ACM North American Computer Chess Championship

New York Hilton
New York, New York
November 11-14
1990

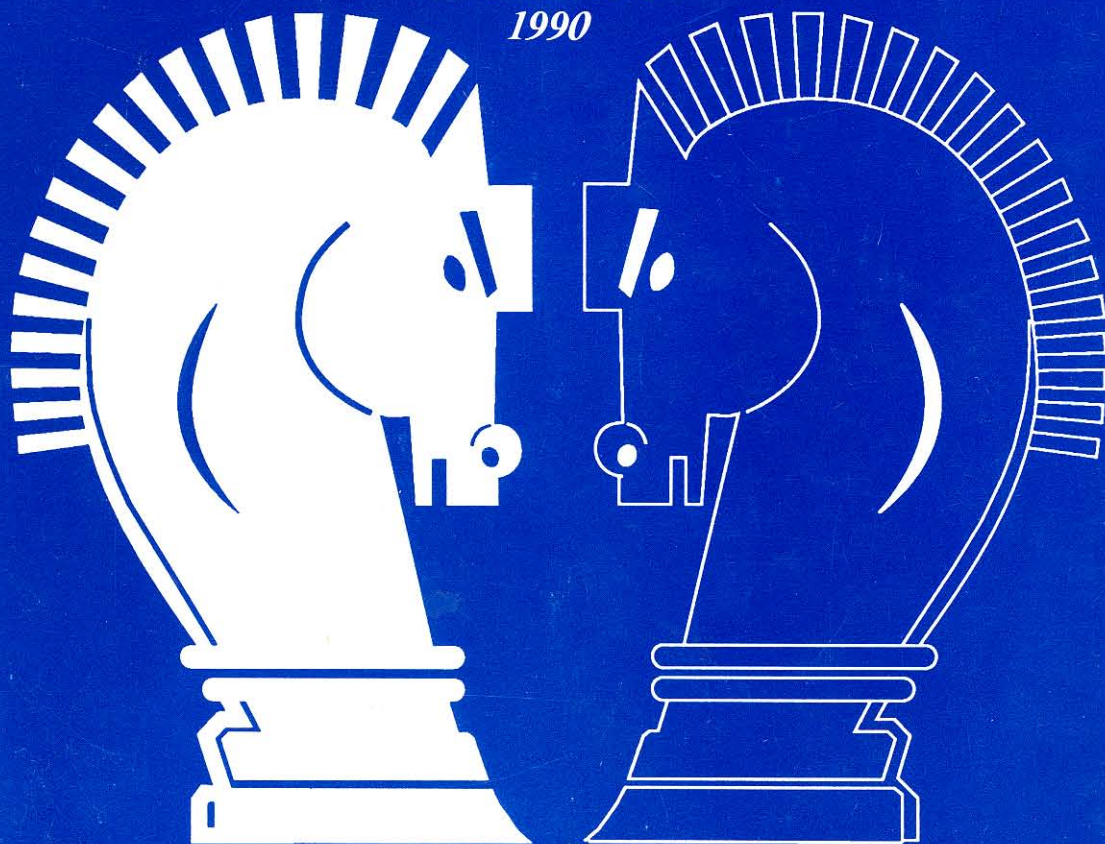ILLUSTRATION: AHLGRIM/STONE

The 21st ACM North American Computer Chess Championship

New York, New York
November 11-14, 1990
A Special Event at the Supercomputing '90 Conference

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1970 New York: CHESS 3.0..........1971 Chicago: CHESS 3.0..........1972 Boston: CHESS 3.0...................
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..1976 Houston: CHESS 4.5............1977 Seattle: CHESS 4.6...........1978 Washington: BELLE.................
....1979 Detroit: CHESS 4.9...................1980 Nashville: BELLE.............1981 Los Angeles: BELLE........
..1982 Dallas: BELLE...........1983 New York: CRAY BLITZ.........1984 San Fransisco: CRAY BLITZ............
..........1985 Denver: HITECH.............1986 Dallas: BELLE.....................1987 Dallas: CHIPTEST-M........
......1988 Orlando: DEEP THOUGHT................1989 Reno: HITECH and DEEP THOUGHT (Tied for 1st Place)

Welcome and Overview

Twenty-one years ago, the ACM hosted the first major chess tournament for computers, the 1st United States Computer Chess Championship, in this very hotel. Six programs competed and a program from Northwestern University called CHESS 3.0 walked away with the title. The supercomputer of the day, an IBM 360/91 located at Columbia University, was used by one of the participants as were a CDC 6400, two IBM 360/65s, a Burroughs B5500 and a Varian 620/i. Several hundred people attended the three round event, watching the computers find incredibly creative ways to lose games of chess. Play was often interrupted in order to resuscitate an ailing computer or terminal. The audience howled with laughter. For the participants, however, it was a learning experience.

For twenty-one years now, the ACM championships have provided an annual showcase of what has been learned. And at each successive ACM championship, progress over the previous year could be observed. In 1975 or so, the programs reached the level of class "A" players. By 1979, they were Experts, by 1983, Masters, and by 1988 or 1989 they attained the level of Grandmasters. There remains one more rung to climb, to reach the level of the world's best human, and the betting is that that is far off. The ultimate question — who wins the game of chess: White or Black? — will have to wait much, much longer to be answered.

The current World Champion and last year's ACM co-champion DEEP THOUGHT — named DEEP THOUGHT/88 for this year's event — will return to test its superiority. HITECH, developed by a group at Carnegie-Mellon University and headed by Hans Berliner, will attempt to improve upon its first-place tie with DEEP THOUGHT. Berliner, it might be pointed out, was here in New York at the first championship and has been at the forefront of progress in the field ever since. MEPHISTO, the world's best commercially-available system, will also try to better last year's performance when they upset DEEP THOUGHT in the final round to finish in a tie for third. Two former world champions, BELLE and CRAY BLITZ, will participate. Ken Thompson, BELLE's captain, has made a number of changes in his program's search heuristics, and will test them out for the first time. BEBE is expected to be a contender and ZARKOV will not be far off.

There are three newcomers to the ACM Championship this year and one deserves special attention. ZERKER, developed at the University of California at Berkeley by James Testa, appears to be about to establish a new norm in the size of tree searched by a program. Testa has indicated that his protege searches 7,000,000 moves per second! While the program has not been subjected to the testing undergone by the more established programs, it nevertheless appears to be a most intimidating newcomer. NOW and NIGHTMARE are also appearing for the first time, but they seem to be no threat to the top competitors.

This championship marks the first time in twenty-one years that the rules of play have been significantly changed. In the past, games were played at a speed requiring each side to play the first forty moves in two hours and an additional twenty moves every hour thereafter. Games frequently lasted as long as seven or eight hours. This year, each side is given two hours to make all its moves, thus guaranteeing that a game will last no more than four hours.

In addition to the regular five round championship, a special Endgame Championship will be held. Positions with several pawns and a Knight, Bishop, or Rook per side will be tested by the

programs in a Swiss-style tournament on Monday and Wednesday mornings. Programs have been subjected to criticism over the years for their weak endgame play and this event may stimulate thinking on this issue.

Three papers on computer chess will be presented on Wednesday morning. Tony Marsland will serve as moderator. Robert Hyatt and Harry Nelson will describe some of the programming techniques used by CRAY BLITZ on the Cray XMP. Lewis Stiller will describe techniques which allow for rapid generation of endgame databases on a Connection Machine. Hans Berliner and Danny Kopec will consider testing strategies for chess programs.

