

Competition

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Starting with the base configuration provided and using the knowledge and skills gained during the lab, we began to modify the configuration of the D-cache and then calculate the respective speed up for each possible configuration. As in the lab, firstly we start to modify the cache size with values 8 kB, 64 kB, 512 kB and 4 MB. Then the change the value of associativity and finally the block size. As in the task 3 of the lab, in order to have a more realistic trade-off, we also change the cache access latency.

With the results that we obtained, we calculated the speed ups for the two applications. For that assumed that the base configuration was the following:

- Cache size = 8 kB;
- Associativity = 2 way;
- Block size = 32 B.

Analysing the results that we obtained, we concluded that the higher speed up for both applications is obtain in a D-cache configuration with cache size equals to 64 kB, 4 ways of associativity and a block size with 128 B. For that configuration the speed up for application “blocked_matrix_mult_1block” (mult1) is 2,063078 and for the application “blocked_matrix_mult_4block” (mult4) is 1,511231. Our cache configuration has provided an, approximately, 2,063x speed up over the base configuration for the application multi1 and 1,51x speed up over the base configuration for the application multi4.

The same procedure was done for the I-cache where we modify and try some different configurations, according the knowledge that we gained during the lab. In this case, we obtain different configurations for the two applications that maximizes the performance. For the application mult1 a configuration reach to the I-cache is a cache size of 64 kB, a associativity of 2 ways and a block size of 128 B. For the application mult4 a I-cache’s configuration is a cache size of 512 kB, a associativity of 8 ways and a block size of 128 B.

The two final configurations for I and D cache are:

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| <ul style="list-style-type: none">• D-cache configuration (mult1)<ul style="list-style-type: none">- Cache size = 64 kB;- Associativity = 4 way- Block size = 128 B | <ul style="list-style-type: none">• I-cache (mult1)<ul style="list-style-type: none">- Cache size = 64 kB;- Associativity = 2 way- Block size = 128 B |
| <ul style="list-style-type: none">• D-cache (mult4)<ul style="list-style-type: none">- Cache size = 64 kB;- Associativity = 4 way- Block size = 128 B | <ul style="list-style-type: none">• I-cache (mult4)<ul style="list-style-type: none">- Cache size = 512 kB;- Associativity = 8 way- Block size = 128 B |