 Earlier known as

B. V. B. College of Engineering & Technology

School of Computer Science and Engineering

DBA Open ended experiment project Report on

***P-four Logistics***

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# Chapter 1: Introduction

**1.1 Logistics**

Logistics is generally the detailed organization and implementation of a complex operation. In general business sense, logistics is the management of the flow of things between the point of origin and the point of consumption to meet the requirements of customers or corporations. The resources managed in logistics may include tangible goods such as materials, equipment, and supplies, as well as food and other consumable items. The logistics of physical items usually involves the integration of information flow, [materials handling](https://en.wikipedia.org/wiki/Materials_management), [production](https://en.wikipedia.org/wiki/Production_(economics)), [packaging](https://en.wikipedia.org/wiki/Packaging), [inventory](https://en.wikipedia.org/wiki/Inventory), [transportation](https://en.wikipedia.org/wiki/Transportation), [warehousing](https://en.wikipedia.org/wiki/Warehousing), and often [security](https://en.wikipedia.org/wiki/Security).[1]

Logistics management is the part of [supply chain management](https://en.wikipedia.org/wiki/Supply_chain_management) and [supply chain engineering](https://en.wikipedia.org/wiki/Supply_chain_engineering) that plans, implements, and [controls](https://en.wikipedia.org/wiki/Control_(management)) the efficient, effective forward, and reverse flow and storage of goods, services, and related information between the point of origin and [point of consumption](https://en.wikipedia.org/wiki/Consumption_(economics)) to meet customer's requirements. The complexity of logistics can be modeled, analyzed, visualized, and optimized by dedicated [simulation software](https://en.wikipedia.org/wiki/Simulation_software). The minimization of the use of resources is a common motivation in all logistics fields. A professional working in the field of logistics management is called a logistician.

According to the Council of Supply Chain Management Professionals (previously the Council of Logistics Management), logistics is the process of planning, implementing and controlling procedures for the efficient and effective transportation and storage of goods including services and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements and includes inbound, outbound, internal and external movements.[2] In business, logistics may have either an internal focus (inbound logistics) or an external focus (outbound logistics), covering the flow and storage of materials from point of origin to point of consumption (see [supply-chain management](https://en.wikipedia.org/wiki/Supply-chain_management)). The main functions of a qualified logistician include [inventory management](https://en.wikipedia.org/wiki/Inventory_management), [purchasing](https://en.wikipedia.org/wiki/Purchasing), transportation, [warehousing](https://en.wikipedia.org/wiki/Warehousing), consultation, and the organizing and [planning](https://en.wikipedia.org/wiki/Planning) of these activities. Logisticians combine professional knowledge of each of these functions to coordinate resources in an organization.

### History of Logistics:

[Logistics](https://www.hdcusa.com/services/3pl-logistics/) refers the movement of products or services to a designated location at an agreed upon time, cost and condition. Ancient Roman and Greek wars are the basis for today’s [logistics systems](https://www.hdcusa.com/services/3pl-logistics/). Rome developed a highly efficient logistic system to supply its legions. Military officers called “logistikas” were responsible for ensuring the supply and allocation of resources, so that soldiers could move forward efficiently.[3]

During the Middle Ages elaborate supply systems, roads and [warehouses](https://www.hdcusa.com/services/public-warehousing/) were used. Forts and castles became storage depots supported by the economy of the surrounding countryside. During the Industrial Revolution, logistics advanced greatly with the addition of railways and ships.

World War I further increased industrial capabilities. The internal-combustion engine gave rise to widespread use of motor transport. World War II was characterized by dramatic advances in [transportation and communication](https://www.hdcusa.com/services/3pl-logistics/). U.S. shipyards performed at an unprecedented pace to expand the merchant marine (a fleet of U.S. civilian-owned merchant vessels that engage in commerce or [transportation of goods](https://www.hdcusa.com/services/3pl-logistics/) and services in and out of the navigable waters of the United States).

After World War II, logistics moved from warfare to business. Physical distribution of products began with a focus on outbound activity. [Filling orders](https://www.hdcusa.com/services/), distribution of products, [storage and warehousing](https://www.hdcusa.com/services/public-warehousing/), production planning and customer service are presently important aspects of the logistics process.

