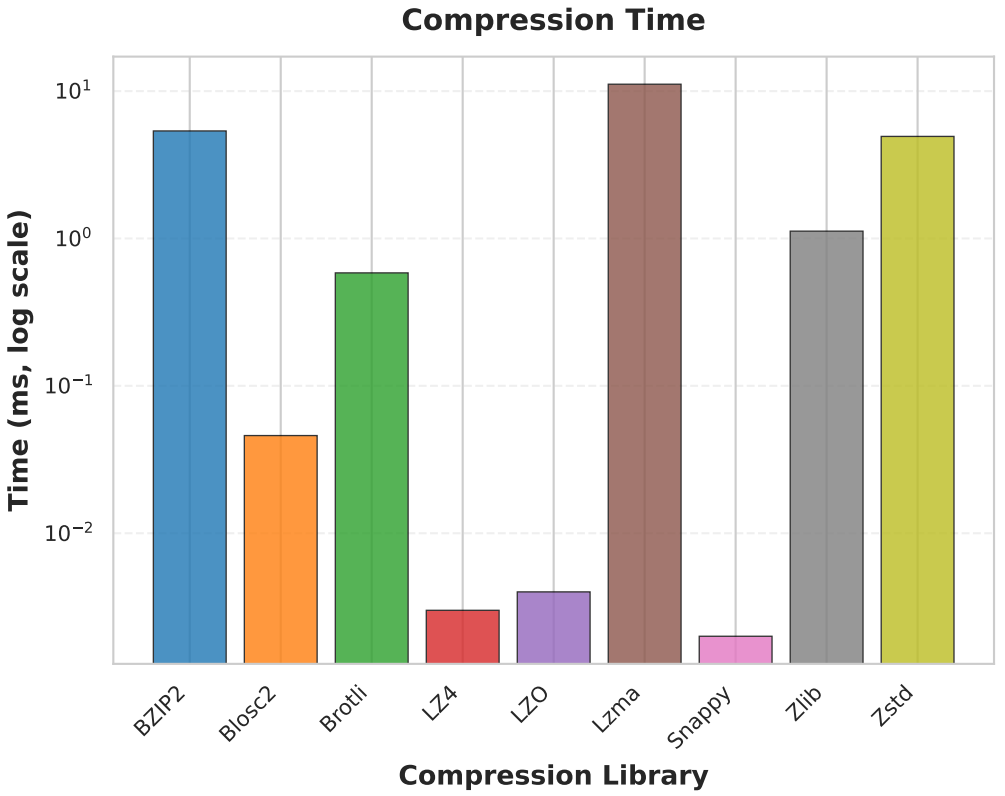
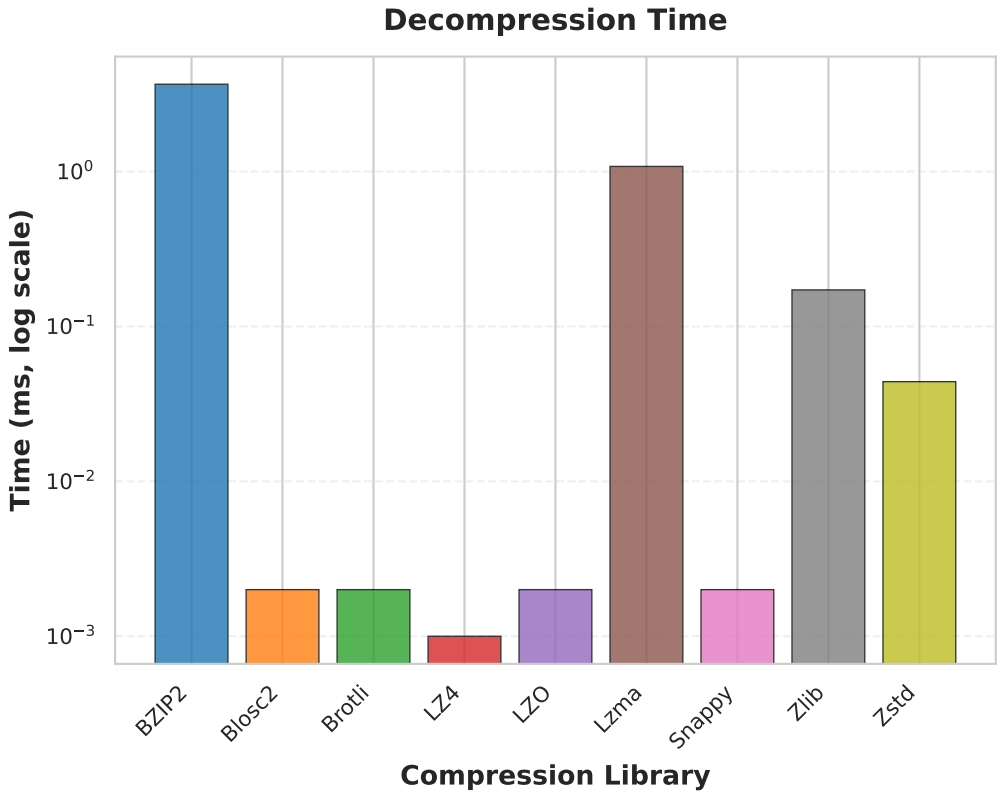
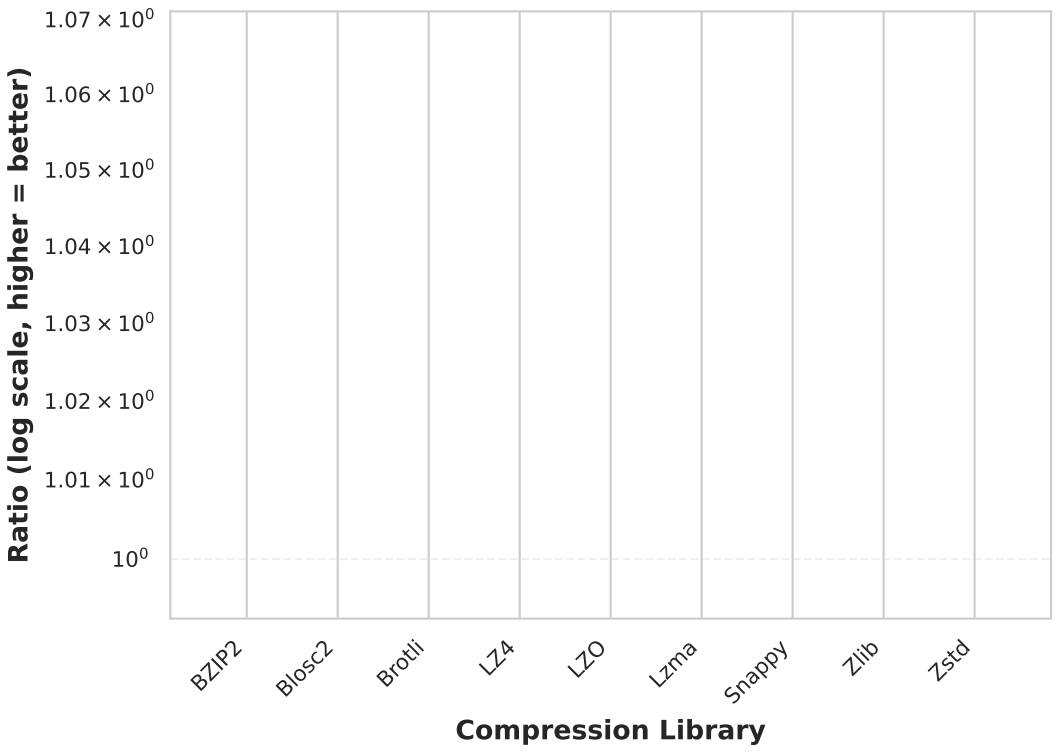
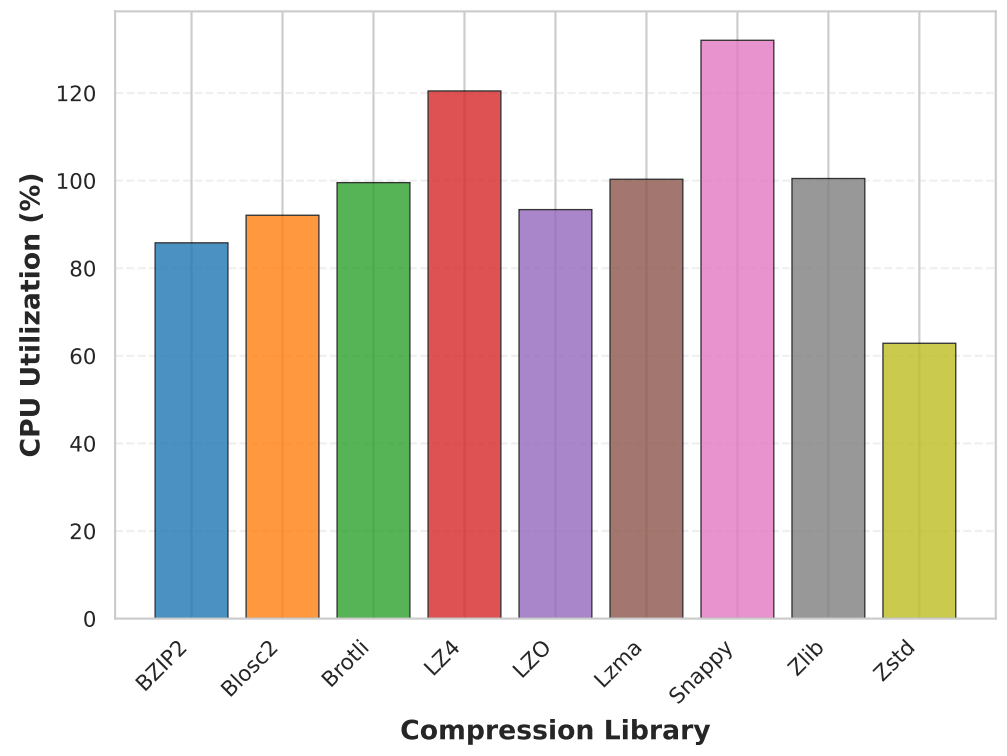
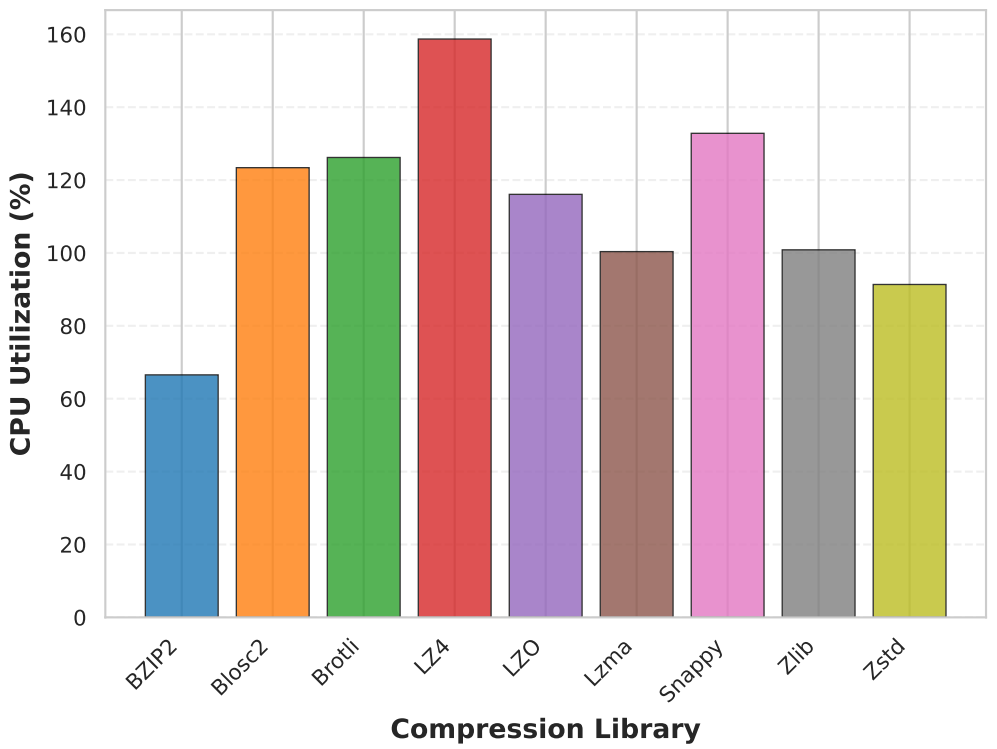
Parameter Study: exponential_high
Exponential(λ=0.05) × 2.0: Fast decay, clustering near zero
Char Data Type, 64KB Chunk Size







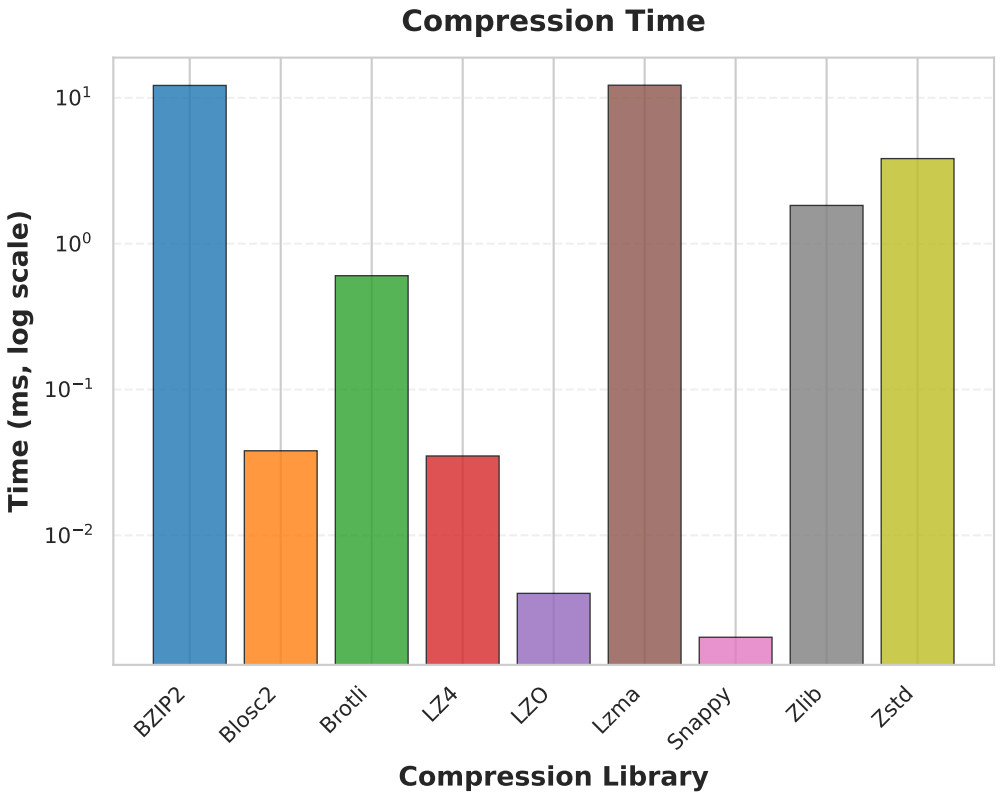


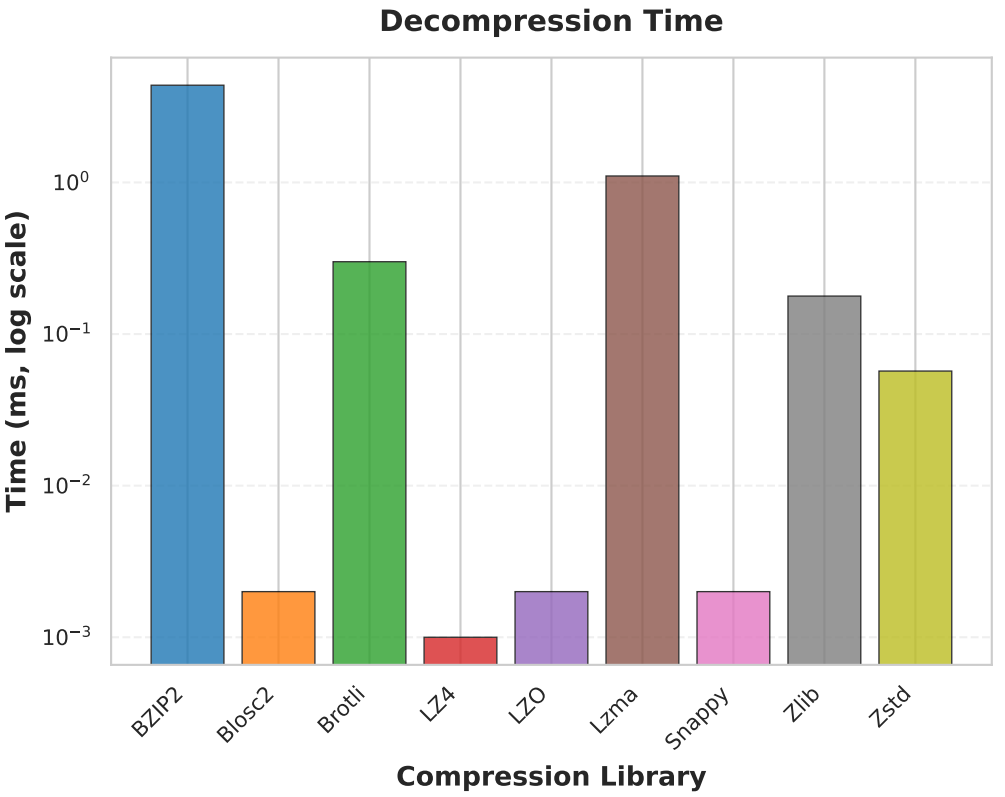


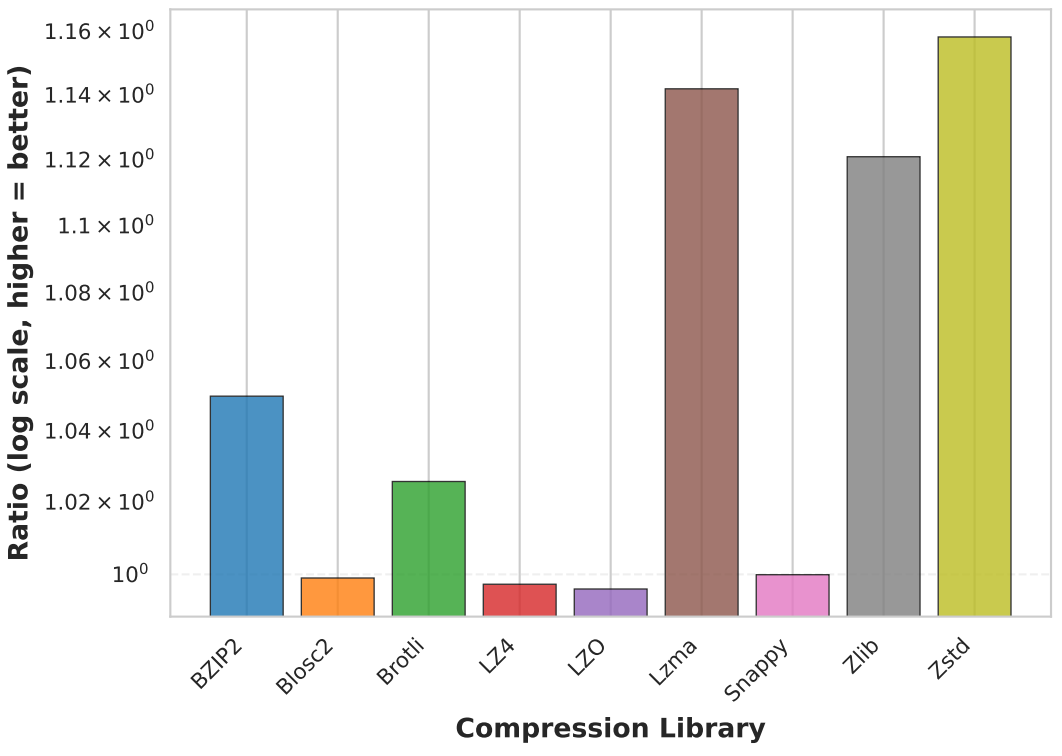
Performance Summary (64KB chunks)
Sorted by Compression Ratio

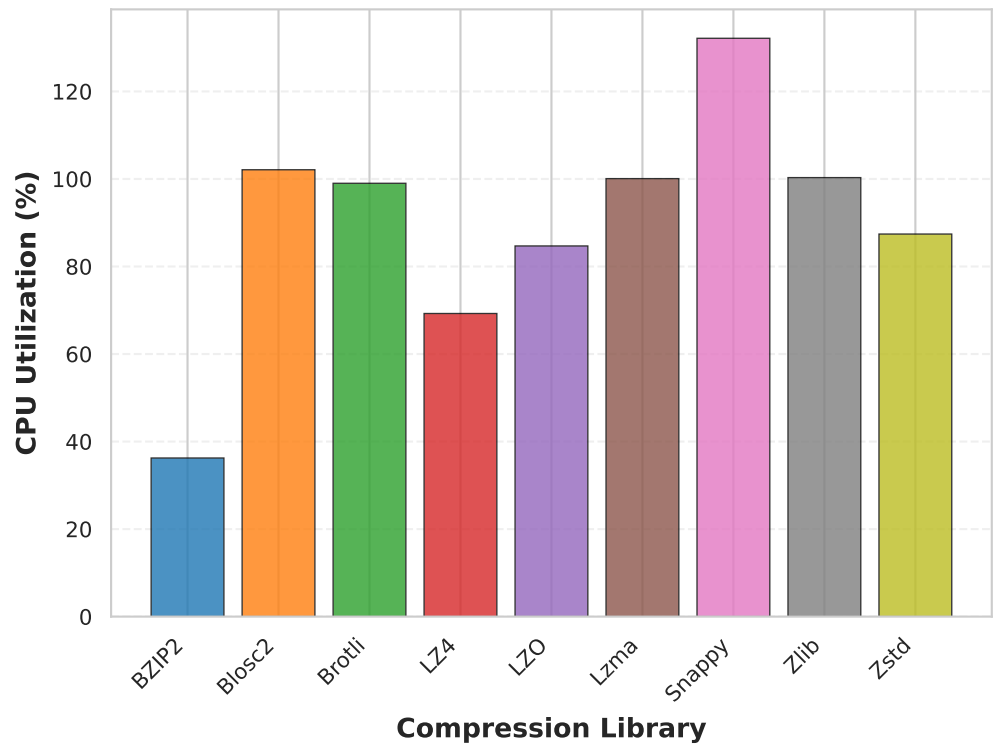
Library	Ratio	Time (ms)	CPU%
Zstd	1.07x	4.9	63%
Zlib	1.06x	1.1	100%
Lzma	1.05x	11.1	100%
BZIP2	1.01x	5.4	86%
Brotli	1.00x	0.6	100%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	92%
LZ4	1.00x	0.0	120%
LZO	1.00x	0.0	93%

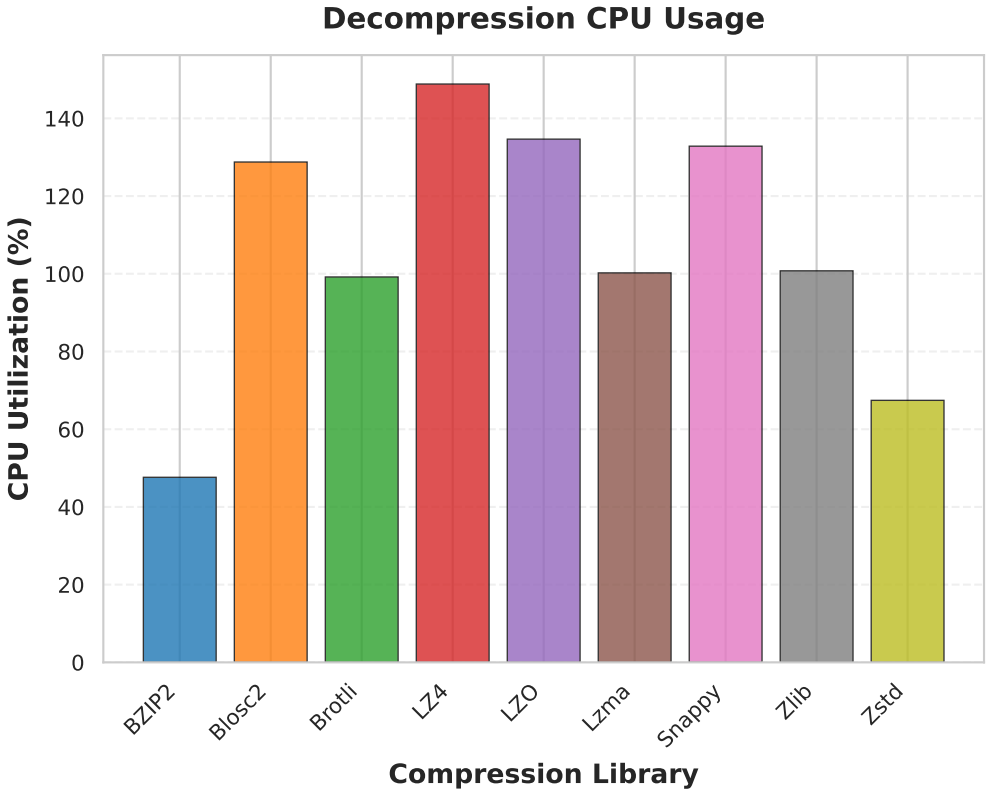
Parameter Study: exponential_incomp
Exponential(λ=0.01) × 1.5 + noise: Slow decay, high entropy
Char Data Type, 64KB Chunk Size







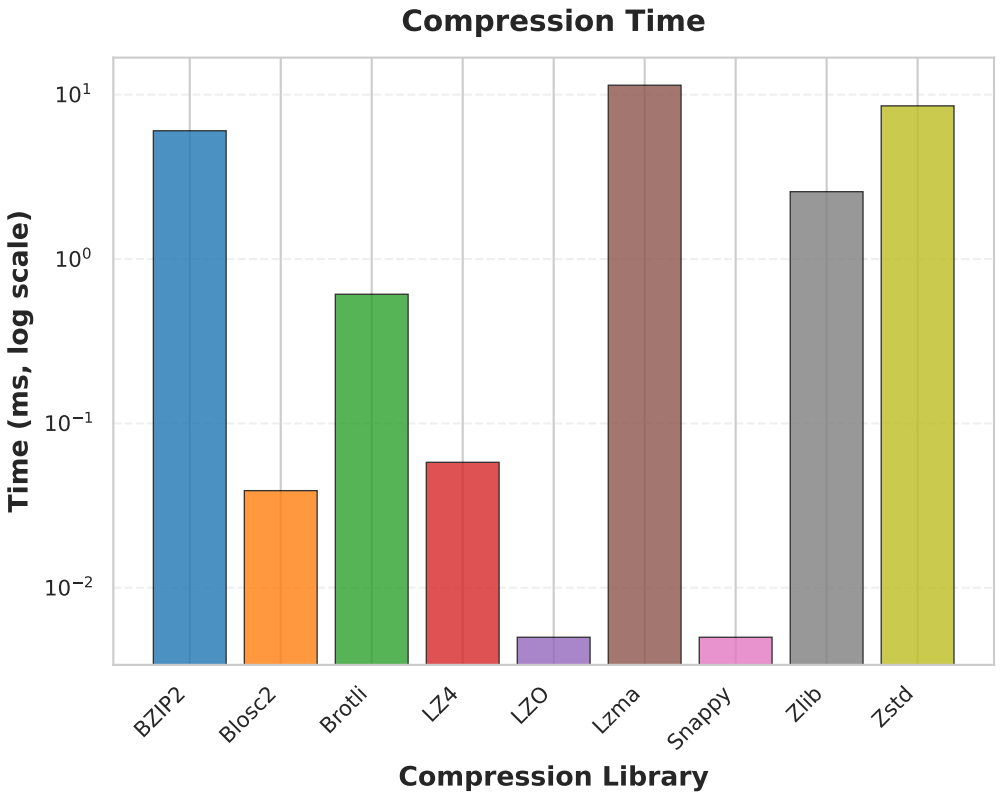


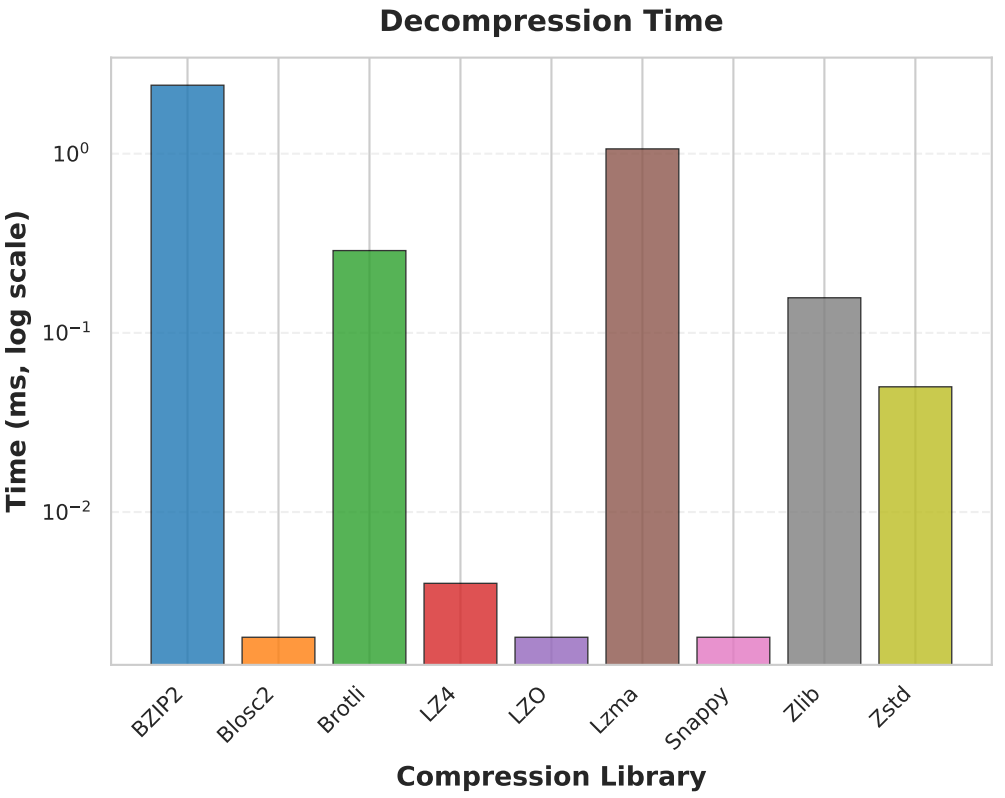


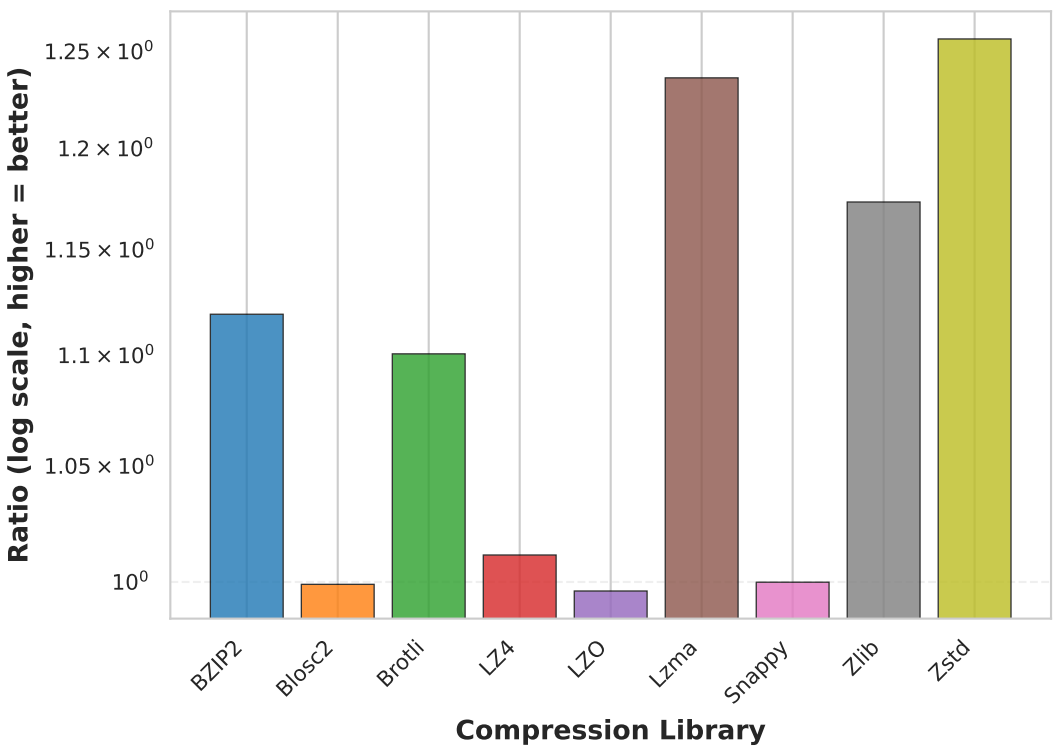
Performance Summary (64KB chunks)
Sorted by Compression Ratio

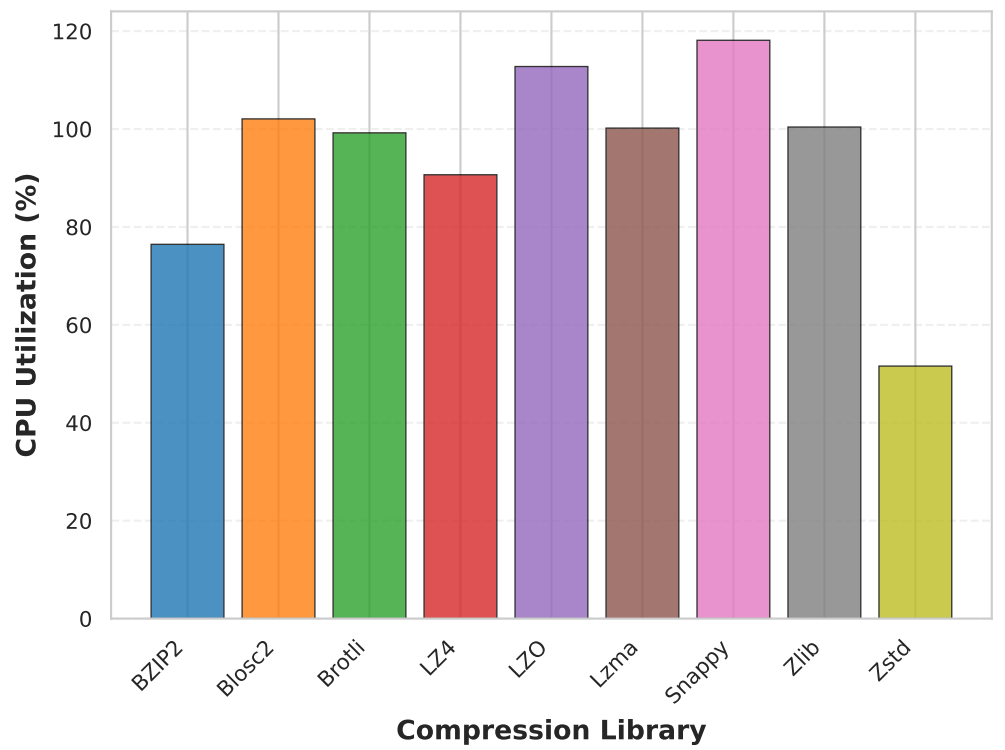
Library	Ratio	Time (ms)	CPU%
Zstd	1.16x	3.8	87%
Lzma	1.14x	12.2	100%
Zlib	1.12x	1.8	100%
BZIP2	1.05x	12.2	36%
Brotli	1.03x	0.6	99%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	69%
LZO	1.00x	0.0	85%

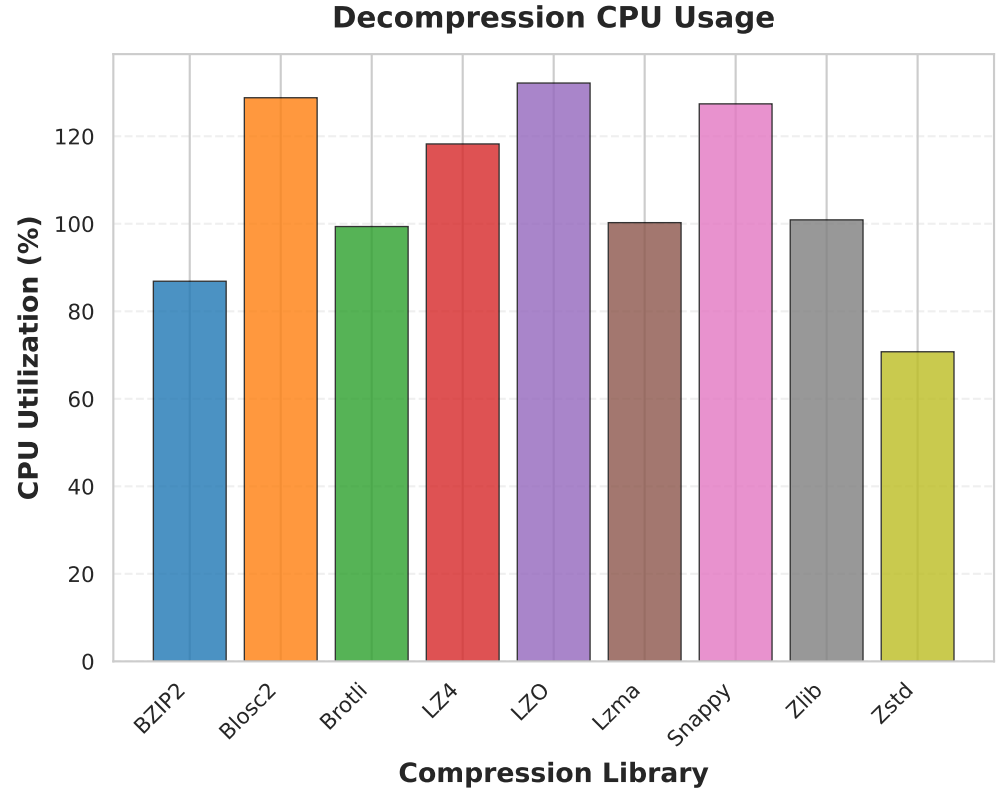
Parameter Study: exponential_light
Exponential(λ=0.012) × 2.5 + 10: Slow decay, wide spread
Char Data Type, 64KB Chunk Size







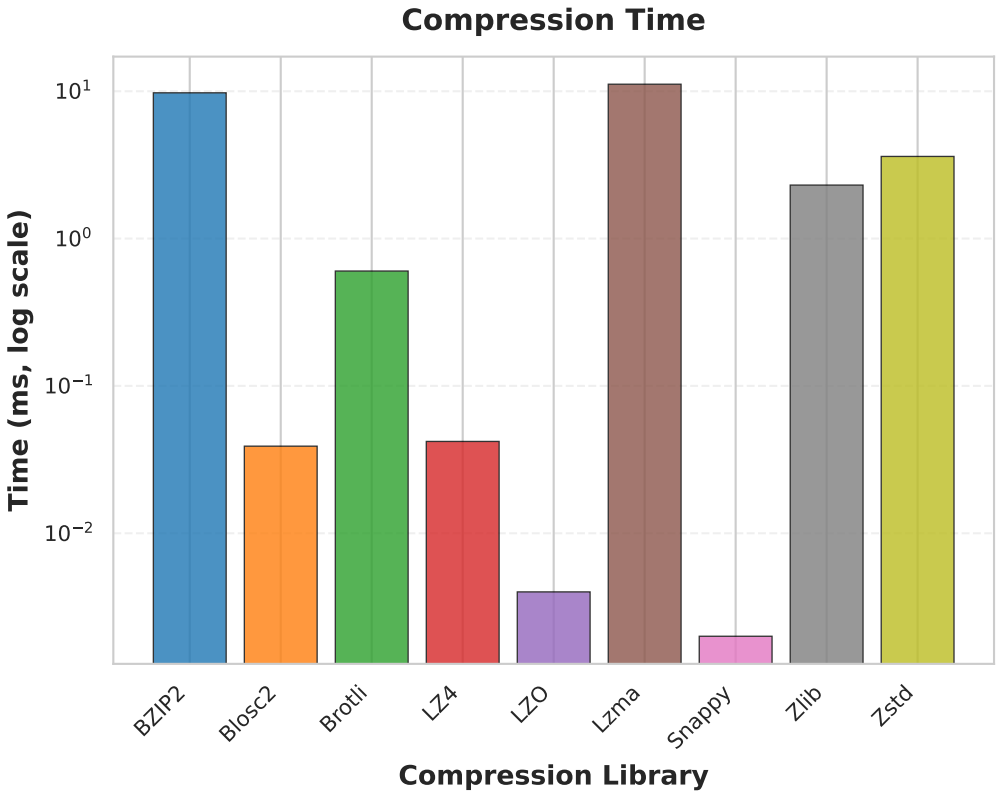


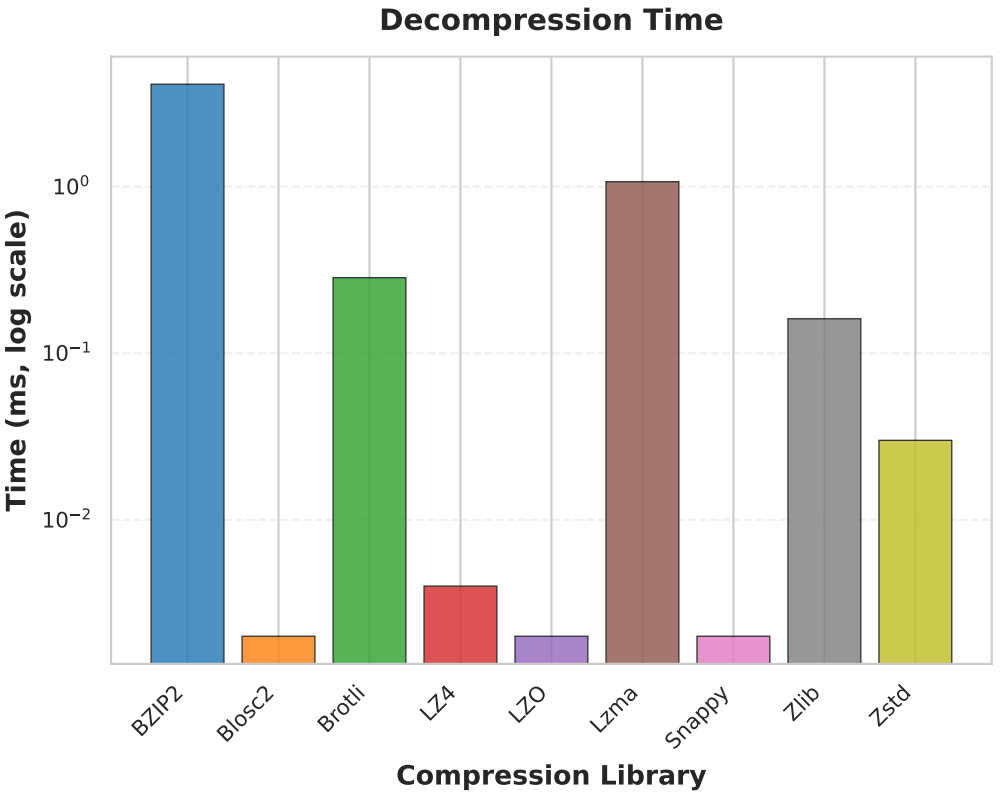


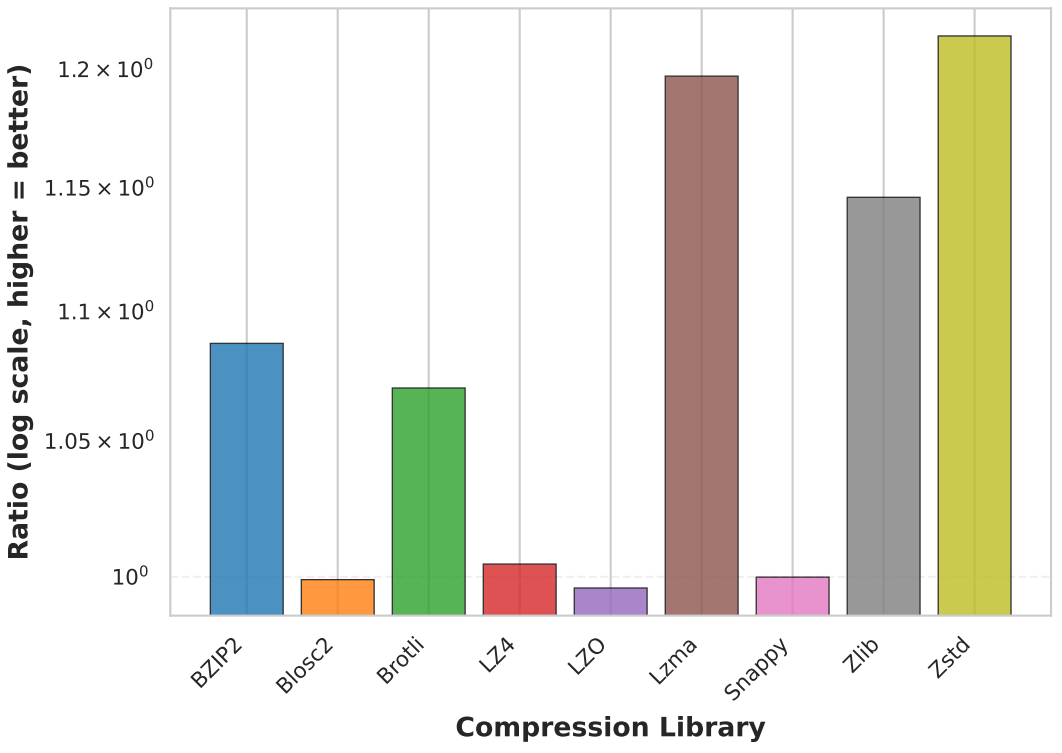
Performance Summary (64KB chunks)
Sorted by Compression Ratio

