

# AyurSutra Patient Management System - Data Dictionary

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## 1. ADMINISTRATORS

**Purpose:** Stores system administrator credentials and profiles for platform management.

Field Name	Data Type	Constraints	Description	Example
admin_id	UUID	PRIMARY KEY	Unique identifier for administrator	a1b2c3d4-e5f6-7890-abcd-ef1234567890
admin_email	VARCHAR(255)	UNIQUE, NOT NULL	Administrator login email address	<a href="mailto:admin@ayursutra.com">admin@ayursutra.com</a>
admin_password	VARCHAR(255)	NOT NULL	Hashed password (bcrypt/argon2)	2b\$12 hashed...
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Record creation timestamp	2025-01-15 10:30:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last modification timestamp	2025-09-30 14:20:00+05:30
is_active	BOOLEAN	DEFAULT TRUE	Account active status flag	true

#### Indexes:

- PRIMARY KEY on `admin_id`
  - UNIQUE INDEX on `admin_email`
- 

## 2. DOCTORS

**Purpose:** Stores doctor profiles, credentials, and professional information for practitioners.

Field Name	Data Type	Constraints	Description	Example
doctor_id	UUID	PRIMARY KEY	Unique identifier for doctor	d7e8f9a0-b1c2-3456-def0-123456789abc
doctor_email	VARCHAR(255)	UNIQUE, NOT NULL	Doctor login email	<a href="mailto:dr.sharma@ayursutra.com">dr.sharma@ayursutra.com</a>
doctor_password	VARCHAR(255)	NOT NULL	Hashed password	2b\$12 hashed...
first_name	VARCHAR(100)	NOT NULL	Doctor's first name	Rajesh
last_name	VARCHAR(100)	NOT NULL	Doctor's last name	Sharma
gender	ENUM	'Male', 'Female', 'Other'	Gender identity	Male
date_of_birth	DATE		Date of birth	1980-06-15
phone_number	VARCHAR(20)		Primary contact number	+91-9876543210
license_number	VARCHAR(50)	UNIQUE, NOT NULL	Medical council registration number	MH/12345/2005
specialization	VARCHAR(100)		Medical specialization	Panchakarma Specialist
qualification	VARCHAR(255)		Educational qualifications	BAMS, MD (Kayachikitsa)
experience_years	INTEGER		Years of practice experience	15
office_address	TEXT		Clinic/hospital address	123 Ayurveda Lane, Indore
city	VARCHAR(100)		City of practice	Indore
state	VARCHAR(100)		State	Madhya Pradesh
postal_code	VARCHAR(20)		PIN code	452001
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Registration timestamp	2025-01-10 09:00:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last profile update	2025-09-25 16:30:00+05:30
is_active	BOOLEAN	DEFAULT TRUE	Active practitioner status	true

Indexes:

- PRIMARY KEY on `doctor_id`
  - UNIQUE INDEX on `doctor_email`, `license_number`
  - INDEX on `specialization`, `city`
- 

### 3. PATIENTS

**Purpose:** Comprehensive patient demographics, medical history, and consent tracking.

Field Name	Data Type	Constraints	Description	Example
patient_id	UUID	PRIMARY KEY	Unique patient identifier	p9a8b7c6-d5e4-3210-fedc-ba9876543210
patient_email	VARCHAR(255)	UNIQUE	Patient portal login email	<a href="mailto:patient@email.com">patient@email.com</a>
patient_password	VARCHAR(255)	NULLABLE	Hashed password (nullable for no portal access)	2b\$12 hashed...
patient_phone_number	VARCHAR(20)	NOT NULL	Primary contact number (mandatory)	+91-9123456780
patient_aadhar_id	VARCHAR(16)	UNIQUE	Aadhaar number (12 digits)	1234-5678-9012
first_name	VARCHAR(100)	NOT NULL	Patient first name	Priya
last_name	VARCHAR(100)	NOT NULL	Patient last name	Patel
date_of_birth	DATE	NOT NULL	Date of birth	1995-03-20
gender	ENUM	NOT NULL	'Male', 'Female', 'Other'	Female
residential_address	TEXT		Full residential address	Flat 202, Green Avenue, Indore
city	VARCHAR(100)		City	Indore
state	VARCHAR(100)		State	Madhya Pradesh
postal_code	VARCHAR(20)		PIN code	452010
blood_group	ENUM		'A+', 'A-', 'B+', 'B-', 'AB+', 'AB-', 'O+', 'O-'	O+
known_allergies	TEXT[]		Array of known allergies	{Penicillin, Peanuts}
current_medications	TEXT[]		Current medication list	{Ashwagandha, Triphala}
emergency_contact_name	VARCHAR(200)		Emergency contact person	Amit Patel

