

This document is part of my individual course work assigned under module Information system.

Mentioning the document in reference would be great if you are planning to

use this as part of your project

#peace

Proposal

Purpose

The proposal of this report is completion of individual coursework assigned under the module Information System. The coursework demands individual to develop an application using MYSQL and prepare a report to present the work accomplished. The coursework was assigned on week 17 due on week 20. The report is to be submitted in a single pdf file.

The purpose of the coursework is to develop a data model for the persistent data of an organization, implementing a database and designing database queries using MYSQL programming language, document the process of development with adequate charts, relational diagrams and their description along with research and development performed during the task.

Problem statement

We were subjected to a problem where data model of an organization was to be built. We were required to specify data dictionary for the database, implement database, populate database, and design database queries.

For an up and running organization, various records are to be kept. Government of Nepal demands transparency of workflow and submission of yearly progress report with adequate transaction information. If an organization fails to submit required database or fails to describe the database, the organization is subjected to legal actions.

Despite of governmental influence, an organization requires database management system to manage transaction details, staff details, and records of tools involved in the organization to achieve their aims and objectives efficiently. Keeping records of transaction in business is mandatory. These records or databases helps in maintaining facts and figures involved in the business. Every businesses are dead serious regarding information and data of their customers, products they sell, their staffs and transactions involved. The value of data worth millions of dollars, hence keeping and maintaining a proper database is mandatory. There are different ways of keeping records, earlier

handwritten data were stored in ledgers now a days with advancement in technology records has transformed into digital form and computers are found to be efficient in data handling, maintaining, sharing and data security.

Observing the potential of computerized databases, visionary developers created high level programming languages that were fit for database related work and made them open sourced so that every other fellow developers can have access to it for creating their own database as per requirements. In this course work, I am creating a database management system using MYSQL – a high level open sourced programming language for an e-commerce organization “Parajuli Marketing Center” that brings in orders from customers fetch the ordered items from suppliers and supplies it with the help of transporters.

Aims and objectives

The aim of this coursework is to develop an application using MYSQL programming language to get hands on experience of database management system. The objectives of the coursework are as follows:

1. To construct a data model for persistent data of an organization
2. To specify data dictionary for the database of that company.
3. To implement database.
4. To populate database with test data
5. To design database queries
6. To prepare well documented report describing the program and procedure involved.

Proposed Approach

In order to accomplish course work following approach is proposed:

1. Develop Gantt chart to keep records of progress and steps taken in order to complete the course work.
2. Perform research on topics related to course work like working with MYSQL database, building entity relational diagram and relational diagram, creating database, creating tables, queries available in MYSQL, importing and exporting MYSQL files.
3. Develop and describe a scenario for creating database management system.
4. Create entity relationship diagram, relational diagram, and data dictionary table describing the database management system.
5. Review the progress of coursework with module leader, prepare and hand in pre submission report.
6. Complete the report and submit the coursework.

Scope of the Project

The e-commerce database management system developed in this coursework can be implemented in small and medium sized e-commerce organizations where items ordered by customers are supplied to them with the help of delivery staffs. The database management system keeps record of suppliers, customers, staffs, and transactions involved.

Moreover the coursework acts as a steppingstone for database management system and its real world implementation. For developers this coursework carves path for understanding workings, management, use of database management system. This approach of preparing proper documentation of the project also helps to maintain a standard format which is understood by other developers as well.

Target Audiences

This project is targeted to small businesses who want to switch from traditional methods of record keeping to computer based database management system in the process of adopting e-commercial approach of buying and selling of goods via telephone calls.

The project also targets developers willing to reference real life example of database management system, understand its workings, and process involved in developing such database management system.

Hardware and Software Requirements

Hardware required for using the database management system software is either a desktop computer or a laptop.

Since MySQL programming language is supported across various operating systems like macOS, windows, and linux this project works on all platforms where MySQL is installed. To develop the database management system application an apple computer with operating system macOS Mojave was used along with following other software tools:

1. [draw.io](#) : It is an open sourced drawing application for developing various diagrams required in software engineering.
2. terminal: It is an inbuilt command line tool of macOS.
3. Microsoft Office : It is an productivity application that was used to prepare charts, tables and format the prepared documents.
4. Pages : It is a document preparing software which was used to prepare this report.
5. Safari : A web browsing software that was used to perform research and development.

Activity Description and Timeline :

The coursework was to be submitted in three weeks. The entire task was divided into smaller fractions and steps to in order to efficiently complete the task.

The first week was devoted in research, study and designing a scenario for database management system fulfilling the requirements of the coursework.

Second week was devoted in developing entity relationship diagram and relational diagram of the database management system. Respective database model and data dictionary was also built and a pre submission report including all of above was submitted to the module leader after verification.

Third week was devoted in constructing the database management system on the basis of verified documents from earlier weeks. Various queries were generated and proper documentation of the report was created.

A graphical description of above workflow is designed below with the help of Gantt chart. A Gantt chart is a tool for project management developed originally by Henry Gantt in the early 1900s. It is a type of bar chart that shows the start and end times for each task in a project schedule. The tasks are usually categorized using a work breakdown structure with summary tasks for the main project deliverables and sub tasks that break the project down into a detailed and manageable task hierarchy.

