

Chess endgame news

Article

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NOTES

CHESS ENDGAME NEWS

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In the 8th round of the ICGA 2011 World Computer Chess Championship in Tilburg, ROOKIE -v- THE BARON provided a case study for tournament arbiters and endgame connoisseurs. Black correctly announced ‘mate in 30’ as advised by its Nalimov DTM(ate) EGT at KQPKQP position 65b, Figure 1a. White was ready to resign but arbiter Jan Krabbenbos’ call was to play on. A mild case of bit rot meant that THE BARON was in fact only intermittently in touch² with its somewhat flawed KQPKQP EGT and could not simply win by look-up. As the next 25 moves show, with (equi-)optimal-move marks and concessions (Bleicher, 2012) in brackets, THE BARON actually regressed in DTM terms, playing five DTM-suboptimal moves and conceding a DTM depth of 36m to ROOKIE’s 9m. However, it still reached KQPKQP with a healthy EGT and a look-up win:

65. ...Qd4+'' 66. Kg2' b2'' 67. Qg6' Qd2+ (+8) 68. Kh3'' Kc7 (+1) 69. Qe4'' Kd6'' 70. Qf5 (-4) Qh6+'' 71. Kg2'' Qc1 (+15: dtm -43m) 72. Qf6+ (-1) Kc5'' 73. Qe7+'' Kb5'' 74. Qb7+'' Ka4'' 75. Qa6+'' Kb3'' 76. Qb7+'' Ka2'' 77. Qd5+'' Ka1'' 78. Qa8+ (-1) Kb1° 79. Qd5'' Qc2+'' 80. Kh3'' Qe2'' 81. Qf7 (-3) Kc1'' 82. Qf4+'' Kd1'' 83. Qf5'' Ke1'' 84. Kh4'' Qe3 (+2) 85. Kh5'' Qb3 (+10: dtm -36m) 86. Qe4+'' Kf2' 87. Qd4+'' Kg2'' 88. Qd2+'' Kh3'' 89. Qd7+'' Kxg3'' (Figure 1b, dtc -21m, dtm -32m) 90. Qg4+'' Kf2'' 91. Qh4+'' Kg2'' 92. Qg4+'' Qg3'' 93. Qe2+'' Qf2'' 94. Qg4+'' Kh2'' 95. Qe4'' Qc5+'' 96. Kh4'' Qc3'' 97. Qf4+'' Kg2' ... 111. (8/8/8/8/8/2Q5/1pq4K/2k5) Resigns 0-1.

In comparison, a DTM-minimaxing line from ChessOK (2012) is 65. ... Qd4+'' 66. Kh2' b2'' 67. Qf7+'' Kc6'' 68. Qe6+'' Kb5'' 69. Qf5+'' Kb4'' 70. Kh3'' Qh8+'' 71. Kg2'' Qa8+'' 72. Kh2'' Qc6'' 73. Qd3'' Ka4'' 74. g4'' Kb4'' 75. g5'' Qc7+'' 76. Kg2'' Qc4'' 77. Qf5'' Kc3'' 78. Qf6+'' Qd4'' 79. Qc6+'' Kd2'' 80. Qb7'' Qg4+'' 81. Kh2'' Qe2+'' 82. Kg1'' Qd1+'' 83. Kf2'' b1Q'' (KQPKQQ, Figure 1c; dtm = -11) 84. Qd5+'' Qd3' 85. Qa5+'' Qc3'' ... 0-1.

So, congratulations to the arbiter for an exemplary call which extended the challenge in this game.

