THE ACM CHESS CHALLENGE

Featuring

World Champion
Garry Kasparov

&

The Premiere of
IBM's Deep Blue

February 10, 11, 13, 14, 16, 17, 1996
All Games Begin at 3:00 p.m.
Pennsylvania Convention Center
Philadelphia, PA

Commentators
for the
ACM Chess Challenge

Anchor Commentators

Yasser Seirawan — International Grandmaster

Maurice Ashley — International Master

Guest Commentators

Danny Kopec — International Master

David Levy — International Master

Ben Mittman — Northwestern University Coach

Dan Heisman — Philadelphia Area Chess Master

Ken Thompson — Creator of BELLE

Arbiter

Mike Valvo — International Master

Prof. T. A. Marsland
Department of Computing Science
University of Alberta
Edmonton, AB Canada T6G 2H1

TABLE OF CONTENTS

WELCOME AND OVERVIEW

The game of chess began in India in the sixth century and spread to Asia, the Middle East, and Europe over the next several hundred years. Today, millions of people play the game, thousands compete in tournaments around the world, and several hundred, the Grandmasters, play the game with artistic mastery and precision. At the summit is Garry Kasparov, the current World Champion, and perhaps the greatest player of all time. Kasparov became World Champion in 1985 when he defeated Anatoly Karpov, and has defended his title successfully five times, most recently last year in New York when he defeated Viswanathan Anand.

At about the same time that Kasparov started playing chess, some of the greatest scientific minds turned their attention to the question of whether their new invention, the electronic computer, could be programmed to play this game with the mastery of the likes of Kasparov. Mikhail Botvinnik, Kasparov's mentor, was world champion at the time and spent most of his later years on chess programming. Claude Shannon, distinguished for his work in information theory and logical design, Alan Turing, renown for his contributions to the theory of computing and for his work during World War II in deciphering German war codes, Norbert Weiner, John McCarthy, and Herb Simon all were intrigued with the question of how to design a chess program that could compete with the best of human players.

Progress was initially slow because of the difficulties programmers faced in working without suitable programming environments. But by 1967 when Kasparov was four years old and played his first chess, matters had improved to where Richard Greenblatt's MAC HACK could compete in a human tournament and receive a "B" rating.

In 1970, the ACM hosted the first major chess tournament in New York. Six programs competed; Northwestern University's CHESS 3.0 captured the title. Its programmers, David Slate, Larry Atkin, and Keith Gorlen continually improved their protege and dominated the field until the late 1970s when Ken Thompson's BELLE raised computer chess to a new level. Thompson designed special-purpose circuitry that permitted BELLE to search trees at a rate of several hundred thousand positions per second. BELLE was awarded the title of Master by the USCF in 1983. But on the very evening that Thompson accepted the title of Master on behalf of his program, Robert Hyatt's CRAY BLITZ surpassed BELLE, winning the 1983 World Computer Chess Championship at the ACM's Annual Conference in New York. Over the remainder of the 1980s, the competition for the top program remained tight, but, by the end of the decade, DEEP THOUGHT and, later, DEEP BLUE emerged as the clear leaders.

DEEP BLUE, the work of Feng-Hsiung Hsu, Murray Campbell, Jerry Brody, and Joe Hoane began at Carnegie Mellon University where Hsu and Campbell were doctoral students. They took their project to IBM in 1989 and began planning their ascension to the top of the chess world. Their plans involved designing special-purpose circuitry for generating moves at high speed and parallelizing their circuitry. In 1993 at the ACM International Computer Chess Championship, a panel of the leading experts generally agreed that programs capable of searching like DEEP BLUE to a depth of 14 half-moves (seven moves for each side) should be able to defeat the world's best human player. Now we will see. The team is under the direction of Dr. Chung-Jen Tan, who has played a major role at IBM in developing their supercomputers. According to Tan, DEEP BLUE will be searching as many as 100 billion chess positions on each move!

For a quarter of a century, the ACM has served as a catalyst for progress in this exciting field. With annual tournaments every year since 1970 (except for 1995) and with technical sessions accompanying these tournaments, progress has been closely chronicled. Ideas were tested, discussed, incorporated, or discarded. The constant support of the ACM has permitted this field to make continual progress. Currently Ken Thompson (Bell Laboratories), Tony Marsland (University of Alberta), Chung-Jen Tan (IBM) and Robert Hyatt (University of Alabama, Birmingham) and I constitute the committee.

In 1977 at the 2nd World Computer Chess Championship in Toronto, the chess programmers formed the International Computer Chess Association, which has organized all of the world championships for computers since that time, and publishes the leading journal on computer chess, the ICCA Journal. This

Philadelphia meeting is sanctioned by the ICCA, and its President Tony Marsland and its Vice-President David Levy are with us this week.

