DBMS MINI PROJECT: Electricity Billing Management System (EBMS)

Submitted by:

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Abstract:

The Electricity Billing Management System (EBMS) is a pivotal component in modern utility infrastructure, ensuring accurate billing, efficient customer management, and streamlined administrative processes. This project presents a comprehensive database management system (DBMS) tailored specifically for EBMS. By integrating robust database architecture with intuitive user interfaces, the system aims to revolutionize the management of electricity billing operations.

Introduction:

Electricity billing is a critical aspect of utility services, requiring meticulous attention to detail and efficient handling of vast amounts of data. Traditional manual methods are prone to errors and inefficiencies, necessitating the adoption of automated systems. This project introduces a sophisticated DBMS for EBMS, offering a centralized platform for managing customer accounts, billing information, tariffs, and administrative tasks. Through the implementation of advanced database technologies, this system seeks to enhance accuracy, reliability, and user accessibility.

Program:

```
-- MySQL dump 10.13  Distrib 8.0.24, for Win64 (x86_64)

--

-- Host: localhost    Database: ebms

-- ------------------------------------------------------

-- Server version 8.0.24

/*!40101 SET @OLD_CHARACTER_SET_CLIENT=@@CHARACTER_SET_CLIENT */;

/*!40101 SET @OLD_CHARACTER_SET_RESULTS=@@CHARACTER_SET_RESULTS */;

/*!40101 SET @OLD_COLLATION_CONNECTION=@@COLLATION_CONNECTION */;

/*!50503 SET NAMES utf8mb4 */;

/*!40103 SET @OLD_TIME_ZONE=@@TIME_ZONE */;

/*!40103 SET TIME_ZONE='+00:00' */;

/*!40014 SET @OLD_UNIQUE_CHECKS=@@UNIQUE_CHECKS, UNIQUE_CHECKS=0 */;

/*!40014 SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0 */;

/*!40101 SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='NO_AUTO_VALUE_ON_ZERO' */;

/*!40111 SET @OLD_SQL_NOTES=@@SQL_NOTES, SQL_NOTES=0 */;

--

-- Table structure for table `account`

--

DROP TABLE IF EXISTS `account`;

/*!40101 SET @saved_cs_client     = @@character_set_client */;

/*!50503 SET character_set_client = utf8mb4 */;

CREATE TABLE `account` (

 `acc_id` int NOT NULL,

 `cust_id` int DEFAULT NULL,

 `account_no` varchar(50) DEFAULT NULL,
```

```sql
  `name` varchar(50) NOT NULL,

  PRIMARY KEY (`acc_id`),

  KEY `cust_id` (`cust_id`),

  CONSTRAINT `account_ibfk_1` FOREIGN KEY (`cust_id`) REFERENCES `customer` (`cust_id`)

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;

/*!40101 SET character_set_client = @saved_cs_client */;

--

-- Dumping data for table `account`

--

LOCK TABLES `account` WRITE;

/*!40000 ALTER TABLE `account` DISABLE KEYS */;

INSERT                        INTO                        `account`                        VALUES
(401,111,'11345','Abhay'),(403,112,'12455','Vishnu'),(405,113,'98754','Anant'),(407,211,'34557','Vijay'),(409,21
2,'24567','Deekshith'),(411,311,'76314','Farhaan'),(413,312,'54327','Ajay'),(415,313,'74123','Nikhil'),(417,411,'
43567','Preetham'),(419,412,'98764','Sridhar'),(421,345,'43561','Rohanjit'),(423,325,'78654','Ayushman'),(425,
347,'67452','Anwesh'),(427,367,'91294','Devash'),(429,324,'89123','Tushar');

/*!40000 ALTER TABLE `account` ENABLE KEYS */;

UNLOCK TABLES;

--

-- Table structure for table `admin`

--

DROP TABLE IF EXISTS `admin`;

/*!40101 SET @saved_cs_client     = @@character_set_client */;

/*!50503 SET character_set_client = utf8mb4 */;

CREATE TABLE `admin` (

  `admin_id` int NOT NULL,

  `admin_name` varchar(50) NOT NULL,

  `cust_id` int DEFAULT NULL,

  PRIMARY KEY (`admin_id`),
```

```sql
  KEY `cust_id` (`cust_id`),

  CONSTRAINT `admin_ibfk_1` FOREIGN KEY (`cust_id`) REFERENCES `customer` (`cust_id`)

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;

/*!40101 SET character_set_client = @saved_cs_client */;

