

# Software Requirements Specification (SRS)

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CareDent

## 1. Introduction

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### 1.1 Purpose

This SRS document defines the functional and non-functional requirements for the **Advanced U.S. Dental Insurance System**—a role-based insurance management platform that simulates real U.S. dental insurance operations including:

- Plan creation and management
- Dentist procedure submissions
- Claim processing and adjudication
- Patient enrollment
- Network and fee schedule handling
- Dashboards for each role
- Cost estimator and Find-a-Dentist modules

This SRS is intended for developers, architects, testers, and stakeholders.

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### 1.2 Scope

The system is a **full-stack web application** built using:

- Java 21
- Spring Boot
- Spring Security (JWT)
- JPA/Hibernate
- MySQL
- React/JSP frontend

The system will support three primary user types:

- **Patient**

- Dentist
- Admin

The system simulates real insurance lifecycle: plan creation → enrollment → treatment → claim → adjudication → reporting.

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## 1.3 Definitions, Acronyms, Abbreviations

Term	Definition
CDT	Current Dental Terminology code used for billing procedures
PPO / HMO	Insurance network types
EOB	Explanation of Benefits
Enrollment	A patient's active subscription to a plan for a benefit year
Allowed Amount	Contracted fee schedule amount for in-network dentists
Annual Maximum	Maximum amount insurance pays per year
Deductible	Amount patient must pay before insurance coverage applies
Claim Line	A single CDT procedure within a claim
JWT	JSON Web Token

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## 1.4 References

- ANSI/ADA Dental CDT Code Set
  - IEEE SRS 830 Standard
  - Spring Security Official Docs
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## 1.5 Overview

This document defines:

- Overall description
- Functional requirements
- Use cases
- System features
- Non-functional requirements

- Data model requirements
  - External interface requirements
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## 2. Overall Description

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### 2.1 Product Perspective

The system is a **multi-tiered web platform**:

- **Frontend:** React or JSP
- **Backend:** Spring Boot REST APIs
- **Database:** MySQL
- **Security:** JWT-based authentication

The system integrates:

- Claim calculation engine
  - Plan rules & coverage handling
  - Fee schedules
  - Dentist networks
  - Cost estimator
  - Find-a-Dentist search
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### 2.2 Product Features Overview

1. **User Authentication/Authorization**
  2. **Plan Management (Admin)**
  3. **Enrollment (Patient)**
  4. **Procedure Management (Dentist)**
  5. **Claim Submission (Dentist/Patient)**
  6. **Claim Calculation Engine**
  7. **Find-a-Dentist Search Module**
  8. **Cost Estimator Module**
  9. **Admin Analytics Dashboard**
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### 2.3 User Classes & Characteristics

User	Description	Privileges
Patient	Insured individual	Enroll, view benefits, view claims, cost estimator
Dentist	Healthcare provider	Submit procedures, submit claims
Admin	Insurance staff	Create plans, manage fee rules, claim oversight

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## 2.4 Operating Environment

- Server: Apache Tomcat (packaged in Spring Boot)
  - Database: MySQL 8+
  - Runtime: JVM 21+
  - OS: Linux/Windows
  - Browsers: Chrome, Firefox, Edge
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## 2.5 Design / Implementation Constraints

- Must follow U.S. dental insurance rules
  - JWT required for all protected endpoints
  - MySQL relational schema
  - CDT compliance
  - Must support network fee schedules
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## 2.6 Assumptions and Dependencies

- Dentists provide accurate procedure fees
  - CDT categories are predefined
  - Users have valid email addresses
  - Insurance plans are updated only by admin
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# 3. System Features (Functional Requirements)

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Below are detailed requirements grouped by module.