An entire industry was born from what started as a way to get products from point A to point B. Many companies now rely on outsourcing for some or all of their [supply chain management](https://www.hdcusa.com/services/)activities, resulting in the development of third party logistics companies for efficient transport and tracking of goods.

### 1.2 Database management System

Formally, a "database" refers to a set of related data and the way it is organized. Access to this data is usually provided by a "database management system" (DBMS) [4] consisting of an integrated set of computer software that allows users to interact with one or more databases and provides access to all of the data contained in the database (although restrictions may exist that limit access to particular data). The DBMS provides various functions that allow entry, storage and retrieval of large quantities of information and provides ways to manage how that information is organized.

DBMSs provide various functions that allow management of a database and its data which can be classified into four main functional groups:

* **Data definition** – Creation, modification and removal of definitions that define the organization of the data.
* **Update** – Insertion, modification, and deletion of the actual data
* **Retrieval** – Providing information in a form directly usable or for further processing by other applications. The retrieved data may be made available in a form basically the same as it is stored in the database or in a new form obtained by altering or combining existing data from the database.
* **Administration** – Registering and monitoring users, enforcing data security, monitoring performance, maintaining data integrity, dealing with concurrency control, and recovering information that has been corrupted by some event such as an unexpected system failure

### Relational database management system (RDBMS)

RDBMS [5] is a database management system (DBMS) based on the relational model of data. Most databases in widespread use today are based on this model. RDBMSs have been a common option for the storage of information in databases used for financial records, manufacturing and logistical information, personnel data, and other applications since the 1980s. Relational databases have often replaced legacy data models like hierarchical databases and network databases because they were easier to implement and administer. Nonetheless, relational databases received continued, unsuccessful challenges by object database management systems in the 1980s and 1990s, (which were introduced in an attempt to address the so-called object-relational impedance mismatch between relational databases and object-oriented application programs), as well as by XML database management systems in the 1990s.However, due to the expanse of technologies, such as horizontal scaling of computer clusters, NoSQL databases have recently become popular as an alternative to RDBMS databases.

### 1.3 Problem Statement

This project aims to design and Implement the database for P-FOUR Logistics to maintain the following activities.

* The logistics company has multiple departments , each department is identified by a unique ID.
* Logistics company also keeps every employees name, address, sex and salary. Every employee is uniquely identified by the unique employee ID.
* The logistic company keeps name, contact number, address of every customer. Every customer is assigned with unique number.
* Logistics company has many vehicles and each vehicle is identified by its unique Vehicle number.
* Logistics company also keeps track of the order details of the customer , with each order having unique order ID.

### 1.4 Objectives of the Project

Following are the main objectives of the study of this project work.

* To study and implement the basic database concepts.
* To understand the database design process.
* To Explore the activities of logistics for designing the database.
* To study and familiar about the Structured Query Languages , Procedural language extensions to SQL.

### 1.5 Motivation

The amount of data we produce every day is truly mind-boggling. There are about 2.5 quintillion bytes of data created each day at our current pace from the large organizations like Banking sector, Educational sector, reservation sector, health care sector and many other business applications. Storing, Maintaining and using data for Decision making are the challenging issues. These issues motivate us to design and develop database application for storing and managing the daily activities of the logistics.

# Chapter 2: Requirement Collection and Analysis

## 2.1 Introduction

The most critical aspect of specification is the gathering and compilation of system and user requirements. This process is normally done in conjunction with managers and users. The major goal in requirements gathering process is to:

* + - Collect the data used by the organization,
    - Identify relationships/conditions to be applied on the data,
    - Identify future data needs, and
    - Determine how the data is used and generated.
    - Identify the functions that are performed on the data

The starting place for data collection is gathering existing forms and reviewing policies and systems. Then, ask users what the data means, and determine their daily processes

Following subsections discuss the data requirements and functional & non functional requirements identified based on the following activities collected from the *P-four* Logistics users.