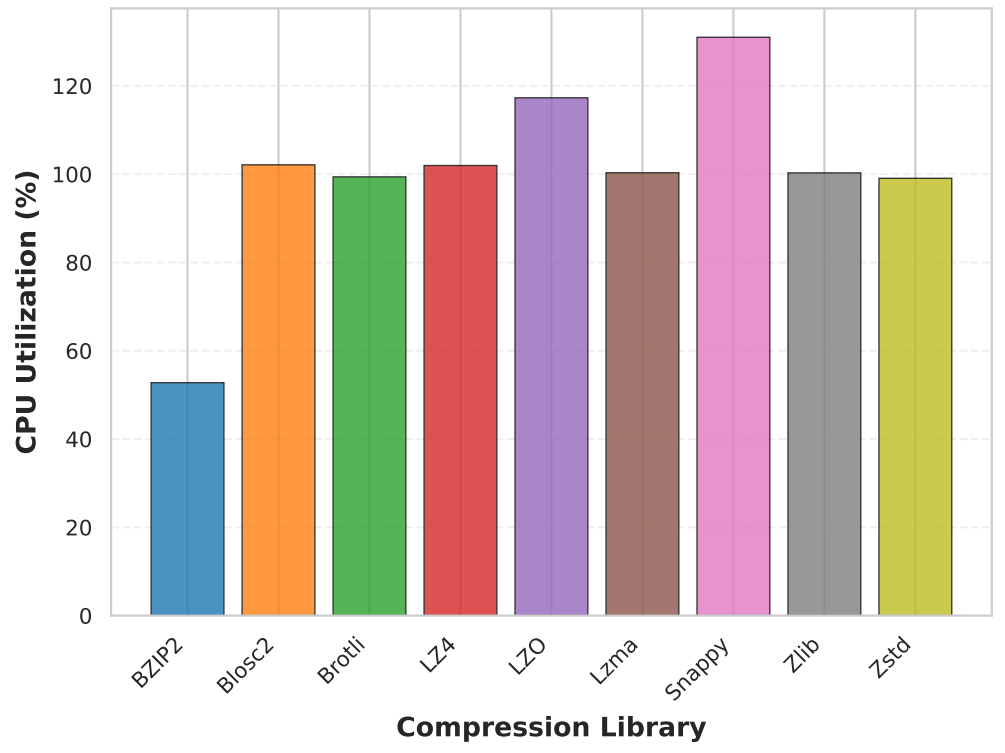
Library	Ratio	Time (ms)	CPU%
Zstd	1.26x	8.6	52%
Lzma	1.24x	11.4	100%
Zlib	1.17x	2.6	100%
BZIP2	1.12x	6.0	76%
Brotli	1.10x	0.6	99%
LZ4	1.01x	0.1	91%
Snappy	1.00x	0.0	118%
Blosc2	1.00x	0.0	102%
LZO	1.00x	0.0	113%

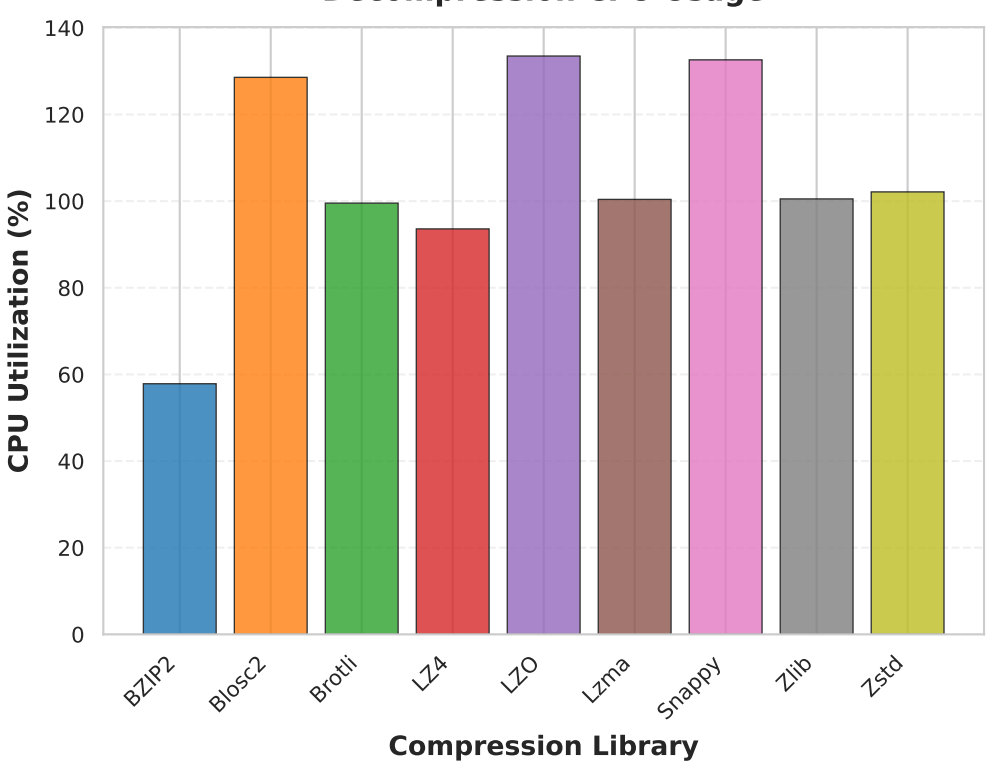
Parameter Study: exponential_medium
Exponential(λ=0.02) × 3.0 + 5: Moderate decay
Char Data Type, 64KB Chunk Size







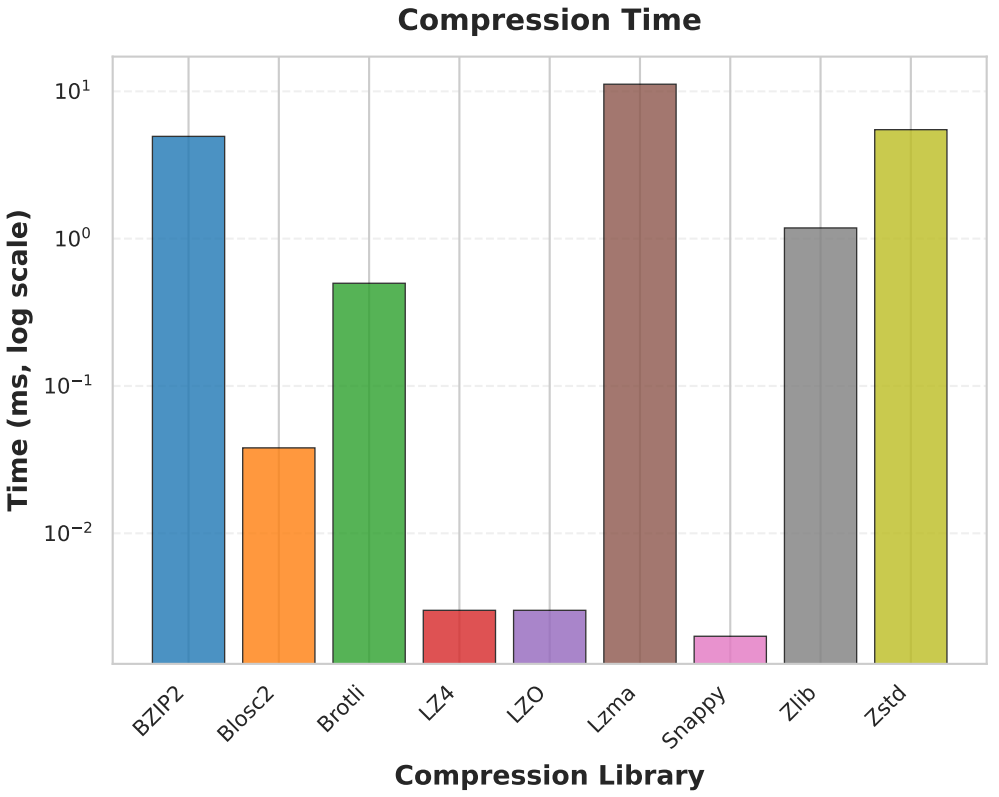


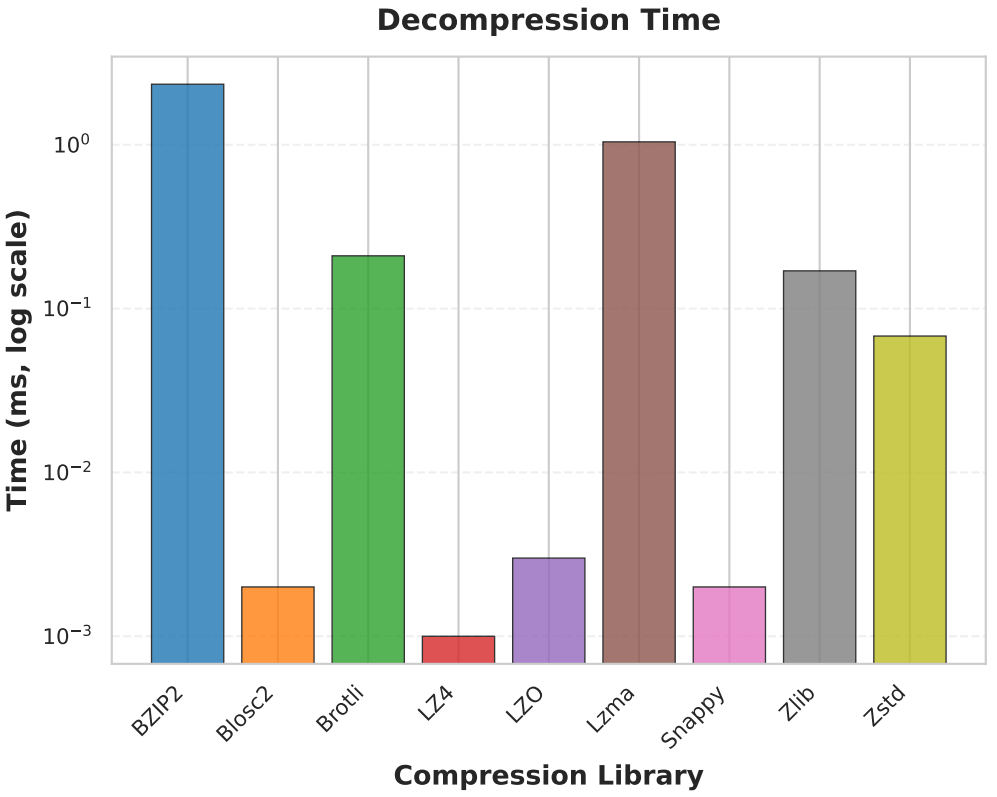


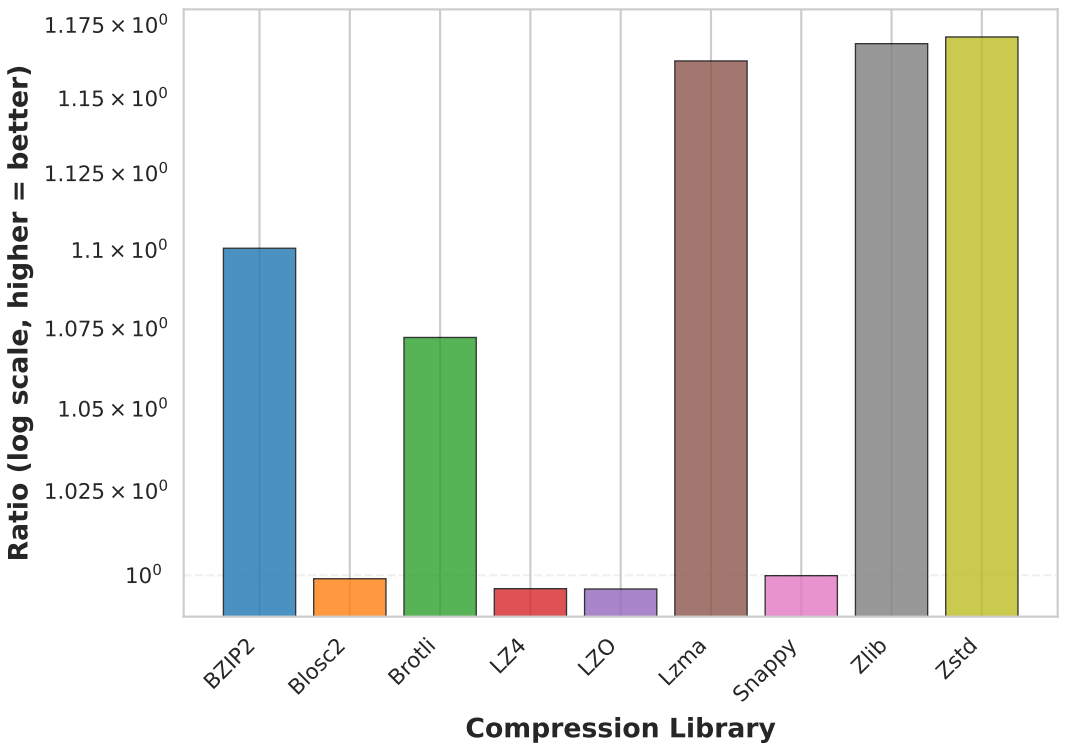
Performance Summary (64KB chunks)
Sorted by Compression Ratio

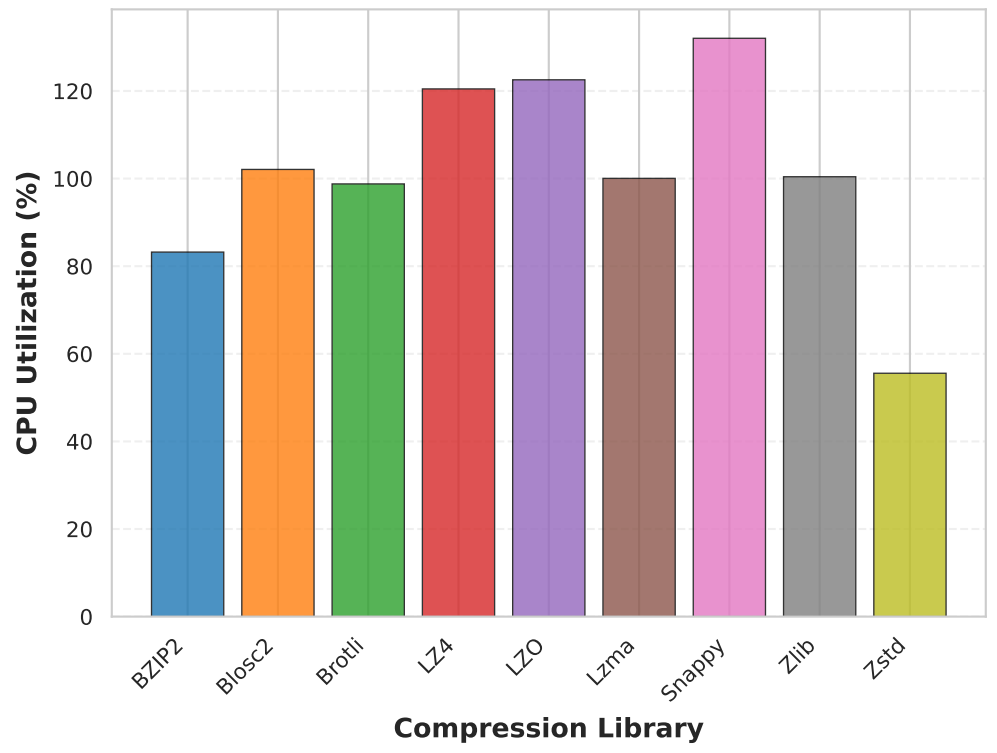
Library	Ratio	Time (ms)	CPU%
Zstd	1.21x	3.6	99%
Lzma	1.20x	11.2	100%
Zlib	1.15x	2.3	100%
BZIP2	1.09x	9.8	53%
Brotli	1.07x	0.6	99%
LZ4	1.00x	0.0	102%
Snappy	1.00x	0.0	131%
Blosc2	1.00x	0.0	102%
LZO	1.00x	0.0	117%

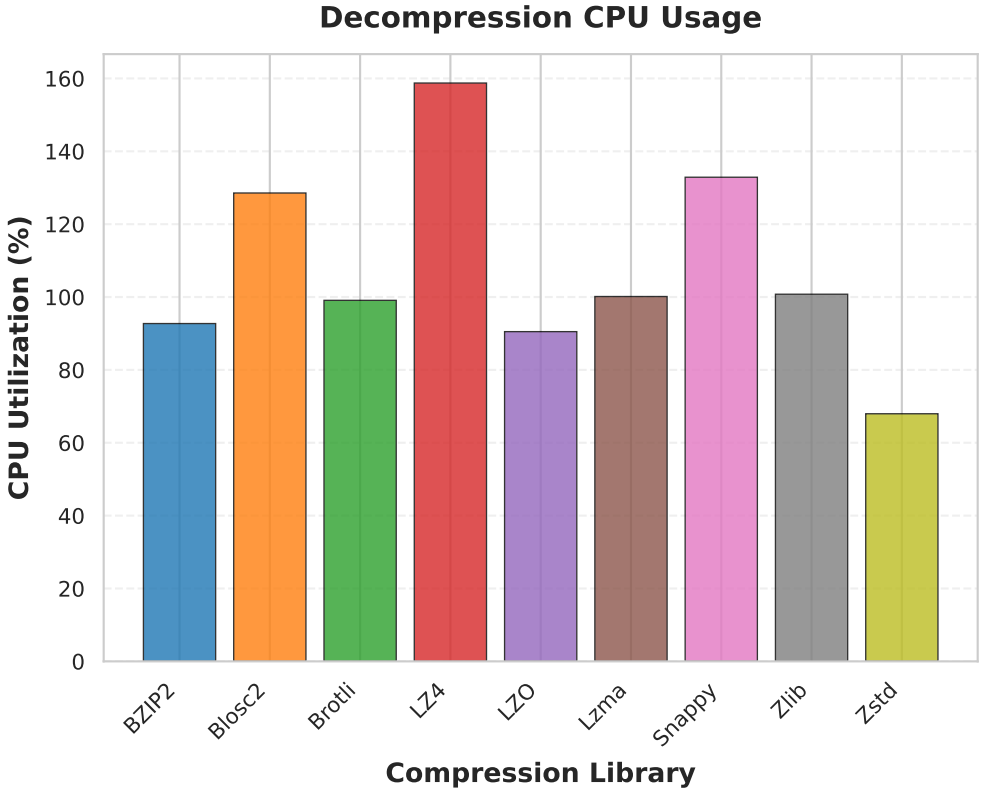
Parameter Study: gamma_high
Gamma(α=1, β=2) × 20: Tight clustering at low values
Char Data Type, 64KB Chunk Size







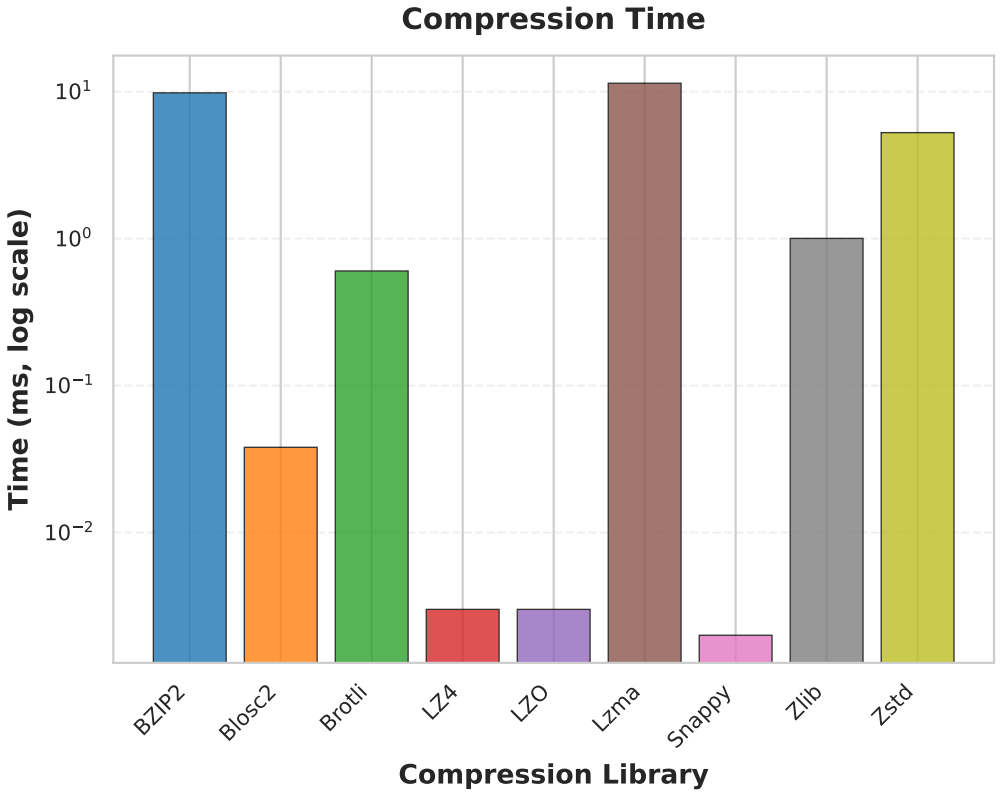


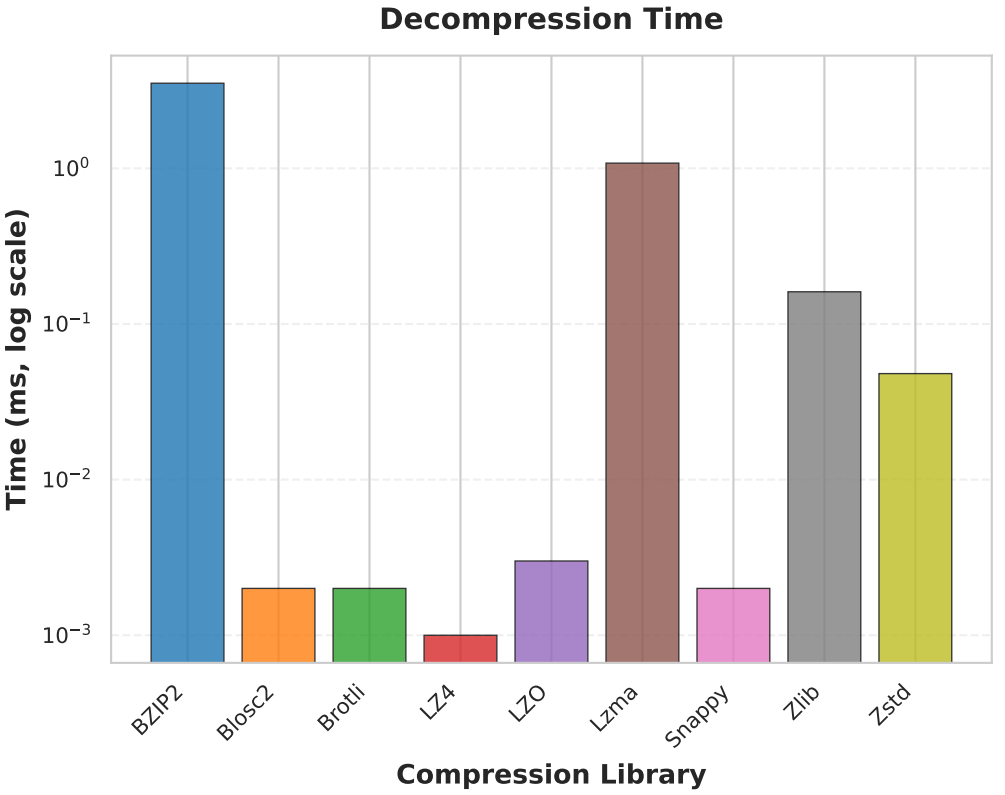


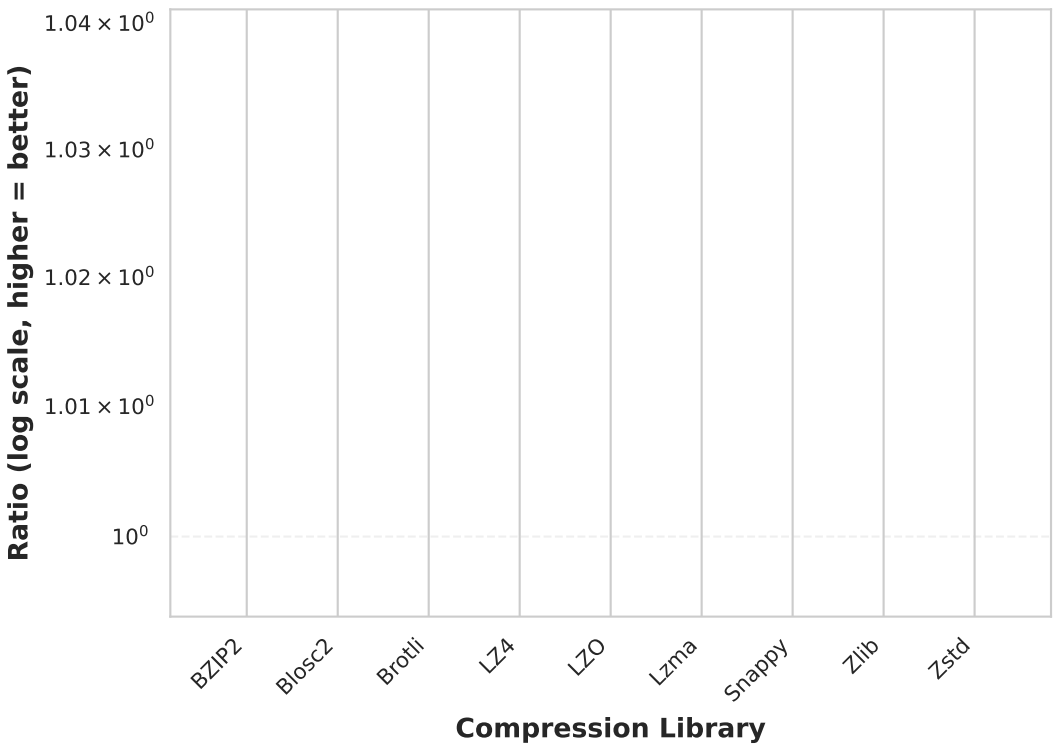
Performance Summary (64KB chunks)
Sorted by Compression Ratio

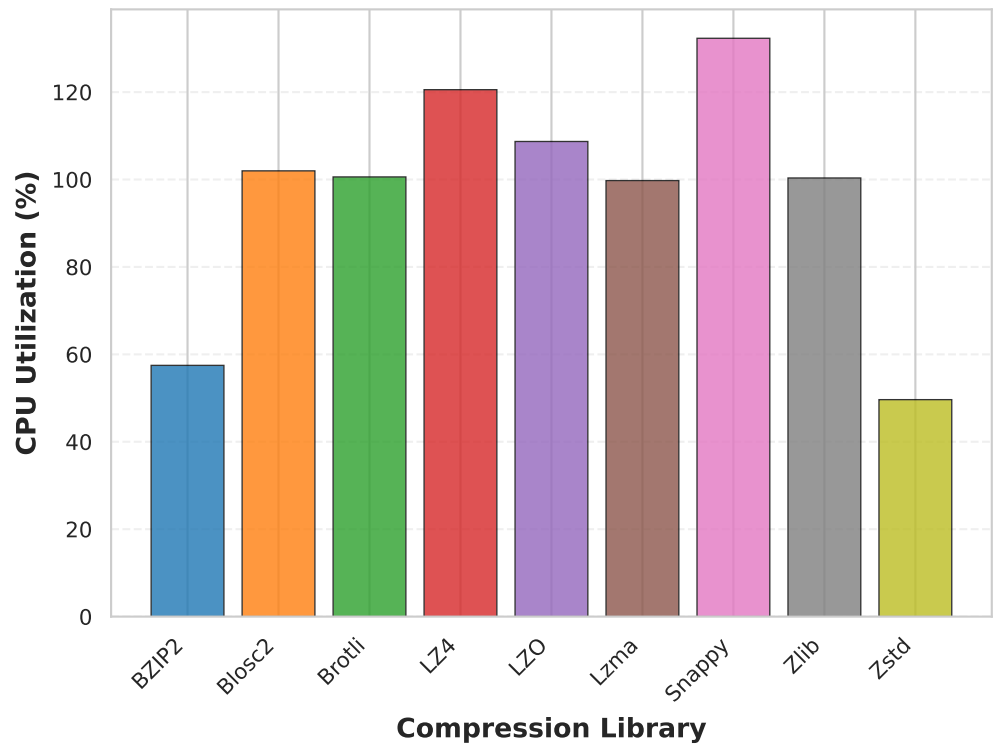
Library	Ratio	Time (ms)	CPU%
Zstd	1.17x	5.5	56%
Zlib	1.17x	1.2	100%
Lzma	1.16x	11.2	100%
BZIP2	1.10x	4.9	83%
Brotli	1.07x	0.5	99%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	120%
LZO	1.00x	0.0	123%

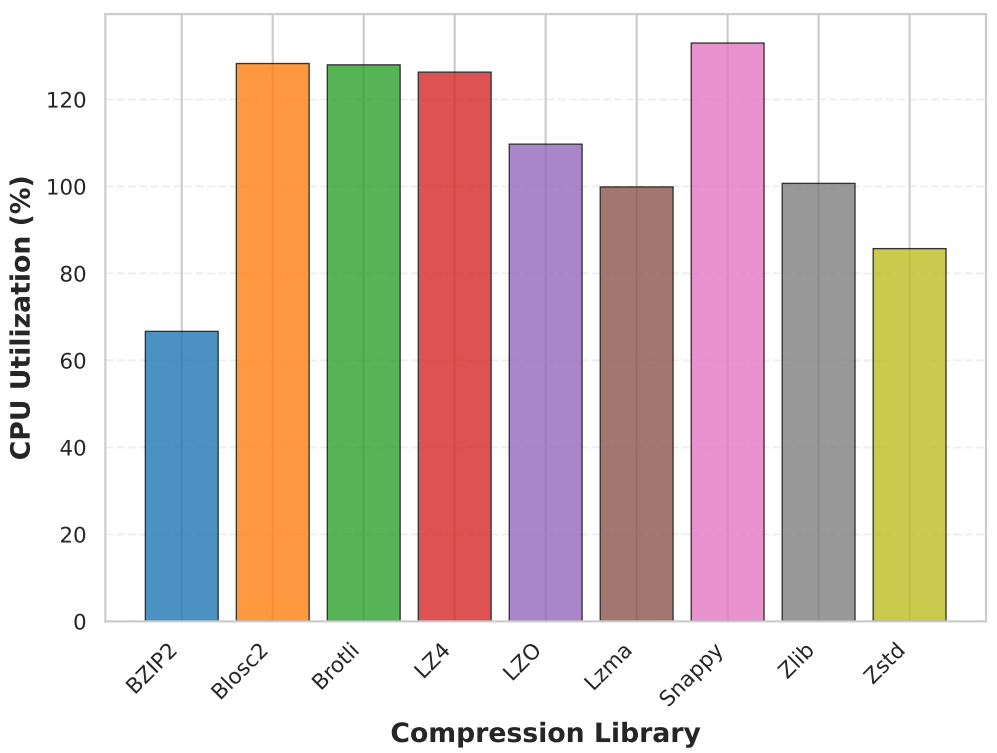
Parameter Study: gamma_incomp
Gamma(α=5, β=5) × 5 + noise: Wide spread, high entropy
Char Data Type, 64KB Chunk Size







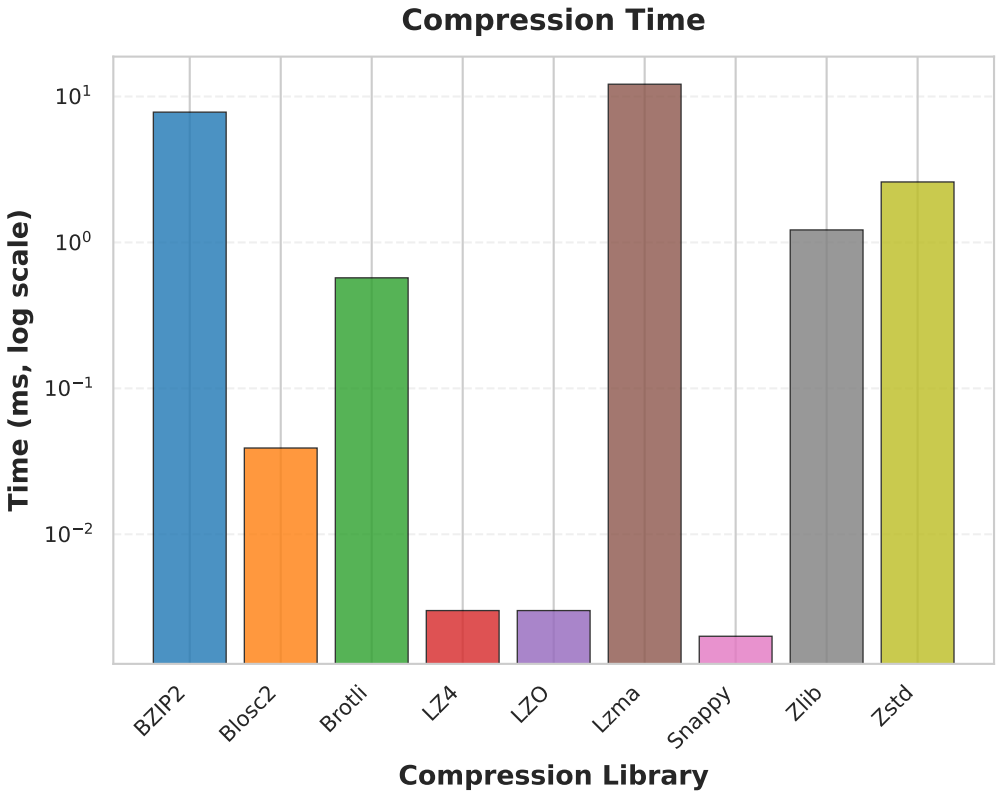


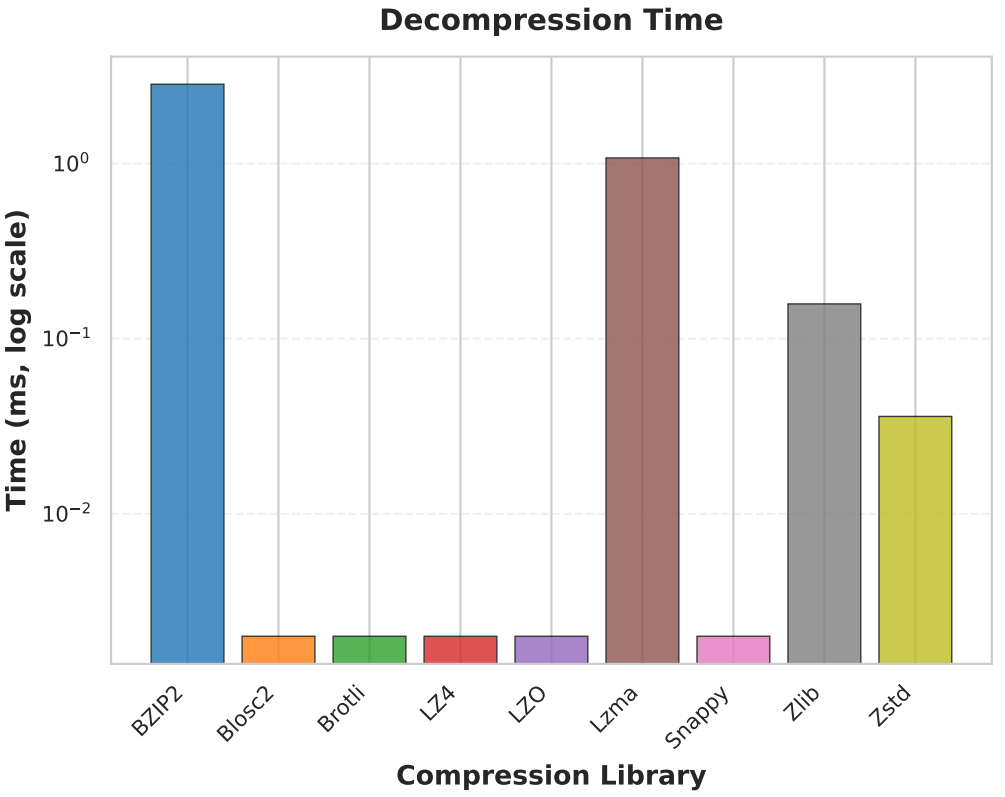


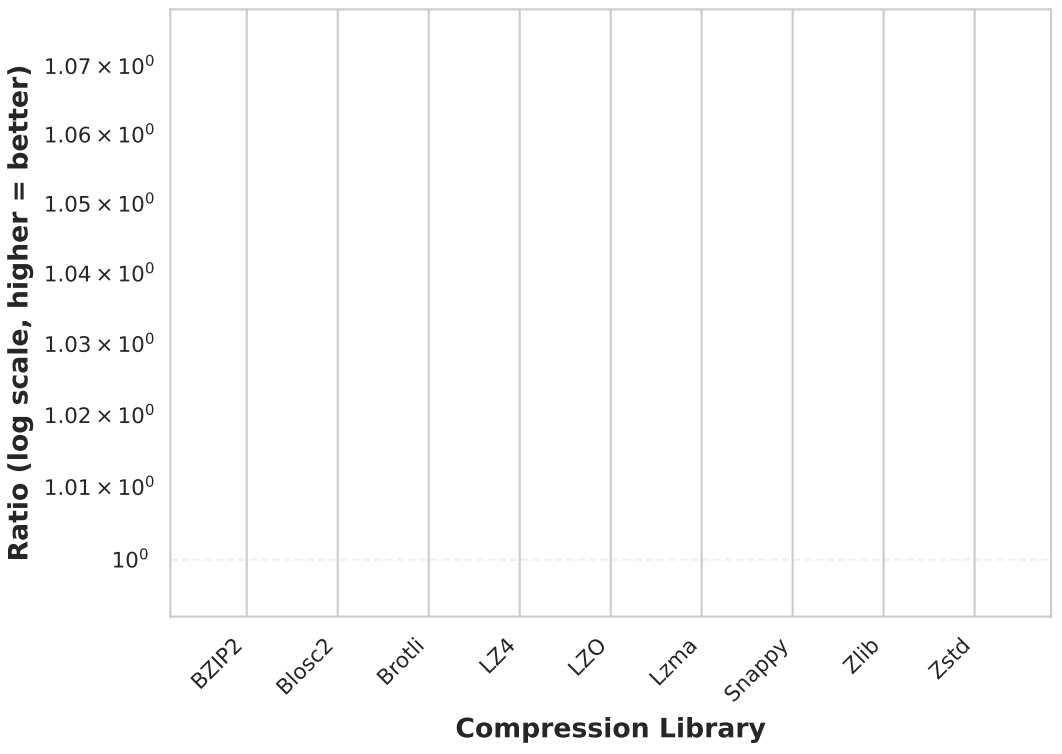
Performance Summary (64KB chunks)
Sorted by Compression Ratio

