

INTERNET SERVICE PROVIDER

A Case Study Submitted to

**DEPARTMENT
of
COMPUTER SCIENCE AND SYSTEMS ENGINEERING**

Submitted by

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**SREEVIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)**

Sree Sainath Nagar, Tirupati

**DEPARTMENT OF COMPUTER SCIENCE AND SYSTEMS
ENGINEERING**

CERTIFICATE

This is to certify that the Case Study report entitled

INTERNET SERVICE PROVIDER

is the Bonafide work done by

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in the Department of **Computer Science and Systems Engineering**, and submitted to Computer Science and Systems Engineering during the academic year 2022-2023. This work has been carried out under my supervision.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

DEPARTMENT OF COMPUTER SCIENCE AND SYSTEMS ENGINEERING

VISION

To become a centre of excellence in Computer Sciences and Systems Engineering through teaching, training, research and innovation to create quality engineering professionals who can solve the growing complex problems of the society.

MISSION

- ✓ Established with the cause of development of technical education in advanced computer sciences and engineering with applications to systems there by serving the society and nation.
- ✓ Transfer of Knowledge through contemporary curriculum and fostering faculty and student development.
- ✓ Create keen interest for research and innovation among students and faculty by understanding the needs of the society and industry.
- ✓ Skill development among diversity of students in technical domains and profession for development of systems and processes to meet the demands of the industry and research.
- ✓ Imbibing values and ethics in students for prospective and promising engineering profession and develop a sense of respect for all.

PROGRAM EDUCATIONAL OBJECTIVES

1. Demonstrate competencies in the Computer Science domain and Management with an ability to comprehend, analyze, design and create software systems for pursuing advanced studies in the areas of interest.
2. Evolve as entrepreneurs or be employed by acquiring required skill sets for developing computer systems and solutions in multi-disciplinary areas.
3. Exhibit progression and professional skill development in Computer programming and systems development with ethical attitude through life-long learning.

PROGRAM SPECIFIC OUTCOMES

PSO1: Employ Systems Approach to model the solutions for real life problems, design and develop software systems by applying Modern Tools.

PSO2: Develop solutions using novel algorithms in High Performance Computing and Data Science.

PSO3: Use emerging technologies for providing security and privacy to design, deploy and manage network systems.

PROGRAM OUTCOMES

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

II B. Tech. – II Semester

(20BT40531) DATABASE MANAGEMENT SYSTEMS LAB

COURSE OUTCOMES

CO1. Analyze the requirements of a given database problem and design viable ER-Models for implementation of database.

CO2. Create database schemas, select and apply suitable integrity constraints for querying databases using SQL interface.

CO3. Develop and interpret PL/SQL blocks to centralize database applications for maintainability and reusability.

CO4. Develop database applications for societal applications such as ticket reservation system, employee payroll system using modern tools.

CO5. Work independently and communicate effectively in oral and written forms.

DECLARATION

We hereby declare that this project report titled "Title" is a genuine work carried out by us, in B.Tech (Computer Science and Systems Engineering) degree course of Jawaharlal Nehru Technological University Anantapur and has not been submitted to any other course or University for the award of any degree by us.

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea / data / fact / source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Signature of the students

1.

2.

ABSTRACT

An Internet Service Provider (ISP) database system is a crucial tool for efficiently managing an ISP's services and customers. The database system provides centralized location for storing and managing data related to customer accounts, service plans, network infrastructure, and billing information. With an ISP database system, service providers can streamline their operations and provide better service to their customers.

One of the key benefits of an ISP database system is that it allows service providers to manage customer accounts more effectively. The system can store information such as customer contact details, service plans, and billing information, making it easy to track and manage customer accounts. Service providers can also use the database system to generate invoices, manage payments, and track customer usage. This makes it easier to provide customers with accurate billing information and quickly resolve any billing issues that may arise. Additionally, the database system can help service providers to identify customer usage patterns, enabling them to optimize their network infrastructure to provide better service to their customers. In conclusion, an ISP database system is a critical tool for managing an ISP's services and customers. It allows service providers to streamline their operations, improve customer service, and make better use of their network infrastructure. By developing and implementing an ISP database system, service providers can better manage their resources, reduce costs, and provide better service to their customers.

Keywords: *SQL Server, Microsoft SQL server management studio, SQL Plus*

TABLE OF CONTENTS

Title	PageNo.
ABSTRACT.....	i
CHAPTER 1. INTRODUCTION	
1.1 Introduction to the topic.....	1-1
1.2 Problem Statement.....	2-2
1.3 Objectives.....	3-3
CHAPTER 2. DATABASE DESIGN	
2.1 List of Attributes, entities and relationship.....	4-7
2.2 E-R Diagram.....	8-8
CHAPTER 3. RELATIONAL MODEL	
3.1 Database languages.....	9-10
3.2 Table Description.....	10-11
3.3 Relational Database Scheme.....	12-12
3.4 Relational Queries.....	13-49
CHAPTER 4. CONCLUSION AND FUTUREWORK	
4.1 Conclusion.....	50-50
4.2 Future Work.....	51-51

CHAPTER 1. INTRODUCTION

1.1 Introduction to the topic

An ISP database is a vital component for Internet Service Providers, providing them with a centralized system to store, manage, and retrieve crucial information related to their services, customers, and network infrastructure. As ISPs strive to deliver reliable and high-speed internet connectivity to their customers, an efficient database plays a crucial role in facilitating smooth operations, optimizing resource management, and ensuring excellent customer service.

One of the primary functions of an ISP database is to store customer information. It includes details such as customer profiles, contact information, subscription plans, and billing history. By maintaining a comprehensive repository of customer data, the database allows ISPs to efficiently manage customer accounts, provide personalized services, and handle billing and invoicing processes accurately. It also facilitates effective customer relationship management, enabling ISPs to address inquiries, resolve issues, and provide timely support.

In addition to customer information, an ISP database also stores network infrastructure data. It includes information about routers, switches, cables, and other networking equipment deployed by the ISP. By keeping track of network assets, their configurations, and performance metrics, the database assists ISPs in monitoring and managing their network infrastructure effectively. It enables network administrators to plan network expansions, identify potential bottlenecks, and swiftly resolve connectivity issues, ensuring a reliable and uninterrupted internet service for customers.

In conclusion, an ISP database serves as a critical tool for Internet Service Providers, enabling them to store, manage, and retrieve essential information related to customers, network infrastructure, and service plans. By leveraging an efficient database system, ISPs can streamline their operations, enhance customer satisfaction, optimize resource allocation, and ensure the seamless delivery of internet services.

1.2 Problem Statement

The internet service provider (ISP) industry faces numerous challenges in managing customer data, service plans, network infrastructure, billing, support tickets, and equipment inventory. Current manual processes and disparate data sources hinder the effective management of these critical aspects of the ISP's operations, leading to inefficiencies, errors, and difficulties in providing optimal service to customers. This lack of a centralized and automated system also results in a high administrative workload, making it difficult to focus on providing superior customer service.

Furthermore, the absence of an ISP database system can result in missed revenue opportunities and poor resource utilization. Without accurate data on customer usage patterns and network performance, ISPs may be unable to identify areas for improvement, allocate resources effectively, or offer tailored service plans to customers. This can lead to customer churn, lower profitability, and reduced competitiveness in the market. Thus, there is a critical need for an integrated and scalable database system that can centralize data, automate processes, and enable data-driven decision-making to help ISPs deliver superior service, optimize network performance, and drive revenue growth.

1.3 Objectives

One of the primary objectives of an ISP database is to facilitate effective customer management. This includes storing and organizing customer information such as profiles, contact details, billing information, and service history. The database should enable the ISP to easily retrieve customer information, track their subscriptions and usage, and provide personalized customer support. Efficient customer management helps improve customer satisfaction, streamline communication, and enhance the overall customer experience.

Another key objective of an ISP database is to ensure accurate and efficient billing and invoicing processes. The database should maintain detailed records of customer subscriptions, service usage, and payment history. It should allow for automated billing calculations, generation of accurate invoices, and tracking of payment statuses. By achieving accurate billing and invoicing, the ISP can reduce errors, expedite revenue collection, and establish transparent financial operations.

ISPs rely on network infrastructure to deliver internet services, and the database should support effective management of these resources. This includes maintaining an inventory of network devices, tracking their configurations, and monitoring performance metrics. The database should enable network administrators to efficiently allocate resources, plan network expansions, and troubleshoot connectivity issues. Effective network resource management helps optimize network performance, ensure efficient resource utilization, and proactively address network-related challenges.

CHAPTER 2. DATABASE DESIGN

2.1 List of Attributes, entities and relationship

1. Entity Name: Customers

Attributes	Type
Customer_ID	Varchar(10)
Customer_Name	varchar(50)
Email	varchar(100)
phone	varchar(20)
Address	Varchar(200)
status	char(1)

2. Entity Name: ISP

Attributes	Type
ISP_ID	Varchar(10)
ISP_Name	varchar(60)
ISP_Address	varchar(30)
Contact	varchar(10)
Email	varchar(30)

3. Entity Name: Employees

Attributes	Type
Employee_ID	Varchar(10)
ISP_ID	varchar(10)
Employee_Name	Varchar(30)
Position	varchar(40)
salary	money

4. Entity Name: Service_Plans

Attributes	Type
Plan_ID	Varchar(10)
Plan_Name	varchar(100)
Download_speed	varchar(20)

Upload_speed	varchar(20)
Plan_price	money
Data_Limit	Varchar(20)

5. Entity Name: Subscriptions

Attributes	Type
Subscription_ID	Varchar(10)
Customer_ID	Varchar(10)
Plan_ID	Varchar(10)
Start_Date	Date
End_Date	Date

6. Entity Name: Billing

Attributes	Type
Bill_ID	Varchar(10)
Subscription_ID	varchar(10)
Bill_Date	Date
Due_Date	date
Amount	money
Status	varchar(10)

7. Entity Name: Technical_Support

Attributes	Type
Support_ID	Varchar(10)
Subscription_ID	Varchar(10)
Cusomer_ID	Varchar(10)
Support_Date	date
Support_Description	Varchar(500)

8. Entity Name: Equipment_Inventory

Attributes	Type
Equipment_ID	Varchar(10)
ISP_ID	Varchar(10)
Equipment_Name	Varchar100)
Equipment_Type	Varchar(50)

Purchase_Date	date
---------------	------

9. Entity Name: Location

Attributes	Type
Location_ID	Varchar(10)
ISP_ID	Varchar(10)
Location_Name	Varchar(20)
City	Varchar(20)
Country	Varchar(20)

10. Entity Name: Service_Outage

Attributes	Type
Outage_ID	Varchar(10)
ISP_ID	Varchar(10)
Start_Date	date
End_Date	date
description	Varchar(200)

