

Symmetric multiprocessing (SMP) scaling

Stockfish 8 and Komodo 10.4 under Windows & Linux

Windows: Windows 10 Professional 64-Bit, Dual AMD Opteron 6376 @ 2.3 GHz

Linux: Ubuntu Server 16.04 LTS (HVM) 64-Bit, Amazon EC2 Instance, m4.16xlarge, Intel Xeon E5-2686v4 @ 2.3 GHz

Engines: default settings, 128 MB Hash

Cutechess-Cli: no draw and resign rules, no ponder, no learning, no tablebases, 1500 diff. opening positions, changing colors

TC = time control, T = number of threads, Elostat Start Elo = 3000

Windows - 1 thread vs 2 threads

TC = 60" + 0.05"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T2 | : 3031 | 6 | 6 | 3000 | 58.7 % | 73.7 % | 21.59 |
| 2 Stockfish 8 T1 | : 2969 | 6 | 6 | 3000 | 41.3 % | 73.7 % | 20.33 |

Result : 1761.0/3000 (+655,=2212,-133)
Perf. : 58.7 %
Elo : **3061**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T2 | : 3044 | 8 | 8 | 3000 | 62.3 % | 59.1 % | 18.48 |
| 2 Komodo 10.4 T1 | : 2956 | 8 | 8 | 3000 | 37.7 % | 59.1 % | 17.44 |

Result : 1868.5/3000 (+982,=1773,-245)
Perf. : 62.3 %
Elo : **3087**

Linux - 1 thread vs 2 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T2 | : 3039 | 7 | 7 | 3000 | 61.0 % | 68.1 % | 19.84 |
| 2 Stockfish 8 T1 | : 2961 | 7 | 7 | 3000 | 39.0 % | 68.1 % | 18.73 |

Result : 1830.0/3000 (+809,=2042,-149)
Perf. : 61.0 %
Elo : **3078**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T2 | : 3044 | 8 | 8 | 3000 | 62.3 % | 55.2 % | 17.02 |
| 2 Komodo 10.4 T1 | : 2956 | 8 | 8 | 3000 | 37.7 % | 55.2 % | 16.06 |

Result : 1868.5/3000 (+1040,=1657,-303)
Perf. : 62.3 %
Elo : **3087**

Windows - 1 thread vs 4 threads

TC = 60" + 0.05"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T4 | : 3056 | 7 | 7 | 3000 | 65.6 % | 65.7 % | 23.08 |
| 2 Stockfish 8 T1 | : 2944 | 7 | 7 | 3000 | 34.4 % | 65.7 % | 20.66 |

Result : 1968.0/3000 (+982,=1972,-46)
Perf. : 65.6 %
Elo : **3112**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T4 | : 3076 | 8 | 8 | 3000 | 70.6 % | 51.5 % | 20.04 |
| 2 Komodo 10.4 T1 | : 2924 | 8 | 8 | 3000 | 29.4 % | 51.5 % | 17.71 |

Result : 2118.0/3000 (+1345,=1546,-109)
Perf. : 70.6 %
Elo : **3152**

Linux - 1 thread vs 4 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T4 | : 3064 | 7 | 7 | 3000 | 67.6 % | 61.2 % | 21.41 |
| 2 Stockfish 8 T1 | : 2936 | 7 | 7 | 3000 | 32.4 % | 61.2 % | 19.39 |

Result : 2028.5/3000 (+1111,=1835,-54)
Perf. : 67.6 %
Elo : **3128**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T4 | : 3084 | 9 | 9 | 3000 | 72.4 % | 47.4 % | 18.51 |
| 2 Komodo 10.4 T1 | : 2916 | 9 | 9 | 3000 | 27.7 % | 47.4 % | 16.29 |

Result : 2170.5/3000 (+1459,=1423,-118)
Perf. : 72.4 %
Elo : **3167**

Windows - 1 thread vs 8 threads

TC = 60" + 0.05"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T8 | : 3079 | 8 | 8 | 3000 | 71.2 % | 56.4 % | 23.87 |
| 2 Stockfish 8 T1 | : 2921 | 8 | 8 | 3000 | 28.8 % | 56.4 % | 20.40 |

Result : 2135.5/3000 (+1289,=1693,-18)
Perf. : 71.2 %
Elo : **3157**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T8 | : 3104 | 9 | 9 | 3000 | 76.8 % | 42.7 % | 21.19 |
| 2 Komodo 10.4 T1 | : 2896 | 9 | 9 | 3000 | 23.2 % | 42.7 % | 17.82 |

Result : 2305.5/3000 (+1665,=1281,-54)
Perf. : 76.8 %
Elo : **3208**

Linux - 1 thread vs 8 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T8 | : 3093 | 8 | 8 | 3000 | 74.4 % | 50.4 % | 22.35 |
| 2 Stockfish 8 T1 | : 2907 | 8 | 8 | 3000 | 25.6 % | 50.4 % | 19.38 |

Result : 2232.5/3000 (+1477,=1511,-12)
Perf. : 74.4 %
Elo : **3185**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Komodo 10.4 T8 | : 3121 | 10 | 10 | 3000 | 80.1 % | 35.8 % | 19.47 |
| 2 Komodo 10.4 T1 | : 2879 | 10 | 10 | 3000 | 19.9 % | 35.8 % | 16.25 |

Result : 2404.0/3000 (+1867,=1074,-59)
Perf. : 80.1 %
Elo : **3242**

Windows - 1 thread vs 16 threads

TC = 60" + 0.05"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T16 | : 3101 | 9 | 9 | 3000 | 76.1 % | 47.4 % | 24.93 |
| 2 Stockfish 8 T1 | : 2899 | 9 | 9 | 3000 | 23.9 % | 47.4 % | 20.16 |

Result : 2283.0/3000 (+1572,=1422,-6)
 Perf. : 76.1 %
 Elo : **3201**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Komodo 10.4 T16 | : 3140 | 11 | 11 | 3000 | 83.3 % | 32.0 % | 21.31 |
| 2 Komodo 10.4 T1 | : 2860 | 11 | 11 | 3000 | 16.7 % | 32.0 % | 17.38 |

Result : 2499.5/3000 (+2020,=959,-21)
 Perf. : 83.3 %
 Elo : **3279**

Linux - 1 thread vs 16 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Stockfish 8 T16 | : 3113 | 13 | 13 | 1516 | 78.7 % | 42.0 % | 23.33 |
| 2 Stockfish 8 T1 | : 2887 | 13 | 13 | 1516 | 21.3 % | 42.0 % | 19.33 |

Result : 1192.5/1516 (+874,=637,-5)
 Perf. : 78.7 %
 Elo : **3227**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Komodo 10.4 T16 | : 3163 | 18 | 17 | 1514 | 86.7 % | 24.8 % | 20.42 |
| 2 Komodo 10.4 T1 | : 2837 | 17 | 18 | 1514 | 13.3 % | 24.8 % | 16.12 |

Result : 1313.0/1514 (+1125,=376,-13)
 Perf. : 86.7 %
 Elo : **3326**

Linux - 1 thread vs 32 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Stockfish 8 T32 | : 3115 | 13 | 13 | 1502 | 79.0 % | 41.5 % | 23.03 |
| 2 Stockfish 8 T1 | : 2885 | 13 | 13 | 1502 | 21.0 % | 41.5 % | 19.45 |

Result : 1186.0/1502 (+874,=624,-4)
 Perf. : 79.0 %
 Elo : **3230**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Komodo 10.4 T32 | : 3172 | 18 | 18 | 1502 | 87.9 % | 23.4 % | 20.94 |
| 2 Komodo 10.4 T1 | : 2828 | 18 | 18 | 1502 | 12.1 % | 23.4 % | 16.22 |

Result : 1320.5/1502 (+1145,=351,-6)
 Perf. : 87.9 %
 Elo : **3345**

Windows - 2 threads vs 4 threads

TC = 60" + 0.05"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T4 | : 3027 | 6 | 6 | 3000 | 57.7 % | 76.5 % | 22.95 |
| 2 Stockfish 8 T2 | : 2973 | 6 | 6 | 3000 | 42.3 % | 76.5 % | 21.61 |

Result : 1732.0/3000 (+584,=2296,-120)
 Perf. : 57.7 %
 Elo : **3054**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T4 | : 3043 | 8 | 8 | 3000 | 62.2 % | 60.7 % | 19.82 |
| 2 Komodo 10.4 T2 | : 2957 | 8 | 8 | 3000 | 37.8 % | 60.7 % | 18.23 |

Result : 1867.0/3000 (+956,=1822,-222)
 Perf. : 62.2 %
 Elo : **3087**

Linux - 2 threads vs 4 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T4 | : 3032 | 9 | 9 | 1570 | 59.2 % | 71.6 % | 21.32 |
| 2 Stockfish 8 T2 | : 2968 | 9 | 9 | 1570 | 40.8 % | 71.6 % | 20.28 |

