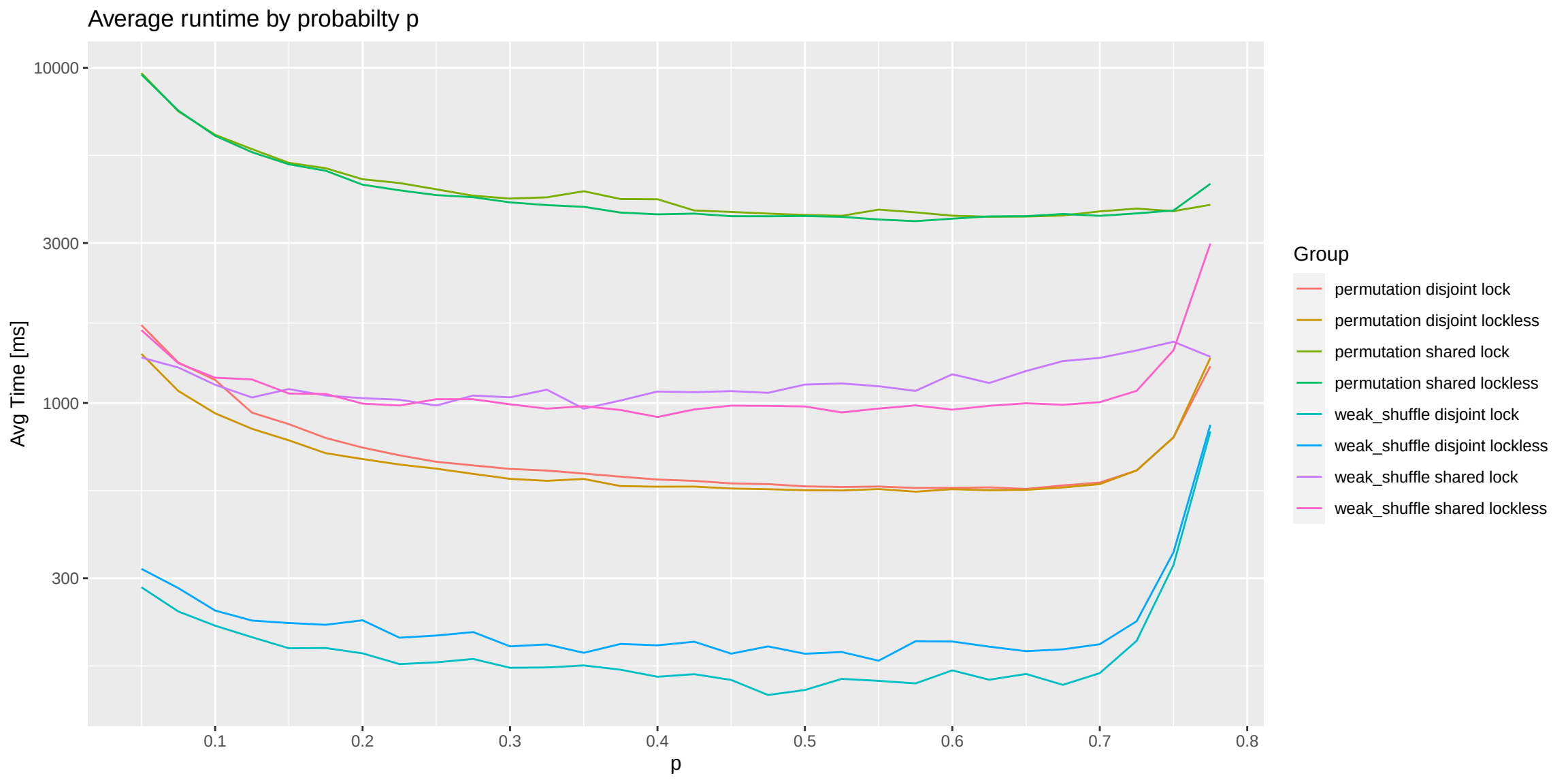
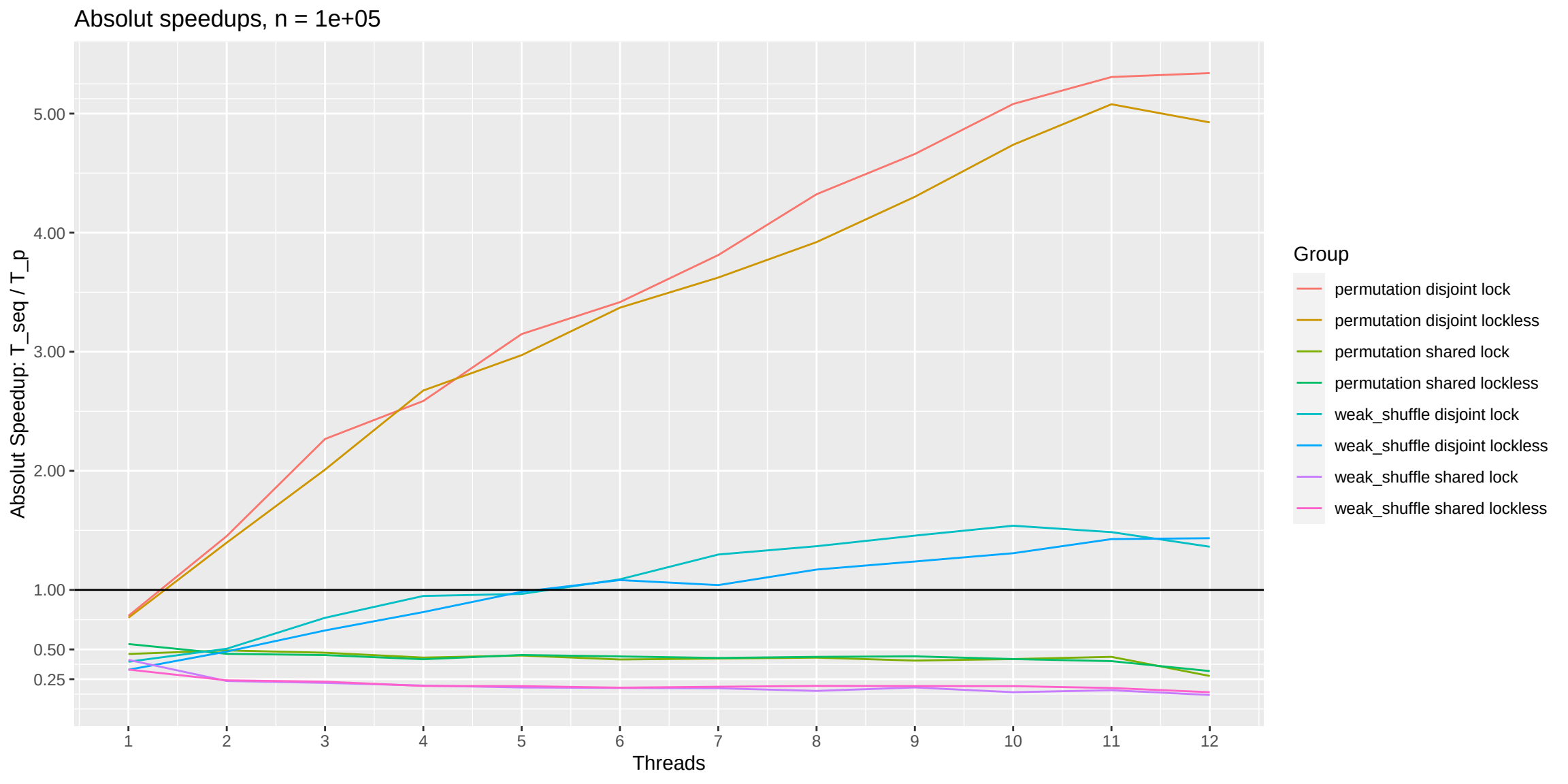
Experiment Info:

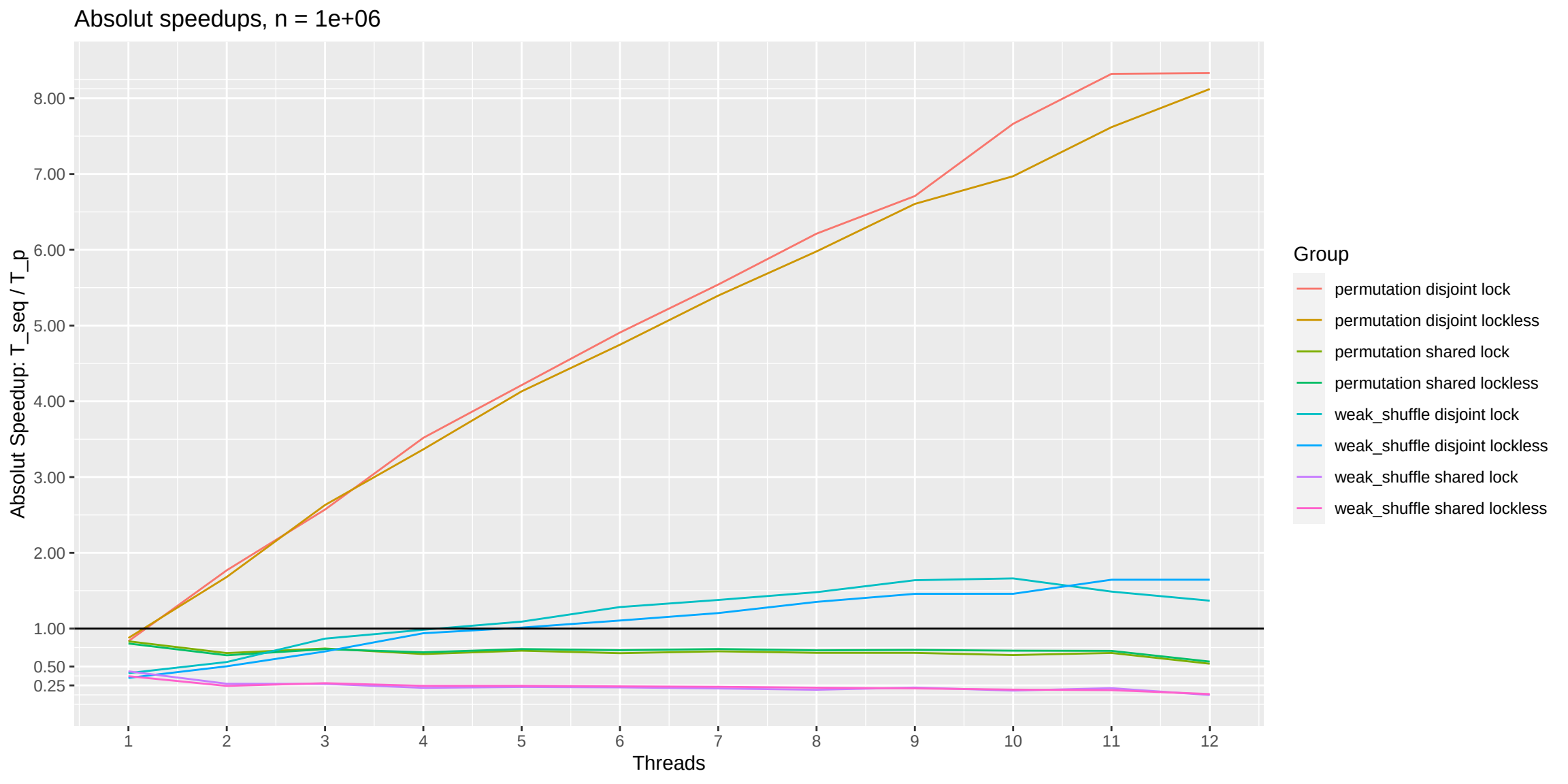
machine: 6 core laptop with 12 threads

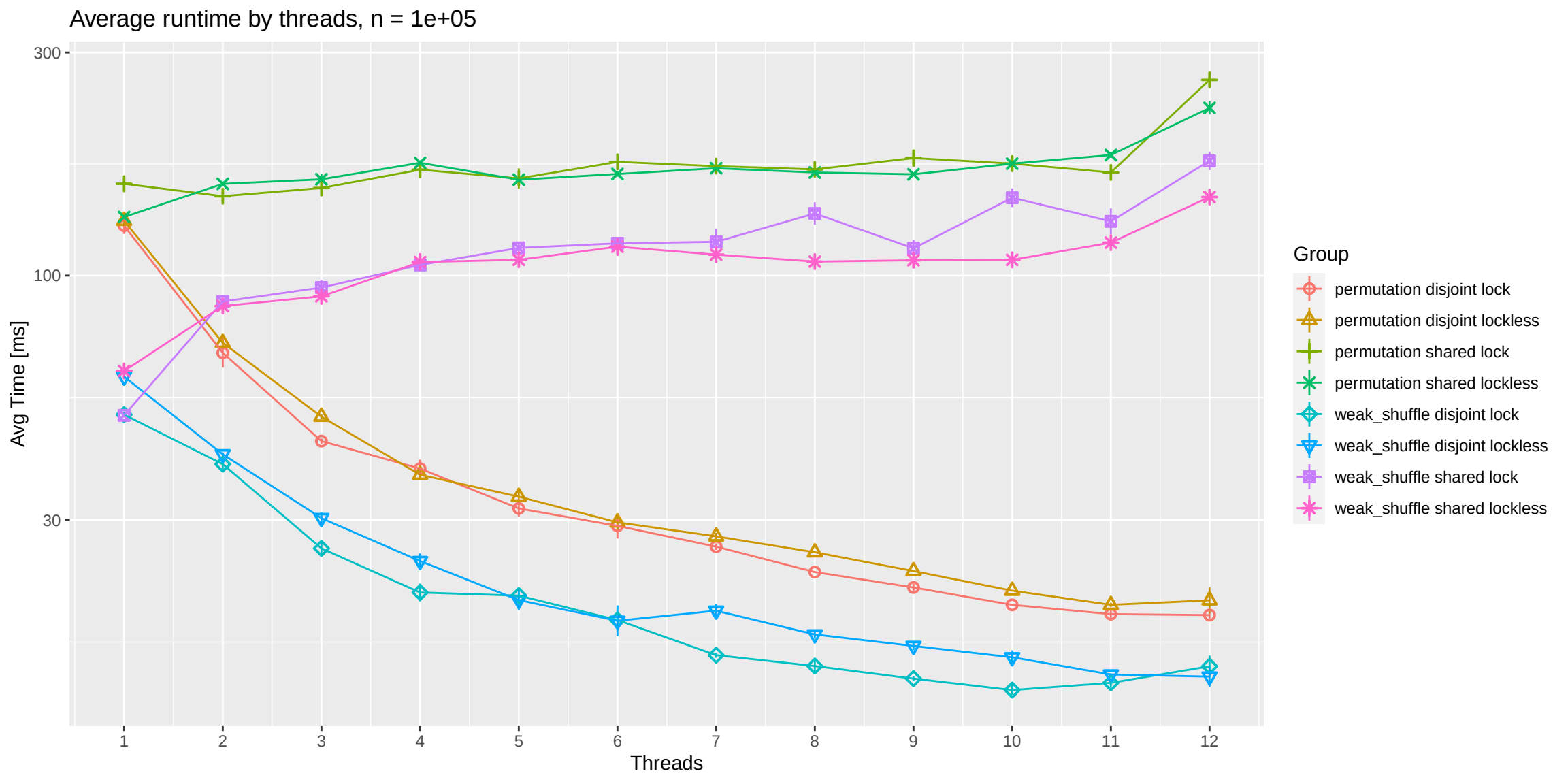
Shuffling:
- permuation: std::shuffle (n random swaps)
- weak−shuffle: n random swaps with adjacent elements in the array

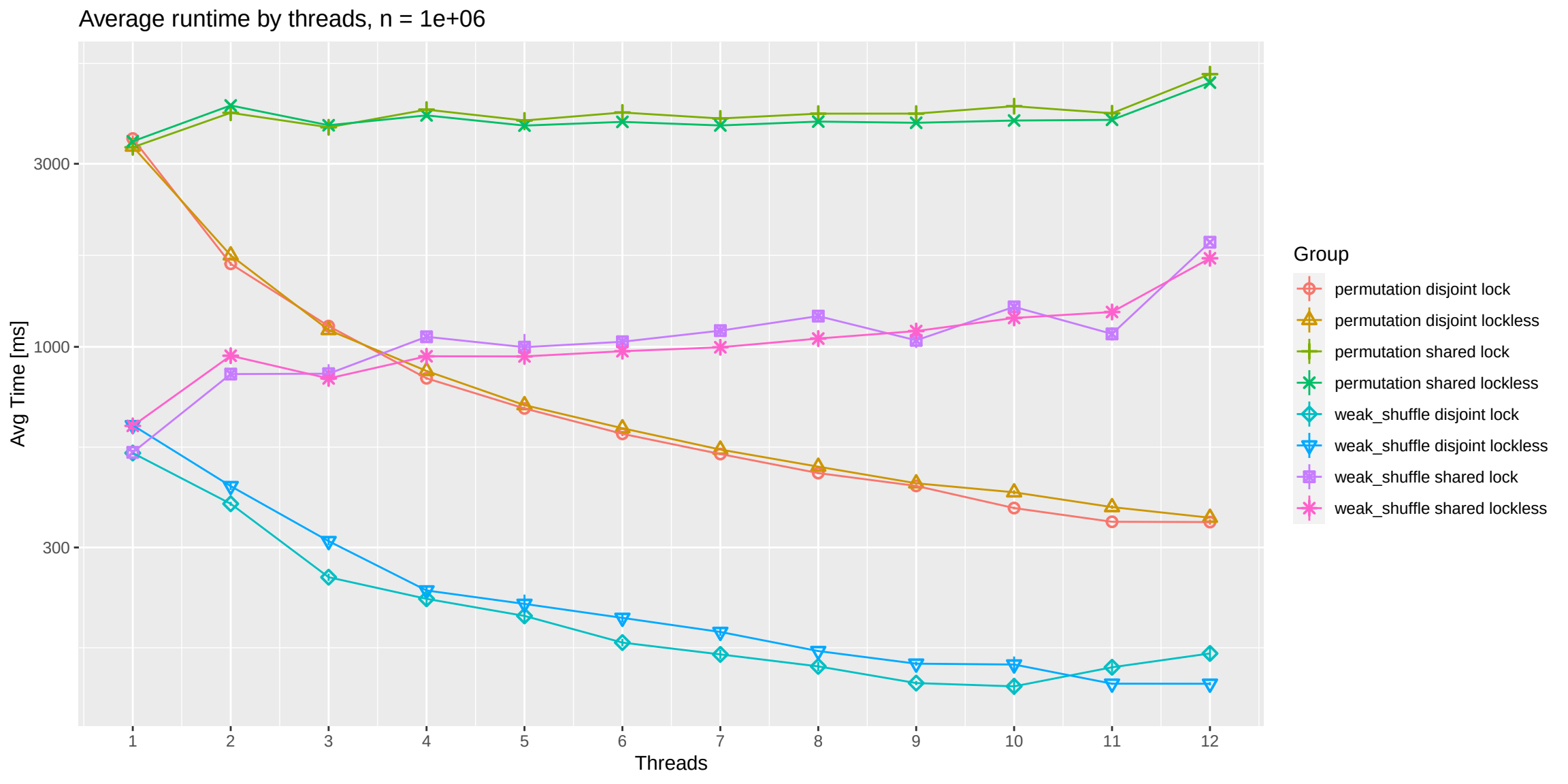
Benchmark: 5 iterations, 20% insert, 20% remove, 60% search, Key = Value = int
