**Week 1**

**Algorithms \_ Data Structures**

**Exercise 2: E-commerce Platform Search Function**

**Scenario:**

You are working on the search functionality of an e-commerce platform. The search needs to be optimized for fast performance.

**Product.java**

**import** java.util.\*;

**public** **class** Product{

**static** **class** Item{

**int** productId;

String productName;

String category;

Item(**int** id,String name,String cat){

productId=id;

productName=name;

category=cat;

}

}

**public** **static** **int** linearSearch(Item[] a,String name){

**for**(**int** i=0;i<a.length;i++){

**if**(a[i].productName.equalsIgnoreCase(name))**return** i;

}

**return** -1;

}

**public** **static** **int** binarySearch(Item[] a,String name){

**int** l=0,r=a.length-1;

**while**(l<=r){

**int** m=(l+r)/2;

**int** cmp=a[m].productName.compareToIgnoreCase(name);

**if**(cmp==0)**return** m;

**else** **if**(cmp<0)l=m+1;

**else** r=m-1;

}

**return** -1;

}

**public** **static** **void** main(String[] args){

Item[] p={

**new** Item(1,"Laptop","Electronics"),

**new** Item(2,"Phone","Electronics"),

**new** Item(3,"Notebook","Stationery"),

**new** Item(4,"Shoes","Footwear"),

**new** Item(5,"Shampoo","Personal Care")

};

Scanner s=**new** Scanner(System.***in***);

String t=s.nextLine();

**int** i=*linearSearch*(p,t);

System.***out***.println(i!=-1?"Linear Found at "+i:"Linear Not Found");

Arrays.*sort*(p,Comparator.*comparing*(a->a.productName.toLowerCase()));

**int** j=*binarySearch*(p,t);

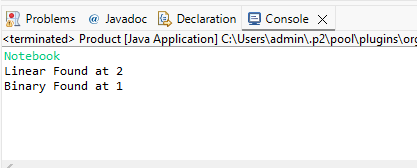
System.***out***.println(j!=-1?"Binary Found at "+j:"Binary Not Found");

s.close();

}

}

**Output:**

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**Exercise 7: Financial Forecasting**

**Scenario:**

You are developing a financial forecasting tool that predicts future values based on past data.

**public** **class** Forecast{

**public** **static** **double** futureValue(**double** pv,**double** rate,**int** n){

**return** pv\**power*(1+rate,n);

}

**public** **static** **double** power(**double** base,**int** exp){

**if**(exp==0)**return** 1;

**return** base\**power*(base,exp-1);

}

**public** **static** **void** main(String[] args){

**double** pv=10000;

**double** r=0.08;

**int** n=5;

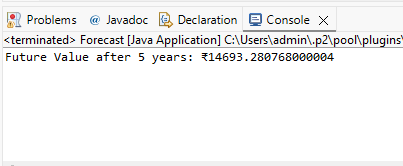
**double** f=*futureValue*(pv,r,n);

System.***out***.println("Future Value after "+n+" years: ₹"+f);

}

}

**Output:**

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