--

-- Dumping data for table `admin`

--

LOCK TABLES `admin` WRITE;

/*!40000 ALTER TABLE `admin` DISABLE KEYS */;

INSERT                    INTO                    `admin`                    VALUES
(1,'Sahil',111),(2,'Karan',112),(3,'Rahul',113),(4,'Nikhil',211),(5,'Sushmitha',212),(6,'Priyanka',311),(7,'Shikha',31
2),(8,'Ritesh',313),(9,'Aman',411),(10,'Nitin',412),(11,'Akshat',345),(12,'Ankit',325),(13,'Shashi',347),(14,'Ritika',
367),(15,'Kamchin',324);

/*!40000 ALTER TABLE `admin` ENABLE KEYS */;

UNLOCK TABLES;

--

-- Table structure for table `billing`

--

DROP TABLE IF EXISTS `billing`;

/*!40101 SET @saved_cs_client     = @@character_set_client */;

/*!50503 SET character_set_client = utf8mb4 */;

CREATE TABLE `billing` (

  `meter_number` varchar(10) NOT NULL,

  `acc_id` int DEFAULT NULL,

  `cust_id` int DEFAULT NULL,

  `monthly_units` int DEFAULT NULL,

  `amount_per_unit` int DEFAULT NULL,

  `total_amount` int DEFAULT NULL,
```

```sql
  PRIMARY KEY (`meter_number`),

  KEY `acc_id` (`acc_id`),

  KEY `cust_id` (`cust_id`),

  CONSTRAINT `billing_ibfk_1` FOREIGN KEY (`acc_id`) REFERENCES `account` (`acc_id`),

  CONSTRAINT `billing_ibfk_2` FOREIGN KEY (`cust_id`) REFERENCES `customer` (`cust_id`)

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;

/*!40101 SET character_set_client = @saved_cs_client */;

--

-- Dumping data for table `billing`

--

LOCK TABLES `billing` WRITE;

/*!40000 ALTER TABLE `billing` DISABLE KEYS */;

INSERT                          INTO                          `billing`                          VALUES
('101',401,111,500,10,5000),('102',403,112,390,10,3900),('103',405,113,208,10,2080),('104',407,211,800,10,80
00),('105',409,212,200,10,2000),('106',411,311,600,10,6000),('107',413,312,250,10,2500),('108',415,313,400,1
0,4000),('109',417,411,450,10,4500),('110',419,412,550,10,5500),('111',421,345,320,10,3200),('112',423,325,5
90,10,5900),('113',425,347,670,10,6700),('114',427,367,230,10,2300),('115',429,324,650,10,6500);

/*!40000 ALTER TABLE `billing` ENABLE KEYS */;

UNLOCK TABLES;

--

-- Table structure for table `customer`

--

DROP TABLE IF EXISTS `customer`;

/*!40101 SET @saved_cs_client     = @@character_set_client */;

/*!50503 SET character_set_client = utf8mb4 */;

CREATE TABLE `customer` (

  `cust_id` int NOT NULL,

  `cust_name` varchar(50) NOT NULL,

  `address` varchar(50) NOT NULL,
```
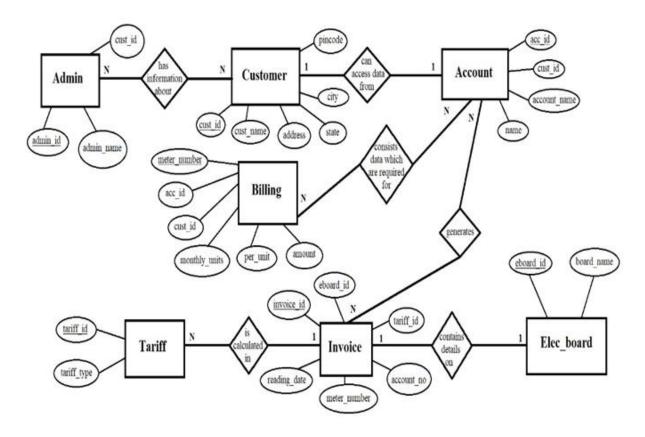
```sql
  `state` varchar(30) NOT NULL,

  `city` varchar(30) NOT NULL,

  `pincode` int NOT NULL,

  PRIMARY KEY (`cust_id`)

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;

/*!40101 SET character_set_client = @saved_cs_client */;

--

-- Dumping data for table `customer`

--

LOCK TABLES `customer` WRITE;

/*!40000 ALTER TABLE `customer` DISABLE KEYS */;

INSERT INTO `customer` VALUES

(111,'Abhay','MGRoad','Karnataka','Mysore\n',570008),(112,'Vishnu','BasaveshwaraNagar','Karnataka','Bangal
ore',570042),(113,'Anant','HDKoteRoad','Karnataka','Mysore',570009),(211,'Vijay','DevarajaUrsRoad','Karnatak
a','Mysore',570034),(212,'Deekshith','RKBlock','Karnataka','Tumkur',580054),(311,'Farhaan','KGKoppal','Karnat
aka','Mysore',570046),(312,'Ajay','PambanBridgeRoad','Tamil Nadu','Rameshwaram',590065),(313,'Nikhil','HSR
Layout','Karnataka','Bangalore',570075),(324,'Tushar','MSRaod','UttarPradesh','Lucknow',640092),(325,'Ayush
man','KanakapuraRoad','Karnataka','Bangalore',570049),(345,'Rohanjit','Kuvempunagar','Karnataka','Mysore',5
70048),(347,'Anwesh','DFG  Layout','Madhya  Pradesh','Indore ',620089),(367,'Devash','Chambal  Road','Tamil
Nadu','Chennai',590068),(411,'Preetham','AB  Block','Uttar  Pradesh','Ayodhya',640055),(412,'Sridhar','Gwalior
Road','Madhya Pradesh','Gwalior',620067);

/*!40000 ALTER TABLE `customer` ENABLE KEYS */;

UNLOCK TABLES;

--

-- Table structure for table `elec_board`

--

DROP TABLE IF EXISTS `elec_board`;