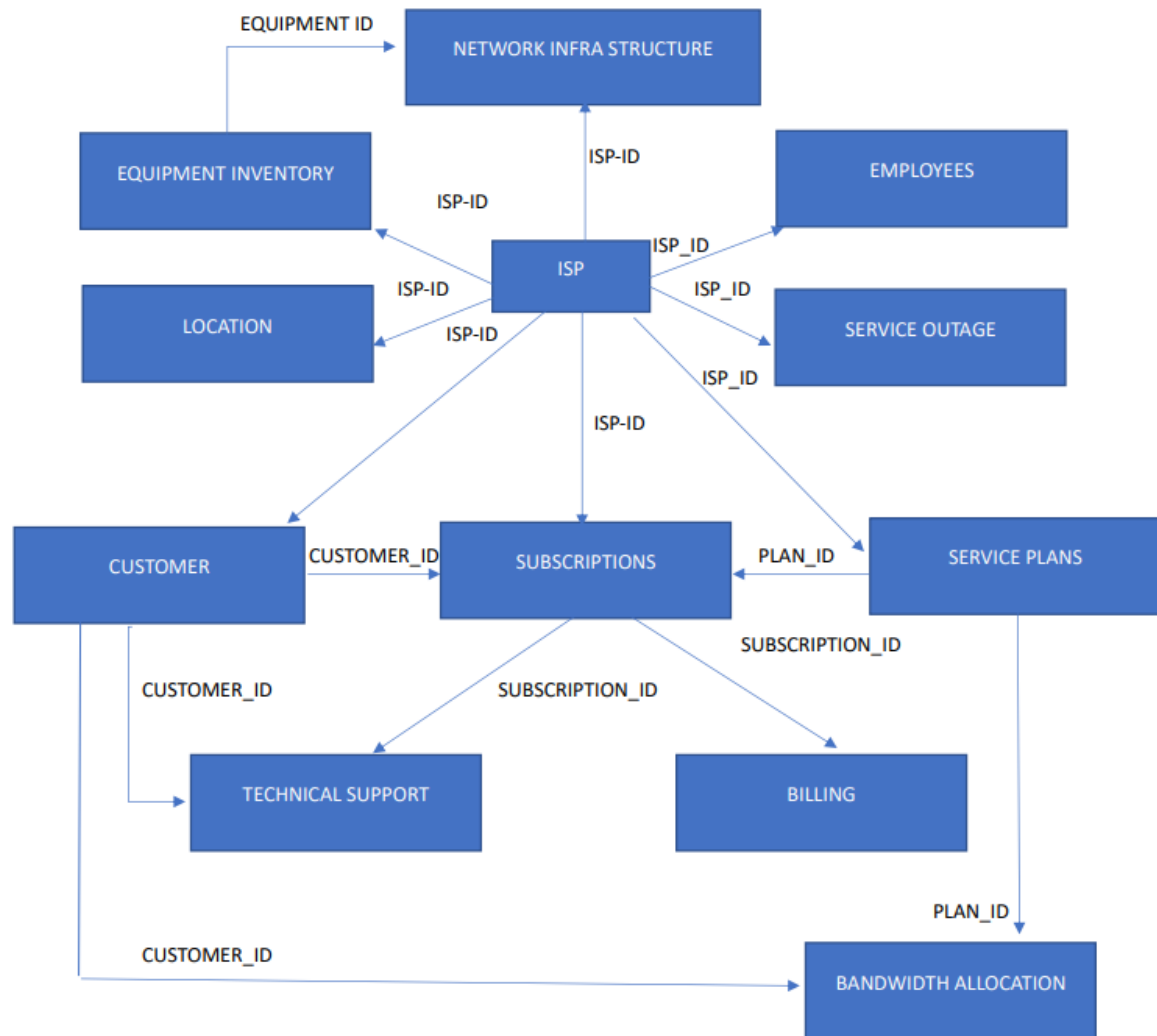
11. Entity Name: Bandwidth_Allocation

Attributes	Type
Bandwidth_ID	Varchar(10)
Customer_ID	Varchar(10)
Plan_ID	Varchar(10)
Bandwidth_Amount	Varchar(20)
Start_Date	Date
End_Date	Date

12. Entity Name: Network_Infrastructure

Attributes	Type
Infrastructure_ID	Varchar(10)
ISP_ID	Varchar(10)
Equipement_ID	Varchar(10)
Capacity	Integer
Installation_Date	Date
Installation_Type	Varchar(30)

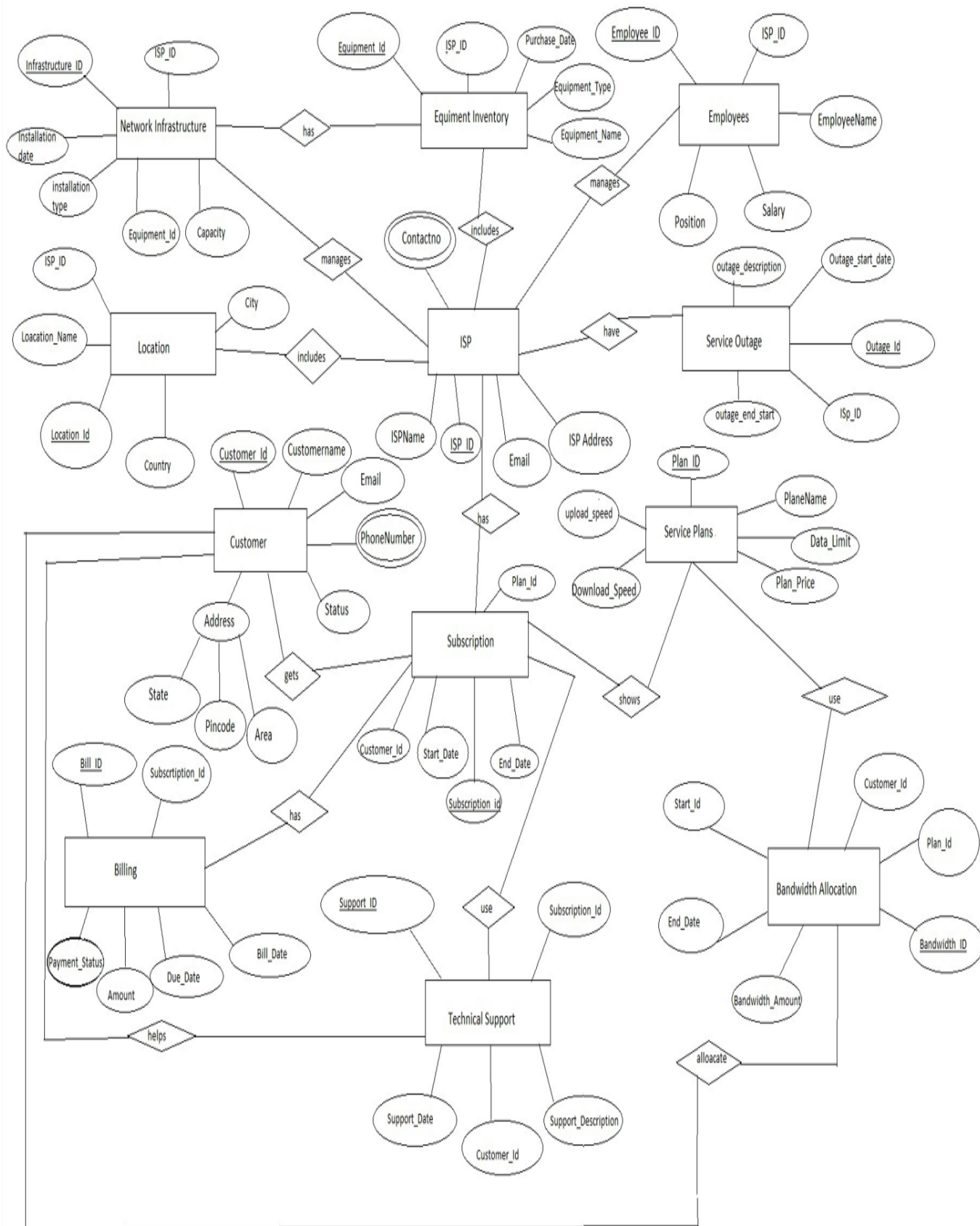
2.1.1 Entities and their relationships:



The above diagram is a simple representation of entities which shows the connectivity between all the entities and the relationship between various entities

To know in detail about the types of relationships that exist between all the entities and to know the different attributes that describes about the entity we design ER(entity relation) diagram.

2.2 E-R Diagram



CHAPTER 3. RELATIONAL MODEL

3.1 Database languages

Four categories of database languages :

1.Data definition language (DDL)

Data definition language (DDL) creates the framework of the database by specifying the database schema, which is the structure that represents the organization of data. Its common uses include the creation and alteration of tables, files, indexes and columns within the database. This language also allows users to rename or drop the existing database or its components.

Here's a list of DDL statements:

- CREATE: Creates a new database or object, such as a table, index or column.
- ALTER: Changes the structure of the database or object.
- DROP: Deletes the database or existing objects.
- RENAME: Renames the database or existing objects.

2.Data manipulation language (DML)

Data manipulation language (DML) provides operations that handle user requests, offering a way to access and manipulate the data that users store within a database. Its common functions include inserting, updating and retrieving data from the database.

Here's a list of DML statements:

- INSERT: Adds new data to the existing database table.
- UPDATE: Changes or updates values in the table.
- DELETE: Removes records or rows from the table.
- SELECT: Retrieves data from the table or multiple tables.

3. Data control language (DCL)

Data control language (DCL) controls access to the data that users store within a database. Essentially, this language controls the rights and permissions of the database system. It allows users to grant or revoke privileges to the database.

Here's a list of DCL statements:

- GRANT: Gives a user access to the database.
- REVOKE: Removes a user's access to the database.

4. Transaction control language (TCL)

Transaction control language (TCL) manages the transactions within a database. Transactions group a set of related tasks into a single, executable task. All the tasks must succeed in order for the transaction to work. Here's a list of TCL statements:

- COMMIT: Carries out a transaction.
- ROLLBACK: Restores a transaction if any tasks fail to execute.

3.2 Table Description

Following are the tables along with constraints used in All in one travel booking database.

1. **Customers:** This table contains various details customers who are accessing ISP services it has customer_id, customer_name, email, phone_number, address and there status

Constraint: Customer_Id is primary key in the given relation

2. **ISP:** Internet Service Provider is the entity in which have the details of internet service provider and it consists attributes like ISP_Id, ISP_Name , ISP_Address, Contact_Number, Email.

Constraint: In this ISP relation we are having ISP_Id primary key.

3. **Employees:** This table contains all the details of the employees working in the particular ISP and it has attributes like employee_id, ISP_Id, Employee_Name, position of the employee and there salary

Constraint: In the employee relation we can employee_id as primary key and to know in which we are having ISP_Id as foreign key in which we come to know in which company they coming.

4. **Service_Plans:** This is the entity we are having attributes like plan_id, plan_name, download_speed, upload_speed, plan_price, data_limit.

Constraint: The attribute Plan_Id will be the primary key.

5. **Subscriptions:** The entity consists the details of the customers who took particular subscription from a ISP it consists of subscription_id, customer_id, plan_id, start_date and end_date.

