

D-CC/88K, a globally optimizing C compiler based on proven compiler technology, is a complete implementation of the proposed ANSI C standard and is fully compliant with the 88000 Binary Compatibility Standard (BCS). D-CC/88K provides specific optimizations for Motorola's RISC processor.

The compiler produces very fast and compact code. Benchmarks show the performance of code compiled with D-CC/88K to be among the best on the market.

Features:

- o Complies with 88000 Object Code Compatibility Standard (OCS) and Binary Compatibility Standard (BCS)
- o Conforms to the proposed ANSI C standard
- o State of the art optimizations
- o Fast compilation
- o Written in C
- o Produces assembler output for Diab's D-AS/88K as well as other MC88000 mnemonics conforming assemblers
- o Generates fast and compact code
- o Compatible with pcc (Portable C Compiler)
- o Supports standard Unix System V command line options
- o Supports symbolic debugging
- o Multi vendor host and operating system support for cross development
- o Assembler output can optionally contain C source as comments

D-CC/88K is a highly optimizing C compiler. It is designed for the professional programmer demanding extremely fast, compact code. The compiler uses many different optimization methods to take full advantage of the Motorola 88000 RISC microprocessor design. These optimizations include superior register allocation, global common subexpression elimination and coloring.

D-CC/88K is written entirely in C and contains a complete implementation of the C language as defined by the proposed ANSI C standard. Where the ANSI standard differs from the older "standard" by Kernighan and Ritchie, either can be selected by an option.

Examples of Optimizations

- o Global common subexpression elimination
- o Lifetime analysis (coloring)
- o Reaching analysis
- o Automatic register allocation
- o Loop invariant code motion
- o Constant propagation
- o Constant folding
- o Strength reduction
- o Dead code elimination
- o Re-ordering code scheduling
- o Cascaded jumps removal
- o Switch optimizations
- o Pass parameters in registers



Operation of D-CC

D-CC is written entirely in the C programming language. The operation of D-CC can be divided into three major steps: parsing of C code, optimizations and code generation.

D-CC uses a bottom-up parser method when parsing the C code. When a C function is encountered during parsing, a tree is built to represent the function. As parsing proceeds, the tree expands until the entire function is parsed. Keeping the tree in primary memory with information about the entire function provides for fast compilation and a very high degree of optimization.

The second phase of operation is known as the optimization phase. In this phase, different optimization methods are applied such as common subexpression elimination, loop invariant code motion and coloring.

The last phase is code generation. D-CC code generation is target dependent, but is not "hard coded" in the compiler itself like many other compilers. Separate generation table files are used by the compiler for each CPU type. A target description language was developed to facilitate retargeting. The same D-CC compiler can be used with different table files when generating code for different CPU's. The use of table files provides fast and flexible development of code generators. The language file is compiled to a table file and read by D-CC at startup. Table files are currently available for the MC68000/10, MC68020/30, MC88000 and NS32XXX processors.

Code generation by D-CC is fast, D-CC can generate an object file more than three times as fast as PCC including the time used by the assembler. All the internal structures are handled such that the compilation time is linearly proportional (not quadratic) to the size of the compiled source. No temporary files are used by the compiler.

Optional Utilities

As an option, DIAB provides an assembler, archiver and linker. The assembler, like D-CC, is table driven for maximum speed and portability. All internal structure designs are linear (not quadratic) resulting in fast compilation on large source files.

The archiver is used for collecting the object files produced by the assembler into one single archive file. An archiver reduces the number of file entries in the file system and provides for faster linking and easier maintenance of the object files.

The linker is used for linking object files and archives into one executable file which can be executed by the system loader. All three utilities are written in C and are portable.

Cross Development Platforms

D-CC/88K, when used with DIAB's assembler, linker and archiver or any other 88000 OCS compliant assembler and linker, is a complete production quality cross development tool for the MC88000. It is available on the following platforms:

Sun 3/SunOs
DS90/D-NIX
DECstation/Ultrix
DEC VAX/VMS
Mac II/MPW
Delta 68/SVR3
Platform 88/SVR3