* The logistics company has multiple departments in around the city, each department is uniquely identified by its name, ID and a particular location in the city.
* Logistics company maintains record of every employees name, address, salary, sex and department they belong. Every employee is uniquely identified by the employee number.
* The company also maintains record of name, contact number, address and total amount paid of the every customer. Every customer is assigned with unique number i.e customer ID.
* Logistics company has many vehicles, and maintains record of its name, model, type and maximum capacity it can hold. Each vehicle is identified by unique Vehicle number.
* Logistics company also keeps track of the order details of the customer , with each order having unique order ID , the parcel material , total amount of the transport , order date and delivery date of the order.
* The logistic company handles various orders and every order is identified by its unique order ID.
* Employee can handle multiple orders and an order may have multiple employees to handle it.

**2.2 Data Requirement**

Data requirement describes the data to be stored in the database pertaining to activities of the logistics company requirement as described in section 2.1. Details of the data stored in the database are shown in table 2.1 and table 2.2.

**Table 2.1: Data to be stored in the database**

|  |  |  |
| --- | --- | --- |
| **Sl.**  **No.** | **Group** | **Data related to each group** |
| 1 | Logistics company Department | Department name, Department ID and Location of the  Deparment. |
| 2 | Logistics company Employee | Employee ID, Employee name, Sex, Salary, Address. |
| 3 | Logistics company Customers | Customer name, Address, contact number, Customer ID. |
| 4 | Logistics company order details | Order date, delivery date, parcel material, total amount for transport, total vehicles needed and Order ID. |
| 5 | Logistics Company Vehicles | Vehicle number, Model, Type, Maximum capacity it can hold. |
| 6 | Company Handles | Order ID ,Employee ID |
| 7 | Company Consists | Order ID ,Vehicle number |
| 8 | Logistics Company | Company name, CEO name, Registration number, Location of the city. |

**Table 2.2: Conditions on Data**

|  |  |
| --- | --- |
| **Sl. No.** | **Conditions** |
| 1 | Employee can handle multiple orders. |
| 2 | Each order may have multiple employees to handle it. |
| 3 | Each customer can give multiple orders for transportation. |
| 4 | One order can be transported in multiple vehicles. |
| 5 | One vehicle can transport and consist multiple orders or parcel material. |

**2.3 Functional Requirement**

Functional requirements are product features or functions that developers must implement to enable users to accomplish their tasks. So, it’s important to make them clear both for the development team and the stakeholders (clients). Table 2.3 shows the different types users of Logistics Company database application and their respective responsibilities (tasks). Table 2.4 shows the different functions and user can perform on the database.

**Table 2.3: Categories of Users and their tasks**

|  |  |  |
| --- | --- | --- |
| Sl. No. | Users | Responsibilities (tasks) |
| 1 | Logistics Company Head | Responsible for Viewing and modifying every department  Data |
| 2 | Employee | Responsible for handling the orders assigned to them. |
| 3 | Customer | Responsible for entering their information, viewing  and tracing their orders. |
| 4 | Department Manager | Responsible for adding employees, adding vehicles and generating various reports as per the requirement of the Department / company head / employee / customer. |

**Table 2.4: Functions of each user**

|  |  |  |
| --- | --- | --- |
| **Sl.**  **No.** | **Functions** | **User** |
| 1 | Insert the records into the database | Company head (CEO), Department manager, employee and customer. |
| 2 | Delete the records from the database | Company head (CEO) and Department manager. |
| 3 | Generate the various reports like department manager details , order details , employee details. | Company head i.e CEO. |
| 4 | Generate the order details with the total amount of transportation. | Customer and Employee. |

## 2.4 Non Functional Requirement

Nonfunctional Requirements (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs. In this project we are addressing the maintainability, usability and security in order to secure the data and accessibility.

**Chapter 3: Database Design**

**3.1. Introduction**

The requirements gathering and specification provides you with a high-level understanding of the organization, its data, and the processes that you must model in the database. Database design involves constructing a suitable model of for the information.

Since the design process is complicated, especially for large databases, database design is divided into three phases:

• Conceptual database design

• Logical database design

• Physical database design.

