

AOCC compiler (with Flang - Fortran Front-end)

Latest release: 3.1, July 2021

<https://developer.amd.com/amd-aocc/>

Architecture		Other options	
Generate instructions that runs on AMD 3 rd Gen EPYC™ and AMD 3 rd Gen Ryzen™	-march=znver3	Enable faster, less precise math operations (part of Ofast)	-ffast-math -freciprocal-math
Generate instructions for the local machine	-march=native	OpenMP® threads and affinity (N number of cores)	export OMP_NUM_THREADS=N export GOMP_CPU_AFFINITY="0-{N-1}"
Optimization Levels		Enabling vector library	-fveclib=AMDLIBM
Disable all optimizations	-O0	Link to AMD library	-L/libm-install-dir/lib -lalm
Minimal level speed and code optimization	-O1/ -O	For Fortran Workloads	
Moderate level optimization	-O2	Compile free form FORTRAN	-ffree-form
Aggressive optimizations	-O3	AMD Optimized Libraries	
Maximize performance	-Ofast	Latest release: 3.0, March 2021	
Enable link time optimization	-flto	https://developer.amd.com/amd-aocl/	
Enable loop optimizations	-funroll-loops -enable-licm-vrp -enable-partial-unswitch -fuse-tile-inner-loop -unroll-threshold	AMD µProf (Performance & Power Profiler)	
Enable advanced loop optimizations	-unroll-aggressive	Latest release: 3.4, March 2021	
Enable function level optimizations	-fitodcalls -function-specialize -finline-aggressive -inline-recursion={1..4} (use with flto) -do-block-reordering={none, normal, aggressive}	https://developer.amd.com/amd-uprof/	
Enable advanced vectorization	-enable-strided-vectorization -enable-epilog-vectorization		
Enable memory layout optimizations	-fremap-arrays (use with -flto)		
Profile guided optimizations	-fprofile-instr-generate (1st invocation) -fprofile-instr-use (2nd invocation)		
OpenMP®	-fopenmp		
For enabling streaming stores, memory bandwidth workloads	-fnt-store		
Enable removal of un-used array computation	-reduce-array-computations=3		

AMD EPYC™ 7xx3-series Processors

Compiler Options Quick Reference Guide



GNU compiler collection (gcc, g++, gfortran)

Latest release: 11.1, April 2021

Recommended version: GCC trunk, later than 5-Dec-2021

<http://gcc.gnu.org>

Microsoft® Visual Studio 2019

Latest stable release: 16.10.3, June 2021

<https://www.visualstudio.com/>

[User Guide](#)

Architecture	
Generate instructions that runs on AMD 3 rd Gen EPYC™ and AMD 3 rd Gen Ryzen™	-march=znver3
Generate instructions for the local machine	-march=native
Optimization Levels	
Disable all optimizations (default)	-O0
Minimal level speed and code optimizations	-O1/ -O
Moderate level optimizations	-O2
Aggressive optimizations	-O3
Maximize performance	-Ofast
Additional Optimizations	
Link time optimization	-flto
Enable unrolling	-funroll-all-loops
Generate memory preload instructions	-fprefetch-loop-arrays --param prefetch-latency=300
Profile-guided optimization	-fprofile-generate (1st invocation) -fprofile-use (2nd invocation)
OpenMP®	-fopenmp
Other options	
Enable generation of code that follows IEEE arithmetic	-mieee-fp
Enable faster, less precise math operations	-ffast-math
Compile free form FORTRAN	-ffree-form
OpenMP® threads and affinity (N number of cores)	export OMP_NUM_THREADS=N export GOMP_CPU_AFFINITY="0-{N-1}"
Link to AMD library	-L/libm-install-dir/lib -lalm

Architecture	
Generate instructions that runs on AMD 3 rd Gen EPYC™ and	/arch:[AVX AVX2]
Optimize for 64-bit AMD processors	/favor:AMD64 /d2zveroupper
Optimization Levels	
Disable optimizations	/Od
Maximum optimizations (favor space)	/O1
Maximum optimizations (favor speed)	/O2
[link.exe] Eliminate unreferenced function and/ or data	/OPT:REF
[link.exe] Perform identical COMDAT folding	/OPT:ICF
Output an informational message for loops that are auto-vectorized	/Qvec-report:[1 2]
Enable automatic parallelization of loops, used in conjunction with #pragma loop() directive	/Qpar
Output an informational message for loops that are auto-parallelized	/Qpar-report:[1 2]
Additional Optimizations	
Maintain the precision for floating-point operations through proper rounding	/fp:precise
Optimize floating-point code for speed at the expense of floating-point accuracy and correctness	/fp:fast
Whole Program Optimization (link-time code generation)	/GL
Profile-guided optimization	LTCG:PGI and /LTCG:PGO

Glibc

Latest release: 2.33, February 2021

Recommendation: 2.26 or later

<https://www.gnu.org/software/libc/>

Binutils

Recommendation: 2.36 or later

<https://www.gnu.org/software/binutils/>

Intel® compilers (icc, icpc, ifort)

Latest release: 19.1

<http://software.intel.com>

Architecture	
Generate instructions that runs on AMD 3 rd Gen EPYC™ and AMD 3 rd Gen Ryzen™	-march=core-avx2 (preferred) OR -axCORE-AVX2
Optimization Levels	
Disable all optimizations	-O0
Speed optimization without code growth	-O1
Enable optimization for speed including vectorization	-O2
Aggressive optimization	-O3
Maximize performance	-Ofast
Additional Optimizations	
Aggressive unrolling	-unroll-aggressive
Disable improved precision floating divides	-no-prec-div
Enable vectorization	-vec
Inter procedural Optimization	-ipo
OpenMP®	-qopenmp
Prefetch optimization	-qopt-prefetch
Profile generated optimization	-prof-gen and -prof-use
Use optimized header definitions	-use-intel-optimized-headers
Other Options	
Floating point accuracy tuning	-fp-model
Compile free form FORTRAN	-free

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