



**SRI LANKA TECHNOLOGICAL CAMPUS**

**SCHOOL OF ENGINEERING**

**BACHELOR OF SCIENCE (HONOURS) IN ENGINEERING IN  
ELECTRONICS AND TELECOMMUNICATION**

**BATCH 07**

**Group “MIND”**

CDP01

Databases

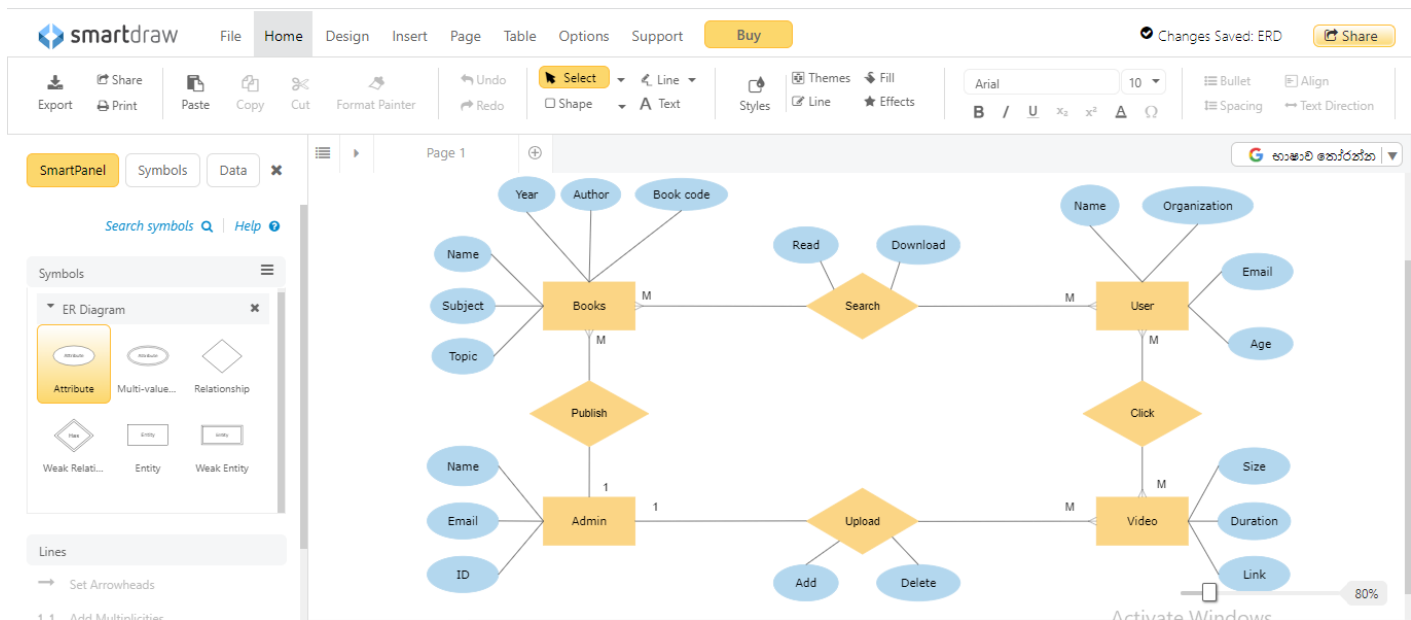
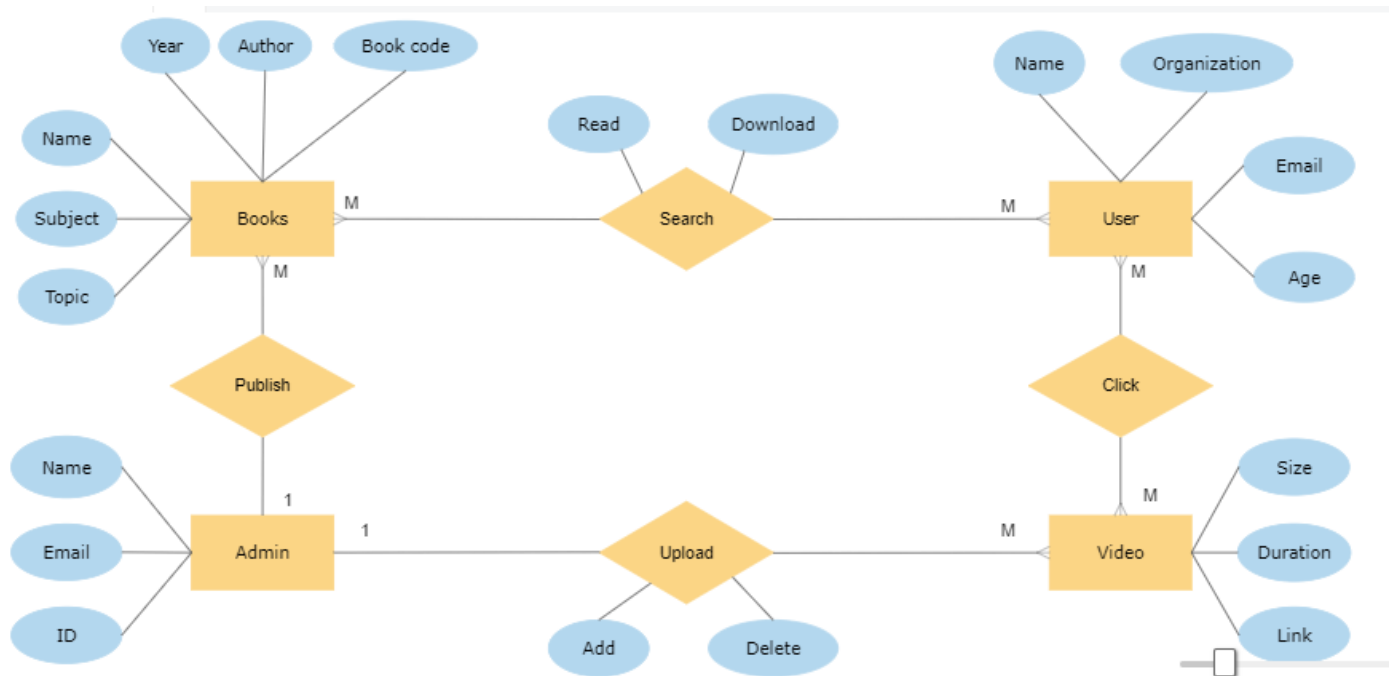
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# Entity Relationship Diagram



