Journal of Advances in Developmental Research (IJAIDR)

E-ISSN: 0976-4844 ● Website: www.ijaidr.com ● Email: editor@ijaidr.com

Enhanced Price Comparison System with Price Range Filters

Suryavamshi Sandeep Babu[1], Maddi Prasana[2], Yella Sravanthi[3], Gaddoju Yamini[4], Tikeshwar Kanchan[5]

[1]Assistant Professor, [2,3,4,5]B. Tech 3rd Year Student

[1,2,3,4,5]CSE(AI&ML), Vignan's Institute of Management and Technology for Women, Hyderabad, India.

Abstract:

Online shopping has become an essential part of modern life, but comparing product prices across multiple platforms is often time-consuming and inefficient.

This study presents a smart price comparison website that helps users find the best deals quickly and easily.The system uses Google Shopping as an intermediary to retrieve product data from various sources.It avoids direct data collection from individual e-commerce websites and ensures reliable information. Users can search for products and view details such as price, image, and source platform.When a product is selected, users are redirected to the respective e-commerce website for purchase.

Overall, the system simplifies the shopping process and enhances decision-making efficiency.

Keywords: Price comparison, e-commerce, Google Shopping, filtering system, user interface, data aggregation, online shopping.

I. INTRODUCTION:

Numerous platforms such as Amazon, Flipkart, Myntra, and others offer a wide range of products with varying prices, discounts, and offers. While this diversity provides users with multiple choices, it also creates a challenge in identifying the best deal efficiently. Consumers often need to manually search for the same product across different websites, making the process time-consuming, repetitive, and confusing due to inconsistent data presentation across platforms.Price comparison systems have emerged as a solution to this problem; however, many existing systems rely on direct data extraction techniques, which can be unreliable, restricted, or legally complex. Additionally, several platforms lack effective filtering mechanisms and seamless navigation from product comparison to the final purchase stage, limiting user convenience and overall experience.

To address these challenges, this research paper proposes an enhanced price comparison website that utilizes Google Shopping as an intermediary platform for retrieving aggregated product information. Instead of directly accessing individual e-commerce websites, the system leverages Google Shopping to obtain structured and reliable product listings from multiple sources. The website presents key product details such as price, source platform, and direct links in a unified interface.

Upon selecting a product, users are redirected through Google Shopping to the respective e-commerce website for purchase completion. This approach not only reduces user effort but also enhances accessibility, reliability, and overall user experience, making the price comparison process more efficient and user-friendly.

II. RELATED WORK:

Recent advancements in e-commerce technologies have led to the development of various price comparison systems designed to help users make better purchasing decisions faster. Many existing

platforms attempt to gather product data from multiple online stores. However, most of these systems rely on direct data extraction or web scraping techniques. These methods come with several limitations, including inconsistent data, legal restrictions, and frequent blocking by e-commerce websites. As a result, keeping product information accurate and up to date remains a major challenge.Several researchers have explored centralized product comparison systems that display prices, ratings, and product details in a single interface. Tools such as price tracking websites and browser extensions offer partial solutions by comparing prices across selected platforms. Unfortunately, these tools often lack effective filtering options and smooth navigation from product comparison to the actual purchase page. In addition, many systems do not present data in a consistent format, which confuses users when trying to compare products side by side.

The rise of aggregated platforms like Google Shopping has introduced a more organized approach to product comparison. These platforms collect and structure data from multiple e-commerce sources, providing reliable product listings that include pricing, reviews, and seller information. This reduces the need for directly extracting data from individual websites. However, most existing applications do not fully take advantage of such intermediaries to improve user interaction through customized filters and simple interfaces.
To address these gaps, this research proposes a web-based price comparison system that uses Google Shopping as a data aggregation layer while incorporating an efficient price range filtering mechanism. Unlike traditional systems, the proposed approach focuses on improving usability, reducing manual effort, and offering a smooth transition from product comparison to final purchase through structured redirection.

III. PROPOSED SYSTEM:

A. Overview of the Proposed System:

This research presents a web-based price comparison system that helps users easily find the best deals across multiple e-commerce platforms. The system uses Google Shopping as an intermediary to retrieve aggregated product listings instead of directly accessing individual websites.Users can search for products and view key details such as price, platform, and links in a unified interface. A price range filtering feature is included to allow users to refine results based on their budget. When a product is selected, users are redirected to the respective e-commerce website through Google Shopping to complete the purchase.

