Database Systems

Project Report

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Contents

1 Entity Relationship Diagram (ERD)

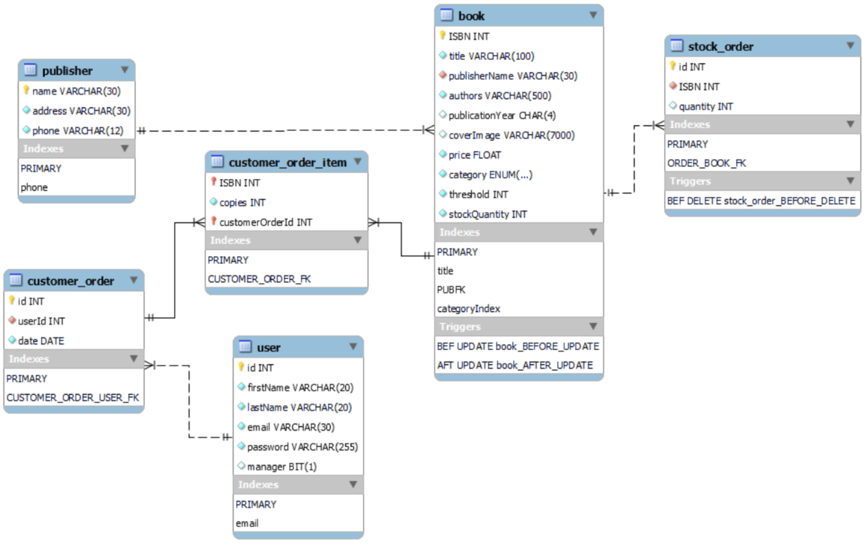
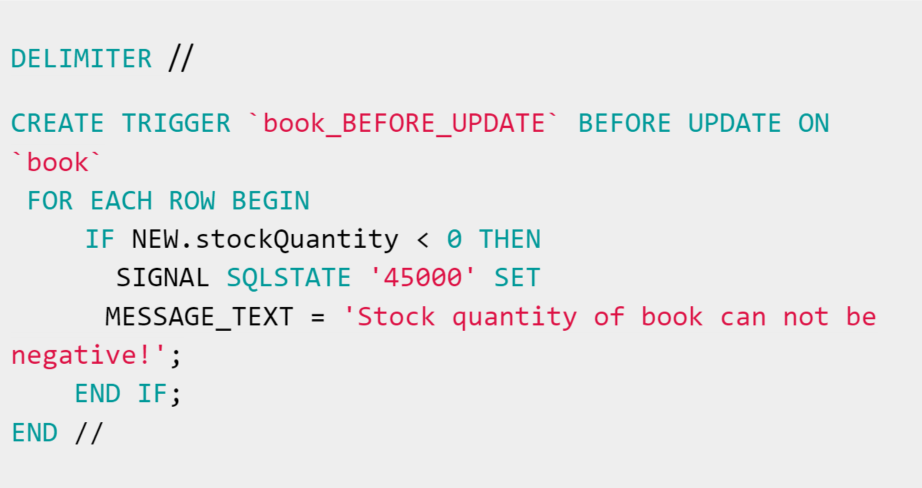


Figure 1: Order Transaction System ERD.

2 Triggers

2.1 Modify existing books

- Before update trigger.
- Rejects update if stock quantity of the book will be negative when a copy or more of the book is sold.
- Ensures that there are enough books in stock to be sold for an order.



