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HI-TECH C[®]

C O M P I L E R S

by Microchip Technology



www.microchip.com/Hi-TECH

Microchip's Omniscient Code Generation™

A world class provider of development tools for embedded systems, best known for its high-performance ANSI C compilers featuring the optimizing, whole-program compilation technology, Omniscient Code Generation, HI-TECH Software is now a wholly-owned subsidiary of Microchip Technology.



As featured in the EDN Hot 100 Products of 2007, HI-TECH C PRO compilers enabled with Omniscient Code Generation (OCG), a whole-program compilation technology, to

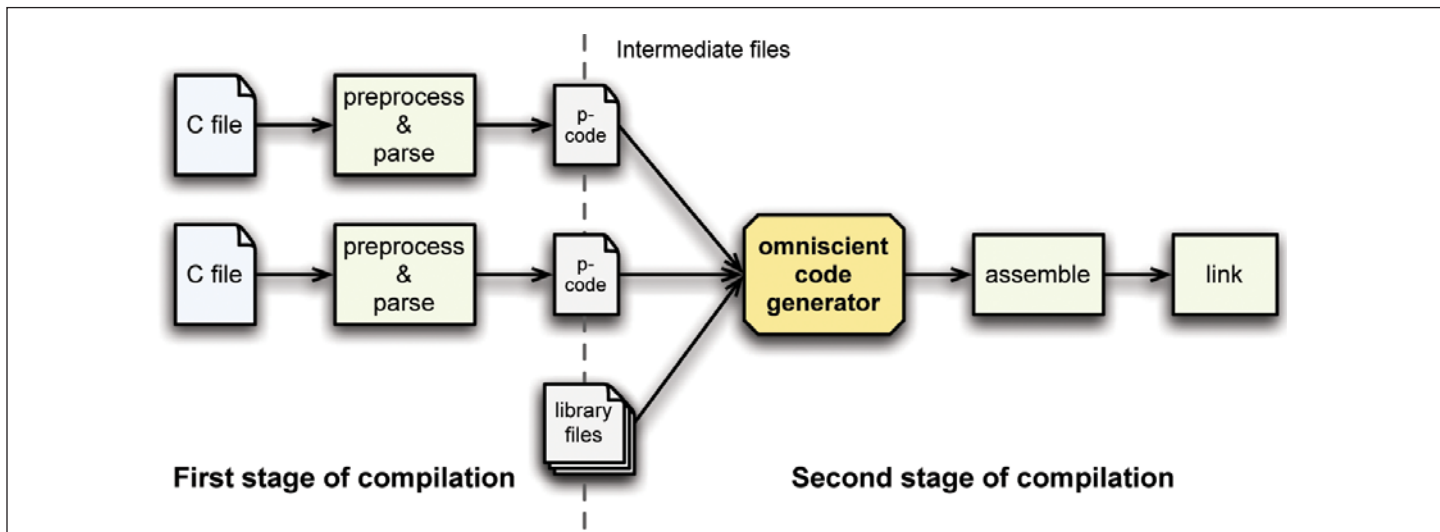
facilitate more intelligent, state-of-the-art code generation and enhance product usability. Omniscient Code Generation has been developed to read and process all C source modules in one step and can deliver denser code, improve RAM utilization and reduce interrupt latency, saving you time, space, power and money.

Rather than relying completely on the linker to uncover errors in independently compiled modules, an OCG compiler completes the initial stages of compilation for each module separately, but defers object code generation until the point at which a view of the whole program is available.

Information gathered from a global view of the program, can be used to provide better detection of potential errors in the user's code, and to better optimize the output.

Freeware

HI-TECH C PRO compilers can also be operated in Lite mode with no memory restrictions or time limits. It supports all devices, however OCG optimizations are not available. HI-TECH Software has provided this freeware compiler, HI-TECH C PRO compilers in Lite mode, as a low-cost tool for hobbyists and students, however the license allows its use for commercial purposes as well. It is ideal as a teaching tool for an introduction to the C language and embedded programming.



