

Assignment 02

Database Systems

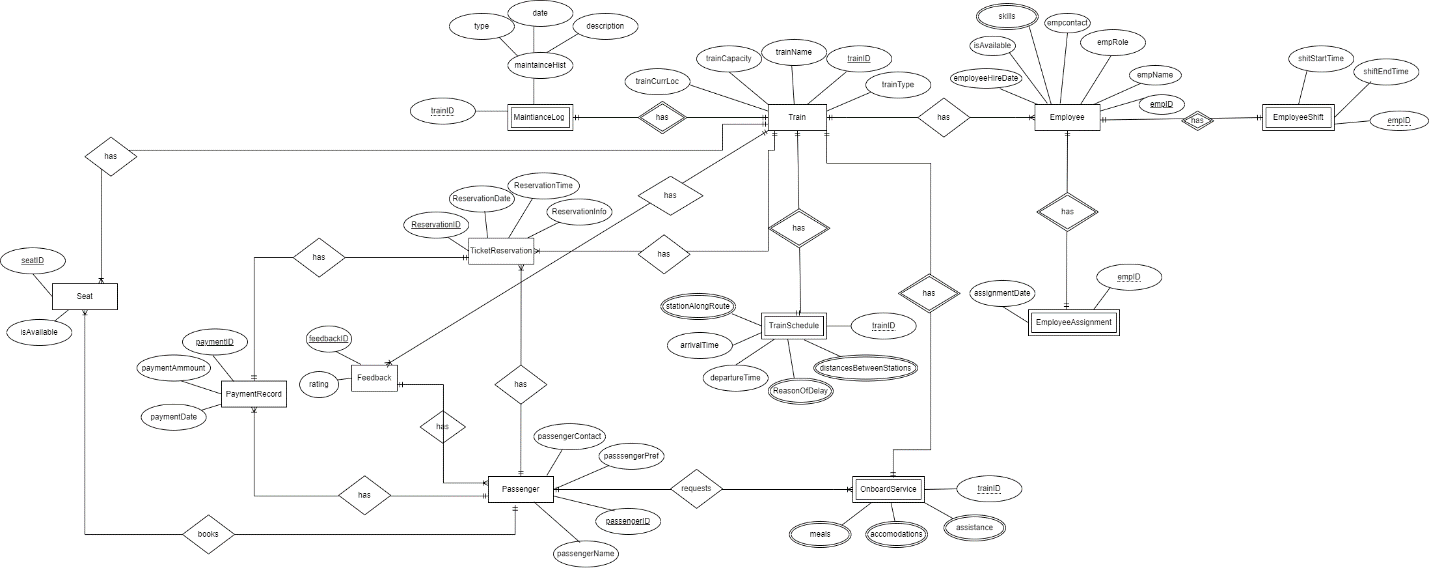


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SE-P

**ERD for Train Management System with Passenger Management and Employee Management**



**Q#1:**

**Relational Schema:**

Train

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| trainID | trainCapacity | trainName | trainCurrLoc | trainType |

MaintanceLog

|  |  |  |  |
| --- | --- | --- | --- |
| trainID (FK) | Maintancetype | maintanceDate | MaintanceDescp |

TicketReservation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ReservationID | ReservationDate | reservationTime | reservationInfo | tainID | paymentID (FK) |

PaymentRecord

|  |  |  |  |
| --- | --- | --- | --- |
| paymentID | paymetAmmount | paymentDate | PassengerID (FK) |

Seat

|  |  |  |  |
| --- | --- | --- | --- |
| SeatID | IsAvailable | trainID (FK) | passengerID (FK) |

Feedback

|  |  |  |
| --- | --- | --- |
| feedbackID | rating | trainID (FK) |

Passenger

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| passengerID | passengerName | passengerPref | passengerCOntract | feedbackID (FK) |

TrainScedule

|  |  |  |
| --- | --- | --- |
| trainArrivalTime | TrainDesperatureTime | trainID (FK)(PK) |

stationAlongRoutes

|  |  |
| --- | --- |
| trainID | routeStation |

reasonOfDelay

|  |  |
| --- | --- |
| trainID | delayReason |

RoutesBwDistance

|  |  |
| --- | --- |
| trainID | distanceBwRoutes |

OboardService

|  |  |
| --- | --- |
| TrainID (PK)(FK) | PassengerID |

mealService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | meals |

accomodationService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | Accommodation |

assistanceService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | assistance |

Employee

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| empID | empName | empRole | empContact | isAvailable | empHireDate |

employeeShift

|  |  |  |
| --- | --- | --- |
| empID (FK) (PK) | shiftStartTime | shiftEndTime |

EmployeeAssignment

|  |  |
| --- | --- |
| empID (FK) (PK) | assignmentDate |

EmpSkill

|  |  |
| --- | --- |
| empID | empSkill |

**Q#2:**

**Flat Table:**

(TrainID,TrainCapacity,TrainName,trainCurrLoc, trainType, MaintanceType,maintanceDate, MaintanceDesc, reservationID, reservationDate, reservationTime, reservationInfo, paymentID, paymentammount, PaymentDate, passengerName, passengerPref, passengerContract, feedbackID, rating, seatID, seatAvailibility, trainArrTime, trainDeptTime, routeStation, delayReason, distbwRoutes, meals, accommodation, assistance, empID, empName, empRole, empContact, empAvailibilty, empHireDate, empShiftStartTime, empShiftEndTime, empAssignmentDate, empSkill)

**Entities and their functional dependencies:**

**Train Entity:**

* TrainID → TrainCapacity, TrainName, trainCurrLoc, trainType, MaintanceType, maintanceDate, MaintanceDesc, trainArrTime, trainDeptTime, routeStation, delayReason, distbwRoutes, meals, accommodation, assistance