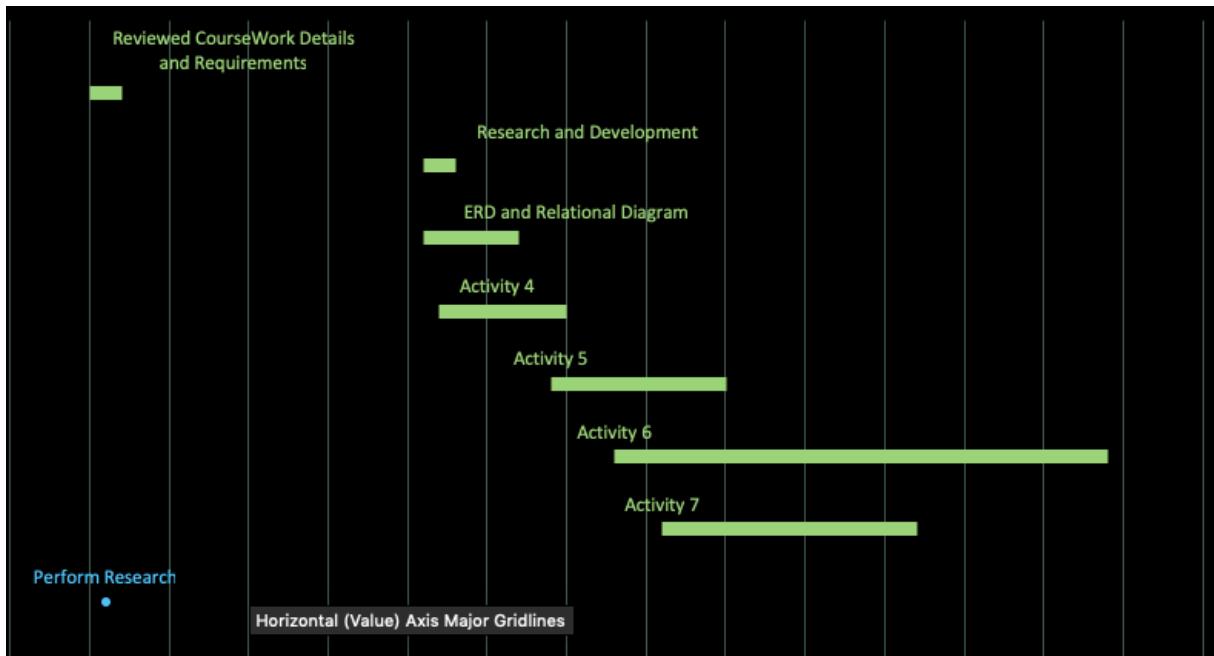


Table of Pictures

<i>Figure 1 Terminal window</i>	3
<i>Figure 2 Sketch App.....</i>	5
<i>Figure 3 Sublime Text App.....</i>	5
<i>Figure 4 Google Chrome Browser</i>	5
<i>Figure 5 Entity Relationship Model</i>	6
<i>Figure 6 Relational Model</i>	7
<i>Figure 7 Research Data Dictionary</i>	16
<i>Figure 8 Research Data Dictionary 2</i>	17
<i>Figure 9 Research Database Schema</i>	18
<i>Figure 10 Research Database Instance.....</i>	19
<i>Figure 11 Research Database model</i>	20
<i>Figure 12 Research Types of Database Model.....</i>	21
<i>Figure 13 Research Relational Database Model</i>	22
<i>Figure 14 Research Entity Relationship Database Model.....</i>	23
<i>Figure 15 Research Other Types of Database Model.....</i>	24
<i>Figure 16 Research Data Independence</i>	25

List of Tables

<i>Table 1 Data Dictionary of Customer</i>	8
<i>Table 2 Data Dictionary of Orders</i>	9
<i>Table 3 Data Dictionary of Items</i>	10
<i>Table 4 Data Dictionary of Transporter</i>	11
<i>Table 5 Data Dictionary of Suppliers</i>	12

Table of Contents

TABLE OF PICTURES	6
LIST OF TABLES	7
INTRODUCTION	1
DATABASE SCHEMA:.....	1
DATA INDEPENDENCE:.....	1
DATA MODEL:.....	1
DISTRIBUTED DATABASE:.....	1
SCENARIO:.....	2
DISCUSSION AND ANALYSIS.....	3
DATABASE MODEL	6
DATA DICTIONARY.....	8
QUERIES	13
RESEARCH.....	16
CONCLUSION.....	21
BIBLIOGRAPHY.....	1

Introduction

Data are collection of facts and figures such as numbers, words, measurements, observations or description of things. The processed data are referred as information. Database is a collection of data on a computer organized in specific structure. Databases are typically made up of tables with rows and columns of information for ease of access, manageability, and updates. Databases are required to properly structure data to avoid data duplication, use same data for multiple purposes, and make database management system cost effective. Database management system is a system software for creating and managing databases. It provides developers and users a definite procedure to create, retrieve, update and manage data in the database. Database Management System have various functions and tasks as it acts as interface for developers and users to interact with database. Various concepts used in database management system includes:

Database Schema: It is a description of the structure of an entire database used by database software to maintain the database. It defines how data is organized and how they are associated in relation to one another. It contains descriptive detail of the database. Database Schema are usually designed by database designers to help programmers understand the database and make it useful. (O'Regan, 2012)

Data independence: Data independence is the idea that generated and stored data should be kept separate from applications that use the data for computing and presentation. It is the ability to change the organization of a database without changing the application software that uses it. (Technopedia, 2010)

Data model: Data model is conceptual view of the data. They are fundamental entities to introduce abstraction in a database management system. It defines how data is connected to each other and how they are processed and stored inside the system. (Tutorialspoint, 2012)

Distributed Database: Distributed database is a database stored on multiple machines.

E-commerce database management system is a project for keeping records of buying, selling, and delivering items ordered by customers via phone calls. Management of e-commerce store includes keeping record of available items for sale, record of orders placed by customers and their details, details of suppliers who supply those items, and records of delivery staffs who delivers those orders. Updating details of above records is very important as it gives information regarding current status of the store. This application keeps record of five entities as customers, items, orders, suppliers, and transporter each including details of respective entities in respective tables. The attributes of these entities are inter related to one another with primary and foreign keys.

Primary keys are unique keys used to uniquely identify each row in the database table. These are usually identification code assigned to represent unique row of attribute. Foreign keys are keys that refers to primary key in another table that are used to relate two tables in a database.

Scenario:

Parajuli Marketing Center is a social media based e-commerce organization located in Lalitpur. The organization keeps record of wholesale suppliers, their details and details of the products that they supply. The organization also create advertisements of those products and focuses on marketing them via social media, and online video streaming sites by targeting potential customers based on their age group, and geographical region. The potential customers contact them through social media messages and phone calls and places order of the items. Once the order is confirmed, the organization dispatches its delivery staffs to fetch those items from suppliers and delivers it to the customers.

Earlier the organization used traditional media for marketing their products and ledgers to keep records of the entire database, which was a tedious task and extra employees were required for its completion. As the number of social media users were growing, the organization planned to switch into social media marketing and computer based database management system to have proper analytics of their advertisement campaigns and to reduce time delay involved in the process.

Discussion and Analysis

A database is a means of storing information in such a way that information can be retrieved from it. A relational database is one that presents information in tables with rows and columns. A table is referred as a relation and data in a table can be related according to common keys. The ability to retrieve related data from a table forms the basis for the term relational database. A database management system handles the way data is stored, maintained, and retrieved whereas a relational database management system performs these tasks in the case of relational database.

There are some integrity rules followed by relational tables to make sure that data contained are accurate and accessible. These rules are:

1. The rows should be unique
2. Columns values must not be repeating groups and array.
3. Null values are assigned when data are not available.

For a table having each unique row, it is possible to use one or more columns to identify a particular row. This unique column is called primary key. A primary key column cannot be null, this rule is termed as entity integrity.

Mac operating system provides terminal as command line tool for developers to work with various development tools. Terminal is widely accepted among developers and it is used as standard across the globe in developers community. Terminal must be initialized with MYSQL statement for root user with password for granting accessing to work with MYSQL database.

```
[Rohans-MacBook-Pro:~ parajulifamily$ mysql -u root -h localhost -p;
Enter password:
]Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 10
Server version: 8.0.15 MySQL Community Server - GPL

Copyright (c) 2000, 2019, Oracle and/or its affiliates. All rights reserved.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
mysql> ]
```

Figure 1 Terminal window

To create database CREATE statement followed by database name is used.

To work on the selected database USE keyword followed by database name is used.

For creating tables for respective entity, CREATE TABLE followed by table name is used and table elements with their type, and detail are passed.

```
CREATE TABLE customers
```

```
(custID INT PRIMARY KEY UNIQUE AUTO_INCREMENT,  
name VARCHAR (50),  
address VARCHAR(250),  
phone VARCHAR(50),  
socialMedia VARCHAR(50)  
);
```

To insert values in the table created INSERT INTO is used followed by table name, column elements and VALUES keyword followed by values to be provided.

```
INSERT INTO customers(name, address, phone, socialMedia) VALUES  
("Pratik  
Ghimere","Satungal,Kathmandu","9841122330","@iampratik"),  
("Prithvi  
Gyawali","Pulchowk,Lalitpur","9842211330","@prithvig"),  
("Sanam      Maharjan",      "Thimi,Bhaktapur",      "9843311220",  
"@mahasanam");
```

While inserting values in the table, error values can be deleted from the row using DELETE keyword followed by table name and criteria selector WHERE condition.

```
DELETE FROM `table_name` [WHERE condition];
```

Repetition of creating required table, inserting value in the tables was carried out as requirement for each table.

Microsoft Visio a diagramming and vector graphics application was introduced to us for the development of entity relationship diagram. Instead Sketch application was used because of unavailability of Microsoft Visio in macOS. The Sketch application is straight forward and simple to use vector graphics application which can also be used for mobile application mockup design, web application design, and all kind of vector and rendering tasks. However Draw.io was used to develop the relational model of the database as it had specific inbuilt library for serving the purpose including required connectors and it was available in macOS as well.

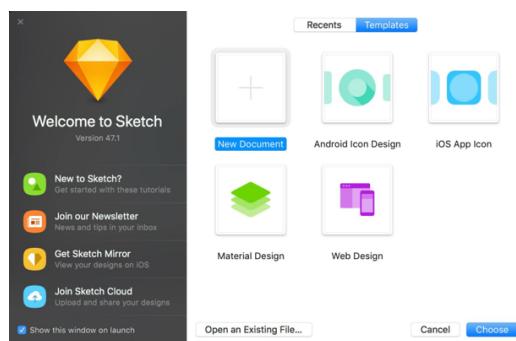
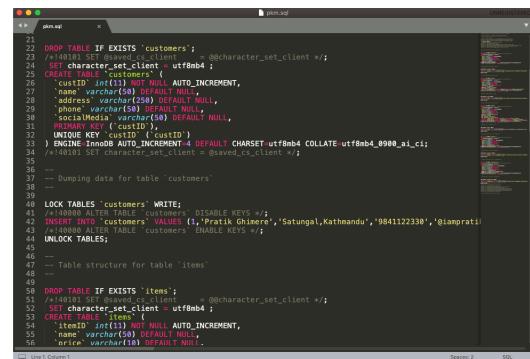


Figure 2 Sketch App



```
21 DROP TABLE IF EXISTS `customers`;
22 SET @character_set_client = @@character_set_client */;
23 SET character_set_client = utf8mb4 ;
24 SET @cCharset = 'utf8mb4';
25 SET @cCollate = 'utf8mb4_unicode_ci';
26 `custID` INT(11) NOT NULL AUTO_INCREMENT,
27 `name` VARCHAR(50) DEFAULT NULL,
28 `address` TEXT DEFAULT NULL,
29 `phone` VARCHAR(50) DEFAULT NULL,
30 `socialMedia` VARCHAR(50) DEFAULT NULL,
31 PRIMARY KEY (`custID`);
32 ENGINE=InnoDB AUTO_INCREMENT=4 DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;
33 -- Dumping data for table 'customers'
34 --
35 -- Table structure for table 'items'
36 --
37 -- Dumping data for table 'items'
38 --
39 LOCK TABLES `customers` WRITE;
40 -- Locking table `customers` for update
41 INSERT INTO `customers` VALUES (1,'Pratik Ghimire','Satungal,Kathmandu','9841122338','@iampratik');
42 -- Unlocking table `customers` ENABLE KEYS;
43 UNLOCK TABLES;
44 --
45 -- Table structure for table 'items'
46 --
47 -- Dumping data for table 'items'
48 --
49 DROP TABLE IF EXISTS `items`;
50 SET @character_set_client = @@character_set_client */;
51 SET character_set_client = utf8mb4 ;
52 CREATE TABLE `items` (
53 `itemID` INT(11) NOT NULL AUTO_INCREMENT,
54 `name` VARCHAR(50) DEFAULT NULL,
55 `price` VARCHAR(10) DEFAULT NULL.
```

Figure 3 Sublime Text App

Sublime text was preferred for writing the MYSQL codes rather than directly writing codes in terminal. The text editing software made it easy to check attributes naming conventions, typing errors and to manage the codes for review. The color coding was helpful to distinct the keywords as well.

Google chrome browser was used for performing all web based research. The agility of chrome browser made it easy and helpful. The note taking extension of the browser collected all marked notes in one place, which made it very helpful while preparing documentations.



