**Job Portal Technical Architecture**

**Complete System Design Document for Unskilled Workers Platform in India**

**Version:** 1.0  
**Date:** December 2024  
**Project:** Job Portal for Unskilled Workers  
**Target Market:** India  
**Document Type:** Complete Technical Design Document

**📋 Table of Contents**

1. [Executive Summary](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#1-executive-summary)
2. [System Architecture Overview](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#2-system-architecture-overview)
3. [Technology Stack](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#3-technology-stack)
4. [Database Design](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#4-database-design)
5. [API Architecture](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#5-api-architecture)
6. [Mobile Application Architecture](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#6-mobile-application-architecture)
7. [Backend Services](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#7-backend-services)
8. [Third-Party Integrations](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#8-third-party-integrations)
9. [Security Architecture](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#9-security-architecture)
10. [Scalability & Performance](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#10-scalability--performance)
11. [Deployment Architecture](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#11-deployment-architecture)
12. [Monitoring & Analytics](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#12-monitoring--analytics)
13. [Implementation Roadmap](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#13-implementation-roadmap)
14. [Cost Estimation](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#14-cost-estimation)
15. [Risk Assessment](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#15-risk-assessment)
16. [Success Metrics & KPIs](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#16-success-metrics--kpis)
17. [Conclusion & Next Steps](https://claude.ai/chat/64a5adae-d41a-4c60-8c88-42a37ea1ab4b#17-conclusion--next-steps)

**1. Executive Summary**

**1.1 Project Overview**

The Job Portal is a comprehensive mobile-first platform designed specifically for unskilled workers in India. The system connects job seekers with employers while addressing unique challenges such as low digital literacy, limited smartphone capabilities, language barriers, and regional diversity.

**1.2 Key Technical Requirements**

* **Mobile-First Design:** Optimized for Android devices with 2-4GB RAM
* **Multi-Language Support:** Hindi, English, and 10+ regional languages
* **Offline Capability:** Core functions work without internet connectivity
* **Low Bandwidth Optimization:** Minimal data usage for 2G/3G networks
* **Voice Integration:** Speech-to-text and text-to-speech capabilities
* **Scalability:** Support for 1M+ users across multiple cities
* **Security:** End-to-end encryption and compliance with Indian data protection laws

**1.3 Target Performance Metrics**

* **Response Time:** <2 seconds for core operations
* **Uptime:** 99.9% availability
* **Concurrent Users:** 50,000+ simultaneous users
* **Data Usage:** <10MB per user per month
* **Battery Optimization:** <5% battery drain per hour of usage
* **Load Capacity:** 10,000+ requests per second

**1.4 Business Objectives**

* **Year 1:** 100,000 active users, 5,000 job placements/month
* **Year 2:** 500,000 active users, 25,000 job placements/month
* **Revenue Model:** 5-10% commission on successful job placements
* **Break-even:** Month 18 with 5,000 monthly placements

**2. System Architecture Overview**

**2.1 High-Level Architecture**

┌─────────────────────────────────────────────────────────────────┐

│ CLIENT TIER │

├─────────────────┬─────────────────┬─────────────────────────────┤

│ Mobile Apps │ Web Portal │ Admin Panel │

│ (Android/iOS) │ (Employers) │ (Internal) │

│ │ │ │

│ - Job Seekers │ - Job Posting │ - User Management │

│ - Voice UI │ - Applications │ - Analytics │

│ - Offline Mode │ - Analytics │ - Content Moderation │

└─────────┬───────┴─────────┬───────┴─────────────┬───────────────┘

│ │ │

└─────────────────┼─────────────────────┘

│

┌─────────────────────────────────────────────────────────────────┐

│ API GATEWAY TIER │

├─────────────────────────────────────────────────────────────────┤

│ - Load Balancing - Rate Limiting │

│ - Authentication - Request Routing │

│ - API Versioning - Response Caching │

│ - SSL Termination - Request Logging │

└─────────────────────────┬───────────────────────────────────────┘

│

┌─────────────────────────────────────────────────────────────────┐

│ MICROSERVICES TIER │

├──────────────┬──────────────┬──────────────┬───────────────────┤

│ Auth Service │ Job Service │ User Service │ Notification Svc │

│ │ │ │ │

│- OTP Login │- Job CRUD │- Profiles │- Push/SMS │

│- JWT Tokens │- Search │- Skills │- Email │

│- Sessions │- Matching │- Documents │- In-App │

│- Refresh │- Analytics │- Verification│- Voice Messages │

├──────────────┼──────────────┼──────────────┼───────────────────┤

│Payment Svc │Message Svc │Location Svc │ File Service │

│ │ │ │ │

│- Razorpay │- Chat │- GPS/Maps │- Upload/Download │

│- UPI │- Voice Msgs │- Geocoding │- Image Processing │

│- Escrow │- Push Notif │- Distance │- Document OCR │

│- Commission │- SMS Backup │- Radius │- CDN Integration │

└──────────────┴──────────────┴──────────────┴───────────────────┘

│

┌─────────────────────────────────────────────────────────────────┐

│ DATA TIER │

├─────────────────┬─────────────────┬─────────────────────────────┤

│ PostgreSQL │ MongoDB │ Redis │

│ │ │ │

│- User Data │- Documents │- Sessions │

│- Job Posts │- Analytics │- Cache │

│- Applications │- Logs │- Queues │

│- Transactions │- Files Metadata │- Real-time Data │

├─────────────────┼─────────────────┼─────────────────────────────┤

│ Elasticsearch │ File Storage │ Message Queue │

│ │ │ │

│- Job Search │- AWS S3 │- Bull Queue │

│- User Search │- Images │- Job Processing │

│- Analytics │- Documents │- Email Queue │

│- Logging │- Voice Files │- Notification Queue │

└─────────────────┴─────────────────┴─────────────────────────────┘

**2.2 Architecture Principles**

**2.2.1 Microservices Architecture**

* **Service Independence:** Each service can be developed, deployed, and scaled independently
* **Domain-Driven Design:** Services organized around business capabilities
* **Fault Isolation:** Failure in one service doesn't bring down the entire system
* **Technology Diversity:** Different services can use different technologies as needed
* **Team Autonomy:** Small teams can own entire service lifecycles

