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PRESS RELEASE

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FPL2000 PROGRAM and SITE details: http://www.fpl.uni-kl.de/FPL/

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The Configware Rush is taking off right now: heralded by FPL2000 and its high Growth Rate.

Even Molecular Biology goes reconfigurable.

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KAISERSLAUTERN / VILLACH -- "Use Configware for Software" is blared out from the bandwagon. In his keynote scheduled for FPL2000 Hitachi's corporate senior chief technologist Dr. Tsugio Makimoto envisions the impact of reconfigurable computing becoming mainstream microchip application, as he has predicted 14 years ago. With silicon technology progress facing its limits next decade Makimoto's Law may well overtrump the Gordon Moore Law, says program chair Reiner Hartenstein. *(Gordon Moore, a founder of intel, predicted in 1965: The number of transistors on a microchip doubles every 18 to 24 months. Dr. Tsugio Makimoto is Hitachi's corporate senior chief technologist, IEEE fellow, recipient of the prestigious Ichimura Award, member of the advisory board of Japan's Nara Institute of Science and Technology (NAIST), member of the international advisory panel of*

the National Science and Technology Board (NSTB) of Singapore, and member of the board of directors of Chartered Semiconductor Manufacturing, Singapore.)

Makimoto observed in 1986, that mainstream microchip application changes every ten years: what's called "Makimoto's Wave". He predicted, that the "third wave" will bring reconfigurable hardware into mainstream. "Makimoto's third wave has been started", says Hartenstein: "the Configware Rush is taking off right now, portraying the microprocessor as a methusela". *(Software as we know it can run only sequential programs on von-Neumann-type hardware. But software cannot be used for the spatial programming of reconfigurable hardware, where a different programming medium is needed: "configware". Software is based on instruction fetch during run time, whereas configware determines (kind of) "instruction fetch" before run time: drastically more powerful complex "instructions" by configuring powerful soft datapaths, where at run time only data streams are piped through, but no instruction streams. See [1], or, introduction in [2], [3]. - Already now reconfigurable integrated circuits like FPGAs are a rapidly growing multi billion dollar market, making ASICs disappear within a few years. See [4], [5]. Analysts predict around $50 billion per year by end of this decade.)*

FPL2000. Founded 1991 at Oxford, UK, FPL is the eldest international conference on reconfigurable computing. FPL2000, the 10th international conference on Field-Programmable Logic and Applications, will be held August 27-30 at Villach, Carinthia, Austria. Its ernomous growth rate confirms Makimoto's prediction. Doubled attendance is expected, since, compared to FPL'99 at Glasgow, submissions have doubled: http:// www.fpl.uni-kl.de/FPL/ .

Product Longevity. Reconfigurable macro module cores will be indispensable ingredients for System on a Chip (SoC) designs, claims Jan Rabaey, head of the Wireless Research Center and Professor at UC Berkeley, in his FPL2000 keynote: especially for next generation cellular wireless communication. „Soap Chip for SoC" says Reiner Hartenstein from Kaiserslautern: „System-on-a-programmable Chip". We are heading toward a microelectronics market revolution, says Tom Kean from Algotronix (Edinburgh) in his keynote: by reconfigurability to cure shrinking product life cycles at exploding design cost, to obtain product longevity through new horizons of flexibility.

Without Reconfigurable "Machines" there is no way out of the current microchip design crisis, says Reiner Hartenstein, Professor at Kaiserslautern: since the 55 years old von Neumann scheme does not support soft datapaths like the KressArray and others, a new machine paradigm which

accepts configware will move up with Makimoto's 3rd wave. Hartenstein envisions an emerging dichotomy of programming where configware engineering competes with software engineering. Configware will shake not only the foundations of programming, but even entire computer science and engineering curricula, says FPL2000 general chair Herbert Gruenbacher of Carinthia Tech. *Reconfigurable machines are a revival of the "fixed plus variable structure computer" idea, published in 1960 by Gerald Estrin, now a professor emeritus of University of California, Los Angeles,*

Merging with Molecular Biology. FPL2000 also bridges the gap between the scenes of microelectronic reconfigurability and evolvable systems, and, of molecular computing - by introducing to exciting new developments in multi-disciplinary co-operations between Computer Science, Molecular Biology, and other relevant areas, which shake the traditional definitions of computer science, and, which are supported by major consortia: the European Molecular Computing Consortium (EMCC), the US "Consortium for Biomolecular Computing", and, the Japanese "Molecular Computer Project".

Biology versus Microelectronics. Reconfigurability is not only the basis of biologically inspired microelectronic systems, but is going beyond traditional electronic context, where molecular biology is just another reconfigurable medium: less fast, but much more flexible, says invited speaker John McCaskill, who expects a rapidly increasing interchange between molecular biology, nanotechnology, microsystems, electronics and information technology in the transition from reconfigurable systems to fully evolvable systems - due to the rapid progress in exploring the parallels between biological reconfiguration and evolution, and, opportunities for using reconfiguration to evolve complex nano-, micro- and electronic-scale devices and computers.

Prof. Dr. John McCaskill is the head of the BioMIP institute of GMD (German National Research Center) near Bonn, investigating the principles and potentials for natural design and programmability in complex biomolecular synthesis systems, like microreactors. His group also works for the NASA on self-reproducing molecular systems and Darwinian chemistry, and he also is international project coordinator and has grants to work on DNA computing (molecular computing) and on pattern formation of molecular ecosystems in microreactor networks.

Microreactors stem from shrinking the test tube down to microscopic

size, so that thousands of simultaneous tests take place simultaneously on a microchip, used for drug discovery, genomics, clinical diagnostics, basic research, and industrial chemical applications - doing within minutes what otherwise would take hours or days. Prof. Hartenstein from Kaiserslautern says: "Modern microreactors are doing for fluids what microprocessors and electronic circuits do for electrons, and will be soon to drug discovery and clinical diagnostics what Pentium processors are to the computing world: chemical bits for electronic bits.

Reconfigurable microreactors are hard on the heels of reconfigurable microelectronic systems, says John McCaskill: Flow microreactors have a circuit-like network of channels and gate-like reactorchambers, where microvalves, controlling the passage of fluid or charged molecules play the role of transistors. For Reconfigurability microvalves are "the liquid analog to a transistor". Prof. McCaskill points out, that also the intermediate level of microfluidic systems is open to reconfiguration and evolution, ready for linking up the electronic and molecular processing worlds.

[1] Reiner W. Hartenstein (invited paper, in german language): Der Mikroprozessor im Neuen Jahrtausend (The Microprocessor in the New Millennium); ELEKTRONIK, 49, 1, (11. Jan. 2000)

[2] Jürgen Becker et al.: Parallelization in Co-Compilation for Configurable Accelerators; Proc. Asia and South Pacific Design Automation Conference, ASP-DAC'98, Yokohama, Japan, Feb. 10-13, 1998 -- http://xputers.informatik.uni-kl.de/papers/paper098-a.pdf

[3] Reiner W. Hartenstein (invited paper): The Microprocessor is no more General Purpose: why Future Reconfigurable Platforms will win; IEEE Proc.Int'l Conf. on Innovative Systems in Silicon, ISIS'97, Austin, Texas, USA, Oct. 8-10, 1997 -- http://xputers.informatik.uni-kl.de/papers/paper097.pdf

[4] N. N.: Hardware goes soft; The Economist, 22-May-99

[5] J. Villasenor, W. H. Mangione-Smith: Configurable Computing; Scientific American, June 1997, pp. 66 - 71

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