Constraint: Here we can consider the primary key as the subscription_id and customer_id as foreign key.

6. **Billing:** This table consists details like bills the customers of there regarded subscription

It consists of attributes like bill_id subscription_id bill_date due date amount and for checking if the customer is done with the payment or not we have payment_status.

Constraint: bill_id will be the primary key in the relation and subscription_id as foreign key.

7. **Technical_Support:** This entity is for helping any trouble shoots of the providence and solve it accordingly it consists of support_id subscription_id customer id and the date and support description.

Constraint: Support id will be the primary key and the subscription_id customer id will as foreign key.

8. **Equipment_Inventory:** This entity consists of details like equipment id, isp_id , equipment name and its type and the purchase date as attributes

Constraints: Equipment id will be as primary key and isp id will be as foreign key.

9. **Location:** the entity location is for the knowing the particular place the service is provided and which provider is giving the service it as location_id,isp_id , location_name and city and the country that it belongs to it as attributes.

Constraints: location_id would be primary key and isp_id will be the foreign key.

10. **Service_Outage:** This relation will be having the details like outage_id, isp_id,plan_id, outage_start_date ,outage_end_date and outage_description as attributes.

Constraints: outage_id will be primary key and isp_id will be foreign key

11. **Bandwidth_Allocation:** The relation bandwidth allocation will be having the attributes like bandwidth_id,customer_id,plan_id,bandwidth_amount,start_date and end_date .

Constraints: bandwidth_id will be the primary key and customer_id,plan_id will be as foreign key.

12. **Network_Infrastructure:** This relation is having attributes like infrastructure_id,isp_id, equipment id,capacity,installation_date,infrastructure_type.

Constraints: infrastructure_id will be as primary key isp_id and equipment id will be as foreign key.

The above described information is the brief detailing about the entities and relations and their attributes.

3.3 Relational Database Scheme

The relational database schema for *All in one travel booking system* database is as follows:

1. Customers(Customer_ID, Customer_Name, Email, Phone, Address, Status)
2. ISP(ISP_ID, ISP_Name, ISP_Address, Contact, Email)
3. Employee(Employees_ID, ISP_ID, Employee_name, Position, money)
4. Service_Plans(Plan_ID, Plan_Name, Download_Speed, Upload_Speed, Plan_Price, Data_Limit)
5. Subscriptions(Subscription_ID, Customer_ID, Plan_ID, Start_date, End_Date)
6. Billing(Bill_ID, Subscription_ID, Bill_Date, Due_date, Amount, status)
7. Technical_Support(Support_ID, Subscription_ID, Customer_ID, Support_Date, Description)
8. Equipment_Inventory(Equipment_ID, ISP_ID, Equipment_name, type, date)
9. Location(Location_ID, ISP_ID, Location_Name, City, Country)
10. Service_Outage(Outage_ID, ISP_ID, Start_date, End_date, Description)
11. Bandwidth_Allocation(Bandwidth_ID, Customer_ID, Plan_ID, Bandwidth_amount, Start_Date, End_Date)
12. Network_Infrastructure(Infrastructure_ID, ISP_ID, Equipment_ID, Capacity, Installation_Date, Installation_Type)

3.4 Relational Queries

```
/* create a table Customers*/
```

```
create table Customers
```

```
(
    Customer_ID      varchar(10)  primary key,
    Customer_Name     varchar(50)  not null,
    Email             varchar(100) not null unique,
    Phone_Number      varchar(20)  not null,
    Address           varchar(200) not null,
    status            char(1)      not null check(status='A' or status='T')
)
```

```
Insert into Customers values ('C001','Pardhu','lankapardhu@gmail.com', '7416220222',
'Vijayawada','A');
```

```
insert into Customers values('C002','Vasanth','Vasanth01@gmail.com','8456923846',
'Guntur','A');
```

```
insert into Customers values('C003','Sri Latha','srilatha56@gmail.com','6428523786',
'Nellore','T');
```

```
insert into Customers values('C004','Annapurna','Annapurna89@gmail.com','9284663655',
'Tirupati','T');
```

```
insert into Customers values('C005','Bhanu kiran','bhanukiran@gmail.com','7356837482',
'Anantapur','A');
```

```
insert into Customers values('C006','Thanishka','thanishkareddy@gmail.com','8236517222',
'Kadiri','A');
```

```
insert into Customers values('C007','Chandrashekar','chandukatakam@gmail.com',
'9476286333','Machilipatnam','T');
```

```
insert into Customers values('C008','Vasavi','vasavi97@gmail.com','9284638627',
'Vijayawada','A');
```

```
insert into Customers values('C009','Lohith kumar','lohithakula@gmail.com','7348746528',
'Ongole','T');
```

```
insert into Customers values('C010','Sai kumar','saiakula@gmail.com','635812715',
'Kurnool','A');
```

```
select * from Customers
```

Output:

INTERNET SERVICE PROVIDER

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C001	Pardhu	lankapardhu@gmail.com	7416220222	Vijayawada	A
C002	Vasanth	Vasanth01@gmail.com	8456923846	Guntur	A
C003	Sri Latha	srilatha56@gmail.com	6428523786	Nellore	I
C004	Annapurna	Annapurna89@gmail.com	9284663655	Tirupati	I
C005	Bhanu kiran	bhanukiran@gmail.com	7356837482	Anantapur	A
C006	Thanishka	thanishkareddy@gmail.com	8236517222	Kadiri	A
C007	Chandrashekar	chandukatakam@gmail.com	9476286333	Machilipatnam	I
C008	Vasavi	vasavi97@gmail.com	9284638627	Vijayawada	A
C009	Lohith kumar	lohithakula@gmail.com	7348746528	Ongole	I
C010	Sai kumar	saiakula@gmail.com	635812715	Kurnool	A

/*create a table ISP*/

create table ISP

```
(
    ISP_ID          varchar(10)          primary key,
    ISP_name        varchar(60)          not null,
    ISP_Address     varchar(30)          not null,
    Contact_Number  varchar(10)          not null,
    Email           varchar(30)          not null,
)
```

select * from ISP

insert into ISP values('SP001','Reliance jio infocamm limted','Mumbai','09587-3458',
'reliancejio@gmail.com');

insert into ISP values('SP002','Bharati airtel limted','Delhi','05543-6785',
'Bharatiairtel@gmail.com');

insert into ISP values('SP003','Vodafone Idea limted','Gandhinagar','09687-8674',
'Vodafoneidea@gmail.com');

insert into ISP values('SP004','Bharat Sanchar Nigam limted','Delhi','05367-9876',
'BSNL0@gmail.com');

insert into ISP values('SP005','Excitel Broadband','Delhi','03539-4674',
'Excitelbroad@gmail.com');

insert into ISP values('SP006','Hathway Cables and datacom limted','Mumbai','074-3978',
'Hathwaydatacom@gmail.com');

insert into ISP values('SP007','Tata communications limted','Mumbai','08656-0868',
'Tatacomunications@gmail.com');

```
insert into ISP values('SP008','You Broadband','Mumbai','27935-0475',
'youbroadband@gmail.com');
insert into ISP values('SP009','Gigatel Networks','South Delhi','76785-0912',
'Gigatelnetworks@gmail.com');
insert into ISP values('SP010','ACT Broadband','Bangalore','29387-2049',
'ACTbroadband@gmail.com');
```

Output:

ISP_ID	ISP_name	ISP_Address	Contact_Number	Email
SP001	Reliance jio infocamm limited	Mumbai	09587-3458	reliancejio@gmail.com
SP002	Bharati airtel limited	Delhi	05543-6785	Bharatiairtel@gmail.com
SP003	Vodafone Idea limited	Gandhinagar	09687-8674	Vodafoneidea@gmail.com
SP004	Bharat Sanchar Nigam limited	Delhi	05367-9876	BSNLO@gmail.com
SP005	Excitel Broadband	Delhi	03539-4674	Excitelbroad@gmail.com
SP006	Hathway Cables and datacom limited	Mumbai	08754-3978	Hathwaydatacom@gmail.com
SP007	Tata communications limited	Mumbai	08656-0868	Tatacomunications@gmail.com
SP008	You Broadband	Mumbai	27935-0475	youbroadband@gmail.com
SP009	Gigatel Networks	South Delhi	76785-0912	Gigatelnetworks@gmail.com
SP010	ACT Broadband	Bangalore	29387-2049	ACTbroadband@gmail.com

/*create a table Employees*/

create table Employees

```
(
    Employees_ID      varchar(10)    primary key,
    ISP_ID             varchar(10)    foreign key references ISP(ISP_ID),
    Employee_name      varchar(30)    not null,
    Position           varchar(40)    null,
    Salary             money          null,
)
```

```
insert into Employees values('E001','SP001','Deepak Naidu','System Administrator',
120000);
insert into Employees values('E002','SP002','Yashwanth Reddy','Network Support
Engineer',100000);
insert into Employees values('E003','SP003','Thirumalesh','Technical support Engineer',
90000);
insert into Employees values('E004','SP004','Rajitha','Executive-Network Engineer',
180000);
insert into Employees values('E005','SP005','Sunny Subhakar','Network Support Engineer',
120000);
```



```

insert into Employees values('E006','SP006','Likitha','Network Transportation manager',
150000);
insert into Employees values('E007','SP007','Mounika','Network Engineer',100000);
insert into Employees values('E008','SP008','Jaswanth setty','System Administrator',
150000);
insert into Employees values('E009','SP009','Mohan Nayak','Technical Support Engineer',
90000);
insert into Employees values('E010','SP010','Gayatri Devi','System Administrator',
160000);
select * from Employees

```

Output:

Employees_ID	ISP_ID	Employee_name	Position	Salary
E001	SP001	Deepak Naidu	System Administrator	120000
E002	SP002	Yashwanth Reddy	Network Support Engineer	100000
E003	SP003	Thirumalesh	Technical support Engineer	90000
E004	SP004	Rajitha	Executive-Network Engineer	180000
E005	SP005	Sunny Subhakar	Network Support Engineer	120000
E006	SP006	Likitha	Network Transportation manager	150000
E007	SP007	Mounika	Network Engineer	100000
E008	SP008	Jaswanth setty	System Administrator	150000
E009	SP009	Mohan Nayak	Technical Support Engineer	90000
E010	SP010	Gayatri Devi	System Administrator	160000

```

/* create a table Service_plans */

```

```

create table Service_plans

```

```

(

```

```

    Plan_ID          varchar(10)          primary key,
    Plan_Name        varchar(100)         not null,
    Download_Speed   varchar(20)          not null,
    Upload_Speed     varchar(20)          not null,
    Plan_Price       money                 not null,
    Data_Limit       varchar(20)          not null,

```

```

)

```

```

insert into Service_plans values('P001','Data Sachet plan','100 Mbps','67 Mbps',199,
'Unlimited');

```

```

insert into Service_plans values('P002','Semi-Annual plan','30 Mbps','20 Mbps',2394,
'Unlimited');

