Differences from the first edition

This second edition represents a rearrangement, modification and augmenting of the first.

The early chapters, on the programming language, have been rearranged so that the programming language features are introduced consecutively, without the intervention of chapters on more technical matters. That technical material has now been delayed, leaving in the original position only just enough to get on with the programming language itself.

The approach to procedures and parameters, including recursive procedures, has been modified considerably, to make it simpler. At the cost of a little generality, the original separate treatment of parameters has been replaced by a more conventional treatment of (recursive) procedures and parameters together.

There is a substantial amount of new material, including: a section on functions and relations (in the 'Z style'); a complete chapter on recursive types (for example, trees), and simple control structures for their use; a section on *functional* refinement, a special and very common case of state transformation whose rules are much simpler than the fully general ones; and two more 'advanced' case studies, adding recursion and data refinement to the techniques illustrated more substantially.

The first extra case study, 'the largest rectangle under a histogram', is well known not to be especially easy whatever technique is used; we develop a proper- (not simply tail-) recursive solution.

The second extra case study, 'a mail system', illustrates at some length the sometimes treacherous interaction of specification, design, re-specification and re-design that leads towards implementation of a system rather than just a program. Data refinement figures prominently.