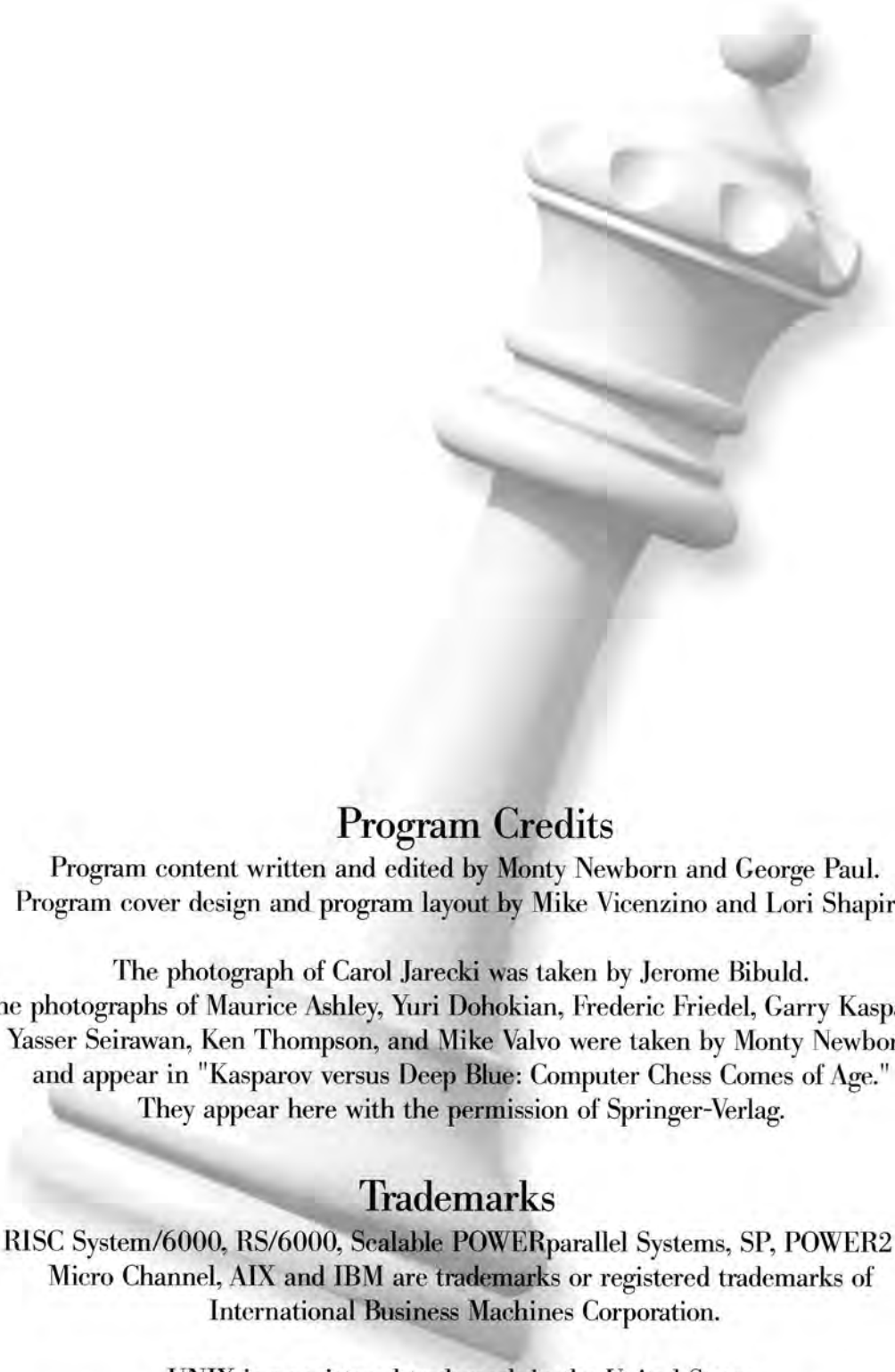
may 3 - 11, 1997

IBM

KASPAROV VS DEEP BLUE

the rematch

under the auspices of the ACM



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Welcome

Greetings!

On behalf of IBM, I would like to welcome you to the IBM Kasparov vs. Deep Blue Rematch. Whether you're with us in New York City or participating in the match via the Internet, we're glad you've joined us for this historic event. We're anticipating a very exciting match.

We at IBM are quite proud of Deep Blue and the team of research scientists who have created it. They are among the hundreds of IBM researchers who work everyday on building, inventing and discovering new technologies which improve our lives and help define the future of computing.

So why has IBM built a machine that plays chess? The applications of the technology we are using in this experiment go far beyond a game. The RS/6000 SP system, the technology underneath Deep Blue, is being used everyday to run businesses, perform technical analysis and conduct scientific experiments. By emulating the Deep Blue architecture--boosting the power of the SP with specialized processors and software knowledge -- we have plans to apply this awesome power to a variety of disciplines, and expect to see amazing results. By introducing the Deep Blue technology to pharmaceutical drug design, financial risk assessment and decision support problems, for example, we hope to realize faster drug development, stronger economic forecasting and smarter decision making. The possibilities are virtually endless.

There has been much discussion in both public and private forums regarding the significance of this match. Are machines taking over mankind? Have we unleashed a monster? Is Garry Kasparov defending the human race?

We at IBM are very pleased that our experiment has caused such a stir. To us, Deep Blue represents innovation leadership and the unlimited promise of technology. It is not simply man vs. machine, but man and machine striving together to reach new heights -- and reaching them. Welcome to the future.

Sincerely,

Paul M. Horn
Senior Vice President,
Research

Acknowledgements

IBM and ACM would like to express their appreciation to the following companies and individuals that have assisted in making this event possible:

AmPro Corporation which provided the auditorium projection equipment and the rear screen projection video systems used in the press room and customer hosting center.

Compunetix, Inc. which manufactured the Micro Channel boards for the chess-specific accelerator chips utilized in Deep Blue.

The Equitable Production Company for the assistance provided in setting up the extensive infrastructure for the event.

Master's International Inc., agents for Garry Kasparov, who worked closely with us to arrange the match.

ParkerVision, Inc. which provided the robotic camera used in the game room to provide overhead views of the chess board.

The United States Chess Federation for working with schools around the area to provide them access to the event.

VLSI Technology, Inc. which manufactured for IBM the chess-specific accelerator chips used in Deep Blue.

Lastly, we appreciate all of the staff from IBM and Technology Solutions, Inc. who worked so diligently to arrange the infrastructure, organization, logistics and publicity which have made the event both possible and successful.

Garry Kasparov

Greatest Champion of All

In 1988, for the first time, chess commentator and Professor of Mathematics of the University of Vancouver, Nathan Divinsky, ran a computer program he had devised to analyze a vast collection of chess statistics, in order to create an *all time* ranking of chess players throughout the history of the game. Garry Kasparov came out on top of the list above Capablanca, Karpov, Lasker, Fischer, Alekhine and all the others, and remains in the same position today. Today Garry, age 34, has been the World Champion for 12 consecutive years.

A child chess prodigy who started playing as a five-year old, Kasparov qualified as an International Chess Master at the age of 16. In 1985, aged just 22, he became the youngest ever World Champion, when he defeated Anatoly Karpov for the title.

Garry has successfully defended his title more times than any other champion in modern times. On each occasion, his famous attacking style of play and incredible depth of knowledge of chess theory has proved too much for his opponent. Garry successfully defended his world title in:

1984 Moscow	vs. Karpov
1985 Moscow	vs. Karpov
1986 London and Leningrad	vs. Karpov
1987 Seville	vs. Karpov
1990 New York and Lyon	vs. Karpov
1993 London	vs. Short
1995 New York	vs. Anand

In search of new horizons and challenges, Kasparov has accepted single-handed challenges from National teams, pioneered matches against computers and, in February 1996, played the IBM computer, Deep Blue. Although Deep Blue was able to analyze an average of 100 million board positions per second, man triumphed over machine.

Today other pursuits occupy much of his time. He has authored four books and is seen as a role model worldwide. Using his popularity in Russia as an agent of democratic change, he was one of the forces behind establishing a democratic Russia.

Kasparov has many business interests of his own. He founded one of the first private shareholder companies in Russia since the Revolution. His group of companies now includes: Moscow Aviation International, which specializes in chartering and selling executive jets; Kasparov Consultancy, which specializes in business, aviation and political consulting; and the Moscovy Group, which handles financial investment and research. The Kasparov Foundation covers his charitable works and the Kasparov International Chess Academy is a natural by-product of his keenness to promote chess in schools. Kasparov assisted in the foundation of the Professional Chess Association, a non-profit organization dedicated to professionalizing and popularizing the game.

Garry was born on April 13, 1963, in Baku, Azerbaijan, and today lives in Moscow. Garry is fluent in Russian and English, and knows basic French and Spanish. His current chess rating is 2780 (ELO). He became the Soviet Junior Champion in 1976, and the World Junior Champion in 1980. In 1980, Garry became an International Grandmaster, and Joint 1st USSR Champion in 1981. In 1984, Garry was a World Champion Finalist, and became World Champion in 1985. Garry's interests include: politics, computers, history, literature, cinema, football, weight training, swimming and tennis.