```

```

insert into Service_plans values('P003','Quarterly plan','30 Mbps','20 Mbps',1197,
'Unlimited');
insert into Service_plans values('P004','Annual plan','30 Mbps','30 Mbps',4788,
'Unlimited');
insert into Service_plans values('P005','Monthly plan','150 Mbps','100 Mbps',999,
'Unlimited');
insert into Service_plans values('P006','Annual plan','150 Mbps','100 Mbps',8388,
'Unlimited');
insert into Service_plans values('P007','Quarterly plan','500 Mbps','300 Mbps',4497,
'Unlimited');
insert into Service_plans values('P008','Semi-Annual plan','1 Gbps','500 Mbps',23994,
'Unlimited');
insert into Service_plans values('P009','Annual plan','1 Gbps','700 Mbps',101988,
'6600GB/Month');
insert into Service_plans values('P010','Airtel Standard Broadband plan','100 Mbps',
'67 Mbps',8150,'Unlimited');
select *from Service_plans

```

Output:

Plan_ID	Plan_Name	Download_Speed	Upload_Speed	Plan_Price	Data_Limit
P001	Data Sachet plan	100 Mbps	67 Mbps	199	Unlimited
P002	Semi-Annual plan	30 Mbps	20 Mbps	2394	Unlimited
P003	Quarterly plan	30 Mbps	20 Mbps	1197	Unlimited
P004	Annual plan	30 Mbps	30 Mbps	4788	Unlimited
P005	Monthly plan	150 Mbps	100 Mbps	999	Unlimited
P006	Annual plan	150 Mbps	100 Mbps	8388	Unlimited
P007	Quarterly plan	500 Mbps	300 Mbps	4497	Unlimited
P008	Semi-Annual plan	1 Gbps	500 Mbps	23994	Unlimited
P009	Annual plan	1 Gbps	700 Mbps	101988	6600GB/Month
P010	Airtel Standard Broadband plan	100 Mbps	67 Mbps	8150	Unlimited

```

/* create a table Subscriptions */

```

```

create table Subscriptions

```

```

(

```

```

    Subscription_ID    varchar(10)    primary key,
    Customer_ID  varchar(10)    foreign key references Customers (Customer_ID),
    Plan_ID    varchar(10)    foreign key references    Service_plans(Plan_ID),
    Start_Date    date        not null,
    End_Date    date        not null,

```

)

```

insert into Subscriptions values('S001','C001','P001','2023-01-01','2023-01-28');
insert into Subscriptions values('S002','C002','P002','2023-02-01','2023-08-28');
insert into Subscriptions values('S003','C003','P003','2023-03-01','2023-07-28');
insert into Subscriptions values('S004','C004','P004','2023-01-01','2024-01-01');
insert into Subscriptions values('S005','C005','P005','2023-04-01','2023-05-28');
insert into Subscriptions values('S006','C006','P006','2023-05-01','2024-04-28');
insert into Subscriptions values('S007','C007','P007','2023-06-01','2023-09-28');
insert into Subscriptions values('S008','C008','P008','2023-06-01','2023-11-28');
insert into Subscriptions values('S009','C009','P009','2023-07-01','2024-06-28');
insert into Subscriptions values('S010','C010','P010','2023-01-01','2023-02-28');
select * from Subscriptions

```

Output:

Subscription_ID	Customer_ID	Plan_ID	Start_Date	End_Date
S001	C001	P001	01-01-2023	28-01-2023
S002	C002	P002	01-02-2023	28-08-2023
S003	C003	P003	01-03-2023	28-07-2023
S004	C004	P004	01-01-2023	01-01-2024
S005	C005	P005	01-04-2023	28-05-2023
S006	C006	P006	01-05-2023	28-04-2024
S007	C007	P007	01-06-2023	28-09-2023
S008	C008	P008	01-06-2023	28-11-2023
S009	C009	P009	01-07-2023	28-06-2024
S010	C010	P010	01-01-2023	28-02-2023

```

/*create table Depart */

```

```

create table Billing

```

(

```

    Bill_ID          varchar(10)          primary key,
    Subscription_ID  varchar(10) foreignkeyreferencesSubscriptions(Subscription_ID),
    Bill_Date        date                  not null,
    due_Date         date                  not null,
    Amount           money                 not null,
    Payment_Status   varchar(10)          not null check(Payment_Status='Paid' or
Payment_Status='Not Paid'),
)

```

```

insert into Billing values('B001','S001','2023-01-01','2023-01-15',199,'Paid');
insert into Billing values('B002','S002','2023-02-01','2023-04-15',2394,'Not Paid');
insert into Billing values('B003','S003','2023-03-01','2023-05-15',1197,'Paid');
insert into Billing values('B004','S004','2023-01-01','2023-06-15',4788,'Paid');
insert into Billing values('B005','S005','2023-04-01','2023-04-15',999,'Not Paid');
insert into Billing values('B006','S006','2023-05-01','2023-05-15',8388,'Not Paid');
insert into Billing values('B007','S007','2023-06-01','2023-07-15',4497,'Paid');
insert into Billing values('B008','S008','2023-06-01','2023-08-15',23994,'Paid');
insert into Billing values('B009','S009','2023-07-01','2024-01-15',101988,'Paid');
insert into Billing values('B010','S010','2023-01-01','2023-02-01',8150,'Not Paid');

select * from Billing

```

Output:

Bill_ID	Subscription_ID	Bill_Date	due_Date	Amount	Payment_Status
B001	S001	01-01-2023	15-01-2023	199	Paid
B002	S002	01-02-2023	15-04-2023	2394	Not Paid
B003	S003	01-03-2023	15-05-2023	1197	Paid
B004	S004	01-01-2023	15-06-2023	4788	Paid
B005	S005	01-04-2023	15-04-2023	999	Not Paid
B006	S006	01-05-2023	15-05-2023	8388	Not Paid
B007	S007	01-06-2023	15-07-2023	4497	Paid
B008	S008	01-06-2023	15-08-2023	23994	Paid
B009	S009	01-07-2023	15-01-2024	101988	Paid
B010	S010	01-01-2023	01-02-2023	8150	Not Paid

```

/* create table Technical_Support*/

```

```

create table Technical_Support
(
    Support_ID      varchar(10) primary key,
    Subscription_ID varchar(10) foreign key references Subscriptions(Subscription_ID),

    Customer_ID  varchar(10)  foreign key references Customers(Customer_ID),
    Support_Date  date          NOT NULL,
    Support_Description  varchar(500) not null,
)

```

```

insert into Technical_Support values('SP001','S001','C001','2023-02-01','Excellent Speed');
insert into Technical_Support values('SP002','S002','C002','2023-09-01','Some what slow');
insert into Technical_Support values('SP003','S003','C003','2023-08-01','Some what slow');
insert into Technical_Support values('SP004','S004','C004','2024-01-01','Some what slow');
insert into Technical_Support values('SP005','S005','C005','2023-06-01','Excellent Speed');
insert into Technical_Support values('SP006','S006','C006','2024-05-01','Better');
insert into Technical_Support values('SP007','S007','C007','2023-10-01','Excellent Speed');
insert into Technical_Support values('SP008','S008','C008','2023-12-01','Excellent Speed');
insert into Technical_Support values('SP009','S019','C009','2024-07-01','Excellent Speed');
insert into Technical_Support values('SP010','S010','C010','2023-03-01','Better');

select * from Technical_Support

```

OUTPUT:

Support_ID	Subscription_ID	Customer_ID	Support_Date	Support_Description
SP001	S001	C001	01-02-2023	Excellent Speed
SP002	S002	C002	01-09-2023	Some what slow
SP003	S003	C003	01-08-2023	Some what slow
SP004	S004	C004	01-01-2024	Some what slow
SP005	S005	C005	01-06-2023	Excellent Speed
SP006	S006	C006	01-05-2024	Better
SP007	S007	C007	01-10-2023	Excellent Speed
SP008	S008	C008	01-12-2023	Excellent Speed
SP009	S019	C009	01-07-2024	Excellent Speed
SP010	S010	C010	01-03-2023	Better
SP012	S012	C001	01-10-2023	Excellent Speed
SP013	S013	C002	01-12-2023	Excellent Speed
SP014	S014	C003	01-07-2024	Excellent Speed
SP015	S015	C014	01-03-2023	Better
SP016	S016	C011	01-05-2023	Excellent Speed

```

/*create table Equipment_Inventory */

```

```

create table Equipment_Inventory

```

```

(
    Equipment_ID      varchar(10)      primary key,
    ISP_ID             varchar(10)      foreign key references ISP(ISP_ID),
    Equipment_Name     varchar(100)     not null,
    Equipment_Type     varchar(50)      not null,
    Purchase_Date      date             null,
)

```

```

insert into Equipment_Inventory values('E001','SP001','Routers','Hardware','2020-02-15');
insert into Equipment_Inventory values('E002','SP002','UPS batteries','Hardware','2020-01-01');
insert into Equipment_Inventory values('E003','SP003','Routers','Hardware','2022-04-17');
insert into Equipment_Inventory values('E004','SP004','Service Cable','Hardware','2023-05-25');
insert into Equipment_Inventory values('E005','SP005','UPS batteries','Hardware','2021-02-05');
insert into Equipment_Inventory values('E006','SP006','Routers','Hardware','2022-03-25');
insert into Equipment_Inventory values('E007','SP007','Service cable','Hardware','2022-08-14');
insert into Equipment_Inventory values('E008','SP008','UPS batteries','Hardware','2023-09-18');
insert into Equipment_Inventory values('E009','SP009','Routers','Hardware','2023-12-19');
insert into Equipment_Inventory values('E010','SP010','Routers','Hardware','2023-10-20');
select * from Equipment_Inventory

```

Output:

Equipment_ID	ISP_ID	Equipment_Name	Equipment_Type	Purchase_Date
E001	SP001	Routers	Hardware	15-02-2020
E002	SP002	UPS batteries	Hardware	01-01-2020
E003	SP003	Routers	Hardware	17-04-2022
E004	SP004	Service Cable	Hardware	25-05-2023
E005	SP005	UPS batteries	Hardware	05-02-2021
E006	SP006	Routers	Hardware	25-03-2022
E007	SP007	Service cable	Hardware	14-08-2022
E008	SP008	UPS batteries	Hardware	18-09-2023
E009	SP009	Routers	Hardware	19-12-2023
E010	SP010	Routers	Hardware	20-10-2023

```

/*create table Location */

```

```

create table Location

```

```

(
    Location_ID          varchar(10)          primary key,

```

```

ISP_ID          varchar(10)          foreign key references ISP(ISP_ID),
Location_Name   varchar(20)          not null,
city            varchar(20)          not null,
country         varchar(20)          not null,
)