Field Name	Data Type	Constraints	Description	Example
emergency_contact_phone	VARCHAR(20)		Emergency contact number	+91-9123456781
emergency_contact_relationship	VARCHAR(100)		Relationship to patient	Spouse
insurance_provider	VARCHAR(200)		Health insurance company	Star Health
insurance_policy_number	VARCHAR(100)		Policy number	SH/12345/2024
privacy_policy_accepted	BOOLEAN	DEFAULT FALSE	DPDP Act privacy consent	true
terms_of_service_accepted	BOOLEAN	DEFAULT FALSE	Terms acceptance	true
health_tips Consent	BOOLEAN	DEFAULT FALSE	Marketing communications consent	false
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Registration date	2025-02-01 11:00:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last profile update	2025-09-20 10:15:00+05:30
is_active	BOOLEAN	DEFAULT TRUE	Active patient status	true

#### Indexes:

- PRIMARY KEY on `patient_id`
- UNIQUE INDEX on `patient_email`, `patient_aadhar_id`
- INDEX on `patient_phone_number`, `first_name`, `last_name`

## 4. CLINICS

**Purpose:** Physical clinic/hospital location information for appointment scheduling.

Field Name	Data Type	Constraints	Description	Example
clinic_id	UUID	PRIMARY KEY	Unique clinic identifier	c1f2e3d4-a5b6-7890-cdef-123456789012
clinic_name	VARCHAR(100)	NOT NULL	Clinic/hospital name	AyurSutra Wellness Center
address	VARCHAR(255)		Full address	456 Health Street, Vijay Nagar
city	VARCHAR(50)		City	Indore
state	VARCHAR(50)		State	Madhya Pradesh
contact_number	VARCHAR(20)		Clinic contact number	+91-731-1234567
email	VARCHAR(100)		Clinic email	<a href="mailto:info@ayursutra.com">info@ayursutra.com</a>
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Registration timestamp	2025-01-05 08:00:00+05:30

#### Indexes:

- PRIMARY KEY on `clinic_id`
  - INDEX on `city`, `state`
- 

## 5. APPOINTMENTS

**Purpose:** Appointment scheduling and management between patients, doctors, and clinics.

Field Name	Data Type	Constraints	Description	Example
appointment_id	UUID	PRIMARY KEY	Unique appointment identifier	apt12345-6789-abcd-ef01-234567890abc
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS table	p9a8b7c6...
doctor_id	UUID	FOREIGN KEY, NOT NULL	Reference to DOCTORS table	d7e8f9a0...
clinic_id	UUID	FOREIGN KEY	Reference to CLINICS table	c1f2e3d4...
appointment_date	DATE	NOT NULL	Appointment date	2025-10-05
appointment_time	TIME	NOT NULL	Appointment time	10:30:00
duration_minutes	INTEGER	DEFAULT 30	Scheduled duration in minutes	45
status	ENUM	DEFAULT 'Scheduled'	'Scheduled', 'Completed', 'Cancelled', 'No-Show'	Scheduled
type	VARCHAR(20)		'In-person', 'E-visit', 'Follow-up'	In-person
reason_for_visit	TEXT		Chief complaint/reason	Panchakarma consultation
notes	TEXT		Additional notes	First visit, referred by Dr. Kumar
scheduled_by	UUID		ID of user who created appointment	d7e8f9a0...
scheduled_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Booking timestamp	2025-09-28 14:30:00+05:30
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Creation timestamp	2025-09-28 14:30:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last modification timestamp	2025-09-29 09:15:00+05:30

## Indexes:

- PRIMARY KEY on `appointment_id`
- FOREIGN KEY on `patient_id`, `doctor_id`, `clinic_id`
- INDEX on `appointment_date`, `status`

