**DT081/4**

**Computer Architecture 3 Laboratory**

**Lab 2: Testing Floating-point vs. Integer Performance**

This laboratory involves measuring the performance of your machine’s CPU in processing integer and floating point numbers. You should test four data types: short integers (2 bytes), long integers (4 bytes), single-precision floats (4 bytes), and double-precision floats (8 bytes). Partition the tests into three categories -- addition/subtraction tests, multiplication/ division tests, and mixed operation tests, having an equal mix of the four operations. For each test (characterized by a test category and data type), measure how many loops of 40000 operations could be completed in 5 seconds (hence, *larger numbers indicate faster performance*).

**Typical results might look like the following:**

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| |  | | --- | | **Addition/Subtraction** | | |  |  | | --- | --- | |  | *Pentium IV* | | *Short Integer* | 11820 | | *Long Integer* | 28397 | | *Single-Precision Float* | 1377 | | *Double-Precision Float* | 1288 | | | **Multiplication/Division**   |  |  | | --- | --- | |  | *Pentium IV* | | *Short Integer* | 7892 | | *Long Integer* | 9376 | | *Single-Precision Float* | 934 | | *Double-Precision Float* | 884 | | **Mixed Operations**   |  |  | | --- | --- | |  | *Pentium IV* | | *Short Integer* | 9299 | | *Long Integer* | 10917 | | *Single-Precision Float* | 1153 | | *Double-Precision Float* | 1297 | |

**Examining Performance:**

For each type of arithmetic operation, once the program has been written, set the cursor to the C line containing the arithmetic operation. Click to set a breakpoint on this line. Run the debugger which will now stop at the line. Now select the debug menu and the disassembly window. Examine the assembly code produced by the compiler for the arithmetic operation. Use this information to interpret the speed variations you measured for each type of arithmetic operation. Hence summarise how the CPU handles each data type.

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