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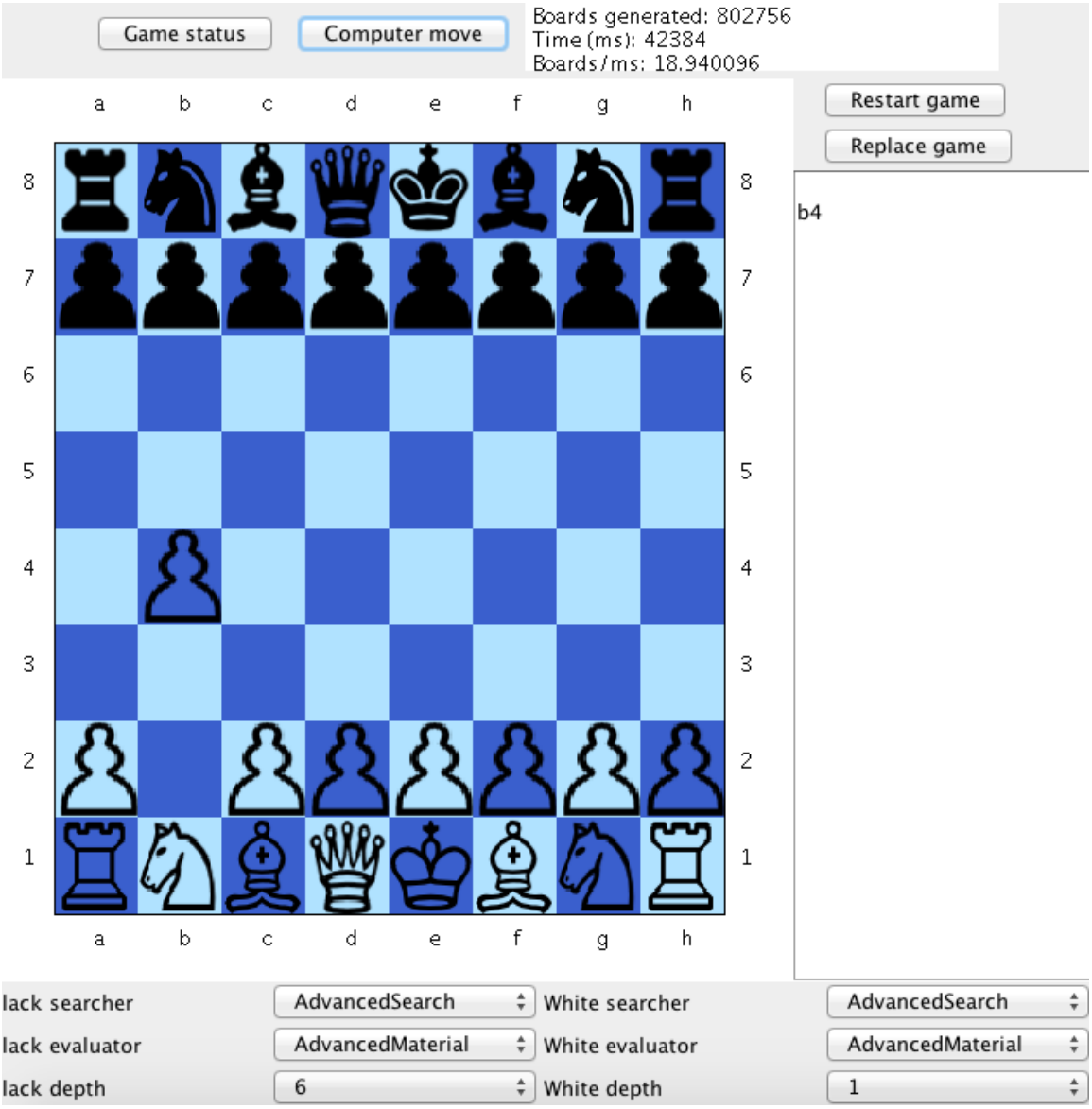
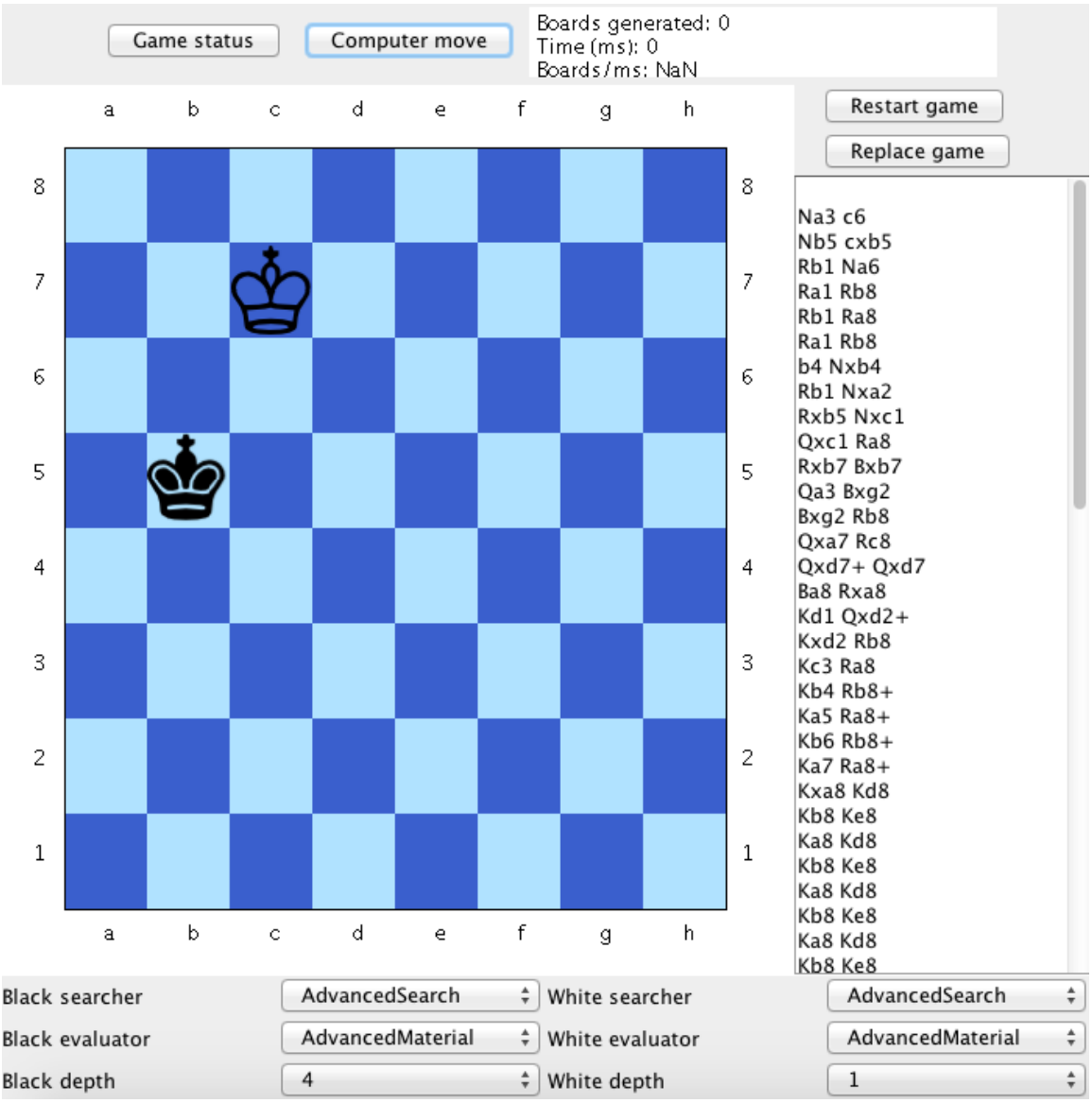
In this project I created Alpha-Beta and an AdvancedSearch that used Alpha-Beta along with a singular extension and a quiescent search extension. In addition to these searches, I also improved upon the BasicMaterials by adding zones of interest, adding pawn promotion incentive, and giving knights higher scores for being in more opportune positions. Overall, the AI performed very well. It was difficult to beat until late game because I had no end-game heuristics that were able to help the AI win.