Figure 4 Google Chrome Browser

Database Model

A database model shows the logical structure of a database, including the relationships and constraints that determine how data can be stored and accessed. Individual database models are designed based on the rules and concepts of whichever broader data model that designers adopt. Most data models can be represented by an accompanying database diagram. There are different database models, most common are entity relationship diagram and relation diagram. (Lucid Chart, 2019)

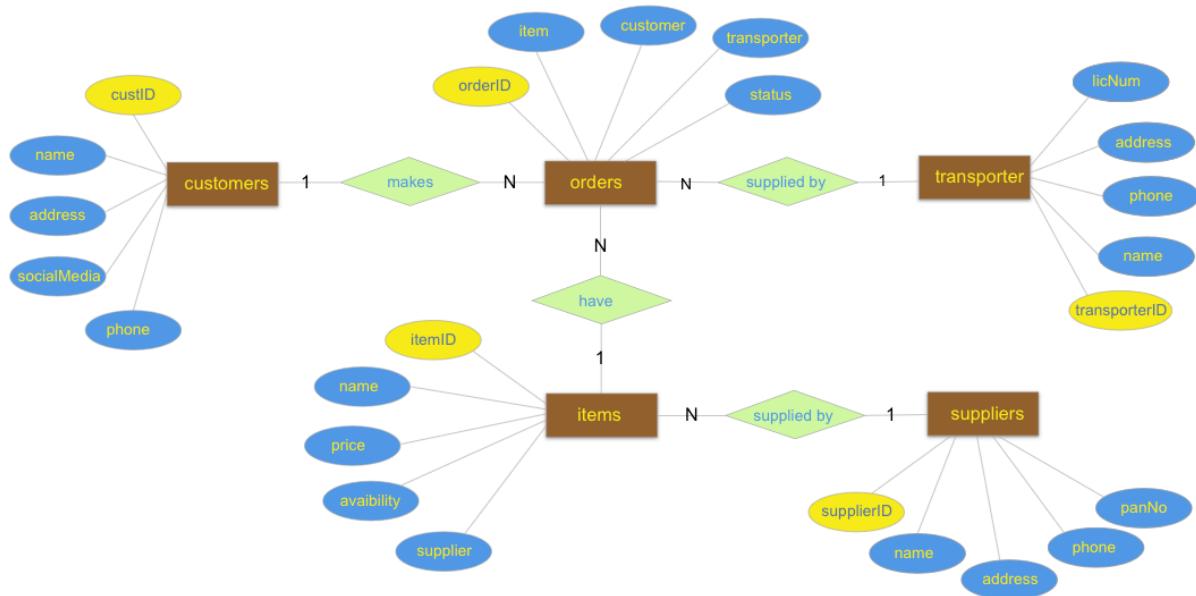


Figure 5 Entity Relationship Model

The entity relationship model captures the relationship between real world entities. Here customers, orders, transporter, items and suppliers are referred to as entities each of which have five attributes. These five entities are related with one another using relationship diamond box. It is very helpful to visualize overall database management system before going to actual programming. The graphical view provides layout of the database and acts as reference to go to while programming. (Lucid Chart, 2019)

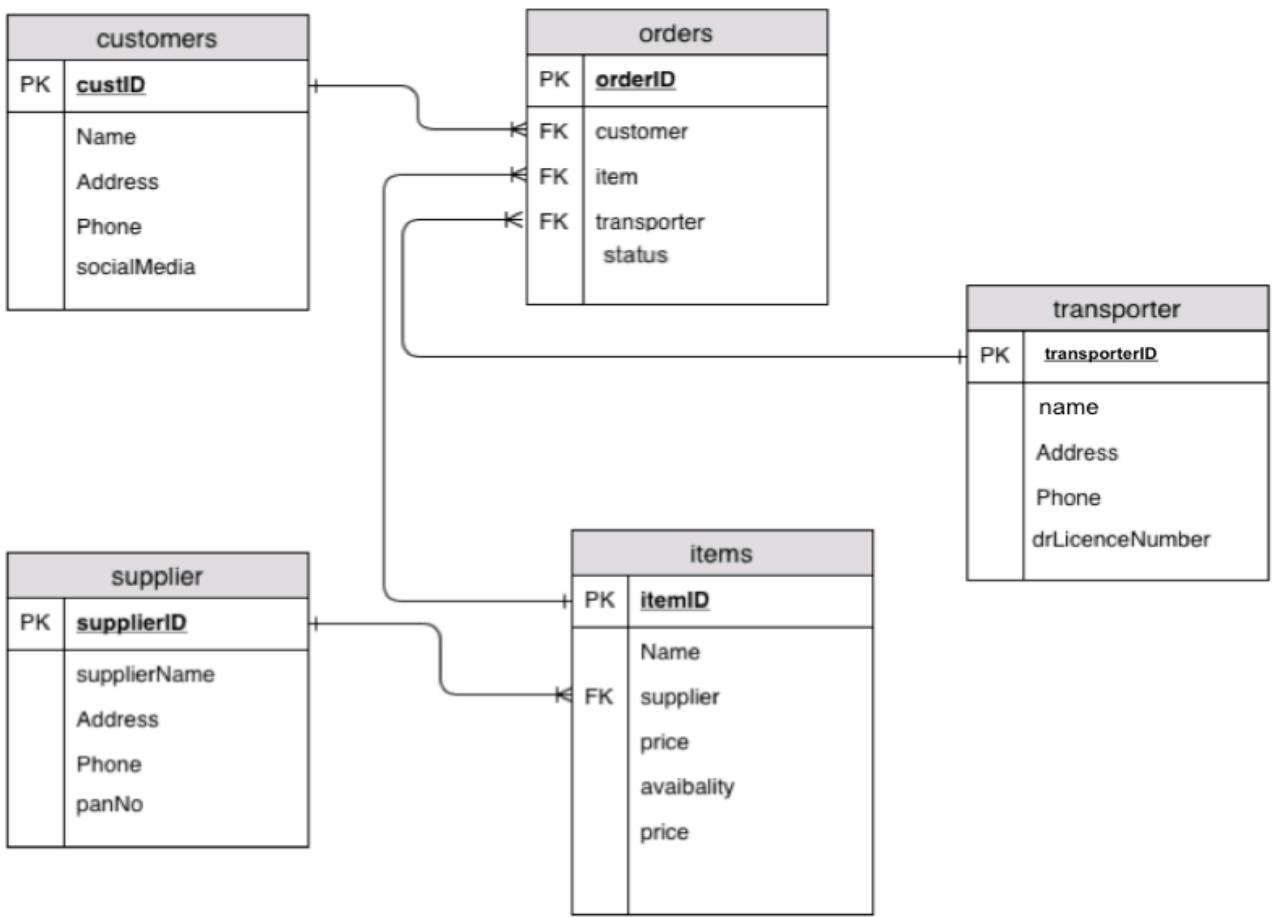


Figure 6 Relational Model

The relational model sorts data into tables each of which consists columns and rows. Each column lists an attribute of the entity. A particular attribute is chosen as a primary key that can be referred to in other tables, when it's called by a foreign key. Each row is also called tuple. A tuple stores data about specific instance of the entity such as name of the customer. The relational model also accounts for the types of relationships between those tables, including one to one or one to many. Many to many relations are broken down to different one to many relation. (Lucid Chart, 2019)

Data Dictionary

A data dictionary is a file or set of files that contains a database's metadata. It contains records of objects in the database, such as entity name, entity description, column name, column description, data type, length, primary key, and notes. Data dictionary completely defines the database with adequate information about the entities, its attributes and their descriptions. Construction of database dictionary is very helpful before creating actual database, acts as a reference place to visit while any uncertainty arises during database development.

Entity Name	Entity Description	Column Name	Column Description	Data Type	Length	Primary Key	Foreign Key	Nullable	Unique	Notes
Customer	A customer is someone who places order in the store	custID	Id of the customer, for unique identification of each customer	INT		True	False	False	True	Auto Incremented
		Name	Name of the customer	VARCHAR	50	False	False	False	False	
		Address	Address of the customer	VARCHAR	250	False	False	False	False	
		Phone	Phone Number of the customer	VARCHAR	15	False	False	False	True	
		Social Media	Social Media of user	VARCHAR	50	False	False	False	True	

Table 1 Data Dictionary of Customer

Entity Name	Entity Description	Column Name	Column Description	Data Type	Length	Primary Key	Foreign Key	Nullable	Unique	Notes
Orders	An order is list of items given by customer	orderID	Id of order, for unique identification of each order	INT		True	False	False	True	Auto Incremented
item	Item ordered by the customer	VARCHAR	100	False	True	False	False	False	References to itemID of items	
customer	Customer who gave the order	VARCHAR	10	False	True	False	False	False	References to custID of customers	
transporter	Transporter who delivers the order	VARCHAR	50	False	True	False	False	False	References to transporterID of transporters	
Status	Delivery status of Order	VARCHAR	20	False	False	False	False	False		

Table 2 Data Dictionary of Orders

Entity Name	Entity Description	Column Name	Column Description	Data Type	Length	Primary Key	Foreign Key	Nullable	Unique	Notes
Items	An item is goods ordered by customer for purchase	itemID	Id of the item, for unique identification of each item	INT		True	False	False	True	Auto Incremented
	Name	Name of the item	VARCHAR	50	False	False	False	False	False	
	Price	Price of the item	VARCHAR	250	False	False	False	False	False	
	supplier	Supplier of the item	VARCHAR	15	False	True	False	False	References to supplierID of suppliers	
	Availability	availability of item	VARCHAR	50	False	False	False	False	False	

Table 3 Data Dictionary of Items

Entity Name	Entity Description	Column Name	Column Description	Data Type	Length	Primary Key	Foreign Key	Nullable	Unique	Notes
Transporter	A transporter is someone who delivers order to the customer	transID	Id of the transporter, for unique identification of each transporter	INT		True	False	False	True	Auto Incremented
		Name	Name of the transporter	VARCHAR	50	False	False	False	False	
		Address	Address of the transporter	VARCHAR	250	False	False	False	False	
		Phone	Phone Number of the transporter	VARCHAR	15	False	False	False	True	
		licNumber	Driving License of the transporter	VARCHAR	50	False	False	False	True	

Table 4 Data Dictionary of Transporter

Entity Name	Entity Description	Column Name	Column Description	Data Type	Length	Primary Key	Foreign Key	Nullable	Unique	Notes
Suppliers	A supplier is someone or some whole sale store that supplies items to our store	supplierID	Id of the supplier, for unique identification of each supplier	INT		True	False	False	True	Auto Incremented
	Name	Name of the supplier	VARCHAR	50	False	False	False	False		
	Address	Address of the supplier	VARCHAR	250	False	False	False	False		
	Phone	Phone Number of the supplier	VARCHAR	15	False	False	False	False		
	panNo	Registered tax number of the supplier	VARCHAR	50	False	False	False	False		

Table 5 Data Dictionary of Suppliers

Queries

A query is a request for information from a database. Queries are used to access information from databases in the required format. Queries can also perform calculations of data or automate data management tasks. Reviewing updates to data before committing them to the database can also be done by use of query.

Some queries performed in the coursework are:

Query 1 : DISTINCT QUERY

DISTINCT is an aggregate function used to return only the unique/distinct entries from a column.

```
[mysql]> SELECT DISTINCT(address) FROM customers;
+-----+
| address |
+-----+
| Satungal,Kathmandu |
| Pulchowk,Lalitpur |
| Thimi,Bhaktapur |
+-----+
```

Query 2 : COUNT(*) QUERY

COUNT(*) returns the total number of rows in a table.

COUNT(column) returns the total number of records in the column excluding null values.

```
[mysql]> select COUNT(*) AS TOTAL_Orders FROM orders;
+-----+
| TOTAL_Orders |
+-----+
|          6 |
+-----+
```

Query 3 : BETWEEN QUERY

BETWEEN operator selects values with in a range. The values can be numbers, text or dates.

```
mysql> SELECT * FROM items WHERE price BETWEEN 500 and 3000;
```

itemID	name	price	supplier	availability
1	Gorilla Camera Stand	1700	3	available
6	Joy Room Laptop Bag	2000	2	available
7	iPad pro 2018 cover	3000	2	available
9	Furex Gaming Mouse	800	1	available

4 rows in set (0.00 sec)

Query 4 : LIMIT QUERY

LIMIT is used to specify the number of records to show as the result of query.

```
mysql> select * from items ORDER BY price DESC LIMIT 2;
```

itemID	name	price	supplier	availability
8	Cannon EOS 750D	8000	3	available
9	Furex Gaming Mouse	800	1	available

2 rows in set (0.00 sec)

Query 5 : GROUP BY QUERY

GROUP BY is used to group the records according to similar values in a certain column.

It is used with aggregate functions.

item	total_sold
1	1
2	1
7	1
8	1
9	1
10	1

6 rows in set (0.01 sec)

Query 6 : ORDER BY QUERY

ORDER BY sorts the records in ascending or descending order according to the specified Column.

item	total_sold
1	1
2	1
7	1
8	1
9	1
10	1

6 rows in set (0.01 sec)

Query 7 : HAVING QUERY

HAVING is used for filtering records based on the result of the aggregate functions.

