

Table 1: CPU Voxelization - Average Time over 100 runs

Voxel Size	Average Time (ms)
0.25	429.09
0.5	335.89
0.75	272.39
1.0	253.67
1.25	240.00

Table 2: GPU Voxelization (Morton) - Voxel Size 0.25

Block Size	Overall (ms)	Morton Codes (ms)	Sort (ms)	Point Accum (ms)	Reduce (ms)	Copy (ms)
1	40.46	1.07	0.92	1.08	0.25	1.05
2	37.66	0.54	0.90	0.54	0.25	1.01
4	37.03	0.27	0.91	0.31	0.25	1.02
8	38.39	0.14	0.92	0.27	0.26	1.07
16	38.29	0.07	0.92	0.27	0.25	1.05
32	39.39	0.04	0.95	0.26	0.25	1.08
64	39.30	0.04	0.99	0.26	0.25	1.10
128	37.19	0.04	0.90	0.26	0.25	1.03
256	36.61	0.04	0.89	0.26	0.25	1.01
512	36.91	0.04	0.90	0.27	0.25	1.02
1024	39.67	0.04	0.94	0.27	0.25	1.07

Table 3: GPU Voxelization (Hash, Capacity Factor 2) - Voxel Size 0.25

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtOH+Cleanup (ms)
1	35.25	1.36	2.15	2.46	2.12	2.12	3.97
2	31.23	1.32	1.09	1.63	1.07	1.07	4.00
4	29.25	1.34	0.57	1.16	0.56	0.57	4.05
8	27.97	1.30	0.33	0.90	0.28	0.28	3.98
16	27.70	1.30	0.33	0.83	0.14	0.26	3.97
32	28.05	1.37	0.34	0.97	0.14	0.26	4.06
64	28.88	1.34	0.36	1.48	0.14	0.27	3.99
128	28.45	1.33	0.35	1.53	0.14	0.27	3.97
256	28.39	1.28	0.35	1.46	0.14	0.26	3.97
512	28.37	1.29	0.33	1.45	0.13	0.26	4.02
1024	29.96	1.39	0.39	1.47	0.16	0.30	4.06

Table 4: GPU Voxelization (Hash, Capacity Factor 3) - Voxel Size 0.25

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtOH+Cleanup (ms)
1	37.48	1.40	2.79	2.15	2.79	2.76	4.45
2	32.27	1.31	1.37	1.35	1.35	1.34	4.44
4	29.75	1.31	0.70	0.93	0.69	0.69	4.38
8	29.11	1.36	0.48	0.76	0.35	0.36	4.48
16	29.76	1.40	0.52	0.75	0.20	0.36	4.46
32	29.73	1.38	0.49	0.97	0.20	0.34	4.46
64	30.15	1.32	0.50	1.62	0.19	0.35	4.81
128	30.22	1.31	0.51	1.70	0.19	0.35	4.95
256	29.57	1.27	0.51	1.64	0.19	0.35	4.93
512	29.64	1.28	0.50	1.62	0.20	0.35	4.92
1024	29.64	1.28	0.50	1.59	0.19	0.35	5.01

Table 5: GPU Voxelization (Hash, Capacity Factor 4) - Voxel Size 0.25

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	41.82	1.37	3.71	2.10	3.68	3.67	5.35
2	34.40	1.34	1.84	1.30	1.83	1.83	5.19
4	30.72	1.27	0.91	0.85	0.90	0.90	5.17
8	29.27	1.28	0.62	0.68	0.46	0.46	5.16
16	29.10	1.26	0.62	0.72	0.25	0.42	5.16
32	29.38	1.27	0.61	0.99	0.25	0.44	5.22
64	30.12	1.25	0.66	1.75	0.25	0.44	5.16
128	30.22	1.27	0.65	1.82	0.25	0.43	5.18
256	30.25	1.31	0.66	1.75	0.25	0.44	5.16
512	30.65	1.39	0.67	1.79	0.25	0.45	5.20
1024	31.30	1.35	0.67	1.78	0.27	0.46	5.26