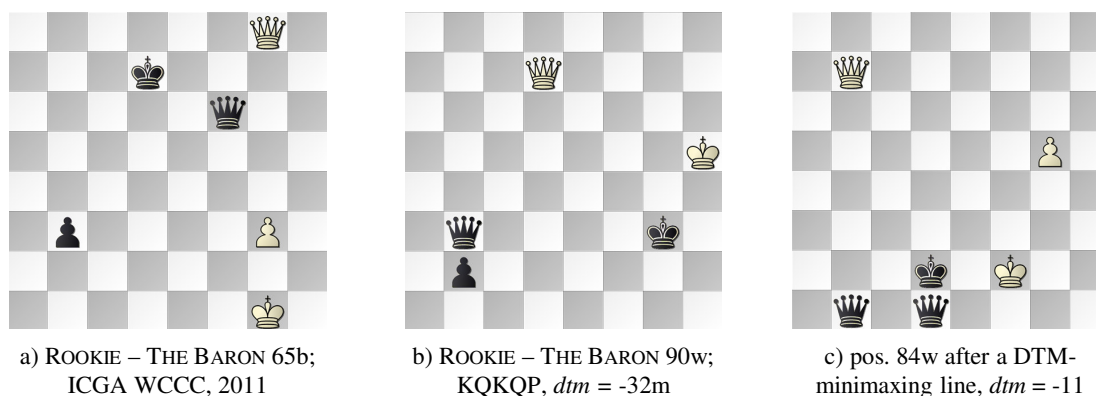


Figure 1: three positions related to ICGA WCCC 2011, ROOKIE -v- THE BARON.

More recently, the 6½-6½ deadlock in the FIDE 2012 World Chess Championship between Anand and Gelfand was broken by superior endgame technique in the KRNPKR phase of Rapid Game 2. This began at theoretically drawn position 56b, Figure 2: White’s aim was to exchange into a KRPKR win. One might therefore ask what moves constitute the most challenging attack and resilient defence against a fallible opponent. Gelfand was facing a tricky Knight and defending a difficult position on time-increments only but Marc Bourzutschky confirms that the game was theoretically drawn³ until position 71b. Here, Bh1 was correct but 71. ... Rf5? allowed the White Knight to check, fork and exchange to advantage with 72. Ne6+ Kc8⁴ 73. Nd4 Rf8 74. Nxf3 Rxf3 (dtc 20m, dtm 34m). Black resigned after 75. Kb6' Rb3 (-2) 76. Rg8+'' Kd7° 77. Rb8'' (dtc -15m, dtm -29m).⁵

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² A failure mode the author has not been able to reproduce by corrupting a KQPKQP EGT: all advice welcome.

³ Gelfand missed a quick draw at 58b, 8/1k6/8/1P1N2r1/3K3R/8/2b5/8: 58. ... Bd3! 59. Kxd3 (59. ~ Bxb5) Rxd5 =.

⁴ MB notes the doughty 72. ...Kd7!/? 73. Nd4! Bh5 74. Rg7+! Rf7 75. Rg5! (75. Rxf7? Bxf7 =) Bd1 76. b6 1-0.

⁵ Assuming minimaxing strategies SC^M/SC^M (Haworth, 2000): 77. ...Rc3' 78. Ka7'' Ra3+'' 79. Kb7'' Rb3'' 80. b6'' Rb2' 81. Rh8'' Rb1' 82. Ka7'' Ra1+'' 83. Kb8'' Rb1' 84. b7'' Ra1'' 85. Rh4'' Kd6'' 86. Rd4+'' Ke6'' {a Lucena position} 87. Kc7''

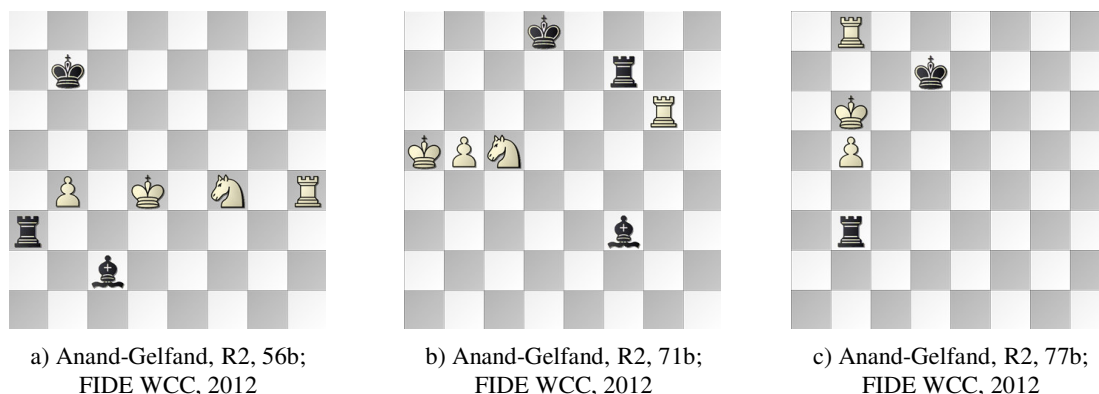


Figure 2: three positions from FIDE WCC 2012, Anand -v- Gelfand, Rapid Game 2.