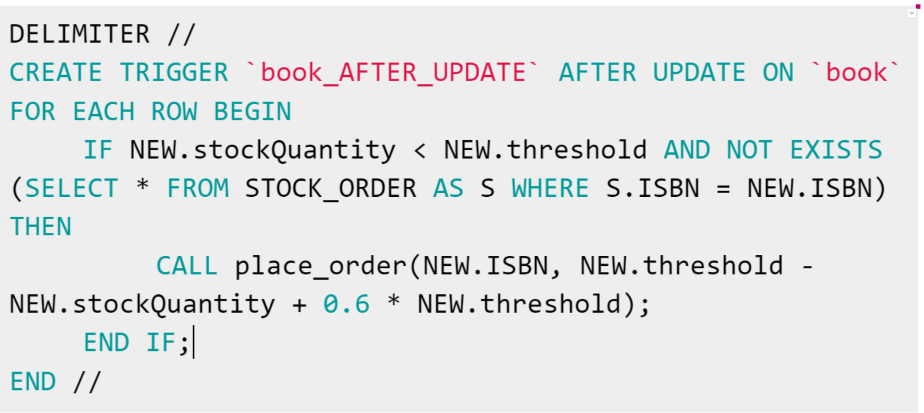
```
DELIMITER //

CREATE TRIGGER `book_BEFORE_UPDATE` BEFORE UPDATE ON
`book`
 FOR EACH ROW BEGIN
     IF NEW.stockQuantity < 0 THEN
       SIGNAL SQLSTATE '45000' SET
      MESSAGE_TEXT = 'Stock quantity of book can not be
negative!';
    END IF;
END //
```

Figure 2: Before Update Trigger.

2.2 Place Order

- After update trigger.
- Warns manager that stock quantity of book is under threshold after updating book copies so that manager should place order with the rest quantity (threshold – stock quantity).
- Ensures that enough books in the stock at minimum equals threshold.
- When the stock quantity of a book after update becomes less than the threshold and there is already no existing order placed for this book in the STOCK_ORDER table, a "place_order(ISBN, quantity)" procedure is called inside the trigger.

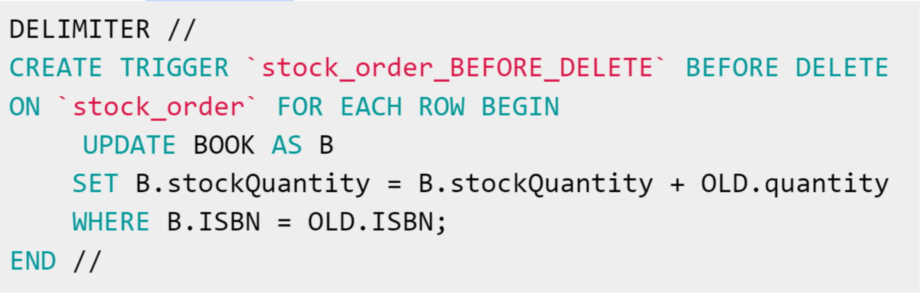


```
DELIMITER //
CREATE TRIGGER `book_AFTER_UPDATE` AFTER UPDATE ON `book`
FOR EACH ROW BEGIN
     IF NEW.stockQuantity < NEW.threshold AND NOT EXISTS
(SELECT * FROM STOCK_ORDER AS S WHERE S.ISBN = NEW.ISBN)
THEN
          CALL place_order(NEW.ISBN, NEW.threshold -
NEW.stockQuantity + 0.6 * NEW.threshold);
     END IF;
END //
```

Figure 3: After Update Trigger.

2.3 Confirm Order

- Before Delete Trigger.
- No required validations, it depends on user decision.
- Update stock quantity of book in BOOK table when we want to confirm order (old stock quantity + order quantity).

