Restoring Software Productivity Crucial To Economic Recovery: The Multi-Core Dilemma, by Uzi Vishkin

Traditionally, Americans look to the manufacturing sector for bettering the recovery prospects of the economy. Software production is the quintessential 21st century mode of manufacturing. But, if most programmers are unable to design software for mainstream computers, this could preempt such prospects.
Yet, this is exactly today's reality.

Today's mainstream desktop and laptop computers are all so-called multi-core machines. Instead of using a single processor (the 'computer brain' also called 'core'), desktops and laptops began using several 'cores' starting around 2005. The number of cores in each computer is expected to continue doubling every 1 to 2 years. Programmers are now expected to program these multiple cores to solve together a single task automatically. In fact, technological constraints forced the transition to multi-cores, as single-core computers started overheating. This transition caught chipmakers and much of the research community unprepared. Consequently, chipmakers are now busy building and designing multi-core processors that most programmers cannot handle. The industry now finds itself coping with the challenge of how to build and program a completely new type of machine, without ready knowledge.

Government investment in this general domain is limited to seeking innovative ways of educating computer science majors to program these hard-to-program multi-cores. These are legitimate efforts, but given current knowledge, expedient, satisfactory results are unlikely. Machines must be built and tested for ease-of-programming before they are placed in the market, not after.

All current government programs dedicated to building better computers are limited to 'beyond silicon' technologies that could be relevant for the 2020s but not earlier, or to extremely large supercomputers for scientific applications. All of these are, of course, legitimate efforts, but for the nearer future, the full faith of the economy is being placed on the few chipmakers that currently dominate the market. However, these chipmakers appear unable, or unwilling, to address the problem that matters most to the recovery of the US job market.

A new government program to facilitate commercial many-core machines whose programming can be handled effectively by most programmers, perhaps with some modest proper training, is needed.

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