

0.1 Exercise 6 - HPCSE - Leonard Wossnig

0.1.1 Task 1.

The calculation for PP and PB results in the following solutions:

PP calculates as: (Instructions per clock) \times (no. of cores) \times (Processor Clock/sec)

Intel Xeon processor E5-2697 v2 PP:

8 Flops/clock \times 12 cores/socket \times 2 sockets \times 2.7 GHz = 518.4 GFLOPS/s

PP is calculated as: (channel size) \times (channels) \times (Memory Clock/sec)

Intel Xeon processor E5-2697 v2 PB:

8 bytes/channel \times 4 channels \times 2 sockets \times 1.866 GHz = 119.4 GByte/s

The above used data are taken from the Intel homepage for the E5-2697 v2

(Source: <http://www.intel.de/content/www/de/de/benchmarks/server/xeon-phi/xeon-phi-theoretical-maximums.html?redirect=/content/www/de/de/benchmarks/server/xeon-phi/xeon-phi-theoretical-maximums.html&locale=/de/de>)

More specific, the PB for one socket is:

8 bytes/channel \times 4 channels \times 1.866 GHz = 59.7 GByte/s

0.1.2 Task 2.

How to calculate the Operational Intensity?

The Operational Intensity is calculated in your code by:

$$\text{Operational Intensity} = \frac{\text{Number of FLOPS}}{\text{Number of Bytes used (read, safed,...)}}$$

. For drawing the Roofline you anyways don't have to specify it in detail, since you just draw the formula:

$$\text{Maximum Performance [GFLOPS/s]} = \min(OI * PB, PP)$$

Then draw IO in range e.g. $[0.1, 1.0]$ or, more specific, until you reach the PP. The Bandwidth is the maximum Bandwidth (e.g. here: 59,7 GBytes/s).

0.1.3 Appendix

In the following i append the source code of some of the tasks:

while for multiple runs the program was executed with the following script file:
