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PCBUILD: A Web-Based Platform for Custom PC Building and E Commerce Integration

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Abstract - The PCBUILD project aims to provide a comprehensive and beginner-friendly platform for building custom PCs. It allows users to explore, compare, and configure PC components such as CPUs, motherboards, GPUs, and storage devices. The platform includes features for product filtering, custom PC building, and prebuilt PC browsing, ensuring both novice and expert users can make informed hardware decisions. It also supports admin functionalities like product management and user verification. The project focuses on an intuitive interface, efficient data handling, and real-time updates to enhance user experience and streamline the PC building process.

Key Words: Custom PC, User-Friendly Interface, Product Comparison, PC Builder, E-commerce Platform

1.INTRODUCTION:

In the digital age, purchasing computer components online has become increasingly popular. However, beginners often struggle with compatibility issues, pricing confusion, and the complexity of building a PC. To address these challenges, **PCBUILD** was designed as a one-stop platform that combines **product browsing, custom PC assembly, and secure checkout**.
The system provides both **user** and **admin interfaces**. Users can browse and filter components like CPUs, GPUs, motherboards, and power supplies, while admins can manage stock, upload product data, and monitor sales. The goal is to make PC building accessible to everyone—whether a first-time buyer or an advanced gamer.

2. LITERATURE SURVEY:

In this section, we have reviewed significant studies and projects relevant to online PC- building platforms, component-compatibility tools, and e-commerce-driven hardware solutions.

These prior works provide insights into the challenges and limitations of existing solutions and highlight the need for a modern, integrated platform such as PCBUILD.

" PCPartPicker: A Web-based PC Building and Compatibility Checking Platform" Independent project widely used by global PC-building communities. Initial launch: 2011, with continuous development and updates. The PCPartPicker is a popular online platform that allows users to select PC components and automatically checks for hardware compatibility. It also provides historical pricing data, user-generated build guides, and links to external retailers for purchasing components. Web-based architecture with integrated retailer APIs, community forums, and database-driven compatibility rules. Drawbacks a. No native build-to-cart purchase on a single platform; relies on external vendors. b. Limited to component selection — does not offer pre-built PC purchasing. c. Lacks role-based admin management for sellers or system integrators. d. Basic user interface for beginners; no step-by-step wizard or guided instructions. While the platform tracks prices and compatibility, it does not provide advanced sales or

"Implementation of an E-commerce-based Custom PC Builder" Research article presented at the International Conference on Computing and Information Technology (IC2IT), 2019. This study proposed integrating an e-commerce store with a guided PC builder. It focused on letting customers configure a computer by selecting compatible components and adding them to a single cart. Frontend: AngularJS and Bootstrap Backend: PHP with MySQL. Deployment: Standalone web application hosted on shared servers. Drawbacks a. No real-time image hosting or scalable cloud database. b. Lacked product comparison and guest-cart functionality. c. Limited admin tools for inventory and sales analytics. d. Not mobile-optimized for modern users.

"An AI-driven PC Component Recommendation System" Authors:LiWei,ChenYu Journal: Journal of Computer Science & Applications, 2021. This paper proposed an AI-powered recommendation system that suggests optimal PC components based on budget, performance needs, and existing selections. It demonstrated the use of machine-learning algorithms to predict compatibility and performance outcomes. Technologies Used Python for AI models Flask for backend APIs SQLite database Drawbacks a. The system focused on recommendations only and did not provide end-to-end build or purchase features.b. Limited scalability due to use of a local database. c. No real-time inventory or order-management tools. d. Did not support admin-side stock or price management.

"Cloud-Integrated Inventory Management for E-commerce Platforms" Authors:R.Sharma,N.Patel Conference on Cloud Computing and Applications, 2022.This project emphasized using cloud-based solutions for managing inventory, product images, and real-time order processing in small-to-medium-sized online stores. It demonstrated the importance of scalable cloud architecture for reducing downtime and enhancing user experience. Technologies Used Backend:Node.js with Express Frontend: React.js Database: MongoDB Atlas Image Hosting: Cloudinary 5. Drawbacks: a. Did not include specialized compatibility checking tools for PC components.b. Focused primarily on inventory control and logistics rather than on guided purchasing workflows. c. No dedicated pre-built PC showcase or build wizard.