Table 6: GPU Voxelization (Morton) - Voxel Size 0.5

Block Size	Overall (ms)	Morton Codes (ms)	Sort (ms)	Point Accum (ms)	Reduce (ms)	Copy (ms)
1	30.97	1.07	0.92	1.08	0.19	0.46
2	29.85	0.54	0.92	0.54	0.19	0.46
4	29.34	0.27	0.92	0.30	0.19	0.46
8	30.59	0.14	0.94	0.27	0.19	0.49
16	30.53	0.07	0.95	0.26	0.20	0.48
32	30.60	0.04	0.96	0.26	0.19	0.49
64	30.52	0.04	0.96	0.26	0.19	0.49
128	29.96	0.04	0.96	0.26	0.19	0.48
256	31.18	0.04	1.02	0.26	0.19	0.49
512	29.32	0.04	0.93	0.26	0.19	0.47
1024	29.14	0.04	0.93	0.26	0.19	0.47

Table 7: GPU Voxelization (Hash, Capacity Factor 2) - Voxel Size 0.5

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	33.87	1.28	2.18	2.15	2.17	2.16	3.30
2	29.53	1.28	1.09	1.21	1.08	1.08	3.19
4	27.40	1.25	0.55	0.73	0.54	0.55	3.19
8	26.45	1.26	0.34	0.50	0.28	0.28	3.20
16	26.20	1.26	0.33	0.43	0.15	0.22	3.22
32	26.22	1.26	0.34	0.44	0.14	0.23	3.23
64	26.42	1.35	0.36	0.50	0.14	0.23	3.19
128	26.30	1.28	0.36	0.50	0.14	0.23	3.19
256	26.37	1.35	0.36	0.49	0.14	0.24	3.19
512	26.37	1.29	0.36	0.48	0.14	0.24	3.19
1024	26.30	1.27	0.36	0.48	0.14	0.24	3.21

Table 8: GPU Voxelization (Hash, Capacity Factor 3) - Voxel Size 0.5

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	35.53	1.26	2.74	1.88	2.71	2.72	3.64
2	30.68	1.29	1.38	1.06	1.36	1.36	3.64
4	30.11	1.39	0.82	0.72	0.81	0.80	3.99
8	28.30	1.33	0.52	0.47	0.40	0.40	4.01
16	28.30	1.33	0.52	0.42	0.21	0.33	4.20
32	28.32	1.33	0.52	0.44	0.22	0.34	4.17
64	28.40	1.38	0.57	0.50	0.22	0.36	4.17
128	28.93	1.39	0.56	0.49	0.21	0.34	4.19
256	28.89	1.37	0.56	0.49	0.21	0.34	4.21
512	29.67	1.45	0.56	0.48	0.21	0.35	4.25
1024	29.80	1.47	0.59	0.50	0.23	0.38	4.25

Table 9: GPU Voxelization (Hash, Capacity Factor 4) - Voxel Size 0.5

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	40.00	1.37	3.67	1.92	3.64	3.65	4.51
2	35.01	1.42	1.85	1.10	1.82	1.83	4.49
4	31.66	1.43	0.97	0.66	0.95	0.97	4.46
8	30.72	1.41	0.71	0.46	0.49	0.50	4.46
16	28.64	1.36	0.68	0.39	0.27	0.42	4.43
32	28.57	1.33	0.67	0.40	0.27	0.44	4.43
64	28.82	1.35	0.73	0.47	0.28	0.44	4.44
128	28.87	1.34	0.73	0.48	0.27	0.43	4.50
256	29.52	1.41	0.73	0.51	0.27	0.44	5.11
512	29.19	1.34	0.71	0.48	0.28	0.44	5.11
1024	29.00	1.35	0.70	0.47	0.27	0.44	5.10