**2.2.2 API-First Design**

* **Contract-First Development:** APIs defined before implementation
* **Comprehensive Documentation:** Swagger/OpenAPI specifications for all endpoints
* **Versioning Strategy:** Backward compatibility with version management
* **Consistent Standards:** Uniform naming conventions and response formats
* **Rate Limiting:** Protection against abuse and ensuring fair usage

**2.2.3 Mobile-First Approach**

* **Progressive Web App (PWA):** Web app with native-like capabilities
* **Offline-First:** Core functionality available without internet
* **Performance Optimization:** Minimal bundle sizes and lazy loading
* **Device Compatibility:** Support for low-end Android devices
* **Battery Efficiency:** Optimized background processes

**2.2.4 Data-Driven Architecture**

* **Real-time Analytics:** Immediate insights into user behavior
* **Machine Learning Integration:** AI-powered job matching and recommendations
* **Performance Monitoring:** Continuous optimization based on usage patterns
* **Business Intelligence:** Comprehensive reporting and dashboards
* **A/B Testing:** Data-driven feature development and optimization

**3. Technology Stack**

**3.1 Frontend Technologies**

**3.1.1 Mobile Application (React Native)**

**Core Framework:**

* React Native: 0.72+
* TypeScript: 5.0+
* Metro Bundler: Latest

**State Management:**

* Redux Toolkit: 1.9+
* RTK Query: Data fetching and caching
* React Redux: 8.0+
* Redux Persist: State persistence

**Navigation:**

* React Navigation: 6.x
* Stack Navigator: Screen transitions
* Tab Navigator: Bottom tabs
* Drawer Navigator: Side menu

**UI Components:**

* NativeBase: 3.4+
* React Native Elements: Fallback
* React Native Vector Icons: 10+
* React Native Gesture Handler: 2.12+

**Device Features:**

* React Native Maps: Location services
* React Native Voice: Speech recognition
* React Native TTS: Text-to-speech
* React Native Camera: Photo capture
* React Native Audio: Voice recording
* React Native Geolocation: GPS access

**Offline & Storage:**

* SQLite: Local database
* WatermelonDB: Reactive local database
* React Native Async Storage: Key-value storage
* MMKV: Fast key-value storage
* React Native FS: File system access

**Push Notifications:**

* Firebase Cloud Messaging: Cross-platform
* React Native Notifications: Local notifications
* React Native Push Notification: iOS support

**Development Tools:**

* Flipper: Debugging
* Reactotron: Development tool
* CodePush: Over-the-air updates
* Sentry: Error tracking
* Jest: Unit testing
* Detox: E2E testing

**3.1.2 Web Portal (Employer Dashboard)**

**Core Framework:**

* Next.js: 13+ with App Router
* TypeScript: 5.0+
* React: 18+

**Styling:**

* Tailwind CSS: 3.3+
* Headless UI: Unstyled components
* Heroicons: Icon library
* Framer Motion: Animations

**State Management:**

* Zustand: Lightweight state management
* TanStack Query: Server state management
* SWR: Data fetching (alternative)

**Authentication:**

* NextAuth.js: Authentication library
* JWT: Token handling
* OAuth providers: Google, LinkedIn

**Data Visualization:**

* Chart.js: Charts and graphs
* D3.js: Custom visualizations
* Recharts: React charts

**Forms & Validation:**

* React Hook Form: Form handling
* Zod: Schema validation
* Yup: Alternative validation

**Development Tools:**

* ESLint: Code linting
* Prettier: Code formatting
* Jest: Unit testing
* Cypress: E2E testing
* Storybook: Component documentation

**3.1.3 Admin Dashboard**

**Core Framework:**

* React: 18+
* TypeScript: 5.0+
* Vite: Build tool

**UI Library:**

* Ant Design: 5.0+
* Material-UI: Alternative
* Styled Components: CSS-in-JS

**State Management:**

* Redux Toolkit: Complex state
* React Query: Server state

**Data Visualization:**

* D3.js: Advanced visualizations
* Recharts: React charts
* Victory: Alternative charts
* MapBox: Geographic data

**Advanced Features:**

* React Virtual: Large lists
* React DnD: Drag and drop
* React Helmet: SEO
* React Router: Client-side routing

**3.2 Backend Technologies**

**3.2.1 Core API Services**

**Runtime Environment:**

* Node.js: 18 LTS
* npm: 9+
* TypeScript: 5.0+

**Web Framework:**

* Express.js: 4.18+
* Helmet: Security middleware
* CORS: Cross-origin requests
* Compression: Response compression

**Authentication:**

* Passport.js: Authentication middleware
* JWT: JSON Web Tokens
* bcrypt: Password hashing
* speakeasy: Two-factor authentication

**API Documentation:**

* Swagger: API documentation
* OpenAPI: 3.0 specification
* Redoc: Alternative documentation

**Validation & Sanitization:**

* Joi: Schema validation
* express-validator: Request validation
* DOMPurify: XSS protection
* Helmet: Security headers

**File Handling:**

* Multer: File upload middleware
* Sharp: Image processing
* pdf-parse: PDF text extraction
* archiver: File compression

**Background Jobs:**

* Bull Queue: Job processing
* Redis: Queue backend
* Cron: Scheduled tasks
* node-schedule: Job scheduling

**Testing:**

* Jest: Testing framework
* Supertest: API testing
* MongoDB Memory Server: Test database
* Factory Girl: Test data generation