The proposed system improves efficiency, reduces manual effort, and provides a simple and reliable price comparison experience.

B. Overall System Architecture:

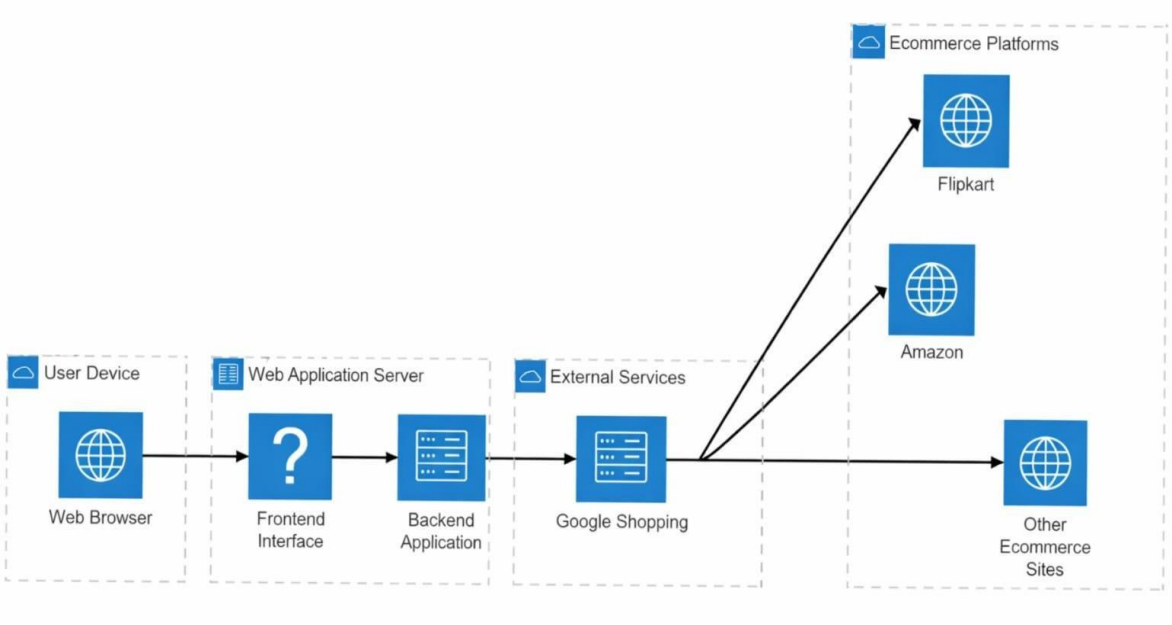

Fig:1 System Architecture

The architecture represents a web-based price comparison system where users interact through a web browser. The backend processes the request and communicates with external services such as Google Shopping to retrieve product information. The system then displays results to the user, and upon selection, redirects them to respective e-commerce platforms like Amazon, Flipkart, and others. This architecture ensures smooth data flow, reliable results, and efficient user interaction.

C. Data Collection Module:

The data collection module retrieves product information from Google Shopping instead of directly accessing individual e-commerce websites. It collects essential details such as product name, price, platform, and product links. This approach ensures consistent, structured, and reliable data for comparison.

D. Filtering Module:

The filtering module allows users to apply price range filters to refine search results. Based on user input, the system displays only relevant products within the selected budget, improving usability and decision-making efficiency.

E. Redirection Mechanism:

The redirection mechanism enables users to navigate from the comparison interface to the actual purchase platform. When a product is selected, users are redirected through Google Shopping to the respective e-commerce website, ensuring a seamless transition.

F. System Efficiency and Performance:

The system improves overall efficiency by reducing manual effort in comparing prices across multiple platforms. By using Google Shopping as an intermediary, it ensures reliable data retrieval, faster response time, and a user-friendly experience.

IV. IMPLEMENTATION DETAILS:

A. Frontend Implementation

The frontend is built using HTML, CSS, and JavaScript. It includes a search bar for entering product names, two input fields for setting minimum and maximum price ranges, and sorting buttons for low-to-high or high-to-low price arrangement. When a user searches, the frontend sends a request to the backend and dynamically displays product cards showing product images, names, prices, and merchant names. Price filtering and sorting are performed instantly on the frontend. Clicking any product card redirects the user to the merchant's website in a new browser tab.