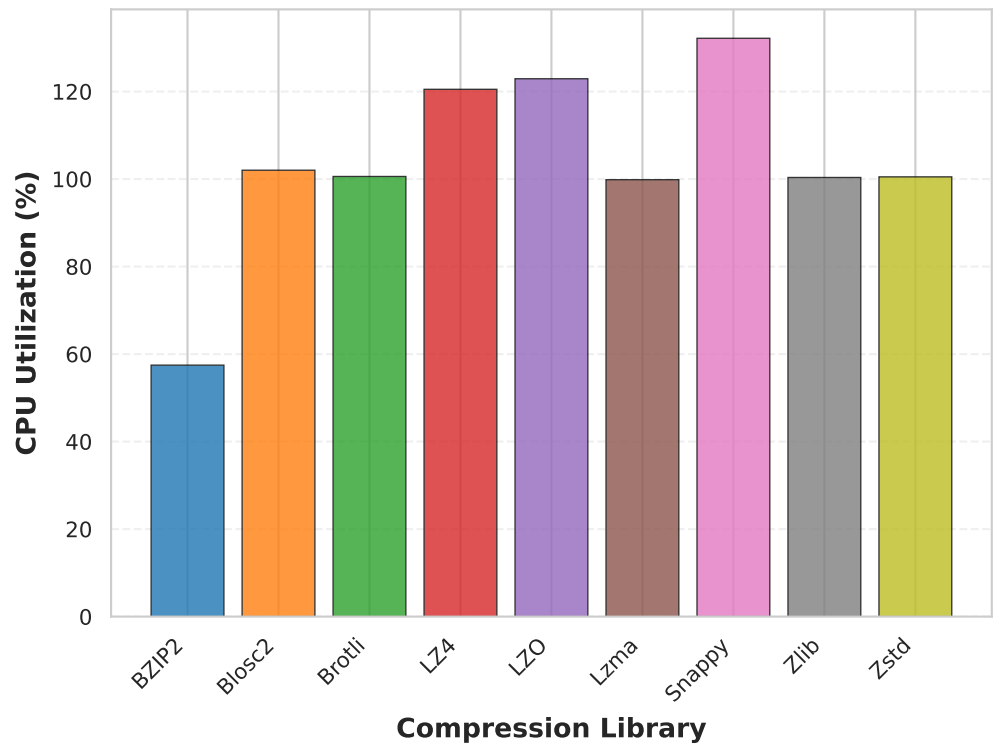
Library	Ratio	Time (ms)	CPU%
Zstd	1.04x	5.3	50%
Zlib	1.04x	1.0	100%
Lzma	1.03x	11.4	100%
BZIP2	1.01x	9.8	57%
Brotli	1.00x	0.6	101%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	121%
LZO	1.00x	0.0	109%

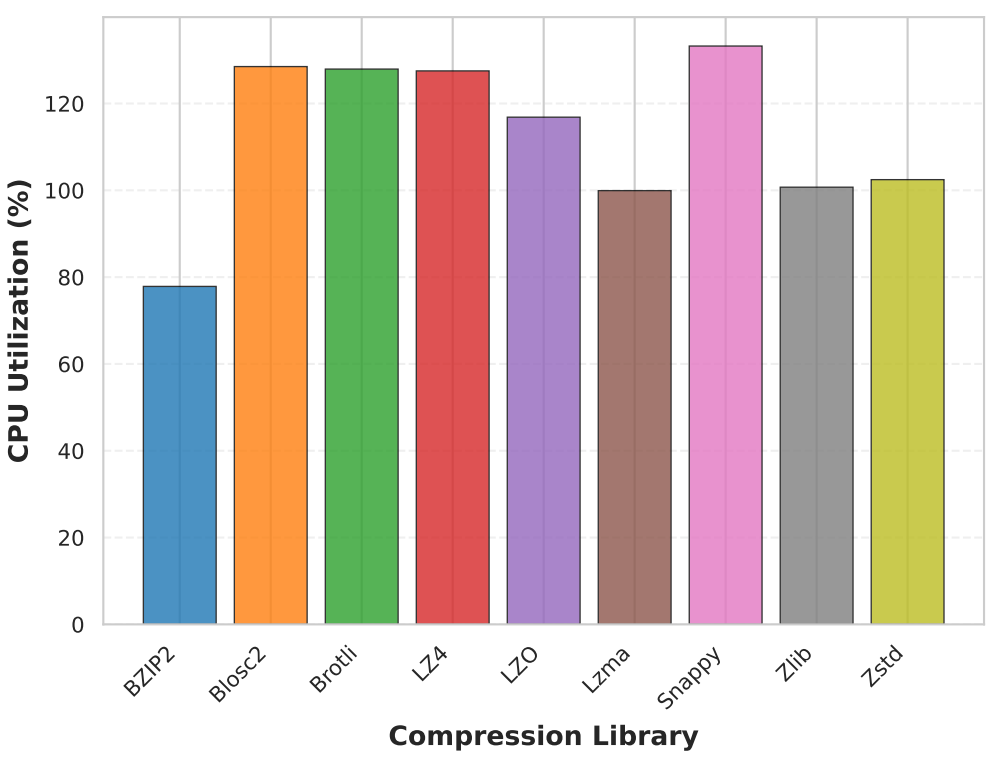
Parameter Study: gamma_light
Gamma(α=5, β=8) × 4: Moderate spread, some clustering
Char Data Type, 64KB Chunk Size







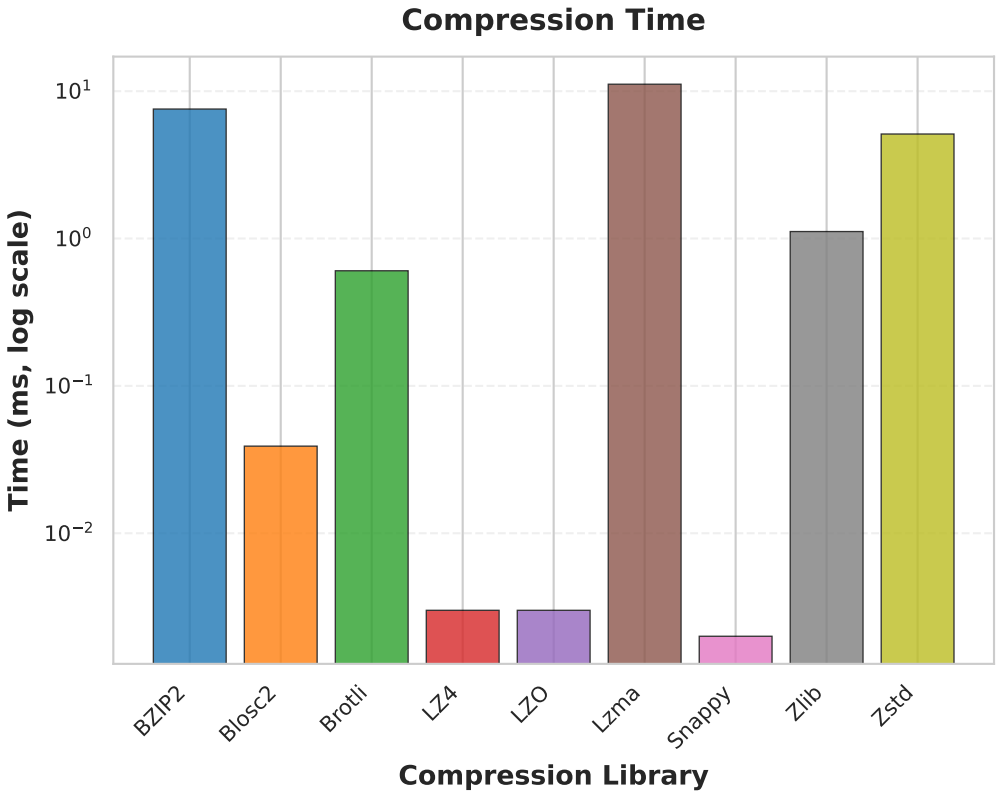


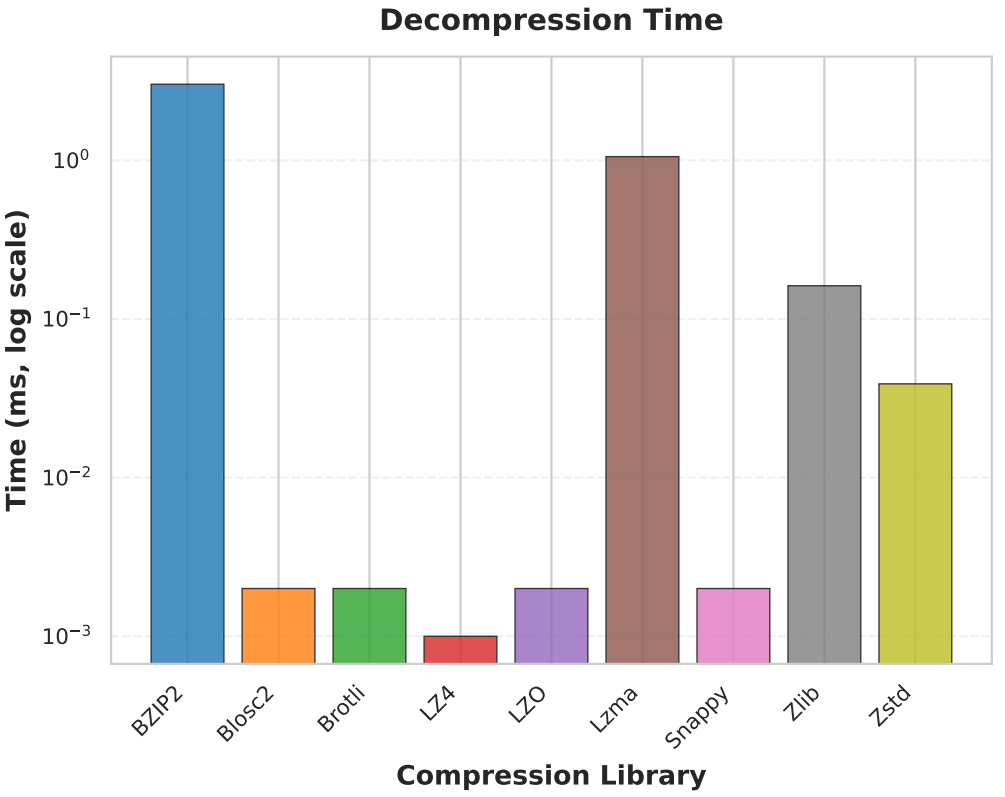


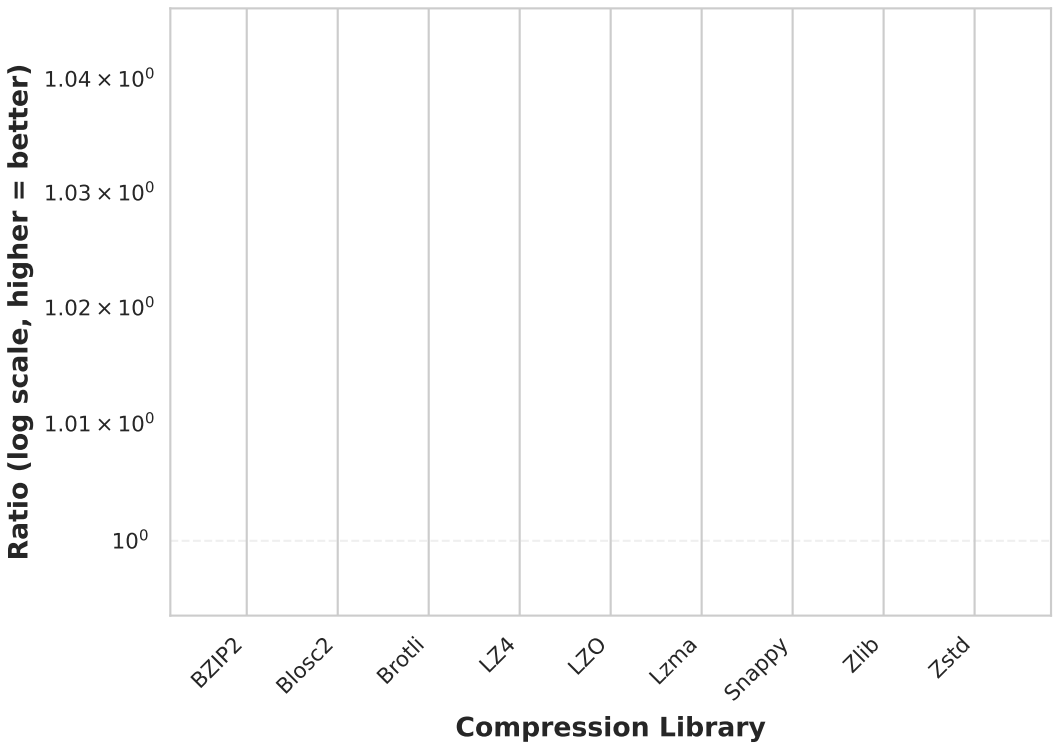
Performance Summary (64KB chunks)
Sorted by Compression Ratio

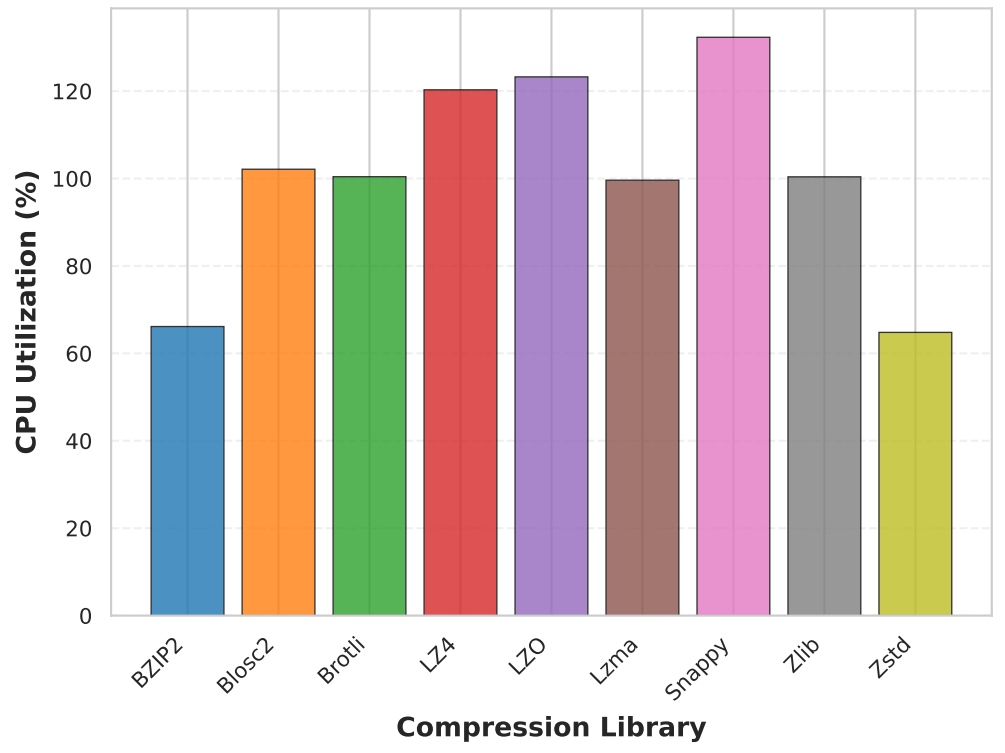
Library	Ratio	Time (ms)	CPU%
Zstd	1.07x	2.6	100%
Zlib	1.07x	1.2	100%
Lzma	1.06x	12.1	100%
BZIP2	1.02x	7.8	57%
Brotli	1.00x	0.6	101%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	121%
LZO	1.00x	0.0	123%

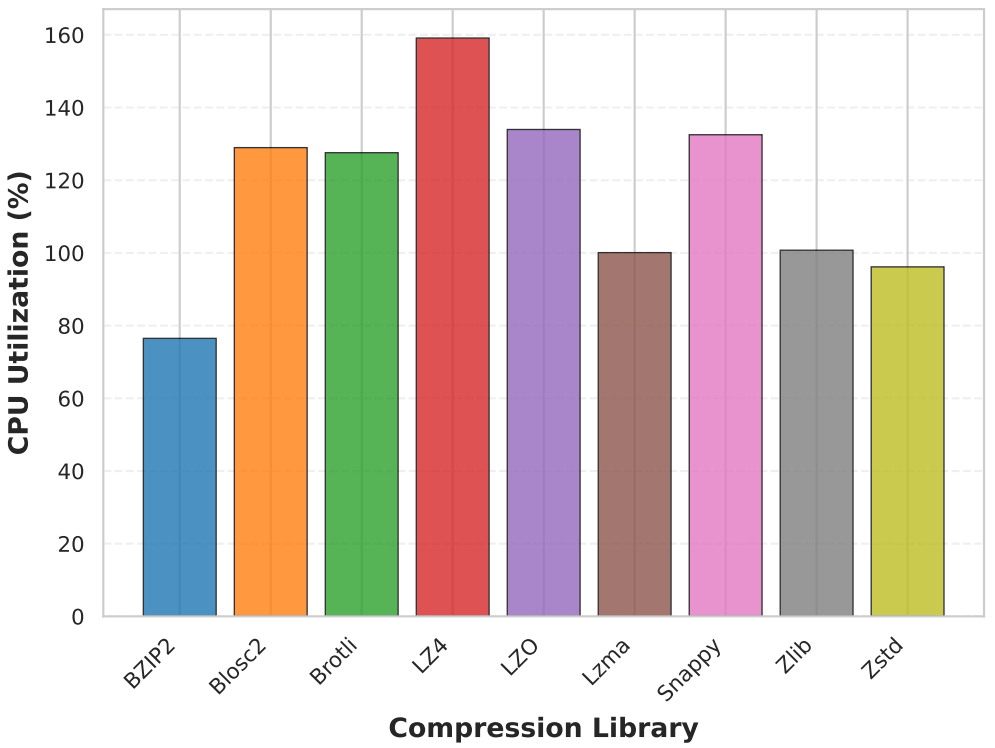
Parameter Study: gamma_medium
Gamma(α=2, β=4) × 15: Medium clustering
Char Data Type, 64KB Chunk Size







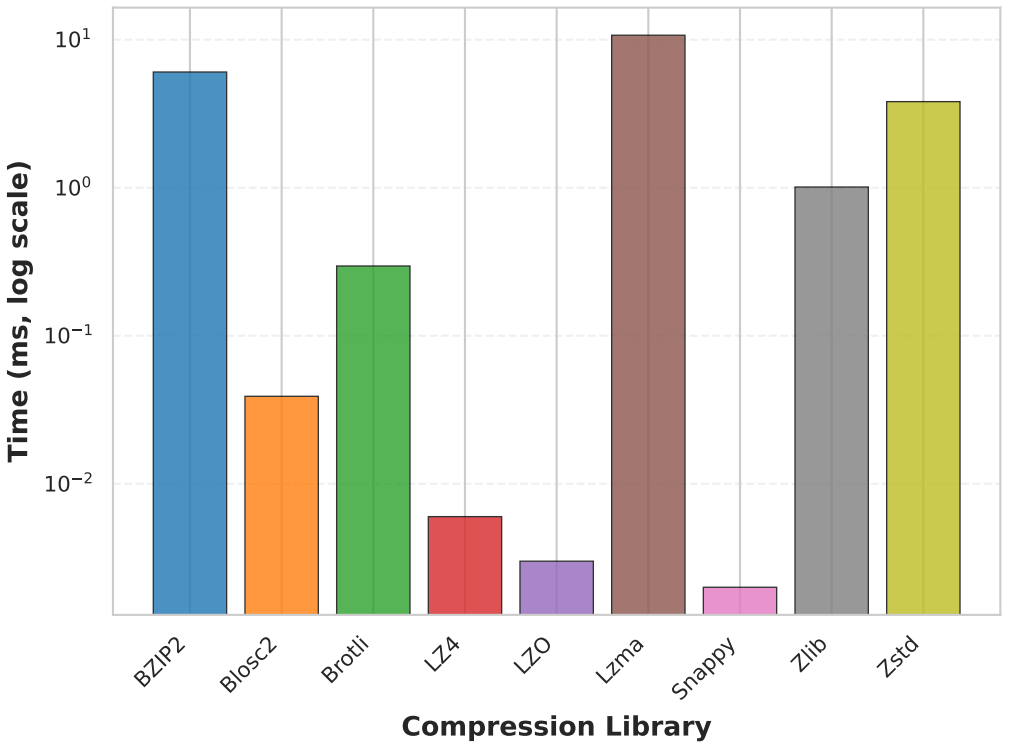


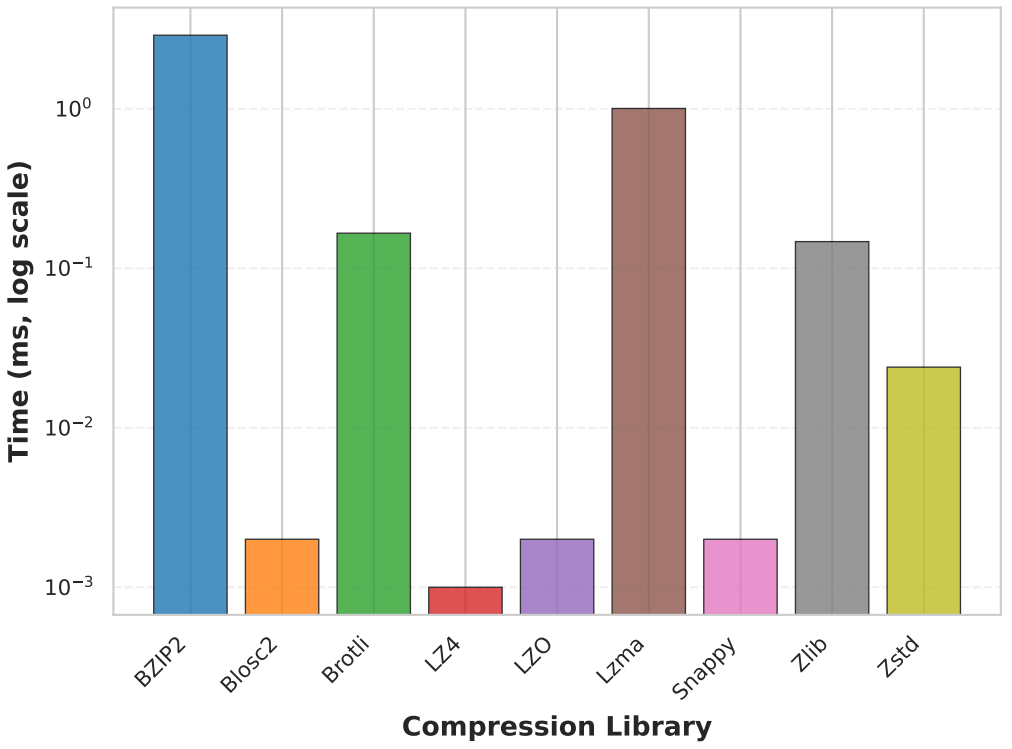


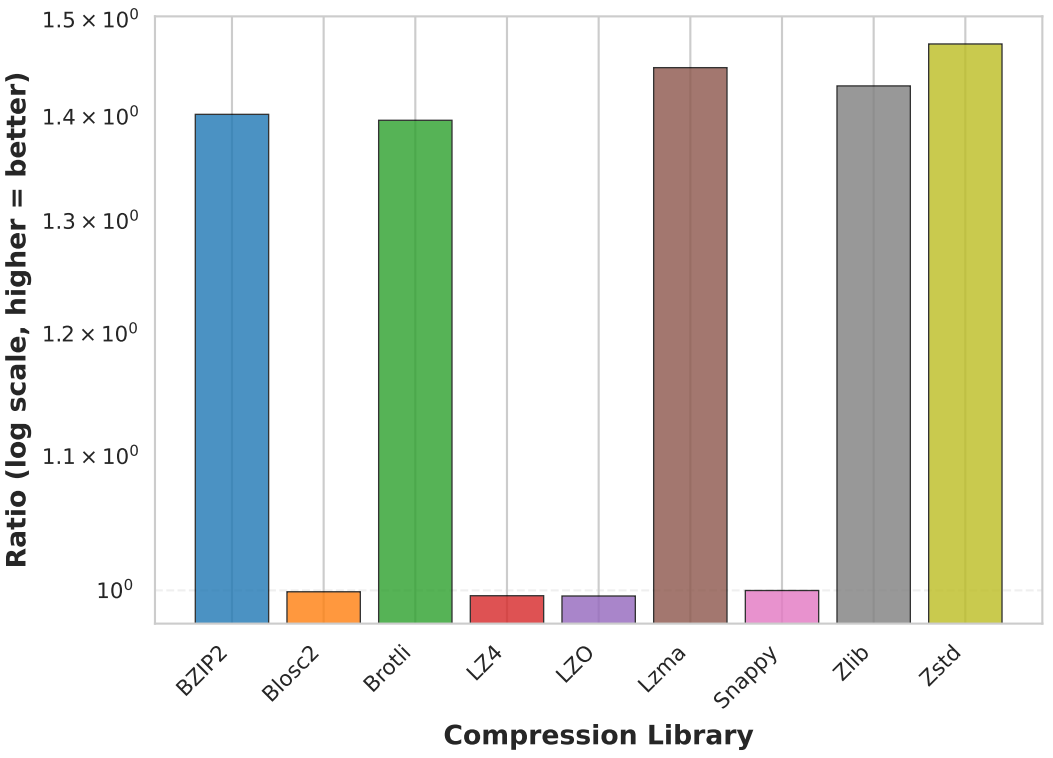
Performance Summary (64KB chunks)
Sorted by Compression Ratio

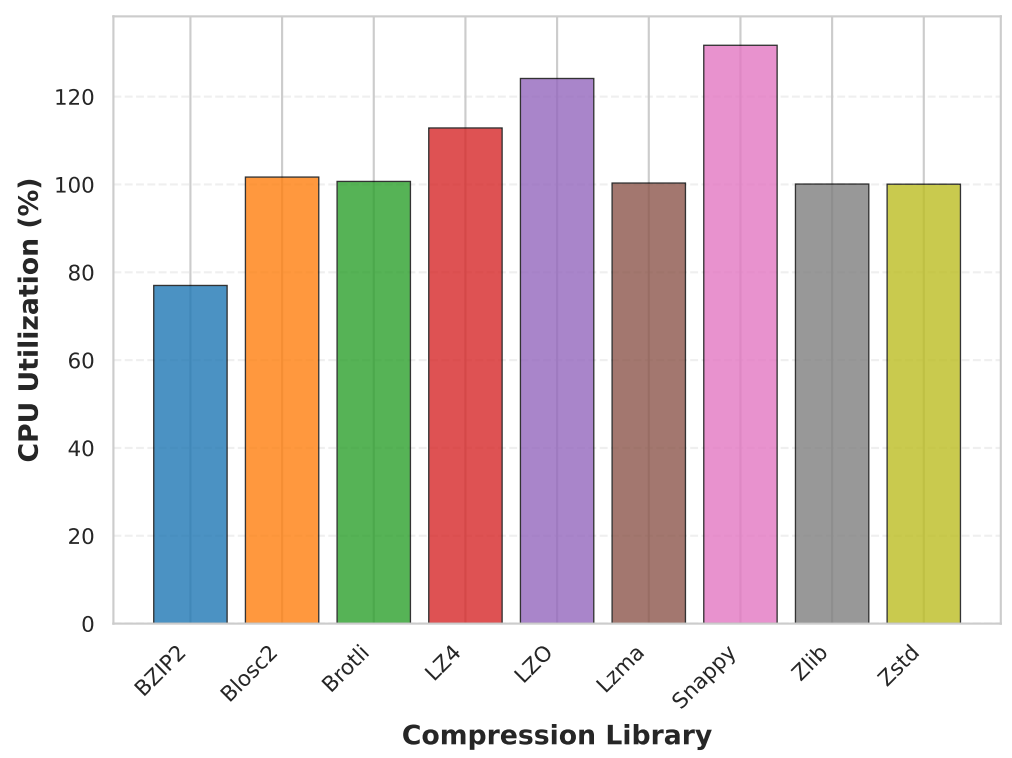
Library	Ratio	Time (ms)	CPU%
Zstd	1.04x	5.1	65%
Zlib	1.04x	1.1	100%
Lzma	1.03x	11.1	100%
BZIP2	1.00x	7.6	66%
Brotli	1.00x	0.6	100%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	120%
LZO	1.00x	0.0	123%

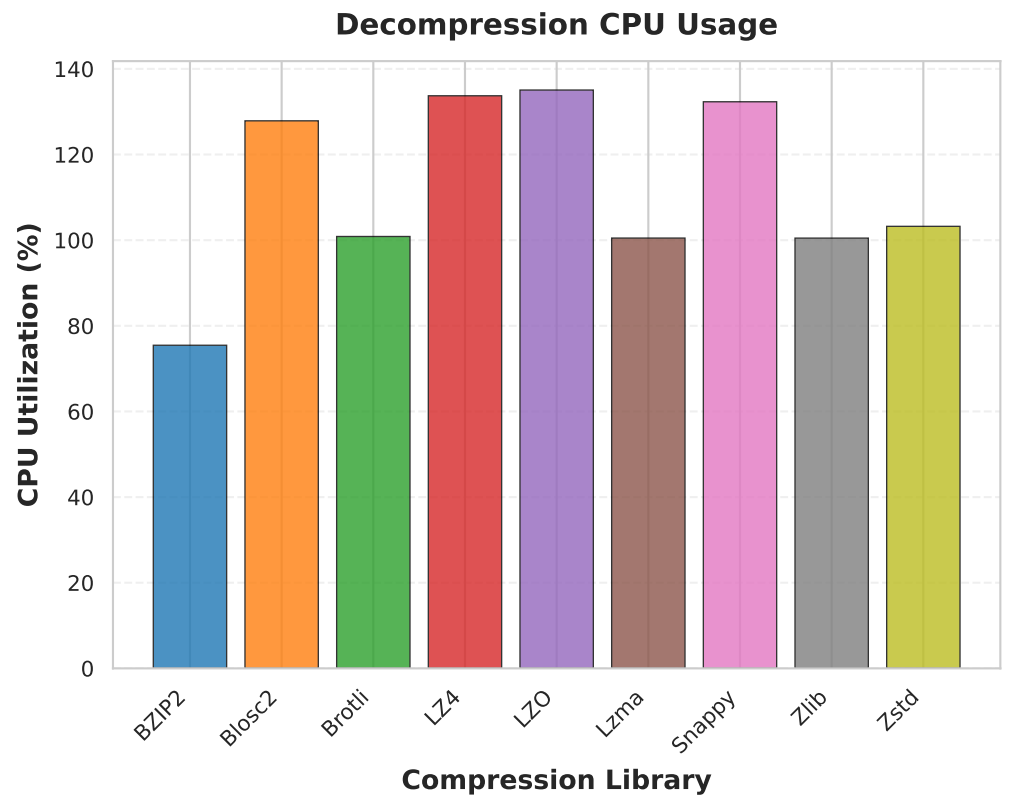
Parameter Study: normal_10
Standard deviation σ = 10 (controls clustering)
Char Data Type, 64KB Chunk Size









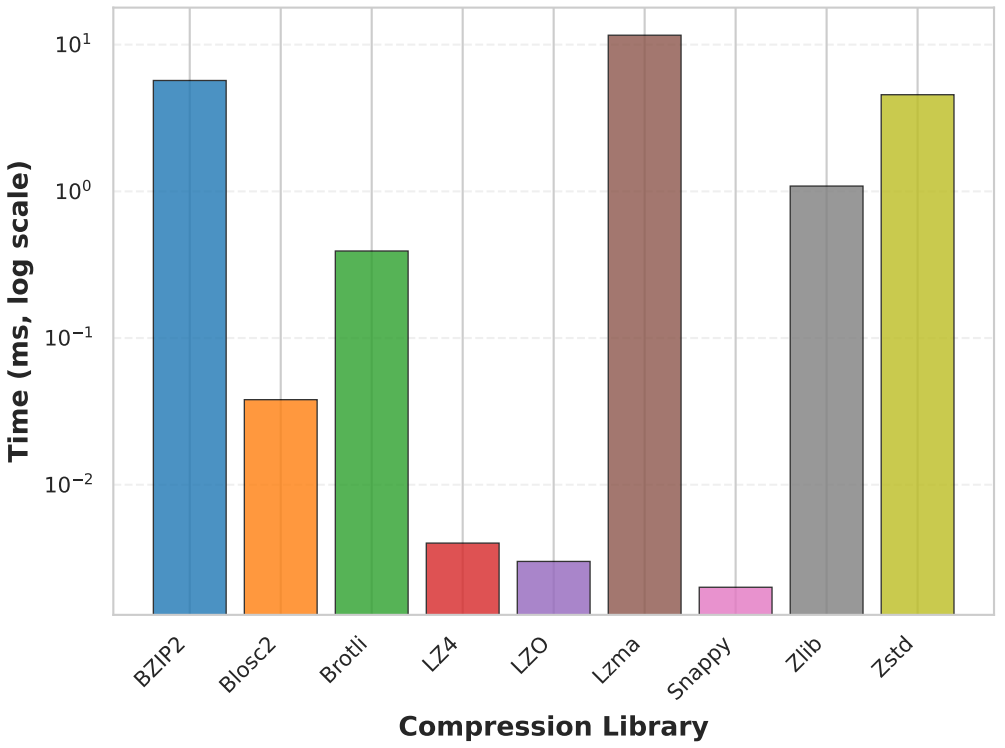


Performance Summary (64KB chunks)
Sorted by Compression Ratio

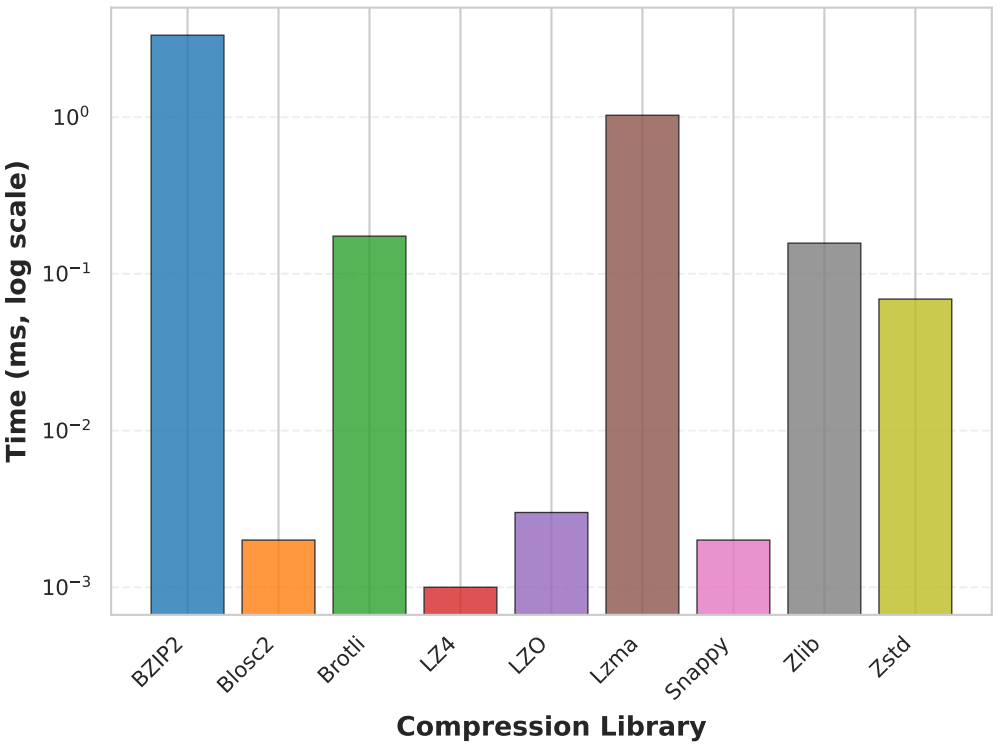
Library	Ratio	Time (ms)	CPU%
Zstd	1.47x	3.8	100%
Lzma	1.45x	10.7	100%
Zlib	1.43x	1.0	100%
BZIP2	1.40x	6.0	77%
Brotli	1.40x	0.3	101%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	113%
LZO	1.00x	0.0	124%

Parameter Study: normal_20
Standard deviation σ = 20 (controls clustering)
Char Data Type, 64KB Chunk Size

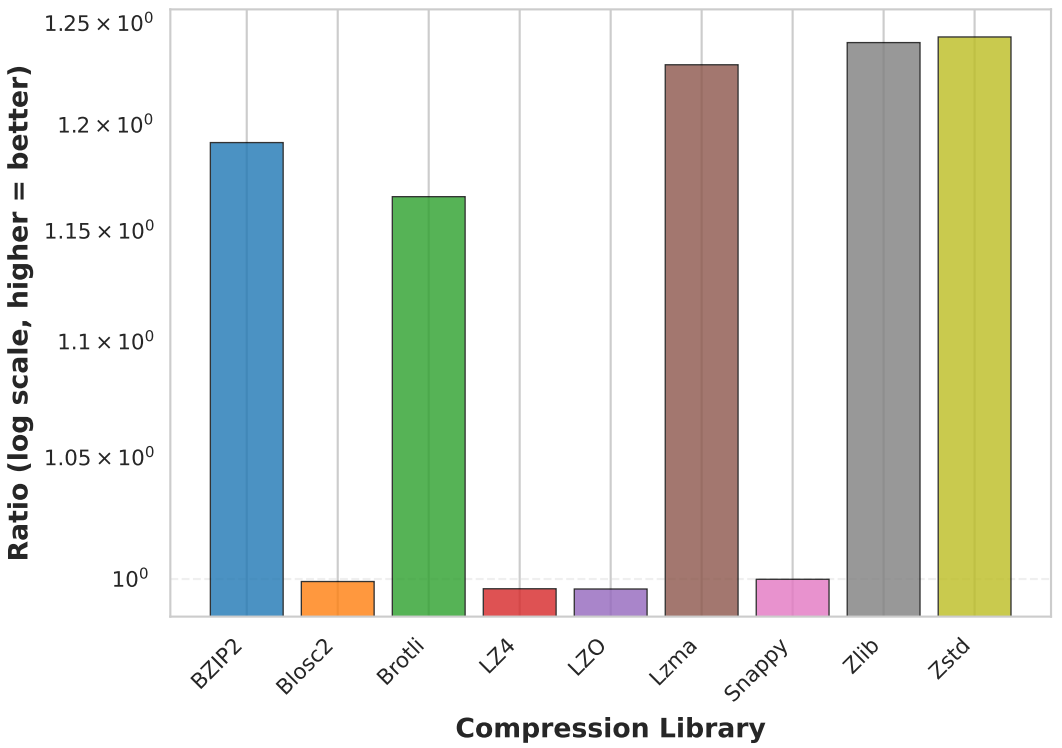
Compression Time



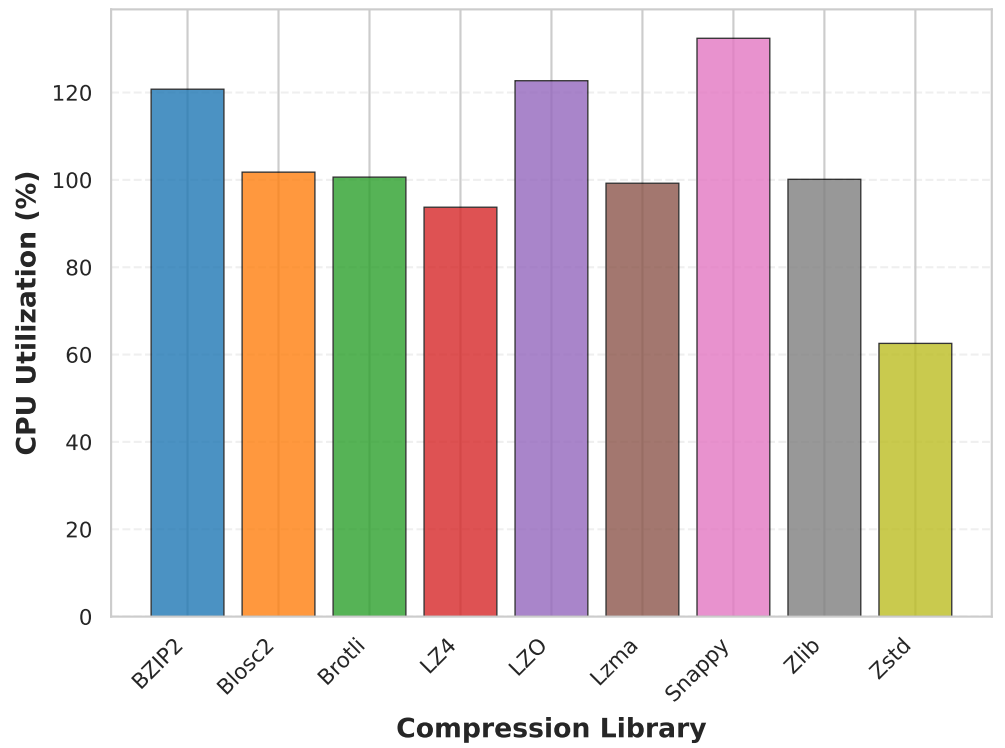
Decompression Time



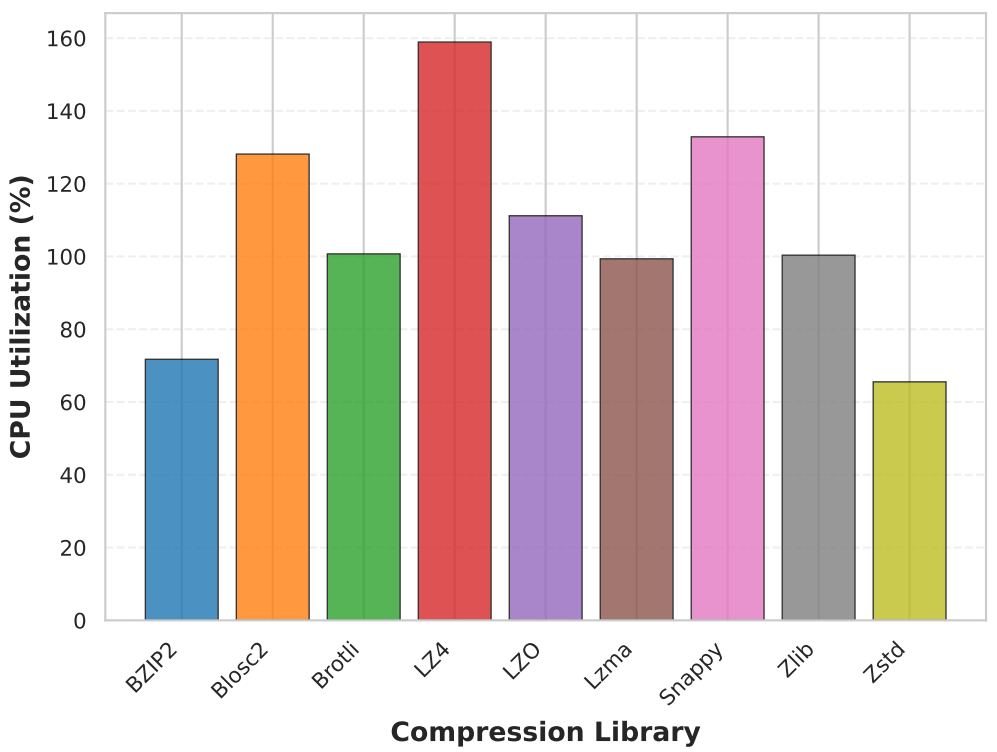
Compression Ratio



Compression CPU Usage



Decompression CPU Usage

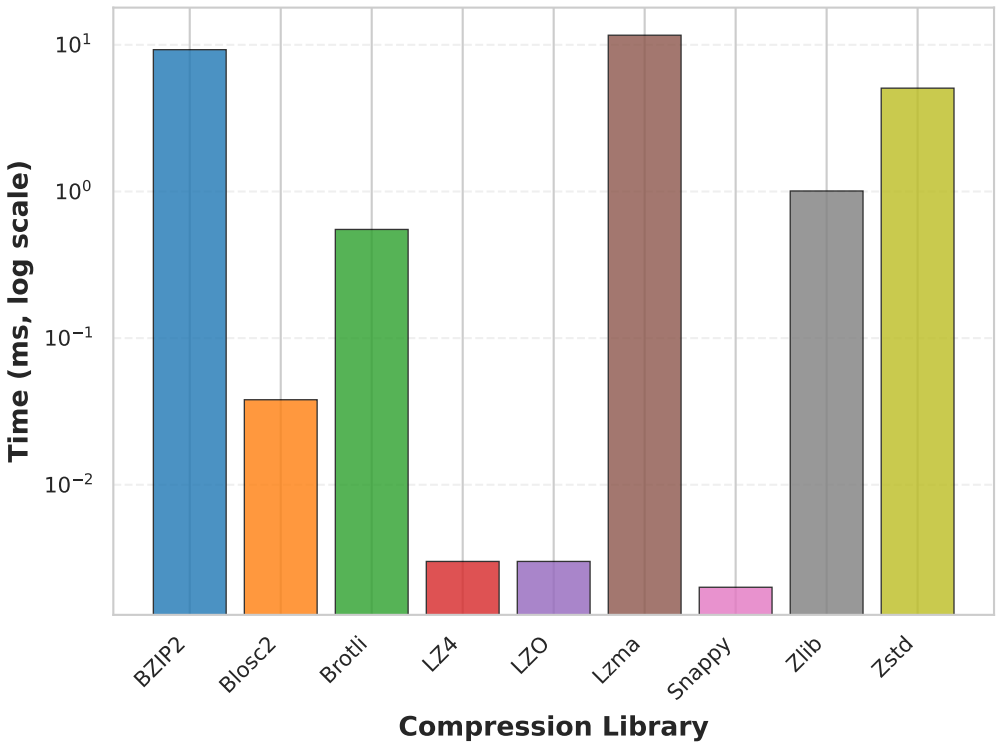


Performance Summary (64KB chunks)
Sorted by Compression Ratio

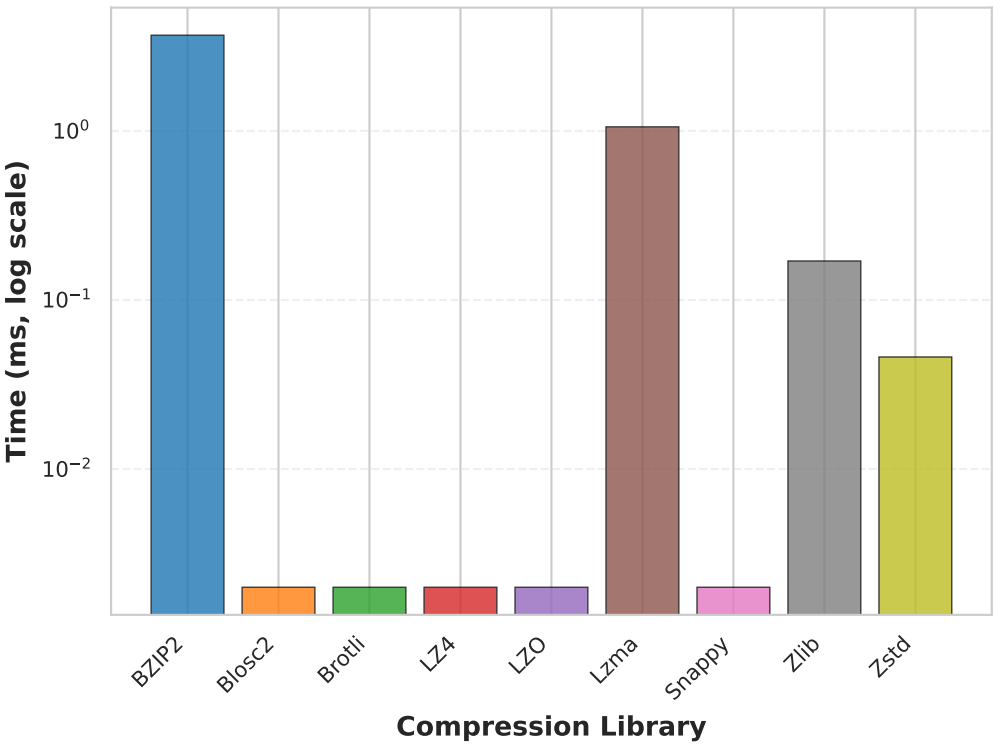
Library	Ratio	Time (ms)	CPU%
Zstd	1.24x	4.6	63%
Zlib	1.24x	1.1	100%
Lzma	1.23x	11.6	99%
BZIP2	1.19x	5.7	121%
Brotli	1.17x	0.4	101%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	94%
LZO	1.00x	0.0	123%