Query 8 : JOIN QUERY

JOINS are used to join two or more tables based on similar columns. It is used to retrieve records from multiple tables.

Query 9 : LIKE QUERY

LIKE operator is used in a WHERE clauses to search for specified pattern.

mysql> SELECT * FROM suppliers WHERE address LIKE "%k%";				
supplierID	name	address	phone	panNo
1	Gadgets and Gears	Mahaboudha,Kathmandu	4422330	1272360213456
2	Old Pinch Shop	Kharibot,Ekantakuna,Lalitpur	9864478090	547239840124
3	Camera House	Newroad,Kathmandu	4411220	345782390812

3 rows in set (0.00 sec)

Research

The screenshot shows the Techopedia website with a yellow header bar containing an 'ALERT' button and the text 'Help us Help You | 2019 Techopedia Reader Survey | Compl...'. Below the header is a navigation bar with links for TOPICS, WEBINARS, DOWNLOADS, DICTIONARY, TUTORIALS, Q & A, and RESOURCES. The main content area has a breadcrumb trail: Home / Dictionary / Tags / Data Management / Data Dictionary. To the left of the main content is a vertical sidebar with an advertisement for BAJAJ Motorcycles featuring a magnifying glass icon and the text 'BAJAJ MOTORCYCLES' and 'BAJAJ 3GCT OFFER'. The main content area features a large title 'Data Dictionary' and a definition section with the heading 'Definition - What does **Data Dictionary** mean?'. The definition text reads: 'A data dictionary is a file or a set of files that contains a database's metadata. The data dictionary contains records about other objects in the database, such as data ownership, data relationships to other objects, and other data.' Below this, there is a paragraph stating: 'The data dictionary is a crucial component of any relational database. Ironically, because of its importance, it is invisible to most database users. Typically, only database administrators interact with the data dictionary.'

Figure 7 Research Data Dictionary

What is Data Dictionary

 Piotr Kononow ⌚ 2018-10-01 📅 2019-02-05

Data dictionary is an inventory of data elements in a database or data model with detailed description of its format, relationships, meaning, source and usage. This term is a little ambiguous and can mean slightly different things:

1. A document
2. [Metadata tables in database systems \(DBMS\)](#)
3. Independent (in relation to DBMS) metadata repository

DATA					DATA DICTIONARY (METADATA)		
employee_id	first_name	last_name	nin	department_id	Column	Data Type	Description
44	Simon	Martinez	HH 45 09 73 D	1	employee_id	int	Primary key of a table
45	Thomas	Goldstein	SA 75 35 42 B	2	first_name	nvarchar(50)	Employee first name
46	Eugene	Cornelsen	NE 22 63 82	2	last_name	nvarchar(50)	Employee last name
47	Andrew	Petculescu	XY 29 87 61 A	1	nin	nvarchar(15)	National Identification Number
48	Ruth	Stadick	MA 12 89 36 A	15	position	nvarchar(50)	Current position title, e.g. Secretary
49	Barny	Scardello	AT 20 73 18	2	department_id	int	Employee department, Ref. Departments
50	Sidney	Hunter	HW 12 94 21 C	6	gender	char(1)	M = Male, F = Female, Null = unknown
51	Jeffrey	Evans	LX 13 26 39 B	6	employment_start_date	date	Start date of employment in organization.
52	Doris	Bemdt	YA 49 88 11 A	3	employment_end_date	date	Employment end date. Null if employee still employed.
53	Diane	Eaton	BE 08 74 68 A	1			
54	Bonnie	Hall	WW 53 77 68 A	15			
55	Taylor	Li	ZE 55 22 80 B	1			

Export Data Dictionary from your databases and share in HTML

[START FREE NOW](#)

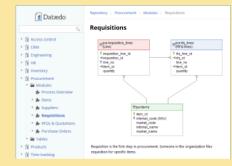
Table of Contents:

[Elements of Data Dictionary](#)

[Functions of Data Dictionary](#)

[Forms of Data Dictionary](#)

[Data Dictionary in Database Lifecycle](#)



The screenshot shows a software application window titled "Dataedo". On the left is a navigation sidebar with categories like "Home", "Catalog", "Tables", "Views", "Procedures", "Functions", "Triggers", "Constraints", "Indexes", "Materialized Views", and "Jobs". The main area is titled "Requisitions" and displays a database schema diagram. It shows a table named "Requisitions" with columns "Requisition_ID", "Employee_ID", "Position", "Department_ID", "Status", and "Comments". There are also foreign key relationships shown between "Requisitions" and other tables like "Employees", "Positions", "Departments", and "Statuses". A note at the bottom right says: "Requisitions table is a composite, composed of the organization hierarchy for specific items."

Document Your Databases

Discover, describe, visualize and share schema of your databases with interactive HTML pages in minutes. Crowdsource and preserve knowledge in Dataedo Data Catalog metadata repository.

[Try Free Now](#)

Elements of Data Dictionary

Data dictionary is a table with data elements (columns) as rows and their attributes as columns. Specific attributes vary depending on the purpose of the data dictionary.

Essential elements

Figure 8 Research Data Dictionary 2

tutorialspoint
SIMPLY EASY LEARNING

Jobs Examples Whiteboard Net Meeting Toc
 HOME Q/A LIBRARY VIDEOS TUTORS <

DBMS - Data Schemas

Advertisements

Previous Page Next Page

Database Schema

A database schema is the skeleton structure that represents the logical view of the entire database. It defines how the data is organized and how the relations among them are associated. It formulates all the constraints that are to be applied on the data.

