Small Device C Compiler

http://sdcc.sourceforge.net

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What is SDCC?

- C compiler (ANSI C89, ISO C99, ISO C11, ISO C2X)
- Freestanding implementation or part of a hosted implementation
- Supporting tools (assembler, linker, simulator, ...)
- Works on many host systems (GNU/Linux, Windows, macOS, Hurd, OpenBSD, FreeBSD, ...)
- Targets various 8-bit architectures (MCS-51, DS80C390, Z80, Z180, eZ80 in Z80 mode, Rabbit 2000, Rabbit 2000A, Rabbit 3000A, SM83, TLCS-90, HC08, S08, STM8, pdk14, pdk15, pdk13, 6502, PIC14, PIC16)
- Has some unusual optimizations that make sense for these targets (in particular in register allocation)
- Users: µC programmers, and retrocomputing/-gaming developers

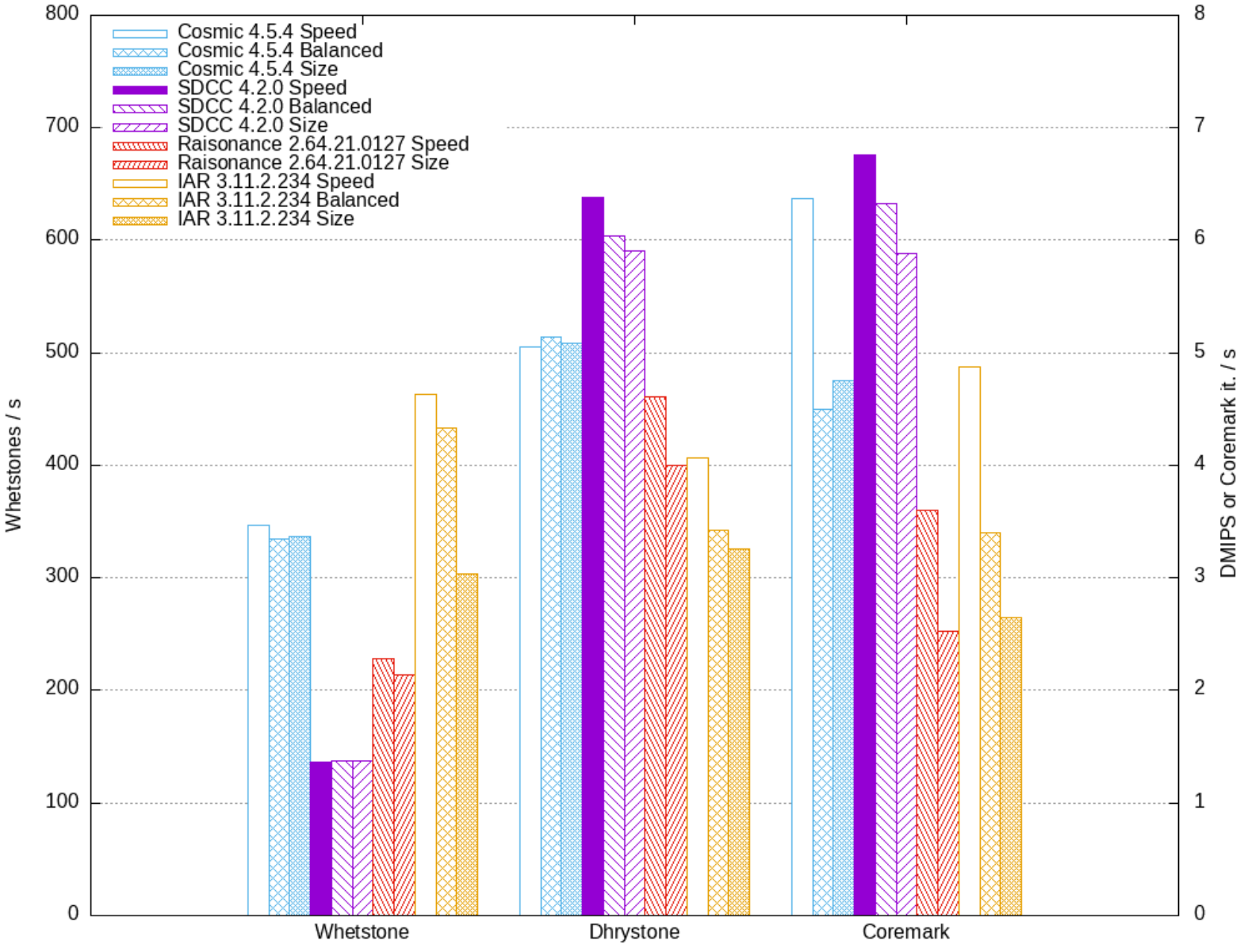
Optimal Register Allocation in Polynomial Time

- Register allocator based on graph-structure theory
- Optimal register allocation in polynomial time
- Flexible through use of cost function
- Provides substantial improvements in code quality
- Slow compilation for targets with many registers
- Compilation speed / code quality trade-off: –max-allocs-per-node
- Little-endian works better

