

ABSTRACT

A TRIE-HASHMAP APPROACH TO AFFIX SEARCH IN AVIATION MANAGEMENT SYSTEM

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19/440457/PA/19087

FL3XX, an aviation management system used by aircraft owners to protect and maintain their planes, faces significant limitations in its search functionality. These limitations are particularly noticeable when handling typos and shorter prefix searches. To address these challenges, this research leverages the dataset from ACAM's FL3XX Dispatch Module to explore trie algorithms, specifically Radix Tries and Hashmap-based Tries.

The primary aim of this research is to enhance the search feature within FL3XX by introducing autocomplete, affix-based keyword searches, and autocorrect capabilities. To evaluate the performance of these trie algorithmic data structures, the study conducts a comprehensive analysis. This includes an assessment of similarity scores between mistyped words and dictionary words, a critical factor in autocorrect accuracy. Furthermore, the evaluation incorporates prefix and suffix scores, which contribute to calculating the overall similarity score between mistyped and dictionary words.

The research results find that the Radix Trie outperforms other models in terms of space and memory consumption, requiring only 2,025 nodes and 6,075 bytes from a 20,000 dataset size. While the Hashmap-based Trie excels in time performance, when searching for the words 'fuel', 'soekarno' and '0800z' could reach as low as 0.000054 to 0.000111 seconds. Furthermore, the Hashmap-based Trie has a better Mean Reciprocal Rank (MRR) score of 0.9984, indicating its suitability for applications where search accuracy is essential.

While these findings contribute valuable insights into optimizing search functionality with time and space efficiency. Future works can be further studied in the exploration of other data structures to consider alternative algorithms such as binary search, hash tables, or suffix arrays. Additionally, hybrid approaches can be investigated to combine the strength of multiple structures, reducing their respective disadvantages, and pushing the boundaries of search efficiency in aviation management applications.

Keywords: Trie, Autocomplete, Autocorrect, Search, Performance.