The chess studies magazine EG published by ARVES continues to provide varied and accessible fare for the reader under its new editor Harold van der Heijden: the contribution of the computer to endgame knowledge is a persistent theme with an excellent column edited by Emil Vlasák. Bourzutschky and Konoval (2011a/b, 2012) have started a serialisation of their sub-8-man findings there with an outstanding combination of computational and chessic authority. The first instalment has been welcomed (Haworth, 2011) and the next two are reviewed here. The 7-man endings covered so far are KBPPKBP, KBPPKNP, KNPPKBP, KNPPKNP, KPPPKPP, KQPPKQP and KRPPKRP. The articles include DTC(onversion)-minimaxing lines from the maxDTC outposts at the extremities of chess, admittedly under their current pragmatic constraint that P-promotions from 7-man endgames are to Queen only. These positions with authors' notes are listed in Table 1. There are also games in which one or more half-points were exchanged: Table 2 indicates the position at which the first 7-man error was made and the total of yielded (half-)points. Some newly 'cooked' studies (van der Heijden, 2010) are featured: Table 3 gives the 'cook position' at which Black improves on the composer's main line.

The square-colour profile of endgame positions involving Bishops has a fundamental effect on their nature. Therefore B&K (2011b) distinguish between *KBPPKBP*s with same-colour Bishops and *KBPPKBPo* with opposite colour Bishops. An extension of the GBR code (e.g., 0040.21_20 for *KBPPKBP*s⁶ and 0040.21_11 for *KBPPKBPo*) would in fact provide a notation to identify all Bishop profiles: *KBBPKBB* is 0080.10_ *ab* with *ab* any of 44, 53, 62, 71 or 80 corresponding to⁷ square-colour splits Bb/Bb (the normal profile without obtrusive force), BBb/b, bb/BB, Bbb/B and BBbb/-.

BK#	Endgame	EG GBR	FEN position	DTC	1 of ..	Note
2.01	KBPPKBP~	0040.21_20	8/8/2p5/4k1b1/8/8/1KP4P/B7 w	78	3	all three positions are similar
2.02	KBPKBPPs~	0040.12_20	5b2/4p3/4p3/4B3/8/2K5/1P6/2k5 w	38	15	
2.09	KBPPKBPo~	0040.21_11	8/2p5/1k6/8/5P2/8/P4b2/K2B4 w	52	146	
2.10	KBPPKBPo~	0040.21_11	8/7k/5p2/2B5/8/8/2PP4/K6b w	52	146	four different P-structures, each with its own winning method
2.11	KBPPKBPo~	0040.21_11	8/7k/4b3/2B5/1Pp5/8/6P1/K7 w	52	146	
2.12	KBPPKBPo~	0040.21_11	1k6/4p3/2B5/8/8/8/1P4Pb/2K5 w	52	146	
2.13	KBPKBPPo~	0040.12_11	8/8/8/2B1k3/8/6p1/4P1p1/K6b w	24	38	all with P(g3, g4) and B(h1)
2.21	KBPPKNP~	0013.21	8/3p4/8/8/k7/8/3P2P1/K3B1n1 w	87	4	all four positions are similar
2.22	KNPKBPP~	0031.12	b4k2/1p5p/1P6/8/5N2/8/K7/8 w	29	4	all reachable in FR-chess only
2.23	KNPKBPP~	0031.12	8/3p4/3p4/6P1/2N5/K6b/8/k7 w	27	1	
3.01	KNPPKBP~	0031.21	8/2p5/8/8/6b1/1PP5/K7/1N5k w	102	1	! No P-move after 9. b4
3.02	KBPKNPP~	0013.12	8/8/B2p4/3p4/8/P6n/1K6/7k w	40	23	three different doubled-pawn P-structures
3.03	KBPKNPP~	0013.12	k7/p7/2K5/p7/1n6/7P/8/2B5 w	40	23	
3.04	KBPKNPP~	0013.12	8/K2n2p1/6p1/8/7B/8/P6k/8 w	40	23	
3.13	KNPPKNP~	0004.21	8/3p4/4N3/7n/8/1P6/2P5/k1K5 w	110	1	
3.14	KNPKNPP~	0004.12	8/4p3/1K4p1/8/1P6/8/6n1/1N3k2 w	44	8	v difficult, interesting win
3.23	KPPPKPP~	0000.32	3k4/4p2p/8/8/8/4PP2/5P2/1K6 w	36	6	all six positions are similar
3.24	KPPKPPP~	0000.23	8/8/3p4/3p4/3pk3/1K6/1P1P4/8 w	26	9	all nine positions are similar