Parameter Study: normal_40
Standard deviation σ = 40 (controls clustering)
Char Data Type, 64KB Chunk Size

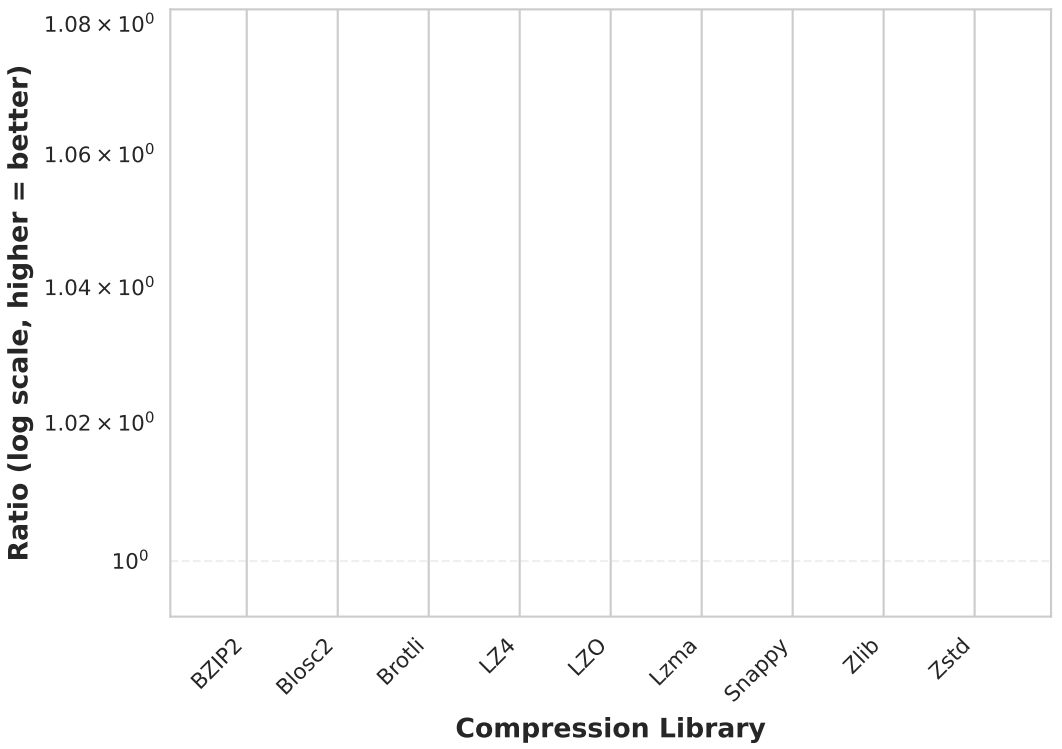
Compression Time



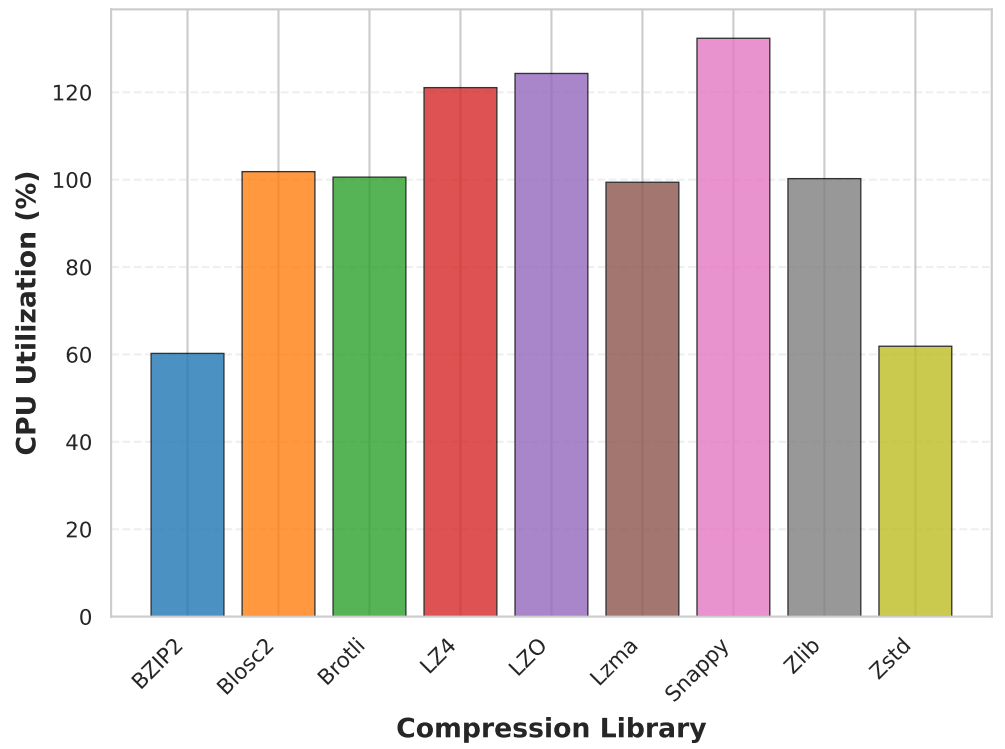
Decompression Time



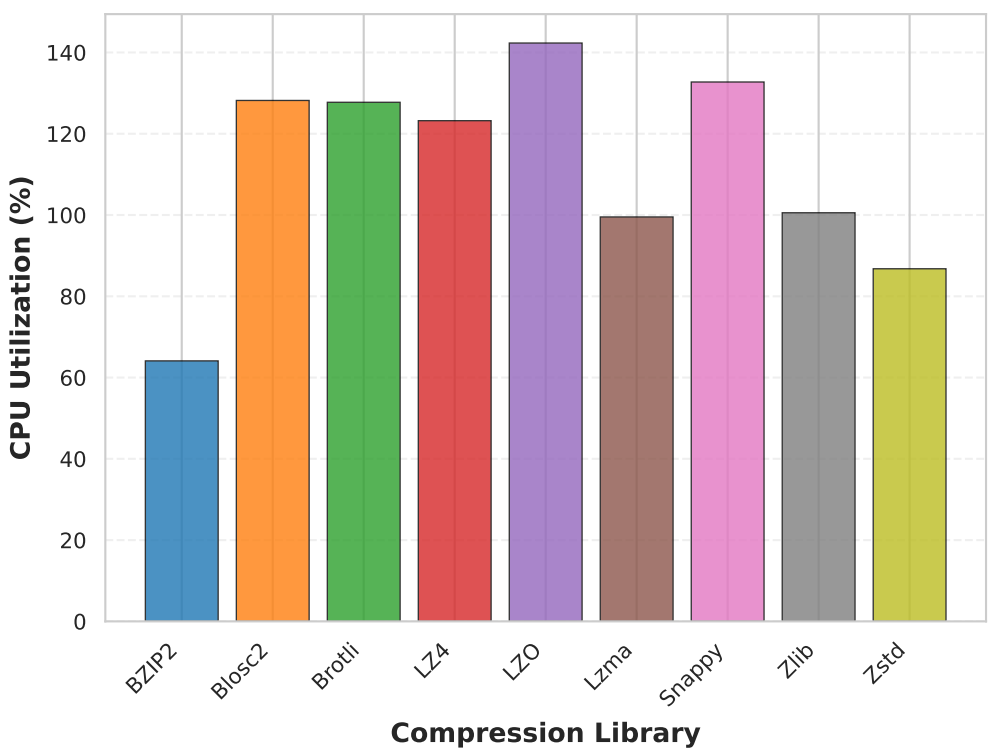
Compression Ratio



Compression CPU Usage



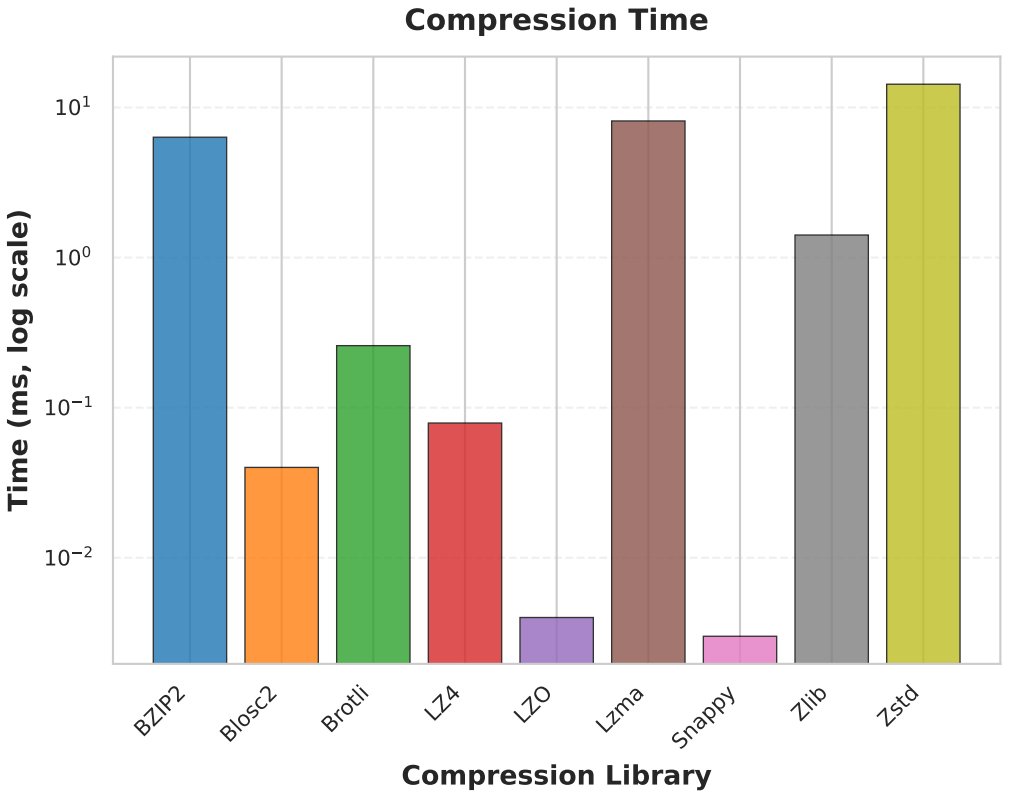
Decompression CPU Usage

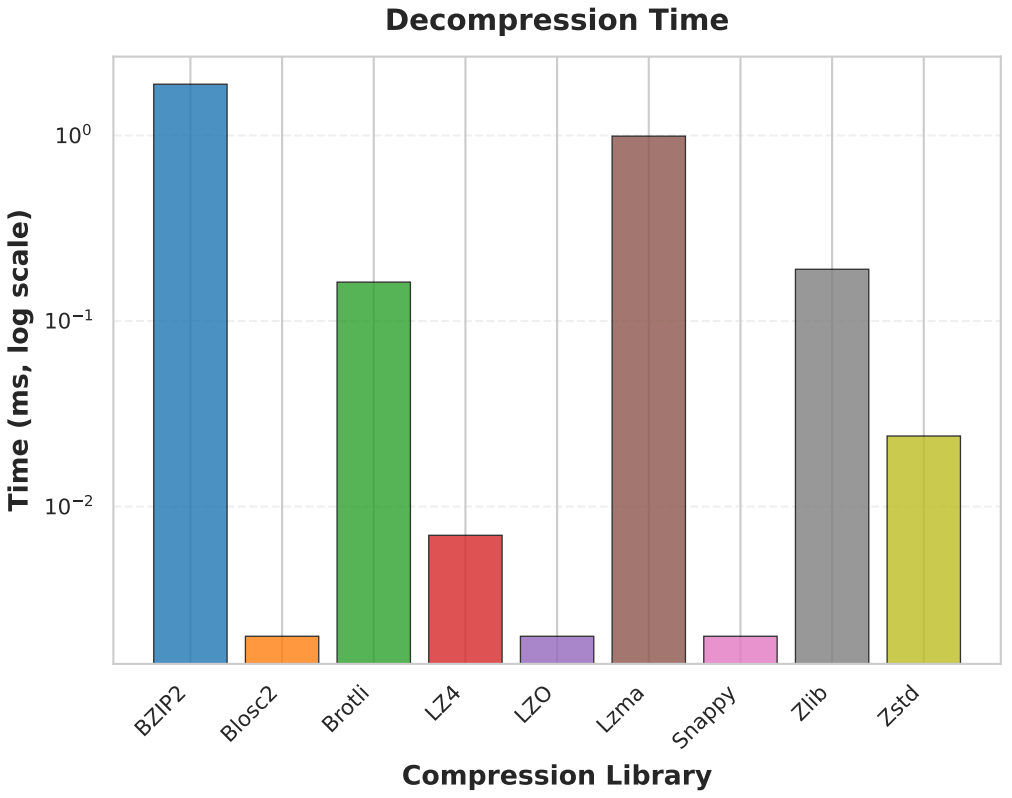


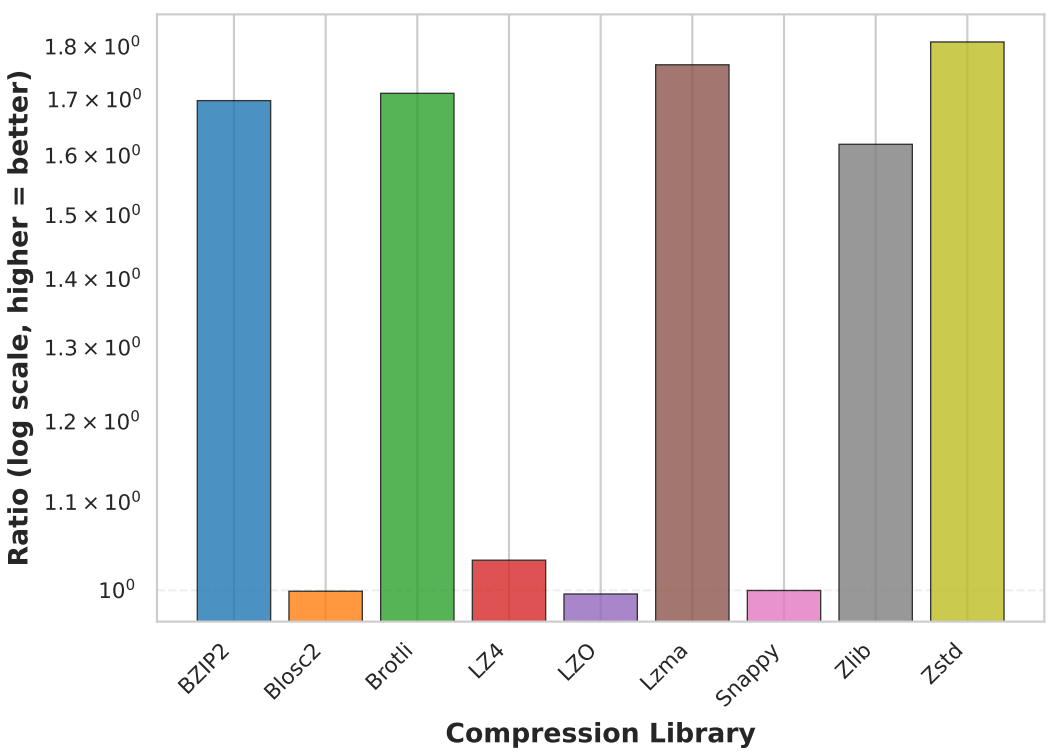
Performance Summary (64KB chunks)
Sorted by Compression Ratio

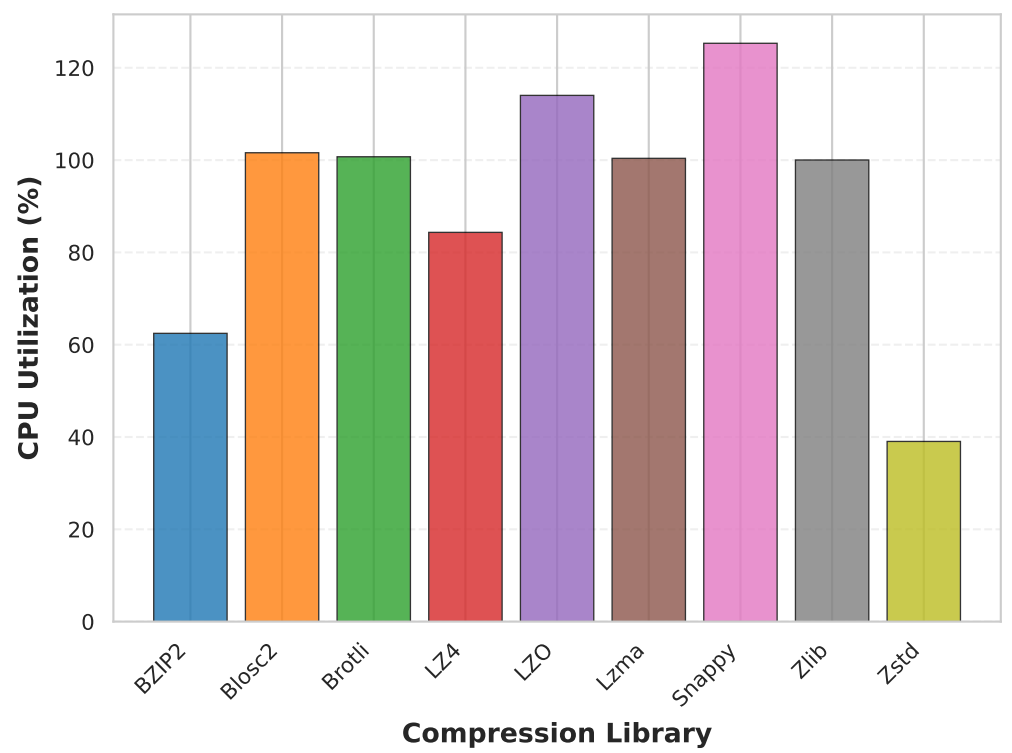
Library	Ratio	Time (ms)	CPU%
Zstd	1.08x	5.1	62%
Zlib	1.08x	1.0	100%
Lzma	1.07x	11.6	99%
BZIP2	1.04x	9.3	60%
Brotli	1.00x	0.6	101%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	121%
LZO	1.00x	0.0	124%

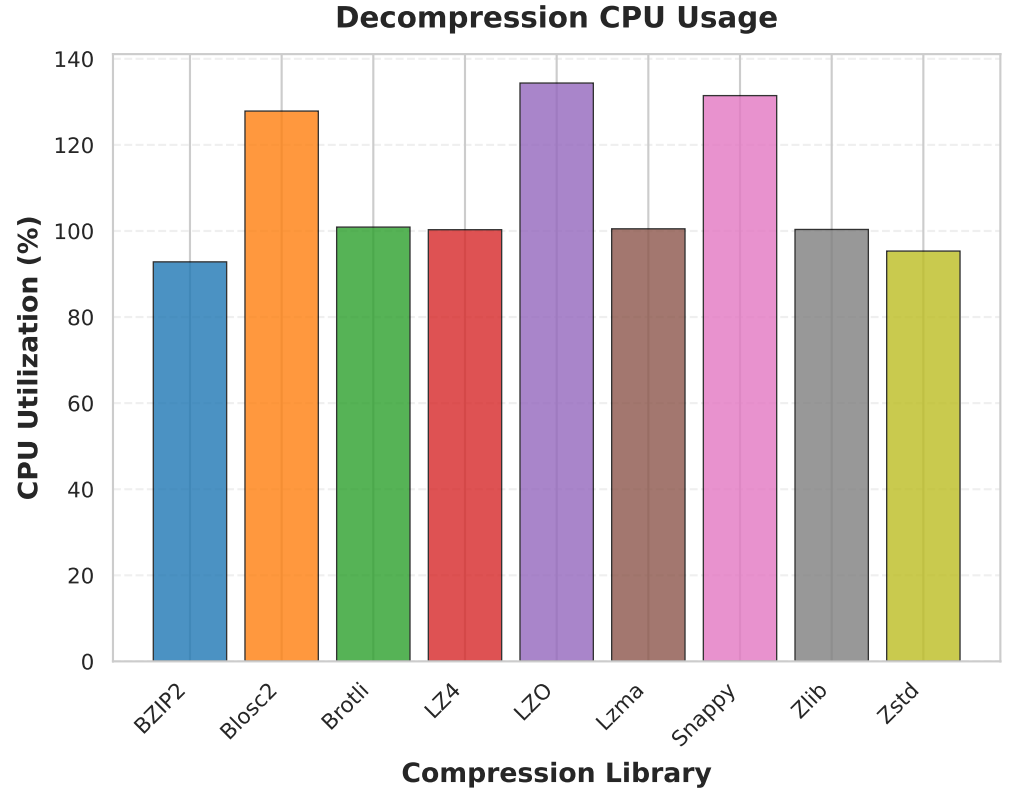
Parameter Study: normal_5
Standard deviation σ = 5 (controls clustering)
Char Data Type, 64KB Chunk Size







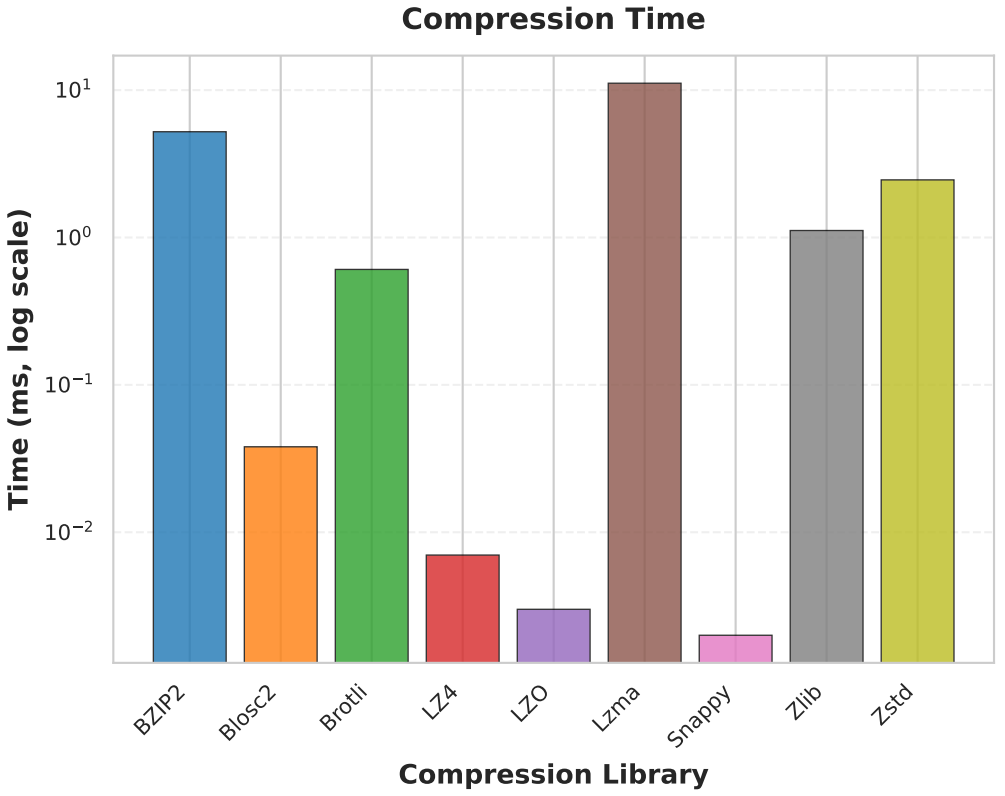


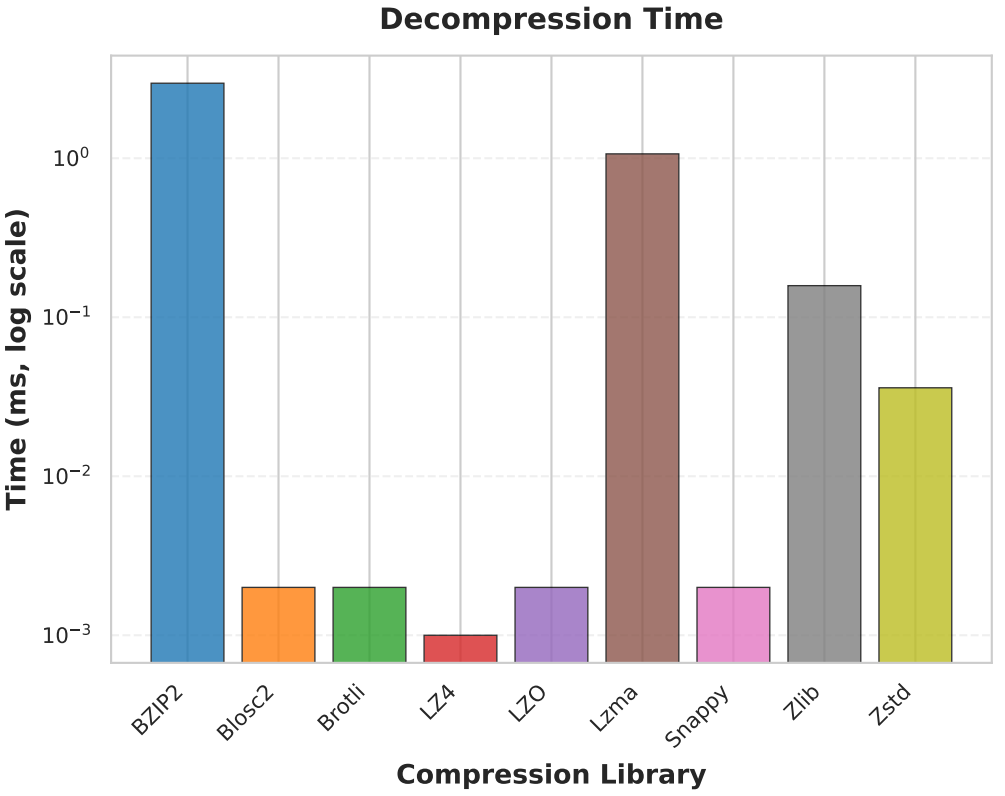


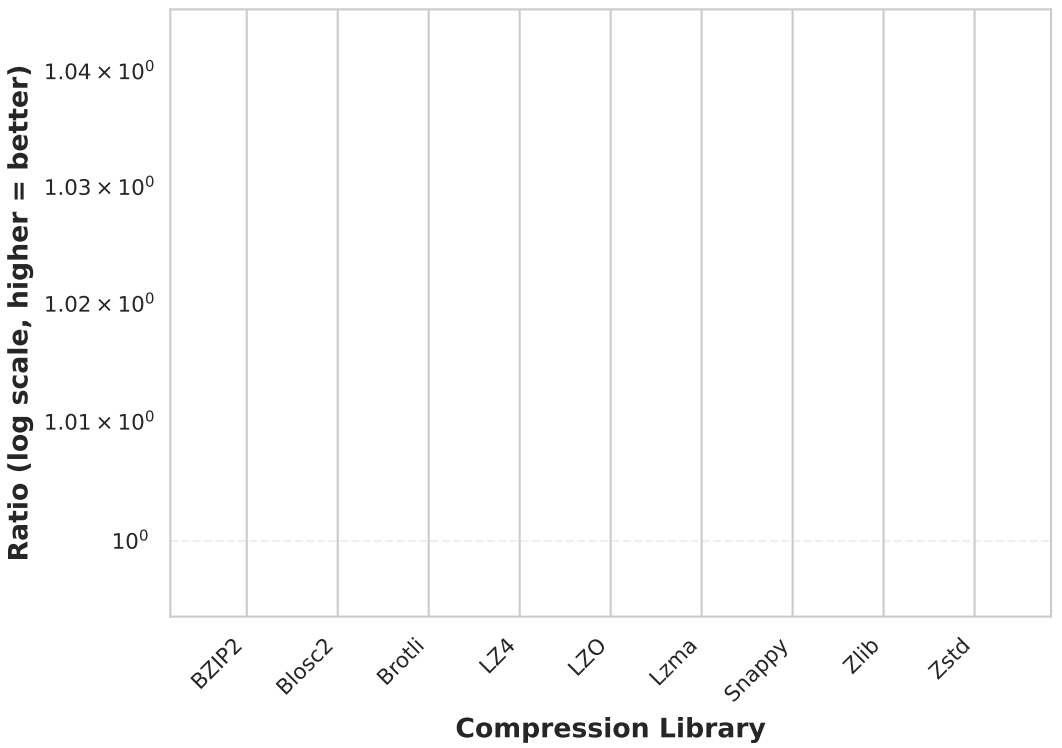
Performance Summary (64KB chunks)
Sorted by Compression Ratio

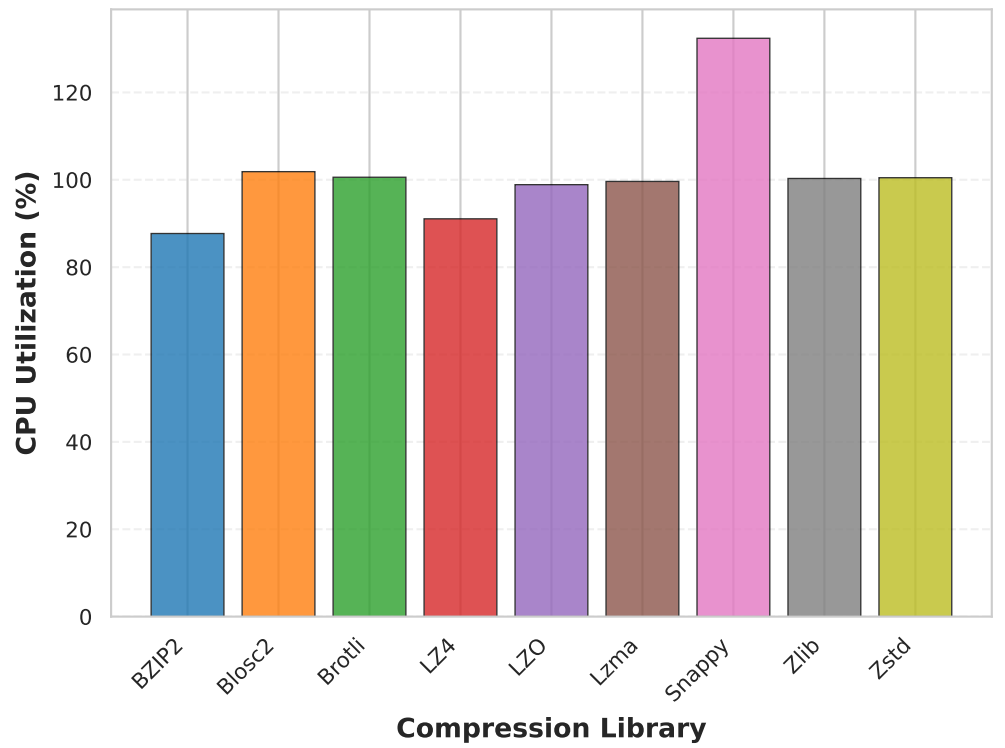
Library	Ratio	Time (ms)	CPU%
Zstd	1.81x	14.3	39%
Lzma	1.77x	8.1	100%
Brotli	1.71x	0.3	101%
BZIP2	1.70x	6.3	62%
Zlib	1.62x	1.4	100%
LZ4	1.03x	0.1	84%
Snappy	1.00x	0.0	125%
Blosc2	1.00x	0.0	102%
LZO	1.00x	0.0	114%

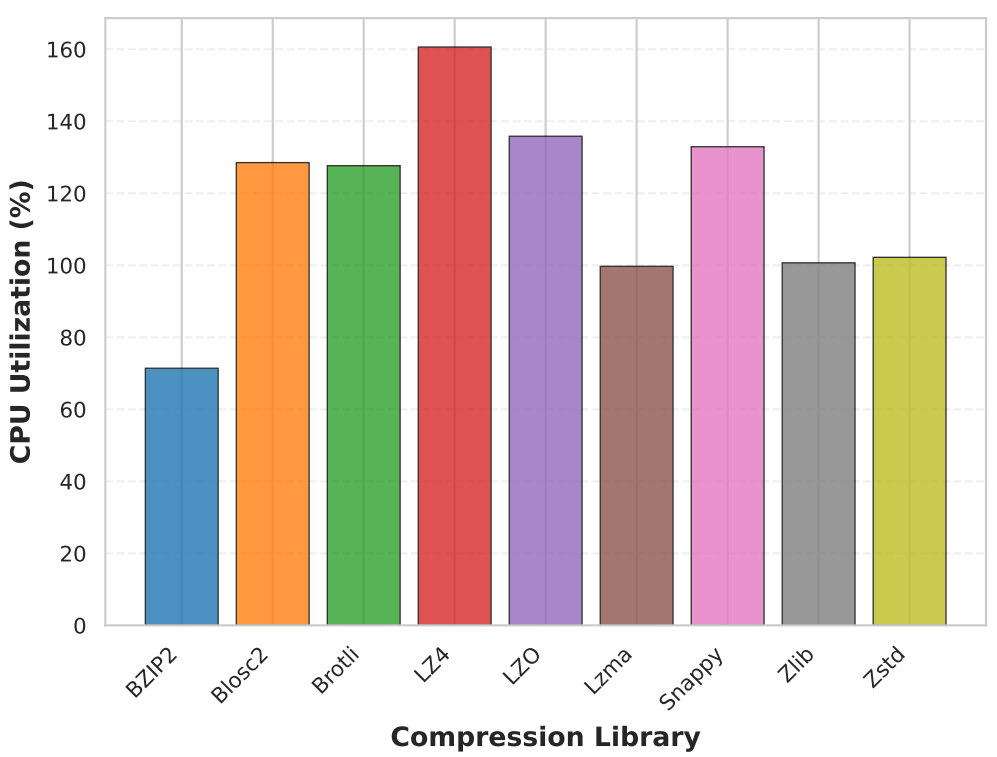
Parameter Study: normal_80
Standard deviation σ = 80 (controls clustering)
Char Data Type, 64KB Chunk Size