Garry Kasparov's Team

Yuri Dochoian was born in the Altai region of Russia in 1964. He entered a special Moscow chess school at the age of eleven. After finishing school in 1982, he entered the Moscow Physical Institute. He became a chess Grandmaster in 1988; a brief summary of his tournament record as a Grandmaster follows:

1988	Plovdiv (1st Place)
	Erevan (3rd Place)
	Sochi (3rd Place)
1989	Wijk-ann-Zee (1st Place)
1992	Berlin Summer (1st Place)
1993	Godesburg (1st Place)
	Lublin (1st Place)
	Munster (1st Place)

Since 1994, he has been working as Kasparov's head coach and second. He lives in Moscow and is married.

Frederic A. Friedel studied philosophy, mathematics and linguistics in Hamburg and Oxford. After a brief university career he became a science journalist on German television, specializing in computers and artificial intelligence. He is the editor of a magazine on computer chess and has staged a number of world computer chess championships. He has also written a standard textbook on the subject in German. In 1987, he founded the software company ChessBase which produces a chess database system used by virtually all professional chess players. The company is also responsible for the popular chess playing program Fritz. For many years Friedel has been a close personal friend and advisor of Garry Kasparov and many of the world's leading players. He is married and has two children.

Deep Blue

IBM's Deep Blue

The Evolution of Deep Blue

IBM Research's current Deep Blue™ project began in 1989 as a way to explore the use of parallel processing to solve complex problems. The Deep Blue team at IBM, Feng-Hsiung Hsu, Murray Campbell, A. Joseph Hoane Jr., Jerry 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 I, was created in 1988 by a team of Carnegie-Mellon graduate students, including Feng-Hsiung Hsu and Murray Campbell. The basic version of Deep Thought I's chess engine contained 250 chips and two processors on a single circuit board. It was capable of analyzing 750,000 board positions per second, or 10 half moves (plies) ahead, for an international chess rating of 2450, which placed it in the lower ranks of the world's Grandmasters.

The chess playing strength of computers is determined by a combination of both speed and chess knowledge. That same year, Deep Thought I stunned the chess world, becoming the first computer to defeat a Grandmaster in a tournament.

In 1989, Deep Thought II was built. Deep Thought II was a six-processor version, capable of searching more than 2,000,000 board positions per second. Deep Thought II played a two-game exhibition match against Garry Kasparov, the reigning world champion, and was beaten. In August 1993, Deep Thought II 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.

Work on Deep Blue, the successor to Deep Thought II, began in 1993 targeted to address many of the system limitations in the earlier machines, specifically in the areas of calculation speed and processing power.

The research team aimed to design a machine that would outcalculate Deep Thought II by a factor of at least 1,000 and be capable of analyzing more than one billion board positions per second at peak speed.

Over a period of years, the team designed a chess-specific accelerator chip that is capable of searching two to three million board positions per second. The team then joined this special-purpose hardware with IBM RS/6000™ SP™ computer for a further several hundred-fold gain over the original Deep Thought by utilizing one or more Micro Channel™ boards, each containing up to eight chess-specific accelerator chips, in each processor node of the SP.

In February 1996, Deep Blue set an historic precedent by defeating world chess champion Garry Kasparov in the first game of the ACM Chess Challenge held in Philadelphia. Although Garry Kasparov went on to win the match by defeating Deep Blue by the final score of 4 to 2, Deep Blue became the first chess computer to defeat a Grandmaster in a regulation game held under championship tournament time conditions and rules. The Deep Blue system, which competed in the ACM Chess Challenge, consisted of a 32-node SP supercomputer, with 66 megahertz POWER 2 nodes, in which each node of the SP employed a single Micro Channel card containing 8 chess accelerator chips.

The current Deep Blue system is a 32-node SP supercomputer with newer POWER2 Super Chip (P2SC) nodes operating at 130 megahertz. Each node of the SP employs two Micro Channel cards, each card containing eight dedicated chess accelerators, for a total of 512 chess accelerators working in parallel. Deep Blue's program code is developed in C, and runs under the AIX™ operating system.

The net result is a scalable, highly parallel system capable of analyzing an average of 200,000,000 board positions per second. This is approximately twice the speed of the Deep Blue system which competed with Garry Kasparov in Philadelphia in February 1996.

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 century.

Alongside the opening database is an endgame database that is activated when only five chess pieces remain on the board. This endgame database provides billions of endgame scenarios.

