Editorial

N Mukunda, Chief Editor

This issue brings together several articles on the world of computers – V Rajaraman on the status of supercomputers today; U N Sinha on Indian efforts in parallel computing since 1986; T B Rajashekar on the World Wide Web, how its information resources are organised and accessed; and a short account of Seymour Cray featured on the back cover. All these should be of interest to our readers, both students and teachers. Sinha's brief article-in-a-box on our own experiences in parallel computers lists several success stories in the areas of computational fluid dynamics, climate modelling and defence applications, problems which could not have been tackled but for parallelisation. While Sinha does mention our strengths, he says also that "*Large scale computing is yet to take firm root in our country*".

V Rajaraman, the doyen of computer science education in the country, traces the history of the subject of supercomputers from the late 1970's till today. Machine speeds keep doubling every eighteen months, thanks to technological advances; and we are at the stage when it is not necessary to own your own machine but you must be able to reach one wherever it may be located, to solve your problem. To reach and not to own – that is the goal. All these advances must inevitably filter down into the educational processes, first at the more advanced levels and then at college levels too.

Rajashekar's long and detailed article on the resources of the Web gives many practical guidelines on its use. With so much information in principle literally at one's fingertips – just a click away – one can easily get drowned, and must learn how to find what one wants, and also judge the quality of what one gets! Physicists – in particular those working in elementary particle or high energy physics – would be pleased to know that it all

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started in CERN – the European Centre for Nuclear Research in Geneva, Switzerland – in 1989 to serve the needs of international collaborations in high energy physics. As WWW pioneer Tim Berners-Lee said at a recent meeting in CERN to see what lies ahead: "*The Web could have been invented anywhere, but there was nowhere better than CERN.*" Just see where it has reached today! With computers entering every aspect of life, children may start learning the alphabet reciting "*A is for Apple, B for Babbage (better, Boole?), C is for Cray, D for Digital…*".

Amit Roy's series on Great Experiments in Physics turns to the Josephson effects in superconductors. Subhashis Nag in an easy humorous style uses college level vector algebra, calculus and mechanics to connect Archimedes and Gauss. Renee Borges tells us how and why plants change sex to follow changes in wind and weather, soil and sun.

On Parallel Computing – Indian Trends

Parallel computing is an excellent illustration of the power of team work. When processors act in unison, the symphony of computations make intractable problems computationally tractable. The distinguishing features are that these processors communicate and synchronize in addition to doing their own part. This, in essence, summarizes the spirit of parallel computing.

A large variety of computational problems arising in fluid dynamics, meteorology, electromagnetism, more generally all fields governed by partial differential equations, lend themselves naturally to parallel computing via domain decomposition techniques. The underlying idea is not new but its success has been made possible due to today's revolutionary microprocessor technology. Other techniques of computation (for example, spectral methods) are also amenable to parallel computing, but techniques are different and demands on the interconnection network more stringent.

By 1985, parallel computing had been recognized as a strategic discipline in US and Europe and many research projects (over 20) had already made substantial progress. In India parallel computing started in 1986 at the National Aerospace Laboratories, Bangalore when R Narasimha, then its Director, set up the Flosolver project with the specific objective to "design, develop, fabricate and use a suitable parallel processing computer for applications to fluid dynamical and aerodynamical problems." The first milestone was reached when the four processor Flosolver Mk1 became operational in December 1986 with all the system and application software developed in-house. By 1988, based on the recommendations of the Science Advisory Council to the Prime Minister, Government of India decided