The PCBUILD system follows a modular approach divided into frontend, backend, and database layers. The frontend is designed using React.js and Tailwind CSS to ensure responsive UI/UX. The backend uses Express.js to handle API routes, authentication, and CRUD operations, while MongoDB serves as the database for managing users, products, and custom builds. Cloudinary is used for secure image storage and management. The system flow begins with user authentication, followed by

product exploration, selection, and final configuration. Data is fetched dynamically using REST APIs, ensuring real-time updates across the client and server

3. PROBLEM DEFINITION

The proposed system, PCBUILD, provides a unified platform for custom PC building and pre-built PC purchasing.
Unlike traditional methods where users must browse multiple websites and face confusion regarding compatibility between components, PCBUILD brings all essential tools together in a single platform.
This system aims to help:

- Beginners, who often face challenges in selecting compatible components.
- PC enthusiasts, who need detailed configuration control.
- Admins, who manage stock, prices, and availability of products.

Through its guided Custom PC Build Wizard, Product Comparison tools, and E- commerce integration, the system minimizes effort, reduces errors, and enhances user experience.
Non-registered users can browse products and use the guest cart, but to save builds or place orders, they must register and log in.
Admins can manage inventory, upload images, track sales, and keep product information updated in real time.
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FEATURES OF WEBSITE/APPLICATION:
1. Custom PC Build Wizard:
Provides a guided, step-by-step interface for selecting compatible components such as motherboard, CPU, RAM, storage, GPU, power supply, and cooling solutions.
2. Pre-built PC Showcase:
Displays ready-to-buy PC builds with detailed specifications, price, and sell-price highlights.
3. Product Comparison:
Allows users to compare selected components or pre-built PCs side by side for informed decisions.
4. Session-based Cart:
Both guests and registered users can add items to the cart; registered users can save builds for future reference.
5. Admin Dashboard:
Enables administrators to manage products, prices, stock levels, and view analytics.
6. Cloud Integration:
Uses Cloudinary for reliable product image hosting and MongoDB Atlas for secure, scalable cloud data storage.
7. Role-based Authentication:
Separates admin and client functionalities, ensuring secure data handling.

BENEFITS TO USERS:
1. For Beginners:
• Simplifies PC building with guided steps and compatibility checks.
• Reduces mistakes in selecting incompatible components.
2. For PC Enthusiasts:
• Offers advanced customization with detailed product specifications.
• Provides comparison tools to make better purchase decisions.
3. For Admins:
• Facilitates quick product updates, stock tracking, and analytics.
• Supports better sales insights for improving business strategies.

BENEFITS TO THE PLATFORM:
• Centralized Solution: All essential tools for PC building and purchasing available in one platform.
• Educational Impact: Guides beginners to understand hardware components.
• Time Efficiency: Reduces browsing time by consolidating products and compatibility features.
• Enhanced User Experience: Provides smooth, responsive, and mobile-friendly UI.
• Scalable Architecture: Cloud-based backend ensures performance even during peak usage.

4. GOALS AND OBJECTIVES

GOALS:
1. Simplify Custom PC Building:
Provide a platform that assists users in selecting compatible parts with step-by-step guidance.
2. Enhance Shopping Experience:
Combine PC building and pre-built PC purchases in one platform with real-time updates.
3. Empower Admins:
Offer easy-to-use tools for inventory management and sales analytics.
4. Ensure Scalability & Reliability:
Utilize cloud technologies for seamless growth and high performance.
5. Educate Users:
Help beginners understand hardware compatibility and performance considerations.

OBJECTIVES:
1. Develop a User-Friendly Registration and Login System:
• Allow role-based access (Admin & Client).
• Ensure secure data handling.
2. Create a Guided Custom PC Build Wizard:
• Offer compatibility checks for selected components.
• Provide real-time product data and prices.
3. Integrate Pre-built PC and Product Comparison Features:
• Enable comparison based on specifications and prices.
• Highlight sell-price deals for better user choice.
4. Enable Session-based Cart and Checkout:
• Support guest and registered user workflows.
• Prepare for integration with online payment gateways.
5. Develop an Admin Dashboard with Analytics:
• Provide stock management, sales tracking, and build trend analysis.
• Simplify product uploads with cloud-based image storage.
6. Maintain Data Security and Reliability:
• Use cloud-based solutions (MongoDB Atlas, Cloudinary) to ensure fast, secure access.
• Follow best practices for authentication and authorization.

