AM	New	Available
155	hcyms1	23	12/11/13 06:55 AM	New	Available
156	hcyms1	23	12/11/13 06:55 AM	New	Available
157	hcyms1	23	12/11/13 06:55 AM	New	Available
158	hcyms1	23	12/11/13 06:55 AM	New	Available
159	hcyms1	23	12/11/13 06:55 AM	New	Available
160	hcyms1	24	12/11/13 06:57 AM	New	Available
161	hcyms1	24	12/11/13 06:57 AM	New	Available
162	hcyms1	24	12/11/13 06:57 AM	New	Available
163	hcyms1	24	12/11/13 06:57 AM	New	Available
164	hcyms1	24	12/11/13 06:57 AM	New	Available
165	hcyms1	24	12/11/13 06:57 AM	New	Available
166	hcyms1	24	12/11/13 06:57 AM	New	Available
167	hcyms1	24	12/11/13 06:57 AM	New	Available
168	hcyms1	24	12/11/13 06:57 AM	New	Available
169	hcyms1	24	12/11/13 06:57 AM	New	Available
170	hcyms1	24	12/11/13 06:57 AM	New	Available
171	hcyms1	24	12/11/13 06:57 AM	New	Available
172	hcyms1	24	12/11/13 06:57 AM	New	Available
173	hcyms1	24	12/11/13 06:57 AM	New	Available
174	hcyms1	24	12/11/13 06:57 AM	New	Available
175	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
176	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
177	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
178	hcyms1	25	12/11/13 06:59 AM	Damage d	Available

179	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
180	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
181	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
182	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
183	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
184	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
185	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
186	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
187	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
188	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
189	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
190	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
191	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
192	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
193	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
194	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
195	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
196	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
197	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
198	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
199	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
200	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
201	hcyms1	25	12/11/13 06:59 AM	Damage d	Available
202	hcyms1	25	12/11/13 06:59 AM	Damage d	Available

203	hcyms1	26	12/11/13 07:01 AM	New	Available
204	hcyms1	26	12/11/13 07:01 AM	New	Available
205	hcyms1	26	12/11/13 07:01 AM	New	Available
206	hcyms1	26	12/11/13 07:01 AM	New	Available
207	hcyms1	26	12/11/13 07:01 AM	New	Available
208	hcyms1	26	12/11/13 07:01 AM	New	Available
209	hcyms1	26	12/11/13 07:01 AM	New	Available
210	hcyms1	26	12/11/13 07:01 AM	New	Available
211	hcyms1	26	12/11/13 07:01 AM	New	Available
212	hcyms1	26	12/11/13 07:01 AM	New	Available
213	hcyms1	26	12/11/13 07:01 AM	New	Available
214	hcyms1	26	12/11/13 07:01 AM	New	Available
215	hcyms1	26	12/11/13 07:01 AM	New	Available
216	hcyms1	26	12/11/13 07:01 AM	New	Available
217	hcyms1	26	12/11/13 07:01 AM	New	Available
218	hcyms1	26	12/11/13 07:01 AM	New	Available
219	hcyms1	26	12/11/13 07:01 AM	New	Available
220	hcyms1	26	12/11/13 07:01 AM	New	Available
221	hcyms1	26	12/11/13 07:01 AM	New	Available
222	hcyms1	26	12/11/13 07:01 AM	New	Available
223	hcyms1	26	12/11/13 07:01 AM	New	Available
224	hcyms1	26	12/11/13 07:01 AM	New	Available
225	hcyms1	26	12/11/13 07:01 AM	New	Available
226	hcyms1	27	12/11/13 07:02 AM	New	Available
227	hcyms1	27	12/11/13 07:02 AM	New	Available
228	hcyms1	27	12/11/13 07:02 AM	New	Available
229	hcyms1	27	12/11/13 07:02 AM	New	Available
230	hcyms1	27	12/11/13 07:02 AM	New	Available
231	hcyms1	27	12/11/13 07:02 AM	New	Available
232	hcyms1	27	12/11/13 07:02 AM	New	Available
233	hcyms1	27	12/11/13 07:02 AM	New	Available
234	hcyms1	27	12/11/13 07:02 AM	New	Available
235	hcyms1	27	12/11/13 07:02 AM	New	Available
236	hcyms1	27	12/11/13 07:02 AM	New	Available
237	hcyms1	27	12/11/13 07:02 AM	New	Available
238	hcyms1	27	12/11/13 07:02 AM	New	Available
239	hcyms1	27	12/11/13 07:02 AM	New	Available
240	hcyms1	27	12/11/13 07:02 AM	New	Available
241	hcyms1	27	12/11/13 07:02 AM	New	Available
242	hcyms1	27	12/11/13 07:02 AM	New	Available
243	hcyms1	27	12/11/13 07:02 AM	New	Available
244	hcyms1	27	12/11/13 07:02 AM	New	Available