## 6. MEDICAL\_RECORDS

**Purpose:** Comprehensive medical visit documentation including vitals and clinical findings.

Field Name	Data Type	Constraints	Description	Example
record_id	UUID	PRIMARY KEY	Unique record identifier	rec98765-4321-dcba-0fed-cba987654321
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS	p9a8b7c6...
doctor_id	UUID	FOREIGN KEY, NOT NULL	Reference to DOCTORS	d7e8f9a0...
appointment_id	UUID	FOREIGN KEY	Related appointment	apt12345...
visit_date	DATE	NOT NULL	Date of medical visit	2025-10-05
chief_complaint	TEXT		Primary symptoms/complaints	Chronic digestive issues, fatigue
diagnosis	TEXT		Medical diagnosis	Vata-Pitta imbalance, Agni mandya
treatment_plan	TEXT		Prescribed treatment approach	Panchakarma therapy - 14 days
prescribed_medications	TEXT		Medications prescribed	Ashwagandha churna, Triphala
follow_up_instructions	TEXT		Post-visit instructions	Return after 2 weeks, avoid cold foods
temperature	DECIMAL(4,1)		Body temperature (°F)	98.6
blood_pressure_systolic	INTEGER		Systolic BP (mmHg)	120
blood_pressure_diastolic	INTEGER		Diastolic BP (mmHg)	80
heart_rate	INTEGER		Heart rate (bpm)	72
weight	DECIMAL(5,2)		Weight (kg)	65.50
height	DECIMAL(5,2)		Height (cm)	165.00
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Record creation	2025-10-05 11:00:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last update	2025-10-05 11:30:00+05:30

**Indexes:**

- PRIMARY KEY on `record_id`
  - FOREIGN KEY on `patient_id`, `doctor_id`, `appointment_id`
  - INDEX on `visit_date`, `patient_id`
- 

## 7. PRESCRIPTIONS

**Purpose:** Detailed medication orders and herbal formulations prescribed by doctors.

Field Name	Data Type	Constraints	Description	Example
prescription_id	UUID	PRIMARY KEY	Unique prescription identifier	prx55555-6666-7777-8888-999900001111
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS	p9a8b7c6...
doctor_id	UUID	FOREIGN KEY, NOT NULL	Prescribing doctor	d7e8f9a0...
appointment_id	UUID	FOREIGN KEY	Related appointment	apt12345...
medical_record_id	UUID	FOREIGN KEY	Related medical record	rec98765...
medication_name	VARCHAR(200)	NOT NULL	Medicine/herb name	Ashwagandha Churna
dosage	VARCHAR(100)	NOT NULL	Dosage amount	5 grams
frequency	VARCHAR(100)	NOT NULL	Administration frequency	Twice daily
duration	VARCHAR(100)		Treatment duration	30 days
instructions	TEXT		Special instructions	Take with warm milk before bed
prescribed_date	DATE	NOT NULL, DEFAULT CURRENT_DATE	Prescription date	2025-10-05
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Creation timestamp	2025-10-05 11:15:00+05:30

**Indexes:**

- PRIMARY KEY on `prescription_id`
  - FOREIGN KEY on `patient_id`, `doctor_id`, `medical_record_id`
  - INDEX on `prescribed_date`, `patient_id`
-

## 8. LAB\_TESTS

**Purpose:** Laboratory test orders, results, and clinical pathology data.

Field Name	Data Type	Constraints	Description	Example
test_id	UUID	PRIMARY KEY	Unique test identifier	lab11111-2222-3333-4444-555566667777
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS	p9a8b7c6...
doctor_id	UUID	FOREIGN KEY, NOT NULL	Ordering doctor	d7e8f9a0...
medical_record_id	UUID	FOREIGN KEY	Related medical record	rec98765...
test_name	VARCHAR(200)	NOT NULL	Name of test	Complete Blood Count (CBC)
test_type	VARCHAR(100)		Category of test	Hematology
ordered_date	DATE	NOT NULL, DEFAULT CURRENT_DATE	Test order date	2025-10-05
sample_collected_date	DATE		Sample collection date	2025-10-06
result_date	DATE		Result available date	2025-10-07
results	TEXT		Test results/findings	Hemoglobin: 12.5 g/dL, WBC: 7000
normal_range	VARCHAR(100)		Reference range	Hb: 12-15 g/dL, WBC: 4000-11000
is_abnormal	BOOLEAN	DEFAULT FALSE	Abnormal flag	false
lab_technician	VARCHAR(200)		Technician name	Suresh Kumar
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Record creation	2025-10-05 11:20:00+05:30

**Indexes:**

- PRIMARY KEY on `test_id`
- FOREIGN KEY on `patient_id`, `doctor_id`, `medical_record_id`
- INDEX on `ordered_date`, `patient_id`