**3.2.2 Database Systems**

**Primary Database:**

* PostgreSQL: 15+
* PostGIS: Geographic data
* pg: Node.js driver
* Sequelize: ORM (alternative)
* TypeORM: TypeScript ORM

**Document Database:**

* MongoDB: 6.x
* Mongoose: ODM
* MongoDB Compass: GUI tool

**Cache & Session Store:**

* Redis: 7.x
* ioredis: Node.js client
* Redis Sentinel: High availability
* Redis Cluster: Horizontal scaling

**Search Engine:**

* Elasticsearch: 8.x
* Kibana: Visualization
* Logstash: Data pipeline
* APM: Application monitoring

**Time Series Database:**

* InfluxDB: Metrics storage
* Grafana: Visualization
* Telegraf: Data collection

**3.2.3 Additional Backend Services**

**Email Services:**

* SendGrid: Transactional emails
* Amazon SES: Alternative
* Nodemailer: SMTP client
* Email Templates: Handlebars

**SMS Services:**

* Twilio: International SMS
* MSG91: India-focused SMS
* AWS SNS: Alternative
* Bulk SMS: Mass messaging

**Push Notifications:**

* Firebase Admin SDK: FCM server
* Apple Push Notifications: iOS
* Web Push: Browser notifications

**Payment Processing:**

* Razorpay: Indian payment gateway
* Stripe: International payments
* PayPal: Alternative
* UPI: Direct bank transfers

**File Storage:**

* AWS S3: Object storage
* Google Cloud Storage: Alternative
* Cloudinary: Image optimization
* ImageKit: Image CDN

**PDF Generation:**

* Puppeteer: PDF from HTML
* jsPDF: Client-side PDF
* PDFKit: Server-side PDF

**Media Processing:**

* FFmpeg: Video/audio processing
* ImageMagick: Image manipulation
* GraphicsMagick: Alternative

**3.3 DevOps & Infrastructure**

**3.3.1 Containerization & Orchestration**

**Containerization:**

* Docker: 24+
* Docker Compose: Multi-container apps
* Dockerfile: Container definitions
* .dockerignore: Optimization

**Container Orchestration:**

* Kubernetes: 1.28+
* Helm: Package manager
* Ingress Controller: Traffic routing
* Cert Manager: SSL certificates

**Container Registry:**

* Docker Hub: Public images
* AWS ECR: Private registry
* GitHub Container Registry: CI/CD integration

**3.3.2 CI/CD Pipeline**

**Version Control:**

* Git: Source control
* GitHub: Repository hosting
* GitLab: Alternative platform
* Bitbucket: Atlassian integration

**CI/CD Platforms:**

* GitHub Actions: Integrated CI/CD
* GitLab CI: Alternative
* Jenkins: Self-hosted
* CircleCI: Cloud-based

**Continuous Integration:**

* Automated testing: Unit, integration, e2e
* Code quality: ESLint, SonarQube
* Security scanning: Snyk, OWASP
* Dependency checking: npm audit

**Continuous Deployment:**

* Blue-green deployment: Zero downtime
* Rolling updates: Gradual rollout
* Canary releases: Risk mitigation
* Feature flags: Controlled rollout

**3.3.3 Infrastructure as Code**

**Infrastructure Provisioning:**

* Terraform: 1.5+
* AWS CloudFormation: AWS native
* Pulumi: Multi-cloud
* Ansible: Configuration management

**Configuration Management:**

* Kubernetes ConfigMaps: Application config
* Kubernetes Secrets: Sensitive data
* Vault: Secret management
* AWS Systems Manager: Parameter store

**Environment Management:**

* Development: Local and cloud
* Staging: Production-like testing
* Production: Live environment
* DR: Disaster recovery

**3.3.4 Monitoring & Observability**

**Application Monitoring:**

* Prometheus: Metrics collection
* Grafana: Visualization
* AlertManager: Alert routing
* Jaeger: Distributed tracing

**Log Management:**

* ELK Stack: Elasticsearch, Logstash, Kibana
* Fluentd: Log forwarding
* CloudWatch: AWS logging
* Papertrail: Log aggregation

**Error Tracking:**

* Sentry: Error monitoring
* Bugsnag: Alternative
* Rollbar: Error reporting
* LogRocket: Session replay

**Performance Monitoring:**

* New Relic: APM
* DataDog: Infrastructure monitoring
* Dynatrace: Full-stack monitoring
* Pingdom: Uptime monitoring

**Security Monitoring:**

* AWS GuardDuty: Threat detection
* Falco: Runtime security
* OWASP ZAP: Security testing
* Nessus: Vulnerability scanning

**3.4 Third-Party Services**

**3.4.1 Communication Services**

**SMS Gateways:**

* Twilio: Global SMS service
* MSG91: India-focused SMS
* TextLocal: UK-based service
* AWS SNS: Amazon's SMS service

**Email Services:**

* SendGrid: Transactional emails
* Mailgun: Developer-friendly
* Amazon SES: AWS email service
* Postmark: High deliverability

**Voice Services:**

* Twilio Voice: Voice calls
* Nexmo/Vonage: Voice API
* Amazon Connect: Contact center
* Google Cloud Speech: Speech recognition

**3.4.2 Payment & Financial Services**

**Payment Gateways:**

* Razorpay: Indian payment solutions
* Stripe: Global payments
* PayPal: International payments
* Paytm: Indian digital wallet

**UPI Providers:**

* PhonePe: UPI transactions
* Google Pay: Google's UPI
* Paytm UPI: Wallet integration
* BHIM: Government UPI app

**Banking APIs:**

* Razorpay X: Banking solutions
* Cashfree: Payment solutions
* InstaMojo: Small business payments
* CCAvenue: Indian payment gateway

**3.4.3 Location & Maps Services**

**Mapping Services:**

* Google Maps: Comprehensive mapping
* MapBox: Customizable maps
* Here Maps: Enterprise solutions
* OpenStreetMap: Open-source maps