Table 1: the 18 maxDTC positions in Bourzutschky and Konoval (2011b, 2012).

Rc1+ 88. Kb6" Rb1+ 89. Ka6" Ke5" 90. Ra4" {defending the bridge to b8} Kd6" 91. Ka7" Kc7" 92. b8=Q+ 1-0.

⁶ A 'White' piece is indicated by a '1' and a 'Black' piece by a '3': '.wb' indicates the number of White and Black pawns.

⁷ The 'second-colour' squares can be such that $b \leq a$, given the freedom of an $a \leftrightarrow h$ flip of the board.

BK#	Endgame	first 7-man FEN position	first error		yielded		date, ECO, players	
			val.	not ...	but ...	res. points		
2.03	KBPPKBPs	68b: 8/8/3Pbk2/2K5/B4p2/P7/8/8	=	71...Res	...Kd4!!	1-0	0.5	1979, E64, Kuzmin-Bouaziz
2.04	KBPPKBPs	67w: 8/3P4/kBK5/p7/P6b/8/8/8	1-0	67. Kc7	Bg1	1-0	1.0	2000, A18, Poluljahov-Ivanov
2.05	KBPPKBPs	69w: 8/8/6pK/4P3/k3b3/8/Bp6/8	0-1	74...g5	...Kb4!	0-1	1.0	2008, C12, Gashimov-Korchnoi
2.14	KBPPKBPs	79b: 8/8/2pB3P/8/1p6/1k1b4/8/K7	=	80. Res	Be7	0-1	0.5	1988, C43, Makarichev-Ye Rongguang
2.15	KBPPKBPs	84b: 8/8/4p3/3bk1B1/8/1pK3P1/8/8	=	93. Bh4	Bh6	0-1	0.5	2002, D30, Iskusnyh-V Malakhov
2.16	KBPPKBPs	53w: 8/2B5/8/1P1b4/7k2/P5/5Kp1/8	=	53...Kg4	...Bc4/Kg5	1-0	0.5	2008, C89, Bacrot-Sargissian
2.24	KNPKBPP	74b: 8/3K4/6pk/6Np/7P/8/8/b7	0-1	74...Bd4	...Bf6!!	=	1.5	1876, C46, L Paulsen-Anderssen
2.25	KNPKBPP	102b: 4b3/8/p7/N1k2P1p/7K/8/8/8	0-1	102...Bf7	...Kd6!	=	0.5	1954, A34, Kotov-Byrne
2.26	KBPPKNP	58w: 8/8/8/1k6/4n1BP/4p3/6PK/8	1-0	58. Be2+	h5+!!	=	0.5	1982, E24, Spassky-Hübner
2.27	KBPPKNP	80w: 5n2/8/5k1p/8/4B1PK/5P2/8/8	1-0	80. Bf5	Kh5!!	=	0.5	2007, D38, Eljanov-Arutinian
3.05	KNPPKBP	66w: 8/4k3/2b5/PpP5/5N2/3K4/8/8	1-0	66. Kc3	a6!	1-0	1.0	1945, C04, Boleslavsky-Rudakovsky
3.06	KBPPKNP	56w: 8/8/pn4p1/3k2P1/5K2/2B5/8/8	0-1	56...Nc4+	...Nd7!	=	0.5	1975, A41, Portisch-Timman
3.07	KBPPKNP	56w: 8/3n4/K2k4/1P6/6p1/6p1/8/7B	=	58. Res	Kb5!!	0-1	0.5	2002, A75, Akhmetov-Bu Xiangzhi
3.08	KBPPKNP	58w: 8/p1k5/n7/5B2/2P2K1p/8/8/8	=	58. Kg4	Bc2!!	=	1.0	2004, C10, Topalov-Milov
3.15	KNPPKNP	59w: 8/8/8/3k4/5P2/4n1Kp/5N1P/8	1-0	59. Kxh3	Kh4!!	=	0.5	1939, C90, Keres-Reshevsky
3.16	KNPPKNP	54b: 8/5k2/5n1p/4K2P/5N2/7P/8/8	=	59...Nc5	...Ke7!!	=	1.0	1971, E42, Gligoric-Ivkov
3.17	KNPPKNP	79w: 8/8/6k1/3Np3/2P1n1P1/8/5K2/8	=	81...Ne6	...Nb3!!	1-0	0.5	1982, C92, Tal-Rubinetti
3.18	KNPPKNP	45w: 4k3/1n6/8/5p2/2P2N2/7P/8/6K1	1-0	53. Kc3	Ke3	=	1.5	1989, E32, Karpov-Andersson
3.25	KPPPKPP	55b: 8/8/8/p1p1k3/2P4K/8/P1P5/8	0-1	57...Kb2	...Kxc4!	0-1	1.0	1960, B47, Belkadi-Pachman
3.26	KPPPKPP	52w: 8/8/pk6/1p6/1P1K1Pp1/8/8/8	=	53...a5	...g3	=	1.0	1970, B47, Barczay-Reshevsky
3.27	KPPPKPP	54b: 8/5p2/4k2p/7P/5PP1/6K1/8/8	=	58...Res	...Kd6/8	1-0	0.5	1981, C96, Psakhis-Savon
3.28	KPPPKPP	56w: 8/8/2p5/2p5/1pP4P1k4K1/8/8	0-1	56...Kxc4	...Ka2/3	=	0.5	2002, B08, Lechtynsky-Vajda

Table 2: the 22 games with 7-man errors selected for Bourzutschky and Konoval (2011b, 2012).

