

The World Wide Computer: Prospects for Parallel and Distributed Computing on the Web¹

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Abstract Researchers have long focused on dramatically increasing the size of problems that can be solved by exploiting massive parallelism. Considerable work was done on special purpose hardware for building concurrent computers and parallelizing conventional sequential programs. On the other hand, models such as Actors were inspired by the idea that using diversity and parallelism, a community of agents could collectively solve much larger problems than sequential programs. Early work on the Actor model studied the semantics of concurrency and distribution. Later work provided novel ways of implementing actors for efficiently executing and migrating them [1].

The recent marriage of computation and communication has created a revolution in domains such as information delivery and e-commerce. This revolution provides a basis for realizing the original vision of research in the Actor paradigm. We envision the creation of a *cybereconomy* where computational resources, such as processing power and network bandwidth are traded along with information. I will describe some recent research in what is required to use resources in such a cybereconomy [2]. In particular, I will discuss the role of mobility, naming [3,4], coordination [5], and middleware [6] in defining and building the concept of a World Wide Computer.

References

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Biography Dr. Gul Agha is Professor of Computer Science at the University of Illinois at Urbana-Champaign. His research interests include models, languages, and tools for parallel, distributed and mobile computing. Dr. Agha serves as Editor-in-Chief of ACM Computing Surveys and was formerly Editor-in-Chief of IEEE Concurrency: Parallel, Distributed and Mobile Computing. Dr. Agha is a past recipient of the Incentives for Excellence Award from Digital Equipment Corporation, the Young Investigator Award from the US Office of Naval Research and the Meritorious Service Award from IEEE Computer Society. He has given close to a hundred invited lectures, including 22 at international conferences and workshops. Among Dr. Agha's general interests are mysticism and epistemology. He has a particular passion for classical Sindhi music and poetry, and for promotion of animal rights and environmentalism.

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