In our project work we are addressing the conceptual database design using ER modelling and logical database design using the implementation data model called Relational model.

**3.2. Conceptual Database Design**

Conceptual database design involves modelling the collected information at a high-level of abstraction without using a particular data model or DBMS. This model allows for easy communication between end-users and database developers and has a clear method to convert from high-level model to relational model. The most popular model for conceptual database design is the Entity Relationship model which describes data as attribute, entity and relationship.

Table 3.1 shows the list of attributes Table 3.2 shows the list of entity types and table 3.3 shows the list of relationship types identified for the requirement discussed in the section 2.1.

**Table 3.1: List of attributes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL.NO** | **ATTRIBUTE NAME** | **ATTRIBUTE TYPE** | **JUSTIFICATION** | **ENTITY TYPE** |
| 1. | REGNO | SIMPLE |  | COMPANY |
| 2. | CNAME | SIMPLE |  | COMPANY |
| 3. | CEO\_NAME | SIMPLE |  | COMPANY |
| 4. | ADDRESS | COMPOSITE | IT HAS 4 COMPONENTS | COMPANY |
| 5. | DNUM | SIMPLE |  | DEPARTMENT |
| 6. | DNAME | SIMPLE |  | DEPARTMENT |
| 7. | DMGR\_SSN | SIMPLE |  | DEPARTMENT |
| 8. | D\_LOCATION | COMPOSITE | IT HAS 3 COMPONENTS | DEPARTMENT |
| 9. | SSN | SIMPLE |  | EMPLOYEE |
| 10. | NAME | COMPOSITE | IT HAS 3 COMPONENTS | EMPLOYEE |
| 11. | DNO | SIMPLE |  | EMPLOYEE |
| 12. | SEX | SIMPLE |  | EMPLOYEE |
| 13. | SALARY | SIMPLE |  | EMPLOYEE |
| 14. | ADDRESS | COMPOSITE | IT HAS 4 COMPONENTS | EMPLOYEE |
| 15. | Phone\_no | SIMPLE |  | DEPENDENT |
| 16. | Sex | SIMPLE |  | DEPENDENT |
| 17. | Name | COMPOSITE | IT HAS 3 COMPONENTS | DEPENDENT |
| 18. | Address | COMPOSITE | IT HAS 4 COMPONENTS | DEPENDENT |
| 19. | ORDER\_ID | SIMPLE |  | ORDER\_DETAILES |
| 20. | ESSN | SIMPLE |  | ORDER\_DETAILES |
| 21. | PARCEL\_MATERIAL | SIMPLE |  | ORDER\_DETAILES |
| 22. | CUSTOMER\_ID | SIMPLE |  | ORDER\_DETAILES |
| 23. | TOTAL\_VEHICLES | SIMPLE |  | ORDER\_DETAILES |
| 24. | TOTAL\_AMOUNT | SIMPLE |  | ORDER\_DETAILES |
| 25. | ORDER\_DATE | SIMPLE |  | ORDER\_DETAILES |
| 26. | DELIVERY\_DATE | SIMPLE |  | ORDER\_DETAILES |
| 27. | COMP\_ID | SIMPLE |  | CUSTOMER |
| 28. | COMP\_NAME | SIMPLE |  | CUSTOMER |
| 29. | CONTACT\_NO | SIMPLE |  | CUSTOMER |
| 30. | ADDRESS | COMPOSITE | IT HAS 4 COMPONENTS | CUSTOMER |
| 31. | VEHICLE\_NO | SIMPLE |  | VEHICLE |
| 32. | MODEL | SIMPLE |  | VEHICLE |
| 33. | TYPE | SIMPLE |  | VEHICLE |
| 34. | MAX\_CAPACITY | SIMPLE |  | VEHICLE |
| 35. | HSSN | SIMPLE |  | HANDLES |
| 36. | ORDER\_ID | SIMPLE |  | HANDLES |
| 37. | VEHICLENO | SIMPLE |  | CONSISTS |
| 38. | ORDER\_ID | SIMPLE |  | CONSISTS |

