Name: Wang Zihao

Student number: A0204706M

Week 2 Studio 2

Group 4b

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Lab Report Question 1:

1. Value of N: 5.
2. Execution time using the same N for double value of “dummy”: 3.120s
3. Educated guess: This is because a double value is more precise which takes more memory, leading to longer processing time.

Lab Report Question 2:

1. Execution time for WorkA() when N = 1:

Execution time for WorkB() when N = 1:

1. No, we should not always use WorkB() to solve this problem. When N > 567, for example we take N = 1000, the execution time for WorkA() is 6.02s which is shorter than the execution time for WorkB() which is 10.680s.

Lab Report Question 3:

1. For approach A, the formula for the amount of work done is 25NƬtime unit.

For approach B, the formula for the amount of work done is (N+N^2)Ƭ time unit.

|  |  |  |
| --- | --- | --- |
| N | Time taken for Approach A | Time Taken for Approach B |
| 1 | 0.26 | 0.02 |
| 2 | 0.53 | 0.06 |
| 3 | 0.80 | 0.12 |
| 4 | 1.06 | 0.21 |
| 5 | 1.33 | 0.32 |
| 6 | 1.60 | 0.44 |
| 7 | 1.87 | 0.59 |
| 8 | 2.13 | 0.76 |
| 9 | 2.38 | 0.96 |
| 10 | 2.67 | 1.17 |

1. For small N values like N = 1 to 10, approach B is more efficient as the time taken is shorter compared to approach A. However, for large N values, approach A is more efficient as the time taken for approach A is directly proportional to N while the time taken for approach B is approximately directly proportional to N^2.

Lab Report Question 4:

1. workC(2\*N):

A screenshot of a cell phone

Description automatically generated

1. workD(29\*N):

A close up of a map

Description automatically generated

1. workE(12345678\*N):

A screenshot of a cell phone

Description automatically generated

Lab Report Question 5:

1. Linear search.
2. O(N).
3. A screenshot of text

   Description automatically generated
4. The time taken for 1 query is too short and the data recorded may not be accurate. Taking 10,000 queries for time measurement and then finding the average time per query help us to record more accurate data.

Lab Report Question 6:

1. Insertion sort.
2. A screenshot of a cell phone

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A close up of a map

Description automatically generated

A screenshot of a social media post

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1. Approach 1 is better. The BigO notation for linear search is O(N), the BigO notation for insertion sort is O(N^2) and the BigO notation for binary search is O(log2(N)). So the BigO Notation for approach 1 is O(N) while the BigO Notation for approach 2 is O(N^2). Thus the overall time complexity of approach 2 is larger than that of approach 1. Thus approach 1 takes shorter time to get the results and so approach 1 is more efficient.