Mike Valvo will serve as Tournament Director of the main event with Danny Kopec serving as Assistant Director. Their roles will be reversed for the Endgame Championship. Both Valvo and Kopec rank among America's leading players. They will make commentary on the games and the audience is invited to ask questions.

We would like to thank Supercomputing '90 for including us on their program. This is the third year that we have been a part of their program. We would also like to thank IBM for their support of this event. Lastly, we would like to thank ACM's SIGARCH who provided the funds for the outstanding prizes.

We wish all the competitors the best of luck. For the audience, we point out that those commenting on the games sound more and more like weather forecasters every year.

Monty Newborn
Chairman
ACM Computer Chess Committee

Hans Berliner
Tony Marsland
Kathe Spracklen
Ken Thompson
Committee Members

21st ACM North American
Computer Chess Championship

Important Times and Places

1. **Schedule of Rounds** (Nassau Room)

Round 1:	1:00 PM	Sunday	November 11
Round 2:	7:00 PM	Sunday	November 11
Round 3:	1:00 PM	Monday	November 12
Round 4:	1:00 PM	Tuesday	November 13
Round 5:	1:00 PM	Wednesday	November 14

2. **Schedule of Rounds for Endgame Tournament** (Nassau Room)

Round 1:	9:00 AM	Monday	November 12
Round 2:	10:30 AM	Monday	November 12
Round 3:	10:30 AM	Wednesday	November 14

3. **ICCA Meeting:** Monday November 12, 6:00-7:00PM. Place TBA.

4. **ACM Computer Chess Committee Meeting:** Tuesday November 13, 12:00-12:45PM.

5. **ACM Press Conference:** Tuesday November 13, 5:30PM.
   Chair: Ken Thompson.

6. **Presentation of Technical Papers,** Wednesday November 14 at 8:30-10:00 AM.
   Chair: Tony Marsland.

7. **Awards Presentation:** Wednesday November 14, 6:00 PM with WIne and Cheese Party.

   Awards:
   First Place.................................. $4000 and Trophy
   Second Place............................. $2000 and Trophy
   Third Place................................. $1000 and Trophy
   Best Small Computing System.......... $1000 and Trophy
   Trophies to first three finishers of Endgame Tournament

Tournament Director: Mike Valvo   **Assistant Director:** Danny Kopec

Endgame Tournament Director: Danny Kopec   **Assistant Director:** Mike Valvo

Tournament Officials: Monty Newborn, Tony Marsland

Information on Participants
21st ACM NACCC

BEBE   Tony Scherzer and Linda Scherzer, SYS-10 Inc., 2117 Stonington Avenue, Hoffman Estates, Illinois 60195.

BELLE   Ken Thompson, MS2C519, Bell Laboratories, Murray Hill, New Jersey, 07974.

CRAY BLITZ   Robert Hyatt, Harry Nelson, Alburt Gower, c/o RH, Computer and Information Science Department, Campbell Hall, University of Alabama at Birmingham, Birmingham, Alabama, 35294.

DEEP THOUGHT/88   Thomas Anantharaman, Peter Jensen, Murray Campbell, Feng-hsiung Hsu, and Andreas Nowatzyk, c/o FH, IBM T. J. Watson Research Center, P. O. Box 704, Yorktown Heights, New York 10598.

HITECH   Carl Ebeling, Hans Berliner, Gordon Goetsch, Andy Gruss, c/o HB, Department of Computer Science, Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213.

MEPHISTO   Richard Lang, Hegener & Glaser A. G., Arnulf Street #2, 8000 Munich 2, Germany.

NIGHTMARE   Reinhold Gellner, Gaby von Rekowski, Bohnenkampstr. 12, D-4500 Osnabrück, Germany.

NOW   Mark Lefler, 223 Arbor Lane, Bryans Road, Maryland 20616.

ZARKOV   John Stanbeck, 4237 Cape Cod Circle, Ft. Collins, Colorado 80525.

ZERKER   James Testa, 1555 W. Middlefield #1, Mountain View, California, 94043.

Computing System Information
21stACM NACCC

Program, Authors	Computing system, language, etc. (* indicates computer at site)	Book size	Nodes/ sec.	Rating estimate
BEBE Tony Scherzer, Linda Scherzer	SYS-10 Chess Engine, assmbler, special-purpose chess circuitry, 64Kb, 16 bits,10 mips, 3Meg hash table.*	5K	40K	2150
BELLE Ken Thompson	PDP 11/23, C Special-purpose chess hardware (Bell Laboratories)	400K	150K	2250
CRAY BLITZ Robert Hyatt, Harry Nelson, Alburt Gower	Cray XMP 48, Fortran+C+assembler 8 Mw, 64 bits, 105 mips/proc., 4 M hash table, (Lawrence Livermore National Lab.).	60K	80K	2375
DEEP THOUGHT/88 Thomas Anantharaman, Peter Jensen, Murray Campbell, Feng-hsiung Hsu, Andreas Nowatzyk	1 SUN 4 with two special processors, C+microcode, 1 M hash table, (Carnegie-Mellon University).	5K	800K	2551
HITECH Carl Ebeling, Hans Berliner, Gordon Goetsch, Andy Gruss	SUN 4 with special chess hardware, microcode + assembler, 1 M hash table, (Carnegie-Mellon University).	NA	100K	2400
MEPHISTO Richard Lang	68030 Mephisto machine, assmbler 128K ROM, 32bit, 45 mh.,1M hash table.*	60K	10K	2350 FIDE
NIGHTMARE Reinhold Gellner, Gaby von Rekowski	80386, C + assembler, 250K hash table.*	15K (moves)	700	1750
NOW Mark Lefler	80386, Pascal+assembler*	5K (moves)	3K	1950
ZARKOV John Stanbeck	MIPS 6000, C 32 bits, 55 mips, 16K hash table. (HP, Fort Collins, Colorado)	5K	2.5K	2200
ZERKER James Testa	Sun Sparkstation, C, 16 Meg, 32 bits, 12 mips, 100Mb hash table, 200,000 transistor VLSI chess microprocessor.* (University of California, Berkeley)	9K	7000K (moves)	2300

Score Table

Team	Rounds					Total Points	Final Place
	1	2	3	4	5		
1. BEBE							
2. BELLE							
3. CRAY BLITZ							
4. DEEP THOUGHT/88							
5. HITECH							
6. MEPHISTO							
7. NIGHTMARE							
8. NOW							
9. ZARKOV							
10. ZERKER							

Code: ⬜ — Number of points

Number and color of opponent

21st ACM North American
Computer Chess Championship

Endgame Championship

Score Table

Team	Rounds			Total Points	Final Place
	1	**2**	**3**		
1. BEBE					
2. BELLE					
3. CRAY BLITZ					
4. DEEP THOUGHT/88					
5. HITECH					
6. MEPHISTO					
7. NIGHTMARE					
8. NOW					
9. ZARKOV					
10. ZERKER					

→ Number of points

→ Number and color of opponent

21st ACM NACCC
Tournament Rules

1. Each entry is a computing system and one or more human operators. A listing of all chess-related programs running on the system must be available on demand to the TD. Each entry requires at least one full-time operator, preferably one of the programmers. One operator cannot assist with more than one entry.

2. Participants are required to attend an orgaizational meeting at 12 noon on November 11 for the purpose of officially registering for the tournament. Rules will be finalized at that meeting.

3. The tournament is a five round Swiss style tournament. The first and second rounds will be played Sunday November 11 at 1:00 PM and 7:00 PM respectively. The third round is scheduled for Monday, November 12 at 1:00 PM, the fourth round for Tuesday November 13 at 1:00 PM, and the final round for Wednesday November 14 at 1:00 PM.

