

JAVA MINI Assignment 1

Problem Statement: E-commerce Price Comparison

Description:

You are tasked with building an E-commerce Price Comparison application using Java 8, Spring Boot, and Web Client. The application should fetch product data from multiple e-commerce APIs concurrently and compare prices to provide users with the best deals and prices.

Retrieve Deal Items for a Specified Category: Implement the below endpoint for the given Category Name

<http://localhost:8090/deals/{categoryName}>

Requirements:

1. Implement a Spring Boot application with Web Client to perform concurrent API calls.
2. Configure the application to fetch product data from multiple e-commerce APIs (e.g., Amazon Backend, eBay Backend, Walmart Backend, etc.).
3. Fetch product information, prices, availability, and other relevant data from each API concurrently.
4. Retrieve the product data in JSON format from each API response.
5. Aggregate the product data from all the APIs into a single response.
6. **Compare prices and identify the best deals for each category.**
7. Implement error handling and graceful degradation for failed API calls.
8. Display or provide the aggregated product data and price comparisons to the users.
9. Utilize Java 8 features such as lambdas, streams, and Completable Future for concurrent processing.

Let's consider a scenario:

Suppose we are passing "Jeans" in Category Name

In this case, we need to fetch all the products related to this category from their respective backend servers concurrently.

- By implementing this approach, we can effectively develop three independent backend servers that will return hard-coded responses from their respective JPA Repositories. (Refer PART 1 in Approach Section on next Page).
- To achieve this solution, we can leverage the concepts of Java 8 or above, such as Thread Executor and Completable Future for asynchronous processing. For making REST API calls in Spring Boot, we can use Feign client or Web Client instead of Rest Template, as Rest Template is deprecated. (Refer PART 2 in Approach Section).

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Approach:

To achieve the desired functionality, we can implement the following approach:

PART 1:

1. Create three separate components in Spring Boot, each representing a different backend server.
2. Utilize JPA Repositories within each component to retrieve hard-coded responses.

Component 1 (Act as Backend Server 1 for Amazon returning below response):

<http://localhost:8081/backendserver1/amazon/deals/{categoryName}>

Category Name = Jeans

Expected Response from Server 1:

```
{
  "categoryName": "Jeans",
  "dealItems": [{
    "itemid": "123456789",
    "productTitle": "Blue Levis Jeans",
    "size": "30",
    "Brand": "Levis"
  "image": {
    "imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"
  },
  "marketingPrice": {
    "originalPrice": {
      "value": "29.99",
      "currency": "USD"
    },
    "discountPercentage": "17.0",
    "discountAmount": {
      "value": "5.0",
      "currency": "USD"
    },
    "priceTreatment": "LIST_PRICE"
  }
  },
}
```

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```
"price": {  
  "value": "24.99",  
  "currency": "USD"  
},  
  "stock": 4,  
  "dealStartDate": "2022-06-20T15:26:00Z",  
  "dealEndDate": "2022-12-20T14:59:59Z"  
  
}, {  
  "itemid": "981235678",  
  "productTitle": "Black Men Slim Fir Mid Rise Jeans",  
  "size": "32",  
  "Brand": "Louis Philippe Jeans"  
  "image": {  
    "imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"  
  },  
  "marketingPrice": {  
    "originalPrice": {  
      "value": "29.99",  
      "currency": "USD"  
    },  
    "discountPercentage": "50.0",  
    "discountAmount": {  
      "value": "14.99",  
      "currency": "USD"  
    },  
    "priceTreatment": "LIST_PRICE"  
  },  
  "price": {  
    "value": "14.99",  
    "currency": "USD"  
  },  
  "stock": 3,  
  "dealStartDate": "2023-06-20T15:26:00Z",  
  "dealEndDate": "2023-12-20T14:59:59Z"  
  
}}
```

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Component 2 (Act as Backend Server 2 for EBAY returning below response):

<http://localhost:8082/backendserver2/ebay/deals/{categoryName}>

Category Name = Jeans

Expected Response from Server 2:

```
{
    "categoryName": "Jeans",
    "dealItems": [{
        "itemid": "2345678767",
        "productTitle": "Blue American Eagle Jeans",
        "size": "32",
        "Brand": "American Eagle",
        "image": {
            "imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"
        },
        "marketingPrice": {
            "originalPrice": {
                "value": "49.99",
                "currency": "USD"
            },
            "discountPercentage": "50.0",
            "discountAmount": {
                "value": "24.99",
                "currency": "USD"
            },
            "priceTreatment": "LIST_PRICE",
            "price": {
                "value": "24.99",
                "currency": "USD"
            },
            "stock": 4,
            "dealStartDate": "2023-06-20T15:26:00Z",
            "dealEndDate": "2023-12-20T14:59:59Z"
        }, {
            "itemid": "4567822189",
```

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```
" productTitle ": "Navy Blue Rare Rabbit Jeans",  
  
"size": "32",  
  
"Brand": "Rare Rabbit",  
  
"image": {  
  
"imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"  
  
},  
  
"marketingPrice": {  
  
"originalPrice": {  
  
"value": "39.99",  
  
"currency": "USD"  
  
},  
  
"discountPercentage": "25.0",  
  
"discountAmount": {  
  
"value": "09.99",  
  
"currency": "USD"  
  
},  
  
"priceTreatment": "LIST_PRICE"  
  
},  
  
"price": {  
  
"value": "29.99",  
  
"currency": "USD"  
  
},  
  
"stock": 0,  
  
"dealStartDate": "2023-06-20T15:26:00Z",  
  
"dealEndDate": "2023-12-20T14:59:59Z"  
  
}}  
  
}
```

Component 3 (Act as Backend Server 3 for Walmart returning below response):