5. SYSTEM ARCHITECTURE

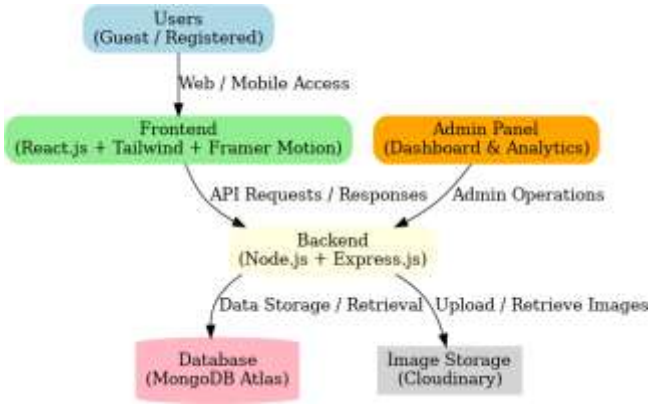

Figure 5.1. System architecture

PCBUILD follows a full-stack, modular architecture designed for scalability, real- time performance, and security.
It comprises the Frontend, Backend, Database, and Cloud Storage, ensuring seamless communication and efficient data flow.

- Frontend:

Built with React.js, styled using Tailwind CSS, and enhanced with Framer Motion for interactive animations.
It provides an intuitive interface for both admins and users, enabling them to browse products, build PCs, compare components, and manage orders. Backend: Developed using Node.js with Express.js, it handles user authentication, business, logic, and API communication between the frontend and the database. Database: Managed by MongoDB Atlas, it stores user profiles, product details, compatibility rules, cart data, and order histories. Cloud Storage: Cloudinary is integrated to store and deliver product images quickly and reliably.
5.2 .Use Case Diagram:
The use-case diagrams illustrate how different users (Admin and Client) interact with PCBUILD core features.

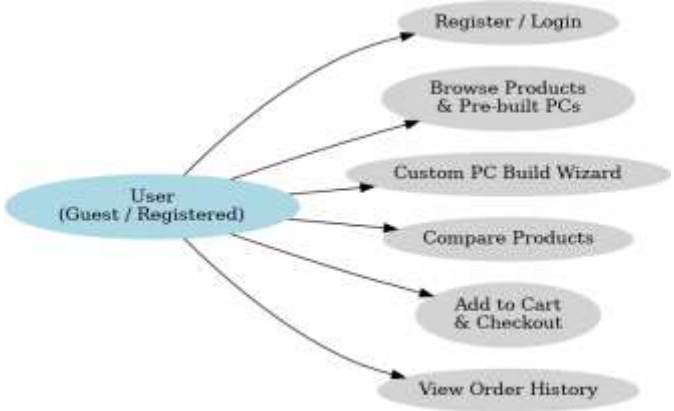

Figure 5.2: Client/User Side
The Client (User) use-case diagram demonstrates how users interact with the system:

- Guest Users:
- Browse products and pre-built PCs.
- Add items to the guest cart.
- Registered Users:
- Register/Login.
- Access the Custom PC Build Wizard.
- Save custom builds and add products to cart.
- Compare products (components or pre-built PCs).
- Proceed to checkout and manage order history.
- Update profile and view purchase status.

The diagram shows user interactions with modules such as Homepage, Build Wizard, Pre-built PCs, Comparison Page, Cart & Checkout, and User Profile.

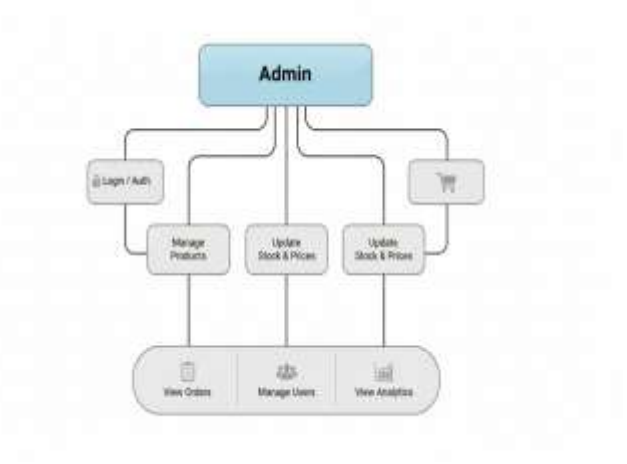

Figure 5.3: Admin Side

The Admin use-case diagram shows how admins manage the platform:

- Login/Authentication: Access to admin dashboard.
- Product Management: Add, update, delete, and organize products (components & pre-built PCs).
- Stock & Price Updates: Adjust inventory levels and pricing in real-time.
- Order & User Management: View user data, process orders, and handle customer issues.
- Analytics: Track sales reports, product performance, and user engagement trends.