/*!40101 SET @saved_cs_client     = @@character_set_client */;

/*!50503 SET character_set_client = utf8mb4 */;

CREATE TABLE `elec_board` (

  `eboard_id` int NOT NULL,
```

```sql
  `board_name` varchar(50) DEFAULT NULL,

  PRIMARY KEY (`eboard_id`)

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;

/*!40101 SET character_set_client = @saved_cs_client */;

--

-- Dumping data for table `elec_board`

--

LOCK TABLES `elec_board` WRITE;

/*!40000 ALTER TABLE `elec_board` DISABLE KEYS */;

INSERT INTO `elec_board` VALUES (1010,'Chamundeshwari Power Corporation'),(2010,'Karnataka Power Corporation'),(3010,'Bangalore Power Corporation'),(4010,'Tamil Nadu Power Corporation'),(5010,'Uttar Pradesh Power Corporation'),(6010,'Madhya Pradesh Power Corporation');

/*!40000 ALTER TABLE `elec_board` ENABLE KEYS */;

UNLOCK TABLES;

--

-- Table structure for table `invoice`

--

DROP TABLE IF EXISTS `invoice`;

/*!40101 SET @saved_cs_client     = @@character_set_client */;

/*!50503 SET character_set_client = utf8mb4 */;

CREATE TABLE `invoice` (

  `invoice_id` int NOT NULL,

  `eboard_id` int DEFAULT NULL,

  `account_no` varchar(50) DEFAULT NULL,

  `tariff_id` int DEFAULT NULL,

  `reading_date` date DEFAULT NULL,

  `Meter_number` varchar(10) DEFAULT NULL,

  PRIMARY KEY (`invoice_id`),
```

```
  KEY `eboard_id` (`eboard_id`),

  KEY `tariff_id` (`tariff_id`),

  KEY `Meter_number` (`Meter_number`),

  CONSTRAINT `invoice_ibfk_1` FOREIGN KEY (`eboard_id`) REFERENCES `elec_board` (`eboard_id`),

  CONSTRAINT `invoice_ibfk_2` FOREIGN KEY (`tariff_id`) REFERENCES `tariff` (`tariff_id`),

  CONSTRAINT `invoice_ibfk_3` FOREIGN KEY (`Meter_number`) REFERENCES `billing` (`meter_number`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;

/*!40101 SET character_set_client = @saved_cs_client */;

--

-- Dumping data for table `invoice`

--

LOCK TABLES `invoice` WRITE;

/*!40000 ALTER TABLE `invoice` DISABLE KEYS */;

INSERT INTO `invoice` VALUES (1000,6010,'98764',12,'2020-06-10','110'),(1047,4010,'91294',15,'2020-06-
03','114'),(1111,1010,'11345',12,'2020-06-23','101'),(1888,1010,'43561',15,'2020-06-
26','111'),(1999,3010,'78654',13,'2020-06-18','112'),(2017,6010,'67452',12,'2020-06-
09','113'),(2222,3010,'12455',13,'2020-06-17','102'),(3333,1010,'98754',12,'2020-06-
22','103'),(4444,1010,'34557',14,'2020-06-14','104'),(5555,2010,'24567',15,'2020-06-
21','105'),(6666,1010,'76314',13,'2020-06-05','106'),(7777,4010,'54327',14,'2020-06-
11','107'),(8014,5010,'89123',15,'2020-06-06','115'),(8888,3010,'74123',12,'2020-06-
12','108'),(9999,5010,'43567',14,'2020-06-13','109');

/*!40000 ALTER TABLE `invoice` ENABLE KEYS */;

UNLOCK TABLES;

--

-- Table structure for table `tariff`

--


DROP TABLE IF EXISTS `tariff`;

/*!40101 SET @saved_cs_client     = @@character_set_client */;

/*!50503 SET character_set_client = utf8mb4 */;
```

```sql
CREATE TABLE `tariff` (

  `tariff_id` int NOT NULL,

  `tariff_type` varchar(50) DEFAULT NULL,

  PRIMARY KEY (`tariff_id`)

) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;

/*!40101 SET character_set_client = @saved_cs_client */;

--

-- Dumping data for table `tariff`

--

LOCK TABLES `tariff` WRITE;

/*!40000 ALTER TABLE `tariff` DISABLE KEYS */;

INSERT INTO `tariff` VALUES (12,'Power factor tariff'),(13,'Peak Load tariff'),(14,'Two part tariff'),(15,'Three part tariff');

/*!40000 ALTER TABLE `tariff` ENABLE KEYS */;

UNLOCK TABLES;

/*!40103 SET TIME_ZONE=@OLD_TIME_ZONE */;

/*!40101 SET SQL_MODE=@OLD_SQL_MODE */;

/*!40014 SET FOREIGN_KEY_CHECKS=@OLD_FOREIGN_KEY_CHECKS */;

/*!40014 SET UNIQUE_CHECKS=@OLD_UNIQUE_CHECKS */;

/*!40101 SET CHARACTER_SET_CLIENT=@OLD_CHARACTER_SET_CLIENT */;

/*!40101 SET CHARACTER_SET_RESULTS=@OLD_CHARACTER_SET_RESULTS */;

/*!40101 SET COLLATION_CONNECTION=@OLD_COLLATION_CONNECTION */;

/*!40111 SET SQL_NOTES=@OLD_SQL_NOTES */;


-- Dump completed on 2021-06-29 12:31:55
```