We are fortunate to have some of the leading chess players in the United States assisting us with commentary. Yasser Seirawan and Maurice Ashley will serve as our "Anchor Commentators." Yasser Seirawan has won the U. S. Open and has been one of the top players in the United States for almost two decades. Maurice Ashley, currently an International Master, is approaching the Grandmaster level. Additional commentary will be provided by a number of "Guest Commentators" including International Master Danny Kopec, IM David Levy, Ken Thompson, creator of BELLE, Ben Mittman, former "coach" of the Northwestern chess team, and Dan Heisman, one of the leading players in the Philadelphia area.

Mike Valvo will serve as Arbiter for the event. Mike is an International Master who has directed major computer chess competitions around the world since the early 1980s.

On Saturday morning, February 10, 1996, the Pennsylvania State Chess Federation will host the Philadelphia area juniors to a special tournament, with the winners receiving prizes and admission to the afternoon's first round of games. On Sunday morning, February 11th, Irina Levitina will play a simultaneous exhibition, again, the winners and those that draw will receive prizes and admission to that afternoon's second round of games. Levitina has won the USSR National Championship four times and the US National Champion three times. In addition, she has won the US National Bridge Championship twice. Ira Riddle, President of the PSCF, assisted by Steve Shutt, were instrumental in putting this program together, and I would like to thank them for their efforts.

On Friday morning, February 16, 1996, a Technical Session will survey "Recent Progress in Computer Chess." Three papers will be presented. Two survey search techniques used by chess programs and the third compares the game of Shogi to Chess from the standpoint of artificial intelligence. Tony Marsland will serve as moderator for the session. The authors of the papers come from Canada, Japan, France, and The Netherlands, reflecting the world-wide interest in chess and related games.

We have scheduled a press conference for the media on Friday, February 9, 1996, at 11:30 AM. There will also be other opportunities during the week for credentialed press to meet the participants.

Many people have contributed to the success of this event, and I extend them my thanks. First and foremost is the outstanding support ACM headquarters has given us. Terrie Phoenix, ACM's Director of Public Relations, and the IBM Communications team interfaced with a multitude of media organizations to spread word of the match. Their efforts are reflected in the interest that this event has attracted. Frank Friedman, Chairman of the ACM Steering Week Committee, did a great job in coordinating the organization of this event with the larger ACM Computing Week '96. Working with Kasparov's agent, Andrew Page, although indirectly through David Levy, has been a pleasure — as has working with David in his capacity as ICCA VP. The help from IBM through Dr. Tan was most generous and really appreciated. In particular, IBM's Jennifer Hall and Marcia Holle require a special thanks for their assistance. Lastly, the participants, Kasparov and the DEEP BLUE team, deserve a special thanks. Both showed great flexibility and a spirit of co-operation.

Before ending, I would like to tell a story. Once upon a time when humans were first learning to fly, I imagine every bird sat on its branch with an expression of disbelief. Airplanes evolved, and the birds stared in amazement. Today it seems that they have adjusted quite well to sharing their space with man's sleek metallic marvels — although I don't believe there is a bird anywhere that would admit an airplane really flies! But we've been to the moon and the planets are next.

I wish the participants an excellent match and the audience an enjoyable week watching the world's greatest chess match. You will see the creative power of the human mind at work challenged by a computer that was also developed by the creative power of the human mind!

Monty Newborn
Chairman, ACM Computer Chess Committee

TIMES AND PLACES OF IMPORTANT EVENTS

The Six Games

All games begin at 3:00 PM and will last at most seven hours.

Game 1:	February 10th 3:00PM	Game 2:	February 11th	3:00PM
Game 3:	February 13th 3:00PM	Game 4:	February 14th	3:00PM
Game 5:	February 16th 3:00PM	Game 6:	February 17th	3:00PM

The Pennsylvania State Chess Federation Children's Program

Directed by Ira Riddle, President, Pennsylvania Chess Federation; assisted by Steve Shutt.

Tournament for Children	February 10th	8:30AM – 1:30PM
Simultaneous Exhibition by Irina Levatina	February 11th	8:30AM – 1:30PM

Technical Session on "Advances in Computer Chess"

Tony Marsland will serve as Session Chairman. The papers are:
New Advances in Alpha-Beta Search, by Jonathan Schaeffer and Aske Plaat.
ABDADA Distributed Minimax Search Algorithm, by Jean-Christophe Weil.
A Shogi-Computer Test Set, by Hitoshi Matsubara, Hiroyuki Iida and Jos W. H. M. Uiterwilk.