**Geocoding Services:**

* Google Geocoding API: Address conversion
* MapBox Geocoding: Alternative
* Nominatim: OSM geocoding
* Here Geocoding: Enterprise

**Location Intelligence:**

* Google Places API: POI data
* Foursquare Places: Location data
* Yelp API: Business information
* TomTom Places: Location services

**3.4.4 Identity & Document Verification**

**Indian Identity Verification:**

* Aadhaar API: Government ID verification
* PAN Verification: Tax ID verification
* Driving License API: DL verification
* Voter ID API: Electoral ID verification

**Document Processing:**

* Tesseract OCR: Text extraction
* Google Vision API: Document analysis
* Amazon Textract: Document processing
* Azure Cognitive Services: AI services

**KYC Services:**

* IDfy: Identity verification
* Signzy: Digital KYC
* Perfios: Financial verification
* Bureau ID: Identity solutions

**4. Database Design**

**4.1 PostgreSQL Schema Design**

**4.1.1 Core User Management Tables**

-- Enable necessary extensions

CREATE EXTENSION IF NOT EXISTS "uuid-ossp";

CREATE EXTENSION IF NOT EXISTS "postgis";

CREATE EXTENSION IF NOT EXISTS "pg\_trgm";

CREATE EXTENSION IF NOT EXISTS "btree\_gin";

-- Custom types for better data integrity

CREATE TYPE user\_type\_enum AS ENUM ('job\_seeker', 'employer', 'admin', 'support');

CREATE TYPE user\_status\_enum AS ENUM ('active', 'suspended', 'pending', 'deactivated');

CREATE TYPE gender\_enum AS ENUM ('male', 'female', 'other', 'prefer\_not\_to\_say');

CREATE TYPE business\_type\_enum AS ENUM ('individual', 'small\_business', 'company', 'startup', 'ngo');

CREATE TYPE verification\_status\_enum AS ENUM ('pending', 'in\_progress', 'verified', 'rejected', 'expired');

CREATE TYPE experience\_level\_enum AS ENUM ('fresher', 'beginner', 'intermediate', 'experienced', 'expert');

CREATE TYPE availability\_enum AS ENUM ('available', 'busy', 'not\_available', 'partially\_available');

-- Users table (both job seekers and employers)

CREATE TABLE users (

id UUID PRIMARY KEY DEFAULT uuid\_generate\_v4(),

phone\_number VARCHAR(15) UNIQUE NOT NULL,

country\_code VARCHAR(5) DEFAULT '+91',

email VARCHAR(255) UNIQUE,

email\_verified BOOLEAN DEFAULT FALSE,

user\_type user\_type\_enum NOT NULL,

status user\_status\_enum DEFAULT 'pending',

preferred\_language VARCHAR(10) DEFAULT 'hi',

timezone VARCHAR(50) DEFAULT 'Asia/Kolkata',

last\_login\_at TIMESTAMP,

login\_count INTEGER DEFAULT 0,

terms\_accepted\_at TIMESTAMP,

privacy\_accepted\_at TIMESTAMP,

marketing\_consent BOOLEAN DEFAULT FALSE,

created\_at TIMESTAMP DEFAULT NOW(),

updated\_at TIMESTAMP DEFAULT NOW(),

deleted\_at TIMESTAMP,

-- Constraints

CONSTRAINT users\_phone\_format CHECK (phone\_number ~ '^[0-9]{10,15}$'),

CONSTRAINT users\_email\_format CHECK (email ~ '^[A-Za-z0-9.\_%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,}$')

);

-- Create indexes for performance

CREATE INDEX CONCURRENTLY idx\_users\_phone ON users(phone\_number) WHERE deleted\_at IS NULL;

CREATE INDEX CONCURRENTLY idx\_users\_email ON users(email) WHERE deleted\_at IS NULL;

CREATE INDEX CONCURRENTLY idx\_users\_type\_status ON users(user\_type, status) WHERE deleted\_at IS NULL;

CREATE INDEX CONCURRENTLY idx\_users\_created\_at ON users(created\_at DESC);

**Job Seeker Profiles:**

CREATE TABLE job\_seeker\_profiles (

id UUID PRIMARY KEY DEFAULT uuid\_generate\_v4(),

user\_id UUID REFERENCES users(id) ON DELETE CASCADE,

full\_name VARCHAR(255) NOT NULL,

display\_name VARCHAR(100),

date\_of\_birth DATE,

age INTEGER GENERATED ALWAYS AS (EXTRACT(YEAR FROM AGE(date\_of\_birth))) STORED,

gender gender\_enum,

profile\_photo\_url VARCHAR(500),

cover\_image\_url VARCHAR(500),

-- Contact Information

whatsapp\_number VARCHAR(15),

emergency\_contact\_name VARCHAR(255),

emergency\_contact\_phone VARCHAR(15),

-- Address Information

current\_location POINT, -- PostGIS geography type

address\_line1 VARCHAR(255),

address\_line2 VARCHAR(255),

landmark VARCHAR(255),

city VARCHAR(100) NOT NULL,

district VARCHAR(100),

state VARCHAR(100) NOT NULL,

country VARCHAR(100) DEFAULT 'India',

pincode VARCHAR(10),

-- Work Preferences

preferred\_work\_radius INTEGER DEFAULT 10, -- in kilometers

max\_commute\_time INTEGER DEFAULT 60, -- in minutes

availability availability\_enum DEFAULT 'available',

available\_days JSONB DEFAULT '["monday","tuesday","wednesday","thursday","friday","saturday"]',

preferred\_shift JSONB DEFAULT '{"morning": true, "afternoon": true, "evening": false, "night": false}',

