

**GROUP ASSIGNMENT**

**TECHNOLOGY PARK MALAYSIA**

**CT069-3-3-DBS**

**Database Security**

**APD3F2202CS(DA), APU3F2202CS(CYB),** **APD3F2022IT(ISS)**

**NAME OF LECTURER: KULOTHUNKAN PALASUNDRAM**

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| --- | --- | --- |
| **STUDENT NAME** | **TP-NUMBER** | **INTAKE** |
| Mozhar Alhosni | TP058272 | APD3F2202CS(CYB) |
| Tarun Aitha | TP058015 | APD3F2022CS(DA) |
| Khirthiga A/P Chandrasekharan | TP058844 | APD3F2022CS(CYB) |
| Haroon Gilani | TP058413 | APD3F2022IT(ISS) |

Table of Contents

[1.0 Workload Matrix 3](#_Toc115095929)

[2.0 Relational Database with Integrity and Redundancy Controls 4](#_Toc115095930)

[2.1 Relational Database Model in 3NF 4](#_Toc115095931)

[2.2 Data Dictionary 4](#_Toc115095932)

[2.3 Individual Deliverables 11](#_Toc115095933)

[2.3.1 Mozhar Alhosni – TP058272 11](#_Toc115095934)

[2.3.2 Tarun Aitha – TP058015 12](#_Toc115095935)

[2.3.3 Khirthiga A/P Chandrasekharan – TP058844 14](#_Toc115095936)

[2.3.4 Haroon Gilani – TP058413 15](#_Toc115095937)

[3.0 User Administration and Authorization Matrix 17](#_Toc115095938)

[3.1 Authorization Matrix 17](#_Toc115095939)

[3.2 Individual Deliverables 19](#_Toc115095940)

[3.2.1 Mozhar Alhosni – TP058272 19](#_Toc115095941)

[3.2.2 Tarun Aitha– TP058015 20](#_Toc115095942)

[3.2.3 Khirthiga A/P Chandrasekharan – TP058844 21](#_Toc115095943)

[3.2.4 Haroon Gilani – TP058413 21](#_Toc115095944)

[4.0 Database Auditing 23](#_Toc115095945)

[4.1 Mozhar Alhosni – TP058272 23](#_Toc115095946)

[*4.2 Tarun Aitha – TP058015* 23](#_Toc115095947)

[*4.3 Khirthiga A/P Chandrasekharan – TP058844* 23](#_Toc115095948)

[*4.4 Haroon Gilani – TP058413* 24](#_Toc115095949)

[5.0 Database Encryption 1](#_Toc115095950)

[5.1 Mozhar Alhosni – TP058272 1](#_Toc115095951)

[*5.2 Tarun Aitha – TP058015* 1](#_Toc115095952)

[*5.3 Khirthiga A/P Chandrasekharan – TP058844* 1](#_Toc115095953)

[*5.4 Haroon Gilani – TP058413* 2](#_Toc115095954)

# 1.0 Workload Matrix

Table

Description automatically generated

# 2.0 Relational Database with Integrity and Redundancy Controls

## 2.1 Relational Database Model in 3NF

Member (MemberID, Name, City, Street, Postcode, PhoneNumber, Type, LoginID, PaymentCardNumberEncrypted)

Transaction (TransactionID, MemberID, DateOfPurchase, IsDeletedByUser)

Publisher (PublisherID, Name, Address, Country)

Category (CategoryName, Tax, Discount)

Book (BookID, Title, CategoryName, Price, PublicationDate, Quantity)

BooksPublished (BookID, PublisherID)

NumberOfCopiesPurchasedPerBook (TransactionID, BookID, NumberOfCopies, TotalPaid)

Author (AuthorID, Name)

AuthoredBooks (AuthorID, BookID)