**Table 3.2: List of Entity types**

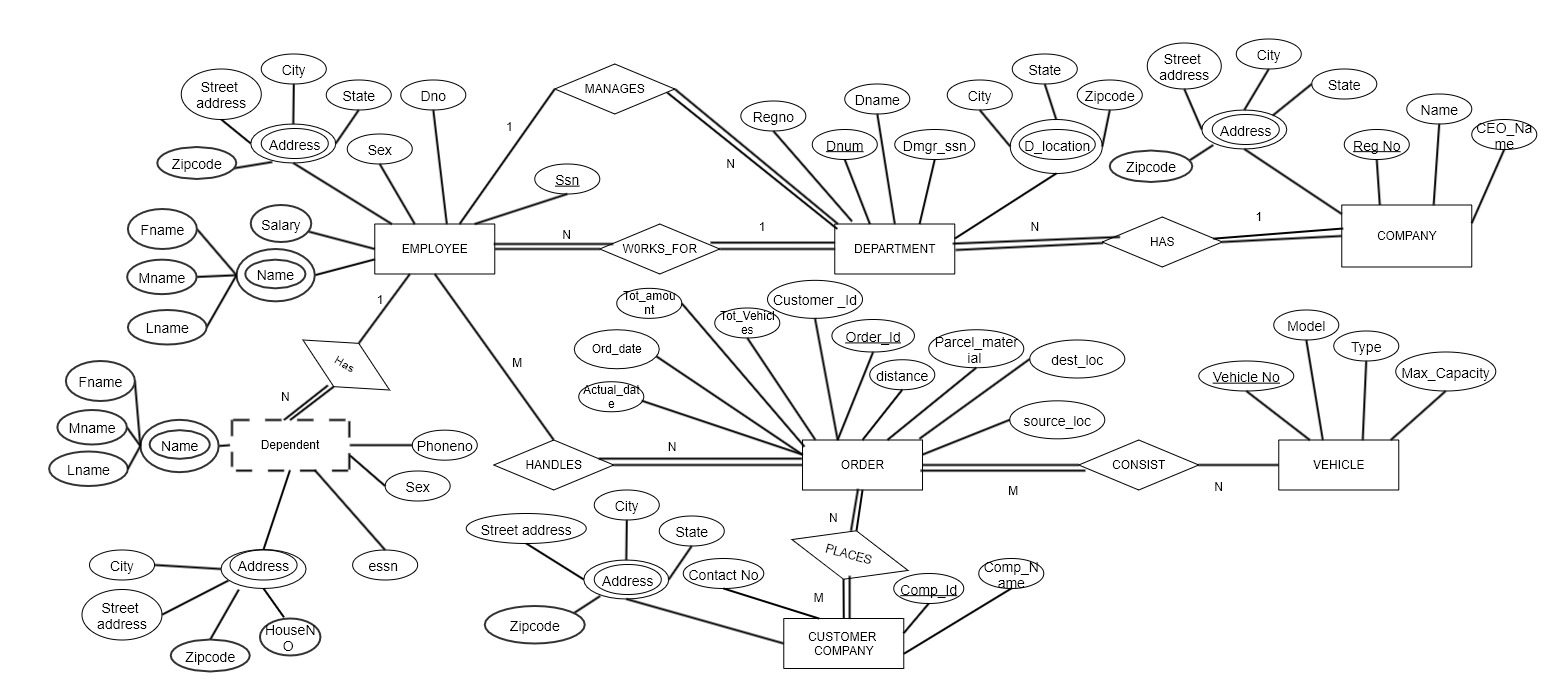
|  |  |  |  |
| --- | --- | --- | --- |
| **SL.NO** | **ENTITY TYPE** | **TYPE OF ENTITY TYPE** | **JUSTIFICATION** |
| 1. | COMPANY | STRONG | It has key attribute |
| 2. | DEPARTMENT | STRONG | It has key attribute |
| 3. | EMPLOYEE | STRONG | It has key attribute |
| 4. | DEPENDENT | WEAK | It doesn’t have key attribute |
| 5. | CUSTOMER | STRONG | It has key attribute |
| 6. | ORDER\_DETAILS | STRONG | It has key attribute |
| 7. | VEHICLE | STRONG | It has key attribute |
| 8. | HANDLES | STRONG | It has key attribute |