willing\_to\_relocate BOOLEAN DEFAULT FALSE,

-- Financial Information

expected\_salary\_min INTEGER,

expected\_salary\_max INTEGER,

current\_salary INTEGER,

salary\_currency VARCHAR(3) DEFAULT 'INR',

salary\_type VARCHAR(20) DEFAULT 'monthly', -- hourly, daily, weekly, monthly

-- Personal Information

languages\_known JSONB DEFAULT '[]', -- Array of language codes

education\_level VARCHAR(50),

marital\_status VARCHAR(20),

family\_members INTEGER,

dependents INTEGER,

-- Verification Status

verification\_status JSONB DEFAULT '{"identity": "pending", "address": "pending", "phone": "pending"}',

verification\_score INTEGER DEFAULT 0, -- 0-100

trust\_score DECIMAL(3,2) DEFAULT 0.0, -- 0.00-5.00

-- Profile Completion

profile\_completion\_percentage INTEGER DEFAULT 0,

onboarding\_completed BOOLEAN DEFAULT FALSE,

onboarding\_step VARCHAR(50) DEFAULT 'basic\_info',

-- Activity Tracking

last\_active\_at TIMESTAMP DEFAULT NOW(),

job\_search\_count INTEGER DEFAULT 0,

applications\_sent INTEGER DEFAULT 0,

profile\_views INTEGER DEFAULT 0,

created\_at TIMESTAMP DEFAULT NOW(),

updated\_at TIMESTAMP DEFAULT NOW(),

-- Constraints

CONSTRAINT age\_valid CHECK (age >= 16 AND age <= 80),

CONSTRAINT salary\_valid CHECK (expected\_salary\_min <= expected\_salary\_max),

CONSTRAINT radius\_valid CHECK (preferred\_work\_radius >= 1 AND preferred\_work\_radius <= 100)

);

**4.1.2 Skills and Categories System**

-- Skill Categories (Construction, Delivery, etc.)

CREATE TABLE skill\_categories (

id UUID PRIMARY KEY DEFAULT uuid\_generate\_v4(),

name VARCHAR(100) NOT NULL,

name\_hindi VARCHAR(100),

name\_regional JSONB DEFAULT '{}', -- {"te": "Telugu name", "ta": "Tamil name", ...}

slug VARCHAR(100) UNIQUE NOT NULL,

description TEXT,

icon\_url VARCHAR(500),

color\_code VARCHAR(7) DEFAULT '#6B7280', -- Hex color for UI

-- Hierarchy Support

parent\_category\_id UUID REFERENCES skill\_categories(id),

level INTEGER DEFAULT 1, -- 1 = main category, 2 = subcategory

sort\_order INTEGER DEFAULT 0,

-- Requirements

requires\_verification BOOLEAN DEFAULT FALSE,

min\_age INTEGER DEFAULT 16,

max\_age INTEGER,

physical\_requirements JSONB DEFAULT '[]',

-- Metadata

is\_active BOOLEAN DEFAULT TRUE,

is\_featured BOOLEAN DEFAULT FALSE,

job\_count INTEGER DEFAULT 0, -- Updated via triggers

worker\_count INTEGER DEFAULT 0,

avg\_salary DECIMAL(10,2),

created\_at TIMESTAMP DEFAULT NOW(),

updated\_at TIMESTAMP DEFAULT NOW(),

created\_by UUID REFERENCES users(id)

);

-- Individual Skills under categories

CREATE TABLE skills (

id UUID PRIMARY KEY DEFAULT uuid\_generate\_v4(),

category\_id UUID REFERENCES skill\_categories(id) NOT NULL,

name VARCHAR(100) NOT NULL,

name\_hindi VARCHAR(100),

name\_regional JSONB DEFAULT '{}',

slug VARCHAR(100) UNIQUE NOT NULL,

description TEXT,

-- Skill Properties

difficulty\_level experience\_level\_enum DEFAULT 'beginner',

learning\_time\_days INTEGER, -- Estimated days to learn

requires\_certification BOOLEAN DEFAULT FALSE,

requires\_verification BOOLEAN DEFAULT FALSE,

verification\_type VARCHAR(50) DEFAULT 'self\_declared',

-- Related Skills

prerequisite\_skills JSONB DEFAULT '[]', -- Array of skill IDs

related\_skills JSONB DEFAULT '[]',

alternative\_names JSONB DEFAULT '[]',

-- Market Data

demand\_score INTEGER DEFAULT 0, -- 0-100 based on job postings

supply\_score INTEGER DEFAULT 0, -- 0-100 based on workers

avg\_salary\_min INTEGER,

avg\_salary\_max INTEGER,

job\_count INTEGER DEFAULT 0,

worker\_count INTEGER DEFAULT 0,

-- Content

training\_resources JSONB DEFAULT '[]',

video\_url VARCHAR(500),

documentation\_url VARCHAR(500),

is\_active BOOLEAN DEFAULT TRUE,

is\_trending BOOLEAN DEFAULT FALSE,

created\_at TIMESTAMP DEFAULT NOW(),

updated\_at TIMESTAMP DEFAULT NOW(),

created\_by UUID REFERENCES users(id)

);

**4.2 MongoDB Collections for Document Storage**

**4.2.1 User Documents Collection**

// User Documents Collection - Stores uploaded documents

{

\_id: ObjectId(),

userId: "uuid", // Reference to users table

profileId: "uuid", // Reference to job\_seeker\_profiles or employer\_profiles

// Document Information

documentType: "aadhaar|pan|driving\_license|educational\_certificate|work\_certificate|business\_license|gst\_certificate",

category: "identity|education|work\_experience|business\_registration|address\_proof",