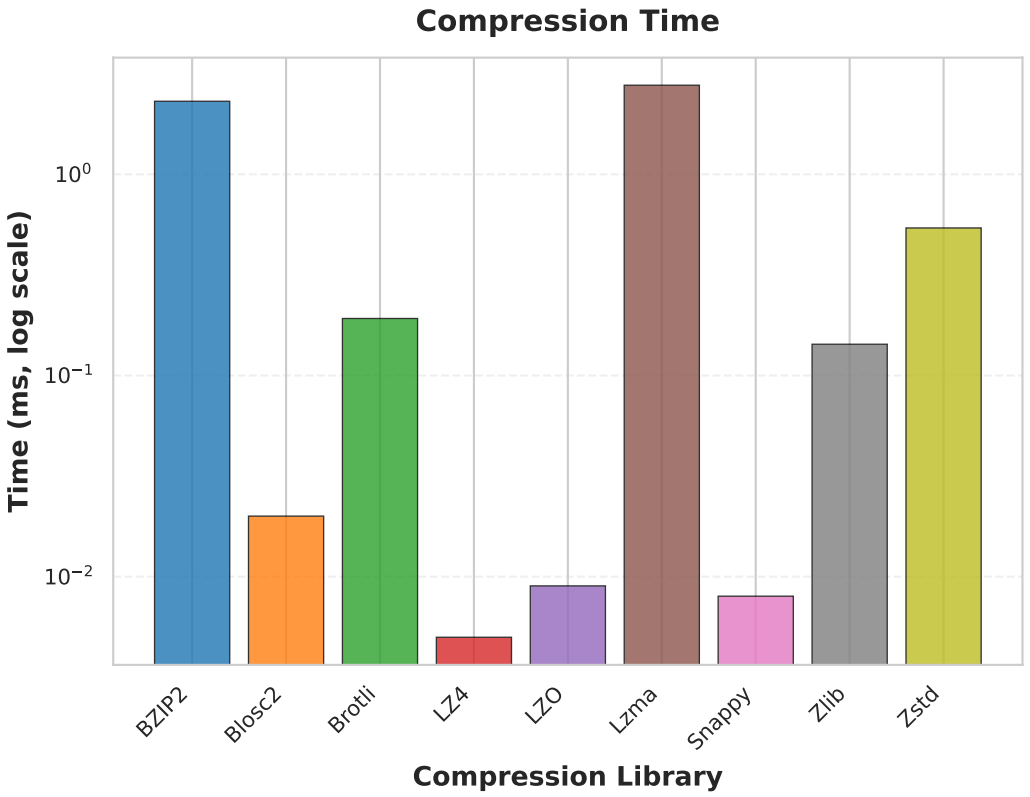


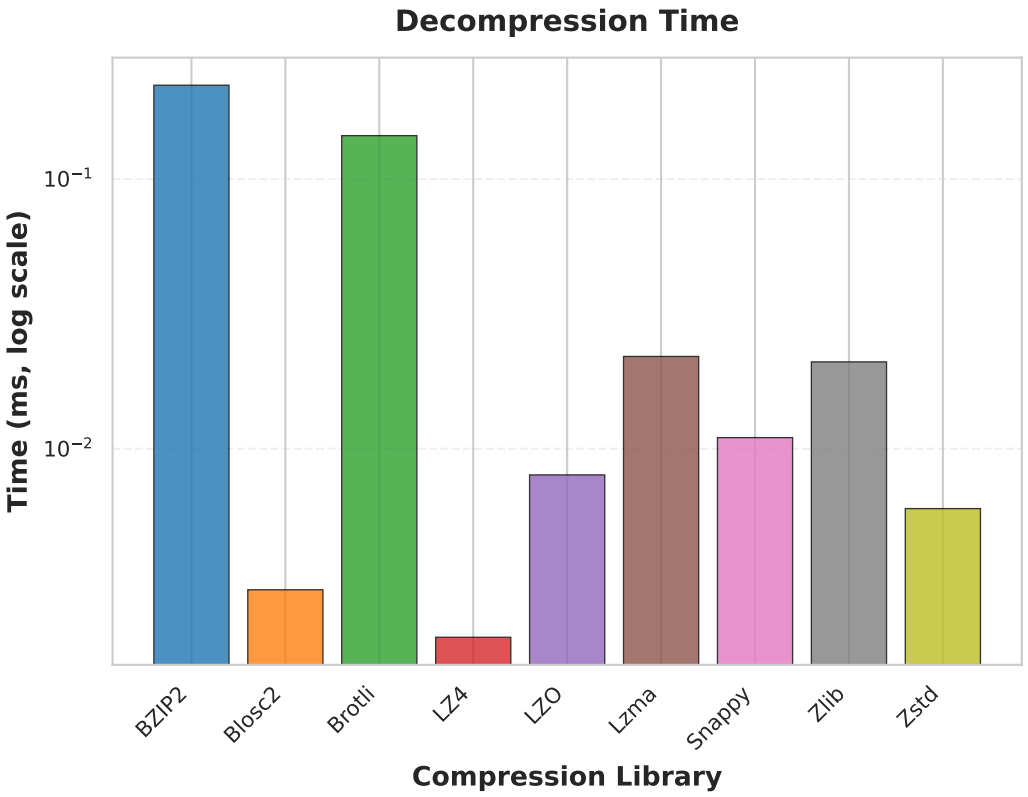


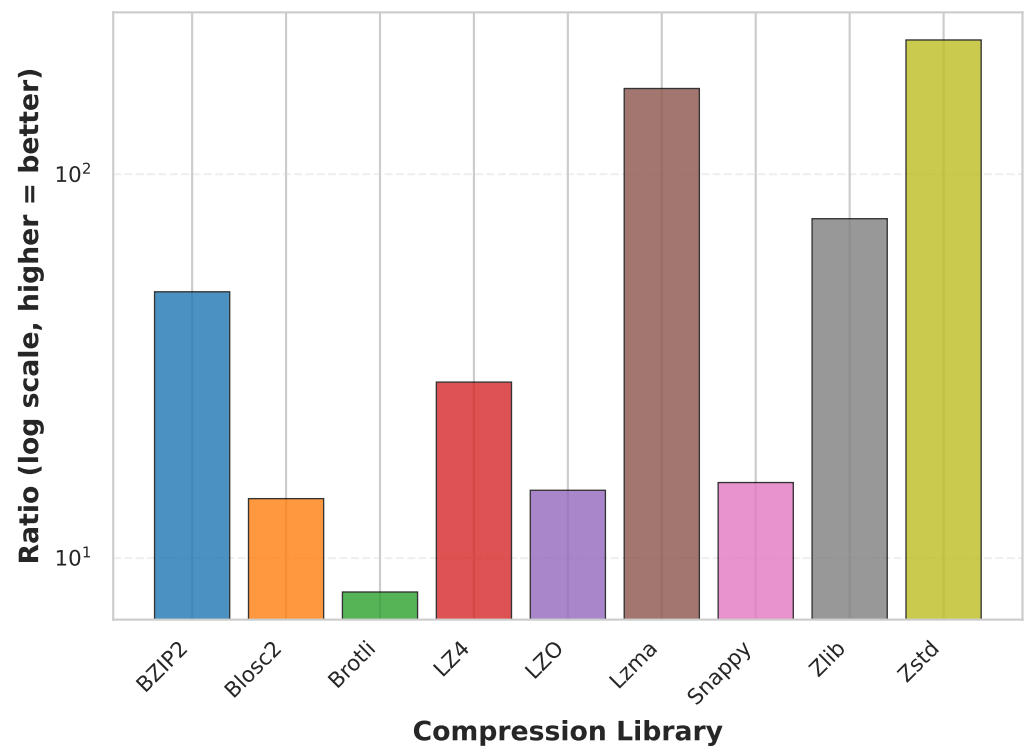
Performance Summary (64KB chunks)
Sorted by Compression Ratio

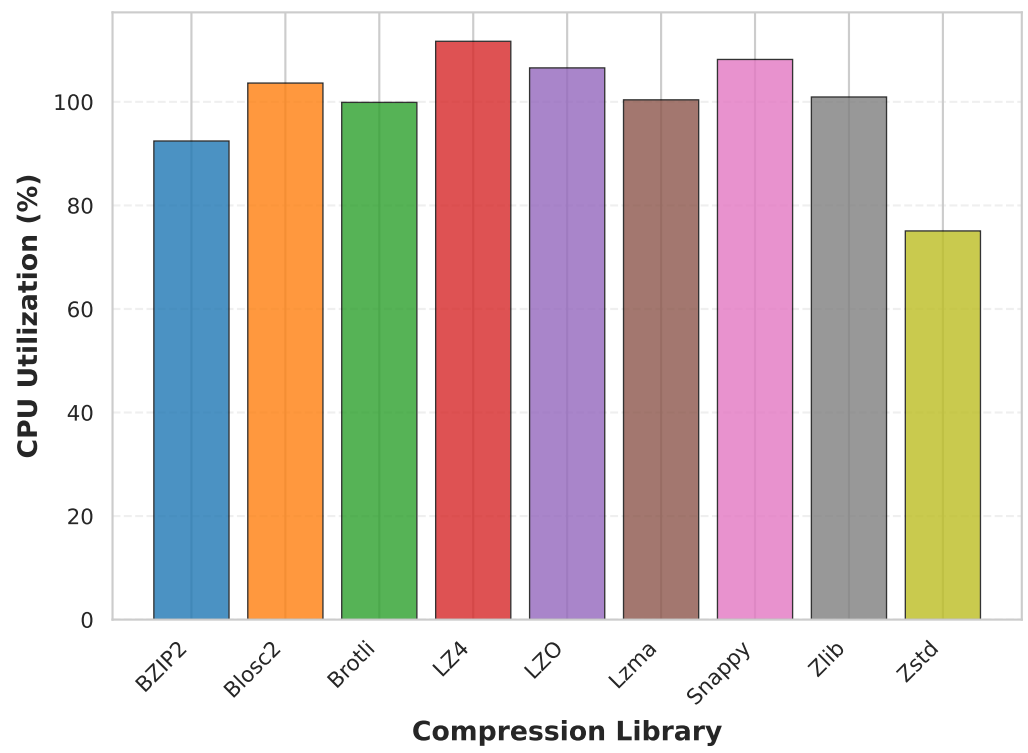
Library	Ratio	Time (ms)	CPU%
Zstd	1.04x	2.5	100%
Zlib	1.04x	1.1	100%
Lzma	1.03x	11.1	100%
Snappy	1.00x	0.0	132%
Brotli	1.00x	0.6	101%
Blosc2	1.00x	0.0	102%
BZIP2	1.00x	5.2	88%
LZ4	1.00x	0.0	91%
LZO	1.00x	0.0	99%

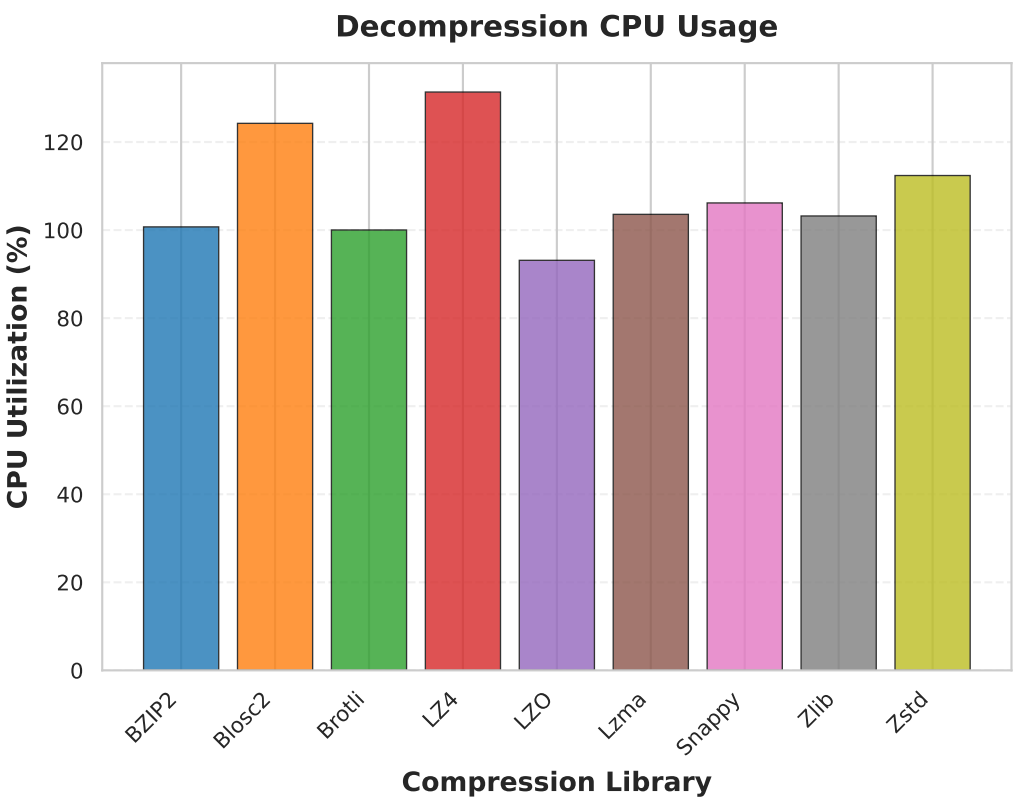
Parameter Study: repeating
Deterministic pattern (AAABBBCCC...): Extremely compressible
Char Data Type, 64KB Chunk Size







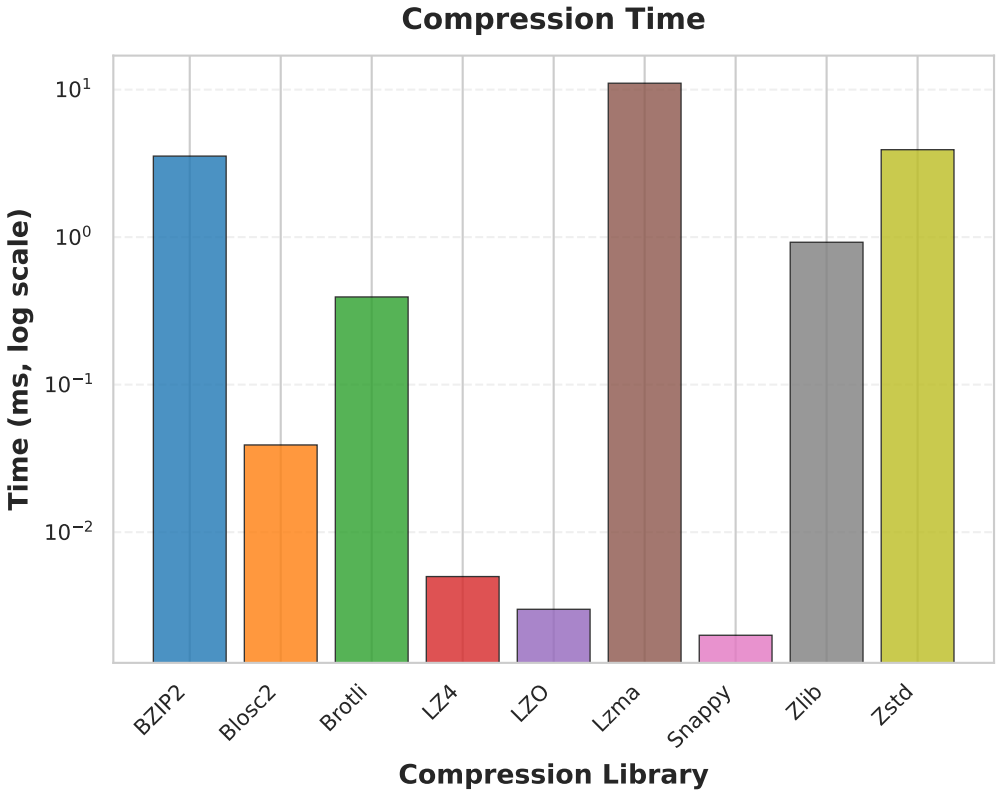


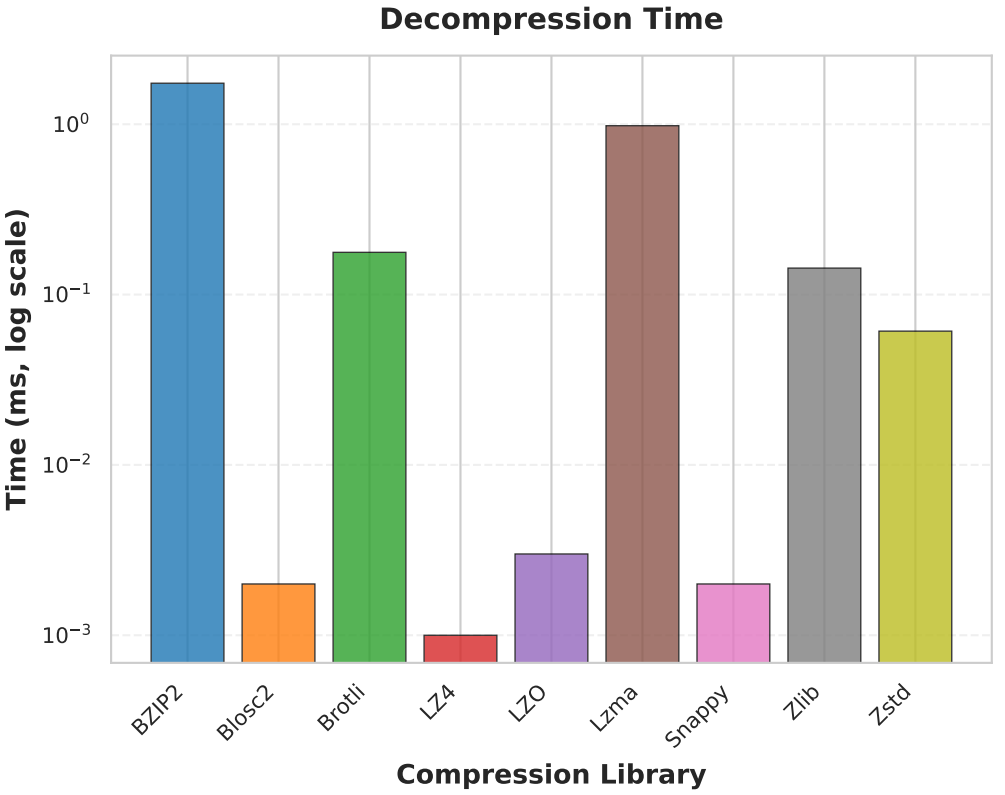


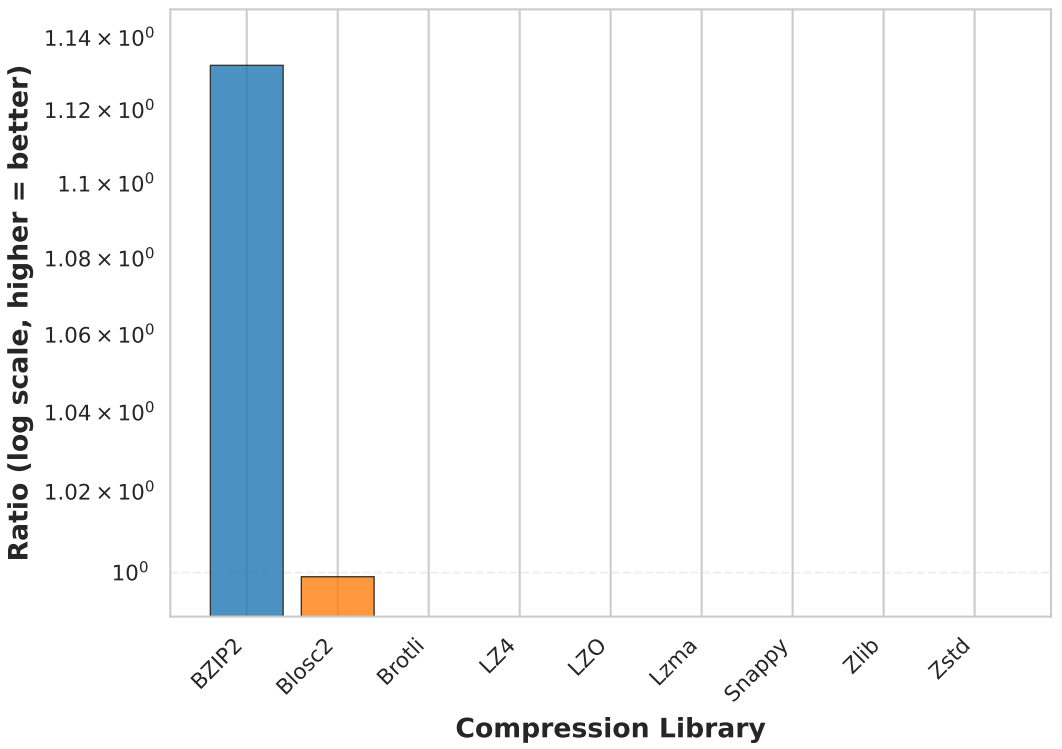
Performance Summary (64KB chunks)
Sorted by Compression Ratio

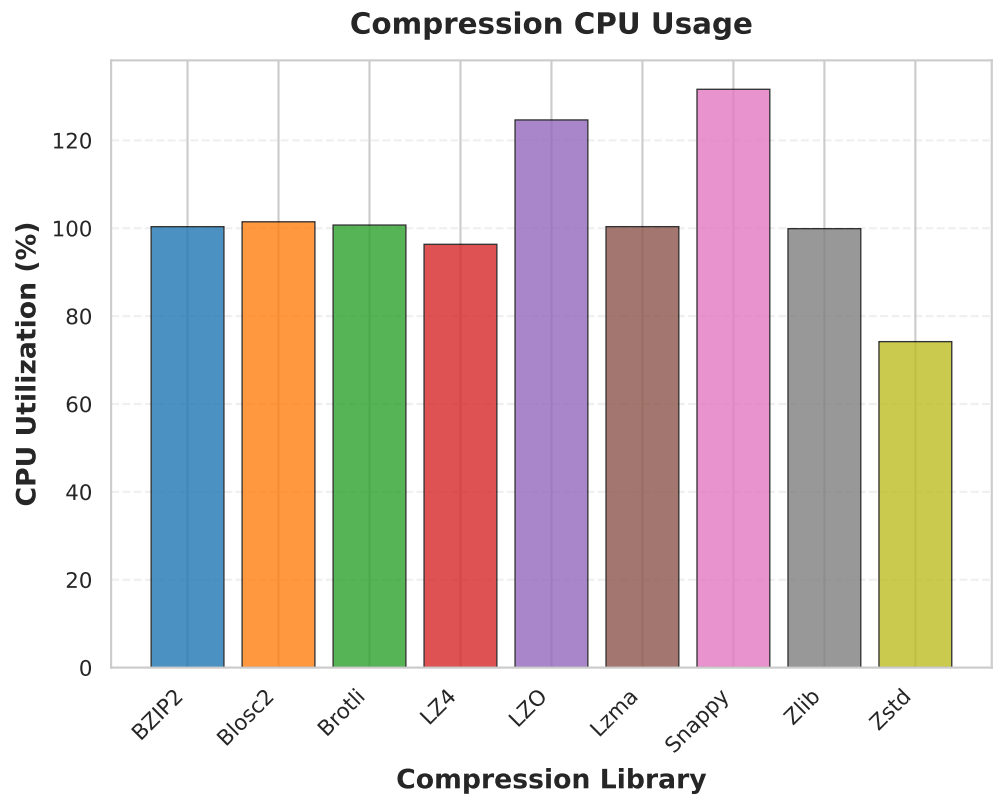
Library	Ratio	Time (ms)	CPU%
Zstd	223.67x	0.5	75%
Lzma	167.18x	2.8	100%
Zlib	76.56x	0.1	101%
BZIP2	49.39x	2.3	92%
LZ4	28.73x	0.0	112%
Snappy	15.73x	0.0	108%
LZO	15.02x	0.0	107%
Blosc2	14.28x	0.0	104%
Brotli	8.16x	0.2	100%

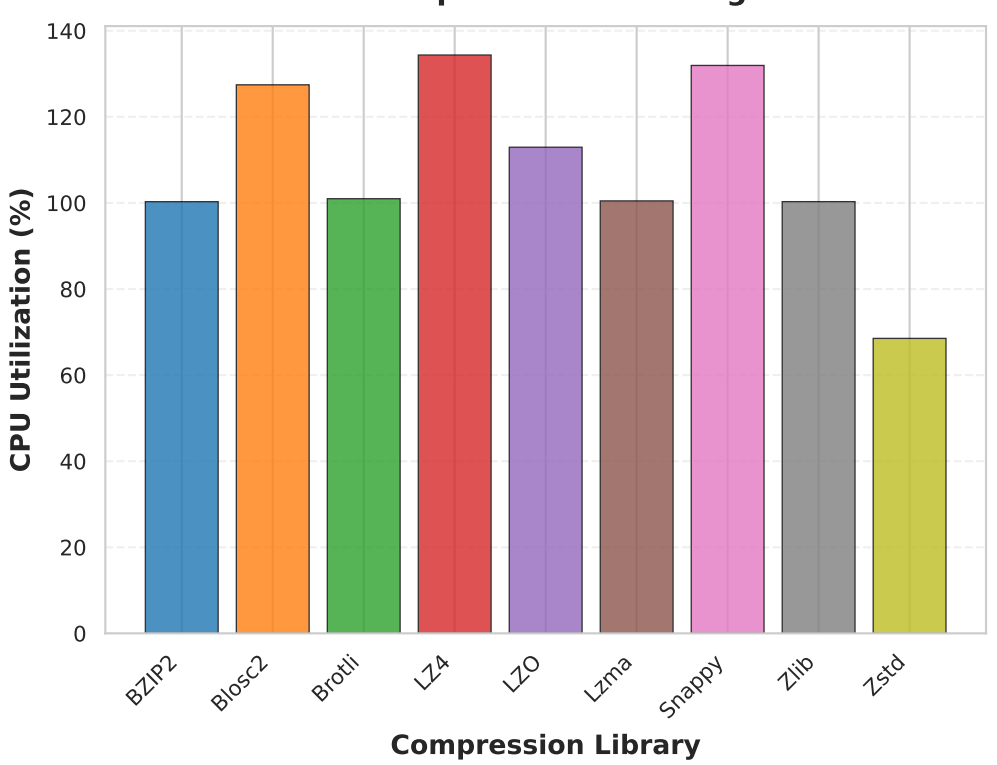
Parameter Study: uniform_127
Max value = 127 (controls entropy/bit usage)
Char Data Type, 64KB Chunk Size







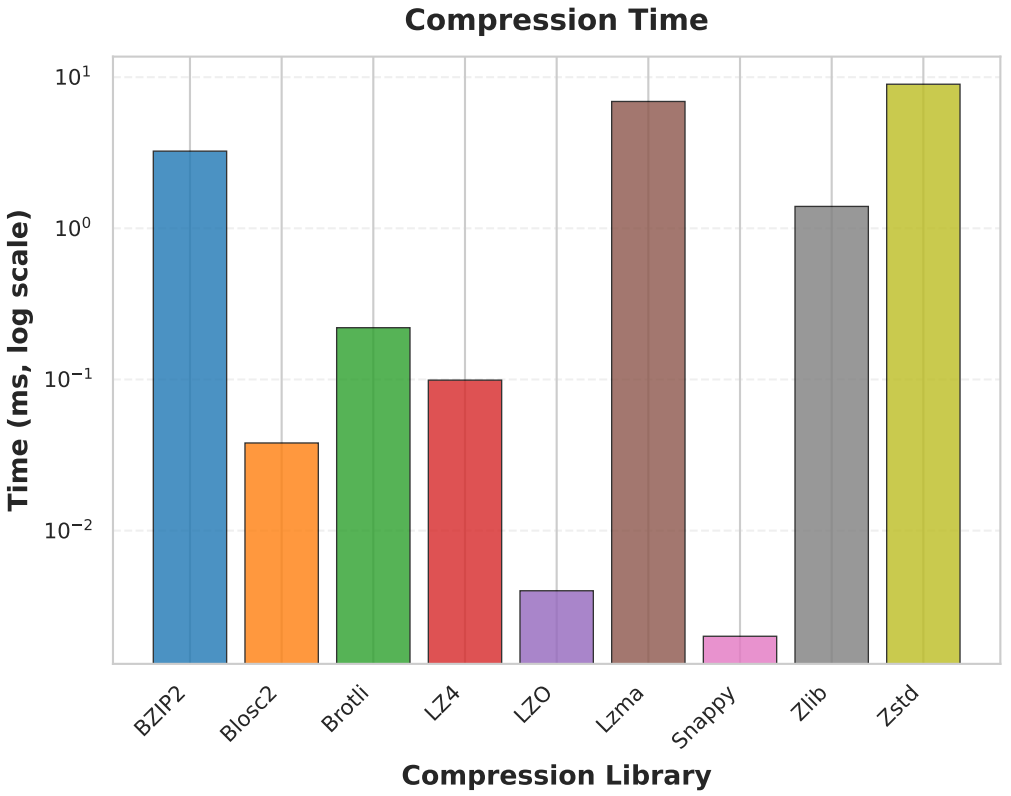


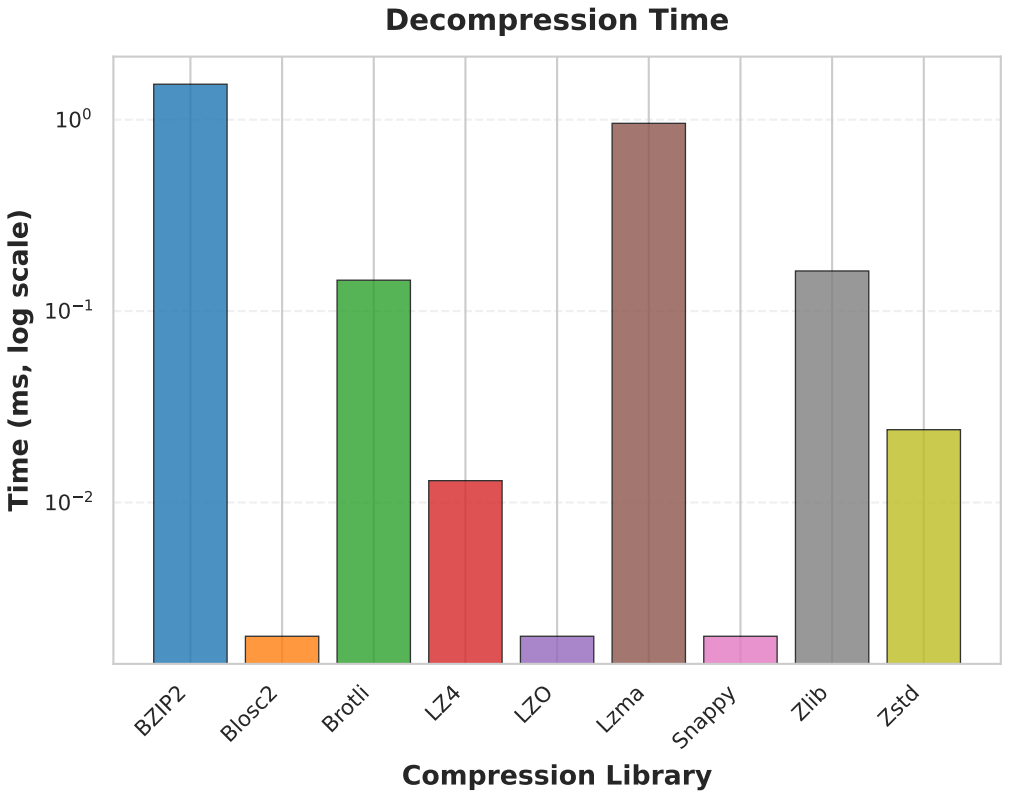


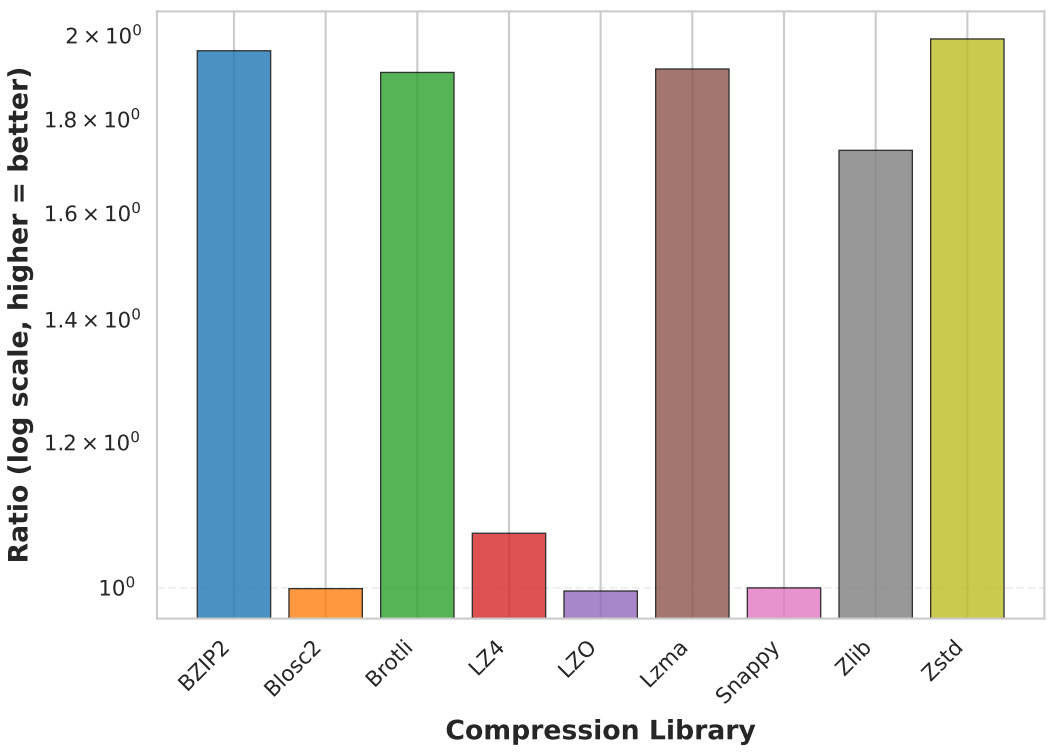
Performance Summary (64KB chunks)
Sorted by Compression Ratio

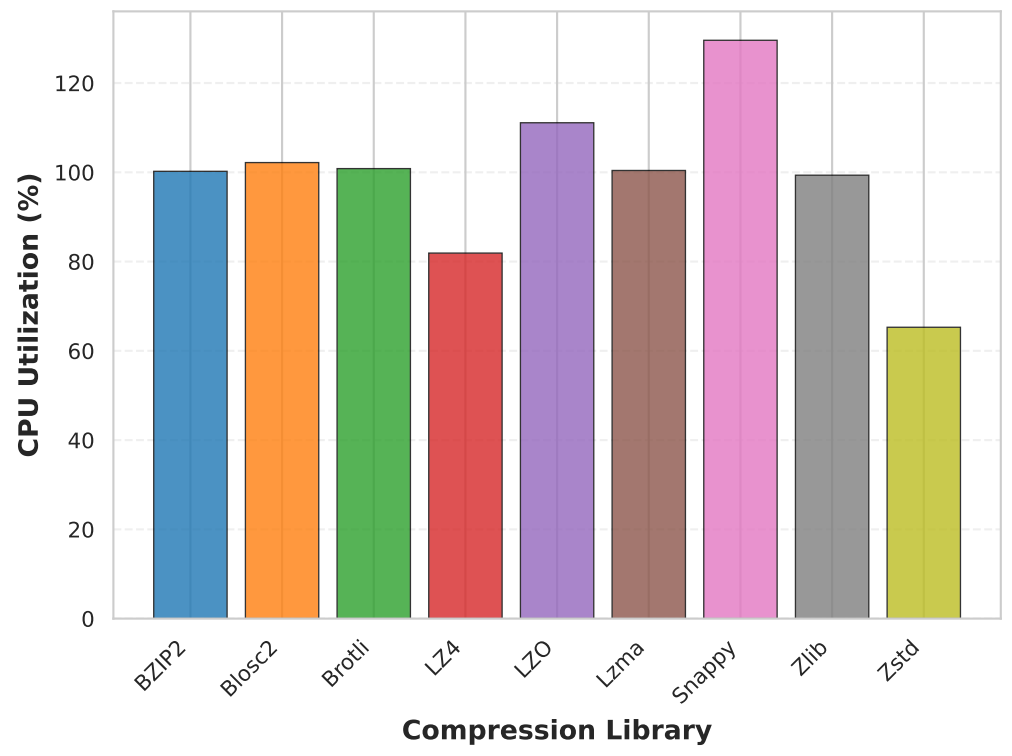
Library	Ratio	Time (ms)	CPU%
Zstd	1.14x	3.9	74%
Zlib	1.14x	0.9	100%
BZIP2	1.13x	3.5	100%
Lzma	1.12x	11.1	100%
Brotli	1.07x	0.4	101%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	101%
LZ4	1.00x	0.0	96%
LZO	1.00x	0.0	125%

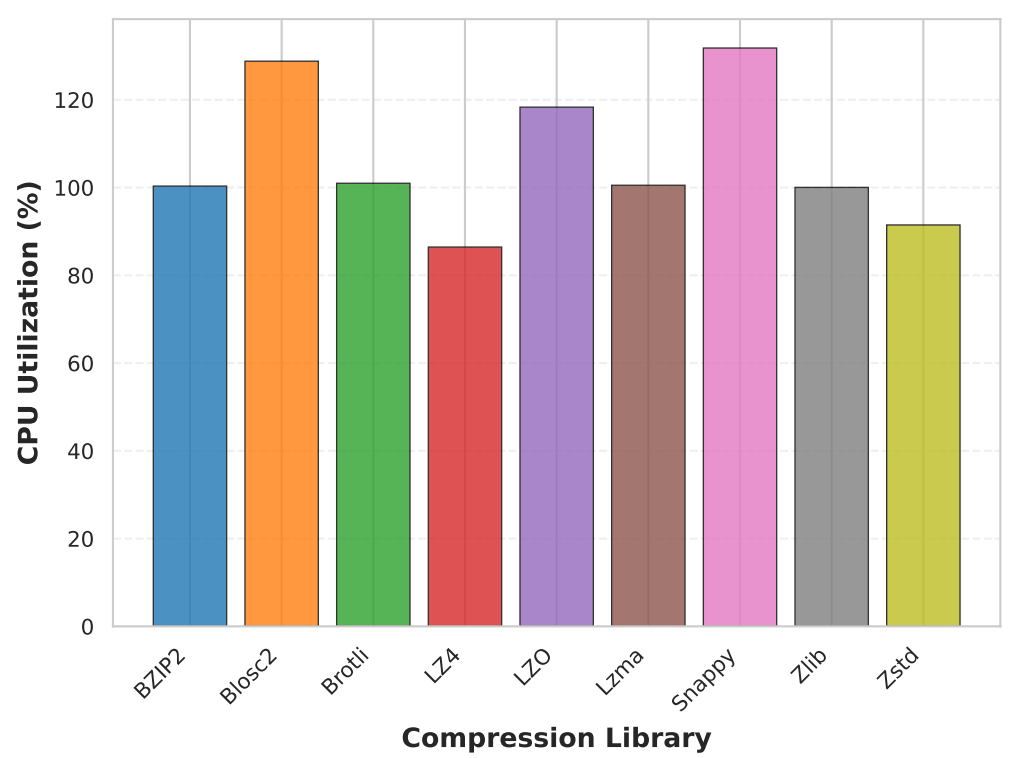
Parameter Study: uniform_15
Max value = 15 (controls entropy/bit usage)
Char Data Type, 64KB Chunk Size







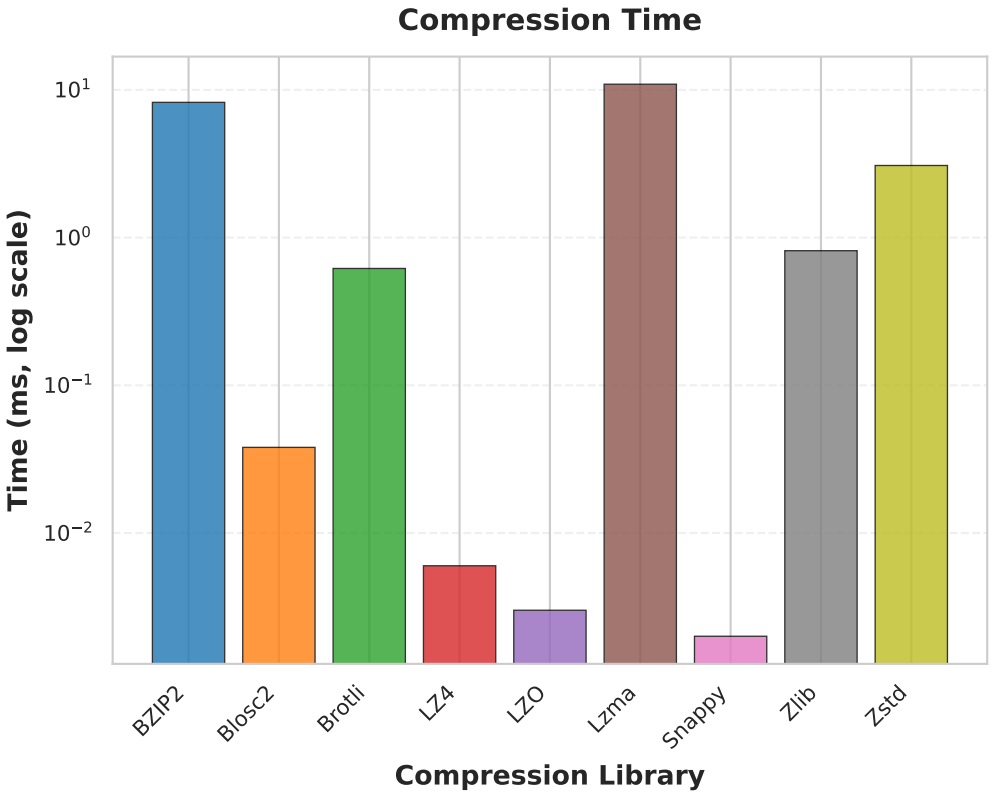


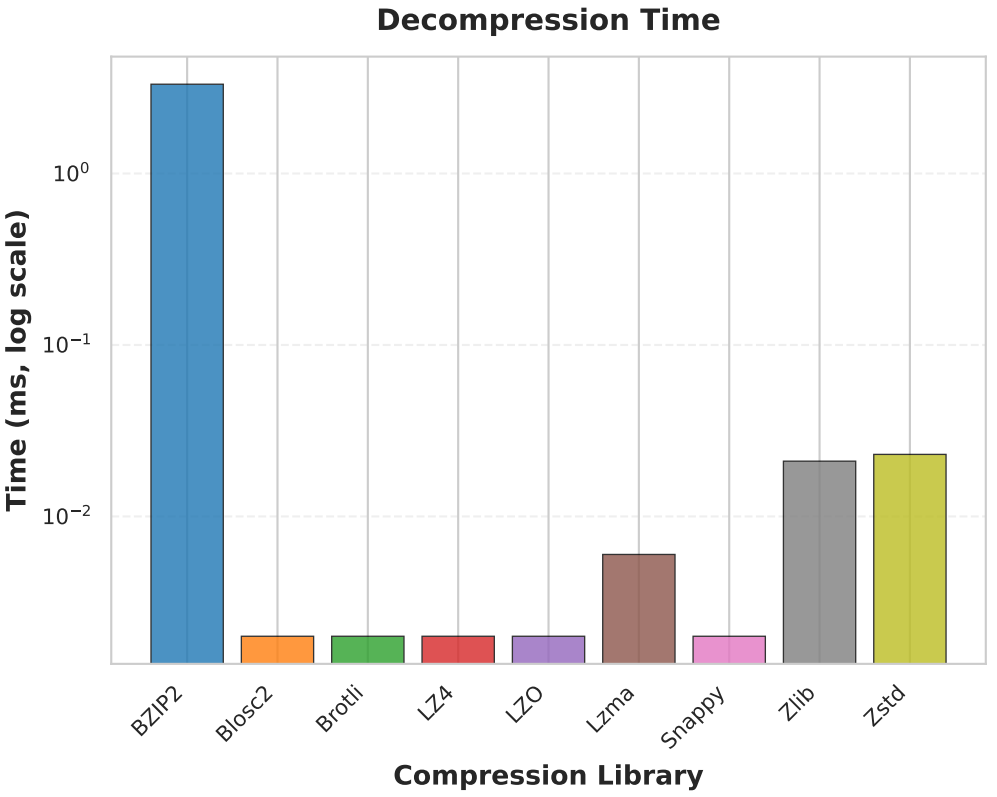


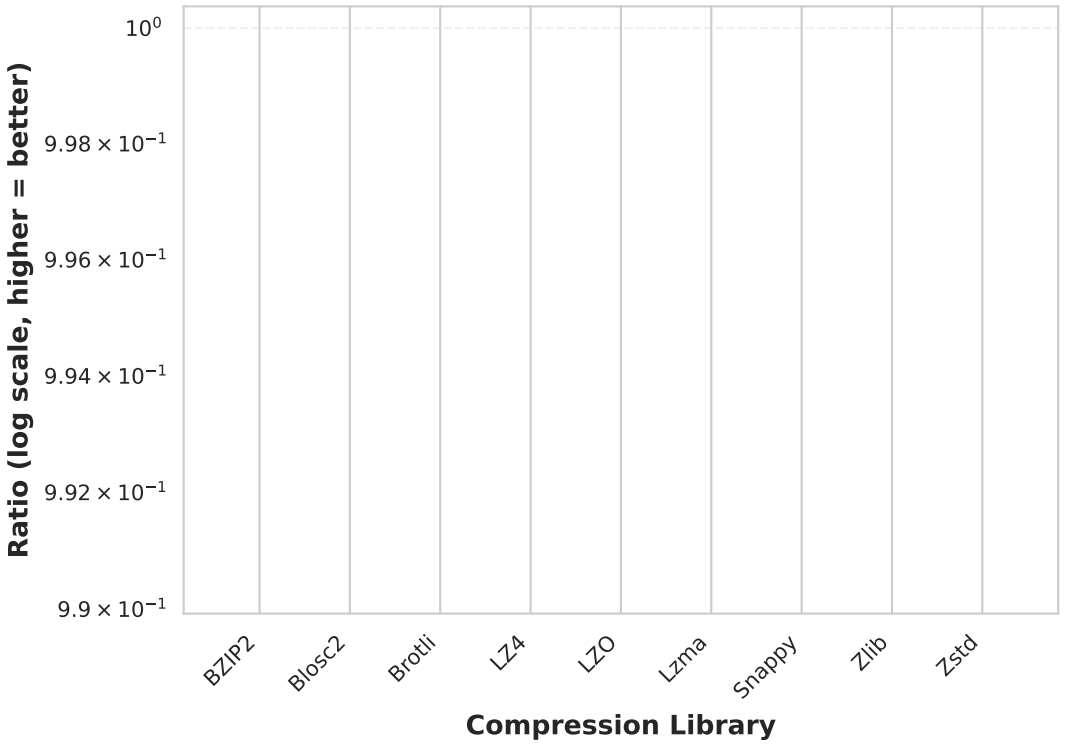
Performance Summary (64KB chunks)
Sorted by Compression Ratio

