ARBA MINCH UNIVERSITY INSTITUTE OF TECHNOLOGY FACULTY OF COMPUTING AND SOFTWARE ENGINEERING DEPARTMENT OF **SOFTWARE ENGINEERING**

DATA STRACTURE AND ALJORITHM

PRODUCT SORTER APPLICATION

Objective

The objective of this application is to develop a product management tool for an e-commerce platform that enables efficient organization and sorting of products based on various criteria, such as price, rating, name, stock quantity, discount percentage, date added, number of reviews, brand name, weight, category, and sales volume. This tool aims to help users quickly organize large lists of products, making it easier to manage and retrieve items based on specific attributes. Each criterion is sorted with a unique sorting algorithm, allowing the user to observe and understand the behavior of various sorting techniques in a practical, real-world context.

Goals

1. **Efficient Product Sorting**: Implement multiple sorting methods to sort products based on various attributes, allowing users to view and retrieve products in a preferred order.
2. **Algorithm Diversity**: Use a range of sorting algorithms (e.g., Bubble Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort) for different sorting criteria to demonstrate the versatility and suitability of each algorithm for specific types of data.
3. **User-Friendly Interface**: Provide an intuitive, easy-to-use interface where users can input product information, select a sorting criterion, and view sorted results in a clear and organized format.
4. **Educational Value**: Provide a practical example of sorting algorithms in action, allowing users or developers to learn about sorting algorithm behavior, complexity, and best practices in a hands-on, applied manner.

Description

This application is structured to manage product data, sort it according to user-defined criteria, and display it in an organized fashion. The user can input details about various products, including price, rating, name, stock quantity, and other common e-commerce attributes. Once products are entered, the

user is prompted to choose a sorting criterion. Each criterion is associated with a specific sorting algorithm that is most appropriate for the nature of the data, providing both functionality and educational insight into sorting algorithm efficiency and behavior.

Key Features and Sorting Algorithms

1. **Price (Bubble Sort)**: Bubble Sort is a basic, comparison-based algorithm, making it easy to understand and well-suited for small datasets. Products are sorted by price, providing a straightforward view of products from least to most expensive.
2. **Rating (Selection Sort)**: Selection Sort iteratively selects the highest-rated product from the unsorted portion of the list and places it at the beginning, showing products in descending order of customer ratings.
3. **Name (Quick Sort)**: Quick Sort is a divide-and-conquer algorithm that organizes products alphabetically by name. Its efficiency with large datasets makes it ideal for sorting names in applications where quick, alphabetical organization is required.
4. **Stock Quantity (Merge Sort)**: Merge Sort is used to sort products based on available stock quantity. This stable and efficient algorithm divides the list into smaller sections, sorts each, and merges them, making it reliable for sorting large quantities of data.
5. **Discount Percentage (Heap Sort)**: Heap Sort utilizes a max-heap data structure to organize products by discount percentage, prioritizing products with the highest discounts. This approach is useful in situations where retrieving products with maximum discounts is crucial.
6. **Additional Sorting Attributes**: The application also includes the capability to sort by attributes such as date added, number of reviews, brand name, weight, category, and sales volume, each demonstrating a unique algorithm that best highlights the characteristic of the data type.

How the Application Works

1. **User Input**: The user inputs product data, including name, price, rating, and other attributes. This information is stored in a list of product objects.
2. **Sorting Menu**: The user selects a sorting criterion from a menu. The application maps each criterion to a specific sorting algorithm, which is then executed.
3. **Display Results**: The sorted list of products is displayed, showing the ordered products according to the selected attribute.

Summary

The Product Sorter Application demonstrates a multi-algorithm approach to sorting within an e-commerce context, providing users with an intuitive tool to manage product data efficiently. Each sorting criterion utilizes a unique algorithm, offering a blend of practical functionality and educational insight into algorithmic performance. Users can quickly sort and retrieve product data based on attributes most relevant to their needs, enhancing product management efficiency in the application. By showcasing different sorting methods, this application provides a valuable example of when and why

certain sorting algorithms may be more advantageous, thus serving as both a practical tool and an educational resource.

The program's structured approach and varied use of algorithms make it an excellent example of applied sorting techniques, bringing algorithm theory into a real-world, user-oriented application.

NO	NAME	ID
1	AMIR MESFIN………………………………………………NSR/099/15
2	YENENEH AMOTS………………………………..………NSR/991/15
3	BEAMAN LAYKEMARIYAM……………………..……..NSR/144/15
4	ABINEZER BASAZNEW……………………………..……NSR/044/15
5	ESAYAS GRMA……………………………………...…NSR/346/15
6	GEWAR NASR……………………………………………NSR/531/15