BK#	Endgame	HH		val.	busted at		move		date, composer(s)
		EG	GBR dbIV#		stip.	FEN position	not ...	but ...	
2.06	KBPPKBPs	0040.21_20	23790	=	0-1	3b: 8/3p3k/5K2/bPB5/8/5p2/8/8	3...Be1	3...Bc3+!!	1949, L Nyevezkey
2.07	KBPPKBPs	0040.21_20	27020	1-0	=	4b: 2B5/4pp2/8/2K2k2/3P4/7b/8/8	4...e6	4...Ke4!	1954, B Sakharov
2.08	KBPPKBPs	0040.21_20	31413	1-0	=	1b: 3K4/4P3/8/2p5/b7/1k1B4/1P6/8	1...c4	1...Kxb2!!	1960, A Herberg
2.17	KBPPKBPs	0040.21_11	3865	1-0	=	7b: 8/2k5/8/PK6/1P2B3/b1p5/8/8	7...Kb8	7...c2!!	1898, T Breede
2.18	KBPPKBPs	0040.21_11	13362	=	0-1	3b: 7k/3b4/3B4/2p5/2P4K/8/p7/8	3...a1Q	3...Kg7!	1929, V De Barbieri
2.19	KBPPKBPs	0040.21_11	47448	1-0	=	3b: 8/8/5K1P/B1p5/5p2/1b6/2k5/8	3...Bg8	3...f3!	1979, N Kralin
2.20	KBPPKBPs	0040.21_11	44834	=	0-1	4b: b7/2k3B1/8/7K/5p2/6pP/8/8	4...Kd6	4...Kc6!	1977, F Zorin
2.28	KBPPKNP	0013.21	47350	=	0-1	3b: 8/8/8/8/b2pP3/1p1N4/k7/2K5 b - e3	3...dxe3	3...Bb5!!	1979, G Amiryani
2.29	KBPPKNP	0013.21	12522	1-0	=	1b: 8/2P5/1p6/1K2N3/5k2/8/4p3/2b5	1...Ke3	1...Kxe5!!	1928, J Hasek
2.30	KBPPKNP	0013.21	57523	1-0	=	6b: 6b1/1p2N1K1/4kP2/3p4/8/8/8/8	6...Bf7	6...d4!	1989, I Melnichenko
2.31	KBPPKNP	0013.21	31039	1-0	=	4b: 8/8/P7/3p4/p3N1k1/8/3K4/7b	4...Bxe4	4...Kf4!	1960, V Tyavlovsky
3.09	KNPPKBP	0031.21	11408	=	0-1	1b: n7/3K4/1P1p4/8/1B6/2k5/2p5/8	1...Kxb4	1...Kb3!	1927, A Herbstman
3.10	KBPPKNP	0013.12	33744	1-0	=	4b: 6K1/n7/1p1p4/8/4B1P1/8/5K2/8	4...Ke3	4...Nb5!	1964, P Vatarescu
3.11	KBPPKNP	0013.12	39573	1-0	=	4b: 8/5p1K/2kp4/3n4/3P4/5B2/8/8	---	4...Kb5!	1971, L Kopá