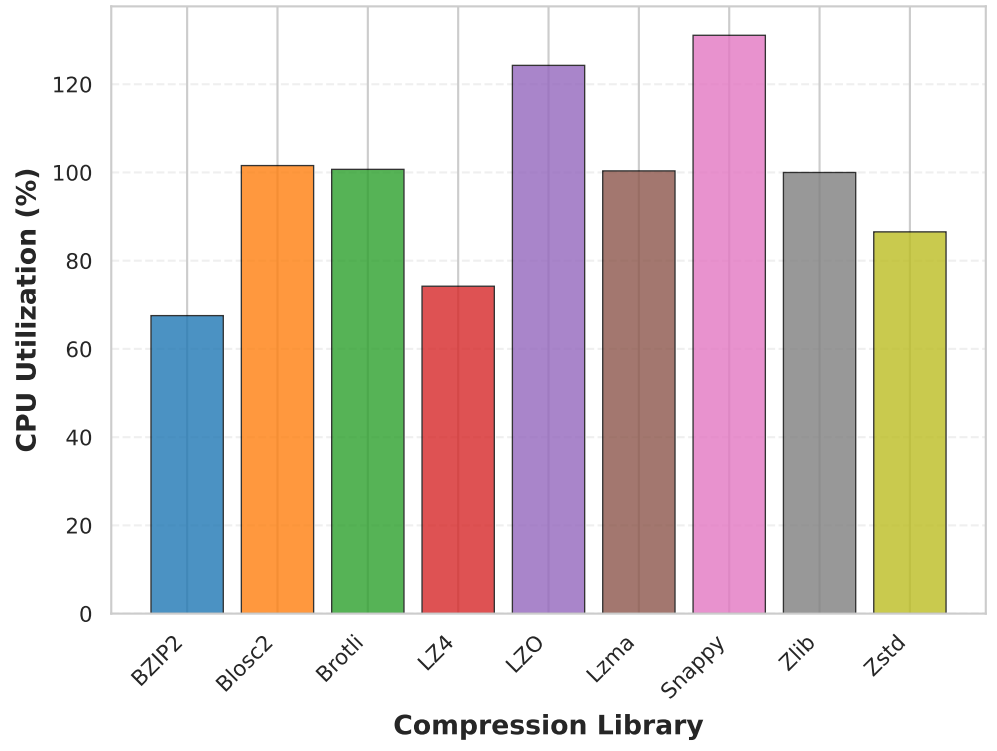
Library	Ratio	Time (ms)	CPU%
Zstd	1.99x	9.0	65%
BZIP2	1.96x	3.2	100%
Lzma	1.92x	6.9	100%
Brotli	1.91x	0.2	101%
Zlib	1.73x	1.4	99%
LZ4	1.07x	0.1	82%
Snappy	1.00x	0.0	130%
Blosc2	1.00x	0.0	102%
LZO	1.00x	0.0	111%

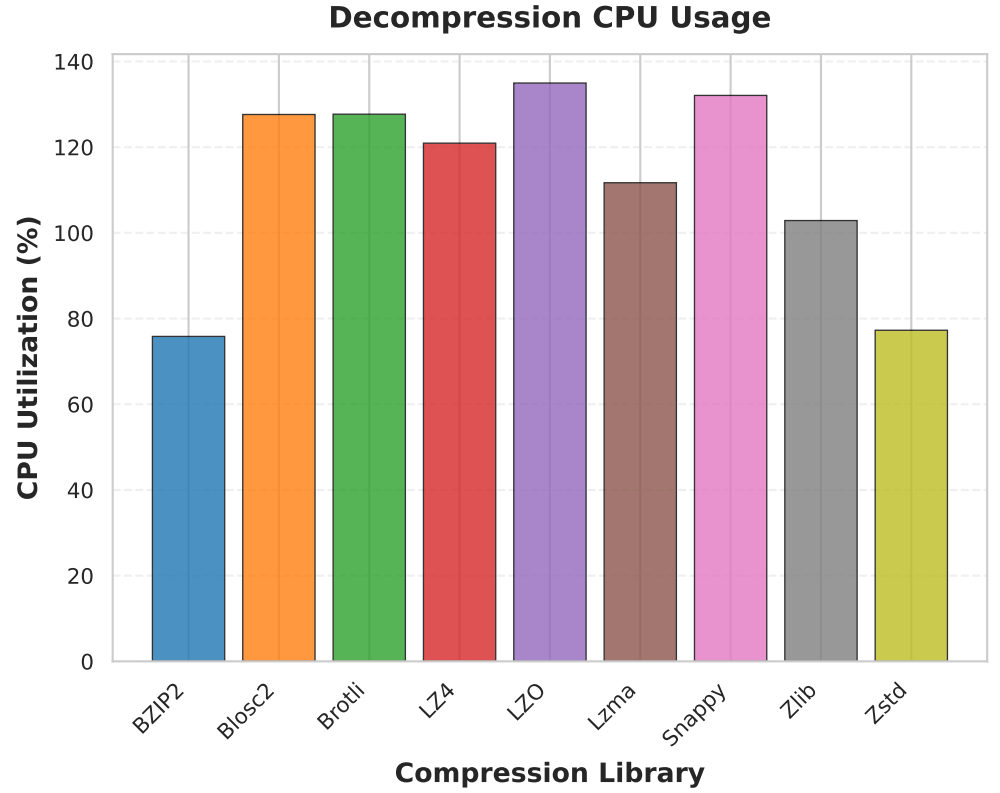
Parameter Study: uniform_255
Max value = 255 (controls entropy/bit usage)
Char Data Type, 64KB Chunk Size







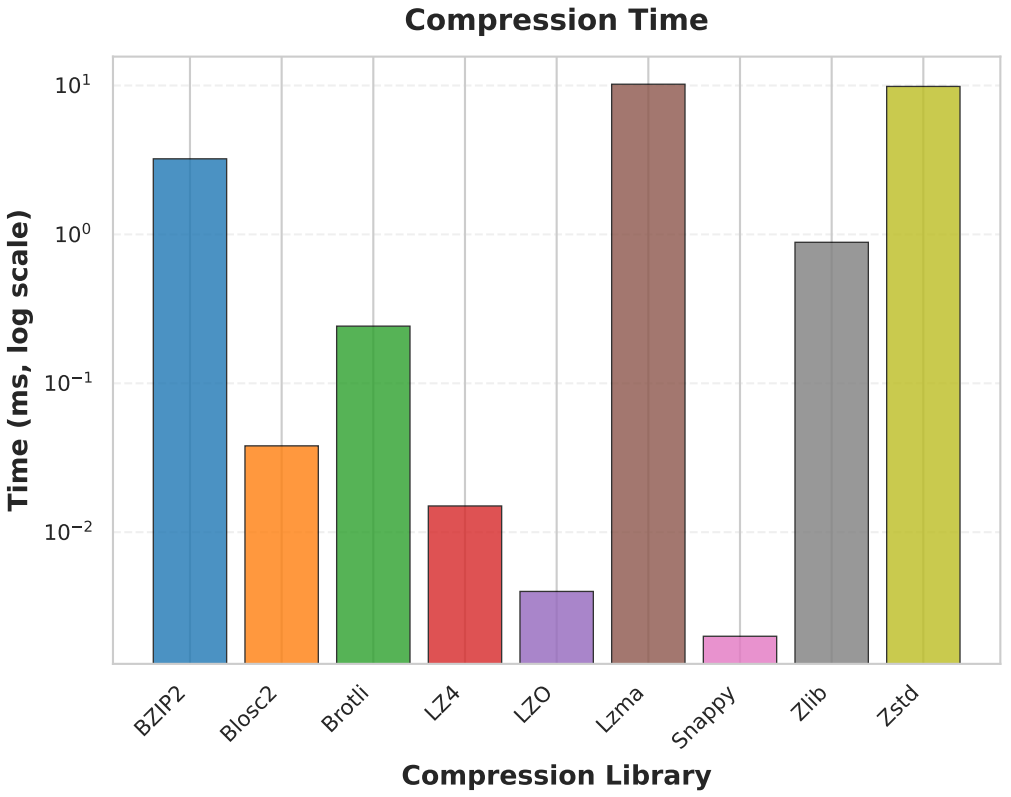


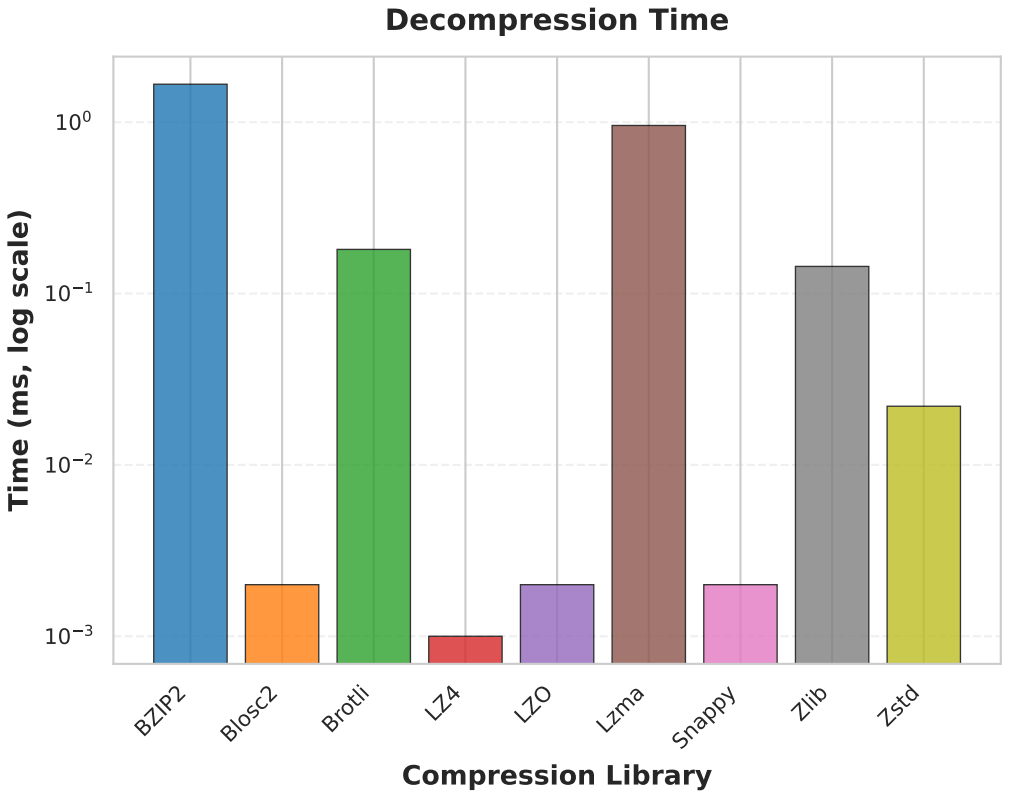


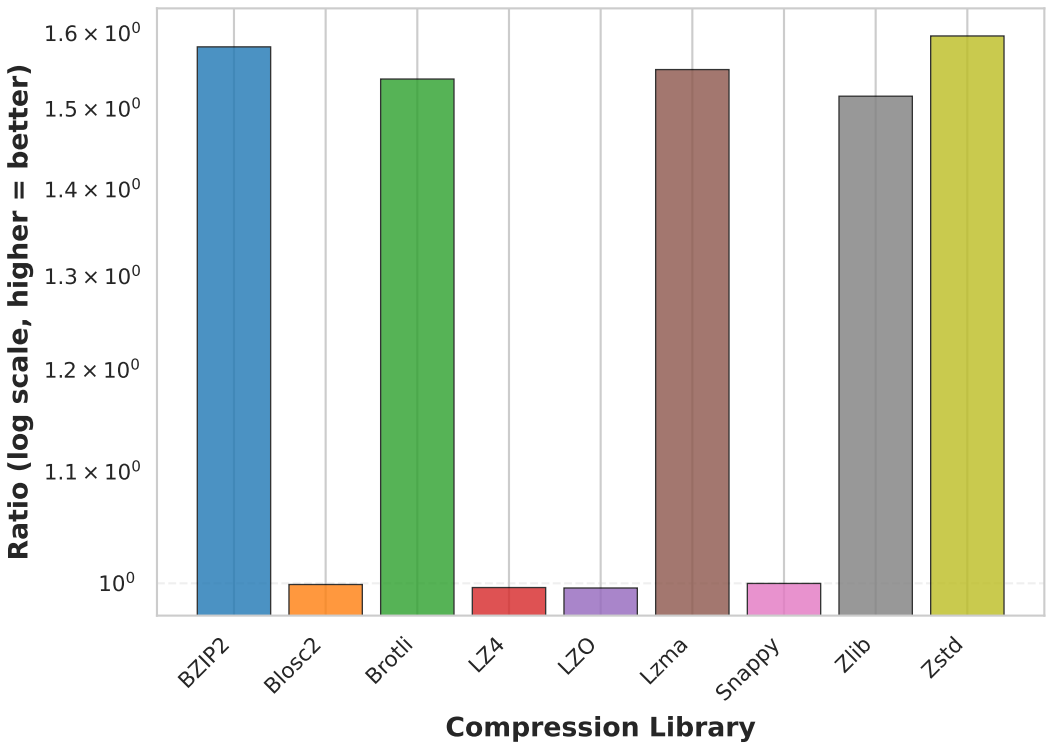
Performance Summary (64KB chunks)
Sorted by Compression Ratio

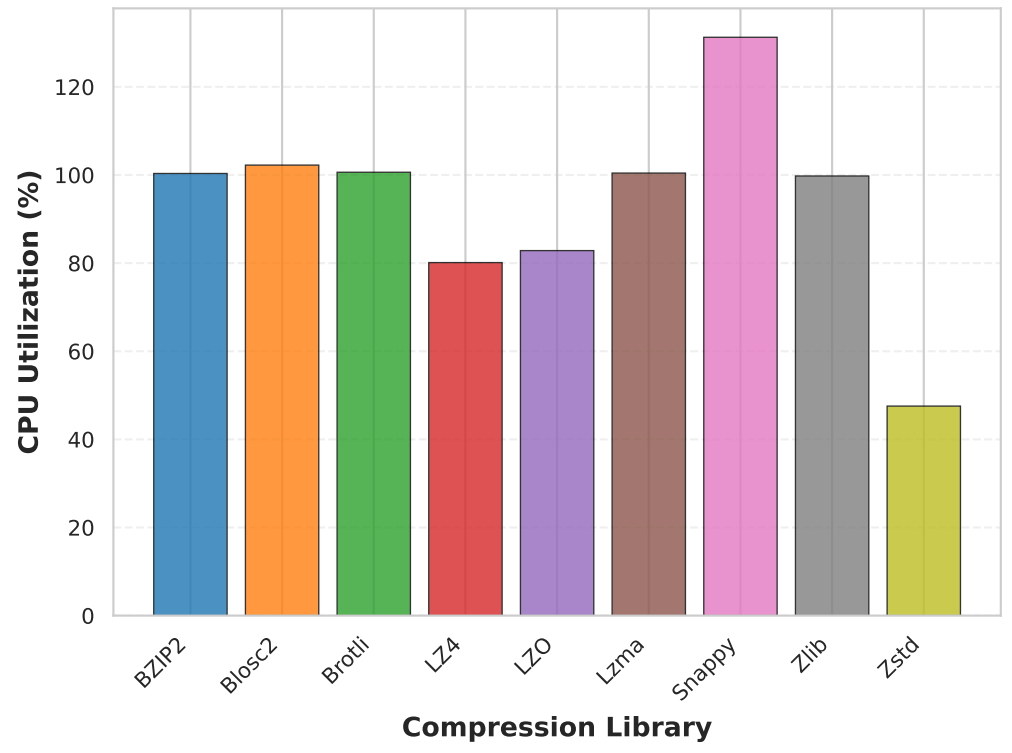
Library	Ratio	Time (ms)	CPU%
Snappy	1.00x	0.0	131%
Brotli	1.00x	0.6	101%
Zstd	1.00x	3.1	87%
Zlib	1.00x	0.8	100%
Lzma	1.00x	10.9	100%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	74%
LZO	1.00x	0.0	124%
BZIP2	0.99x	8.2	68%

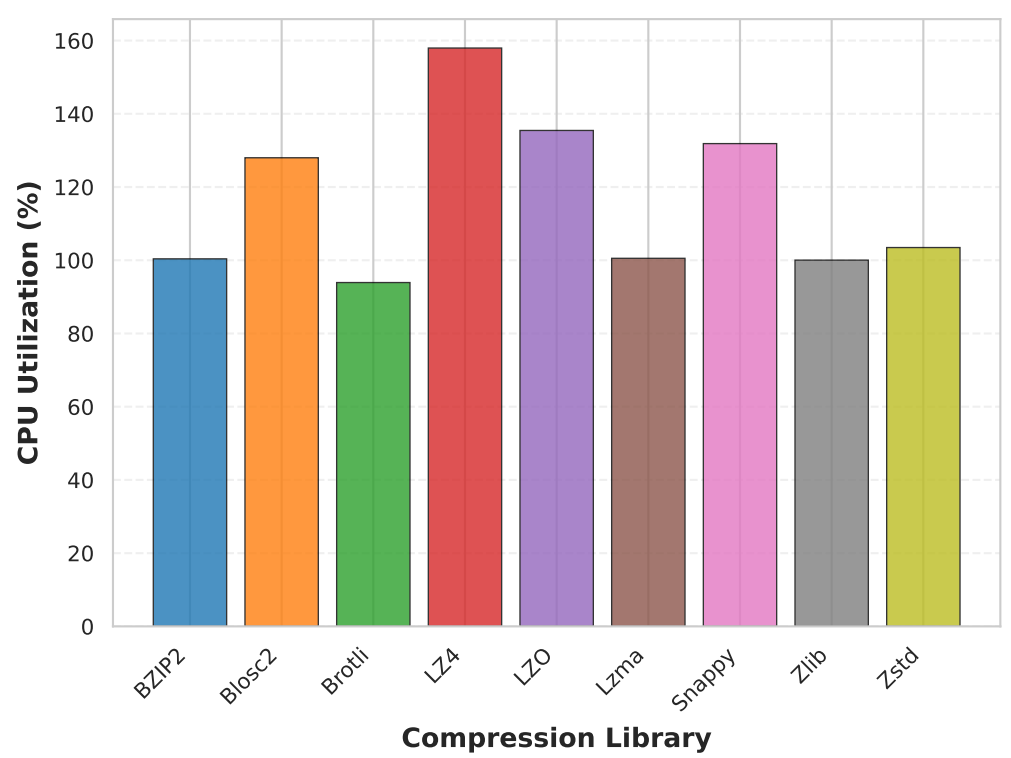
Parameter Study: uniform_31
Max value = 31 (controls entropy/bit usage)
Char Data Type, 64KB Chunk Size







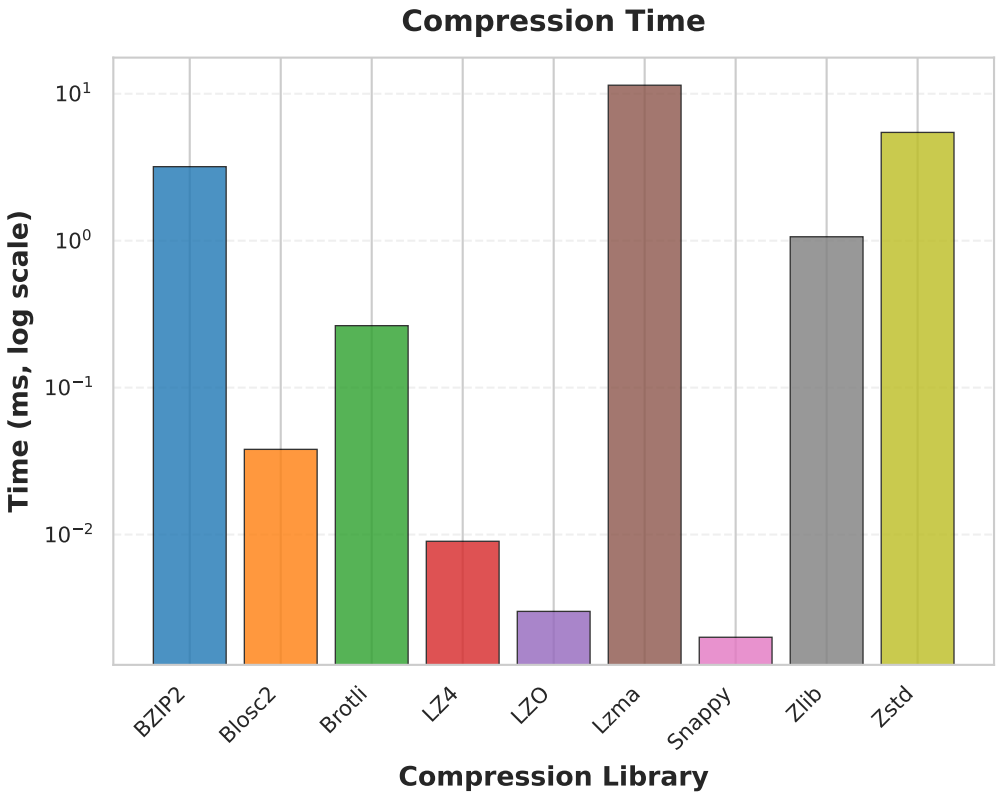


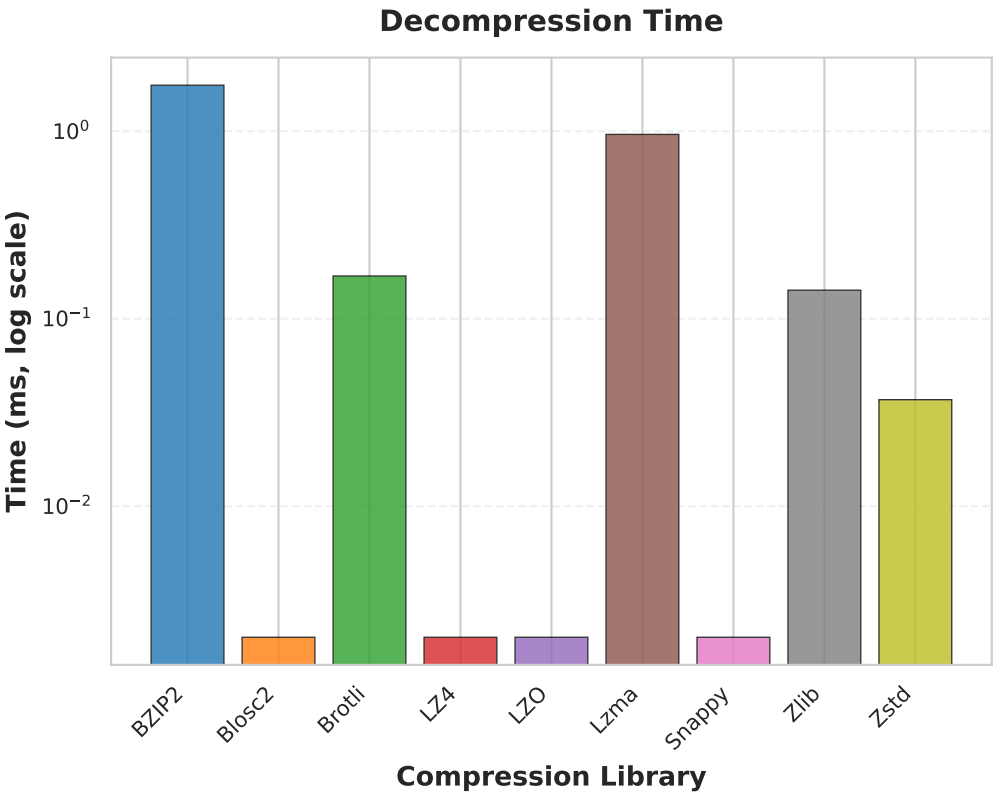


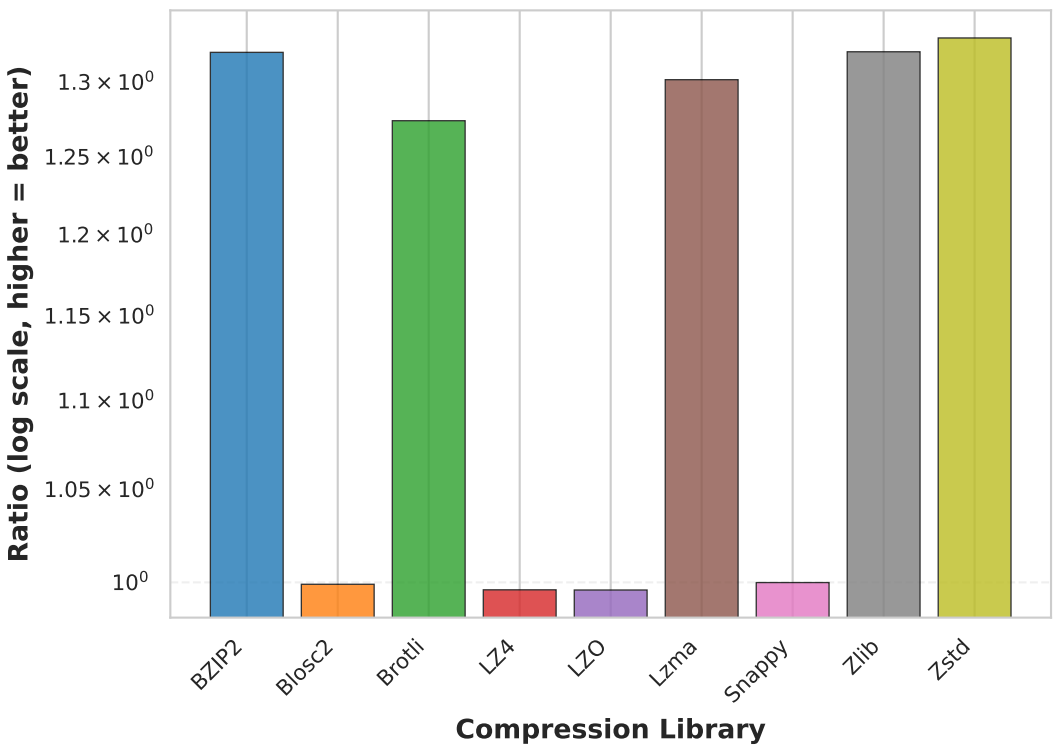
Performance Summary (64KB chunks)
Sorted by Compression Ratio

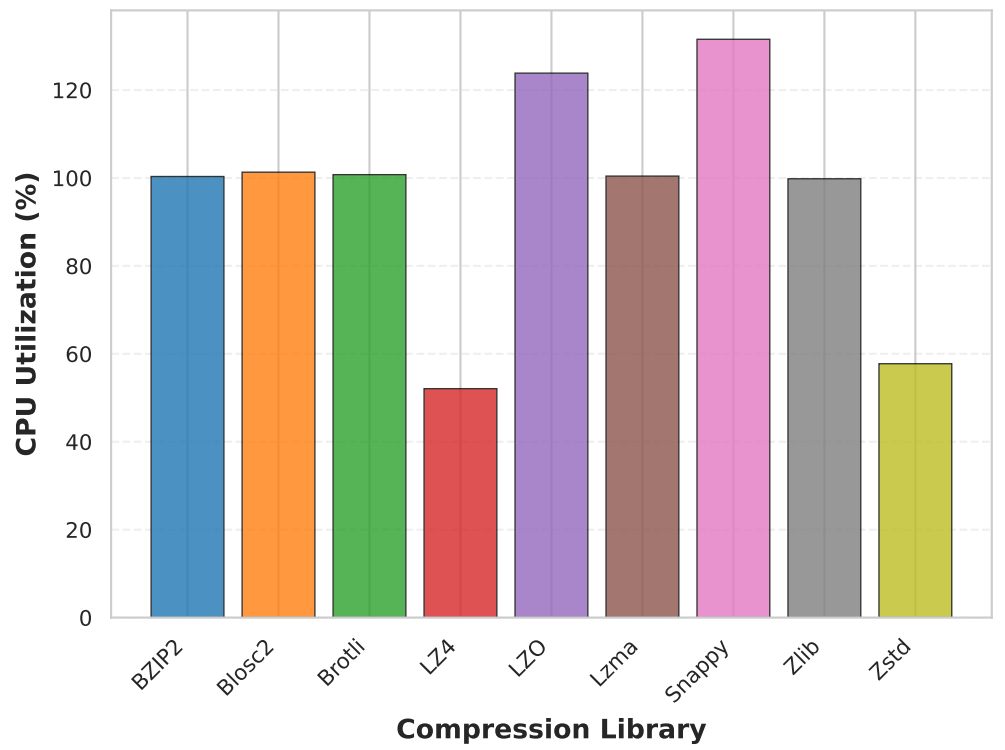
Library	Ratio	Time (ms)	CPU%
Zstd	1.60x	9.9	48%
BZIP2	1.58x	3.2	100%
Lzma	1.55x	10.2	100%
Brotli	1.54x	0.2	101%
Zlib	1.52x	0.9	100%
Snappy	1.00x	0.0	131%
Blosc2	1.00x	0.0	102%
LZ4	1.00x	0.0	80%
LZO	1.00x	0.0	83%

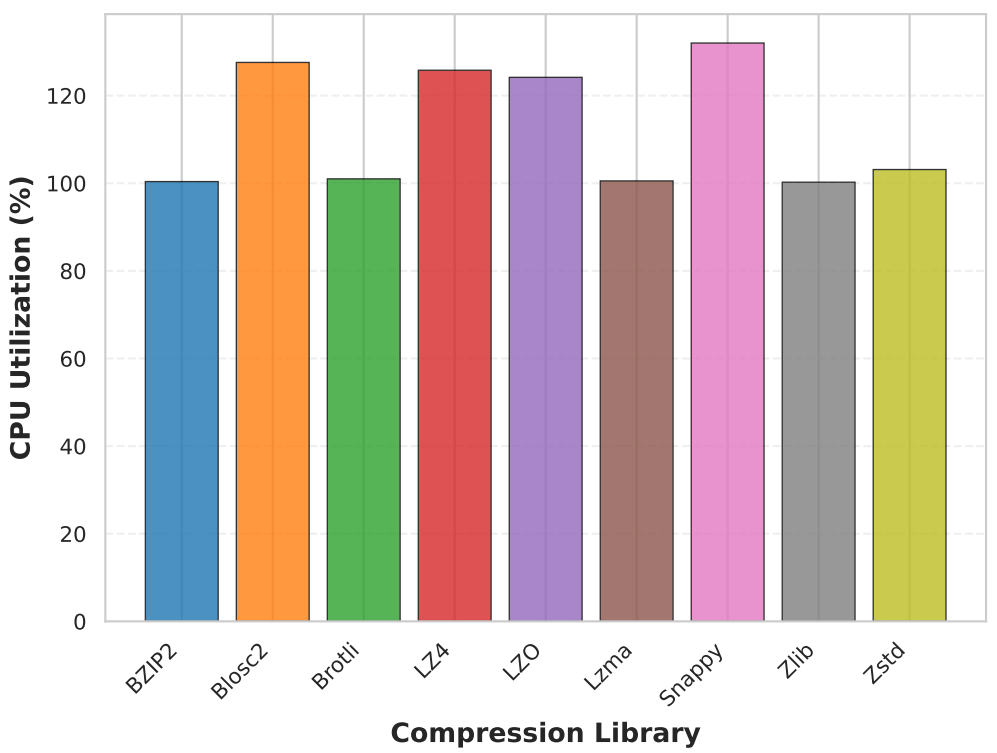
Parameter Study: uniform_63
Max value = 63 (controls entropy/bit usage)
Char Data Type, 64KB Chunk Size







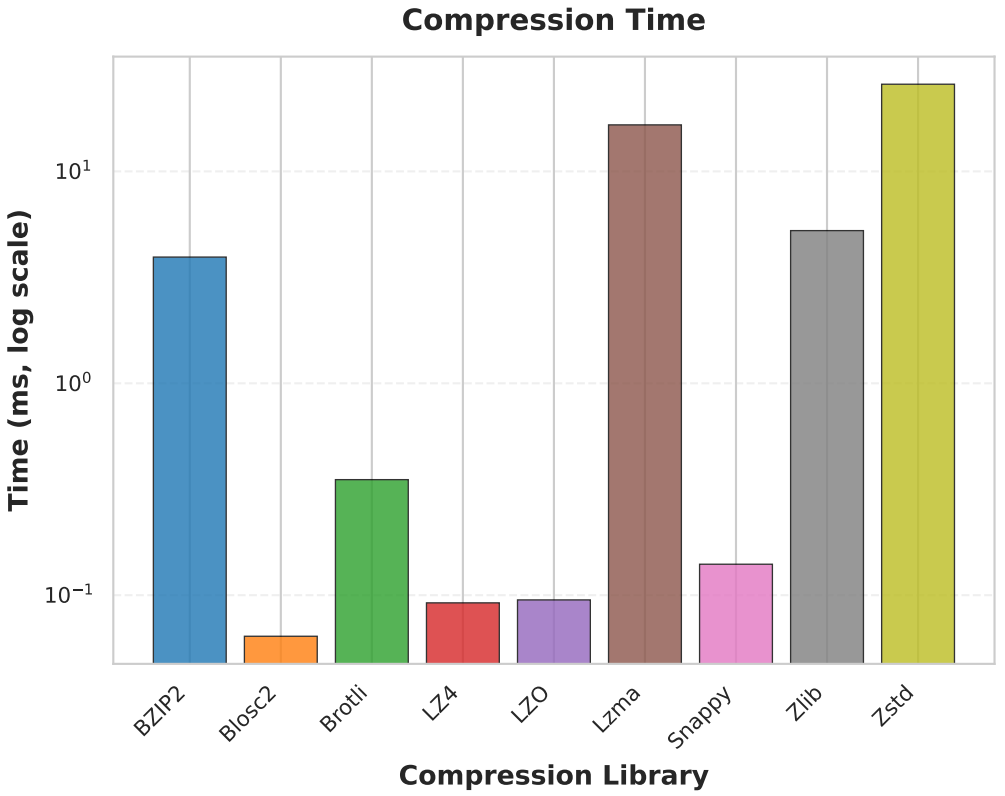


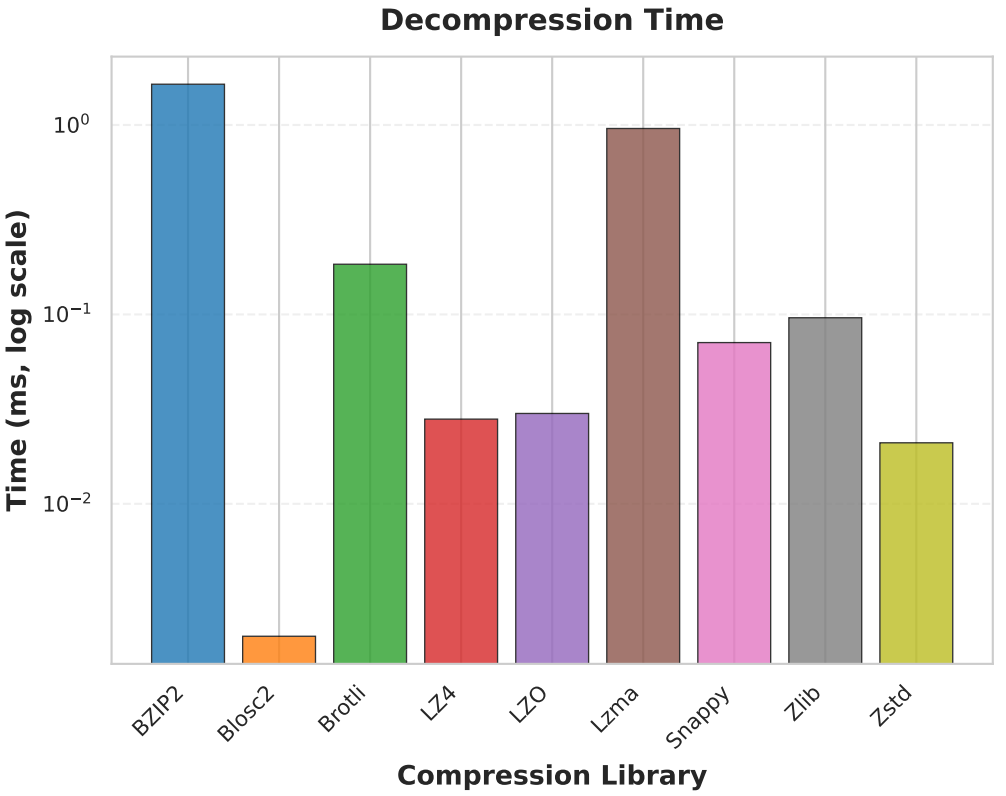


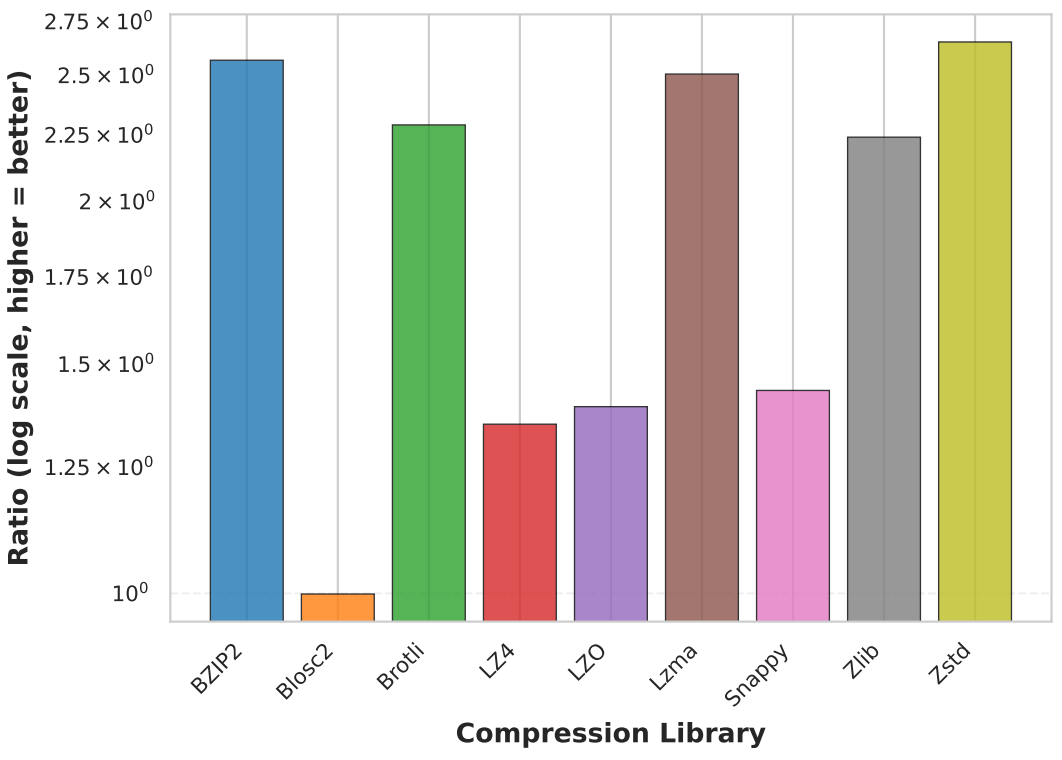
Performance Summary (64KB chunks)
Sorted by Compression Ratio

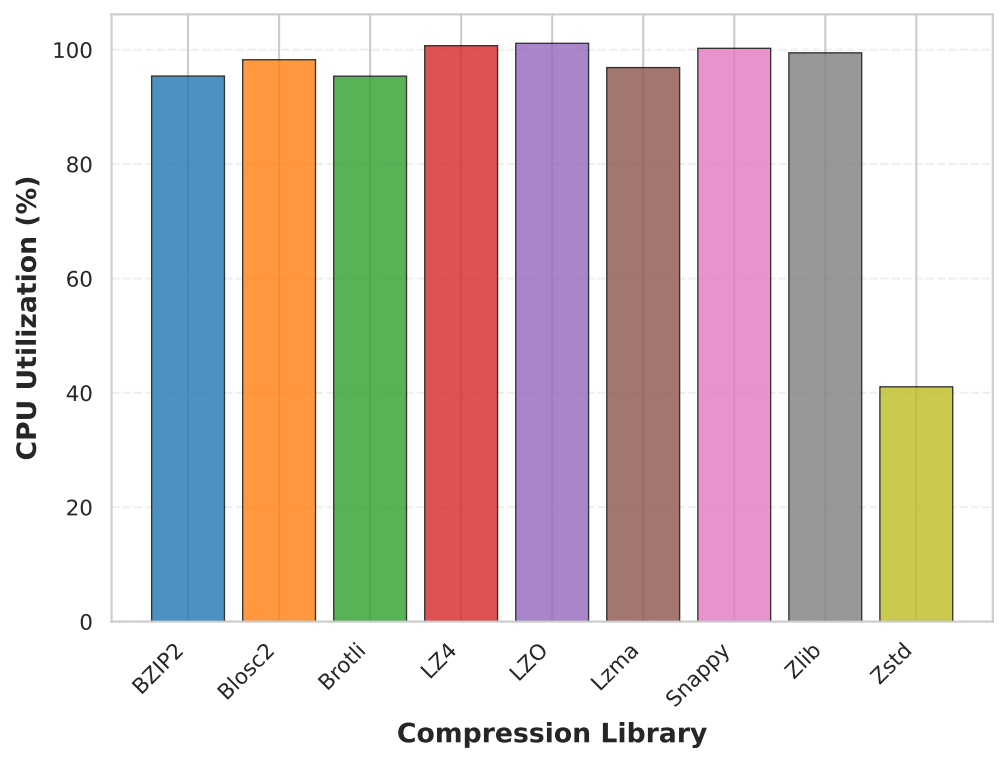
Library	Ratio	Time (ms)	CPU%
Zstd	1.33x	5.5	58%
Zlib	1.32x	1.1	100%
BZIP2	1.32x	3.2	100%
Lzma	1.30x	11.4	100%
Brotli	1.27x	0.3	101%
Snappy	1.00x	0.0	132%
Blosc2	1.00x	0.0	101%
LZ4	1.00x	0.0	52%
LZO	1.00x	0.0	124%

