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A Web Application for Enhancing Stock Analysis Using Power BI and AWS

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ABSTRACT: The goal of this project is to enhance the Stock Monitoring Application by improving stock optimization by 30% and increasing on-time deliveries by 40%. The application is designed to efficiently manage inventory levels, reduce costs, and improve service levels by utilizing strategies that determine the optimal stock quantity for each item. Built with frontend technologies like HTML, CSS (using Tailwind), JavaScript, and the React framework, the application ensures an intuitive, user-friendly interface. The backend is powered by Node.js and Express.js, facilitating smooth server-side operations, while user data and logins are securely stored in a MongoDB database, ensuring scalability and reliability. The integration of Stripe payment gateway ensures secure, seamless transactions, allowing businesses to handle payments efficiently. The application also features two dashboards, one for admins and another for users, to provide targeted functionalities for each user type. Admins can view and manage orders, monitor inventory, and track performance, while users can easily place orders and view available products. Integrated with Power BI, the application visualizes key business metrics, such as stockouts, available products, and profits, through interactive reports and dashboards, enabling informed decision-making. The application is deployed on AWS EC2 for scalability, with an S3 Bucket used for secure, accessible data storage. This infrastructure ensures high availability, performance, and the ability to scale as needed, offering businesses a reliable, data-driven solution for optimizing inventory and improving operational efficiency.

KEYWORDS: Stripe, E-commerce, EC2, Data-visualization, StockOuts, Amazon Web Services, Simple Storage service.

I. INTRODUCTION

This project involves developing a full-stack web application aimed at optimizing stock monitoring and improving delivery processes. The application seeks to enhance stock optimization by 30% and increase on-time deliveries by 40%, addressing key operational challenges to reduce costs and improve customer satisfaction. The application's frontend is built using React and Tailwind CSS to deliver a responsive, interactive user interface. React's component-based architecture ensures reusability and accelerates feature development, while Tailwind CSS provides a utility-first framework for creating visually appealing and responsive designs. Together, these tools ensure a seamless and engaging user experience across devices for both customers and administrators. The backend utilizes Node.js and Express.js to enable scalable and efficient server-side development. Node.js's non-blocking I/O model handles multiple simultaneous requests, while Express.js simplifies routing and middleware integration. RESTful APIs facilitate seamless communication between the frontend and backend, ensuring a responsive and efficient application. MongoDB, a flexible NoSQL database, is used to manage data such as user profiles, product details, and orders. Real-time synchronization ensures customers have access to the latest stock and order information. Robust security measures, including encrypted passwords, token-based authentication, and OTP validation for sensitive actions, safeguard user data and transactions.

Secure payment processing is integrated through Stripe, supporting credit cards and digital wallets. OTP validation further enhances transaction security, reducing the risk of fraud. The application also features dashboards tailored for different user groups. Customers can view order details, track deliveries, and manage their shopping carts. Administrators benefit from tools to monitor inventory, manage product listings, and analyze sales performance. Integration with Microsoft Power BI enhances decision-making by providing interactive reports and visualizations of stock levels, sales trends, and user activity. These insights enable proactive decisions to optimize inventory and delivery operations. To ensure reliability and scalability, the project leverages AWS for hosting and storage. EC2 manages computing resources, while S3 provides secure storage for static assets and user content, ensuring consistent performance under varying traffic loads. By combining advanced technologies, secure payment systems, and data visualization tools, this application addresses critical challenges in inventory management and delivery processes. It

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enhances operational efficiency, reduces costs, and improves customer satisfaction, making it an essential solution for businesses seeking to optimize performance and drive growth.

II. LITERATURE SURVEY

The paper proposes using a data warehouse and Kimball's dimensional design methodology to build a business intelligence system. It transforms transaction data via the ETL process and visualizes insights through Power BI dashboards, focusing on customer satisfaction, product ratings, and delivery delays. While highlighting benefits like improved customer analysis, stock management, and financial performance, it overlooks key issues related to data quality, integration, and governance, essential for an effective system.[1]

The paper presents the design of a web-based e-commerce information system using HTML, CSS, JavaScript, React, Bootstrap, Node.js, Express.js, and MongoDB. It employs a structured system development approach, including flow maps, context diagrams, and multi-level DFDs. The system enhances admin efficiency in data processing, bookkeeping, and campaigns while aiding consumers in product selection. Addressing privacy concerns, it prioritizes data security with SSL certificates, secure payment gateways, and compliance with regulations.[2]