Presentation of the ICCA Novag Prize for the "Best Contribution to Computer Chess for 1994/95"
February 16th 10:30AM – 12:00Noon

The Arbiter

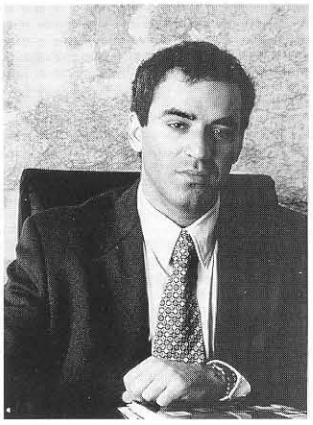
Mike Valvo will serve as arbiter — his fifteen years of experience and knowledge of both chess and computers make him the ideal person for this job.

The Commentators

Yasser Seirawan and Maurice Ashley will serve as our anchor commentators. In addition to their over-the-board strength, they have served in this capacity before, most recently at the Kasparov-Anand World Championship Match in New York last year. They will receive help each day from a number of leading chess players and computer chess experts. Commentators include Ken Thompson, Danny Kopec, Dan Heisman, David Levy, and Ben Mittman.

GARRY KASPAROV – THE IMMOVABLE OBJECT

by David Levy, Vice President ICCA



There is no doubt that Garry Kasparov is the strongest chess player of all time, but the simplicity of the bare statement belies the enormous power and energy of this human whirlwind. By applying all of his energy to his most important games Kasparov can see far more possibilities that his opponents can even dream of. One of his match opponents, Tony Miles, who is a leading English Grandmaster, once described what it is like for a world–class player to encounter Kasparov at the chessboard: "I thought I was just going to play the World Champion – not some 27- eyed monster who sees everything."

Without watching Kasparov in action, studying some of his games, or seeing him analyze with leading Grandmasters, it is impossible to imagine the huge quantity of energy that he emanates. And this energy is not just employed in playing chess, for Garry is also a tireless promoter of the game throughout the world, an international businessman with his own aviation consultancy and, by the way, he also speaks 15 languages. His journey to Philadelphia for this match against DEEP BLUE is prompted by a determination to "defend mankind against the onslaught of the computer." And when Kasparov is determined to succeed, nothing and no one can be considered an irresistible force.

Garry Kimovich Kasparov was born in Baku, the capital of Azerbaijan, on April 13,1963, the son of a Jewish father, who died when Garry was only seven, and an Armenian mother. Garry's talent for chess was spotted at an early age, and he was given many of the training opportunities that the most talented young players in the Soviet Union could expect in those days, almost as their birthright. He was also the star pupil at the chess school founded and run by Mikhail Botvinnik, himself World Chess Champion for more than 12 years (1948 – 1963) and, incidentally, one of the earliest researchers into the complexities of computer chess.

At the age of seventeen Garry won the World Junior Championship, when it was already clear that the ultimate title was destined to be his. But unfortunately for Kasparov, his ascendancy in world chess occurred during the era of the man who was to become his most frequent opponent, Anatoly Karpov. It was in 1975 that Karpov was awarded the World Chess Championship by forfeit, when the mercurial Bobby Fischer was unwilling to agree to the regulations proposed for his title defense against the Russian. And so, without playing a single game in a World Championship match, Karpov was crowned king.

Being a conformist within the Soviet system, Karpov became the favorite of the Kremlin. The Soviet leaders, political as well as chess leaders, regarded Karpov as the ideal ambassador for their country. He was almost invariably successful in tournaments and represented exactly the communist image that was considered patriotic. But when, in 1981, Kasparov shared first place in the Soviet Championship and later scored a stunning string of tournament and match victories, the blue skies of Soviet chess appeared to cloud over for the apparatchiks. Suddenly there was a threat to the perceived dominance of Karpov, and that threat had to be dealt with, one way or another. It would be unthinkable for a progressive such as Kasparov to become World Chess Champion for, as a leading Soviet chess official once said to Garry, "We already have one World Champion. We don't need another one." The child of Glasnost was to be held back at all costs.

In order to retard Kasparov's chess development, steps were taken to prevent him from accepting invitations to certain major tournaments. By depriving him occasionally of an opportunity to gain more competitive experience at the very highest level, the Soviet authorities hoped to make it more difficult for Kasparov to reach Karpov's strength. But with determination and energy Kasparov overcame all other opposition and qualified, in 1984, to play a match with Karpov for the title of World Champion. The match was to be fought until one of the combatants had scored six wins, with draws not counting.