// File Information

originalName: "aadhaar\_card.pdf",

fileName: "doc\_uuid\_encrypted.pdf", // Encrypted filename for security

fileUrl: "https://storage.example.com/documents/doc\_uuid\_encrypted.pdf",

thumbnailUrl: "https://storage.example.com/thumbnails/doc\_uuid\_thumb.jpg",

mimeType: "application/pdf",

fileSize: 1234567, // in bytes

fileSizeFormatted: "1.2 MB",

// Verification Details

verificationStatus: "pending|in\_progress|verified|rejected|expired",

verificationDetails: {

method: "ocr|manual|api", // How it was verified

confidence: 0.95, // 0.0 to 1.0

ocrText: "extracted text from document",

extractedData: {

name: "John Doe",

documentNumber: "1234-5678-9012",

issueDate: "2020-01-01",

expiryDate: "2030-01-01",

address: "123 Main St, City, State, PIN",

dateOfBirth: "1990-01-01",

fatherName: "Father Name"

},

verificationDate: ISODate("2024-01-15T10:30:00Z"),

verifiedBy: "uuid", // User ID of verifier

verificationNotes: "Document appears authentic",

rejectionReason: "Unclear image quality"

},

uploadedAt: ISODate("2024-01-15T10:30:00Z"),

updatedAt: ISODate("2024-01-15T10:35:00Z")

}

**4.2.2 Job Analytics Collection**

// Job Performance Analytics Collection

{

\_id: ObjectId(),

jobPostingId: "uuid", // Reference to job\_postings table

employerId: "uuid", // Reference to employer\_profiles table

// Time Period

analyticsPeriod: "daily|weekly|monthly",

startDate: ISODate("2024-01-01T00:00:00Z"),

endDate: ISODate("2024-01-31T23:59:59Z"),

// View Analytics

viewsData: {

totalViews: 1250,

uniqueViews: 980,

averageViewDuration: 45, // seconds

bounceRate: 0.35, // percentage of single-page sessions

// Daily breakdown

dailyViews: [

{

date: "2024-01-01",

views: 45,

uniqueViews: 38,

averageDuration: 42,

topViewingHours: [9, 10, 14, 15, 18, 19] // Peak hours

}

],

// Geographic distribution

viewsByLocation: [

{

city: "Bangalore",

state: "Karnataka",

views: 345,

uniqueViews: 287

},

{

city: "Mumbai",

state: "Maharashtra",

views: 198,

uniqueViews: 165

}

]

},

// Application Analytics

applicationsData: {

totalApplications: 87,

qualifiedApplications: 45,

shortlistedApplications: 12,

interviewedCandidates: 8,

selectedCandidates: 2,

// Conversion funnel

conversionRates: {

viewToApplication: 0.0696, // 87/1250

applicationToShortlist: 0.138, // 12/87

shortlistToInterview: 0.667, // 8/12

interviewToSelection: 0.25 // 2/8

}

},

lastUpdated: ISODate("2024-02-01T00:00:00Z"),

dataSource: "automated\_collection",

version: "1.0"

}

**4.3 Redis Data Structures and Caching Strategy**

**4.3.1 User Session Management**

# User sessions with detailed information

HSET user:session:{sessionId}

userId "uuid"

userType "job\_seeker"

loginTime "2024-01-15T10:30:00Z"

lastActivity "2024-01-15T14:25:00Z"

deviceInfo '{"platform":"android","model":"Samsung Galaxy A12","appVersion":"1.2.3"}'

location '{"city":"Bangalore","state":"Karnataka","coordinates":[77.5946,12.9716]}'

permissions '["location","camera","notifications"]'

EXPIRE user:session:{sessionId} 86400 # 24 hours

# Active user tracking

SADD online\_users {userId}

EXPIRE online\_users 300 # 5 minutes

# User preferences cache

HSET user:preferences:{userId}

language "hi"

notifications\_enabled "true"

job\_alert\_radius "15"

salary\_alerts "true"

push\_notifications "true"

sms\_notifications "false"

EXPIRE user:preferences:{userId} 7200 # 2 hours

**4.3.2 Job Search and Matching Cache**

# Job search results cache with complex key generation

SET jobs:search:{hashOfQueryParams} '[

{"id":"job\_uuid\_1","title":"Construction Worker","location":"Bangalore","salary":18000},

{"id":"job\_uuid\_2","title":"Mason Required","location":"Bangalore","salary":20000}

]'

EXPIRE jobs:search:{hashOfQueryParams} 1800 # 30 minutes

# Popular searches cache

ZINCRBY popular\_searches 1 "construction worker bangalore"

ZINCRBY popular\_searches 1 "delivery boy mumbai"

# Job recommendations for users (personalized)

SET user:recommendations:{userId} '[

{"jobId":"uuid1","score":0.95,"reason":"skill\_match"},

{"jobId":"uuid2","score":0.87,"reason":"location\_proximity"}

]'

EXPIRE user:recommendations:{userId} 3600 # 1 hour

# Job view counts (real-time)

HINCRBY job:stats:{jobId} views\_count 1

HINCRBY job:stats:{jobId} applications\_count 1

**4.3.3 Application Rate Limiting and Security**

# API rate limiting by user

INCR api:rate\_limit:{userId}:job\_search

EXPIRE api:rate\_limit:{userId}:job\_search 3600 # Reset every hour

# OTP rate limiting

INCR otp:attempts:{phoneNumber}

EXPIRE otp:attempts:{phoneNumber} 900 # 15 minutes

# Failed login attempt tracking

INCR login:failed:{phoneNumber}

EXPIRE login:failed:{phoneNumber} 1800 # 30 minutes

**5. API Architecture**

**5.1 RESTful API Design Principles**

**5.1.1 API Standards and Conventions**

**Base URL Structure:**

* Production: https://api.jobportal.com/v1
* Staging: https://api-staging.jobportal.com/v1
* Development: https://api-dev.jobportal.com/v1

**HTTP Methods:**

* GET: Retrieve resources
* POST: Create new resources
* PUT: Update entire resources
* PATCH: Partial updates
* DELETE: Remove resources

**Response Format:**

{

"success": true,

"data": {...},

"message": "Operation completed successfully",

"timestamp": "2024-01-15T10:30:00Z",

"requestId": "req\_550e8400-e29b-41d4-a716-446655440000"

