

Foreword

This volume records the 31 papers presented at the 12th Symposium on Computer Arithmetic, held in the Assembly Rooms, Bath, England, July 19-21, 1995.

Since 1969, the ARITH Symposium series has been the primary forum for reporting new work in the design of arithmetic chips and systems, and in the theory of arithmetic in computers. The Symposia are biennial and in recent years have alternated between Europe and North America. A clear focus and a deservedly strong reputation for the quality of research presented, attracts truly global participation. The ARITH-12 Call-for-Papers generated 80 submissions from 17 countries; the 31 papers finally selected represent nine countries.

The ARITH review process is particularly rigorous. Willy McAllister coordinated a Program Committee of 32 acknowledged experts in computer arithmetic, who in turn called on an army of over 100 specialist reviewers from around the world. The global scope of ARITH does generate some difficulties, and we are deeply indebted to John McWhirter and Neil Burgess for acting as regional Program Co-Chairs for Europe and for Asia and the Pacific Rim, respectively. It's useful to have someone in position for roughly every eight time-zones!

In early March of this year, 20 of the Program Committee members met in Palo Alto, California, by which time typically four written reviews had been gathered for each of the 80 full papers submitted. The debate over which papers to accept raged for nearly two days! The quality and detail of many of the reviews, and the dedication displayed by the Program Committee were extraordinary. As a result of their efforts, we are confident that these proceedings represent the best current work in arithmetic worldwide.

Periods of intense development in arithmetic naturally track growth periods in the design of computers, and more recently, silicon chips. The stimulus for the last decade has been the explosive growth in microprocessors for personal computers, fueling many new ideas in the design of VLSI arithmetic units. Design emphasis has been on speed and precision, with the ubiquity of the IEEE-754 floating-point standard exerting a particularly strong influence.

Several of the papers collected here describe techniques for achieving ever higher performance within the confines of IEEE-754. Perhaps remarkably, there also appears to be no slow-down in the rate at which new ideas emerge for fundamental operations such as multiplication, division, and square root; are all represented here in force. As integration densities and performance demands increase, there is growing interest in hardware-assisted function evaluation, in particular for computing the transcendentals. And finally, recent microprocessor history provides a stark reminder that one of the hardest things about arithmetic machine design and programming is getting it right, and proving that it's right. There is a strong showing this year for papers which deal with the problems of error containment in complex designs and complex calculations.

The setting of this year's Symposium speaks best for itself. Bath is the finest surviving example of a Georgian city, designed and built largely in the 18th century on the site of the Roman spa town of Aquae Sulis. The two million visitors each year somewhat overwhelm the 83,000 inhabitants, but have given Bath a social infrastructure quite out of proportion to its size. To say that there is plenty to do would be understating the case!

Finally we must acknowledge our collective debt to two more groups of people. First, to the authors of all the papers submitted, for making their work available and for going to great lengths to facilitate our understanding of it. And second, to the IEEE and its Computer Society, for providing an organizational framework which makes this sort of meeting possible.

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