

**DSE 2144– Advanced Programming Language Lab**  
**Week 8 – Date: 04<sup>th</sup> October 2024**

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**Exercise 1:**

**File Handling in Python with Error and Exception Handling**

You are tasked with building a simple data processing system for an **e-commerce company** that handles product inventories and customer reviews. The company uses two types of files to store data:

1. **CSV Files:** The product inventory is stored in a CSV file with the following columns: *Product ID, Product Name, Category, Price, and Stock Quantity*.
2. **JSON Files:** Customer reviews for each product are stored in separate JSON files. Each review file contains a list of reviews for a product, where each review has the following fields: *Review ID, User ID, Rating, Comment, and Date*.

Your system needs to process these files to provide insights and updates on product availability, pricing trends, and customer feedback. Additionally, the system should allow adding new products and updating product information in the CSV file, while handling errors and exceptions gracefully.

**System Requirements:**

**1. Product Management (CSV File):**

- **Add New Products:** Write a function to add a new product to the inventory CSV file.
- **Update Stock and Price:** Implement a function to update the stock quantity and price of an existing product in the CSV file.
- **Check Product Availability:** Write a function that reads the CSV file to check if a product is in stock and, if so, how many units are available.

**2. Customer Review Management (JSON Files):**

- **Add Customer Review:** Implement a function that adds a new customer review to the corresponding JSON file for a product.
- **Average Rating Calculation:** Write a function that reads a product's JSON review file and calculates its average rating.
- **Review Search:** Implement a search function that reads the JSON file and allows users to search for reviews containing specific keywords in the comment section.

**3. Data Analysis:**

- **Top Rated Products:** Create a function that reads all product review JSON files, calculates the average rating for each product, and lists the top 5 highest-rated products.
- **Out of Stock Products:** Write a function that reads the CSV inventory file and lists all products that are out of stock.
- **Price Trends:** Implement a function to read the CSV file and identify products whose prices have increased or decreased in the past month.

**4. Error and Exception Handling:**

- Implement error handling for situations such as:
  - **File Not Found:** When the CSV or JSON file is missing.
  - **Invalid Data Format:** If the data in the files does not match the expected structure.
  - **File Corruption:** When a file contains corrupted data.
  - **Read/Write Permissions:** When the system does not have permission to read or write to a file.