

Group 3
Isaac Javid
Alexander Diamante

i.) comparative execution time and short analysis of the performance of the kernels

C program execution time

Vector Size	Average Execution Time
2 ²⁰	0.003950 seconds
2 ²⁴	0.072600 seconds
2 ²⁸	1.034650 seconds

Assembly execution time

Vector Size	Average Execution Time
2 ²⁰	0.001100 seconds
2 ²⁴	0.028850 seconds
2 ²⁸	0.743500 seconds

In performing the comparative execution time tables, both kernels used the same values and the same vector sizes. For smaller vector sizes, the C implementation performs reasonably well, however, as the vector size increases, the execution time rises significantly. This increase is expected due to the linear growth of the computational workload. However, in the assembly implementation, it consistently outperforms the C implementation for all vector sizes. This reflects the advantages of optimized SIMD instructions in assembly, which allow for parallel processing of data.

ii.) Take a screenshot of the program output with the correctness check (C).

```

C Runs
C Dot Product = 5740.000000
C Dot Product = 5740.000000
C Dot Product = 5740.000000
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C Dot Product = 5740.000000
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C Dot Product = 5740.000000
Vector size: 20
Average time for C implementation: 0.000000 seconds

```

Correctness check: $A = \{1, 2, 3, \dots, 20\}$ and $B = \{2, 4, 6, \dots, 40\}$, $n = 20$, Dot Product = 5740

iii.) Take a screenshot of the program output, including the correctness check (x86-64).

```

Assembly Runs
Assembly Dot Product = 5740.000000
Assembly Dot Product = 5740.000000
Assembly Dot Product = 5740.000000
Assembly Dot Product = 5740.000000
Assembly Dot Product = 5740.000000
Assembly Dot Product = 5740.000000
Assembly Dot Product = 5740.000000
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Assembly Dot Product = 5740.000000
Assembly Dot Product = 5740.000000
Assembly Dot Product = 5740.000000
Average time for Assembly implementation: 0.000050 seconds

```

Correctness check: $A = \{1, 2, 3, \dots, 20\}$ and $B = \{2, 4, 6, \dots, 40\}$, $n = 20$, Dot Product = 5740