- Disjoint: the shuffled permutation is equally divided to each thread
- Shared:: the shuffled permuation is given to each thread

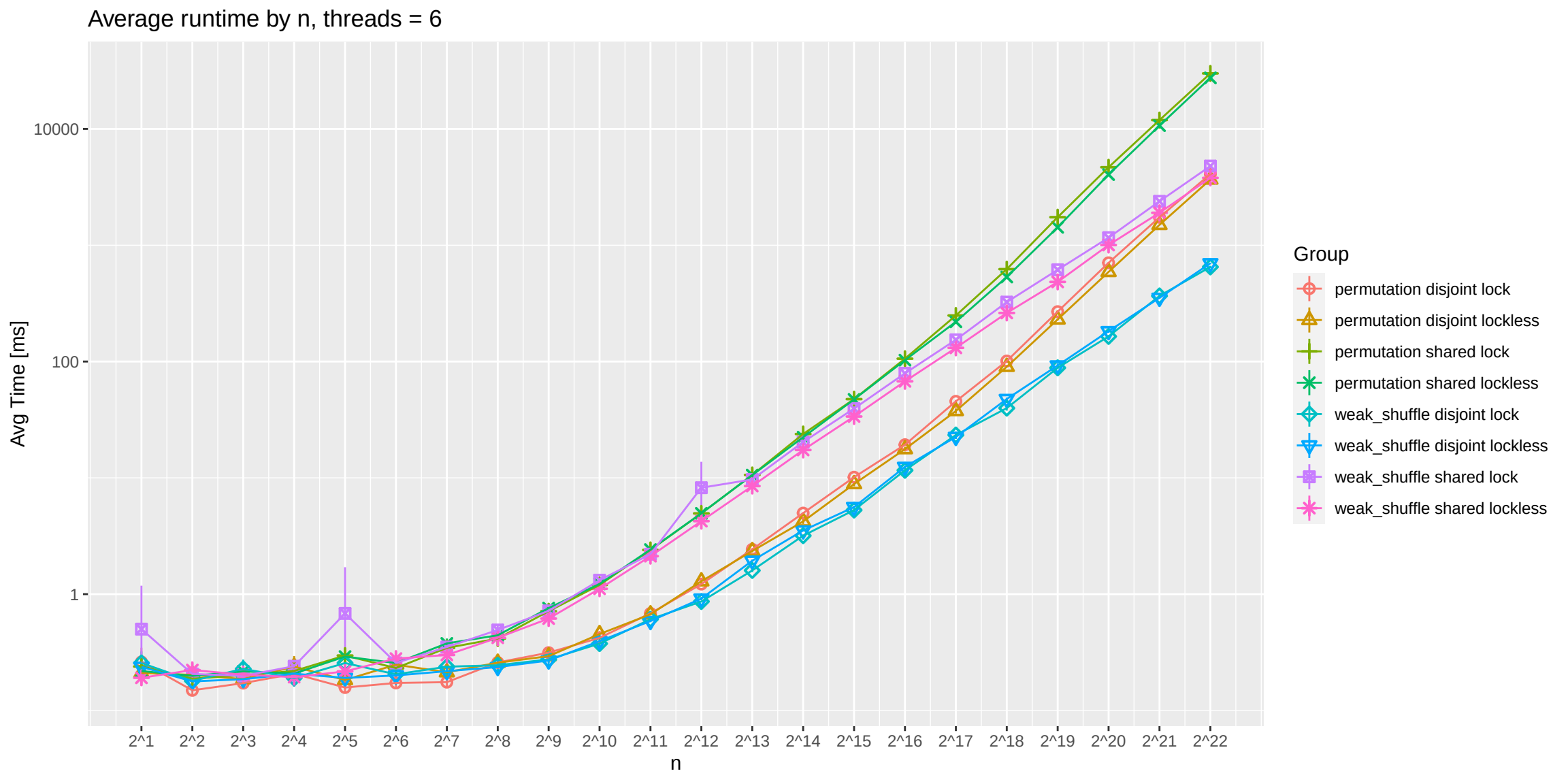

Average runtime by probabilty p
Avg Time [ms]
10000
3000
1000
300
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
p
Group
permutation disjoint lock
permutation disjoint lockless
permutation shared lock
permutation shared lockless
weak_shuffle disjoint lock
weak_shuffle disjoint lockless
weak_shuffle shared lock
weak_shuffle shared lockless

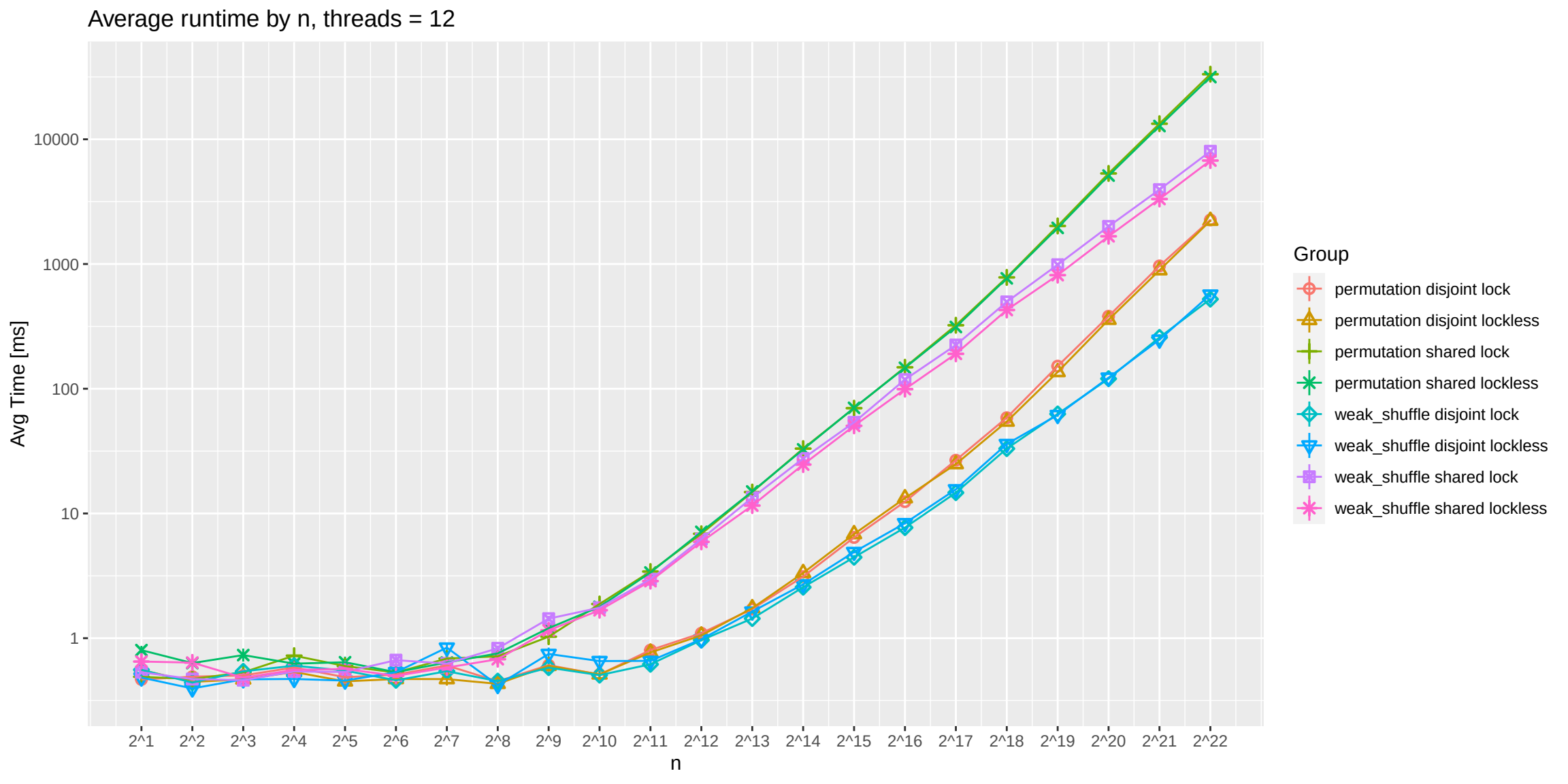

Absolut speedups, n = 1e+05
Absolut Speedup: T_seq / T_p
5.00
4.00
3.00
2.00
1.00
0.50
0.25
1
2
3
4
5
6
7
8
9
10
11
12
Threads
Group
permutation disjoint lock
permutation disjoint lockless
permutation shared lock
permutation shared lockless
weak_shuffle disjoint lock
weak_shuffle disjoint lockless
weak_shuffle shared lock