Result : 929.0/1570 (+367,=1124,-79)
 Perf. : 59.2 %
 Elo : **3064**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Komodo 10.4 T4 | : 3033 | 11 | 11 | 1512 | 59.5 % | 56.9 % | 18.21 |
| 2 Komodo 10.4 T2 | : 2967 | 11 | 11 | 1512 | 40.5 % | 56.9 % | 17.08 |

Result : 900.0/1512 (+470,=860,-182)
 Perf. : 59.5 %
 Elo : **3067**

Windows - 4 threads vs 8 threads

TC = 60" + 0.05"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T8 | : 3024 | 6 | 6 | 3000 | 56.9 % | 78.5 % | 24.39 |
| 2 Stockfish 8 T4 | : 2976 | 6 | 6 | 3000 | 43.1 % | 78.5 % | 23.11 |

Result : 1707.0/3000 (+529,=2356,-115)
 Perf. : 56.9 %
 Elo : **3048**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T8 | : 3037 | 7 | 7 | 3000 | 60.4 % | 64.4 % | 20.70 |
| 2 Komodo 10.4 T4 | : 2963 | 7 | 7 | 3000 | 39.6 % | 64.4 % | 19.59 |

Result : 1812.5/3000 (+847,=1931,-222)
 Perf. : 60.4 %
 Elo : **3073**

Linux - 4 threads vs 8 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T8 | : 3023 | 8 | 8 | 1510 | 56.6 % | 76.8 % | 22.87 |
| 2 Stockfish 8 T4 | : 2977 | 8 | 8 | 1510 | 43.4 % | 76.8 % | 21.96 |

Result : 854.5/1510 (+275,=1159,-76)
 Perf. : 56.6 %
 Elo : **3046**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Komodo 10.4 T8 | : 3029 | 10 | 10 | 1510 | 58.3 % | 64.0 % | 19.49 |
| 2 Komodo 10.4 T4 | : 2971 | 10 | 10 | 1510 | 41.7 % | 64.0 % | 18.78 |

Result : 881.0/1510 (+398,=966,-146)
 Perf. : 58.3 %
 Elo : **3059**

Windows - 8 threads vs 16 threads

TC = 60" + 0.05"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T16 | : 3023 | 5 | 5 | 3000 | 56.5 % | 80.0 % | 25.68 |
| 2 Stockfish 8 T8 | : 2977 | 5 | 5 | 3000 | 43.5 % | 80.0 % | 24.31 |

Result : 1694.0/3000 (+494,=2400,-106)
 Perf. : 56.5 %
 Elo : **3045**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T16 | : 3033 | 7 | 7 | 3000 | 59.2 % | 65.6 % | 21.22 |
| 2 Komodo 10.4 T8 | : 2967 | 7 | 7 | 3000 | 40.8 % | 65.6 % | 20.47 |

Result : 1777.5/3000 (+793,=1969,-238)
 Perf. : 59.2 %
 Elo : **3065**

Linux - 8 threads vs 16 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T16 | : 3016 | 8 | 8 | 1514 | 54.5 % | 79.4 % | 24.20 |
| 2 Stockfish 8 T8 | : 2984 | 8 | 8 | 1514 | 45.5 % | 79.4 % | 23.73 |

Result : 825.0/1514 (+224,=1202,-88)
 Perf. : 54.5 %
 Elo : **3031**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|----|----|-------|--------|--------|--------------|
| 1 Komodo 10.4 T16 | : 3022 | 10 | 10 | 1512 | 56.3 % | 65.3 % | 20.56 |
| 2 Komodo 10.4 T8 | : 2978 | 10 | 10 | 1512 | 43.7 % | 65.3 % | 19.88 |

Result : 851.5/1512 (+358,=987,-167)
 Perf. : 56.3 %
 Elo : **3044**

Linux - 16 threads vs 32 threads

TC = 10" + 0.1"

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Stockfish 8 T32 | : 3004 | 8 | 7 | 1254 | 51.3 % | 84.8 % | 25.62 |
| 2 Stockfish 8 T16 | : 2996 | 7 | 8 | 1254 | 48.7 % | 84.8 % | 25.92 |

Result : 643.0/1254 (+111,=1064,-79)
 Perf. : 51.3 %
 Elo : **3009**

| Program | Elo | + | - | Games | Score | Draws | Depth |
|-------------------|--------|---|---|-------|--------|--------|--------------|
| 1 Komodo 10.4 T32 | : 3006 | 9 | 9 | 1606 | 51.7 % | 69.2 % | 20.82 |
| 2 Komodo 10.4 T16 | : 2994 | 9 | 9 | 1606 | 48.3 % | 69.2 % | 21.34 |

Result : 830.0/1606 (+274,=1112,-220)
 Perf. : 51.7 %
 Elo : **3012**