

Entities and Attributes:

Master Tables

bank

bank table contains the details of Banks that the Dental Practice would be taking loans from. The attributes of the bank table include bank_code, bank_name, and bank_address.

patient

patient table is to maintain patient's basic details along with patient's insurance details like patient_id, patient_name, address, age, gender, contact_info and patient_state. patient_state attribute will help in knowing the patient's state when it comes to scheduling that whether the patient is contacted, scheduled, recently visited, up for next visit or dormant.

appliances

appliances table will have the information on the stock items that the Dental Practice owns. The attributes include total_quantity, available_quantity, and cost_per_item. The table contains all the softwares and appliances that are bought when starting up as well stocking details when they get over.

insurance_providers

Insurance_providers table holds details of the insurance providers with whom the patients of the Dental Practice are associated with. The attributes include provider_id, provider_name, phone_no and provider_address.

employee

employee entity consist of all the staff details who work for Dental practice including doctors and front-office workers. The attributes include employee id, employee name, age, phone number, address, gender and salary in CTC.

- **doctor**
doctors are employee and doctor table is inherited from the Employee entity and consist of the doctor's basic details. It will have doctor's license details to keep track of their medical license.
- **front_office_workers**
front-office_workers are employees and the entity is inherited from Employee entity and has the front worker's basic details. They help in scheduling the appointment and in some other hospital tasks.

Connecting Tables

Loan

Loan entity will have all the attributes like amount_sanctioned, amount_paid, amount_owed, interest_rate and borrowed_rate for the loans that the Dental Practice takes from different banks.

transactions

transactions table will have all the transaction details of the Dental Practice with attributes like transaction_amount, time_stamp, transaction_type and transaction_description. These includes loan details, expenses on various category i.e on appliances, operating costs, salary payment and lease payment. It also includes transactions of earnings from patients and insurance providers which all are distinguished based on the category of transactions. The transaction table will have all the information that can help owners generate billable income at the end of each day.

earnings

earnings entity will be helpful for data analytics as it will give us all the earning that the Dental Practice gets which can be fetched from the billing record and some other earnings from donations, medical aid etc. This help owners to see the report that will include all the income which helps them in assessing profit or loss.

These other entities altogether gives the total expenditure which helps the owner in assessing profit or loss.

- **employee_payroll**
This table will have all the employee salary details. The table is linked to main transaction table which has all the salary transactions.
- **loan_transactions**
loan_transactions table contains all the loan payments details paid by the Dental Practice to the banks. This is linked to transaction table which has all the loan transactions.
- **lease_schedule**
lease_schedule entity contains the lease details of the medical building that the Dental Practice is leasing.
- **operating_cost**
This table contains monthly operating cost details of the Dental Practice. This is linked to transaction table which has all the transactions.

- **appliance_payment**

This entity will have the transaction details of the payments done to buy the appliances.

billing Record

billing record will maintain all the patient billing records : total amount, amount owed by patient, amount paid, and amount paid by the insurance.

medical record

medical record holds patient's medical treatment details which includes the procedures details prescriptions, and doctor notes.

patient_insurance_info

This table contains insurance details of the patient.

appointment

appointment entity will have the scheduling details of all the appointments taken by the patient which includes patient details, doctors who are seeing the patient and the front office worker's details who scheduled the appointment. Front office workers keep updating the schedule table daily according to appointments and owners can see the day's schedule with the help of timestamp. At a time, there can be total 0 to 8 appointments as there are maximum 8 rooms available.

prescription

prescription entity will have the medical prescriptions that the doctor gives to the patient after consultation. This include medicine details, dosage and medication period.

appointment_room

The entity will have the room details that is used for the patient's appointment. This includes room no, room type, number of beds and whether it's available or not. There are total 0 to 8 rooms available at that particular time.

