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A practical approach to constructing an operational compiler...

Engineering a Compiler: VAX-11 Code Generation and Optimization



by Patricia Anklam, David Cutler, Roger Heinen, Jr., and M. Donald MacLaren, all of Digital Equipment Corporation

With an emphasis on authentic engineering processes, this book offers a step-by-step description of the development of a production-quality compiler with a code generator capable of highly optimized object code for multiple source languages. Specifically, it details the practical experiences of the programming team that developed a PL/I General Purpose subset compiler for Digital Equipment Corporation's VAX machines.

Engineering a Compiler focuses primarily on the lesser known aspect of compiler design—the back end code generation phases. More than half the book is devoted to optimization—global optimization, tree reductions, register allocation, and peephole optimization. The programming team's solutions to common problems of compiler design provide useful information to anyone undertaking a similar venture with other equipment.

The book begins by providing background information on the VAX code generator, the PL/I compiler, and the design team's approach to bootstrapping an existing PL/I compiler to produce code for VAX machines. Following chapters discuss specific aspects of the compiler design, such as the requirements for constructing Table-Building Language source programs, the symbol table and the structure of the trees, the Intermediate Language, Write Tree, the engineering and evolution of the optimizer, examples of VAX code generation, and the software engineering tools the team found most useful. Numerous PL/I and C program examples, a glossary, and over 80 figures and tables are included.

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