## 2.2 Data Dictionary

Relation/Table Name: Member

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| MemberID | INT IDENTITY (1,1) | PRIMARY KEY | 119 | Stores a unique, auto incremented MemberID of a Member starting at 1 |
| Name | VARCHAR (90) | NOT NULL | RajRaj | The name of the user in the database. |
| City | VARCHAR (30) | NOT NULL | Malacca City | The city where the user lives. |
| Street | VARCHAR (45) | NOT NULL | Jalan Tun Ali | The street name where the user lives. |
| Postcode | CHAR (5) | NULL | 57000 | The post code of the city. |
| PhoneNumber | VARCHAR (11) | NOT NULL | 0123456789 | The mobile number of the user. |
| Type | VARCHAR (20) | NOT NULL, Value Must be Staff or Student | Staff | The position of the user in the library. |
| LoginID | VARCHAR (30) | NULL | Raj123@APUBSPLD.com | The email ID of the user. |
| PaymentCardNumberEncrypted | VARBINARY (1000) | NOT NULL | 0X12sw445rt6hh8dnnn389999 | The credit/debit card number of the user. (Encrypted) |

Relation/Table Name: Transaction

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| TransactionID | INT IDENTITY (1,1) | PRIMARY KEY | 1 | Stores a unique, autoincremented Transaction ID for the user when a transaction is done. |
| MemberID | INT | FOERIGN KEY | 2 | The ID from the Member Table. |
| DateOfPurchase | DATE | DEFAULT CONVERT (DATE, GETDATE ()) | 2020-08-09 | Stores the date when the user purchases a book from the library. |
| IsDeleted | BIT | DEFAULT IS 0, NOT NULL | 0 | 0 is FALSE, 1 is TRUE |

Relation/Table Name: Publisher

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| PublisherID | INT IDENTITY (1,1) | PRIMARY KEY | 1 | Stores a unique, autoincremented Publisher ID for the Publisher when a Publisher is added in the database. |
| Name | VARCHAR (90) | NOT NULL | SK Publishers | The name of the publisher |
| Address | VARCHAR (80) | NOT NULL | G 2850 Jln Sj 5/7 B Taman Jaya | The address of the publisher |
| Country | VARCHAR (50) | NOT NULL | Malaysia | The county of the publisher located. |

Relation/Table Name: Category

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| CategoryName | VARCHAR (70) | PRIMARY KEY | Children | The category of the book. |
| Tax | TINYINT | DEFAULT IS 0, Value = > 0 and < = 100 | 10 | The Tax applied on the category |
| Discount | TINYINT | DEFAULT IS 0, Value = > 0 and < = 100 | 20 | The discount applied on the category. |

Relation/Table Name: Book

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| BookID | INT IDENTITY (1,1) | PRIMARY KEY | 2 | Stores a unique, autoincremented Book ID for the Book when a Book is added in the database. |
| Title | VARCHAR (150) | NOT NULL | Dream Big Little One | The name of the book. |
| CategoryName | VARCHAR  (70) | FOREIGN KEY | Children | The category of the book |
| Price | SMALLINT | NOT NULL, Price should be > = 1 | 300 | The price of the book. |
| PublicationDate | DATE | NOT NULL | 2015-01-22 | The date when the book was published. |
| Quanity | SMALLINT | NOT NUL, Value should be > = 0. | 5 | The number of books available in the library database. |

Relation/Table Name: BooksPublished

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| BookID | INT | FOERIGN KEY | 1 | The ID of the book in the database |
| PublisherID | INT | FOERIGN KEY | 2 | The ID of the publisher in the database |

Relation/Table Name: NumberOfCopiesPurchasedPerBook

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| TransactionID | INT | PRIMARY KEY, FOERIGN KEY | 2 | The ID for a transaction when a book is purchased. |
| BookID | INT | FOREIGN KEY | 3 | The ID of the book |
| NumberOfCopies | TINY INT | Values > 1 | 4 | The number of books purchased. |
| TotalPaid | INT | NULL | 230 | The total amount of the purchased book. |

Relation/Table Name: Author

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| AuthorID | INT IDENTITY (1,1) | PRIMARY KEY | 5 | Stores a unique, autoincremented Author ID for the Author when an Author is added in the database. |
| Name | VARCHAR (90) | NOT NULL | Daud Khalid | The Name of the Author. |