Relations

loan table is related to **bank** through **1:M relationship** as a bank can provide multiple loans to Dental Practice and a loan can be from only one bank. As multiple loans can be taken from multiple banks, to make it unique, bank_id and loan_id is made as composite key. This relationship thus has a **strong** relation.

loan_transactions is linked to **loan** table through **1:M relationship** as one loan can have many loan transactions (includes multiple disbursements and payments) and each transaction is linked to only one loan and has a **weak** relation.

appliance_payment is related to **appliances** table through **1:M relationship** as each appliance can have multiple payment records, but each payment record will be linked to one appliance_id. This is a **weak** relation.

transaction table is linked to 6 different tables which are categorized based on the category of transaction through **1 to zero or 1** relation as each transaction is unique to whichever category of transaction it is and not all transaction will be of every type. transaction_id is made as primary and foreign key in these tables as each transaction_id is unique. This makes all these relations with transaction entity as **strong relation** and these entities related to transaction table are **weak** entities.

- **appliance_payment** is linked to **transactions** through **1 to zero or 1** relation. This is a **strong** relation.
- **loan_transactions** is linked to **transactions** through **1 to zero to one** relationship as each loan transaction can be linked to only one transaction and vice versa. If there is no loan, then the transaction table will have no loan transaction details. This is a **strong** relation.
- **employee_payroll** is related to **transactions** through **1 to zero or 1** relation. This is a **strong** relation.
- **earnings** is linked to **transactions** through **1 to zero or 1** relation and is a **strong** relation.
- **lease_schedule** is linked to **transactions** through **1 to zero or 1** relationship and is a **strong** relation.
- **operating_cost** is linked to **transactions** through **1 to zero or 1** relationship and is a **strong** relation.

billing_record is related to **insurance_provider** and **patient** through **1 to zero or many** and **1:M** respectively. Each insurance provider can provide insurance to zero or many patients and can have many billing transactions for same or multiple patients, but each billing transaction can be of only one insurance provider. This is a **weak** relation. Similarly, each patient can have many billing records if he takes many treatments and each billing id will be of one patient.

earnings is related to **billing record** through **1 to zero or many** relationship as each earning can have zero or many transactions of the patient payment or insurance payment i.e. both insurer and patient can pay for the same billing id which comes from the billing record and billing transaction will be of unique earning. This is a **weak relation**.

patient_insurance_info is a bridge between patient and insurance_provider as each patient can have multiple insurances and each insurance provider can provide insurance to multiple

patients. A patient can have zero or many insurance and linked by 1 to zero or many relation. Insurance provider can provide insurance to one or many patients but each patient's insurance information for that particular insurance is linked to the respective provider as well as the patient. Attributes `patient_id` and `provider_id` from the patient and insurance_provider table respectively are together made as composite key in `patient_insurance_info` as the combination is unique to the table. Hence, both patient and insurance_provider make the strong relation with the `patient_insurance_info`. This makes `patient_insurance_info`, a weak entity.

medical_record is linked to **patient** and **prescription** entity through **1 to zero or many** and **1:1** relation respectively. Each patient can have multiple medical records for the different kinds of treatments he takes for various procedures. Also, each doctor can be involved in many medical records for that patient. But, each medical record will be aligned with one patient and one doctor at that time.

employee entity is related to **employee_payroll** through **1 to zero or many** relation. An employee can have zero or many salary records but each salary record will be aligned with one particular employee.

appointment is related to **patient**, **doctor**, **frontline_workers** and **appointment_room**, **prescription** and **prescription** entities.

- **patient to appointment** is **1:M** as each patient can take multiple appointments but that particular appointment will be aligned with one patient
- **doctor to appointment** is **M:M** relation as each doctor can have either zero or multiple appointments and also each appointment can include multiple doctors to treat the patient.
- **frontline_workers** to appointment is **1:M** as each frontline_worker can schedule zero or multiple appointments but each appointment is scheduled by only one frontline_worker.
- **appointment_room to appointment** is **1:M** as each appointment room can be given for zero or multiple appointments and each appointment can occur in only one appointment room at that time.
- **prescription to appointment** is zero or one to many relation. An appointment can result in doctor giving either zero or one prescription and one prescription can be given for many appointments if it is a continued visit for the same procedure.