3.12	KNPPKBP	0031.21	54129	1-0	=	4b: 8/1b6/8/4N1K1/2k1p3/4P3/5P2/8	4...Kc3	4...Kb3!	1985, A Yusupov
3.19	KNPPKBP	0004.21	28393	1-0	=	3b: 8/3n2k1/8/3K1Pp1/6P1/8/5N2/8	3...Nf6+	3...Kf7	1955, Y Averbakh
3.20	KNPPKBP	0004.21	29714	=	0-1	2b: 8/4K3/8/1P6/8/5N2/4n1pP/7k	2...Nc3	2...Nd4	1958, A Koranyi
3.21	KNPPKBP	0004.21	37849	1-0	=	4b: 1n5K/4p3/2kP4/8/N5P1/8/8/8	4...exd6	4...e5!	1969, H Backe
3.22	KNPPKBP	0004.12	38115	=	0-1	2b: 8/8/8/p3P3/p2K4/2n5/1k6/N7	2...Nb5+	2...a3!	1970, A P Kuznetsov, A Motor
3.29	KPPKPPP	0000.23	8989	1-0	=	4b: 8/1p6/7p/P6K/2k3p1/8/5P2/8	4...Kb5	4...Kd5!!	1923, A Troitzky
3.30	KPPKPPP	0000.23	28893	=	0-1	5b: 8/6p1/4p3/5Pp1/6P1/8/1k6/3K4	5...exf5	5...e5!	1956, K Stoyanov
3.31	KPPKPPP	0000.23	34155	1-0	=	2b: 8/2K5/8/4ppP1/3pk3/8/3P4/8	2...f4	2...Kd3!	1964, E Pogoyants
3.32	KPPKPPP	0000.23	43756	1-0	=	3b: 8/8/3P4/p7/5p2/K1k1p3/4P3/8	3...f3	3...Kd2!	1976, H Reddman

Table 3: the 23 cooked studies selected for Bourzutschky and Konoval (2011b, 2012).

Vlasák (2012) notes two other promising approaches to super-6-man endgames. First, Pedro Pérez Romero (2012) offers a free Chess EGT generator FINALGEN, albeit with the restriction that there must be at most one Q/R/B/N piece per side in the initial position. Like Bleicher's FREEZER (2004), it exploits the restricted placement of advanced and/or facing Pawns to produce reduced-sized EGTs quickly. It has analysed positions with up to 11 men. FINALGEN's depth metric, DTP, is the new 'moves to P-conversion or mate'. Significantly, it then seeks mate after P-conversion by creating a Win/Unknown_value 'WU' EGT.