4. Trophies and prizes will be awarded to the first three finishers. The order of finish will be determined by the total number of points earned. If two or more teams have an equal number of points, they will be considered as tied, and the trophies and prizes divided accordingly. A prize of $4000 will be awarded to the program which finishes the tournament with the most points, $2000 to the second most, and $1000 to the third most. A trophy and $1000 prize will be awarded to the "Best Small Computing System."

5. Unless otherwise specified, rules of play are identical to those of "human" tournament play. If a point is in question, the TD has the right to make the final decision.

6. Games are played at a speed of all moves for each side in two hours.

7. An operator may ask that the TD stop the clock at most twice during the course of a game because of technical difficulties. The clock must be restarted each time after at most 15 minutes. If an operator using a remote computer can clearly establish that his problems are not in his own computing system but in the communication network, the TD can permit additional time-outs.

8. If a program experiences technical difficulties, the operator can ask the TD for permission to restart the program. When restarting a program after a failure of any kind, the operator must reset all parameters to their values at the time the game was interupted. An operator error made when starting a game or in the middle of a game can be corrected only with the approval of the TD.

9. If an operator types in an incorrect move, the TD must be immediately notified. The clock will be stopped. The game must then be backed up to the point where the error occurred. The clock of the side which made the error is left unchanged while the TD will back up the clock of the other side an amount equal to that lost. The TD may back up the clock of the side in error if it would otherwise force that side to lose the game on time, or leave it with less than two minutes per move until the next time control. In this case, the TD will back up the clock of the side in error to give it an average of two minutes per move until the next time control. If no record is available, the TD will assume each move by the side not in error required three minutes. Both sides may adjust

program parameters after such an error with the approval of the TD. The TD may not allow certain parameters to be changed, e.g., the contempt factor.

10. Terminals located at the tournament site must communicate directly with remote computers, i.e., there cannot be any human intermediary at the remote location. In cases where there are communication difficulties with remote computers, the TD can disregard this rule.

11. Each team that uses a terminal must position the terminal on the game table in such a way that the opponent has a good view of it. An operator can only (1) type in moves and (2) respond to request from the computer for clock information. If an operator must type in any other information, it must be approved ahead of time by the TD. (This might happen if there is noise on the communication line and, for example, a CR must be typed to clear the line.) The operator cannot querry the system to see if it alive without permission of the TD.

12. A team must receive the approval of the TD to change from one computing system to another.

13. Each game is officially played on a chess board provided by the Tournament Committee. The official clock is also provided by the Tournament Committee.

14. At the end of each game, each team is required to turn in a game listing to the TD.

Endgame Tournament Rules

The Rules for the Endgame Tournament are the same as those for the main tournament with the exceptions of Rules 2, 3, 4, and 6.

2'. Participants are required to attend an organizational meeting at 8:30AM on Monday November 12th for the purpose of officially registering for the tournament. Rules will be finalized at that meeting.

3'. The tournament is a three round Swiss style tournament. Each match consists of two games with each side having White in one of the games. A match will be scored as 2 points fpr two victories, 1.5 points for one victory and one draw, etc. The first and second rounds will be played Monday November 12 at 9:00 AM and 10:30AM respectively. The third round is scheduled for Wednesday, November 14 at 10:30 AM.

4'. Trophies will be awarded to the first three finishers. The order of finish will be determined by the number of points won. If two or more teams finish with an equal number of points, they will be considered tied.

6'. Games are played at a rate of all moves for each side in ten minutes.

History of Major Tournaments

ACM North American Computer Chess Championships

Year City	Winner	Runner-up
1970 New York	CHESS 3.0; Slate, Atkin, Gorlen, CDC 6400	DALY CHESS PROGRAM; Daly, King, Varian 620/i
1971 Chicago	CHESS 3.5; Slate, Atkin, Gorlen, CDC 6400	TECH; Gillogly, PDP 10
1972 Boston	CHESS 3.6; Slate, Atkin, Gorlen, CDC 6400	OSTRICH; Arnold, Newborn, DG Supernova
1973 Atlanta	CHESS 4.0; Slate, Atkin, Gorlen, CDC 6400	TECH II; Baisley, PDP 10
1974 San Diego	RIBBIT; Hansen, Crook, Parry, Honeywell 6050	CHESS 4.0; Slate, Atkin, CDC 6400
1975 Minneapolis	CHESS 4.4; Slate, Atkin, CDC Cyber 175	TREEFROG; Hansen, Calnek, Crook, Honeywell 6080
1976 Houston	CHESS 4.5; Slate, Atkin, CDC Cyber 176	CHAOS; Swartz, Berman, ALexander Ruben, Toikka, Winograd, Amdahl 470
1977 Seattle	CHESS 4.6; Slate, Atkin, CDC Cyber 176	DUCHESS; Truscott, Wright, Jensen, IBM 370/168
1978 Washington	BELLE; Thompson, Condon, PDP 11/70 with chess hardware	CHESS 4.7; Slate, Atkin, CDC Cyber 176
1979 Detroit	CHESS 4.9; Slate, Atkin, CDC Cyber 176	BELLE; Thompson, Condon, PDP 11/70 with chess hardware
1980 Nashville	BELLE; Thompson, Condon, PDP 11/70 with chess hardware	CHAOS; Alexander, O'Keefe, Swartz, Berman, Amdahl 470
1981 Los Angeles	BELLE; Thompson, Condon, PDP 11/23 with chess hardware	NUCHESS; Blanchard, Slate, CDC Cyber 176
1982 Dallas	BELLE; Thompson, Condon, PDP 11/23 with chess hardware	CRAY BLITZ; Hyatt, Gower, Nelson, Cray 1

1983 Not held as the ACM NACCC that year but as the Fourth World Championship. See World Championships.

| 1984 San Fransisco | CRAY BLITZ; Hyatt, Gower, Nelson, Cray XMP/4 | BEBE; Scherzer, Chess Engine, and FIDELITY EXPERIMENTAL; Sparcklen, Spracklen, Fidelity machine |
| 1985 Denver | HITECH; Ebeling, Berliner, Goetsch, Paley Campbell, Slomer, SUN w/ chess hardware | BEBE; Scherzer, Chess engine |

1986 Dallas	BELLE; Thompson, Condon, PDP 11/23 with chess hardware	LACHEX; Wendroff, Cray X-MP
1987 Dallas	CHIPTEST-M; Anantharaman, Hsu Campbell, SUN 3 with VLSI chess hardware	CRAY BLITZ; Hyatt, Nelson, Gower Cray XMP 4/8
1988 Orlando	DEEP THOUGHT 0.02; Hsu Anatharaman, Browne, Campbell, Nowatzyk, SUN 3 w/ VLSI circuitry	CHESS CHALLENGER EXP; Spracklen, Spracklen, Nelson, Fidelity machine with Motorola 68030 microprocessor
1989 Reno	HITECH*; Ebeling, Berliner, Goetsch, Paley, Campbell, Slomer, SUN w/ chess hardware (* denotes 1st-place tie)	DEEP THOUIGHT*; Hsu, Anantharaman, Browne, Campbell, Nowatzyk, 3 SUN 4s w/ VLSI chess hardware