**Table 3.3: List of Relationship types**

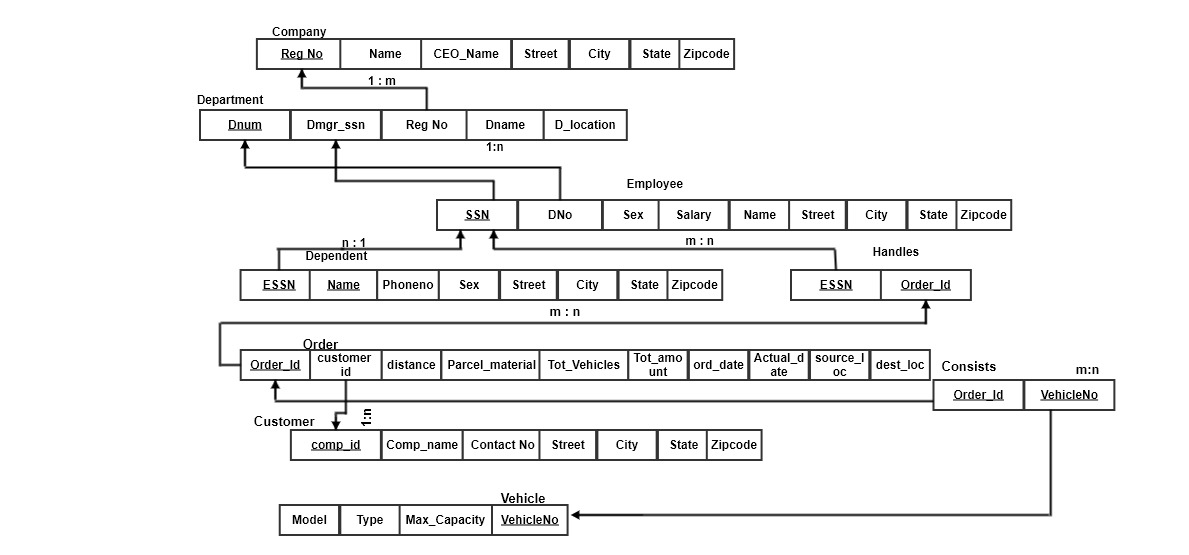
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL.NO** | **Relation type**  **Name** | **Type of Relationship type** | **Justification** | **Participating**  **Entity Type with**  **cardinality ratio** | **Participation** |
| 1. | WORKS \_FOR | SIMPLE |  | DEPARTMENT | TOTAL |
| EMPLOYEE | TOTAL |
| 2. | HANDLES | SIMPLE |  | EMPLOYEE | PARTIAL |
| ORDER | TOTAL |
| 3. | MANAGES | SIMPLE |  | EMPLOYEE | PARTIAL |
| DEPARTMENT | TOTAL |
| 4. | HAS | SIMPLE |  | COMPANY | TOTAL |
| DEPARTMENT | TOTAL |
| 5. | HAS | SIMPLE |  | EMPLOYEE | PARTIAL |
| DEPENDENT | TOTAL |
| 6. | CONSISTS | SIMPLE |  | ORDER | TOTAL |
| VEHICLE | PARTIAL |
| 7. | PLACES | SIMPLE |  | CUSTOMER | TOTAL |
| ORDER | TOTAL |

**3.2.1 E-R Diagram, Schema Diagram and Normalization**

Entity relationship diagram of the proposed system as described in the requirement analysis is shown in the figure 3.1and figure 3.2 shows the schema diagram obtained after converting ER diagram to relational model.



