Reconfigurable HPC[1]: torpedoed by Deficits in Education ?

(keynote address[2])
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Abstract. Currently there is a deep chasm between Reconfigurable Computing (RC) and the way, how "classical" CS people look at parallelism [1]. The situation is comparable to the well-known hardware / software chasm. In education until recently RC has been subject of embedded systems or SoC design within EE departments, whereas most classical CS departments have ignored the enormous speed-up opportunities which can be obtained from this field. Only a few departments provide special courses mostly attended by a small percentage of graduate students. Conferences like ISCA stubbornly refused to include RC and related areas in their scope. Also many major players in the IT market have mainly ignored this area.

Since some months ago this situation is on the way to be changed. An increasing number of colleagues from classical parallel computing or supercomputing communities is going to be ready to discuss fundamental issues with us [2] [3]. Last year, Intel Research at Hillsboro, Ore, held a major internal workshop on RC. It has been told, that also Microsoft has held an internal workshop on this area. Other major players have already joined this movement, like Hewlett Packard, IBM, infineon, Motorola, Sony, ST microelectronics, Texas Instruments, Toshiba, and others. A major break-through also in CS education is overdue. All scientific and know-how ingredients needed are available - ready to be integrated in all CS curricula: software / configware co-compilation [4] [5], software to configware migration [6] [7], mapping applications onto morphware [6] [7] [8] [9], architectural resources for data-stream-based anti machines [10] [11] [12], and many others. Not only FPGAs, but also coarse grain datapath array platforms are available commercialy.along with application development tools [13].

The new road map is based on the duality of an instruction-stream-based mind set, and a data-stream-based mind set [1] [12] [14] [15]. Not only the HPC community urgently needs to benefit from a curricular revision. A rapidly increasing percentage of

1) High Performance Computing
2) prepared for the first International Workshop on Reconfigurable Systems for HPC (RHPC), July 21, 2004, held in conjunction with the 7th International Conference on High Performance Computing and Grid in the Asia Pacific Region (HPC Asia 2004), July 20 - 22, 2004, Omiya Sonic City (Tokyo Area), Japan

programmers implements code for embedded systems. However, most CS graduates are not qualified for this changing labour market. With their procedural-only mind set they cannot cope with hardware / configware / software partitioning. Currently such tasks are mainly carried out by EE professionals. In order not to loose this competition, and, to avoid a disaster for future CS graduates looking for their first job, CS departments have to wake up. Here we have a good chance to become successful trailblazers by forming a RC old boys' network together with colleagues from "classical CS", organized like the Mead & Conway movement more than 20 years ago [16].

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