The Deep Blue Team

Chung-Jen Tan is the senior manager of the Application Systems Technologies department at IBM's T. J. Watson Research Center in Yorktown Heights, New York. He is also the manager of the IBM Deep Blue computer chess project. Since 1984, he has been engaged in various activities for developing IBM's research programs in the area of architecture development and machine design for highly parallel, scalable systems. His department was responsible for the architecture definition and instrumental in the design of the early versions of the IBM RISC System/6000 Scalable POWERparallel System (SP). For his research activities in parallel processing systems, he was awarded an IBM Outstanding Technical Achievement Award in 1987, and an IBM Research Outstanding Contribution Award again in 1994. As part of the overall research activities in understanding how to effectively solve large complex problems with parallel processing computing systems, the Deep Blue project was started in his department in 1993. C.J. is a member of the ACM, a senior member of the 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 Doctor of Engineering Science from Columbia University in 1969. He joined the 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.

Feng-Hsiung Hsu joined IBM in 1989 as a research scientist at the IBM's Thomas J. Watson Research Center, and is currently 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 Grandmaster-level rating, and the Omni Challenge Prize in 1990 by defeating International Master David Levy. He is also the recipient of the 1990 Mephisto Award for his doctoral dissertation and the 1991 Grace Murray Hopper Award for his contributions to 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.

Murray Campbell is a research scientist at the IBM's Thomas J. Watson Research Center in Yorktown Heights, New York. He has been working on the Deep Thought and Deep Blue computer chess projects since joining IBM in 1989. Murray was awarded an IBM Outstanding Innovation Award for his contributions to the Deep Blue project. Deep Blue and its predecessor machines have won many awards and distinctions: first computer to defeat a Grandmaster in tournament play-1988, the Fredkin Prize for first Grandmaster-level chess computer, the OMNI Challenge Prize, and first computer to defeat World Chess Champion Garry Kasparov in a regulation game-1996. The machines developed by Murray and his colleagues have also won numerous ACM International and World Computer Chess Championships. Murray received his doctoral degree from the Carnegie-Mellon University School of Computer Science in 1987, for work on chunking as an abstract mechanism in solving complex problems. He received a M.S. in computing science in 1981 from the University of Alberta for his research in parallel game tree search. He also received his B.S. in computing science from the University of Alberta in 1979. Murray has been involved with computer chess research for more than 15 years. He is also an expert chess player as well as a former chess champion of Alberta. He has co-authored a number of papers on computer chess, including a Mephisto-award winning paper on selective search algorithms.

Joseph Hoane, Jr. has been working on the software for Deep Thought and Deep Blue for five years at IBM's Thomas J. Watson Research Center in Yorktown Heights, New York. His previous efforts at IBM Research include work on RP3, a research parallel processor; network simulation for parallel processors to understand communication overhead; and a custom embedded 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.

Jerry Brody has been working on the Deep Thought and Deep Blue hardware systems for almost six 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); the Yorktown Simulation Engine (YSE), a logic simulation machine; and the 801 machine hardware replication, IBM's first RISC processor. Jerry also worked (1978) on VS-4 hardware, a vector scan system that etched patterns directly on silicon 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.

Joel Benjamin, a native New Yorker, was born in Brooklyn, and is 33 years old. Today, Joel resides in Manhattan. In 1977, at the age of 13, Joel became the first person to break Bobby Fischer's record, becoming the youngest U.S. Master to that time. In 1980, he became an International Master. In 1985, Joel graduated from Yale University with a B.A. in history, and he became an International Grandmaster in 1986. In 1987, Joel became the first awardee of the Samford Fellowship as the most promising player under the age of 25 in the United States. Joel, a three-time U.S. Junior Champion, became U.S. Champion in 1987. Joel has participated in a record 15 consecutive U.S. Invitational Championships. He is a five-time U.S. Olympic Chess Team member and two-time medalist. He won two gold medals in the 1993 World Team Championship. Joel is also the three-time defending champion of the Harvard Cup, in which Grandmasters play against chess computers. In his only regulation meeting against World Champion Garry Kasparov at Horgen in 1994, Joel and Garry played to a draw. Joel appeared in the movie, "Searching for Bobby Fischer," and was named to the list of 50 smartest New Yorkers by New York magazine in 1995. Joel worked briefly with the IBM Deep Blue team in their preparation for the match with Garry Kasparov in Philadelphia in February 1996, and has worked with the team coaching Deep Blue in preparation for the rematch since last fall.

The Commentators

Michael Valvo is an International Chess Master and frequent arbiter of computer chess events. He was the arbiter of the 1996 ACM Chess Challenge match between Kasparov and IBM's Deep Blue. Valvo brings unique experience to this event as he often commentated the ACM computer chess tournaments in the 1980s and 1990s. He is co-author of a book on the 1990 Kasparov-Karpov match and technical editor of Bobby Fischer Teaches Chess. He is also known as a blindfold chess exhibitionist and in the early years of computer chess, would take on the whole field that participated in an ACM event blindfolded. In the chess arena, he is probably most well known for his 2-0 record in a postal style match against Deep Blue's predecessor, Deep Thought, in 1989.