Denser Code, Better Performance

Eliminate Bloated Code

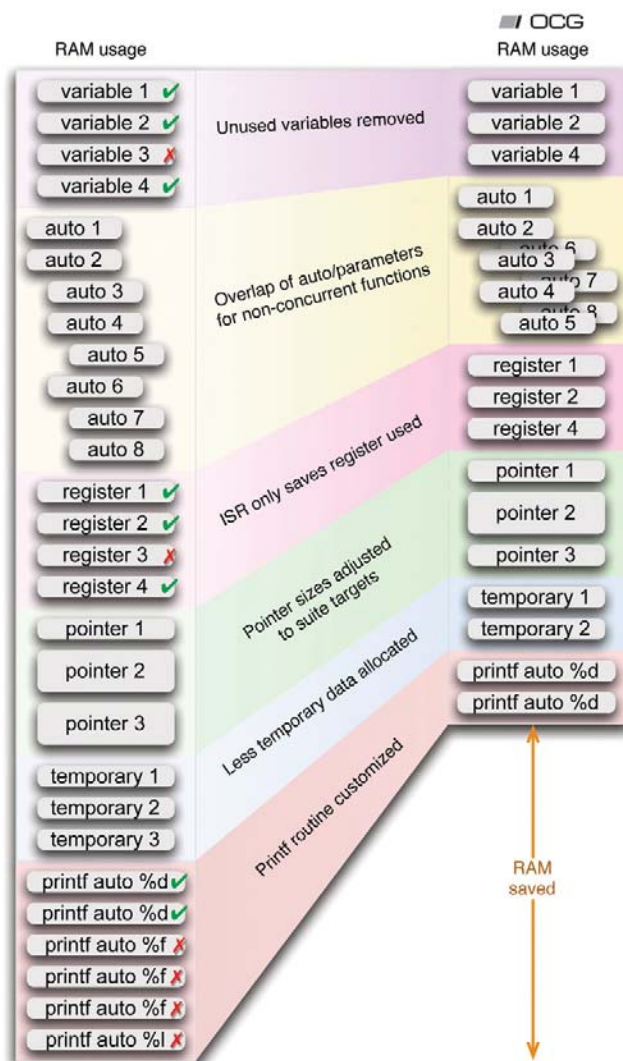
Unused Variables. The all-seeing nature of OCG enables the compiler to determine if a variable is being used in the program. Unused variables are removed, thus saving RAM.

Auto Variables. If two functions are never active at the same time, their auto variables can be overlapped. The function call graph that OCG constructs means that the exact usage of the functions is known and this technique can be effectively applied.

Registers. The compiler will also know exactly which registers are in both interrupt and mainline context, so it can generate code accordingly, minimizing both the code size and cycles required to switch contexts.

Automatic Bank Management. OCG allows automatic allocation of data into RAM banks eliminating the need for the programmer to specify the location of the variables.

Customized printf. OCG has the ability to generate a printf function that is customized for the program at hand. It does this by scanning the user's code and only includes those features of printf that were detected. This results in a huge saving in program memory but also saves you valuable RAM space.



Focus More on Your Goals and Less on Your Code

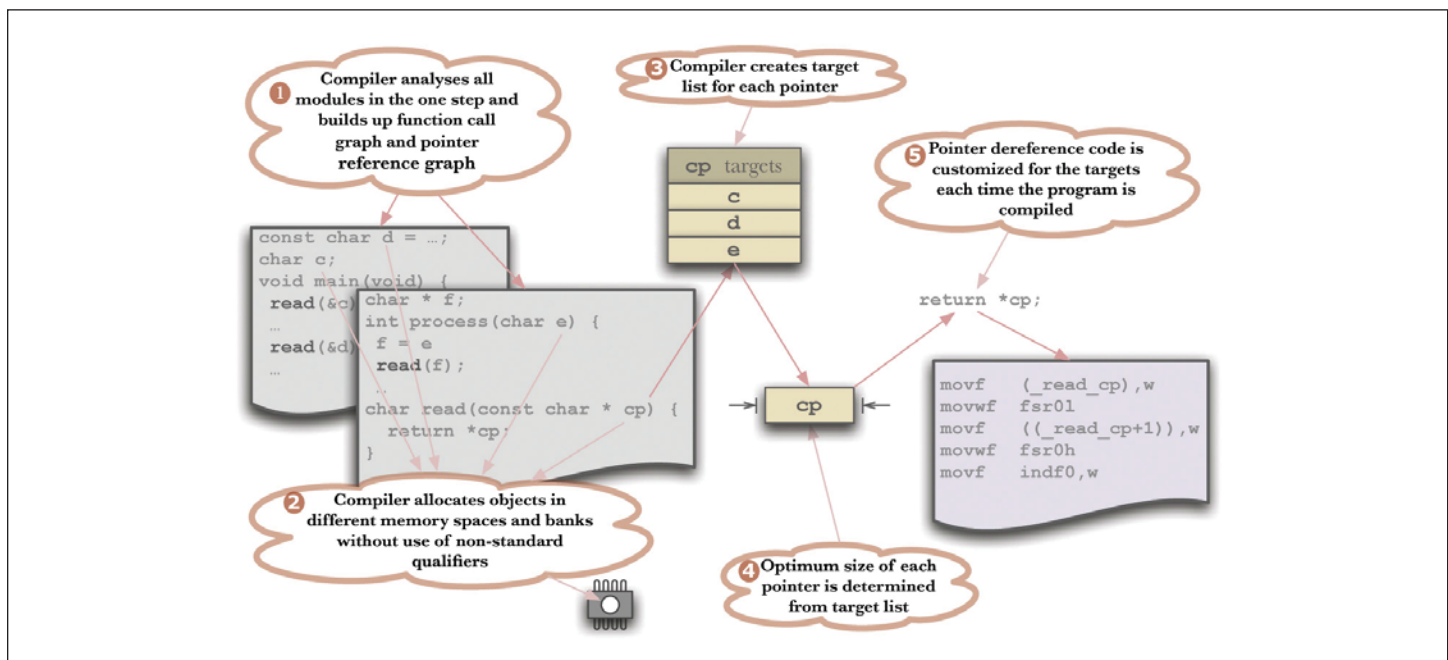
Save Time and Effort

Operation. Most embedded C compilers require special linker scripts and numerous command line options to be used to cater for differing device architectures. With full knowledge of the device and the ability to determine where all objects will be linked, much of this work is reduced or eliminated with HI-TECH C PRO compilers.

