An-Najah National University
Computer Engineering Department

Computer Architecture II HW #1
Loop Unrolling

In this homework we will try to measure the effect of loop unrolling on performance (running time).

Instructions:

1- In the source file unrolling.c you will find the normal (unoptimized) version of a simple loop (similar to the one we studied in class). The program in the source file will print the time it takes to execute the loop.

2- Define a new function called **unrolled_4(…)** in which you will implement loop unrolling with a degree of 4. Also, write code that measures the running time of this function.

3- Compare the running time of the normal loop with the unrolled loop. Measure the speed up (speedup = time_or_normal/time_or_unrolled).

4- Repeat the above with unrolling degrees of 8, 16 and 64.

5- Try for array sizes of 1024, 1024*1024, 16*1024*1024.

6- List all your results in two tables (see below). For each configuration (you should have 15 configurations) list the running time and speedup.

7- In addition to your code make sure to hand a one-page report describing and explaining your results.

Note: make sure to turn off the compiler optimizations using the (gcc -o0 option).

Good Luck

Tables Format

		Unrolling Time			
Input-size	Normal	Degree-4	Degree-8	Degree-16	Degree-64
1024					
1024*1024					
16*1024*1024					

		Unrolling Speedup			
Input-size	Normal	Degree-4	Degree-8	Degree-16	Degree-64
1024					
1024*1024					
16*1024*1024					