**Fig.3.1: ER Diagram**

****

**Fig 3.2: Schema diagram of the Fig.3.1**

COMPANY

(Reg\_No, Name, CEO\_Name, Address)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

DEPARTMENT

(Dnum, Dmgr\_ssn, Reg\_No, Dname, D\_location)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

EMPLOYEE

(Ssn, Dno, Sex, Address, Salary, Name)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

DEPENDENT

(Essn, Name, Phoneno, Address, Sex)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

HANDLES

(Essn, Order\_ID)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

ORDER

(Order\_ID, Customer\_ID, Essn, Parcel\_material, Total\_vehicles, Total\_amount, Order\_date, delivery\_date)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

CUSTOMER

(Comp\_ID, Comp\_name, Contact\_no, Address)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

VEHICLE

(Model, Type, Max\_Capacity, Vehicleno)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

CONSISTS

(Order\_ID, VehicleNo)

* The Relation is in 1NF as it has atomic valued attributes
* The Relation is in 2NF since, every attribute is fully functionally dependent on the key.

**Chapter 4. Implementation and Results**

**4.1 Introduction**

Implementation involves the construction of a database according to the specification of a logical schema. This will include the specification of an appropriate storage schema, security enforcement, external schema and so on. Implementation is influenced by the choice of available DBMSs, database tools and operating environment. There are additional tasks beyond simply creating a database schema and implementing the constraints such as data must be entered into the tables, issues relating to the users and user processes need to be addressed, and the management activities associated with wider aspects of corporate data management need to be supported. In practice, implementation of the logical schema in a given DBMS requires a very detailed knowledge of the specific features and facilities that the DBMS has to offer.

In an ideal world, and in keeping with good software engineering practice, the first stage of implementation would involve matching the design requirements with the best available implementing tools and then using those tools for the implementation. In database terms, this might involve choosing vendor products with DBMS and SQL variants most suited to the database which is to be implemented. There are many relational DBMSs, available such as Oracle Database, Microsoft SQL Server , MySQL, IBM DB2, IBM Informix and Microsoft Access, use SQL. In this project we used Oracle SQL developer create the following tables of Logistics Table database.

**4.2 Database Tables**

Following tables table 4.1 to table 4.9 are the tables created for the schema diagram shown in figure 3.2.

**TABLE 4.1 COMPANY TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| REG.NO | VARCHAR(5) | PRIMARY KEY |
| CNAME | VARCHAR(25) | NOT NULL |
| CEO\_FNAME | VARCHAR(25) | NOT NULL |
| PHONE\_NUMBER | NUMBER(10) | NOT NULL |
| STREET | VARCHAR(30) | NOT NULL |
| CITY | VARCHAR(25) | NOT NULL |
| STATE | VARCHAR(20) | NOT NULL |
| ZIP CODE | NUMBER(8) | NOT NULL |

**TABLE 4.2 EMPLOYEE TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| SSN | NUMBER(5) | PRIMARY KEY |
| FNAME | VARCHAR(25) | NOT NULL |
| MNAME | VARCHAR(15) |  |
| LNAME | VARCHAR(25) | NOT NULL |
| DNO | INTEGER | FOREIGN KEY REFERENCE TO DEPARTMENT |
| SEX | VARCHAR | NOT NULL |
| SALARY | INTEGER | NOT NULL |
| STREET | VARCHAR(30) | NOT NULL |
| CITY | VARCHAR(20) | NOT NULL |
| STATE | VARCHAR(20) | NOT NULL |
| ZIPCODE | NUMBER(6) | NOT NULL |

**TABLE 4.3 DEPARTMENT TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| DNUM | INTEGER | PRIMARY KEY |
| DMRG\_NO | INTEGER | NOT NULL |
| REGNO | VARCHAR(15) | FOREIGN KEY REFERENCES TO COMPANY |
| DNAME | VARCHAR(20) | NOT NULL |
| D\_LOCATION | VARCHAR(30) | NOT NULL |

**TABLE 4.4 DEPENDENT TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| ESSN | INTEGER | FOREIGN KEY REFERENCES TO EMPLOYEE |
| FNAME | VARCHAR(25) | NOT NULL |
| MNAME | VARCHAR(4) | NOT NULL |
| LNAME | VARCHAR(4) | NOT NULL |
| SEX | VARCHAR | NOT NULL |
| STREET | VARCHAR(30) | NOT NULL |
| CITY | VARCHAR(25) | NOT NULL |
| STATE\_NAME | VARCHAR(20) | NOT NULL |
| ZIPCODE | NUMBER(6) | NOT NULL |