weak_shuffle shared lockless

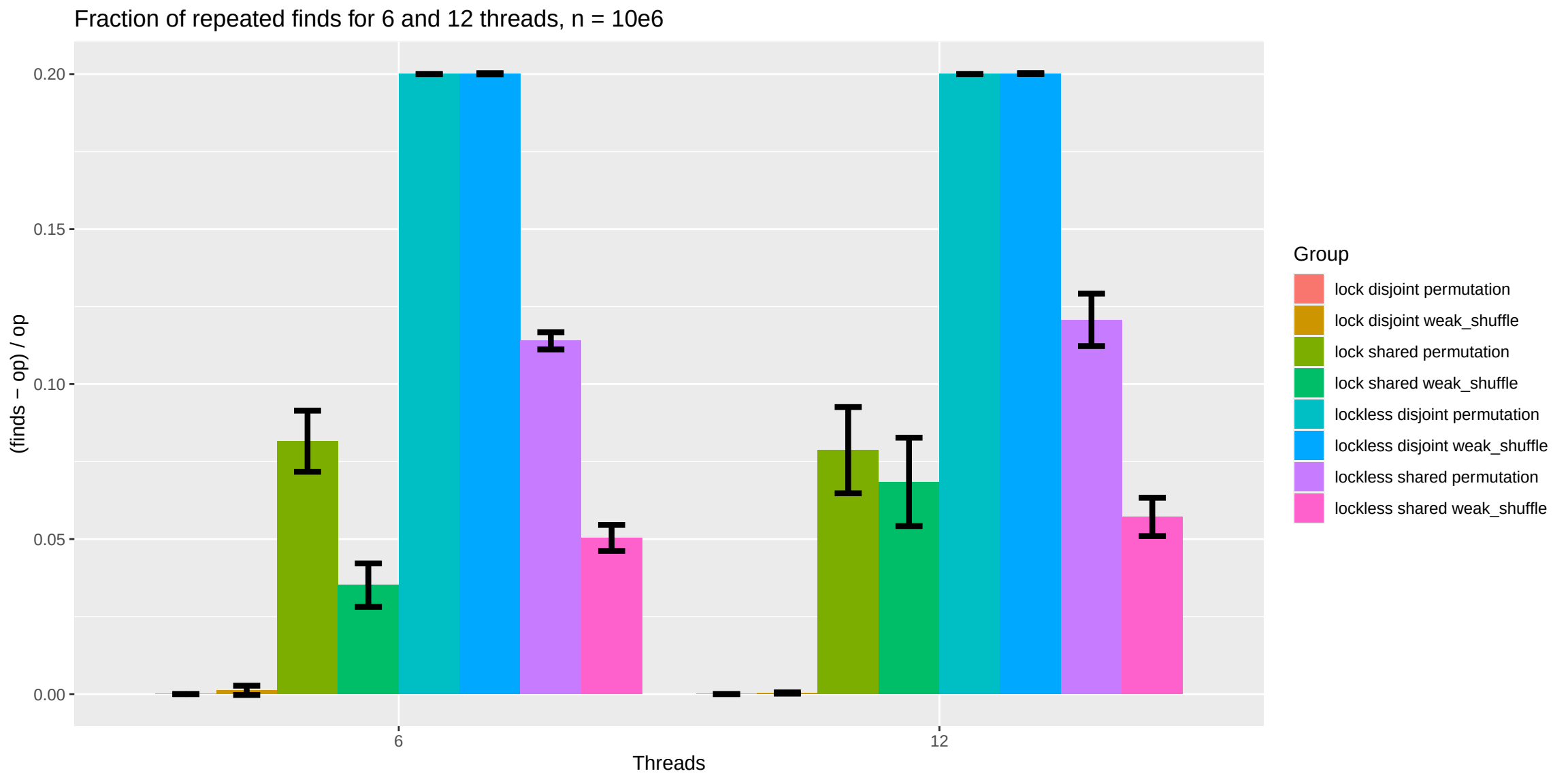

Absolut speedups, n = 1e+06
Absolut Speedup: T_seq / T_p
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.50
0.25
1
2
3
4
5
6
7
8
9
10
11
12
Threads
Group
permutation disjoint lock
permutation disjoint lockless
permutation shared lock
permutation shared lockless
weak_shuffle disjoint lock
weak_shuffle disjoint lockless
weak_shuffle shared lock
weak_shuffle shared lockless