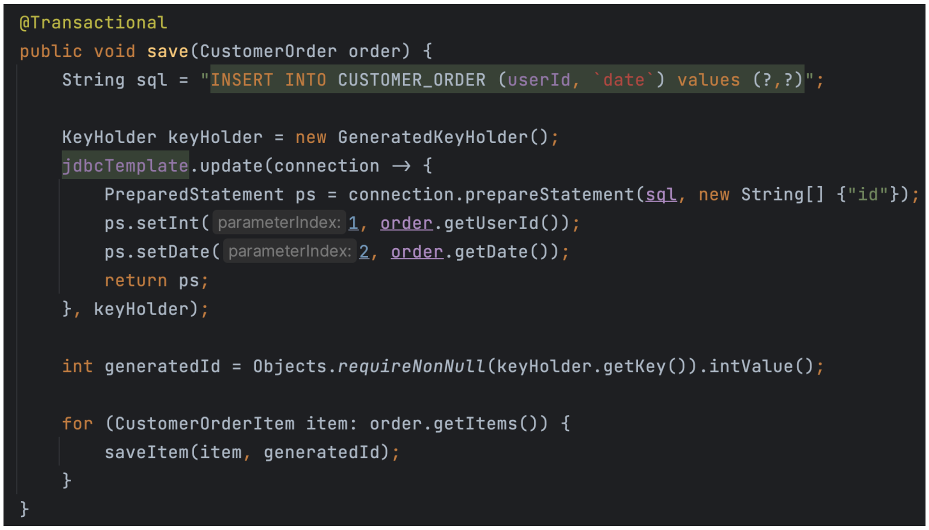


```sql
DELIMITER //
CREATE TRIGGER `stock_order_BEFORE_DELETE` BEFORE DELETE
ON `stock_order` FOR EACH ROW BEGIN
     UPDATE BOOK AS B
    SET B.stockQuantity = B.stockQuantity + OLD.quantity
    WHERE B.ISBN = OLD.ISBN;
END //
```

Figure 4: Before Delete Trigger.

3 Transactions

The @Transactional Bean makes sure that a transaction doesn't cause any inconsistencies in the Database.



```java
@Transactional
public void save(CustomerOrder order) {
    String sql = "INSERT INTO CUSTOMER_ORDER (userId, `date`) values (?,?)";

    KeyHolder keyHolder = new GeneratedKeyHolder();
    jdbcTemplate.update(connection -> {
        PreparedStatement ps = connection.prepareStatement(sql, new String[] {"id"});
        ps.setInt( parameterIndex: 1, order.getUserId());
        ps.setDate( parameterIndex: 2, order.getDate());
        return ps;
    }, keyHolder);

    int generatedId = Objects.requireNonNull(keyHolder.getKey()).intValue();

    for (CustomerOrderItem item: order.getItems()) {
        saveItem(item, generatedId);
    }
}
```

Figure 5: Example for Transactional Bean.

4 Indices

There are built-in indices for primary key and unique attributes.

4.1 Publisher

- Name Index (primary index).
- Phone (unique attribute) Index.

4.2 Book

4.2.1 ISBN (Primary Index)

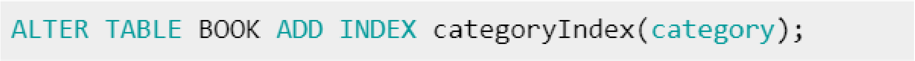
Supports quick search by ISBN.

4.2.2 Title (Unique Attribute)

Supports quick search by title of the book.

4.2.3 Category Index

Support quick search for books of the same category by clustering them.



```
ALTER TABLE BOOK ADD INDEX categoryIndex(category);
```

Figure 6: Creating Category Index.

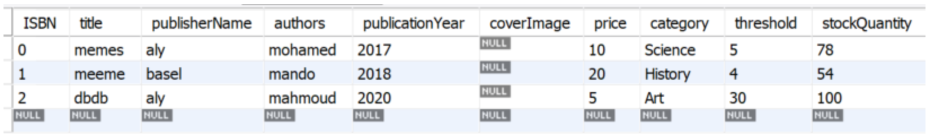
4.3 User

- Email index (Unique Attribute).