The study highlights the role of ETL in ensuring accurate data for Business Intelligence (BI) systems by cleaning and standardizing data for analysis. Using an OLAP schema and Artificial Neural Networks (ANNs), it analyzes and forecasts pharmacy drug stock, enabling proactive inventory management. This "Deep Inventory Management" approach leverages machine learning for precise predictions, improving stock optimization through high-quality data processing and enhanced decision-making, benefiting the pharmacy's operations.[3]

The Vercelli methodology was applied to assess the impact of using business intelligence tools on the decision-making process in organizations, specifically in sales marketing. The empirical data for the case study were extracted from the web using Microsoft Power BI Desktop. The study applies the Vercellis methodology to assess the impact of using business intelligence tools on the decision-making process in organizations, specifically in sales marketing. This research paper do not explain clearly about the vercellis methodology. By using the vercellis method, the dataset can consists of duplicate data which decreases the accuracy. The paper showed that implementing business intelligence tools and integrated dashboards can enhance the decision-making process in organizations, particularly in the sales marketing area. These tools enable the integration and analysis of data from various sources, providing real-time access to valuable information for making informed business decisions.[4]

The paper aims to analyze Amazon Web Services (AWS) infrastructure by leveraging passive network measurements, which allow for non-intrusive observation of traffic patterns and internal communication. The rise of cloud computing has created a need to understand cloud infrastructure characteristics, traffic patterns, and inter-data center interactions to optimize resource allocation and ensure efficient performance. Unlike previous studies that used active measurement techniques, this research employs passive measurements to analyze AWS's internal and external communication patterns without influencing traffic behavior. Research by Benson et al. explored inter-data center communication using active measurements. This paper addresses the gap by analyzing real-world AWS traffic flows using passive methods, which are non-intrusive. The authors collected and analyzed traffic data from a university network, focusing on flow-level characteristics and interactions between AWS regions[5].

III. METHODOLOGY

The implementation Main Project is divided into the following modules keeping every module consisting of main functionality in the whole project. Inventory Management: Inventory management is the process of overseeing and controlling the flow of goods and materials within an organization. It involves optimizing the levels of inventory to meet customer demand while minimizing costs associated with holding excess stock. Key aspects of inventory management include inventory planning, forecasting demand, procurement, storage, and order fulfillment. Effective inventory management aims to strike a balance between ensuring product availability to meet customer demands and avoiding overstocking, which can tie up capital and lead to increased storage costs. It involves implementing strategies such as just-in-time inventory, economic order quantity (EOQ) models, and inventory optimization techniques to optimize stock levels. Furthermore, inventory management plays a crucial role in enhancing operational efficiency, reducing stockouts, improving customer satisfaction, and maximizing profitability. By leveraging inventory management software and advanced analytics tools, organizations can gain insights into inventory performance, identify trends, and make data-driven decisions to optimize their inventory management processes. AWS (Amazon

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Web Services):AWS, or Amazon Web Services, is a comprehensive cloud computing platform offered by Amazon.com. It provides a wide range of cloud services, including computing power, storage, databases, networking, analytics, machine learning, and artificial intelligence, among others. AWS offers a highly scalable, reliable, and secure infrastructure that enables organizations to build and deploy applications and services quickly and efficiently. Someofthekeyservicesoffered byAWSinclude:

Amazon EC2 (Elastic Compute Cloud): A web service that provides resizable compute capacity in thecloud, allowing users to launch virtual servers, known as instances, to run applications. Amazon S3 (Simple Storage Service): A scalable object storage service that allows users to store and retrieve data from anywhere on the web. S3 provides highly durable and available storage with high throughput and low latency. Amazon RDS (Relational Database Service): A managed database service that makes it easy to set up,operate, and scale relational databases in the cloud, such as MySQL, PostgreSQL, and SQL Server. Amazon Redshift: A fully managed data warehouse service that allows users to analyze large datasets using SQL queries. Redshift is optimized for high-performance analysis of structured data. DeptofIT,GMRIT Page 22 Main Project 2024 Amazon Lambda: Aserverless computing service that allows users to run code in response to events without provisioning or managing servers.AWS offers pay-as-you-go pricing models, allowing users to pay only for the resources they consume, with no upfront costs or long-term commitments. This makes AWS an attractive option for organizations of all sizes, from startups to enterprise-level businesses, looking to leverage the benefits of cloud computing. S3 Bucket: Amazon S3 (Simple Storage Service) is a scalable object storage service offered by AWS, designed to store and retrieve any amount of data from anywhere on the web. S3 uses a concept called "buckets" to organize and manage data storage.An S3 bucket is a container for objects stored in S3. It acts as a logical unit of storage that can hold an unlimited number of objects, each of which can be up to 5 terabytes in size. Objects stored in S3 buckets can include files, images, videos, documents, and other types of data.S3 buckets are globally unique, meaning that each bucket name must be unique across all of AWS. When creating a new bucket, users must choose a globally unique name for the bucket, which will be used to access the bucket and its contents.S3 buckets can be configured with various features and settings, including access control policies, versioning, encryption, and lifecycle management. Access to S3 buckets and objects can be controlled using AWS Identity and Access Management (IAM) policies, allowing users to define who can access the data and what actions they can perform.S3 buckets play a critical role in many AWS services and applications, serving as a central repository for storing and accessing data in the cloud. They are commonly used for data backup and archiving, website hosting, content distribution, and as a data lake for analytics and big data processing. Power BI:Power BI is a business analytics tool developed by Microsoft that allows users to visualize and analyze data from various sources to gain insights into their business operations.

It provides a suite of tools for data visualization, business intelligence, and reporting, enabling users to create interactive dashboards and reports to explore and share insights with others. Key features ofPower BI include: Data connectivity: Power BI supports connectivity to a wide range of data sources, including databases, cloud services, files, and online services. It allows users to import data from these sources or connect to them live for real-time analysis. Data modeling: Power BI provides tools for data modeling and transformation, allowing users to clean, reshape, and combine data fromdifferent sources to create a unified view for analysis. Visualization: Power BI offers a variety of visualization options, including charts, graphs, maps, and tables, to represent data in a visually appealing and easy-to-understand format. Users can customize the appearance and formatting of visualizations to suit their preferences. DeptofIT,GMRIT Page 23 Main Project 2024 Interactive dashboards: Power BI enables users to create interactive dashboards that display key metrics and insights in real-time. Dashboards can be customized with filters, slicers, and drill-down capabilities to explore data at different levels of detail. Collaboration and sharing: Power BI allows users to collaborate with colleagues by sharing dashboards and reports, either internally within their organization or externally with clients or partners. It provides features for managing access permissions and controlling data security. Power BI is available in various editions, including Power BI Desktop (a free desktop application for building reports), Power BI Pro (a subscription-based service for sharing and collaborating on reports), and Power BI Premium (a dedicated capacity for large-scale deployments and enterprise- grade features). E-commerce: E-commerce, short for electronic commerce, refers to the buying and selling of goods and services over the internet. It encompasses a wide range of online transactions, including online retail, digital downloads, online auctions, and electronic payments.E-commerce has become increasingly popular in recent years, driven by advances in technology, changes in consumer behaviour, and the widespread adoption of mobile devices and internet connectivity. It offers numerous benefits for both businesses and consumers, including: Convenience: E-commerce allows consumers to shop from the comfort of their homes or on the go, anytime and anywhere, without the need to visit physical stores. Global reach: E-commerce enables businesses to reach a global audience, breaking down geographical barriers and expanding their customer base beyond traditional brick-and-mortar locations. Cost savings: E-commerce can help businesses reduce overhead costs

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associated with maintaining physical stores, such as rent, utilities, and staffing. It also allows for more efficient inventory managementand order fulfilment processes. Personalization: E-commerce platforms can collect data on customer preferences and behavior, allowing businesses to personalize the shopping experience with targeted promotions, recommendations, and personalized product offerings. Accessibility: E-commerce makes it easier for individuals with disabilities or mobility limitations to access products and services, as they can shop online from their own devices using accessible interfaces.Key components of an e-commerce ecosystem include: Online storefront: The website or digital platform where customers browse products, make purchases, and interact with the business