## DDL Scripts

The screenshot shows the phpMyAdmin interface for a database named 'library'. The left sidebar shows the database structure, including 'information\_schema', 'library', 'mysql', 'performance\_schema', 'phpmyadmin', and 'test'. The 'library' database is selected, and the 'Structure' tab is active. The table list shows 6 tables: book, openlink, paper, subject, user, and video. The 'user' table is highlighted. Below the table list, there is a 'Create table' button and a form to create a new table with a name and number of columns.

Table	Action	Rows	Type	Collation	Size	Overhead
book	Browse Structure Search Insert Empty Drop	14	InnoDB	latin1_swedish_ci	32 Kib	-
openlink	Browse Structure Search Insert Empty Drop	1	InnoDB	latin1_swedish_ci	32 Kib	-
paper	Browse Structure Search Insert Empty Drop	8	InnoDB	latin1_swedish_ci	16 Kib	-
subject	Browse Structure Search Insert Empty Drop	15	InnoDB	latin1_swedish_ci	16 Kib	-
user	Browse Structure Search Insert Empty Drop	2	InnoDB	latin1_swedish_ci	32 Kib	-
video	Browse Structure Search Insert Empty Drop	14	InnoDB	latin1_swedish_ci	48 Kib	-
6 tables	Sum	46	InnoDB	latin1_swedish_ci	176 Kib	0 B

The screenshot shows the phpMyAdmin interface for the 'user' table. The left sidebar shows the database structure, including 'information\_schema', 'library', 'mysql', 'performance\_schema', 'phpmyadmin', and 'test'. The 'library' database is selected, and the 'Structure' tab is active. The 'user' table is highlighted. Below the table list, there is a 'Create table' button and a form to create a new table with a name and number of columns. The 'Query results operations' section shows the table data.