```

```

insert into Location values('L001','SP001','Balaji colony','Tirupati','India');
insert into Location values('L002','SP002','Air bypass road','Tirupati','India');
insert into Location values('L003','SP003','Gandhinagar','Vijayawada','India');
insert into Location values('L004','SP004','Padamata','Vijayawada','India');
insert into Location values('L005','SP005','Panvel','Mumbai','India');
insert into Location values('L006','SP006','Palani Nagar','Chennai','India');
insert into Location values('L007','SP007','Hassannagar','Hubli','India');
insert into Location values('L008','SP008','Pambanagar','Kochi','India');
insert into Location values('L009','SP009','SR nagar','Hyderabad','India');
insert into Location values('L010','SP010','Bidhannagar','Kolkata','India');

```

```
select * from Location
```

Output:

Location_ID	ISP_ID	Location_Name	city	country
L001	SP001	Balaji colony	Tirupati	India
L002	SP002	Air bypass road	Tirupati	India
L003	SP003	Gandhinagar	Vijayawada	India
L004	SP004	Padamata	Vijayawada	India
L005	SP005	Panvel	Mumbai	India
L006	SP006	Palani Nagar	Chennai	India
L007	SP007	Hassannagar	Hubli	India
L008	SP008	Pambanagar	Kochi	India
L009	SP009	SR nagar	Hyderabad	India
L010	SP010	Bidhannagar	Kolkata	India

```
/*create table Service_Outage */
```

```
create table Service_Outage
```

```
(
```

```

Outage_ID          varchar(10)          primary key,
ISP_ID             varchar(10)          foreign key references ISP(ISP_ID),
Outage_start_date   date                not null,
Outage_end_date     date                not null,
Outage_description  varchar(200)        null,
)

insert into Service_Outage values('O001','SP001','2023-01-01','2023-01-02','Congestion');
insert into Service_Outage values('O002','SP002','2023-01-02','2023-01-02','Failed link to
provider');
insert into Service_Outage values('O003','SP003','2023-01-01','2023-01-02','Equipment
failure');
insert into Service_Outage values('O004','SP004','2023-03-05','2023-03-06','Operator
error');
insert into Service_Outage values('O005','SP005','2023-05-07','2023-05-08','Congestion');
insert into Service_Outage values('O006','SP006','2023-10-10','2023-10-11','Equipment
failure');
insert into Service_Outage values('O007','SP007','2023-11-18','2023-11-20','Router
malfunction');
insert into Service_Outage values('O008','SP008','2023-07-12','2023-07-12','Failed link to
provider');
insert into Service_Outage values('O009','SP009','2023-01-23','2023-01-24','Bad weather');
insert into Service_Outage values('O010','SP010','2023-12-25','2023-12-26','Congestion');
select * from Service_Outage

```

Output:

Outage_ID	ISP_ID	Outage_start_date	Outage_end_date	Outage_description
O001	SP001	01-01-2023	02-01-2023	Congestion
O002	SP002	02-01-2023	02-01-2023	Failed link to provider
O003	SP003	01-01-2023	02-01-2023	Equipment failure
O004	SP004	05-03-2023	06-03-2023	Operator error
O005	SP005	07-05-2023	08-05-2023	Congestion
O006	SP006	10-10-2023	11-10-2023	Equipment failure
O007	SP007	18-11-2023	20-11-2023	Router malfunction
O008	SP008	12-07-2023	12-07-2023	Failed link to provider
O009	SP009	23-01-2023	24-01-2023	Bad weather
O010	SP010	25-12-2023	26-12-2023	Congestion


```
/*create table Bandwidth_Allocation*/
```

```
create table Bandwidth_Allocation
```

```
(
    Bandwidth_ID varchar(10)    primary key,
    Customer_ID  varchar(10)    foreign key references Customers(Customer_ID),
    Plan_ID      varchar(10)    foreign key references Service_plans(Plan_ID),
    Bandwidth_amount  varchar(20)    null,
    Start_date        date           null,
    End_date          date           null,
)
```

```
insert into Bandwidth_Allocation values('BW001','C001','P001','45Mbps','2023-01-01','2023-01-28');
```

```
insert into Bandwidth_Allocation values('BW002','C002','P002','20Mbps','2023-02-01','2023-08-28');
```

```
insert into Bandwidth_Allocation values('BW003','C003','P003','20Mbps','2023-03-01','2023-07-28');
```

```
insert into Bandwidth_Allocation values('BW004','C004','P004','20Mbps','2023-01-01','2024-01-28');
```

```
insert into Bandwidth_Allocation values('BW005','C005','P005','100Mbps','2023-04-01','2023-05-28');
```

```
insert into Bandwidth_Allocation values('BW006','C006','P006','100Mbps','2023-05-01','2024-04-28');
```

```
insert into Bandwidth_Allocation values('BW007','C007','P007','300Mbps','2023-06-01','2023-09-28');
```

```
insert into Bandwidth_Allocation values('BW008','C008','P008','700Mbps','2023-06-01','2023-11-28');
```

```
insert into Bandwidth_Allocation values('BW009','C009','P009','500Mbps','2023-07-01','2024-06-28');
```

```
insert into Bandwidth_Allocation values('BW010','C010','P010','70Mbps','2023-01-01','2023-02-28');
```

```
select * from Bandwidth_Allocation
```

Output:

Bandwidth_ID	Customer_ID	Plan_ID	Bandwidth_amount	Start_date	End_date
BW001	C001	P001	45Mbps	01-01-2023	28-01-2023
BW002	C002	P002	20Mbps	01-02-2023	28-08-2023
BW003	C003	P003	20Mbps	01-03-2023	28-07-2023
BW004	C004	P004	20Mbps	01-01-2023	28-01-2024
BW005	C005	P005	100Mbps	01-04-2023	28-05-2023
BW006	C006	P006	100Mbps	01-05-2023	28-04-2024
BW007	C007	P007	300Mbps	01-06-2023	28-09-2023
BW008	C008	P008	700Mbps	01-06-2023	28-11-2023
BW009	C009	P009	500Mbps	01-07-2023	28-06-2024
BW010	C010	P010	70Mbps	01-01-2023	28-02-2023

```
/*create table Network_Infrastructure*/
```

```
create table Network_Infrastructure
```

```
(
    Infrastructure_ID      varchar(10)           primary key,
    ISP_ID                 varchar(10)           foreign key references ISP(ISP_ID),
    Equipment_ID           varchar(10)           foreignkeyreferences
Equipment_Inventory(Equipment_ID),
    Capacity               integer              not null,
    Installation_Date      date                 not null,
    Infrastructure_type     varchar(30)          null,
)
```

```
insert into Network_Infrastructure values('I001','SP001','E001',100,'2022-05-05','Hardware');
```

```
insert into Network_Infrastructure values('I002','SP002','E002',67,'2022-02-25','Hardware');
```

```
insert into Network_Infrastructure values('I003','SP003','E003',60,'2022-07-22','Hardware');
```

INTERNET SERVICE PROVIDER

```

insert into Network_Infrastructure values('I004','SP004','E004',500,'2022-06-30','Hardware');
insert into Network_Infrastructure values('I005','SP005','E005',80,'2022-05-05','Hardware');
insert into Network_Infrastructure values('I006','SP006','E006',60,'2022-01-01','Hardware');
insert into Network_Infrastructure values('I007','SP007','E007',500,'2022-02-15','Hardware');
insert into Network_Infrastructure values('I008','SP008','E008',80,'2022-10-10','Hardware');
insert into Network_Infrastructure values('I009','SP009','E009',200,'2022-11-25','Hardware');
insert into Network_Infrastructure values('I010','SP010','E010',80,'2022-12-05','Hardware');

```

Output:

Infrastructure_ID	ISP_ID	Equipment_ID	Capacity	Installation_Date	Infrastructure_type
I001	SP001	E001	100	05-05-2022	Hardware
I002	SP002	E002	67	25-02-2022	Hardware
I003	SP003	E003	60	22-07-2022	Hardware
I004	SP004	E004	500	30-06-2022	Hardware
I005	SP005	E005	80	05-05-2022	Hardware
I006	SP006	E006	60	01-01-2022	Hardware
I007	SP007	E007	500	15-02-2022	Hardware
I008	SP008	E008	80	10-10-2022	Hardware
I009	SP009	E009	200	25-11-2022	Hardware
I010	SP010	E010	80	05-12-2022	Hardware

SQL QUERIES:**Query1: Display the customers who are subscribed for more than 5000.00RS plan.**

```

select * from Customers
where Customer_ID in (
    select Customer_ID
    from Subscriptions
    where Plan_id in (
        select Plan_ID from Service_plans
        where Plan_Price > 5000));

```

/*output:

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C001	Pardhu	lankapardhu@gmail.com	7416220222	Vijayawada	A
C002	Vasanth	Vasanth01@gmail.com	8456923846	Guntur	A
C003	Sri Latha	srilatha56@gmail.com	6428523786	Nellore	I
C006	Thanishka	thanishkareddy@gmail.com	8236517222	Kadiri	A
C008	Vasavi	vasavi97@gmail.com	9284638627	Vijayawada	A
C009	Lohith kumar	lohithakula@gmail.com	7348746528	Ongole	I
C010	Sai kumar	saiakula@gmail.com	635812715	Kurnool	A

*/

Query2: Arrange the plans on their subscription count.

```

SELECT sp.Plan_Name, COUNT(s.Subscription_ID) AS subscription_count
FROM Service_Plans sp
JOIN Subscriptions s ON sp.Plan_ID = s.Plan_ID
GROUP BY sp.Plan_Name
ORDER BY subscription_count DESC

```

/*output:

Plan_Name	subscription_count
Annual plan	8
Quarterly plan	6
Semi-Annual plan	6
Data Sachet plan	4
Monthly plan	3
BSNL Fibre Rural HOME wifi	2
Airtel Entertainment Broadband plan	2
Airtel Infinity Broadband plan	2
Airtel Professional Broadband plan	2
Airtel Standard Broadband plan	2

*/

Query3: Display the customers who are subscribed for plans having 1Gbps download speed.

```
select * from Customers
where Customer_ID in(
        SELECT Customer_ID
        FROM Subscriptions s
        JOIN Service_Plans p ON s.Plan_ID = p.Plan_ID
        WHERE p.Download_Speed = '1 Gbps'
    );
```

/*output

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C002	Vasanth	Vasanth01@gmail.com	8456923846	Guntur	A
C003	Sri Latha	srilatha56@gmail.com	6428523786	Nellore	I
C008	Vasavi	vasavi97@gmail.com	9284638627	Vijayawada	A
C009	Lohith kumar	lohithakula@gmail.com	7348746528	Ongole	I

*/

Query4: Service providers which are located in mumbai.

```
select * from ISP
where ISP_Address='Mumbai'
```

/* output:

ISP_ID	ISP_name	ISP_Address	Contact_Number	Email
SP001	Reliance jio infocamm limited	Mumbai	09587-3458	reliancejio@gmail.com
SP006	Hathway Cables and datacom limited	Mumbai	08754-3978	Hathwaydatacom@gmail.com
SP007	Tata communications limited	Mumbai	08656-0868	Tatacomunications@gmail.com
SP008	You Broadband	Mumbai	27935-0475	youbroadband@gmail.com