A database schema defines its entities and the relationship among them. It contains a descriptive detail of the database, which can be depicted by means of schema diagrams. It's the database designers who design the schema to help programmers understand the database and make it useful.

```

graph TD
    LS[Logical Schema] --> S1((View 1))
    LS --> S2((View 2))
    LS --> S3((View 3))
    subgraph LS
        direction LR
        S1 --- S2 --- S3
    end
    subgraph LS
        direction LR
        S1 --- S2 --- S3
    end
    subgraph LS
        direction LR
        S1 --- S2 --- S3
    end

```

Figure 9 Research Database Schema

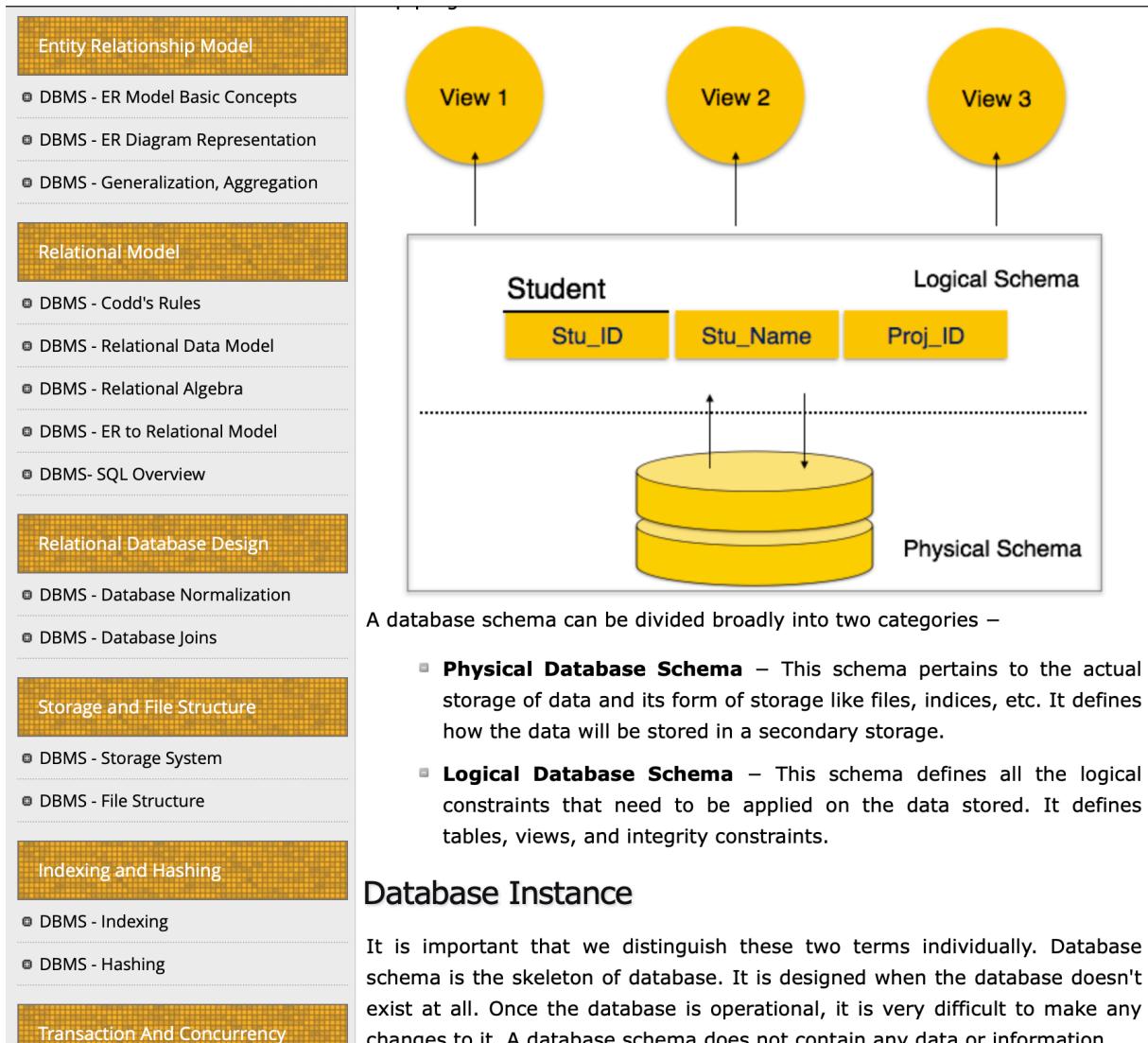
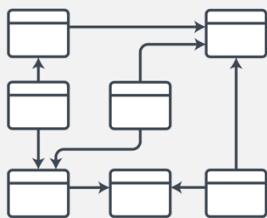


Figure 10 Research Database Instance

What is a Database Model



What are your Database diagram needs?

I'm new to Database diagrams and want to learn more.

I want to make my own Database diagram in Lucidchart.

I want to make a Database diagram from a Lucidchart template.

Contents

- Types of database models
 - Relational model
 - Hierarchical model
 - Network model
- Object-oriented database model

A database model shows the logical structure of a database, including the relationships and constraints that determine how data can be stored and accessed. Individual database models are designed based on the rules and concepts of whichever broader data model the designers adopt. Most data models can be represented by an accompanying database diagram.

8 min read

Figure 11 Research Database model

Contents

[Types of database models](#)

[Relational model](#)

[Hierarchical model](#)

[Network model](#)

[Object-oriented database model](#)

[Object-relational model](#)

[Entity-relationship model](#)

[Other database models](#)

[NoSQL database models](#)

[Databases on the Web](#)

Types of database models

There are many kinds of data models. Some of the most common ones include:

- Hierarchical database model
- Relational model
- Network model
- Object-oriented database model
- Entity-relationship model
- Document model
- Entity-attribute-value model
- Star schema
- The object-relational model, which combines the two that make up its name

You may choose to describe a database with any one of these depending on several factors. The biggest factor is whether the database management system you are using supports a particular model. Most database management systems are built with a particular data model in mind and require their users to adopt that

Figure 12 Research Types of Database Model

What is a Database Model

Build a Database

Contents

Types of database models

[Relational model](#)

Hierarchical model

Network model

Object-oriented database model

Object-relational model

Entity-relationship model

Other database models

NoSQL database models

Databases on the Web

Relational model

The most common model, the relational model sorts data into tables, also known as relations, each of which consists of columns and rows. Each column lists an attribute of the entity in question, such as price, zip code, or birth date. Together, the attributes in a relation are called a domain. A particular attribute or combination of attributes is chosen as a primary key that can be referred to in other tables, when it's called a foreign key.

Each row, also called a tuple, includes data about a specific instance of the entity in question, such as a particular employee.