}

**Error Response Format:**

{

"success": false,

"error": {

"code": "VALIDATION\_ERROR",

"message": "The provided data is invalid",

"details": [

{

"field": "phoneNumber",

"message": "Phone number is required"

}

]

},

"timestamp": "2024-01-15T10:30:00Z",

"requestId": "req\_550e8400-e29b-41d4-a716-446655440000"

}

**5.1.2 Authentication and Authorization**

**JWT Token Structure:**

{

"header": {

"alg": "HS256",

"typ": "JWT"

},

"payload": {

"userId": "550e8400-e29b-41d4-a716-446655440000",

"userType": "job\_seeker",

"phoneNumber": "+919876543210",

"permissions": ["read\_jobs", "apply\_jobs", "manage\_profile"],

"iat": 1642271400,

"exp": 1642357800,

"iss": "jobportal.com"

}

}

**Authorization Headers:**

Authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9...

X-API-Key: api\_key\_for\_third\_party\_integrations

X-Client-Version: 1.2.3

X-Platform: android

**5.2 Core API Endpoints**

**5.2.1 Authentication APIs**

**User Registration:**

POST /auth/register

Content-Type: application/json

{

"phoneNumber": "+919876543210",

"userType": "job\_seeker",

"referralCode": "REF123456",

"deviceInfo": {

"platform": "android",

"model": "Samsung Galaxy A12",

"version": "11",

"appVersion": "1.2.3"

}

}

Response:

{

"success": true,

"data": {

"userId": "550e8400-e29b-41d4-a716-446655440000",

"otpSent": true,

"expiresIn": 300,

"nextStep": "verify\_otp"

}

}

**OTP Verification:**

POST /auth/verify-otp

Content-Type: application/json

{

"phoneNumber": "+919876543210",

"otp": "123456",

"deviceToken": "fcm\_device\_token\_here"

}

Response:

{

"success": true,

"data": {

"accessToken": "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9...",

"refreshToken": "refresh\_token\_here",

"user": {

"id": "550e8400-e29b-41d4-a716-446655440000",

"phoneNumber": "+919876543210",

"userType": "job\_seeker",

"isNewUser": true,

"profileCompleted": false

},

"tokenExpiry": "2024-01-15T22:30:00Z"

}

}

**5.2.2 Job Search APIs**

**Search Jobs:**

GET /jobs/search

Authorization: Bearer {token}

Query Parameters:

?query=mason

&location=bangalore

&radius=10

&salaryMin=800

&salaryMax=1500

&jobType=full\_time

&urgency=immediate

&skills=masonry,construction

&page=1

&limit=20

&sort=relevance

Response:

{

"success": true,

"data": {

"jobs": [

{

"id": "job\_550e8400",

"title": "Experienced Mason Required",

"shortDescription": "We need an experienced mason for residential construction project",

"employer": {

"id": "emp\_123",

"name": "ABC Construction Pvt Ltd",

"logo": "https://cdn.example.com/logos/abc\_construction.jpg",

"rating": 4.2,

"totalReviews": 89,

"verificationStatus": "verified"

},

"location": {

"city": "Bangalore",

"state": "Karnataka",

"address": "Whitefield, Bangalore",

"distance": 5.2,

"coordinates": [77.7500, 12.9698]

},

"salary": {

"min": 800,

"max": 1200,

"type": "daily",

"currency": "INR",

"negotiable": false

},

"requirements": {

"skills": ["masonry", "construction"],

"experience": "intermediate",

"minAge": 21,

"maxAge": 45

},

"benefits": ["food\_provided", "transport\_allowance"],

"urgency": "immediate",

"postedAt": "2024-01-15T10:30:00Z",

"expiresAt": "2024-02-15T23:59:59Z",

"applicationsCount": 23,

"viewsCount": 156,

"matchScore": 0.94,

"featured": true,

"premium": false

}

],

"filters": {

"availableFilters": {

"jobTypes": ["full\_time", "part\_time", "contract"],

"urgencyLevels": ["immediate", "within\_24\_hours", "within\_week"],

"salaryRanges": [

{"min": 0, "max": 500, "count": 45},

{"min": 500, "max": 1000, "count": 120},

{"min": 1000, "max": 1500, "count": 89}

],

"skills": [

{"id": "masonry", "name": "Masonry", "count": 67},

{"id": "construction", "name": "Construction", "count": 156}

]

}

},

"pagination": {

"page": 1,

"limit": 20,

"total": 245,

"pages": 13,

"hasNext": true,

"hasPrev": false

},

"searchInsights": {

"totalResults": 245,

"searchTime": 0.045,

"popularSearches": ["mason bangalore", "construction worker"],

"suggestedsearches": ["carpenter bangalore", "plumber bangalore"]

}

}

}

**Get Job Details:**

GET /jobs/550e8400-e29b-41d4-a716-446655440000

Authorization: Bearer {token}

Response:

{

"success": true,

"data": {

"job": {

"id": "job\_550e8400",

"title": "Experienced Mason Required - Residential Project",

"description": "We are looking for an experienced mason for our residential construction project in Whitefield area. The project involves brick work, plastering, and general masonry work for a 3-month duration.",

"shortDescription": "Experienced mason needed for 3-month residential project",

"category": {

"id": "construction",

"name": "Construction",

"icon": "https://cdn.example.com/icons/construction.png"

},

"employer": {

"id": "emp\_123",

"name": "ABC Construction Pvt Ltd",

"description": "Leading construction company in Bangalore with 15+ years of experience",

"rating": 4.2,

"totalReviews": 89,

"responseRate": 0.89,

"avgResponseTime": "4 hours",

"logo": "https://cdn.example.com/logos/abc\_construction.jpg",

"website": "https://abcconstruction.com",

"location": {

"city": "Bangalore",

"state": "Karnataka"