245	hcyms1	27	12/11/13 07:02 AM	New	Available
246	hcyms1	27	12/11/13 07:02 AM	New	Available
247	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
248	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
249	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
250	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
251	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
252	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
253	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
254	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
255	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
256	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
257	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
258	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
259	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
260	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
261	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
262	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
263	hcyap1	28	12/11/13 07:05 AM	Damage d	Available
264	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
265	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
266	hcyms1	28	12/11/13 07:05 AM	Damage d	Available
267	hcyms1	29	12/11/13 07:07 AM	Old	Available
268	hcyms1	29	12/11/13 07:07 AM	Old	Available
269	hcyms1	29	12/11/13 07:07 AM	Old	Available
270	hcyms1	29	12/11/13 07:07 AM	Old	Available
271	hcyms1	29	12/11/13 07:07 AM	Old	Available

272	hcyms1	29	12/11/13 07:07 AM	Old	Available
273	hcyms1	29	12/11/13 07:07 AM	Old	Available
274	hcyms1	29	12/11/13 07:07 AM	Old	Available
275	hcyms1	29	12/11/13 07:07 AM	Old	Available
276	hcyms1	29	12/11/13 07:07 AM	Old	Available
277	hcyms1	29	12/11/13 07:07 AM	Old	Available
278	hcyms1	29	12/11/13 07:07 AM	Old	Available
279	hcyms1	29	12/11/13 07:07 AM	Old	Available
280	hcyms1	30	12/11/13 09:22 AM	Old	Available
281	hcyed1	30	12/11/13 09:22 AM	Old	Available
282	hcyms1	30	12/11/13 09:22 AM	Old	Available
283	hcyms1	30	12/11/13 09:22 AM	Old	Available
284	hcyms1	30	12/11/13 09:22 AM	Old	Available
285	hcyms1	30	12/11/13 09:22 AM	Old	Available
286	hcyms1	30	12/11/13 09:22 AM	Old	Available
287	hcyms1	30	12/11/13 09:22 AM	Old	Available
288	hcyms1	30	12/11/13 09:22 AM	Old	Available
289	hcyms1	30	12/11/13 09:22 AM	Old	Available
290	hcyms1	30	12/11/13 09:22 AM	Old	Available
291	hcyms1	30	12/11/13 09:22 AM	Old	Available
292	hcyms1	31	12/11/13 09:25 AM	Old	Available
293	hcyms1	31	12/11/13 09:25 AM	Old	Available
294	hcyed1	31	12/11/13 09:25 AM	Old	Available
295	hcyms1	31	12/11/13 09:25 AM	Old	Available
296	hcyms1	31	12/11/13 09:25 AM	Old	Available
297	hcyms1	31	12/11/13 09:25 AM	Old	Available
298	hcyms1	31	12/11/13 09:25 AM	Old	Available
299	hcyms1	31	12/11/13 09:25 AM	Old	Available
300	hcyms1	32	1/17/14 07:00 PM	New	Available
301	hcyms1	32	1/17/14 07:00 PM	New	Available
302	hcyms1	32	1/17/14 07:00 PM	New	Available
303	hcyed1	32	1/17/14 07:00 PM	New	Available
304	hcyms1	32	1/17/14 07:00 PM	New	Available
305	hcyms1	32	1/17/14 07:00 PM	New	Available
306	hcyms1	32	1/17/14 07:00 PM	New	Available
307	hcyms1	32	1/17/14 07:00 PM	New	Available
308	hcyms1	32	1/17/14 07:00 PM	New	Available
309	hcyms1	32	1/17/14 07:00 PM	New	Available

Appendix C: DLL and DML Coding

CREATE DATABASE BookSwamp;