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## 3.1 User Authentication Module

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### 3.1.1 Login

**Description:** Users authenticate using email/password.

**Requirements:**

ID	Requirement
AUTH-01	System must authenticate using JWT
AUTH-02	Passwords encrypted using BCrypt
AUTH-03	Users must receive JWT token upon login
AUTH-04	Invalid credentials return HTTP 401

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## 3.2 Patient Module

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### 3.2.1 Patient Registration

ID	Requirement
PAT-01	Patient can create account with basic info
PAT-02	System assigns PATIENT role automatically
PAT-03	Email must be unique

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### 3.2.2 View Plans

ID	Requirement
PAT-10	Patient views list of active dental plans
PAT-11	Plan details must include deductible, max, coverage, premium

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### 3.2.3 Enrollment

ID	Requirement
PAT-20	A patient may enroll in exactly one plan per benefit year
PAT-21	Enrollment initializes deductibleUsed = 0
PAT-22	Enrollment initializes annualMaxUsed = 0

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## 3.2.4 View Benefit Summary

ID	Requirement
PAT-30	Patient views remaining deductible
PAT-31	Patient views remaining annual max
PAT-32	Patient views coverage percentages

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## 3.2.5 Claims & History

ID	Requirement
PAT-40	Patient views all claims submitted on their behalf
PAT-41	Each claim must display: insurance paid, patient responsibility, date, procedures

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## 3.2.6 Cost Estimator Tool

ID	Requirement
PAT-50	Patients enter CDT code + dentist selection
PAT-51	System applies network rules
PAT-52	System returns estimate: fee, allowed amount, deductible applied, insurance vs patient share

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## 3.2.7 Find-a-Dentist

ID	Requirement

ID	Requirement
PAT-60	Patient filters by ZIP, state, city
PAT-61	Patient filters by specialty
PAT-62	Results must include network status and accepted plans

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## 3.3 Dentist Module

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### 3.3.1 Add Dental Procedures

ID	Requirement
DEN-01	Dentist can add CDT code, category, fee
DEN-02	CDT code must be unique per dentist

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### 3.3.2 Submit Treatment Claim

ID	Requirement
DEN-10	Dentist selects patient and procedure
DEN-11	System creates Claim and ClaimLine records

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### 3.3.3 View Submitted Claims

ID	Requirement
DEN-20	Dentist views status of submitted claims
DEN-21	Dentist views calculation results (EOB breakdown)

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## 3.4 Admin Module

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## 3.4.1 Plan Management

ID	Requirement
ADM-01	Admin creates plans with deductible, annual max, coverage, premium
ADM-02	Admin edits plans
ADM-03	Admin manages coverage percentages by category

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## 3.4.2 Fee Schedule Management

ID	Requirement
ADM-10	Admin defines CDT categories (preventive, basic, major)
ADM-11	Admin sets coverage % for each category

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## 3.4.3 Network Management

ID	Requirement
ADM-20	Admin defines networks: PPO, HMO, Premier
ADM-21	Admin assigns dentists to networks

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## 3.4.4 Claims Queue

ID	Requirement
ADM-30	Admin views pending claims
ADM-31	Admin can approve/reject claims
ADM-32	Admin can override calculation manually (optional)

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## 3.4.5 Analytics Dashboard

ID	Requirement

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ID	Requirement
ADM-40	Dashboard displays total claims per year
ADM-41	Dashboard displays total insurance payouts
ADM-42	Dashboard includes plan enrollment stats

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## 3.5 Claim Calculation Engine

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### 3.5.1 Deductible Application

- Apply remaining deductible before any coverage.

### 3.5.2 Coverage Application

- Use coverage % based on CDT category:
  - Preventive: 100%
  - Basic: 80%
  - Major: 50%

### 3.5.3 Network Fee Rules

Network	Allowed Amount Rule
In-Network PPO	Allowed amount < dentist fee
Out-of-Network	Allowed amount = dentist fee
HMO	Fixed copay (future module)

### 3.5.4 Annual Maximum

- Insurance cannot pay beyond remaining annual maximum.

### 3.5.5 Output

- Insurance paid

- Patient responsibility
  - Deductible applied
  - Annual max used
  - Final EOB JSON
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## 4. External Interface Requirements

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### 4.1 User Interfaces

- Web-based dashboards for all roles
- Responsive UI (mobile-friendly)

### 4.2 API Interfaces

REST endpoints:

- `/auth/**`
- `/patient/**`
- `/dentist/**`
- `/admin/**`

### 4.3 Hardware Interfaces

- Standard web browser
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## 6. Database Requirements

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### Required Tables:

- users
- roles
- patients
- dentists
- dental\_plans
- plan\_coverage\_rules
- enrollments

- claims
  - claim\_lines
  - dental\_procedures
  - networks
  - dentist\_networks
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