},

"otherActiveJobs": 12,

"totalHires": 89,

"hiringSuccessRate": 0.78

},

"location": {

"coordinates": [77.7500, 12.9698],

"address": {

"line1": "Whitefield Main Road",

"line2": "Near ITPL",

"city": "Bangalore",

"state": "Karnataka",

"pincode": "560066",

"landmark": "Opposite Forum Mall"

},

"description": "Easy access by public transport",

"distance": 5.2,

"travelTime": "25 minutes by bus"

},

"salary": {

"min": 800,

"max": 1200,

"type": "daily",

"currency": "INR",

"negotiable": false,

"paymentTerms": "Weekly payment on Saturdays"

},

"benefits": [

{

"type": "food\_provided",

"name": "Food Provided",

"description": "Lunch and tea provided"

},

{

"type": "transport\_allowance",

"name": "Transport Allowance",

"description": "₹100 per day transport allowance"

}

],

"requirements": {

"skills": [

{

"id": "masonry",

"name": "Masonry",

"level": "intermediate",

"required": true,

"minExperience": 2

}

],

"experience": "intermediate",

"minAge": 21,

"maxAge": 45,

"physicalRequirements": "Ability to lift 25kg, work at heights",

"educationRequirements": "Primary education preferred",

"languageRequirements": ["hindi", "kannada"],

"additionalRequirements": "Should have own basic tools"

},

"workDetails": {

"jobType": "full\_time",

"startDate": "2024-01-22",

"endDate": "2024-04-22",

"duration": "3 months",

"urgency": "immediate",

"workingHours": {

"start": "08:00",

"end": "17:00",

"break": 60

},

"workingDays": ["monday", "tuesday", "wednesday", "thursday", "friday", "saturday"],

"shiftDetails": "Single day shift only"

},

"applicationProcess": {

"deadline": "2024-01-25T23:59:59Z",

"instructions": "Please bring work samples and references",

"contactPerson": "Rajesh Kumar",

"contactPhone": "+919876543210",

"screeningQuestions": [

{

"question": "How many years of masonry experience do you have?",

"type": "number",

"required": true

}

]

},

"metrics": {

"applicationsCount": 23,

"viewsCount": 156,

"uniqueViewsCount": 134,

"shortlistCount": 5,

"averageApplicationTime": "2.5 days",

"competitionLevel": "moderate"

},

"timeline": {

"postedDate": "2024-01-15T10:30:00Z",

"expiresAt": "2024-02-15T23:59:59Z",

"startDate": "2024-01-20",

"expectedDuration": "3 months",

"urgency": "immediate"

},

"insights": {

"similarJobsCount": 15,

"averageSalaryInArea": 950,

"demandTrend": "increasing",

"bestTimeToApply": "morning",

"successRate": "68% of applications get response"

},

"userContext": {

"matchScore": 0.94,

"canApply": true,

"applicationStatus": null,

"missingRequirements": [],

"strengthAreas": ["skill\_match", "location\_preference"],

"recommendationReason": "Perfect match for your masonry skills and location preference"

}

}

}

}

**5.3 Job Application APIs**

**5.3.1 Apply for Job**

POST /jobs/550e8400-e29b-41d4-a716-446655440000/apply

Authorization: Bearer {token}

Content-Type: multipart/form-data

Form Data:

- coverMessage: "I am interested in this mason position..."

- expectedSalary: 1000

- availabilityStartDate: "2024-01-22"

- resume: [file upload]

- voiceMessage: [audio file upload]

- screeningAnswers: {"experience\_years": 3, "can\_work\_heights": true}

Response:

{

"success": true,

"data": {

"application": {

"id": "app\_550e8400",

"jobId": "job\_550e8400",

"status": "applied",

"appliedAt": "2024-01-16T14:30:00Z",

"applicationNumber": "APP-2024-001234"

},

"nextSteps": [

{

"step": "employer\_review",

"description": "Your application will be reviewed by the employer",

"expectedTime": "2-3 business days"

},

{

"step": "possible\_interview",

"description": "You may be contacted for an interview",

"tips": ["Keep your phone available", "Prepare work samples"]

}

],

"trackingInfo": {

"applicationId": "app\_550e8400",

"trackingUrl": "/applications/app\_550e8400/track"

}

}

}

**5.3.2 Track Application Status**

GET /applications/550e8400-e29b-41d4-a716-446655440000

Authorization: Bearer {token}

Response:

{

"success": true,

"data": {

"application": {

"id": "app\_550e8400",

"job": {

"id": "job\_550e8400",

"title": "Experienced Mason Required",

"employer": {

"name": "ABC Construction Pvt Ltd",

"logo": "https://cdn.example.com/logos/abc\_construction.jpg"

}

},

"status": "shortlisted",

"timeline": [

{

"status": "applied",

"timestamp": "2024-01-16T14:30:00Z",

"description": "Application submitted successfully"

},

{

"status": "viewed",

"timestamp": "2024-01-17T09:15:00Z",

"description": "Employer viewed your application"

},

{

"status": "shortlisted",

"timestamp": "2024-01-17T11:30:00Z",

"description": "You have been shortlisted for this position"

}

],

"interviewDetails": {

"scheduled": true,

"dateTime": "2024-01-20T10:00:00Z",

"type": "in\_person",

"location": {

"address": "ABC Construction Office, Whitefield",

"coordinates": [77.7500, 12.9698]

},

"contactPerson": "Rajesh Kumar",

"contactPhone": "+919876543210",

"instructions": "Please bring your ID proof and work samples"

},

"messages": [

{

"id": "msg\_123",

"from": "employer",

"message": "We are impressed with your profile. Can you join for an interview tomorrow?",

"timestamp": "2024-01-17T11:35:00Z",

"read": true

}

],

"feedback": {

"strengths": ["Good experience", "Local candidate"],

"concerns": [],

"overallRating": 4.5

}

}

}

}