DATA:

When set to depth 6, Advanced Search does not finish searching in 10 seconds because of the singular extension and quiescent search additions cause it to go further than 6, often much too far to be beneficial in the opening game.



It works exceptionally well at a depth of 4.



The AdvancedSearch takes a little bit longer than Alpha-Beta because of the two extensions, but makes much more informed decisions. After the openings, AdvancedSearch outperforms both MiniMax and Alpha-Beta significantly in play, and greatly outperforms MiniMax in time efficiency.

Alpha Beta first Move Against Advanced

Advanced Search against Alpha Beta

As you can see, even though AdvancedSearch uses Alpha-Beta as its core searcher, it doesn't even use the same opening move as Alpha-Beta by itself.

Alpha Beta Opening Move White. Note the time of 602 ms at depth 4.

MiniMax First Move Time and Node. Note that the move has still not been made after 14129 ms at a depth of 4. Minimax was greatly outperformed by both Alpha-Beta and AdvancedSearch.

AdvancedSearch was able to make decisions based on a greater depth than the other searches, and was able to do so in a timely manner. This led to an incredible foresight for the AI when playing, making it very difficult to trick into making bad moves. However, some odd moves were seen while playing, often made out of nowhere for seemingly no good reason. This could be due to a bug in my code, or maybe the AI thought it had a great set of moves planned way ahead and it just didn't play out. Either way, the AI performed exceptionally well and I am very happy with it.