**Project Design Phase**

**Solution Architecture**

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| Date | 19 April 2025 |
| Team ID | SWTID1745000177 |
| Project Name | ShopEZ: E-commerce Application |
| Maximum Marks | 4 marks |

**Solution Architecture:**

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

* Find the best tech solution to solve existing business problems.
* Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
* Define features, development phases, and solution requirements.
* Provide specifications according to which the solution is defined, managed, and delivered.

Solution Architecture of ShopEZ:

1. Client:  
     
   User: Represents the end-user (shopper or seller) who interacts with the ShopEZ web app.  
     
   ShopEZ Web App: The front-end application accessed by the user through their browser.  
     
   Browser: The web browser used by the client to access the application.

* User: Represents the end-user who interacts with the stock trading web app.
* ShopEZ E-commerce Application: The front-end application accessed by the user through their browser.

1. **Browser:** The web browser used by the client to access the web application.
2. Backend:  
     
   Node.js: The JavaScript runtime environment used for server-side operations.  
     
   Express.js: A web application framework for Node.js, managing HTTP requests and routing.

* Node.js: The JavaScript runtime environment used for building the server-side of the application.
* Express.js: A web application framework for Node.js, used to handle HTTP requests and route them to the appropriate handlers.

1. Frontend:  
     
   React.js: The JavaScript library used to build the ShopEZ user interface, enabling dynamic interactions such as product browsing and checkout.

* React.js: The JavaScript library used for building the user interface of the web app. React components are rendered in the browser, providing a dynamic and responsive user experience.

1. Database:  
     
   MongoDB: The NoSQL database used to store collections for Users, Carts, Orders, and Products.

* MongoDB: The NoSQL database used to store user information, stock data, transaction history, and other relevant data for the web app.

1. External Services:  
     
   Payment Gateway API: For secure and seamless transaction processing.  
     
   Email/Notification Service: Sends order confirmations and status updates to users.

* Stock Market Data API: An external service used to fetch real-time stock market data, which is crucial for providing up-to-date information to the users.
* Notification Service: An external service used to send notifications to users about their transactions, stock price changes, or other important events.

Interaction Flow for ShopEZ:

1. Client Interaction:  
     
   The user accesses ShopEZ via a browser and interacts with the intuitive React-based UI.

* The user interacts with the stock trading web app through their browser.

1. Request Flow:  
     
   HTTP requests from the browser are handled by the Node.js and Express.js backend.

* The browser sends an HTTP request to the WebServer (Node.js with Express.js) to access the web app.

1. User Actions:  
     
   Users can browse products, filter options, add items to their cart, and complete purchases. Sellers can manage inventory and view analytics via their dashboard.

* The user interacts with the React components in the app (e.g., checking stock prices, making transactions).
* These interactions result in API calls from the React app to the WebServer.

1. Data Operations:  
     
   The backend handles API calls and performs operations on Users, Orders, Products, and Carts stored in MongoDB.

* The WebServer handles these API calls and performs CRUD (Create, Read, Update, Delete) operations on the MongoDB database.

1. External Services Interaction:  
     
   The backend interacts with the Payment Gateway for transactions and Notification Service for order-related messages.

* The WebServer fetches real-time stock data from the Stock Market Data API and sends notifications via the Notification Service when necessary.
* The fetched data is saved in the MongoDB database for future use and quick access.

1. Response Flow:  
     
   The backend sends responses back to the React frontend, which updates the UI with real-time feedback such as order confirmation.

* The WebServer processes the data and returns the API responses to the React app.
* The React app updates the user interface based on the responses, providing the user with real-time data and feedback.

Notes:  
  
Client Note: Users experience a seamless interface for product discovery and checkout.  
  
Database Note: MongoDB stores Users, Carts, Orders, and Products.  
  
External Services Note: Secure payments and real-time order updates are handled via APIs.

* Client Note: The client interacts with the React.js application, which is served by the Node.js and Express.js backend.
* Database Note: MongoDB is used for storing user information, stock data, and transaction history.
* External Services Note: External services are used for fetching real-time stock market data and sending notifications to users.

**Solution Architecture Diagram:**

A diagram of a software application

Description automatically generated with medium confidence

Figure 1: Architecture and data flow of the stock trading web application