Maurice Ashley was born in St. Andrews, Jamaica, attended Brooklyn Tech High School, and went on to receive a B.A. in English at the City College of New York. He learned chess playing his brother at home and studying numerous chess books. (He owns over 300 in his personal library). Ashley sharpened his skills playing in Brooklyn's Prospect Park as well as playing in many local chess tournaments. In 1986, he became a USCF National Master, making the USCF's Top 50 List in June 1993. In November of 1993, he became the first African-American FIDE International Master. He was the Marshall Chess Club Champion in 1993.

Ashley has an extensive record as a chess commentator, having served in that capacity at the 1995 World Chess Championship and at the epic ACM Chess Challenge between Kasparov and IBM's Deep Blue last year. He was a play-by-play announcer for chess sport shows on ESPN and Eurosport. He was an interviewer in Paramount's "Searching for Bobby Fischer."

Ashley coached the Raging Rooks (J.H.S. 43) of Harlem on to win the National Junior High School Championships in 1991 and the Dark Knights (Mott Hall; also from Harlem) on to two National Championships (1994 and 1995) in the Junior Varsity Division of the same event.

Ashley is the designer of a chess tutorial for CD-ROM (Maurice Ashley Teaches Chess) by Simon and Schuster and Davidson, which came out in 1996.

Ashley is currently pursuing the goal of becoming the first African-American Grandmaster in the history of the game of chess.

Yasser Seirawan has been a professional chess player since 1977. As such, he is familiar with every aspect of the chess world. He has earned innumerable awards and titles including: FIDE International Chess Grandmaster (1980), the single highest honor a player can earn, three times Champion of the United States, twice U.S. Junior Champion, 1979-1980 World Junior Champion, seven-time U.S. Olympic Team member and 1989 FIDE Western Hemisphere Rapid Chess Champion. IGM Seirawan has defeated both PCA Champion Garry Kasparov and FIDE Champion Anatoly Karpov in tournament play and twice has been a World Champion Candidate. He is the winner of innumerable tournaments including the 1996 Aegon Human versus Computer Chess Tournament -- the world's most prestigious human versus computer chess event.

Seirawan has been ranked among the world's top 10 players and is usually rated as the top American nationally and internationally. In 1988, he was a founding board member of the Grandmasters Association (GMA). As a writer he has twice earned the American Chess Journalist (CJA) of the Year award (1990 and 1995), the CJA's most prestigious award. He has authored many books including, Play Winning Chess, Winning Chess Tactics, Winning Chess Strategies, Winning Chess Brilliancies (all by Microsoft Press), Five Crowns, Take My Rooks, Alekhine in the Americas, Alekhine in Europe and Asia and No Regrets (all by ICE Publishing). He has received the First Citizen of the State of Washington, and the City of Seattle has honored him with a Yasser Seirawan Day. His contacts in the world of chess encompass all major chess associations and commercial organizations.

Seirawan was also a commentator at the 1996 ACM Chess Challenge between Kasparov and IBM's Deep Blue. He thinks that chess computers are weak!

The Match Officials

The Match Arbiter

Carol Jarecki is a graduate of the University of Pennsylvania's Graduate Hospital with a diploma in anesthesiology. She married Dr. Richard Jarecki and lived in Germany from 1967-74 before returning to the New York area. Carol and Richard have three children. Their son, John, broke a record once set by Bobby Fischer by becoming a Master at age 12 and was the impetus for her involvement in chess. An International Arbiter since 1984 and an active U.S. National Tournament Director, she has been the arbiter for many high-level events including the 1990 Kasparov -Karpov World Championship in Lyon, and the 1995 Kasparov-Anand World Championship in New York, as well as several Chess Olympiads and innumerable other major international and national chess tournaments. She was the Arbiter for the original 1989 match between Kasparov and Deep Blue's predecessor, Deep Thought, upon which the Nova program, "The Chip and the Chess Master," was based. Jarecki co-authored the current USCF Official Rules of Chess, chairs the U.S. Rules and Appeals Commission, contributes to various chess journals and, in 1993, received the USCF's Distinguished Service Award, the highest national recognition. Jarecki studied aviation while living in Germany, flew extensively in Europe and continues to be an avid pilot.

The Appeals Board

Ken Thompson, Mike Valvo and Monty Newborn constitute the Appeals Board. If a player objects to a decision of the Arbiter, an appeal can be made to this Board. Valvo's biography appears in the Commentator's section; Thompson's and Newborn's follow.

