Week 1

Algorithms and Data Structures

Exercise 2: E-commerce Platform Search Function

Understanding Asymptotic Notation:

Big O Notation

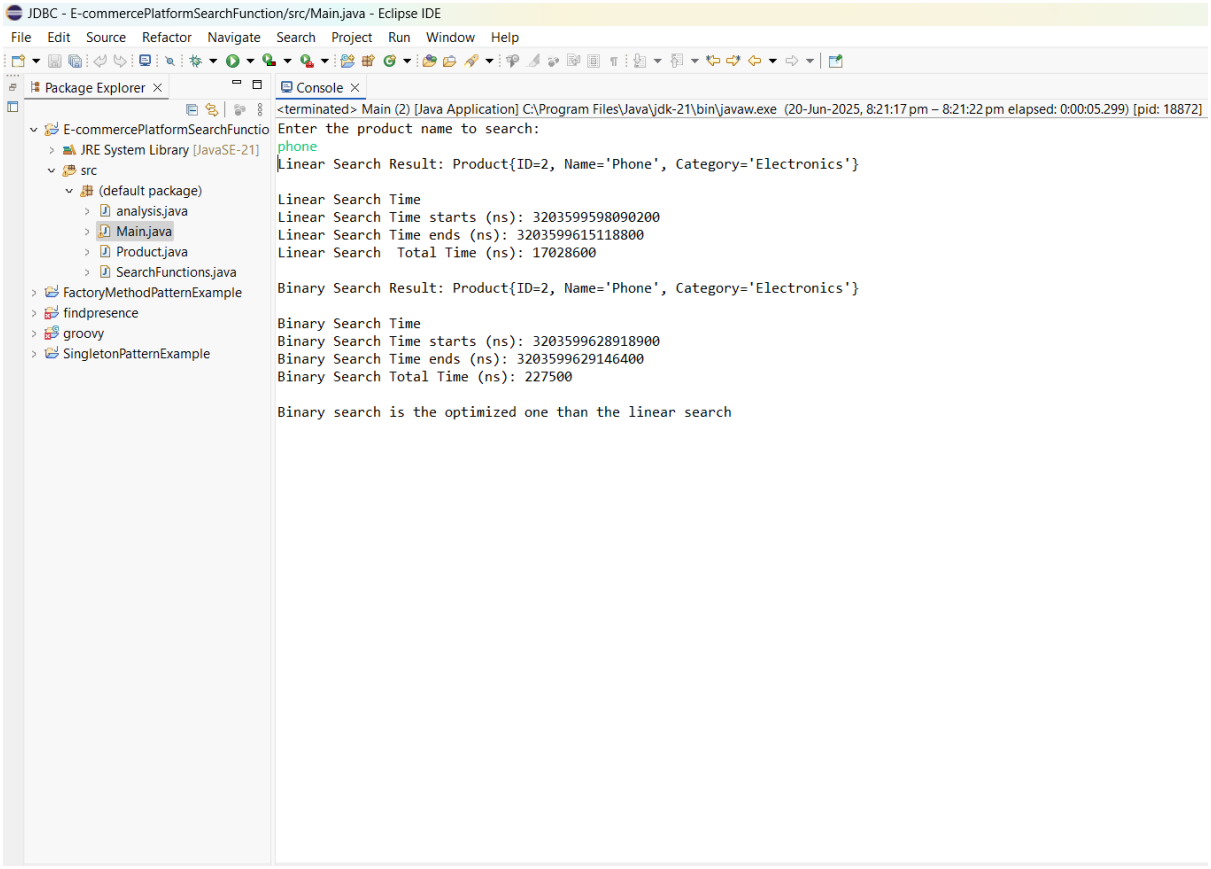
Big O notation is used to describe the performance or complexity of an algorithm in terms of input size. It gives us a worst-case upper bound on the time (or space) required by the algorithm.