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World Championships

Year City	Winner	Runner-up
1974 Stockholm	KAISSA; Donskoy, Arlazarov, ICL 4/70	CHESS 4.0; Slate, Atkin, CDC 6600
1977 Toronto	CHESS 4.6; Slate, Atkin, CDC Cyber 176	DUCHESS; Truscott, Wright, Jensen, IBM 370/165
1980 Linz	BELLE; Thompson, Condon, PDP 11/23 with chess circuitry	CHAOS; Alexander, Swartz, Berman O'Keefe, Amdahl 470/V8
1983 New York	CRAY BLITZ; Hyatt, Gower, Nelson, Cray XMP 48	BEBE; Scherzer, Chess engine
1986 Cologne	CRAY BLITZ; Hyatt, Gower, Nelson, Cray XMP	HITECH; Berliner, et al., SUN workstaton with chess circuitry
1989 Edmonton	DEEP THOUGHT; Hsu, Anantharaman Browne, Campbell, Jansen, Nowatzyk, SUN with VLSI chess hardware	BEBE; Scherzer, Scherzer, Chess Engine

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World Microcomputer Championships

Year City	Winner	Runner-up
1980 London	CHESS CHALLENGER	BORIS EXPERIMENTAL
1981 Travemunde	FIDELITY X	CHESS CHAMPION MARK V
1983 Budapest	ELITE A/S	MEPHISTO X
1984 Glasgow	Four way tie: ELITE X, MEPHISTO S/X, PRINCHESS, PSION CHESS	
1985 Amsterdam	MEPHISTO AMSTERDAM I	MEPHISTO AMSTERDAM II
1986 Dallas	MEPHISTO DALLAS 3	FIDELITY "2533"
1987 Rome	MEPHISTO	CYRUS 68K
1988 Almeria	MEPHISTO	FIDELITY
1989 Portoroz	MEPHISTO	FIDELITY

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ACM
North American
Computer Chess
Championship

Monty Newborn, McGill University & Danny Kopec, University of Maine

Despite entering ranked almost a class above the field, a last-round loss forced DEEP THOUGHT to settle for a first-place tie with HITECH at the 20th Annual ACM North American Computer Chess Championship. The five-round Swiss-style tournament was held November 12–15 at Bally's-Reno in conjunction with Supercomputing '89. It marked the twentieth consecutive year that ACM has organized this major chess event. Until 1988, the tournament took place at the Annual ACM Conferences. In 1988 and again this year, however, the event was hosted by the joint ACM SIGARCH/IEEE Computer Society Supercomputing Conference. Ten teams participated in the strongest computer chess tournament in history. Every program was playing at least at the Expert level.

This year's tournament offered $5000 in prizes. HITECH and DEEP THOUGHT's programmers each won $2000 for their first-place tie while MEPHISTO X and BEBE's programmers split the $1000 third-place prize. In addition to the cash prizes, trophies were awarded to the first three finishers. A special trophy was given to MEPHISTO X as the "Best Small Computing System."

A Technical Session chaired by Tony Marsland was held during the championship. The topic of the session was endgame play by computers. Once upon a time computers played the endgame particularly badly, but this is no longer the case. The session considered some of the improvements and some of the problems that remain.

David Levy served as Tournament Director, returning after a layoff of almost a decade. He served as TD for the first time in 1971, continuing into the early 1980s when his own programs began to compete. Levy will take on DEEP THOUGHT in London in a four-game match in December.* In 1978, he won a bet made in 1968 that no computer would defeat him during the following ten years. This time he appears to be the underdog.

Attending the championship as an Honored Guest was Ben Mittman. Mittman was head of Northwestern University's Vogelback Computing Center during the years that Slate, Atkin, and Gorlen's programs dominated the ACM events. Some give him credit for being Northwestern University's greatest and most successful "coach." From 1971 through 1983, Ben also was involved in the organization of the tournaments. From 1977 through 1983, Ben served as the first president of the International Computer Chess Association. He was also the first editor of what is now called the *ICCA Journal,* the main journal for technical papers on computer chess.

This year the championship is scheduled to be a part of Supercomputing '90 in New York City on November 11–14. The 1990 event will see the first major change in the tournament rules. For the last 20 years, the rules have specified that each player is given two hours to make the first 40 moves and an additional hour for each 20 moves thereafter. Games frequently lasted more than six hours. This year, each computer will be required to make all its moves in two hours, thus guaranteeing that no game will last more than four hours. In addition to the main championship, a special endgame tournament will be held testing the programs' abilities in this special part of the game. For the first time at Supercomputing '90, all games will be played during the day beginning at 1:00 p.m.— except for one 7:00 p.m. Sunday evening game on the 11th. The event will be a five-round

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*Levy lost his match to DEEP THOUGHT in four straight games.

Swiss-style tournament. For information contact Professor Monty Newborn, School of Computer Science, McGill University, 3480 University Street, Montreal, Quebec, Canada, H3A 2A7.

▫ *The 1989 Championship* ▫

The first round saw second-seeded CRAY BLITZ and fourth-seeded MEPHISTO X forced to settle for draws with REBEL 89 X and ZARKOV respectively. Top-seeded DEEP THOUGHT found itself in a very bad position against PHOENIX, but turned the tables when the latter failed to press its advantage. The game revealed a castling bug to DEEP THOUGHT's programmers. This bug caused them to avoid castling in games with Kasparov and again against PHOENIX. The bug was corrected before the second round began. If it had not surfaced in this game, it is quite likely that DEEP THOUGHT would have lost to HITECH in the third round. Third-seeded HITECH defeated NOVAG X and BP upset BEBE. The reults of the first round showed how evenly balanced the field was.

With the exception of third-seeded HITECH's defeat of second-seeded CRAY BLITZ, the second round went according to form. DEEP THOUGHT waltzed over BP, MEPHISTO X went down to REBEL 89 X, PHOENIX defeated ZARKOV and BEBE defeated NOVAG X.

DEEP THOUGHT and HITECH remained the only two undefeated teams going into round three, and they were paired to play. In making the pairing Levy decided that colors would be decided by a flip of the coin. Berliner appealed this procedure to the Appeals Committee (Marsland, Mittman, and Newborn); prior to the tournament there had been a discussion of how pairing would be made and colors decided; the Appeals Committee overruled Levy, concluding that HITECH was, in fact, due White. Berliner had a special interest in having HITECH play White. He had seen DEEP THOUGHT lose to Kasparov playing White, and had prepared a large opening book based on the assumption that HITECH's game with DEEP THOUGHT would follow the same line. Kasparov also defeated DEEP THOUGHT playing Black, but DEEP THOUGHT was not as likely to follow that line of play against HITECH. In 1988, Berliner had also prepared a large opening book for its individual encounter with DEEP THOUGHT. When they played, HITECH got to use the specially prepared book, but quickly got into trouble after leaving the book. Exactly the same thing happened this year; DEEP THOUGHT recovered from a shaky opening and defeated HITECH in a wild encounter.

In the other four games in round 3, REBEL 89 X defeated BP, MEPHISTO X defeated CRAY BLITZ, PHOENIX defeated BEBE, and NOVAG X drew with ZARKOV. In round 4, DEEP THOUGHT (3 points) trounced REBEL 89 X (2 1/2 points), HITECH refuted BEBE's early diversions from book play, MEPHISTO X and PHOENIX drew as did ZARKOV and BP, while CRAY BLITZ won its first game of the tournament by defeating NOVAG X. The fifth and final round proved to be the most exciting. Two games finished early: BEBE defeated ZARKOV and NOVAG defeated BP. But DEEP THOUGHT vs. MEPHISTO X, REBEL 89 vs. HITECH and CRAY BLITZ vs. PHOENIX were all long thrilling games. DEEP THOUGHT had played MEPHISTO X in the last round of the 1988 tournament and had barely managed to win. This year, the game had some of the same flavor as the previous year; MEPHISTO X had won the

battle for space in both games. While in 1988, DEEP THOUGHT managed to wiggle out of its confinement, this time it was not able to do so and was defeated on the 64th move. Meanwhile on the next board, HITECH and REBEL 89 X maneuvered for 71 moves before REBEL 89 X threw in the towel, giving HITECH a tie for first place. CRAY BLITZ managed to end the tournament with an even 2 1/2–2 1/2 score.

