Foundations of Information Technology - 15CSE377
Department of Electronics and Communication Engineering
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RELATIONAL DATABASE MANAGEMENT SYSTEM MODEL

(A Hypothetical RDBMS System for Railways based on IRCTC)

A Project by:

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1. Abstract

A Relational Database Management System (RDBMS) is a collection of programs that enable people to create, update, administer and interact with a relational database. An RDBMS is a powerful data management tool used widely across the world.

The main aim of this Relational Database Management System (RDBMS) project is to understand the process of learning how to create and manage a Relational Database through the use of RDBMS software. We aim to demonstrate the use of create, read, update, delete, join operations in Structured Query Language (SQL) through the use of MySQL, an open-source RDBMS software in this project. This project starts by adding tables of trains, employees, passengers, tickets, stations and food plans. The relation between each table and its attributes has been made with the help of a Entity Relationship (E-R) diagram and implemented the same in MySQL. The data is retrieved from the database by using different SQL queries and the results are displayed, thus simulating a small-scale, hypothetical database model that could be used in a real-life scenario of a Railway corporation, in this case, the Indian Railway Catering and Tourism Corporation (IRCTC).

2. Entity-Relationship (E-R) Diagram

An Entity–Relationship model (E-R model) describes the structure of a database with the help of a diagram using notations known as E-R notations. There are different kinds of E-R notations, in this case the Crow's Foot notation has been used. E-R diagrams can be viewed as an abstract of a database model. The main components of an E-R model are: Entity set and Relationship set. It helps us understand the relationship between each instance or entity. Every database design starts with the design of a blueprint (E-R diagram) which is later used to extract or capture all the details required to build the application.

Relational database design can be sophisticated, hence it is required that the database architect breaks down the design plan into smaller parts and focuses on every minute detail. E-R diagrams help make the structure of the database simpler and easier to understand.

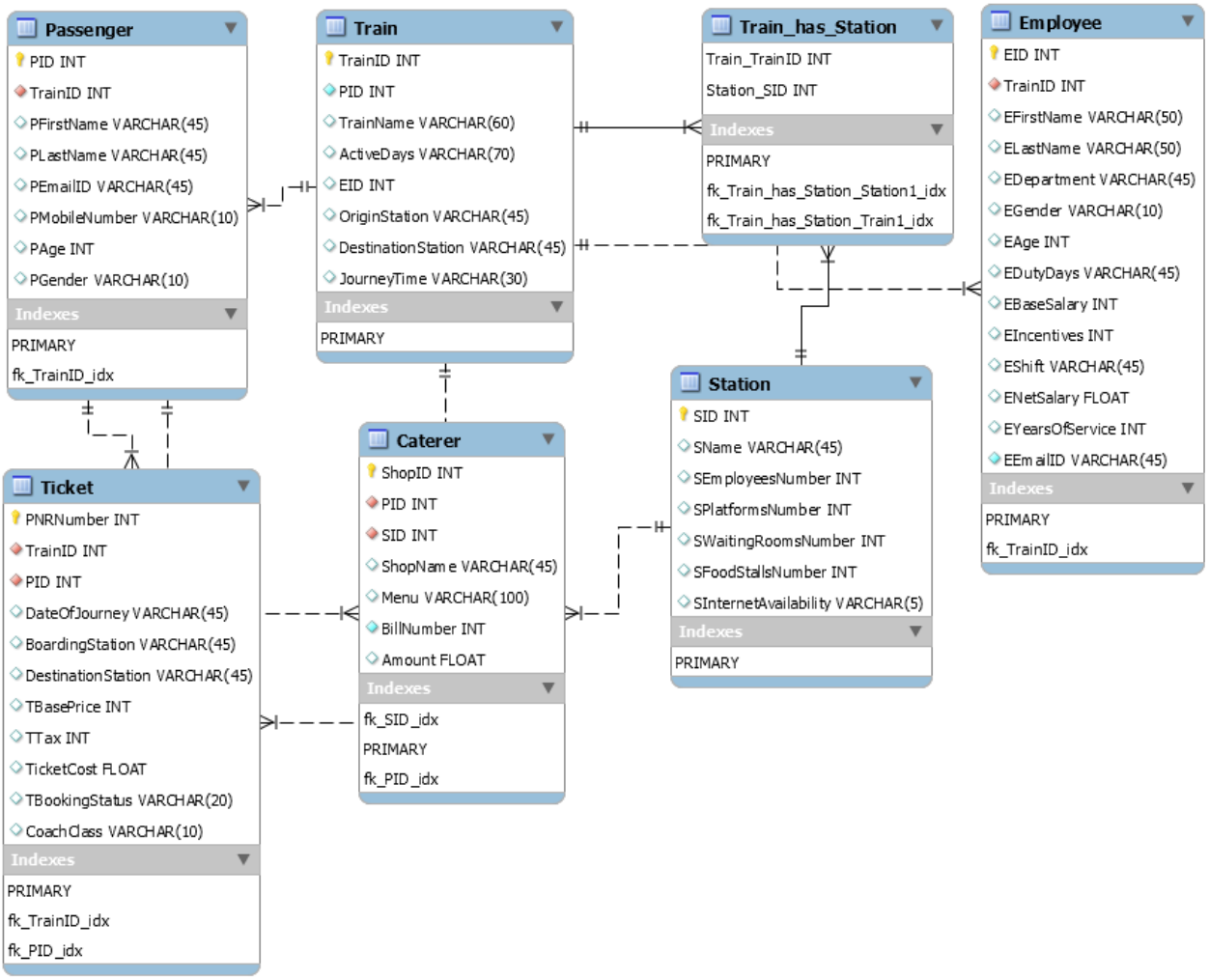

Figure 2.1: The E-R Diagram for the IRCTC RDBMS Model.

Figure 2.1 represents the relationships of the various tables used in our model. This diagram helps in future in drafting the code for this project. We have broken down our database design into six different entities namely:

1. Passenger
2. Train
3. Station
4. Ticket
5. Employee
6. Caterer

Each entity will have a cardinality with another entity that defines their relationship. In Figure 2.1,

- The **Passenger** table has a **many-to-one relationship (N:1)** with the **Train** table which means that more than one passenger can travel in one train.
- The **Ticket** table is a **weak entity** since it **depends** upon the **existence** of the **Passenger** table and the cardinality between these tables is **one-to-many (1:N)** as each passenger can buy/hold many tickets.
- The **Train** table has a **many-to-many relationship (N:M)** with the **Station** table which means that many trains can pass by many stations.
- The **Employee** table has a **many-to-one relationship (N:1)** with the **Train** table which means that many employees (Loco-pilot, Ticket Collector, Cleaner, etc.) can work for one particular train.
- The **Passenger** table has a **one-to-many relationship (1:N)** with the **Caterer** table which means that one person can buy multiple items from a particular caterer.
- The **Station** Table has a **one-to-many relationship (1:N)** with the **Caterer** table since each station can house many food outlets at a time.