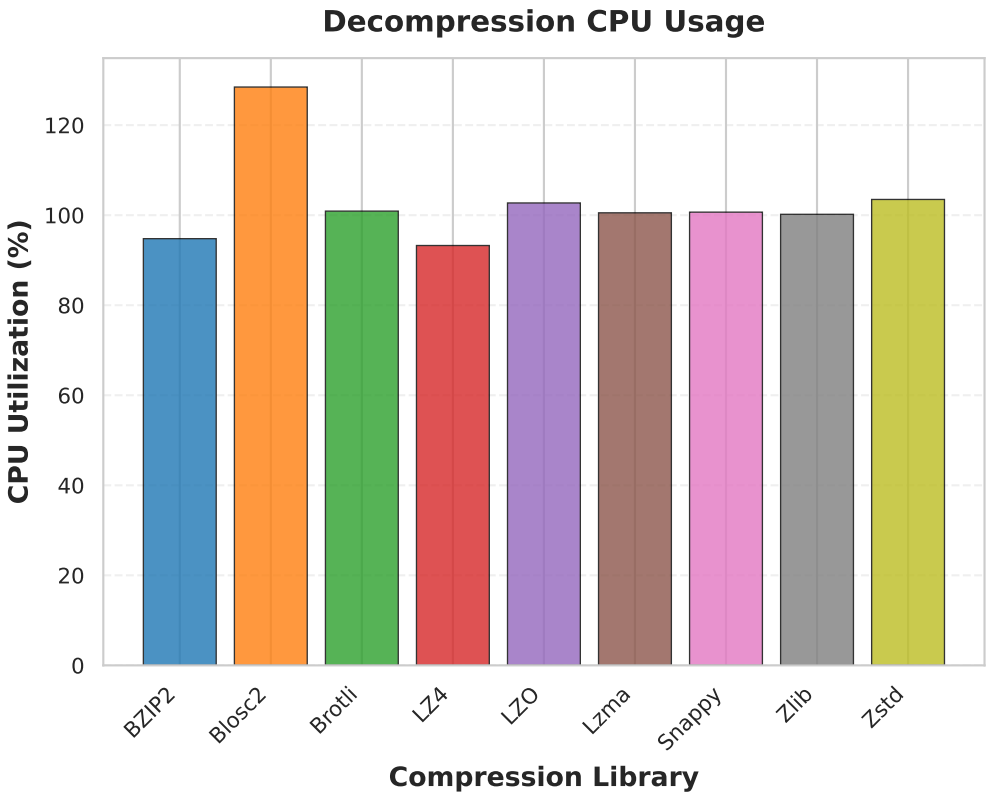
Parameter Study: uniform_7
Max value = 7 (controls entropy/bit usage)
Char Data Type, 64KB Chunk Size









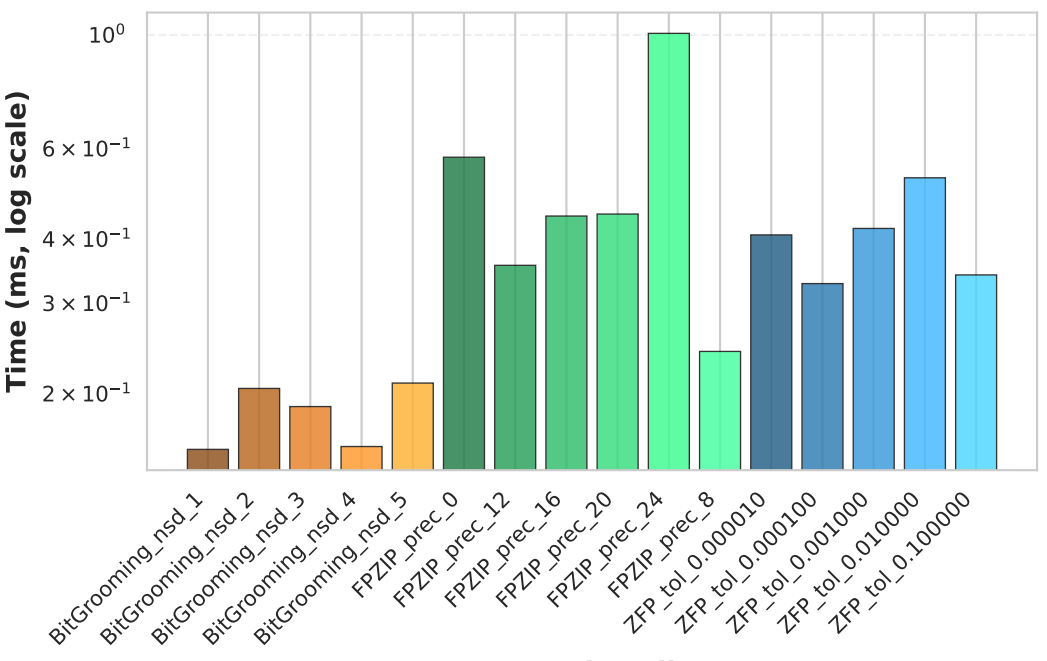


Performance Summary (64KB chunks)
Sorted by Compression Ratio

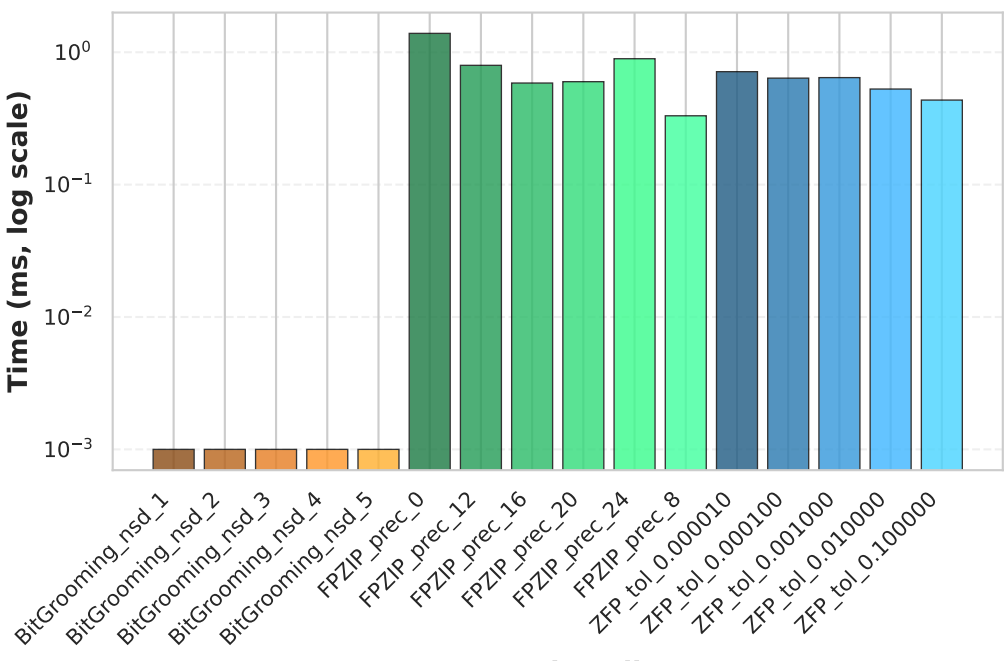
Library	Ratio	Time (ms)	CPU%
Zstd	2.65x	25.8	41%
BZIP2	2.57x	3.9	95%
Lzma	2.51x	16.6	97%
Brotli	2.29x	0.4	95%
Zlib	2.24x	5.3	99%
Snappy	1.43x	0.1	100%
LZO	1.39x	0.1	101%
LZ4	1.35x	0.1	101%
Blosc2	1.00x	0.1	98%

Parameter Study: noisy_float
Float Data Type, 64KB Chunk Size

Compression Time



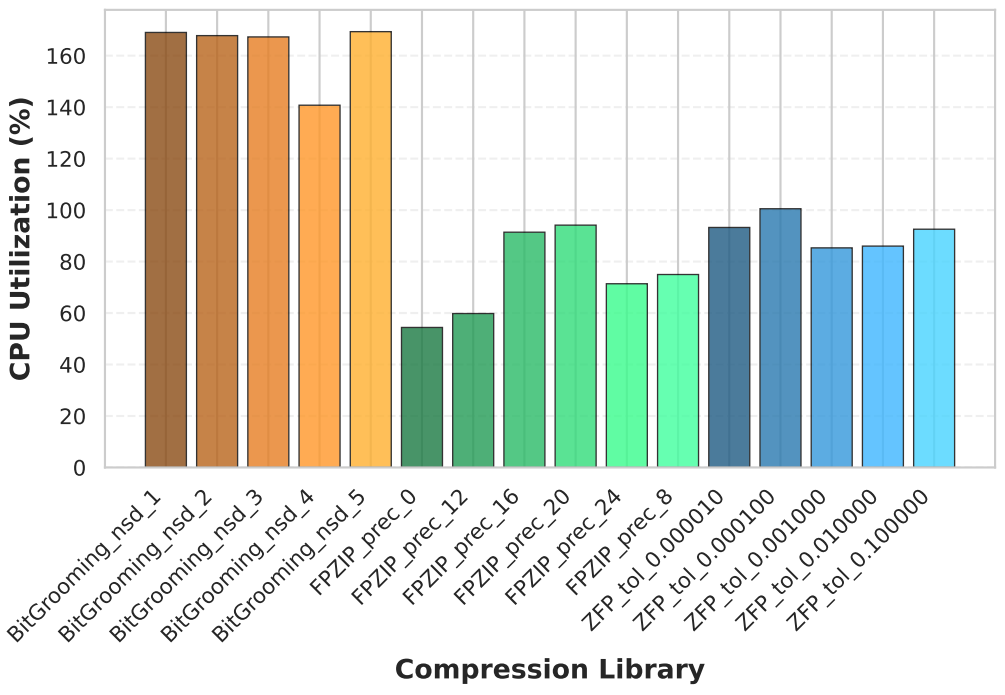
Decompression Time



Compression Ratio

Compression CPU Usage

Decompression CPU Usage



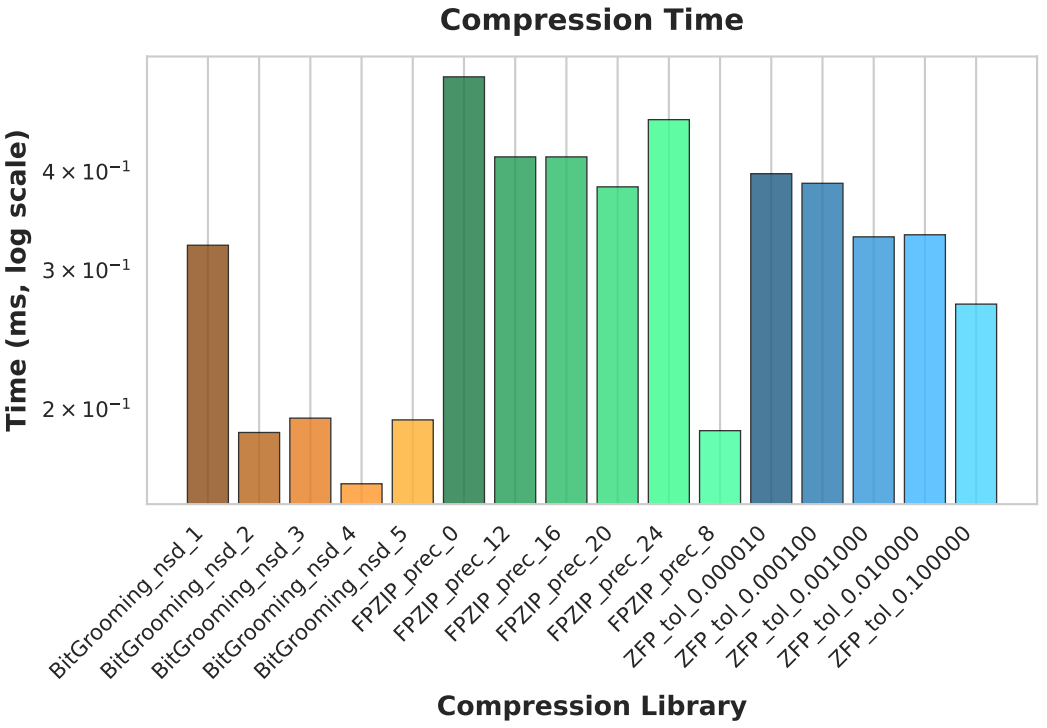
Performance Summary (64KB chunks)
Sorted by Compression Ratio

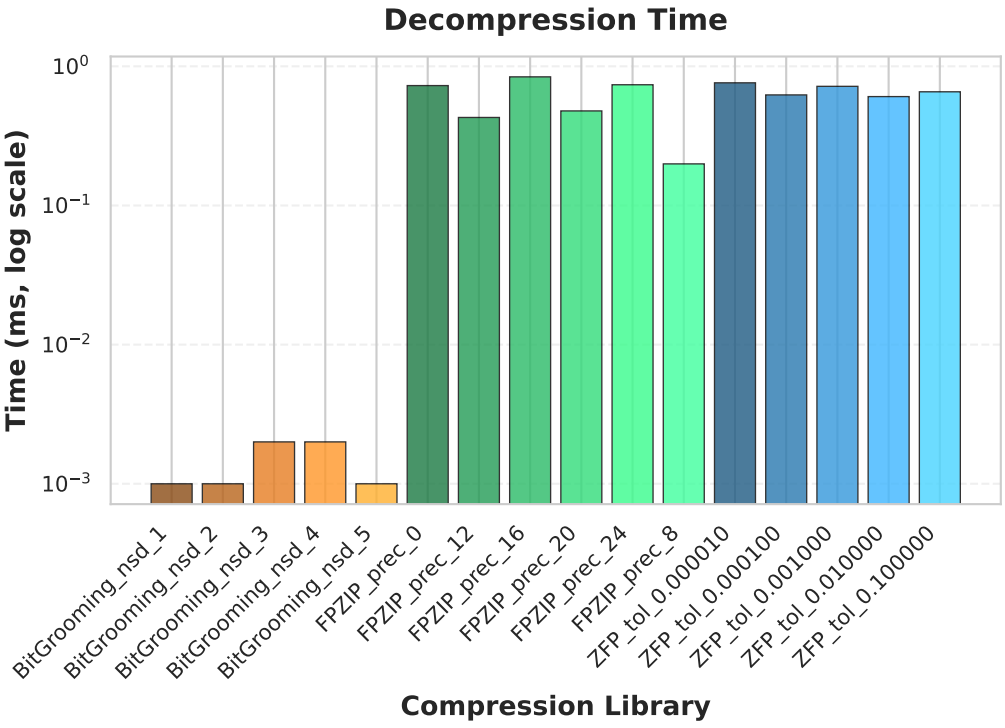
Library	Ratio	Time (ms)	CPU%
FPZIP_prec_8	8.54x	0.2	79%
FPZIP_prec_12	3.23x	0.4	100%
FPZIP_prec_16	2.30x	0.4	94%
ZFP_tol_0.100000	1.81x	0.3	86%
FPZIP_prec_20	1.79x	0.4	101%
ZFP_tol_0.010000	1.55x	0.5	64%
FPZIP_prec_24	1.46x	1.0	49%
ZFP_tol_0.001000	1.35x	0.4	75%
ZFP_tol_0.000100	1.16x	0.3	101%

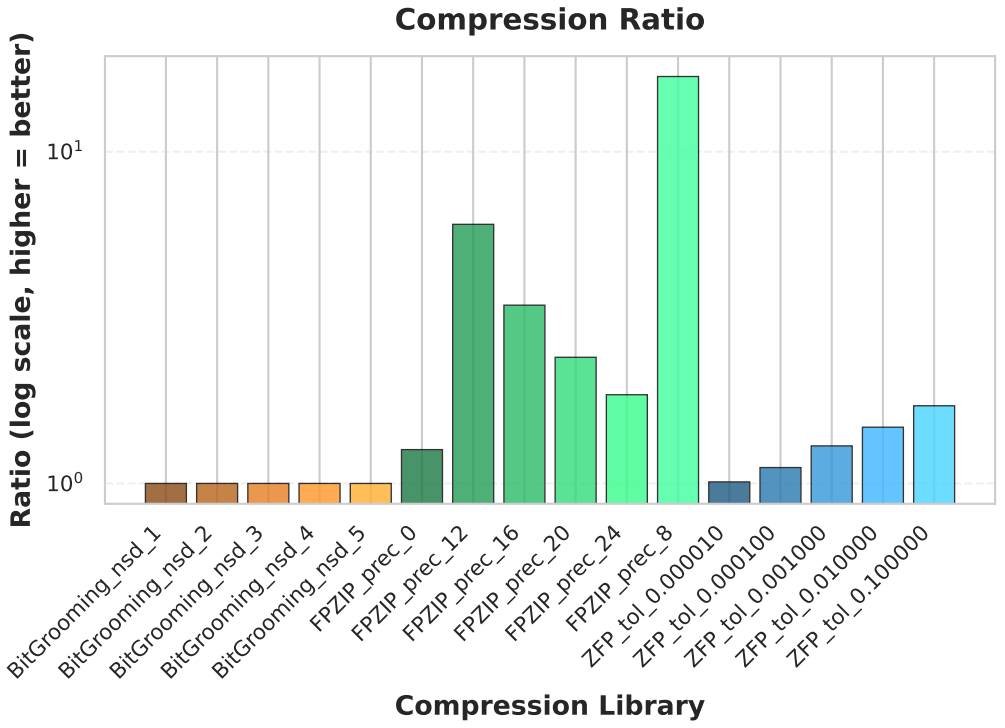
Signal-to-Noise Ratio (SNR)

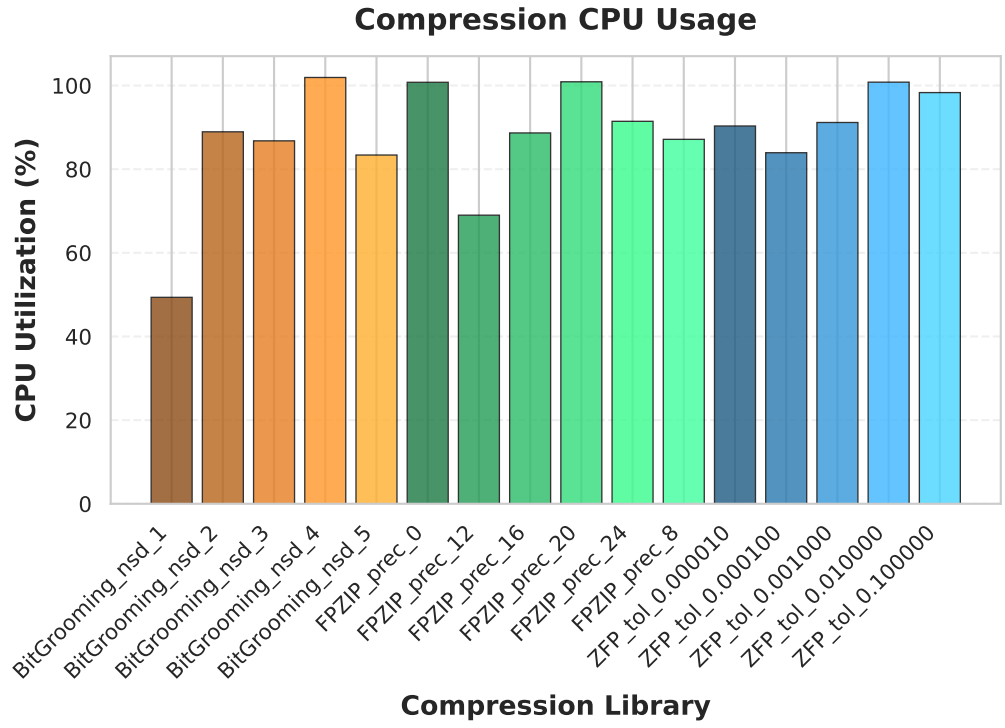
Peak Signal-to-Noise Ratio (PSNR)

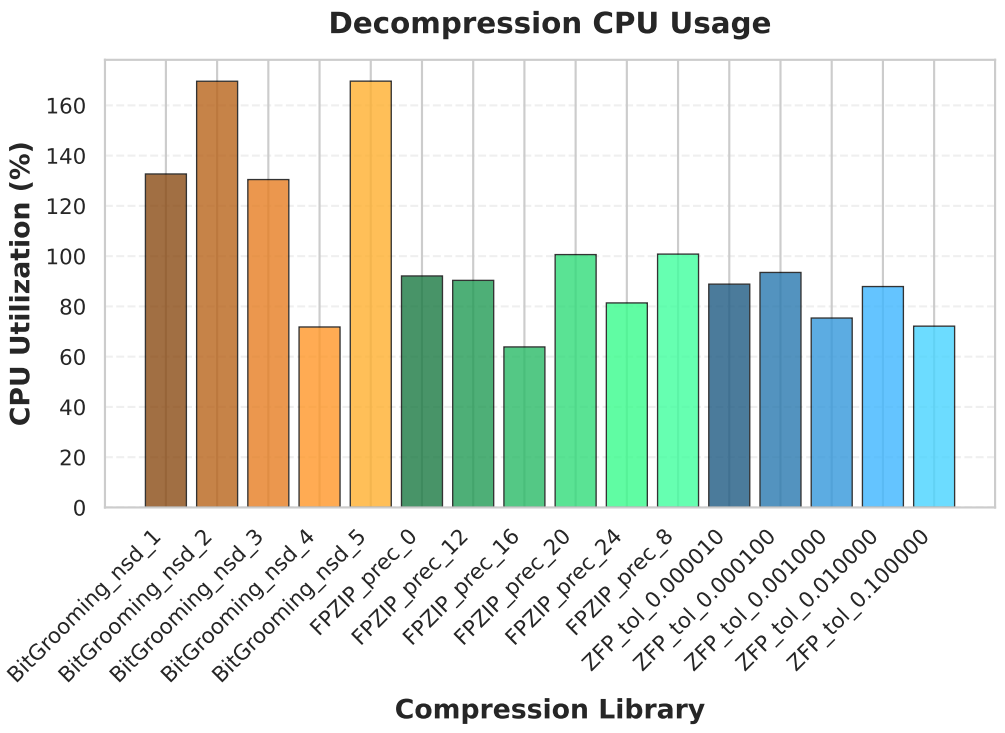
Parameter Study: normal_float
Float data: Normal distribution (μ=500, σ=200)
Float Data Type, 64KB Chunk Size









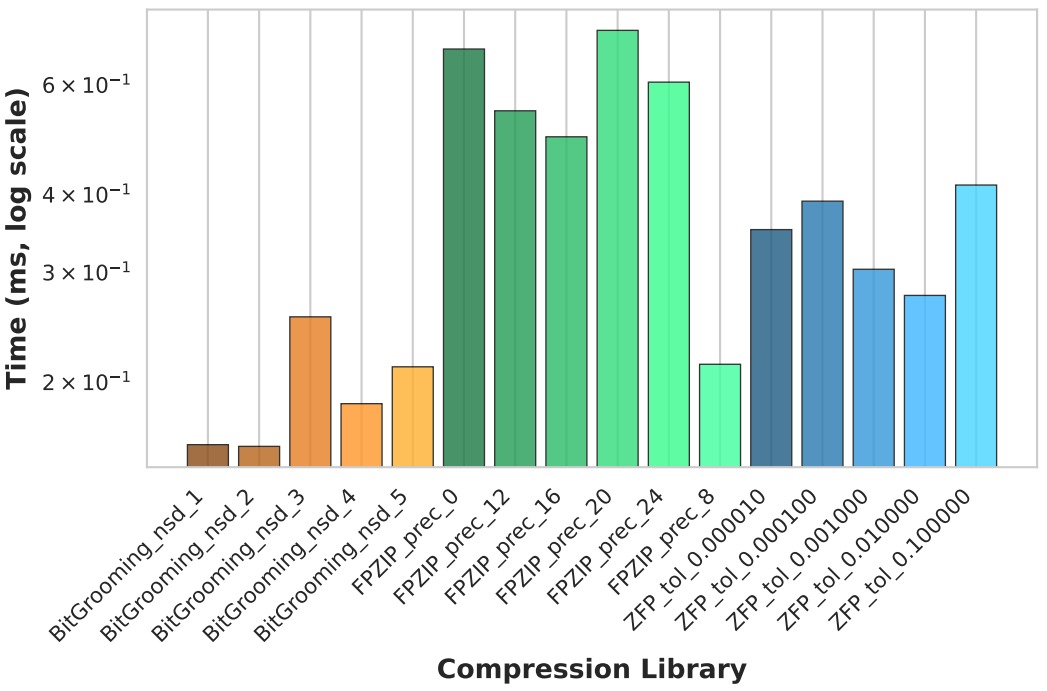


Performance Summary (64KB chunks)
Sorted by Compression Ratio

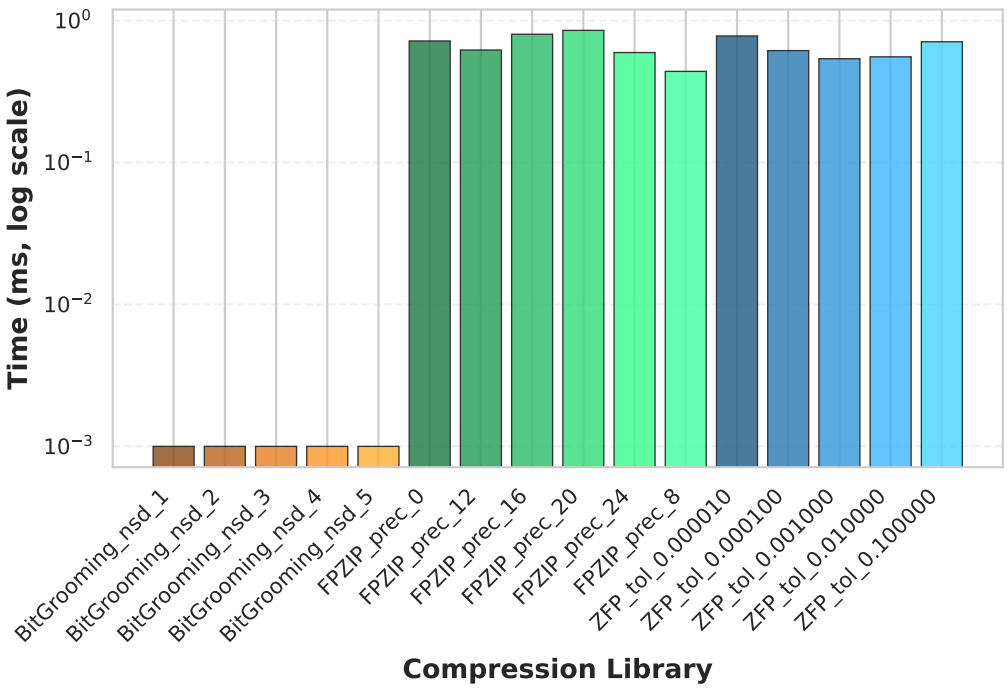
Library	Ratio	Time (ms)	CPU%
FPZIP_prec_8	16.86x	0.2	87%
FPZIP_prec_12	6.04x	0.4	69%
FPZIP_prec_16	3.45x	0.4	89%
FPZIP_prec_20	2.40x	0.4	101%
FPZIP_prec_24	1.85x	0.5	91%
ZFP_tol_0.100000	1.71x	0.3	98%
ZFP_tol_0.010000	1.48x	0.3	101%
ZFP_tol_0.001000	1.30x	0.3	91%
FPZIP_prec_0	1.26x	0.5	101%

Parameter Study: random_float
Float Data Type, 64KB Chunk Size

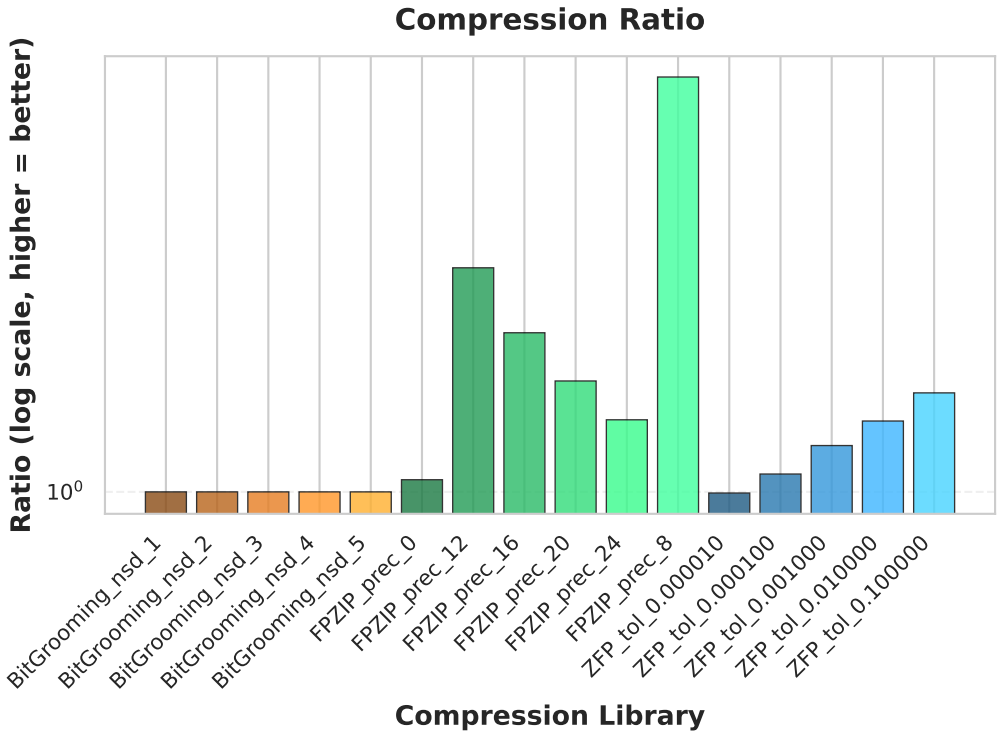
Compression Time



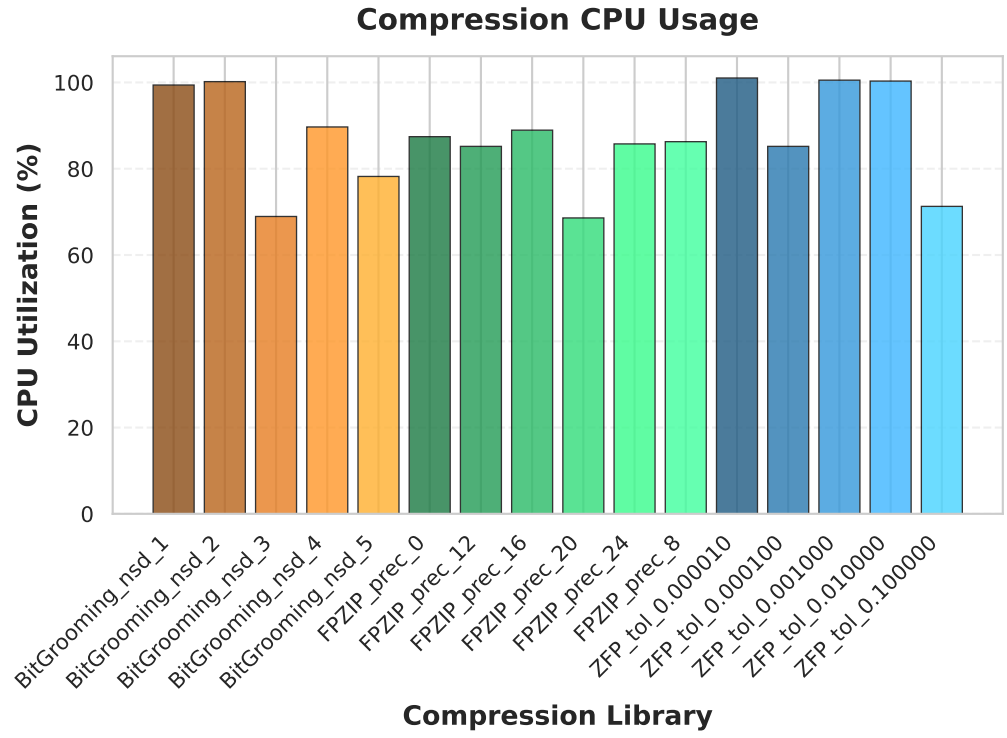
Decompression Time



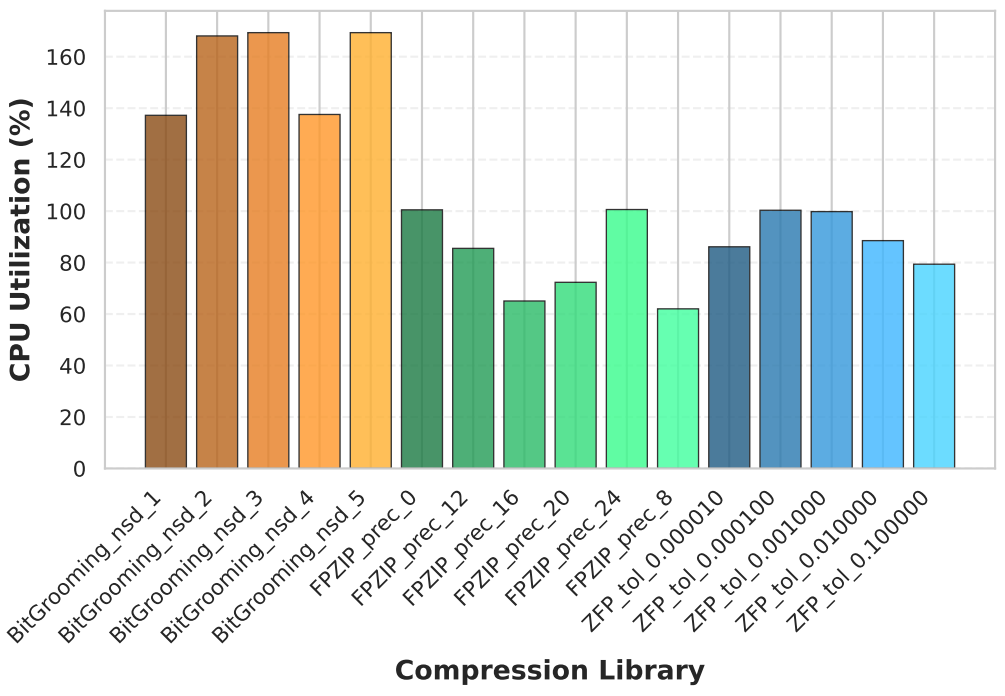
Compression Ratio



Compression CPU Usage



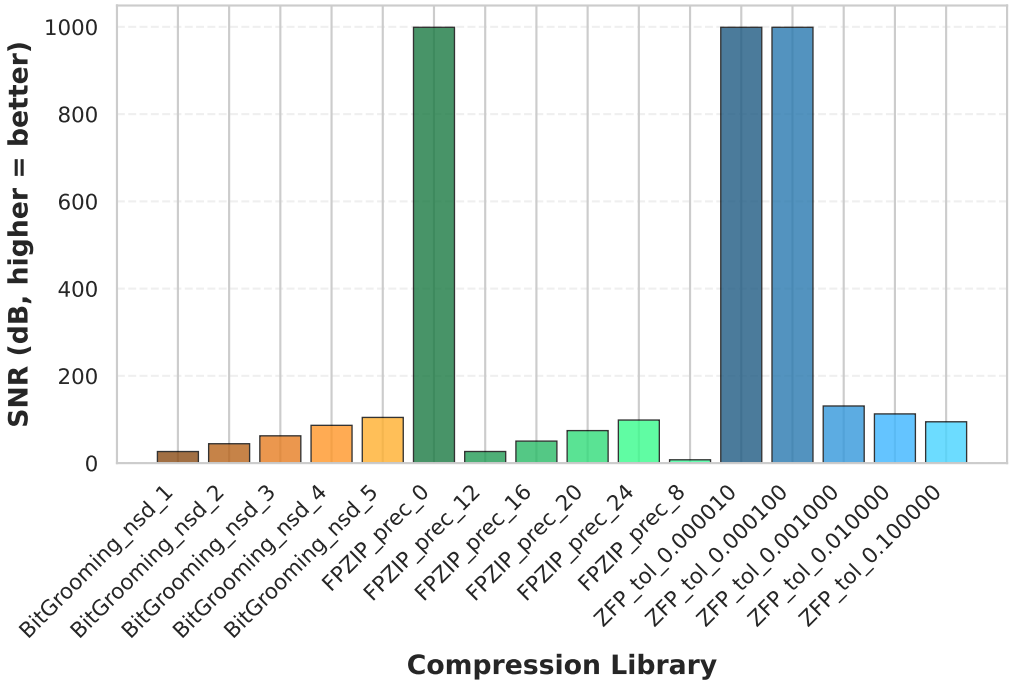
Decompression CPU Usage



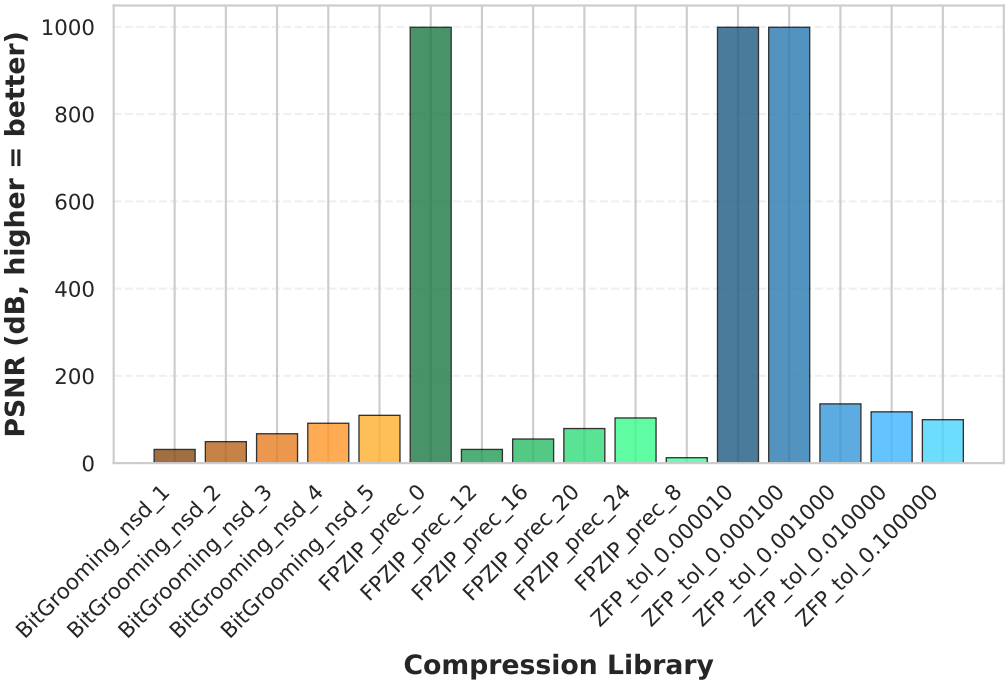
Performance Summary (64KB chunks)
Sorted by Compression Ratio

Library	Ratio	Time (ms)	CPU%
FPZIP_prec_8	8.53x	0.2	86%
FPZIP_prec_12	3.18x	0.5	85%
FPZIP_prec_16	2.28x	0.5	89%
FPZIP_prec_20	1.77x	0.7	69%
ZFP_tol_0.100000	1.67x	0.4	71%
FPZIP_prec_24	1.45x	0.6	86%
ZFP_tol_0.010000	1.44x	0.3	100%
ZFP_tol_0.001000	1.27x	0.3	101%
ZFP_tol_0.000100	1.10x	0.4	85%

Signal-to-Noise Ratio (SNR)

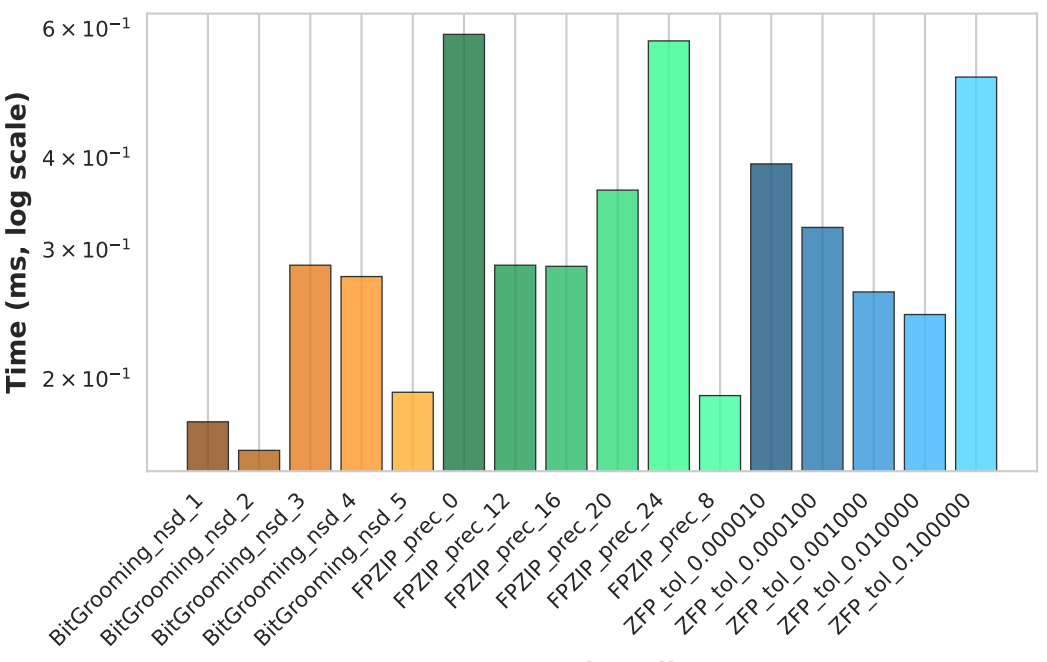


Peak Signal-to-Noise Ratio (PSNR)