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## 9. BILLING

**Purpose:** Financial transaction records, invoices, and payment tracking.

Field Name	Data Type	Constraints	Description	Example
bill_id	UUID	PRIMARY KEY	Unique billing identifier	bill9999-8888-7777-6666-555544443333
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS	p9a8b7c6...
doctor_id	UUID	FOREIGN KEY	Consulting doctor	d7e8f9a0...
appointment_id	UUID	FOREIGN KEY	Related appointment	apt12345...
bill_date	DATE	NOT NULL, DEFAULT CURRENT_DATE	Invoice date	2025-10-05
service_type	VARCHAR(50)		Type of service	Appointment, E-visit, Order
consultation_fee	DECIMAL(10,2)	DEFAULT 0	Doctor consultation charges	1000.00
lab_charges	DECIMAL(10,2)	DEFAULT 0	Laboratory test charges	500.00
medication_charges	DECIMAL(10,2)	DEFAULT 0	Medicine costs	750.00
other_charges	DECIMAL(10,2)	DEFAULT 0	Miscellaneous charges	100.00
total_amount	DECIMAL(10,2)	NOT NULL	Total bill amount	2350.00
paid_amount	DECIMAL(10,2)	DEFAULT 0	Amount paid	2350.00
payment_status	VARCHAR(50)	DEFAULT 'Pending'	'Paid', 'Pending', 'Failed', 'Refunded'	Paid
payment_method	VARCHAR(50)		Payment method	Credit Card
payment_mode	VARCHAR(20)		'UPI', 'Card', 'Netbanking', 'Cash'	UPI
payment_date	DATE		Payment completion date	2025-10-05
transaction_id	VARCHAR(100)		Payment gateway transaction ID	TXN20251005123456
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Record creation	2025-10-05 12:00:00+05:30

## Indexes:

- PRIMARY KEY on `bill_id`
  - FOREIGN KEY on `patient_id`, `doctor_id`, `appointment_id`
  - INDEX on `bill_date`, `payment_status`, `transaction_id`
- 

## 10. DOCTOR\_AVAILABILITY

Purpose: Doctor weekly schedule and availability for appointment booking.

Field Name	Data Type	Constraints	Description	Example
availability_id	UUID	PRIMARY KEY	Unique availability record	avl00001-1111-2222-3333-444455556666
doctor_id	UUID	FOREIGN KEY, NOT NULL	Reference to DOCTORS	d7e8f9a0...
day_of_week	INTEGER	NOT NULL, CHECK (0-6)	Day: 0=Sunday, 1=Monday...6=Saturday	1
start_time	TIME	NOT NULL	Availability start time	09:00:00
end_time	TIME	NOT NULL	Availability end time	17:00:00
is_available	BOOLEAN	DEFAULT TRUE	Active availability flag	true
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Record creation	2025-01-10 10:00:00+05:30

### Constraints:

- UNIQUE (doctor\_id, day\_of\_week, start\_time)

## Indexes:

- PRIMARY KEY on `availability_id`
  - FOREIGN KEY on `doctor_id`
  - UNIQUE INDEX on (doctor\_id, day\_of\_week, start\_time)
- 

## 11. AUDIT\_LOGS

Purpose: DPDP Act 2023 compliance - comprehensive activity tracking and audit trails.

Field Name	Data Type	Constraints	Description	Example
log_id	UUID	PRIMARY KEY	Unique log entry identifier	log77777-8888-9999-0000-111122223333
user_id	UUID		ID of user performing action	d7e8f9a0-...
user_role	ENUM		'admin', 'doctor', 'patient'	doctor
action	VARCHAR(100)	NOT NULL	Action performed	UPDATE_PATIENT_RECORD
table_name	VARCHAR(100)		Database table affected	medical_records
record_id	UUID		ID of affected record	rec98765-...
old_values	JSONB		Previous values (JSON format)	{"diagnosis": "old text"}
new_values	JSONB		Updated values (JSON format)	{"diagnosis": "new text"}
ip_address	INET		IP address of request	203.0.113.45
user_agent	TEXT		Browser/client information	Mozilla/5.0...
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Action timestamp	2025-10-05 11:30:00+05:30

## Indexes:

- PRIMARY KEY on `log_id`
- INDEX on `user_id`, `table_name`, `created_at`

## 12. DIET\_PLANS

Purpose: AI-generated Ayurvedic diet plans based on Prakriti (constitution) and patient needs.

