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Polymorphic programming. I. Another language designed on semantic principles. (English) Zbl 0561.68004

We wish to illustrate the potential of a thus far little explored avenue of programming language design - namely the employment of types and routines as values in their own right within the framework of an Algol. In this first paper we pay particular attention to the development of highly orthogonal self-initializing data structures, and to the advantageous expressive power of polymorphism when combined with routine values so as to provide abstract data structures. The emphasis is on the design phase, rather than on the implementation details or precise syntactic structure of the envisaged language. A second, companion paper discusses the design of a high-level orthogonal abstract architecture intended to support polymorphic languages in which routines are "first class" values. The relationship of the abstract machine architecture to the programming language vis-a-vis the "semantic gap" is then discussed from the viewpoint of compiling programs which are strongly typed while exploiting polymorphism. We feel that polymorphism is essential if truly general purpose programs, software tools, are to be written easily. The research reported herein is an effort towards realizing this goal.

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