B. Backend Implementation

The backend is built using Node.js and Express. It exposes an API endpoint at /api/search that accepts a product name as a query parameter. The backend validates the request and calls SerpAPI to fetch real-time product data from Google Shopping. It extracts relevant fields such as product name, price, image URL, merchant name, and product link. The cleaned data is then sent back to the frontend as a JSON response. Errors are handled gracefully with appropriate status codes and messages.

C. API Integration and Performance

The system uses SerpAPI as a bridge to Google Shopping. The backend sends a request to https://serpapi.com/search with the product name and API key. The response contains a shopping_results array which is processed and sent to the frontend. A typical search takes one to two seconds. Filtering and sorting happen instantly. The system displays friendly error messages when no results are found or when network issues occur.

V. MODULE SPLIT-UP:

- Provides a simple and interactive user interface with a search bar for product input.
- Captures user queries and sends requests to the backend system.
- Retrieves product details such as price, platform, and links from Google Shopping.
- Displays product results from multiple e-commerce platforms in a structured format.
- Applies price range filtering to show products within the user’s budget.
- Enables users to compare prices easily across different platforms.
- Redirects users to the respective e-commerce website upon product selection.
- Ensures smooth navigation and efficient user experience.

VI. ALGORITHM:

The system follows a step-by-step algorithmic approach to perform product search, price filtering, sorting, and redirection. The algorithm is described below in a structured pseudocode format.

Step 1: Product Search

The algorithm begins by accepting a product name as input from the user. If the product name is empty or null, the system displays an error message saying "Enter product name" and stops further execution. If the product name is valid, the system sends a request to the backend API along with the product name.

Step 2: Data Retrieval

The backend receives the request and calls the SerpAPI service to fetch product data from Google Shopping. Once the data is received, the system extracts key details for each product including the product name, price, image URL, product link, and source merchant name. All extracted products are stored in a list for further processing.

Step 3: Price Range Filtering
The system accepts minimum price and maximum price values from the user. It then iterates through each product in the product list. If a product's price falls within the range between the minimum and maximum values, that product is added to a new filtered list. Products outside the specified price range are discarded from the results.

Step 4: Sorting
The system accepts a sort order from the user which can be either "low" for low to high price or "high" for high to low price. If the sort order is "low", the filtered list is sorted in ascending order so the cheapest product appears first. If the sort order is "high", the filtered list is sorted in descending order so the most expensive product appears first.

Step 5: Display and Redirection
The final filtered and sorted list is displayed to the user in the form of product cards showing images, prices, and merchant names. When the user clicks on any product, the system opens the corresponding product link in a new browser tab, redirecting the user to the merchant's website to complete the purchase.

VII. PSEUDO CODE:

BEGIN

INITIALIZE web server and API connection LOAD frontend interface

WHILE system is running DO WAIT for user input
GET product_name from search bar
GET min_price, max_price from filter inputs GET sort_order from sorting buttons

IF product_name is empty THEN DISPLAY "Please enter a product name" CONTINUE
END IF

SEND request to backend API with product_name RECEIVE product_list from SerpAPI via Google Shopping

FOR each product in product_list DO EXTRACT name, price, image, link, source
END FOR

SET filtered_list = empty list

FOR each product in product_list DO
IF product.price >= min_price AND product.price <= max_price THEN ADD product to filtered_list
END IF END FOR

IF sort_order = "low" THEN
SORT filtered_list in ascending order by price ELSE IF sort_order = "high" THEN
SORT filtered_list in descending order by price END IF

DISPLAY filtered_list as product cards on dashboard WAIT for user click on any product
IF user clicks on product THEN
OPEN product.link in new browser tab END IF