Field Name	Data Type	Constraints	Description	Example
dietplan_id	UUID	PRIMARY KEY	Unique diet plan identifier	diet1111-2222-3333-4444-555566667777
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS	p9a8b7c6-...
doctor_id	UUID	FOREIGN KEY	Reviewing/approving doctor	d7e8f9a0-...
prakriti_type	VARCHAR(20)		'Vata', 'Pitta', 'Kapha', 'Vata-Pitta', etc.	Vata-Pitta
morning_meal	TEXT		Breakfast recommendations	Warm oatmeal with ghee, dates
afternoon_meal	TEXT		Lunch recommendations	Rice, dal, seasonal vegetables
dinner_meal	TEXT		Dinner recommendations	Light khichdi with cumin
created_by	VARCHAR(20)		'AI', 'Doctor'	AI
status	VARCHAR(20)		'Generated', 'Under Review', 'Approved'	Approved
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Creation timestamp	2025-10-05 12:30:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last update	2025-10-06 09:00:00+05:30

## Indexes:

- PRIMARY KEY on `dietplan_id`
- FOREIGN KEY on `patient_id`, `doctor_id`
- INDEX on `patient_id`, `status`

## 13. TREATMENT\_PLANS

Purpose: Panchakarma and therapeutic treatment plans for patients.

Field Name	Data Type	Constraints	Description	Example
treatment_id	UUID	PRIMARY KEY	Unique treatment plan identifier	trt22222-3333-4444-5555-666677778888
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS	p9a8b7c6-...
doctor_id	UUID	FOREIGN KEY, NOT NULL	Prescribing doctor	d7e8f9a0-...
diagnosis	TEXT		Health condition/diagnosis	Chronic arthritis, Vata imbalance
therapy	TEXT		Therapy recommendations	Abhyanga, Swedana, Basti
duration	VARCHAR(50)		Treatment duration	14 days
status	VARCHAR(20)		'Active', 'Completed', 'Discontinued'	Active
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Creation timestamp	2025-10-05 13:00:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last update	2025-10-05 13:00:00+05:30

### Indexes:

- PRIMARY KEY on `treatment_id`
  - FOREIGN KEY on `patient_id`, `doctor_id`
  - INDEX on `patient_id`, `status`
- 

## 14. HEALTH\_PLANS

Purpose: Long-term wellness and health management programs.

Field Name	Data Type	Constraints	Description	Example
plan_id	UUID	PRIMARY KEY	Unique health plan identifier	hlth3333-4444-5555-6666-777788889999
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS	p9a8b7c6...
doctor_id	UUID	FOREIGN KEY, NOT NULL	Assigned doctor	d7e8f9a0...
plan_name	VARCHAR(100)		Plan name	Complete Panchakarma Package
duration	VARCHAR(50)		Program duration	3 months
description	TEXT		Detailed plan description	Comprehensive detox and rejuvenation
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Creation timestamp	2025-10-01 10:00:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last update	2025-10-01 10:00:00+05:30

#### Indexes:

- PRIMARY KEY on `plan_id`
  - FOREIGN KEY on `patient_id`, `doctor_id`
- 

## 15. E\_VISITS

Purpose: Telemedicine/video consultation scheduling and management.

Field Name	Data Type	Constraints	Description	Example
evisit_id	UUID	PRIMARY KEY	Unique e-visit identifier	evst4444-5555-6666-7777-888899990000
patient_id	UUID	FOREIGN KEY, NOT NULL	Reference to PATIENTS	p9a8b7c6....
doctor_id	UUID	FOREIGN KEY, NOT NULL	Consulting doctor	d7e8f9a0-...
scheduled_time	DATETIME	NOT NULL	Appointment date & time	2025-10-10 15:00:00+05:30
status	VARCHAR(20)		'Pending', 'Approved', 'Completed', 'Cancelled'	Approved
payment_flag	BOOLEAN	DEFAULT FALSE	Payment completion status	true
notes	TEXT		Consultation notes	Follow-up for previous treatment
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Creation timestamp	2025-10-05 14:00:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last update	2025-10-06 10:00:00+05:30

## Indexes:

- PRIMARY KEY on `evisit_id`
- FOREIGN KEY on `patient_id`, `doctor_id`
- INDEX on `scheduled_time`, `status`

## 16. ORDERS

Purpose: Medicine and herbal product order management.

