Deep Blue

Deep Blue is a computer chess system,developed at IBM research during the mid 1990.It had defeated many Grandmasters proving its capability.The predecessors to the final version of Deep Blue were the ChipTest , Deep Thought and Deep Blue (I).The Deep Blue was composed of 30-node IBM RS/6000 SP computer and 480 single-chip chess search engines.Deep Blue is organized in 3 layers.One of the SP processors work as the master and the rest as workers.Deep Blue relies on many of the ideas developed in earlier chess programs,including quiescence search,iterative deepening,transportation tables and NegaScout.

A new selective search technique was built for Deep thought which formed the basis for the Deep Blue selective search.The search is called 'Dual Credit with Delayed Extensions'. It is depth limited version of alpha-beta using the Negamax formulation.This technique avoids oscillating searches as well as significantly reduces the number of re-searches.There are various types of Credit Generation Mechanisms such as 1) Singular,binary,trinary etc. 2) Absolute Singular 3)Threat,mate threat 4)Influence 5)Domain Dependent.The credit assigned for various conditions is depth dependent,with postitions near the root of the tree generally receiving more credit than positions far from the root.The Deep Blue scores are composed of two 16-bit signed integers.The regular score is one integer and the other is tiebreaker. Another technique introduced in Deep Blue is a pruning mechanism called 'No progress' it strives by saying that 'If a move is good for a player then it should be played earlier rather than later'

A Hardware search takes place in the Chess chips.It carries out fixed-depth null-window search which includes quiescence search.It is very fast but to match with the software search,it is limited to 4-5 ply searches plus quiescence on average.Hardware search is parameterized by various factors like depth of search,endgame rom,various flags to enable singular testing,one ply search etc.Deep Blue uses a Parallel-search algorithm.It uses a centralized control of the parallel search,the control is managed on the SP nodes as chess chips don't have the functionality.Deep Blue permits parallelism under certain conditions only.The early iterations of the Parallel search are carried out in the master nodes but as the search gets deeper it gets allocated among the rest nodes/system.Deep Blue's parallel search is non deterministic.The Deep Blue evaluation function is essentially a sum of feature values.A feature value can be either dynamic or static.The opening book in Deep Blue was created by hand by Grandmaster Joel Benjamin,it consisted about 4000 opening positions which the Deep Blue calculated prior to the game.The Endgame databases in the Deep Blue included all chess positions with five or less move positions.

Deep Blue succeeded not because of any single factor but because of the combinatory work of all its features.Current research suggested that addition of pruning mechanisms could have significantly improved Deep Blue's performance.