5 Jasper Report

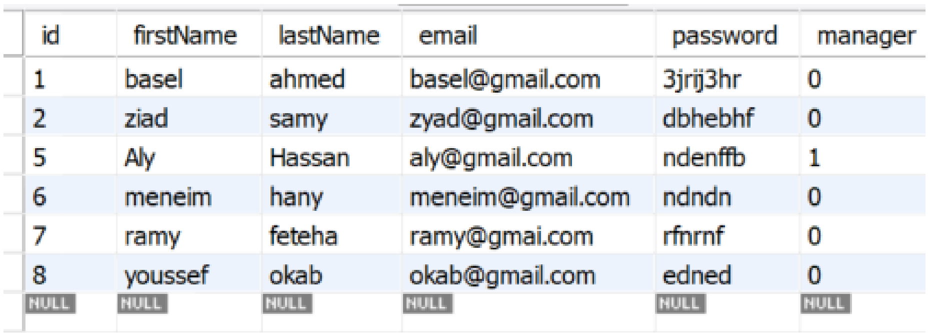
The following is an example of what will be shown when a manager shows the required statistics in the store.

5.1 Database Instance



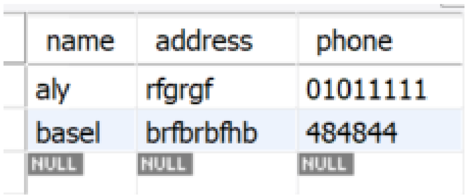
ISBN	title	publisherName	authors	publicationYear	coverImage	price	category	threshold	stockQuantity
0	memes	aly	mohamed	2017	NULL	10	Science	5	78
1	meeme	basel	mando	2018	NULL	20	History	4	54
2	dbdb	aly	mahmoud	2020	NULL	5	Art	30	100
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Figure 7: Book Table.



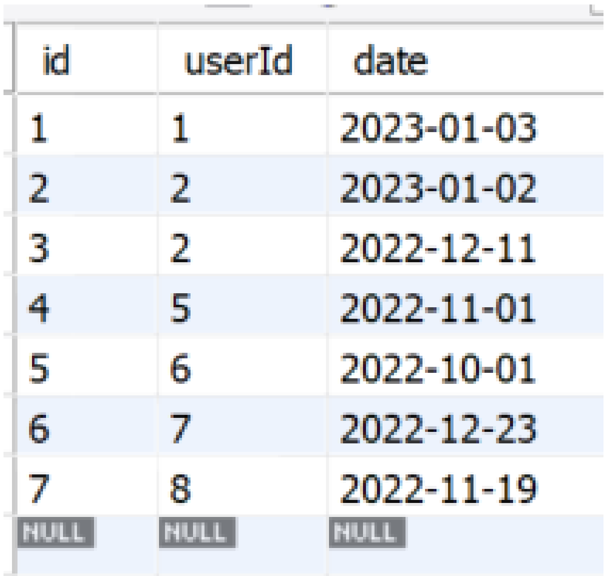
id	firstName	lastName	email	password	manager
1	basel	ahmed	basel@gmail.com	3jrij3hr	0
2	ziad	samy	zyad@gmail.com	dbhebhf	0
5	Aly	Hassan	aly@gmail.com	ndenffb	1
6	meneim	hany	meneim@gmail.com	ndndn	0
7	ramy	feteha	ramy@gmai.com	rfnrnf	0
8	youssef	okab	okab@gmail.com	edned	0
NULL	NULL	NULL	NULL	NULL	NULL

Figure 8: User Table.



