

An-Najah National University

Computer Engineering Department

Computer Architecture II HW #3

Cache Optimizations

Matrix multiplication is one of the most important modern computational kernels. In this homework we will try to optimize this computation using the memory/cache optimization techniques we learnt in the class.

Instructions:

- 1- In the source file `cache.c` you will find the conventional (unoptimized) version of matrix multiplication implemented in the function **`mat_mat(...)`**
- 2- Define a new function called **`mat_mat_interchanged(...)`** in which you will implement the interchange optimization. Make sure to verify the correctness of the output of this function by comparing with the result of the conventional matrix multiplication function. You can use the **`compare`** function for that.
- 3- Define a new function called **`mat_mat_blocked`** in which you will implement the blocking optimization. Make sure to verify the correctness of the output of this function as above. Experiment with more than one block size (try 16, 32 and 64 for example).
- 4- Define a new function called **`mat_mat_blocked_interchanged()`** in which you will implement both of the previous optimizations at the same time. Don't forget to verify the correctness of the output.
- 5- In addition to your code make sure to hand a one-page report describing and explaining your results.

Good Luck