□ *The Games* □

Three annotated games follow. They are the three most crucial games of the tournament: HITECH vs. CRAY BLITZ (Round 2); HITECH vs. DEEP THOUGHT (Round 3); and MEPHISTO X vs. DEEP THOUGHT (Round 4). Also following is a listing of the moves and overview comments from three other important games: PHOENIX vs. DEEP THOUGHT (Round 1); BEBE vs. HITECH (Round 4); and REBEL 89 X vs. HITECH (Round 5). These six games were played by seven of the ten programs, and should give the reader an excellent feel for their capabilities.

ROUND 1

PHOENIX (WHITE)
vs.
DEEP THOUGHT (BLACK)
English Opening (A21/23 5 Be7)

This first-round battle should have resulted in a major upset as DEEP THOUGHT, uninterested in castling, was in serious trouble throughout much of the game. Only well into the endgame does PHOENIX finally get tripped up by a frisky passed pawn, and by DEEP THOUGHT's ability to carry out deeper searches.

1 c4 e5 2 Nc3 d6 3 Nf3 f5 4 d4 e4 5 Bg5 Be7 6 B:e7 N:e7 7 Nd2 c5 8 Nb3 Qb6 9 e3 Be6 10 Be2 Nd7 11 d5 Bf7 12 f3 e:f3 13 g:f3 Nf6 14 O-O a5 15 Qc2 Nd7 16 Bd3 Bg6 17 Nc1! Ra6? 18 N1e2 Ne5 19 Nf4 N:d3 20 Qa4+ Kf8 21 N:d3 Be8 22 Qc2 Qd8 23 Nf4 Bd7 24 Kh1 Kg8? 25 Rg1 g6 26 Nb5 Qf8 27 Nc7 Ra7 28 Nce6 Qf7 29 Qc3 B:e6 30 N:e6 *(better d:e6)* b5 31 Rg2 *(e4!)* b:c4 32 Q:c4 Ra8 33 Rag1 Qf6 34 Qd3 Kf7 35 e4 Rhb8 36 Qe3 Rb4 37 a3 Rb6 38 Qh6 Rh8 39 Re1 Kg8 40 Qd2 Rb5 41 Nc7 Rb7 42 Ne8 Qd4 43 Q:d4 c:d4 44 N:d6 Rb3 45 e:f5 *(better N:f5)* Re3 46 R:e3 d:e3 47 f:g6 h:g6 48 Nc4 N:d5 49 R:g6+ Kh7 50 Rg1 e2 51 Re1 Nf4 52 b3 Re8 53 Nb2 Rc8 54 Nc4 a4 55 h4 a:b3 56 Nb2 Rc2 Black resigns.

ROUND 2

HITECH (WHITE)
vs.
CRAY BLITZ (BLACK)
Torre Attack (C11/20 8 Nxf6+)

This game has a bit of everything. It starts with a relatively quiet opening, but gains intensity and momentum when White and Black castle on opposite wings. After a careful

central buildup, both sides start to attack their opponent's king. White's attack is more dangerous and faster. The Black king becomes somewhat exposed. However, a number of exchanges ensue and a decisive outcome seems unlikely. HITECH keeps up the pressure against the exposed Black king. This difference in king safety in the king, queen, rook and pawns ending ultimately proves the critical factor in determining White's victory. HITECH's technical display is very fine.

1 d4 Nf6 2 Nf3 e6 3 Bg5
The Torre Attack, named after the great Mexican attacking player of the early 1900s, is quite a comfortable line to play: it allows White to be aggressive and sound with simple developing moves without requiring too much theoretical knowledge.

3...d5 4 Nbd2 Be7 5 B:f6 B:f6 6 e4 d:e4 7 N:e4 Nd7 8 N:f6+
This ends the *Encyclopedia of Chess Openings* main reference for this variation. The identical position can easily be reached from a king's pawn opening, namely the Rubenstein Variation of the French Defense, i.e., 1 e4 e6 2 d4 d5 3 Nc3 d:e4 4 N:e4 Nf6 5 Bg5 Be7 6 B:f6 B:f6 7 Nc3 Nd7 8 N:f6+. Now the reader may wonder how many programs really know this, except for their transposition tables.

8...N:f6 9 Qd2
White has a slight advantage in space and it is clear that White will castle queenside while Black will castle on the kingside. Usually, White's attack is faster and more dangerous.

9...Qd6 10 O-O-O O-O 11 Bc4?!
Not the natural square for this piece. Normal is Bd3.

11...b6 12 Ne5 Bb7 13 f4
Guarding the g-pawn and adding support to the N/e5 while creating the later possibility of f5. Many human players, however, would be eager to sacrifice the g-pawn for open lines or play 13 Rhg1 with g4 to follow.

13...Rad8 14 Rhe1 a6 15 Qe2 b5 16 Bb3
HITECH has played the opening very solidly with little risk involved.

16...Nd5
CRAY BLITZ has also played the opening very solidly and is now very close to equalizing.

17 g3 c5 18 d:c5 Q:c5 19 Qh5!
Renewing White's attack with tactical potential like 20 f5, then if e:f5 21 Q:f5 with 22 N:f7 R:f7 23 B:d5 B:d5 24 R:d5 R:d5 25 Re8+ etc., looming.
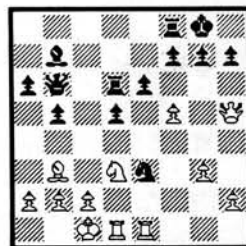
19...Rd6 20 Nd3 Qb6 21 f5! Ne3

Figure 1 Position after Black's 21...Ne3

22 f:e6! f:e6

If 22 . . . N:d1 23 Q:f7 + !! R:f7 24 e:f7 and mates.

23 Nf4!

Continuing the attack with furor.

23 . . . R:d1 +

Now if 23 . . . N:d1 24 N:e6 wins for White.

24 R:d1 Bc8

Sadly forced.

Historical Notes

Since 1970, the ACM North American Computer Chess Championships have served both as a catalyst for progress and as a historical record of this most exciting area of artificial intelligence research. During these 20 years, programs have improved from the level of rank club players to among the best in the world—their USCF-equivalent ratings have gone from approximately 1600 to 2600!

David Slate, Larry Atkin, and Keith Gorlen's program, CHESS 3.0, then 3.2, 3.5, 4.0, 4.5, and finally 4.9 dominated the ACM championships throughout the 1970s. Developed at Northwestern University, their program first ran on a CDC 6400 computer. When CDC's Cyber 170 series computers appeared in the mid-1970s, the authors joined forces with David Cahlander of CDC and transferred their program to the Cyber 175 and shortly thereafter to the even more powerful Cyber 176. RIBBIT, developed at Waterloo University by a team of students—Ron Hanson, Russell Crook, and Jim Parry—surprised everyone when it upset the Northwestern program at ACM '75, but except for that year, versions of Slate, Atkin, and Gorlen's program won all the ACM championships from 1970 through 1977. By 1977, CHESS 4.9 was playing at the level of a chess expert, with a rating of approximately 2100.

Ken Thompson and Joe Condon's BELLE, using special-purpose chess hardware, upset CHESS 4.7 in 1978, but the latter came back in 1979 and won its last ACM championship. 1980–1982 were years during which BELLE was invincible. BELLE was awarded the title of U.S. Chess Master in 1983 by the United States Chess Federation, the first program to receive that distinction. Its USCF rating was just over 2200. Thompson and Condon's special-purpose chess hardware searched approximately 160,000 chess positions per second.

In 1983, however, Robert Hyatt, Harry Nelson and Burt Gower's CRAY BLITZ upset Thompson and Condon's protegé in the Fourth World Championship (held at ACM '83 in New York in place of the usual NACCC). It was, in fact, at that tournament that BELLE was awarded the title of U.S. Chess Master. CRAY BLITZ won again at ACM '84 and seemed to be playing at the 2300 level.

However, HITECH came to ACM '85 in Denver and performed at a new level of strength. Developed at Carnegie-Mellon University by Carl Ebeling, Hans Berliner, Gordon Goetsch, Andy Gruss, Murray Campbell, and Andy Palay, HITECH used special-purpose circuitry designed by Ebeling. Berliner served as head of the team. In 1986, HITECH passed up defending its ACM title, and BELLE came out of retirement to capture first place.

For the last two years, DEEP THOUGHT has led the competition at the ACM championships, and it seemed likely to do so again this year. DEEP THOUGHT was developed at Carnegie-Mellon University by Feng-Hsiung Hsu, Murray Campbell, Thomas Anantharaman, Peter Jansen and Andreas Nowatzyk. It searches approximately 2,000,000 chess positions per second, ten times as many as any other program. It currently uses six special-purpose VLSI chess chips, two per SUN 4 computer, while carrying out a parallel search of the chess tree. DEEP THOUGHT seems to be playing chess at the Grandmaster level, at least in the middlegame and endgame. It played a two-game match against Gary Kasparov in New York just several weeks prior to Reno; Kasparov decisively won both games. The match, held at the New York Academy of Art on October 22, 1989, was organized by Shelby Lyman. Kasparov, prior to the match, gave DEEP THOUGHT credit for a FIDE rating of 2480-2500, the equivalent of at least a 2600 USCF rating.

25 Re1 Nc4 26 Qe2
White's persistent attack on the central files, especially focusing on e6, has been most impressive.

26...g5?!
Such a weakening move rarely survives into the endgame, but CRAY BLITZ hopes for counterplay on the f2 square.

27 Nd3 Qc7 28 Qg4 Rf5 29 h4 h6 30 a3
CRAY BLITZ has defended its disjointed position rather well and now HITECH effectively takes a time out.

Computing System Information

Program, Authors	Computing system, language, etc.	Book size	Nodes/sec.	Rating
BEBE Tony Scherzer, Linda Scherzer	SYS-10 Chess Engine, assembler 64Kb, 16 bits, 10 mips, 256K hash table.*	5K	40K	2175
BP Robert Cullum	Compaq 386/20, C + assembler 1Mb, 32 bits, 5 mips, 32K hash table.*	15K	600	2050
CRAY BLITZ Robert Hyatt, Harry Nelson, Albert Gower	Cray XMP 48, Fortran + C + assembler 8 Mw, 64 bits, 105 mips/proc., 4M hash table, (Lawrence Livermore National Laboratory).	60K	80K	2375
DEEP THOUGHT Thomas Anantharaman, Mike Browne, Murray Campbell, Feng-hsiung Hsu, and Andreas Nowatzyk	3 SUN 4s with two special processors per SUN, C + microcode, .5M hash table per SUN, (Carnegie-Mellon University).	5K	2000K	2551
HITECH Carl Ebeling, Hans Berliner, Gordon Goetsch, Murray Campbell, Andy Gruss, and Andy Palay	SUN 4 with special chess hardware, assembler 1M hash table, (Carnegie-Mellon University).	NA	100K	2413
MEPHISTO X Richard Lang	68030 Mephisto machine, assembler 128k ROM, 32 bit, 45 mh., 1M hash table.*	60K	10K	2350FIDE
NOVAG X David Kittinger	6502 dedicated hardware, assembler 64K, 8 bits, 4 mips.*	10K	4K	2164
REBEL 89X Ed Schroeder	6502 bit slice processor, assembler 64Kb, 8 bits, 18mh.*	12K	2K	2170FIDE
PHOENIX Jonathan Schaeffer	7 SUN 4s, C, 256K hash table/processor, (Carnegie-Mellon University).	20K	10K	2200
ZARKOV John Stanbeck	Hewlett-Packard 9000/835, C 48 Meg, 32 bits, 10 mips, 16K hash table. (HP, Fort Collins, Colorado)	5K	3K	2200

Notes:
(1) Hash table size indicates the number of positions.
(2) Rating estimates are based on USCF points unless otherwise specified.
(3) * denotes computer at site.

30...Kf8 31 h:g5 R:g5 32 Qh4 Q:g3 33 Q:h6+ Ke7 34 Qh8 Bb7 35 Qc3 Bd5 36 Qd4
Until now, Black's defense has held up very well, but there are still weaknesses in the position of the Black king which White can exploit.

36...Qd6 37 Rf1 Ne5 38 N:e5 R:e5 39 Qa7+ Kd8 40 B:d5 R:d5 41 Rh1 Rh5!
If now 42 R:h5 Qf4+ 43.Kb1 (or 43. Kd1 Qf3+) Qf1+ etc., draws.

42 Qa8+ Ke7 43 Rg1 Rg5 44 Rh1 Rh5
It almost appears that Black has secured a draw.

45 Rg1 Rg5 46 Qb7+
HITECH doggedly pursues a win.

46...Kf6 47 Qf3+ Rf5 48 Qa8 Qf4+ 49 Kb1 Qd6 50 Qh8+ Ke7 51 Qh4+ Ke8 52 Qh7 Rf7 53 Rg8+
If this were a game between two human players, White's persistence might almost seem annoying, but...

53...Rf8
If 53...Ke7 54 Qh4+ Kd7 55 Rd8+ wins.

54 Rg7
Finally, White can declare a winning advantage based on the safety of its king and the exposure of the Black king.

54...Qd5 55 b3 Qd4 56 Ka2 Q:g7
Desperation. If...Rf1 57 Qg8+ wins quickly. Otherwise the threat of 57 Rb7 (or a7) was deadly.

57 Q:g7 Black resigns
A very impressive technical performance by HITECH.

ROUND
3

**HITECH (WHITE)
vs.
DEEP THOUGHT (BLACK)
Queen's Gambit Accepted (D/20/06 3...Nc6)**

This game illustrates some of the major problems still confronting computer chess. Here we have a program rated 2413 (HITECH) against a program rated 2551 (DEEP THOUGHT), yet the differences in the performance of each program in the two halves of the game are like night and day.

After 13 Bh3, Berliner's protegé has an overwhelming position, but to whom should the credit or blame go? Surely the credit for White's brilliant opening success must go to Berliner himself, for after 13 moves his program is in a position that any ordinary club-level player would be delighted to have.

Despite DEEP THOUGHT's divergence from its second game against World Champion Gary Kasparov in New York just three weeks earlier, it plays the opening very poorly. However, HITECH, once out of Berliner's book, quickly goes astray to recover the sacrificed pawn, only to thereby lose the thread of the game.