Field Name	Data Type	Constraints	Description	Example
order_id	UUID	PRIMARY KEY	Unique order identifier	ord55555-6666-7777-8888-999900001111
patient_id	UUID	FOREIGN KEY, NOT NULL	Patient placing order	p9a8b7c6...
prescription_id	UUID	FOREIGN KEY	Related prescription (if applicable)	prx55555-...
product_name	VARCHAR(100)	NOT NULL	Medicine/herb product name	Ashwagandha Capsules 500mg
quantity	INTEGER	NOT NULL	Quantity ordered	60
price	DECIMAL(10,2)	NOT NULL	Price per unit	12.50
total_amount	DECIMAL(10,2)	NOT NULL	Final order total	750.00
status	VARCHAR(20)	DEFAULT 'Pending'	'Pending', 'Confirmed', 'Shipped', 'Delivered'	Shipped
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Order placement timestamp	2025-10-05 15:00:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last status update	2025-10-07 10:00:00+05:30

## Indexes:

- PRIMARY KEY on `order_id`
  - FOREIGN KEY on `patient_id`, `prescription_id`
  - INDEX on `patient_id`, `status`, `created_at`
- 

## 17. AI\_CHATBOT

**Purpose:** Patient support chatbot interactions and conversation history.

Field Name	Data Type	Constraints	Description	Example
chat_id	UUID	PRIMARY KEY	Unique chat message identifier	chat6666-7777-8888-9999-000011112222
patient_id	UUID	FOREIGN KEY, NOT NULL	Patient user	p9a8b7c6...
query_text	TEXT	NOT NULL	Patient question/query	What diet should I follow for Vata?
response_text	TEXT	NOT NULL	AI/doctor response	For Vata dosha, warm, nourishing...
response_type	VARCHAR(20)		'AI-generated', 'Doctor-reviewed'	AI-generated
timestamp	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Message timestamp	2025-10-05 16:00:00+05:30

### Indexes:

- PRIMARY KEY on `chat_id`
  - FOREIGN KEY on `patient_id`
  - INDEX on `patient_id`, `timestamp`
- 

## 18. REQUESTS

**Purpose:** Patient service requests for prescriptions, consultations, and reviews.

Field Name	Data Type	Constraints	Description	Example
request_id	UUID	PRIMARY KEY	Unique request identifier	req77777-8888-9999-0000-111122223333
patient_id	UUID	FOREIGN KEY, NOT NULL	Requesting patient	p9a8b7c6...
doctor_id	UUID	FOREIGN KEY	Assigned doctor	d7e8f9a0...
type	VARCHAR(50)	NOT NULL	'E-visit', 'Prescription refill', 'Diet review'	Prescription refill
status	VARCHAR(20)	DEFAULT 'Pending'	'Pending', 'Approved', 'Rejected', 'Completed'	Pending
details	TEXT		Additional request details	Need refill for Ashwagandha
created_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Request submission time	2025-10-05 17:00:00+05:30
updated_at	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Last status update	2025-10-06 09:30:00+05:30

## Indexes:

- PRIMARY KEY on `request_id`
  - FOREIGN KEY on `patient_id`, `doctor_id`
  - INDEX on `patient_id`, `status`, `type`
- 

## Data Type Definitions

### ENUM Types

#### `user_role`

- `admin` - System administrator
- `doctor` - Medical practitioner
- `patient` - Healthcare consumer

#### `gender_type`

- `Male` - Male gender
- `Female` - Female gender
- `Other` - Non-binary/other gender identity

#### `appointment_status`

- `Scheduled` - Appointment confirmed
- `Completed` - Patient visited
- `Cancelled` - Appointment cancelled
- `No-Show` - Patient didn't attend

### `blood_group_type`

- `A+`, `A-` - Blood type A positive/negative
  - `B+`, `B-` - Blood type B positive/negative
  - `AB+`, `AB-` - Blood type AB positive/negative
  - `O+`, `O-` - Blood type O positive/negative
- 

## Business Rules & Constraints

### 1. Authentication & Authorization

- All passwords must be hashed using bcrypt (cost factor  $\geq 12$ ) or Argon2
- Minimum password length: 8 characters
- Session tokens expire after 24 hours
- MFA required for admin accounts

### 2. Patient Data Privacy (DPDP Act 2023)

- `privacy_policy_accepted` must be TRUE before data collection
- `terms_of_service_accepted` must be TRUE before service access
- Aadhaar data encrypted at rest with AES-256
- PII fields logged in `audit_logs` on every access
- Data retention: 7 years from last interaction
- Right to erasure: soft delete with `is_active = FALSE`

### 3. Appointment Rules

- Cannot schedule appointments in the past
- Maximum appointments per patient per day: 3
- Minimum gap between appointments: 15 minutes
- Cancellation allowed up to 2 hours before appointment
- No-show marked if patient doesn't arrive within 15 minutes