Workflow Diagram:

Result:

The implementation of the EBMS DBMS yields significant benefits in terms of operational efficiency, data accuracy, and user satisfaction. By automating billing processes and centralizing data management, the system minimizes errors, reduces administrative overhead, and enhances overall productivity. Customers benefit from accurate billing, transparent tariff structures, and streamlined account management processes. Administrators gain access to comprehensive tools for monitoring and managing system

operations, thereby facilitating informed decision-making and strategic planning. Overall, the EBMS DBMS enhances the efficiency and effectiveness of electricity billing operations, contributing to the optimization of utility company services.

```
+---------+-----------+--------------------+----------------+-------------+---------+
| cust_id | cust_name | address            | state          | city        | pincode |
+---------+-----------+--------------------+----------------+-------------+---------+
|     111 | Abhay     | MG Road            | Karnataka      | Mysore      |  570008 |
|     112 | Vishnu    | Basaveshwara Nagar | Karnataka      | Bangalore   |  570042 |
|     113 | Anant     | HD Kote Road       | Karnataka      | Mysore      |  570009 |
|     211 | Vijay     | Devaraja Urs Road  | Karnataka      | Mysore      |  570034 |
|     212 | Deekshith | RK Block           | Karnataka      | Tumkur      |  570054 |
|     311 | Farhaan   | KG Koppal          | Karnataka      | Mysore      |  570046 |
|     312 | Ajay      | Pamban Bridge Road | Tamil Nadu     | Rameshwaram |  590065 |
|     313 | Nikhil    | HSR Layout         | Karnataka      | Bangalore   |  570075 |
|     324 | Tushar    | MS Road            | Uttar Pradesh  | Lucknow     |  640092 |
|     325 | Ayushman  | Kanakpura Road     | Karnataka      | Bangalore   |  570049 |
|     345 | Rohanjit  | Kuvempunagar       | Karnataka      | Mysore      |  570048 |
|     347 | Anwesh    | DFG Layout         | Madhya Pradesh | Indore      |  620089 |
|     367 | Devash    | Chambal Road       | Tamil Nadu     | Chennai     |  590068 |
|     411 | Preetham  | AB Block           | Uttar Pradesh  | Ayodhya     |  640055 |
|     412 | Sridhar   | Gwalior Road       | Madhya Pradesh | Gwalior     |  640067 |
+---------+-----------+--------------------+----------------+-------------+---------+
+----------+------------+---------+
| admin_id | admin_name | cust_id |
+----------+------------+---------+
|        1 | Sahil      |     111 |
|        2 | Karan      |     112 |
|        3 | Rahul      |     113 |
|        4 | Nikhil     |     211 |
|        5 | Sushmita   |     212 |
|        6 | Priyanka   |     311 |
|        7 | Shikha     |     312 |
|        8 | Ritesh     |     313 |
|        9 | Aman       |     411 |
|       10 | Nitin      |     412 |
|       11 | Akshat     |     345 |
|       12 | Ankit      |     325 |
|       13 | Shashi     |     347 |
|       14 | Ritika     |     367 |
|       15 | Kamchin    |     324 |
+----------+------------+---------+
```