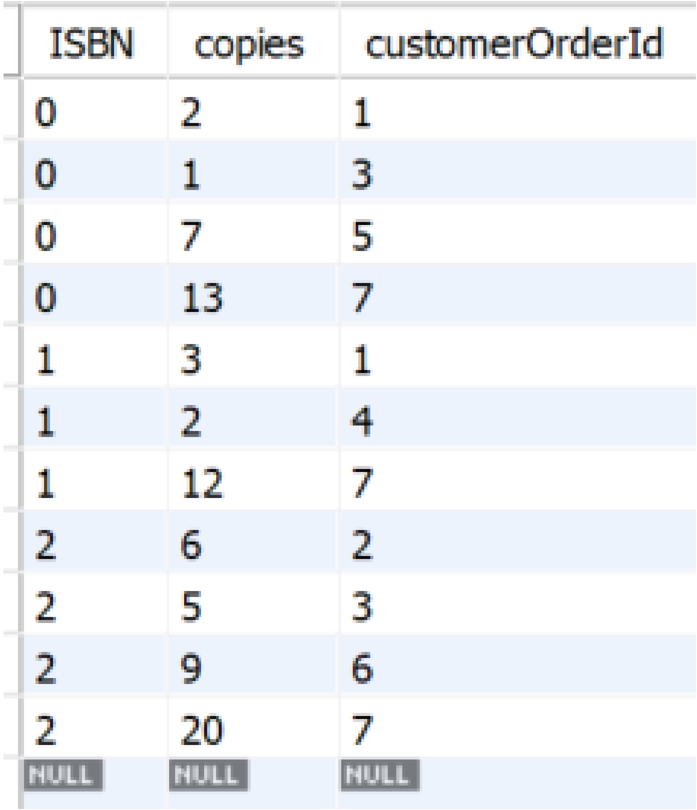
name	address	phone
aly	rfgrgf	01011111
basel	brfbrbfhb	484844
NULL	NULL	NULL

Figure 9: Publisher Table.



id	userId	date
1	1	2023-01-03
2	2	2023-01-02
3	2	2022-12-11
4	5	2022-11-01
5	6	2022-10-01
6	7	2022-12-23
7	8	2022-11-19
NULL	NULL	NULL

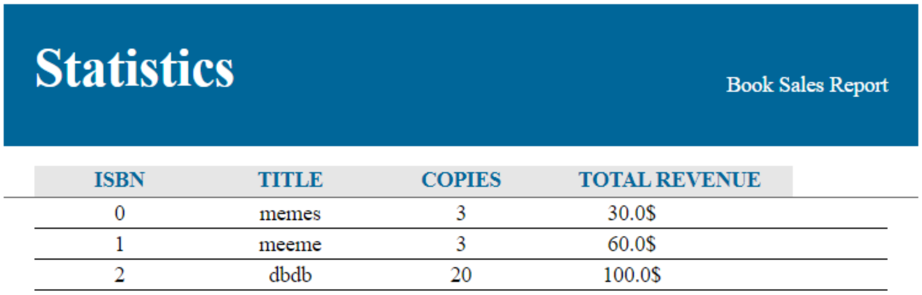
Figure 10: Customer Order Table.



ISBN	copies	customerOrderId
0	2	1
0	1	3
0	7	5
0	13	7
1	3	1
1	2	4
1	12	7
2	6	2
2	5	3
2	9	6
2	20	7
NULL	NULL	NULL

Figure 11: Customer Order Item Table.

5.2 Report

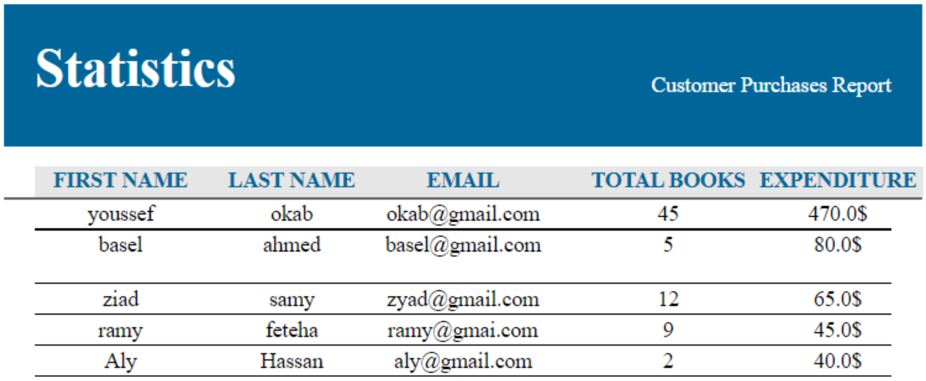


Statistics

Book Sales Report

ISBN	TITLE	COPIES	TOTAL REVENUE
0	memes	3	30.0$
1	meeme	3	60.0$
2	dbdb	20	100.0$

Figure 12: Total Sales For Books In The Previous Month.