6. RESULTS AND DISCUSSION:

The final system successfully integrates multiple modules to deliver a smooth and interactive user experience.

User Features:

- Browse and compare PC components
- Build your own PC with real-time compatibility checks
- Add to cart, checkout, and pay securely
- Manage orders and view history

Admin Features:

- Upload or delete components
- Manage stock and pricing
- Monitor sales and transactions
- View registered users and roles

The **frontend's modern design**, combined with **backend scalability**, ensures fast and reliable performance. The **Razorpay gateway** guarantees transaction security and reliability.

Sample Outputs:

Figure 6.1:Home Page

The **Home Page** serves as the central dashboard for users. It showcases featured products, categories like CPU, GPU, RAM, and Motherboard, and includes banners for sales or discounts. The page also integrates quick links for "Build Your PC" and "Compare Products" features.

Figure 6.2:Custom PC Build Page

This page allows users to **select compatible PC components** such as CPU, motherboard, graphics card, storage, and power supply.

Once selections are made, the total price is automatically calculated and displayed. The interface is dynamic, ensuring compatibility suggestions and real-time updates.

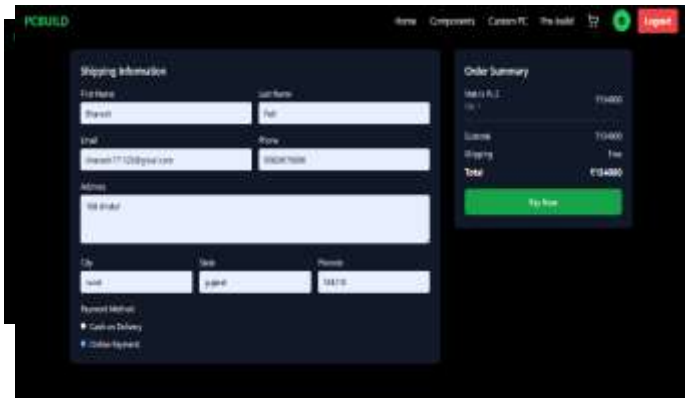

Figure 6.3:Cart & Checkout Page

This page displays selected items, including product details, quantity, and total cost.

Users can proceed to checkout using **Razorpay integration**, which ensures secure online transactions. The page also allows coupon or discount applications before payment.

Figure 6.4:Admin site order page

The **Admin Panel** provides tools to manage products, stock, users, and orders.

Admins can view total sales, active users, and product statistics. They can also upload new components, adjust stock levels, and remove or edit existing products with ease

3. CONCLUSIONS

The The **PCBUILD** project demonstrates the effective integration of full-stack web technologies to create a user-centric and scalable e-commerce platform. It addresses major challenges in the PC-building community by offering a structured and easy-to-use solution.

The project not only enhances user experience but also showcases modern development practices like **REST APIs, modular design, and cloud integration**. Future improvements can include **AI-based recommendations, live chat support, mobile app development,** and **real-time compatibility checks** between PC components

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REFERENCES

[1] React Documentation (Meta Platforms Inc.), "React – A JavaScript library for building user interfaces." Retrieved from https://react.dev

[2] Node.js Foundation, "Node.js – JavaScript runtime built on Chrome's V8 JavaScript engine." Retrieved from https://nodejs.org

[3] MongoDB Inc., "MongoDB – The Developer Data Platform." Retrieved from https://www.mongodb.com

[4] Vite.js Developers, "Vite – Next Generation Frontend Tooling for Modern Web Projects." Retrieved from https://vitejs.dev

[5] Tailwind Labs, "Tailwind CSS – A Utility-First CSS Framework for Rapid UI Development." Retrieved from https://tailwindcss.com

[6] Razorpay Software Pvt. Ltd., "Razorpay Payment Gateway Integration Guide." Retrieved from https://razorpay.com/docs/

[7] Express.js Developers, "Express – Fast, Unopinionated, Minimalist Web Framework for Node.js." Retrieved from https://expressjs.com

[8] Framer Motion Documentation, "Framer Motion – Open Source Motion Library for React." Retrieved from https://www.framer.com/motion/

[9] GitHub Documentation, "GitHub – Distributed Version Control and Collaboration Platform." Retrieved from https://docs.github.com