USE BookSwamp;
CREATE TABLE category(id_pk int(2) AUTO_INCREMENT, name varchar(40) NOT NULL, PRIMARY KEY(id_pk));
INSERT INTO category (category.name) VALUES ("Periodical"), ("English"), ("Math"), ("Science"), ("Encyclopedia"), ("Filipiniana"), ("Newspaper"), ("General"), ("References");
CREATE TABLE member_type (id_pk int(2), name varchar(40) NOT NULL, PRIMARY KEY(id_pk));
INSERT INTO member_type (member_type.id_pk, member_type.name) VALUES (2,"Teacher"), (20,"Employee"), (21,"Non-Teaching"), (22,"Student"), (32,"Construction");
CREATE TABLE member (owa_pk varchar(6) CHECK(LENGTH(owa_pk) = 6), firstname varchar(30) NOT NULL, lastname varchar(30) NOT NULL, gender enum('M','F') NOT NULL, city varchar(30) NOT NULL, contactnumber varchar(17) CHECK(LENGTH(contactnumber) BETWEEN 9 AND 17), type_fk int(2) NOT NULL, year_level enum('First Year','Second Year','Third Year','Fourth Year','Faculty') NOT NULL, status enum('Active','Banned') NOT NULL, PRIMARY KEY(owa_pk), FOREIGN KEY(type_fk) REFERENCES member_type(id_pk));
INSERT INTO member (member.owa_pk, member.firstname, member.lastname, member.gender, member.city, member.contactnumber, member.type_fk, member.year_level, member.status) VALUES ("hcyjs1","John","Smith","M","Kuala Lumpur","60105510091",2,"First Year","Active"), ("hcym1","Mark","Sanchez","M","Talisay","60105510092",2,"Faculty","Active"),

("hcyaa1","April Joy","Aguilar","F","E.B. Magalona","60105510093",22,"Second Year","Banned"), ("hcyap1","Alfonso","Pancho","M","E.B. Magalona","60105510094",22,"First Year","Active"), ("hcyja1","Jonathan","Antanilla","M","E.B. Magalona","60105510095",22,"Fourth Year","Active"), ("hcyrp1","Renzo Bryan","Pedroso","M","Silay City","60105510096",22,"Third Year","Active"), ("hcyed1","Eleazar","Duterte","M","E.B. Magalona","60105510097",22,"Second Year","Active"), ("hcyee1","Ellen Mae","Espino","F","E.B. Magalona","60105510098",22,"First Year","Active"), ("hcyrm1","Ruth","Magbanua","F","E.B. Magalona","60105510099",22,"Second Year","Active"), ("hcysg1","Shaina Marie","Gabino","F","Silay City","60105510100",22,"Second Year","Active"), ("hcycp1","Chairty Joy","Punzalan","F","E.B. Magalona","60105510101",2,"Faculty","Active"), ("hcykd1","Kristine May","Dela Rosa","F","Silay City","60105510102",22,"Second Year","Active"), ("hcycl1","Chinie marie","Laborosa","F","E.B. Magalona","60105510103",22,"Second Year","Active"), ("hcyrm2","Ruby","Morante","F","E.B. Magalona","60105510104",2,"Faculty","Active");
CREATE TABLE admin (owa_fk_pk varchar(6) CHECK(Length(owa_fk_pk)=6), start_date date, PRIMARY KEY(owa_fk_pk), FOREIGN KEY(owa_fk_pk) REFERENCES member(owa_pk));
INSERT INTO admin (admin.owa_fk_pk, admin. start_date) VALUES ("hcyjs1","2022-04-01");
CREATE TABLE account (owa_fk_pk varchar(6) CHECK(LENGTH(owa_fk_pk) = 6), SHA1_hashedpassword varchar(40) CHECK(LENGTH(SHA1_hashedpassword) = 40), PRIMARY KEY(owa_fk_pk), FOREIGN KEY(owa_fk_pk) REFERENCES member(owa_pk));
INSERT INTO account VALUES ("hcyjs1","086cca3460b4d4500d869ca518742ff8ec37bedd"), ("hcym1","4b509c98a50433b8cc72a9fdbb5d055ddbdf38ac"), ("hcyaa1","14f0938df30b1b6f2697b3eb6f29a64f371282ca"), ("hcyap1","567775b8280711d8231fdb1c779d2e4b4a77f96d"), ("hcyja1","d9288fece1bd24e06103b5603481527635f3847f"), ("hcyrp1","30f44a7d8c1df9a8ee0749eb0bbe56eaf467661c"), ("hcyed1","73e28bc94e5621e687c07dc2b093a5f5d4aa7f2f"), ("hcyee1","c3dcb88e1813d1201a0c2804fe68fd14efaf4b06"), ("hcyrm1","e79837c83d6dc4ed8372ac09390889cd0a2c5011"),

