

# A summary of “Deep Blue” paper

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This paper describes about Deep Blue computer chess system, developed at IBM Research during the mid-1990s. Note that there were two different unnamed versions of it. One that lost to then-reigning World Chess Champion Garry Kasparov in 1996 and the other that won in 1997.

Deep blue relied in different AI algorithms like quiescent search, iterative deepening, transposition table which formed the very basis of a chess-playing system but the feature which stands out deep blue from others is its evaluation function.

The evaluation function is an algorithm that processes the "goodness" of a given chess position. Positions with positive values are good for White, and conversely, positions with negative values are good for Black. If the overall score is negative, for example, this means that Black has the advantage.

Deep Blue's evaluation function stares at four basic chess values: material, position, King safety and tempo. Material is based on the "worth" of particular chess pieces. For eg: if a pawn is valued at 1, then the rook is worth 5 and the Queen is valued at 9. The King, of course, is beyond value because his loss means the loss of the game.

Deep Blue works a system called selective extensions to examine chessboard positions. Selective extensions allow the computer to more efficiently search deeply into critical board arrangements. Instead of attempting to conduct an exhaustive "brute force" search into every possible position, Deep Blue selectively chooses distinct paths to follow, eliminating irrelevant searches in the process. It uses "live" software that can actually generate up to 200,000,000 positions per second when searching for the optimal move.

The latest iteration of the Deep Blue computer is a 32-node IBM RS/6000 SP high-performance computer, which utilizes the new Power Two Super Chip processors (P2SC). Each node of the SP employs a single microchannel card containing 8 dedicated VLSI chess processors, for a total of 256 processors working in tandem. The net result is a scalable, highly parallel system capable of calculating 60 billion moves within three minutes, which is the time allotted to each player's move in classical chess.