[10] **MDN Web Docs (Mozilla)**, "JavaScript Reference – Core Language Features and Web APIs." Retrieved from https://developer.mozilla.org

[11] R.Muthumeenakshi, Balasubramaniam S., Charanjeet Singh, Pallavi V. Sapkale, M M Mukhedkar, "An Efficient and Secure Authentication Approach in VANET Using

Location and Signature-Based Services",Ad Hoc & Sensor Wireless Networks 53 (Issue 1-2), 59-83, 2022.
[12] Uttam D. Kolekar, M M Mukhedkar, "Development of Optimized and Secure Routing Algorithm using AODV, ACO and LSB Steganography for Mobile Ad-Hoc Network", Journal of Advanced Research in Dynamical and Control Systems (JARDCS),Vol. 11, issue 9, pp. 560-568, Sept 2019.
[13] Sandeep B Hake, M M Mukhedkar, "Design and development of universal test bench for engine aftertreatment controls system", International journal of advanced research in electronics and communication engineering, Volume 6, Issue 4, Pages 309-312, 2017.
[14] Samarjeet Powalkar, M M Mukhedkar, "Fast face recognition based on wavelet transform on pca" International Journal of Scientific Research in Science, Engineering & Technology, Vol 1, Issue 4, PP 21-24, 2015.
[15] U Waghmode, DP Deshmukh, S Ekshinge, A Kurund, M M Mukhedkar "An Innovative Approach Using Cyber Security for Steganography for Wireless Adhoc Mobile Network Application"
[16] International Conference on Science Technology Engineering and Management (ICSTEM), Pages 1-5, 2024.
[17] C Kaur, DS Rao, S Bandhekar, M M Mukhedkar "Enhanced Land Use and Land Cover Classification Through Human Group-based Particle Swarm Optimization-Ant Colony Optimization Integration with Convolutional Neural Networ", International Journal of Advanced Computer Science & Applications, Vol 14, Issue 11, 2023.
[18] Divya Rohatgi, Veera Ankalu Vuyyuru, KVSS Ramakrishna, Yousef A Baker El-Ebiary, V Antony Asir Daniel, M M Mukhedkar "Feline Wolf Net: A Hybrid Lion-Grey Wolf Optimization Deep Learning Model for Ovarian Cancer Detection", International Journal of Advanced Computer Science and Applications, Vol 14, Issue 9, 2023.

[19] Uttam D. Kolekar, M M Mukhedkar, "Trust-Based Secure Routing in Mobile Ad Hoc Network Using Hybrid Optimization Algorithm", The Computer Journal, Oxford University Press, Vol. 62, issue 10, pp.1528-1545, Oct 2019.
[20] Uttam D. Kolekar, M M Mukhedkar, "E-TDGO: An Encrypted Trust based dolphin glowworm optimization for secure routing in mobile ad-hoc network", International Journal of Communication Systems, Wiley publication, Vol. 33, issue 7, May 2020.
[21] Moresh Mukhedkar, Dilip P Deshmukh, Abhijeet Kadam, "Efficient Development of Gesture Language Translation System using CNN"15th International Conference on Computing Communication and Networking Technologies (ICCCNT) Pages 1-6, 2024.
[22] Moresh Mukhedkar, Prajwal Kote, Mounesha Zonde, Om Jadhav, Vaibhav Bhasme, Nitin A Dawande "Advanced and Secure Data Sharing Scheme with Blockchain and IPFS: A Brief Review"15th International Conference on Computing Communication and Networking Technologies (ICCCNT), Pages 1-5, 2024.
[23] Prasant, P., Saravanan, D., Sangeethapriya, J., Mukhedkar, M. "NR layer 2 and layer 3" Machine Learning for Mobile Communications, Taylor & Francis, CRC Press, pp. 32–45, 2024.
[24] Borana, G.K., Vishwakarma, N.H., Tamboli, S., Mukhedkar, Moresh M., Dawande, N.A., "Defending the Digital World: A Comprehensive Guide Against SQL Injection Threats" 2nd International Conference on Inventive Computing and Informatics, ICICI, pp. 707–714, 2024.
[25] Mukhedkar, Moresh M., Deshmukh, D.P. et.al, "An Innovative Approach Using Cyber Security for Steganography for Wireless Adhoc Mobile Network Application" International Conference on Science, Technology, Engineering and Management, 2024.