Two optimizations we used were:

- Hashmap containment of DOM parsed objects

- Batch insert

We use hashmaps instead of a list to reduce the time it takes to retrieve values because now we do not need to iterate through an entire list to retrieve them. We have a hashmap for authors, books, genres, and when we create keypairs for them, we use the hashtables to get the values instantly instead of iterating through a list. Additionally, we also improve runtime because we do not have to run another query after every insert because we can get the values instantly from the hashtable.

We use using batch insert to decrease the time it takes to insert all of the data in the database. Normally, every time you insert a row into the database, you have to make a connection and insert the data to the server for every row. With batch insert, all the insertions are done in one statement to the server so that only one insert statement is executed. Additionally, with the batch inserts, we do not need to reparse the query after every insertion.

By using these optimizations, we were able to significantly improve runtime. Our runtime after our optimizations was 4.23506 seconds to run more than 60,000 queries, shaving off minutes off our runtime without any optimzations.