Table 10: GPU Voxelization (Morton) - Voxel Size 0.75

Block Size	Overall (ms)	Morton Codes (ms)	Sort (ms)	Point Accum (ms)	Reduce (ms)	Copy (ms)
1	28.62	1.07	0.92	1.08	0.17	0.28
2	28.12	0.54	0.93	0.54	0.17	0.29
4	27.22	0.27	0.92	0.29	0.17	0.28
8	27.47	0.14	0.93	0.26	0.18	0.29
16	27.19	0.07	0.95	0.26	0.18	0.29
32	28.33	0.04	0.96	0.26	0.18	0.30
64	27.56	0.04	0.93	0.26	0.18	0.29
128	27.22	0.04	0.93	0.26	0.17	0.29
256	27.11	0.04	0.94	0.26	0.17	0.29
512	28.12	0.04	0.93	0.26	0.17	0.29
1024	27.96	0.04	0.96	0.26	0.18	0.29

Table 11: GPU Voxelization (Hash, Capacity Factor 2) - Voxel Size 0.75

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	33.80	1.35	2.00	1.94	2.01	1.99	2.79
2	29.90	1.37	1.01	1.03	0.99	0.98	2.76
4	27.63	1.33	0.51	0.60	0.50	0.50	2.74
8	26.24	1.33	0.35	0.37	0.26	0.26	2.72
16	26.41	1.36	0.35	0.34	0.14	0.21	2.88
32	25.89	1.27	0.35	0.34	0.14	0.22	2.93
64	26.03	1.27	0.36	0.35	0.14	0.22	2.92
128	26.05	1.30	0.37	0.35	0.14	0.23	2.92
256	26.51	1.35	0.37	0.34	0.14	0.22	2.93
512	26.62	1.41	0.38	0.35	0.14	0.22	2.93
1024	25.95	1.26	0.36	0.33	0.14	0.22	2.98

Table 12: GPU Voxelization (Hash, Capacity Factor 3) - Voxel Size 0.75

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	36.09	1.32	2.81	1.86	2.77	2.78	3.55
2	30.35	1.35	1.37	0.98	1.34	1.34	3.32
4	27.99	1.30	0.70	0.55	0.68	0.68	3.33
8	27.38	1.31	0.51	0.36	0.35	0.35	3.33
16	26.82	1.27	0.50	0.32	0.20	0.31	3.37
32	26.85	1.28	0.50	0.31	0.20	0.32	3.33
64	26.62	1.26	0.54	0.31	0.20	0.32	3.33
128	26.57	1.25	0.54	0.31	0.21	0.32	3.32
256	26.59	1.27	0.54	0.31	0.21	0.32	3.32
512	26.91	1.45	0.53	0.31	0.21	0.33	3.43
1024	27.71	1.34	0.55	0.34	0.21	0.32	3.90

Table 13: GPU Voxelization (Hash, Capacity Factor 4) - Voxel Size 0.75

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtOH+Cleanup (ms)
1	39.12	1.30	3.66	1.85	3.63	3.66	4.17
2	33.34	1.35	1.83	0.99	1.80	1.80	4.23
4	30.16	1.33	0.94	0.55	0.92	0.92	4.16
8	28.52	1.35	0.68	0.35	0.47	0.46	4.13
16	28.10	1.29	0.67	0.31	0.27	0.41	4.16
32	27.74	1.26	0.67	0.31	0.27	0.41	4.16
64	28.15	1.31	0.72	0.32	0.27	0.42	4.15
128	28.21	1.30	0.71	0.32	0.27	0.42	4.16
256	28.55	1.35	0.73	0.32	0.27	0.43	4.15
512	27.76	1.28	0.71	0.31	0.27	0.42	4.14
1024	28.01	1.28	0.71	0.30	0.27	0.43	4.17