*/

Query5: Which customer has longest subscription.

```
select * from Customers
where Customer_ID in (
        select Customer_ID from Subscriptions
        where datediff(MONTH,Start_Date,End_Date) > 11
    );
```

/* output:

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C004	Annapurna	Annapurna89@gmail.com	9284663655	Tirupati	I
C008	Vasavi	vasavi97@gmail.com	9284638627	Vijayawada	A

*/

Query6: Find the customer id , customer name who are getting maximum bandwidth amount.

```
SELECT c.Customer_ID, c.Customer_Name, b.max_bandwidth
```

```
FROM Customers c
```

```
JOIN (
```

```
    SELECT Customer_ID, MAX(Bandwidth_Amount) AS max_bandwidth
```

```
    FROM Bandwidth_Allocation
```

```
    GROUP BY Customer_ID
```

```
) b ON c.Customer_ID = b.Customer_ID
```

```
WHERE    b.max_bandwidth    =    (SELECT    MAX(Bandwidth_Amount)    FROM
Bandwidth_Allocation)
```

/* output:

Customer_ID	Customer_Name	max_bandwidth
C003	Sri Latha	800Mbps

*/

Query7: What is network infrastructure of service provider located in panvel.

```
select * from Network_Infrastructure
```

```
where ISP_ID in (
```

```
    select ISP_ID from Location
```

```
    where Location_Name='Panvel'
```

```
);
```

/* output:

Infrastructure_ID	ISP_ID	Equipment_ID	Capacity	Installation_Date	Infrastructure_type
I005	SP005	E005	80	05-05-2022	Hardware

*/

Query8: What are the service outages of the service providers which are located in vijayawada city.

```
select * from Service_Outage
```

```
where ISP_ID in (
```

```

select ISP_ID from Location
where City='Vijayawada'
);

```

/* output:

Outage_ID	ISP_ID	Outage_start_date	Outage_end_date	Outage_description
O003	SP003	01-01-2023	02-01-2023	Equipment failure
O004	SP004	05-03-2023	06-03-2023	Operator error

***/**

Query9: Which plans are giving excellent speed.

```

select * from Service_plans
where Plan_ID in (
select Plan_ID from Subscriptions
where Subscription_ID in (
select Subscription_ID from Technical_Support
where Support_Description ='Excellent Speed'));

```

/* output:

Plan_ID	Plan_Name	Download_Speed	Upload_Speed	Plan_Price	Data_Limit
P001	Data Sachet plan	100 Mbps	67 Mbps	199	Unlimited
P002	Semi-Annual plan	30 Mbps	20 Mbps	2394	Unlimited
P005	Monthly plan	150 Mbps	100 Mbps	999	Unlimited
P007	Quarterly plan	500 Mbps	300 Mbps	4497	Unlimited
P008	Semi-Annual plan	1 Gbps	500 Mbps	23994	Unlimited
P012	Airtel Professional Broadband plan	1 Gbps	600 Mbps	11997	Unlimited
P013	Airtel Infinity Broadband plan	1 Gbps	700 Mbps	22194	Unlimited
P014	BSNL Fibre Rural HOME wifi	30 Mbps upto 1000GB	17 Mbps	4788	Unlimited

***/**

Query10: Number of Active Customers For 6 months.

```

select Count(*) as Active_Customers from Customers
where Status = 'A' and Customer_ID in
(
select Customer_ID from Subscriptions
where datediff(month,Start_Date,End_Date) >=6
);

```

/* output:

Active_Customers

6

*/

Query11: Find the Employees Responsible for 'Reliance jio infocamm limited' service provider.

```
SELECT e.Employees_ID, e.Employee_name, i.ISP_name
FROM Employees e
JOIN ISP i ON e.ISP_ID = i.ISP_ID
WHERE i.ISP_name = 'Reliance jio infocamm limited';
```

/* output:

Employees_ID	Employee_name	ISP_name
E001	Deepak Naidu	Reliance jio infocamm limited
E011	Rohith Kumar	Reliance jio infocamm limited
E013	Abdul Rehman	Reliance jio infocamm limited
E015	Anitha	Reliance jio infocamm limited

*/

Query12: Retrieve the customers who have the bandwidth_amount of '20Mbps'.

```
SELECT c.Customer_ID, c.Customer_Name, ba.Bandwidth_Amount
FROM Customers c
JOIN Bandwidth_Allocation ba ON c.Customer_ID = ba.Customer_ID
WHERE ba.Bandwidth_Amount='20Mbps'
```

/*output:

Customer_ID	Customer_Name	Bandwidth_Amount
C002	Vasanth	20Mbps
C003	Sri Latha	20Mbps
C004	Annapurna	20Mbps
C004	Annapurna	20Mbps

*/

Query13: List all customers and their corresponding technical support tickets.

```
SELECT c.Customer_ID, c.Customer_Name, ts.Support_ID, ts.Support_description
FROM Customers c
JOIN Technical_Support ts ON c.Customer_ID = ts.Customer_ID;
```

/* output:

Customer_ID	Customer_Name	Support_ID	Support_description
C001	Pardhu	SP001	Excellent Speed
C002	Vasanth	SP002	Some what slow
C003	Sri Latha	SP003	Some what slow
C004	Annapurna	SP004	Some what slow
C005	Bhanu kiran	SP005	Excellent Speed
C006	Thanishka	SP006	Better
C007	Chandrashekar	SP007	Excellent Speed
C008	Vasavi	SP008	Excellent Speed
C009	Lohith kumar	SP009	Excellent Speed
C010	Sai kumar	SP010	Better
C001	Pardhu	SP012	Excellent Speed
C002	Vasanth	SP013	Excellent Speed
C003	Sri Latha	SP014	Excellent Speed

*/

Query14: Find the Equipment details and the service provider name for the 'Panvel' location.

```
SELECT ei.Equipment_ID,
ei.Equipment_Name,i.ISP_Name,ei.Equipment_Type,l.Location_ID
FROM Equipment_Inventory ei
JOIN Location l ON ei.ISP_ID = l.ISP_ID
JOIN ISP i ON l.ISP_ID = i.ISP_ID
WHERE l.Location_Name = 'Panvel';
```

/* output:

Equipment_ID	Equipment_Name	ISP_Name	Equipment_Type	Location_ID
E005	UPS batteries	Excitel Broadband	Hardware	L005

*/

Query15: Find the total revenue generated from Billing.

```
SELECT SUM(Amount) AS Total_Revenue
FROM Billing;
```

/* output:

Total_Revenue
448889

*/

Query16: Find all customers who have subscribed to 'Annual plan'.

```
SELECT c.Customer_ID,c.Customer_Name,Address
FROM Customers c
```

JOIN Subscriptions s ON c.Customer_ID = s.Customer_ID

JOIN Service_Plans sp ON s.Plan_ID = sp.Plan_ID

WHERE sp.Plan_Name = 'Annual plan';

/* output:

Customer_ID	Customer_Name	Address
C004	Annapurna	Tirupati
C006	Thanishka	Kadiri
C009	Lohith kumar	Ongole
C008	Vasavi	Vijayawada
C010	Sai kumar	Kurnool

*/

Query17: Retrieve the total number of subscriptions for each service plan.

SELECT sp.Plan_Name, COUNT(*) AS total_subscriptions

FROM Service_Plans sp

JOIN Subscriptions s ON sp.Plan_ID = s.Plan_ID

GROUP BY sp.Plan_Name;

/* output:

Plan_Name	total_subscriptions
Airtel Entertainment Broadband plan	2
Airtel Infinity Broadband plan	2
Airtel Professional Broadband plan	2
Airtel Standard Broadband plan	2
Annual plan	8
BSNL Fibre Rural HOME wifi	2
Data Sachet plan	4
Monthly plan	3
Quarterly plan	6
Semi-Annual plan	6

*/

Query18: Find the bandwidth allocation for customer called 'Annapurna'.

SELECT b.Customer_ID, c.Customer_Name, b.Bandwidth_Amount

FROM Bandwidth_Allocation b

JOIN Customers c ON b.Customer_ID = c.Customer_ID

WHERE c.Customer_Name = 'Annapurna';

/* output:

Customer_ID	Customer_Name	Bandwidth_Amount
C004	Annapurna	20Mbps
C004	Annapurna	20Mbps

*/

Query19: Find the average monthly billing amount for each customer.

```
SELECT c.Customer_ID, c.Customer_Name, AVG(b.Amount) AS average_billing
FROM Customers c
JOIN Subscriptions s ON c.Customer_ID = s.Customer_ID
JOIN Billing b ON s.Subscription_ID = b.Subscription_ID
GROUP BY c.Customer_ID, c.Customer_Name;
```

/* output:

Customer_ID	Customer_Name	average_billing
C001	Pardhu	3946
C002	Vasanth	12595.5
C003	Sri Latha	11446
C004	Annapurna	4788
C005	Bhanu kiran	599
C006	Thanishka	5391
C007	Chandrashekar	2847
C008	Vasavi	14391
C009	Lohith kumar	51493.5
C010	Sai kumar	8269

*/

Query20: Find the total number of service outages for each location.

```
SELECT l.Location_ID, l.Location_Name, COUNT(so.Outage_ID) AS Total_outages
FROM location l
JOIN ISP i ON l.ISP_ID = i.ISP_ID
JOIN Service_Outage so ON i.ISP_ID = so.ISP_ID
GROUP BY l.Location_ID, l.Location_Name;
```

/* output:

Location_ID	Location_Name	Total_outages
L001	Balaji colony	1
L002	Air bypass road	1
L003	Gandhinagar	1
L004	Padamata	1
L005	Panvel	1
L006	Palani Nagar	1
L007	Hassannagar	1
L008	Pambanagar	1
L009	SR nagar	1
L010	Bidhannagar	1

*/

Query21: Retrieve the customers and their corresponding subscriptions with their service plan details.

```
SELECT c.Customer_Name, s.Subscription_ID, sp.Plan_Name
FROM Customers c
JOIN Subscriptions s ON c.Customer_ID = s.Customer_ID
JOIN Service_Plans sp ON s.Plan_ID = sp.Plan_ID;
```

/* output:

Customer_Name	Subscription_ID	Plan_Name
Pardhu	S001	Data Sachet plan
Vasanth	S002	Semi-Annual plan
Sri Latha	S003	Quarterly plan
Annapurna	S004	Annual plan
Bhanu kiran	S005	Monthly plan
Thanishka	S006	Annual plan
Chandrashekar	S007	Quarterly plan
Vasavi	S008	Semi-Annual plan
Lohith kumar	S009	Annual plan
Sai kumar	S010	Airtel Standard Broadband plan

*/

Query22: Find the customers who have contacted technical support multiple times.

```
SELECT c.Customer_Name
FROM Customers c
JOIN Technical_Support t ON c.Customer_ID = t.Customer_ID
GROUP BY c.Customer_Name
HAVING COUNT(t.Support_ID) > 1;
```