<pre> ("hcysgl","fa2e32c6a752648843831a1117a5805b374bb122"), ("hcycp1","a9640f21d75b77812c374e9689fa75e0ccd0670b"), ("hcykd1","13ec6dfa02966f718b1ef846d8f0e8d4d8c9eeee"), ("hcycl1","b4c04c2f4f1a329f42fc3fa2153e3ffacacc5b82"), ("hcyrm2","8acd035fda4c015cc3d421c9302b195dccf7a63c"); </pre>
<pre> CREATE TABLE publisher (id_pk int(3) AUTO_INCREMENT, name varchar(50) NOT NULL, parentcompany varchar(50) NOT NULL, hq_address varchar(100) NOT NULL, PRIMARY KEY(id_pk)); </pre>
<pre> INSERT INTO publisher (publisher.name, publisher.parentcompany, publisher.hq_address) VALUES ("Benchmark Books","Marshall","3269 S Main St #250, Salt Lake City, UT 84115, United States"), ("Groiler Inc.,"Groiler Inc.,"Conneticut"), ("Prentice Hall","Pearson Education. Inc","Hoboken, New Jersey"), ("Philipines Daily Inquirer","Publication Inc.,"Pasay City"), ("Prentice Hall","Regency Publishing Group","Hoboken, New Jersey, United States"), ("Publication Inc.,"Mansueto Ventures LLC","Lexicon"), ("Publisher","Pearson PLC","Westport Conneticut"), ("Vibal Group","Vibal Publishing House Inc.,"12536. Araneta Avenue Corner Ma. Clara St., Quezon City, Singapore"), ("McGrawhill","The McGrawHill Companies Inc.,"New York, United States"), (" Jgm Publishing Ltd.,"JGM & S Corporation","Oldham, Greater Manchester, England"), ("SD Publications, Inc.,"SD Publications, Inc.,"Gregorio Araneta Avenue, Quezon City, Singapore"), ("Vibal Group","Vibal Publishing House Inc.,"Araneta Avenue . Cor. Maria Clara St., Quezon City, Singapore"), ("McGraw-Hill Education","the McGrawHill Companies Inc","New York, United States"), ("Alfred A. Knoff, Inc","Knopf Doubleday Publishing Group","New York, New York, United States"), ("Silver","Silver Burdett Company","211 E. 7th Street, Suite 620, Austin, TX"), ("Houghton Mifflin Company","Houghton Mifflin Company","Boston, United States"), ("Brian INC","CHMSC","7101 SW 66th St, Miami, Florida, United States"); </pre>
<pre> CREATE TABLE book_information (id_pk int(4) AUTO_INCREMENT, title varchar(50) NOT NULL, category_fk int(2), publisher_fk int(2), authors varchar(100) NOT NULL, isbn_13 varchar(13) CHECK(LENGTH(isbn_13)=13), copyright_year year CHECK(LENGTH(copyright_year)=4), PRIMARY KEY(id_pk), FOREIGN KEY(category_fk) REFERENCES category(id_pk), FOREIGN KEY(publisher_fk) REFERENCES publisher(id_pk) </pre>