user_id	email	password	first_name	last_name
2	admin@admin.com	\$2y\$0\$9tjch0C1vFR.mVgPZQ1fFeLubfZ0SRPSyDlckVjuf...	Admin	Admin
3	abir@bca.com	\$2y\$0\$64HOLIMPKzCbWAEcSwkze.mA1hP4NaI91fhcV6GFST...	Abir	Roy

phpMyAdmin

Recent Favorites

- New
- information\_schema
- library
- New
- book
- paper
- paperlink
- subject
- user
- video
- mysql
- performance\_schema
- phpmyadmin
- test

Server: 127.0.0.1 » Database: library » Table: subject

Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers

Show all Number of rows: 25 Filter rows: Search this table Sort by key: None

+ Options

subject_id	subject_name
1	Operating System
3	C++
10	Unix & Shell Programming
12	Data Structure
13	Computer Network
14	C Programming
15	Computer Architecture
16	Java
17	Graphics
18	Database Management System
19	Mathematics for Computing
20	Windows Programming
21	Visual Basic
22	Software Project Management & Quality Assurance
24	Udemy learning

Check all With selected Edit Copy Delete Export

phpMyAdmin

Recent Favorites

- New
- information\_schema
- library
- New
- book
- paper
- paperlink
- subject
- user
- video
- mysql
- performance\_schema
- phpmyadmin
- test

Server: 127.0.0.1 » Database: library » Table: book

Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers

Showing rows 0 - 13 (14 total, Query took 0.0000 seconds)

SELECT \* FROM 'book'

Profiling [ Edit mine ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]

Show all Number of rows: 25 Filter rows: Search this table Sort by key: None

+ Options

book_id	title	author	topic	paper	subject	year	file_name	cover_picture
4	Let Us C	Yashavant Kanetkar	C programming	1	14	1	500cef1cd62539a7730f62c4830027.pdf	8d62d640147050857b
5	Computer System Architecture	Gurusaran Singh	computer architecture	2	15	1	034e2d0be04b11e5d0b370791b65495b.pdf	59c830a763aa076667
6	Data Structures With C	Seymour Lipschutz	Data Structures	3	12	2	e194654bf49372201a07ace8d6607.pdf	8a18454d6e5dc5cb6
7	Programming In C++	Stephen C Dewhurst	C++	4	3	2	d2cd24e0794d797aef69ee1793134d99.pdf	7e560d99cc722c57688
8	Unix Shell Scripting	Randal K Michael	Unix and Shell Programming	5	10	3	9d9544d5e1d940030e30700ba70de1d.pdf	1c91b5ee184ea0814e
9	The Complete Reference Java	Herbert Schildt	Java	6	16	3	2f7a72e83cc0168a9567e8d115d9ea6.pdf	613af05c7845c04c5c6
10	Computer Graphics	David J. Eck	Introduction to Graphics	3	17	2	6e03a7b0aee5b532df1f6b686f6bc3.pdf	3cd183378dd26b752b
11	Computer Networking	Olivier Bonaventure	Computer Networking	5	13	3	60ab239ed90575b027c9e02c5352f32.pdf	5a3a7d85ca5c4e07aa
12	Operating System	Abraham Silberschatz	Operating System & Concepts	3	1	2	f1c3efce99e0b59969eeac74ae24b527.pdf	9b4c9actb53b0fb50177