The model also accounts for the types of relationships between those tables, including one-to-one, one-to-many, and many-to-many relationships. Here's an example:

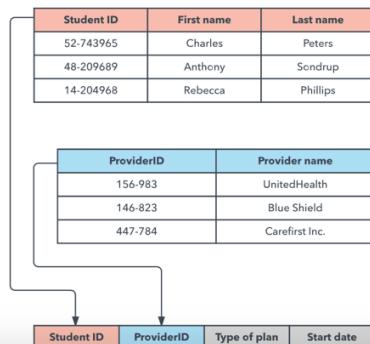
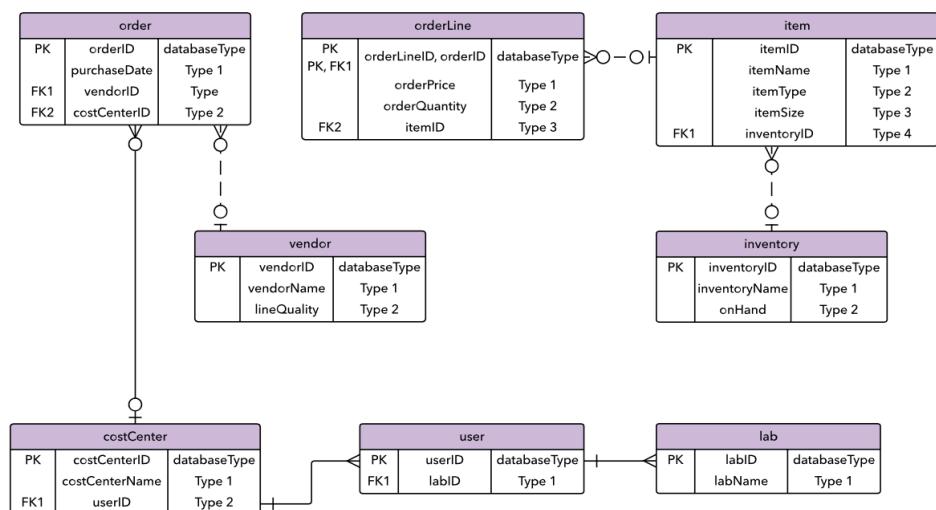


Figure 13 Research Relational Database Model

Entity-relationship model

This model captures the relationships between real-world entities much like the network model, but it isn't as directly tied to the physical structure of the database. Instead, it's often used for designing a database conceptually.

Here, the people, places, and things about which data points are stored are referred to as entities, each of which has certain attributes that together make up their domain. The cardinality, or relationships between entities, are mapped as well.



A common form of the ER diagram is the star schema, in which a central fact table connects to multiple dimensional tables.

Figure 14 Research Entity Relationship Database Model

Other database models

A variety of other database models have been or are still used today.

Inverted file model

A database built with the inverted file structure is designed to facilitate fast full text searches. In this model, data content is indexed as a series of keys in a lookup table, with the values pointing to the location of the associated files. This structure can provide nearly instantaneous reporting in big data and analytics, for instance.

This model has been used by the ADABAS database management system of Software AG since 1970, and it is still supported today.

Flat model

The flat model is the earliest, simplest data model. It simply lists all the data in a single table, consisting of columns and rows. In order to access or manipulate the data, the computer has to read the entire flat file into memory, which makes this model inefficient for all but the smallest data sets.

Multidimensional model

This is a variation of the relational model designed to facilitate improved analytical processing. While the relational model is optimized for online transaction processing (OLTP), this model is

Figure 15 Research Other Types of Database Model

Data Independence



Definition - What does **Data Independence** mean?

Data independence is the idea that generated and stored data should be kept separate from applications that use the data for computing and presentation. In many systems, data independence is an innate function related to the multiple components of the system; however, it is possible to keep data contained within a use application.



Techopedia explains **Data Independence**

To demonstrate the popularity of data independence, experts often point to conventional database systems. The role of a database is to hold data for use by various applications. Data independence allows for the same data to be used in many different ways. It's a more versatile approach than keeping data hidden within a program's source code.

As big data and other technology advances continue to progress, ideas for using data have gone far beyond simple data independence to cross-platform functionality, where data gets routed to many different destinations before being returned to a safe and secure storage medium. For example, an analytics engine will typically intake data in order to parse it and present results, but will return that data to a central data warehouse or other storage location. In these kinds of systems, data is most often rented, not owned and remains largely transient (though often highly regulated) until the time where it is no longer useful to the system, and will be archived or deleted according to the particular needs of administrators.

Figure 16 Research Data Independence

Conclusion

The task assigned in the coursework was completed with lots of effort and hardships. Tons of research and analysis were done to get through each steps of the work. Routine meetup with teachers were conducted where progressive work were shown and valuable suggestions were undertaken. With iteration of above steps again and again finally an executable program performing assigned task was developed.

This course work helped a lot in shaping a junior programmer in real programming world. Where a database is to be created with MYSQL programming language. This coursework has sharpen the self-research and analysis skills to carve steps for developing a program, selecting the best way to develop the program, debug errors generated during development process and regular follow-up with senior developer to avoid deviation from main path.

The coursework also required a proper documented report of all task performed during development of the program. As documentation of any project helps to overview and understand the project, it was very helpful in building our skill of preparing report in a standardized format accepted globally.

Time management and working accordingly to complete assigned task before deadline was one of the most important lesson learned from this course work. The course work was a hefty task to be completed within three weeks of time. All required research, analysis, planning, development, testing and documenting the process was to be done with in that time frame. It was a very tight schedule as course work of other subject were also to be completed in those same weeks. There were sleepless nights and constant programming thoughts going through my mind in these three weeks. Despite of procrastination and overwhelming feeling, I was able keep my thoughts aside and have some break time as well. Looking behind from this point, it makes me feel good that I have completed the task in time.

To sum up, the second course work of information system where a database management system was to be developed using MYSQL programming language was successfully completed. There were many valuable lesson learned during the program development process. All in all this course work gave a sneak peak of what life of a future programmer is going to be like.

Bibliography

- Anon. (n.d.) *Tutorialspoint* [Online]. Available from:
https://www.tutorialspoint.com/dbms/dbms_data_schemas.htm [Accessed 20 March 2019].
- Lucid Chart. (2019) *Lucid Chart* [Online]. (1.5) Available from:
<https://www.lucidchart.com/pages/database-diagram/database-models> [Accessed 22 March 2019].
- O'Regan, E. (2012) *Tutorialspoint* [Online]. (1.0) Available from:
https://www.tutorialspoint.com/dbms/dbms_data_schemas.htm [Accessed 20 March 2019].
- Technopedia. (2010) *Technopedia* [Online]. (2) Available from:
<https://www.techopedia.com/definition/1178/data-independence> [Accessed 20 March 2019].
- Tutorialspoint. (2012) *Tutorialspoint* [Online]. (1.5) Available from:
https://www.tutorialspoint.com/dbms/dbms_data_models.htm [Accessed 20 March 2019].