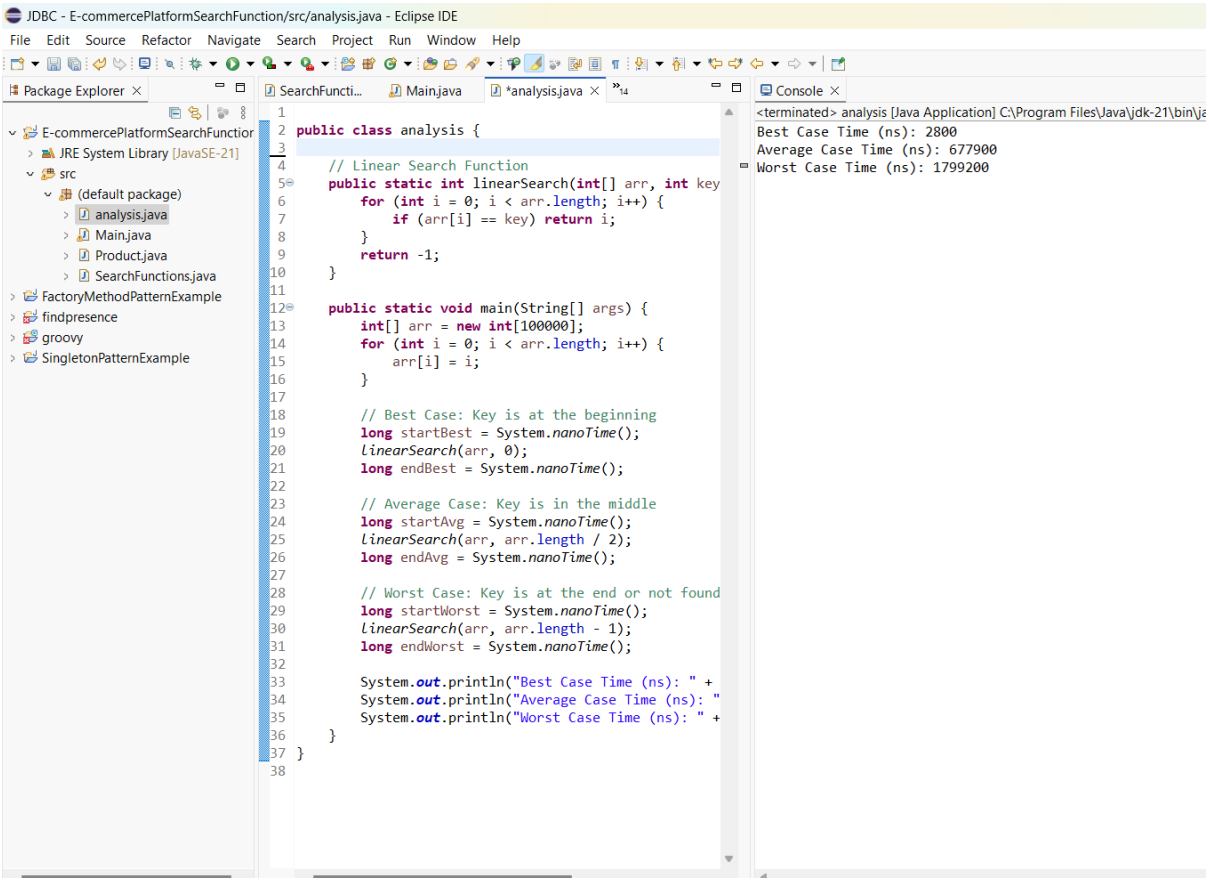
- Comparing algorithms regardless of hardware.
- Predicting scalability as the number of inputs grows.

Best, Average, and Worst-Case

- Best Case: Minimum time required (e.g., first element matched).
- Average Case: Expected time with random inputs.
- Worst Case: Maximum time (e.g., last or no match).

Output snapshot:




JDBC - E-commercePlatformSearchFunction/src/analysis.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
E-commercePlatformSearchFunctior
JRE System Library [JavaSE-21]
src
(default package)
analysis.java
Main.java
Product.java
SearchFunctions.java
FactoryMethodPatternExample
findpresence
groovy
SingletonPatternExample
SearchFuncti...
Main.java
*analysis.java
public class analysis {
// Linear Search Function
public static int linearSearch(int[] arr, int key
for (int i = 0; i < arr.length; i++) {
if (arr[i] == key) return i;
}
return -1;
}
public static void main(String[] args) {
int[] arr = new int[100000];
for (int i = 0; i < arr.length; i++) {
arr[i] = i;
}
// Best Case: Key is at the beginning
long startBest = System.nanoTime();
linearSearch(arr, 0);
long endBest = System.nanoTime();
// Average Case: Key is in the middle
long startAvg = System.nanoTime();
linearSearch(arr, arr.length / 2);
long endAvg = System.nanoTime();
// Worst Case: Key is at the end or not found
long startWorst = System.nanoTime();
linearSearch(arr, arr.length - 1);
long endWorst = System.nanoTime();
System.out.println("Best Case Time (ns): " +
System.out.println("Average Case Time (ns): "
System.out.println("Worst Case Time (ns): " +
}
}
Console
<terminated> analysis [Java Application] C:\Program Files\Java\jdk-21\bin\ja
Best Case Time (ns): 2800
Average Case Time (ns): 677900
Worst Case Time (ns): 1799200