IV. SECURITY

Spectrum sensing: Detecting unused spectrum and sharing it, without harmful interference to other users; an important requirement of the cognitive-radio network to sense empty spectrum. Detecting primary users is the most efficient way to detect empty spectrum. Spectrum-sensing techniques may be grouped into three categories:

Transmitter detection: Cognitive radios must have the capability to determine if a signal from a primary transmitter is locally present in a certain spectrum. There are several proposed approaches to transmitter detection:
1. Cooperative detection: Refers to spectrum-sensing methods where information from multiple cognitive-radio users is incorporated for primary-user detection.
2. Interference-based detection.
Since primary user networks have no requirement to change their infrastructure for spectrum sharing, the task falls to CRs as secondary users to detect the presence of primary users through continuous spectrum sensing. Spectrum sensing by CRs can be conducted either individually or cooperatively. Recently, the efficacy of cooperative spectrum sensing has gained a great deal of attention. There are several advantages offered by cooperative spectrum sensing over the non-cooperative methods. However, due to the randomness of the appearance of PUs, it is extremely difficult to achieve fast and smooth spectrum transition leading to limited interference to PUs and performance degradation of SUs. Locally collected and exchanged spectrum sensing information is used to construct a perceived environment that will impact CR behaviour. This opens opportunities to malicious attackers. In cooperative spectrum sensing a group of secondary users perform spectrum sensing by collaboratively exchanging locally collected information. Malicious secondary users may take advantage of cooperative spectrum sensing and launch attacks by sending false local spectrum sensing results to others, resulting in a wrong spectrum sensing decision. Two known security threats in CRs are Selfish Primary User Emulation (SPUE) and Malicious Primary User Emulation (MPUE) attack. These types of attacks emulate signals with the characteristics of incumbent primary users to fool other secondary users.

SPUE: In this attack, an attacker's objective is to maximize its own spectrum usage. When selfish attackers detect a vacant spectrum band, they prevent other secondary users from competing for that band by transmitting signals that emulate the signal characteristics of primary user signals. This attack is mostly carried out by two selfish secondary users.

MPUE: In this attack, the objective is to obstruct the DSA process of SUs- i.e., prevent SUs from detecting and using vacant licensed spectrum bands, causing denial of service.

Using the Trust-Worthy algorithm it defines a threshold value to the SUs to overcome the PUE attacks. It enables CR-Networks nodes to efficiently utilize the available spectrum channels. Nodes, which can easily find various licensed channel opportunities without interfering the primary system increases. This reveals that it has a potential to be able to convert the various network conditions into a performance improvement.

V. RESULT AND DISCUSSION

On clicking this http://localhost:3000, we simply redirected to the react application. By clicking this link, the user is redirected to the main interface of the e-commerce application, where they can explore various product categories, view item details, and add items to their cart. This application is built on the latest version of React (React 18), which ensures a smooth, fast, and responsive user experience. The single-page nature of the app, enabled by React's efficient state management and component lifecycle handling, makes it ideal for seamless navigation and real-time interactions with minimal page reloads, giving users a modern shopping experience