END WHILE
END

VIII. RESULTS:

A. System Interface and Functionality

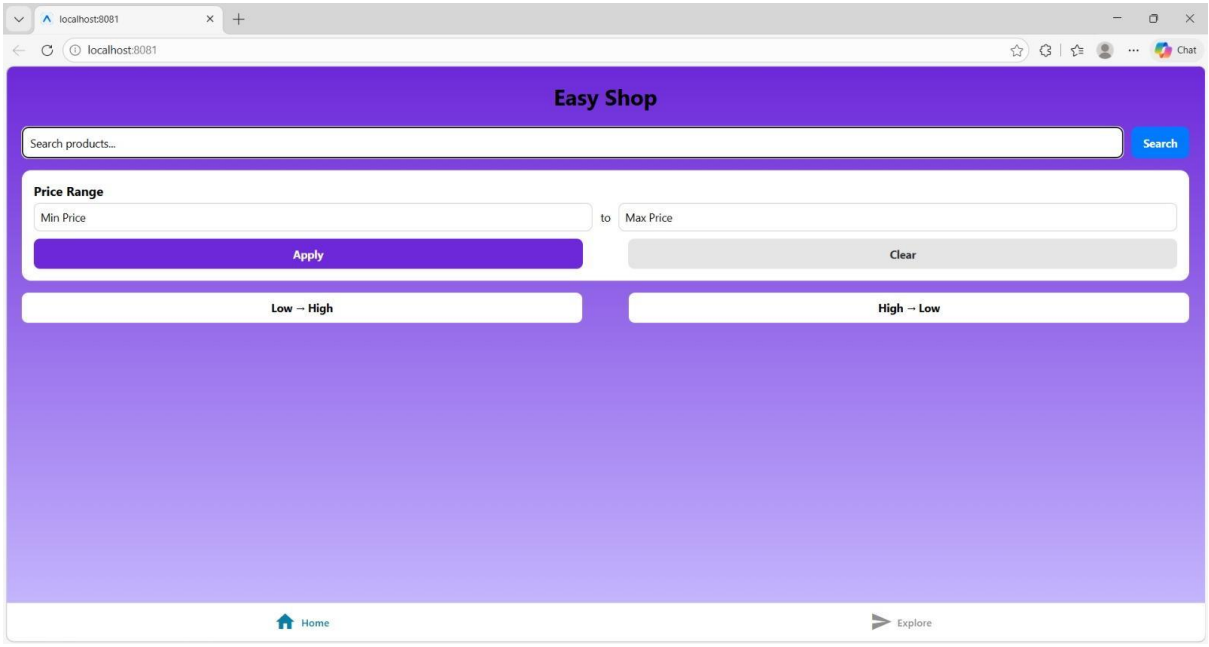

Fig. 1: Starting Page – Search Interface

The homepage features a search bar, price range inputs (Min/Max Price), filter controls, and sorting options (Low–High / High–Low).

