UNUM: A tinker-Toy Approach to Building Multicore PowerPC Microarchitectures

The goal of the UNUM project is to show that it is possible to synthesize many different PowerPC models (both existing and new variants) quickly by using a library of microarchitectural IP blocks. The IP blocks and modules that we are developing include instruction decoder, branch predictor, speculative execution structures, ALUs, L1 and L2 cache structures, and cache-coherence engines. This project in addition to providing PowerPC “gateware” for others to use, will shed light on how IP blocks should be written to be easily modifiable and reusable.

Nirav Dave and Mike Pellauer are the main architects of UNUM.

Arvind is the Johnson Professor of Computer Science and Engineering at the Massachusetts Institute of Technology and a member of CSAIL (Computer Science and Artificial Intelligence Laboratory). Before joining MIT in 1979, he taught at the University of California, Irvine, and IIT, Kanpur (77-78). Arvind graduated from IIT, Kanpur, in 1969 and did his M.S. (72) and Ph.D. (73) at the University of Minnesota.

In 1992, Arvind's group, in collaboration with Motorola, completed the Monsoon dataflow machine and its associated software. A dozen of these machines were built and installed at Los Alamos National Labs and other universities, before Monsoon was retired to the Computer Museum in California.

In 2000, Arvind took a two-year leave of absence to start Sandburst, a fabless semiconductor company to produce a chip set for 10G-bit Ethernet routers. He served as its President until his return to MIT in September 2002. In 2003, Arvind co-founded Bluespec Inc., an EDA company to produce a set of tools for high-level synthesis. He currently serves on the board of both Sandburst and Bluespec.

Arvind has served on the editorial board of numerous journals and has also chaired many conferences. From 1986-92, he was the Chief Technical Advisor for the UN sponsored Knowledge Based Computer Systems project in India. During 1992-93 Arvind was Fujitsu Visiting Professor at the University of Tokyo. In 2001, Dr. R. S. Nikhil and Arvind published the book "Implicit parallel programming in pH".

Arvind's current research interests are synthesis and verification of large digital systems described using Guarded Atomic Actions; and Memory Models and Cache Coherence Protocols for parallel architectures and languages.