1 d4 d5 2 c4 d:c4 3 e4
The Queen's Gambit Accepted has been a well-known, well-analyzed opening for many years, yet this most aggressive natural move has gone in and out of vogue. When the World Champion plays such a move, however, it automatically seems revitalized. Previously it was generally accepted that 3 e4 allows Black several ways to equalize including 3 . . . c5, 3 . . . Nf6 and the complicated 3 . . . e5. Perhaps Kasparov had expected 3 . . . Nc6, which is also not considered bad.

3 . . . Nc6 4 Nf3 Bg4 5 d5 Ne5 6 Nc3
This simple temporizing move is Kasparov's improvement over the normal 6 Bf4 Ng6 7 Be3, etc. About three weeks earlier, against Kasparov, DEEP THOUGHT played 6 . . . c6, which turned out badly after 7 Bf4 Ng6 8 Be3 c:d5 9 e:d5 Ne5 10 Qd4 N:f3 + 11 g:f3 B:f3 12 Bc4!

6 . . . Nf6
DEEP THOUGHT divulged this "improvement" to Kasparov at an informal dinner gathering at Harvard University, when the World Champion expressed his curiosity about how it might improve over its play from a week earlier. Berliner prepares a wonderful continuation involving a pawn sacrifice for development and central control which virtually leads to a won game.

7 Bf4 Nfd7 8 Qa4!
Black is now compelled to accept the pawn sacrifice, and DEEP THOUGHT, being temporarily two pawns up, cannot be too unhappy.

8 . . . N:f3 + 9 g:f3 B:f3 10 Rg1
White has excellent open lines and lots of space. It is hard for Black to complete the development of its pieces.

10 . . . a6 11 Q:c4 Rc8 12 Rg3 Bh5 13 Bh3 f6
A very poor-looking move, but Black threatens 14 . . . g5 and 15 . . . Ne5 with some semblance of counterplay. HITECH no doubt sees this and gets "worried" with 14 Qb4. White should play 14 Be6 so that on 14 . . . g5 15 Be3 Ne5 16 Qf1 (with the idea 17 Qh3) would be crushing, e.g., 16 . . . Nf3 +? 17 R:f3 B:f3 18 Qh3 or on 16 . . . g4 17 f4 is dynamite.
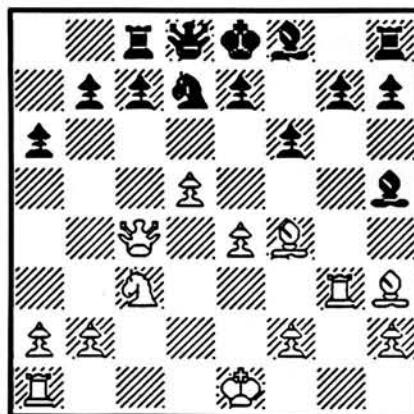

Figure 2 Position after Black's 13 . . . f6

14 Qb4?

If 14...e5 15 d:e5 e.p.B:b4 16 e:d7 + Q:d7 17 B:d7 + K:d7 18 R:g7 + is winning for White, but Black has other ways to proceed, while the White queen is not comfortable on b4.

14...g5 15 Be3 b5 16 Qd4?

Now 16 Qa5 threatening the weak a6 pawn and preparing to attack the backward c7 pawn looks right.

16...c5 17 d:c6

Black may already be better after this. Better was 17 Qd2.

17...R:c6 18 R:g5

Within just a few moves much of White's overwhelming edge has disappeared. Black's principal threats include...Rc4, ...Ne5, and then...b4 in addition to...Rd6 and

Score Table for the 20th ACM NACCC, Reno

Team	Rounds 1	2	3	4	5	Total Points	Final Place
1. HITECH	1 / 9B	2 / 6W	2 / 2W	3 / 4B	4 / 5B	4	1 =
2. DEEP THOUGHT	1 / 7B	2 / 8W	3 / 1B	4 / 5W	4 / 3B	4	1 =
3. MEPHISTO X	1 / 10W	2 / 5B	3 / 6B	4 / 7W	4 / 2W	3	3 =
4. BEBE	1/2 / 8B	1/2 / 9W	1 1/2 / 7B	2 / 1W	3 / 10B	3	3 =
5. REBEL 89 X	1/2 / 6B	1 1/2 / 3W	2 1/2 / 8B	2 1/2 / 2B	2 1/2 / 1W	2 1/2	5 =
6. CRAY BLITZ	1/2 / 5W	1/2 / 1B	1/2 / 3W	1 1/2 / 9B	2 1/2 / 7W	2 1/2	5 =
7. PHOENIX	0 / 2W	1 / 10B	1 / 4W	1 1/2 / 3B	1 1/2 / 6B	1 1/2	7 =
8. BP	1 / 4W	1 / 2B	1 / 5W	1 1/2 / 10B	1 1/2 / 9W	1 1/2	7 =
9. NOVAG X	0 / 1W	0 / 4B	1/2 / 10W	1/2 / 6W	1 1/2 / 8B	1 1/2	7 =
10. ZARKOV	1/2 / 3B	1/2 / 7W	1 / 9B	1 1/2 / 8W	1 1/2 / 4W	1 1/2	7 =
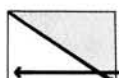
Code: ← Number of points
← Number of opponent and color

then...Ne5; suddenly White's king is caught in the line of fire. It is already hard to suggest a good move for White.

18...f:g5 19 Q:h8 Nf6 20 Bf1
The errors in White's play are revealed. How quickly the tables have turned. Black suddenly threatened to win with 20...R:c3 21 b:c3 Qd3. HITECH's reply was sadly necessary.

20...Qa5 21 Bd4 Qb4 22 B:f6 R:f6
White is in zugzwang (there are no moves which do not lose material or ground). If 23 Rb1 Qd4 wins immediately.

23 Rd1 B:d1 24 a3 Q:b2 25 N:d1 Q:a3 26 Q:h7 Qa5+ 27 Ke2 Rd6 28 Qh5+ Kd8 29 Q:g5 Bh6 30 Qg8+ Kc7 White resigns.

ROUND 4

BEBE (WHITE)
vs.
HITECH (BLACK)
Irregular King's Pawn Opening

Tony Scherzer wanted to avoid HITECH'S opening book and does so quite effectively but this does not affect the outcome of the game.

1 Na3 e5 2 e4 B:a3 3 b:a3 Nf6 4 f3 d5 5 Bb2 Qe7 6 Bd3 Nbd7 7 Qe2 d4 8 f4 c5 9 g3 e:f4 10 g:f4 Nb6 11 e5 Nfd5 12 Qf2 Be6 13 Qg3 O-O-O 14 Ne2 f5 15 Rg1 c4 16 B:d4 c:d3 17 Q:d3 Kb8 18 Rd1 Rd7 19 h3 Rhd8 20 Qf3 Rc7 21 Qd3 Nc4 22 Rg3 Qh4 23 Qf3 Bf7 24 Qf2 Bh5 25 B:a7+ Ka8 26 Rb3 Q:f2+ 27 B:f2 B:e2 28 K:e2 N:f4+ 29 Ke1 Re7 30 d4 N:e5 31 Kf1 g5 32 Re1 Nc6 33 R:e7 N:e7 34 Rg3 Rc8 35 c3 Ned5 36 Be1 h5 37 Bd2 g4 38 h:g4 f:g4 39 Bc1 Re8 40 c4 Ne2 41 Rg2 N:c1 42 c:d5 Rd8 43 Ke1 White resigns.