<http://localhost:8083/backendserver3/walmart/deals/{categoryName}>

Category Name = Jeans

```
{  
  
"categoryName": "Jeans",  
  
"dealItems": [{  
  
"itemid": "777654321",  
  
"productTitle": "Men Black Regular Jeans",  
  
}
```

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```
"size": "32",
"Brand": "H&M",
"image": {
  "imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"
},
"marketingPrice": {
  "originalPrice": {
    "value": "29.99",
    "currency": "USD"
  },
  "discountPercentage": "40.0",
  "discountAmount": {
    "value": "11.99",
    "currency": "USD"
  },
  "priceTreatment": "LIST_PRICE",
},
"price": {
  "value": "17.99",
  "currency": "USD"
},
"stock": 4,
"dealStartDate": "2023-06-20T15:26:00Z",
"dealEndDate": "2023-12-20T14:59:59Z"
}, {
  "itemid": "55666778231",
  "productTitle": "Light Fade Clean Look Stretchable Jeans",
  "size": "32",
  "Brand": "Louis Philippe Jeans",
  "image": {
    "imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"},
```

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```
"marketingPrice": {  
  "originalPrice": {  
    "value": "39.99",  
    "currency": "USD"  
  },  
  "discountPercentage": "25.0",  
  "discountAmount": {  
    "value": "09.99",  
    "currency": "USD"  
  },  
  "priceTreatment": "LIST_PRICE",  
  "price": {  
    "value": "29.99",  
    "currency": "USD"},  
  "stock": 3,  
  "dealStartDate": "2023-06-20T15:26:00Z",  
  "dealEndDate": "2023-12-20T14:59:59Z"  
}}
```

PART 2:

- Initiate concurrent requests to fetch transactions from each backend server using Completable Future.
- Collect the responses and combine them into a single list using Stream APIs.
- Put the logic to find out the best deals based on discount, price, stock availability, current date.
- Filter & Sort the List Items by Maximum Discount at the top, if two Items have similar discount then compare the prices, Lower price should be stay at the top.
- If stock is zero, we must skip the item from the response.
- we must skip the item from the response if the current date does not lie between the deal start date and deal end date.

NOTE: Write Junit Test Cases for above Endpoint, covering all the scenarios. Usage of Mockito for mocking the response is mandatory.

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Here is the finalized expected sample response based on the provided data:

The response from the "Get Deals" endpoint should be a JSON array containing the consolidated deal Items from all the backend servers with respect to a given category.

Response Description:

If you noticed, we have fetched a total of 6 products, with two products obtained from each backend server. However, upon reviewing the final response, you will observe that we only have 4 products included in below array. The reason for this discrepancy is that one product has a stock quantity of zero, and the other product's deal date has already expired. Hence, we have excluded both records from the response.

```
{
  "categoryName": "Jeans",
  "dealItems": [
    {
      "itemid": "981235678",
      "productTitle": "Black Men Slim Fir Mid Rise Jeans",
      "size": "32",
      "Brand": " Louis Philippe Jeans ",
      "image": {
        "imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"
      },
      "marketingPrice": {
        "originalPrice": {
          "value": "29.99",
          "currency": "USD"
        },
        "discountPercentage": "50.0",
        "discountAmount": {
          "value": "14.99",
          "currency": "USD"
        },
        "priceTreatment": "LIST_PRICE"
      }
    }
  ]
}
```


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```
,
"price": {
  "value": "14.99",
  "currency": "USD"
},
"stock": 3,
"dealStartDate": "2023-06-20T15:26:00Z",
"dealEndDate": "2023-12-20T14:59:59Z"
},{
  "itemid": "2345678767",
  "productTitle": "Blue American Eagle Jeans",
  "size": "32",
  "Brand": "American Eagle",
  "image": {
    "imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"
  },
  "marketingPrice": {
    "originalPrice": {
      "value": "49.99",
      "currency": "USD"
    },
    "discountPercentage": "50.0",
    "discountAmount": {
      "value": "24.99",
      "currency": "USD"
    },
    "priceTreatment": "LIST_PRICE"
  },
  "price": {
    "value": "24.99",
    "currency": "USD"
  }
```

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```
,
"stock": 4,
"dealStartDate": "2023-06-20T15:26:00Z",
"dealEndDate": "2023-12-20T14:59:59Z"
},{
"itemid": "777654321",
"productTitle": "Men Black Regular Jeans",
"size": "32",
"Brand": "H&M",
"image": {
"imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"
},
"marketingPrice": {
"originalPrice": {
"value": "29.99",
"currency": "USD"
},
"discountPercentage": "40.0",
"discountAmount": {
"value": "11.99",
"currency": "USD"
}
},
"price": {
"value": "17.99",
"currency": "USD"
},
"stock": 4,
"dealStartDate": "2023-06-20T15:26:00Z",
"dealEndDate": "2023-12-20T14:59:59Z"
},{
```

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```
"itemid": "55666778231",  
"productTitle ": "Light Fade Clean Look Stretchable Jeans",  
"size": "32",  
"Brand": "Louis Philippe Jeans",  
"image": {  
  "imageUrl": "https://i.ebayimg.com/images/g/~*****N/s-l225.jpg"  
},  
"marketingPrice": {  
  "originalPrice": {  
    "value": "39.99",  
    "currency": "USD"  
  },  
  "discountPercentage": "25.0",  
  "discountAmount": {  
    "value": "09.99",  
    "currency": "USD"  
  },  
  "priceTreatment": "LIST_PRICE"  
},  
"price": {  
  "value": "29.99",  
  "currency": "USD"  
},  
"stock": 3,  
"dealStartDate": "2023-06-20T15:26:00Z",  
"dealEndDate": "2023-12-20T14:59:59Z"  
}]  
}
```