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Project Topic

Number of topic: 4

Topic: Dentist - services, customers, visits, payments

Goal of Project

The goal of this project is to create a robust database system for a dental clinic that centralizes management of patient services, appointments, and financial transactions, with the intent to streamline clinic operations, improve patient service delivery, and facilitate easier access to and management of patient records.

Purpose

The purpose of this database is to provide a comprehensive platform that allows dental professionals to document, track, and manage patient interactions and clinic services effectively. It will enable the recording of detailed visit histories, treatment plans, and payment transactions. This system is designed to improve the quality of patient care by giving dentists and clinic staff easy access to patient histories and relevant medical information, thereby facilitating informed decision-making and efficient clinic management.

Assumptions and Limitations

Assumptions:

Uniform User Interface: The database is assumed to be used by various staff members (dentists, assistants, administrative staff) with a standard, user-friendly interface.

Data Entry and Accuracy: It is assumed that all users will enter data accurately and consistently.

Regular Updates: The database will require regular updates and maintenance to ensure accurate and up-to-date information.

Limitations:

Static Pricing: The database schema assumes that service prices are consistent across all clinics and do not change frequently.

Limited Customer Information: The system captures basic customer details but might not account for detailed medical history or specific preferences.

No Multiple Dentists per Appointment: Each appointment is linked to a single dentist; team consultations are not considered.

Single Clinic Focus: The system is tailored for a single clinic and may require significant modifications for multi-clinic usage.

Possible scenarios of database use

- Scheduling and managing patient appointments.
- Entering and updating patient records.
- Documenting treatments and procedures performed.
- Generating and processing billing and invoices.
- Managing insurance claims and payments.
- Tracking dental supplies and inventory.
- Producing financial and operational reports.
- Accessing patient medical histories in emergencies.
- Recording and tracking specialist referrals.
- Maintaining records of patient interactions and follow-ups.
- Managing staff schedules and assignments.
- Analyzing treatment trends and patient demographics.
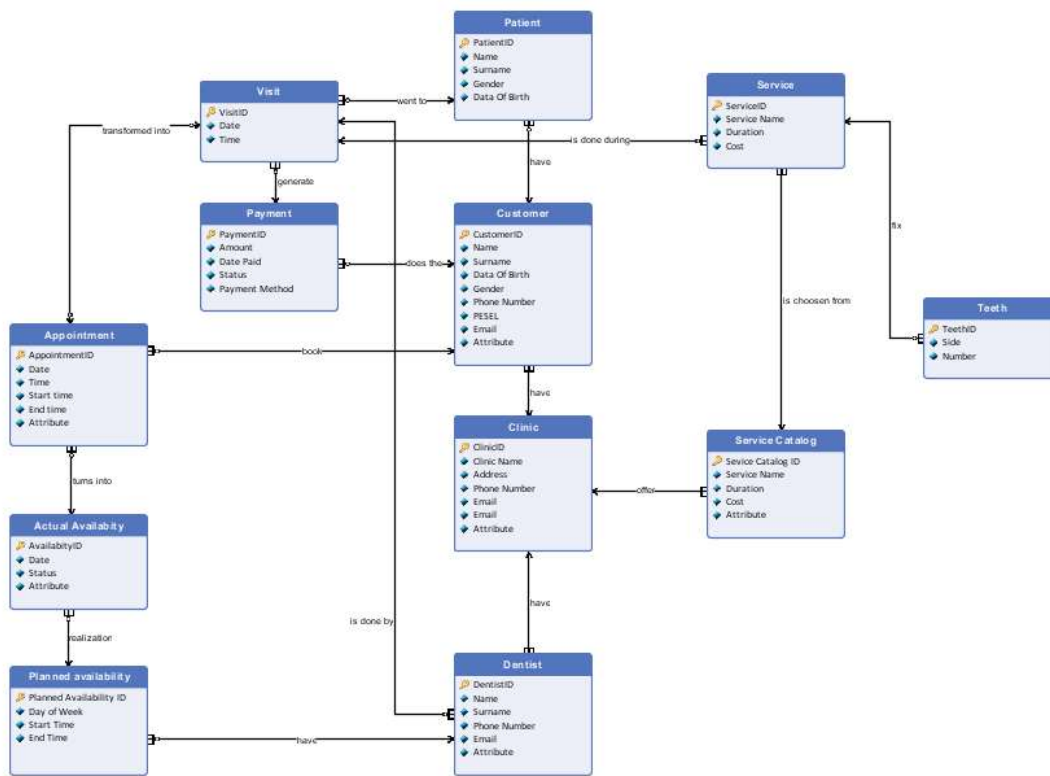
Description of ERD diagram

Dentist

Attribute	PrimaryKey	Domain/Data Type	Description
dentist_id	Yes	Natural number	Unique identifier of the dentist.
name	No	Text	First name of the dentist.
surname	No	Text	Last name of the dentist.
license_number	No	Text	Professional license number of the dentist.
specialization	No	Text	Field of dental medicine in which the dentist specializes.
phone_number	No	Text	Contact number of the dentist.

Appointment

Attribute	PrimaryKey	Domain/Data Type	Description
appointment_id	Yes	Natural number	Unique identifier for each appointment.
patient_id	No	Natural number	Identifier of the patient; foreign key from Patients entity.
dentist_id	No	Natural number	Identifier of the dentist; foreign key from Dentists entity.
date	No	Date	The date when the appointment is scheduled.
time	No	Time	The time when the appointment is scheduled.
status	No	Text	Status of the appointment (e.g., scheduled, completed, canceled).

Service

Attribute	PrimaryKey	Domain/Data Type	Description
appointment_id	Yes	Natural number	Unique identifier for each appointment.
patient_id	No	Natural number	Identifier of the patient; foreign key from Patients entity.
dentist_id	No	Natural number	Identifier of the dentist; foreign key from Dentists entity.
date	No	Date	The date when the appointment is scheduled.
time	No	Time	The time when the appointment is scheduled.

Payment

Attribute	PrimaryKey	Domain/Data Type	Description
payment_id	Yes	Natural number	Unique identifier for each payment.
appointment_id	No	Natural number	Identifier of the appointment; foreign key from Appointments entity.
amount	No	Decimal	Amount of payment received.
date	No	Date	The date when the payment was made.
method	No	Text	Payment method (e.g., cash, credit card, insurance).

Patient

Attribute	PrimaryKey	Domain/Data Type	Description
PatientID	Yes	Natural number	Unique identifier for each patient.
Name	No	Text	The patient's first name.

Surname	No	Text	The patient's surname.
Gender	No	Char	The patient's gender ('M' for male, 'F' for female).
Date of Birth	No	Date	The patient's date of birth.
PESEL	No	Text	The Polish national identification number.

Visit

Attribute	PrimaryKey	Domain/Data Type	Description
VisitID	Yes	Natural number	Unique identifier for each visit.
Date	No	Date	The date of the visit.
Time	No	Time	The time of the visit.

Clinic

Attribute	PrimaryKey	Domain/Data Type	Description
ClinicID	Yes	Natural number	Unique identifier for each clinic location.
Clinic Name	No	Text	The name of the clinic.
Address	No	Text	The physical address of the clinic.
Phone Number	No	Text	Contact phone number for the clinic.
Email	No	Text	Contact email address for the clinic.

Service Catalog

Attribute	PrimaryKey	Domain/Data Type	Description
ServiceCatalogID	Yes	Natural number	Unique identifier for each catalog entry.
Service Name	No	Text	Name of the service provided.
Duration	No	Time interval	Expected duration of the service.
Cost	No	Decimal	Cost of the service.

Teeth

Attribute	PrimaryKey	Domain/Data Type	Description
TeethID	Yes	Natural number	Unique identifier for each tooth record.
Side	No	Char	Side of the mouth where the tooth is located ('L' for left, 'R' for right).
Number	No	Integer	Number assigned to the tooth based on dental notation.

Actual Availability

Attribute	PrimaryKey	Domain/Data Type	Description
AvailabilityID	Yes	Natural number	Unique identifier for each availability slot.
Date	No	Date	Date of availability.
Status	No	Text	Status indicating whether the time slot is booked or free.

Planned Availability

Attribute	PrimaryKey	Domain/Data Type	Description
PlannedAvailabilityID	Yes	Natural number	Unique identifier for each planned availability entry.
Day of Week	No	Text	Day of the week for which the availability is planned.
Start Time	No	Time	Start time of the availability slot.
End Time	No	Time	End time of the availability slot.

