

# CloudStore Technical Specifications

## 1. System Architecture

CloudStore is built on a microservices architecture with the following core components:

- API Gateway: Routes requests to appropriate services
- AuthenticationService: Handles user authentication and token management
- FileManager: Central service for all file operations
- StorageManager: Manages multi-cloud storage backends
- SearchService: Provides full-text search capabilities
- NotificationService: Handles all notifications

## 2. Service Dependencies

The services have the following dependency relationships:

AuthenticationService depends on UserManager for credential validation and SessionManager for session handling.

FileManager depends on StorageManager for file storage, PermissionManager for access control, and QuotaManager for storage limits.

SearchService depends on IndexService for search indexing and PermissionManager for filtering results.

ShareService depends on PermissionManager for access rights and NotificationService for alerts.

## 3. Storage Backend

StorageManager supports multiple cloud storage providers:

- AWS S3 (Primary)
- Google Cloud Storage (Secondary)
- Azure Blob Storage (Backup)

Files are automatically replicated across providers for redundancy. The QuotaManager tracks storage usage and enforces limits per user.

## 4. Security Model

Security is implemented at multiple layers:

Authentication: JWT tokens with 24-hour expiry managed by AuthenticationService

Authorization: Role-based access control via PermissionManager

Encryption: TLS 1.3 in transit, AES-256 at rest

Audit: Comprehensive logging via AuditService

The PermissionManager enforces access control for all file operations.

## 5. API Endpoints

Core API endpoints:

- POST /auth/login - AuthenticationService login
- POST /auth/logout - AuthenticationService logout
- GET /files - FileManager list files
- POST /files/upload - FileManager upload
- GET /files/{id} - FileManager get file
- DELETE /files/{id} - FileManager delete
- POST /share - ShareService create share
- GET /search - SearchService query

## 6. Performance Specifications

Target performance metrics:

- API Response Time: < 200ms (p95)
- File Upload Throughput: 100 MB/s
- Search Latency: < 500ms
- Concurrent Users: 10,000+

The IndexService maintains search indexes for sub-second query performance.

## 7. Integration Points

External integrations:

NotificationService integrates with:

- SendGrid for email
- Firebase for push notifications
- Twilio for SMS

StorageManager integrates with:

- AWS S3 API
- Google Cloud Storage API
- Azure Blob Storage API

AuthenticationService supports:

- OAuth 2.0 (Google, Microsoft, GitHub)
- SAML 2.0 for enterprise SSO