With the help of FINALGEN, Bryant (2012) analysed the interesting KBP(g4)P(h5)KNP(h6) position *p1w*, *2n5/7k/5B1p/2K4P/6P1/8/8/8 w*. Rusz (2012) conjectured that *p1w* is a Vital Zug (Haworth and Rusz, 2011), i.e., that *p1b* (*p1w* with btm) is vital to White winning. Bleicher used FREEZER to create an EGT for a Chess Variant with *p1b* set to draw: *p1w* then being a draw confirmed that it is indeed a Vital Zug. In Chess, *p1w/p1b* have DTC 46m/-10m so DTC zugdepth is 36m and *p1w* becomes the DTC-deepest Vital Zug known to the author. Black forces an albeit losing line of DTC/P-(equi-)optimal moves through *p1b* as follows:

(*dtc* 46m, *ntp* 55m) **1. Bd4" Ne7" 2. Kd6" Ng6" 3. Be3'** (3. Be5' Nh4" 4. Kd5" Nf3" 5. Bf4" Ne1" 6. Kc4" Kg7" 7. Kd4" Kh7" 8. Kc3" Ng2" 9. Bd2" Nh4" 10. Kd3" Nf3" 11. Bf4" Ne1+" 12. Kd2" *p12b*) **Nh4" 4. Ke5' Nf3+" 5. Ke4" Ne1" 6. Bd2" Nc2" 7. Kd3" Na3" 8. Bf4" Nb5" 9. Kc4" Na3+" 10. Kb4" Nc2+" 11. Kc3" Ne1" 12. Kd2" *p12b* Nf3+" 13. Ke3" Ne1" 14. Bg3" Nc2+" 15. Kd3" Nb4+" 16. Kc4" Nc6" 17. Kc5" Na5" 18. Bf4" Kg7" 19. Kb6" Nc4+" 20. Kb5" Na3+" 21. Kb4" Nc2+" 22. Kc3" Ne1" 23. Kd2" Nf3+" 24. Ke3" Ne1" 25. Be5+" Kg8" 26. Bc3" Nc2+" 27. Kd3" Na3" 28. Be5" Kf7" 29. Bf4" Kg7" 30. Kc3" Kh7" 31. Be5" Nb1+" 32. Kc2" Na3+" 33. Kb3" Nb5" 34. Kb4" Na7" 35. Kc5" Nc8" 36. Bf6"** (*dtc* -10m, *ntp* -19m) 1–0.

Completely different in character, scale and scope is the 7-man Chess EGT generation programme at the M. V. Lomonosov Moscow State University. The MVL team (2012) are principally using a T-Platform super-computer, currently 22nd on the 'Top 500' list (HPC, 2012), also named LOMONOSOV in honour of the outstanding 18th century Russian polymath. This has 40,000 64-bit Intel Xeon cores each with 1.5GB RAM. This initiative pioneers major intra-EGT-computation parallelism and conveniently uses up to 2,048 cores on each of several concurrent EGT-generation tasks. Welcome innovations include partial, 6-way rank-based endgame Pawn-slicing and a depth metric in symmetric, information-retentive plies rather than winner's moves. Computation times for the KQRKQB DTM EGT, 374 seconds (512 cores), 214" (1k cores) and 140" (2k cores) naturally show sublinear speed-up: inter-task parallelism is also used. All sub-7-man and 4+3(p) 'no castling' DTM EGTs have been generated. The current prediction is of 100TB of EGTs by end-2012 with the completion of the 5+2(p) 'no castling' EGTs. WDL and DTC EGTs are also in prospect.

The challenge of ensuring that the EGTs correctly represent chess itself is an important and difficult one (Hurd and Haworth, 2010): EGT-generation errors can be subtle and are certainly infectious (Schaeffer et al., 2003). Although this giant supercomputer is not without its network and disc issues, EGT-verification code, as independent as possible from the EGT-generation code, is not yet available. So further evidence of defensive programming and of EGT correctness will be welcome and no doubt forthcoming.

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