Hardware Optimization using Stretch IDE
Due April 7, 2006

Description:

1. Modify your existing C program that performs round-up (software version) to the Stretch-IDE. However, make the following changes.
    - Only generate 2,000 numbers and these numbers should be stored directly into the input array with 2,000 entries. In other words, write a routine that generates 2,000 random numbers and call in once.
    - You round up function (both software and hardware) will work on these numbers and then store the values back into the output array.
2. Profile the program and identify the software hotspots. Make sure you save the profiled result. Pay special attention to your round-up function.
3. Rewrite the round-up portion of your program in Stretch-c. You should take the full advantage of multiple functional units, wide data and stream I/O to speed up the round-up process.
4. Profile the program after the hardware optimization has been made. Make sure you don't overwrite the profiled results from the non-optimized/software version.
5. Calculate the round-up speed up and overall speed up. If you don't remember how to do this part, please refer to your computer architecture book (Amdahl's Law).

Things to watch out for:

1. Get the license file to unlock the compiler. Stretch has provided us with 15 more licenses. Send your hard-drive serial number to get the license.
2. Profiler can take a long time so be patient.
3. The Stretch IDE and its service pack is available for download at: corleone.unl.edu/~witty/stretch. Note that the username and password will be given in class on March 27. If you can't come to class, ask your classmates or send me an email. The file you want is *stretch_sdk_2005.exe*. Also browse the directory for any other useful information that you may need.

What to submit:

1. The source file for the non-optimized version compiled in Stretch-IDE environment.
2. The profiling result of the non-optimized version.
3. The source file for the optimized version and the Stretch C source file.
4. The profiling result for the optimized version.
5. Your calculation of the round-up speed-up and the overall speed-up.
6. Compare your experience using the Stretch to create instruction extension with creating custom instruction with Altera Nios.
7. The number of hours spent on this assignment.