## 4. Medical Records

- Only assigned doctor can create/edit records
- Records immutable after 24 hours (requires admin approval for changes)
- All changes logged in `audit_logs`
- Minimum required fields: `visit_date`, `chief_complaint`, `diagnosis`

## 5. Prescriptions

- Must be linked to valid `medical_record_id`
- Duration mandatory for controlled substances
- Electronic signature required (digital certificate)
- Valid for 30 days from `prescribed_date`

## 6. Billing

- `total_amount` = `consultation_fee` + `lab_charges` + `medication_charges` + `other_charges`
- Payment due within 7 days for non-emergency services
- Refund window: 48 hours for cancelled appointments
- Transaction audit trail mandatory for tax compliance

## 7. Diet Plans (RAG/AI Generated)

- All AI-generated plans require doctor approval
- Status must transition: Generated → Under Review → Approved
- Versioning required for plan modifications
- Source attribution stored for RAG retrieval citations

## 8. E-Visits

- Payment must be completed before appointment (`payment_flag` = TRUE)
- WebRTC room created 10 minutes before `scheduled_time`
- Session recordings stored for 90 days (consent required)
- Maximum duration: 60 minutes

## 9. Data Synchronization (Offline-First)

- Client timestamp always includes timezone
- Conflict resolution: server wins for medical data
- Delta sync using `updated_at` timestamp
- Maximum offline period: 7 days

## 10. Audit Logging

- Log all CREATE, UPDATE, DELETE operations
  - Retention period: 7 years minimum
  - IP address anonymization after 90 days (GDPR-style)
  - Encrypted storage for sensitive operations
- 

## Indexes Summary

### Performance Optimization Indexes

#### High-Priority Indexes (Query Performance)

```
sql

-- Patient lookup
CREATE INDEX idx_patients_phone ON patients(patient_phone_number);
CREATE INDEX idx_patients_aadhar ON patients(patient_aadhar_id);
CREATE INDEX idx_patients_fullname ON patients(first_name, last_name);

-- Appointment scheduling
CREATE INDEX idx_appointments_doctor_date ON appointments(doctor_id, appointment_date);
CREATE INDEX idx_appointments_patient_status ON appointments(patient_id, status);

-- Medical records timeline
CREATE INDEX idx_medical_records_patient_date ON medical_records(patient_id, visit_date DESC);

-- Billing queries
CREATE INDEX idx_billing_patient_date ON billing(patient_id, bill_date DESC);
CREATE INDEX idx_billing_unpaid ON billing(payment_status) WHERE payment_status = 'Pending';

-- Audit compliance
CREATE INDEX idx_audit_logs_user_time ON audit_logs(user_id, created_at DESC);
CREATE INDEX idx_audit_logs_table_record ON audit_logs(table_name, record_id);
```

### Composite Indexes

```
sql
```

```
-- Doctor availability lookup
CREATE INDEX idx_doctor_avail_schedule ON doctor_availability(doctor_id, day_of_week, is_available);

-- Prescription tracking
CREATE INDEX idx_prescriptions_patient_date ON prescriptions(patient_id, prescribed_date DESC);

-- Order fulfillment
CREATE INDEX idx_orders_status_created ON orders(status, created_at) WHERE status != 'Delivered';
```

## Views (Read-Optimized Queries)

### 1. patient\_summary

**Purpose:** Quick patient overview with appointment and record counts

```
sql
SELECT patient_id, full_name, contact_info,
       total_appointments, total_records, last_visit_date
```

### 2. doctor\_schedule

**Purpose:** Weekly availability matrix for appointment booking

```
sql
SELECT doctor_id, doctor_name, specialization,
       day_of_week, availability_hours
```

### 3. upcoming\_appointments

**Purpose:** Today's and future appointments dashboard

```
sql
SELECT appointment_id, patient_name, doctor_name,
       clinic_name, appointment_datetime, status
WHERE appointment_date >= CURRENT_DATE
```

### 4. pending\_bills

**Purpose:** Outstanding payments report

```
sql
```

```
SELECT bill_id, patient_name, total_amount,  
       days_overdue, contact_number  
WHERE payment_status = 'Pending'
```

## 5. active\_treatments

**Purpose:** Ongoing treatment plans monitoring

sql

```
SELECT treatment_id, patient_name, doctor_name,  
       therapy, days_remaining, progress_status  
WHERE status = 'Active'
```

## Triggers & Automation

### Auto-Update Triggers

- `update_updated_at_column()` - Updates `updated_at` on row modification
- Applied to: administrators, doctors, patients, appointments, medical\_records