**Reservation Entity:**

* reservationID → TrainID, reservationDate, reservationTime, reservationInfo, paymentID
* TrainID, reservationDate → reservationTime, reservationInfo, paymentID
* paymentID → paymentammount, PaymentDate

**Passenger Entity:**

* reservationID → passengerName, passengerPref, passengerContact
* feedbackID → rating

**Employee Entity:**

* empID → empName, empRole, empContact, empAvailibilty, empHireDate, empShiftStartTime, empShiftEndTime, empAssignmentDate, empSkill
* empRole → empID

**Relationships and their functional dependencies:**

* **Train-Reservation Relationship:**
  + TrainID → reservationID, reservationDate, reservationTime, reservationInfo, paymentID
  + reservationID → TrainID, reservationDate, reservationTime, reservationInfo, paymentID
* **Passenger-Reservation Relationship:**
  + reservationID → passengerName, passengerPref, passengerContact
* **Payment-Reservation Relationship:**
  + paymentID → paymentammount, PaymentDate
* **Passenger-Feedback Relationship:**
  + feedbackID → rating
* **Employee-Assignment Relationship:**
  + empID → empName, empRole, empContact, empAvailibilty, empHireDate, empShiftStartTime, empShiftEndTime, empAssignmentDate, empSkill
  + empRole → empID

**1st Normal Form:**

FlatTable (TrainID, TrainCapacity, TrainName, trainCurrLoc, trainType, MaintanceType, maintanceDate, MaintanceDesc, reservationID, reservationDate, reservationTime, reservationInfo, paymentID, paymentammount, PaymentDate, passengerID, passengerName, passengerPref, passengerContract, feedbackID, rating, seatID, seatAvailibility, trainArrTime, trainDeptTime, empID, empName, empRole, empContact, empAvailibilty, empHireDate, empShiftStartTime, empShiftEndTime, empAssignmentDate,)

stationAlongRoutes

|  |  |
| --- | --- |
| trainID | routeStation |

reasonOfDelay

|  |  |
| --- | --- |
| trainID | delayReason |

RoutesBwDistance

|  |  |
| --- | --- |
| trainID | distanceBwRoutes |

mealService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | meals |

accomodationService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | Accommodation |

assistanceService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | assistannce |

EmpSkill

|  |  |
| --- | --- |
| empID | empSkill |

**Description:**

In first normal form, all the table which has multivalued attributes are converted into separate tables.

**2nd Normal Form:**

Train

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| trainID | trainCapacity | trainName | trainCurrLoc | trainType | mntnctype | mntncDate | mntncDescp |

TicketReservation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ReservationID | ReservationDate | reservationTime | reservationInfo | tainID | paymentID (FK) |

PaymentRecord

|  |  |  |  |
| --- | --- | --- | --- |
| paymentID | paymetAmmount | paymentDate | PassengerID (FK) |

Seat

|  |  |  |  |
| --- | --- | --- | --- |
| SeatID | IsAvailable | trainID (FK) | passengerID (FK) |

Employee

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| empID | empName | empRole | empContact | isAvailable | empHireDate | shiftStartTime | shiftEndTime |

Feedback

|  |  |  |
| --- | --- | --- |
| feedbackID | rating | trainID (FK) |

**Description:**

In 2nd NF, the flat table has primary composite keys so all the attributes connected the one part of composite keys are combined and the attributes with the other part of composite keys are separated.

**3rd Normal Form:**

Train

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| trainID | trainCapacity | trainName | trainCurrLoc | trainType |

MaintanceLog

|  |  |  |  |
| --- | --- | --- | --- |
| trainID (FK) | Maintancetype | maintanceDate | MaintanceDescp |

TicketReservation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ReservationID | ReservationDate | reservationTime | reservationInfo | tainID | paymentID (FK) |

PaymentRecord

|  |  |  |  |
| --- | --- | --- | --- |
| paymentID | paymetAmmount | paymentDate | PassengerID (FK) |

Seat

|  |  |  |  |
| --- | --- | --- | --- |
| SeatID | IsAvailable | trainID (FK) | passengerID (FK) |

Feedback

|  |  |  |
| --- | --- | --- |
| feedbackID | rating | trainID (FK) |

Passenger

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| passengerID | passengerName | passengerPref | passengerCOntract | feedbackID (FK) |

TrainScedule

|  |  |  |
| --- | --- | --- |
| trainArrivalTime | TrainDesperatureTime | trainID (FK)(PK) |

stationAlongRoutes

|  |  |
| --- | --- |
| trainID | routeStation |

reasonOfDelay

|  |  |
| --- | --- |
| trainID | delayReason |

RoutesBwDistance

|  |  |
| --- | --- |
| trainID | distanceBwRoutes |

OboardService

|  |  |
| --- | --- |
| TrainID (PK)(FK) | PassengerID |

mealService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | meals |

accomodationService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | Accommodation |

assistanceService

|  |  |  |
| --- | --- | --- |
| trainID (PK)(FK) | passengerID (FK) | assistance |

Employee

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| empID | empName | empRole | empContact | isAvailable | empHireDate |

employeeShift

|  |  |  |
| --- | --- | --- |
| empID (FK) (PK) | shiftStartTime | shiftEndTime |

EmployeeAssignment

|  |  |
| --- | --- |
| empID (FK) (PK) | assignmentDate |

EmpSkill

|  |  |
| --- | --- |
| empID | empSkill |

**Description:**

In 3rd NF, all the table has its own set of primary and foreign keys.