**Project Design Phase**

**Solution Architecture**

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| Date | 15 FEBURARY 2025 |
| Team ID | SWTID1743254297 |
| Project Name | TUNETRAIL- YOUR PATHWAY TO PERFECT PLAYLIST |
| Maximum Marks | 4 Marks |

**Solution Architecture**

Below is a high-level overview of the architecture of the system: 1. Client Layer (Frontend)

* React.js based SPA (Single Page Application)
* Axios for communicating with backend APIs
* Tailwind CSS for styling
* Features:
  + User interaction interface
  + Dynamic playlist UI
  + Real-time music control bar

2. Server Layer (Backend)

* Node.js + Express.js server
* Handles API routing, authentication, file processing
* Uses Multer middleware for file uploads
* Implements JWT for secure session handling

3. Business Logic Layer

* Recommendation algorithm (based on tags, genres, likes)
* Role-based access (admin, artist, listener)
* Song access control (free vs. premium)

4. Database Layer

* MongoDB (Atlas) – for storing:
  + User profiles
  + Song metadata (name, artist, duration, genre)
  + Playlists
  + Analytics logs
* Indexed fields for fast querying
* Relationships handled through ObjectId referencing

5. Storage & Delivery Layer

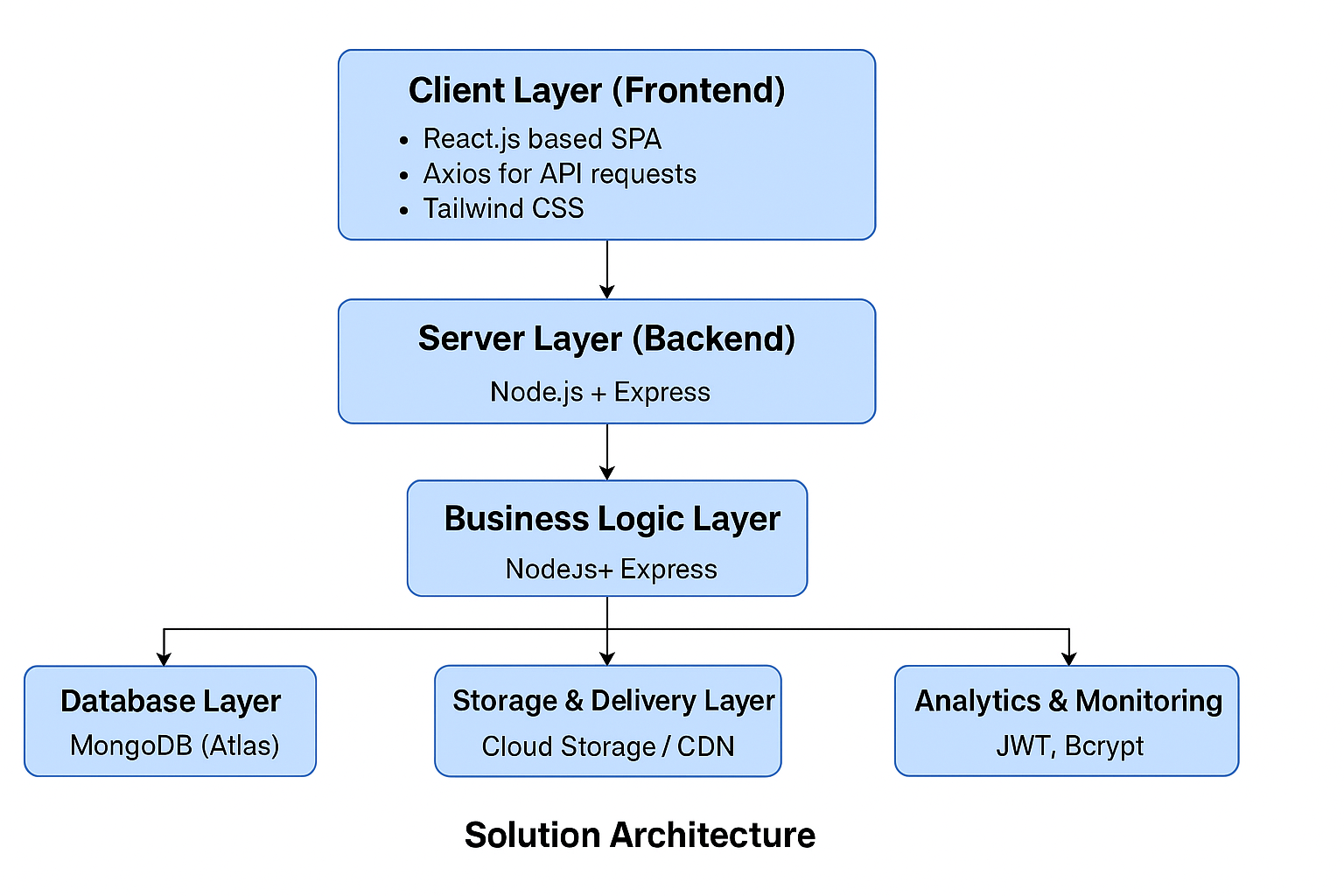
* Cloudinary / Firebase Storage / AWS S3 for:
  + Hosting audio files and cover art
* CDN Integration for faster access globally

6. Authentication & Security

* JWT tokens for login sessions
* Bcrypt for password hashing
* Input validation to prevent injection attacks

7. Analytics & Monitoring

* Admin dashboards for song popularity
* Artist dashboard for individual song performance
* Google Analytics / Mixpanel for tracking engagement

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