### Audit Triggers

- `log_patient_data_access()` - Logs all patient PII access
- `log_medical_record_changes()` - Captures before/after values
- `log_prescription_creation()` - Tracks prescription issuance

### Business Logic Triggers

- `validate_appointment_time()` - Prevents overlapping appointments
- `calculate_bill_total()` - Auto-computes total\_amount
- `update_appointment_status()` - Auto-marks No-Show after 15 min

## Backup & Recovery Strategy

### Backup Schedule

- **Full Backup:** Daily at 02:00 IST
- **Incremental:** Every 6 hours
- **Transaction Logs:** Continuous (Point-in-Time Recovery)
- **Retention:** 30 days rolling, 12 months yearly snapshots

## Data Residency

- Primary Region: ap-south-1 (Mumbai)
- Backup Region: ap-south-2 (Hyderabad)
- Cross-region replication lag: < 5 seconds

## Disaster Recovery

- RTO (Recovery Time Objective): 4 hours
  - RPO (Recovery Point Objective): 15 minutes
  - Automated failover for critical services
- 

## Security & Encryption

### Data Encryption

- **At Rest:** AES-256 encryption (AWS RDS encryption)
- **In Transit:** TLS 1.3 (minimum TLS 1.2)
- **Application Level:**
  - Passwords: bcrypt (cost 12)
  - Aadhaar: AES-256-GCM with key rotation
  - Medical records: Field-level encryption

### Access Control

- **Row-Level Security (RLS):** Enabled for multi-tenant isolation
- **Role-Based Access:**
  - Admin: Full access
  - Doctor: Own patients + assigned clinics
  - Patient: Own records only

### Compliance Certifications

- ISO 27001 (Information Security)
  - HIPAA equivalent (for international patients)
  - DPDP Act 2023 (India)
  - SOC 2 Type II
-

# Performance Benchmarks

## Expected Query Performance

- Patient lookup by ID/phone: < 10ms
- Appointment search (date range): < 50ms
- Medical record retrieval: < 100ms
- Diet plan generation (RAG): < 3s
- Dashboard load (aggregations): < 200ms

## Scalability Targets

- Concurrent users: 10,000+
  - Database size: 500GB+ (5 years data)
  - Transactions per second: 1000+ (peak)
  - API response time (p95): < 500ms
- 

## Migration & Versioning

### Schema Version Control

- Use migration tools: Flyway or Liquibase
- Version format: YYYYMMDD\_description.sql
- Rollback scripts mandatory for production changes

### Data Migration Strategy

- **Phase 1:** Core entities (patients, doctors, appointments)
  - **Phase 2:** Medical records, prescriptions
  - **Phase 3:** AI features (diet plans, chatbot)
  - **Phase 4:** Analytics and reporting
- 

## Monitoring & Alerts

### Database Metrics

- Connection pool utilization
- Slow query log (> 1 second)
- Deadlock detection
- Replication lag

- Storage capacity (alert at 80%)

## Application Metrics

- Failed authentication attempts
  - API error rates
  - Appointment booking success rate
  - E-visit connection quality
  - RAG retrieval accuracy
- 

## Integration Points

### External Systems

- **ABHA (Ayushman Bharat Health Account)**: Patient identity verification
- **Payment Gateways**: Razorpay, Paytm, UPI
- **SMS/Email**: Twilio, AWS SES/SNS for notifications
- **FHIR Server**: HL7 FHIR R4 for EHR interoperability
- **Video Platform**: LiveKit/Daily.co for WebRTC

### API Endpoints (Summary)

- RESTful API: `/api/v1/*`
  - GraphQL: `/graphql` (queries, mutations, subscriptions)
  - WebSocket: `/ws` (real-time notifications)
  - FHIR: `/fhir/*` (standardized healthcare data exchange)
- 

## Glossary

### Ayurvedic Terms:

- **Prakriti**: Constitutional type (Vata, Pitta, Kapha)
- **Agni**: Digestive fire/metabolism
- **Dosha**: Biological energies governing body functions
- **Panchakarma**: Five cleansing/detoxification therapies
- **Rasayana**: Rejuvenation therapy

### Technical Terms:

- **RAG**: Retrieval-Augmented Generation (AI technique)

- **DPDP:** Digital Personal Data Protection Act
  - **FHIR:** Fast Healthcare Interoperability Resources
  - **ABHA:** Ayushman Bharat Health Account
  - **WebRTC:** Web Real-Time Communication
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