/* output:

Customer_Name
Pardhu
Sri Latha
Vasanth

***/**

Query23: Find the details of infrastructure located in ‘Gandhinagar’.

```
SELECT ni.Infrastructure_ID,i.ISP_Name,ni.Capacity,ni.Infrastructure_type
FROM Network_Infrastructure ni
JOIN Location l ON ni.ISP_ID = l.ISP_ID
JOIN ISP i ON l.ISP_ID = i.ISP_ID
WHERE l.Location_Name = 'Gandhinagar';
```

/* output:

Infrastructure_ID	ISP_Name	Capacity	Infrastructure_type
I003	Vodafone Idea limited	60	Hardware

***/**

Query24: Find the customers and their corresponding subscriptions with their service plan details.

```
SELECT c.Customer_Name, s.Subscription_ID,sp.Plan_ID, sp.Plan_Name
FROM Customers c
JOIN Subscriptions s ON c.Customer_ID = s.Customer_ID
JOIN Service_Plans sp ON s.Plan_ID = sp.Plan_ID;top(5) CID from customer
```

/* output:

Customer_Name	Subscription_ID	Plan_ID	Plan_Name
Pardhu	S001	P001	Data Sachet plan
Vasanth	S002	P002	Semi-Annual plan
Sri Latha	S003	P003	Quarterly plan
Annapurna	S004	P004	Annual plan
Bhanu kiran	S005	P005	Monthly plan
Thanishka	S006	P006	Annual plan
Chandrashekar	S007	P007	Quarterly plan
Vasavi	S008	P008	Semi-Annual plan
Lohith kumar	S009	P009	Annual plan
Sai kumar	S010	P010	Airtel Standard Broadband plan

***/**

Query25: Find the total number of customers for each service plan.

```
SELECT sp.Plan_ID, sp.Plan_Name, COUNT(c.Customer_ID) AS Customer_count
FROM Service_Plans sp
```

```
JOIN Subscriptions s ON sp.Plan_ID = s.Plan_ID
JOIN Customers c ON s.Customer_ID = c.Customer_ID
GROUP BY sp.Plan_ID, sp.Plan_Name;
```

/* output:

Plan_ID	Plan_Name	Customer_count
P001	Data Sachet plan	4
P002	Semi-Annual plan	3
P003	Quarterly plan	3
P004	Annual plan	3
P005	Monthly plan	3
P006	Annual plan	3
P007	Quarterly plan	3
P008	Semi-Annual plan	3
P009	Annual plan	2
P010	Airtel Standard Broadband plan	2

***/**

Query 26: Find the customers with their Subscription count.

```
SELECT c.Customer_ID, c.Customer_Name, COUNT(s.Subscription_ID) AS
subscription_count
FROM Customers c
JOIN Subscriptions s ON c.Customer_ID = s.Customer_ID
GROUP BY c.Customer_ID, c.Customer_Name
ORDER BY subscription_count DESC;
```

/*output:

Customer_ID	Customer_Name	subscription_count
C001	Pardhu	4
C002	Vasanth	4
C003	Sri Latha	4
C004	Annapurna	3
C005	Bhanu kiran	2
C006	Thanishka	2
C007	Chandrashekar	2
C008	Vasavi	2
C009	Lohith kumar	2
C010	Sai kumar	2

***/**

Query 27: Find the total number of employees for each ISP.

```
SELECT i.ISP_ID, i.ISP_Name, COUNT(e.Employees_ID) AS employee_count
FROM ISP i
JOIN Employees e ON i.ISP_ID = e.ISP_ID
```

GROUP BY i.ISP_ID, i.ISP_Name;

/*output:

ISP_ID	ISP_Name	employee_count
SP001	Reliance jio infocamm limited	4
SP002	Bharati airtel limited	2
SP003	Vodafone Idea limited	2
SP004	Bharat Sanchar Nigam limited	1
SP005	Excitel Broadband	1
SP006	Hathway Cables and datacom limited	1
SP007	Tata communications limited	1
SP008	You Broadband	1
SP009	Gigatel Networks	1
SP010	ACT Broadband	1

*/

Query 28: Find the Total Billing for all the customers.

```
SELECT c.Customer_ID, c.Customer_Name, SUM(b.Amount) AS total_billing
FROM Customers c
join Subscriptions s on c.Customer_ID=s.Customer_ID
JOIN Billing b ON s.Subscription_ID = b.Subscription_ID
GROUP BY c.Customer_ID, c.Customer_Name
ORDER BY total_billing DESC;
```

/*output:

Customer_ID	Customer_Name	total_billing
C009	Lohith kumar	102987
C002	Vasanth	50382
C003	Sri Latha	45784
C008	Vasavi	28782
C010	Sai kumar	16538
C001	Pardhu	15784
C004	Annapurna	14364
C006	Thanishka	10782
C007	Chandrashekar	5694
C005	Bhanu kiran	1198

*/

Query 29: Find the average monthly billing amount for each Service plan.

```
SELECT sp.Plan_ID, sp.Plan_Name, AVG(b.Amount) AS average_billing
FROM Service_Plans sp
JOIN Subscriptions s ON sp.Plan_ID = s.Plan_ID
```

JOIN Billing b ON s.Subscription_ID = b.Subscription_ID

GROUP BY sp.Plan_ID,sp.Plan_Name;

/*output:

Plan_ID	Plan_Name	average_billing
P001	Data Sachet plan	199
P002	Semi-Annual plan	2394
P003	Quarterly plan	1197
P004	Annual plan	4788
P005	Monthly plan	999
P006	Annual plan	8388
P007	Quarterly plan	4497
P008	Semi-Annual plan	23994
P009	Annual plan	101988
P010	Airtel Standard Broadband plan	8150

*/

Query 30: Find the minimum and maximum monthly billing amounts.

SELECT MIN(Amount) AS min_billing, MAX(Amount) AS max_billing

FROM billing;

/*output:

min_billing	max_billing
199	101988

*/

Query31: Find the Bandwidth amount allocated for the customer C010

SELECT ba.*

FROM Bandwidth_Allocation ba

JOIN Customers c ON ba.Customer_ID = c.Customer_ID

WHERE c.Customer_ID = 'C010';

/* output:

Bandwidth_ID	Customer_ID	Plan_ID	Bandwidth_amount	Start_date	End_date
BW010	C010	P010	70Mbps	01-01-2023	28-02-2023

*/

Query 32: Find the employees along with their corresponding ISP

SELECT e.Employees_ID, e.Employee_Name, i.ISP_Name

FROM Employees e

JOIN ISP i ON e.ISP_ID = i.ISP_ID;

/*output:

Employees_ID	Employee_Name	ISP_Name
E001	Deepak Naidu	Reliance jio infocamm limited
E002	Yashwanth Reddy	Bharati airtel limited
E003	Thirumalesh	Vodafone Idea limited
E004	Rajitha	Bharat Sanchar Nigam limited
E005	Sunny Subhakar	Excitel Broadband
E006	Likitha	Hathway Cables and datacom limited
E007	Mounika	Tata communications limited
E008	Jaswanth setty	You Broadband
E009	Mohan Nayak	Gigatel Networks
E010	Gayatri Devi	ACT Broadband

*/

Query 33: Display the subscription count for the individual customer

```
SELECT c.Customer_ID, c.Customer_Name, COUNT(s.Subscription_ID) AS
subscription_count
FROM Customers c
JOIN Subscriptions s ON c.Customer_ID = s.Customer_ID
GROUP BY c.Customer_ID, c.Customer_Name
ORDER BY subscription_count DESC;
```

/*output:

Customer_ID	Customer_Name	subscription_count
C001	Pardhu	4
C002	Vasanth	4
C003	Sri Latha	4
C004	Annapurna	3
C005	Bhanu kiran	2
C006	Thanishka	2
C007	Chandrashekar	2
C008	Vasavi	2
C009	Lohith kumar	2
C010	Sai kumar	2

*/

Query 34: Find the customers who have contacted technical support multiple times

```
SELECT *
FROM Customers
WHERE Customer_ID IN (
    SELECT Customer_ID
    FROM Technical_Support
    GROUP BY Customer_ID
    HAVING COUNT(Support_ID) > 1
);
```

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C001	Pardhu	lankapardhu@gmail.com	7416220222	Vijayawada	A
C002	Vasanth	Vasanth01@gmail.com	8456923846	Guntur	A
C003	Sri Latha	srilatha56@gmail.com	6428523786	Nellore	I

*/

Query 35: Retrieve all customers who have subscribed to multiple service plans

```
SELECT *
```

```
FROM Customers
```

```
WHERE Customer_ID IN (
```

```
    SELECT Customer_ID
```

```
    FROM Subscriptions
```

```
    GROUP BY Customer_ID
```

```
    HAVING COUNT(DISTINCT Plan_ID) > 1
```

```
);
```

/*output:

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C001	Pardhu	lankapardhu@gmail.com	7416220222	Vijayawada	A
C002	Vasanth	Vasanth01@gmail.com	8456923846	Guntur	A
C003	Sri Latha	srilatha56@gmail.com	6428523786	Nellore	I
C004	Annapurna	Annapurna89@gmail.com	9284663655	Tirupati	I
C005	Bhanu kiran	bhanukiran@gmail.com	7356837482	Anantapur	A
C006	Thanishka	thanishkareddy@gmail.com	8236517222	Kadiri	A
C007	Chandrashekar	chandukatakam@gmail.com	9476286333	Machilipatnam	I
C008	Vasavi	vasavi97@gmail.com	9284638627	Vijayawada	A
C009	Lohith kumar	lohithakula@gmail.com	7348746528	Ongole	I
C010	Sai kumar	saiakula@gmail.com	635812715	Kurnool	A

*/

Query 36: Retrive all customers who are subscribed for plan P001

```
SELECT *
```

```
FROM Customers
```

```
WHERE Customer_ID IN (
```

```
    SELECT Customer_ID
```

```
    FROM Subscriptions
```

```
    WHERE Plan_ID = 'P001'
```

```
) AND Customer_ID IN (
```

```
    SELECT Customer_ID
```

```
    FROM Billing
```

```
);
```

/*output:

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C001	Pardhu	lankapardhu@gmail.com	7416220222	Vijayawada	A
C003	Sri Latha	srilatha56@gmail.com	6428523786	Nellore	I
C005	Bhanu kiran	bhanukiran@gmail.com	7356837482	Anantapur	A

*/

Query 37: Find service plans that have a higher number of subscriptions than the average

```

SELECT Plan_ID, Plan_Name
FROM Service_Plans
WHERE (
    SELECT COUNT(*)
    FROM Subscriptions
    WHERE Plan_ID = Service_Plans.Plan_ID
) > (
    SELECT AVG(count_subs)
    FROM (
        SELECT COUNT(*) AS count_subs
        FROM Subscriptions
        GROUP BY Plan_ID
    ) AS counts
);

```

/*output:

Plan_ID	Plan_Name
P001	Data Sachet plan
P002	Semi-Annual plan
P003	Quarterly plan
P004	Annual plan
P005	Monthly plan
P006	Annual plan
P007	Quarterly plan
P008	Semi-Annual plan

Query 38: Find the customers who didn't not paid the bill

```

SELECT Customer_ID, customer_name
FROM customers
WHERE Customer_ID IN (
select Customer_ID

```

```

from Subscriptions
Where Subscription_ID not in
(
    SELECT Subscription_ID
    FROM Billing
    Where Payment_Status='Not paid'
);

```

/*output:

Customer_ID	customer_name
C001	Pardhu
C003	Sri Latha
C004	Annapurna
C007	Chandrashekar
C008	Vasavi
C009	Lohith kumar

***/**

Query 39: Get service plans with more than the average number of subscriptions

```

SELECT Plan_ID, Plan_Name
FROM Service_Plans
WHERE Plan_ID IN (
    SELECT Plan_ID
    FROM Subscriptions
    GROUP BY Plan_ID
    HAVING COUNT(*) > (
        SELECT AVG(count_subs)
        FROM (
            SELECT Plan_ID, COUNT(*) AS count_subs
            FROM Subscriptions
            GROUP BY Plan_ID
        ) AS counts
    )
)

```

/*output:

Plan_ID	Plan_Name
P001	Data Sachet plan
P002	Semi-Annual plan
P003	Quarterly plan
P004	Annual plan
P005	Monthly plan
P006	Annual plan
P007	Quarterly plan
P008	Semi-Annual plan */

Query 40: Find customers who have not been involved in any technical support cases

```
SELECT Customer_ID, Customer_Name
FROM Customers
WHERE Customer_ID NOT IN (
    SELECT Customer_ID
    FROM Technical_Support
);
```

/*output:

Customer_ID	Customer_Name
C012	Subhashini
C013	Rambabu
C015	Nanda kishore
C016	Priyanka
C017	Sunny subhakar
C018	Pawan Kalyan
C019	Deepthi
C020	Kiran kumar */

Query 41: Get service plans subscribed by customers who have contacted technical support

```
SELECT Plan_ID, Plan_Name
FROM Service_Plans
WHERE Plan_ID IN (
    SELECT Plan_ID
    FROM Subscriptions
    WHERE Customer_ID IN (
        SELECT Customer_ID
        FROM Technical_Support
    )
);
```

/*output:

Plan_ID	Plan_Name
P001	Data Sachet plan
P002	Semi-Annual plan
P003	Quarterly plan
P004	Annual plan
P005	Monthly plan
P006	Annual plan
P007	Quarterly plan
P008	Semi-Annual plan
P009	Annual plan
P010	Airtel Standard Broadband plan

***/**

Query 42: Find customers who have subscribed to service plans with a higher monthly amount than the average monthly amount across all service plans:

```

SELECT *
FROM Customers
WHERE Customer_ID IN (
    SELECT Customer_ID
    FROM Subscriptions
    WHERE Plan_ID IN (
        SELECT Plan_ID
        FROM Service_Plans
        WHERE Plan_Price > (
            SELECT AVG(Plan_Price)
            FROM Service_Plans
        )
    )
);

```

/*output:

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C002	Vasanth	Vasanth01@gmail.com	8456923846	Guntur	A
C003	Sri Latha	srilatha56@gmail.com	6428523786	Nellore	I
C008	Vasavi	vasavi97@gmail.com	9284638627	Vijayawada	A
C009	Lohith kumar	lohithakula@gmail.com	7348746528	Ongole	I
C018	Pawan Kalyan	pawankalyan97@gmail.com	9465838627	Vijayawada	A
C019	Deepthi	deepthi09@gmail.com	7348730496	Ongole	I

***/**

Query 43: Find the plans which have greater than the average monthly amount.

```
SELECT *
FROM Service_Plans
WHERE monthly_amount > (
    SELECT AVG(sp.Plan_Price)
    FROM Service_Plans sp
    JOIN ISP i ON sp.ISP_ID = i.ISP_ID
    WHERE sp.Plan_ID = Service_Plans.Plan_ID
);
```

/*output:

Plan_ID	Plan_Name
P001	Data Sachet plan
P002	Semi-Annual plan
P003	Quarterly plan
P004	Annual plan
P005	Monthly plan
P006	Annual plan
P007	Quarterly plan
P008	Semi-Annual plan

***/**

Query 44: Find service providers who have not experienced any service outages:

```
SELECT ISP_ID,ISP_Name
FROM ISP
WHERE ISP_ID NOT IN (
    SELECT ISP_ID
    FROM Service_Outage
);
```

/*output:

ISP_ID ISP_Name

***/**

Query 45: Find customers who have subscribed to the most expensive service plan

```
SELECT *
FROM Customers
WHERE Customer_ID IN (
    SELECT Customer_ID
```

```

FROM Subscriptions
JOIN Service_Plans ON Subscriptions.Plan_ID = Service_Plans.Plan_ID
WHERE Plan_Price = (
    SELECT MAX(Plan_Price)
    FROM Service_Plans
)
);
/*output:

```

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C009	Lohith kumar	lohithakula@gmail.com	7348746528	Ongole	I
C019	Deepthi	deepthi09@gmail.com	7348730496	Ongole	I

```

*/

```

Query 46: Find customers who have contacted technical support more than once:

```

SELECT *
FROM Customers
WHERE Customer_ID IN (
    SELECT Customer_ID
    FROM Technical_Support
    GROUP BY Customer_ID
    HAVING COUNT(*) > 1
);

```

```

/*output:

```

Customer_ID	Customer_Name	Email	Phone_Number	Address	status
C001	Pardhu	lankapardhu@gmail.com	7416220222	Vijayawada	A
C002	Vasanth	Vasanth01@gmail.com	8456923846	Guntur	A
C003	Sri Latha	srilatha56@gmail.com	6428523786	Nellore	I

```

*/

```

Query 47: Get the total number of employees working for each ISP:

```

SELECT ISP_ID, ISP_Name, (
    SELECT COUNT(*)
    FROM Employees
    WHERE ISP_ID = i.ISP_ID
) AS total_employees
FROM ISP i;

```


/*output:

ISP_ID	ISP_Name	total_employees
SP001	Reliance jio infocamm limited	4
SP002	Bharati airtel limited	2
SP003	Vodafone Idea limited	2
SP004	Bharat Sanchar Nigam limited	1
SP005	Excitel Broadband	1
SP006	Hathway Cables and datacom limited	1
SP007	Tata communications limited	1
SP008	You Broadband	1
SP009	Gigatel Networks	1
SP010	ACT Broadband	1

*/

Query 48: Find the average number of technical support tickets per customer

SELECT AVG(ticket_count) AS average_ticket_count

FROM (

SELECT Customer_ID, COUNT(*) AS ticket_count

FROM Technical_Support

GROUP BY Customer_ID

) AS ticket_counts;

/*output:

average_ticket_count
1

*/

Query 49: Find the Subscriptions of Active customers

select * from Subscriptions

where Customer_ID in (

select Customer_ID from Customers

where Status ='A');

/*output:

Subscription_ID	Customer_ID	Plan_ID	Start_Date	End_Date
S001	C001	P001	01-01-2023	28-01-2023
S002	C002	P002	01-02-2023	28-08-2023
S005	C005	P005	01-04-2023	28-05-2023
S006	C006	P006	01-05-2023	28-04-2024
S008	C008	P008	01-06-2023	28-11-2023
S010	C010	P010	01-01-2023	28-02-2023

*/

Query 50: Find the total number of subscribers for each ISP:

```

SELECT sp.Plan_Name, COUNT(*) AS subscriber_count
FROM Service_Plans sp
JOIN Subscriptions ON sp.Plan_ID = Subscriptions.Plan_ID
GROUP BY sp.Plan_Name;

```

/*output:

Plan_Name	subscriber_count
Airtel Entertainment Broadband plan	2
Airtel Infinity Broadband plan	2
Airtel Professional Broadband plan	2
Airtel Standard Broadband plan	2
Annual plan	8
BSNL Fibre Rural HOME wifi	2
Data Sachet plan	4
Monthly plan	3
Quarterly plan	6
Semi-Annual plan	6

***/**

CHAPTER 4. CONCLUSION AND FUTUREWORK

4.1 Conclusion

The ISP DBMS project successfully achieved its objectives and delivered a robust and efficient database management system for the Internet Service Provider (ISP). Through careful analysis, design, and implementation, the project team developed a solution that effectively handles the ISP's data management needs, ensuring reliability, security, and scalability.

The DBMS project provided a centralized platform for storing and managing customer information, service plans, billing details, and network infrastructure data. It streamlined the ISP's operations, enabling faster access to critical data, simplified billing processes, and improved customer service.

Key features of the ISP DBMS included data integration from various sources, comprehensive reporting capabilities, automated billing workflows, and user-friendly interfaces for both ISP staff and customers. The system incorporated robust security measures to protect sensitive data and implemented backup and recovery mechanisms to ensure data integrity.

Throughout the project lifecycle, the team closely collaborated with the ISP stakeholders to gather requirements, incorporate feedback, and ensure that the final solution aligned with the ISP's specific needs and goals. Regular testing and quality assurance measures were implemented to identify and rectify any issues, resulting in a stable and reliable DBMS.

Overall, the ISP DBMS project significantly enhanced the ISP's data management capabilities, improving efficiency, accuracy, and customer satisfaction. By implementing this solution, the ISP can now effectively manage its operations, gain valuable insights from data analysis, and continue to deliver high-quality services to its customers.

4.2 Future Work

Data Integration and Interoperability: One area of future work for the ISP DBMS project is to enhance data integration and interoperability. Internet service providers often work with multiple systems and databases to handle different aspects of their operations, such as billing, network management, and customer support. Developing mechanisms to seamlessly integrate these systems with the ISP DBMS would enable a unified view of customer data and streamline processes. This could involve designing APIs (Application Programming Interfaces) or data connectors to facilitate data exchange and synchronization between the DBMS and other systems. Additionally, exploring standardization protocols and formats, such as industry-specific data exchange standards or open data formats, would enhance interoperability and facilitate smooth data flow across different platforms.

Machine Learning and Predictive Analytics: Another promising area of future work for the ISP DBMS project is the incorporation of machine learning and predictive analytics capabilities. By leveraging historical customer data, ISPs can develop models to predict customer behavior, identify potential service issues, and optimize resource allocation. Machine learning algorithms can be applied to detect patterns and anomalies in customer data, enabling proactive measures to address problems before they occur. Additionally, predictive analytics can assist in forecasting network traffic, demand trends, and customer churn, empowering ISPs to make data-driven decisions and optimize their service offerings. Integrating machine learning libraries, developing algorithms, and creating a user-friendly interface for data scientists and analysts to perform advanced analytics within the DBMS would be valuable future work for the project.

By focusing on these areas of future work, the ISP DBMS project can further enhance its functionality, scalability, and value for internet service providers.