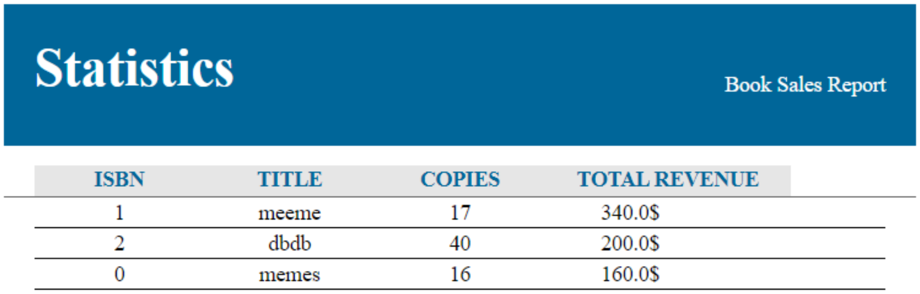


Statistics

Customer Purchases Report

FIRST NAME	LAST NAME	EMAIL	TOTAL BOOKS	EXPENDITURE
youssef	okab	okab@gmail.com	45	470.0$
basel	ahmed	basel@gmail.com	5	80.0$
ziad	samy	zyad@gmail.com	12	65.0$
ramy	feteha	ramy@gmai.com	9	45.0$
Aly	Hassan	aly@gmail.com	2	40.0$

Figure 13: Top 5 Customers.



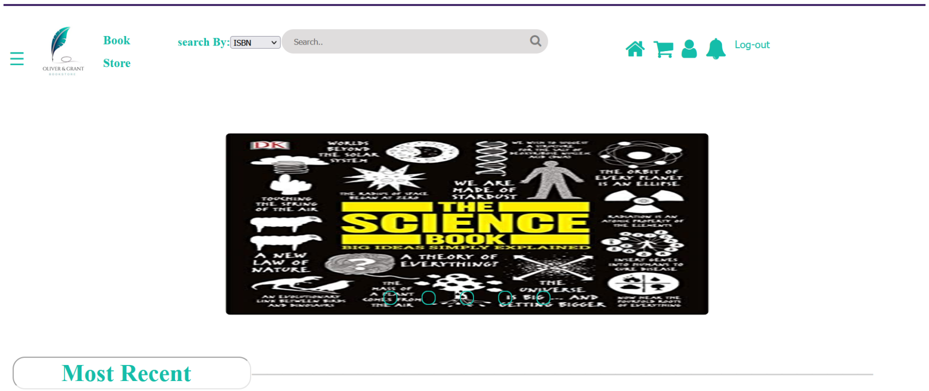
Statistics

Book Sales Report

ISBN	TITLE	COPIES	TOTAL REVENUE
1	meeme	17	340.0$
2	dbdb	40	200.0$
0	memes	16	160.0$