The 1984 World Championship started very badly for Kasparov, who had never previously played a match at this level. Before long he was 5-0 down and seemed to be facing certain defeat. But then the immovable object sum-

moned up the full force that he could muster and drew game after game after game, frustrating Karpov, who by now needed only a single win to retain his title. Eventually Kasparov won the game, followed by some more draws. Then, after 46 games and with the score standing at 5 losses, 1 win and 40 draws, Kasparov struck again, taking games 47 and 48 in quick succession.

Suddenly there was absolute panic in Moscow's political circles. The President of the International Chess Federation, who was presiding over a committee meeting in Dubai at the time, was telephoned by a Soviet government minister and promptly announced to his committee: "I must go to Moscow immediately to save Karpov". And thus, on February 15, 1985, the first Karpov versus Kasparov match was declared ended "without result," thereby preserving Karpov from what most experts expected would be a continued run of losses and the end of his reign as World Champion.

The events of that fateful day exactly 11 years ago have echoed throughout the chess world ever since and acted as the driving force behind Kasparov's reorganization of world chess politics. Kasparov's first task was to win the rematch, held later in 1985, which he did in great style. The 24th and final game of that match is one of the most famous that Garry has ever played – his patient defense with the black pieces was rewarded when his counter-attack crashed through to Karpov's king. Having become the youngest ever World Chess Champion at the age of 22, Kasparov has successfully defended the title no less than five times: 1986 (London and Leningrad); 1987 (Seville); 1990 (New York and Lyons); 1993 (London); and 1995 (New York). In his most recent defense, against Vishy Anand of India, Kasparov demonstrated just how far ahead he is of the other top Grandmasters. Garry, just like any top sportsman, is prone to lapse in the occasional game, but when the chips are down even a player in the world's top ten needs a telescope to see Kasparov, he is so far ahead of the pack.

In chess politics, Kasparov has unleashed his energy and determination to improve the lot of the top professionals. In 1993, together with England's Nigel Short who was then his challenger for the World Championship title, Garry broke away from the International Chess Federation and set up the Professional Chess Association (PCA), which now controls the World Championship. Under the aegis of the PCA Kasparov has been promoting top-level international competition to the considerable benefit of the world's leading Grandmasters. He has instigated a series of Grand Prix events in which 16 top players contest a knockout format over a period of only 4 days for prize funds in the region of $150,000.

Kasparov has long recognized the inevitable advances in computer science and artificial intelligence and their effect on increasing the skill levels of chess-playing programs. Along with most of the world's top players, Garry regularly uses his PC with its enormous database of chess games to help him prepare for meeting specific opponents and to study the latest ideas in the chess openings. But unlike some leading Grandmasters, Kasparov has never been afraid to play against a computer in public, even when the rate of play has made the odds less favorable for him.

To understand the significance of the rate of play (the number of moves each player must make within a specified period) on the relative performances of the opponents, one must realize that fast play is to the advantage of the computer program. This is because when playing very quickly, even the strongest human Grandmasters will sometimes make a shallow oversight which their electronic opponent will seize upon with glee. Chess players of all levels, from club standard up to World Champion, often enjoy playing "5-minute" or "blitz" chess against each other, in which each player has only 5 minutes in which to make all of his moves. (A player who exceeds the 5-minute limit loses the game on time.) It is at this form of chess that computers excel, simply because they do not make shallow oversights.

Garry Kasparov's first public defeat at the hands of a computer program came in March 1994 when he lost a single game to FRITZ at a blitz tournament in Munich, Germany. The program shared first place in the tournament with Kasparov, who convincingly won the play-off. At that form of chess, where the moves must be rattled out like machine-gun bullets, Kasparov might feel happy with a score against the program of 80% or thereabouts, but as the pace of the game slows down so the computer's chances are diminished. At the more sedate rate of 25 minutes per player per game, as in the PCA Grand Prix tournaments,

Kasparov's expected score against a program will normally increase, yet it was at one of these tournaments in London, in August 1994, that the unthinkable happened. Playing against the program CHESS GENIUS in the very first round, Garry was knocked out of the tournament. (He got his revenge against CHESS GENIUS last year, in a 2-game match played on German TV.)

Chess played at high speed is great fun for the players and even more fun for the spectators, who can revel at the sight of the elementary errors sometimes perpetrated by their chess heroes. But the classic rate of play in force for the Kasparov versus DEEP BLUE match is exactly that used in the human World Championship — an average of 3 minutes per move rather than, say, 5 seconds at blitz chess or 20–30 seconds in a Grand Prix game. By taking on DEEP BLUE under these time rules, Kasparov is paying the program the supreme complement. It is as if he is saying to his opponent: "I know that if we play very quickly, then I may have a lot of problems. But I have faith that when the games are at the classic rate of play, I can still demonstrate the superiority of man against the machine."