Customer

Attribute	PrimaryKey	Domain/Data Type	Description
CustomerID	Yes	Natural number	Unique identifier for each customer.

Name	No	Text	The customer's first name.
Surname	No	Text	The customer's last name.
Date of Birth	No	Date	The customer's date of birth.
Gender	No	Char	The customer's gender ('M' for male, 'F' for female).
Phone Number	No	Text	Contact phone number for the customer.
Email	No	Text	Contact email address for the customer.
PESEL	No	Text	The Polish national identification number, if applicable.

Description of Relationships

Name	Entity Set 1	Entity Set 2	Cardinality	Description
books	Customer	Appointment	1:0..*	This relationship indicates that a customer can book zero or more appointments, but each appointment is booked by exactly one customer. It ensures that every appointment is linked to customer records.
transforms_into	Appointment	Visit	1:1	This relationship signifies that each appointment transforms into exactly one visit, capturing the

				transition from scheduled to actualized patient engagement.
generates	Visit	Payment	1:0..*	A visit may generate zero or more payments, accounting for cases where a single visit results in multiple payment transactions.
does_the	Customer	Payment	1:0..*	A customer may make several payments, reflecting the various transactions a customer has with the clinic, like paying in installments.
is_done_during	Service	Visit	1:0..*	Indicates that a service is done during a visit. A visit can include multiple services, reflecting the treatments a patient receives.
is_chosen_from	Service	Service Catalog	1:1	Each service is chosen from the service catalog, ensuring services offered are standardized according to the clinic's offerings.
has	Customer	Teeth	1:0..*	A customer has zero or more records associated with individual teeth, representing detailed dental records.

provides	Clinic	Service Catalog	1:1	A clinic provides services listed in a service catalog. This relationship indicates that there is one service catalog for the clinic.

Description of Entities

Patient: Stores personal information of individuals who have received treatment at the clinic, including name, gender, date of birth, and a unique identifier.

Customer: Represents the clinic's clientele who may book appointments, make payments, and receive services. It includes contact information and personal details like PESEL numbers.

Visit: Records each instance a patient comes to the clinic, capturing the date and time, and linking to the services provided during the visit.

Payment: Details financial transactions between the customer and the clinic, including the amount, date, and method of payment, and the status of each transaction.

Appointment: Manages the scheduling details for patients' visits to the clinic, including times, dates, and associated services.

Actual Availability: Reflects the real-time scheduling availability for appointments, indicating which time slots are available or booked on given dates.

Planned Availability: Represents the planned or expected availability of the clinic's resources, such as staff or equipment, at specific times.

Clinic: Contains information about the clinic itself, such as location details, contact information, and any additional attributes necessary for operations.

Service: Defines the various dental services offered by the clinic, specifying the nature, duration, and cost of each service.

Service Catalog: Serves as a repository of all services the clinic provides, allowing for consistent reference across appointments and treatments.

Dentist: Includes professional details of each dentist working at the clinic, such as name, phone number, email, and any specific attributes related to their practice.

Teeth: Holds records of dental information specific to each patient's individual teeth, which may include tooth numbers and sides of the mouth.

Customer (CustomerID, Name, Surname, PhoneNumber, Email, Address, Gender, Data Of Birth, PESEL, have REF Clinic)

Patient (PatientID, Name, Surname, DateOfBirth, Gender, is_a REF Customer)

Visit (VisitID, Date, Time, went_to REF Patient, generate REF Payment)

Payment (PaymentID, Amount, PaymentDate, PaymentMethod, Status, does the REF Customer)

Appointment (AppointmentID, Date, StartTime, EndTime, ReasonForVisit, is_booked_by REF Customer, is_during REF Actual Availability)

Actual Availability (AvailabilityID, DateTime, Status, realization_to REF Planned Availability)

Planned Availability (PlanAvailID, DayOfWeek, StartTime, EndTime, have REF Dentist)

Dentist (DentistID, Name, Surname, PhoneNumber, Email, PESEL, works_at REF Clinic)

Clinic (ClinicID, Name, Address, PhoneNumber, Email)

Service Catalog (ServCatalogID, ServiceName, Description, Duration, Cost, is_offered_by REF Clinic)

Service Done (ServiceID, Name, Description, Cost, Duration, is chosen from REF ServiceCatalog, is done during REF Visit)

Teeth (TeethID, ToothNumber, ToothSide, fix REF Patient)