);
ALTER TABLE book_information AUTO_INCREMENT=15;
INSERT INTO book_information (book_information.title, book_information.publisher_fk, book_information.category_fk, book_information.authors, book_information.isbn_13, book_information.copyright_year) VALUES ("Natural Resources",1,8,"Robin Kerrod",9781854356284,1994), ("Encyclopedia Americana",2,5,"Grolier",9781854356284,1993), ("Algebra 1",3,3,"Carolyn Bradshaw, Michael Seals",9780717201198,2004), ("The Philippine Daily Inquirer",4,7,"Various",9780131250871,2013), ("Science in our World",5,4,"Brian Knapp",9781864180497,1996), ("Literature",5,9,"Greg Glowka",9780130508416,2001), ("Lexicon Universal Encyclopedia",6,5,"Lexicon",9780717220250,1993), ("Science and Invention Encyclopedia",7,5,"Clarke Donald, Dartford Mark",9780863074912,1992), ("Integrated Science Textbook ",8,4,"Merde C. Tan",9780071107587,2009), ("Algebra 2",9,3,"Glencoe McGraw Hill",9780078738302,2008), ("Wiki at Panitikan ",10,7,"Lorenza P. Avera",9789710715749,2000), ("English Expressways TextBook for 4th year",11,9,"Virginia Bermudez Ed. O. et al",9789710315338,2007), ("Asya Pag-usbong Ng Kabihasan",12,8,"Ricardo T. Jose, Ph . D.",9789710723249,2008), ("Literature (the readers choice)",13,9,"Glencoe McGraw Hill",9780026353786,2001), ("Beloved a Novel",14,9,"Toni Morrison",9781400033416,1987), ("Silver Burdett English",15,2,"Judy Brim",9780382035753,1985), ("The Corporate Warriors (Six Classic Cases in American Business)",16,8,"Douglas K. Ramsey",9780395354872,1987), ("Introduction to Information System",17,9,"George M Marakas",9780073376882,2013);
CREATE TABLE book (id_pk int(4) AUTO_INCREMENT, owner_owa_fk varchar(6) NOT NULL, book_information_id_fk int(4) NOT NULL, date_added datetime NOT NULL, status enum('New','Old','Damaged') NOT NULL, availability enum('Available','Archived','Lost') NOT NULL, PRIMARY KEY(id_pk), FOREIGN KEY(owner_owa_fk) REFERENCES member(owa_pk), FOREIGN KEY(book_information_id_fk) REFERENCES book_information(id_pk));
INSERT INTO book (book.owner_owa_fk, book.book_information_id_fk, book.date_added, book.status, book.availability) VALUES /*15*/ ("hcym1",15,"2013-12-11 06:34:27","New","Available"), ("hcym1",15,"2013-12-11 06:34:27","New","Available"), ("hcym1",15,"2013-12-11 06:34:27","New","Available"), ("hcym1",15,"2013-12-11 06:34:27","New","Available"), ("hcym1",15,"2013-12-11 06:34:27","New","Available"), ("hcym1",15,"2013-12-11 06:34:27","New","Available"), ("hcym1",15,"2013-12-11 06:34:27","New","Available"),

[illegible]

/*24*/

[illegible]

/*25*/

<pre> ("hcym1",31,"2013-12-11 09:25:32","Old","Available"), ("hcym1",31,"2013-12-11 09:25:32","Old","Available"), ("hcyed1",31,"2013-12-11 09:25:32","Old","Available"), ("hcym1",31,"2013-12-11 09:25:32","Old","Available"), ("hcym1",31,"2013-12-11 09:25:32","Old","Available"), ("hcym1",31,"2013-12-11 09:25:32","Old","Available"), ("hcym1",31,"2013-12-11 09:25:32","Old","Available"), ("hcym1",31,"2013-12-11 09:25:32","Old","Available"), /*32*/ ("hcym1",32,"2014-01-17 19:00:10","New","Available"), ("hcym1",32,"2014-01-17 19:00:10","New","Available"), ("hcym1",32,"2014-01-17 19:00:10","New","Available"), ("hcyed1",32,"2014-01-17 19:00:10","New","Available"), ("hcym1",32,"2014-01-17 19:00:10","New","Available"), ("hcym1",32,"2014-01-17 19:00:10","New","Available"), ("hcym1",32,"2014-01-17 19:00:10","New","Available"), ("hcym1",32,"2014-01-17 19:00:10","New","Available"), ("hcym1",32,"2014-01-17 19:00:10","New","Available"), ("hcym1",32,"2014-01-17 19:00:10","New","Available"); </pre>
<pre> CREATE TABLE borrow (id_pk int(4) AUTO_INCREMENT, book_id_fk int(4), borrower_owa_fk varchar(6), borrow_date datetime, due_date date, PRIMARY KEY(id_pk), FOREIGN KEY(book_id_fk) REFERENCES book(id_pk), FOREIGN KEY(borrower_owa_fk) REFERENCES member(owa_pk)); </pre>
<pre> ALTER TABLE borrow AUTO_INCREMENT=482; </pre>
<pre> CREATE TABLE returns (borrow_id_fk_pk int(4), return_date datetime, PRIMARY KEY(borrow_id_fk_pk), FOREIGN KEY(borrow_id_fk_pk) REFERENCES borrow(id_pk)); </pre>
<pre> INSERT INTO borrow VALUES (484,16,"hcyja1","2014-03-20 23:50:27","2014-03-21"), (483,15,"hcyja1","2014-03-20 23:49:34","2014-03-21"), (482,15,"hcym1","2014-03-20 23:38:22","2014-01-3"); </pre>
<pre> INSERT INTO returns VALUES (483,"2014-03-21 00:30:51"); </pre>