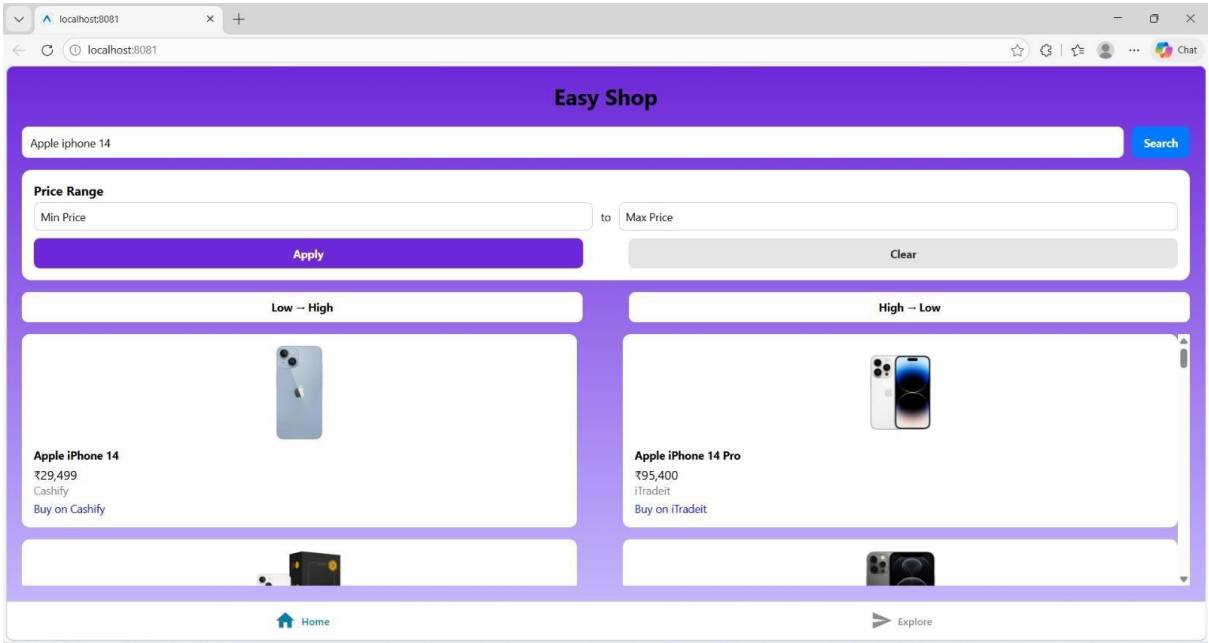

Fig. 2: Search Results After Product Query

When searching for "Apple iPhone 14," the system displays product cards with merchant names, prices, and purchase links from multiple platforms including Cashify and iTradetit.

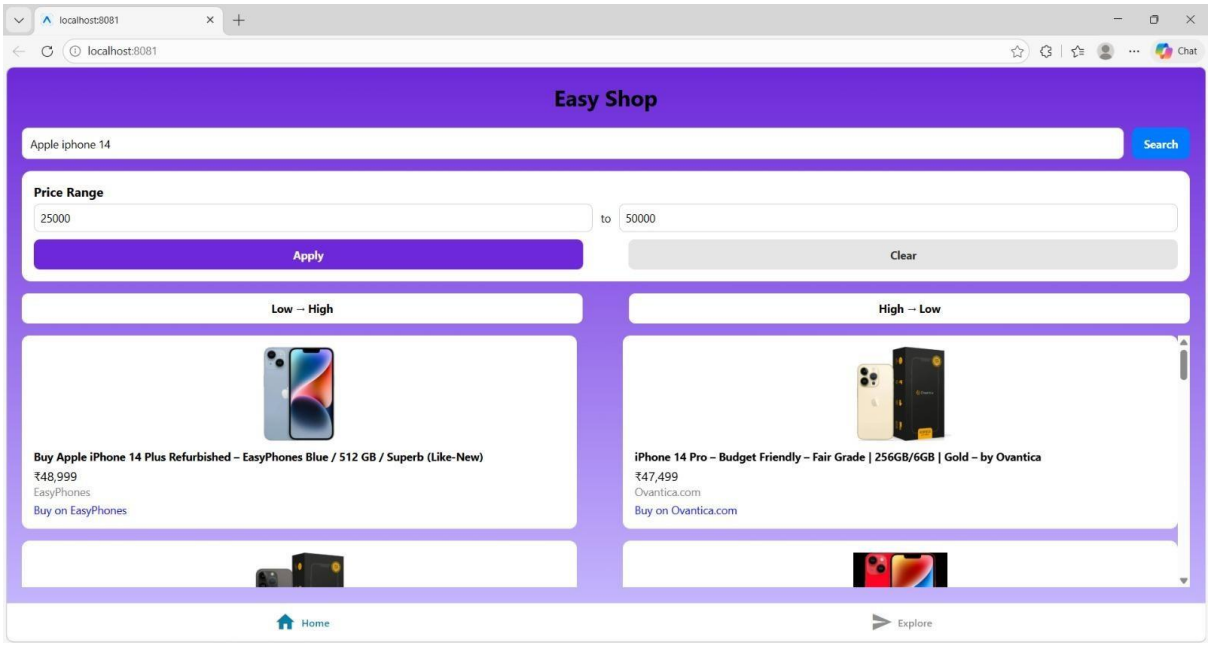

Fig. 3: Price Range Filter Applied

With price filter set to Rs 25,000–Rs 50,000, the system displays only relevant products (e.g., iPhone 14 Plus at Rs 48,999), effectively filtering out items outside the range.