The very fact that IBM has a program capable of offering a serious challenge to Kasparov under World Championship conditions represents an outstanding achievement in engineering. Irrespective of the score in Philadelphia, Kasparov will now see that the writing is on the wall. Quite possibly, the greatest human chess player the world has ever known will also turn out to be the last human World Chess Champion.

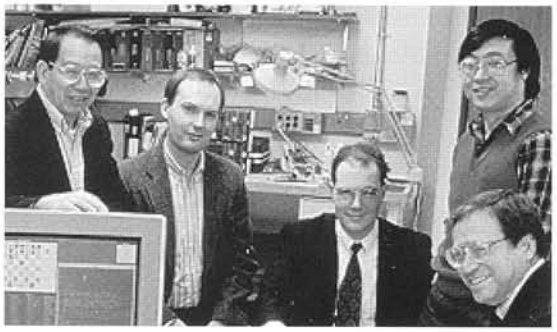
DATA ON KASPAROV

Born:	April 13, 1963 in Baku, Azerbaijan
Home:	Moscow, Russia
Interests:	Politics, computers, literature, history, cinema, sports including football, jogging, swimming, cycling, badminton, tennis

KEY CHESS DATES

Started Playing:	1967
Soviet Junior Champion:	1976
World Junior Champion:	1980
International Grandmaster:	1980
Joint 1st USSR Championship:	1981
World Champion Finalist:	1984
World Champion:	1985-

IBM's DEEP BLUE AND THE DEEP BLUE TEAM



Pictured above (*l - r*): C.J. Tan, Murrary Cambell, Joe Hoane, Jerry Brody, Feng-Hsiung Hsu

IBM Research's DEEP BLUE* project began in 1989 as a way to explore use of parallel processing to solve complex problems. The DEEP BLUE team at IBM, Feng-Hsiung Hsu, Murray Campbell, A. Joseph Hoane Jr., Gershon Brody, and Chung-Jen Tan, saw this complex problem as a classical research challenge; how to develop a chess-playing computer to test the best chess players in the world.

The predecessor of DEEP BLUE, called DEEP THOUGHT, was created in 1988 by a team of Carnegie Mellon graduate students, including Feng-Hsiung Hsu and Murray Campbell. The basic version of DEEP BLUE's chess engine contained 250 chips and two processors on a single circuit board and was capable of analyzing 750,000 positions per second or 10 half moves ahead, for an international performance rating of 2450, which placed it in the lower ranks of the world's Grandmasters. Computers' rating points are determined by a combination of both their speed and knowledge. That same year, DEEP THOUGHT stunned the chess world, becoming the first computer to defeat a Grandmaster in a tournament. However, in 1989, an experimental six-processor version of DEEP THOUGHT, capable of searching more than two million positions per second, played a two-game exhibition match against Garry Kasparov, the reigning world champion, and was beaten. In August 1993, DEEP THOUGHT defeated Judit Polgar, the youngest Grandmaster in history and the strongest female player in the world. In June 1994, the computer again won the title of International Computer Chess Champion.

The successor to DEEP THOUGHT, now entitled DEEP BLUE, was designed to address many of the system limitations of DEEP THOUGHT, specifically in the areas of calculation speed and processing power. The research team aimed to design a machine that would outcalculate DEEP THOUGHT by a factor of at least 1,000 and examine more than one billion moves per second.

Over a period of years, the team designed a chess-specific processor chip that is capable of searching two to three million positions per second, and then the team joined this special-purpose hardware with IBM's RISC System/6000* Scalable POWERparallel Systems* (SP) computer for a further several hundred-fold gain over the original DEEP THOUGHT.

The last iteration of the DEEP BLUE computer is a 32-node IBM RS/6000 SP-2 high performance computer. Each node of the SP employs a single microchannel card containing eight dedicated VLSI chess processors, for a total of 256 processors working in tandem. DEEP BLUE's programming code is developed in C and runs under the AIX operating system. The net result is a scalable, highly parallel system capable of calculating 50 to 100 billion positions in classical chess.

In order to give DEEP BLUE even greater resources from which to draw, the DEEP BLUE team collected an opening game database that provides the system with Grandmaster games played over the last 100 years. Alongside the opening database is an endgame database that is activated when only five chess pieces remain on the board. This database provides billions of endgame scenarios.