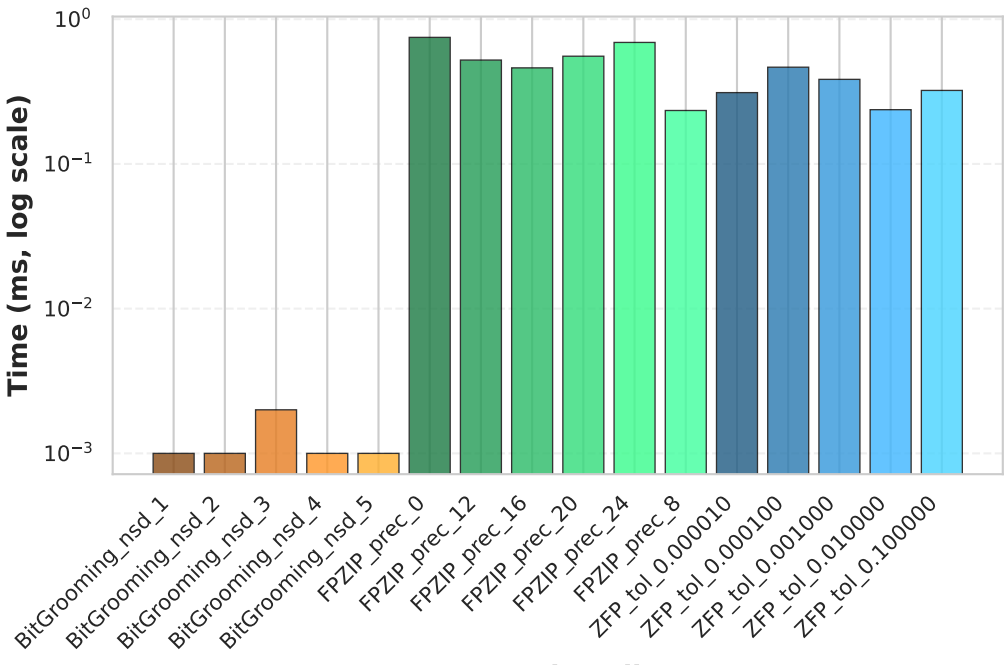


Parameter Study: repeating_float
Float Data Type, 64KB Chunk Size

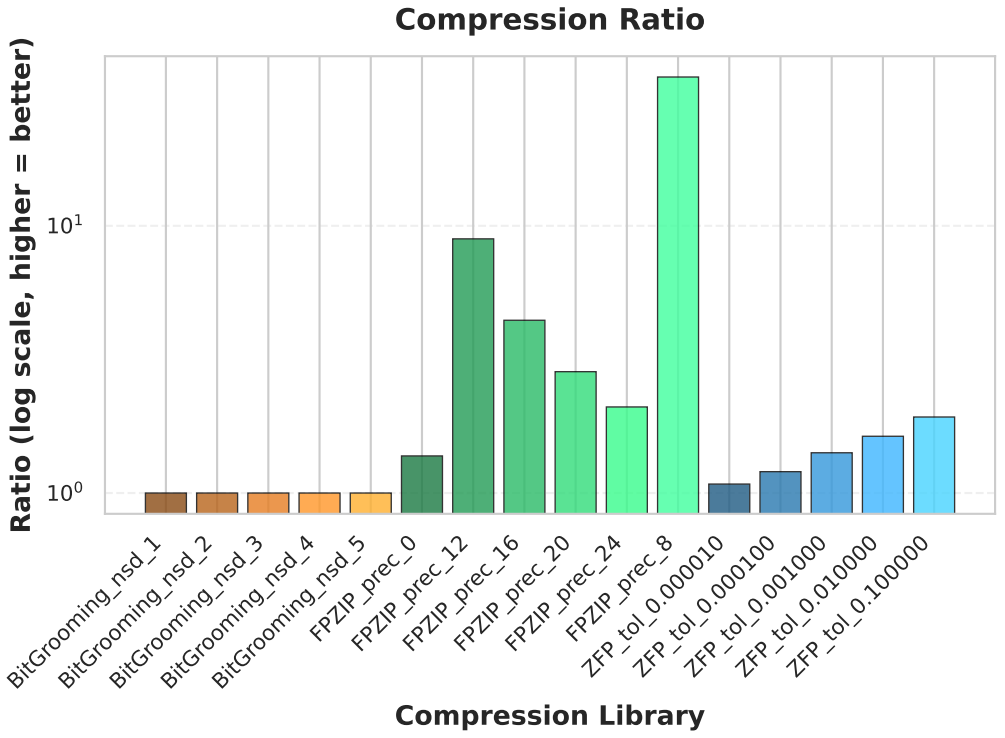
Compression Time



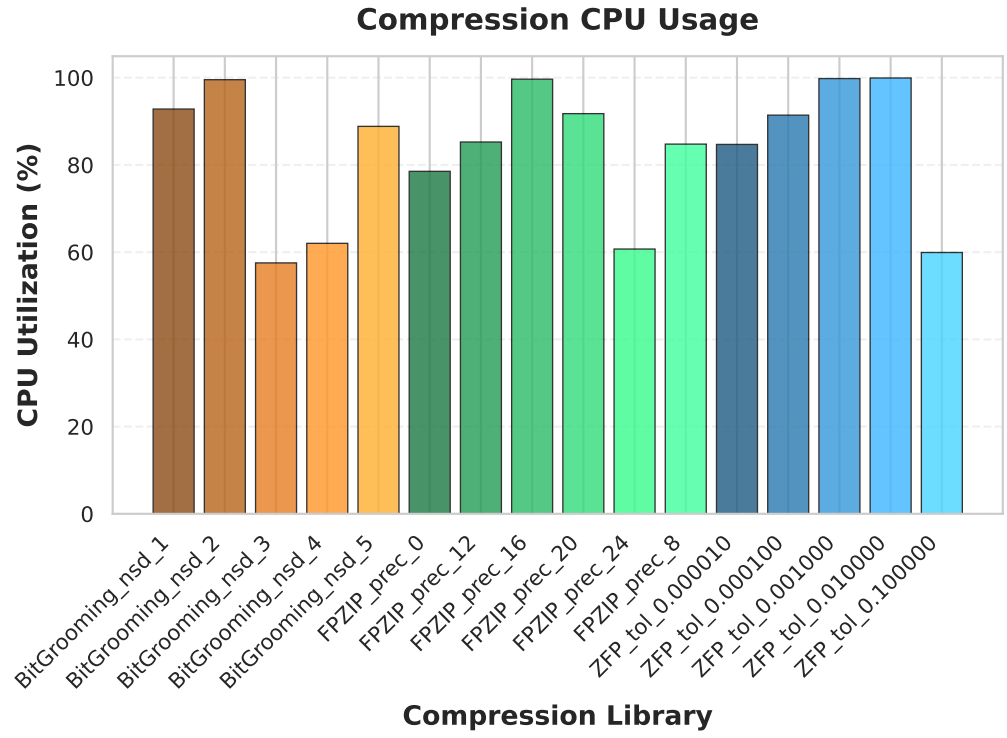
Decompression Time



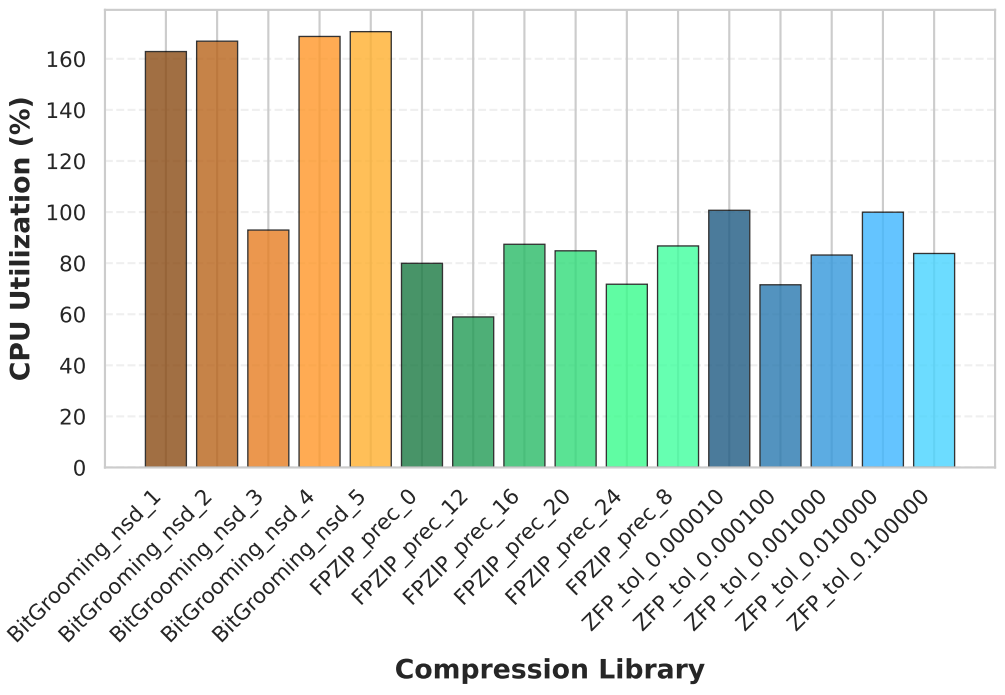
Compression Ratio



Compression CPU Usage



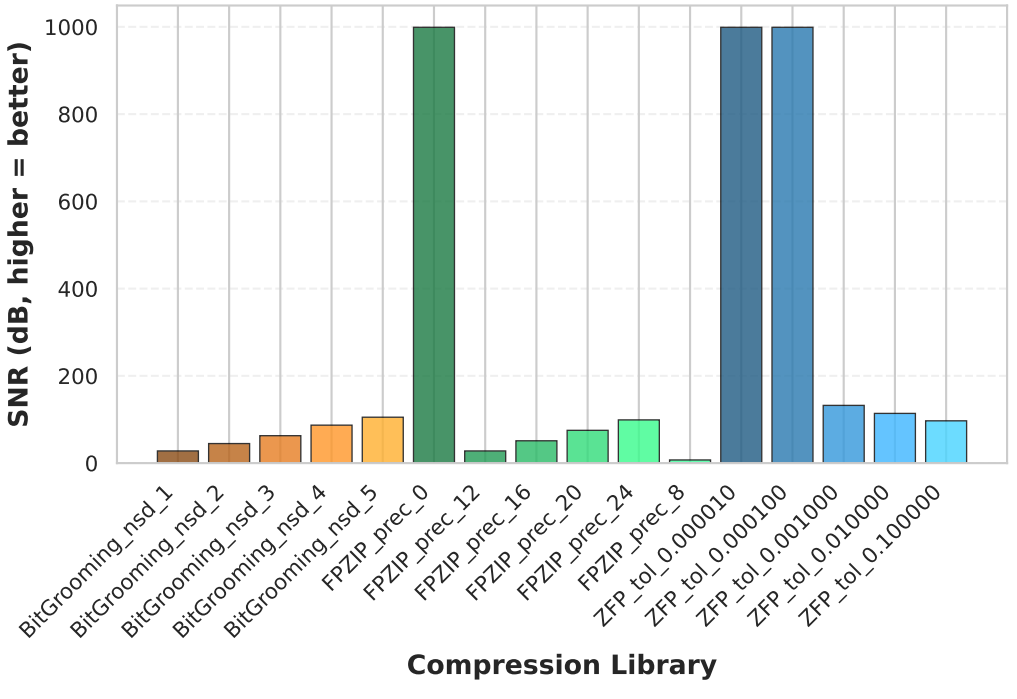
Decompression CPU Usage



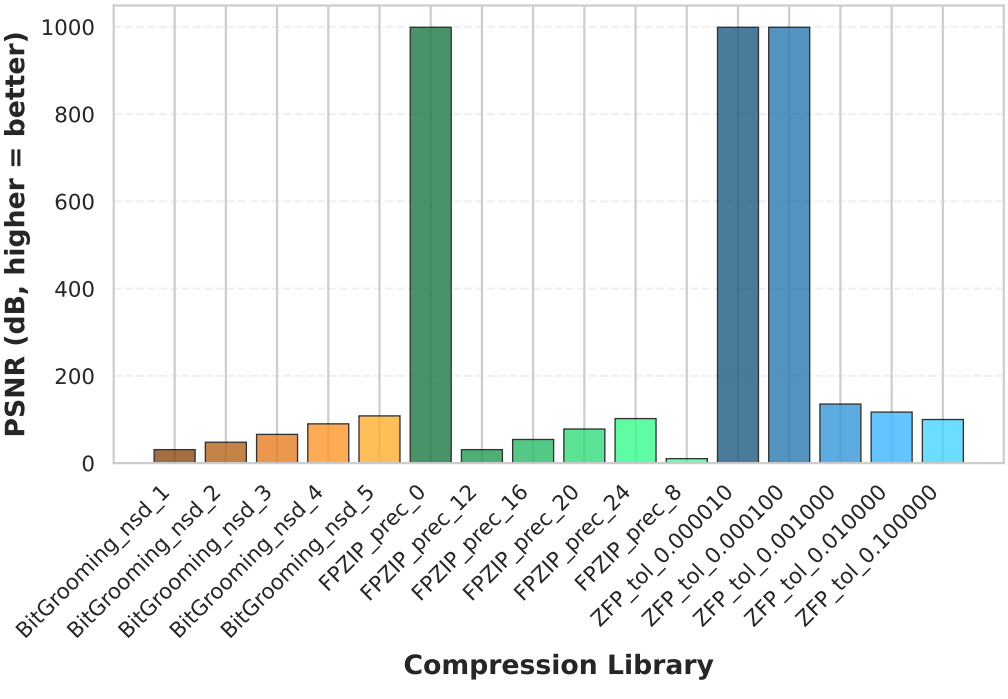
Performance Summary (64KB chunks)
Sorted by Compression Ratio

Library	Ratio	Time (ms)	CPU%
FPZIP_prec_8	36.05x	0.2	85%
FPZIP_prec_12	8.94x	0.3	85%
FPZIP_prec_16	4.43x	0.3	100%
FPZIP_prec_20	2.85x	0.4	92%
FPZIP_prec_24	2.10x	0.6	61%
ZFP_tol_0.100000	1.93x	0.5	60%
ZFP_tol_0.010000	1.63x	0.2	100%
ZFP_tol_0.001000	1.41x	0.3	100%
FPZIP_prec_0	1.38x	0.6	79%

Signal-to-Noise Ratio (SNR)

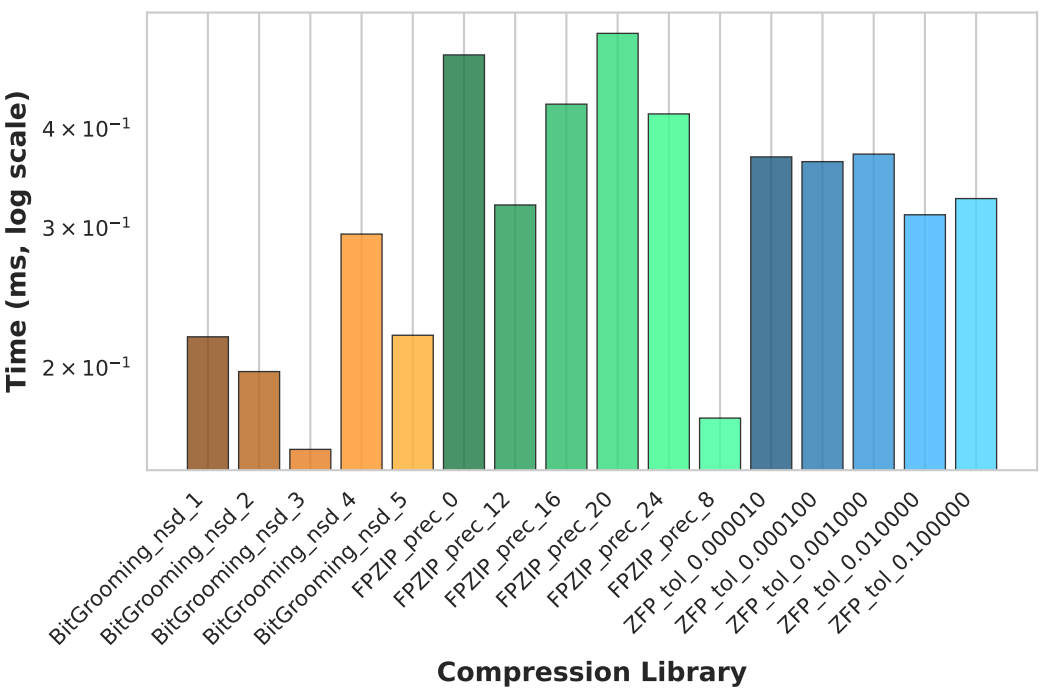


Peak Signal-to-Noise Ratio (PSNR)

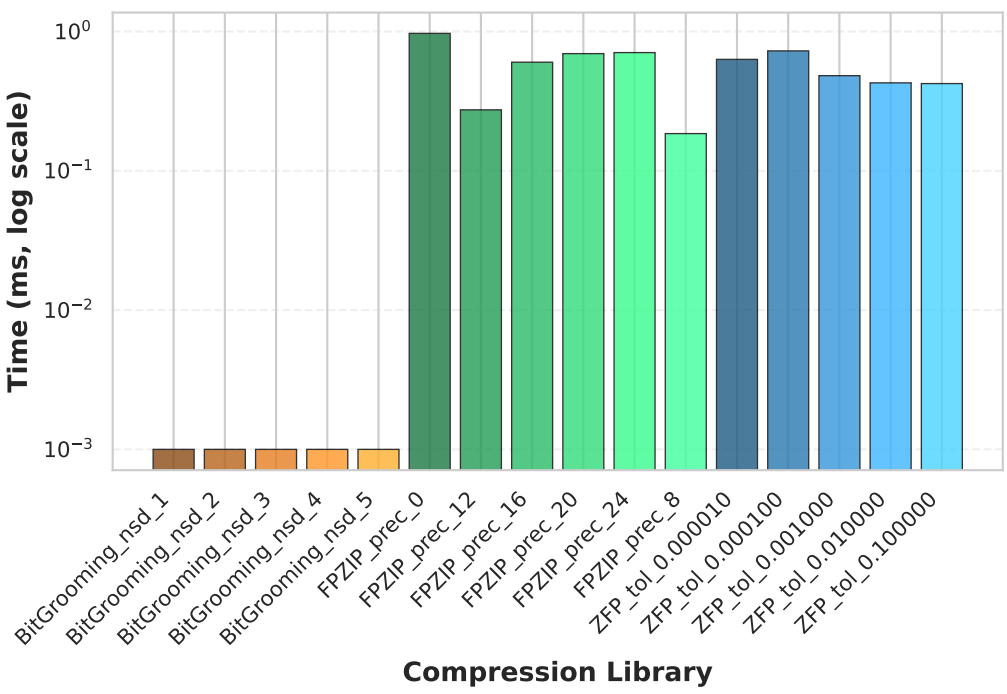


Parameter Study: structured_float
Float Data Type, 64KB Chunk Size

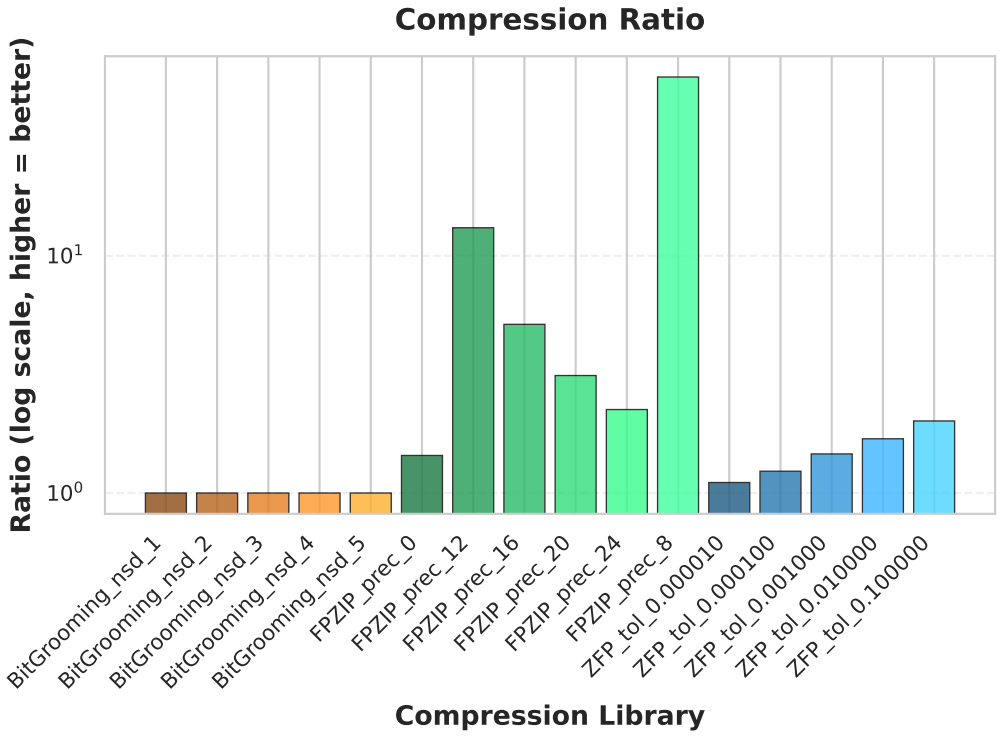
Compression Time



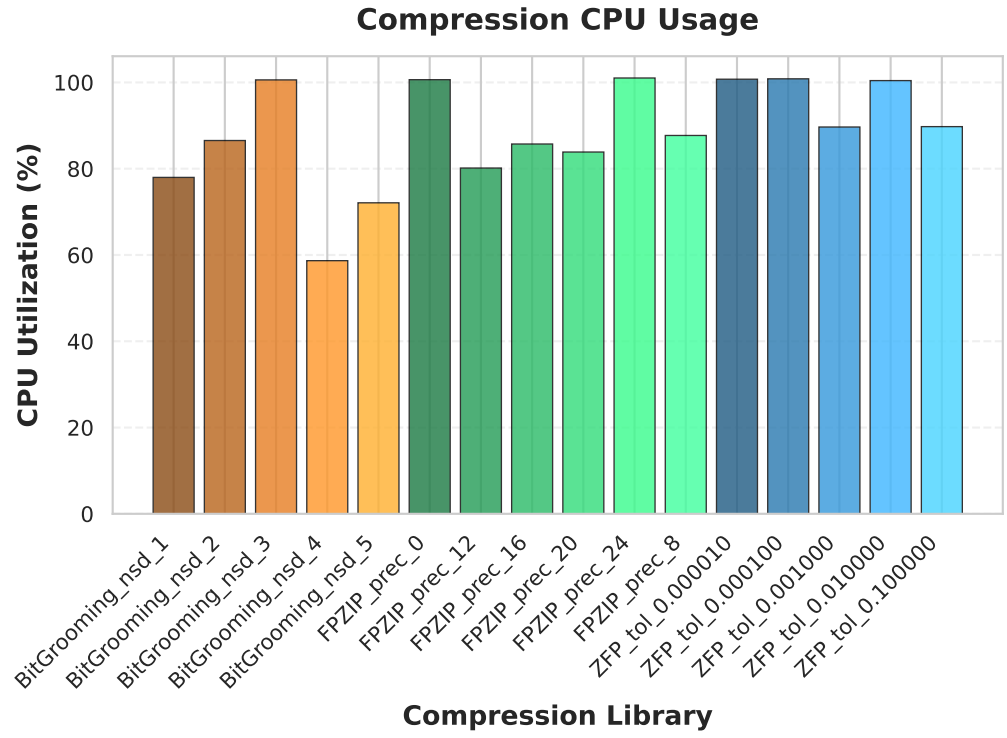
Decompression Time



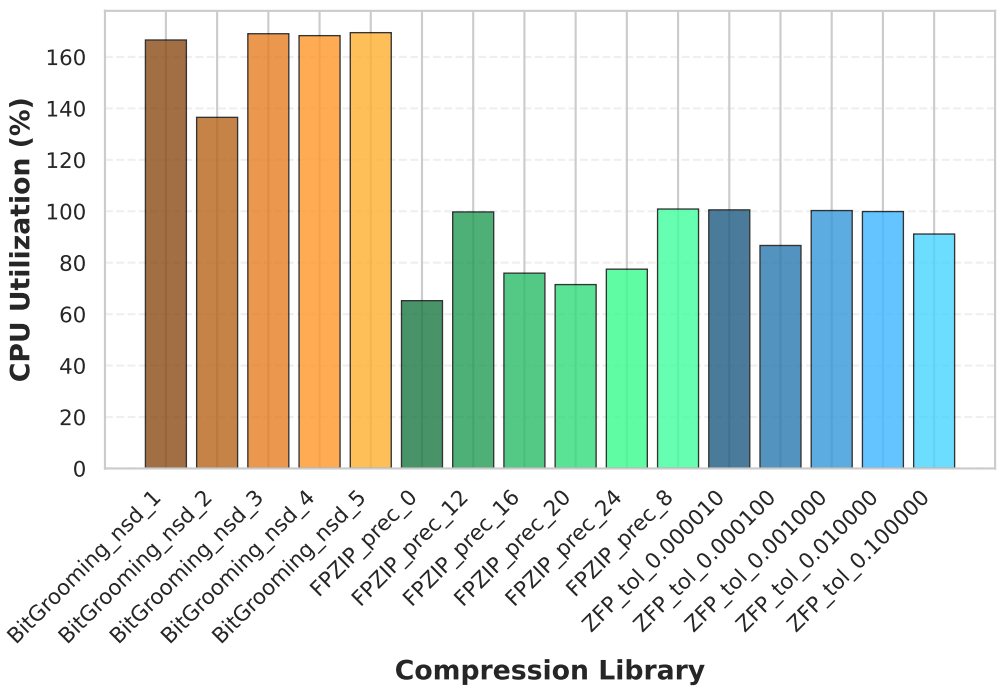
Compression Ratio



Compression CPU Usage



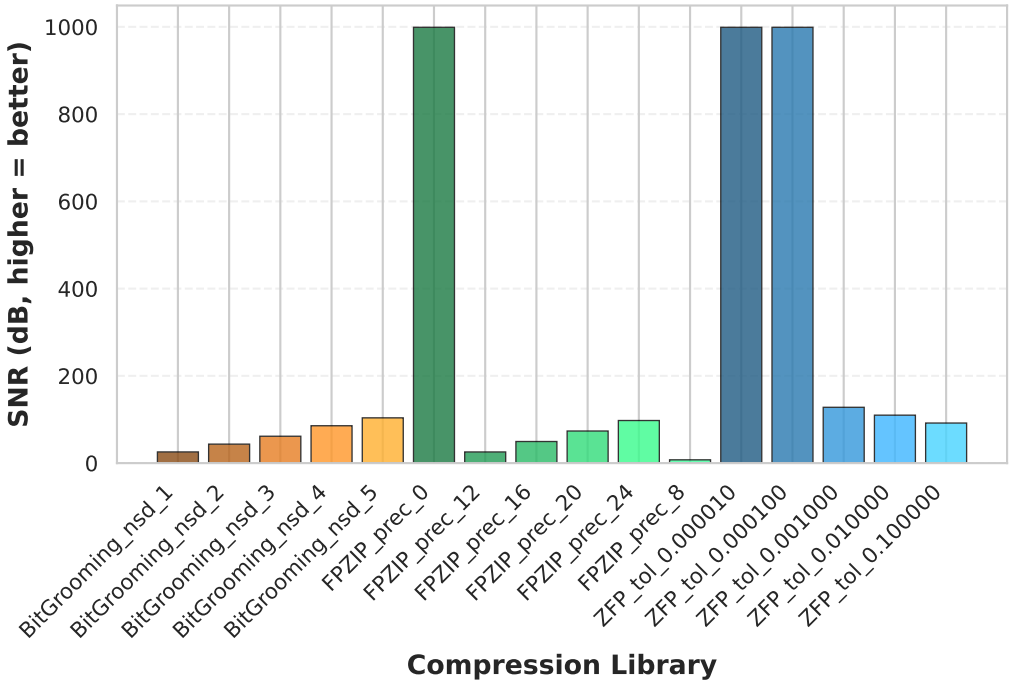
Decompression CPU Usage



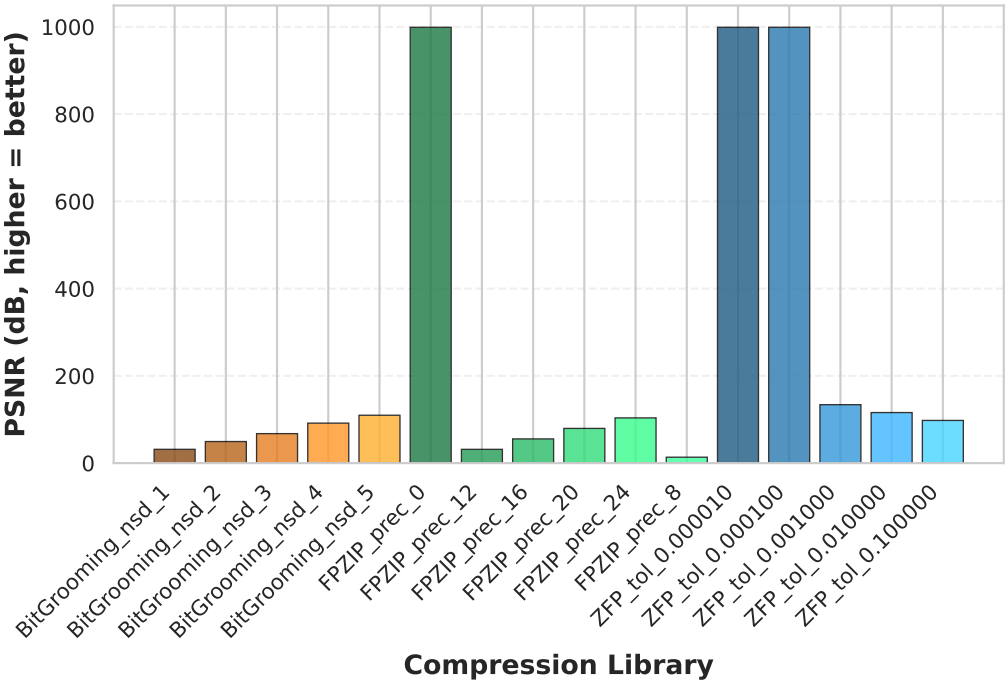
Performance Summary (64KB chunks)
Sorted by Compression Ratio

Library	Ratio	Time (ms)	CPU%
FPZIP_prec_8	56.76x	0.2	88%
FPZIP_prec_12	13.13x	0.3	80%
FPZIP_prec_16	5.14x	0.4	86%
FPZIP_prec_20	3.13x	0.5	84%
FPZIP_prec_24	2.25x	0.4	101%
ZFP_tol_0.100000	2.01x	0.3	90%
ZFP_tol_0.010000	1.69x	0.3	100%
ZFP_tol_0.001000	1.46x	0.4	90%
FPZIP_prec_0	1.44x	0.5	101%

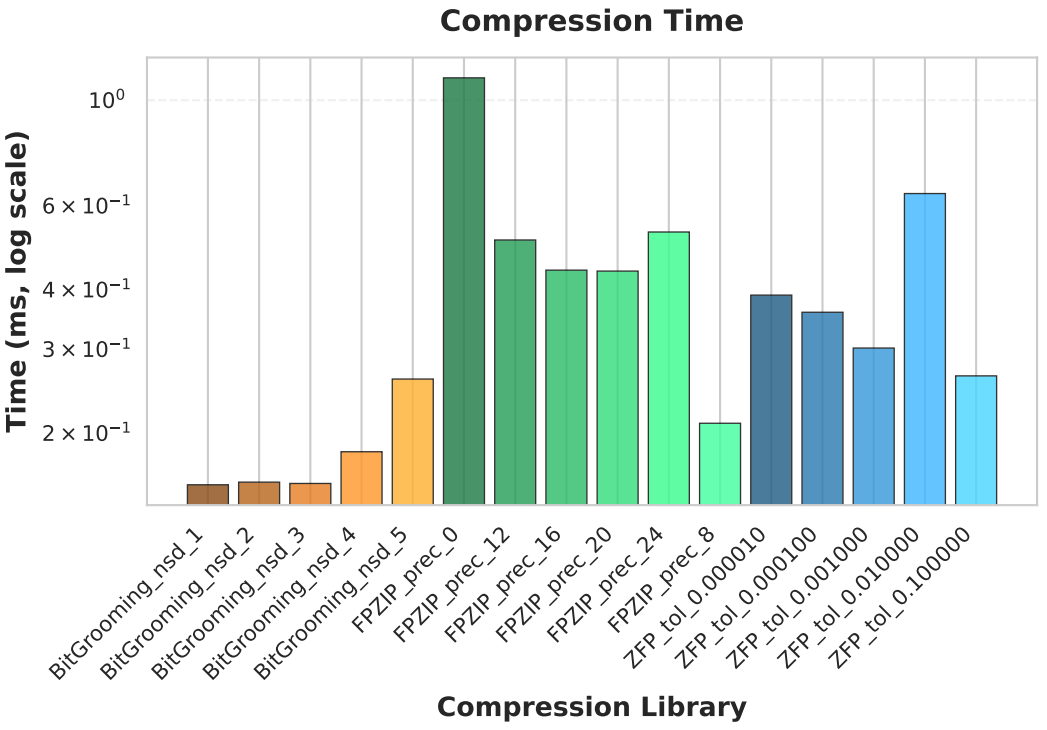
Signal-to-Noise Ratio (SNR)

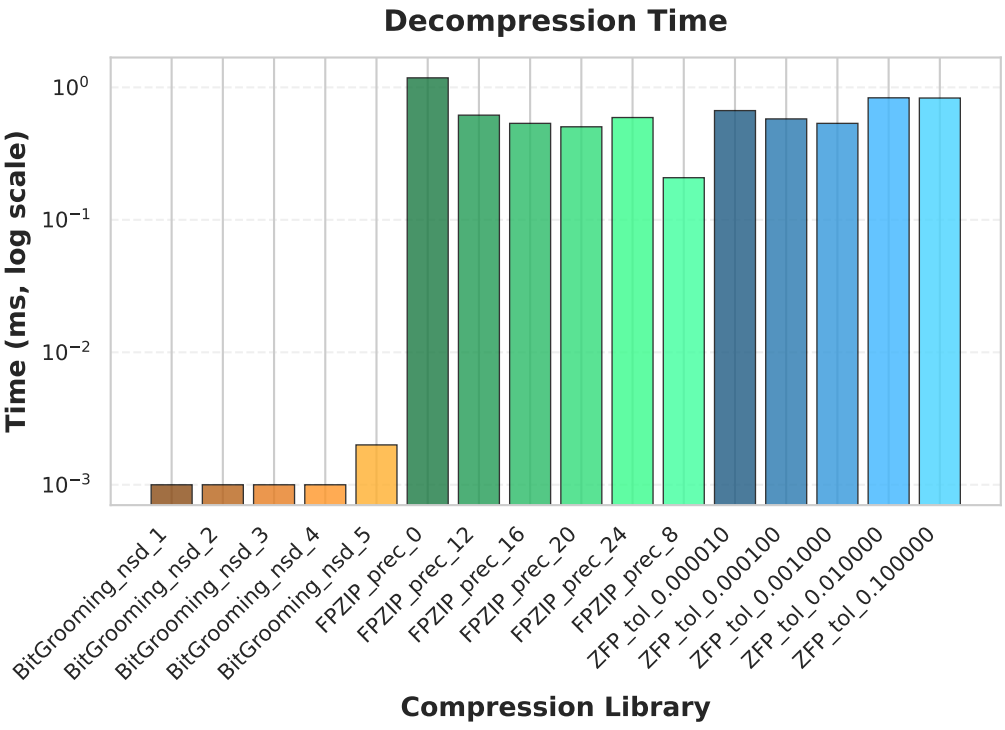


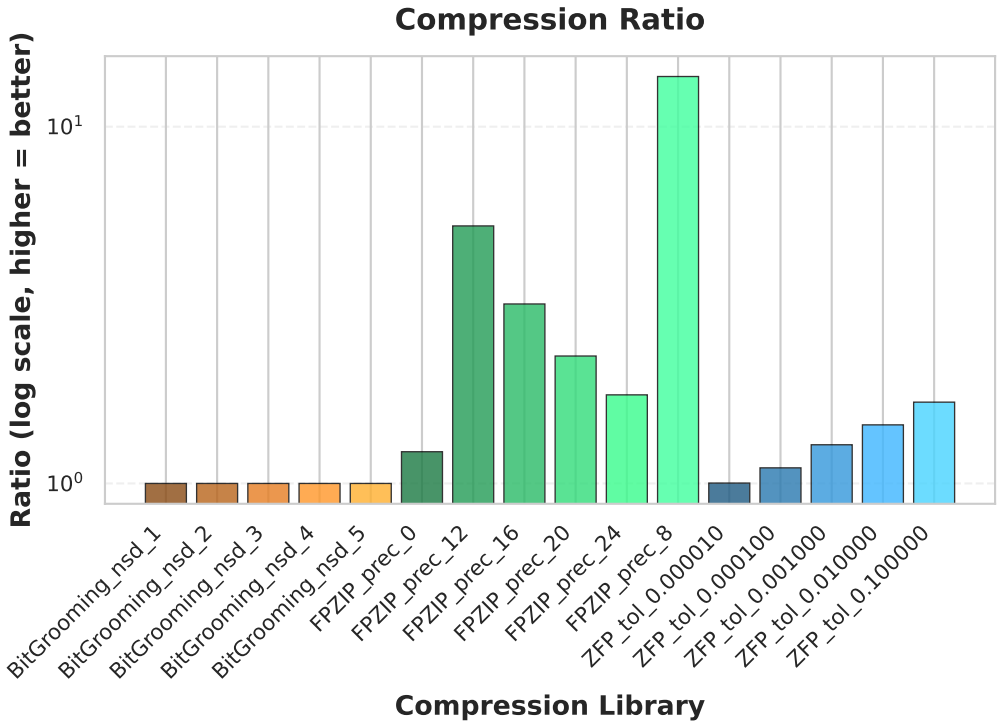
Peak Signal-to-Noise Ratio (PSNR)

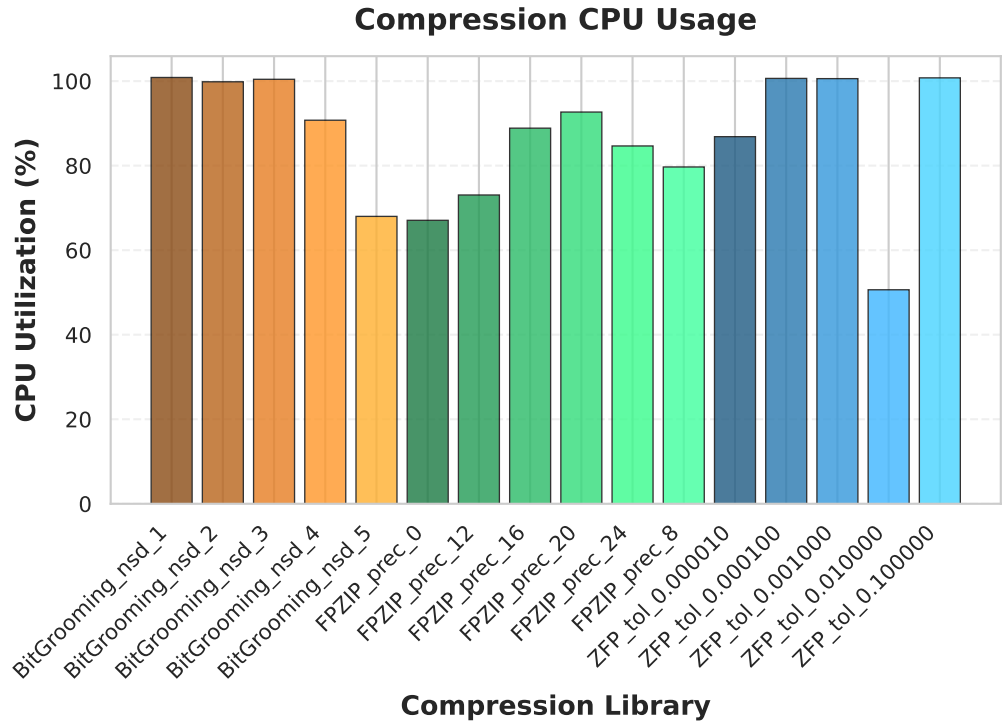


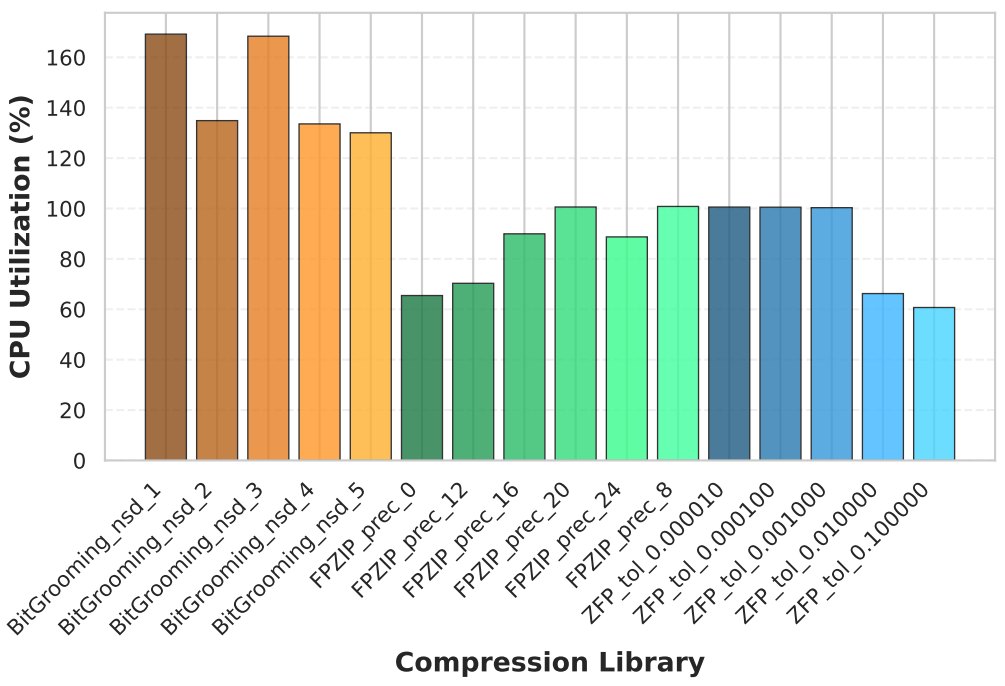
Parameter Study: uniform_float
Float data: Uniform distribution [0.0, 1000.0]
Float Data Type, 64KB Chunk Size











Performance Summary (64KB chunks)
Sorted by Compression Ratio

Library	Ratio	Time (ms)	CPU%
FPZIP_prec_8	13.83x	0.2	80%
FPZIP_prec_12	5.27x	0.5	73%
FPZIP_prec_16	3.18x	0.4	89%
FPZIP_prec_20	2.28x	0.4	93%
FPZIP_prec_24	1.77x	0.5	85%
ZFP_tol_0.100000	1.69x	0.3	101%
ZFP_tol_0.010000	1.46x	0.6	51%
ZFP_tol_0.001000	1.28x	0.3	101%
FPZIP_prec_0	1.23x	1.1	67%