HPCSE2: Exercise 5

Kalman Joseph Szenes

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1 Task 1

1.1 a)

The peak performance is computed using the following formula: Clock Rate * #Cores * #Flop/s/Core = 0.00133 * 3584 = 4.763 [TFLOPS]

The RAM bandwidth is computed using the following formula: Bus Width * Mem Clock Rate * 2 = 0.4096 / 8 * 715 = 732.16 [GB/s]

1.2 b)

Using the Roofline model, we can compute that the arithmetic intensity (AI) that would lead to ideal balance of ressources between memory and computation is around 6.5 FLOP/Byte. Anything under that is memory bound, anything over that is compute bound. The AI of DGEMM is given by the following formula:

$$\frac{m * n * k}{m * k + n * k + m * n}$$

where M, N and K are the matrix dimensions. The AI that we obtain with our matrix dimensions is hence: 1638.4 [FLOP/Byte]. This is well over the 6.5 [FLOP/Byte] and hence DGEMM is compute bound.