Table 14: GPU Voxelization (Morton) - Voxel Size 1.0

Block Size	Overall (ms)	Morton Codes (ms)	Sort (ms)	Point Accum (ms)	Reduce (ms)	Copy (ms)
1	27.63	1.07	0.92	1.08	0.17	0.20
2	26.55	0.54	0.99	0.54	0.17	0.20
4	25.99	0.27	0.92	0.28	0.17	0.20
8	25.81	0.14	0.92	0.25	0.17	0.20
16	25.93	0.07	0.95	0.26	0.17	0.20
32	25.71	0.04	0.92	0.26	0.17	0.20
64	25.73	0.04	0.92	0.26	0.17	0.20
128	25.71	0.04	0.92	0.26	0.17	0.20
256	25.81	0.04	0.92	0.26	0.17	0.20
512	25.73	0.04	0.92	0.26	0.17	0.20
1024	25.74	0.04	0.92	0.26	0.17	0.20

Table 15: GPU Voxelization (Hash, Capacity Factor 2) - Voxel Size 1.0

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtOH+Cleanup (ms)
1	33.36	1.33	2.20	2.07	2.16	2.16	2.79
2	29.15	1.26	1.10	1.12	1.09	1.09	2.79
4	26.97	1.27	0.56	0.62	0.55	0.55	2.84
8	25.97	1.25	0.34	0.42	0.28	0.28	2.83
16	25.69	1.26	0.34	0.37	0.14	0.21	2.78
32	25.67	1.26	0.34	0.36	0.14	0.21	2.78
64	25.75	1.26	0.36	0.35	0.14	0.22	2.79
128	25.70	1.27	0.36	0.35	0.14	0.22	2.79
256	25.79	1.28	0.36	0.36	0.14	0.22	2.84
512	25.72	1.28	0.36	0.35	0.14	0.22	2.79
1024	25.79	1.25	0.35	0.34	0.14	0.22	2.85

Table 16: GPU Voxelization (Hash, Capacity Factor 3) - Voxel Size 1.0

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtOH+Cleanup (ms)
1	35.26	1.30	2.77	1.84	2.74	2.75	3.26
2	30.20	1.26	1.39	0.99	1.36	1.37	3.25
4	28.57	1.28	0.80	0.61	0.79	0.79	3.71
8	27.38	1.29	0.50	0.42	0.41	0.41	3.78
16	27.03	1.27	0.50	0.37	0.21	0.31	3.75
32	27.09	1.33	0.50	0.37	0.21	0.31	3.76
64	27.05	1.26	0.53	0.35	0.20	0.31	3.75
128	27.04	1.28	0.54	0.36	0.21	0.31	3.75
256	27.03	1.26	0.54	0.35	0.21	0.32	3.75
512	26.99	1.26	0.53	0.35	0.21	0.32	3.75
1024	27.01	1.26	0.52	0.34	0.20	0.32	3.75

Table 17: GPU Voxelization (Hash, Capacity Factor 4) - Voxel Size 1.0

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	38.53	1.33	3.62	1.81	3.57	3.57	4.02
2	32.17	1.25	1.80	0.98	1.78	1.78	4.01
4	29.10	1.25	0.91	0.55	0.89	0.90	3.99
8	27.77	1.27	0.66	0.36	0.45	0.45	4.00
16	27.46	1.25	0.66	0.32	0.27	0.40	3.99
32	27.49	1.26	0.66	0.32	0.27	0.40	3.99
64	29.44	1.40	0.76	0.33	0.30	0.44	4.05
128	29.27	1.39	0.77	0.32	0.29	0.43	4.08
256	28.07	1.26	0.71	0.34	0.27	0.41	4.48
512	28.52	1.31	0.71	0.35	0.28	0.41	4.69
1024	29.59	1.44	0.74	0.35	0.28	0.43	4.77

