47Billion

SOFTWARE REQUIREMENTS SPECIFICATION (SRS)

1. Introduction

1.1 Purpose

This Software Requirements Specification (SRS) document defines the complete functional and non-functional requirements of ShareXpress. It provides a detailed understanding of the system for developers, evaluators, and future maintainers.

1.2 Scope of the Project

ShareXpress is a web-based distributed system designed to enable secure, privacy-first file sharing and document editing using QR-based session pairing. The system supports both registered and guest users with controlled access and cloud-backed storage.

1.3 Definitions and Acronyms

QR – Quick Response Code
JWT – JSON Web Token
OTP – One-Time Password
BLE – Bluetooth Low Energy
DFD – Data Flow Diagram
TTL – Time to Live

2. Overall Description

2.1 Product Perspective

ShareXpress follows a backend-driven distributed architecture consisting of a browser-based frontend, FastAPI backend services, MongoDB database, and S3-compatible object storage.

2.2 Product Functions

- User authentication using OAuth and OTP
- Guest session creation and management
- QR code generation and resolution
- Secure file upload and download
- On-the-go document editing and versioning

- Access control and revocation
- Activity logging and automatic cleanup

2.3 User Classes

Guest User: Temporary user identified via backend session
Registered User: Authenticated user with persistent identity
Receiver: Any user who gains access by scanning a QR code

2.4 Operating Environment

The system operates on modern web browsers across desktop and mobile platforms, with backend services hosted on a server environment supporting Python and MongoDB.

3. System Architecture

The system architecture ensures that all authentication, QR resolution, file management, and access control logic is handled server-side.

Client Browser → FastAPI Backend → MongoDB + S3 Storage

4. Functional Requirements

4.1 Authentication Module

The authentication module supports Google OAuth and OTP-based authentication. Registered users receive JWT tokens, while guest users are assigned temporary sessions.

4.2 Session Management Module

This module creates and manages sessions, tracks activity, enforces expiration, and supports manual revocation for security.

4.3 QR Code Management Module

QR codes are generated server-side using opaque tokens. Permanent QR codes are assigned to registered users, while temporary QR codes are assigned to guest sessions.

4.4 Sharing Session Module

Upon QR resolution, a sharing session is created to securely connect sender and receiver. This module enforces session-based access control.

4.5 File Upload and Storage Module

Files are validated, size-limited, stored in S3-compatible storage, and their metadata is maintained in MongoDB.

4.6 Document Editing and Versioning Module
Documents can be edited directly in the browser. Each edit results in a new version to preserve file history.

4.7 Access Control Module
This module controls permissions such as view, edit, and download, and supports real-time access revocation.

4.8 Cloud Storage Module
Registered users are provided limited cloud storage, while guest users are restricted to temporary storage only.

4.9 Activity Logging Module
Tracks user activities including uploads, edits, and sharing actions. Users can permanently delete their activity history.

4.10 Cleanup and Expiry Module
Automatically removes expired sessions, QR codes, and temporary files using TTL-based mechanisms.

5. Data Flow Diagrams
DFD Level-0 represents the interaction between users and the ShareXpress system. DFD Level-1 and Level-2 describe authentication, QR-based sharing, file handling, and access control flows.

6. Activity Flow
User opens application → Authentication or Guest Session → QR Generation → QR Scan → Sharing Session Creation → File Upload/Edit → Access Revocation or Expiry

7. Non-Functional Requirements
Security: No authentication tokens are exposed in QR codes.
Performance: Fast QR resolution and concurrent file access.
Scalability: Horizontally scalable backend and storage.
Usability: Web-based access without application installation.

8. Future Scope

Future enhancements include peer-to-peer transfer using WebRTC, end-to-end encryption, offline LAN mode, and collaborative document editing.

9. Conclusion

ShareXpress presents a secure and privacy-first solution for modern file sharing by combining QR-based session pairing, backend-controlled access, document editing, and cloud storage within a distributed system.

10. Approval

This SRS serves as the baseline for development and validation of sharexpress application.