acc_id	cust_id	account_no	name
401	111	11345	Abhay
403	112	12455	Vishnu
405	113	98754	Anant
407	211	34557	Vijay
409	212	24567	Deekshith
411	311	76314	Farhaan
413	312	54327	Ajay
415	313	74123	Nikhil
417	411	43567	Preetham
419	412	98764	Sridhar
421	345	43561	Rohanjit
423	325	78654	Ayushman
425	347	67452	Anwesh
427	367	91294	Devash
429	324	89123	Tushar

meter_number	acc_id	cust_id	monthly_units	amount_per_unit	total_amount
101	401	111	500	10	5000
102	403	112	390	10	3900
103	405	113	208	10	2080
104	407	211	800	10	8000
105	409	212	200	10	2000
106	411	311	600	10	6000
107	413	312	250	10	2500
108	415	313	400	10	4000
109	417	411	450	10	4500
110	419	412	550	10	5500
111	421	345	320	10	3200
112	423	325	590	10	5900
113	425	347	670	10	6700
114	427	367	230	10	2300
115	429	324	650	10	6500

eboard_id	board_name
1010	Chamundeshwari Power Corporation Limited
2010	Karnataka Power Corporation Limited
3010	Bangalore Power Corporation Limited
4010	Tamil Nadu Power Corporation Limited
5010	Uttar Pradesh Power Corporation Limited
6010	Madhya Pradesh Power Corporation Limited

```
+-----------+----------------------+
| tariff_id | tariff_type          |
+-----------+----------------------+
|        12 | Power factor tariff  |
|        13 | Peak Load tariff     |
|        14 | Two part tariff      |
|        15 | Three part tariff    |
+-----------+----------------------+
```

```
+------------+----------+------------+-----------+--------------+---------------+
| invoice_id | eboard_id | account_no | tariff_id | reading_date | meter_number |
+------------+----------+------------+-----------+--------------+---------------+
|       1000 |     6010 | 98764      |        12 | 2021-06-10   | 110          |
|       1047 |     4010 | 91294      |        15 | 2021-06-03   | 114          |
|       1111 |     1010 | 11345      |        12 | 2021-06-23   | 101          |
|       1888 |     1010 | 43561      |        15 | 2021-06-26   | 111          |
|       1999 |     3010 | 78654      |        13 | 2021-06-18   | 112          |
|       2017 |     6010 | 67452      |        12 | 2021-06-09   | 113          |
|       2222 |     3010 | 12455      |        13 | 2021-06-17   | 102          |
|       3333 |     1010 | 98754      |        12 | 2021-06-22   | 103          |
|       4444 |     1010 | 34557      |        14 | 2021-06-14   | 104          |
|       5555 |     2010 | 24567      |        15 | 2021-06-21   | 105          |
|       6666 |     1010 | 76314      |        13 | 2021-06-05   | 106          |
|       7777 |     4010 | 54327      |        14 | 2021-06-11   | 107          |
|       8014 |     5010 | 89123      |        15 | 2021-06-06   | 115          |
|       8888 |     3010 | 74123      |        12 | 2021-06-12   | 108          |
|       9999 |     5010 | 43567      |        14 | 2021-06-13   | 109          |
+------------+----------+------------+-----------+--------------+---------------+
```

Conclusion:

In conclusion, the EBMS DBMS represents a paradigm shift in the management of electricity billing operations, offering a comprehensive solution for utility companies to optimize their service delivery. By leveraging advanced database technologies and intuitive user interfaces, the system streamlines billing processes, improves data accuracy, and enhances user experience. The implementation of EBMS DBMS underscores the importance of leveraging technology to address the evolving needs of utility infrastructure, ensuring reliable and efficient delivery of electricity services to customers.