PicoServer - Building a Compact Energy Efficient Multiprocessor

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Abstract. With power and cooling becoming an increasingly costly part of the operating budget of a server, the old trend of striving for higher performance with little regard for power is over. Emerging semiconductor process technologies, multicore architectures, and new interconnect technology provide an avenue for future servers to become low power, compact, and possibly mobile. In talk we examine two techniques for achieving low power: 1)3D die stacking; and 2) replacing DRAM with Flash memory. 3D die stacking technology can bond multiple dies together vertically and provide millions of connections between layers. In this talk, we examine the case for a PicoServer, a multicore architecture using 3D stacking to implement a simple, low-power, high-performance server system. Secondly, we will show how Flash memory, a low power high density non- volatile memory technology, can be used to replace DRAM, lowering the power of the main memory, to further reduce power.

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