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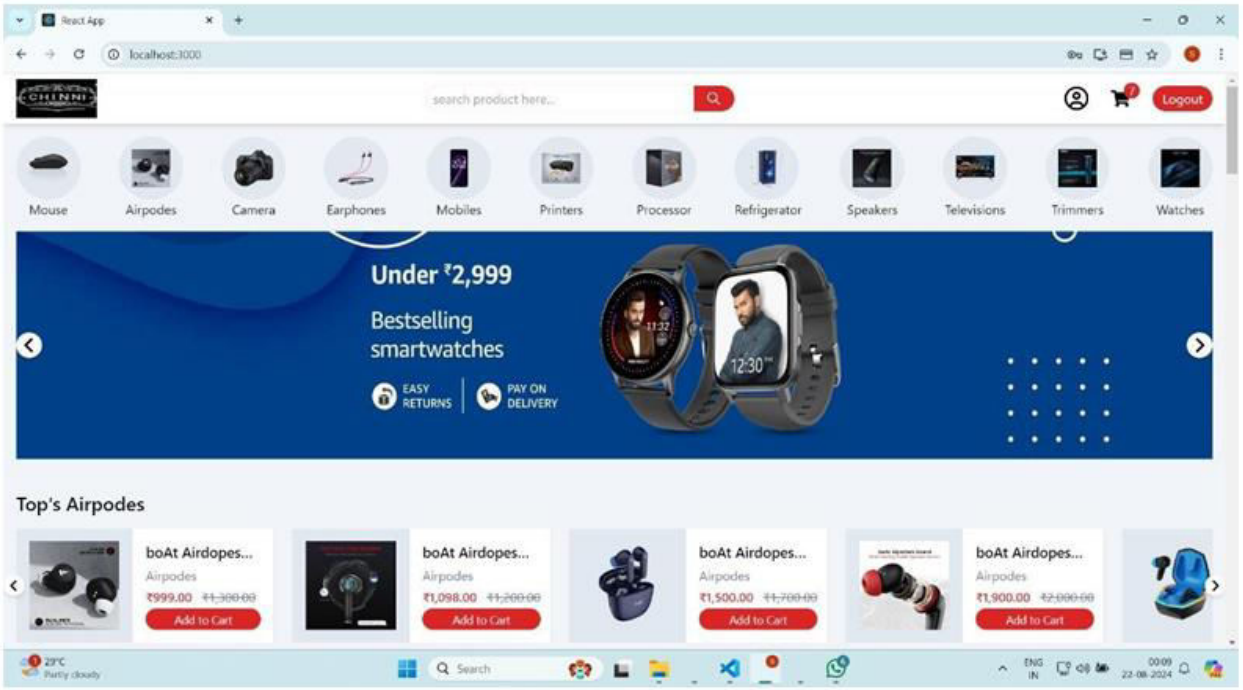

Fig. 1 Dashboard

Step1: We are adding some functionalities such as login functionality as shown in the below figure. focus on designing a user-friendly login page. Start with the user interface, incorporating input fields for email or username and password, along with buttons for login, forgot password, and sign-up. Include a "Remember Me" checkbox to allow users to stay logged in and ensure clear error messages for any failed login attempts.The login page is designed to be user-friendly, focusing on simplicity and functionality to ensure a smooth user experience. The interface includes input fields for email or username and password, making it flexible for different types of login credentials. A clearly visible login button initiates the process, while options like “Forgot Password” and “Sign Up” give users additional control, allowing them to reset their password or create a new account seamlessly.

