The Montana Moose Call
Montana Section of the Institute of Electrical and Electronics Engineers

Montana Section News

October, 2004

Chair's Message

Ross Snider

Cost advantage of using Field Programmable Gate Arrays The top 500 supercomputers of the world are listed on the top500.org web site where it is indicated that Cray Inc. and Sandia National Laboratories are building the Red Storm 41.5 teraflop supercomputer nicknamed "Thor's Hammer" for $90 million. It will contain 10,368 AMD Opteron processors each running at 2.0 GHz. Now if a particular algorithm can use a fixed-point representation instead of a floating-point representation (which is commonly done in digital signal processing) and memory requirements are not extreme, than the capability of the recently announced Virtex 4 FPGAs from Xilinx are compelling. The Virtex 4 XC4SX55 will have 512 DSP slices running at 500 MHz. Each DSP slice contains an 18-bit x 18-bit multiplier as well as a 48-bit accumulator. This means that this single chip can perform 512 billion fixed-point operations each second and 81 of these Virtex 4's could perform 41.4 trillion fixed-point operations per second. Table 1 illustrates the point that if one can migrate to a fixed-point world, than a 41 terafixop system could possibly be set up for $14.6 thousand in FPGA parts as compared to $8.3 million for floating-point processors. This means that a supercomputing FPGA fixed-point system could be ~500 times cheaper than a typical floating-point supercomputing system. Of course, not all applications can be done in fixed-point, but if it can....

Table 1

Data Type:	Processor	Price	Target Performance	Number of Processors
Floating-point	AMD Opteron	$800	41.5 Teraflops	10,368
Fixed-point	Xilinx XC4SX55	$180*[1]	41.4 Terafixops*[2]	81

*1 Estimated from the announced price of the SX25 for $60 in 25K quantities, which contains 128 DSP Slices and 128 Block RAMs. The price for the SX55 was estimated from the increase in die area needed to hold 512 DSP Slices and 320 Bock RAMs.

*2 Terafixops = 1 trillion (10^12) fixed-point operations per second.

Xilinx is now targeting the automotive market. Xilinx points out that market analyst firm ABI research says the worldwide markets for semiconductors for in-car audio, infotainment and driver information/telematics systems is forecast to more than double from $5.6 billion in 2003 to $12.8 billion in 2010. According to Frank Visquez, director of Automotive Technologies at ABI Research, the FPGA/CPLD revenue portion of this segment is expected to grow 94 percent from $240.3 million in 2003 to $449.3 million in 2010. Xilinx is offering a suite of IP for the automotive market, including communications and connectivity cores such as controller area network (CAN) and local interconnect network (LIN) cores.

The speaker for the October 28, IEEE meeting will be **Bryan Robertus from Advanced Electronic Design (AED) here in Bozeman**.

Title: FPGAs: What they are and what they can do

Abstract: Field Programmable Gate Arrays (FPGAs) are gaining a lot of steam in the digital world with capabilities and applications that far exceed their initial projections. A brief overview of FPGA technology will be provided followed by descriptions of real world applications and how they work.

Did You Know

That Murphy (of Murphy's Law) was an EE? Answer to the last "Did You Know?" –Sheridan, Meagher & Custer.

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