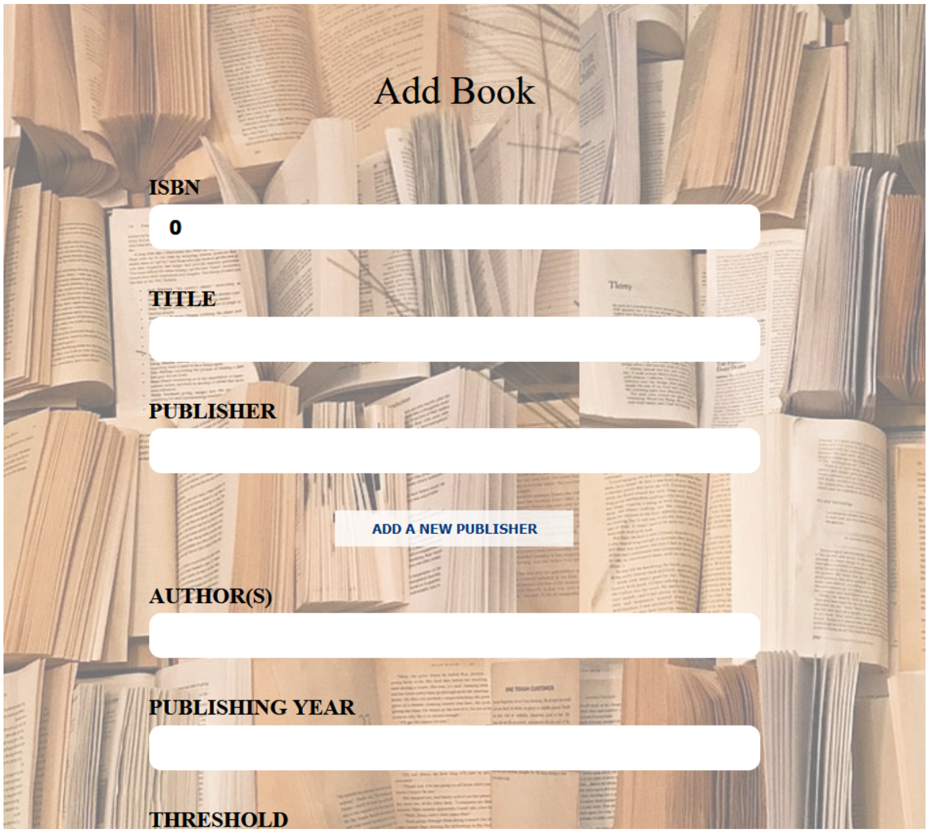
Figure 14: Top 10 Selling Books In The Last 3 Months.

6 Front-end



search By: ISBN

Figure 15: Online Book Store Home Page.



Add Book

ISBN

0

TITLE

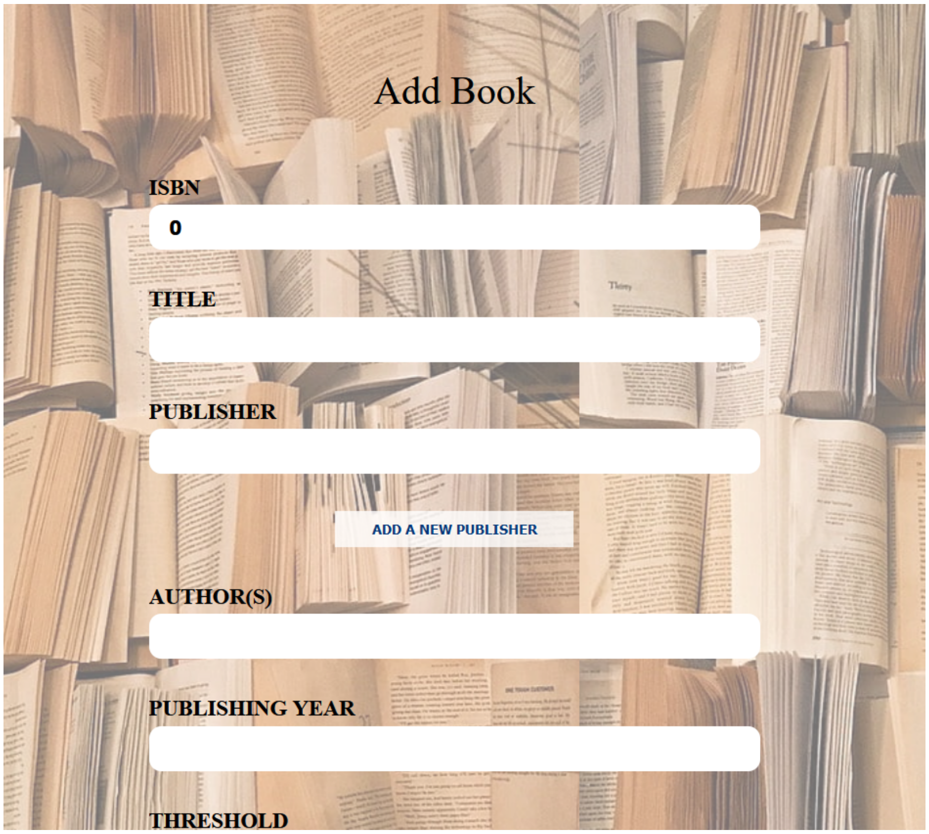
PUBLISHER

AUTHOR(S)

