Solution Design and Architecture - To-Do List Application

1. Tech Stack Selection

A robust tech stack ensures scalability, maintainability, and performance of the application.

Frontend

- React.js (with Vite or CRA)
- TailwindCSS / Material UI
- Axios / Fetch API

Backend

- Node.js with Express.js
- JWT (JSON Web Tokens)
- Bcrypt.js

Database

- MongoDB (NoSQL)
- Mongoose

Deployment & DevOps

- Frontend: Vercel / Netlify
- Backend: AWS EC2 / Heroku
- Database: MongoDB Atlas
- CI/CD: GitHub Actions or GitLab CI/CD

Supporting Tools

- Postman
- Git & GitHub
- Docker (Optional)

2. UI Structure / API Schema Design

UI Structure

- Login / Signup Page
- Dashboard
- Task Components
- Add/Edit Task Modal
- Profile/Settings

API Schema Design (REST Endpoints)

Authentication:

- POST /auth/signup
- POST /auth/login
- POST /auth/logout

Task Management:

- GET /tasks
- POST /tasks
- GET /tasks/:id
- PUT /tasks/:id
- DELETE /tasks/:id

3. Data Handling Approach

Frontend State Management

- React Context API / Redux Toolkit
- LocalStorage
- Optimistic UI Updates

Backend Data Flow

1. User sends request with JWT token
2. Middleware validates token
3. Request processed by controller
4. Business logic applied
5. MongoDB updated
6. Response sent back to client

Database Schema (MongoDB)

User Schema:

{ "userId": "string", "name": "string", "email": "string", "passwordHash": "string", "createdAt": "date" }

Task Schema:

{ "taskId": "string", "userId": "string", "title": "string", "description": "string", "priority": "low | medium | high", "status": "pending | completed", "dueDate": "date", "createdAt": "date", "updatedAt": "date" }

4. Component / Module Diagram

Frontend Modules

- Authentication Module (Login, Signup)
- Task Management Module (TaskList, TaskCard, Add/Edit Modal)

- Profile Module (Settings, Logout)

Backend Modules

- Auth Controller
- Task Controller
- Middleware
- Database Layer

5. Basic Flow Diagram

User Flow:

1. User opens app → Redirects to Login page
2. Login/Signup → JWT token generated
3. Dashboard loaded → Fetch tasks
4. User actions: Add, Edit, Delete, Mark Complete
5. Logout → JWT cleared → Redirected to login