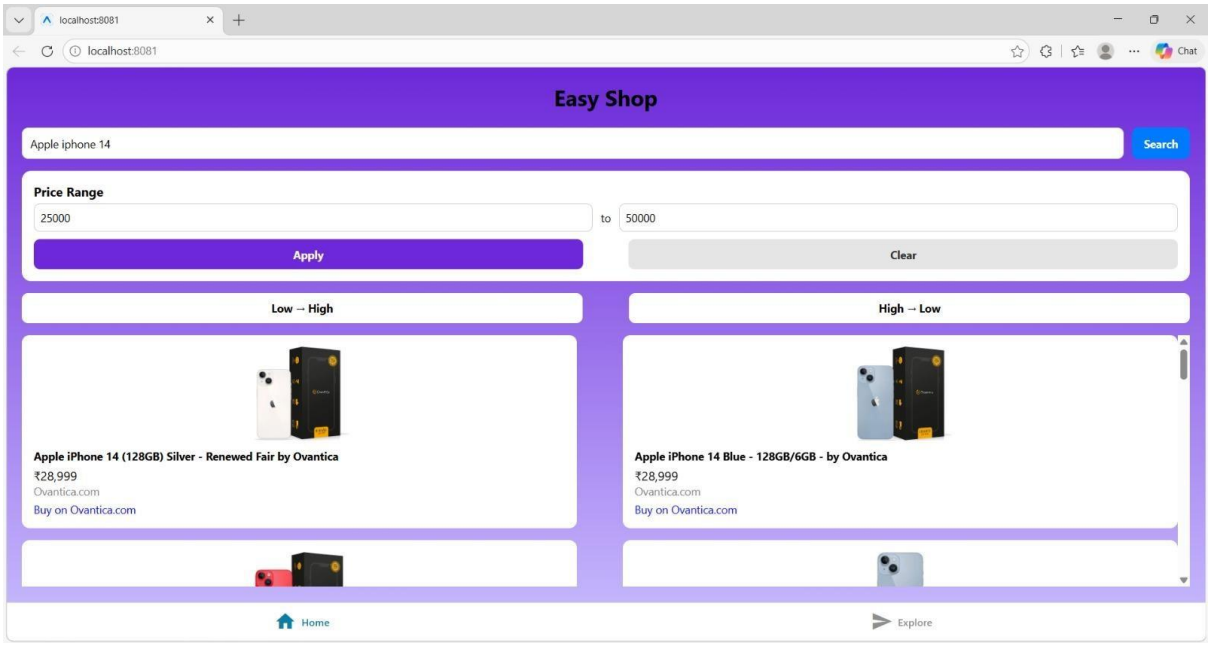

Fig. 4: Low–High Sorting Applied

Products are sorted in ascending order by price, allowing users to quickly identify the most affordable options.

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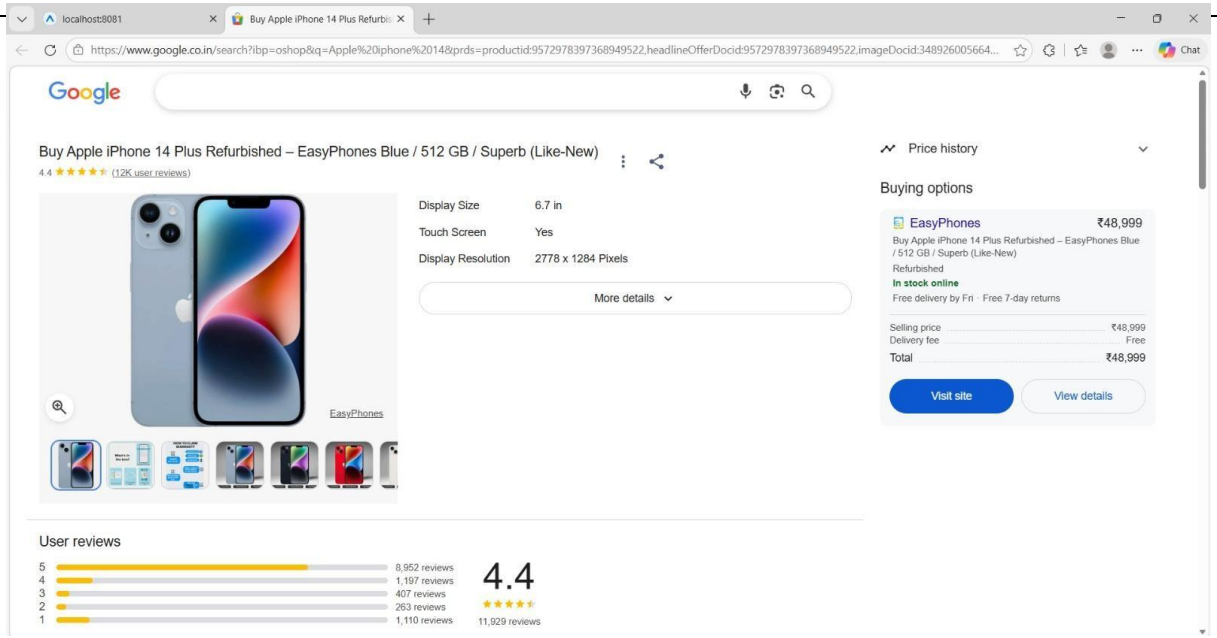

Fig. 5: Product Detail Page

The detailed view displays product specifications, user ratings (4.4 from 11,929 reviews), price history, and buying options with total price breakdown.