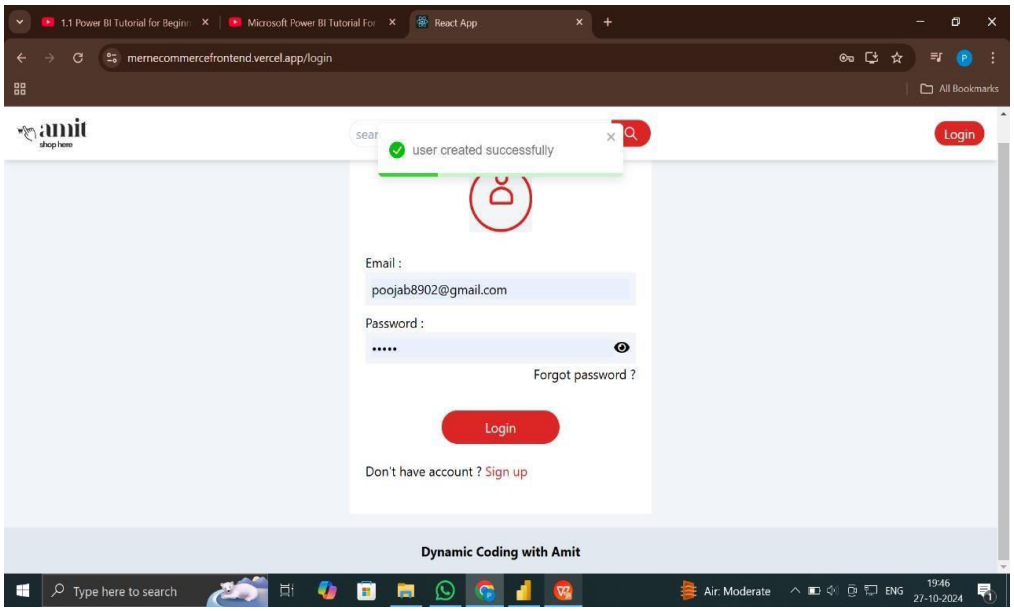

Fig. 2 Login Page

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Step2: Also we are adding search functionality as shown in the below figure. In we are incorporating search functionality into the e-commerce platform. The search feature should include a prominent search bar at the top of the page, allowing users to easily input their queries. Implement features such as auto-suggestions that display relevant product names as users type, enhancing the search experience. The new search functionality on the e-commerce platform is designed to make product discovery fast and intuitive. At the top of the page, a prominent search bar allows users to enter queries, while auto-suggestions provide relevant product names as they type, speeding up their journey to the items they need. Additionally, filter and sorting options enable users to refine results based on categories, price range, revisit previous queries without retyping, and dynamic search results instantly update as users type, ensuring they see the most.The login page is designed to be user- friendly, focusing on simplicity and functionality to ensure a smooth user experience. The interface includes input fields for email or username and password, making it flexible for different types of login credentials. A clearly visible login button initiates the process, while options like “Forgot Password” and “Sign Up” give users additional control.

Uploading .csv files in Power BI: The data stored in the MongoDB database is extracted in CSV format and uploaded to Power BI for visualization. This process begins with querying the MongoDB database to retrieve relevant user data, transaction details, or any other necessary information. Once the data is fetched, it is transformed into a CSV file, ensuring that the structure is compatible with Power BI”s import requirements.

A Power BI report for e-commerce data provides a powerful way to visualize and interpret crucial business metrics, empowering teams to make data-driven decisions. By leveraging Power BI's interactive charts, graphs, and filtering options, businesses can transform raw e-commerce data into an insightful dashboard that displays key performance indicators (KPIs) such as total sales, conversion rates, customer demographics, and product performance. Through these visuals, companies can track trends in customer behavior, identify popular products, and monitor seasonal patterns, helping them tailor marketing strategies and inventory planning. The report’s dynamic features allow users to drill down into specific segments, compare different time periods, and customize views to see data in context. Overall, Power BI reports turn complex datasets into accessible, actionable insights, providing a competitive edge in understanding and optimizing e- commerce performance.

PowerBI Report: The visualization of e-commerce data in a Power BI report enables businesses to gain valuable insights into their operations, customer behaviors, and sales performance. Using Power BI's dynamic visualization tools, e-commerce data can be transformed into engaging and informative dashboards that highlight key metrics. Power BI’s e-commerce report capabilities go beyond static data views, offering real-time, dynamic updates that help businesses stay on top of their operations. For instance, live data feeds can populate sales data in real time, allowing businesses to respond quickly to changes, such as surges in demand or shifts in customer preferences. This immediate insight can be crucial during high-traffic periods, like sales events or holidays, enabling teams to make rapid adjustments to inventory, pricing, and promotions. The report can also include **customer journey tracking**, visualizing each stage from discovery to purchase, and helping businesses identify any friction points in the process. Additionally, **geolocation analysis** tools within Power BI can reveal patterns by region, assisting in tailored marketing strategies for different locations. Businesses can create interactive **heatmaps** for sales by location, revealing regional performance variations and informing localized campaigns.

***Vercel deployment*:** A straightforward process that allows developers to quickly and easily host their web applications. Vercel is a cloud platform optimized for static sites and serverless functions, making it an ideal choice for frameworks like Next.js, React, Vue, and others. To deploy an application on Vercel, you typically start by connecting your GitHub account to Vercel. Once connected, you can import your project directly from your repository. Vercel automatically detects the framework you’re using, sets up the appropriate build settings, and handles the deployment process. Vercel is a popular platform for deploying web applications, especially for frontend frameworks like React, Next.js, and Vue.js. Known for its ease of use, Vercel provides fast, serverless deployment with continuous integration and delivery (CI/CD), enabling developers to rapidly deploy, preview, and ship changes to production. Here’s a quick overview of how deployment on Vercel works.