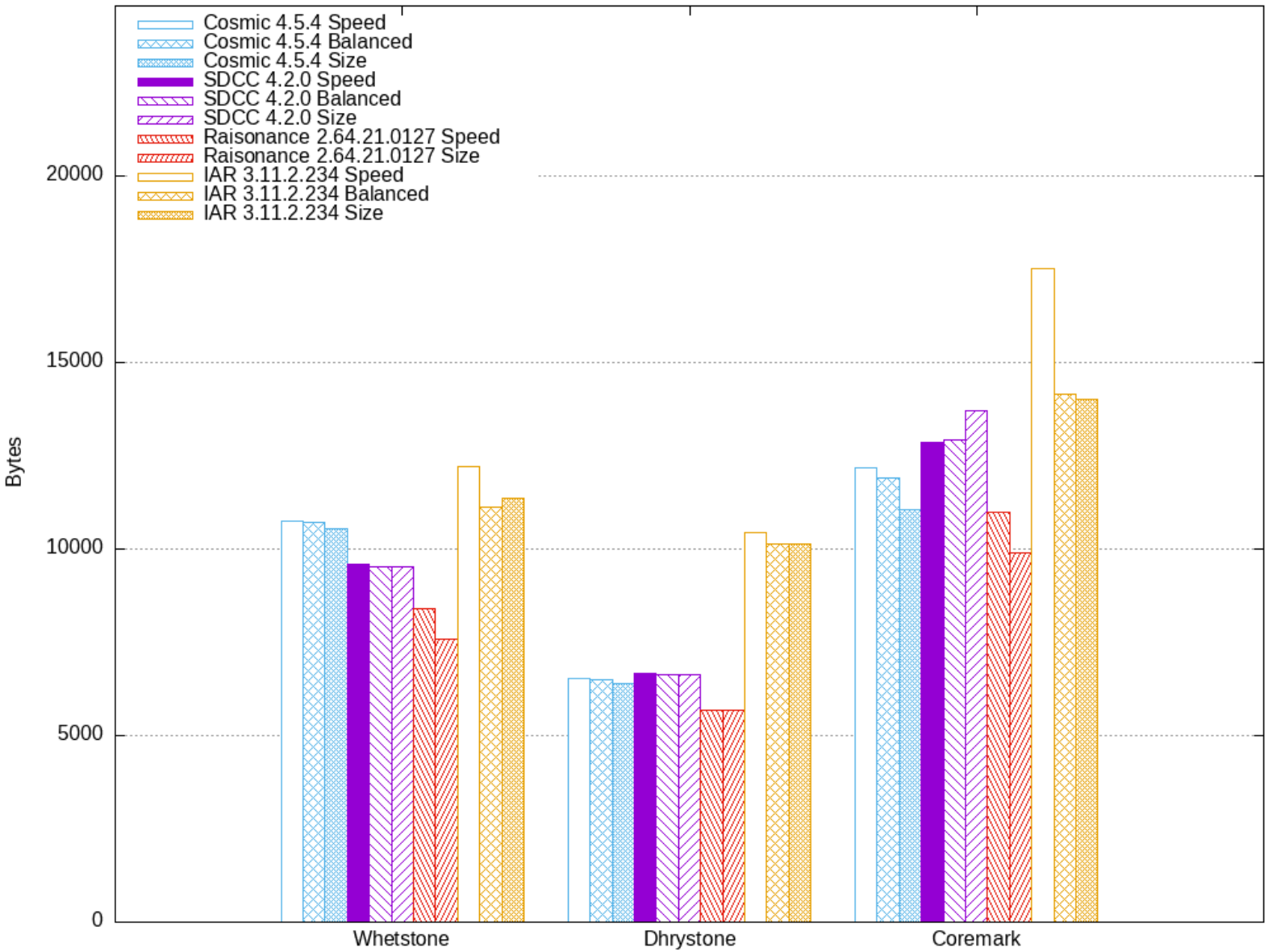
Bytewise Register Allocation and Spilling

- Decide on the storage of variables bytewise
- Decide for each individual byte in a variable whether to store it in memory or a register
- Consider any byte of any register as a possible storage location

SDCC vs. non-free compilers: STM8 Benchmark scores



SDCC vs. non-free compilers: STM8 Code size



Regression testing

- Regression testing of nightly snapshots
- ≈ 23000 tests (twice as many as 2020) compiled and executed on simulators
- Tests mostly from fixed bugs and from GCC
- Targets architectures: MCS-51, DS390, Z80, Z180, eZ80 in Z80 mode, Rabbit 2000, Rabbit 3000A, LR35902, TLCS-90, HC08, S08, STM8, pdk14, pdk15
- Host OS: GNU/Linux, macOS, "Windows" (cross-compiled on GNU/Linux, tested via wine), FreeBSD
- Host architectures: x86, amd64, ppc, aarch64

TODO

- SDCC needs developers
- Fix SDCC bugs
- Improve SDCC further in standard compliance, optimizations, debug info, etc
- Improve IDE integration
- Improve hardware interface tools (Easy PDK programmer, free firmware for ST-Link, OpenRabbit, etc)