PUBLISHING YEAR

THRESHOLD

Figure 16: Adding A Book.



Add Book

ISBN

0

TITLE

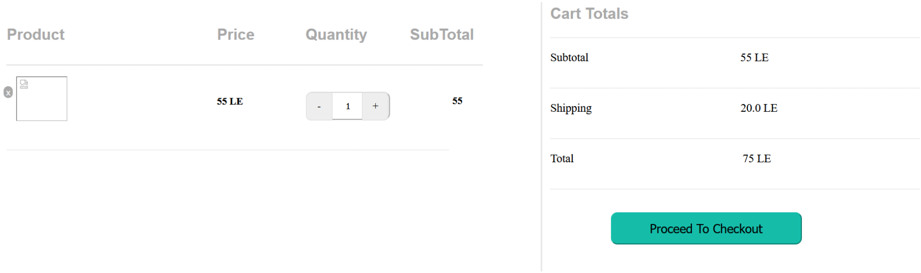
PUBLISHER

AUTHOR(S)

PUBLISHING YEAR

THRESHOLD

Figure 17: Adding A Publisher.

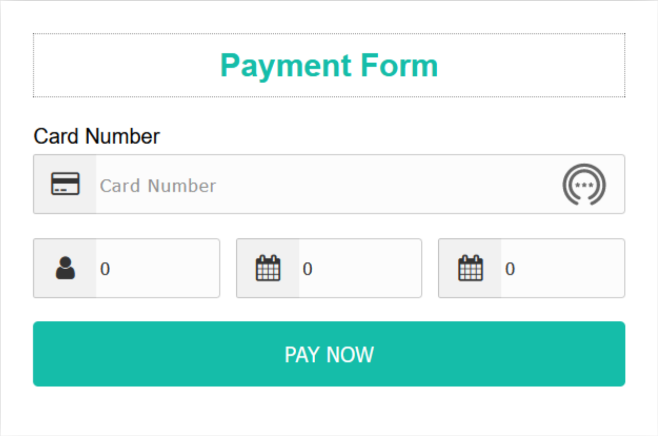


Product	Price	Quantity	SubTotal
	55 LE	- 1 +	55

Cart Totals

Subtotal	55 LE
Shipping	20.0 LE
Total	75 LE

Figure 18: Checkout Cart.



Payment Form

Card Number

Card Number

0 0 0

Figure 19: Payment Window.

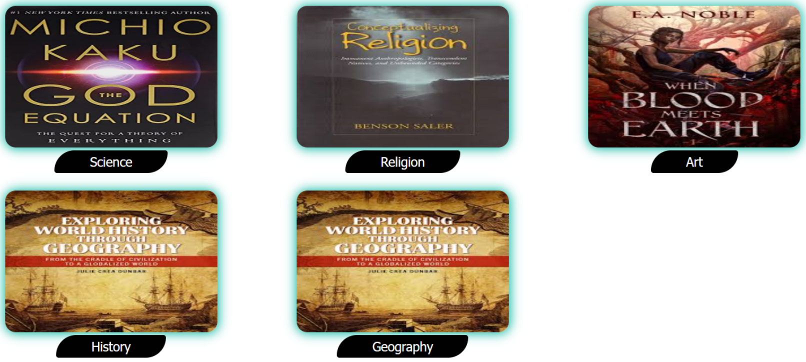


Figure 20: Categories.