ROUND 5

MEPHISTO X (WHITE)
vs.
DEEP THOUGHT (BLACK)
Queen's Gambit Accepted (D25/18 8 g4)

The first game which the "mature" DEEP THOUGHT has lost to another program. Appropriately it is the very positional, ever-dangerous MEPHISTO X program which achieves this feat against the tactically ferocious DEEP THOUGHT. The game follows a quiet course whereby Black never quite equalizes from the opening. White enjoys a strong, solid center which it never relinquishes. The reader may recall that MEPHISTO X almost beat DEEP THOUGHT at last year's 19th ACM NACCC in the same round with the same colors.

1 d4 d5 2 c4 d:c4 3 Nf3

MEPHISTO X follows the more solid, traditional lines of the Queen's Gambit Accepted which can also give White a nice edge.

3...Nf6 4 e3 Bg4 5 B:c4 e6 6 h3 Bh5 7 Nc3 Nbd7 8 g4 Bg6 9 Nh4 Be4?!

It is better to "lose" the bishop on g6 and recapture with the h-pawn with play on the half-open h-file.

10 N:e4 N:e4 11 Nf3 Nd6 12 Bb3 Qe7?

A very poor placement of the queen, interfering with the development of the king's bishop. Indicated is 12...c5 with counterplay. As the game continues, Black never gets to play the lever...c5.

13 Bd2 h5 14 Rg1 h:g4 15 h:g4 O-O-O 16 Ba5 b6?

Could Black really be a 2551 player? Why weaken the White squares around the king voluntarily? Indicated was 16...Nb6 or Kb8.

17 Bb4

The ensuing trade of this bishop seems unnecessary, but if 18 Ba3, DEEP THOUGHT may get some counterplay with ...e5. White should just try to play Rc1, Qe2, Bc6 and exploit the weakened white squares.

17...a5 18 B:d6 Q:d6 19 Qc2 Be7 20 O-O-O Rh3 21 Nd2 c6

This pawn remains weak throughout the game and MEPHISTO X quietly exploits this.

22 Rh1 Rdh8 23 R:h3 R:h3 24 Ne4 Qc7 25 Kb1 g5

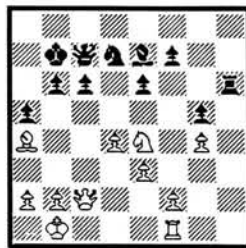Black could not play 25...c5 because of 26 d5.

Figure 3 Position after White's 27 Ba4

26 Rc1 Kb7 27 Ba4

MEPHISTO X plays directly and simply. It is not the world's most tactical program, and over the years it has appeared reluctant to play line-opening pawn thrusts. Here 27 d5!? is one such try, but there could follow 27...e:d5 28 B:d5 Ne5 29 f4 g:f4 30 e:f4 Qd7! and perhaps MEPHISTO X's decision not to play 27 d5!? is correct.

27...Nb8 28 Nd2 Qd7 29 Bb3

Quite a sobering but disappointing move. It cannot be proven here, but intuitively it would seem that 29 Nc4!! must win. There are lines like 29...b5 30 Ne5 Qe8 (30...Qd5? 31 Bb3) 31 B:b5 c:b5 32 Qc7+ with a winning attack. Besides 30 Ne5 there is the threat of 30 Qb3 hitting b6 and a5. It is probable that DEEP THOUGHT saw these possibilities against itself.

29 . . . Na6 30 Qe4 Nb4 31 a3 Nd5 32 Qg2 Rh8 33 Ne4 f6 34 Qg3 Rg8 35 Rh1 f5 36 g:f5 e:f5 37 Qh3

The game has taken another course since the previous note, but White still enjoys a comfortable edge via the solid central pawn chain and control of the h-file which Black once owned.

37 . . . Rf8 38 Nd2 Bf6 39 Qh7 Rf7 40 Qh6 Qe6 41 Qg6 Rg7 42 Rh7 R:h7 43 Q:h7 + Be7 44 Kc1

Despite the foregoing exchange of rooks, White has made inroads into Black's position which is somewhat tangled.

44 . . . Kc7 45 Nf3 Kd8 46 Ne5 g4 47 Qh8 + Kc7 48 Kd2 Kb7 49 N:c6!

Finally MEPHISTO X finds a tactical coup which converts its positional advantage into a material win (a pawn). If now 49 . . . K:c6 50 Qa8 + Kd6 51 Qb8 + Kd7 (or Kc6) 52 Ba4 + and wins.

49 . . . Q:c6 50 Qe5 Nc7 51 Q:e7 Qg2 52 Qh4 f4 53 e:f4 Qe4 54 Q:g4 Q:d4 +

Black's checks quickly run out.

55 Kc1 Q:f2 56 Qf5 Qf3 57 Kc2 Kc6 58 Qe5 Nd5?

This loses quickly, but there was little Black could do to stop the f-pawn in any case.

59 Qe6 + Kc5 60 B:d5 Q:d5 61 Q:d5 + K:d5 62 Kd3 a4 63 Kc3 Kc5 64 f5 Black resigns.

<p style="text-align:center">
R O U N D
5
REBEL 89X (WHITE)
VS.
HITECH (BLACK)
Queen's Pawn Opening
</p>

This Queen's Pawn Opening between REBEL 89 X and HITECH is hard to call exciting, but it was very important in determining first place. In essence, after some early queen maneuvering, Black sets up an impregnable position. After much prying, White gradually misplaces its pieces, especially the bishop on h4 where it gets trapped. HITECH efficiently prepares this bishop's capture. REBEL 89 X gets two pawns for the piece, but they are to no avail. HITECH exemplifies championship-level technique to mop up.

1 d4 d5 2 Nf3 Nf6 3 Bf4 Bf5 4 e3 e6 5 Bd3 B:d3 6 Q:d3 Nbd7 7 Nbd2 c5 8 O-O c4 9 Qe2 Qb6 10 Rab1 Qa5 11 a3 Be7 12 e4 Qa4 13 c3 d:e4 14 N:e4 N:e4 15 Q:e4 Qb5 16 a4 Qa6 17 b4 Nf6 18 Qc2 Nd5 19 Bg3 Rc8 20 Rfe1 O-O 21 Re2 Qb6 22 Ne5 Qd8 23 a5 Qe8 24 Ra1 Qb5 25 h3 a6 26 Rb1 Rfd8 27 f4 Bd6 28 Rf1 Re8 29 Ng4 Re7 30 Bh4 Ree8 31 g3 Qc6 32 Ra1 Qb5 33 Nf2 Qd7 34 Ne4 Bf8 35 Rd1 h6 36 Kh2 Rb8 37 Nc5 Qb5 38 Ra1 Kh8 39 Rf1 Rbc8 40 Rb1 Rc7 41 Ra1 Rcc8 42 Rf1 g6 43 Ne4 Kg7 44 Rfe1 Rc7 45 Rd2 f6 46 Rde2 Rf7 47 Nf2 g5 48 f:g5 f:g5 49 B:g5 h:g5 50 R:e6 R:e6 51 R:e6 Kh8 52 Nd1 Re7 53 Qe2 R:e6 54 Q:e6 Kg7 55 Qe5 + Nf6 56 Qe6 Qe8 57 Q:e8 N:e8 58 Kg2 Nd6 59 Kf3 Kg6 60 Kg4 Ne4 61 h4 Nf6 + 62 Kf3 g4 + 63 Kg2 Kh5 64 Ne3 Ne4 65 N:c4 N:c3 66 Ne3 B:b4 67 d5 Bc5 68 Nc4 N:d5 69 Kf1 Nf6 70 Nd2 Bb4 71 Nb3 Ne4 White resigns. ◨