Eliminates the Need for Memory Space Qualifiers.

Because the compiler knows how frequently each variable is used and which variables are dependent, it can optimize pointers and position objects in the most efficient memory spaces, eliminating the need for the programmer to do this manually with non-standard C language extensions.

Debugging with Optimizations. Since a lot more of the optimizations are performed at the C level, rather than at the assembly or linker level, HI-TECH C PRO compilers allows more comprehensive debugging of code, even with the optimizations turned on. As a rule, code compiled with full optimization can be difficult or impossible to debug, making it very difficult to identify bugs that may be causing the system to function incorrectly. The OCG compiler automatically preserves all the relationships between the object code and the original C-code, enabling the quick and simple debugging of optimized code. Even C library code in your project can be debugged at the source level.



Pricing and Availability

	HI-TECH C PRO (PRO Mode)	HI-TECH C PRO (Standard Mode)	HI-TECH C PRO (Lite Mode)
PIC10/12/16 MCUs	SW500010	SW500005	√
PIC18 MCUs	SW500007	SW500008	√
PIC24 MCUs/dsPIC® DSCs	(2)	SW500009	(2)
PIC32 MCUs	SW500011	SW500012 ⁽¹⁾	√

Notes:

Enterprise, multi-user and site licenses are also available.

1) Planned availability Q2 2009.

2) Planned availability Q3 2009.

For current pricing and availability information on HI-TECH C Compilers for Microchip MCUs, please contact a Microchip distributor. HI-TECH C Compilers are also available at: www.microchipdirect.com.

High Priority Access

HI-TECH C PRO compilers come with a 12 month maintenance subscription providing web access to new versions, patch level updates and priority technical support.

HI-TECH C Compilers at a Glance

HI-TECH C PRO (PRO Mode) HI-TECH C PRO (Standard Mode) HI-TECH C PRO (Lite Mode)

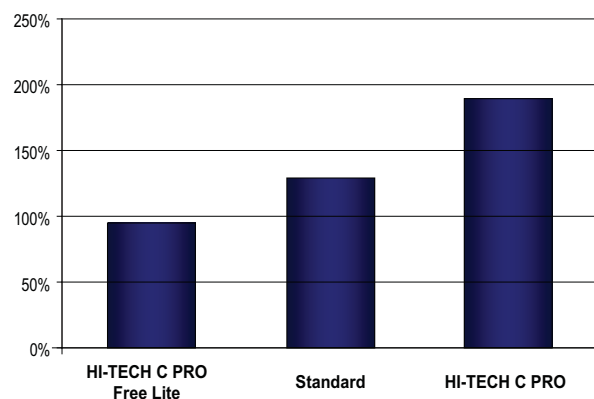
OPTIMIZATION

Omniscient Code Generation™ Compilation Technology	√	√	√
Degree or statement-level optimizations	Very High	High	Low
Optimizes the size of each pointer variable in your code based on its' usage	√	Limited Operation	✗
Reduces overhead required for interrupt context switching	√	Limited Operation	✗
Dynamic register allocation for parameter passing (where applicable)	√	Limited Operation	✗
Number of registers available for function parameters (where applicable)	All	Some	Minimum
Register cycling for improved pipeline performance (where applicable)	√	√	✗
Branch/load delay optimizations (where applicable)	√	√	✗
Automatic in-lining of selected library routines for improved speed	√	√	✗
Customized runtime startup routine	√	√	√
Optimizations for rapid runtime startup and memory clearing	√	√	✗
Automatically allocates objects into optimal locations	√	√	Limited Operation
Procedural abstraction optimizations	√	Limited Operation	✗
Degree of optimizations of printf function	High	High	High

USABILITY/FEATURES

Support for all PIC® MCU devices	√	√	√
Unlimited memory usage	√	√	√
Automatically handles memory banking without requiring special qualifiers	√	√	√
Includes Microchip-compatible peripheral library	√	√	√
Can identify inconsistent definitions across modules	√	√	√
Multiple Interrupt Handling Schemes (where applicable)	√	√	√
Built-in cycle accurate delay routine	√	√	√
Automatic generation of configuration words (where applicable)	√	√	√
Warn if potential runtime stack overflow detected	√	√	√
Automatically analyzes user assembly and object code files	√	√	√
Eliminates the need for many non-standard C qualifiers and compiler options	√	√	√
Potential number of printf configurations	~650	~650	~650
Operation for printf customization	Automatic	Automatic	Automatic
Debuggable library routines	√	√	√
Fully integrates into MPLAB® IDE and is compatible with all Microchip debuggers and emulators	√	√	√
Runs on: Windows® XP, Vista & Vista64, Linux and Mac® OS X	√	√	√

Code size. The HI-TECH C PRO with Omniscient Code Generation optimizations can produce code up to 30% smaller than the Standard Mode, and 50% smaller than the Lite mode.



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