gem5/Z3/gcc/Clang/Redis Heap Fitness Landscapes
Evo* 2025 Late-Breaking Abstracts

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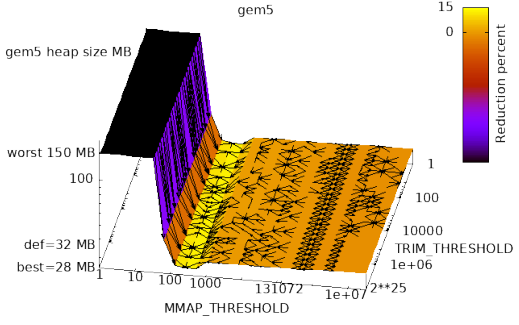
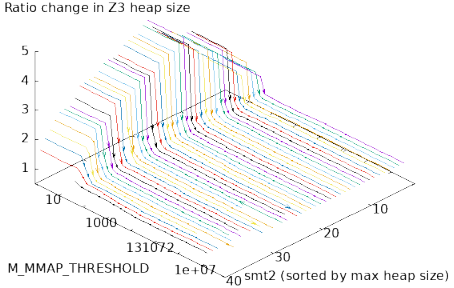
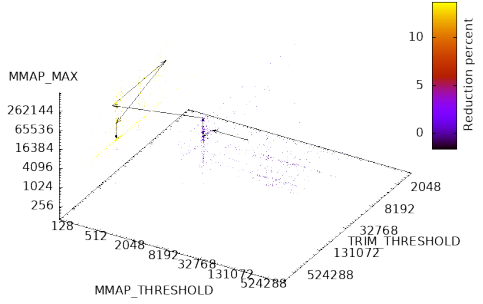
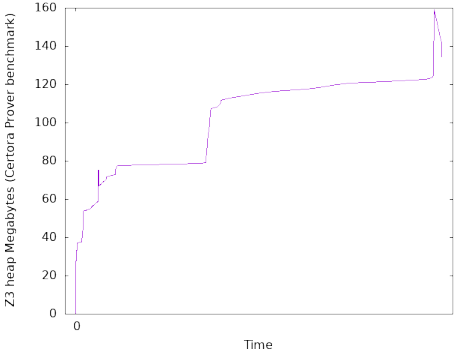
We adapt “The gem5 C++ glibc Heap Fitness Landscape" W.B. Langdon and B.R. Bruce GI@ICSE 2025”, to use Valgrind Massif on 1,300,000 line C++ gem5, on Microsoft’s 600,000 LOC C++ theorem prover Z3 and benchmarks from the SMT-COMP 2024. Showing the memory landscape is far smoother than is commonly assumed and that Magpie and CMA-ES can tune GNU malloc giving 2.4 megabytes reductions in peak RAM use without coding changes. Similar results are given on the GCC and Clang LLVM compilers and 150,000 LOC C Redis key-value database.





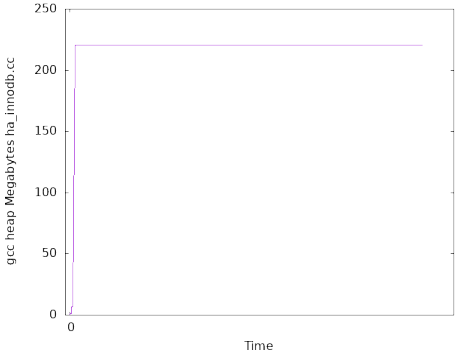


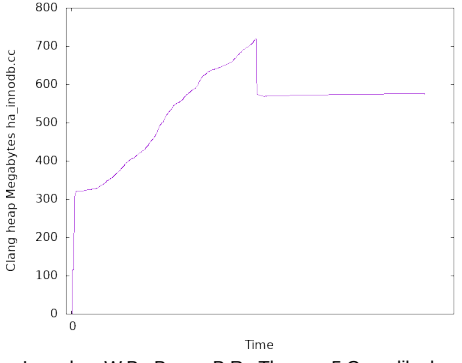


M_MMAP_MAX_tune	g[0,33554432,1/65536][65536]
M_TRIM_THRESHOLD_tune	g[0,33554432,1/131072][131072]
M_MMAP_THRESHOLD_tune	g[0,33554432,1/131072][131072]

Table 2. Mean percentage improvement of ten runs of Magpie and CMA-ES

	Z3	(best)	gcc	(best)	Clang	(best)	Redis	(best)
Magpie	1.5 ± 0.0	1.5	0.0 ± 0.0	0.0	0.0 ± 0.0	0.1	0.3 ± 0.0	0.3
CMA-ES	1.5 ± 0.0	1.5	0.0 ± 0.0	0.0	0.0 ± 0.0	0.0	0.2 ± 0.1	0.3





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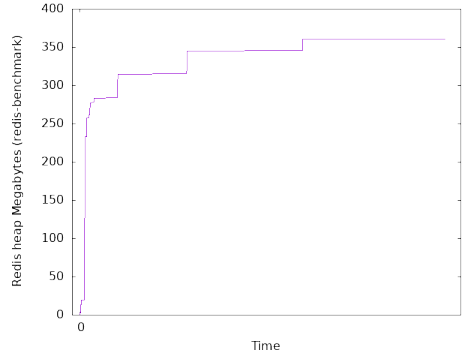

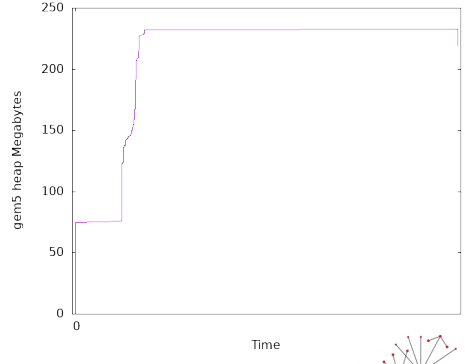

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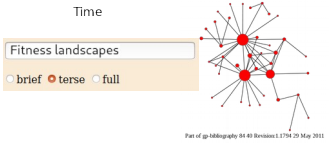

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