ABOUT THE DEEP BLUE TEAM

JERRY BRODY has been working on the DEEP BLUE hardware design for almost five years at the IBM T.J. Watson Research Center in Yorktown Heights, New York. He joined IBM Research in 1978. Since joining IBM, he has worked on the Research Parallel Processor Prototype (RP3); YSE hardware, a logic simulation machine; 801 machine hardware replication, IBM's first RISC processor. He also worked (1978) on

VS-4 hardware, a vector scan system that etched patterns directly on silicone wafers for submicron integrated circuits. He graduated in 1959 from the RCA Institute in New York City, with an A.S. degree in television and RF theory. He also took many undergraduate courses at different schools and colleges.

MURRAY CAMPBELL is a research scientist at the IBM T. J. Watson Research Center in Yorktown Heights. He has been working on the DEEP BLUE computer chess project since joining IBM in 1989.

He received his Ph.D. in 1987 from the Carnegie Mellon University School of Computer Science for work on chunking as an abstract mechanism in solving complex problems. He received an M.Sc. in computing science in 1981 from the University of Alberta for his research in parallel game tree search. He also received his B.Sc. in computing science from the University of Alberta in 1979.

A. JOSEPH HOANE, JR. has been working on the DEEP BLUE software for five years at IBM Research in Yorktown Heights. Previous efforts at IBM Research include work on RP3, a research parallel processor; network simulation for parallel processors to understand the communication overhead; and a custom, imbedded compiler for a database system. From 1984 to 1987 he worked at IBM, East Fishkill, on a custom wiring program for Multilayer Ceramic Modules.

He graduated in 1984 from the University of Illinois with a B.S. in computer science, and received an M.S. in computer science from Columbia University in 1994.

FENG-HSIUNG HSU joined IBM in 1989 as a research staff member at IBM T. J. Watson Research Center, and is currently the architect and the principal designer of the DEEP BLUE chess machine.

He received a Ph.D. in computer science from Carnegie Mellon University in 1989 for architectural work on chess machines and for work on parallel alpha-beta search algorithms. He is best known for his work on the chess machine DEEP THOUGHT, which won the Fredkin Intermediate Prize in 1988 as the first computer to achieve a Grandmaster-level rating, and the Omni Challenge Prize in 1990 by defeating International Master David Levy with the perfect score of 4-0. He is also the recipient of the 1990 Mephisto Award for his doctoral dissertation and also the 1991 ACM Grace Murray Hopper Award for his contributions in architecture and algorithms for chess machines.

His current research interests, besides "building the ultimate chess machine," include algorithm design, parallel software design, high performance system architecture, VLSI design, and special-purpose computing.

CHUNG-JEN TAN is a senior manager of the Parallel System Platforms Department at the IBM T. J. Watson Research Center in Yorktown Heights, New York. In this capacity, his responsibilities include research programs in the areas of architecture development and machine design for highly parallel scalable systems. His department was responsible for the communication subsystem architecture definition and instrumental in the design of the IBM RISC System/6000 Scalable POWERparallel Systems SP. He is also the manager of the IBM DEEP BLUE computer chess project.

He is a member of the ACM, IEEE, and a member of the ACM Computer Chess Committee. He received a B.S.E.E. degree from Seattle University in 1963, and a Ph.D. in engineering science from Columbia University in 1969. He joined IBM T. J. Watson Research Center in 1969 as a Research Staff Member, and has been involved in technical and managerial activities in the areas of design automation, optimizing compilers, and parallel processing.

HISTORY OF ACM COMPUTER CHESS EVENTS

In 1970, the ACM Annual Conference hosted the First United States Computer Chess Championship. The name was changed to the North American Computer Chess Championship in 1975 and to the ACM International Computer Chess Championship in 1991.

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, H'well 6050	CHESS 4.0; Slate, Atkin, CDC 6400
1975	Minneapolis	CHESS 4.4; Slate, Atkin, CDC Cyber 175	TREEFROG; Hansen, Calnek, Crook, H'well 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,IBM370/168
1978	Washington	BELLE; Thompson, Condon, PDP 11/70 w/ 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 w/ chess hardware	CHAOS; Alexander, O'Keefe, Swartz, Berman, Amdahl 470
1981	Los Angeles	BELLE; Thompson, Condon, PDP 11/23 w/ chess hardware	NUCHESS; Blanchard, Slate, CDC Cyber 176
1982	Dallas	BELLE; Thompson, Condon, PDP 11/23 w/ chess hardware	CRAY BLITZ; Hyatt, Gower, Nelson, Cray 1
1983		Held as the Fourth World Championship.	

