Explanation of Data Structure Selection

We have used array and hash maps as data structure for TinyDB, our objective is achieving simplicity, effectiveness and being as easy to process as possible. We used a combination of arrays and hash maps for in-memory data manipulation and plain text files for data persistence. For query commands recognition and processing, arrays are obviously our best choice since they give us fast access and simple iterations. Arrays provide fast access to the elements by their index, and this is useful for typical scenarios like iteration over query results or commands that apply on many records.

Whereas hash maps are suitable when it comes to querying user profiles and looking up & managing database metadata. Hash maps provide constant time complexity for search operations, making them ideal for user profile management and metadata storage, where rapid access and updates are necessary.

We created a custom file format to store our data and to ensure that, it easily parsed for accurate result. The custom file format well aligned with specified requirements rather than using JSON or XML. The above use of data structures and file format approach balances performance with simplicity, facilitating quick development and reliable data management. It will be particularly advantageous in future modules as well, such as transaction processing, where quick in-memory operations are required before committing changes to persistent storage.