

“Box pruning revisited” – an optimization project by Pierre Terdiman – 2017

## Part 10 – integer SIMD

Interlude:

Similar to what we did in version 7, and in sake of completeness, I tried using integer comparisons in the SIMD version as well.

The changes are straightforward: encode floats as integers like we did in version 7, replace SIMD floating-point intrinsics with SIMD integer intrinsics.

There are no special traps here, and not much to report, because at the end of the day the results are slower:

Home PC:

Complete test (brute force): found 11811 intersections in 781780 K-cycles.

17454 K-cycles.

16681 K-cycles.

16669 K-cycles.

17145 K-cycles.

16703 K-cycles.

16683 K-cycles.

16668 K-cycles.

16667 K-cycles.

16862 K-cycles.

16707 K-cycles.

16670 K-cycles.

16689 K-cycles.

16668 K-cycles.

16949 K-cycles.

16710 K-cycles.

16667 K-cycles.

Complete test (box pruning): found 11715 intersections in 16667 K-cycles.

Office PC:

Complete test (brute force): found 11811 intersections in 810906 K-cycles.

16607 K-cycles.

15927 K-cycles.

15648 K-cycles.

15971 K-cycles.

15648 K-cycles.

15960 K-cycles.

15742 K-cycles.

15990 K-cycles.

15837 K-cycles.

15741 K-cycles.

15970 K-cycles.

15651 K-cycles.

16247 K-cycles.

15649 K-cycles.

15834 K-cycles.

15738 K-cycles.

Complete test (box pruning): found 11715 intersections in 15648 K-cycles.

The gains are summarized here:

Home PC	Timings (K-Cycles)	Delta (K-Cycles)	Speedup	Overall X factor
(Version1)	(101662)			
Version2 - base	98822	0	0%	1.0
Version3	93138	~5600	~5%	~1.06
Version4	81834	~11000	~12%	~1.20
Version5	78140	~3600	~4%	~1.26
Version6a	60579	~17000	~22%	~1.63
Version6b	41605	~18000	~31%	~2.37
(Version7)	(40906)	-	-	-
(Version8)	(31383)	(~10000)	(~24%)	(~3.14)
Version9a	34486	~7100	~17%	~2.86
Version9b - unsafe	32477	~2000	~5%	~3.04
Version9b - safe	32565	~1900	~5%	~3.03
Version9c - unsafe	16223	~16000	~50%	~6.09
Version9c - safe	14802	~17000	~54%	~6.67
Version10	(16667)	-	-	-

Office PC	Timings (K-Cycles)	Delta (K-Cycles)	Speedup	Overall X factor
(Version1)	(96203)			
Version2 - base	92885	0	0%	1.0
Version3	88352	~4500	~5%	~1.05
Version4	77156	~11000	~12%	~1.20
Version5	73778	~3300	~4%	~1.25
Version6a	58451	~15000	~20%	~1.58
Version6b	45634	~12000	~21%	~2.03
(Version7)	(43987)	-	-	-
(Version8)	(29083)	(~16000)	(~36%)	(~3.19)
Version9a	31864	~13000	~30%	~2.91
Version9b - unsafe	15097	~16000	~52%	~6.15
Version9b - safe	15116	~16000	~52%	~6.14
Version9c - unsafe	12707	~2300	~15%	~7.30
Version9c - safe	12562	~2500	~16%	~7.39
Version10	(15648)	-	-	-

What we learnt:

Don't bother with integer comparisons anymore.

We are still using integer SIMD in PhysX for this, so it appears that the PhysX version is sub-optimal. Expect some performance gains in PhysX 3.5.