**TABLE 4.5 CUSTOMER TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| COMP\_ID | VARCHAR(10) | PRIMARY KEY |
| COMP\_NAME | VARCHAR(30) | NOT NULL |
| CONTACT\_NO | NUMBER(10) | NOT NULL |
| STREET | VARCHAR(30) | NOT NULL |
| CITY | VARCHAR(25) | NOT NULL |
| STATE\_NAME | VARCHAR(20) | NOT NULL |
| ZIPCODE | NUMBER(6) | NOT NULL |

**TABLE 4.6 ORDER\_DETAILS TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| ORDER\_ID | VARCHAR(20) | PRIMARY KEY |
| CUSTOMER\_ID | VARCHAR(20) | FOREIGN KEY REFERENCES TO CUSTOMER |
| ESSN | INTEGER | FOREIGN KEY REFERENCES TO EMPLOYEE |
| PARCEL\_MATRIAL | VARCHAR(10) |  |
| TOT\_VEHICLES | INTEGER |  |
| TOT\_AMOUNT | INTEGER |  |
| ORD\_DATE | DATE | NOT NULL |
| ACTUAL\_DATE | DATE | NOT NULL |

**TABLE 4.7 VEHICLE TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| VEHICAL\_NO | VARCHAR(20) | PRIMARY KEY |
| MODEL | VARCHAR(20) |  |
| TYPE | VARCHAR(20) |  |
| MAX\_CAPACITY | VARCHAR(10) |  |

**TABLE 4.8 HANDLES TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| HSSN | INTEGER | FOREIGN KEY REFERENCES TO EMPLOYEE |
| ORDER\_ID | VARCHAR(20) | FOREIGN KEY REFERENCES TO ORDER\_DETAILS |

**TABLE 4.9 HANDLES TABLE DESCRIPTION**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTE NAME** | **TYPE** | **CONSTRAINTS** |
| VEHICLENO | VARCHAR(20) | FOREIGN KEY REFERENCES TO VEHICLE |
| ORDER\_ID | VARCHAR(20) | FOREIGN KEY REFERENCES TO ORDER \_DETAILS |

Following syntax shows for creating database table shown with an example for the Table 4.1 and 4.2.

**Database creation:**

CREATE TABLE COMPANY

( REG\_NO VARCHAR(5) NOT NULL PRIMARY KEY,

CNAME VARCHAR(25) NOT NULL,

CEO\_FNAME VARCHAR(25) NOT NULL,

PHONE\_NUMBER NUMBER(10) NOT NULL,

STREET VARCHAR(30) NOT NULL,

CITY VARCHAR(25) NOT NULL,

STATE\_NAME VARCHAR(20) NOT NULL,

ZIPCODE NUMBER(8) NOT NULL

);

CREATE TABLE EMPLOYEE

( SSN NUMBER(5) PRIMARY KEY,

FNAME VARCHAR(25) NOT NULL,

MNAME VARCHAR(15),

LNAME VARCHAR(25) NOT NULL,

DNO INTEGER NOT NULL,

SEX CHAR,

SALARY INTEGER,

STREET VARCHAR(30) NOT NULL,

CITY VARCHAR(20) NOT NULL,

STATE\_NAME VARCHAR(20) NOT NULL,

ZIPCODE NUMBER(6) NOT NULL

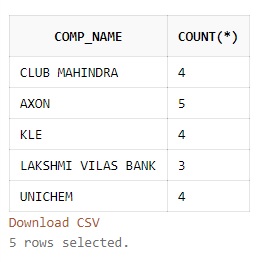
);

**4.3 Results:**

Figures Fig.3.3 and Fig.3.4 shows the sample reports of the proposed system. Fig.3.3 employee report of the male employees whose salary is greater than average salary and Fig.3.4 customer report of the customer having more than two orders.

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**Fig 3.3 Employee Report**



**Fig 3.4 Customer Report**

**References**

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3. <https://www.hdcusa.com/news/history-of-logistics-distribution-and-supply-chain-management/>
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