Relation/Table Name: AuthoredBooks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Constrain(s)** | **Example** | **Description** |
| AuthorID | INT | PRIMARY KEY, FOREIGN KEY | 2 | The ID of the Author. |
| BookID | INT | FOREIGN KEY | 3 | The ID of the book. |

## 2.3 Individual Deliverables

### 2.3.1 Mozhar Alhosni – TP058272

DDL of the Member table. All referential integrity checks were used (only if applicable):

A screenshot of a computer

Description automatically generated with medium confidence

DML of the Member table:

Graphical user interface

Description automatically generated

DDL of the BooksPublished table; since this is a bridge entity, it has a composite primary key:

A picture containing text

Description automatically generated

DML of the BooksPublished table:

Text

Description automatically generated

DDL of the AuthoredBooks table:

A picture containing text

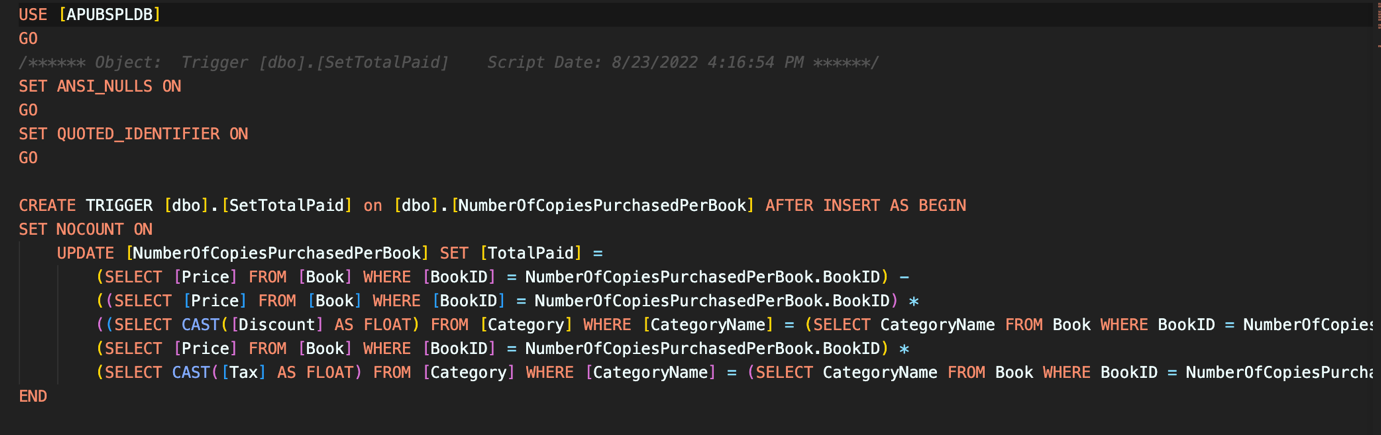
Description automatically generated

DDL of the AuthoredBooks table:

A picture containing text

Description automatically generated

The below trigger will set the column SetTotalPaid as the total amount to be paid by the customer including the discount added and tax added:



### 2.3.2 Tarun Aitha – TP058015

DDL of the Book table:

Text

Description automatically generated

DDL of the Book table:

Graphical user interface, text

Description automatically generated

DML of the Book table:

Text

Description automatically generated with medium confidence

DML of the Transaction table:

Text

Description automatically generated

The below trigger will set login ID as the value in the column that is added where it joins the name with a random number and ends with @apubspl.com:

Text

Description automatically generated

### 2.3.3 Khirthiga A/P Chandrasekharan – TP058844

DDL of the NumberOfCopiesPurchasedPerBook table:

Text

Description automatically generated

DDL of the Publisher table:

Text

Description automatically generated

DML of the NumberOfCopisePurchasedPerBook:

Text

Description automatically generated

DML of the Publisher:

Text

Description automatically generated

Text

Description automatically generated

The above figure will trigger the column the SetUserDeletedToTrue as 1 whenever the user deletes transactions

### 2.3.4 Haroon Gilani – TP058413

DDL For Cateogory

Text

Description automatically generated

DDL for Author

Text

Description automatically generated

DML for Cateogory

A picture containing table

Description automatically generated

DML for Author

Text

Description automatically generated

Text

Description automatically generated

The above figure is the script for the select top Nrows command .