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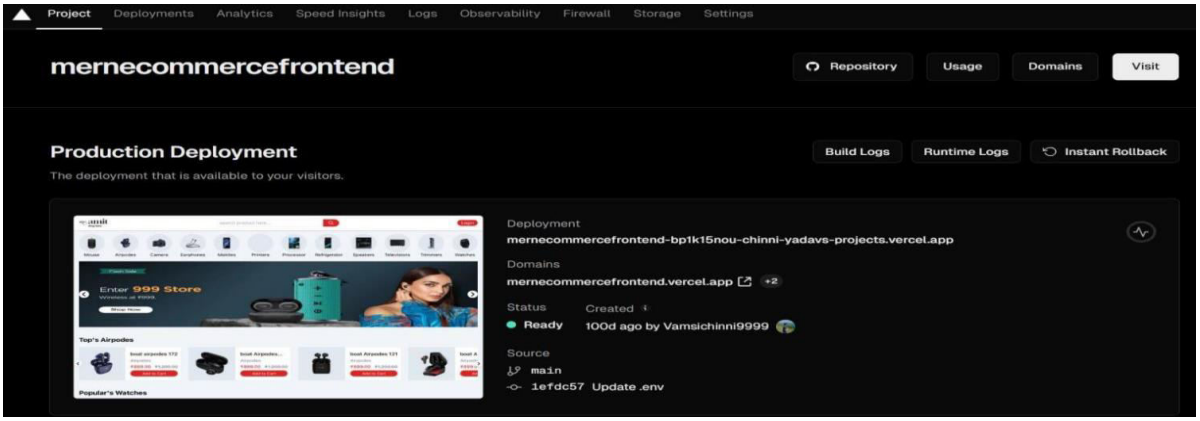

Fig 3: Vercel Deployement Production

Vercel simplifies the deployment process, making it ideal for developers seeking a fast, reliable, and serverless platform to host their web applications. One of its standout features is the seamless integration with GitHub, GitLab, and Bitbucket, enabling continuous deployment. Every time you push code to a repository, Vercel automatically triggers a deployment, ensuring that the latest changes are reflected in real-time. This eliminates the need for manual deployments and allows for easy collaboration between team members.

The platform is optimized for static sites and serverless functions, allowing developers to deploy dynamic applications without managing traditional server infrastructure. This is particularly beneficial for frontend frameworks like React and Next.js, as Vercel provides out-of-the-box optimizations such as server-side rendering (SSR) and static site generation (SSG), improving both performance and SEO. For backend functionality, Vercel offers serverless functions, which can be used to build APIs and handle server-side operations in a scalable, cost-effective manner.

Moreover, Vercel's preview deployments are a major advantage for teams. Whenever a new feature is developed in a separate branch, Vercel generates a preview deployment that can be shared with stakeholders for review. This allows teams to test features in a production-like environment before they go live, helping catch issues early. Custom domain support with automatic SSL encryption addsa layer of security and professional branding, ensuring that sites are not only functional but also secure.

AWS S3: (Amazon Simple Storage Service) deployment involves using a cloud-based storage solution to store and manage data securely and efficiently. In simple terms, it allows users to upload files such as documents, images, videos, and backup onto Amazon's servers, where they can be accessed anytime and from anywhere. To deploy data in S3, you create a "bucket," which is like a folder that holds your files. You can then upload your data to this bucket using the *AWS Management Console,* command line tools, or APIsThis makes S3 a versatile solution for businesses and individuals looking to store and retrieve data in a scalable and cost-effective way.

Transaction details in Stripe:
Transaction details in Stripe provide a comprehensive overview of each payment processed through the platform. Key components include a unique transaction ID that allows for easy tracking and reference, as well as the payment status indicating whether the transaction was successful, pending, or failed. that their sensitive data is encrypted and securely processed by Stripe**.** If your application offers subscription-based services, Stripe can manage recurring billing, handling automated renewals and cancellations with minimal code, which can increase customer retention Stripe sends out detailed transaction receipts and invoices automatically, helping customers track their purchases and providing clear records of payments for easy reference. Stripe's integrated fraud detection and prevention tools, such as **Radar**, analyze payment patterns and flag potentially fraudulent transactions in real-time, reducing risks and ensuring transaction safety. Stripe enables smooth refund management within the application, allowing admins to quickly process refunds, partial or full, directly from the dashboard, thereby improving customer satisfaction. Stripe provides customizable UI components that adapt to the look and feel of your application, ensuring that the checkout process feels integrated and visually consistent. This integration not only enhances security and user trust but also simplifies backend financial management, creating a comprehensive solution that supports growth while maintaining operational efficiency.