Average runtime by threads, n = 1e+05
Avg Time [ms]
300
100
30
1
2
3
4
5
6
7
8
9
10
11
12
Threads
Group
permutation disjoint lock
permutation disjoint lockless
permutation shared lock
permutation shared lockless
weak_shuffle disjoint lock
weak_shuffle disjoint lockless
weak_shuffle shared lock
weak_shuffle shared lockless


Average runtime by threads, n = 1e+06
Avg Time [ms]
3000
1000
300
1
2
3
4
5
6
7
8
9
10
11
12
Threads
Group
permutation disjoint lock
permutation disjoint lockless
permutation shared lock
permutation shared lockless
weak_shuffle disjoint lock
weak_shuffle disjoint lockless
weak_shuffle shared lock
weak_shuffle shared lockless


Average runtime by n, threads = 6
Avg Time [ms]
10000
100
1
2^1
2^2
2^3
2^4
2^5
2^6
2^7
2^8
2^9
2^10
2^11
2^12
2^13
2^14
2^15
2^16
2^17
2^18
2^19
2^20
2^21
2^22
n
Group
permutation disjoint lock
permutation disjoint lockless
permutation shared lock
permutation shared lockless
weak_shuffle disjoint lock
weak_shuffle disjoint lockless
weak_shuffle shared lock
weak_shuffle shared lockless


Average runtime by n, threads = 12
Avg Time [ms]
10000
1000
100
10
1
2^1
2^2
2^3
2^4
2^5
2^6
2^7
2^8
2^9
2^10
2^11
2^12
2^13
2^14
2^15
2^16
2^17
2^18
2^19
2^20
2^21
2^22
n
Group
permutation disjoint lock
permutation disjoint lockless
permutation shared lock
permutation shared lockless
weak_shuffle disjoint lock
weak_shuffle disjoint lockless
weak_shuffle shared lock
weak_shuffle shared lockless


Fraction of repeated finds for 6 and 12 threads, n = 10e6
(finds – op) / op
0.20
0.15
0.10
0.05
0.00
6
12
Threads
Group
lock disjoint permutation
lock disjoint weak_shuffle
lock shared permutation
lock shared weak_shuffle
lockless disjoint permutation
lockless disjoint weak_shuffle
lockless shared permutation
lockless shared weak_shuffle