Ken Thompson, a Bell Laboratories Senior Research Scientist, has been a leader in the development of chess-playing computers. His program BELLE was world champion from 1980 to 1983; it was the first program awarded the title of U.S. Master by the USCF in 1983. Thompson pioneered in the development of special-purpose chess hardware, laying the foundation for Deep Blue's own VLSI chess circuitry. Thompson also pioneered in the development of end-game databases, and has a database of all five-piece and several six-piece endgames. Thompson is also well-known for creating the UNIX™ operating system at Bell Laboratories in the late 1960s. He received the ACM Turing Award in 1983. He was elected to the National Academy of Engineering in 1980 -- the second youngest person ever so elected -- and the National Academy of Science in 1985.

Monty Newborn has served as chairman of the ACM Computer Chess Committee since the early 1980s. He is a professor of computer science at McGill University. His chess program OSTRICH competed in five world championships dating back to 1974. He served as president of the International Computer Chess Association from 1983 to 1986. He is the author of five books on computer chess, the latest being *Garry Kasparov versus Deep Blue: Computer Chess Comes of Age*. Newborn is an ACM Fellow.

Schedule of Events

The Games

Colors decided	May 1	1:00 P.M. (Opening Press Conference)
Game 1:	May 3	3:00 P.M.
Game 2:	May 4	3:00 P.M.
Game 3:	May 6	3:00 P.M.
Game 4:	May 7	3:00 P.M.
Game 5:	May 10	3:00 P.M.
Game 6:	May 11	3:00 P.M.

The Game Room is on an upper floor of the Equitable Building at 787 Seventh Avenue, New York, NY. This room is not open to the public. Closed-circuit television will bring the games to the Equitable Auditorium, where continuous commentary will be provided by America's leading chess and computer authorities.

The Commentary

Schedule Subject to Change

Game 1 (Saturday, May 3)

2:45 P.M.	Welcome & Introductions	
3:00 P.M.	Game 1 Begins	Commentary by The Commentary Team of Mike Valvo, IM; Yasser Seirawan, IGM; and Maurice Ashley, IM
4:00 P.M.	Deep Blue Overview *	Member, Deep Blue Team
5:00 P.M.	Kasparov's Match Preparation *	Frederic Friedel, Consultant to Garry Kasparov
Conclusion	Game 1 Wrap-up	Garry Kasparov, IGM; and Deep Blue Team

Game 2 (Sunday, May 4)

2:45 P.M.	Welcome	The Commentary Team
3:00 P.M.	Game 2 Begins	
4:00 P.M.	The Deep Blue System *	Member, Deep Blue Team
5:00 P.M.	Impressions of Game	Guest Grandmaster
Conclusion	Game 2 Wrap-up	Garry Kasparov, IGM; and Deep Blue Team

Game 3 (Tuesday, May 6)

2:45 P.M.	Welcome	The Commentary Team
3:00 P.M.	Game 3 Begins	
4:00 P.M.	Coaching Deep Blue *	Joel Benjamin, IGM; member, Deep Blue Team
5:00 P.M.	Impressions of Game	Guest Grandmaster
Conclusion	Game 3 Wrap-up	Garry Kasparov, IGM; and Deep Blue Team

Game 4 (Wednesday, May 7)

2:45 P.M.	Welcome	The Commentary Team
3:00 P.M.	Game 4 Begins	
4:00 P.M.	Significance of Match	Joe DeBlasi, Executive Director, ACM
5:00 P.M.	Impressions of Game	Guest Grandmaster
Conclusion	Game 4 Wrap-up	Garry Kasparov, IGM; and Deep Blue Team

Game 5 (Saturday, May 10)

2:45 P.M.	Welcome	The Commentary Team
3:00 P.M.	Game 5 Begins	
4:00 P.M.	The Deep Blue System *	Member, Deep Blue Team
5:00 P.M.	Impressions of Game	Guest Grandmaster
Conclusion	Game 5 Wrap-up	Garry Kasparov, IGM; and Deep Blue Team

Game 6 (Sunday, May 11)

2:45 P.M.	Welcome	The Commentary Team
3:00 P.M.	Game 6 Begins	
4:00 P.M.	Significance of Match *	IBM Executive
5:00 P.M.	Impressions of Game and the Match	Guest Grandmaster
Conclusion	Awards Ceremony	Charles H. House, President, ACM
	Wrap-up Game 6 and the Match	Garry Kasparov, IGM; and Deep Blue Team

*** Subject to Availability During Game**

The ACM and Computer Chess

In 1970, the ACM, then called the Association for Computing Machinery, hosted the world's first chess computer chess tournament, the First United States Computer Chess Championship, in which the participants were all computers.