Console

Server: 127.0.0.1 • Database: library • Table: video

Options: + Options

	video_id	video_name	video_description	subject	topic	file_name	on_youtube	youtube_link	video_url
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	1	C tutorial	Student Information	14	Language C		1	-CpG3oATGIs	120c53689d8a4671aeb8411
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	2	C++	Student Information	3	Language C++		1	mUQZ1qmKILY	9ff167a371155306b68da980
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	3	Java	Student Information	16	Java tutorial		1	qQVqfvs3p48	7b12b7ad9a45777da88f2a
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	4	Windows Programming Tutorial	Programming Windows for Beginners	20	Windows Programming for Beginners		1	PT8pQn5wihQ	0bc395f1045c341c11cee0e
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	5	Introduction to OS	Brief Description on Operating System	1	Operating System		1	2i2N_Qo_FyM	77f3999df14408c2a2890f32f
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	6	DBMS Tutorial	DBMS tutorial for Beginners	18	Database Management System Tutorial		1	zQMj76_gCUU	78bd5646f3baa36e0ee997a
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	7	Data Structure & Algorithms	Complete Tutorial On Data Structure	14	Data Structure		1	YWn8BNj_G-U	6a35446474d9eab8b903f
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	8	Computer Graphics Tutorial	Graphics Tutorial	17	Computer Graphics		1	NpEjpsUZLPE	ac63db7c6abe4bf1735a2d
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	9	Unix Shell Programming	Shell Scripting for beginners	10	Shell Programming for Beginners		1	lEheCUis7fIA	c194a02b443c9fd295ee83f
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	10	Software Project Management	Software Project Management	22	Software Project Management for Beginners		1	SPcv4PUKQX8	0889990681e223075c71465
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	11	Visual Basic Tutorial 2017	Visual Basic Tutorial	21	Visual Basic for Beginners		1	3FWddODLno	7a67e5361797c340b96c18c
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	12	Computing Maths Using Logic	Computing Mathematics	19	Discrete Mathematics		1	4O4GpNRm-JE	81195b469e9b7f176f7d25f
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	13	Introduction to Computer	Computer Architecture for	15	Computer Architecture		1	4TzMyXmzLBM	ed14774da902b6f5d534813c

localhost/phpmyadmin/sql.php?server=1&db=library&table=openlink&pos=0

## Performance and Security considerations

### 1. Performance Enhancing Measures

To ensure the efficient performance of the database, the following performance enhancing measures have been implemented:

#### 1.1 Indexes

Indexes have been created on frequently accessed columns to improve query performance. By creating indexes, the database can quickly locate the required data, reducing the time taken to retrieve information.

#### 1.2 Database Design Optimization

The database schema has been designed in a way that minimizes redundancy and maximizes data integrity. Normalization techniques have been applied to eliminate data duplication and improve overall database performance.

#### 1.3 Query Optimization

Queries have been optimized to minimize the number of table scans and utilize indexes effectively. Techniques such as query rewriting, query caching, and the use of appropriate joins and subqueries have been employed to enhance query performance.

#### 1.4 Data Compression

Data compression techniques have been implemented to reduce the storage space required by the database. Compressing data can improve disk I/O performance and minimize storage costs.

#### 1.5 Caching

Caching mechanisms, such as in-memory caching or query result caching, have been implemented to store frequently accessed data in memory. Caching can significantly reduce database access time and improve overall application performance.

### 2. Security Measures

To ensure the security of the database, the following security measures have been implemented:

#### 2.1 User Authentication and Authorization:

A robust user authentication and authorization system has been implemented to control access to the database. Each user is required to provide valid credentials to access the database, and their access privileges are defined based on their roles and responsibilities.

#### 2.2 Encryption

Sensitive data stored in the database is encrypted to prevent unauthorized access. Encryption techniques, such as symmetric key encryption or hashing algorithms, have been applied to protect data at rest and during transmission.

#### 2.3 Role-Based Access Control

Access to specific database objects is controlled based on user roles. Only authorized users with the necessary privileges can perform certain operations, such as modifying the database structure or executing critical queries.

#### 2.4 Regular Security Audits

Periodic security audits are conducted to identify and address any vulnerabilities in the database system. This includes reviewing user access permissions, monitoring database logs for suspicious activities, and implementing security patches and updates.

#### 2.5 Data Backup and Recovery

A robust backup and recovery strategy is in place to ensure the integrity and availability of the database. Regular backups are performed to protect against data loss, and recovery procedures are tested to ensure that data can be restored in case of an incident.

## References