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experience where they can complete payments using credit cards, debit cards, and other supported methods. The integration leverages Stripe's advanced security protocols, including **tokenization and encryption**, to protect sensitive information. Additionally, features like **real-time payment processing** and **instant payment notifications** improve user experience and help admins manage transactions efficiently. The Stripe dashboard offers insights into payment metrics, making it easy to track sales, refunds, and payment statuses. This integration not only boosts customer trust through enhanced security but also streamlines the payment process, reducing cart abandonment and improving overall conversion rates. The Stripe integration also brings additional features to the application that enhance the overall user experience and backend functionality. Stripe supports multiple payment methods like Apple Pay, Google Pay, and international credit/debit cards, catering to a global audience and making it convenient for users to pay with their preferred method.

We are adding some functionalities such as login functionality as shown in the below figure. focus on designing a user-friendly login page. Start with the user interface, incorporating input fields for email or username and password, along with buttons for login, forgot password, and sign-up. Include a "Remember Me" checkbox to allow users to stay logged in and ensure clear error messages for any failed login attempts.

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Key features and functionalities of business analytics tools include: Data integration: Business analytics tools can connect to and integrate data from multiple sources, including databases, spreadsheets, cloud services, and external data feeds. This allows users to aggregate and consolidate data from disparate sources for analysis.Data preprocessing: Business analytics tools often include features for cleaning, filtering, and transforming data to ensure its quality and consistency. This may involve tasks such as removing duplicates, handling missing values, and standardizing data formats.Data analysis: Business analytics tools provide a range of analytical capabilities to explore and analyze data. This includes descriptive analytics to summarize and visualize data, diagnostic analytics to identify patterns and trends, predictive analytics to forecast future outcomes, and prescriptive analytics to recommend actions based on data insights.

The motivation for the study is the growing relevance of e-commerce in global trade and the need to distinguish between different types of online transactions. As the digital economy expands, recognizing the differences between e-commerce models helps businesses strategize more effectively. Previous research on e-commerce primarily explored its technical and economic implications, focusing on infrastructure, consumer behavior, and market trends. Studies such as Laudon and Traver (2008) emphasized understanding consumer-focused models like B2C (business- to-consumer), but lacked an in-depth examination of other types. The paper categorizes e-commerce into key models: B2B (business-to-business), B2C (business-to-consumer), C2C (consumer-to- consumer), and B2G (business-to-government). Each model is defined based on the nature of the participants and their interactions, with examples provided to illustrate each type.The study highlights that B2B is one of the most significant e-commerce models in terms of volume and value. Previous research supports this, indicating that B2B transactions often involve supply chain management and large-scale enterprise trading. The paper also examines the growing importance of C2C e-commerce, enabled by platforms like eBay and Craigslist. Studies by Wang et al. (2010) emphasized that C2C models rely heavily on trust and user-generated content to facilitate transactions between individuals. The contribution of this study is to provide a

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comprehensive overview of the main e- commerce types, offering insights into how each model functions and its unique challenges. This classification aids businesses and policymakers in understanding the dynamics of digital trade and the roles played by different stakeholders.

VI. CONCLUSION

In conclusion, this project effectively combines the power of real-time data analysis, secure payment processing, and robust deployment to create a comprehensive e-commerce solution. By integrating Power BI for dynamic visualization, businesses can gain invaluable insights into their operations, customer behavior, and sales performance, making data-driven decisions more accessible and impactful. The seamless integration with Stripe ensures secure and efficient payment transactions, enhancing the user experience with a reliable and trusted gateway. With deployment on AWS EC2, the application becomes globally accessible, providing the scalability and reliability needed for real-time operations. Additionally, the dynamic data visualization in MongoDB ensures that the system remains up-to-date with real-time analytics, allowing for continuous performance monitoring and optimization. This project, through its innovative use of cutting-edge technologies, offers a powerful tool for businesses seeking to optimize their e-commerce operations, enhance customer satisfaction, and drive growth. To further elaborate, this project not only integrates advanced technologies but also creates a seamless ecosystem that enhances both operational efficiency and customer experience. The real-time analytics powered by Power BI offers businesses the ability to instantly visualize and understand crucial e-commerce data, helping to identify trends, optimize product offerings, and streamline decision-making processes. This capability is vital for businesses to stay competitive in the fast-paced e- commerce landscape.

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