The ACM, with approximately 75,000 members, is the senior professional society in the computer field. This three- round event, held at the New York Hilton Hotel, was a great success and ever since then, the ACM has played a leading role in this frontier activity in computer science.

The ACM hosted major championships every year through 1994 at their major conferences. In the early 1980's, the ACM Computer Chess Committee was established to coordinate the organization of the events.

That committee's current members are Tony Marsland of the University of Alberta, Robert Hyatt of the University of Alabama at Birmingham, Hans Berliner of Carnegie-Mellon University, Chung-Jen Tan of IBM Research, Ken Thompson of Bell Laboratories and Monty Newborn of McGill University.

Over the years, computers have been playing increasingly stronger chess. In 1983, Thompson's BELLE was awarded the title of United States Master by the USCF at the ACM-sponsored 4th World Computer Chess Championship, again at the New York Hilton.

Several years later, Grandmasters began to routinely lose games to the top programs. In 1987, CHIPTEST-M won the 18th ACM North American Computer Chess Championship, moving to the front of the world of chess programs.

Later renamed Deep Thought, it continued to dominate the ACM tournaments in the late 1980s, and when its development team of Hsu, Campbell and Anantharaman joined IBM in 1991, the effort took on an increased dimension.

Parallel processing hardware coupled with very fast circuitry moved the new creation, Deep Blue, to higher levels of play than previously seen by computers. In 1994, IBM's Deep Blue dominated ACM's International Computer Chess Championship in Cape May, N.J.; it was at that event that IBM and the ACM first discussed the possibility of the 1996 ACM Computer Chess Challenge between Deep Blue and Garry Kasparov.

After several months of negotiations, the stage was set for six of the most exciting games the chess world has ever seen. Deep Blue drew the initial blood with a dramatic first-round victory, but gave back its point in the second round. The third and fourth rounds were hard-fought drawn games, characterized by an incredible stubbornness and resourcefulness by Deep Blue and an attacking, creative but respectfully cautious Kasparov. In the fifth game, Kasparov offered a draw after making his 23rd move, but the Deep Blue team turned him down. Kasparov managed to turn the tables and forced a resignation on move 47. In the final game, it seemed as though Kasparov had caught on to the mind and style of his opponent, setting up a line-of-play that left him in total command and the winner of the $400,000 winner's prize.

Deep Blue settled for a $100,000 purse.

The purse for this rematch is $1,100,000, the purse is divided $700,000 / $400,000. The ACM's Computer Chess Committee is officiating the match and providing commentary.

We have put together an outstanding team: Carol Jarecki is the Match Arbiter; commentators are Yasser Seirawan, Maurice Ashley and Mike Valvo. The Appeals Board consists of Ken Thompson, Mike Valvo and Monty Newborn.

We will do our best to ensure the smooth running of the Match while providing those in attendance a delightful and stimulating day of commentary, second guessing with leading experts and interviews with members of both teams.

Monty Newborn
Chairman, ACM Computer Chess Committee

Internet Coverage of the Event

Fans from around the world can see real-time coverage of every game by visiting the Kasparov vs. Deep Blue Rematch Website at www.chess.ibm.com.

Beyond the live game coverage is the latest news from the event floor, including interviews, news spots, video and image highlights of the day's events. Users may also join the rematch community, where online discussion topics range from the game at hand, to Kasparov's techniques, the future of chess and computing, and an array of other fascinating topics, hosted by chess experts and aficionados.

The rematch Website also digs deeper, offering an informative look at the players, some classic past matches, and analysis and commentary of previous games. Users can delve into the technology that makes Deep Blue tick, read about the IBM researchers behind Deep Blue and look at some innovative applications of parallel processing technology. Fans will also find here some Kasparov vs. Deep Blue souvenirs, and chess neophytes can take advantage of the online chess glossary and reference to bone up on the game.

Rules of Play

The rate of play shall be 40 moves per player in the first two hours of that player's time (the First Period), then 20 moves per player in the one hour of that player's time (the Second Period), then all the remaining moves in an additional 30 minutes per player (the Final Period). Any time not consumed during the first period is carried forward to the second period and any time not consumed during the second period is carried forward to the final period.

Kasparov has the right of choice of the chess clock to be used during the Match. In the event of there being a faulty clock and if a replacement of the same type of clock is unavailable, the ACM has the right to substitute a chess clock of a different type.

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, irrespective of game postponement or forfeiture.

Deep Blue shall be operated by an operator provided for this purpose by IBM. Provided that it is not Kasparov's turn to move, the operator may be replaced at any time or times during a game or the Match at IBM's discretion.

