CampusPrint – Technology Stack Explanation

1. Overview

CampusPrint is a web-based campus printing management system designed using a fully free and open-source technology stack. The system consists of a student-facing website for uploading print requests and an admin dashboard for managing and processing those requests.

2. Frontend Technology

React.js is used to build both the student website and the admin dashboard. React provides a component-based architecture, fast rendering, and excellent scalability. It is free, open-source, and widely used in the industry.

Tailwind CSS is used for styling the application. It allows rapid UI development using utility classes and does not require any paid licenses.

Vercel is used for hosting the frontend. It provides free hosting, automatic HTTPS, and seamless GitHub integration.

3. Backend Technology

Node.js is used as the backend runtime environment. It is lightweight, fast, and ideal for handling file uploads and API requests.

Express.js is used to build REST APIs. It simplifies routing, request handling, and middleware management while remaining fully free.

Render / Railway (Free Tier) is used to deploy the backend server, allowing free cloud hosting for small to medium workloads.

4. Database

MongoDB Atlas (Free M0 Cluster) is used as the database. It stores order details, student information, transaction IDs, and order statuses. MongoDB's document-based structure is ideal for flexible order data.

5. File Storage

Cloudinary (Free Tier) is used to store uploaded PDF files securely. Files are stored privately, and access is restricted to administrators only. This avoids server storage overload and ensures reliability.

6. PDF Processing

Open-source libraries such as **multer** (for handling file uploads) and **pdf-parse** (for extracting page count from PDFs) are used. These libraries are free and efficient.

7. Authentication

Authentication is required only for administrators. A simple JWT-based authentication system is implemented to secure the admin dashboard. Students do not require authentication.

8. Payment Handling

No payment gateway is integrated. Students manually enter their payment transaction ID after paying via UPI or campus-approved methods. This approach keeps the system fully free and simple.

9. Development Tools

GitHub is used for version control, VS Code for development, Postman for API testing, and Figma for UI wireframing. All tools are free to use.

10. Conclusion

The chosen tech stack ensures zero cost, scalability for campus usage, ease of development, and strong relevance to real-world software engineering practices.