# 3.0 User Administration and Authorization Matrix

## 3.1 Authorization Matrix

|  |  |  |  |
| --- | --- | --- | --- |
| Account | Type | Object(s) | Privilege(s) |
| MembersRole | Role | Table:   * Member | Read (SELECT) |
| MembersRole | Role | Table:   * Book | Read (SELECT) |
| MembersRole | Role | Table:   * Member   Columns:   * Name * City * Street * Postcode * PhoneNumber * PaymentCardNumber | Update (UPDATE) |
| MembersRole | Role | Table:   * Transaction | Read, Update, Delete (SELECT, UPDATE, DELETE) |
| MembersRole | Role | Table:   * NumberOfCopiesPurchasedPerBook | Read, Update, Delete (SELECT, UPDATE, DELETE) |
| BookStoreAdministratorsRole | Role | Tables:   * Book * Publisher * Author * AuthoredBooks, * Publisher, * BooksPublished, * Category | Read, Update, Add, Delete  (SELECT, UPDATE, INSERT, DELETE) |
| BookStoreAdministratorsRole | Role | Table:   * Member | Read, Add, Update (SELECT, INSERT, UPDATE) |
| DatabaseAdministratorsRole | Role | Database:   * APUBSPLDB | ALL (Control) |
| ManagementRole | Role | Database:   * APUBSPLDB | Read (SELECT) |

|  |  |
| --- | --- |
| User | Role |
| Peter Carter | ManagementRole |
| Raj Raj | DatabaseAdministratorsRole |
| Adam Muhammad | BookStoreAdministratorsRole |
| Ian Stirk |  |

## 3.2 Individual Deliverables

### 3.2.1 Mozhar Alhosni – TP058272

Text

Description automatically generated

Graphical user interface, text, application

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

### 3.2.2 Tarun Aitha– TP058015

Text

Description automatically generated

Graphical user interface, text

Description automatically generated

Text

Description automatically generated with medium confidence

Text

Description automatically generated

### 3.2.3 Khirthiga A/P Chandrasekharan – TP058844

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

### 3.2.4 Haroon Gilani – TP058413

A screenshot of a computer

Description automatically generated with low confidence

Text

Description automatically generated

Text

Description automatically generated

# 4.0 Database Auditing

### 4.1 Mozhar Alhosni – TP058272

First a server audit for “APUBSPLDB” needs to be created with the relevant configurations:

Text

Description automatically generated

## *4.2 Tarun Aitha – TP058015*

Then, a Server Audit Specification needs to be created since there are events/action groups that cannot be listened for in the Database Specification level:

Text

Description automatically generated with medium confidence

## *4.3 Khirthiga A/P Chandrasekharan – TP058844*

Text

Description automatically generated

## *4.4 Haroon Gilani – TP058413*

Text

Description automatically generated

# 5.0 Database Encryption

### 5.1 Mozhar Alhosni – TP058272

First, within “APUBSPLDB”, a master key encryption must be created using a secure password, so that it can be later used when applying TDE. In addition to adding a certificate that is protected by the Master Key:

**Text

Description automatically generated**

## *5.2 Tarun Aitha – TP058015*

Additionally, users can create certificates that are encrypted by passwords instead of master security keys:

**Text

Description automatically generated**

## *5.3 Khirthiga A/P Chandrasekharan – TP058844*

Moreover, an asymmetric key can be create and encrypted by a password:

**Text

Description automatically generated**

## *5.4 Haroon Gilani – TP058413*

After the keys as been created we can now encrypt the passwords

**Text

Description automatically generated**