The operator, at his option, shall sit at the chess table facing Kasparov. Although the operator is free to move about in a non-distracting manner when it is Deep Blue's turn to move, the operator may not leave the table or move in a distracting manner when it is Kasparov's turn to move.

In the event of a technical fault or problem in any way relating 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.

When it is Deep Blue'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 or other conditions which make the game unplayable) which prevents Deep Blue's move from being made in the normal way.

When Kasparov has made his move, the IBM operator must promptly communicate this move to Deep Blue via equipment provided for this purpose, such equipment to operate in a manner which cannot reasonably be regarded as disturbing to Kasparov. In addition, the operator is required to promptly communicate to Deep Blue information about draw offers and draw refusals.

When Deep Blue has chosen 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.

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 the mistake is discovered, the Arbiter shall set-up the pieces on the chess board to their positions immediately before the mistake, and adjust the player's clock times. If it is possible for the Arbiter to determine the times that should be showing on the players' clocks, then the Arbiter shall adjust the clocks accordingly. 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. In addition, Kasparov will receive a recovery bonus of five minutes on his remaining clock time to compensate for the disturbance caused to his concentration.

At any time during the game when it is Deep Blue's turn to move, the operator may indicate to Deep Blue how much time remains on either or both sides of the chess clock.

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.

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 work carried out in the playing hall is only that which is absolutely necessary and is carried out only when it is not Kasparov's turn to move. Any work which can be carried out via the mirror terminal in the Deep Blue control room shall be carried out there. In the case work is required to be performed in the playing hall, Kasparov will receive a recovery bonus of five minutes on his remaining clock time to compensate for the disturbance caused to his concentration by the onsite repairs.

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.

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.

In the manner concerning the laws of chess and their interpretation, including those matters referred to in 1-15, the decision of the Arbiter shall be final.

The Arbiter shall be appointed by the ACM and shall be a person who is acceptable to the ACM, IBM and Kasparov. If the appointed Arbiter is unwell or unable to officiate for any reason, then the ACM may, at its sole discretion, appoint a replacement Arbiter but shall, if practical, consult with the players or their representatives over the choice of the replacement Arbiter.

The ACM shall be responsible for resolving chess rules during the Match and shall be responsible for the appointment of the Arbiter and together with the Arbiter shall have the responsibility to oversee and officiate the six games comprising the Match.

In the event Kasparov or IBM disagree with a decision of the Arbiter, the ACM Appeals Board will be called upon to make a final decision.

The ACM Appeals Board will monitor the playing hall and accessory facilities used by both sides to ensure compliance with Match rules and to ensure that no inappropriate conduct by either side takes place. Any irregularities will be immediately acted upon and reported to IBM and Kasparov. The members of the Appeals Board will be agreeable to both sides.

Scorecard

The IBM Kasparov vs. Deep Blue Rematch

New York, May 3 - 11, 1997

Round: _____ **White:** _____ **Black:** _____ **Opening:** _____

White	Black	White	Black
1._____	_____	21._____	_____
2._____	_____	22._____	_____
3._____	_____	23._____	_____
4._____	_____	24._____	_____
5._____	_____	25._____	_____
6._____	_____	26._____	_____
7._____	_____	27._____	_____
8._____	_____	28._____	_____
9._____	_____	29._____	_____
10._____	_____	30._____	_____
11._____	_____	31._____	_____
12._____	_____	32._____	_____
13._____	_____	33._____	_____
14._____	_____	34._____	_____
15._____	_____	35._____	_____
16._____	_____	36._____	_____
17._____	_____	37._____	_____
18._____	_____	38._____	_____
19._____	_____	39._____	_____
20._____	_____	40._____	_____

White	Black	White	Black
41._____	_____	66._____	_____
42._____	_____	67._____	_____
43._____	_____	68._____	_____
44._____	_____	69._____	_____
45._____	_____	70._____	_____
46._____	_____	71._____	_____
47._____	_____	72._____	_____
48._____	_____	73._____	_____
49._____	_____	74._____	_____
50._____	_____	75._____	_____
51._____	_____	76._____	_____
52._____	_____	77._____	_____
53._____	_____	78._____	_____
54._____	_____	79._____	_____
55._____	_____	80._____	_____
56._____	_____	81._____	_____
57._____	_____	82._____	_____
58._____	_____	83._____	_____
59._____	_____	84._____	_____
60._____	_____	85._____	_____
61._____	_____	86._____	_____
62._____	_____	87._____	_____
63._____	_____	88._____	_____
64._____	_____	89._____	_____
65._____	_____	90._____	_____

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