Year	City	Winner	Runner-up
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, 11/23 w/ 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 CHALLENGEREXP; Spracklen, Spracklen, Nelson; Fidelity machine with Motorola 68030
1989	Reno	HITECH*; Ebeling, Berliner, Goetsch, Paley, Campbell, Slomer, SUN w/ chess hardware (* denotes 1st-place tie)	DEEP THOUGHT*; Hsu,Anantharaman; Browne, Campbell, Nowatzyk, 3 SUN 4s w/ VLSI chess hardware
1990	New York	DEEP THOUGHT/88; Hsu, Anantharaman, Jensen, Campbell, Nowatzyk, SUN 4 with two special VLSI chess circuits	MEPHISTO; Lang, 68030 microprocessor MEPHISTO machine
1991	Albuquerque	DEEP THOUGHT II, Hsu, Campbell, IBM RS/6000 550 + 24 chess processors.	M CHESS; Hirsch, IBM PC Clone/486.
1993	Indianapolis	Socrates II, Dailey, Kaufmann, IBM PC	CRAY BLITZ; Hyatt, Gower, Nelson
1994	Cape May	DEEP ThoughtII, Hsu, Campbell and Hoane IBM RS6000 + 12 chess processors	ZARKOV, John Stanback, HP 735.
1995		Not Held	

THE INTERNATIONAL COMPUTER CHESS ASSOCIATION (ICCA)

by David Levy, Vice President ICCA

The ICCA is the official world governing body for computer chess. It was founded in 1977 to regularize the activities of the computer chess community which, by then, had already spawned more than ten championship tournaments in which all of the participants were computer programs.

The founding President of the ICCA was Ben Mittman, Director of the Computer Center at Northwestern University, Evanston, Illinois. Under Mittman's guidance, a small group of Northwestern students had developed the first significant chess program (an early version won the very first computer chess championship, organized by the ACM at its 1970 annual conference in New York. For a decade, subsequent versions of the Northwestern program completely dominated the world of computer chess, winning eight of the first ten ACM championships as well as the 1977 World Computer Chess Championship.

Mittman provided the support and early leadership that firmly established the ICCA and he developed the ICCA Newsletter which has since grown into a quarterly journal, respected in academic centers and libraries throughout the world for the depth and quality of its news and technical articles on computer chess. Mittman's term ran from 1977 to 1983. He was succeeded by Monty Newborn of McGill University, Montreal, from 1983 to 1986; by International Master David Levy of London, from 1986 to 1992; and since 1992, by Tony Marsland of the University of Alberta, Edmonton.

Within two years of its inception, the ICCA had taken over the organization of the triennial World Computer Chess Championships. By 1980 an annual event had been created for the growing band of microcomputer programmers who had entered the arena. Up to the end of 1995 the ICCA could boast the organization of 13 World Microcomputer Chess Championships, which are usually held every year. In 1995, the latest and most successful of the triennial World Championship's was held in Hong Kong– an event that is open not only to the micros but to all computer systems. The Hong Kong event was the 8th in the series and was contested by 24 of the world's very strongest chess programs from 12 different countries.

The ICCA is proud to have helped set up and to offer its auspices to this "High Noon" encounter between man and machine. The IBM team has long been at the pinnacle of computer chess, with successes that include a stunning tournament victory at Long Beach, California, when an earlier version of the program tied for first place, ahead of a host of top Grandmasters, including the former World Chess Champion Mikhail Tal. In Garry Kasparov the IBM team is challenging a player who is determined to defend mankind against the inexorable advance of technology. A match of tension, excitement, and undoubtedly a few surprises, awaits us in Philadelphia.

For further information on the ICCA and how to join, please contact Tony Marsland, Department of Computing Science, University of Alberta, Edmonton, Alberta T6G 2H1, Canada. e-mail: tony@cs.ualberta.ca

RULES GOVERNING THE MATCH

1 The ICCA — The match is being held under the auspices of ICCA.

2 Number of Games and Schedule of Play

2.1 The Match consists of six games, all of which will be played. A win scores 1 point, a draw scores 0.5 points and a loss scores 0 points. The player who accumulates the most points at the end of the Match shall be declared the winner. The Match will be declared drawn if both players score 3 points.

2.2 All games will commence at 3:00 p.m., local Philadelphia time.

2.3 Game 1 will be played on February 10th, 1996, Game 2 will be played on February 11th, 1996,
Game 3 will be played on February 13th, 1996, Game 4 will be played on February 14th, 1996,
Game 5 will be played on February 16th, 1996, Game 6 will be played on February 17th, 1996.

2.4 Neither player can ask for a postponement of any game. If one player does not play any of the above games, then that player forfeits that game.

3 Rate of Play and the Chess Clock
3.1 The rate of play shall be 40 moves/player in the first two hours of that player's time, then 20 moves/player in the next one hour of that player's time, then all the remaining moves in an additional 30 minutes per player. Time not consumed during one period is carried forward to the next.