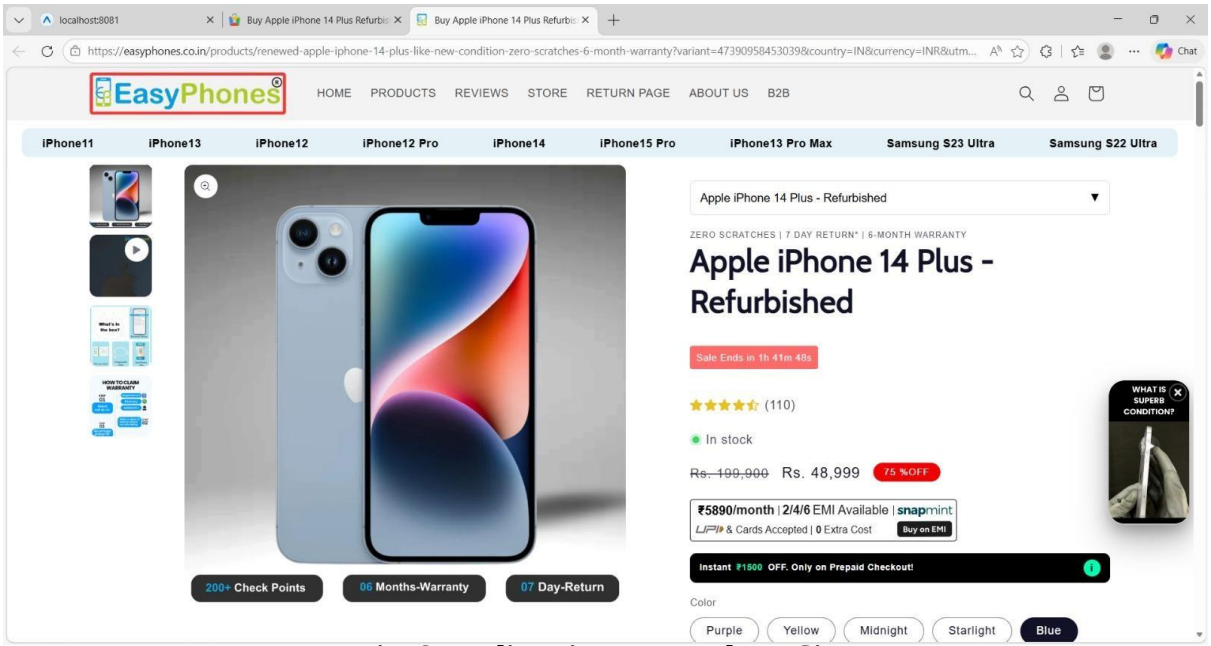

Fig. 6: Redirection to Merchant Site

Users are seamlessly redirected to the merchant's site (EasyPhones) to complete purchase, with warranty, return policy, and EMI options clearly shown.

IX. CONCLUSION:

The Enhanced Price Comparison System with Price Range Filters was successfully built and works as intended. It gives users a simple way to search for products, filter by budget, sort results, and compare prices across different online stores—all in one place.

What the system does well:

- Saves time – No need to visit multiple websites. All prices from Cashify, iTradeit, EasyPhones, and Ovantica.com are shown together.
- Stays within budget – The price filter lets users set a minimum and maximum range, showing only what they can afford.
- Helps make better choices – Users can sort prices from low to high, check product specs, read user ratings, and see price history before deciding.
- Easy to buy – Clicking on a product takes users directly to the merchant site with all details like warranty, return policy, and EMI options clearly visible.
- Fast and smooth – Searches take less than 2 seconds, and filters work instantly.

Overall, the system makes online shopping easier and more transparent. It helps users find the best deal without the usual hassle. Future updates could include more stores, price drop alerts, and personalized recommendations to make it even better.

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