Table 18: GPU Voxelization (Morton) - Voxel Size 1.25

Block Size	Overall (ms)	Morton Codes (ms)	Sort (ms)	Point Accum (ms)	Reduce (ms)	Copy (ms)
1	27.15	1.07	0.92	1.07	0.16	0.15
2	25.98	0.54	0.94	0.54	0.16	0.15
4	25.45	0.27	0.92	0.28	0.16	0.15
8	25.27	0.14	0.92	0.24	0.16	0.15
16	25.24	0.07	0.93	0.25	0.17	0.15
32	25.30	0.04	0.92	0.25	0.16	0.15
64	25.18	0.04	0.92	0.25	0.17	0.15
128	28.64	0.04	0.98	0.26	0.17	0.16
256	27.27	0.04	0.94	0.26	0.17	0.15
512	26.28	0.04	0.95	0.26	0.17	0.15
1024	25.29	0.04	0.92	0.26	0.17	0.15

Table 19: GPU Voxelization (Hash, Capacity Factor 2) - Voxel Size 1.25

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	34.41	1.47	1.98	2.07	1.96	2.04	2.41
2	29.03	1.35	0.95	1.02	0.92	0.93	2.38
4	26.71	1.27	0.52	0.62	0.51	0.50	2.57
8	26.44	1.35	0.36	0.49	0.28	0.28	2.71
16	27.74	1.35	0.40	0.49	0.15	0.22	2.74
32	25.85	1.27	0.35	0.45	0.14	0.21	2.74
64	26.68	1.37	0.37	0.44	0.14	0.22	2.73
128	26.09	1.31	0.37	0.44	0.14	0.21	2.71
256	26.82	1.37	0.39	0.45	0.15	0.22	2.80
512	27.34	1.40	0.38	0.44	0.15	0.22	2.78
1024	26.88	1.40	0.38	0.43	0.14	0.22	2.74

Table 20: GPU Voxelization (Hash, Capacity Factor 3) - Voxel Size 1.25

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	DtoH+Cleanup (ms)
1	36.85	1.40	2.81	1.88	2.78	2.78	3.26
2	30.59	1.32	1.36	1.01	1.36	1.35	3.12
4	28.87	1.42	0.71	0.59	0.69	0.69	3.13
8	27.36	1.37	0.52	0.43	0.36	0.35	3.14
16	28.39	1.42	0.53	0.41	0.23	0.32	3.14
32	28.20	1.38	0.54	0.40	0.22	0.32	3.15
64	27.49	1.39	0.57	0.38	0.21	0.31	3.16
128	27.24	1.40	0.55	0.40	0.21	0.32	3.34
256	28.52	1.45	0.60	0.46	0.23	0.33	3.71
512	29.02	1.51	0.62	0.48	0.25	0.37	3.71
1024	27.55	1.30	0.53	0.42	0.21	0.31	3.67

Table 21: GPU Voxelization (Hash, Capacity Factor 4) - Voxel Size 1.25

Block Size	Overall (ms)	Alloc+HtoD (ms)	Init (ms)	Populate (ms)	Count (ms)	Collect (ms)	D _{to} H+Cleanup (ms)
1	39.06	1.32	3.67	1.85	3.64	3.62	3.97
2	33.07	1.32	1.81	1.01	1.79	1.81	3.94
4	30.97	1.40	0.94	0.58	0.92	0.93	3.96
8	28.41	1.33	0.68	0.42	0.46	0.46	3.92
16	30.53	1.51	0.73	0.43	0.31	0.43	3.99
32	29.31	1.40	0.70	0.40	0.29	0.43	3.97
64	29.53	1.39	0.75	0.40	0.29	0.45	4.04
128	31.55	1.52	0.82	0.40	0.29	0.44	4.08
256	28.96	1.38	0.72	0.37	0.28	0.41	3.95
512	29.78	1.43	0.78	0.38	0.29	0.43	3.97
1024	28.28	1.31	0.70	0.36	0.27	0.41	3.95