3.2 Kasparov has the right of choice of the chess clock to be used during the match, but in the event of there being a faulty clock and if a replacement of the same type of clock is unavailable, then ICCA has the right to substitute a chess clock of a different type.

4 Award Ceremony and Prizes
The prize fund will be US $500,000 which will be split 80% to the winner and 20% to the loser. If the score of the match is 3-3, the prize money will be shared equally between Kasparov and DEEP BLUE.

5 Logistics and Rules of Play
5.1 DEEP BLUE shall be operated by an operator provided for this purpose by IBM.

5.2 When he chooses, the operator shall sit at the chess table facing Kasparov. Although the operator is free to leave the table or move about in a non-distracting manner when it is DEEP BLUE 's turn to move, when it is Kasparov's turn to move, the operator, if he chooses to sit at the chess table, may not leave the table or move in a distracting manner until it becomes DEEP BLUE 's turn to move.

5.3 Provided that it is not Kasparov's turn to move, the operator may be replaced at any time or times during the game at IBM's sole discretion.
5.4 In the event of a technical fault or problem relating in any way to DEEP BLUE the operator

may, provided that it is not Kasparov's turn to move, communicate with any person he chooses in such a manner as to avoid any distraction which may reasonably be regarded as disturbing to Kasparov.

5.5 When it is the program's turn to move, DEEP BLUE 's chess clock must remain running at all times even though there may be a technical fault (excluding power failure, discussed below) which prevents DEEP BLUE 's move from being made in the normal way.

5.6 When Kasparov has made his move, the operator may communicate this move to DEEP BLUE via equipment provided for this purpose, such equipment to operate in a manner which can not reasonably be regarded as disturbing to Kasparov.

5.7 When DEEP BLUE has made its move and communicated its move to the operator, the operator shall make DEEP BLUE 's move on the chess board and then press DEEP BLUE 's side of the chess clock.

5.8 If the operator makes a mistake either in communicating Kasparov's move to DEEP BLUE or in making DEEP BLUE 's move on the chess board, when this mistake is discovered the position immediately before the mistake is set upon the chess board and the players' clock times are adjusted. If it is possible for the arbiter to determine the times that should be showing on the players' clocks then he shall adjust the clocks accordingly, but if this is not possible then each player shall be allotted a time proportional to that indicated by his clock when the error was discovered such that the proportion is the same as the ratio of the number of moves made by that player up to the time the error was made divided by the number of moves made by that player up to the time the error was discovered.

5.9 Kasparov and the operator shall both keep a written record of the moves of the game at least up to move 60, after which it is optional for each of them to do as he wishes. DEEP BLUE's operator will provide the arbiter a computer printout of the game within one hour of the completion of each game.

5.10 When DEEP BLUE is on the move, the operator may tell DEEP BLUE the time remaining on either or both sides of the chess clock provided that the computer initiates the request for such information.

5.11 If, during play, DEEP BLUE is unable to perform in the expected manner, for example being unable to accept a legal move, then the operator may set up in the computer the current board position and status along with the clock times of both players and any other information required by the program, but all such work is permitted only while it is not Kasparov's turn to move.

5.12 At any time during play IBM may replace any or all of the computer hardware and/or software being used to play the games provided that any such work carried out in the playing hall is carried out only when it is not Kasparov's turn to move.

5.13 The operator may offer a draw, accept a draw or resign on behalf of DEEP BLUE. This may be done with or without consulting DEEP BLUE.
5.14 During the opening ceremony, Kasparov will draw lots to determine his color in the first game of the match and thereafter the colors will alternate.

5.15 In all matters concerning the laws of chess and their interpretation, including those matters referred to in clauses 1.5.1 to 1.5.14 inclusive, the decision of the arbiter shall be final.

6 The Arbiter

The arbiter is Mike Valvo. If he is unwell or unable to officiate for any reason then the ICCA may at its sole discretion appoint a replacement arbiter but shall, if practical, consult with the players or their representatives over the choice of replacement arbiter.

7 The Official Rules

The rules presented here are a condensation of the official rules in the contract drawn between Kasparov and IBM and only are meant to be a guide for the audience.

SCORECARD

Round_____ White:_____ Black:_____

White	Black	White	Black	White	Black
1		26		51	
2		27		52	
3		28		53	
4		29		54	
5		30		55	
6		31		56	
7		32		57	
8		33		58	
9		34		59	
10		35		60	
11		36		61	
12		37		62	
13		38		63	
14		39		64	
15		40		65	
16		41		66	
17		42		67	
18		43		68	
19		44		69	
20		45		70	
21		46		71	
22		47		72	
23		48		73	
24		49		74	
25		50		75	